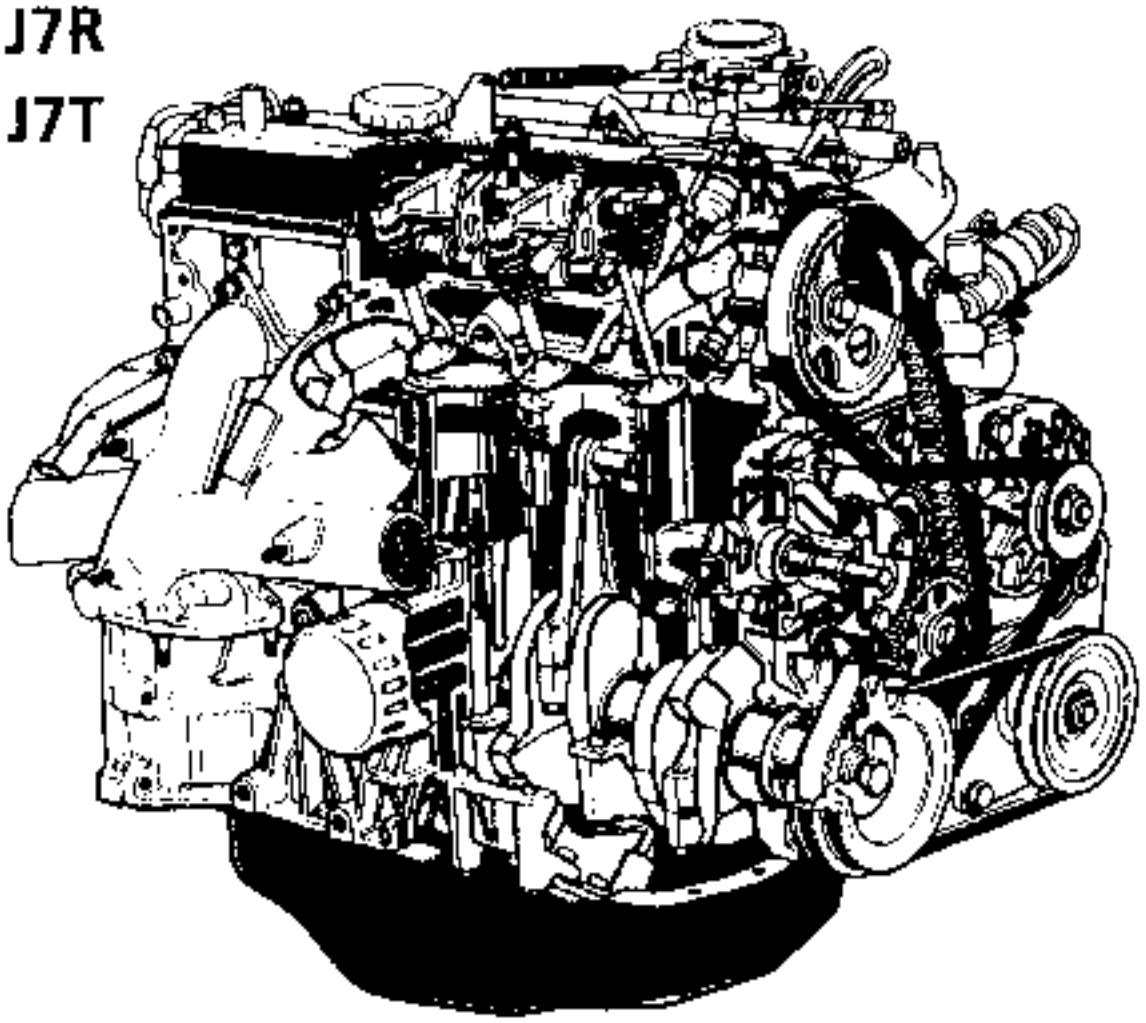
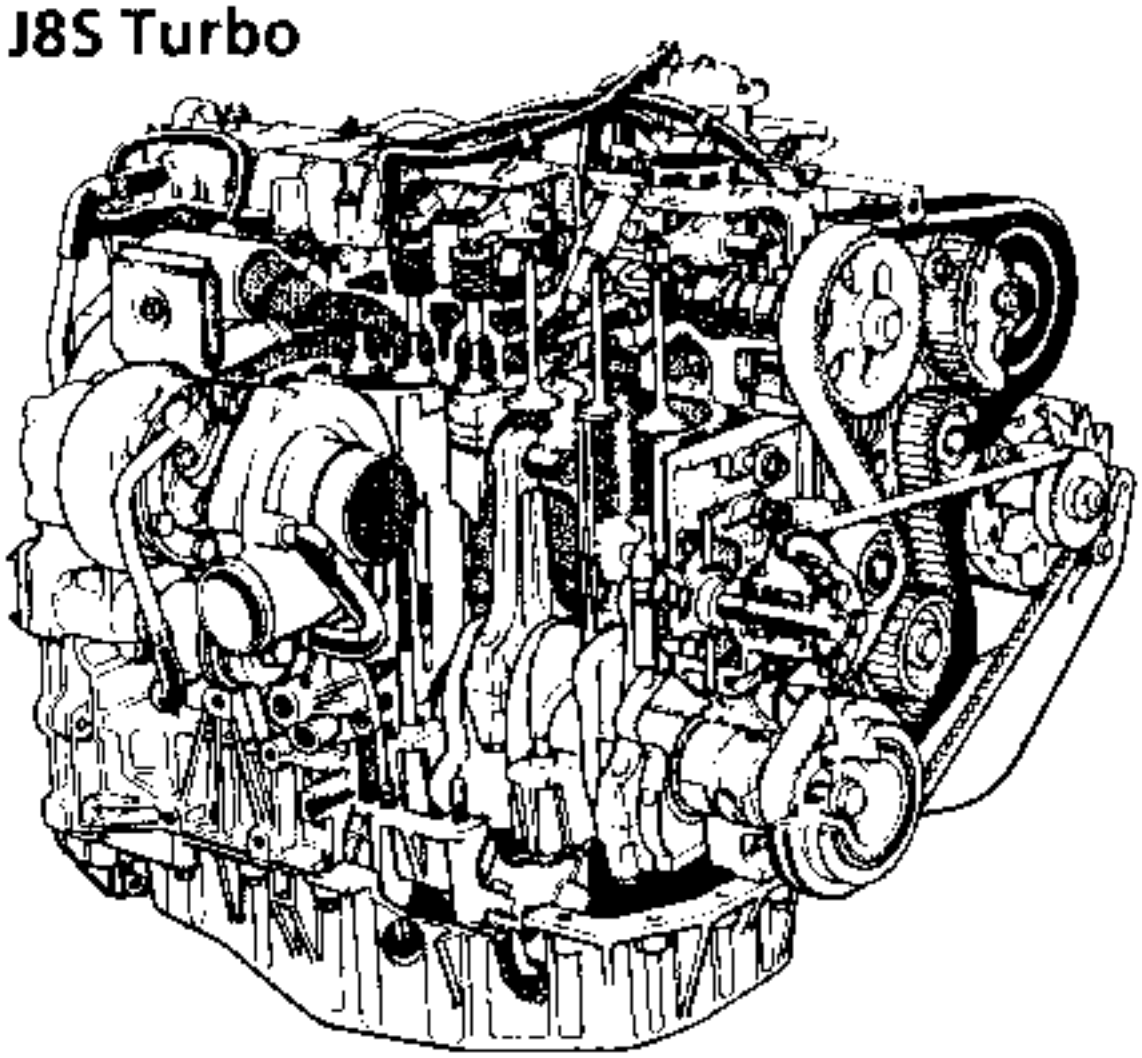
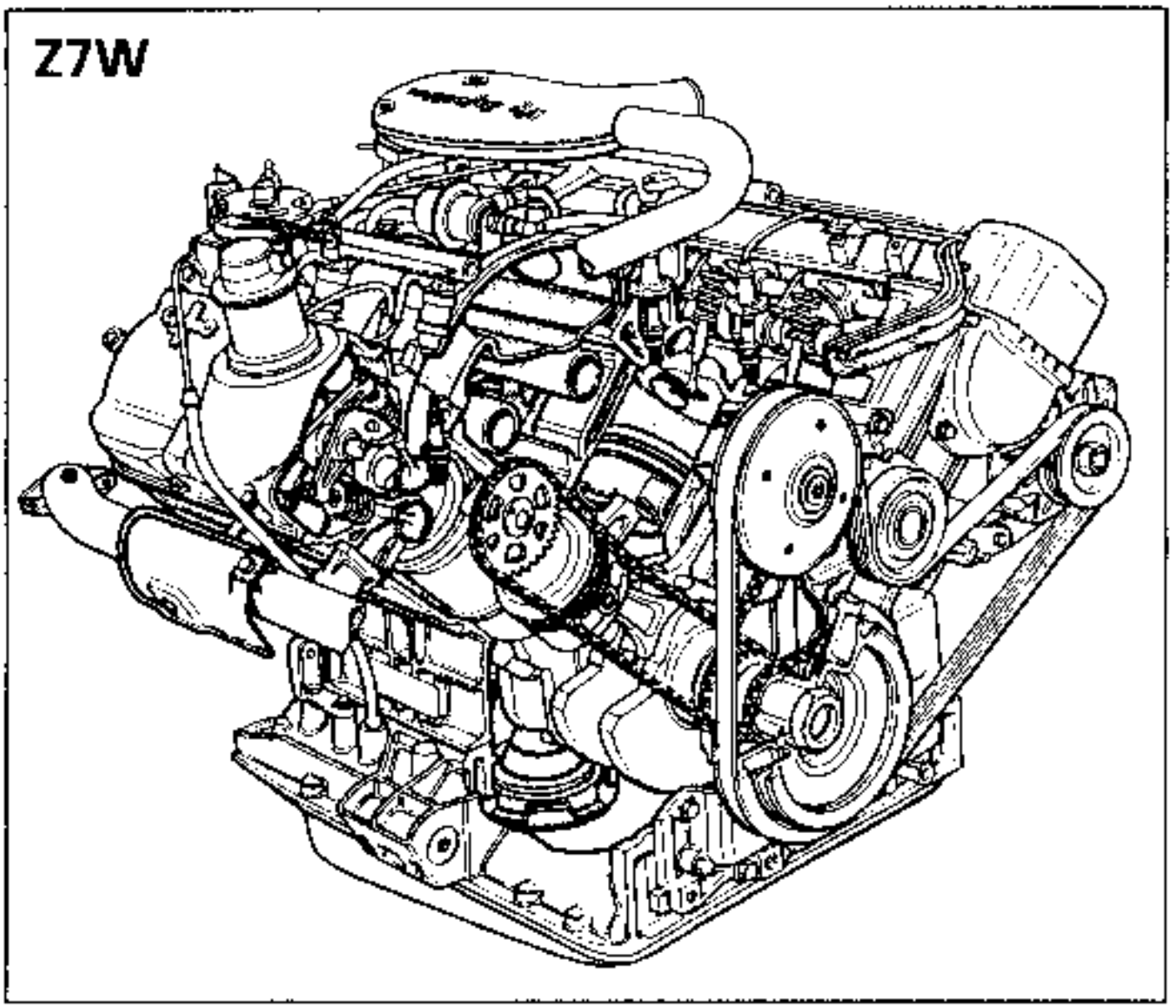
J7R
J7T



J8S Turbo




Z7W

DESCRIPTION	PACK SIZE	PART NO
GREASE AND SEALING PRODUCTS		
• MOLYKOTE "BR2" for trunnions, clutch fork bearing areas, lower suspension arm bearings, torsion bar splines, steering box, driveshaft splines.	1 kg tin	77 01 421 145
"MOLYKOTE M55+" • Clutch friction hub splines	1 litre drum	77 01 421 079
• "MOLYKOTE CU 7439" (high temperature grease) Turbo-charger etc	1 kg tin	77 01 417 627
• Perfect seal "LOWAC" jointing compound	100 g tube	77 01 417 404
• Mastic for sealing exhaust pipe connections	1.5 kg drum	77 01 421 161
•"CAF 4/60 THIXO" for driveshaft roll pins	100 g tube	77 01 404 452

Vehicle Type	Engine		Bore (mm)	Stroke (mm)	C/R
	Type	Cubic Capacity (cc)			
J635 05 S635 05	J8S 772	2068	86	89	21,5
J634 05	J8S 776	2068	86	89	21,5
J636 15	J7R 768	1995	88	82	9,2
J637 05 J637 08 S637 05	J7T 772	2165	88	89	9,2
J638 05	Z7W 712	2849	91	73	9,5

Engine workshop repair manuals to be consulted depending on type of engine to be repaired:

Workshop Repair Manual \ Engine	J8S	J7R	J7T	Z7W
J (E)		X	X	
J (D)	X			
Z (E)				X

The engine section of this workshop repair manual covers:

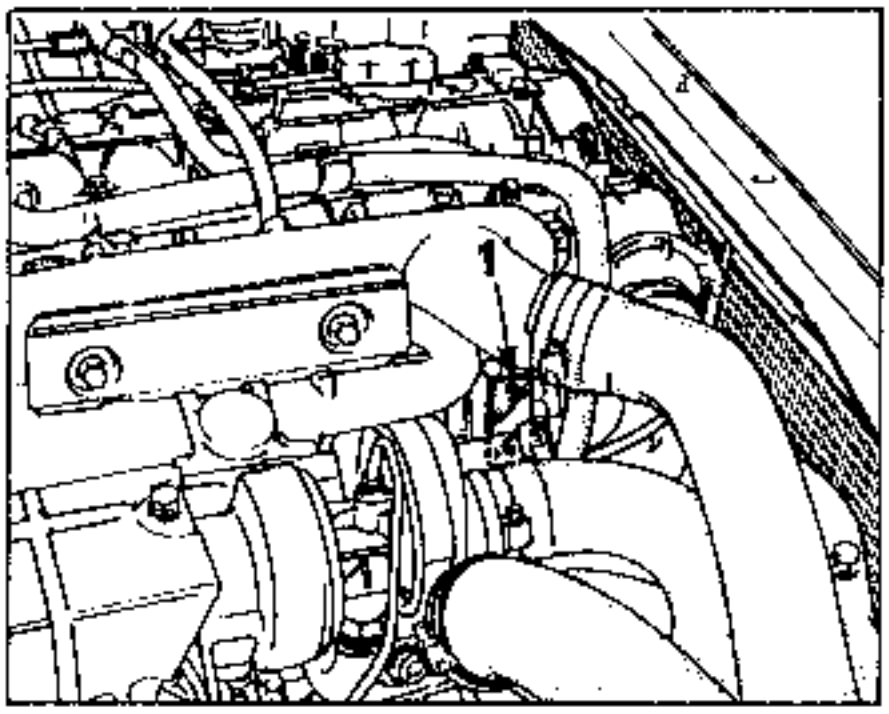
- The removal and refitting operations of:
  - the engine - gearbox assembly, to be performed on a 2 post lift, after noting the precautions to be taken see GENERAL section.

  - engine with gearbox
  - engine alone
- Some operations having special features:
  - cooling system
  - drive belts
  - exhaust system
  - carburation/injection

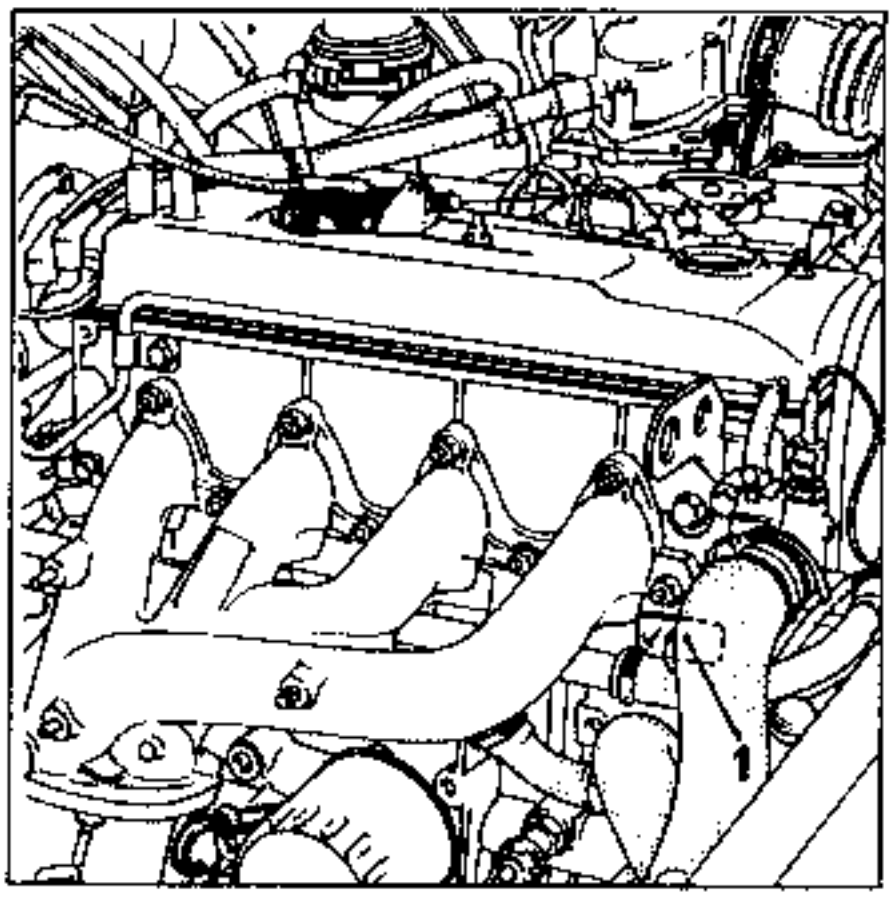
Although other operations such as replacing the cylinder head and replacing the pistons and liners can be performed with the engine in situ, they have not been described in this workshop repair manual since they have no special points in relation to the methods described in the engine workshop repair manual.

LOCATION OF ENGINE IDENTITY PLATE (1).

J8S ENGINE

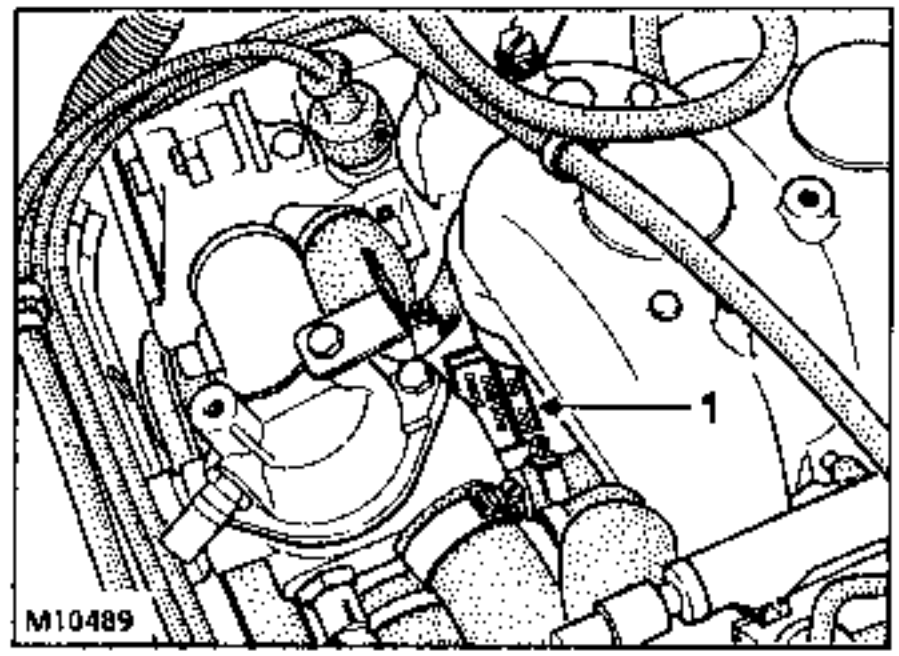


J7R - J7T ENGINES

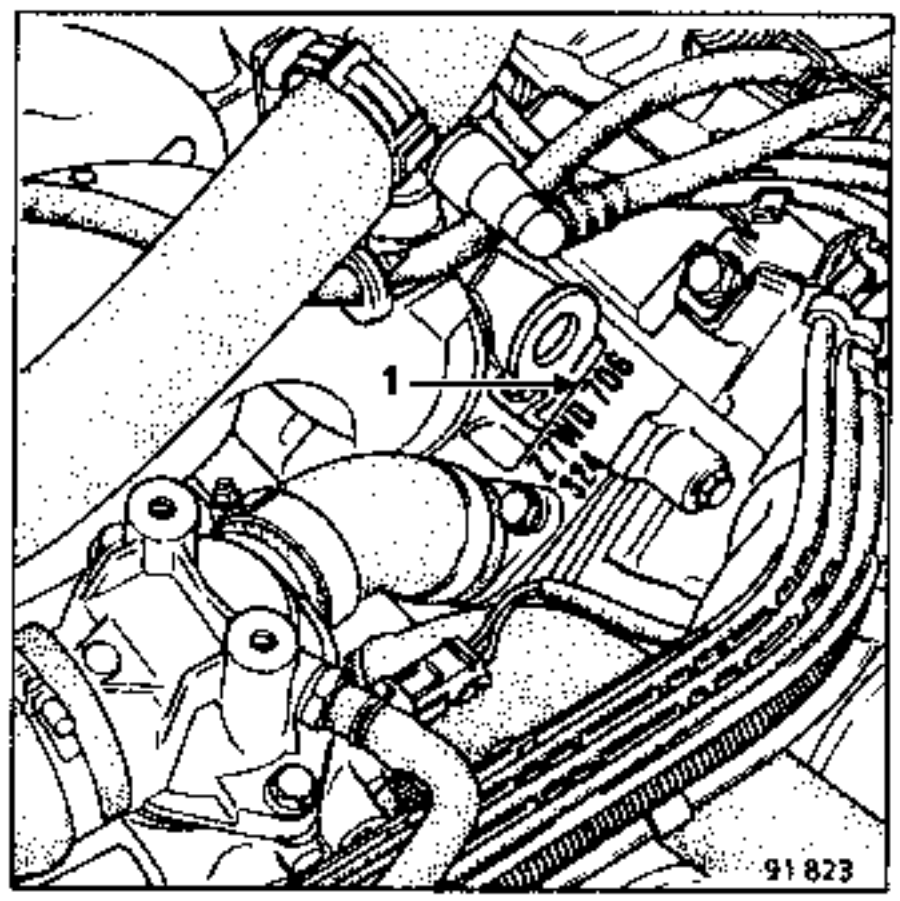


Z7W ENGINE

Identification on cylinder block



Identification on cylinder head



CHECKING METHOD

Engine oil consumption of 1 litre per 500 miles (1000 km) is tolerable.

Check that there are no external engine oil leaks.

Certain conditions when draining the engine oil must be respected in order for a check to be efficient:

- the engine must be hot;
- turn the crankshaft so that No 1 cylinder is on TDC firing stroke;
- remove the dipstick and filler plug.

Then drain the oil from the engine leaving it to run out for at least 15 minutes.

Refit the drain plug and "seal" it (dab of paint both on the plug and sump) so that it can be checked subsequently that it has not been removed.

Using a graduated flask, measure the amount of oil required for refilling:

Engine type:	J7R	5.7 litres
	J7T	5.7 litres
	J8S	5.5 litres
	Z7W	6.0 litres

Refit and seal the filler plug with a dab of paint.

Ask the vehicle owner to return after travelling approximately 500 miles (1000 km) with the vehicle, regularly checking the oil level with the dipstick.

When the vehicle is returned, check that the oil drain and refill plugs have not been removed.

Set up the same conditions again:

- engine hot;
- crankshaft with No 1 cylinder on TDC firing stroke;
- dipstick and filler plug removed.

Drain the engine oil and use a graduated flask to measure the amount of oil collected.

ESSENTIAL SPECIAL TOOLING	
Mot. 1014	Pressure gauge

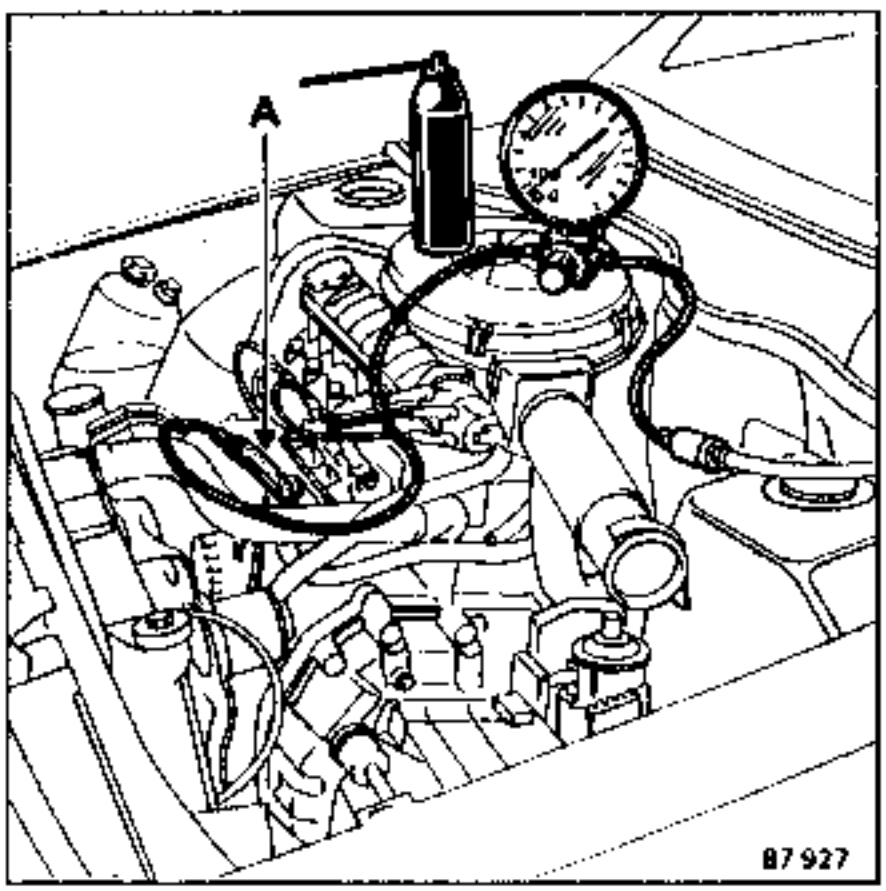
MATERIALS
Gas leakage detector: "1000 bulles" (AIR LIQUIDE) MOUSS MM2 (LUBRO Oils) or equivalent. (These products are available in aerosols containing approx. 400 ml).

It is easier to find external oil leaks if the internal section of the engine is pressurised and a gas-detector product is sprayed over the area of the engine where the leak is suspected.

CONNECTION

On the oil vapour rebreathing system (enables the entire part of the engine which is not under oil pressure to be checked):

Example of connection:



- Pressure gauge Mot. 1014 with end piece (A) can be connected to the oil vapour rebreathing circuit.

METHOD:

NEVER EXCEED A PRESSURE OF 80 MILLIBARS

The lip-type seals will turn over above this pressure.

Completely unscrew the pressure relief valve on gauge Mot. 1014 before connecting it to the rebreathing system.

Increase the pressure very slowly up to 80 millibars and check:
- the sealing of the filler cap and dipstick;
- any air leaks in the air intake circuit (oil vapour rebreathing circuit not blocked).

Generously spray the area in which the leak is suspected with leak detecting fluid and look to see whether any soap bubbles are forming anywhere.

NOTE:

. In some cases ancillary units may have to be removed, for example the flywheel protection plate.

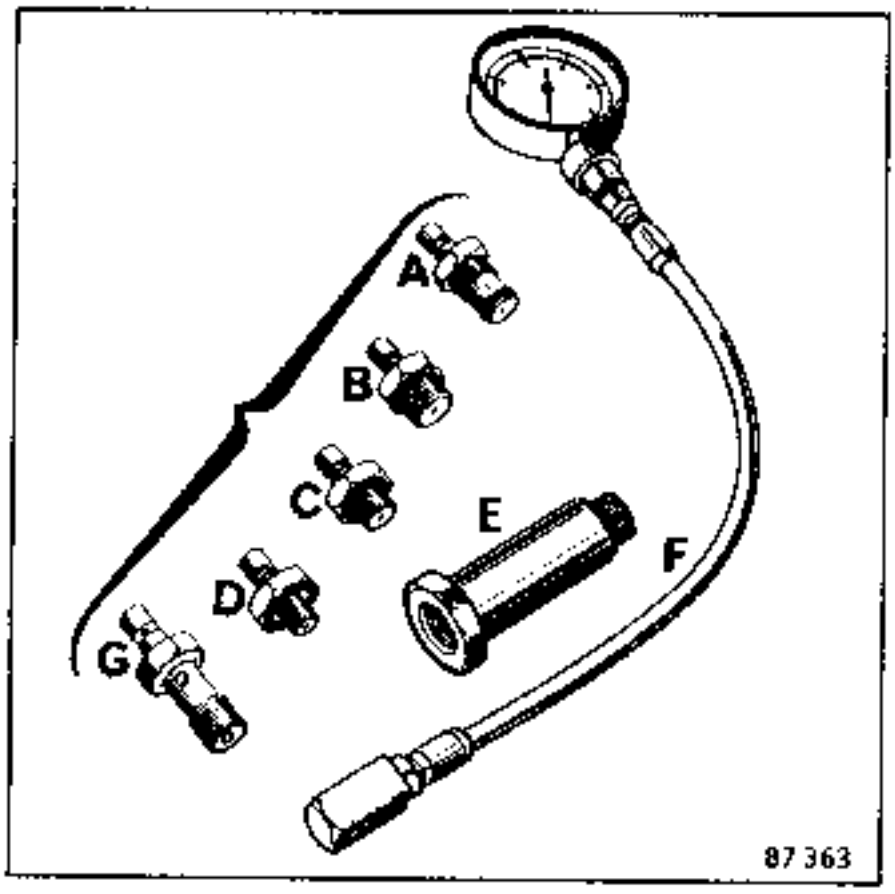
. This operation can also be performed on a removed engine.

. If this operation is performed after repairs have been carried out, wait for the sealing paste to harden and only perform it for a short while so as not to dislodge the paste.

ESSENTIAL SPECIAL TOOLING
Mot. **836-05** Oil pressure measuring kit

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

Contents of kit Mot. 836-05.

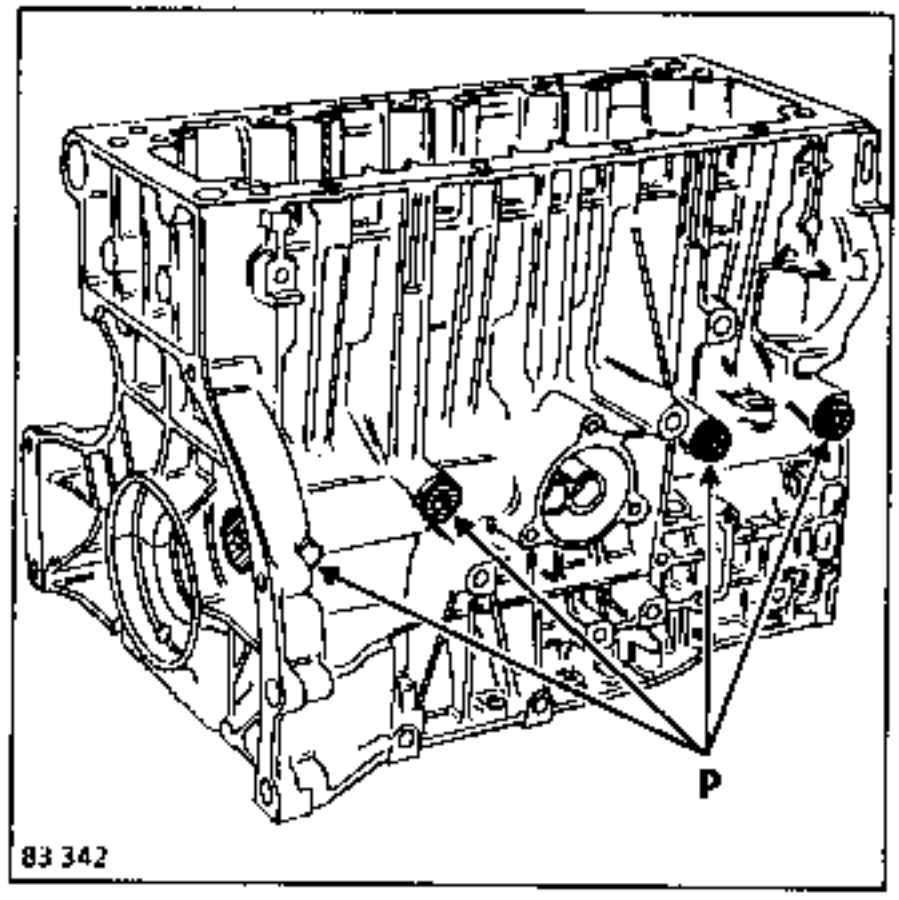


USE: F + C (14 x 150)

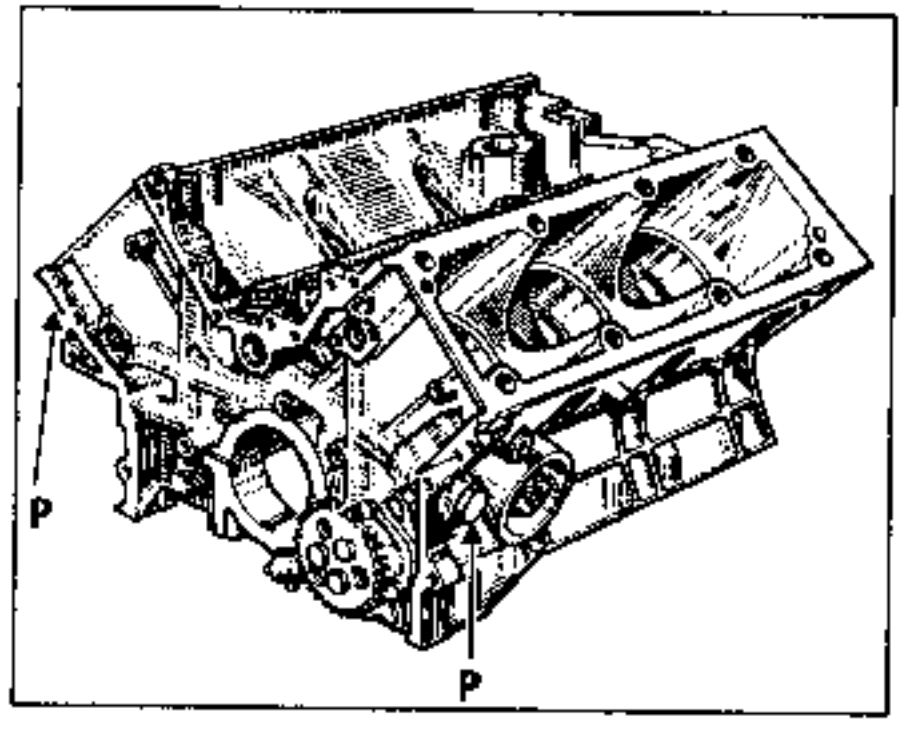
The oil pressure can be read off on the engine at P.

Engine Speed rpm	Min. Pressure at 80°C (bars)	
	J7R - J7T - J8S	Z7W
Idling	0,8	1
3 000	3	-
5 500	-	4

J7R - J7T - J8S ENGINES



Z7W ENGINE

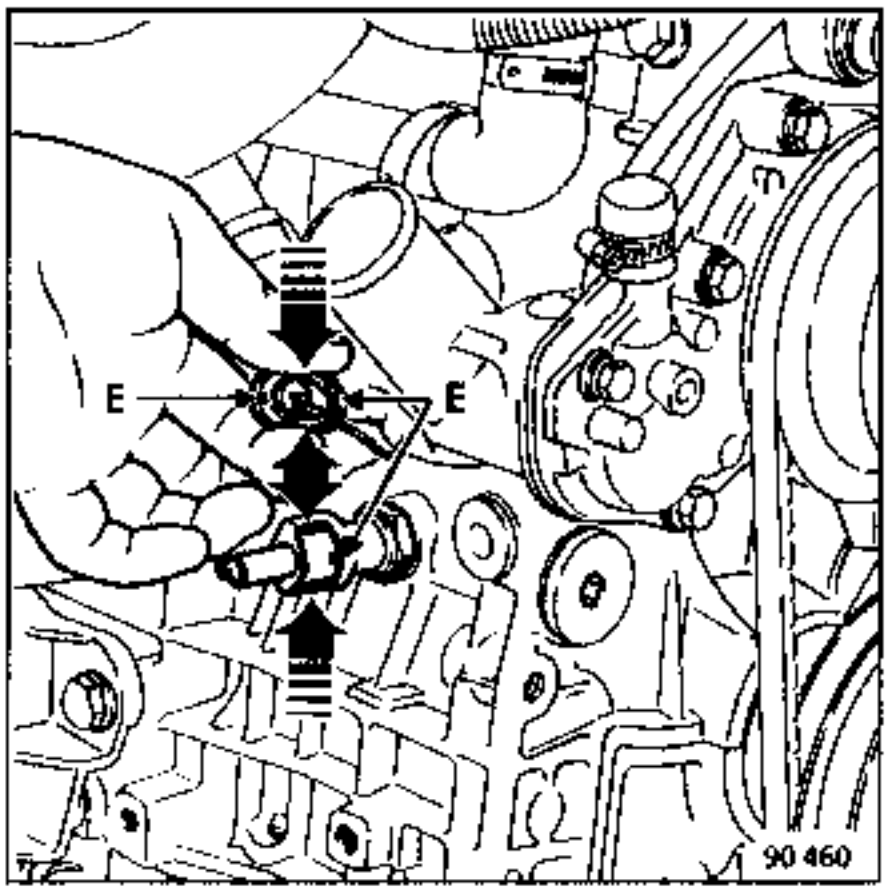


REMOVAL

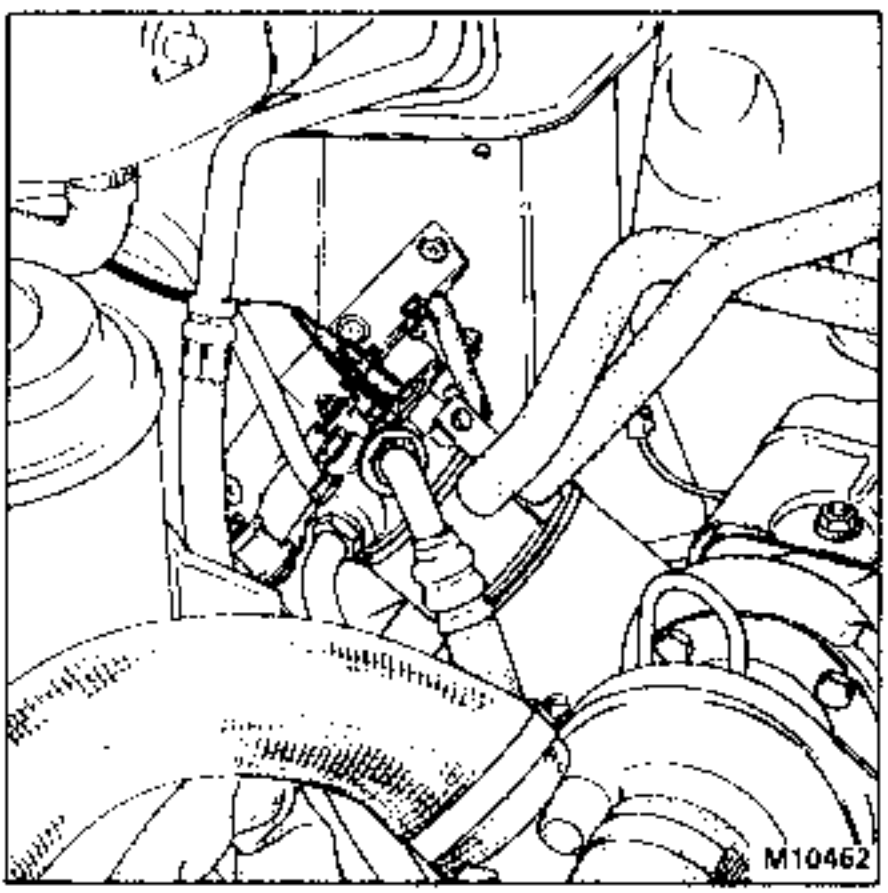
Disconnect the connector by pressing on both sides of it simultaneously to move away the two notches (E) and remove the connector from the sensor.

Unscrew the sensor.

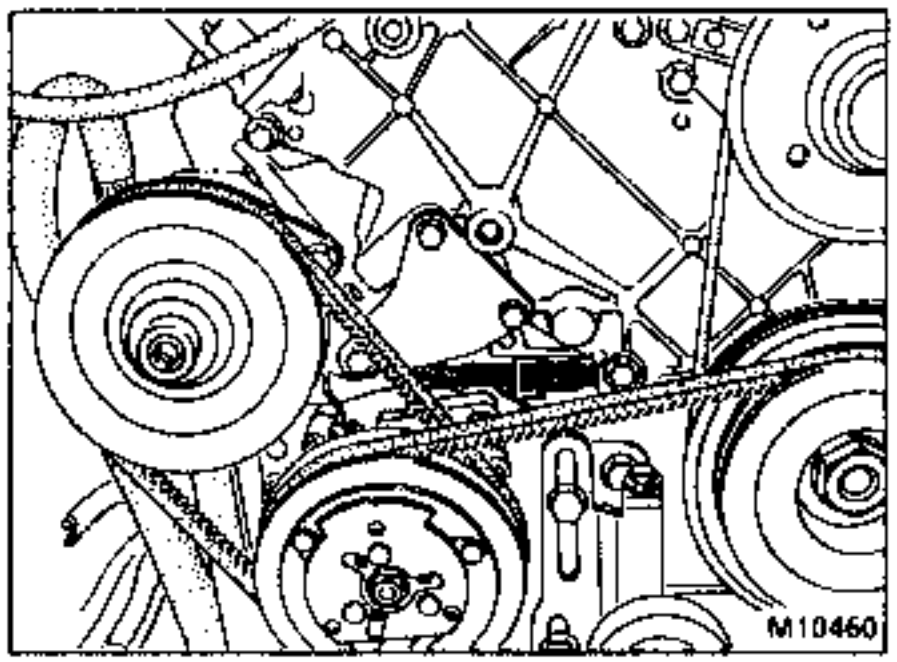
J7R - J7T ENGINES



J8S ENGINE



Z7W ENGINE



REFITTING

Replace the seal.

Proceed in the reverse order to removal.

ESSENTIAL SPECIAL TOOLING	
Mot. 878	Engine lifting tool

TIGHTENING TORQUES (in daNm)	
Engine pad mounting bolts	4
Gearbox bolts	5

The engine is removed alone by freeing it at the front of the vehicle.
Lifting rings are used to facilitate this operation.

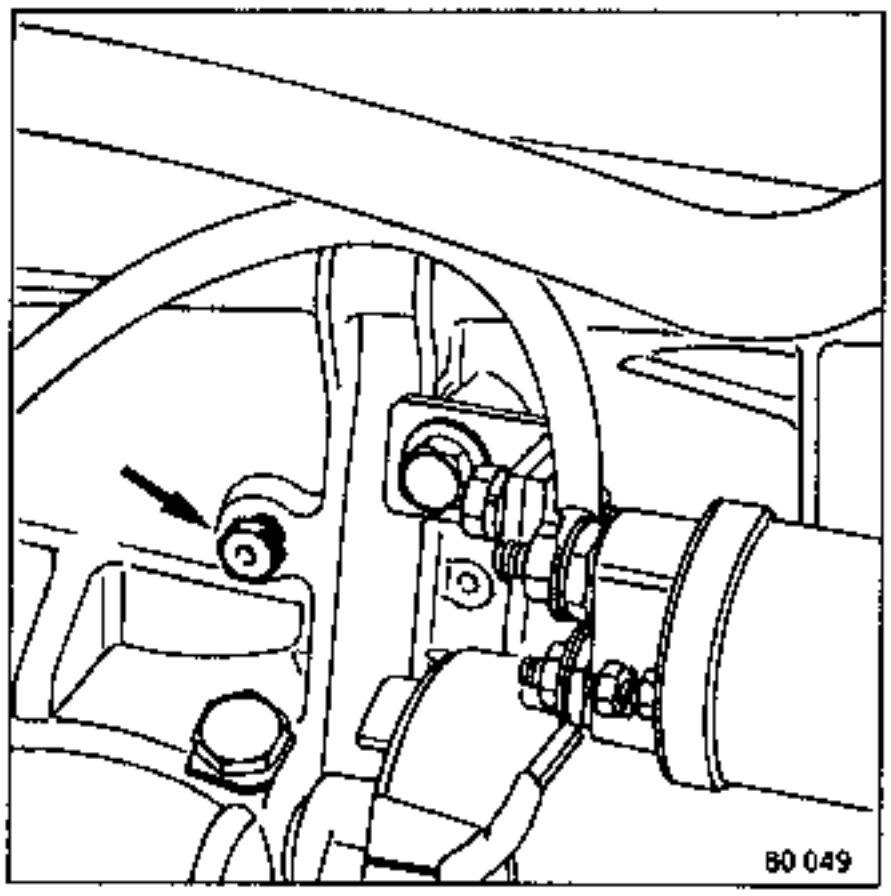
REMOVAL

Disconnect:

- the battery;
- the injection harness connectors;
- the earth under the R/H headlight.

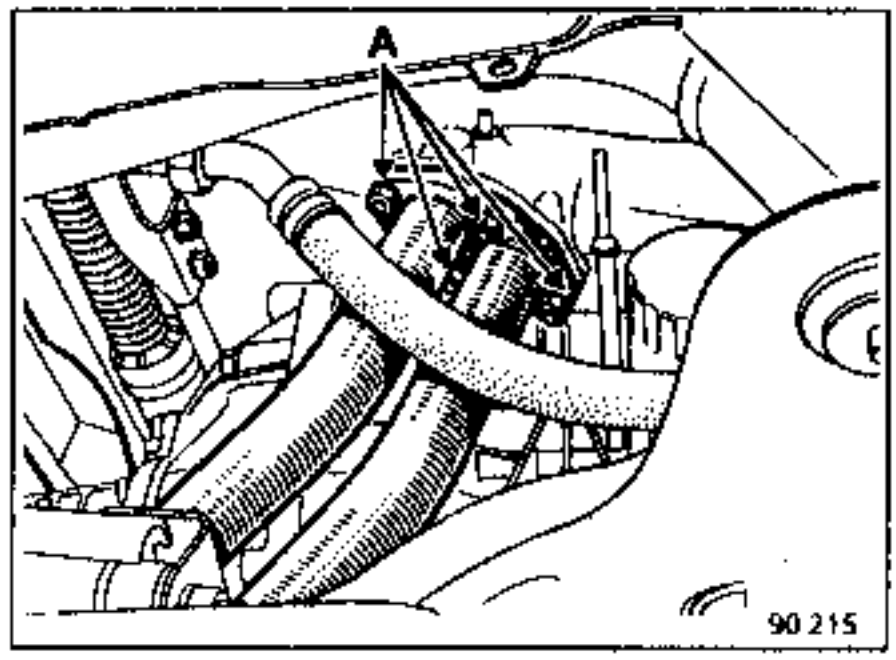
Drain the cooling system from:

- the radiator lower hose;
- the cylinder block.



Remove:

- the bonnet;
- the front deflector;
- the upper cross-member bar;
- the front shield;
- the radiator with the engine cooling fans (condensor on version with air conditioning);
- the air filter;
- the heater special fan with heat shield;
- the heater fan assembly;
- the exhaust mounting from the manifold (A).

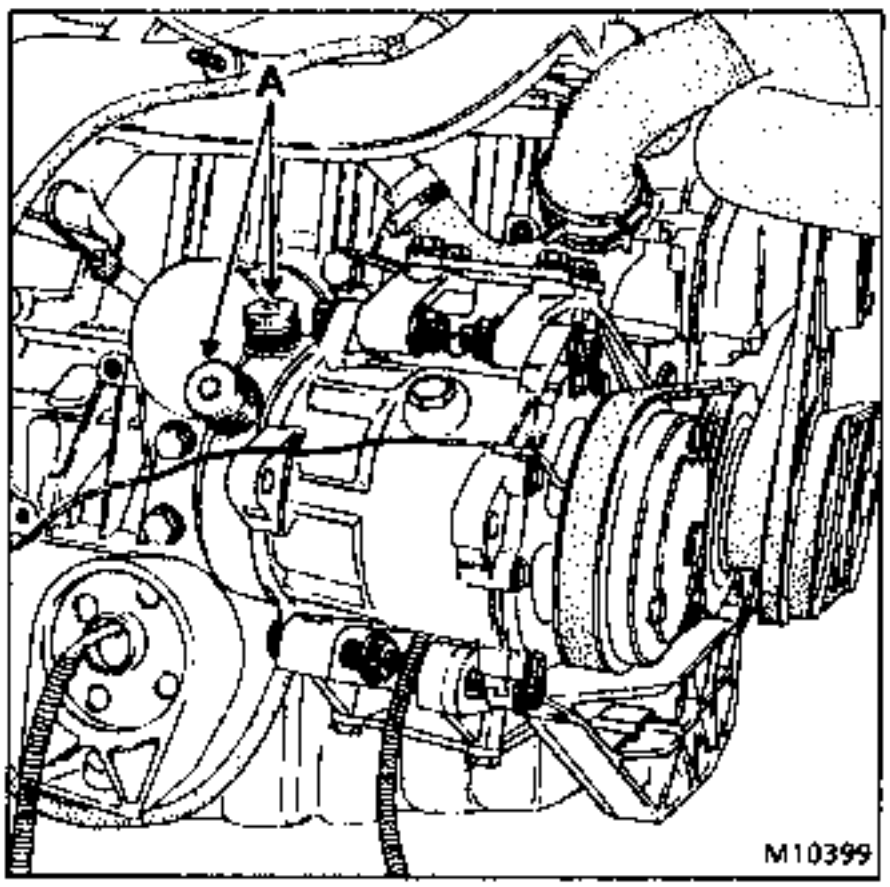


Disconnect:

- the accelerator cable;
- the clutch cable;
- the heater pipes;
- the fuel pipes from the injector gallery;
- the high and low pressure pipes from the power-assisted steering pump.

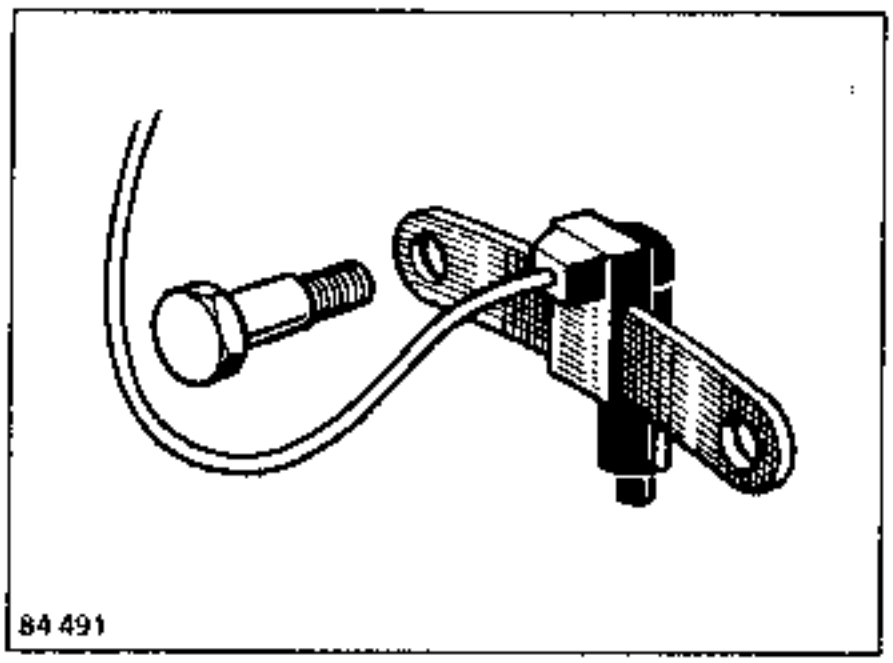
On version with air conditioning

Diconnect the freon hoses and blank off apertures (A).



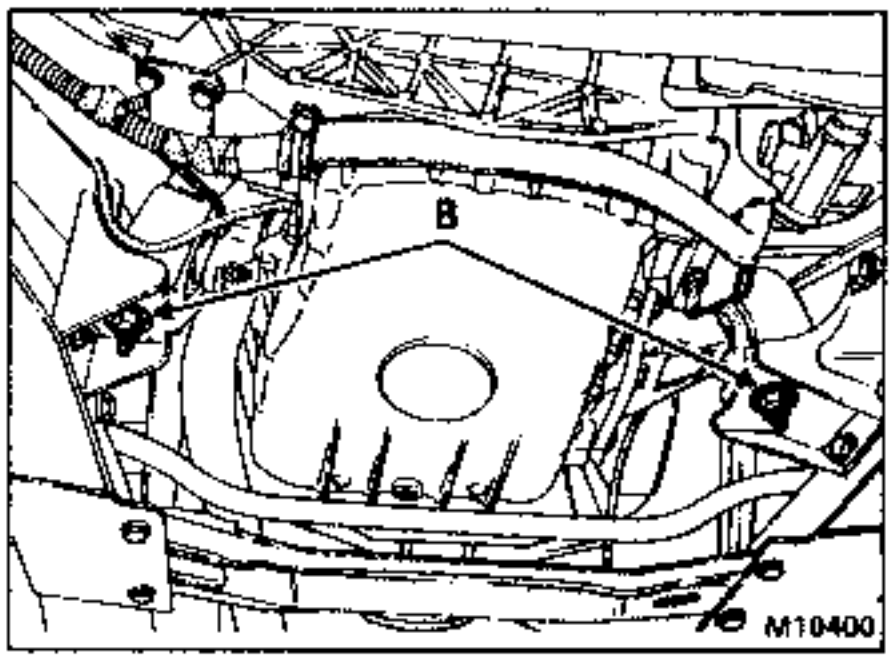
Remove:

- the mounting bolts from around the gearbox;
- the mounting bolts from the starter;
- the position sensor;

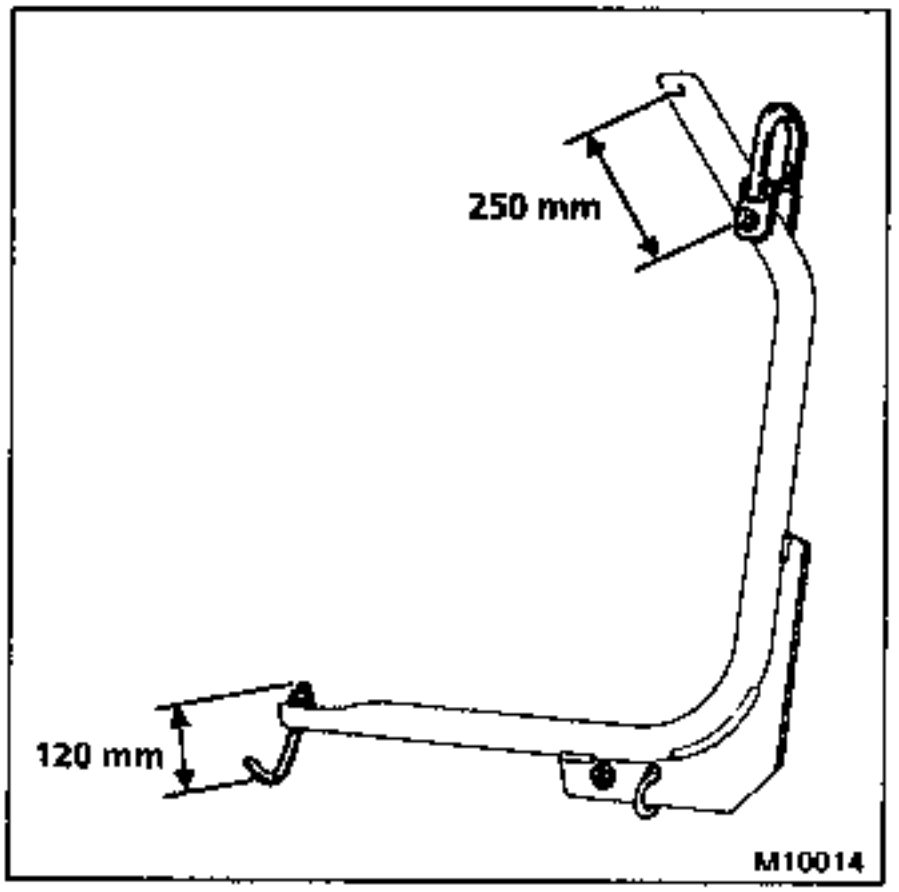


- nuts (B) securing the engine mountings.

Support the gearbox under the vehicle.



Use tool Mot. 878 and attach the engine by its lifting rings.



WHEN TOOL MOT. 878 IS USED THE USER MUST MODIFY IT AS FOLLOWS:

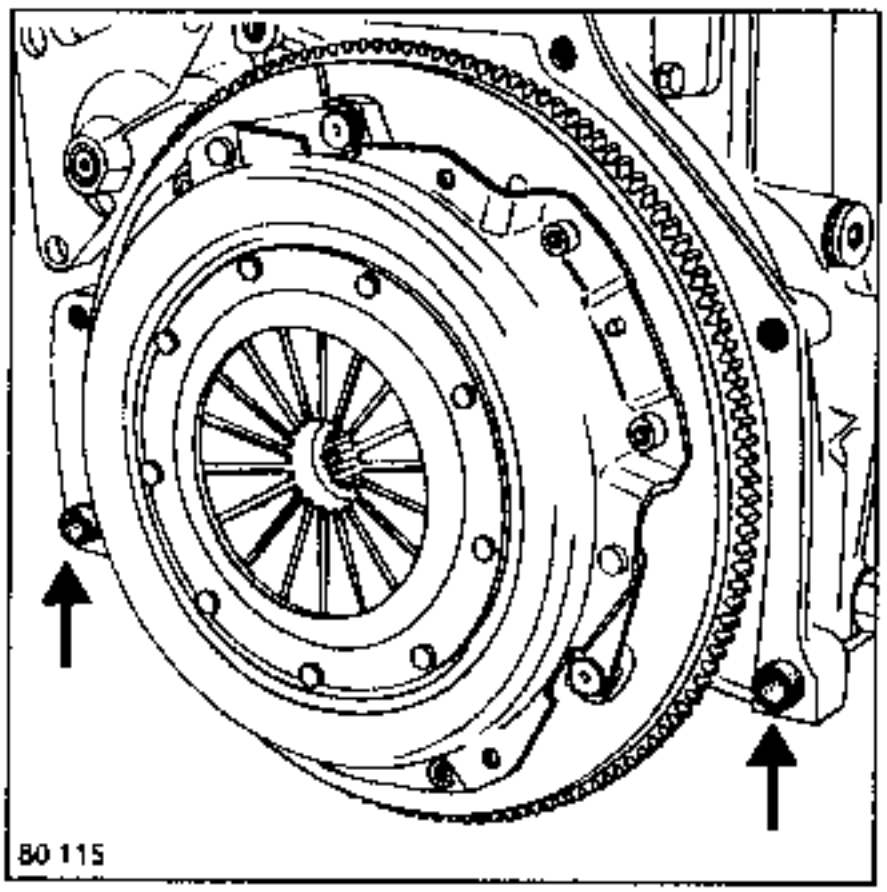
1) a hook 120 mm high is to be made from a 12 mm threaded rod. This will hook into the rear lifting ring on the engine.

2) A hole 12 mm in diameter must be drilled 250 mm away from the original position of the hoist shackle on the tool so that the shackle can be moved to tilt the engine to the correct angle

REFITTING - Special Points

Proceed in the reverse order to removal.

Check that the locating dowels are on the clutch casing and starter.



Lightly grease the clutch shaft splines with MOLYKOTE BR2.

Unfasten the rear mountings for the starter on the cylinder block so that starter is not in the way of the assembly of the gearbox and engine.

Top up the engine oil.

- Fill and bleed the cooling system.
- Fill the power assisted steering (pump) circuit.
- Fill and bleed the freon circuit (on version with air conditioning).

Adjust:

- the accelerator cable travel;
- the clutch cable.

ESSENTIAL SPECIAL TOOLING
Mot.**878** Engine Lifting Tool

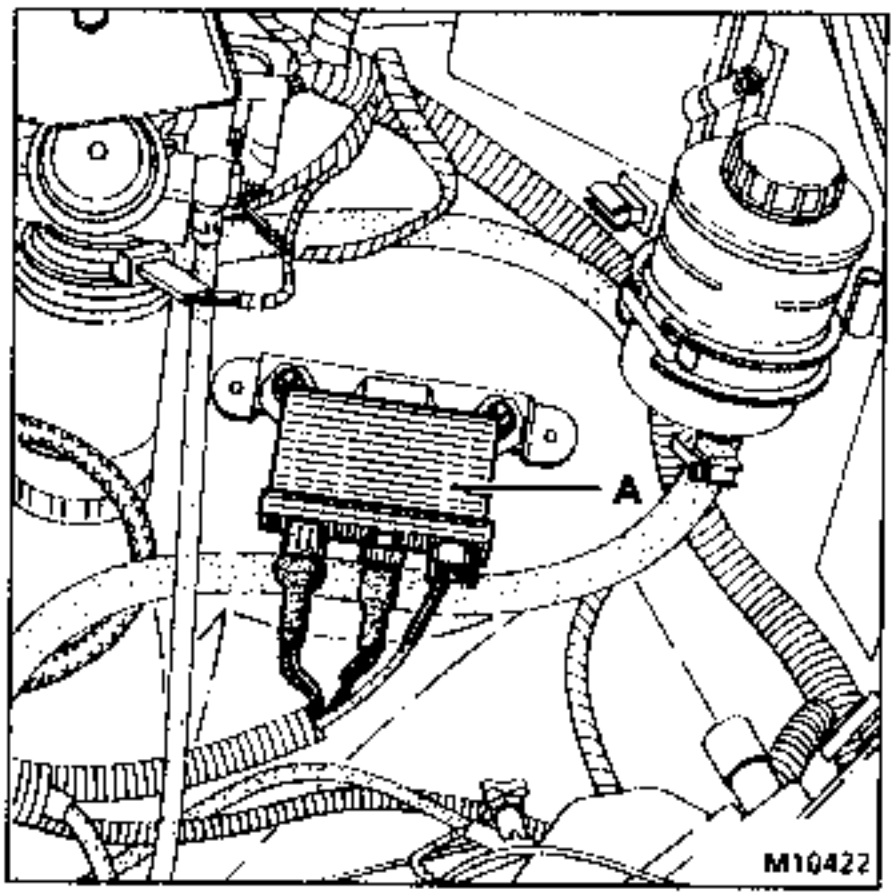
TIGHTENING TORQUES (in daNm)	
Engine Pad Mounting Bolts	4
Gearbox Bolts	5

REMOVAL

The engine is removed alone by freeing it at the front of the vehicle.

Disconnect:

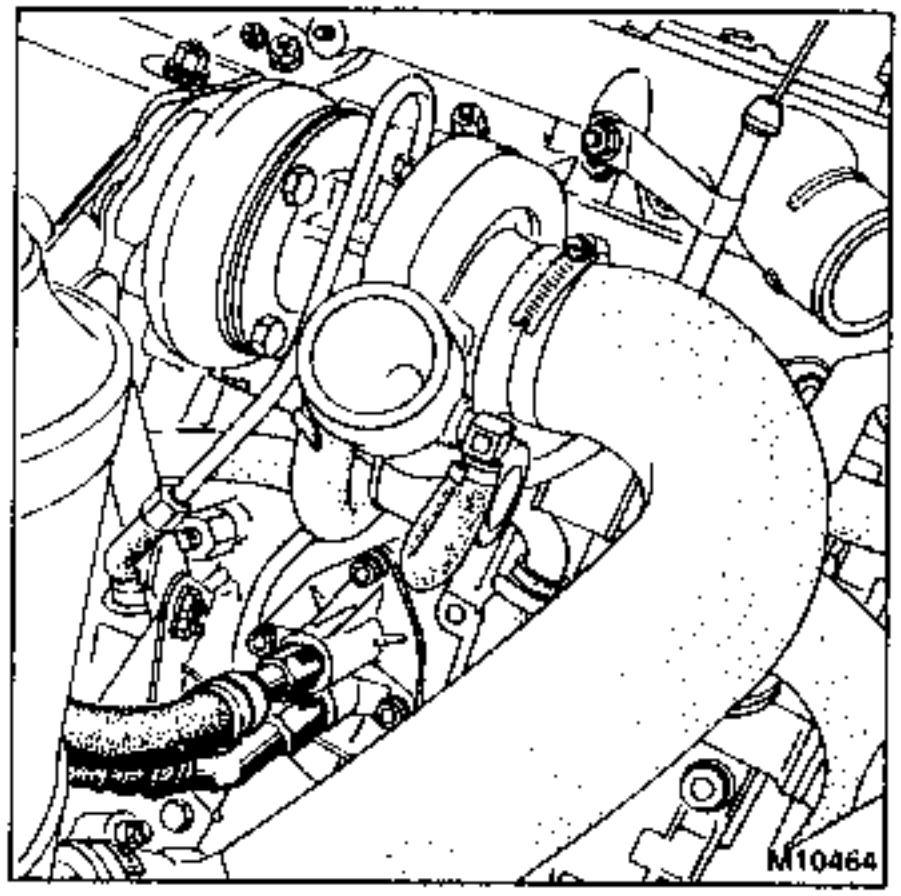
- the battery;
- the earth under the L/H headlight;
- the preheating unit connectors (A).



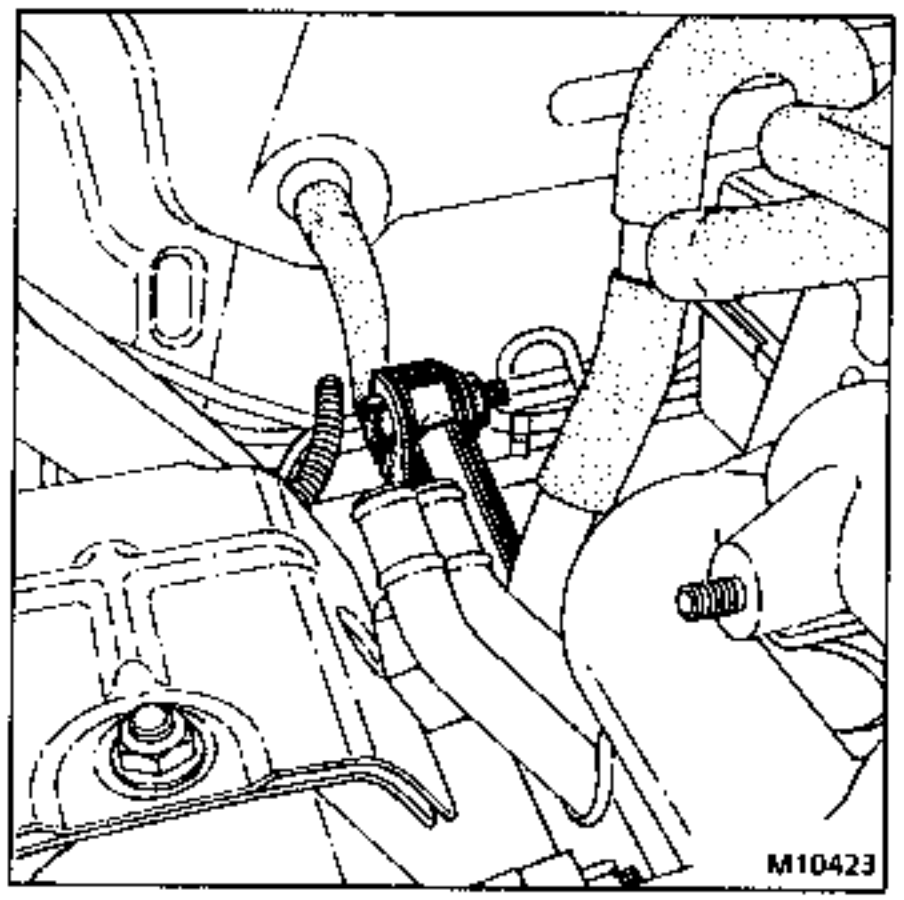
Drain the cooling system at the radiator lower hose.

Remove:

- the bonnet;
- the front deflector;
- the upper cross-member bar;
- the front shield;
- the radiator with the cooling fans (condenser on version with air conditioning);
- the air hoses (air filter, compressor, intercooler, inlet manifold);
- the flexible coolant hoses;
- the flexible oil hoses from the engine block;

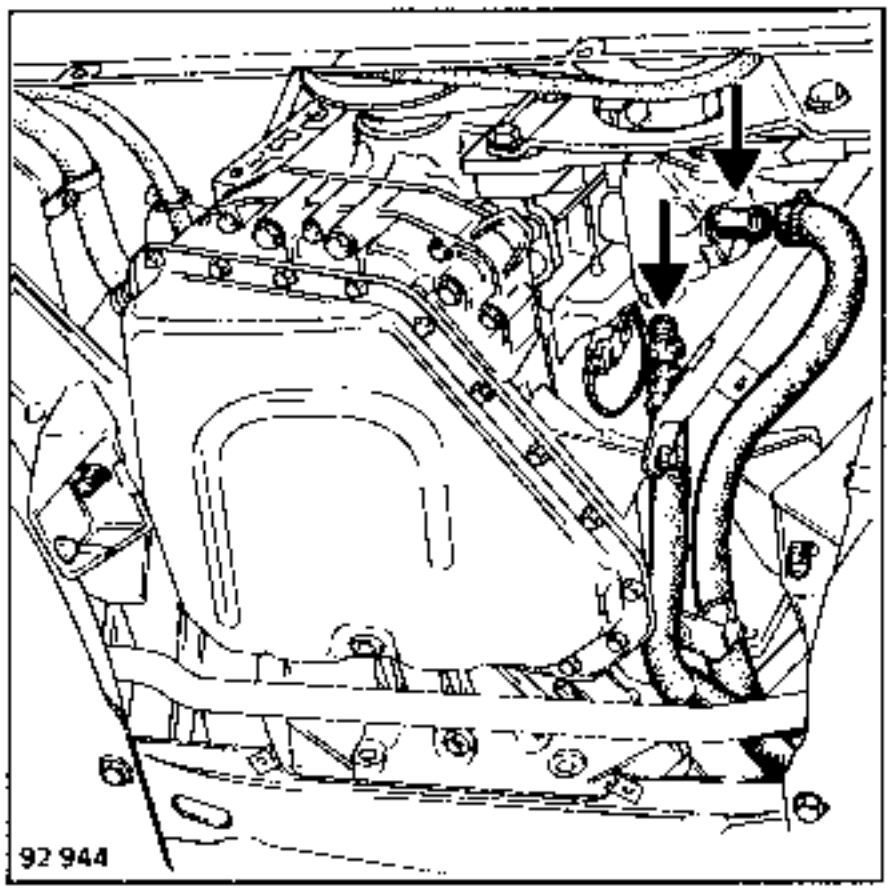


- the movement limiter on the steering cross-member;
- the exhaust pipe from the turbo outlet.



Disconnect:

- the flexible diesel fuel feed and return hoses, block off the hoses to avoid spilling diesel fuel;
- the hose from the vacuum pump;
- the power-assisted steering hoses;



- the turbo pressure take-off on the inlet manifold;
- the clutch cable;
- the accelerator cable.

On the version with air conditioning

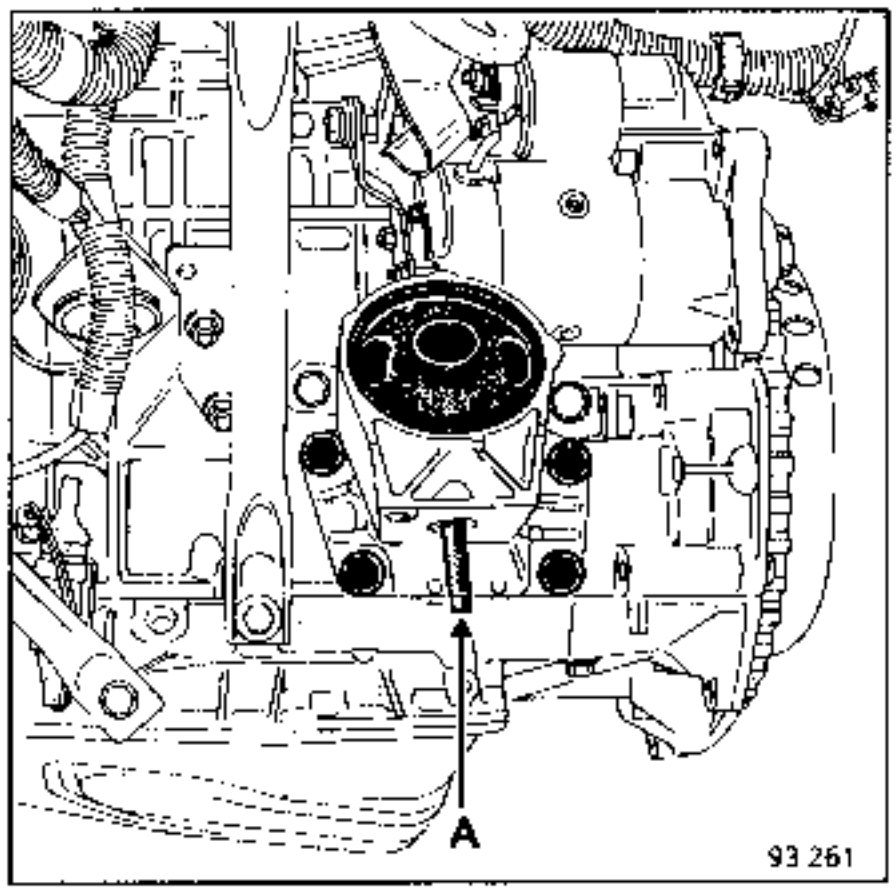
Disconnect the freon hoses and blank off the apertures on the compressor.

Fit removal tool Mot.878 modified as required.

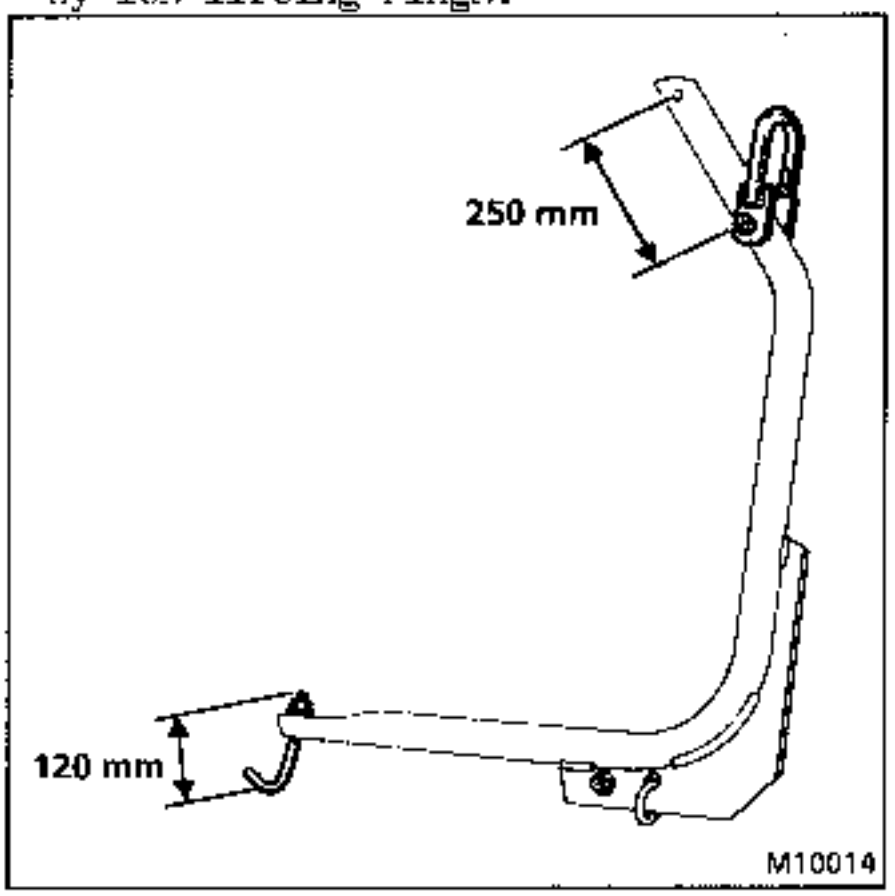
Remove:

- the mounting bolts from around the gearbox and starter;
- the engine mounting securing nuts (A).

Support the gearbox under the vehicle.



Use tool Mot. 878 and attach the engine by its lifting rings.



WHEN TOOL MOT.878 IS USED THE USER MUST MODIFY IT AS FOLLOWS.

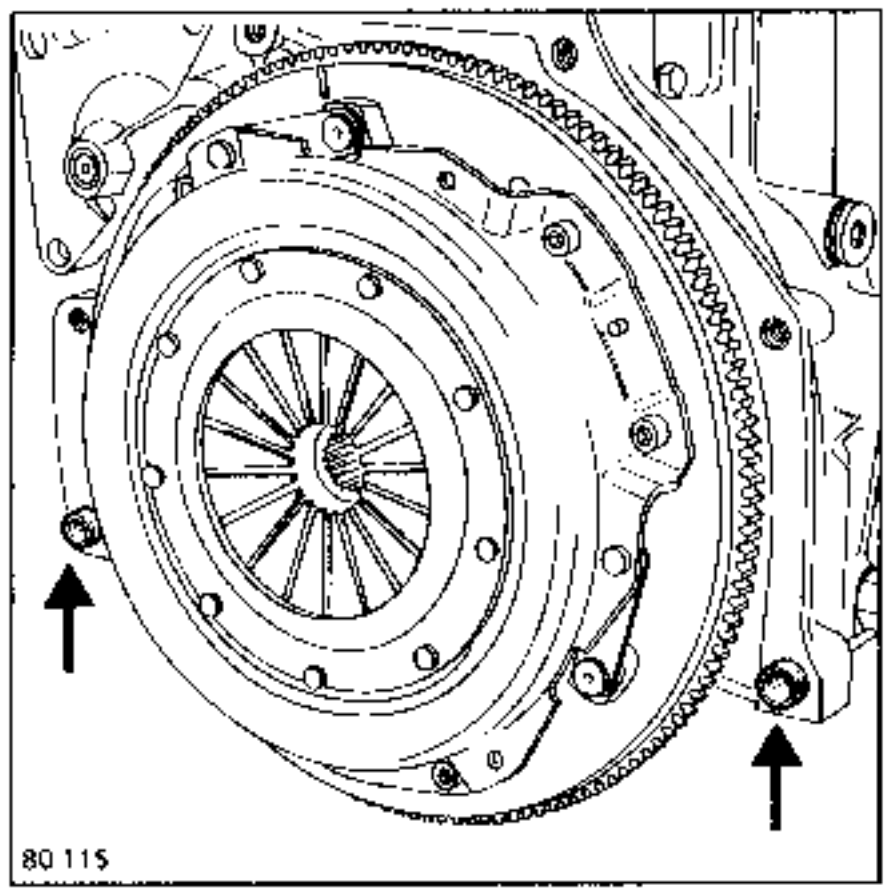
1) A hook 120 mm high is to be made from a 12 mm threaded rod. This will hook into the rear lifting ring on the engine.

2) A hole 12 mm in diameter must be drilled 250 mm away from the original position of the hoist shackle on the tool so that the shackle can be moved to tilt the engine to the correct angle.

REFITTING - Special Points

Proceed in the reverse order to removal.

Check that the locating dowels are on the clutch casing and starter.



Lightly grease the clutch shaft splines with MOLYKOTE BR2.

Unfasten the rear mountings for the starter on the cylinder block so that the starter is not in the way of the assembly of the gearbox and engine.

Top up the engine oil.

- Fill and bleed the cooling system.
- Fill the power-assisted steering pump circuit.
- Fill and bleed the freon circuit (on version with air conditioning).

Adjust:

- the accelerator cable travel;
- the clutch cable.

ESSENTIAL SPECIAL TOOLING	
Mot. **878**	Engine lifting tool

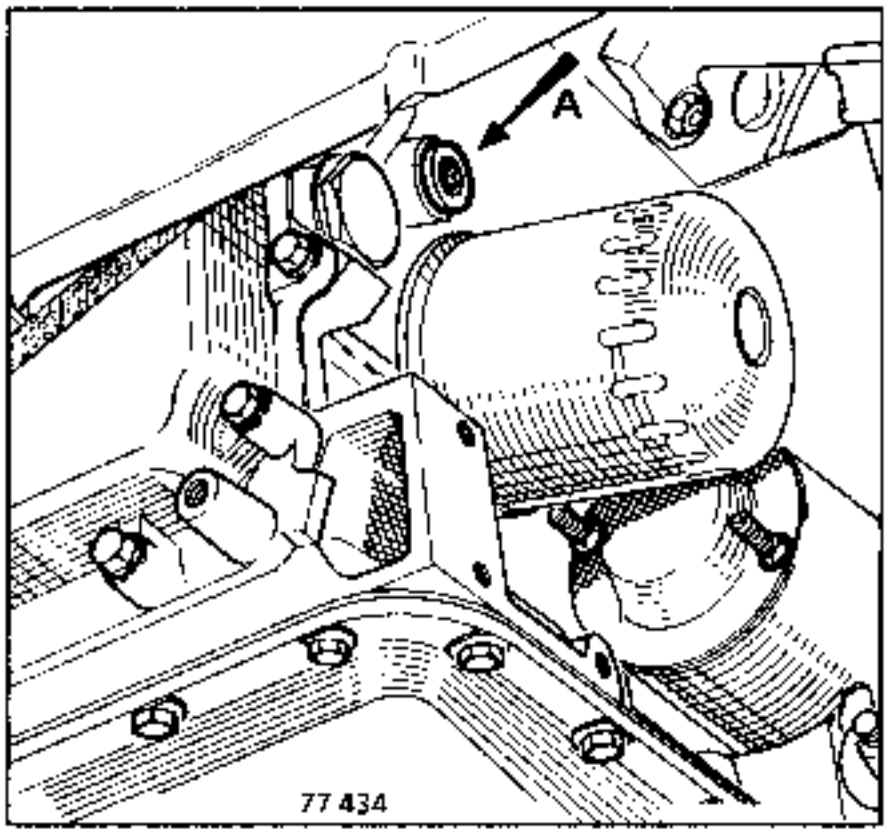
TIGHTENING TORQUES (in daNm)	▽
Engine mounting bolts	4
Gearbox bolts	5

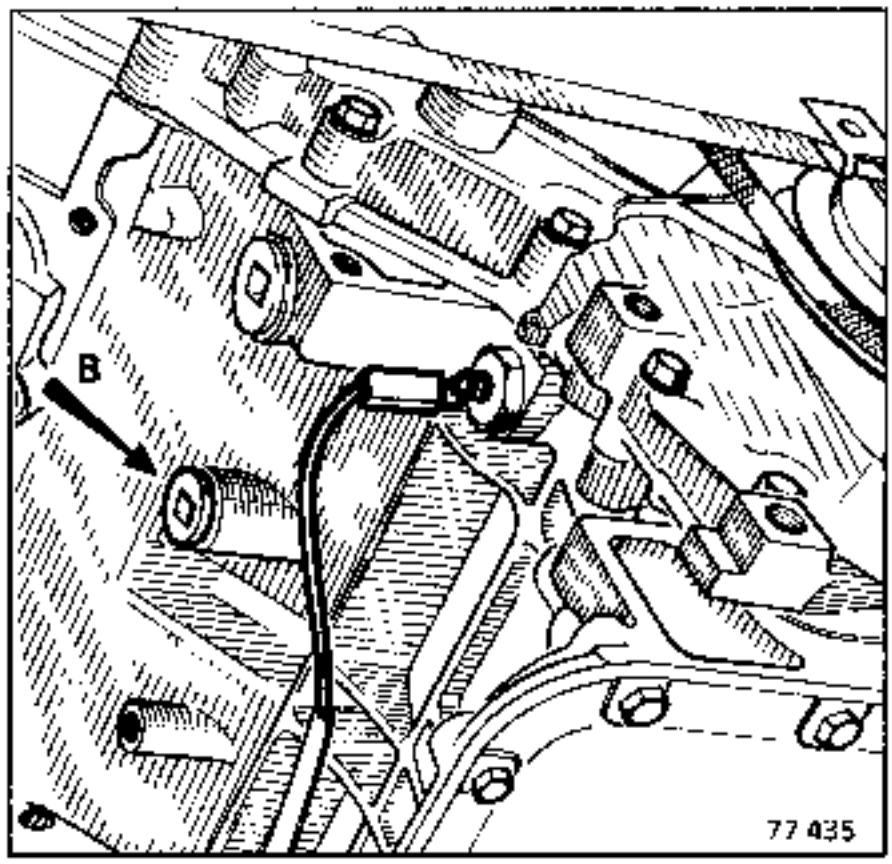
The engine is removed alone by freeing it at the front of the vehicle.
Lifting rings are used to facilitate this operation.

REMOVAL

Disconnect the battery.

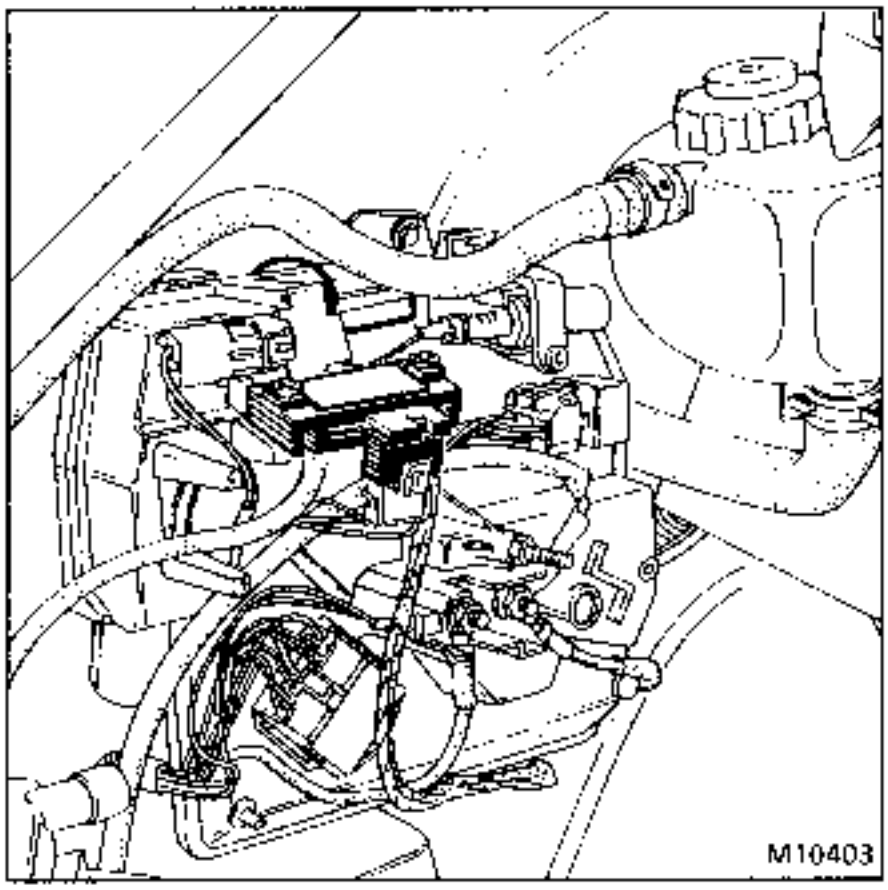
Drain the cooling system;
- at the radiator lower hose;
- at the cylinder block (plugs A and B).





