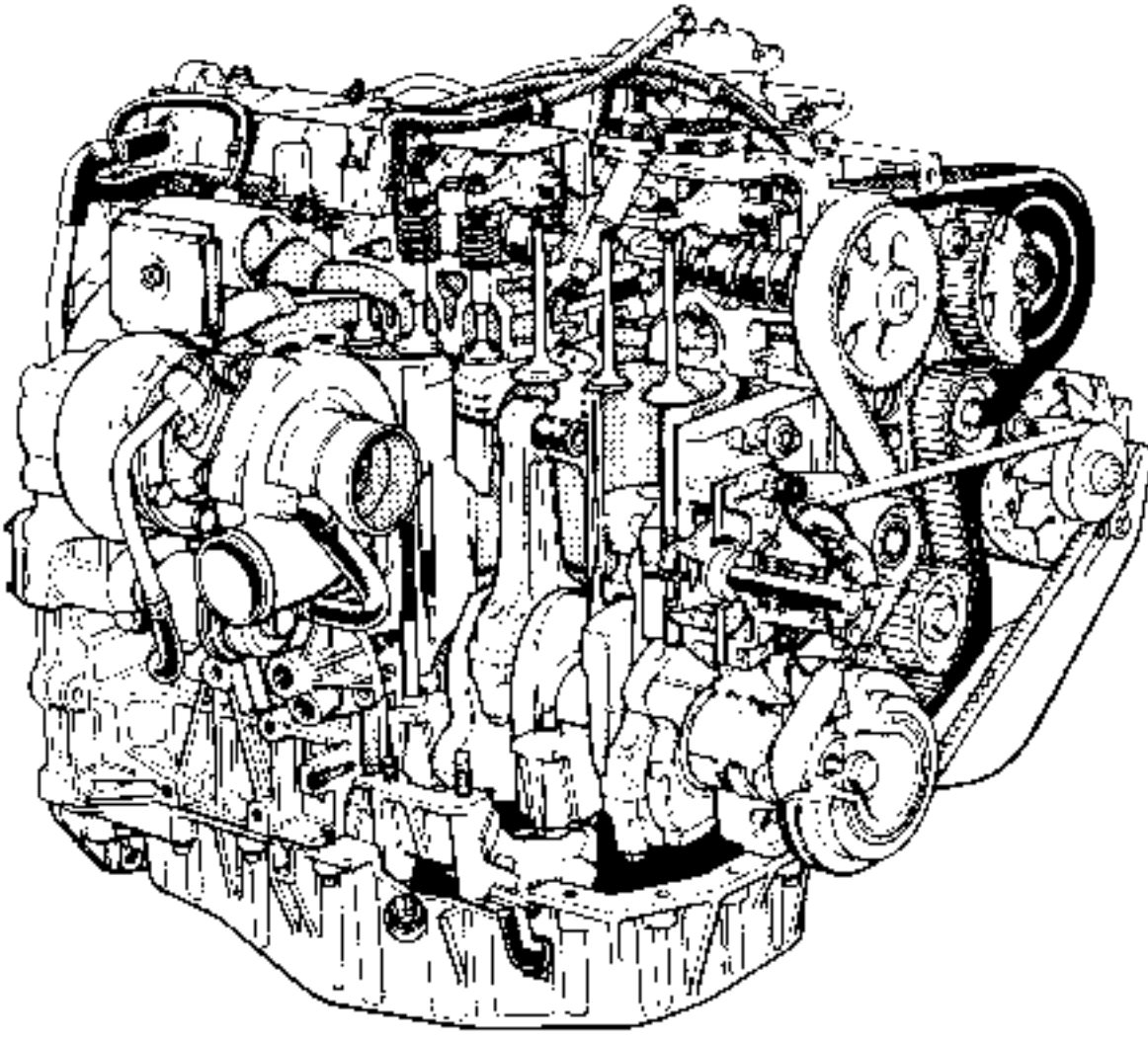
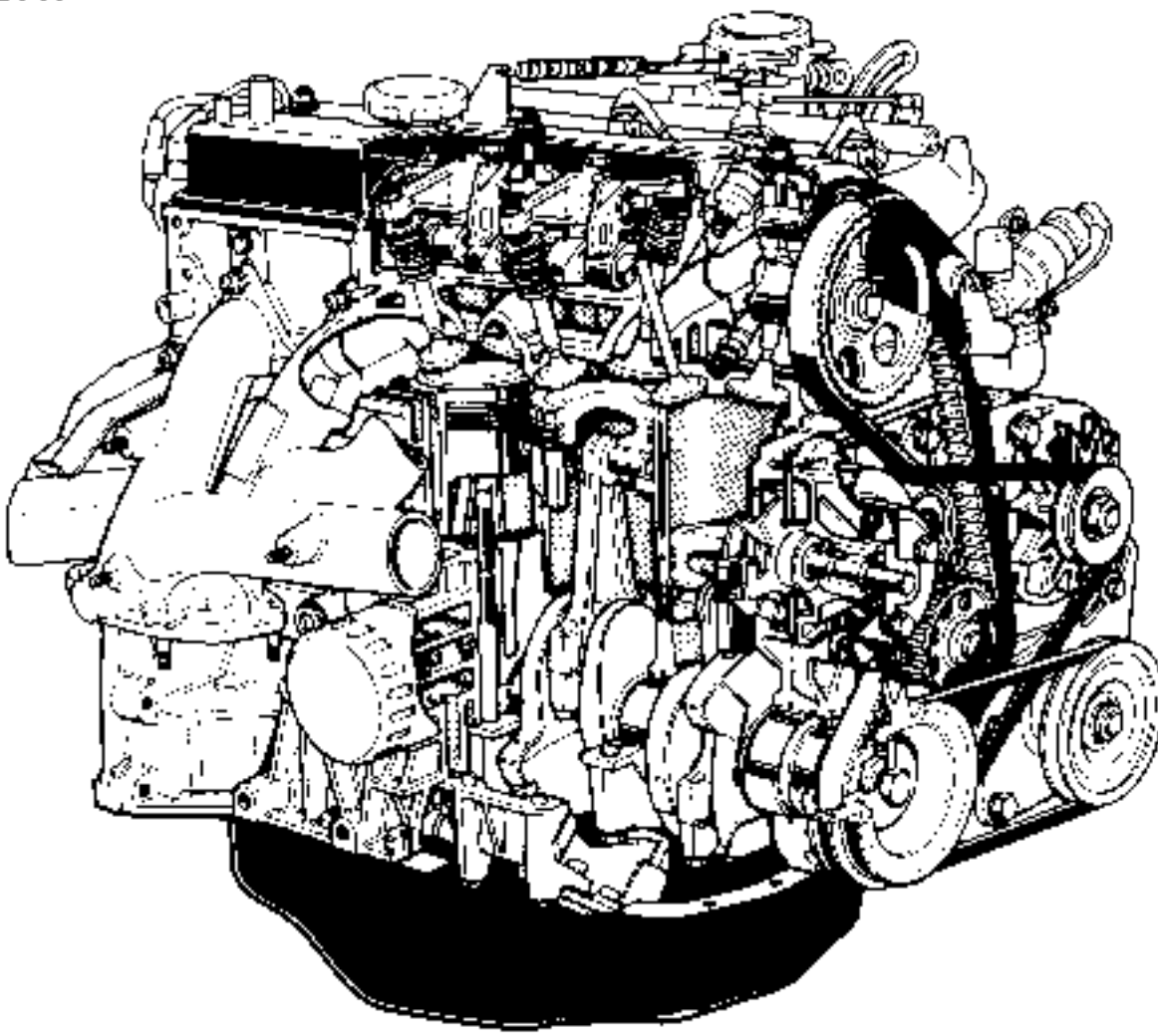


J8S

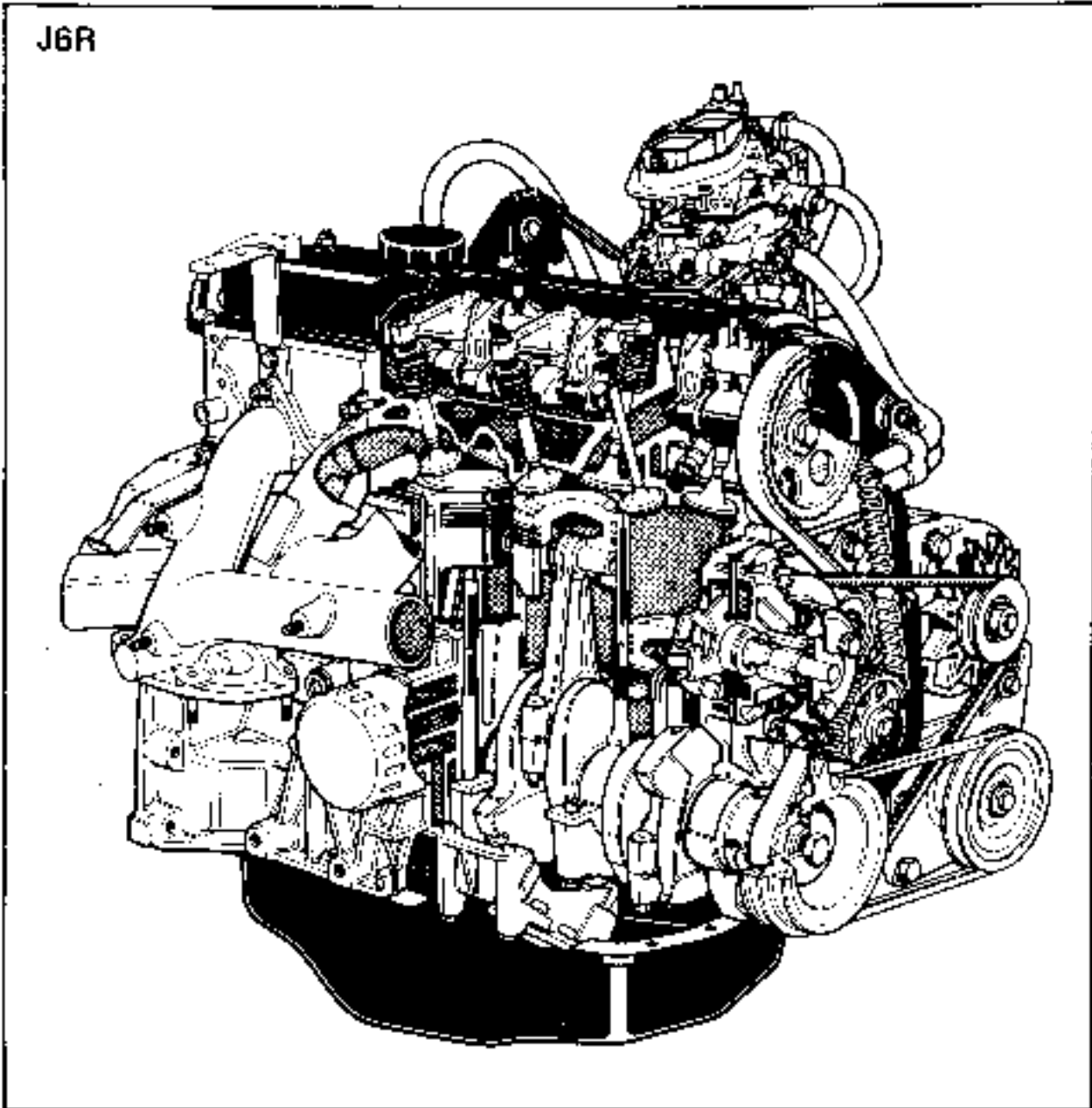
Turbo



J7T
J7R



J6R

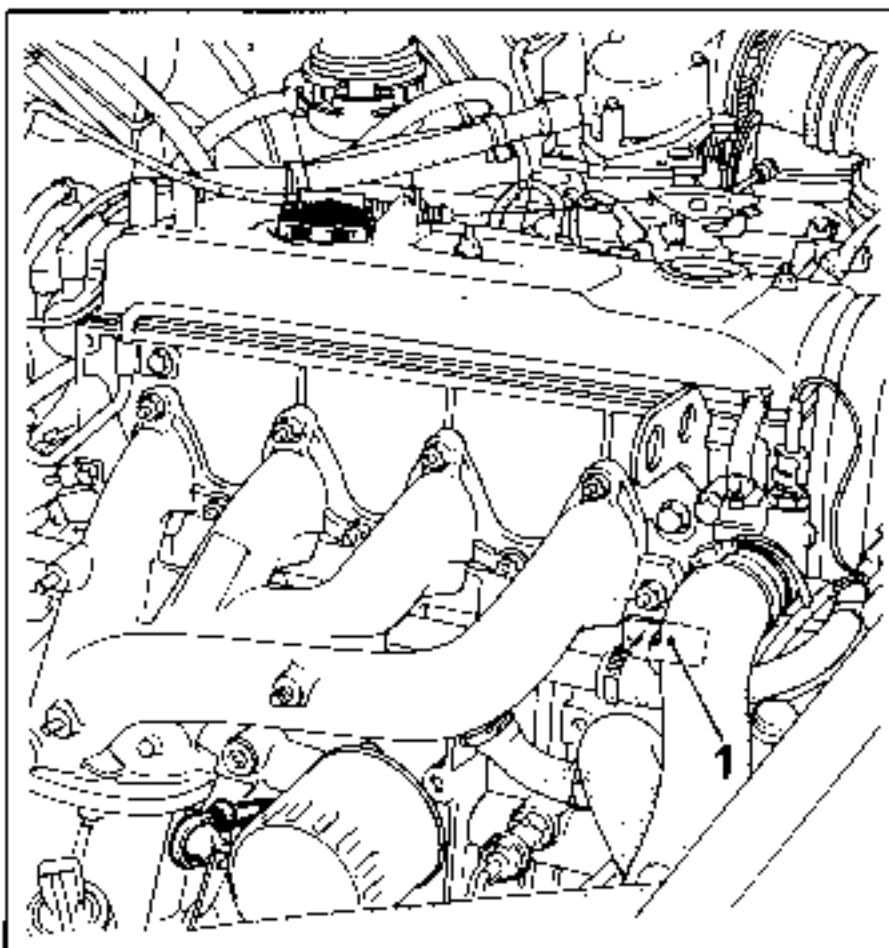


Type	Quantity	Component
MOBIL X57030 No. 20 grease	Coating	- Driveshaft splines - gear-box end - Clutch shaft splines
CAF 4/60 THIXO	Coating	Driveshaft rollpin locations
Loctite FRENBLOC (locking and sealing resin)	Coating	Brake calliper mounting bolts
Loctite FRENETANCH (locking and sealing resin)	Coating	Crankshaft pulley mounting bolts
ELF. Multi	Coating	Wheel bolts
MOLYKOTE CU. 7439	Coating	For centring wheels and turbo bolts

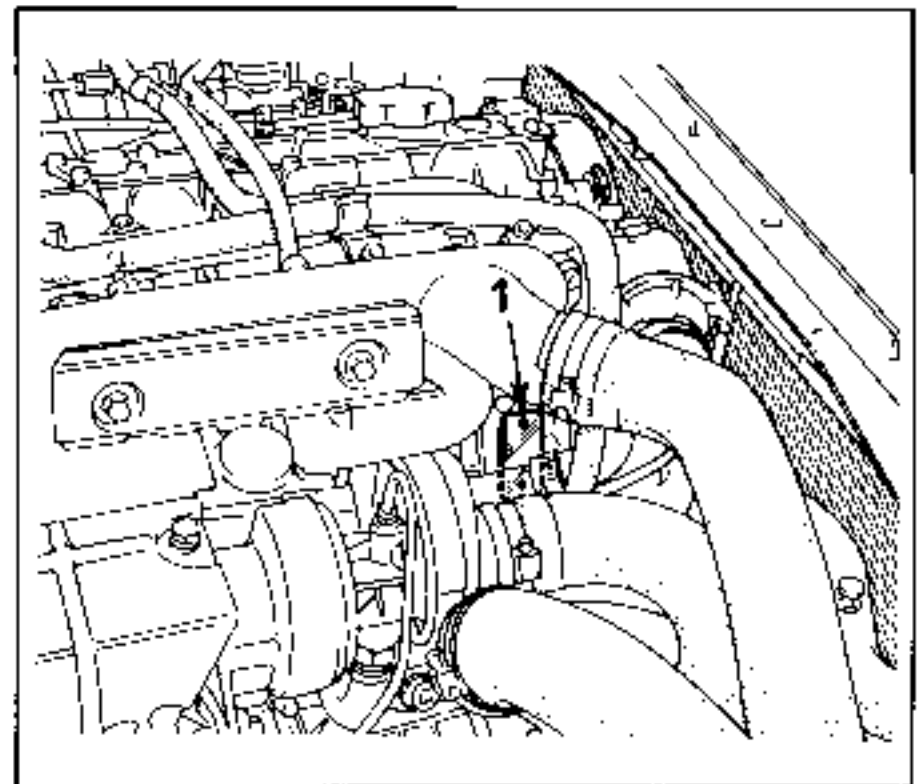
Identification

Location of engine identity plate (1).

J6R, J7R, J7T engines



J8S engine




Vehicle type	Engine type	C/R	Stroke	Bore	Cubic capacity	Special point
J 112 S 112	C 234 J6R C 236 D 734	9.2	82	88	1995	Repair: see manual Mot.J --(E)
J 115 S 115	J8S 240	21.5	89	86	2068	Repair: see manual Mot.J --- (D)
J 116	J7R 760	10	82	88	1995	RENIX injection and Mot.J --- (E)
J 117	J7T 770	9.2	89	88	2165	

Workshop repair manuals **Mot. J (D)** and **(E)** are to be consulted for repairing the above-mentioned engines.

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 M.R. 271**.

-  - 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.

ESSENTIAL SPECIAL TOOLING	
Mot. 1014	Pressure gauge

MATERIALS

Gas leakage detector:
 "1000 bulles" (AIR LIQUIDE)
 MOUSS MM2 (LUBRO oils) or equivalent.

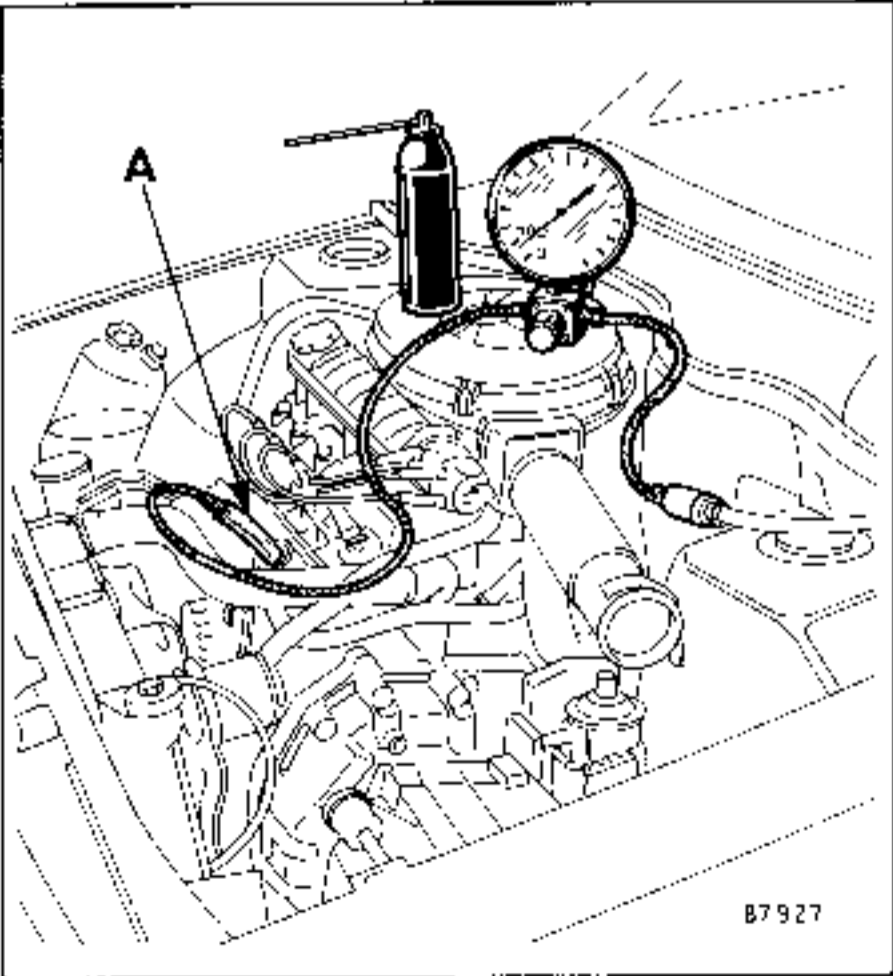
(These products are available in aerosols containing approx. 400 ml).

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.

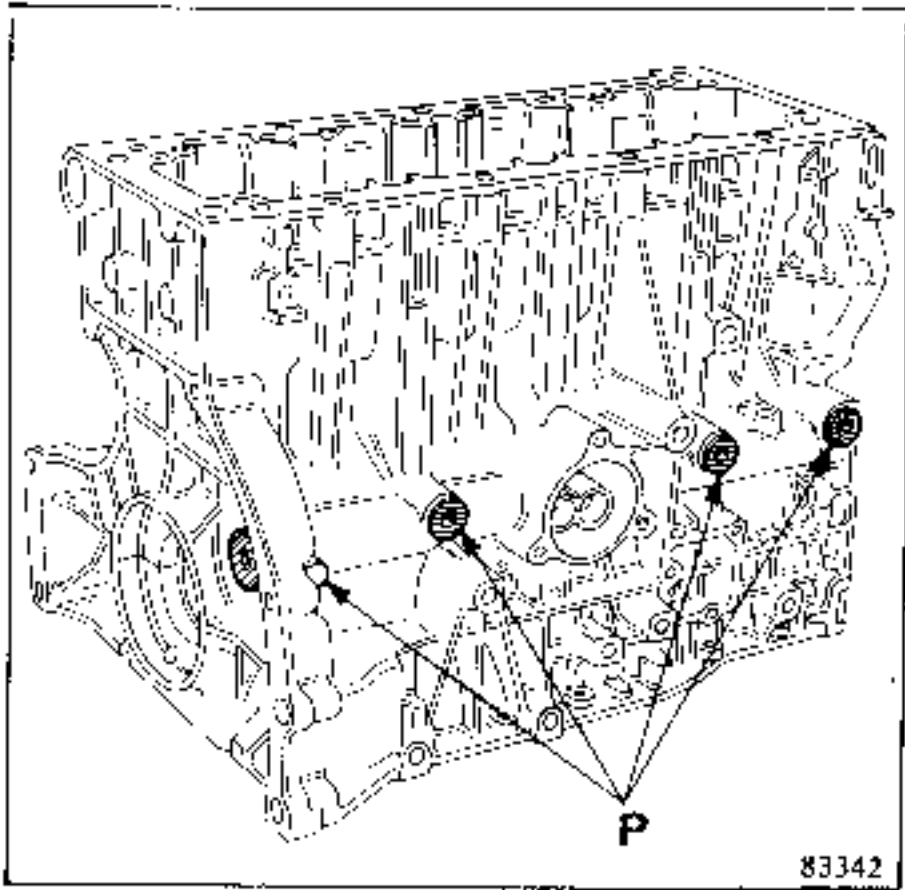
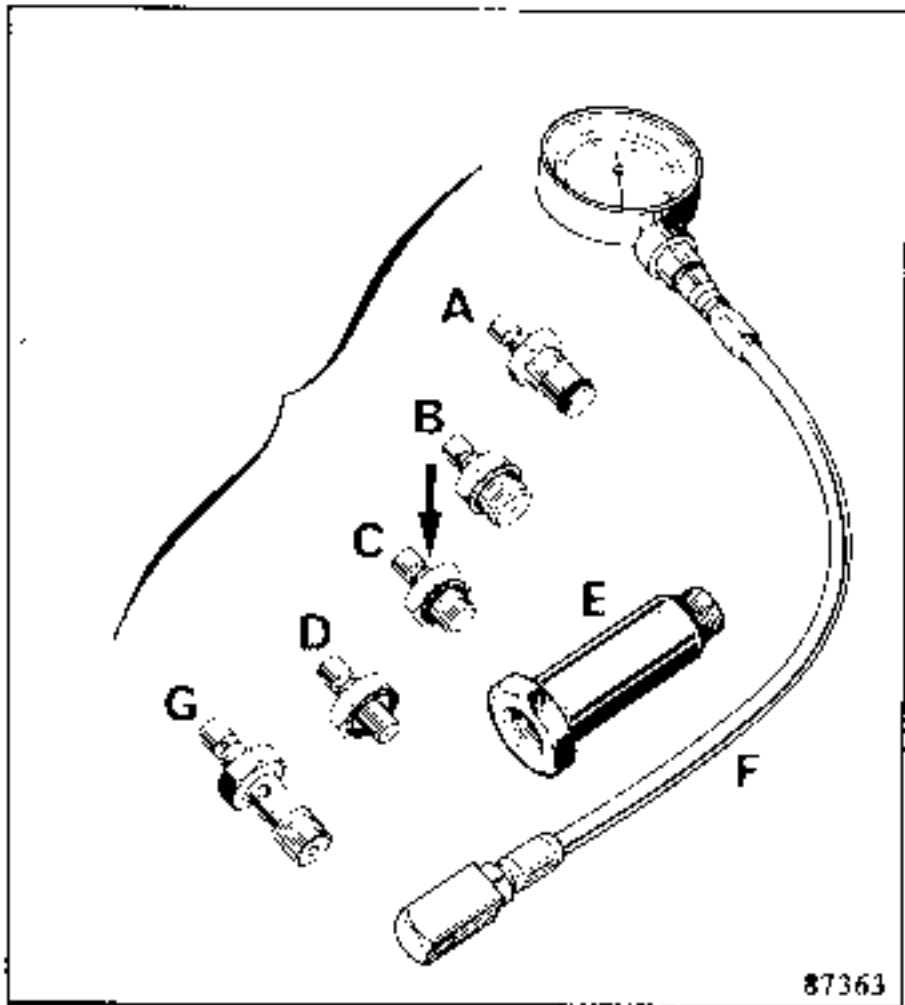
NOTE:

- . 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.



OIL PRESSURE

Engine speed (rpm)	Min. pressure 80°C (bars)
Idling	0,8
3 000	3,0

USE: F + C (14 x 150)

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

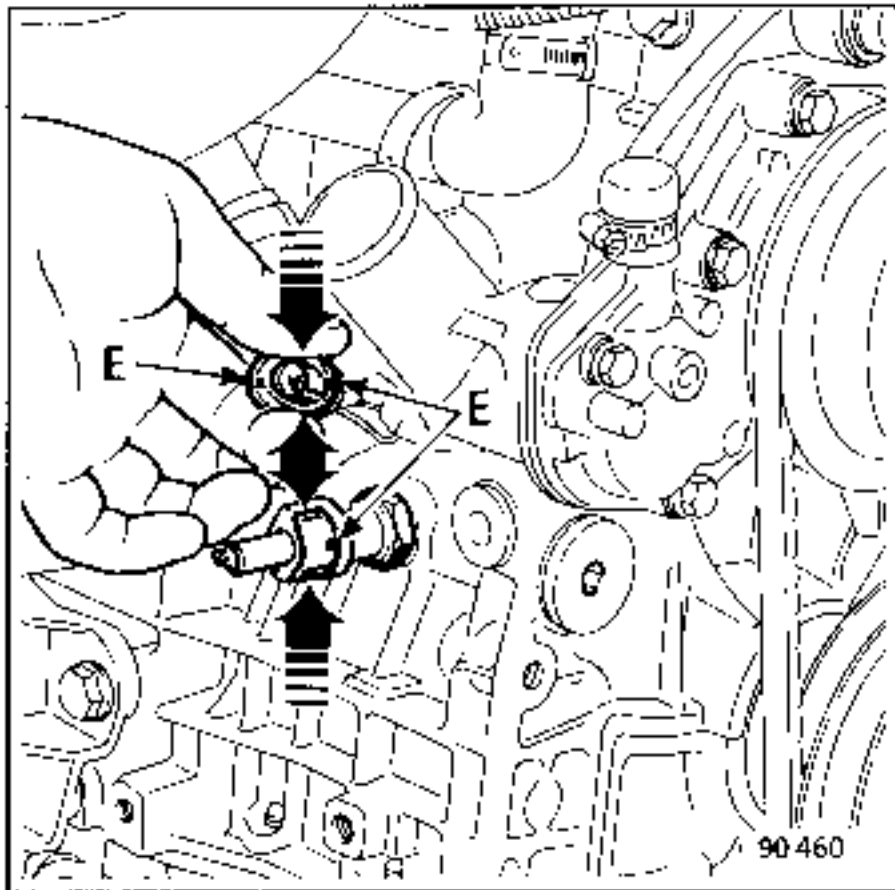
OIL PRESSURE SENSOR

On models J 112/116/117
S 112

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.



REFITTING

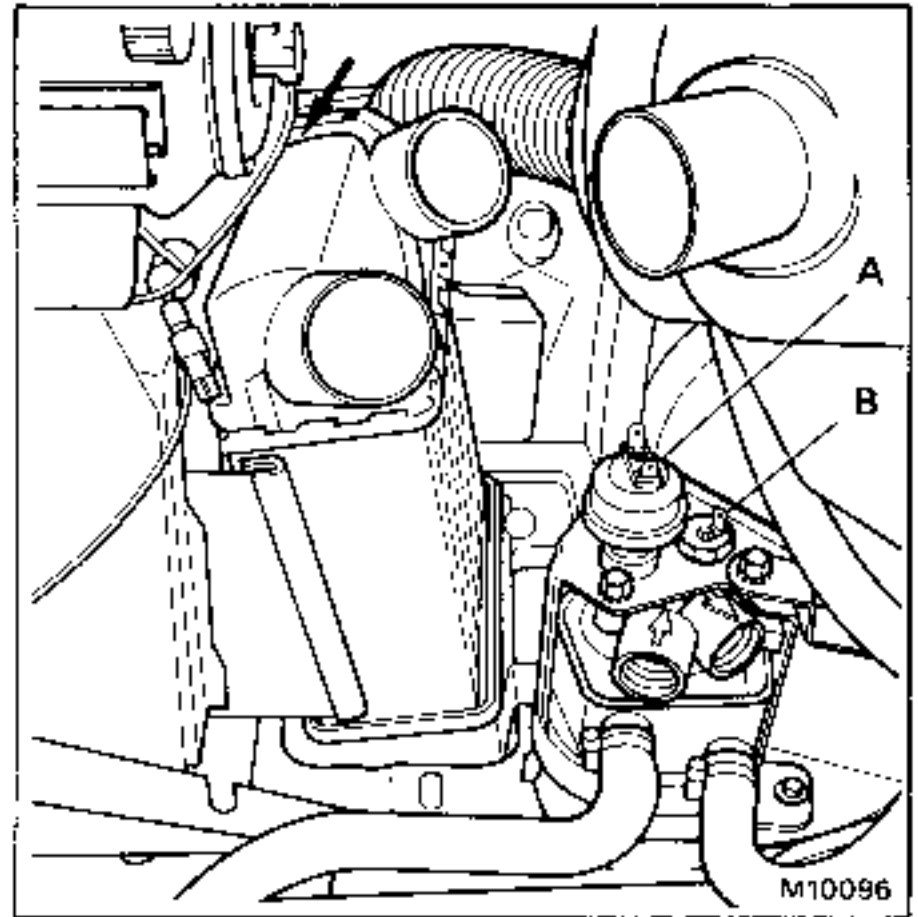
Replace the seal.

Proceed in the reverse order to removal.

On models J 115/S 115

REMOVAL

Disconnect the connectors from the oil pressure sensor (A) and low oil pressure warning light sensor (B) located on the oil cooler.



REFITTING

Replace the seals on the low pressure warning light sensor (B) and oil pressure sensor (A).

ESSENTIAL SPECIAL TOOLING

Mot. 878 Engine lifting tool

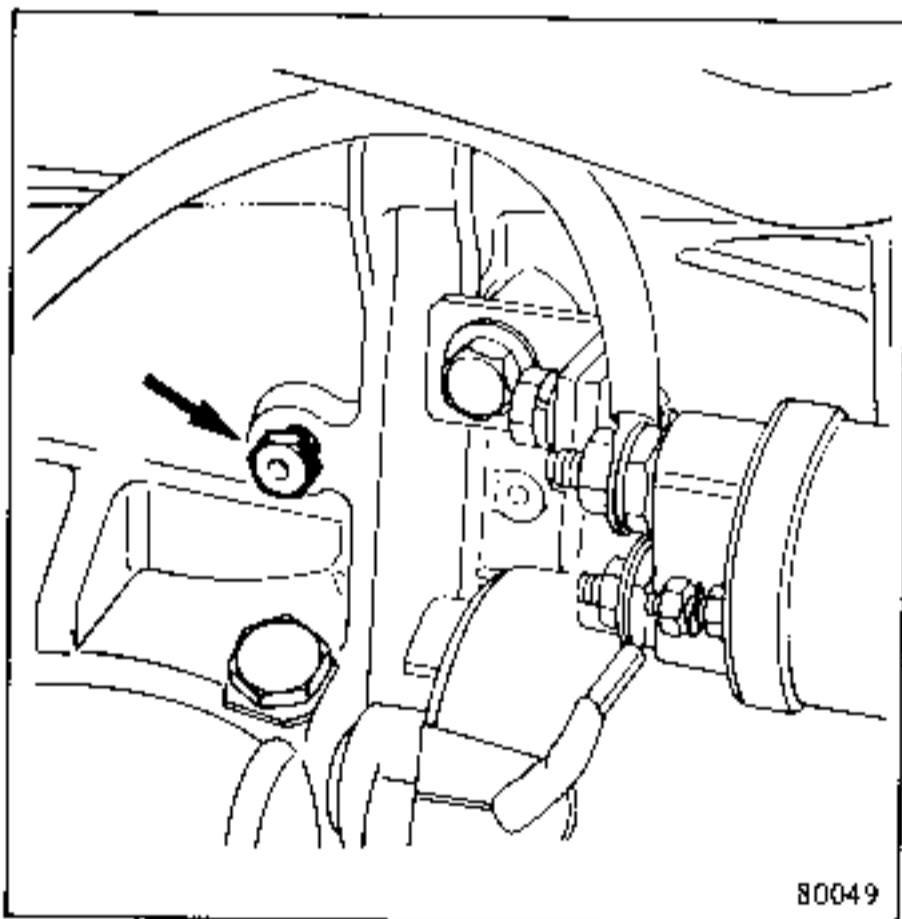
The engine is removed alone by freeing it at the front of the vehicle. Lifting rings are used to facilitate this operation.

REMOVAL

Disconnect the battery.

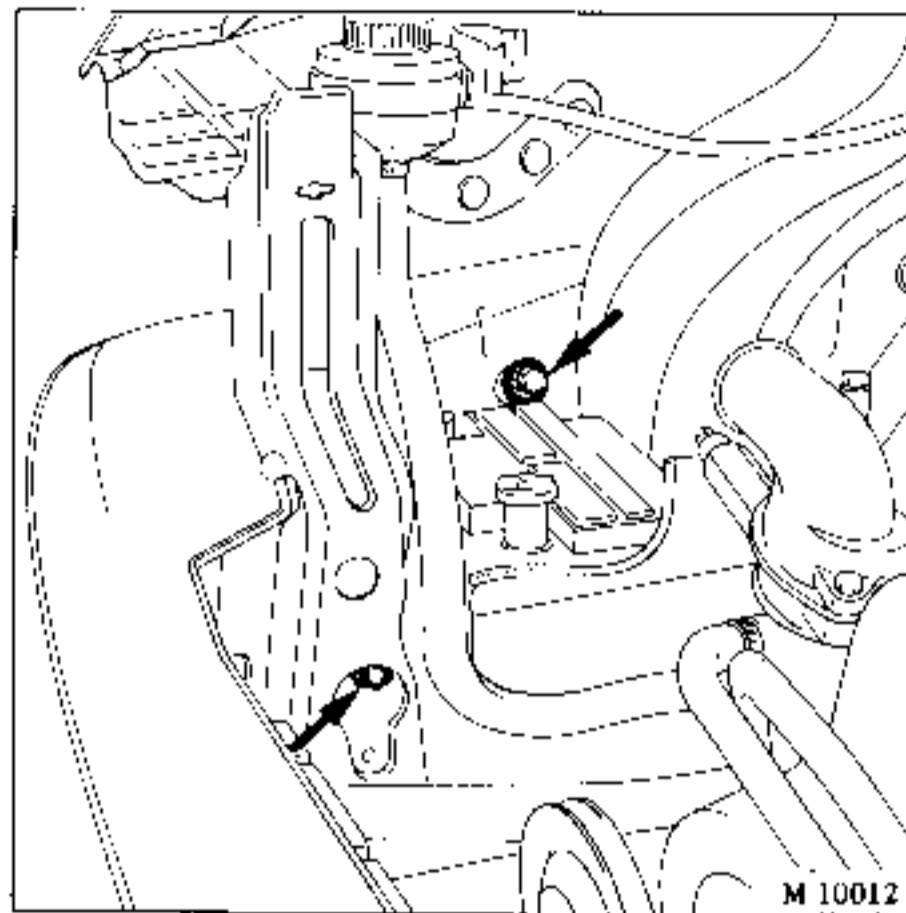
Drain the cooling system:

- at the radiator lower hose;
- at the cylinder block .



