Type	Quantity	Components
Rhodorseal 5661	Coat	Driveshaft roll pin holes
Loctite FRENBLOC Locking and sealing resin	Coat	Brake caliper mounting bolts
Loctite FRENETANCH Locking and sealing resin	Coat	Crankshaft pulley mounting bolts
MOLYKOTE BR 2	Coat	For wheel centres
Exhaust pipe paste	Coat	For sealing the exhaust

Vehicle type	Engine	Manual gearbox	Automatic transmission	Capacity (cm^3)	Bore (mm)	Stroke (mm)	Ratio
JE0A	F3R	JC5	AD4	1998	82.7	93	9.8/1
JE0E/SE0E	G8T	PK1	-	2188	87	92	23/1
JE0D	Z7X	-	AD8	2963	93	72.7	9.6/1

Engine Workshop Repair Manual or Technical Note to be consulted depending on the type of engine to be repaired.

Engine / Document	Z7X	F3R	G8T TURBO
Mot. Z	X		
Mot. F (E)		X	
Mot. G			X (1)

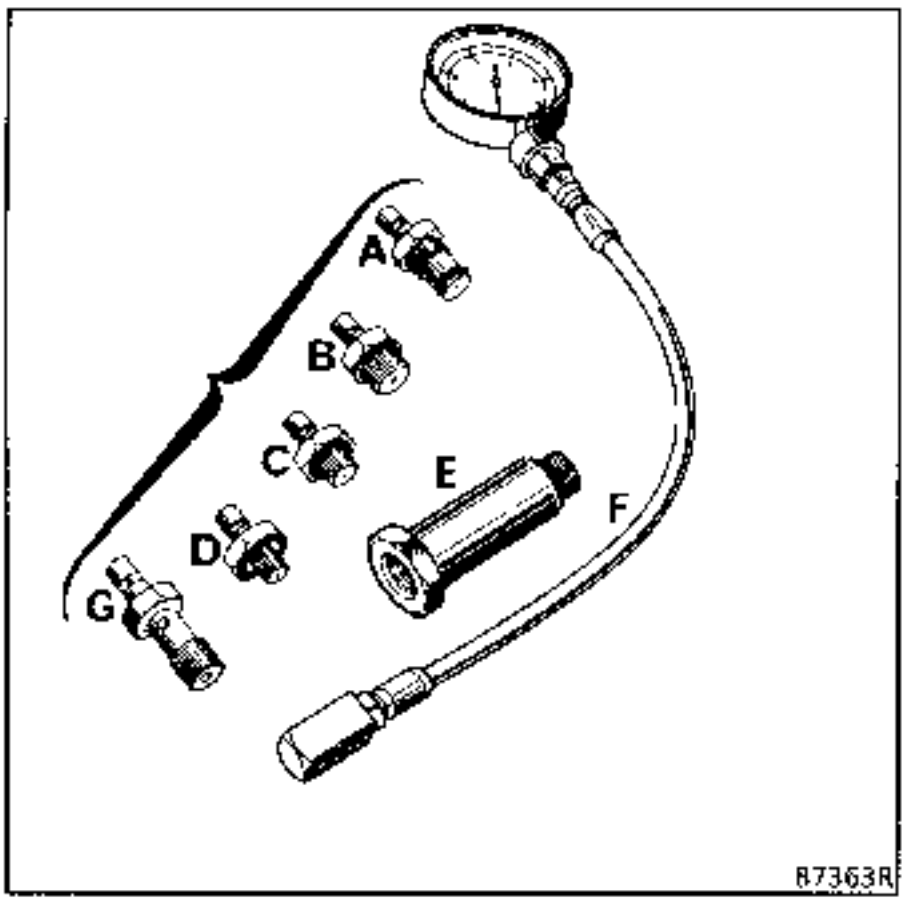
(1) Currently being prepared

CHECKING

SPECIAL TOOLING REQUIRED
Mot. 836 -05 Oil pressure measuring kit

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

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



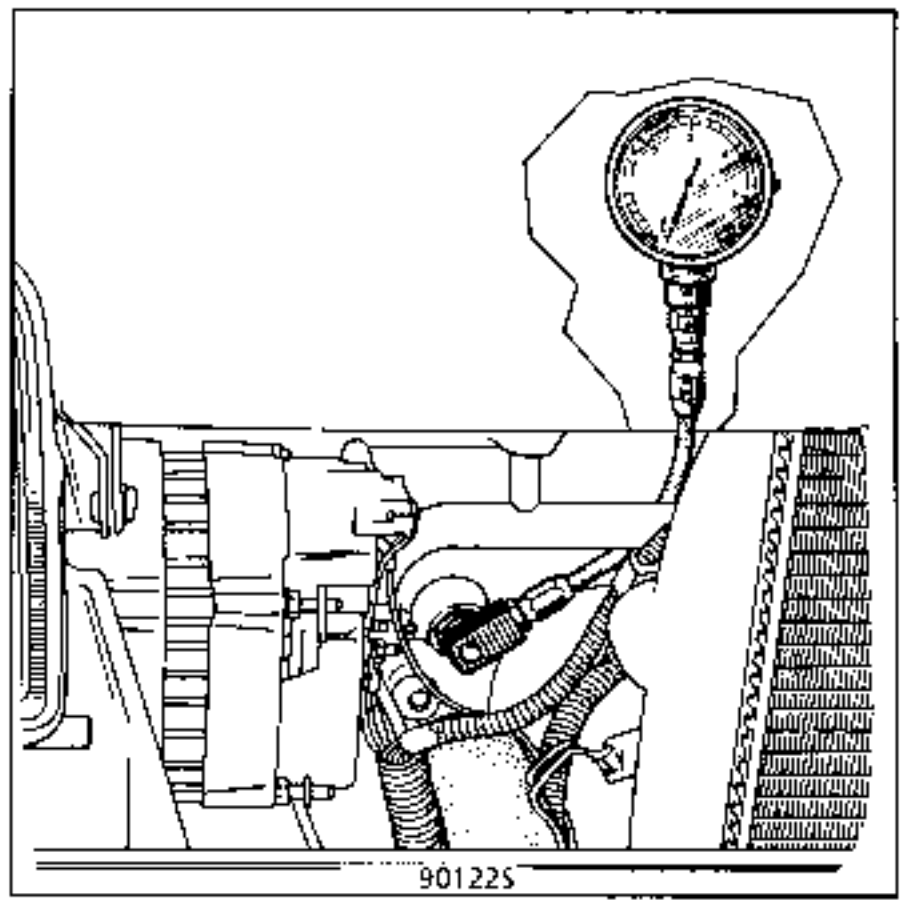
USE:

Z engines
F3R engines } F + B
G8T engine F + E + C

Connect the pressure gauge in the place of the switch using the 22 mm long socket to remove the pressure switch.

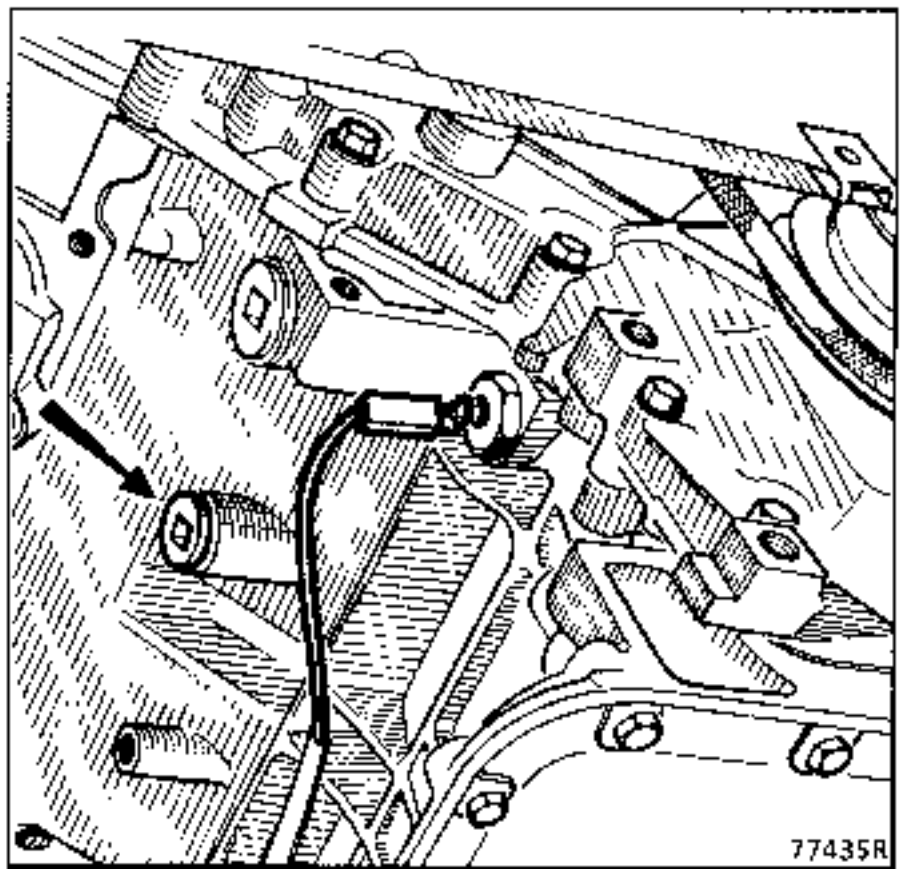
Checking F engines

- at 1000 rpm 1.2 bar minimum
  at 3000 rpm 3.5 bar minimum



Checking Z engines

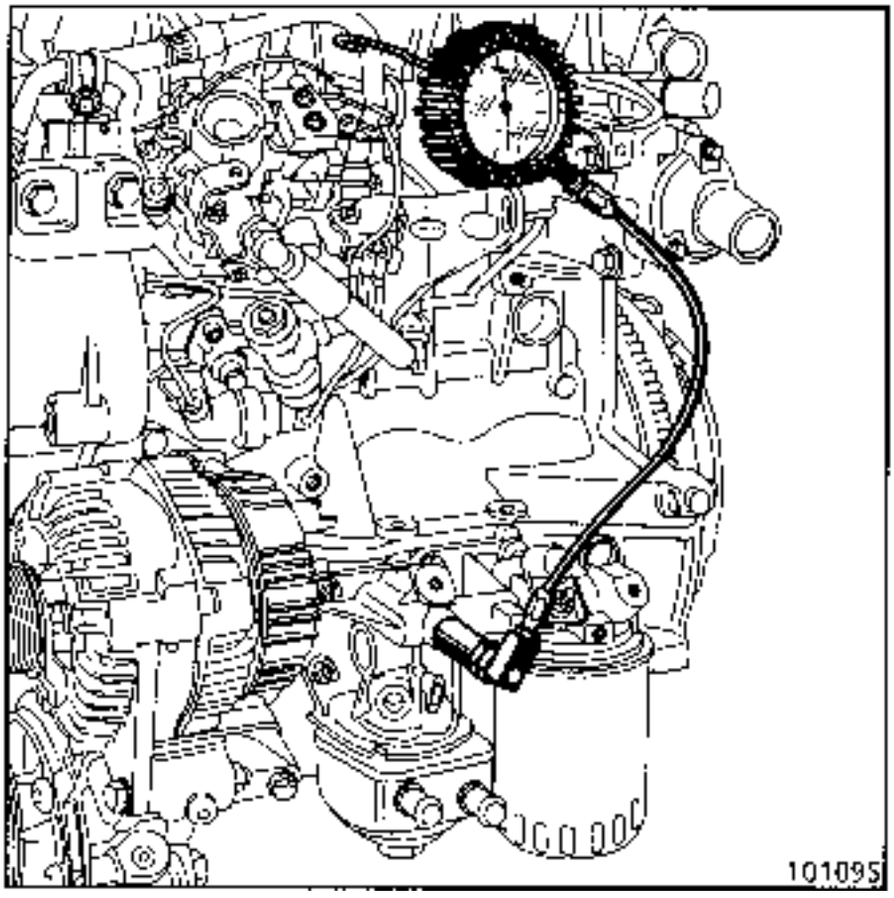
- at idle speed 2.2 bar minimum
  at 4000 rpm 4.4 bar minimum



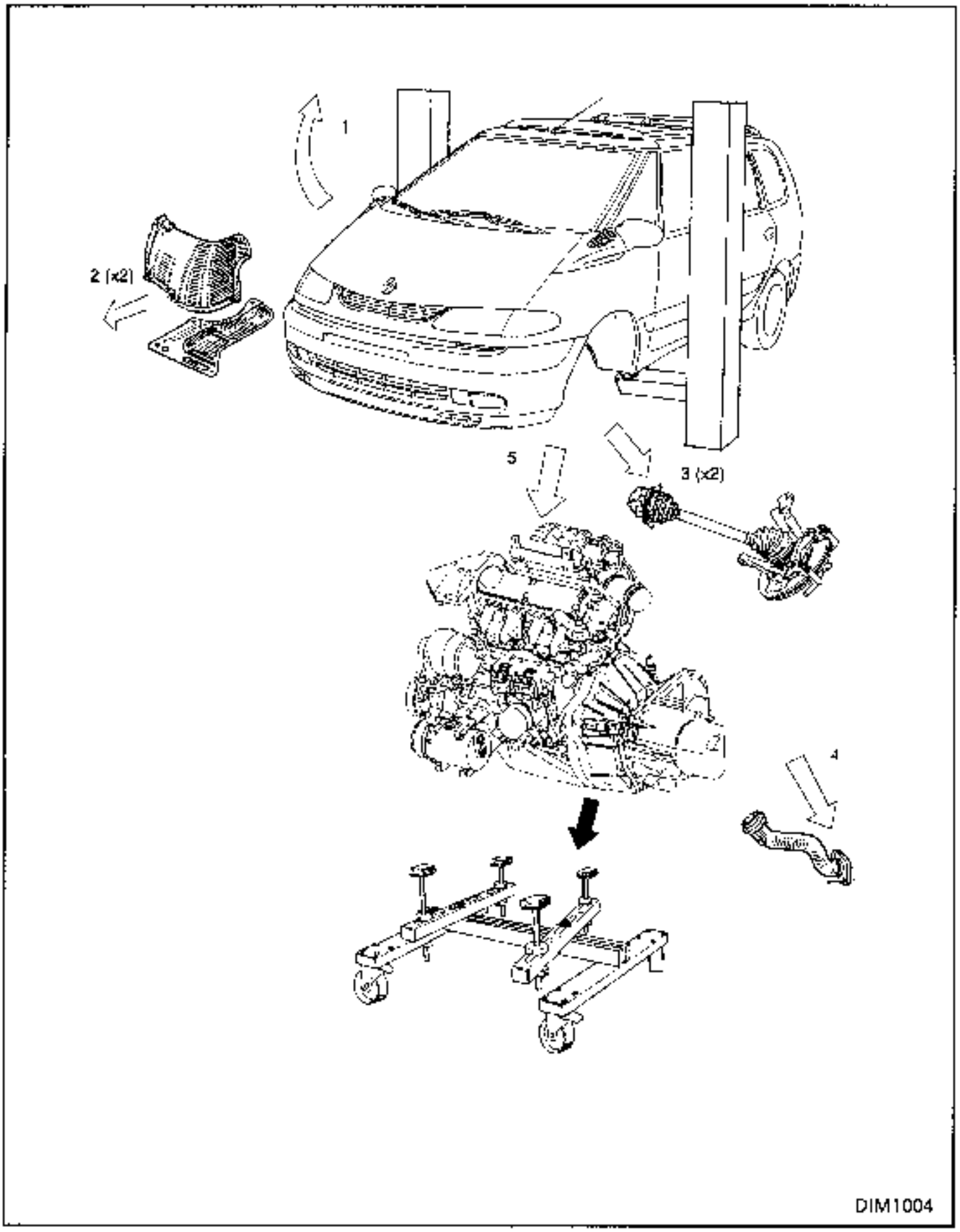
Checking G8T engines

Measure:

- at 1 000 rpm 1.6 bar minimum
- at 3 000 rpm 4 bar minimum



Removing - refitting the engine and transmission assembly F3R - JC5



This is carried out on a 2 or 4 post lift, without removing :
- the front sub-frame,
- the bumper,
- the front panel,
- the cooling assembly.

SPECIAL TOOLING REQUIRED	
Mot. 1289-02	Centring fork for suspended engine mounting limiter
Mot. 1202	Hose clip pliers
Dir. 1282-01 + 02	Wrenches for slackening steering rack union
BVi. 31-01	Set of punches for roll pins
Tav. 476	Ball joint extractor

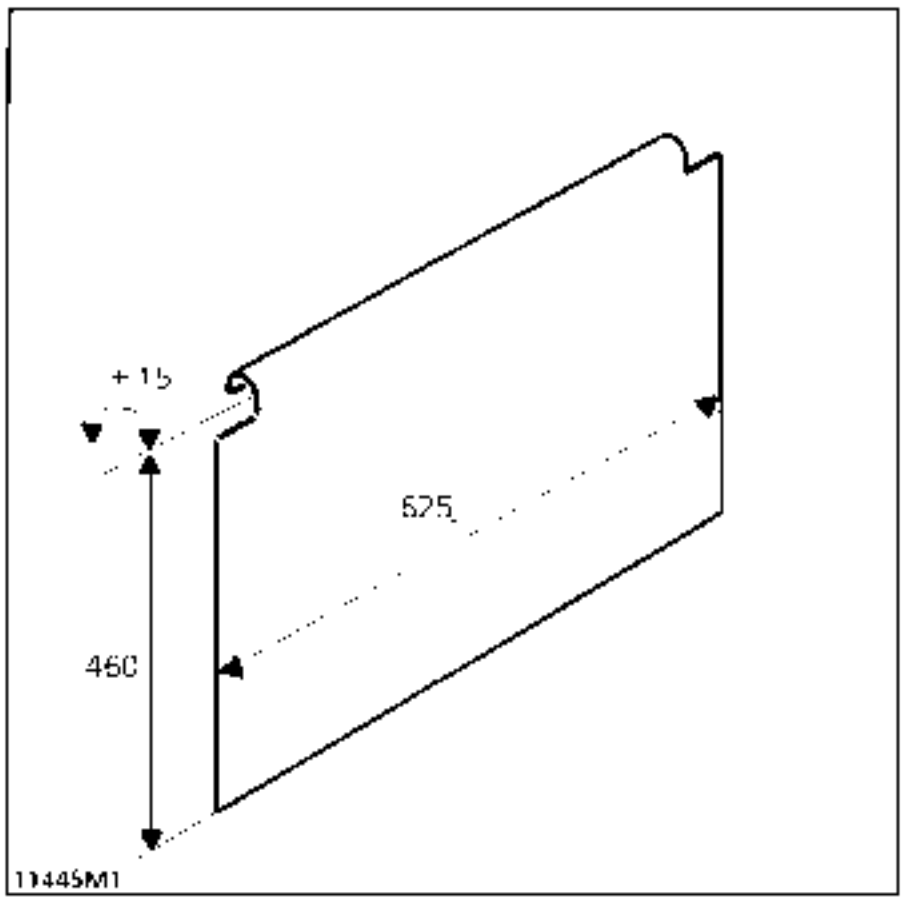
MATERIALS REQUIRED
Impact ball joint extractor
Safety pads
Tooling for separating refrigerant fluid unions NAUDER 7240 and 7242
Universal adjustable support tool

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

Put the vehicle on a 2 post lift fitted with Fog safety pads (see section "Methods of lifting").

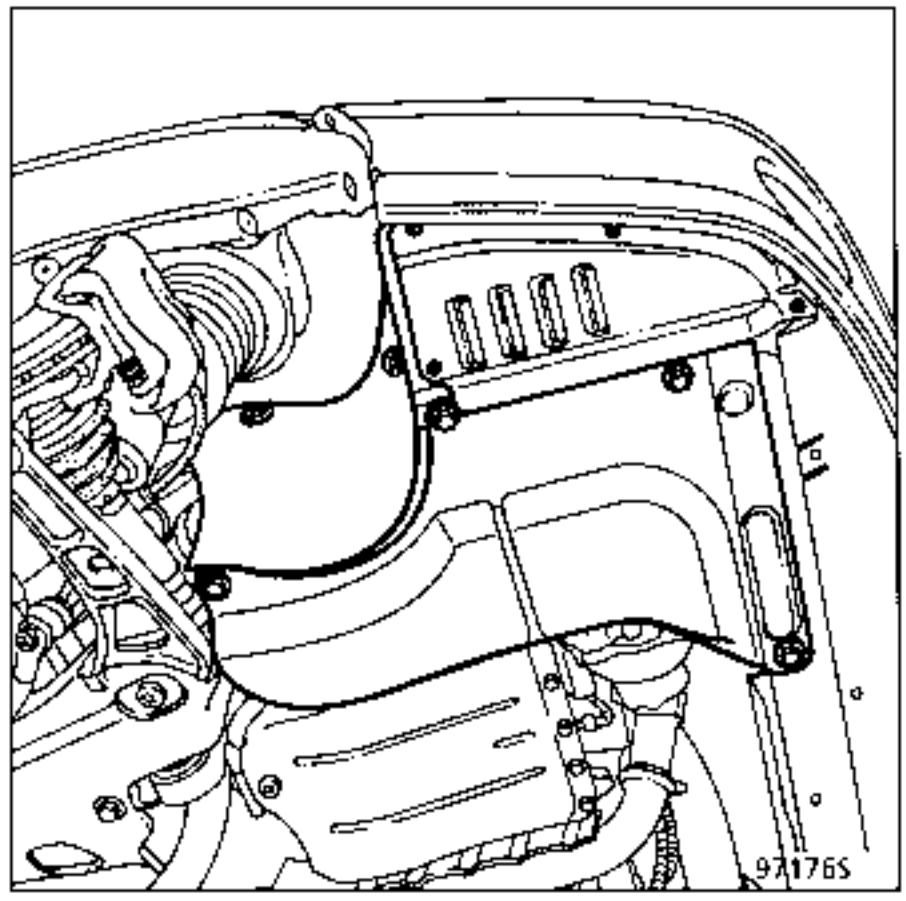
Disconnect and remove the battery.
Remove the connectors for the engine wiring and the 30 A fuse.

Fit the locally made tool to protect the radiator (THIS MUST BE DONE) :



Materials: aluminium or steel plate with a folded over edge at the top to hook onto the upper corner of the radiator.

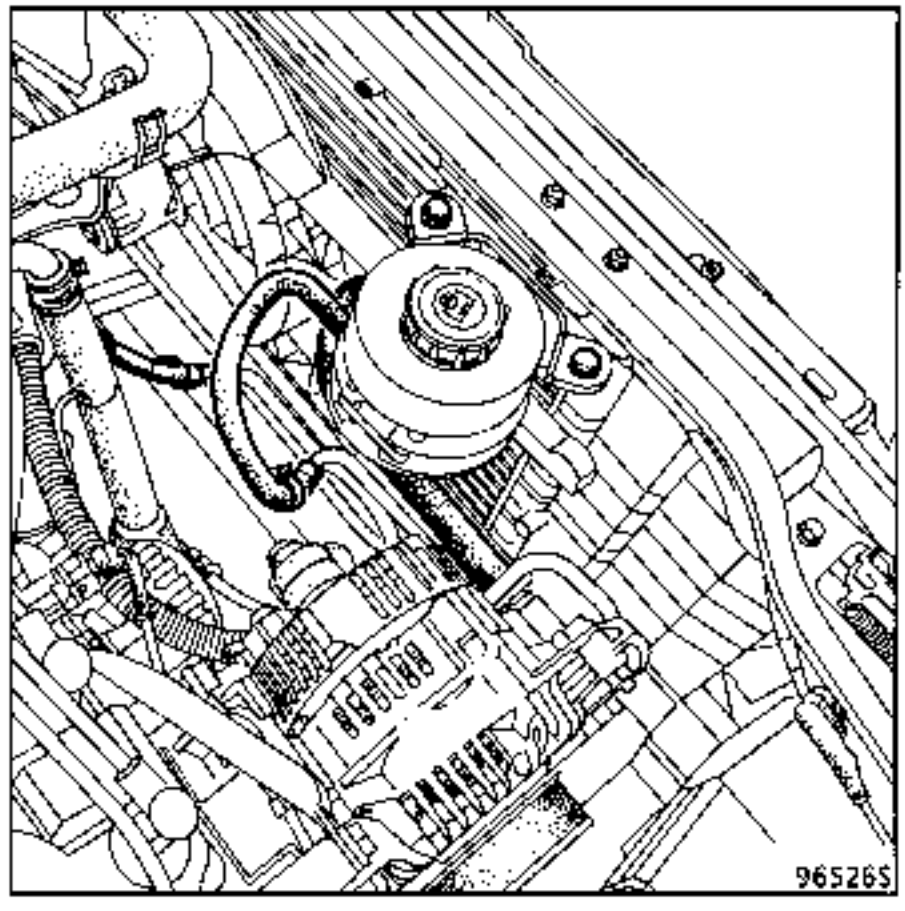
Remove:
- the engine undertrays,
- the front wheels,
- the front left and right hand shields at the rear of the wheel arches,
- the wheel arch protectors.



- the front left and right hand wheel arches.

Drain the air conditioning circuit (if fitted) using the filling station equipment.

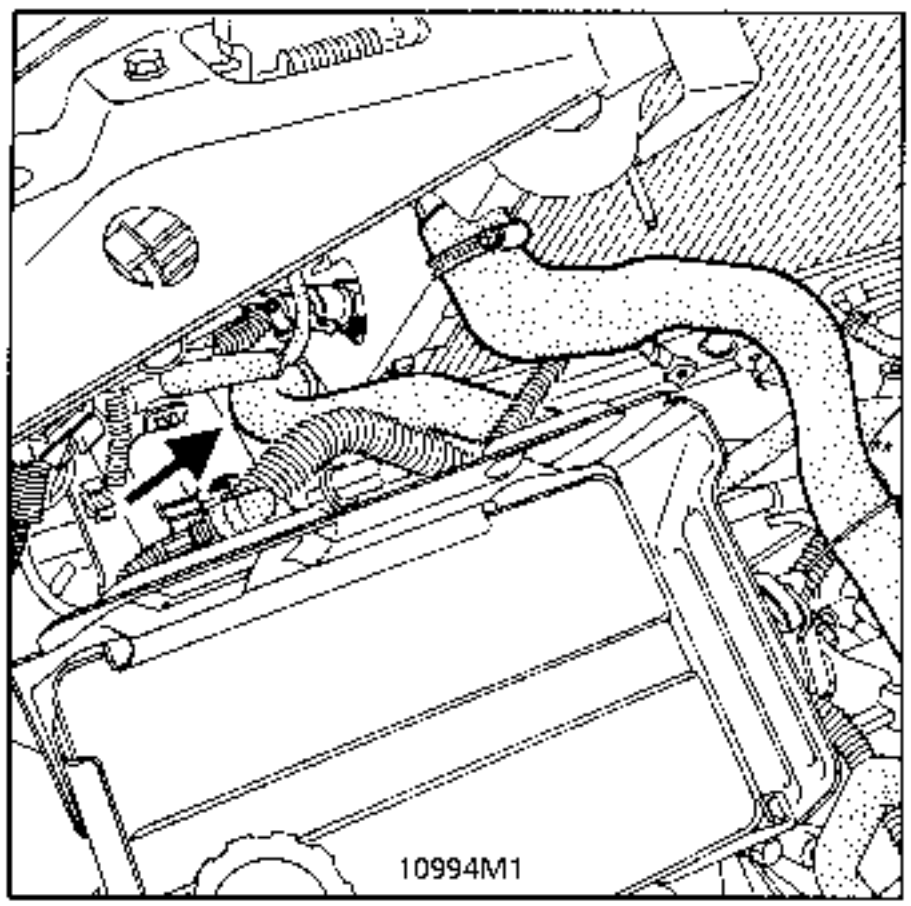
Drain the power assisted steering circuit :
- from the low pressure hose on the cooler,
- from the high pressure hose from the power assisted steering pump (fit plugs to the pump).



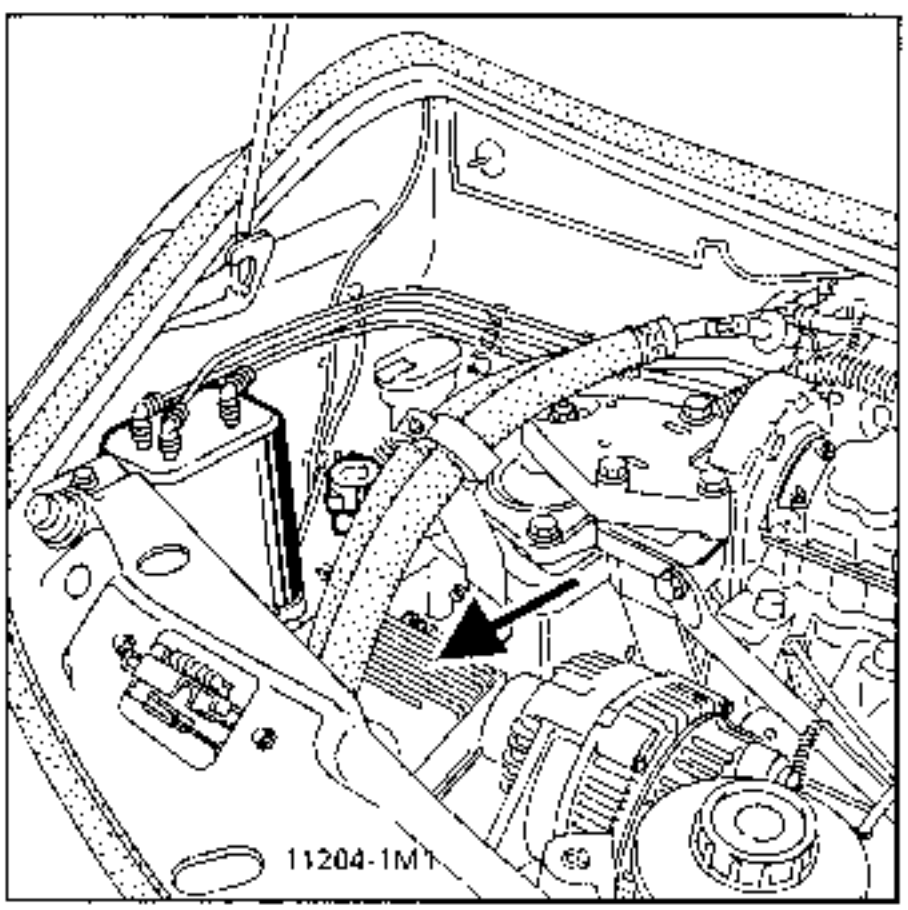
Remove the power assisted steering pipe mounting flanges on the engine.

Drain the cooling circuit :

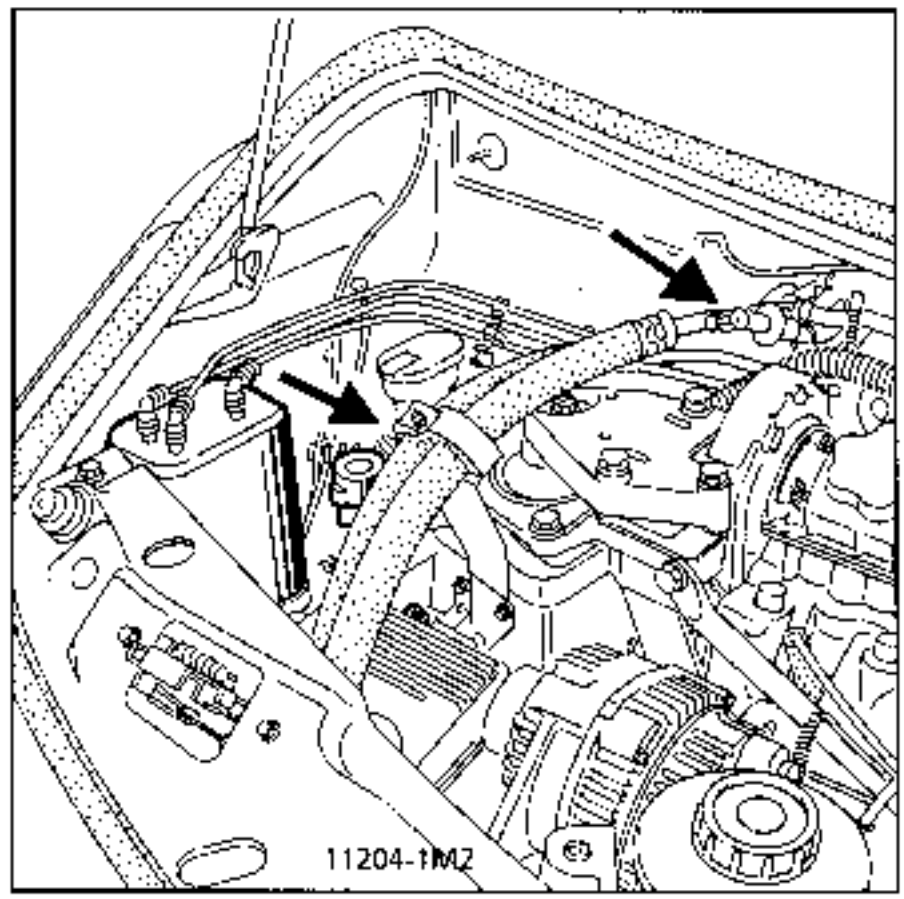
- from the lower radiator hose at the water pump end. Disconnect the pipe from the bottom of the radiator so the engine maybe removed unhindered,
- from the upper radiator hose (cylinder head pipe end).



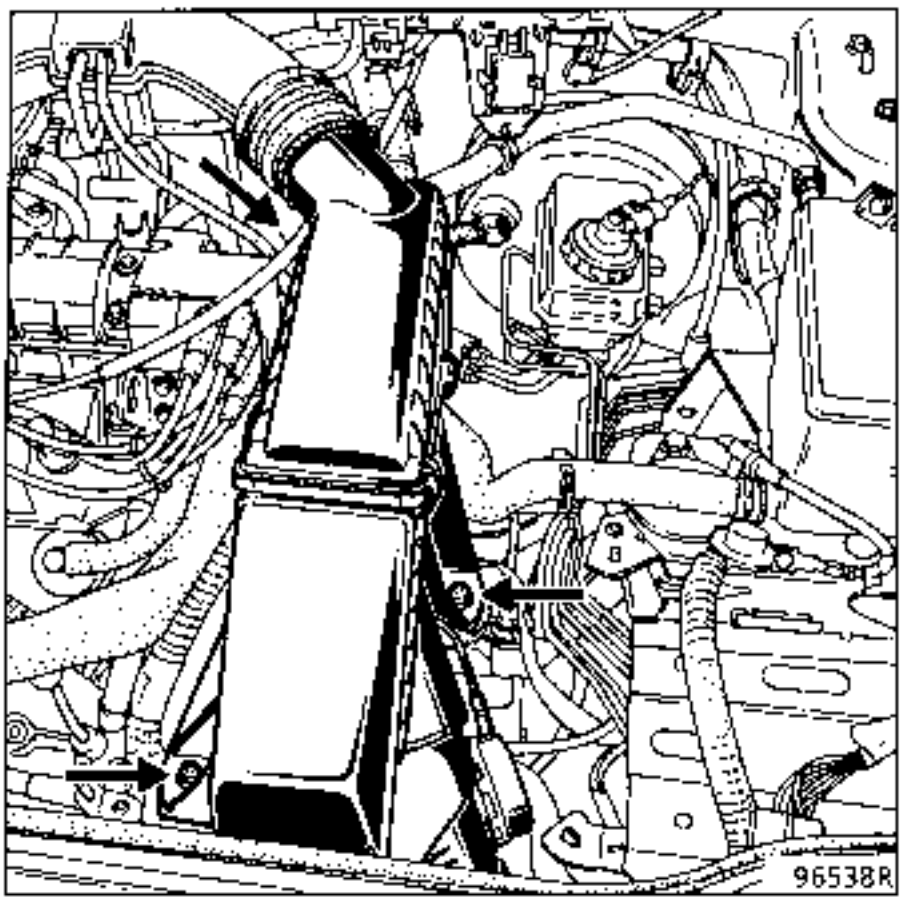
Disconnect the injection computer after removing it from the side member.

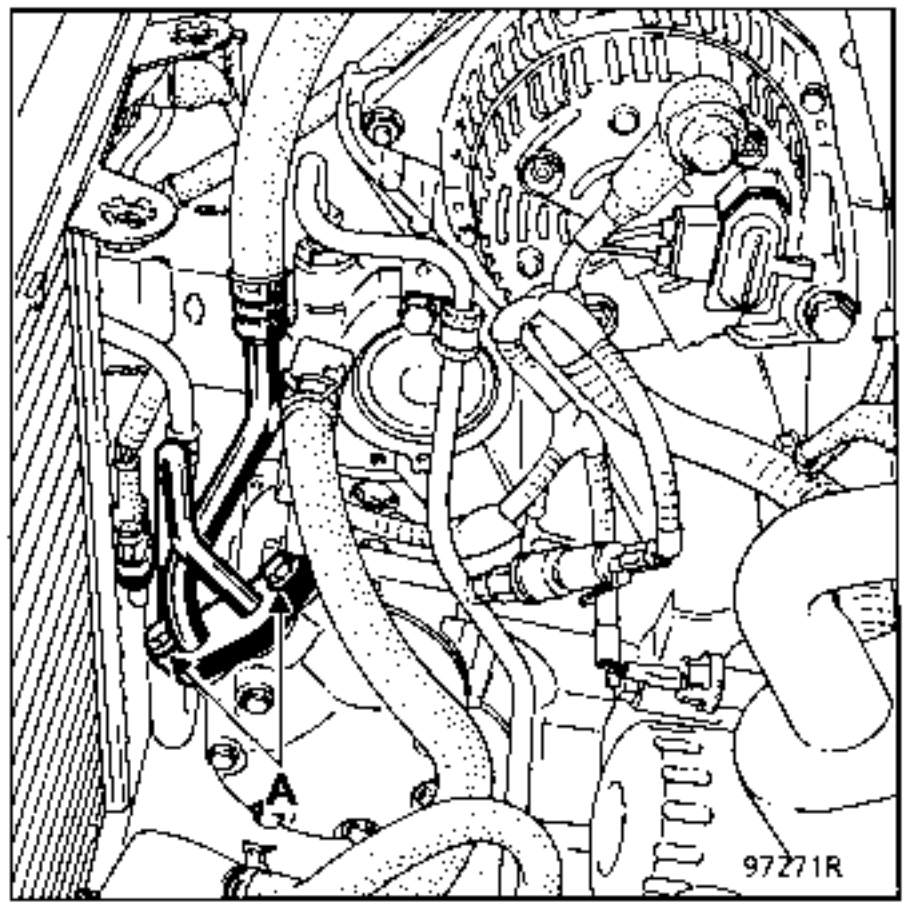


Disconnect the air conditioning pipes mounting from the right hand suspended engine mounting. Disconnect them without damaging the plastic clips which secure the wiring to the right hand wing. Release the AC unions on the bulkhead . (NAUDER tools 7240 and 7242. See section 62.)



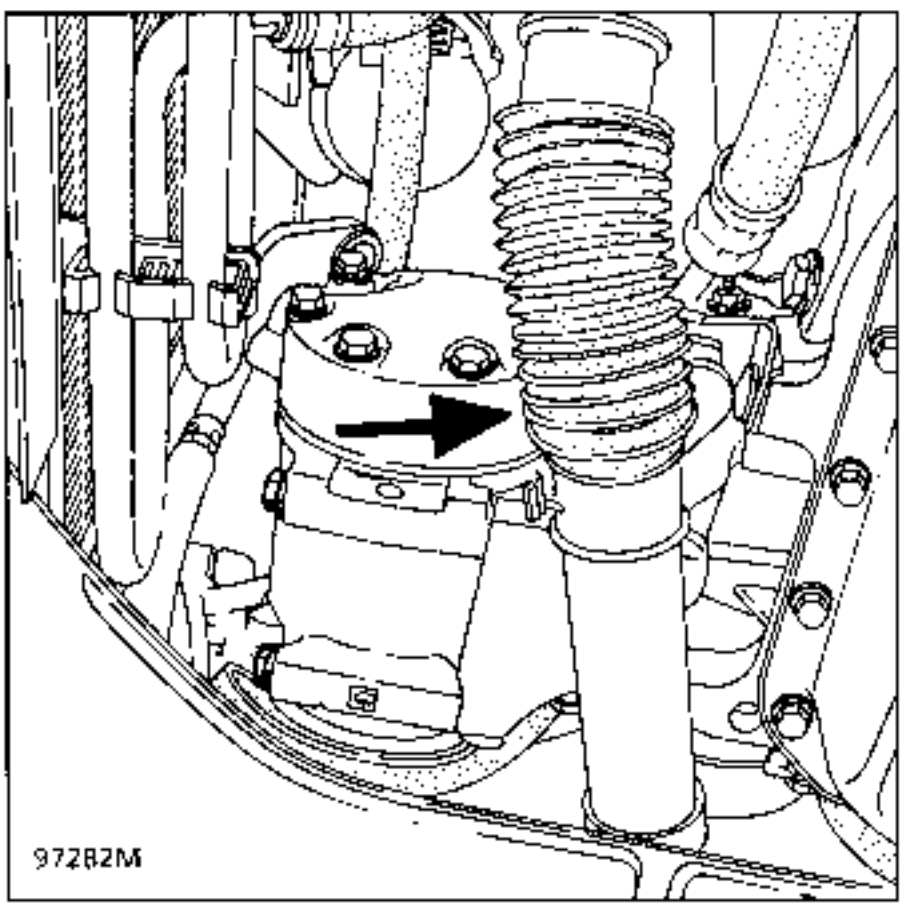
Disconnect the wiring and fold it down over the engine.
Remove the air filter and disconnect the vacuum pipe on the brake servo.





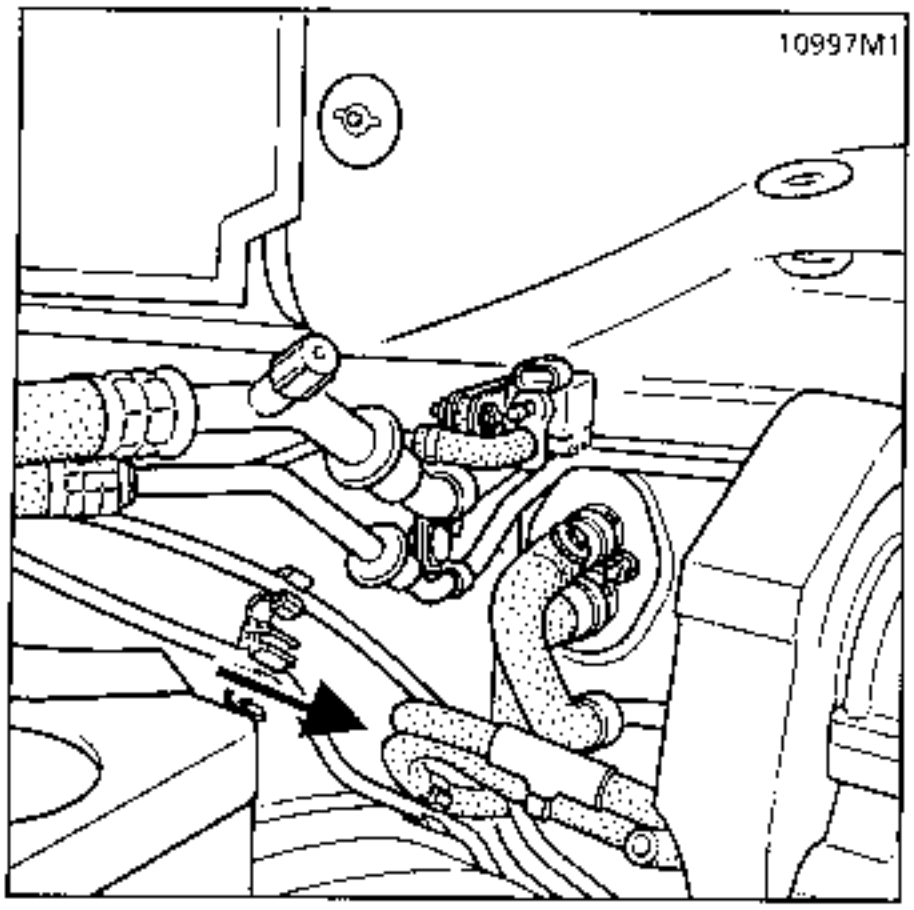
Remove the mounting bolt for the gearbox earth strap.

Remove the air intake resonator upstream of the air filter.



Disconnect the AC pipes for the compressor (2 bolts (A) on the flange). Hermetically seal the openings.

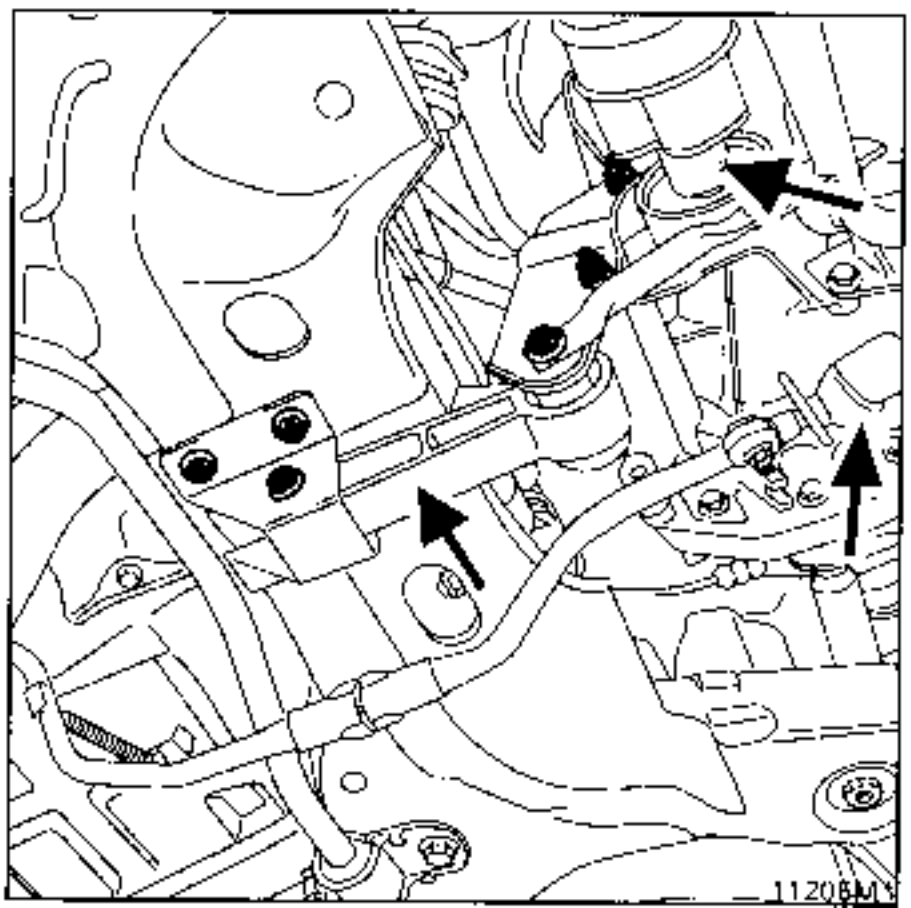
Disconnect :
- the fuel pipes,



- the hose and connector for the absolute pressure sensor,
- the accelerator cable,
- the clutch cable at the fork.

Lift the vehicle;

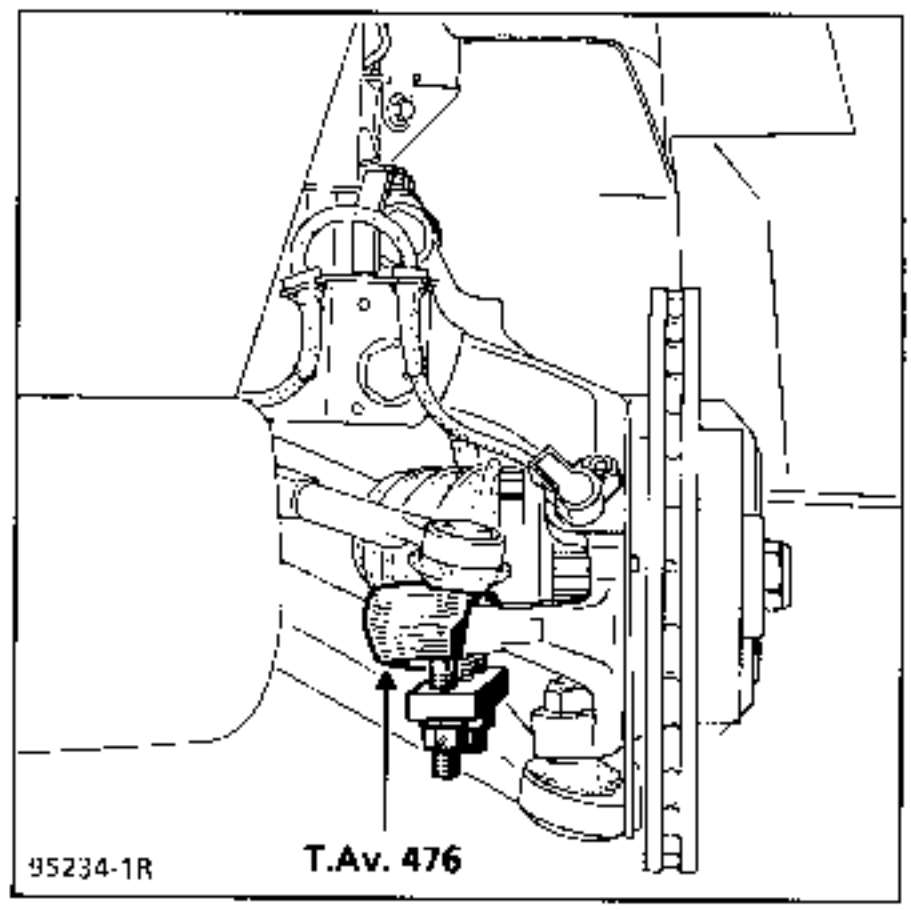
Drain the gearbox.
Remove:
- the engine tie bar,
- the exhaust flange at the manifold end,
- the gear control (move the gaiter to one side),
- the right hand driveshaft roll pin.



Disconnect the oxygen sensor connector.

Removing the driveshafts:
On the right hand side remove:
- the brake caliper and attach it to the shock absorber spring,(if necessary, release the brake pipe from the shock absorber strut).
- the driveshaft gaiter bolts,
- the shock absorber base bolts **(mark the way they were fitted)**.

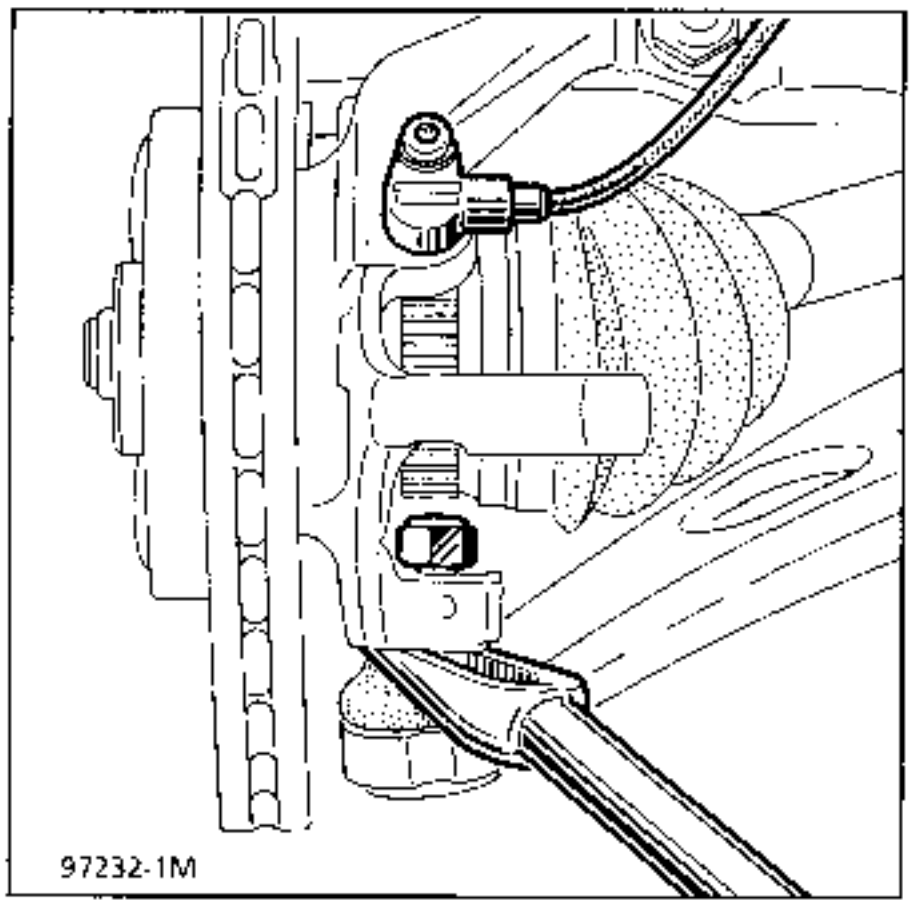
Release the lower ball joints (using an impact extractor) and the track rod ends (Tool Tav.476).
Tilt the stub axle carrier and release the right hand driveshaft after removing the roll pin securing the driveshaft to the gearbox output shaft.



On the left hand side remove:
- the brake caliper and attach it to the shock absorber spring,
- the shock absorber base bolts (mark the way they were fitted).

Release the lower ball joints (using an impact extractor) and the track rod ends (Tool Tav.476).
Tilt the stub axle carrier and release the left hand driveshaft after removing the 3 mounting bolts for the gaiter on the gearbox.

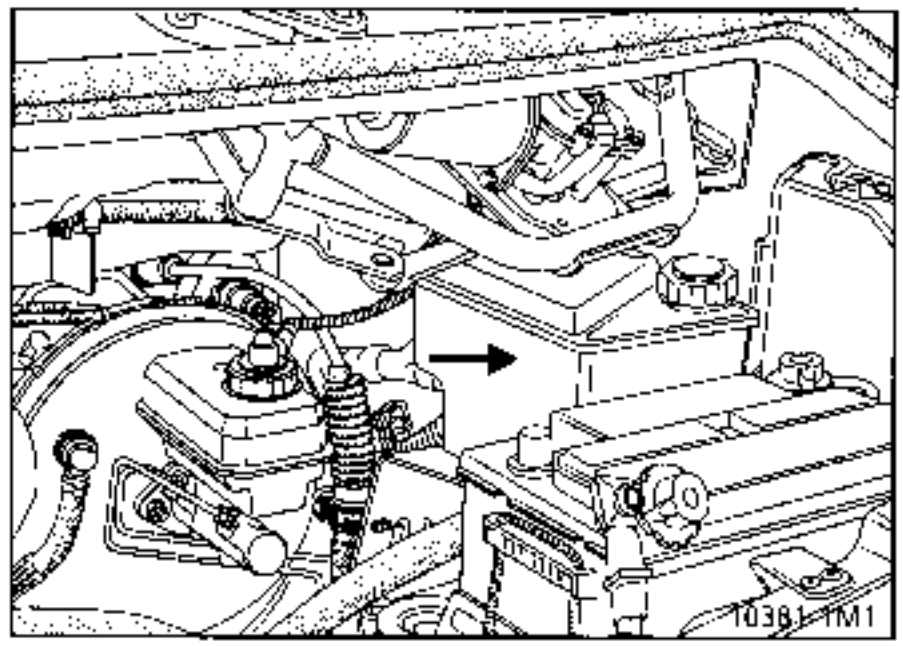
TAKE CARE NOT TO DAMAGE THE GAITERS



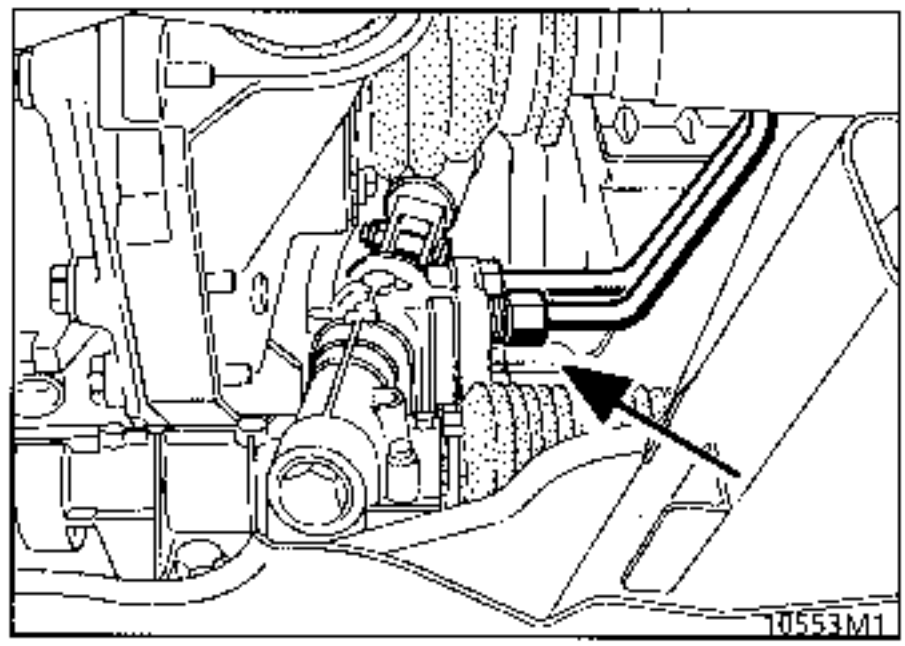
Remove the exhaust pipe between the manifold and the catalytic converter.
Disconnect the oxygen sensor.

Lower the vehicle;

Disconnect the lower engine/radiator hose at the bottom of the radiator, move it to the top of the engine.
Disconnect:
- the heater matrix coolant pipes from the engine,
- the expansion bottle (2 hoses),

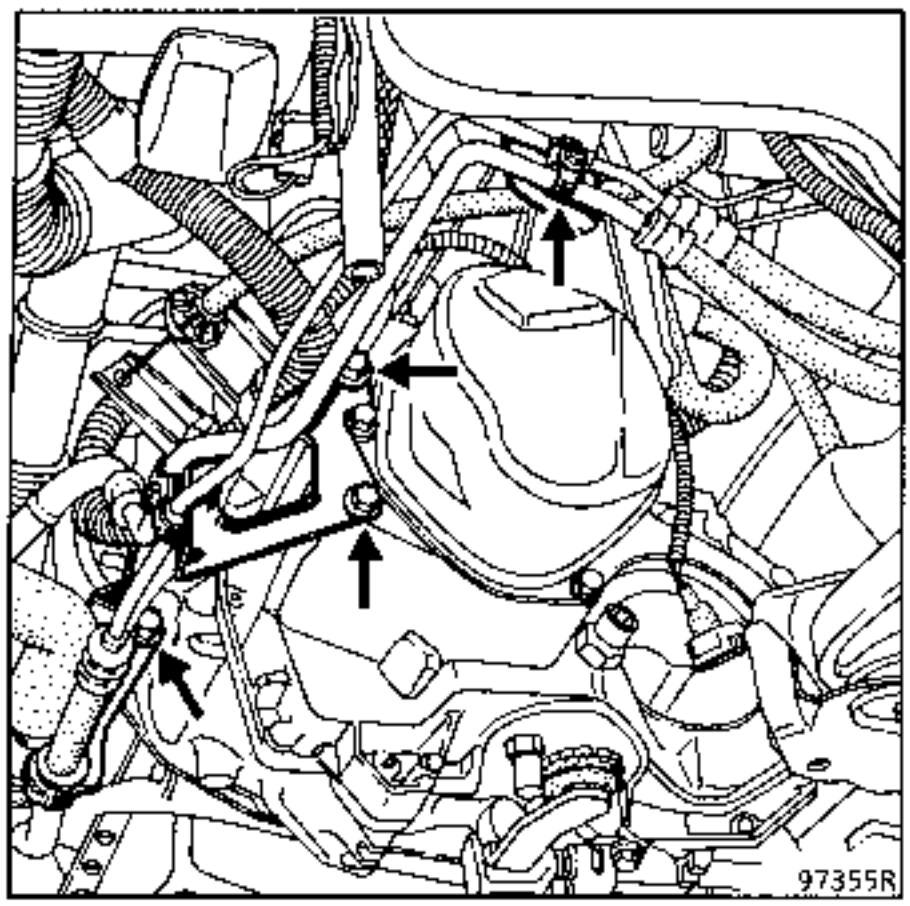


Disconnect the high pressure pipe (lower pipe) for the power assisted steering on the steering rack (Tools Dir.1282-01).



ENGINE AND ENGINE PERIPHERALS
Engine - Transmission

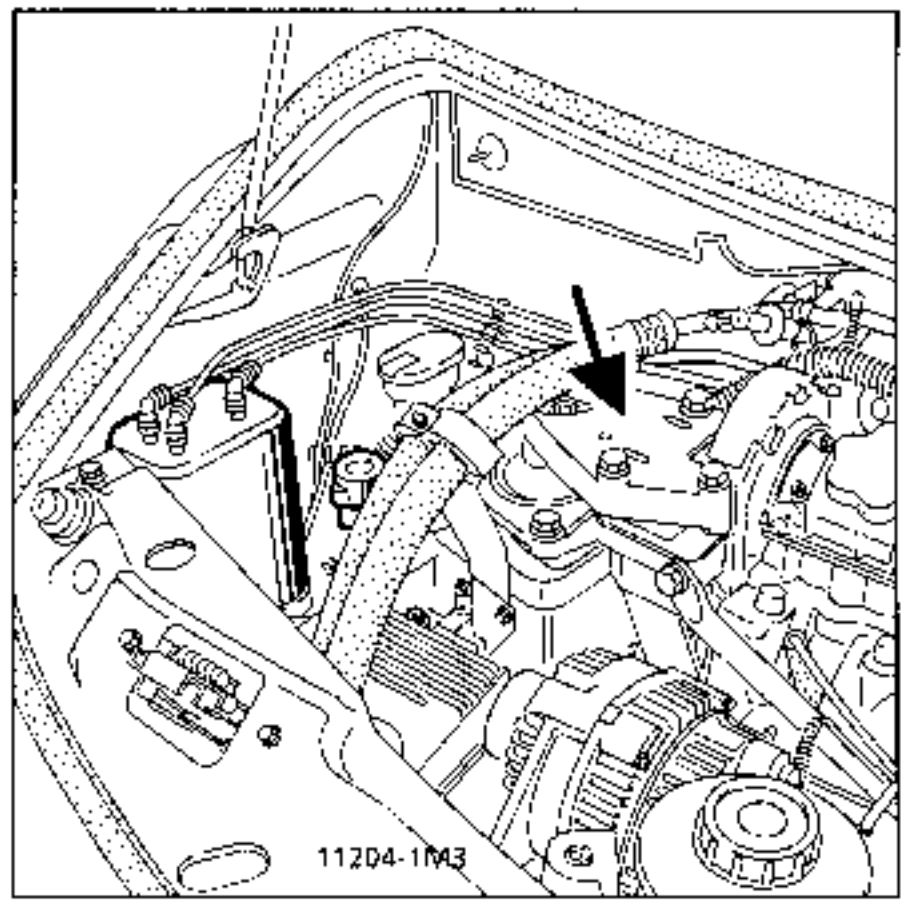
To make removing the engine and transmission assembly easier, slacken the two mounting brackets for the power assisted steering pipes on the transmission and the front of the engine and put them on the top of the engine.



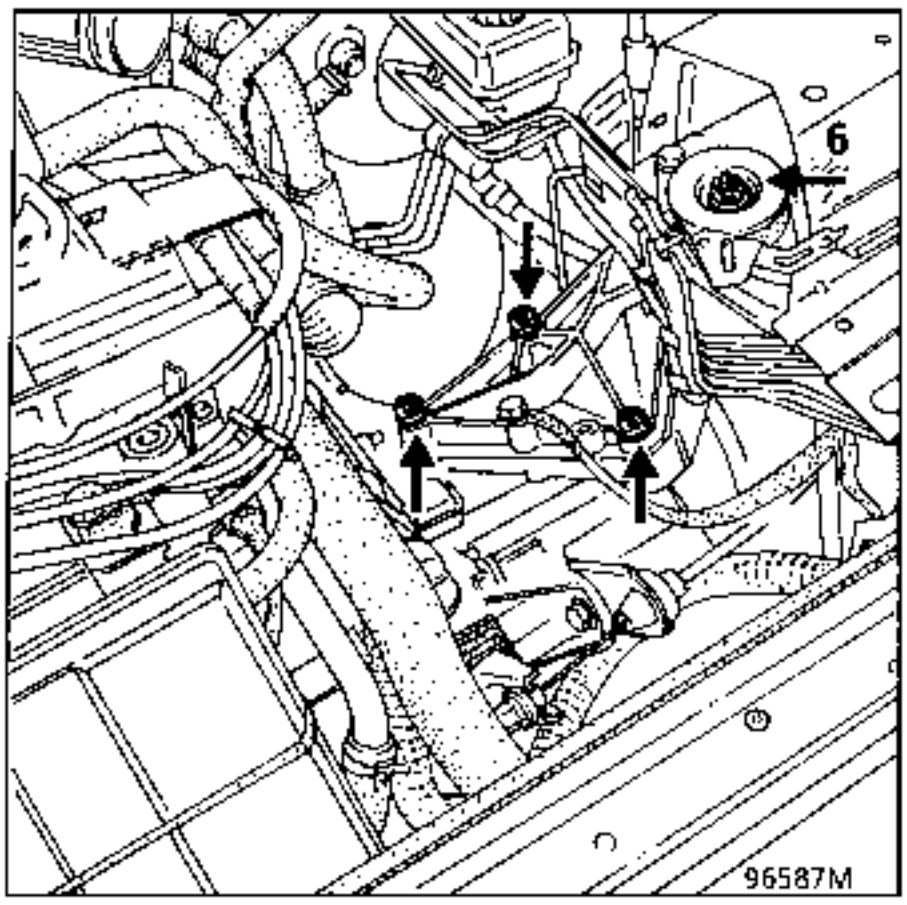
Lower the vehicle;
Disconnect the engine wiring at the engine connection unit.

Fit an adjustable support tool under the engine; carefully lower the vehicle onto the support tool (two persons required for this operation).

Slacken the right hand suspended engine mounting cover.



Slacken the three mounting bolts for the gearbox mounting (do not touch the rubber mounting pad (6) for the gearbox suspended mounting).



Gently lower the engine in relation to the vehicle, (this operation requires 2 persons).

REFITTING - Special notes

Position the engine and gearbox assembly in the engine compartment.

Fit the gearbox suspended mounting, fitting it to the gearbox on its rubber mounting.

Fit the suspended engine mounting cover and centre the limiter using tool **Mot. 1289-02.**

Tighten all the nuts and bolts to the recommended torque.

Refitting is then the reverse of removal.

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

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

Adjust the accelerator cable.

Fit the speedometer cable.

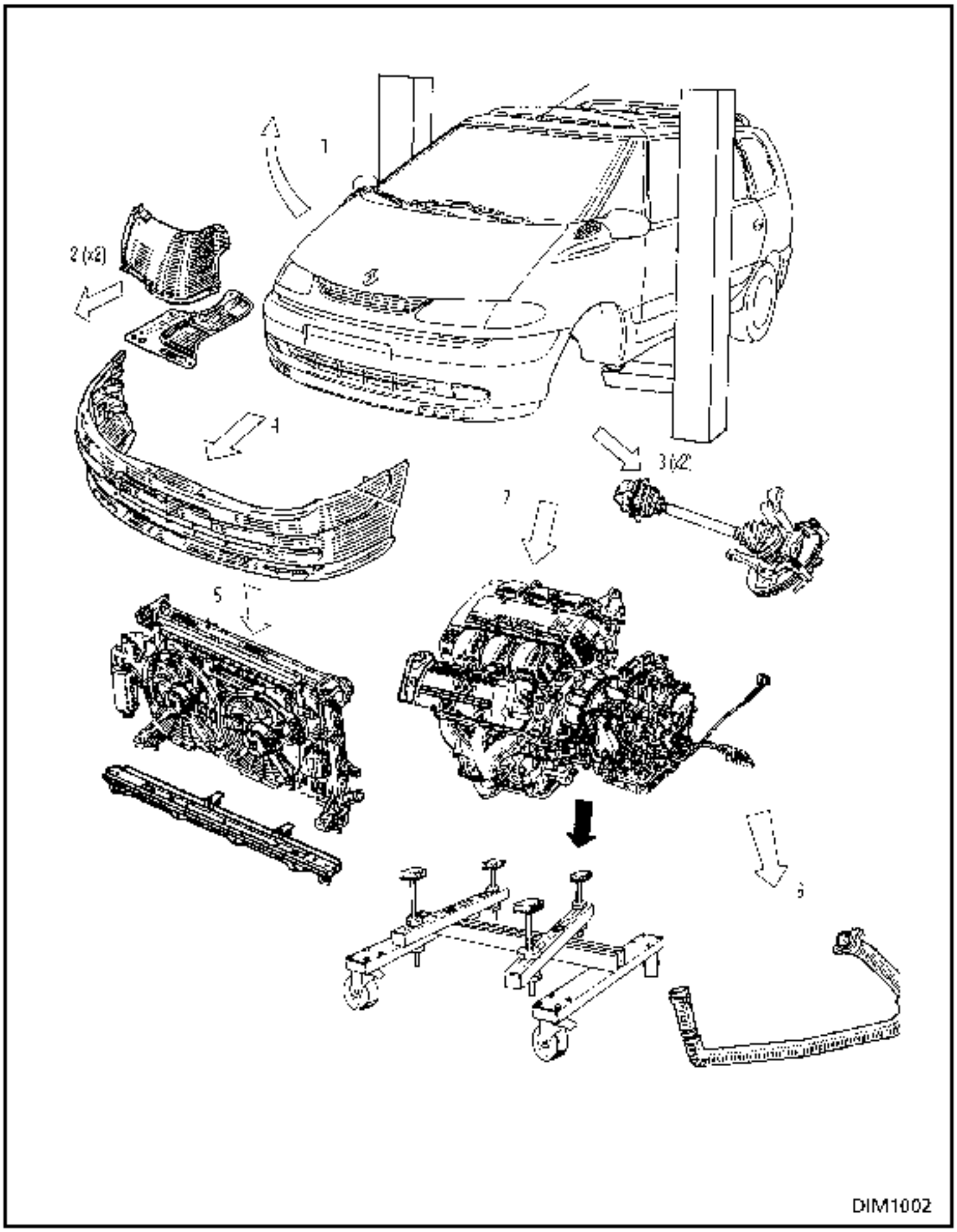
Fill:
- the gearbox with oil,
- the cooling circuit and bleed it (see chapter 19),
- the power assisted steering circuit and bleed it.

Reset all instruments or components affected by disconnecting the battery.

If fitted:

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

Removing - refitting the engine and transmission assembly Z7X - AD8



This is carried out on a 2 or 4 post lift, **without** removing the front sub-frame.

SPECIAL TOOLING REQUIRED	
Mot. 1289 -02	Centring fork for suspended engine mounting limiter
Mot. 1202	Hose clip pliers
Dir. 1282-01 + 02	Wrenches for slackening steering rack union
Tav. 476	Ball joint extractor

MATERIALS REQUIRED
Impact ball joint extractor
Safety pads
Tooling for separating refrigerant fluid unions NAUDER 7240 and 7247
Universal adjustable support tool

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	10
Driveshaft gaiter mounting bolt	2.5
Right hand driveshaft nut	25
Shock absorber base bolt	20
Suspended engine mounting rear bar bolt	12 to 18
Gearbox suspended mounting lower nut	5.5 to 8
Front right hand suspended engine mounting cover bolt on engine	5 to 6.5
Front right hand mounting bolt for suspended engine mounting limiter	5 to 6.5
Rubber engine mounting nut on front right hand suspended engine mounting cover	3 to 4.5

REMOVAL:

The engine and transmission assembly is removed from below; the front bumper, cooling fan and radiator assembly must be removed beforehand.

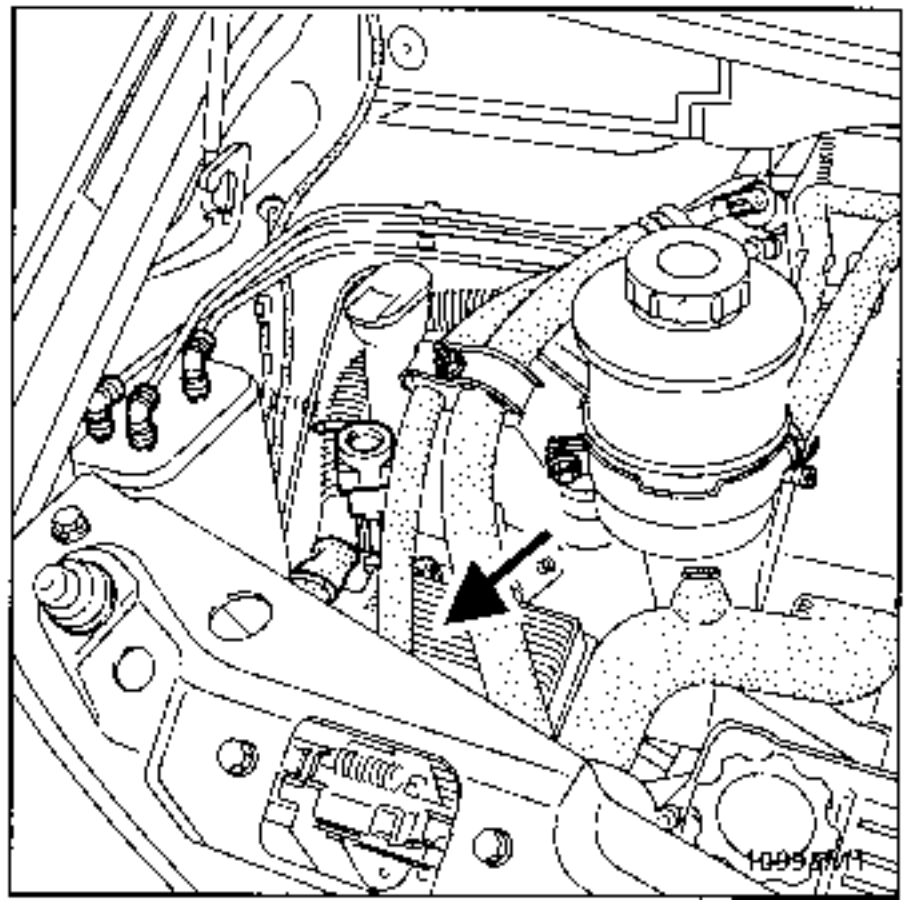
Put the vehicle on a 2 post lift fitted with Fog safety pads (see section "Methods of lifting").

Drain the refrigerant circuit.

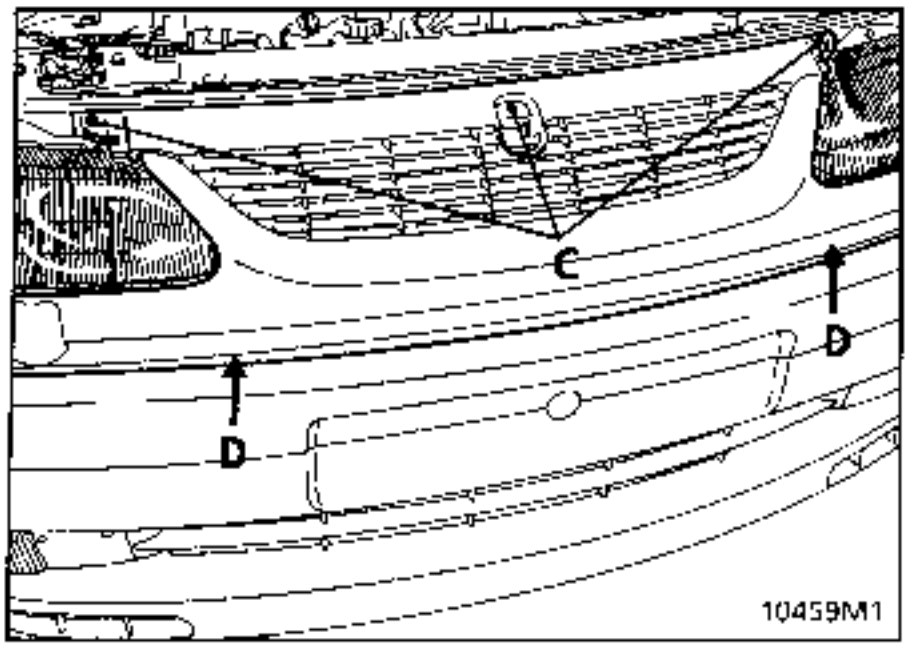
Remove:
- the battery and its tray,
- the cover from the connector and fuse box,
- the air filter,
- the front wheels,
- the front bumper.

Disconnect the AT computer connector.

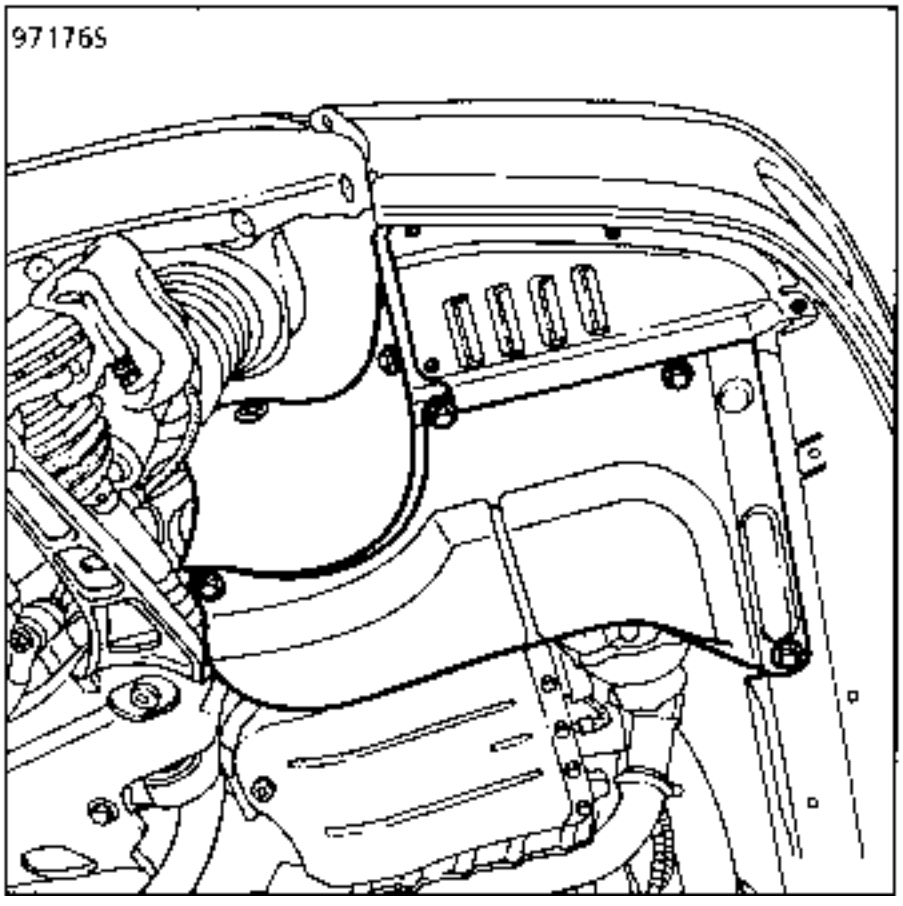
Remove the battery housing (+ AT computer) to give better access to the engine connection unit.



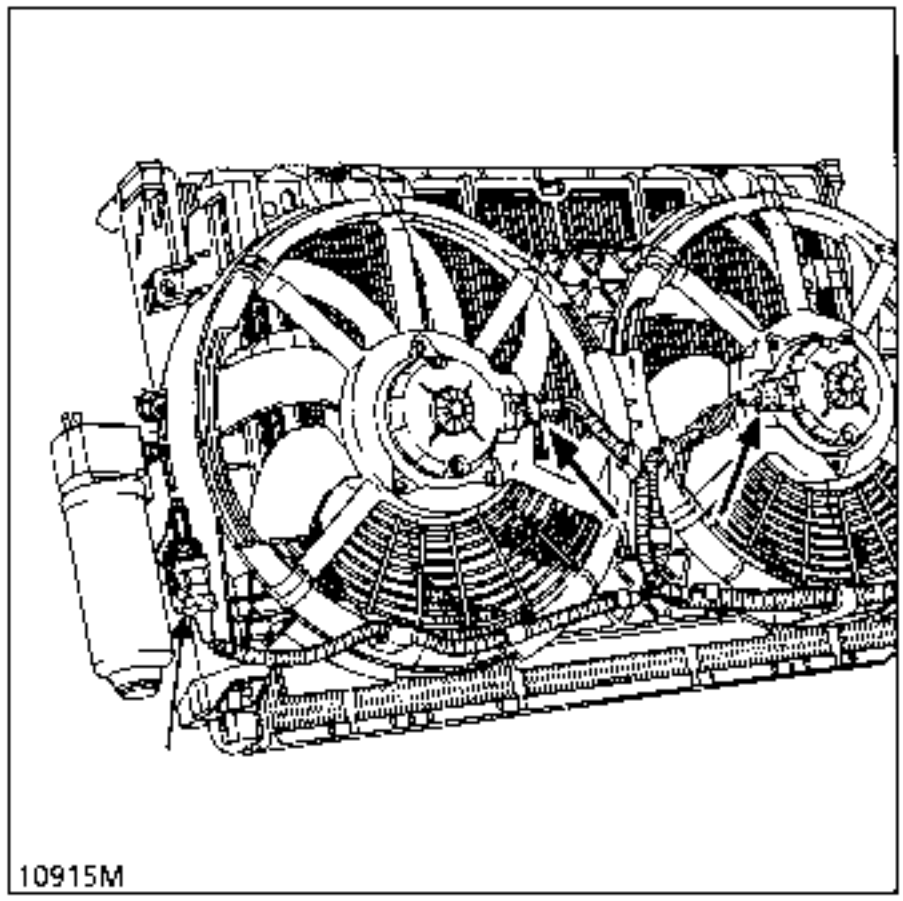
Remove:
- the radiator grille (D), the radiator grille bar and extensions (C).



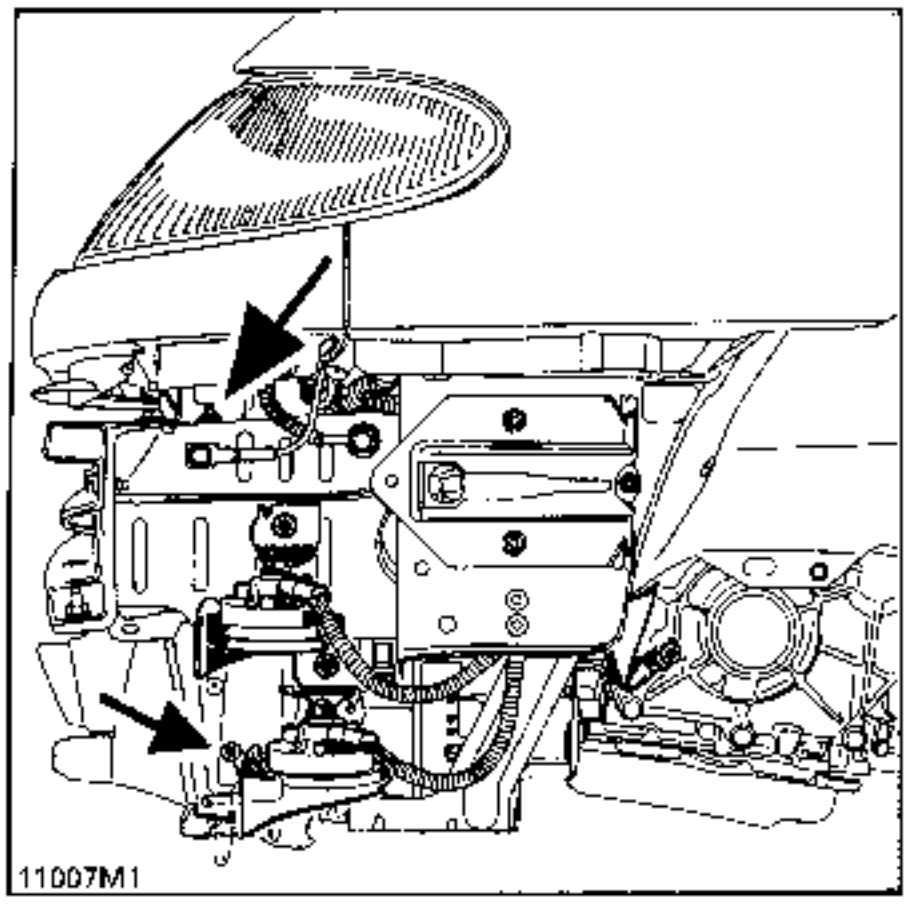
- the wheel arch protectors,
- the engine undertrays.



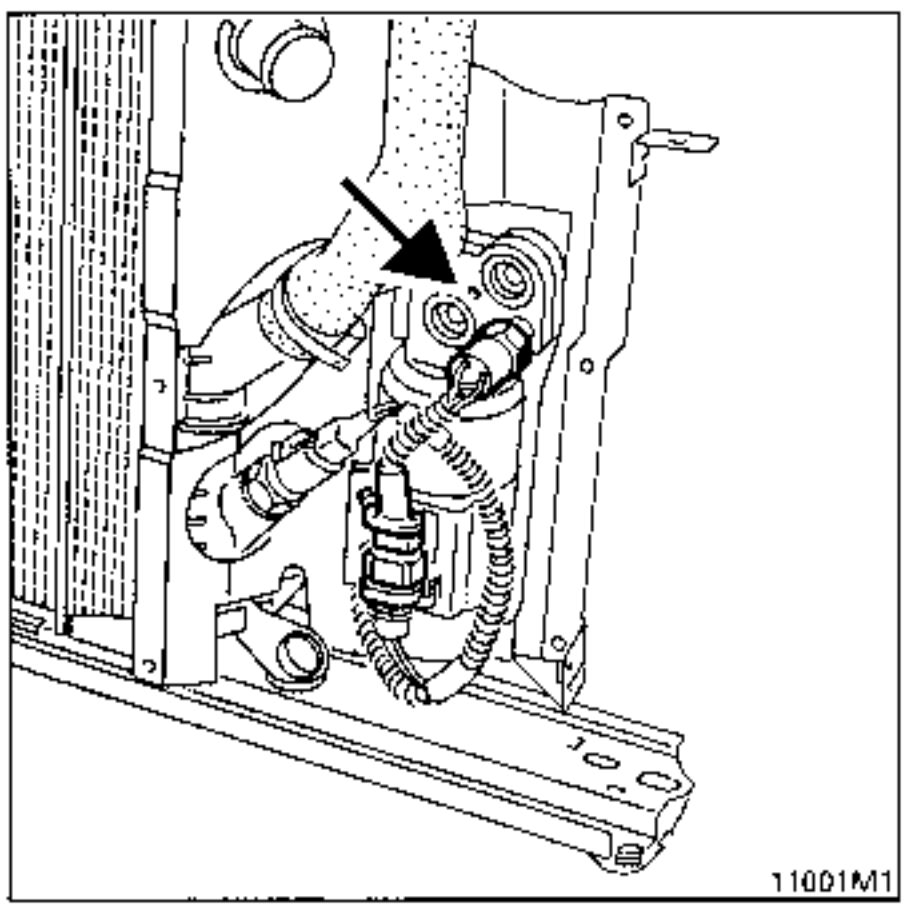
Removing the cooling assembly; to do this:
Disconnect the wiring at the fan motors, the tri-function pressure switch for the air conditioning and the radiator thermostat. Release the wiring.

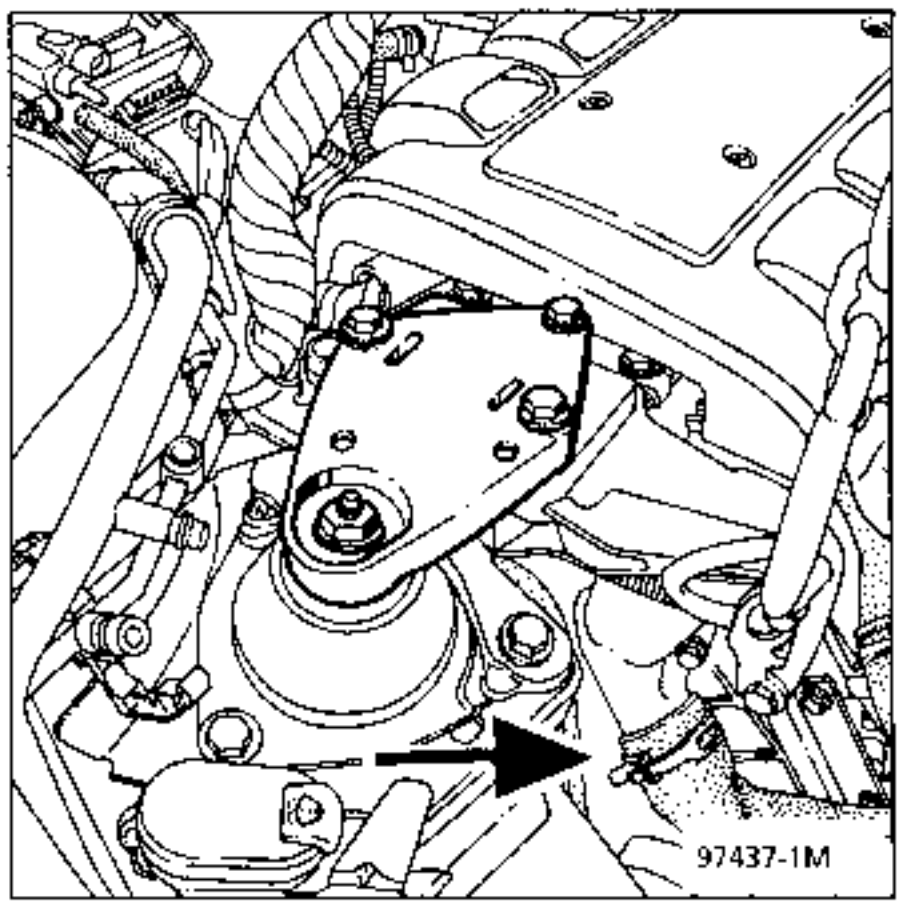


Remove the 4 mounting bolts for the deflectors on the side member.
Fold the deflectors onto the cooling assembly.



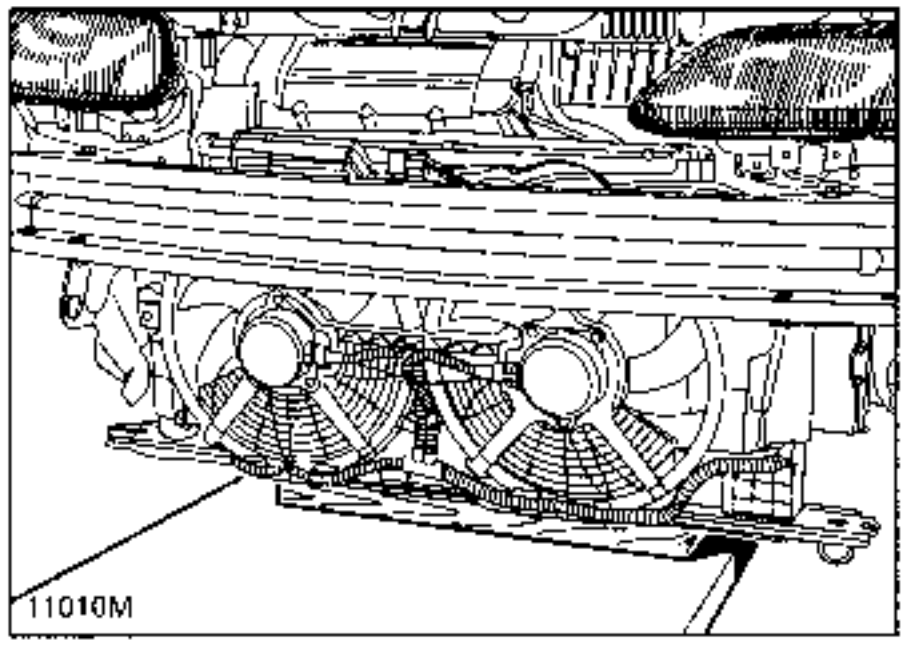
Drain the cooling circuit:
- disconnecting the upper hose on the radiator (if necessary, remove the thermostat unit).
- removing the lower hose between the engine and radiator at the bottom of the engine.
Plug the openings to prevent fluid running out.





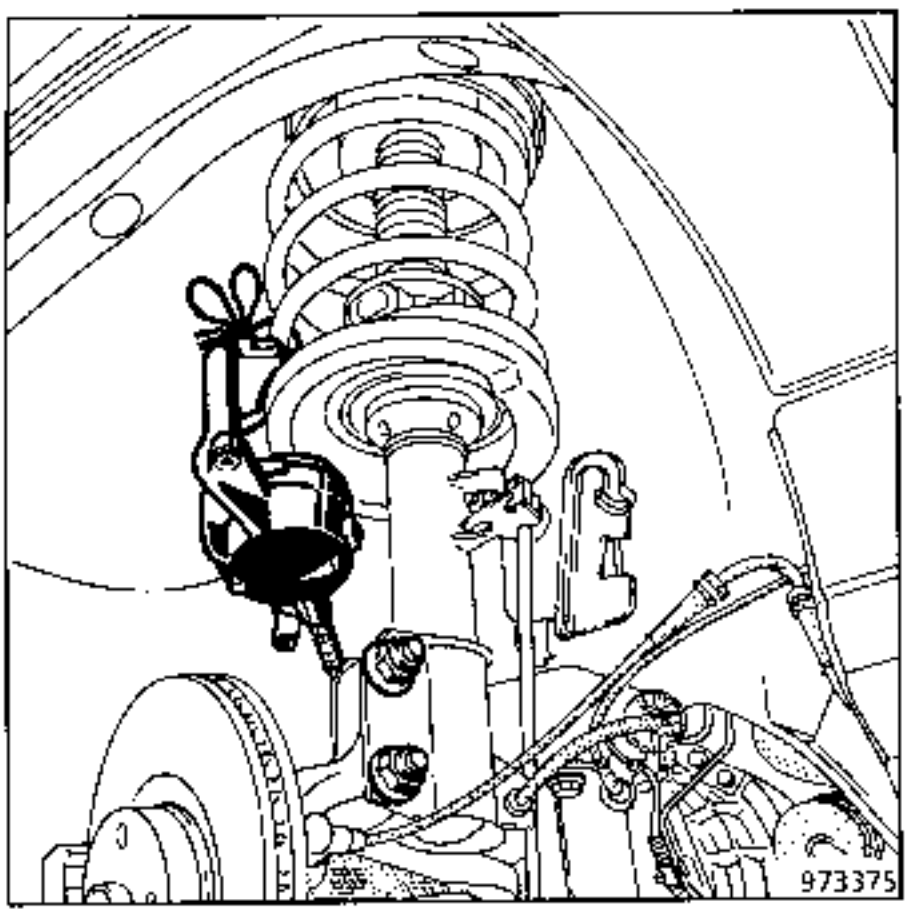
Slacken the mounting for the AC pipes on the dehydration canister (all openings must be plugged).

Lift the vehicle
Remove the cooling assembly using two persons.
(2 bolts under the ends of the side members)

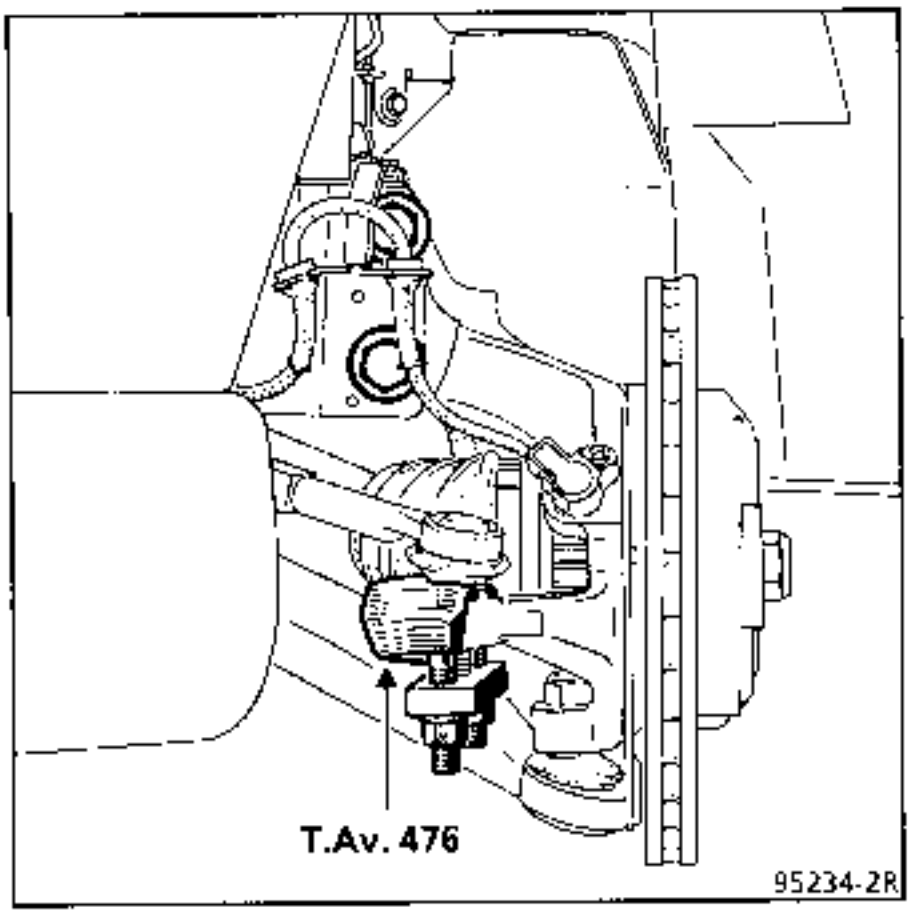


Partially drain the final drive.
Remove the driveshafts with the brake discs and stub axles, to do this:

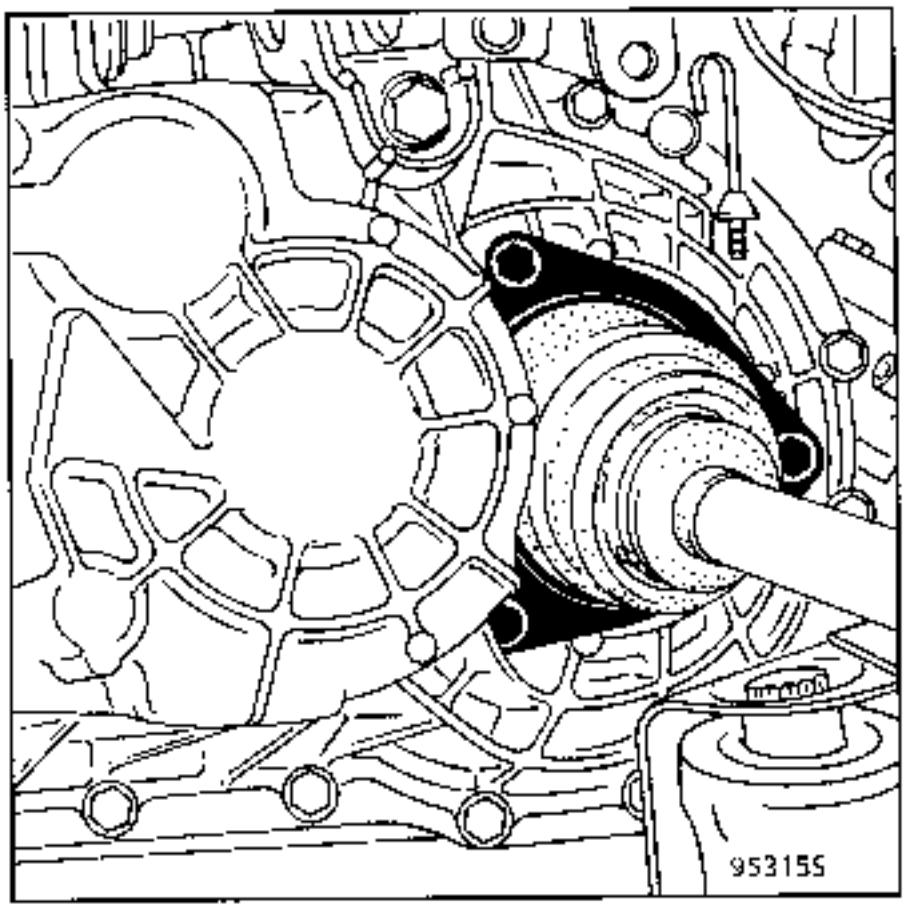
- slacken the brake calipers and attach them to the spring.
- disconnect the ABS target sensors;



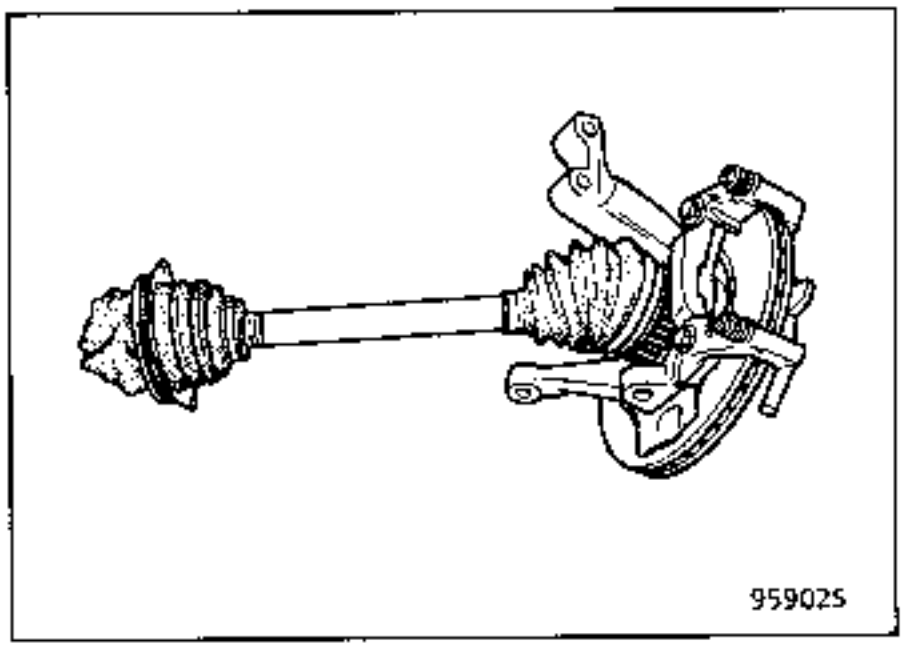
Remove the nuts from the bolts mounting the shock absorber struts to the stub axles.
Disconnect the track rod ends and the lower ball joints using tool **T.A.v. 476.**



Left hand side.
Remove the 3 mounting bolts for the driveshaft gaiters on the transmission.

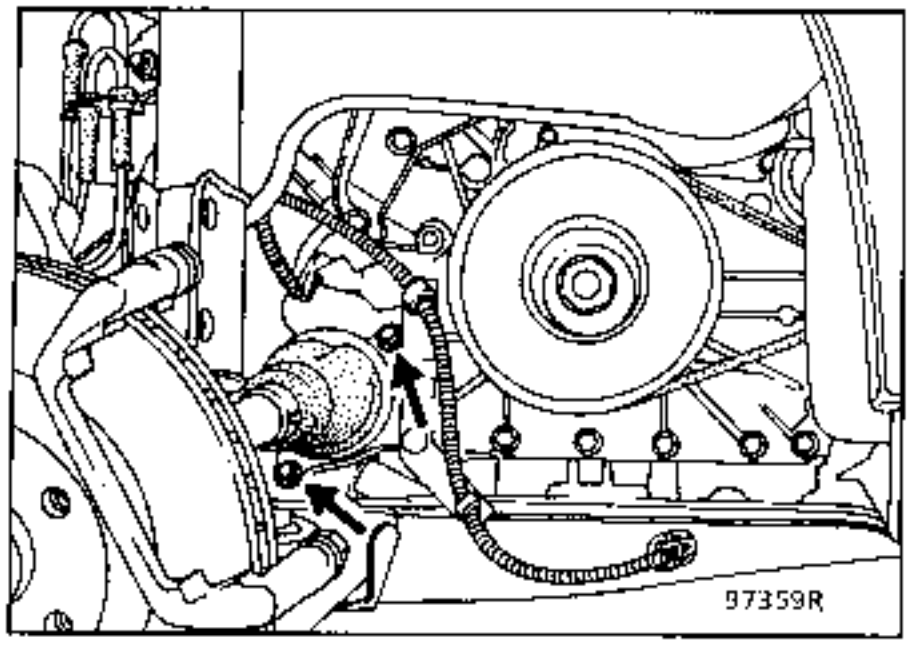


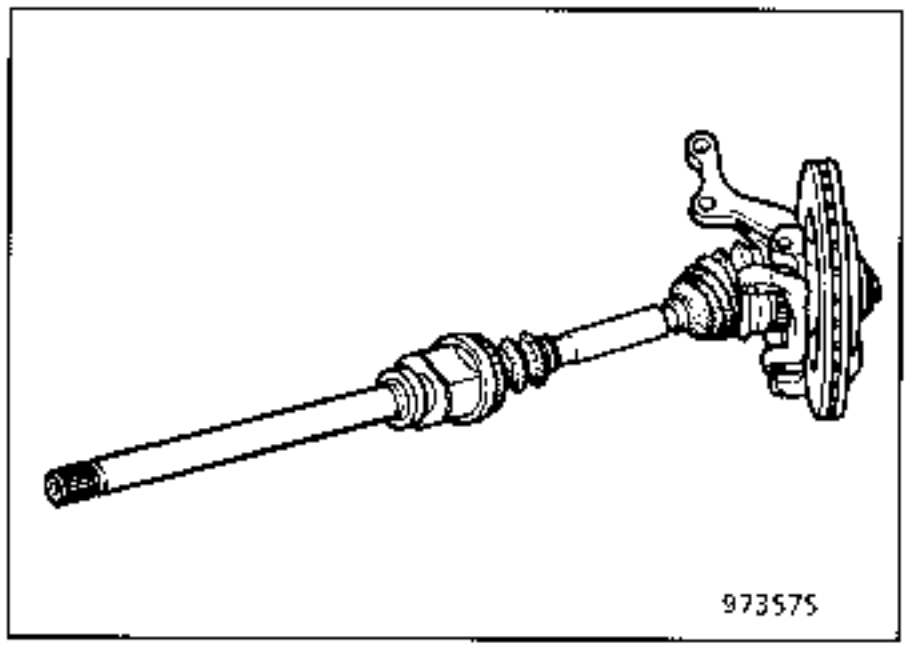
Remove the mounting bolts for the shock absorber strut on the stub axle and remove the driveshaft - stub axle - disc assembly.



Right hand side

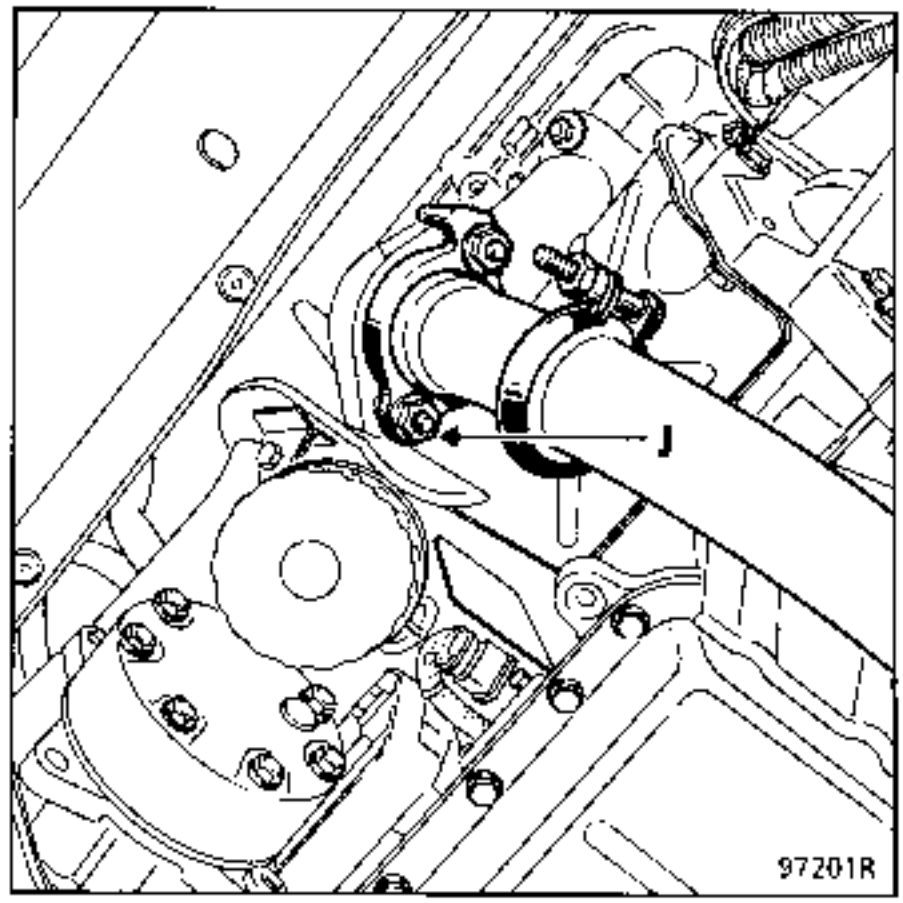
Remove the 2 mounting bolts for the driveshaft anti-release plate on the relay bearing.
Remove the driveshaft - stub axle - disc assembly.

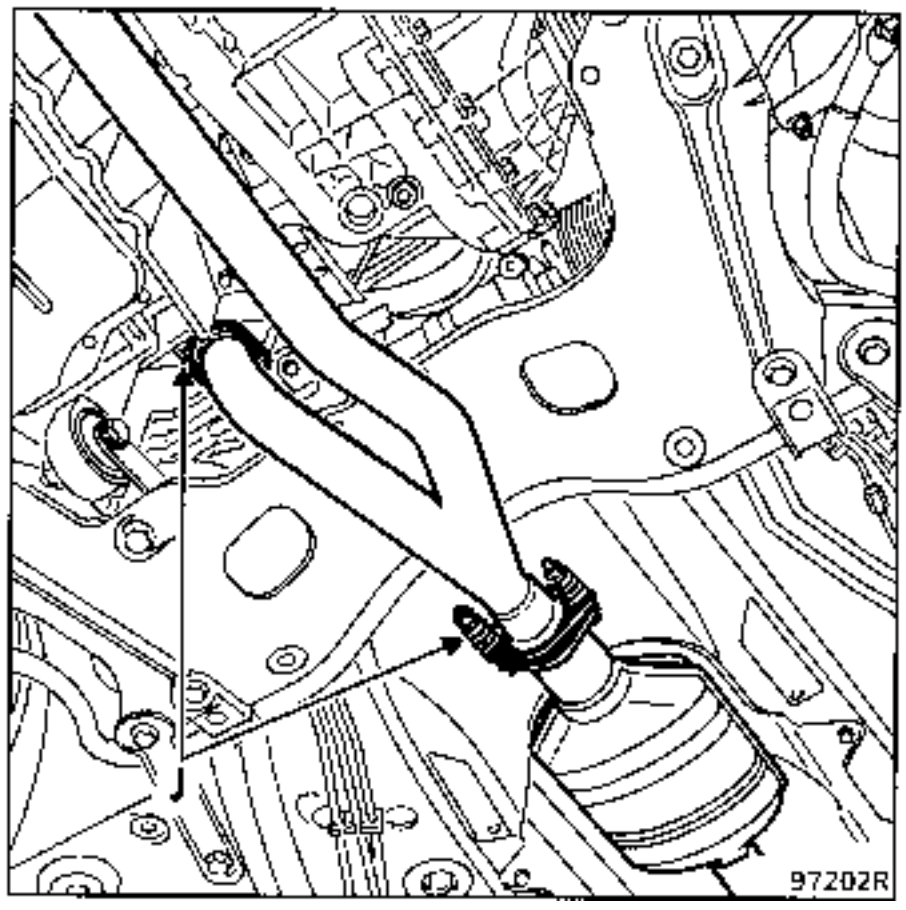




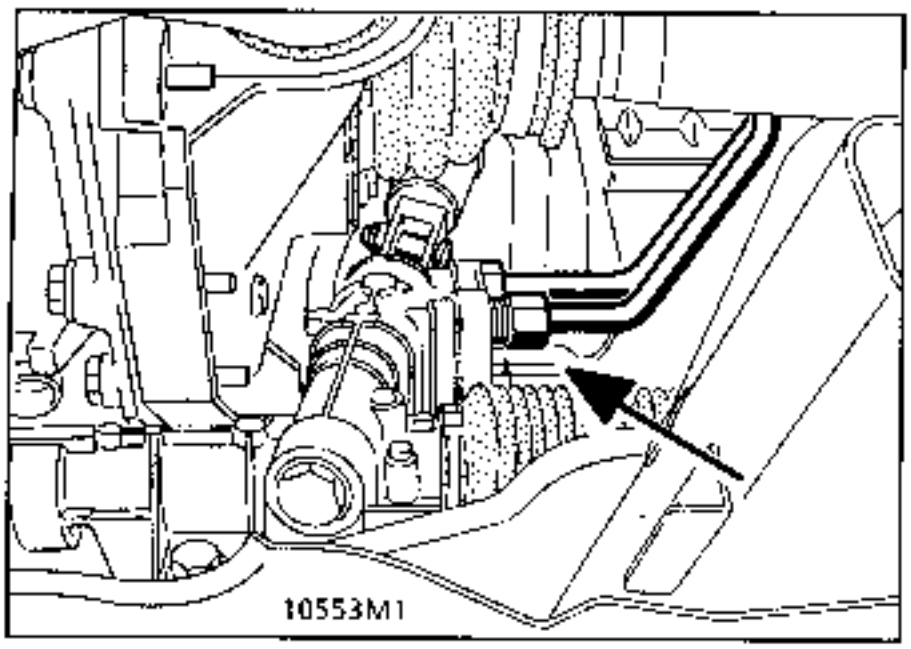
IMPORTANT :protect the driveshaft gaiters and avoid any impacts.

Remove the dual exhaust pipe.

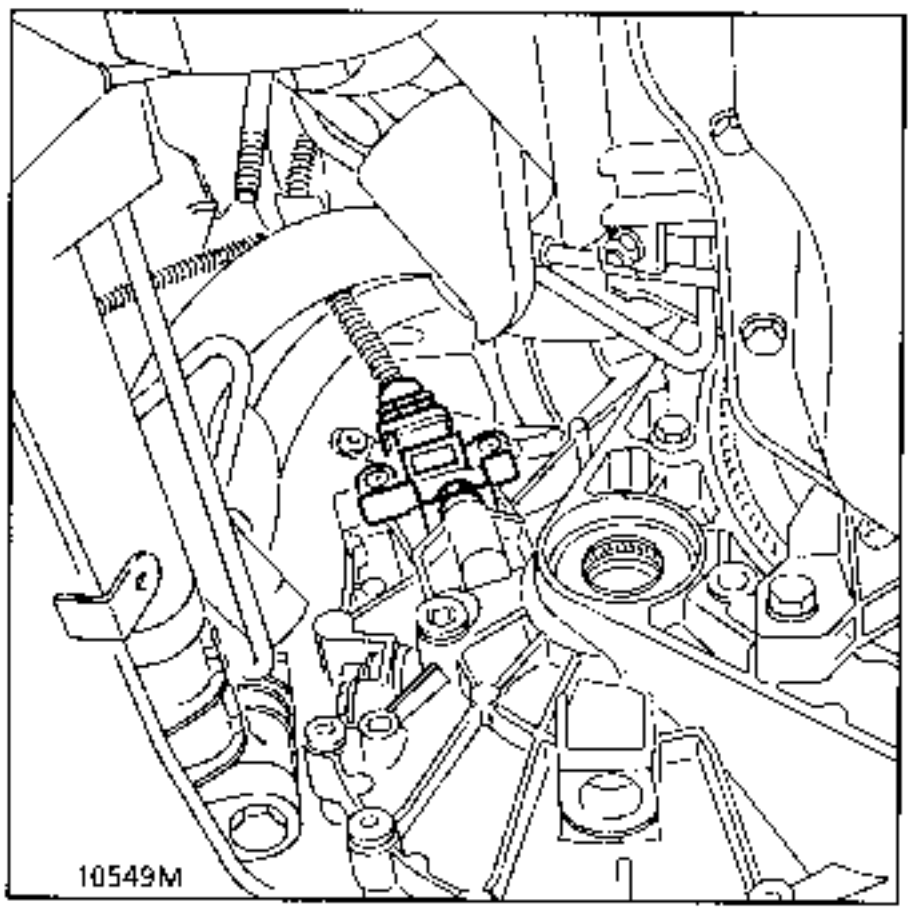




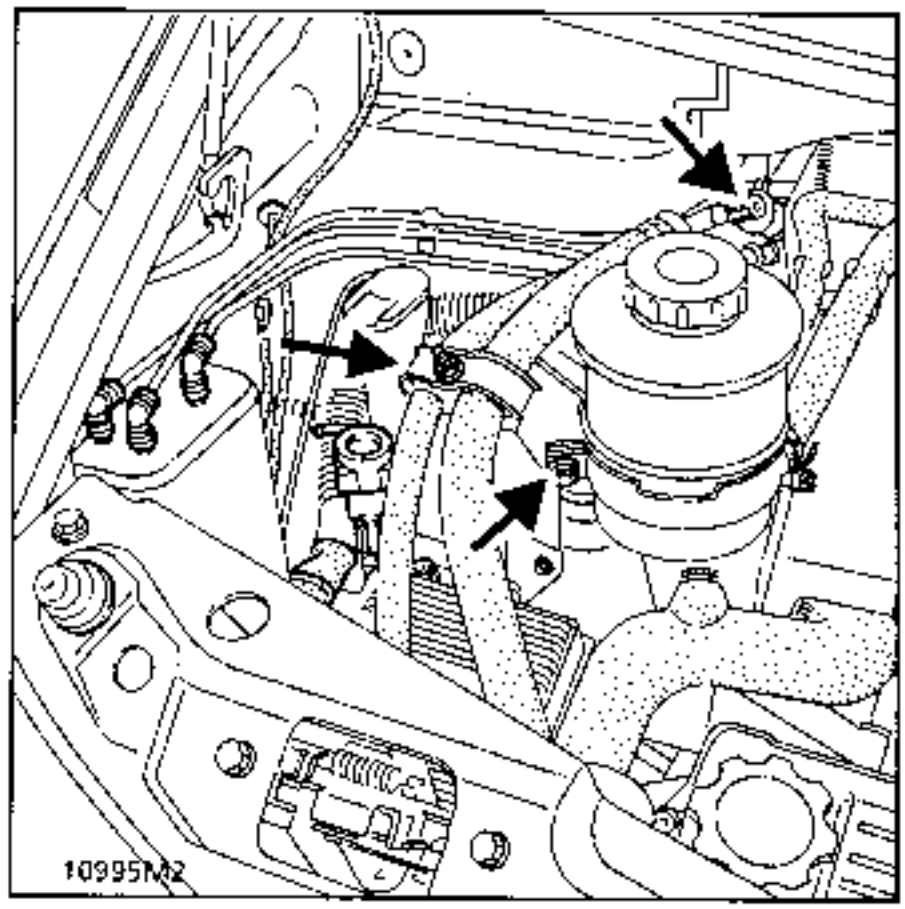
Remove the engine tie bar bolt and the earth strap from the gearbox.
Drain the power assisted steering circuit at the cooler under the body.
Disconnect the high pressure pipe for the power assisted steering at the steering rack (take precautions to catch the oil which will run out) using tool **DIR 1282-01**



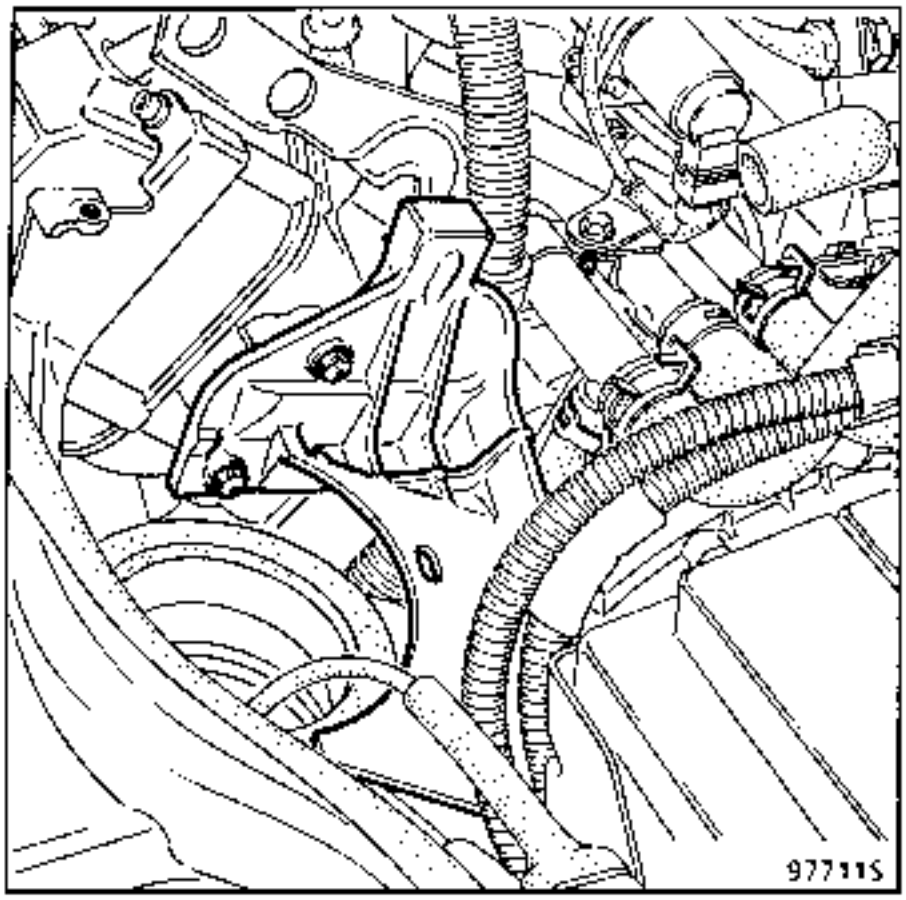
Disconnect the speedo socket on the gearbox.



Remove the mounting for the AC circuit pipes on the right hand suspended mounting.
Remove the PAS reservoir support and set it on the engine.
Disconnect the AC low pressure pipe at the bulkhead (see Section 62).
Remove without cutting the 3 plastic clips which secure the injection computer wiring on the bulkhead.

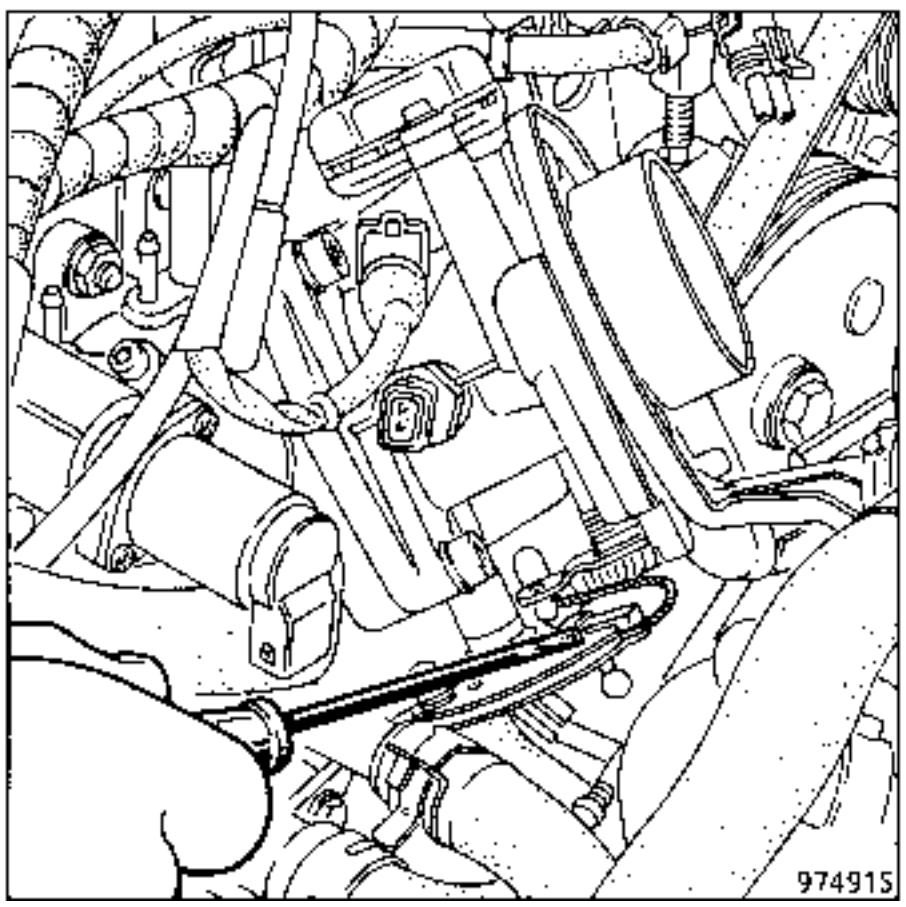


Disconnect the automatic transmission computer wiring clips; fold the wiring over onto the engine. Remove the air intake sleeve together with its aluminium mounting.



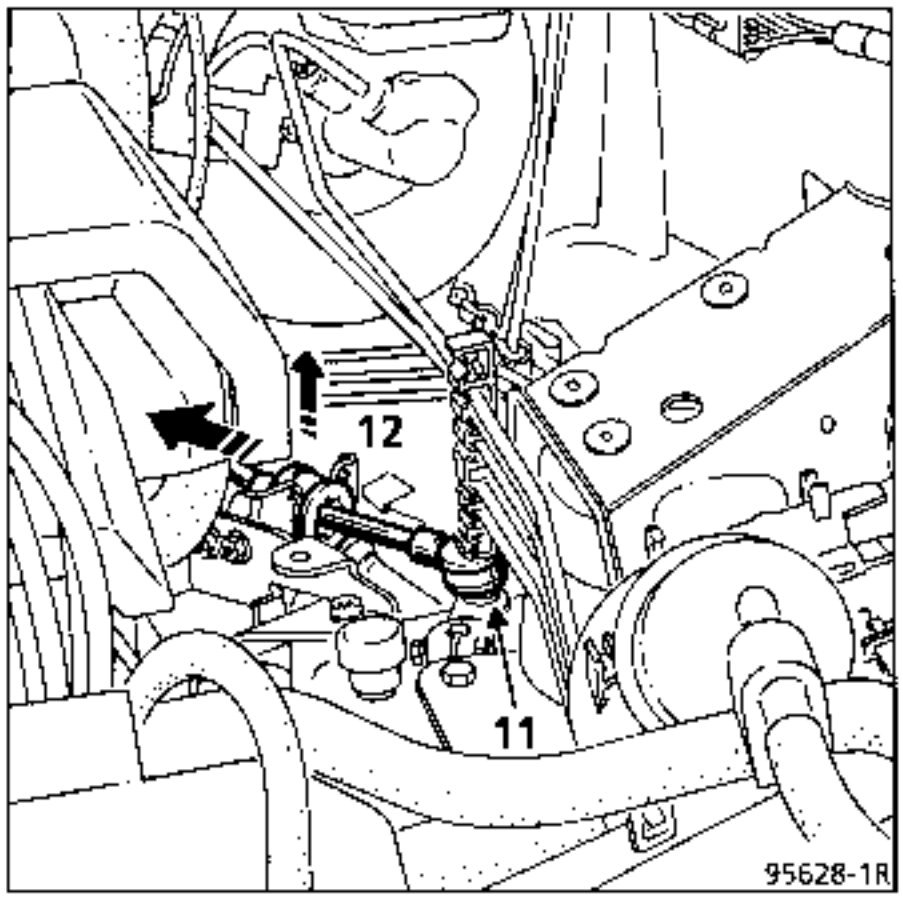
Remove the cover on the inlet manifold.

On the left hand side.
Disconnect the accelerator cable from the throttle: to do this, release the accelerator retaining clip using a screwdriver.



Remove the mounting bracket for the power assisted steering high pressure pipe above the automatic transmission control ball joint.

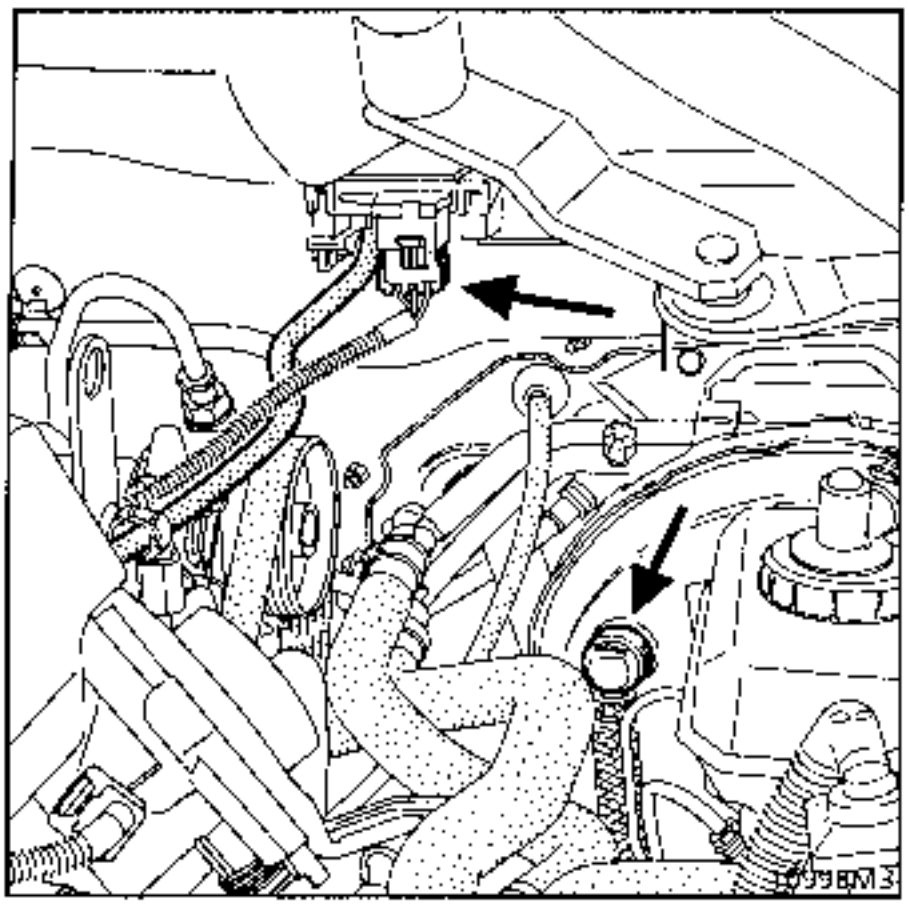
Disconnect the automatic transmission control cable : first disconnect the ball joint (11), retain the pin and release the cable sleeve by pushing towards the bulkhead.



Disconnect the heater matrix pipes from the engine (take precautions to catch the fluid which will run out).

IMPORTANT: if the quick release unions are difficult to unclip, push on the union, pressing the releasing tabs before pulling. Do not deform the rigid pipes on the bulkhead (see also section 19).

Disconnect the absolute pressure sensor (1 pipe + 1 connector) on the bulkhead at the top left hand side.
Remove the coolant reservoir without disconnecting it; rest it on the engine.
Disconnect the vacuum pipe from the brake servo.



Disconnect the power assisted steering low pressure pipe from the rigid pipe on the bulkhead.

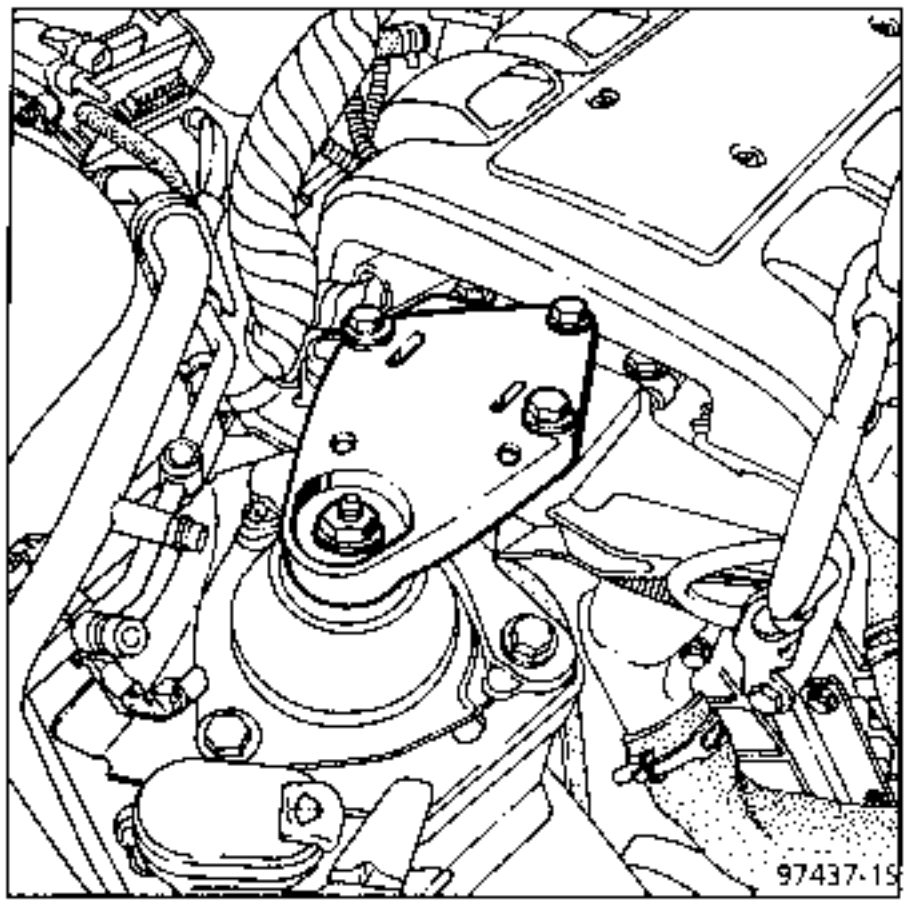
Disconnect the engine wiring in the engine connection unit.

On the right hand side.

Disconnect the canister solenoid valve; disconnect the canister pipe at the right hand suspended mounting.
Remove a fuel pipe mounting bracket on the cylinder head.
Disconnect the fuel pipes.

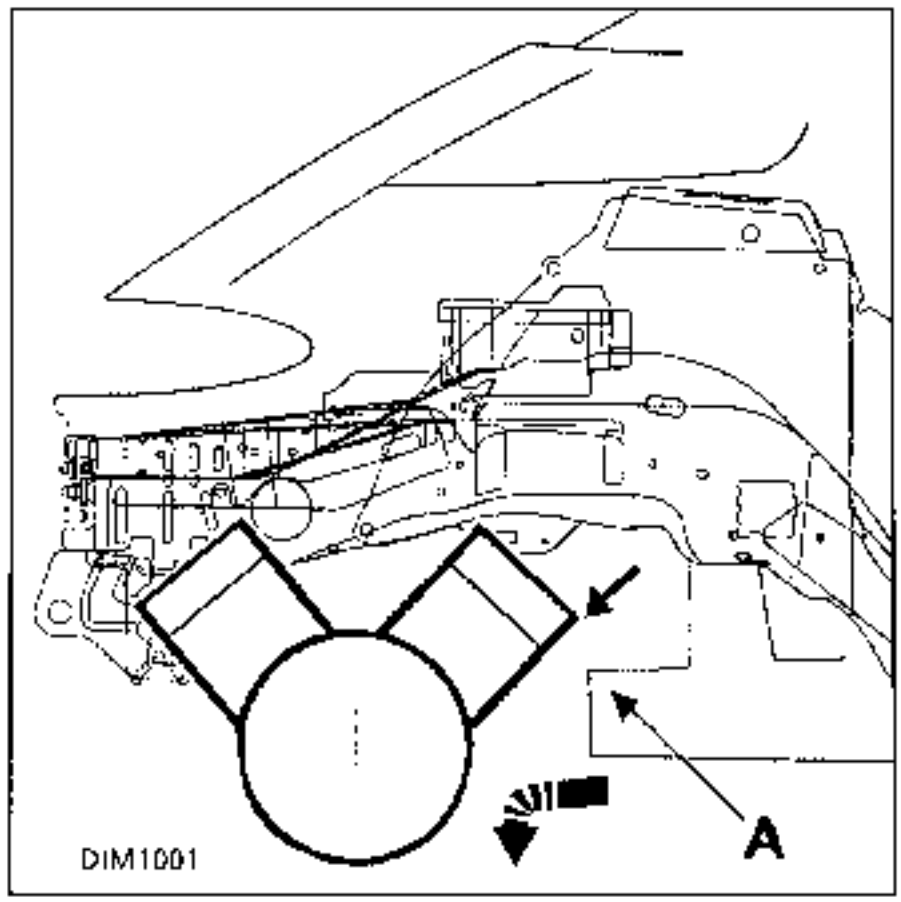
From below:
Disconnect the oxygen sensor.
Prepare the pipes and wiring for the removal of the engine and transmission assembly.
Fit the removal tool and gently lower the vehicle onto it (this operation requires two persons).

Remove the right hand suspended engine mounting cover.



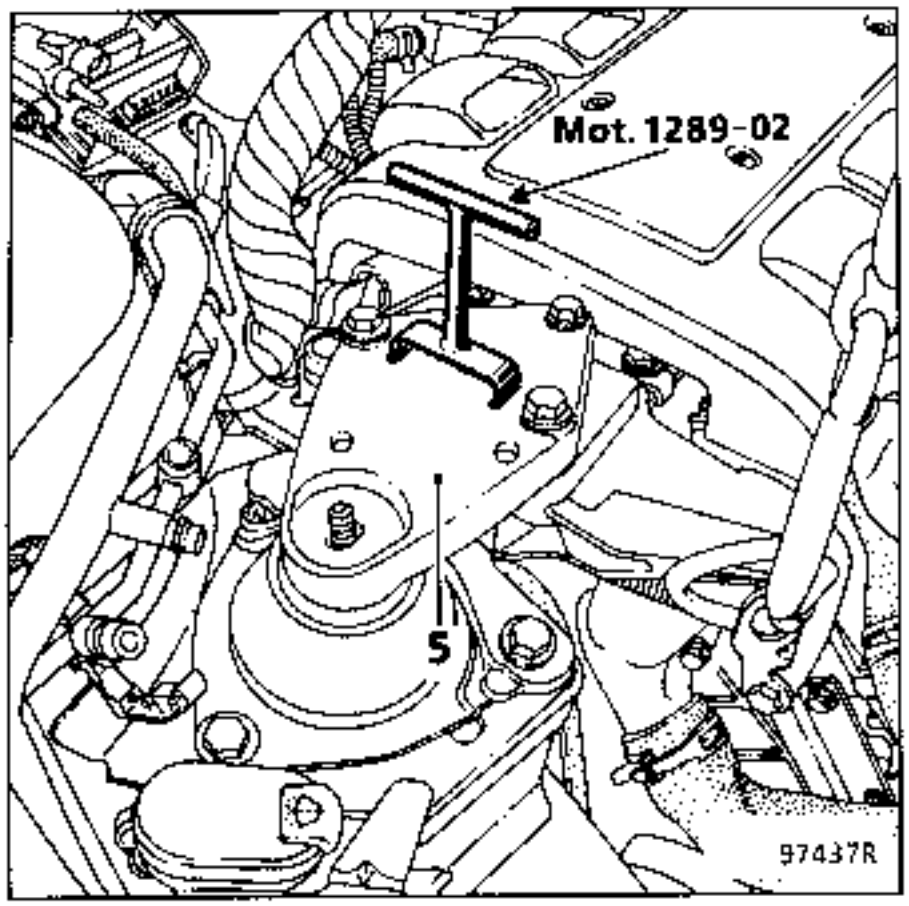
Remove the left hand suspended engine mounting bolts.
Release the engine from the suspended mountings.

Lower the engine and transmission assembly from below, moving it a few centimetres forward.



Take care to ensure the automatic transmission control cable is clear when the engine is removed and avoid interference between the rear cylinder head and the right hand edge of the sub-frame at (A).

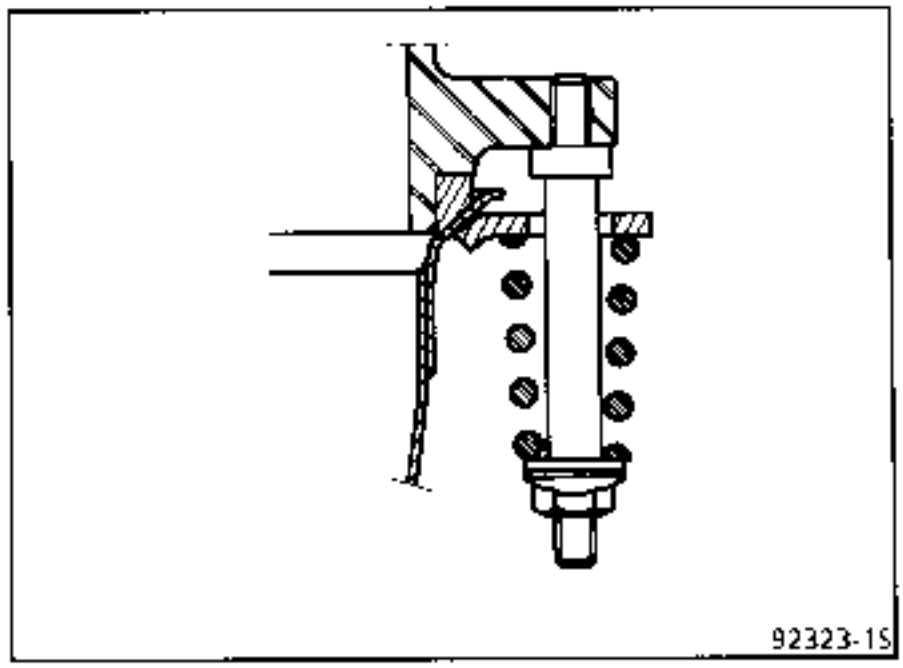
REFITTING:
Refitting is the reverse of removal; adjust the position of the right hand suspended engine mounting movement limiter using tool
Mot. 1289-02



Fill:
- the gearbox with oil,
- top up the engine oil level if necessary
- the power assisted steering circuit
- the cooling circuit and bleed it ,
- the air conditioning circuit (depending on version).

Adjust the accelerator cable.

Tighten the exhaust flange and fit the spring assembly.

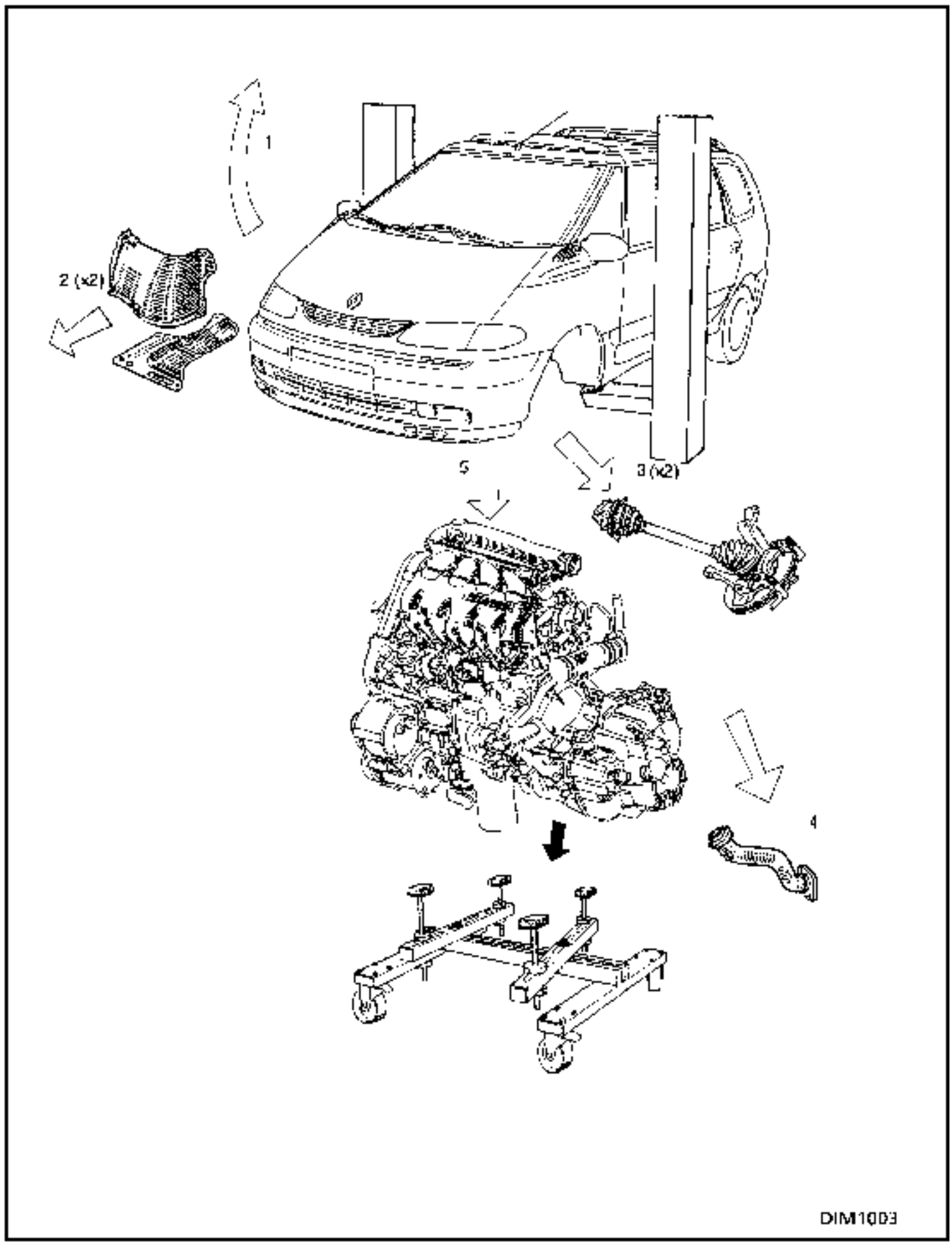


IMPERATIVE : tighten to the stop

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

VERY IMPORTANT : REMEMBER TO VALIDATE FULL LOAD AND NO LOAD, to reprogramme the load potentiometer travel into the AT computer (see corresponding section).

Removing - refitting the engine and transmission assembly G8T TURBO - PK1



This is carried out on a 2 or 4 post lift, without removing :
- the front sub-frame,
- the bumper,
- the front panel,
- the cooling assembly.

SPECIAL TOOLING REQUIRED	
Mot. 1289 -01	Centring fork for suspended engine mounting limiter
Mot. 1202	Hose clip pliers
Dir. 1282-01 + 02	Wrenches for slackening steering rack unions
Tav. 476	Ball joint extractor

MATERIALS REQUIRED

Impact ball joint extractor
Safety pads
Tooling for separating refrigerant fluid unions NAUDER 7240 and 7242
Universal adjustable support tool

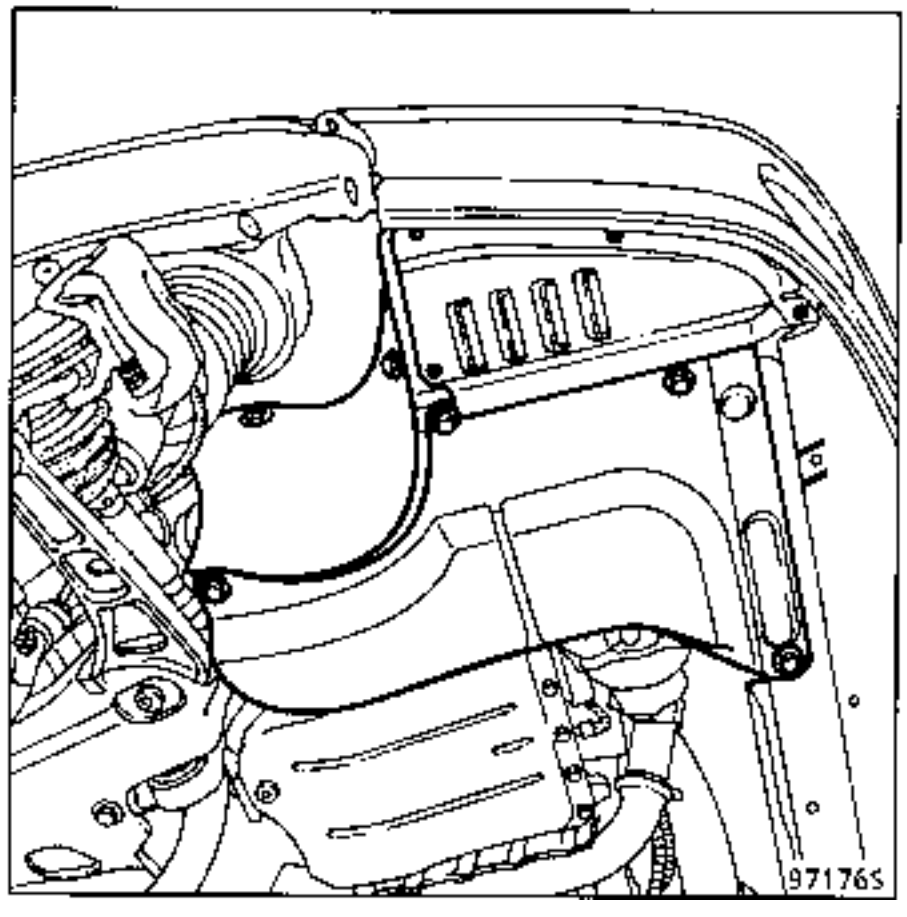
TIGHTENING TORQUES (in daN.m) ▽	
Shock absorber base mounting bolts Ø M16 × 200	20
Lower ball joint nut	6.5
Driveshaft gaiter mounting bolt	2.5
Track rod end nut	4
Wheel bolts	10
Engine tie bar bolt	12 to 18
Suspended mounting bolt on gearbox	5.5 to 6.5
Upper mounting nut for suspended mounting pad on front left hand side member	5.5 to 8
Lower mounting nut for suspended mounting pad on front left hand side member	10 to 12.5
Pad mounting bolt on front left hand side member	6 to 8
Mounting bolt on engine for front right hand suspended mounting cover	4.8 to 6.5

Put the vehicle on a 2 post lift with safety pads.

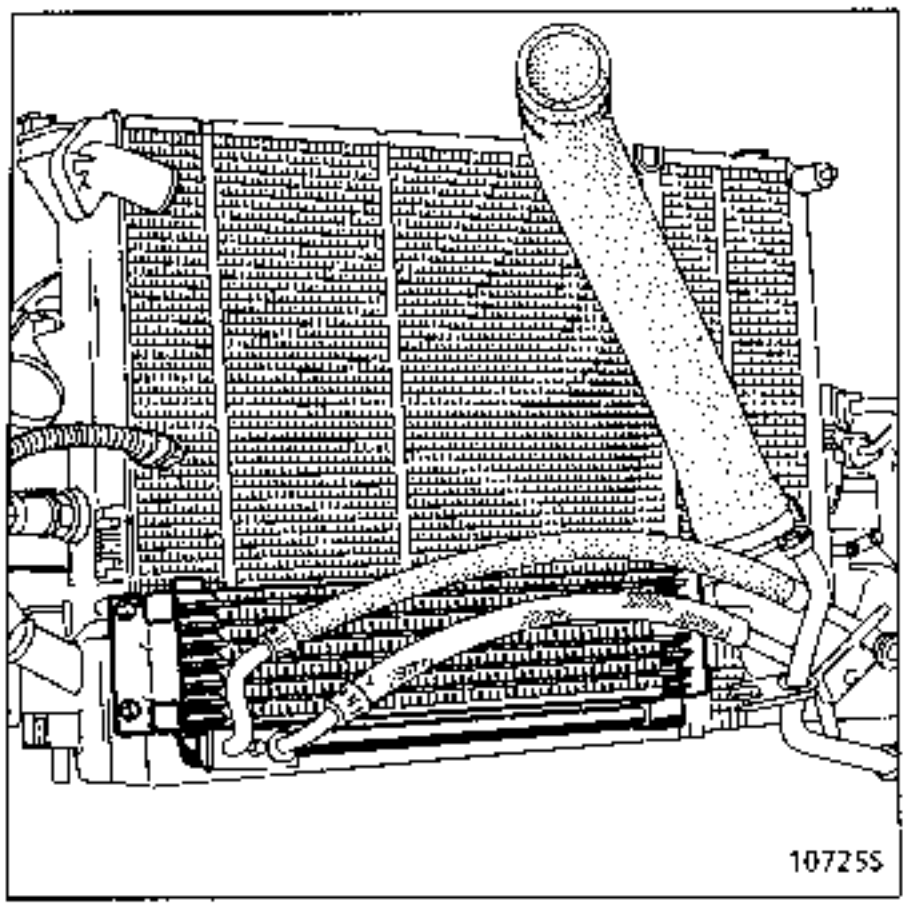
Remove the battery.

Drain the engine oil and gearbox oil then refit the plugs with new seals.

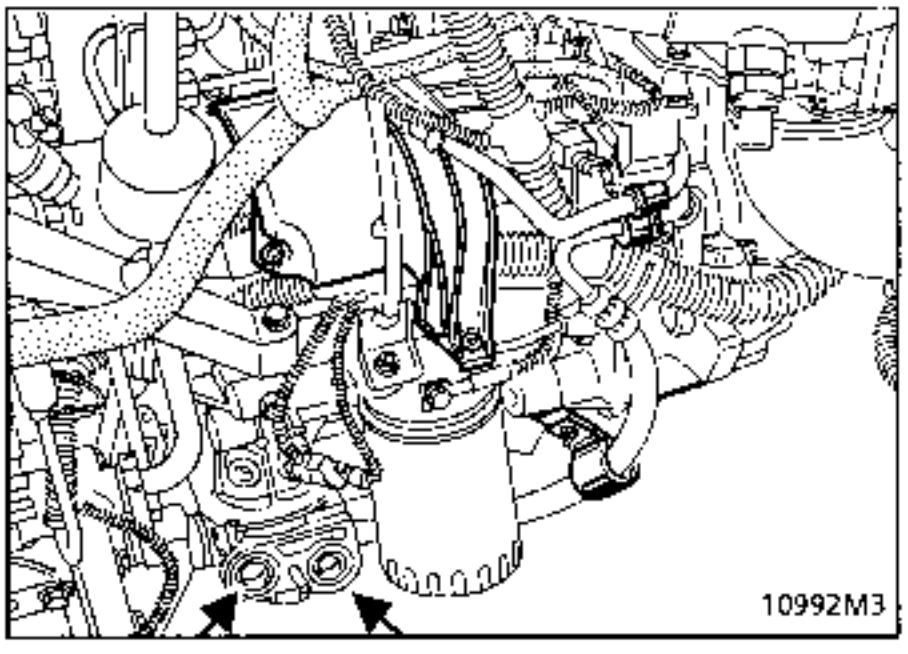
Remove:
- the engine undertrays,
- the wheel arch protectors,



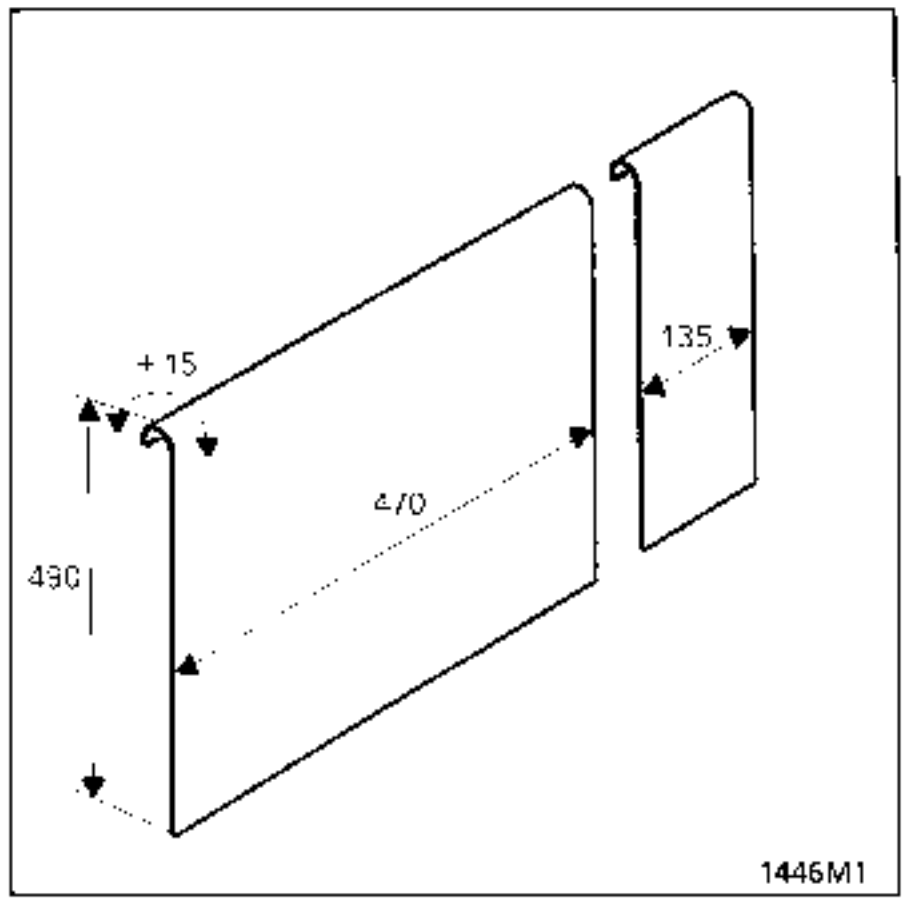
Remove the oil cooler, separating it from the radiator.



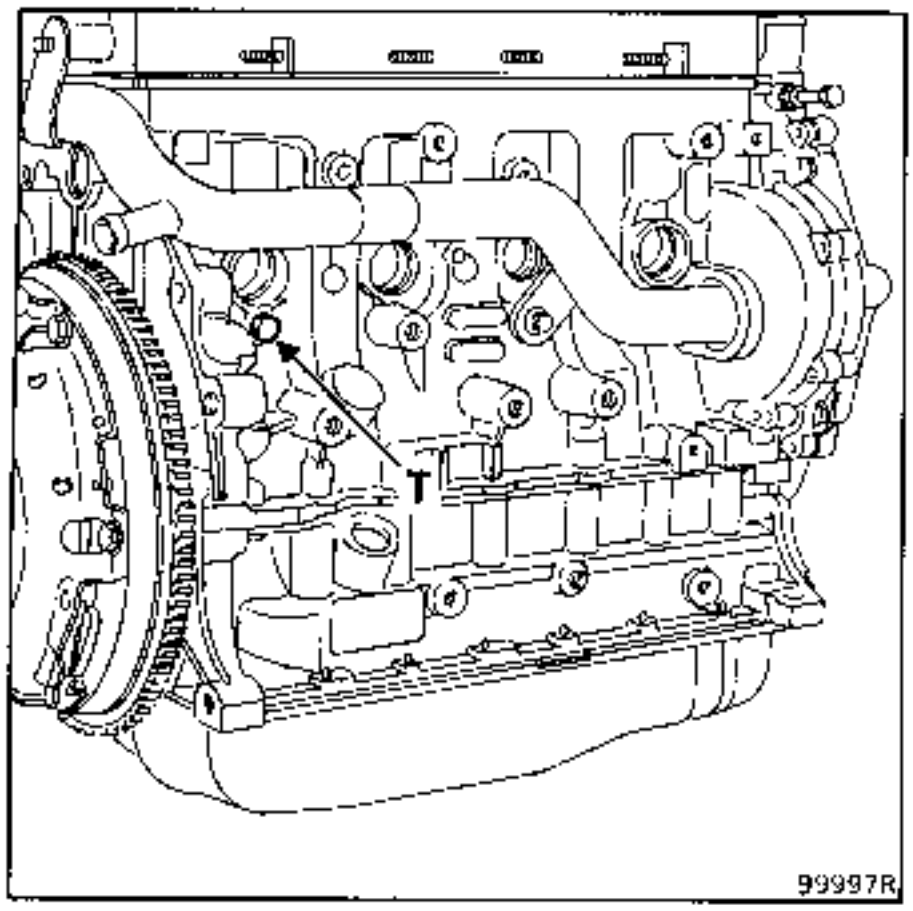
Slacken the mounting flange for the oil exchanger pipes at the oil filter mounting (renew the seals on refitting).