Remove:

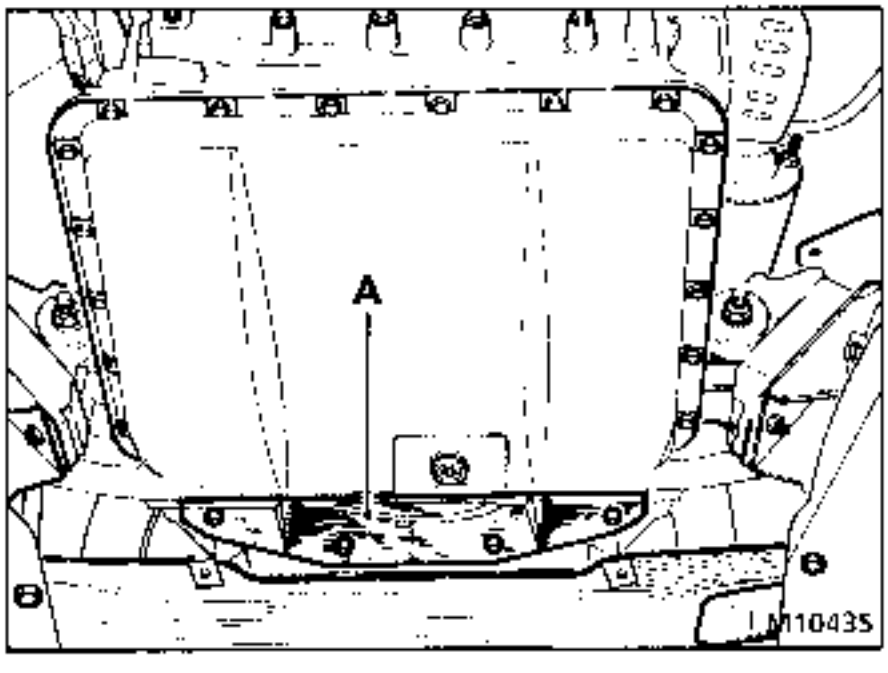
- the bonnet;
- the front deflector;
- the upper cross-member bar
- the front shield;
- the radiator with the cooling fans (condensor on version with air condition);
- the air filter;
- the heat shield from the special heater fan;
- the special heater fan assembly;
- the headlight units;
- the alternator.



The injection unit mounting plate is to be removed and placed on the engine.

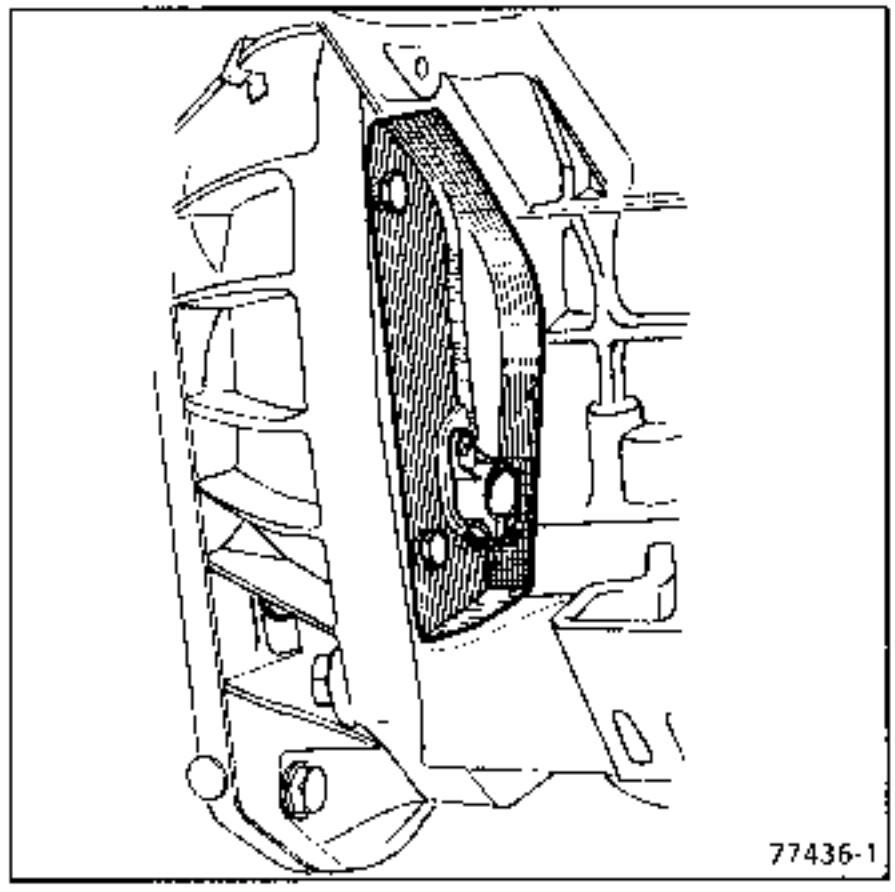
Disconnect:

- the power-assisted steering hoses:
- high pressure hose from the pump
- low pressure hose from the reservoir;
- the coolant hoses;
- the fuel inlet hoses on the injector galleries;
- the accelerator cable;
- the oxygen sensor connections;
- the AEI position sensor connection;
- the freon hoses and blank off the apertures on the compressor.

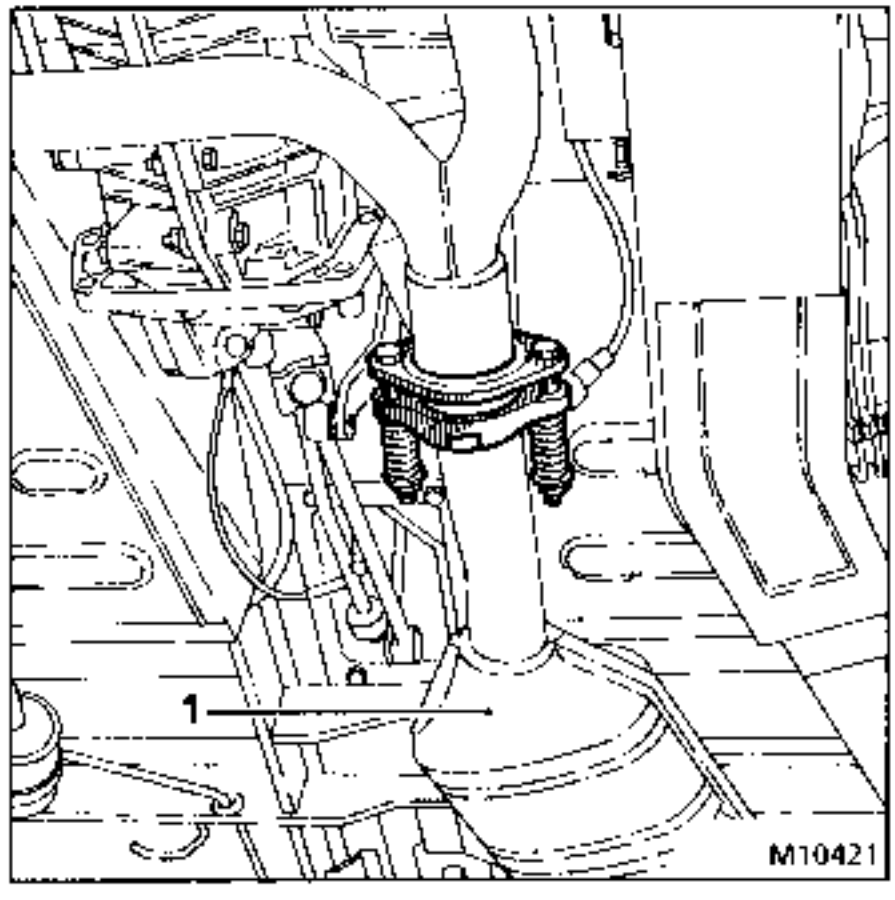


Remove:

- the lower protective panel from the flywheel (A);



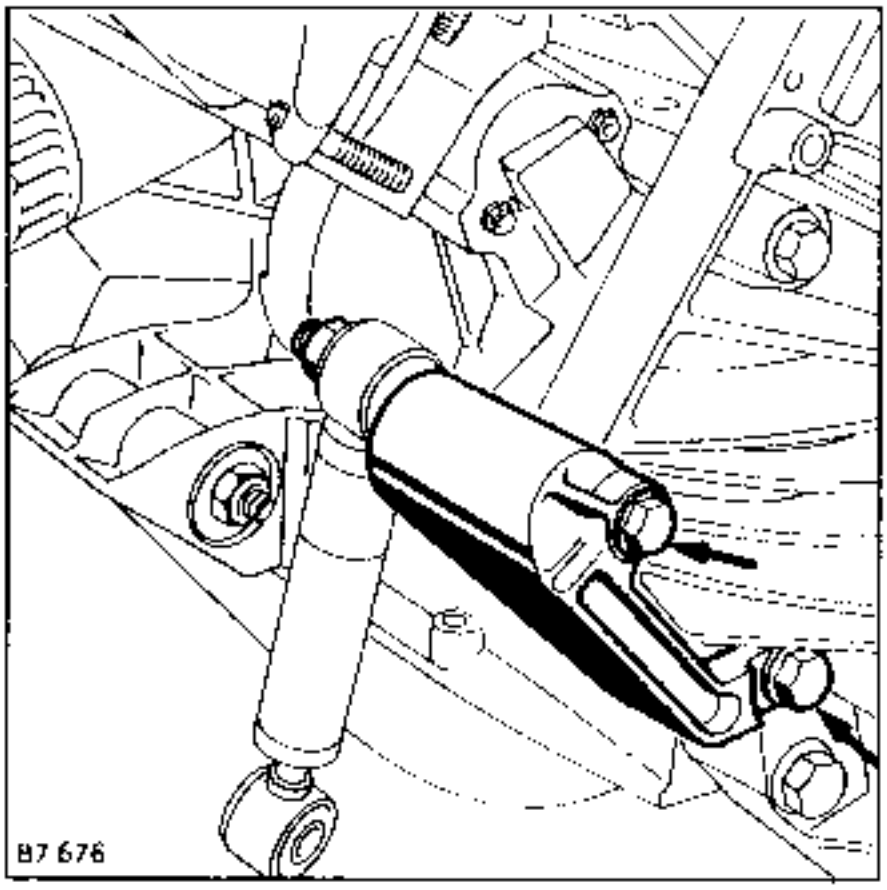
- the righthand protective panel from the flywheel.



uncouple the exhaust downpipe from the manifold outlet and from the inlet of the catalytic convertor (1).

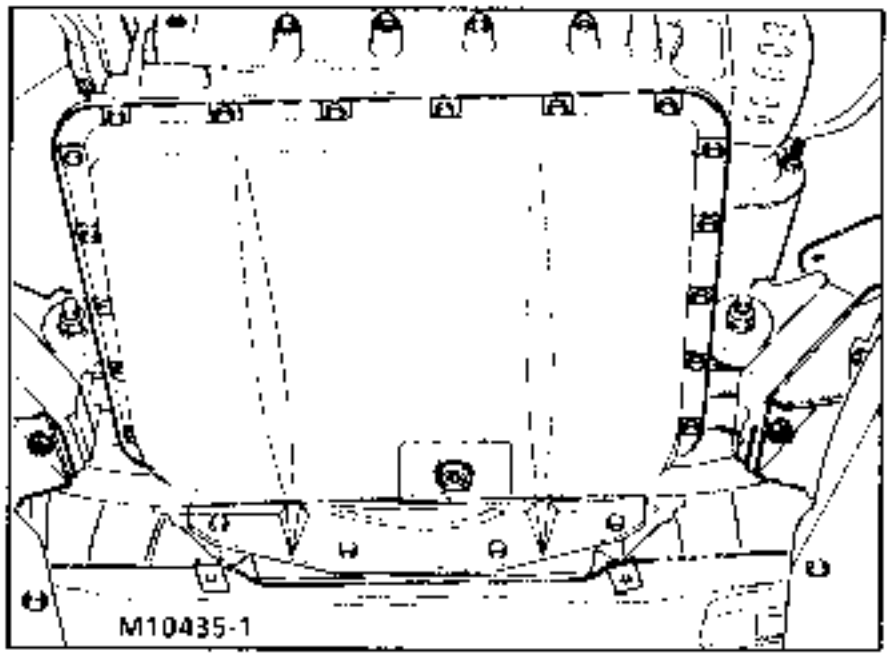
Remove:

- the bolts from around the gearbox;
- the starter mounting bolts;
- the lefthand shock absorber and its mounting.



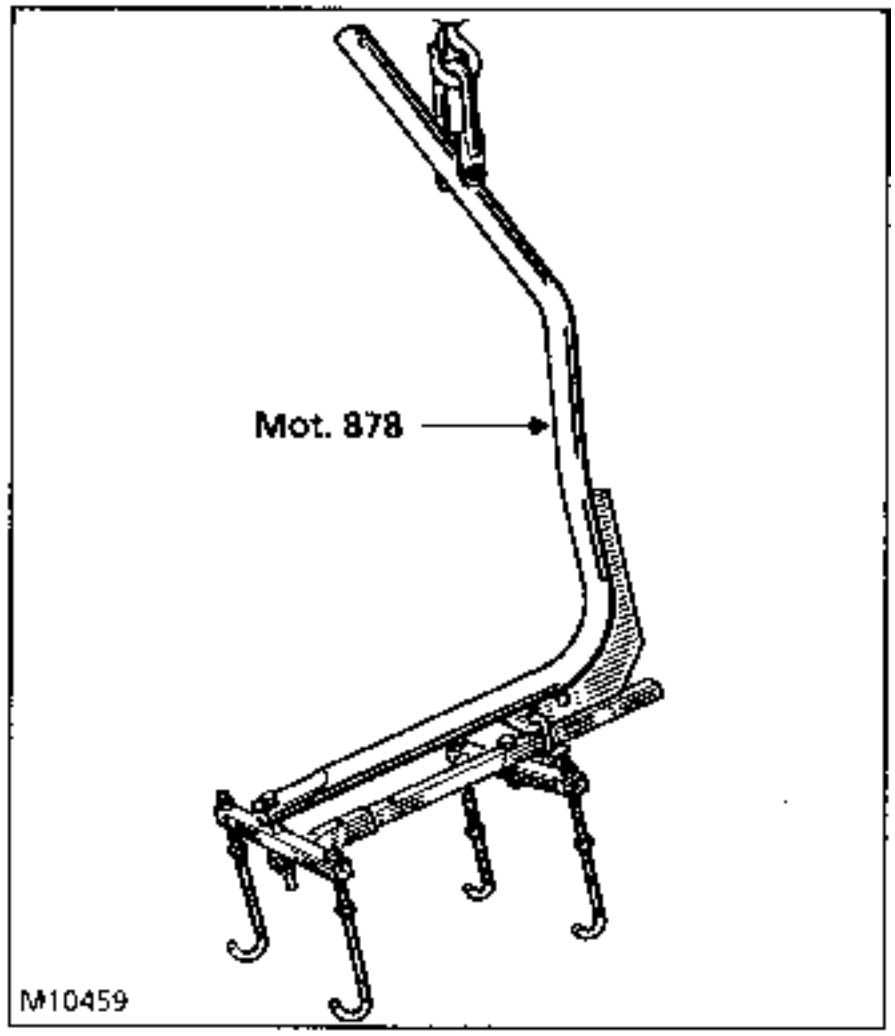
On the righthand side:

only disconnect the lower part of the shock absorber.

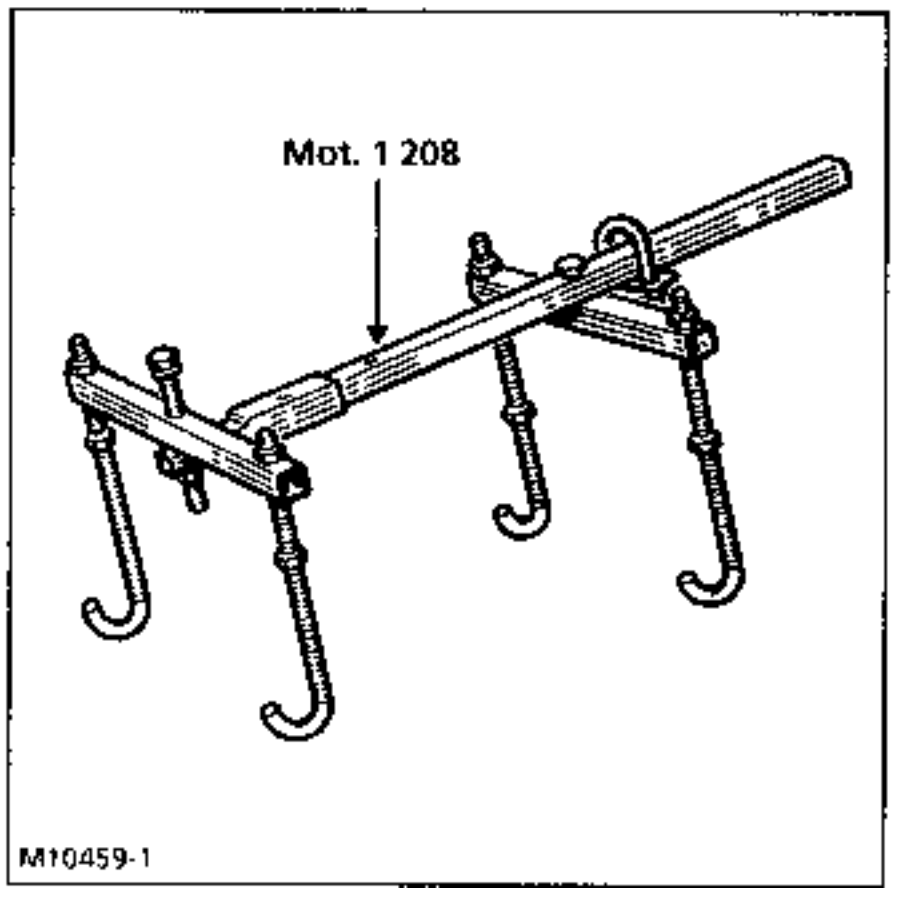


Remove the nuts securing the engine mountings.

Use modified tool Mot. 878 equipped with tool Mot. 1 208 and attach the engine to its lifting rings.

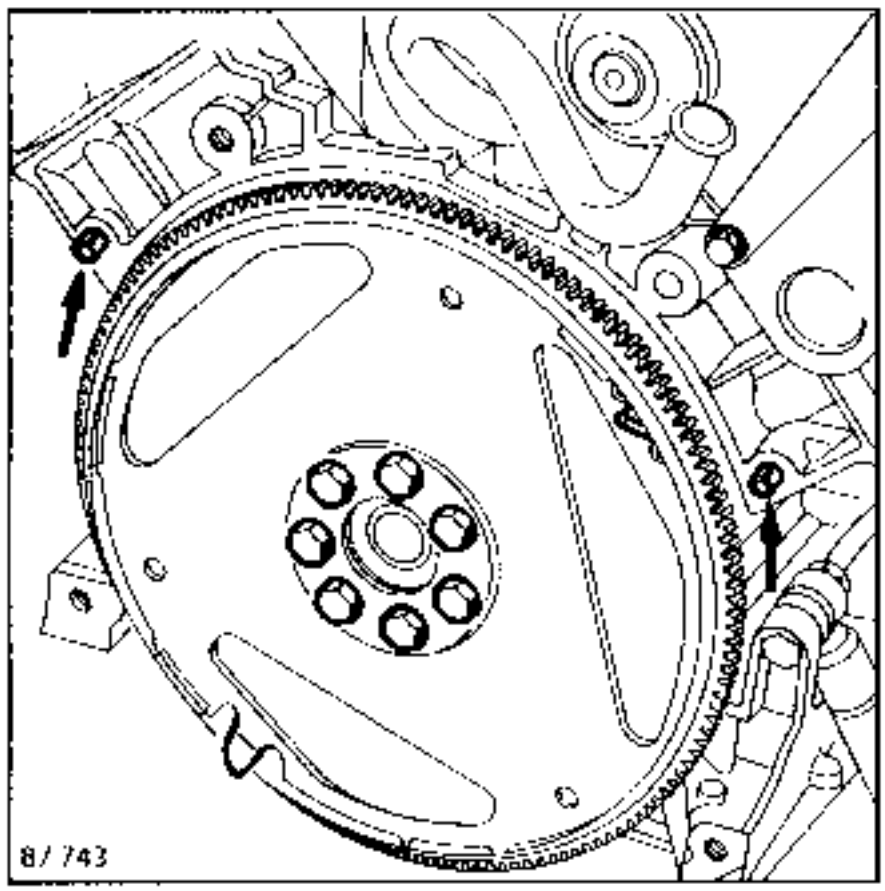


Take the engine out from the front of the vehicle.



REFITTING - Special Points

Check that the locating dowels are on the clutch casing and starter.



Lightly grease the clutch shaft splines with MOLYKOTE BR2 grease.

Top up the engine oil.
Fill and bleed the cooling system.
Fill and bleed the power-assisted steering sytem.
Fill the freon system on versions with air conditioning.

Adjust the travel of the accelerator cable.

ESSENTIAL SPECIAL TOOLING	
Mot. 878	Engine lifting tool
BVi 31-01	Pin drift

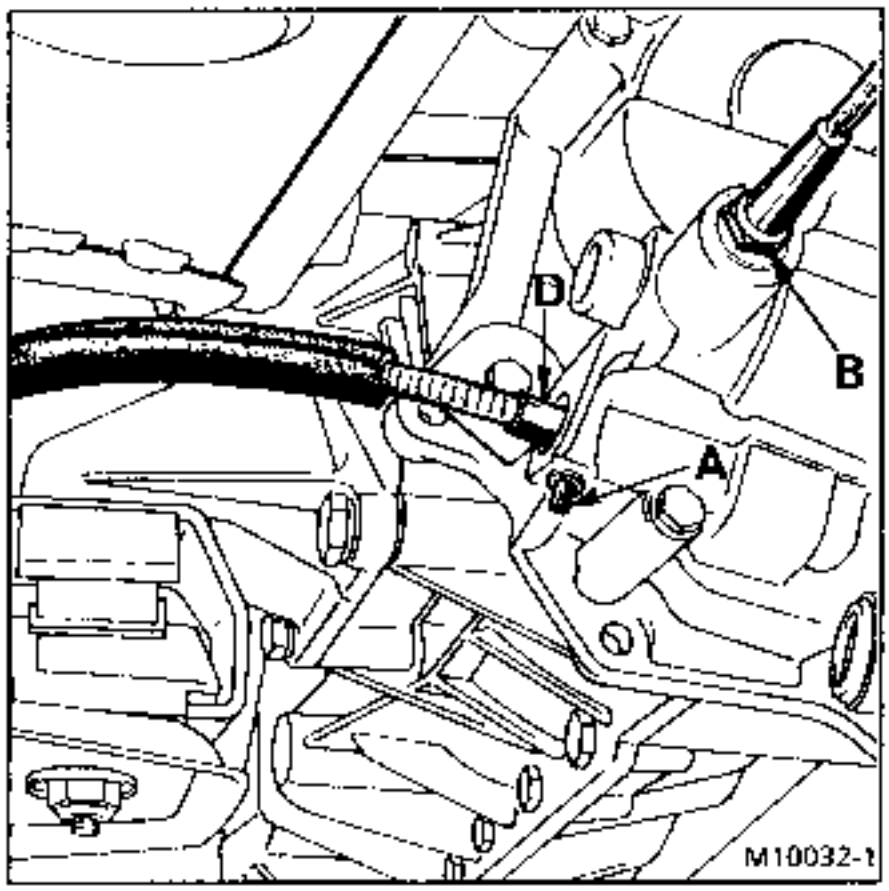
TIGHTENING TORQUES (in daNm)	
Engine-gearbox pad mounting pad bolts	4
Wheel bolts	9

REMOVAL - REFITTING

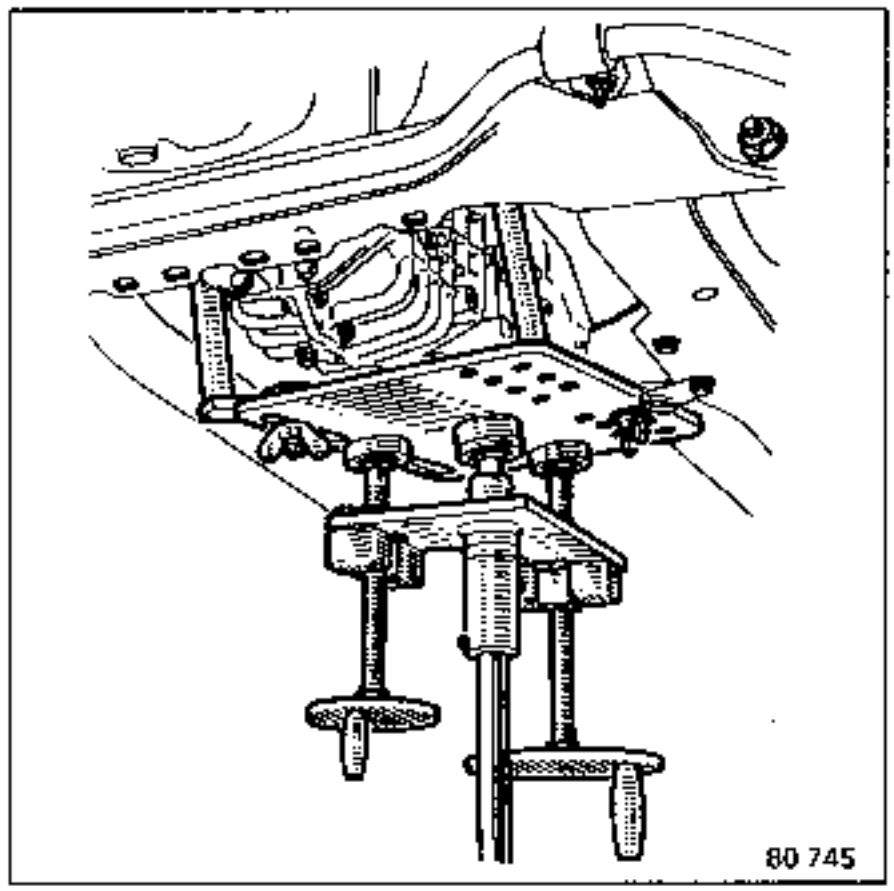
The engine - gearbox assembly is removed from the front of the vehicle (see engine removal section).

SPECIAL POINTS

Disconnect:
- speedometer cable (D) by removing (A);
- reverse gear locking cable (B);
- the gearbox control linkage.



Knock out the driveshaft roll pins.



Chock up the gearbox under the vehicle using a component jack.

Remove the gearbox mountings.

Allow the engine-gearbox assembly to rest on the rear crossmember.

Free the driveshafts by stressing the engine-gearbox assembly slightly in the opposite direction to the driveshaft to be removed.

Remove the engine mounting securing nuts.

Take out the engine-gearbox assembly using modified tool Mot.878.

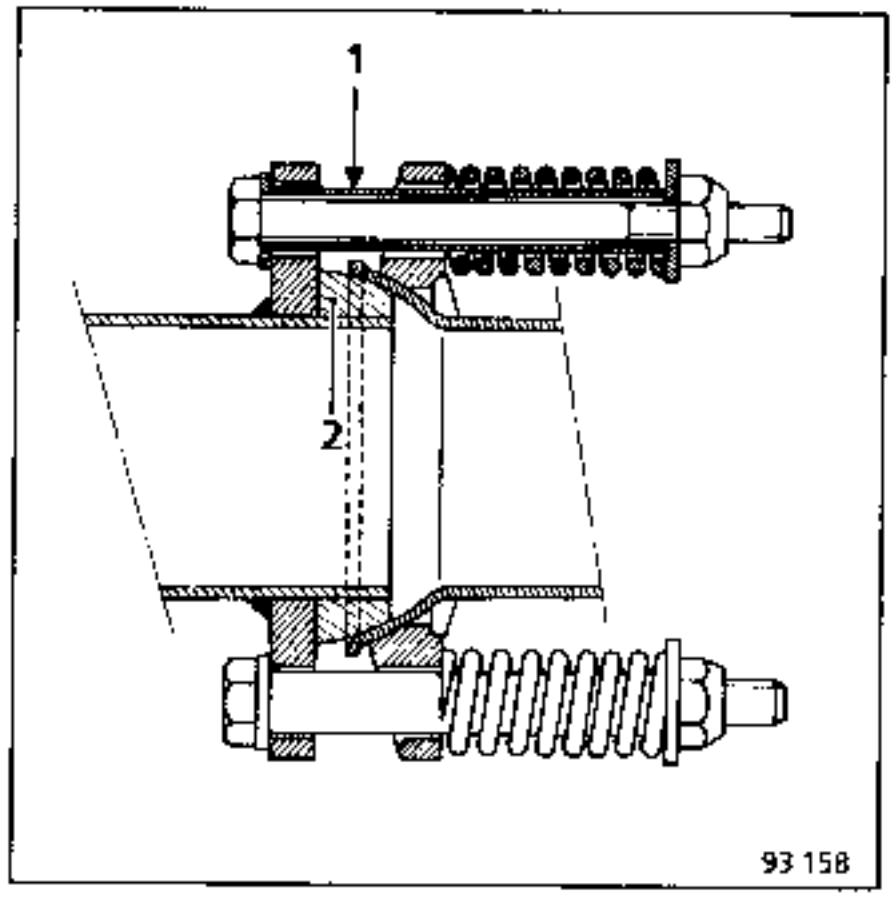
REFITTING

Proceed in the reverse order to removal.

- Top up the gearbox oil,
- Plug the driveshaft roll pins.
- Top up the engine oil if necessary,
- Fill the power-assisted steering circuit,
- Fill and bleed the cooling system,
- Fill the freon system (version with air conditioning).

Adjust:
- the accelerator cable;
- the clutch clearance.

Tighten the clamp, fitting the springs and Metex bush (2).



ESSENTIAL:

Tighten the clamp until it abuts against spacers (1).

ESSENTIAL SPECIAL TOOLING	
Mot. 878	Engine Lifting Tool
B.Vi 31-01	Pin Drift
T.Av 476	Ball Joint Extractor

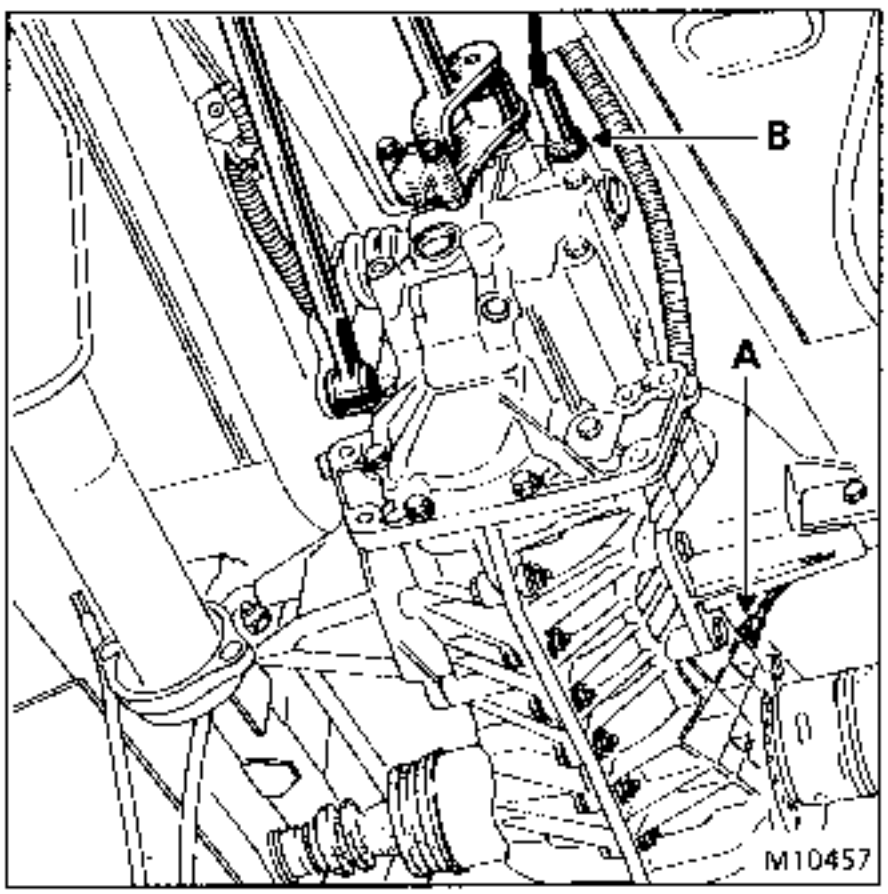
TIGHTENING TORQUES (in daNm)	
Wheel bolts	10
Steering ball joint bolts	4
Suspension ball joint bolts	7
Castor tie rod nuts	7
Upper ball joint mounting bolts	2.2

REMOVAL - REFITTING

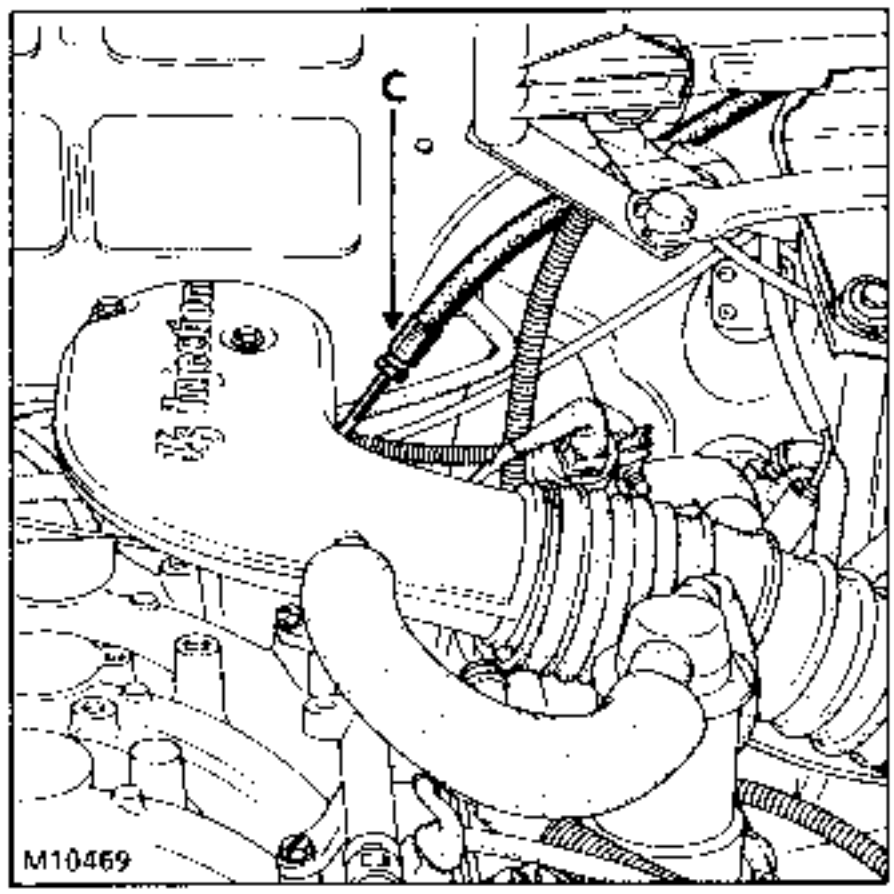
The engine-gearbox assembly is removed from the front of the vehicle (see engine removal section).

SPECIAL POINTS

Disconnect:
- speedometer cable (A);
- reverse gear locking cable (B);



- the oxygen sensor and reversing light switch connectors;
- the gear control linkage;
- clutch slave cylinder feed union (C).



Remove:
- the lower cross member;
- the exhaust mounting and flange.

Knock out the driveshaft roll pins and uncouple the driveshafts.

Remove the nuts securing the gearbox and engine mounting.

Fit in place tool Mot.878 equipped with tool Mot.1205 for the Z7W engine (see engine removal).

Take out the engine-gearbox assembly from the front of the vehicle.

REFITTING

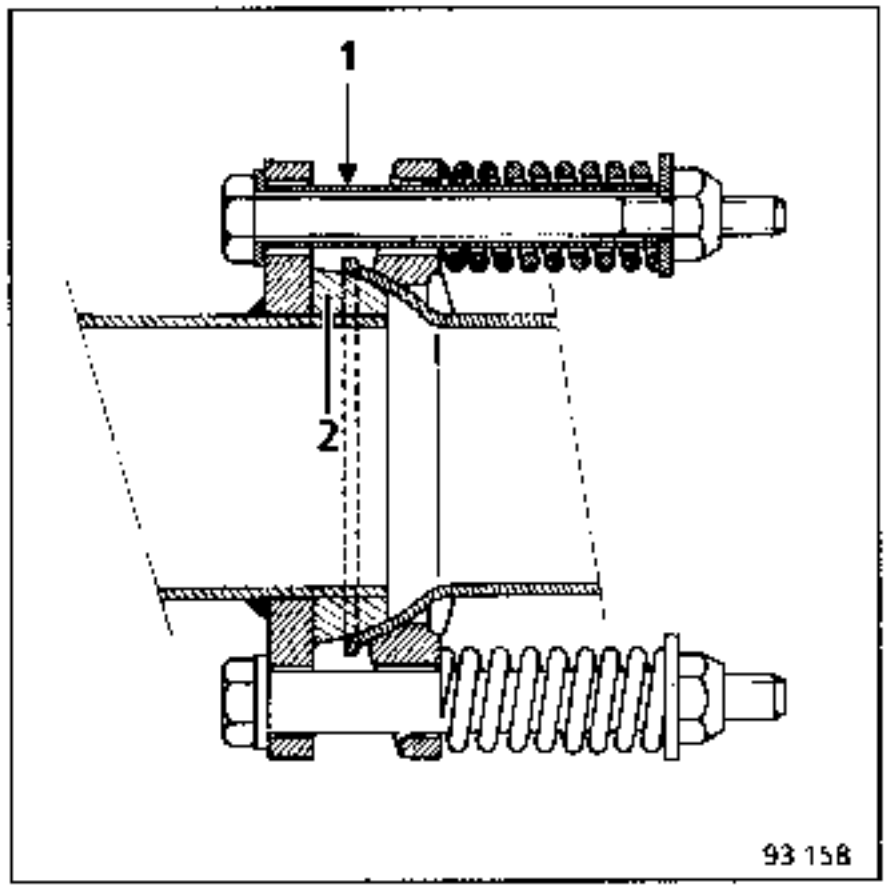
Proceed in the reverse order to removal.

Torque tighten the bolts and nuts as specified (see preceding page).

- Top up the gearbox oil.
- Plug the driveshaft roll pins.
- Top up the engine oil if necessary.
- Fill the power-assisted steering system.
- Fill and bleed the cooling system.
- Fill and bleed the hydraulic clutch control circuit.
  Fill the freon circuit (version with air conditioning).

Adjust the accelerator cable.

Tighten the clamp, fitting the springs and Metex bush (2).



ESSENTIAL:

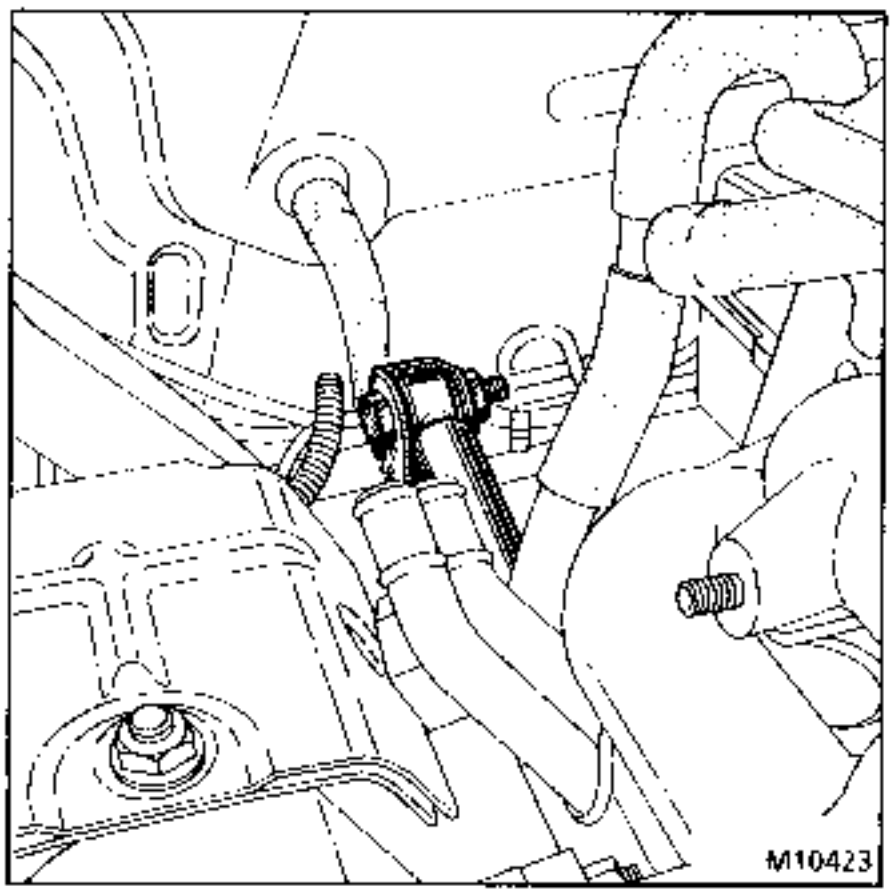
Tighten the clamp until it abuts against spacers (1).

REMOVAL

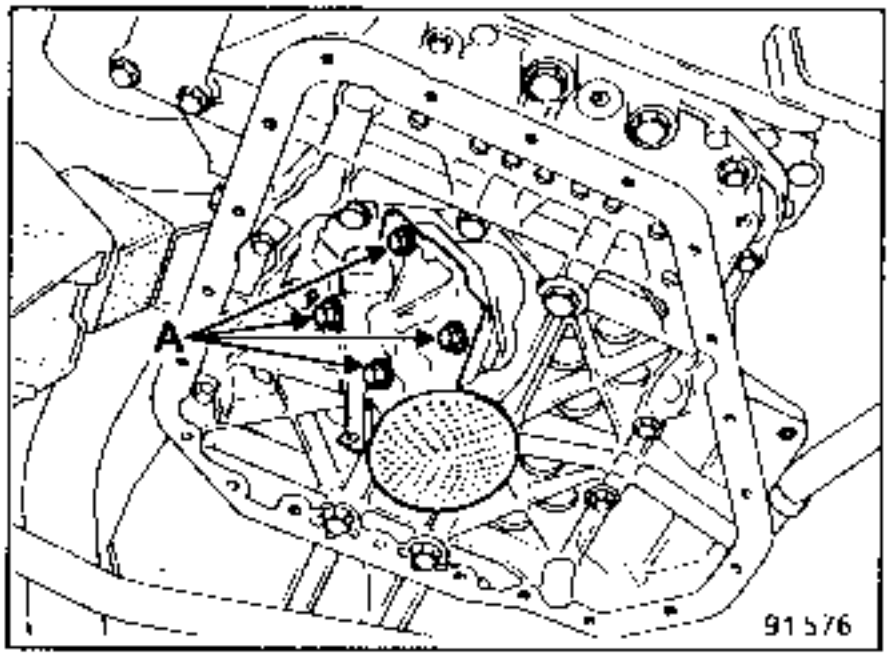
Drain the engine.

Remove:
- the movement limiter from the steering cross member;

J8S ENGINE

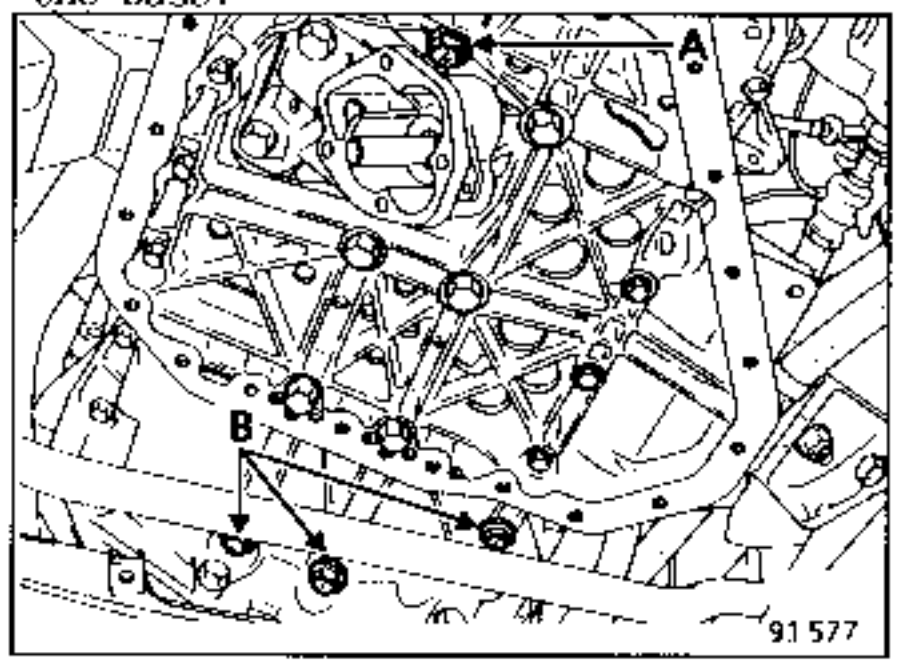


- the sheet metal sump;
- the engine mounting nuts;
- the oil pump strainer by removing bolts (A), recover the pump sprocket;



- the two bolts from the oil pump;
- the oil level sensor (if necessary);
- the bolts securing the base (see marking of bolts and tightening torques).

Slightly raise the engine, the three bolts (B) are removed together with the base.



REFITTING

Clean the sump and casings thoroughly.

Place a few drops of CAF 4/60 THIXO paste on the base to hold the seal in place.

Position the oil pump driveshaft with the circlip at the pump end.

Torque tighten the base bolts (see table showing markings and tightening torques on following page).

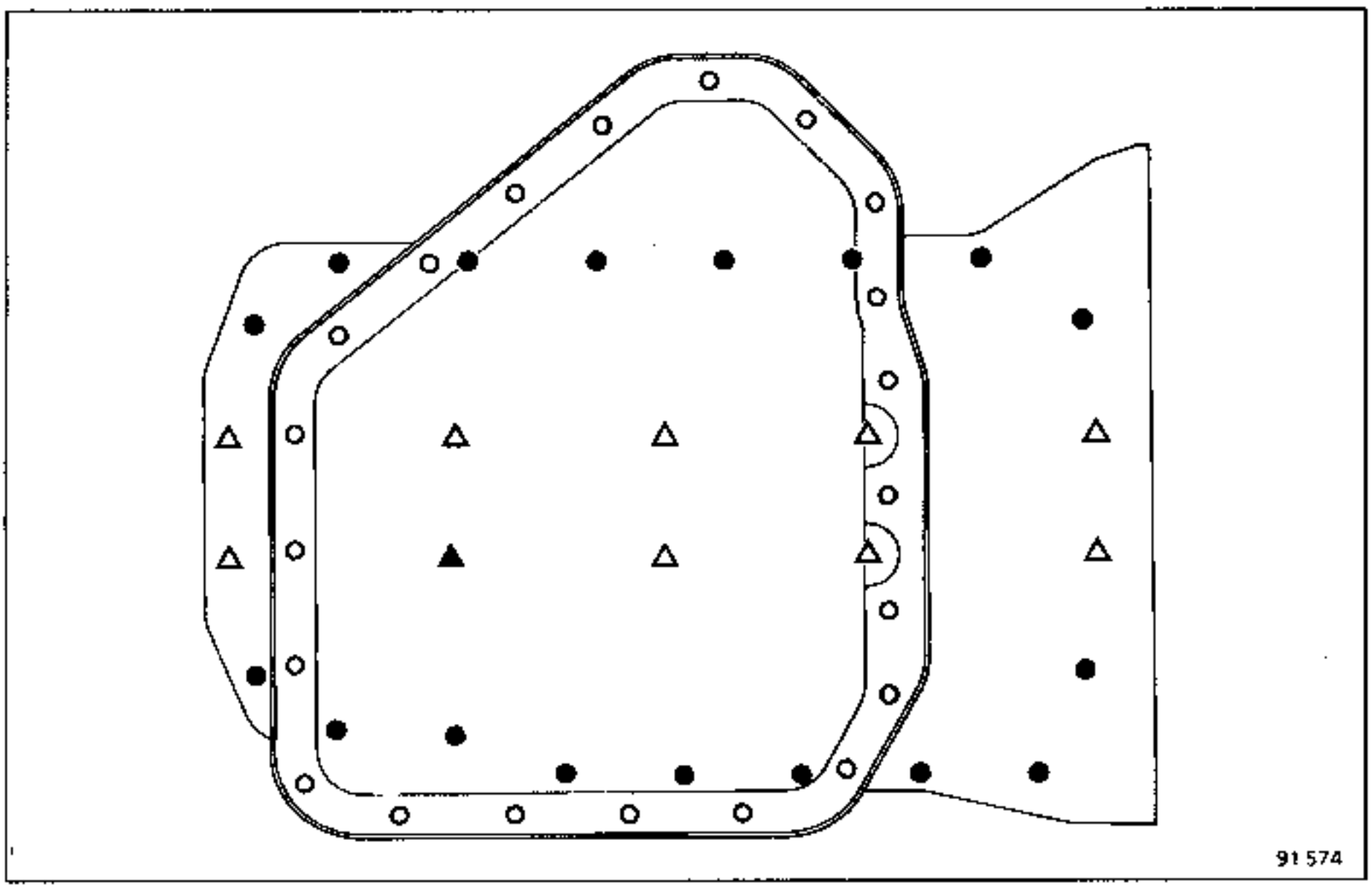
Fit in place and torque tighten the oil pump (4 to 4.5 daNm)(ensure that the driveshaft is correctly fitted).

Refit the sprockets and pump cover and torque tighten it.

Reassemble the sheet metal sump and torque tighten the bolts.

Top up the engine oil.

Markings of the bolts securing the base to the cylinder block and the sump to the base.



There are 4 types of bolts marked as follows:

- ● 17 bolts (M7 x 100-50), tightening torque: 1.2 to 1.8 daNm
- ○ 21 bolts (M6 x 100-16), tightening torque: 0.7 to 1.1 daNm
- ▲ 1 bolt (M10 x 150-40), tightening torque: 3.2 to 4.8 daNm
- △ 9 bolts (M10 x 150-75), tightening torque: 3.2 to 4.8 daNm
- ⊗ Bolts not used

ESSENTIAL SPECIAL TOOLING	
Mot. 1063	Hinged Wrench for Sump

TIGHTENING TORQUES (in daNm)	
Sump bolts	0.7 to 1.1

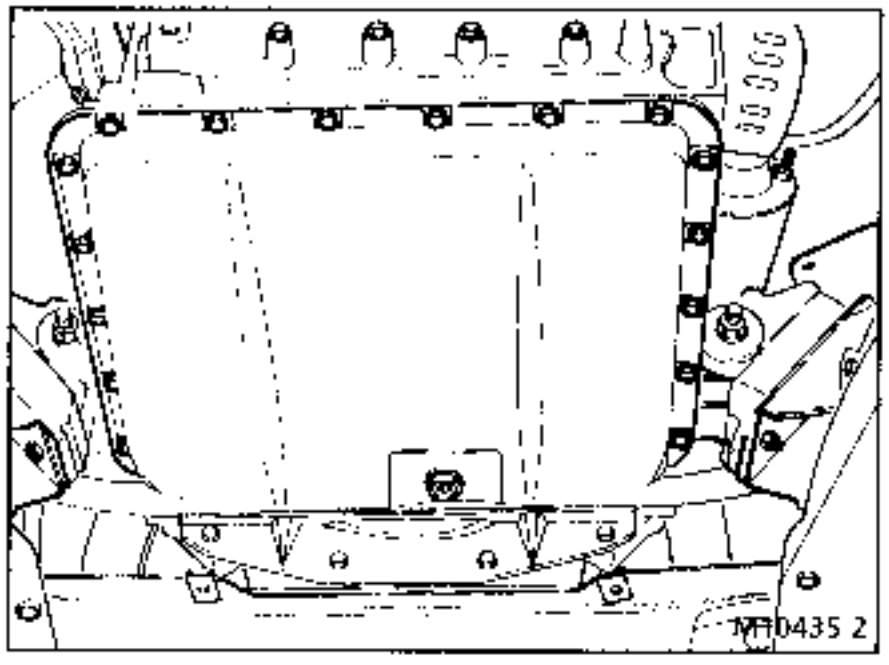
REMOVAL

Disconnect the battery.

Drain the engine.

Remove the dipstick.

Remove the sump bolts.



REFITTING

Thoroughly clean the joint faces of the sheet metal sump and engine block.

Position the gasket dry on the sump.

Refit the sump and torque tighten the bolts.

Top up the engine oil.

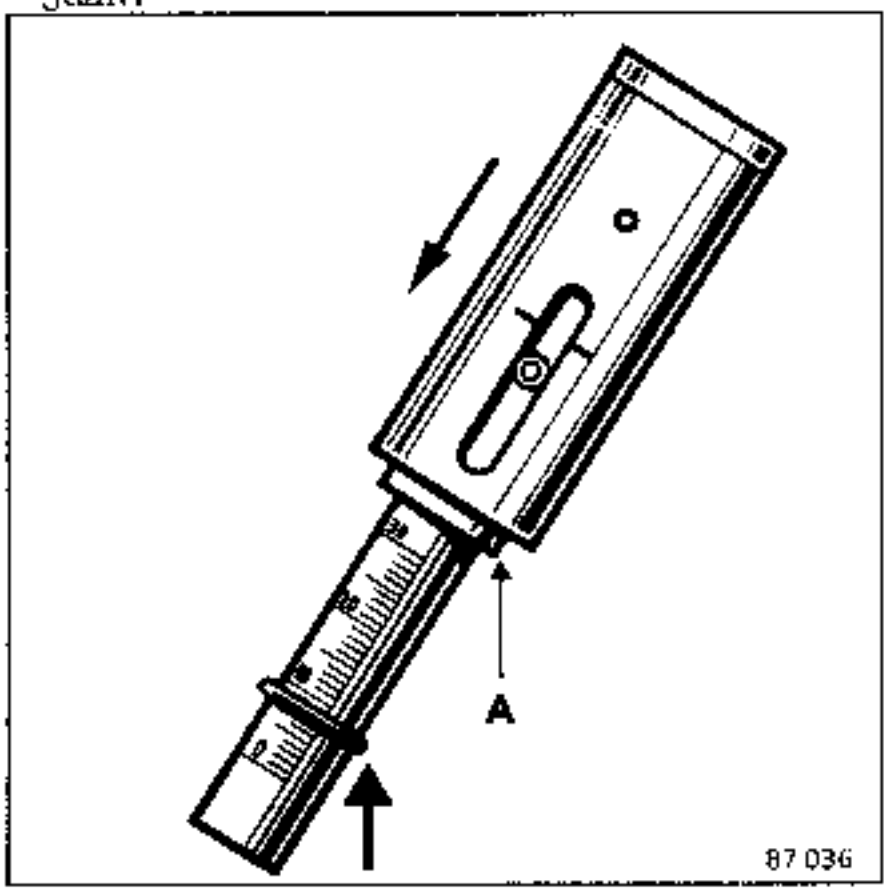
REPLACING

ESSENTIAL SPECIAL TOOLING
Ele.346.04 Belt tension checking tool

A belt must always be fitted with the tensioner released as as not to apply excessive load to the pulleys and to the belt.

CHECKING METHOD

Tool Ele.346-04 measures the deflection of the rear of the belt at a load of 3daN.



Check that the lower part of the rubber ring is in line with the zero graduation on the plunger.

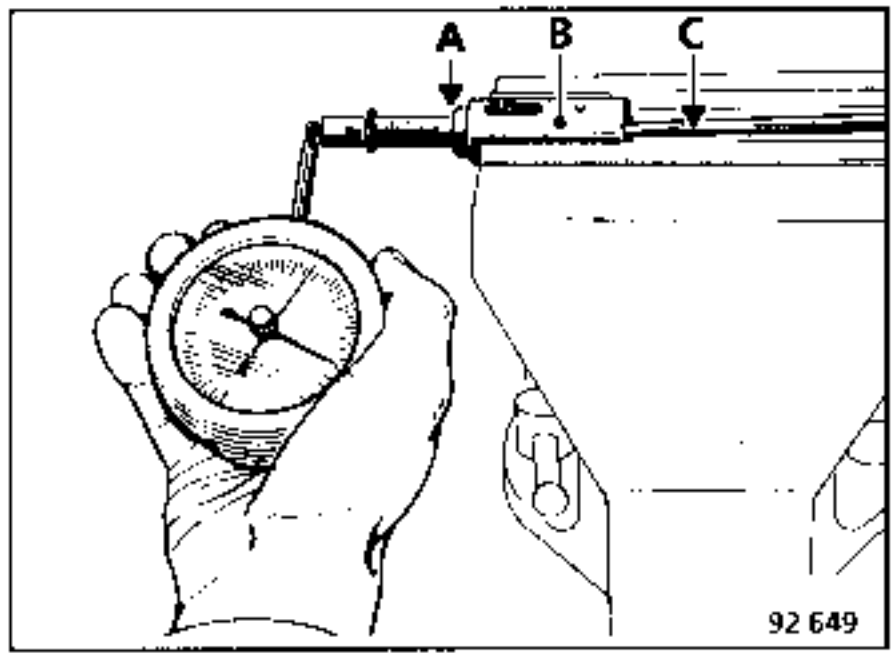
Apply the bar to the belt with the plunger half-way between the two pulley centres.

Press down the sliding part of the plunger until its shoulder (A) comes flush with the end of the plunger body.

Remove the tool and read the belt deflection in line with the lower edge of the rubber ring.

ZEROING TOOL Ele.346-04

The initial setting of tool Ele.346-04 must be checked periodically.



Secure tool Ele.346 in a vice after removing the blanking cover. Place the cylindrical section of tool BVi. 906 at the end of the sliding part.

Shoulder (A) must be flush with plunger (B) when the needle indicates 3 daN. If it does not, turn screw (C) to increase or reduce the spring tension.

ESSENTIAL SPECIAL TOOLING	
Mot.**854**	Locking tool
Elc.**346-04**	Belt checking tool

REPLACING

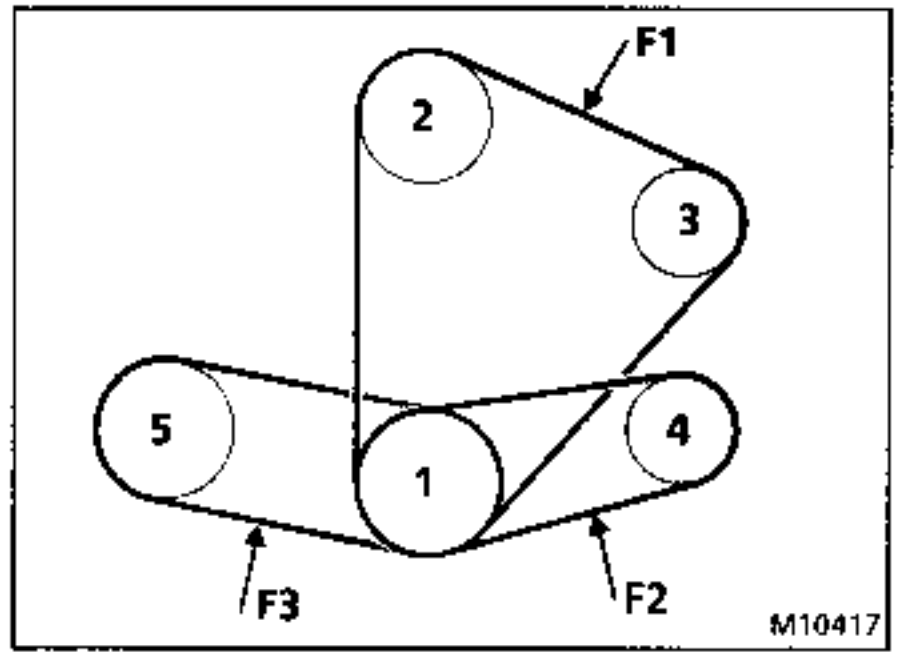
TIMING BELT

J7R-J7T petrol engines: please consult document MOT.J(E) for points other than those given below:

- the front deflector;
- the upper cross member tube;
- the radiator and engine cooling fans;
- the PAS pump belt;
- the alternator drive belt.

AIR CONDITIONING COMPRESSOR BELT

In order to replace the compressor belt the following have to be removed:
- the timing belt;
- the alternator drive belt;
- the PAS pump drive belt.



1 Crankshaft
2 Coolant pump
3 Alternator
4 PAS pump
5 Air conditioning compressor

BELT TENSION

FUNCTION	Alternator Coolant Pump	Power Steering	Air conditioning Compressor
Belt type	V-Shaped	V-Shaped	Multi-toothed
Mark	F1	F2	F3
F when cold (mm)	3.5 to 4.5	3.5	3 to 4
F when hot (mm)	5.5 to 6.5	4 to 4.5	3.5 to 4.5
Only retension belt if F > than	-	5	-

(F = deflection measured with tool Elc.346.04)

ESSENTIAL SPECIAL TOOLING	
Mot. 854	Locking tool
Ele. 346-04	Belt checking tool

REPLACING

TIMING BELT

Consult document MOT.J(D) for points other than those dealt with below.

Remove:

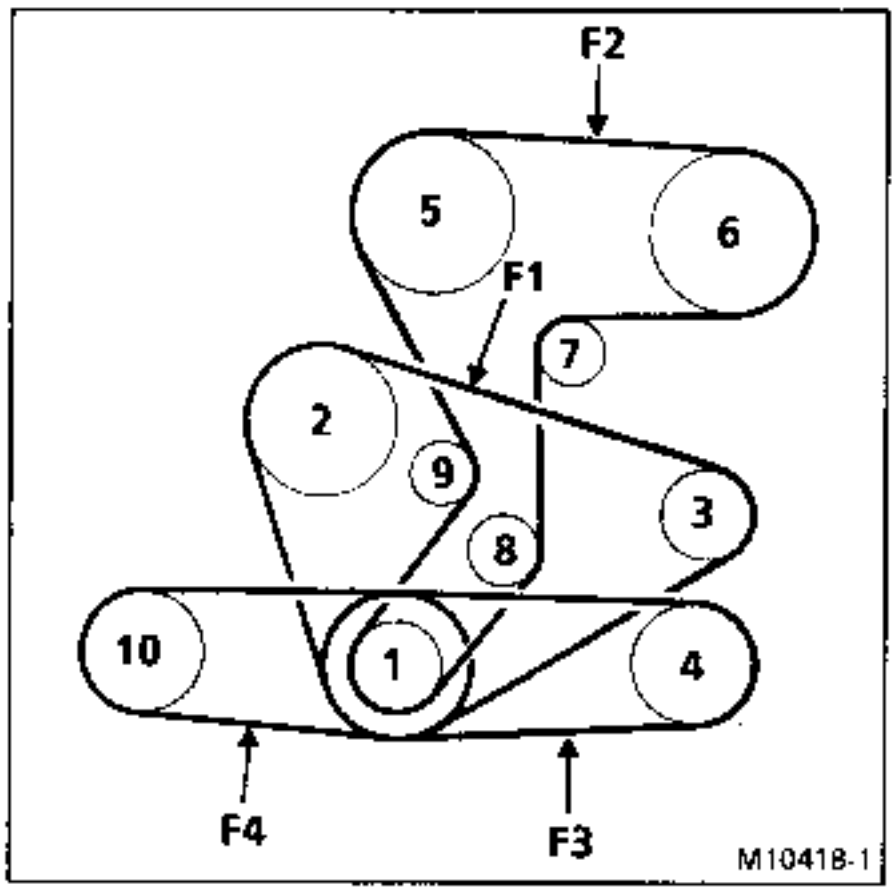
- the front grille;
- the upper cross member tube;
- the radiator with the cooling fans;
- the timing gear cover.

AIR CONDITIONING COMPRESSOR BELT

In order to replace the compressor belt the timing belt has to be removed.

ALTERNATOR DRIVE BELT

The PAS pump drive belt has to be removed in order to be able to remove the alternator drive belt.



1 Crankshaft
2 Coolant pump
3 Alternator
4 PAS pump
5 Camshaft
6 Injection pump
7 Timing belt tensioner
8 Swivel lever
9 Swivel lever
10 Air conditioning compressor

BELT TENSION

FUNCTION	Alternator Coolant Pump	Power Steering	Camshaft Injection Pump	Air conditioning Compressor
Belt Type	V-Shaped	V-Shaped	Flat-toothed	Multi-toothed
Mark	F1	F3	F2	F4
F when cold (mm)	3.5 to 4.5	3.5	3 to 5	3 to 4
F when hot (mm)	5.5 to 6.5	4 to 4.5	-	3.5 to 4.5
Only retension belt if F > than	-	5.0	-	-

(F = deflection measured with tool Ele.346.04)

ESSENTIAL SPECIAL TOOLING
Ele.346-04 Belt checking tool

ALTERNATOR DRIVE BELT

In order to remove the alternator drive belt the power-assisted steering belt has to be removed.

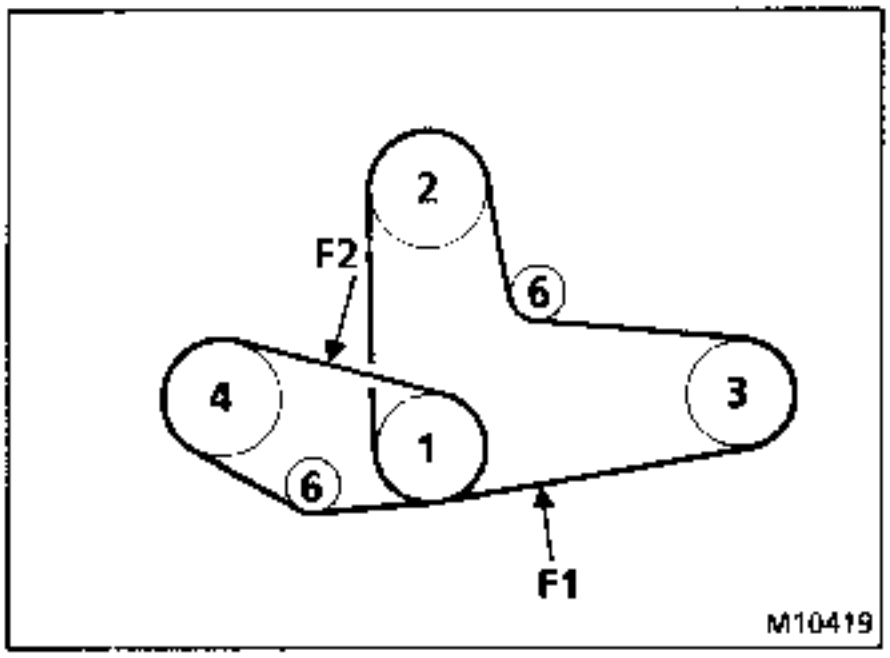
Version with air conditioning

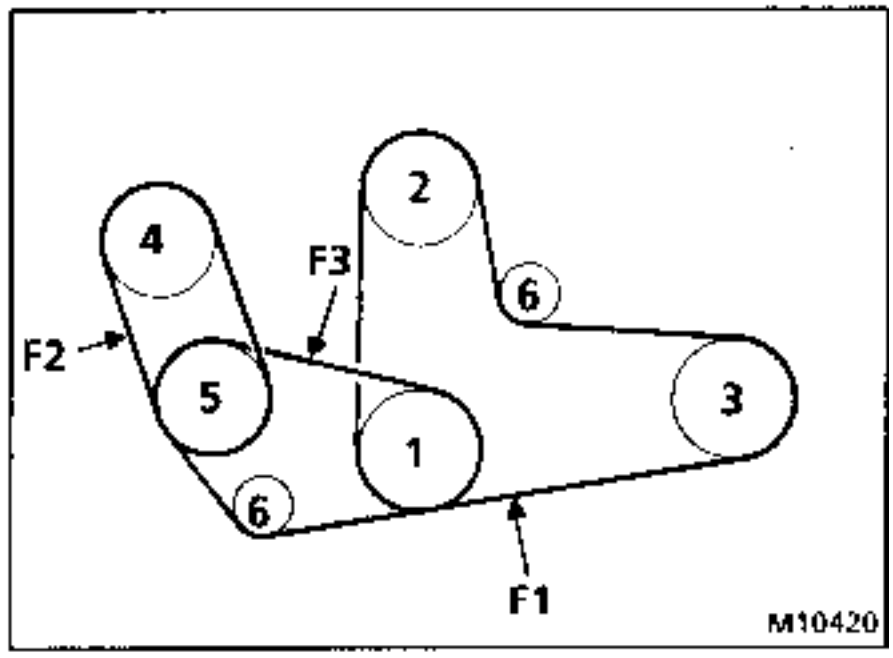
ALTERNATOR DRIVE BELT

In order to remove the alternator drive belt the air conditioning compressor belt must be removed.

PAS PUMP BELT

In order to remove the PAS pump belt, the air conditioning compressor belt has to be removed.





1 Crankshaft
2 Coolant pump pulley
3 Alternator pulley
4 PAS pump pulley
5 Air conditioning compressor pulley
6 Tensioner

BELT TENSION (F = deflection measured with tool Ele.346-04)

FUNCTION	Alternator Coolant Pump	Power Steering	Air Conditioning Compressor
Belt Type	Multi-toothed	V-Shaped	V-Shaped
Mark	F1	F2	F3
F when cold (mm)	3	2.5 to 3	3 to 4
F when hot (mm)	3 to 3.5	3 to 3.5	3.5 to 4.5
Only retension belt if F > than	4,5	5	-

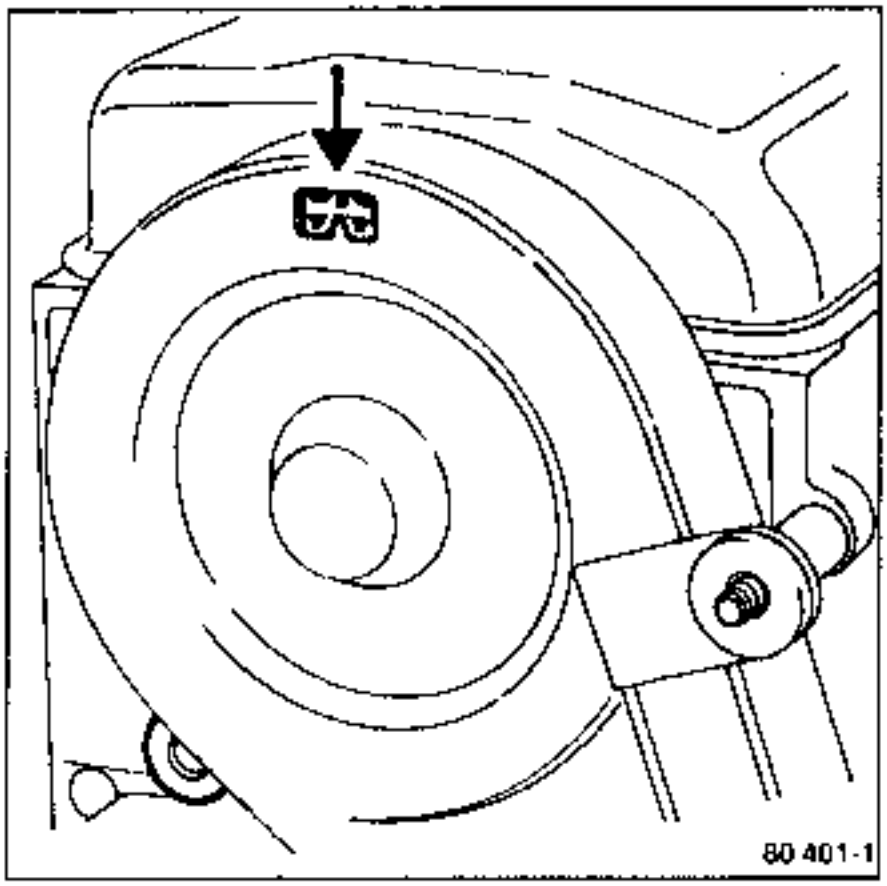
ESSENTIAL SPECIAL TOOLING	
Mot. 647	Rocker arm clearance adjusting tool

ROCKER ARM CLEARANCE ADJUSTMENT

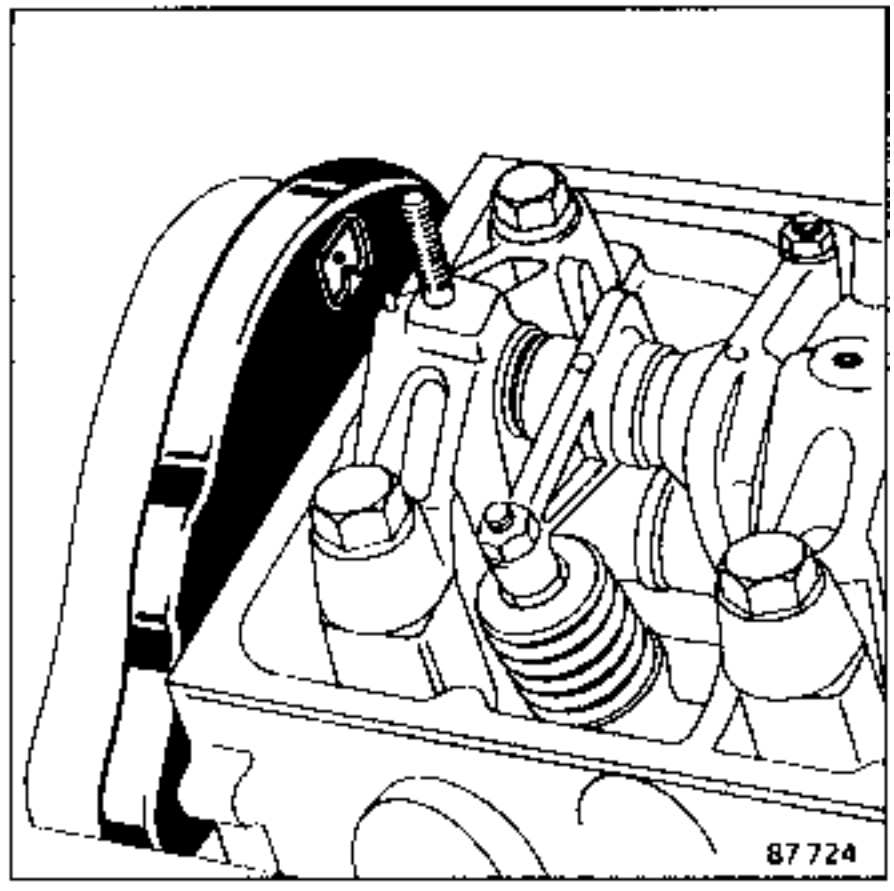
THE FOLLOWING METHOD MUST BE USED FOR ADJUSTING THE ROCKER ARM CLEARANCES ON J7T AND J7R ENGINES

Clearance adjustment (mm) - cold (approximately 20°C):
- Inlet: 0.10 to 0.15
- Exhaust: 0.20 to 0.25

Turn the crankshaft so that no. 1 cylinder is on TDC (no. 4 cylinder valves "rocking").



Turn the crankshaft (viewed from timing gear side) in a clockwise direction until the first mark on the camshaft toothed sprocket (at the cylinder head side) is in line with the mark made on the casing.



Adjust the corresponding rocker arm clearances then move the camshaft to the following mark (see table).

Marks	Adjust	
	Inlet	Exhaust
1 st	2	4
2 nd	1	2
3 rd	3	1
4 th	4	3

ESSENTIAL SPECIAL TOOLING	
Mot. 647	Rocker arm clearance adjusting tool

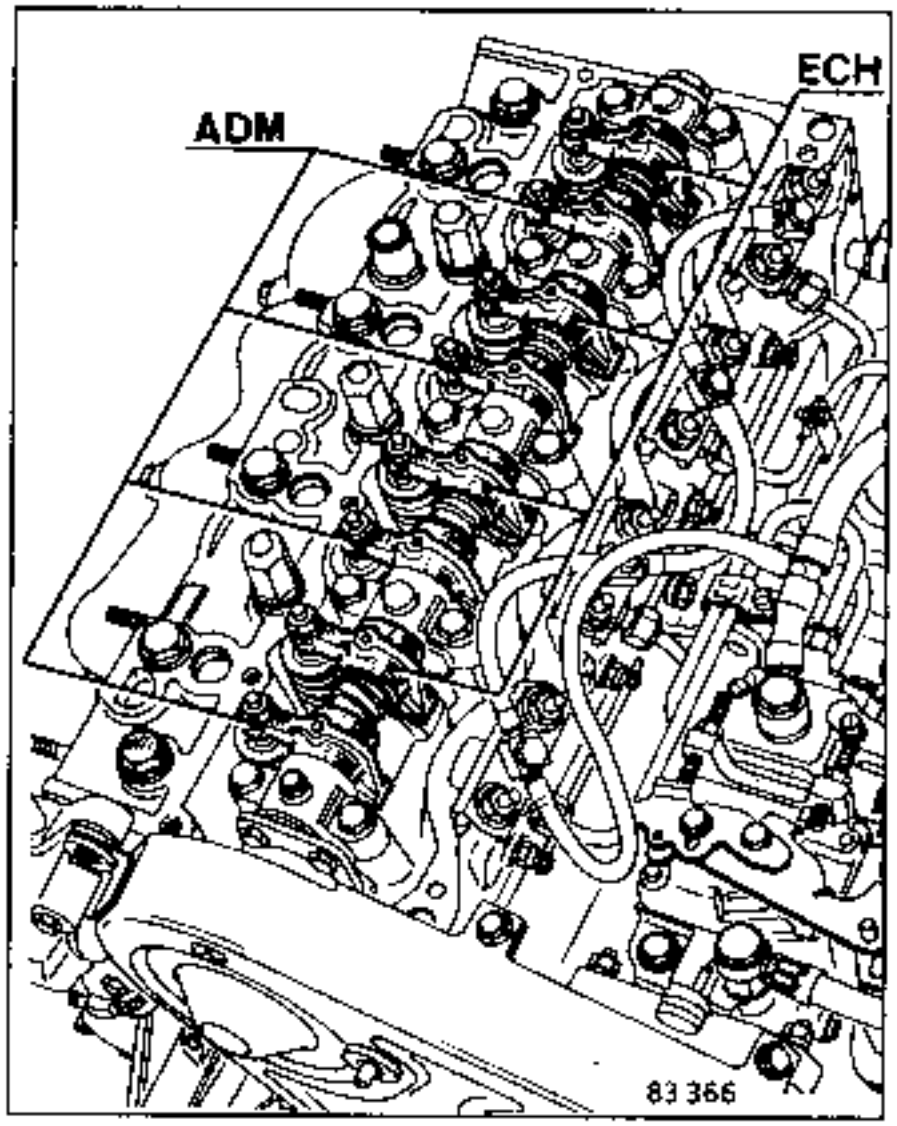
ROCKER ARM CLEARANCE ADJUSTMENT

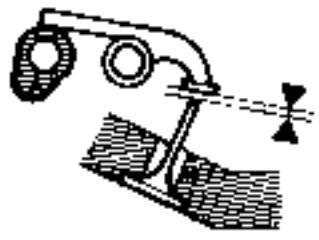
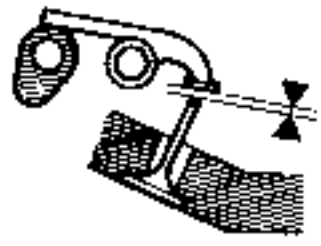
Move no. 1 cylinder exhaust valve so that it is fully open and adjust no. 3 cylinder inlet valve and no. 4 cylinder exhaust valve clearance.

Proceed in the same way for the other cylinders in the order given in the table.

Rocker arm clearance (mm), cold:

- inlet: 0.20
- exhaust: 0.25



Exhaust valve to be fully opened	Inlet valve to be adjusted	Exhaust valve to be adjusted
		
1	3	4
3	4	2
4	2	1
2	1	3

ESSENTIAL SPECIAL TOOLING	
Mot. **647**	Rocker arm clearance adjusting tool

ADJUSTING THE ROCKER ARM CLEARANCES

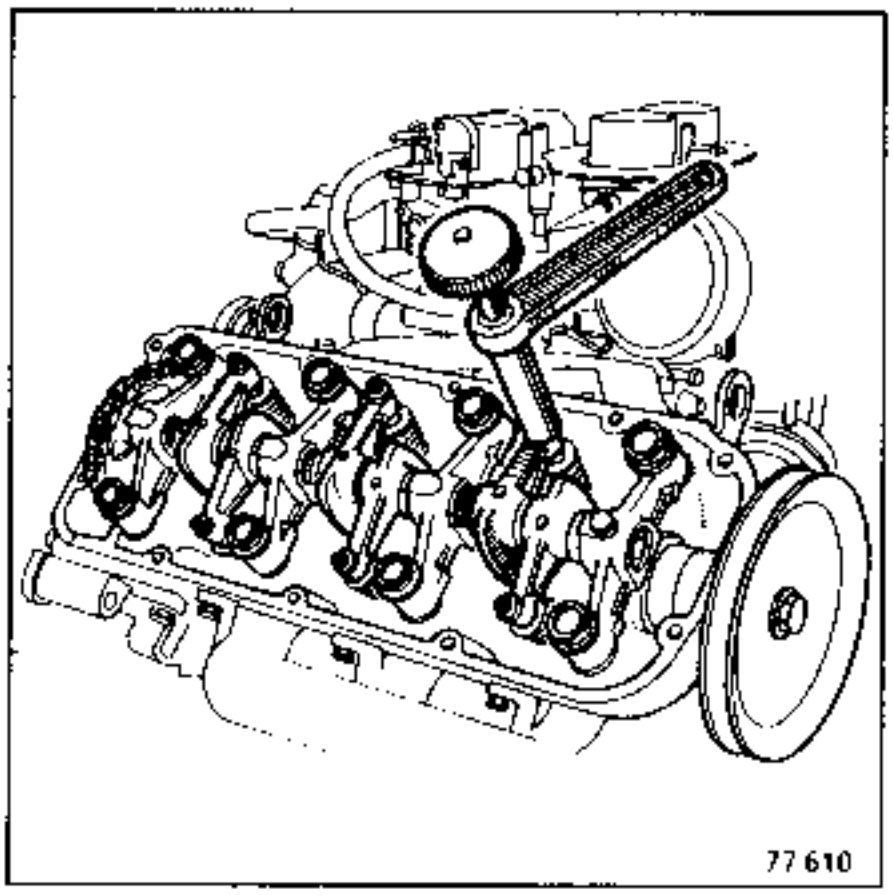
Rocker arm clearance (mm) - cold:

- inlet: 0.10
- exhaust: 0.25

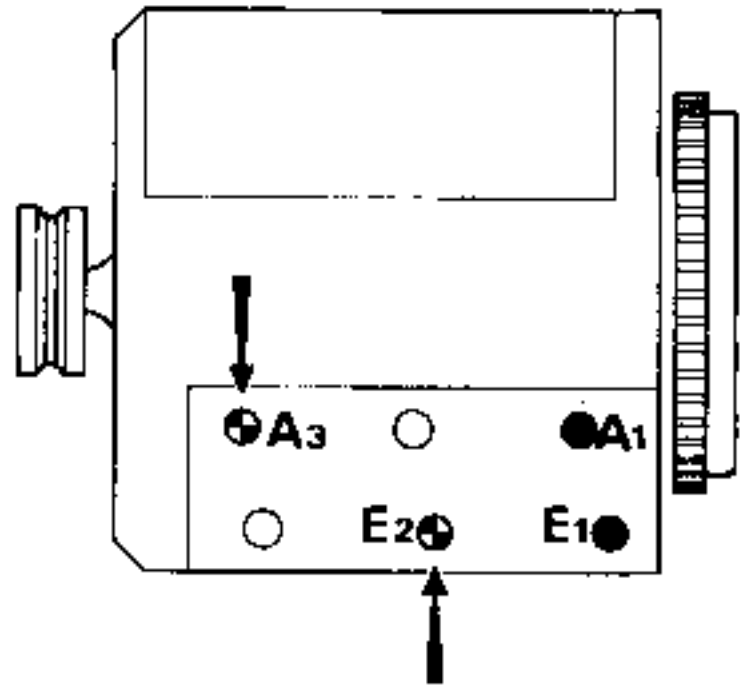
FIRST METHOD

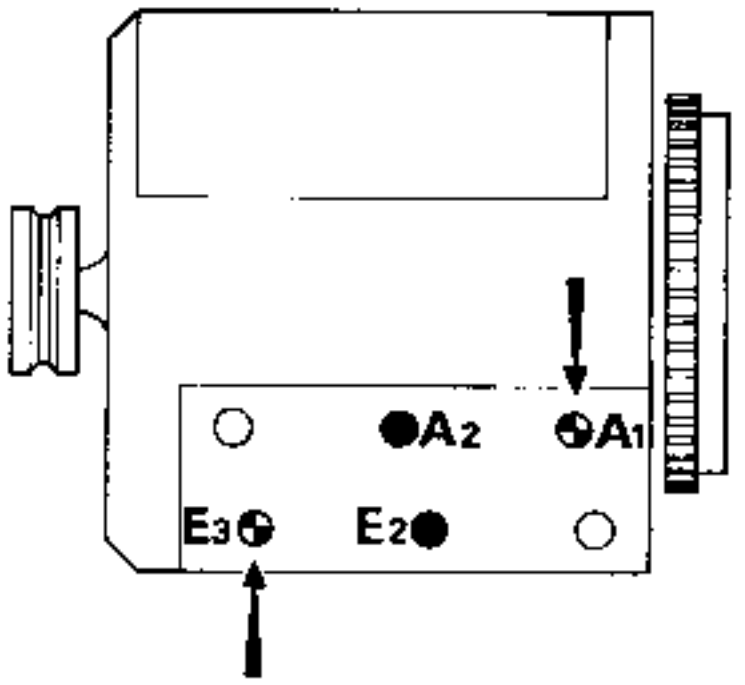
Cylinder by cylinder adjustment.