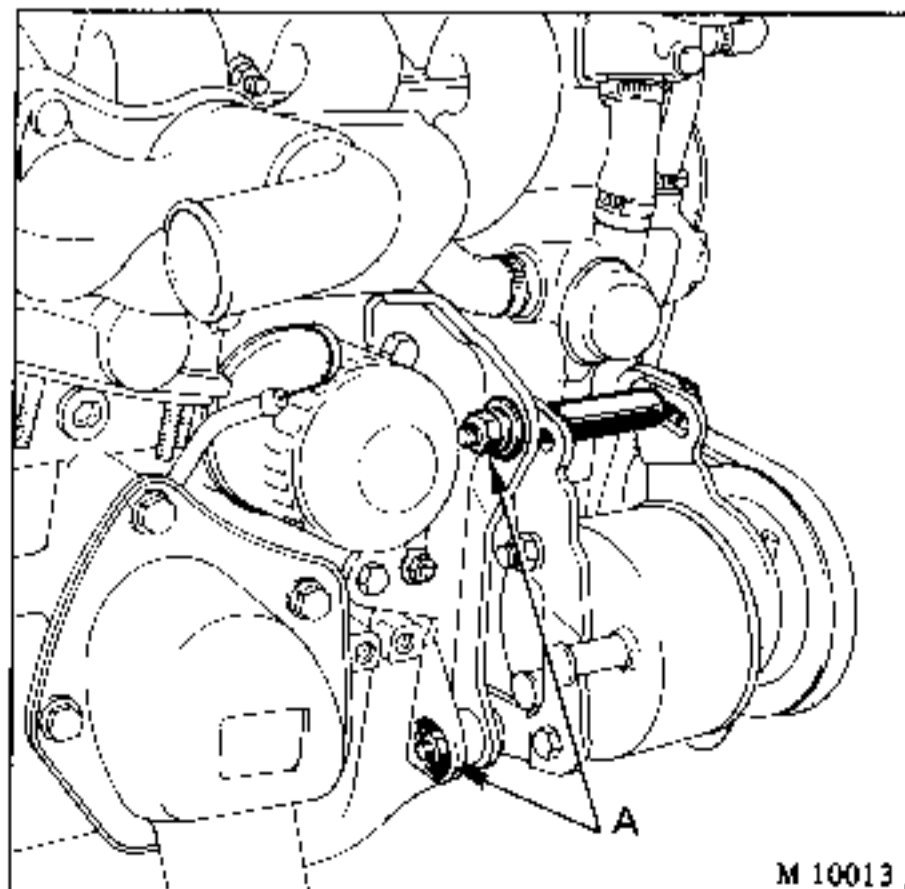
Remove:

- the bonnet
- the upper crossmember
- the radiator and lefthand deflector
- the front grille
- the front shield



- the lower crossmember.

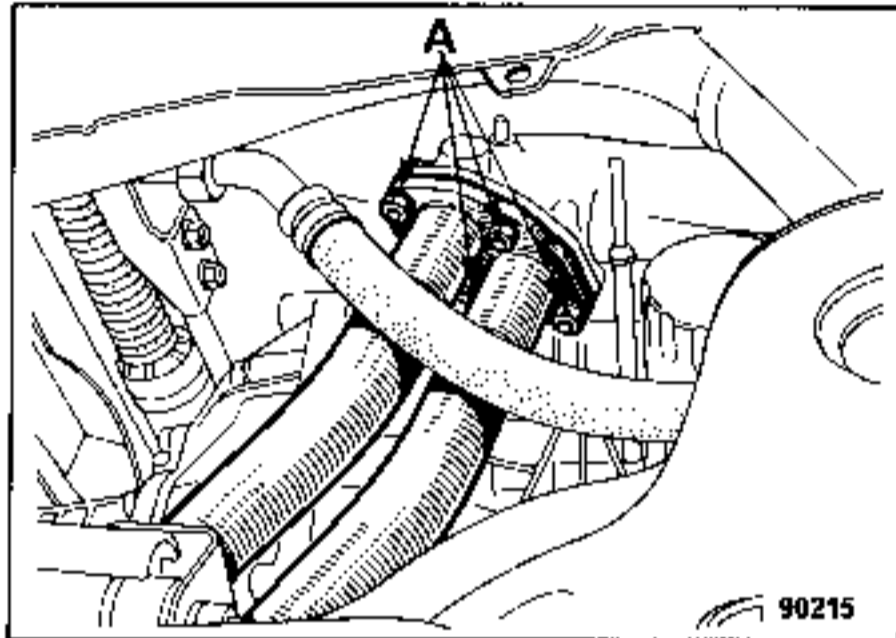
Uncouple the power assisted steering pump from the engine at A and place it at the side.



REMOVAL (continued)

Remove:

- the carburettor cover and hot air feed hose with its lug secured to the rocker cover;
- the air filter;
- the mounting securing the exhaust to manifold (A).

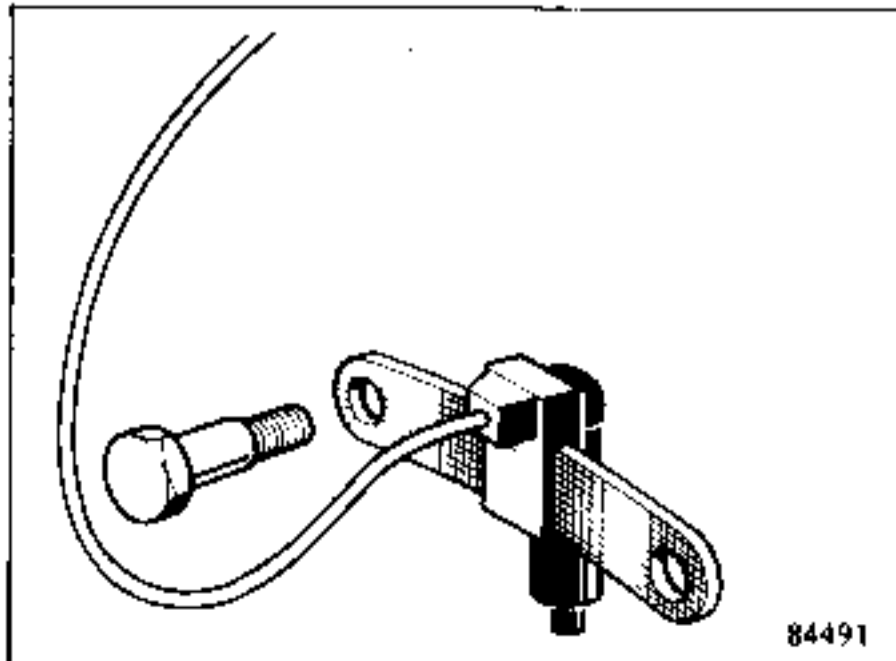


Disconnect:

- the electric junction blocks and feed lines (mark them as necessary);
- the accelerator cable;
- the fuel lines from the pump.

Remove:

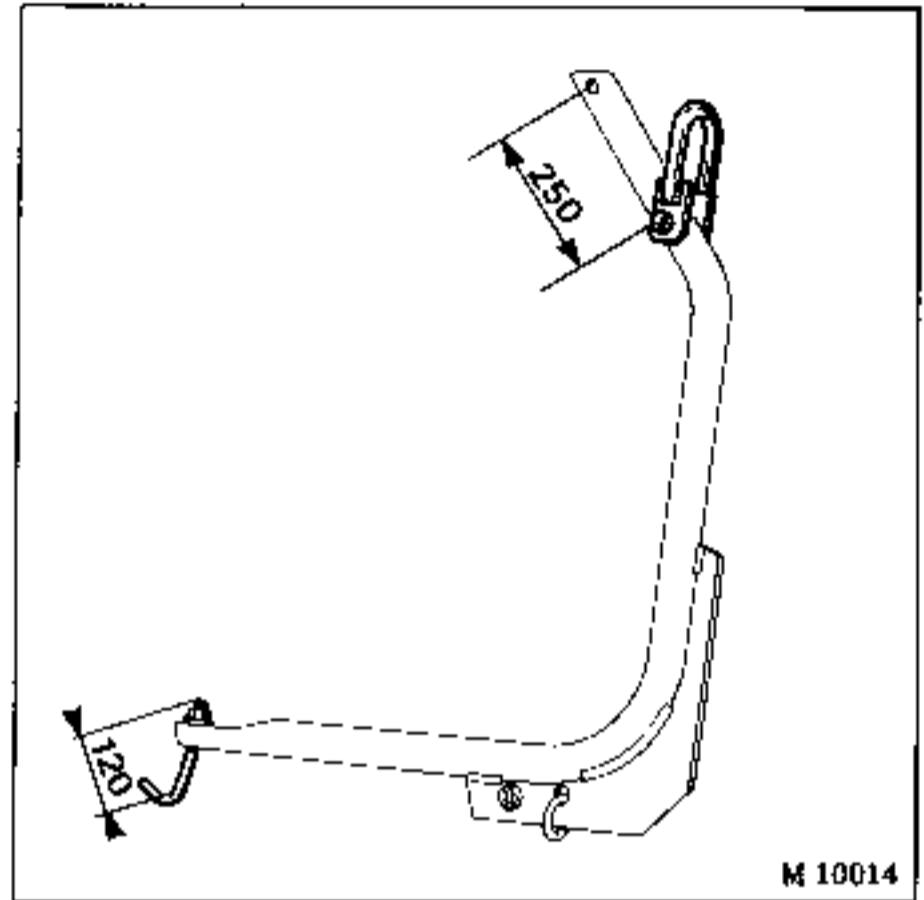
- the mounting bolts from:
 - . around the gearbox
 - . the starter
 - . the flywheel protection plate, which rests on the engine;
- the position sensor;



- the engine support mounting nuts.

Support the gearbox under the vehicle.

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

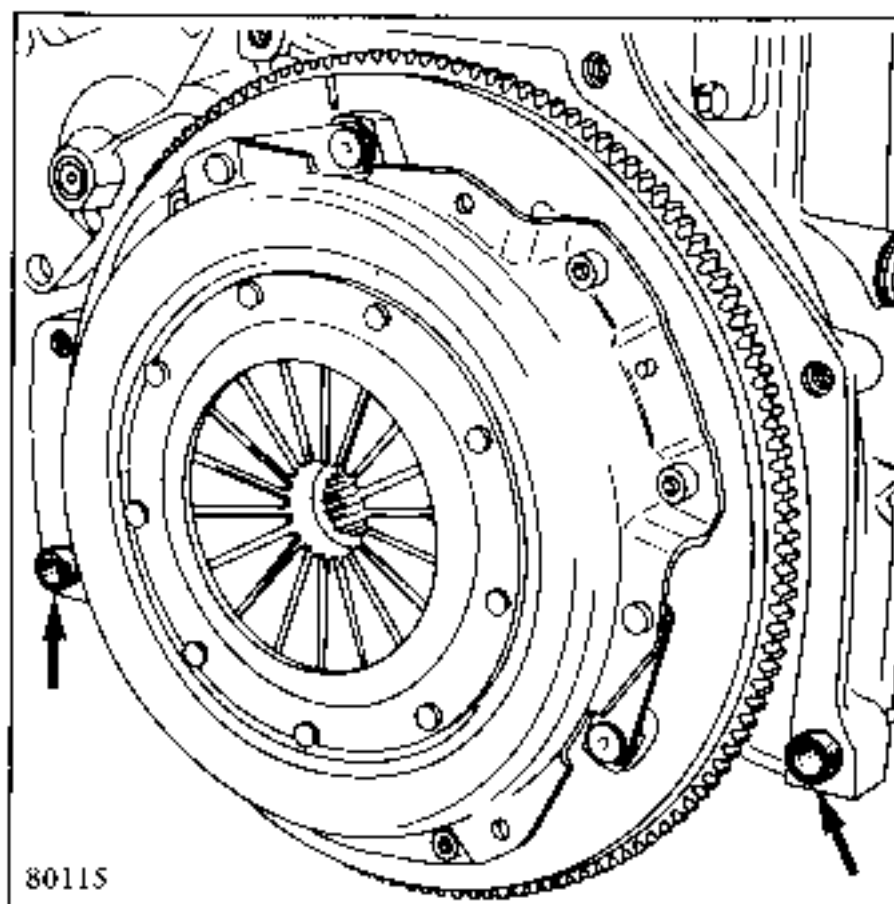


WHEN TOOL MOT. 878 IS USED THE USER MUST MODIFY IT AS FOLLOWS:

- 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)

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 of 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.

Adjust the travel of the accelerator cable.

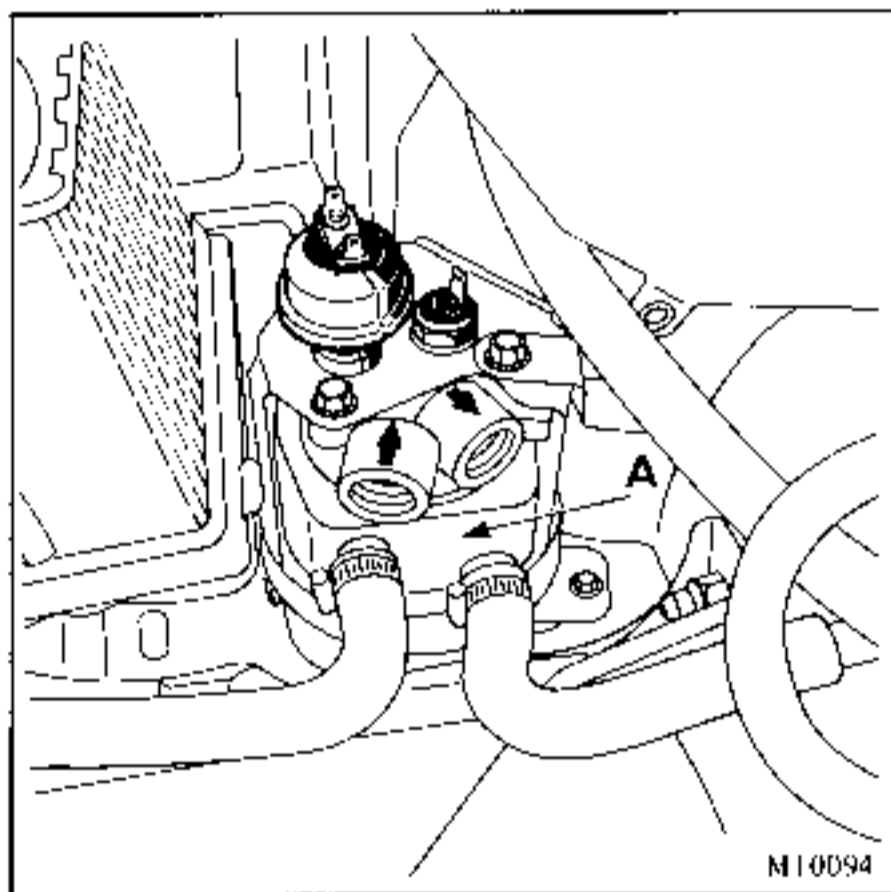
REMOVAL (Special points)

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

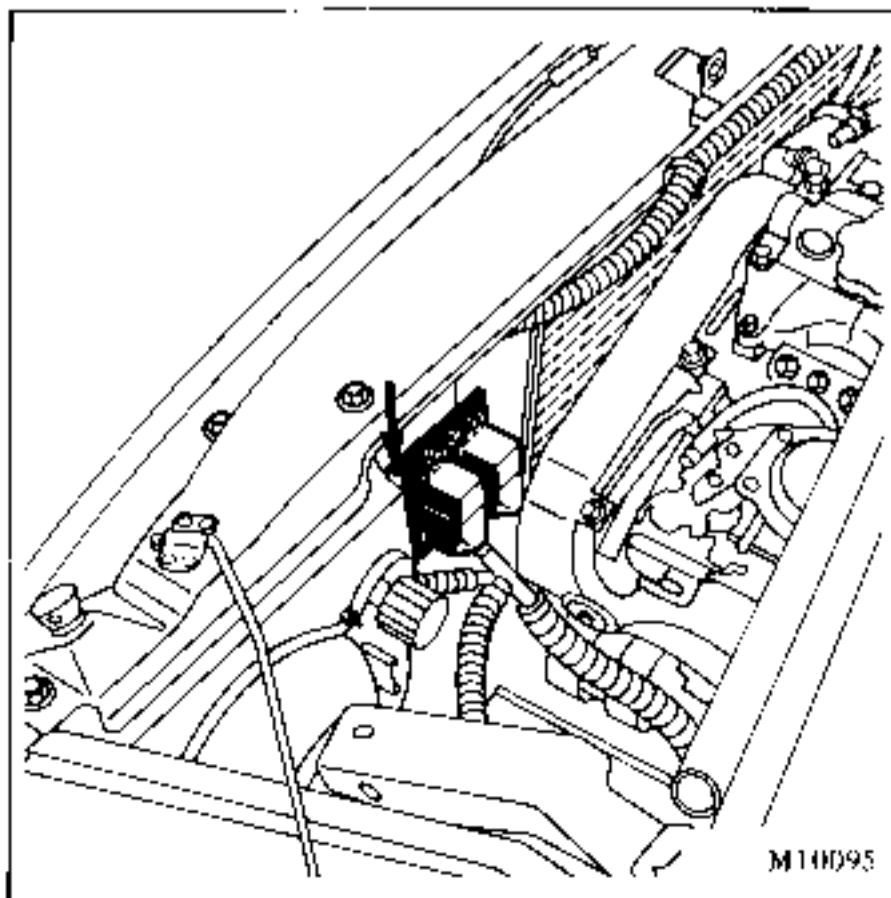
Drain the cooling system by freeing the radiator lower hose.

Remove:

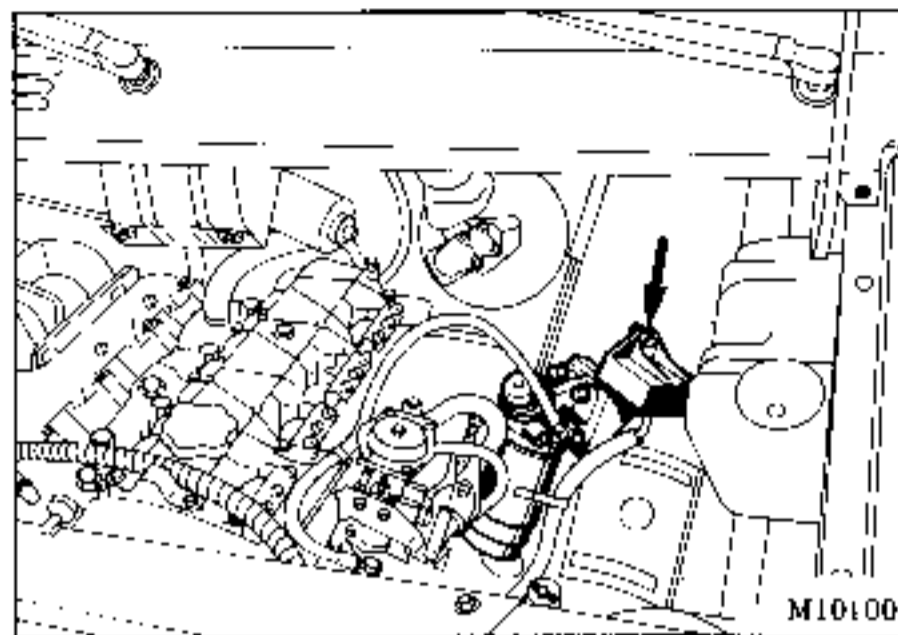
- the air hoses (air filter, compressor, intercooler, inlet manifold);
- the flexible oil pipes connected to the oil-to-water intercooler (A);
- the flexible coolant pipes;



- the engine cooling fan relay mounting;



- the pre-heater unit;

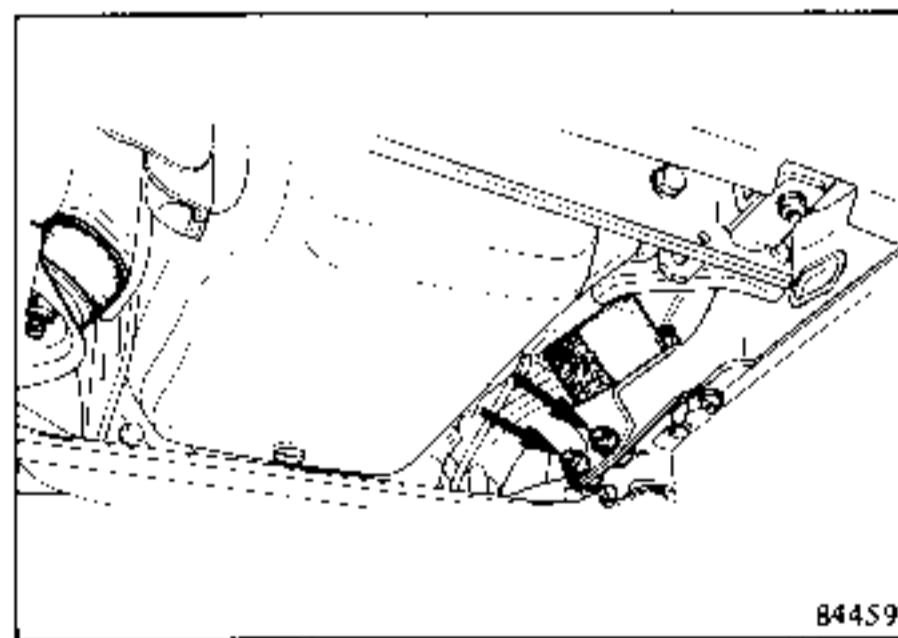


- the electrical connections from the junction blocks;
- the flexible feed and return lines for the diesel fuel, plug the hoses to avoid diesel fuel spillages;
- the exhaust pipe at the turbo outlet.

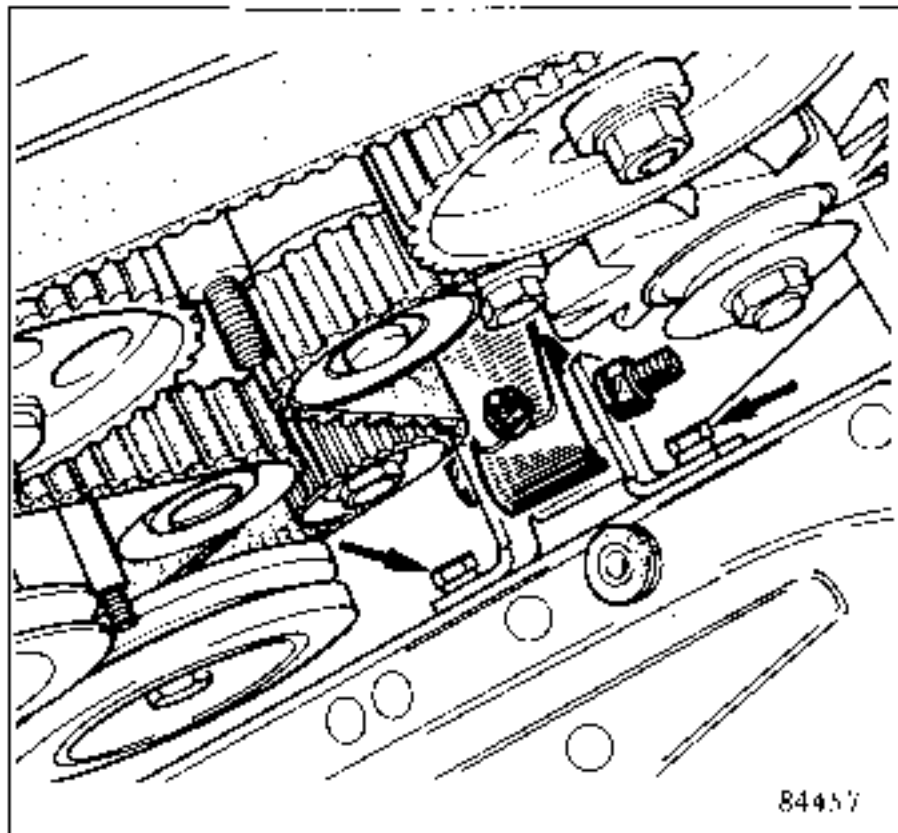
Fit removal tool Mot. 878 modified as instructed on page 10-09.

Remove:

- the engine mounting pads;

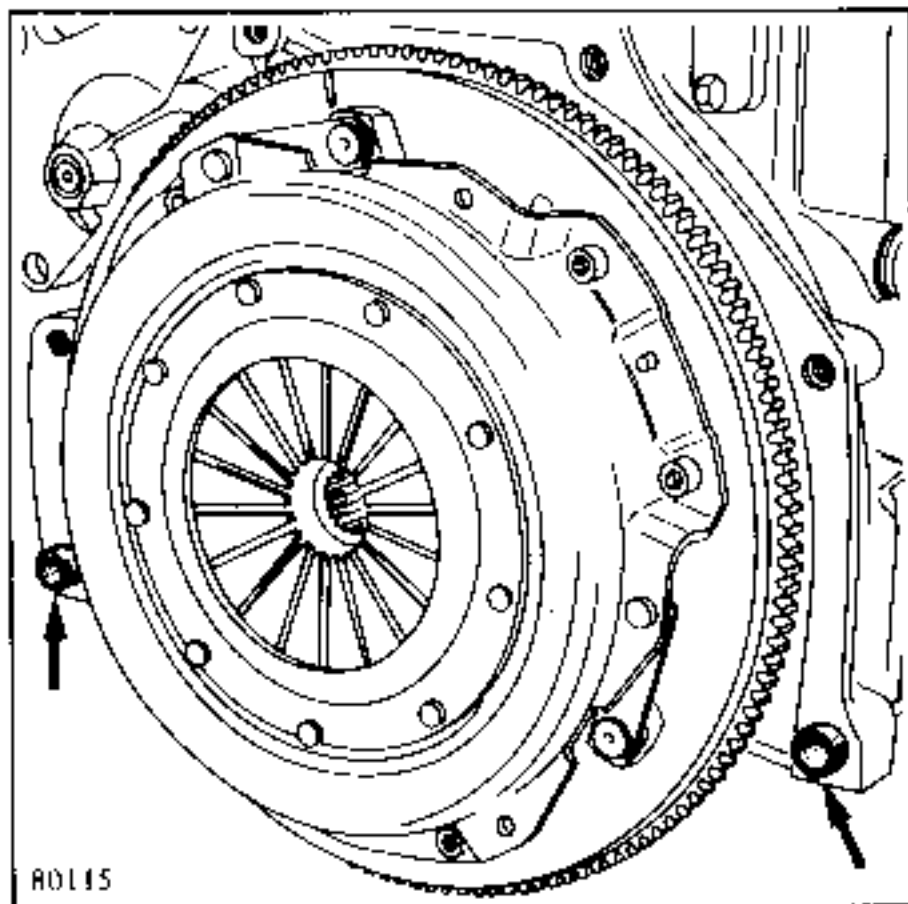


- the engine movement limiter mountings on the front crossmember.



REFITTING (special points)

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



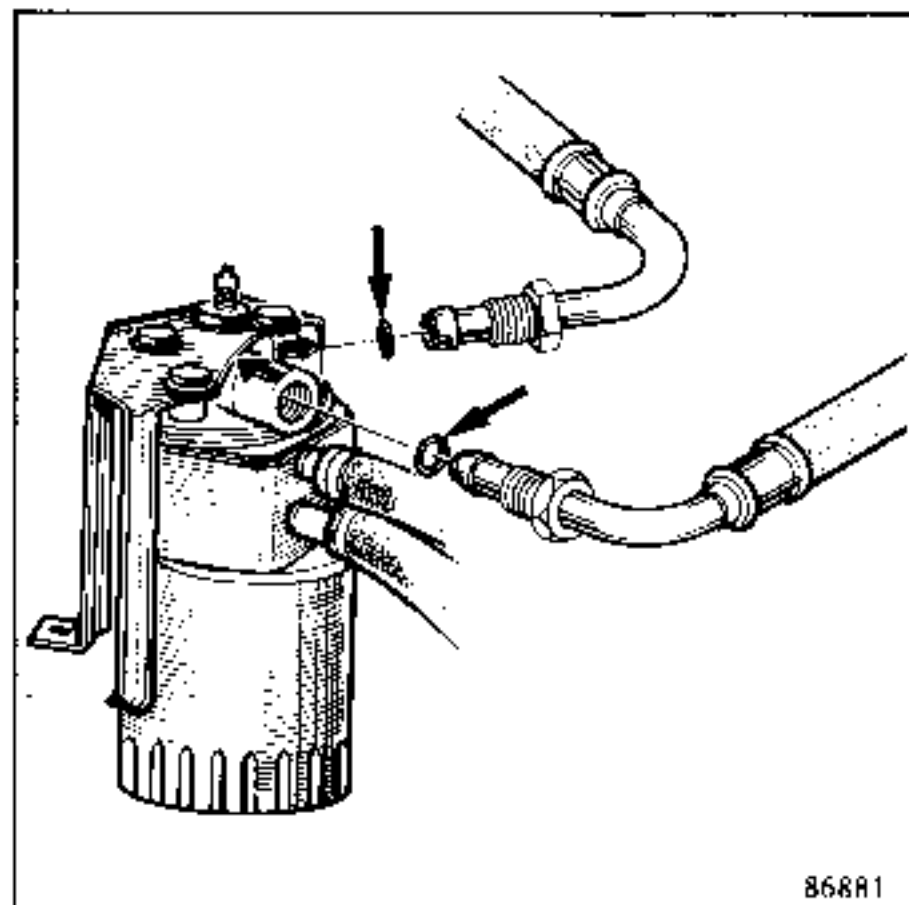
Lightly grease the clutch shaft splines with **MOLYKOTE BR2**.

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

Top up the engine oil.
Fill and bleed the cooling system.

Adjust the accelerator cable travel.

Replace the "O"-ring seals on the flexible oil pipes connecting the engine to the intercooler.



ESSENTIAL SPECIAL TOOLING

- Mot. 878 Engine lifting tool - modified Traffic type
- B. Vi. 31-01 Pin drift
- T. Av. 476 Ball joint extractor

TIGHTENING TORQUES (in daNm)



Wheel bolts	9
Steering ball joint bolts	4
Suspension ball joint bolts	7
Caster tie-rod nuts	7
Upper ball joint mounting bolts.	2.2

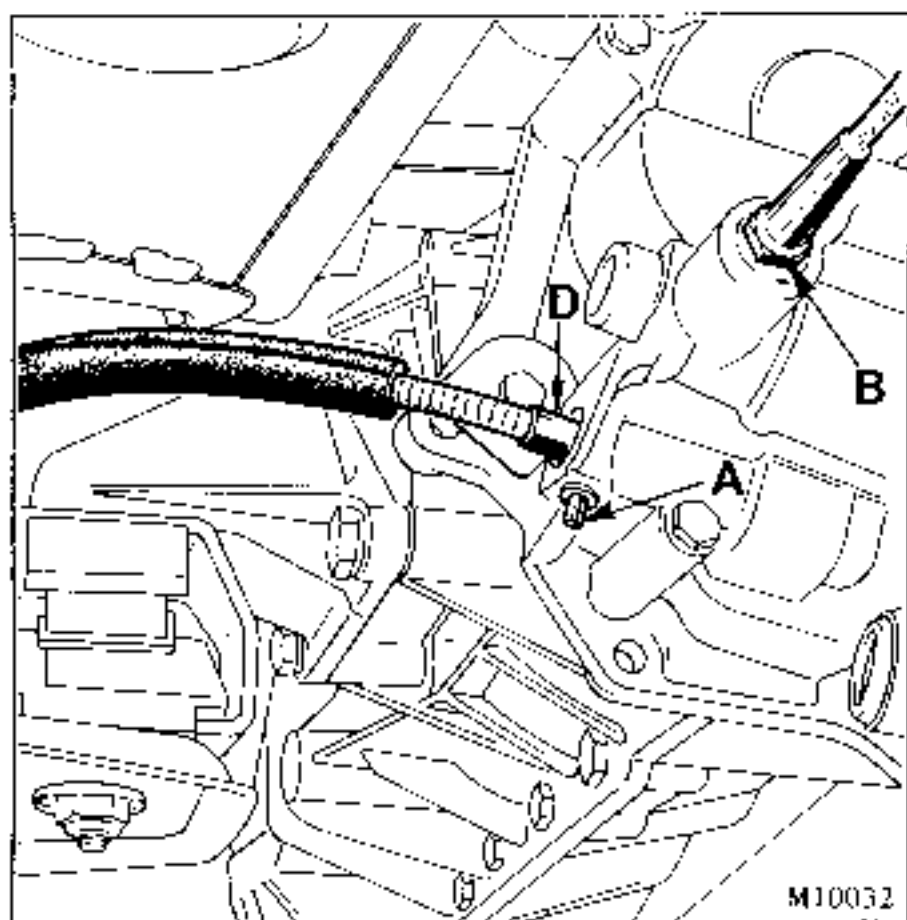
REMOVING-REFITTING

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).

Disconnect the reverse gear locking cable (B).



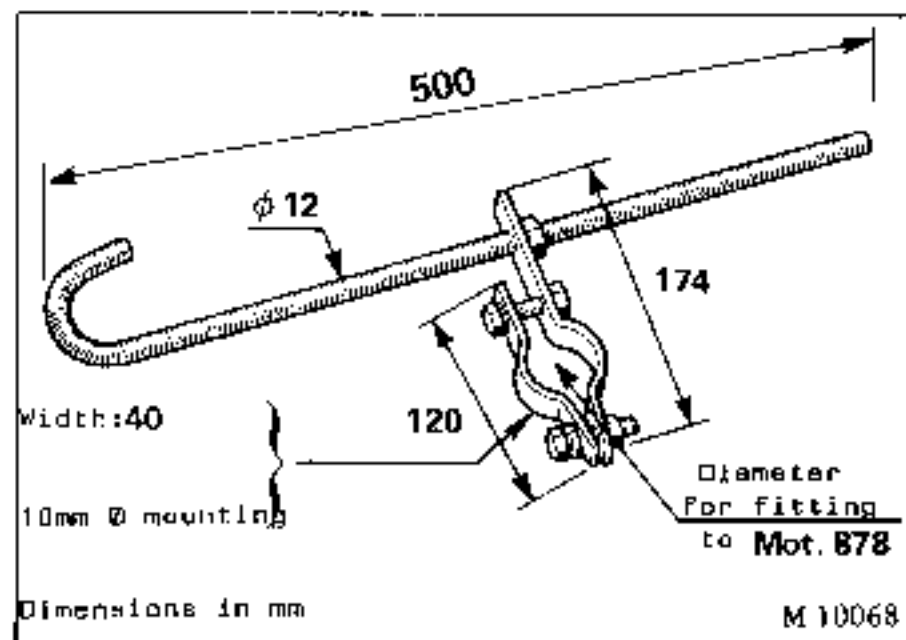
Loosen the gearbox mounting securing nuts.

Uncouple the driveshafts.

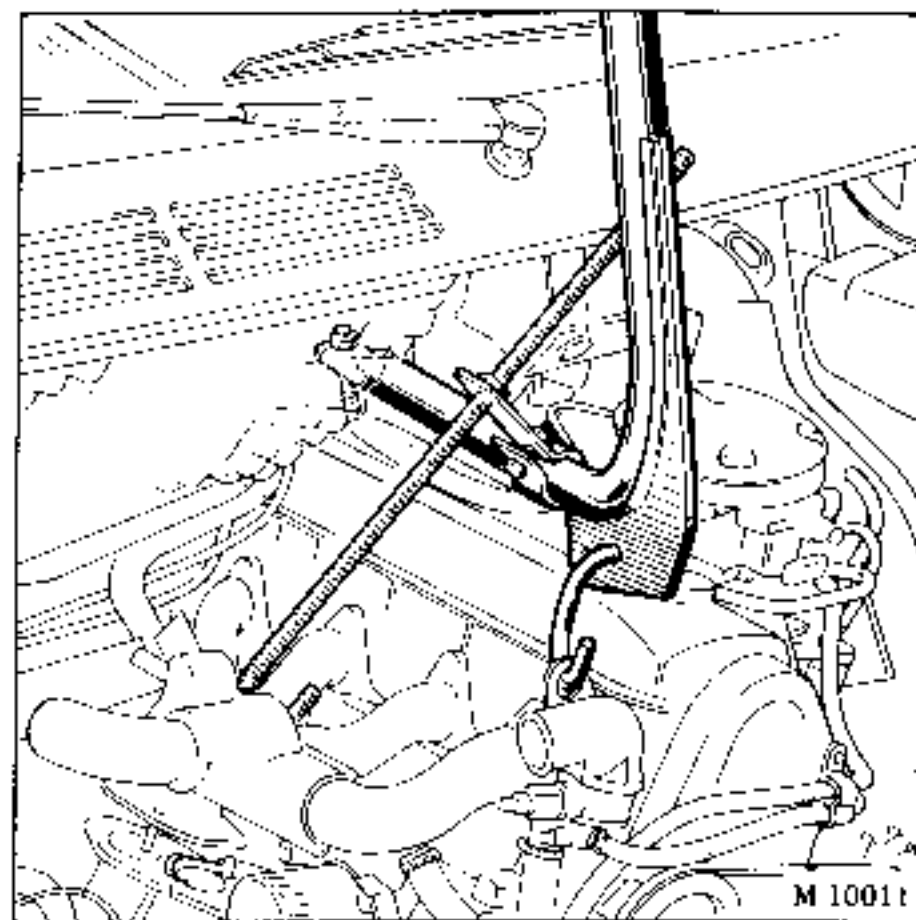
Remove the exhaust clamp and mounting.

When using tool Mot. 878 to remove the engine-gearbox assembly, a third support point must be made in order to keep the engine inclined at the correct angle.

Model to be made up and fitted to tool Mot. 878.



Fit the tool in place.



REMOVING-REFITTING (continued)

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

REFITTING

Proceed in the reverse order to removal.

Torque tighten the bolts and nuts.

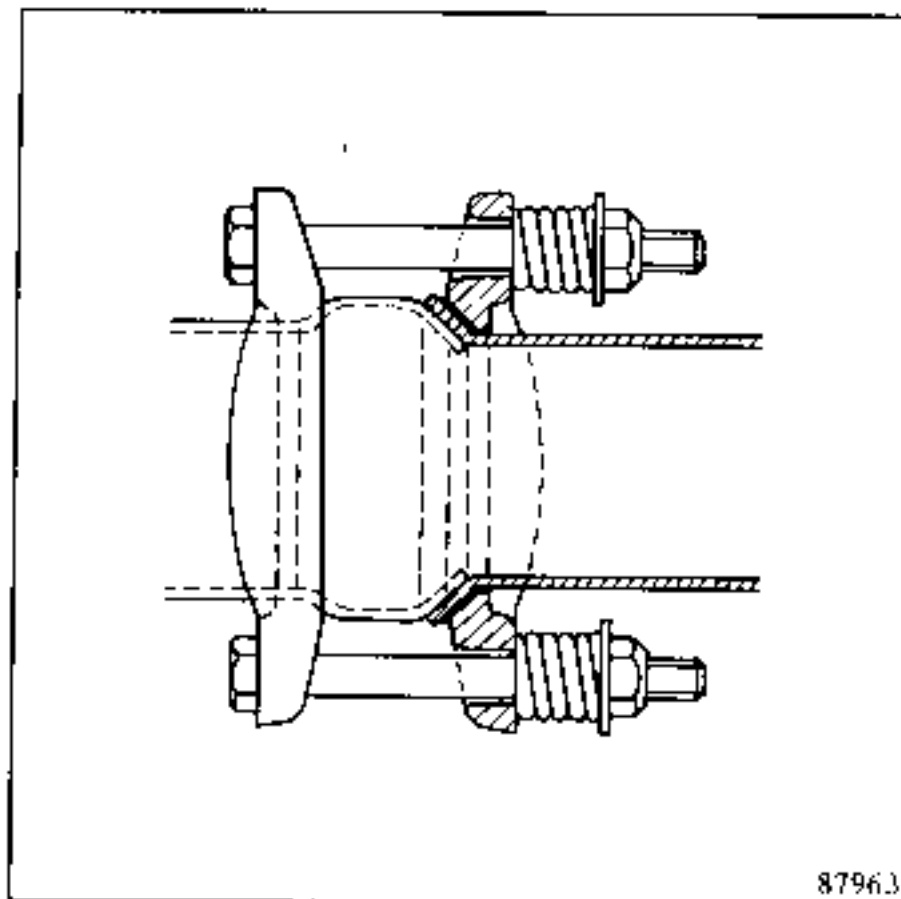


Top up the gearbox oil.
Plug the driveshaft roll pins.
Top up the engine oil if necessary.