Fit a locally made tool to protect the radiator as shown below.

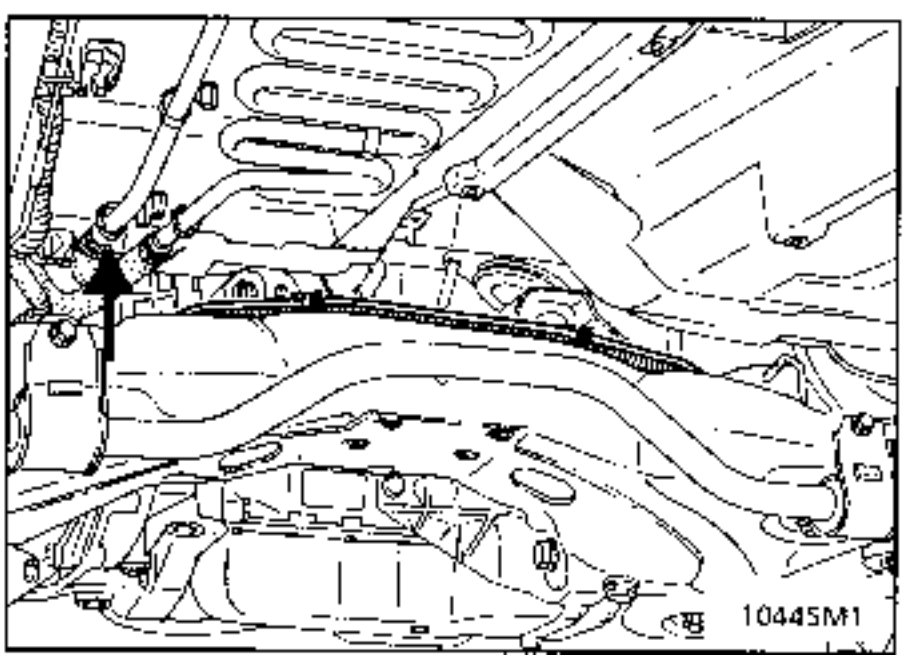


Drain :
- the coolant from the engine at the engine block (T),

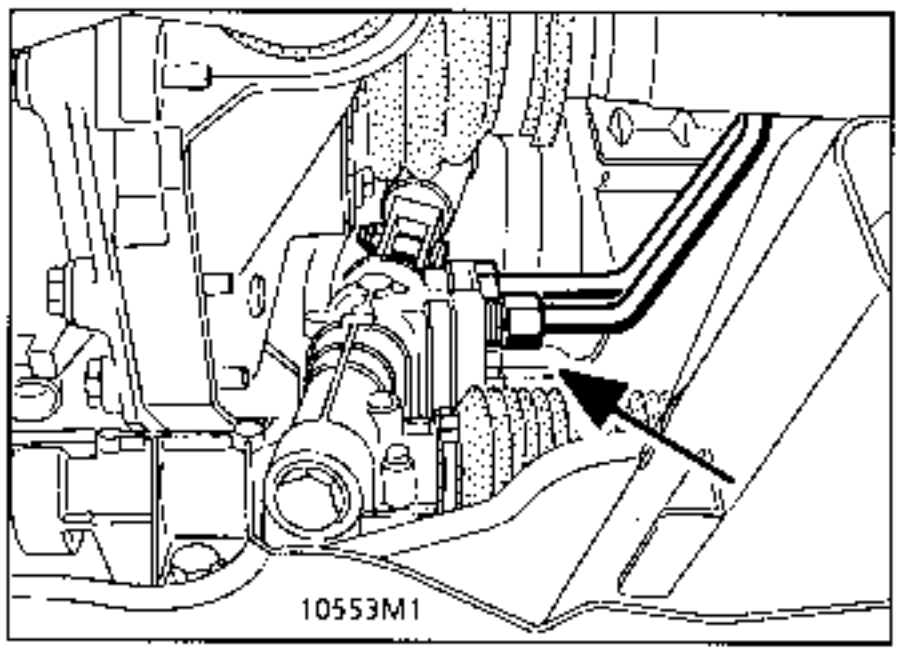


- the refrigerant circuit (if fitted) using the filling station equipment.

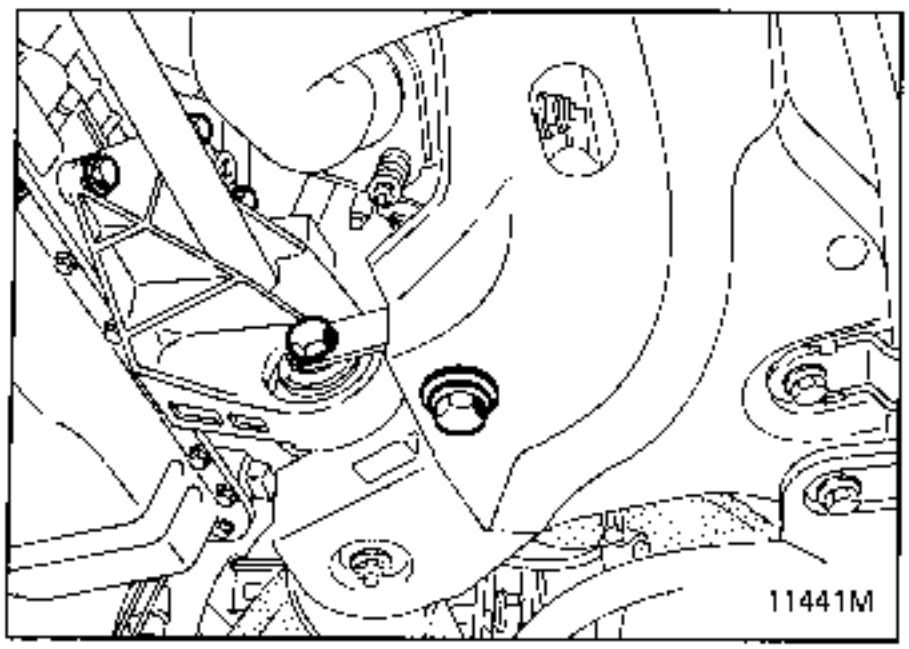
- the power assisted steering circuit (disconnect the left hand pipe from the radiator under the body).



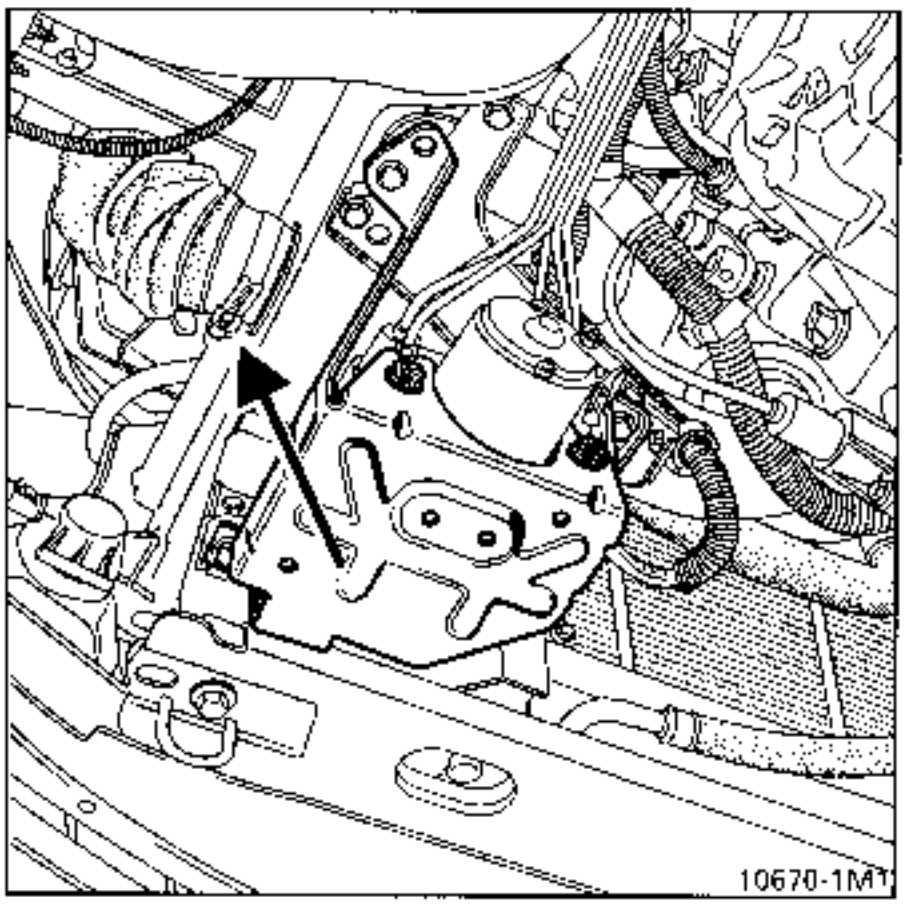
Disconnect the lower power assisted steering pipe and high pressure pipe from the steering rack (Tools Dir.1282-01).



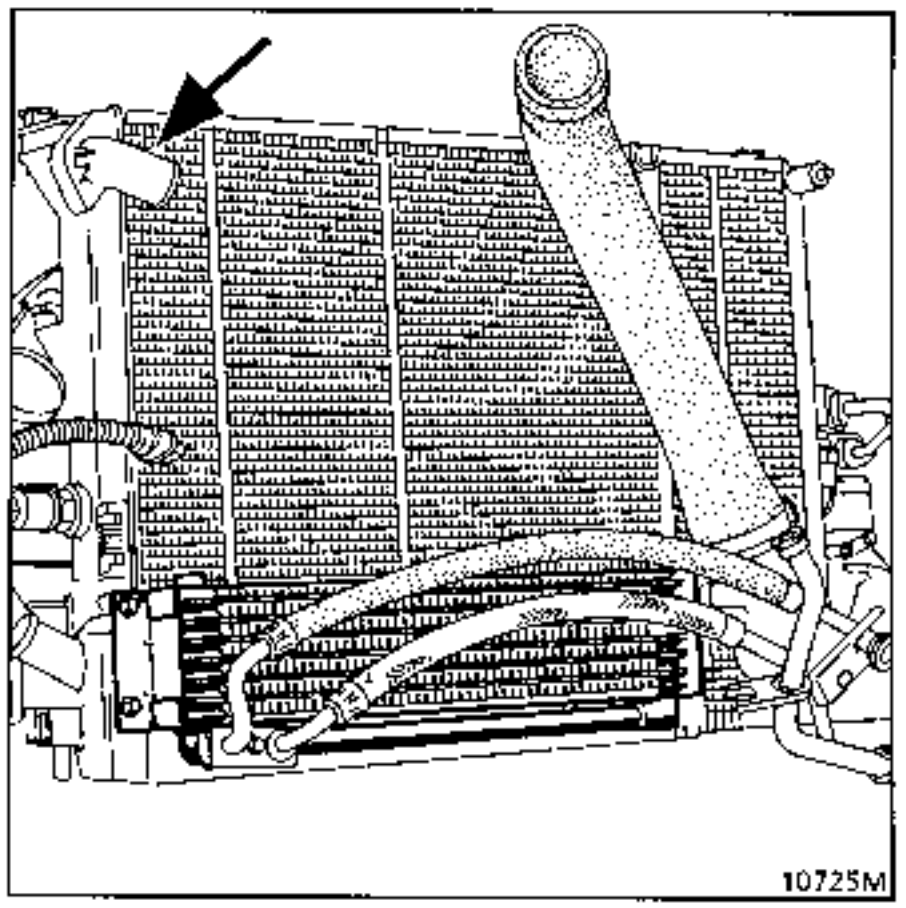
Completely remove the engine tie bar.



Remove:
- the exhaust outlet pipe,
- the rigid plastic air inlet pipe to the air / air exchanger,
- the clip for the air intake sleeve across the side member.



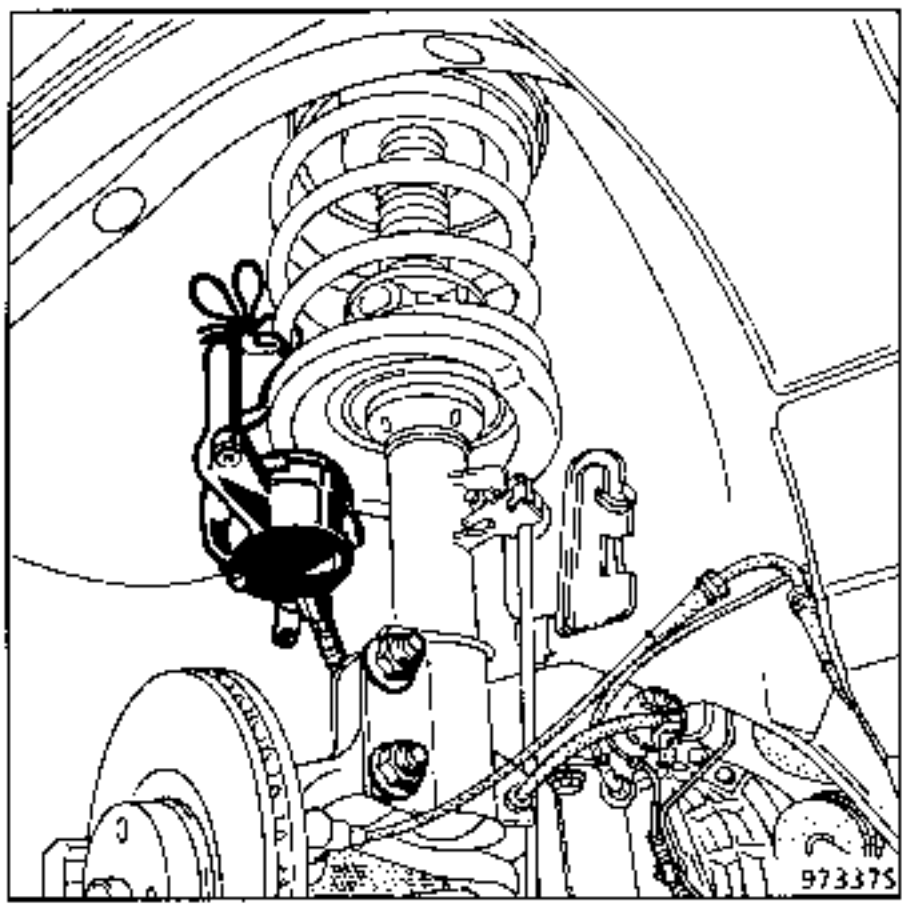
Disconnect the coolant hose from the bottom of the radiator (prevent fluid running onto the ABS unit) .



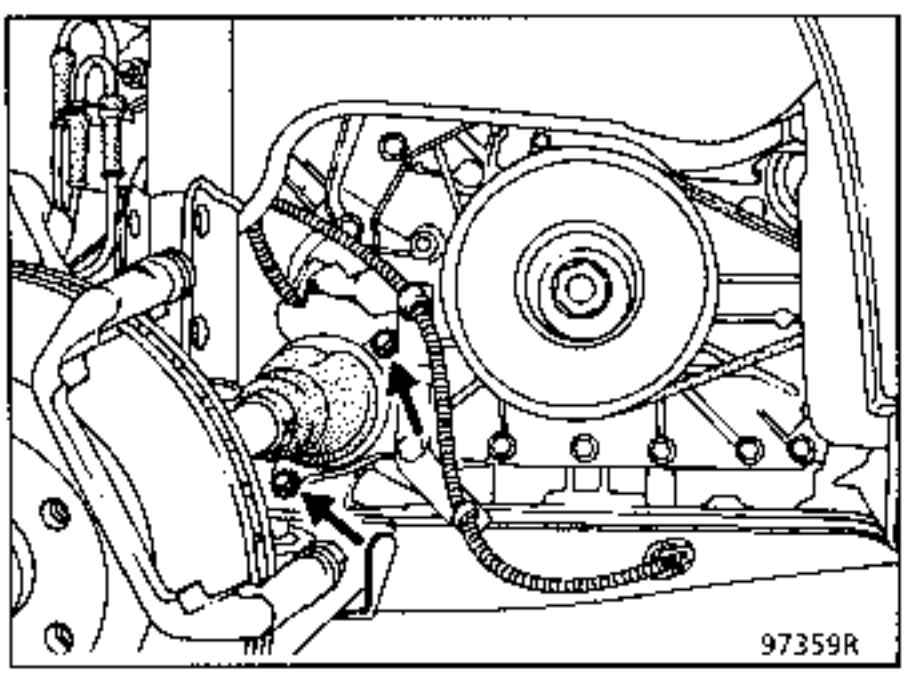
REMOVING THE DRIVESHAFTS:

Right hand side of the vehicle

Remove:
- the front right hand brake caliper, securing it to the suspension spring to protect the pipe.



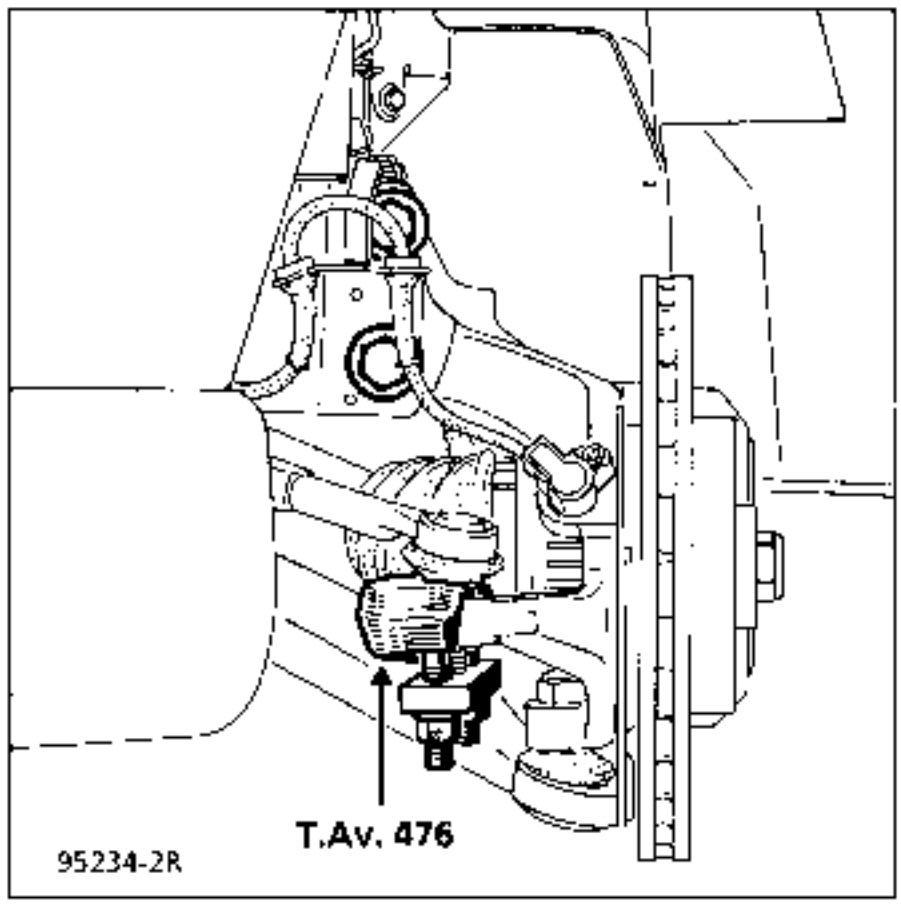
- the two mounting bolts for the driveshaft flange on the relay bearing.



- the track rod end using tool T. Av. 476,

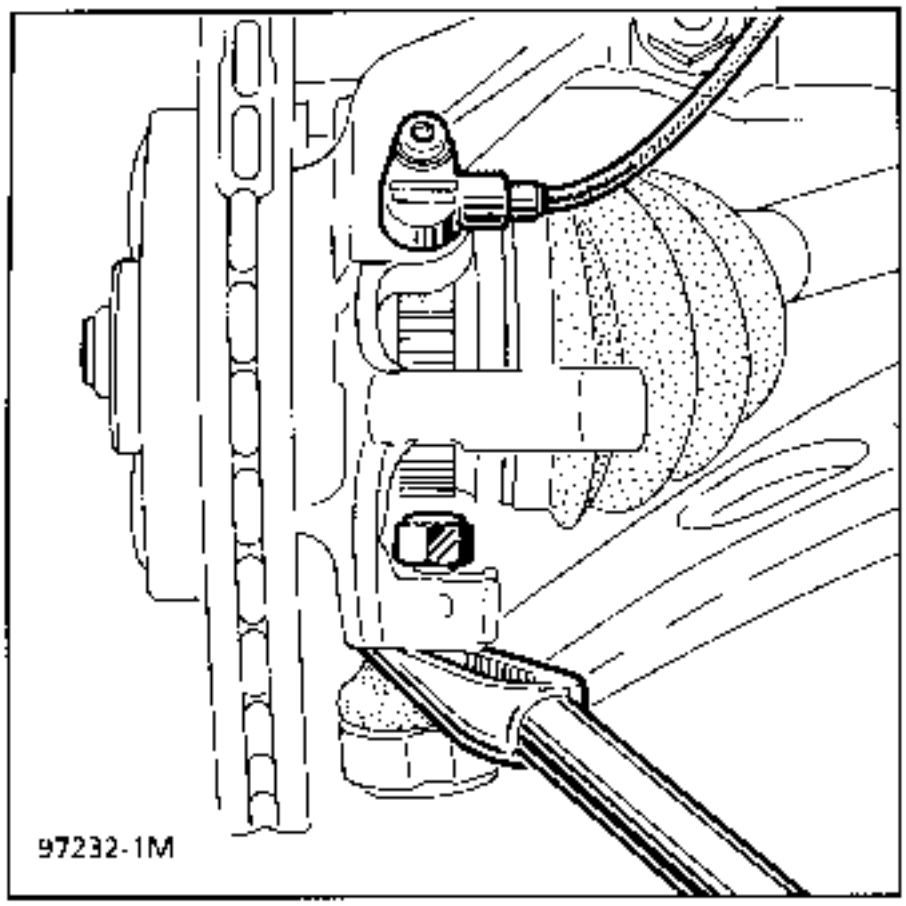
Release the brake pad wear warning light wire.
Disconnect the ABS target sensor.

Remove the shock absorber base bolts.

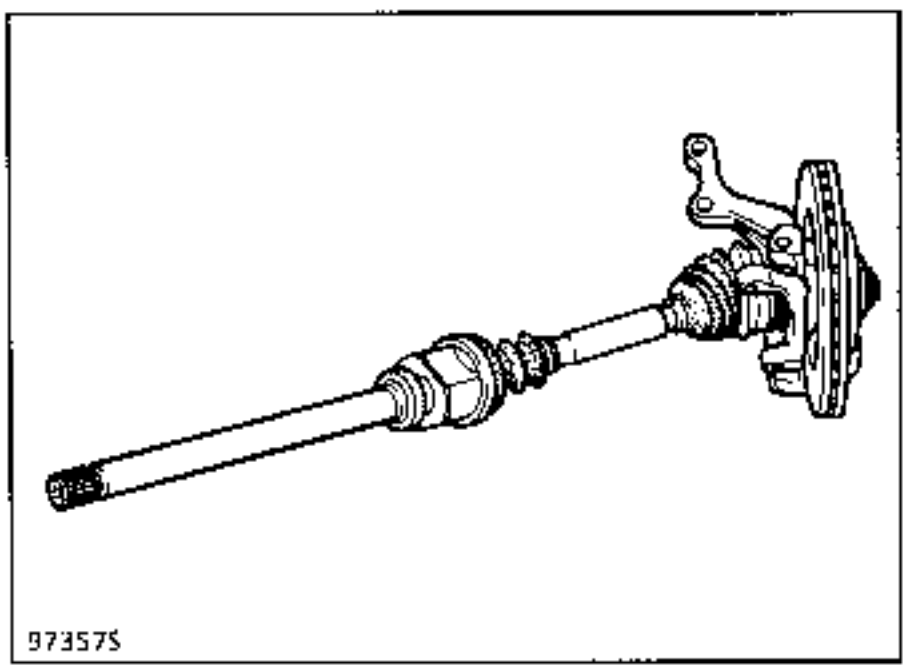


– the wheel sensor if the vehicle is fitted with ABS,

Slacken the lower ball joint nut as far as possible and release the ball joint using an impact ball joint extractor.



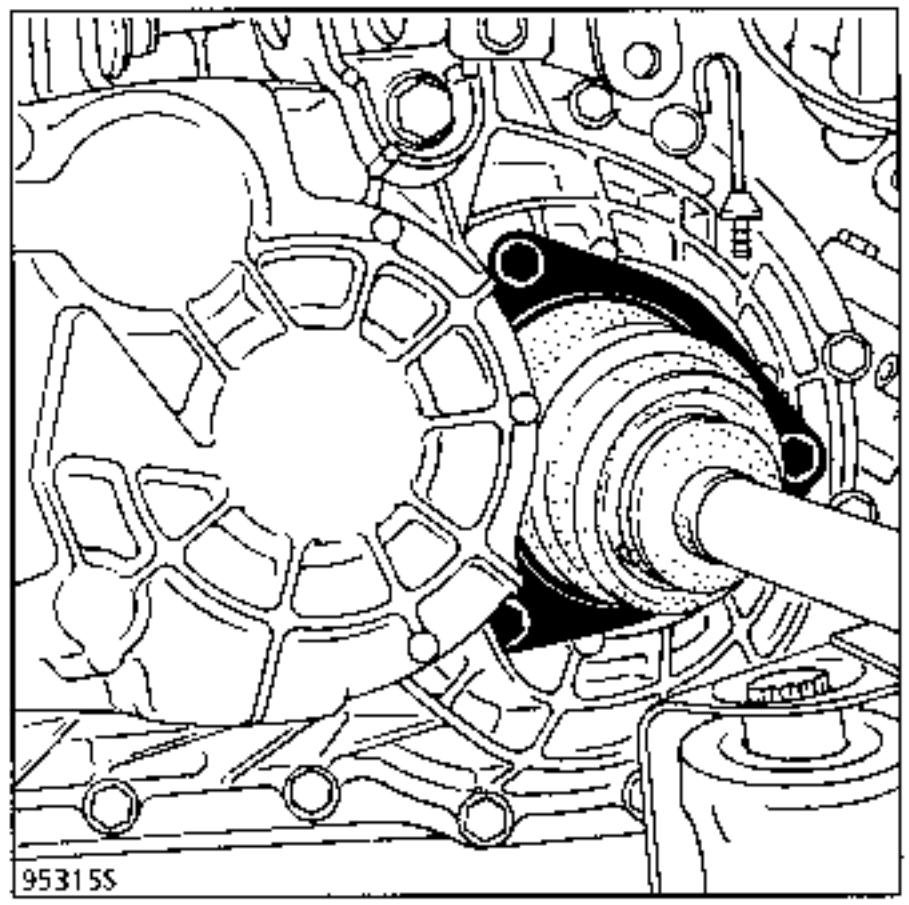
Remove the hub assembled with the driveshaft.



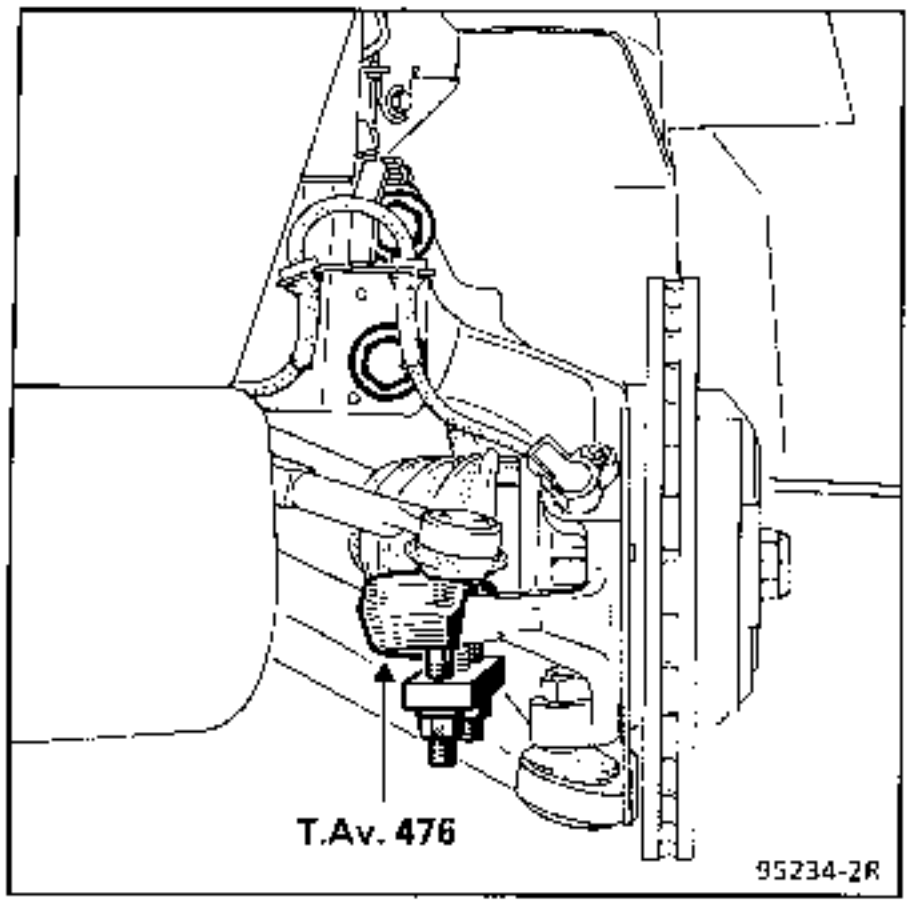
Take care to protect the gaiters.

Left hand side of the vehicle.

Remove:
– the brake caliper (attach it to the suspension spring),
– the three driveshaft gaiter mounting bolts.



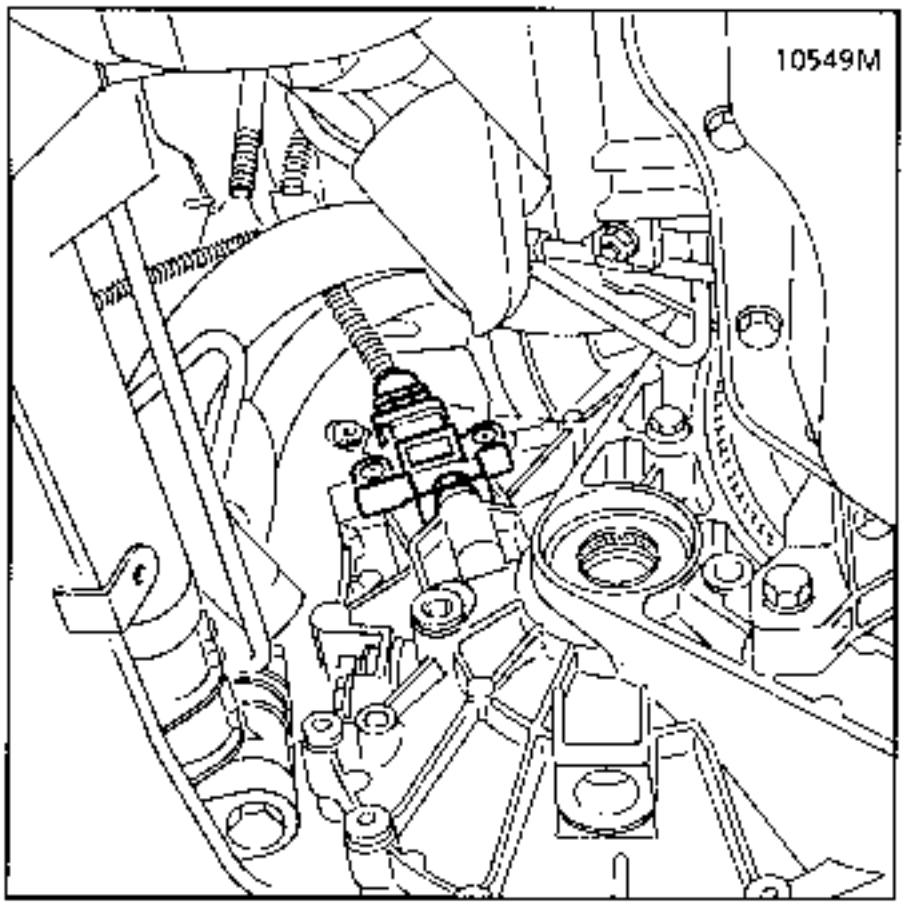
– the track rod end using tool T. Av. 476,
Release the brake pad wear warning light wire.
Disconnect the ABS target sensor.
Remove the shock absorber base bolts.



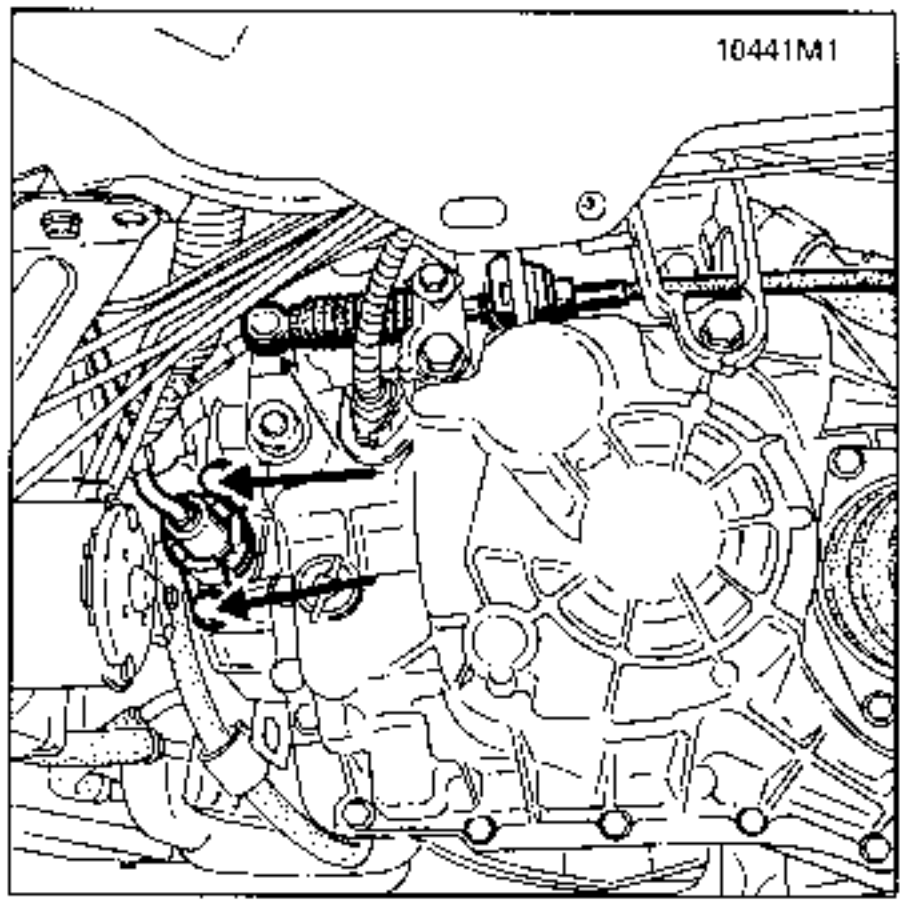
Release the lower ball joints and track rod ends.
Remove the stub axle - disc - driveshaft assembly.

Disconnect the earth strap from the gearbox.

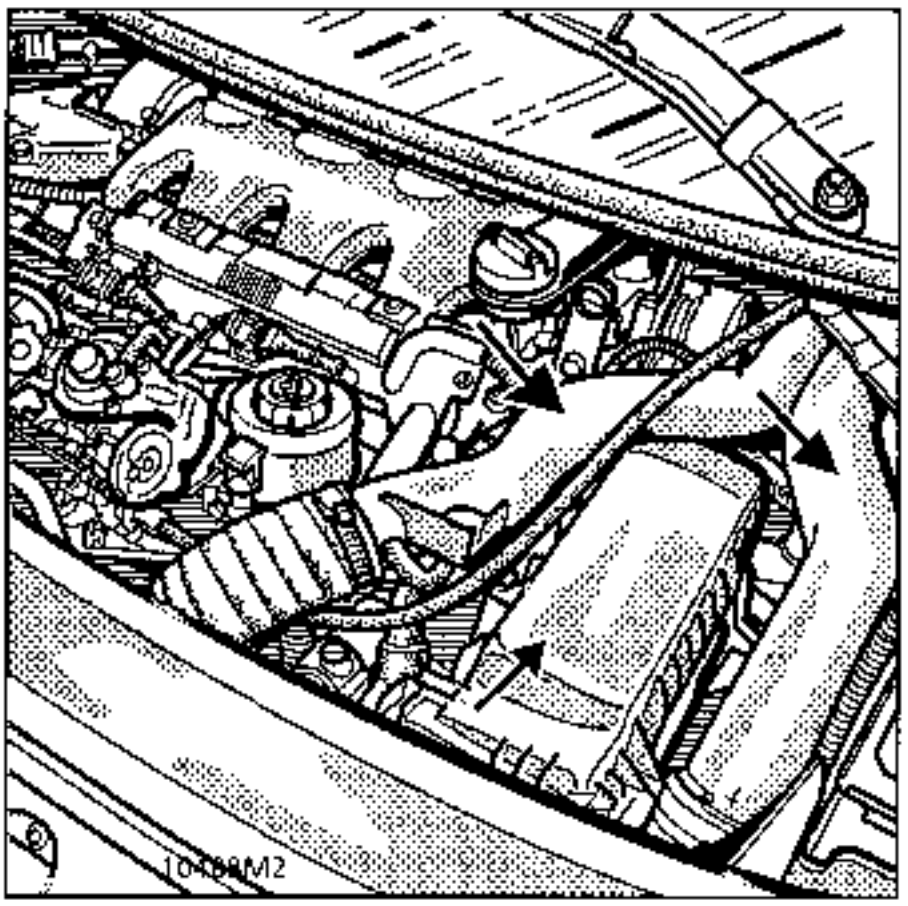
Disconnect the speedo sensor from the rear of the gearbox.



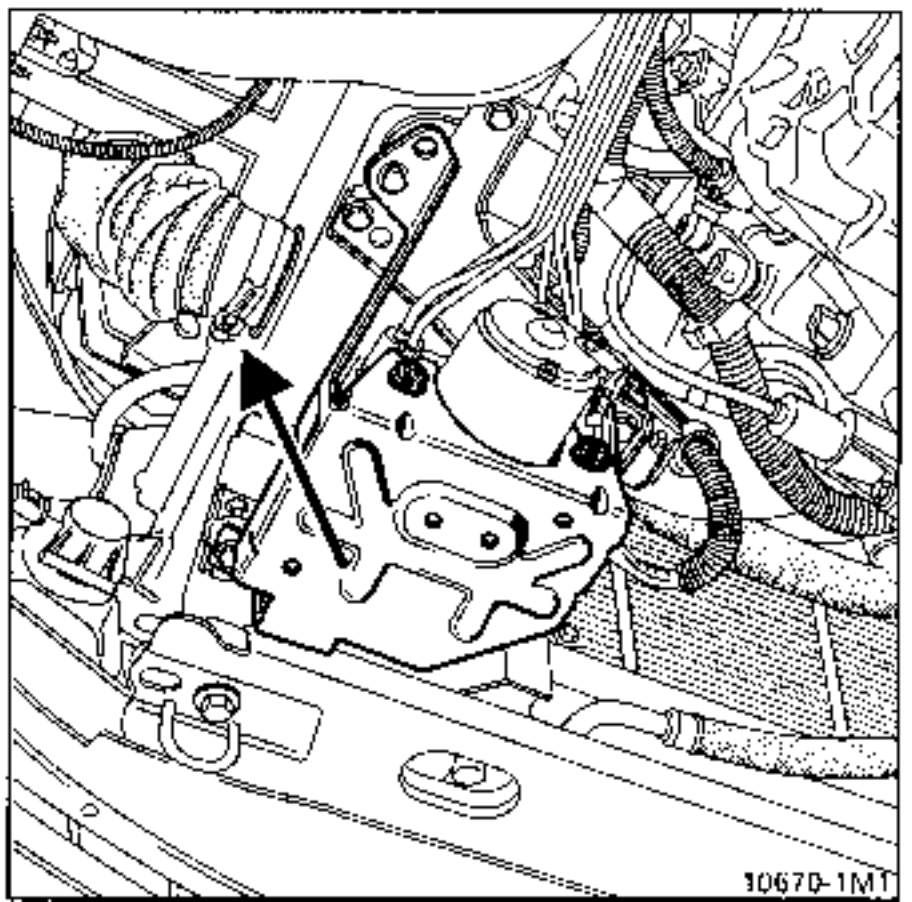
Unclip and partially release the gear selection cable.
Separate the clutch slave cylinder from the gearbox (2 bolts).



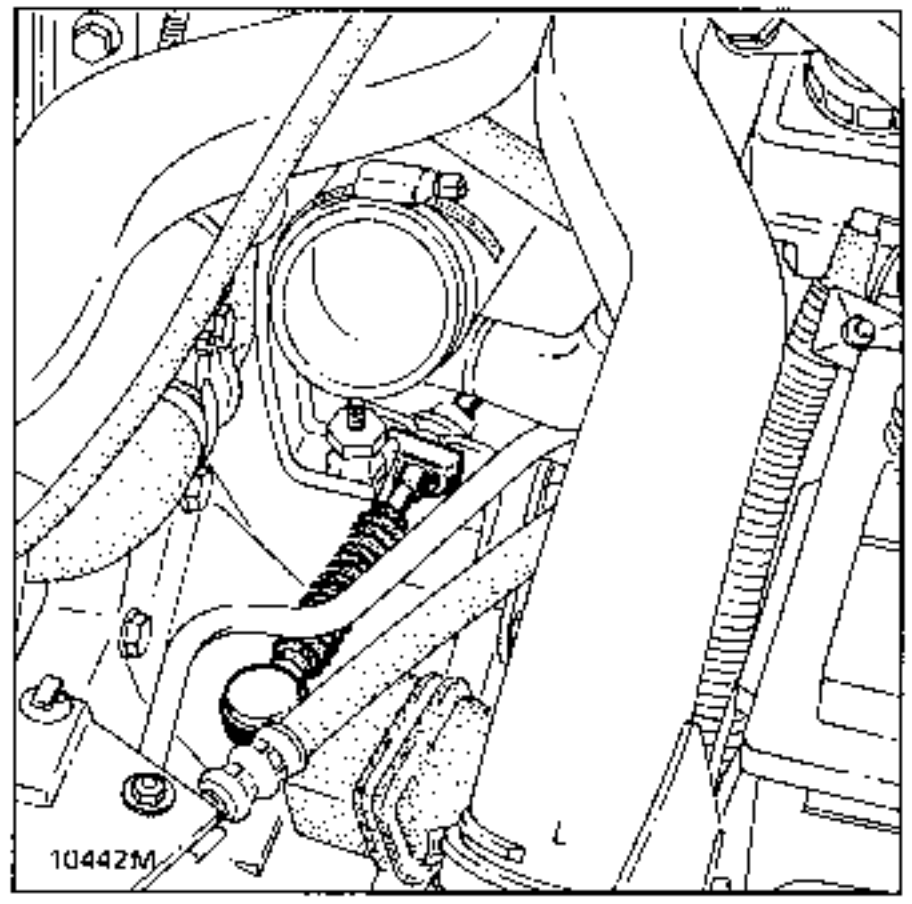
Lower the vehicle.
Remove:
- the air intake sleeve mounted on the headlight carrier cross member,
- the rubber pipe between the air / air exchanger and the inlet manifold,
- the plastic pipe between the turbocharger and the exchanger,
- the rubber pipe between the turbocharger and the exchanger,
- the air filter,
- the air filter mounting,
- the air filter mounting aluminium supports.



Remove the intermediate air intake sleeve on the side member.



Disconnect the vacuum pipe from the brake servo.
Disconnect the EGR solenoid valve pipes.
Release the gear changing cable.



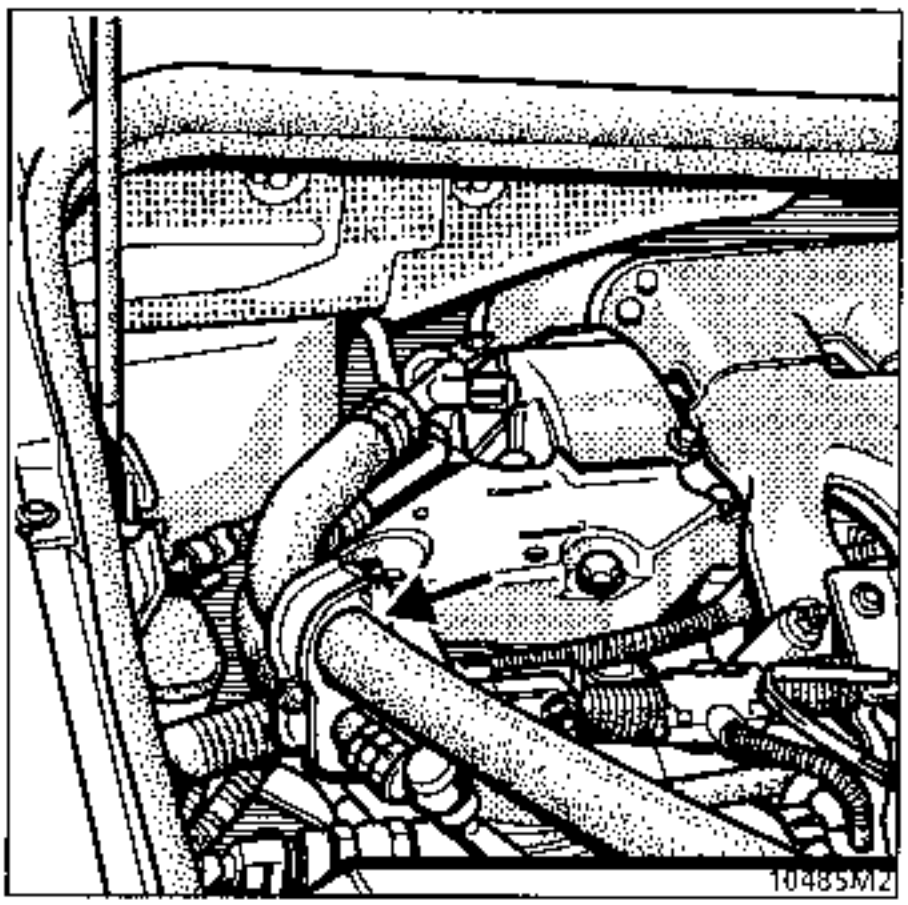
Disconnect the accelerator cable.

Disconnect the heater matrix pipes.
Open the engine connection unit and disconnect the connectors and relays terminating the engine wiring.

Release the upper coolant hose on the radiator.

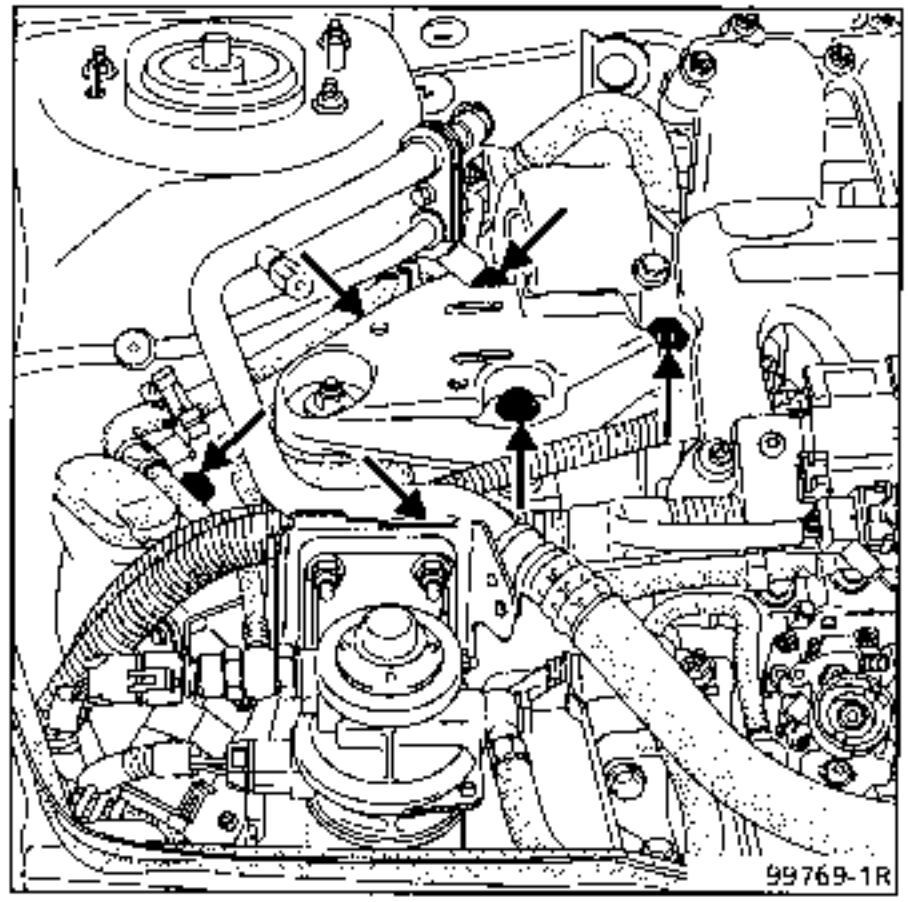
On the right hand side

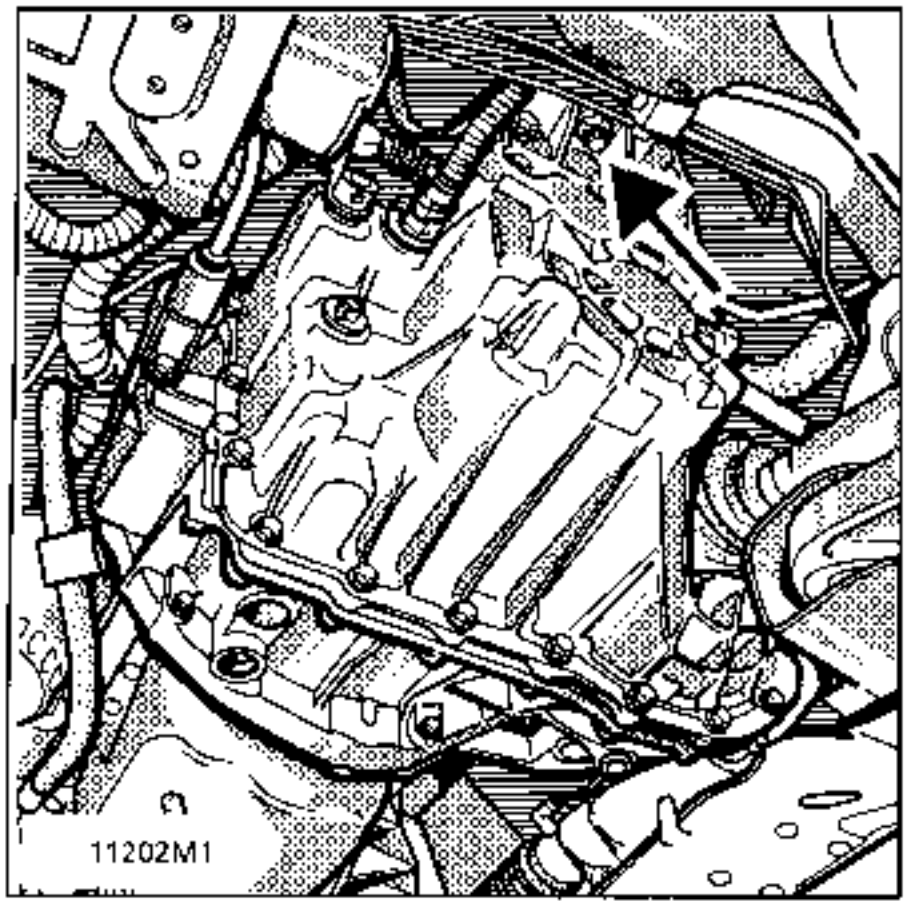
Slacken the injection computer mounting on the right hand wing.
Remove the AC pipes mounting clip on the diesel fuel filter (to allow the computer to pass).
Cut the 2 plastic clips which retain the electric wiring on the turret.
Disconnect the diesel fuel heater.

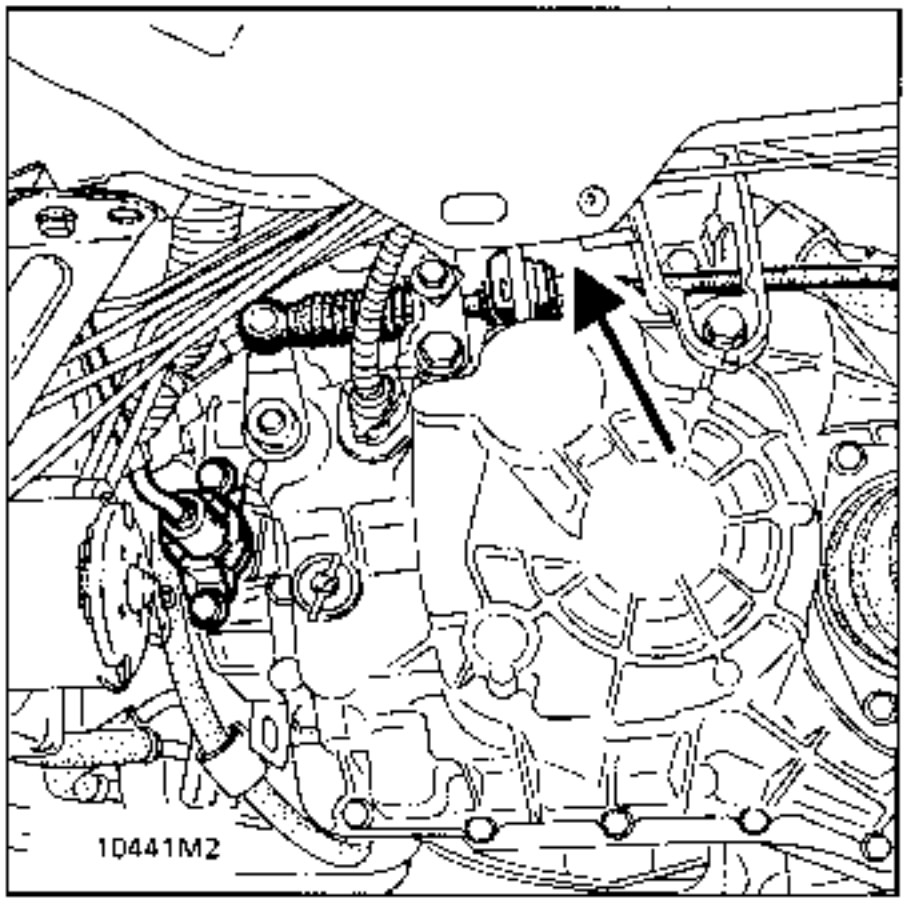


Disconnect the diesel supply / injection pump union.
Disconnect the diesel return union to the fuel tank on the shock absorber turret.
Pass the computer under the AC pipes and attach it to the engine.

Lift the vehicle
Fit the universal support tool and lower the engine onto the tool (2 persons required)
Remove the cover from the right hand suspended engine mounting (4 bolts) and the movement limiter.
Remove the lower nut from the left hand suspended mounting (1 bolt).







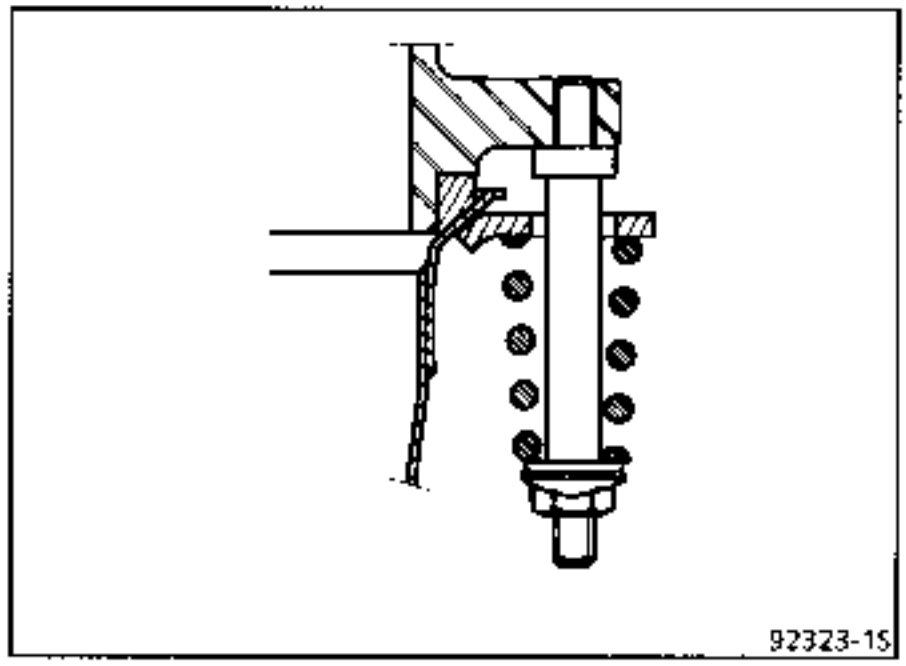
Lower the engine (2 persons required):
The engine is removed from below its position in the vehicle.

IMPORTANT:
- take care not to damage the power assisted steering pump which passes close to the edge of the cooling radiator;
- take care not to damage the oil vapour decanter which may touch the sub-frame; at the same time as the engine is lowered, move the engine and transmission assembly towards the left of the vehicle.

REFITTING:
Refitting is the reverse of removal; adjust the position of the right hand suspended mounting movement limiter using tool
Mot. 1289-02
Fill:
- the gearbox with oil,
- top up the engine oil level if necessary
- the power assisted steering circuit
- the cooling circuit and bleed it ,
- the air conditioning circuit (depending on version).

Adjust the accelerator cable.

Tighten the exhaust flange and fit the spring assembly.



IMPERATIVE : tighten to the stop

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

TOOLING REQUIRED
Torx 50 mm socket

TIGHTENING TORQUES (in daN.m)	
Sump bolt	1.2 to 1.5

Put the vehicle on a 2 post lift.

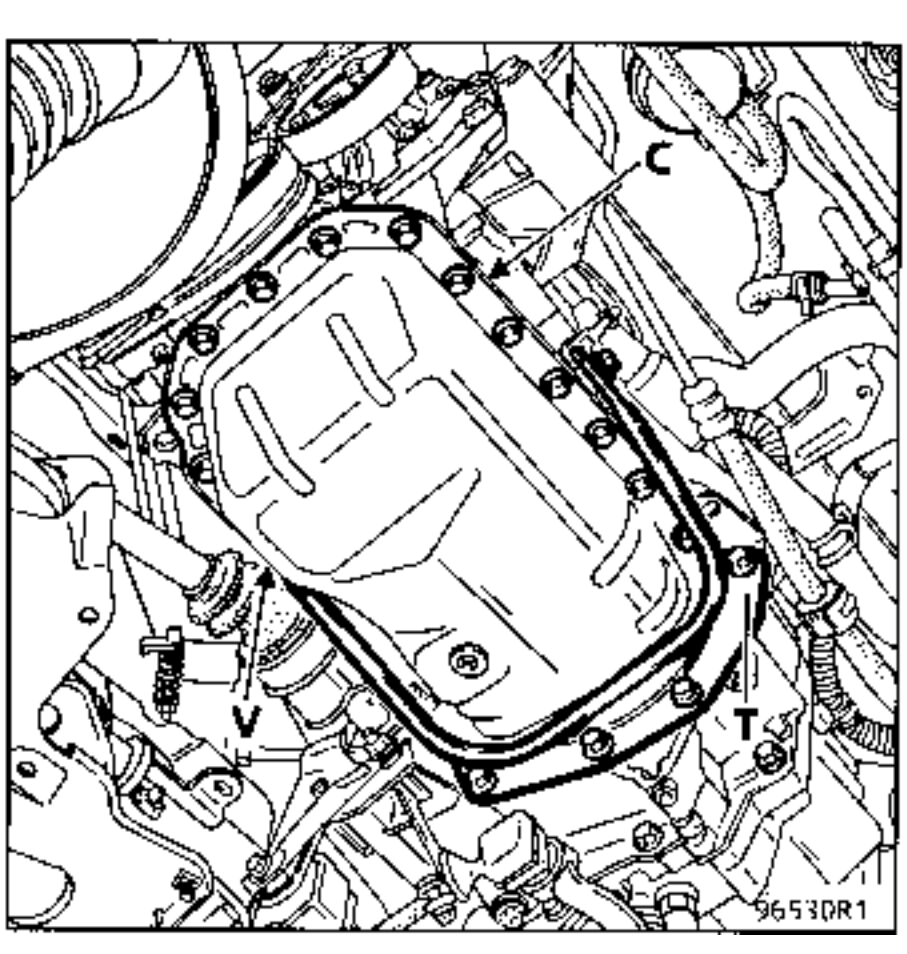
Drain the engine oil.

Remove:
- the engine - gearbox support bar (T),

NOTE : bolt (V) is removed with a Torx 50 mm socket and an 8 mm open wrench.

- the sump bolts (C).

Remove the sump.



REFITTING

Clean the sealing surface.

Fit the After Sales gasket (see P.R.).

Position the sump.

Fit the sump to the engine.

Refit the engine - gearbox support bar.

Fill the engine with oil.

NOTE : the Torx bolt (V) may be replaced with a hexagonal head bolt to simplify refitting.

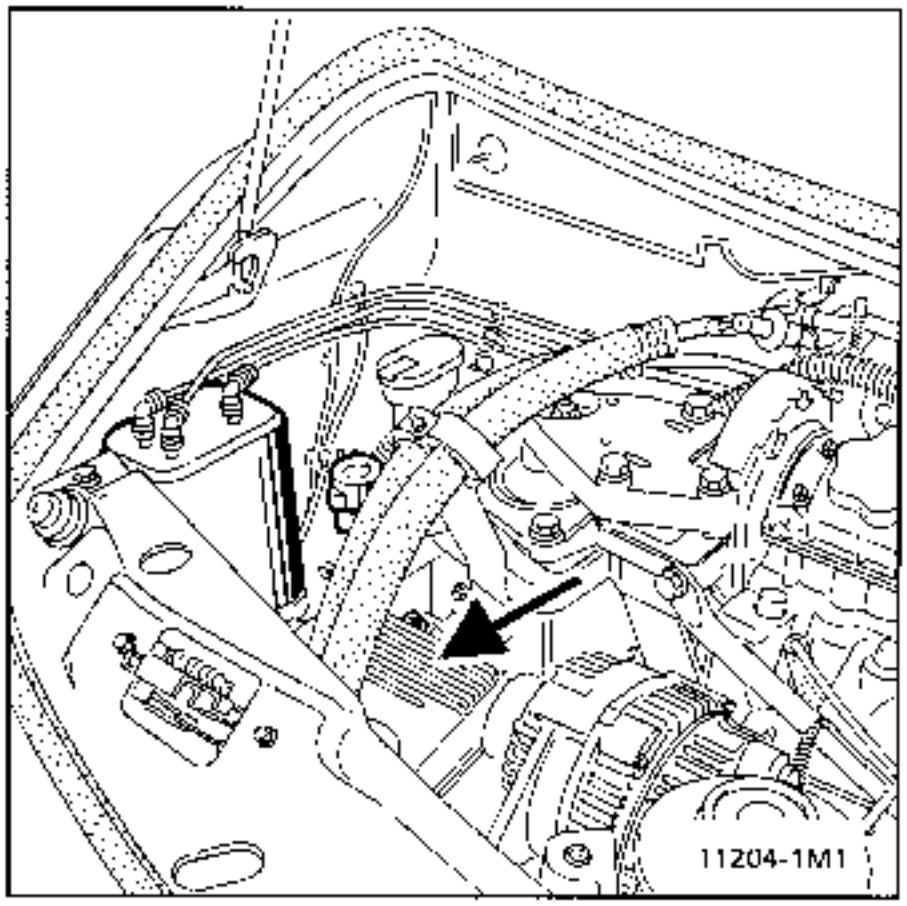
SPECIAL TOOLING REQUIRED	
Mot. 1273	Tool for checking belt tension

TIGHTENING TORQUES (in daN.m)	
Tension wheel mounting nut	5
Wheel bolts	10

REMOVAL

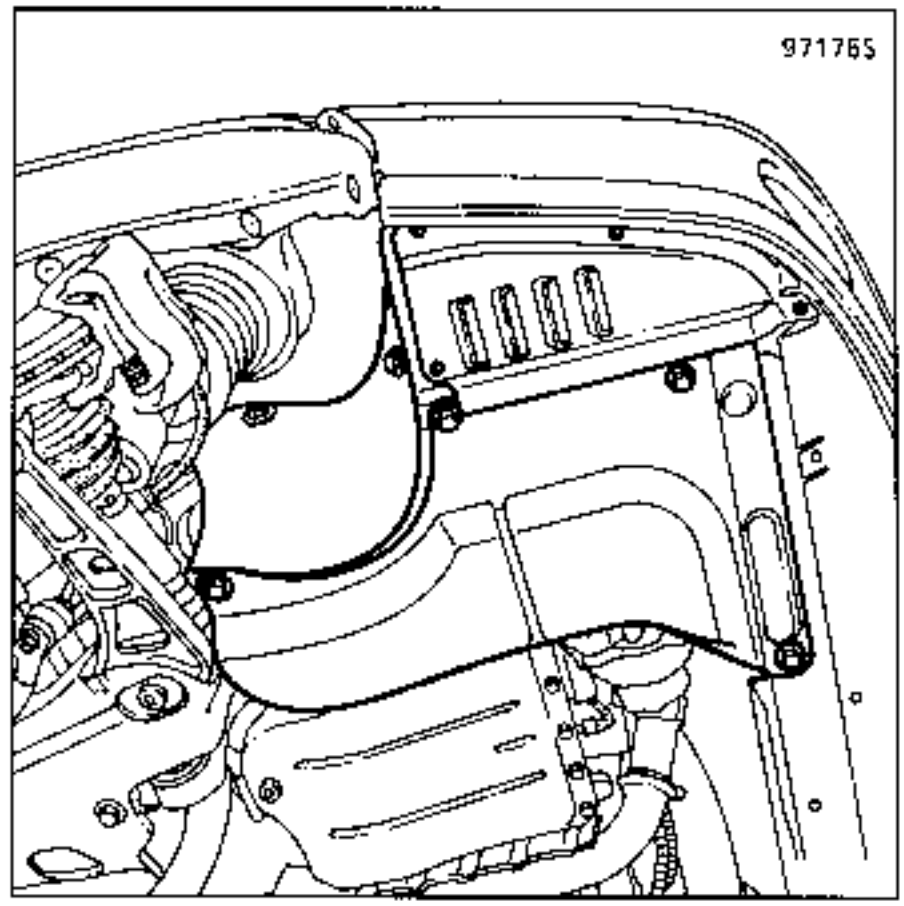
Put the vehicle on a lift with the front wheels hanging free.
Disconnect the battery.

Disconnect the injection computer and remove it (2 bolts).

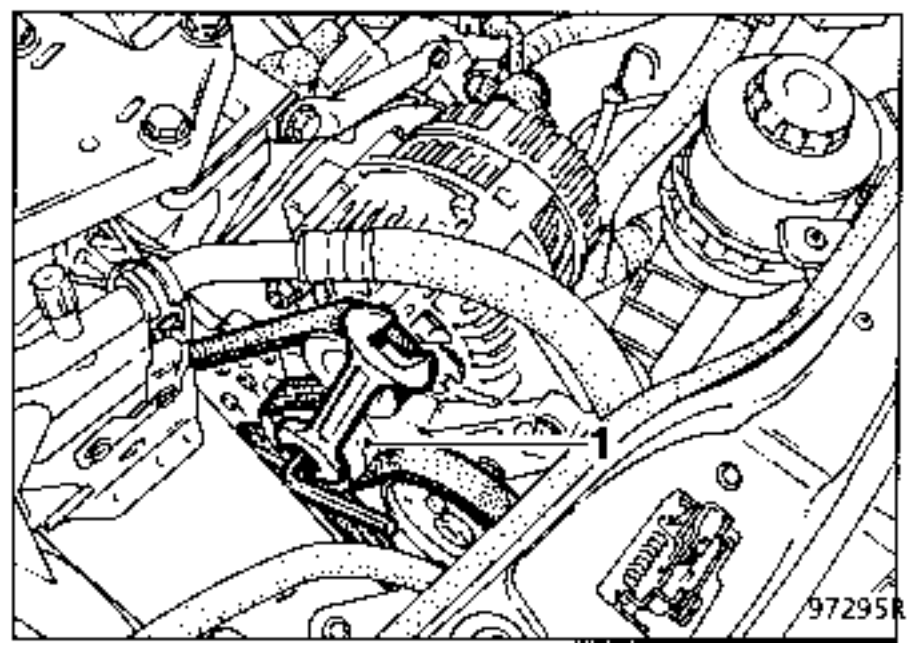


Lift the vehicle.

Remove the front right hand wheel and the wheel arch protector.



Slacken the belt at the tension wheel (1) using a 7 mm Allen key for the central locking bolt and a 22 mm open or combination wrench for the tension wheel.



Release the belt.

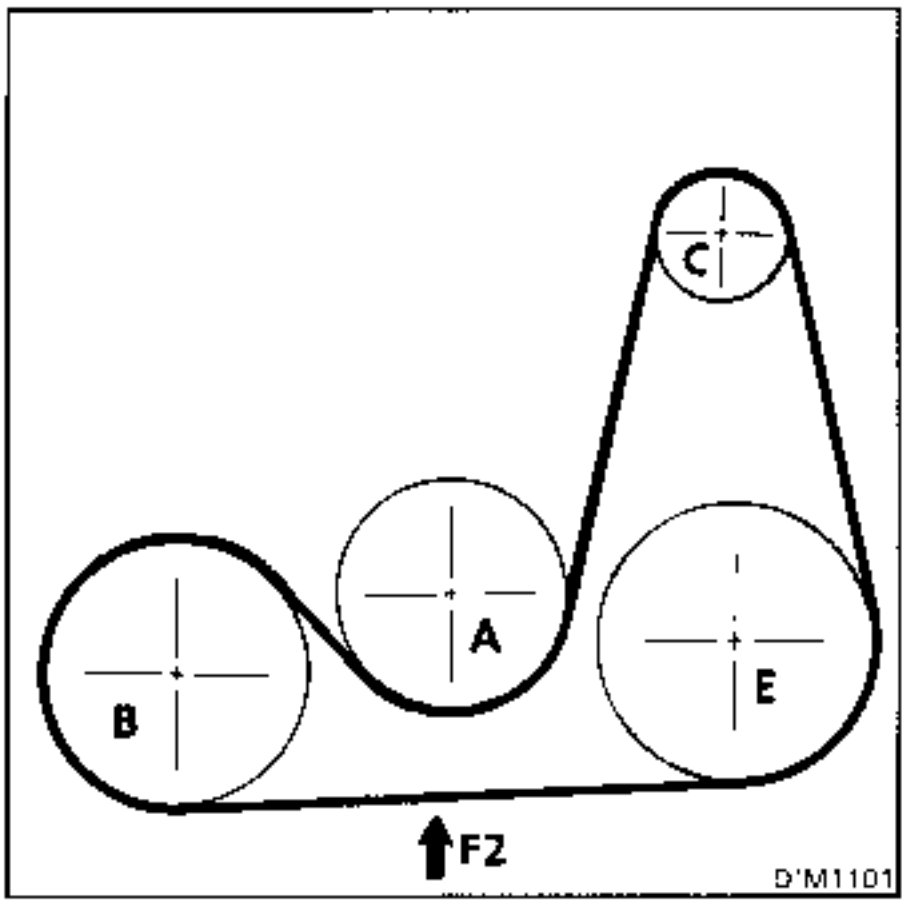
REFITTING - **Special notes**

The method for tensioning the belt described below must be followed.

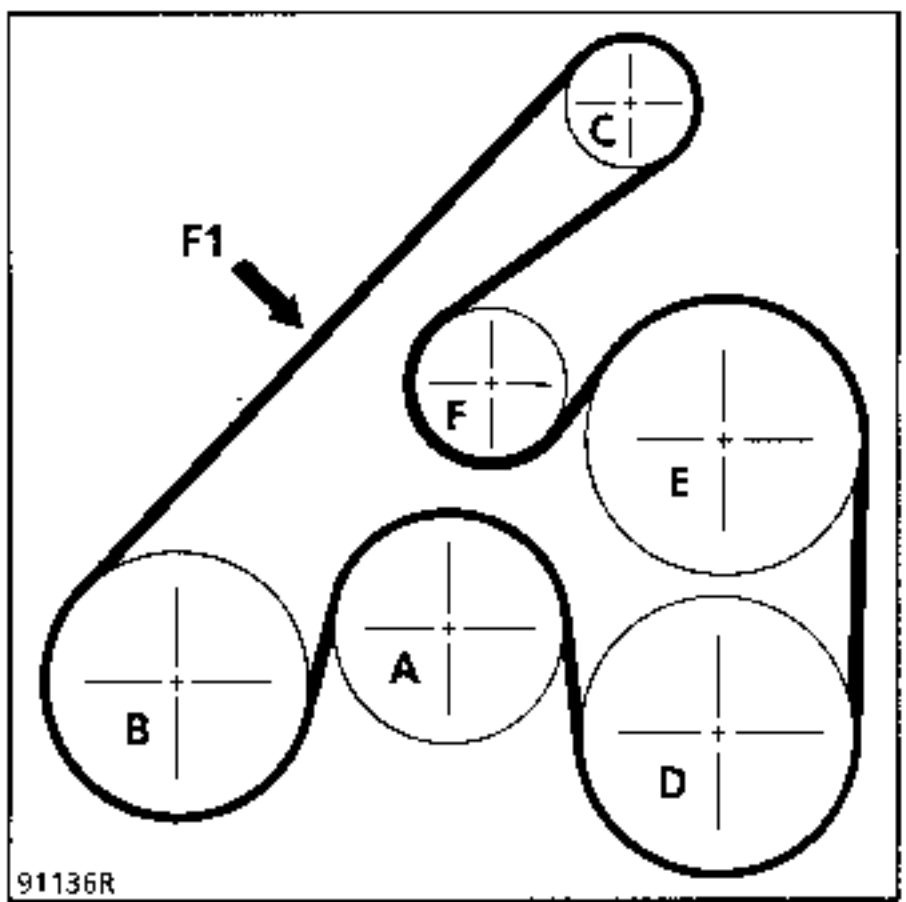
Once a belt has been slackened, it must be renewed.

Routing:

– version WITHOUT AIR CONDITIONING:



– version WITH AIR CONDITIONING:



A Water pump
B Crankshaft
C Alternator
D Air conditioning compressor
E Power assisted steering pump
T Tension wheel
→ Point for checking tension

TENSION VALUES

When the engine is cold (ambient temperature), fit the new belt.

Fit the sensor of tool **Mot. 1273** at the point shown (→).

Turn the knob on the sensor until it clicks.

Tighten the belt until the display on tool **Mot. 1273** shows the fitting value specified below.

Lock the tension wheel, test and adjust the value.

Turn the crankshaft 3 times.

Check the tension value is between the fitting value and the minimum operating value (same value if the tension is being tested without the belt being removed).

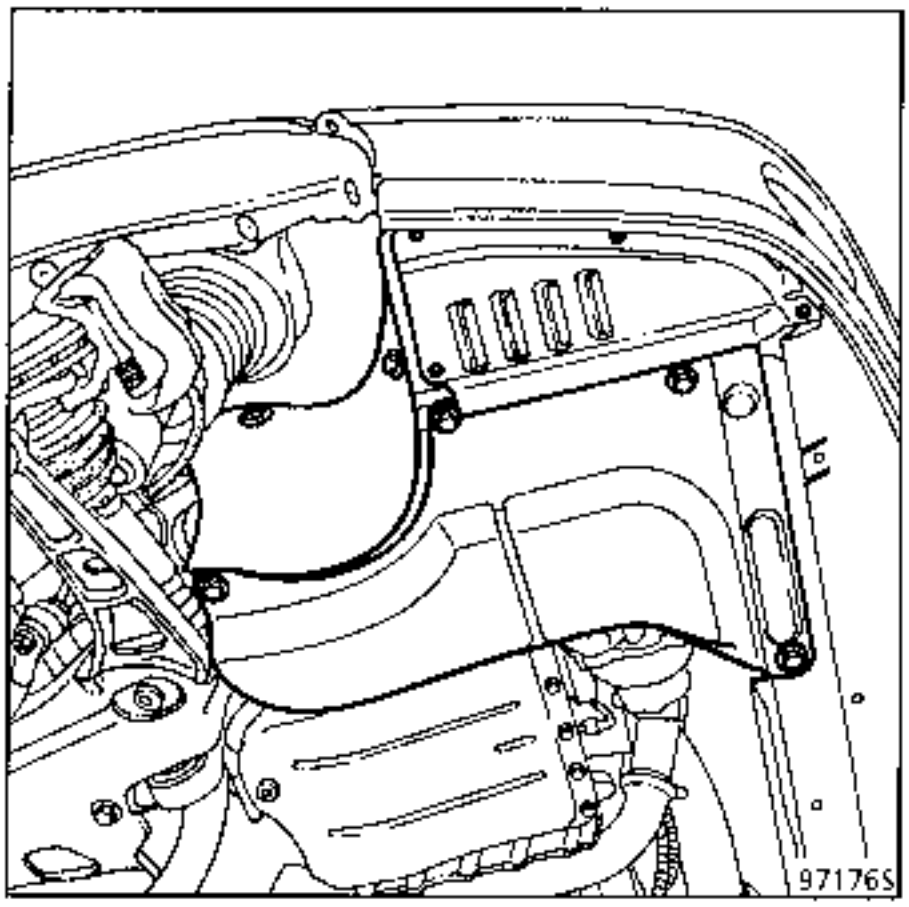
Once a belt has been removed, do not refit it.

Tension (US=SEEM Units)	Power assisted steering belt (F2) multi-tooth	Air conditioning belt (F1) multi-tooth
Fitting	**112 ± 6 US**	**114 ± 5 US**
Minimum operating	**62 US**	**62 US**

REMOVING THE ALTERNATOR BELT:

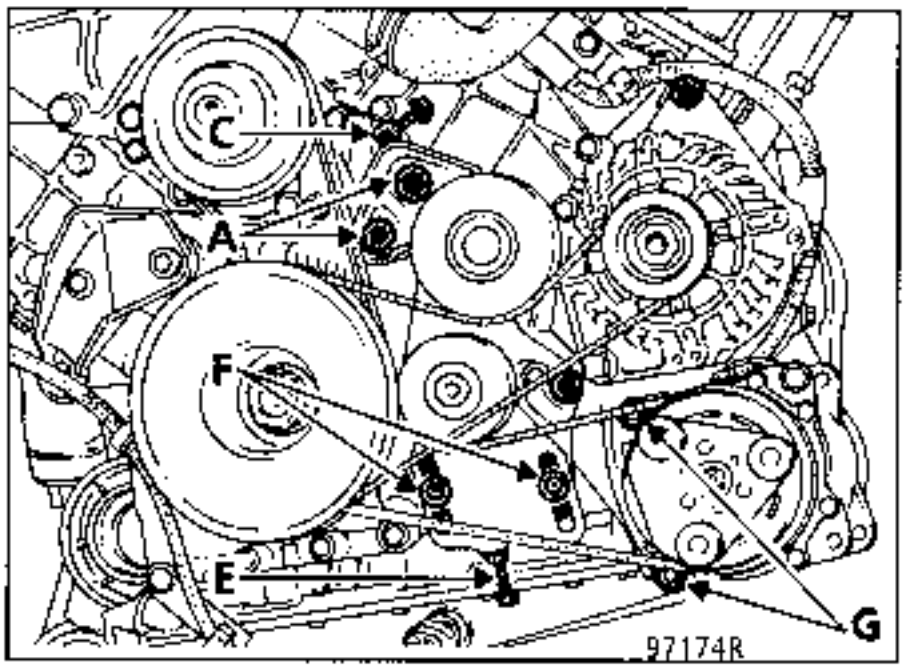
Vehicle on a 2 post lift, disconnect the battery.

Remove:
- the front right hand wheel,
- the mudguard,
- the engine undertray.



Slacken the 2 bolts for the alternator belt tension wheels (A).

From above, slacken the adjusting bolt for the tension wheel (C).



Remove the alternator belt.

REFITTING

Refitting is the reverse of removal.

Special note

Once a belt has been removed, do not refit it.

Follow the tensioning method in section 07 "Accessories belt tension"

REMOVING THE WATER PUMP / AIR CONDITIONING COMPRESSOR BELT:

Remove the alternator belt.

Release:
- the adjusting bolt (E) for the compressor belt (see diagram opposite),
- the lock nut for the adjusting bolt and slacken this as far as possible,
- the 2 bolts (F) for the compressor belt tension wheel.

Remove the compressor belt.

REFITTING

Refitting is the reverse of removal.

Special note

Once a belt has been removed, do not refit it.

Follow the tensioning method in section 07 "Accessories belt tension"

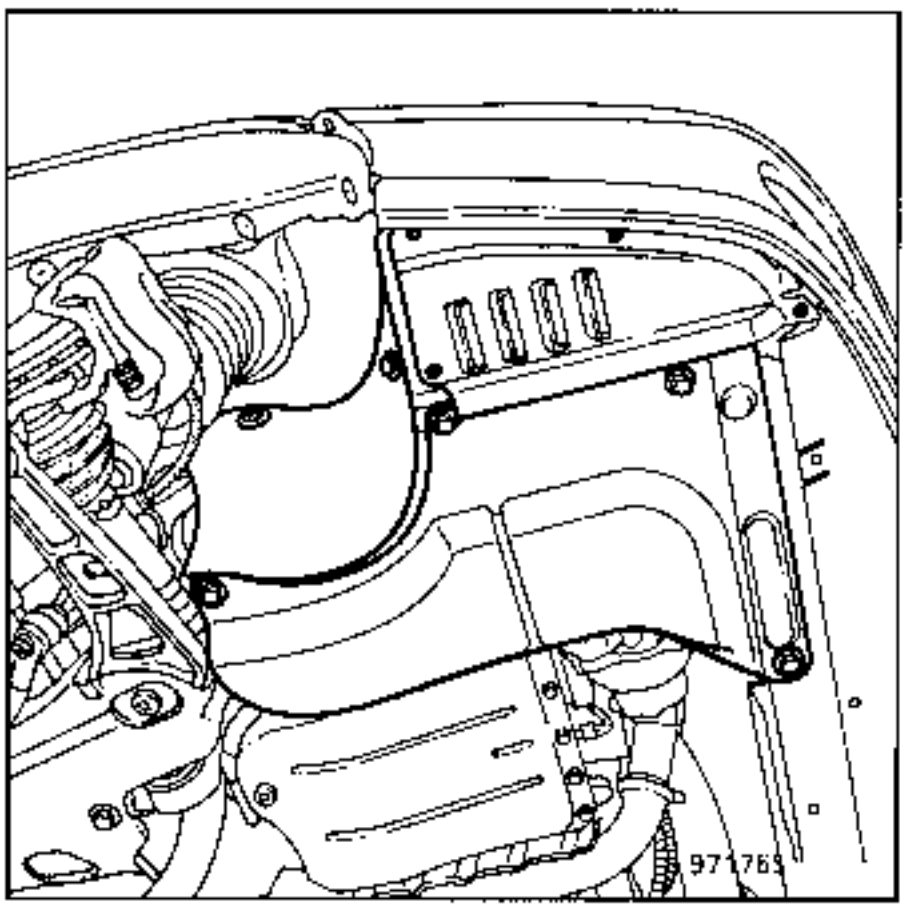
Refit the alternator belt.

SPECIAL TOOLING REQUIRED		
Mot.	1273	Tool for checking belt tension
Mot.	1370	Wrench for tensioning tension wheel
Mot.	1368	Wrench for tightening adjusting wheel
Mot.	1369	Tool for tensioning tightening wheel
Mot	1376	Pin for locking tension wheel

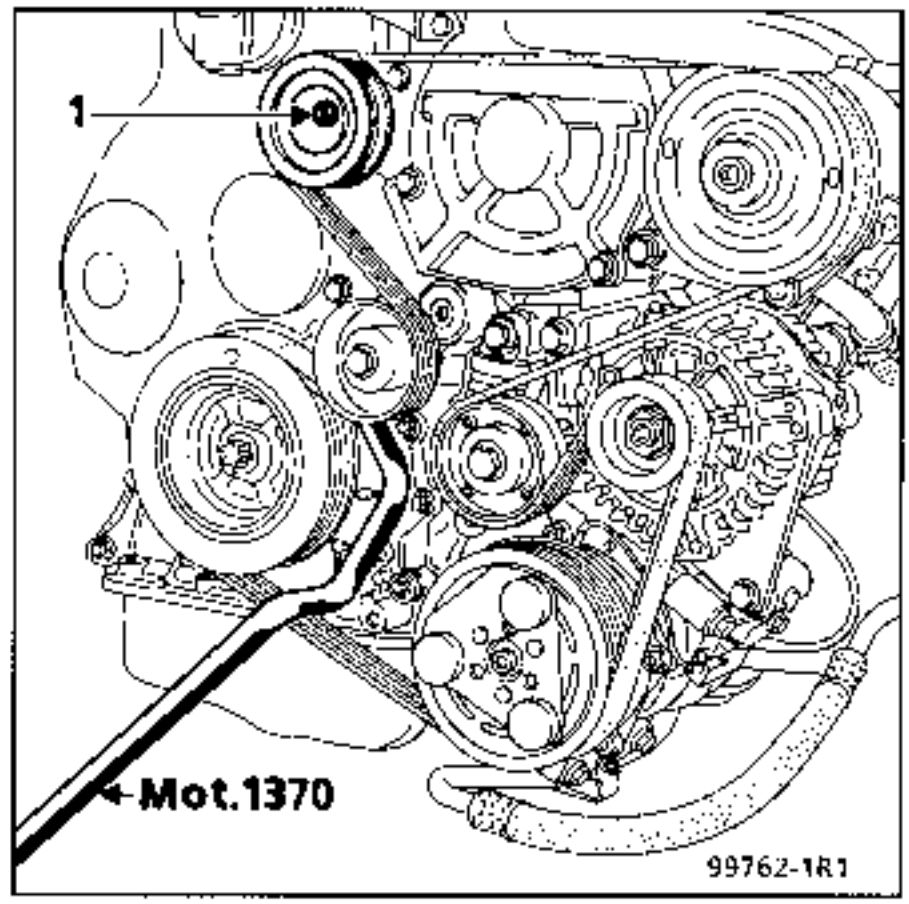
VERSION with A/C

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	10
Bolt for accessories belt tensioner wheel (without A/C)	5.6
Eccentric tension wheel bolt (A/C)	4

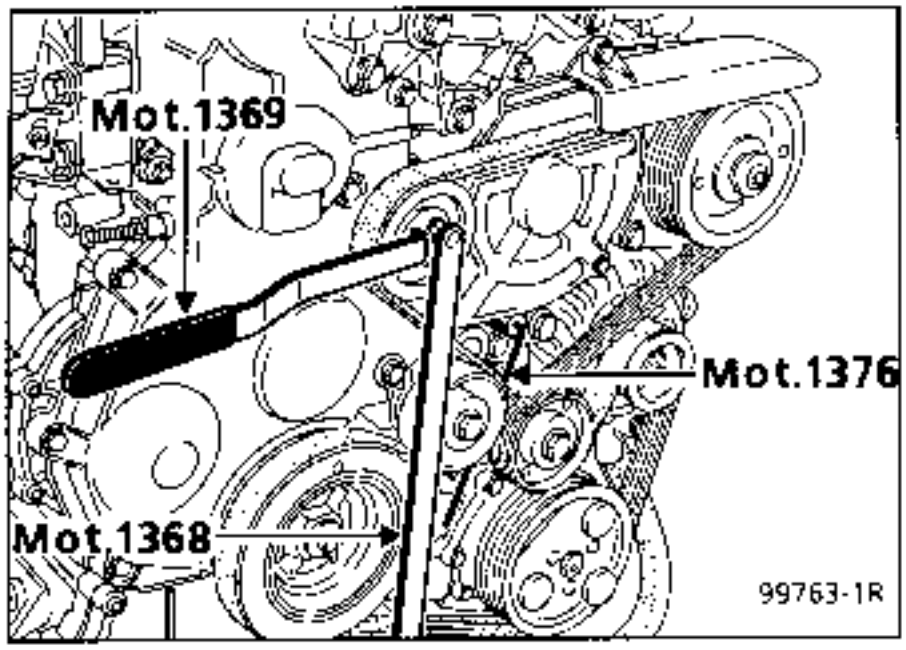
Put the vehicle on a lift with the front wheels hanging free.
Remove the front right hand wheel.
Remove the front right hand wheel arch protector.



Fit tool **Mot. 1370**.around the body of the accessories belt tension wheel.



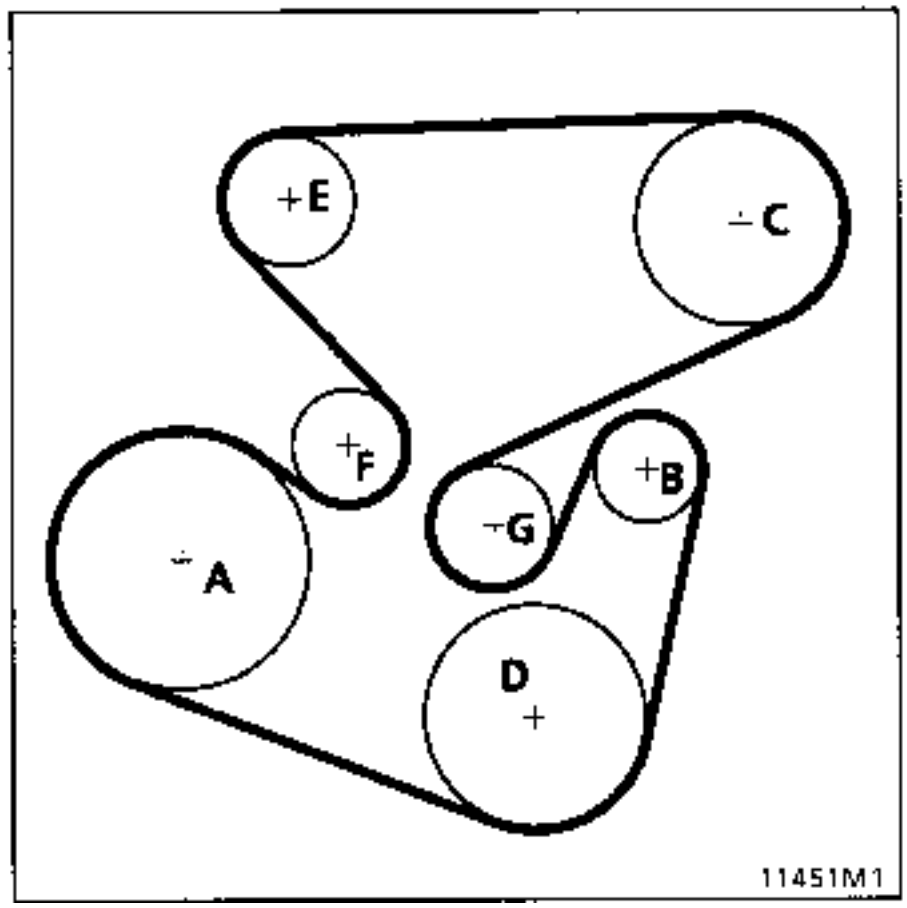
Set the automatic tensioner against the stop by pushing it backwards and remove the belt.
Fit tool **Mot. 1376** into the housing.
Remove tool **Mot.1370**, and fit tool **Mot. 1368** , slacken and remove the accessories belt eccentric tension wheel.



REFITTING:

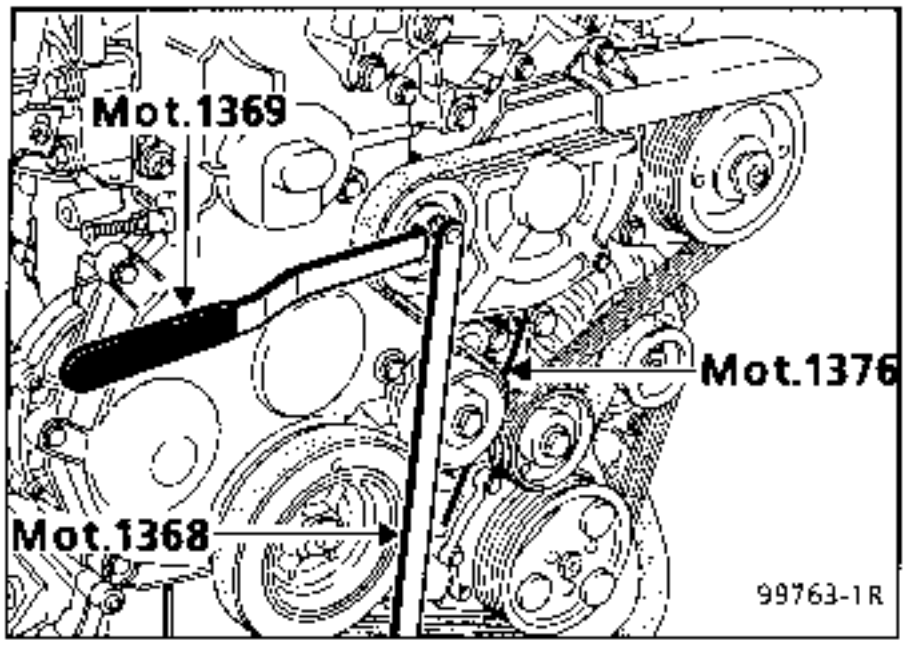
Once a belt has been removed, do not refit it.

Fit the belt as shown below:
(also see section "Accessories belt tension")



Begin tensioning the belt by pivoting the eccentric tension wheel at the top left (E) towards the rear of the vehicle using tool **Mot. 1369**,**until** tool **Mot. 1376** is released.

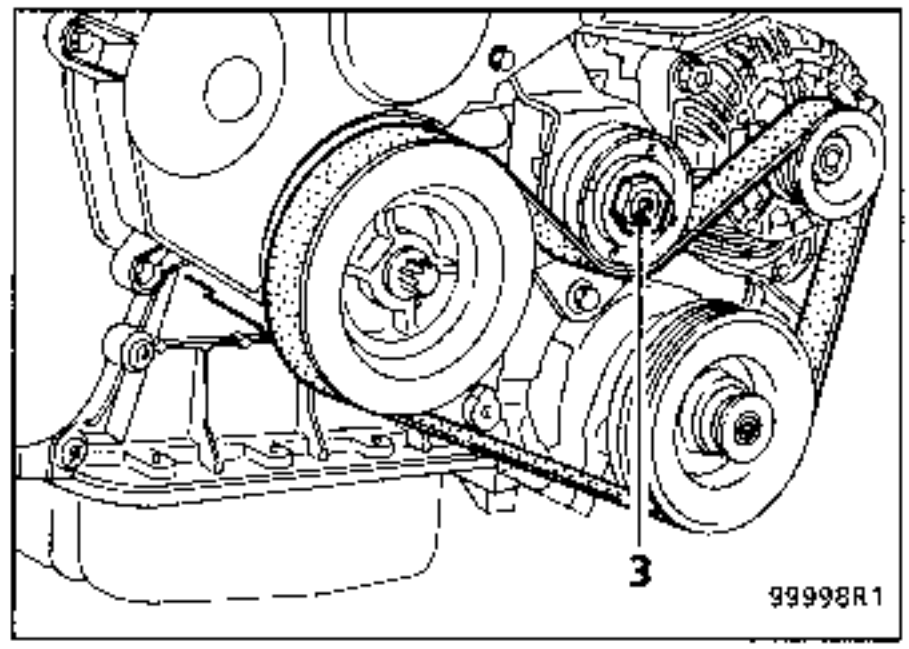
Then tighten the central bolt of the wheel using tool **Mot.** 1**368**.



The plastic housing above tool **Mot. 1376** may prevent this tool from being released.
If this is the case, use tool **Mot. 1370** to free it completely.

VERSION without A/C

Remove the accessories belt by slackening the central tension wheel bolt (3) a quarter turn using an allen key, then turn the tension wheel anticlockwise.
Remove the belt.



REFITTING: Once a belt has been removed, do not refit it.

Refitting is the reverse of removal.

TIMING BELT ADJUSTMENT

SPECIAL TOOLING REQUIRED		
Mot.	1273	Tool for checking belt tension
Mot.	1289-01	Centring fork for suspended engine mounting limiter
Mot.	1318	TDC pin
Mot.	1370	Wrench for tensioning tension wheel
Mot.	1368	Wrench for tightening adjusting wheel
Mot.	1369	Tool for tensioning tightening wheel
Mot	1376	Pin for locking tension wheel
T. Av.	476	Ball joint extractor

EQUIPMENT REQUIRED
14 TORX ring spanner - timing cover bolts
Impact ball joint extractor
8 TORX ring spanner - timing cover bolts
Anti-tilt safety pads

TIGHTENING TORQUES (in daN.m)	
Front right hand suspended engine mounting cover nut	3 to 4.5
Wheel bolts	10
Timing tension wheel nut	3
Accessories belt tension wheel bolt	5.6
Accessories belt roller nut	4
Suspended mounting cover bolt	5 to 6.5
Suspended mounting limiter bolt	5 to 6.5
Crankshaft pulley	2.5 + 64° ± 6°
Suspended mounting bolt on cylinder head	4 to 4.6

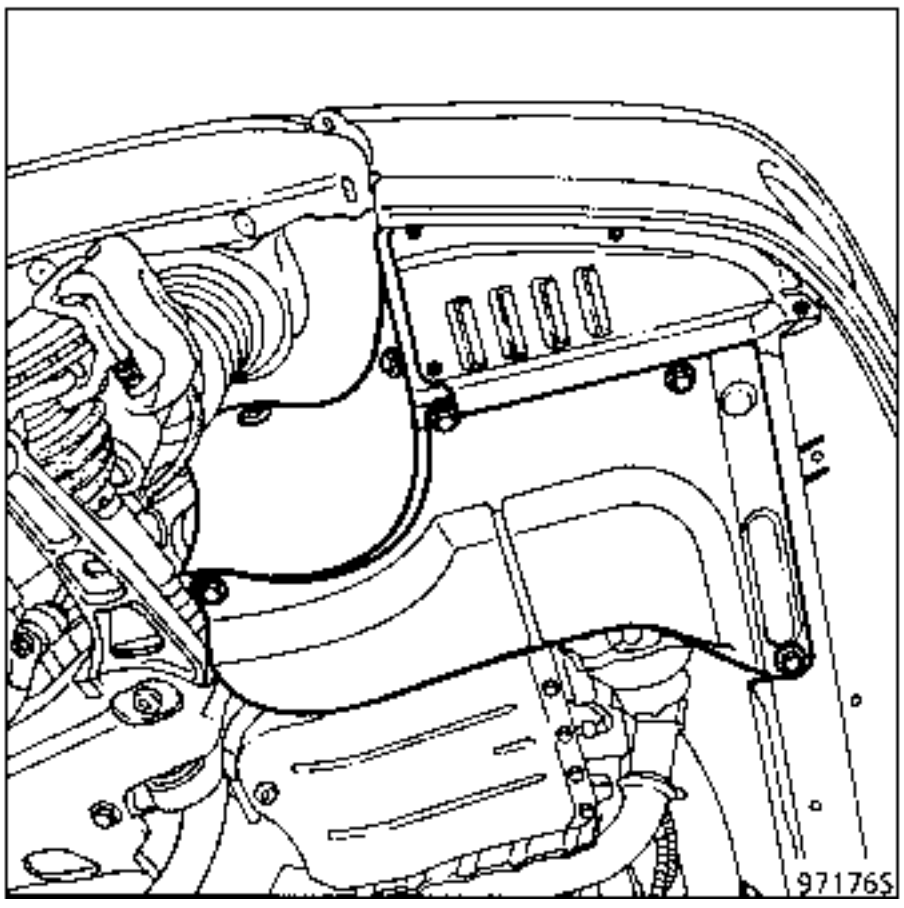
REMOVAL

Put the vehicle on a 2 post lift, front wheels hanging free.

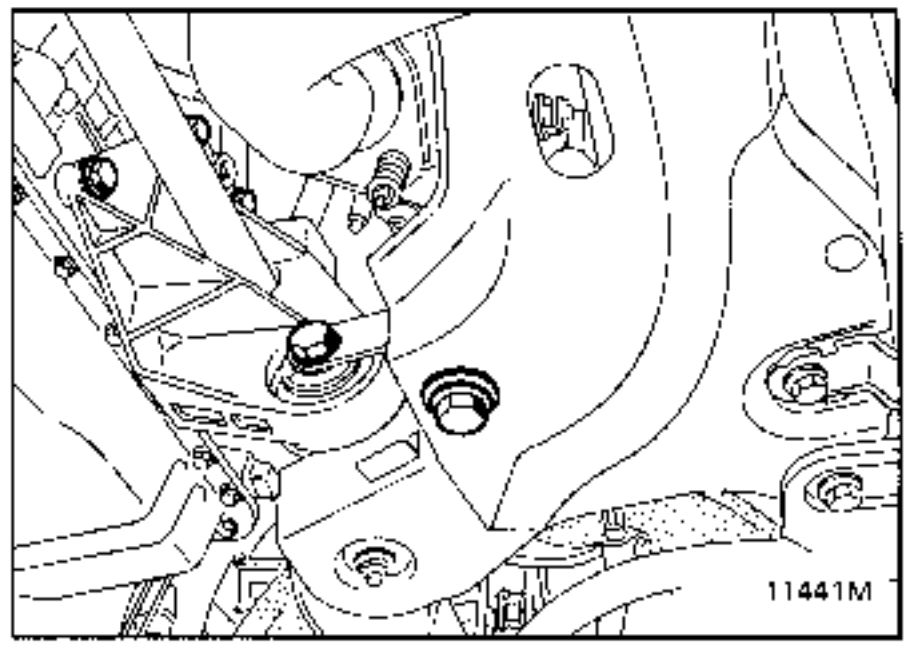
Disconnect the battery.

If necessary, drain the refrigerant fluid circuit.

Remove:
- the front right hand wheel,
- the engine undertray,
- the front right hand wheel arch protector.

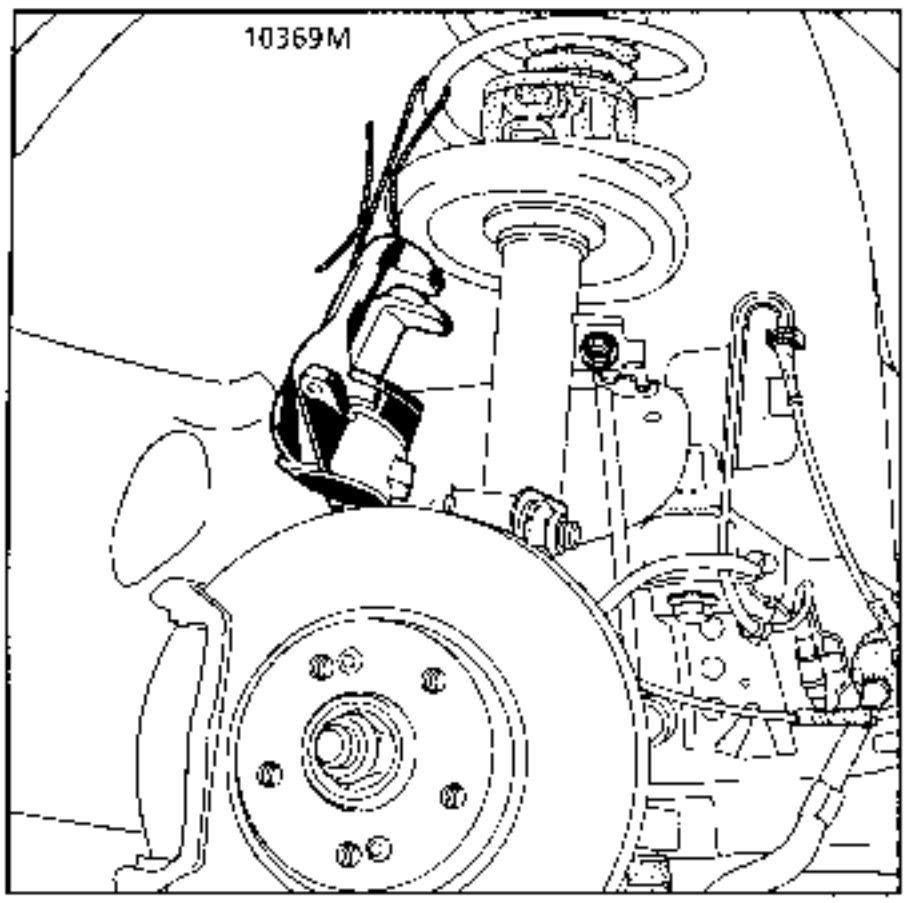


- the engine tie bar,
- the exhaust downpipe.

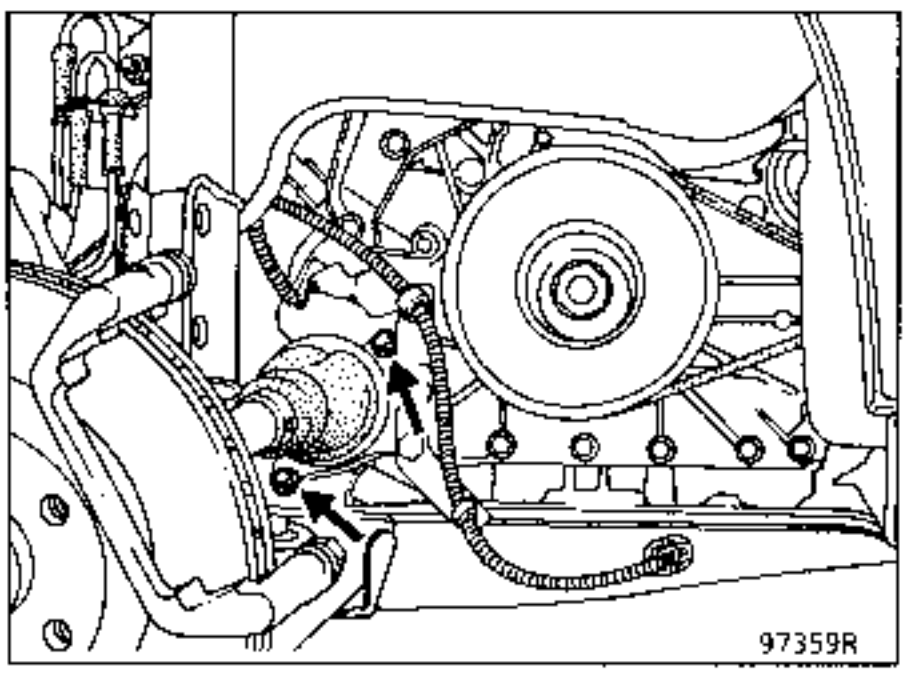


On the right hand side of the vehicle

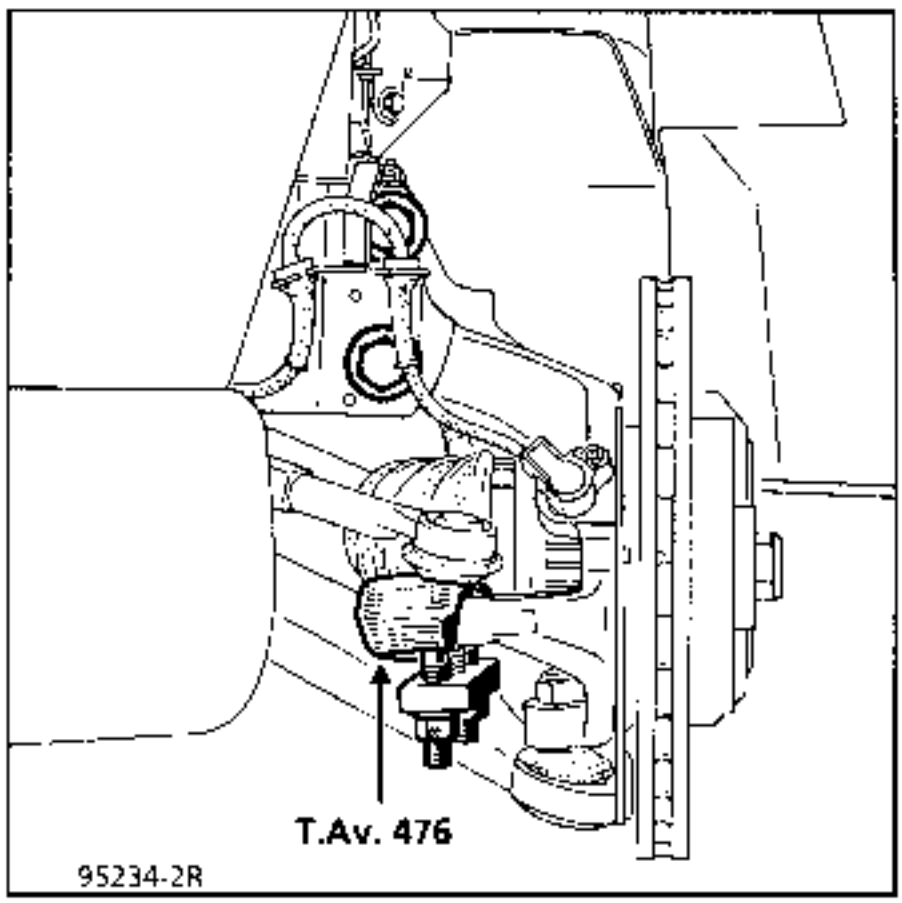
Remove the driveshaft, to do this, remove:
- the front right hand brake caliper and secure it to the suspension spring to protect the pipe.



- the two mounting bolts for the driveshaft flange on the relay bearing.

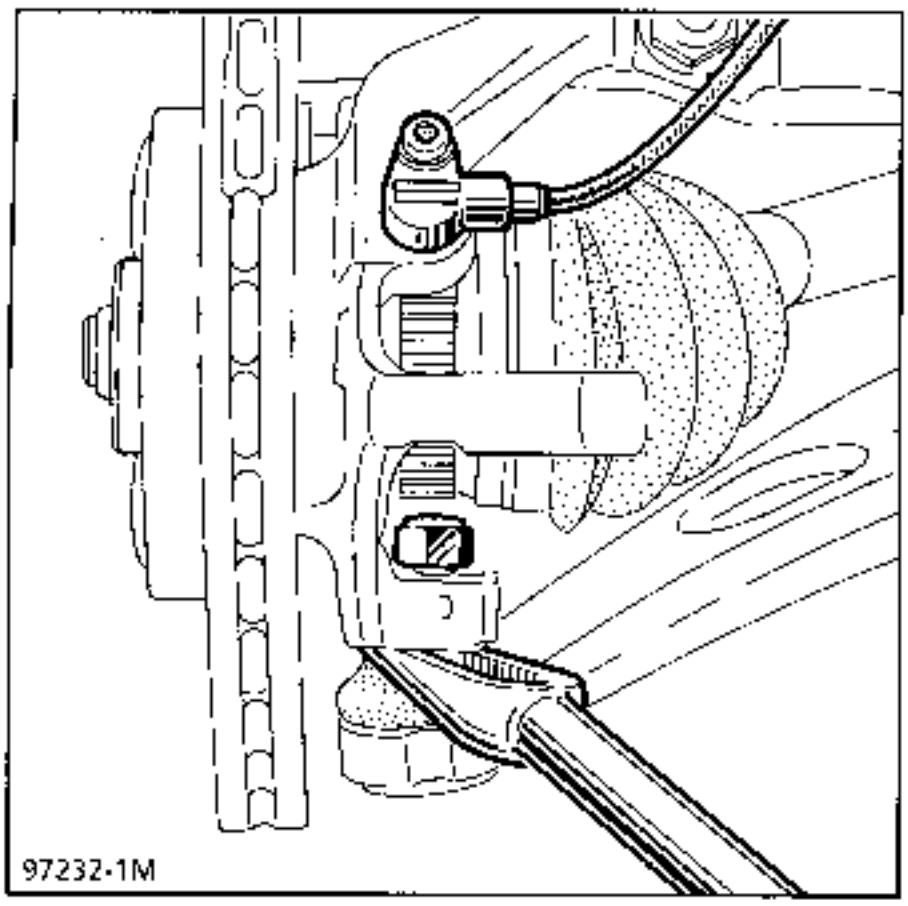


- the track rod end using tool **T. Av. 476,**
- the shock absorber base mounting bolts,

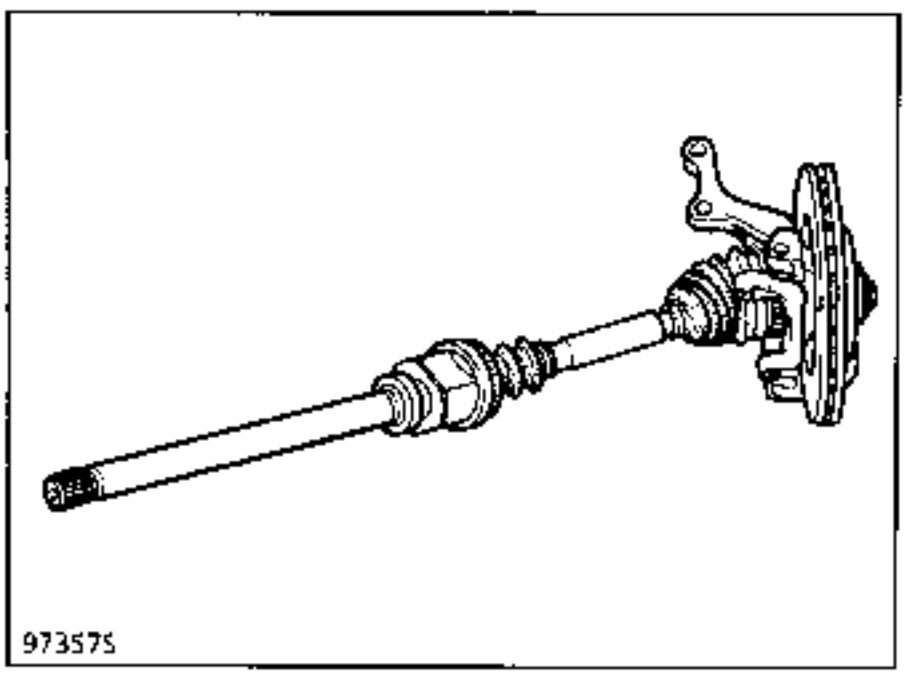


– the wheel sensor if the vehicle is fitted with ABS.

Slacken the lower ball joint nut as far as possible and release it using an impact ball joint extractor (example: **FACOM D98**)

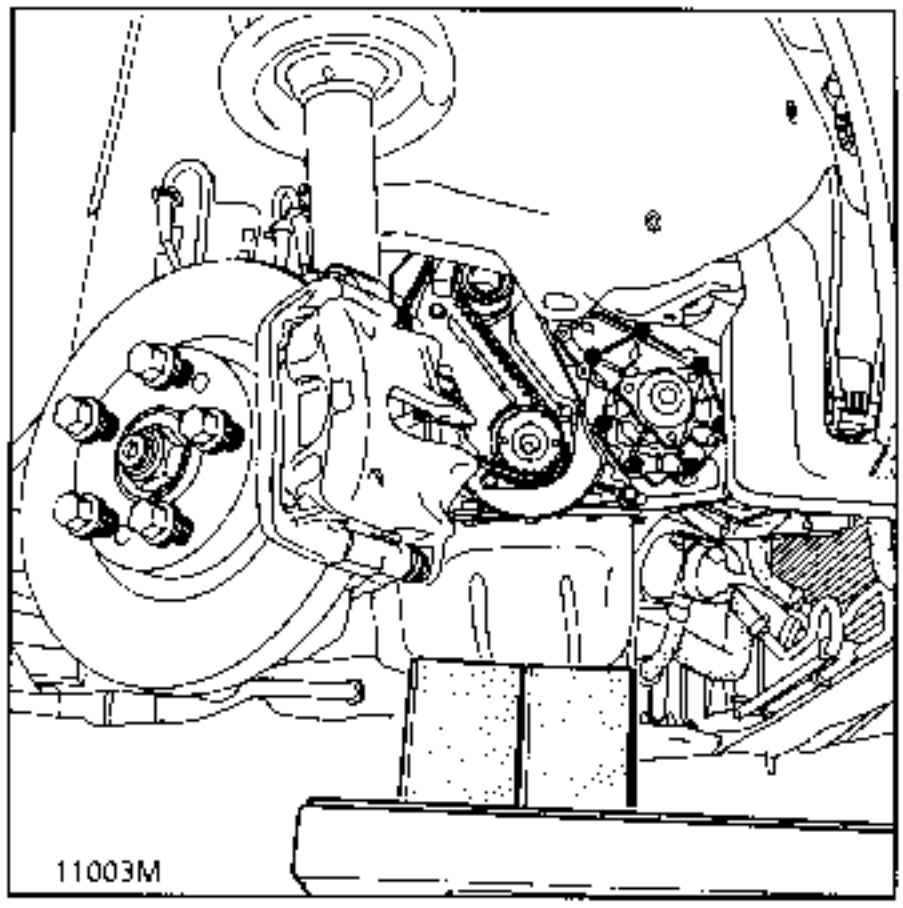


Remove the hub assembled with the driveshaft.

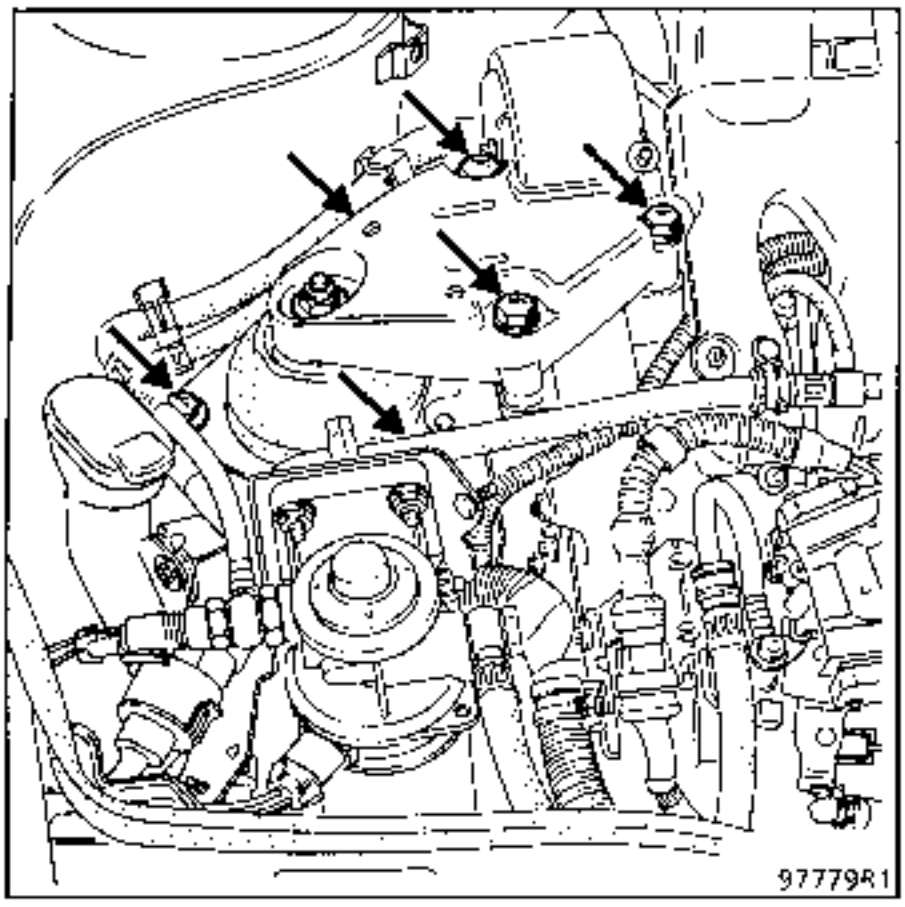


Take care to protect the gaiters.

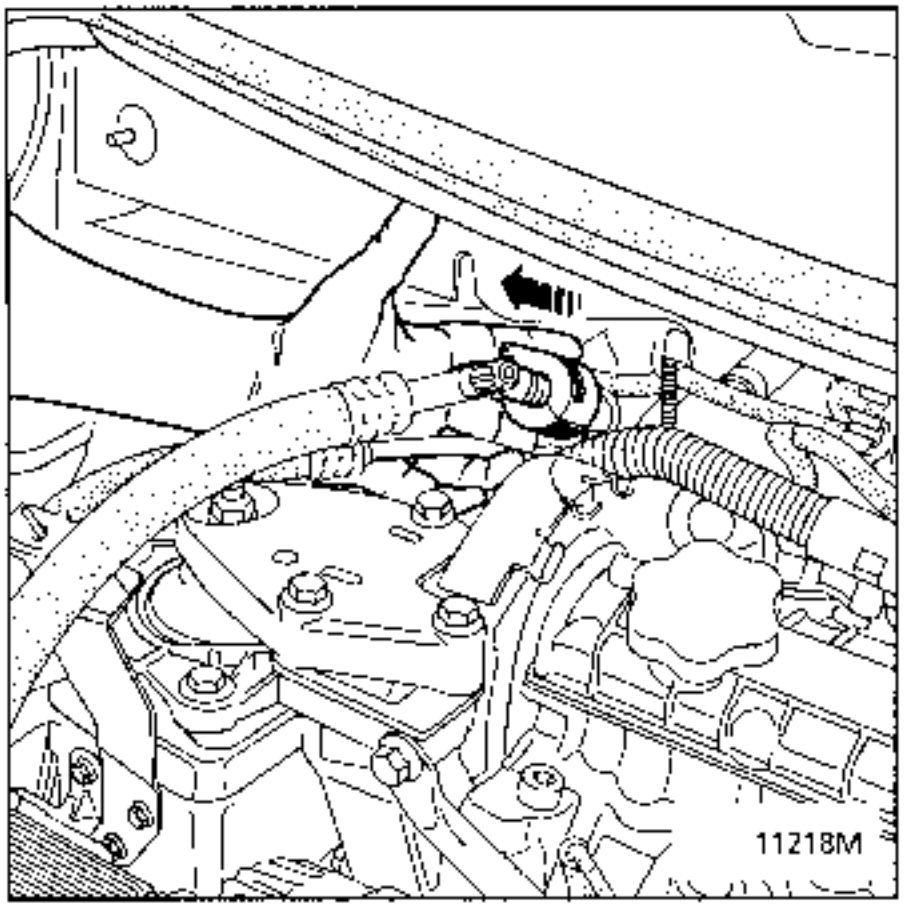
Set the sump on a wooden or rubber support.



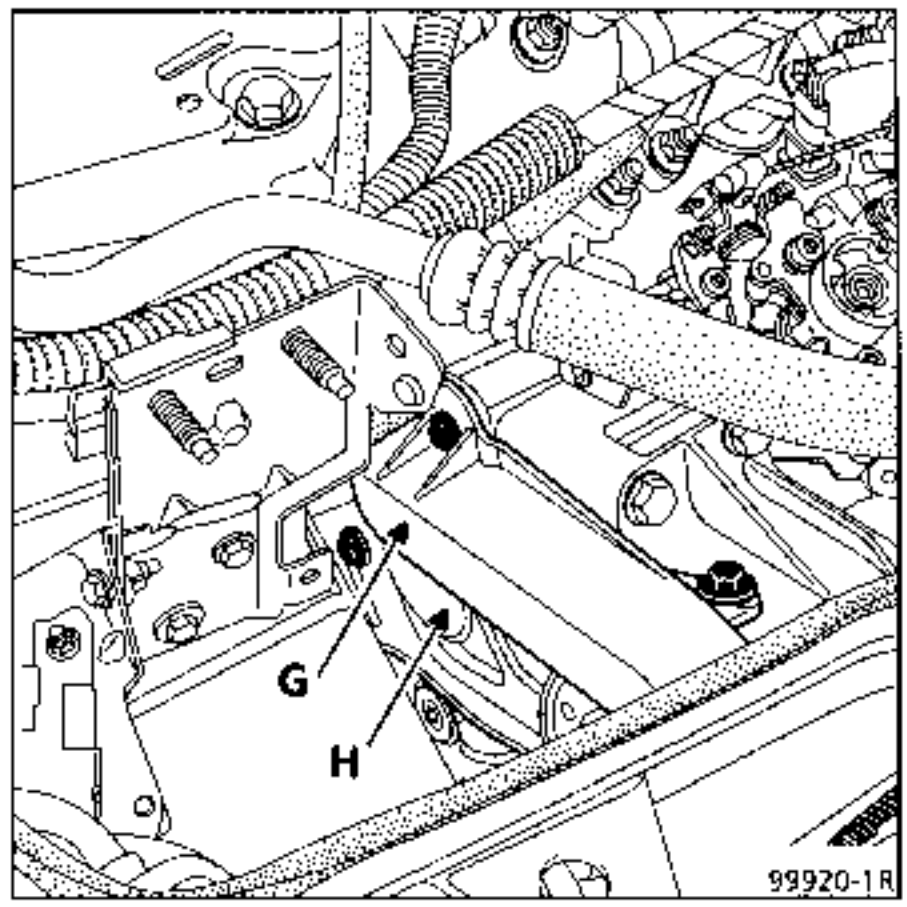
Remove the right hand suspended mounting cover (4 bolts), and its mounting.
Completely remove the suspended mounting.



Disconnect the quick release unions on the AC circuit pipes at the shock absorber turret (Tool - **NAUDER ref: 7240 and 7242**).

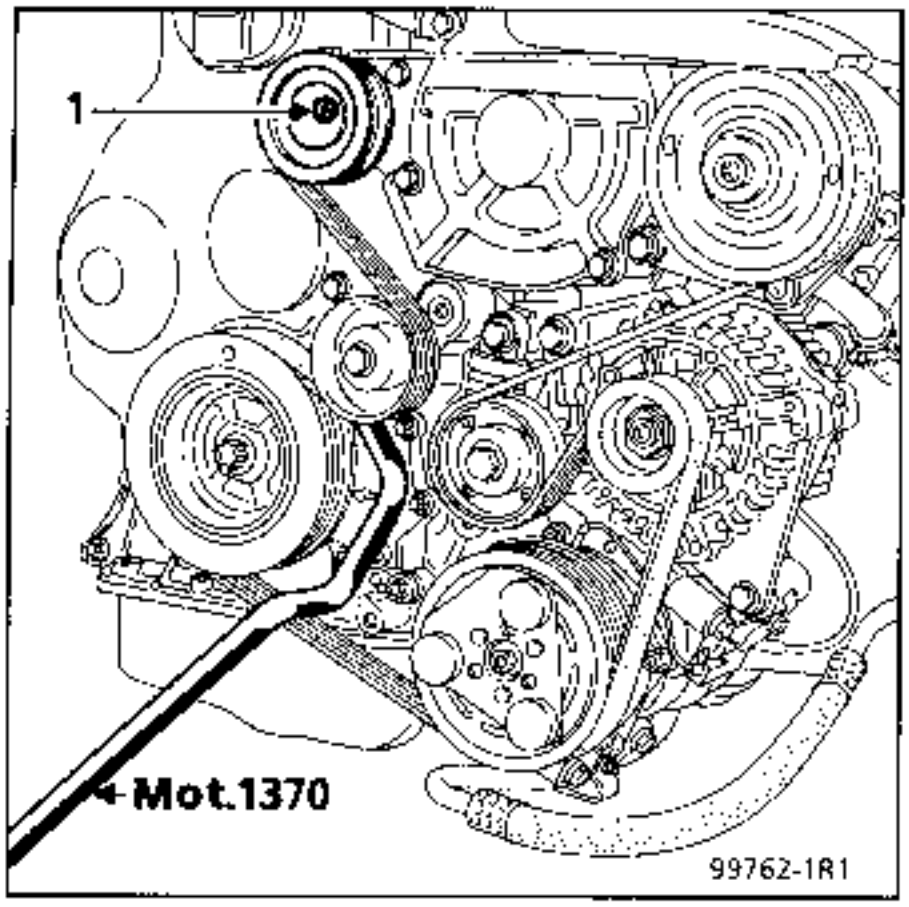


Remove the accessories belt upper housing (G).

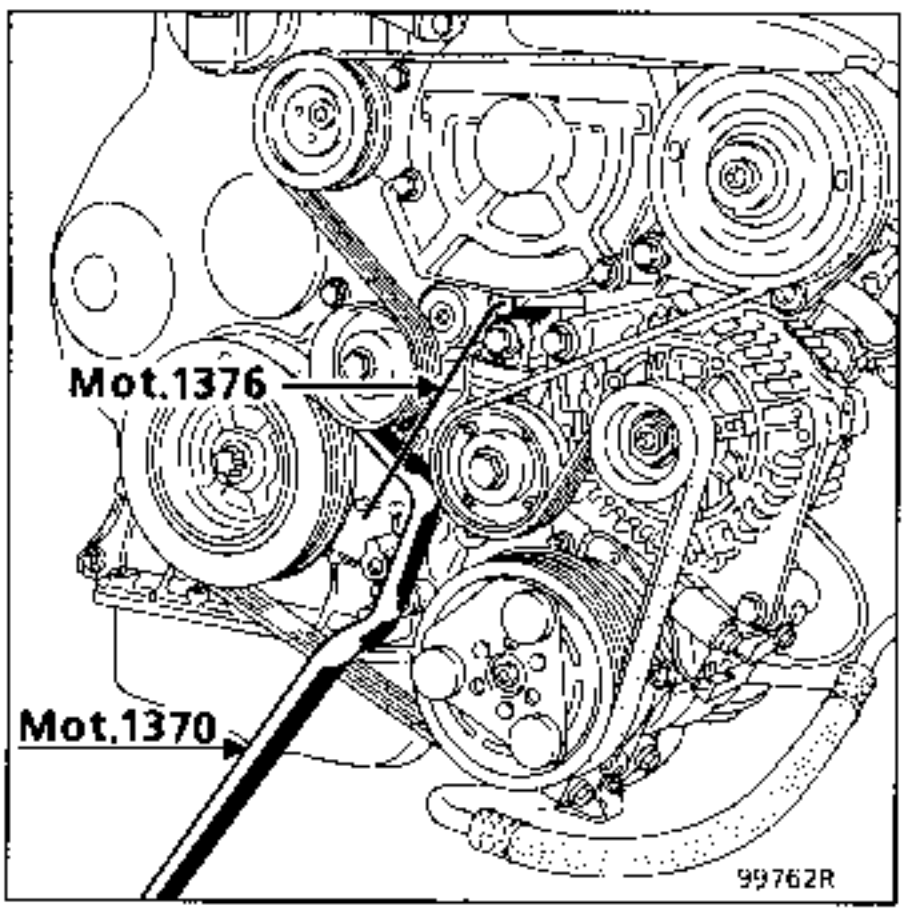


Remove the accessories belt; to do this:

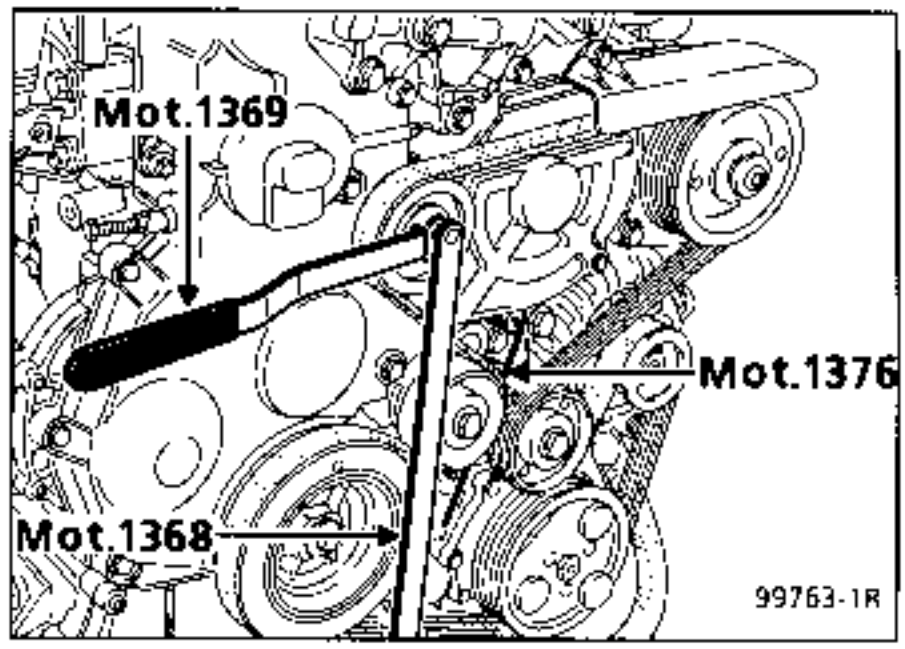
– fit tool **Mot. 1370**.around the body of the accessories belt tension wheel,



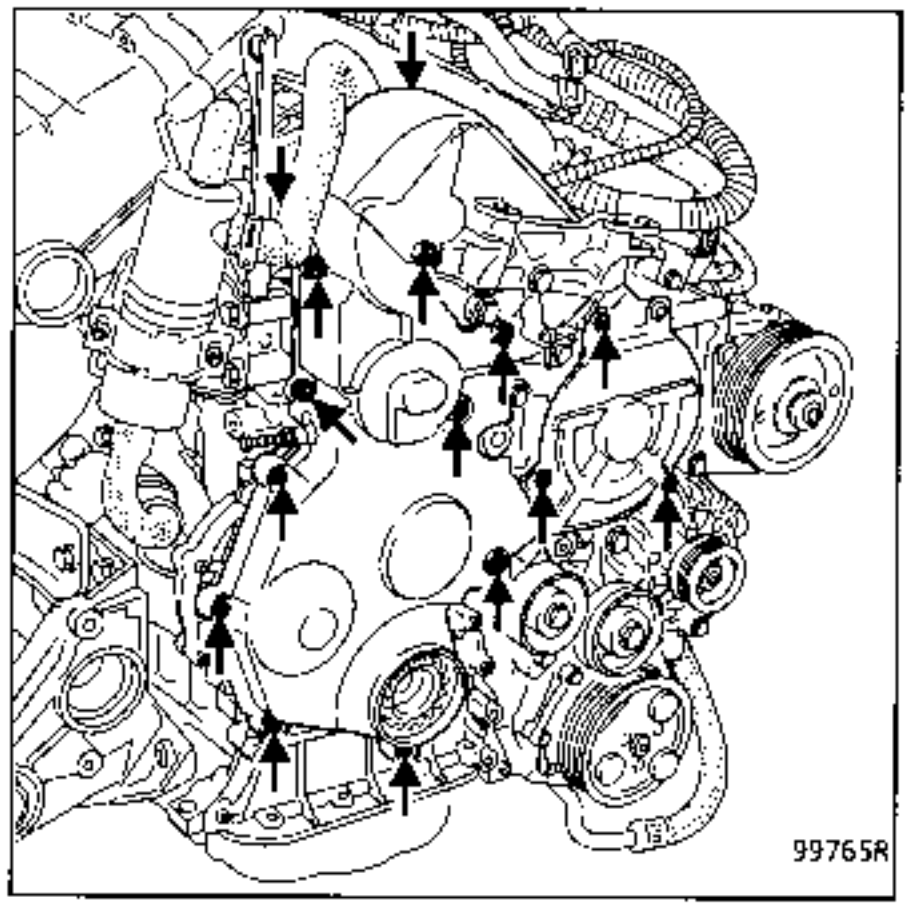
– set the automatic tensioner against the stop by pushing it backwards and inserting tool **Mot.1376** in the hole in the housing,



– remove tool **Mot.1370**,fit tool **Mot. 1368** , and slacken the eccentric tension wheel bolt for the accessories belt.

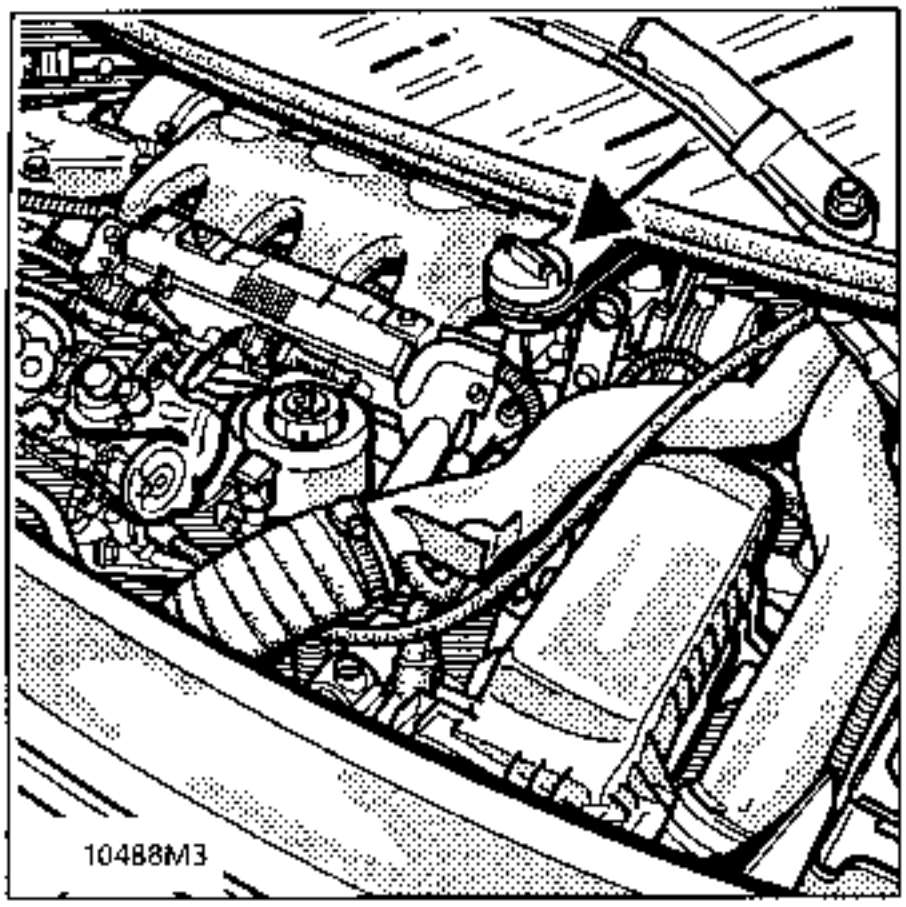


Remove:
- the accessories belt.
- the accessories pulley on the crankshaft,
- the timing covers,



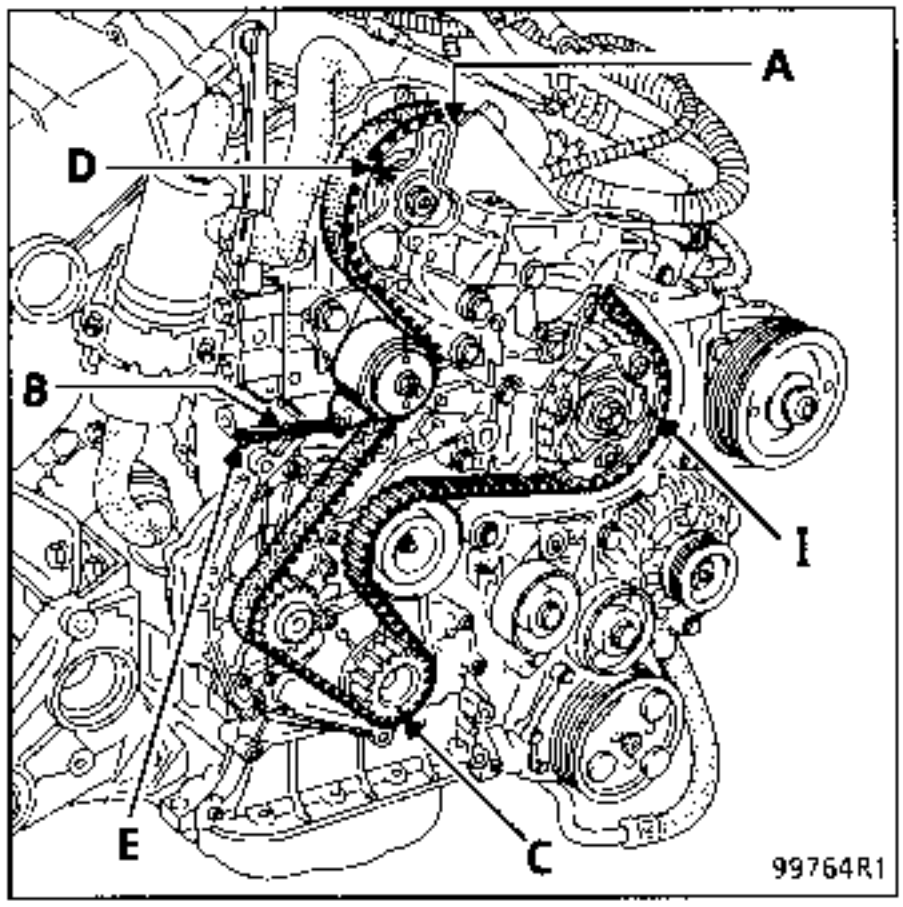
NOTE: for these operations and the following operations on the timing face, the engine should be "raised" or "lowered" in relation to the vehicle using the following points as stops:

- at the top: contact between the oil filler neck and the bulkhead,
- at the bottom: lower by 70mm maximum.

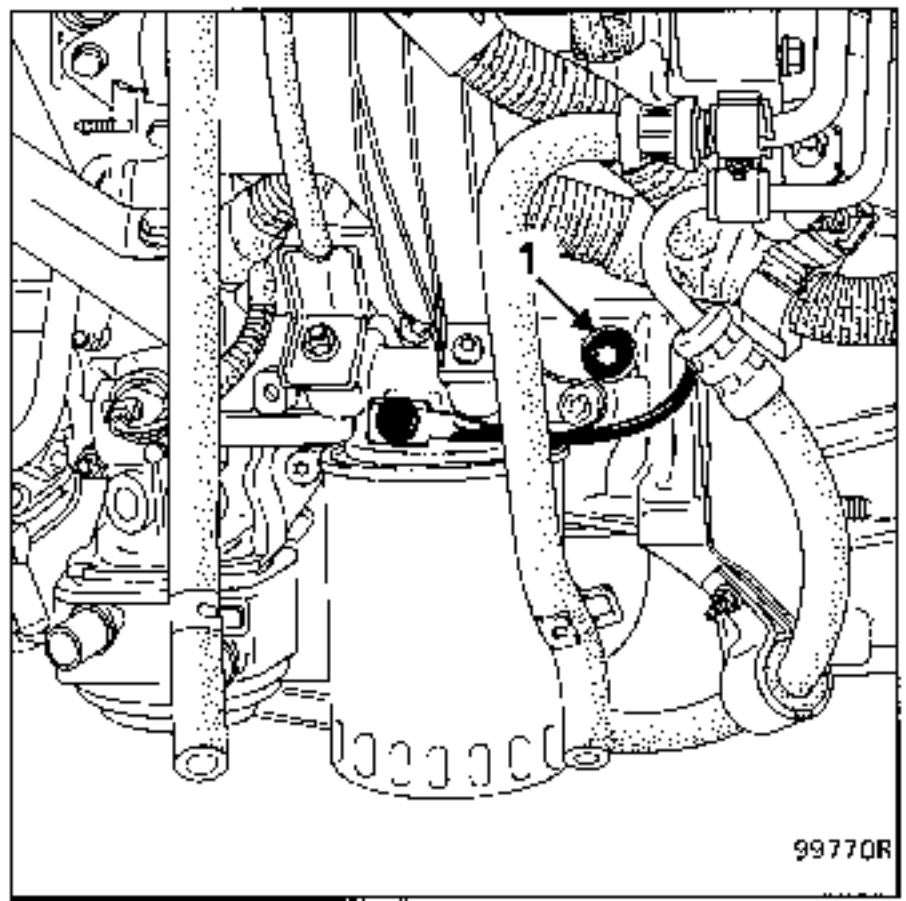


Adjusting the timing

Turn the engine to bring the crankshaft sprocket reference mark (C) to the bottom, the camshaft sprocket reference mark (D) slightly to the left (45°) (the interior mark (A) on the camshaft sprocket should be opposite the fixed point on the rocker box cover), and reference mark (I) on the injection pump sprocket opposite the reference mark on the injection pump housing.



Remove the timing adjusting plug (1) and set the engine to TDC (pin of diameter 7) **Mot. 1318.**



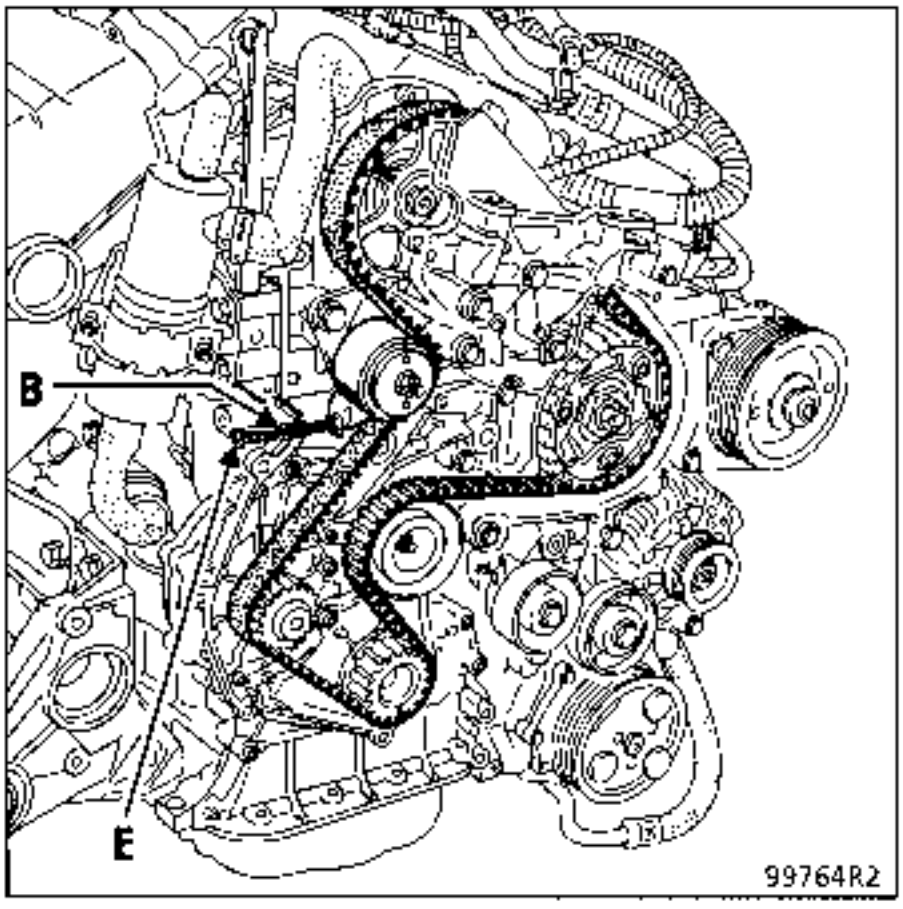
Slacken the timing belt by slackening nut (B) and bolt (E).

Remove the timing belt.

REFITTING - Special notes

- Check that pin **Mot. 1318** is still in place.
- Fit the timing belt, aligning the sprocket - belt reference marks.

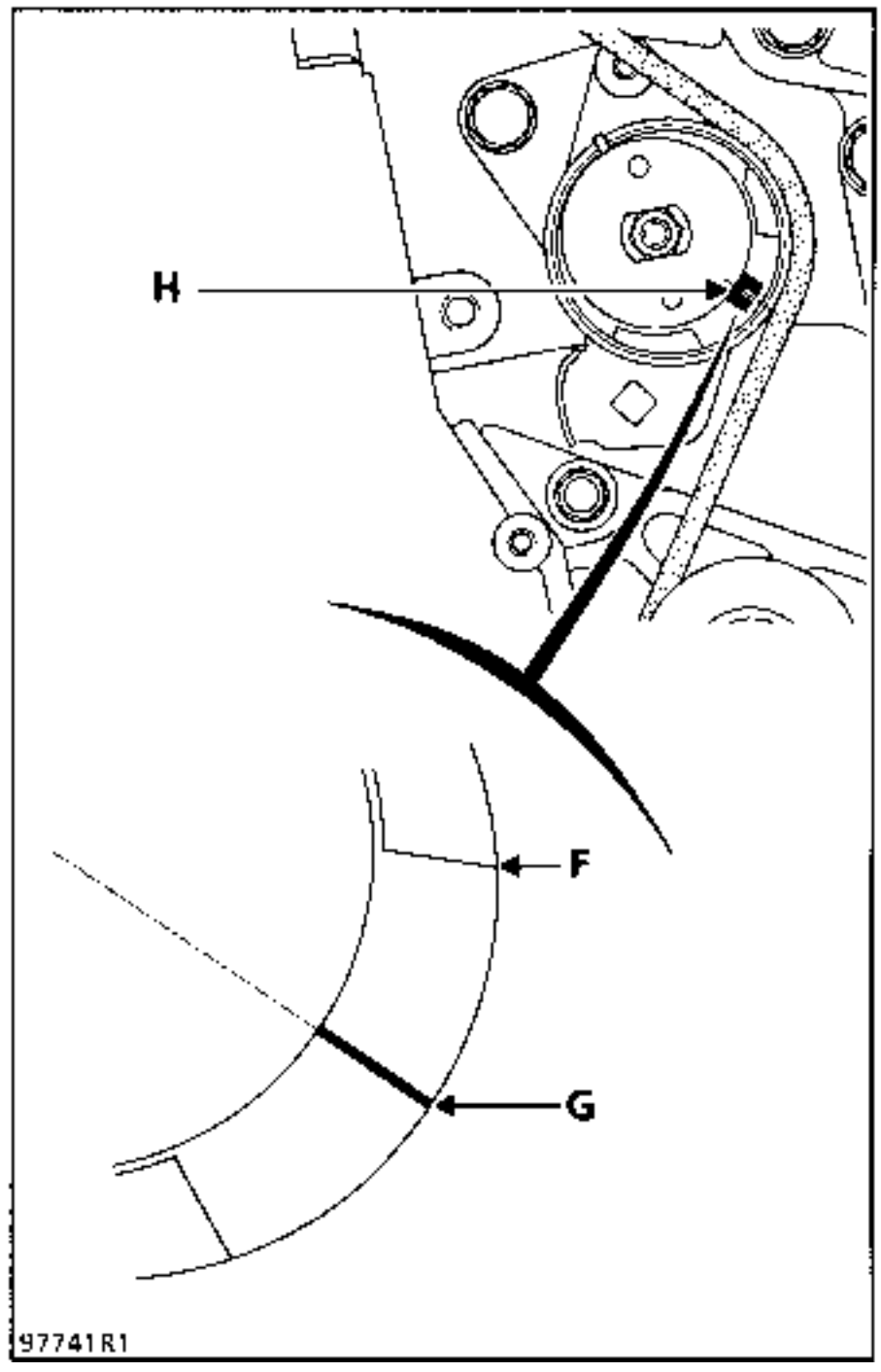
Adjusting the belt tension
- use the tension adjusting bolt (E).



The method described below MUST be followed to adjust the belt tension.

- Bring the timing belt under tension by bringing sector (H) of the tension wheel to stop (F), without forcing it, using bolt (E); tighten the tension wheel nut.
- Remove the TDC pin, turn the crankshaft 3 times (clockwise as seen from the timing end)to return to TDC without going backwards, then refit the TDC pin.
- Slacken the tension wheel nut, then progressively bring the wheel to the nominal tension position (G) (reference mark aligned with the centre of sector (H)).
- Torque tighten the nut to **3 daN.m**.

NOTE : Never turn the engine in the opposite direction to normal operation.



Check the injection pump timing ; (**see section 13; Pump - timing**)

Remember to remove the TDC pin.

Clean the bearing face of the crankshaft pulley.

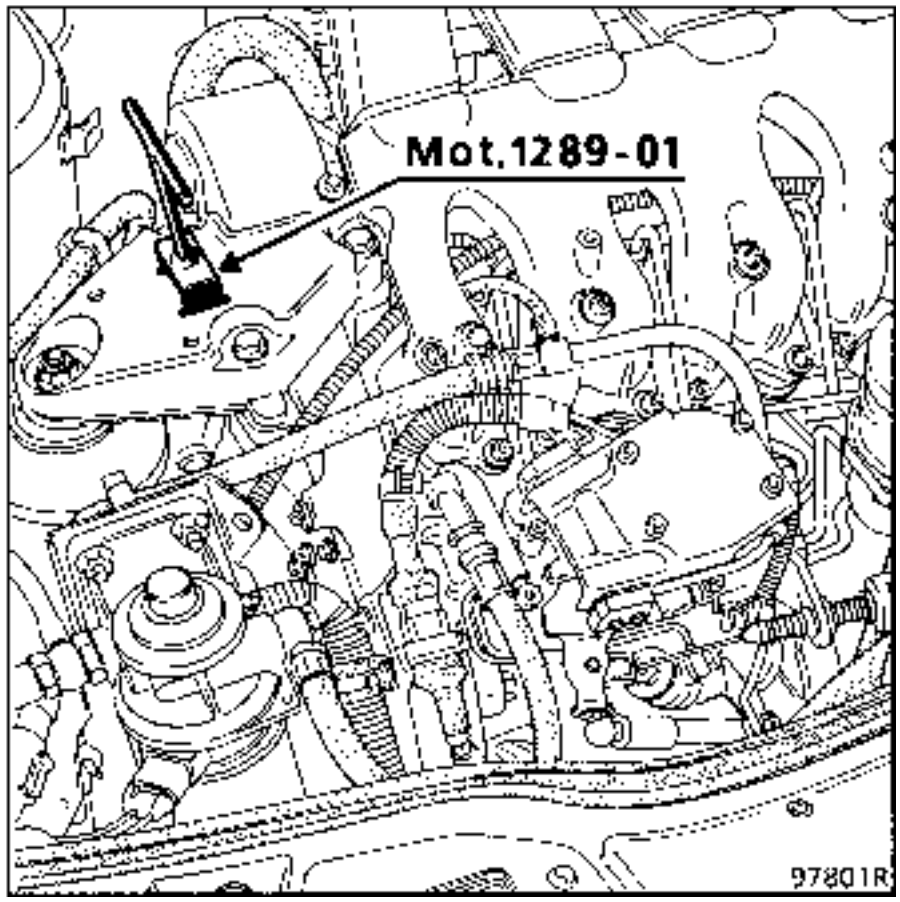
Apply 2 drops of LOCTITE AUTOFORM to the crankshaft pulley.

The bolt must be renewed;apply a torque of 2.5 daN.m, then an angle of 64° ± 6°

Refitting is the reverse of removal.

If necessary, replace the refrigerant fluid in the circuit.

The suspended mounting cover is fitted using tool **Mot. 1289-01**.



TIMING BELT ADJUSTMENT

SPECIAL TOOLING REQUIRED		
Mot.	1054	TDC pin
Mot.	1273	Tool for checking belt tension
Mot.	1289-02	Centring fork for suspended engine mounting limiter

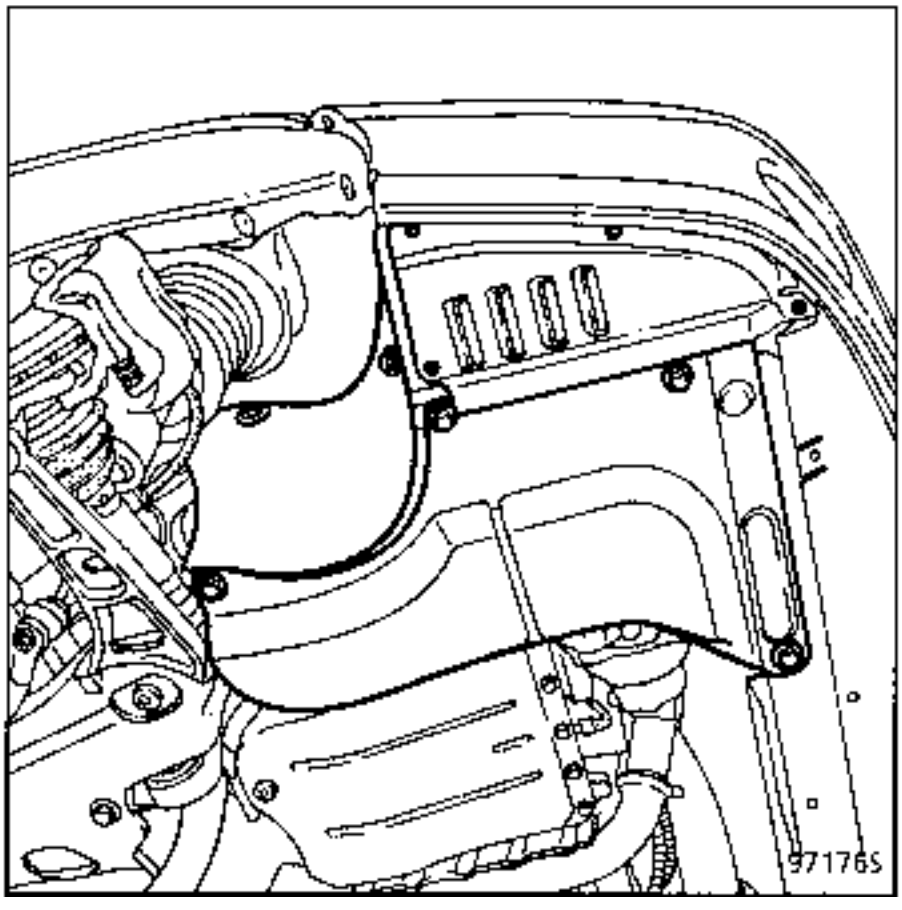
TIGHTENING TORQUES (in daN.m)	
Front right hand suspended engine mounting cover nut	3 to 4.5
Wheel bolts 5 holes	10
Tension wheel nut	5
Suspended mounting cover bolt	5 to 6.5
Suspended mounting limiter bolt	5 to 6.5
Crankshaft pulley	2 + 115° ± 15°
Suspended mounting bolt on cylinder head	2 to 2.5

REMOVAL

Put the vehicle on a 2 post lift, front wheels hanging free. Disconnect the battery.