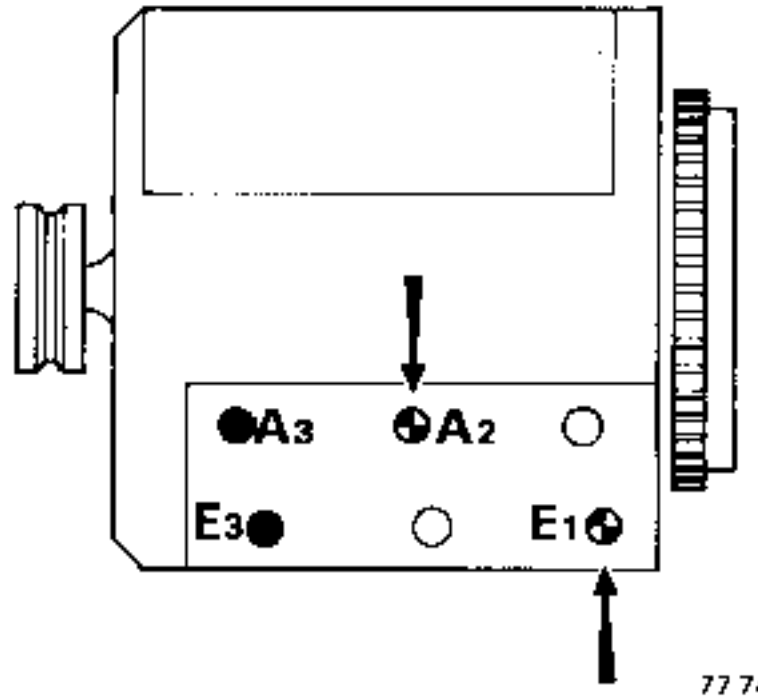
CYLINDER BANK A



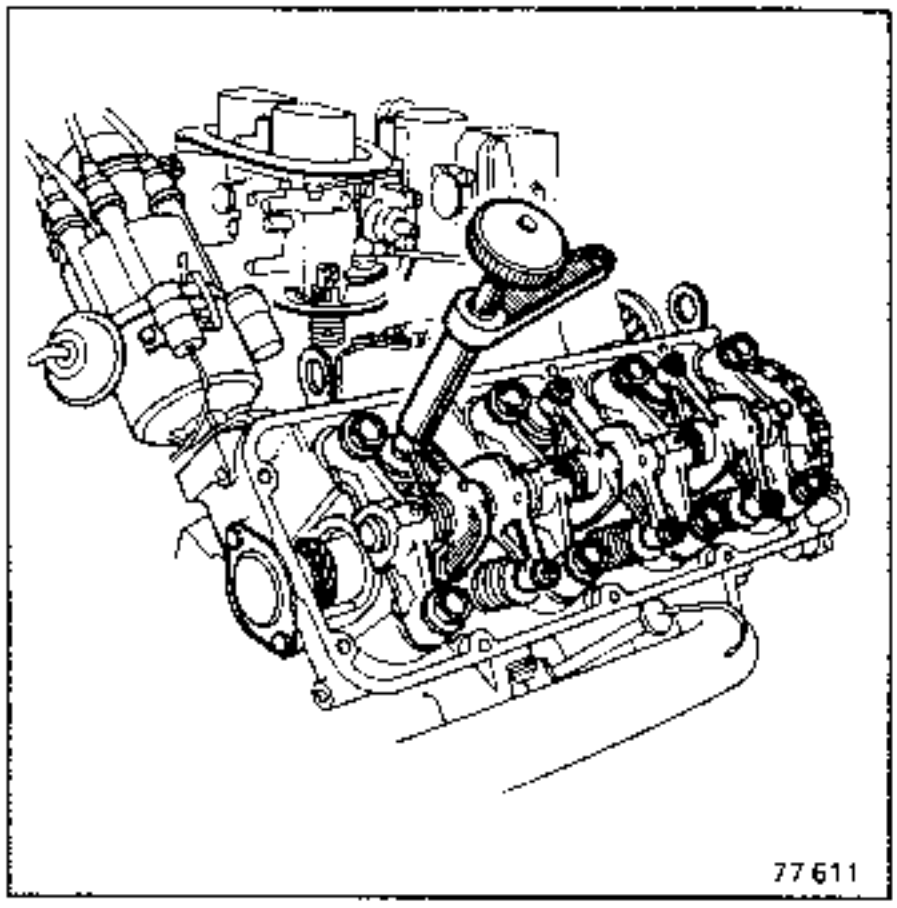
Rocker arms tilted	Rocker arms to be adjusted	
	Inlet	Exhaust
A1 - E1	A3	E2
A2 - E2	A1	E3
A3 -E3	A2	E1



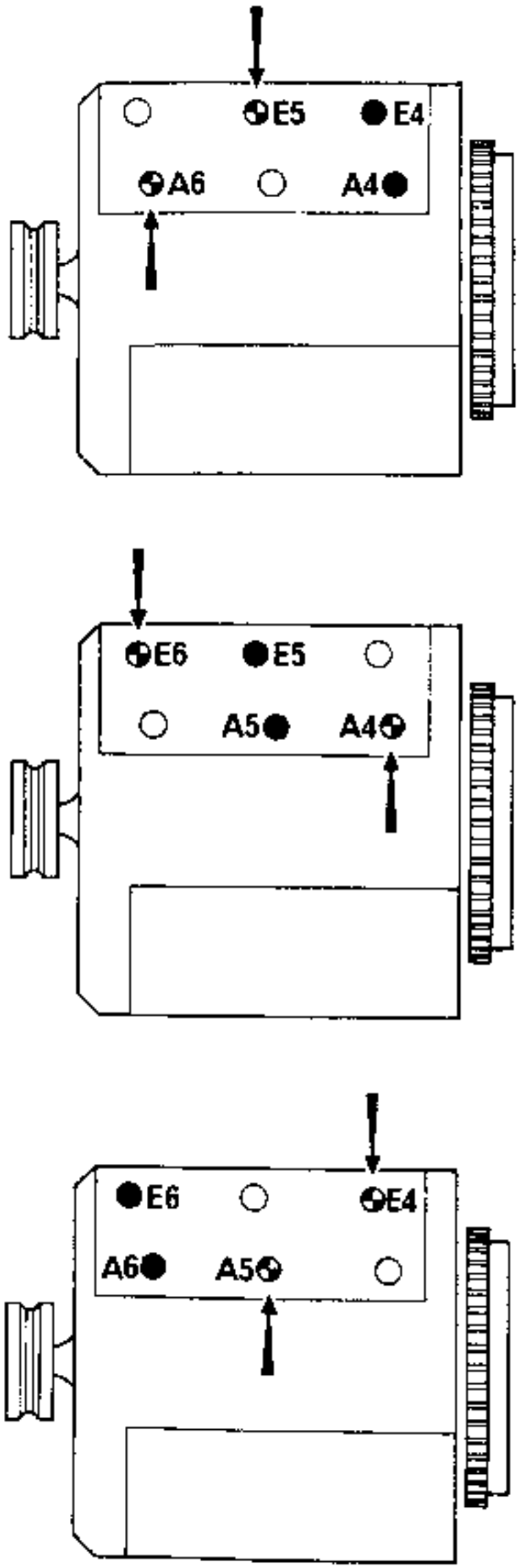




CYLINDER BANK B



Rocker arms tilted	Rocker arms to be adjusted	
	Inlet	Exhaust
A4 - E4	A6	E5
A5 - E5	A4	E6
A6 - E6	A5	E4



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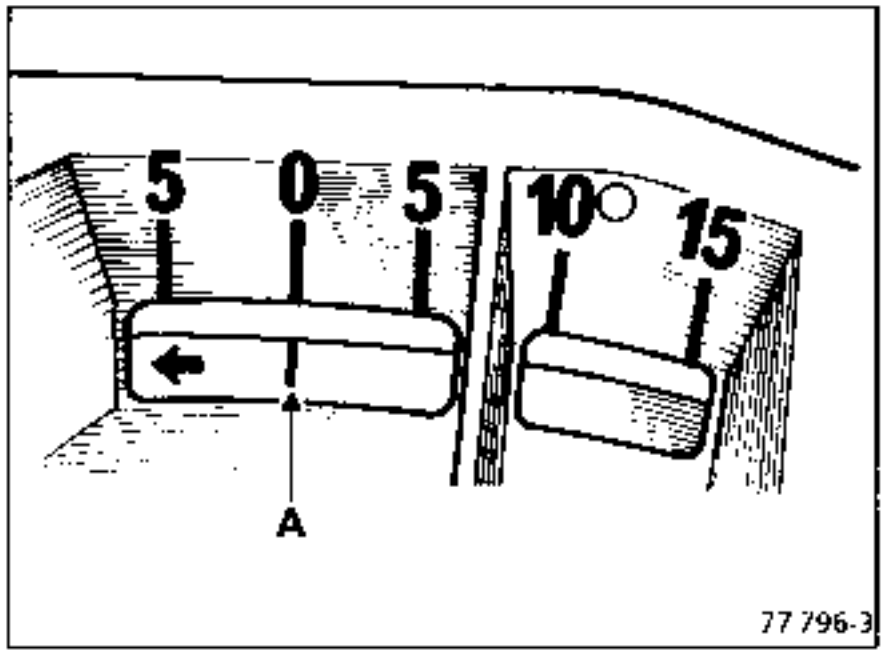
SECOND METHOD

Move No 1 cylinder piston to IDC-firing stroke, which corresponds to:
- No 5 cylinder rocker arm tilted;
- mark (A) on flywheel opposite mark (0) on the clutch casing.



No 1 Cylinder Firing Stroke	Rocker arms to be adjusted	
	Inlet	Exhaust
	A1	E 1
	A2	E 3
	A4	E 6

Turn the crankshaft through 1 revolution staring from position I, which corresponds to:
- No I cylinder on TDC end of exhaust - beginning of inlet;
- No 1 cylinder rocker arms tilted;
- position A on flywheel, opposite mark 0 on clutch casing.

No 1 Cylinder End of Exhaust Beginning of Inlet	Rocker arms to be adjusted	
	Inlet	Exhaust
	A3	E 2
	A5	E 4
	A6	E 5

Country where vehicle marketed: Italy-UK-Belgium

Vehicle	Engine						Gearbox	Injection Type	Ignition Type
	Type	Suf-fix	Bore (mm)	Stroke (mm)	Cubic Capacity (cc)	C/R			
J636 15	J7R	768	88	82	1995	9,2	Manual 4 x 2	BENDIX Multipoint	Ignition power module with pinking sensor

Engine	Idling Speed Adjustment		Fuel	
	Engine Speed (rpm)	Mixture (CO)	Special Point	Octane Rating
J7R 768	775 ± 50 (not adjustable)	Max 0.5% (not adjustable)	Unleaded	O.R.95.

For a coolant temperature between 80 and 100°C.

Fuel Feed	Multipoint Injection
Fuel pump. located on righthand side member in front of fuel tank.	Voltage: 12 volts Pressure: 3 bars Delivery: 130 l/h
Fuel filter: located on lefthand side member near front seat.	Replacement: every 36000 miles (50000 km)
Pressure Regulator	Pressure:- - at zero vacuum: 2.5 ± 0.2 bars - at 500 mbar vacuum: 2.0 ± 0.2 bars
Electromagnetic injectors	Computer operated only Voltage: 12 volts Resistance: 2,5 ± 0,5 Ω
Throttle casing	SOLEX: single barrel 50 mm Ø Mark: 863
No load/full load switch with three wires	A - idling: throttle opening < 1° B - Part load: throttle opening > 1° C - Throttle opening > 70°
Idling speed regulating valve	Bosch voltage: 12 volts

Computer	Bendix No.	Approval No.	RNUR No.	Diagnostic Code
J636 15	5100 820 102	77 00 855 526	77 00 855 528	71

Coolant Temperature Sensor (CTP)	Temperature °C Resistance Ohms	20 ± 1 283 297	80 ± 1 383 397	90 ± 1 403 417
Air Temperature Sensor (CTP)	Temperature °C Resistance Ohms	0 ± 1 254-266	20 ± 1 283-297	40 ± 1 315-329

Oxygen Sensor	Make: LS/BOSCH 1 at 800°C Rich mixture: 625 to 1100 mV Lean Mixture: 0 to 150 mV
Catalytic Convertor	Three-purpose type ◇ Mark C01
Paper-type cartridge air filter	Replace every 12000 miles (20000 km)
EGR	
Anti-evaporation system	With canister: GM Rochester
Ignition	Curves: Incorporated in injection computer Ignition Power Module with pinking sensor

Country where vehicle marketed: Europe

Vehicle	Engine						Gearbox	Injection Type	Ignition Type
	Type	Suffix	Bore (mm)	Stroke (mm)	Cubic Capacity (cc)	C/R			
J637 05 J637 08 S637 05	J7T	772	88	89	2165	9,2	Manual 4 x 2 or 4 x 4	Bendix multipoint mixture regulation	Ignition power module with pinking sensor

Engine	Idling Speed Adustment		Fuel	
	Engine Speed (rpm)	Mixture (CO)	Special Point	Octane Rating
J7T 772	775-825 (not adjustable)	Max 0.5% (not adjustable)	Unleaded	O.R.95 min

For a coolant temperature between 80 and 100°C.

Fuel feed	Multipoint injection
Fuel pump: located on righthand side member in front of fuel tank	Voltage: 12 volts Pressure: 3 bars Delivery: 130 l/h
Fuel filter located on lefthand side member near front seat.	Replacement every 36000 miles (50000 km)
Pressure regulator	- at zero vacuum: 2,5 ± 0,2 bars - at 500 mbar vacuum: 2,0 ± 0,2 bars
Electromagnetic injectors	Computer-operated only Voltage: 12 volts Resistance: 2,5 ± 0,5 Ω
Throttle casing	SOLEX single barrel 50 mm Ø Mark 1-863
No load/full load switch with three wires	A - idling: throttle opening < 1° B - part load: throttle opening > 1° C - throttle opening > 70°
Idling speed regulating valve	Bosch voltage: 12 volts

Computer	Bendix No	Approval No	RNUR No	Diagnostic Code
J637 05 J637 08 S637 05	S100 820 101	77 00 851 739	77 00 851 633	51

Coolant Temperature Sensor (CTP)	Temperature °C Resistance Ohms	20 ± 1 283-297	80 ± 1 383-397	90 ± 1 403-417
Air Temperature Sensor (CTP)	Temperature °C Resistance Ohms	0 ± 1 254-266	20 ± 1 283-297	40 ± 1 315-329

Oxygen Sensor	Make: LS 14 BOSCH I' at 800°C Rich mixture: 625 to 1100 mV Lean mixture: 0 to 150 mV
Catalytic Convertor	Three-purpose type J637 05 WALKER J637 08 S637 05
Paper-type cartridge air filter	Replace every 12000 miles (20000 km)
EGR	
Anti-evaporation system	With canister: GM Rochester
Ignition	Curves: Incorporated in injection computer Ignition Power Module with pinking sensor

Country where vehicle marketed: Europe

Vehicle	Engine						Gearbox	Injection Type	Ignition Type
	Type	Suf-fix	Bore (mm)	Stroke (mm)	Cubic Capacity (cc)	C/R			
J638 05	Z7W	712	91	73	2849	9,5	Manual 4 x 2 or 4 x 4	BENDIX Multipoint	Ignition power module with pinking sensor

Engine	Idling Speed Adjustment		Fuel	
	Engine Speed (rpm)	Mixture (CO)	Special Point	Octane Rating
Z7W 712	800 ± 25 (not adjustable)	Max 0.5% (not adjustable)	Unleaded	0.R.95 min

For a coolant temperature between 80 and 100°C

Fuel feed	Multipoint injection
Fuel pump: located on righthand side member in front of fuel tank	Voltage 12 volts Pressure 3 bars Delivery 130 l/h
Fuel filter located near fuel pump	Replacement every 36000 miles (50000 km)
Pressure Regulator	- at zero vacuum 3 ± 0,2 bars - at 500 mbar vacuum 2,5 ± 0,2 bars
Electromagnetic injectors	Computer - operated only Voltage 12 volts Resistance: 2,5 ± 0,5 Ω
Throttle casing	SOLEX: Ø 55 mm Mark 919
Load potentiometer	A - idling: XR25 value = 5-10 B - part load: XR25 value = 15-190 C - full throttle: XR25 value = 235 ± 15
Idling speed regulating valve	Bosch voltage: 12 volts

Computer	Bendix No	Approval No	RNUR No	Diagnostic Code
J638 05	5101 260 104	77 00 851 740	77 00 851 634	12.8

Coolant Temperature Sensor (CTN	Temperature °C Resistance Ohms	20 ± 1 3 061-4 045	80 ± 1 301-367	90 ± 1 212-273
Air Temperature Sensor (CTN)	Temperature °C Resistance Ohms	0 ± 1 7 469-11 970	20 ± 1 3 061-4 045	40 ± 1 1 289-1 654

Oxygen Sensor	Make : BOSCH LS H24 Electrically heated to 800°C Rich mixture : 625-1 100 mV Lean mixture : 0-150 mV
Catalytic Convertor	Three-purpose type ◇ Mark C08
Paper-type cartridge air filter	Replace every 12000 miles (20000 km)
ECR	
Anti evaporation system	With canister : GM Rochester
Ignition	Curves: Incorporated in injection computer Ignition Power Module with pinking sensor

OPERATION OF THE INJECTION SYSTEM

I THE FUEL SYSTEM

- Electric fuel pump
- Fuel pressure regulator
- Fuel filter

II THE INJECTION COMPUTER AND ITS PERIPHERAL UNITS

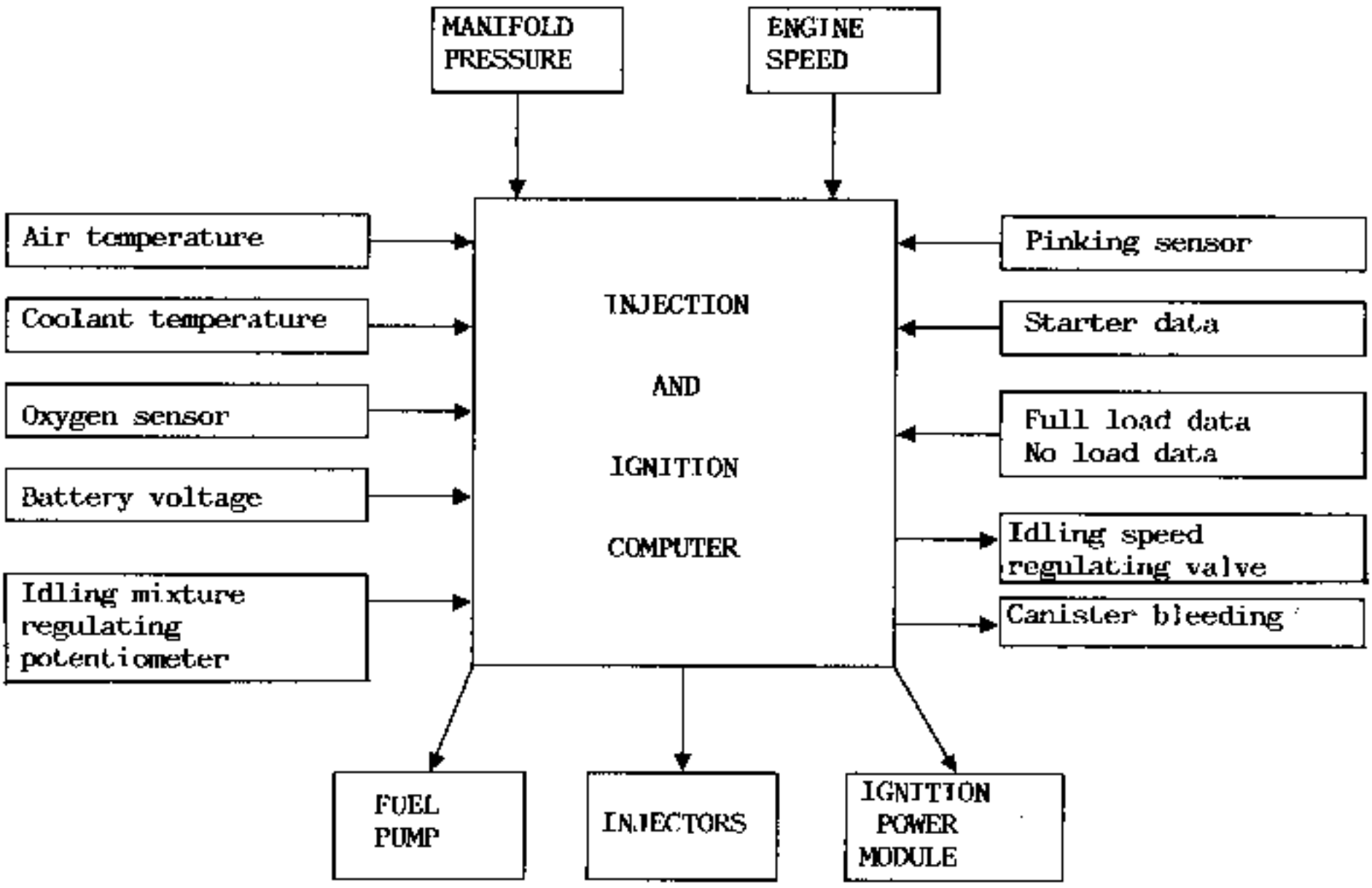
- Injection and ignition computer
- Coolant temperature sensor
- Air temperature sensor
- Flywheel and sensor target
- Speed and position sensor
- Absolute pressure sensor
- No-load/full load switch
- Pinking sensor
- Oxygen sensor
- Idling speed regulation valve
- Anti-evaporation bleeding (canister) by solenoid valve

- Idling mixture regulating potentiometer

III THE POWER SUPPLY

- Ignition power module
- Electromagnetic injectors

OPERATION OF THE INJECTION SYSTEM



Injection and ignition computer

The digital computer is based on a printed circuit and has a microprocessor as its principal component.

The injection computer also incorporates the two integrated circuits of the electronic ignition system (AEI) which are used as peripherals of the microprocessor.

It is housed in the engine compartment, on the righthand wheel arch.

SOLEX THROTTLE CASING

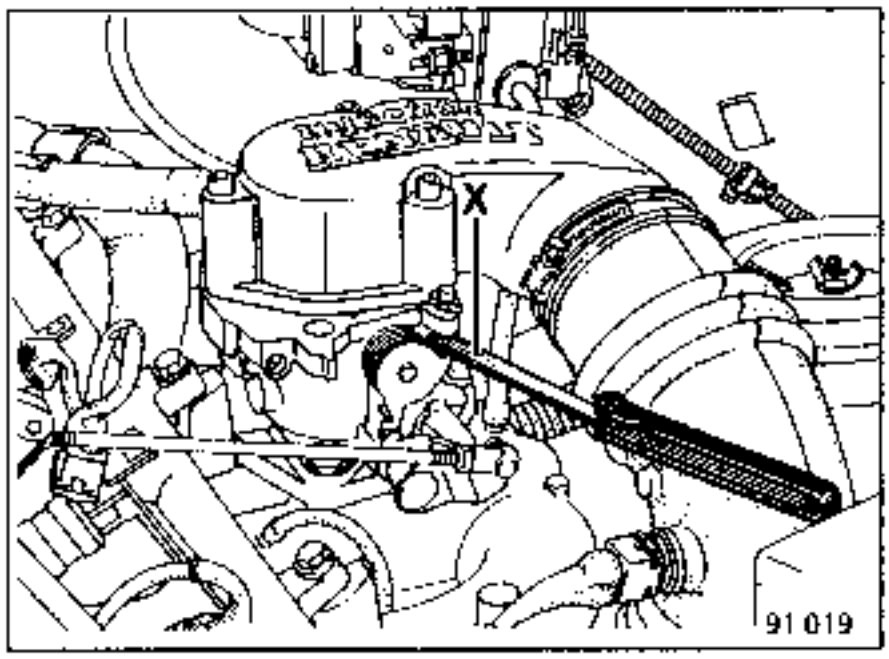
ADJUSTING THE NO LOAD/FULL LOAD SWITCH

Using the ohmmeter and a set of gauges check that the switch is operating correctly:

A - Idling: no load, throttle butterfly opening less than X = 0.2 mm

B - Partial load: throttle butterfly opening greater than X = 0.3 mm

C - Full throttle: throttle butterfly opening greater than 70° (22 mm dia. gauge between throttle butterfly and body).



Throttle opening	Resistance between terminals in ohms	
	A and B	B and C
A	0	Infinite
B	Infinite	Infinite
C	Infinite	0

The checks and adjustments can be performed using the XR 25 test box with the ignition switched on:

A: Idling bar graph (no load) illuminated
B: No load/full load bar graphs extinguished
C: Full load bar graph illuminated

NOTE: The switch is adjusted by altering the direction of the switch on the throttle casing after slackening the screws.

AIR FLOW REGULATION (depending on version)

Connect the XR 25 test box equipped with the latest cassette.

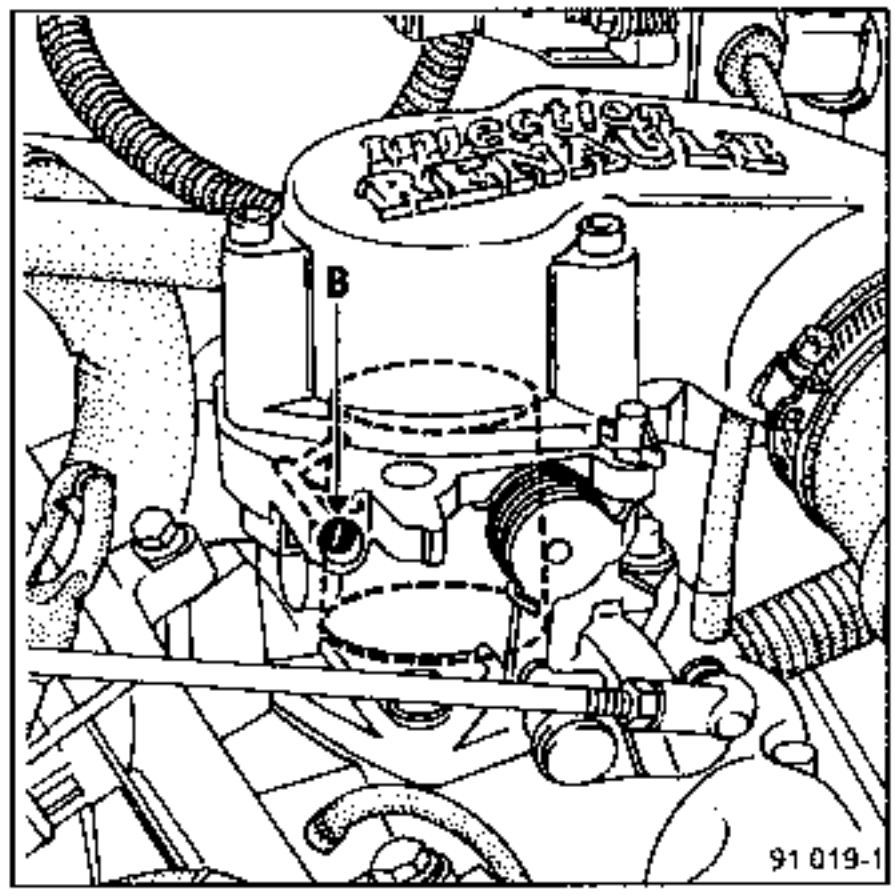
Enter D 03 # 12 and read off the value on the centre display.

Check the speed: # 06: 775 to 825 rpm.

Look for the minimum value by slackening screw (B) until the idling speed increases.

Then tighten screw (B) until this value is increased by 0.2 to 0.3 ms.

For example: Minimum value 2.8 ms.
Adjust to 3.05 ± 0.5 ms.



NOTE: Screw (B) is completely tight on new vehicles.

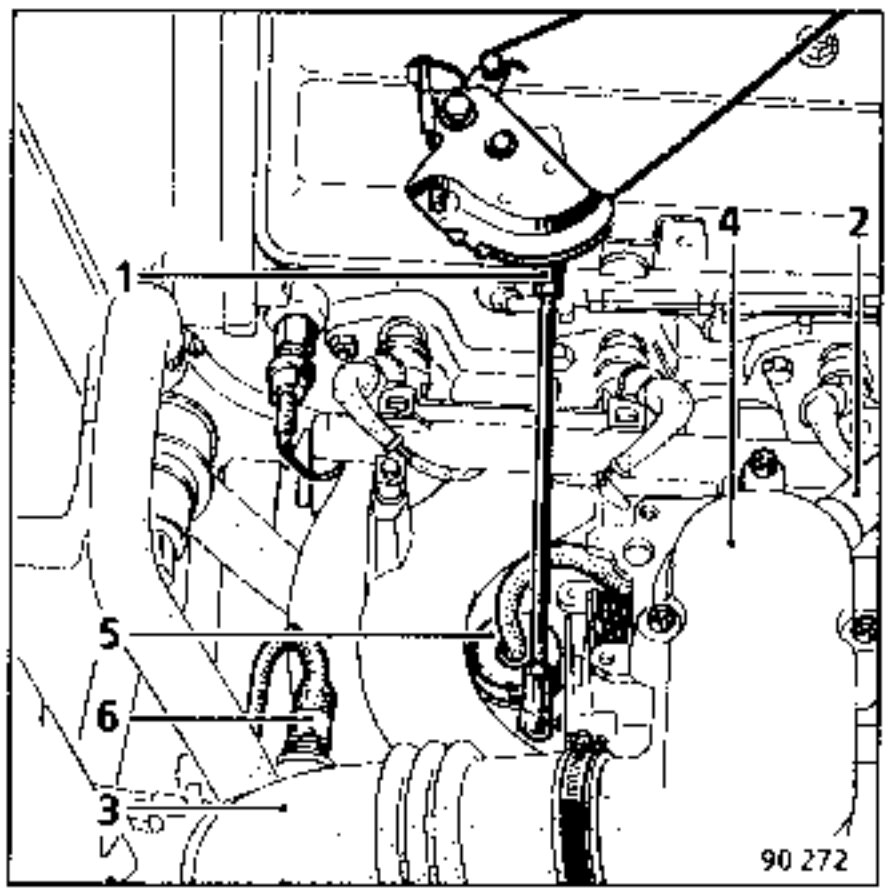
Maintenance:

On vehicles so equipped, adjust the by-pass, if necessary, whenever the engine is tuned.

When the adjustment has been made, fit a tamperproof cap on by-pass adjusting screw (B), part no 77 01 200 832.

REMOVAL

Disconnect:
- throttle control (1);
- rebreathing hose (2);
- air inlet hose (3);
- cover (4) held by three screws;
- the throttle casing itself.



REFITTING

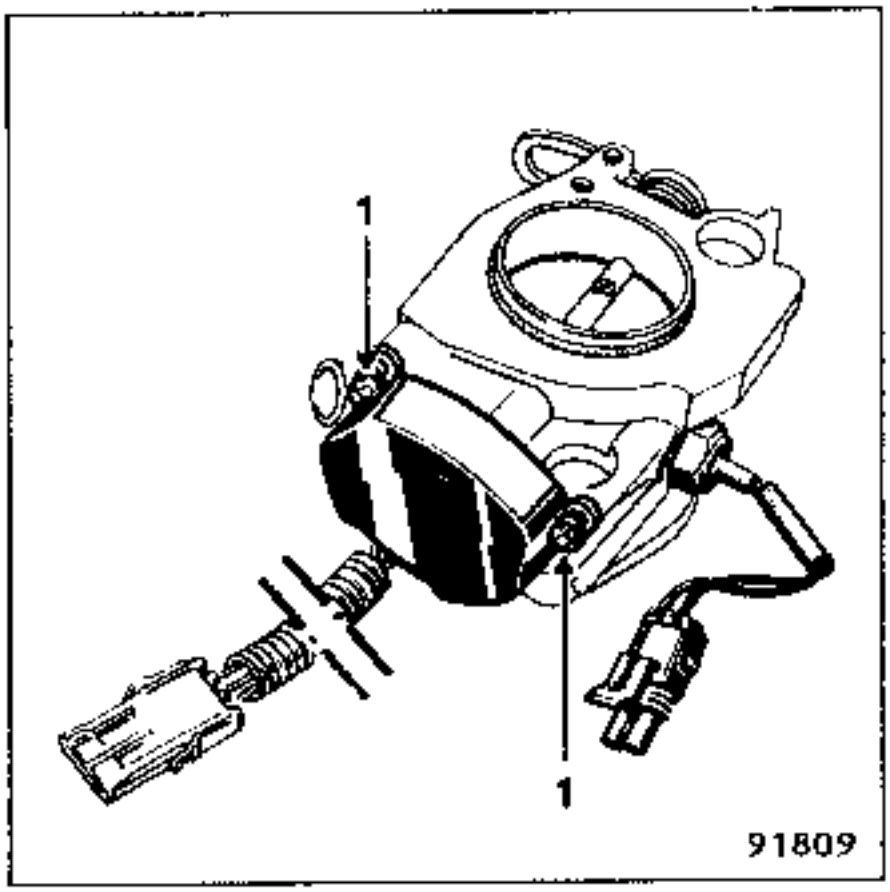
Fit a new seal.

LOAD POTENTIOMETER ADJUSTMENT

Use XR25 test box equipped with the latest cassette.

With the ignition on and engine stopped, enter D03 # 17 and read off the value on the central display.

A - Idling: value should be 10(+0 -5)
B - Part load: variable value between idling speed value and full throttle value.
C - Full Throttle: value should be 235 (± 15)



The bar graphs may also be read off on the XR25 test box:

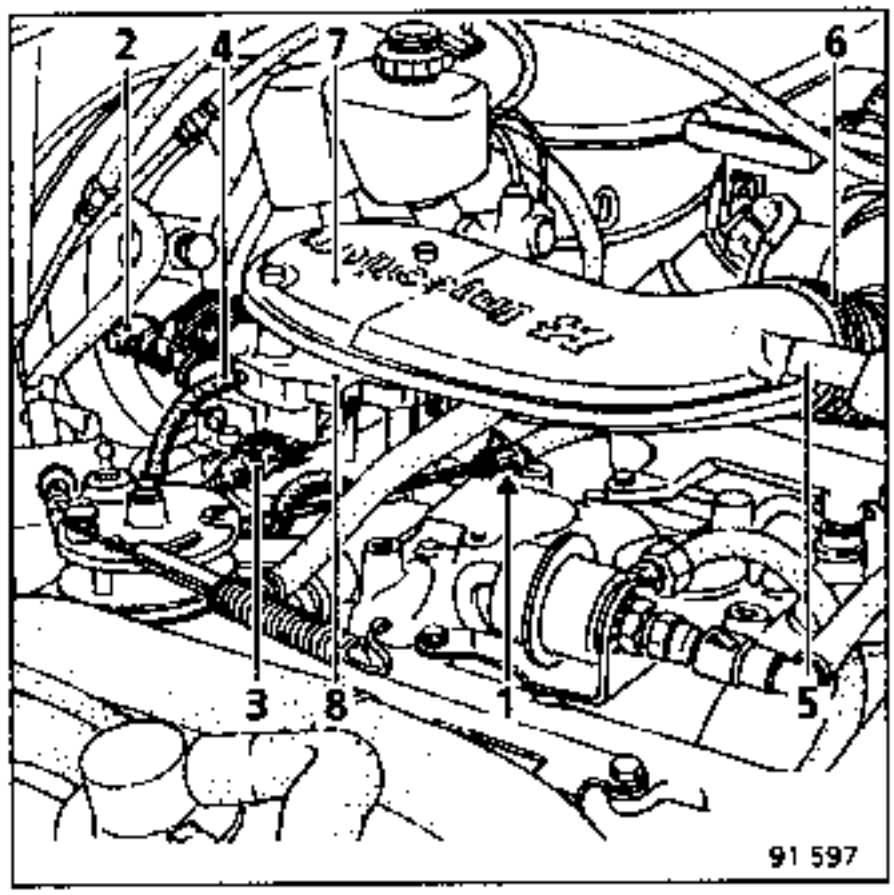
A: no load idling speed bargraph illuminated
B: no load-full load bargraphs extinguished
C: full throttle bargraph illuminated.

NOTE: the load potentiometer is adjusted by moving the switch on the throttle casing after slackening screws (1).

REMOVAL

Remove the heating system fan unit (see section 61).

Disconnect:
- accelerator control (1);
- throttle potentiometer connector (2) and air temperature sensor connector (3);
- the canister bleeding signal (4) for vehicles with anti-evaporation system;
- air inlet hoses (5) and (6);
- the cover secured by 3 screws (7);
- the throttle casing itself.



On reassembly:

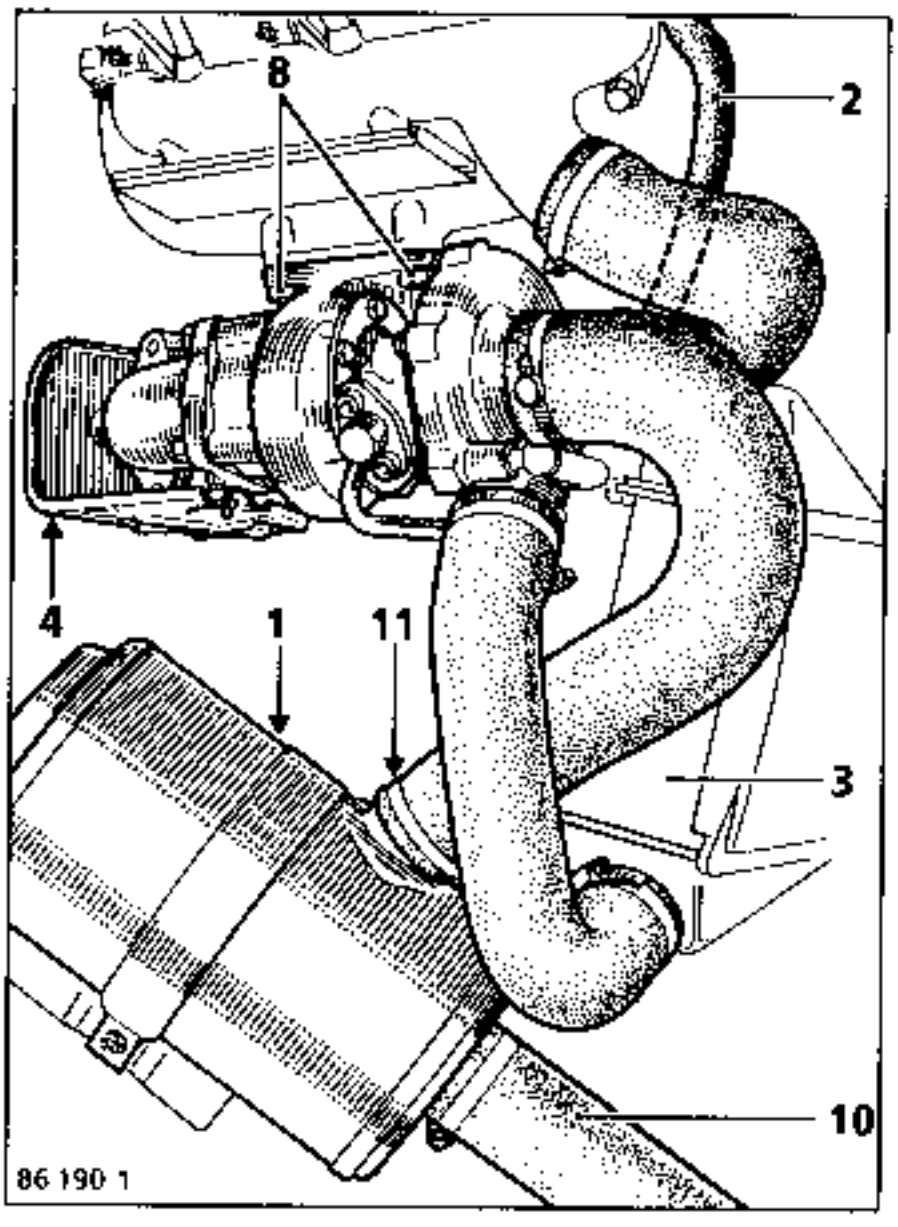
Fit new seals and ensure that the hoses are correctly tightened.

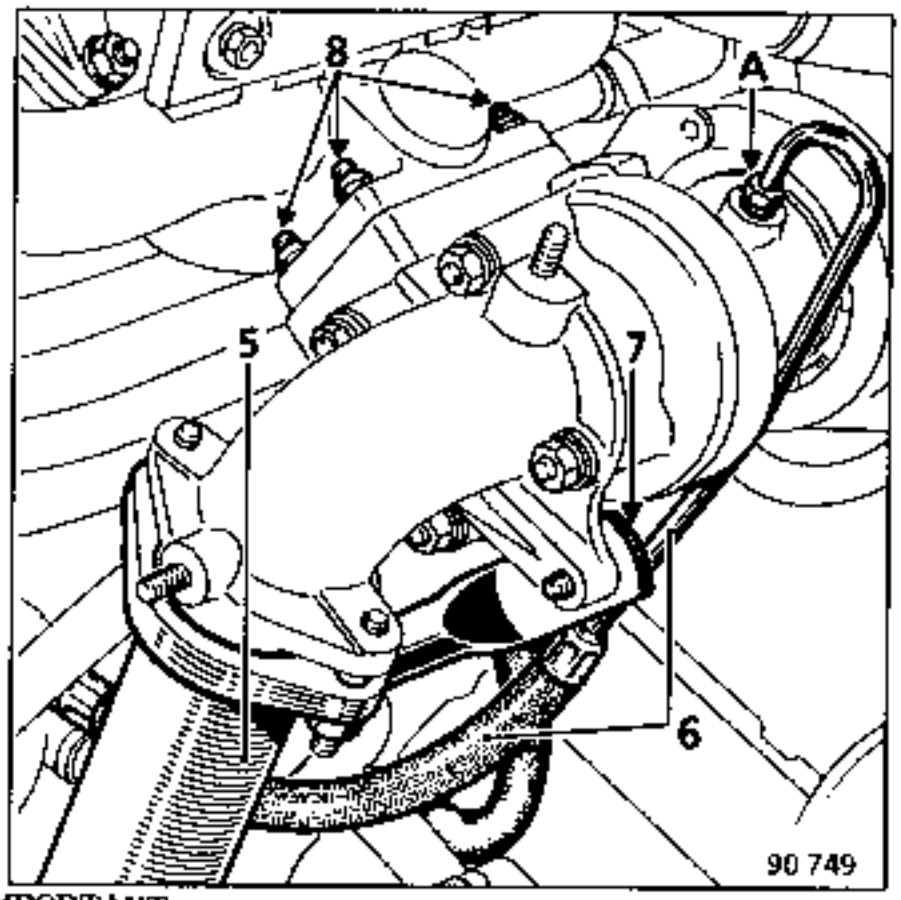
REMOVING - REFITTING

REMOVAL

Remove the pipes and hoses between the air filter and turbo (11) in order;

- the air-to-air intercooler (3) and outlet hoses;
- heat shield (4);
- exhaust outlet elbow (5);
- oil feed and return hoses (6);
- support mounting bolts (7);
- the bolts holding turbocharger (8) and remove it.





IMPORTANT:
Avoid all damage to the boost pressure regulator, Even slight damage risks jamming the wastegate.

REFITTING

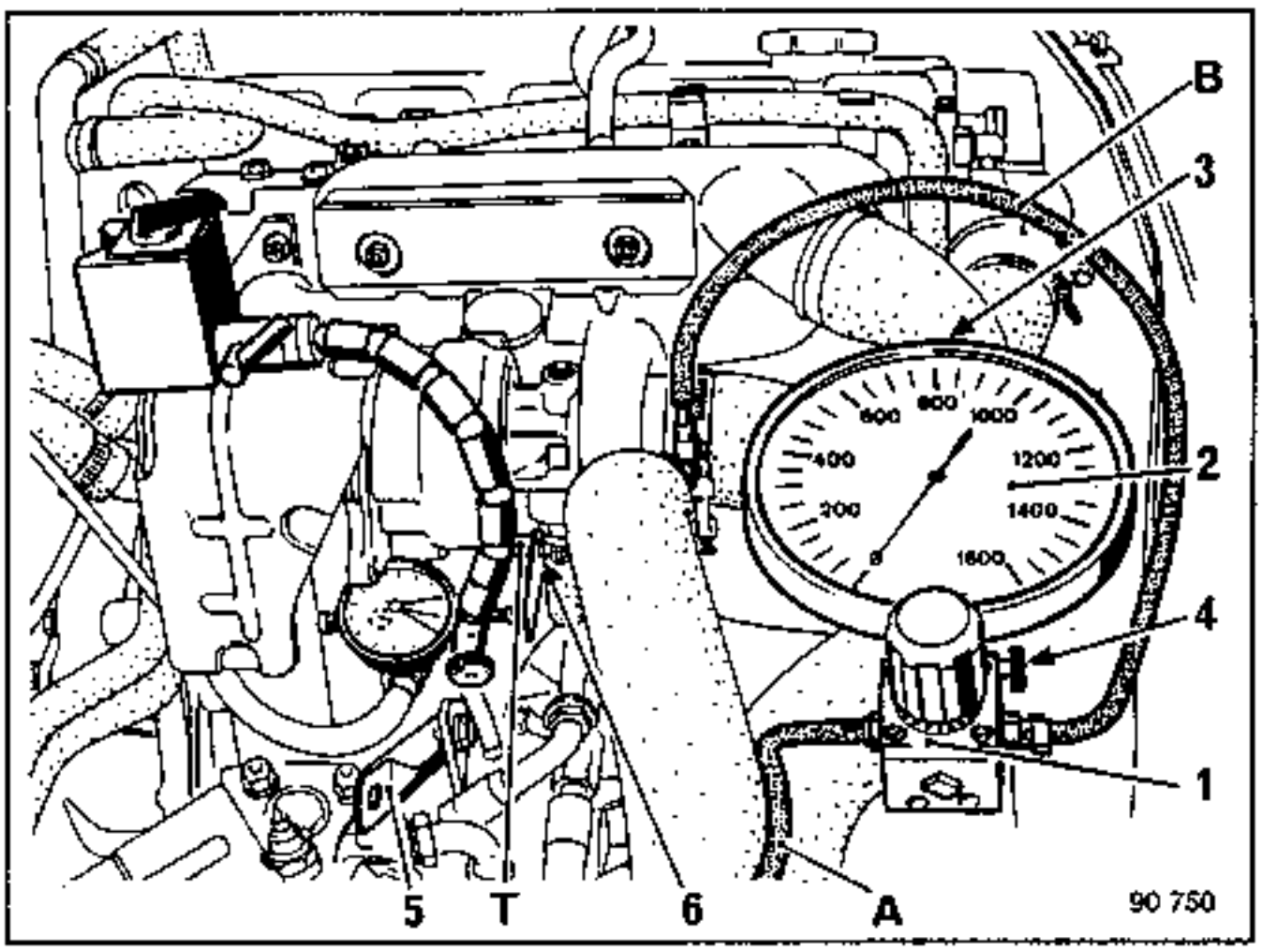
Thoroughly clean the joint faces of exhaust manifold and turbocharger. Replace the self-locking nuts holding turbocharger on the exhaust manifold with new nuts as specified in the Replacement Parts Catalogue.

Replace the oil feed and return seals.

Fill the turbocharger with engine oil via inlet aperture (A).

Tighten the oil feed union and run engine at idling speed to allow the circuit to re-establish.

CHECKING THE PRESSURE AT WHICH THE REGULATOR OPENS



METHOD OF USING TOOL KIT Mot.1014

This kit consists of an adjustable pressure reducing valve (1), a pressure gauge (2) graduated from 0 to 1.6 bars, fitted with a zeroing screw (3) and a leak screw (7).

Before using the equipment, zero the pressure gauge (screw 3) and fully unscrew the screw (1) on the pressure reducing valve and the leak screw (4). Connect the inlet pipe (A) to the compressed air supply.

Connect the output pipe (B) to the take-off on the turbocharging pressure regulator to be tested. Tighten screw(4).

Then slowly screw in the screw on the pressure reducing valve (1) until the required air pressure or the travel specified for the pressure regulator rod (the pressure is stabilized by slightly turning back the screw (1)is obtained).

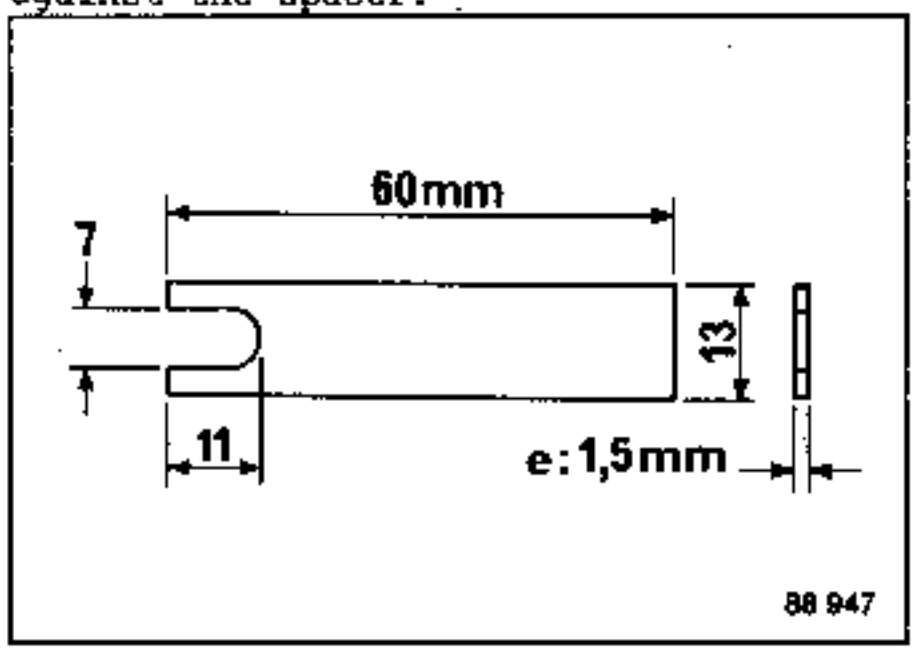
CHECKING THE CALIBRATION PRESSURE

Disconnect the oil input and the turbo-charger support (5).

Disconnect the hose from the take-off point on the regulator unit and connect up equipment Mot.1014.

Make up a spacer to the dimensions shown in the drawing below and clamp it between the rod (1) and the nut (6).

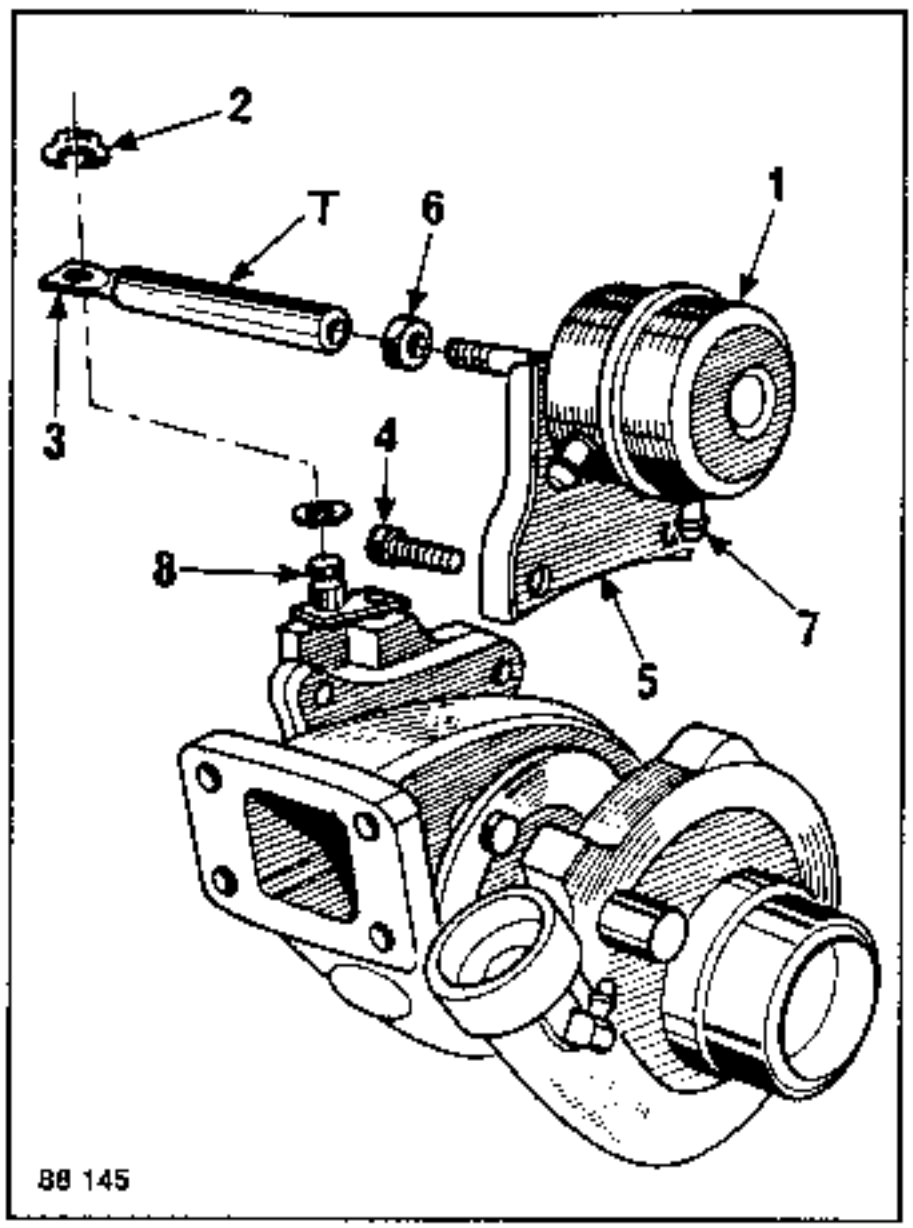
Place a dial indicator, mounted on the heat shield with a magnetic base, against the spacer.



Slowly increase the pressure to obtain a movement of the adjusting rod of 0.38 ± 0.02mm and note the pressure gauge reading, which should be within the test figures stated.

If the calibration pressure is outside these tolerances, replace the regulator unit (punch locked end fitting) or adjust it (end fitting "sealed" with a dab of lacquer).

REPLACING THE REGULATOR UNIT



Disconnect the hose from the regulator unit (1).

Remove the circlip (2) and take off the screwed end fitting (3).

Remove the securing screws (4) and take off the regulator unit.

Place the new regulator unit in position and secure it with new screws (tightened to between 1.6 and 1.8 daN.m).

Tighten the locknut (6) and the screwed end fitting (6) on the rod.

ADJUSTING THE CALIBRATION PRESSURE

Connect tool Mot.1014 to the take-off point (7) and apply the specified adjusting pressure.

Test Pressure	Adjusting Pressure	Adjusting Rod Travel
640 to 700 mbar	670 to 700 mbar	0.36 to 0.40 mm

WARNING:

Ensure that there are no air leaks between the pressure gauge and the regulator unit.

Press down the valve control arm (8) to keep the valve closed.

Under these conditions, adjust the position of the end fitting (3) so that the hole in its clevice just fits over the control arm (8) when it is still held in the valve closed position.

Lower the pressure at the take-off point (7) to zero.

Mount a dial indicator, using a magnetic base, so that its plunger rests against the end of the adjusting rod and zero the dial indicator.

Slowly increase the pressure to obtain an adjusting rod movement of 0.38 ± 0.02mm and note the reading on the pressure gauge which should be within the adjustment pressure tolerances stated on the chart.

If the pressure is outside these tolerances, change the position of the screwed end fitting (3) (screw it in to increase and unscrew it to reduce the pressure) until the specified adjustment pressure has been obtained.

Bring the locknut (6) against the end fitting (3) and tighten it to between 0.6 and 0.7 daN.m.

Apply a dab of paint across both locknut and screwed end fitting.

WARNING:

Do not get any of the paint on the smooth part of the regulator rod (part no. 77 01 407 679).

CHECKING THE BOOT PRESSURE

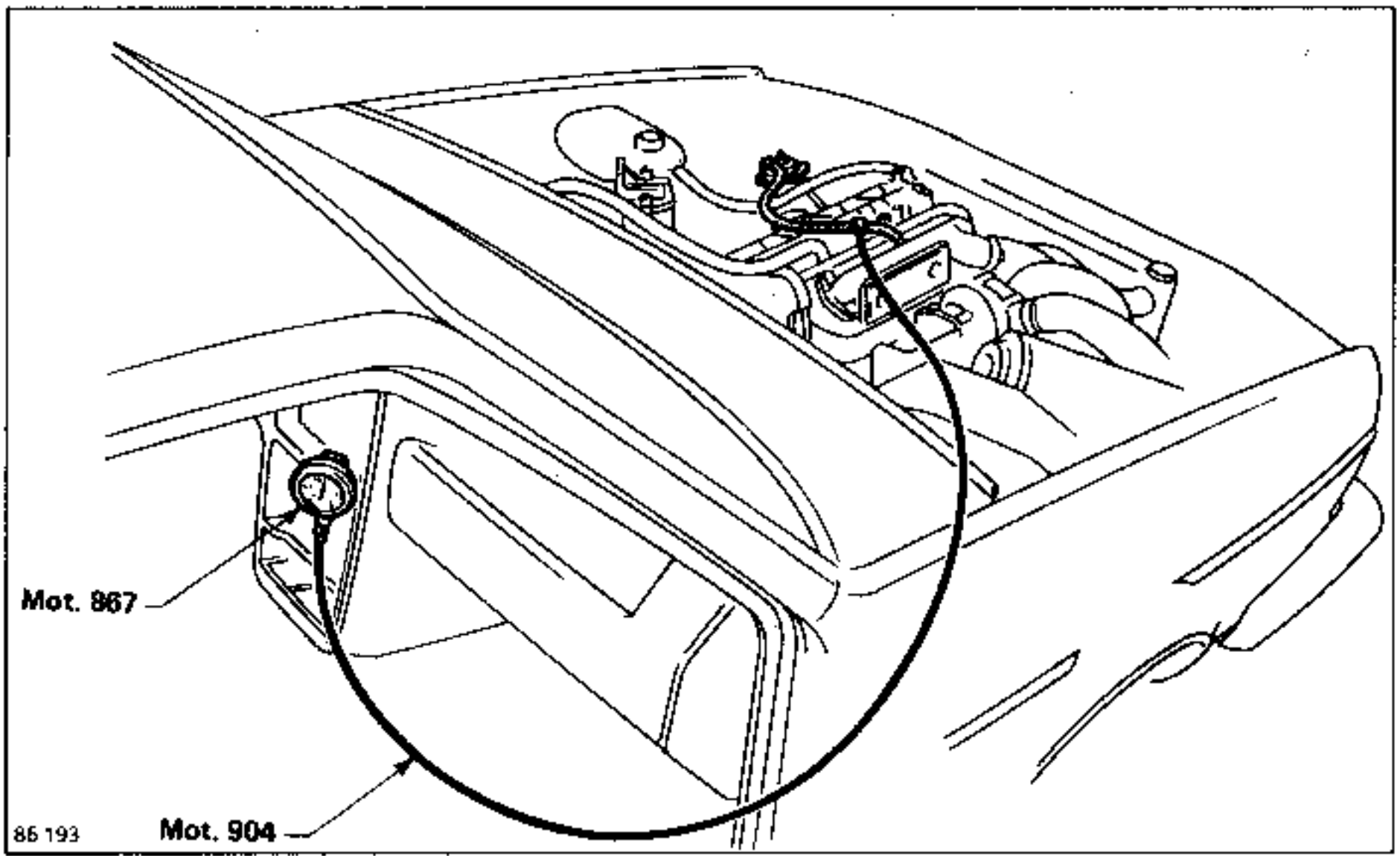
Connect connection hoses Mot. 904 to the hose connecting the inlet manifold to the injection pump LDA governor and connect the pressure gauge from Mot. 867 at the other end.

Route the hose around any projections which might cut it, round the outside of the bonnet (along the wing joint, securing it with adhesive tape) and through the front righthand window, attaching the pressure gauge to the heater controls.

Read off the maximim boost pressure when the engine speed is

2500 ± 250 rpm

- maximum pressure = 600 ± 0.25 bars

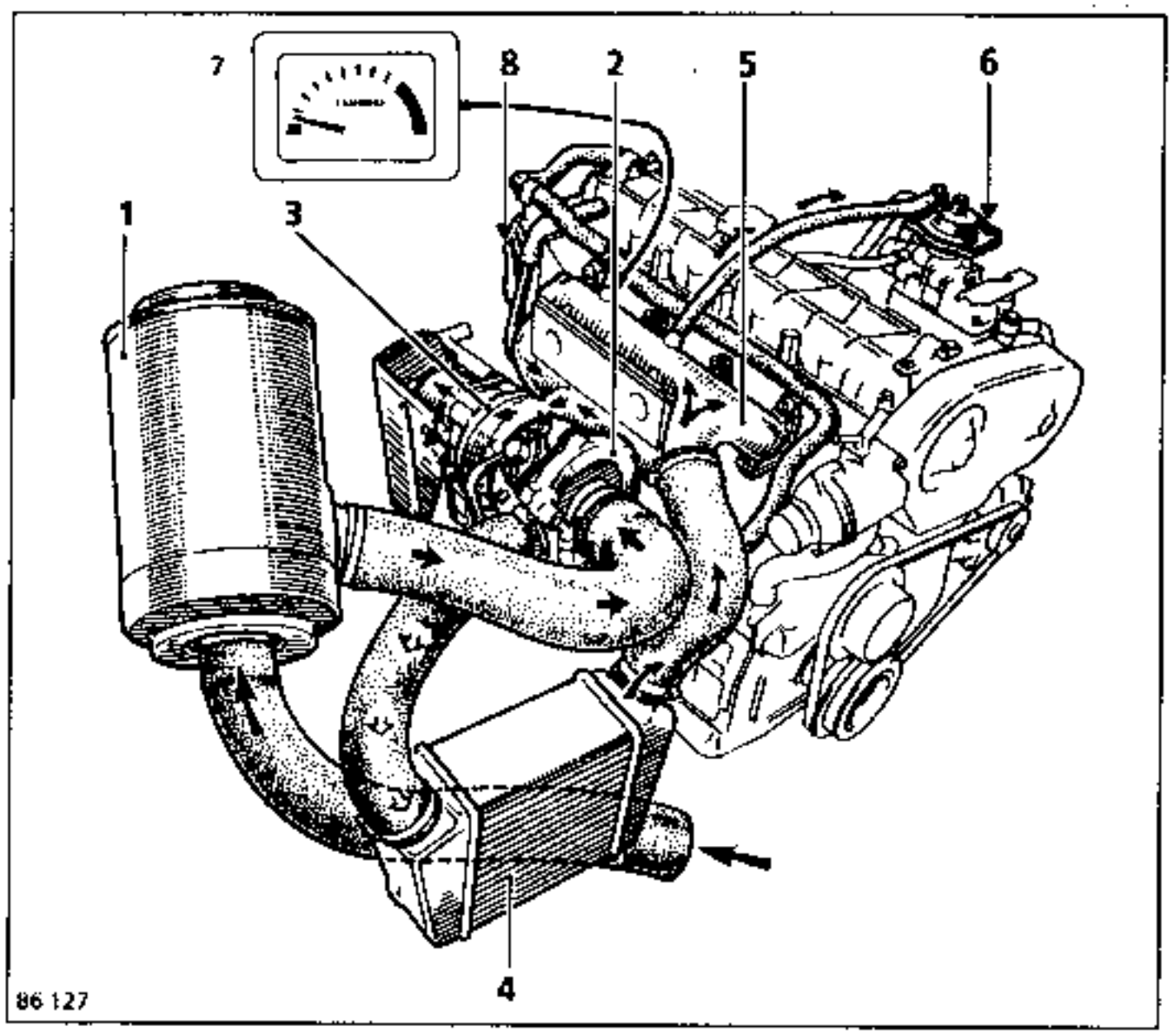


PRECAUTIONS TO BE TAKEN WHEN STARTING UP THE TURBOCHARGED ENGINE

After performing an operation on an engine which has required the disconnection of oil lines, it is essential to reprime the turbocharger oil system, according to the following instructions:

- disconnect the turbocharger oil inlet hose and fill the turbocharger with engine oil;
- activate the starter to reprime the turbocharger oil supply circuit until oil flows out of the turbocharger oil inlet hose;
- reconnect the oil inlet hose to the turbocharger;
- start the engine and run it at idling speed so that the oil circuit to the turbocharger can be re-established.

DIAGRAM SHOWING CIRCULATION OF THE GASES



➡ Air at atmospheric pressure

⇨ Compressed inlet air

➡ Cooled compressed inlet air

→ Exhaust gas

1 Air filter
2 Inlet air compressor
3 Drive turbine controlled by exhaust gases

4 Compressed inlet air cooler
5 Compressed inlet air manifold
6 Injection pump with LDA governor
7 Instrument panel boost pressure gauge
8 Oil separator

NOTE: The crankcase oil vapours are separated in unit (8) which is connected to the sump and to the inlet hose in front of the turbo.

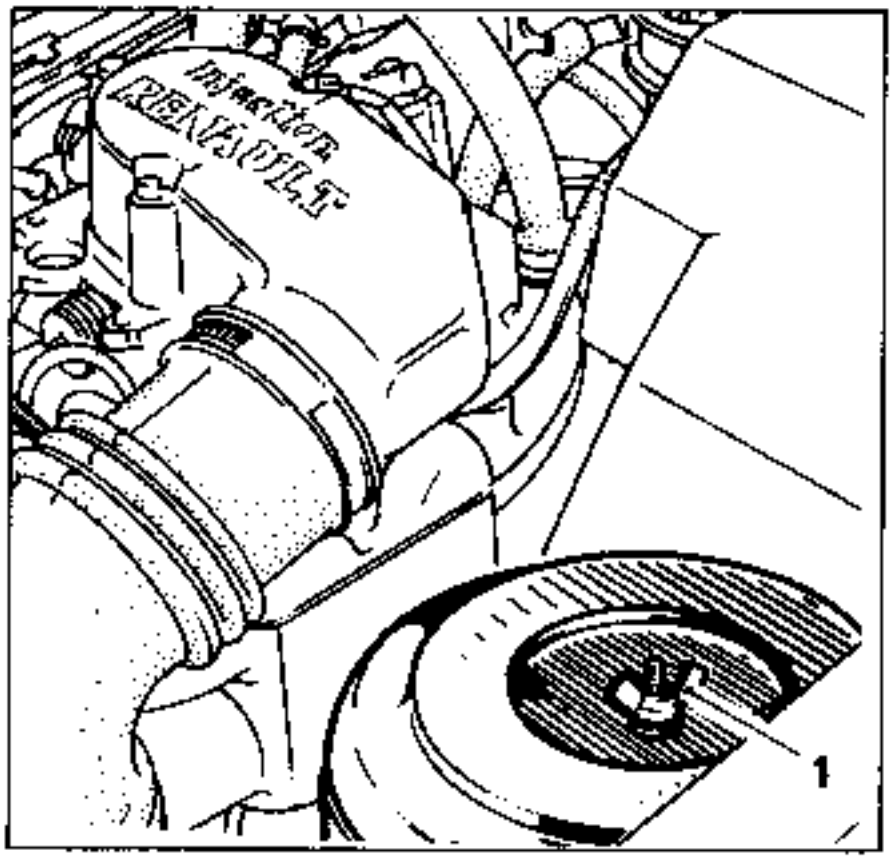
REPLACING THE FILTER CARTRIDGE (Every 12000 miles)(20000 km))

Remove air filter cover (1).

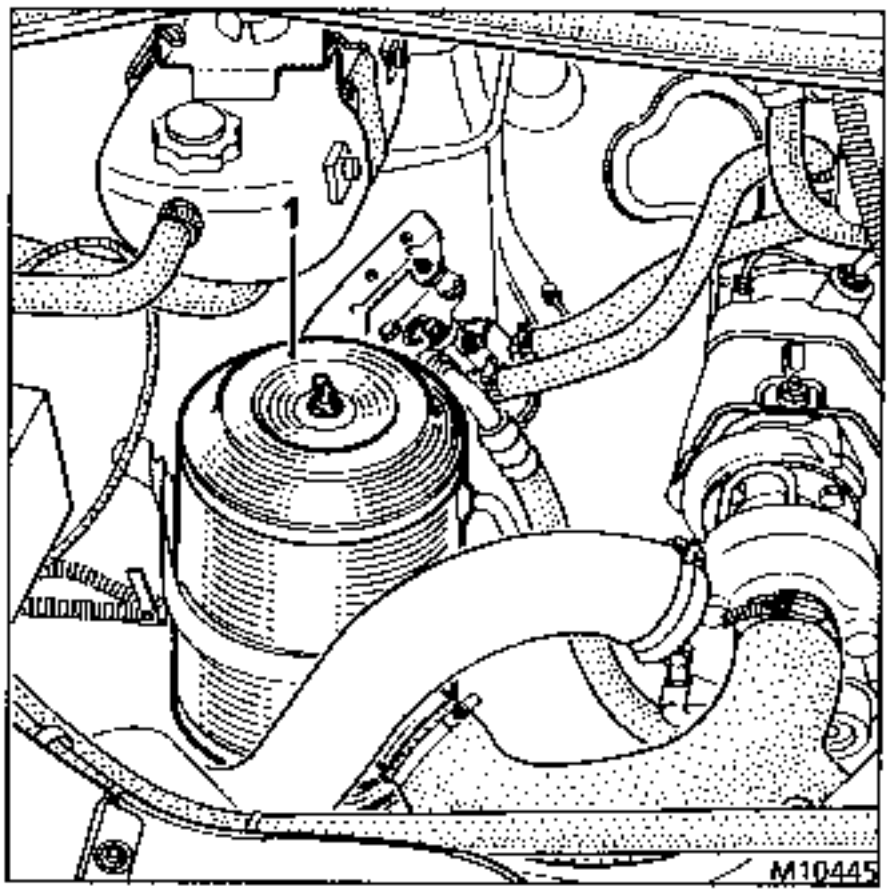
Remove the worn filter cartridge and replace it with a new one.

Refit the air filter cover checking that the cartridge is centred and secure it in place.

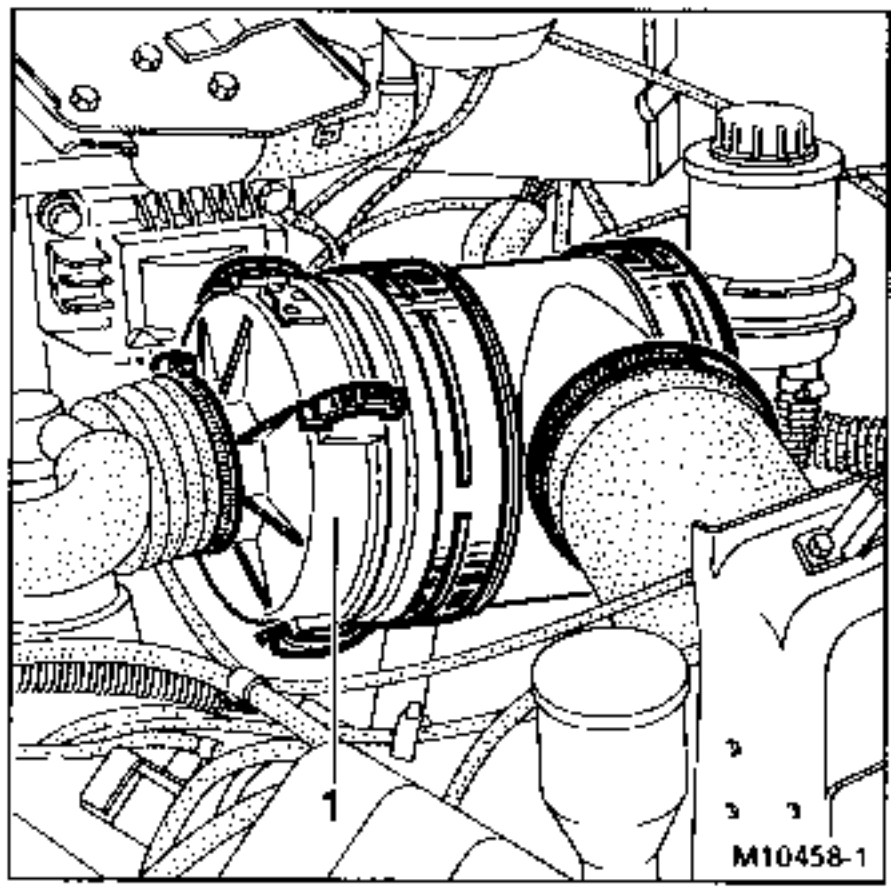
J7R-J7T ENGINES



J5S ENGINE



Z7W ENGINE



REMOVAL - REFITTING

Replace every 36000 miles (50000 km).

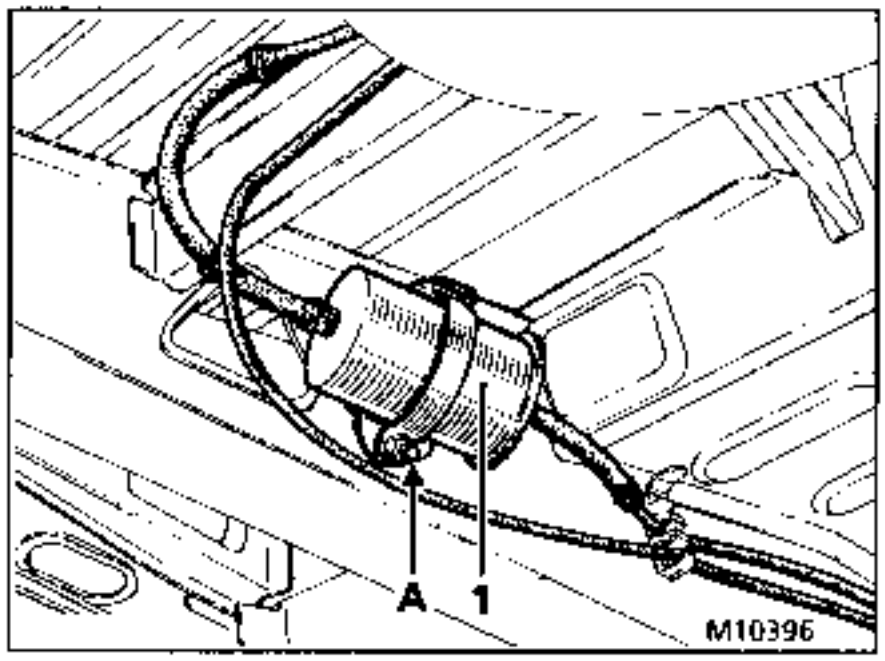
Disconnect the inlet and outlet hoses.

Slacken nut (A).

Take out the filter.

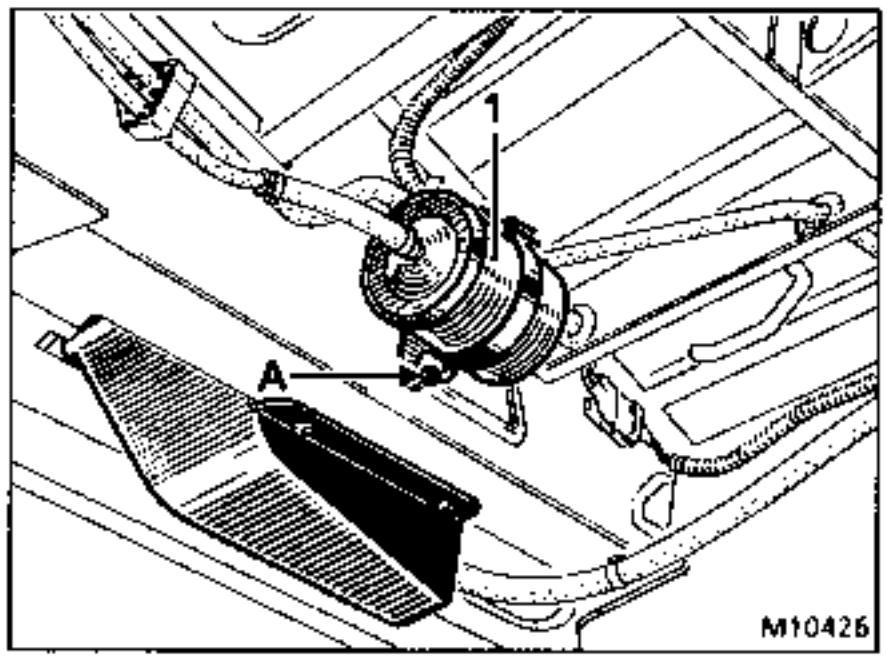
On refitting, ensure that the filter is fitted as indicated by the markings on the filter.

J7R - J7T ENGINES



Fuel filter (1) is located on the left-hand side member level with the front seat.

Z7W ENGINE



Fuel filter (1) is located on the inner face of the righthand side member near the fuel pump.

CHECKING THE FUEL PRESSURE

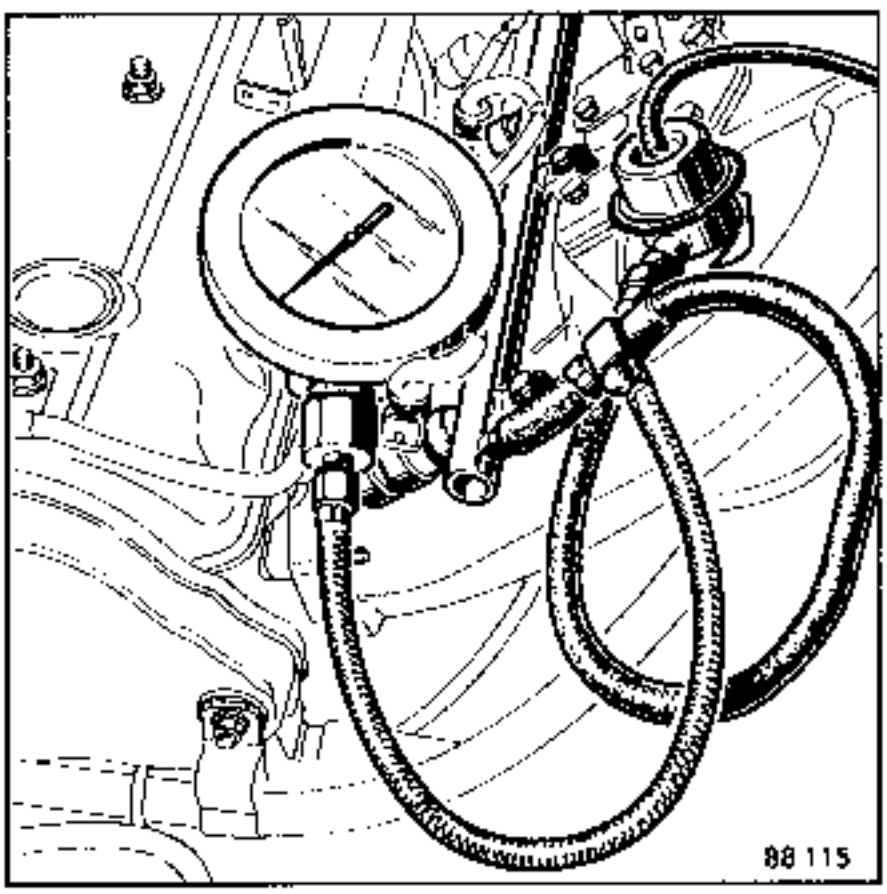
Disconnect the flexible hose between the pressure regulator and the injector gallery.

Connect a 0-6 bar pressure gauge.

Disconnect the pressure regulator vacuum flexible hose and connect it to a vacuum pump.

Start the engine.

Check the pressure and note it:
2.5 ± 0.2 bars - J7R - J7T
3.0 ± 0.2 bars - Z7W
Apply a vacuum of approximately 500 mbars to the pressure regulator: the pressure should drop by the value shown on the vacuum gauge.

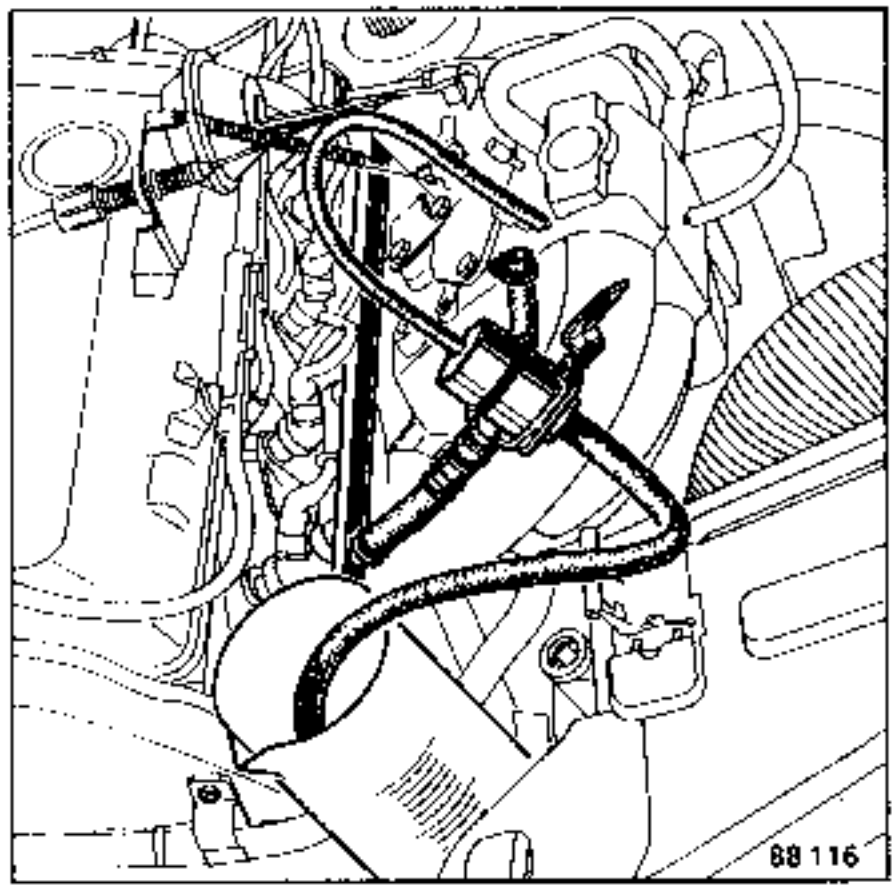


CHECKING THE FUEL PUMP DELIVERY

Disconnect the return-to-tank flexible hose going from the pressure regulator and place it in a 2000 ml graduated flask.

Start the fuel pump:

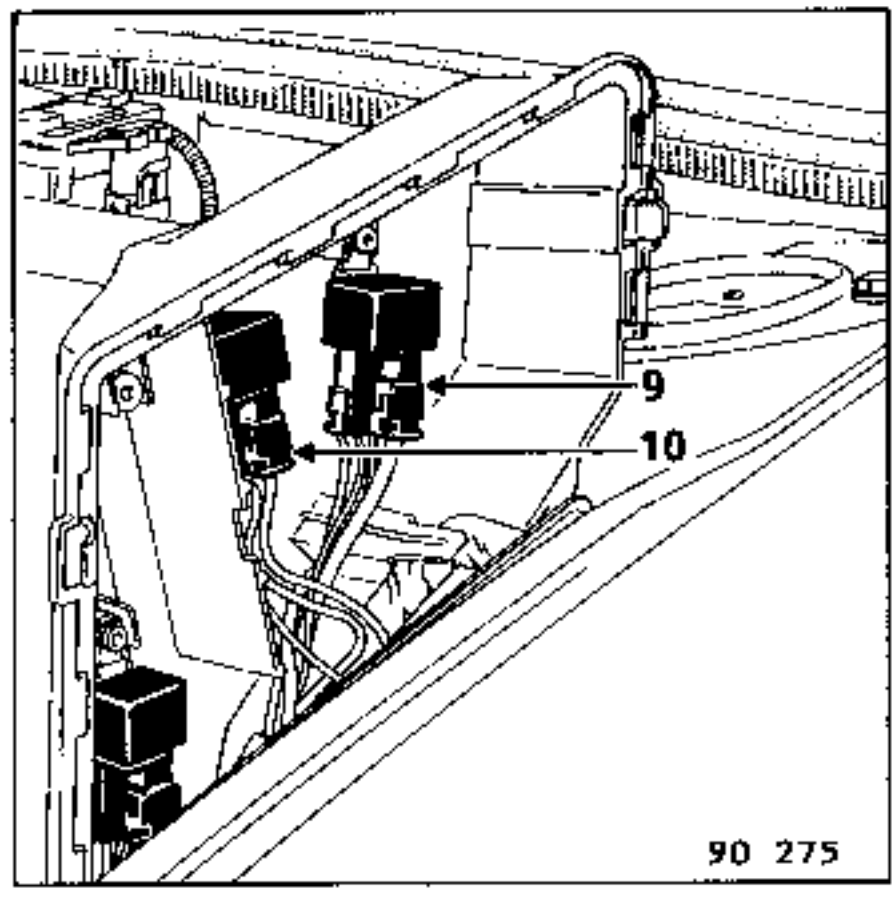
On the connector of fuel pump relay 293 shunt terminals 3 and 5 (large wires), with the computer disconnected. (Relays located inside injection computer cover).



Minimum delivery: 130 litres/hour, greater than 1 litre per 30 seconds.

Checking the pump pressure

Clamp the return-to-tank hose (for a few seconds). The pressure should be greater than 5 bars. If it is not, check the electrical circuit, the fuel pump and fuel filter.