Fill and bleed the cooling system.

Adjust the accelerator cable.

Tighten the clamp, fitting the springs and heat-meltable seal.



ESSENTIAL:

Replace the heat-meltable seal whenever it is removed and tighten the clamp so that the coils are touching (do not slacken).

ESSENTIAL SPECIAL TOOLS

Mot. 878 Lifting tool

REMOVAL

STEEL SUMP

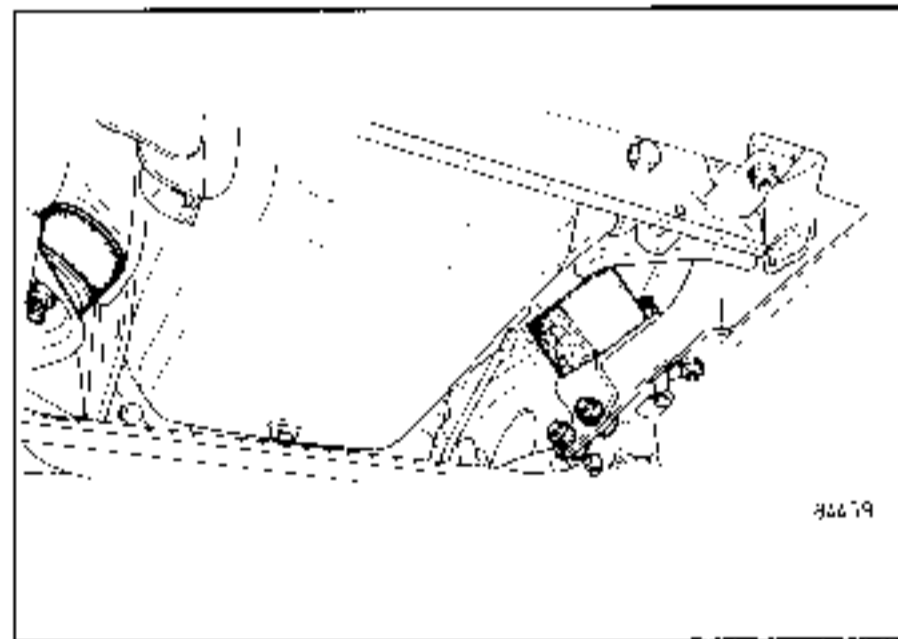
Drain the engine oil.

Remove the flywheel protection plate.

Remove:

- the bolts from around the sump;
- the bolts on the crossmember using an 11 mm ball joint wrench of the type with a universal joint claw **Facom 99-11**;
- the bolts on the rear bearing and with a split head, using a screwdriver.

Remove the engine mounting pad fixings.



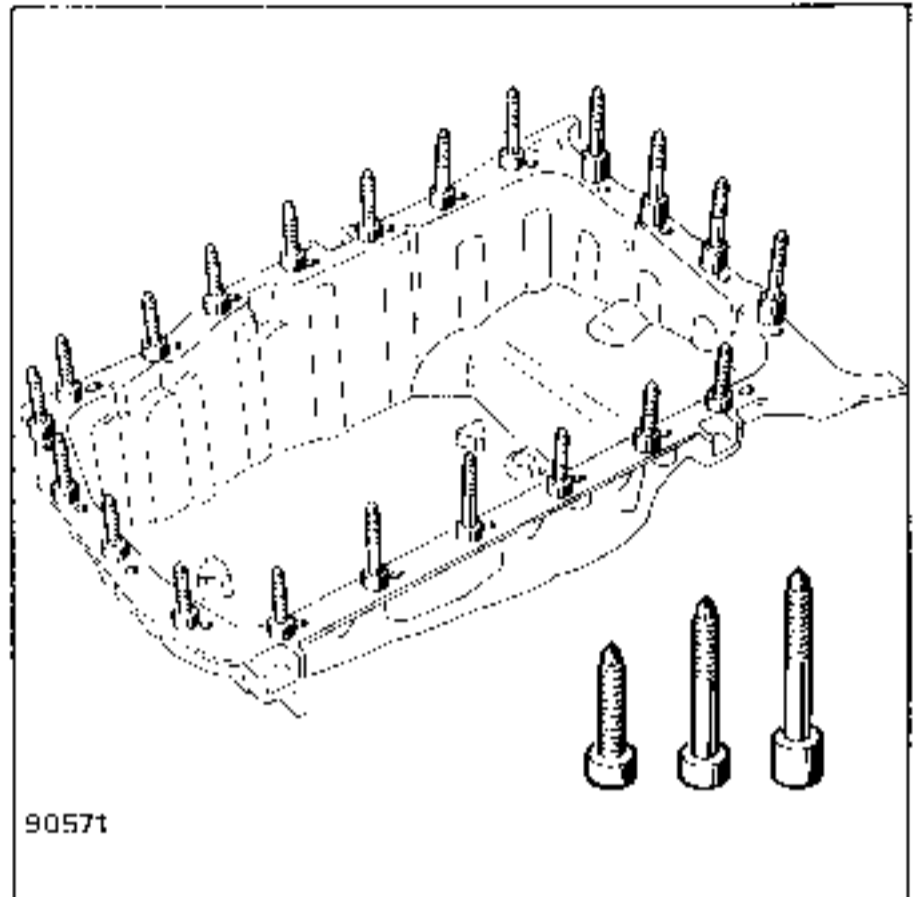
Raise the engine so that the sump can be removed.

ALUMINIUM SUMP (special points)

TIGHTENING TORQUES (in daNm)

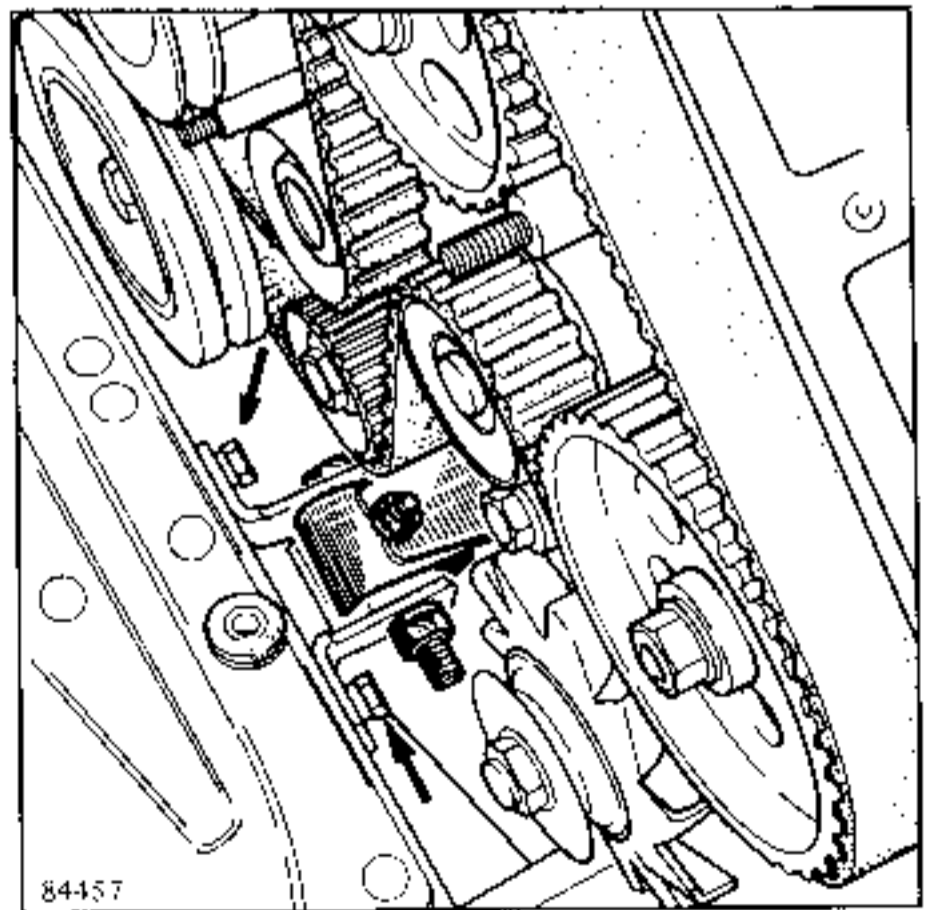
Sump bolts..... 1

Mark the bolts (three types marked **A**, **B** and **C**).



For DIESEL engines

Remove the engine movement limiter mountings from the front crossmember.



Special point concerning refitting

The seal is fitted dry.

Tighten the bolts holding the clutch casing and sump first.

Torque tighten the bolts to 1 daNm.

REPLACING

ESSENTIAL SPECIAL TOOLING

- Mot. 854 Locking tool
- Elé. 346-04 Belt checking tool

POWER STEERING PUMP DRIVE BELT

The following components have to be removed for the replacement of the power steering drive belt:

- the timing belt (see below);
- the belt protection plate.

TIMING BELT

J6R and J7R - J7T petrol engines
Consult Mot. J (E) for points other than those given below:

Remove:

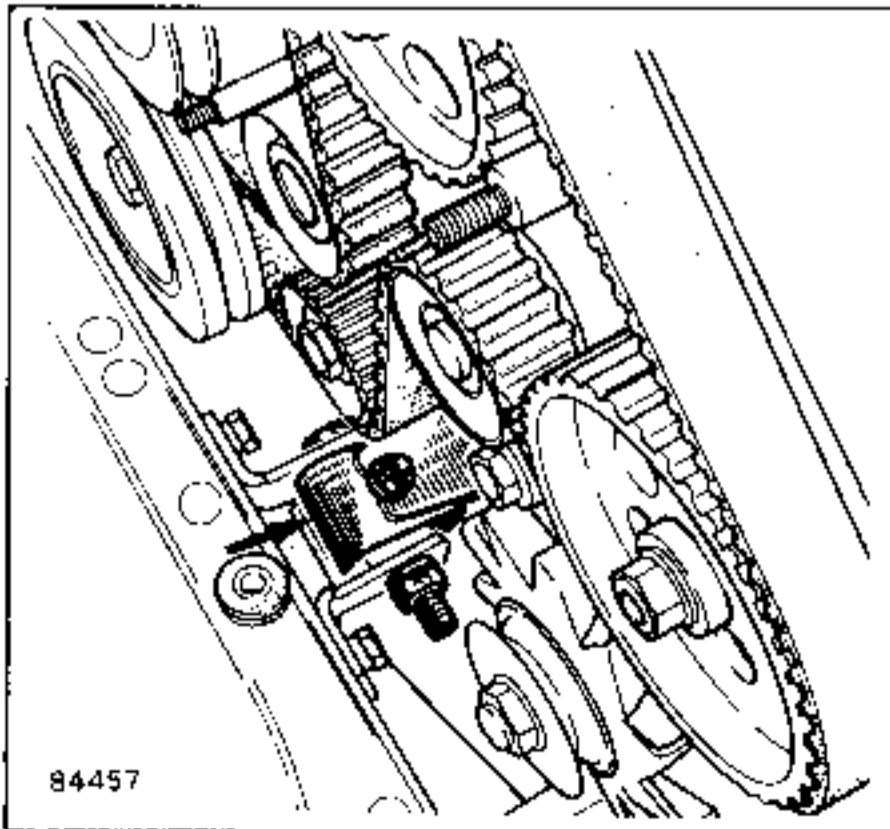
- front grille;
- upper crossmember;
- radiator;
- alternator drive belt.

Diesel engine

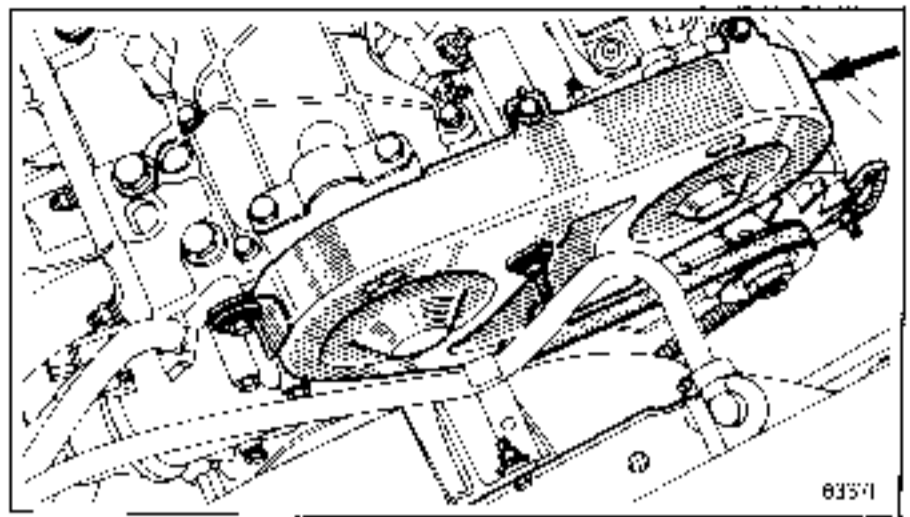
Consult Mot. J (D) for points other than those given below.

Remove:

- the engine movement limiter mountings;

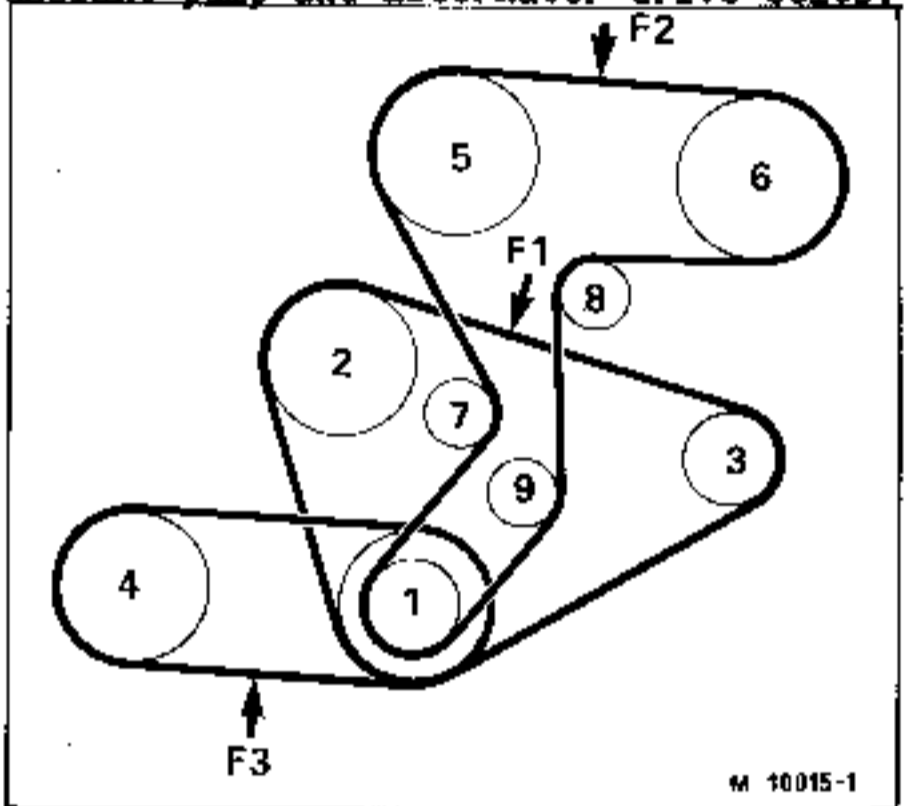


- the lower crossmember;
- the timing gear cover.



TENSION

Timing gear, injection, power steering, coolant pump and alternator drive belts.



Function	Alternator coolant pump	Power steering	Camshaft Injection pump
Belt type	V-shaped	V-shaped	flat toothed
Mark	F1	F3	F2
F cold (mm)	3.5 4.5	3.5	3 5
F hot (mm)	5.5 6.5	4 4.5	-
Only re-tension belt if F > than	-	5.0	-

- 1 Crankshaft
- 2 Coolant pump
- 3 Alternator
- 4 Power steering pump
- 5 Camshaft
- 6 Injection pump
- 7 Drive belt tensioner
- 8/9 Swivel lever

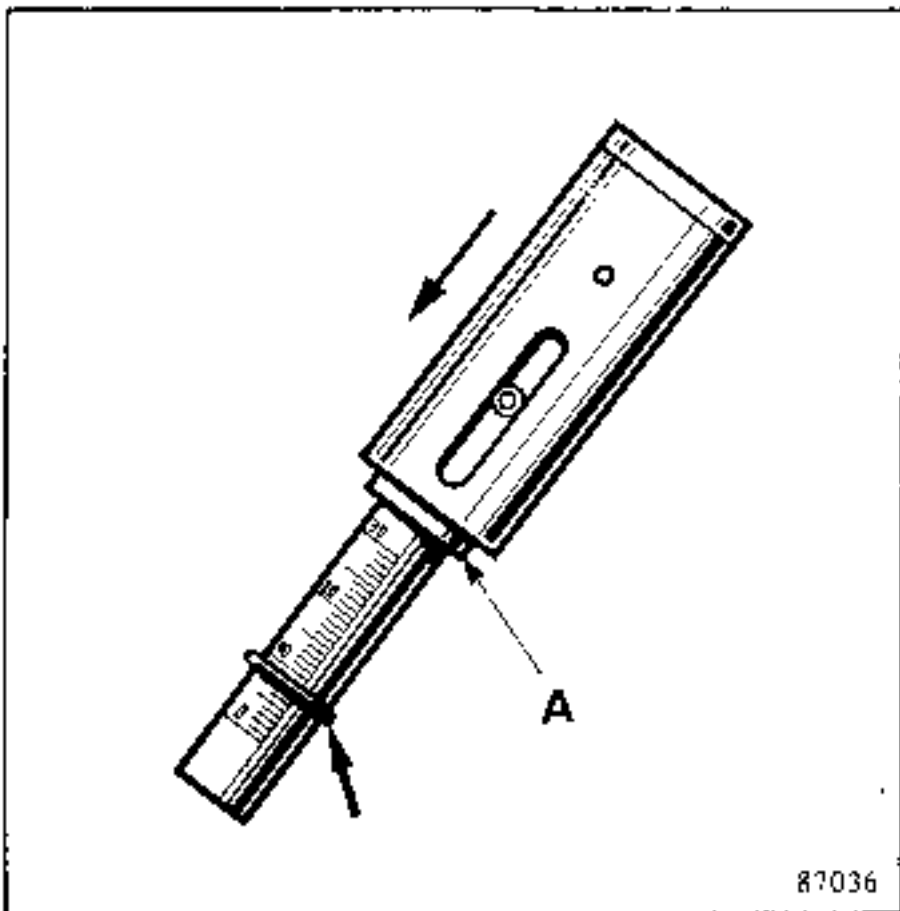
REPLACING

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



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

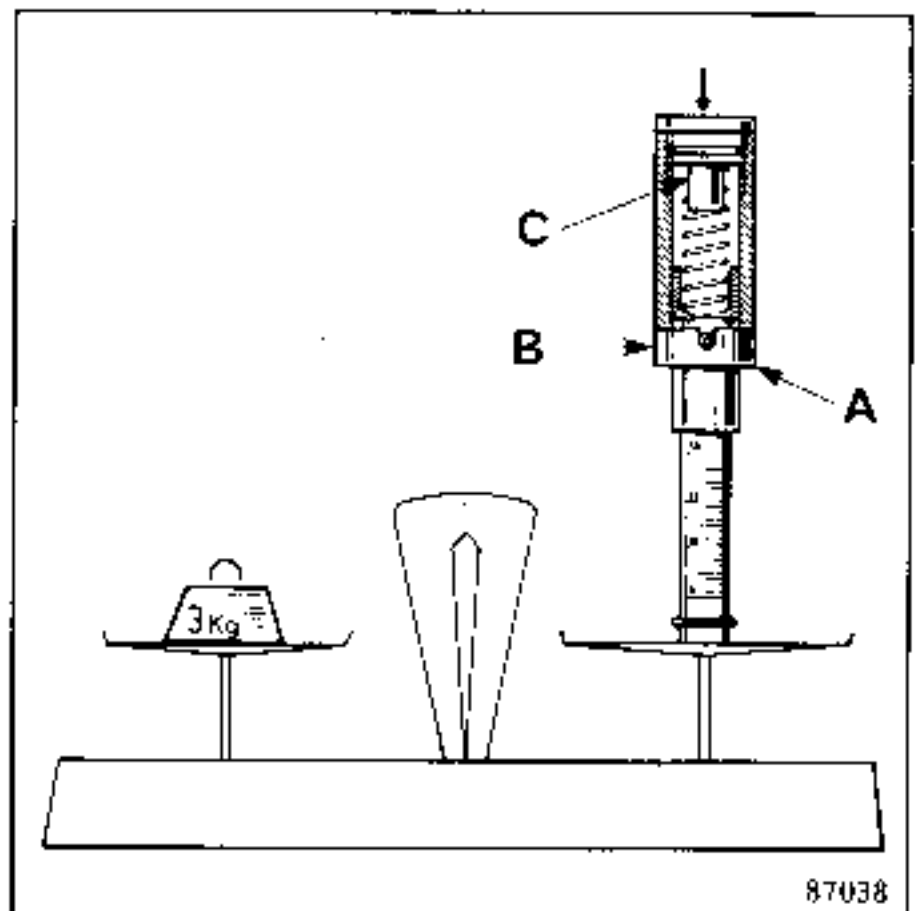
Apply the bar to the belt with the plunger half-way between the two pulley centres.

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.



Apply a load equivalent to a weight of 3 kg to the tool. The shoulder (A) must come flush with the end of the plunger body (B). If it does not, turn screw (C) to increase or reduce the spring tension.

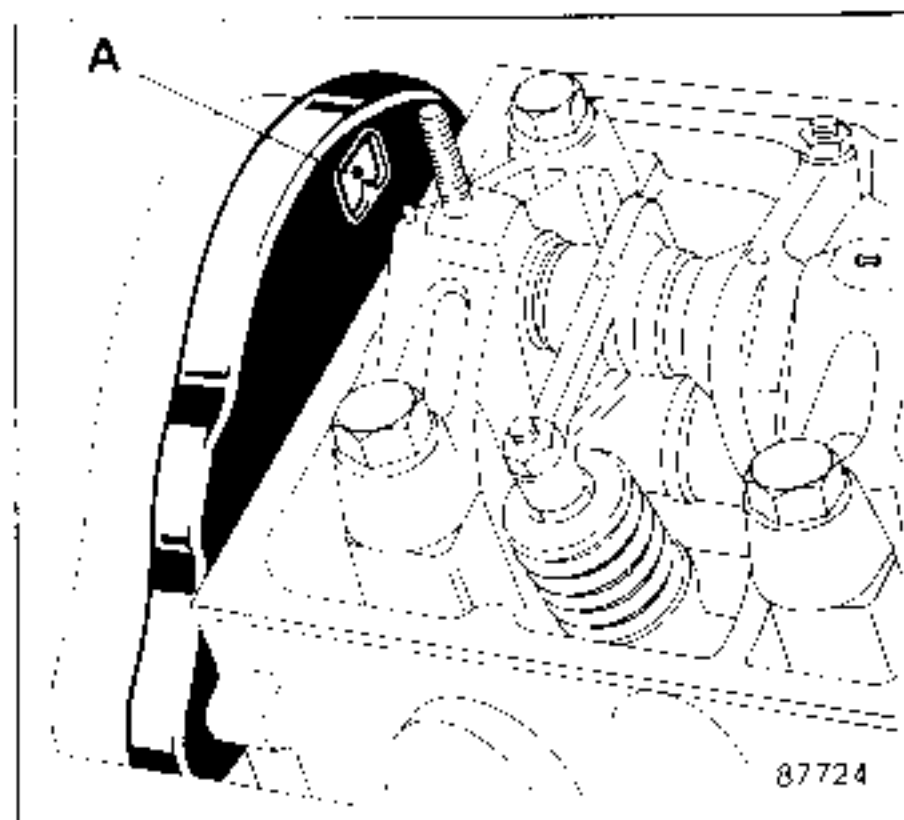
If the engine has markings (A), use the adjusting method and values for the J7T engine

ADJUSTING THE ROCKER ARM CLEARANCES

ESSENTIAL SPECIAL TOOLING	
Mot. 647	Rocker arm clearance adjusting tool

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

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



Exhaust valve to be opened fully



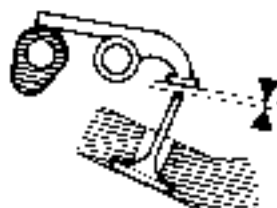
1

3

4

2

Inlet valve to be adjusted



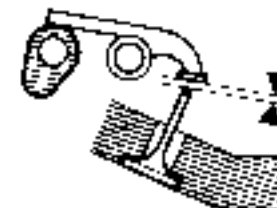
3

4

2

1

Exhaust valve to be adjusted



4

2

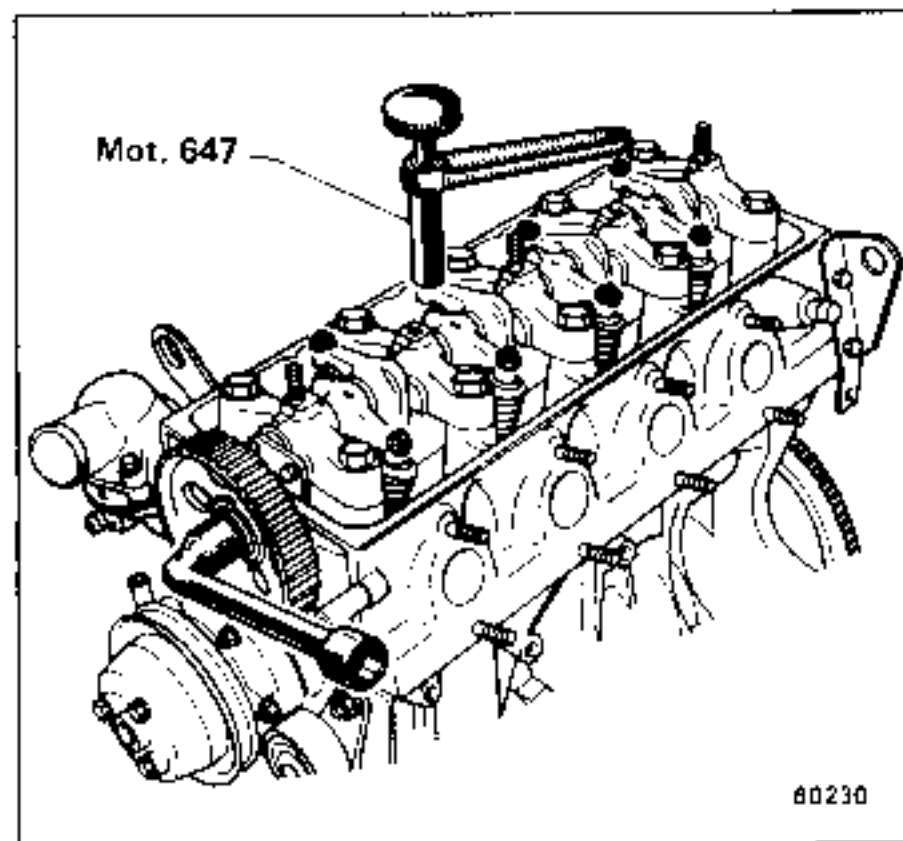
1

3

78 573

Clearance adjustment (mm) - cold:

- inlet	0,10
- exhaust	0,25



80230

ROCKER ARM CLEARANCE ADJUSTMENT

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

ESSENTIAL SPECIAL TOOLING

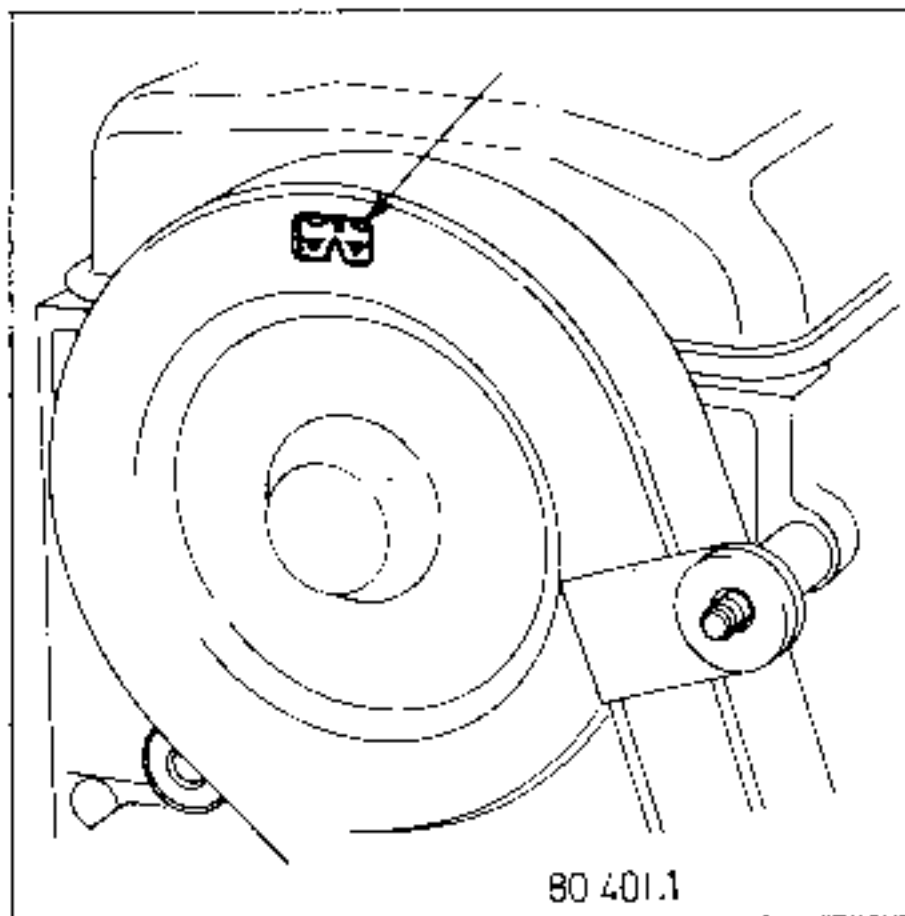
Mot. 647 Rocker arm clearance adjusting tool

Clearance adjustment (mm) - cold (approx. 20°C)

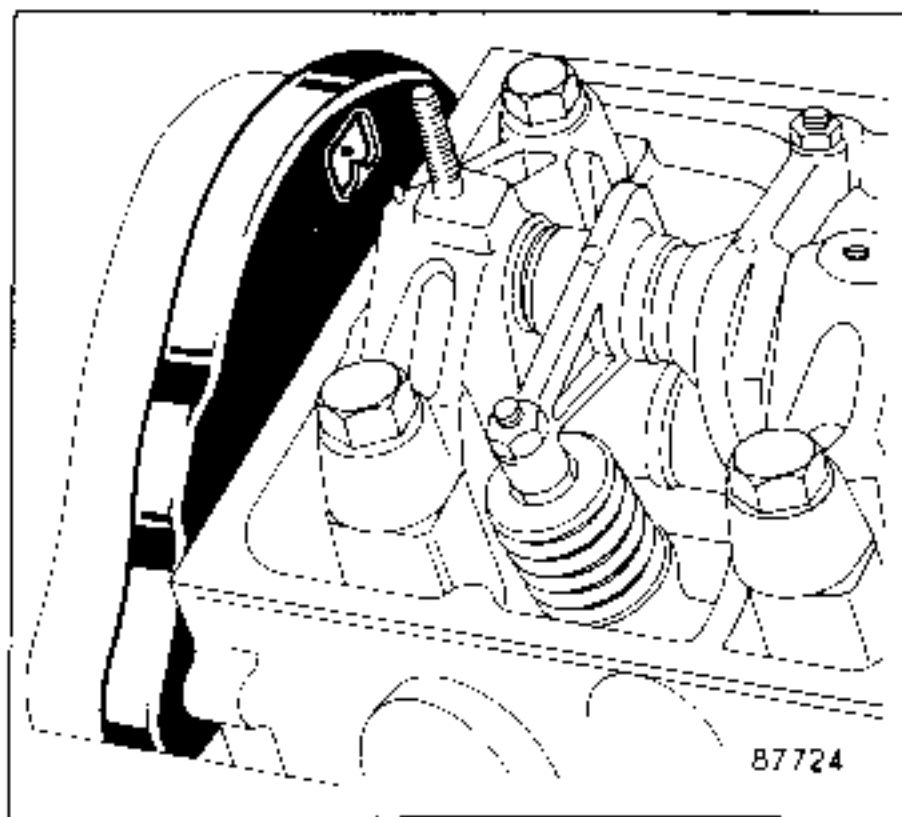
Inlet : **0.10 to 0.15.**

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 end) in a clockwise direction until the first mark on the camshaft toothed belt (at the cylinder head end) 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

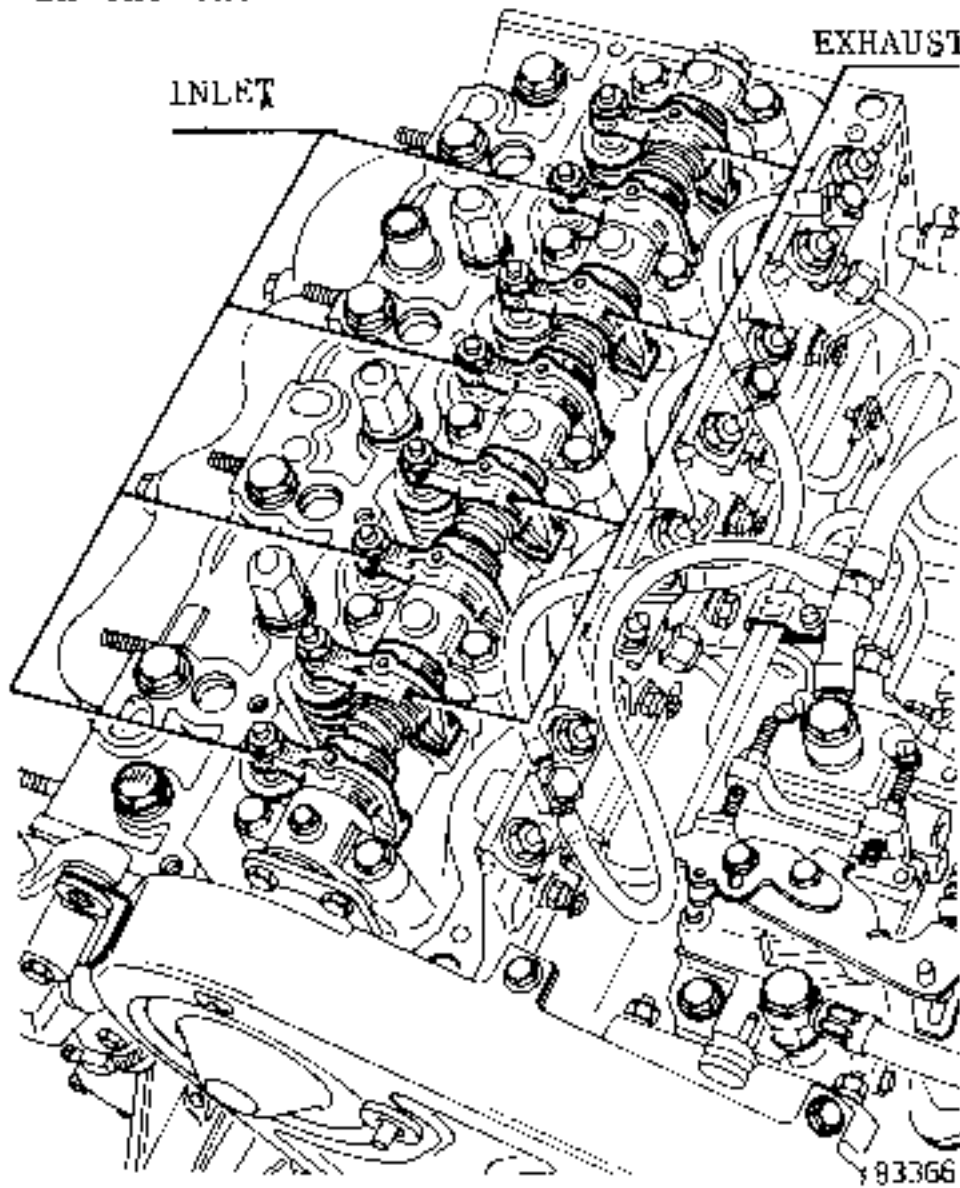
ROCKER ARM CLEARANCE ADJUSTMENT

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

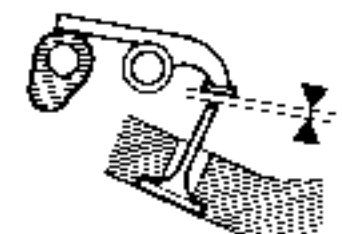
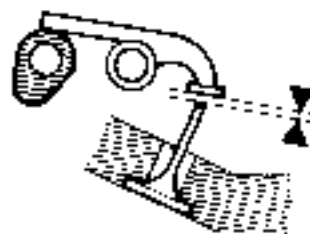
- inlet: 0.20
- exhaust: 0.25



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

COUNTRY WHERE VEHICLE MARKETED:							EUROPE		
Vehicle	Engine						Gearbox	Fuel feed	Mark
	Type	Suffix	Bore (mm)	Stroke (mm)	Cubic capacity (cc)	C/R			
J112 S112	J6R	C 234	88	82	1995	9.2	4 x 2	WEBER 32 DARA	40
Idling speed adjustment							Tamperproof cap	Fast idling	
Engine speed (rpm)		Richness (CO)		Conditions			Part number	Engine speed (rpm)	
800 ± 50		1.5 ± 0.5		After cooling fan has cut in			77 01 200 833		
Fuel grade:							Special point	Octane rating	
							Leaded	O.R. 96	
Anti-pollution system:									
EXHAUST							Conventional		

COUNTRY WHERE VEHICLE MARKETED:							SWITZERLAND - AUSTRIA		
Vehicle	Engine						Gearbox	Fuel feed	Mark
	Type	Suffix	Bore (mm)	Stroke (mm)	Cubic capacity (cc)	C/R			
J112	J6R	C 236	88	82	1995	8.6	Manual 4 x 2	WEBER 32 DARA	53
Idling speed adjustment							Tamperproof cap	Fast idling	
Engine speed (rpm)		Richness (CO)		Conditions			Part number	Engine speed (rpm)	
800 ± 50		1.5 ± 0.5		After cooling fan has cut in			77 01 200 833	1800 ± 100	
Fuel grade:							Special point	Octane rating	
							Leaded	O.R. 98	
Anti-pollution system:							Air intake on exhaust Exhaust gas recirculation		
EXHAUST							Conventional		

COUNTRY WHERE VEHICLE IS MARKETED						EUROPE			
Vehicle	Engine						Gearbox	Fuel feed	Mark
	Type	Suffix	Bore (mm)	Stroke (mm)	Cubic capacity (cc)	C/R			
J11205 J11208	J6R	D 734	88	82	1995	9.2	Manual 4 x 2	WEBER 28 x 36	.0
Idling speed adjustment							Tamperproof cap	Fast idling	
Engine speed rpm		Richness (CO)		Conditions:		Part number		Engine speed rpm	
700 ± 50		1.5 ± 0.5		After cooling fan has cut in		77 01 200 833			
Fuel grade:						Special point		Octane rating	
						Leaded		O.R. 98	
Anti-pollution system:									
EXHAUST						Conventional			

COUNTRY WHERE VEHICLE MARKETED							EUROPE			
Vehicle	Engine						Gearbox	Injection type	Ignition type	
	Type	Suffix	Bore (mm)	Stroke (mm)	Cubic capacity (cc)	C/R				
J11605 J11608	J7R	E 760	88	82	1995	10	Manual 4 x 2 or 4 x 4	Renix Multipoint	Ignition power module with pink- ing sensor	

ENGINE	Idling speed adjustment		Fuel	
	Engine speed rpm	Richness (CO)	Special point	Octane rating
J7R E 760	800 ± 25 (not adjustable)	1.5 ± 0.5	Leaded	O.R. 98

* When the coolant temperature is between 80 and 100°C.