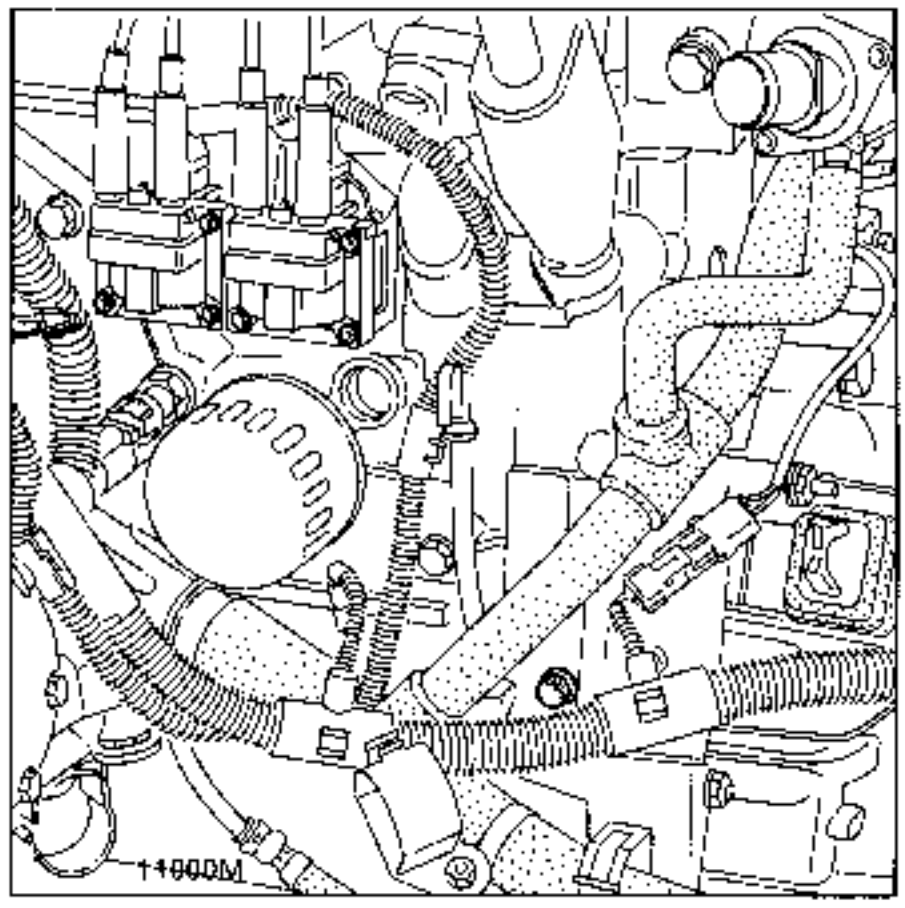
Remove:

- the front right hand wheel,
- the right hand engine undertray,
- the exhaust downpipe.

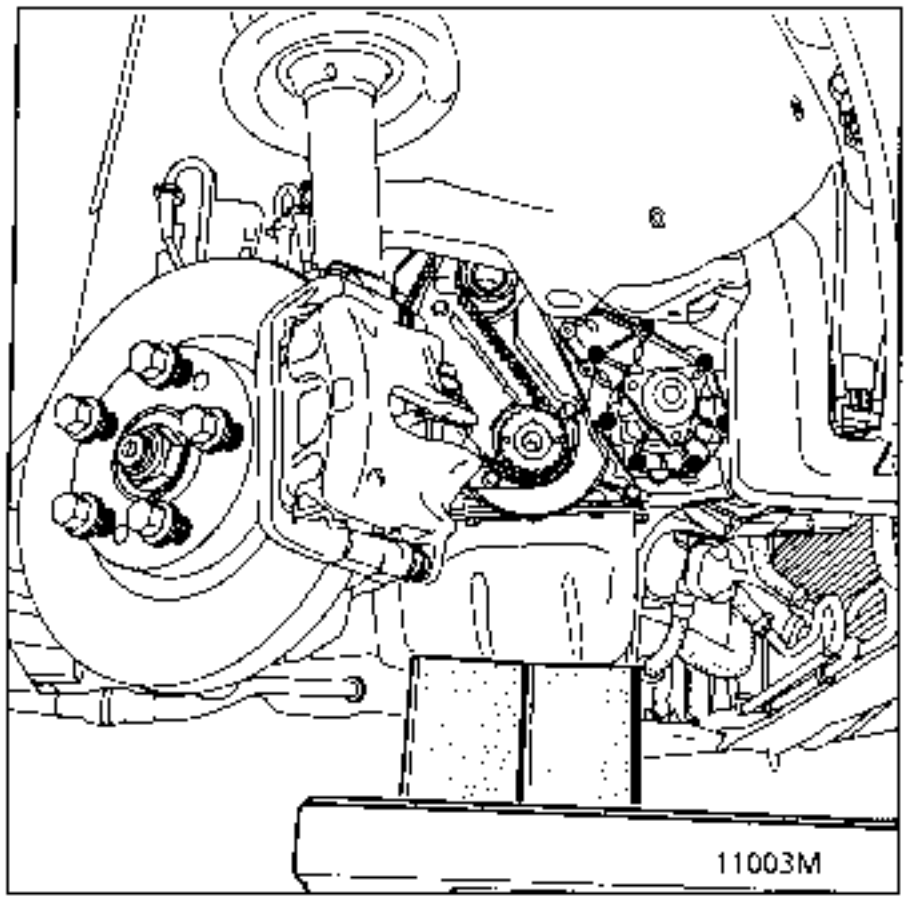


- the front right hand wheel arch protector.

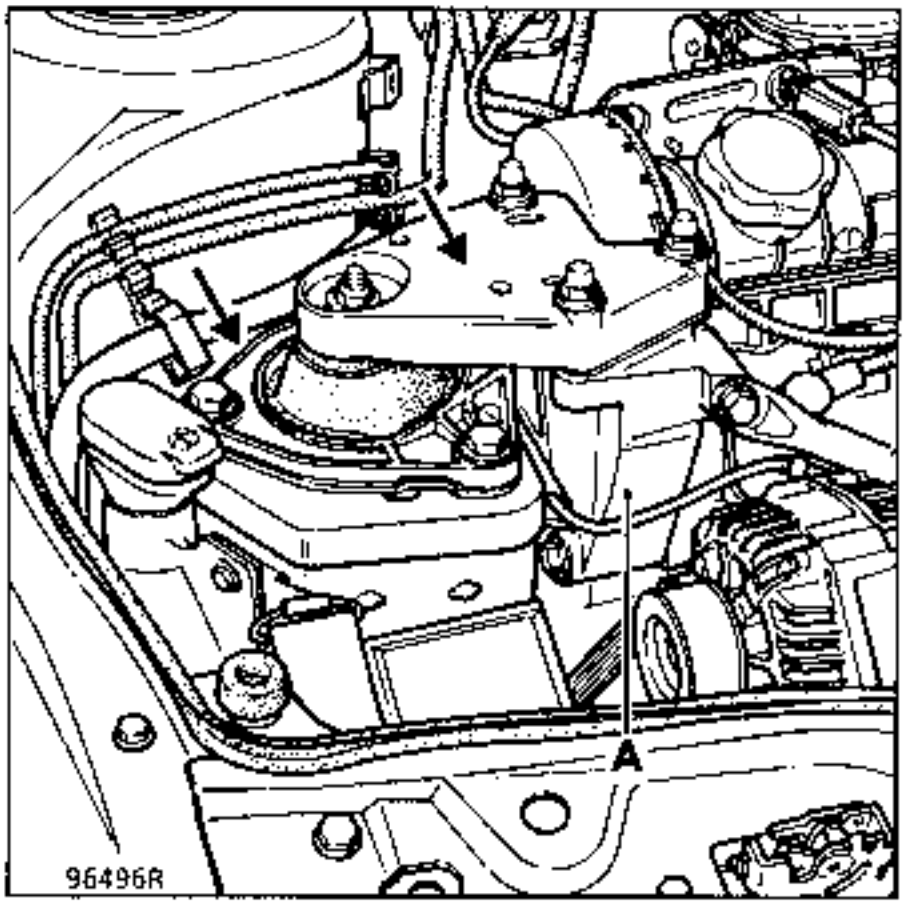
Pin the engine at TDC using tool Mot. 1054.



Lift the vehicle so the right hand side of the engine may be set on a flat surface with a wooden block.

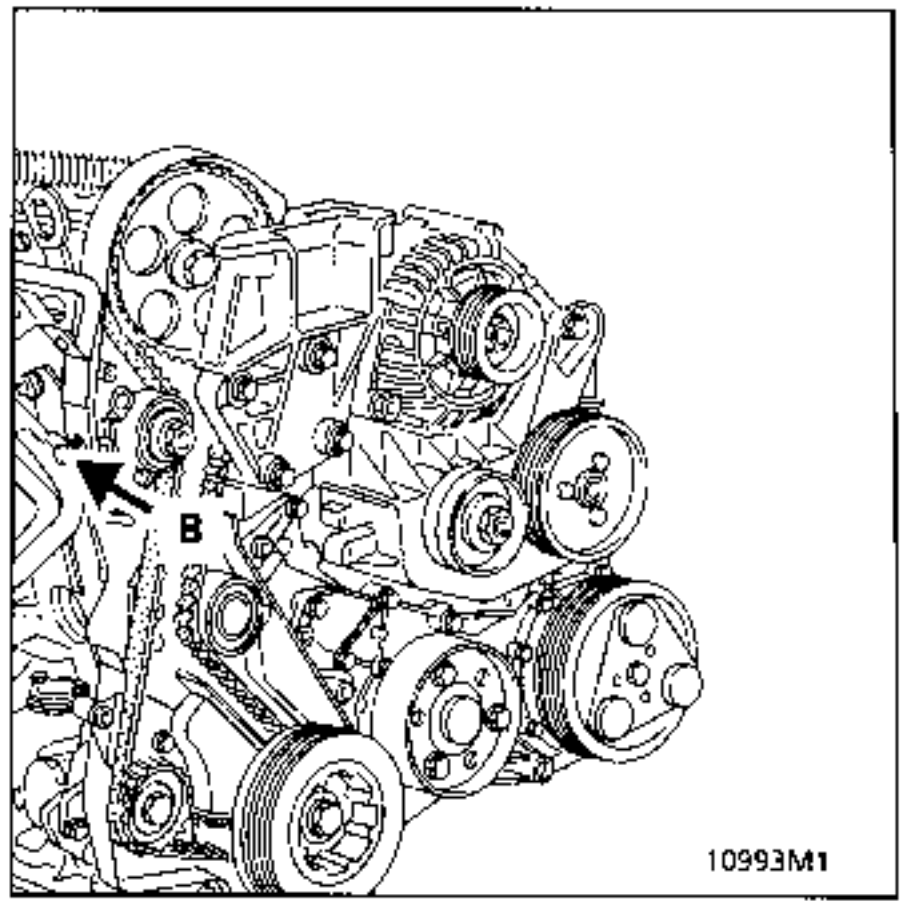


Remove:
- the suspended mounting cover and the movement limiter,
- the upper timing cover.



- the crankshaft pulley,
- the lower timing cover,
- the accessories belt, (see section 07 "removing - refitting the accessories belt")

Slacken the timing belt by slackening the tension wheel shaft and bolt (B).



Remove the suspended mounting support (A) on the cylinder head and the timing belt.

NOTE : the belt is trapped on the support.

REFITTING - Special notes

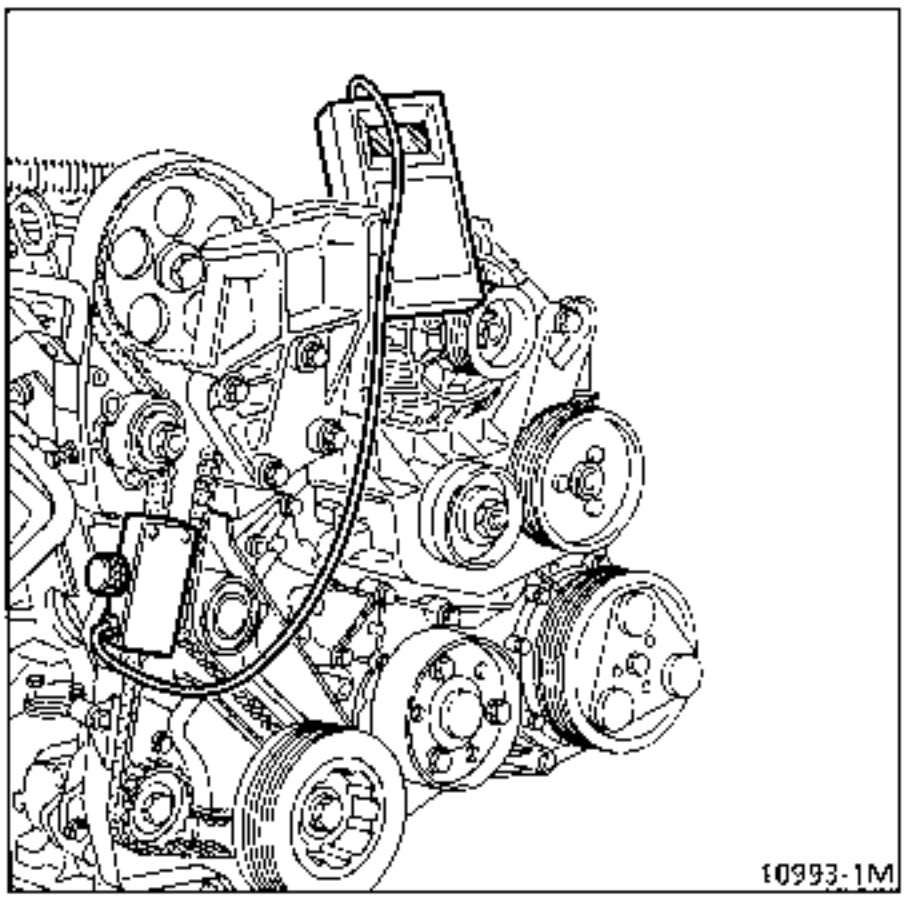
Check that pin **Mot. 1054** is still in place.

Fit the belt and the suspended mounting support to the cylinder head aligning the reference marks on the pullies and belt.

Pretension the timing belt by tightening one bolt (B) on the inner timing cover (see diagram on previous page).

Fit tool **Mot. 1273** .

Tension the belt (see section 07).

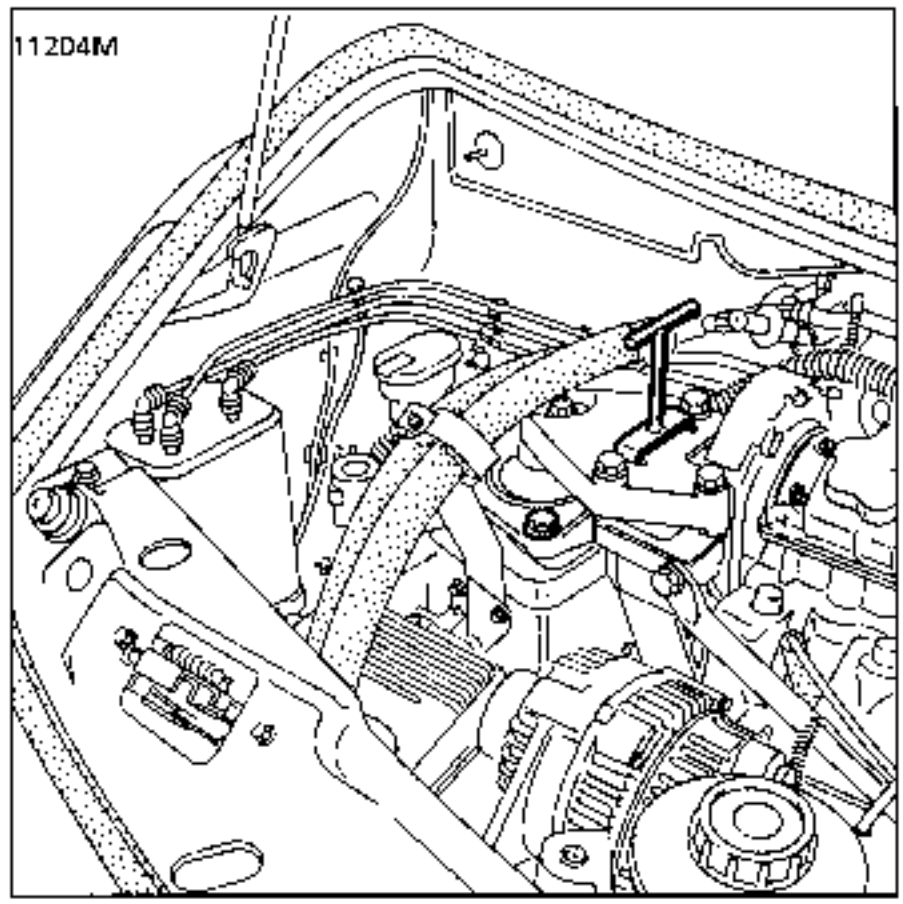


Lock the tension wheel at **5 daN.m**.

NOTE: the crankshaft pulley bolt must be renewed and torque tightened to 2 daN.m, then angle tighten to 115:°± 15°

Fit the suspended mounting cover.

Centre the limiter using tool **Mot. 1289-02.**



Refitting is the reverse of removal.

SPECIAL TOOLING REQUIRED		
Mot.	1273	Tool for checking belt tension
Mot.	1289-01	Centring fork for suspended engine mounting limiter
Mot.	1318	TDC pin
Mot.	1370	Wrench for tensioning tension wheel
Mot.	1368	Wrench for tightening adjusting wheel
Mot.	1369	Tool for tensioning tightening wheel
Mot	1376	Pin for locking tension wheel
T. Av.	.476	Ball joint extractor

EQUIPMENT REQUIRED
14 TORX ring spanner - timing cover bolts
Impact ball joint extractor
8 TORX ring spanner - timing cover bolts
Universal support tool for removing the engine and transmission assembly
Anti-tilt safety pads

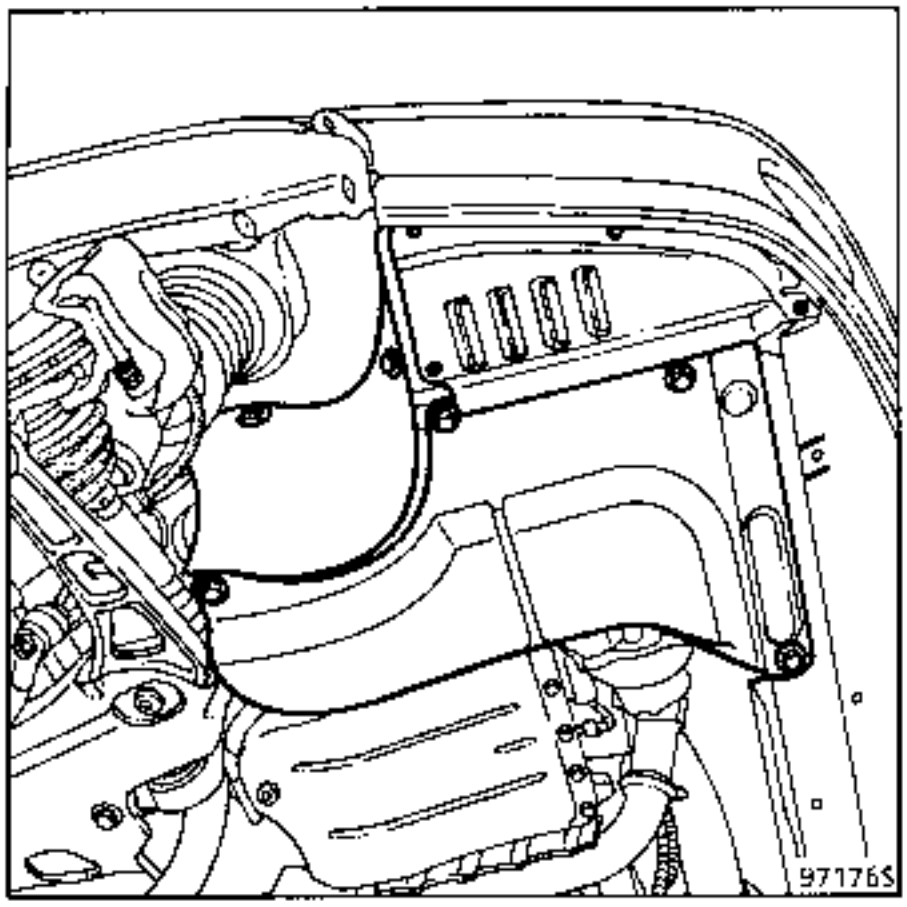
TIGHTENING TORQUES (in daN.m)	
Front right hand suspended engine mounting cover nut	3 to 4.5
Wheel bolts	10
Timing tension wheel nut	3
Accessories belt tension wheel bolt	5.6
Accessories belt roller nut	4
Water pump bolt	2
Suspended mounting cover bolt	5 to 6.5
Suspended mounting limiter bolt	5 to 6.5
Crankshaft pulley	2.5 + 64° ± 6°
Suspended mounting bolt on cylinder head	4 to 4.6

REMOVAL

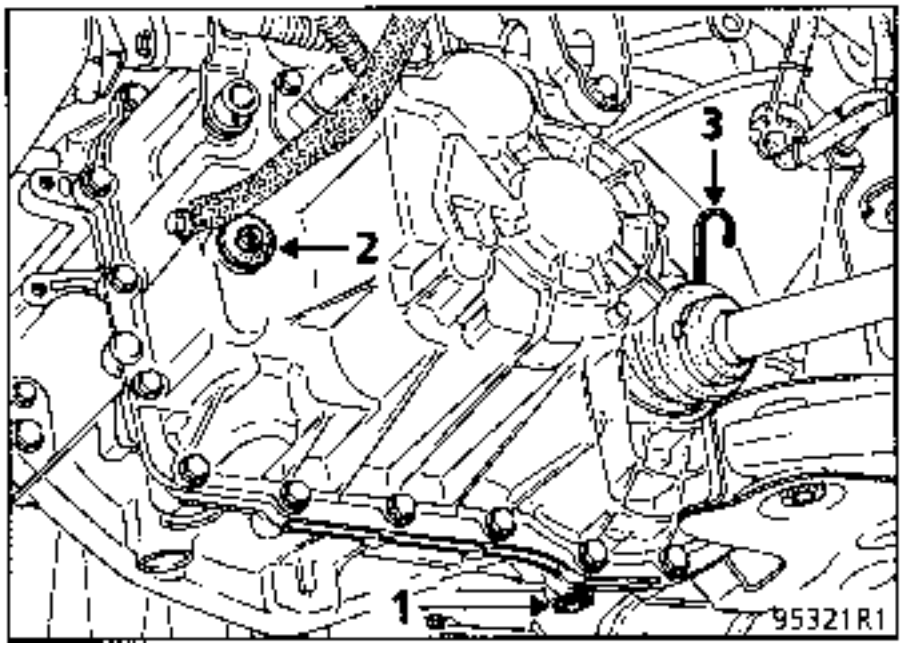
Put the vehicle on a 2 post lift, front wheels hanging free.

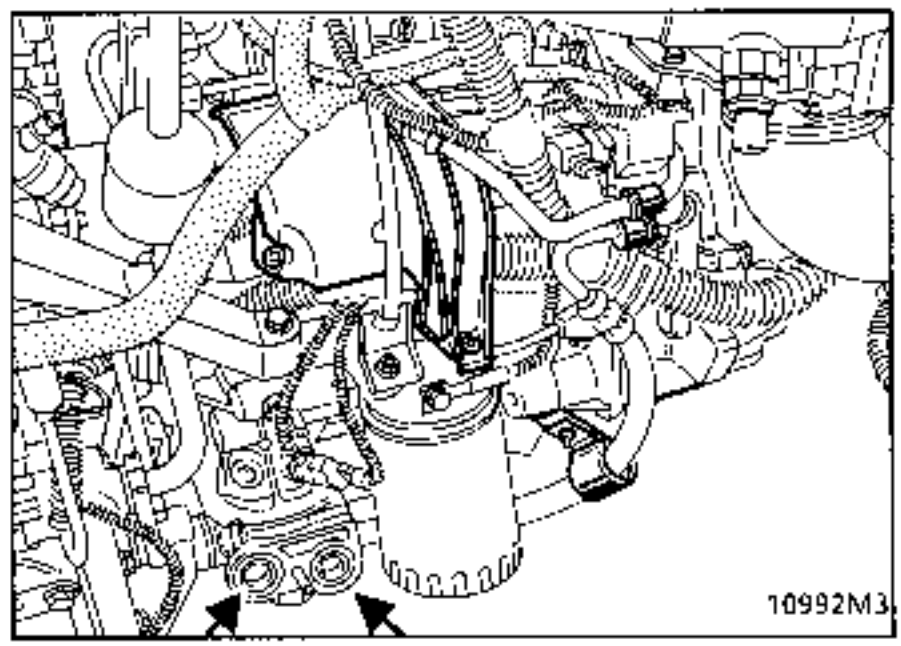
Disconnect the battery.

Remove:
- the front right hand wheel,
- the engine undertray,
- the front right hand wheel arch protector.

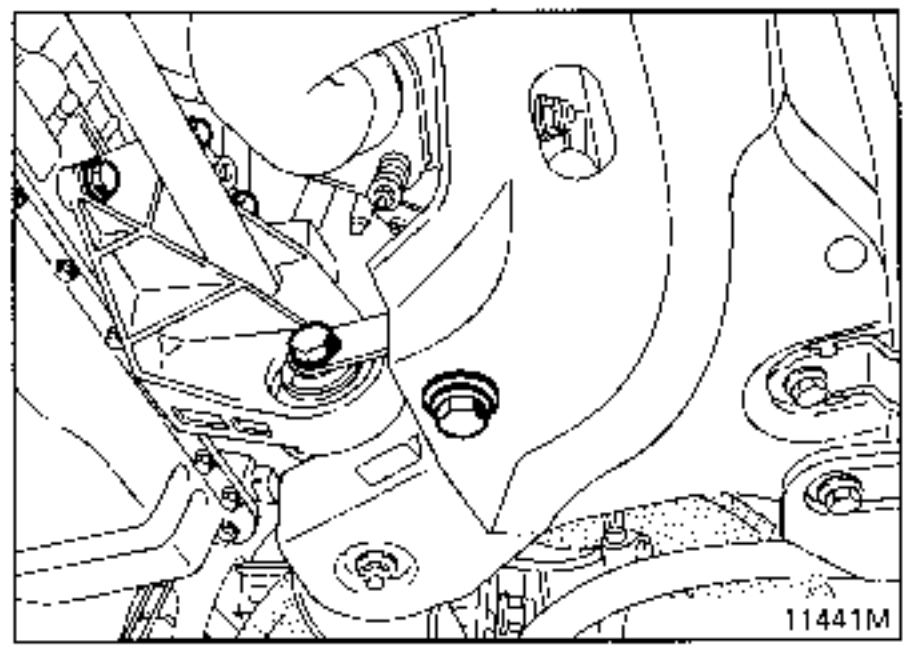


Drain the gearbox (1) (3 min draining time).
Remove the mounting flange for the oil pipes on the oil filter mounting; plug the openings and take care to catch any oil which runs out.



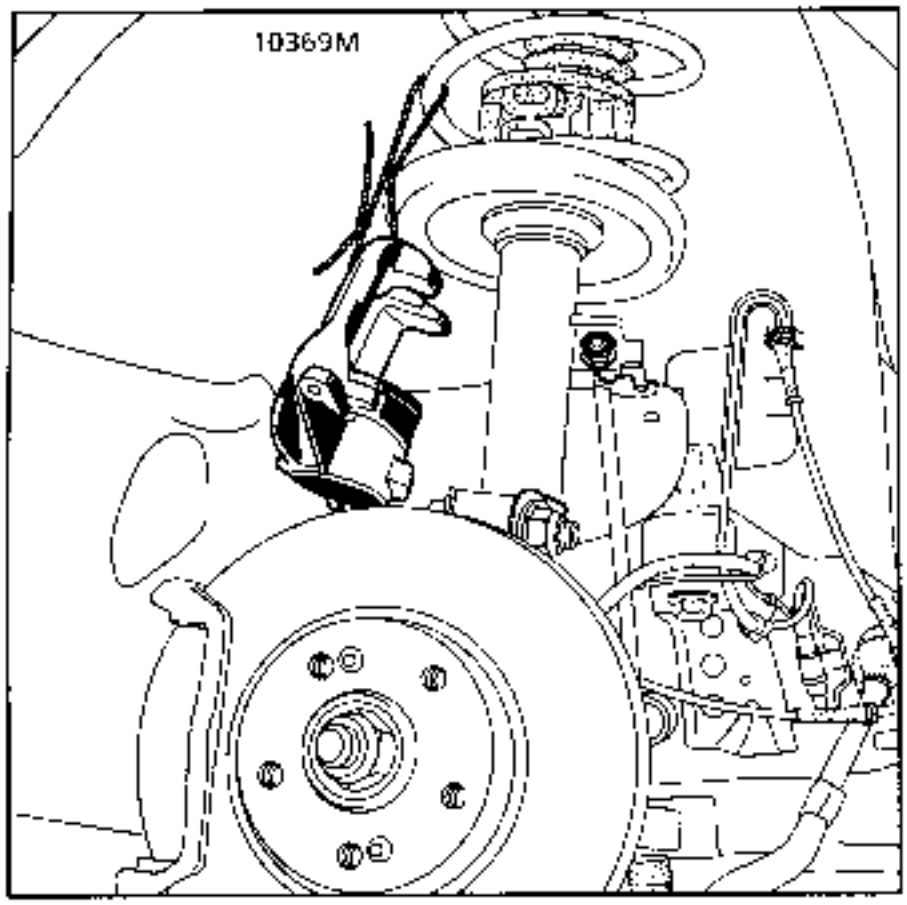


Completely remove the engine tie bar.
Remove the exhaust downpipe.

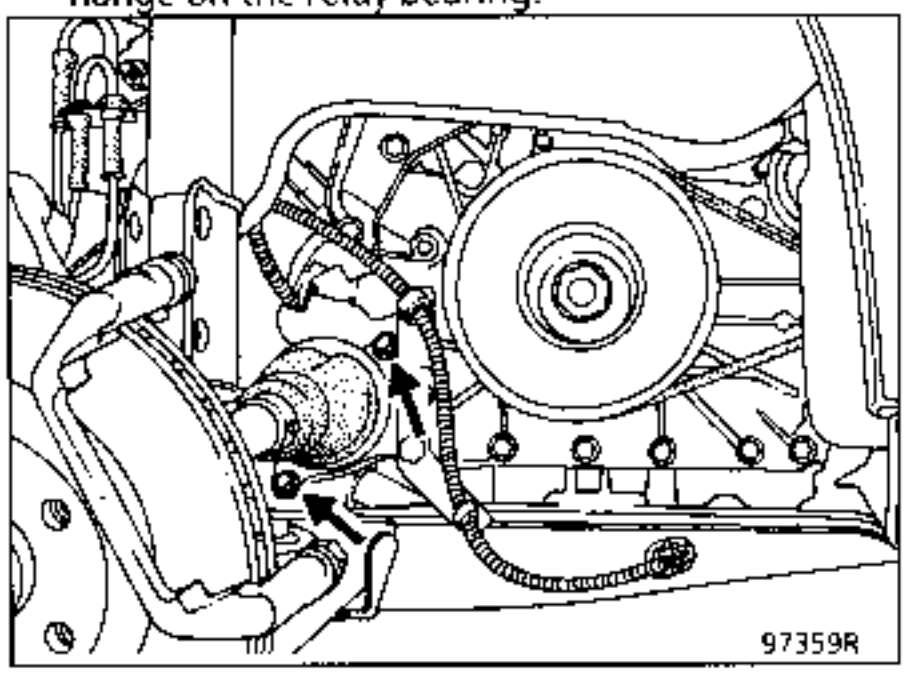


Right hand side of the vehicle

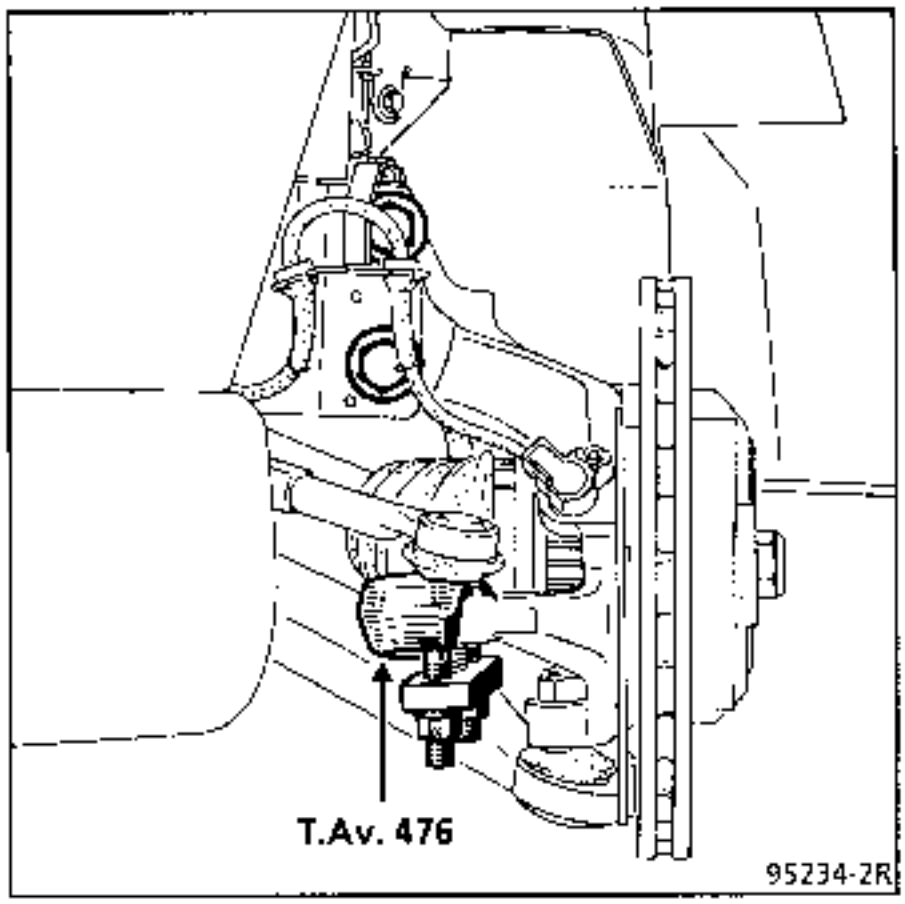
Remove:
- the front right hand brake caliper and secure it to the suspension spring to protect the pipe.



- the two mounting bolts for the driveshaft flange on the relay bearing.

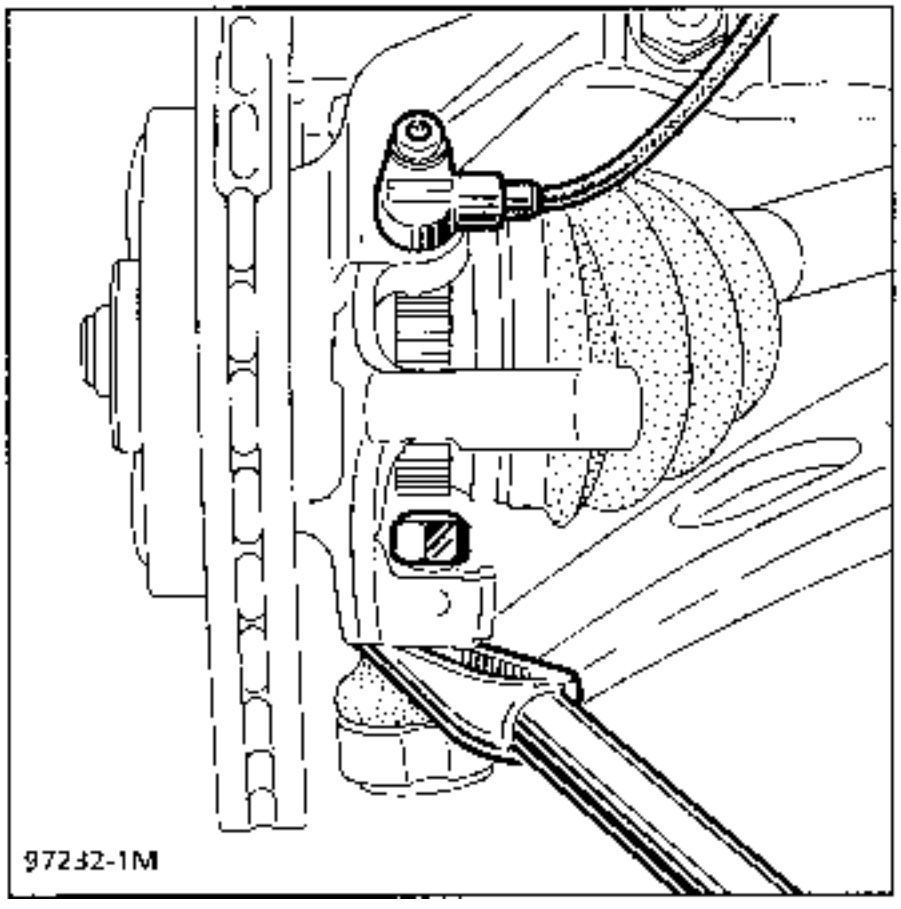


- the track rod end using tool **T. Av. 476,**
- the shock absorber base mounting bolts,

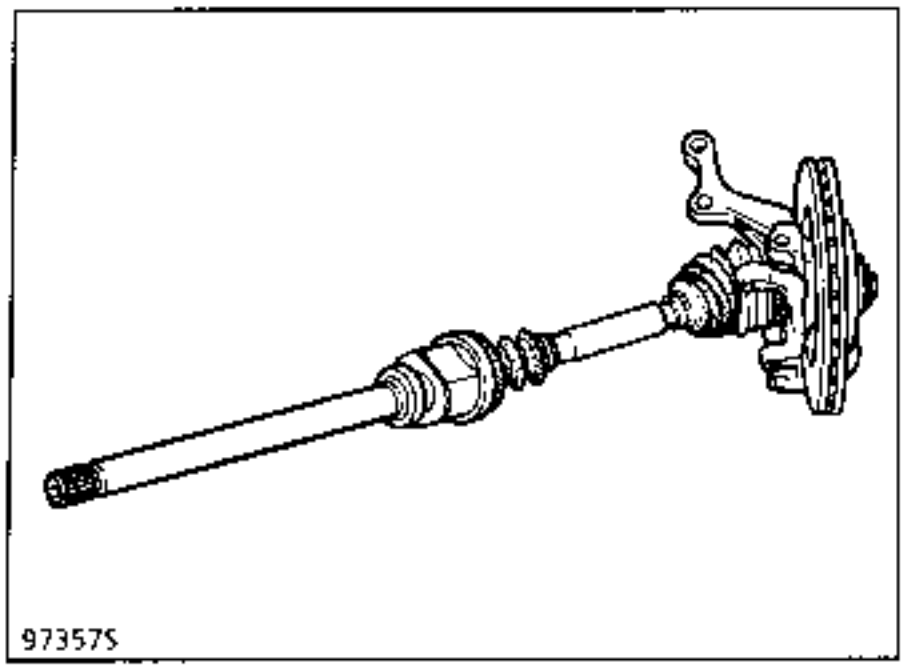


- the wheel sensor if the vehicle is fitted with ABS.

Slacken the lower ball joint nut as far as possible and release it using an impact ball joint extractor.



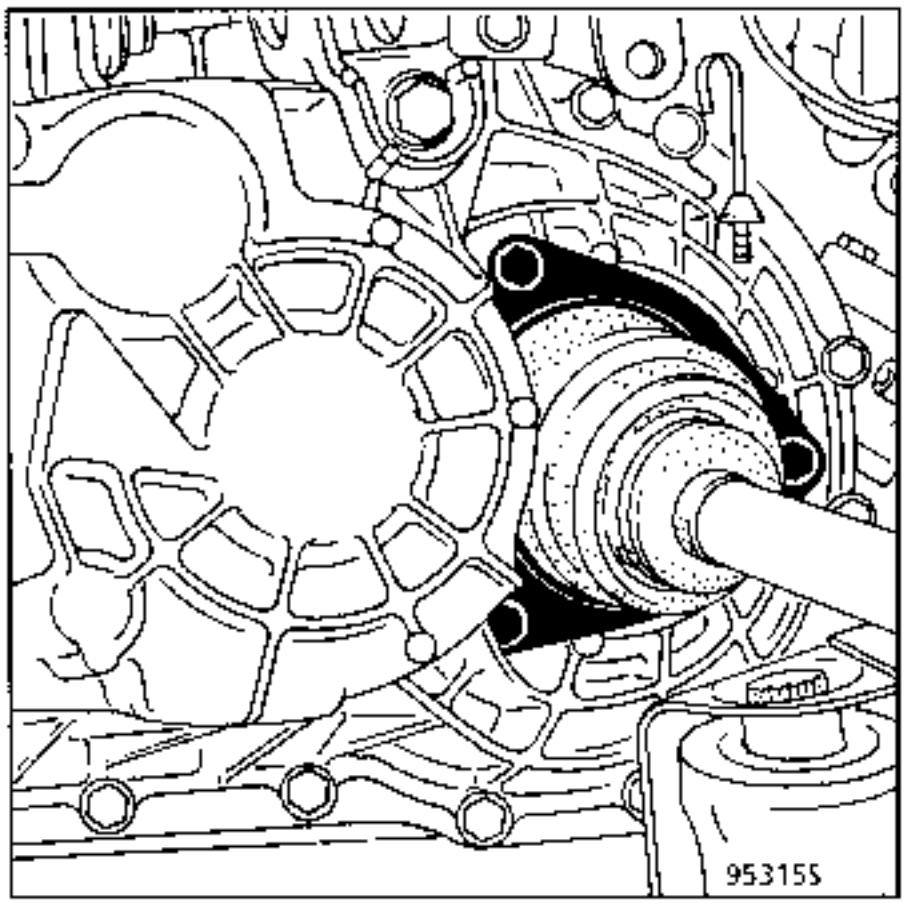
Remove the hub assembled with the driveshaft.



Take care to protect the gaiters.

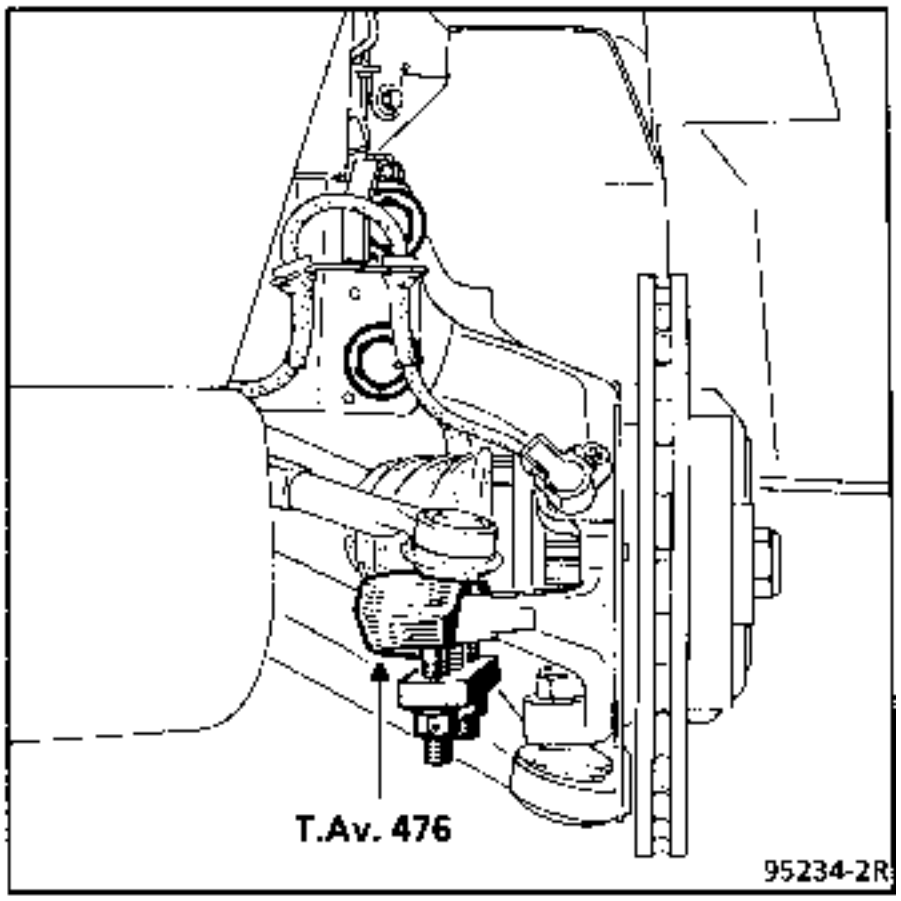
Left hand side of the vehicle

Remove:
- the brake caliper,
- the three driveshaft gaiter mounting bolts,



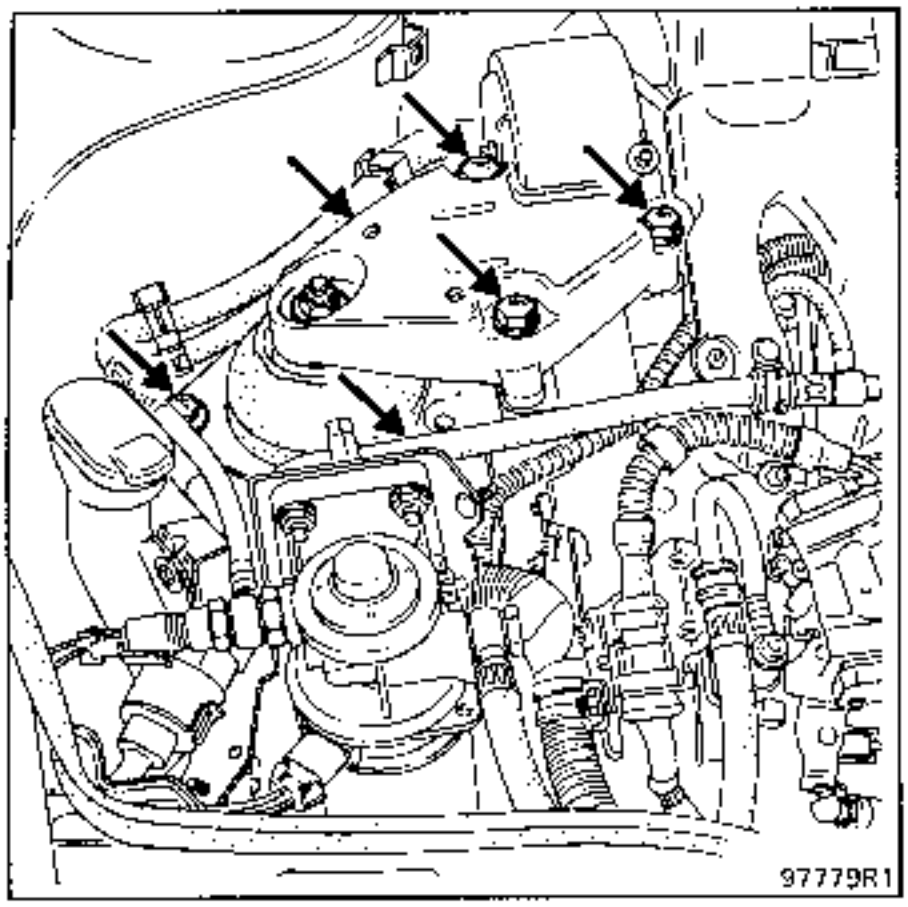
- the track rod end using tool **T. Av. 476,**

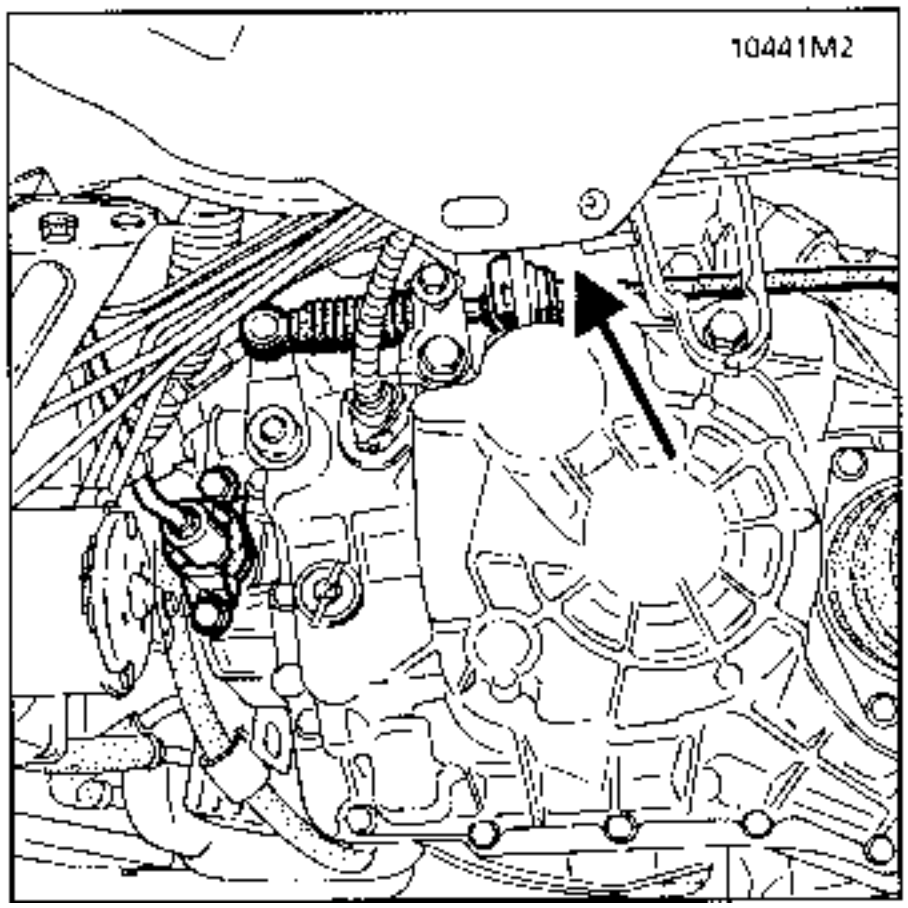
Release the brake pad wear warning light wire and disconnect the ABS target sensor.
Remove the shock absorber base bolts.



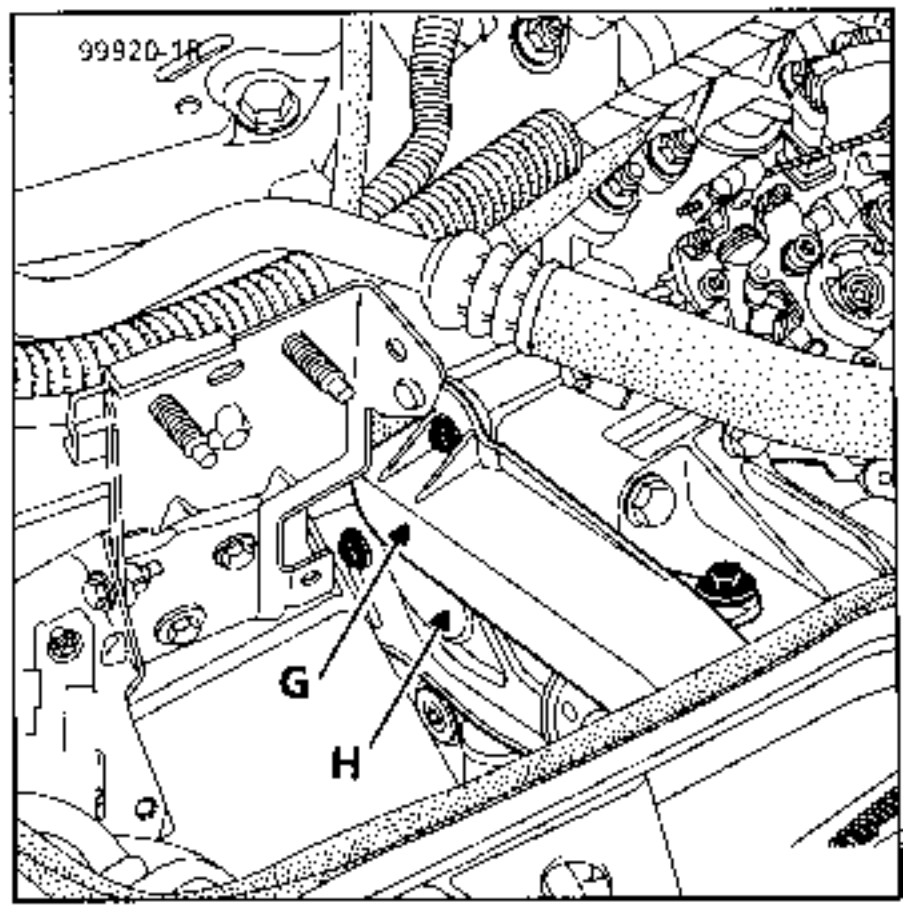
Release the lower ball joints and the track rod ends.
Remove the stub-axle - disc - driveshaft assembly.
Fit the universal support and lower the engine onto it (2 persons required).

Remove:
– the right hand suspended mounting cover (4 bolts), and its mounting.
– the upper nut for the left hand suspended mounting (1 bolt)





– the upper accessories belt housing (G).



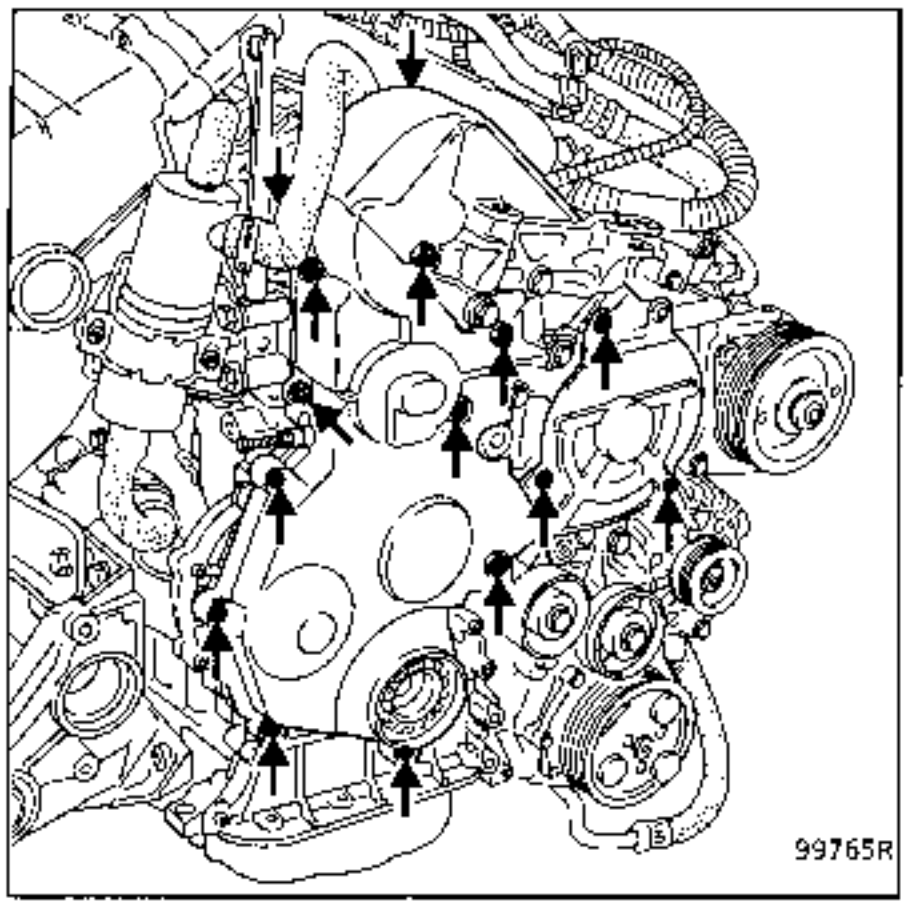
– lower the engine and transmission assembly by approximately 70 mm and push it to the left.

TAKE CARE not to damage the refrigerant gas pipe between the compressor and the dehydration canister (version with air conditioning). The engine and transmission assembly may not be lowered further than this pipe will extend.

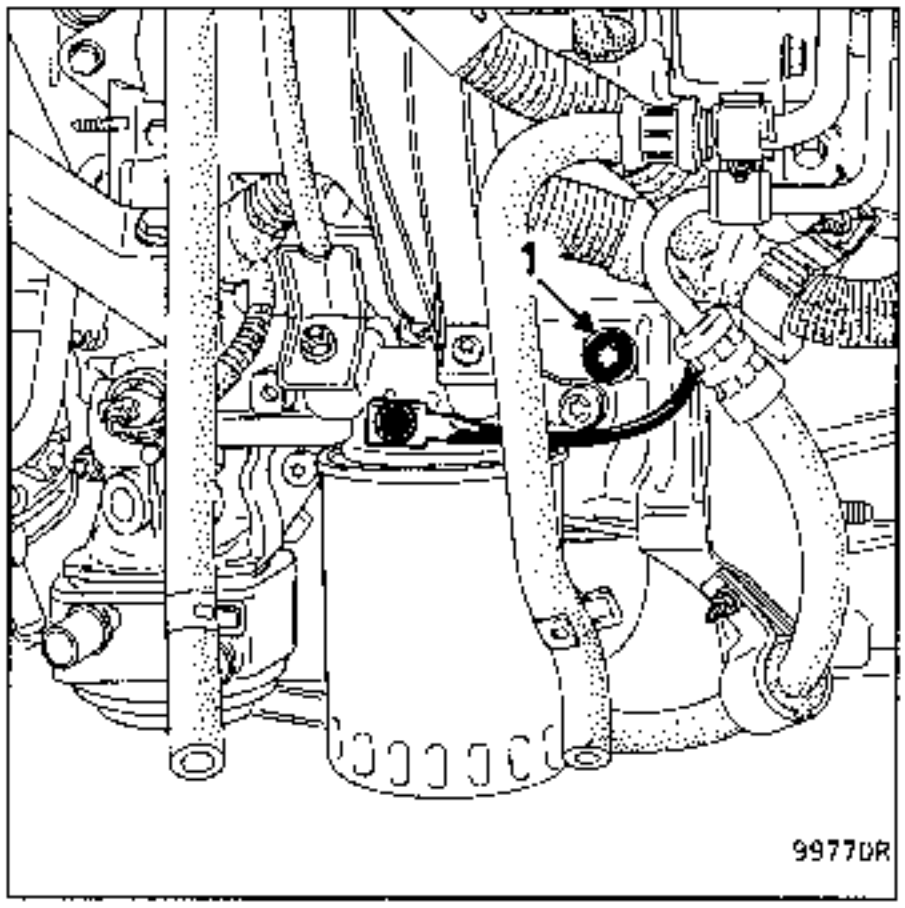
Removing the accessories belt

See section on "Accessories belt (removal - refitting)"

Remove:
- the accessories pulley on the crankshaft,
- the timing covers,

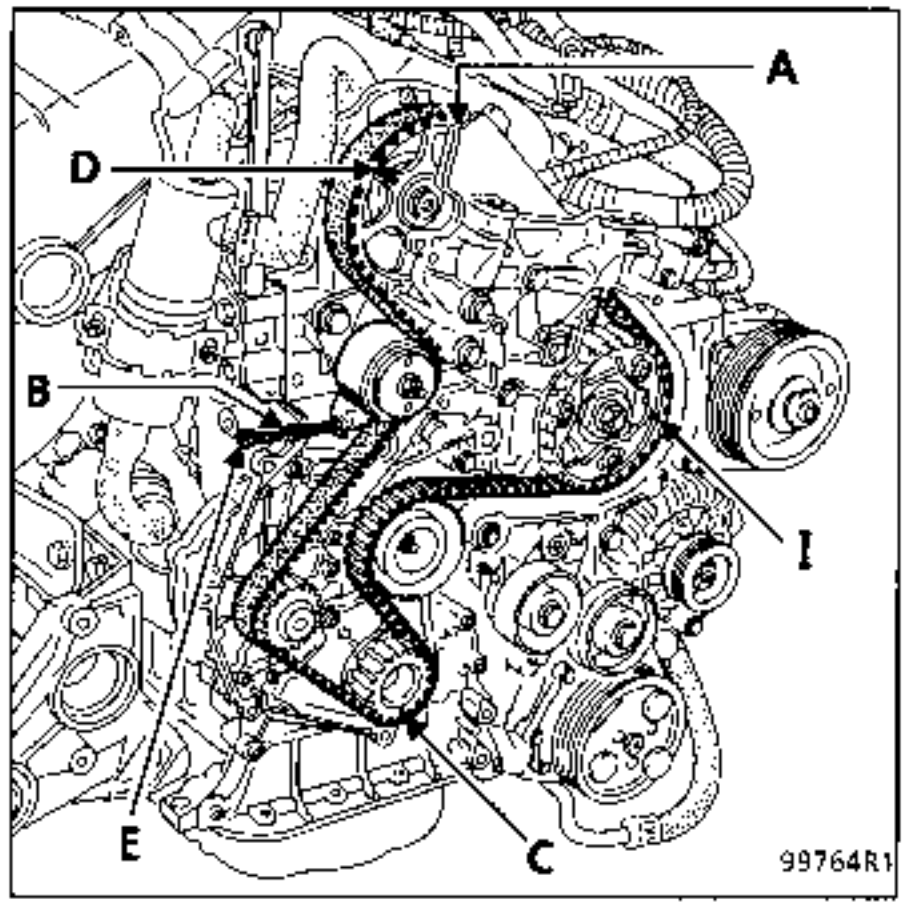


Remove the timing plug (1) and set the engine at TDC (pin diameter 7) **Mot. 1318**



Adjusting the timing

Turn the engine to bring the crankshaft sprocket reference mark (C) to the bottom, the camshaft sprocket reference mark (D) slightly to the left (45°) (the interior mark (A) on the camshaft sprocket should be opposite the fixed point on the rocker box cover), and reference mark (I) on the injection pump sprocket opposite the reference mark on the injection pump housing.



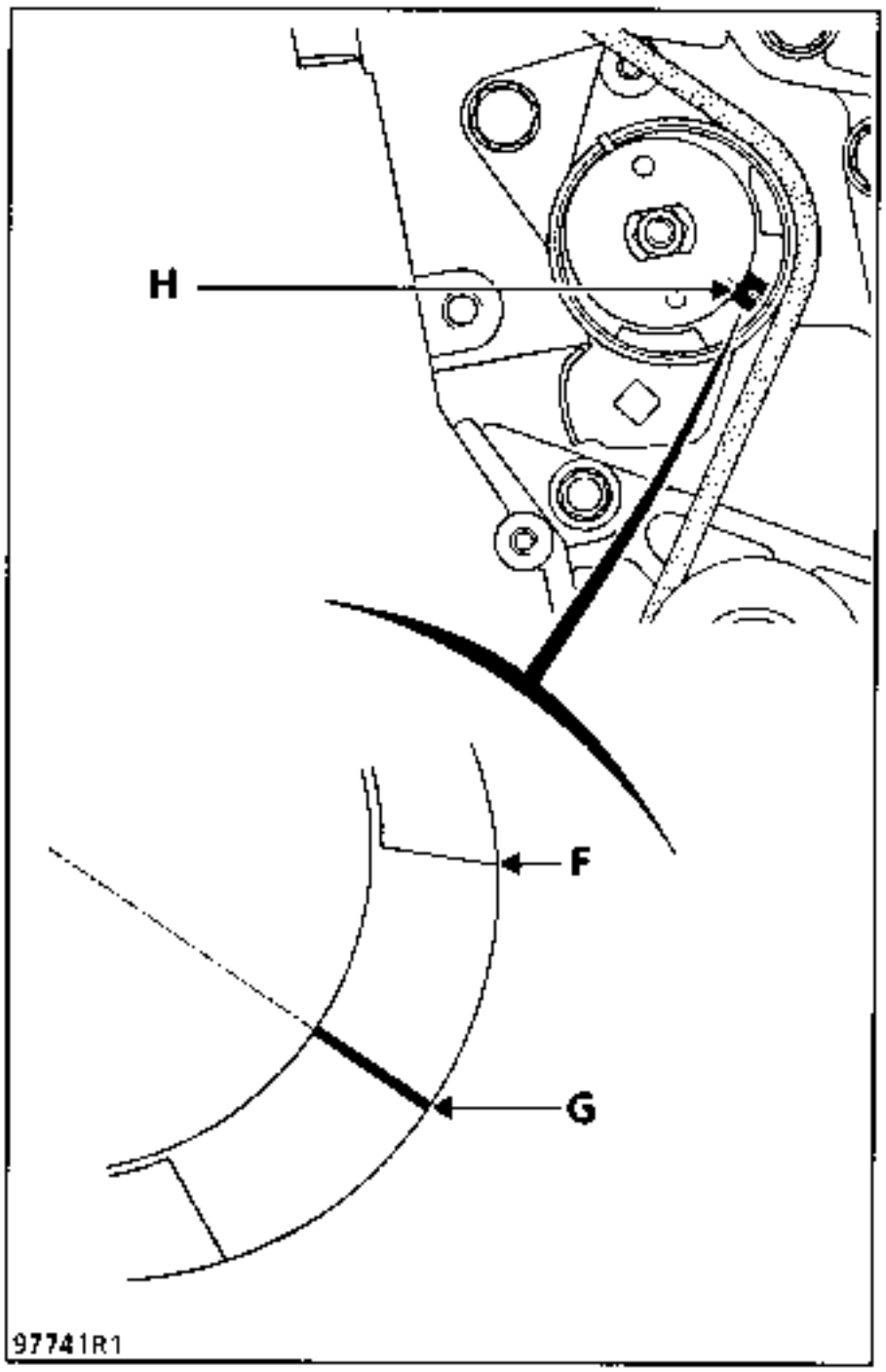
Slacken the timing belt by slackening nut (B) and bolt (E).

Remove the timing belt.

Remove the timing tension wheel by completely removing its central nut.

REFITTING - Special notes

- Check that pin **Mot. 1318** is still in place.
- Fit the timing tension wheel.
- **Fit the timing belt, aligning the sprocket - belt reference marks.The method described below MUST be followed to adjust the belt tension.**
- Bring the timing belt under tension by bringing sector (H) of the tension wheel to stop (F), without forcing it, using bolt (E); tighten the tension wheel nut.



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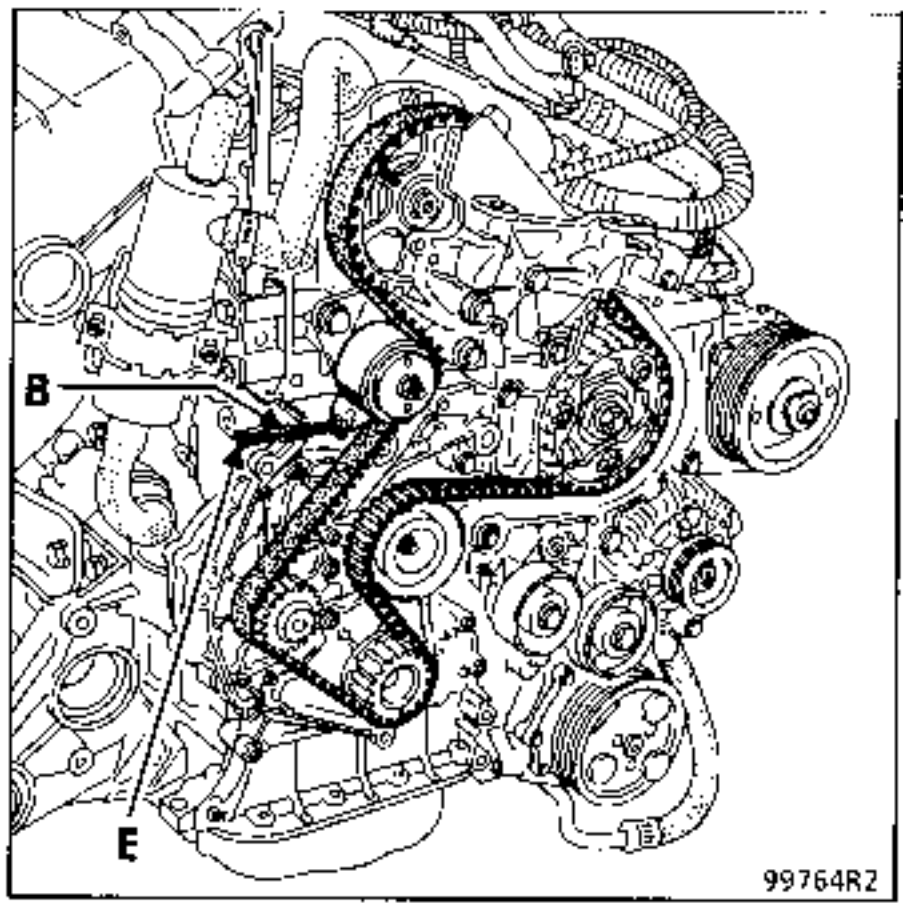
Remove the TDC pin, turn the crankshaft 3 times (clockwise as seen from the timing end)to return to TDC without going backwards, then refit the TDC pin.

Slacken the tension wheel nut, then progressively bring the wheel to the nominal tension position (G) (reference mark aligned with the centre of sector (H)).

Torque tighten the nut to **3 daN.m**.



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NOTE : Never turn the engine in the opposite direction to normal operation.

Check the injection pump timing ; (**see section 13; Pump - timing**)

Remember to remove the TDC pin.

Clean the bearing face of the crankshaft pulley.

Apply 2 drops of LOCTITE AUTOFORM to the crankshaft pulley. **The bolt must be renewed**

Refitting is the reverse of removal.

Adjusting the accessories belt tension

Vehicle with air conditioning

Fit the new belt following the method described in section 07 " **Accessories belt tension** ".

Vehicle without air conditioning

Tighten the tension wheel central locking bolt using an allen key until it touches the tension wheel and there is no play.

Fit the new belt and tension it until the display of tool **Mot. 1273** shows the recommended fitting value (see section "**Accessories belt tension**").

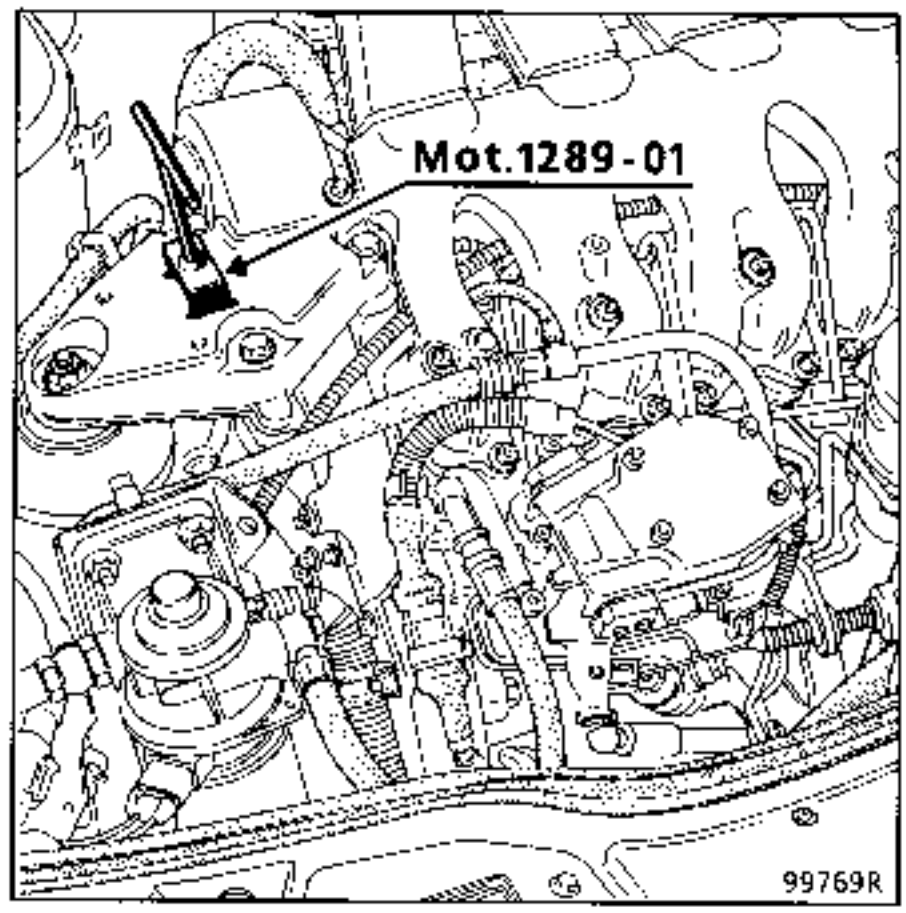
REFITTING: Once a belt has been removed, do not refit it.

Fit the suspended mounting cover and movement limiter assembly.

ADJUSTING THE LONGITUDINAL MOVEMENT LIMITER

Slacken the limiter bolts (4).

Insert the limiter centring fork , **Mot.1289-01** into the slots on the suspended mounting cover.



Lock the limiter bolts (4) at a torque of **5.5 daN.m**.

SPECIAL TOOLING REQUIRED	
Mot. 1273	Tool for checking belt tension

TENSION VALUES

When the engine is cold (ambient temperature), fit the new belt.

Fit the sensor of tool **Mot. 1273** at the point shown (→).

Turn the knob on the sensor until it clicks.

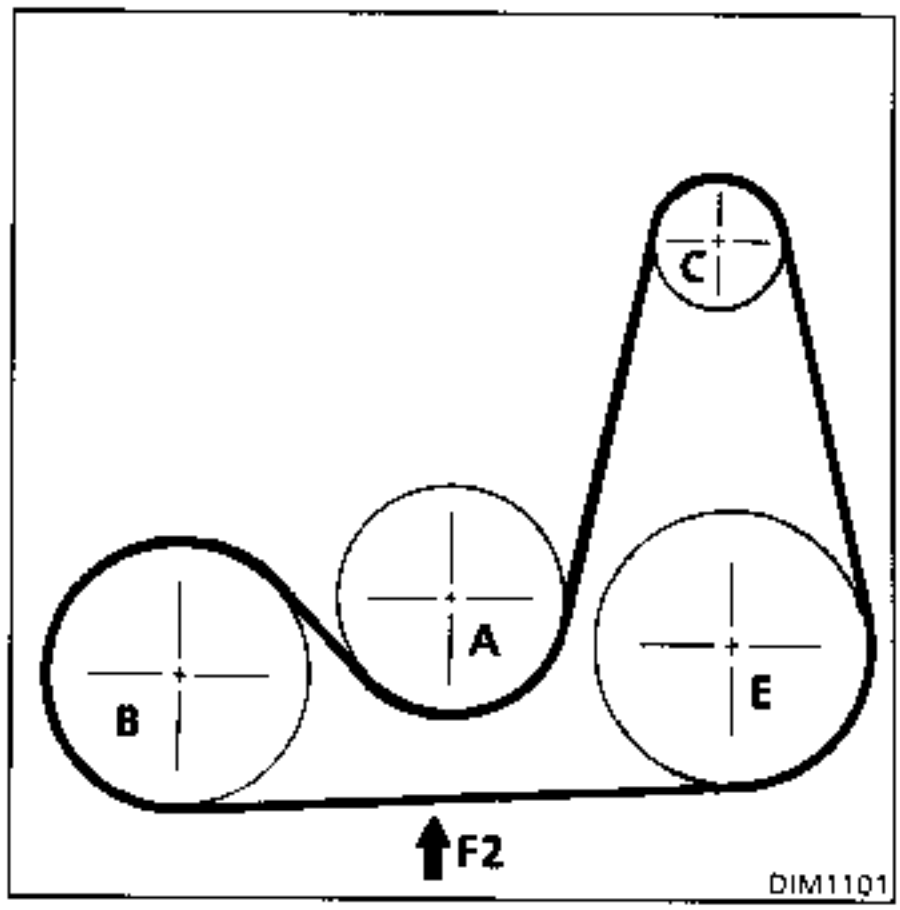
Tighten the belt until the display on tool **Mot. 1273** shows the fitting value specified below.

Lock the tension wheel, test and adjust the value.

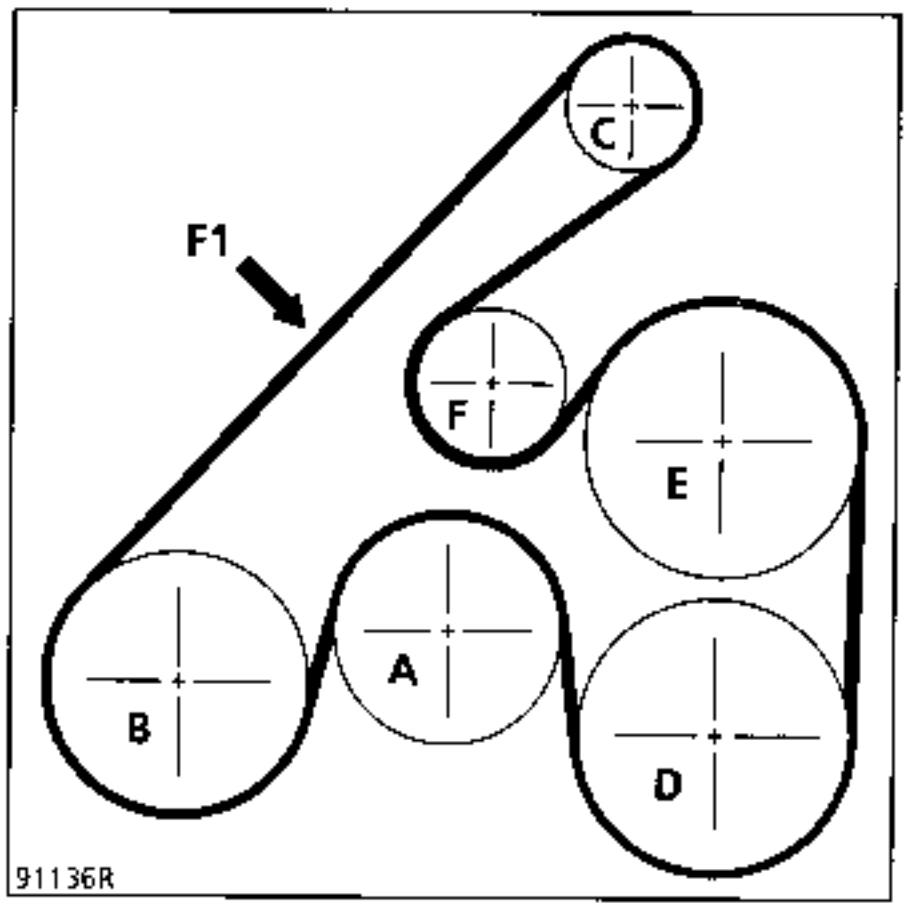
Turn the crankshaft 3 times.

Check the tension value is between the fitting value and the minimum operating value (same value if the tension is being tested without the belt being removed).

Once a belt has been removed, do not refit it.



Tension (US = SEEM Units)	Power assisted steering belt (F2) multi-tooth	Air conditioning belt (F1) multi-tooth
Fitting	112 ± 6 US	114 ± 5 US
Minimum operating	62 US	62 US



A Water pump
B Crankshaft
C Alternator
D Air conditioning compressor
E Steering assistance pump
T Tension wheel
→ Tension testing point

SPECIAL TOOLING REQUIRED	
Mot. 1273	Tool for checking belt tension

TENSION VALUES

Engine cold (ambient temperature), fit the new belt.

Fit the sensor of tool **Mot. 1273** to the point marked(→).

Turn the sensor knob until it clicks.

Tighten the belt until the display of tool **Mot. 1273** shows the recommended fitting value below.

Lock the tension wheel, test and adjust the value.

Turn the crankshaft 3 times.

Check the tension value is between the fitting value and the minimum operating value (same value if the tension is being tested without the belt being removed).

Once a belt has been removed, do not refit it.

Z ENGINE:

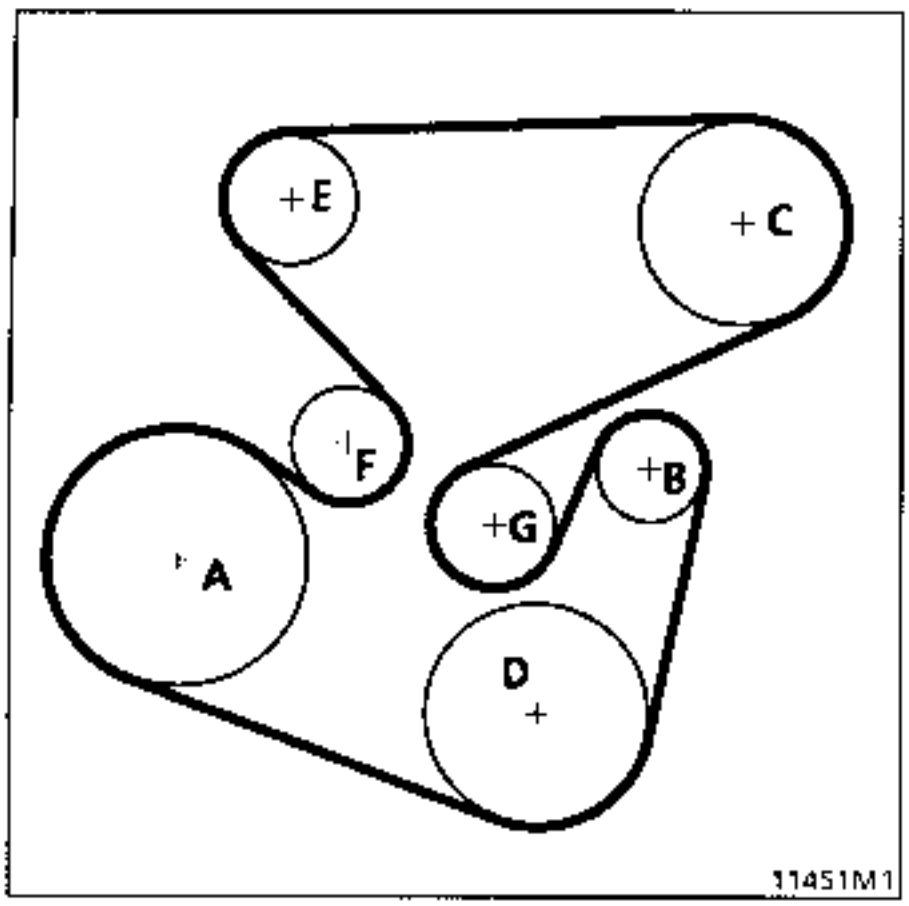
Tension (US − SEEM Units)	Power assisted steering belt (D) multi-tooth	Air conditioning belt (C) multi-tooth	Alternator belt (A) multi-tooth	Water pump belt (P) multi-tooth
Fitting	**94 ± 4 US**	**102 ± 6 US**	**91 ± 5 US**	**100 ± 5 US**
Minimum operating	**56 US**	**57 US**	**50 US**	**41 US**

G ENGINE (without AC):

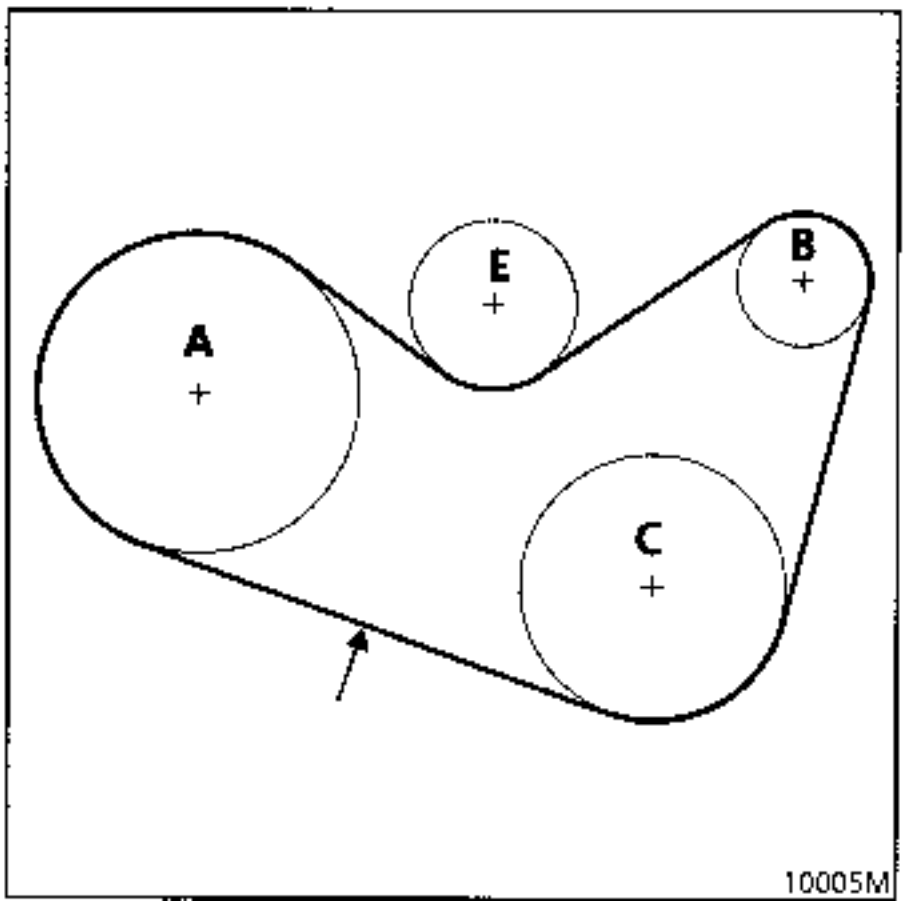
Tension (US = SEEM Units)	Alternator belt with PAS or AC (F1) multi-tooth
Fitting	**116 ± 8 US**
Minimum operating	**63**

POSITION OF COMPONENTS:

Alternator belt with power assisted steering and with air conditioning.



Alternator belt with power assisted steering and without air conditioning.



A Crankshaft

B Alternator

C Power assisted steering pump

D Air conditioning compressor

E Eccentric tension wheel

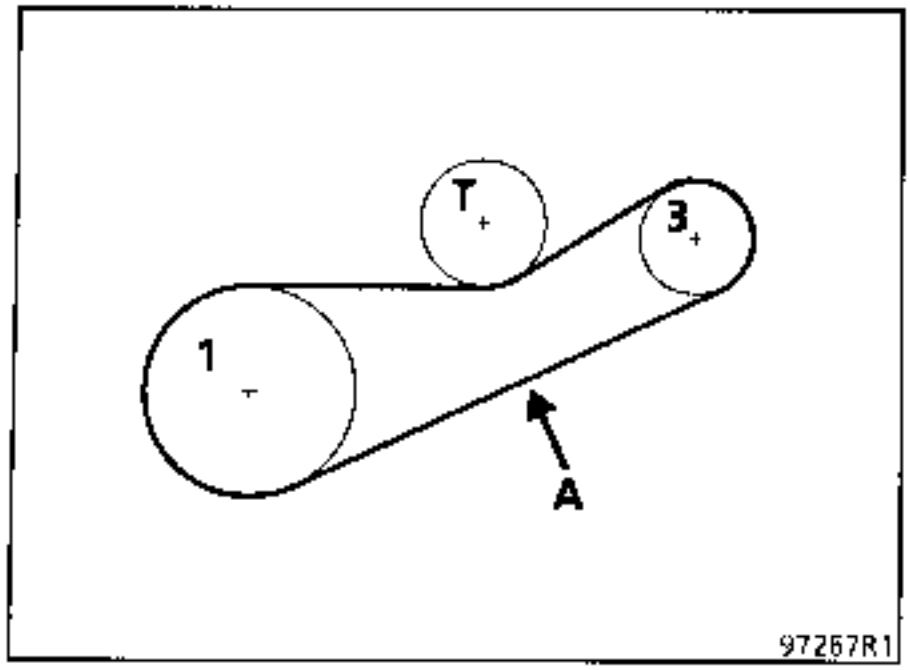
F Automatic tensioner

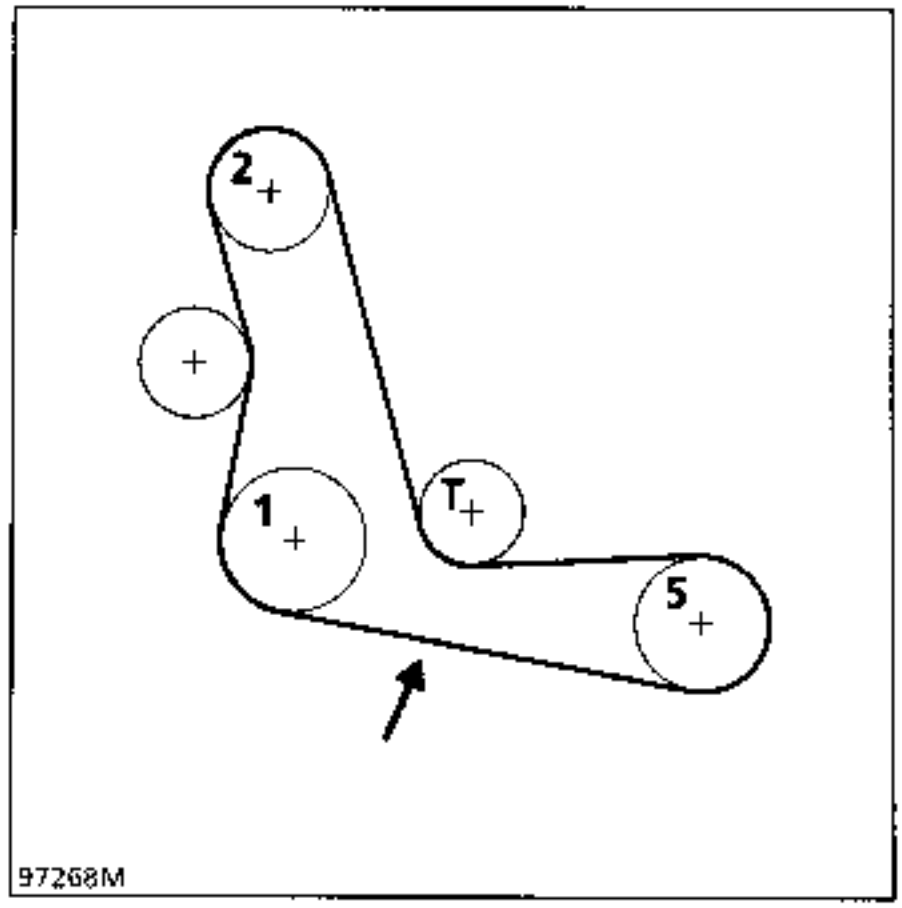
G Fixed roller

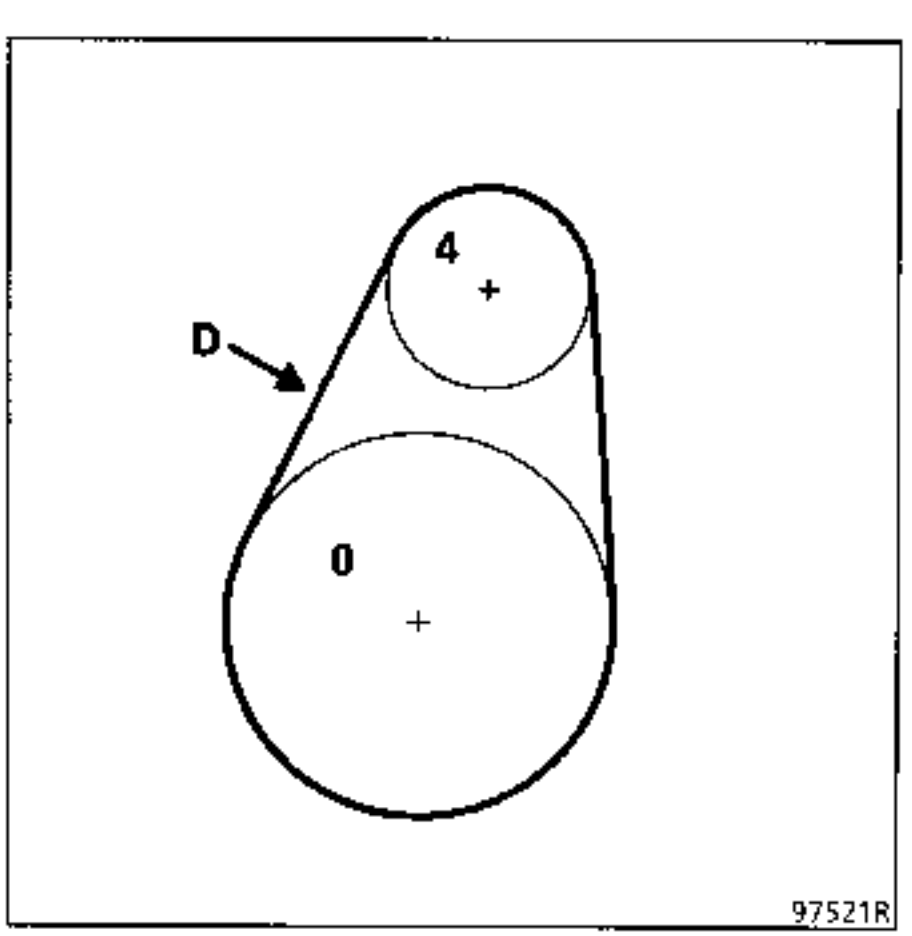
The tension of the accessories belt for the G8T engine with AC is obtained and ensured by an automatic tensioner.

For the tensioning method, refer to the section "Removing - refitting the accessories belt"

POSITION OF COMPONENTS:







0 Camshaft
1 Crankshaft
2 Water pump
3 Alternator
4 Power assisted steering pump
5 Air conditioning compressor
T Tension wheel
→ Point for checking tension

For removing the cylinder head on the G8T and F3R engines and the rear cylinder head on the Z7X engine, the engine and transmission assembly must be removed beforehand. Refer to section 10 "Removing - refitting the engine" and refer to the section corresponding to the engine in question.

F3R ENGINE

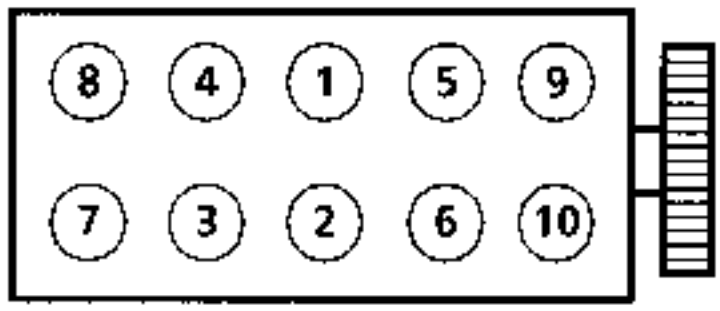
METHOD FOR TIGHTENING THE CYLINDER HEAD

All the bolts must be systematically renewed after removal.

Lubricate the bolt threads and under the bolt heads with engine oil.

REMINDER: In order to obtain correct bolt tightening, remove any oil in the cylinder head mounting bolt holes using a syringe.

Tighten in the following order :



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1st tightening **3 daN.m**.

2nd tightening (angle) : **50° ± 4°**

Wait for a minimum of 3 minutes.

Slacken bolts 1 and 2 by 180° then:

1st retightening **2.5 daN.m**.

2nd retightening (angle) : **123° ± 7°**.

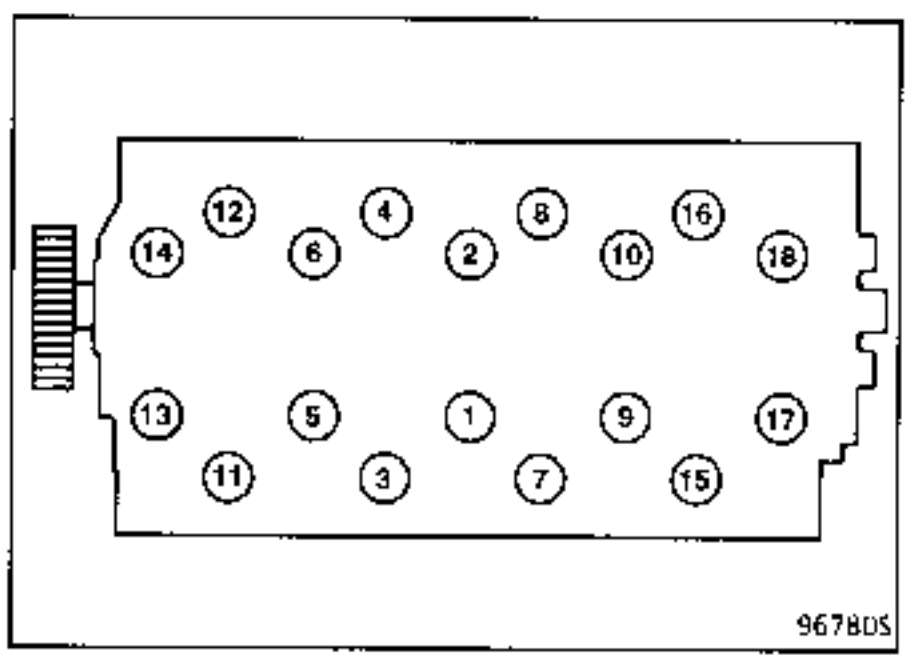
Repeat the slackening and retightening operations for bolts 3-4, 5-6, 7-8, 9-10.

There is no cylinder head retightening operation.

G8T ENGINES - METHOD FOR TIGHTENING THE CYLINDER HEAD

Preseating the gasket: tighten all the bolts to **2 daN.m**, then angle tighten according to the following table, in the recommended order 1 to 18.

Bolt reference	Tightening angle ± 2° (in degrees)	Bolt length (in mm)
1, 5, 9, 13, 17	215°	185 with washer
2, 6, 10, 14, 18	240°	185 without washer
3, 7, 11, 15	160°	103 with washer
4, 8, 12, 16	246°	207.5 without washer



Seating the gasket: Wait for 3 minutes stabilisation period.

- **Tightening:**
  - slacken bolts 1 and 2 until they are totally free,
  - tighten bolts 1 and 2 **to 2 daN.m** then angle tighten according to the table below,

  - slacken bolts 3, 4, 5, 6 until they are totally free,
  - tighten bolts 3, 4, 5, 6 **to 2 daN.m** then angle tighten according to the table below,

  - slacken bolts 7, 8, 9, 10 until they are totally free,
  - tighten bolts 7, 8, 9, 10 to **2 daN.m** then angle tighten according to the table below,

  - slacken bolts 11, 12, 13, 14 until they are totally free,
  - tighten bolts 11, 12, 13, 14 to **2 daN.m** then angle tighten according to the table below,

  - slacken bolts 15, 16, 17, 18 until they are totally free,
  - tighten bolts 15, 16, 17, 18 **to 2 daN.m** then angle tighten according to the table below,

Bolt reference	Tightening angle ± 6° (in degrees)	Bolt length (in mm)
1, 5, 9, 13, 17	296°	185 with washer
2, 6, 10, 14, 18	301°	185 without washer
3, 7, 11, 15	243°	103 with washer
4, 8, 12, 16	322°	207.5 without washer

SPECIAL TOOLING REQUIRED		
Mot.	1390	Engine and transmission support tool
Mot.	587	Cylinder head pin extractor
Mot.	588	Liner retainer plates
Mot.	589 -01	Camshaft sprocket support
Mot.	591 -02	Angular wrench for tightening the cylinder head
Mot.	591 -04	
Mot.	1202	Hose clip pliers
Mot.	1209	Spring compression tool
Mot.	1273	Tool for checking belt tension
Mot.	1289 -02	Centring fork for suspended engine mounting limiter

EQUIPMENT REQUIRED

Anti-tilt safety pads

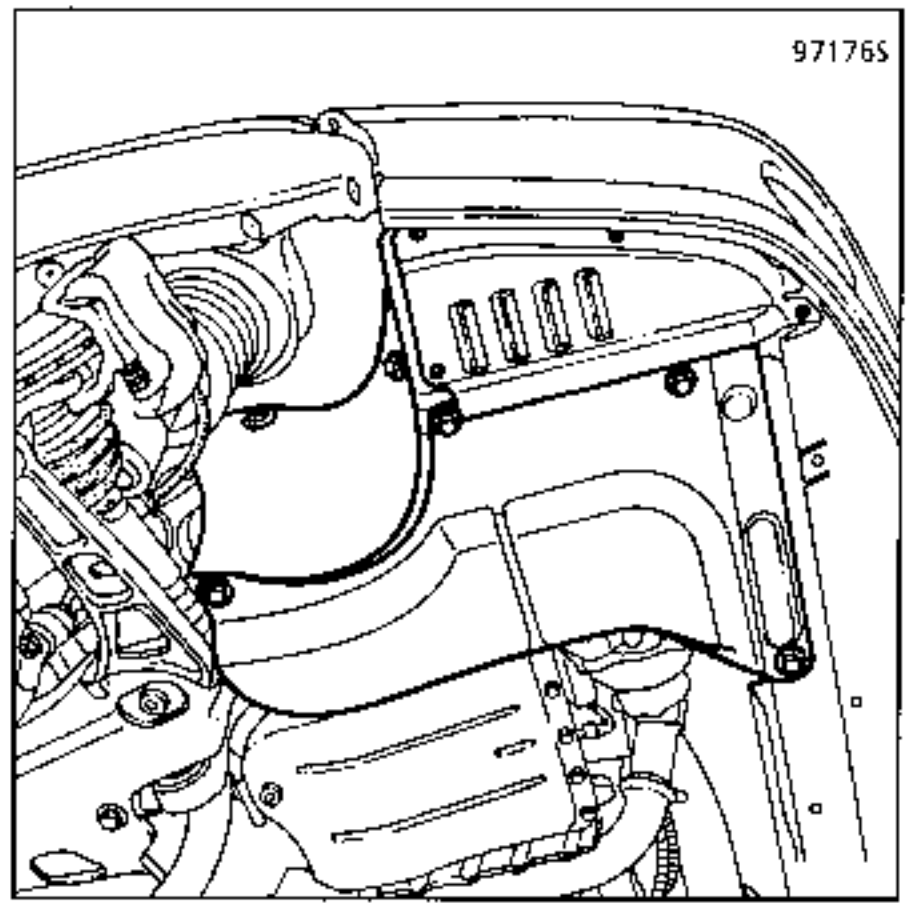
TIGHTENING TORQUES (in daN.m)	
Front suspended engine mounting cover nut	3 to 4.5
Wheel bolt	10
Suspended mounting cover bolt	5 to 6.5
Camshaft bolt (power assisted steering pulley)	6 to 7
Camshaft sprocket mounting bolt	7 to 9

REMOVAL

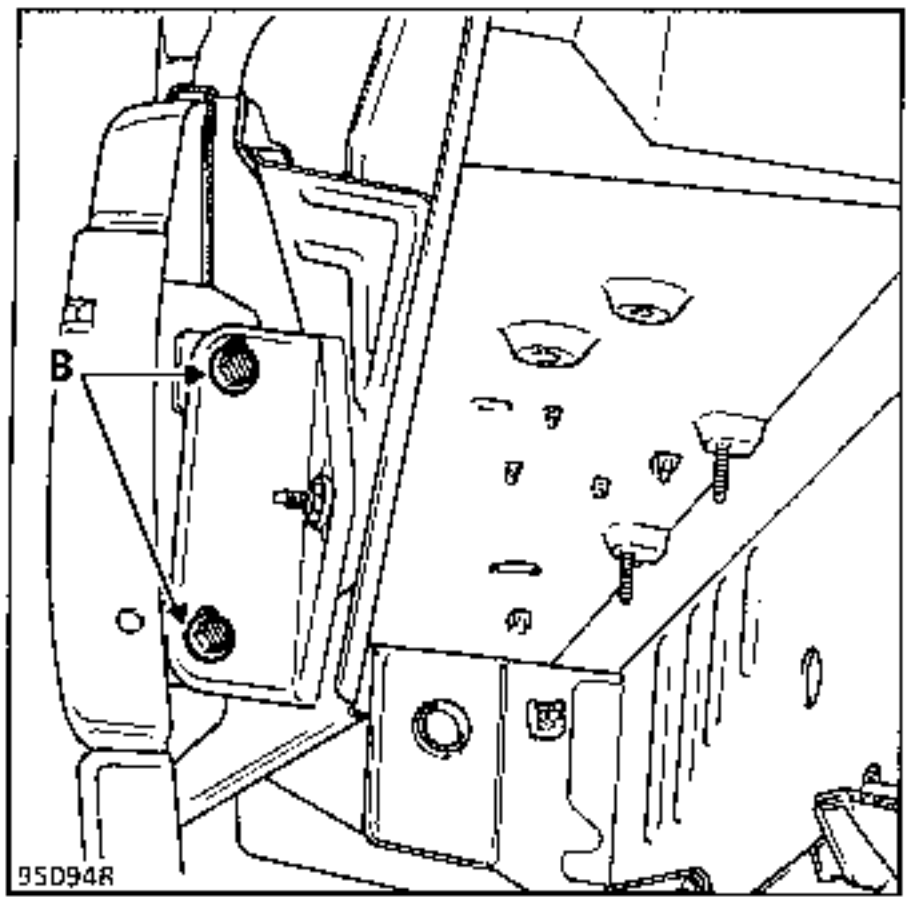
Put the vehicle on a 2 post lift.

Disconnect the battery then remove it.

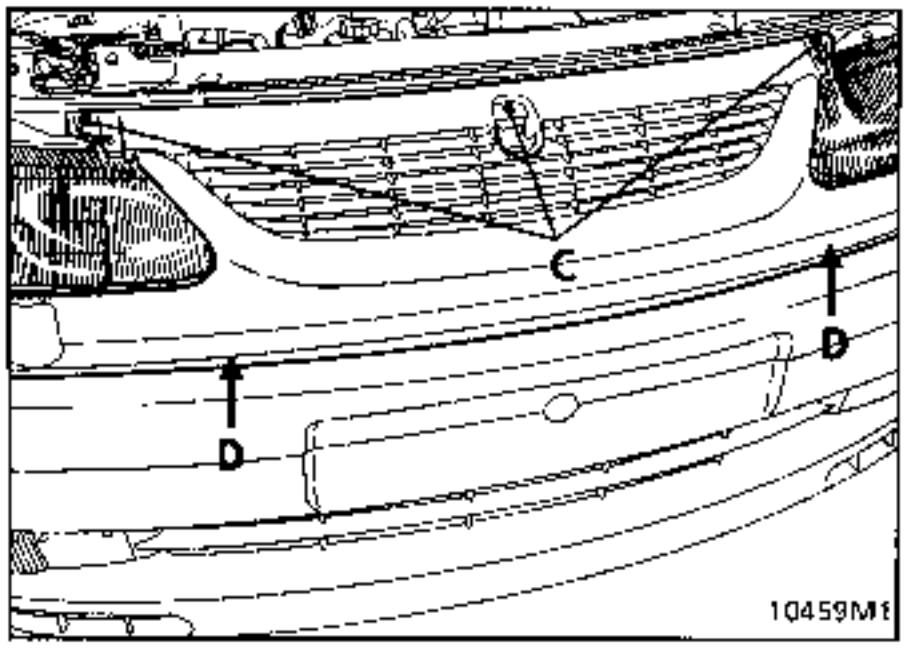
Remove:
- the engine undertray,
- the wheels,
- the left and right hand wheel arches,



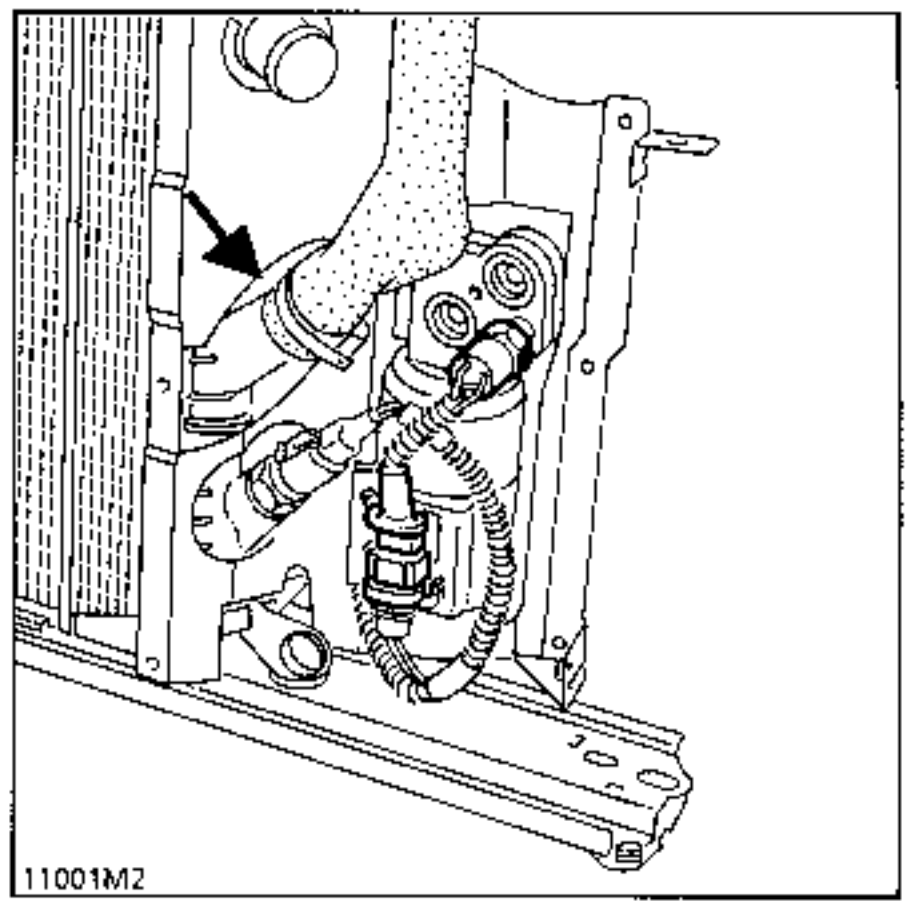
– the side mounting bolts for the bumper on the left and right hand sides (B), then remove it (after disconnecting the additional lights connector).



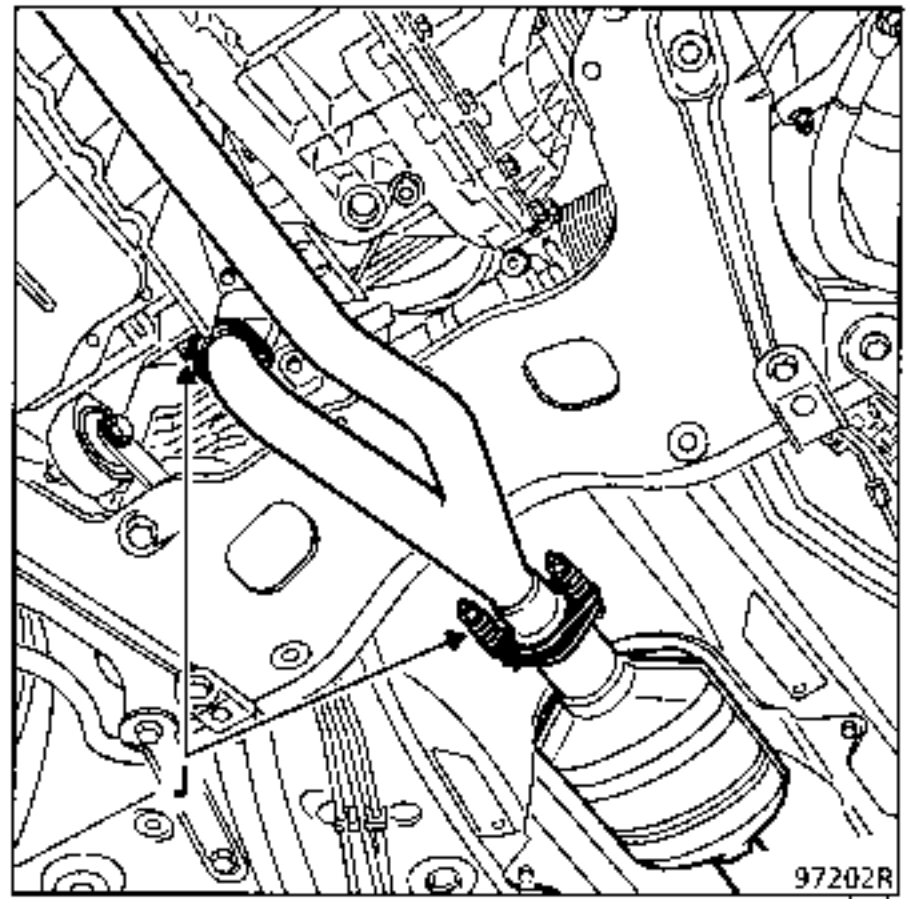
– the radiator grille and bar,

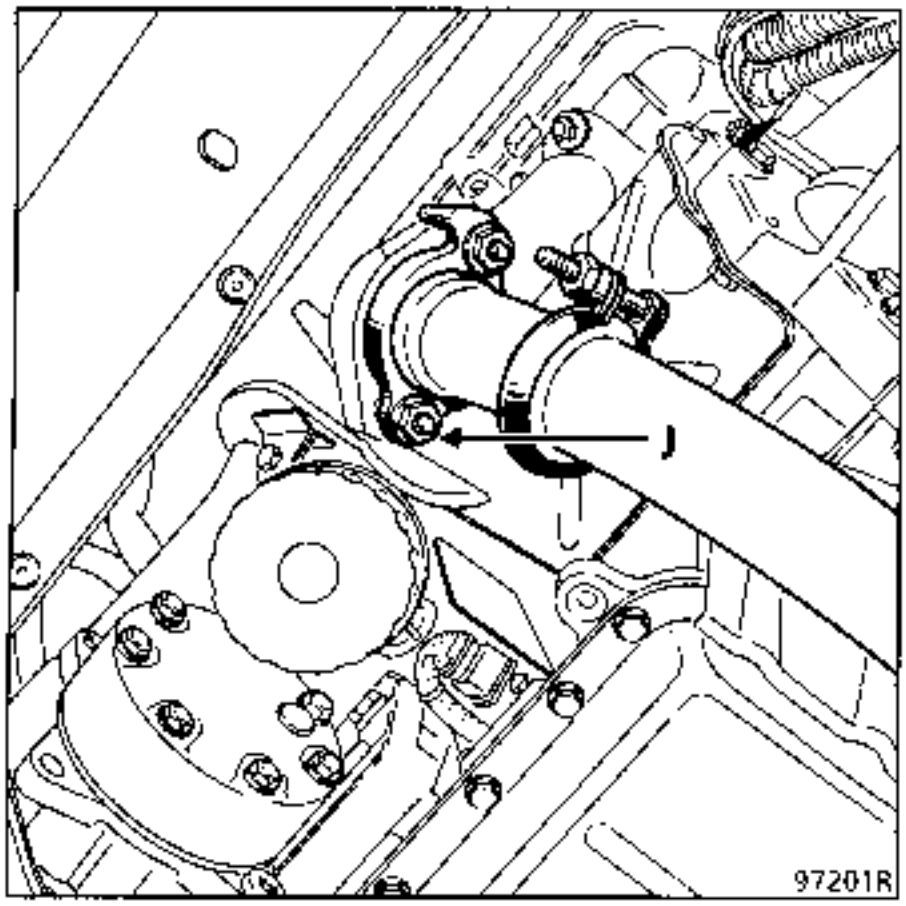


Drain the cooling circuit from the lower radiator hose.



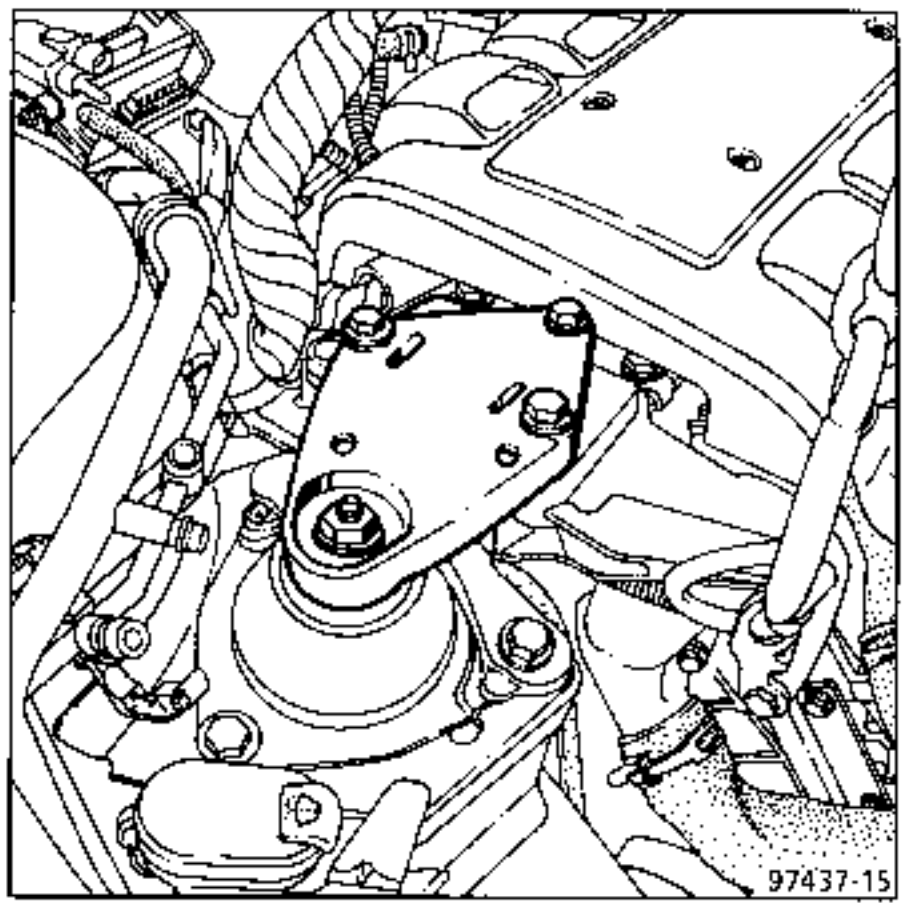
Remove the cooling assembly (see section 19 "Removing - refitting the cooling system")
Remove the exhaust downpipe at (J).



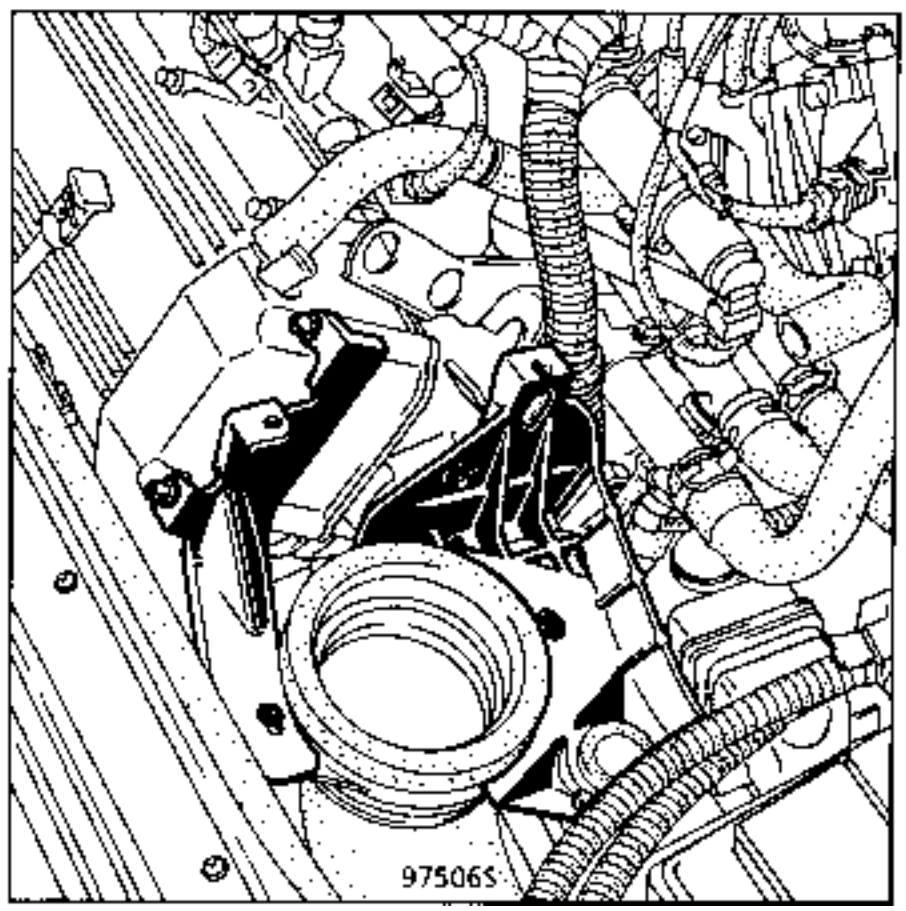


Fit the universal support tool under the engine to support it.

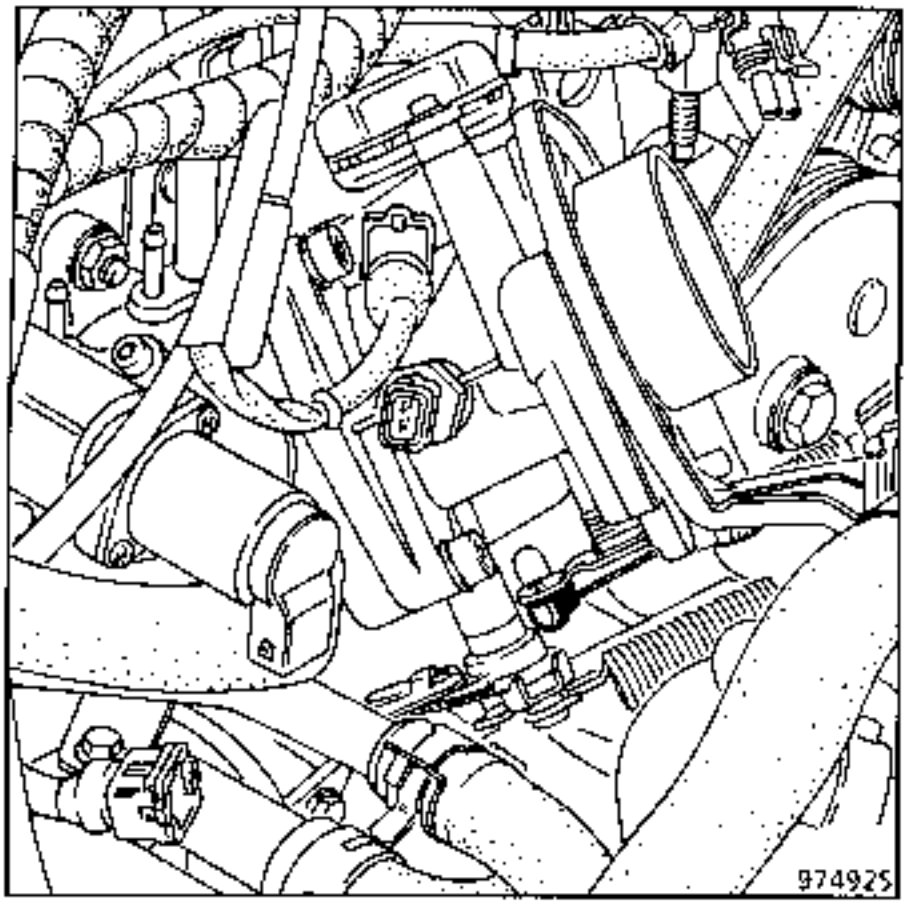
Remove:
- the suspended mounting cover and the movement limiter,



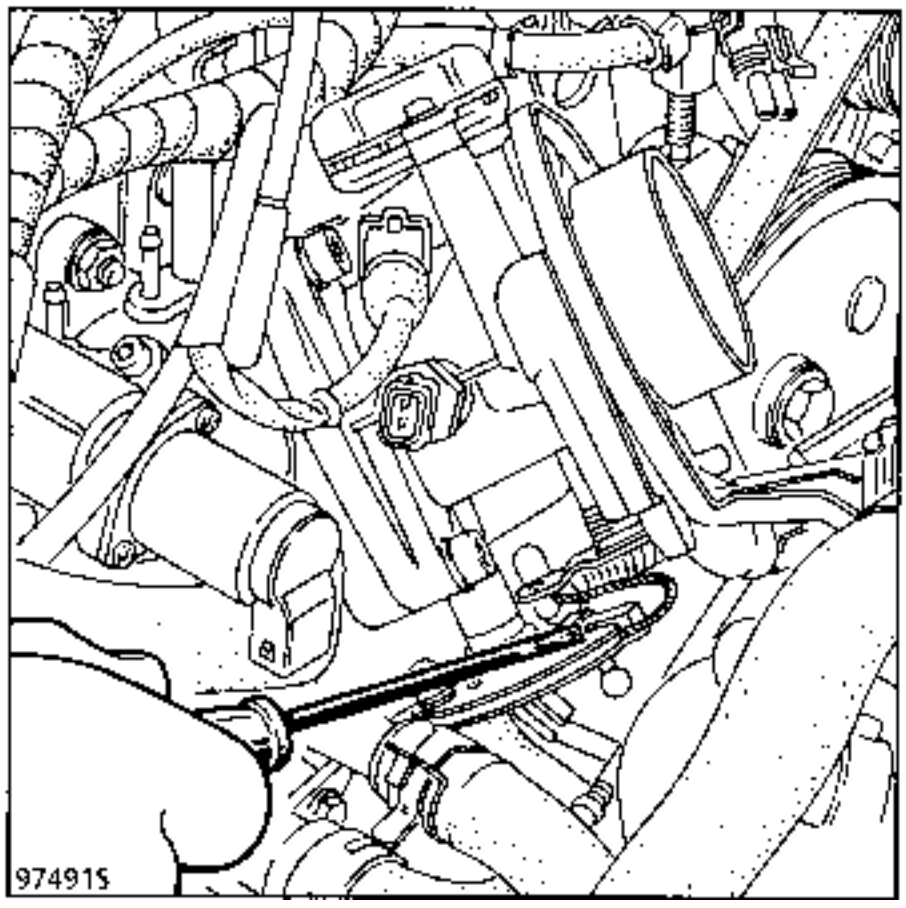
- the air filter and the air duct,
- the air filter mounting.



Remove:
- the inlet manifold cover,
- the accelerator cable - use a screwdriver to loosen the accelerator linkage.



Twist the accelerator control and remove the cable retaining clip from the groove .

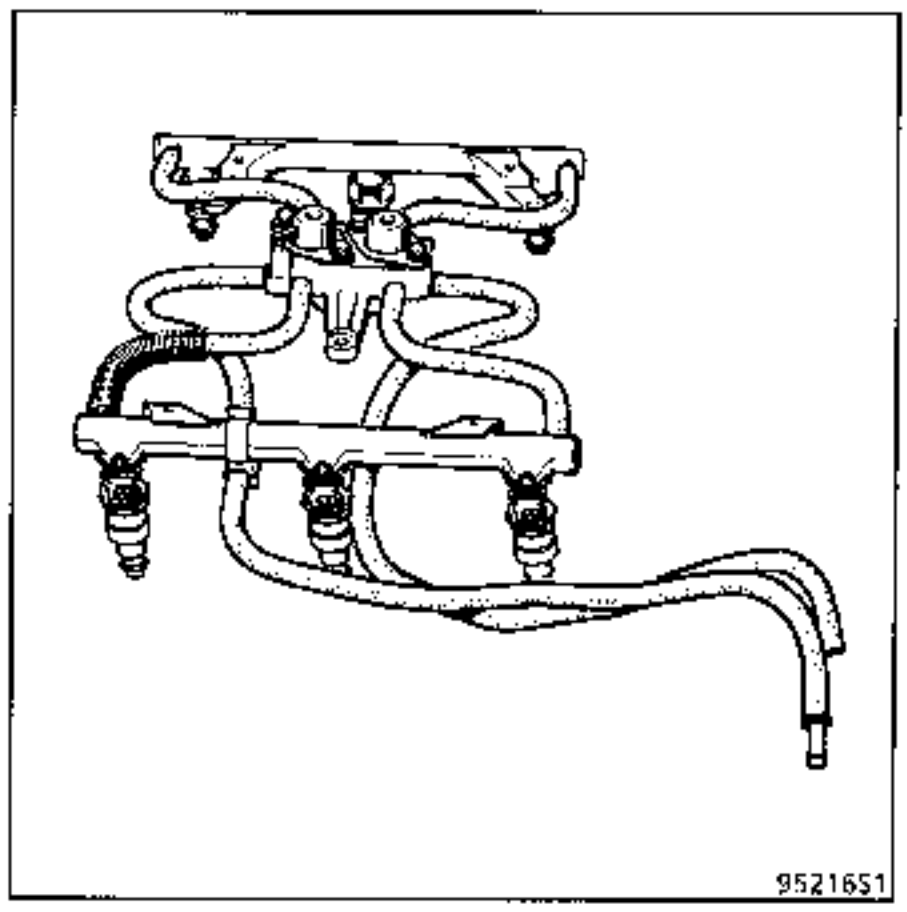


Remove the cable and its sleeve.

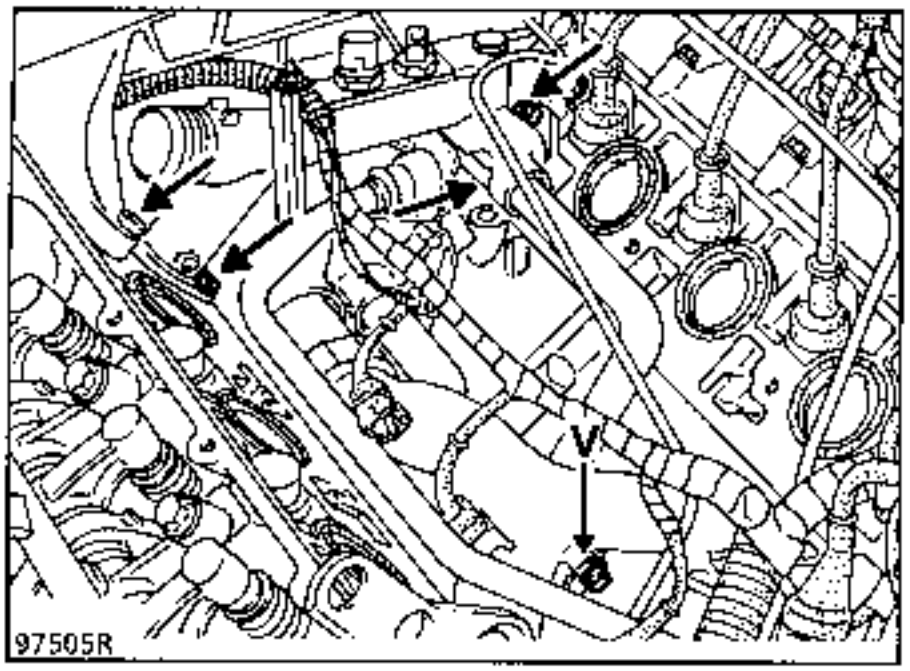
Disconnect:
- the vacuum pipes from the manifold,
- the plug leads from the front cylinder bank,
- the front and rear injector wiring,
- the power module connectors,
- the connector wiring for the oil pressure switch and the oil temperature sensor,
- the throttle body connectors,
- the fuel supply and return pipes.

Remove:
- the wiring supports mounted on the inlet manifold,
- the computer, together with its wiring, from the right hand side,
- the injector gallery mounting bolts and the pulse damper regulator assembly. Extract the assembly.

IMPORTANT: under each of the injector gallery and pressure regulator mounting points, there are heat insulation blocks. Ensure these blocks are retained during removal of the components.

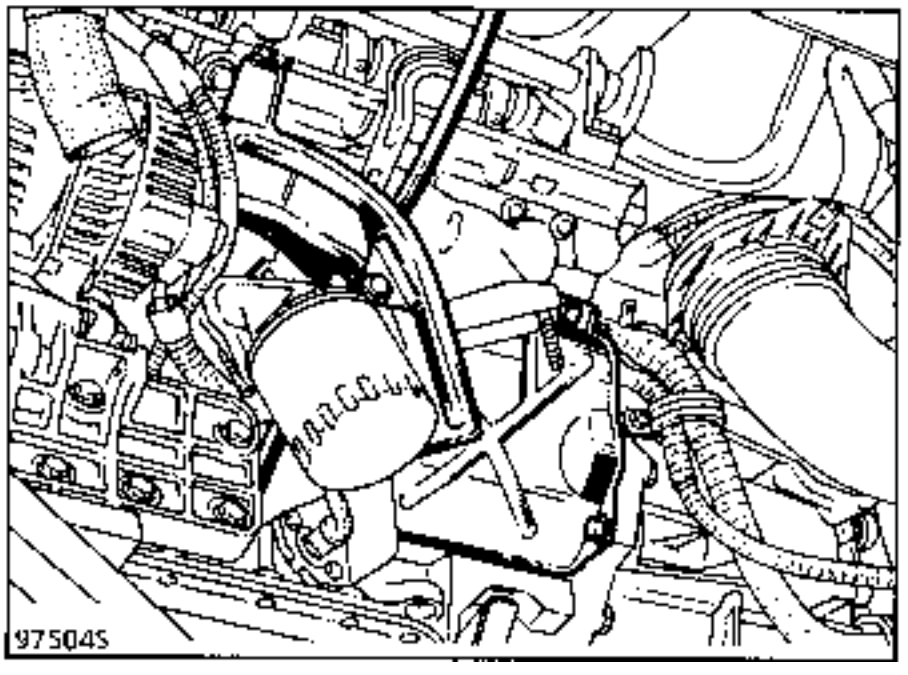


Remove:
- the connecting plate between the manifold and the suspended engine mounting,
- the inlet manifold with the throttle body,
- the rocker box cover for the front cylinder bank,
- the four mounting bolts for the bridge,
- the mounting bolt (V) for the rigid pipe

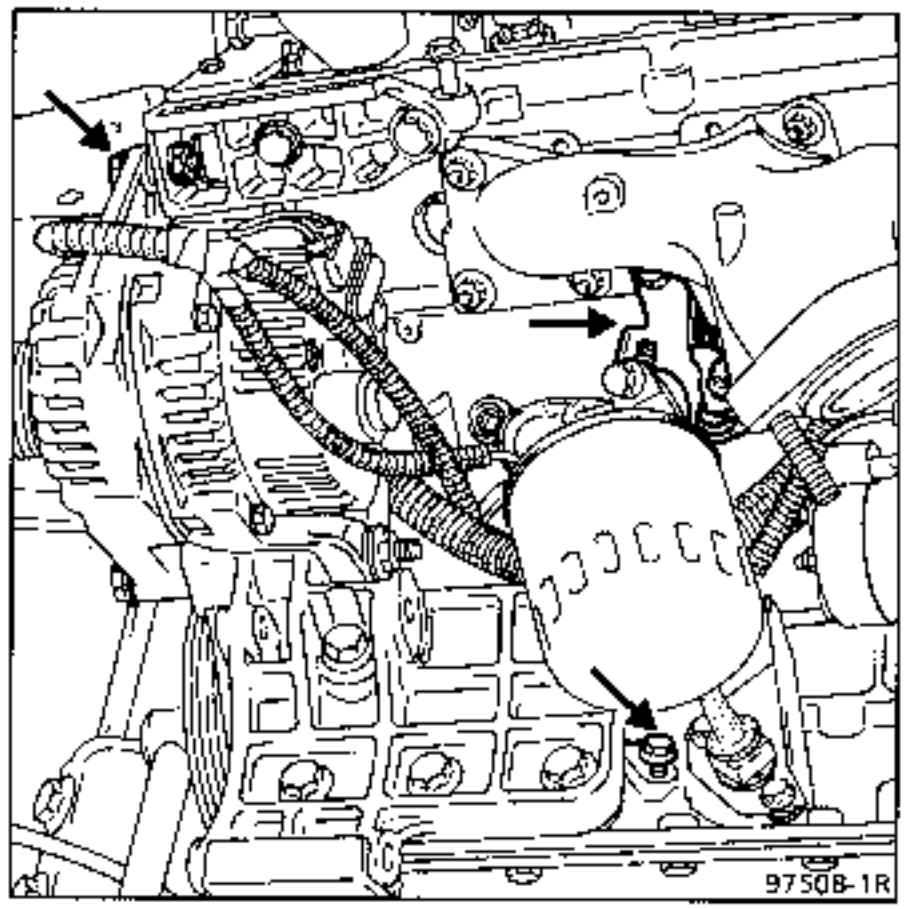


Release the pipe from the bridge and from the thermostat unit.

Remove:
- the exhaust heat shields,



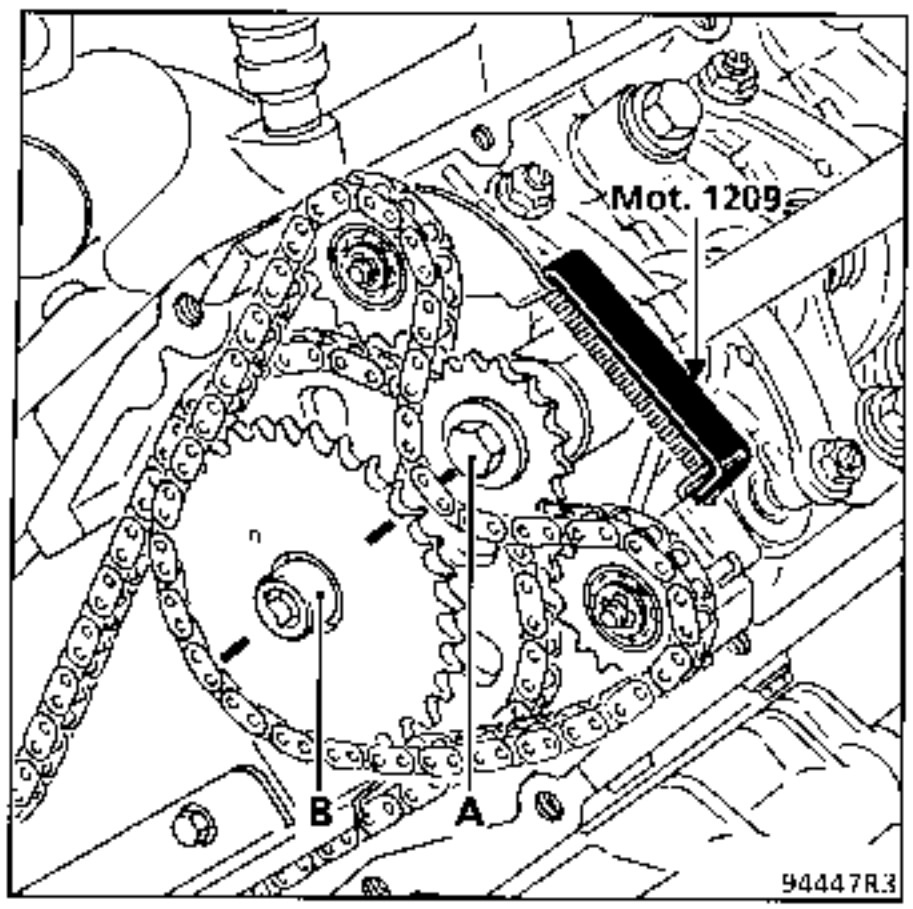
- the heat shield mountings,
- the upper alternator mounting bolt,
- the engine oil dipstick guide,



- the alternator drive belt,
- the four upper mounting bolts securing the timing cover to the cylinder head.

Align the reference marks on the sprockets.

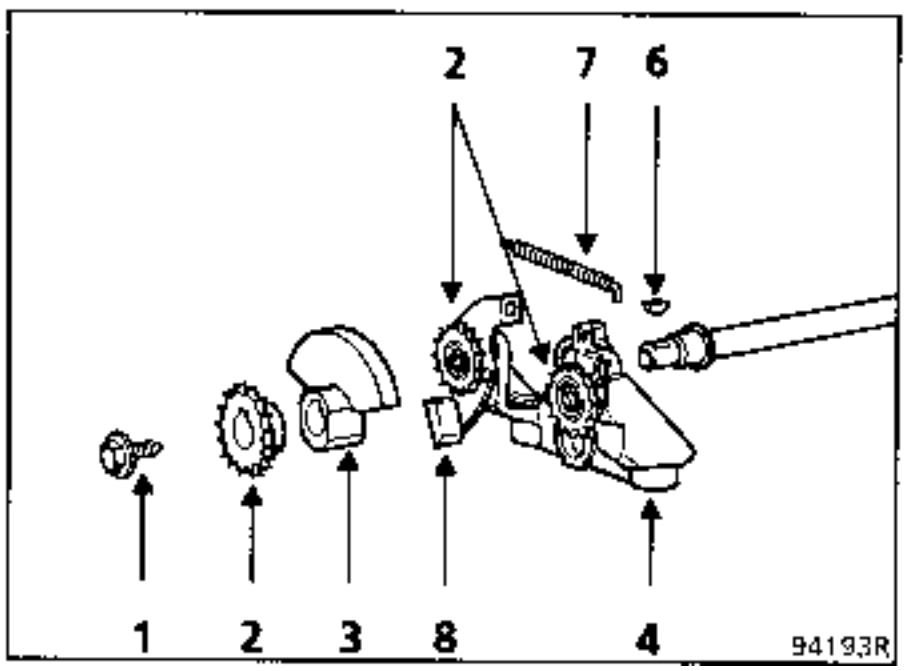
Fit tool **Mot.1209** to the balance chain tensioner.



Remove bolt (A) then bolt(B).

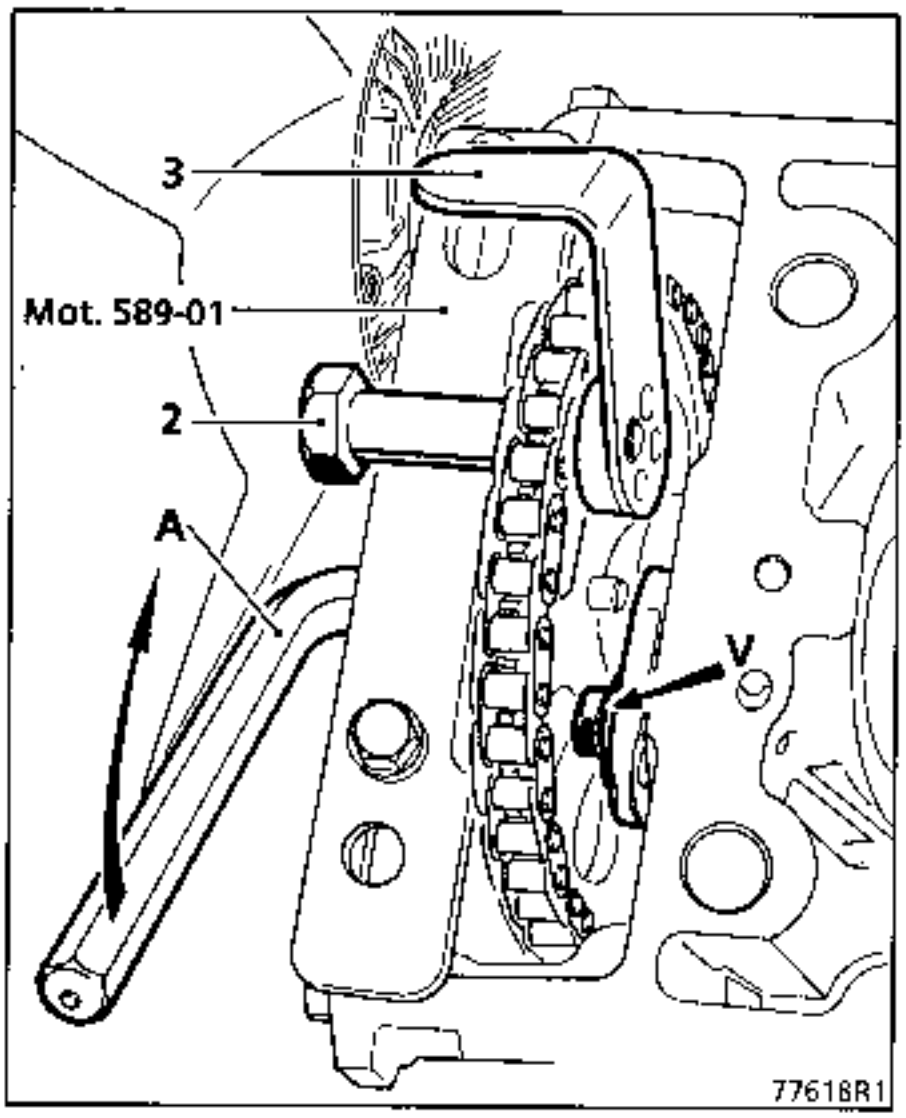
Extract:
- the balance chain,
- the balance sprockets.

Pull the shaft (C) back to release the fly-weight (D) and its key (E).



Fit tool **Mot. 589-01** to the camshaft sprocket on the timing cover.

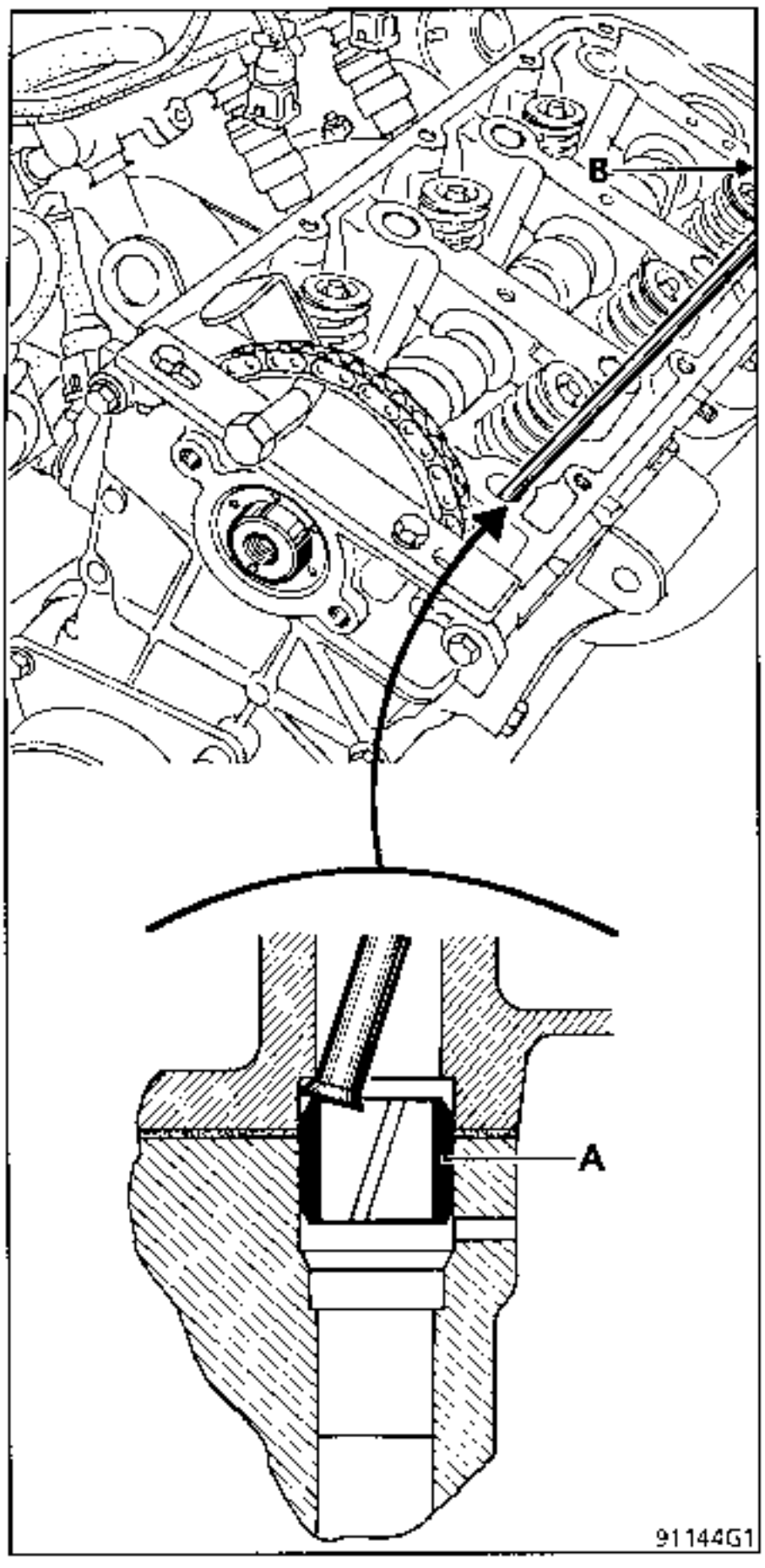
Secure the camshaft sprocket using bolt (2) and nut (3) threaded through one of the openings in the gear.



Remove:
- the camshaft sprocket plug,
- the camshaft sprocket mounting bolt using an Allen key (A),

Slacken the mounting bolt (V) for the camshaft stop, release the stop from the groove, and push the camshaft back.

Tap the locating dowels (A) and (B) down using a used push rod, for example.

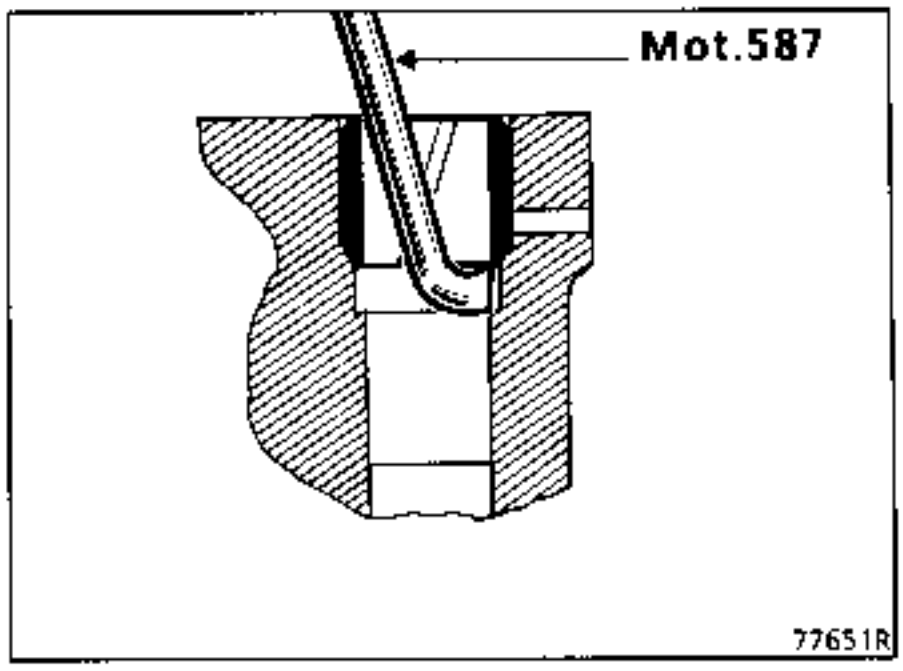


Loosen the cylinder head and remove it taking care not to move the cylinder liners.

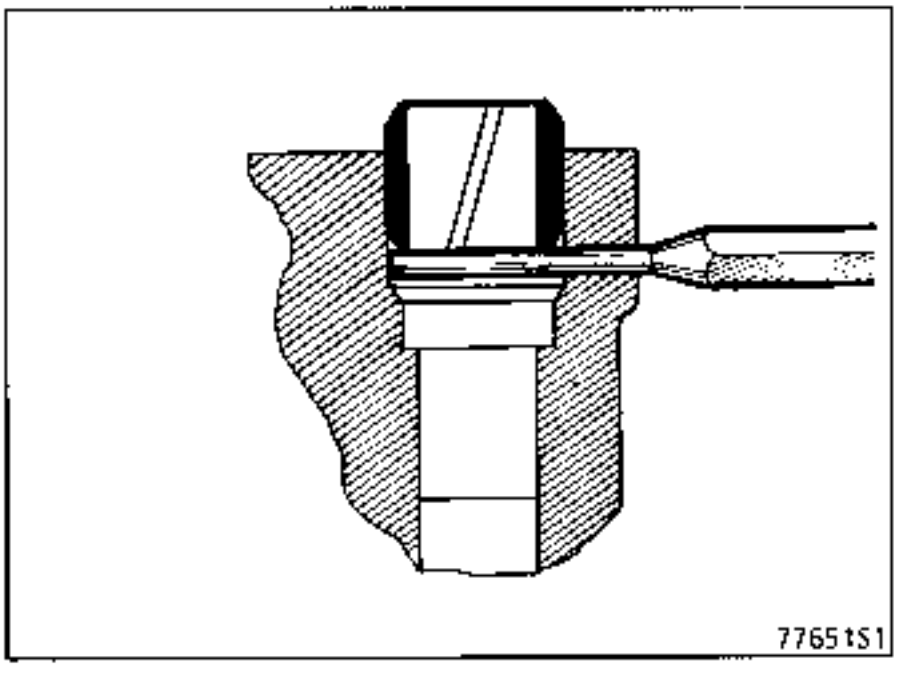
Use a syringe to remove any coolant remaining in the cylinder block.

Extract the locating dowels (A) and (B) from the cylinder head using tool **Mot. 587**.

Remove the gasket.



Set the locating dowels to the correct height using a **3 mm** roll pin punch.



Clean the sealing faces of the cylinder head and the cylinder block : use **Décapjoint 77 01 405 952**.

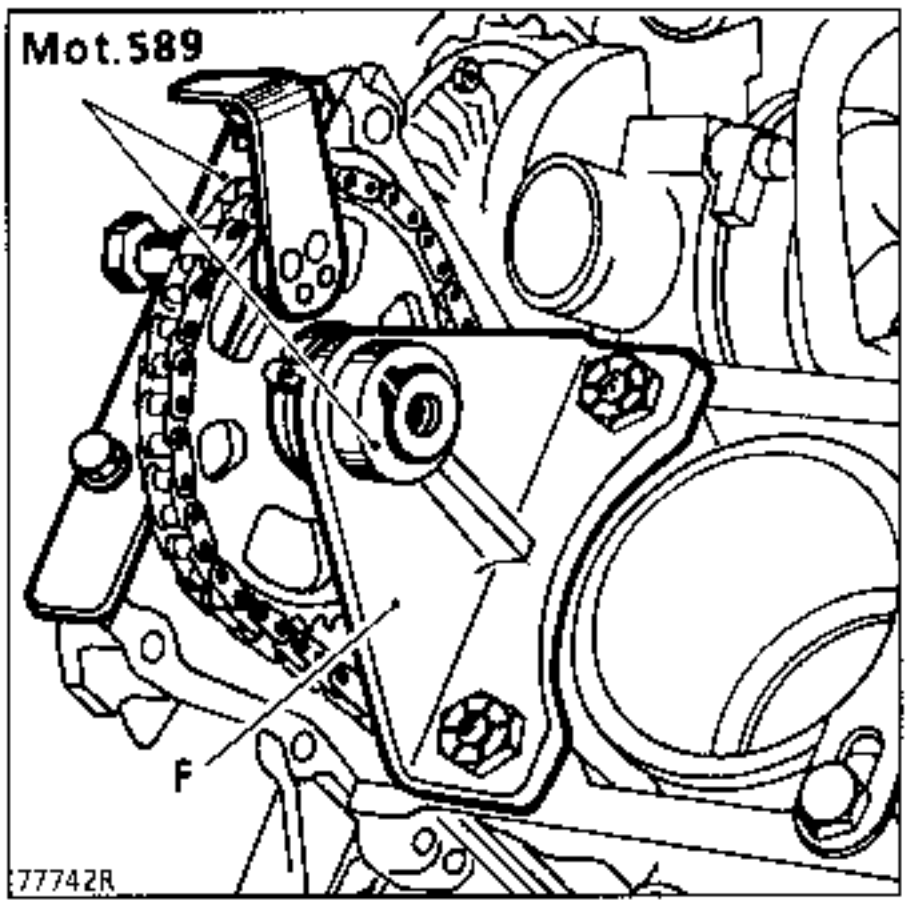
CHECKING THE CYLINDER HEAD BOW

Use a rule and a set of feeler gauges to check for surface deformation.

Maximum deformation **0.05 mm**

The cylinder head may not be re-surfaced.

In order to avoid offsetting the timing, use the dummy bearing (F) only if it is necessary to turn the crankshaft, for example when replacing the cylinder liner assemblies.

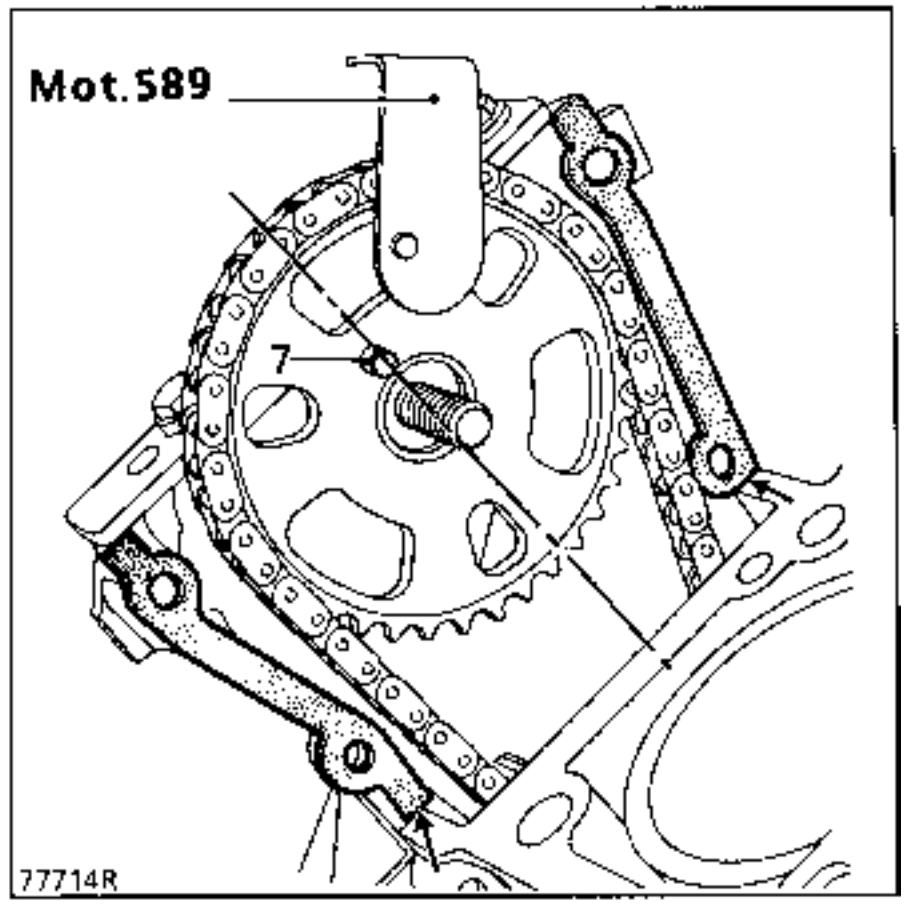


REFITTING - Special notes

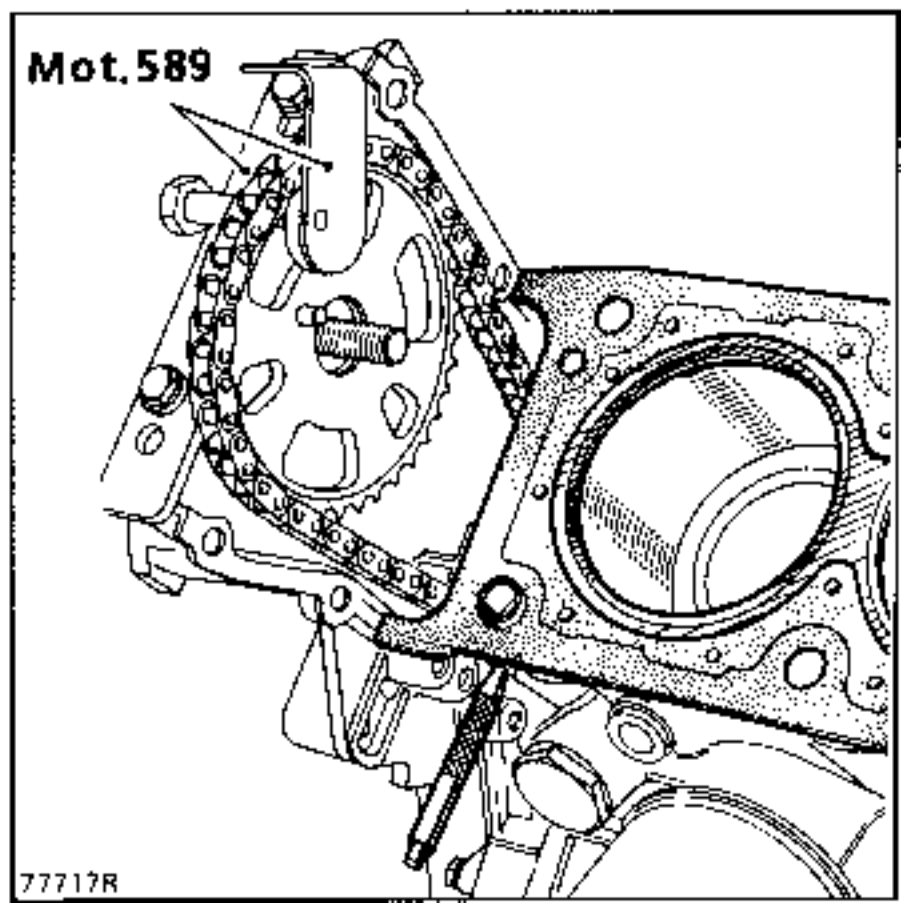
Refitting is the reverse of removal.