3 - Fuel pump relay

4 - Injection relay

Essential Special Tooling	
Mot. 453-01	Hose Clamps

REMOVAL

The pump is located on the righthand side member under a protective casing in front of the fuel tank.

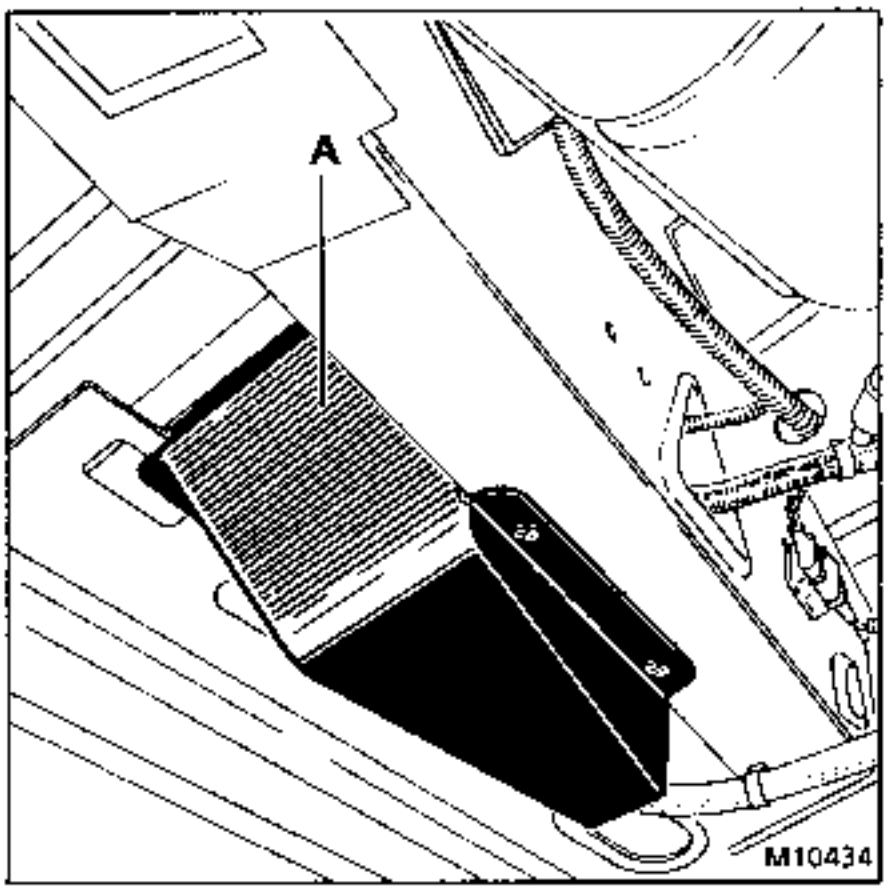
Remove protective casing (A).

Fit hose clamps MOT.453-01 to the flexible hoses and disconnect them.

Disconnect the electric leads from the pump.

Unscrew the fuel pump mounting clip.

Take out the pump.



REFITTING

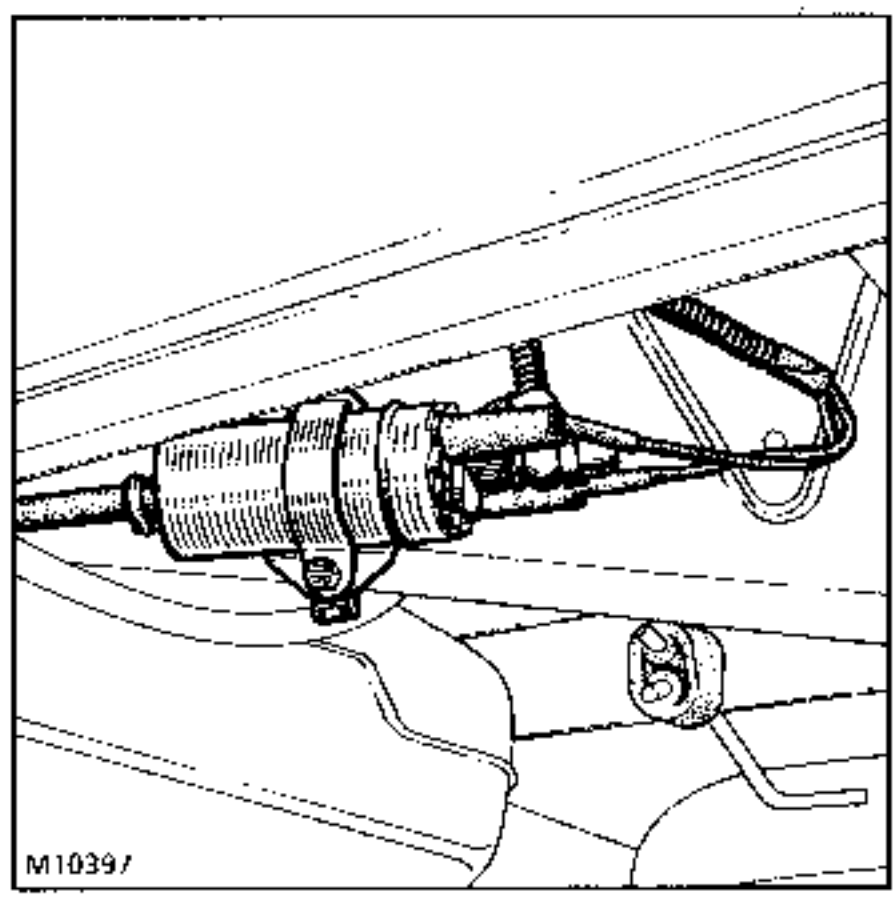
IMPORTANT:

Check the condition and connections of the hoses and electric leads (positive and negative are indicated on the pump).

The direction of flow of the fuel is shown on the filter.

Replace the clips.

Remove clamps MOT.453-01.



BOSCH INJECTION EQUIPMENT

Vehicle	Type	Engine
ESPACE TURBO	J635 05 - S635 05	J8S 772

Description	Make and type	Special points
Injection pump	BOSCH VE4/9F2200R345 VE4/9F2200R345-1 (versions with air conditioning)	Single piston rotary pump with mechanical centrifugal governor, automatic hydraulic advance, automatic cold start and fast idling system and solenoid shut-off, delivery corrector according to boost pressure (LDA).
Pump timing (engine at T.D.C., pump lift)	0,70 ± 0,02 mm	
Injectors	BOSCH KBE 48 S7	calibration + 8 bars - 5
Pintle and seat assemblies	BOSCH DN OSD 264	
Fuel filter	BOSCH ROTO DIESEL	Quick release filter element with integral water drain. With incorporated priming pump. Filter with electronic diesel fuel heater.
Injector pipes		Outside ø 6 mm Inside ø 2 mm Length 275 mm
Turbocharger	GARRETT T2 466 450	Boost pressure 0,6 ± 0,025 bars at 2500 ± 250 rpm Static opening pressure : 730 ± 30 mbars for adjusting rod travel of 0.38 ± 0.02 mm
Pre-heater unit	CARTIER	With pre-heating and post-heating function (3 mins max.)
Heater plug post-heating thermal switch		Circuit cut-off : 65° ± 2°C Circuit closed : 55° ± 2°C

SETTINGS

Idling	750 ± 50	rpm
Maximum speed	5000	rpm
Smoke density		
Approved figure	1.6^{m-1} :	48%
Maximum legal	2^{m-1}	55 %

TIMING TEST (on diagnostic bay)

Injection pump	Idling speed rpm	Injection commences before TDC
BOSCH J8S BT04	750 $^{+0}_{-50}$	13,5 + 1°

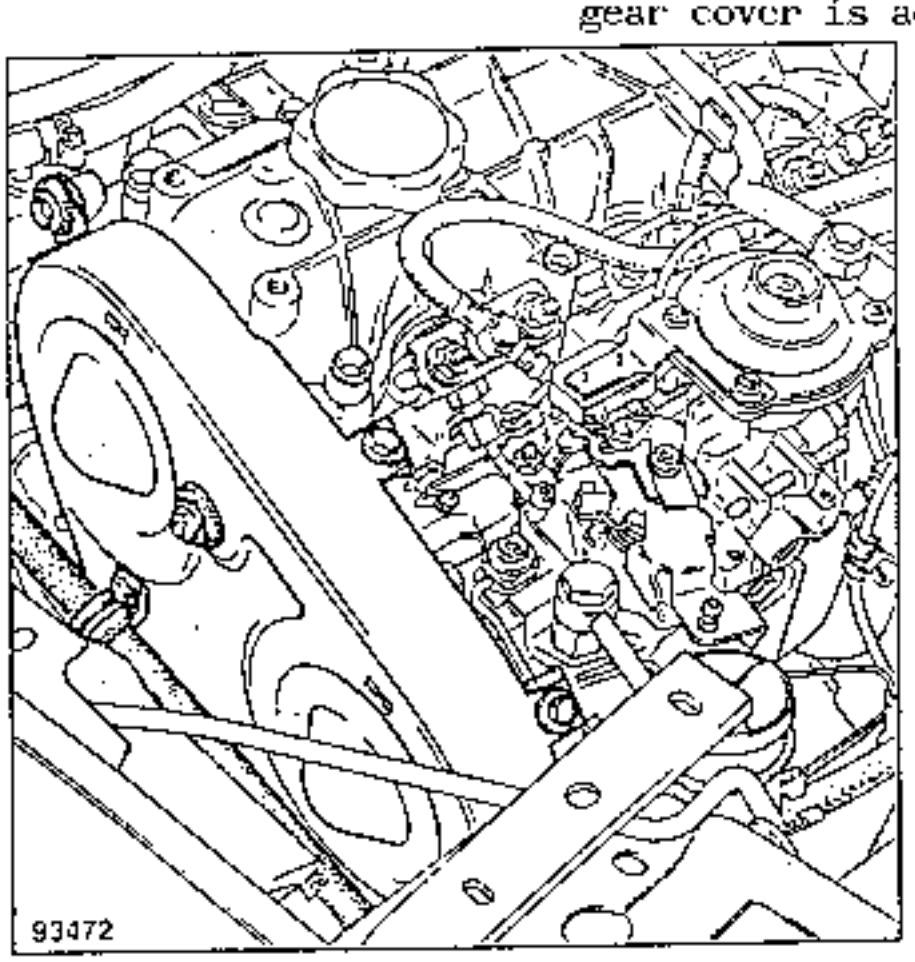
ACCESS TO TIMING GEAR COVER

The method for removal and refitting and timing the pump is described in MR INJ.(D).

HOWEVER, in order to reach the timing cover the following components have to be removed:

- the deflector;
- the upper cross member tube.

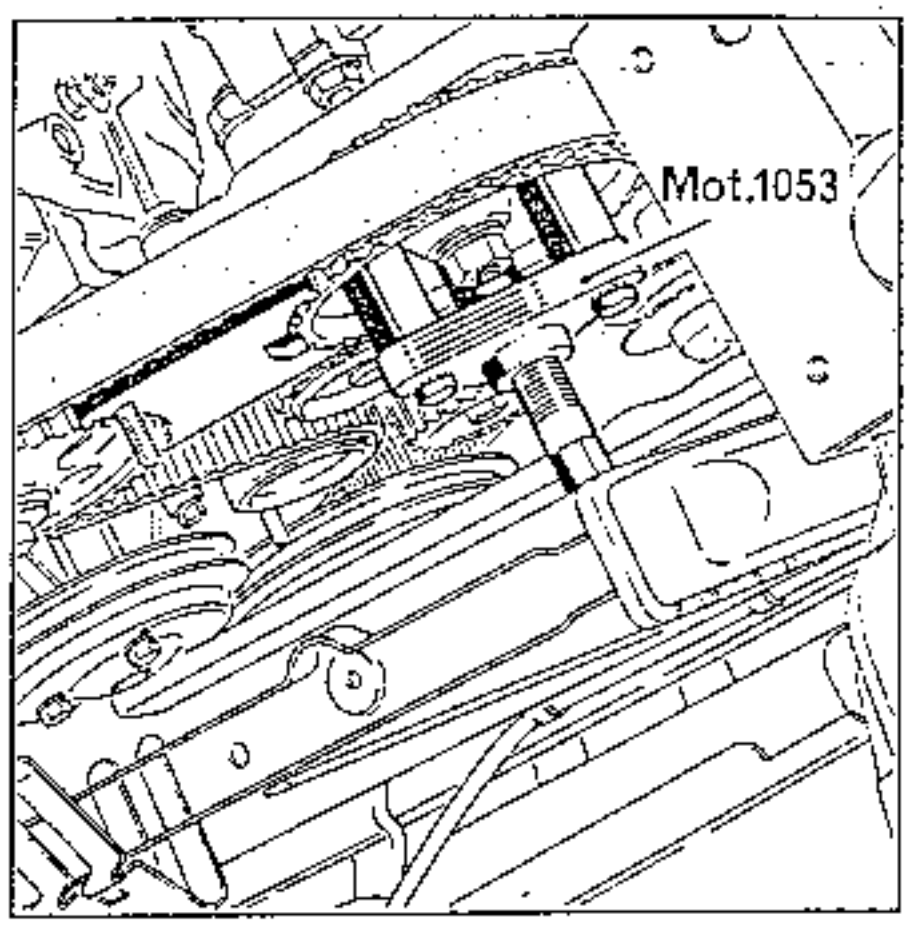
Tilt the radiator so that the timing gear cover is accessible.



Remove the cable protector located on the timing gear cover and release it by moving it forwards.

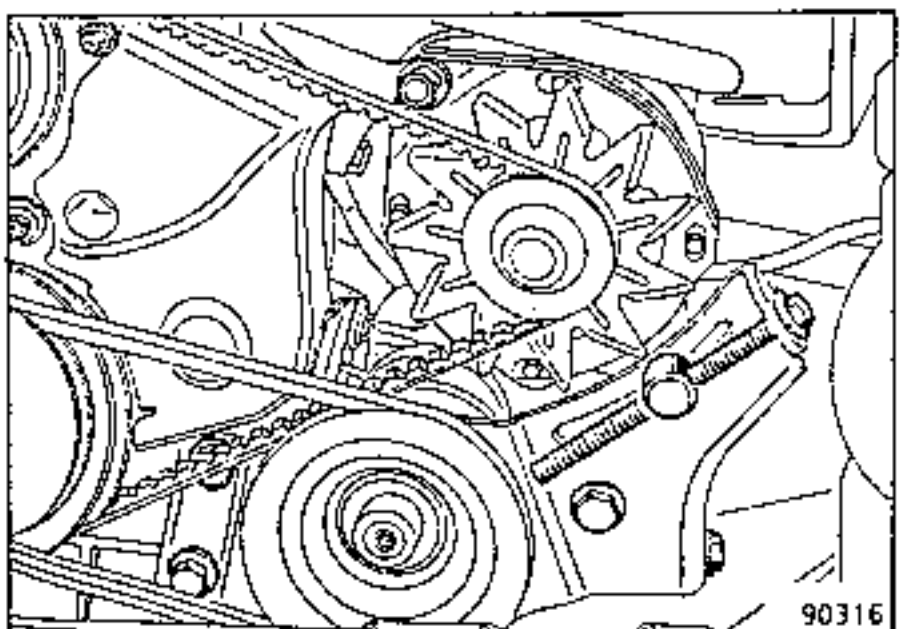
Remove the timing gear cover.

Use tool MOT.1053 to free the injection pump sprocket.

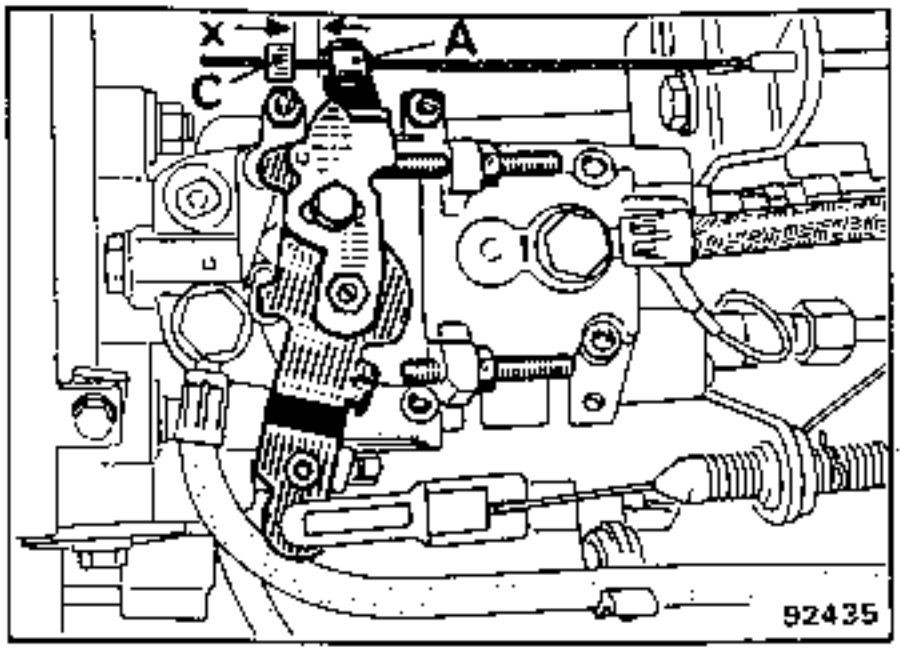


Under the vehicle remove :

- the PAS pump belt;
- the alternator drive belt and coolant pump.



IV - ADJUSTING THE FAST IDLING THERMO-STAT CABLE CLAMP



This operation must be carried out when the engine is warm after having adjusted the idling and fast idling speeds.

Pull the cable tight and place the cable clamp 6mm (dimension X) from lever (A), when in the idling position, then tighten the screw on the cable clamp(C).

Load micro switch (1).

The micro switch is to be checked or adjusted:

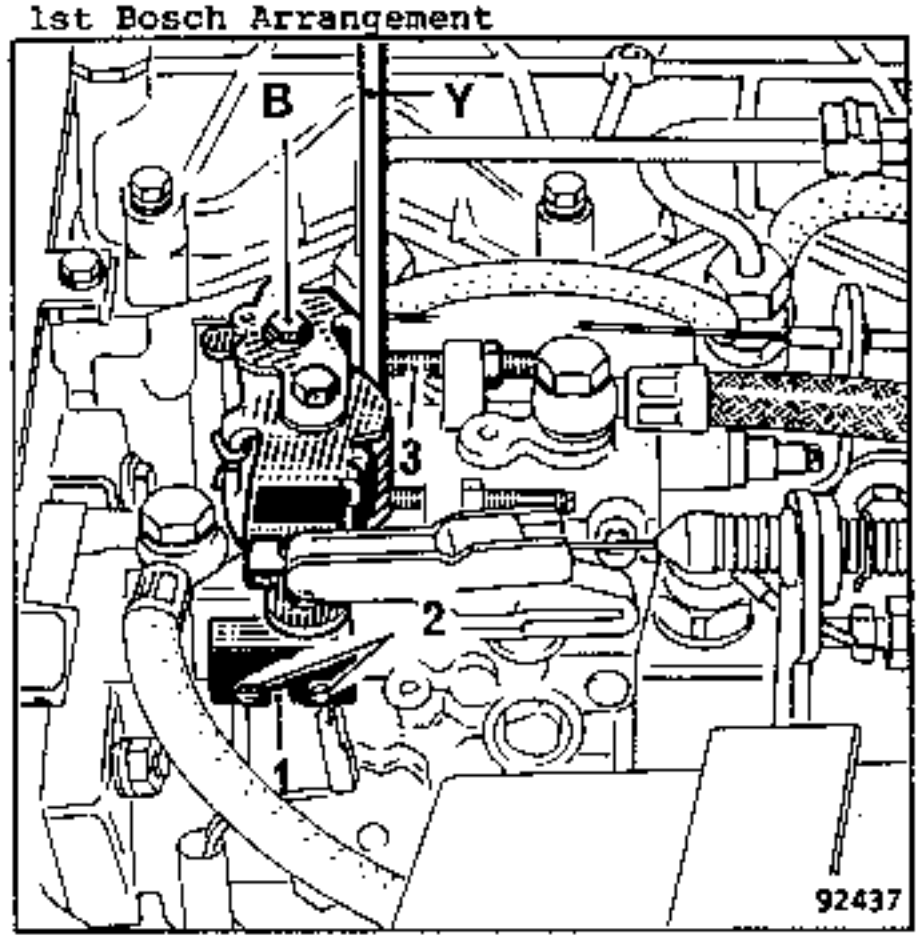
- whenever the micro switch has been replaced,
- following replacement of burnt out heater plugs,
- whenever work has been carried out on the injection pump at an injection centre (C.I.R.).

Use an ohmmeter or a test lamp.

Place a spacer (Y) between the throttle lever (B) and the anti stall stop (3):

Spacer (Y) in mm	Micro Switch	Test Lamp	Ohmmeter
10,2	closed	on	0Ω
11,5	open	off	Infinity

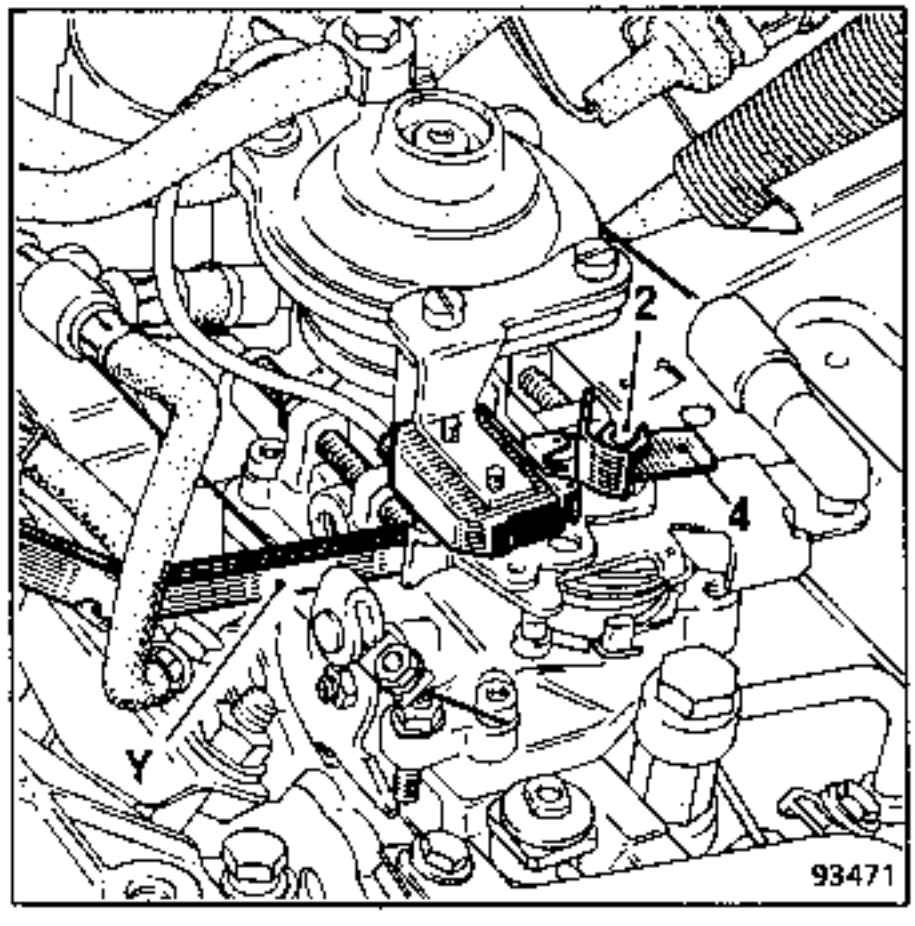
1st Bosch Arrangement



The system is adjusted by moving the micro switch (1) on its support.

Loosen the screws (2) and adjust the position of the micro switch to obtain the specified values.

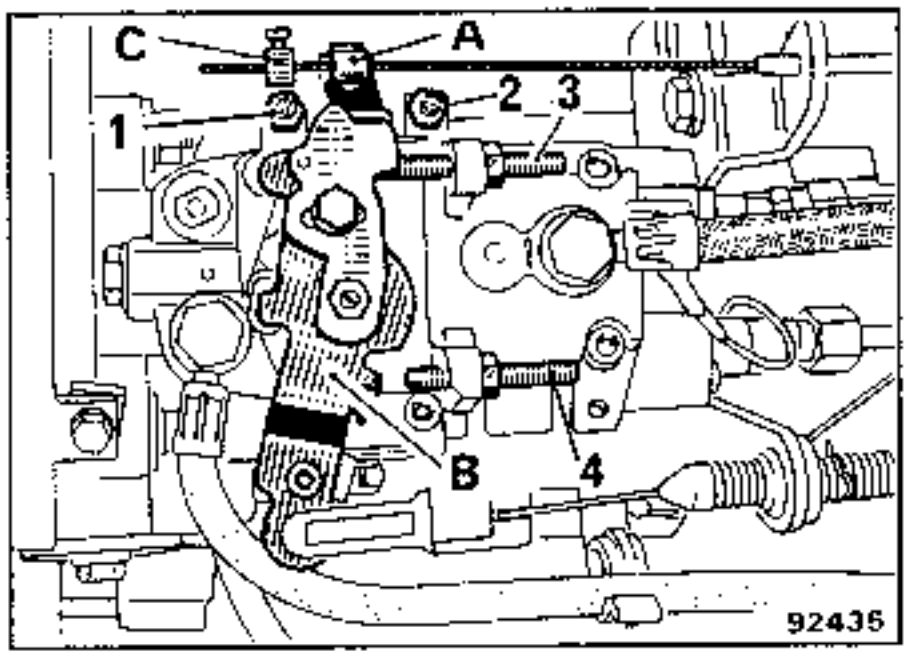
2nd Bosch Pump Arrangement



The adjustment is carried out by moving the cam on the throttle lever.

Loosen the screw (2) and move the cam (4) to obtain the specified value (Y).

CHECKING THE SPEEDS



A - Idling and fast idling lever.

B - Throttle lever.

1 - Fast idling adjusting stop screw.

2 - Normal idling adjusting stop screw.

3 - Residual delivery (anti stall) stop screw

4 - Maximum speed stop screw

This screw is sealed at the factory with a dab of Shellac varnish. It is not to be adjusted except by an injection centre specialist (C.I.R.).

I - ADJUSTING THE IDLING SPEED - FAST IDLING AND ANTI STALL SYSTEM

NOTE: All the adjustments described below are to be carried out on a warm engine, i.e. with a coolant temperature of more than 80°C.

a) Check that the idling speed is correct (see specifications).

NOTE: If the idling speed is not correct, a complete adjustment sequence will have to be carried out (see II).

b) If the idling speed is correct, place a 1mm feeler gauge between the stop screw (3) and the throttle lever (B). The speed should increase by 10 to 20 rpm.

- If the speed increases by more than 20 rpm, the complete adjusting sequence must be carried out (see II).

- If the speed increases by less than 10 rpm, only adjustment (IId) will be required.

II - FULLY ADJUSTING THE IDLING SPEED

a) Loosen the locknut and unscrew the screw (3) until the fall in the engine speed is stable, then unscrew screw (3) by a further two turns.

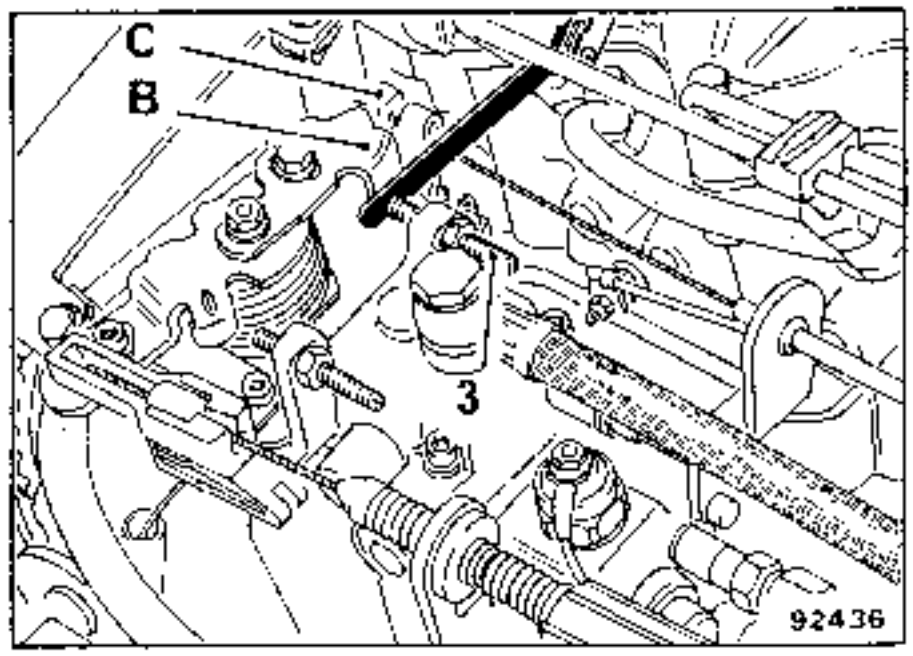
Check that the cable clamp (C) does not interfere with the movement of lever (A).

b) Loosen the locknut and turn screw (2) to obtain the required idling speed, then retighten the locknut.

c) Place a 1mm feeler gauge between the stop screw (3) and the throttle lever (B). The idling speed should not increase. If it does, repeat adjustments IIa and IIb.

d) With the 1mm feeler gauge still in position, tighten the stop screw (3) to increase the idling speed by 10 to 20 rpm. Remove the 1mm feeler gauge. The idling should return to the original speed.

Accelerate positively several times and allow the engine to return to idling speed.

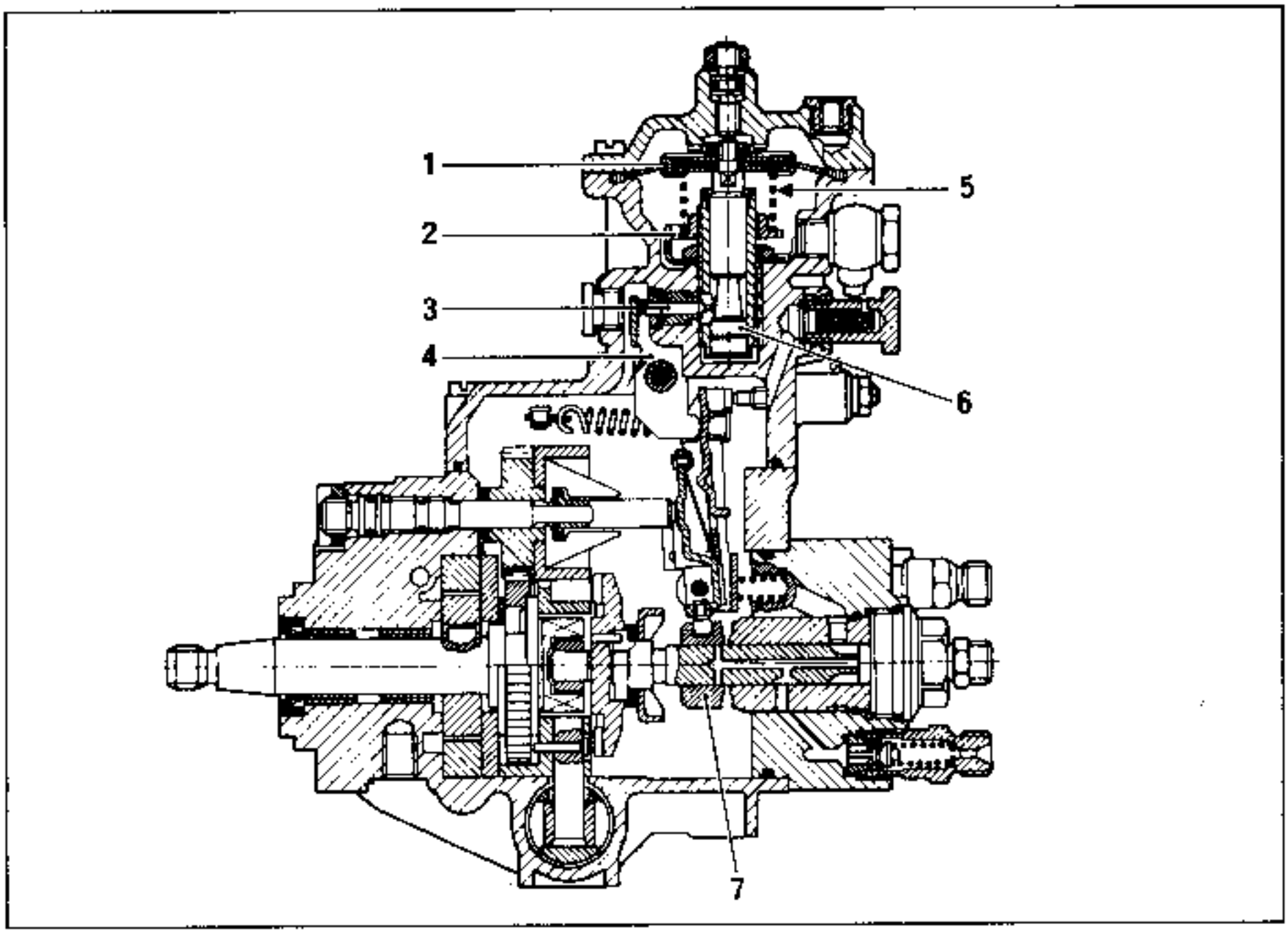


Check the initial idling speeds, with and without the 1mm feeler gauge, and if the speeds have altered, repeat the adjustments (b, c and d).

III- ADJUSTING THE FAST IDLING SPEED

Place lever (A) against its stop (1). Loosen the locknut and turn the screw (1) to obtain a speed of 1,000 $\pm$ 25 rpm, then retighten the locknut.

Recheck the fast idling speed and if it is outside the tolerances, repeat operation III.



1 Diaphram
2 Adjusting nut
3 Guide shaft
4 Stop lever
5 Compression spring
6 Adjusting shaft
7 Flow adjusting bush

The engine is supplied via an injection pump fitted with an LDA corrector which adjusts the pump delivery according to the boost pressure.

DESCRIPTION

The LDA corrector comprises a diaphram (1) which is subjected to:
- the inlet manifold pressure in its upper section;
- atmospheric pressure in its lower section.

A spring (5) holds the diaphragm in the reduced delivery position.

Nut (2) adjusts the tension of spring (5) and enables the delivery to be altered according to the boost pressure.

NOTE: the pump settings are sealed with a dab of paint; any alterations of settings should only be undertaken by an injection centre specialist.

OPERATION

The LDA corrector restricts the injector pump delivery in order to limit smoke emissions on acceleration or low engine speed at full load.

As soon as the boost pressure acts on the diaphragm it is moved, thus driving adjusting shaft (6) and guide shaft (3), stop lever (4) pivots thus enabling delivery adjusting bush (7) to move in the direction in which the delivery is increased.

ESSENTIAL SPECIAL TOOLING
M.S. 870 Vacuum gauge

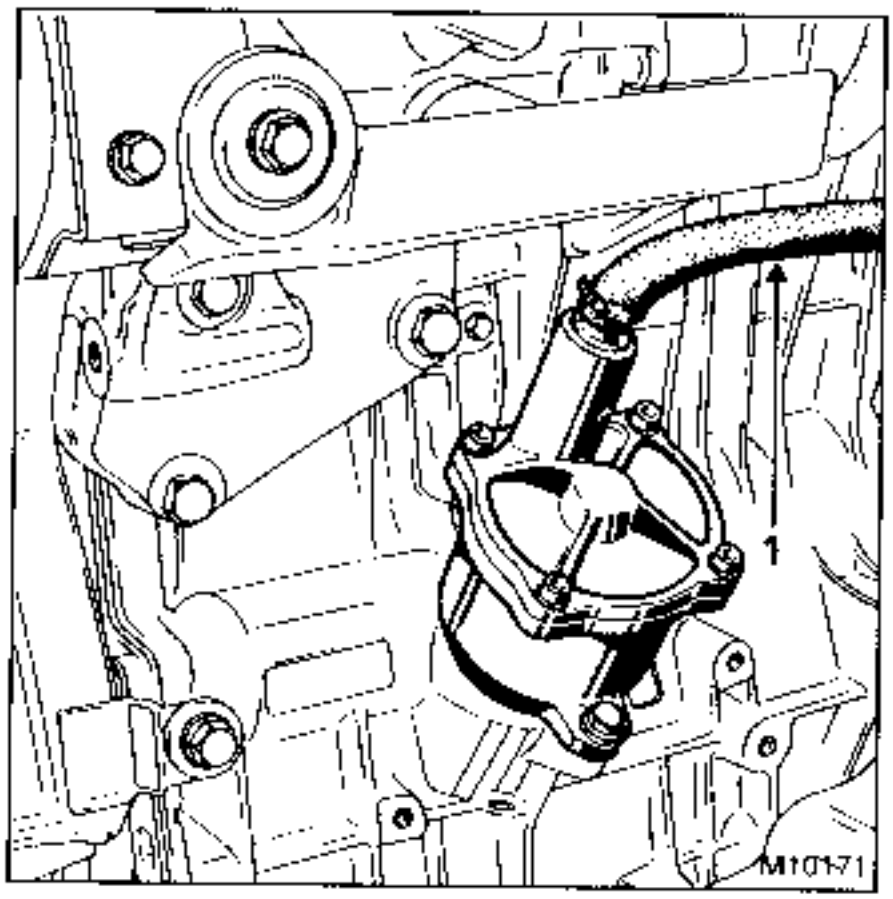
CHECKING

This operation is performed in situ.

Disconnect pump intake connection hose (1) and connect vacuum gauge Mot. 870 in its place.

Run the engine at a minimum of 2000 rpm.

The absolute vacuum pressure obtained should be greater than 770 mbar (570 mm Hg).



NOTE:
The complete method for checking the servo system is the same as for other vehicles in the range.

REFILLING THE SYSTEM

Oil grade to use:

ELF RENAULTMATIC D2
or
MOBIL ATF 220

Capacity: 1.1 litre

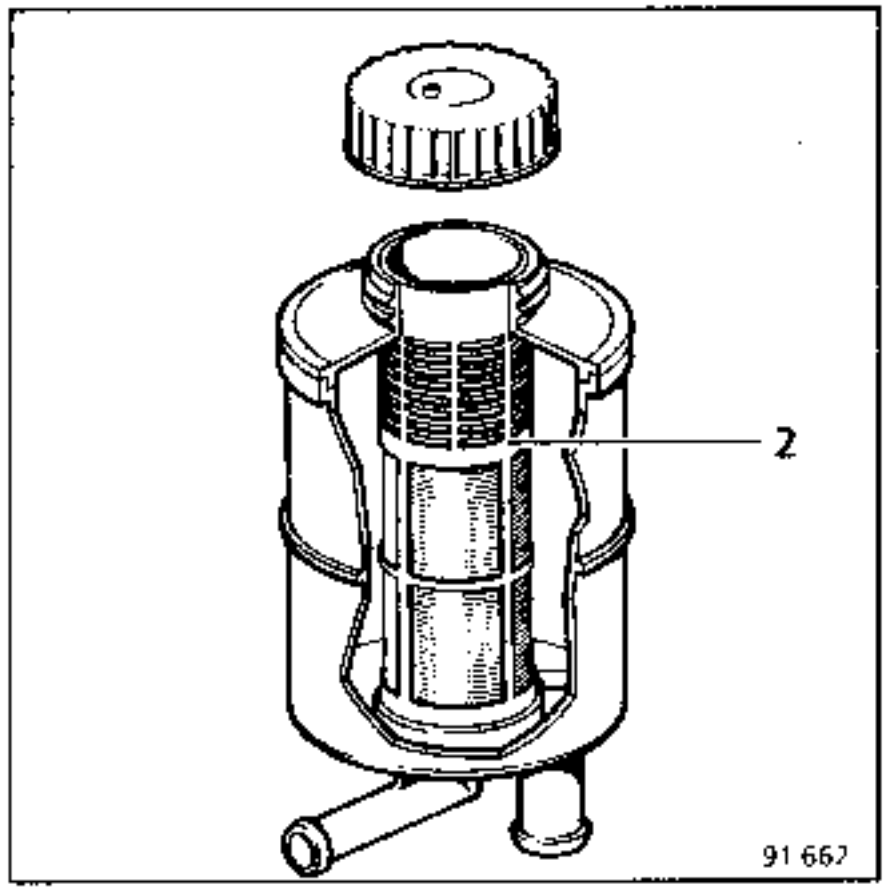
Fill the reservoir completely.

Move the steering gently in both directions.

Top up the oil level.

Start the engine and gently move the steering completely from right to left.

Top up the oil level.



The oil should be visible level with pad (2) in the sleeve.

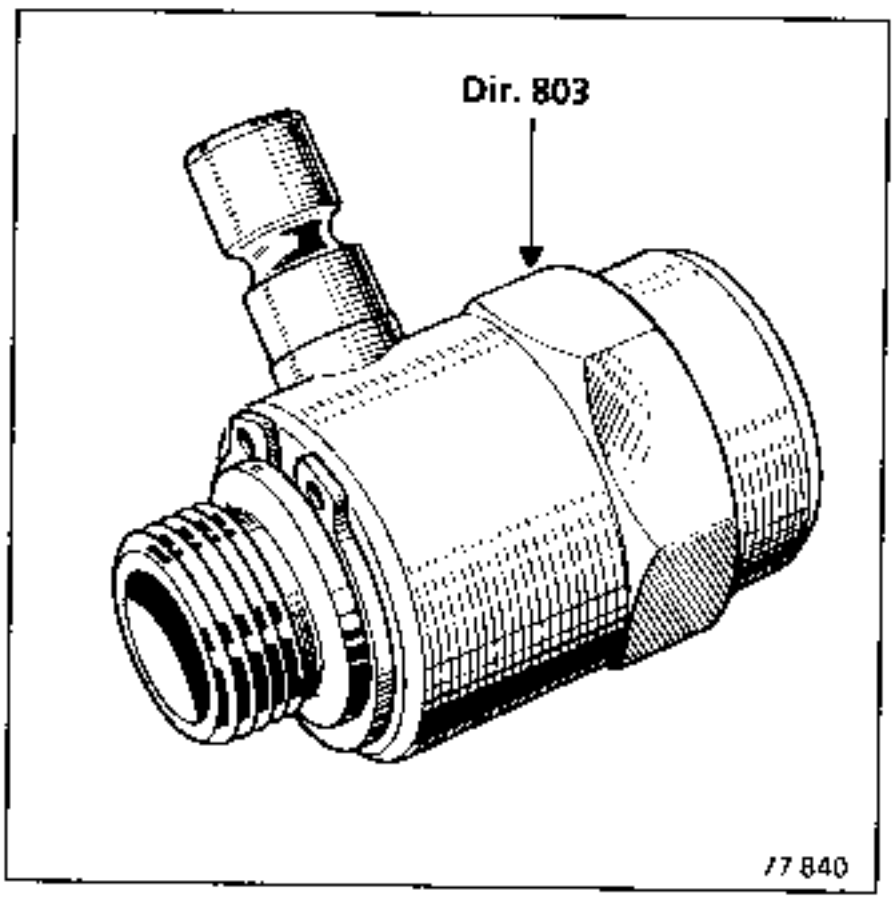
ESSENTIAL SPECIAL TOOLING		
Mot.	453-01	Flexible hose clamps
Dir.	803	Union with metric pitch
Fre.	1085	
	or	Pressure measuring gauge
Fr.	244-04	

CHECKING THE OIL PRESSURE

Fit a clamp Mot. 453-01 on the pump low pressure hoses.

Disconnect the high pressure lines (place a container underneath to catch the fluid).

Place union Dir. 803 (with metric pitch)between the hose and the pump.



Connect pressure gauge Fre. 1085 or Fre. 244-04.

Remove clamp Mot. 453-01.

Top up the oil level in the pump and run the engine so that the pressure can be checked.

Wheels in a straight line:

Irrespective of the engine speed, the maximum pressure should not exceed 5 to 7 bars.

Wheels turned on full lock on one side:

Keep the wheels on full lock on one side; the maximum pressure should be 85 bars.

This operation should be performed relatively quickly, to prevent a great increase in the oil temperature.

Remove union Dir. 803 and pressure gauge Fre. 1085 or Fre. 244-04 and cut off the pump supply by fitting clamp Mot. 453-01.

Reconnect the high pressure lines and remove clamp Mot. 453-01.

Top up the oil in the reservoir.

ESSENTIAL SPECIAL TOOLING
Mot.453-01 Hose Clamps

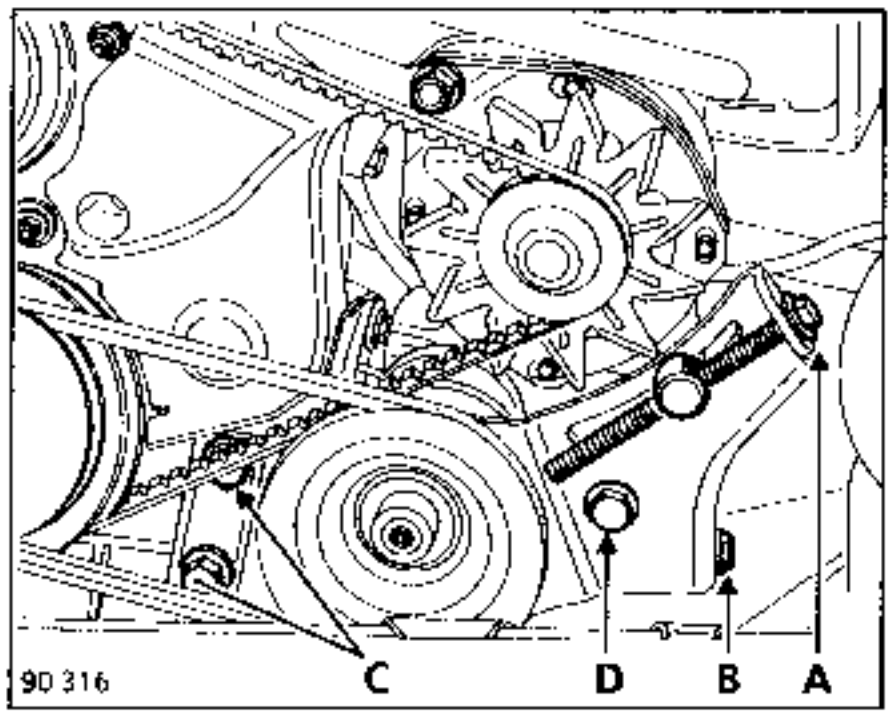
REMOVAL

Fit a clamp Mot.453 01 to the feed pipes.

Place a container underneath to catch the oil.

Disconnect the feed and high pressure hoses.

Slacken:
- alternator tensioner (A) and remove the alternator lower mounting nut;
  PAS pump tensioner (B);
- the 2 bolts (C), bolt (D) and the pump rear mounting bolt.



Free the belt.

Remove:
  the pump rear mounting bolt;
- the 2 bolts (C);
- the pump-mounting assembly.

If any parts are being replaced remove:
  the pulley (see relevant section);
- the mounting.

REFITTING

If parts are being replaced, fit in place:
- the pump mounting;
- the pulley (see relevant section).

Refit:
- the pump-mounting assembly;
- the high and low pressure feed lines.

Remove clamp Mot.453-01.

Adjust the belt tension (see relevant section).

Fill and bleed the circuit (see relevant section).

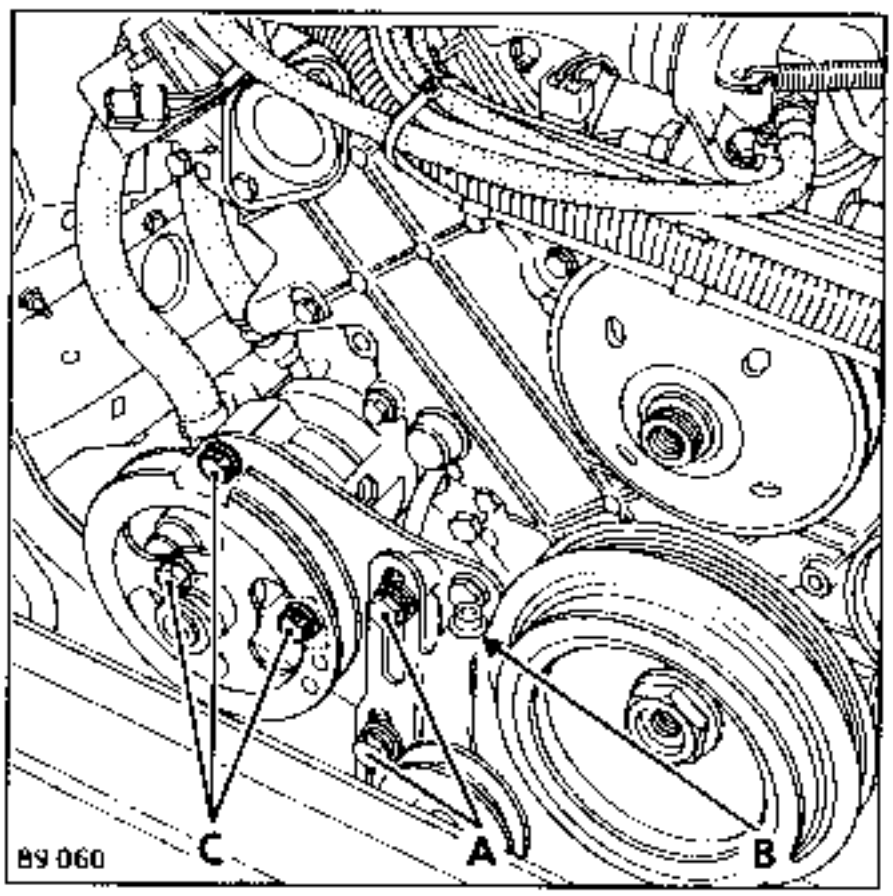
ESSENTIAL SPECIAL TOOLING	
Mot. 453-01	Hose Clamps
Ele. 346-04	Belt Tension Checking Tool

REMOVAL

Fit clamp Mot.453-01 on the feed lines.

Place a container underneath to catch the oil.

Disconnect the feed and high pressure hoses.



Slacken bolts (A).

Slacken the belt by unfastening bolt (B).

Free the belt.

Slacken the 3 bolts (C) on the front mounting and rear mounting bolt.

Remove the pump.

REFITTING

Proceed in the reverse order to removal.

Adjust the belt (see section 11).

Fill and bleed the system.

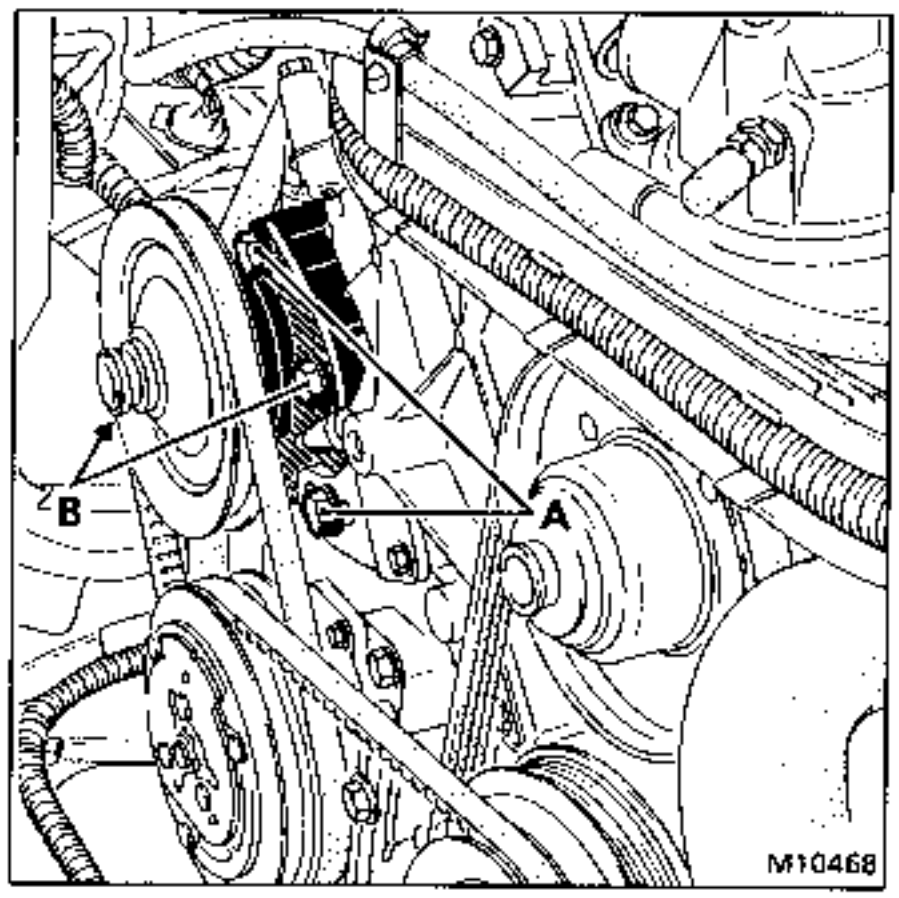
Version with Air Conditioning

REMOVAL

Fit clamp Mot.453-01 to the feed lines.

Place a container underneath to catch the fluid.

Disconnect the feed and high pressure lines.



Slacken bolts (A).

Tilt the pump:

- free the belt;
- unscrew bolts (B);
- remove the pump.

REFITTING

Proceed in the reverse order to removal.

Adjust the belt (see section 11).

Fill and bleed the system.

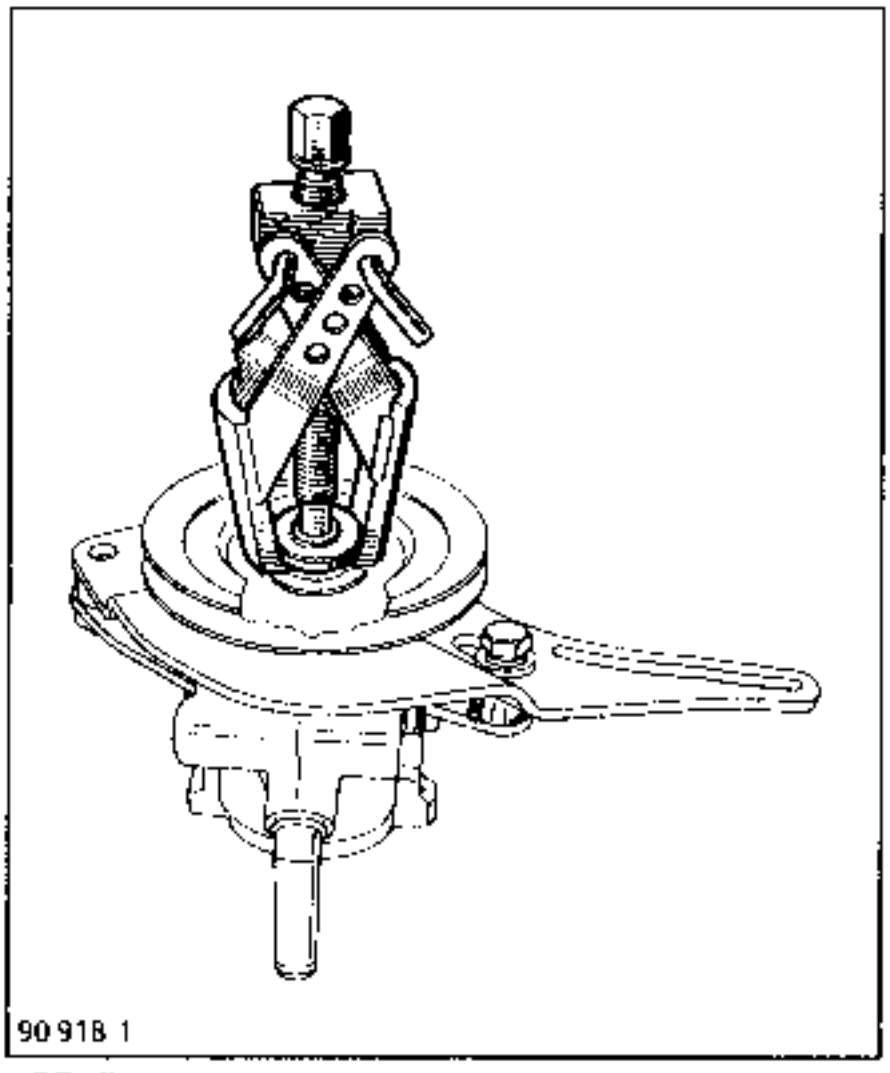
In order to remove the PAS pump belt, the air conditioning compressor belt has to be removed.

REPLACING THE PULLEY

ESSENTIAL SPECIAL TOOLING	
Dir. 1083	Power-assisted pump pulley refitting tooling

REMOVAL

Extract the pulley using an extractor tool after reading off the distance between the pulley and the end of the shaft.



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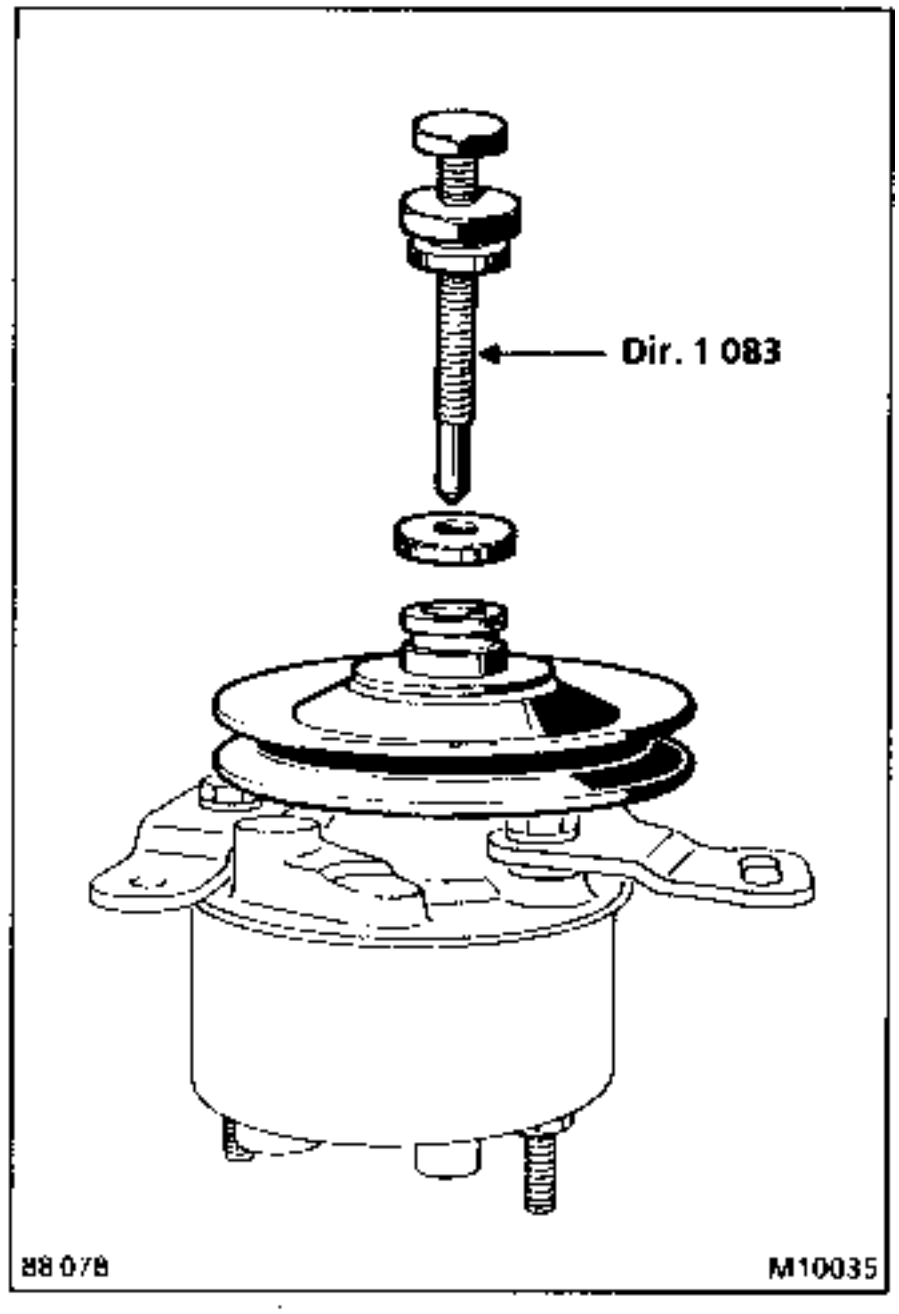
REFITTING

NOTE: It is essential to fit the pump bracket before fitting the pulley.

Push on the pulley using tool Dir. 1083 until the dimension measured before removal is obtained.



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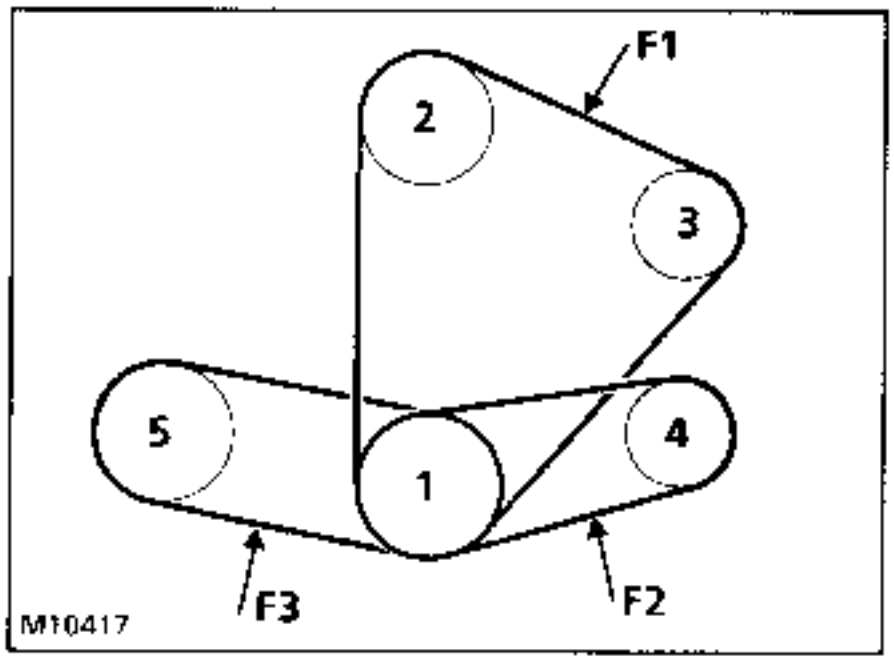
ADJUSTING THE DRIVE BELT TENSION

ESSENTIAL SPECIAL TOOLING
Ele. 346-04 Belt tension tester

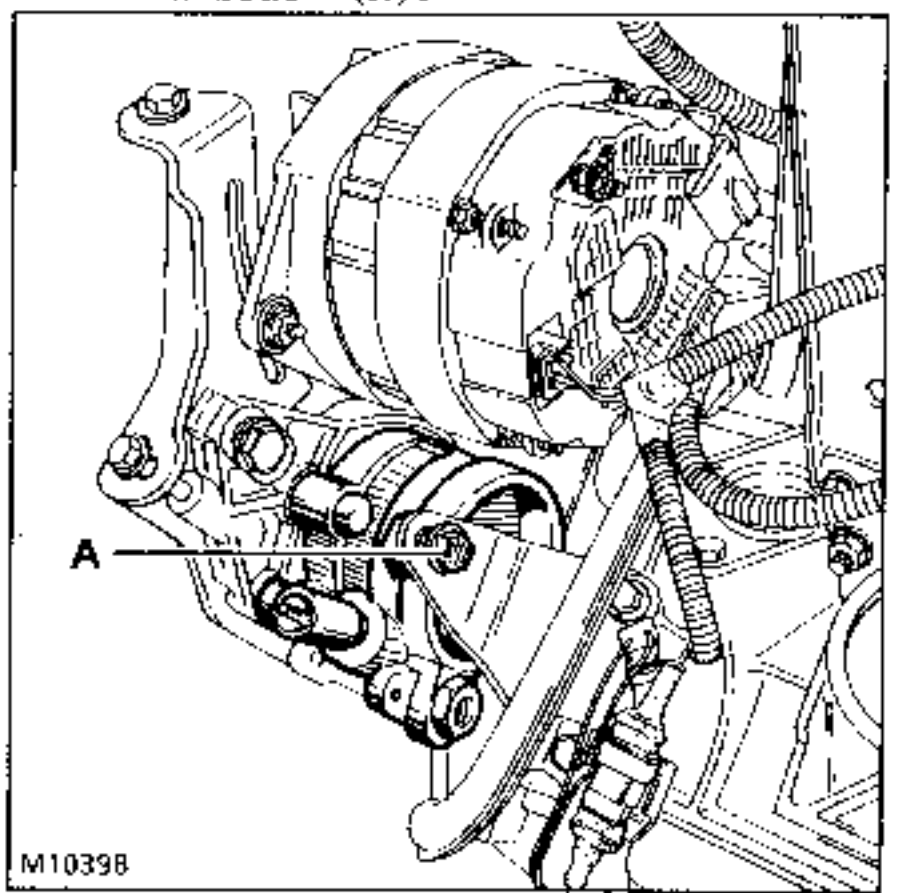


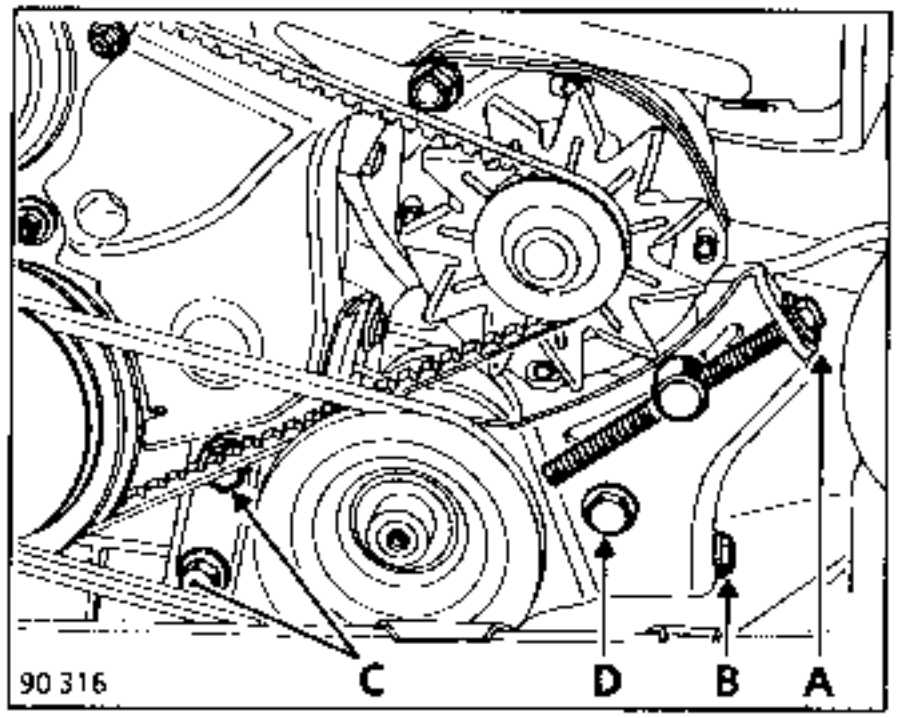
1 - Crankshaft pulley
2 - Coolant pump pulley
3 - Alternator pulley
4 - Power steering pump pulley
5 - Air conditioning compressor pulley

CHECKING

Cold : 3.5 mm
Hot: 4 to 4.5 mm

Place the vehicle on a lift.
Unscrew bolt (A).





Slacken bolts C and D.

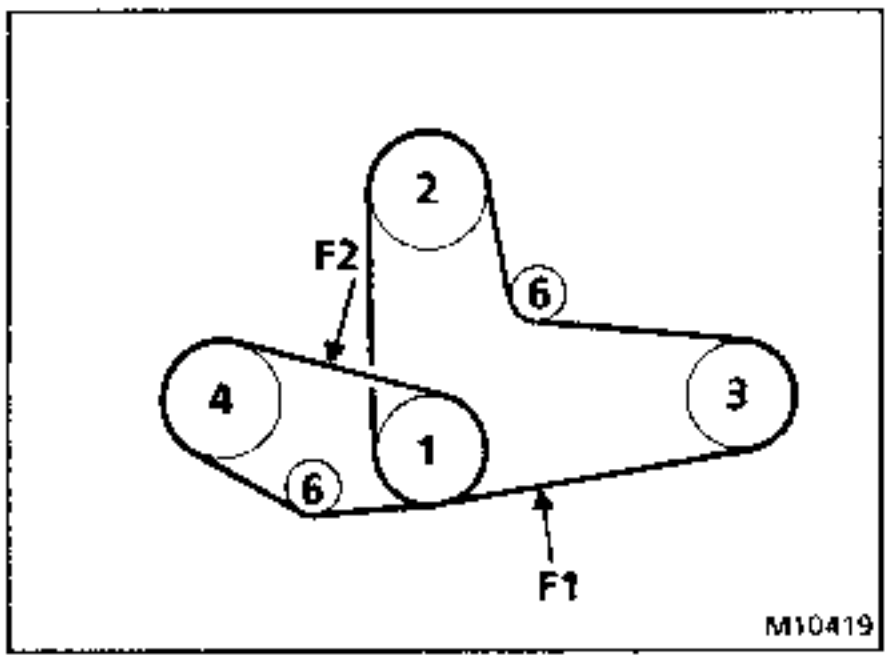
Tension the belt, using a tensioning bolt (B).

Retighten the 3 bolts (A), (C) and (D).

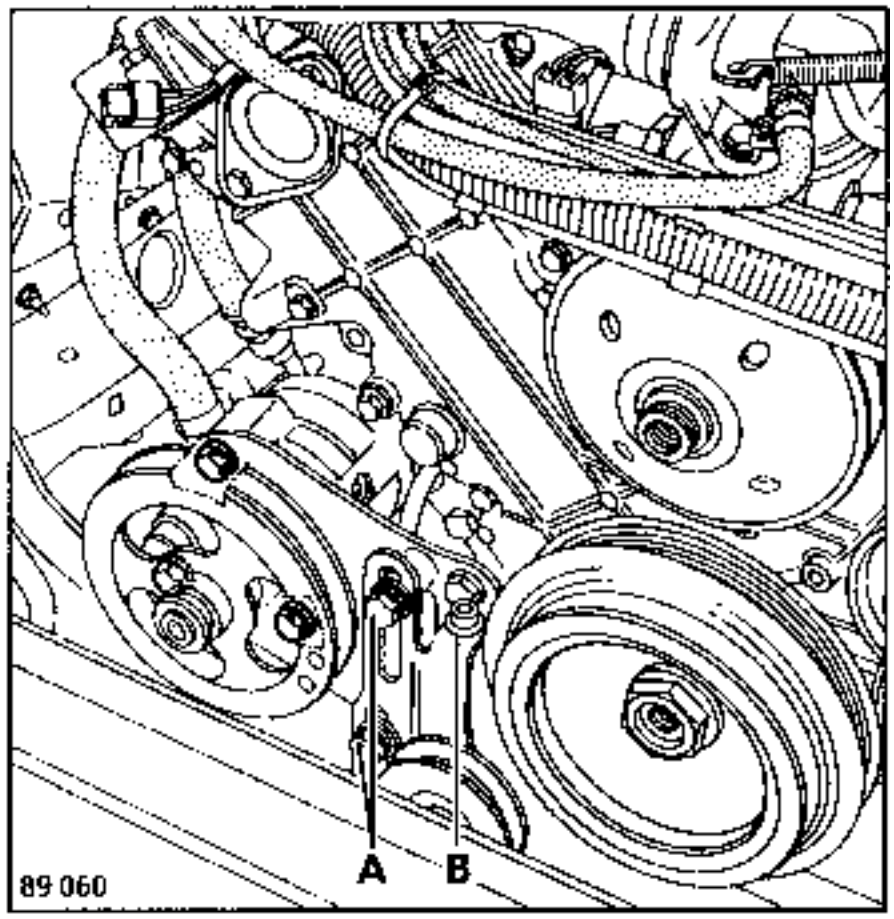
Check the tension after 10 minutes' operation (deflection F: 4 to 4.5 mm).

ADJUSTING THE BELT TENSION

ESSENTIAL SPECIAL TOOLING
Ele. 346-04 Belt Tension Tester



1 Crankshaft pulley
2 Coolant pump pulley
3 Alternator pulley
4 Power-assisted steering pulley
6 Tensioner



Slacken bolts (A).

Tension the belt - bolt (B).

Tighten bolts (A).

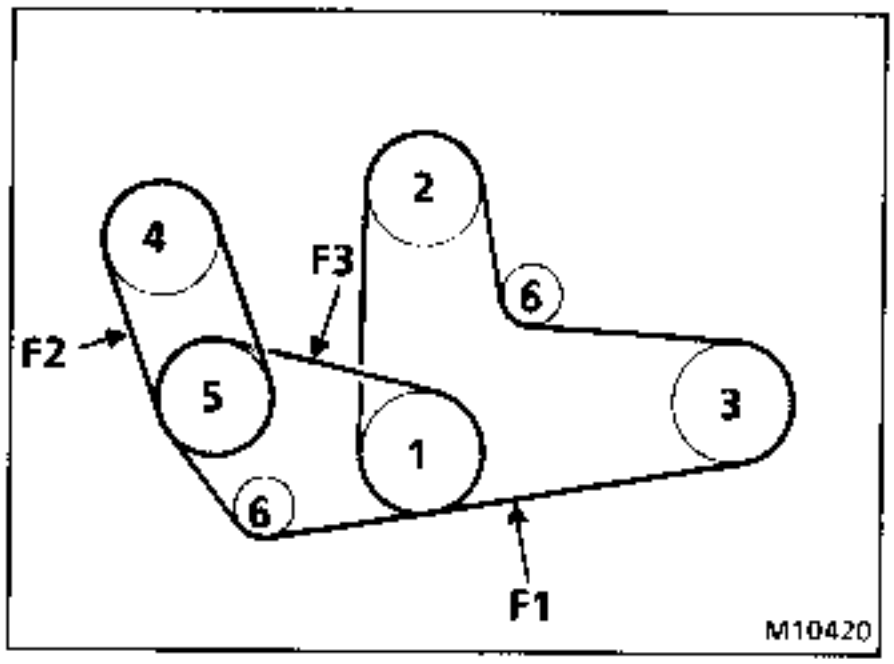
Check the tension after 10 minutes running:

- Cold 3.5 mm
- Hot 4 to 4.5 mm

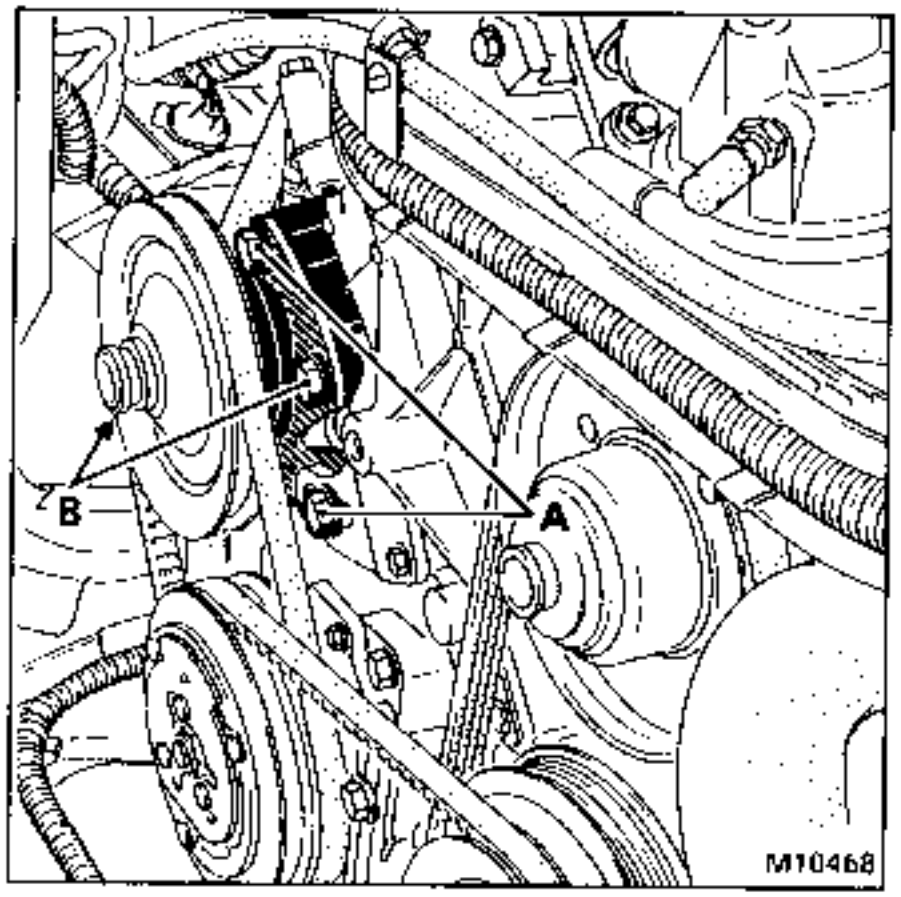
Version with air conditioning

ADJUSTING THE BELT TENSION

ESSENTIAL SPECIAL TOOLING
Ele. 346-04 Belt Tension Tester



1 Crankshaft pulley
2 Coolant pump pulley
3 Alternator pulley
4 PAS pump pulley
5 Air conditioning compressor pulley
6 Tensioner



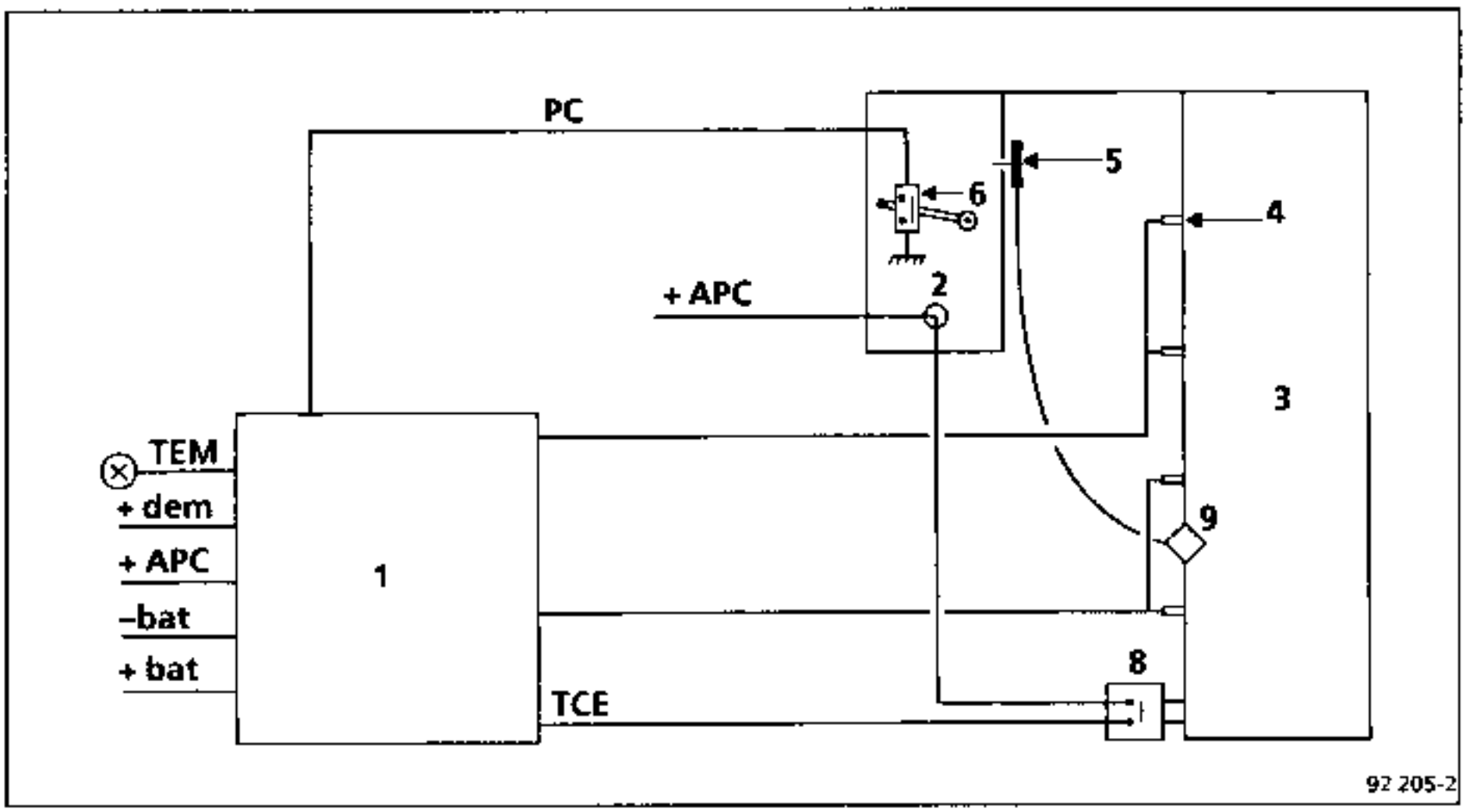
Slacken bolts (A).

Using a lever, tension the belt.

Retighten bolts (A).

Check the tension after 10 minutes' running:
- cold **3,5 mm**
- hot **4-4,5 mm**

COLD START SYSTEM OPERATING DIAGRAM



1 Preheater computer
2 Injection pump
3 Engine
4 Heater plugs
5 Idling and fast idling lever
6 Solenoid valve (circuit established on idling)
8 Thermal switch (circuit established when temperature less than approx 60°C)
9 Thermal component (permits fast idling, engine cold).

OPERATION OF PREHEATER COMPUTER

A Ignition on (T1: heater plug heating time)

NOTE: the illumination of the test bulb varies according to the unit temperature:
- approximately 20 seconds at -30°C
- immediate at 80°C.

B Cut-off of heater plugs warming-up stage (without starter being activated, heater supply cuts off after 4.5 secs T2).

C Engine starting: when starter activated, heater plugs are still fully supplied with power for 10 seconds (T3).

D Heater plugs post-heating - T4. This function may last for 3 minutes maximum; during this period the heater plugs are supplied with power at half capacity (alternately in pairs).

NOTE: function T3 may be interrupted:

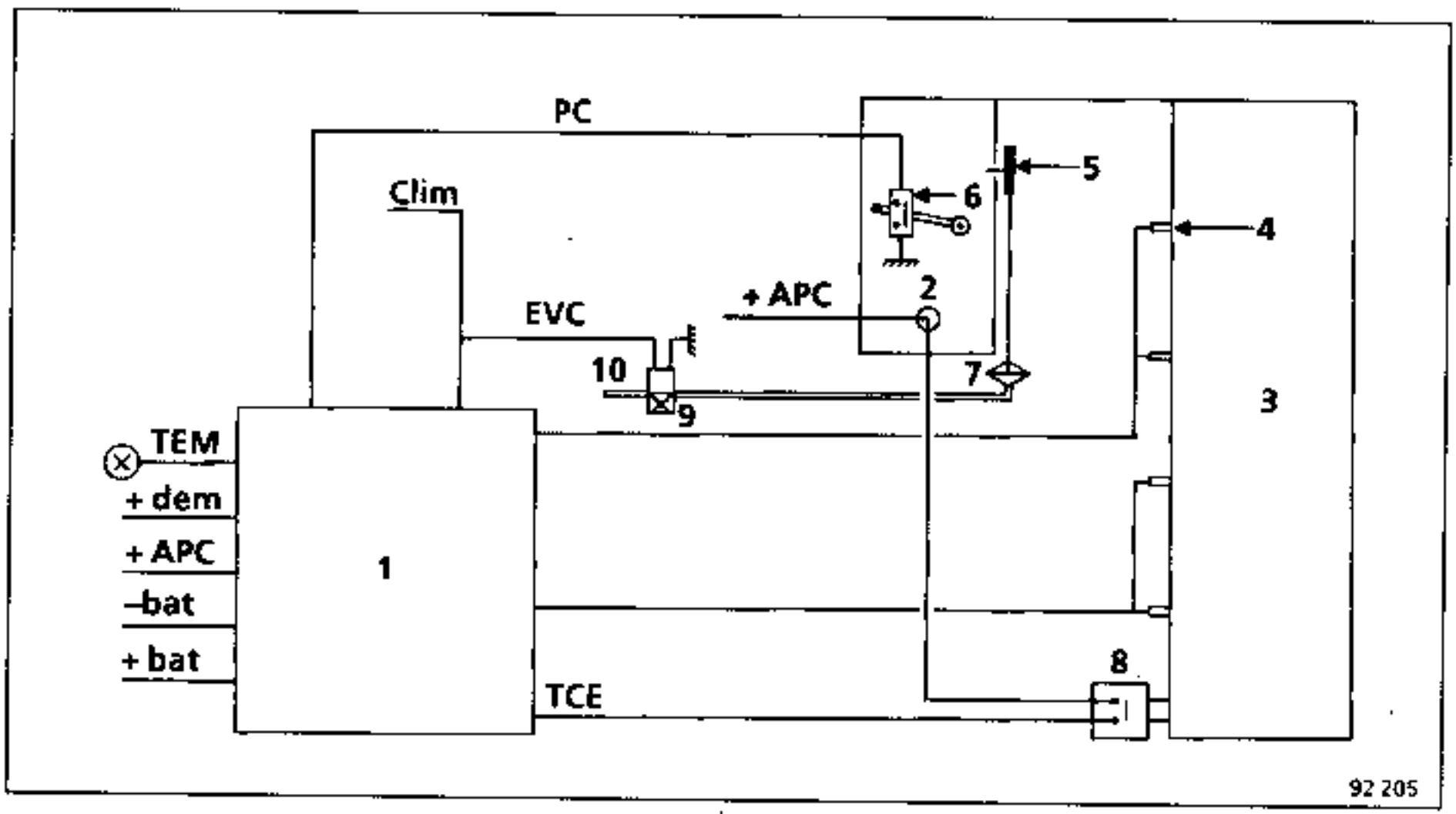
- as soon as the coolant temperature exceeds 60°C approximately (thermal switch 8);
- 3 seconds after the load switch 6 has cut off. The heater plugs heating system is re-established as soon as the full throttle circuit is open.

FAST IDLING WHEN COLD

A thermal component (9) holds idling lever (5) in the fast idling position.

As the temperature increases, the lever gradually returns to the normal idling position.