Fuel feed	Multipoint injection
Fuel pump: between righthand cross-members, above fuel tank	Voltage : 12 Pressure : 3 Delivery : 130 l/h
Fuel filter: located near fuel pump	Replacement: every 30 000 miles (50 000 km)
Pressure regulator	Pressure: - at zero vacuum : 2.5 ± 0.2 bars - at 500 mbars : 2.0 ± 0.2 bars
Electromagnetic injectors	Computer-operated only Voltage : 12 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	Renix no.	Approval no.	R.N.U.R. number	Diagnostic code
J11605	S 100806.102	77 00 741 999	77 00 742 312	} 24.3 26.3
J11608	S 100806.102	77 00 741 999	77 00 742 312	

Coolant temperature sensor	Temperature °C	20 ± 1	80 ± 1	90 ± 1
	Resistance Ω	283 297	383 397	403 417
Air temperature sensor	Temperature °C	0 ± 1	20 ± 1	40 ± 1
	Resistance Ω	254 266	283 297	315 329

Oxygen sensor	
Exhaust	Conventional
Air filter with paper cartridge	Replace every: 12 000 miles (20 000 km)
E.G.R.	
Anti-evaporation system	
Ignition	Curves: integrated in computer Ignition power module Pinking sensor

Country in which vehicle marketed:							SWITZERLAND		
Vehicle	Engine						Gearbox	Injection type	Ignition type
	Type	Suffix	Bore (mm)	Stroke (mm)	Cubic capacity (cc)	C/R			
J11705 J11708	J7T	N 770	88	89	2165	9.2	Manual 4 x 2 or 4 x 4	Renix Multipoint + Mixture regulation	Ignition power module with pink- ing sensor

Engine	Idling speed adjustment		Fuel	
	Engine speed rpm	Richness (CO)	Special point	Octane rating
J7T N 770	775 to 825 (not adjustable)	0.5% maximum (not adjustable)	Unleaded	O.R. 92 min.

* If the coolant temperature is between 80 and 100°C.

Fuel feed type	Regulated multipoint injection
Fuel pump: located between righthand sidemembers, above fuel tank	Voltage : 12 volts Pressure : 3 bars Delivery : 130 litre/hour
Fuel filter: located near fuel pump	Replace: every 30 000 miles (50 000 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 ohms
Throttle casing No load/full load switch with three wires	SOLEX: Single barrel 50 mm Ø Mark: 863 A - Idling: throttle opening < 1° B - Part load: throttle opening > 1° C - Throttle opening > 70°
Idling speed regulating valve	Bosch, voltage: 12 volts

Computer	Renix no.	Approval no.	R.N.U.R. number	Diagnostic code
J11705	S 100807.101	77 00 734 613	77 00 736 393	30.3
J11708	S 100807.103	77 00 742 317	77 00 742 314	38.3

Coolant temperature sensor	Temperature °C	20 ± 1	80 ± 1	90 ± 1
	Resistance Ω	283 297	383 397	403 417
Air temperature sensor	Temperature °C	0 ± 1	20 ± 1	40 ± 1
	Resistance Ω	254 266	283 297	315 329

Oxygen sensor	Make: BOSCH At 800°C: - rich mixture: 625 to 1100 mV - lean mixture: 0 to 150 mV
Catalytic converter	Type: Three-purpose J11705: Mark CO1 J11708: Mark MATRA 22 587
Air filter with paper cartridge	Replace: every 12 000 miles (20 000 km)
E.G.R.	
Anti-evaporation system	With: depending on model Canister: G.M.
Ignition	Curves: integral with injection computer Ignition power module Pinking sensor

OPERATION OF THE INJECTION SYSTEM

I - THE FUEL SYSTEM

- Electric fuel pump
- Fuel pressure regulator
- Fuel filter

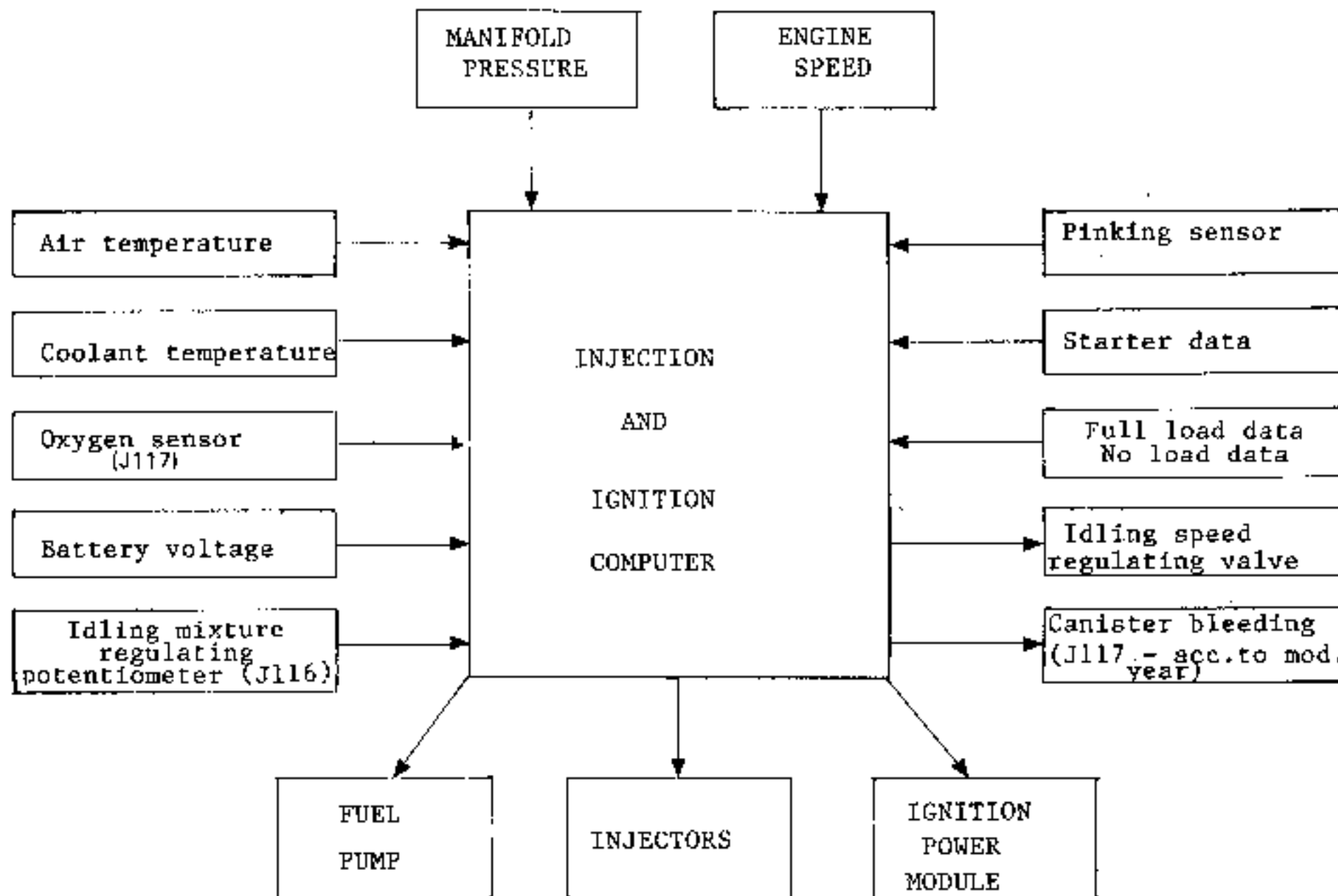
II - THE INJECTION COMPUTER AND ITS PERIPHERAL UNITS

- 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 (J117)
- Idling speed regulation valve
- Anti-evaporation bleeding (canister) by solenoid valve (J117 depending on model year)
- Idling mixture regulating potentiometer (J116)

III - THE POWER SUPPLY

- Ignition power module
- Electromagnetic sensors

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 passenger compartment, under the centre console.

BOSCH INJECTION EQUIPMENT

Vehicle	Assembly	Type	Engine
ESPACE TURBO	2	J 115 - S 115	J8S.240

Description	Make and type	Special points
Injection pump	BOSCH VE 4/9 F 2200 R 153 2	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 2	
Injectors	BOSCH KBE 48 S7	
Pintle and seat assemblies	BOSCH DN OSD 264 2	Setting $130 \pm \begin{matrix} 8 \\ -5 \end{matrix}$ bars
Fuel filter	BOSCH 2 ROTO DIESEL 2	Quick release filter element with integral water drain. With incorporated priming pump. NOTE: As from 1987 vehicles are equipped with a ROTO DIESEL filter with a diesel fuel heater which heats the fuel via the engine cooling system
Injector pipes		Outside Ø : 6 mm Inside Ø : 2 mm Length : 275 mm
Turbocharger	GARRETT T3	Boost pressure (T3) 0.6 ± 0.025 bars at 2 500 ± 250 rpm

SETTINGS

Idling	750 + 50 rpm
Max. speed	4700 - 4800 rpm
Smoke density	
Approved figure	1.6 ^{m-1} : 48 %
Max. legal	2 ^{m-1} : 55 %

TIMING TEST (on diagnostic bay)

Injection pump	Idling speed rpm	Injection commences before TDC
BOSCH VE R153	750 + 0 - 50	13.5 ± 1°

METHOD OF REGULATING THE IDLING SPEED

This regulation must be performed with a great degree of precision so that a stable CO percentage is obtained between two services. We remind you that the CO must be adjusted under the following precise conditions:

- 1) The vehicle must be run in; it must have reached a mileage of at least 600 miles (1000 km) (if the adjustment is carried out on a vehicle that has not been run-in it can alter very quickly).
- 2) The choke must not be operating (check this).
- 3) The engine must be at its normal operating temperature. To obtain this, run it at approximately 2000 rpm until the thermostat open. Do not warm it up at idling speed because the CO readings on an engine that has run for a few minutes at idling speed are not valid.
- 4) The idling speed must be that specified by the manufacturer (see chart).
- 5) The air filter must be in position and the element clean.
- 6) The ignition system must be in good condition and correctly adjusted.
- 7) There should be no additional air leakage into any part of the system (vacuum pipes, anti-pollution system, etc.).
- 8) There should be no extensive leakage on the exhaust system. It must be leaktight.
- 9) None of the heavy electrical consumption units (cooling fan, headlights, heated rear screen, etc.) must be operating.

Adjusting the idling speed using the exhaust gas analyser

In the countries where the tamperproof cap is fitted to mixture screw (B), remove it.

Turn screw (A) to obtain the average idling speed as indicated in the table for the vehicle in question.

Turn screw (B) to obtain the correct CO percentage given in the chart.

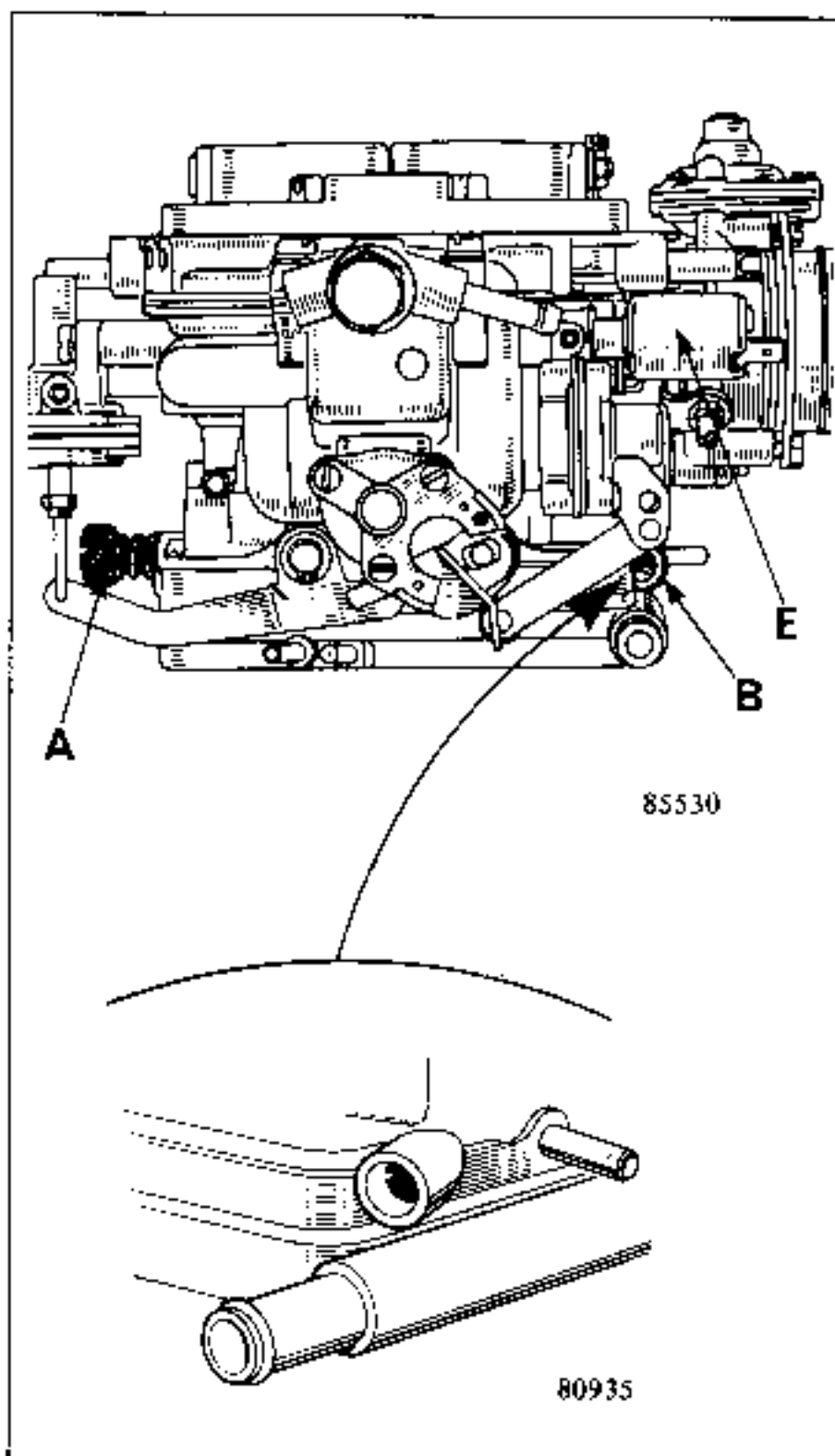
Turn screw (A) to obtain the correct idling speed.

Repeat these last two operations so that a correct CO percentage and idling speed are obtained.

Fit a tamperproof cap on screw (B) when the adjustment has been made, on countries where this is a legal requirement.

Tamperproof cap

CARBURETTOR	Tamperproof cap part no.
WEBER : - 32 DARA - 28x36 DARA	77 01 200 833



SOLEX THROTTLE CASING

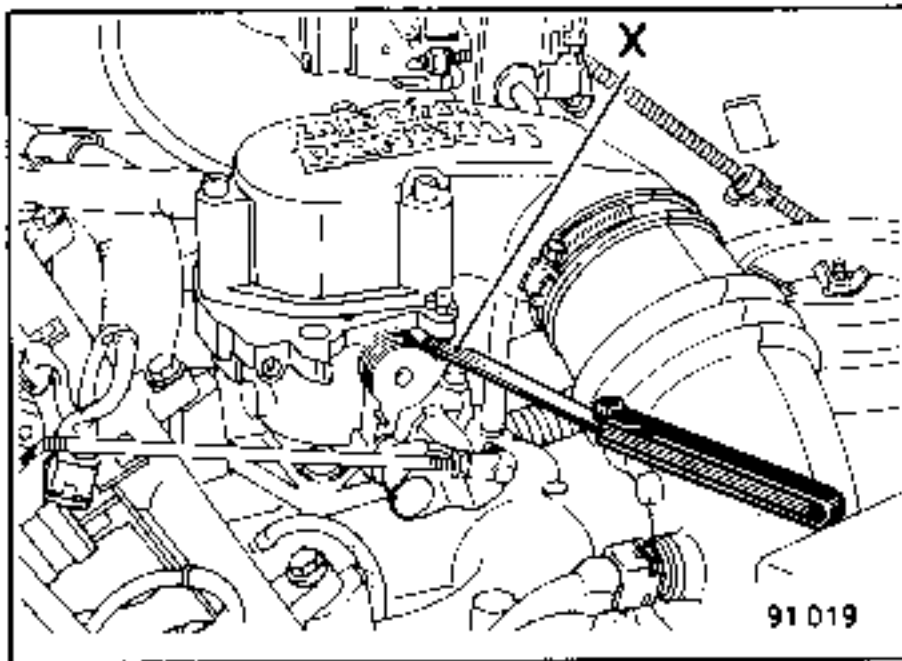
Adjusting the No load/Full load switch

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 B	B 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 cassette no. 5 or the next one (engine hot and idling), with the CO correctly adjusted (J116).

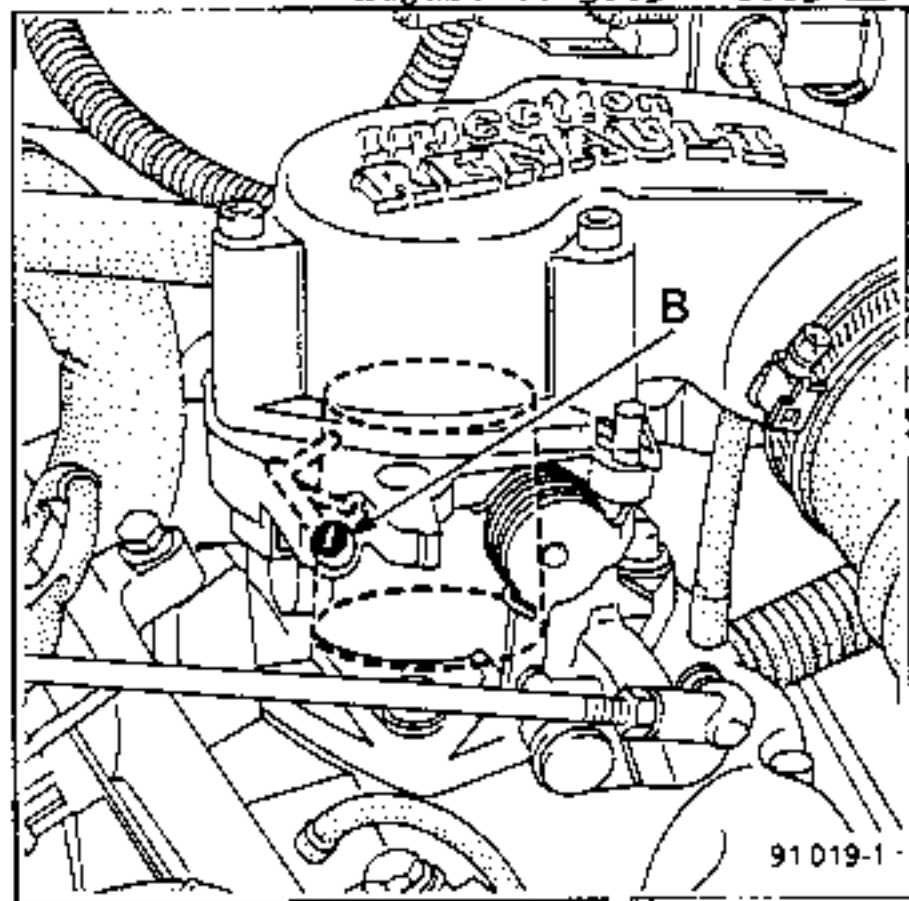
Enter D 03# 12 and read off the value on the centre display.

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: Min. value: 2.8 ms
Adjust to 3.05 ± 0.05 ms



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

Maintenance:

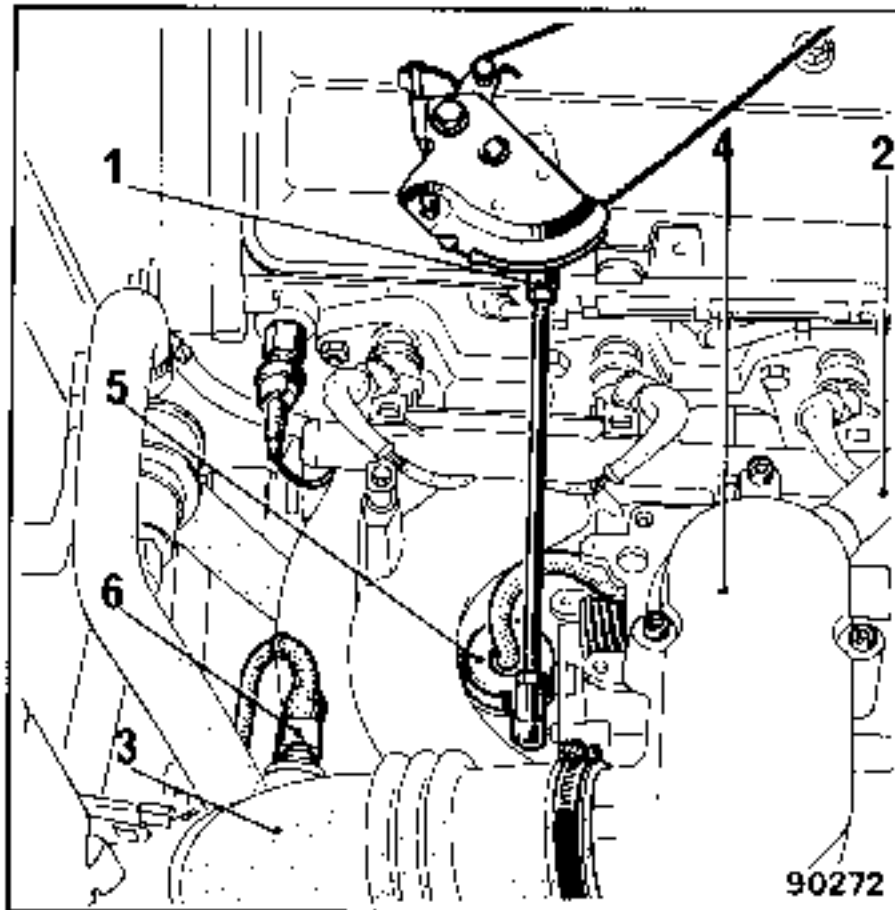
On vehicles so equipped, adjust the bypass, if necessary, whenever the engine is tuned.

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

REMOVAL

Disconnect :

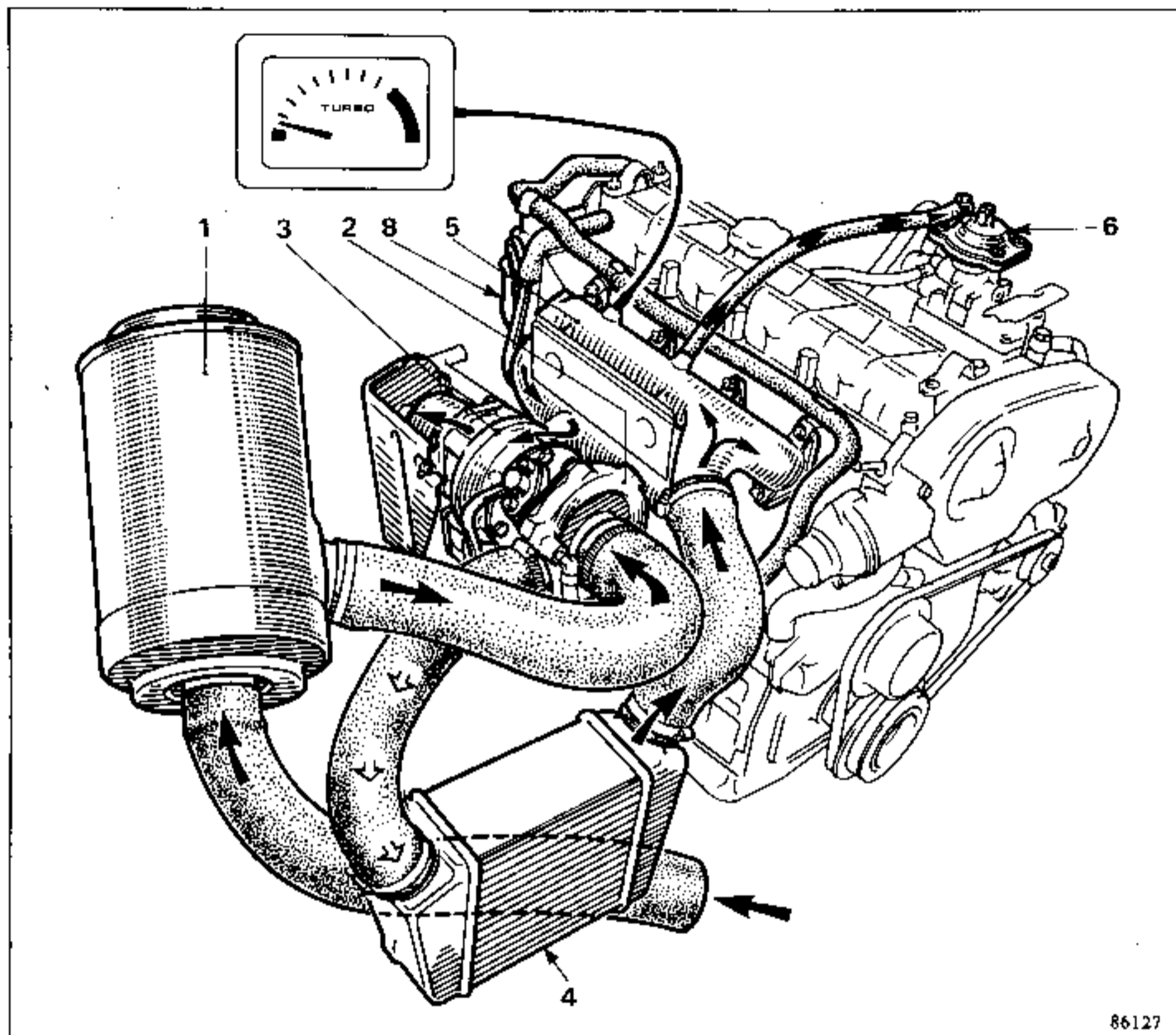
- throttle control (1);
- rebreathing hose (2);
- air inlet hose (3);
- cover (4) held by three screws;
- the throttle casing itself.



REFITTING




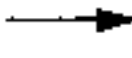
Fit a new seal.

DIAGRAM SHOWING CIRCULATION OF THE GASES



86127

- 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

-  Air at atmospheric pressure
-  Compressed inlet air
-  Cooled compressed inlet air
-  Exhaust gas

NOTE

The oil vapours from the cylinder block are separated in unit (8) which is connected, on the one hand, to the sump and, on the other, to the inlet duct in front of the turbocharger.

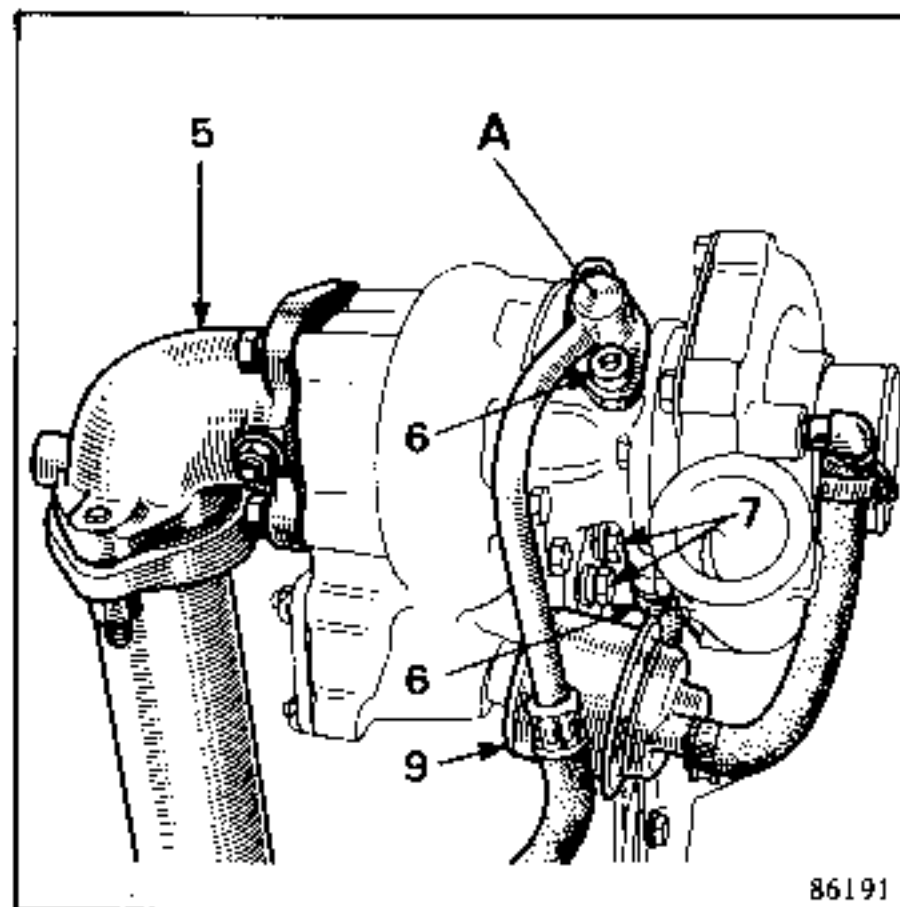
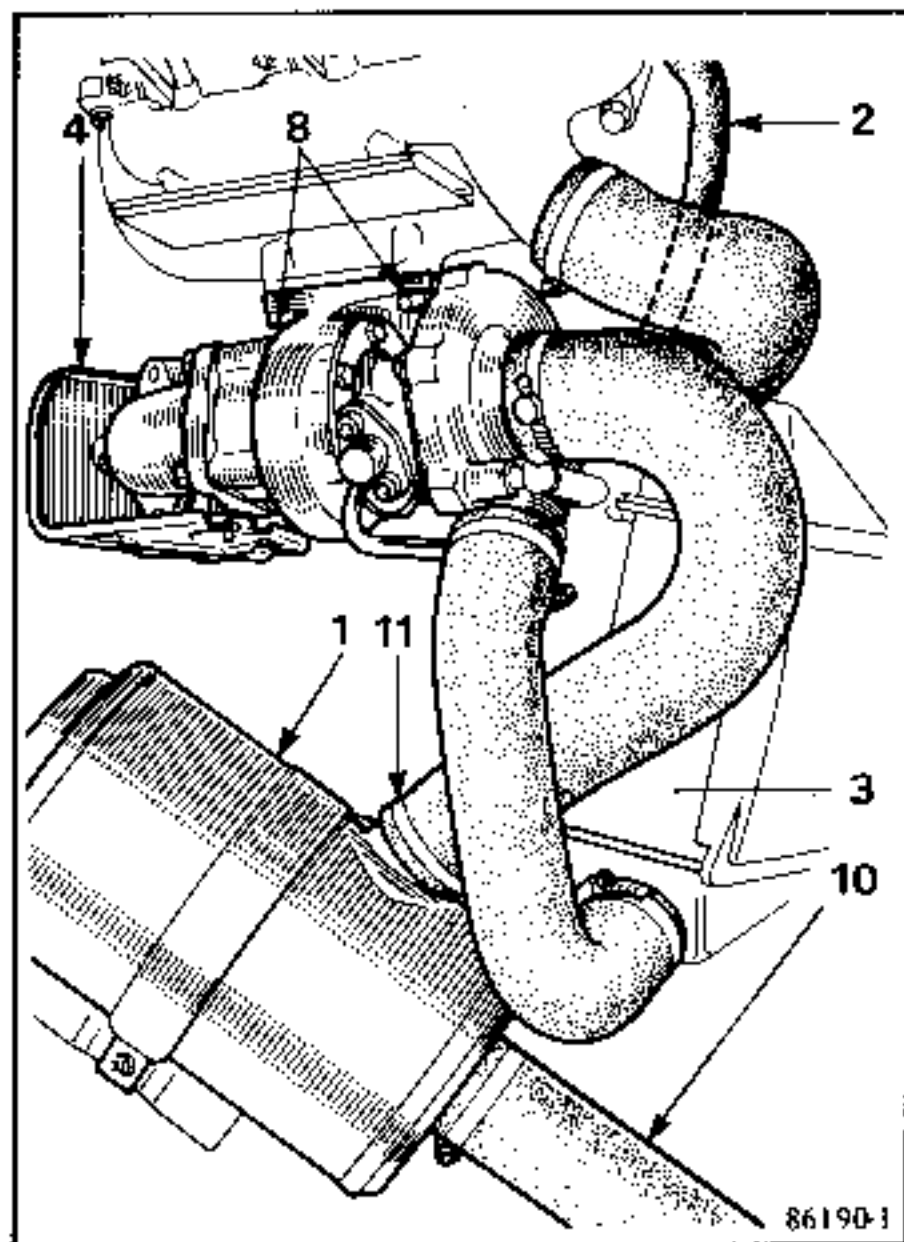
REMOVING - REFITTING

As the load pressure regulator (9) is set in the factory it cannot be replaced or adjusted. If it is faulty the entire turbocharger must be replaced.

REMOVAL

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

- the air-to-air intercooler (3) inlet 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 (9). Even slight damage risks jamming the wastegate.

REFITTING

Thoroughly clean the joint faces of the exhaust manifold and turbocharger. Replace the self-locking nuts holding the turbocharger on the exhaust manifold by new nuts as specified in the Service 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 the engine at idling speed to allow the oil circuit to re-establish.

Checking the boost pressure

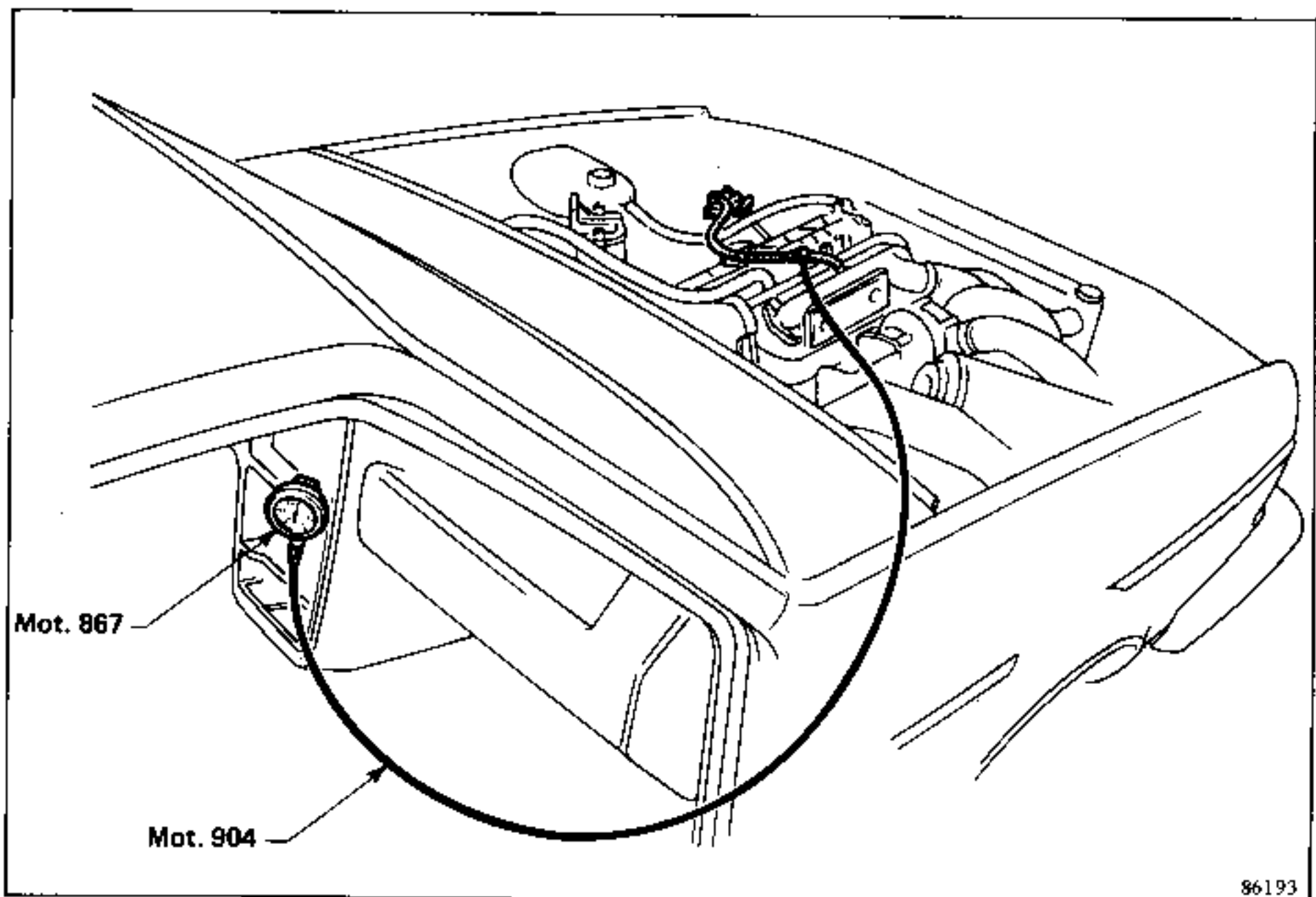
Connect connection hoses **Mot. 904** to the hose connecting the inlet manifold to the injection pump LDA governor and connect the pressure gauge from **Mot. 867** at the other end.