SEALING BETWEEN THE CYLINDER HEAD AND THE CYLINDER BLOCK

Use **Autojoint AJ66 (77 01 422 751)** to seal the joint between the cylinder head and the timing case.



Insert a **3 mm** punch (roll pin punch) into each of the centring pin holes and position each of the pins against its punch to prevent it from being pushed in when the cylinder head is refitted.



SEALING BETWEEN THE CYLINDER HEAD AND THE CYLINDER BLOCK

Fit:
- a new, dry gasket,
- the cylinder head, taking care to ensure it is correctly positioned.

Insert the timing cover mounting bolts and hand tighten them.

Fit the camshaft carefully with the sprocket, aligning the keys.

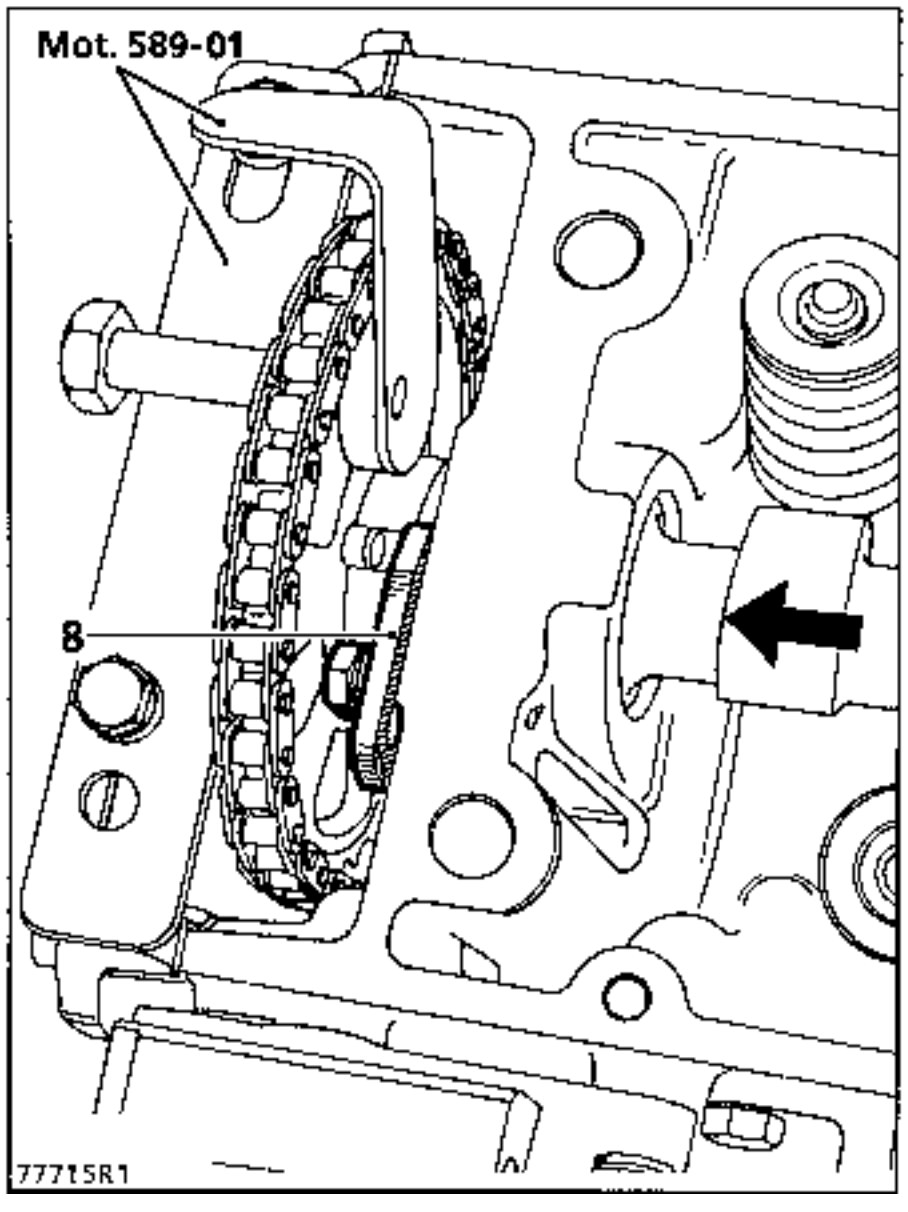
Ensure stop fork (8) is fully pushed back, so that the camshaft flange may pass.

Gently tighten the sprocket mounting bolt.

Remove tool **Mot. 589-01**.

Push the camshaft stop fork fully back into the groove and torque tighten the bolt.

Remove the two **3 mm** pins.

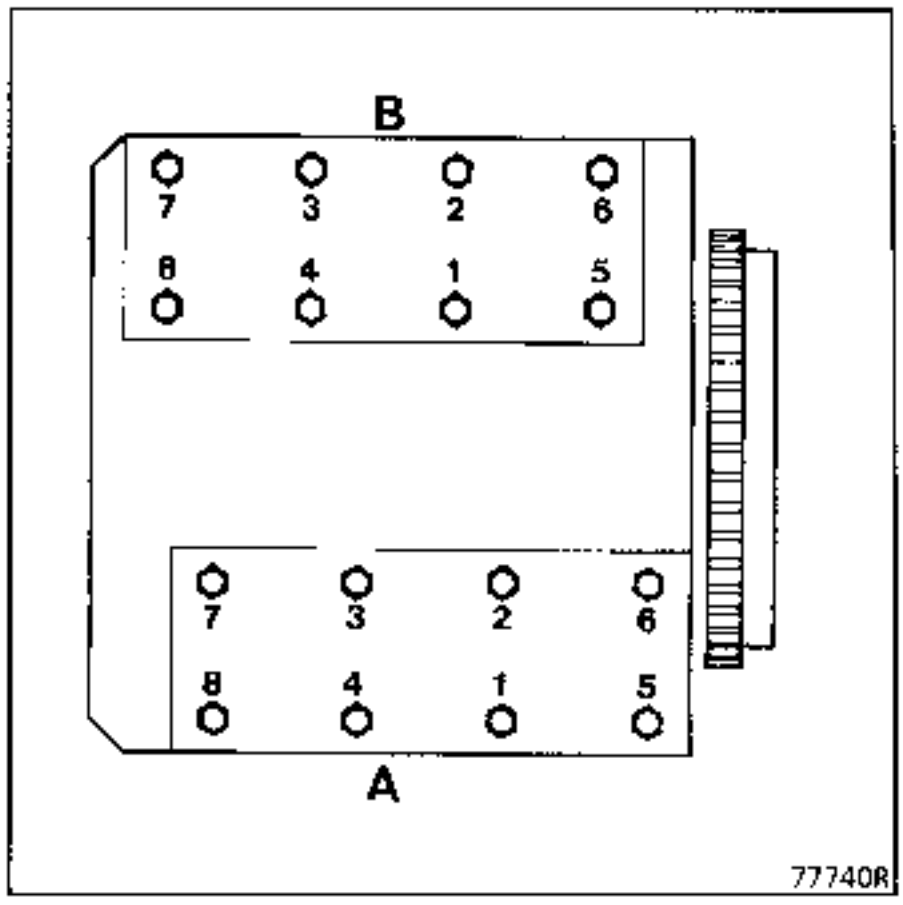


Fit the rocker gear with the balance system.

IMPORTANT: the key may fall out of the balance shaft - place a cloth in the timing cover to catch it.

TIGHTENING

Pretighten all bolts to **6 daN.m** in the order shown to compress the gasket.



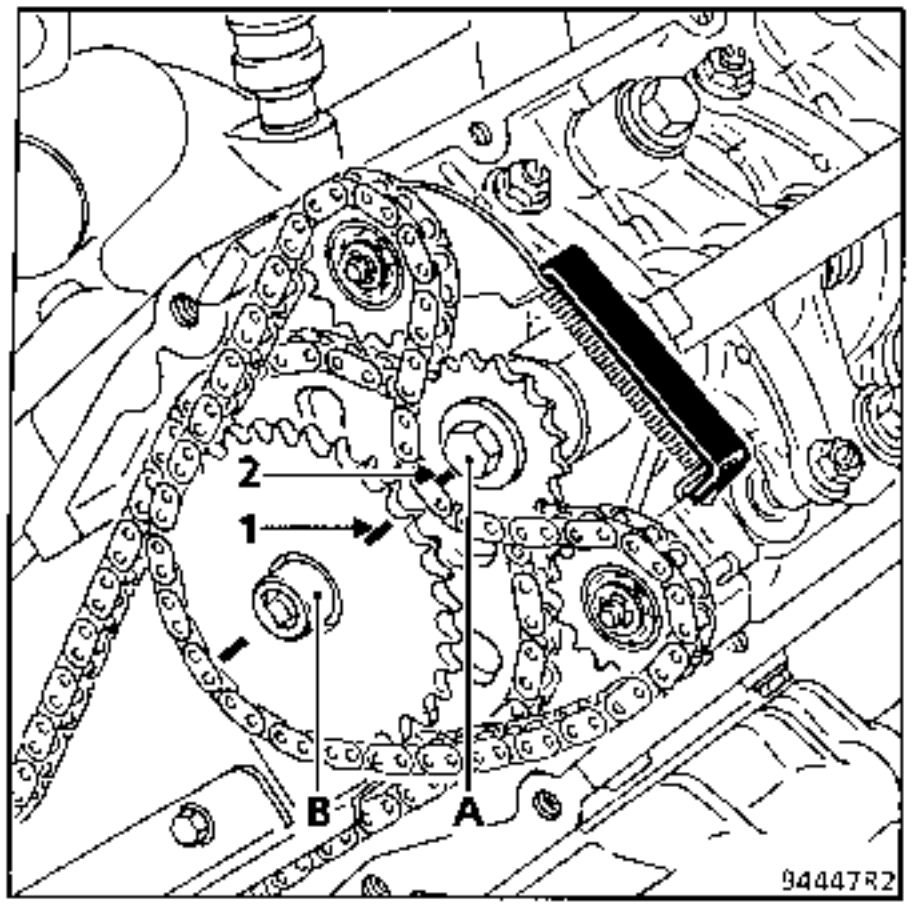
Slacken all the bolts.

Pretighten to **4 daN.m**, then tighten all the bolts to an angle of **180°**.

There is no cylinder head retightening operation.

TIGHTENING

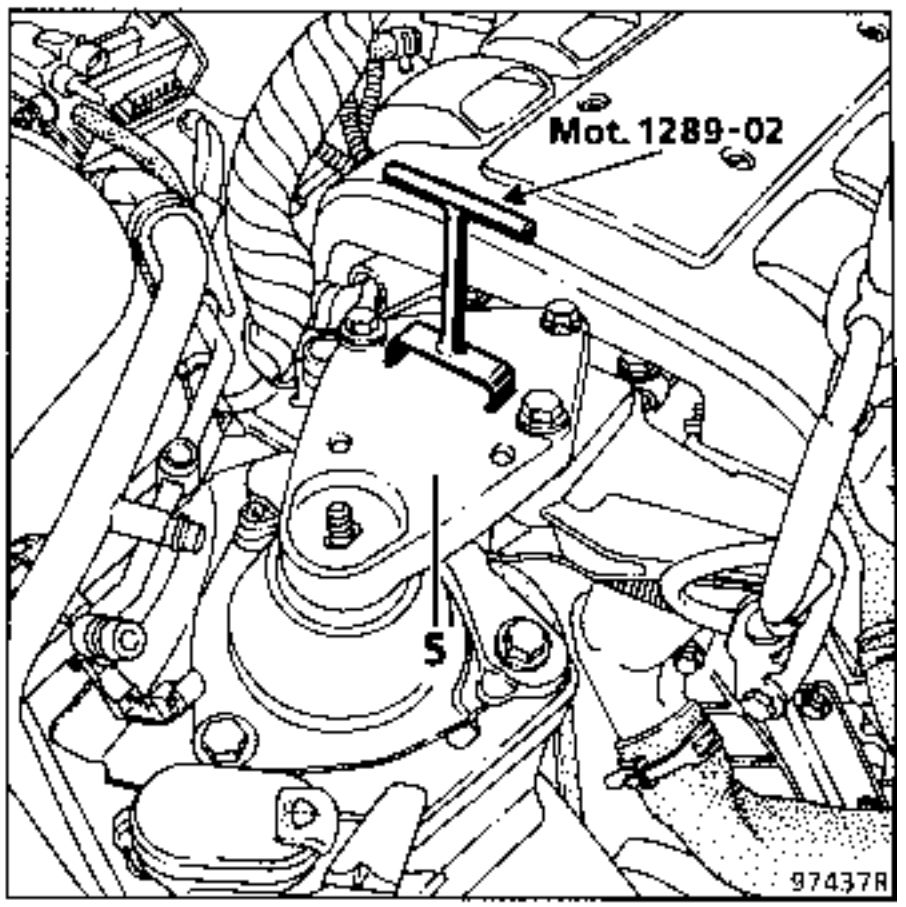
Fit sprocket (A) with its chain then fit sprocket (B) and align reference marks (1) and (2) opposite each other.



Coat the two balance system mounting bolts with **Loctite FRENETANCH** and tighten them to the recommended torque.

Remove tool **Mot. 1209** to allow the balance chain tensioner to act on the chain.

Fit the suspended engine mounting cover, support the engine then fit fork **Mot. 1289-02** to centre the limiter.



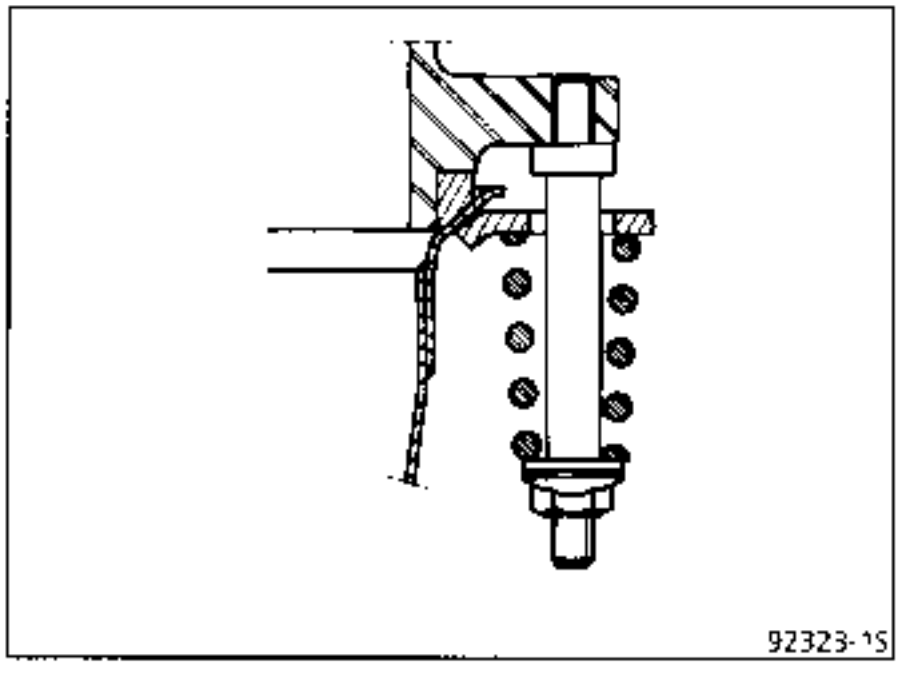
Torque tighten the cover and limiter bolts (see section 19 Engine suspension).

Refit the engine and remove tool **Mot. 1289-02**.

Adjust the alternator drive belt tension using tool **Mot. 1273** (see Chapter 11 Accessories belts).

Fill and bleed the engine cooling circuit.
Adjust the accelerator cable.

Tighten the exhaust flange above the catalytic converter and fit the spring assembly.



IMPERATIVE : tighten to the stop

Refit all the engine accessories.

REMOVAL

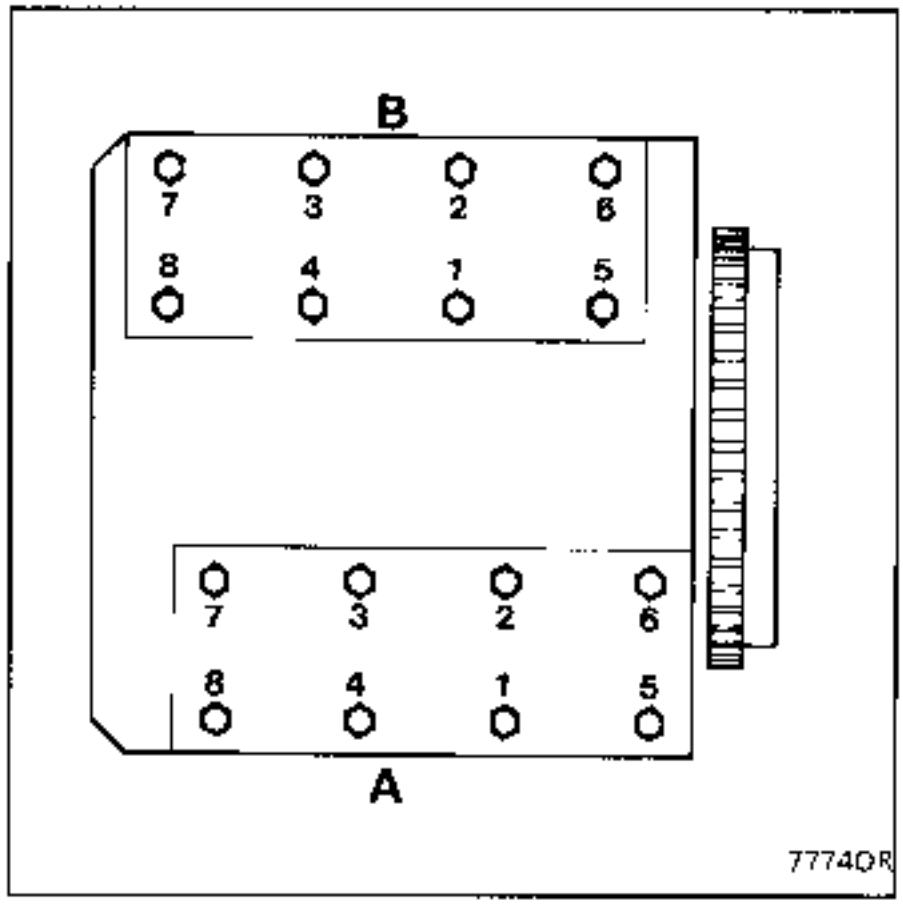
The engine and gearbox assembly must be removed for this cylinder head.

Refer to the section **Mot. Z.**

Z7X ENGINE

METHOD FOR TIGHTENING THE CYLINDER HEADS

Tighten in the order specified below:



New gaskets:

Tighten to **6 daN.m**. in the recommended order

Slacken, pretighten to **4 daN.m**

then angle tighten to:

180° in the recommended order

Adjust the valve clearances.

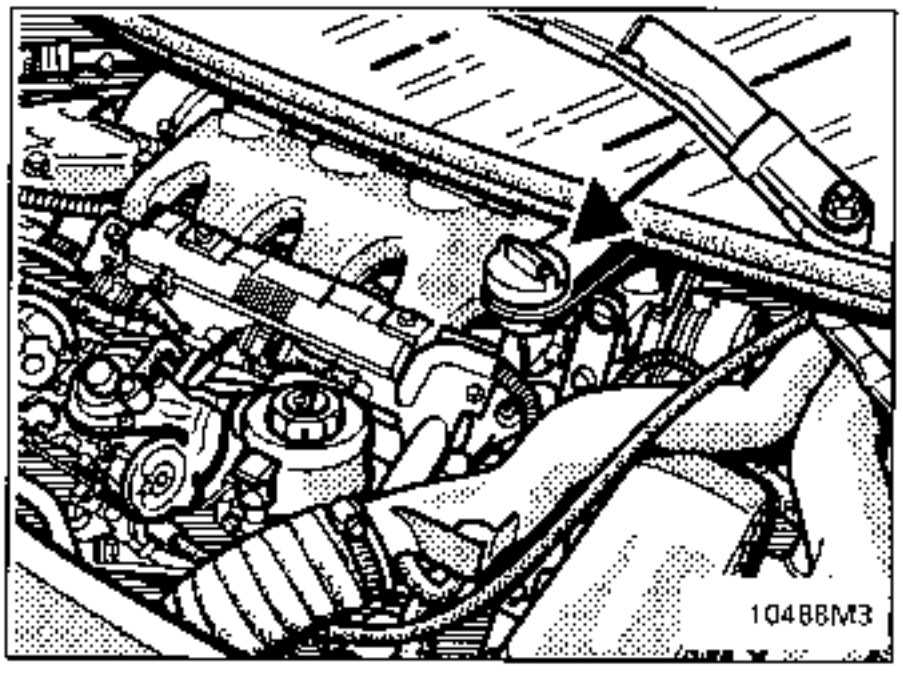
Bring the engine up to temperature:
2000 rpm for 15 minutes

Retightening :
This operation is carried out when the engine is cold (after the engine has been stopped for a minimum of 6 hours).

Additional angle tightening:

50°. without prior slackening

There is no cylinder head retightening operation.



This filler neck makes it easier to fill the engine with oil.
It is however only designed to support the weight of a 5 litre can.

REMOVAL:

Remove the two mounting bolts on the retaining bracket.
Remove the filler neck from the sleeve.

Slacken the connecting sleeve on the rocker box cover.

Remove the filler neck.

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Engine						Type of injection
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Ratio	
JE0A	F3R	728	82.7	93	1998	9.8/1 ±0.4	Multipoint sequential

Tests at idle speed *					Fuel *** (minimum octane rating)
Engine speed (rpm.)	Pollutant emission **				
	CO (%)(1)	CO2 (%)	HC (ppm)	Lambda (λ)	
850 ± 50	0.5 max	14.5 min	100 max	0.97 < λ < 1.03	Unleaded (≥ 95)

(1) at 2500 rpm, CO must be a maximum of 0.3

* For a coolant temperature above 80°C. Tests at 2500 rpm stable speed then at idle speed.

** For legal values refer to your country specification.

Type of fuel supply	Regulated multipoint injection
Fuel pump submersed pump in fuel tank Type : NARVAL	Voltage: 12 volts Pressure: 3 bars Flow: 80 litres/hour minimum
Fuel filter mounted under vehicle in front of fuel tank	
Throttle body	Type : Magneti-Marelli 871 - 215
Pressure regulator: BOSCH 0 280 160 515 or WEBER RPM 39	Regulated pressure: 4.5 to 7bars 3.0 ± 0.2 bar with no vacuum 2.5 ± 0.2 bar for a vacuum of 500 mbar
Solenoid injectors Type : Siemens Deka 867 867	Voltage: 12 volts Resistance : 14.5 ± 0.5 Ω
Idle speed regulation valve Make - Hitachi	Type : AESP 207-17 Winding resistance : 9.6 ± 10% Ω
Throttle position potentiometer	Check using XR25 # 17 For idle regulation 17 to 43 For full load 195 to 242

SPECIFICATIONS AND ADJUSTMENT VALUES

Temperature in °C (± 1°)	0	20	40	80	90
Air temperature sensor Type CTN Siemens 1432-2 Resistance in Ohms	8385to 10610	3279 to 3769	1373 to 1555	-	-

Heated oxygen sensor Make BOSCH LSH 25 0258 003 644.	Voltage at 850°C : Rich mixture => 625 mV Lean mixture : 0 to 80 mV
Catalytic converter (under vehicle)	◇ C50
Anti-evaporation system - Canister 60 25 303 195	With canister : specific to MATRA Solenoid bleed valve: Delco Remy 199 resistance : 35 ± 3 Ohms
2 coil static ignition	Advance integral in injection computer Ignition power module integral in computer Pinking sensor
Plugs	BOSCH : WR8 D C04 EYQUEM : RC 52 LS Gap: 0.9 mm (adjustable) Tightening torque : 2.5 to 3 daN.m

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Engine						Type of injection
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Ratio	
JE0D	Z7X	775	93	72.7	2963	9.6/1	Multipoint SIEMENS depolluted

Tests at idle speed *					Fuel *** (minimum octane rating)
Engine speed (rpm.)	Pollutant emission **				
	CO (%)(1)	CO2 (%)	HC (ppm)	Lambda (λ)	
700 ± 50 in P/N 850 + 50 in D	0.5 max	14.5 min	100 max	$0.97 < \lambda < 1.03$	Unleaded ($\geq$ 95)

(1) at 2500 rpm, CO must be a maximum of 0.3

* For a coolant temperature above 80°C. Tests at 2500 rpm for approximately 30 seconds.

** For legal values refer to your country specification.

Type of fuel supply	Regulated multipoint injection with 55 track computer
Submersed pump in fuel tank Type : **NARVAL**	Voltage: 12 volts Pressure: 3 bars Flow: 80 litres/hour minimum
Fuel filter mounted under vehicle in front of fuel tank	
Throttle body	Type : Solex, diameter 55 mm Reference 77 00 874 766
Pressure regulator	Regulated pressure: 4.5 to 7 bars Zero vacuum 3 ± 0.2 bar Vacuum of 500 mbars 2.5 ± 0.2 bar
Solenoid injectors Type : SIEMENS Deka 1 863 409	Voltage: 12 volts Resistance : 14.5 ± 0.5 Ω
Idle speed regulation valve Make: Hitachi single winding	Reference 77 00 744 614 Resistance : 9.5 + 1 Ω
Throttle position potentiometer (non-adjustable)	Check using XR25 # 17 Regulated idle speed 0 to 47 Full load 138 to 255
Pulse damper	Type : Bosch

SPECIFICATIONS AND ADJUSTMENT VALUES

Temperature in °C (± 1°)	0	20	40	80	90
Air temperature sensor Type CTN Resistance in Ohms	8385 to 10610	3279 to 3769	1373 to 1555	–	–
Coolant temperature sensor Type CTN Resistance in Ohms	–	3279 to 3769	1373 to 1555	315 to 348	225 to 255

Heated oxygen sensor Make N.T.K. 77 00 856 629	Voltage at 850°C : Rich mixture > 625 mV Lean mixture : 0 to 80 mV
Catalytic converter (under vehicle floor)	◇ C48
Paper cartridge air filter	
Anti-evaporation system	With canister : CAN 307 298 Solenoid bleed valve: Delco Remy 199 resistance : 35 ± 3 Ohms
Static ignition	Advance integral in injection computer Ignition coils Pinking sensor
Plugs	EYQUEM : RFC 58 LS 3 RFC 57 LS 3 Gap: 1.2 mm (non-adjustable) Tightening torque : 2.5 daN.m

SPECIAL TOOLING REQUIRED	
Mot 453-01	Hose clamp

TIGHTENING TORQUES (in daN.m)	
Throttle body mounting bolt on inlet manifold	2
Throttle potentiometer mounting bolt	0.2

REMOVAL

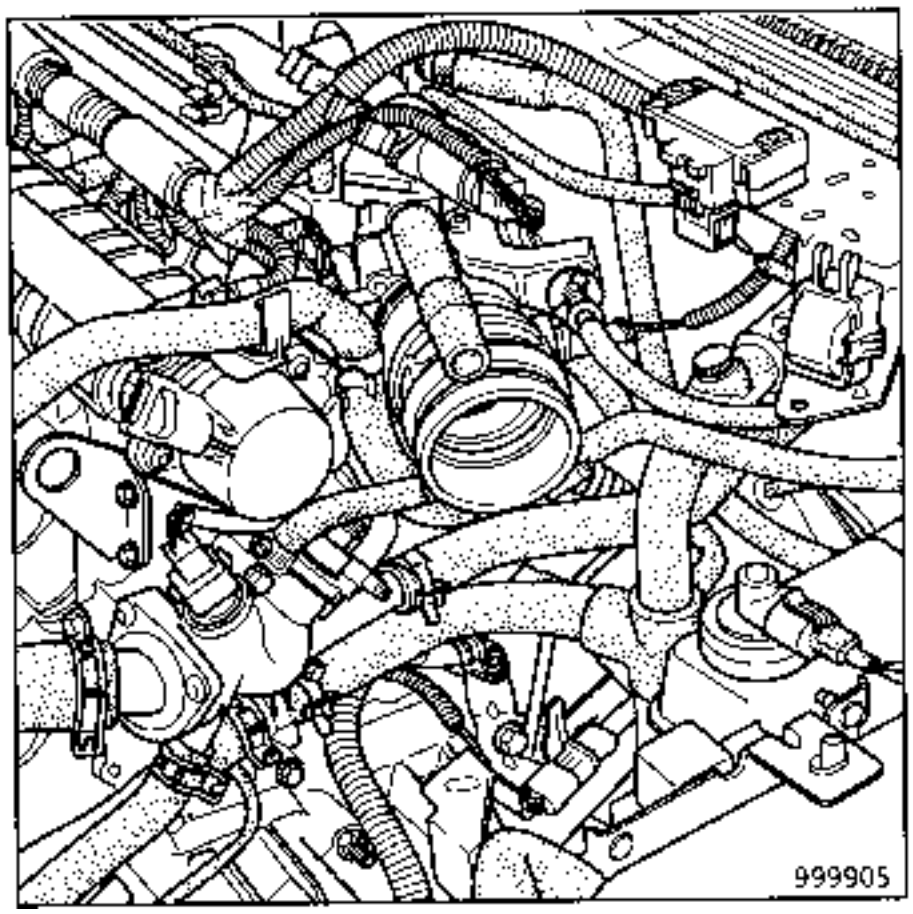
Disconnect the battery.

Remove the three bolts mounting the body to the air filter.

Disconnect the air temperature sensor.

Slacken the clip mounting the air sleeve to the throttle body.

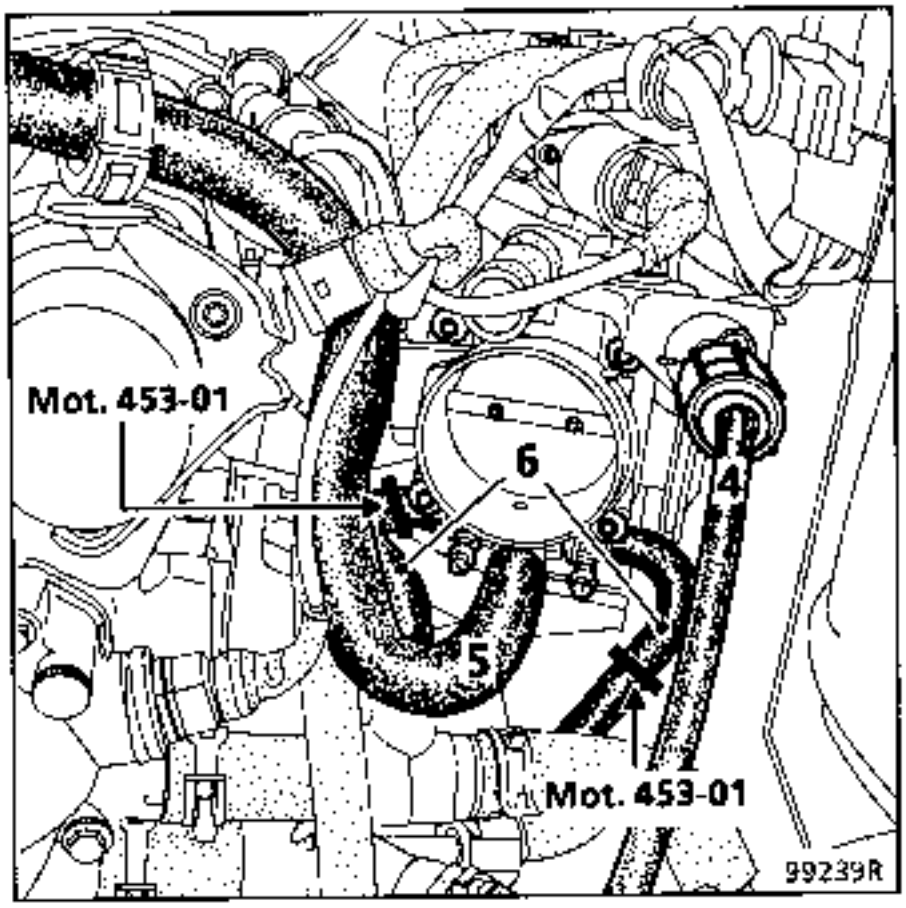
Remove the air filter and the air sleeve.



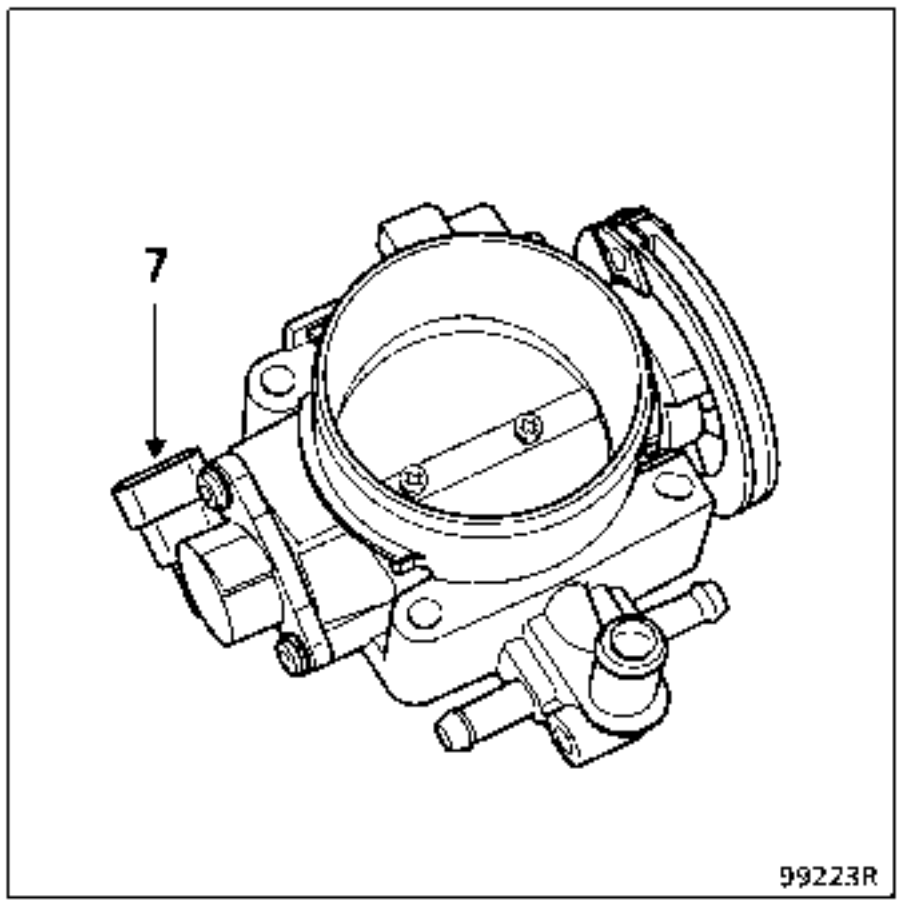
Disconnect:
- the throttle position potentiometer,
- the accelerator cable (4),
- the oil vapour rebreathing pipe (5),
- the two coolant hoses (6) which heat the throttle body, after clamping them using tool Mot. 453-01.

Remove the 4 throttle body mounting bolts and remove the throttle body.

Remove the heat shield between the throttle body and the manifold.



NOTE : the throttle position potentiometer (7) may only be removed after the throttle body has been removed (it is not adjustable).



REFITTING

Remove the gaskets on the throttle body heat shield and renew them (they do not need to be re-bonded).

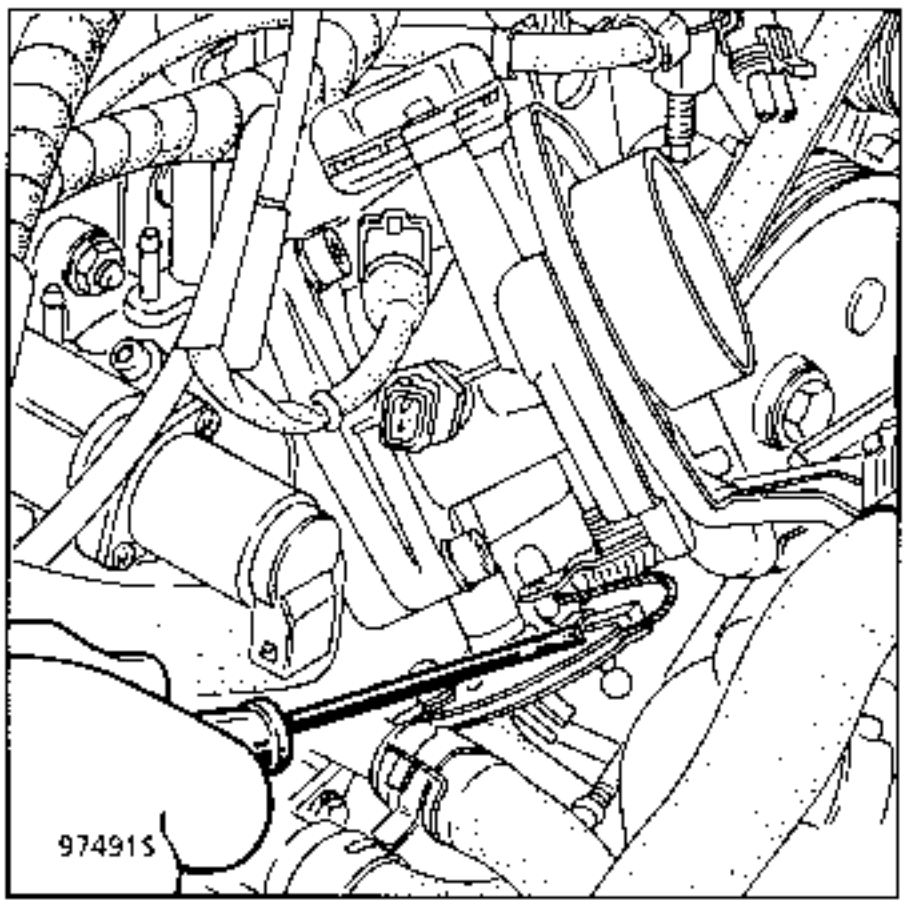
Refitting is then the reverse of removal.

TIGHTENING TORQUES (in daN.m)	
Throttle body mounting bolt on intermediate manifold	2.3

REMOVAL

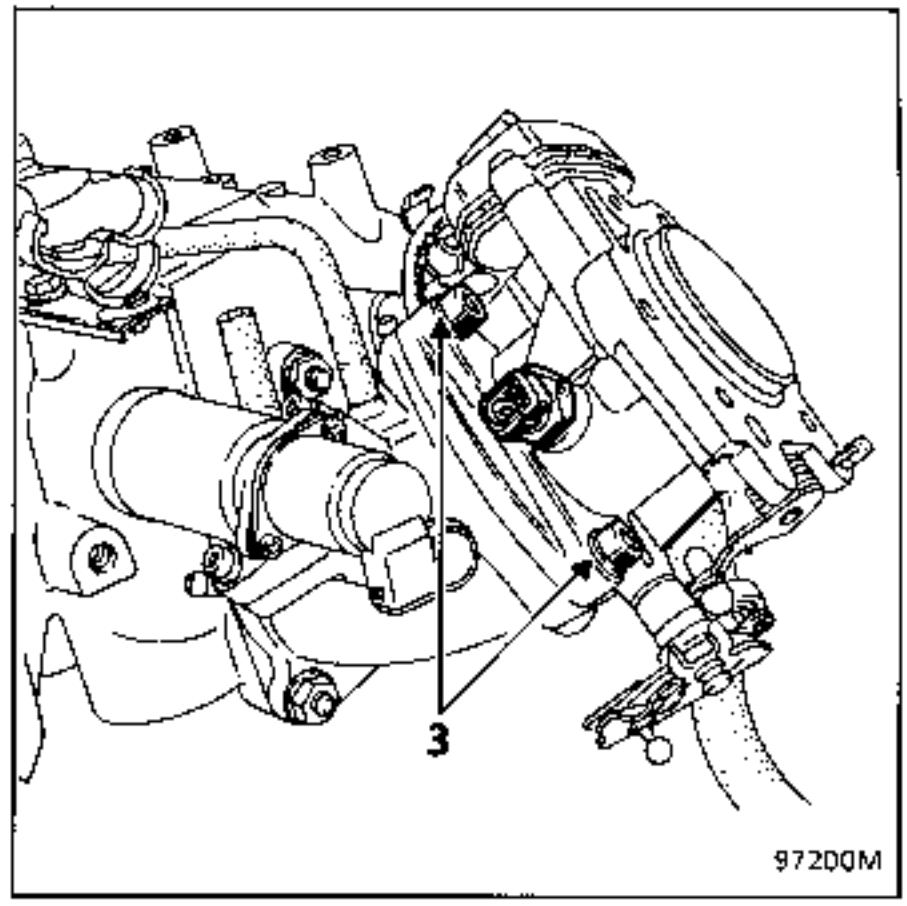
Remove :
- the upper engine protection cover (secured by four bolts),
- the air filter and the flexible air inlet pipe to the throttle body,

Disconnect the accelerator cable (and the cruise control LDA linkage).



Remove:
- the accelerator cable mounting bracket.

Disconnect:
- the air temperature sensor.
- the throttle position potentiometer connector mounted on the engine lifting ring.



Remove the three throttle body mounting bolts (3) and remove the throttle body.

REFITTING

Replace the paper gasket at the base of the throttle body.

Refitting is the reverse of removal.

Ensure all the various connectors are correctly re-fitted.

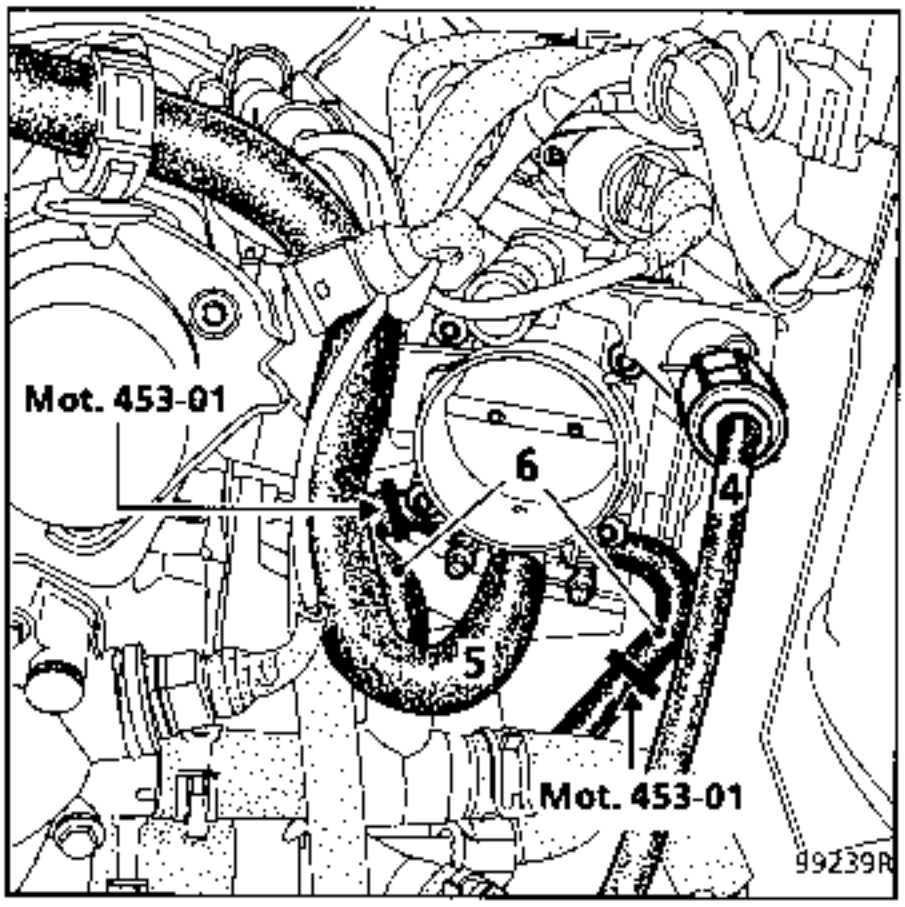
REMOVAL - REFITTING OF THE INLET AND EXHAUST MANIFOLDS

TIGHTENING TORQUES (in daN.m)	
Manifold mounting nuts on cylinder head	$2\ ^{+0.2}_{-0}$

NOTES:

- To replace the manifold gasket both manifolds must be removed. They are removed from below.
- The exhaust manifold may be removed by itself, but the inlet manifold may only be removed after removing the exhaust manifold.

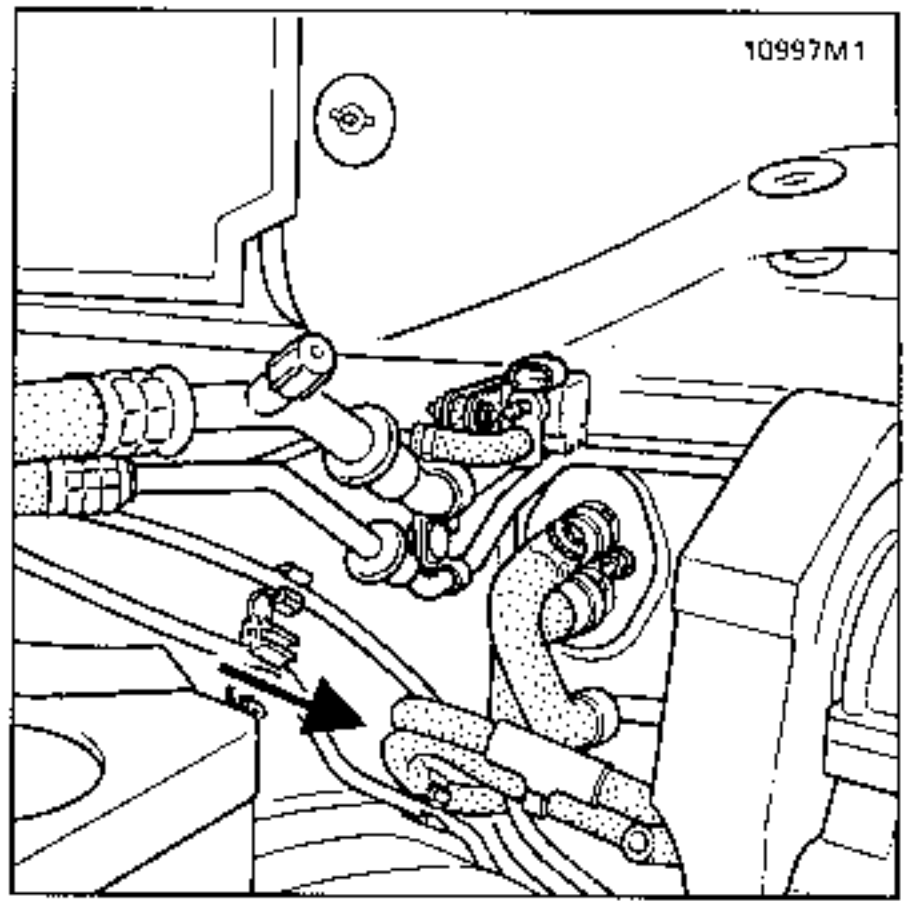
REMOVING THE INLET MANIFOLD:



Disconnect the battery.
Remove the air filter and the throttle body (4 bolts).
Disconnect:
- the accelerator cable,
- the recycling and heating pipes from the throttle body (clamp the coolant hoses using tool Mot. 453-01).

Disconnect the idle speed regulation valve, the injectors, the air temperature sensor and release the wiring at the rear.

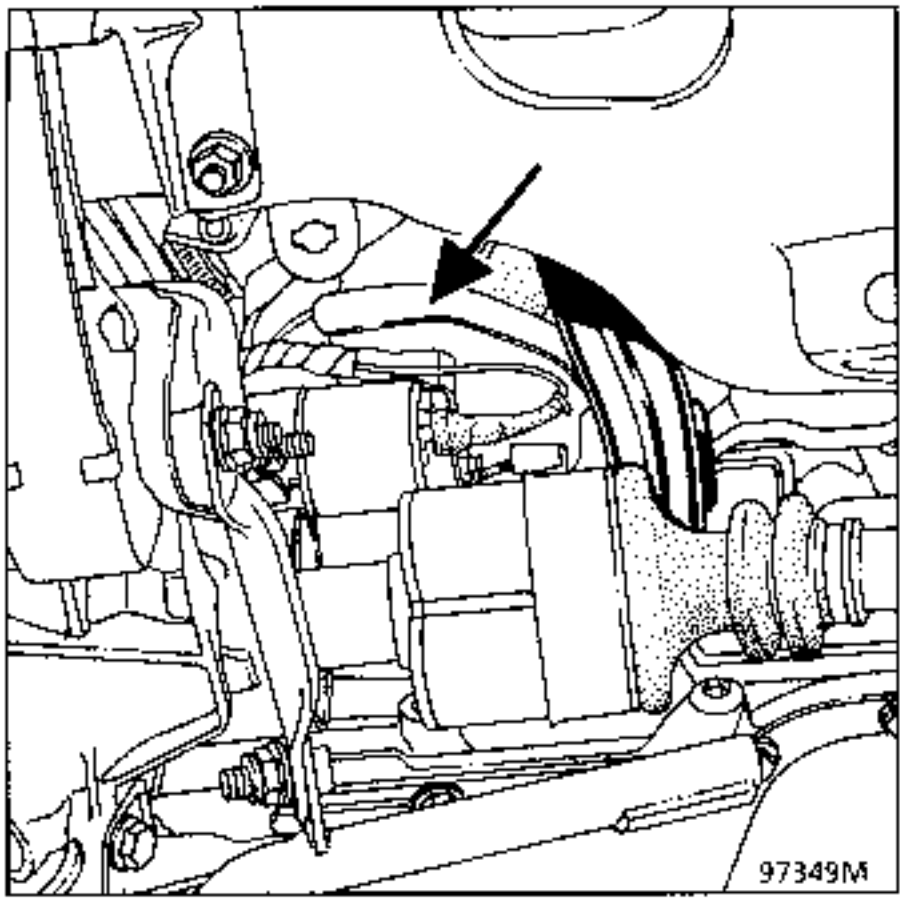
On the injector gallery: disconnect the fuel supply and return pipes and the vacuum pipe on the regulator.

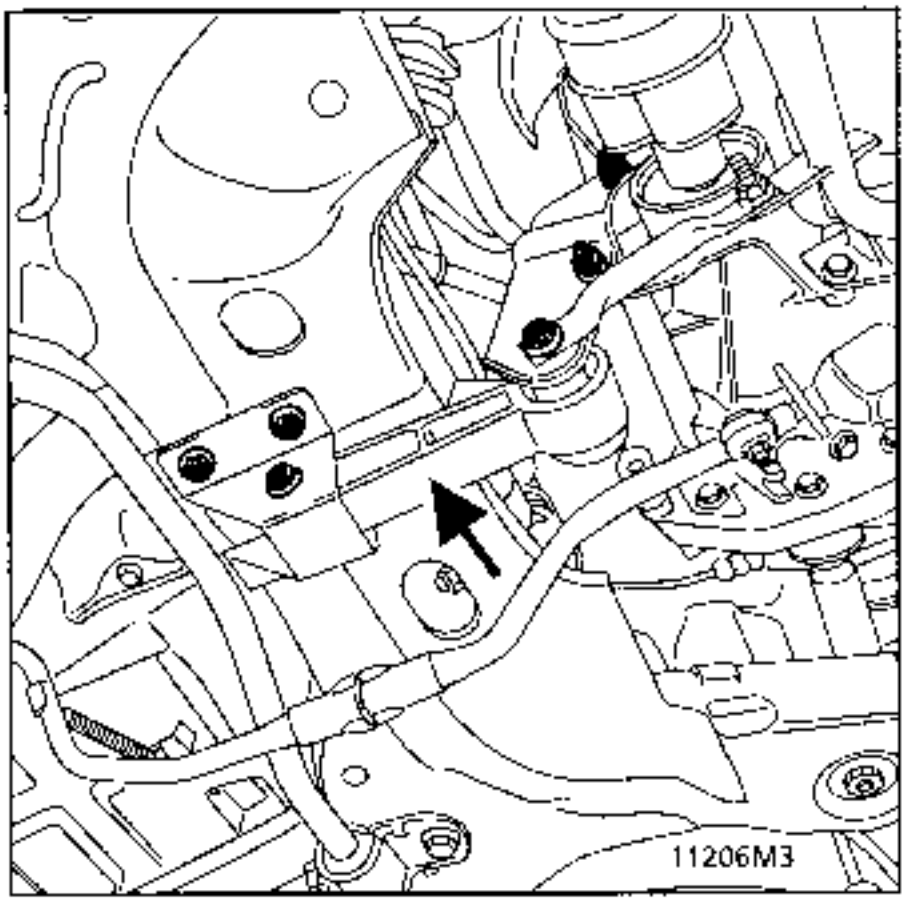


From under the vehicle, remove the right hand driveshaft with the right hand stub axle (see section 10 "Removing - refitting the engine and transmission assembly").

REMOVING THE EXHAUST MANIFOLD

From under the vehicle, remove:
- the right hand driveshaft,
- the exhaust pipe,
- the stiffening bracket between the manifold and the engine block,
- the starter heat shield,
- the engine tie bar.



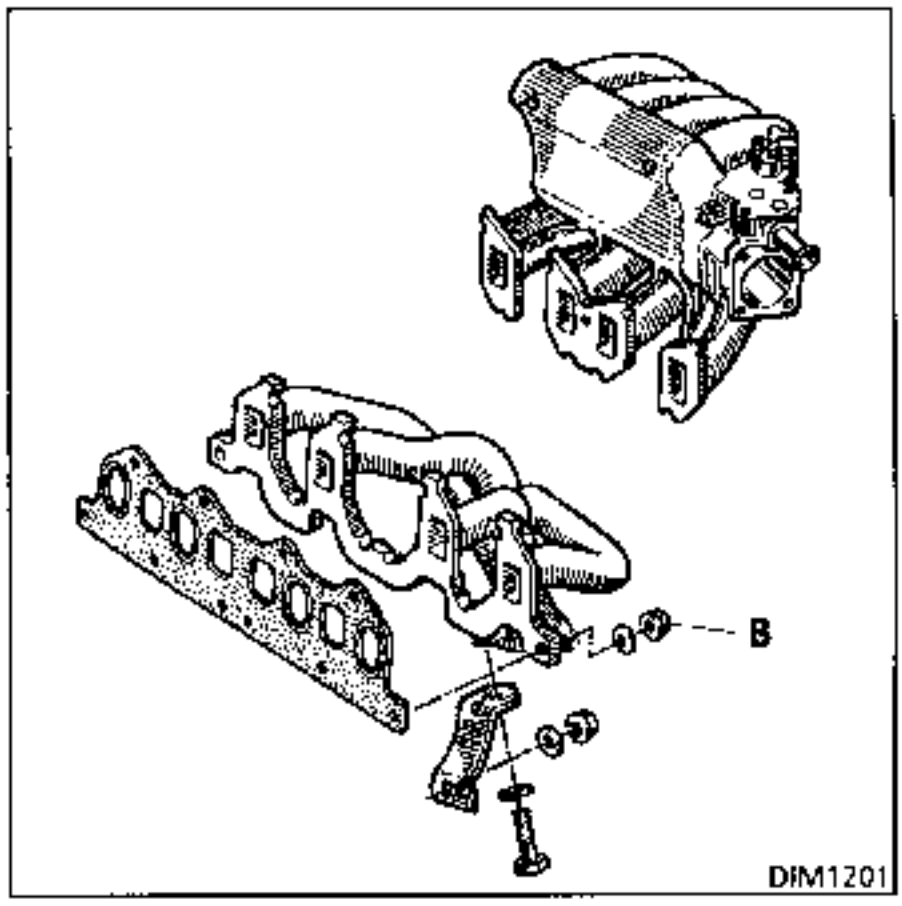


If the exhaust manifold only is being removed, remove all the mounting nuts for the inlet / exhaust manifold assembly from below the vehicle, including the two end ones (B) which only hold the exhaust pipe.

Remove the manifold from below.

The inlet manifold is removed from below after removing the exhaust manifold.

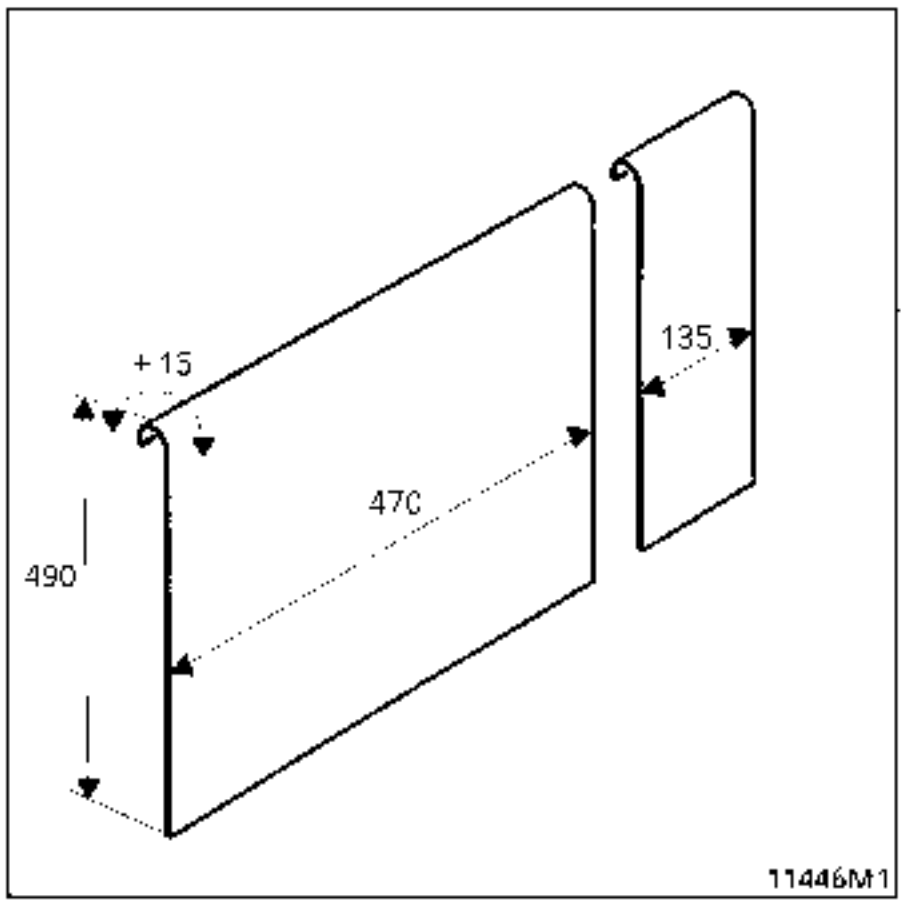
The manifold gasket should be fitted with the metallic side against the manifold (crimped side against the cylinder head).



SPECIAL TOOLING REQUIRED	
Mot. 1289-01	Fork for centring suspended engine mounting limiter.

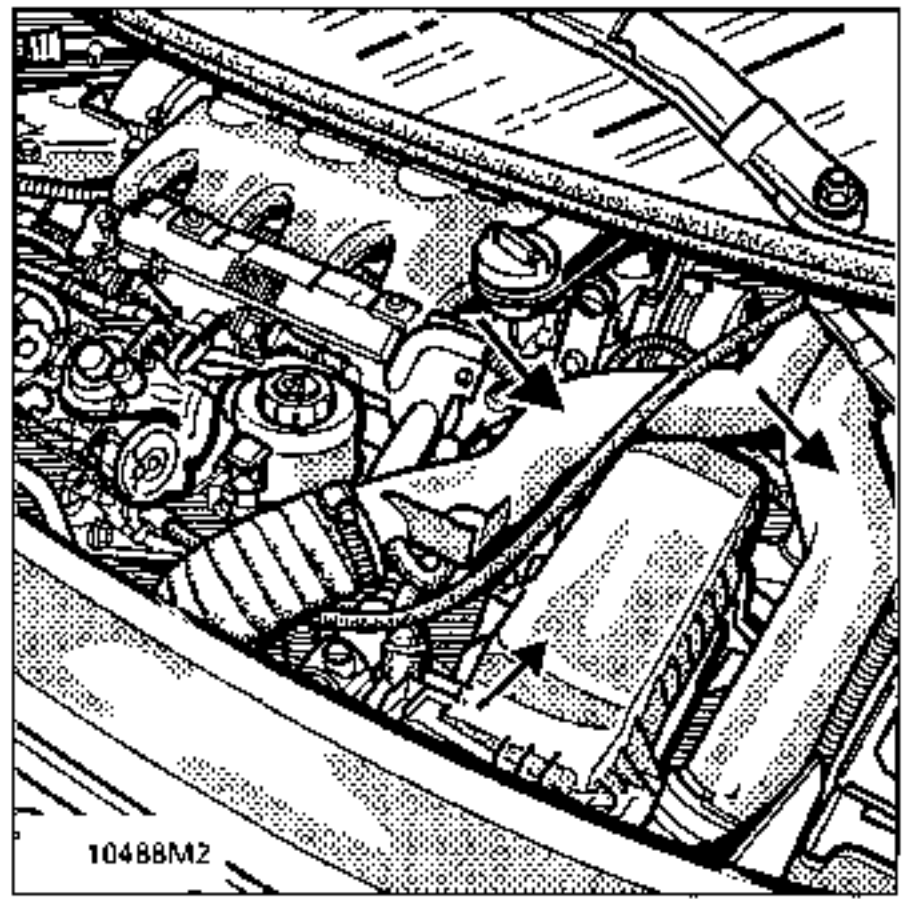
TIGHTENING TORQUES (in daN.m)	
Nuts mounting inlet manifold to cylinder head	2.1
Shock absorber base bolt	20
Driveshaft nut (+ Loctite)	20
Engine tie bar bolt	12 to 18
Mounting bolt on engine for front right hand suspended mounting cover	4.8 to 6.5
Front right suspended mounting movement limiter mounting bolt	4.8 to 6.5
Mounting nut for rubber mounting on front right suspended mounting cover	3 to 4.5
Wheel bolts	10

Disconnect the battery.
Put the vehicle on a lift and remove the front wheels.
Separate (but do not disconnect) the oil exchanger on the cooling radiator.
Fit the locally made tool to protect the radiator (THIS MUST BE DONE).

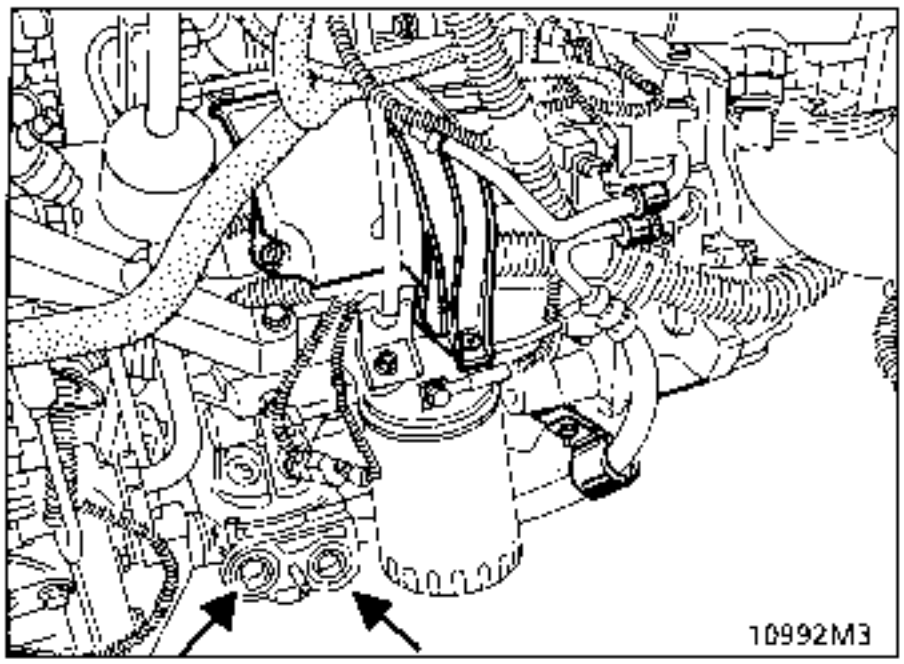


Remove the air filter unit: 1 clip at the rear, and release the unit from the hoses and its centring pin.

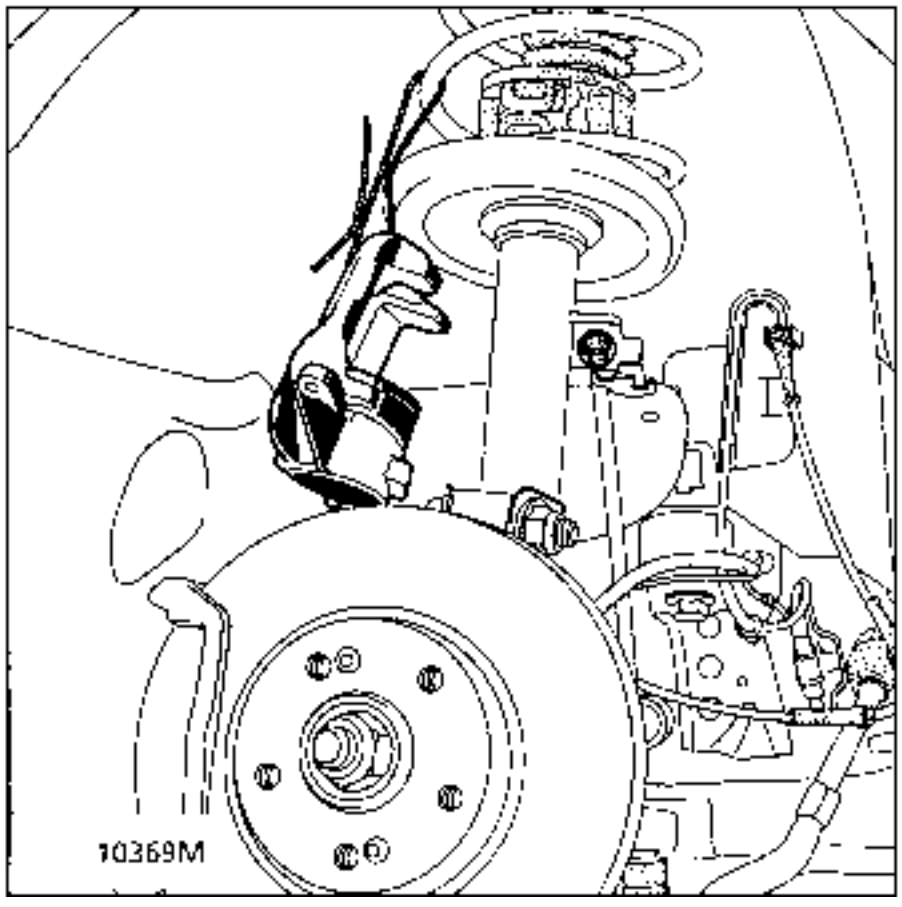
Remove the rigid pipes from the air/air exchanger.
Disconnect the air temperature sensor on the hose and remove the assembly.



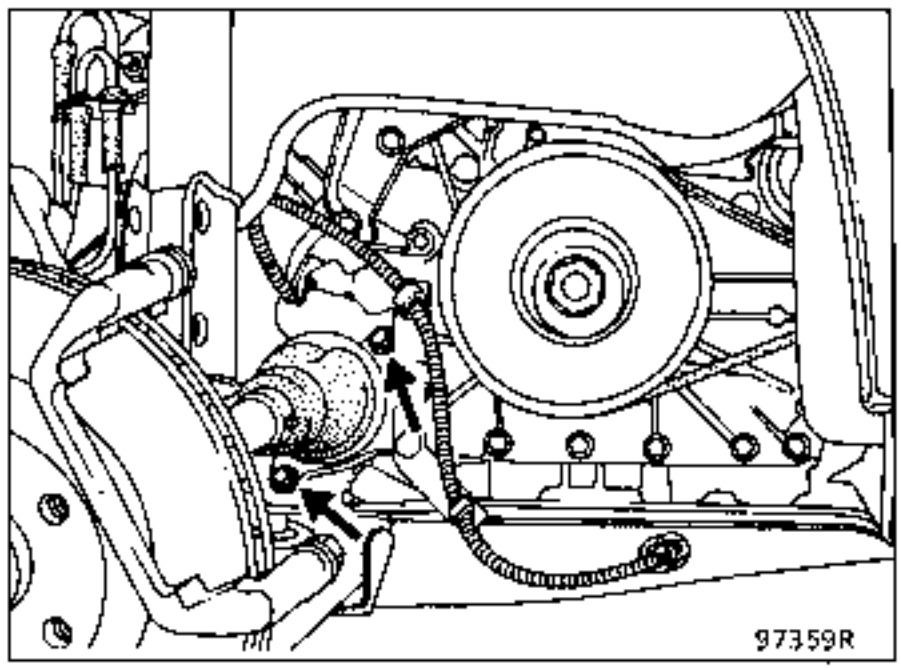
Remove the plastic engine undertrays.
Remove the wheel arch protectors.
Partially drain the gearbox (3 minutes draining time).
Slacken the mounting flange for the oil pipes on the oil filter mounting (take care to catch the oil which will run out).
Remove the oil exchanger.



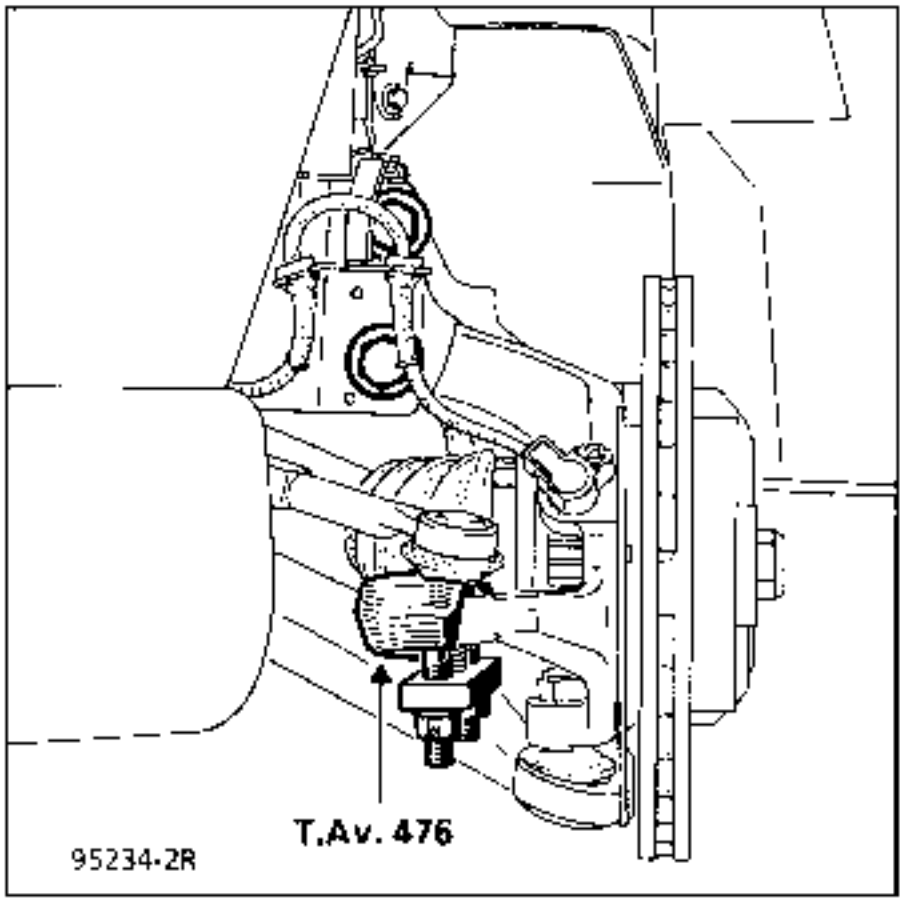
Right hand side of the vehicle:
Remove:
- the front right hand brake caliper and secure it to the suspension spring to protect the pipe.



- the two mounting bolts for the driveshaft flange on the relay bearing.

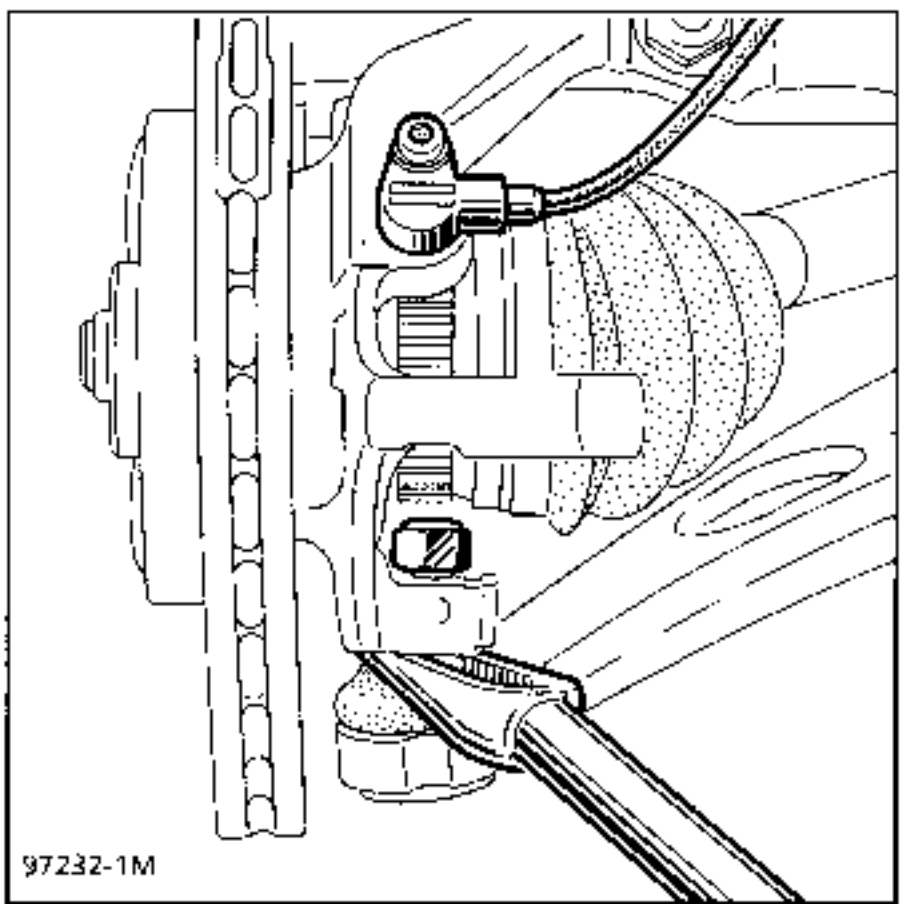


– the track rod end using tool **T. Av. 476**,
– the shock absorber base mounting bolts,

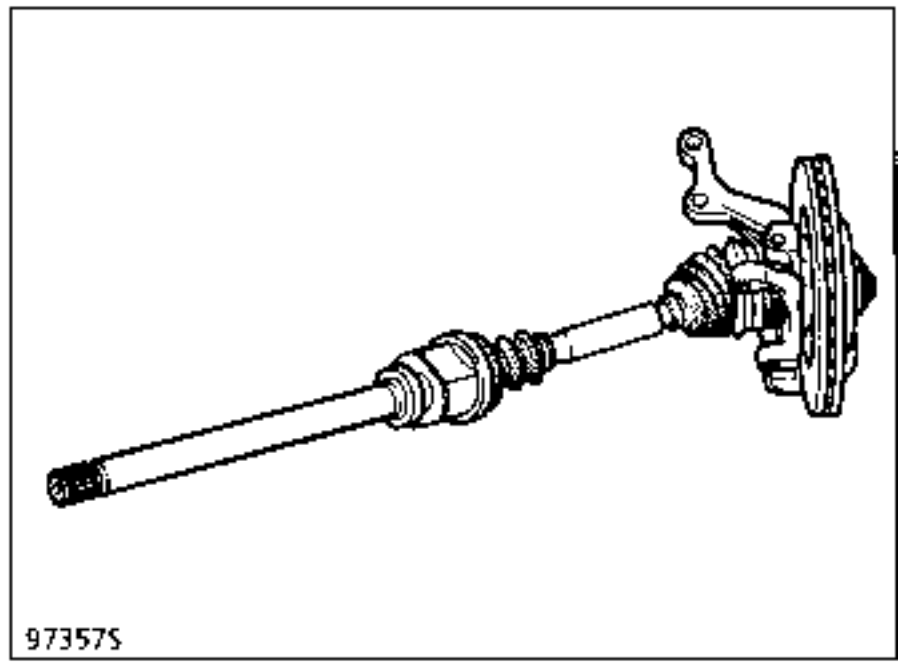


– the wheel sensor if the vehicle is fitted with ABS.

Slacken the lower ball joint nut as far as possible and release it using an impact ball joint extractor.



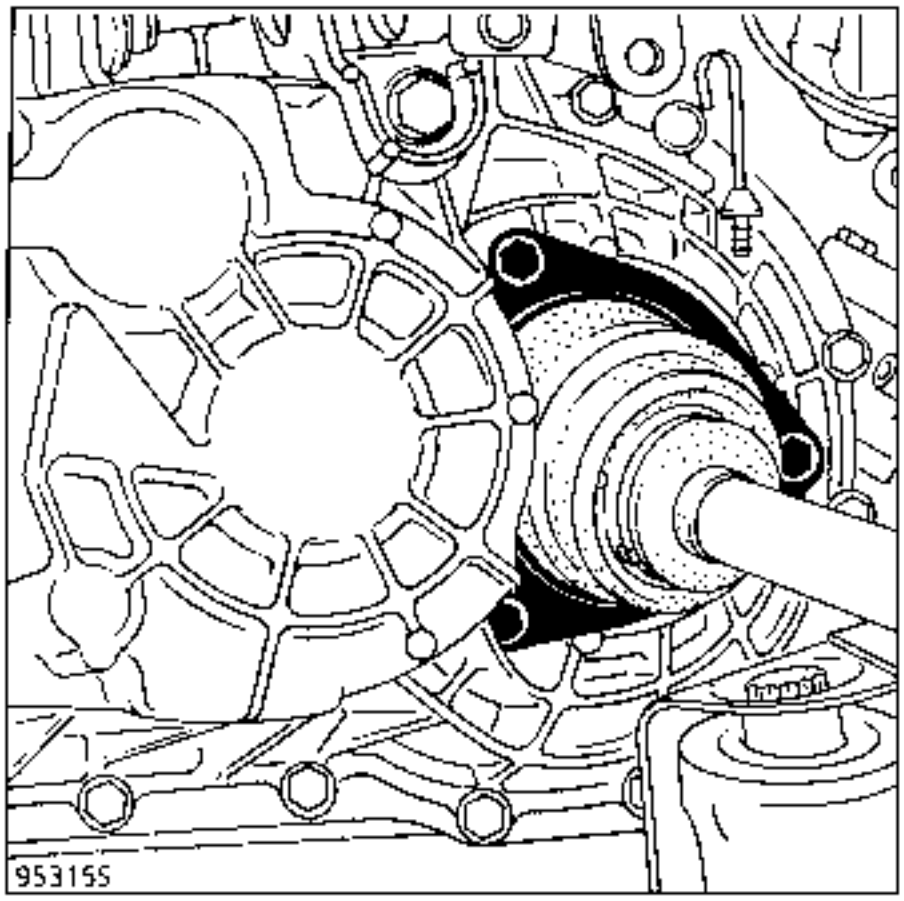
Remove the hub assembled with the driveshaft.



Take care to protect the gaiters.

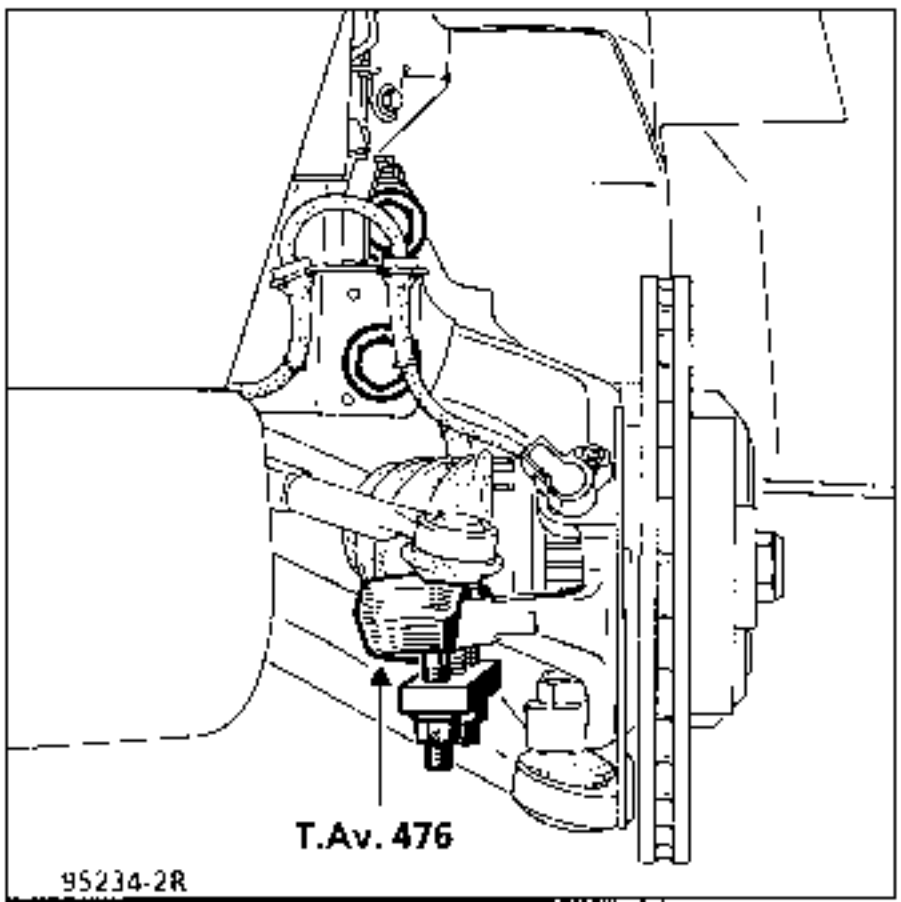
Left hand side of the vehicle:

Remove:
- the brake caliper,
- the three driveshaft gaiter mounting bolts,

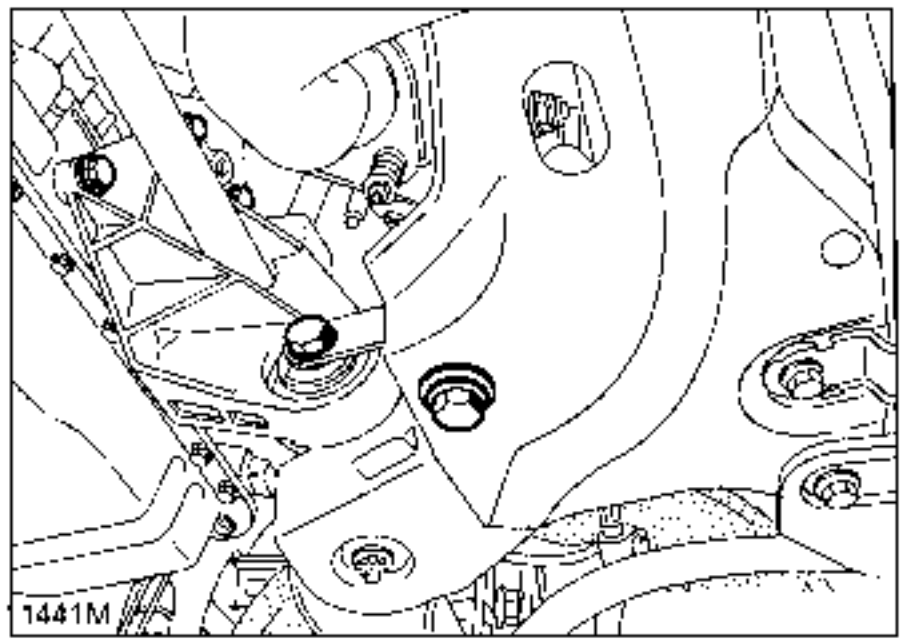


- the track rod end using tool
  T. Av. 476,

Release the brake pad wear warning light wire and disconnect the ABS target sensor.
Remove the shock absorber base bolts.

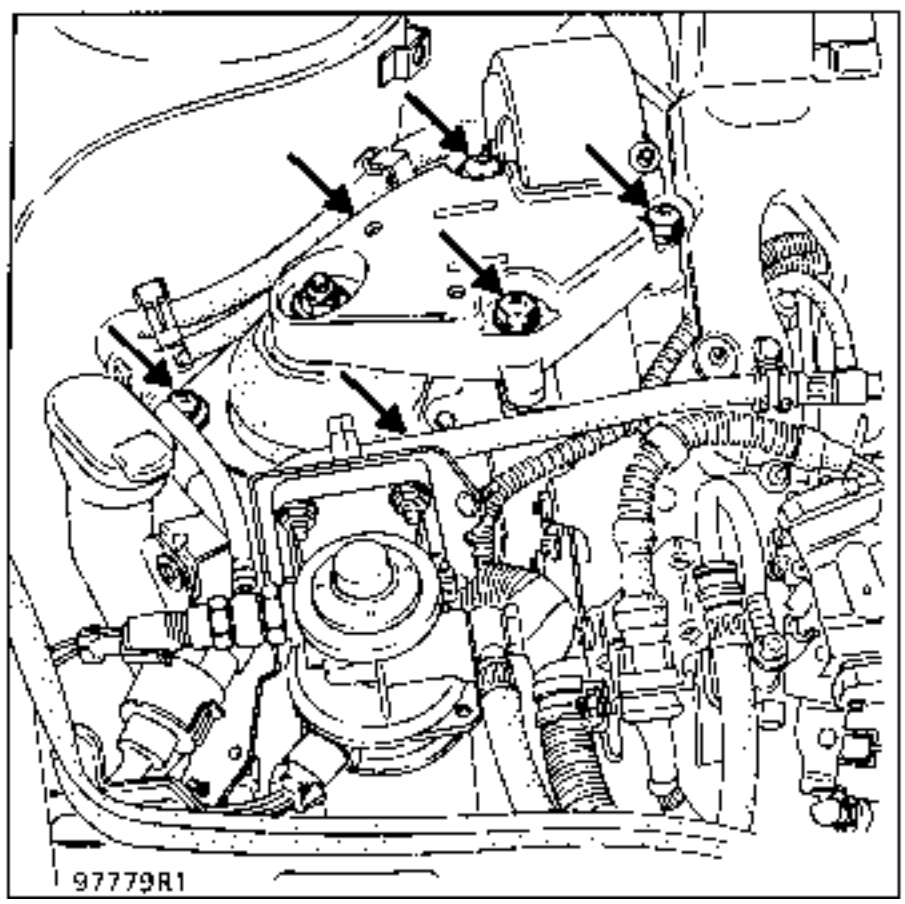


Release the lower ball joints and track rod ends.
Remove the stub-axle - disc - driveshaft assembly.
Remove the engine tie bar bolt.

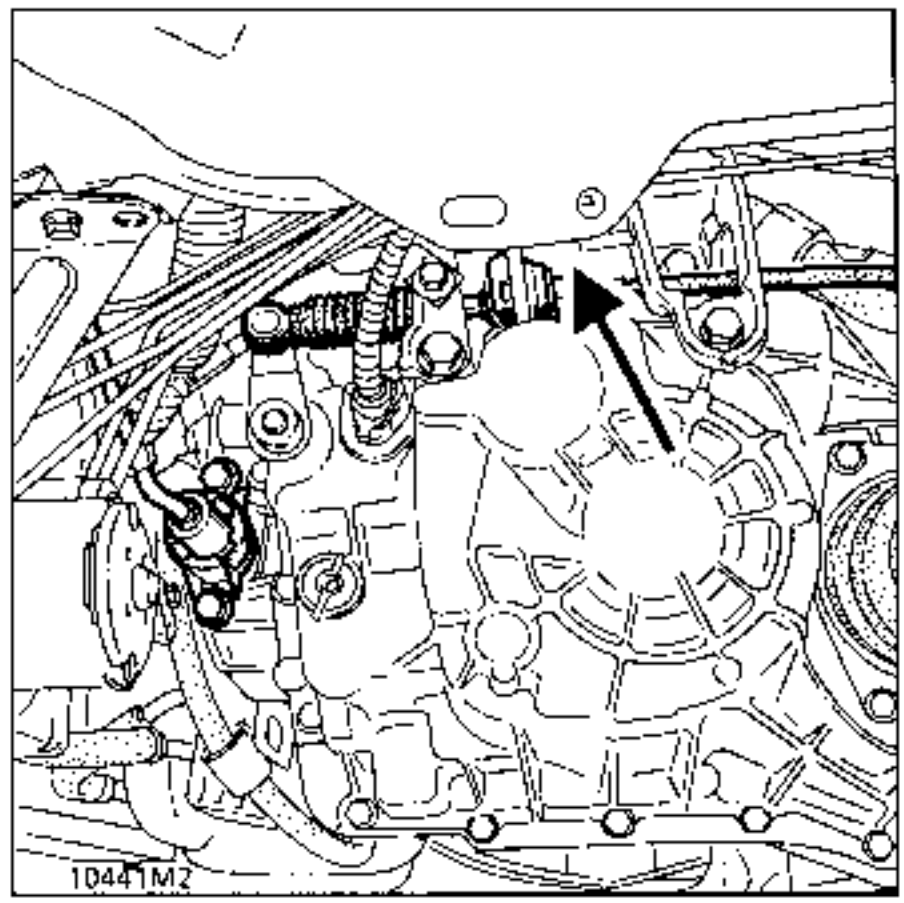


Remove the exhaust downpipe.
Fit the universal support and lower the engine onto it (2 persons required).

Remove the right hand suspended mounting cover (4 bolts).

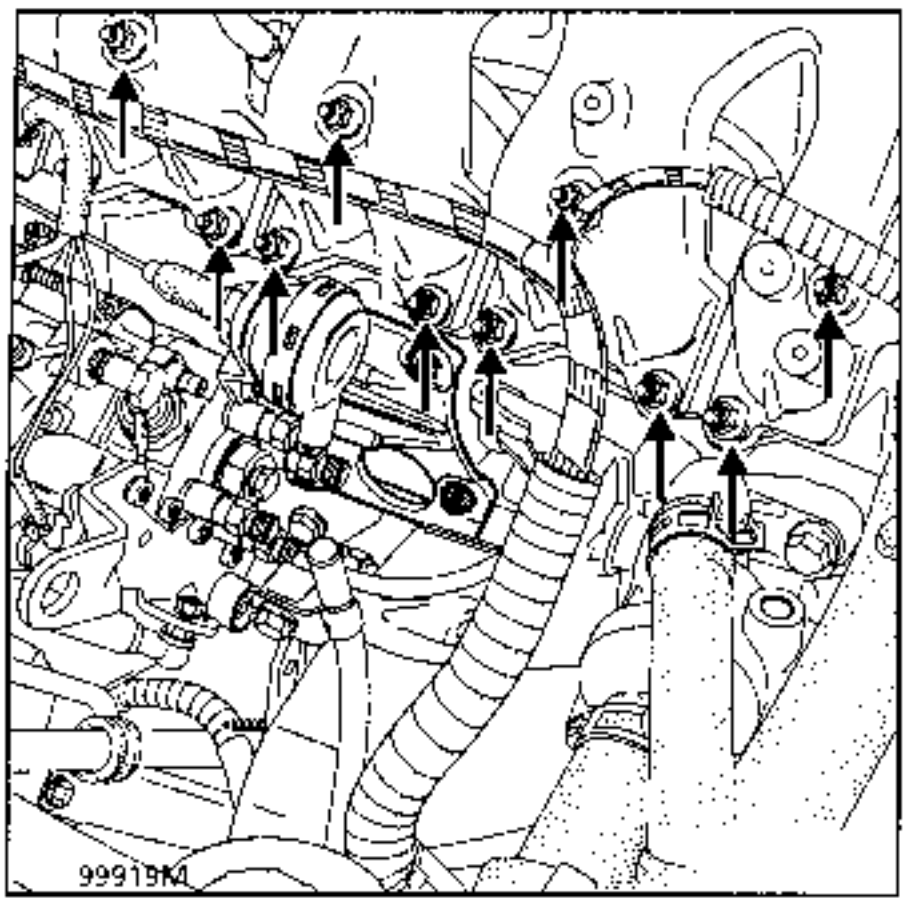


Remove the left hand suspended mounting bolt (1 bolt).

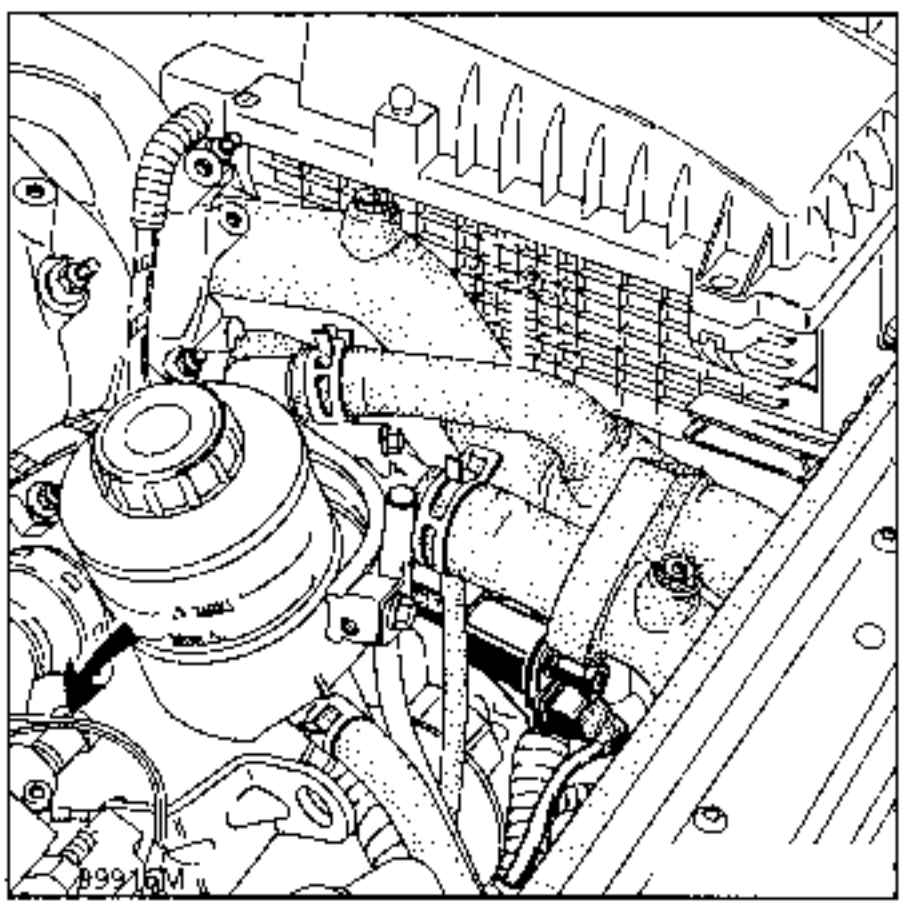


If necessary, disconnect injector n°1 (electrical connector) and remove the plastic cover (2 connectors + 1 diesel fuel pipe).

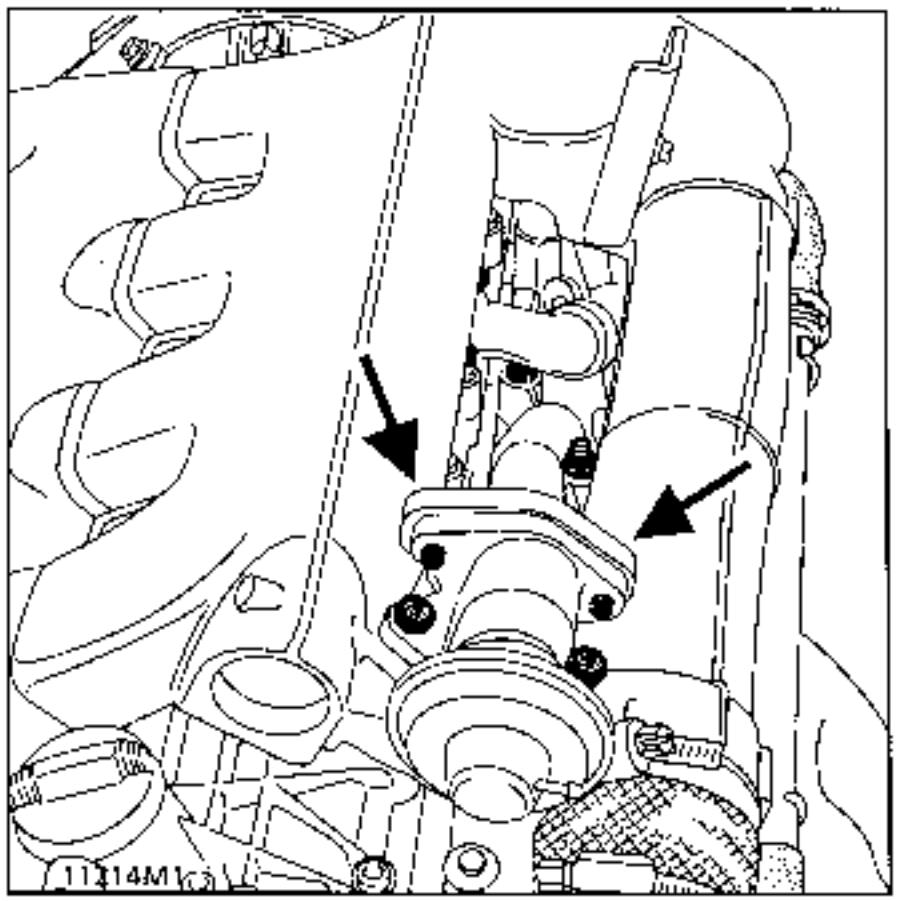
Remove the 13 manifold nuts.

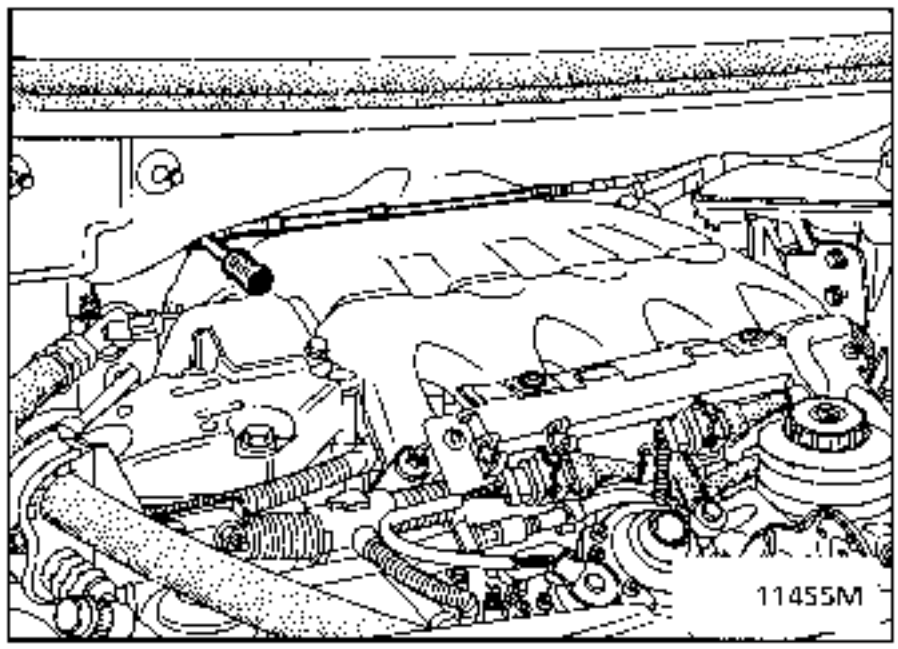


Lower the power assisted steering fluid reservoir.

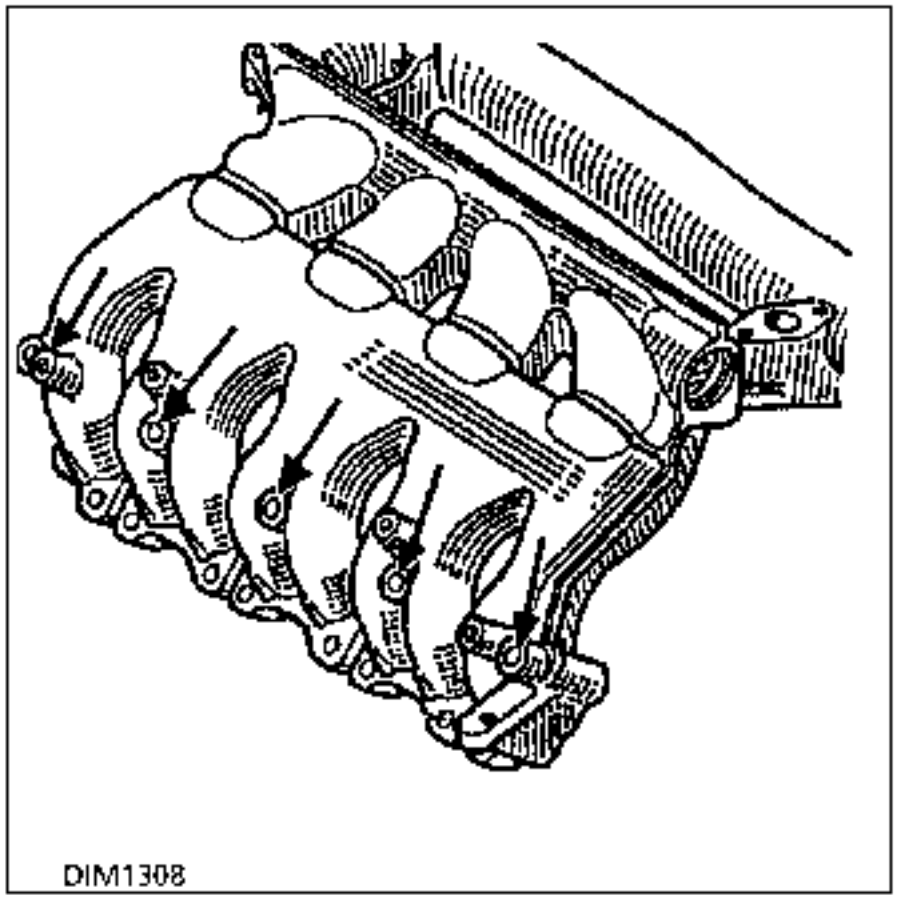


Remove the two rear right hand mounting bolts for the inlet manifold.
Remove the two mounting bolts for the EGR pipe on the capsule.





Remove the manifold; remove the 5 upper studs if necessary.



Refitting is the reverse of removal. Renew the gaskets.
Remember to top up the transmission oil level (see section 07).

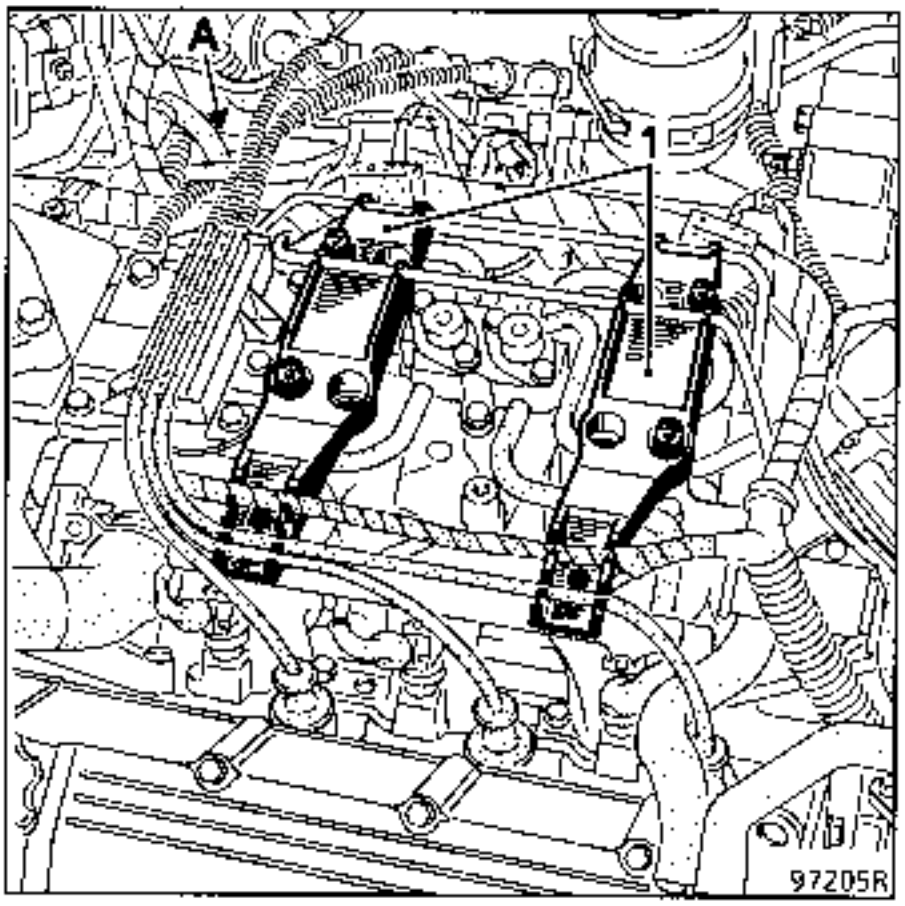
Tightening torques :
- manifold mounting studs: 0.6 ± 0.2 daN.m
- manifold mounting nuts: 2.1 daN.m
- exhaust downpipe: 2.2daN.m

TIGHTENING TORQUES (in daN.m)	
Bolts mounting manifold on cylinder heads	1.5 to 2
Mounting bolt for injector gallery and pulse damper regulator assembly on manifold	0.9 ± 0.2

REMOVAL

Disconnect the battery

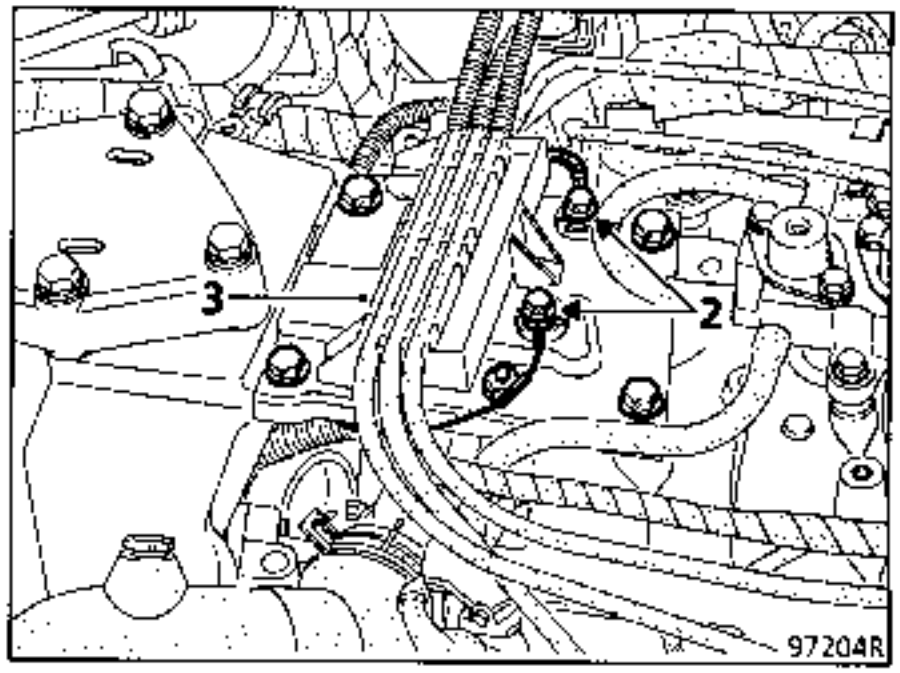
Remove the upper engine protection cover (secured by four bolts).



Remove the plastic wiring mounting clip fitted to the engine lifting ring at (A).

Release the wiring and the various pipes from the two cover mountings (1).

Remove the two mountings (1) (each secured by two bolts).

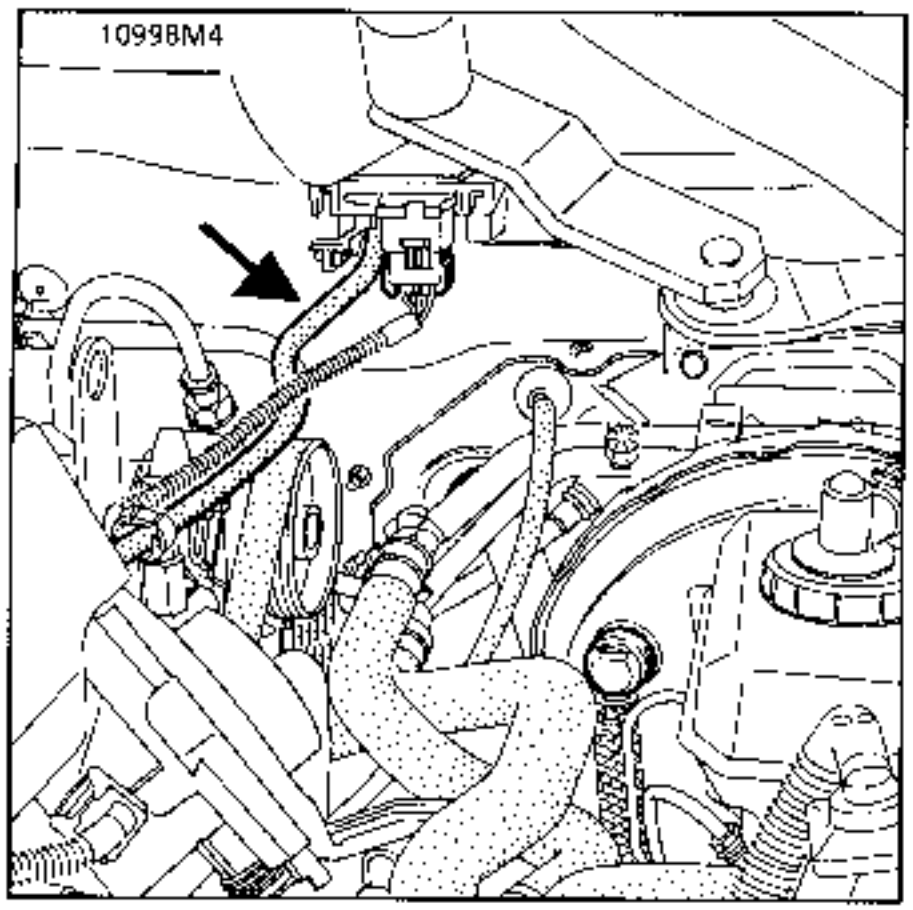


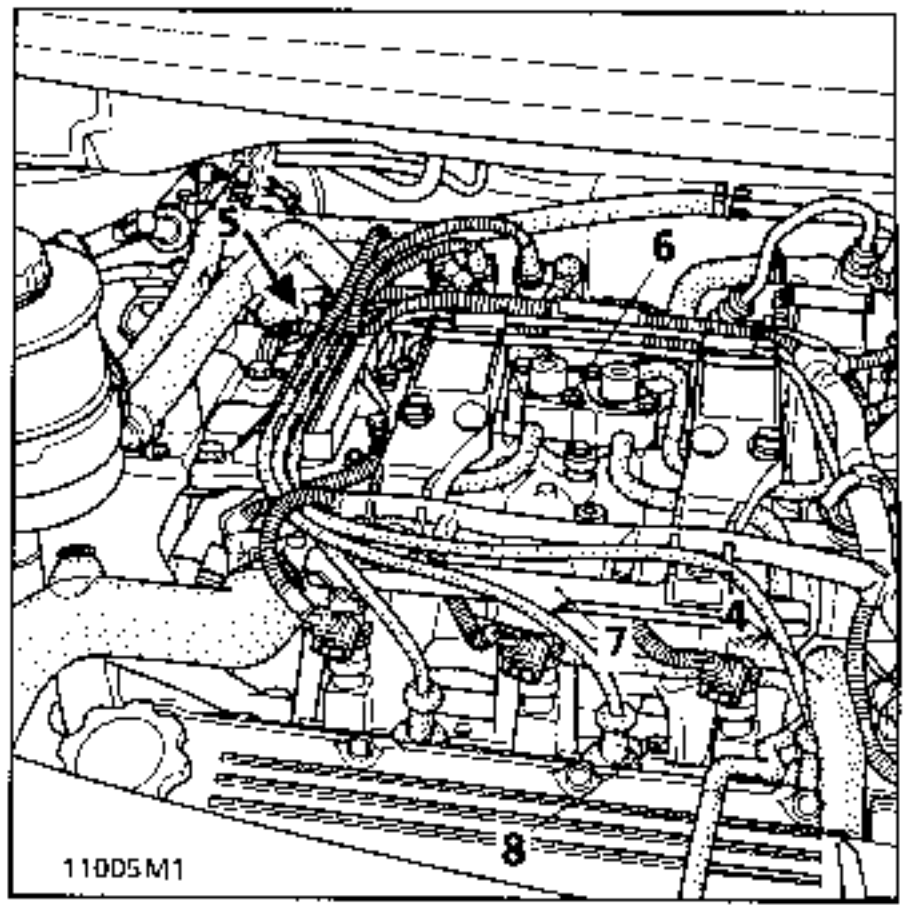
Disconnect the plug leads from the front cylinder bank and push them to the rear.

Remove:
- bolts (2), to release the earth wires, then retain the two plastic anti-rotation spacers
- the HT lead retaining plate (3) (mounted by four bolts and one nut).

Remove the air filter sleeve.

Disconnect:
- the pipe connecting the idle speed regulation valve to the air filter,
- the pipe for the absolute pressure sensor,





- the oil vapour rebreathing pipe (4),
- the regulator vacuum pipe,
- the canister bleed solenoid vacuum pipe,
- the brake servo vacuum pipe,
- the air sensor connector on the throttle body,
- the idle speed regulation valve connector,
- the connectors for the potentiometer and the engine speed sensor.

Remove the mounting bracket for the fuel supply and return pipes mounted at (5) on the cylinder head.

Disconnect the fuel supply pipe (marked green) and the fuel return pipe (marked red) at (5).

Disconnect the six injectors.

Remove:

- the two regulator - pulse damper assembly mounting bolts (6) from the manifold and retain the two insulating blocks,
- the four mounting bolts (7) securing the two injector galleries to the manifold and retain the insulating blocks ,
- the injector gallery, regulator and pulse damper assembly.

Disconnect the accelerator cable (and the cruise control LDA linkage).

Remove the four manifold mounting bolts (8) from the cylinder heads.

Release and remove the manifold - throttle body assembly to the front.

REFITTING

Refitting is the reverse of removal.

Replace the manifold gaskets.

Take care to check that :

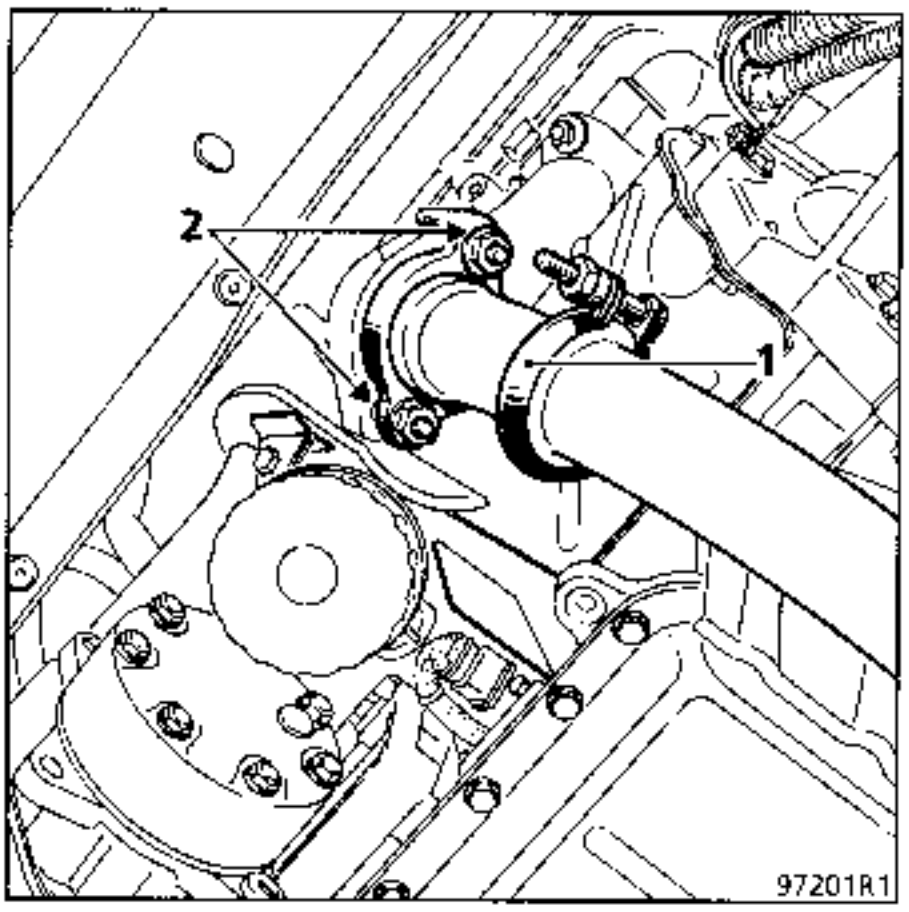
- the electrical wiring and pneumatic pipes are correctly replaced and connected ,
- the insulating blocks are refitted under the mountings for the injector galleries and the regulator - pulse damper assembly.

TIGHTENING TORQUES (in daN.m)	
Mounting nuts securing manifold to cylinder head	2
Mounting nuts securing exhaust downpipe to manifold	3.5

FRONT MANIFOLD

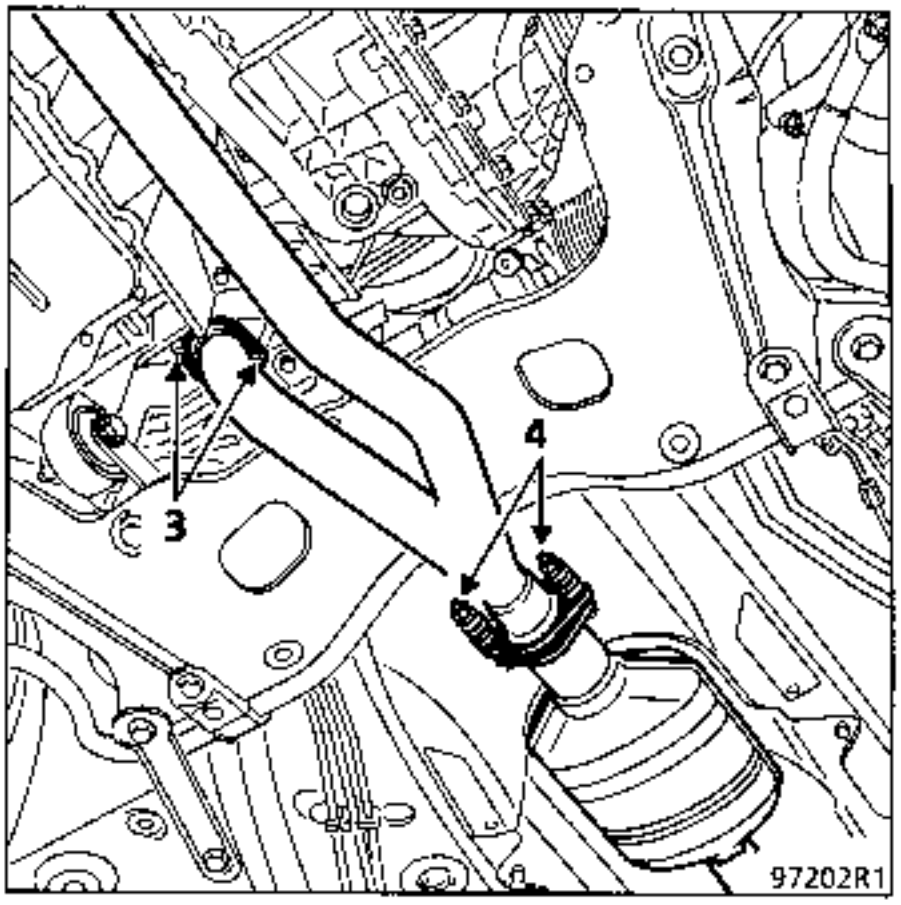
REMOVAL

Disconnect the battery



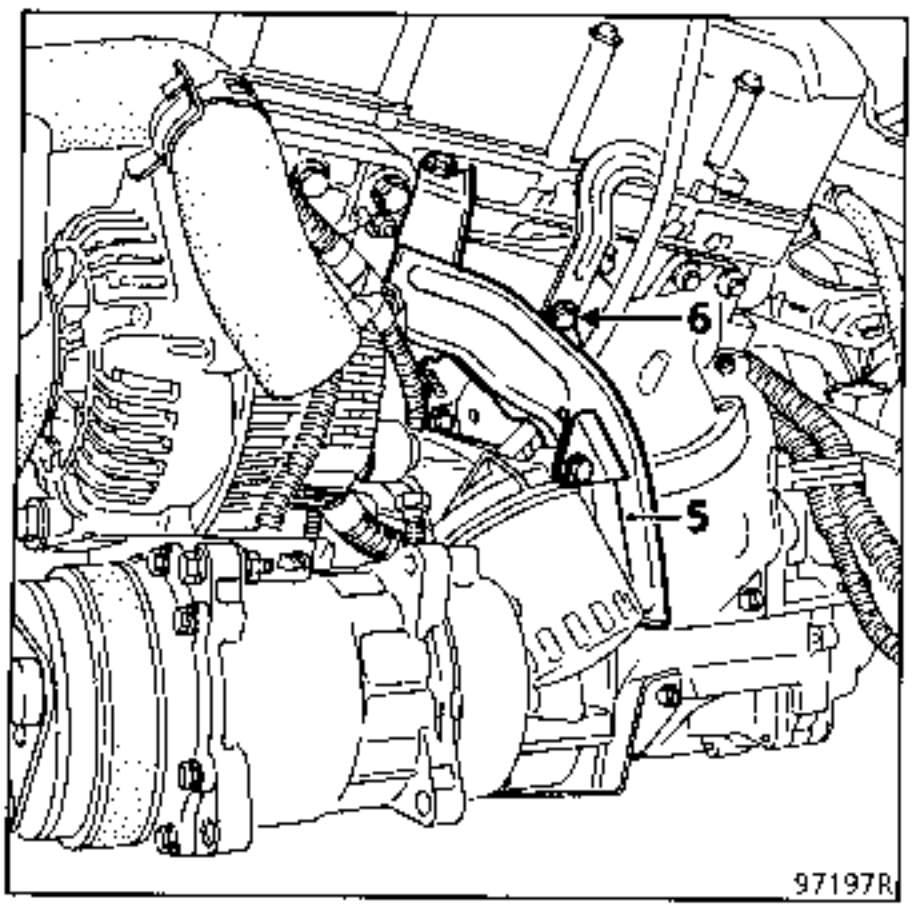
Loosen clip (1).

Remove the mounting nuts (2) and (3) for the downpipe on the front and rear manifolds.

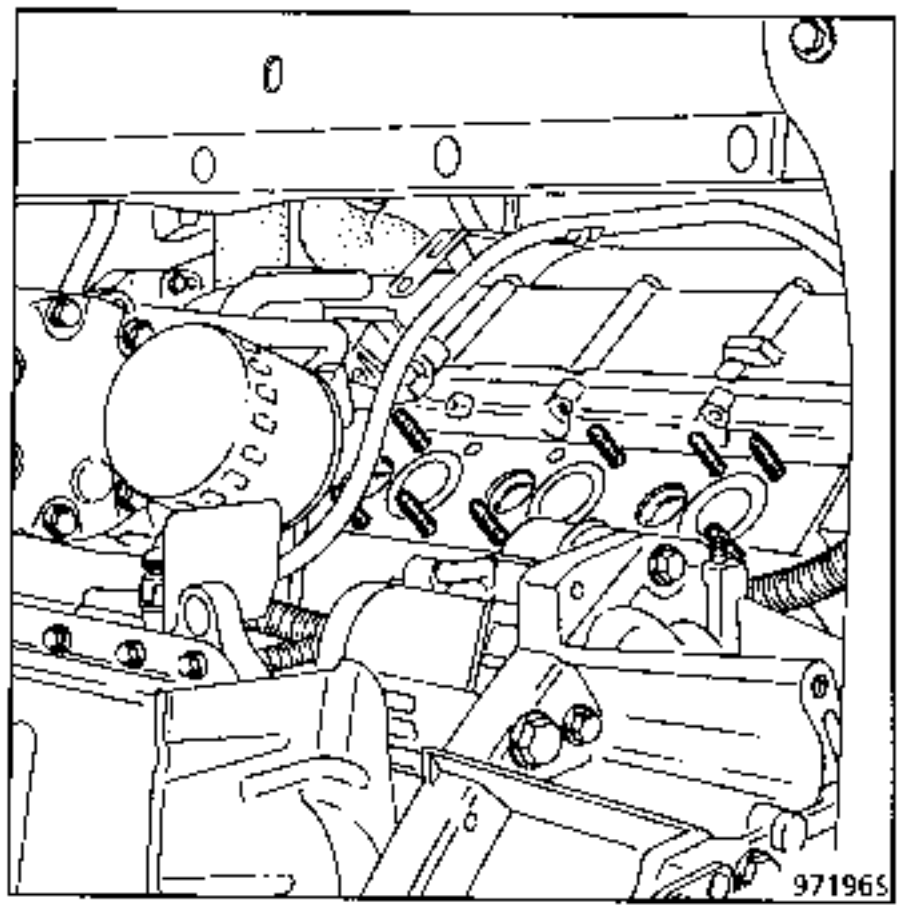


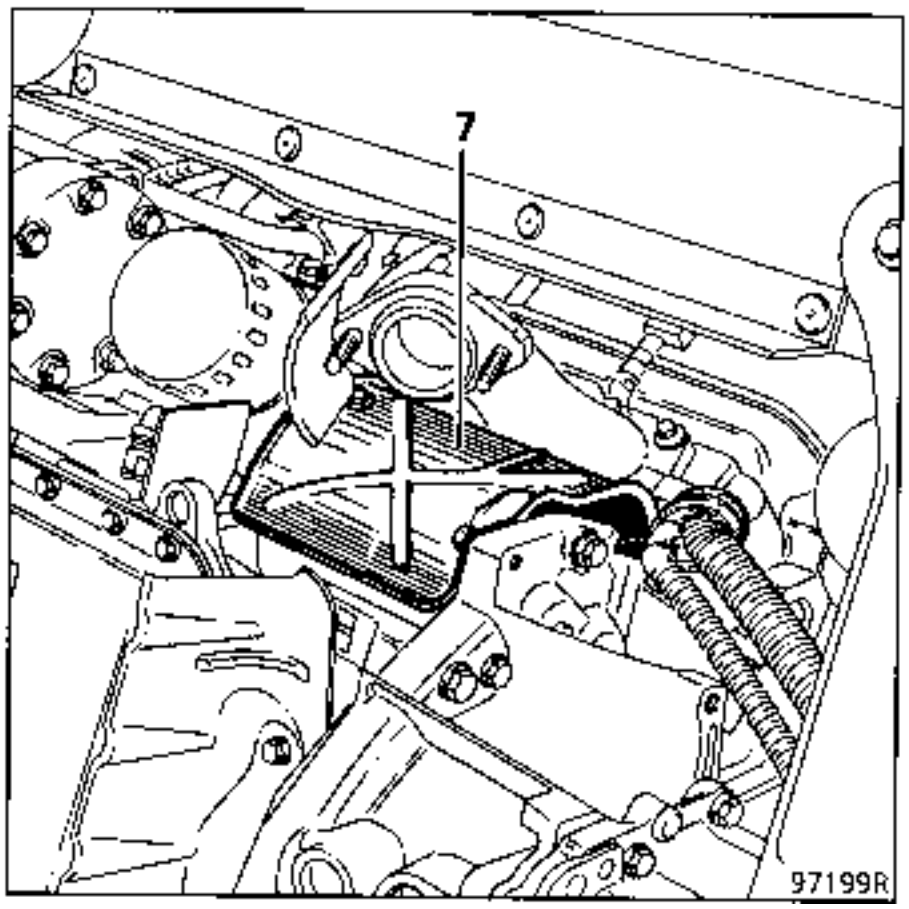
Disconnect the oxygen sensor.

Remove the mounting bolts (4) securing the downpipe to the catalytic converter and release the pipe.



Remove:
- the oil filter heat shield (5) which is secured by two bolts,
- the dipstick tube mounting bolt (6),
- the starter heat shield (7) which is secured by three bolts,
- the heat shield mounting bracket,





- the 8 manifold mounting nuts and remove the manifold.

REFITTING

Renew the manifold gaskets and position them correctly (crimped side against the cylinder head).

When refitting the exhaust downpipe tighten the mountings on the manifolds (2) and (3) first, then tighten clip (1), to ensure the exhaust pipe is correctly sealed.

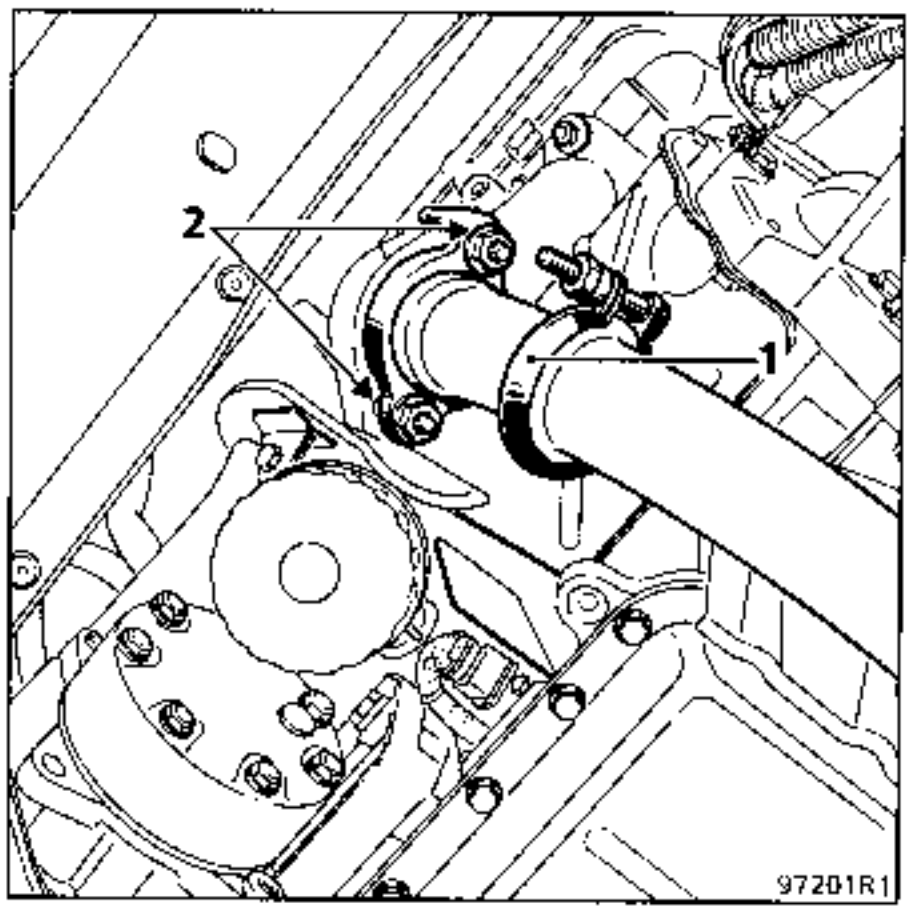
Ensure the heat shields are refitted and are secure.

TIGHTENING TORQUES (in daN.m)	
Mounting nuts securing manifold to cylinder head	2
Mounting nuts securing exhaust downpipe to manifold	3.5

REAR MANIFOLD

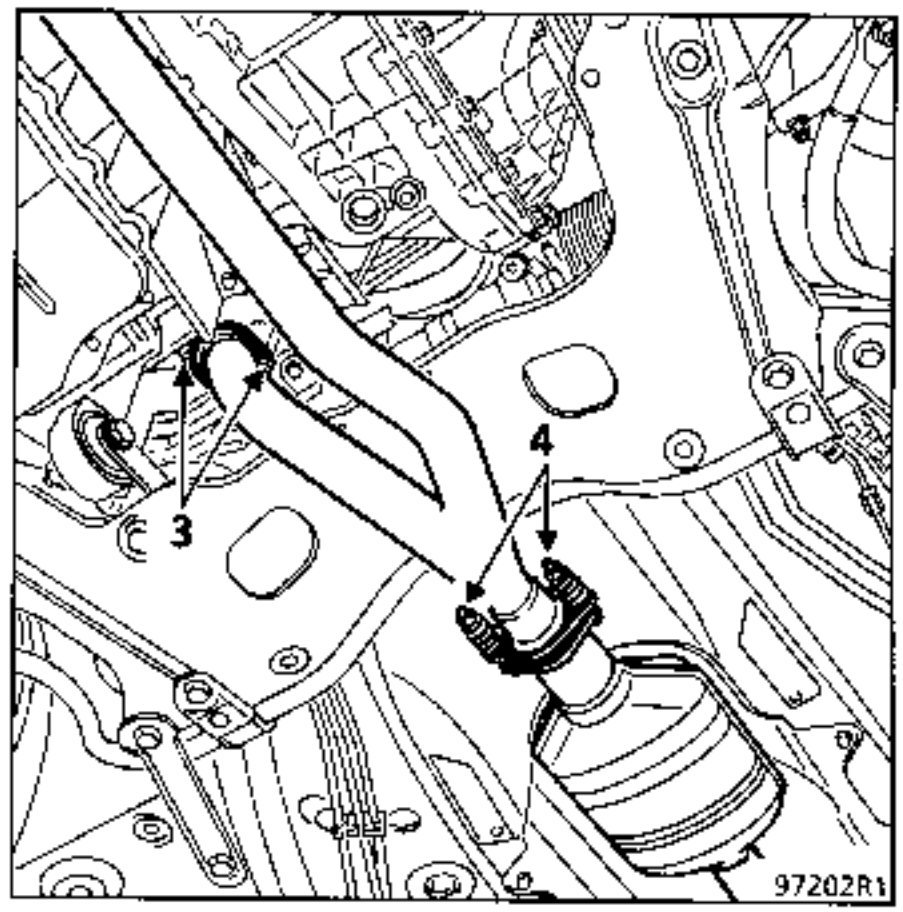
REMOVAL

Disconnect the battery.



Loosen clip (1).

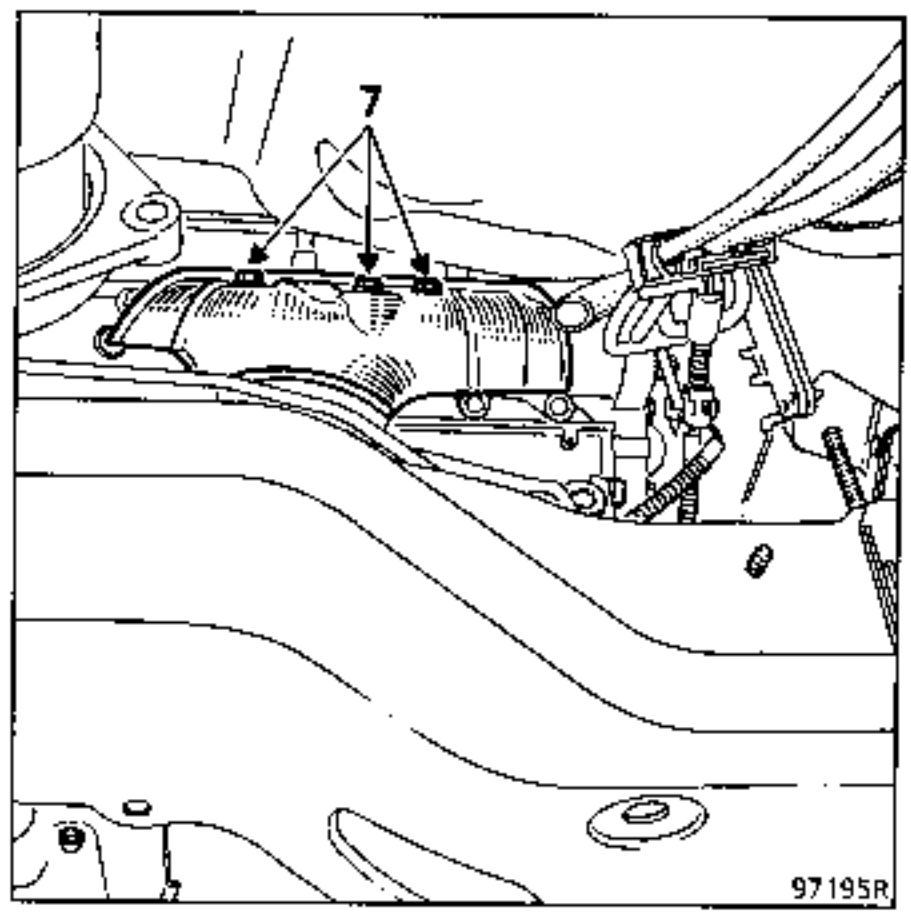
Remove the mounting nuts (2) and (3) for the downpipe on the front and rear manifolds.



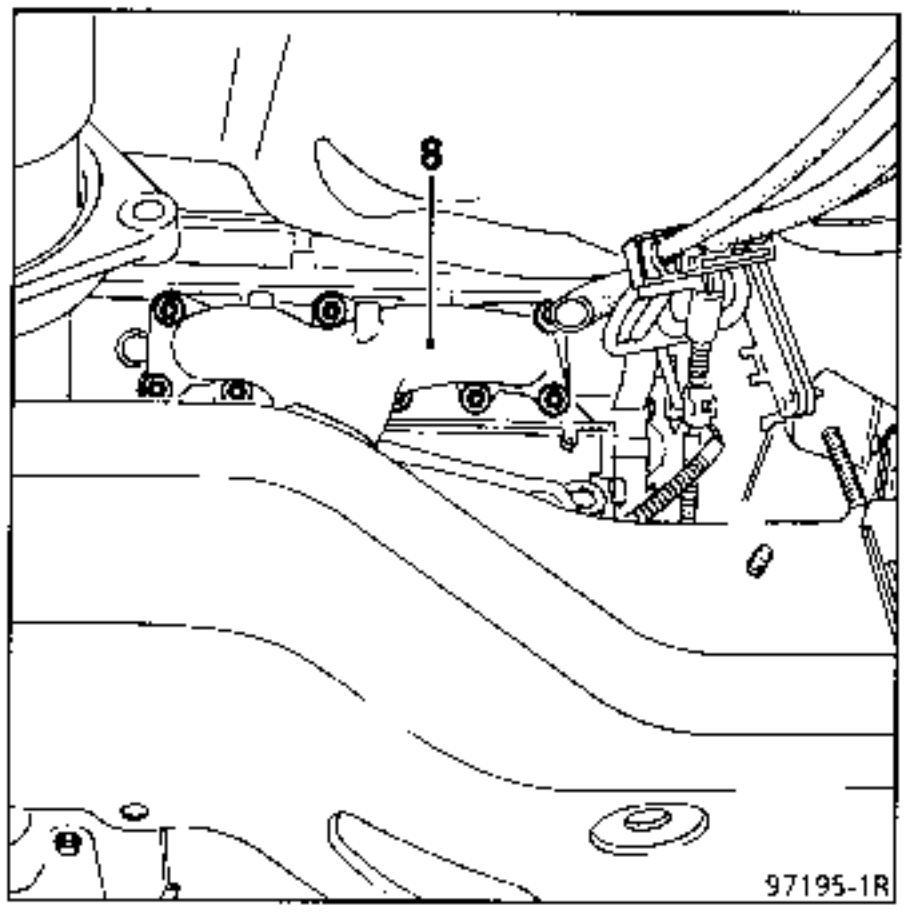
Disconnect the oxygen sensor.

Remove:

- the exhaust downpipe mounting bolts (4) from the catalytic converter and remove the downpipe.



- the three heat shield mounting bolts (5) on the manifold and remove the heat shield.



– the 8 manifold mounting nuts (8) and remove the manifold.

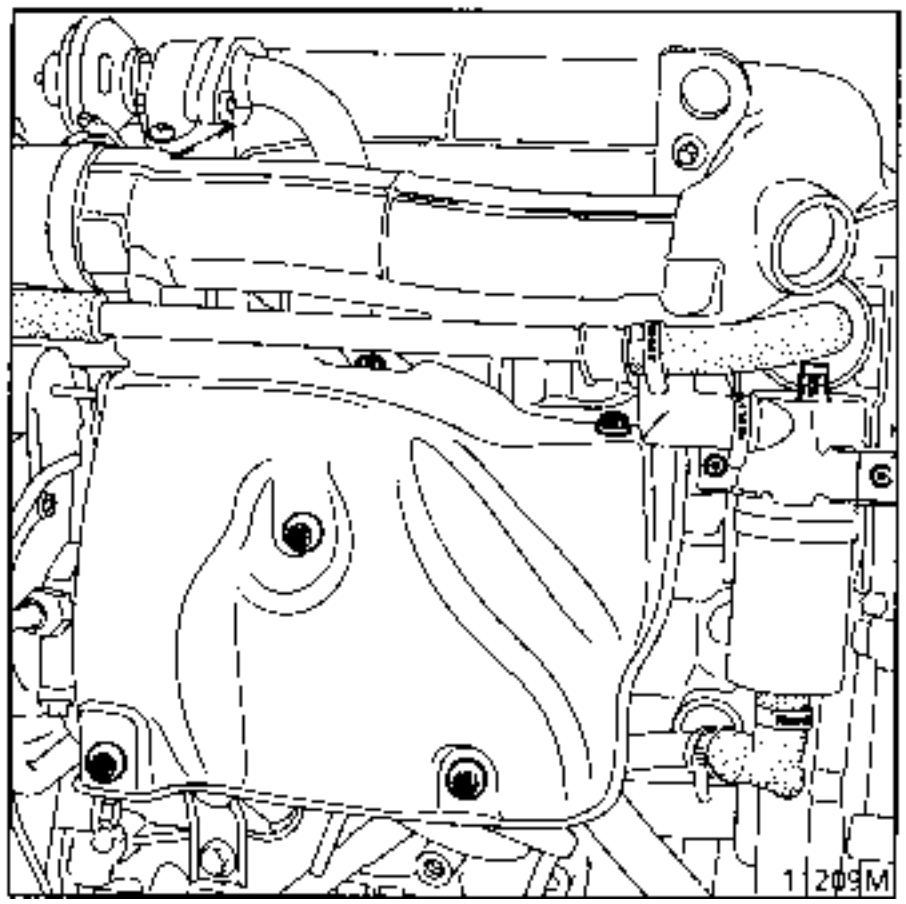
REFITTING

Renew the manifold gaskets and position them correctly (crimped side against the cylinder head).

When refitting the exhaust downpipe tighten the mountings on the manifolds first, then tighten clip (1), to ensure the exhaust pipe is correctly sealed.

Ensure the heat shields are refitted and are secure.

Removal of the exhaust manifold, the turbocharger or peripheral components around the turbocharger require the engine and transmission assembly to be removed beforehand.
See section 10 "Removing - refitting the engine and transmission assembly".
The heat shield tightening torque must be observed on refitting: **0, 9 DaN.m**.



Checking the turbo pressure by road testing the vehicle

Fit a T piece on the injection pump take-off, with a pneumatic pipe and a pressure gauge, taking the instrument into the passenger compartment (for example: pressure gauge in kit **Mot. 1311**).

Test conditions:

Vehicle on a hill in 5th gear (vehicle under load).

Just before **2000 rpm** depress the accelerator fully to give full load.

The increase in engine speed and boost pressure should be progressive.

Values obtained (before air- air exchanger)

Engine speed (rpm)	Test boost pressure (mbar)
2 000	750 ± 50
4 300	865 ± 25

On the vehicle

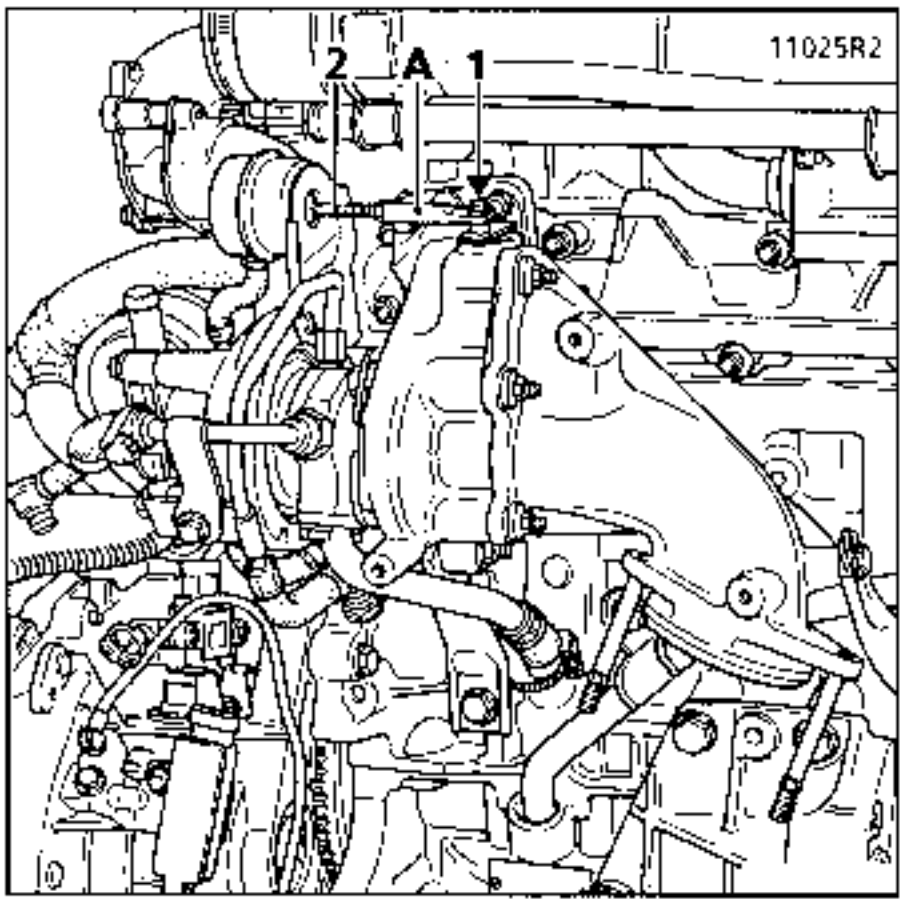
When checking the calibration pressure the adjustment of the wastegate rod length (2) may have to be altered (pressure outside tolerance limits).

This adjustment requires the engine and transmission assembly to be removed.

This adjustment is made with the turbo in place.

Checking the wastegate rod travel (2) is carried out using a dial gauge positioned at the end of the wastegate rod. Increasing pressure is applied to the wastegate using pressure gauge **Mot. 1014.**

Calibration pressure values



Adjustment pressure values (mbar)	Rod movement (mm)
903 ± 47 1085 ± 30	0.38 4

To do this, release clip (1) and the regulator arm rod.

Use a vice to hold the rod at the wastegate end (2).

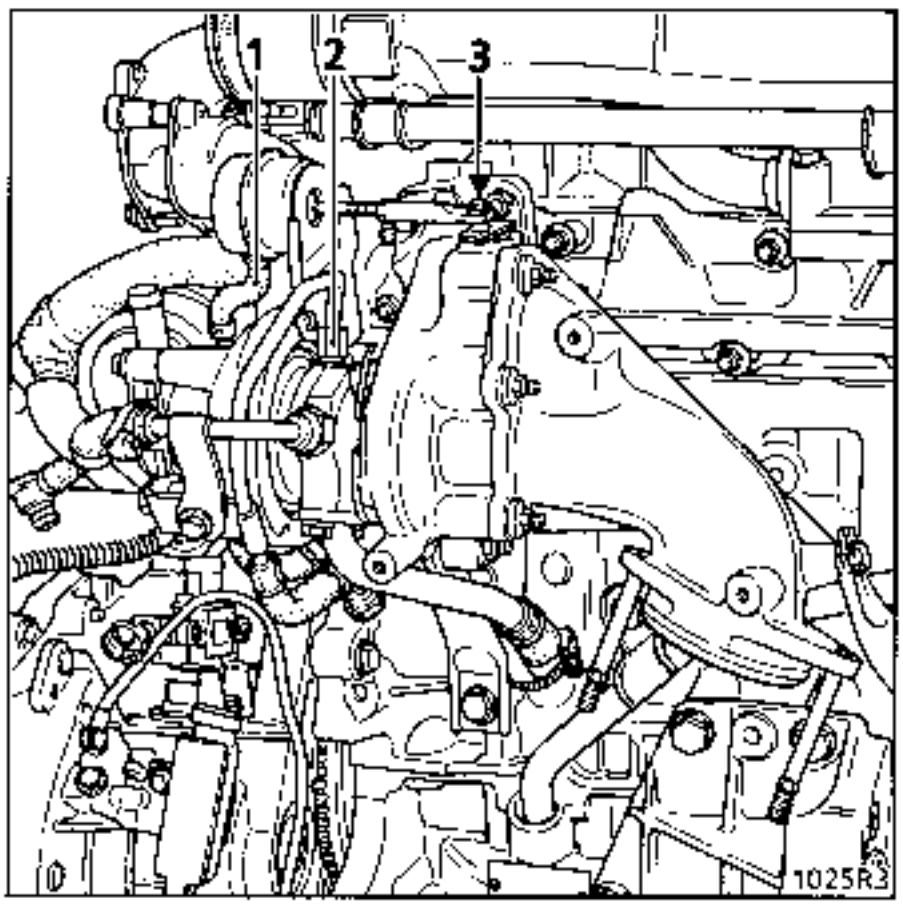
Slacken the lock nut then slacken or tighten the threaded end section.

Turn the shaft in half turns (tighten to increase the calibration pressure).

NOTE : Refitting of the threaded end section (A) is facilitated by using tool **Mot. 1014** and by applying increasing pressure.

REMOVAL - REFITTING

The inlet manifold must be removed to remove the wastegate (see corresponding section), as must the turbo heat shield.



Remove:
- the inlet manifold and the heat shield,
- the pneumatic pipe (1),
- the oil supply union (2),
- circlip (3) on the wastegate rod,
- the 2 mounting bolts for the support.

REFITTING

Refit:
- the 2 mounting bolts for the wastegate support using "Loctite Frenbloc", tightening torque **1.5 daN.m**,
- the upper coolant union and check that the seals are in good condition; replace them if necessary.

To refit the wastegate rod, use tool **Mot. 1014**.

TIGHTENING TORQUES (in daN.m)		
Coolant union bolts	inlet	1.5
	outlet	1
Oil union bolts (inlet - outlet)		2
Turbo mounting and turbo outlet elbow nuts		2
Heat shield mounting bolt		0.9

REMOVAL

Removal - refitting of the turbocharger requires the engine and transmission assembly to be removed. Refer to section 10 "Removing - refitting the engine and transmission assembly".

REFITTING - Special notes

Refitting is the reverse of removal. Renew all damaged clips, all self locking mounting nuts for the turbo on the exhaust manifold and the turbine outlet elbow nuts.

Replace the seals and observe the tightening torques.

Special precautions

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

Check its seal is good (crimped). If it is not, replace it.

Important :

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

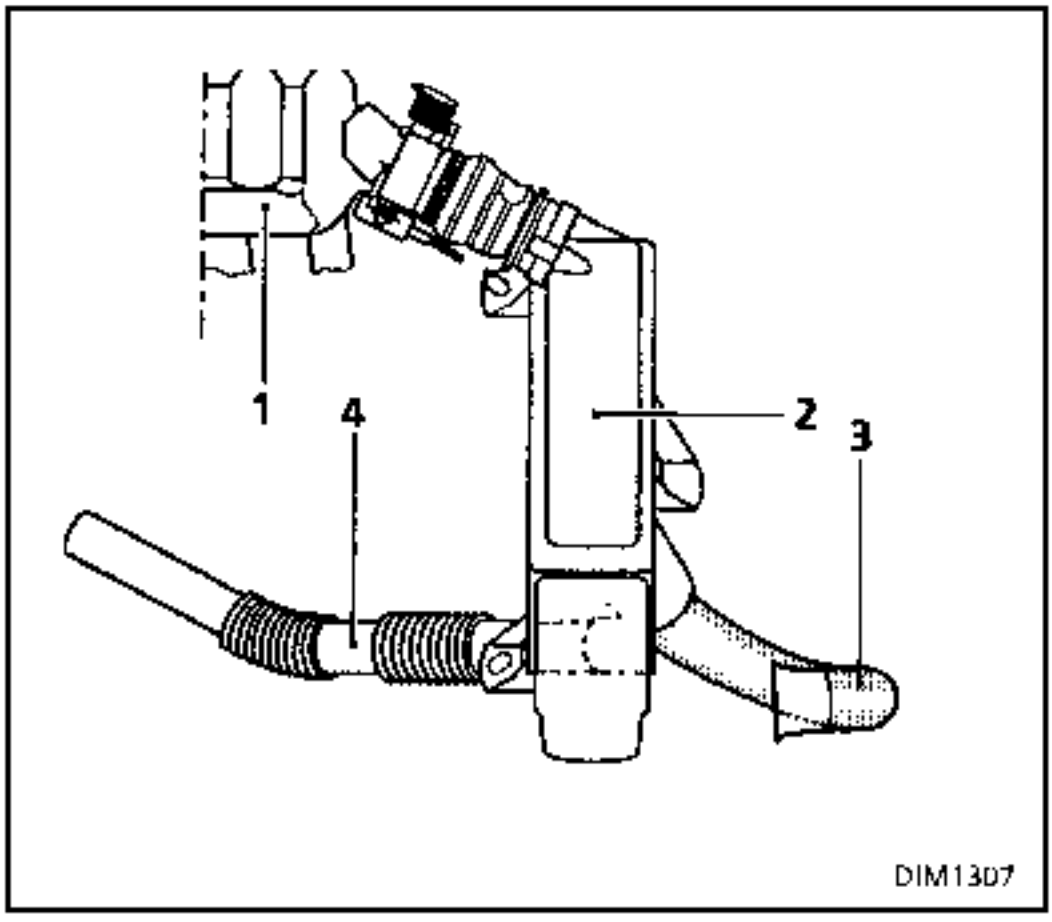
Activate the starter until the oil pressure warning light extinguishes (this may take a few seconds).

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

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

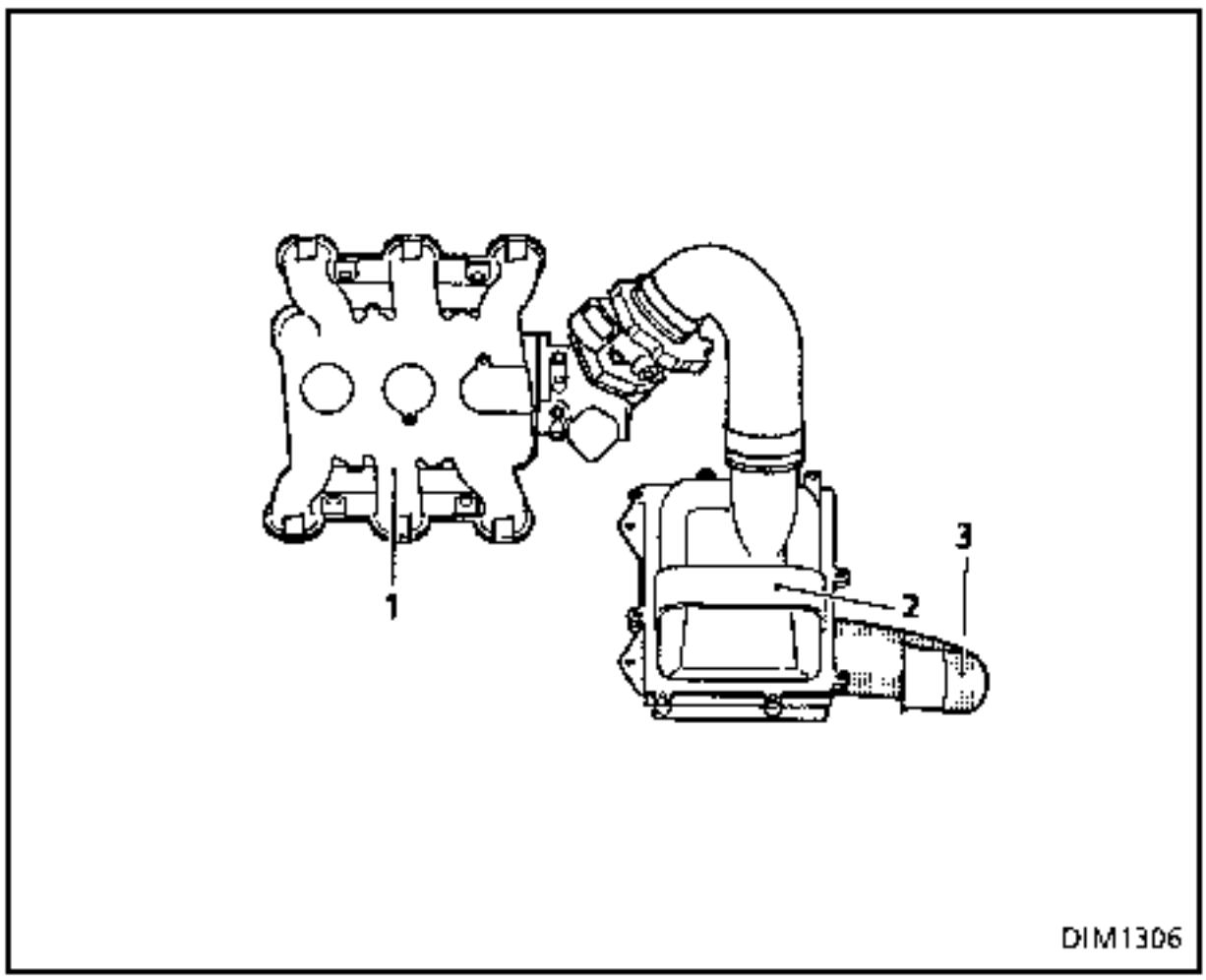
Removal of the air-air exchanger requires the cooling assembly to be removed.
See section 19 "Removing - refitting the cooling assembly".