COLD START SYSTEM OPERATING DIAGRAM (Air Conditioning)



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FAST IDLING
On vehicles equipped with air conditioning, fast idling (5) is controlled by a pneumatic vacuum capsule (7) connected to the vacuum pump circuit (10).
FAST IDLING WHEN COLD

Solenoid valve (9) is supplied at the same time as the heater plugs (T1 + T2 - T3 + T4).

FAULT FINDING

General

The pre and post heating unit is equipped with protective devices which partially or totally cancel its operation:

- heater plugs or power circuits shorting;

- short circuit on instrument panel warning light output;

- power supply greater than 16 ± 1 volt

NOTE: the operation of the unit returns to normal as soon as the above defect has disappeared.

The causes of the failure to operate of the preheating unit are diagnosed according to the following observations:

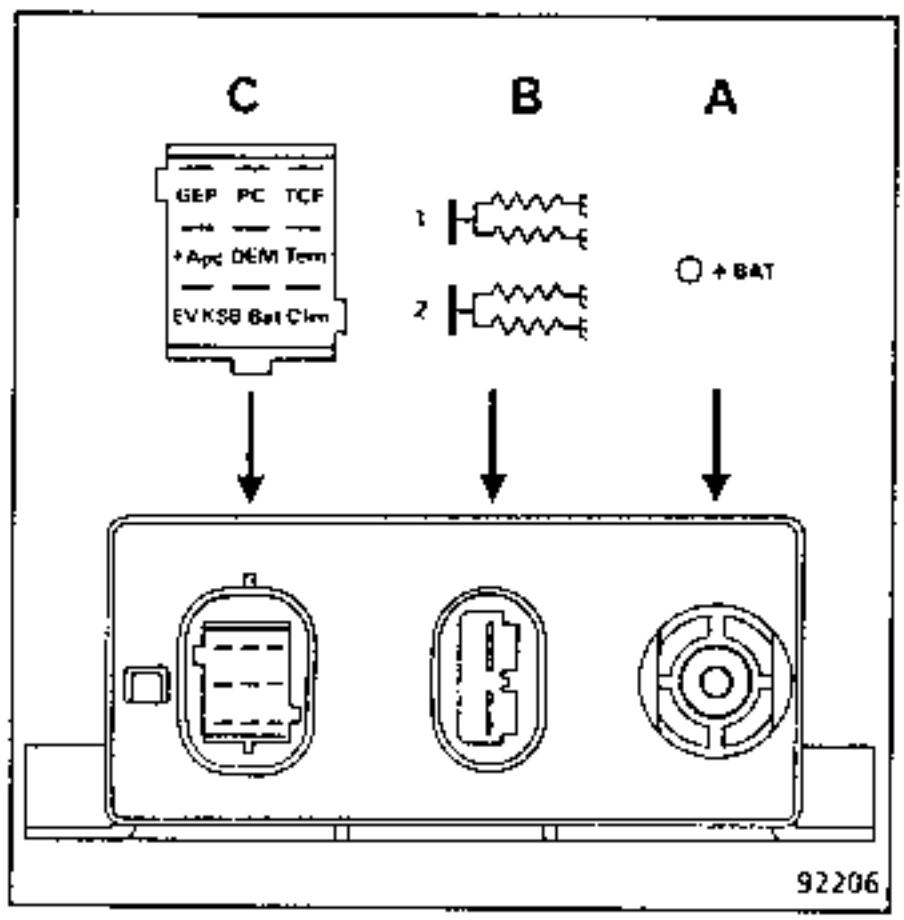
1 - Preheater warning light does not operate and engine does not start when cold.

2 - Preheating warning light operates and engine does not start when cold.

3 - Preheating warning light does not operate and engine starts normally when cold after approximately 10 seconds preheating time.

4 - Preheating system operating normally and postheating system not operating.

ELECTRONIC PREHEATER UNIT



Circuit Channel Functions

A - + BAT = battery +

B - 1: Power supply to plugs 1 and 2
2: Power supply to plugs 3 and 4

C - GEP: not used (electrically driven power steering pump).

P.C.: load switch on injection pump control lever (circuit closed at idling speed)

TCE: coolant temperature switch (circuit open at temperatures above approximately 60°C).

+ APC: + after ignition switch.

DEM: + starter signal

TEM: preheater warning light

EV KSB: cold starting advance solenoid valve.

-BAT: battery earth (ground).

Clim: + fast idling solenoid valve supply (air conditioning option).

FAULT FINDING

1 Preheating warning light does not operate and engine does not start when cold.

CHECK	REMEDIAL ACTION
Disconnect heater plug feed connector (B) and perform a preheating test: - warning light illuminates normally	Check heater plug harness. If correct, check and replace faulty heater plug or plugs.
- warning does not illuminate and no voltage at connector (B) outputs	Check heater plug circuit and instrument panel warning light circuit, repair if necessary.
- warning light does not illuminate and no voltage at connector (B) output	Check: - connector (A) battery - - connector (C) + after ignition connector (C) battery earth - if feed correct, change preheating unit

2 Preheating warning light operates and engine does not start when cold.

CHECK	REMEDIAL ACTION
Disconnect connector (B) and perform a preheating test.	
Warning light illuminates and voltage at connector (B) outputs.	Check heater plug circuit; if correct check and replace faulty heater plug or plugs.
Warning light illuminates and no voltage at connector (B) outputs.	Replace preheating unit.

3 Preheating warning light does not operate and engine does not start when cold after approximately 10 seconds preheating time.

CHECK	REMEDIAL ACTION
Earth connector (C) output (warning light) using a 2 amp fuse ignition on:	
- fuse burns out	Instrument panel warning light harness shorting; repair.
- warning light does not illuminate	Bulb burnt out or harness faulty. Replace bulb or repair harness.
- warning light illuminates	Replace preheating unit.

FAULT FINDING

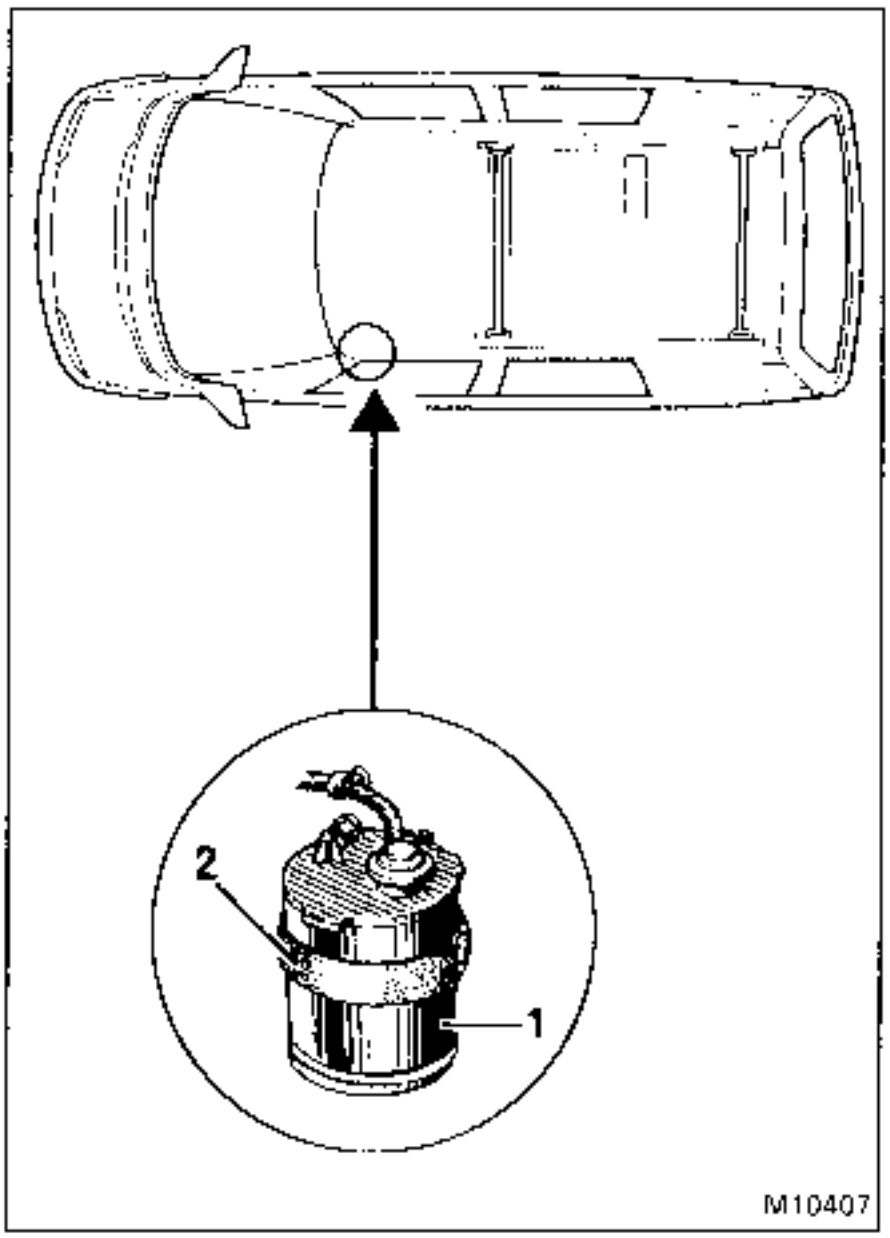
4 Preheating system operating normally and postheating system not operating.

CHECK	REMEDIAL ACTION
Disconnect connector (C) and using a voltmeter/ohmmeter check: - the resistance between outputs (full load and battery -): accelerator in idling position: resistance = 0 ohms full throttle: resistance - infinity	If circuit is cut, check harness, microswitch and its connectors; if faulty repair.
- voltage with ignition on between ouputs (TCE and bat-):	If circuit is closed, check that micro switch to specification and correctly adjusted.
engine cold, coolant temperature less than 55°C ± 2°C - 12 volts	If no voltage: check electrical harness, thermal switch and its connector.
engine hot, coolant temperature greater than 65°C ± 2°C = 0 volts	If voltage present: check harness and that thermal switch is to specification.
If all the tests performed are correct and postheating system does not operate when engine started cold	Replace preheating unit.

SPECIAL POINTS

LOCATION OF COMPONENTS OF THE ANTI-POLLUTION SYSTEM
Fuel vapour absorber or canister (1) is mounted on the lefthand sidemember, below the passenger seat.

The fuel vapour absorber bleeding valve is mounted on the ignition power module mounting bracket..



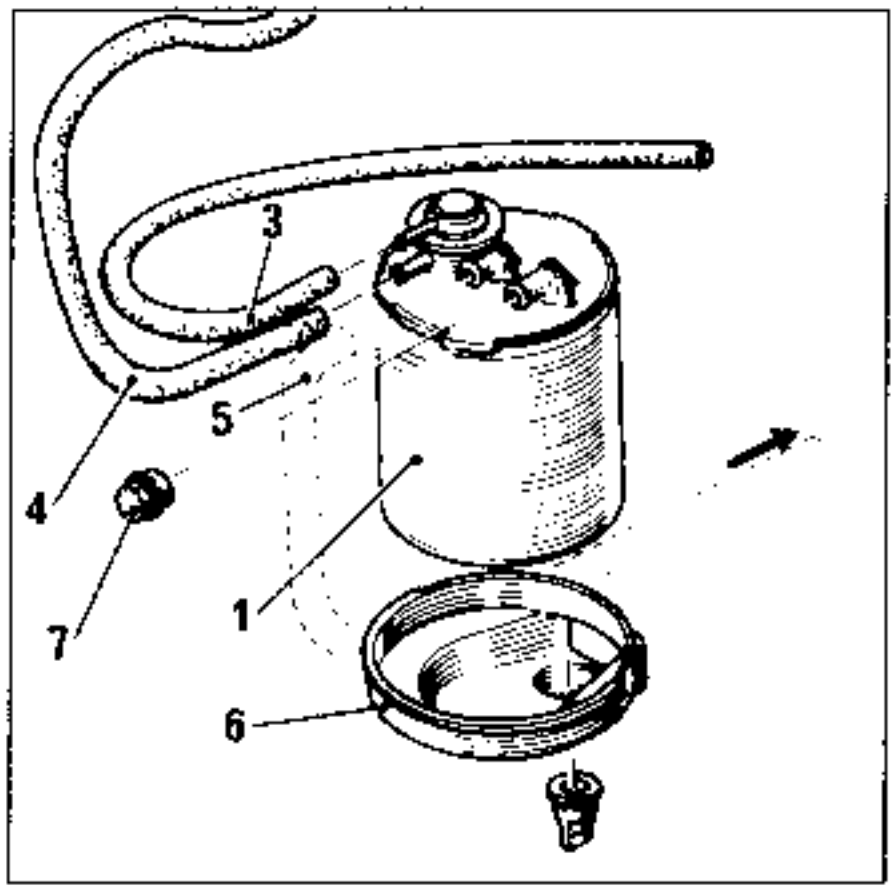
REMOVING-REFITTING THE FUEL VAPOUR ABSORBER

Disconnect hoses (3) and (4) from the absorber.

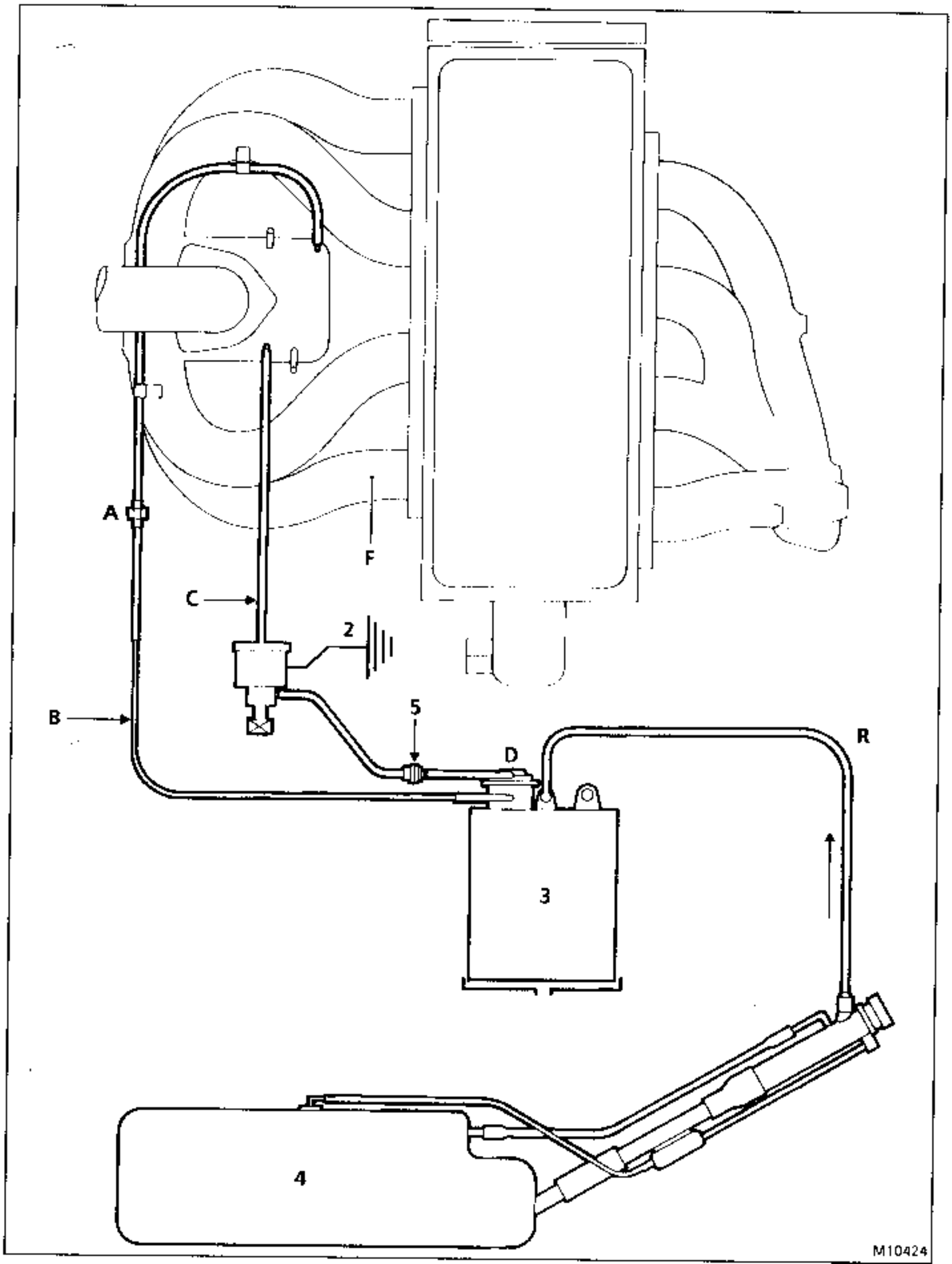
Remove securing strap (2) from the absorber and take it off its bracket.

1 Fuel vapour absorber (or canister)
2 Securing strap (detail drawing above)
3 To solenoid valve
4 To inlet manifold
5 To fuel tank
6 Mounting bracket
7 Plug

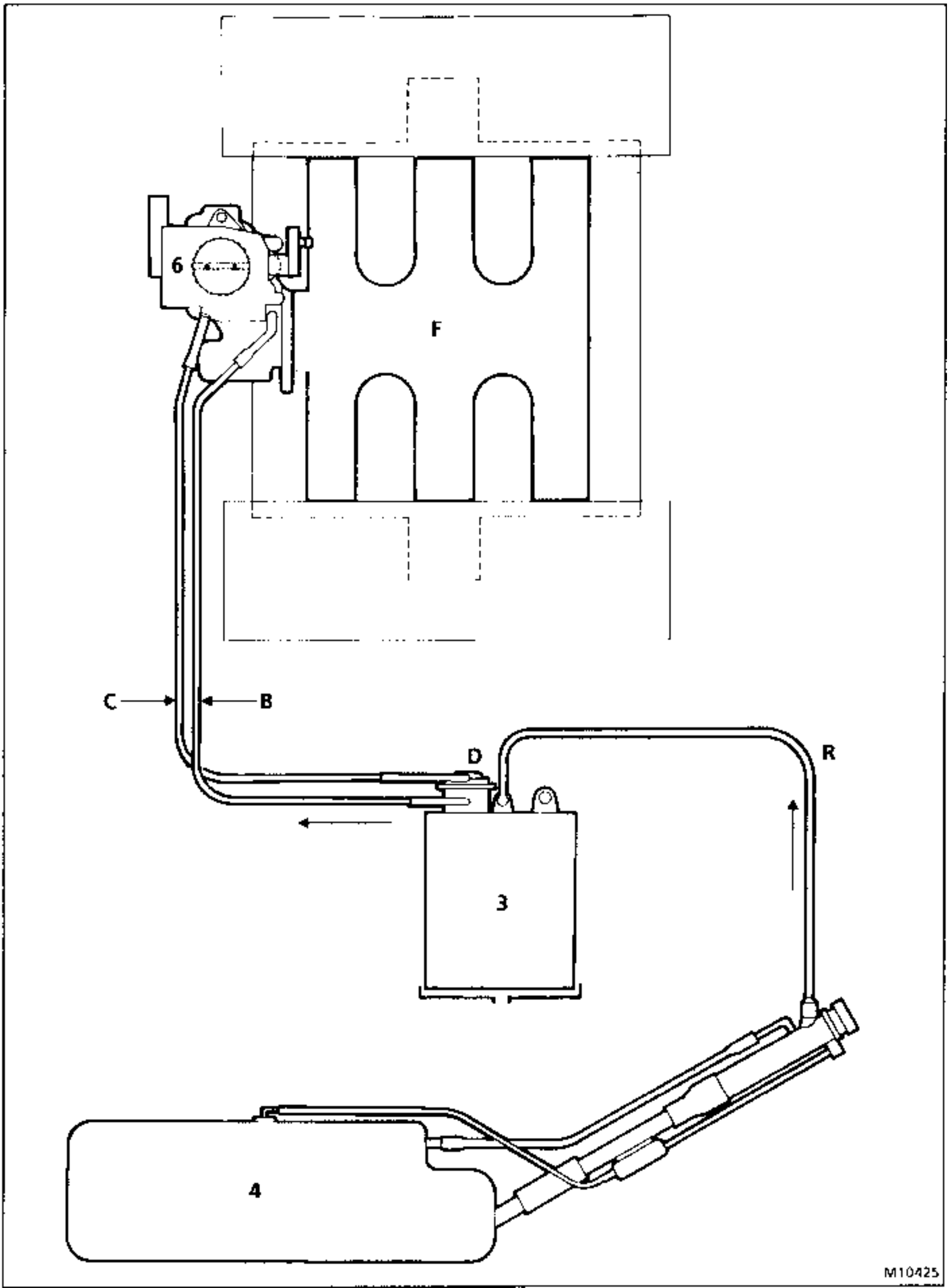
On reassembly, ensure that the hoses are connected the correct way round.



SPECIAL FEATURES



SPECIAL FEATURES



SPECIAL POINTS

1 Fuel vapour absorber bleeding control solenoid valve
2 Computer
3 Fuel vapour absorber
4 Fuel tank
5 Delay valve
6 Throttle casing

A - 2 mm diameter, white restrictor
B - Fuel vapour absorber bleeding lines (inlet manifold - absorber)
C - Fuel vapour absorber bleeding guide lines (absorber - solenoid valve)
D - Fuel vapour absorber valve
F - Inlet manifold
R To fuel tank

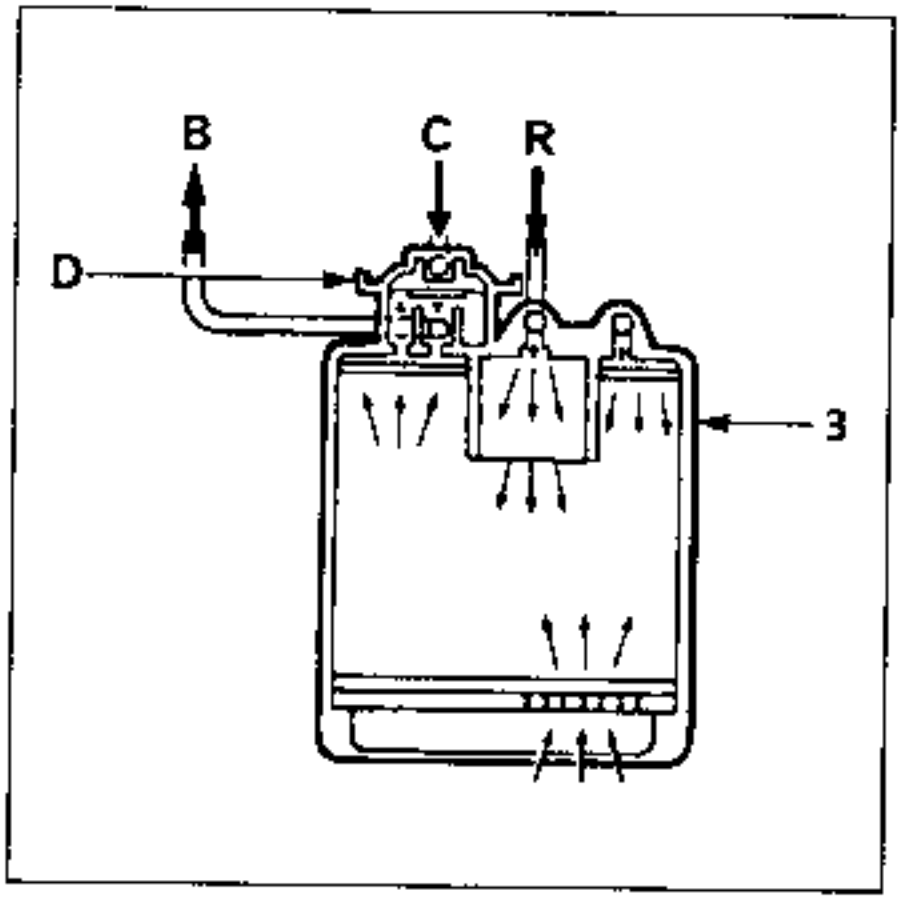
ESPACE vehicles are equpped with a system which absorbs the vapours from the fuel tank.

The circuit consists of a fuel vapour absorber (canister) connected to the tank by lines (R).

The fuel vapour absorber contains activated carbon. It comprises a valve (D) connected to the inlet manifold and guided by the injection computer (2) by means of solenoid valve (1) and duct (C). The fuel vapour absorber is bled via line (B); it is calibrated by restrictor (A) which is 2 mm in diameter and is white in colour.

OPERATION OF ENGINES J7R-J7T

- Engine stopped:
  The fuel vapours are collected by the fuel vapour absorber (canister).
- Enging idling:
  There is no bleeding information to solenoid valve (1) (no control by injection computer (2)).



- Engine operating other than at idling speed:
  Under certain conditions, when the engine is hot, injection computer (2) guides solenoid valve (1) electrically, establishing pneumatic circuit (C) from inlet manifold (F) to fuel vapour absorber (3);the fuel vapour absorber is therefore bled.

Z7W OPERATION

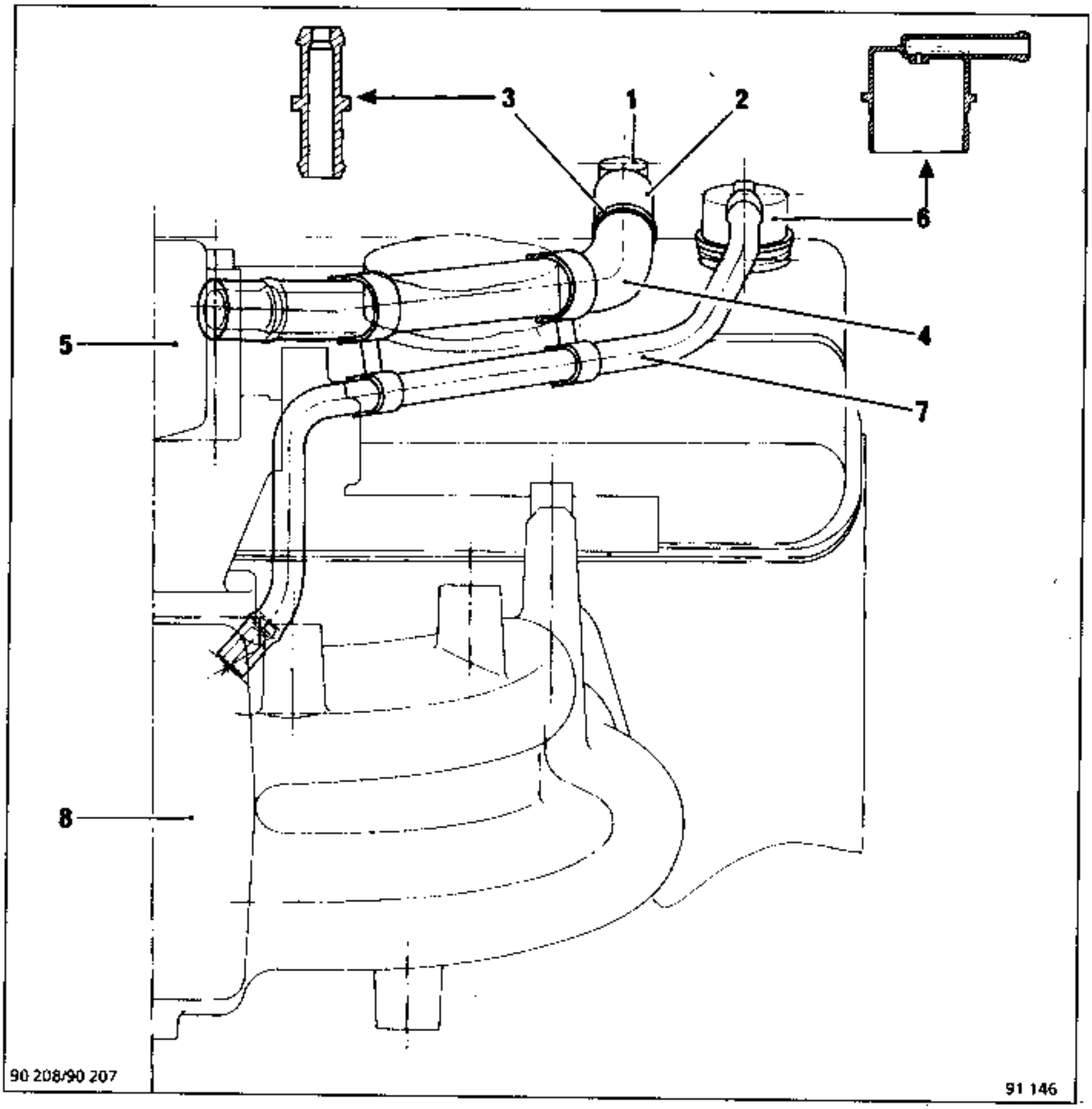
- Engine stopped:
  The fuel vapours are collected by the fuel vapour absorber (canister).

- Engine running:
  The fuel vapours present in the canister are drawn in by a vacuum via tube (B) at the throttle casing base.

TEST OF ANTI-EVAPORATION SYSTEM

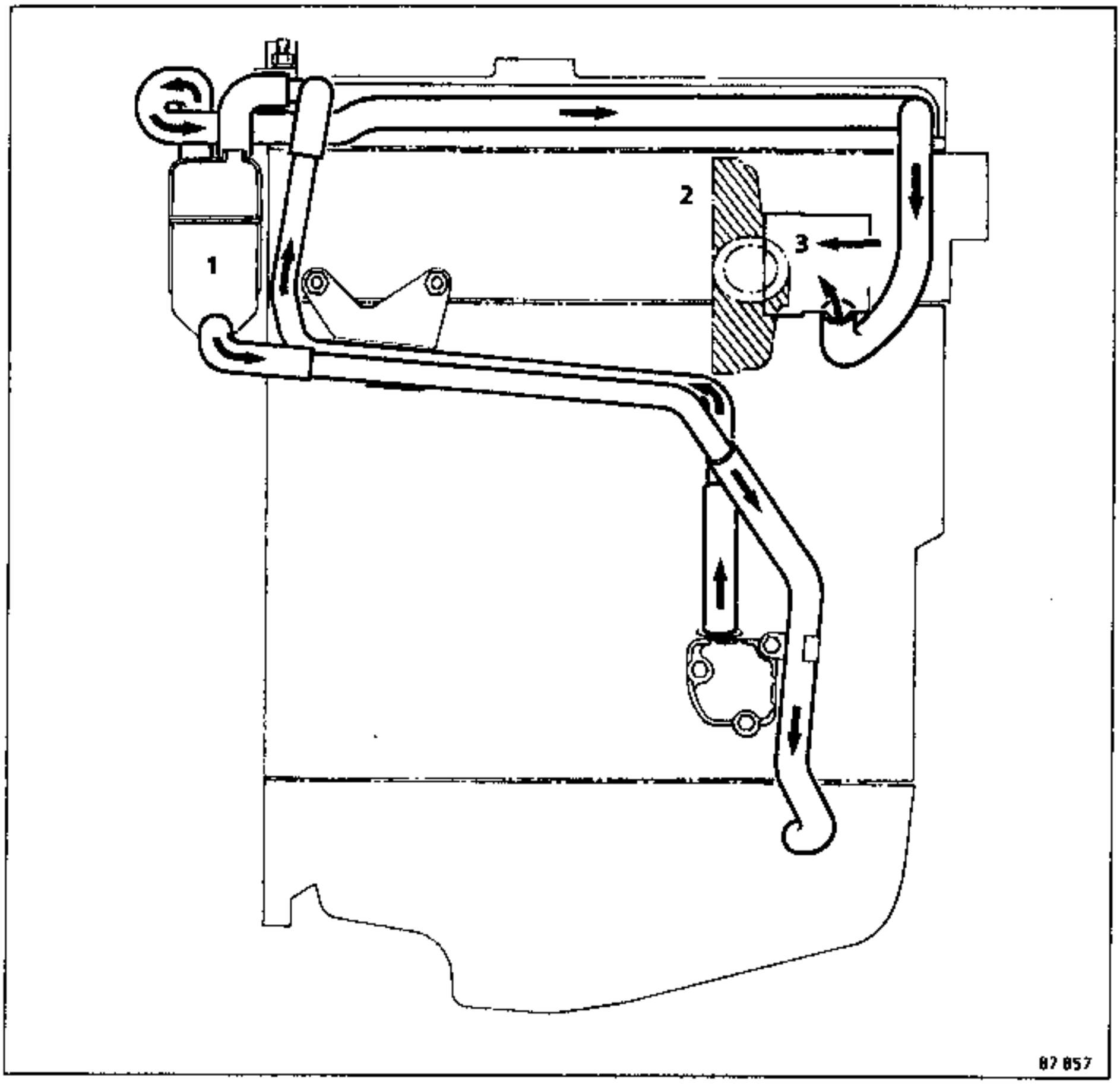
FUNCTION TESTED	TEST APPARATUS	CONDITIONS	OBSERVATIONS	COMMENTS
Bleeding of anti-evaporation system	Vacuum gauges connected in parallel	Engine hot, after cooling fan has cut in twice		
	- at M1 - at M2 - Voltmeter	At idling	Vacuum at M2 zero Voltage=12 volts on 2 terminals of solenoid valve.	If vacuum at M2= M1 check pneumatic and electric circuits.
		When accelerator depressed	Read off the voltage on sol. valve terminals Vacuum at M2 = Vacuum at M1 Voltage drops to 0 when accelera- depressed.	If voltage on sol. valve and vacuum at M2 does not equal vacuum at M1 check harness between sol.valve and computer.
Bleeding of anti-evaporation system	XR25 test box 2 vacuum gauges	Engine hot after cooling fan motor has cut in twice	Disconnect one of 2 leads going to sol. valve.	At idling: variation in idling speed and cyclic opening ratio enter # 12 on XR25
Sol. valve check	- at M1 - at M2 - rev counter	On idling	Disconnect 2 leads from sol. valve. Connect a +12 volt supply to one terminal of sol.valve and a (-) earth to other terminal and disconnect one of 2 leads. Vacuum at M1 = vacuum at M2 Drop in engine speed and vacuum at M1.	Otherwise check sol. valve and connection of air circuits.
Checking the air circuits			Disconnect line to sol. valve at M2;apply a vacuum of approx 300 mbar with manual vacuum pump on the line	On idling: variation in engine speed (increase) and reduction in cyclic opening ratio. If not: check air circuits.

ANTI-POLLUTION
Oil vapour rebreathing



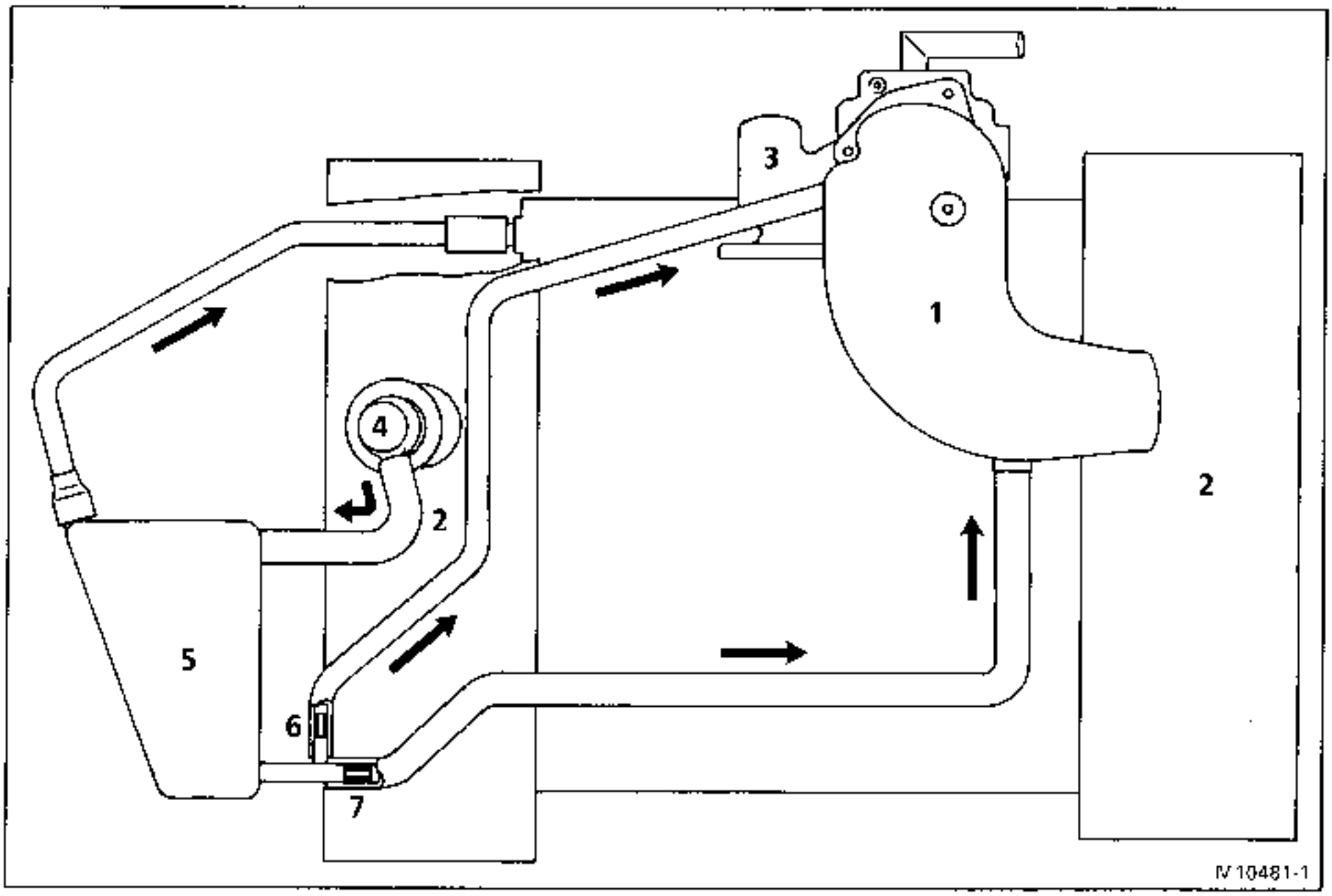
1 2-way union
2 Hose connecting restrictor and 2-way union
3 3mm dia. yellow restrictor
4 Hose connecting restrictor and cover
5 Cover on throttle casing
6 2-way union, internal calibration: 2.2mm dia.
7 Hose connecting 2-way calibrated union and manifold
8 Manifold

ANTI-POLLUTION
Oil vapour rebreathing



1 Oil separator
2 Turbocharger
3 Air

ANTI-POLLUTION
Oil vapour rebreathing



1 Throttle casing cover
2 Rocker cover
3 Throttle casing
4 Oil refill plug
5 Separator unit
6 2 mm diameter restrictor
7 7 mm diameter restrictor

REMOVAL

Remove the air filter (J7R-J7T-Z7W).

Disconnect:

- the battery;
- the electric connection leads.

Slacken bolts (A) and (B).

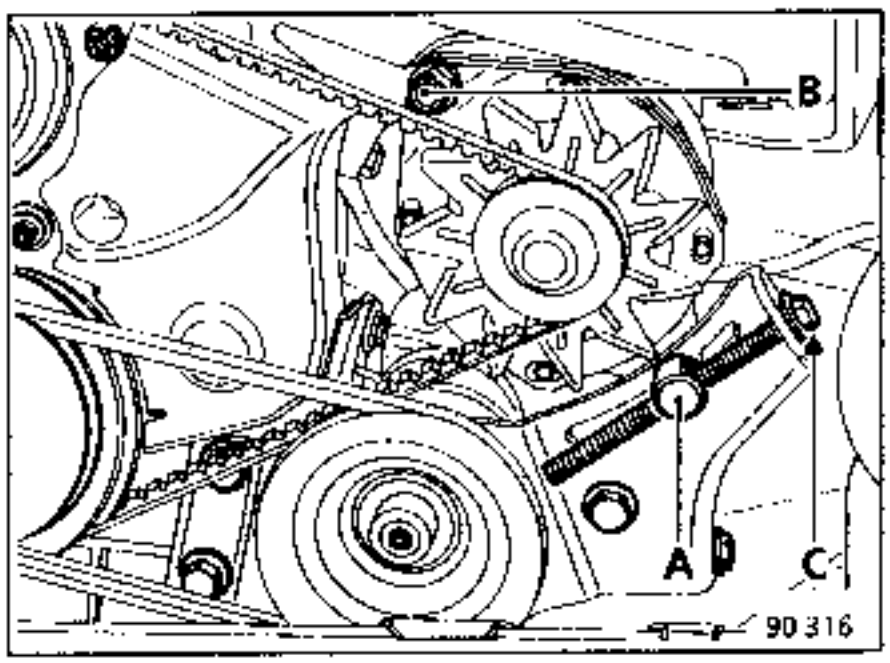
Slacken the bolt using bolt (C).

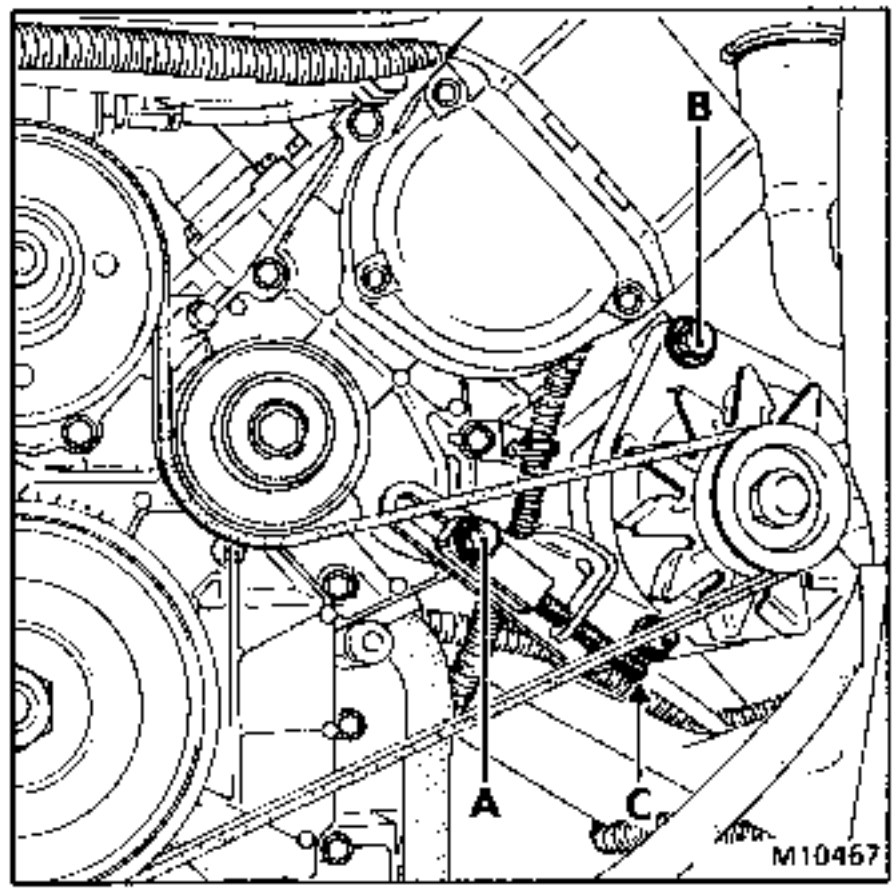
Free the belt.

Remove bolts (A) and (B).

Remove the alternator from the side.

J7R-J7T-J8S ENGINES





REFITTING

Proceed in reverse order.

Belt tension when cold: Tool Ele.346-04

- Deflection F: 4.5 to 5.5 mm (J7R-J7T-J8S)
- Deflection F: 3 to 3.5 mm (Z7W)

NOTE: never use a screwdriver to remove belts since they are made of synthetic material and may be damaged.

CHECKING THE VOLTAGE IN SITU

Connect a voltmeter to the battery terminals and read off the battery voltage.

Start the engine and increase speed until the voltmeter needle stabilises at the regulated voltage.

This should be between 13.5 and 14.8 volts.

Connect the maximum number of consumer units; the regulated voltage should still be between 13.5 and 14.8 volts.

ATTENTION: The battery and regulator must be disconnected whenever arc-welding is peformed on the vehicle.

ALLOCATION OF ALTERNATORS

Engine Type / Valeo Alternator		Without Air Conditioning				With Air Conditioning			
		J7R	J7T	J8S	Z7W	J7R	J7T	J8S	Z7W
70 A	A13N173	X	X						
70A	A13N171			X					
90A	A14N125				X				
90A	A14N74		X*						
90A	A14N178			X*					
105A	A14N73							X	
105A	A14N75					X	X		
105A	A14N124								X

* Cold countries

CHECKING

After 15 minutes heating-up at voltage of 13.5 volts.

RPM	A13N173 70A	A13N171 70A	A14N74 A14N 178 90A	A14N125 90A	A14N73 105A	A14N124 105A	A14N75 105A
1 250	12 A	12 A	9 A	22 A	30 A	30 A	12 A
3 000	61 A	61 A	76 A	67 A	82 A	82 A	82 A
6 000	70 A	70 A	89 A	90 A	105 A	105 A	105 A

OPERATION - DIAGNOSIS

The ESPACE is equipped with alternators with incorporated regulators and a warning light on the instrument panel which operates as follows:

- when the ignition is switched on, the light comes on;
- when the engine starts, the light goes out;
- if the warning light comes on when the engine is operating, it indicates a lack of charge.

FAULT FINDING

The warning light does not come on when the ignition is switched on:

Check whether the bulb has blown (to do this, earth the 6.3 mm pin of the connector: the light should come on).

The warning light comes on when the engine is running:

It indicates a lack of charge, which may be due to:

- broken alternator drive belt;
- cut charging circuit cable;
- internal damage to alternator (rotor, stator, diodes or brushes);
- regulator defect.

The cutomer complains of a charging circuit defect and the warning light is operating correctly:

If the regulated voltage is less than 13.5 volts check the alternator as the fault may be due to:

- a burst diode
- a cut phase
- carboned-up tracks.

CHECKING THE VOLTAGE IN SITU

Connect a voltmeter to the battery terminals and read off the battery voltage.

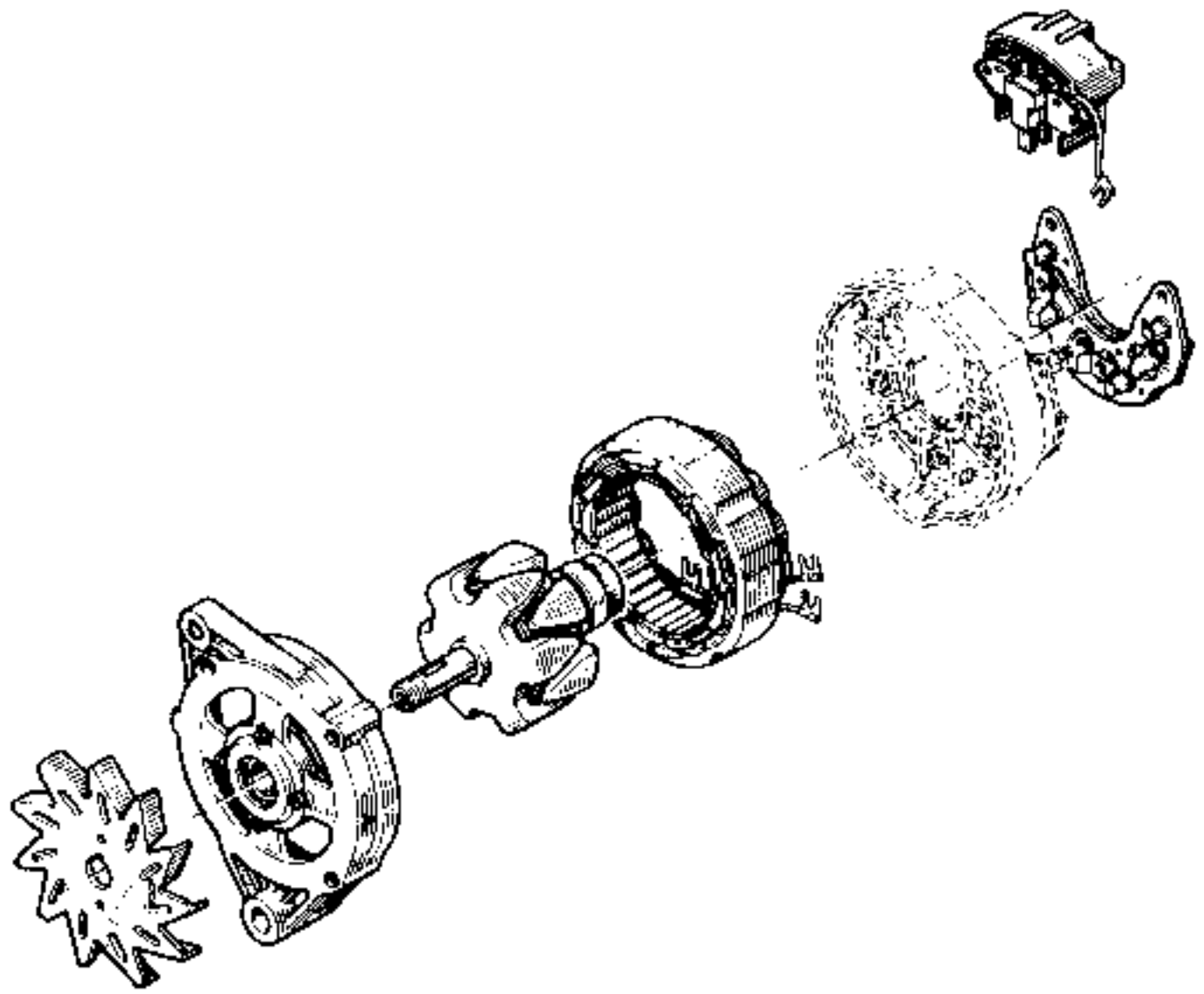
Start the engine and increase speed until the voltmeter needle stabilises at the regulated voltage.

This voltage should be between 13.5 and 14.8 volts.

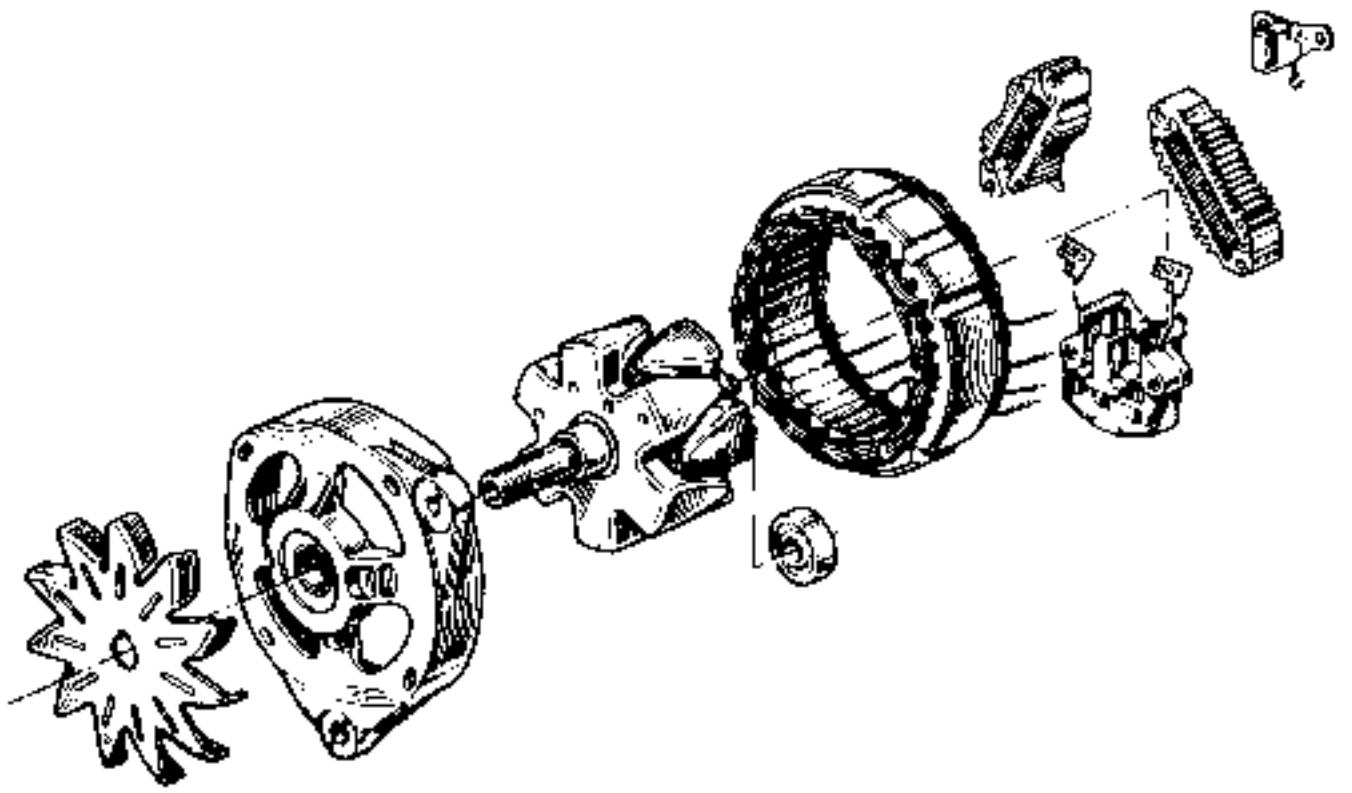
Connect the maximum number of consumer units; the regulated voltage should still be between 13.5 and 14.8 volts.

ATTENTION: the battery and regulator must be disconnected whenever arc-welding is performed on the vehicle.

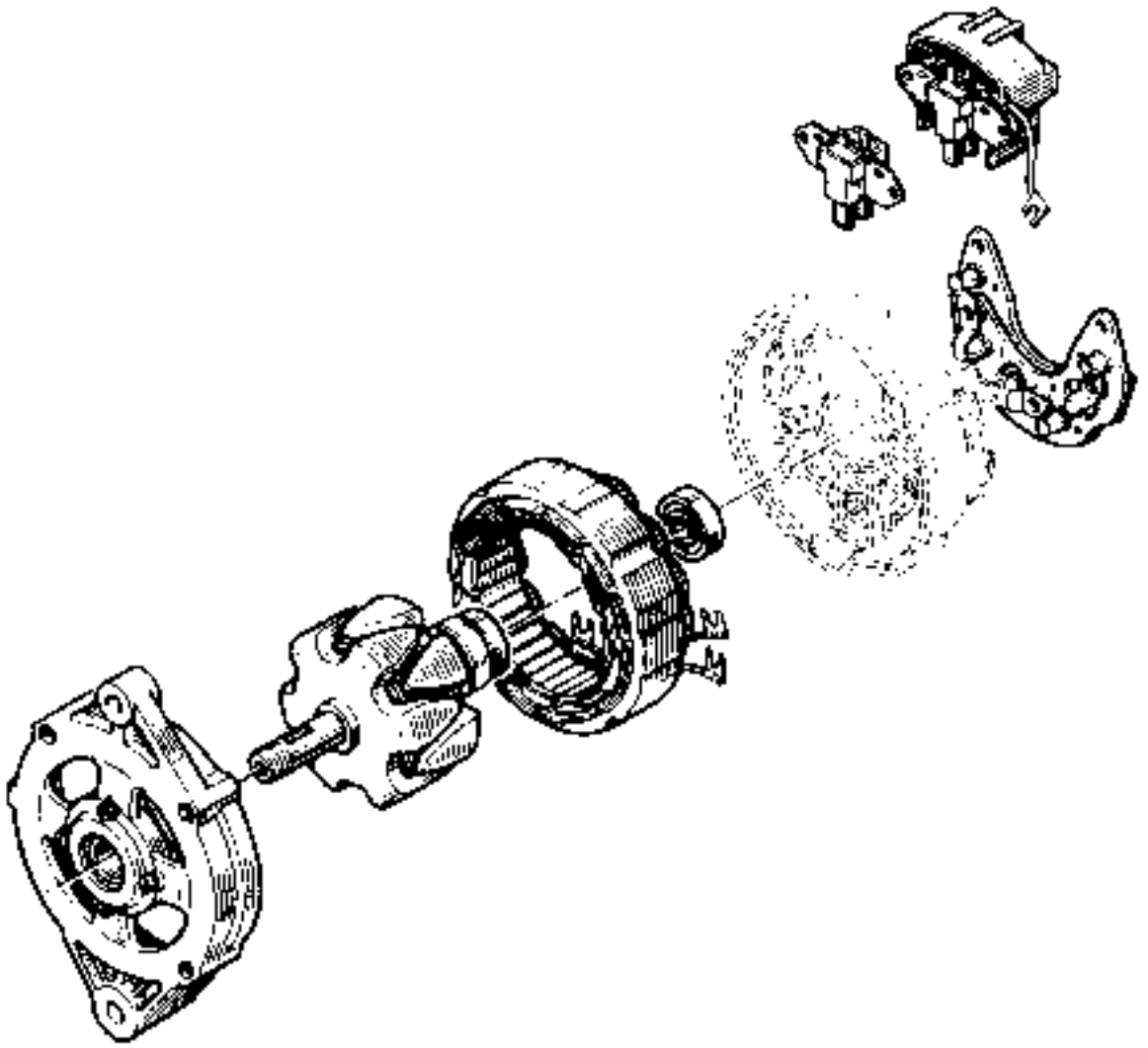
A 14 N 125
A 14 N 124
A 14 N 74



A 14 N 73
A 14 N 75

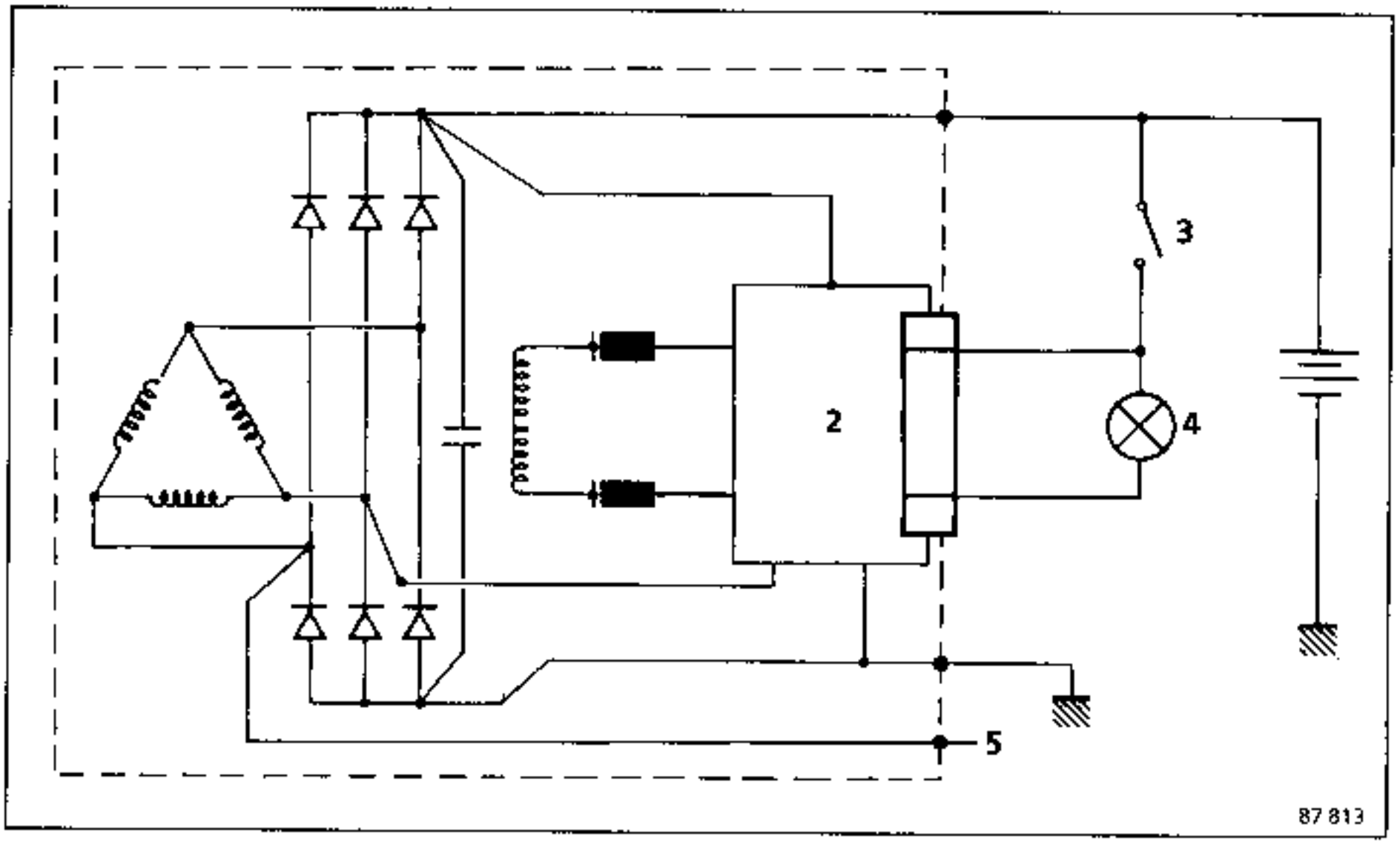


A 13 N 171
A 13 N 173

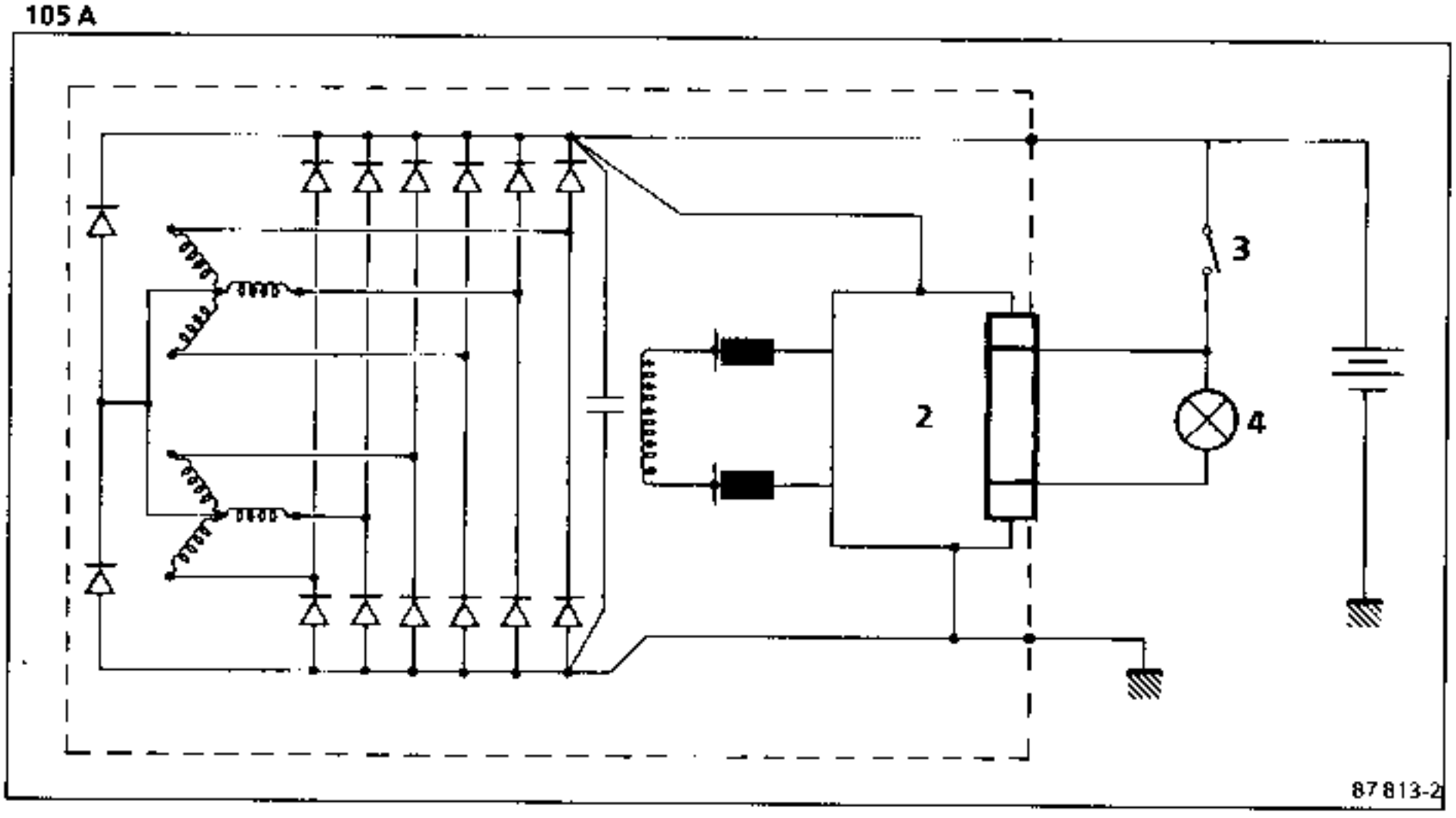


OPERATING DIAGRAM

All types except 105 A



105 A



2 Regulator
3 Ignition switch
4 Instrument panel bulb
5 Rev counter

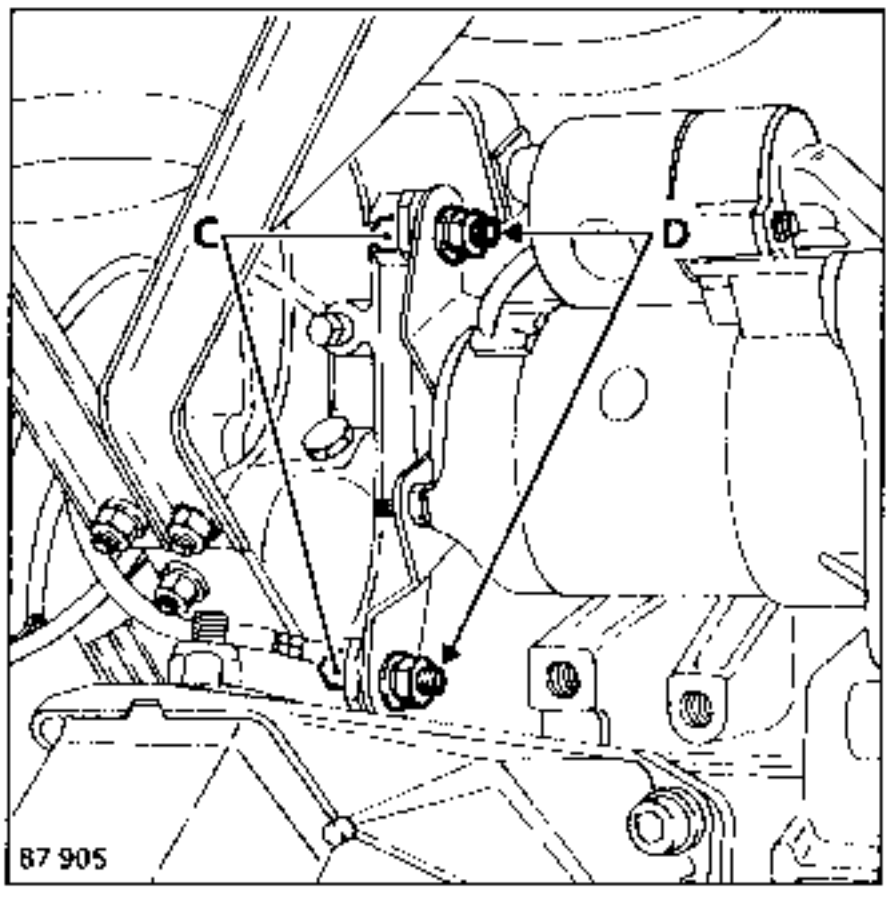
J7R - J7T ENGINES

REMOVAL

Disconnect the battery.

Disconnect the leads.

Remove:
- the two rear mounting bolts (D);
- the two mounting bolts (C) from the casing;
- the three mounting bolts from the clutch casing;
- the starter.



REFITTING

Special Points:
Fit and tighten the three bolts on the clutch casing.

Run up by hand the rear mounting bolts on the starter and the cylinder block.

Tighten the two bolts (C).

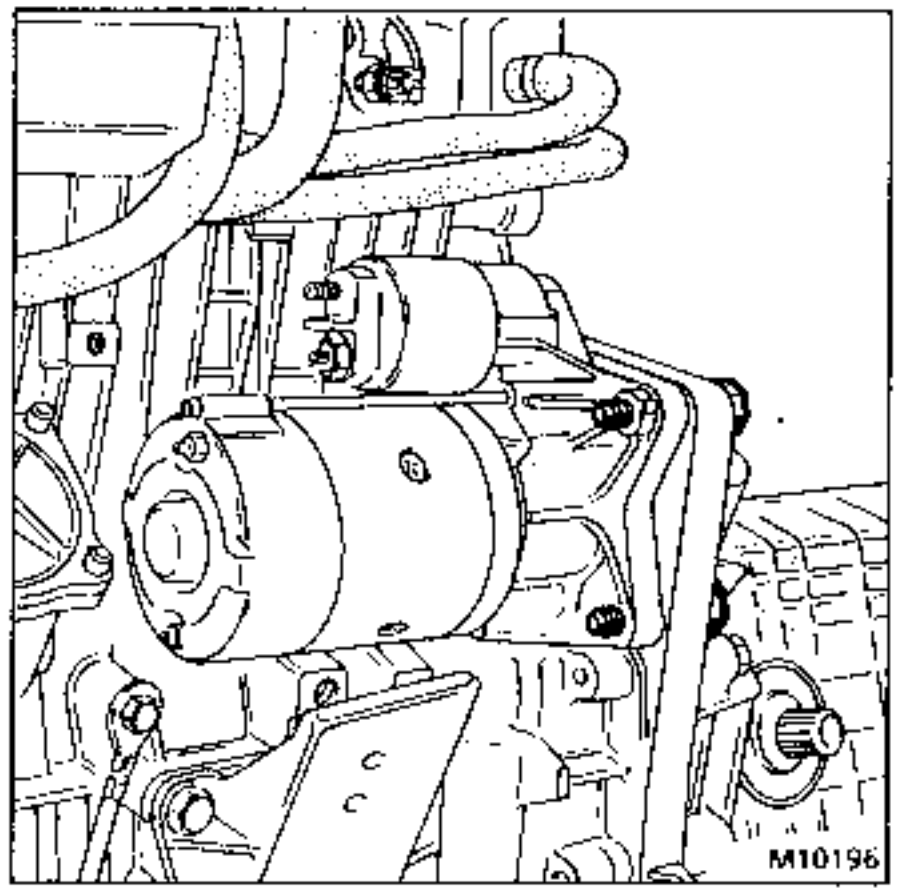
Tighten the two bolts (D).

J8S ENGINE

REMOVAL

Disconnect the battery.

Disconnect the leads.



Remove:
- the three mounting bolts from the clutch casing;
- the starter.

REFITTING

Proceed in the reverse order to removal.

REMOVAL

Disconnect the battery.

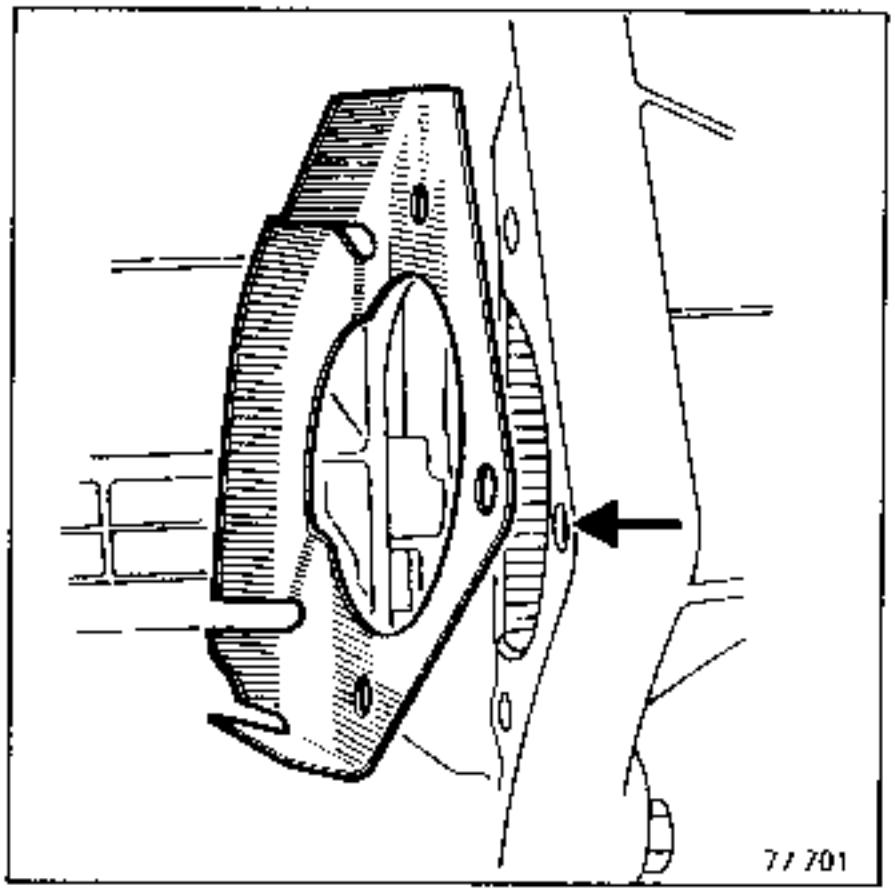
Remove the oil filter.

Disconnect the leads.

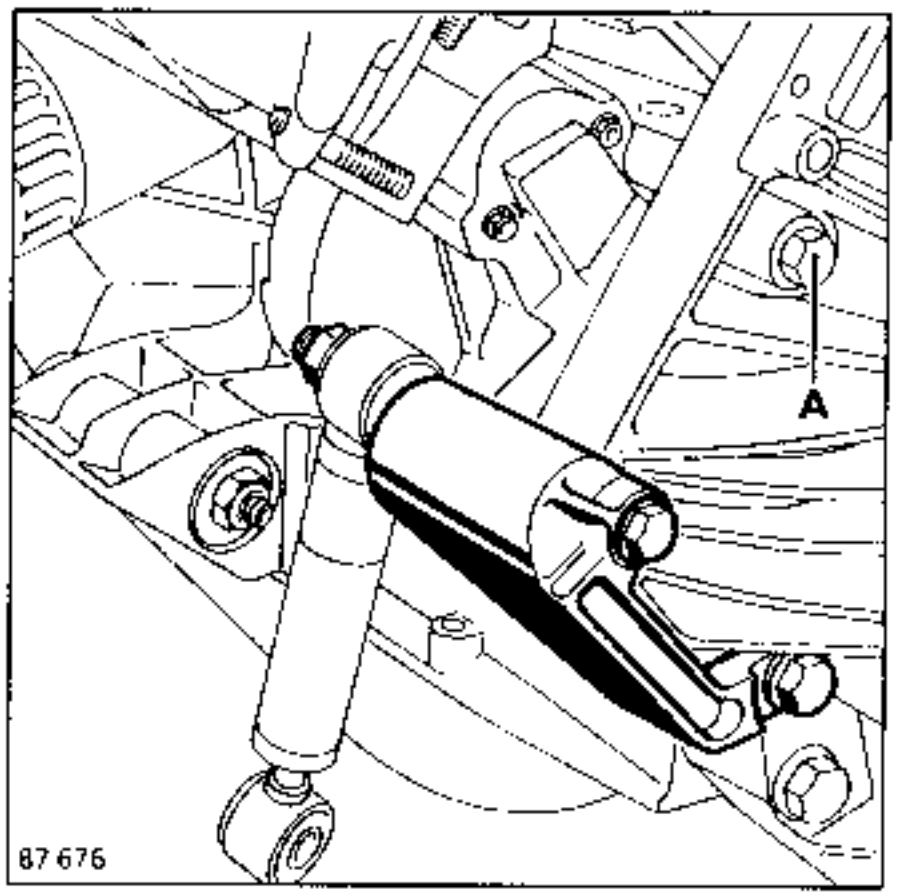
Remove the 3 starter mounting bolts.

Remove the starter.

REFITTING - Special Points



Position the protective panel in the centring bush on the clutch casing.

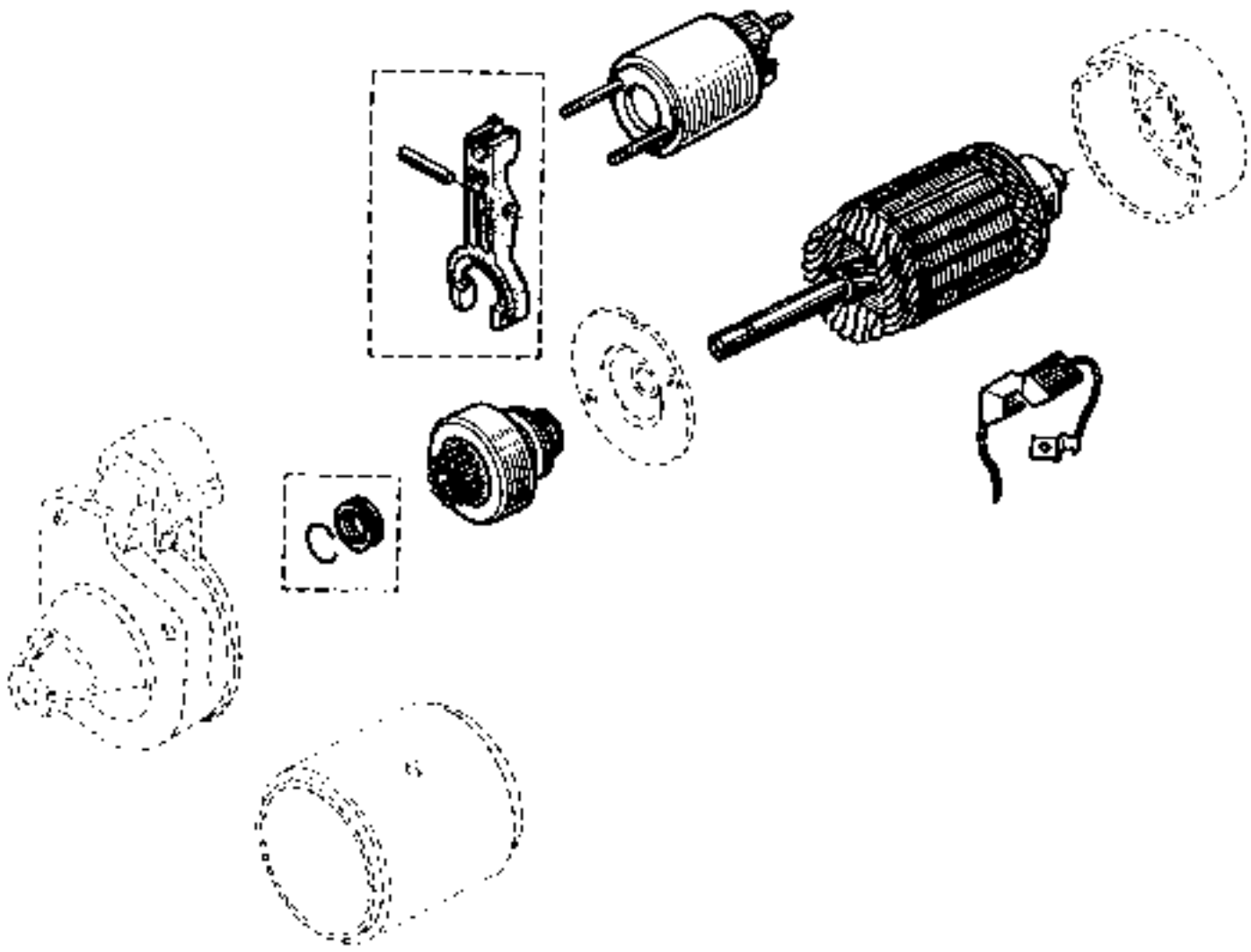


Fit and tighten the 3 mounting bolts on the clutch casing.

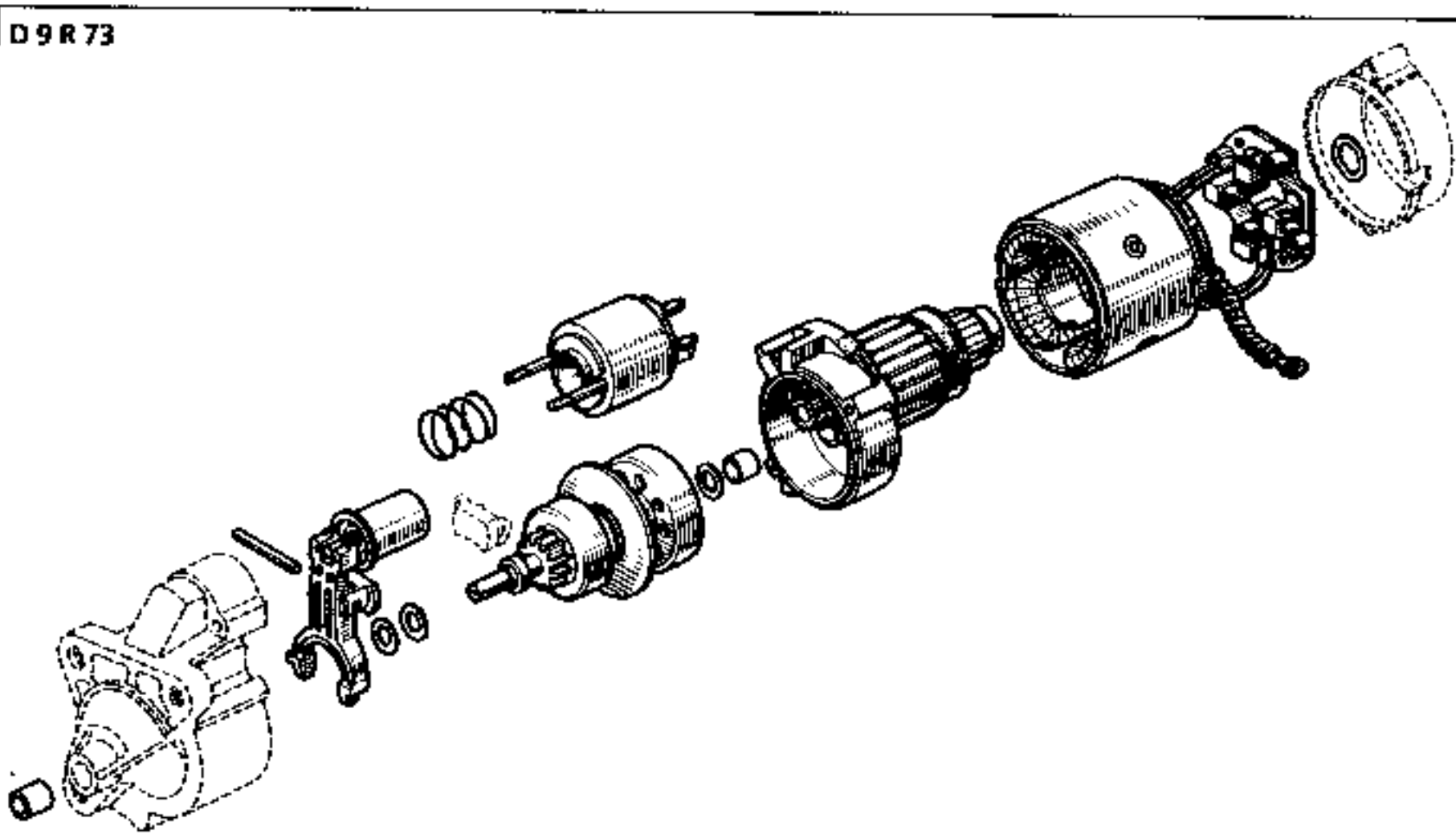
Bolt (A) is the shortest.