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 maximum boost pressure when the engine speed is

2500 ± 250 rpm

- max. pressure = 0.600 ± 0.025 bars



**PRECAUTIONS TO BE TAKEN WHEN STARTING UP THE
TURBOCHARGER**

After performing an operation on the engine which has required the connection 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.

ESSENTIAL SPECIAL TOOLING

Mot. 213-01	Test pressure gauge
Mot. 453-01	Flexible hose clamp

CHECKING METHOD

Before disconnecting the hose connecting the fuel pump to the carburettor, let the engine idle so as to be sure that the carburettor float chamber is filled to its maximum level.

Stop the engine.

Disconnect the pump outlet hose.

Connect test pressure gauge Mot. 213-01.

Clamp the return-to-tank hose with clamps Mot. 453-01.

The hose must be:

- transparent
- as short as possible.

With the pressure gauge held as high as possible (so that the hoses are practically vertical), start the engine and let it idle.

When the fuel level has stabilised in the hoses, lower them until the fuel is level with the pump diaphragm.

Read off the value of the static pressure.

Static pressure, pump not delivering:

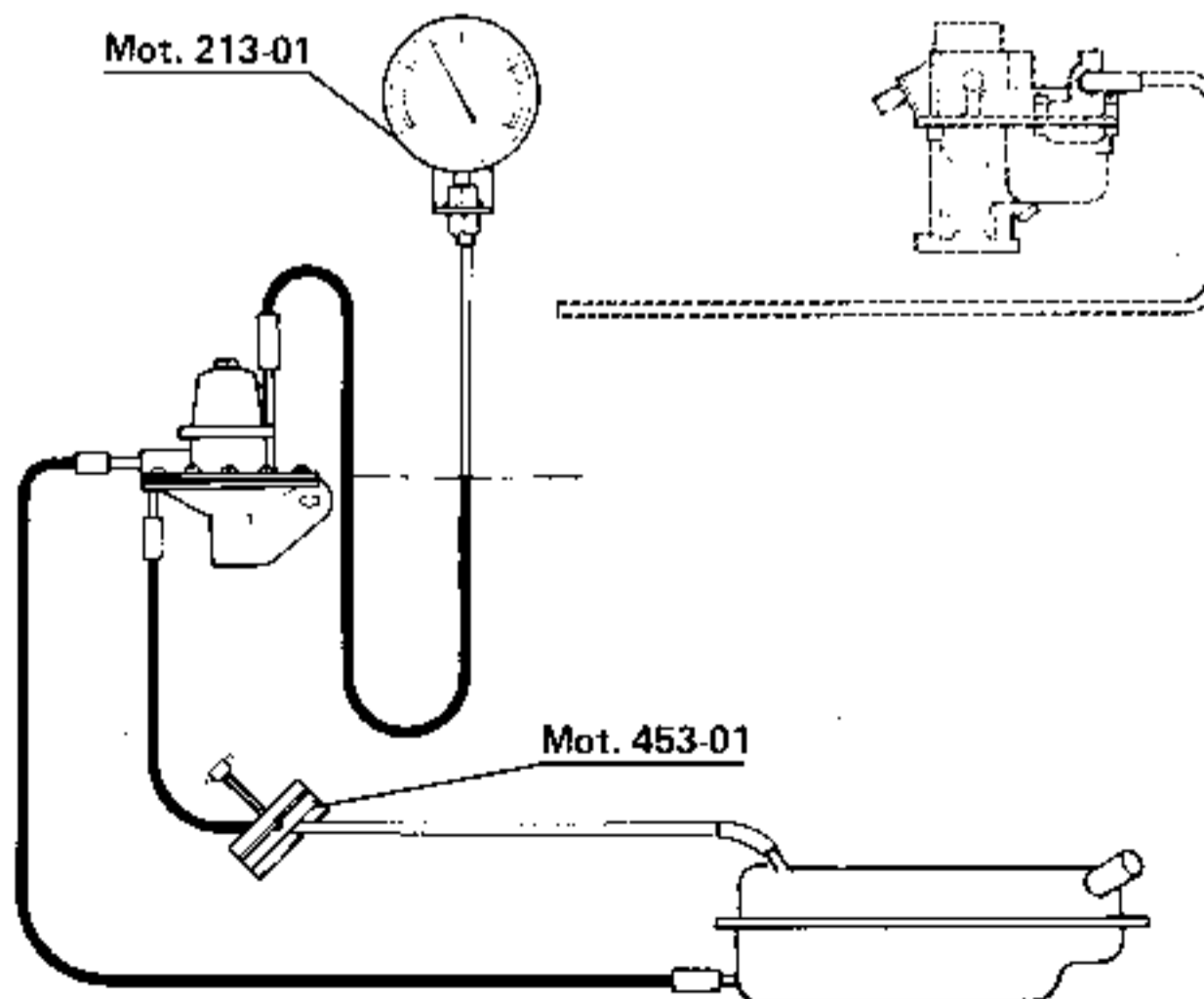
- min.: 0.280 mbars
- max.: 0.330 mbars.

PRECAUTIONS

The pressure gauge must never be connected in parallel.

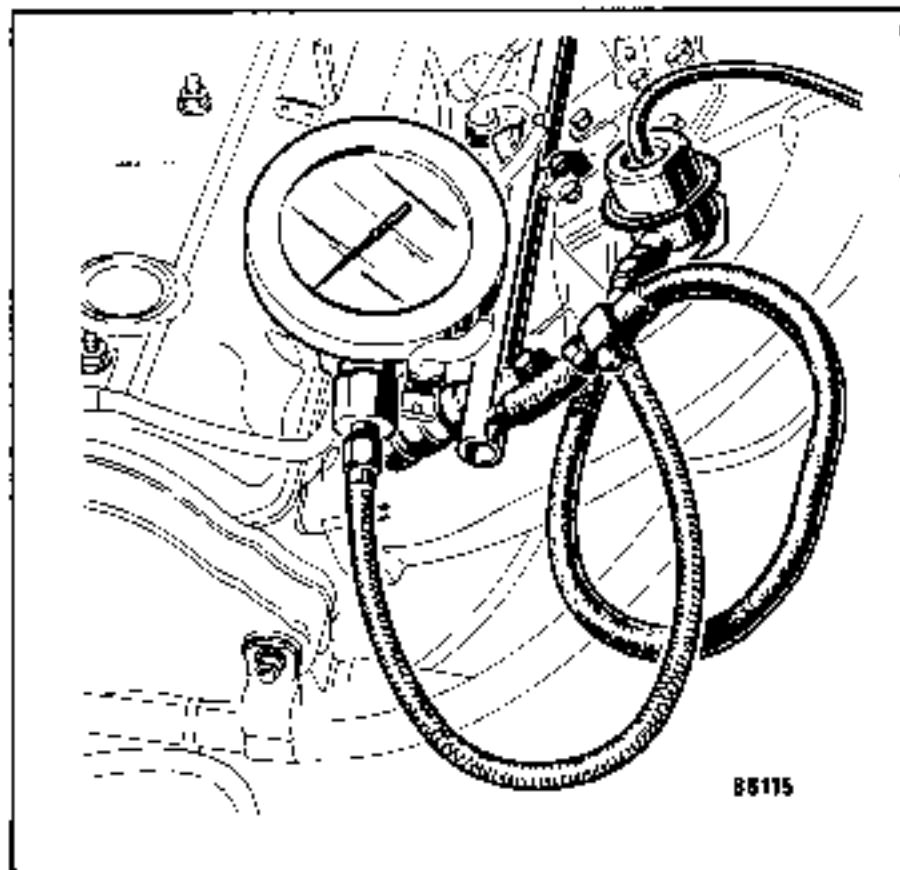
Checking the return-to-tank

Check that the circuit is not blocked by releasing clamp Mot. 453-01, which should make the pressure drop by 0.01 to 0.02 bars.



Checking the fuel pressure

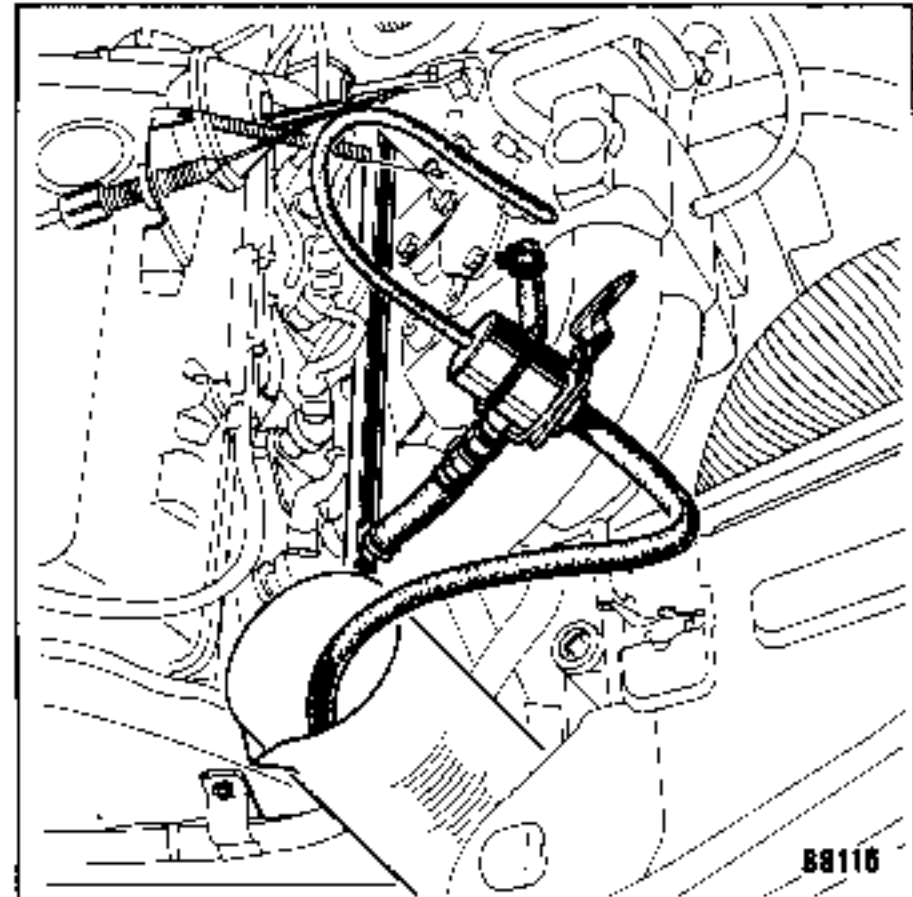
- Disconnect the flexible hose between the pressure regulator and the injector gallery.
- Connect a 0-6 bar pressure gauge.
- Disconnect the pressure regulator vacuum flexible hose and connect it to a vacuum pump.
- Start the engine.
- Check the pressure and note it:
J7T engine: 2.5 ± 0.2 bars
J7R engine: 2.5 ± 0.2 bars
- 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:

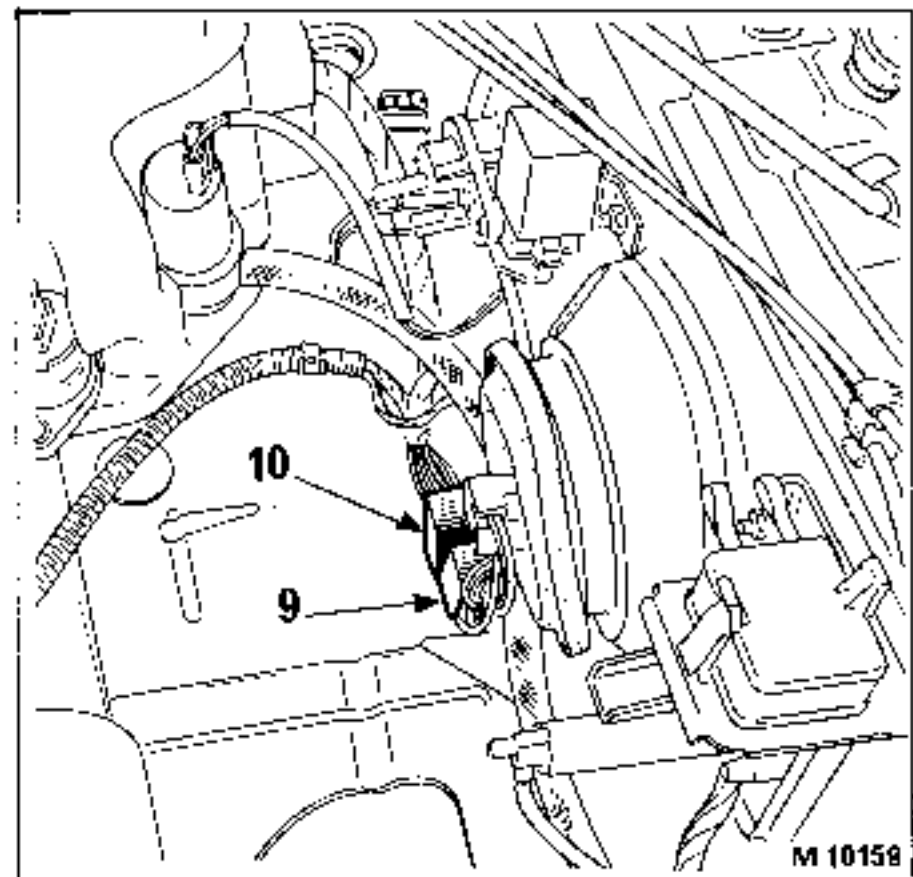
- on the connector of fuel pump relay 493 shunt terminals 3 and 5 (large wires), with the computer disconnected. (Relays located under the lefthand headlight).



Minimum delivery: 130 litres/hour or 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.



9 - Fuel pump relay

10 - Injection relay

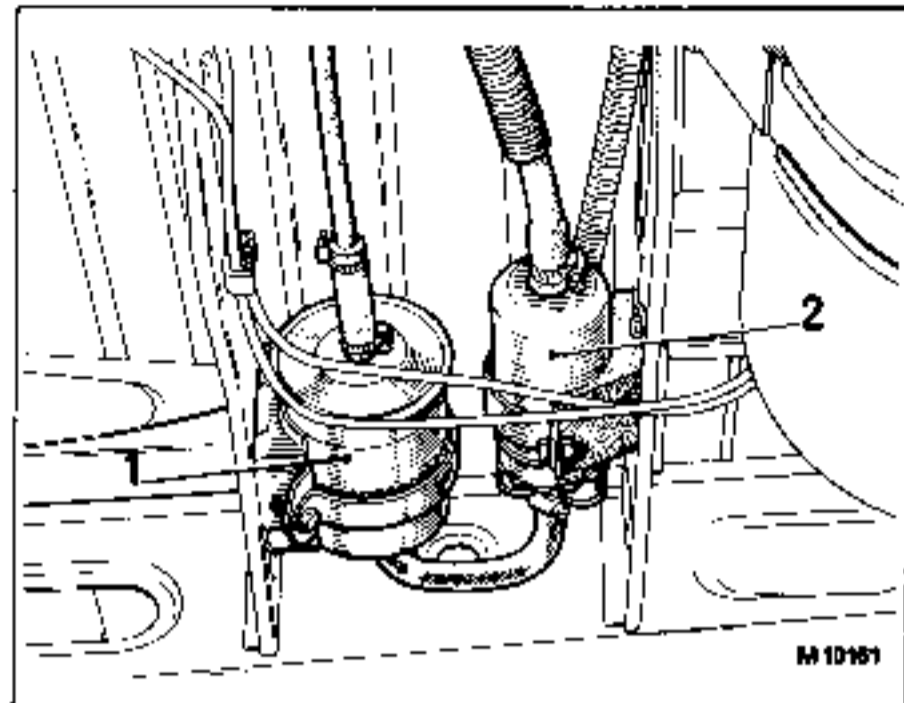
J 116 - J 117 4 x 2

REMOVAL - REFITTING

The fuel filter must be replaced every 30 000 miles (50 000 km).

The fuel filter is located on a plate next to the fuel pump and between the righthand sidemembers, in front of the fuel tank.

The complete replacement procedure for the filter is dealt with in the section dealing with the removal of the fuel pump.



1 - Fuel filter

2 - Fuel pump

Fuel pump

ESSENTIAL SPECIAL TOOLING

Mot. 453-01 Flexible hose clamp

J 116 - J 117 4 x 2

REMOVAL

The pump is located on a plate with the fuel filter.

Fit clamps Mot. 453-01 on the flexible hoses and disconnect them.

Disconnect the electric leads from the pump.

Unscrew the fuel pump mounting clip.

Take out the pump.

Unscrew the mounting clip from the fuel filter.

Take out the filter.

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.

INLET AIR HEATER

Only vehicles with the J6R engine are equipped with the inlet air heater.

DESCRIPTION

This device comprises an air filter with a dual inlet which has a distribution flap for metering hot and cold air.

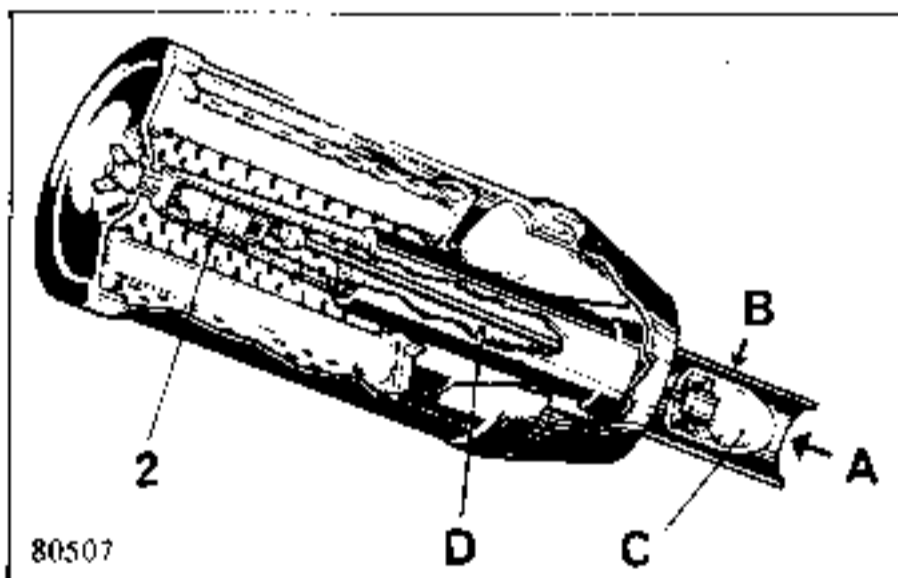
The distribution flap is controlled by a thermostatic element made from expandable wax (2), mounted on the air filter and located in the path of the mixture air.

A - Cold air

B - Hot air

C - Flap

D - Mixed air to carburettor

**CHECKING**

Immerse the air filter in water up to the level of the thermostatic element.

After 5 minutes:

- if the water temperature is at 26°C the flap should cut off the cold air inlet;
- if the water temperature is at 36°C the flap should cut off the hot air inlet.

ADJUSTMENT

The element cannot be adjusted.

CHECKING

ESSENTIAL SPECIAL TOOLING

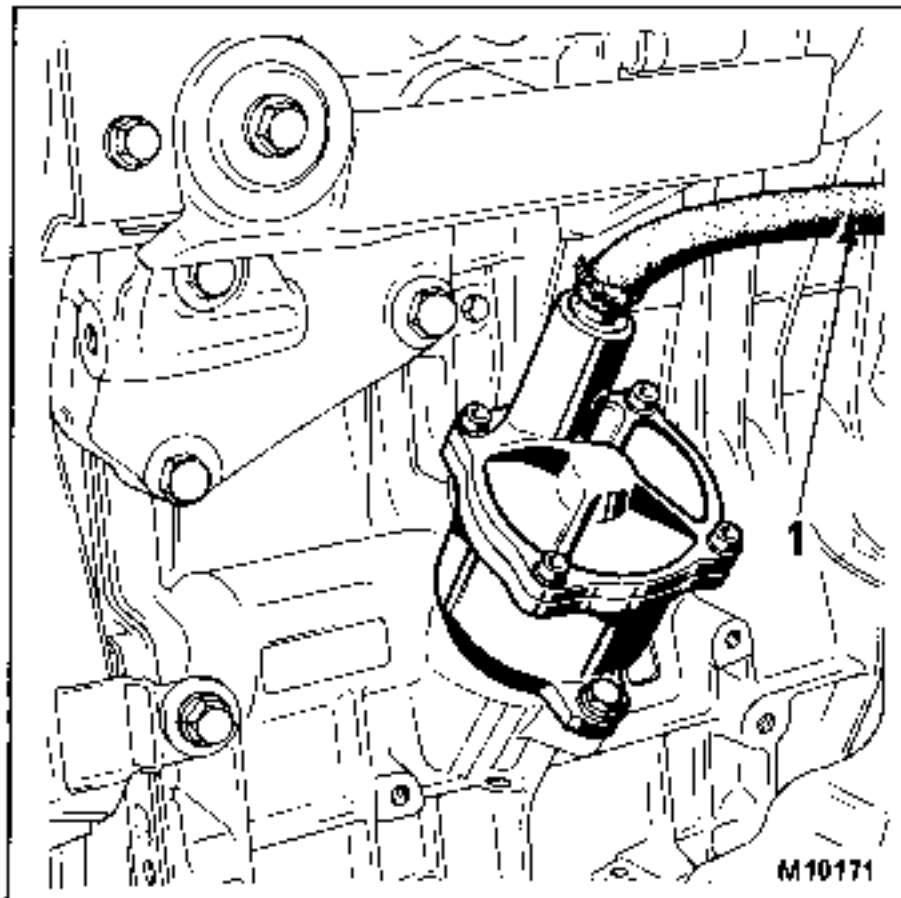
M.S. 870 Vacuum gauge

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 or
- TOTAL DEXRON.

Capacity: 1.1 litre.

Refilling the system:

Fill the reservoir completely.

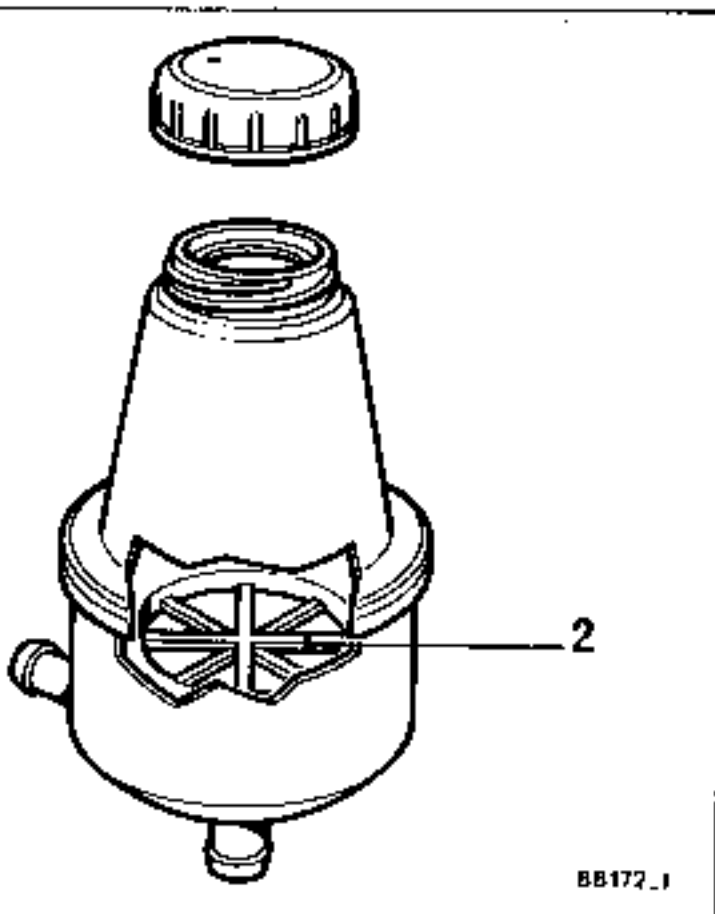
Move the steering gently in both directions.

Top up the oil level.

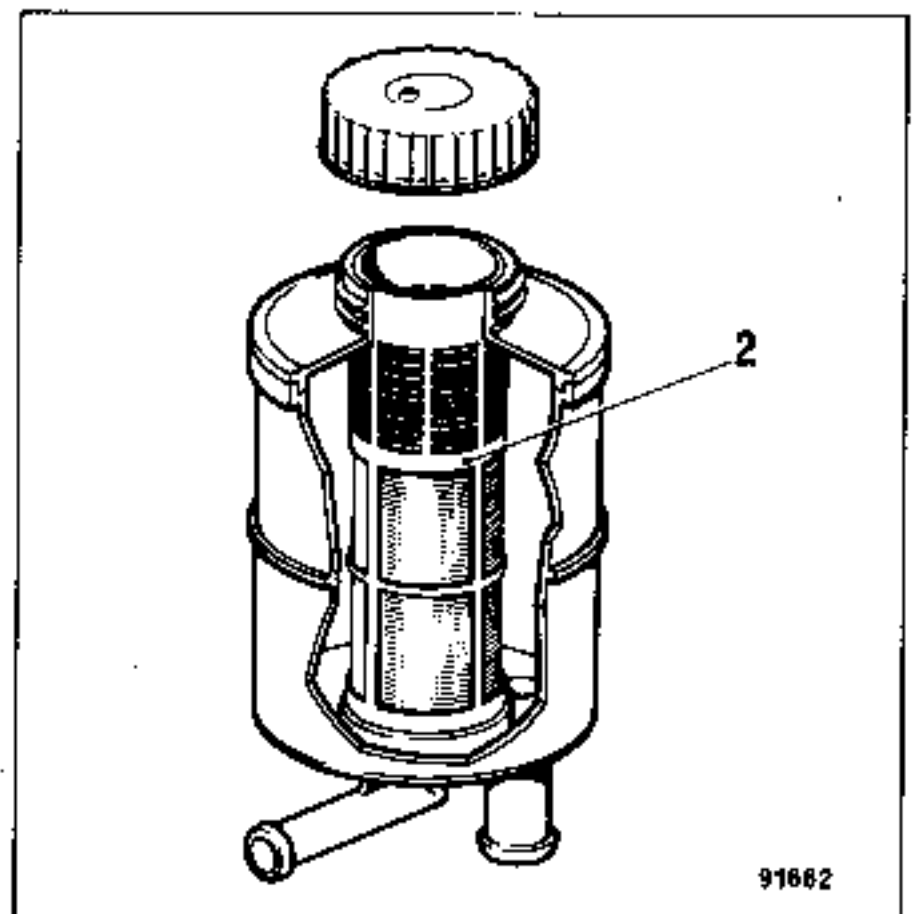
Start the engine and gently move the steering completely from right to left.

Top up the oil level.

1st type



2nd type



The oil should be visible at the level of grid (2).

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

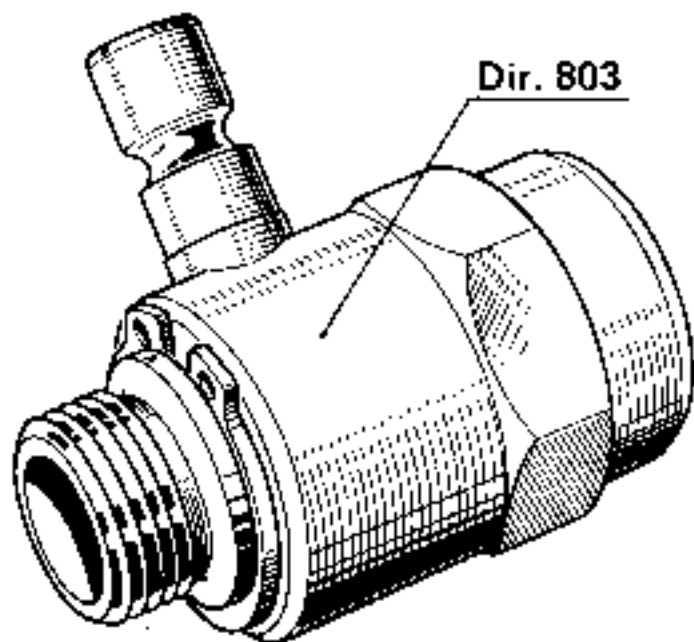
CHECKING THE OIL PRESSURE

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

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.



7/840

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 max. 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 65 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.

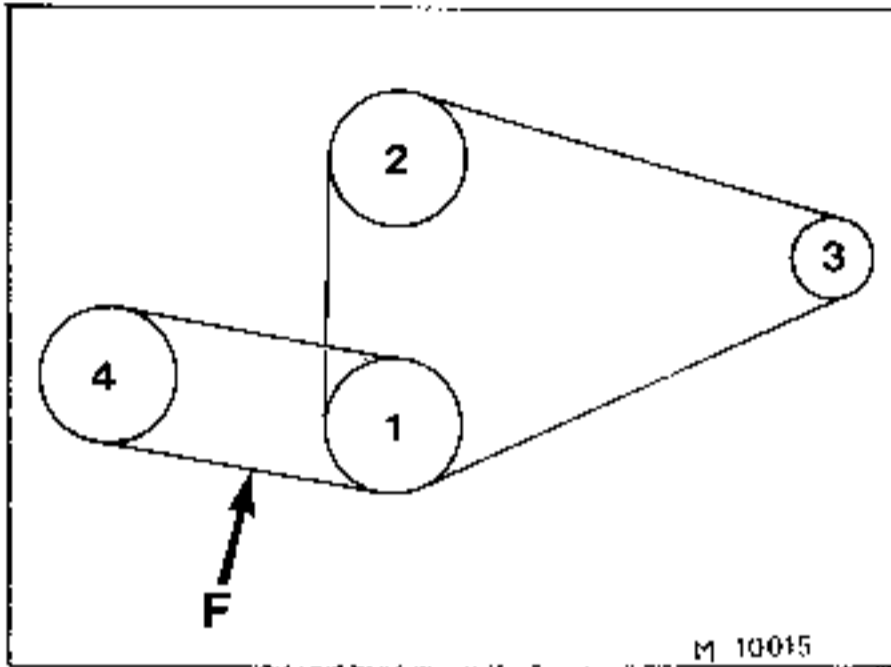
Reconnect the high pressure line and remove clamp Mot. 453-01.

Top up the oil in the reservoir.

ADJUSTING THE DRIVE BELT TENSION

ESSENTIAL SPECIAL TOOLING

Elé. 346-04 Belt tension tester

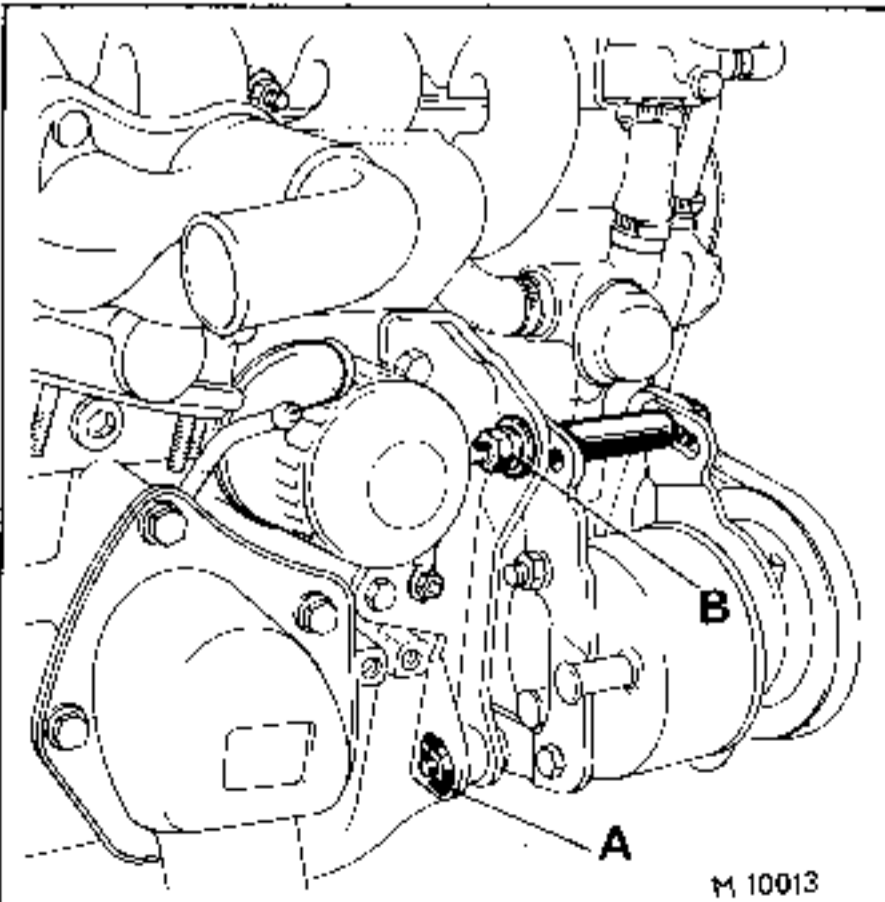


- 1 - Crankshaft pulley
- 2 - Coolant pump pulley
- 3 - Alternator pulley
- 4 - Power steering pump pulley

Checking

- cold: 3.5 mm
- hot : 4 to 4.5 mm.

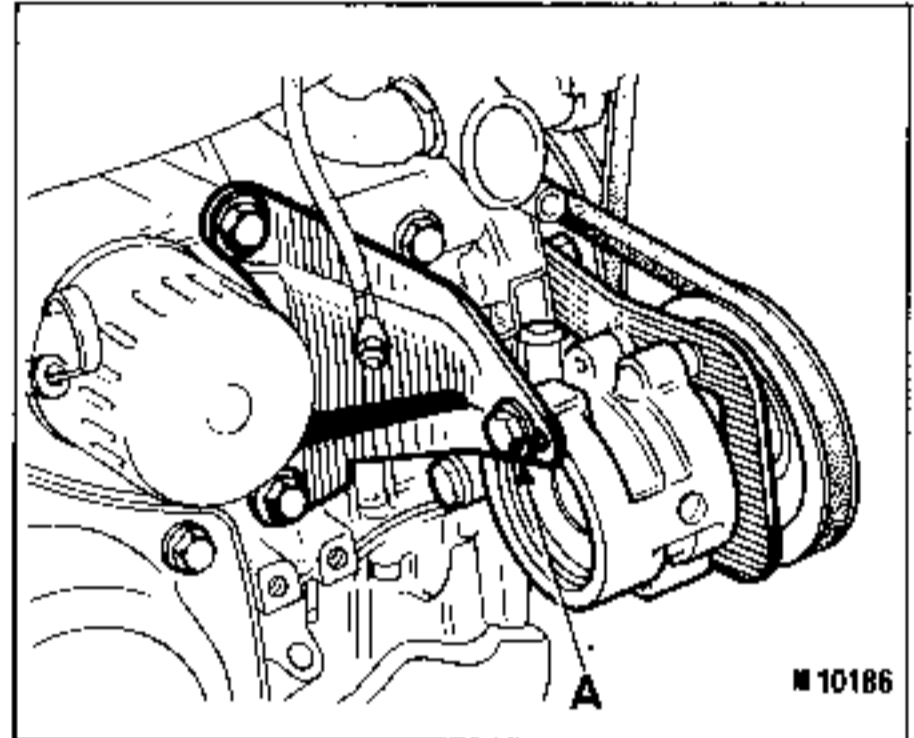
Up to January 1988:



Loosen bolts A and B.

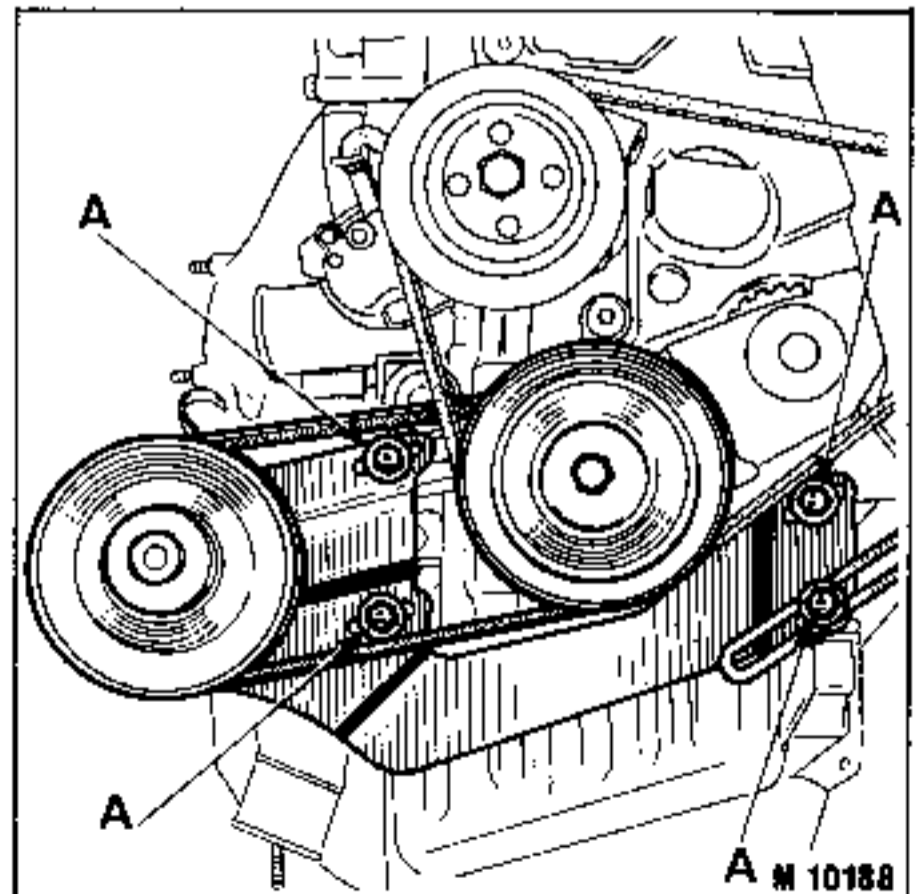
As from February 1988:

Unscrew bolt A in the engine compartment.