F3R ENGINE



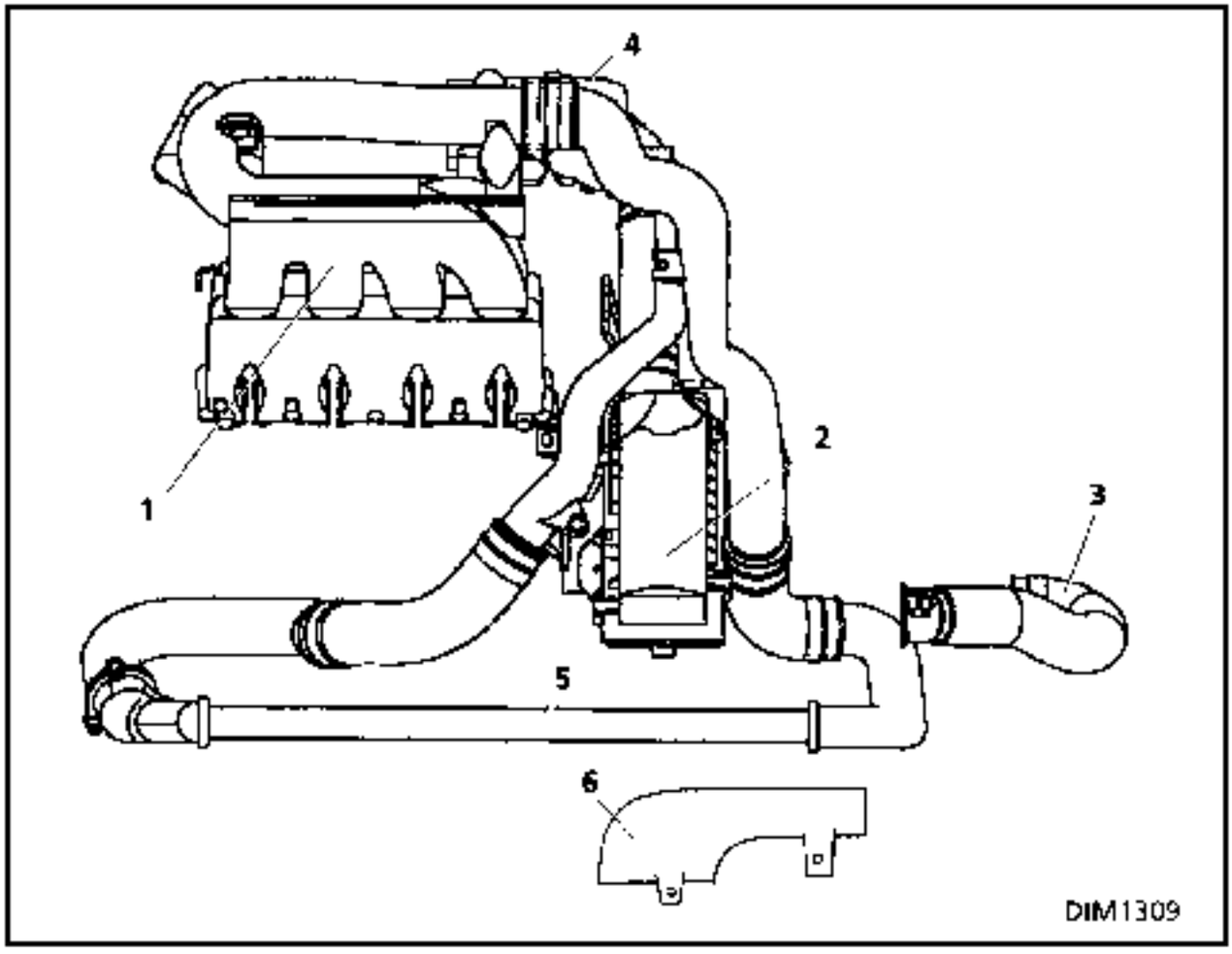
1 Manifold
2 Air filter
3 Cotton air inlet sleeve
4 Resonator

Z7X ENGINE



1 Manifold
2 Air filter
3 Cotton air inlet sleeve

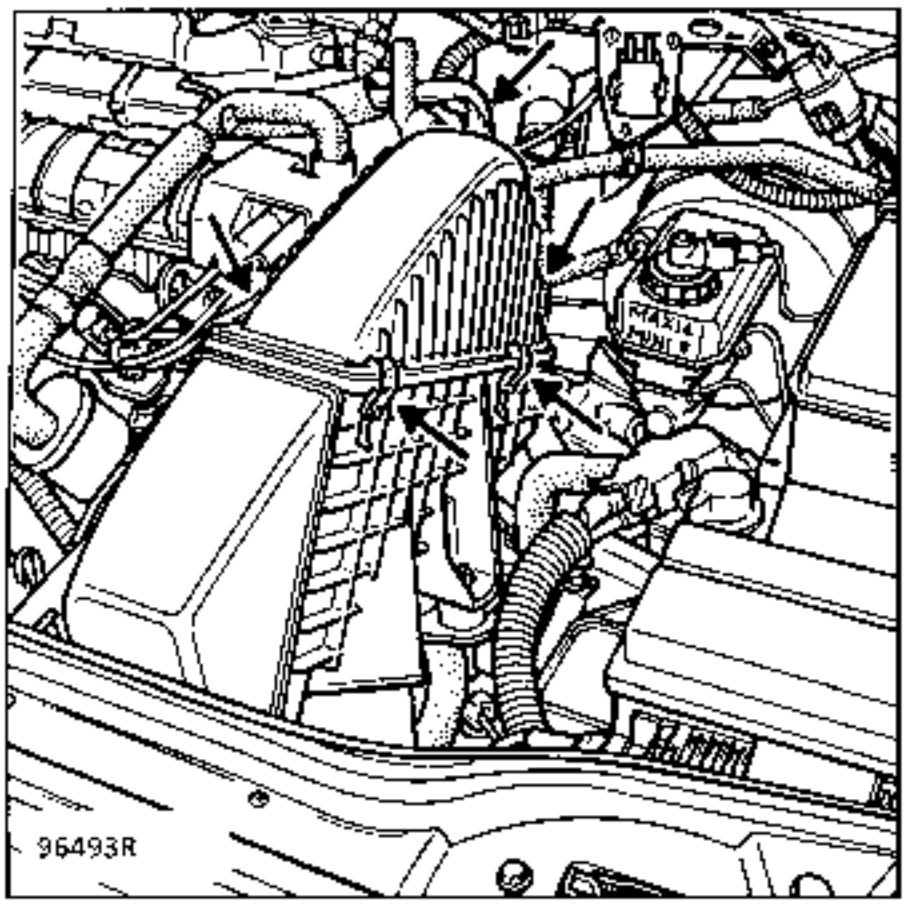
G8T turbo ENGINE



1 Manifold
2 Air filter
3 Intermediate air inlet sleeve
4 Turbocharger
5 Air/air exchanger
6 Fresh air inlet sleeve

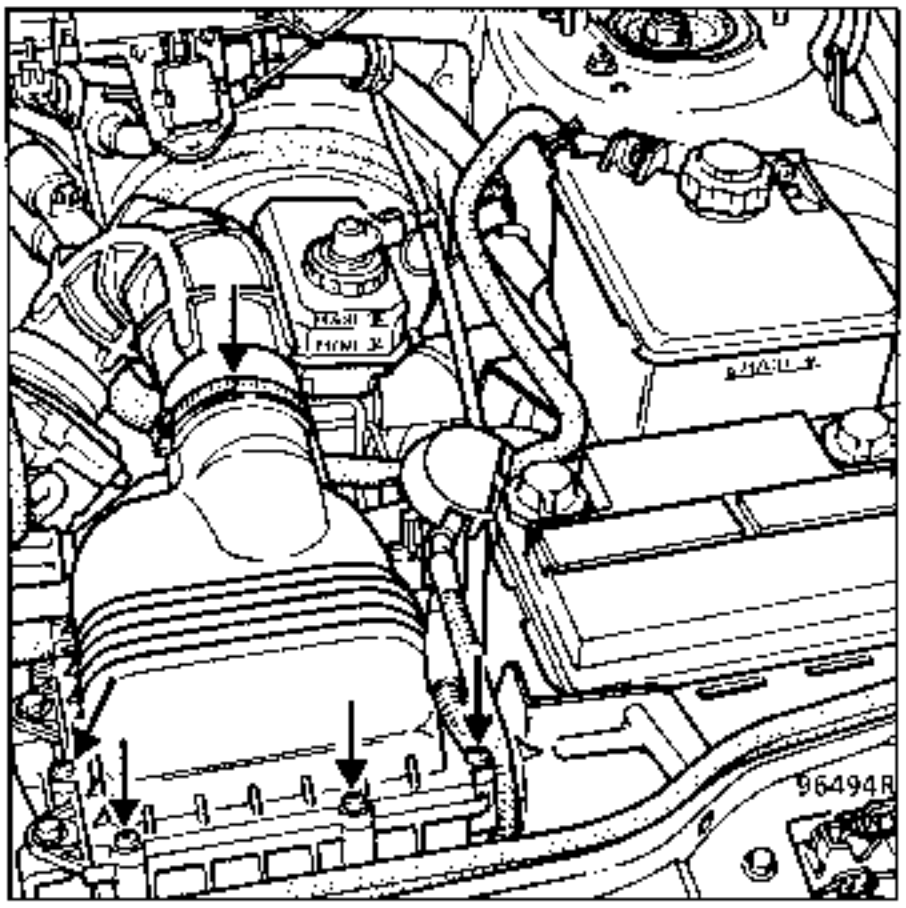
REPLACING THE FILTER CARTRIDGE

F3R ENGINES



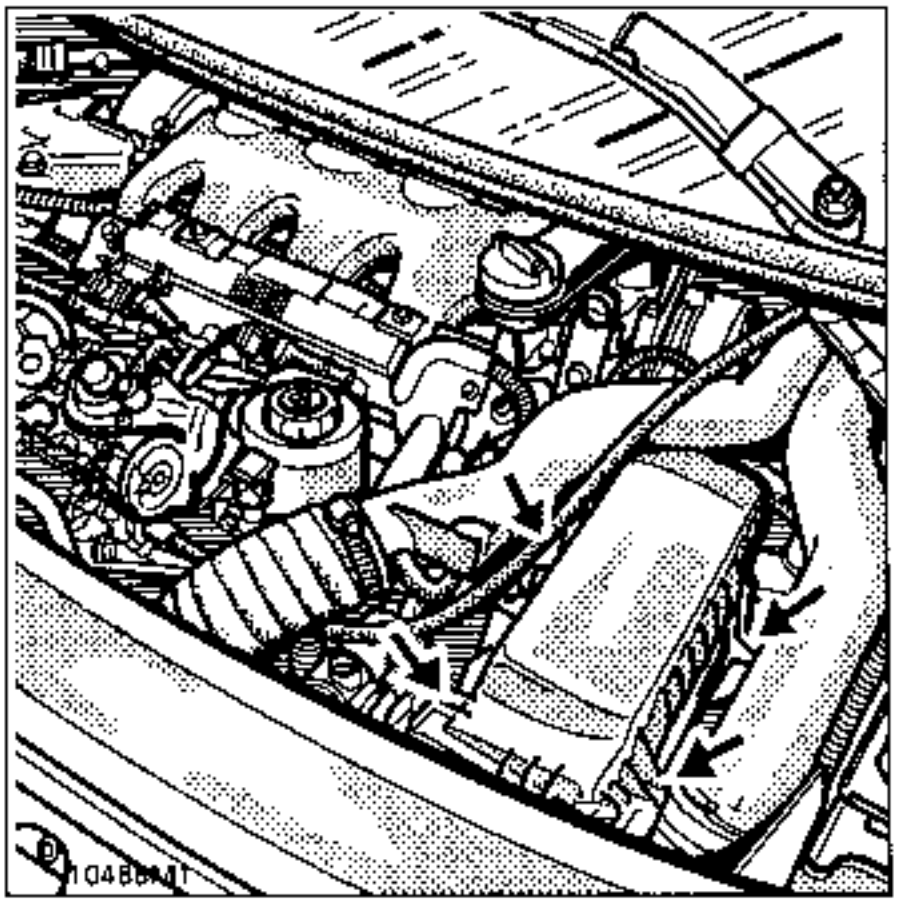
Remove the four clips and loosen the collar on the flexible pipe to remove the upper section so the filter cartridge is accessible.

Z7X ENGINES



Remove the eight mounting bolts securing the upper section and loosen the collar on the flexible pipe to reach the filter cartridge.

G8T turbo ENGINES

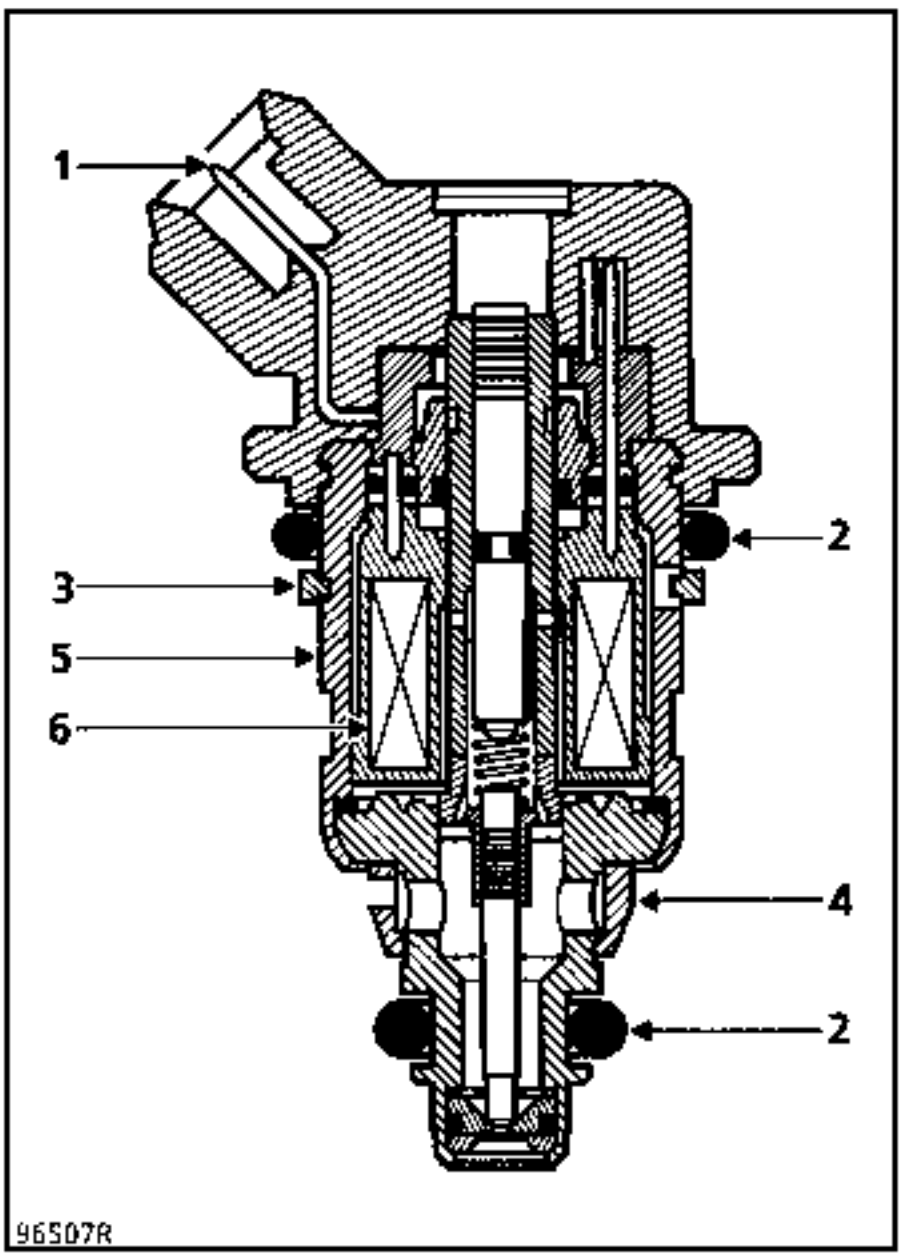


"Siemens Deka 2"type injectors are fitted to this engine.

They are mounted on the injector gallery. Two O rings ensure each injector is sealed.

Fuel circulates continually around the circumference of each injector body. This action prevents the formation of bubbles of fuel vapour and aids starting the engine when it is warm.

DETAIL OF THE INJECTOR



1 Connector
2 O rings
3 Upper O ring retaining circlip
4 Filter
5 Metal body
6 Coil

IMPORTANT :

There are no special problems when removing an injector. The injector gallery must be removed beforehand however as the fuel contained in the gallery will otherwise enter the cylinder in question.

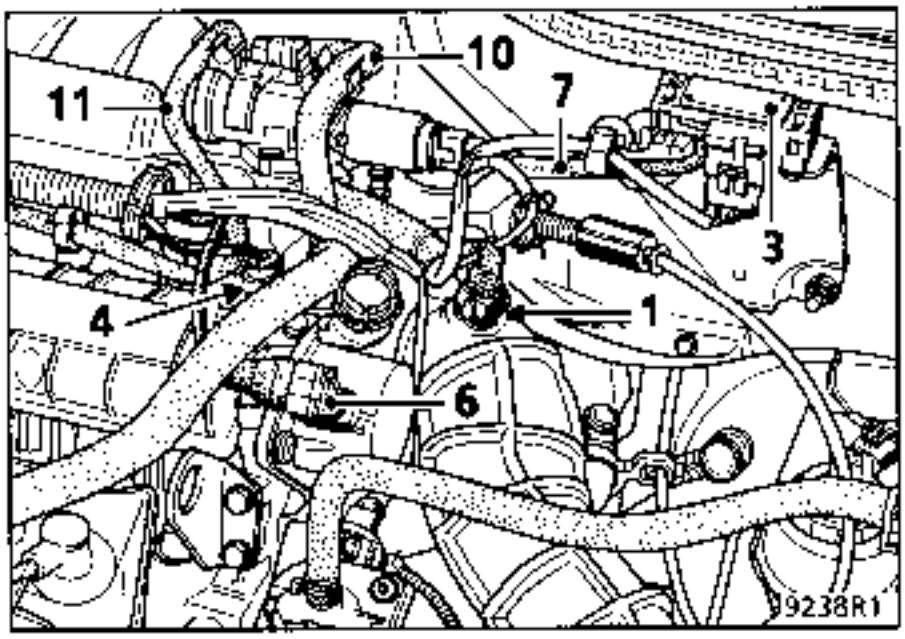
NOTE : when refitting the upper seal, use the conical ring supplied with the kit of seals.

TIGHTENING TORQUES (in daN.m)	
Bolt mounting throttle body on manifold	2
Gallery mounting nut	1

REMOVAL

Disconnect the battery.

Disconnect:
- the air temperature sensor (1),
- the pressure sensor (3),
- the throttle potentiometer (4),
- the camshaft sensor (6),
- the fuel vapour recirculation pipe (11),
- the vacuum pipe (10) from the brake servo,
- the vacuum pipe (7) from the pressure sensor.



Slacken the clip mounting the air sleeve to the throttle body.

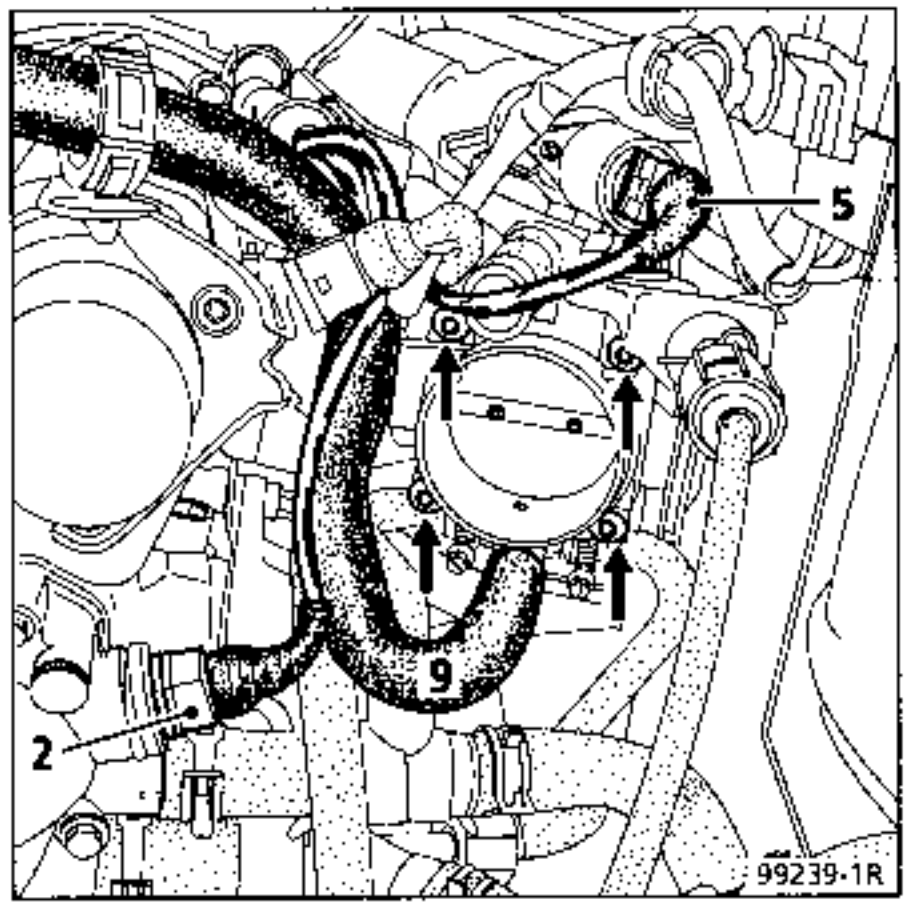
Remove the three air filter mounting nuts.

Remove the filter and the air sleeve.

Disconnect:
- the oil vapour rebreathing pipe (9),
- the coolant temperature sensor (2),
- the idle regulation solenoid valve (5).

Remove the four bolts mounting the throttle body (do not disconnect the coolant hoses which heat the throttle body).

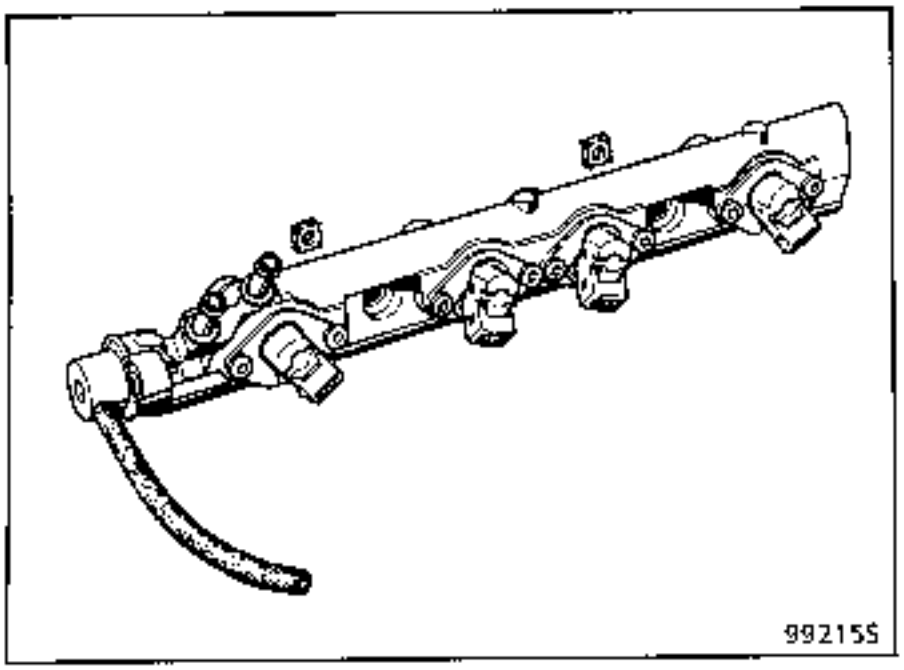
Remove the heat shield between the throttle body and the manifold.



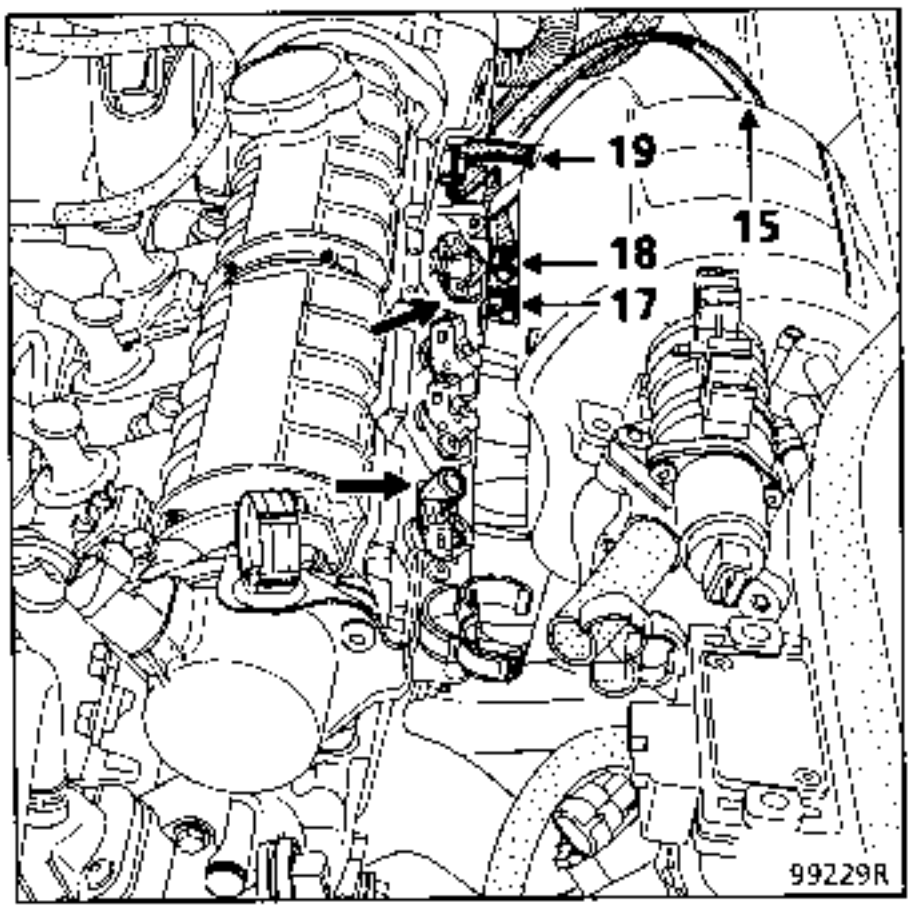
Disconnect the injectors.

Remove the wiring mounting.

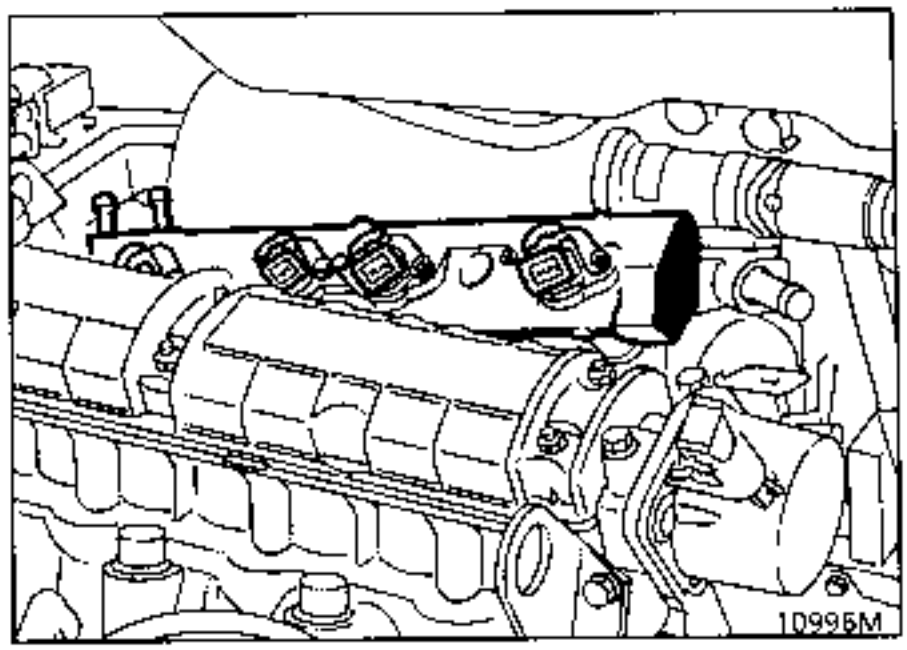
Release the wiring and the pipe mounted on the manifold and tilt the assembly on the injection computer side (right hand side).
Disconnect:
- the fuel supply pipe (17) located at the flywheel end, marked by a green ring,
- the fuel return pipe to the fuel tank (18) located at the timing end, marked by a red ring,
- the vacuum take off pipe (19) for the fuel pressure regulator.



Remove:
- the two nuts mounting the injector gallery,
- the two earth wires (15).

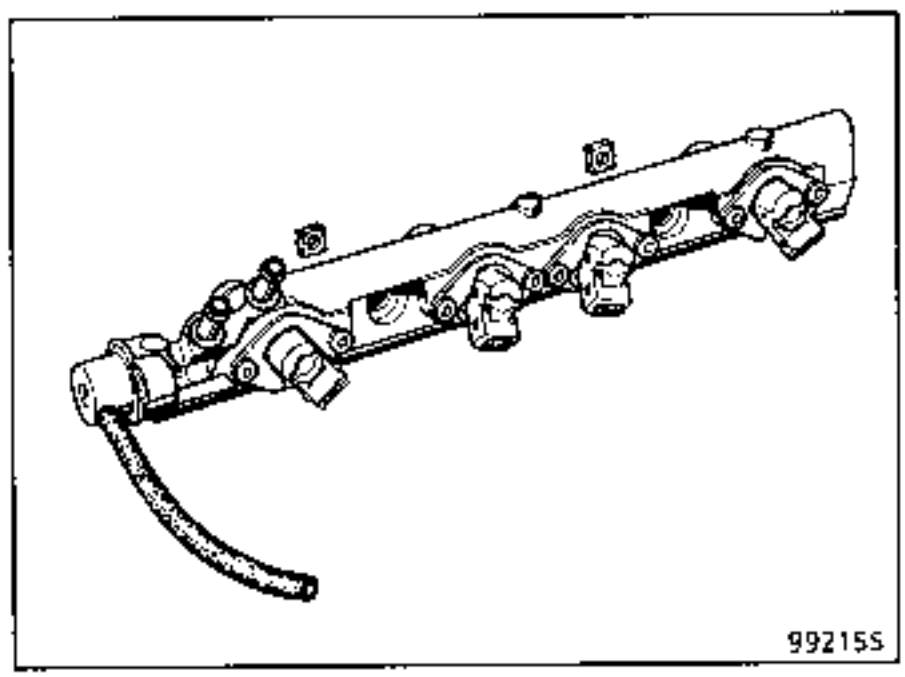


Remove the gallery, tilting it so that the injector connectors are towards you.



REFITTING

Ensure the two plastic spacers are present. They are located on the two gallery mounting studs between the gallery and the cylinder head.

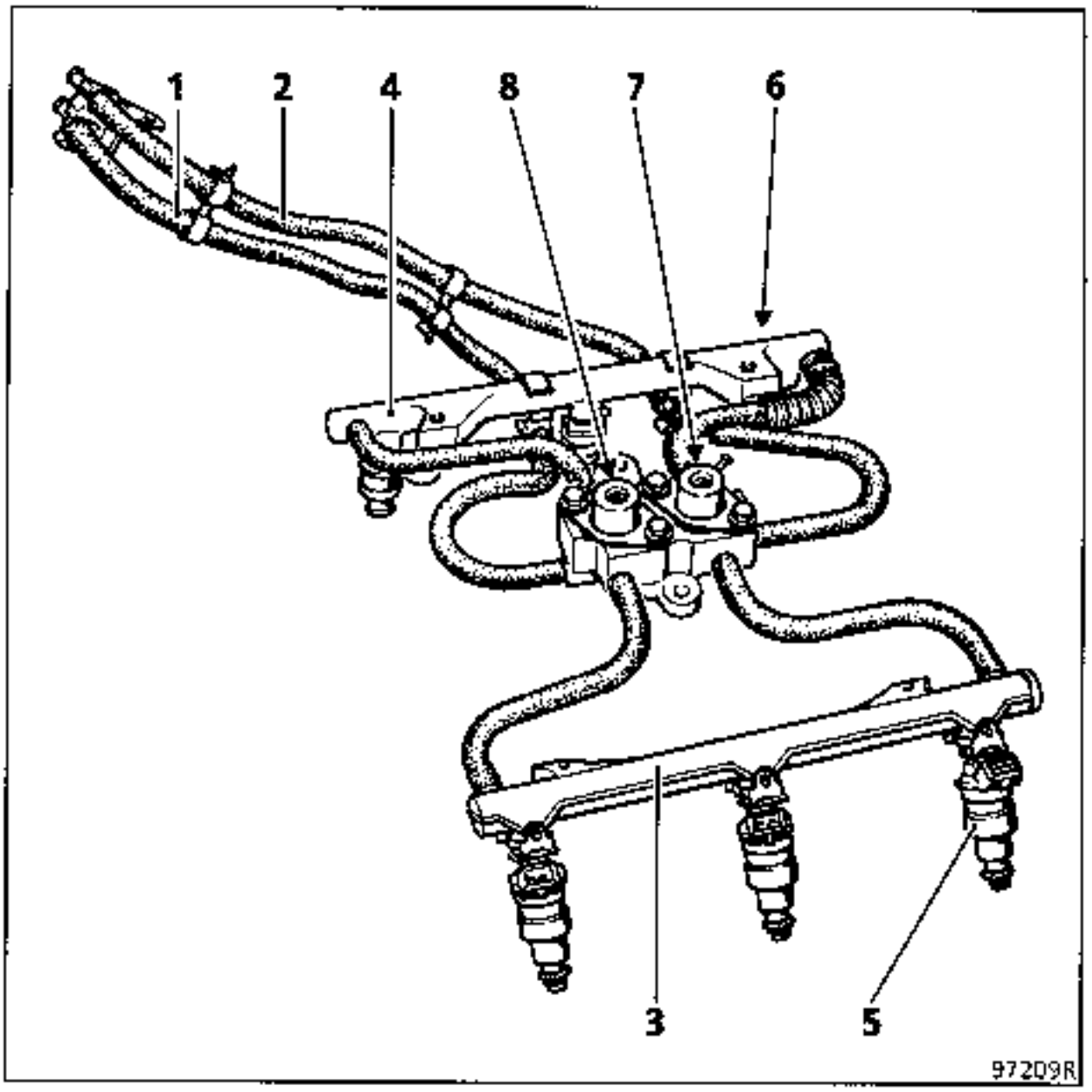


Remove the seals bonded to the throttle body heat shield and renew them (they do not need to be bonded).

Refitting is then the reverse of removal.

TIGHTENING TORQUES (in daN.m)	
Mounting bolt securing injector gallery and pulse damper regulator assembly to the manifold	0.9 ± 0.2

DIAGRAM OF THE ASSEMBLY



1 Fuel supply pipe marked by a green coloured ring
2 Fuel return pipe marked by a red coloured ring
3 Front injector gallery (cylinders 1 - 2 - 3)
4 Rear injector gallery (cylinders 4 - 5 - 6)
5 Injector for cylinder n° 1
6 Injector for cylinder n° 4
7 Fuel pressure regulator
8 Pulse damper

NOTES:

There are heat insulating blocks under each mounting for the injector galleries and the pulse damper - regulation assembly. Check to ensure these blocks are correctly positioned when working on the injector galleries.

The pipes for the regulator - pulse damper assembly and the injector galleries may not be removed

There is no connection between the pressure regulator and the pulse damper.

SPECIAL TOOLING REQUIRED	
Mot. 1397	Spanner for removing the pump - sender unit nut
Mot. 1265	Pliers for removing quick release unions - 8 mm

EQUIPMENT REQUIRED

COMPONENT JACK

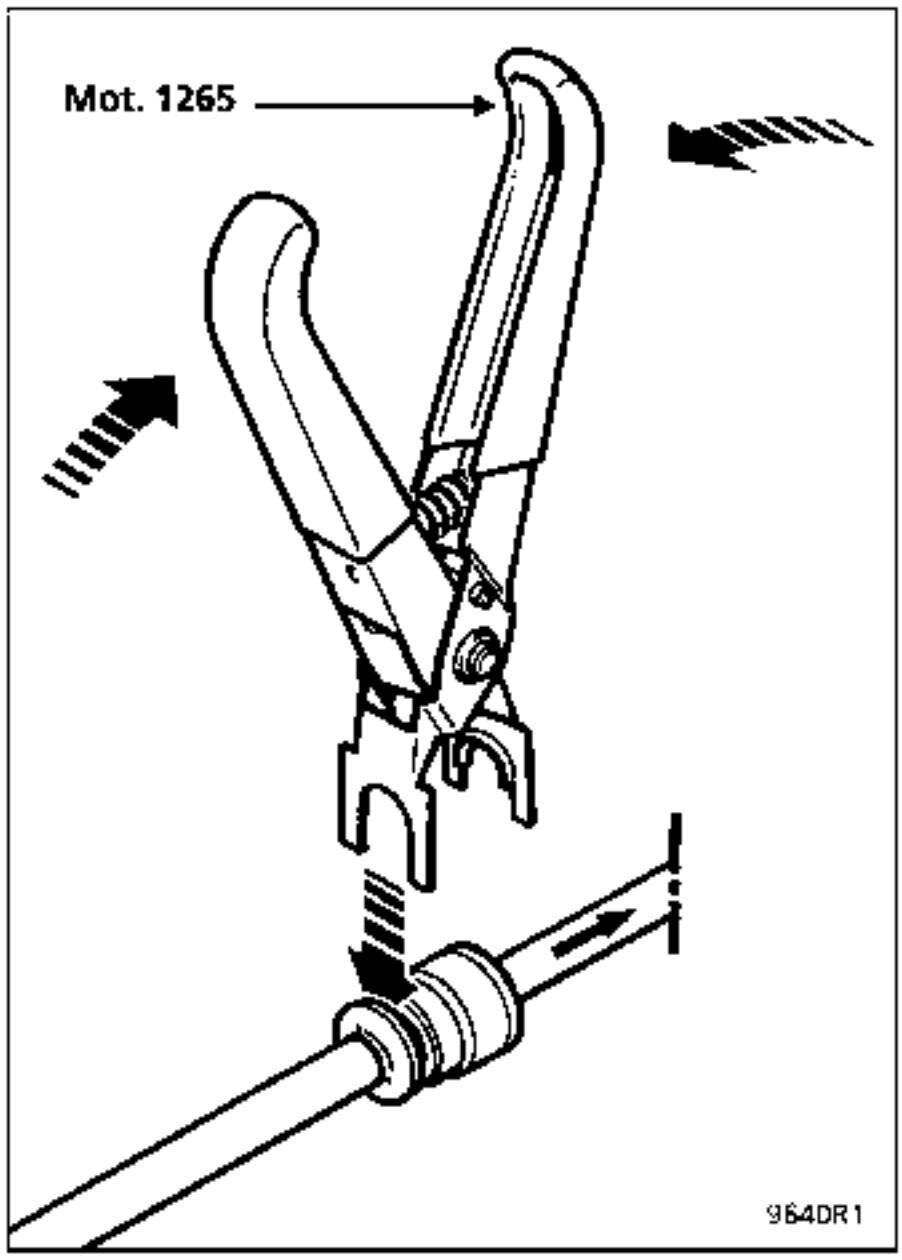
REMOVAL - REFITTING OF THE PUMP - SENDER UNIT ASSEMBLY

The fuel tank must be removed to remove and refit the pump - sender unit assembly. To do this, put the vehicle on a lift.

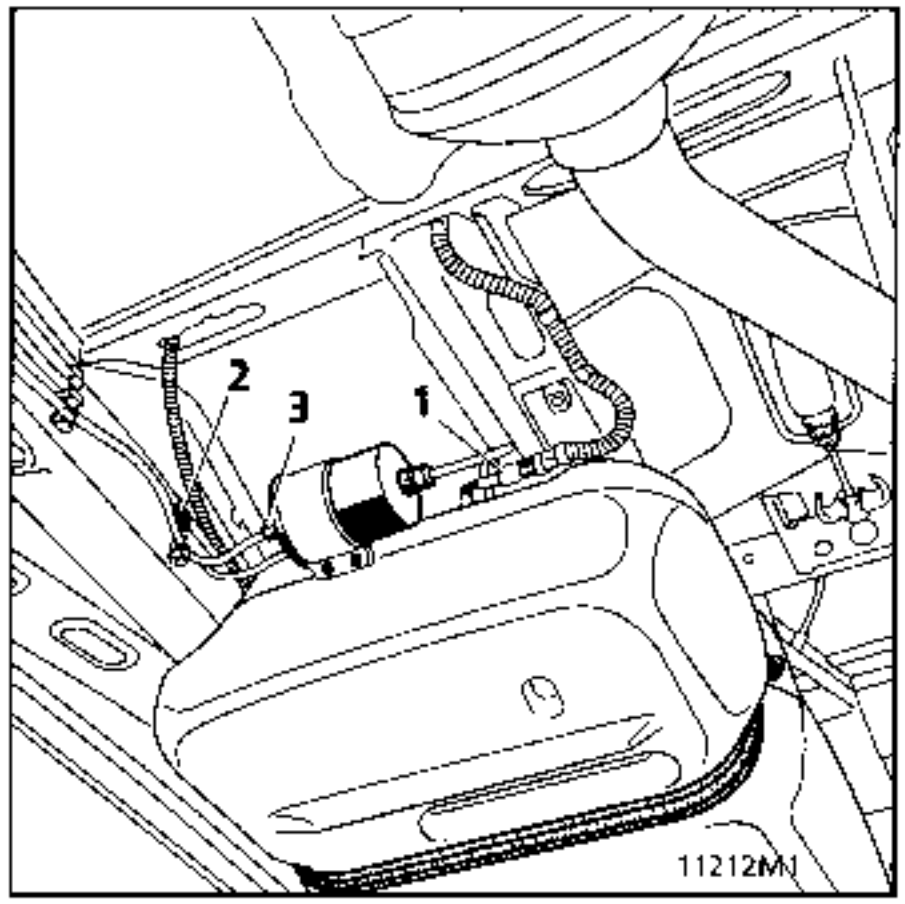
Disconnect the battery.

IMPORTANT :

- for all operations on the fuel tank or the fuel supply circuit: never smoke, keep all sources of heat away from the working area,
- ensure protection against fuel spray when removing pipes (due to residual pressure).

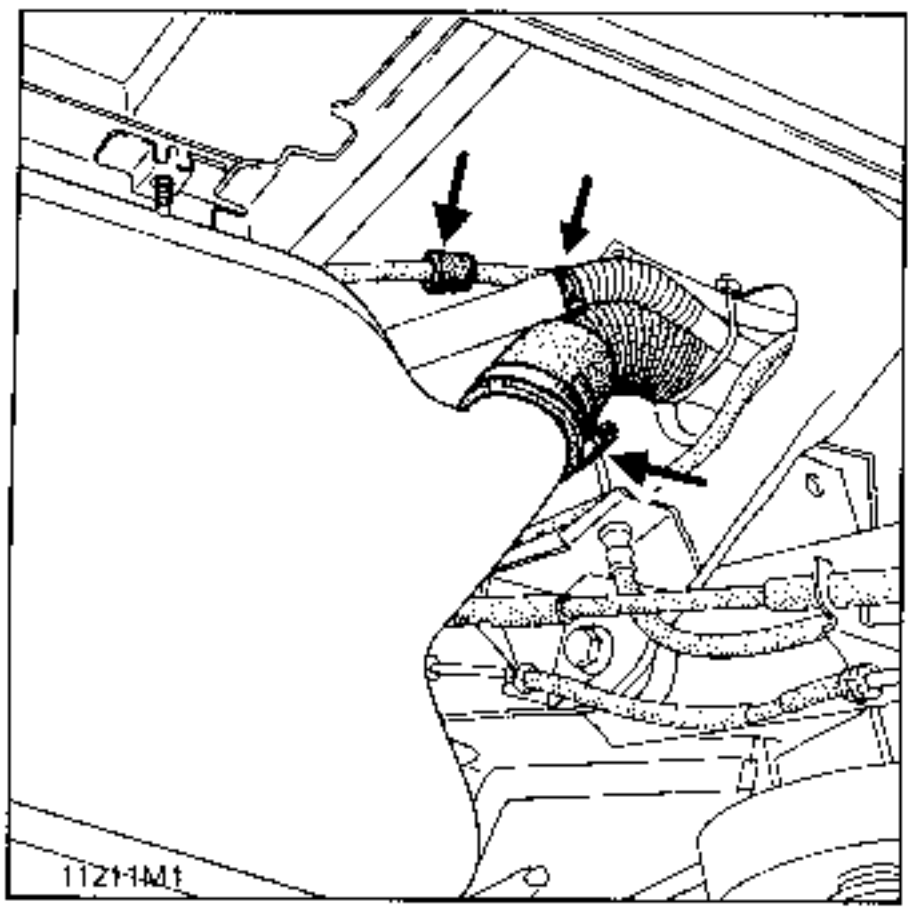


Disconnect the fuel unions in front of the filter using tool **Mot. 1265**, at (3) and at (2) on the fuel return pipe to the fuel tank.



- disconnect the fuel sender unit connector (1).

– disconnect the fuel supply pipe from the tank and the degassing pipes.



Remove the fuel tank by removing the two mounting straps and using a component jack, for example, to support the tank.

IMPORTANT: disconnecting the main supply pipe (ringed) from the tank is difficult; ensure you do not pull directly on the downpipe as this pipe may be damaged.

Disconnect the fuel supply pipe (marked by a green quick release union on the pump - sender unit assembly) and the fuel return pipe (marked by a red quick release union on the pump - sender unit assembly), using the special pliers **Mot. 1265**.

Remove the mounting nut using tool **Mot. 1264**, then remove the pump - sender unit assembly while preventing the plate from turning.

NOTE : if the pump - sender unit assembly will be removed for several hours, screw the mounting nut back on the fuel tank to avoid any deformation.

Tool **Mot. 1265** does not need to be used to reconnect the pipes.

Ensure all unions are correctly connected (two O rings are present).

When refitting:

– Check that the seal has not been damaged and replace it if necessary.

– Replace the seal on the fuel tank before refitting the assembly.

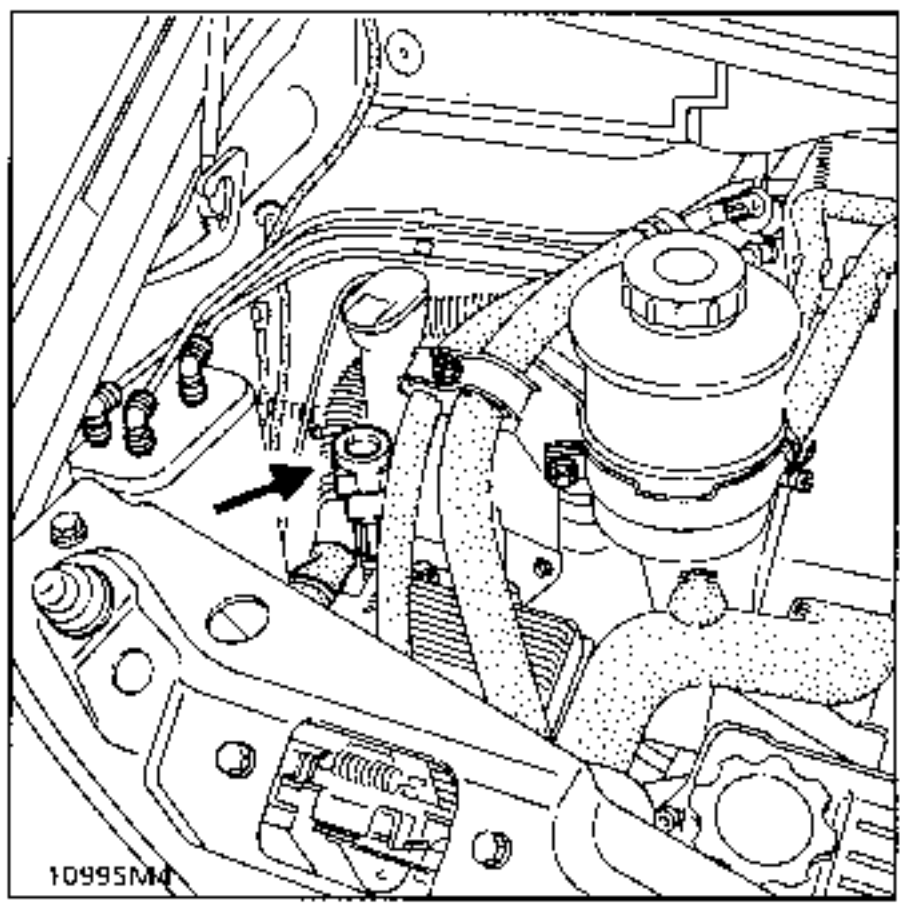
– Position the pump - sender unit assembly (see index C).

– Tighten the nut to a torque of **3.5 daN.m** maximum, while holding the assembly plate to prevent it from turning.

INERTIA SWITCH (IMPACT SENSOR):

Petrol version:
If there is an impact, the inertia switch cuts the electric feed to the fuel pump.

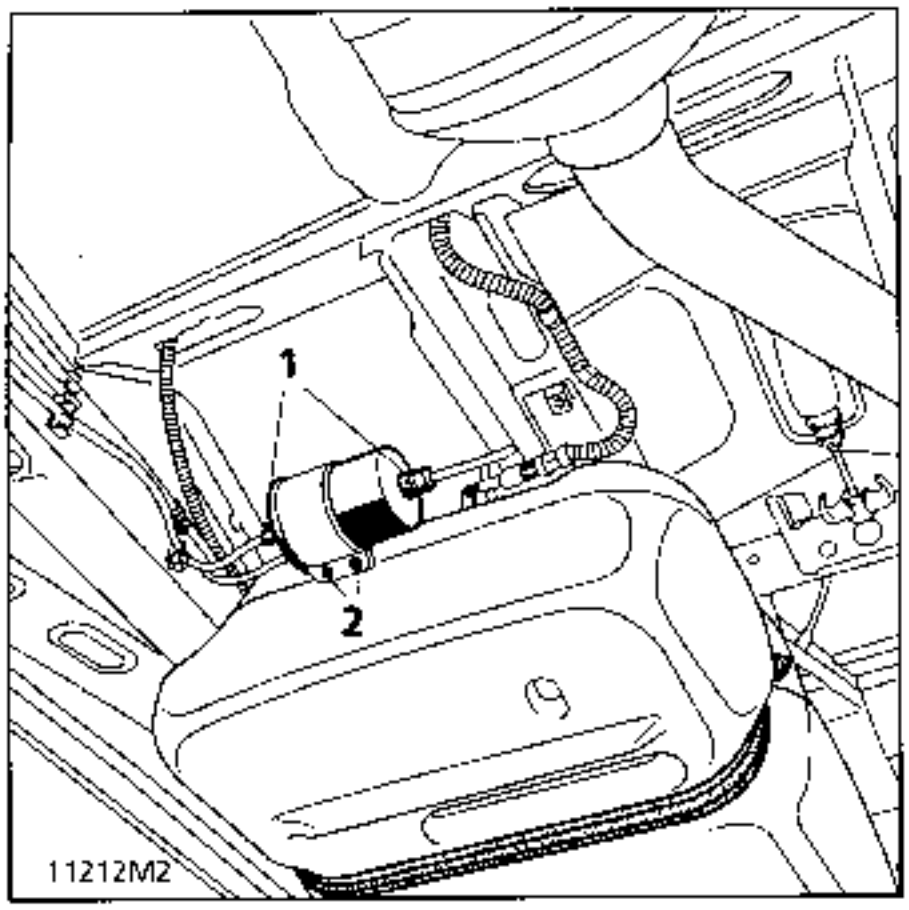
Diesel version:
The switch cuts the feed to the coded solenoid valve unit.
To reset the switch, press the button on the switch.



For more information, refer to section 83.

SPECIAL TOOLING REQUIRED	
Mot. 1265	Pliers for removing quick release unions

LOCATION



The fuel filter is located under the vehicle, in front of the fuel tank along the side member.

REPLACEMENT

The filter should be replaced every 40000 miles (60000 km).

Before removing the filter take precautions to catch fuel that will run out of the pipes (**the pipes should not be clamped as they would be damaged**).

If clips have been fitted, they must be removed before the pipes may be disconnected (these clips are fitted in the factory to ensure the quick release unions are correctly fitted).

Disconnect the pipes fitted with quick release unions (1) using tool **Mot. 1265** (see diagram opposite for how to position the tool on the union).

Remove bolts (2) and remove the fuel filter.

When refitting :

Ensure the fuel flows the correct way through the filter (marked by an arrow on the filter).

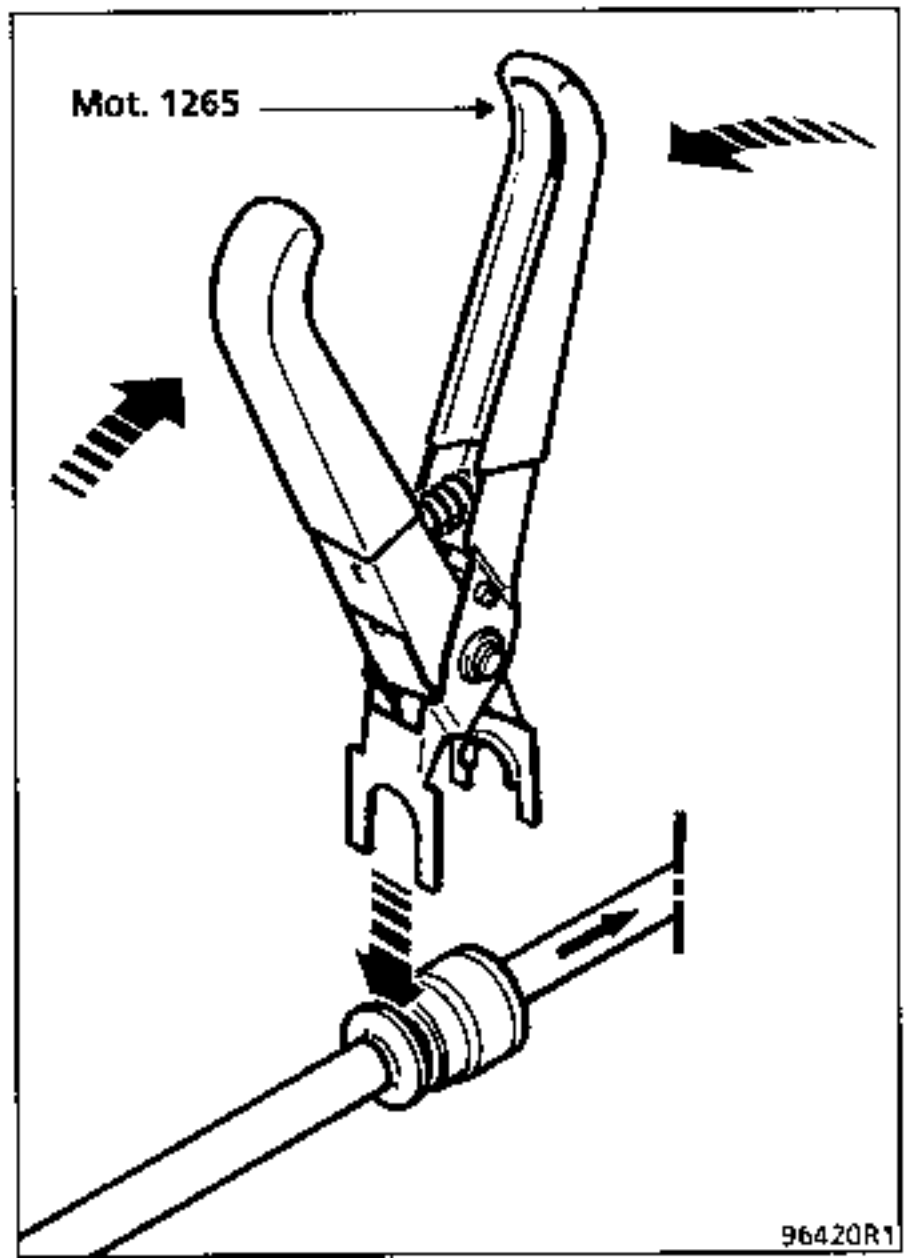
Reconnect the pipes by hand (tool **Mot. 1265** is not required).

Ensure all unions are correctly connected (two O rings are present).

NOTE :

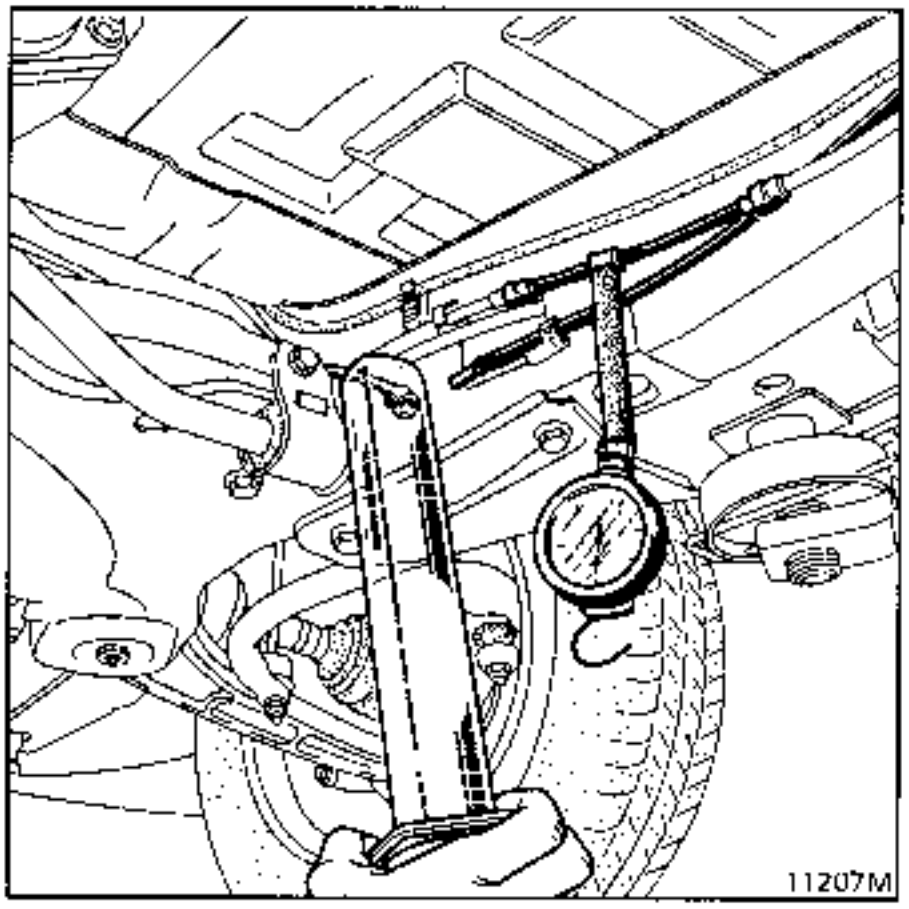
The pipes cannot be disconnected without the correct tool.

Positioning the pliers :



CHECKING THE PUMP SUPPLY PRESSURE AND FLOW

SPECIAL TOOLING REQUIRED
Mot. 1311 - 01 Fuel pressure test kit
EQUIPMENT REQUIRED
2000 ml measuring cylinder



Disconnect the fuel supply pipe at the side member.

Fit the three way valve (1) and connect pressure gauge **0 ; +10 bar** of tool kit **Mot. 1311-01.**

Disconnect the return pipe (2) and connect a tube to empty into a **2000 ml** measuring cylinder.

Run the fuel pump for 1 minute then read the pressure and measure the amount of fuel collected in the measuring cylinder:

Pressure: **3 bar ± 0.2**
Minimum flow: **1.3 litre**

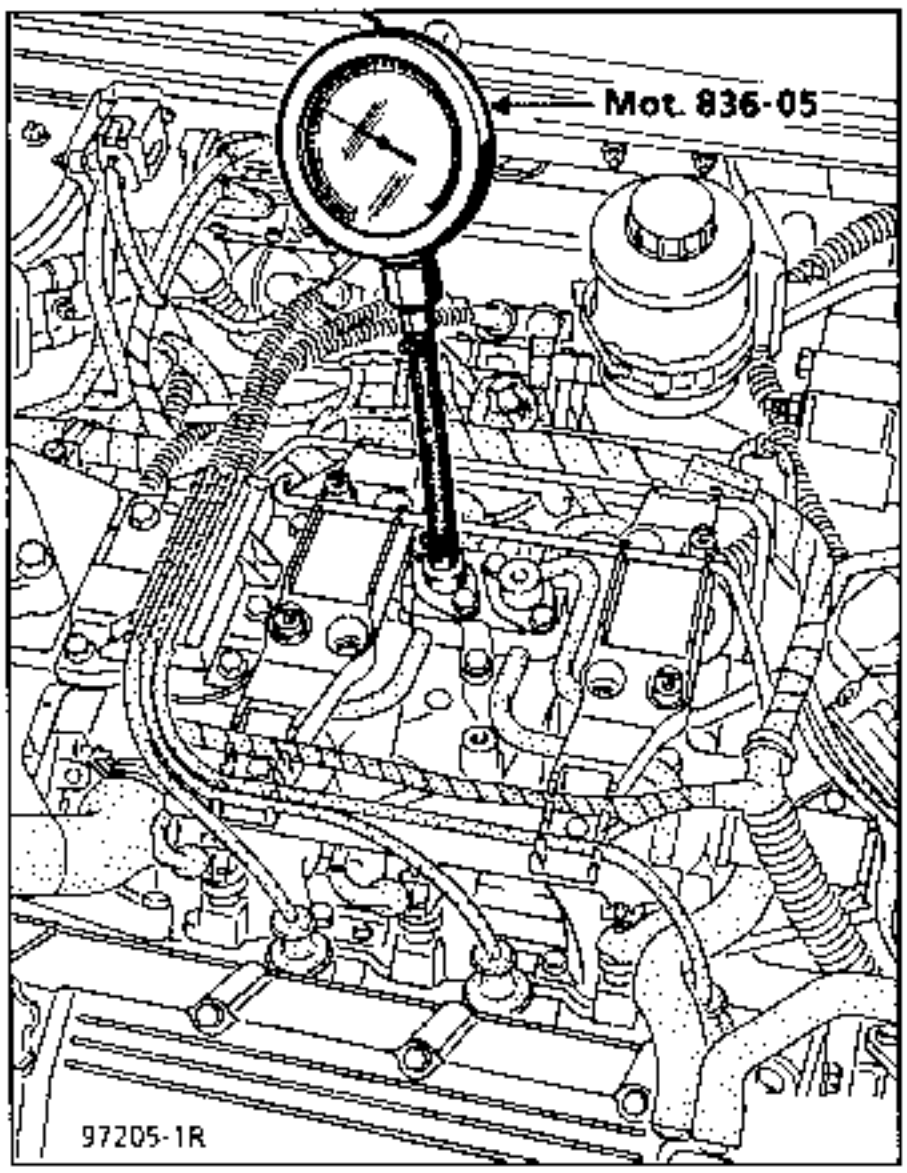
CHECKING THE PUMP SAFETY VALVE

Run the pump and block the return pipe for a short moment using the 2 way valve, the pressure should stabilise between **4.5 and 7.5 bar.**

CHECKING THE PUMP SUPPLY PRESSURE AND FLOW

SPECIAL TOOLING REQUIRED
Mot. 1311 - 01 Fuel pressure test kit
EQUIPMENT REQUIRED
2000 ml measuring cylinder

CHECKING THE PRESSURE



Remove:
- the upper engine protective cover which is secured by four bolts,
- the pulse damper and fit tool **Mot. 1311** with its O ring in place of the damper.

Connect the pipe of tool **Mot. 1311** and the pressure gauge **0 - 10 bar** of tool **Mot. 836-05**.

Shunt terminals (3) and (5) (large section wires) on the fuel pump relay and check the pressure ; it should be **3 ± 0.2 bar**.

Apply a vacuum to the fuel pressure regulator ; the supply pressure should drop by the same amount as the vacuum applied.

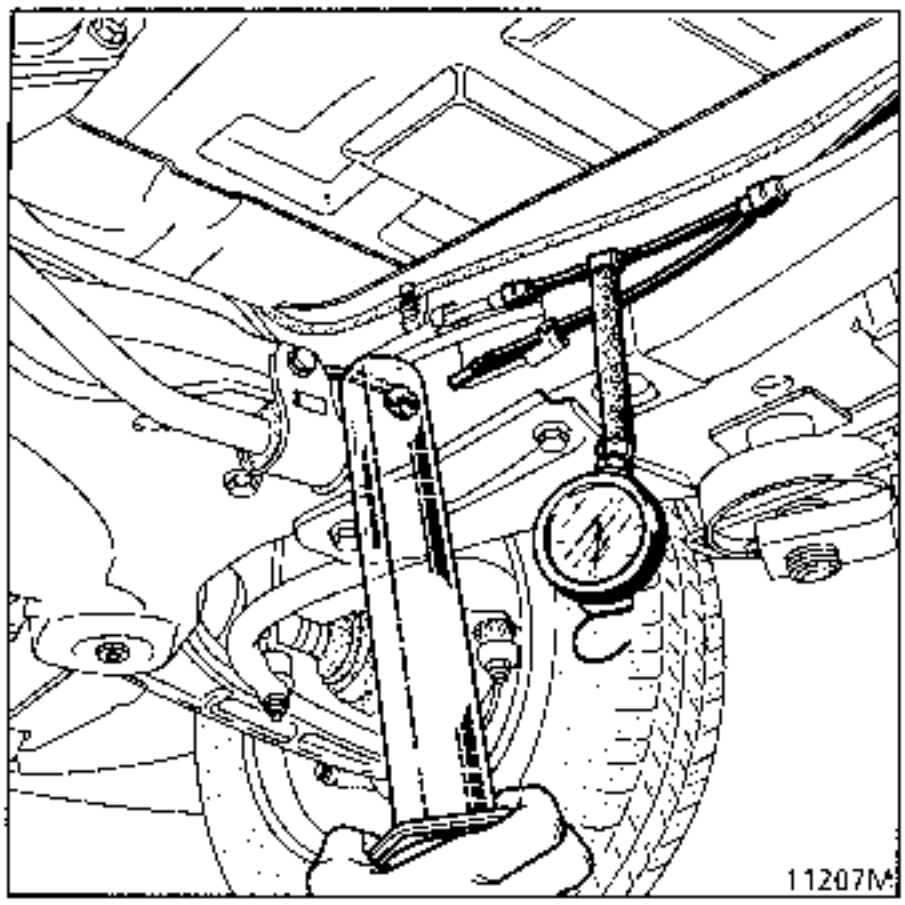
Pinch the fuel return pipe for a short moment close to the bulkhead to check the pressure of the fuel pump safety valve; the pressure should be between **4.5 and 7.5 bar**.

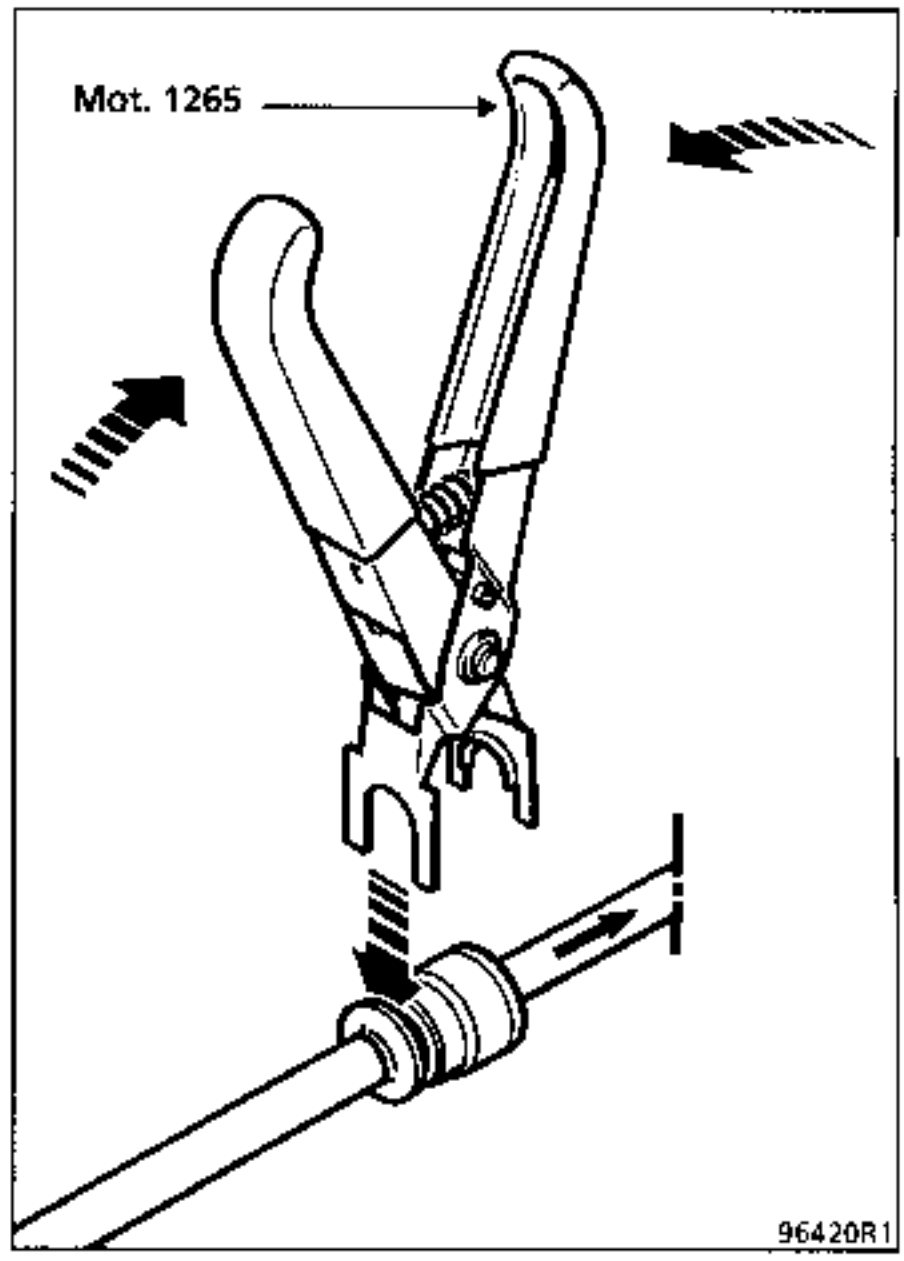
NOTE : renew the O ring when refitting the pulse damper.

CHECKING THE PUMP FLOW

Check the pump flow using the union on the pipe on the right hand side member.

To do this:
Disconnect the fuel return pipe (marked by a red quick release union).





Connect one end of a semi-rigid 8 mm pipe to the end of the quick release union and position the other end of the pipe in the 0 - 2000 ml measuring cylinder.

Check the pump flow - it should be greater than **1.3 litres** in 1 minute.

NOTE :

Ensure all unions are correctly connected when refitting (two O rings are present).

If the fuel flow is low check the pump feed voltage (10 % reduction in flow for a voltage drop of 1 Volt).

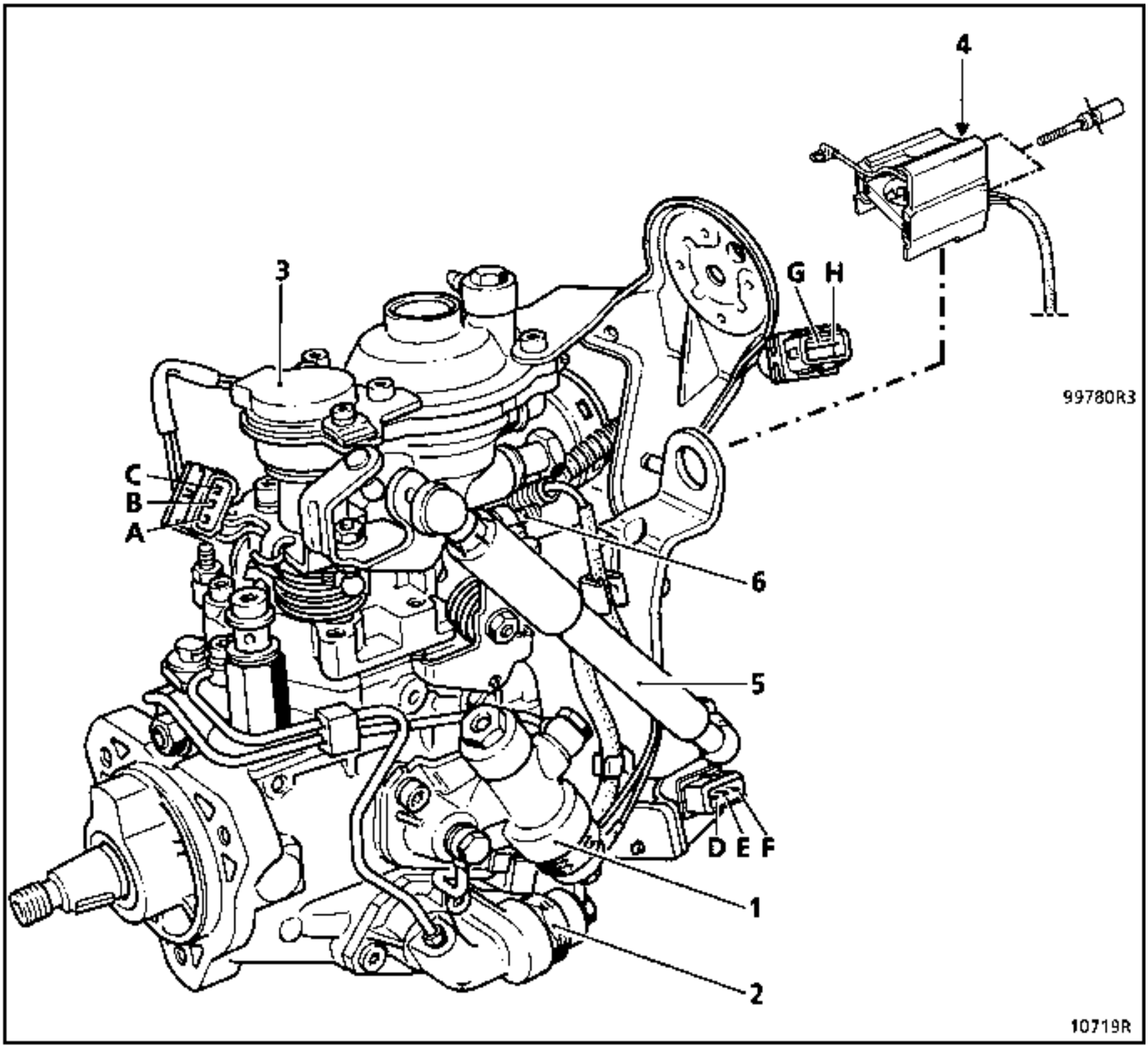
SPECIFICATIONS

Vehicle	Engine	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Ratio
JE0 E05	G8T 716	87	92	2188	23

Description	make / type	Special notes
Injection pump	R593/4 (without A/C) R593/5 (A/C)	Rotary pump with: - cold start solenoid (KSB) - fast idle device with LDA * - electromagnetically controlled load dependence (ALFB) - Pre-postheating time control unit
Pump timing (TDC pin, 7 mm diameter)		Pump piston lift: 0.74 ± 0.04 mm (setting value is stamped on load lever)
Injector holders	BOSCH KCA 17 S42	Tightening torque : 7 ± 1 daN.m.
Injectors	BOSCH DN OSD 313	Test : 150 $^{+10}_{-5}$ Maximum gap: 8 bars
Fuel filter	PURFLUX	Incorporated priming pump. The filter has an electric diesel fuel heater
Return pipes		Exterior diameter: 6 mm Interior diameter: 2.5 mm Length: 400 mm
Preheating unit	NAGARES	With pre-postheating function and control of KSB and ALFB solenoid valves.
Plugs	LUCAS BERU-BOSCH	Current: 15 A approximately after 5 seconds heating Tightening torque : 2.5 daN.m

ENGINE SPEED (rpm)			SMOKE OPACITY	
Idle speed	Maximum no load	Maximum with load	Homologation value	Legal maximum
725 ± 50	5 000 ± 100	4 500 ± 100	1.52 m-1 (46%)	2.5 m-1

PRESENTATION



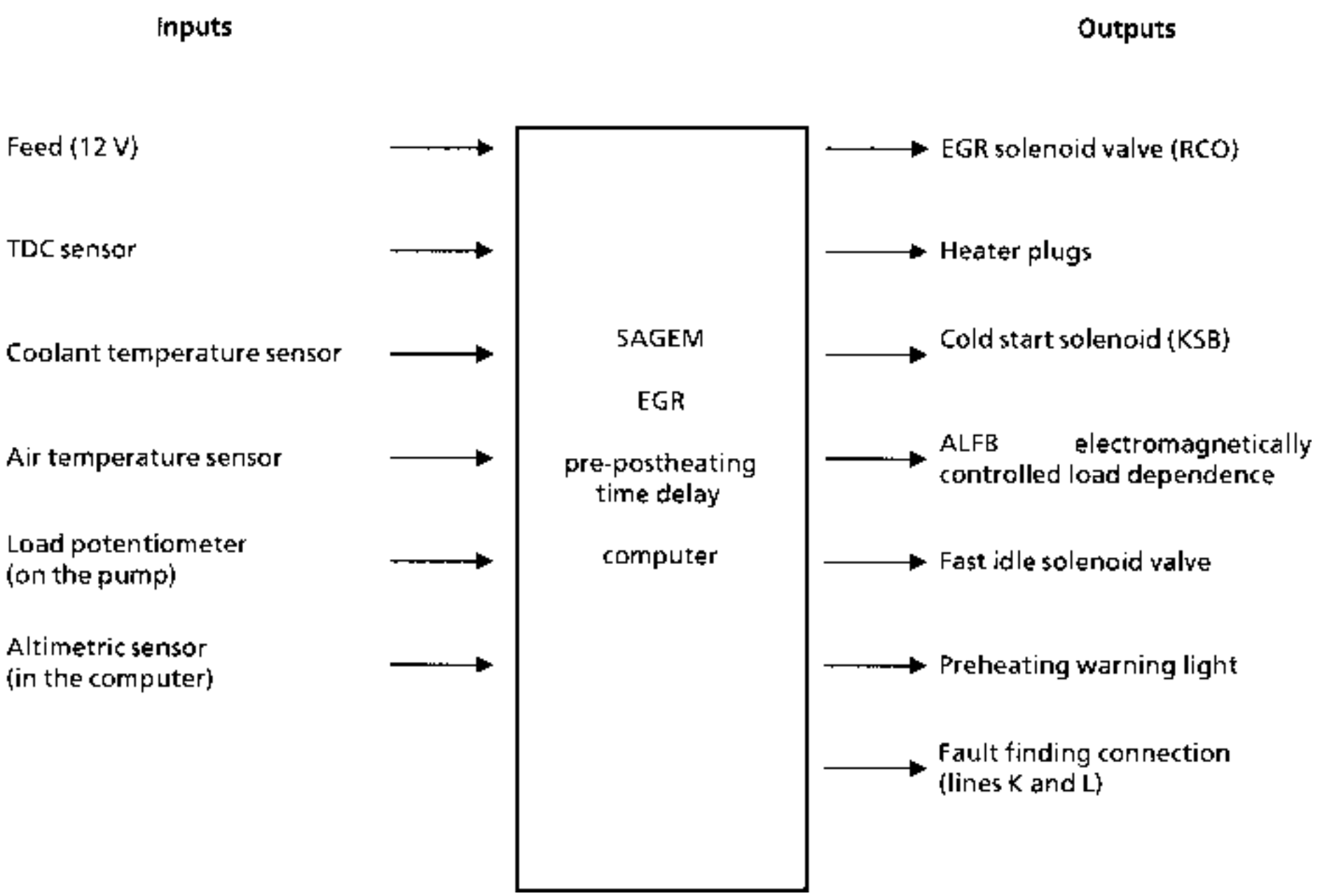
1 Cold start control solenoid (KSB)
2 Load dependence control solenoid (ALFB)
3 Load potentiometer
4 Coded solenoid valve electronic unit
5 Deceleration damper
6 Maximum engine speed adjustment screw (this may only be adjusted in a Renault Injection Centre)

A Load potentiometer earth
B Load lever signal
C Load lever potentiometer feed (5 Volts)
D Coded line
E After ignition feed (12 Volts)
F Earth
G Load dependence solenoid valve (ALFB)
H Cold start solenoid valve (KSB)

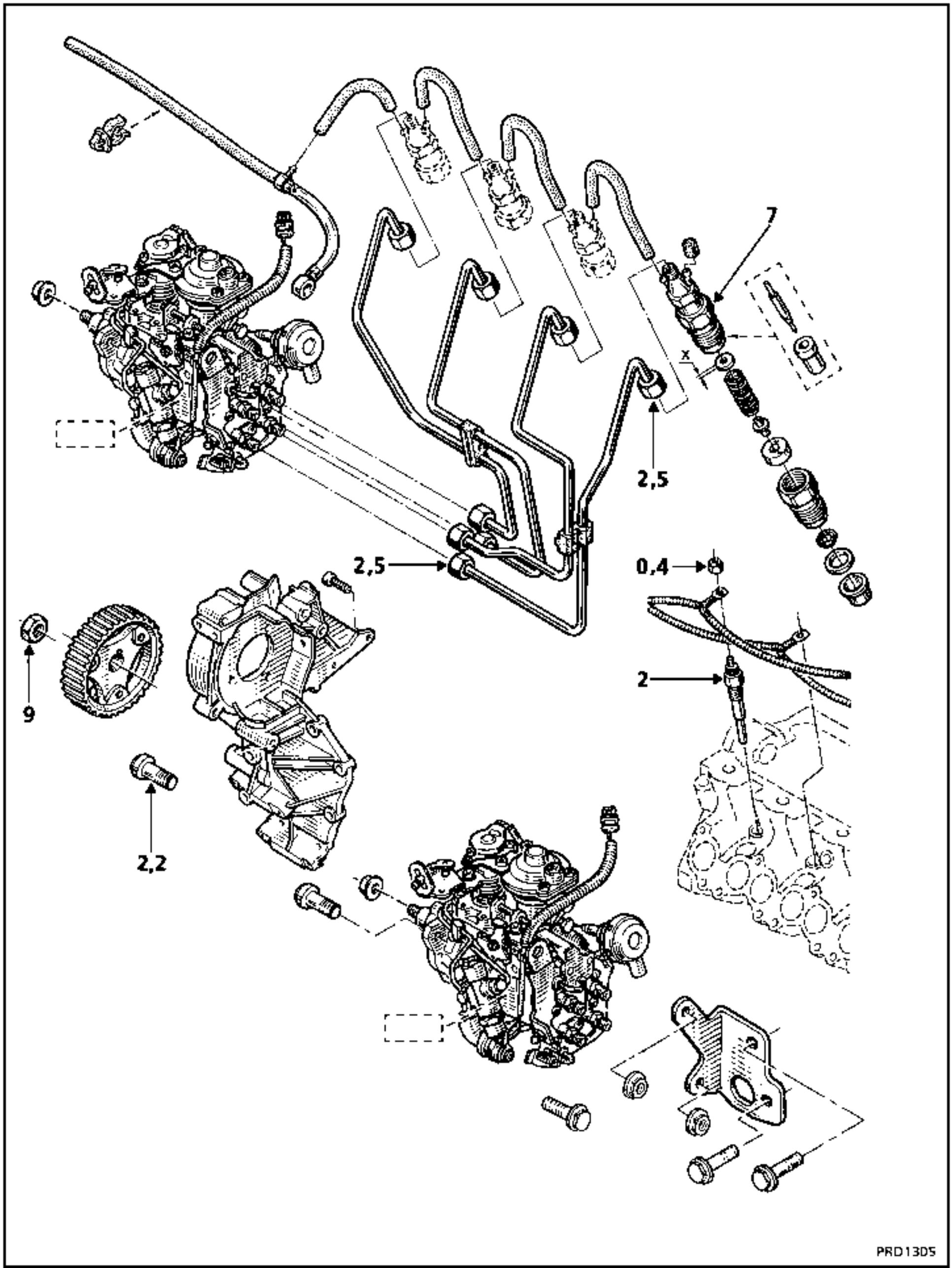
To meet the requirements of the EURO 96 vehicle standard, the ESPACE Turbo Diesel is fitted with a T.P.P. - EGR device (Temporisation pré-post chauffage (Pre-postheating time delay) and computer controlled EGR).

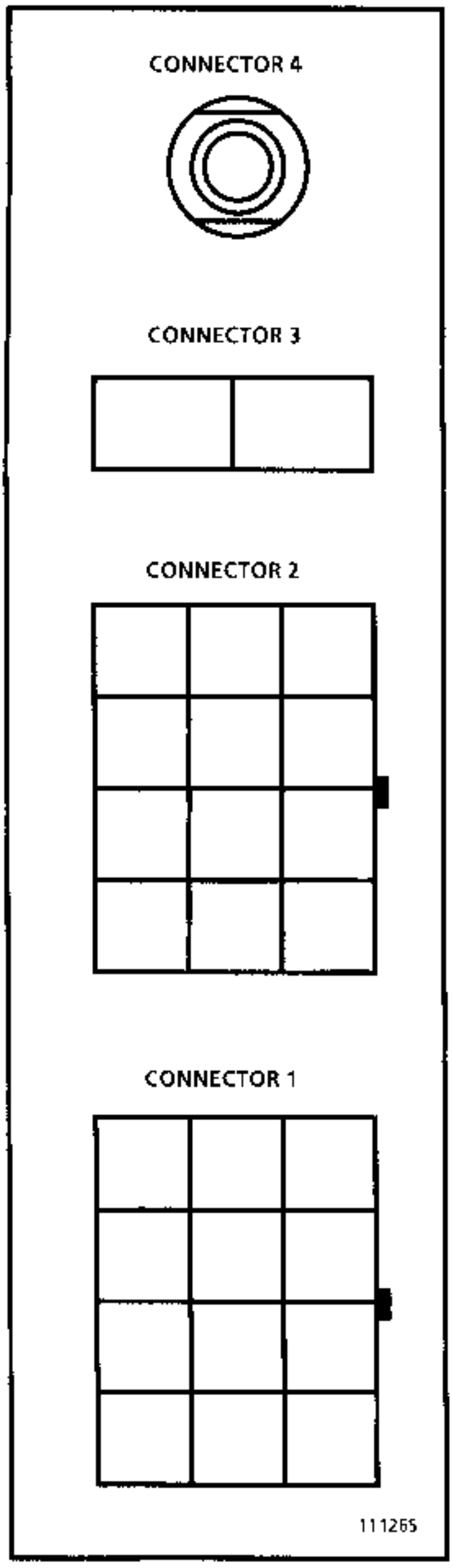
The diesel injection pump remains completely mechanical.

The computer also controls:
- the EGR,
- the pump actuators on the KSB (cold start solenoid) and ALFB (cancellation of advance retard for low loads and idle speed),
- heater plugs control,
- fast idle control.



FUEL SUPPLY - PUMPS - PREHEATING
Tigthtening torques





CONNECTOR 1

A1 Load potentiometer information
A2 Air temperature information
A3 Speed sensor signal input
A4 Speed sensor signal input
B1 Not used
B2 Coolant temperature sensor information
B3 Air / coolant sensors earth
B4 Load potentiometer earth
C1 Not used
C2 Not used
C3 Load potentiometer feed (5 Volts)
C4 Not used

CONNECTOR 2

A1 Diagnostic line K
A2 + starter
A3 Electronic earth
A4 + after ignition
B1 Air conditioning information (+ 12 Volts)
B2 KSB solenoid valve control(+ 12 Volts)
B3 Not used
B4 Not used
C1 Preheating warning light (control via earth)
C2 Diagnostic line L
C3 EGR solenoid valve control (via earth)
C4 ALFB electromagnetically controlled load dependence solenoid control (+ 12 Volts)

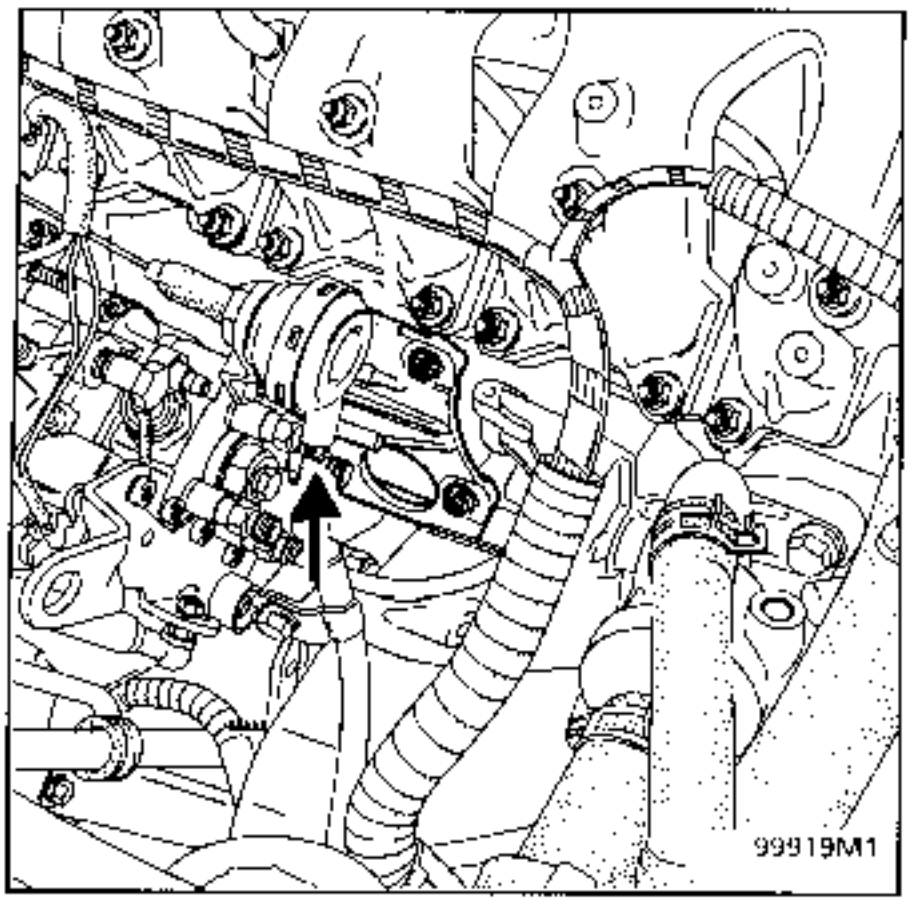
CONNECTOR 3

1 Feed to plugs 1 - 3
2 Feed to plugs 2 - 4

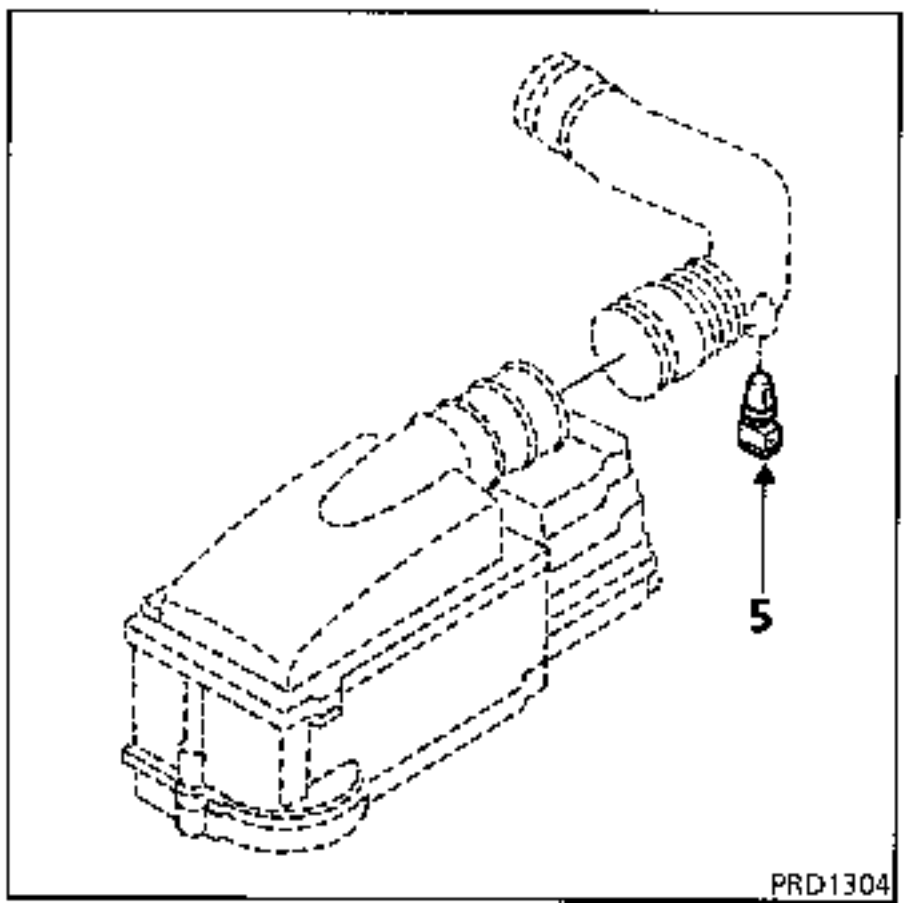
CONNECTOR 4

1 Battery : + before ignition feed

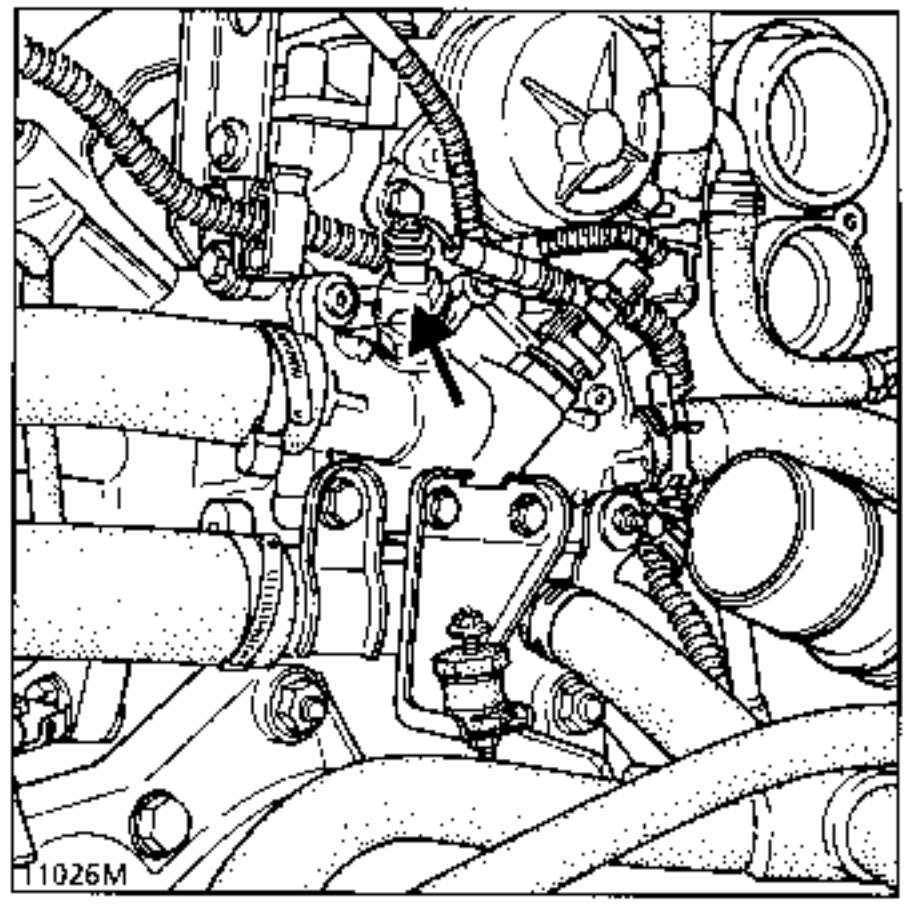
Fast idle solenoid valve (version with air conditioning)



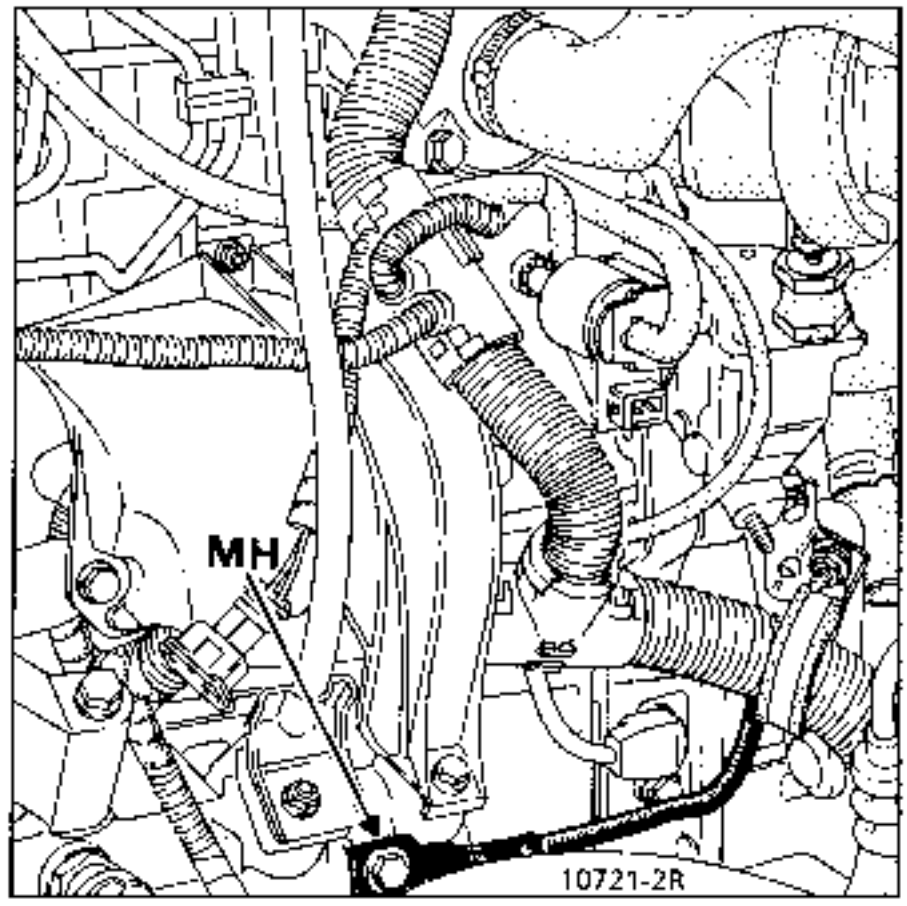
Air sensor (5)



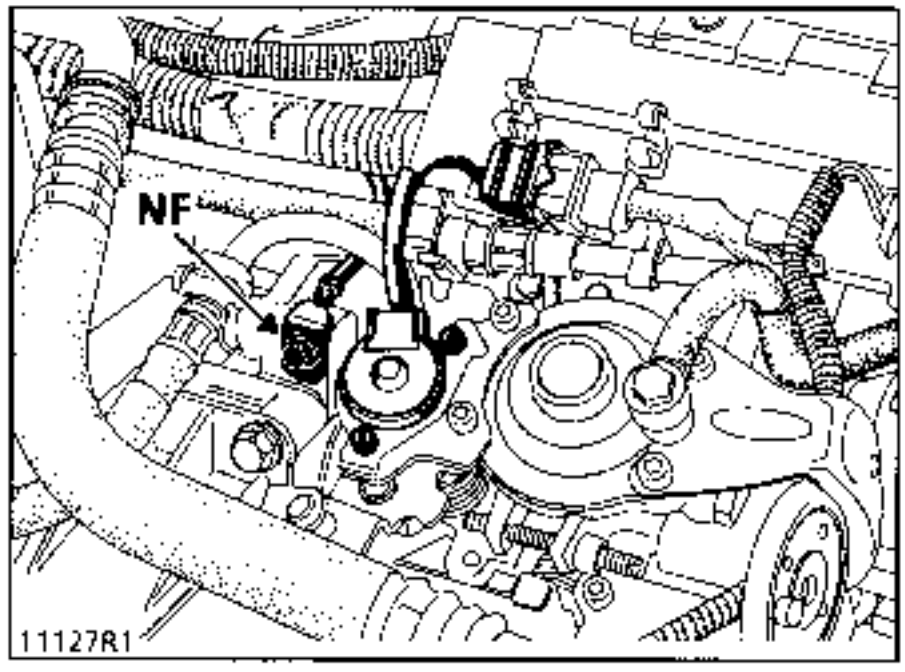
Coolant temperature sensor (white connector)



The computer is mounted on the right hand mudguard skirt, next to the windscreen washer bottle filling opening.



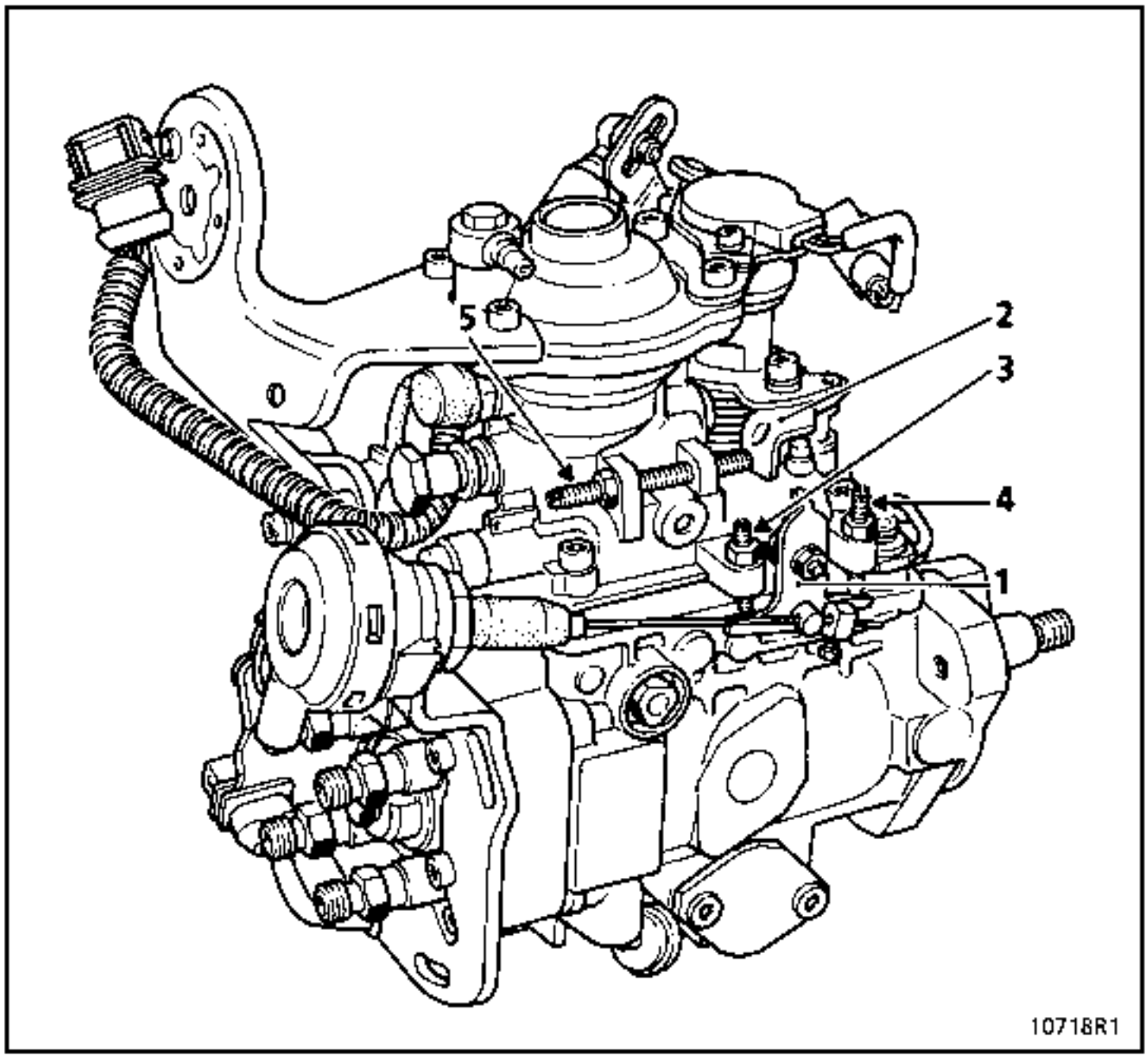
MH Engine earth



NF Electronic earth

The solenoid valve for controlling the EGR system (RCO) is mounted on the body, above the brake fluid reservoir.

These adjustments must be made in the correct order when the engine is warm, after the engine cooling fan has operated twice.



1. ADJUSTING THE IDLE SPEED AND THE RESIDUAL FLOW (ANTI-STALL)

a) Check that lever (1) is against screw (3).

b) Slacken the residual flow screw by 2 turns (5).

c) Adjust the idle speed to **725 ± 25 rpm** using screw (3).

d) Fit a **1 mm** shim between the residual flow screw (5) and the load lever (2).

e) Adjust the residual flow screw (5) to obtain an engine speed **10 to 20 rpm** higher than the idle speed.

f) Remove the **1 mm** shim then accelerate sharply **twice**.

g) Check the idle speed is correct, adjust it again if necessary and then recheck the residual flow.

h) Programme the no load and full load positions using command G31*

IMPORTANT : any modifications to the residual flow screw must be followed by programming of the no load and full load positions (G31*).

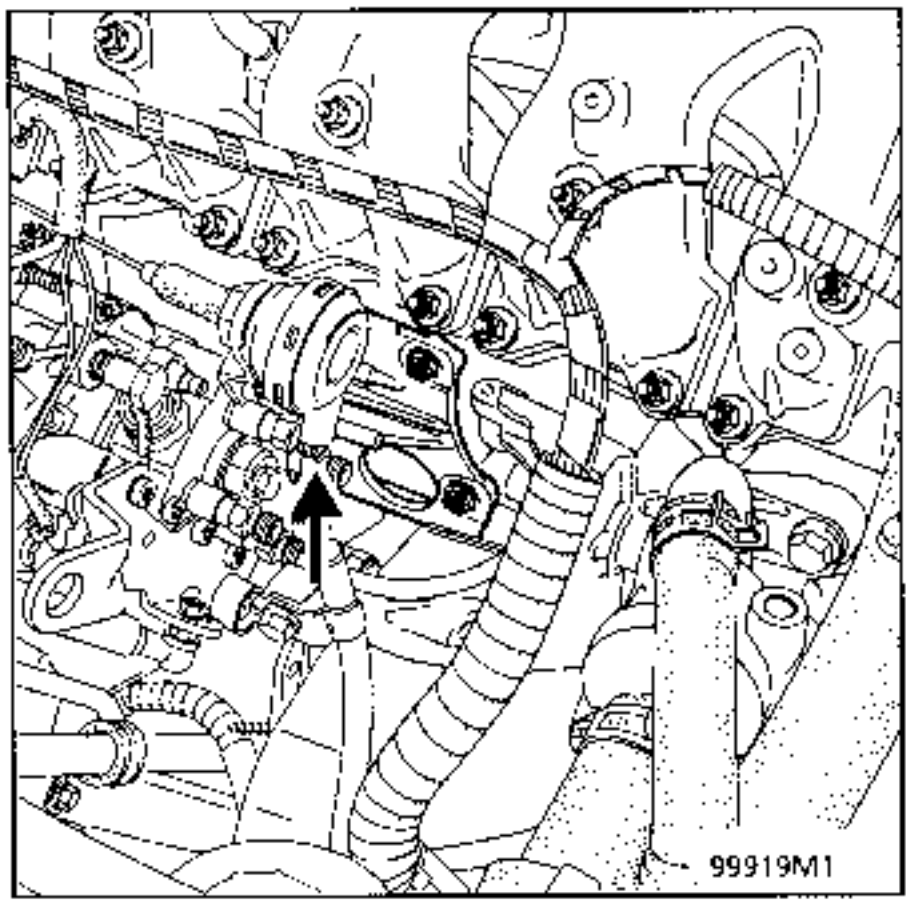
2. ADJUSTING THE FAST IDLE

Set the separate idle lever (1) against the fast idle screw (4), then adjust the engine speed to **850 ± 25 rpm** using this screw (4).

For vehicles fitted with air conditioning, the separate idle lever is inverted. Because of this, the fast idle control is actuated normally.

Idle speed is obtained when the cable is held taut by the vacuum in the LDA, assisting cold starting of the engine.

To adjust the fast idle (version with air conditioning) just open the pneumatic circuit. Disconnect the capsule for example.



3. ADJUSTING THE POSITION OF THE FAST IDLE CABLE GRIP

Check that the separate idle lever (1) is against the idle screw (3).

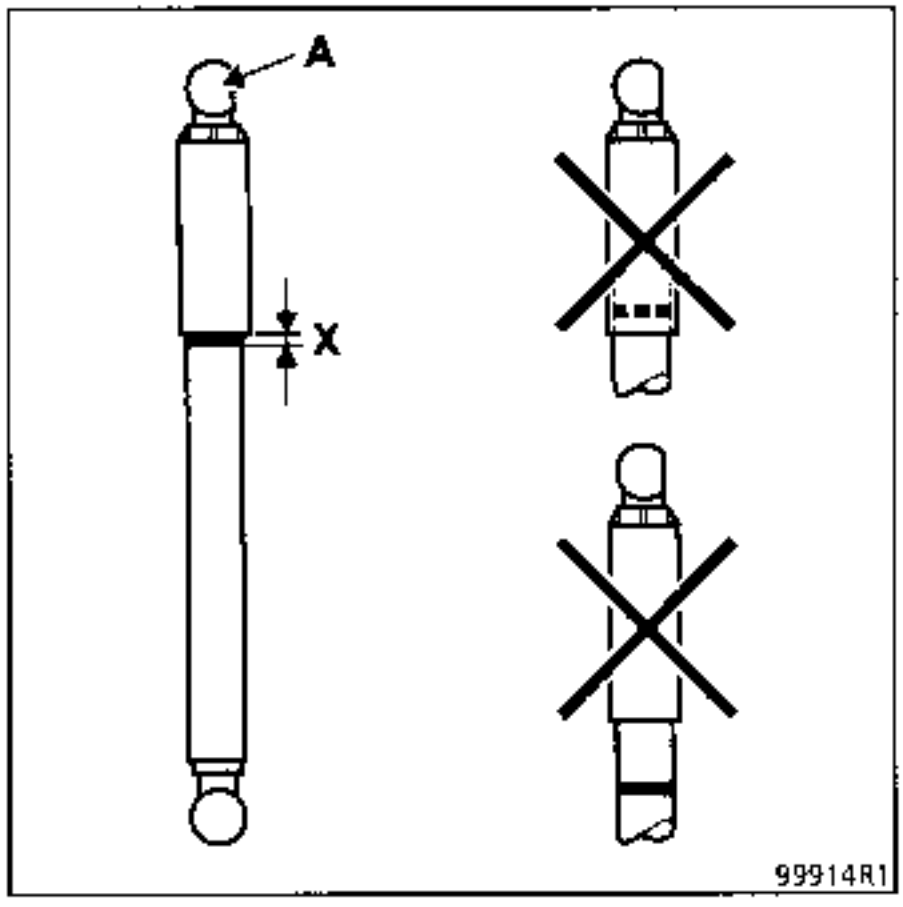
With the cable taut, position the cable grip to:
- **5 ± 1 mm** version without air conditioning
- **2 ± 1 mm** version with air conditioning

4. ADJUSTING THE ACCELERATION DAMPER - DISTANCE BETWEEN THE BALL JOINTS

When the previous adjustments have been made, the length of the damper must be adjusted. Set lever (1) against the idle screw (3).

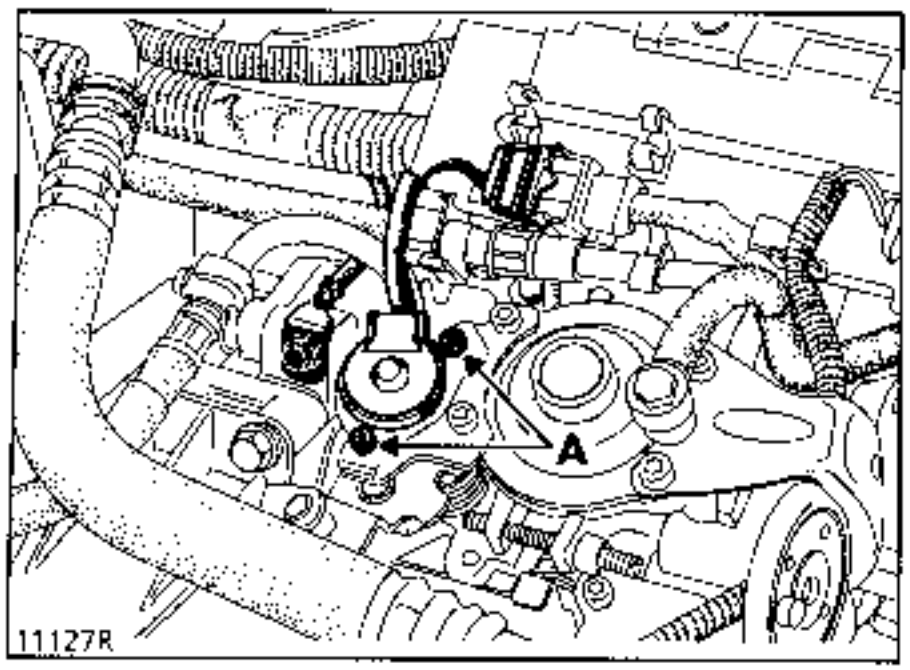
The paint mark should be located as shown in the diagram below.

If a modification is required, adjust the upper ball joint (A).



X = 2 mm

REPLACEMENT



REMOVAL

Ignition off:
- remove the 2 bolts (A),
- disconnect the connector.

REFITTING

Refit the new potentiometer.

The angular position in relation to the pump must be observed (see diagram above).

NOTE : it is not permitted to touch the drive dog on the load lever, otherwise the potentiometer must be adjusted in a Renault Injection Centre.

ADJUSTMENT

The load potentiometer is adjusted under voltage.

In order to provide a voltage across the terminals of the potentiometer (connector connected and ignition on), an intermediate cable must be made which can be connected in series between the potentiometer connector and the engine wiring connector.

Using a voltmeter, measure the voltage across terminals 1 and 2 on the potentiometer.

In the full load position, the voltage should be **4.5 Volts ± 0.1**.

Adjustment is made by rotating the potentiometer.

Programme the no load and full load positions once more. To do this, enter G31* on the XR25 then programme the full load position, followed by the no load position.

SPECIAL TOOLING REQUIRED		
Mot.	1317	Pump pulley retaining tool
Mot.	1318	7 mm TDC pin
T.Ar.	1094	Extractor

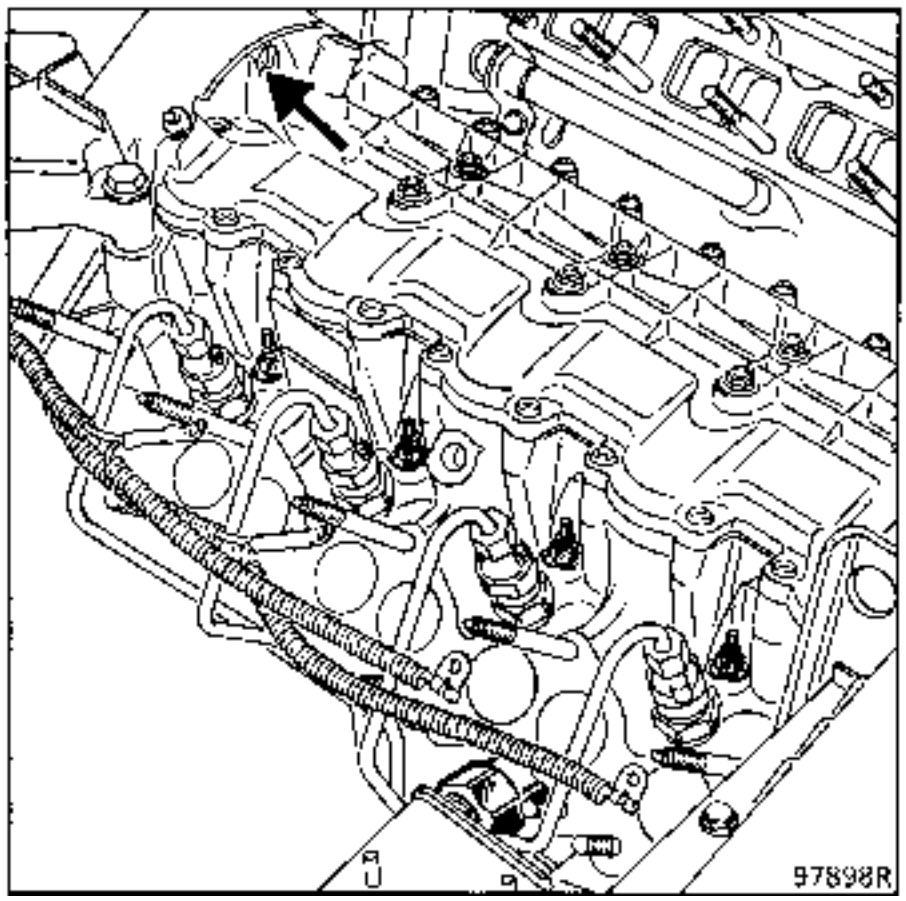
Tools for removing - refitting the accessories belt (AC version) see section 11

TIGHTENING TORQUES (in daN.m)	
Pulley nut	9
Pump mounting bolt	2.2
Rear support mounting	2.2

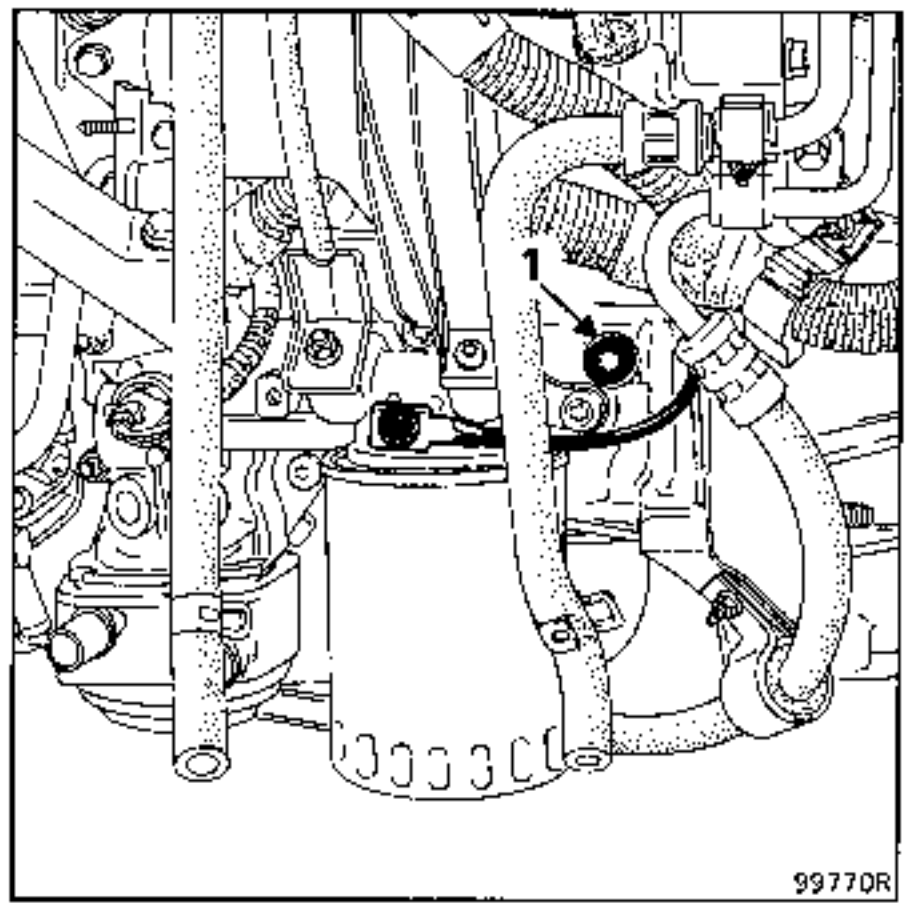
REMOVAL

Vehicle on a lift, battery disconnected:

- bring the engine to TDC for cylinder n° 1 using the opening in the rocker box cover and the reference mark on the camshaft pulley (arrowed),



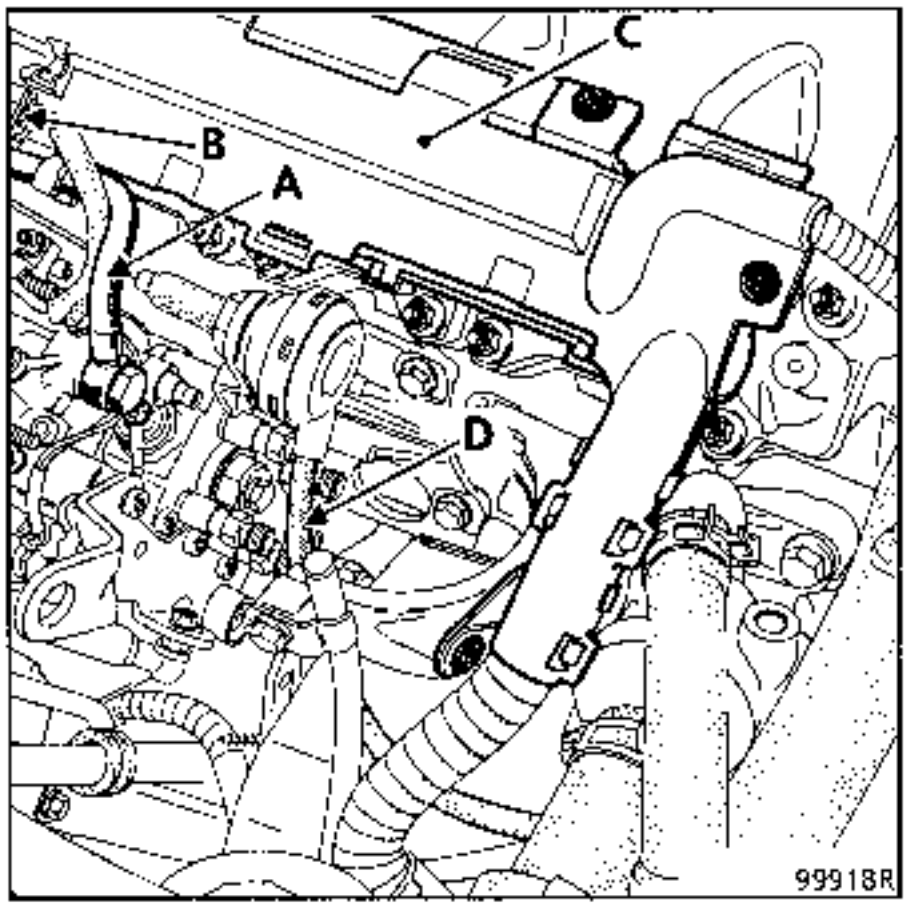
- lift the vehicle and remove the engine undertray and the right hand wheel arch protector,



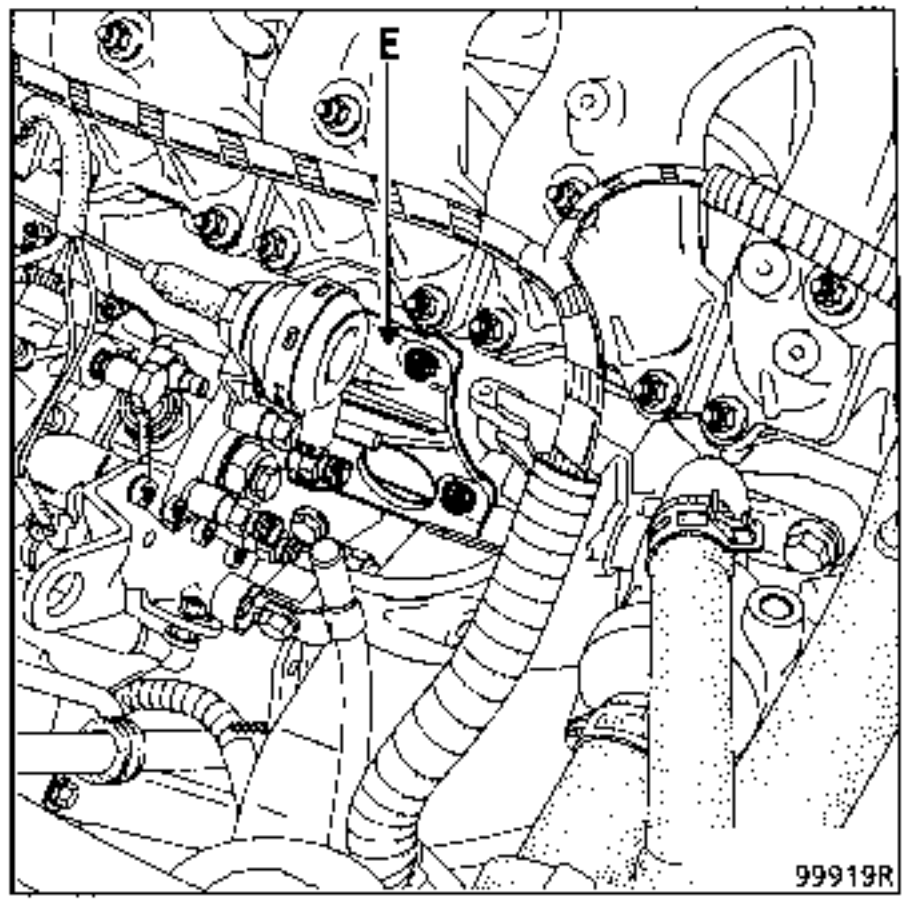
- after removing bolt (1), immobilise the engine (turning it in the normal direction), using pin **Mot. 1318 , 7 mm** diameter.

From above the vehicle, remove:

- the retaining bolt for the power assisted steering reservoir and release the reservoir,
- the accelerator cable from the injection pump end,
- the diesel supply and return pipes(A),
- the fuel shut off solenoid feed (connector),
- connector (B),
- the plastic shield (C),
- the fast idle cable, or if the vehicle has air conditioning, the pipe (D) for the pneumatic LDA control,

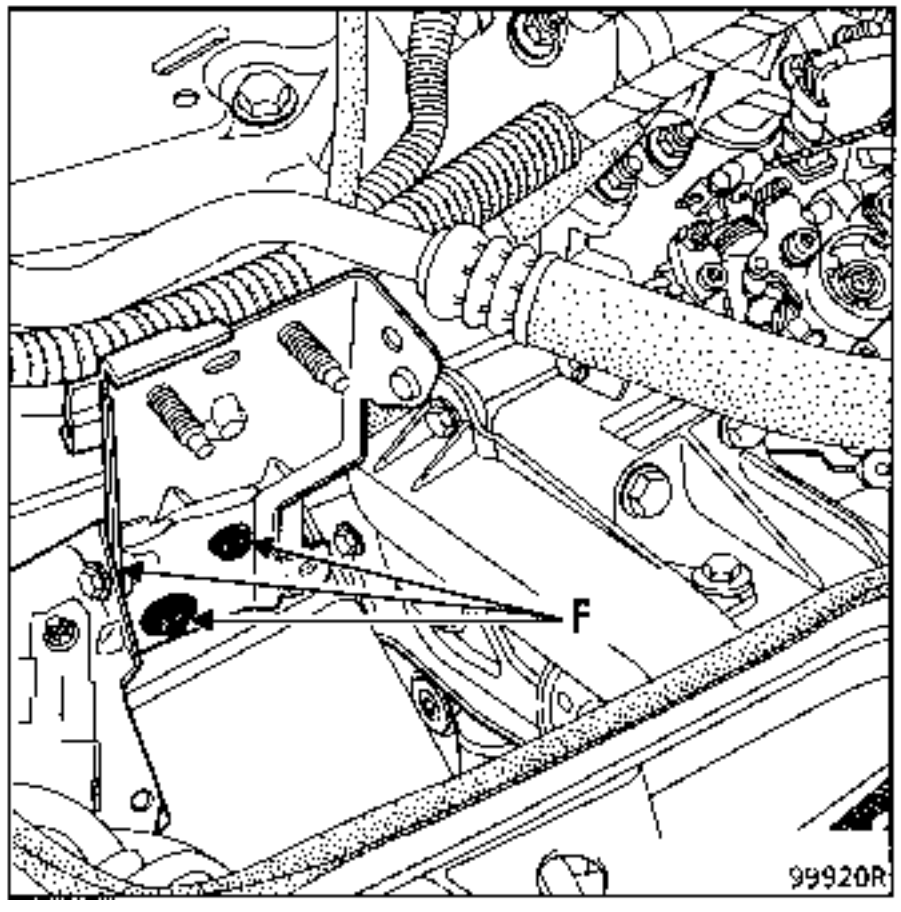


- the high pressure pipes, Mot. 1383,
- the two mounting bolts for the rear support (E) on the engine block.

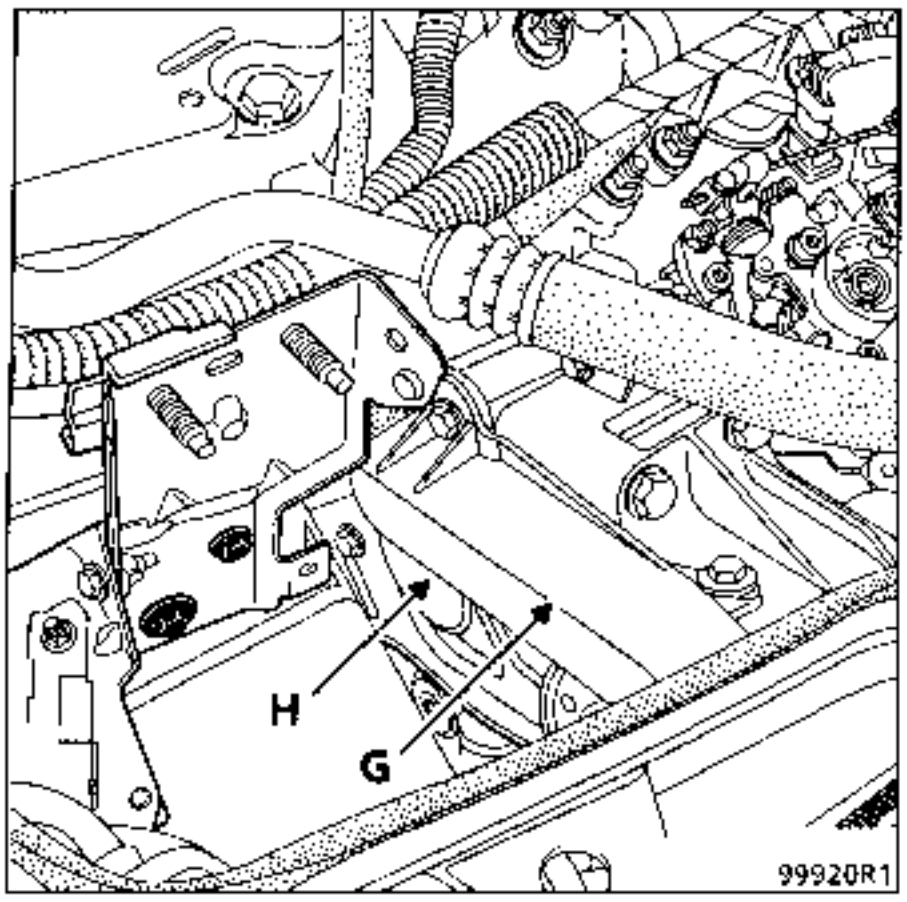


Remove:

- the mounting bracket for the refrigerant pipes on the right hand suspended engine mounting,
- the diesel fuel filter- filter head assembly (2 nuts),
- the filter mounting (3 bolts) (F),

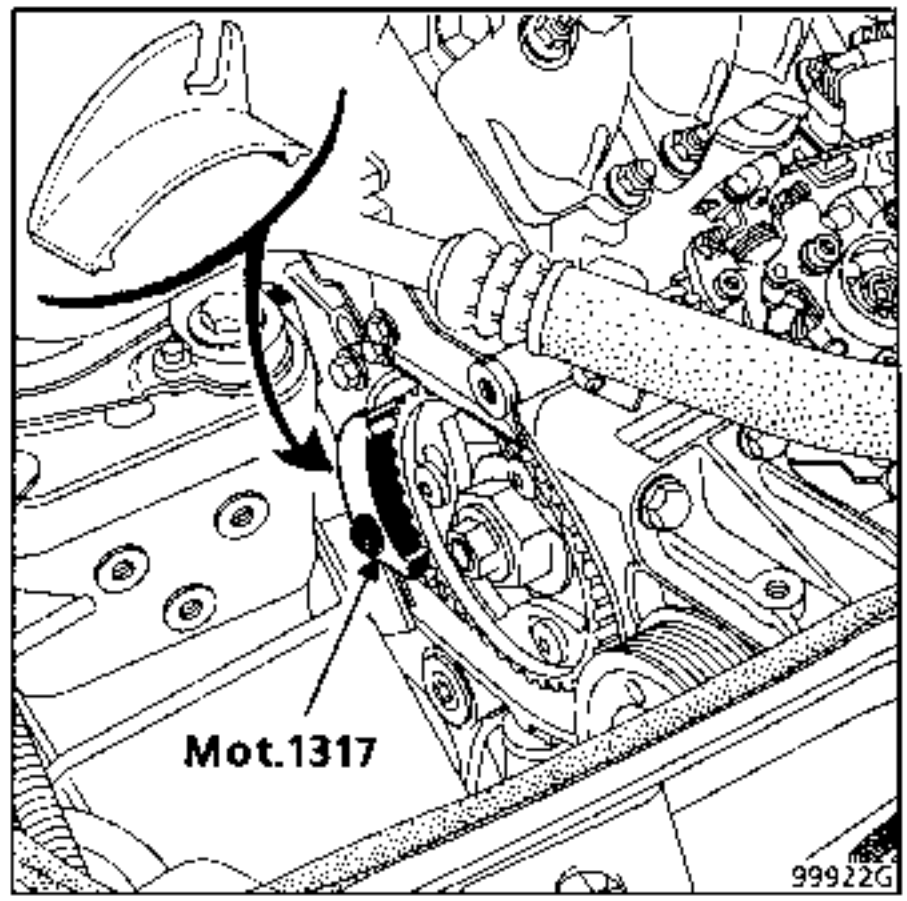


- the plastic protector (G) for versions with air conditioning,
- the pump pulley housing (H).



For versions with air conditioning, remove the accessories belt to make removing the pump mounting bolts easier. To do this, refer to section 11.

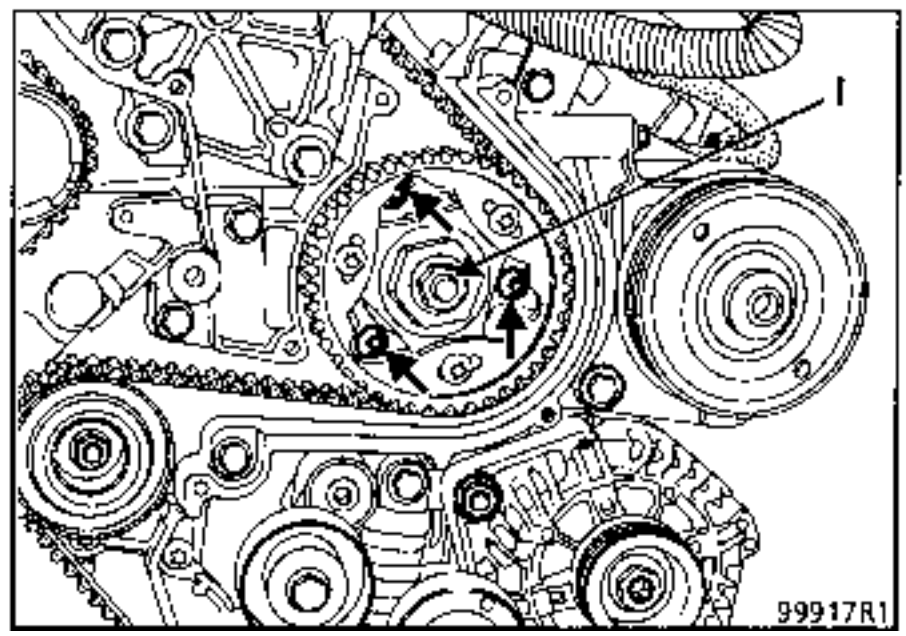
Fit the injection pump pulley retaining tool **Mot. 1317**.



Modify tool **Mot. 1317** as shown above (b) if necessary.

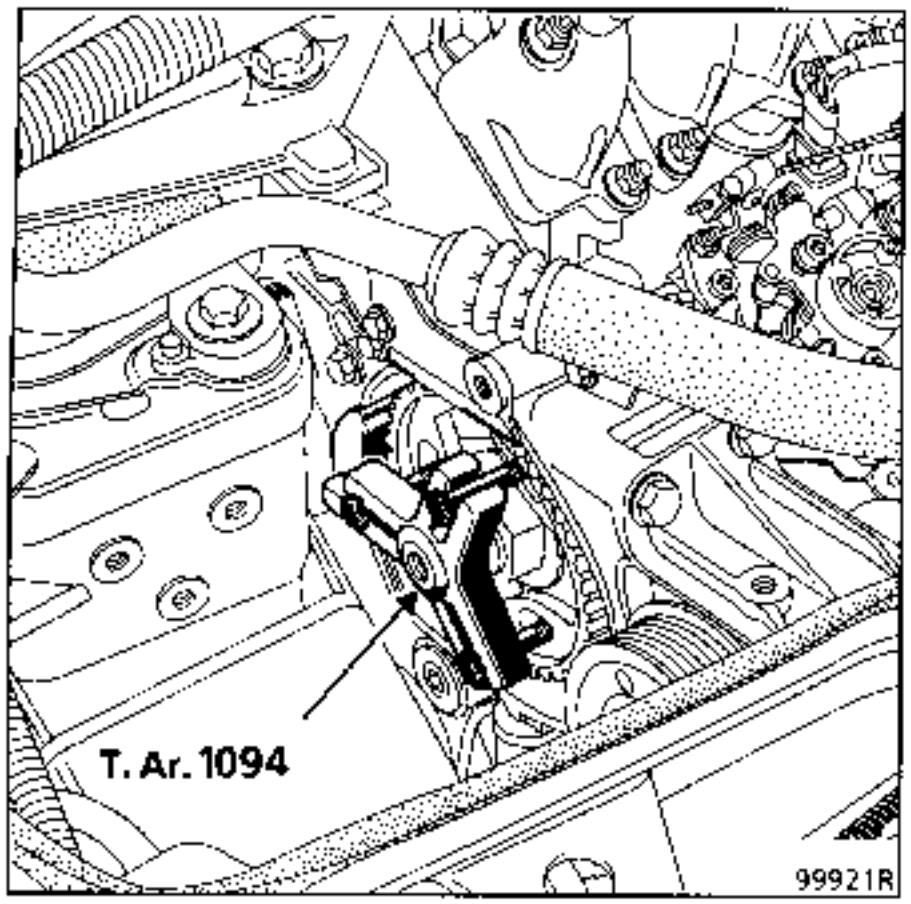
Remove:

- the pump hub mounting nut (I),
- the three pump mounting bolts (star socket 40) (arrowed),



- the three bolts mounting the pulley on the hub (star socket 40).

Fit the body of the extractor **T.Ar. 1094** with 3 bolts **M 8 x 125, 55 mm** long to release the tapered shaft of the pump on the hub.



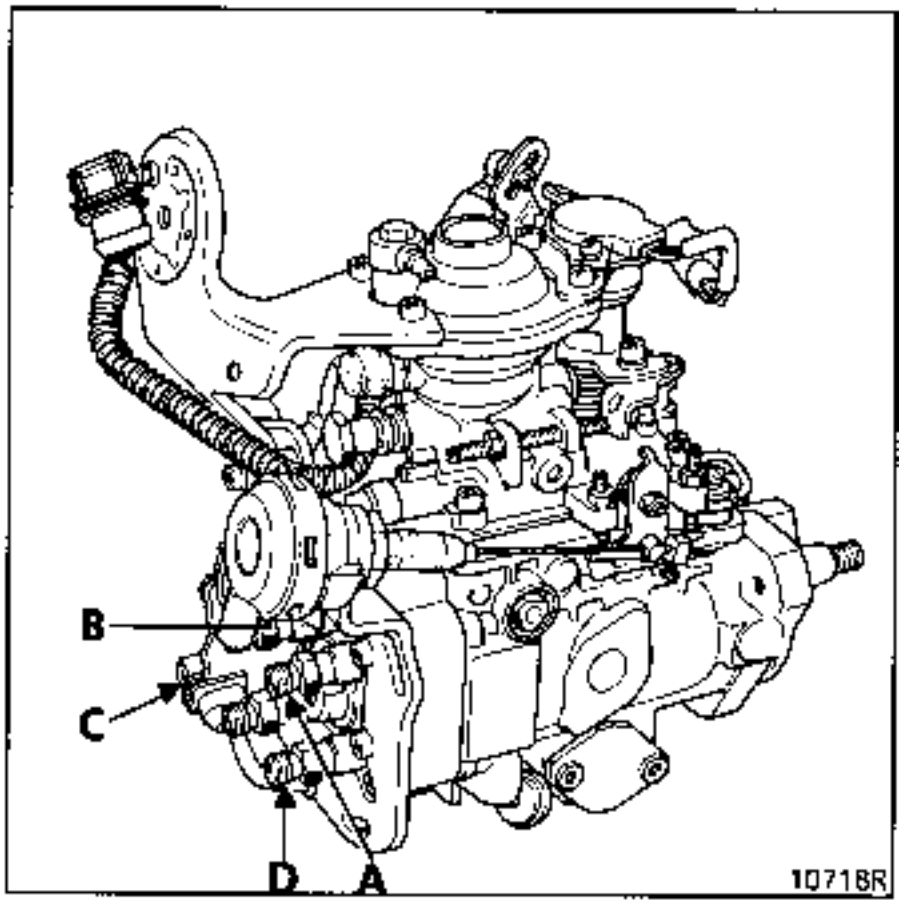
Remove the pump (take care to retain the key).

Slacken the two mounting bolts for the rear support on the pump.

REFITTING

When refitting, the position of the hub in relation to the sprocket must be checked.

The key should be positioned in line with the high pressure outlet marked (C) (see diagram below).



Bond the key using grease and take care to prevent it from falling out when refitting.

Observe the correct tightening torque for the nut on the pump shaft (**9 ± 0.5 daN.m**).

Refitting is then the reverse of removal.

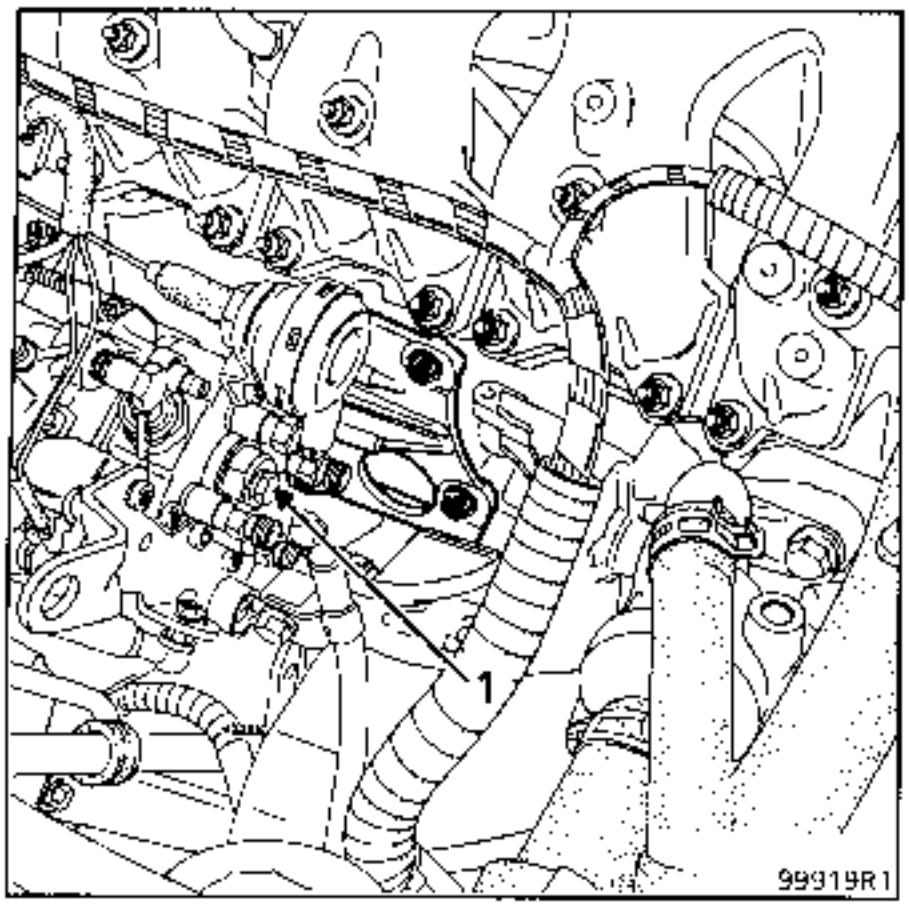
To fit the rear support, first lock the bolts on the pump (slot on cylinder block end).

Before refitting the pump pulley housing, it must be adjusted (see method below).

For versions with air conditioning, renew the belt and refer to section 07 of Technical Note n° 2431A for refitting.

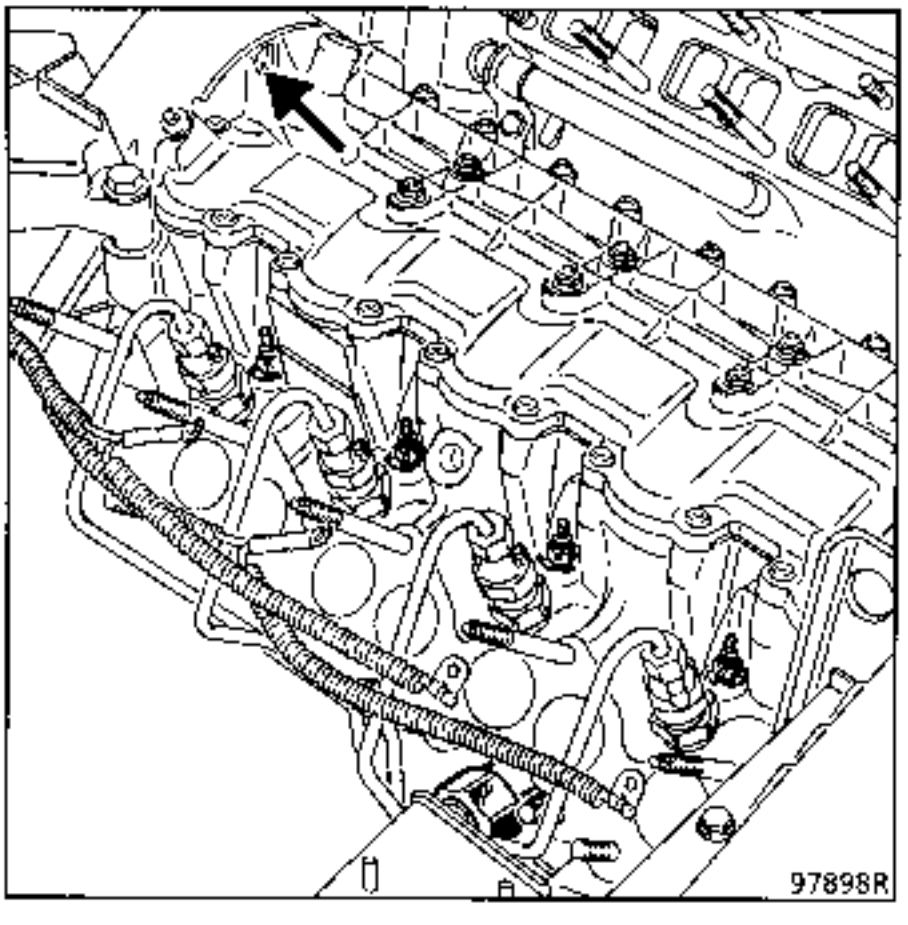
CHECKING THE PUMP TIMING

Put the vehicle on a lift.



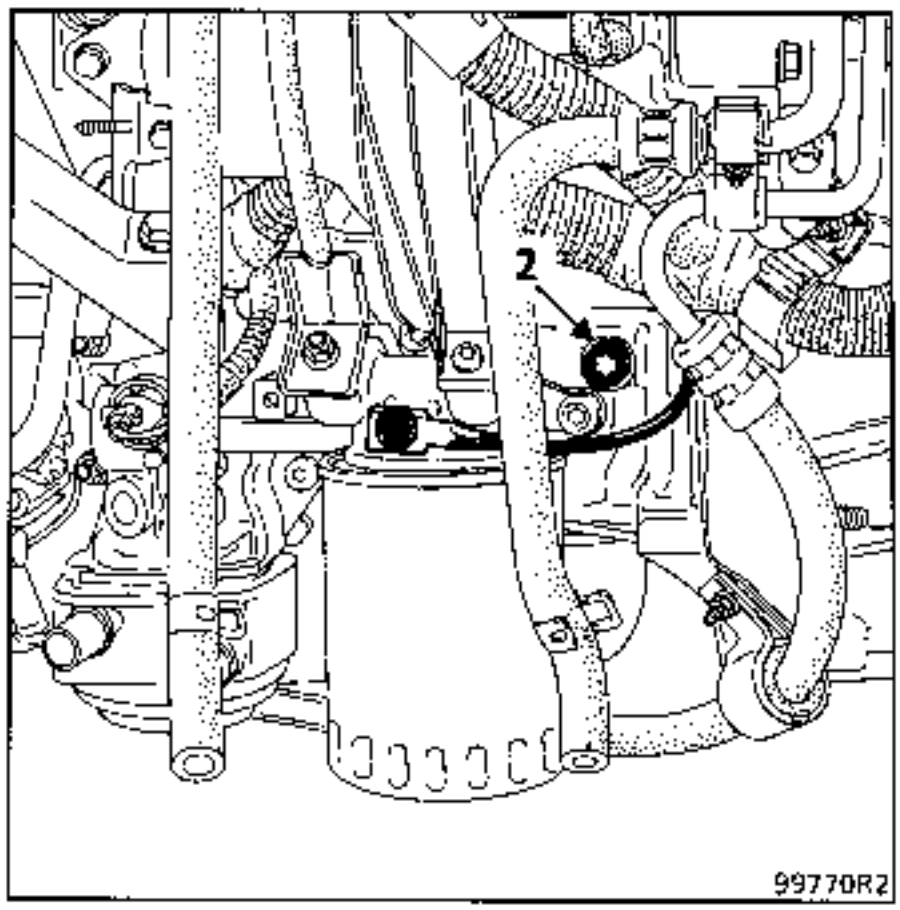
Remove bolt (1) to fit the dial gauge mounting **Mot. 856** (remove the high pressure pipes if necessary).

Fit the dial gauge and zero it at BDC for the injection pump piston.



Bring the engine to TDC for cylinder n° 1 using the opening in the rocker box cover and the reference mark on the camshaft pulley (arrowed).

Lift the vehicle.



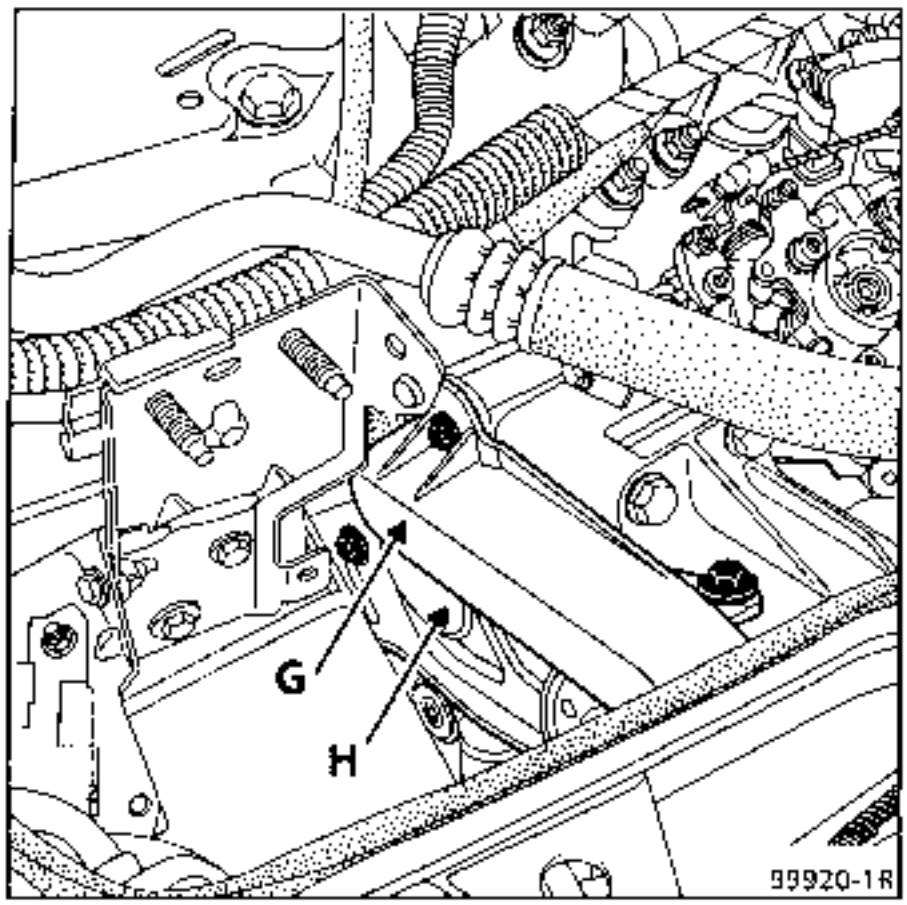
After removing bolt (2), immobilise the engine (turning it in the normal direction of operation, without going backwards, otherwise turn the engine through 2 revolutions) using pin **Mot. 1318, 7 mm** diameter.

Check the pump piston lift read on the dial gauge, which should be :

0.8 ± 0.04 mm.

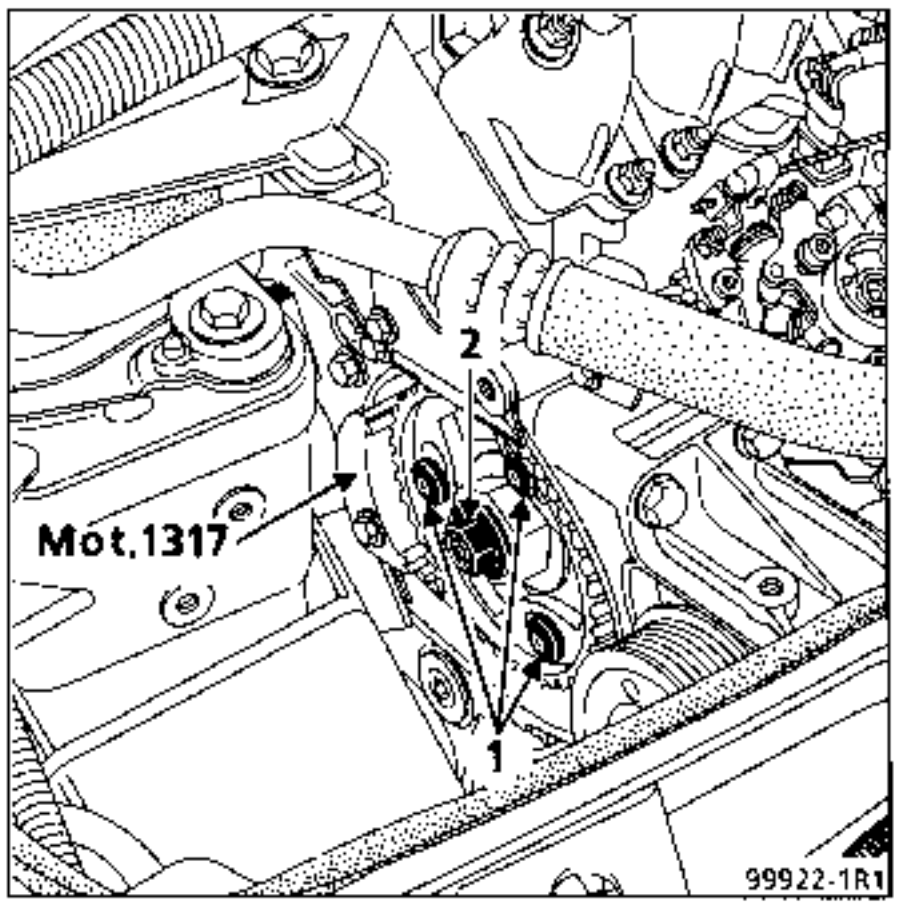
If the value read for the pump piston lift is not correct, the pump must be reset.

To do this, remove:
- the plastic housing (G) for versions with air conditioning,
- the pump pulley housing (H).



Fit the sprocket immobilising tool **Mot. 1317**.