Make	Type	Torque (pinion locked)	Amperage (pinion locked)	When Mounted
VALEO	D9E851	0,8 daN.m	350 A	J7R - J7T
PARTS RHONE	D9R73	6 daN.m	1 350 A	J8S
VALEO	D9E200	1,1 daN.m	400 A	Z7W
MITSUBISHI	M001T74491	2,8 daN.m	980 A	Z7W
VALEO	D10E881	1,5 daN.m	500 A	J7T

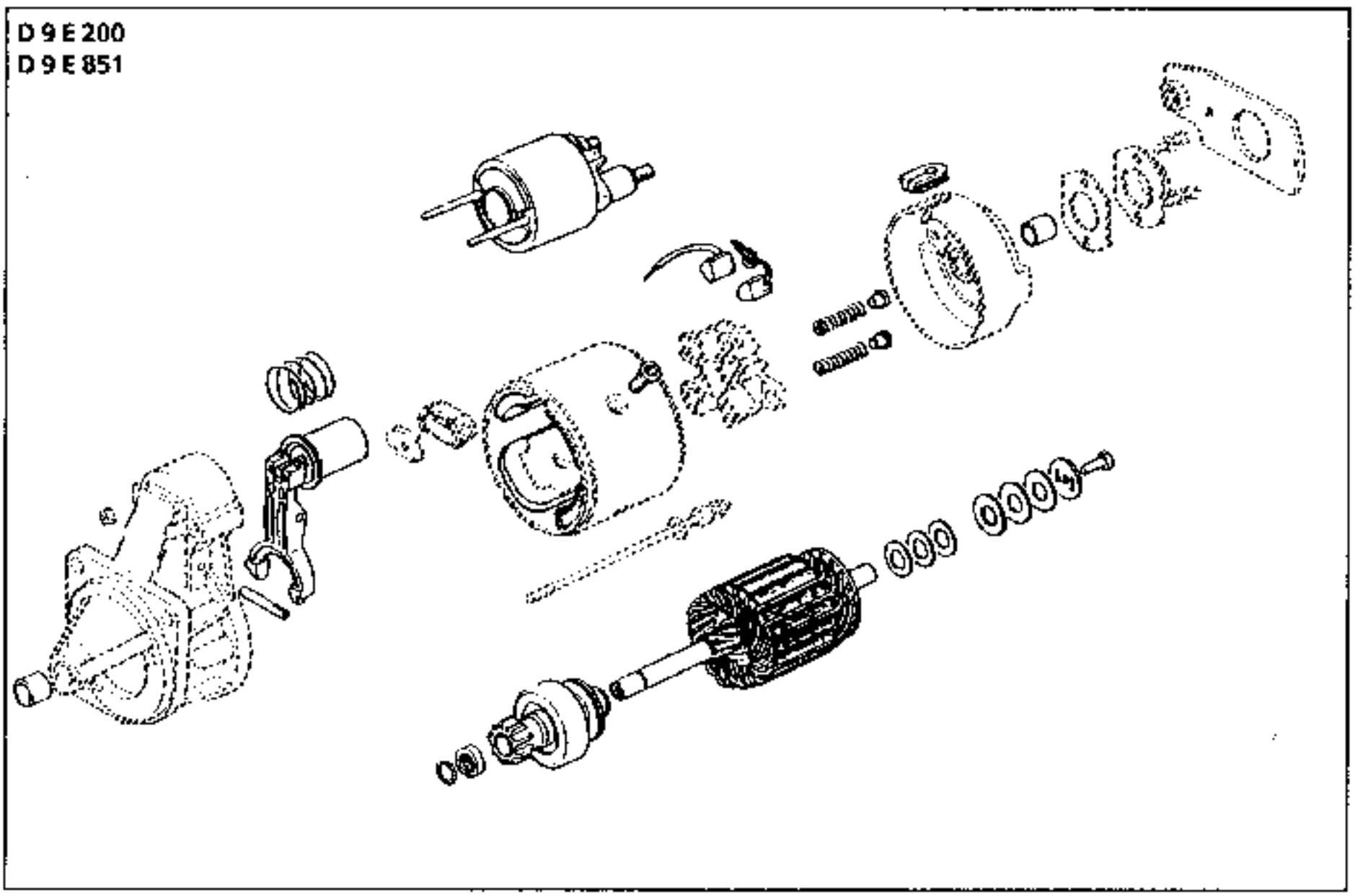
D 10 E 881



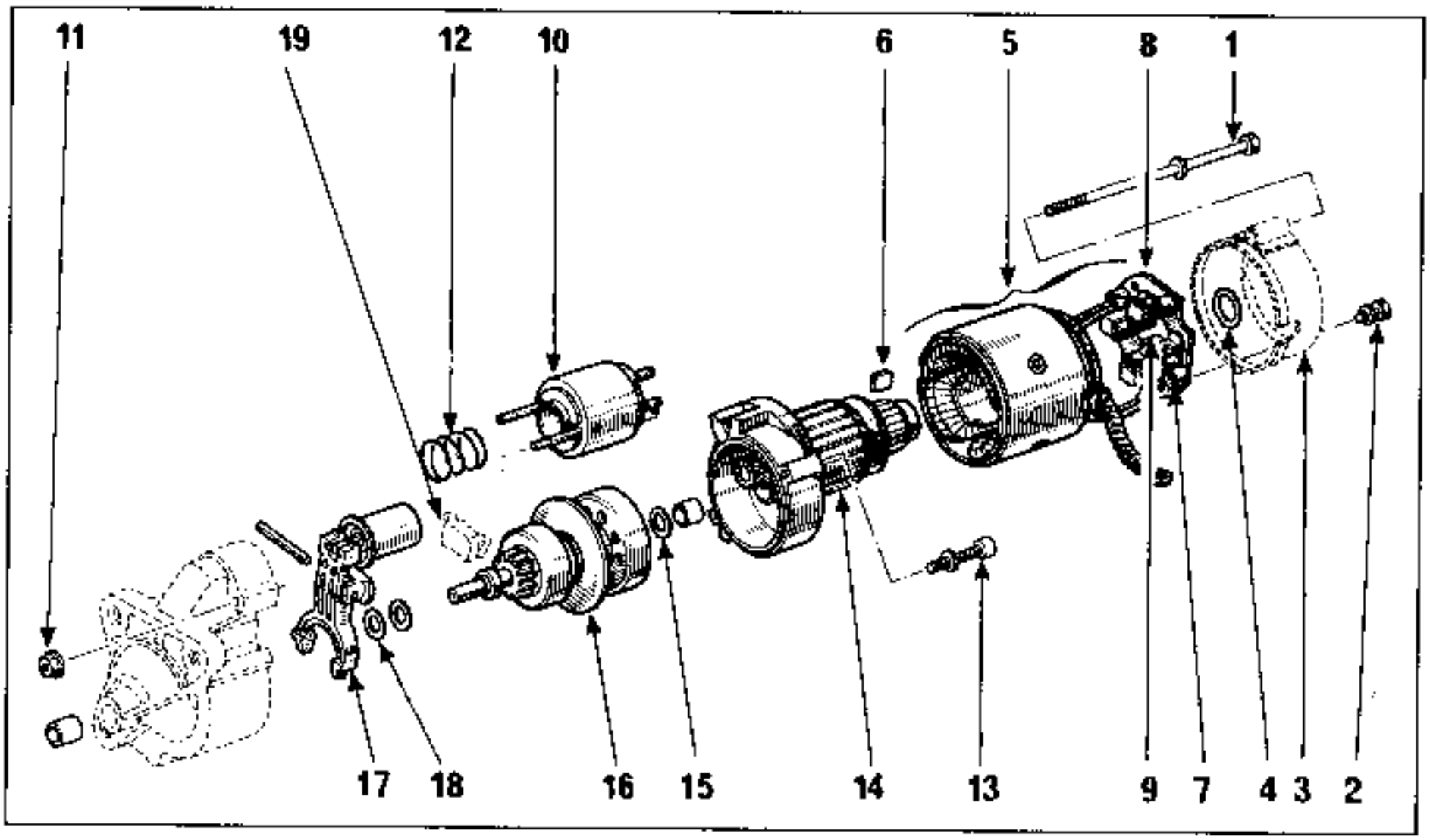
D 9 R 73



D 9 E 200
D 9 E 851



REPAIRING D 9 R 73



FEATURES

Reduced weight and size.
High drive power.
High armature speed (17000 rpm).

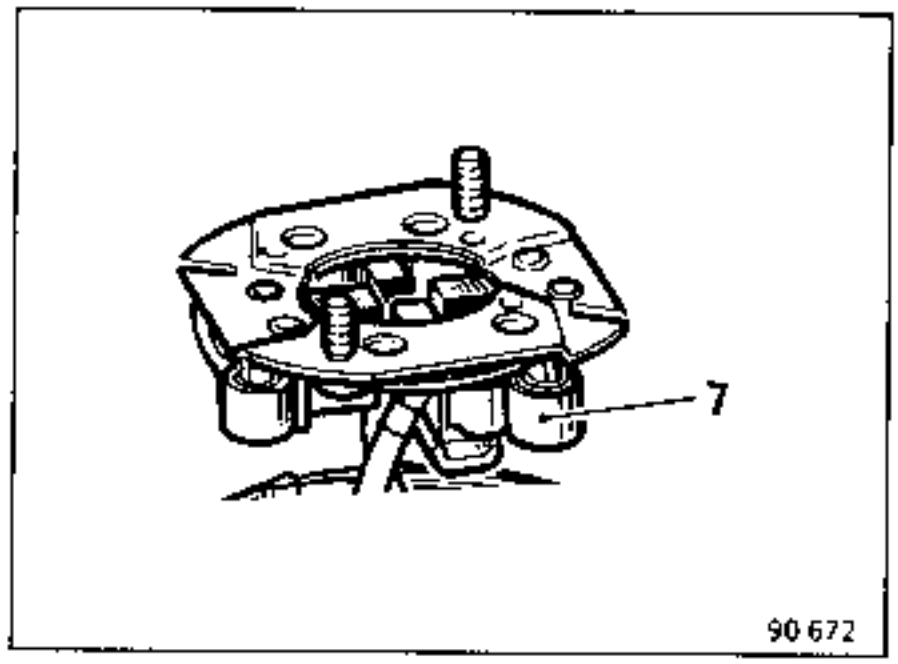
DISMANTLING THE REAR OF THE STARTER

Remove:
- assembly bolts (1);
- nuts (2) holding the brush-holder;
- cover (3);
  washer (4);
- field winding and brush-holder assembly (5).

Remove guide plate (6).

ATTENTION:

It is forbidden to remove springs (7) from the brushes. This type of starter has brushes which are highly compressed by springs (7) (applied force: 5.5 daNm). If the springs are removed there is a serious risk of injury.



REPLACING THE BRUSHES

Brushes (9) cannot be removed alone.

As the operating temperature around the brushes is high, the brushes must not be soldered.

Therefore, the brushes are sold mounted on their plates (8) with the field windings.

REPAIRING D 9 R 73

DISMANTLING THE DRIVE

Remove:
- switch (10) by means of nuts (11) and its spring (12);
- bolt (13) holding the reduction gear unit;
- field winding (14);
- washer (15);
- seal (19);
- drive (16) and control lever (17);
- shims (18).

SPECIAL POINTS

The field winding and reduction gear unit cannot be dismantled (the drive gear is bonded on the field winding).

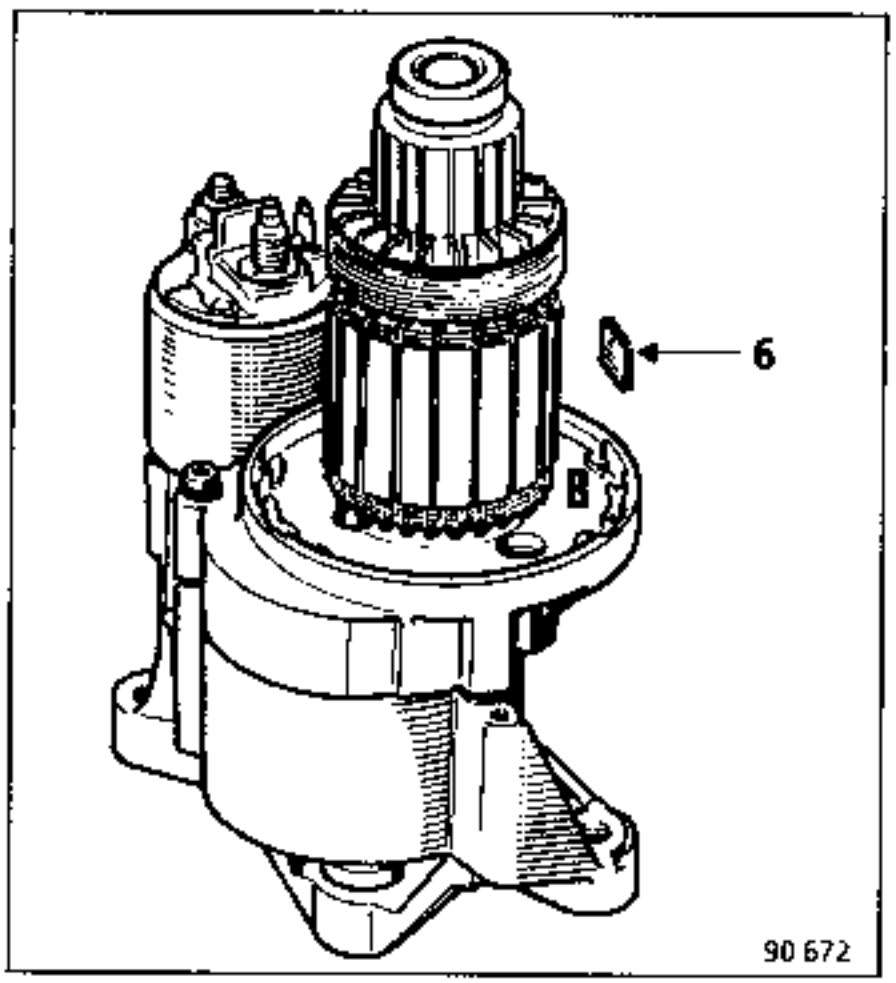
The drive assembly with the toothed wheel cannot be dismantled (the toothed wheel is crimped onto the shaft).

REFITTING THE DRIVE

Refit the shims recovered on dismantling.

Grease the drive.

Refit the components in the reverse order to removal.

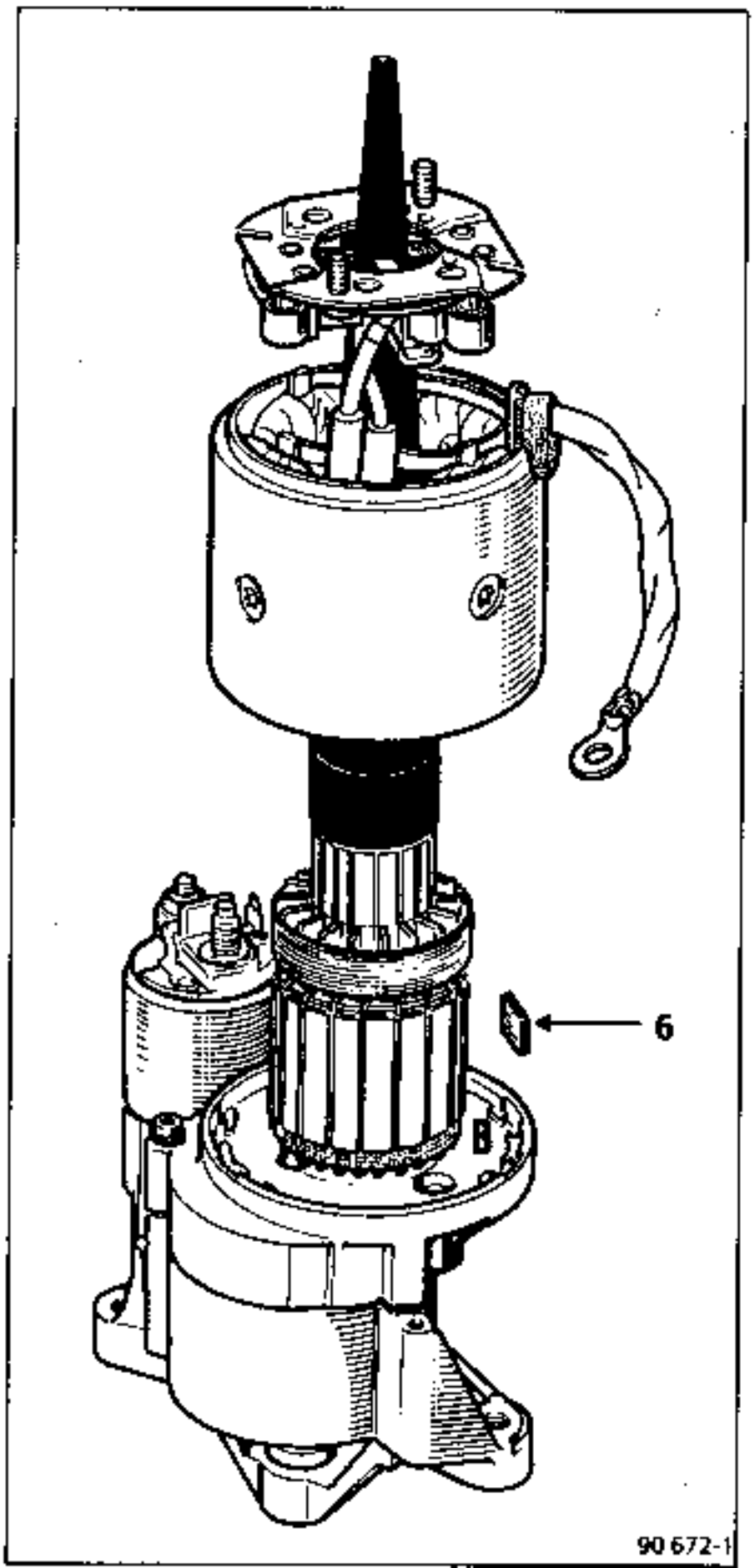


SPECIAL POINTS

Refit the field winding and the brushes:

Fit guide plate (6) at B.

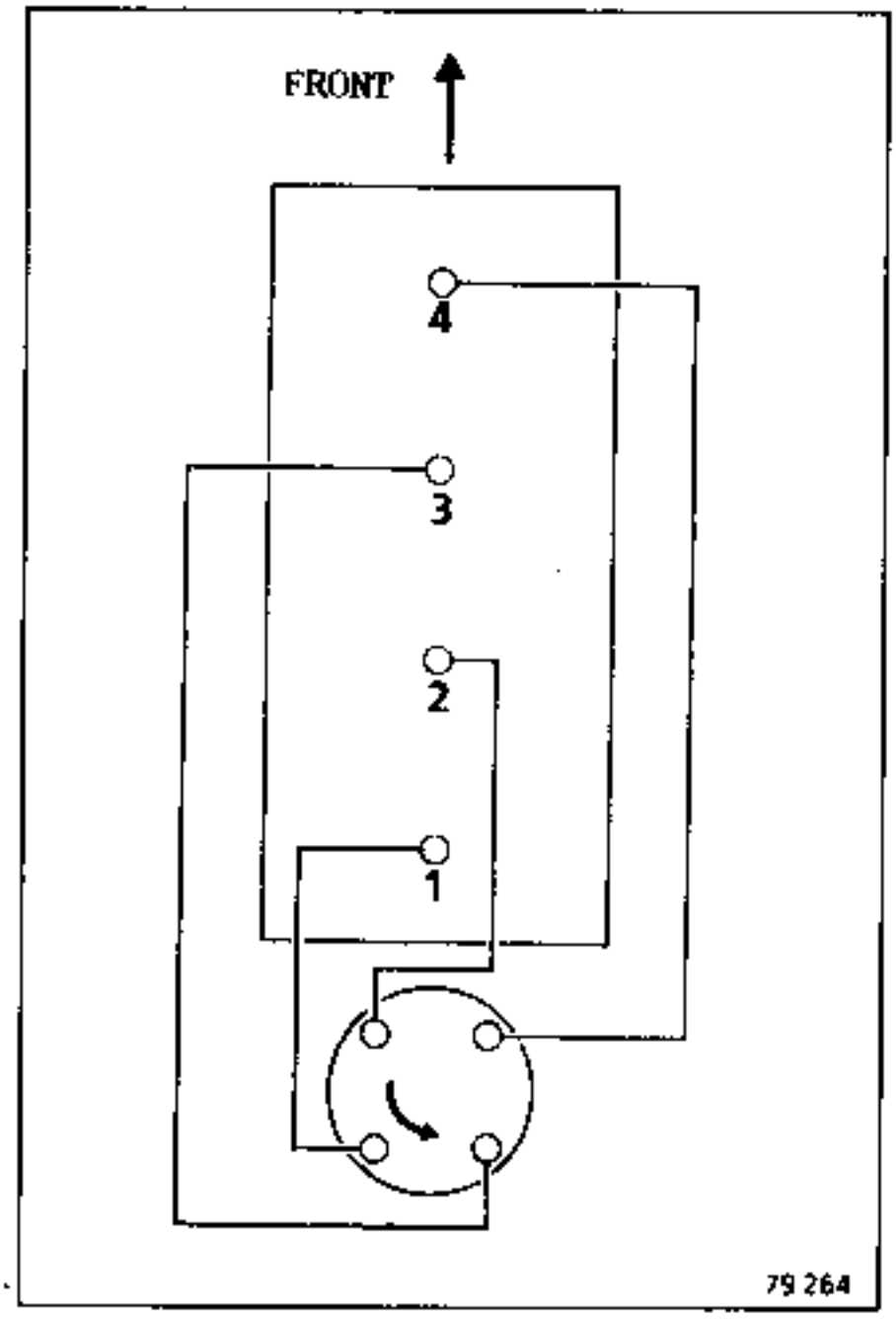
This operation may be simplified by using a special tool available from Paris-Rhone. Contact the Technical Department for further information.



Vehicle	Engine	Curves
J636	J7R	Injection
J637 - 5637	J7T	
J638	Z7W	

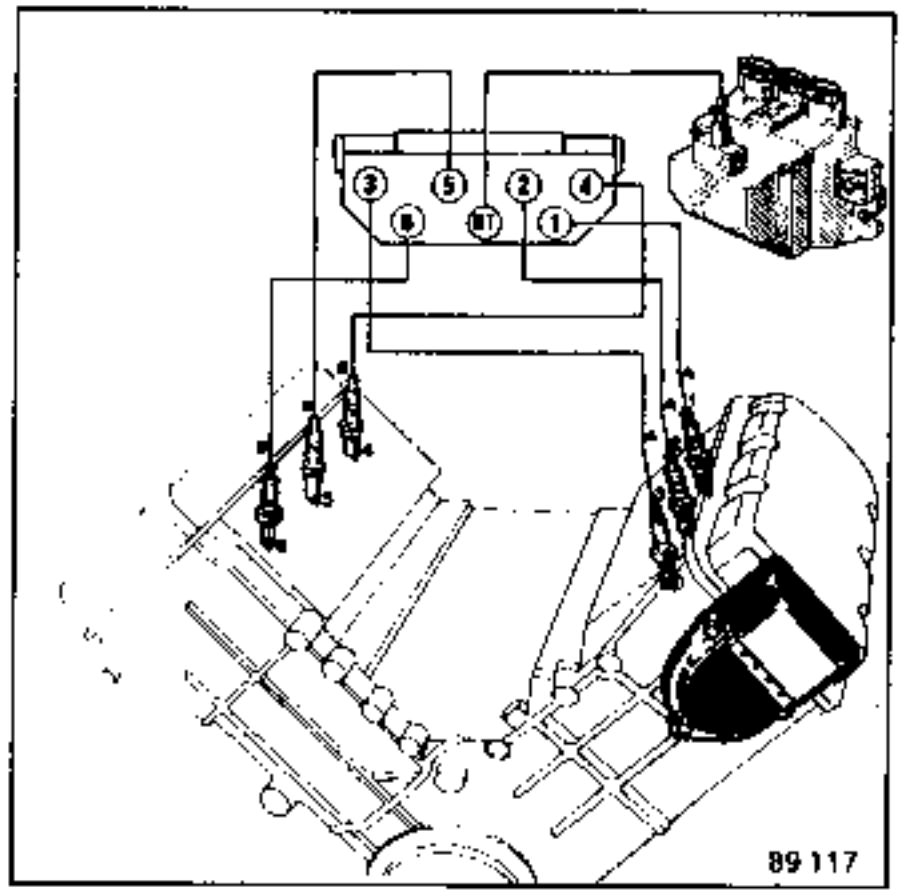
CONNECTION

J7T and J7R engines



Firing Order: 1-3-4-2

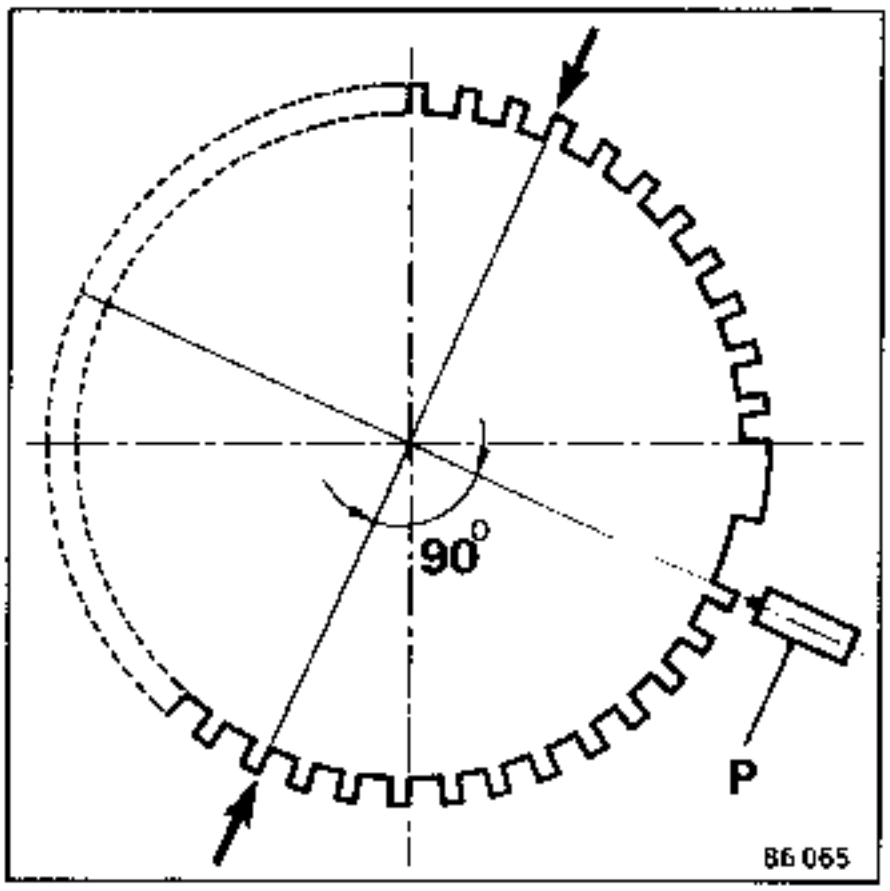
Z7W ENGINE



Firing Order: 1-6-3-5-2-4

1 FLYWHEEL

This has 44 regularly spaced teeth, two of which have been removed at 180° and 360° to create an absolute marking 90° before and after top and bottom dead centres. In reality, therefore, there are only 40 teeth.



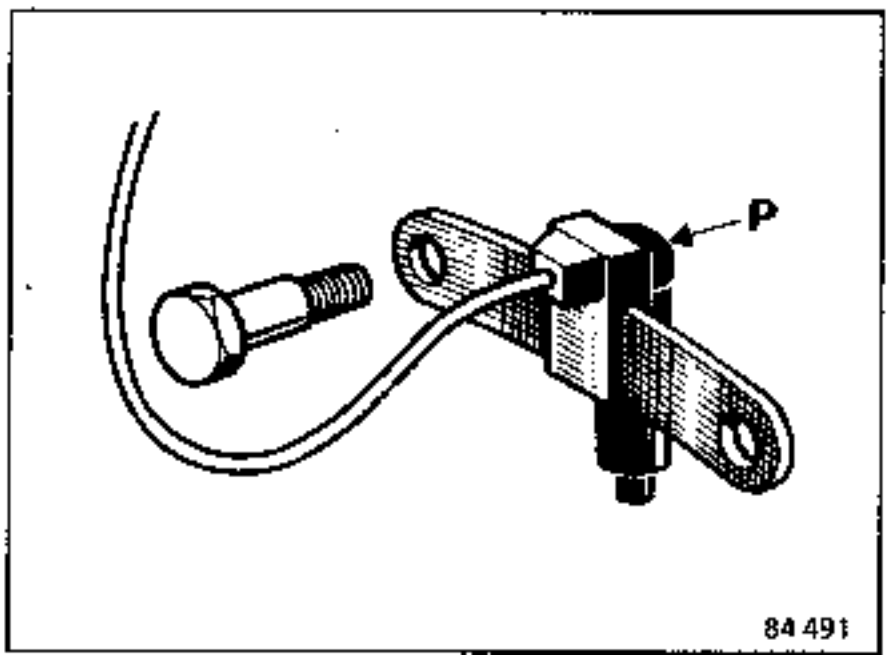
2 POSITION SENSOR (P)

This marks:

- the position of top dead centre and bottom dead centre;
- the rotational speed of the engine.

It cannot be adjusted (it is pre-set on its mounting bar).

It must be mounted on the clutch bell-housing with shouldered bolts.

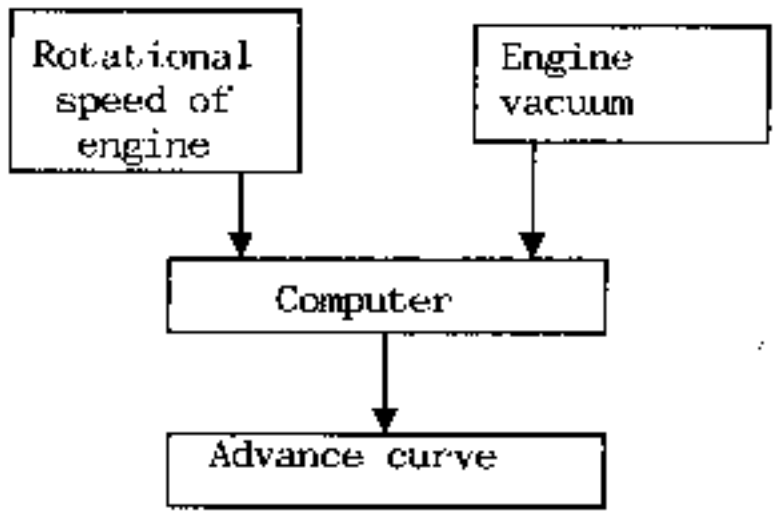


3 ABSOLUTE PRESSURE SENSOR

The pressure in the inlet manifold is measured by a sensor which emits an electrical image of the manifold pressure. This signal is one of the main parameters of the calculation of the injection time.

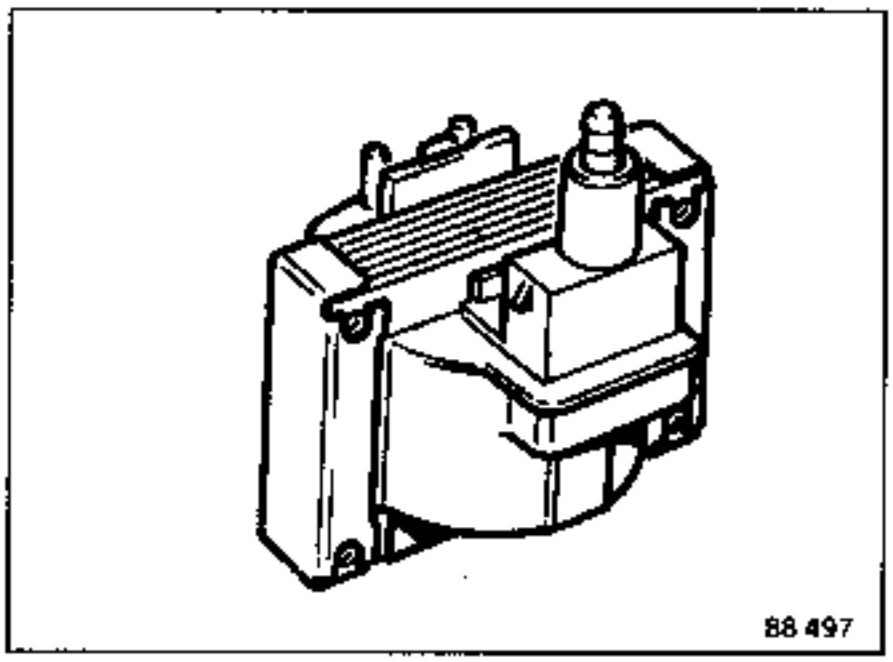
4 COMPUTER

This is an electronic system defining the advance curve in accordance with the engine's rotational speed and the engine vacuum.



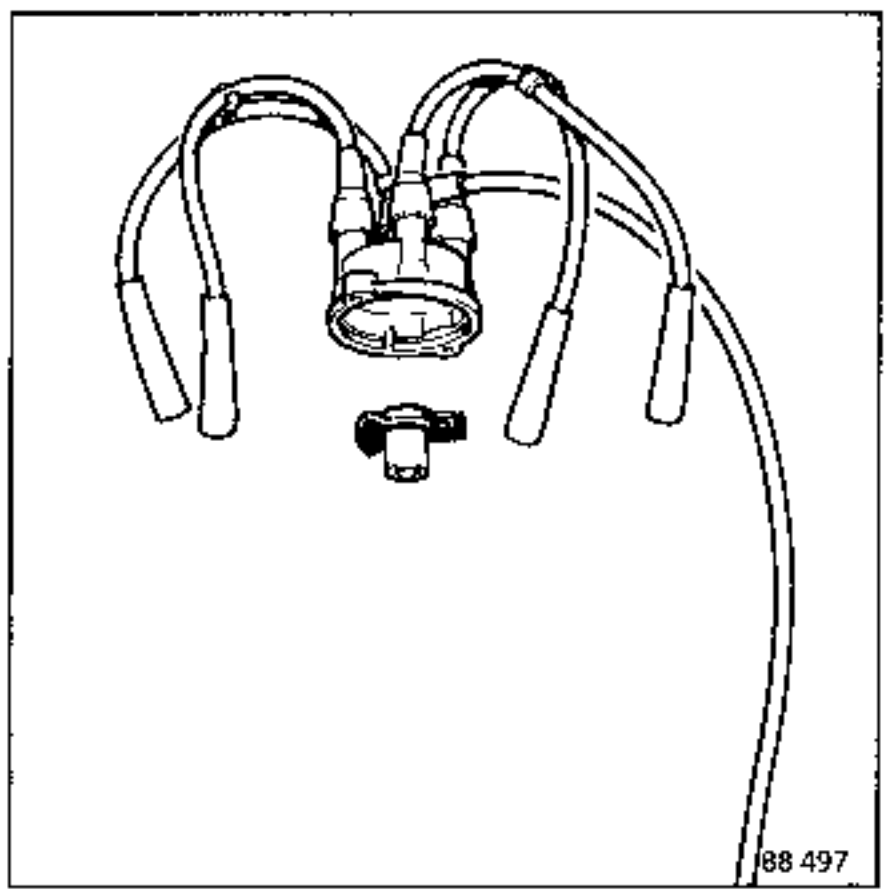
5 COIL

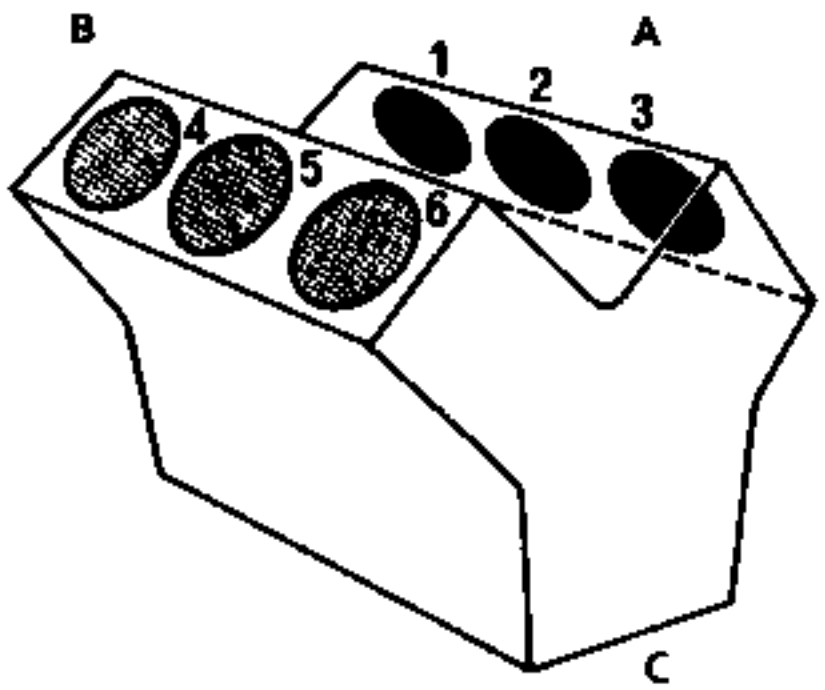
This is independent of the computer and can, therefore, be replaced.

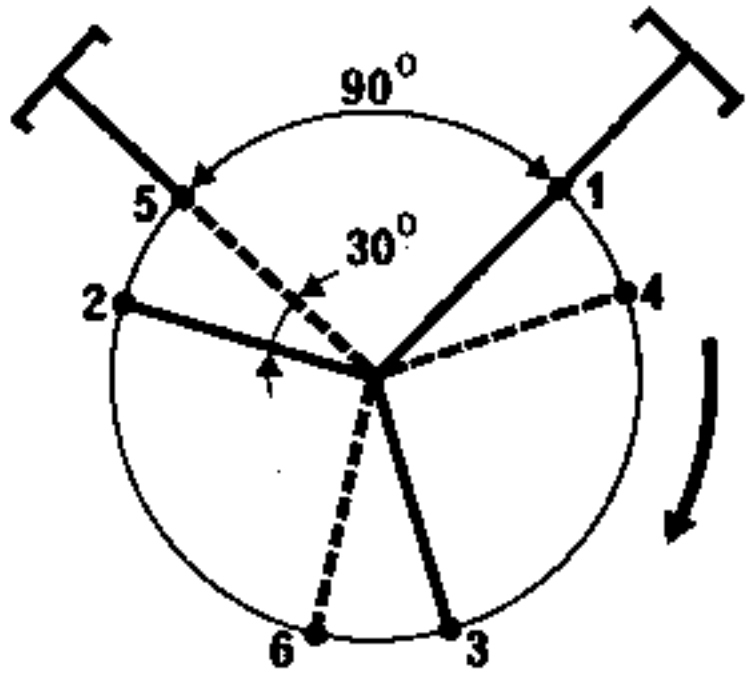


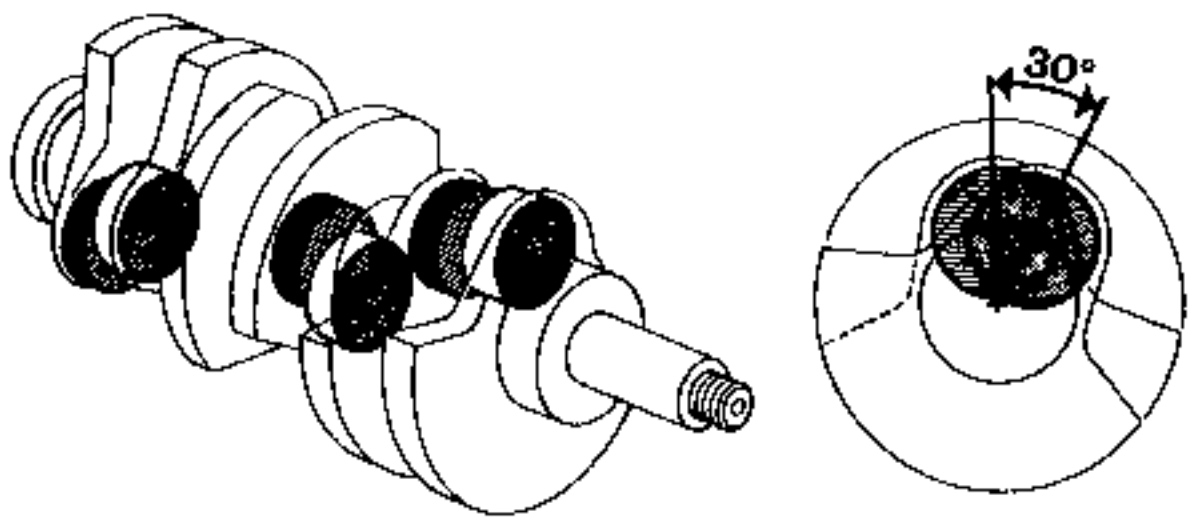
6 - DISTRIBUTOR

The sole function of the distributor is to distribute the high tension to the spark plugs in the firing order.
It cannot be adjusted.









89 124

REMINDER

The complete cycle of a 4-stroke engine is 2 crankshaft revolutions, ie. 720°.

For a 6 cylinder engine the ideal ignition pattern is obtained by distributing the sparks every 120° (720:6).

Determining the order of top dead centre points on the Z7W engine at 90° with crankpins offset by 30°.

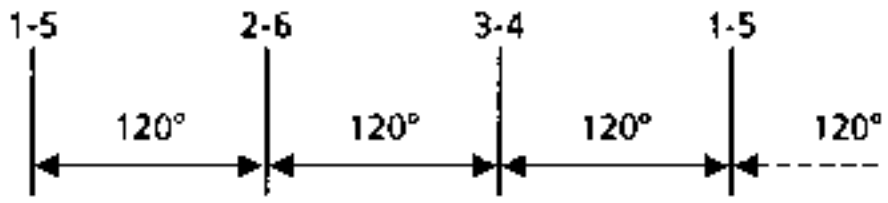
It should firstly be noted that the crank pins for cylinders 4-5-6 correspond to bank (B)(righthand bank) and are advanced by 30° respectively in relation to the crank pins of cylinders 1-2-3 of bank (A)(lefthand bank).

By turning the crankshaft from no 1 cylinder TDC, the TDC of each of the other cylinders may be found in the following order.

Timing gear end (C).

TDC ORDER

Interval in degrees between TDCs in crankshaft degrees.



It should be noted that one piston from each bank (A) and (B) is simultaneously on TDC.

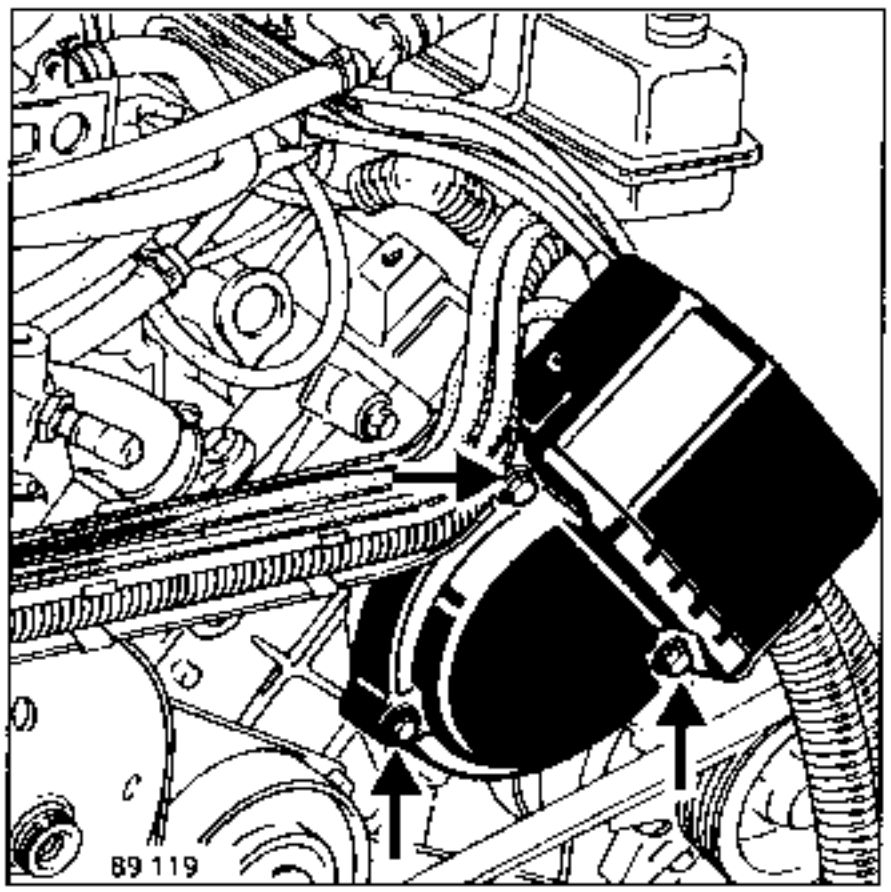
DETERMINING THE FIRING ORDER

In order to balance the engine operation satisfactorily, ignition should alternate between the two cylinder banks.

This therefore leads to the following firing order:
1-6-3-5-2-4 with a distributer having points equally spaced at 60°.

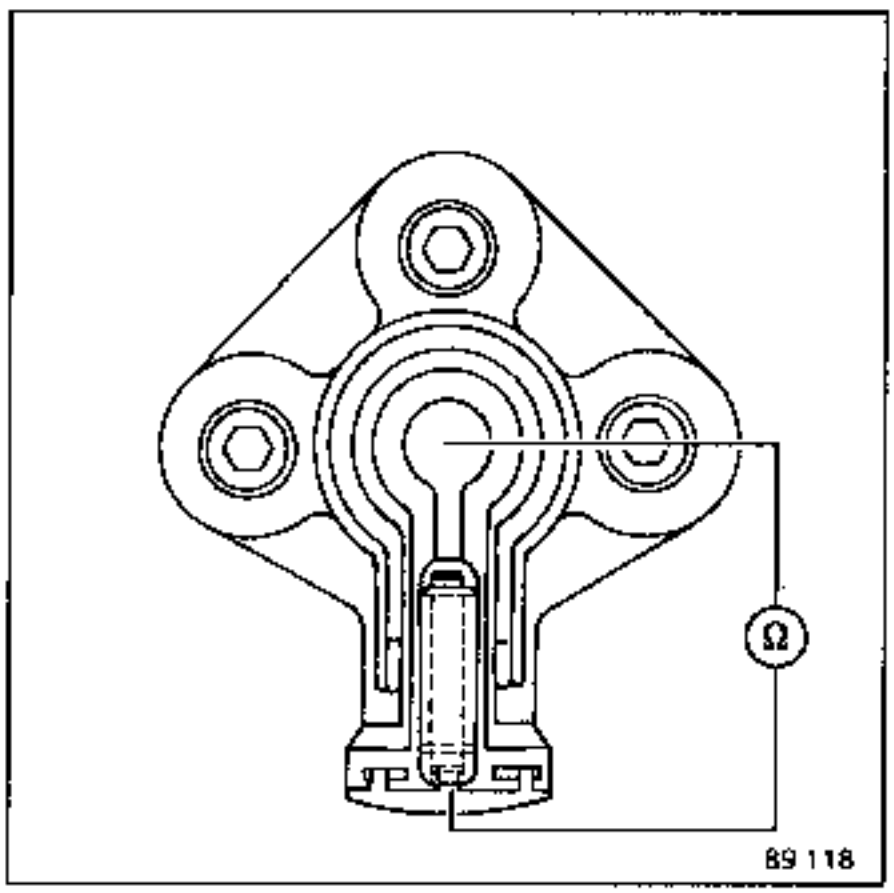
DISTRIBUTOR

Remove:
- the cover (clipped in place);
- the distributor cap (3 bolts);



- the distributor finger (3 screws);
- the insulating cup.

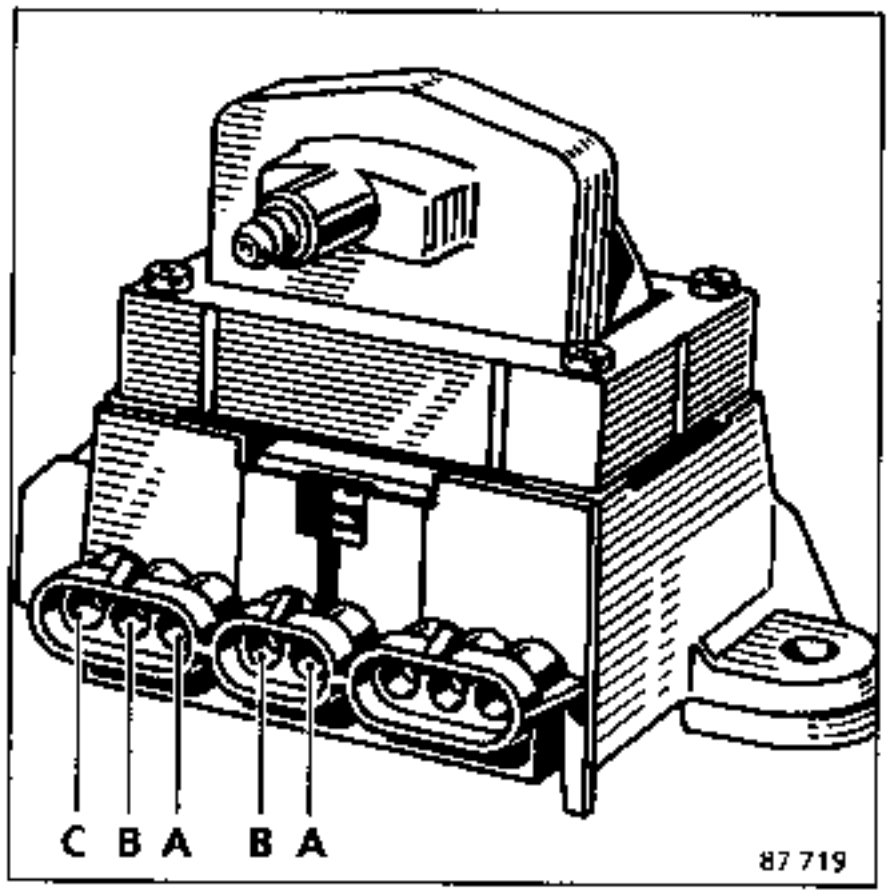
Check:
- the general condition of the points and distributor brushes;
- the resistance of the distributor finger using an ohmmeter. Correct value:
  0.8 K ohms to 1.3 ohms
- that O ring seal is fitted on the insulating cup.



Refit the various parts.

Distributor finger tightening torque:
0,2-0,3 daN.m

The injection unit contains the ignition advance curves and sends a 5 volt control signal to the ignition power module.



3-way connector

A - Battery +
B - Earth
C - Rev. counter

2-way connector

A - Control earth
B - Control signal

Vehicle	Engine	SPARK PLUGS			Electrodes gap (mm)
		Eyquem	Champion	AC	
J636	J7R	C82LJS	S6YC	–	0,9
J637 S637	J7T	–	S7YC RS7YC	C41CLTS CR41CLTS	0,9
J638	Z7W	C72LJS	–	–	0,9

The Bendix injection system fitted to the Espace J636-J637 and J638 is characterised by the following:

- a computer which manages the injection and ignition systems; the ignition advance is regulated by means of a pinking sensor mounted on the cylinder head between cylinders nos 2 and 3, under the inlet manifold for J7R and J7T engines and on the cylinder block near the oil filter for Z7W engines;
- the computer is mounted in the engine compartment on the front righthand inner wing flange panel;
- the injection relays are mounted inside the computer;
- the throttle casing with an integral air bypass is of the inverse type; 50 mm on J7R and J7T engines 55 mm on Z7W engine;
- the idling speed regulating valve is mounted on the air distributor;
- the absolute pressure sensor is mounted near the computer on the front righthand inner wing flange panel;
- the oxygen or lambda sensor is screwed into the exhaust downpipe on the J636 and J637 and at the catalytic converter inlet on the J638;
- the injection warning light is on the instrument panel.

Coolant Sensor

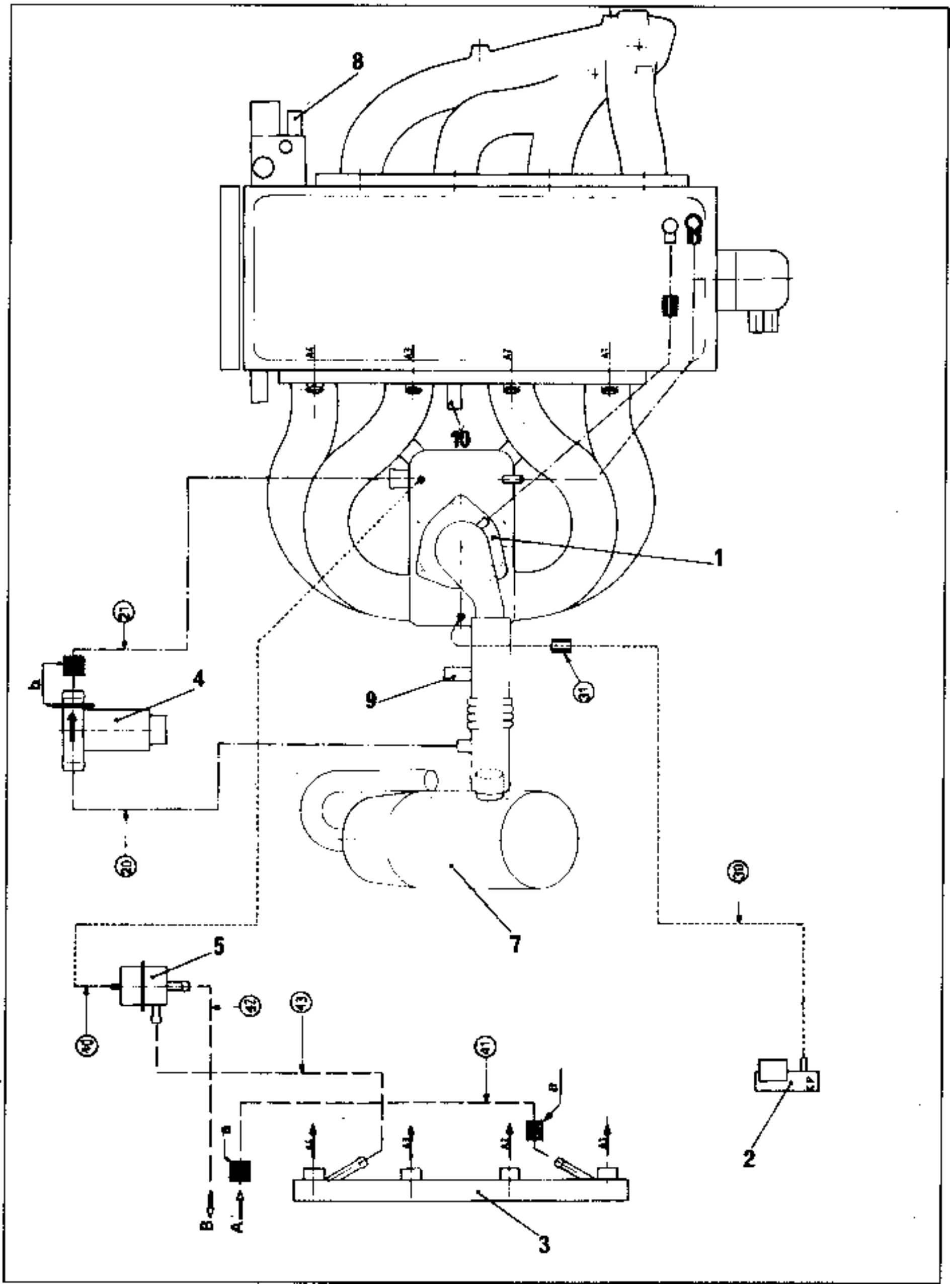
Temperature °C	20 ± 1	80 ± 1	90 ± 1
J7R-J7T Engines (CTP Bendix)			
Resistance Ohms	283 to 297	383 to 397	403 to 417
Z7W Engine (CTN Bendix)			
Resistance Ohms	3 061 to 4 045	301 to 367	212 to 273

Air Sensor

Temperature °C	0 ± 1	20 ± 1	40 ± 1
J7R-J7T Engines (CTP)			
Resistance Ohms	254 to 266	283 to 297	315 to 329
Z7W Engine (CTN)			
Resistance Ohms	7 469 to 11 970	3 061 to 4 045	1 289 to 1 654

CTP: positive temperature co-efficient

CTN: negative temperature co-efficient

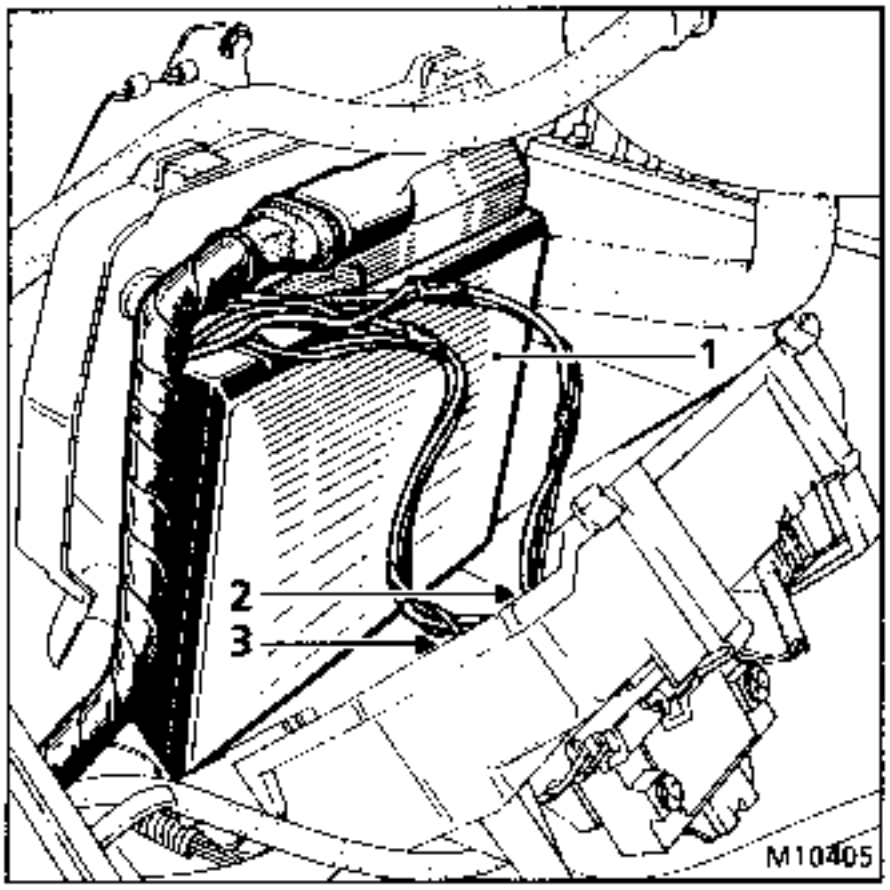

8
10
1
4
9
31
20
7
5
42
43
41
37
B
A
3
2
30

1 - Throttle casing
2 - Absolute pressure sensor
3 - Fuel injection gallery
4 - Idling speed electronic regulator
5 - Fuel pressure regulator
7 - Resonator-type air filter
8 - Coolant temperature sensor
9 - Air temperature sensor
10 - Pinking sensor
A : Fuel inlet
B : Fuel return

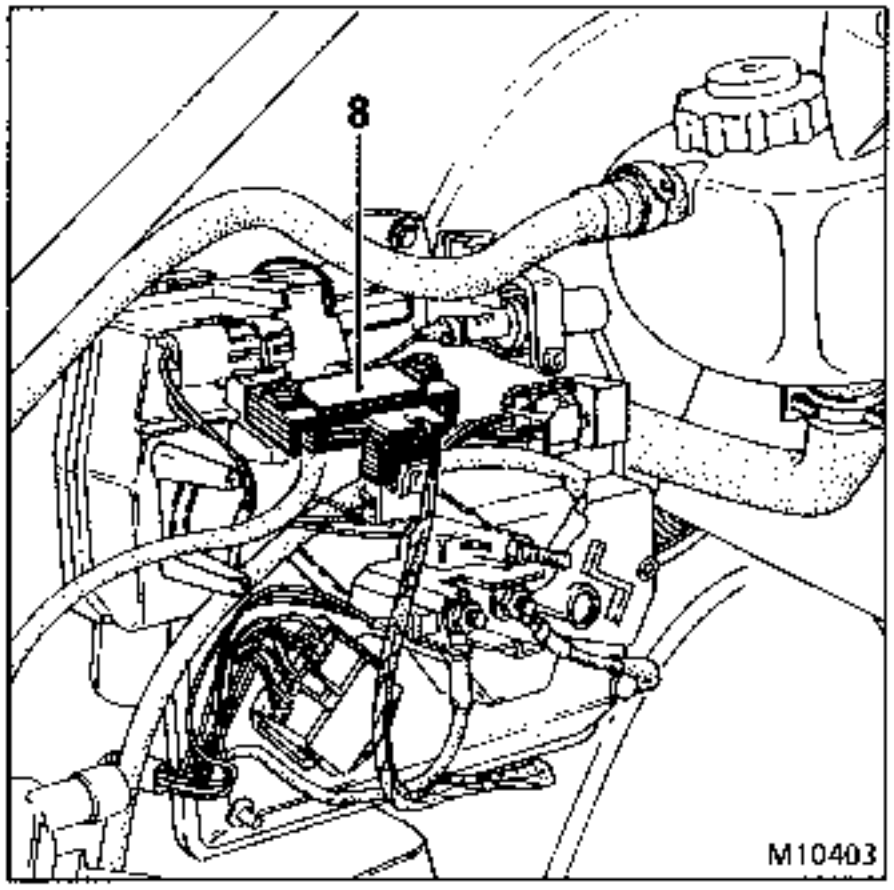
ELECTRONIC IDLING SPEED REGULATOR				
MARK	DESCRIPTION/FUNCTION	CLIP	RING COLOUR	COMMENTS
20	Inlet hose	2	None	On electric regulator blue ring
21	Outlet hose	2	Blue (b)	Return side

ABSOLUTE PRESSURE (MAP) SENSOR				
MARK	DESCRIPTION/FUNCTION	RING COLOUR	CLIP	COMMENTS
30	Vacuum hose	None	None	
31	A Ø 1.5 restrictor	White restrictor		

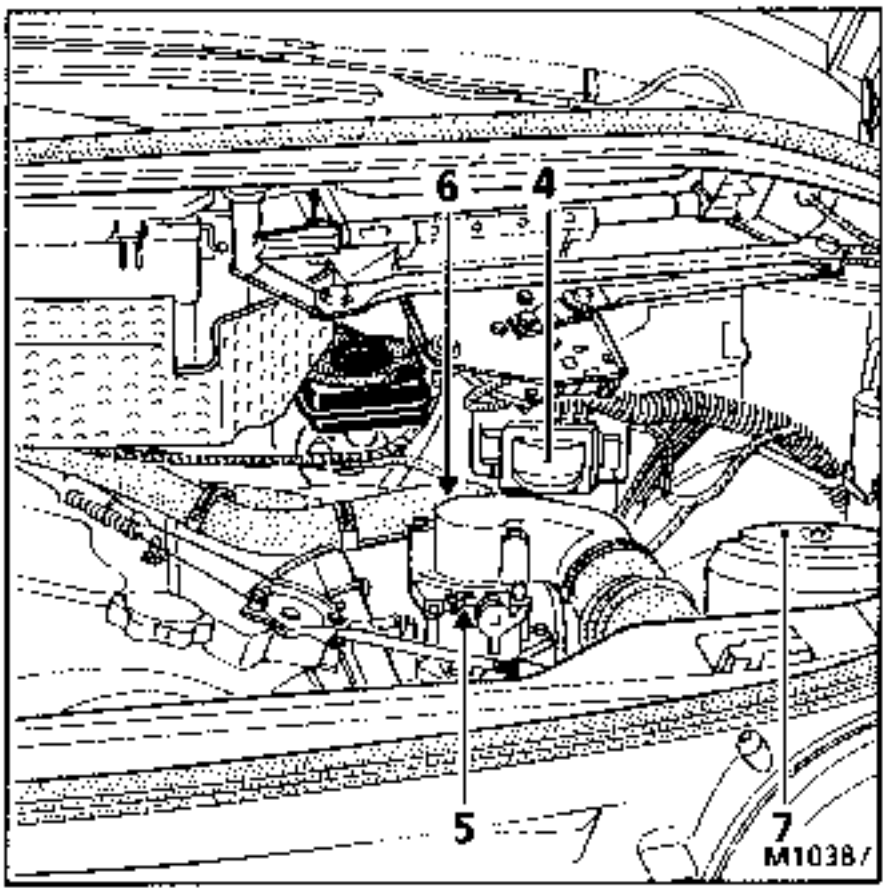
FUEL LINES				
MARK	DESCRIPTION/FUNCTION	CLIP	RING COLOUR	COMMENTS
40	Vacuum hose	None	None	
41	Inlet hose	2	pink (a)	
42	Return hose	2	none	
43	Gallery hose to fuel pressure regulator	2	none	



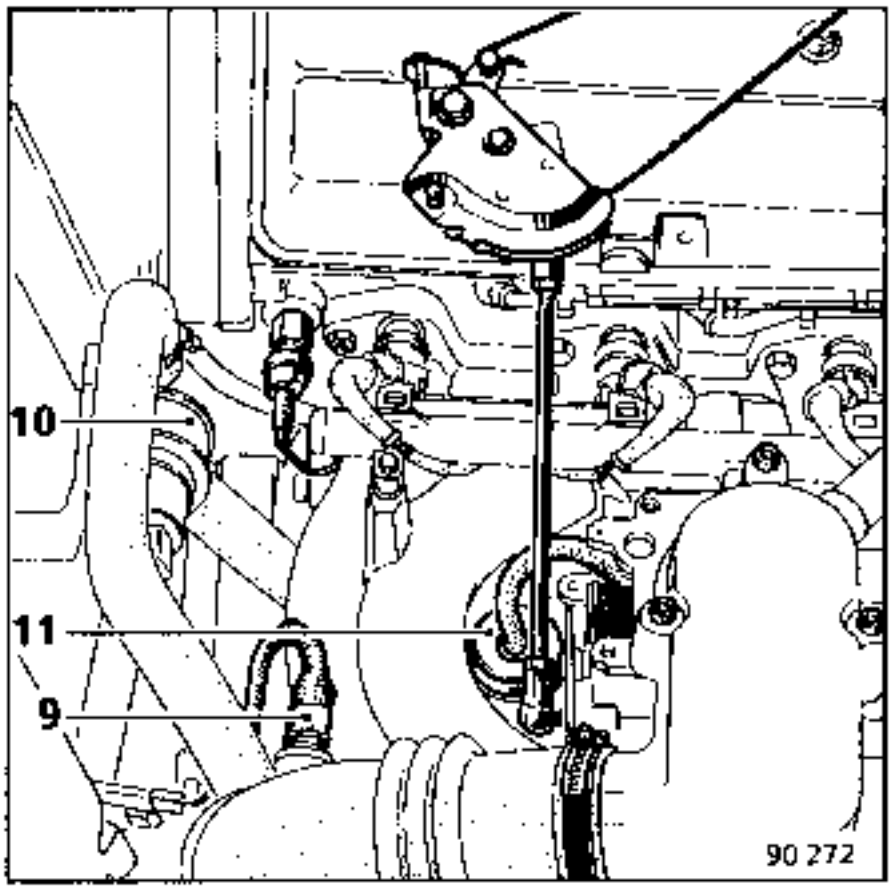
1 Computer: mounted on front R/H inner wing flange panel;
2 Fuel pump relay
3 Injection relay



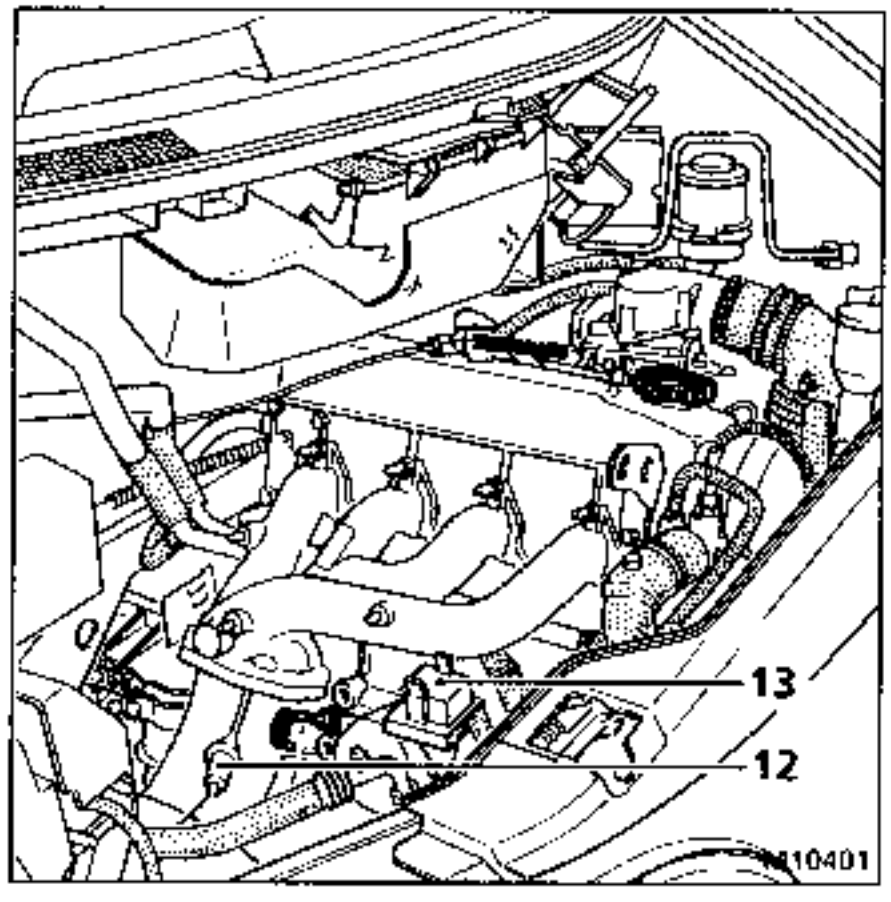
8 Absolute pressure sensor



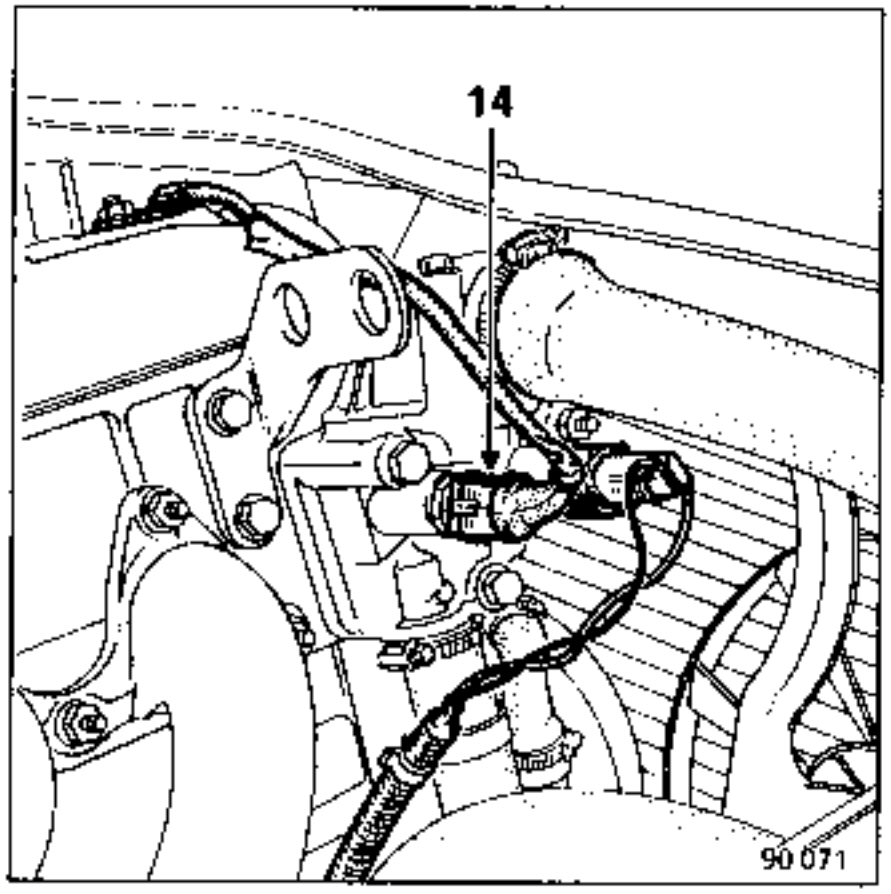
4 Ignition power module
5 Throttle casing
6 No load-full load switch
7 Air filter



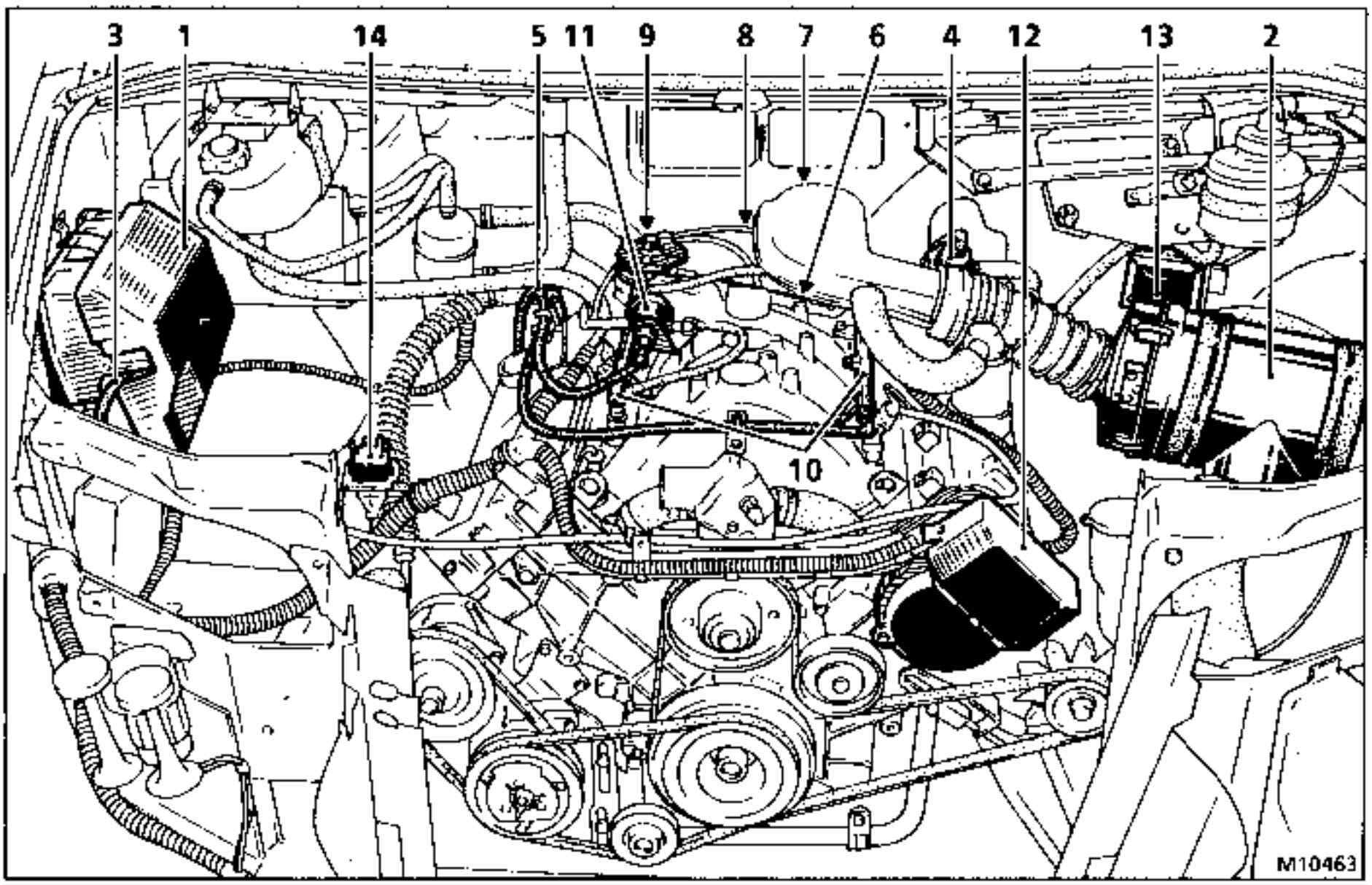
9 Air temperature sensor
10 Idling speed regulating valve
11 Fuel pressure regulator



12 Oxygen sensor
13 Diagnostic socket

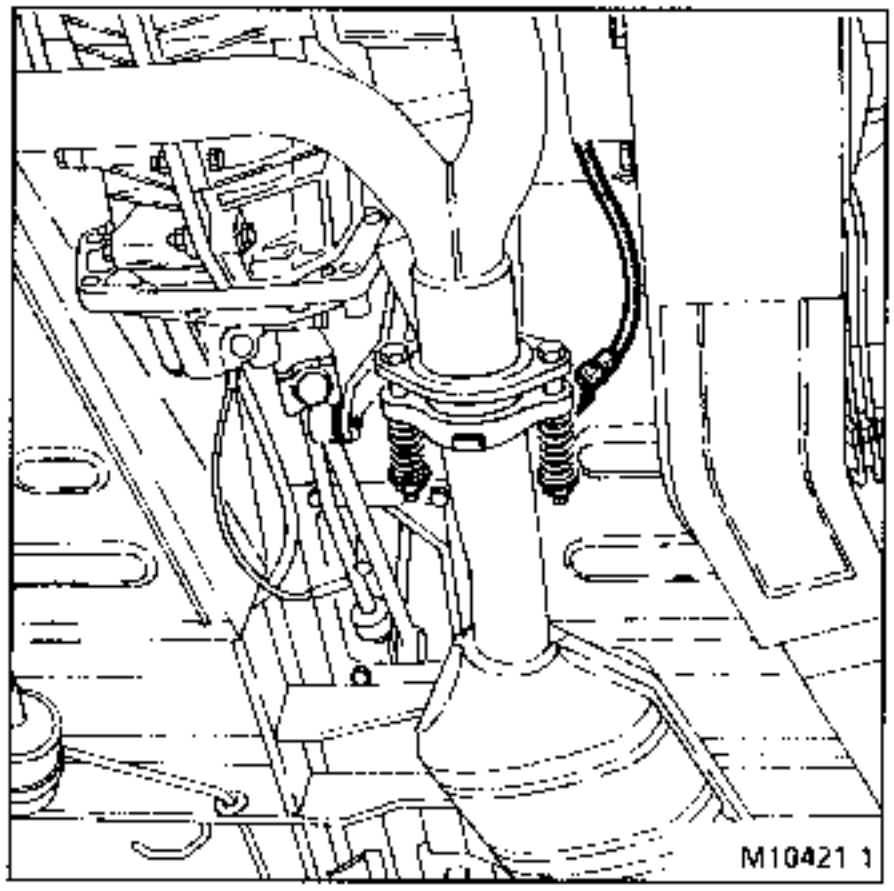


14 Coolant temperature sensor

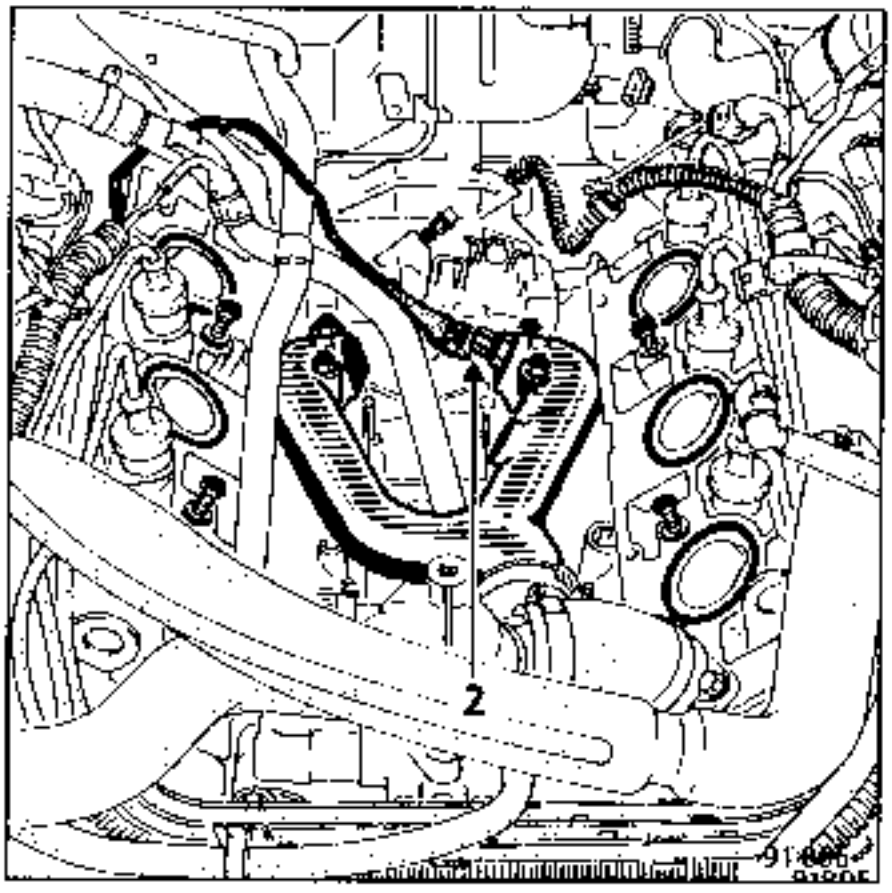


1 injection and ignition computer plus relay
2 air filter
3 absolute pressure sensor
4 idling speed regulating valve
5 fuel feed and return hoses
6 throttle casing
7 throttle butterfly position potentiometer
8 air temperature sensor
9 accelerator control barrel
10 fuel feed galleries
11 fuel pressure regulator
12 ignition distributor
13 ignition power module
14 diagnostic socket

Oxygen Sensor

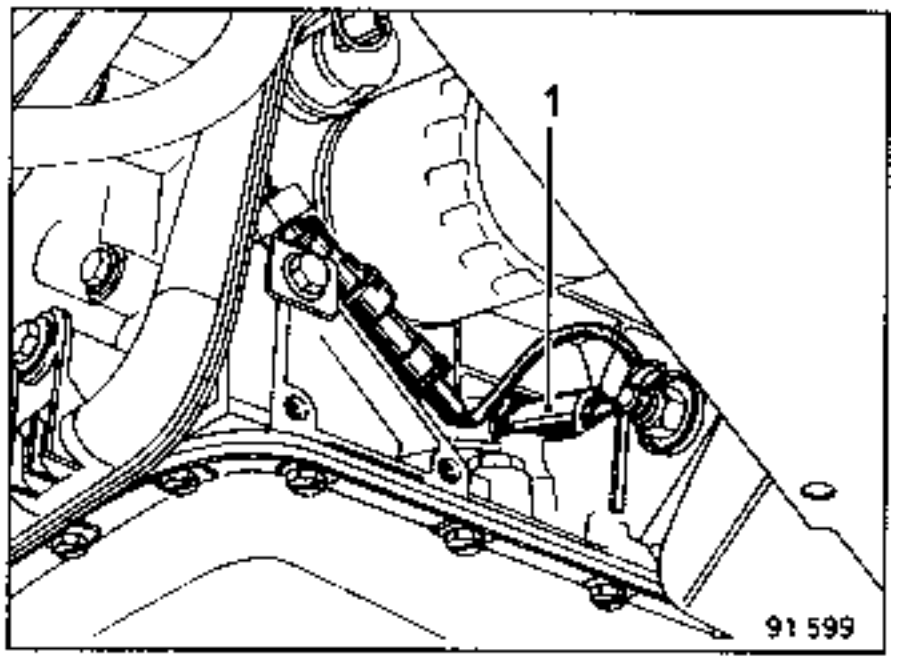


Coolant Temperature Sensor (2)



NOTE: to reach the sensor, remove the throttle casing and intermediate manifold.

Pinking sensor (1)

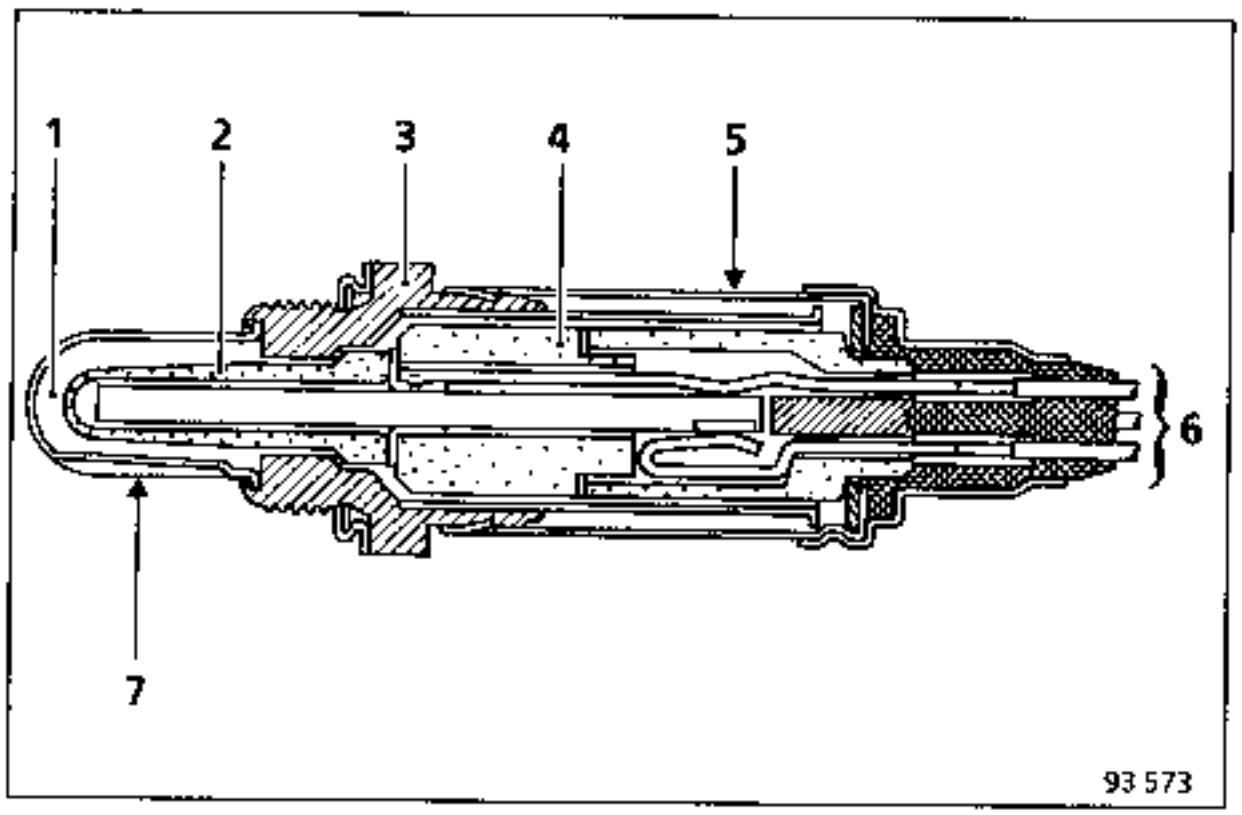


MIXTURE REGULATION

METHOD OF OPERATION OF THE OXYGEN (LAMBDA) SENSOR

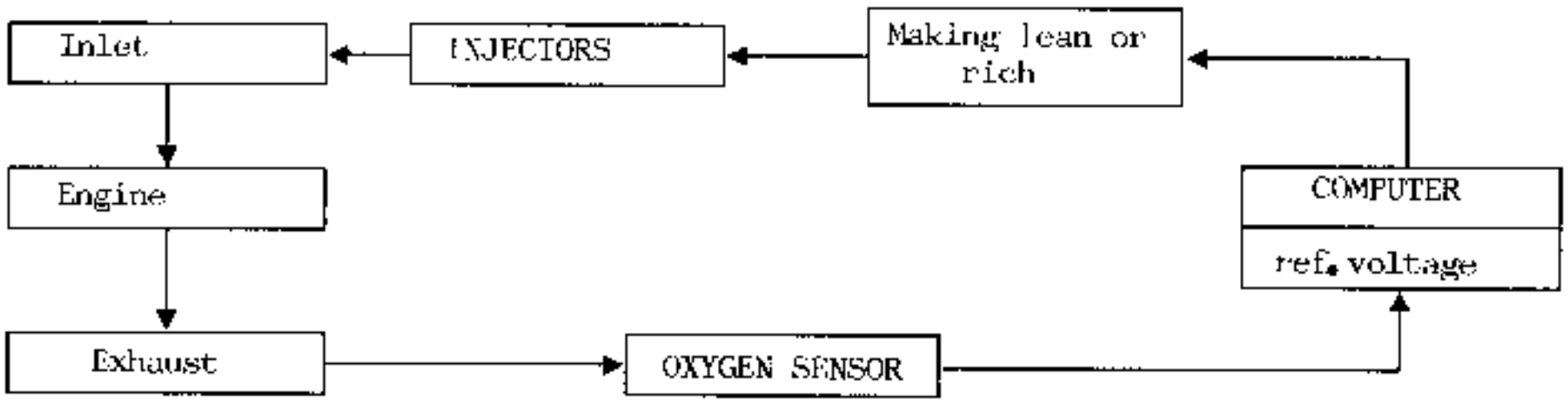
The operating method is based on the property of the ceramic used which conducts oxygen ions from a temperature of approx. 250°C. If the oxygen content is different on the two sides of the sensor, an electric voltage is established between the two limit surfaces owing to this special property of the ceramic. This voltage enables the oxygen content on both sides of the sensor to be measured.