Place the vehicle on a lift.

Unscrew bolts A.



Tension the belt, using a lever.

Retighten the five bolts A.

Check the tension after 10 minutes operation (arrow F 4 to 4.5 mm).

REMOVING - REFITTING THE PUMP

ESSENTIAL SPECIAL TOOLING

- Mot. 453-01 Flexible hose clamps
Ele. 346-04 Belt tension tester

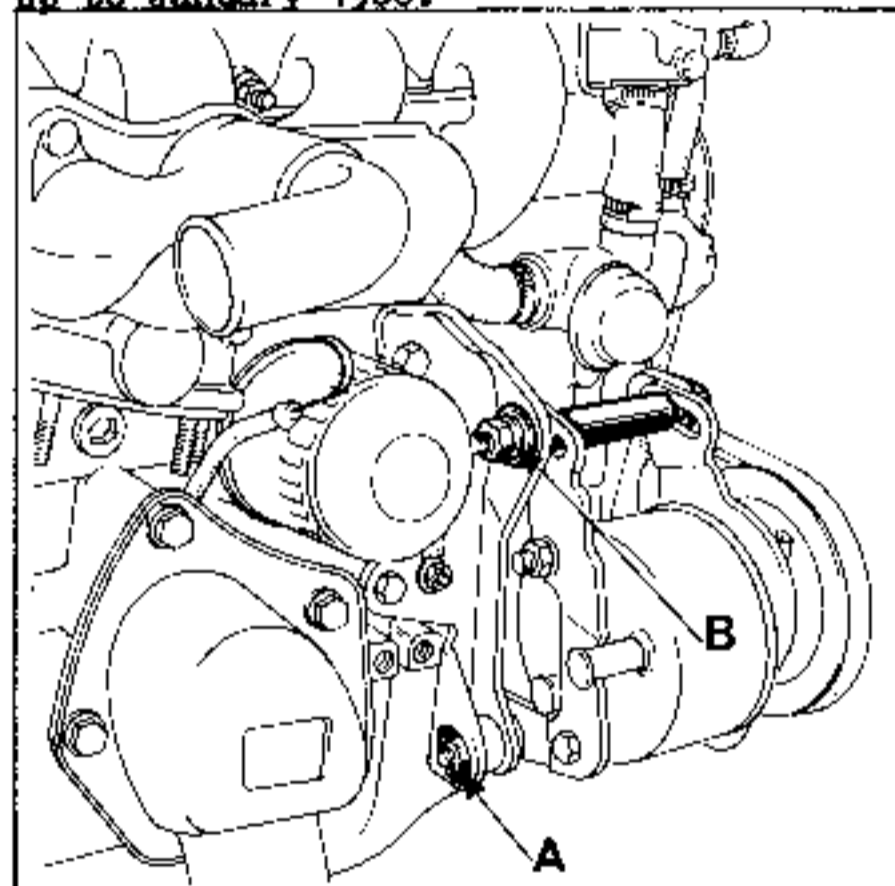
REMOVING

Fit clamp Mot. 453-01 on the fuel feed lines.
Place a container underneath to catch the fluid.

Disconnect:

- the feed pipes
- the high pressure lines.

Up to January 1988:



Unscrew bolt A.
Unscrew tensioner bolt B.
Free the belt.

Remove:

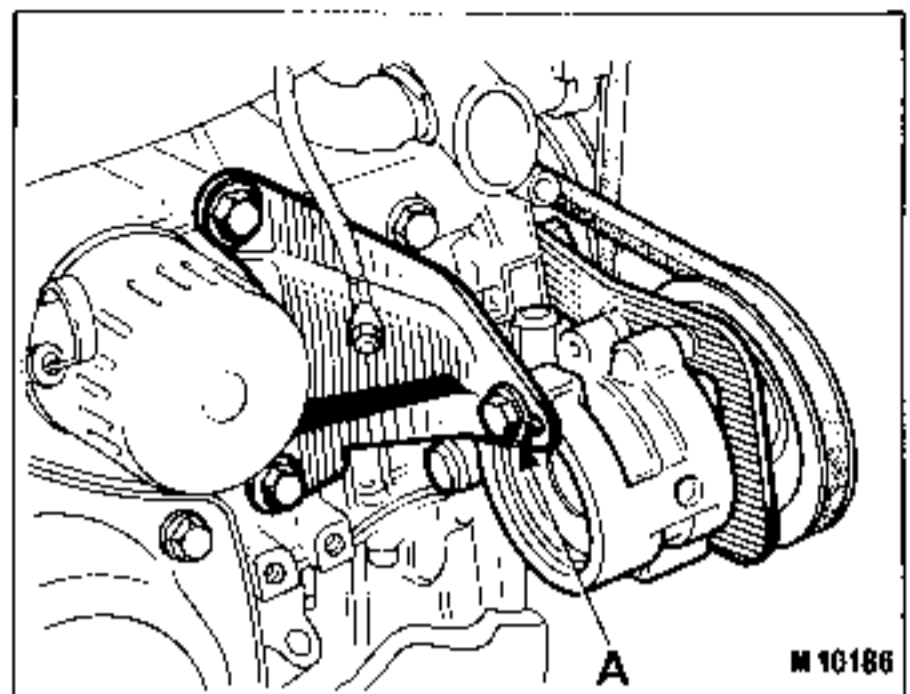
- shaft B;
- shaft A;
- the pump-bracket assembly;
- the pulley (see corresponding paragraph);
- the bracket.

As from February 1988

The same precautions must be taken in relation to the pipes as for the previous model.

Petrol and diesel versions

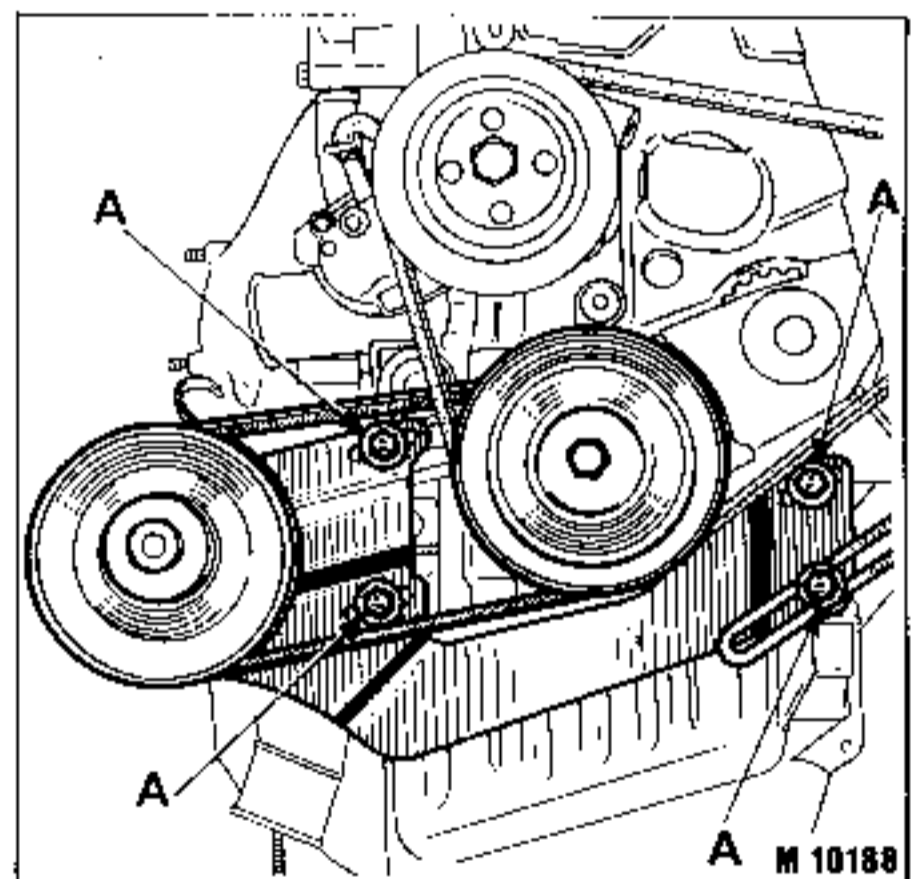
In the engine compartment, unscrew and remove bolt A.



Place the vehicle on a lift.
Unscrew and remove bolts A.

Special point for Diesel version:

On the righthand side, ensure that the engine support flange is free.



Remove:

- the pump-bracket assembly from below;
- the pulley (see corresponding paragraph);
- the bracket.

REFITTING

Fit in place:

- the bracket;
- the pulley (see corresponding paragraph);
- the pump-bracket assembly.

Adjust the belt tension using tool Ele. 346-04.

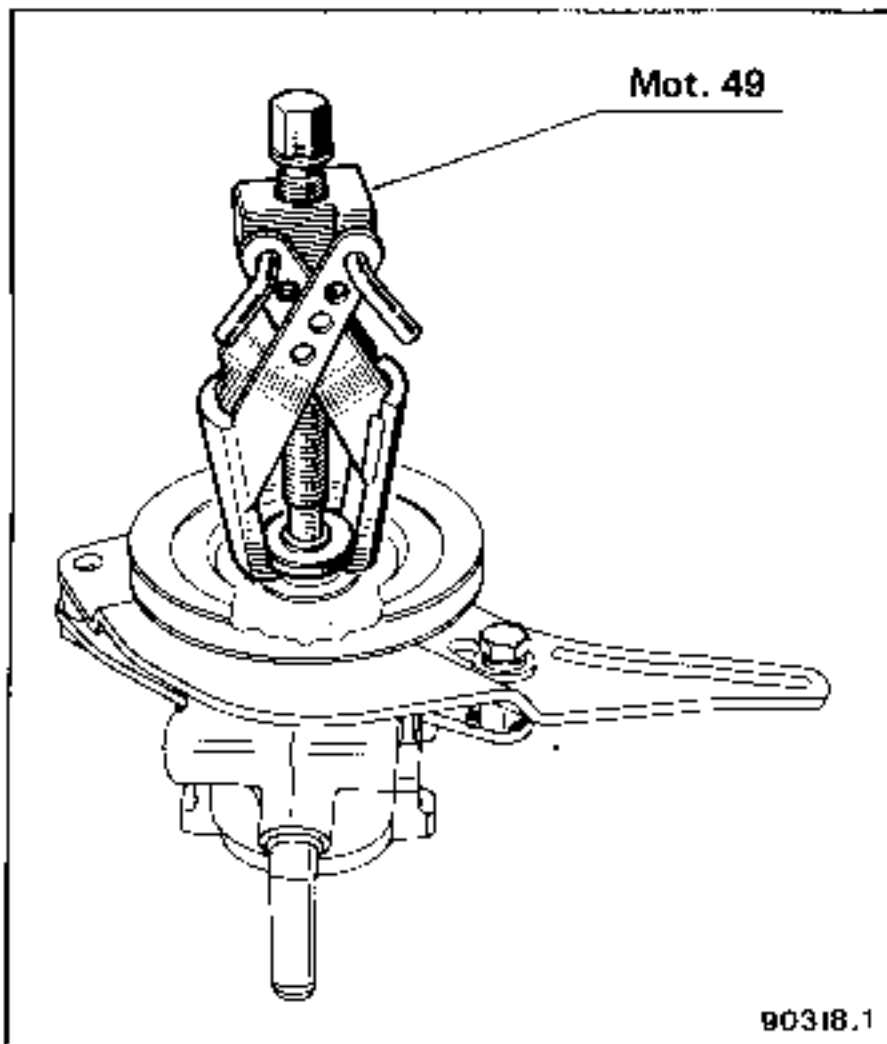
Fill and bleed the system.

REPLACING THE PULLEY

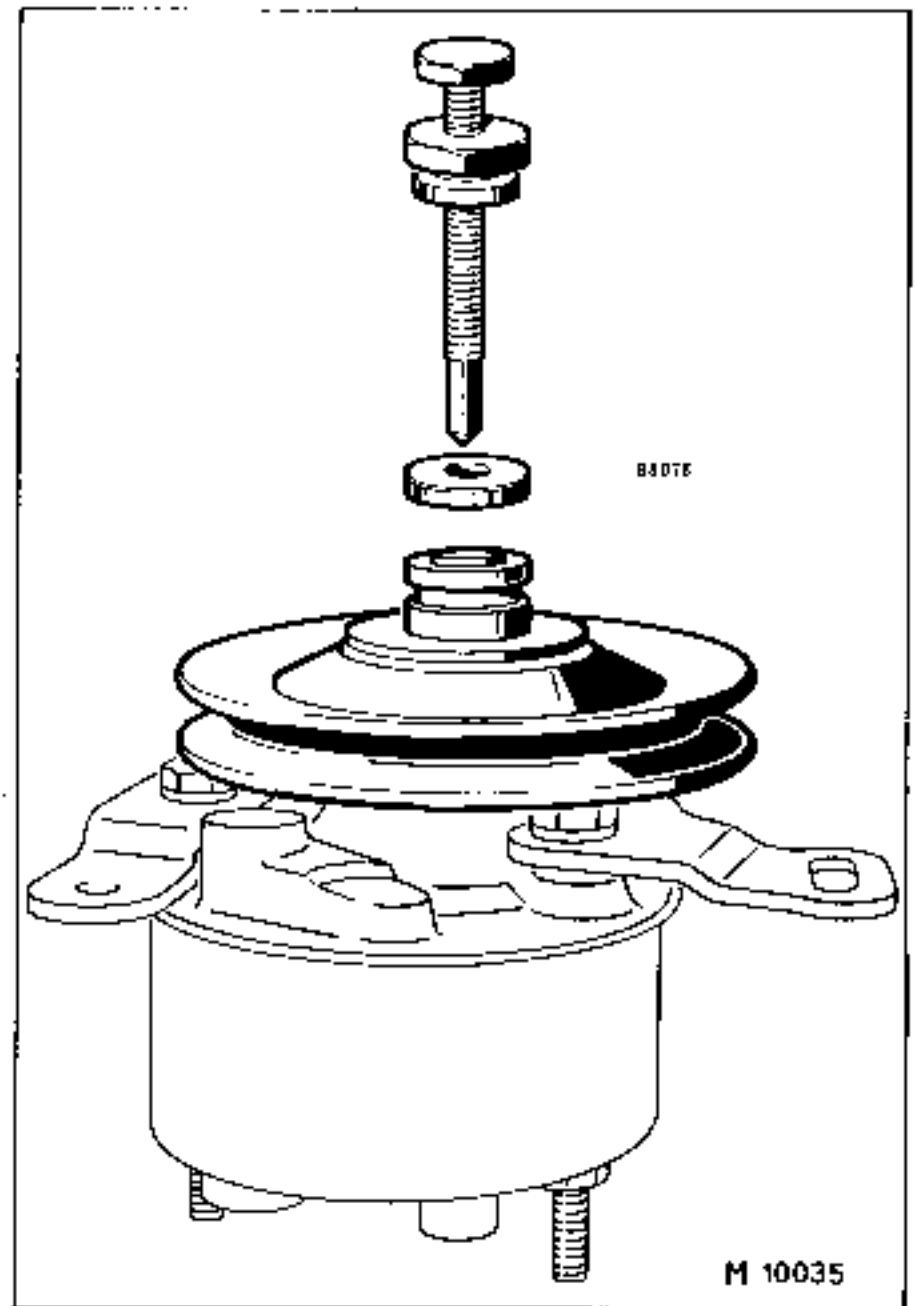
ESSENTIAL SPECIAL TOOLING	
Mot. 49	Extractor
Dir. 1083	Power assisted pump pulley refitting tooling

REMOVAL

Extract the pulley using tool Mot. 49 after reading off the distance between the pulley and the end of the shaft.



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



REFITTING

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

METHOD OF REGULATING THE IDLING SPEED

This regulation must be performed with a great degree of precision so that a stable CO percentage is obtained between two services. We remind you that the CO must be adjusted under the following precise conditions:

- 1) The vehicle must be run in; it must have reached a mileage of at least 600 miles (1000 km) (if the adjustment is carried out on a vehicle that has not been run-in it can alter very quickly).
- 2) The choke must not be operating (check this).
- 3) The engine must be at its normal operating temperature. To obtain this, run it at approximately 2000 rpm until the thermostat open. Do not warm it up at idling speed because the CO readings on an engine that has run for a few minutes at idling speed are not valid.
- 4) The idling speed must be that specified by the manufacturer (see chart).
- 5) The air filter must be in position and the element clean.
- 6) The ignition system must be in good condition and correctly adjusted.
- 7) There should be no additional air leakage into any part of the system (vacuum pipes, emission control system, rebreathing system, anti-evaporation system, E.G.R. system, etc.).
- 8) There should be no extensive leakage on the exhaust system. It must be leaktight.
- 9) None of the heavy electrical consumption units (cooling fan, headlights, heated rear screen, etc.) must be operating.
- 10) Ensure that the exhaust gas recirculation (EGR) system is not operating when the engine is idling.
- 11) Before adjusting the idling speed, switch off the system which feeds air to the exhaust system (pulsair) by clamping the duct connecting the pulsairs to the air filter, or by blocking the pulsairs.
(Pulsair = type of air check valve)

Adjusting the idling speed using the exhaust gas analyser

In the countries where the tamperproof cap is fitted to mixture screw (B), remove it.

Turn screw (A) to obtain the average idling speed as indicated in the table for the vehicle in question.

Turn screw (B) to obtain the correct idling speed.

Repeat these last two operations so that a correct CO percentage and idling speed are obtained.

Fit a tamperproof cap on screw (B) when the adjustment has been made, on countries where this is a legal requirement.

Tamperproof cap

CARBURETTOR	Tamperproof cap Part no.
WEBER 32 DARA	77 01 200 833

Current regulations stipulate that on checking the measured value should be within the value tolerances on the information label stuck under the bonnet.

After adjusting the idling speed, remember to start the air intake system to the exhaust. On so doing, there should be a reduction in the mixture and CO percentage.

J 112 vehicles with the J6R 236 engine are equipped with:

- an air intake to the exhaust system (pulsairs);
- the exhaust gas recirculation system (EGR);
- a WEBER 32 DARA carburettor with:
 - . an automatic start device controlled by an electrical heater resistor;
 - . a pneumatic enrichment device;
 - . a throttle butterfly opening device;
 - . an anti-re-ignition system on the first barrel idling jet and on the constant CO system;
 - . a system for locking the second barrel when the engine starts.

WEBER 32 DARA CARBURETTOR

COLD START

Operation

A heater resistor (9) on the choke cover is controlled by a relay (23) which is dependent on an ambient thermal switch (22) which closes above 15°C.

VACUUM SENSOR

Operation

AEI capsule (15) is controlled by a solenoid valve (14) which is dependent on a coolant thermal switch (24) which opens when the coolant temperature is above 60°C and is connected:

- at carburettor temperatures lower than 60°C under the 1st barrel throttle butterfly by a circuit to the delay valve (13) which maintains the advance;
- at temperatures above 60°C the connection is above the throttle butterfly.

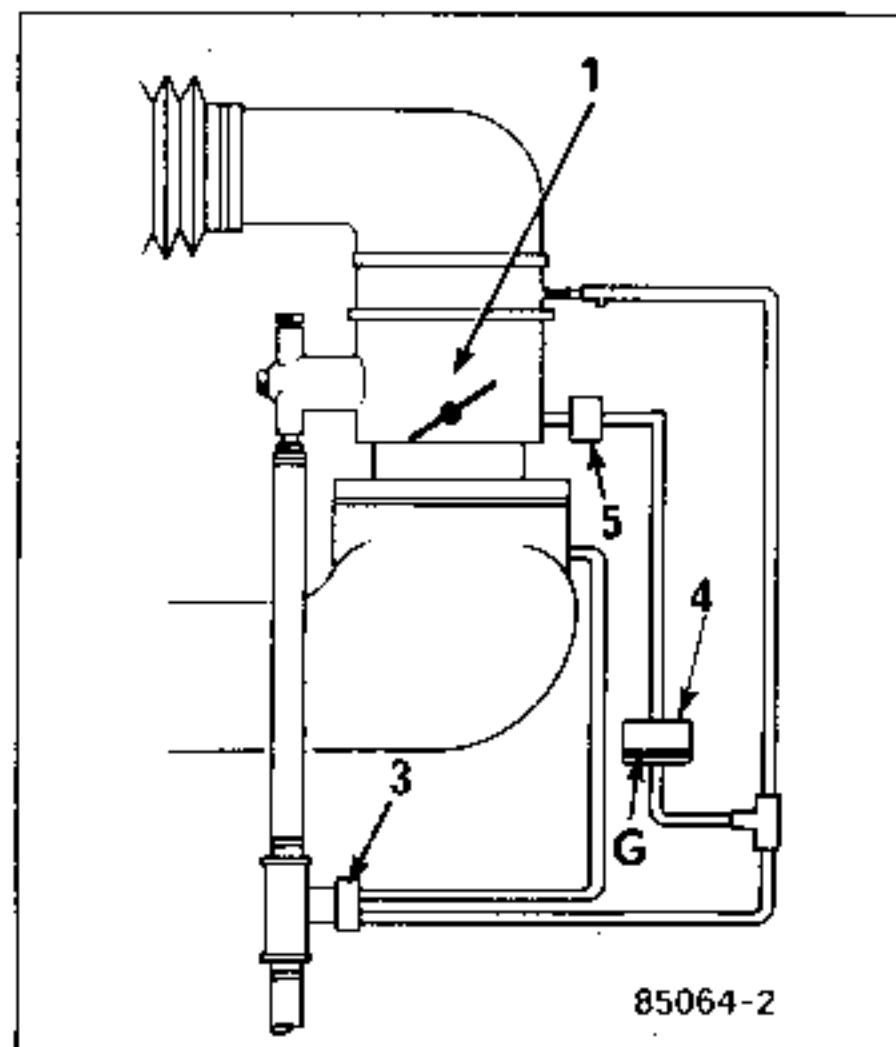
OPERATION OF THE PNEUMATIC ENRICHMENT DEVICE

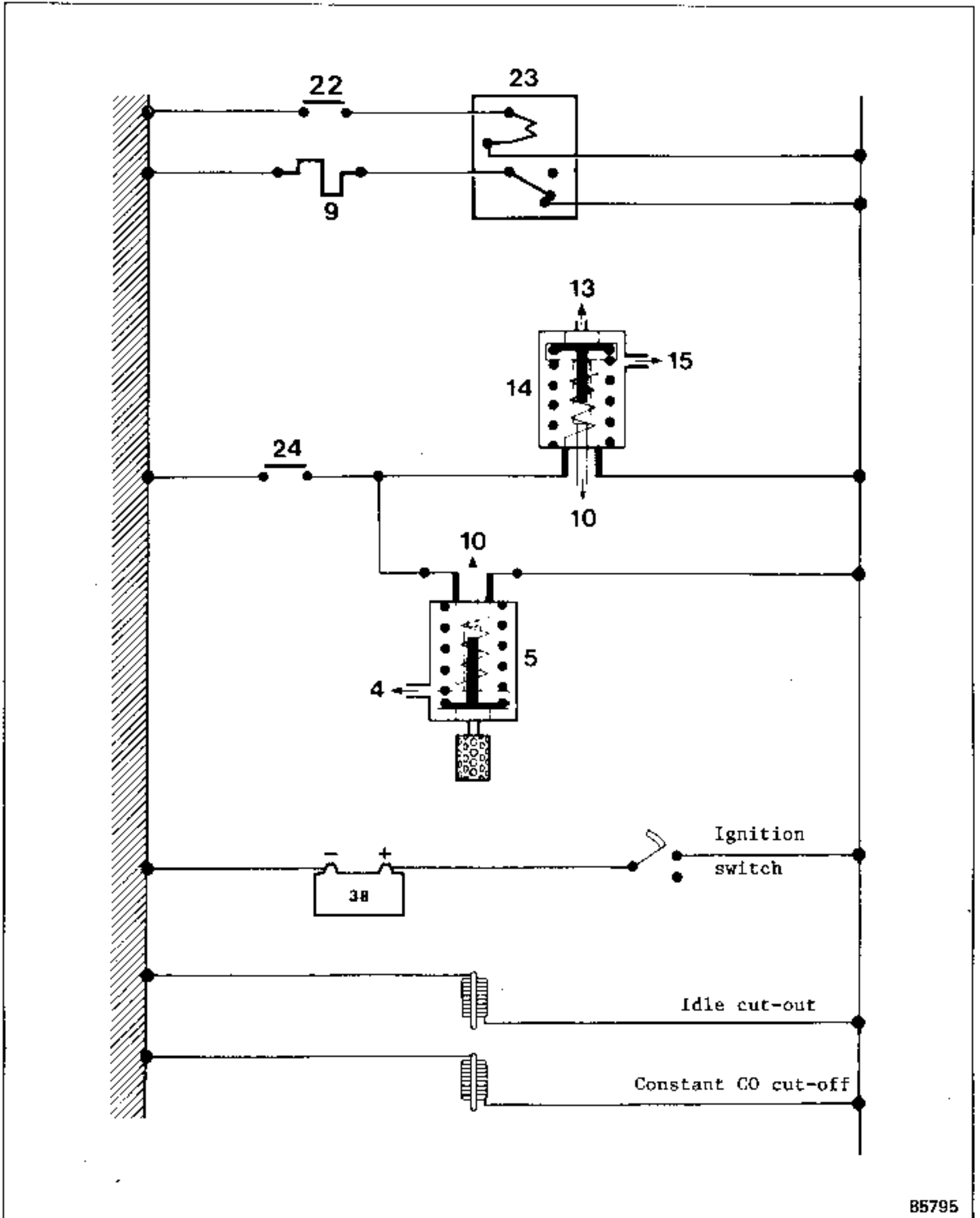
On the choke coolant system a thermal valve (3) is connected to the inlet manifold.

When the coolant temperature is below 15°C the thermal valve is open, the vacuum acts on the 2nd barrel locking device (5) which stops the throttle butterfly opening.

When the coolant temperature is above 15°C the thermal valve is closed, cutting off the vacuum circuit. The circuit, 2nd barrel locking device (5) and thermal valve (3) are connected to the carburettor cover which enables the vacuum in the circuit to drop when thermal valve (3) closes.

A delay valve (4) (grey at the thermal valve end) holds the vacuum for several seconds after thermal valve (3) has closed.



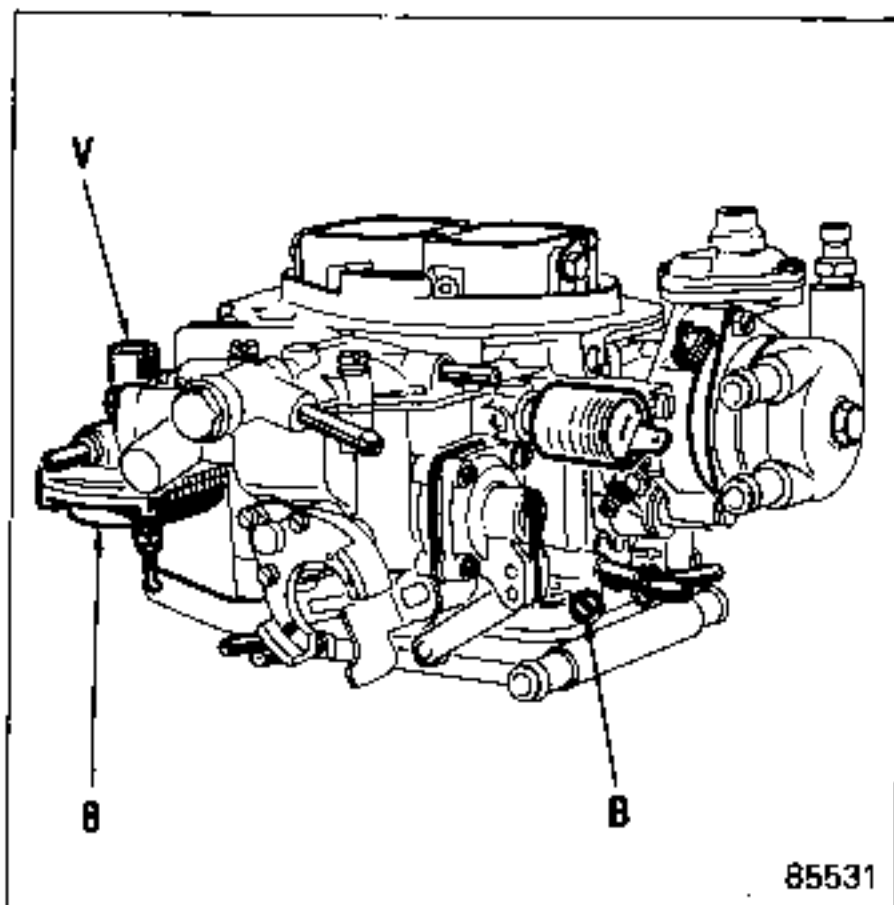


B5795

Note: Each component is shown in the rest position, irrespective of the position of the system.

FAST IDLING REGULATION

Engine hot, after the ENGINE COOLING FAN has cut in, and idling speed regulation normal.



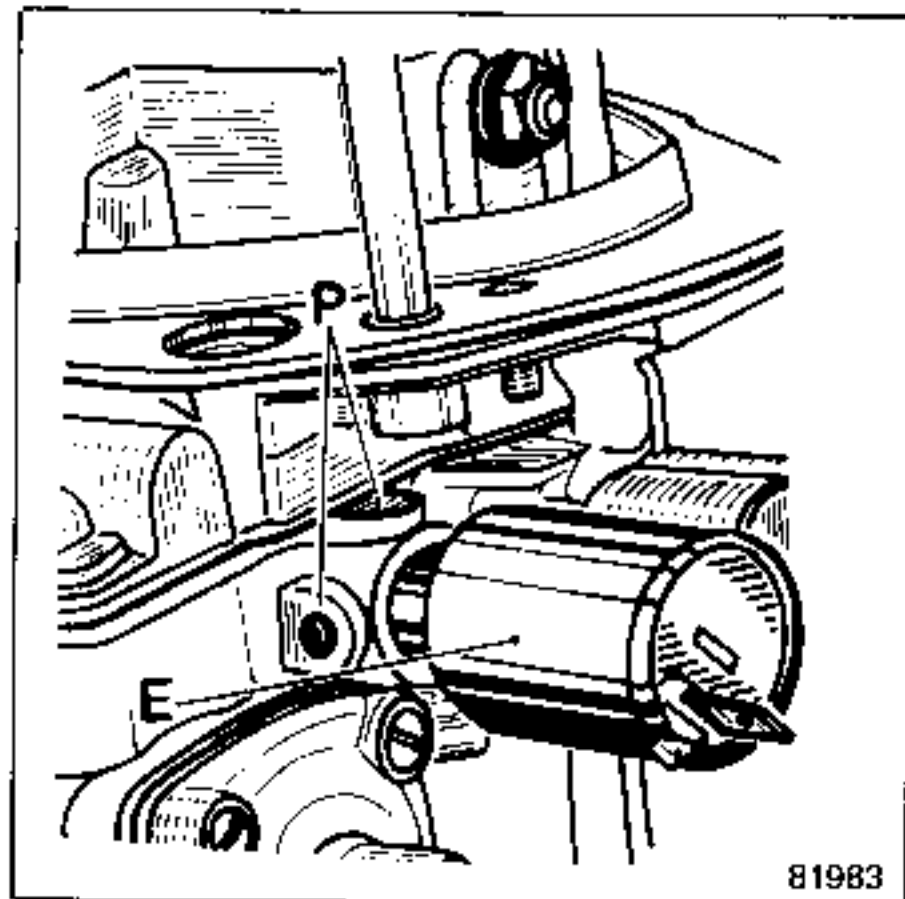
Turn screw V, applying a vacuum of at least 600 mbars with a vacuum pump to the throttle butterfly opening device to obtain a fast idling speed of:
1800 ± 100 rpm.

ANTI-RE-IGNITION SYSTEM**Idle cut-out (E)**

This is a solenoid valve which closes the idling circuit as soon as it is no longer supplied with power, ie. when the ignition contact is cut off.

To check its operation, start the engine, let it idle and disconnect the feed wire: the engine speed should drop.

To dismantle the idle cut-out, remove screw (P).

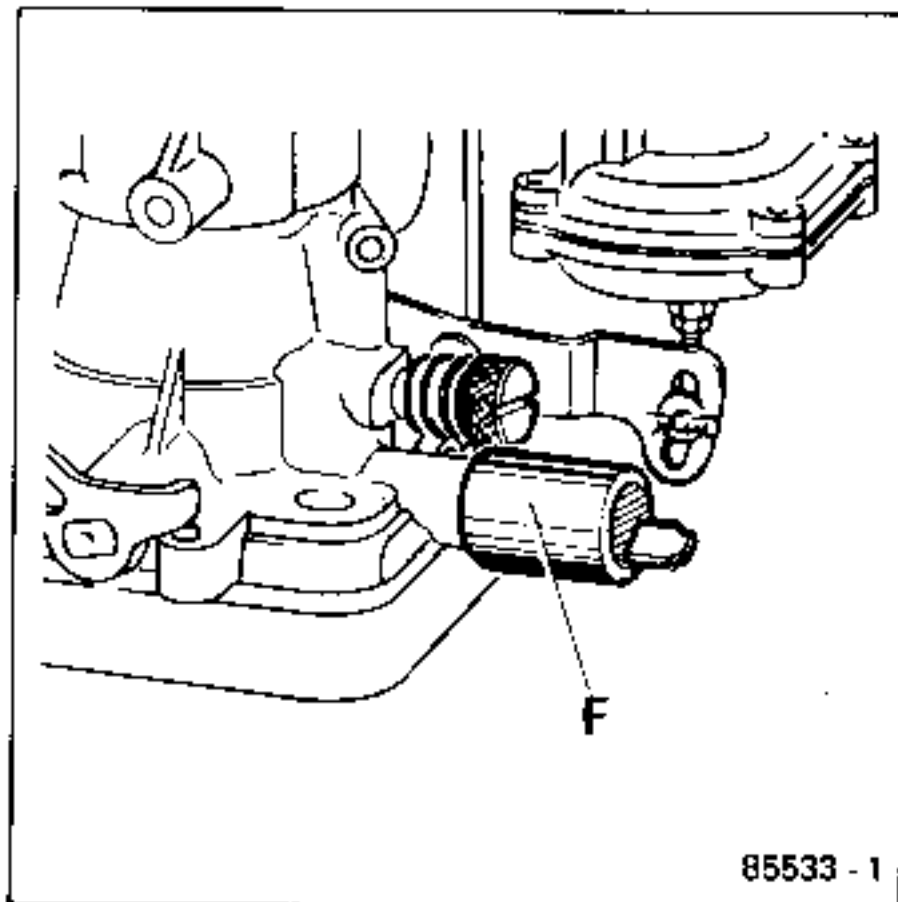
**Constant CO cut-off (F)**

This is a solenoid valve similar to the idle cut-off (E) which is not energised when the contact is cut-off and closes the constant CO circuit.

NOTE: To check its operation, start the engine and let it idle then disconnect:

- the feed wire to idle cut-off (E); the idling speed drops;
- the feed wire to constant CO cut-off (F); the idling speed drops.

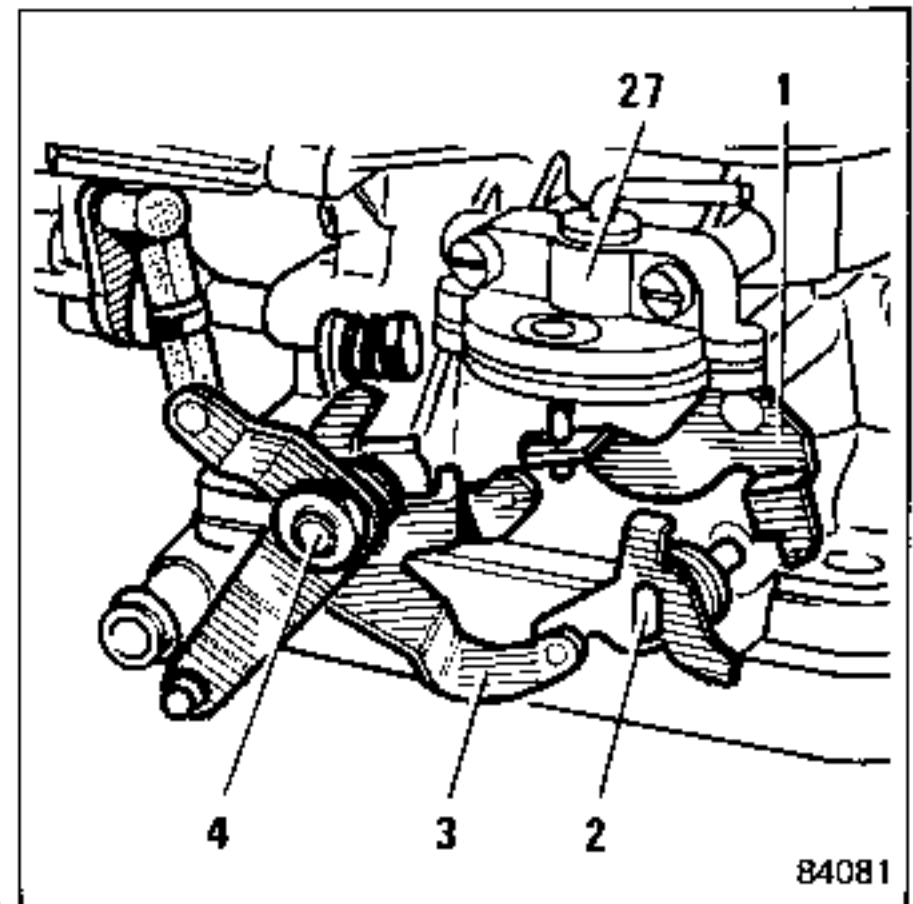
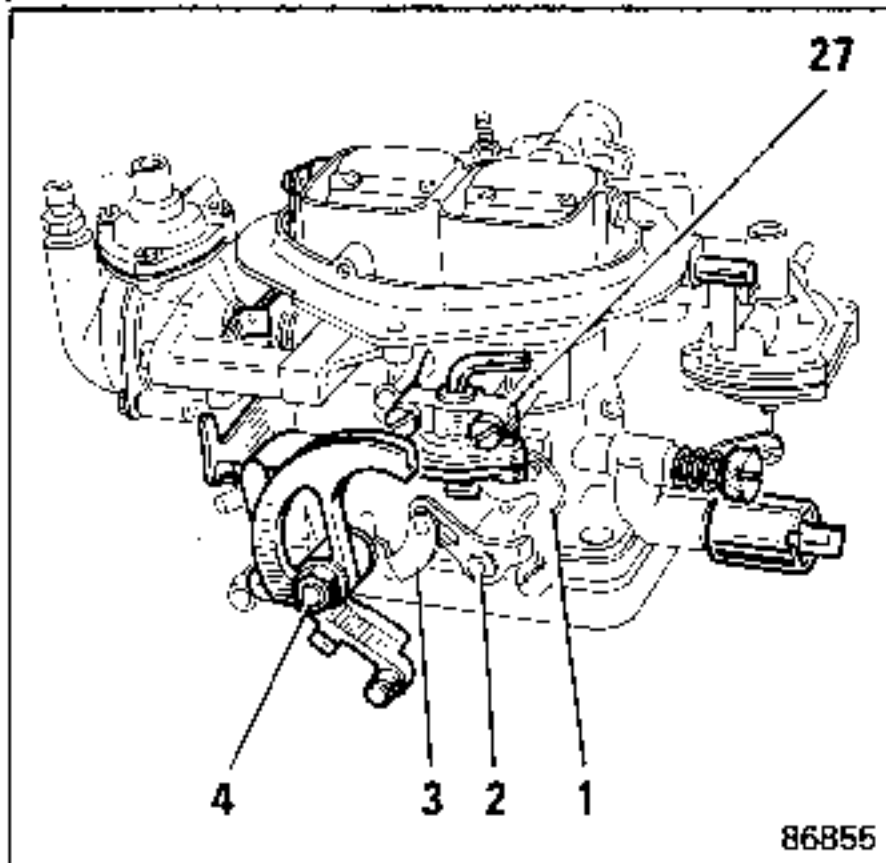
When the two leads are disconnected simultaneously the engine stops.