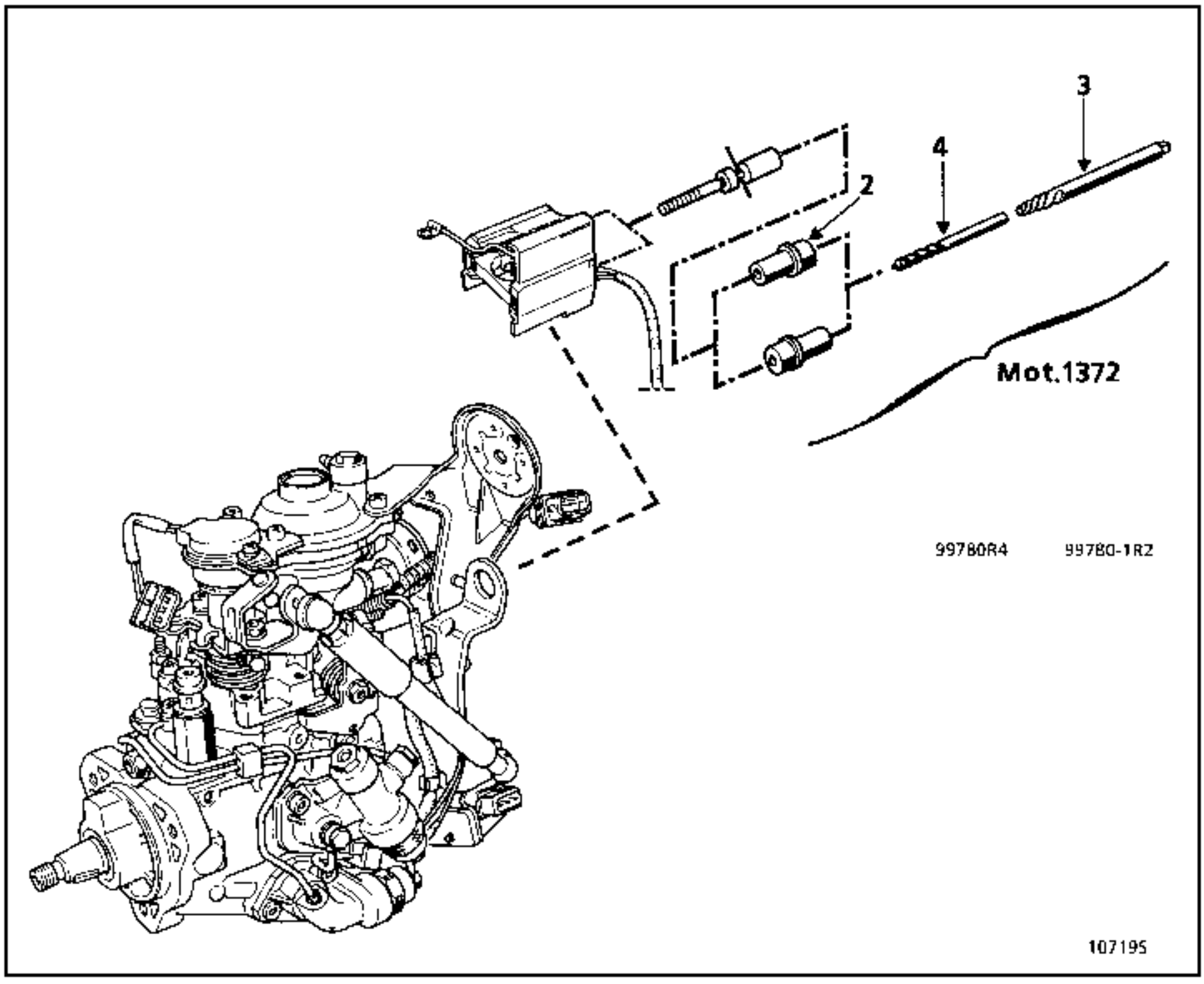
Slacken the three pulley - hub mounting bolts (**1**) then adjust the pump piston lift using the central nut (**2**).



After retightening the mounting bolts (1), turn the engine through two revolutions without going backwards, them immobilise it once more to check the pump timing.

SPECIAL TOOLING REQUIRED		
Mot.	1372	Kit for extracting self shearing bolts from computers

NOTE : this operation may be carried out with the injection pump in position on the engine.

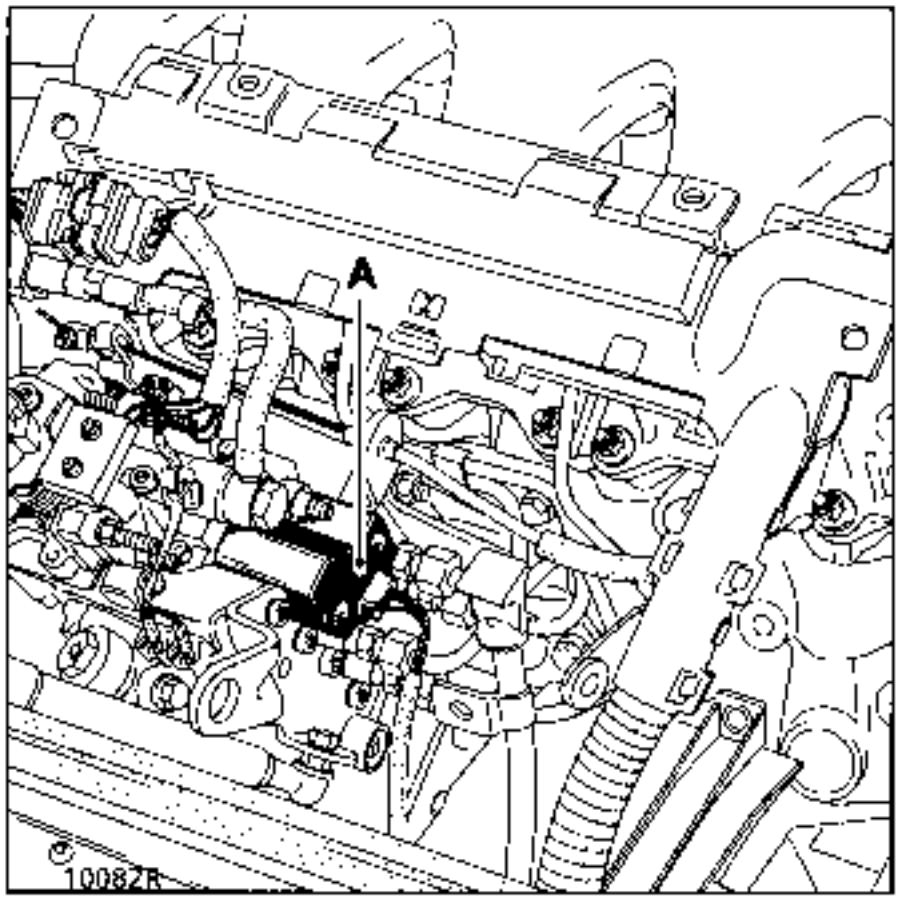


REMOVAL

Battery disconnected, remove:

- the accelerator cable at the injection pump end,
- the air filter - air filter unit assembly,
- the turbo outlet air sleeve,
- the retaining bolt for the power assisted steering fluid reservoir and release the reservoir,
- the power assisted steering reservoir mounting (three bolts on engine),
- the two radiator hoses at the engine end (take precautions to catch the coolant which will run out).

Now replace the computer (A). To do this, use tool **Mot. 1372**.



Fit the drilling tube (2).

Drill two holes using the drill (4), diameter **4 mm**, from the kit (**drilling depth approximately 4 mm**).

Lightly oil the drill to assist drilling.

Use the extractor (3) and its handle to remove the bolts.

Remove the computer for the coded solenoid valve (A).

Tightening torque for the fuel shut off wire nut **0.2 daN.m**.

Use self shearing bolts from the Parts Department (**tighten until the heads break**).

Ensure the plastic cover is replaced on the fuel shut off nut.

REFITTING

Refitting is the reverse of removal.

Bleed the cooling circuit.

The pre-postheating function is controlled by the computer.

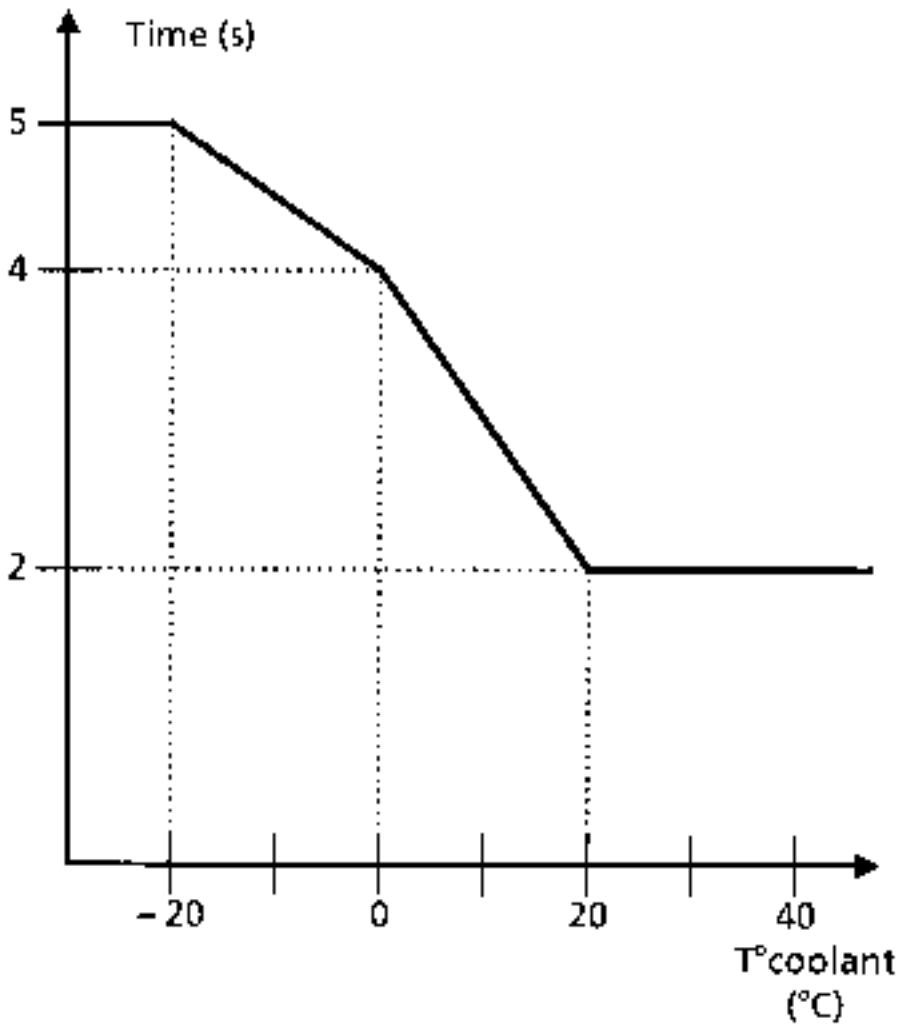
The heater plugs relay unit is included in the computer.

1. IGNITION ON - PREHEATING

Preheating has two phases:

a) Variable preheating

This depends on the coolant temperature when the ignition is turned on (preheating warning light illuminates).



b) Fixed preheating

After the preheating warning light has extinguished (variable preheating), the plugs remain fed for **8.5 seconds** before the engine is started.

2. STARTING

While the starter is activated, the four plugs are continuously fed.

3. ENGINE RUNNING - POSTHEATING

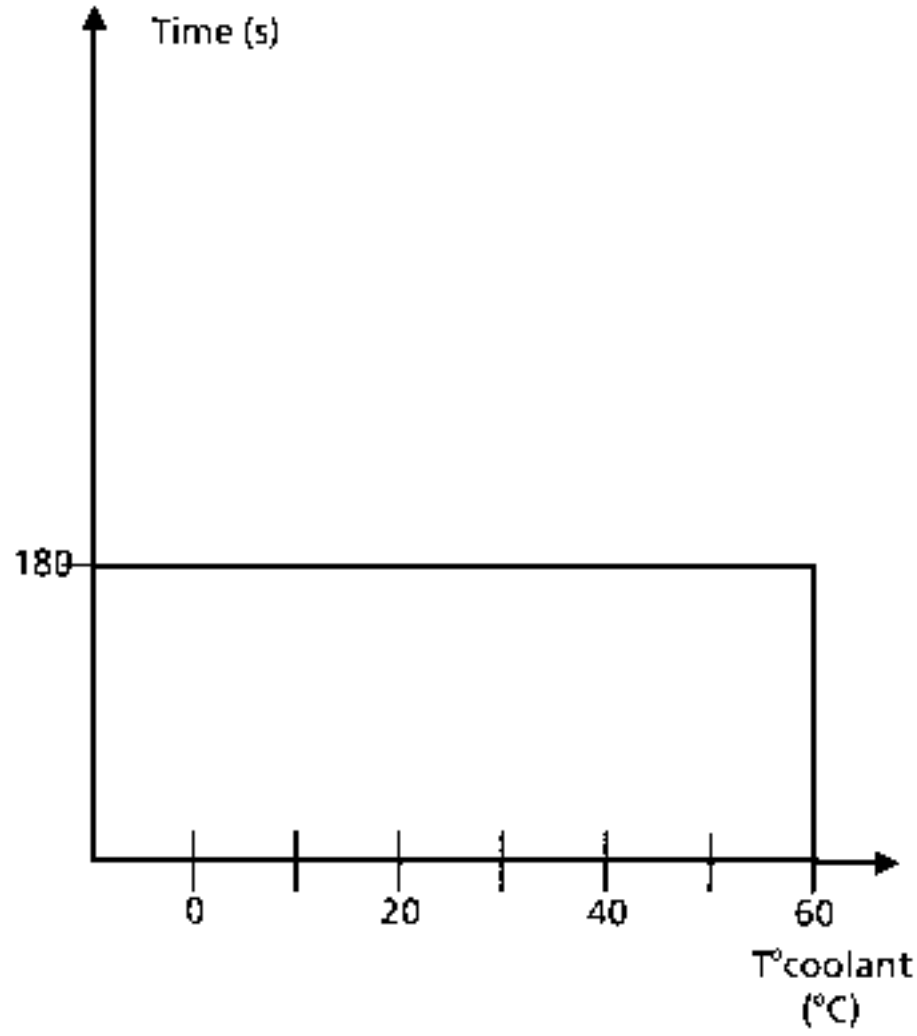
Postheating has two phases:

a) Fixed postheating

After the engine has been started the plugs are fed simultaneously for **10 seconds**.

b) Variable postheating

Variable postheating begins when fixed postheating has ended. The 4 plugs are fed (continuously) for 3 minutes.



Variable postheating may be interrupted:

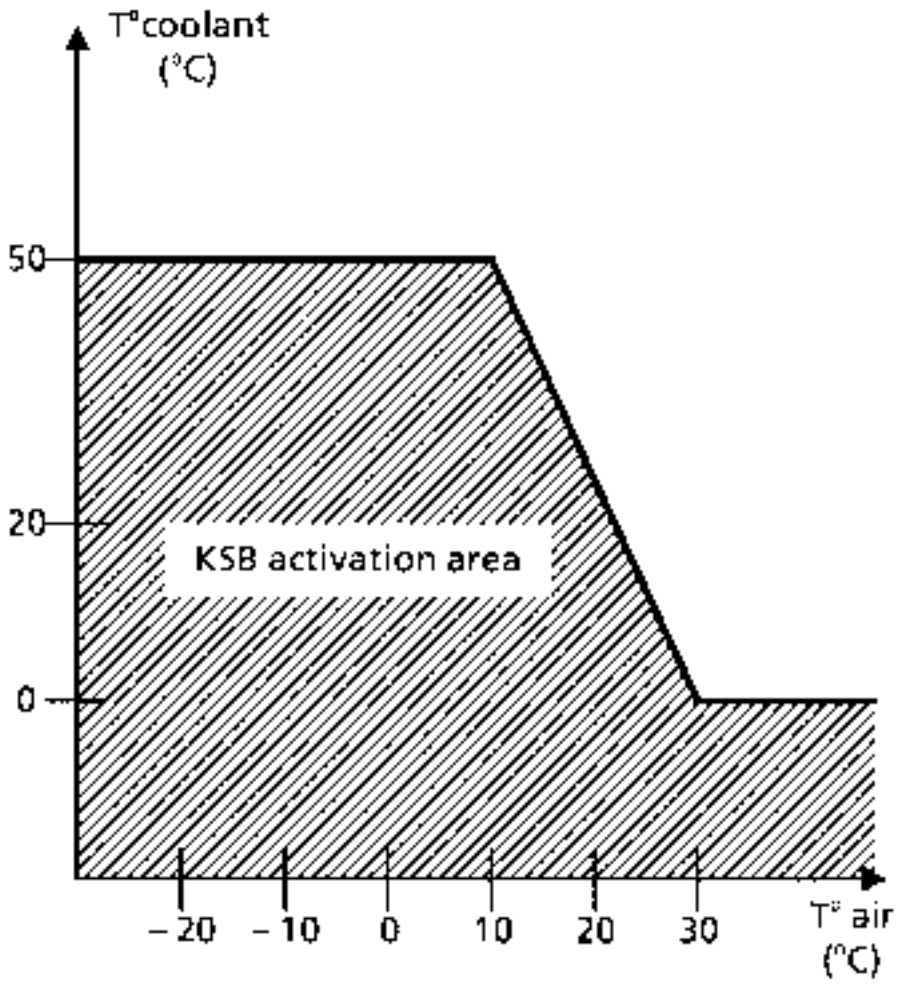
- finally when the coolant temperature > 60°C,
- temporarily when the computer receives the information 60 % load (from the load potentiometer), for more than 3 seconds ; the function is re-established when the engine returns to idle speed or low load.

The cold start device (KSB) is controlled by the computer.

The cold start device (KSB) is activated as soon as the ignition is turned on for 8 seconds minimum (after starting), and is then activated or deactivated depending on the following conditions:

a) Air temperature when the ignition is turned on

Example :
Air temperature = 10°C → KSB activated
until coolant temperature = 50°C.



b) Altitude

At altitude, the deactivation of the KSB by air temperature occurs later. Thus, the time that the solenoid valve is energised is increased (as for the electromagnetically controlled ALFB load dependence solenoid).

c) Load and engine speed

In all cases, the KSB is deactivated if:
- engine speed > 2250 rpm.
- full load (load potentiometer information).

Hydraulic load dependence (LFB) reduces the transfer pressure at idle speed and low loads to reduce the advance.

The solenoid valve (ALFB) device suppresses the function (LFB) when the engine is cold. The solenoid valve (ALFB) is controlled by the computer.

Control of the ALFB depends on various parameters:

a) Air temperature when the ignition is turned on

Example :
air temperature = **20°C** → ALFB activated until coolant temperature = **65°C**

b) Altitude

At altitude, the deactivation of the ALFB by air temperature occurs later. Thus, the time that the solenoid valve is energised is increased.

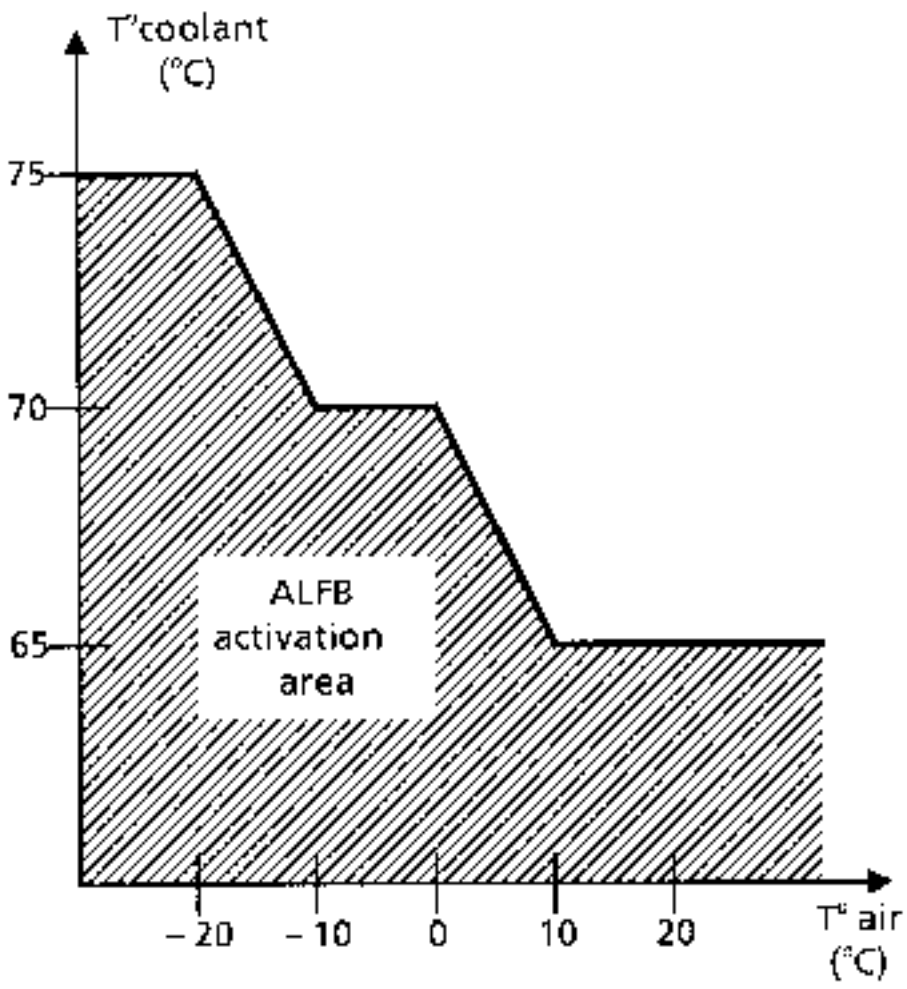
c) Load and engine speed

For noise and depollution reasons, the ALFB is activated if:

65°C < coolant temperature < **80°C**
and
1350 rpm < engine speed < **1900 rpm**

In all cases, ALFB operation is deactivated if:

engine speed > **3050 rpm** or full load (load potentiometer information).



The fast idle function is controlled by the computer via a solenoid valve with LDA control. This is for versions with air conditioning only.

When the ignition is turned on, the fast idle control is activated if the air temperature < 10°C.

The function is deactivated when coolant temperature > 60°C.

The E.G.R. function is controlled by the computer via an R.C.O. solenoid valve (cyclical opening ratio).

The EGR valve is controlled pneumatically. Its opening depends on the solenoid control current.

For:

I = 1.1 Amps → fully open
I = 0 Amps → closed
0 Amps < I < 1.1 Amps → partially open

The current supplied by the computer to the solenoid valve depends on the following parameters:
- the load,
- the engine speed,
- the altitude,
- the coolant temperature,
- the air temperature.

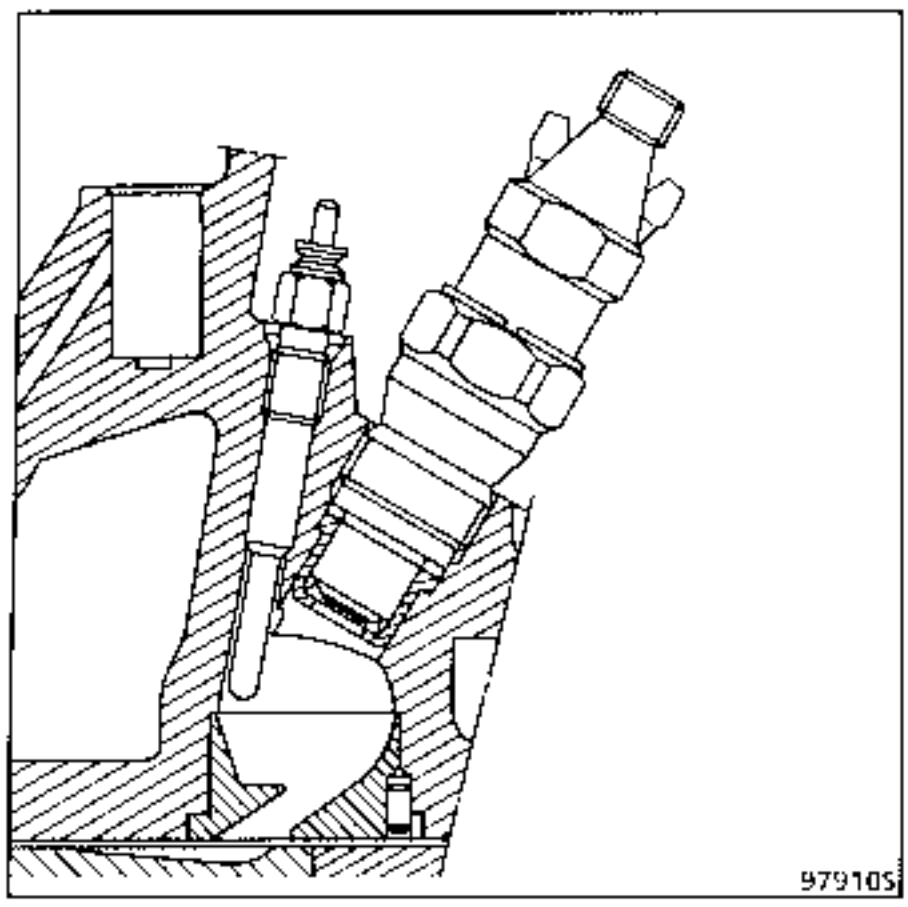
In all cases, EGR operation is deactivated if:

Air temperature ≤ 19°C
and
Coolant temperature < 40°C

Vehicle stationary at idle speed for longer than 20 seconds.

If there is a fault with one of the components listed below, the computer enters "**defect mode**", which means that replacement values are used to ensure engine operation.

Faulty component	Set values (for replacement)				
	Pre-postheating time	Fast idle	EGR function	ALFB	KSB
Coolant sensor	Pre : 13.5 sec Post : 10 sec	Activation 3 min 16 sec	Cut	Cut: – full load – engine speed > 3050 rpm	Minimum time 8 seconds. Cut : – full load – engine speed < 2250 rpm
Air sensor	–	Activated if coolant temperature < 60°C	Cut	Coolant temperature – 75°C	Coolant temperature – 50°C
Load potentiometer	Pre : not used Post : 10 sec	–	Cut	No defect mode	No defect mode
Heater plugs	Set of faulty plugs no longer activated	–	–	–	–
TDC sensor	–	–	Cut	No defect mode	No defect mode
Pressure sensor	–	–	Cut	Altitude = 2500 m	Altitude = 2500 m



This engine is fitted with ultra-fast heater plugs.
The electrode is raised to temperature (850°C) in between 3 and 7 seconds depending on the internal specifications of the plug. It is fitted with a 5 mm electrode which has a new position in the pre-chamber to limit engine noise during the postheating phase.

Replacement

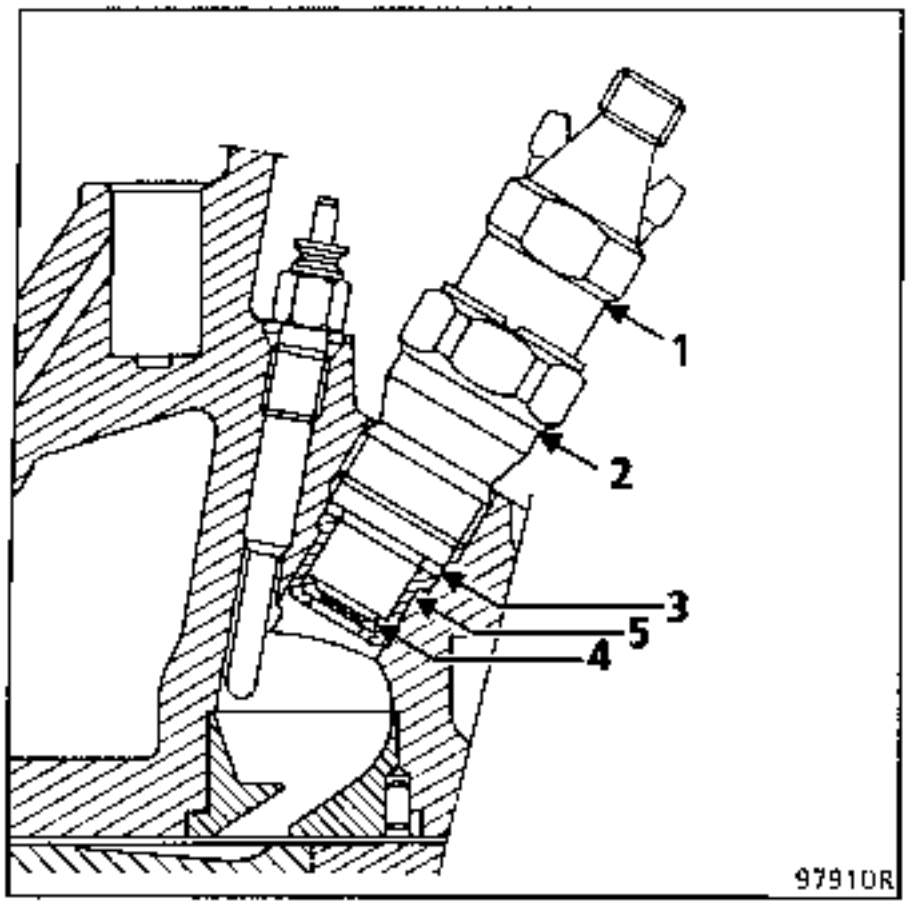
The inlet manifold does not need to be removed, but the operation to replace the plugs must be carried out with the greatest possible care to avoid damaging the cylinder head threads or losing a foreign body inside the plug opening.

Proceed as follows:
- disconnect the battery,
- remove the plug leads, making two needles to thread them under the inlet manifold,
- blow the dust off the plugs,
- slacken the plugs using a 10 mm socket + joint + extension + junior ratchet.

When refitting, the following tightening torques must be observed:
- heater plugs : 1.5 ± 0.3 daN.m

- inlet manifold mounting nut:
  2.2 ± 0.2 daN.m

Special notes



1 + 2 : Injector holder assembly.

3 : Injector holder assembly seal on cylinder head.

4 : Flame arresting washer.

5 : Injector protector.

The injector holder is screwed into the cylinder head. The inlet manifold does not need to be removed to remove the injector holder.
To remove the high pressure pipes from the injectors, use wrench **Mot.1383**. To remove the injector holder assembly, use the 27 mm long socket **Mot. 997** .

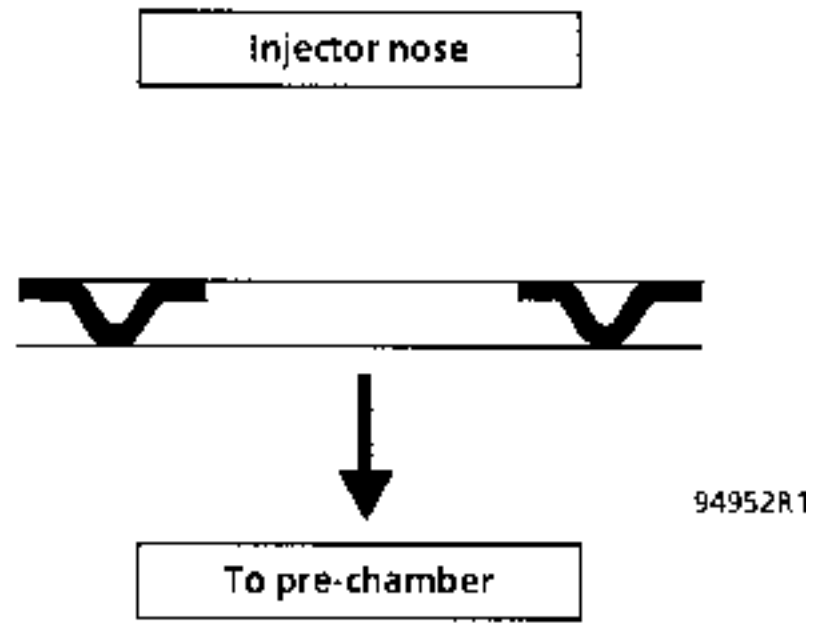
The following tightening torques must be observed:

- Lower section (2) on upper section (1) of the injector holder: 8 ± 1 daN.m

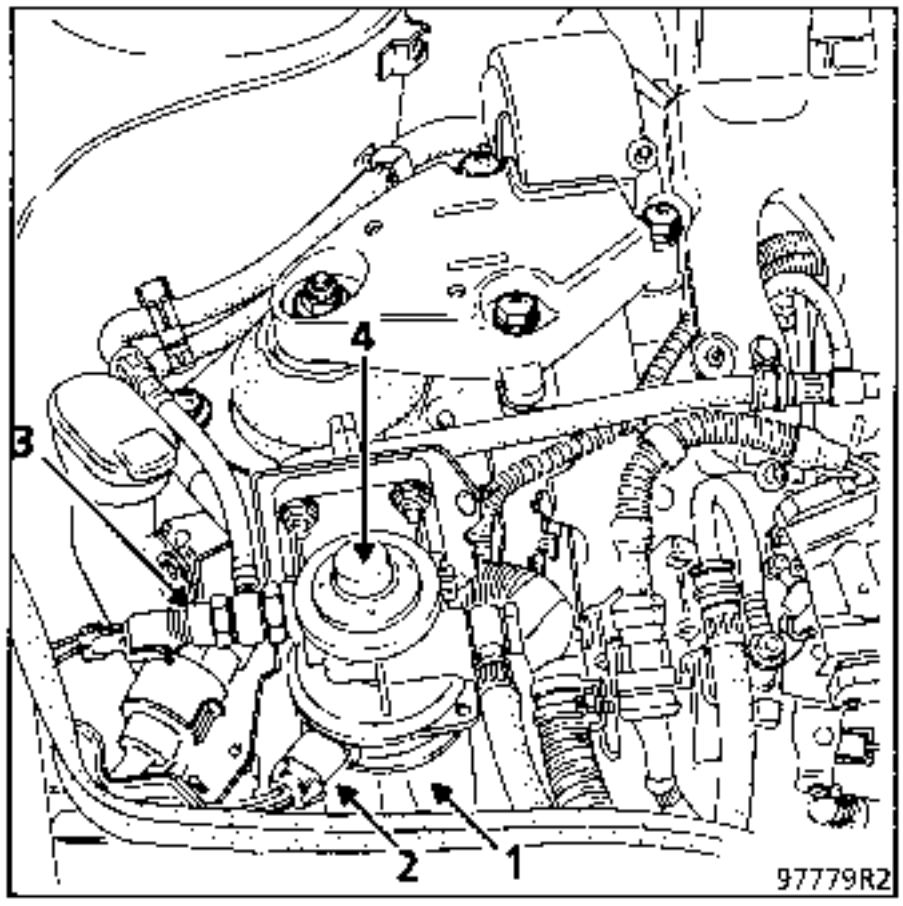
- Injector holder on cylinder head : 7 + 1 daN.m

Each time the injector holder is removed, the copper seal must be renewed together with the flame arresting washer.

Position of flame arresting washer



PRESENTATION



1 : Fuel filter.

2 : Electric heater.

3 : Temperature switch.

4 : Manual priming pump.

This filter is fitted with an electric heater and a temperature switch which ensures the heater is supplied depending on the temperature of the diesel fuel. The heater is rated at approximately 150 Watts.

The electric heater is supplied for a diesel fuel temperature less than 0° C and the feed is cut when the temperature of the fuel is greater than 8° C (± 3° C).

METHOD FOR REPLACING THE CARTRIDGE:

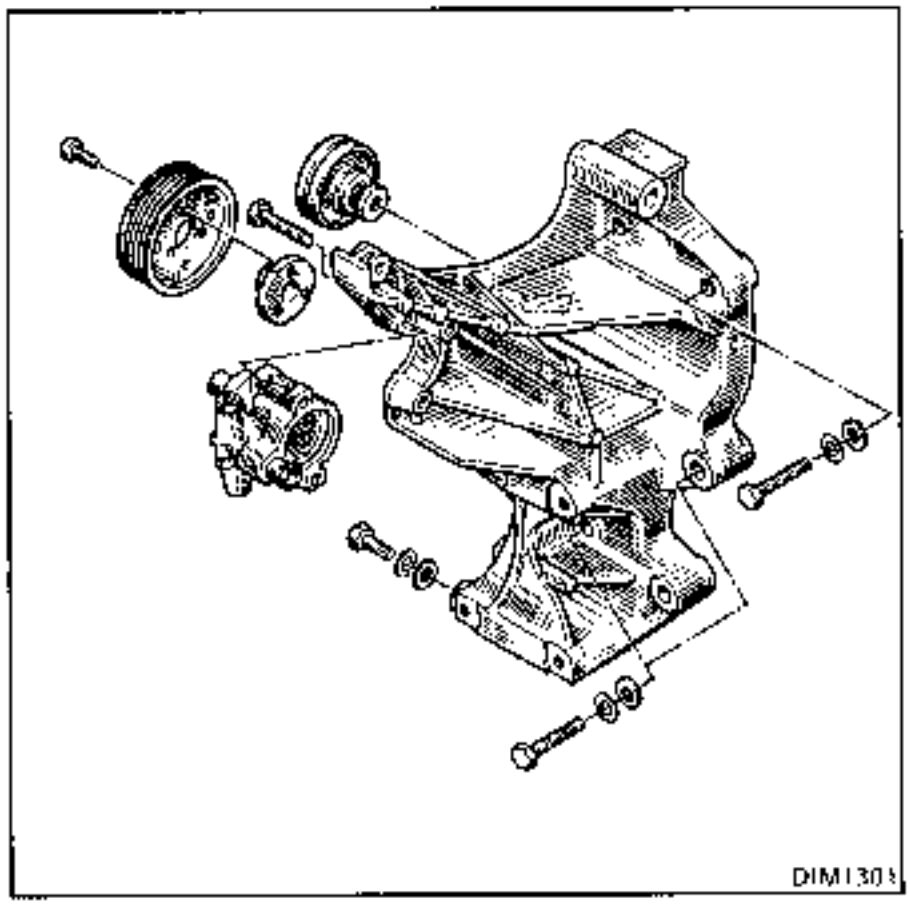
The mounting bolts for the filter body on its mounting may need to be removed to replace the cartridge.

In this case renew the copper seals for the banjo connectors removed.

SPECIAL TOOLING REQUIRED	
Mot. 453-01	Hose clamp pliers
Mot. 1273	Tool for checking belt tension

TIGHTENING TORQUES (in daN.m)	
Pump pulley mounting bolt	0.8
Tension wheel mounting nut	5
Power assisted steering pump mounting bolt	3

Diagram of mounting.



REMOVAL

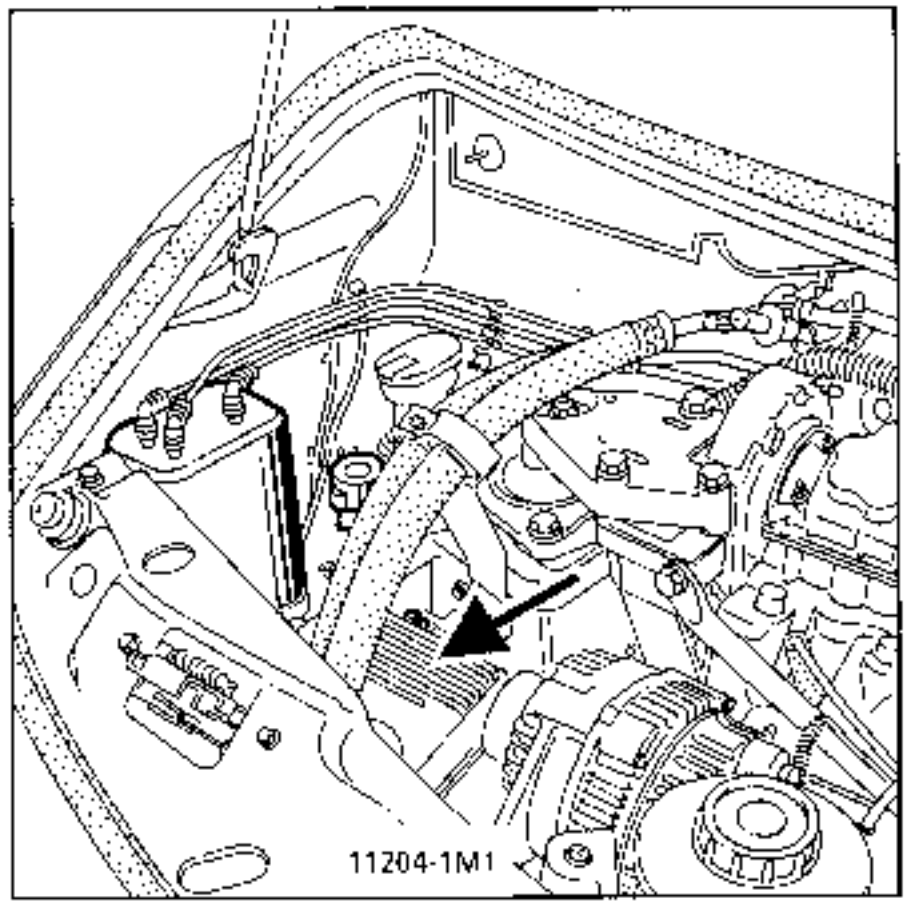
Put the vehicle on a lift, front wheels hanging free.

Disconnect the battery.

Fit clamp **Mot. 453-01** to each of the pipes from the power assisted steering fluid reservoir.

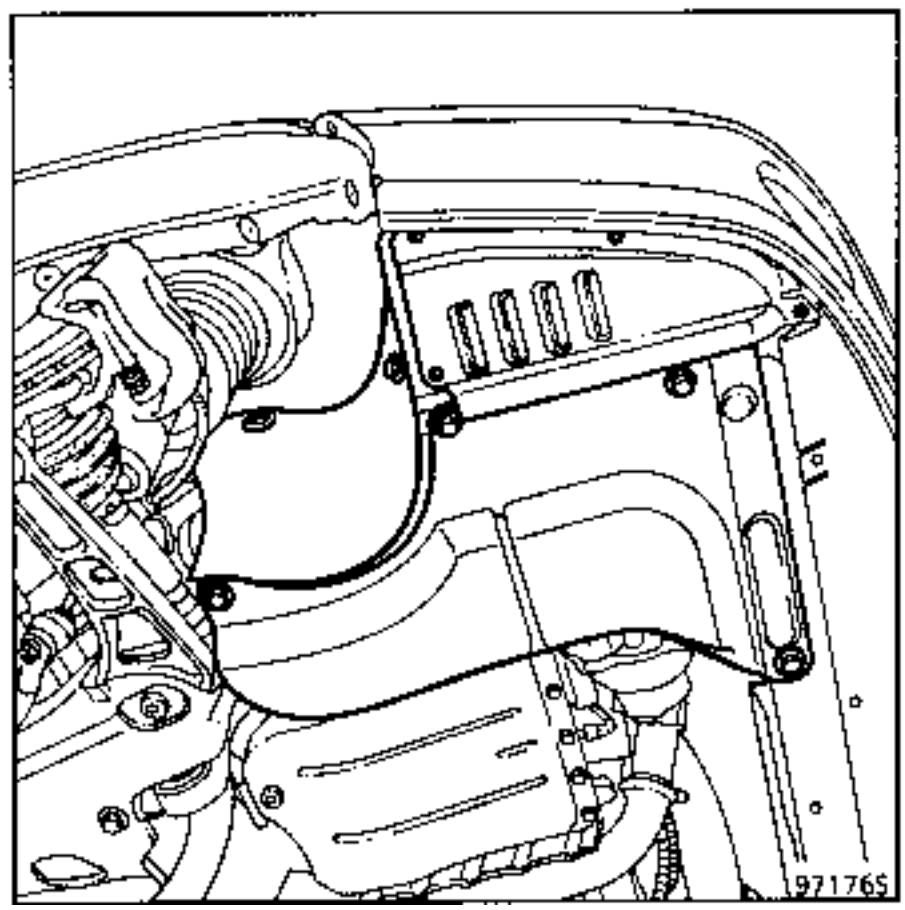
Take precautions to catch the oil which will run out.

Disconnect the injection computer and remove it (2 bolts).



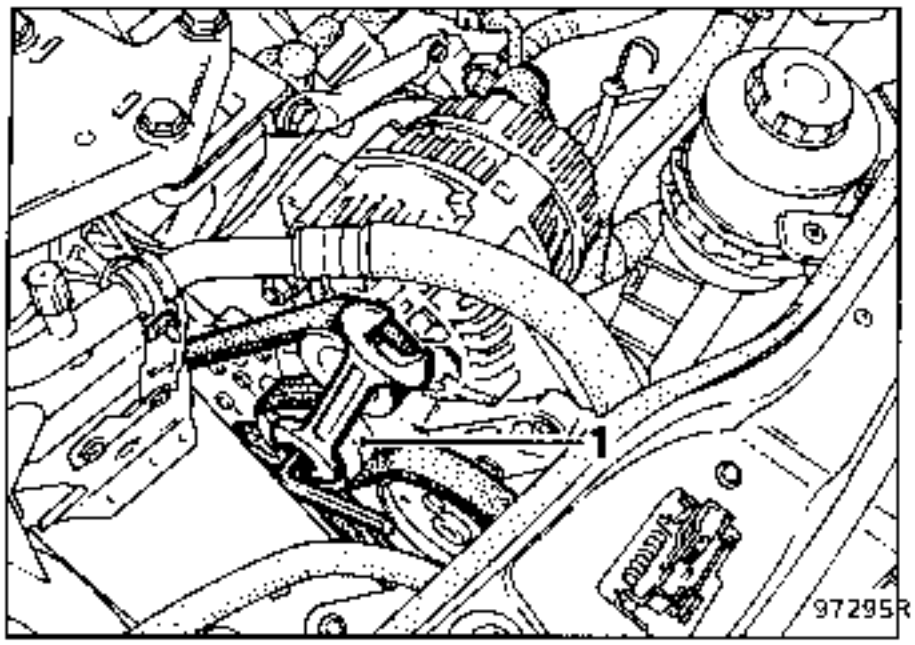
Lift the vehicle.

Remove the front right hand wheel, remove the right hand wheel arch protection.

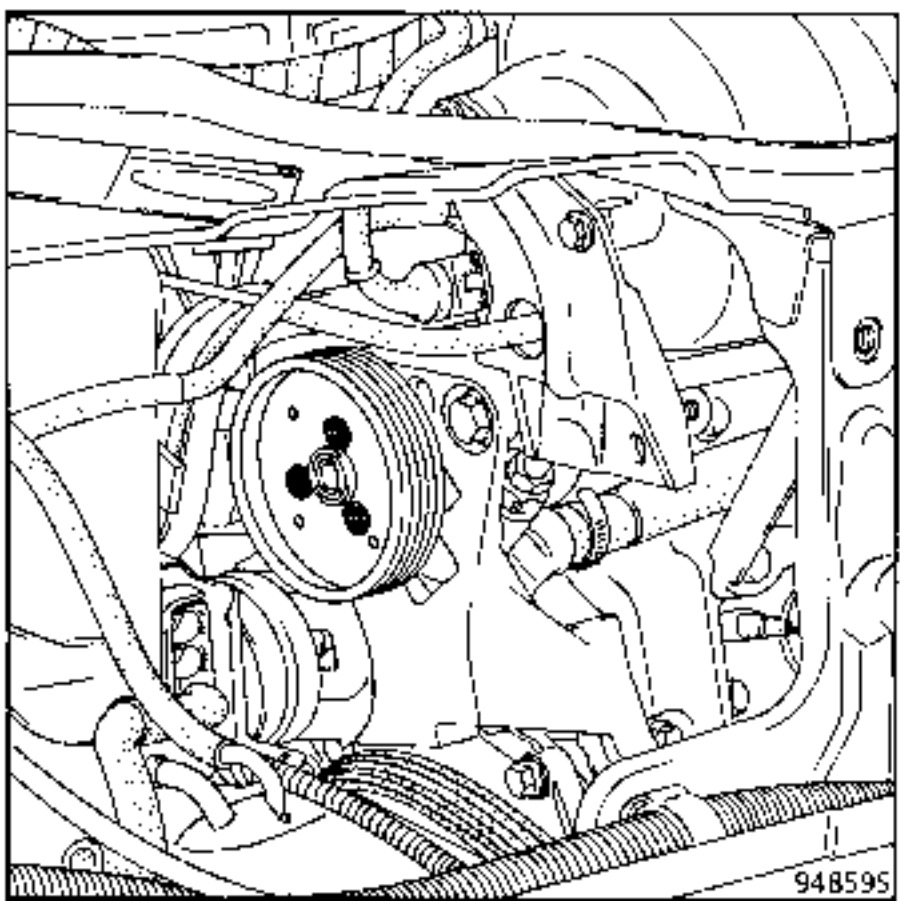


Disconnect the pipes for:
- supply,
- high pressure.

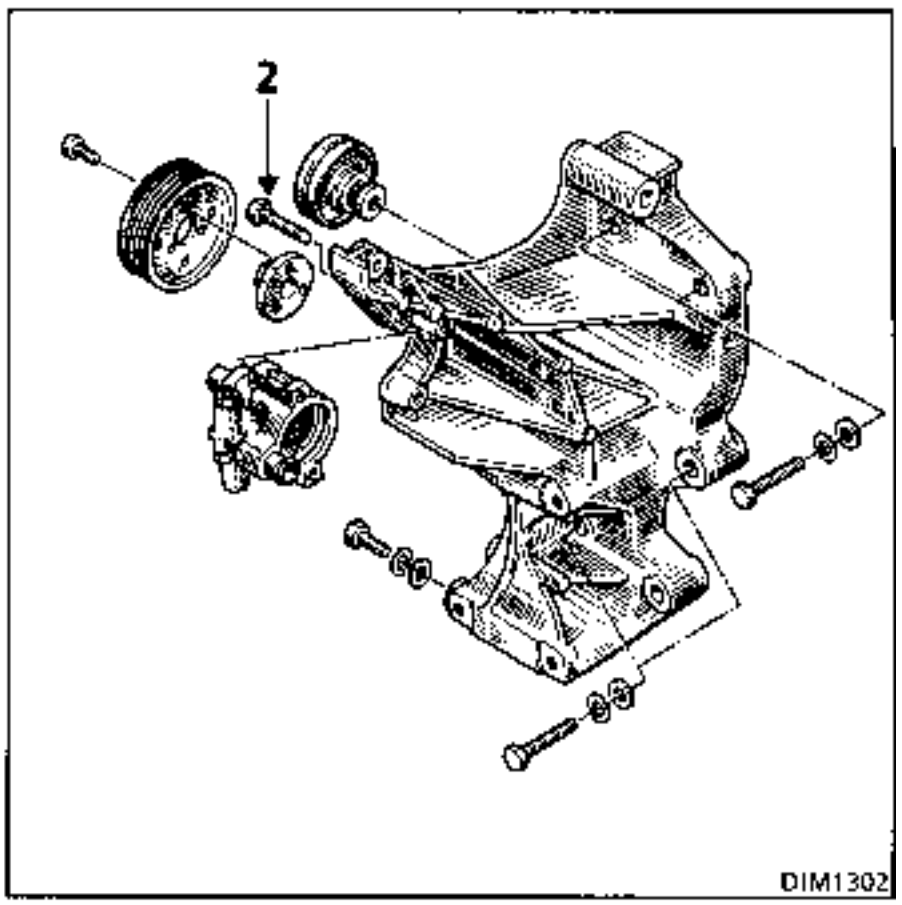
Slacken the belt at the tension wheel using a 7 mm allen key for the central locking bolt and an open or combination wrench of 22 mm for the tension wheel.



Release the belt.
Remove:
- the pump pulley (3 Torx 30 bolts).



- the 3 mounting bolts (2) for the pump on its support.



Remove the pump.

REFITTING - Special notes

Refer to section 11 for refitting the accessories belt.

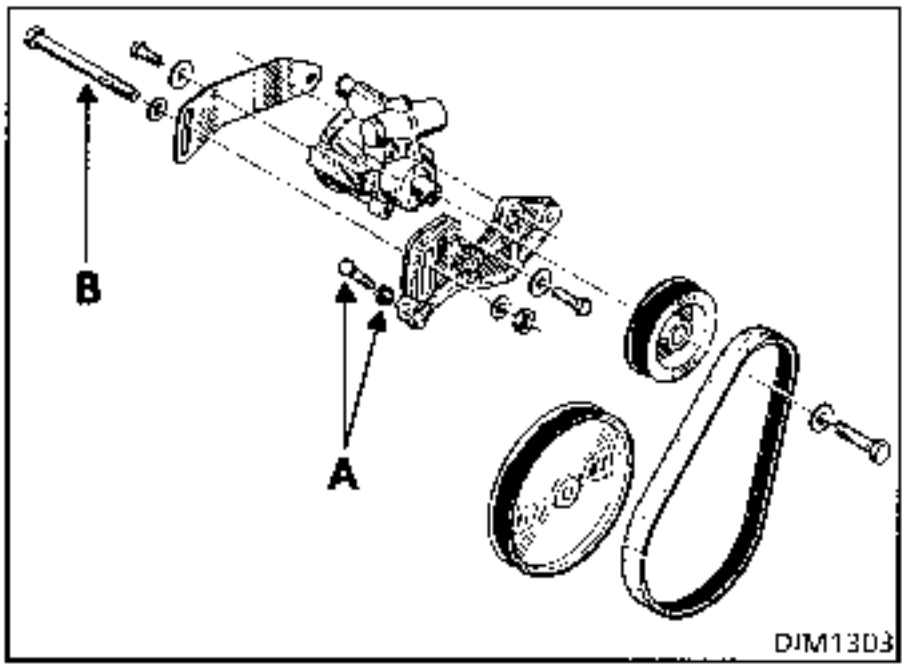
The method for tensioning the belt must be observed, using tool **Mot. 1273** (see method in the following pages).

Any belt which has been slackened must be renewed.

Fill and bleed the circuit.

SPECIAL TOOLING REQUIRED		
Mot.	453-01	Hose clamp pliers
Mot.	1273	Tool for testing belt tension

TIGHTENING TORQUES (in daN.m)	
Pump mounting bolt on rocker box cover	5
Bolts securing the mountings on pump	2.5



REMOVAL

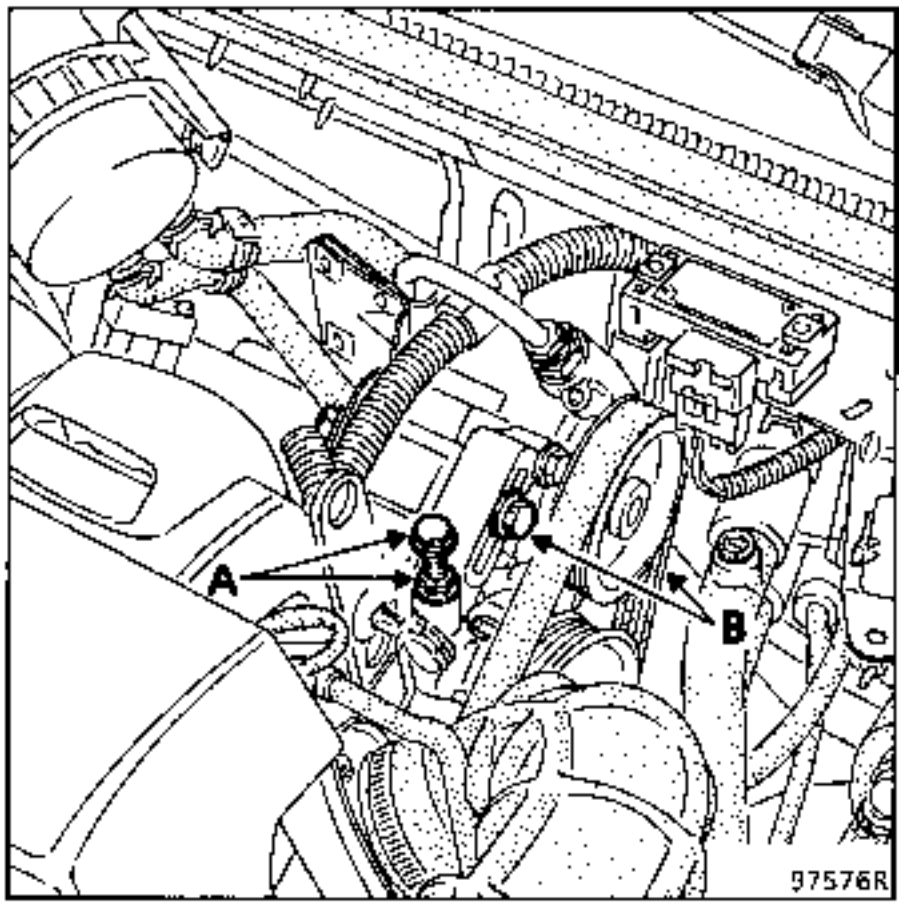
Fit a clamp **Mot. 453-01** to each of the pipes from the power assisted steering fluid reservoir.

Take precautions to catch the oil which will run out.

Disconnect the pipes for:
- supply,
- high pressure.

Loosen the belt tensioner assembly (A) (tension bolt - lock nut) .

Remove the two pump mounting bolts (B).



Remove the pump belt.
Remove the pump and mounting assembly.

REFITTING -Special notes

The method for tensioning the belt must be observed, and tool **Mot. 1273 must be used** (see section 11 - tensioning belts).

Fill and bleed the circuit.

SPECIAL TOOLING REQUIRED		
Mot.	453-01	Hose clamp pliers
Mot.	1202	Hose clip pliers
Mot.	1368	Tool for tightening eccentric tension wheel bolt
Mot.	1369	Tool for tensioning eccentric tension wheel
Mot.	1370	Tool for tensioning automatic tensioner
Mot.	1376	Tool for checking accessories belt tension

TIGHTENING TORQUES (in daN.m)	
Wheel bolt	10
Eccentric tension wheel bolt	4

REMOVAL

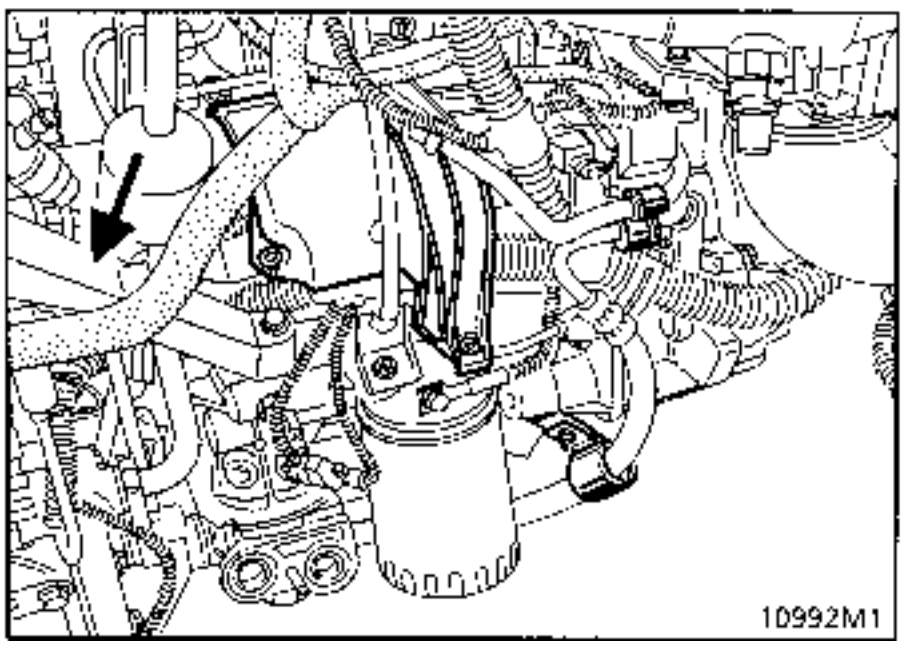
Put the vehicle on a 2 post lift.

Disconnect the battery.

Remove:
- the accessories belt (see section 11 ; removing the accessories belt in removing the timing belt).

- the accelerator cable,

- the PAS pump - engine support bar.



Fit clamp **Mot. 453-01** to the supply pipe for the power assisted steering pump.

Disconnect the supply and high pressure pipes from the power assisted steering pump.

IMPORTANT: the alternator must be protected against any splashes of oil.

Remove:
- the three power assisted steering pump support mounting bolts.

- the PAS pump - support assembly.

REFITTING - Special notes

Refitting is the reverse of removal.

Adjusting the accessories belt tension

Fit the new belt following the method described in the following pages.

Fill and bleed the circuit.

NOTE : never refit a belt once it has been removed - renew it.

BELT TENSION (cont)

ADJUSTING

TENSION VALUES

When the engine is cold (ambient temperature), fit the new belt.

Fit the sensor of tool **Mot. 1273** at the point shown (→).

Turn the knob on the sensor until it clicks.

Tighten the belt until the display on tool **Mot. 1273** shows the fitting value specified below.

Lock the tension wheel, test and adjust the value.

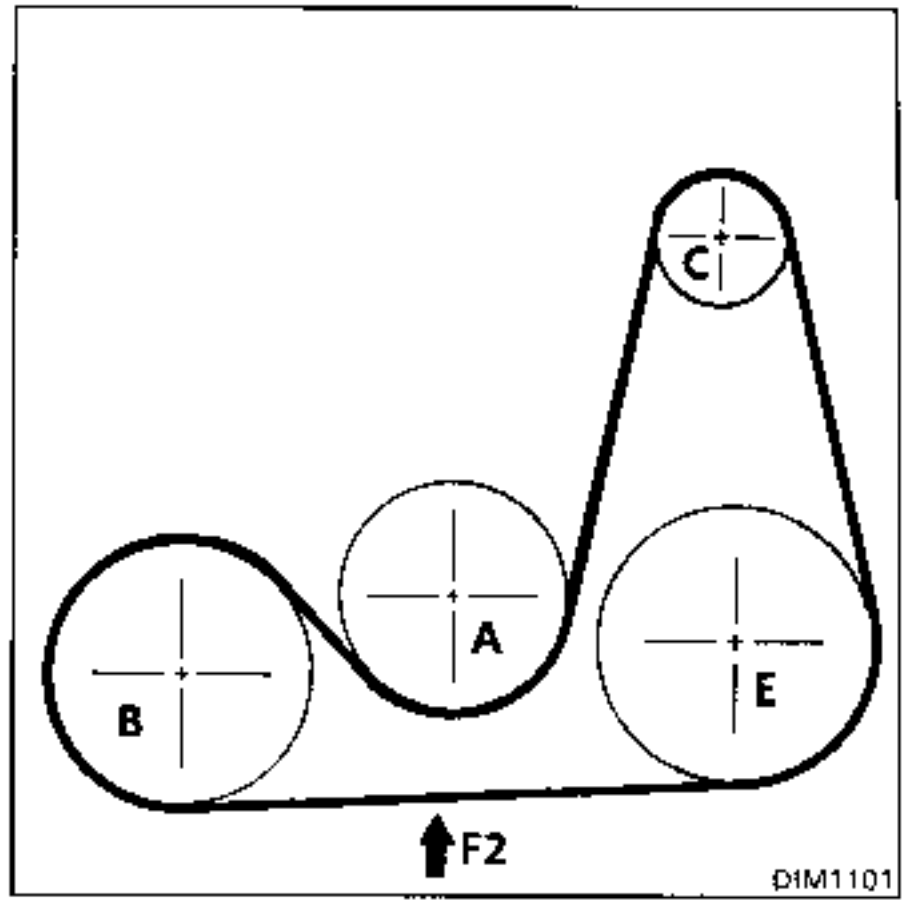
Turn the crankshaft 3 times.

Check the tension value is between the fitting value and the minimum operating value (same value if the tension is being tested without the belt being removed).

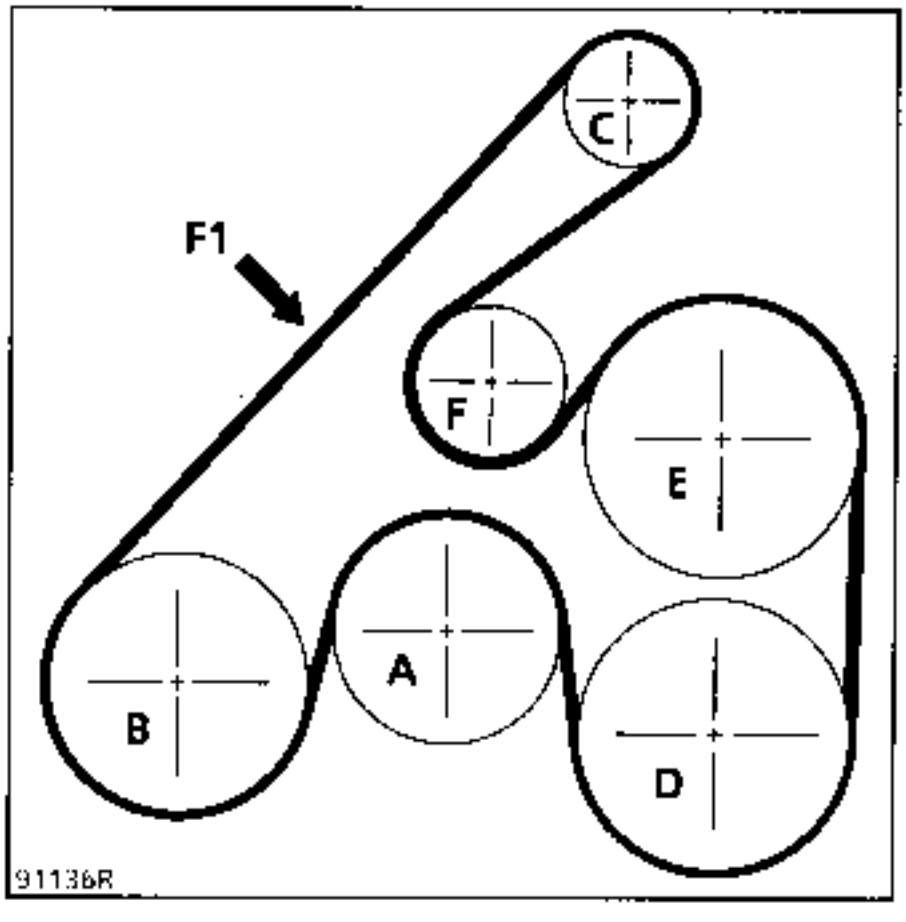
Once a belt has been removed, do not refit it.

Tension (US = SEEM Units)	Power assisted steering belt (F2) multi-tooth	Air conditioning belt (F1) multi-tooth
Fitting	112 ± 6 US	114 ± 5 US
Minimum operating	62 US	62 US

F engine without air conditioning



F engine with air conditioning



A Water pump
B Crankshaft
C Alternator
D Air conditioning compressor
E Power assisted steering pump
F Tension wheel
→ Point for checking tension

BELT TENSION (cont)

ADJUSTING

TENSION VALUES

When the engine is cold (ambient temperature), fit the new belt.

Fit the sensor of tool **Mot. 1273** at the point shown (→).

Turn the knob on the sensor until it clicks.

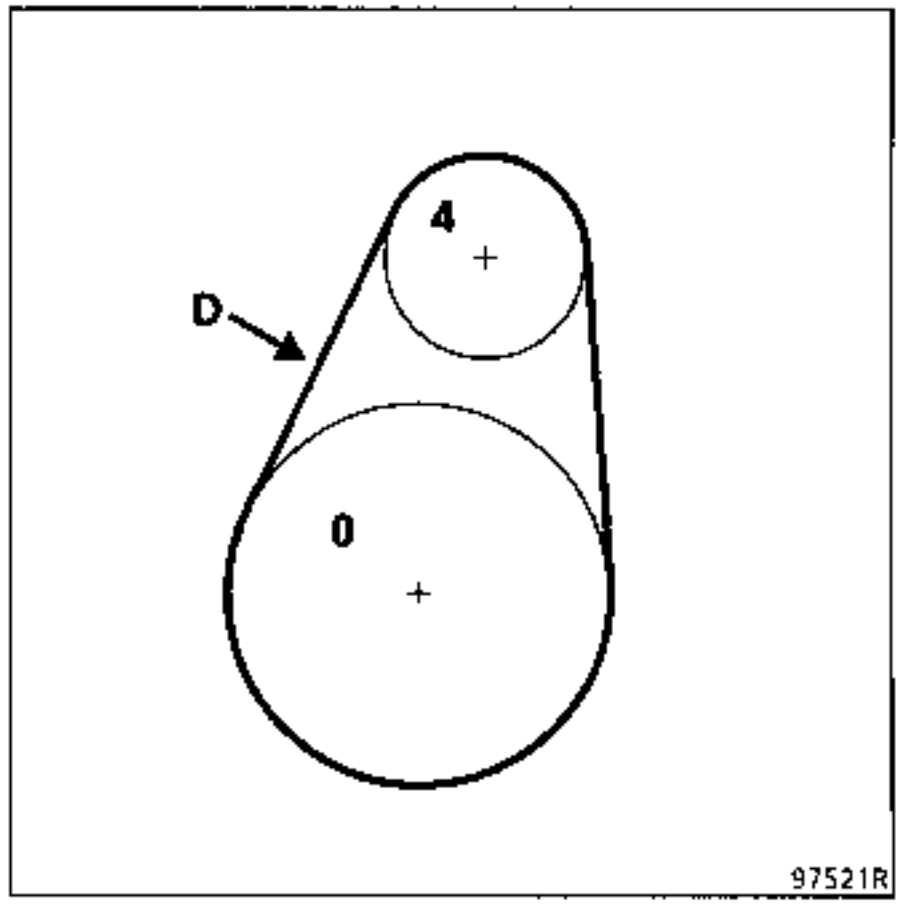
Tighten the belt until the display on tool **Mot. 1273** shows the fitting value specified below.

Lock the tension wheel, test and adjust the value.

Turn the crankshaft 3 times.

Check the tension value is between the fitting value and the minimum operating value (same value if the tension is being tested without the belt being removed).

Once a belt has been removed, do not refit it.



0 Camshaft
4 Power assisted steering pump
D Point for checking tension

Tension (US – SEEM Units)	Power assisted steering belt (F2) multi-tooth
Fitting	**94 ± 4** US
Minimum operating	**56** US

REPLACING THE PULLEY

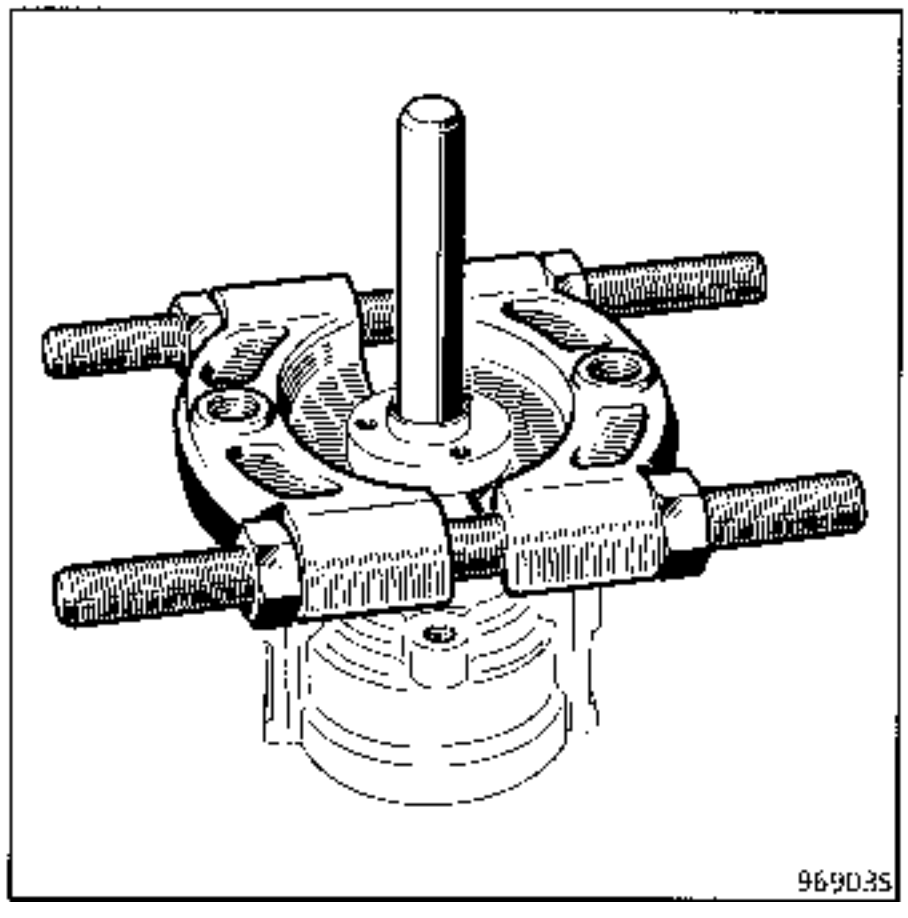
SPECIAL TOOLING REQUIRED	
Dir. 1083	Tooling for refitting the pulley or hub on the power assisted steering pump
Dir. 1308	Pulley extractor
EQUIPMENT REQUIRED	
FACOM U53T	Extractor
NAUDER	Tool for refitting pulley or hub on PAS pump

If the power assisted steering pump is replaced, the Parts Department supplies the new pump without a pulley. The old pulley must therefore be removed to be fitted to the new pump (Z ENGINE) or the hub must be extracted (F ENGINE).

F ENGINE

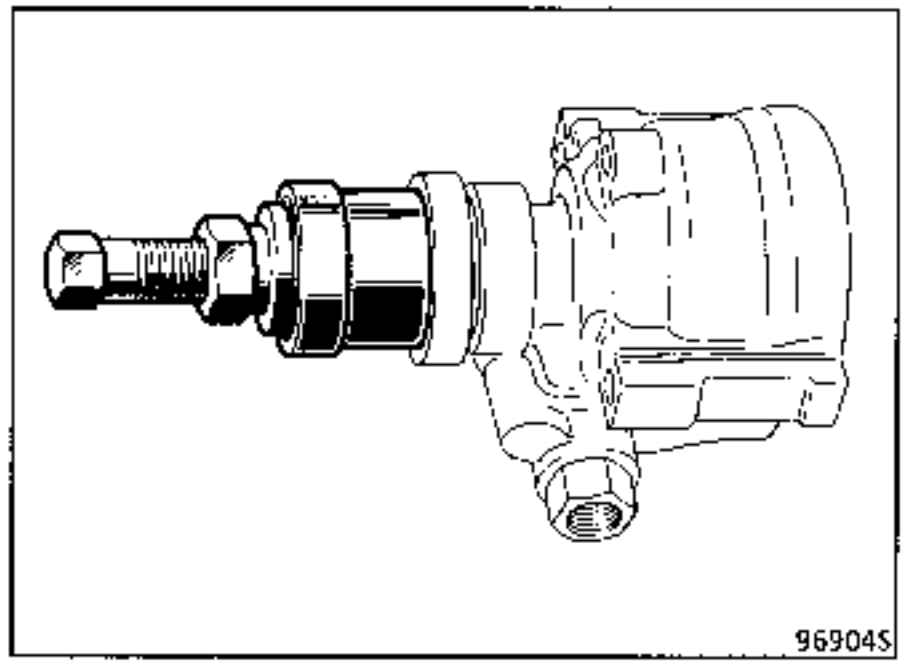
REMOVAL (hub)

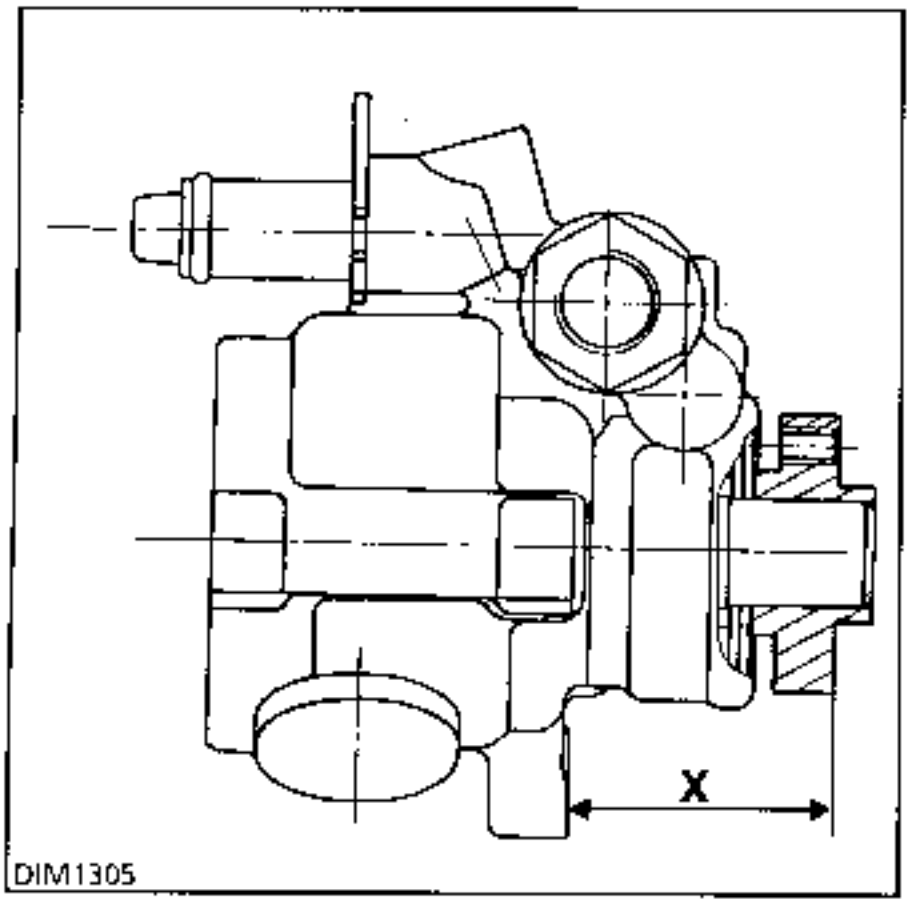
Use the press with an extractor.



REFITTING

Press the hub on using tool Dir. **1083** or tool **NAUDER** (see MATERIALS section) until dimension **X = 40.6 mm** is obtained.

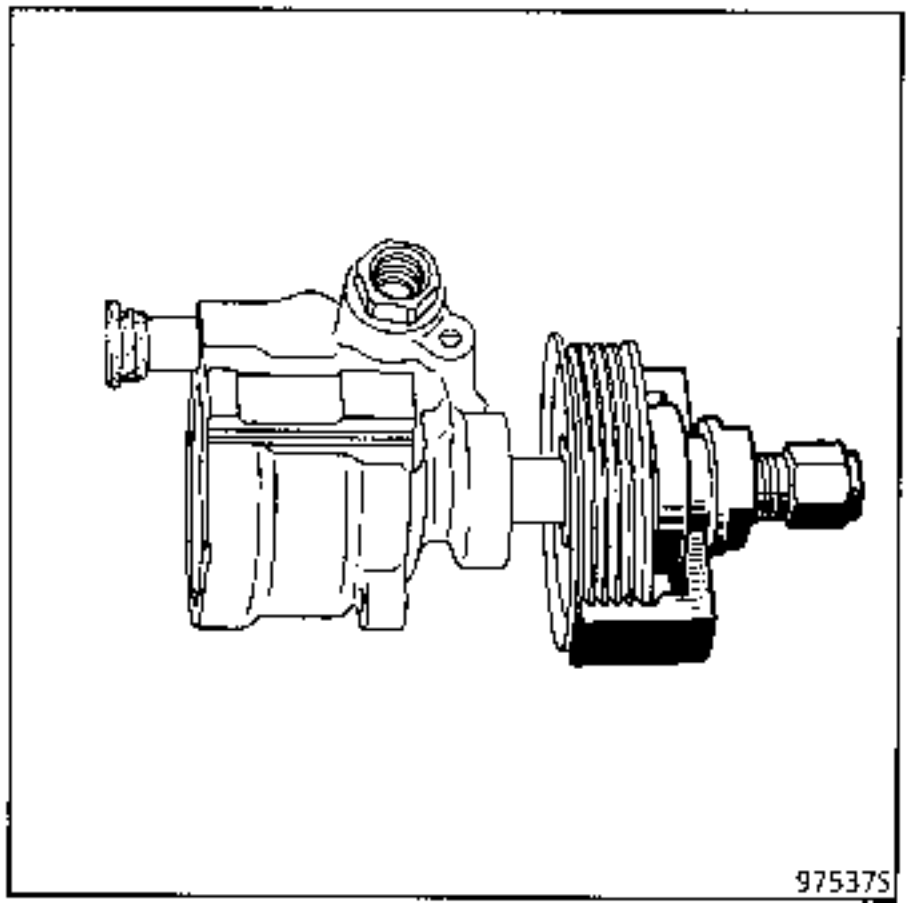


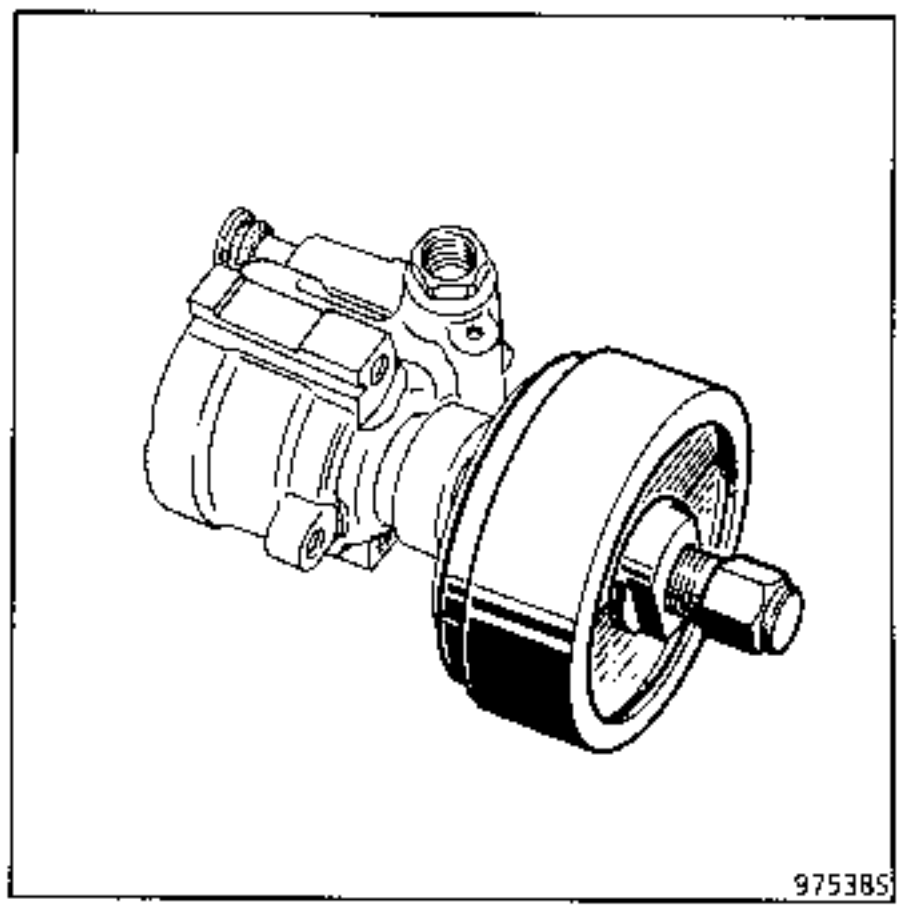


Z ENGINE

REMOVAL (pulley)

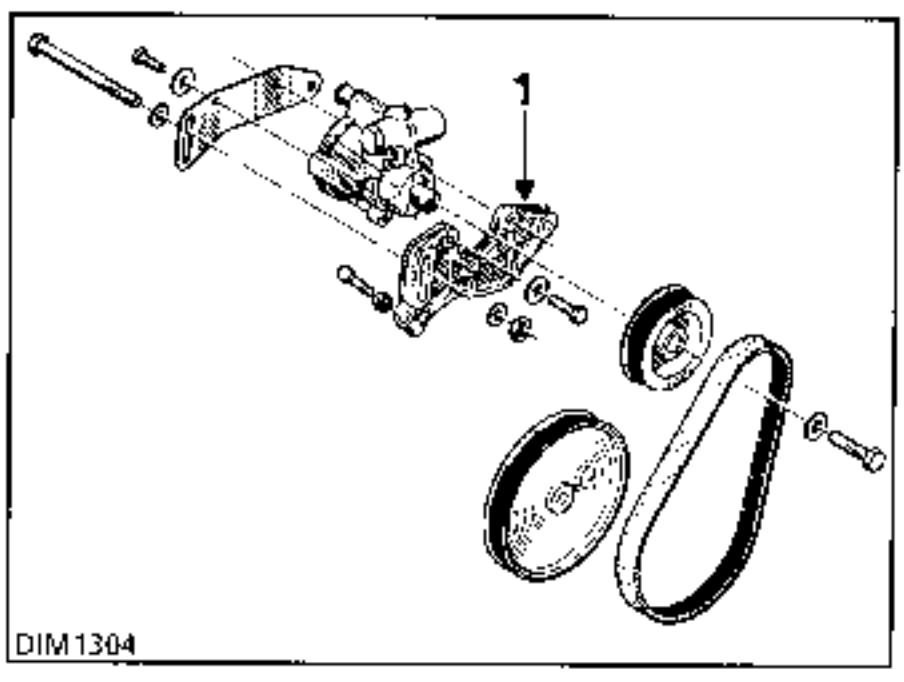
Use **tool Dir. 1308** to remove the pulley.



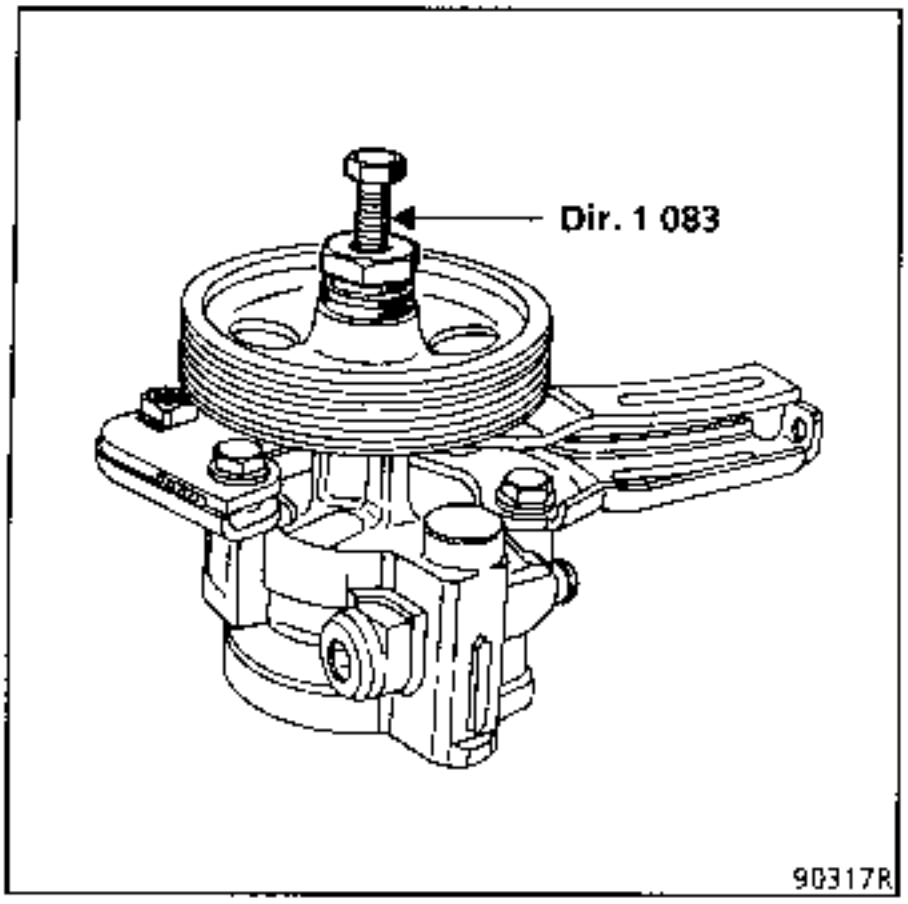


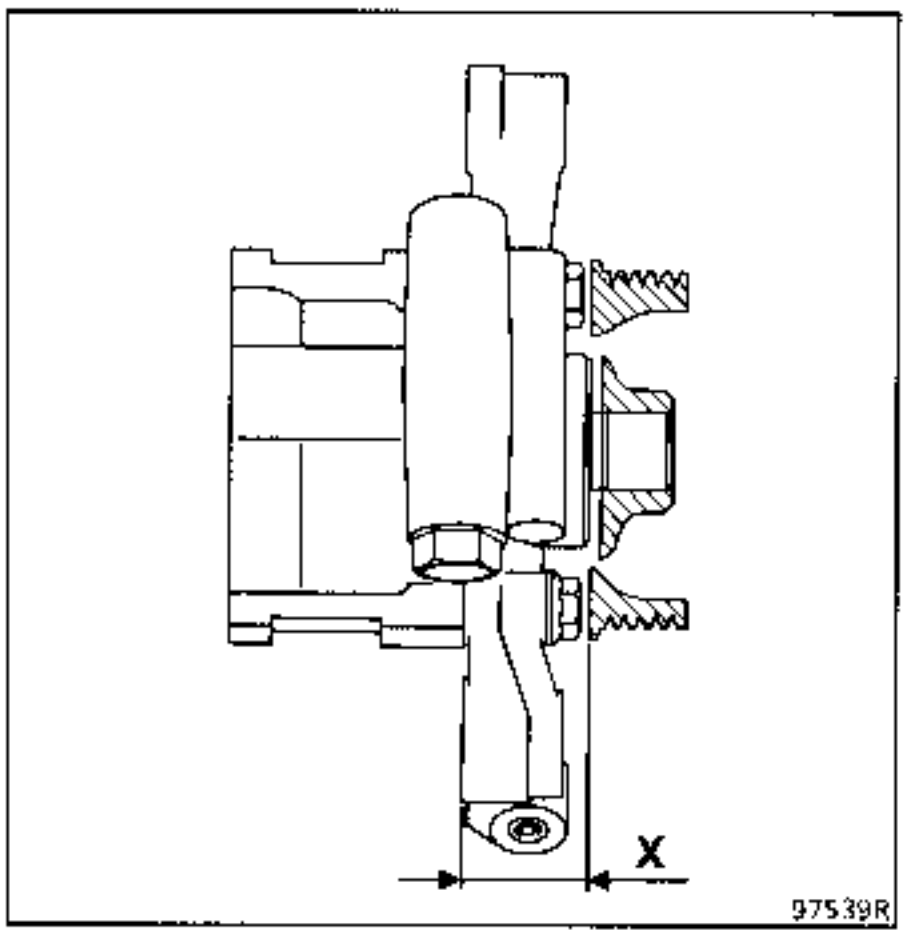
REFITTING

NOTE : before refitting the pulley, the pump mounting (1) must be fitted into position.



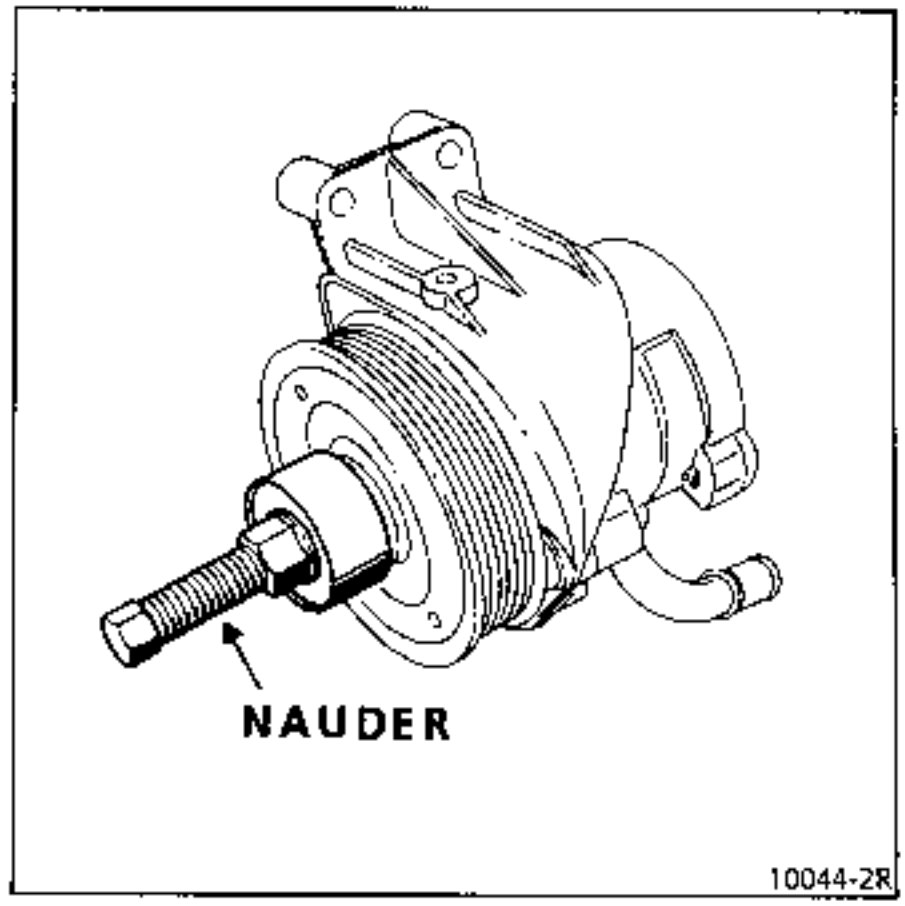
Press the hub on using tool **Dir. 1083** or tool **NAUDER** (see MATERIALS section) until dimension **X = 30.8 mm** is obtained.





G8T ENGINE

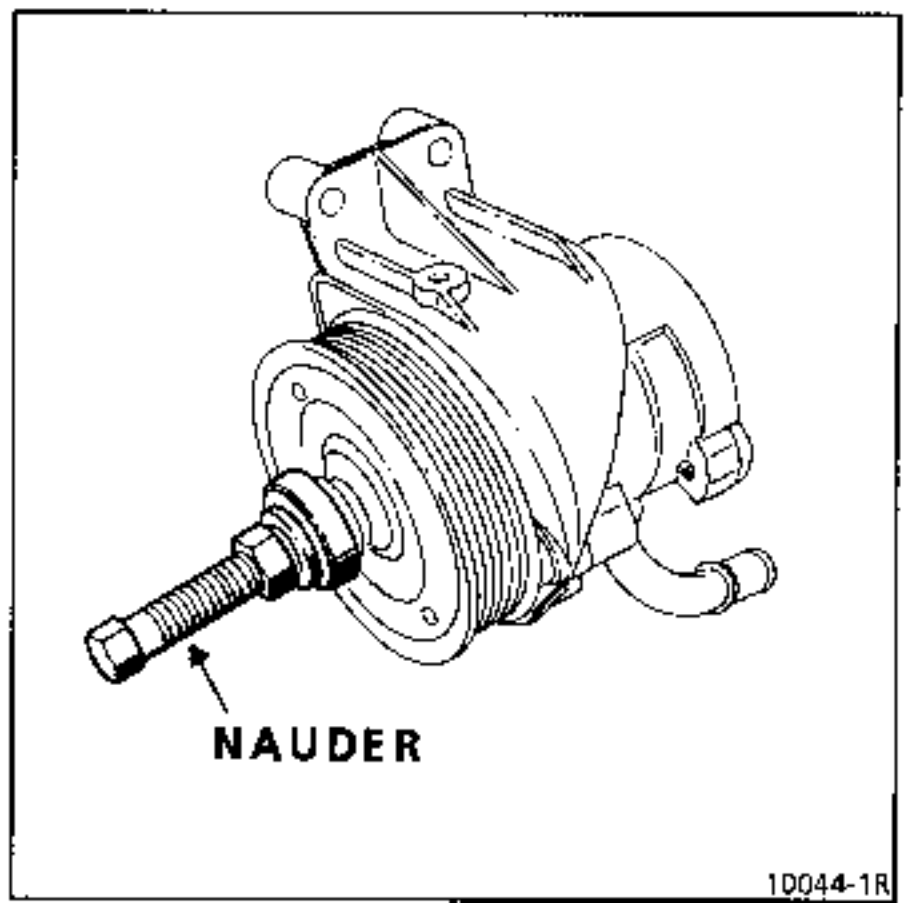
On the bench, using the **NAUDER** tool, remove the pulley.



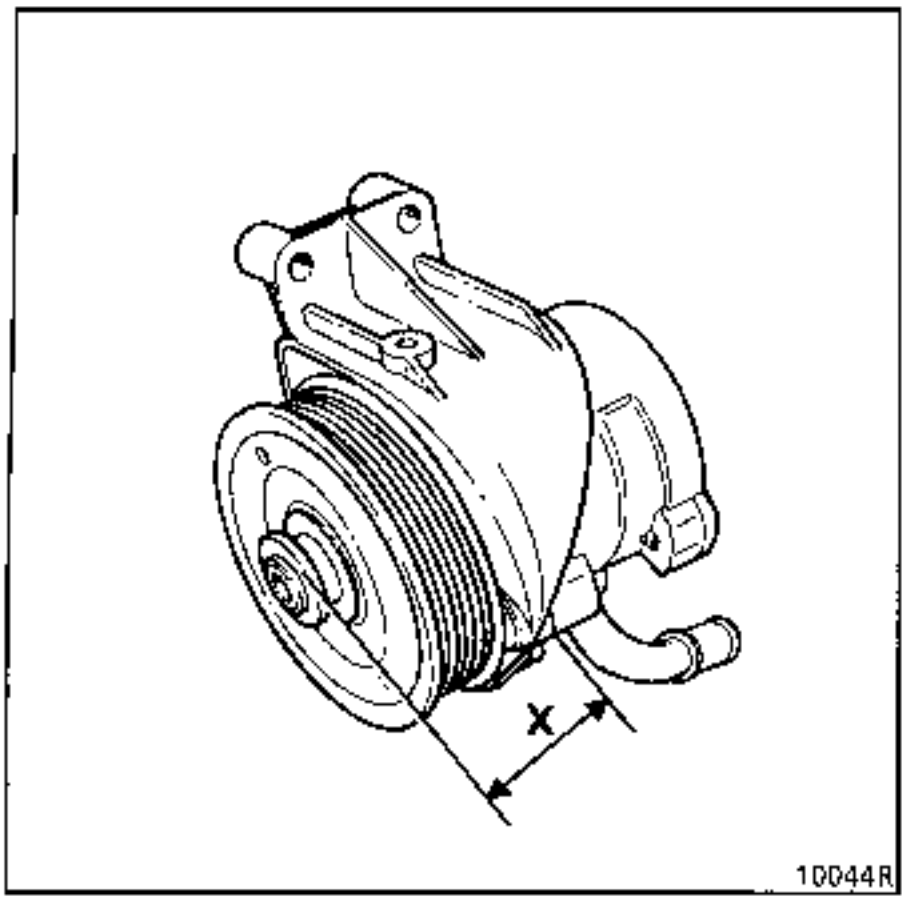
Remove the three **bolts** mounting the pump on its support.

REFITTING - Special notes

Use the **NAUDER** tool to refit the pulley.



Press the pulley on until dimension **X = 66.8 mm** is obtained.



Refitting is the reverse of removal.

Adjusting the accessories belt tension.

Fit the new belt following the method described in **section 011 ; Accessories belt tension**.

Fill and bleed the circuit.

NOTE : never refit a belt once it has been removed - renew it.

FILLING THE CIRCUIT

Oil grade to be used:

- ELF RENAULT MATIC D2 or
- MOBIL ATF 220.

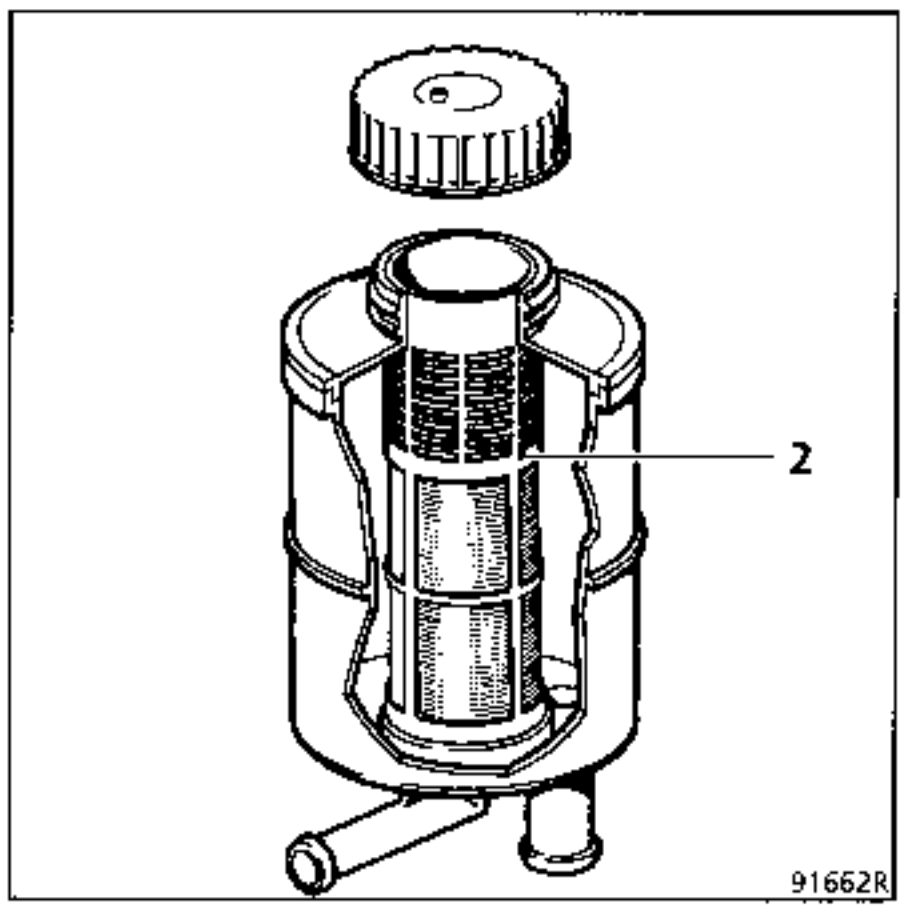
Filling the circuit

Fill the reservoir (to 3/4 full), using a funnel with a 15/100 filter to avoid the introduction of impurities.

Start the engine and gently move the steering wheel from lock to lock.

Top up the level and check the circuit is sealed.

SEPARATE RESERVOIR



The oil should be visible at the level of the marker (2) on the filter sleeve.

LOOKING FOR FAULTS

The main fault is the lack of assistance.

The causes of the lack of assistance may be determined by examining the oil pressure during the following operating phases :

- no action at the steering wheel,
- steering wheel at full lock.

1 - **No action at the steering wheel**

Whatever the engine speed, the pressure should not exceed **5 to 7 bar**.

- at idle speed : pressure too high
  ➔ valve faulty,

- under acceleration : pressure too low
  ➔ regulator faulty.

2 - **Steering wheel at full lock**

This operation should not be carried out for a long period to avoid overheating the oil.

When the steering wheel is held at full lock, the maximum pressure should be:
86 to 93 bar - F engine
93 to 100 bar - Z engine
93 to 103 bar - G engine

The difference in pressure between full lock on the right and left hand sides should not exceed **5 bar**.

- pressure too low, pressure gauge needle fluctuates :
  ➔ regulator faulty,

- pressure too low, pressure gauge needle steady :
  ➔ . belt slack,
  . valve faulty,
  . internal cylinder leak,

- difference in pressure between full lock on either side :
  ➔ valve faulty.

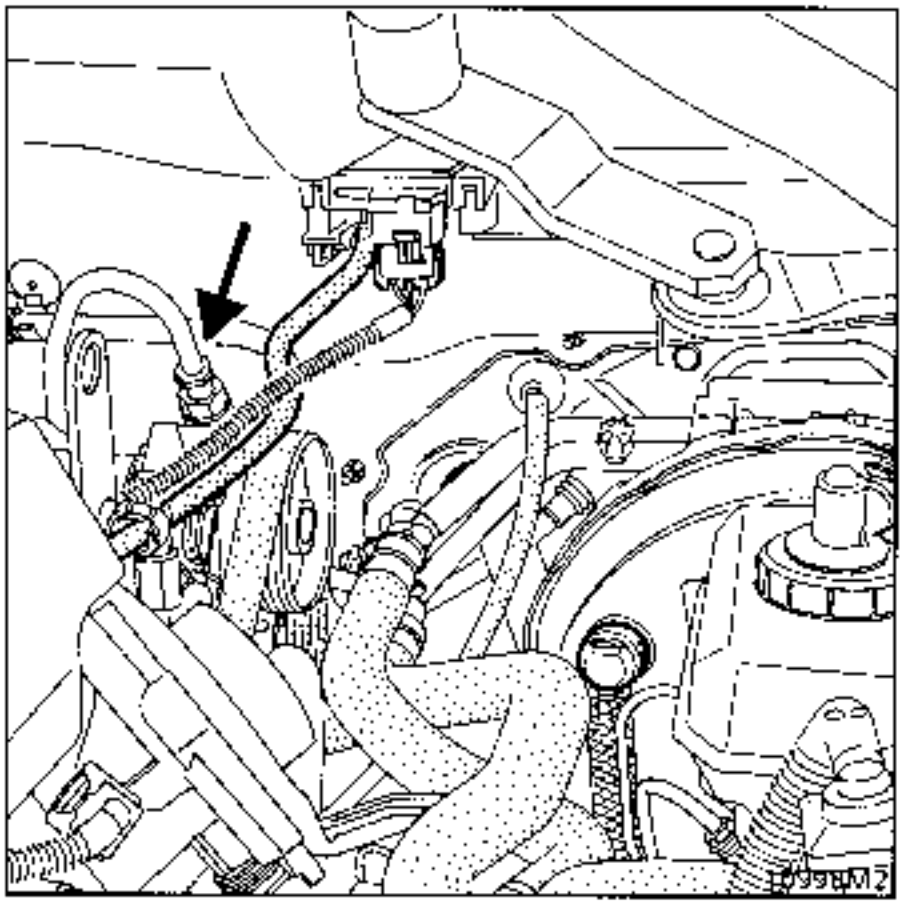
CHECKING THE OIL PRESSURE

SPECIAL TOOLING REQUIRED		
Dir.	803	Metric thread union
Dir.	1204	Union for measuring pressure
Mot.	453 - 01	Hose clamp pliers
Fre.	1 085	Pressure gauge
	or	
Fre.	244 - 03	
Fre.	284 - 06	Connecting pipe

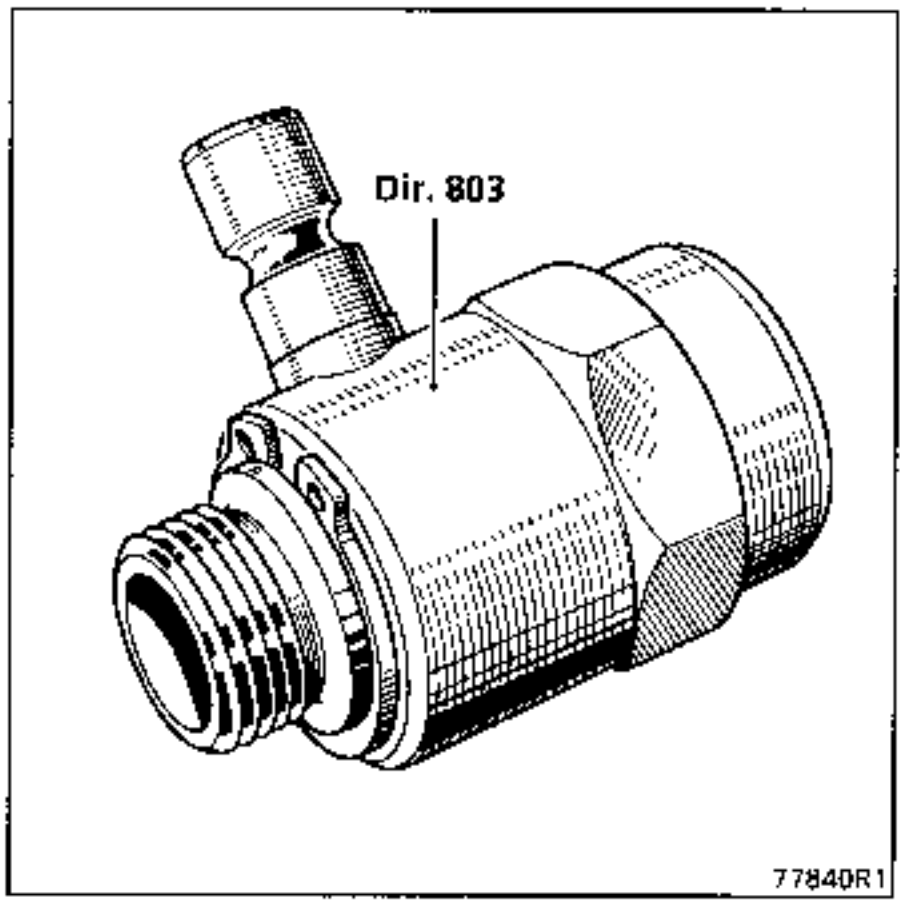
A) Z engine

Fit clamps **Mot. 453-01** to the pump low pressure hoses (to prevent the circuit from draining).

Disconnect the high pressure pipe (1) (take precautions to protect against the oil which will run out).



Fit union **Dir. 803** (metric thread) between the pipe and the pump.

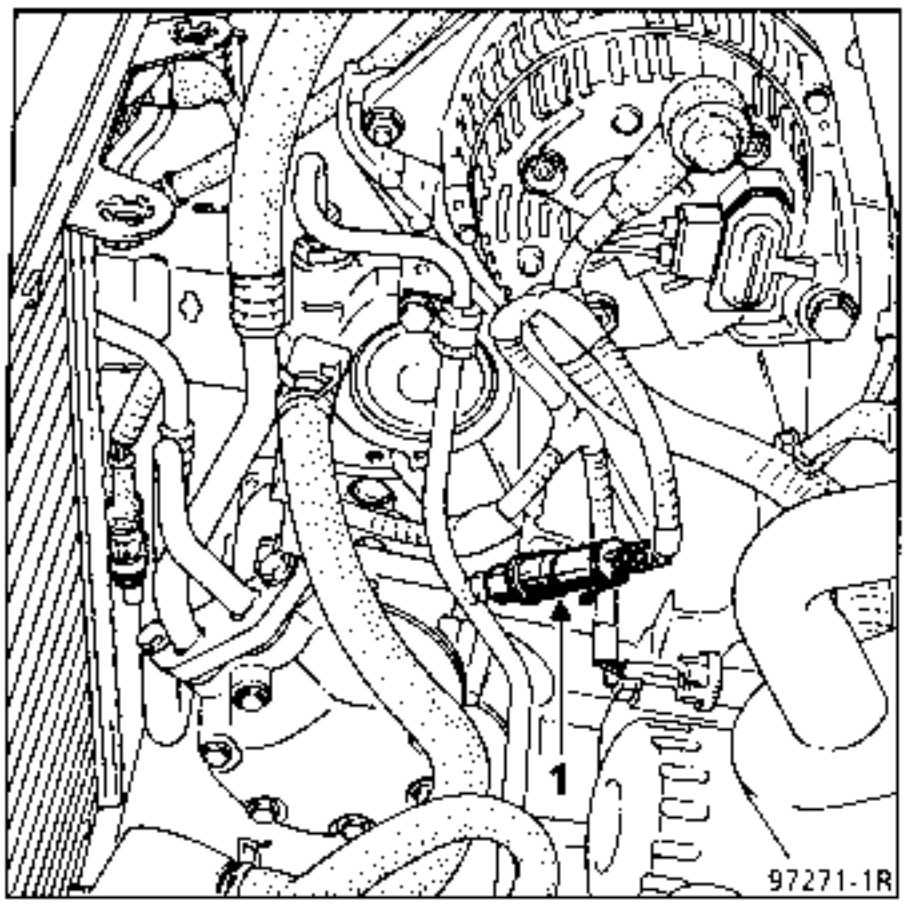


Connect the pressure gauge **Fre. 1 085** or (**Fre. 244-03** + **Fre. 284-06**).

CHECKING THE OIL PRESSURE (cont)

B) F engines

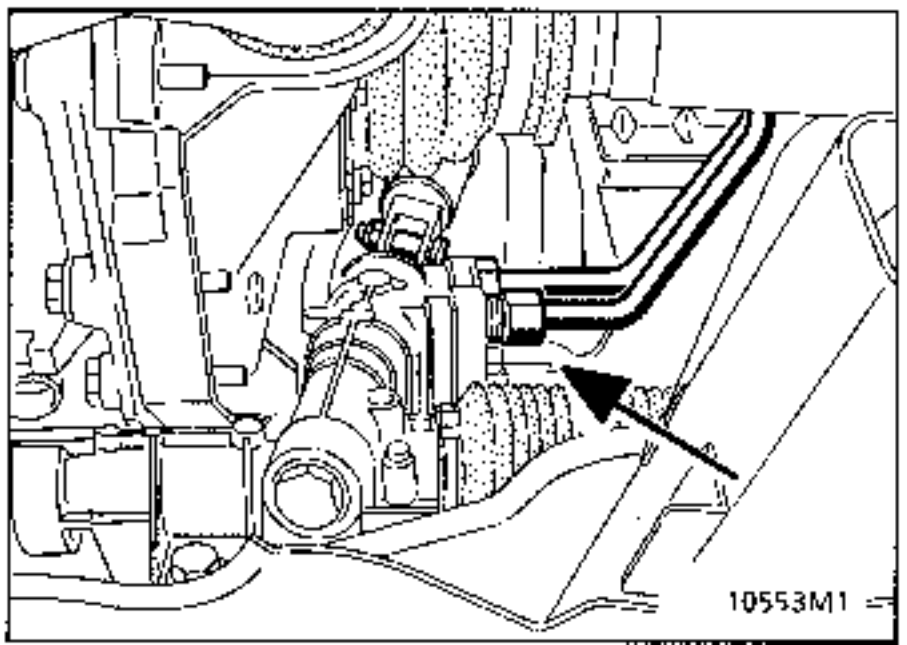
On the rigid pipe (high pressure), at the pump outlet, remove the pressostat (1).



Connect the pressure measuring union Dir. 1204 and the oil pressure gauge Fre. 1085 or (Fre. 244-03 + Fre. 284-06).

C) G engines

Fit union Dir. 803 (metric thread) between the high pressure pipe and the steering box valve (take precautions to protect against the oil which will run out).



B) G engines

Connect pressure gauges Fre. 1085 or (Fre. 244-03 + Fre. 284-06).

Top up the level of the pump and run the engine to check the pressure.

ALL TYPES

Remove clamp Mot. 453-01 (Z engine).

Top up the level of the pump and run the engine to check the pressure.

Wheels straight, whatever the engine speed, the pressure should not exceed : 5 to 7 bar.

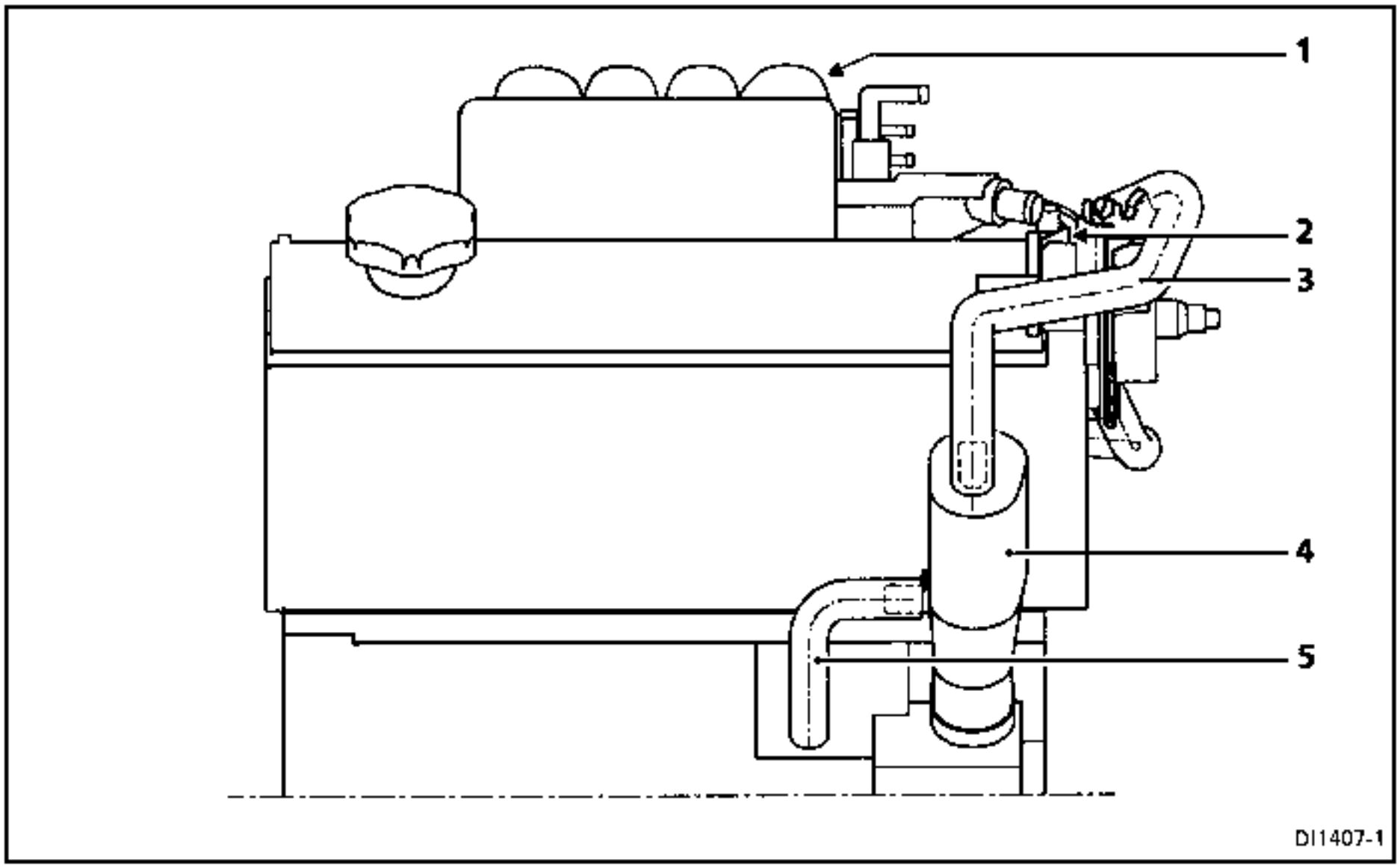
Full lock, the maximum pressure should be :
86 to 93 bar - F engine
93 to 100 bar - Z engine
93 to 103 bar - G engine

This operation should not be prolonged to avoid overheating the oil.

Remove the union Dir. 803 or Dir. 1204 and the pressure gauge by cutting the pump feed using clamp Mot. 453-01 (Z engine).

Reconnect the high pressure pipe or the pressostat (depending on the case) and remove clamp Mot. 453-01.

CIRCUIT DIAGRAM



1 Inlet manifold

2 Throttle body

3 Oil vapour rebreathing pipe (connected to throttle body)

4 Oil decanter

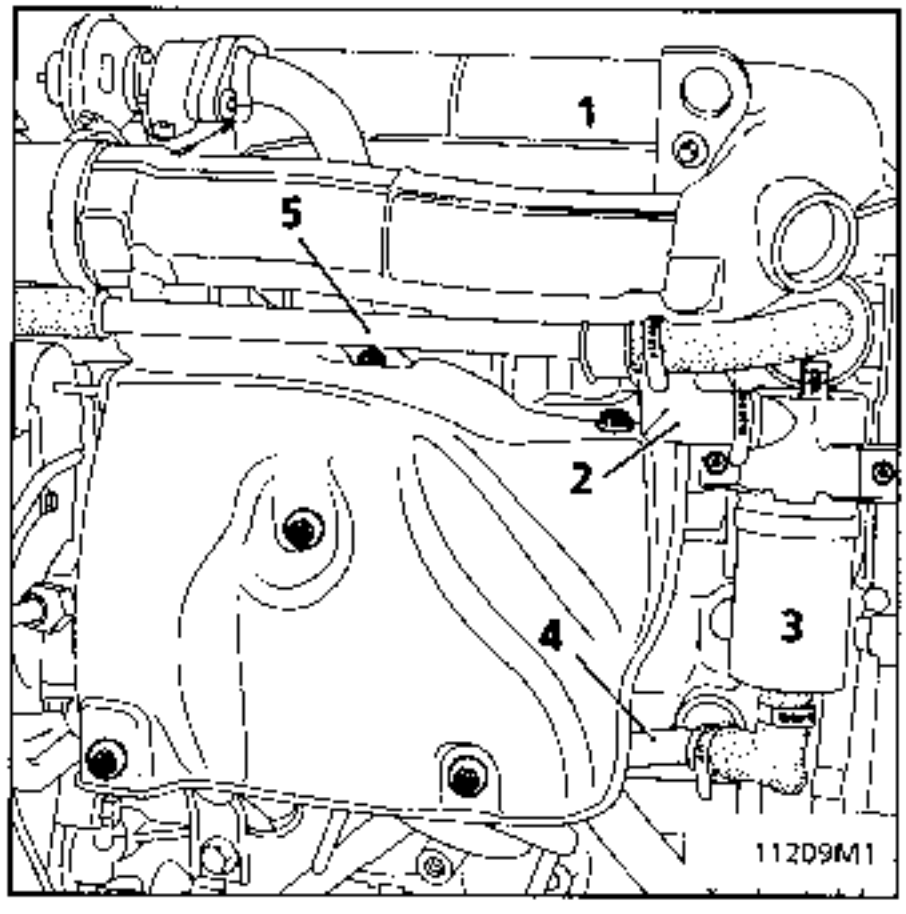
5 Oil vapour rebreathing pipe from engine to decanter

The restrictions in the circuits upstream and downstream from the oil vapour rebreathing system are integral by moulding in the throttle body.

CHECKING

To guarantee correct operation of the antipollution system, the oil vapour rebreathing circuit must be kept in good condition and be clean.

CIRCUIT DIAGRAM

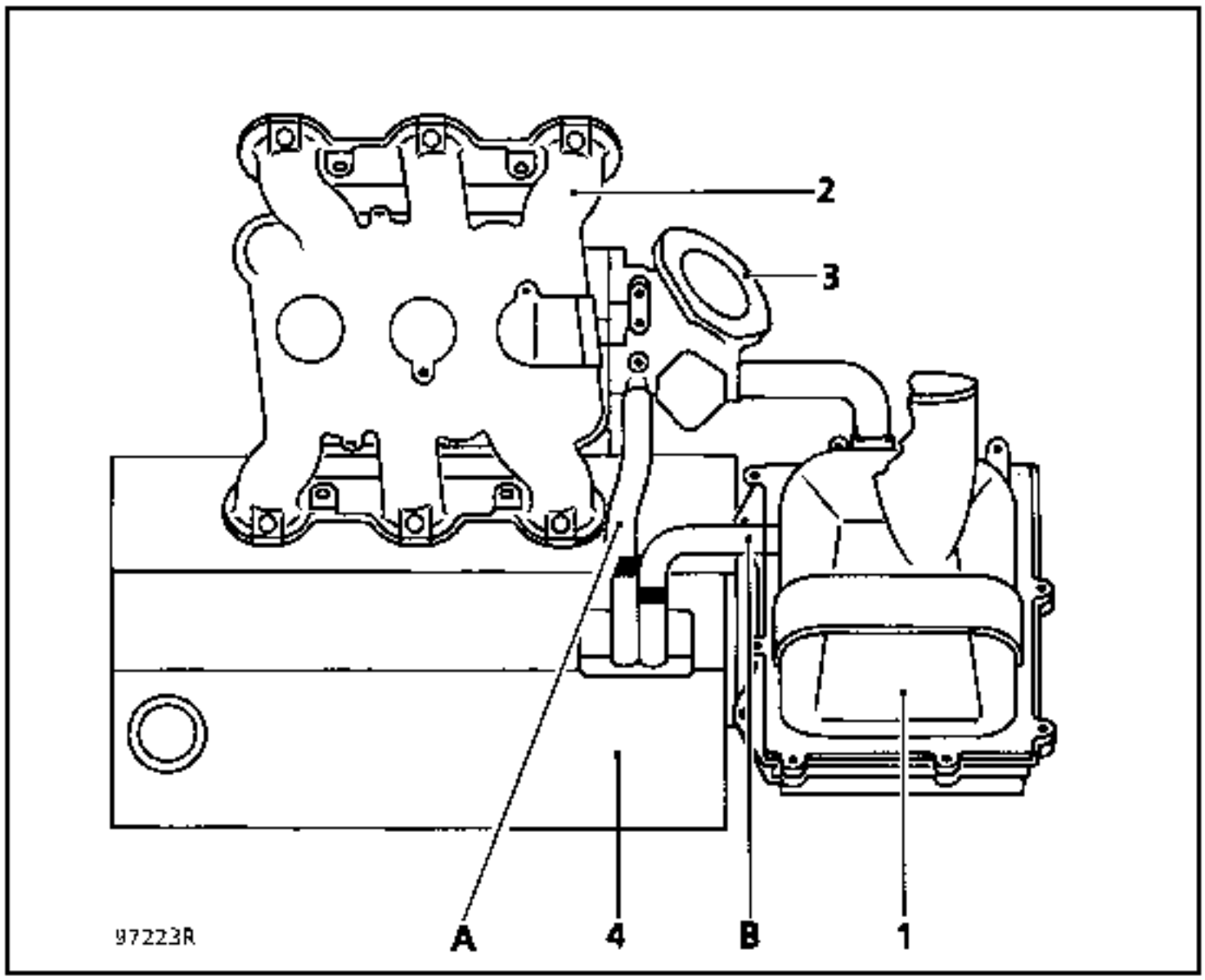


1 Inlet manifold
2 Vapour collecting pipe from rocker box cover.
3 Oil decanter.
4 Oil condensation recycling pipe (to engine block).
5 Oil vapour rebreathing pipe (to air chamber).

CHECKING

To guarantee correct operation of the antipollution system, the oil vapour rebreathing circuit must be kept in good condition and be clean.

CIRCUIT DIAGRAM



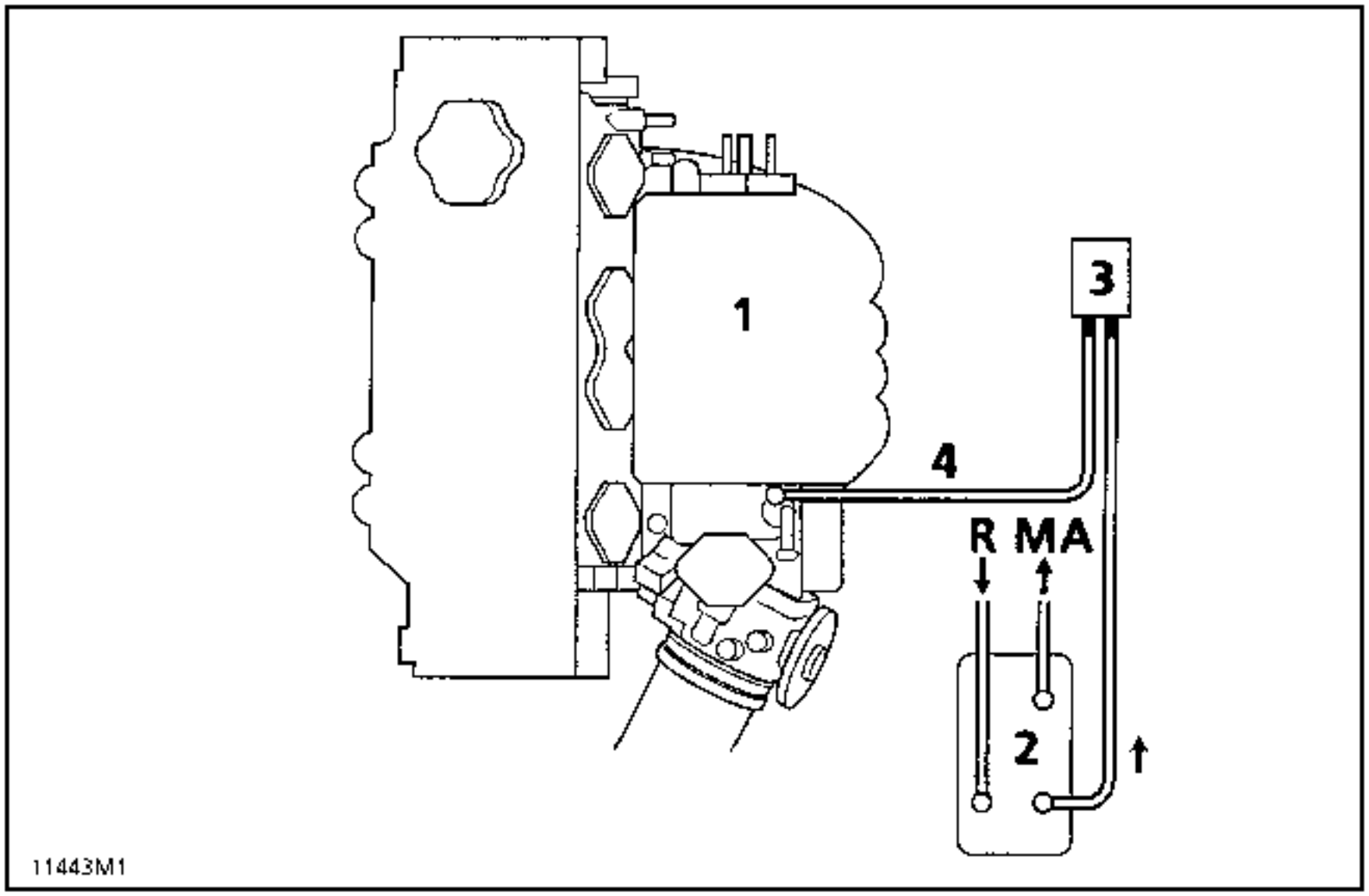
1 Air filter
2 Inlet manifold
3 Intermediate manifold
4 Front cylinder bank
A Downstream rebreathing pipe with 1.7 mm jet
B Upstream rebreathing pipe with 6.5 mm jet

CHECKING

To guarantee correct operation of the antipollution system, the oil vapour rebreathing circuit must be kept in good condition and be clean.

Check the cleanliness and conformity of all jets.

OPERATING DIAGRAM OF THE CIRCUIT



1 Inlet manifold

2 Canister

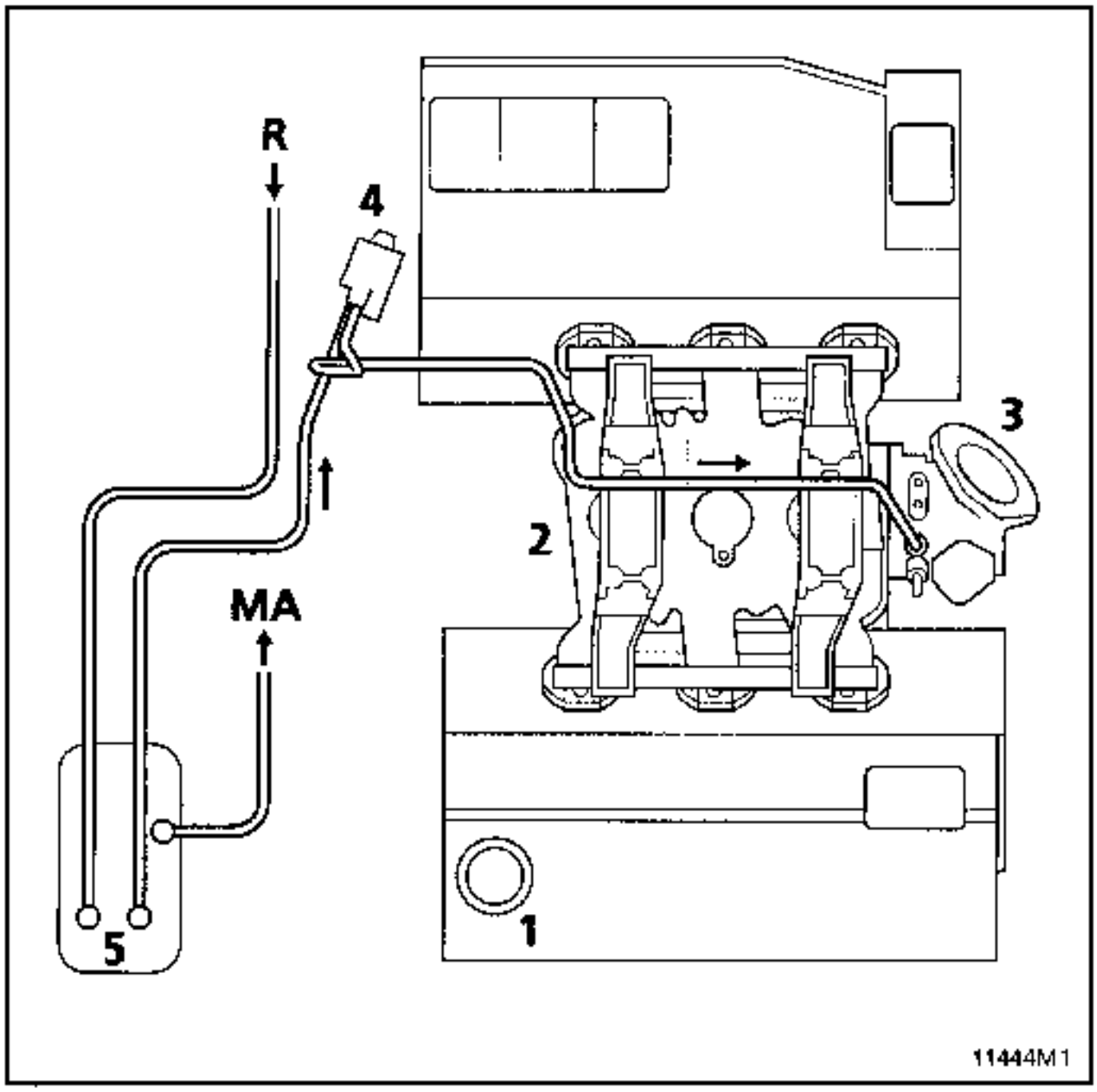
3 RCO control solenoid

4 Fuel vapour rebreathing pipe

R Pipe from fuel tank

MA Breather

OPERATING DIAGRAM OF THE CIRCUIT



1 Front cylinder bank
2 Inlet manifold
3 Intermediate manifold
4 Canister bleed solenoid valve
5 Canister
MA Breather (pipe with green marker)
R Fuel tank vapour collection pipe

OPERATING PRINCIPLE

The fuel tank breather is connected by a pipe through the fuel vapour absorber (see canister - fuel tank connection).

The fuel vapour passing through the canister is retained by the active carbon in the canister.

The computer determines the cyclical opening ratio (R.C.O.) for the canister bleed solenoid depending on various parameters (depending on the engine speed and manifold pressure).

The solenoid valve allows a variable amount of recycled fuel vapour (depending on the R.C.O.) to be sent from the canister to the inlet manifold.

The variation in the diameter of the fuel vapour passage in the solenoid valve is caused by the magnetic field created by feeding the coil and the force of the return spring which closes the valve.

If a throttle position potentiometer fault is detected, the canister may be bled for an engine speed greater than 1500 rpm. during richness regulation.

CONDITION FOR BLEEDING THE CANISTER

During richness regulation

Coolant temperature greater than + 55°C,

Air temperature greater than – 10°C.
No load position not recognised (if there is a fault in the throttle potentiometer sensor, the condition of no load position not recognised is replaced by an engine speed condition
R > 1500 rpm).

Outside richness regulation

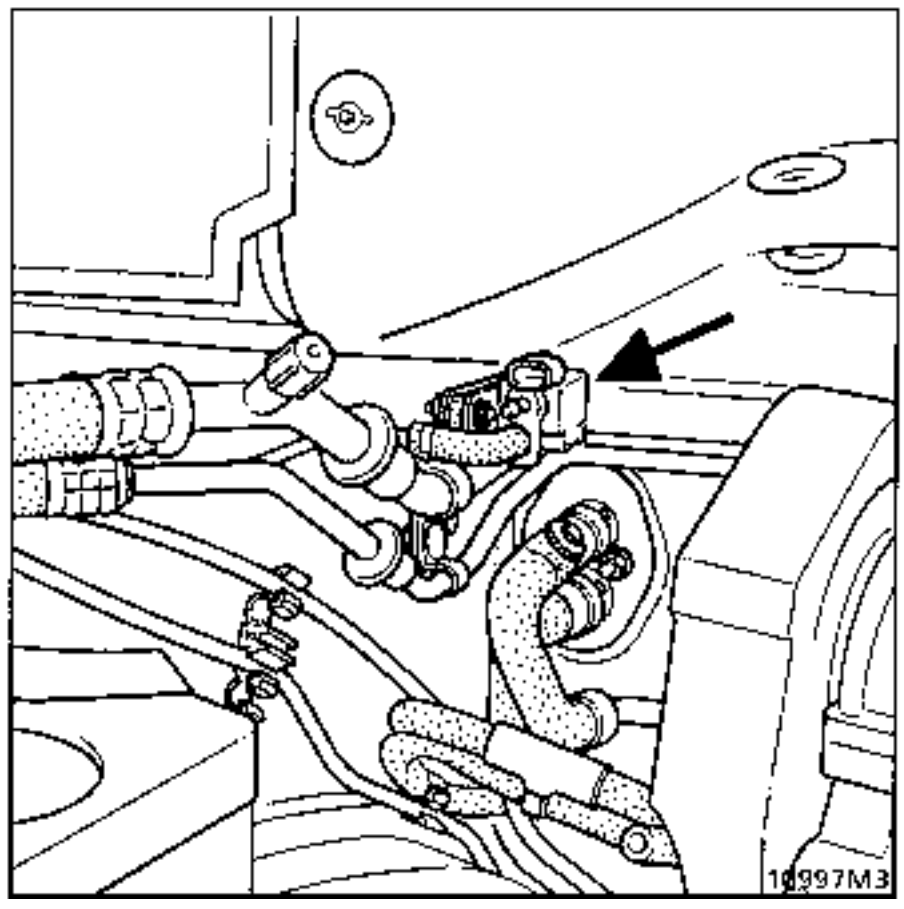
No load position not recognised.
Coolant temperature less than – 15°C.

If the oxygen sensor is faulty, bleeding is permitted outside of no load conditions.

The canister bleed solenoid valve cyclical opening ratio may be visualised using the XR25 and #23. The solenoid valve is closed for #23 = 0.7 % (minimum value).

LOCATION OF COMPONENTS

Canister bleed solenoid valve

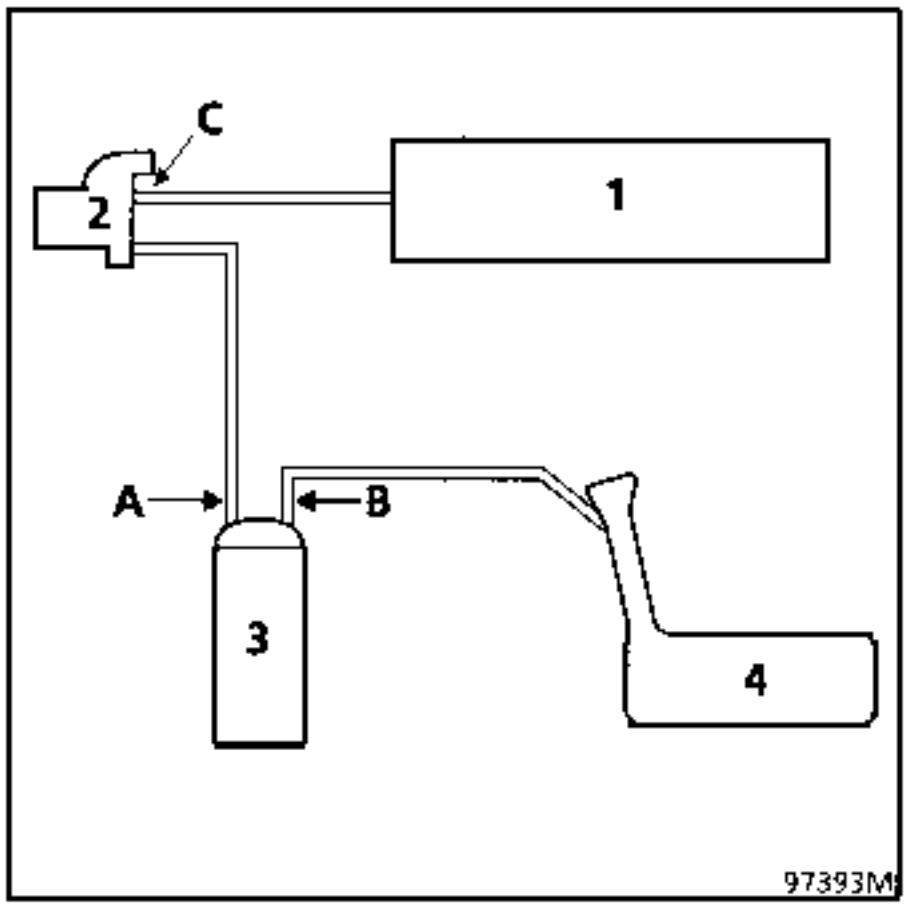


CHECKING CANISTER BLEED OPERATION

Incorrect operation of the system may cause the idle speed to be unstable or the engine to stall.

Check the conformity of the circuit (see operational diagrams).

Check the condition of the pipes to the fuel tank.



1 Inlet manifold
2 Canister bleed valve
3 Canister
4 Fuel tank

At idle speed connect a pressure gauge (**– 3 ; + 3 bars**) (**Mot. 1311-01**) to the **"CAN" outlet** on the solenoid valve, to check there is no vacuum (the command value read by the **XR25** for #23 remains minimal X = 0.7 %). **Is there a vacuum ?**

YES Ignition off, use a vacuum pump to apply a vacuum of **500 mbars** to the solenoid valve at (C). This should not vary by more than **10 mbars** in **30 seconds**.
Does the pressure vary?

YES The solenoid valve is faulty. Renew it. Air must be blown into the pipe connecting the solenoid valve to the canister to remove any particles of active carbon.

NO There is an electrical fault. Check the circuit.

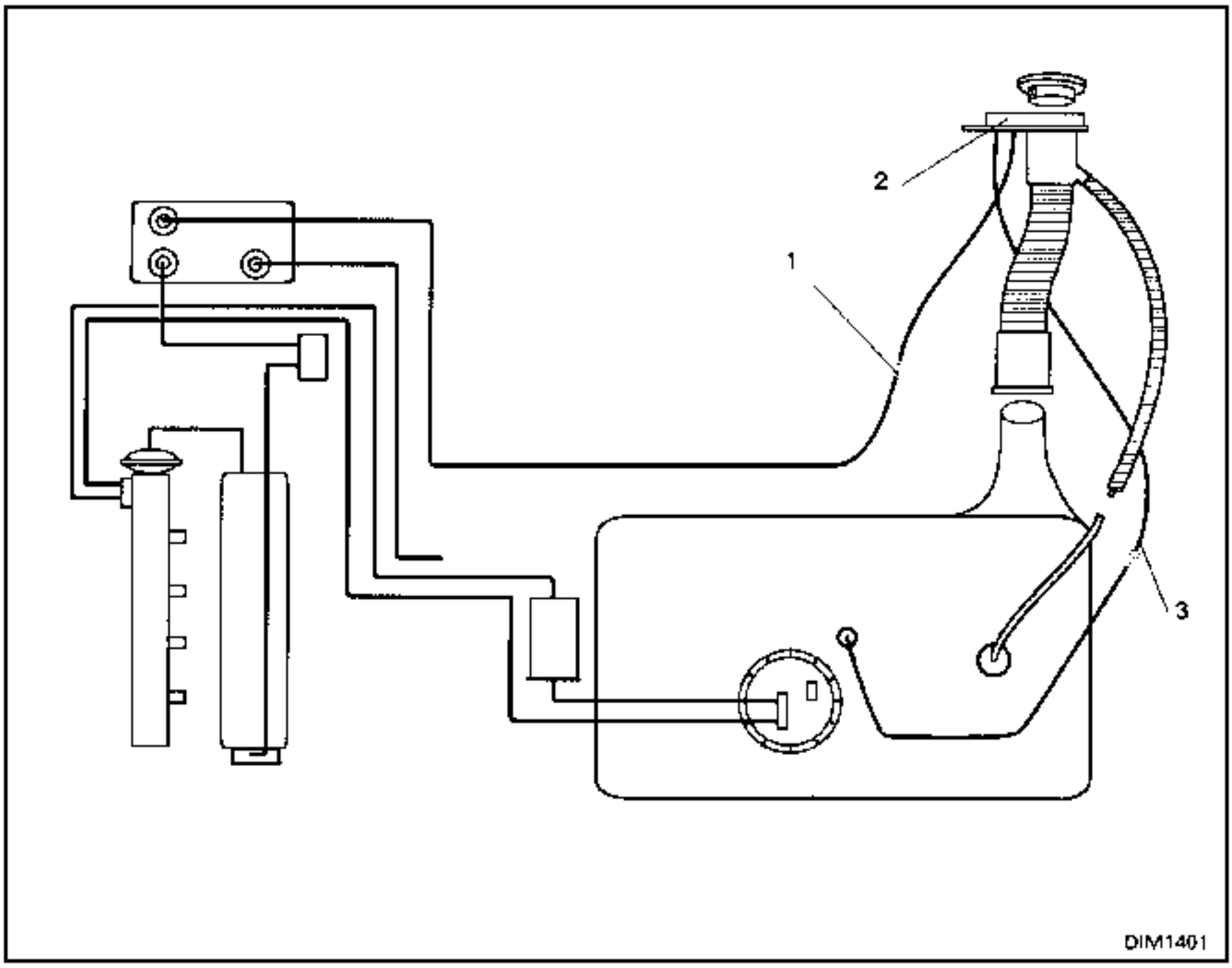
NO Under bleeding conditions (not at idle speed, engine warm), the vacuum should increase (the value for #23 on the XR25 should also be seen to increase).

The fuel tank breather pipe should also be checked. After removing the filler cap, use a vacuum pump to apply a vacuum to the pipe at (B). If a vacuum can be applied to this pipe the overfill prevention valve is sealing correctly.

If, when the fuel filler cap is replaced, the vacuum disappears quickly, the pipe is not blocked by the valve and the degassing volumes inside the fuel tank are not sealed from each other.

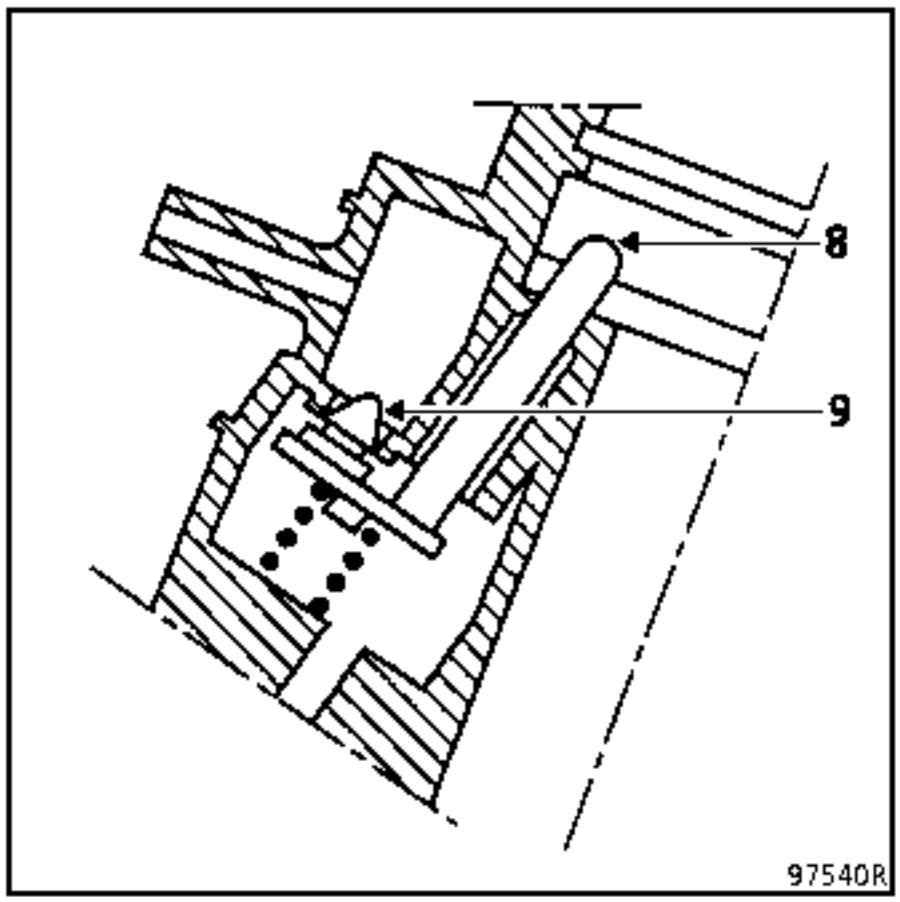
CANISTER - FUEL TANK CONNECTION

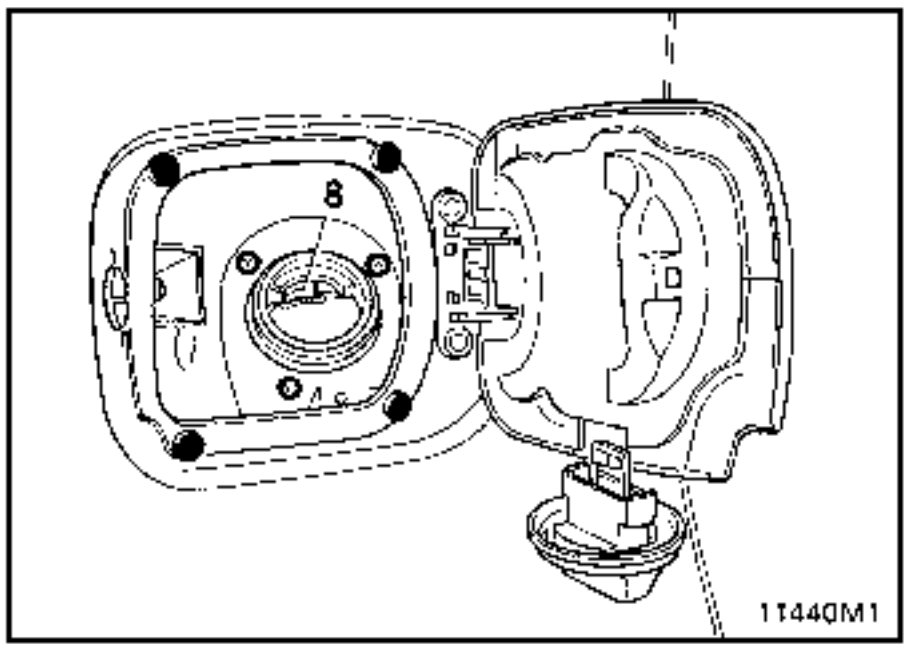
The canister is connected to the fuel tank pneumatically by a pipe which passes under the body.



This pipe has a quick release union (1) just in front of the filler neck and is connected to the fuel tank by the overfill prevention valve (2), and the pipe (3) which connects the filler neck to the fuel tank.

Function of the overfill prevention valve.





The overfill prevention valve prevents fuel from passing to the canister from the fuel tank when the fuel tank is being filled.

When the fuel filler cap is removed the valve closes, trapping a volume of air in the upper section of the tank.

The valve opens again when the fuel filler cap is replaced ; when the cap is turned it presses on a pushrod (8) and frees the valve (9).

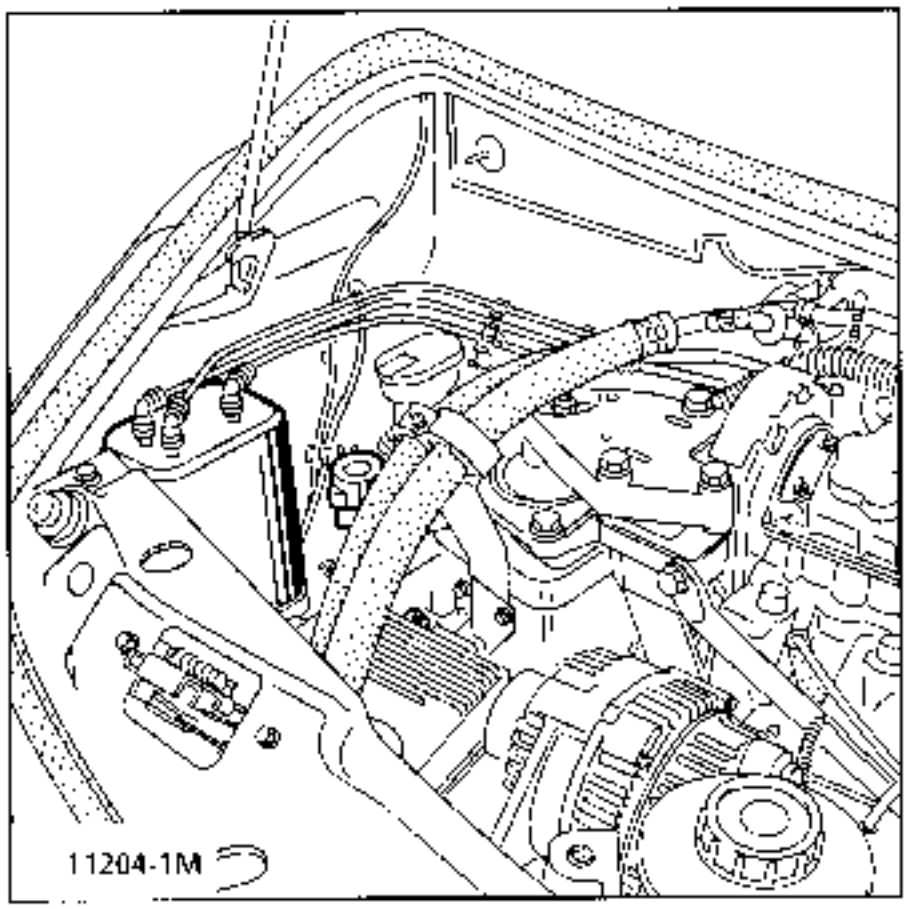
REMOVAL - REFITTING OF THE CANISTER (FUEL VAPOUR ABSORBER)

Put the vehicle on a lift.

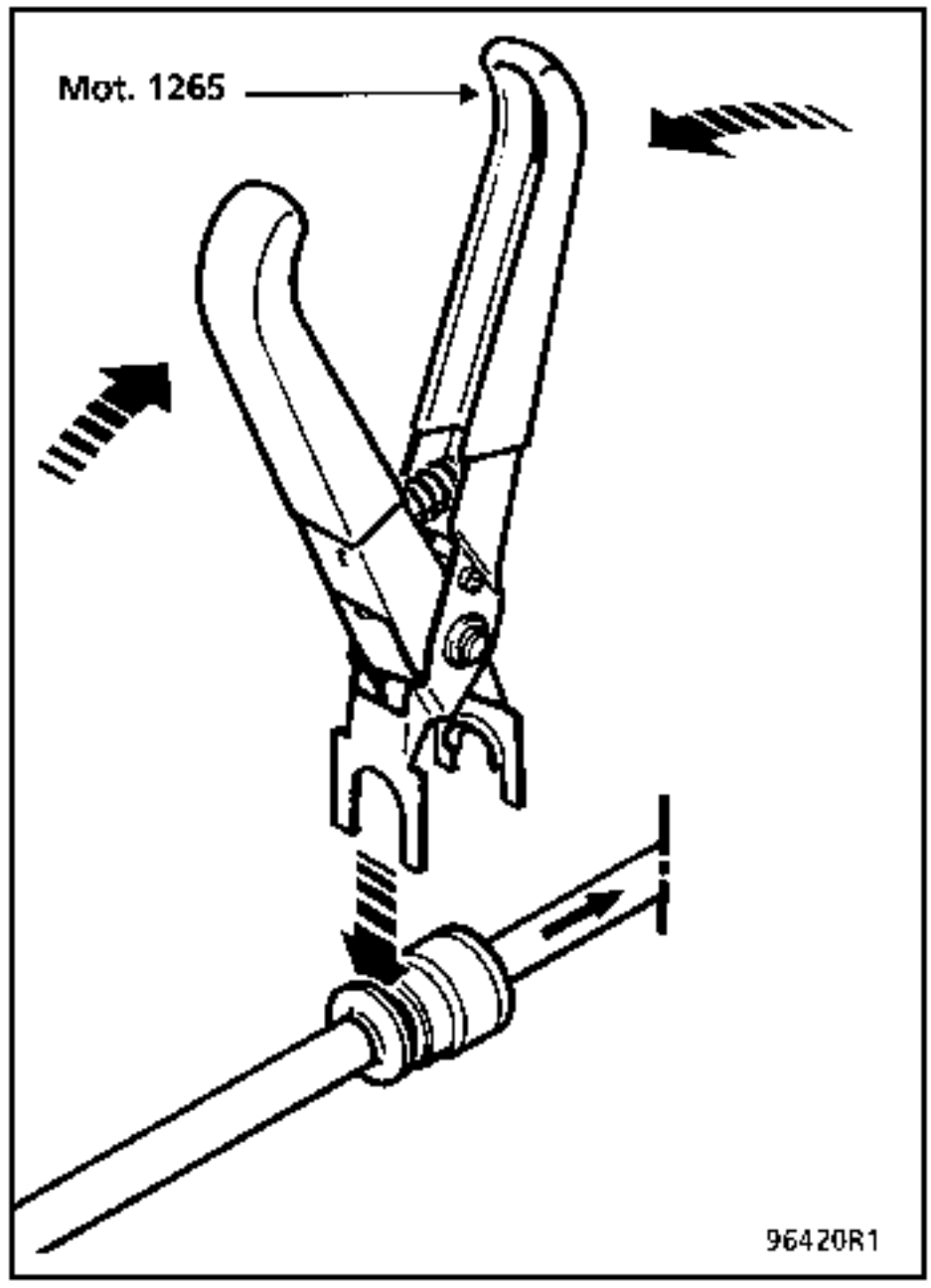
Disconnect:

- the battery,
- the pipe connecting the canister and canister bleed solenoid valve,
- disconnect the canister - fuel tank pipe using pliers **Mot. 1265** (see diagram below for how to position the pliers).

- remove the two canister mounting bolts .



When refitting, reconnect the pipes by hand. Ensure the quick release unions are correctly re-connected (presence of two O rings).



CHECKS TO BE CARRIED OUT BEFORE THE ANTI-POLLUTION TEST

Ensure:

- the ignition system is operating correctly (correct type plugs, correctly set, HT leads correctly connected and in good condition).
- the injection system is operating correctly (correct supply, check conformity with XR25)
- conformity and sealing of exhaust line.

CHECKING THE ANTI-POLLUTION SYSTEM

Let the vehicle warm up until the engine cooling fan has operated twice.

Connect a correctly calibrated four gas analyser to the exhaust pipe.

Keep the engine speed at 2500 rpm for 30 seconds, then return to idle speed and read off the pollutant values.

CO ≤ **0.3 %**
CO_2 ≥ **14.5 %**
HC ≤ **100 ppm**
0.97 ≤ **λ** ≤ **1.03**

NOTE : $\lambda = \frac{1}{\text{richness}}$

λ > 1→ lean mixture
λ < 1→ rich mixture

If these values are correct, the anti-pollution system is operating correctly.

If the values obtained are not correct, additional tests must be carried out:
- check the condition of the engine (condition of the oil, valve clearances, timing, etc...)
- check the oxygen sensor is operating correctly (Chapter 17).
- test for the presence of lead (see below).

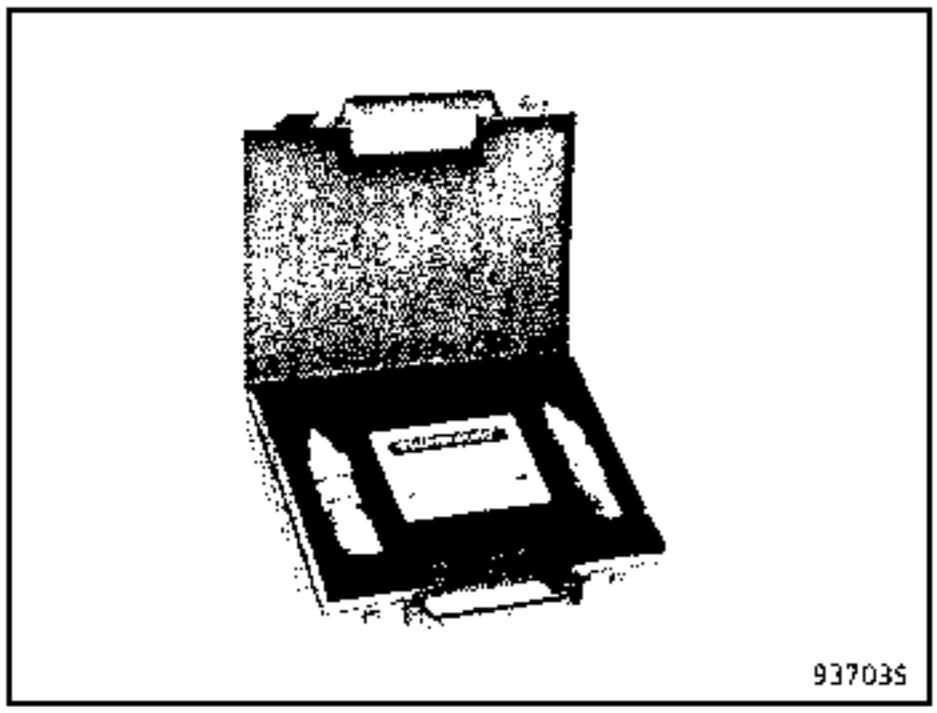
If the test for lead is positive, wait until the vehicle has used two or three full tanks of unleaded fuel before replacing the oxygen sensor.