The oxygen sensor determines the ratio of oxygen in the exhaust gases, the value of which varies according to the richness of the mixture. The sensor has the special feature that a variation in the composition of the carburated mixture, by comparison with the stoichiometric ratio (Lambda - 1) is manifested as a variation in the output voltage.



1 - Protective sheathing
2 - Ceramic sensor
3 - Base
4 - Contact pin
5 - Protective pin
6 - Electrical connections
7 - Exhaust gas

MIXTURE REGULATION



PRINCIPLE OF REGULATION BY THE OXYGEN OR LAMBDA SENSOR

OXYGEN SENSOR LOCATION

On the J7R and J7T engines the oxygen or Lambda sensor is located in the exhaust downpipe.

On the Z7W engine, the sensor is placed at the catalytic converter inlet.

REPLACING THE OXYGEN SENSOR

REMOVAL

Disconnect the connector from the wiring harness.
Unscrew the oxygen sensor from the exhaust downpipe.

Clean the threads of the downpipe.

REFITTING

ATTENTION:

Only apply anti-seizing grease to the threads of the sensor, not to the other parts.

Screw the oxygen sensor into the exhaust downpipe by hand. Torque tighten it to 2.7 to 3.4 daNm.

Reconnect the wiring harness connector.

NOTE:
The leads of the oxygen sensor cannot be joined or soldered. If these leads break the sensor must be replaced.

J7R-J7I-Z7W Engines:

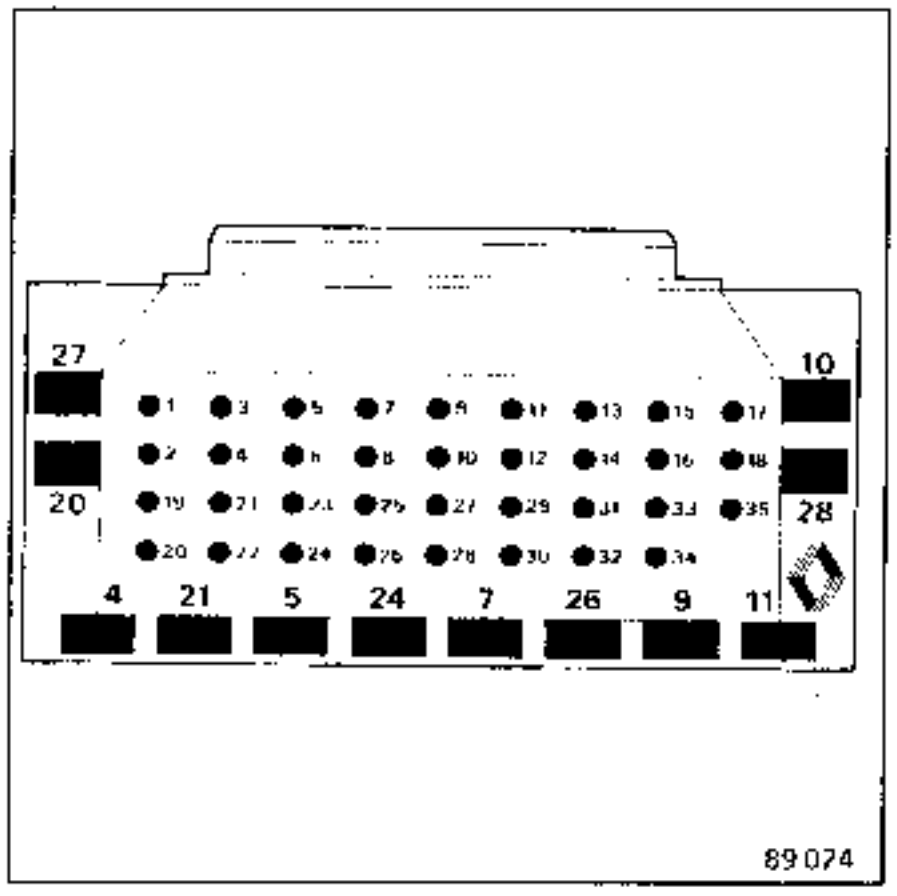
The engines are fitted with an anti-pollution system comprising a lambda sensor and catalytic converter which does not enable any adjustment to be made to the idling speed.

Fault finding oxygen sensor: please consult Technical note 1529.

The XR 25 test box has been developed as a test unit for microprocessor systems. When it is connected to the diagnostic plug it enables systems to be checked and breakdowns to be remedied quickly by informing the operator of the state of the computer and of most of its peripheral units. See manual M.R. INJ. R (E).

XR 25 test box

M.S 1048 terminal holder



PRECAUTIONS:

The computer must be disconnected and no tests can be performed on the computer itself.

When performing electrical checks with the voltmeter/ohmmeter or shunting electrical terminals, take care not to make any errors in the markings of the wires indicated in the checks.

A connection error may damage the component parts of the injection system.

CHECKING THE INTAKE CIRCUIT FOR LEAKS

If the idling speed is unstable (pumping), the condition of the hoses and unions in the intake system must be checked.

Also make sure that the no load/full load switch is operating correctly as similar incidents can arise if it is not.

NOTE:

If the data obtained with the XR 25 requires the electrical continuity to be checked from a main connector of the injection system, connecting this tool to the connector will make it easier for the probe tips to reach the different contacts.

(Tool M.S 1048 consists of a 35-track base integral with a printed circuit on which there are 35 copper-plated surfaces numbered from 1 to 35).

LIST OF UNITS

104	Ignition switch
120	Computer
146	Pinking sensor
147	Atmospheric pressure sensor
163	Starter
171	Air conditioning clutch
193 196	Injectors
208	Electronic ignition module
218	Fuel pump
266	No load/full load switch
225	Diagnostic socket
236	Fuel pump relay
238	Injection locking relay
242	Oxygen sensor
244	Coolant temperature sensor
247	Instrument panel
149	Flywheel sensor
272	Air temperature sensor
341	Idling speed regulating valve
362	Battery+ terminal plate
371	Fuel vapour absorber

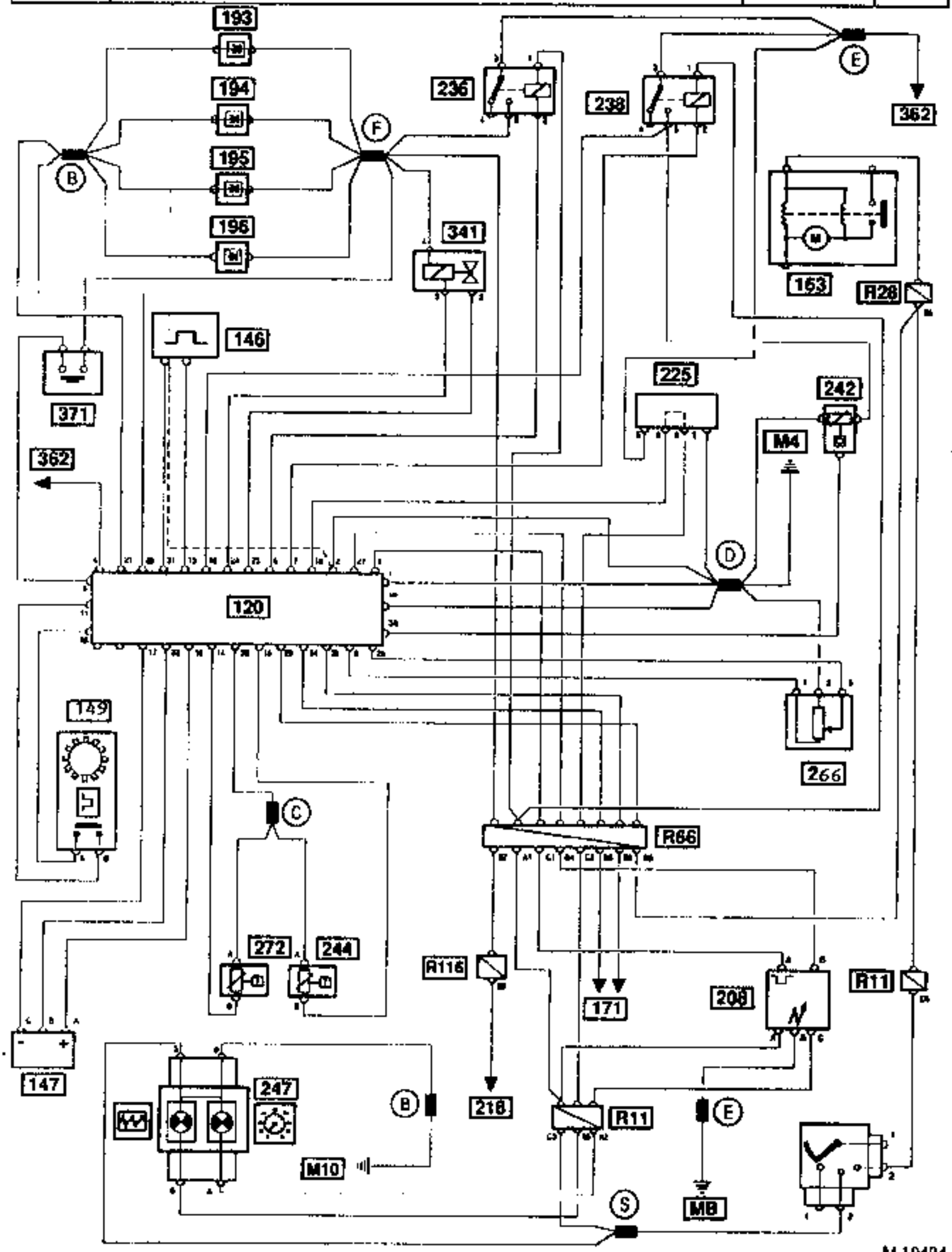
List of junctions

R11	Dashboard/lefthand side member
R28	Engine/lefthand side member
R66	Injection: righthand side member
R116	Engine/fuel pump

List of earths

MB	Front lefthand earth
M4	Bodywork earth
M10	Front lefthand pillar earth

NOM	INJECTION		91	X 63
	TYPE : J	EQUIP : E1 - E2	GHI : All types	
	MOT : 6 - 7			



M 10494

LIST OF UNITS

104 Ignition switch
120 Computer
146 Pinking sensor
147 Atmospheric pressure sensor
163 Starter
171 Air conditioning clutch
193-198 Injectors
208 Electronic ignition module
218 Fuel pump
222 Throttle butterfly potentiometer

225 Diagnostic socket
232 Starter relay
236 Fuel pump relay
238 Injection locking relay
242 Oxygen sensor
244 Coolant temperature sensor
247 Instrument panel
149 Flywheel sensor
272 Air temperature sensor
341 Idling speed regulating valve
362 Battery- terminal plate
371 Fuel vapour absorber
474 Air conditioning compresser

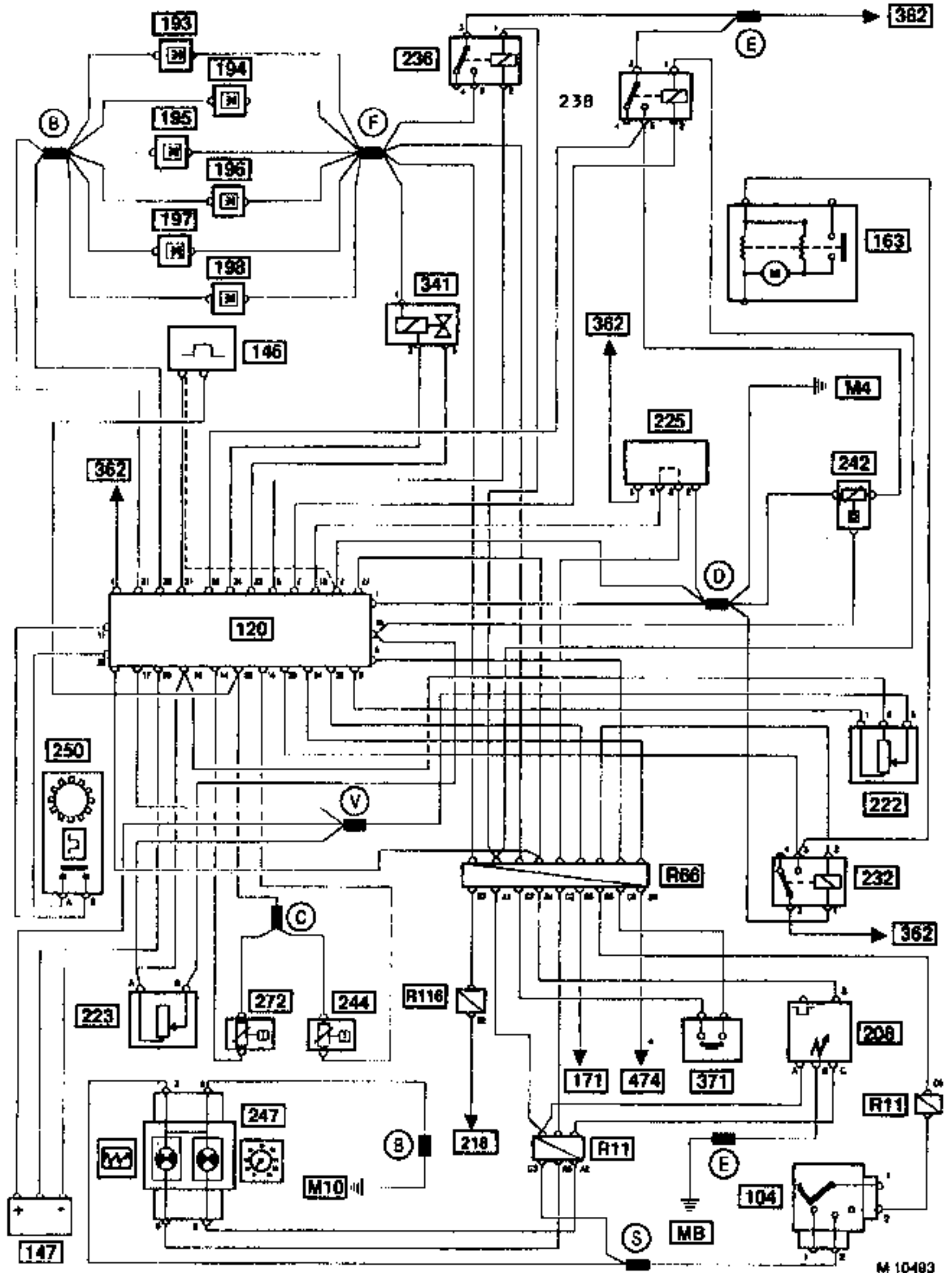
List of Junctions

R11 Dashboard/lefthand side member
R66 Injection/righthand side member
R116 Engine/Fuel pump

List of Earths

MB Front lefthand earth
M4 Bodywork earth
M10 Front lefthand pillar earth

NOM	INJECTION		91	X 63
	TYPE : J	EQUIP. : E3	GHI : All Types	
	MOT. : 8			



DISPLAYS READ IN ABSENCE OF INCIDENTS

- Connect the XR 25 to the vehicle's diagnostic plug and using the appropriate cassette
- Ignition on
- Key in: D 03

Computer identification number in relation to vehicle

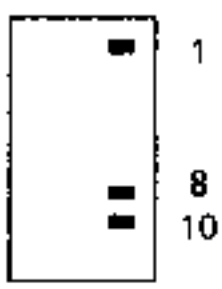
example: X X 3

Injection code number

(XR25 Centre Display)

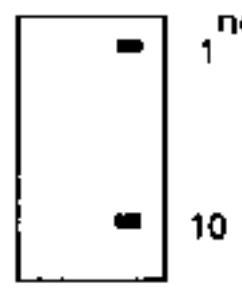
XX = 71 J7R
XX = 51 J71
XX = 128 Z7W

TEST 1
(ignition on)

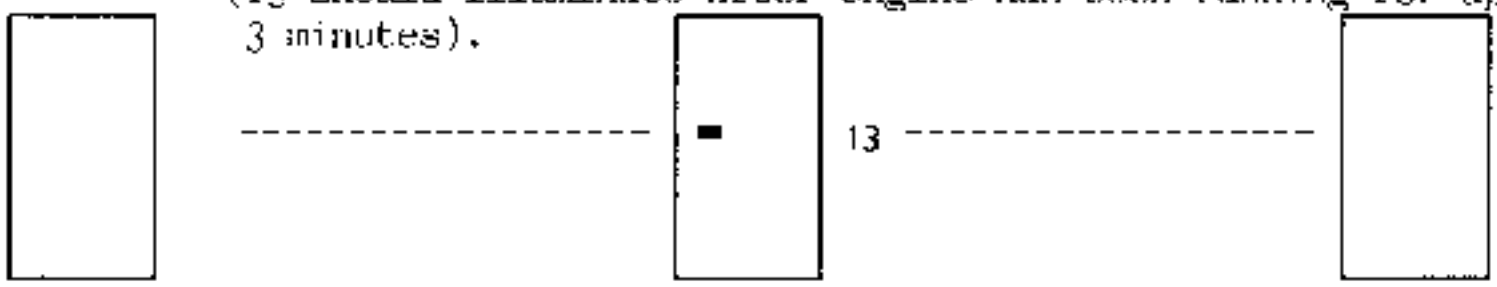


TEST 2
(engine running)

TEST 3*
(at starter speed if vehicle does not start)



In all 3 tests: 13 must be off when engine cold
(13 should illuminate after engine has been running for approx 3 minutes).



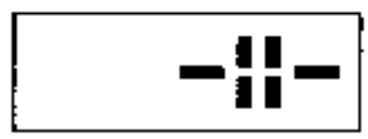
GOOD GOOD GOOD

*Ignition on 1/8/10 are illuminated. Line 8 goes out when starter activated.

Possible readings on centre display

1) Ignition on, engine stopped

2) Ignition on, engine running (no incidents) diagnostic code not emitted



1) Diagnostic code not interpreted, check conformity of computer with vehicle

2) In the "additional tests" functions, setting table not interpreted

1) Check conformity of computer in relation to vehicle, but diagnosis may be interpreted by XR 25

No incidents stored.
Latest cassette.

DIAGNOSTIC CODE:

XX 3

XX = 71 J7R
XX = 51 J7T
XX = 128 Z7W

On the XR25 bar graph, if one or more lines are illuminated, please consult the corresponding number on the diagnostic card.

		87A		
•	1	CODE PRESENT	TEST 1 IGNITION ON ENGINE STOPPED	TEST 2 ENGINE RUNNING
	2	COMPUTER DIAGNOSIS		
	3	5 VOLT FEED		
•	4	AIR SENSOR CIRCUIT		
•	5	COOLANT SENSOR CIRCUIT		
	6	CO POTENTIOMETER CIRCUIT		
•	7	PRESSURE SENSOR SIGNAL		
•	8	FLYWHEEL SENSOR CIRCUIT	TEST 3 TEST AT START (if vehicle does not start)	
	9	INJECTOR FEED		
•	10	NO/LOAD-FULL LOAD SWITCHES		
		"R" INJECTION CARD CODE : D 03		
	11	FLYWHEEL SENSOR		
	12	PINKING SENSOR		
•	13	OXYGEN SENSOR		
•	14	AIR CONDITIONING DATA		
		Engine stopped #03 Air Temp: #01 Pressure in mb #04 Bat. Volt: V #02 Coolant Temperature: degrees		
		Engine running #06 Engine speed: rpm		
	20	MEMORY FUNCTION	Code 00	

• Tests performed

PINKING SENSOR
Engine idling:
enter # 13
read off on centre display:
value read off should vary according to engine speed. If still less than 5: check pinking sensor and harness.

CHECKING SEQUENCE

TEST 1

Ignition on, engine stopped
Read results from 1 to 7
If off from 2 to 7: no incidents

TEST 2

Engine running
Read results from 1 to 14
If off from 1 to 14: no incidents

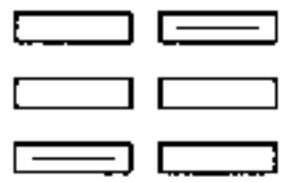
ADDITIONAL TESTS
(Engine running)

- no load-full load throttle switch
- pinking sensor
- 02 sensor

THROTTLE BUTTERFLY SWITCH
Engine running *: activate accelerator watching line 10.

* may be performed with engine stopped.

CONFORMITY TEST

Function to be checked	Conditions	Selection on test box	Bar Graph Line Number	Bar graph display	Display on digital display Remarks
Assembly of idling regulation valve	Engine stopped Visual check				Flow towards manifold in direction shown by arrow on valve
Position of injection diagnosis	Engine stopped Ignition on	D03	L1 L8 L10	 L1 : code present L8 : TDC code L10 : no load switch	xxx3 xx = 51 J7T xx = 71 J7R 3 = injection diagnosis
Checking no load/full load switch	Engine stopped: ignition on - no load - light throttle - full throttle		L10 L10 L10		
Checking absolute pressure sensor	Engine stopped Ignition on	#01	L7		xxxx depends on local barometric pressure
Checking coolant temperature sensor	Engine idling after fan has cut in once. If display on test box returns to 0	#02 D03 #02	L5		xxx 80°C-110°C
Checking air temperature sensor	Engine idling	#03	L4		xxx Ambient temp ±2°C
Checking idling speed regulation speed	Engine hot and idling - No consumers switched on - cooling fan - headlights - wheels locked	#06 #12			Measure speed xxx 775-825 rpm Measure RCO xxx 2,8-3,5

CONFORMITY TEST

Function to be checked	Conditions	Selection on test box	Bar graph line No	Bar Graph display	Display on digital display Remarks
Checking idling speed regulation and engine speed with air conditioning	Engine hot and idling Coolant temp > 80°C with air cond.				Read off speed ≤ [xxx] ≤ 1 000 rpm Measure RCO
	Compressor engaged	#06	L14		xxx ≥ 3,45 ms
	Compressor disengaged	#12	L14		xxx ≥ 2,8 ms
Check no load switch, engine running	Engine running - no load		L10		
	- light throttle		L10		
	- gradual return to no load position		L10		
Checking pinking sensor Measure noise	Engine hot unladen: 3 600 + 200 * − 0	#13	L12		Measure the min and max values over approx 10 secs [xxx] Value should not be zero and should vary
Checking oxygen sensor	Engine hot and idling	#35	L13	Test possible must be illuminated on R/H	Sensor primed Read off values [xxx] 20 ≤ [xxx] ≤ 230

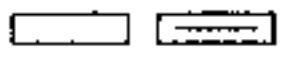
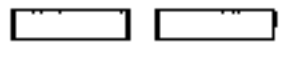
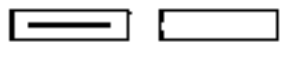
The check for conformity is performed using the XR25 test box and the latest cassette, with the corresponding magnetic card placed opposite the bar graphs.

With the engine stopped, connect the test box to the vehicle's diagnostic plug.

*NOTE:

A sensor incident may be detected when accelerating unladen: take no account of this.

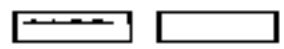
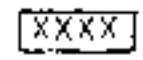
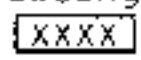
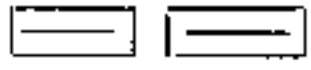
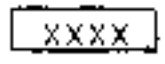
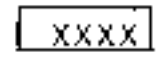
CONFORMITY TEST

Function to be checked	Conditions	Selection on test box	Bar Graph line No	Bar Graph Display	Display on digital display Remarks
Idling speed regulating valve assembly	Engine stopped Visual check				Flow towards manifold in direction indicated by arrow on valve.
Computer correspondence	Engine stopped Ignition on	D03	L1 L8 L10		Correct code No TDC No load switch Read 128 otherwise check that computer to specification
Throttle butterfly potentiometer	Engine stopped Ignition on - no load	#17	L10		Value read off should be between 05 and 10, otherwise check: throttle casing returned correctly to idling, then potentiometer adjustment or replace throttle casing (if value read is 128 an incident has been detected, eg potentiometer badly timed <0)
	- light throttle		L10		Value read off increases.
	- full throttle		L10		Value read off should be >215 and <255 otherwise check: -throttle casing completely open -potentiometer and harness

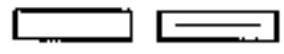
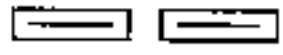
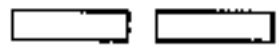
CONFORMITY TEST

Function to be checked	Conditions	Selection on test box	Bar Graph line No	Bar Graph Display	Display on digital display Remarks
Absolute pressure sensor	Engine stopped Ignition on	#01	L7		Value read off should be equal to atmospheric pressure (between 950 and 1025 mbar at sea level) otherwise check: - pressure sensor - connector harness
Coolant sensor	Engine cold Ignition on	#02	L5		Value read off should be equal to ambient temp. - if bar graph illuminated: check sensor, connector, harness; - if value read off is not ambient temp: check sensor
Air sensor	Engine cold Ignition on	#03	L4		Value read off should be equal to ambient temp. - if bar graph is illuminated check sensor, connector, harness; - if value read off is not ambient temp: check sensor

CONFORMITY TEST

Function to be checked	Conditions	Selection on test box	Bar Graph line No	Bar Graph Display	Display on digital display Remarks
Battery voltage	Engine hot and idling	#04			Value read off should be between 13 and 14.5 volts otherwise check battery and alternator
Oxygen sensor operation	Engine hot after cooling fans have cut in twice. Engine idling. Read off after starting delay	# 5 35	L13		 XXXX = voltage value varies between 50 and 900 mV (approximate readings)  Value hovers around 128 0 XXX 255
	Defect mode. Sensor breakdown, leads cut, sensor disconnected.	#05 #	L13		 Value is fixed.  XXX = 128

CONFORMITY TEST

Function to be checked	Conditions	Selection on test box	Bar Graph line No	Bar Graph Display	Display on digital display Remarks
Idling speed and regulation with air conditioning	Request for air conditioning Compressor not engaged Compressor engaged	 #04 #12	 L14 L14	 	Check engine speed 910 ± 50 rpm Check engine speed 910 ± 50 rpm otherwise check harness Read off RC0
Pinking sensor Measuring noise	Engine hot unladen N = 3 500 rpm	#13	L12		Value read off should not be 0 and variable otherwise check harness and sensor

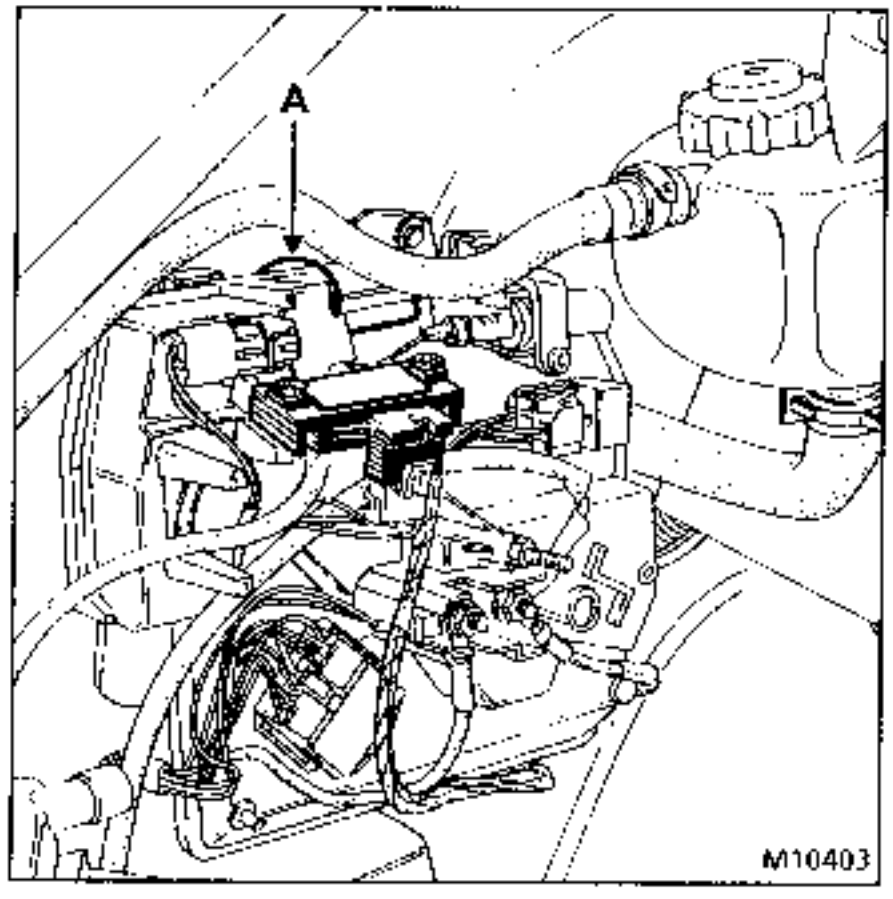
Remark:
Using this fault-finding sequence pre-supposes that the engine is in good condition and that the electrical system has been checked and, when applicable, rectified.

1. Engine not starting or difficult to start	2. Engine starts then stops	3. Uneven idling	4. Poor engine acceleration	5. Misfiring at all speeds	6. Excessive fuel consumption	7. Low power	8. Exhaust gas CO% too high at idling speed (>0.5%)	9. Pinking	10. Idling speed too high	11. Idling speed too low (engine stalls)	CAUSE	REMEDIAL ACTION - CHECKS
●	●										Defective relay assembly (3 sec timing)	Check voltage supply
●											Electric fuel pump not working	Check fuel pressure Are relays and fuel pump switched on? If they are, change fuel pump
		●	●			●			●		Idling switch badly adjusted or defective	Check timing of switch or replace it if defective
●		●	●						●		Air intake system not sealed	Check inlet manifold, elements connected to it and all hose connections
●		●			●	●					Faulty injectors	Check injector pulses by feeling, elimination of electrical feed (drop in eng. speed)
●	●					●					Fuel pressure too low or non-existent Air sensor defective	Check fuel pressure, filter + pipes, pressure regulator and pump. Check sensor, change it if necessary
					●						Fuel pressure too high	Is hose connecting press. reg to inlet manifold connected? Fuel return hose clogged or trapped. Defective pressure regulator
●									●	●	Idling regulation valve Coolant sensor Idling switch defective	Check valve operation, if faulty change it. Check sensor, change if necessary. Adjust or change switch.
●									●	●	Idling regulation valve feed defect	Check electric circuit, computer conformity; if faulty or not to spec., change it
						●		●			Poor ignition, excessive engine temperature, incorrect mixture, incorrect fuel grade	Check coolant circuit, ignition system fuel supply, full load swith, mixture reg.

1	2	3	4	5	6	7	8	9	10	11	CAUSE	REMEDY - CHECK
						●		●			Air sensor defective	Check air sensor, change if necessary
		●		●							Faulty flywheel sensor target	Check that notches or apertures on flywheel are regular and to specification
		●	●			●	●				Faulty full load switch	Check and change if necessary
											Faulty idling switch	Check and change if necessary
											Faulty oxygen sensor	Change it if necessary
											Fuel pressure	Check fuel press. Check fuel circuit if necessary
●	●										Defective pressure sensor	Check the hose connecting the inlet manifold Check the elec. supply of the sensor (-5volts)
●											Defective speed sensor	Check resistance and air gap
●											Defective ignition power module	Check the feed to the module and resistance of the coil
	●					●					Defective air sensor	Check resistance and circuit
●					●						Defective coolant temp. sensor on engine	Measure resistance and circuit
		●									Throttle butterfly not closing	Free the butterfly throttle, adjust accel. rods and then adjust throttle butterfly
						●					Throttle butterfly not opening competely	Adjust the accelerator control
				●							Poor central earthing, defective connector contacts	Check the connections
●	●	●	●	●	●	●			●	●	Cut wiring harness and connections	Repair the cut section
●	●	●	●	●	●	●			●	●	Faulty computer	Check all electric circuits before changing the computer

REMOVAL - REFITTING

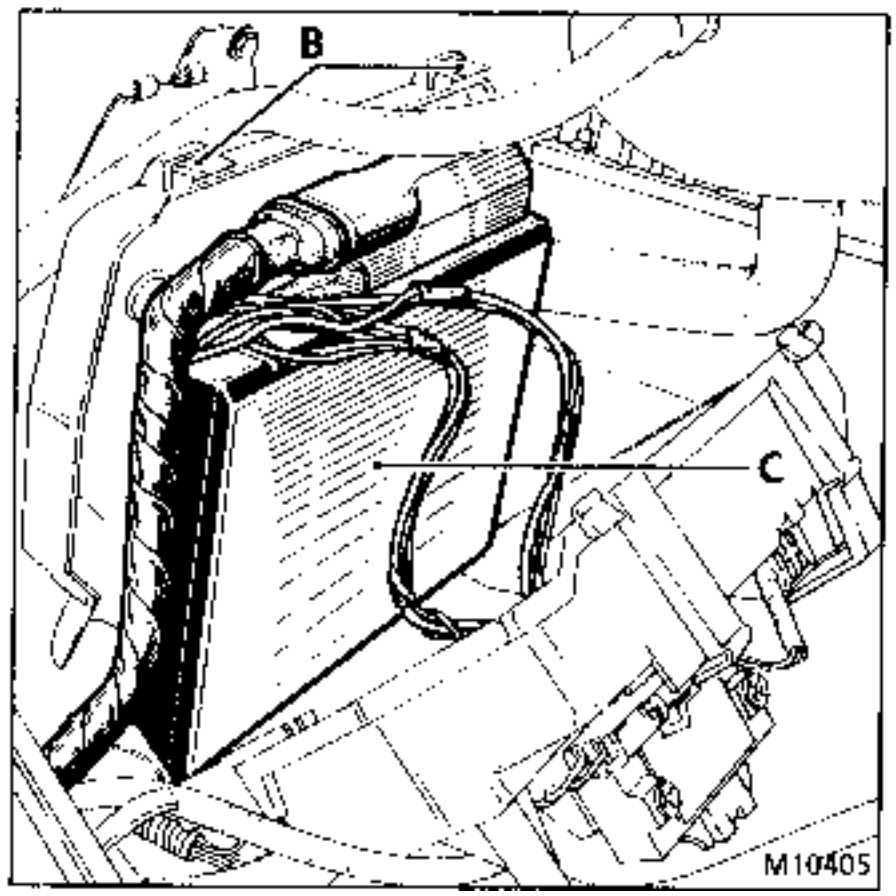
Remove clip (A).



Unclip unit (B).

Open the unit.

Take out computer (C).



REPLACING

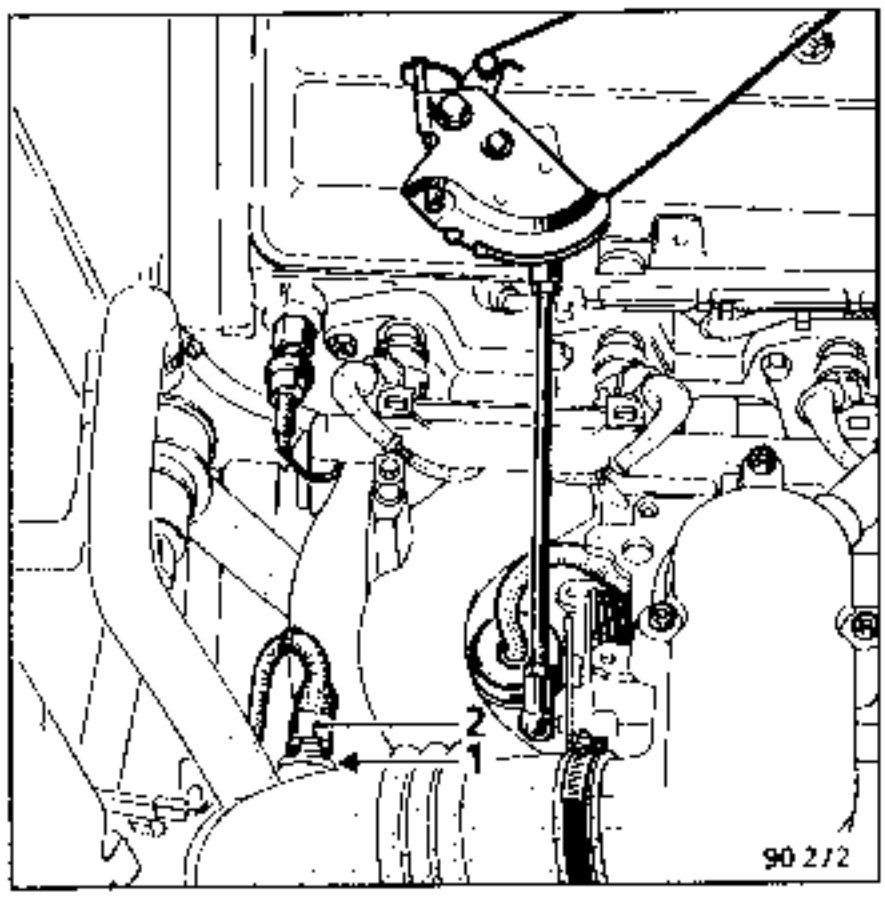
The sensor is located on the air inlet circuit and is press fitted onto the rubber pipe.

Disconnect connector (2) from the wiring harness and remove sensor (1).

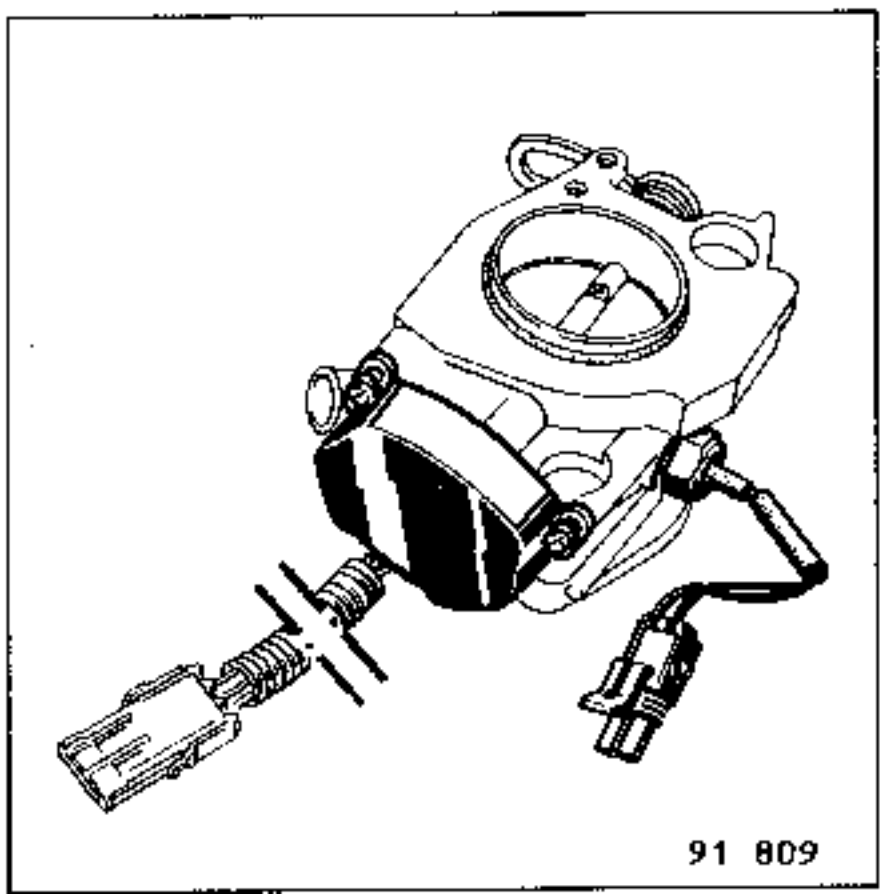
On reassembly:

Ensure that the sensor is properly refitted and check that the connector is clipped in place correctly.

J7R-J7T ENGINES



Z7W ENGINE

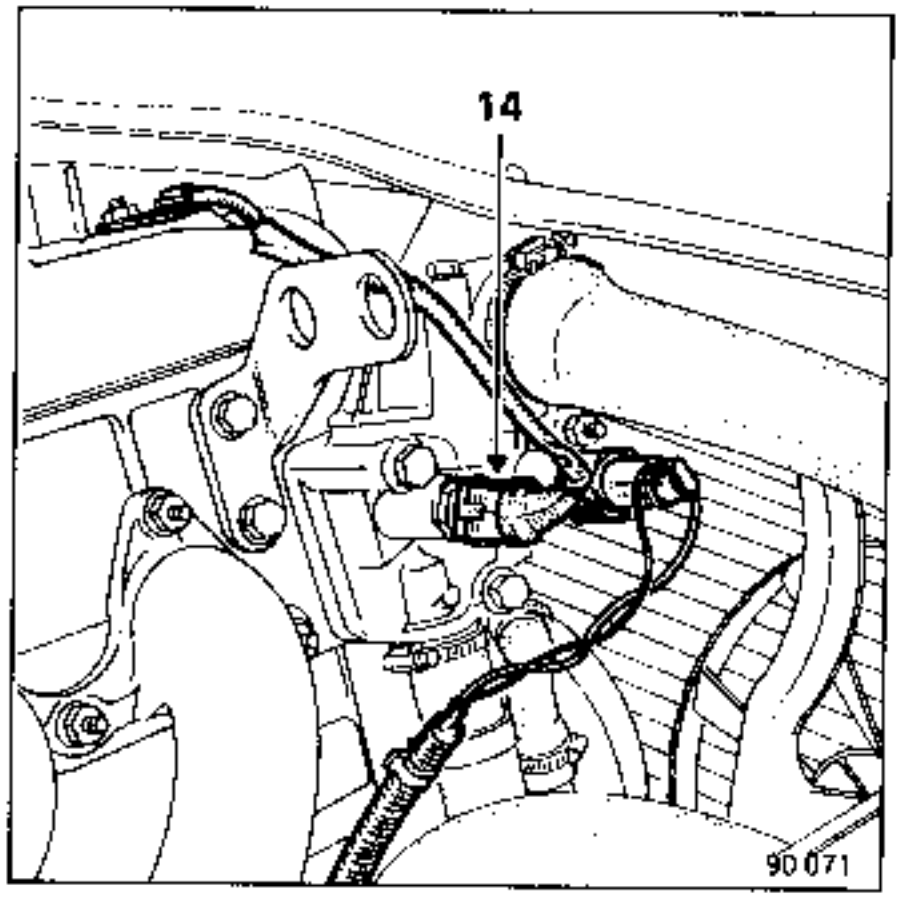


REMOVING THE SENSOR FROM J7R-J7T ENGINES

PRECAUTION: the sensor must be removed when the engine is cold.

Disconnect the connector from the wiring harness.

Unscrew sensor (14) and blank off the aperture in the coolant pump rapidly to avoid any loss of coolant.

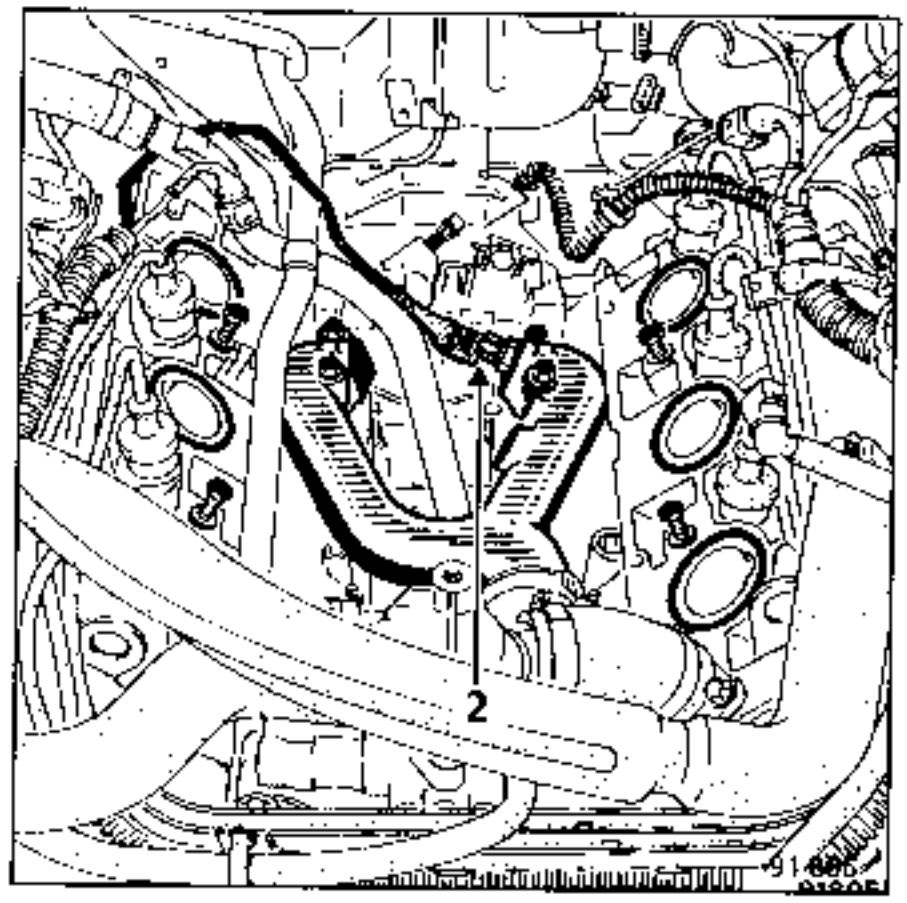


REMOVING AND REFITTING THE SENSOR ON Z7W ENGINES

Remove:
- the heater matrix
- the throttle casing
- the inlet manifold.

Disconnect connector (2) from the wiring harness.

Unscrew the sensor and blank off the aperture rapidly to avoid any loss of coolant.



REPLACING

Disconnect :

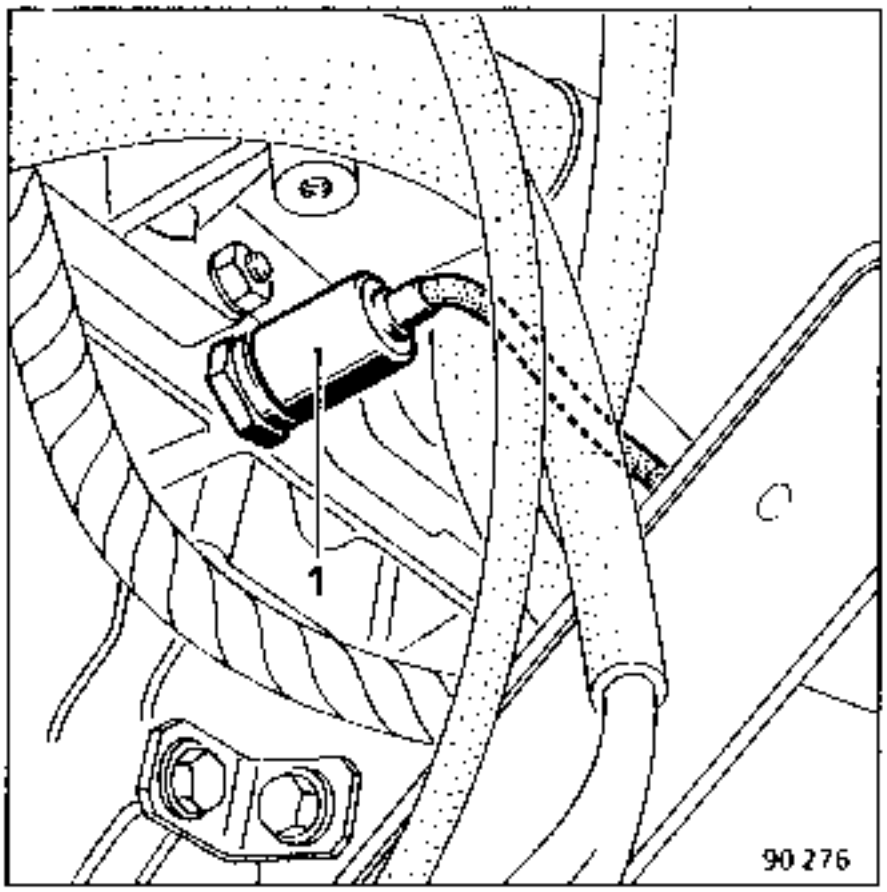
- the air temperature sensor;
- the air duct connecting the air filter to the cover.

Remove the air filter.

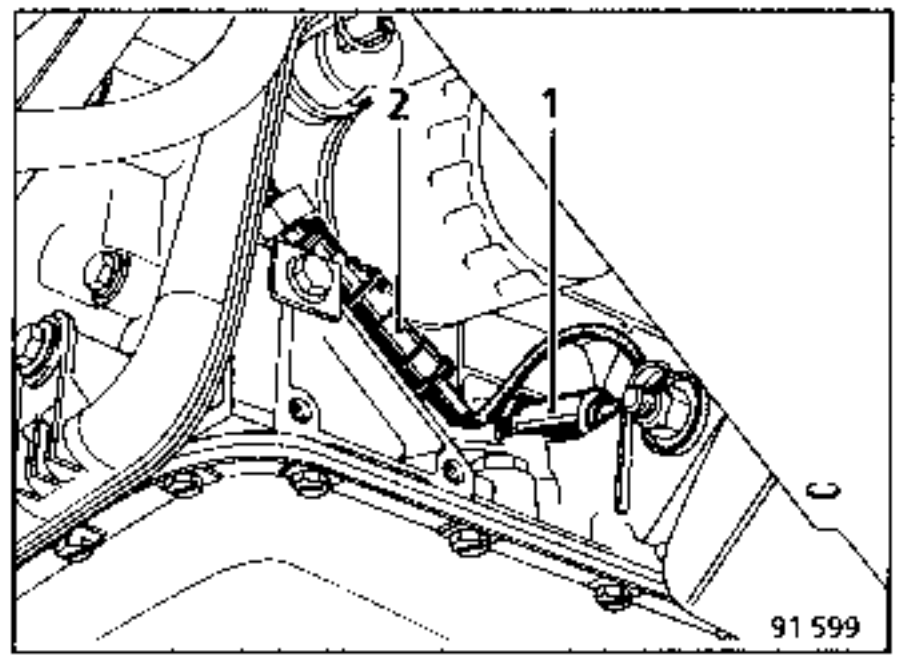
Disconnect the pinking sensor connector.

Slacken pinking sensor (1) using a 24 mm open-ended spanner, reaching it from underneath the air distributor.

J7R-J7T ENGINES



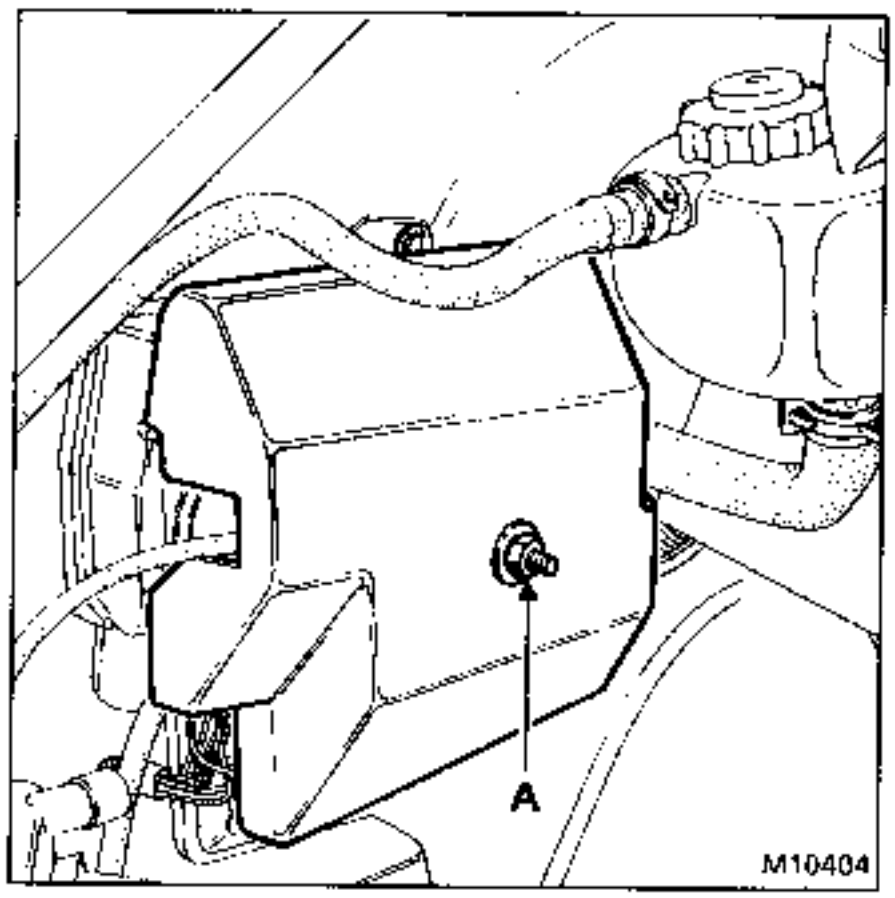
Z7W ENGINE



Disconnect connector (2) which connects the pinking sensor to the wiring harness.

Dismantle pinking sensor (1).

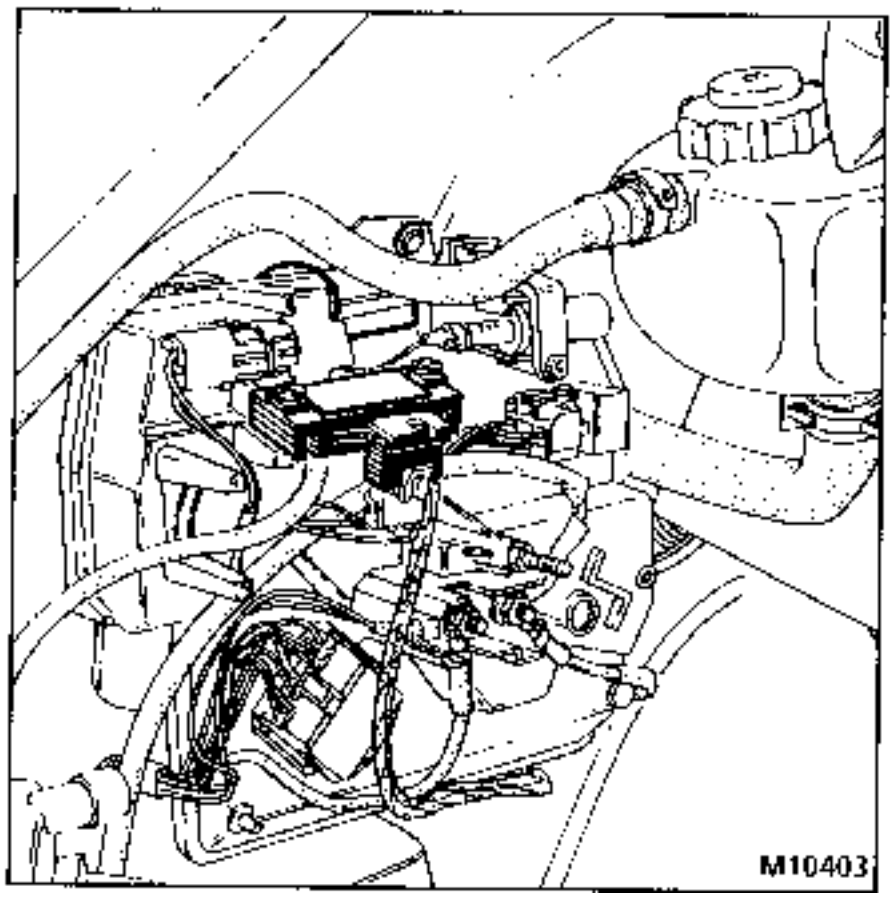
Remove the plastic cover from the mounting secured on the front righthand inner wing flange panel (nut A).



Disconnect the connector connecting it to the wiring harness.

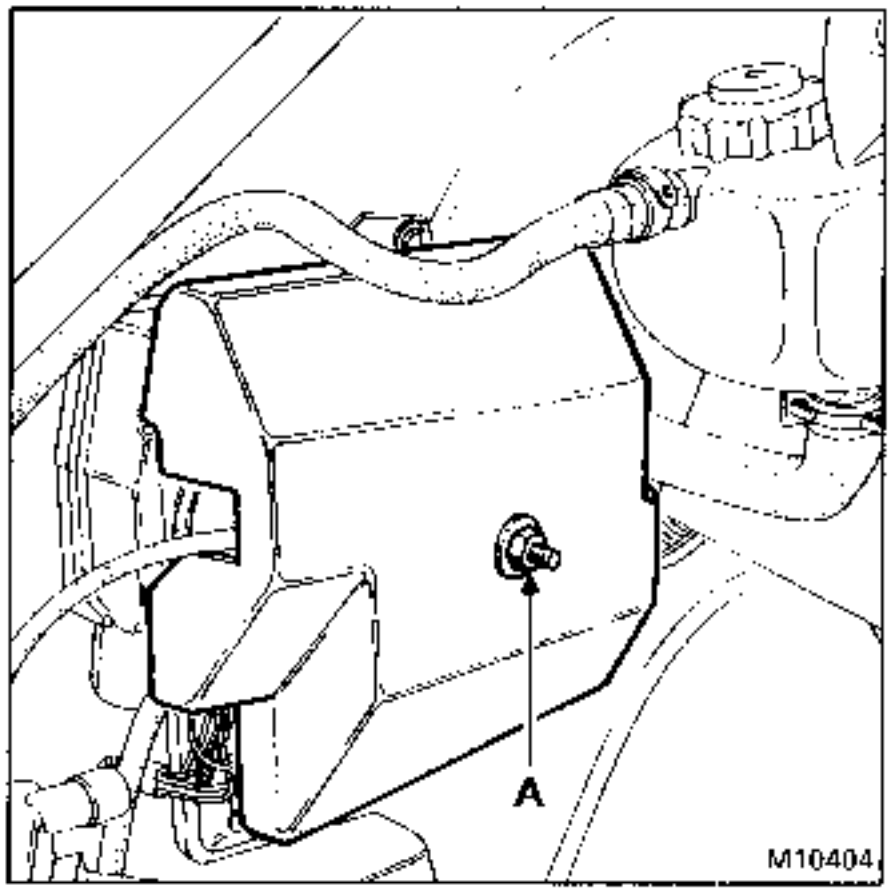
Use a screwdriver as a lever to disconnect the hose from the sensor. Do not pull on the hose.

Remove the sensor.

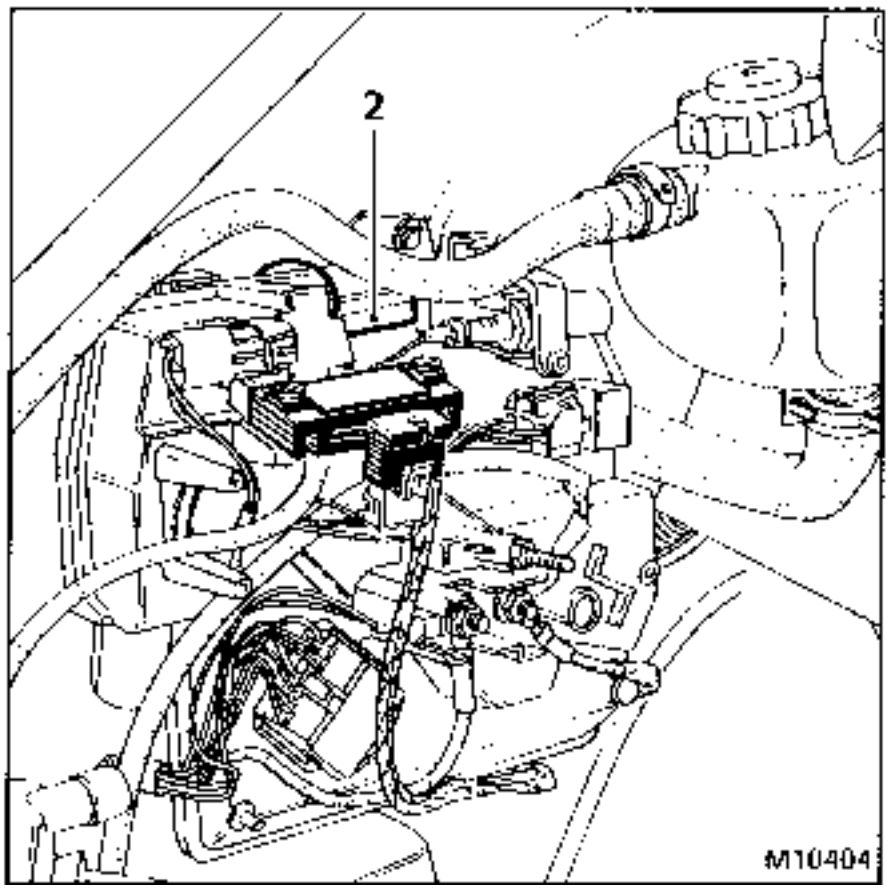


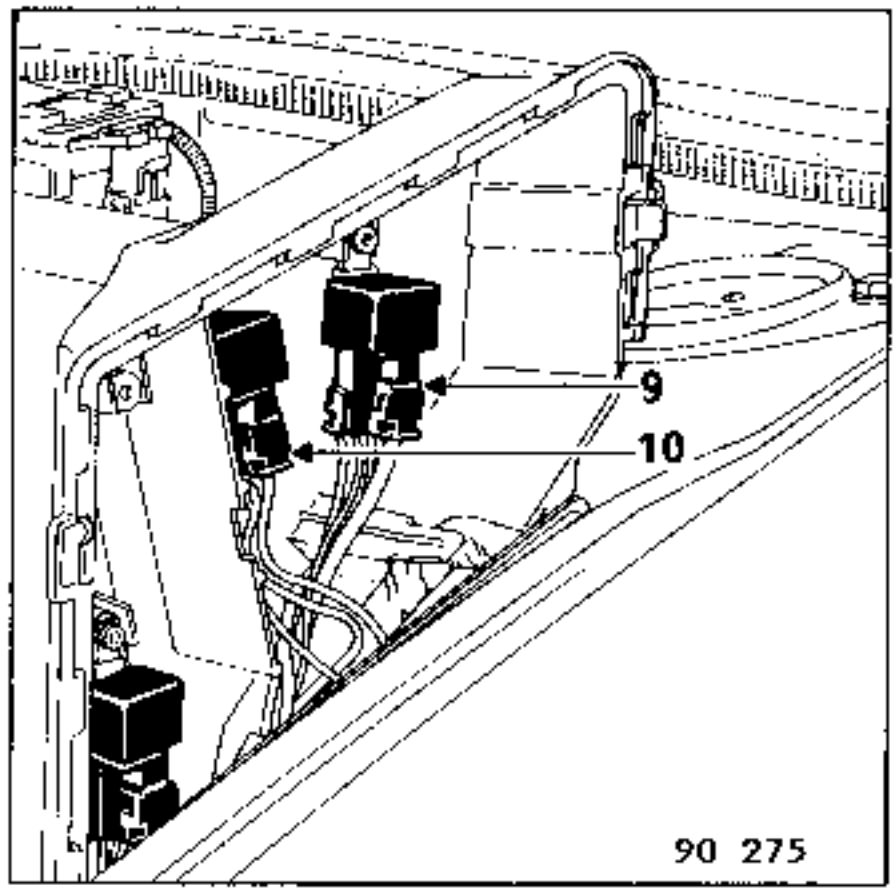
REPLACING

Unscrew bolt (A) from the protective casing.



Unfasten the pin securing the two parts of the plastic casing protecting computer (2).





The relays are located in the upper part of the plastic casing protecting the computer.

3 Pump relay
4 Injection feed

REFITTING

Refit in the reverse order to removal.

IMPORTANT: on reassembly, position computer protective casing centring pin correctly in the mounting before clipping on the assembly mounting clip .

IDLING REGULATION VALVE (1)

REMOVAL

Disconnect:
- the connector connecting the regulating valve to the wiring harness;
- the air hoses;
- the screws from the clip retaining the regulating valve;
- remove the retaining clip;
- take out the regulating valve.

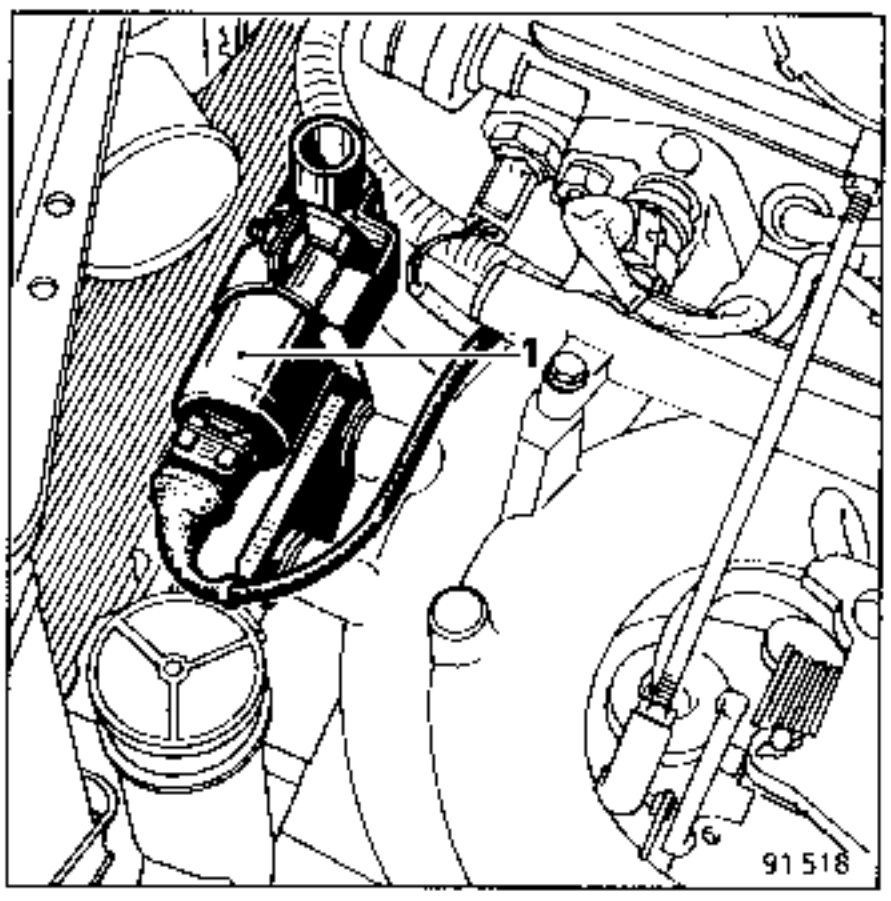
REFITTING

IMPORTANT:

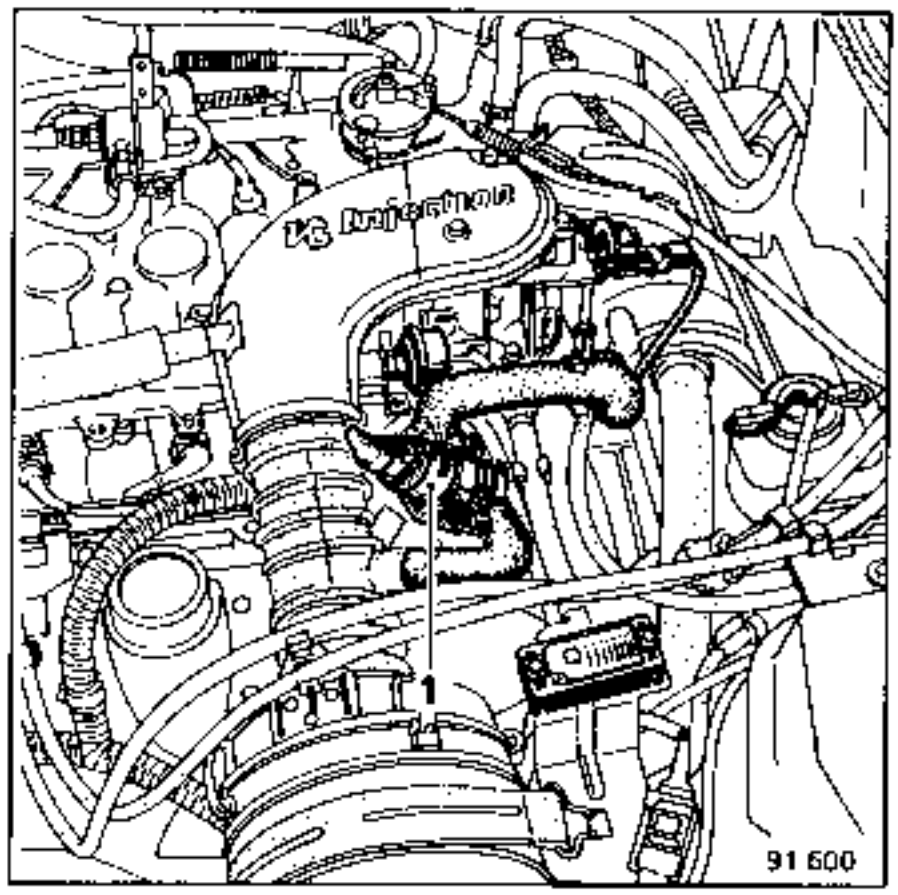
Position the hoses so that they are not under any stress.

Fit the valve the correct way round (arrow on the valve base indicates the direction of air flow)

J7R-J7T ENGINES



Z7W ENGINE



QUANTITY AND GRADE OF ANTI-FREEZE

Engine type	Quantity (litres)	Grade	Special point
J7R - J7T	8,4	Coolant	Protection down to -23°C for hot, temperate or cold countries.
J8S Turbo	8,8	GLACEOL AL	
Z7W	10	(TYPE C)	Protection down to -40°C for "extreme cold" countries

ANTI-FREEZE DENSITY

The coolant is to be replaced every 36000 miles (60000 km).

Take a sample of the fluid from the expansion chamber.

Read the density with the refractometer.

Hot and temperate climates:

protection down to -23°C (35% anti-freeze solution)

Extreme cold climates:

protection down to -40°C (50% anti-freeze solution).

The protection actually falls if the anti-freeze density exceeds 60%.

The protection readings shown on the chart are those obtained at a coolant temperature of 40°C.

Using the chart:

On vehicles with a cooling system capacity of 7.5 litres, if the protection is noted as being -15°C:

To bring the protection down to -25°C 1 litre of the solution in the system is to be replaced by 1 litre of pure anti-freeze;

To bring the protection down to -40°C replace 2.4 litres of the solution by 2.4 litres of pure anti-freeze.

Pure anti-freeze to be added

-23°C

Hot, temperate and cold climates

Protection reading at 40°C (coolant temperature)		System Capacity (litres) 7.5
- 5°C	Volume of coolant to be replaced by Glaceol Al. type C to obtain protection down to -23°C.	2
-10°C		1,4
-15°C		1
-20°C		0,3

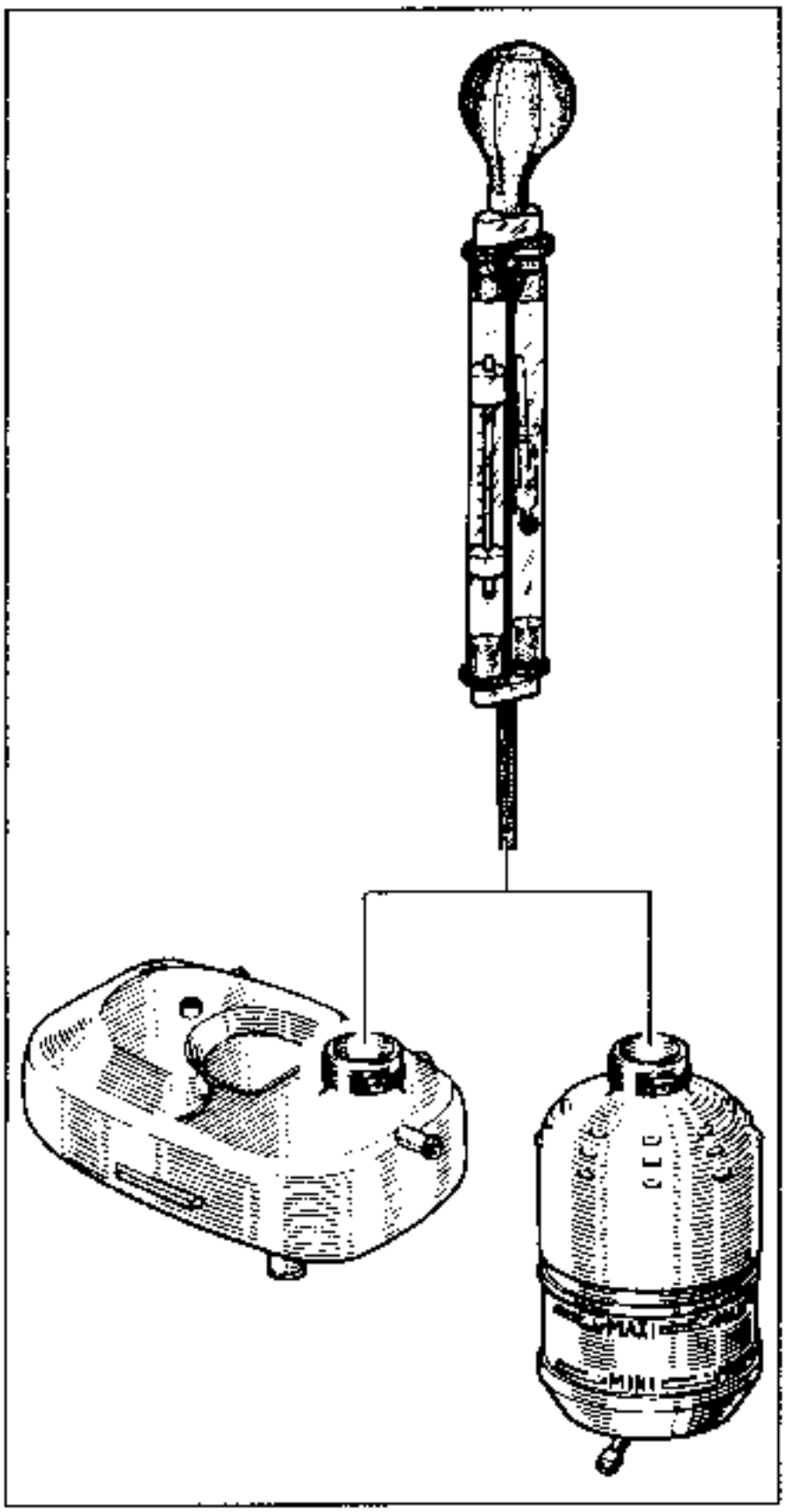
-40°C

"Extreme cold" climates

Protection reading at 40°C (coolant temperature)		System Capacity (litres) 7.5
- 5°C	Volume of coolant to be replaced by Glaceol AL type C to obtain protection down to -40°C.	3,3
-10°C		2,8
-15°C		2,4
-20°C		1,9
-25°C		1,6
-30°C		1,3
-35°C		0,7

ANTI-FREEZE DENSITY

Draw up coolant so that it surrounds the base of the thermometer and enables the densitymeter to float freely.



Refractometer:

Contact your local After-Sales head office.

Densitymeter:

Contact your local After-Sales head office.

Check that the densitymeter:
- does not make contact with the top of the tube (too much coolant);
- does not stick to the wall of the tube. If necessary, tap it lightly to free it.

Read off:

- the coolant temperature;
- the coolant density.

Consult the correction chart to find the actual protection provided by the coolant in question.

Reading on Thermometer	Reading on Densitymeter Float						
	3	5	10	15	20	30	40
10	0	0	5	8	11	14	18
20	1	2	6	10	14	18	24
30	2	3	8	12	17	24	33
40	3	5	10	15	20	30	40
50	4	7	12	18	24	35	
60	6	9	15	22	28	40	
70	8	12	18	25	32		
80	10	14	22	32	37		

Corrected Protection in °C

Centigrade below 0°

Example { reading on therm. 60 / reading on densitymeter 10 } Protection down to minus 15°C

ALUMINIUM MATRIX RADIATORS

Some vehicles are equipped with cooling radiators the matrix of which is made from aluminium.

Flushing out

Do not flush-out this type of radiator, or its engine cooling system, with caustic soda or alkaline compounds (it can cause corrosion to light alloy and thus leakage).

Storage

Radiators can be stored after removal without taking any particular precautions for a maximum period of 48 hours.

After this, traces of brazing flux that have entered the radiator during manufacture, together with dichloride elements from the water which it previously contained can, following contact with the air, cause the aluminium components of the radiator to corrode and thus subsequently leak.

Therefore, if a radiator has been removed for more than 48 hours it must:

- either be rinsed out thoroughly with water, blown dry with compressed air and its apertures plugged;
- or be kept filled with an anti-freeze solution, if such a course is practical.

Anti-freeze and coolant

It is essential to use the correct type of anti-freeze in these alluminium radiators.

Coolant solution AL type C or concentrated anti-freeze GLACEOL AL type C supplied by the Renault Network, fulfils the specification laid down by our Design Office, especially as regards:

- the fact that it does not attack the various aluminium and cast iron components;
- its reserve of alkalinity which is specially adapted to the specific requirements of light alloys;
- the special additives which it contains and provide protection against the acidic products of combustion both in high-speed Diesel engines and petrol engines;
- the fact that its proportions provide protection and efficient running at all temperatures.

Prepared coolant type C

- 2 litre can	77 01 405 402
- 10 litre drum	77 01 405 403
- 215 litre drum	77 01 417 021.

Prepared coolant type C Export

- 1 litre can	77 01 406 211.

ESSENTIAL SPECIAL TOOLING		
M.S.	543-05	Cooling system leakage test kit
M.S.	554-01	Adaptor for M.S 554-05
M.S.	554-04	Adaptor for M.S 554-05

1- CHECKING THE SYSTEM FOR LEAKS

Replace the expansion chamber valve by adaptor Mot. 554-01.

Connect this to tool M.S 554-05.

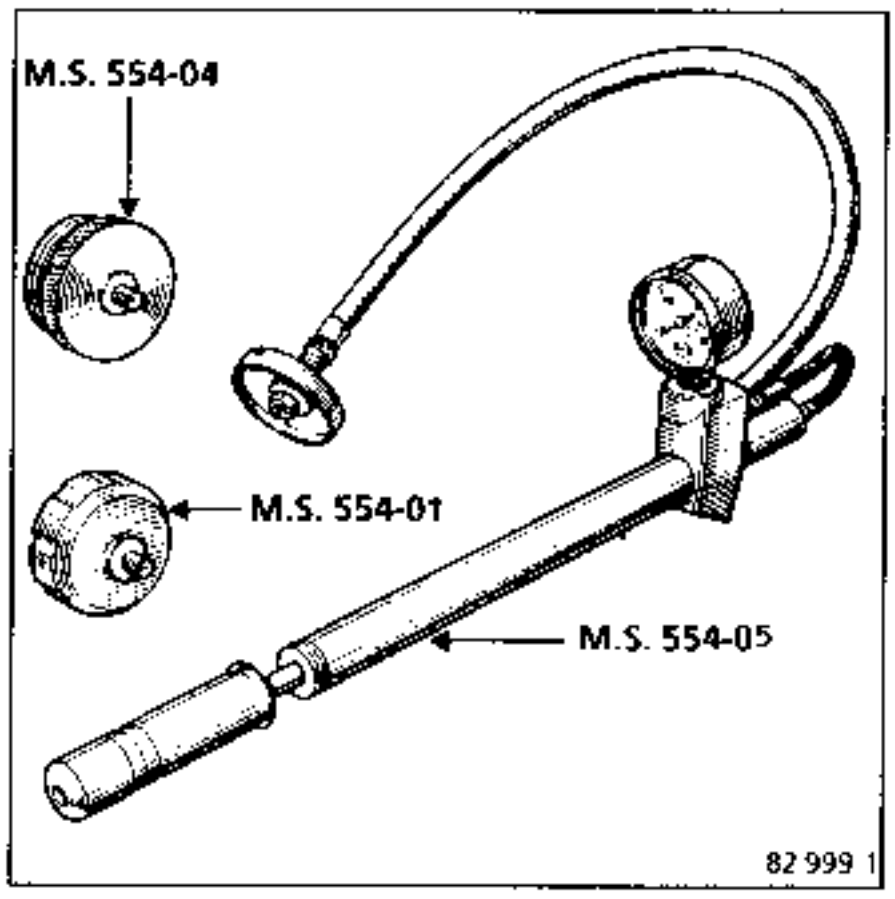
Warm up the engine then stop it.

Pump the equipment to pressurise the system.

Stop pumping at 0.1 bars below the figure at which the valve is set.

The pressure should not drop. If it does, look for the leak.

Slowly unscrew the connection on tool M.S 554-03 to depressurise the cooling system, then remove tool M.S 554-01 and refit the expansion chamber valve using a new seal.



2- CHECKING THE VALVE PRESSURE SETTING

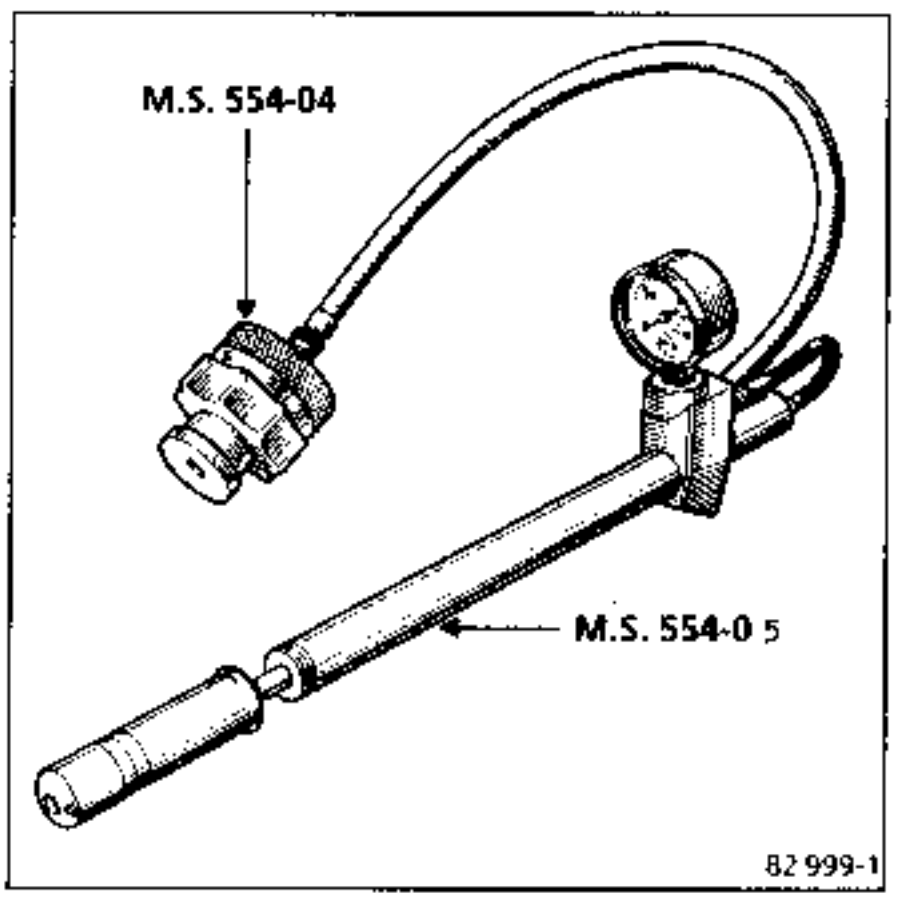
If coolant has flowed through the expansion chamber valve it will have to be replaced by a new one.

Fit tool M.S 554-04 to pump M.S 554-05 and connect it to the valve to be tested.

Increase the pressure. It should stabilise at the valve pressure setting. Test tolerance: ± 0.1 bars.

Valve pressure setting

Brown plastic valve, 1.2 bars.



There is no heater matrix valve.

As the coolant circulates continuously in the heater matrix it helps to cool the engine.

FILLING

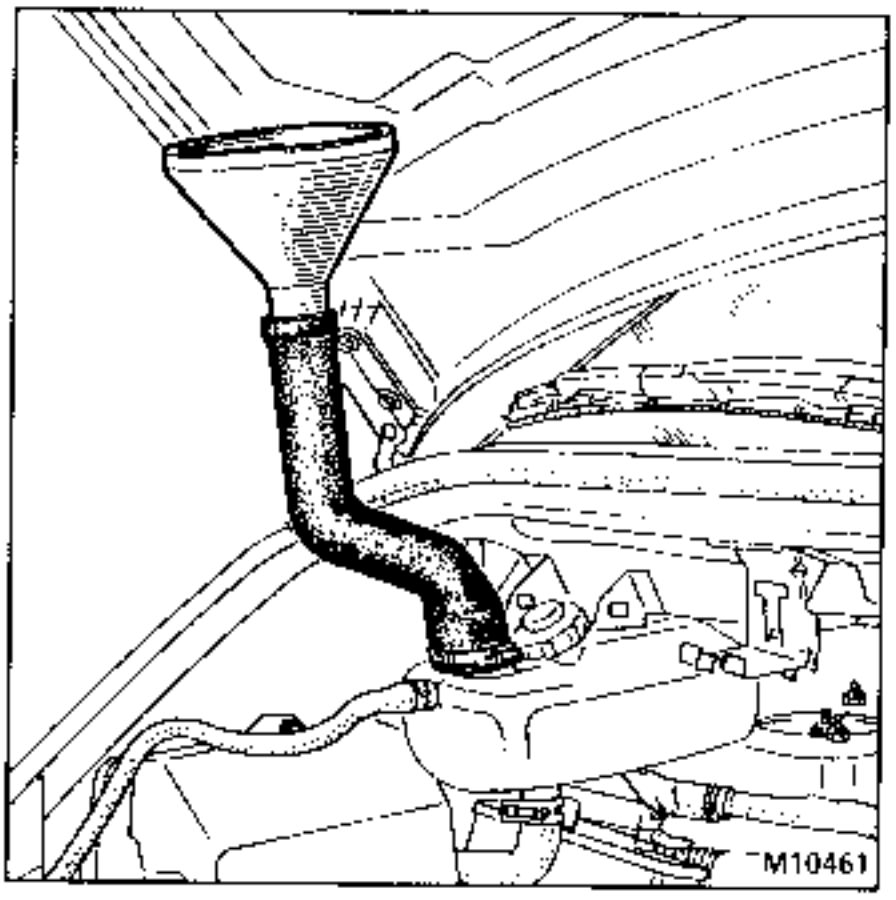
Remove the cap from the expansion chamber or chambers.