Locking the 2nd barrel

This system comprises a diaphragm device (27) which controls lever (1) enabling the 2nd barrel throttle butterfly (2) to be prevented from opening when the diaphragm has a vacuum applied to it.

A system of levers (3) arranged on the 1st barrel throttle butterfly (4) enables the 2nd barrel throttle butterfly to close in the idling position.



When 1st barrel throttle butterfly (4) is three-quarters of the way open, lever (3) progressively controls 2nd barrel throttle link (2).

The 2nd barrel throttle butterfly opens slightly and butts up against link (1) which prevents it opening and also prevents the 1st barrel opening completely.

NOTE: See anti-pollution diagram

A delay valve (3) connected in parallel enables the diaphragm circuit (21) to be vented to atmosphere.

A slight leakage through internal pores enables the system to return to barometric pressure as soon as the vacuum circuit is cut-off (coolant temperature above 15°C).

a) Operation under normal conditions and engine hot

Thermal valve (12) does not feed diaphragm device (27) and 2nd barrel throttle butterfly (2) is free.

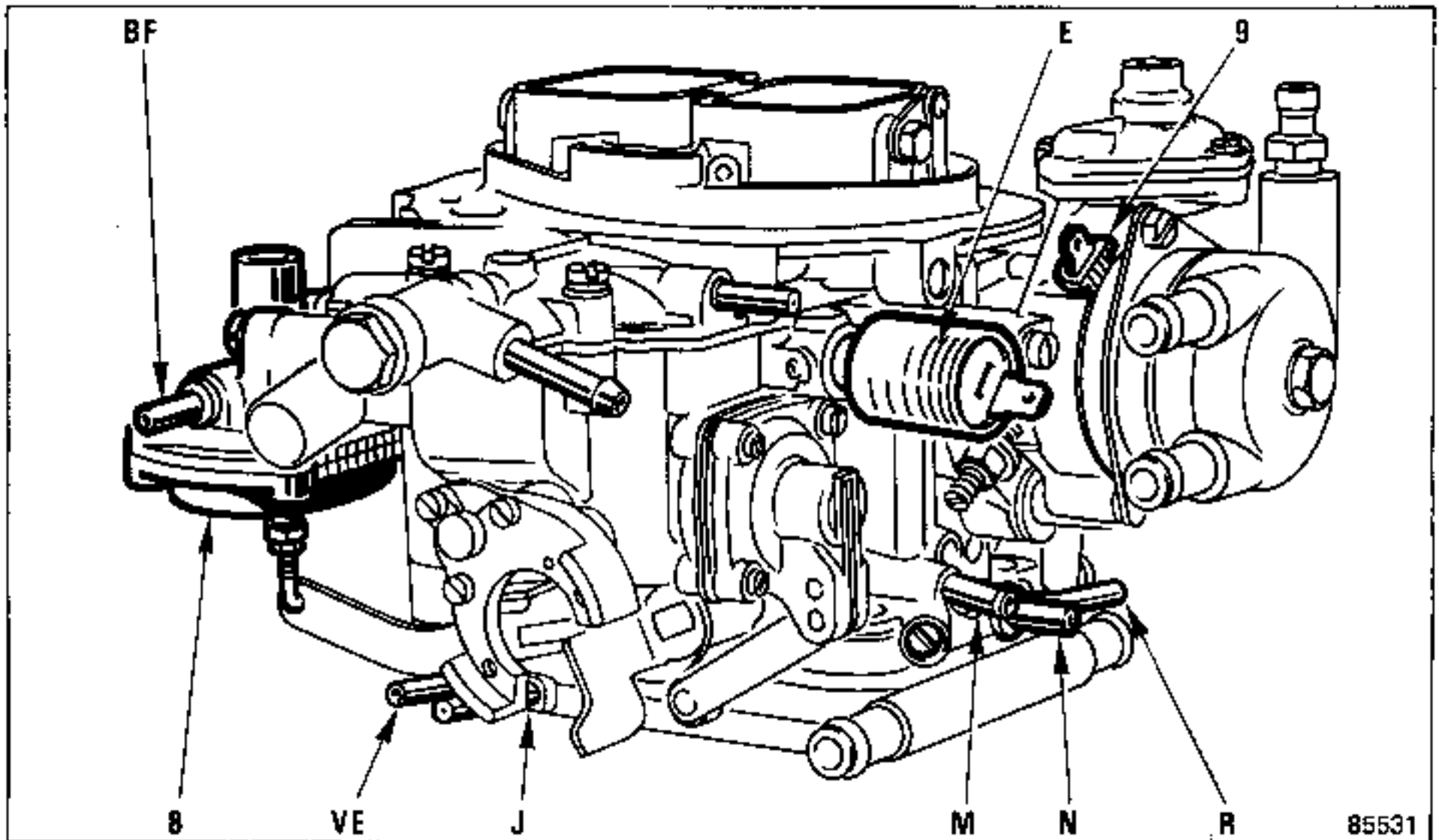
When 1st barrel throttle butterfly (4) is three quarters open, lever (3) progressively controls the link of 2nd barrel throttle (2) which opens.

b) Operation when engine cold (temperature below 15°C)

Thermal valve (12) feeds the vacuum to diaphragm device (27) and link (1) prevents 2nd barrel throttle butterfly (2) opening.

MARKING OF THE FUNCTIONS OF THE ANTI-POLLUTION SYSTEM

To avoid connection errors, coloured rings have been fitted on the carburettor.

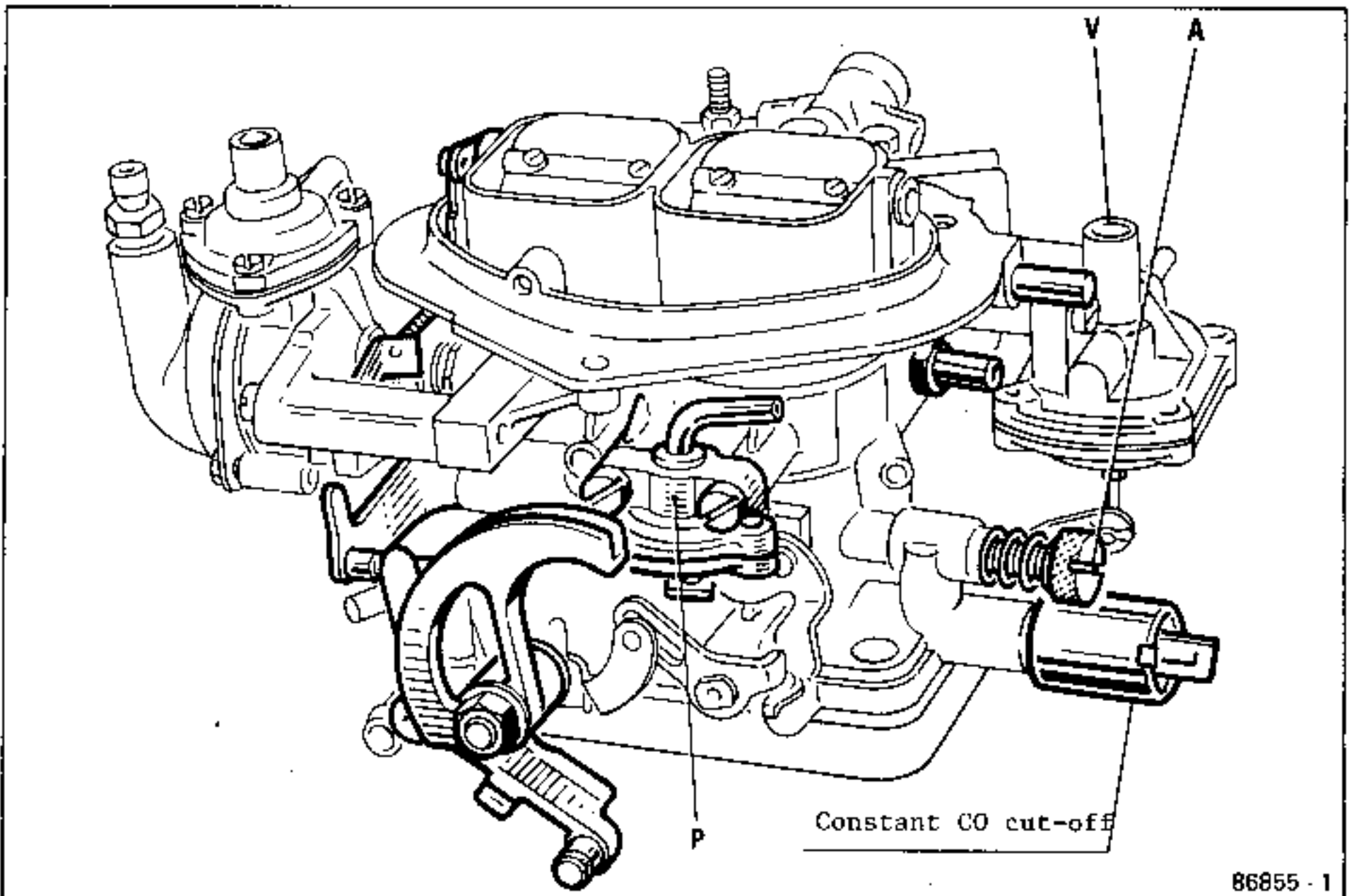


BF · Dark blue
VE · Green

J · Yellow
M · Brown

N · Black
R · Red

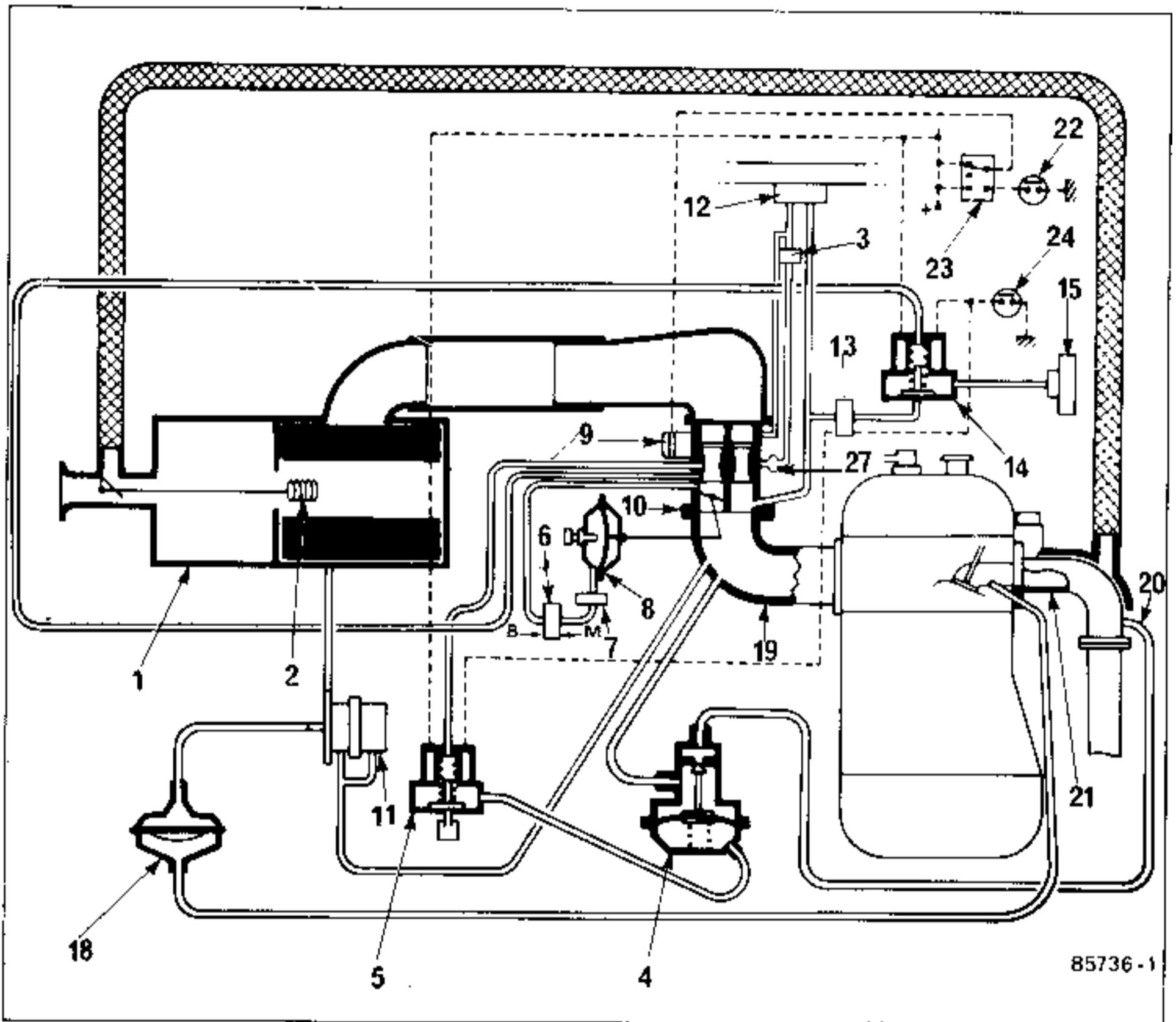
85531



Constant CO cut-off

86855 - 1

DIAGRAM OF THE ANTI-POLLUTION SYSTEM



- 1 Thermostatic air filter
- 2 Thermostatic capsule
- 3 Grey delay valve
- 4 EGR valve
- 5 Solenoid valve
- 6 Brown-white delay valve
- 7 Chamber
- 8 Throttle opener
- 9 Automatic choke
- 10 Caburettor
- 11 By-pass valve
- 12 15°C thermal valve

- 13 Green delay valve
- 14 Solenoid valve
- 15 Integral electronic ignition (AEI)
- 16 Air inlet valve
- 19 Inlet manifold
- 20 Restrictor
- 21 Exhaust manifold
- 22 15°C ambient thermal switch
- 23 Relay
- 24 60°C thermal switch
- 27 2nd barrel locking device

E.G.R. SYSTEM OPERATION

The opening of EGR valve (4) is controlled by the vacuum at the carburettor 1st barrel choke tube.

Up to a coolant temperature of 60°C solenoid valve (5), controlled by thermal switch (24), cuts off the vacuum information to the EGR valve.

The exhaust gases, therefore, are not recirculated.

Above 60°C solenoid valve (5), controlled by thermal valve (24), opens the vacuum circuit to the EGR valve.

The vacuum coming from inlet manifold (14) only acts on mobile assembly (M) if the pressure coming from exhaust manifold (13), along the route shown by the arrows, pushes diaphragm (M) which closes hole (1).

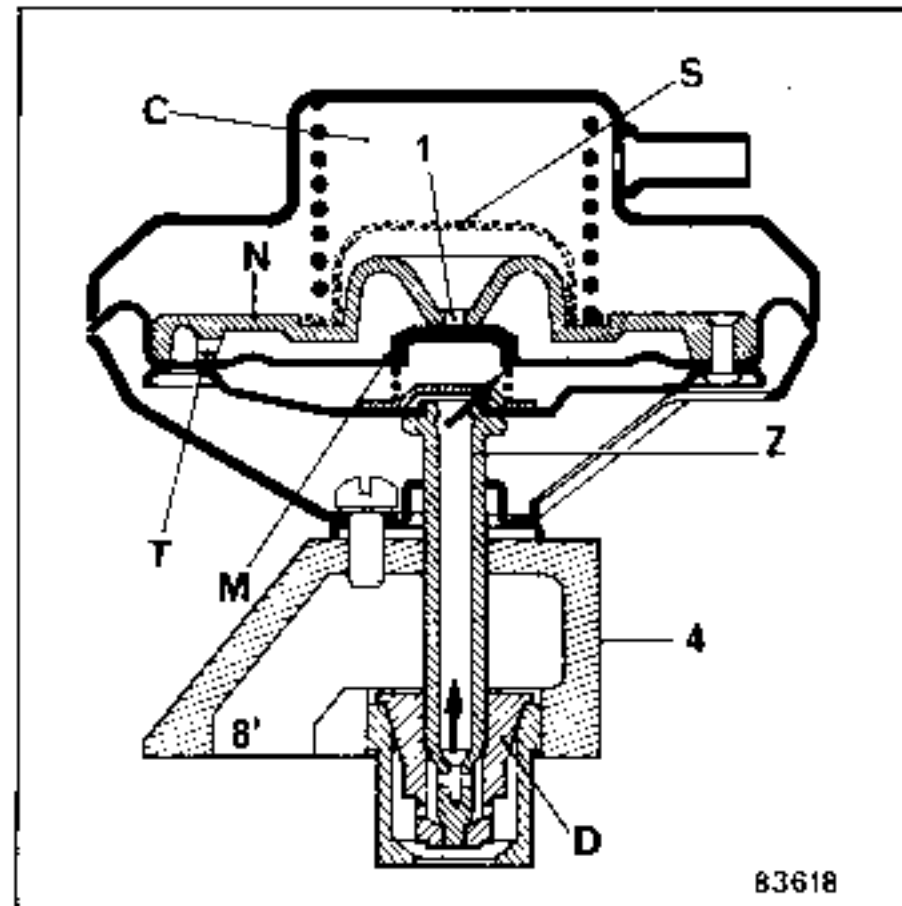
Chamber (C) is vented to atmosphere through a strainer (S), hole (1) and peripheral holes (T).

When hole (1) is blocked, the vacuum draws the assembly and opens valve (D), enabling the exhaust gases to recirculate to inlet manifold (8').

This valve, therefore, cannot be controlled by the application of a vacuum with a vacuum pump.

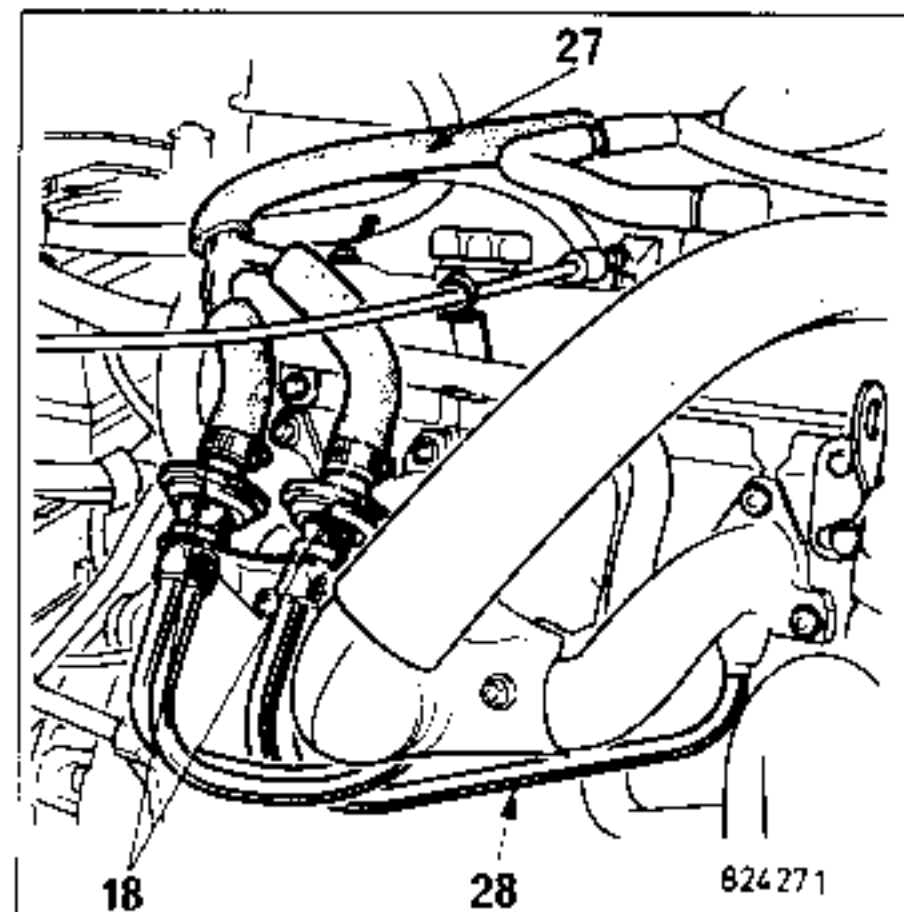
Checking:

Valve guide (D) is visible in area (Z). Just accelerate, with the engine hot, to check visually that it moves.

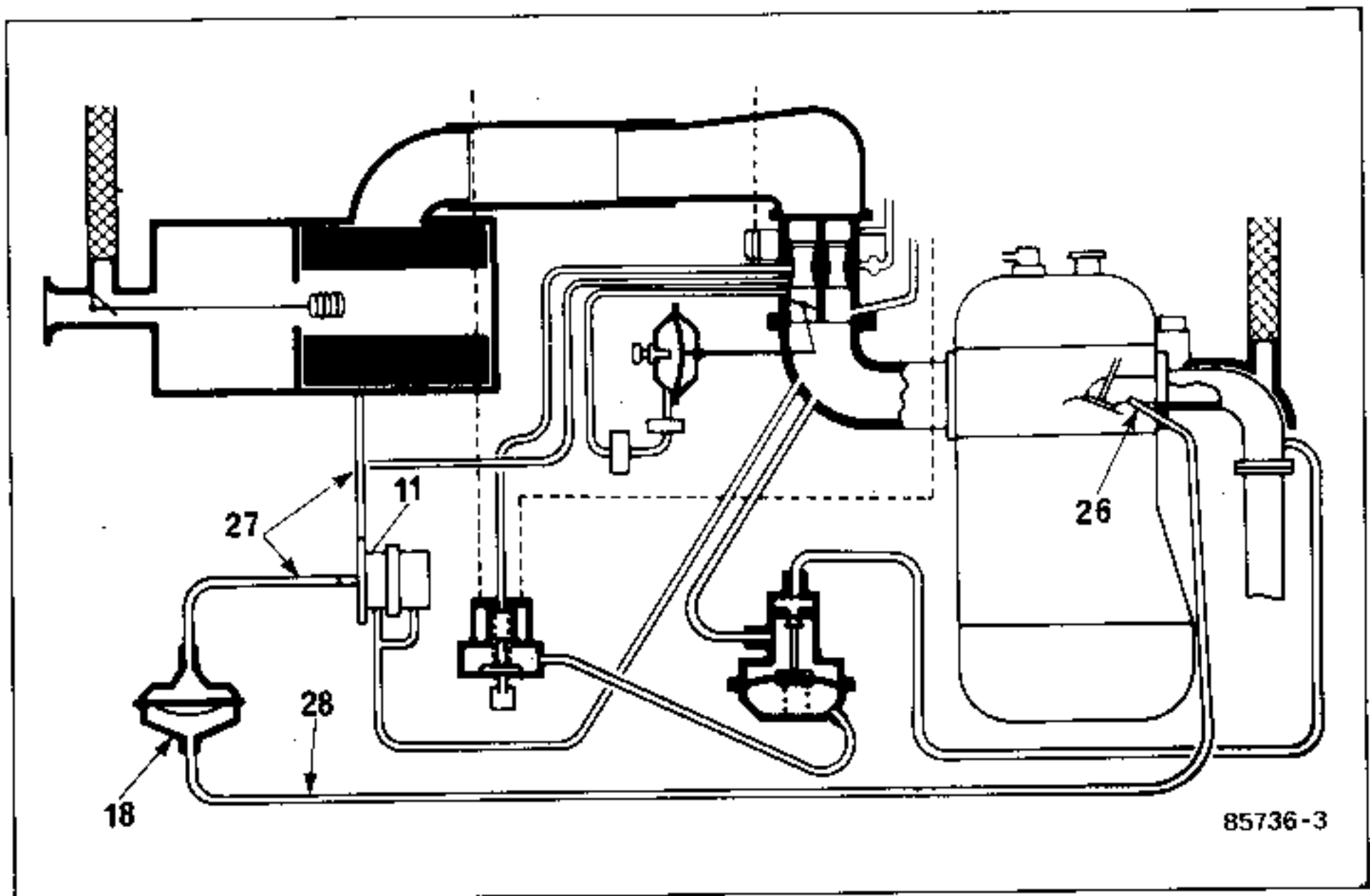
**CHECKING THE OPERATION OF THE SYSTEM
INJECTING AIR INTO THE EXHAUST**

The air injection system consists of:

- two air injection valves (18);
- four injectors (26) opening out under the exhaust valves;
- a hose (27) connecting the air filter to the two valves (18) by means of a bypass valve (11) and hoses (28) connecting the air injection valves to cylinders (1) and (4) and (2) and (3).



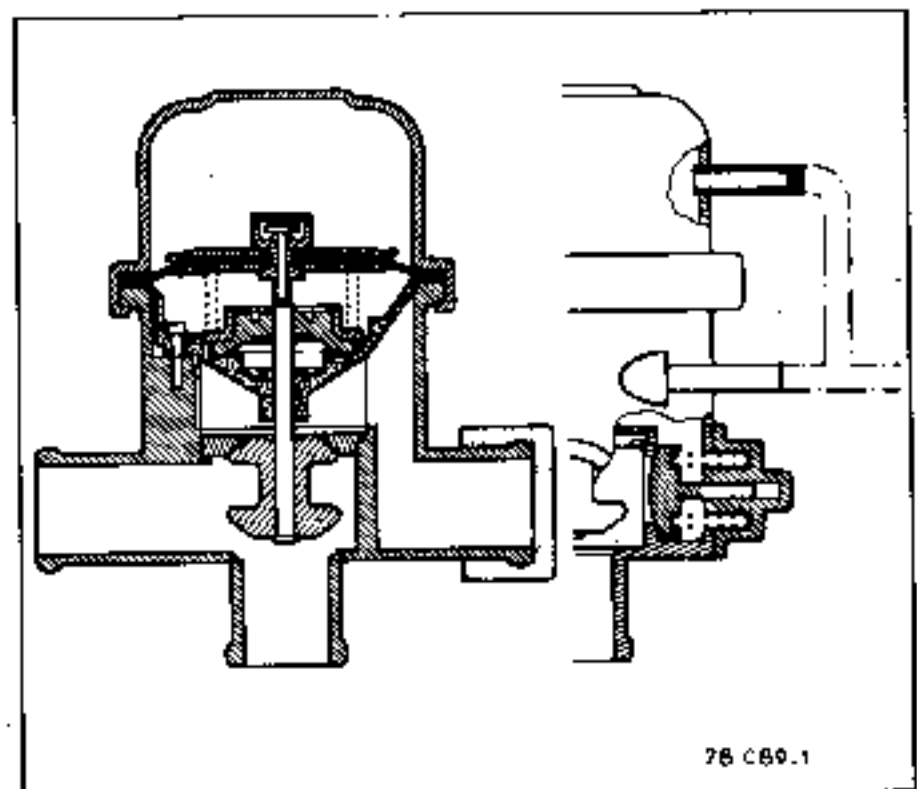
OPERATION OF THE SYSTEM FOR THE INTAKE OF AIR INTO THE EXHAUST (continued)

**Operation**

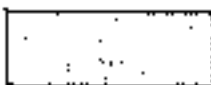
When the exhaust valve has closed, the gas inertia causes a vacuum behind the valve. Because of this, the ambient air coming from the air filter passes via the air inlet valve and arrives behind the valve to oxidise the unburnt gases. When the pressure behind the valve is greater than atmospheric pressure the air inlet valve closes and prevents the return of the gases.

BY-PASS VALVE

To prevent back-firing, a by-pass valve (11) cuts off the air injection during deceleration.



FUNCTION TESTED



CONDITIONS - TOOLING	OBSERVATIONS	COMMENTS
IDLING SPEED REGULATION		
<ul style="list-style-type: none"> - Engine hot - Hoses between air inlet valves and air filter blocked. 	<p>800 ± 50 rpm CO 1.5 ± 0.5%</p>	<ul style="list-style-type: none"> - Warm up engine at 2000 rpm before performing adjustment. <p>Note: After removing clamp from air inlet valves, the engine speed should increase by approximately 50 rpm.</p>
FAST IDLING		
<ul style="list-style-type: none"> - Engine hot - After adjusting normal idling speed - Connect throttle opener directly to manifold (600 mbar). - Depress accelerator pedal. - Wait approximately 4 secs. for engine speed to stabilise. 	<p>1800 ± 100 rpm</p>	<p>If engine speed measured is not within given tolerances, it must be adjusted via throttle opener screw. After adjustment, however, the engine must be returned to normal idling speed by disconnecting the throttle opener and repeating the entire checking operation.</p>
ADVANCE CORRECTION DURING CHOKE PHASE		
<ul style="list-style-type: none"> - Engine hot - Disconnect the two leads from 60° sensor (mark 24) and connect them together. 	<p>Engine picks up speed (approx. 200 rpm)</p> <p>If engine speed increases very gradually (200 rpm in approx. 10 secs.)</p>	<p>If engine speed does not vary check with a vacuum gauge to see whether the AEI capsule is correctly supplied with a vacuum.</p> <ul style="list-style-type: none"> - If it is: change the AEI unit - If it is not: check the connection of solenoid valve (14) <p>Check direction of delay valve (mark 13) - green in colour</p>
LOCKING OF CARBURETTOR SECOND BARREL THROTTLE BUTTERFLY		
<ul style="list-style-type: none"> - Engine hot - Vacuum gauge 0 - 1000 - Disconnect vacuum hose from "lung" on side of carburettor (mark 27 - page 14-7) 		<p>If the pressure gauge shows a vacuum, check the valve connections (12).</p>

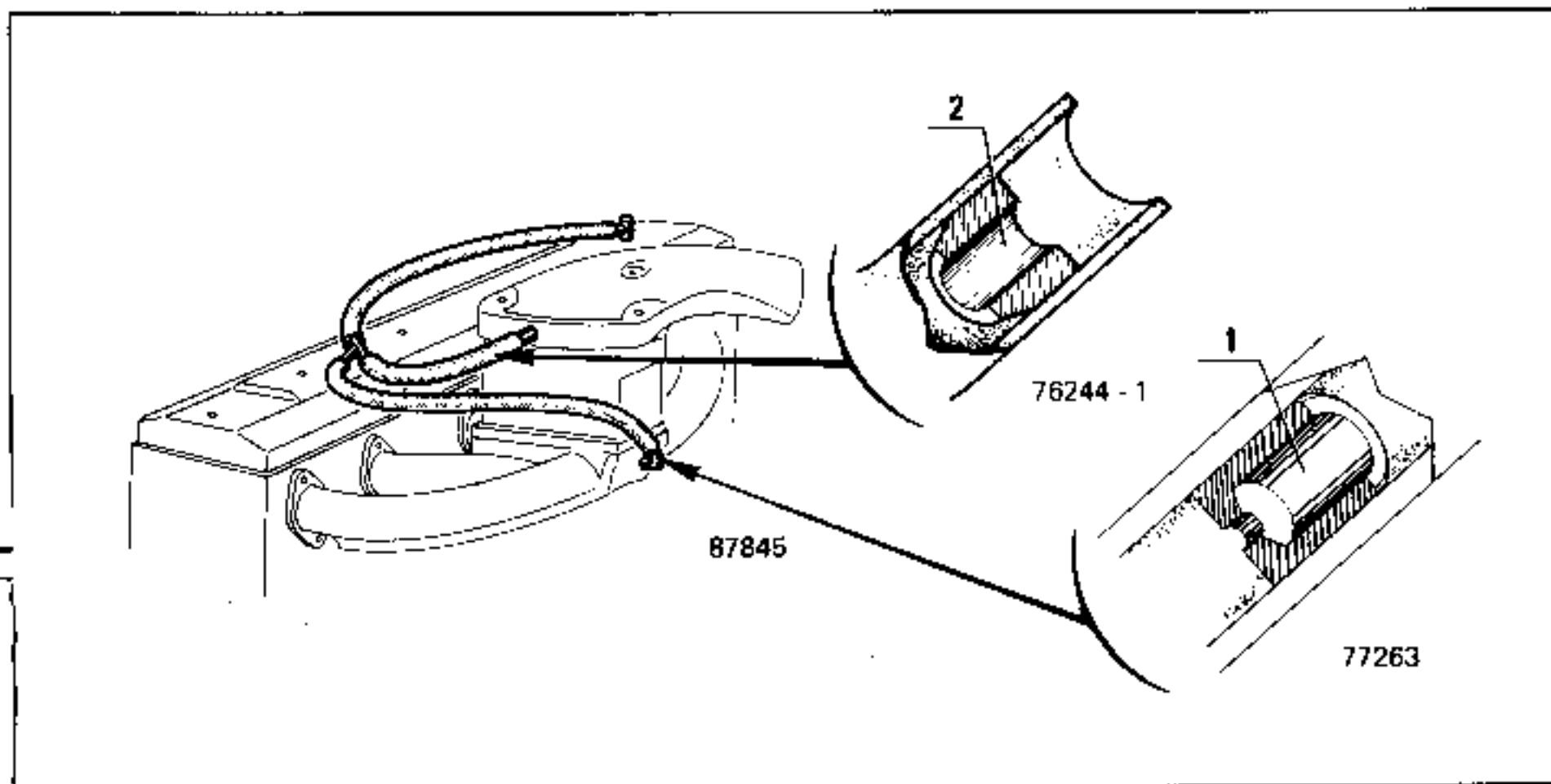
TEST OF ANTI-EVAPORATION SYSTEM

FUNCTION TESTED	TEST APPARATUS	CONDITIONS	OBSERVATIONS	COMMENTS
Bleeding of anti-evaporation system	Vacuum gauges connected in parallel - at M1 - at M2 - Voltmeter	Engine hot, after cooling fan has cut in twice		
		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 the solenoid valve terminals Vacuum at M2 = Vacuum at M1 Voltage drops to 0 when accelerator depressed	If voltage on solenoid valve and vacuum at M2 does not equal vacuum at M1, check harness between solenoid valve and computer.
Bleeding of anti-evaporation system	XR 25 test box 2 vacuum gauges	Engine hot after cooling fan motor has cut in twice	Disconnect one of the two leads going to solenoid valve	At idling: variation in idling speed and cyclic opening ratio enter # 12 on XR 25.
Solenoid valve check	- at M1 - at M2 - rev. counter	On idling	Disconnect the 2 leads from the solenoid valve. Connect a +12 volt supply to one terminal of the solenoid valve and a (-) earth to the other terminal and disconnect one of the two leads. Vacuum at M1 = vacuum at M2 Drop in engine speed and vacuum at M1. Disconnect the line to solenoid valve at M2; apply a vacuum of approx 300 mbar with manual vacuum pump on the line.	Otherwise, check solenoid valve and connection of air circuits. On idling: variation in engine speed (increase) and reduction in cyclic opening ratio. If not: check air circuits.
Checking the air circuits				

FUNCTION TESTED

CONDITIONS* - TOOLING	OBSERVATIONS	COMMENTS
ELECTRICAL ASSISTANCE		
<ul style="list-style-type: none"> - Engine cold, external temperature \rightarrow 15°C - Disconnect the electric assistance lead. - And connect test apparatus (test bulb and voltmeter) 	<ul style="list-style-type: none"> - Warning light illuminates - 14 to 12 volts voltage 	<p>If the light does not illuminate, check the electrical circuit or 15° sensor (22).</p>
EXHAUST GAS RECIRCULATION VALVE FEED CIRCUIT		
<ul style="list-style-type: none"> - Engine hot. - Disconnect the vacuum hose from the recirculation valve. Connect in place of valve a 0-1000 mbar vacuum gauge. Disconnect the leads from the 60°C sensor (mark 24), connect them together and keep engine speed at 2500 rpm approx. 		<p>If vacuum gauge indicates a vacuum, check the air connections and electrical connections of solenoid valve (mark 5)</p>
<p>Reconnect the 60°C sensor (mark 24) and keep the engine speed at approx. 2500 rpm.</p>	<p>The vacuum gauge should show a vacuum greater than or equal to 100 mbars.</p>	<p>If it does not, check the electrical and air connections of solenoid valve (mark 5) and that temperature sensor (mark 24) is operating correctly - it should be non-conductive for coolant temps. $>$ than or equal to 60°C.</p>
FAST IDLING (throttle opener with chamber plus delay valve) Time taken to pass from fast idling to idling speed		
<ul style="list-style-type: none"> - Engine hot - Run the engine unladen at speed of 3000 rpm approx. then release throttle control rapidly. 	<p>The engine speed drops progressively and returns to normal idling speed after a period of time less than or equal to 8 seconds.</p>	<p>If the return to normal idling speed is:</p> <ul style="list-style-type: none"> - abrupt, without dropping gradually, check fitting direction of delay valve (mark 6). - longer than 8 seconds, check that brown-white delay valve (mark 6) is to specification

The gases coming from the crankcase are recirculated from the rocker cover on the inlet manifold by a dual circuit (upstream and downstream) and are burned in the combustion chamber.