If, after all these test have been carried out, the values are still incorrect, replace the catalytic converter.

The Nauder lead testing kit is required for this test.

For information on ordering a kit, contact your After Sales Head Office.

Part Numbers :
- Complete kit: **T900**
- 40 test papers : **T900/1**



METHOD

DETECTING LEAD AT THE EXHAUST

a - **Test conditions :**
- Engine stationary.
- Exhaust pipes hot but not burning.
- Do not test when the temperature is below 0°C.

b - If necessary use a soft cloth to clean the inside of the exhaust pipe so any soot deposits are removed.

c - Wearing the gloves, take a test paper and moisten it slightly with distilled water (the paper is not effective if it is too wet).

d - Press the damp paper onto the cleaned exhaust pipe immediately and hold it there firmly for about a minute.

e - Remove the test paper and allow to dry. The test paper will turn red or pink if lead is present.

ATTENTION : **The test for lead should only be carried out on the exhaust pipe, never on the oxygen sensor.**

IDENTIFICATION

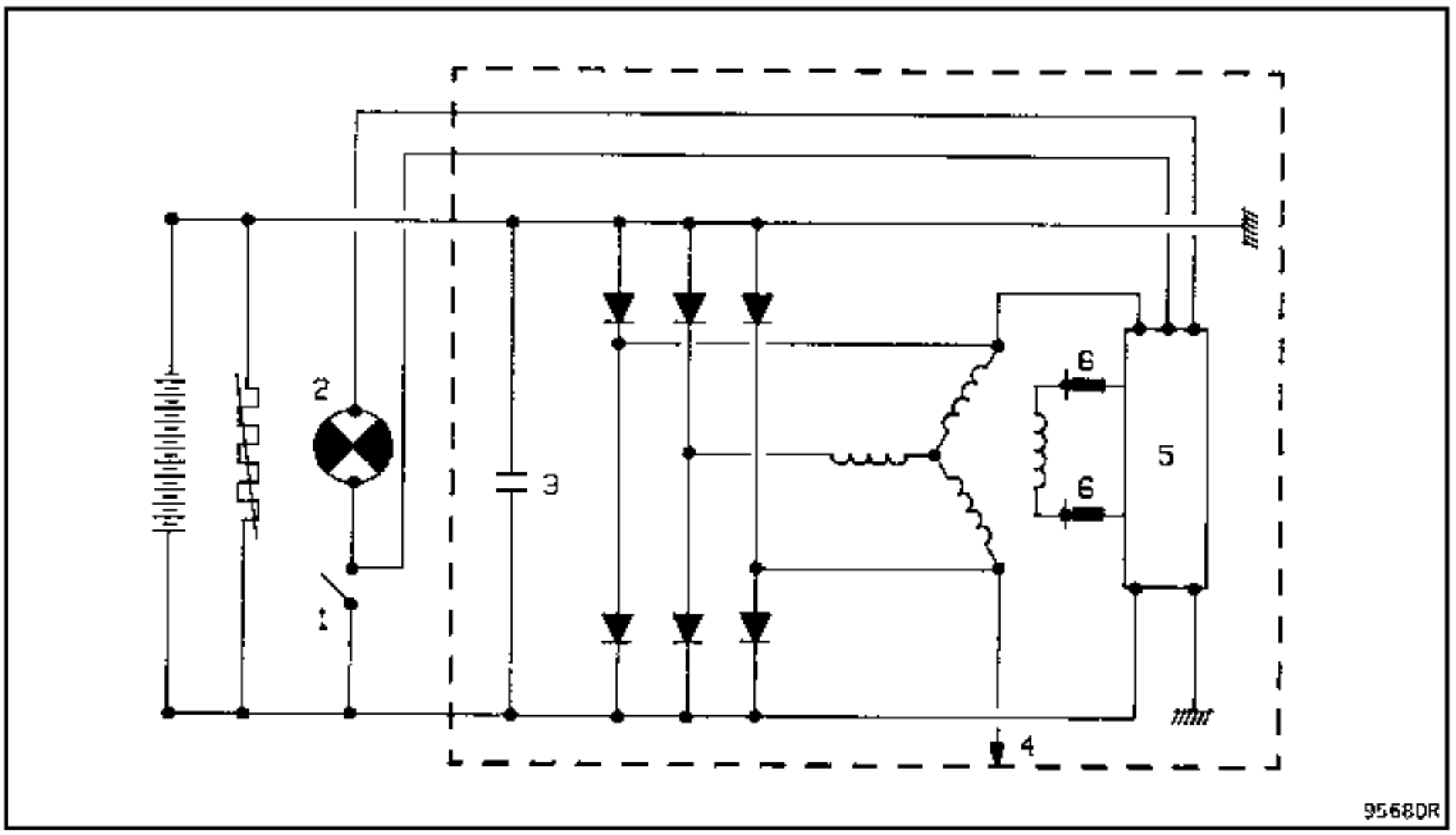
VEHICLE	ENGINE	ALTERNATOR	CURRENT
JE0 A	F3R 728	VALEO A 13 VI 164 (A/C) VALEO A 11 VI 79 (WITHOUT A/C)	110 A 75 A
JE0 D	Z7X 775	VALEO A 13 VI 57163	110 A
JE0 E / SE0 E	G8T 716	VALEO A13 VI 166 (WITHOUT A/C) VALEO A13 VI 167 (A/C)	80 A 110 A

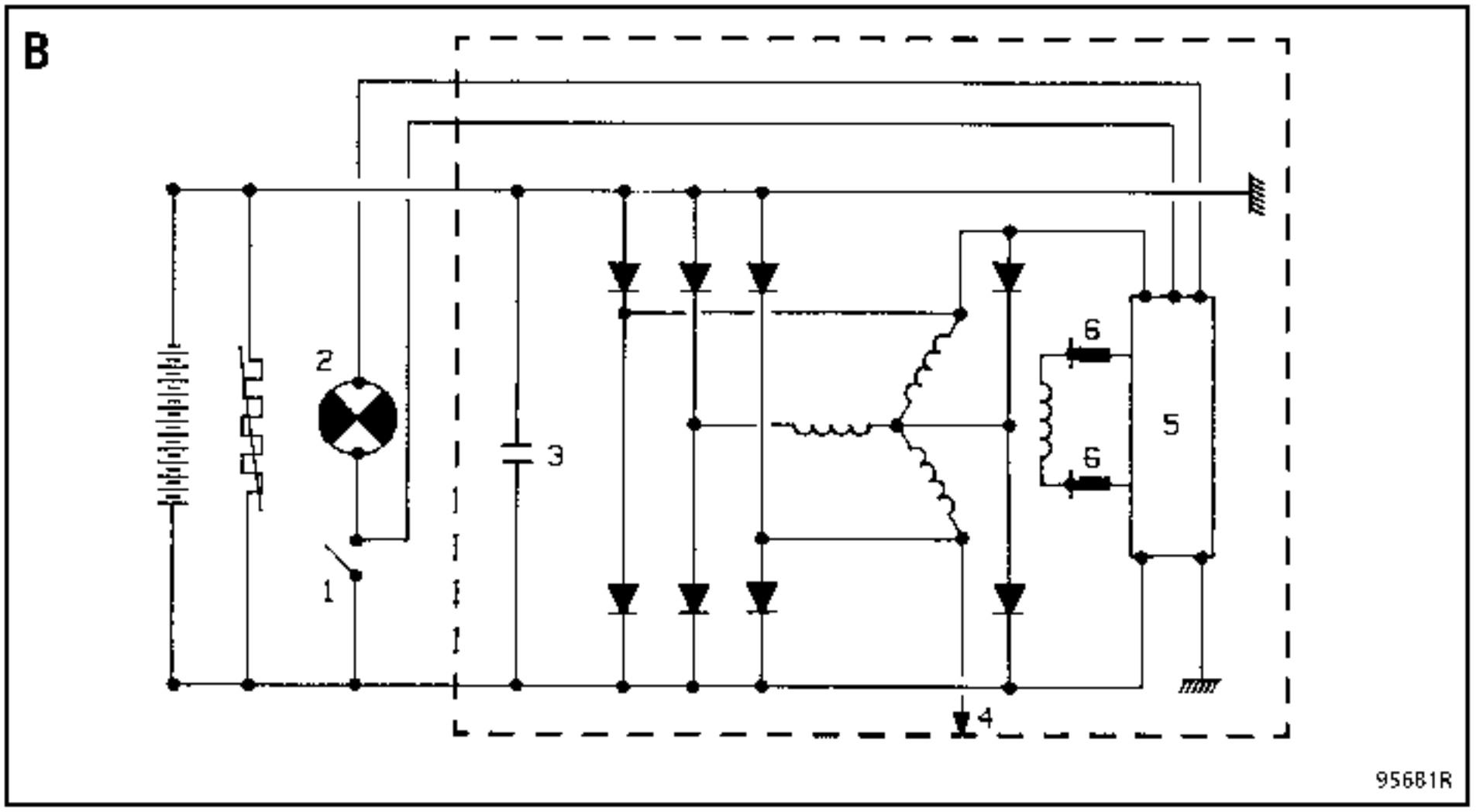
CHECKING

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

rpm	80 amps	110 amps
1 500	28 A	26 A
4 000	75 A	94 A
6 000	80 A	105 A

DIAGRAMS





A 80 A alternators
B 110 A alternators

1 Ignition switch
2 1.2 W warning light
3 2.2 µF condenser
4 Rev counter on diesel versions
5 Voltage regulator
6 Brush

OPERATION - FAULT FINDING

This vehicle is fitted with an alternator with integral regulator and a warning light on the instrument panel which has the following functions:

- when the ignition is switched on, the light illuminates
- when the engine is started the light extinguishes,
- if the light illuminates while the engine is running, there is a charging fault.

LOOKING FOR FAULTS

The warning light does not illuminate when the ignition is switched on.

Check:
- all electrical connections are good.
- the bulb has not blown. (Earth the circuit and the bulb should illuminate).

The warning light illuminates when the engine is running.

This indicates a charging fault which could be caused by :

- the alternator drive belt being broken or the charging wiring being cut,
- internal alternator deterioration (rotor, stator, diodes or brush),
- a regulator fault,
- excess voltage.

The customer complains of a lack of charge and the warning light is operating correctly.

If the regulated voltage is less than 13.5 V, check the alternator. The fault could be caused by :

- a diode which has been damaged,
- a phase which is cut,
- contaminated or worn tracks.

Checking the voltage

Connect a voltmeter across the battery terminals and read the battery voltage.

Start the engine and increase the engine speed until the needle registers a stable regulated voltage.

This voltage should be between 13.5 V and 14.8 V.

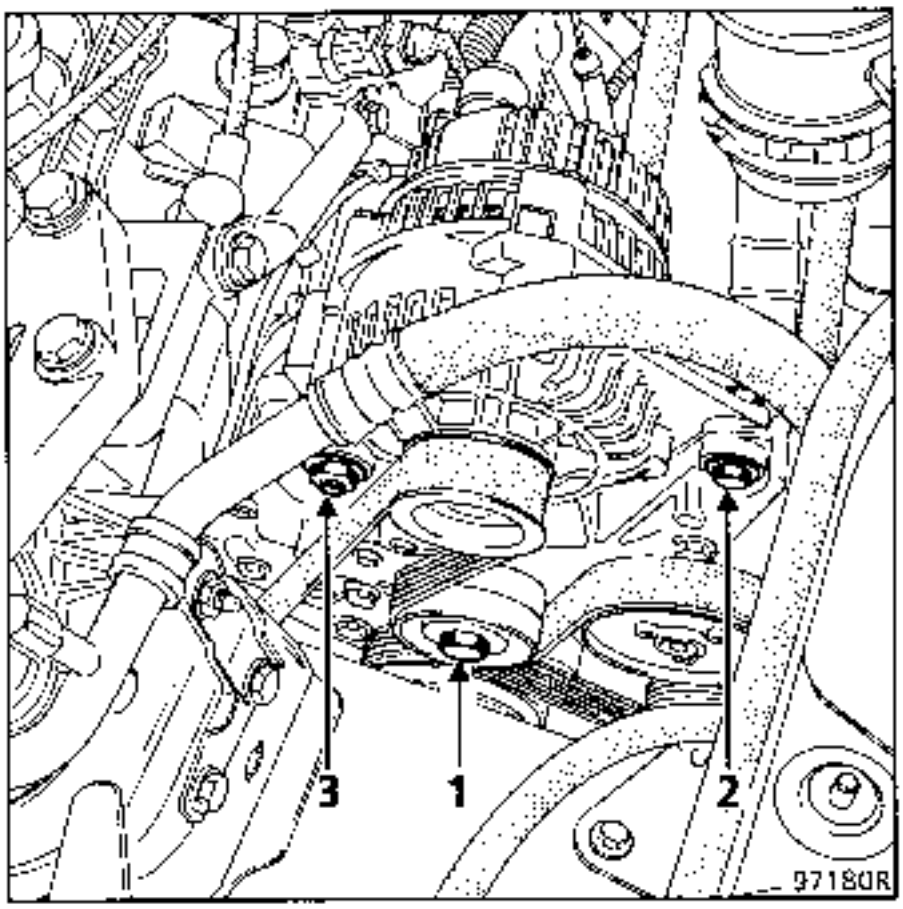
Connect as many consumers as possible, the regulated voltage should be between 13.5 V and 14.8 V.

ATTENTION : *if arc welding work is to be carried out on the vehicle, the battery and regulator must be disconnected.*

REMOVAL

Disconnect:
- the battery,
- the electrical connections on the alternator,
- the pinking sensor,
- the coil feed connector.

Slacken the drive belt by loosening the tension wheel bolt (1).
Remove bolt (2) and shaft (3) then remove the alternator.



REFITTING

Refitting is the reverse of removal.

Special note

Do not refit the old drive belt. **Renew it** (see section 11 - accessories belt).

REMOVAL

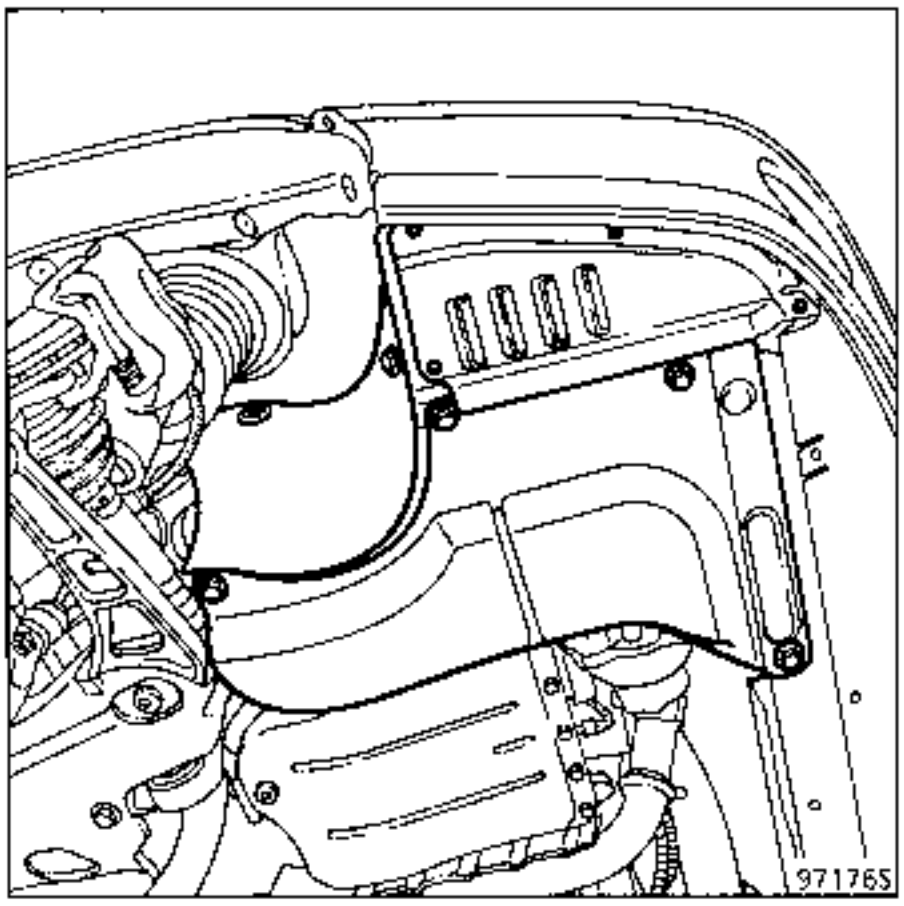
SPECIAL TOOLING REQUIRED	
Mot. 1 280	Tool for removing the oil filter

The removal of the alternator requires the washer bottle to be removed and the air conditioning compressor to be lowered.

With the vehicle on a 2 post lift, disconnect the battery.

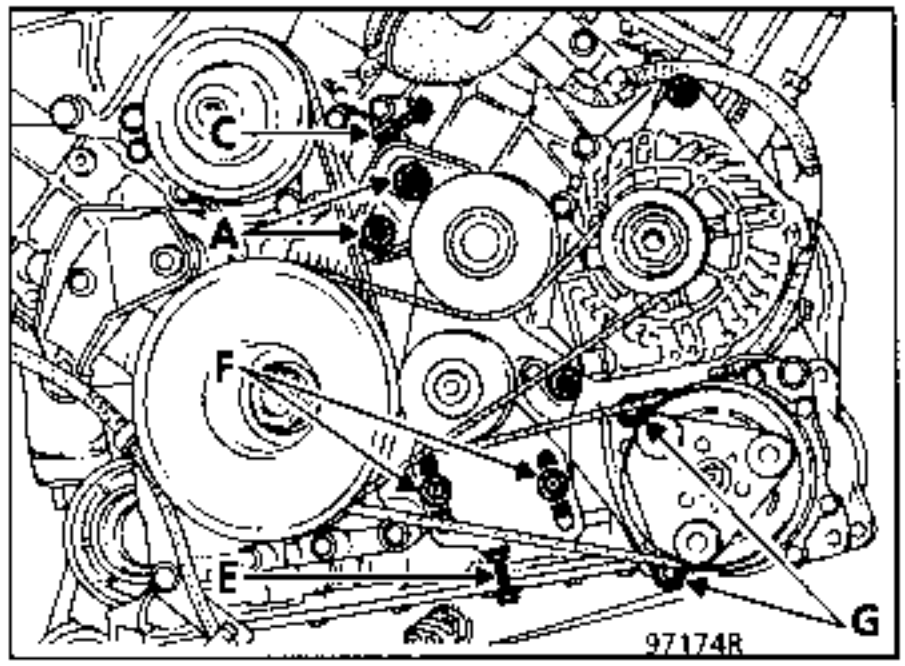
Disconnect and remove the injection computer with its mounting.

Remove:
- the front right hand wheel,
- the mudguard,
- the engine undertray.

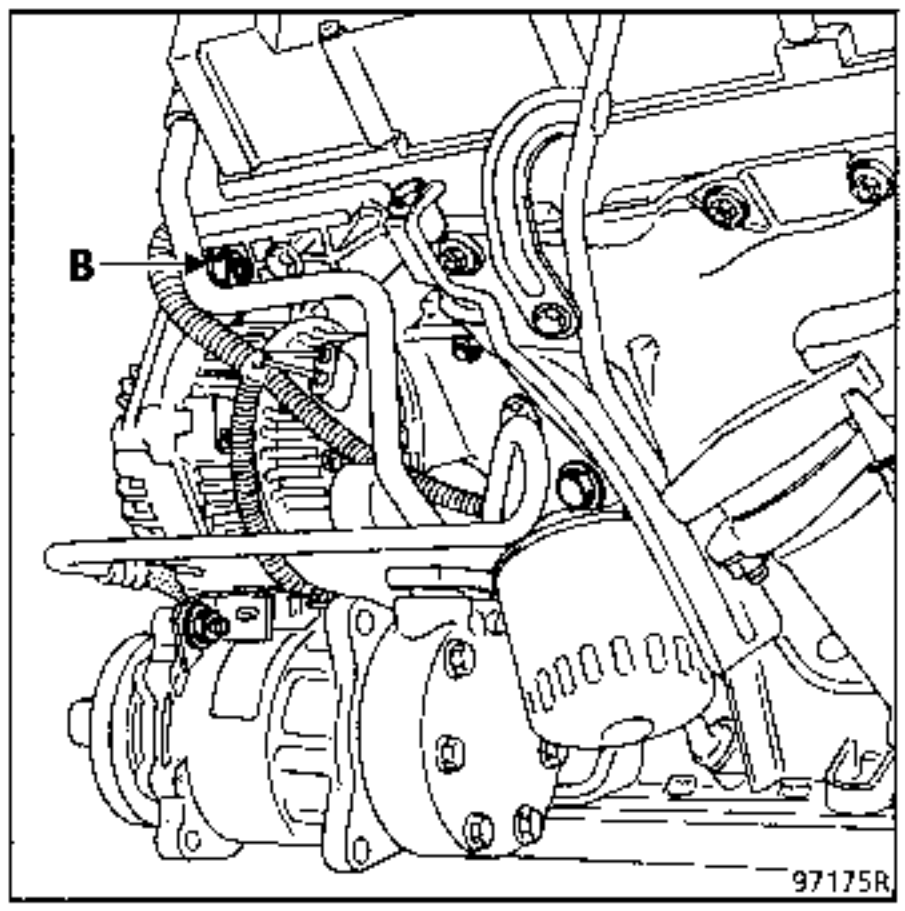


Slacken the two alternator drive belt tension wheel bolts (A).

From above, loosen the tension adjustment bolt (C).



Slacken the upper alternator mounting (B). Remove the mounting bracket for the AC circuit pipe on the right of the front cylinder head.



Remove the alternator drive belt.

Slacken:
- the compressor drive belt adjustment bolt (E) ,
- the adjustment bolt lock nut and slacken the bolt as much as possible,
- the 2 compressor drive belt tension wheel bolts (F) .

Remove the compressor drive belt.

Slacken the oil filter and remove it.

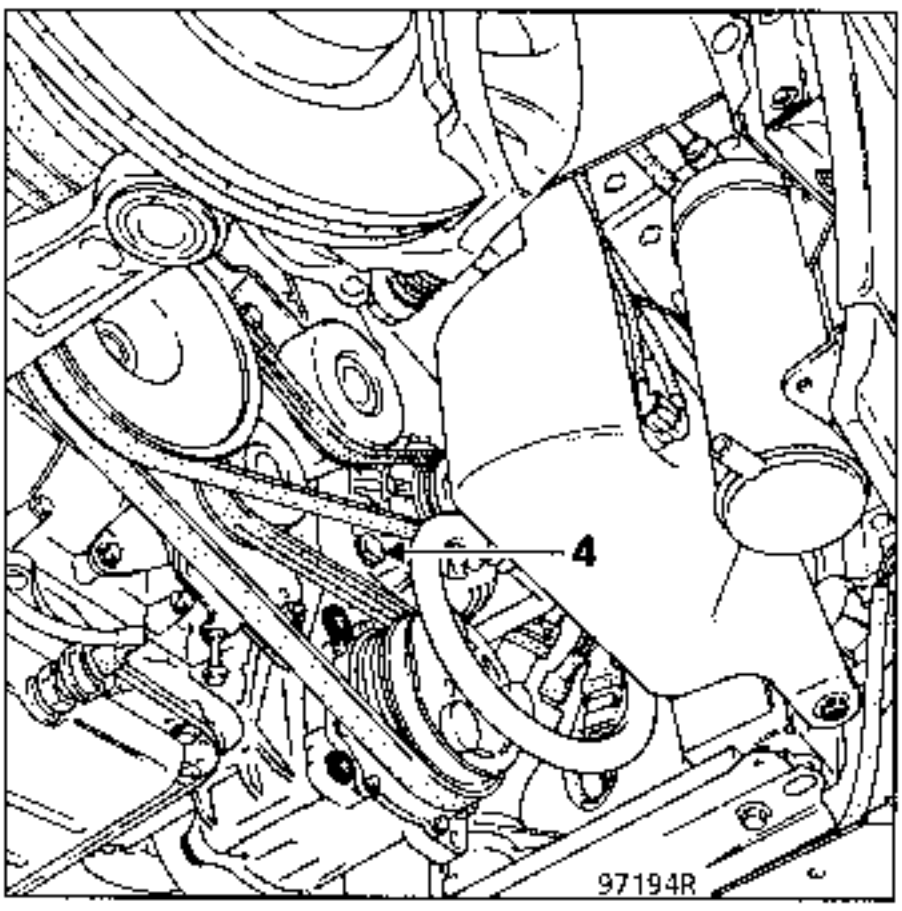
Remove the 4 compressor mounting bolts.

Release the compressor from its mounting (let it hang from the mounting).

Disconnect the alternator electrical connections.

Slacken the lower alternator mounting (4) and remove it.

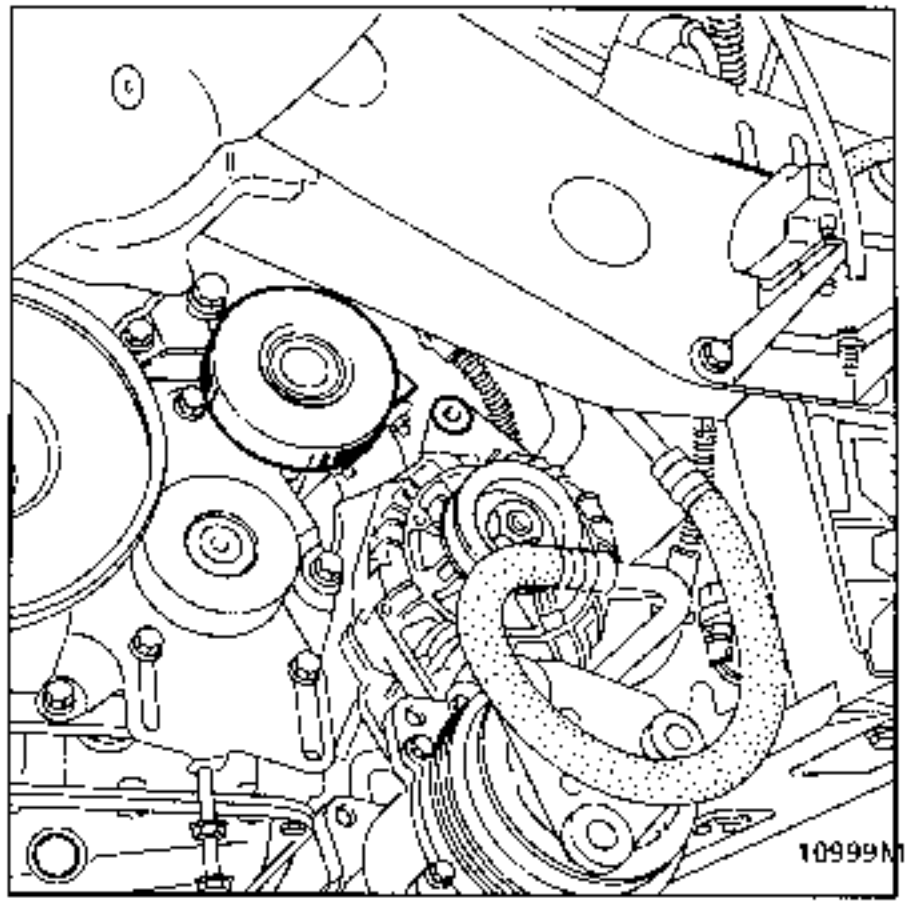
Remove the windscreen washer reservoir.
Disconnect the pump connector.
Disconnect the two pipes after marking them.
Remove the lower reservoir mounting bolt.



Lower the vehicle.
Remove the upper reservoir mounting bolt.
Remove the reservoir and pump assembly from the vehicle.

Remove the upper alternator mounting bolt.

Lift the vehicle and remove the alternator (lift the tension wheel as far as possible).



REFITTING

Refitting is the reverse of removal.
To facilitate refitting of the upper alternator nut (B), fit the alternator with its two bolts, fit the air conditioning compressor with its two bolts, without tightening them, put nut (B) into position and remove the compressor again to continue the refitting operations.

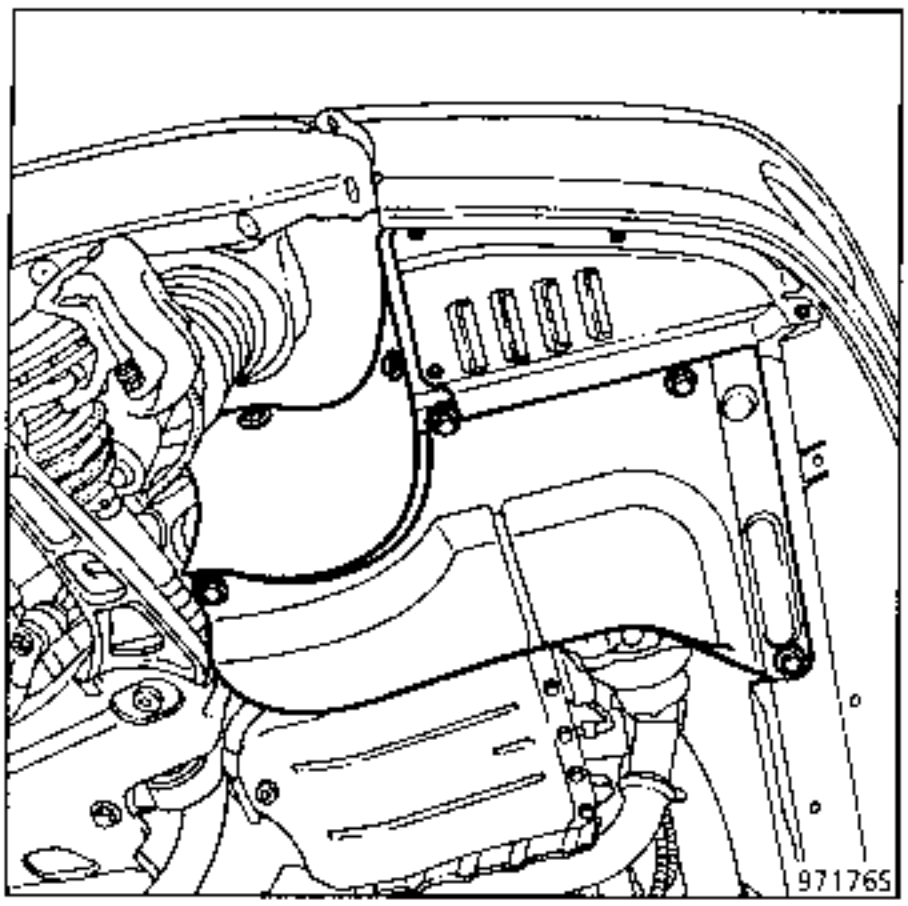
Special notes:

Top up the engine oil level if necessary.

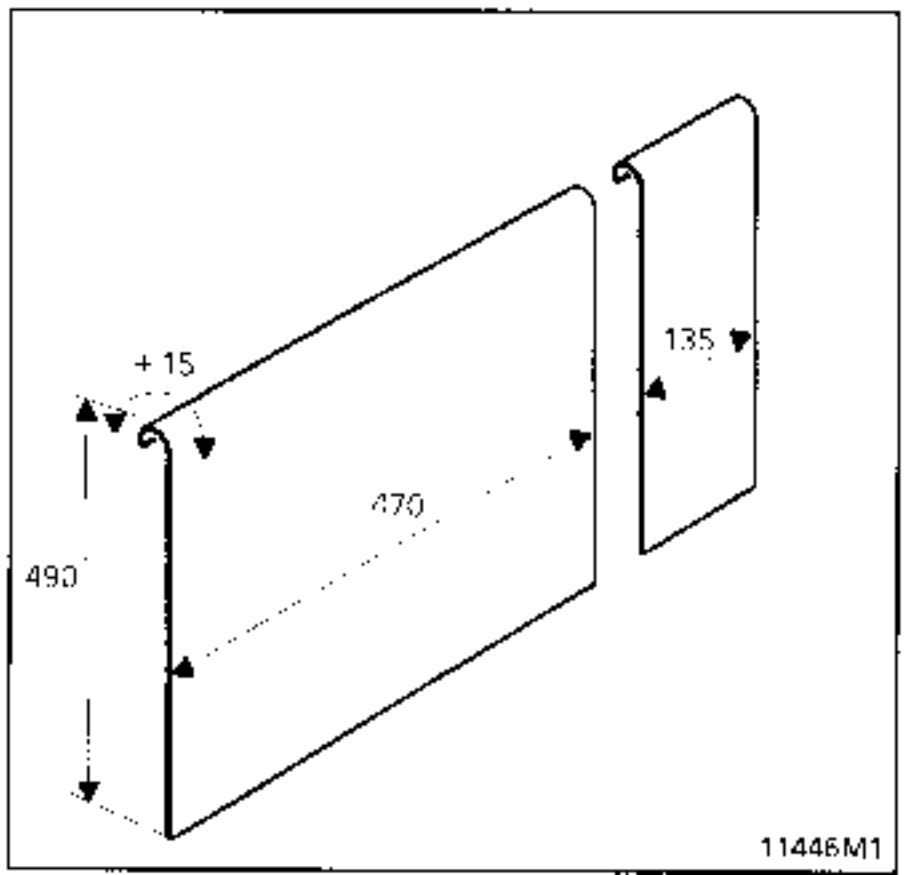
Do not refit the old belt. **Renew it**.

REMOVAL

With the vehicle on a 2 post lift, disconnect the battery.
Remove:
- the engine undertray,
- the right hand mudguard,

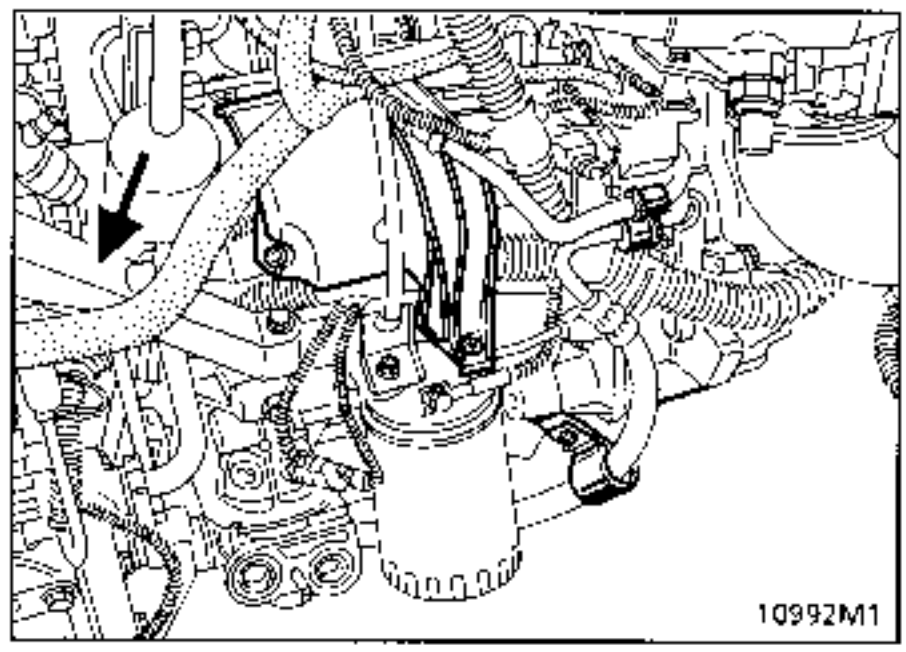


Remove the accessories belt. (see section 11 "Removing - refitting the accessories belt").
Release (but do not disconnect) the engine oil exchanger on the radiator.
Fit the locally made tool to protect the radiator (steel or aluminium sheet to dimensions below).



Vehicle with air conditioning

- release the air conditioning pipe from the engine - PAS pump support bar, then remove it.

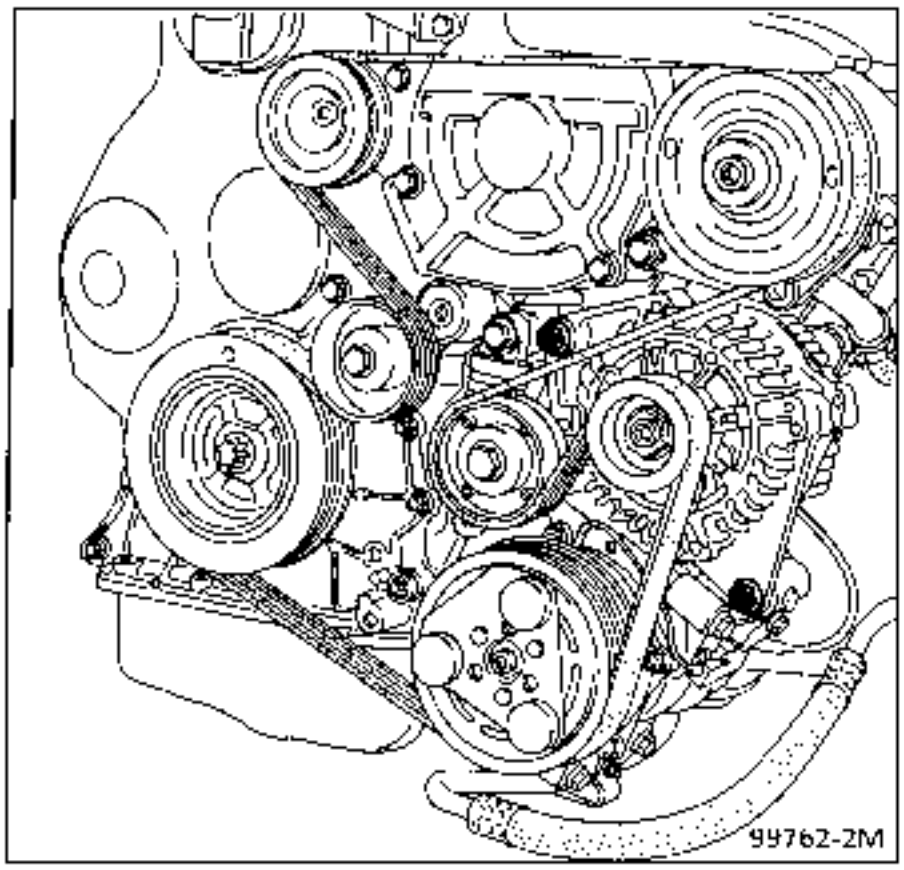


Remove the PAS pump. To do this:
- fit clamp **Mot. 453-01** to the PAS supply pipe.
- disconnect the supply and high pressure pipes for the power assisted steering pump.

IMPORTANT: the alternator must be protected from any splashes of oil.

Remove:
- the three mounting bolts from the power assisted steering pump support.
- the power assisted steering pump - support assembly.

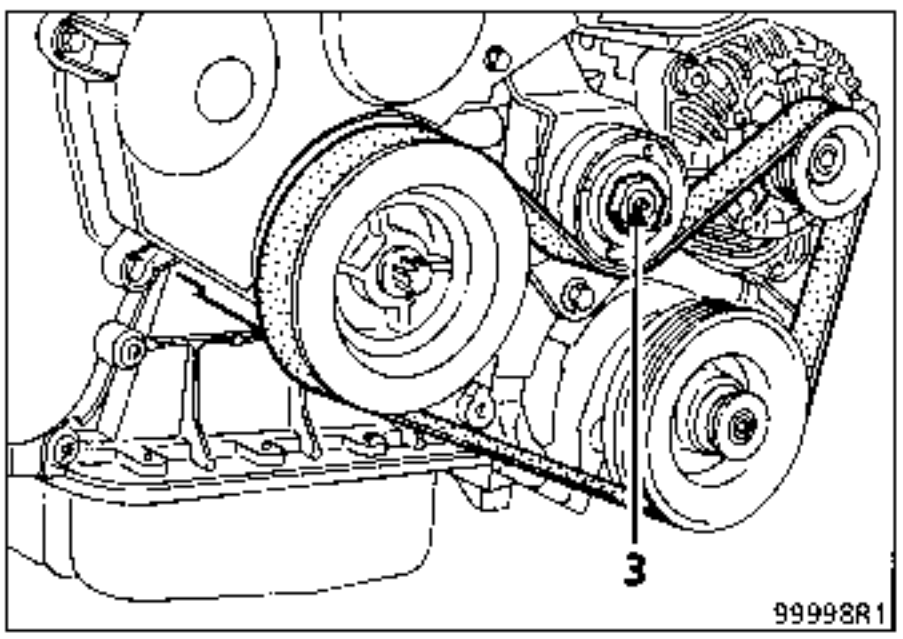
Disconnect the electrical wiring from the alternator.
Remove the 2 upper and lower mounting bolts.



Release the alternator from above, via the opening made by removing the PAS pump.

Vehicle without air conditioning

Remove:
- the alternator belt by slackening the central tension wheel bolt (3) a quarter turn using an allen key, then turn the tension wheel anticlockwise,



- the accelerator cable.

Disconnect the electrical connections on the alternator.

Remove the two alternator mounting bolts and the alternator.

REFITTING

Refitting is the reverse of removal.

Adjusting the accessories belt tension

Vehicle with air conditioning

Fit the new belt following the method described in **Section 11 ; Accessories belt tension.**

Vehicle without air conditioning

Tighten the central tension wheel locking bolt using an allen key until it touches the tension wheel and there is no play.

Fit the new belt and tension it until the display of tool **Mot. 1273** shows the recommended fitting value **(Section 11 ; Accessories belt tension)**.

NOTE: never refit an old belt. Renew it.

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

TENSION VALUES

When the engine is cold (ambient temperature), fit the new belt.

Fit the sensor of tool **Mot. 1273** at the point shown (→).

Turn the knob on the sensor until it clicks.

Tighten the belt until the display on tool **Mot. 1273** shows the fitting value specified below.

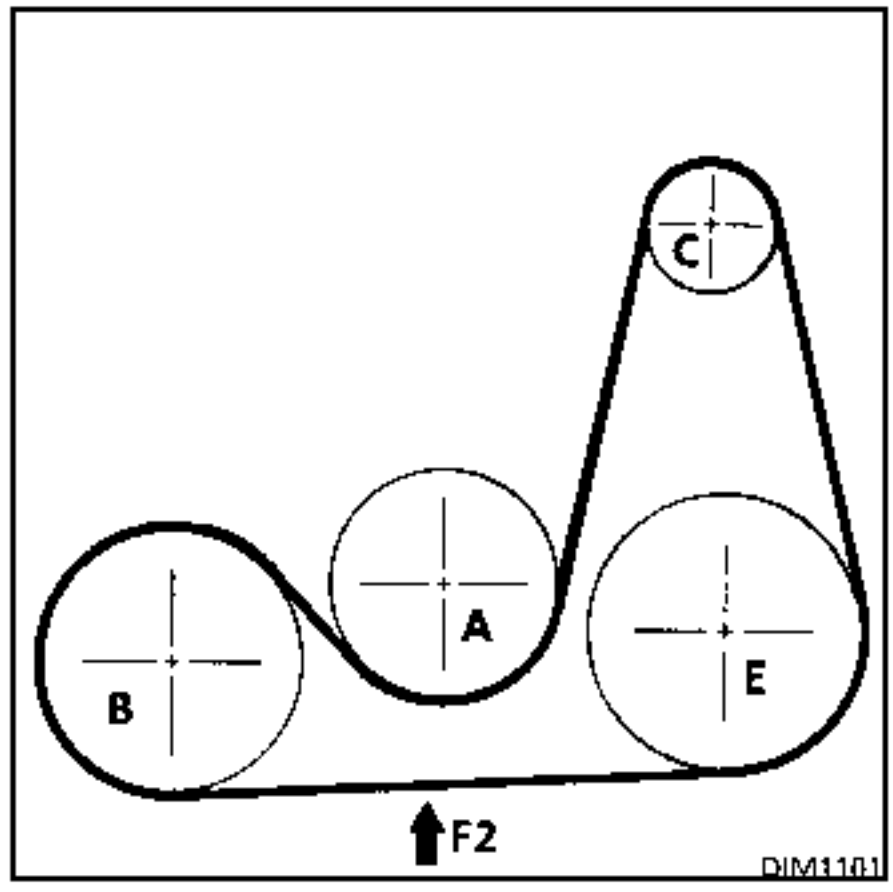
Lock the tension wheel, test and adjust the value.

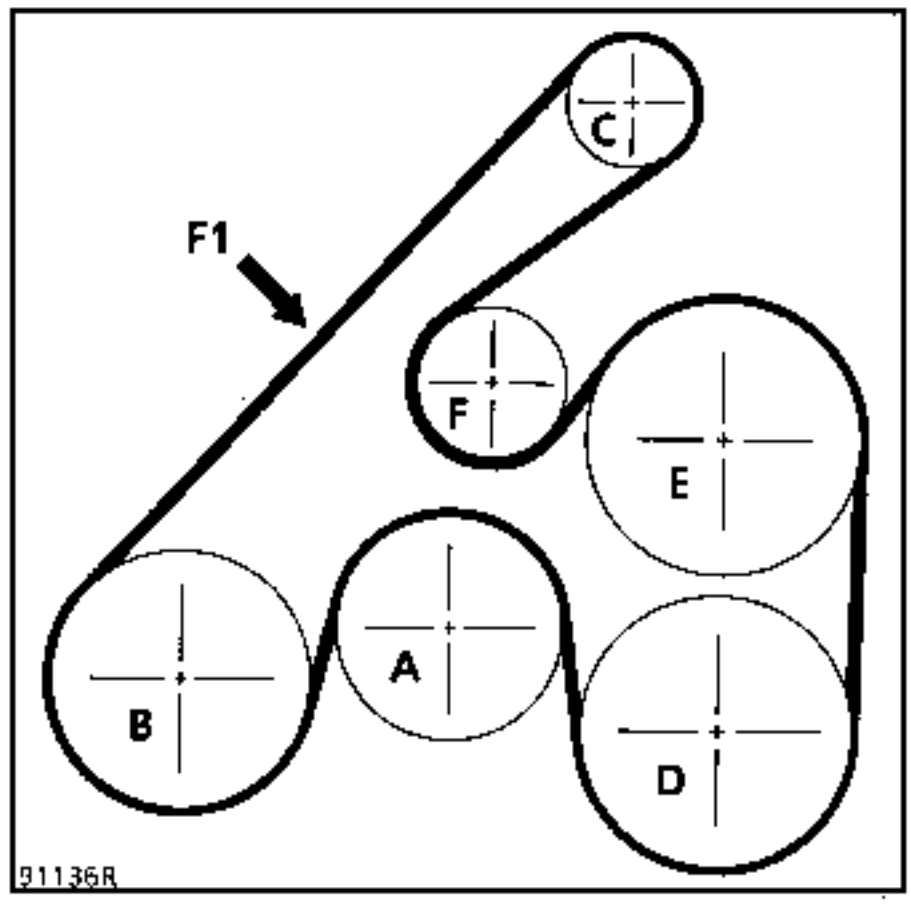
Turn the crankshaft 3 times.

Check the tension value is between the fitting value and the minimum operating value (same value if the tension is being tested without the belt being removed).

Once a belt has been removed, do not refit it.

Tension (US = SEEM Units)	Power assisted steering belt (F2) multi-tooth	Air conditioning belt (F1) multi-tooth
Fitting	**112 ± 6 US**	**114 ± 5 US**
Minimum operating	**62 US**	**62 US**





A Water pump
B Crankshaft
C Alternator
D Air conditioning compressor
E Power assisted steering pump
T Tension wheel
→ Point for checking tension

SPECIAL TOOLING REQUIRED	
Mot. 1273	Tool for checking belt tension

TENSION VALUES

When the engine is cold (ambient temperature), fit the new belt.

Fit the sensor of tool **Mot. 1273** at the point shown (→).

Turn the knob on the sensor until it clicks.

Tighten the belt until the display on tool **Mot. 1273** shows the fitting value specified below.

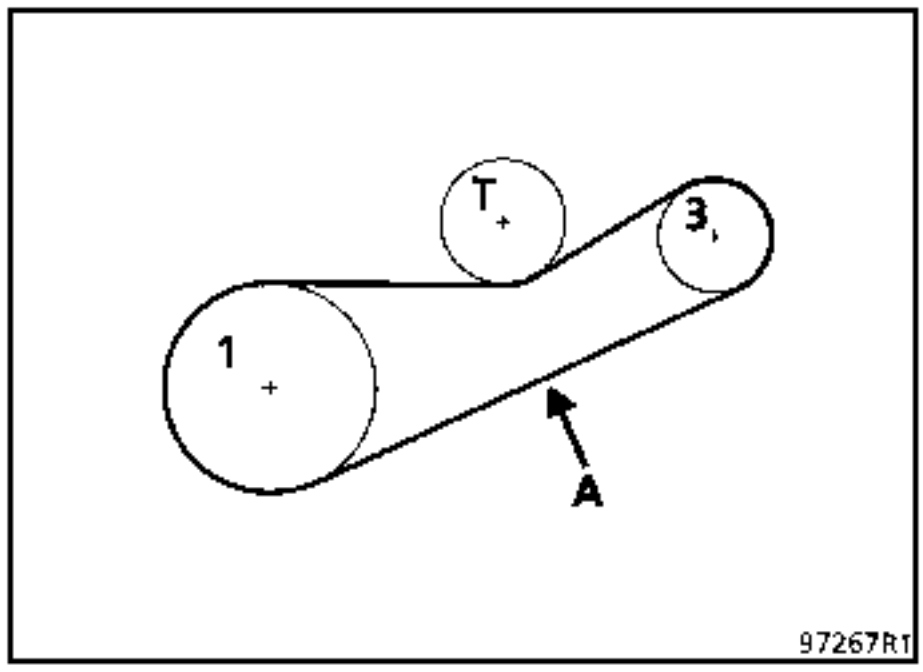
Lock the tension wheel, test and adjust the value.

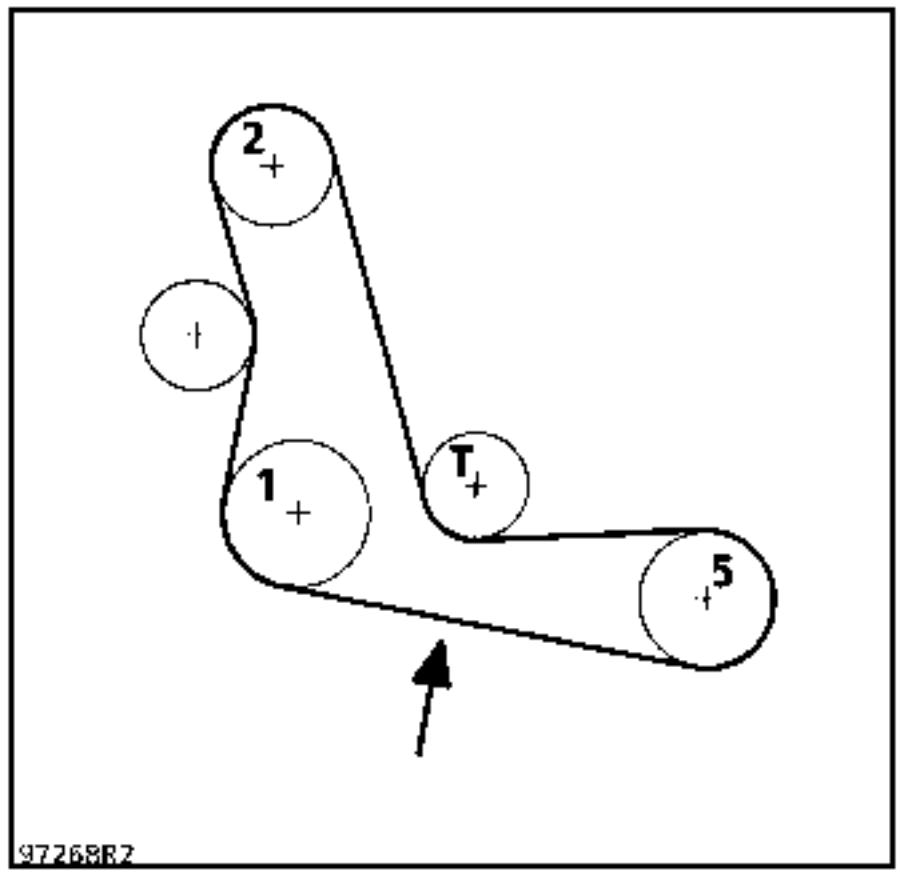
Turn the crankshaft 3 times.

Check the tension value is between the fitting value and the minimum operating value (same value if the tension is being tested without the belt being removed).

Once a belt has been removed, do not refit it.

Tension (US = SEEM Units)	Air conditioning belt (C) multi-tooth	Alternator belt (A) multi-tooth
Fitting	**102 ± 6 US**	**91 ± 5 US**
Minimum operating	**57 US**	**50 US**





1 Crankshaft
2 Water pump
3 Alternator
5 Air conditioning compressor
T Tension wheel
→ Point for checking tension

VEHICLE	ENGINE	STARTER
JE0 A	F3R 728	VALEO D 6 RA 133
JE0 D	Z7X 775	VALEO D 6 R A45
JE0 E / SE0 E	G8T 716	BOSCH 001 233 240

REMOVAL

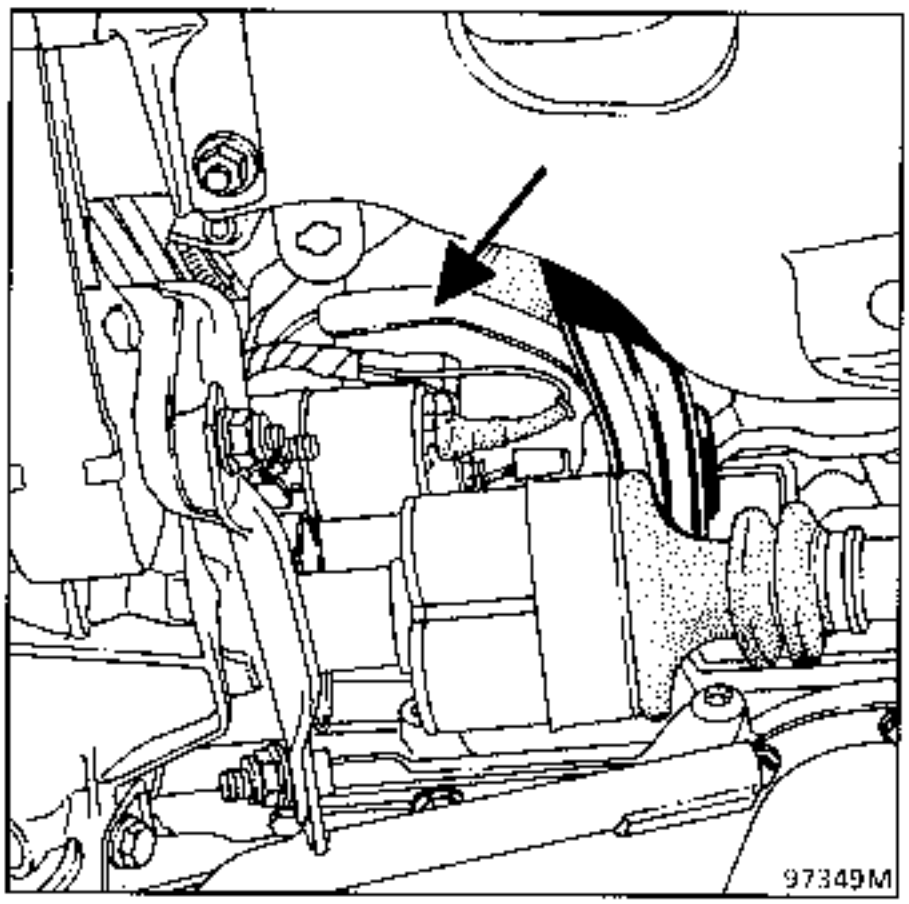
With the vehicle on a lift, disconnect the battery.

Remove the air filter and its mounting.

From below the vehicle.

Remove the heat shield.

Disconnect the starter electrical connections.



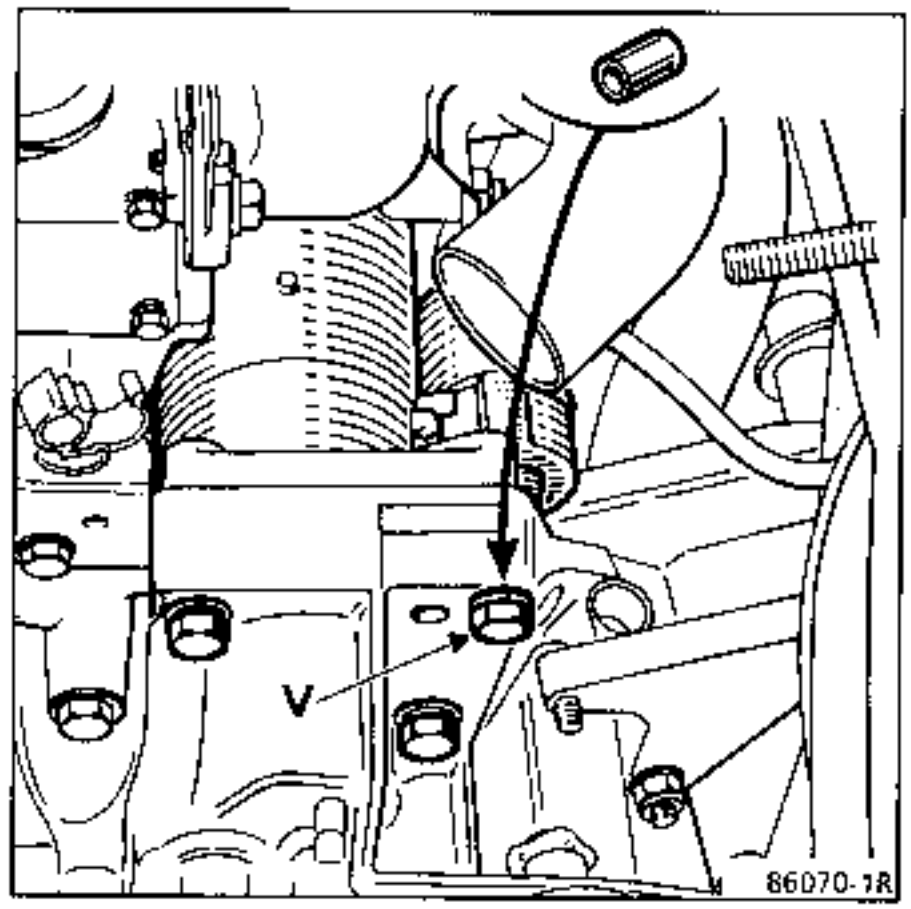
Remove the 3 starter mounting bolts.

REFITTING

Refitting is the reverse of removal.

Special note

Check for the presence of the centring dowel (D) which must be present in the hole for bolt (V).

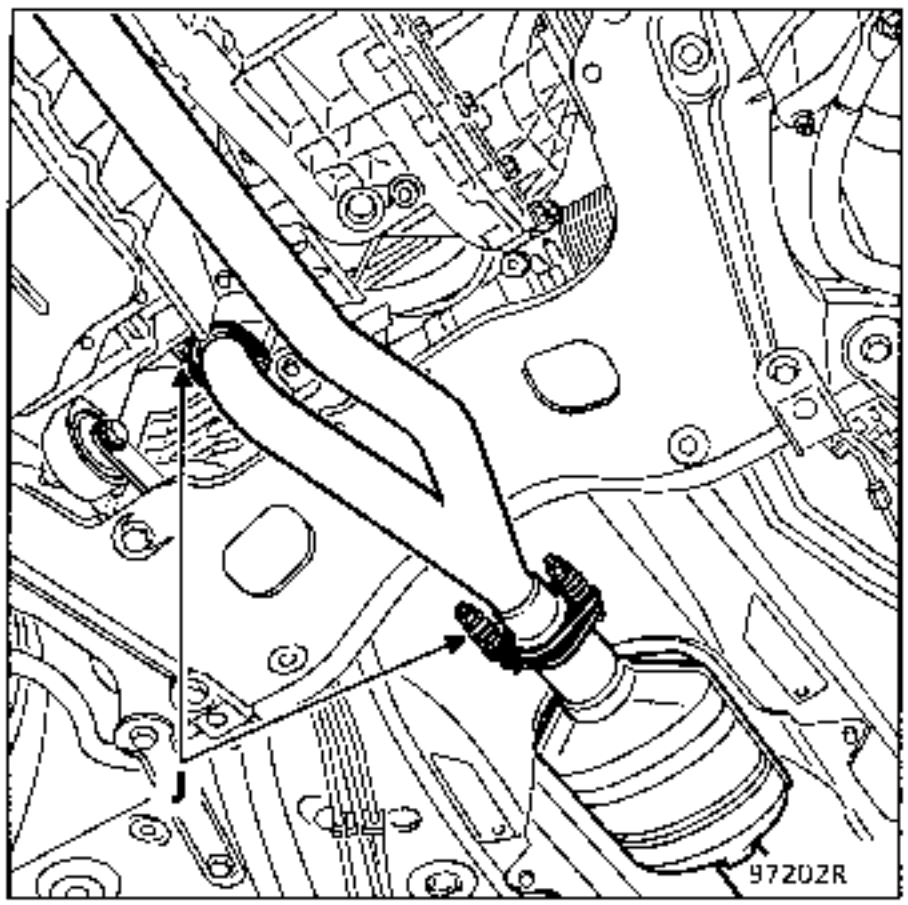


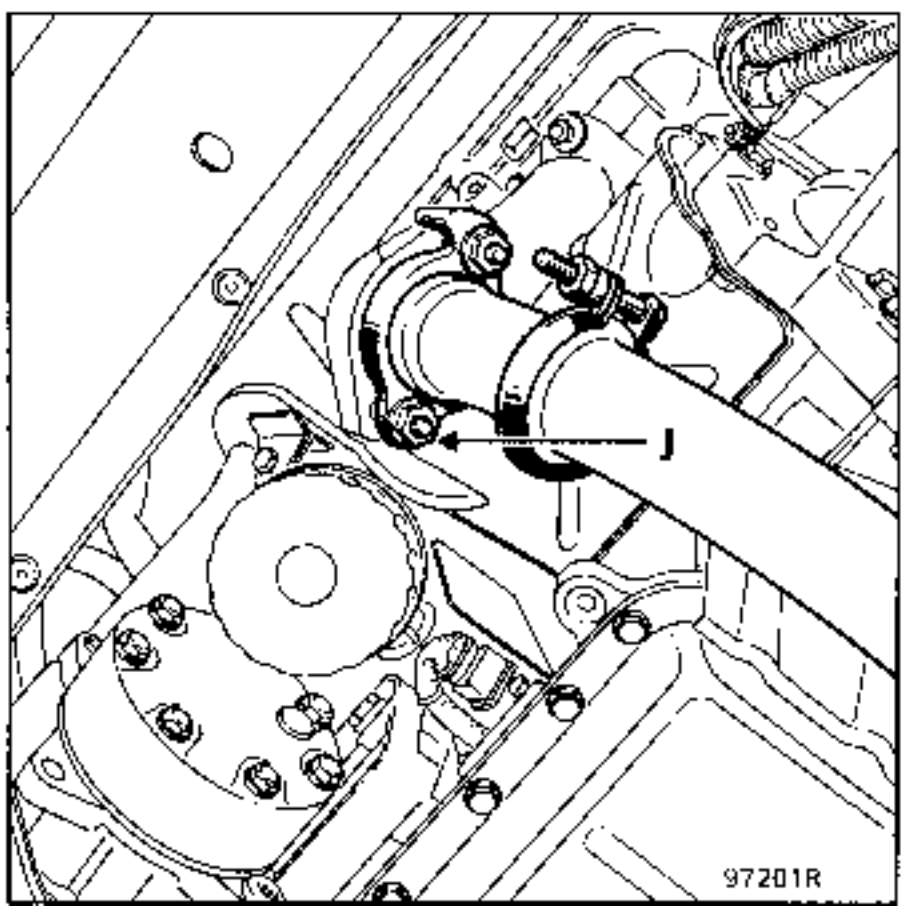
REMOVAL - REFITTING

SPECIAL TOOLING REQUIRED	
Mot. 1 214	Exhaust clip pliers

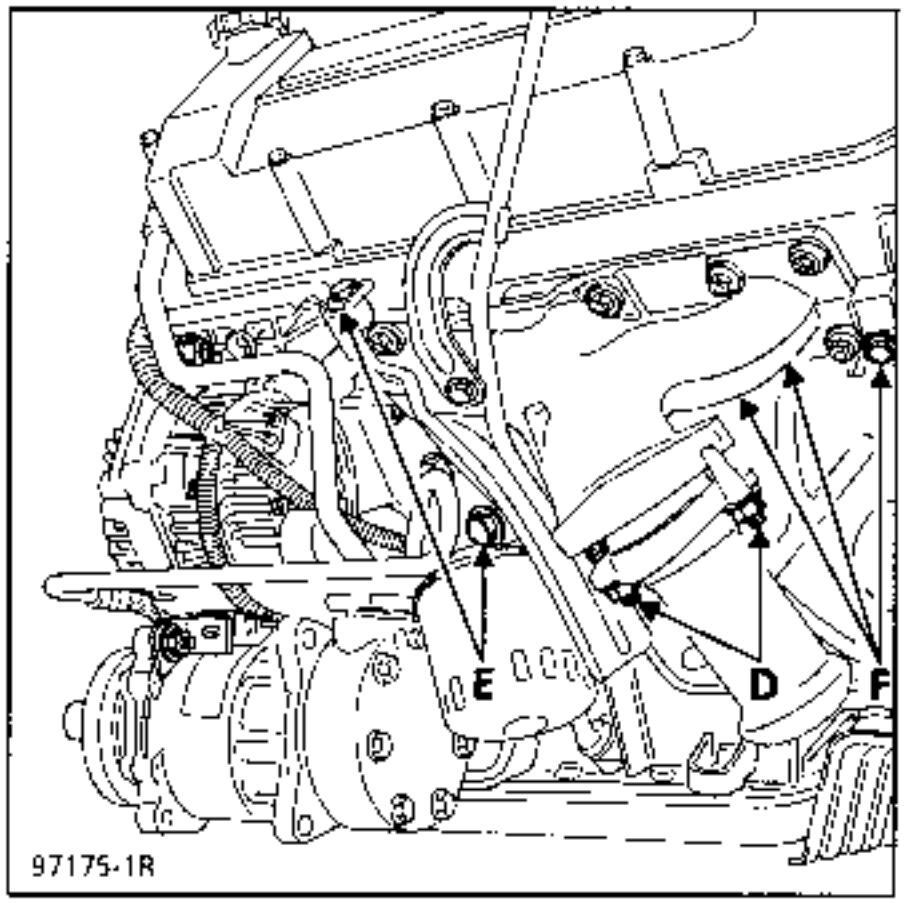
With the vehicle on a lift, disconnect the battery.

Remove the exhaust downpipe at (J):





Remove:
- the heat shield protecting the oil filter by removing the 2 bolts (E),
- the starter heat shield by the 3 mounting bolts (F),
- the clip which secures the ignition cable,
- the starter energising and feed wires.

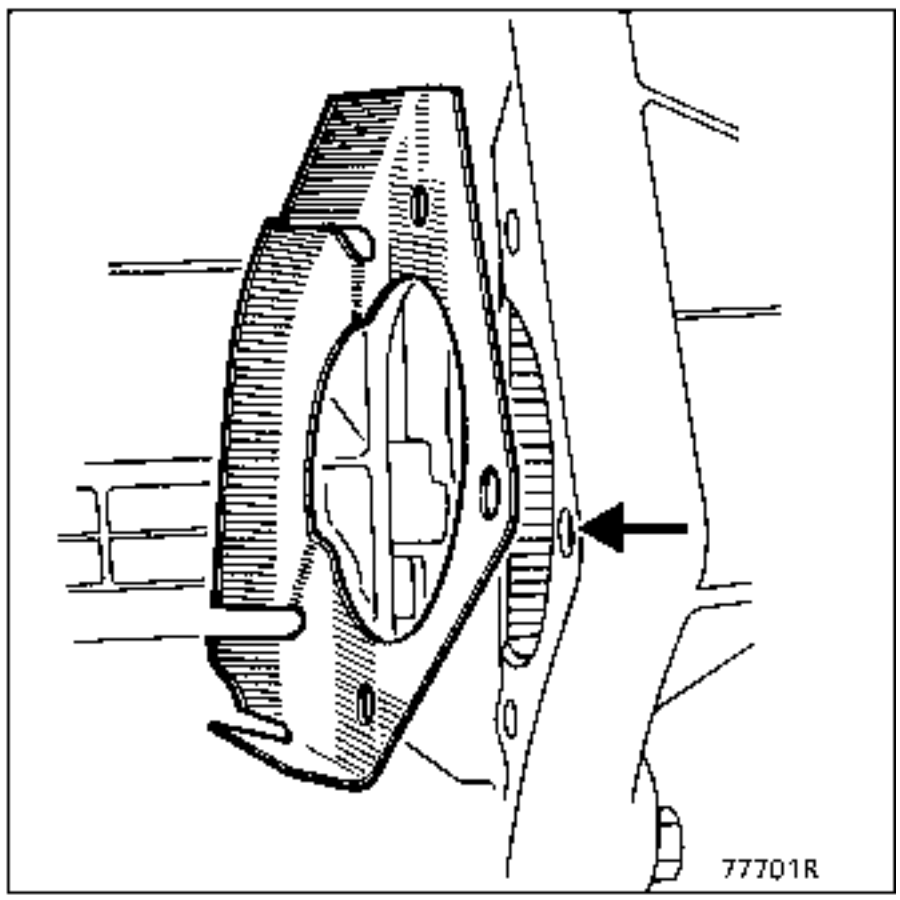


Remove the 3 starter mounting bolts.

Cut the plastic wiring clip if necessary.

Release the starter.

There is a protective plate between the starter and the clutch bellhousing.



REFITTING

Position the protective plate using the centring ring on the clutch bellhousing.

Position the starter and hold it in place using the bolt on the centring ring.

Reconnect the electrical connections.

Secure the starter with the remaining 2 mounting bolts.

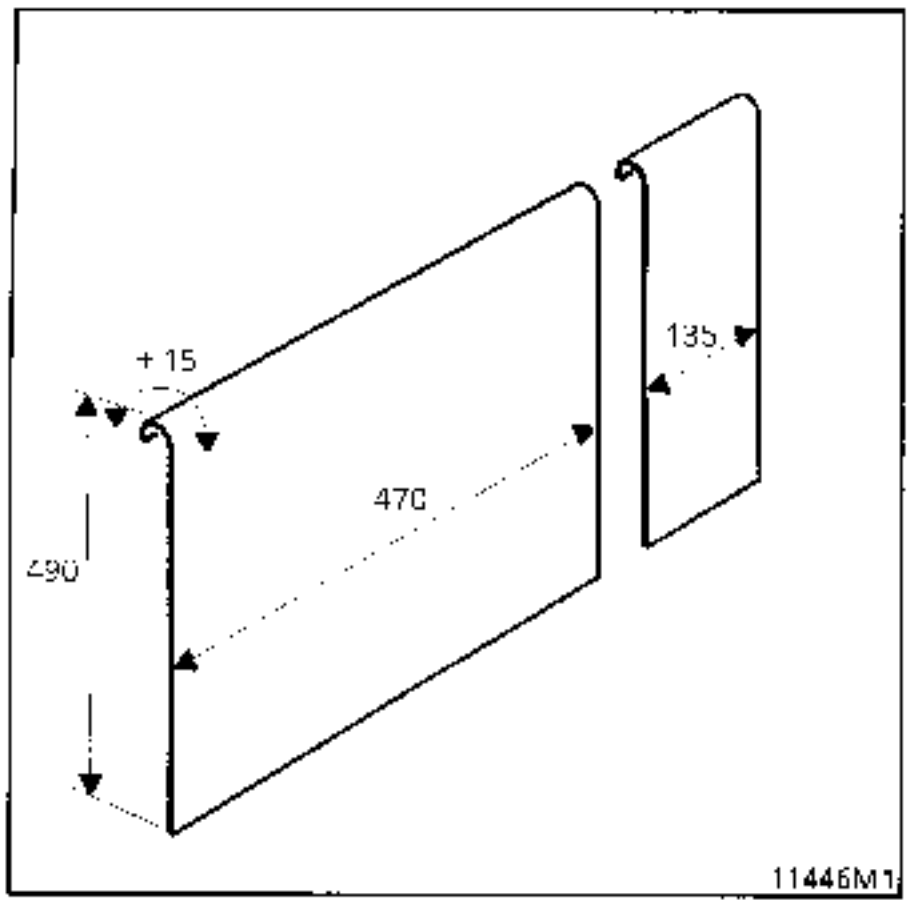
Fit a new plastic clip to secure the wiring.

Refit:
- the starter cable retaining bracket,
- the starter heat shield,
- the oil filter heat shield,
- the exhaust downpipe.

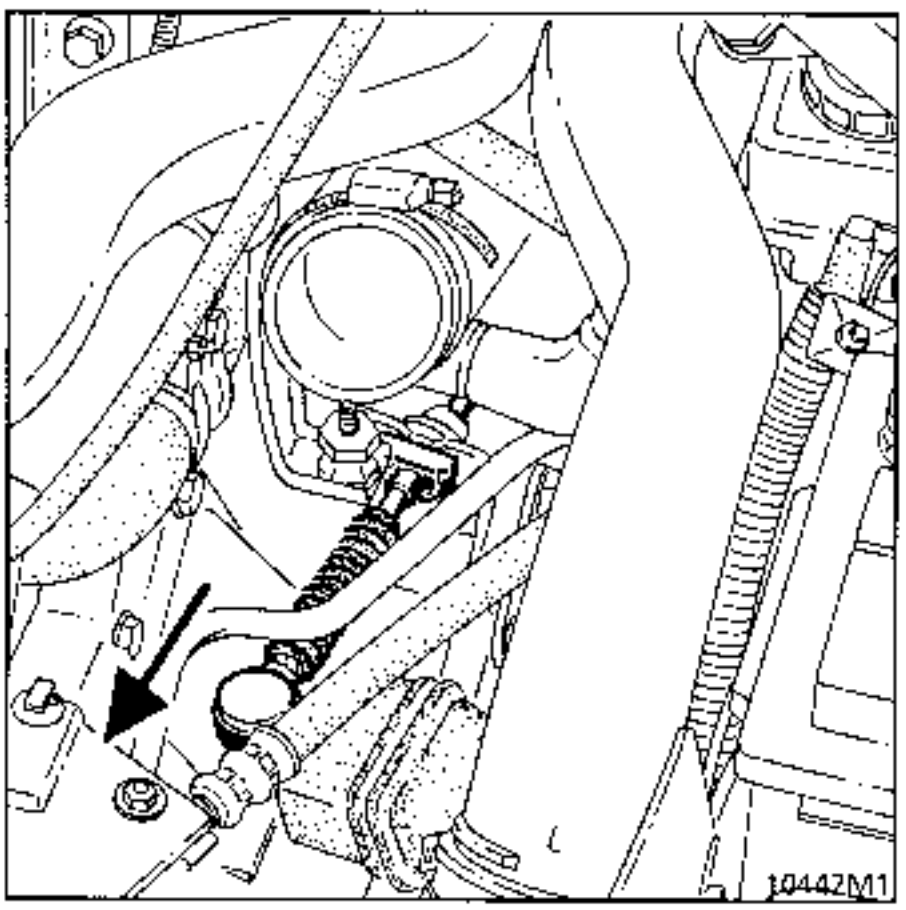
REMOVAL

Put the vehicle on a lift.
Disconnect the battery.
Separate the oil exchanger from the radiator.

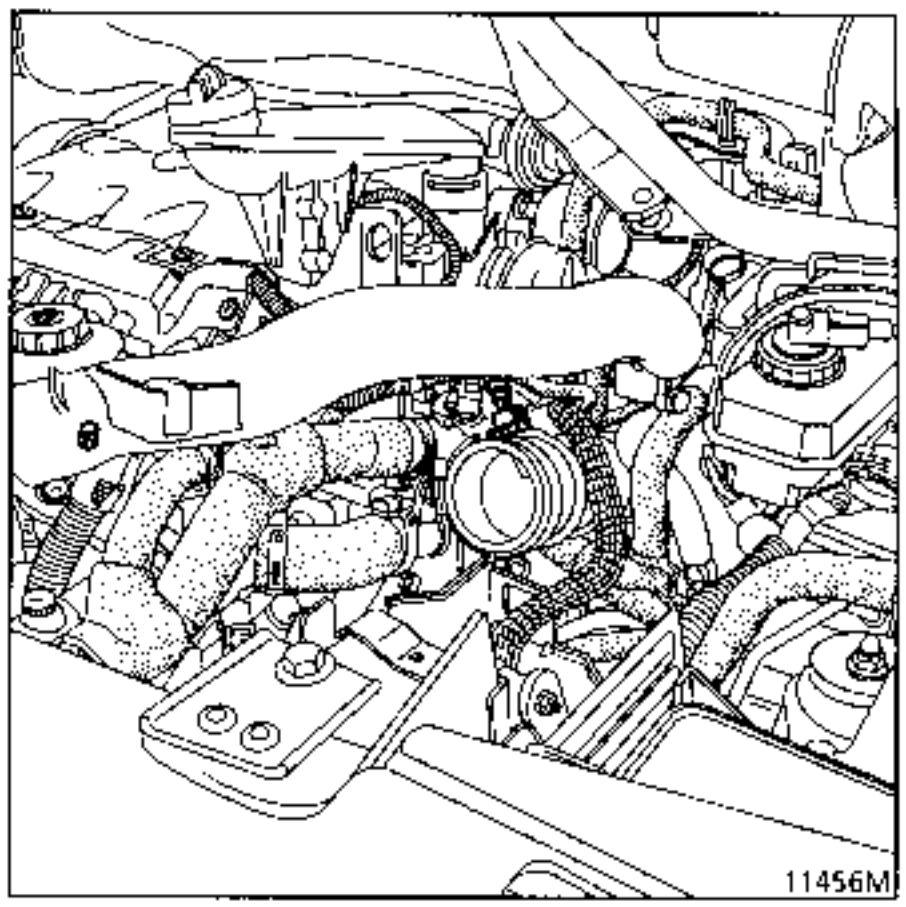
Fit the radiator protection tool (aluminium or steel plate).



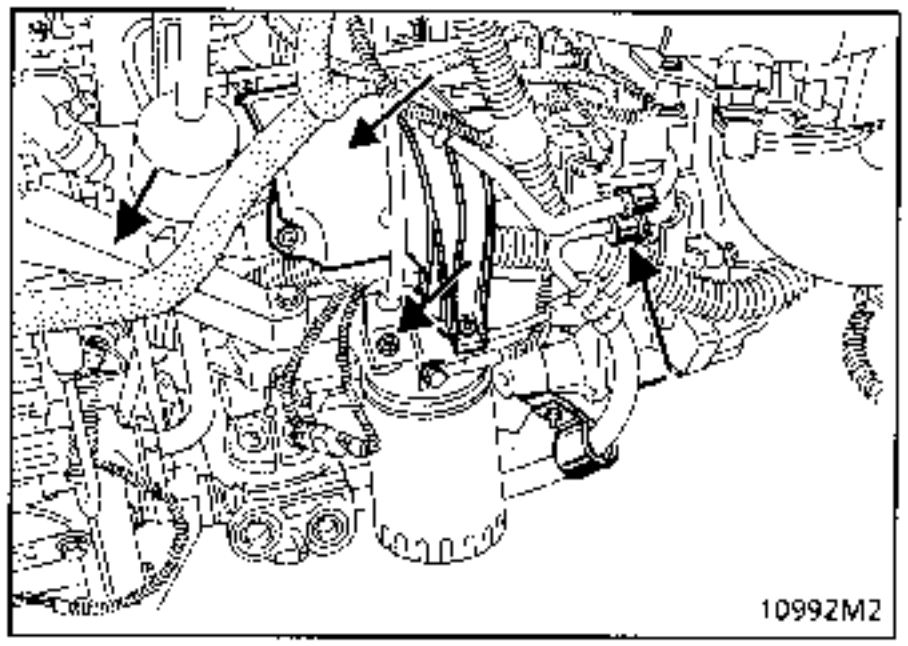
Remove:
- the engine undertray,
- the air filter and its mounting,
- the support in front of the air filter mounting.



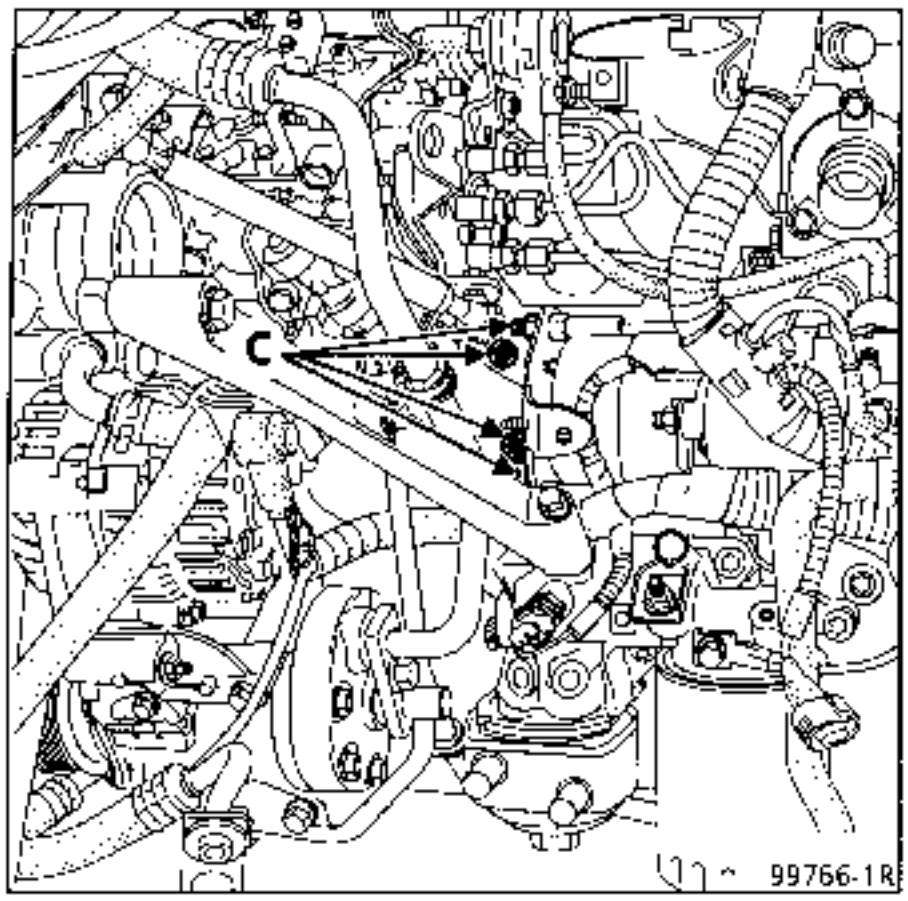
Remove the plastic pipe between the exchanger and the manifold.



Remove:
- the dipstick guide,
- the protective shield for the starter ,
- the engine - power assisted steering pump support bar,
- the bolt mounting the power assisted steering pipes on the front of the gearbox



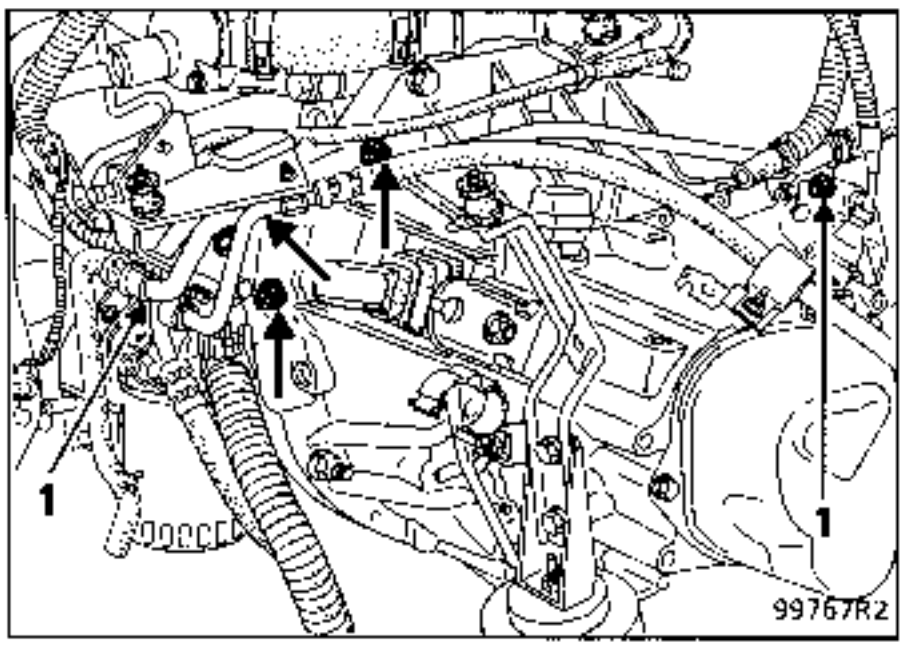
Disconnect the starter electrical connections.
Remove the starter rear mounting at (C),



Disconnect the starter electrically (energising + feed)

Remove:

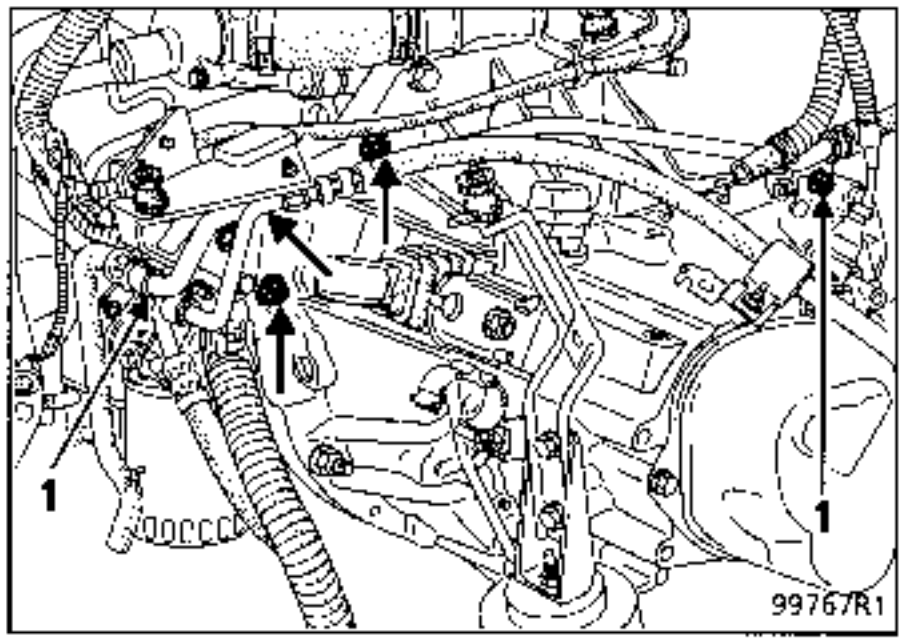
- mountings (1) for the power assisted steering pipes.
- the three starter mounting bolts.



REFITTING

Refitting is the reverse of removal.

Check for the presence of the centring dowel which must be present in the upper hole for one of the starter mounting bolts.



The differences between static ignition with two coils and distributed ignition are:

- the high voltage distributor is no longer used,
- two dual output coils are used.

PRESENTATION

The system comprises:

- the injection computer (the ignition power stage is integrated into the computer),
- two dual output coils,
- four spark plugs,
- an anti-interference condenser.

DESCRIPTION - OPERATING PRINCIPLE

COMPUTER

The injection computer (120), depending on the information received from various sensors, but principally depending on the engine speed and load, determines:

- the number of degrees of advance to be used and consequently the ignition point,
- which cylinders are at TDC and consequently the ignition coil to be operated.

The spark is created at the two cylinders at TDC by cutting the earth to the coil concerned.

COILS (module)

There are two coils. They are of the dual output type.

They are controlled separately by the computer.

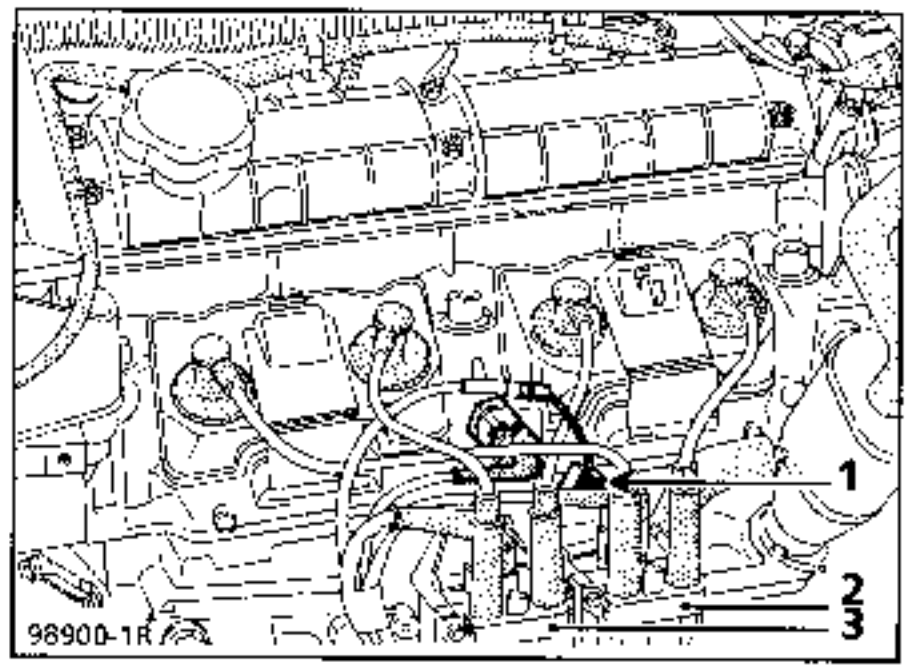
They create two sparks at the same time.

They are fitted with colour coding on the 3 track connectors.

Coil (2) has a black connector. It provides a spark at the same time for cylinders 1 and 4. It is controlled by track 28 on the injection computer.

Coil (3) has a grey connector. It provides a spark at the same time for cylinders 2 and 3. It is controlled by track 29 on the injection computer.

Both coils are connected to an anti-interference condenser (1).



Electrical connector

Track	Allocation
1	+ anti-interference condenser
2	– after ignition
3	Coil control by computer

Reference for coil connector tracks

Marking on connector + –

Connector

Track number 1 2 3

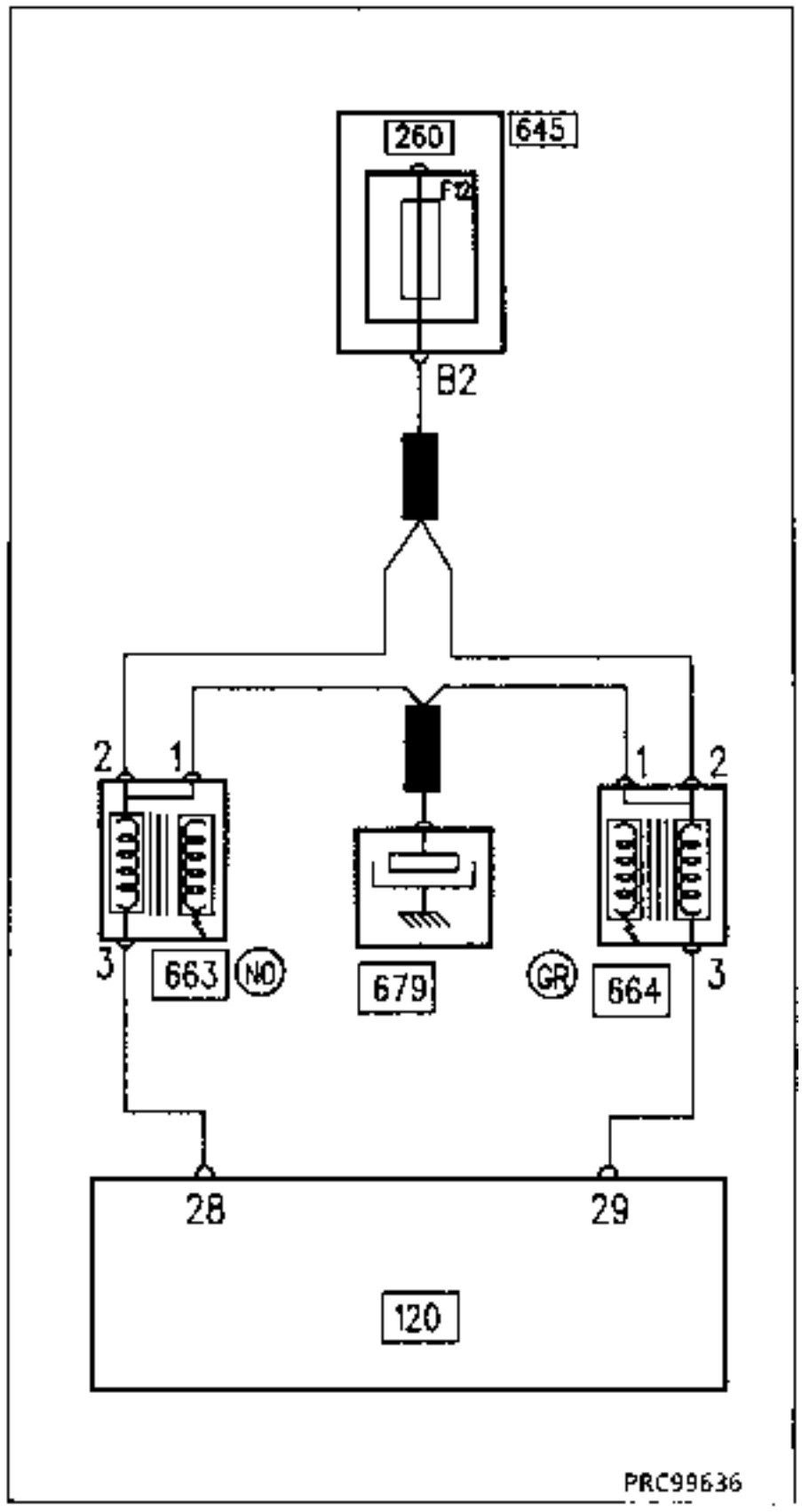
Test to be made between tracks	Resistance
1 – 2	0.2 Ω
1 – 3	1 Ω
2 – 3	1 Ω
HT – HT	8 kΩ

PLUGS

Engine	Make	Type
F3R	BOSCH EYQUEM	WR8 D C04 RC 52 LS

Flat base with seal
Gap 0.9 mm ± 0.05
Tightening torque 2.5 to 3 daN.m

OPERATIONAL WIRING DIAGRAM



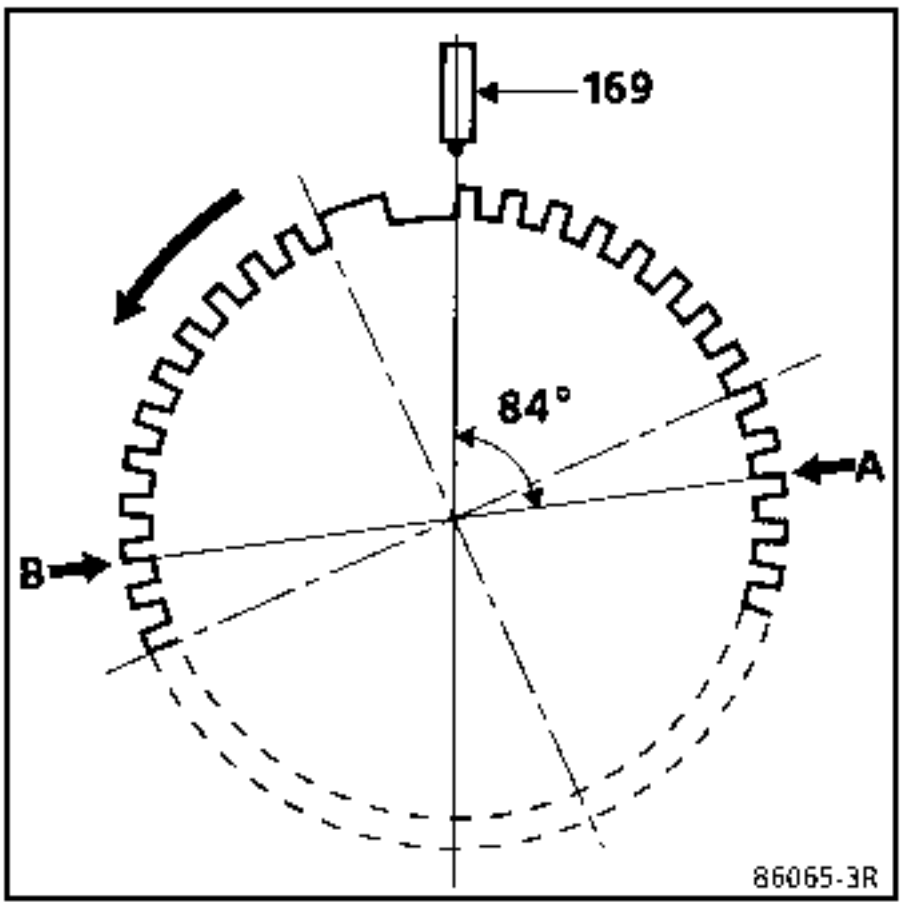
KEY TO COMPONENTS

120 Injection computer
260 Fuse box
645 Passenger compartment connection unit
663 Dual output ignition coil for cylinders 1 and 4
664 Dual output ignition coil for cylinders 2 and 3
679 Anti-interference condenser

SPECIAL NOTES FOR THE FLYWHEEL

Description

The flywheel has 60 evenly spaced teeth of which 2 have been removed to make a reference mark 84° or 14 full teeth before TDC for cylinders 1 and 4 ; there are therefore only 58 teeth on an actual flywheel.



Cylinders 1 and 4 are at TDC when arrow (A) passes in front of the engine speed sensor (169).

Cylinders 2 and 3 are at TDC when arrow (B) passes in front of the engine speed sensor (169).

Operating principle

The computer knows that TDC for cylinders 1 and 4 is located on the rising edge of the 15th tooth after the long gap. Consequently, depending on the degree of advance to be applied, it knows, by counting the number of teeth, where the ignition point should be located.

TDC for cylinders 2 and 3 is located on the rising edge of the 45th tooth after the long gap.

NOTE : advance correction according to the signal from the pinking sensor is discussed in section 17 Injection.

Cylinder 1 is at the flywheel end.

DESCRIPTION

Static ignition is a system which increases the amount of energy available at the spark plugs by suppressing all components between the transformer, three high voltage coils with dual windings, and the spark plugs. The spark quality is therefore improved.

OPERATING PRINCIPLE

Depending on the type of information from the TDC sensor (marked 149), the injection computer (marked 120) sends a command to one of the coils.

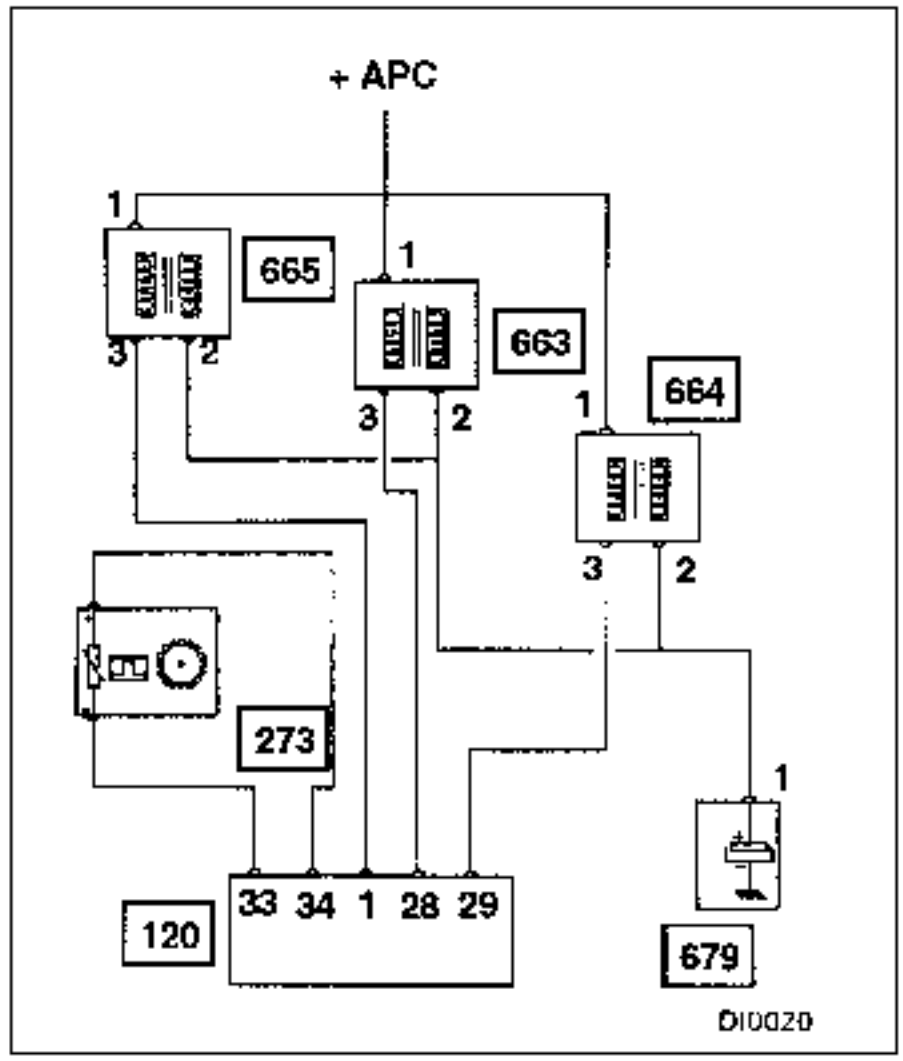
- If the command is sent on track 28 of the injection computer (marked 120), coil 1 is controlled (marked 663).
- If the command is sent on track 29 of the injection computer, coil 2 is controlled (marked 664).
- If the command is sent on track 1 of the injection computer, coil 3 is controlled (marked 665).

Each coil produces two sparks at the same time:

- ignition coil 1 (marked 663) creates one spark at the plug in cylinder n° 1 and one spark at the plug in cylinder n° 5,
- ignition coil 2 (marked 664) creates one spark at the plug in cylinder n° 2 and one spark at the plug in cylinder n° 6,
- ignition coil 3 (marked 665) creates one spark at the plug in cylinder n° 3 and one spark at the plug in cylinder n° 4.

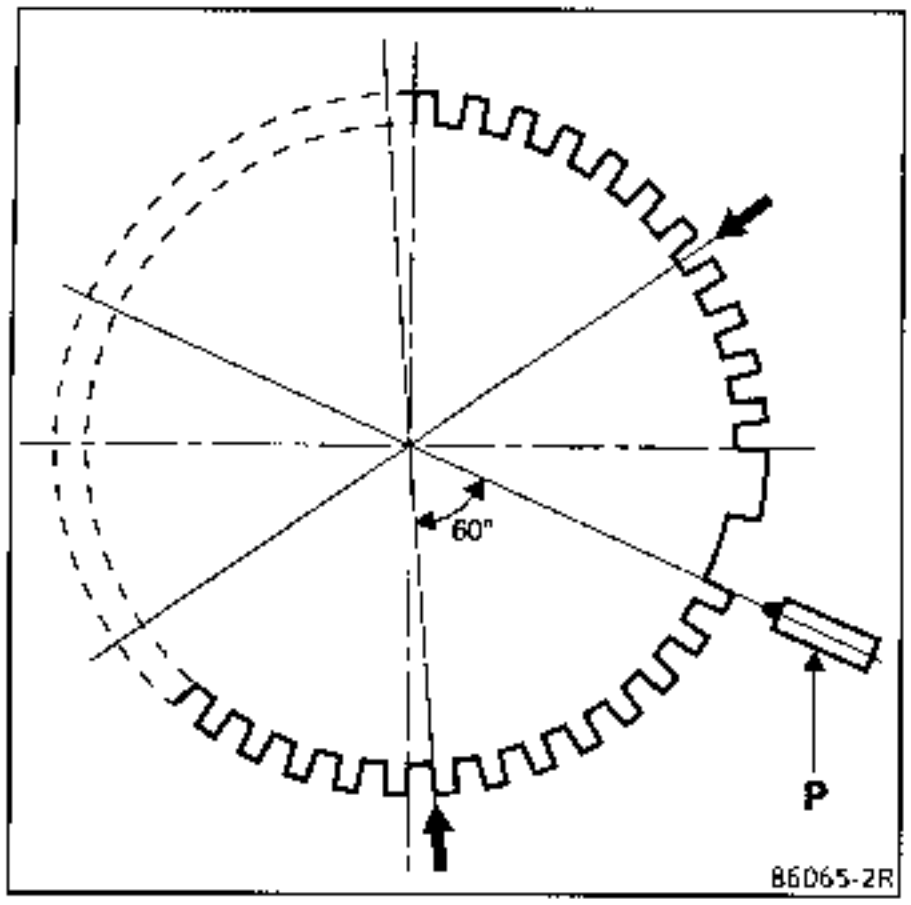
KEY TO COMPONENTS

120 Injection computer
273 TDC sensor
663 Ignition coil 1 (black connector)
664 Ignition coil 2 (grey connector)
665 Ignition coil 3 (brown connector)
679 Radio suppression condenser



1 - ENGINE FLYWHEEL

The flywheel has 60 evenly spaced teeth of which 2 have been removed to make a reference mark 60° before TDC ; there are therefore only 58 teeth on an actual flywheel.

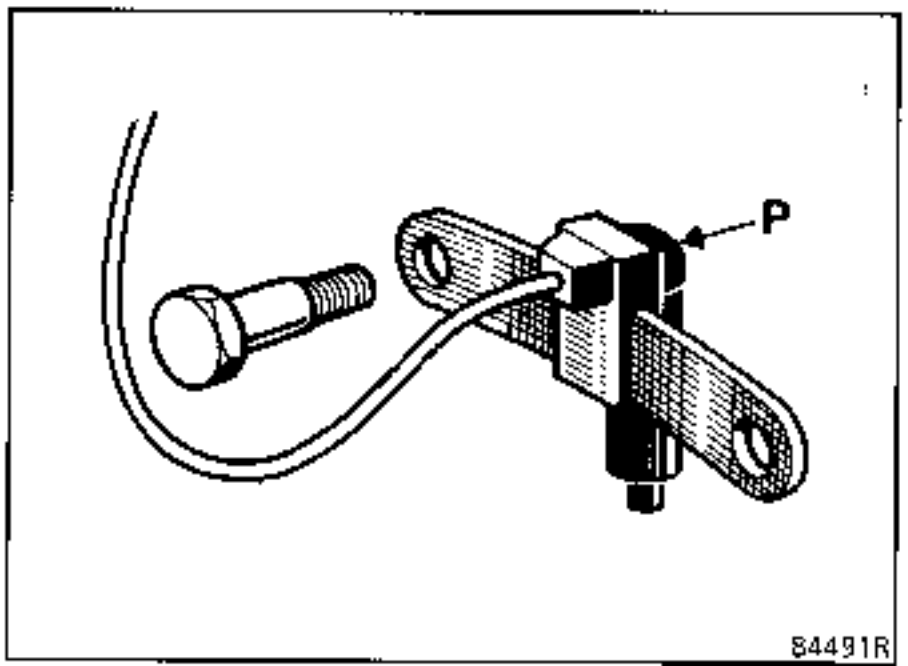


2 - SPEED AND POSITION SENSOR (P)

This sensor measures :
- the TDC and BDC positions,
- the engine speed.

The sensor cannot be adjusted (preset on its mounting bar).

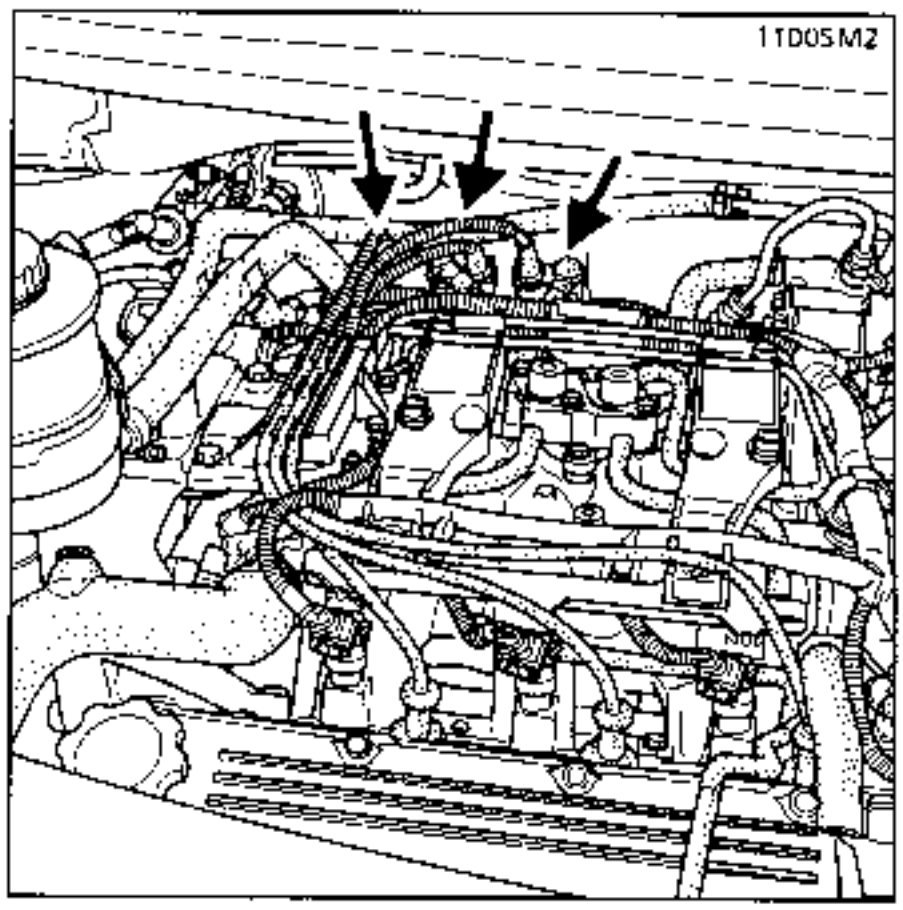
The sensor should be mounted on the clutch bell-housing with shouldered bolts.



3 - COILS

There a 3 ignition coils which are all independent from the injection computer. They may therefore be replaced.

They are mounted on the rocker box cover.



Connection

Track	Allocation
1	+ Radio suppression condenser / Ignition power module
2	– After ignition
3	Ignition coil control

4 - COMPUTER

This is an electrical system which determines the advance depending on engine speed and load.

Plugs

Type	Engine	EYQUEM	BOSCH	Gap (mm)
JE0A	F3R 728	RC 52 LS	WR8 D C04	0.9
JE0D	Z7X 775	RFC 58LS 3 RFC 57LS 3	-	1.2 (non-adjustable)

Plug with a seal : Tightening torque **2.5 to 3 daN.m**.

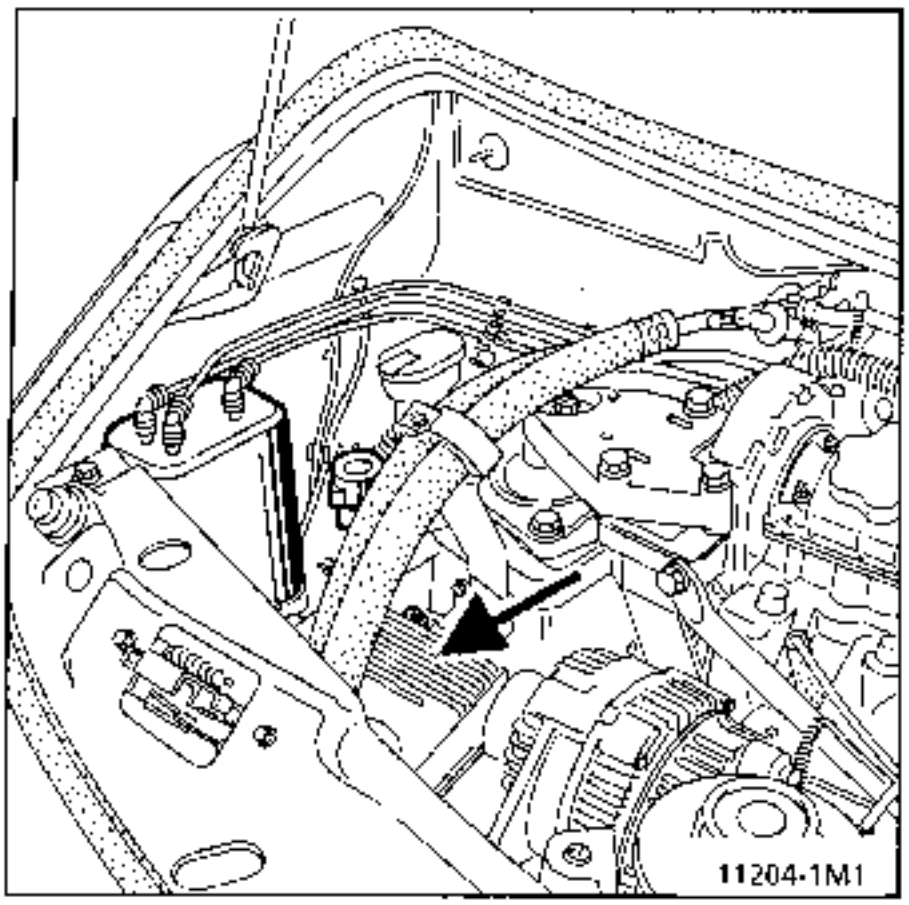
ATTENTION : Observe the make and type of plug specified - the thermal rating is not the only reason for their specification.

SPECIAL NOTES FOR MULTIPOINT INJECTION

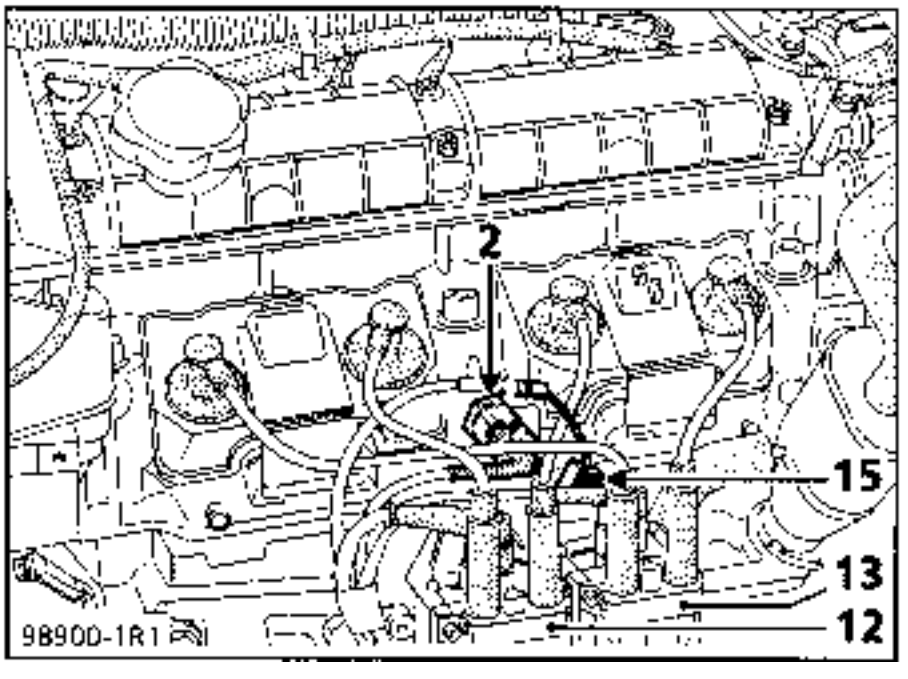
- 55 track SIEMENS FENIX 5 computer.
- Injection is cylinder by cylinder (sequential).
- Static ignition with dual coils.
- Canister bleed solenoid controlled by RCO signal.
- Idle speed correction depending on:
  - battery voltage,
  - air conditioning,
  - heated windscreen,
  - power assisted steering pressostat (F3R 728).
- Injection warning light on instrument panel operational.
- Use fault finding fiche N° 27.
- Computer configuration depending on gearbox type (manual gearbox or automatic transmission)

FITTING A 2ND GENERATION ENGINE IMMOBILISER REQUIRES A SPECIAL PROCEDURE FOR REPLACING THE COMPUTER.

1 Injection computer

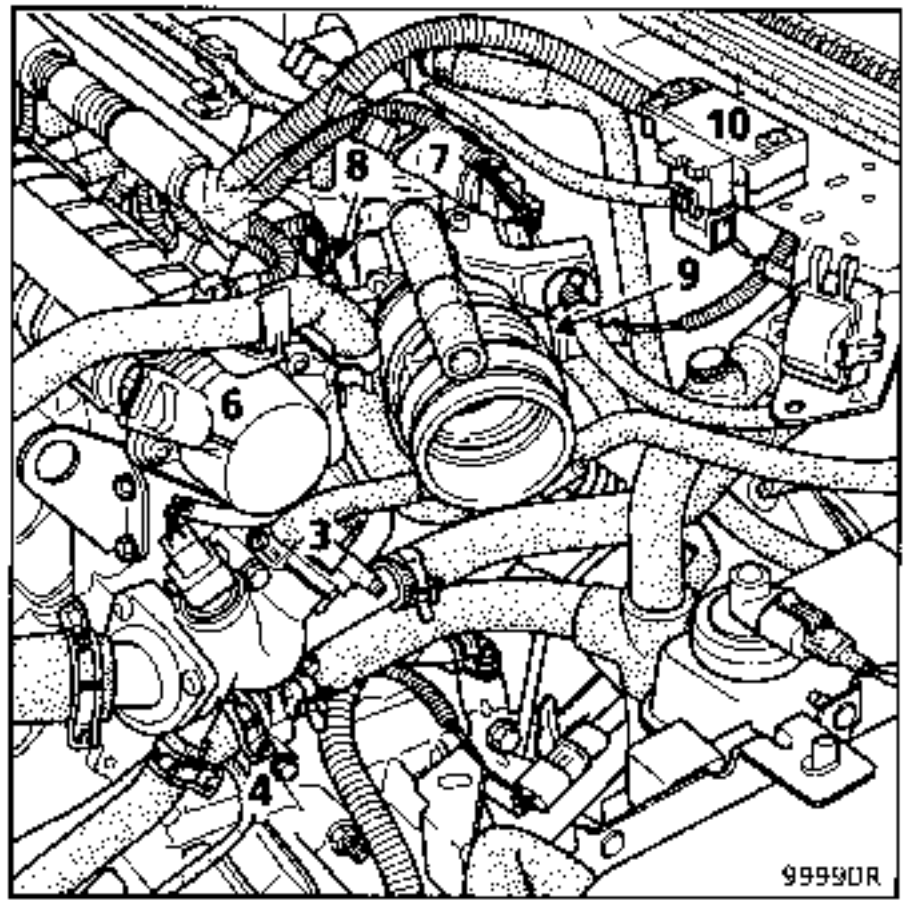


2 Pinking sensor
(tightening torque: **2.5 daN.m**)
12 Coil for cylinders 2 - 3
13 Coil for cylinders 1 - 4
15 Anti-interference condenser

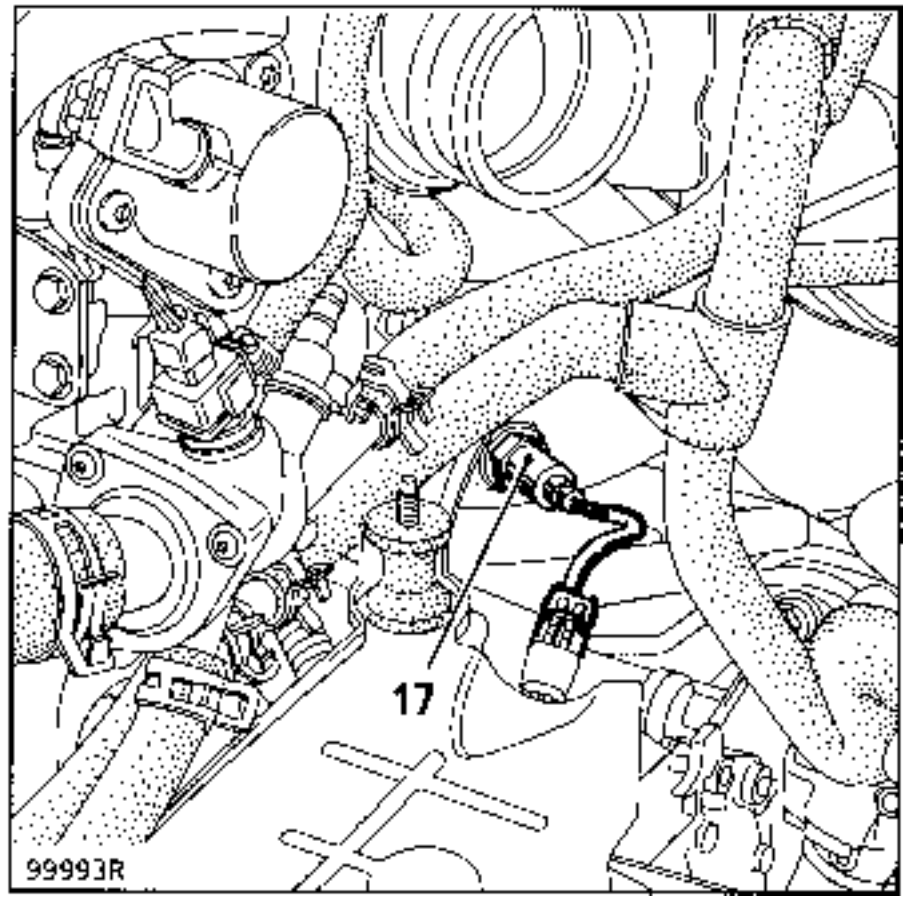


3 Coolant temperature sensor (clipped)
4 TDC sensor

6 Camshaft sensor (see removal in sub-section "Special notes on sequential injection")
7 Idle speed regulation solenoid valve
8 Throttle position potentiometer (non-adjustable)
9 Air temperature sensor (clipped)
10 Absolute pressure sensor



17 Oxygen sensor
(tightening torque : **4.5 daN.m**)



PRESENTATION

The F3R engine is fitted with sequential injection.

Injection of fuel is not carried out simultaneously to all four cylinders as with conventional injection, but cylinder after cylinder when they are at the start of the inlet phase.

To do this, it is necessary for:
- each injector to be connected separately to the computer (injector n° 1 is at the flywheel end),
- the computer to know which cylinder is at the inlet phase.

To determine the cylinder at the inlet phase, the computer uses 2 sensors:
- the TDC sensor,
- the camshaft sensor.

The TDC sensor allows the computer to determine the engine speed, and to know which cylinders are at TDC:
- cylinders 1 and 4 at TDC,
- cylinders 2 and 3 at TDC.

The camshaft sensor allows the computer to know which of the two cylinders at TDC is at the start of the inlet phase.

DEFECT MODE IN THE CASE OF A FAULT WITH THE CAMSHAFT SENSOR

The system remains in sequential injection. The cycle 1 - 3 - 4 - 2 is retained.

When fuel is injected for the first time, or at the beginning of the starting phase, the computer decides arbitrarily to inject fuel to cylinder n° 1 when cylinders 1 and 4 are at TDC.

Two possibilities may then arise:
- the system is phased correctly,
- the system is out of phase by one revolution, in which case, operation of the engine is not greatly affected.

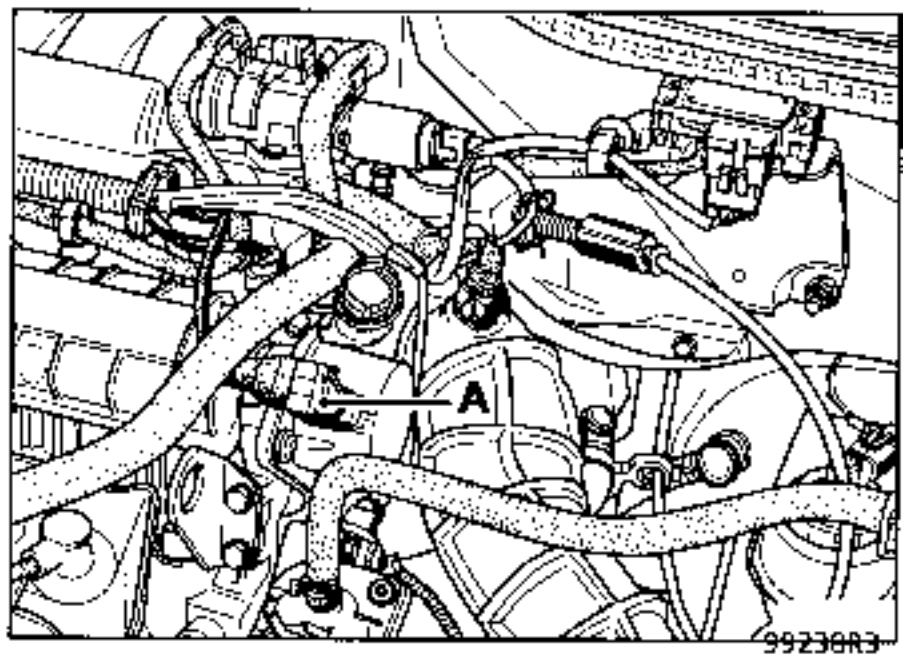
DESCRIPTION

The camshaft sensor (A) is located at the end of the camshaft. It is mounted on to the cylinder head by 3 bolts.

The sensor is opposite a long target of 180°. This is mounted on the end of the camshaft.

If the target is located within the sensor air gap, 12 V is sent to the computer.

If the target is not in the sensor air gap, 0 V is sent to the computer.



SENSOR OPERATING PRINCIPLE

The sensor is supplied with 12 Volts. The computer sends it a 5 V feed on track 2.

Depending on the position of the target, the sensor closes the circuit and earths this voltage (the computer receives 0 V), or the sensor leaves the circuit open (the computer receives 12 V).

PRINCIPLE FOR RECOGNISING THE CYLINDER AT THE INLET PHASE

Depending on the signal from the TDC sensor, the computer knows at what moment cylinders 1 and 4 are at TDC and at what moment cylinders 2 and 3 are at TDC. (For further explanations refer to section 17 "Ignition").

Cylinders 1 and 4 are at TDC,

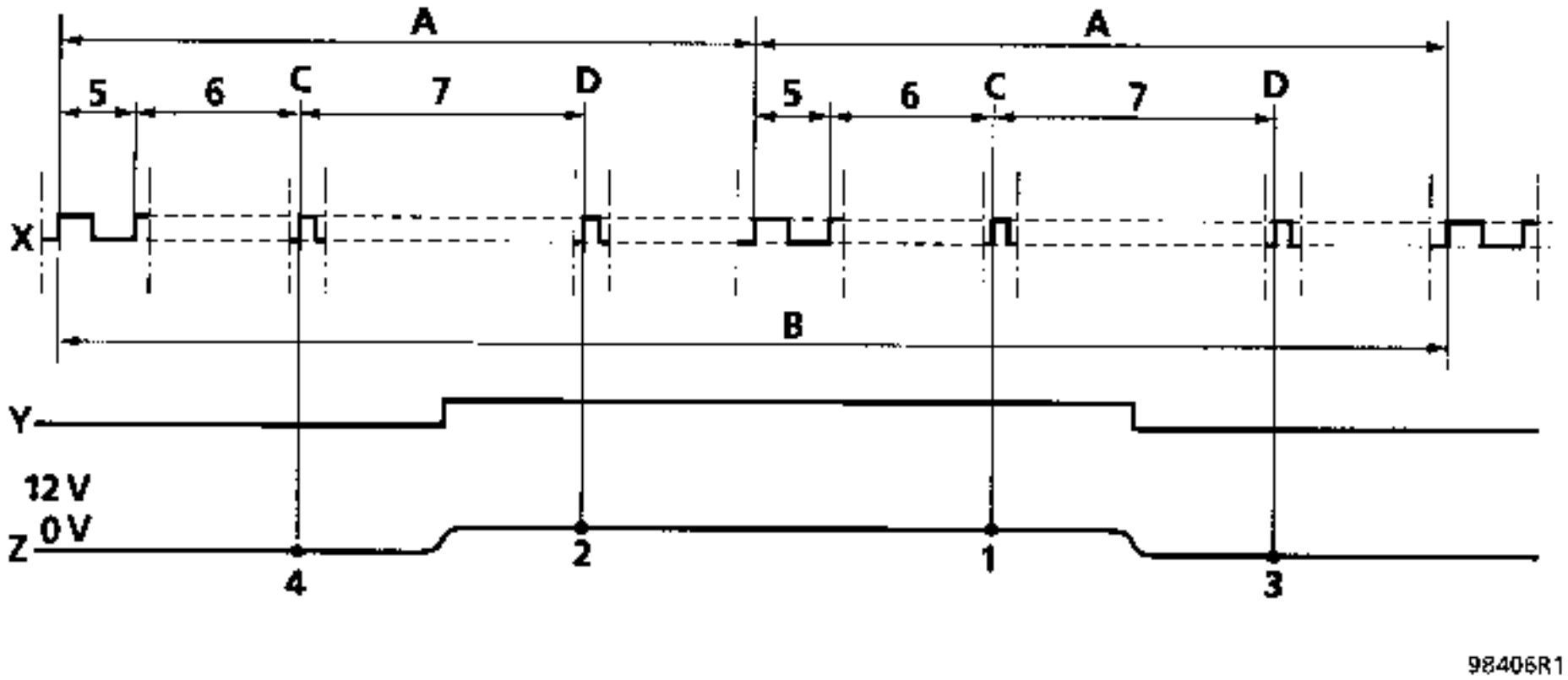
- if the signal from the camshaft sensor is 0 Volts, cylinder 4 is at the start of the inlet phase,
- if the signal from the camshaft sensor is 12 Volts, cylinder 1 is at the start of the inlet phase.

Cylinders 2 and 3 are at TDC,

- if the signal from the camshaft sensor is 0 Volts, cylinder 3 is at the start of the inlet phase,
- if the signal from the camshaft sensor is 12 Volts, cylinder 2 is at the start of the inlet phase.

LOGIC

Cylinder at TDC	Signal from camshaft sensor	Cylinder at start of inlet phase
1 - 4	12 Volts	1
	0 Volt	4
2 - 3	12 Volts	2
	0 Volt	3



A 1 rotation of the crankshaft
B 1 rotation of the camshaft

C TDC 1 - 4
D TDC 2 - 3

1 Cylinder 1 at inlet
2 Cylinder 2 at inlet
3 Cylinder 3 at inlet
4 Cylinder 4 at inlet

5 Gap in flywheel
6 84° or 14 teeth
7 30 teeth

X Flywheel target
Y Camshaft target
Z Voltage from camshaft sensor

NOTE : All values are given in TDC degrees.

1. REMOVING THE CAMSHAFT SENSOR

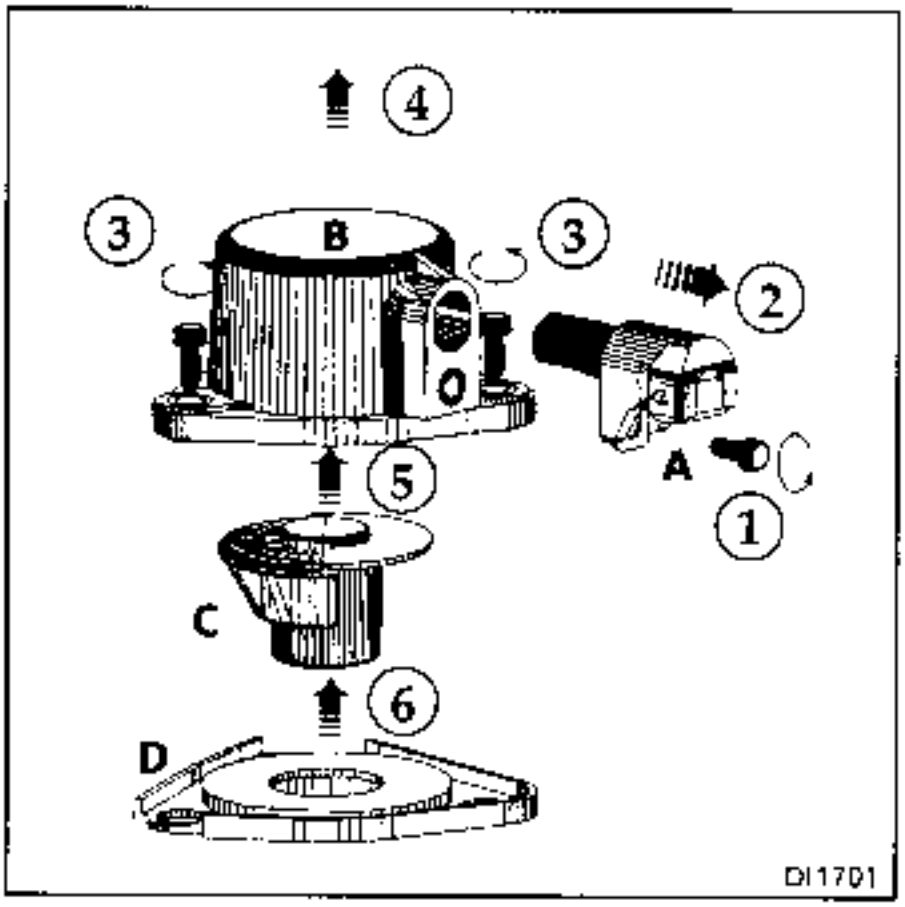
Disconnect the sensor.

Remove:
- the camshaft sensor (A) (one bolt),
- the cover (B) (three bolts).

Target (C) is held on the end of the camshaft by a spring ring.

To remove the target from the camshaft:

- Rest a copper hammer against the back of the target.
- Tap the copper hammer using a mallet with small sharp taps.
- Remove the target (C) and the plastic protective cover (D).



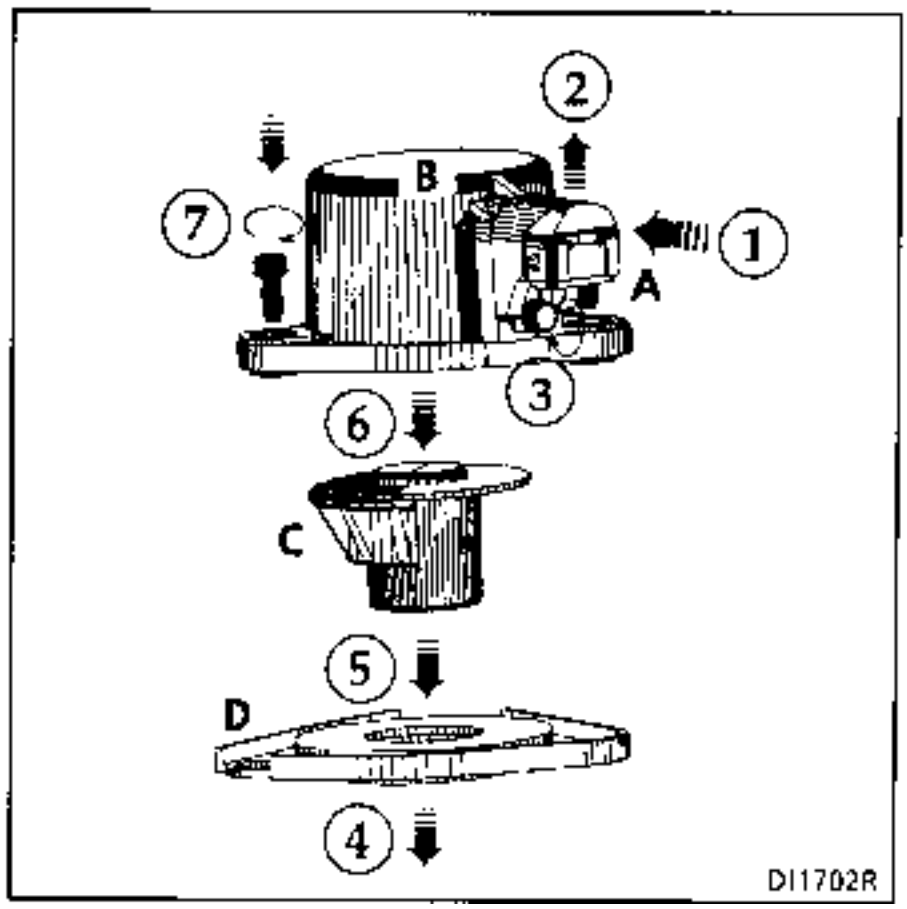
DI1701

2. REFITTING THE CAMSHAFT SENSOR

IMPORTANT : the order of operations described below MUST be observed. If the method is not followed correctly the sensor may not operate correctly and / or may be damaged.

Refit:

- the sensor to the cover, pushing it upwards, and torque tighten to **0.15 daN.m**,
- the plastic protective cover,
- the target (it has a foolproofing device. Check its position before fitting it to the end of the camshaft; to bond it use Loctite Scelbloc),
- the cover with the sensor. Tighten the three cover bolts to a torque of **1 daN.m**.



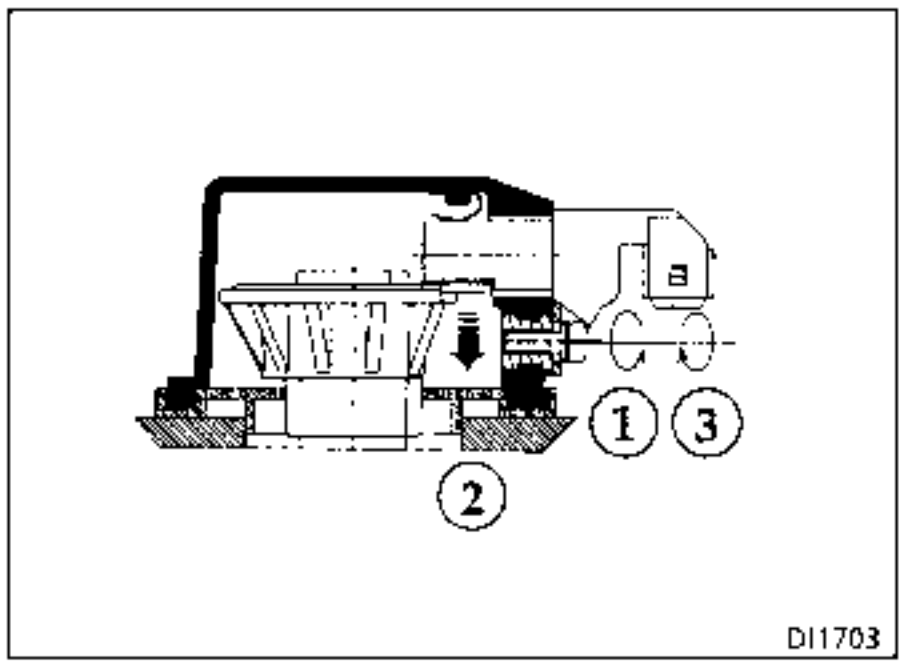
DI1702R

3. ADJUSTING THE TARGET / SENSOR GAP

Adjustment is made by slackening the bolt mounting the sensor without touching the sensor itself and retightening the bolt to a torque of **0.8 daN.m**.

When the bolt is slackened, the sensor is released and a spring in the cover flattens it against the target.

When the bolt is tightened, the sensor is secured. It has two plastic grooves which rest against the target. These grooves wear away when the engine turns over for the first few times, contact is broken and the gap is set correctly.
If the two grooves have been worn away completely, the sensor cannot be adjusted. It must be renewed.



VERY IMPORTANT : after the sensor has been refitted, IT IS VITAL to check that it has been correctly set. To do this, only the voltmeter function on the XR25 may be used.
Leaving the sensor connected, slide back the rubber sleeve protecting the back of the sensor. Start the engine. Note the voltage on track N° 2 on the sensor (centre track). The voltage read by the XR25 must alternate between 0 then 12 volts. If this is not the case reset the sensor again.

CAMSHAFT SENSOR CONNECTIONS

TRACK	ALLOCATION
1	Earth
2	Information to injection computer on track 42
3	+ after ignition

This vehicle is fitted with a 2nd generation engine immobiliser system.

REPLACING THE INJECTION COMPUTER

The computers are supplied uncoded but are capable of being programmed with a code.

When replacing the computer, the vehicle code must be programmed in and then check that the immobiliser system is operational.

To do this, turn the ignition on for a few seconds then remove the key.

CHECKING THE IMMOBILISER FUNCTION

Remove the key from the ignition switch. After 10 seconds the red immobiliser warning light will flash.

When the air conditioning is selected, the idle speed is increased to 900 rpm (F3R).

PROGRAMMING FOR OPERATION OF THE COMPRESSOR

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

Starting the engine
The compressor is prevented from operating for 10 seconds after the engine has been started.

Thermal protection
The compressor clutch is prevented from engaging if the coolant temperature is greater than or equal to + 115°C

Over-revving protection
The compressor may not operate if the engine speed is greater than 6 000 rpm.

POWER ASSISTED STEERING PRESSOSTAT - INJECTION COMPUTER CONNECTION (F3R 728 engine)

The injection computer receives information from the power assisted steering pressostat. This depends on the pressure in the hydraulic circuit. The higher the pressure, the more energy is used by the power assisted steering pump.

The injection computer, to compensate for this energy use, increases the percentage opening of the idle speed regulation solenoid valve.

The information is received on track 13 on the injection computer. Pressostat closed, the computer receives an earth. The idle speed is adjusted to **850 rpm** .

IDLE SPEED CORRECTION DEPENDING ON THE BATTERY VOLTAGE

This correction compensates for the drop in voltage due to operation of consumers when the battery is poorly charged. To do this, the idle speed is increased, allowing the alternator to rotate more and consequently increase the charging voltage.

The lower the voltage, the greater the degree of correction. Correction of the engine speed is therefore variable. It begins when the voltage drops to below **12.7 Volts**. Correction begins at the nominal engine speed and may reach a maximum of **910 rpm.**

IDLE SPEED CORRECTION DEPENDING ON AIR CONDITIONING OPERATION

When the air conditioning is selected, the idle speed is increased to 900 rpm.

PRINCIPLE

Under normal warm engine operating conditions, the RCO idle speed value using #12 varies between an upper and a lower value to obtain the nominal idle speed.

If the engine operating conditions are different (running in, engine contaminated...) the RCO idle speed value may be situated close to the upper or lower value.

Adaptive correction (#21) for the RCO idle speed (#12) allows compensation to be made for slow variations in the engine's air requirements.

This correction is only operational if the coolant temperature is greater than 80°C, 20 seconds after starting the engine and if the engine is in the nominal idle speed regulation phase.

RCO IDLE SPEED VALUES AND ADAPTIVE CORRECTION

	F3R 728 engine
Nominal idle speed (#06)	X = 820 rpm
R.C.O. idle speed (#12)	20 % ≤ X ≤ 40 %
Adaptive idle speed (#21)	Threshold: – min. :– 8.6 % – max. : + 6.2 %

INTERPRETATION OF THE GATE VALUES

If there is an excess of air (air leak, throttle stop incorrectly set...) the idle speed increases, the RCO idle speed value for #12 decreases to return to the nominal idle speed; the RCO idle speed adaptive correction value for #21 reduces.

If there is a lack of air (pollution, etc.), the strategy is reversed:
The RCO idle speed for #12 increases and adaptive correction for #21 also increases.

IMPORTANT : after erasing the computer memory (disconnecting the battery), the engine must be allowed to run at idle speed before returning the vehicle to the customer so that the adaptive correction may correctly reset itself.

OXYGEN SENSOR VOLTAGE (#05)

Reading #05 on the XR25 : the value read is the voltage sent to the computer by the oxygen sensor; it is expressed in Volts (the value actually varies between 0 and 1 000 millivolts).

When the engine is in the richness regulation phase, the voltage value should oscillate rapidly and should be between 50 ± 50 mV (lean mixture) and 850 ± 50 mV (rich mixture) and vice versa.

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

RICHNESS CORRECTION (#35)

The value given under # 35 on the XR25 represents the average value of richness corrections made by the computer depending on the richness of the burnt mixture as seen by the oxygen sensor (the oxygen sensor actually analyses the oxygen content of the exhaust gases directly from the richness of the burnt mixture).

The richness correction has a centre point of 128 with thresholds of 0 and 255 (experience has shown that under normal operating conditions # 35 is located close to 128 with only a small amount of variation).

- Value less than 128 : request for mixture to be made leaner
- Value greater than 128 : request for mixture to be made richer

ENTRY INTO RICHNESS REGULATION MODE

Loop phase

Richness regulation begins after the timed starting period :
- for no load if the coolant temperature has reached: + 35 °C
- outside no load conditions if the coolant temperature is greater than + 15 °C.

The timed starting period is dependent on the coolant temperature:
- at 20 °C (it is a maximum of 2 minutes),
- at 80 °C (it is a maximum of 1 minute).

if richness regulation has not yet started, # 35 = 128

Non-loop mode

When richness regulation is occurring, the operating phases when the computer ignores the voltage information from the oxygen sensor are:

- Full load: **#35** = variable and greater than **128**
- Sharp acceleration: **#35** = variable and greater than **128**
- Sharp deceleration with no load information (injection cut*) : **#35** = **128**
- Oxygen sensor fault: **#35** = **128**
- On deceleration depending on manifold vacuum **#35** = **128**

* there is no injection cut-out in first gear.

DEFECT MODE IN THE EVENT OF AN OXYGEN SENSOR FAULT

If the voltage from the oxygen sensor is incorrect (# 05 varies only slightly or not at all) during richness regulation, the computer will only enter defect mode (# 35 = 128) if the fault has been present for 3 to 5 minutes. The fault will be memorised in this case only.

If an oxygen sensor fault is present and recognised and if the fault has already been stored, the system enters the open loop mode directly (# 35 = 128).

PRINCIPLE

In the loop mode (see section 17 "Richness regulation"), richness regulation (# 35), corrects the injection timing to give fuel metering which is as close as possible to richness 1. The correction value is close to 128, with limit values of 0 and 255.

Variations may affect the components of the injection system and the correction may drift towards 0 or 255, to ensure richness 1 is obtained.

Adaptive correction allows the injection mapping to be adjusted to recentre the richness regulation to 128 and to ensure a constant authority of correction to make the mixture leaner or richer.

Adaptive correction to richness regulation has two parts:

- Adaptive correction for average and high engine loads (#30)
- Adaptive correction for idle speed and low engine loads (#31).

Adaptive corrections take 128 as the average value after initialisation (erasing the memory) and have the following threshold values:

F3R ENGINE
$82 \leq \#30 \leq 224$
$32 \leq \#31 \leq 224$

Adaptive correction only takes place when the engine is warm, in the loop phase (#35 variable) and for a specified manifold pressure range.

The engine must have operated in the loop mode for several pressure zones in order that adaptive correction begins to change to compensate for the variations in engine operating richness.

Following reinitialisation of the computer (return to 128 for # 30 and # 31) a special road test must therefore be carried out.

ROAD TEST

Conditions :

- Engine warm (coolant temperature > 70° C)
- Do not exceed engine speed of **4300 rpm**

For this test, start from a fairly low engine speed, in 3rd or 4th gear using progressive acceleration **to stabilise the required pressure for 10 seconds in each zone** (see table).

Pressure zones to cover during the test (# 01)

	Zone n° 1 (mbars)	Zone n° 2 (mbars)	Zone n° 3 (mbars)	Zone n° 4 (mbars)	Zone n° 5 (mbars)
F3R	300 ---------- 410	---------- 500	---------- 590	---------- 680	---------- 870
	Average 355	Average 455	Average 545	Average 635	Average 775

Following this test the corrections will be operational.

31 varies more significantly for idle speed and low loads and # 30 for average and high loads, but both are operational over all of the manifold pressure ranges.

The test should be followed by a normal, varied drive, covering 3 to 6 miles (5 to 10 km).

After the test, read the values for # 30 and # 31, without stopping the engine. Initially 128, they may have changed. If not, repeat the test ensuring that the test conditions are observed.

Interpretation of information gathered on a road test

If there is a lack of fuel (injectors dirty, fuel pressure and flow too low...), richness regulation # 35 increases to obtain the richness as close as possible to richness 1 and adaptive correction # 30 and # 31 increases until the richness correction returns to oscillate around 128.

If there is an excess of fuel, the situation is reversed:
Richness regulation # 35 reduces and adaptive correction # 30 and # 31 also reduces to recentre the richness correction (# 35) around 128.

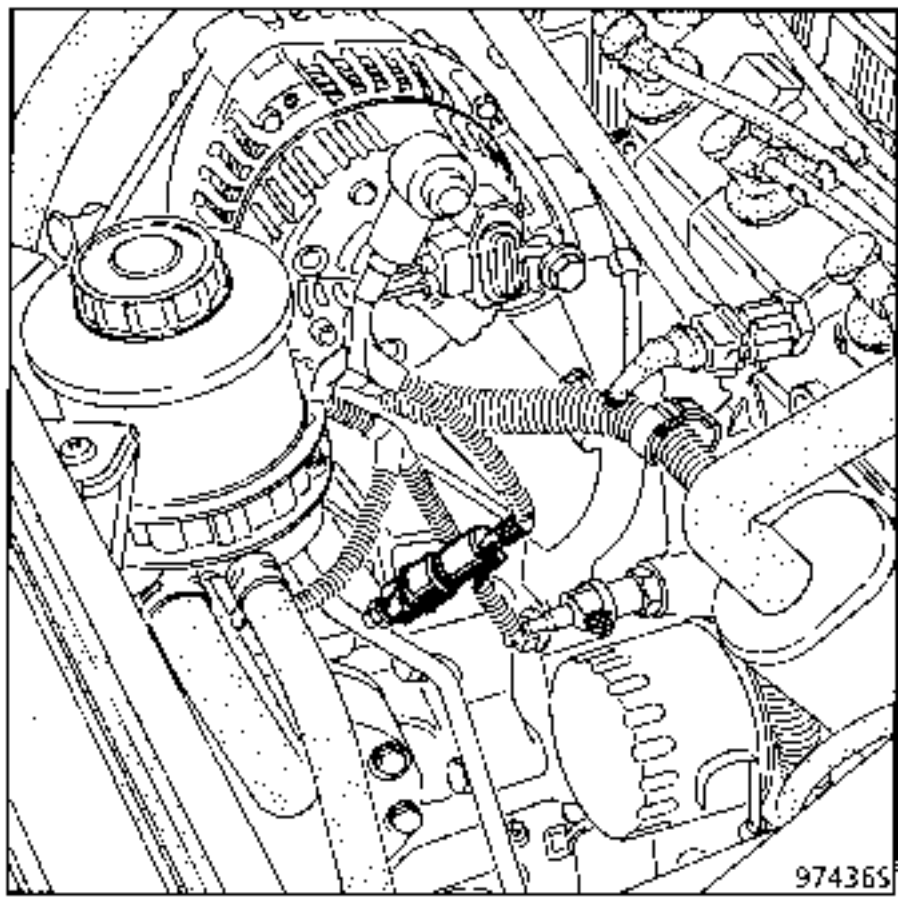
NOTE: the analysis which may be made using # 31 remains difficult since this correction mainly operates for idle speed and low loads and is also very sensitive.

Hasty conclusions should not therefore be drawn from this gate value, rather the position of # 30 should be examined.

The information from these two gates gives an idea about the engine operation richness, and may be used as a guide for fault finding.

IMPORTANT : # 30 and # 31 should only be examined and analysed after a customer complaint, an operating fault and if they are at the threshold with the value for # 35 also offset (# 35 varies above 175 or below 80).

F3R ENGINE



The pressostat allows the idle speed to be increased during parking manoeuvres.

SPECIAL NOTES FOR THE MULTIPOINT INJECTION SYSTEM FITTED TO THE Z7X ENGINE.

- 55 track computer
- Static ignition.
- Injection lock relay used for anti-percolation relay only.
- Fuel pump electrical feed line monitoring.
- Use both fiches n° 27 :
  - the first is used for "fault" bargraphs,
  - the second is for "status" bargraphs.
- Use modes G01* and G02* to switch from "status tests" to "fault tests".
- Use the command modes to select various actuators (ignition on only).
- Reading of cyclical opening ratio (R.C.O.) for the canister bleed solenoid (# 23).
- Actual value is read on the XR25 (# . .) when a fault occurs with an injection component, not the defect mode value applied by the injection computer.
- Special richness adaptive correction programming zones.
- Absolute pressure sensor defect mode strategy (pressure information is calculated from the throttle position information and the engine speed).
- Maximum engine speed before injection is cut : **6200 rpm**

INJECTION WARNING LIGHT ILLUMINATION ON THE INSTRUMENT PANEL
(For a vehicle without the on-board computer)

When the ignition is turned on, the warning light flashes (while the computer identifies the immobiliser code), then illuminates permanently for 3 seconds, then extinguishes.

- Fault in an injection system component

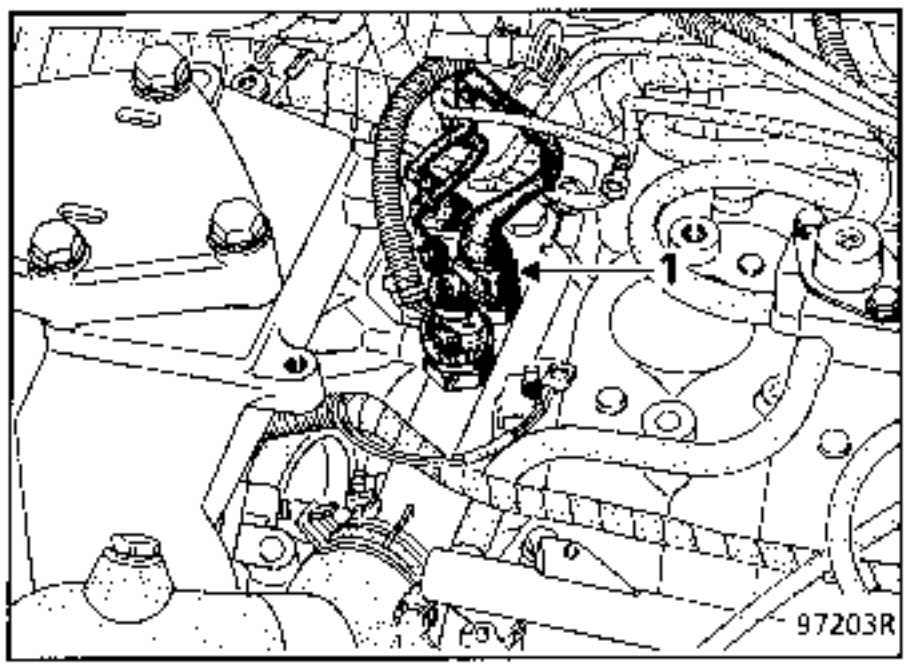
The fault is visualised by:

Simultaneous illumination of the injection and service warning lights (fault present).

Faults with the following components cause the warning light to illuminate :
- absolute pressure sensor,
- throttle position potentiometer,
- injectors,
- idle speed regulation valve,
- absence of vehicle speed information when the vehicle is moving.

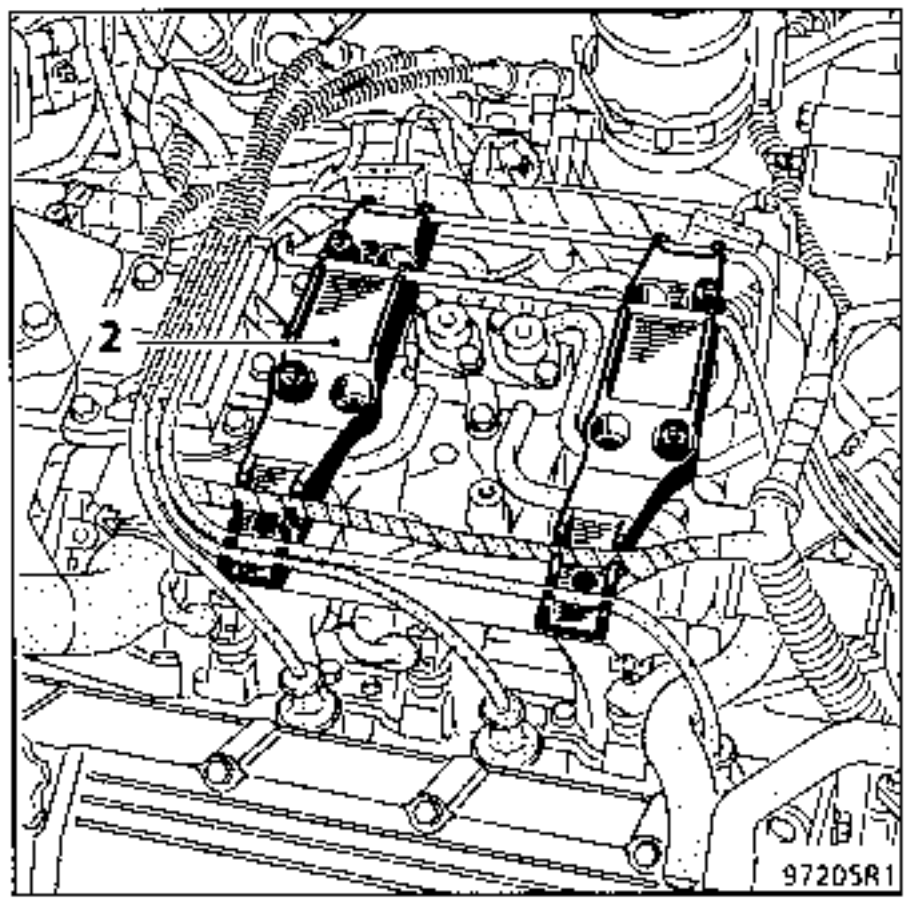
Also refer to the corresponding Fault finding section.

LOCATION

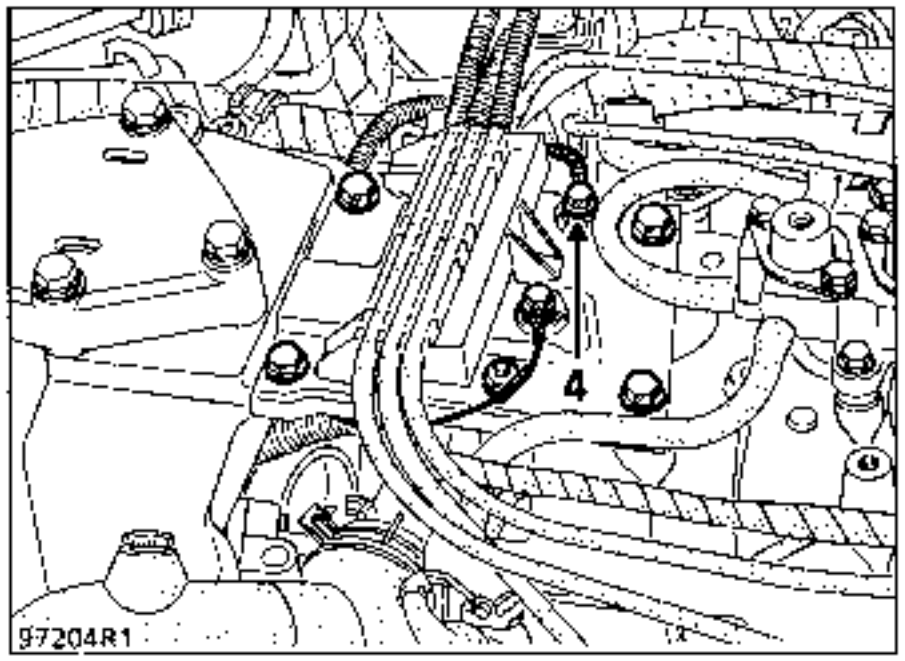


The coolant temperature sensor (1) for the injection system is mounted on the coolant circulation bridge between the two cylinder banks.