Open the bleed screws.

Remove the radiator filler cap.

Place a locally made up filler pipe over the expansion chamber threads.

Fill the system through the filler pipe.



Close the bleed screws as soon as coolant flows from them.

Start the engine (1500 rpm).

Top up the coolant level to over-flowing for approx 4 minutes.

Place a container underneath to catch the coolant.

Remove the filler pipe.

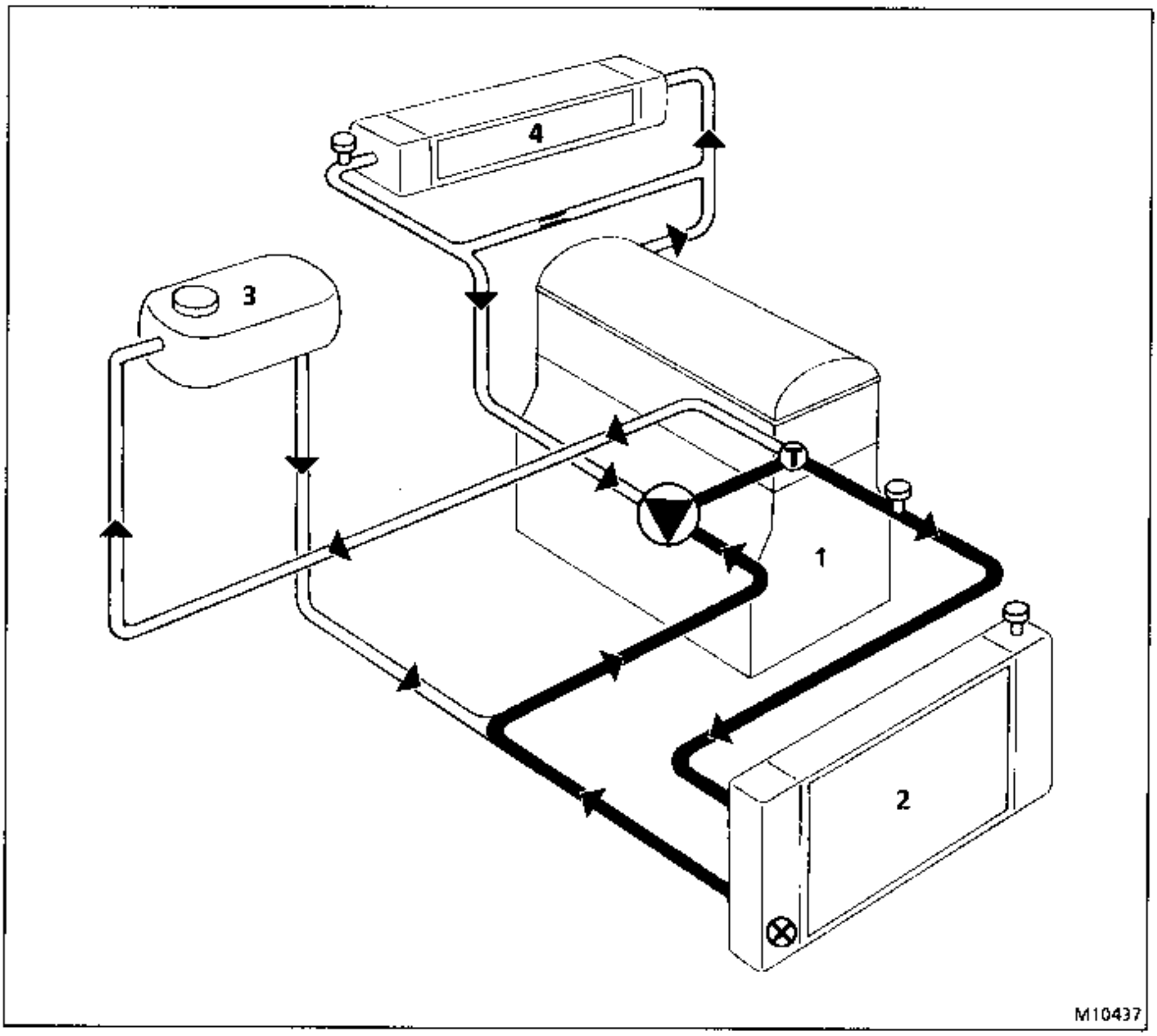
Close the expansion chamber.

BLEEDING

Run the engine for 10 minutes at 1500 rpm until the cooling fan(s) cuts (cut) in (time required for automatic defuming to occur).

Check that the coolant level is near the MAX mark.

DO NOT OPEN THE BLEED SCREW(S) WHEN THE ENGINE IS RUNNING.
RETIGHTEN THE EXPANSION BOTTLE CAP WHEN THE ENGINE IS HOT.



1 Engine

2 Radiator

3 Expansion chamber

4 Heater matrix

NOTE: There is a red bush on the heater matrix inlet hose.

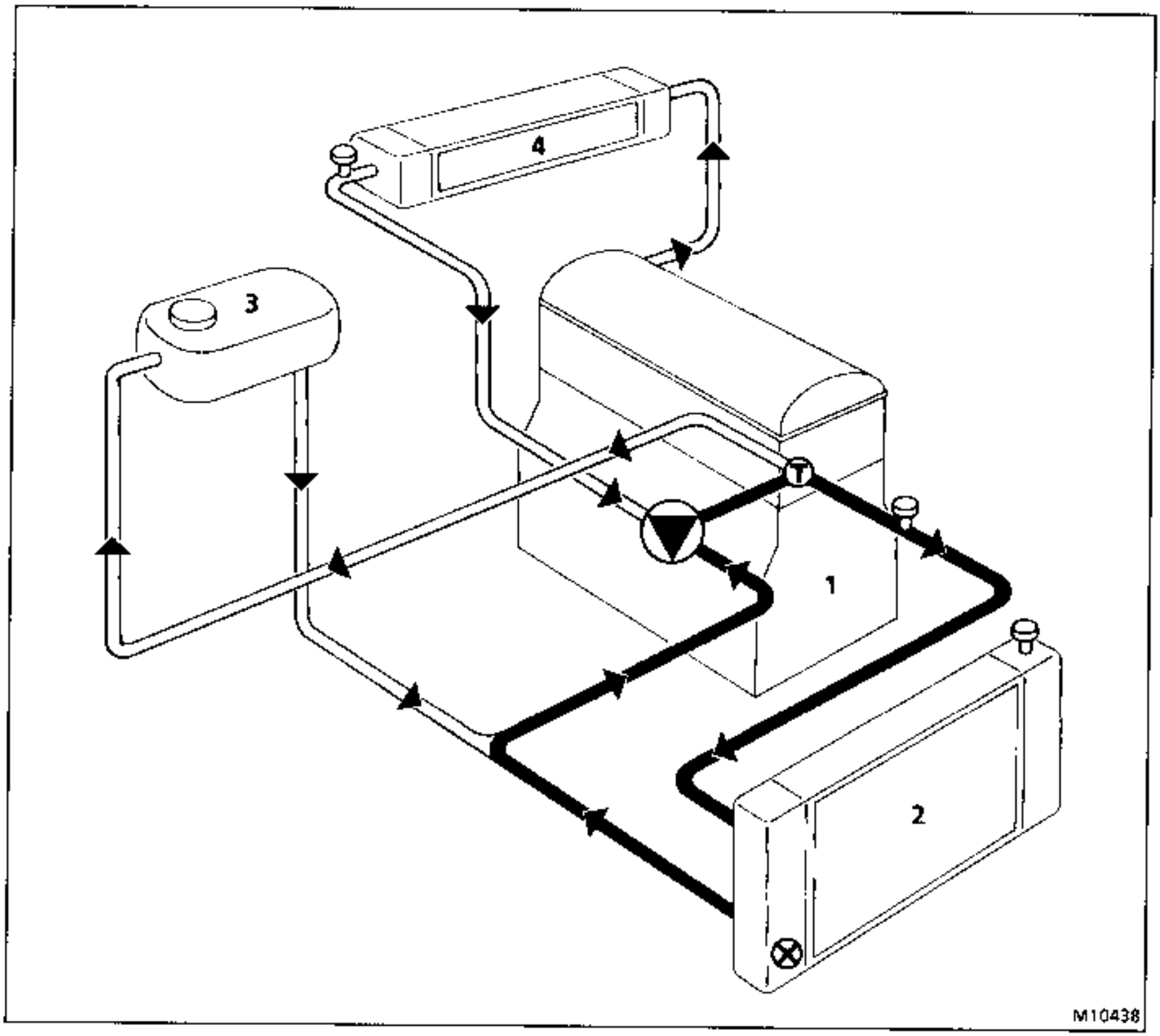
Coolant pump

Thermostat

Bleed screw

Thermal switch

AIR CONDITIONING



1 Engine

2 Radiator

3 Expansion chamber

4 Heater matrix

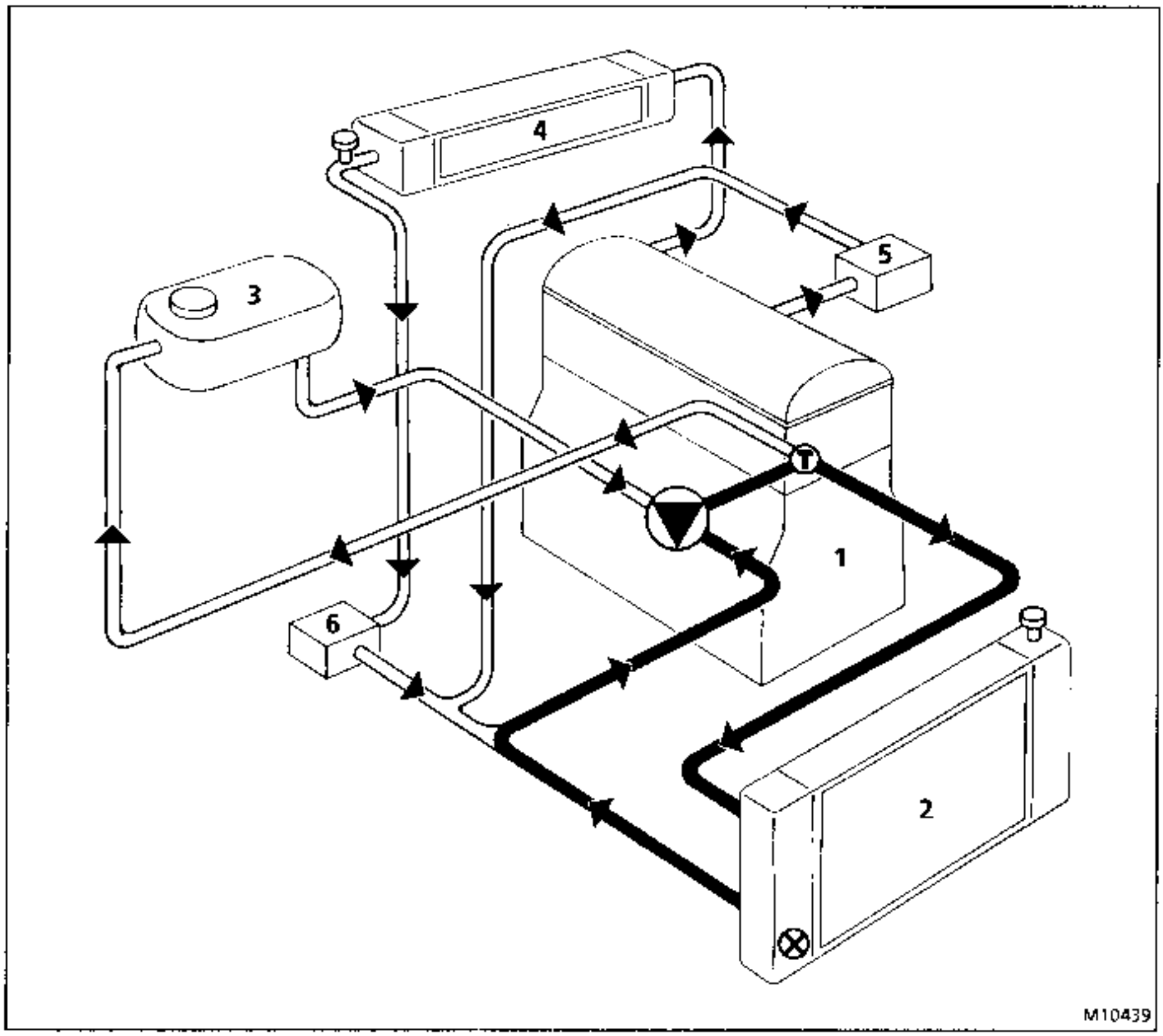
NOTE: The heater matrix inlet hose is marked by a red bush.

Coolant pump

Thermostat

Bleed Screw

Thermal switch



1 Engine

2 Radiator

3 Expansion chamber

4 Heater matrix

5 Cold start system

6 Water/Oil intercooler

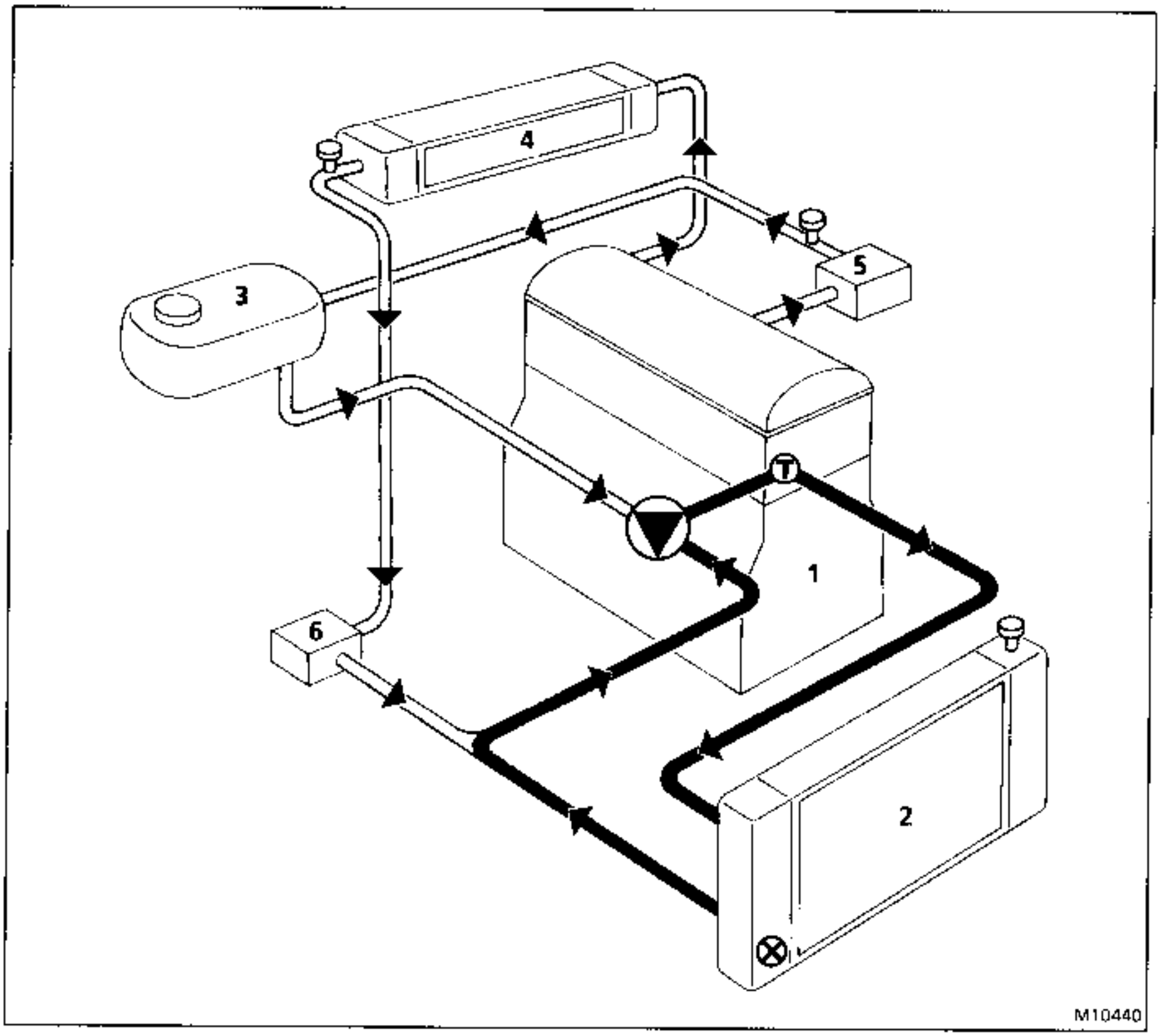
NOTE: The heater matrix and intercooler hoses are marked by a red bush.

Coolant pump

Thermostat

Bleed screw

Thermal switch



1 Engine

2 Radiator

3 Expansion chamber

4 Heater matrix

5 Cold start system

6 Oil/Water intercooler

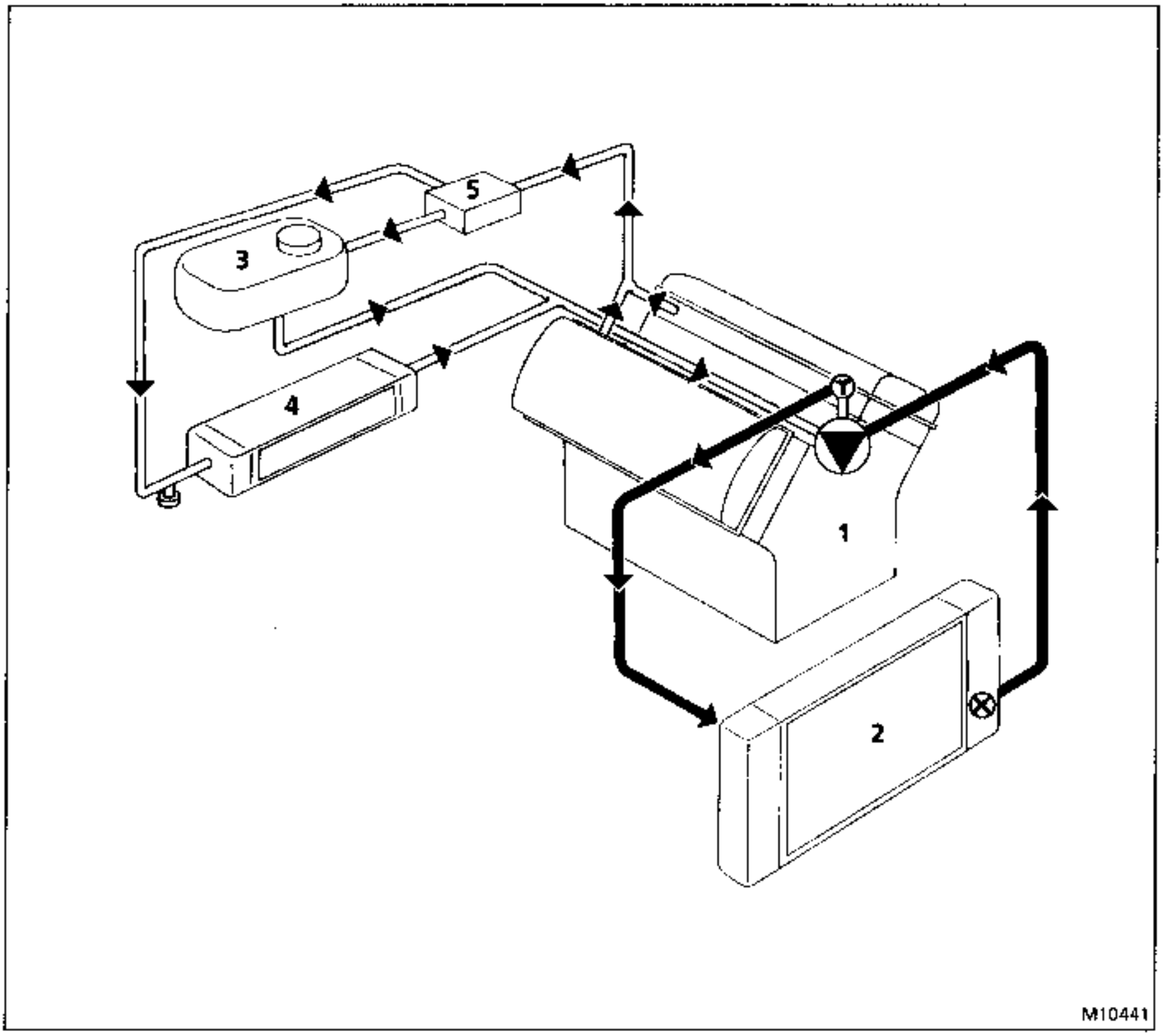
NOTE: The heater matrix inlet and intercooler hoses are marked with a red bush.

Coolant pump

T Thermostat

Bleed screw

Thermal switch



1 Engine

2 Radiator

3 Expansion chamber

4 Heater matrix

5 Vortex

NOTE: The heater matrix inlet hose is marked by a red bush.

Coolant pump

Thermostat

Bleed screw

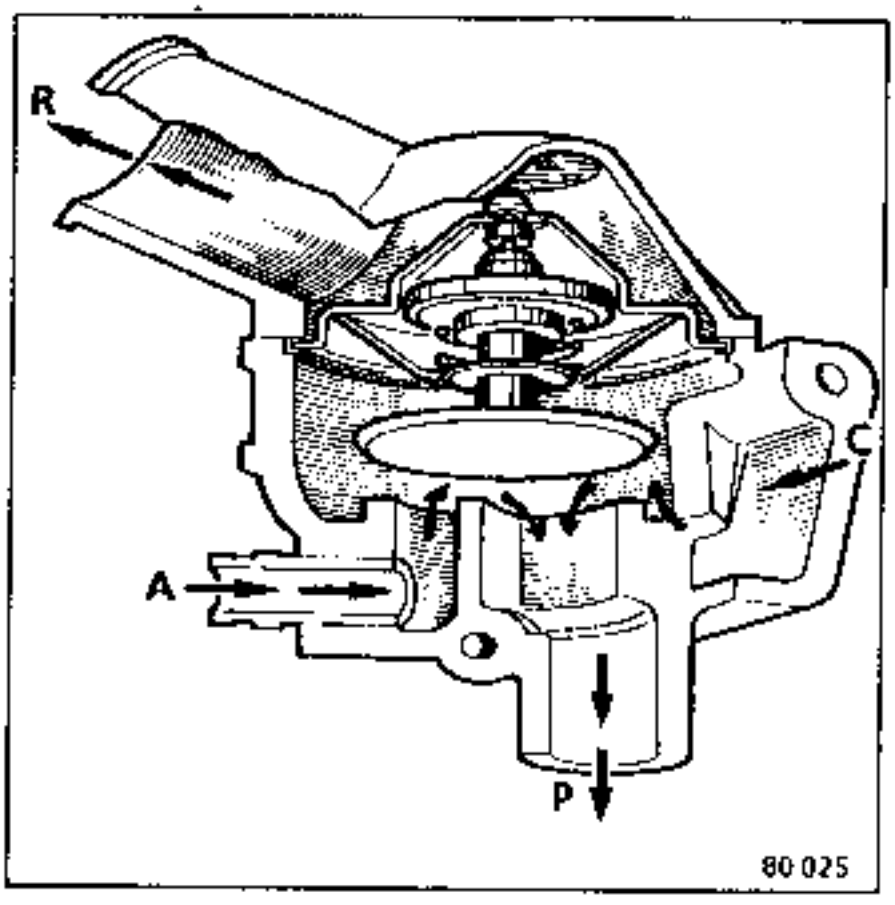
Thermal switch

OPERATION

The coolant pump sends coolant into the cylinder block.

COLD ENGINE

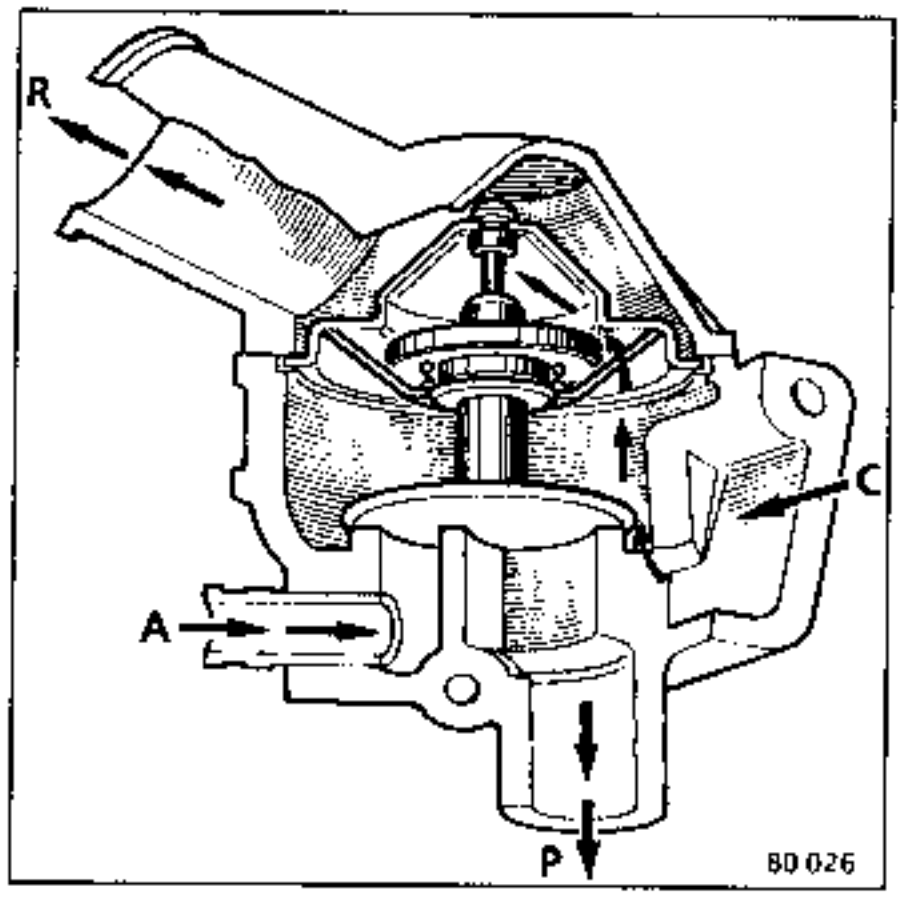
The coolant circulates in the cylinder block, cylinder head, inlet manifold, and heater matrix circuit. The thermostat below (and intercooler on J8S) is in the closed position; it allows the coolant coming from the cylinder head (circuit C) to pass to the coolant pump (circuit P) and closes off the passage to the radiator (circuit R).



HOT ENGINE

The coolant circulates in the cylinder block, the cylinder head, the heater matrix (and intercooler on J8S).

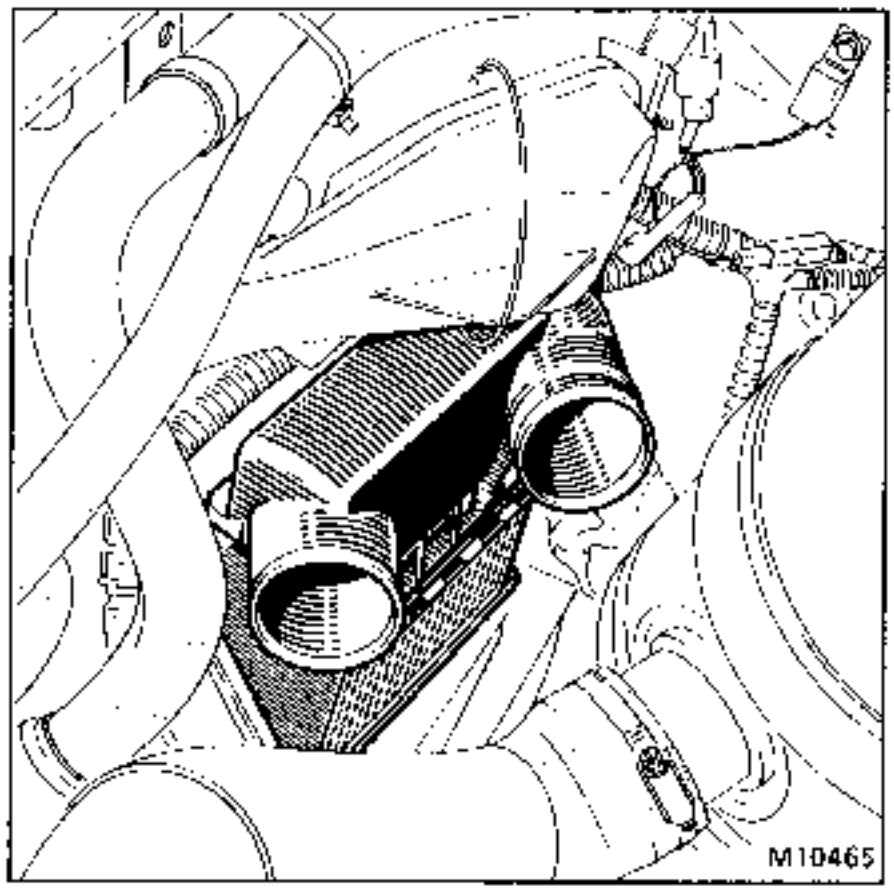
The thermostat below is in the open position. It allows the coolant coming from the cylinder head (circuit C) to pass to the radiator (circuit R).



Engine type	Starts to open (°C)	Fully open (°C)	Travel in mm
J8S - J7T - J8S Turbo	81	93	7,5
Z7W	85	93	7,5

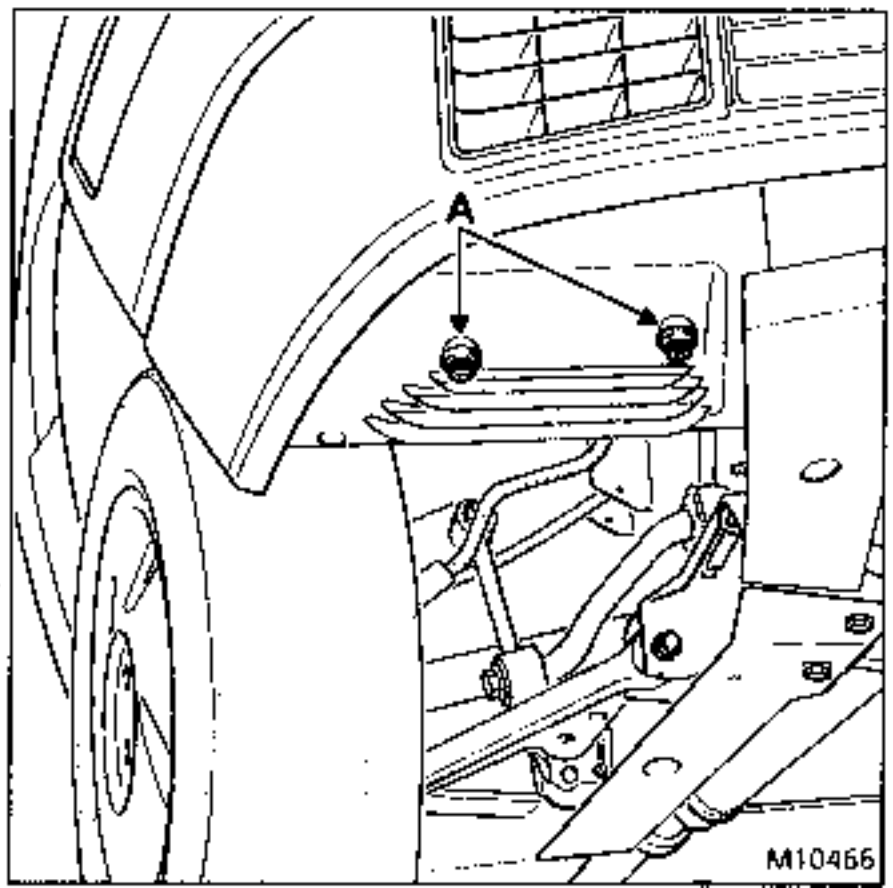
REMOVAL

Remove:
- the hoses between the air filter and compressor;
- the hoses between the turbocharger and the intercooler;
- the intercooler mounting bolts.



Free the intercooler from the top.

On refitting take care to position inner studs (A) on the intercooler correctly in their locations.



FAULT-FINDING

Incidents connected with the turbocharger

INCIDENT	CAUSE	SOLUTION
Lack of power	Hose between inlet manifold and LDA disconnected	Reconnect hoses correctly
(Boost pressure correct)	Vent-to-atmosphere hose under LDA diaphram blocked	Unblock hose
	Insufficient injection pump delivery	Have the injection pump adjusted at a Renault Injection Centre
Black smoke from exhaust and insufficient boost pressure	Poor sealing of inlet circuit	Check air filter, sealing of inlet circuit. air-to-air intercooler hoses
	Turbocharger faulty	Replace turbocharger Note: the load regulator and turbocharger cannot be adjusted.
Black smoke from exhaust and boost pressure correct	Injection pump delivery too high	Have injection pump adjusted at a Renault Injection Centre

REPLACEMENT

The replacement methods use diagrams which enable the particular points to be dealt with to be located immediately.

To avoid too much information on these diagrams, only the conventional signs indicating the details of the operation to be performed are used.

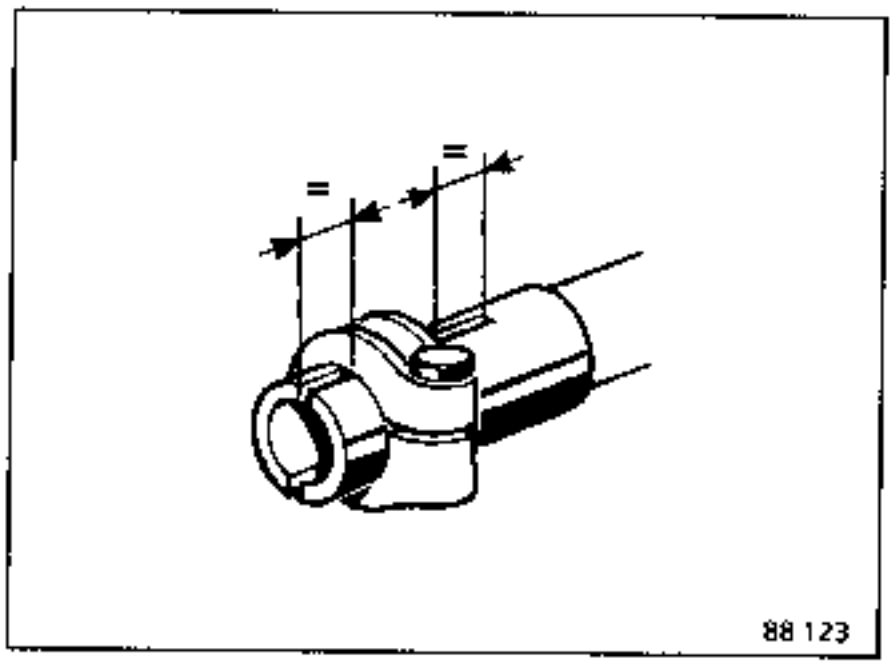
→ Unscrew completely to remove

⊘ Cut;
- either with a torch
- or with a tube cutter.

Cut with a torch only at:
- the flange
the outer tube at a push-in joint

To obtain a correct alignment of the exhaust assembly and correct tightening of the clips:

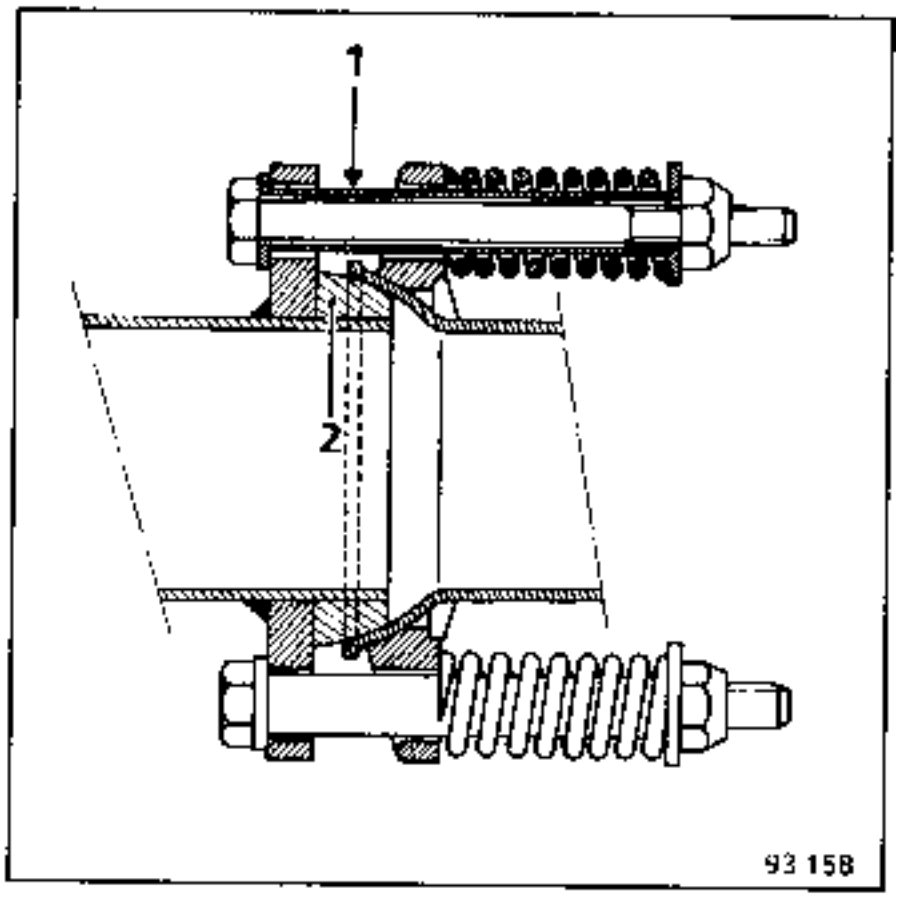
- tighten the different connections in the order given, starting with the exhaust manifold and ending with the silencers;
- position the clips so that their tightening surface bears on the split ends of the hoses and the openings in them are located between two slots on a hose;



- tighten the clip screws to the specified torque:
8 mm diameter screws: 2 daNm
to prevent the hoses and clips deforming and thus causing leaks.

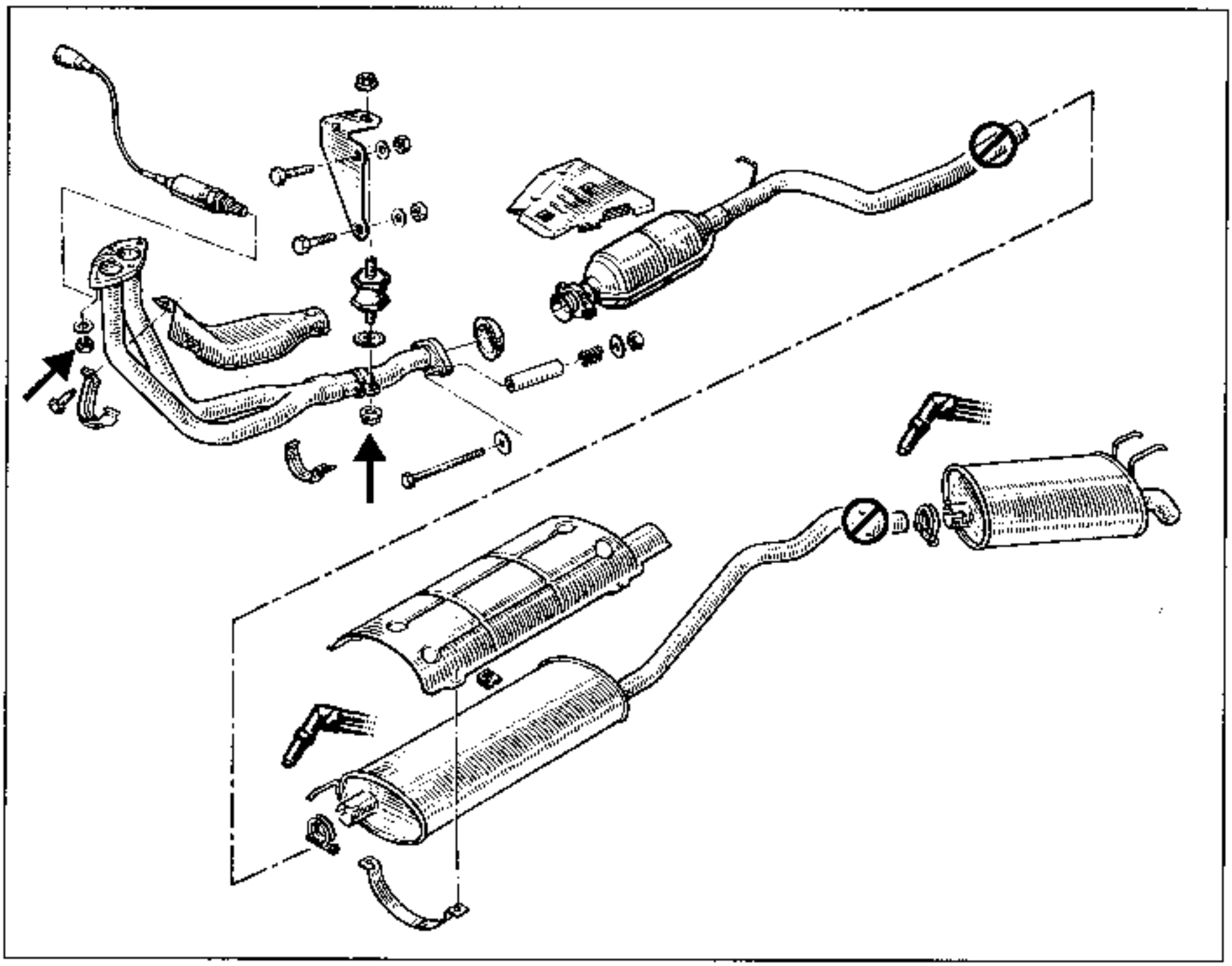
Ball joint with METEX bush

NOTE: a spacer (1) determines the spring tension, tighten it until it is abutting against the spacers.

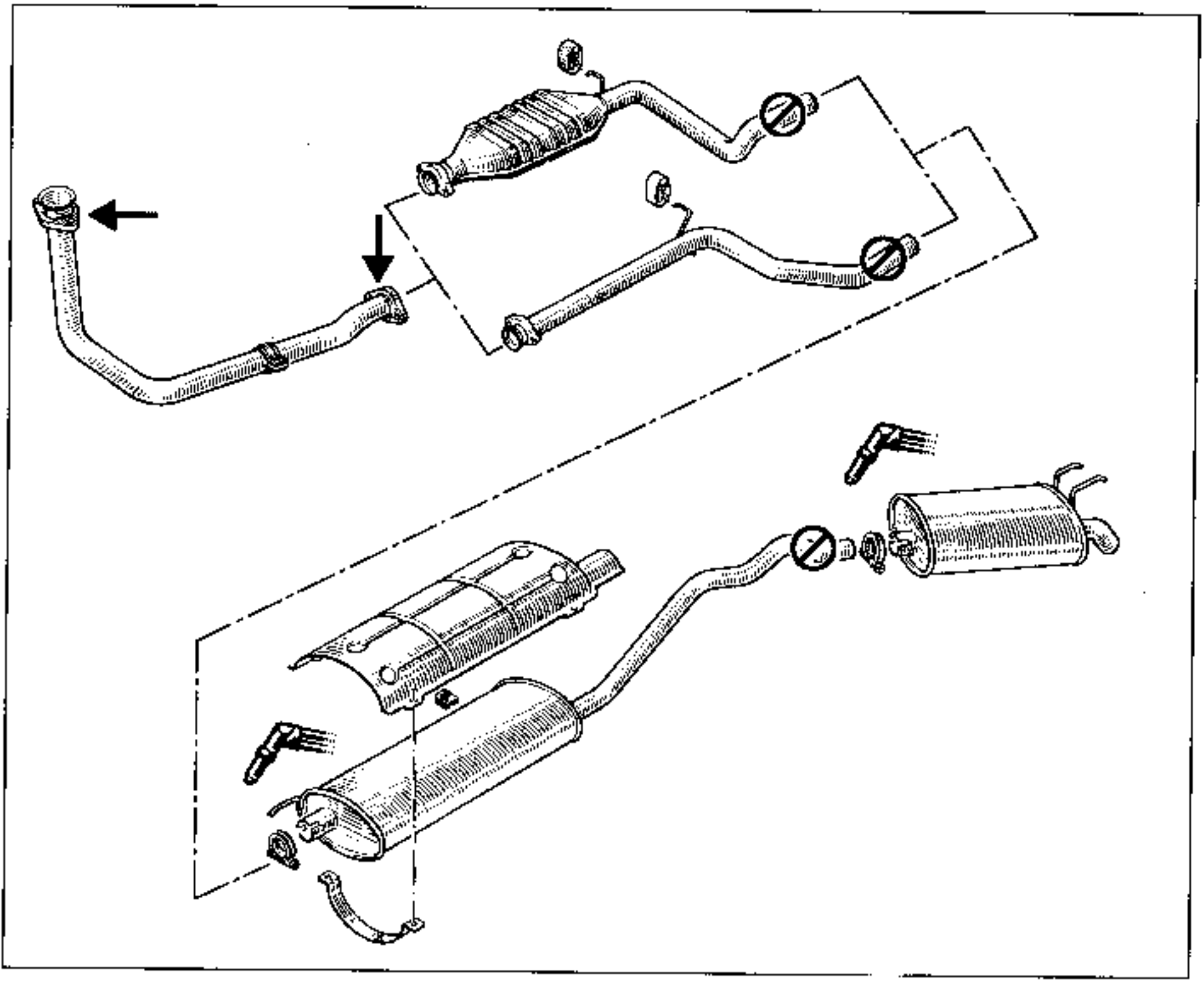


1 spacer bush
2 METEX friction bush

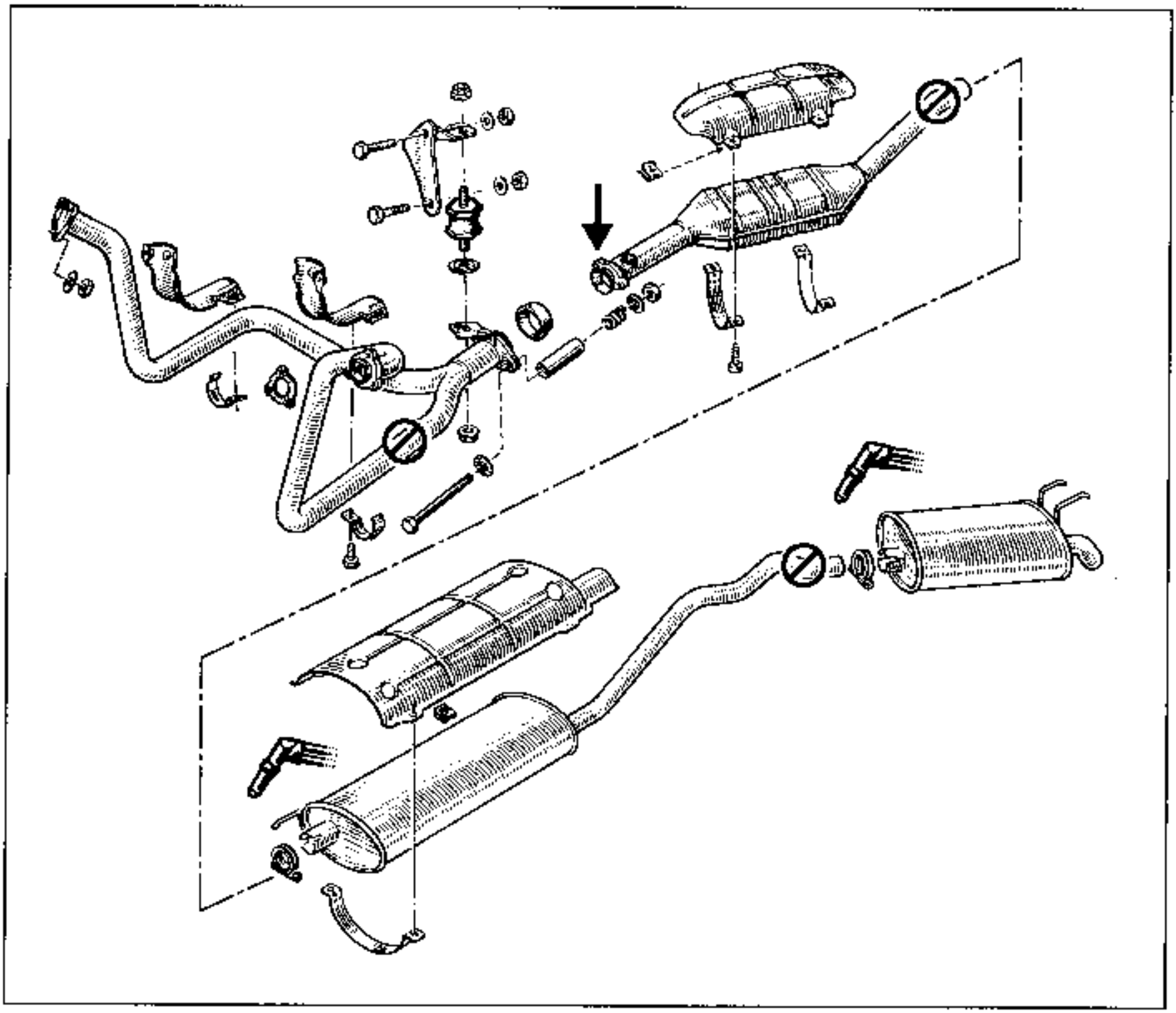
J7R - J7T



J8SV - J8SX



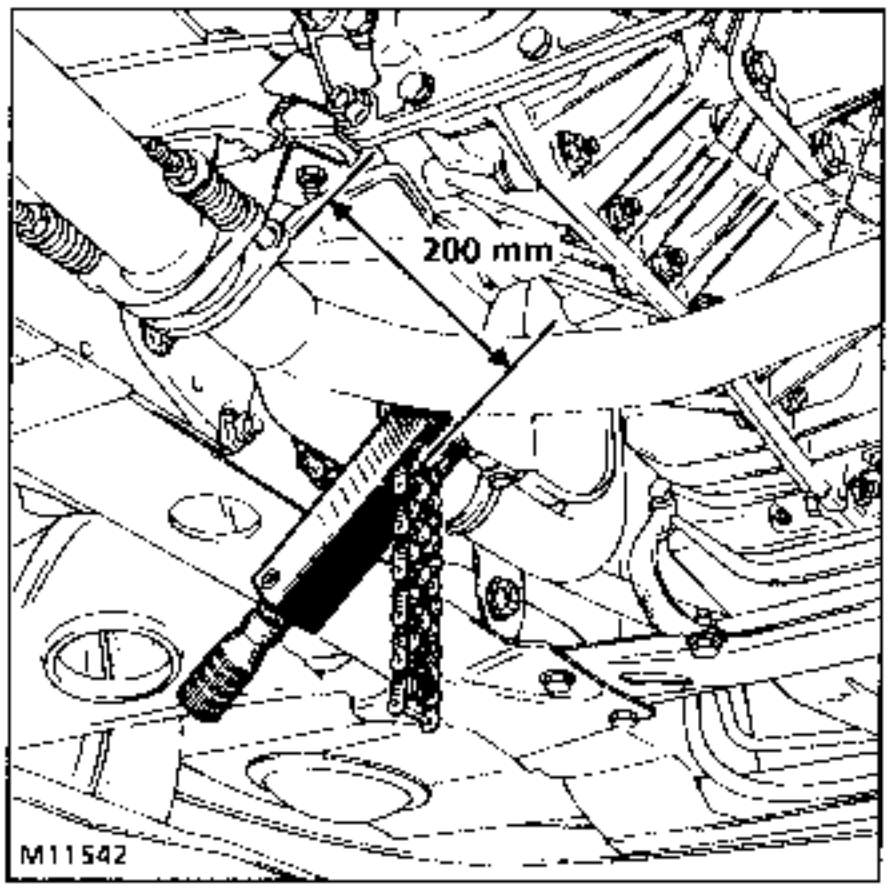
Z7W



EXHAUST DOWNPIPE

REMOVAL

Cut the downpipe 200 mm away from the clamp using tool Mot.1219.



Remove:

- the nuts from the manifold and clamp;
- the downpipe in two sections.

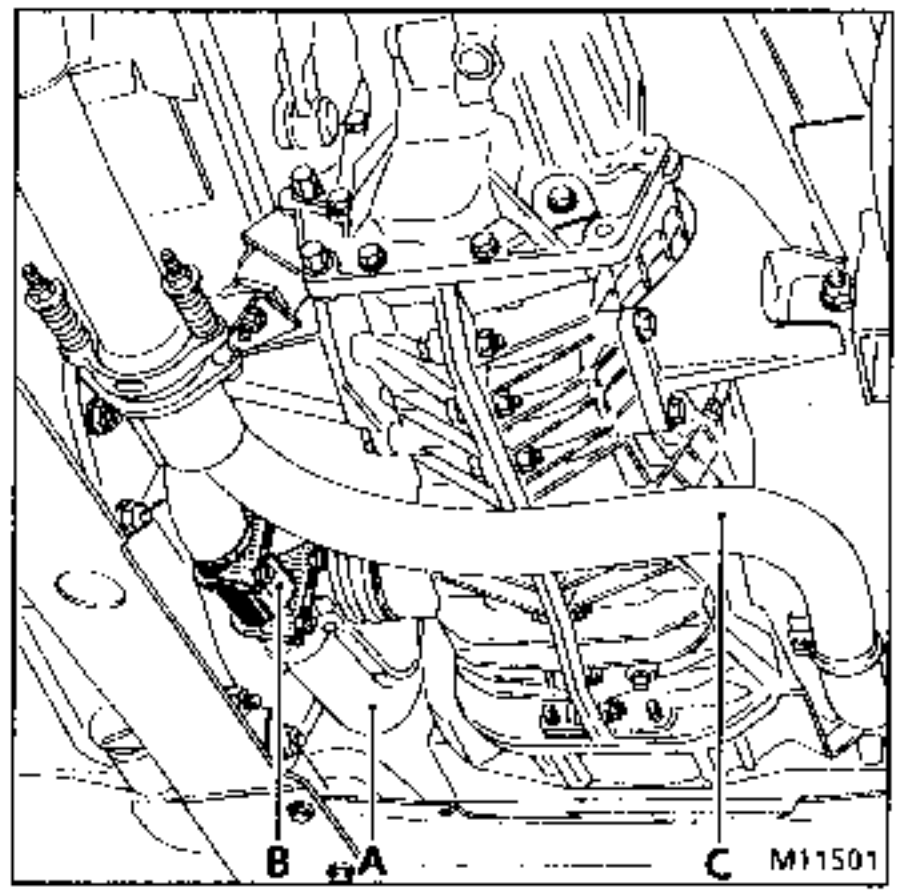
REFITTING

Fit in place the lefthand part (A) of the downpipe on the manifold.

Coat the tubes with exhaust sealing paste.

Fit in place:
- sleeve (B);
- the righthand part of the downpipe (C).

Tighten the sleeve mounting nuts.



AIM

The catalytic converters are used to process the main pollutants in the exhaust gases (reduction of carbon monoxide, hydrocarbons and nitrous oxides).

OPERATION

The catalytic converter operates under optimum conditions when the air-fuel mixture approaches the ideal degree of richness 1.

Precious metals such as platinum or palladium are used in the construction of catalysers.

Catalysis is a process used to facilitate a chemical reaction without the catalysts used taking part in the reaction or being used up by it.

PRECAUTIONS TO BE TAKEN

Metal catalytic converters are destroyed by certain materials and, for this reason, petrol from which lead additives have been removed must be used. Small quantities of lead do not necessarily destroy the catalyst but they always cause overheating. This overheating is often of such proportions that the cellular structure of the catalyser is damaged and disintegrates, thus blocking the passage of the exhaust gases.

TO PREVENT OVERHEATING:

- The engine must be in good condition (in particular the fuel supply system and ignition must be precisely tuned) so that the catalyst is not working under unusual conditions.
- The vehicle must be stopped immediately if there are snatches on ignition, fuel supply incidents, a loss of power or other symptoms (engine temperature too high, if it stalls several times or when it returns to ignition).
- Overheating may also be caused if the engine is run too long on the starter, or if the vehicle is started by obtaining a tow; these are circumstances under which the engine receives too rich a mixture for a long time (over one minute) which may self-ignite occasionally.

REMOVAL-REFITTING

If petrol with lead additives is used the exhaust pipe upstream of the catalytic converter must be replaced by a new one (when the primary downpipe and catalytic converter are in two sections).

Before replacing any components, the petrol in the fuel supply system must have the lead additives removed from it.

For this purpose: the system may either be flushed out with unleased petrol, or the vehicle run to consume several tanks full of unleaded petrol.

NOTE: Whenever working on the vehicle's exhaust system, ensure that the system is completely leaktight between the exhaust manifold seal and the catalytic converter inclusive.

All seals removed must be replaced.

SPECIAL POINTS

Do not park or run the engine in places where combustible materials such as grass or leaves could come into contact with a hot exhaust system. Under certain wind and climatic conditions these materials could be ignited by the hot exhaust system.

CHECKING THE CATALYTIC CONVERTER

Check first of all that the catalytic converter or oxygen sensor has not been polluted by leaded petrol: perform the test for checking for the presence of lead at the vehicle exhaust as appropriate.

Connect a gas anyliser to the rear of the vehicle.

Vehicle cold:

- read off the values of the pollutants;
- warm up the engine (allow cooling fan to cut in twice);
- read off the values of the pollutants at idling and at an engine speed between 2500 and 3000 rpm.

  - if the CO is greater than 0.2%, disconnect the oxygen sensor;
  - if the CO does not vary when the sensor is connected or disconnected, replace the oxygen sensor. (Attention: the oxygen sensor may have been polluted by lead present in the petrol; perform the test for lead on the oxygen sensor to make sure; also make sure that is operating correctly using the XR25 test box: check it by means of line 13 bar graphs and by the variations read off when #05 is entered at idling and at a steady engine speed between 2500 and 3000 rpm);
  - if, using a new oxygen sensor, the CO percentage is still greater than 0.2%, ensure that the catalytic converter does not make any noise when it is shaken (confirm this by travelling with the vehicle).

Remove the catalytic converter and ensure:
- that there is no visual damage;
- that there are no suspicious noises, by shaking the converter;
- that there is nothing partially or totally blocking the converter.

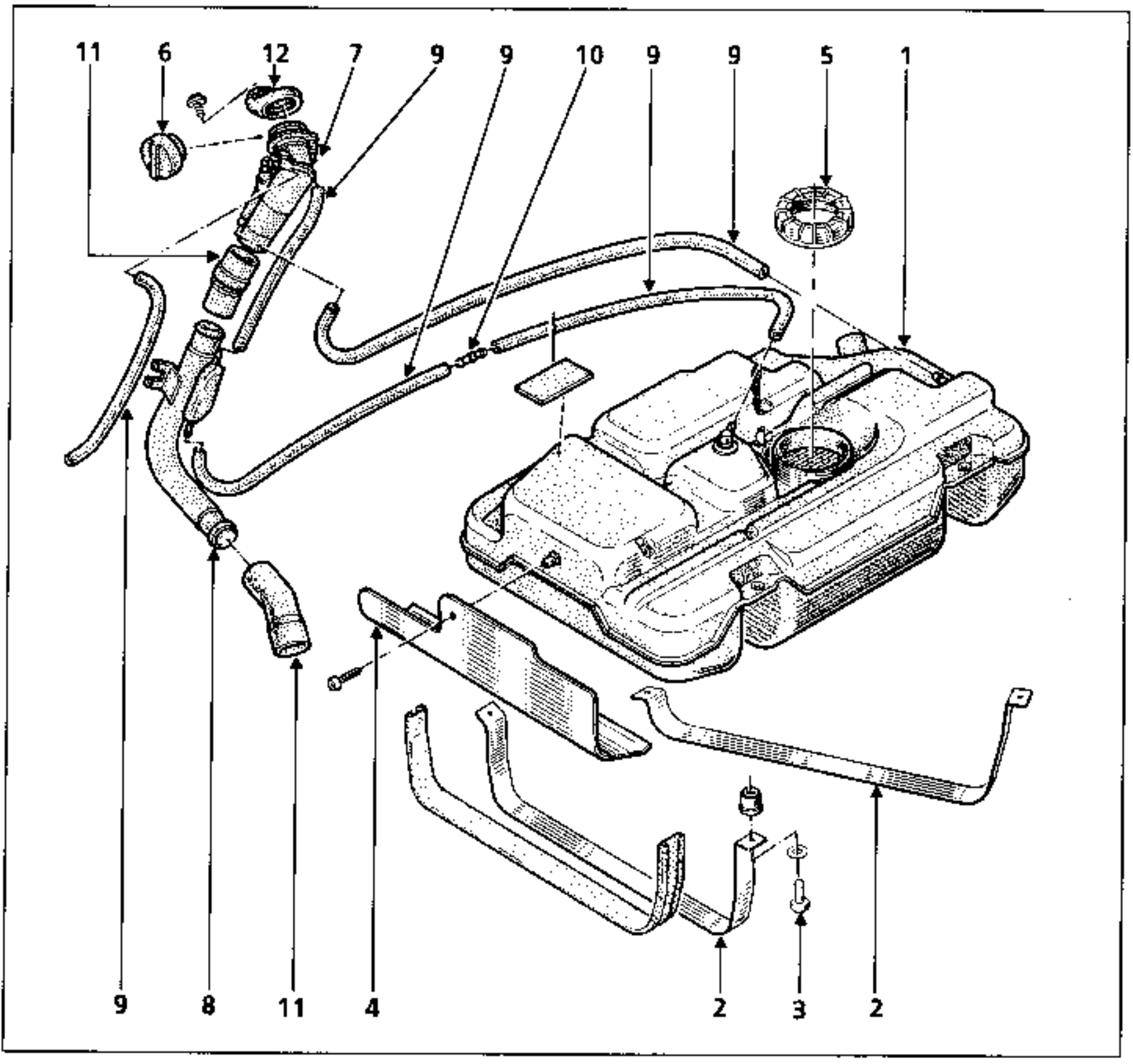
ATTENTION:

Before changing a catalytic converter erroneously, ensure;

- that the vehicle is in perfect running condition: fuel supply, ignition, battery charging circuit, mixture regulation via oxygen sensor (test using XR25 test box and lead test);
- vehicle performance by carring out a road test;
- that there are no localised noises coming from the catalytic converter during a road test;
- that the exhaust system is perfectly leak tight;
- that there is no lead in the exhaust system by performing the appropriate test;
- that the values of the pollutants measured are correct:
  . engine temperature;
  . values measured at idling speed and at an engine speed between 2500 and 3000 rpm.

NOTE: the variations of the various pollutants are not always immediate, they may be transitory and irregular since the pollutant readings vary according to the characteristics of the CO tester used (sensitivity, response time, condensation of the circuits, condition of filters, length of hoses, etc).

- ensure that the apparatus is perfectly calibrated after the necessary warming up time



1 Fuel tank
2 Mounting straps
3 Mounting bolt
4 Protective panel
5 Locking ring
6 Fuel tank cap (non-ventilated type)
7 Filler pipe
8 Filler pipe hose
9 Venting hose
10 Double union
11 Filler pipe union
12 Filler pipe inlet

NOTE: on injection engines, the fuel tank vent-to-atmosphere is via the canister.

REMOVAL

Place the vehicle on an hydraulic lift.

Before raising the vehicle:

Disconnect the battery.

Drain the fuel contained in the fuel tank using a pump.

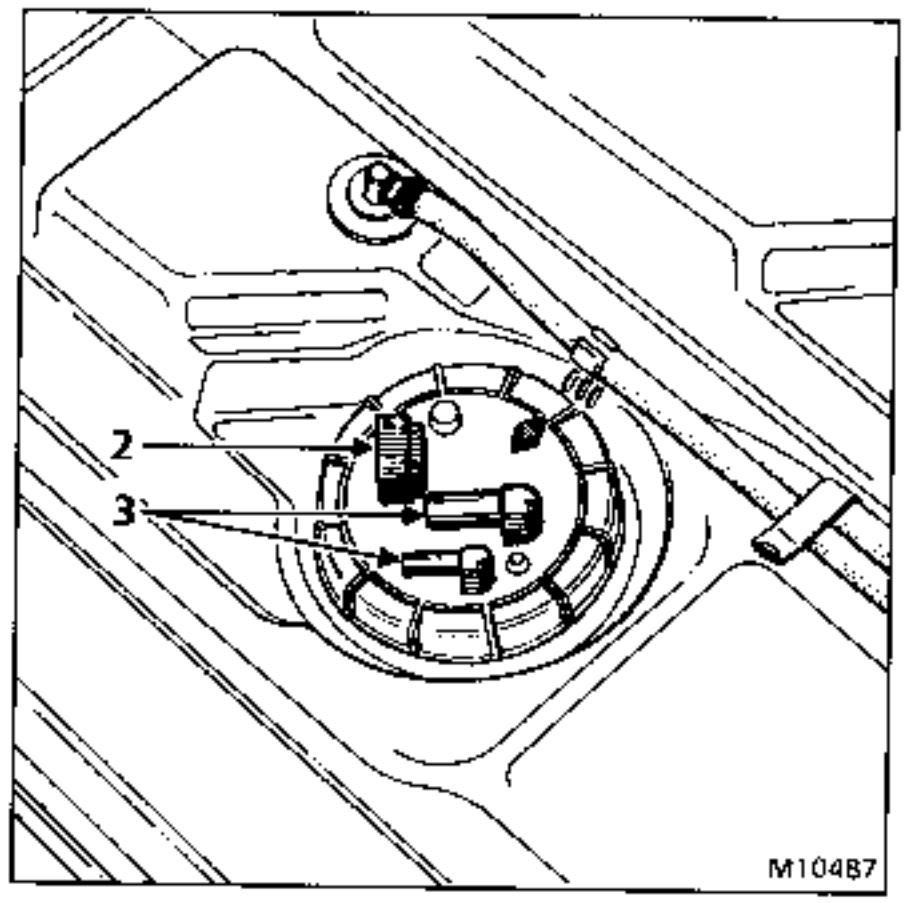
Raise the vehicle:

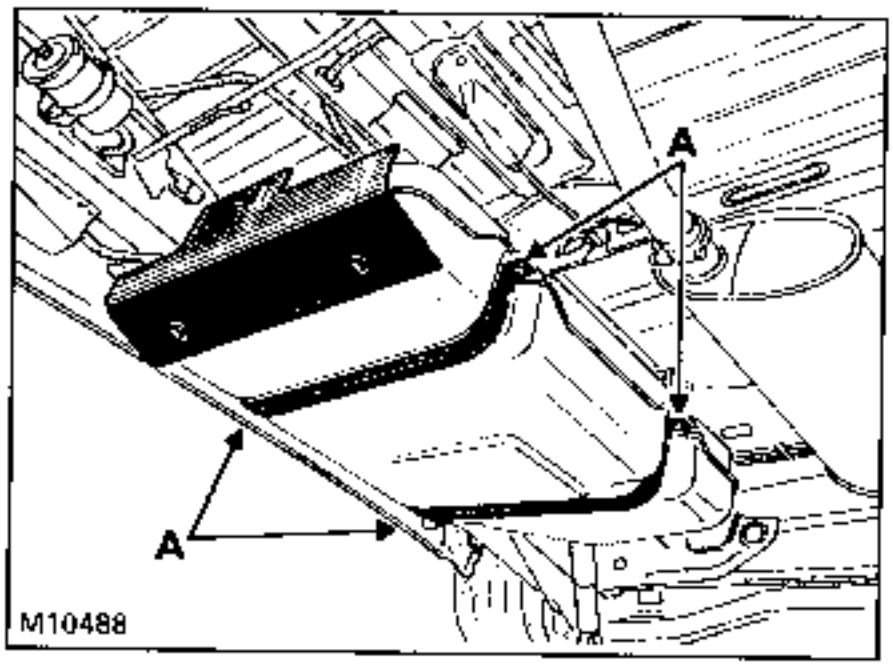
Remove the protection panel from the fuel tank.

Remove the tightening clip from the filler pipe.

Separate the hose from the filler pipe.

Position a DESVIL V710 type stand under the fuel tank without resting on the fuel tank sender unit well.





Remove the 4 mounting bolts (A) on the straps retaining the fuel tank.

Gently lower the fuel tank then disconnect:
- the sender unit electric feed (2);
- the various flexible hoses, taking care to mark those for defuming and vent-to-atmosphere (different restrictors at the fuel tank outlet (3)).

REFITTING

Perform the operations in reverse order to removal.

HOWEVER, when refitting the fuel tank to the vehicle, take care not to pinch the fuel feed and return hoses between the body and the fuel tank.

GENERAL

Rocker type sender unit equipped with a cup preventing unpriming; it is mounted on a spring to enable the intake hose to remain as close as possible to the bottom of the tank (the cup is in contact with the bottom) when the plastic tank is deformed.

REMOVAL

It is removed when the fuel tank is removed from the vehicle.

Special Point

ATTENTION: do not force the float: allow it to drop by its own weight (risk of internal damage).

A bead of sealing paste is applied between the seal and fuel tank when the sender unit is assembled.

NEVER USE A SCREWDRIVER AND HAMMER to remove the sender unit since there is a risk of damaging the notches on the plastic nut and damaging the sender unit.

Remove the plastic nut using a strap wrench or pin wrench Mot.1221.

REFITTING

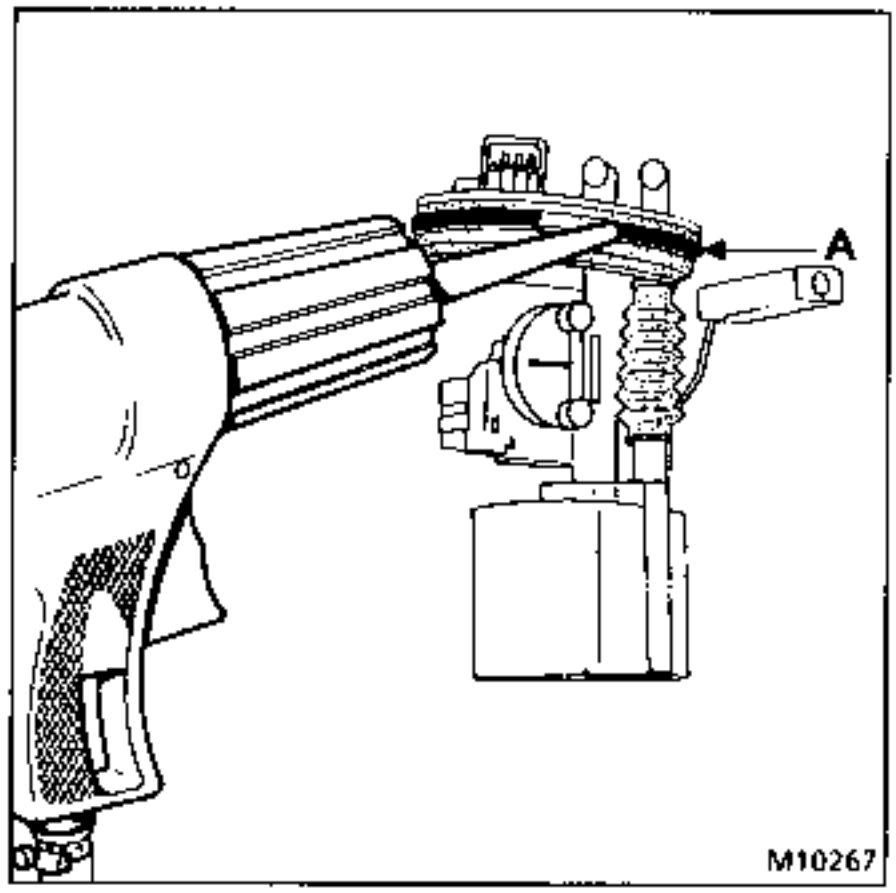
Material required:

Cartridge of BETASEAL 711904HV11 part no 77 01 202 234

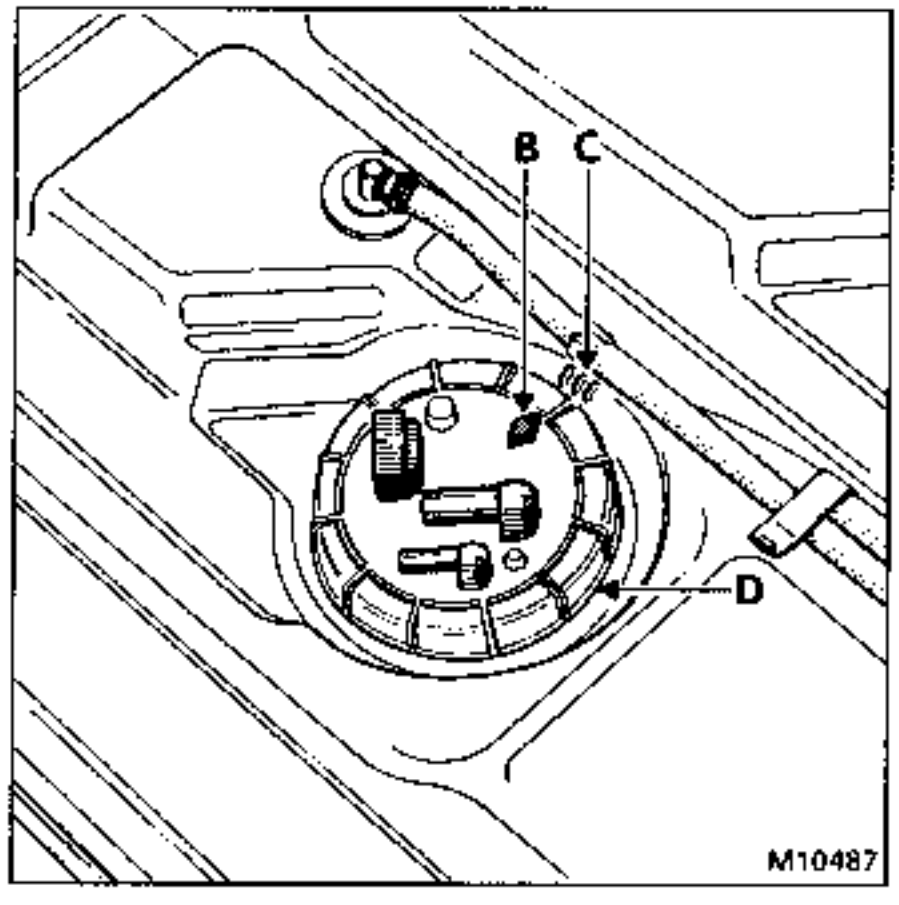
Tooling required:

310 ml cartridge spray gun
pin wrench Mot.1221.

Remove any mastic remaining on the fuel tank, seal and sender unit.



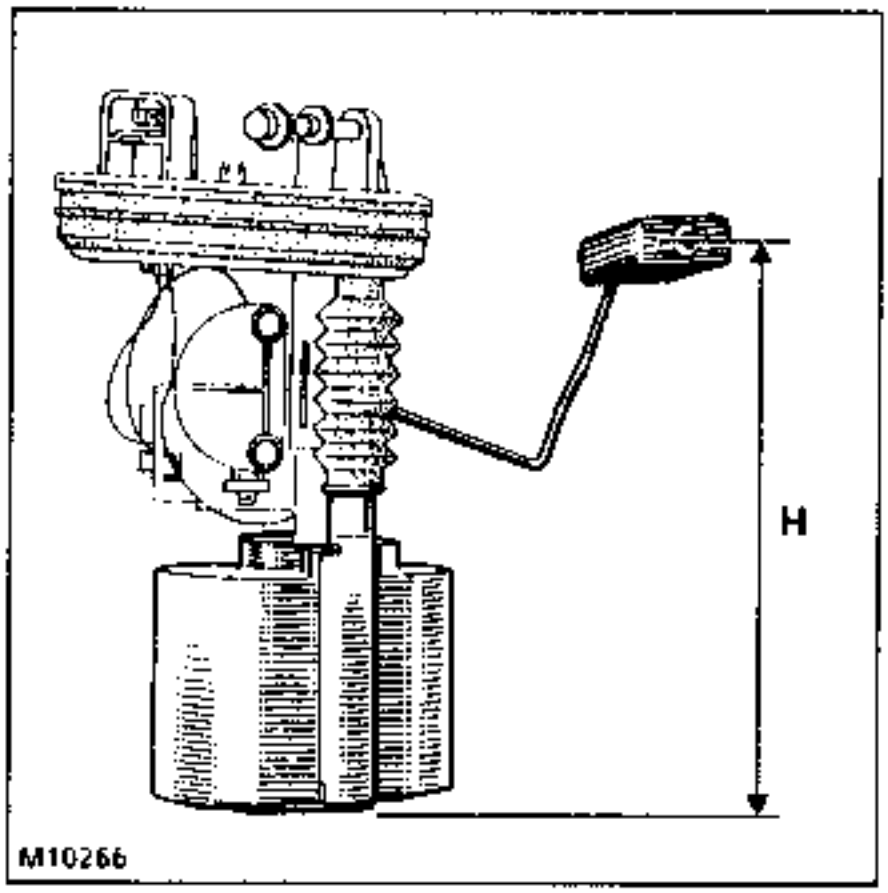
Extrude a 3 mm diameter bead (A) over the periphery of the seal.



Fit in place the assembly, placing arrow (B) opposite mark (C).

Tighten nut (D).

CHECKING



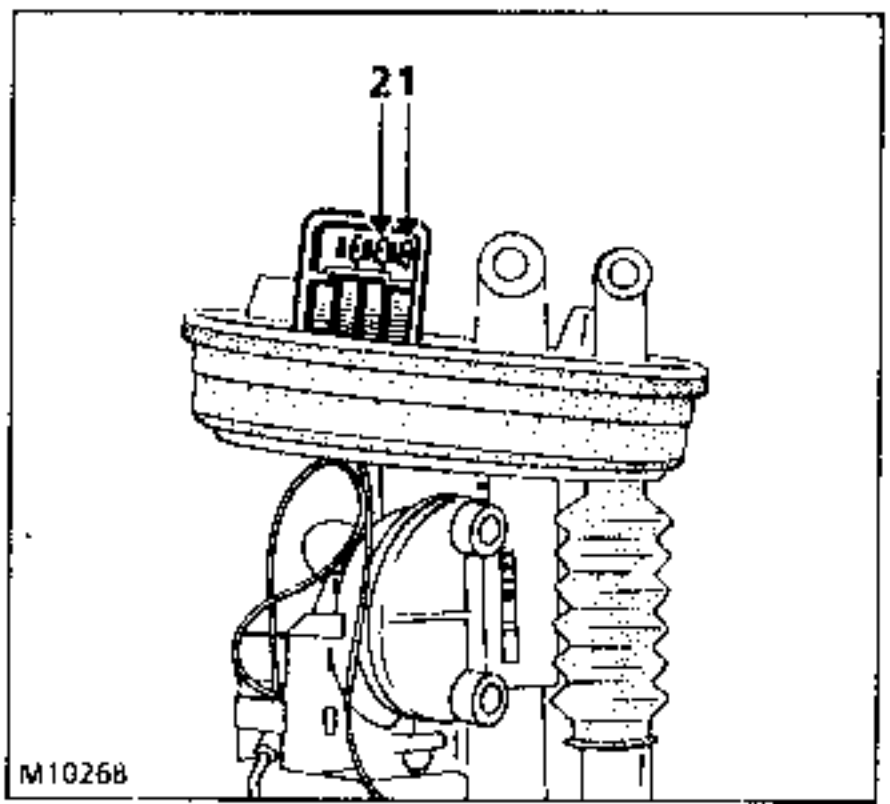
Place the sender unit cup on a flat surface.

Measure dimension H between the bearing face and float centre line.

ATTENTION; do not force the float, allow it to drop by its own weight (risk of internal damage).

Use an ohmmeter to measure between terminals (1) and (2) (indicator).

Gauge indication	Height H in mm	Resistance at terminals 1 and 2 (Ohms)
4/4	196	0 - 7
3/4	155	43-55
1/2	117	89-103
1/4	79	149-169
Warning light illumina-tes- reserve	34,5	295-305



REMOVAL

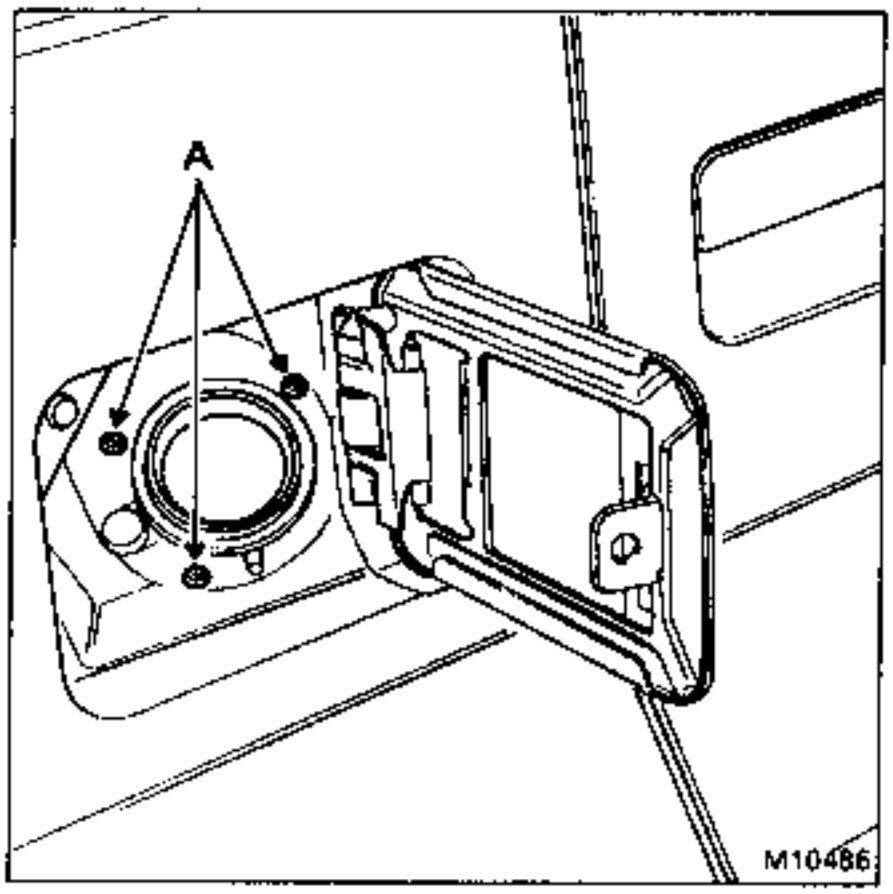
Place the vehicle on an hydraulic lift.

Before raising the vehicle:

Disconnect the battery.

Drain the fuel in the fuel tank using a pump.

Remove the 3 bolts (A) fitting the top of the filler pipe.



Raise the vehicle:

Remove the rear righthand wheel.

Remove the wheel arch shield by drilling the rivets.

Disconnect:
- the filler pipe;
- the venting hoses.

Remove all hoses.

REFITTING

Attach the hose assembly using tape.

Coat with soapy water to facilitate their passage through the side member.

Fit the hoses in place in the side member.

Position the assembly in the wheel arch.

Then proceed in the reverse order to removal.

FILLING THE FUEL TANK

The useful capacity of the fuel tank is 77 ± 1 litre.

Insert the filler pipe as far as it will go and allow the automatic feed to cut in.

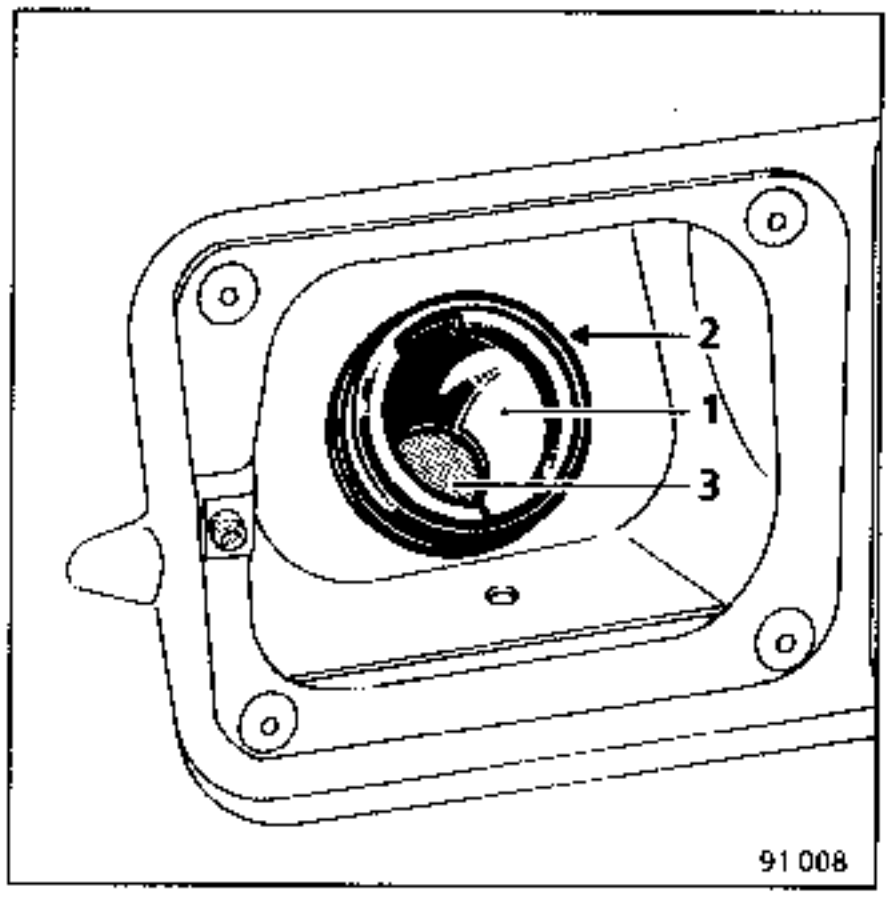
The first time the pump stops automatically, when the tank is nearly full, a maximum of 2 further litres can be added.

In effect, the tank is designed to have an expansion volume which must be preserved.

It is therefore inadvisable to fill the tank to overflowing.

FILLING THE FUEL TANK WITH UNLEADED PETROL

The vehicle must be fed solely with unleaded petrol; the filler pipe has:
- a filling aperture with reduced diameter which cannot be used with a filler pipe for leaded petrol;
- a gate valve blocking the filler aperture.



1 Gate device
2 Filler aperture
3 Gate valve