SPECIAL NOTES FOR REMOVAL



To reach the sensor, remove:
- the upper engine protective cover,
- the cover mounting(2) (mounted by 2 bolts),

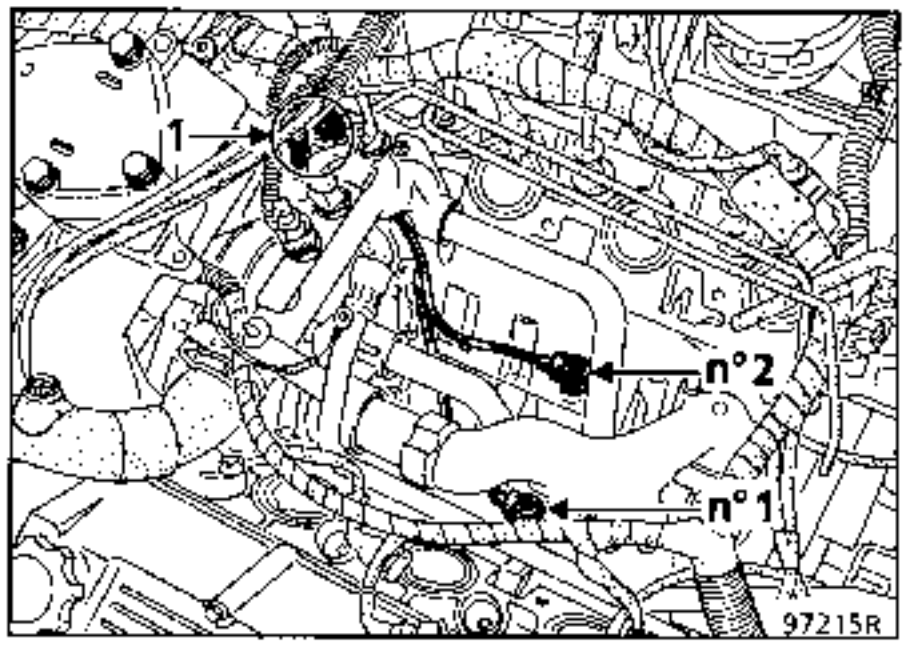


- the HT leads mounting bracket (3) (remove the 4 mounting bolts, the nut and the two earth wires).

Remove the sensor, taking care not to lose any coolant.

Refitting is the reverse of removal; ensure the connector is correctly connected.

LOCATION



The pinking sensors are mounted to the cylinder heads at the bottom of the "V" formed by the two cylinder banks.

The inlet manifold must be removed to replace the sensors (see Chapter 12).

The correct fitting of the connectors (which are mounted near to the coolant temperature sensor) can be checked without removing the manifold (see method for removing the coolant temperature sensor for information on how to reach the connectors).

IDENTIFICATION OF THE SENSORS

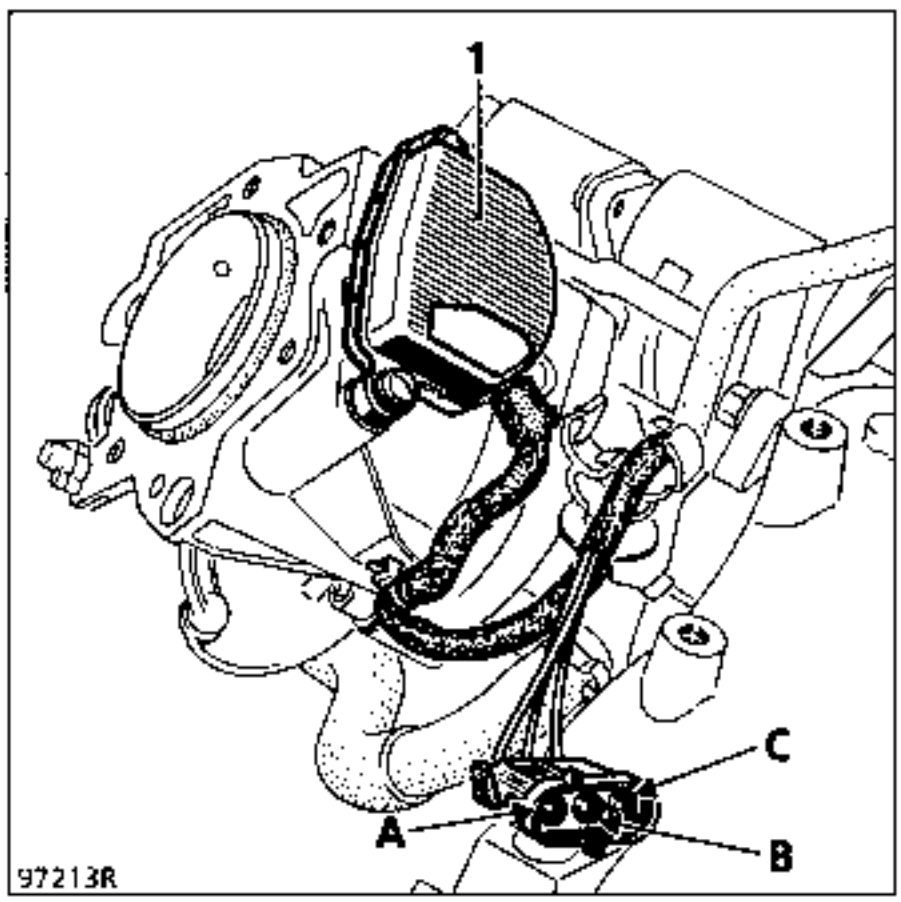
When the sensors are removed they must be repositioned correctly so that the computer may correct the advance setting if necessary for the cylinder or cylinders concerned.

Pinking sensor n° 1 with the green connector, must be fitted to the front cylinder bank (corresponding to cylinders 1, 2 and 3).

Pinking sensor n° 2 with the blue connector must be fitted to the rear cylinder bank (corresponding to cylinders 4, 5 and 6).

IMPORTANT : the correct tightening torque for the sensor must be used: **2 ± 5 daN.m**

LOCATION



A Throttle position information
B Earth
C −5 Volts feed

The throttle position potentiometer (1) is mounted on the throttle body and cannot be adjusted.

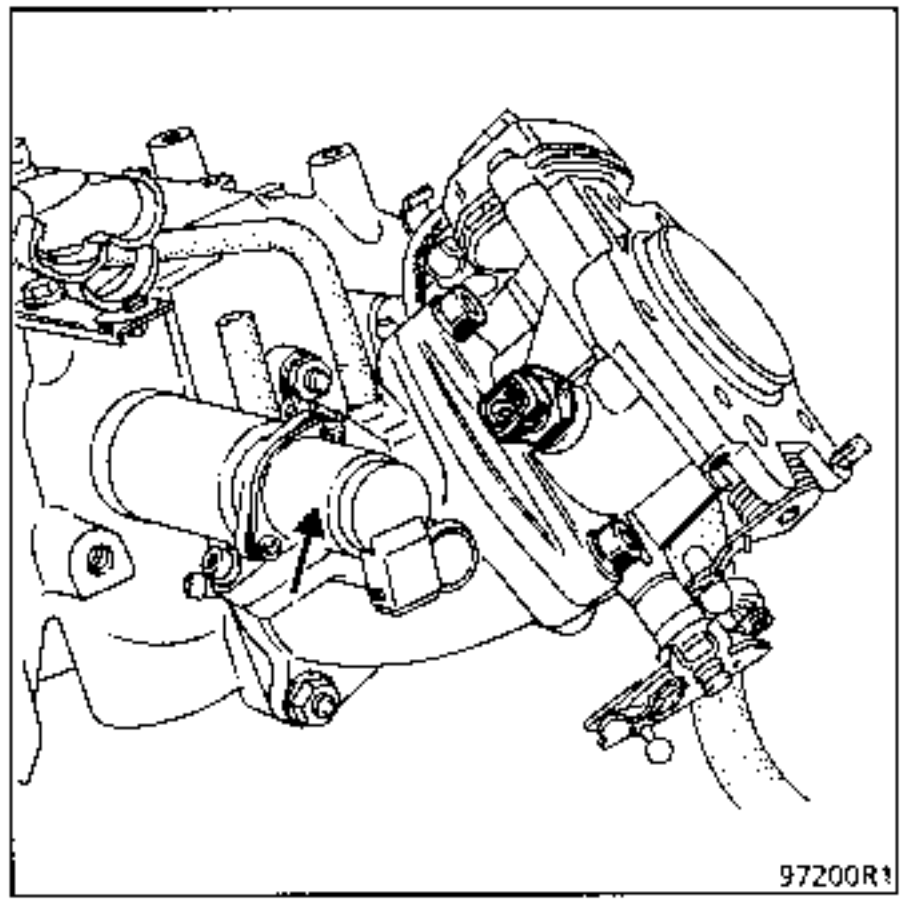
SPECIAL NOTES

The injection computer is programmed with the no load position information according to special rules .

If the potentiometer information under # 17 is greater than 47 without the accelerator being touched, the no load position is no longer programmed.

Full load position information (PF) is determined based on the no load position information : full load is recognised as a value under # 17 which is equal to the no load value plus 128.

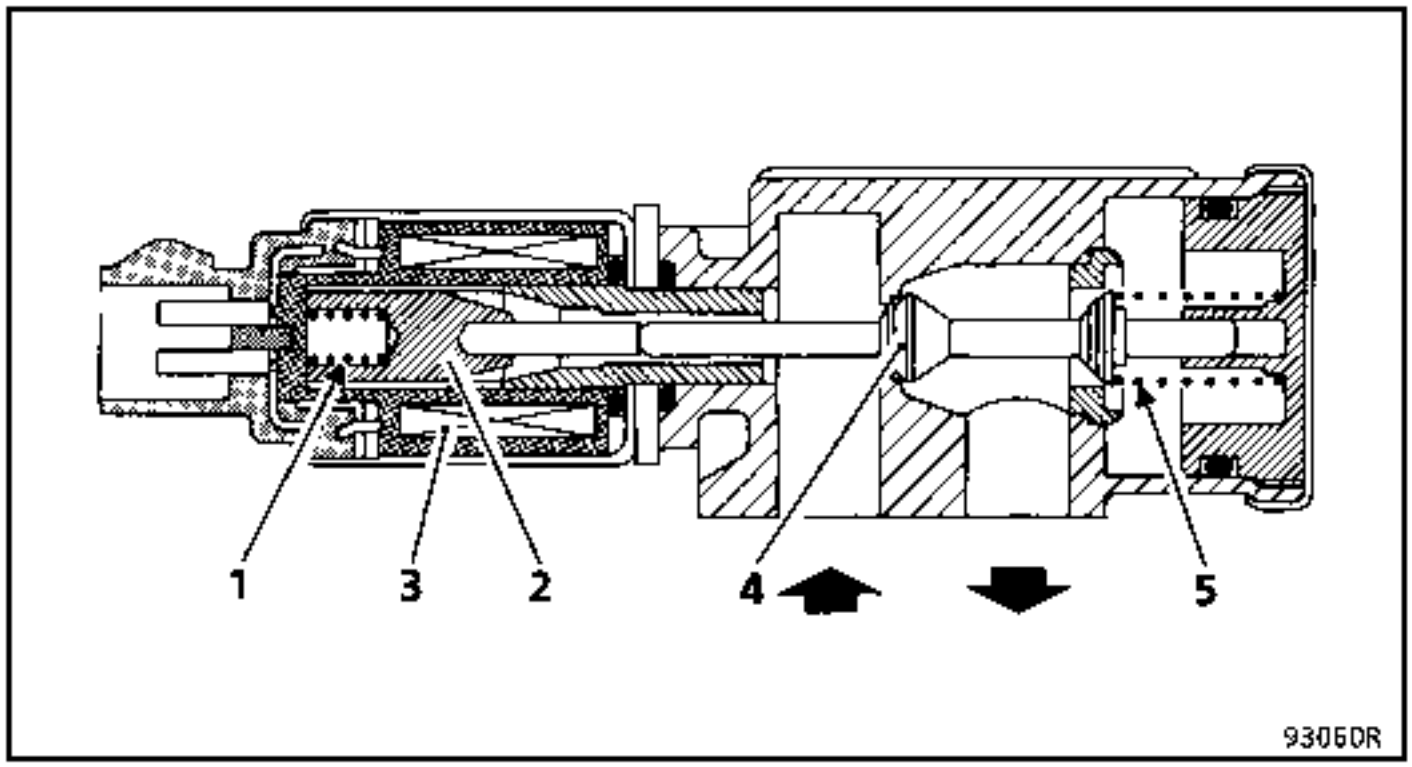
LOCATION (Z7X ENGINE)



The idle speed regulation valve is mounted on the intermediate manifold.

It is of type Hitachi AESP 207-10. Its resistance is **9.5 ± 1 Ohm.**

OPERATING PRINCIPLE (F3R and Z7X)



The idle speed regulation valve is a single coil solenoid valve. It regulates the additional air flow to the throttle body to maintain the engine speed at a predetermined value under all idle speed conditions.

Rest position:

The air circuit is closed, valve (4) is pushed back towards coil (3) by spring(5), the core (2) is held against the valve by the small spring (1).

Ignition on, engine not running:

The computer controls the idle speed regulation valve on track 54 (application of a sequential earth time).

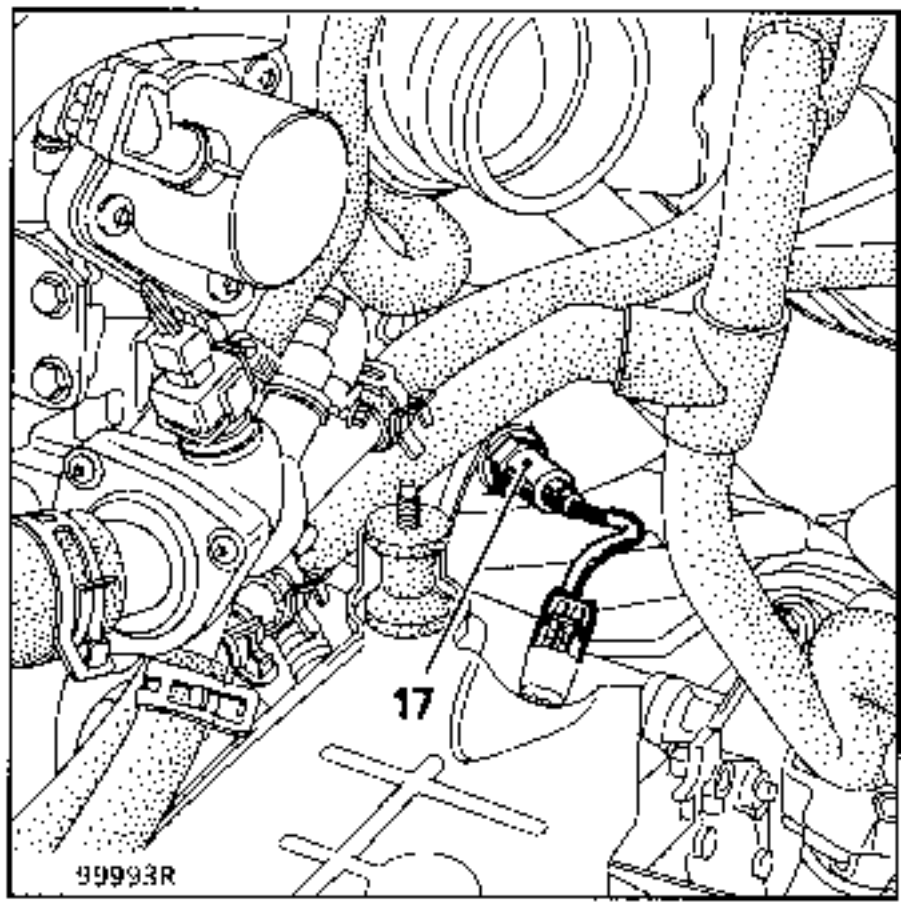
The valve is commanded to open 95 % (Reading on XR25 #12), but remains closed as it receives a ¬· 12 Volts through the fuel pump relay. (The fuel pump is controlled a few moments after the ignition is turned on while the computer receives TDC information).

Engine running at idle speed:

The magnetic field created by the feed to the coil moves the core in the valve.

The computer then maintains a cyclical opening ratio corresponding to the flow required to give the desired idle speed (depending on engine operating conditions).

F3R ENGINES



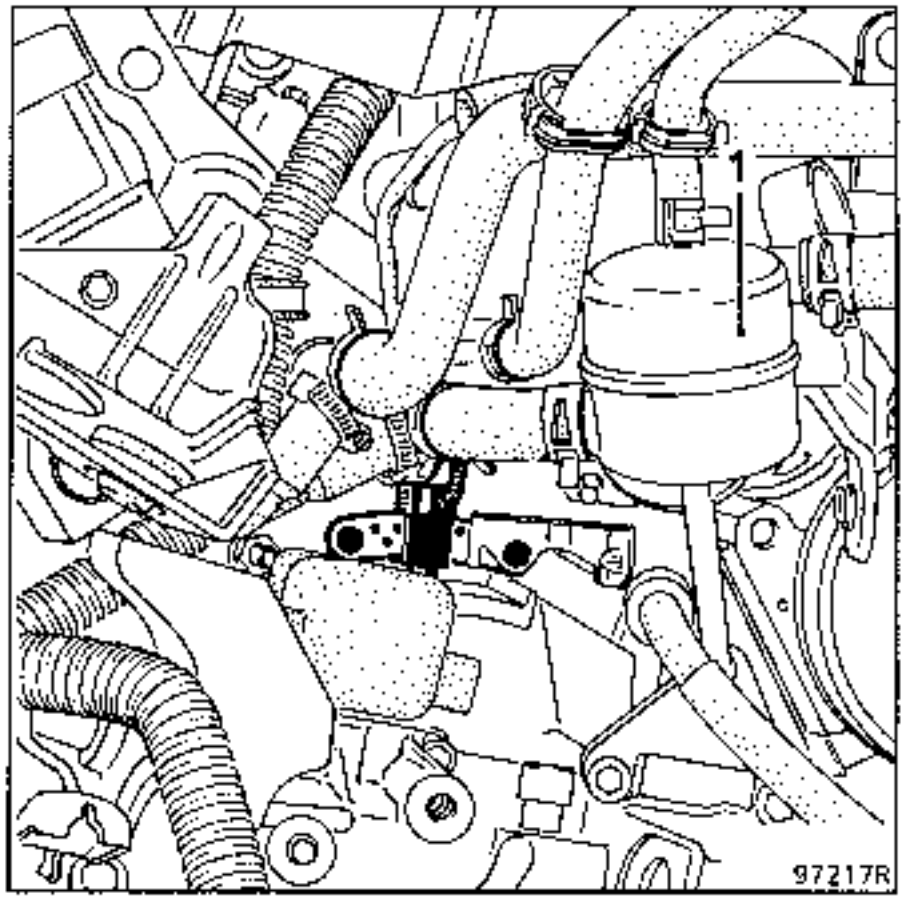
The sensor is mounted on the exhaust downpipe just after the connection to the manifold.

Tightening torque: **4 ± 0.5 daN.m**

Z7X ENGINE

The sensor is mounted on the catalytic converter just after the connection to the exhaust down-pipe.

NOTE : if the sensor is removed it must be refitted using the recommended torque of **4 ± 0.5 daN.m** and the wiring must be correctly routed.



The TDC sensor is mounted on the upper section of the clutch bellhousing near to the degassing bottle (1).

There are no special notes for removal ; take care not to let a bolt or washer drop into the clutch bellhousing .

VOLUME AND GRADE OF COOLANT

Engine	Volume (in litres)	Grade	Special notes
G8T	9	GLACEOL type D recommended coolant only	Protection down to- 25 °C for temperate and cold countries
F3R	7		Protection down to - 37 °C for extreme cold countries
Z7X	10		

THERMOSTAT

Engine type	Starts opening (in °C)	Fully open (in °C)	Travel (in mm)
G8T	83	95	7.5
F3R	89	99	9
Z7X	84	96	9

ALUMINIUM RADIATORS

Certain vehicles are fitted with aluminium section radiators.

Rinsing

Never rinse these components or the cooling circuit with caustic soda or alkaline products (light alloy sections may corrode and cause leaks).

Storage

These radiators may be stored with no special precautions for a **maximum of 48 hours** after removal.

After this period the brazing flux particles which enter the radiator during manufacture and the dichlorate chemicals from the coolant previously in the radiator cause oxidation of the aluminium radiator components when in contact with the air, causing leaks.

If a radiator is to be removed for **more than 48 hours**:

- **RINSE WITH COPIOUS AMOUNTS OF WATER**, BLOW OUT with compressed air then PLUG all openings, or
- Keep the radiator full of coolant if possible.

Coolant

Aluminium radiators require special coolant.

GLACEOL type D coolant which is marketed by the Renault Network meets the requirements set by our Design Office for:

- neutral reactivity with various cast aluminium components,
- alkalinity specifications adapted for light alloys,
- **special additives which give efficient protection against acidic combustion products both for Diesel and Petrol engines**
- concentration ensuring protection and good operation at all temperatures.

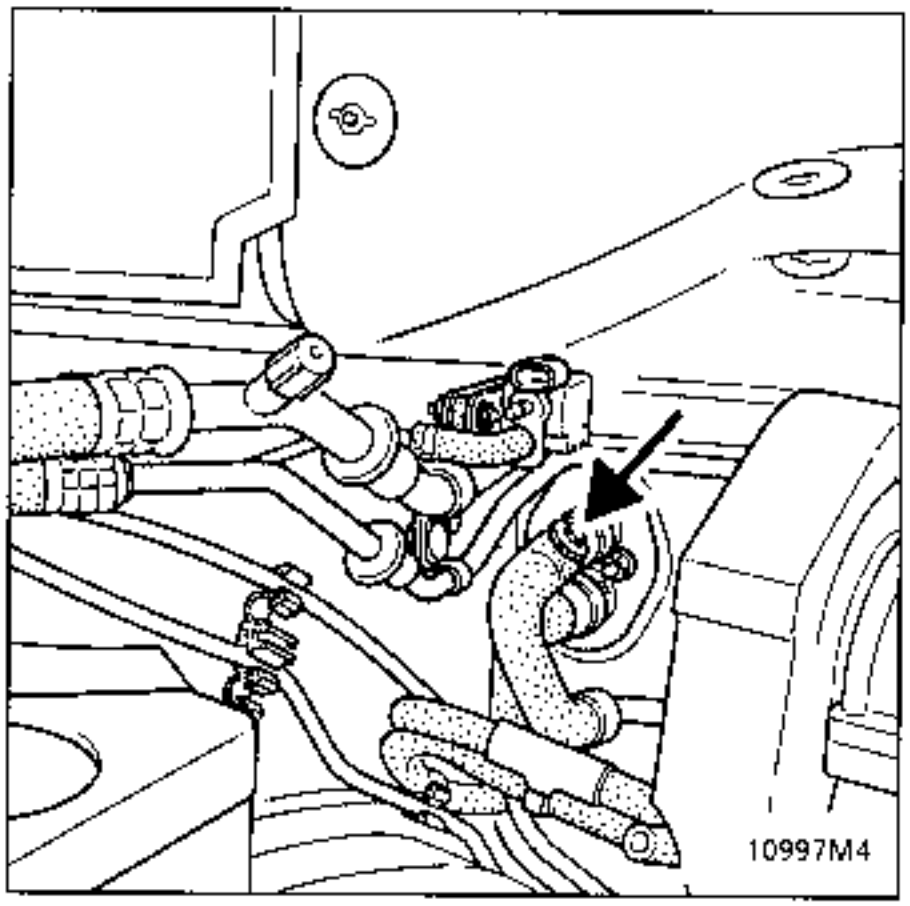
There is no heater matrix valve.

The coolant is continuously circulated in the heater matrix, contributing to engine cooling.

FILLING

Check the drain plug/s are tight.

Open the bleed screw at the radiator and the heater matrix pipes.



Fill the circuit through the expansion bottle..

Close the bleed screw/s as soon as liquid runs out in a continuous jet.

Start the engine (2 500 rpm).

Adjust the overflow level for 4 minutes approximately.

Close the bottle.

BLEEDING

Let the engine run for 10 minutes at 2 500 rpm (F and Z engine) or 20 minutes (G engine), until the engine cooling fan operates (time required for automatic degassing).

Check the coolant level is near the "Max" mark.

NEVER OPEN THE BLEED SCREW/S WHEN THE ENGINE IS RUNNING.

REPLACE THE EXPANSION BOTTLE CAP WHEN THE ENGINE IS WARM.

SPECIAL TOOLING REQUIRED		
M.S.	554-07	Kit for testing cooling circuit sealing
M.S.	554-01	Adapter for M.S. 554-07
M.S.	554-06	Adapter for M.S. 554-07

1 - Testing the sealing of the circuit

Replace the expansion bottle valve with adapter **M.S. 554-01**.

Connect this to tool **M.S. 554-07**.

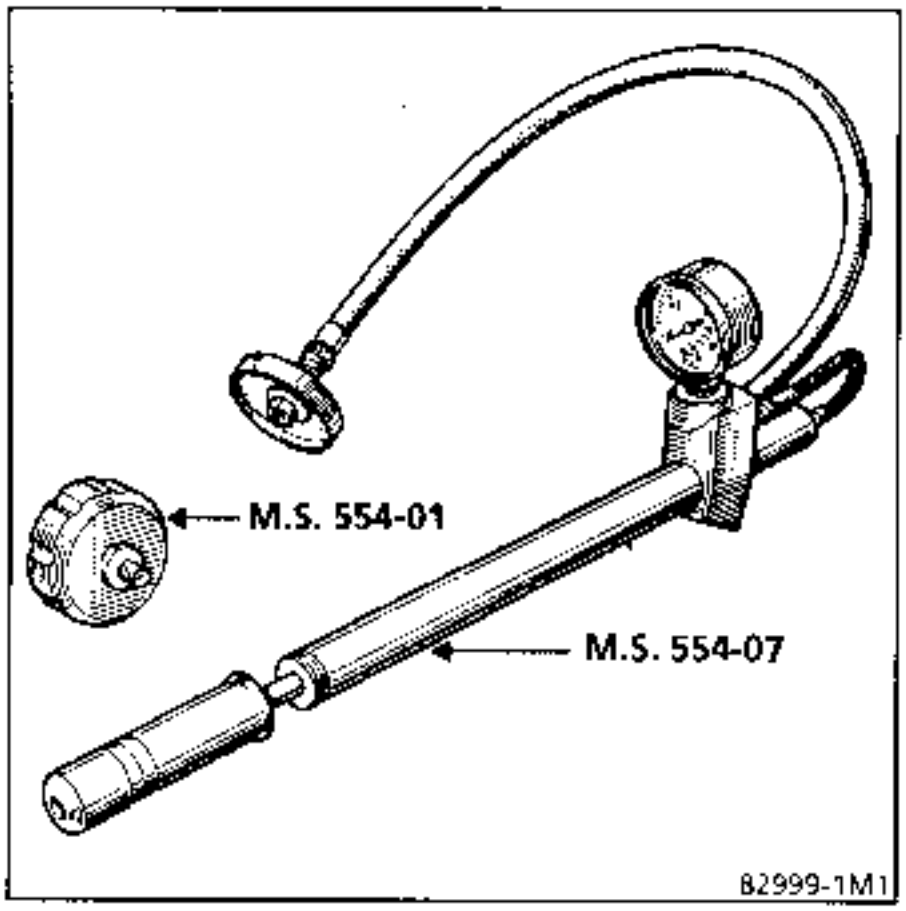
Let the engine warm up then stop it.

Pump to put the circuit under pressure.

Stop pumping at **0.1 bar** less than the valve is rated.

The pressure should not drop, otherwise look for the leak.

Slowly unscrew the union of tool **M.S. 554-07** to decompress the cooling circuit, then remove tool **M.S. 554-01** and refit the expansion bottle valve with a new seal.



2 - Checking the rating of the valve.

If liquid passes through the expansion bottle valve,the valve must be replaced.

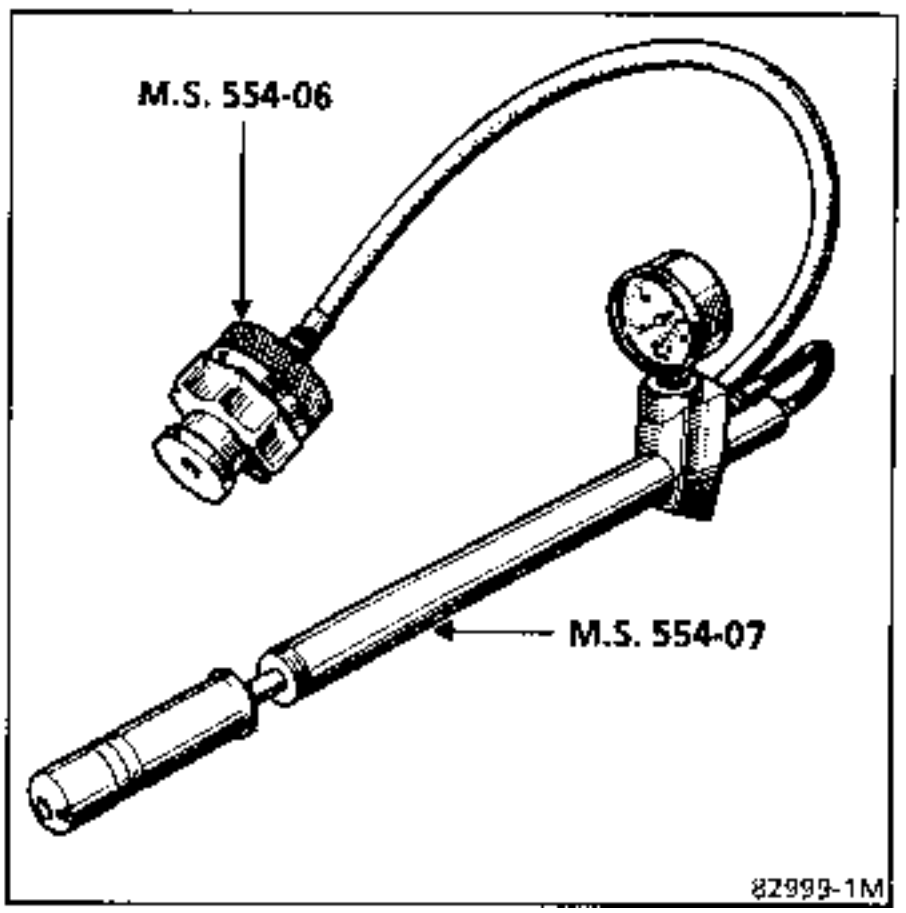
On pump **M.S. 554-07** fit tool **M.S. 554-06** and fit the assembly on the valve to be checked.

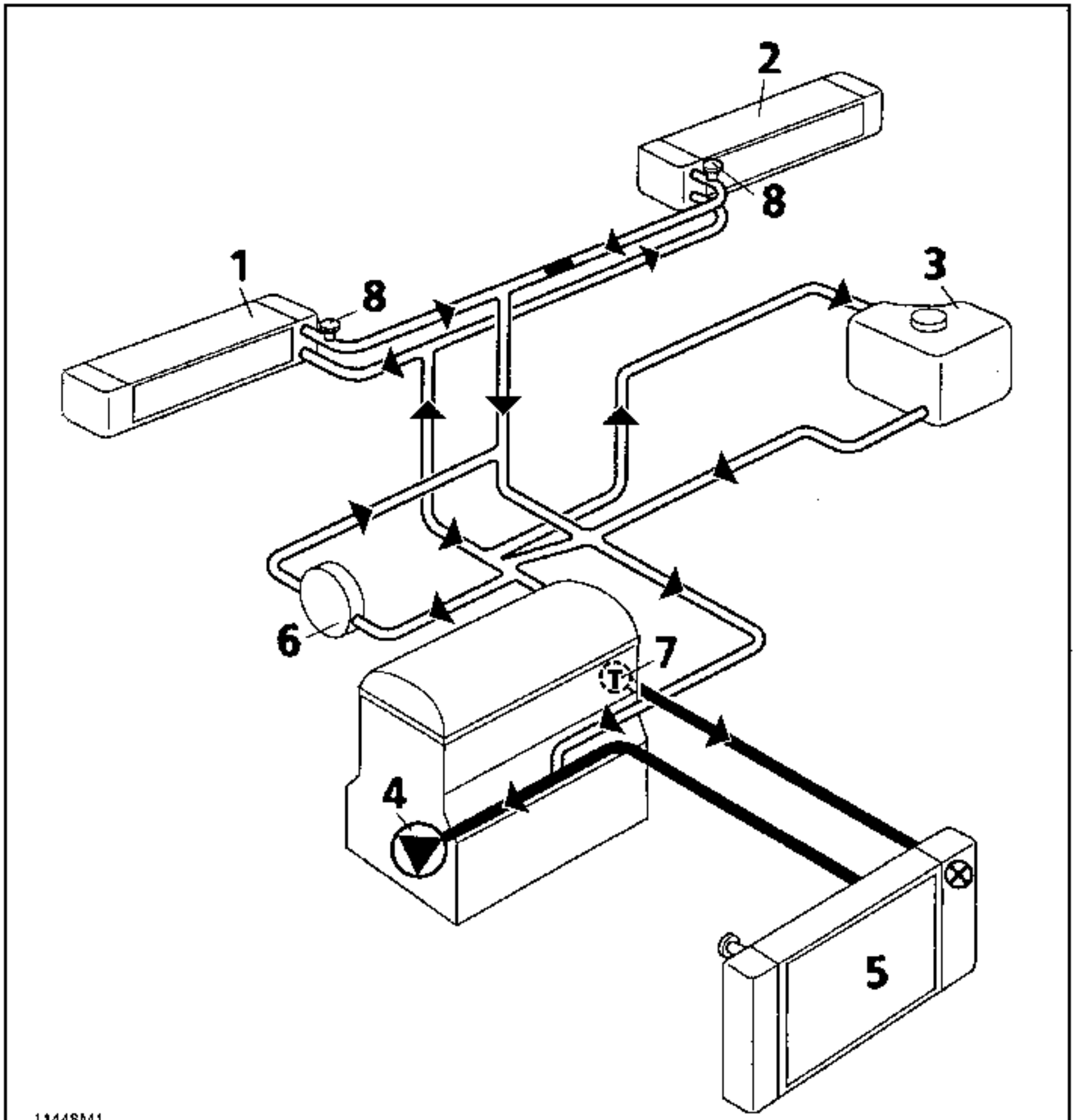
Increase the pressure which should stabilise at the valve rating pressure with a test tolerance of ± **0.1 bar**.

Valve rating :

Brown colour plastic valve **1.2 bar**.

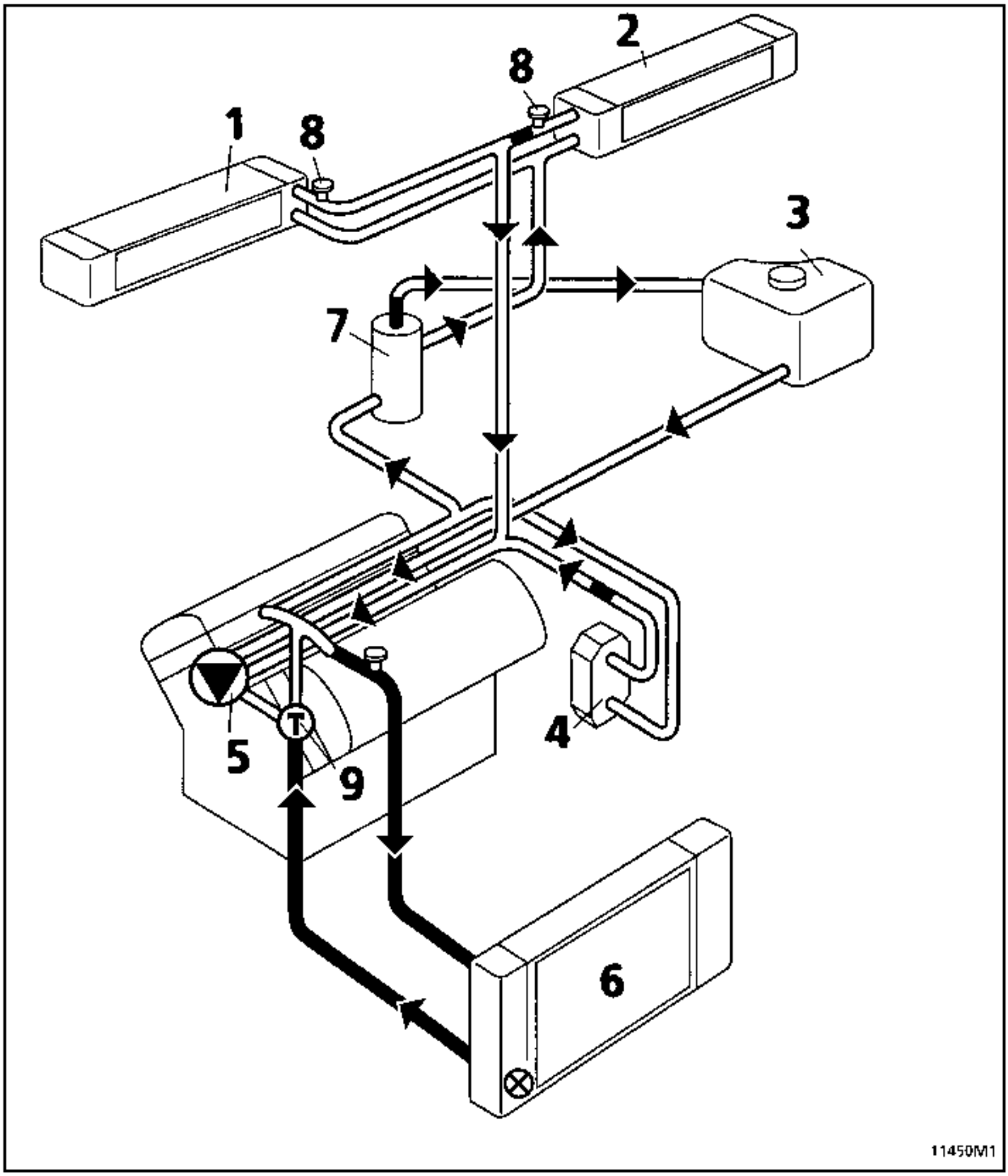
Blue colour plastic valve **1.6 bar**.





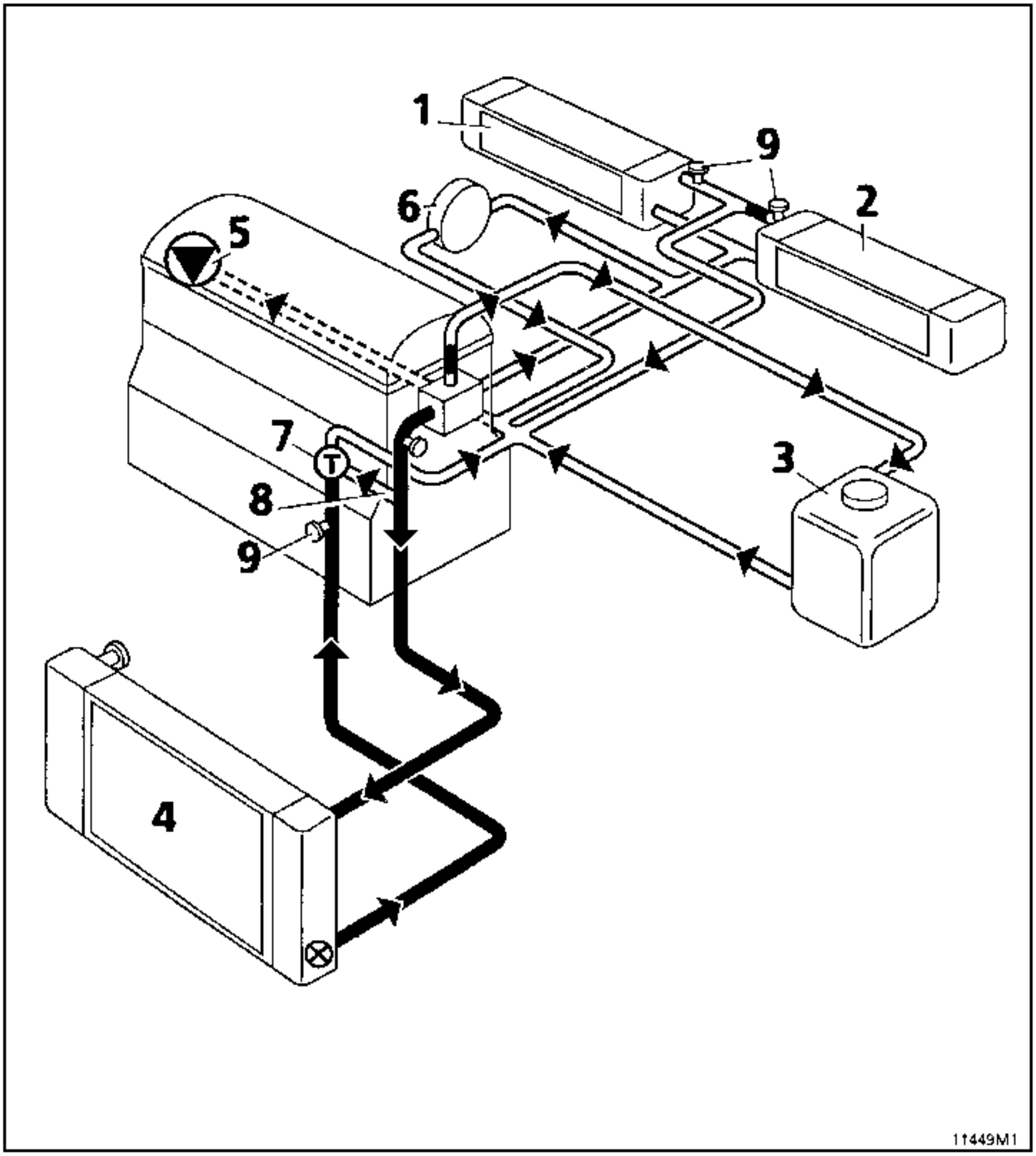
1 Right hand heater matrix
2 Left hand heater matrix
3 "Hot" bottle with permanent degassing
4 Water pump
5 Radiator
6 Throttle body heating system
7 Engine outlet and thermostat pipe
8 Bleed screws

The expansion bottle valve rating is **1.6 bar** (blue).



1 Right hand heater matrix
2 Left hand heater matrix
3 "Hot" bottle with permanent degassing
4 Automatic transmission radiator
5 Water pump
6 Radiator
7 Vortex (removes bubbles)
8 Bleed screws
9 Thermostat

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



1 Right hand heater matrix
2 Left hand heater matrix
3 "Hot" bottle with permanent degassing
4 Engine cooling radiator
5 Water pump
6 Turbocharger bearing
7 Thermostat
8 Thermostat coolant circuit (cold)
9 Bleed screws

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

Removal of the engine cooling radiator requires the cooling assembly to be removed.

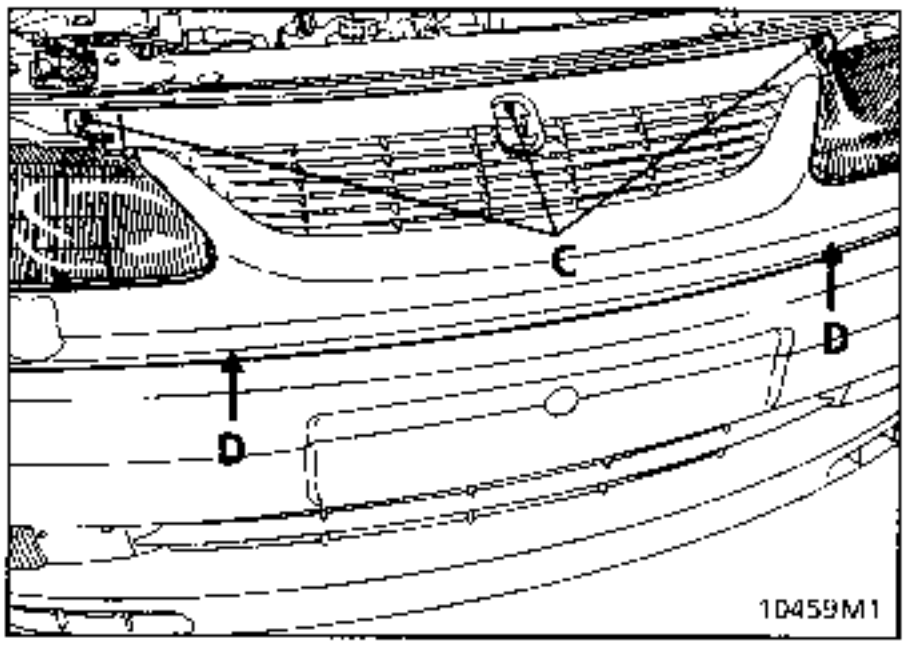
Put the vehicle on a 2 post lift.

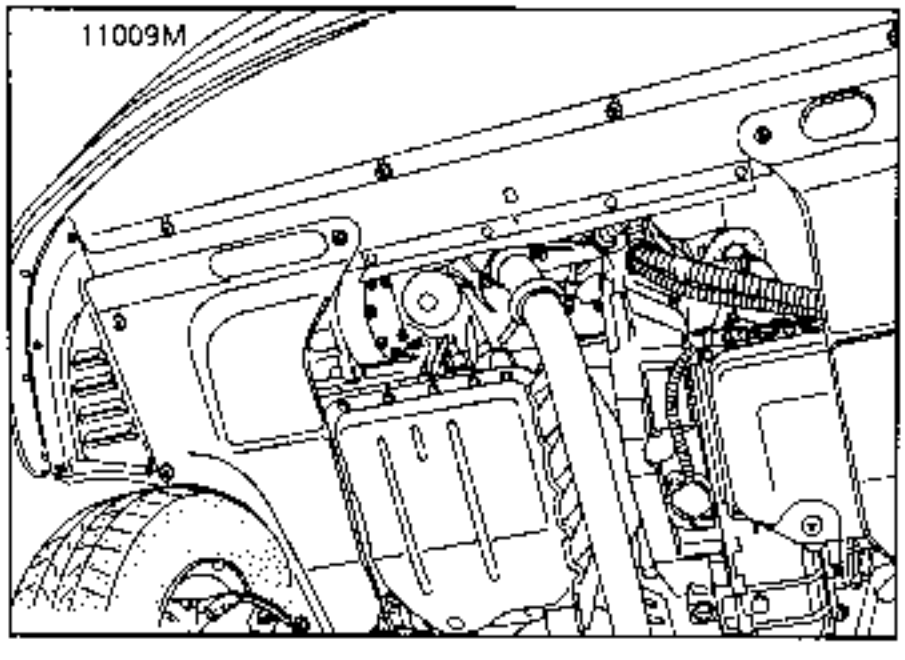
Disconnect and remove the battery.

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

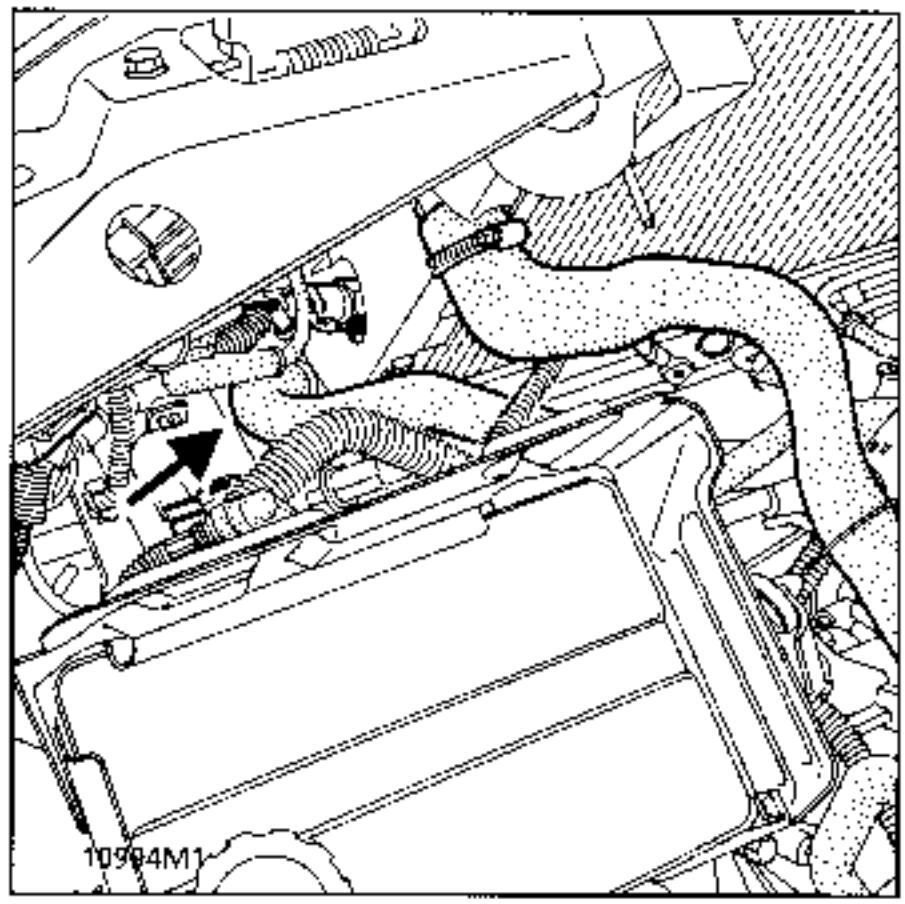
Remove the radiator grille, the radiator grille bar and the front bumper (move the left hand wheel arch to one side to reach the two bolts).

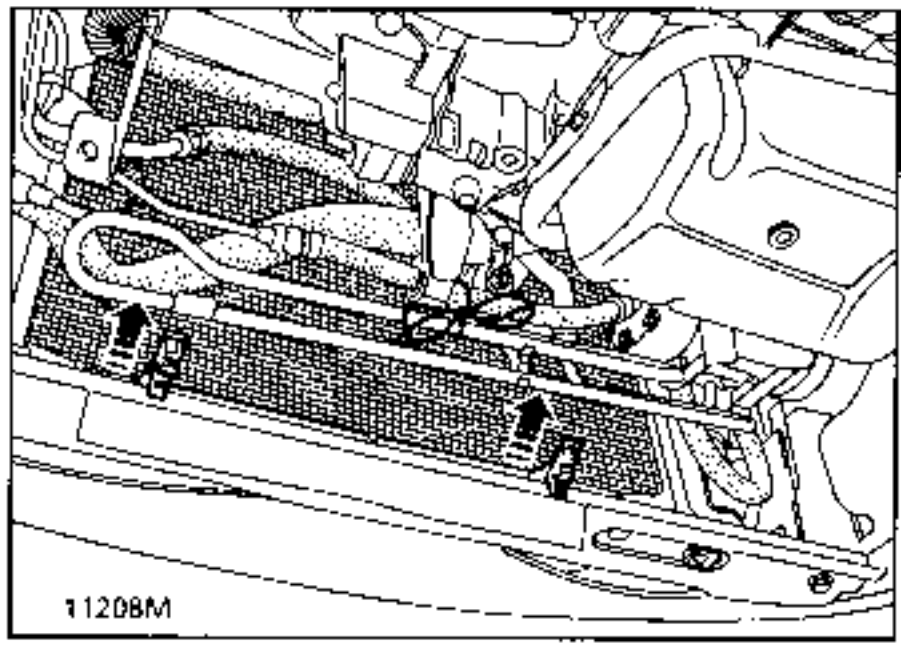
Disconnect the fog lights if necessary.



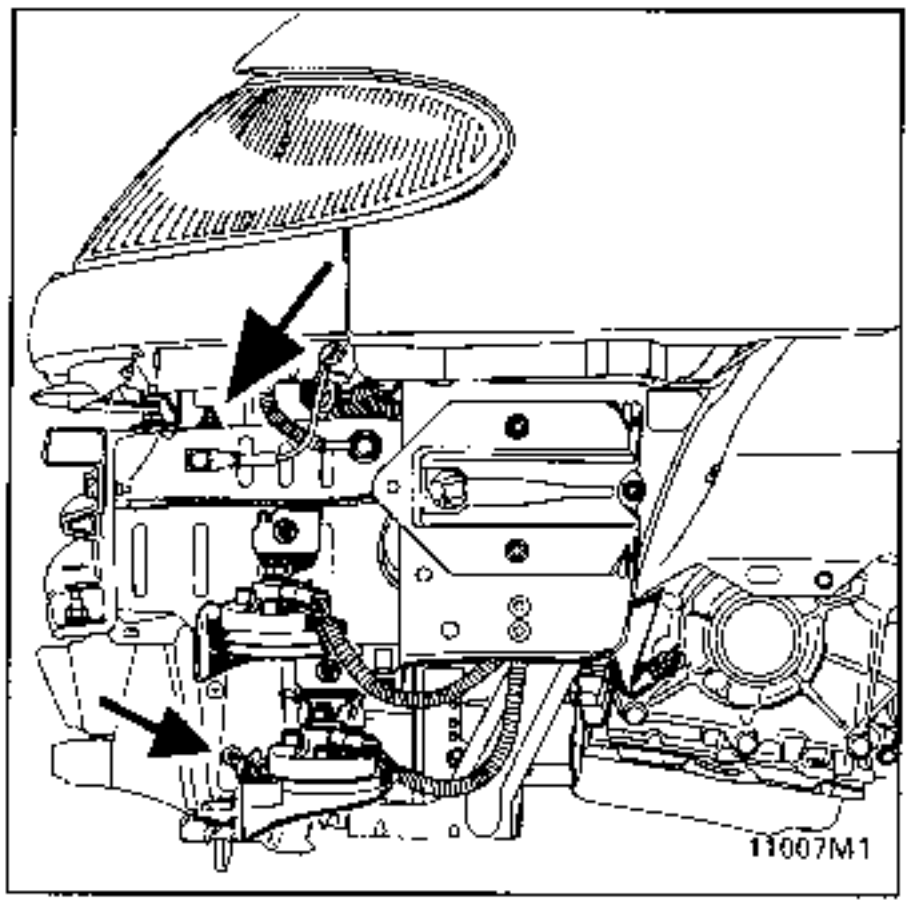


Drain the cooling circuit by disconnecting the lower radiator hose.
Unclip the power assisted steering oil cooler and attach it to the engine.



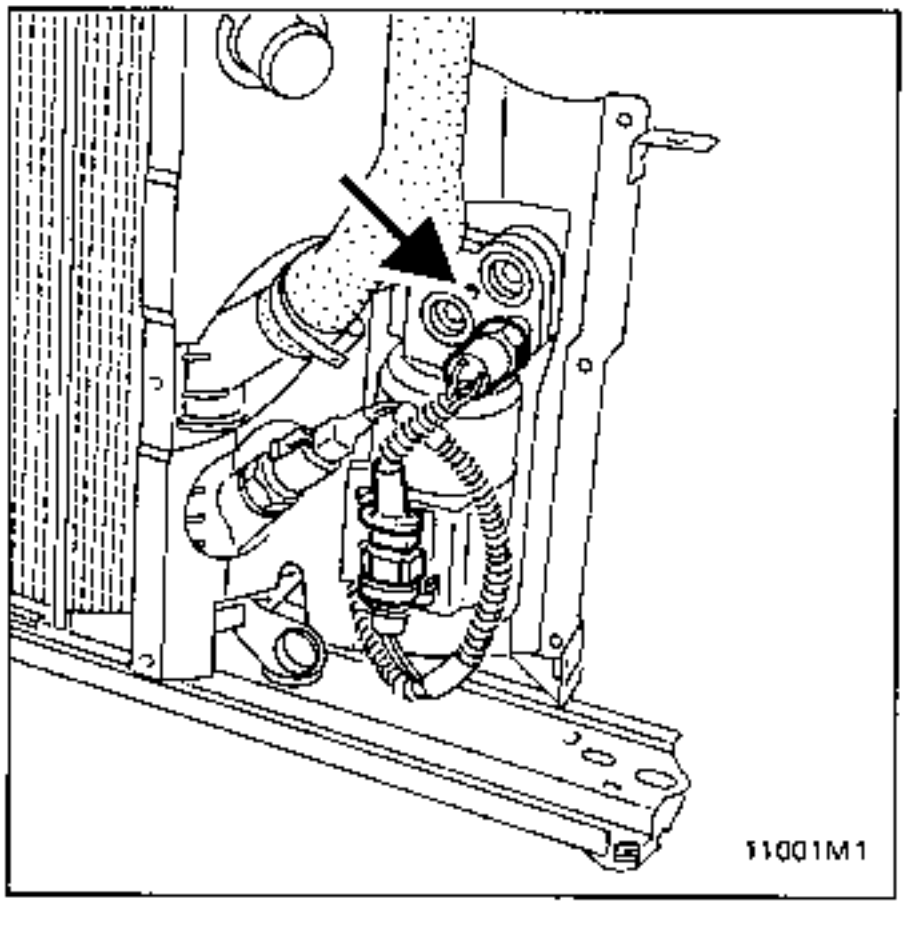


Remove the mounting bolts for the deflectors on the side members.

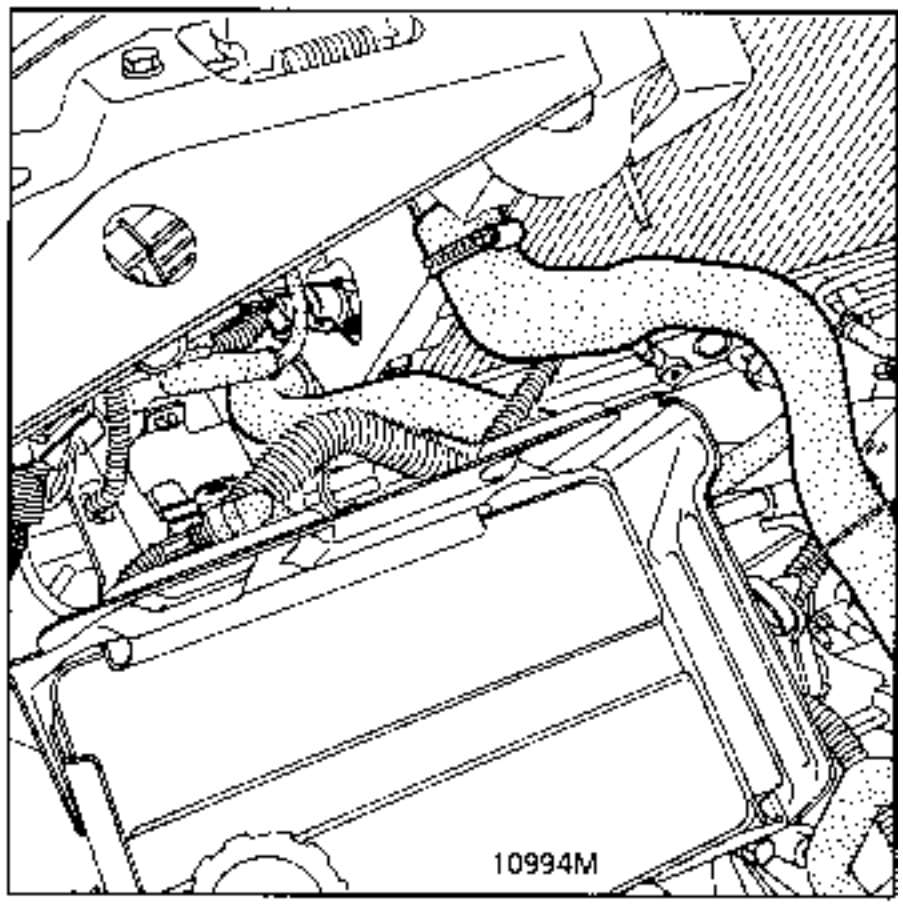


Fold the deflectors back towards the cooling assembly.

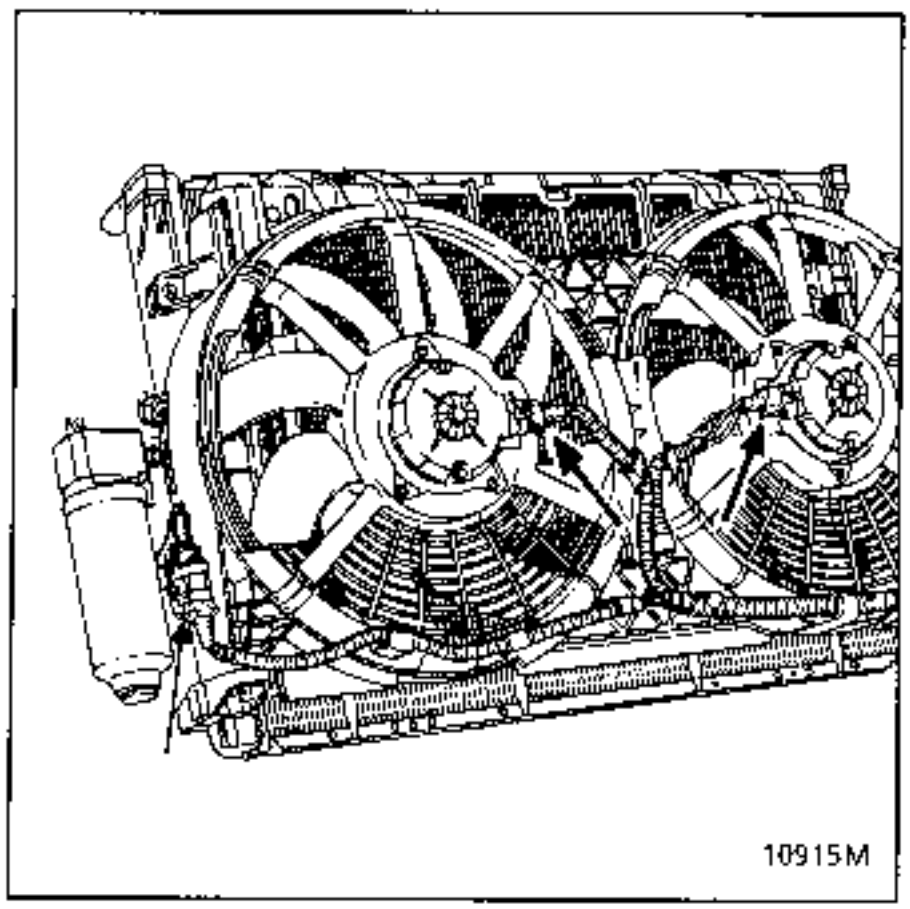
Remove the mounting bolt for the air conditioning circuit pipe flange on the dehydration canister.
Disconnect the trifunction pressostat (below the canister).



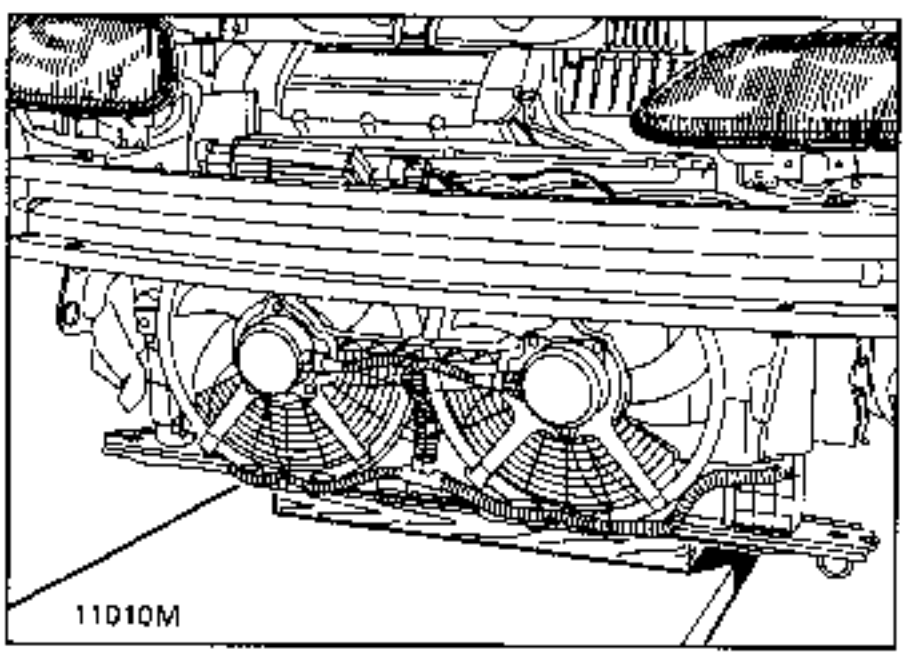
Disconnect:
- the upper radiator hose,
- the radiator temperature switch (RH side)



Release the wiring from the fan ferrule and allow it to hang through the deflector.



Put the lower radiator cross member on one or two blocks to support it and clear access to the mounting bolts on the front of the side members.



Remove the two mounting bolts for the cross member on the side members and lift the vehicle to remove the cooling assembly.

REFITTING:

Two persons are required to refit the cooling assembly; lubricate the upper rubber mountings on the headlight carrier cross member if necessary.

Refitting is the reverse of removal.

Fill the refrigerant circuit (if fitted), and fill the cooling circuit with coolant.

Reconnect the battery and reset all components affected by disconnecting the battery.

Bleed the engine and check the cooling and air conditioning circuits are sealed.

Removal of the Z7X cooling assembly is identical to that of the F3R, except for:

- the radiator temperature switch is located on the right hand side of the radiator,
- access is reduced to the dehydration canister mounting bolt as the engine is larger.

For the G8T engine, the oil exchanger must be separated from the radiator (without disconnecting it) to lower the cooling assembly.

F3R ENGINE :

REMOVAL:

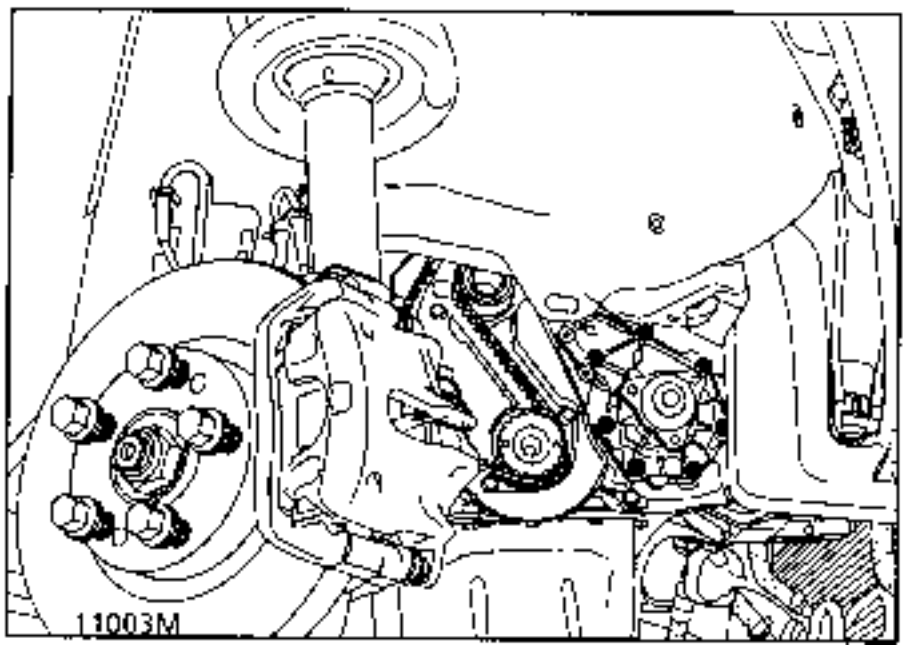
Remove the accessories belt (see section 11 " Removing - refitting the accessories belt").

Remove the water pump pulley.

Remove the mounting bolts for the pump on the engine block.

REFITTING:

Refitting is the reverse of removal. Clean the gasket face if necessary.



G8T ENGINE :

REMOVAL:

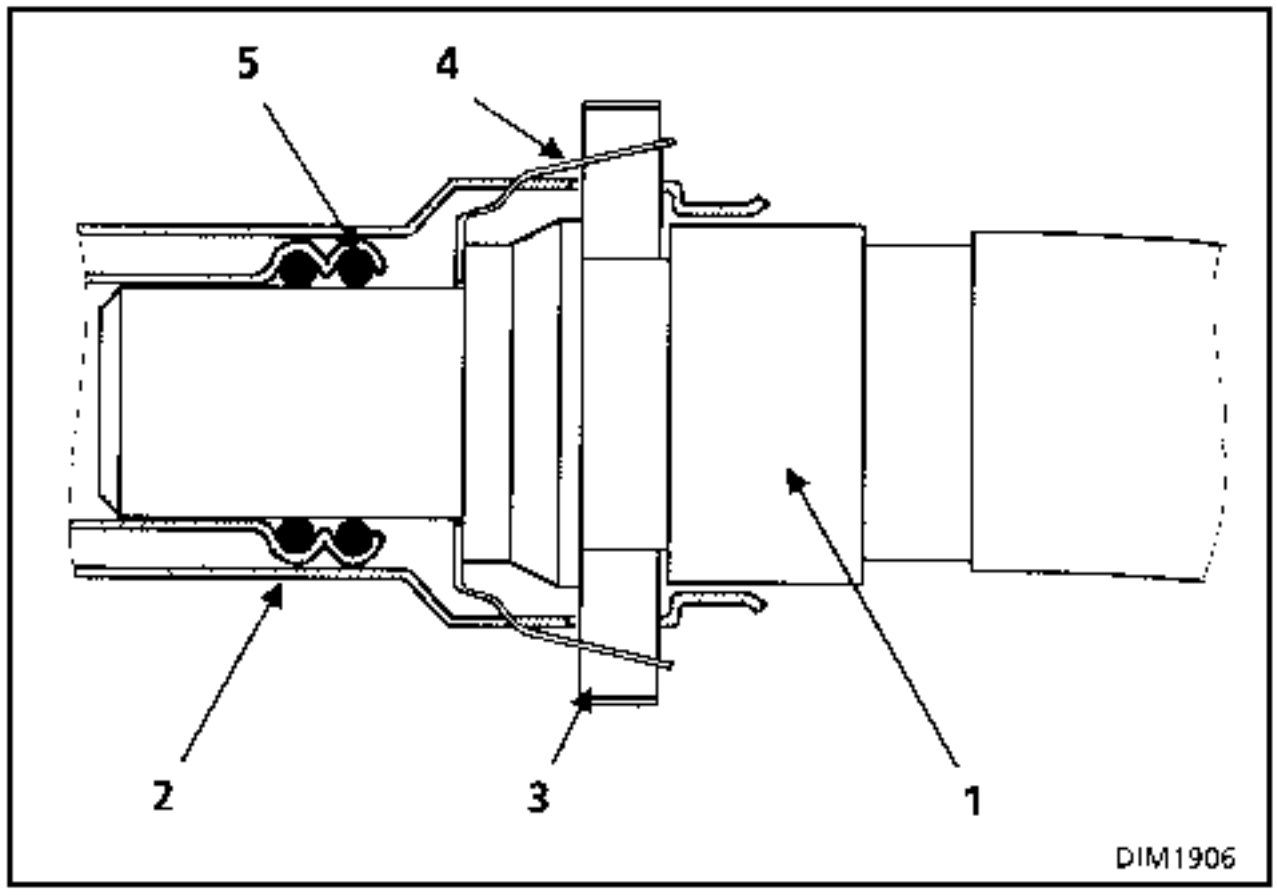
Remove the timing belt (see section 11 " Removing - refitting the timing belt").

Remove the mounting bolts for the pump on the engine block.

REFITTING:

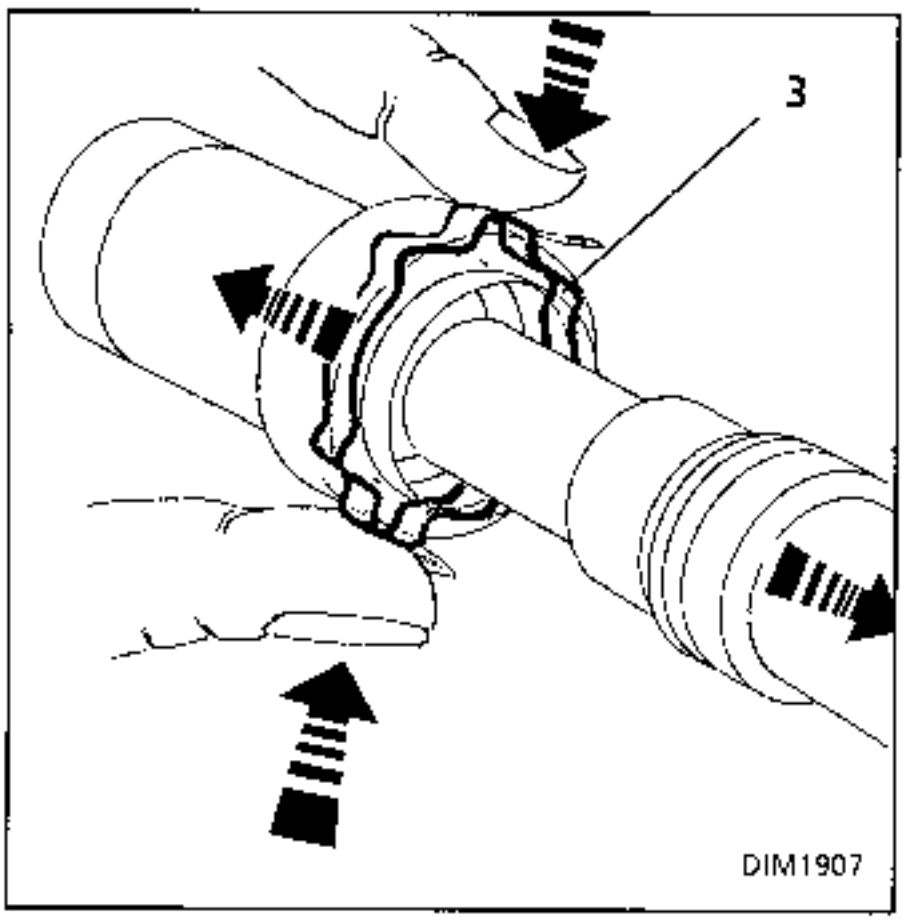
Refitting is the reverse of removal. Clean the gasket face if necessary.

Removal of the water pump requires the engine - automatic transmission assembly to be removed (see section 10 "Removal - refitting of the engine and transmission assembly") and the Z engine section.
When refitting, renew the rubber seals on the various pipes and refit them with great care (the seals are extremely fragile).

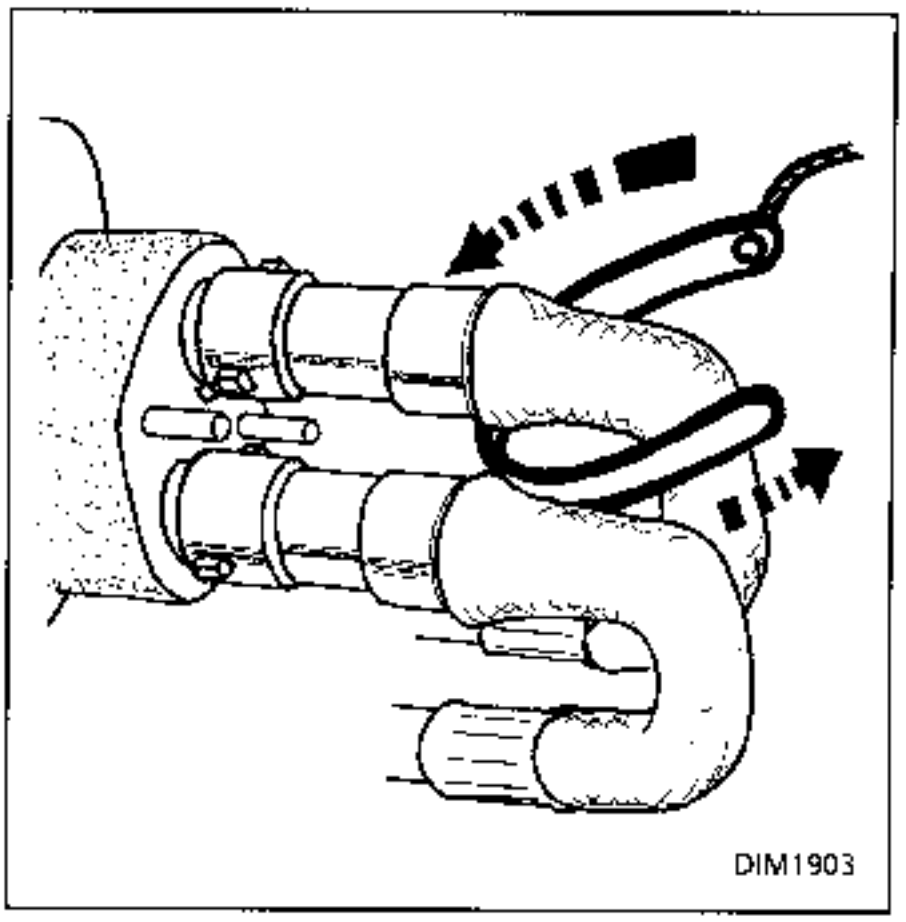


1 - Male union on water pipe or heater matrix pipe.
2 - Female union body.
3 - Flexible axial locking ring.
4 - Thrust ring and locking indicator.
5 - O ring seals.

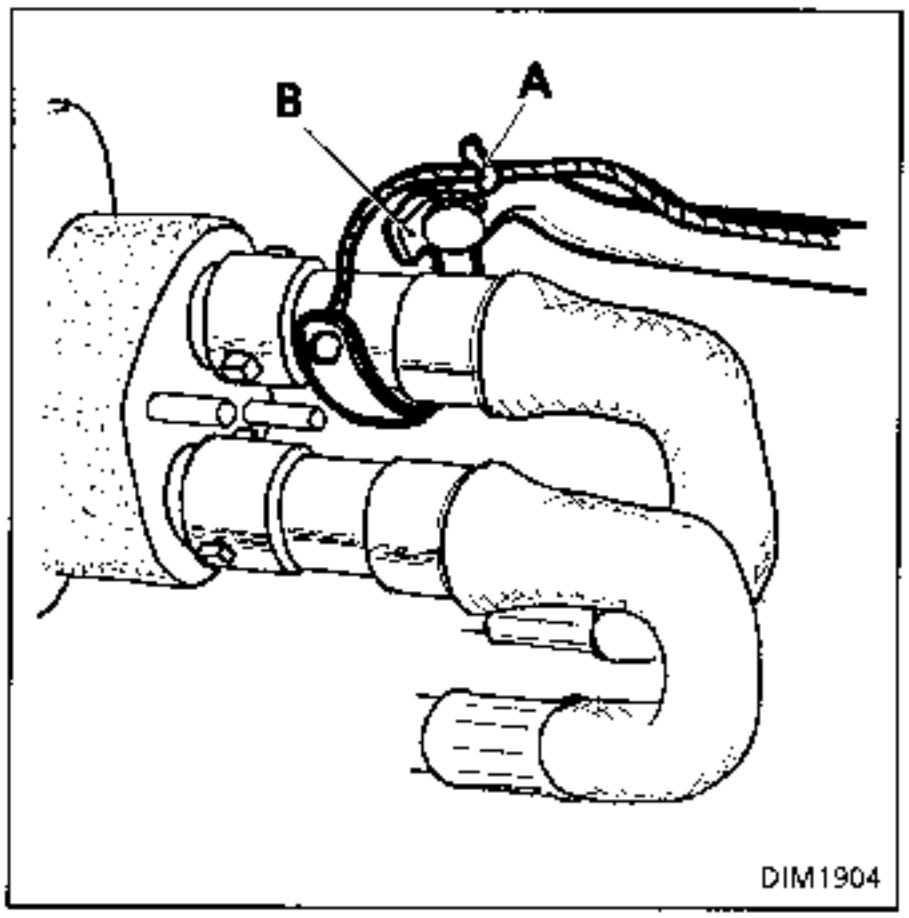
The heater matrix connections on the water pipes are quick release unions.
To release, press on the catches on part (3) and pull at the same time to separate the connection.



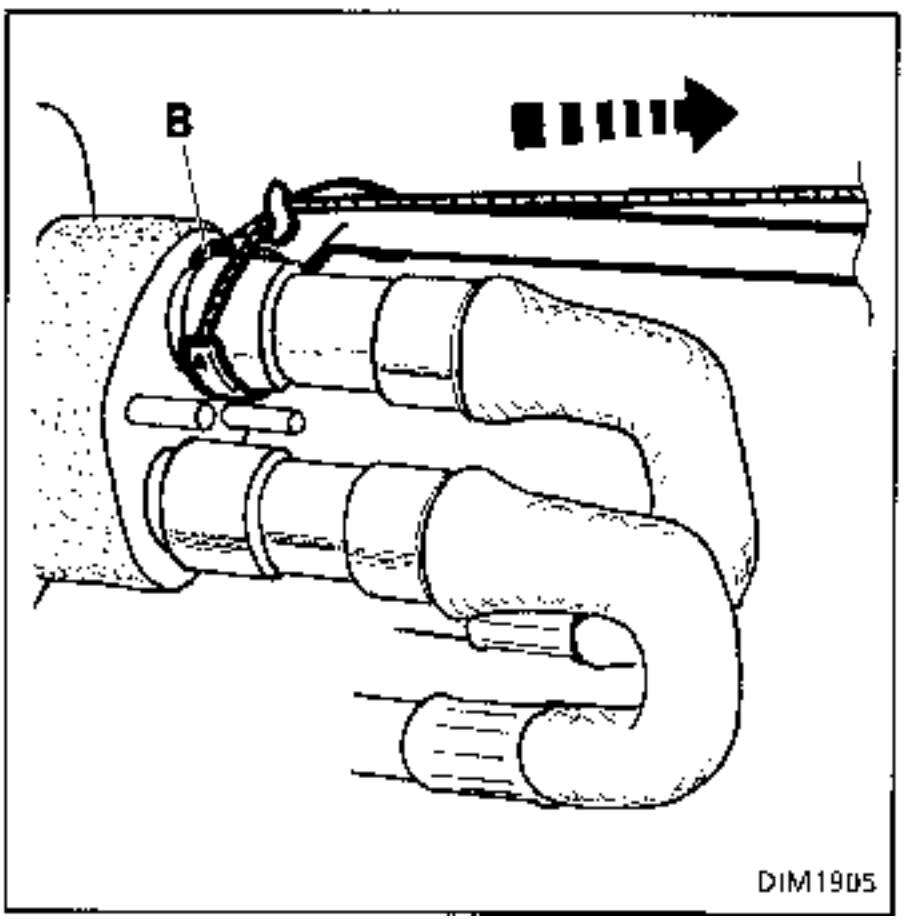
If this is difficult push (with moderate pressure) the union before pulling it.
On the version G8T A/C, the right hand heater matrix unions are inaccessible by hand. Use tool **Mot. 1395** as follows:
- fit the tab between the pipes;



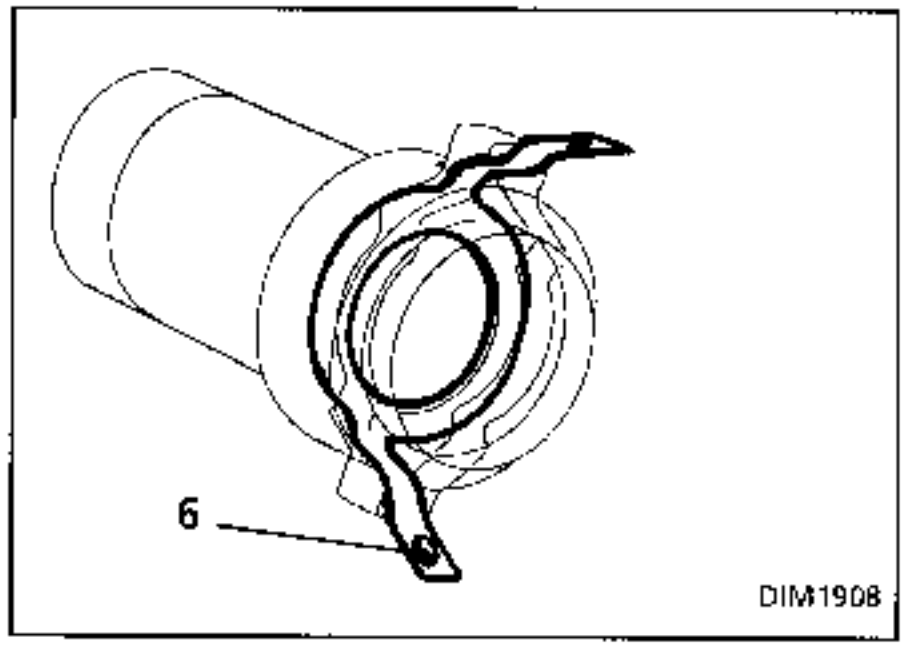
Fit the cable into the hook (A);



Fit lip (B) behind the union.
Pull at the same time on the handle and more gently on the cable.



To lock, press on the catches on part (3) and push on part (1) at the same time, which, when pressing part (4), will cause the indicators (6) to disappear, confirming that the union is correctly connected.

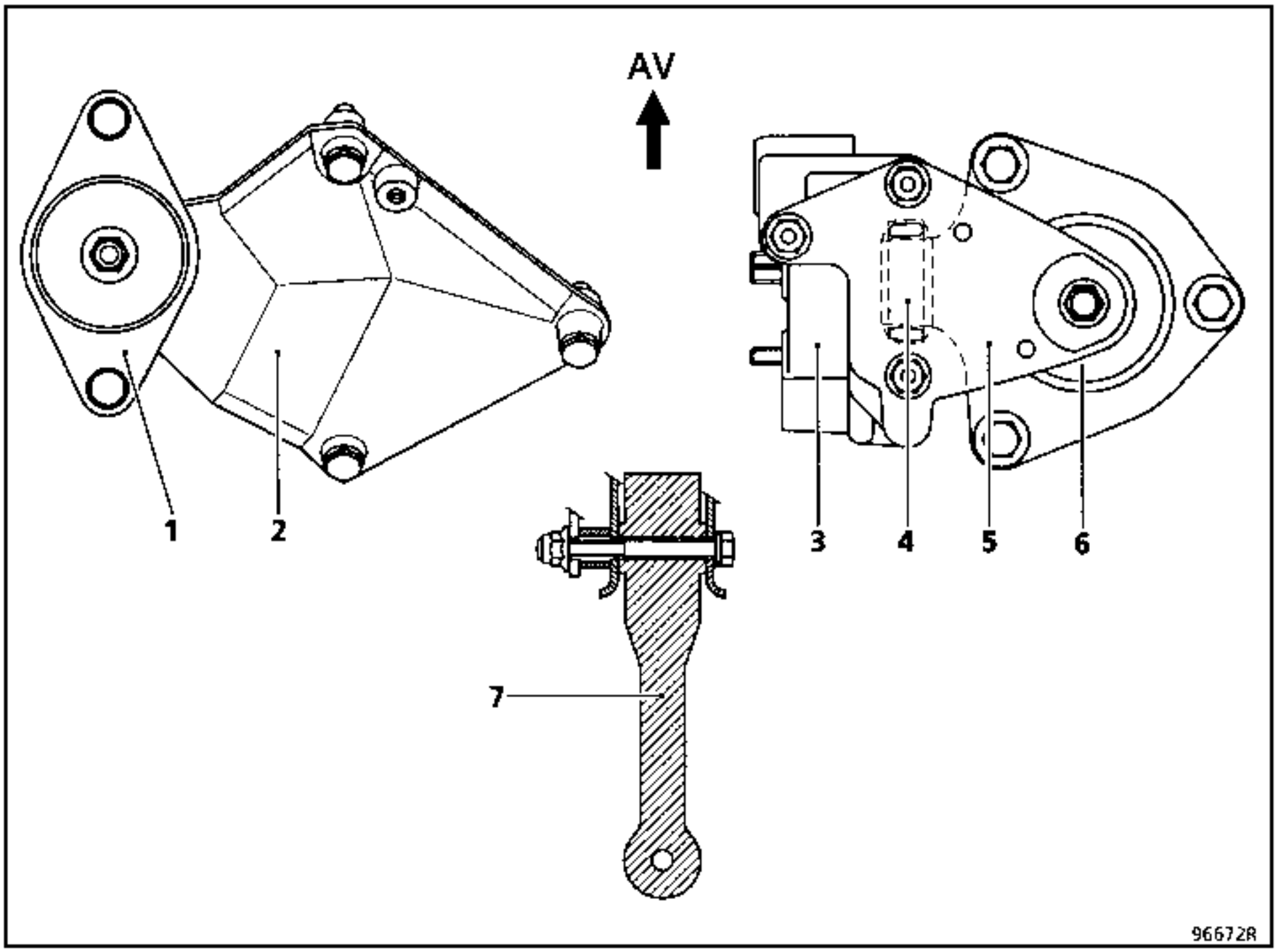


If locking is not certain or if the indicators (6) do not disappear despite an appearance of being against the stop, apply a little grease on one of the joint faces and begin again with care.

THESE UNIONS MUST NEVER BE FORCED, OTHERWISE THERE IS A RISK OF:

- **damage to the anti-corrosion coating on the heater matrix pipes, which will be followed by rapid corrosion and leaks,**
- **the heater matrix pipes being twisted and damaged (when releasing or locking).**

DESCRIPTION



1 Front left hand rubber suspended engine mounting
2 Suspended engine mounting support on gear box
3 Suspended engine mounting support on cylinder head
4 Longitudinal movement limiter
5 Suspended engine mounting cover
6 Front right hand rubber suspended engine mounting
7 Engine tie-bar

CONSTRUCTION

The engine is suspended on two rubber mountings (1 and 6). The engine is secured in the longitudinal direction by :

- the engine tie-bar at the bottom of the engine and transmission assembly (7),
- the movement limiter at the top of the engine and transmission assembly (4).

NOTE : in order to avoid damaging the rubber mountings, do not exceed 20° angular movement in relation to the vertical.

ADJUSTING THE LONGITUDINAL MOVEMENT LIMITER

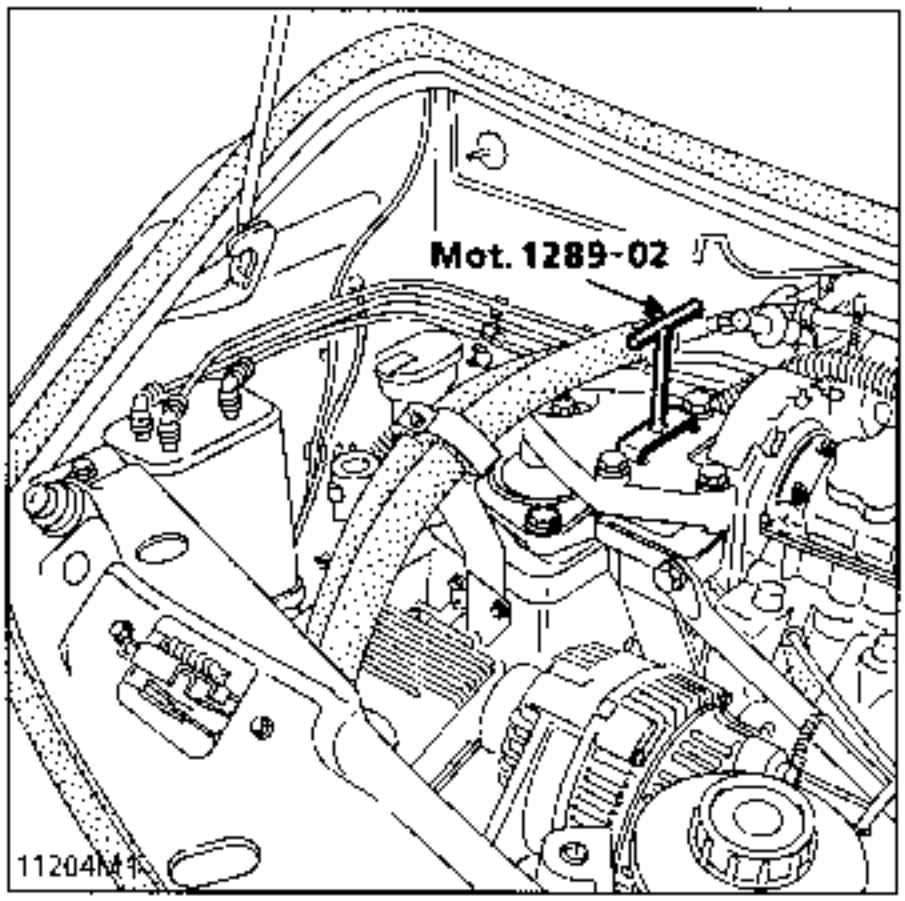
(After removing this part, number 4 on the diagram).

Support the weight of the engine and transmission assembly using a load positioning tool.

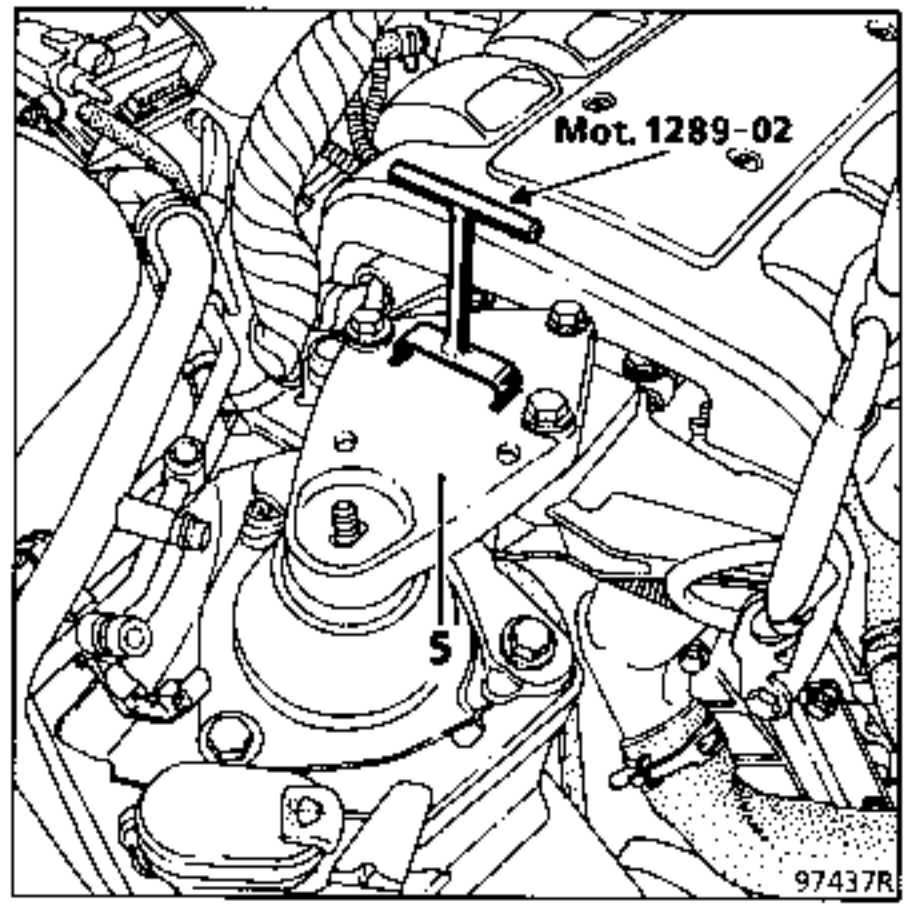
Slacken the limiter bolts (4).

Insert the centring fork **(Mot. 1289-02)** into the openings on the suspended engine mounting cover (5).

F ENGINE

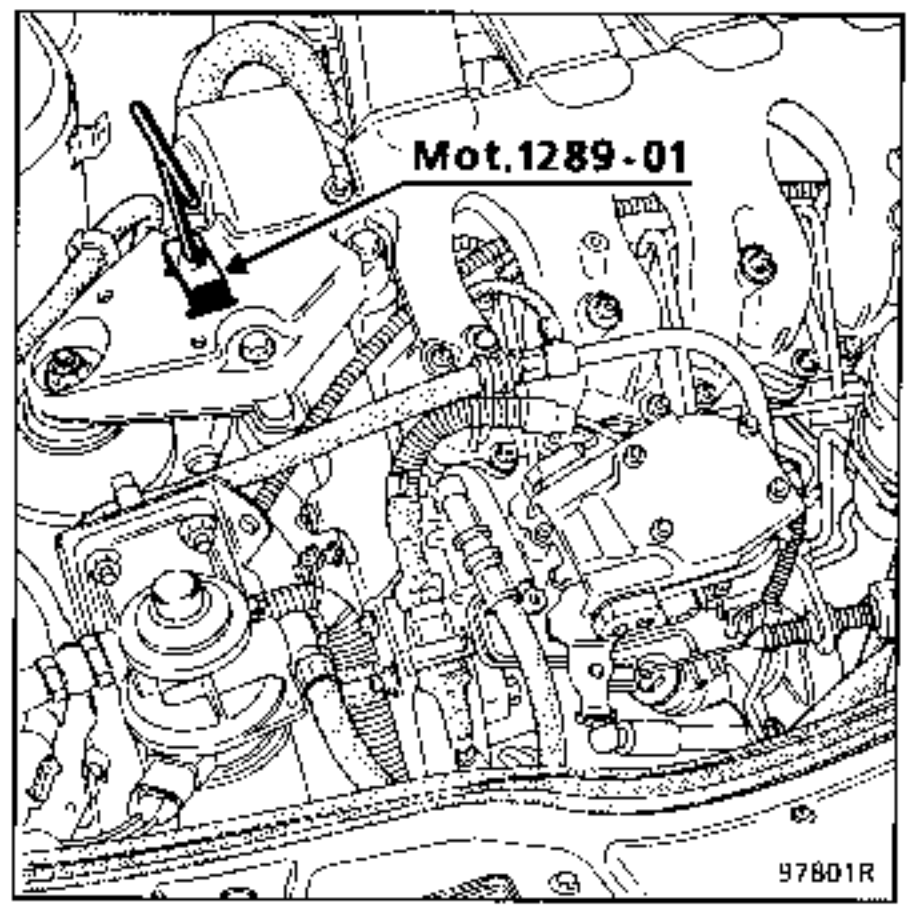


Z ENGINE



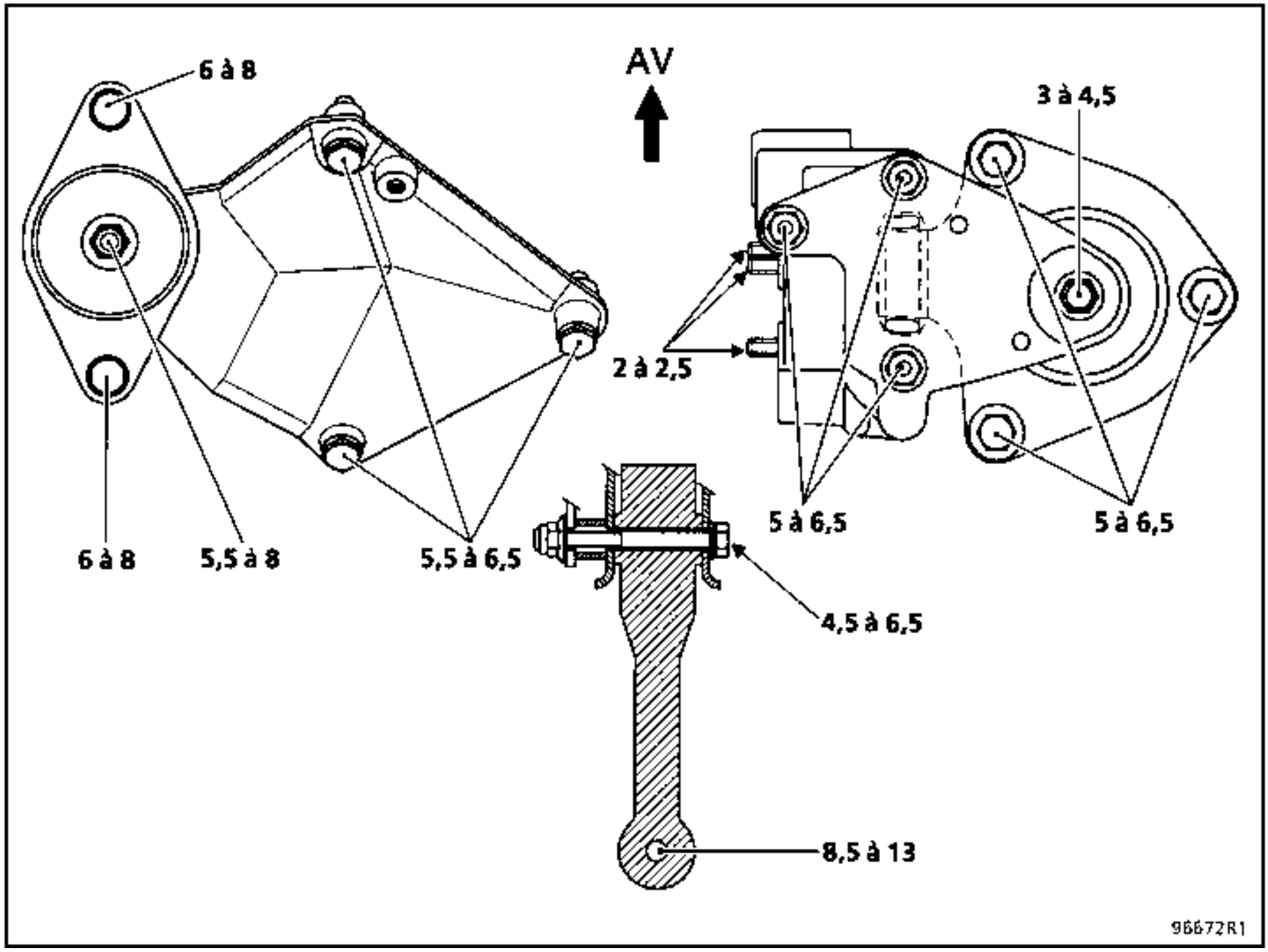
NOTE : this operation can only be carried out if the gearbox mounting and the engine tie-bar are in position and tightened to the correct torque. Torque tighten the tie-bar bolts.

G ENGINE

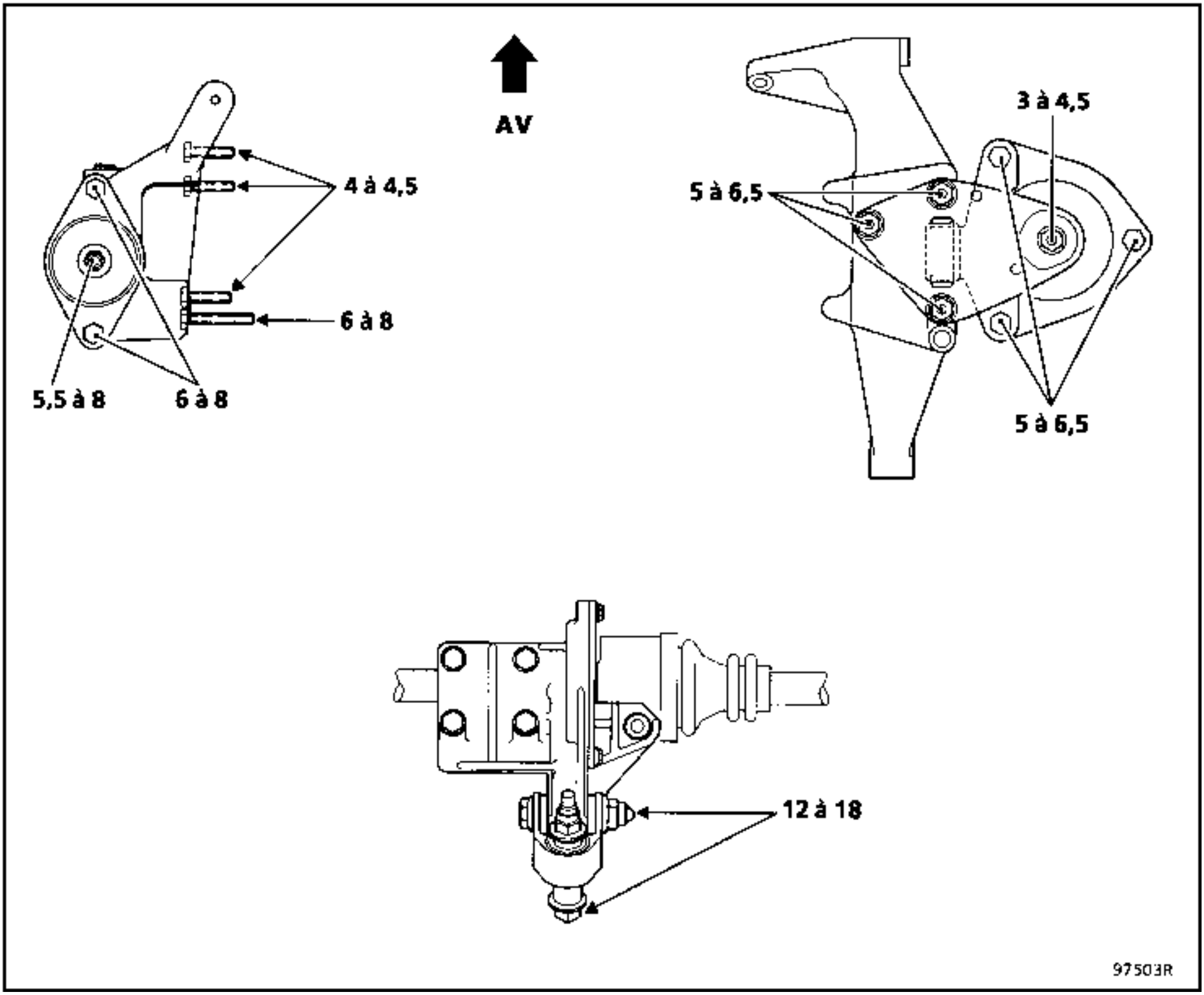


NOTE : this operation can only be carried out if the gearbox mounting and the engine tie-bar are in position and tightened to the correct torque.

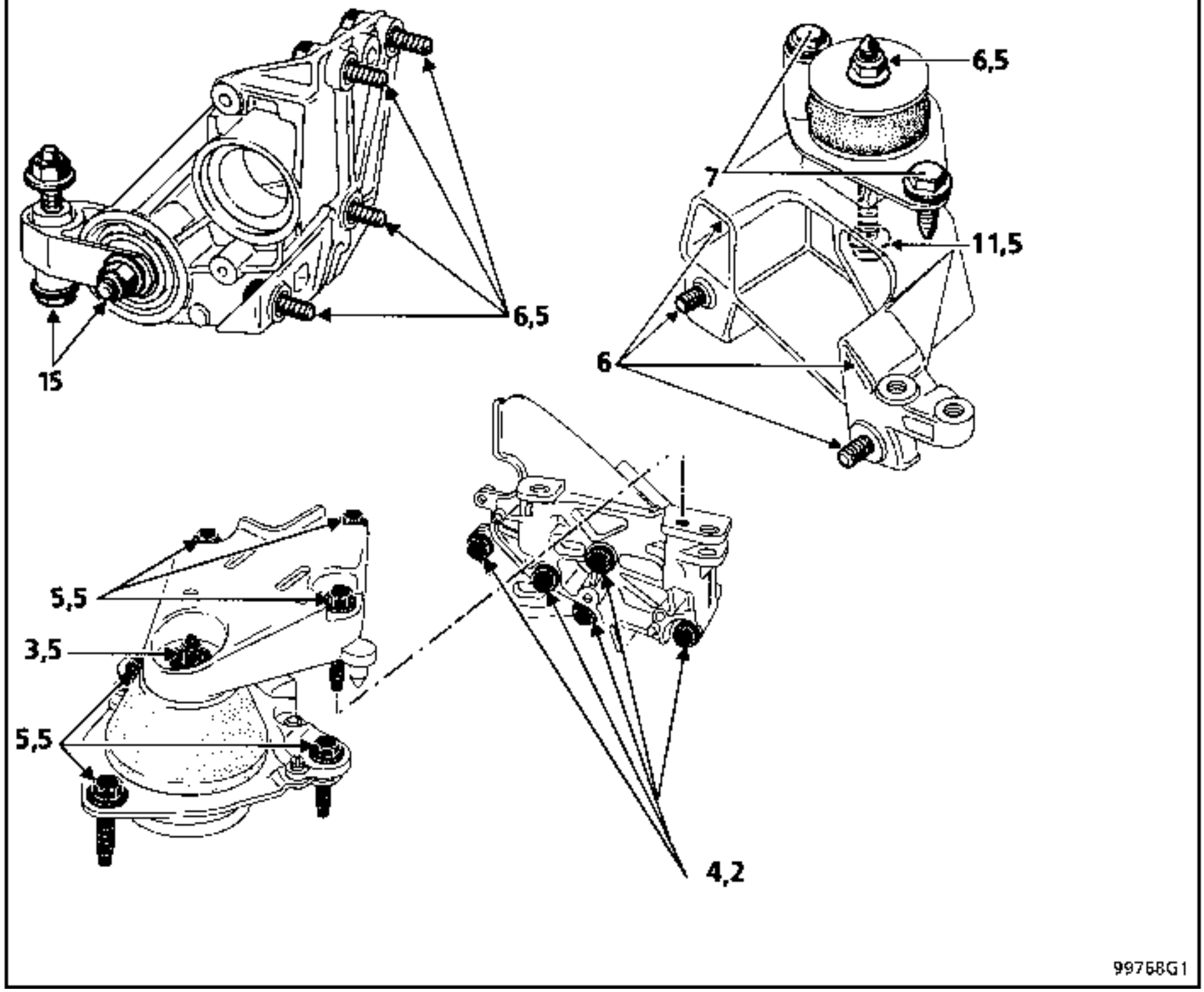
TIGHTENING TORQUES (in daN.m)



TIGHTENING TORQUES (in daN.m)



TIGHTENING TORQUES (in daN.m)



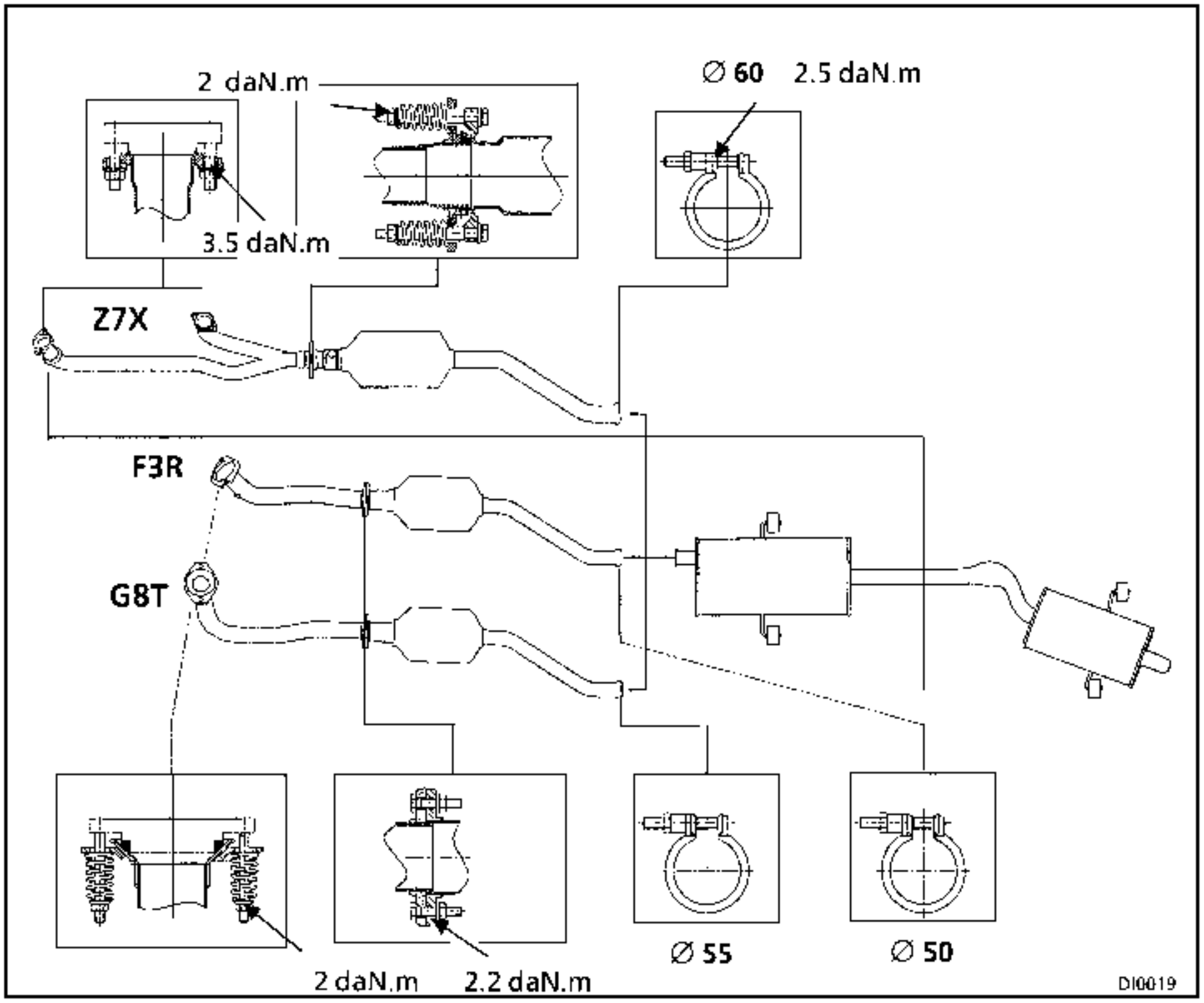
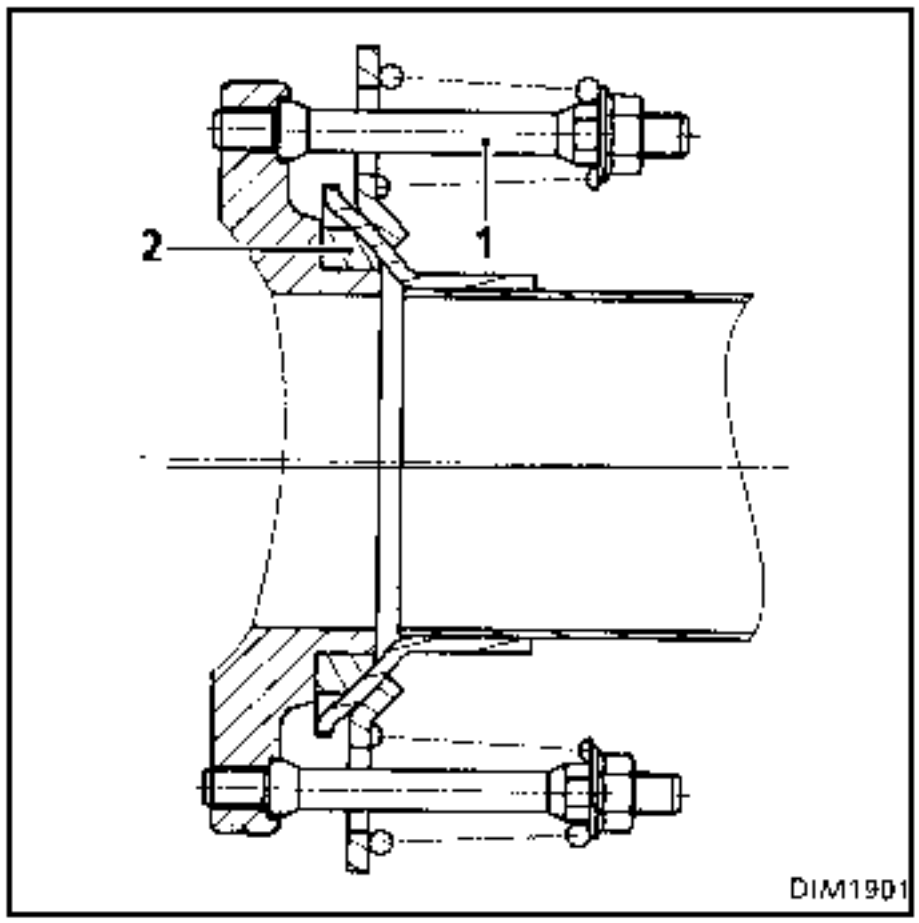


Diagram of exhaust mounting (diameter of clips in mm) and tightening torques.

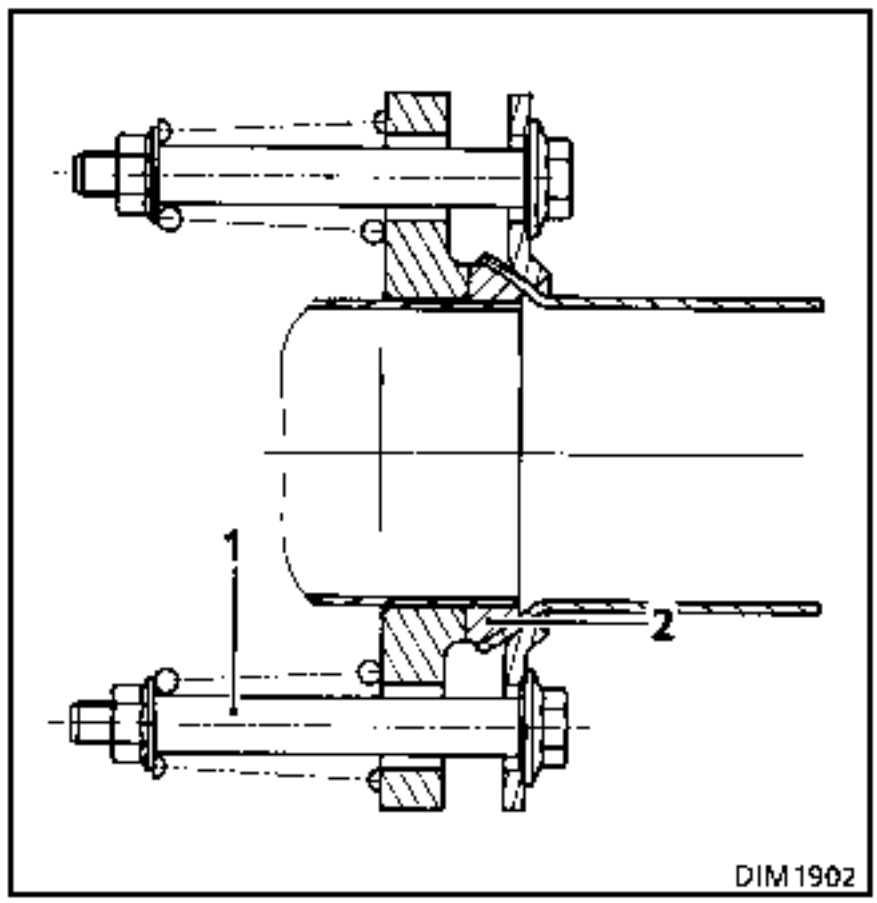
The exhaust downpipe studs (1) on F3R and G8T engines are fitted with stops which determine the spring tension. Tighten to the stop.

F3R - G8T ENGINES



Z7X ENGINE

THE Z7X engine exhaust is fitted with a "METEX" ring system between the dual manifold outlet pipe and the catalytic converter.



IMPORTANT :

- The sealing between the manifold gasket surface and the catalytic converter must be perfect.
- Any seals removed **MUST** be renewed (especially the catalytic converter flange seal).
- During removal and refitting, the catalytic converter should not be subjected to mechanical shocks, which, if repeated, could damage the converter.

TIGHTENING TORQUES (in daN.m)	
Ball joint nut (F - G)	2
Ball joint nut(Metex) (Z)	2
Catalytic converter inlet flange nut	2.2
Cat. converter / expansion box clip nut(Z)	2.5
Cat.converter / expansion box clip nut (F-G)	- self limiting
After sales sleeve nut	2.5

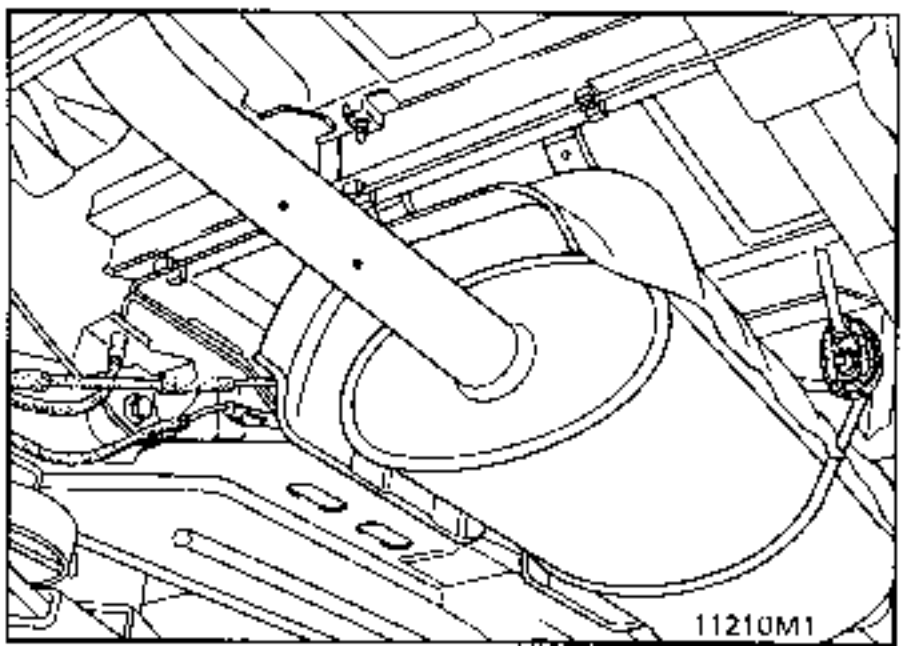
REMOVAL - REFITTING

Although the pipe is a single part between the expansion box and the silencer, they may be replaced as independent items.
The exhaust line must be cut to replace the expansion box or the silencer in After Sales.

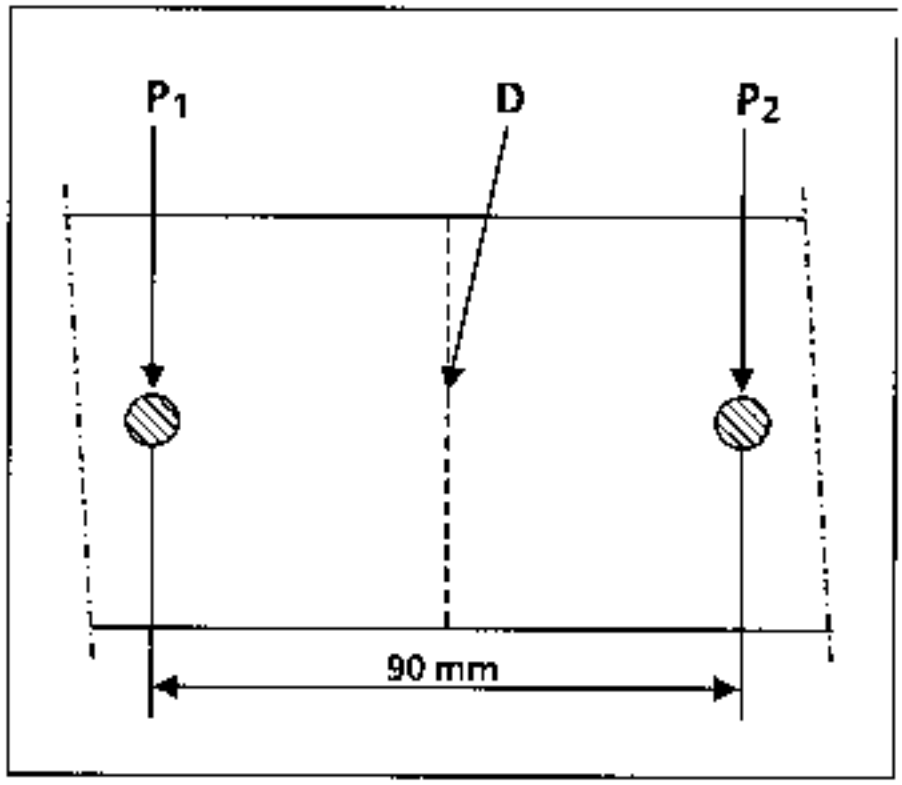
To do this, it is vital to:
- remove the expansion box / silencer assembly (see description of the operation at the end of the section),
- mark the cutting area,
- use cutting tool **Mot. 1199**,
- check the after sales sleeve is correctly fitted.

DETERMINING THE CUTTING AREA

The cutting area is marked by two punch marks on the exhaust pipe (left hand or right hand side on the straight part of the tube).



The distance between the two marks is **90 mm**. To cut the pipe, mark the centre point (D) between the two marks (P1 and P2).



The marks may be obscured by corrosion or dirt; rub the area with glass paper to locate them.

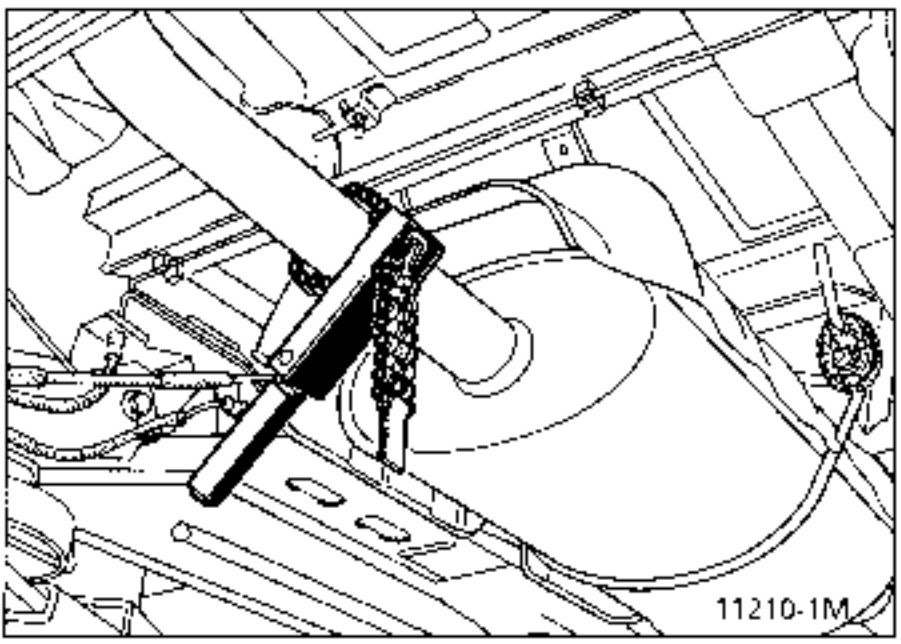
IMPORTANT : during operations under the vehicle, check the heat shields for the exhaust pipe are present and are correctly secured.

USING TOOL Mot. 1199

Position the tool on the pipe.

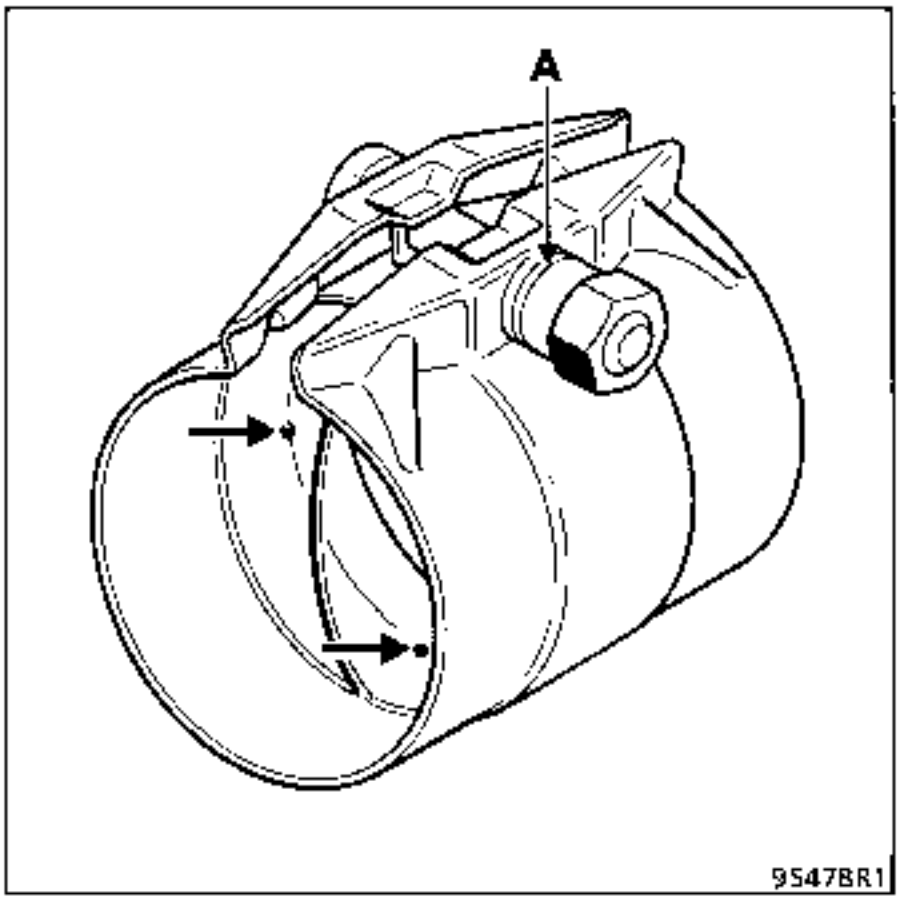
Slacken the chain as far as possible (unscrew) and pass it around the pipe. Attach the chain to the tool.

Screw in and pivot the tool around the pipe while increasing the chain tension (screw in) as the cut progresses (do not tighten the tool too much to avoid deforming the pipe).



Remove the part to be replaced.

FITTING THE AFTER SALES SLEEVE



To avoid any leaks in the exhaust pipe, the sleeve must be correctly positioned over the two exhaust pipe sections. The pipe must be against the stops inside the sleeve.

Begin by positioning the sleeve over the used section of the pipe, adjust the collar by tightening gently.

Check the position of the pipe in relation to the stops.

Fit the new section of the pipe.

Before fitting the sleeve on the pipe, apply a little mastic to the inner ring on the sleeve to prevent leaks.

(Exhaust mastic, Part Number. 77 01 421 161 SODICAM).

IMPORTANT : the bolt and nut used for tightening the sleeve must be aligned vertically on the left hand side of the exhaust pipe to avoid any risks of touching the underside of the body.

Before fully tightening the nut, ensure the catalytic converter and expansion box (and resonator) are fully in contact with the ground.

When a collar has been used once, renew it.

The nut on the collar has a groove (A) to ensure it is tightened to the correct torque. When the nut is tightened and the groove disappears, it causes a distinct clicking sound and the nut is then tightened to the correct torque (**2.5 daN.m**).

NOTE:
there are two different diameters of sleeve available:
- 50 mm diameter : F3R engines
- 55 mm diameter : Z7X - G8T engines

Before refitting the assembly check that no impurities or metallic particles have been trapped in the exhaust pipe upstream of the catalytic converter.

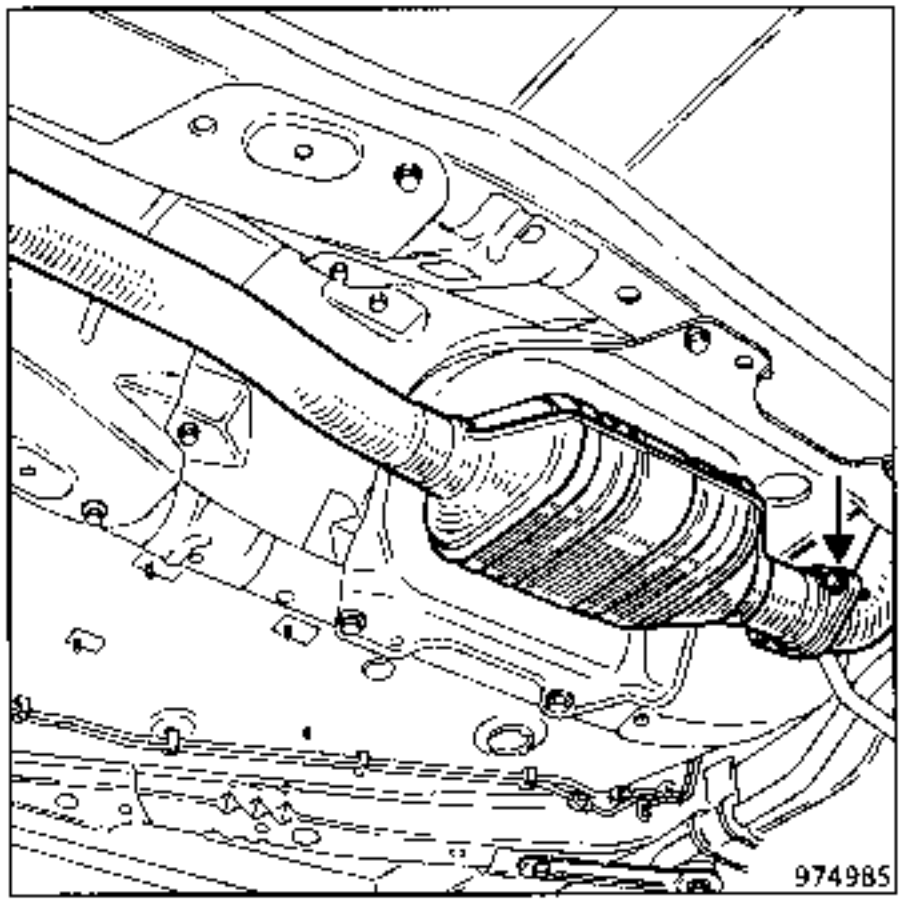
Replace the catalytic converter outlet seal.

When refitting the expansion box/ silencer assembly support the catalytic converter / expansion box joint in order to align the exhaust pipe correctly.

Check the pipe does not touch the body at any point when it is refitted.

REMOVING THE PIPE

Remove the catalytic converter.



Obtain assistance to support the catalytic converter and remove the expansion box outlet clip, together with the rubber mountings.

NOISE IN THE EXHAUST PIPE

The vehicle must be tested to determine the location of the noise (if necessary with the customer). The noise should then be reproduced when stationary. To do this, accelerate sharply to cover a wide range of engine resonances.

Having reproduced the fault :

- ensure the exhaust pipe is not touching the body,

- check the alignment, conformity and condition of the exhaust assembly,

- try to eliminate the noise noted by tightening the exhaust line section or heat shields at fault.

If the noise is coming from the catalytic converter, remove it and test as follows:

- visual examination inside the catalytic convertor (internal section melted),

- examine for noise whilst after shaking the catalytic converter (internal section broken or foreign body inside).

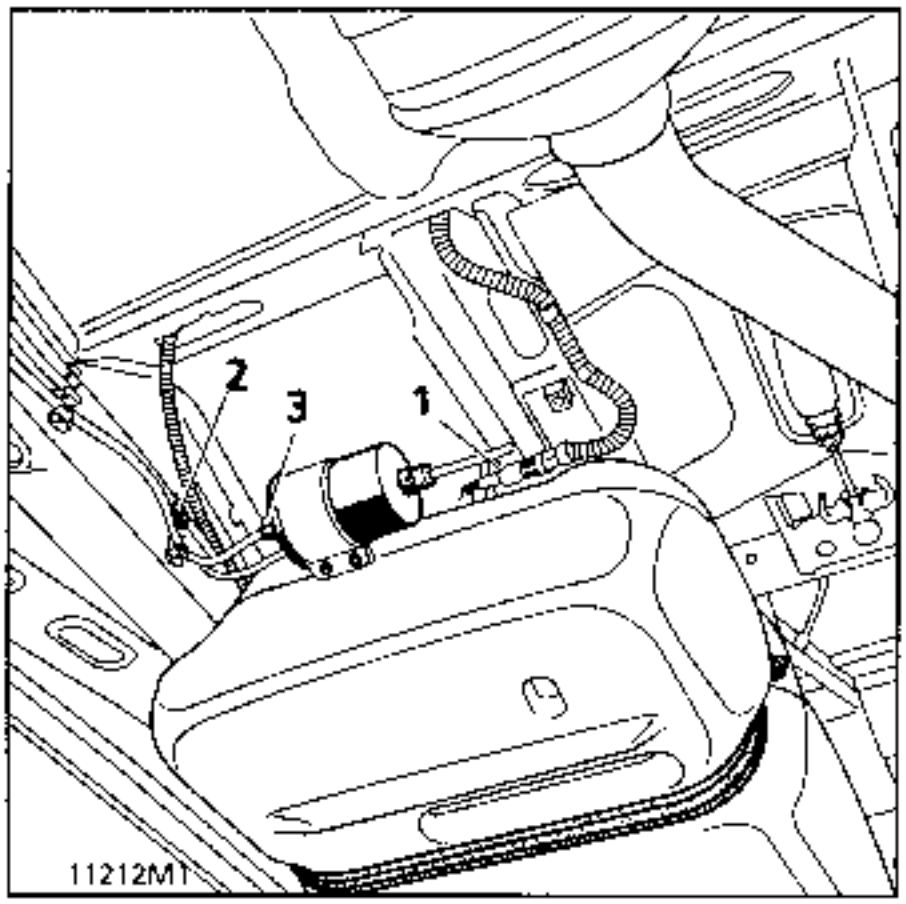
If the internal section has melted the cause must be determined (see chapter 14 : test to be carried out before anti-pollution tests) and check that catalytic converter particles have not blocked the exhaust system further down.

Only if one of the faults mentioned above is found, replace the converter.

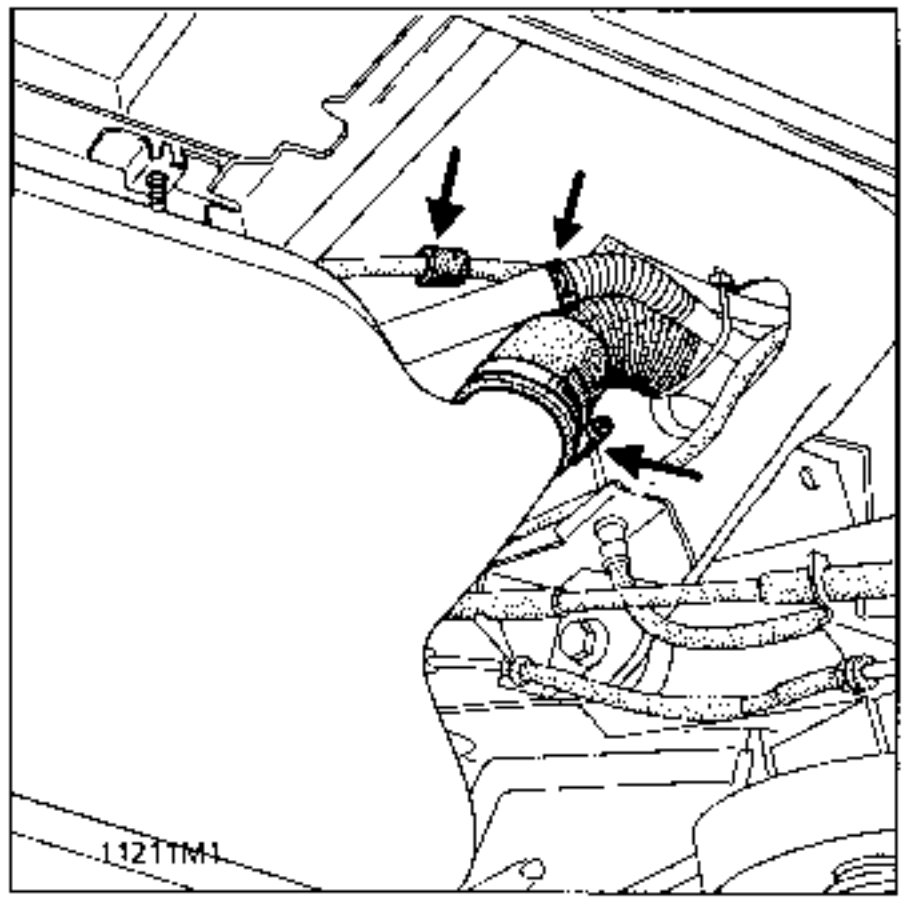
SPECIAL TOOLING REQUIRED	
Mot. 1265	**Pliers for removing quick release fuel unions**

REMOVAL

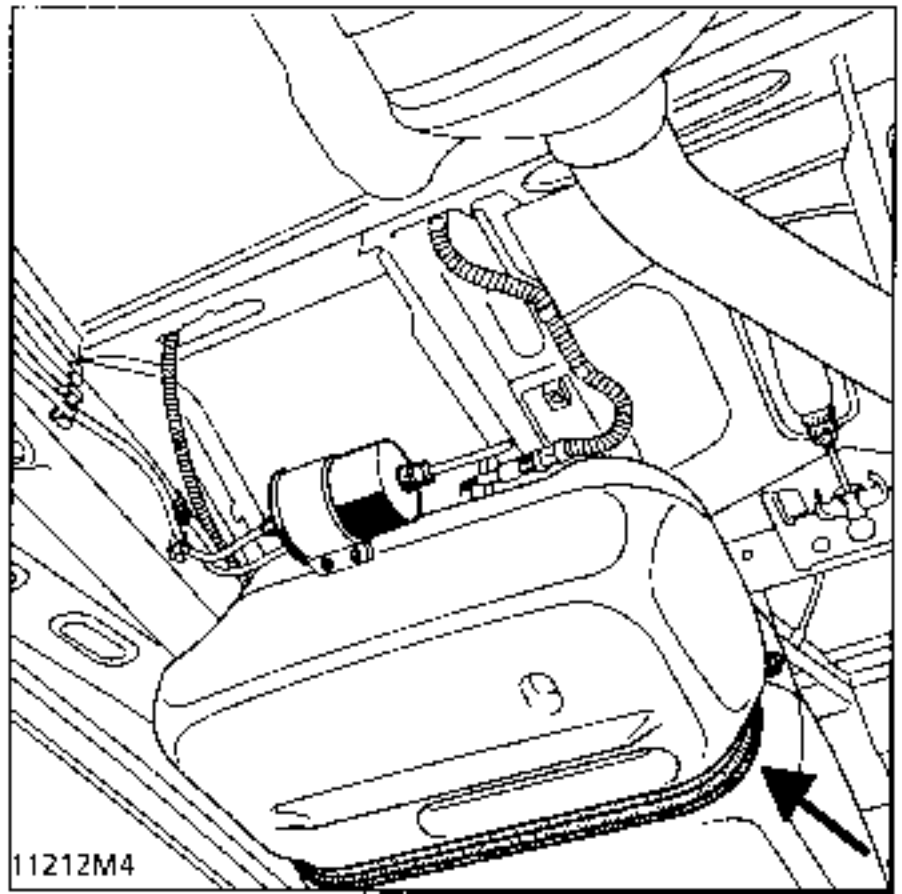
Disconnect the electrical connector (1) on the sender unit, the fuel return pipe union (2) and the supply pipe union (3) using pliers **Mot. 1265** after removing the clip which shows if the assembly has been pushed in (if fitted) (see below for how to fit the pliers).



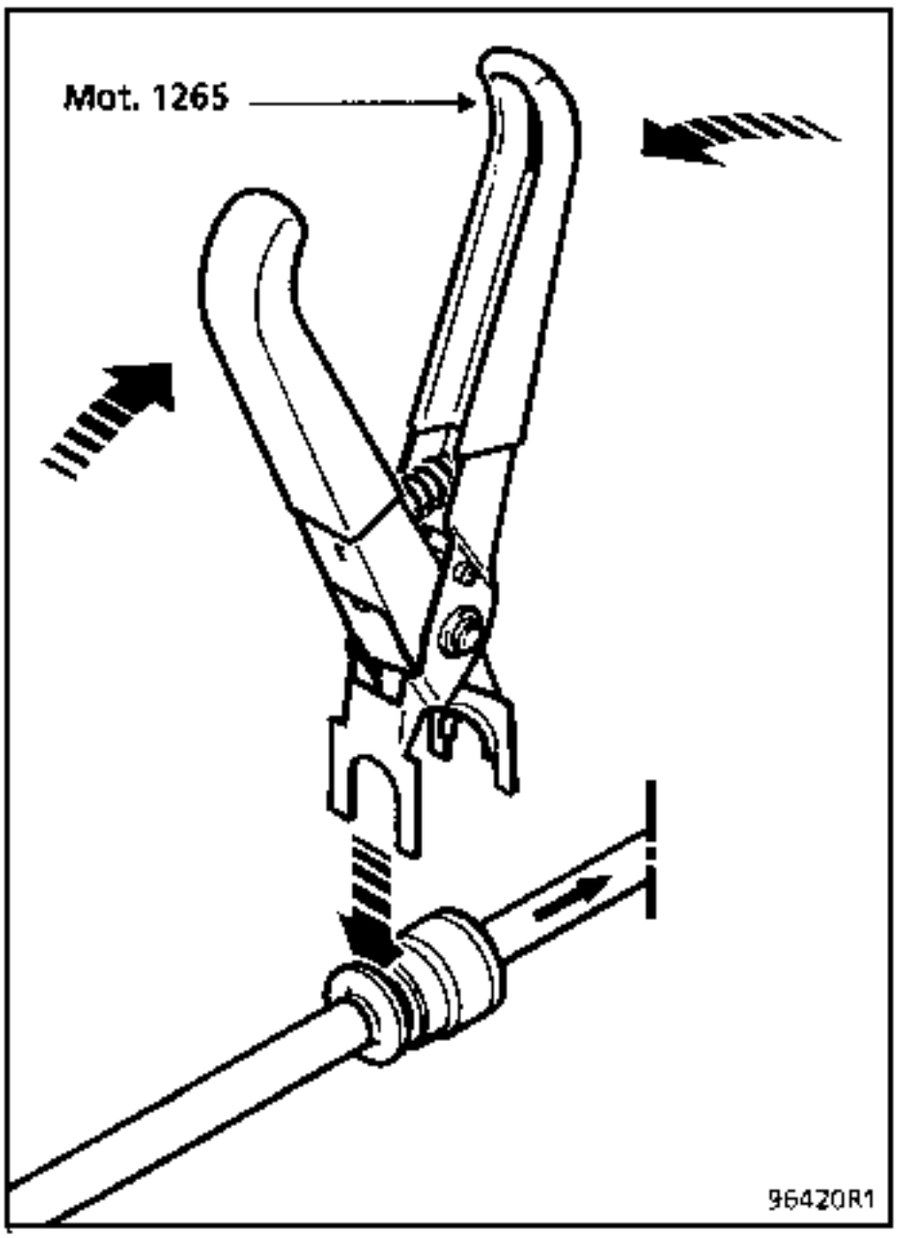
Disconnect the quick release union (4) on the pipe connecting the fuel tank to the filler neck using tool **Mot. 1265**.
Remove the filler neck pipe union (5) and return pipe union (6).



Position a component jack under the fuel tank.
Remove the straps which are each secured by two bolts.
Carefully lower the fuel tank - two persons required.



POSITIONING PLIERS Mot. 1265 AND Mot. 1265-01
Mot.1265 for pipe of diameter 8 mm.
Mot.1265-01 for pipe of diameter 10 mm.



REFITTING

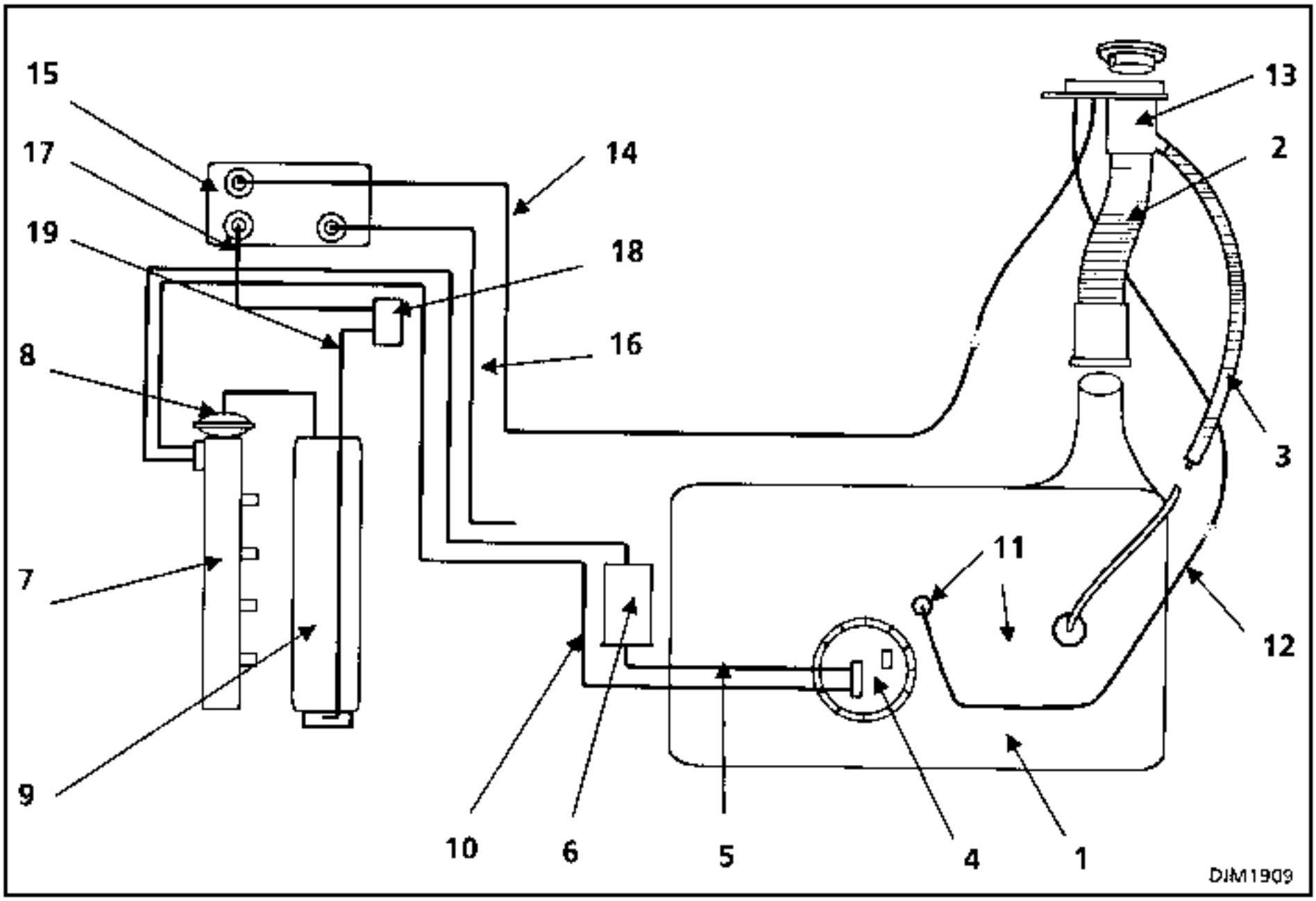
Refitting is the reverse of removal.

Take care not to pinch any pipes (risk of leaks).

Fit the quick release unions by hand and ensure they connect correctly (sealed by 2 O rings).

Take care to ensure the heat shield is correctly re-fitted.

FUEL TANK ASSEMBLY: diagram of fuel and degassing circuits



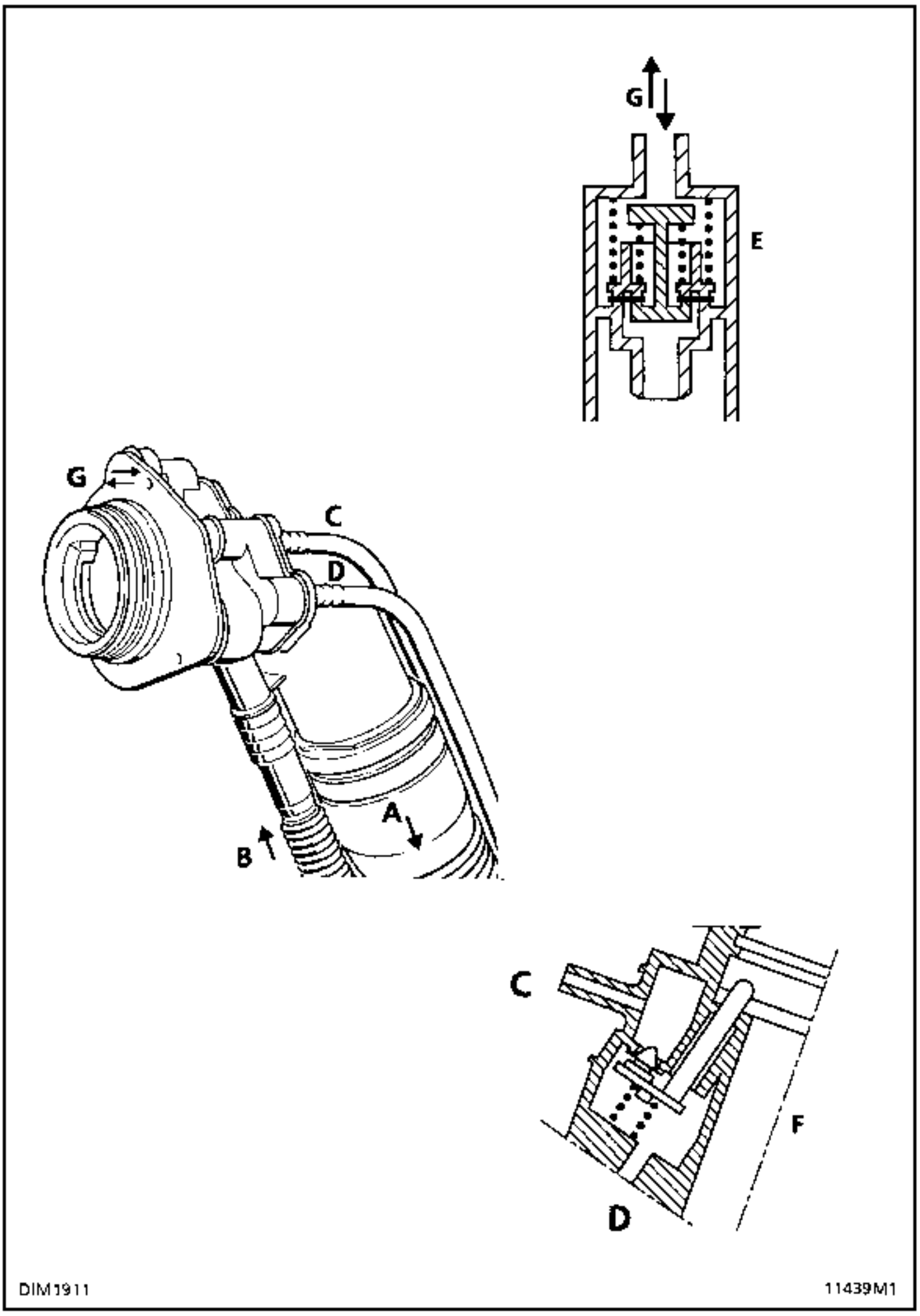
FUEL CIRCUIT:

1 Fuel tank
2 Supply pipe from filler neck to fuel tank.
3 Fuel tank breather for filling (anti-backsplash).
4 Fuel tank sender unit/ pump
5 Sender unit/ pump outlet supply pipe.
6 Fuel filter.
7 Injector gallery.
8 Pressure regulator controlled by inlet manifold pressure (8)
9 Inlet manifold
10 Fuel return pipe to fuel tank.

DEGASSING CIRCUIT:

11 Leak prevention valve if vehicle turns over
12 Breather pipe connecting upper part of fuel tank to filler neck (degassing)
13 Filler neck with over-filling prevention valve and excess pressure - under-pressure safety valve.
14 Breather connecting filler neck to canister
15 Canister
16 Breather pipe ending in right hand side member (at front footwell)
17 Pipe connecting canister to solenoid valve.
18 Solenoid valve.
19 Pipe connecting solenoid valve to inlet manifold intake.

SPECIAL FEATURES OF FILLER NECK



A Fuel tank supply pipe
B Pipe for degassing system during filling
C Degassing pipe to canister
D Degassing pipe from fuel tank
E Excess pressure - under-pressure safety valve
F Over-filling prevention valve
G Degassing hole for excess pressure - under-pressure safety valve

PURPOSE OF THE VALVES

F **Overfill prevention valve**

When the filler cap is removed the valve is closed trapping a volume of air (expansion volume). This prevents fuel from filling this volume.

When the filler cap is replaced, the valve opens allowing the tank to breathe through the canister.

E **Excess - under-pressure safety valve**

If the fuel vapour recirculation circuit is blocked, these valves prevent the fuel tank being subject to excess pressure (the tank would inflate) or lack of pressure (as fuel is used, the tank would be crushed).

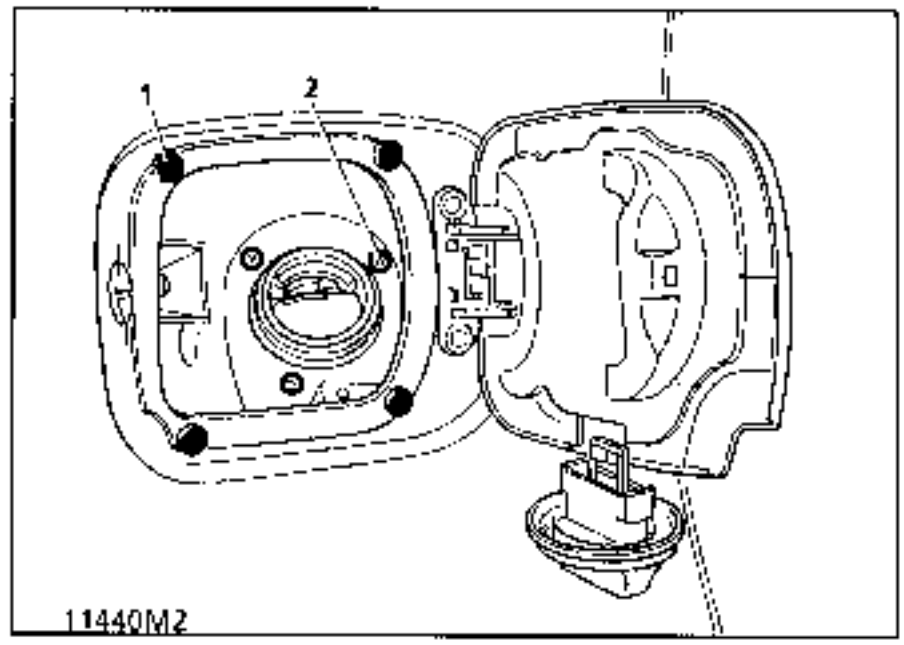
NOTES:

The filler neck has a sealed cap.

The diesel version has the same filler neck, but the degassing circuit above the overfilling prevention valve ends in a breather directly in the side member instead of the canister.

REMOVING - REFITTING THE FILLER NECK:

Expose rivets (1) and release them.
Remove the dust cover and bolts (2).
Remove the filler neck from below, after disconnecting it from the fuel tank and removing the right hand wheel arch protector.



The filler neck for unleaded fuel has a swinging flap valve which prevents leaded fuel being put into the tank.

Leaded fuel damages the depollution system : oxygen sensor and catalytic converter.