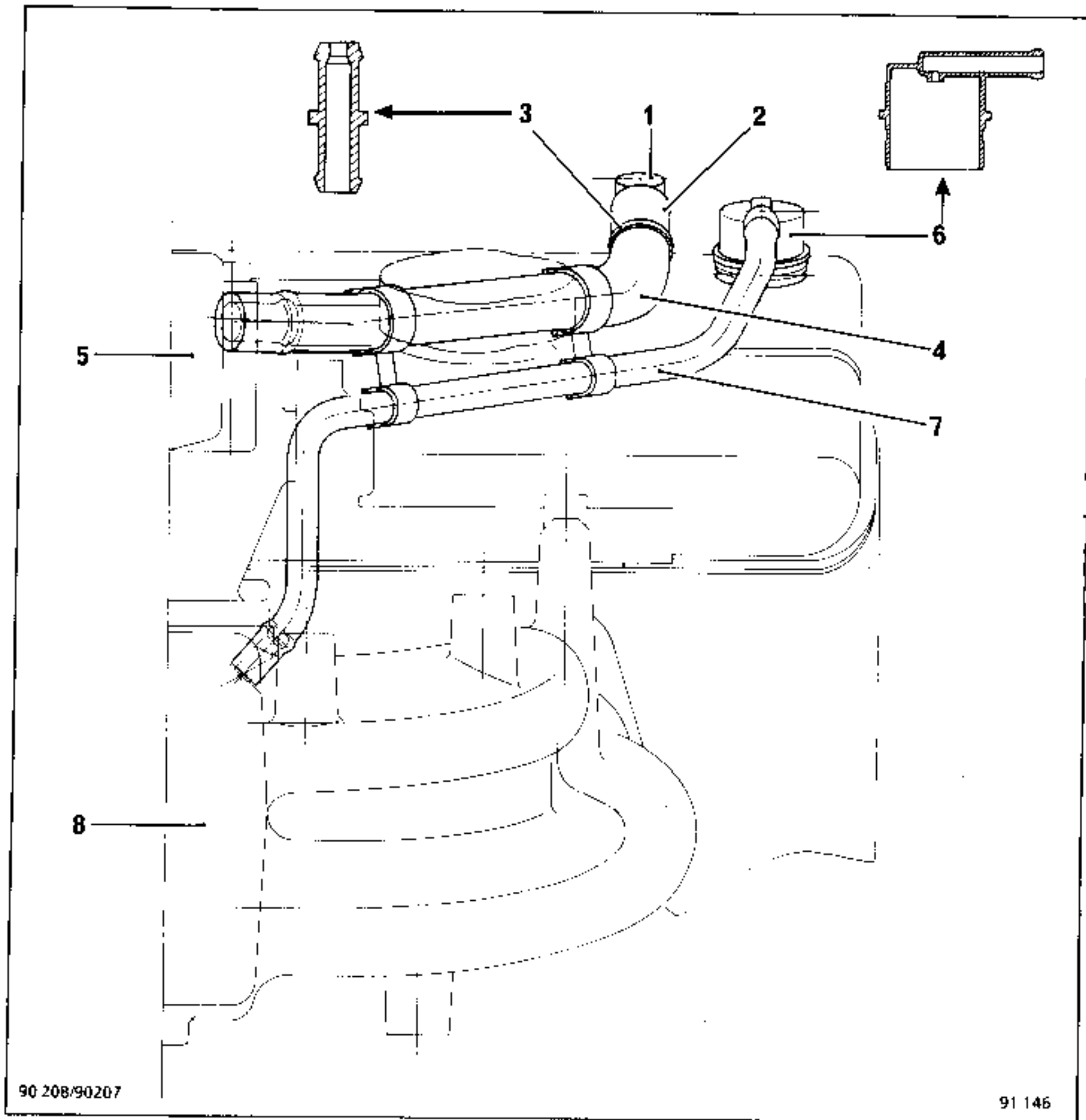


Restrictor 1: 1.7 mm dia.

Restrictor 2: 5.5 mm dia.

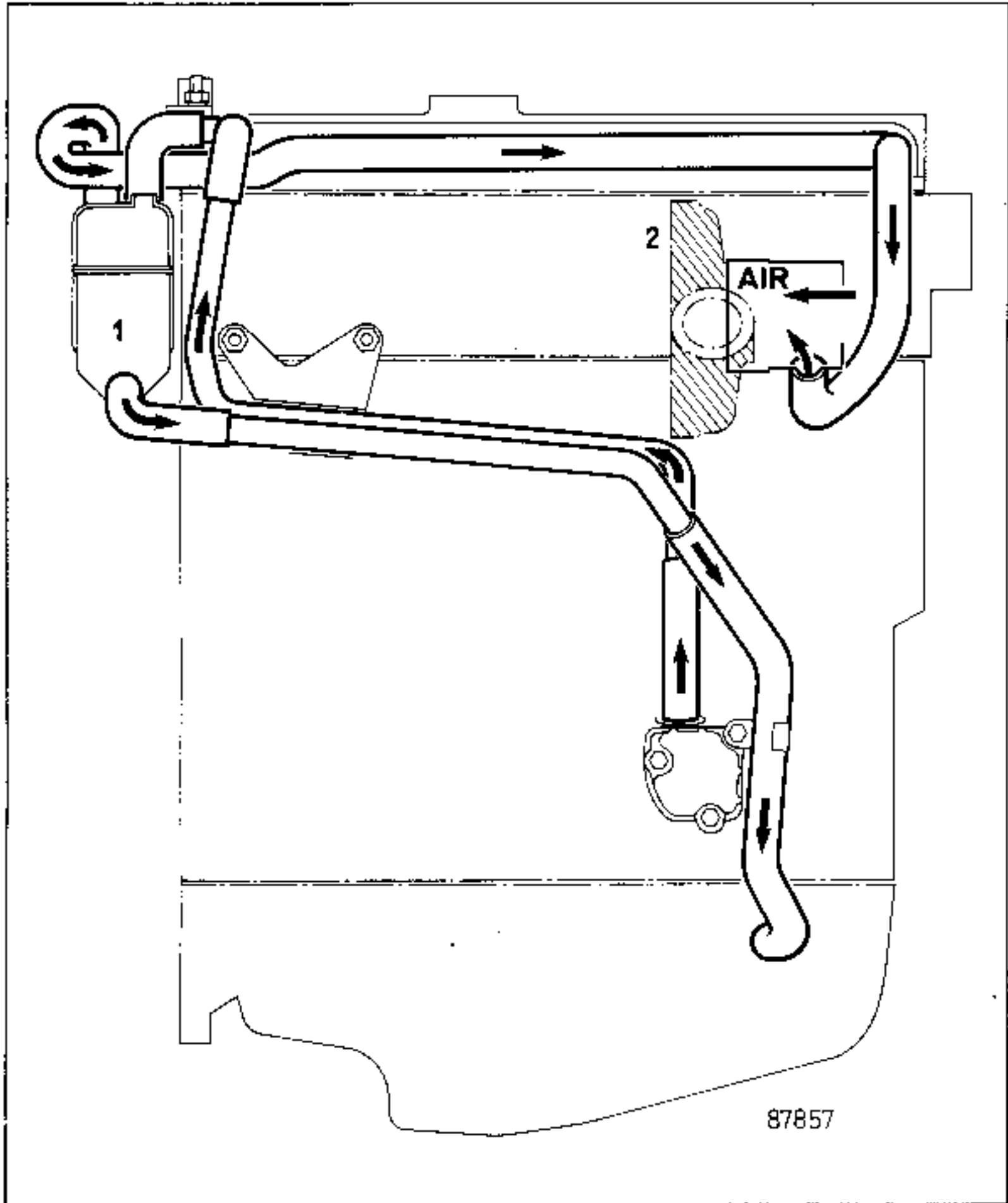
Checking

To ensure that the anti-pollution system is operating correctly, the oil vapour rebreathing system must be kept clean and in good condition. Check that the restrictors are fitted and are to specification.



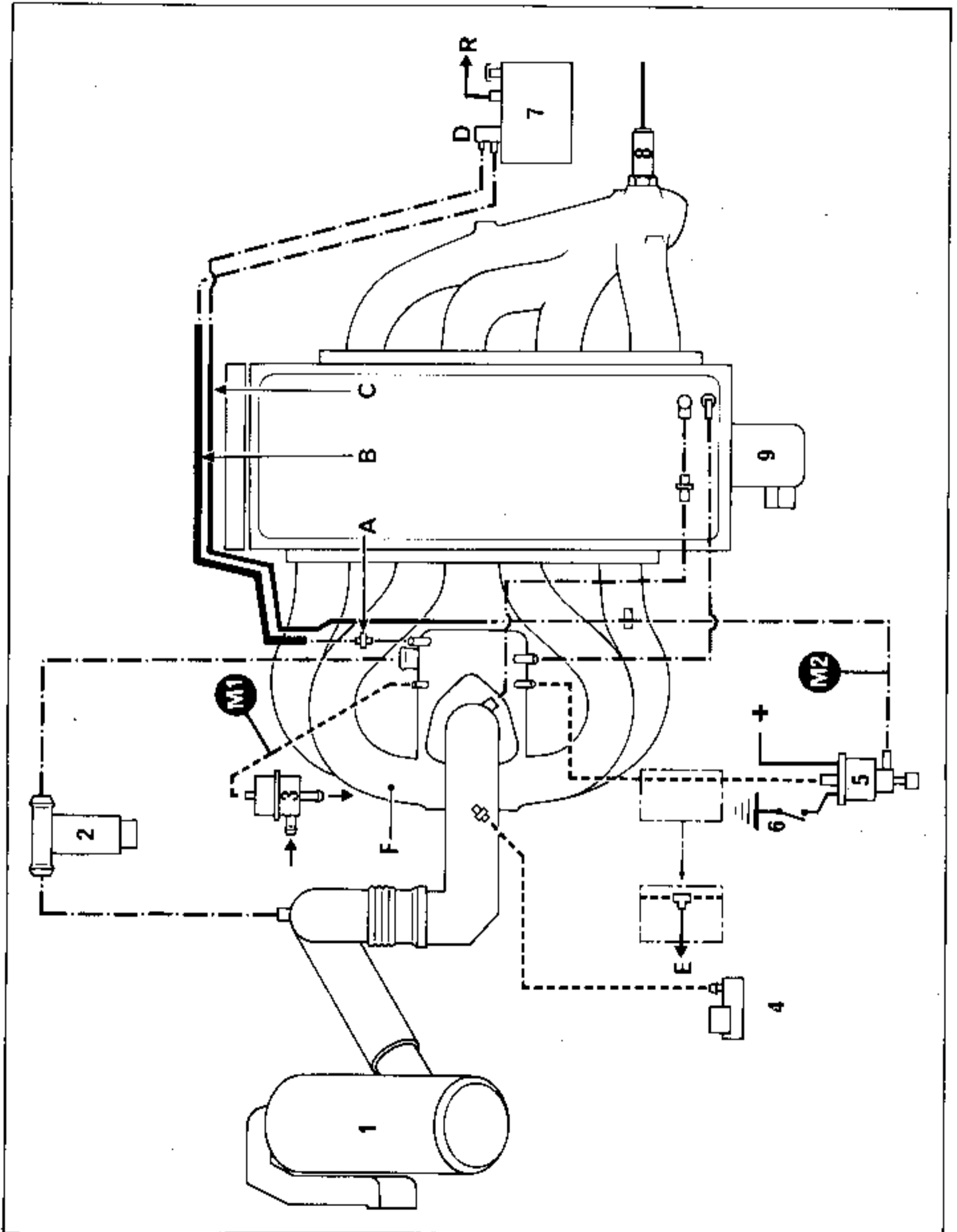
- 1 2-way union
- 2 Hose connecting restrictor and 2-way union
- 3 6 mm dia., yellow restrictor
- 4 Hose connecting restrictor and cover
- 5 Cover on throttle casing

- 6 2-way union
internal calibration: 2.2 mm dia.
- 7 Hose connecting 2-way calibrated union and manifold
- 8 Manifold



- 1 - Oil separator
- 2 - Turbocharger

SPECIAL FEATURES



SPECIAL POINTS

- 1 Air filter
- 2 Idling speed regulation valve
- 3 Fuel pressure regulator
- 4 Pressure sensor
- 5 Solenoid valve controlling fuel vapour absorber
- 6 Computer
- 7 Fuel vapour absorber (canister)
- 8 Oxygen or Lambda sensor
- 9 Ignition distributor

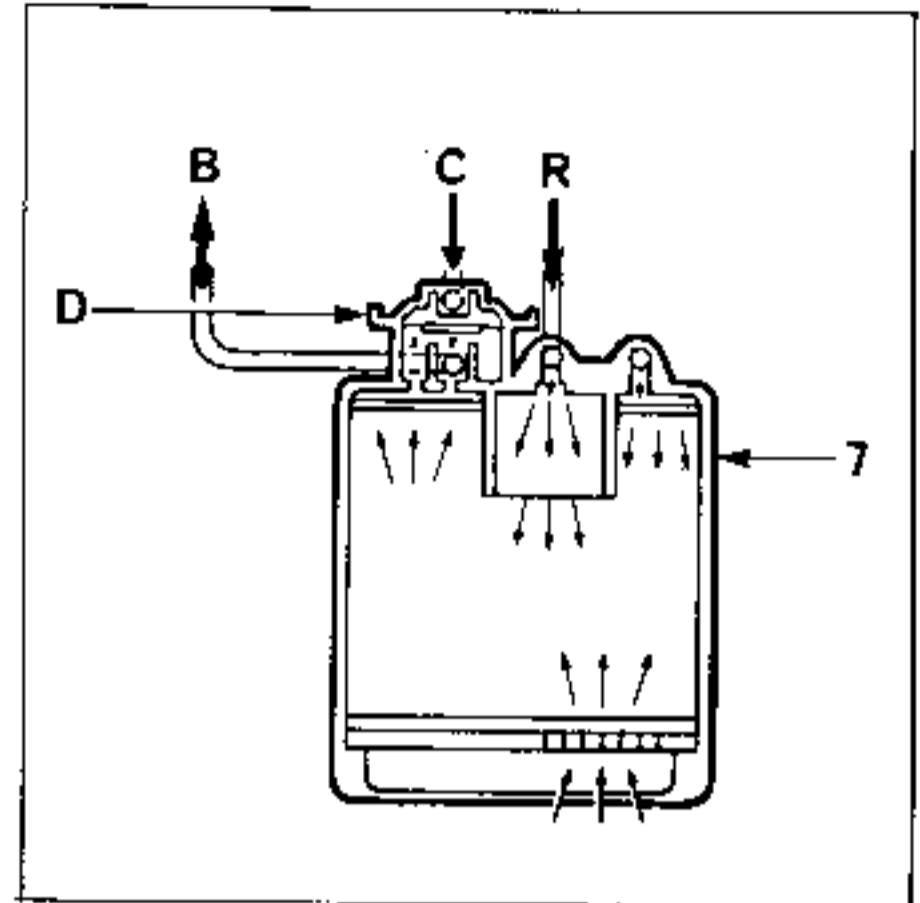
- A - 2 mm diameter, white restrictor
 B - Fuel vapour absorber bleeding lines (inlet manifold + absorber)
 C - Fuel vapour absorber bleeding guide lines (absorber - solenoid valve)
 D - Fuel vapour absorber valve
 F - Inlet manifold
 R - To fuel tank

ESPACE J117 vehicles are equipped 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 active carbon. It comprises a valve (D) connected to the inlet manifold and guided by the injection computer (6) by means of solenoid valve (5) 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

- **Engine stopped:**
The fuel vapours are collected by the fuel vapour absorber (canister).
- **Engine idling:**
There is no bleeding information to solenoid valve (5) (no control by injection computer (6)).

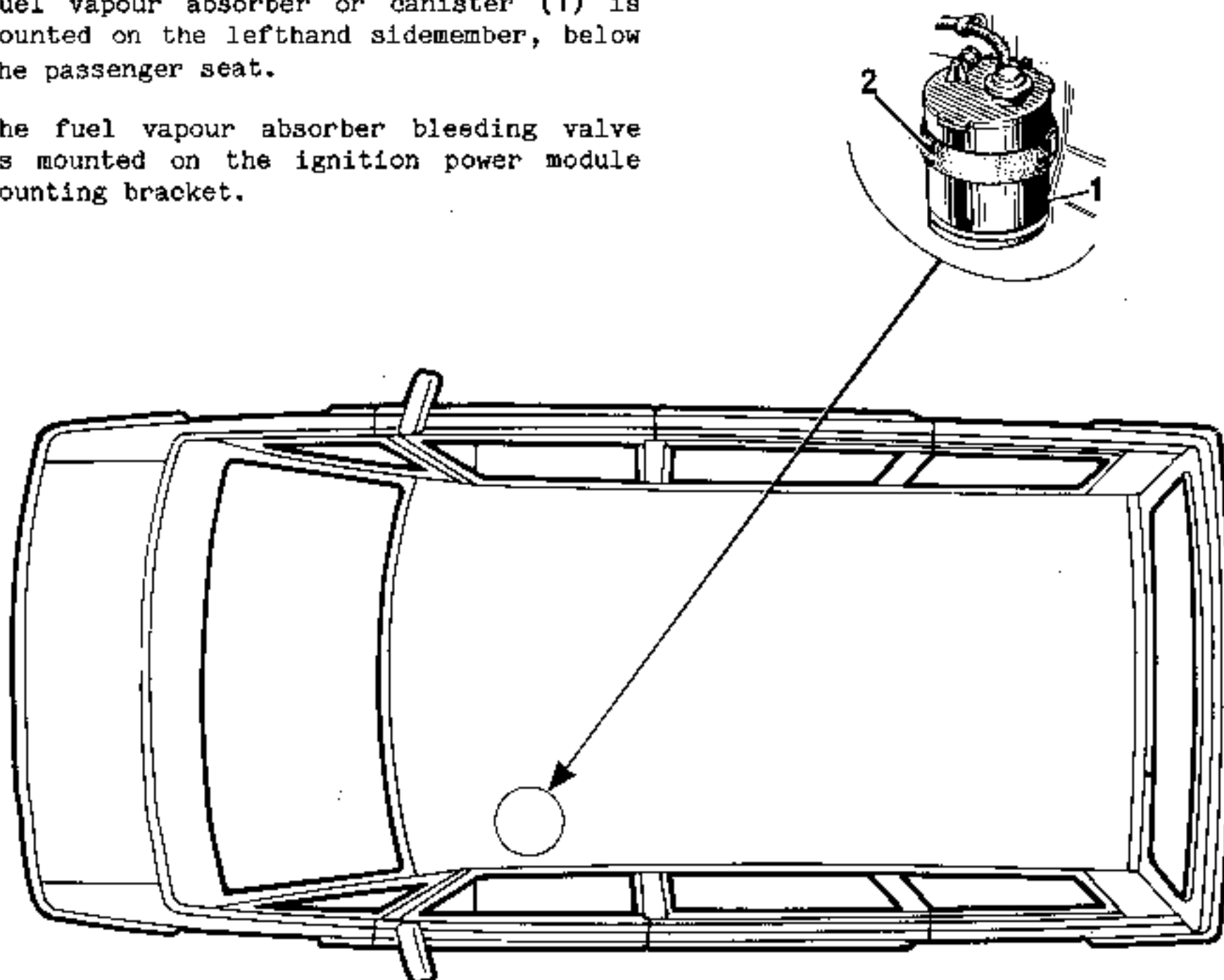


- **Engine operating other than at idling speed**
Under certain conditions, when the engine is hot, injection computer (6) guides solenoid valve (5) electrically, establishing pneumatic circuit (C) from inlet manifold (F) to fuel vapour absorber (7); the fuel vapour absorber is therefore bled.

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.

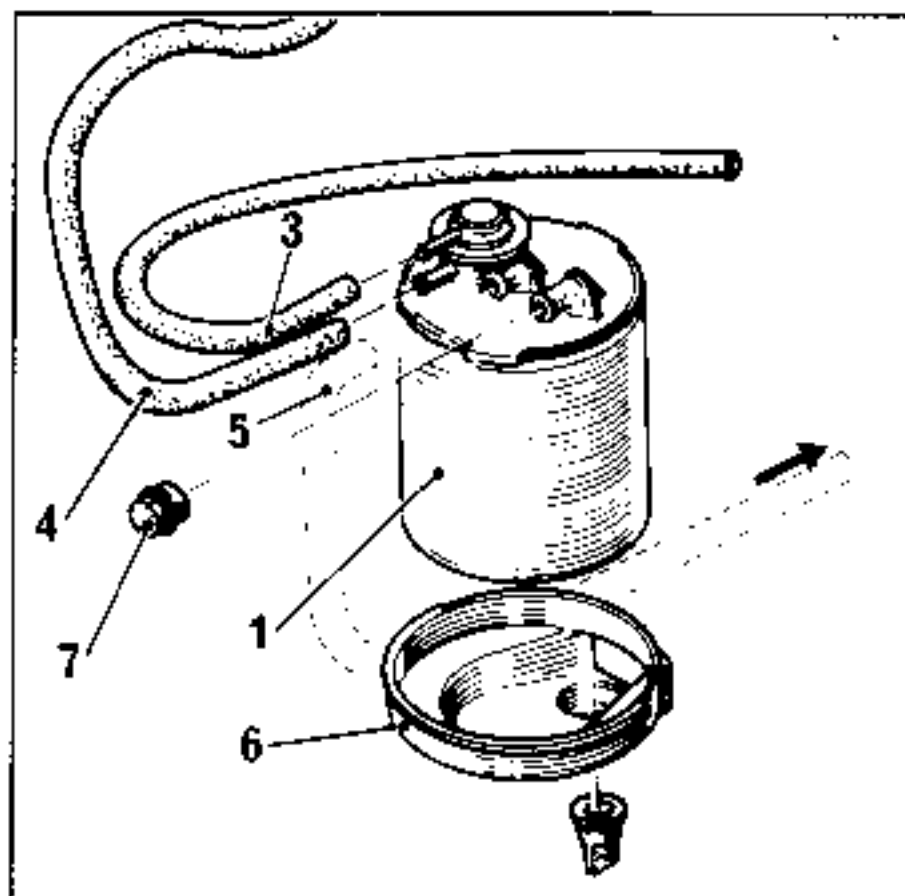
**REMOVING-REFITTING THE FUEL VAPOUR ABSORBER**

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.



ESSENTIAL SPECIAL TOOLING

Ele. 346-04 Belt tension tester

REMOVAL

Disconnect:

- the battery;
- the electric leads (connection).

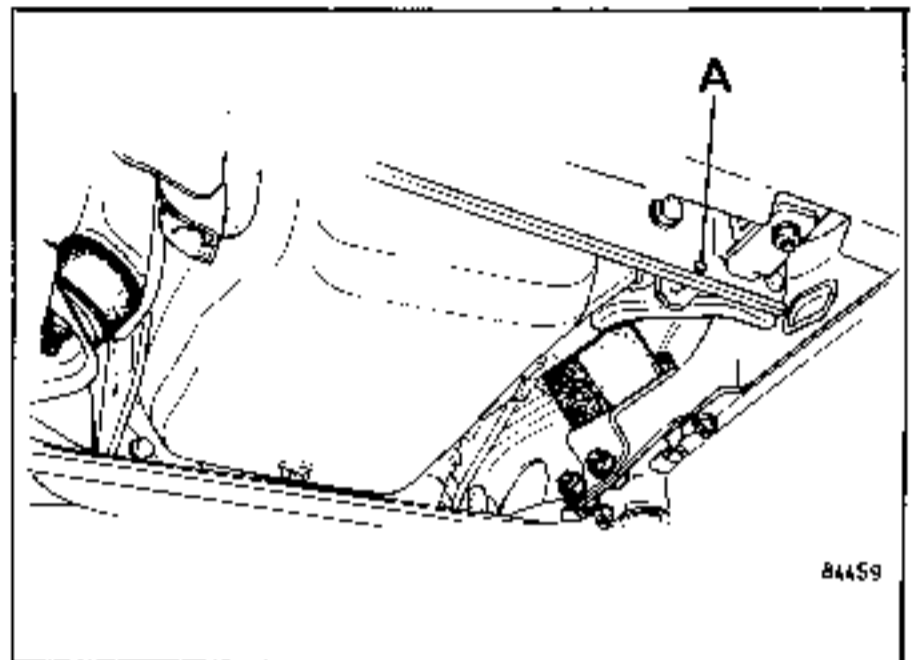
Unscrew screw (A) from the tensioner under the vehicle.

Remove screw (B) holding the tensioner.

Free the belt.

Remove screw (C) from the alternator mounting.

Remove the alternator from below.



REFITTING

Proceed in the reverse order.

BELT TENSION WHEN COLD

Tool Ele. 346-04

Arrow F = 4.5 to 5.5 mm.

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.

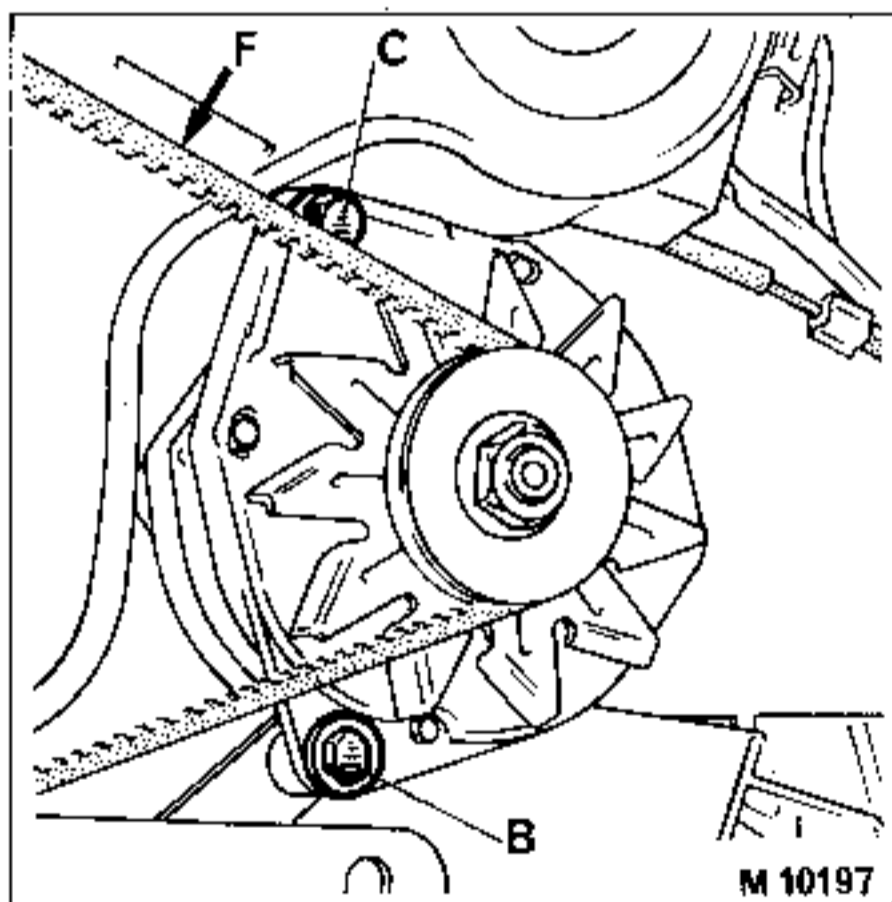
Start the engine and increase speed until the voltmeter needle stabilises at the regulated voltage.

This 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 under the vehicle.



OPERATION

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 regulator connector is connected;
- 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 customer 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.

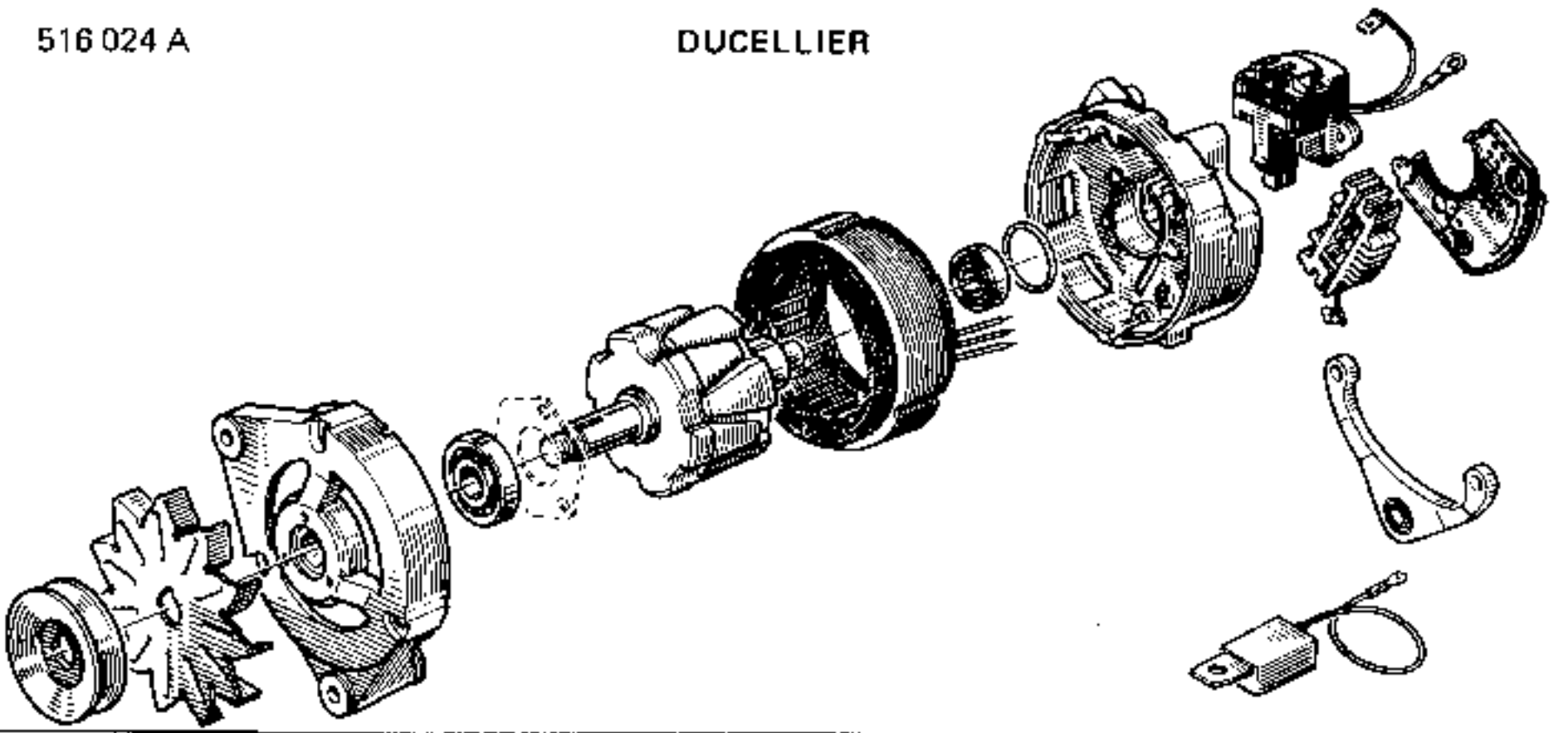
Check

After allowing the engine to warm up for 15 minutes at a voltage of 13.5 volts.

Type rpm	Ducellier 516 024 A	Paris Rhone A 13 N87	Paris Rhone A14 N75
1250	20 A	5 A	—
1500	—	—	33 A
2000	—	—	60 A
3000	61 A	53 A	82 A
6000	68 A	60 A	105 A

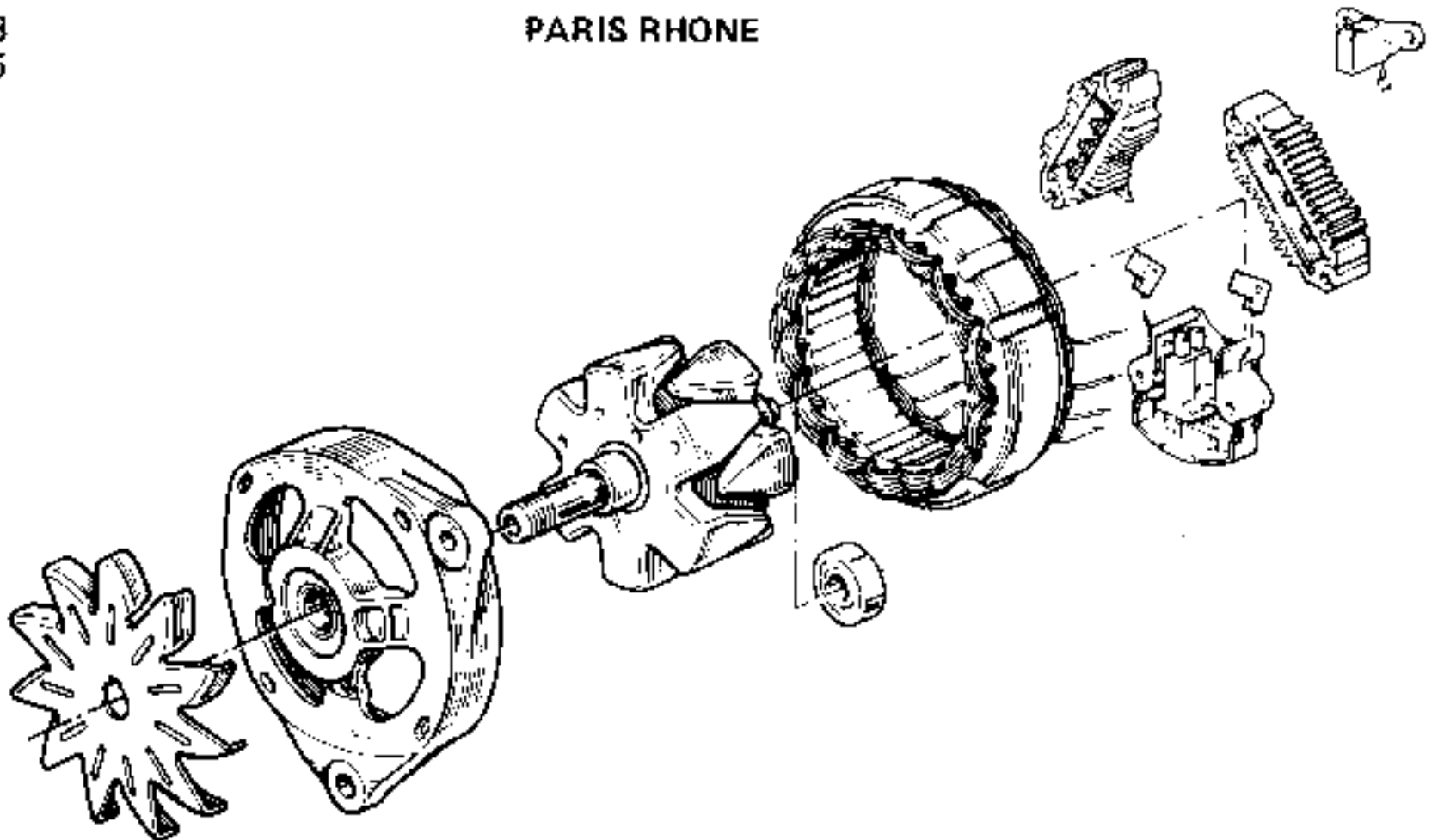
516 024 A

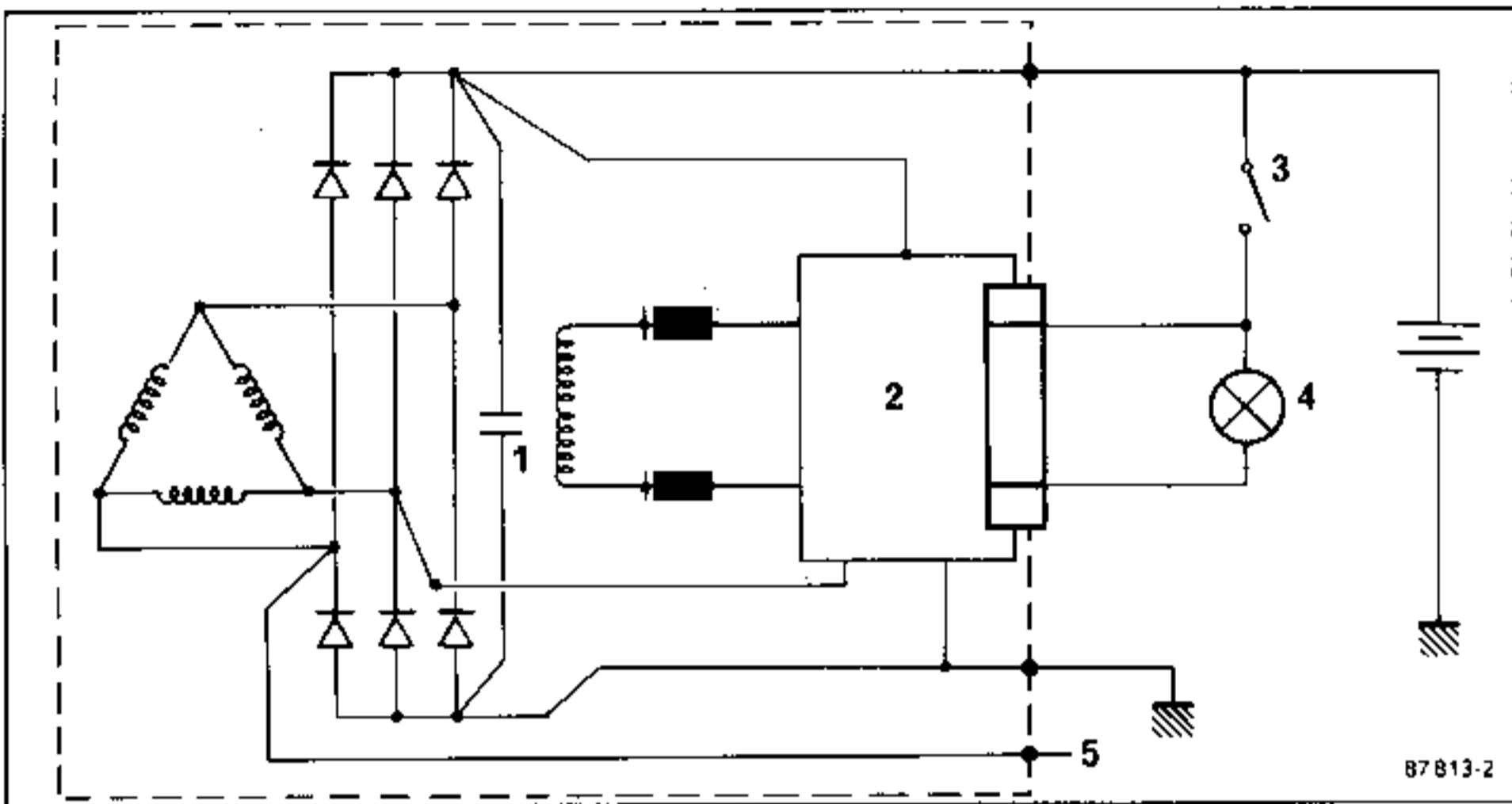
DUCELLIER



A 14 N 73
A 14 N 75

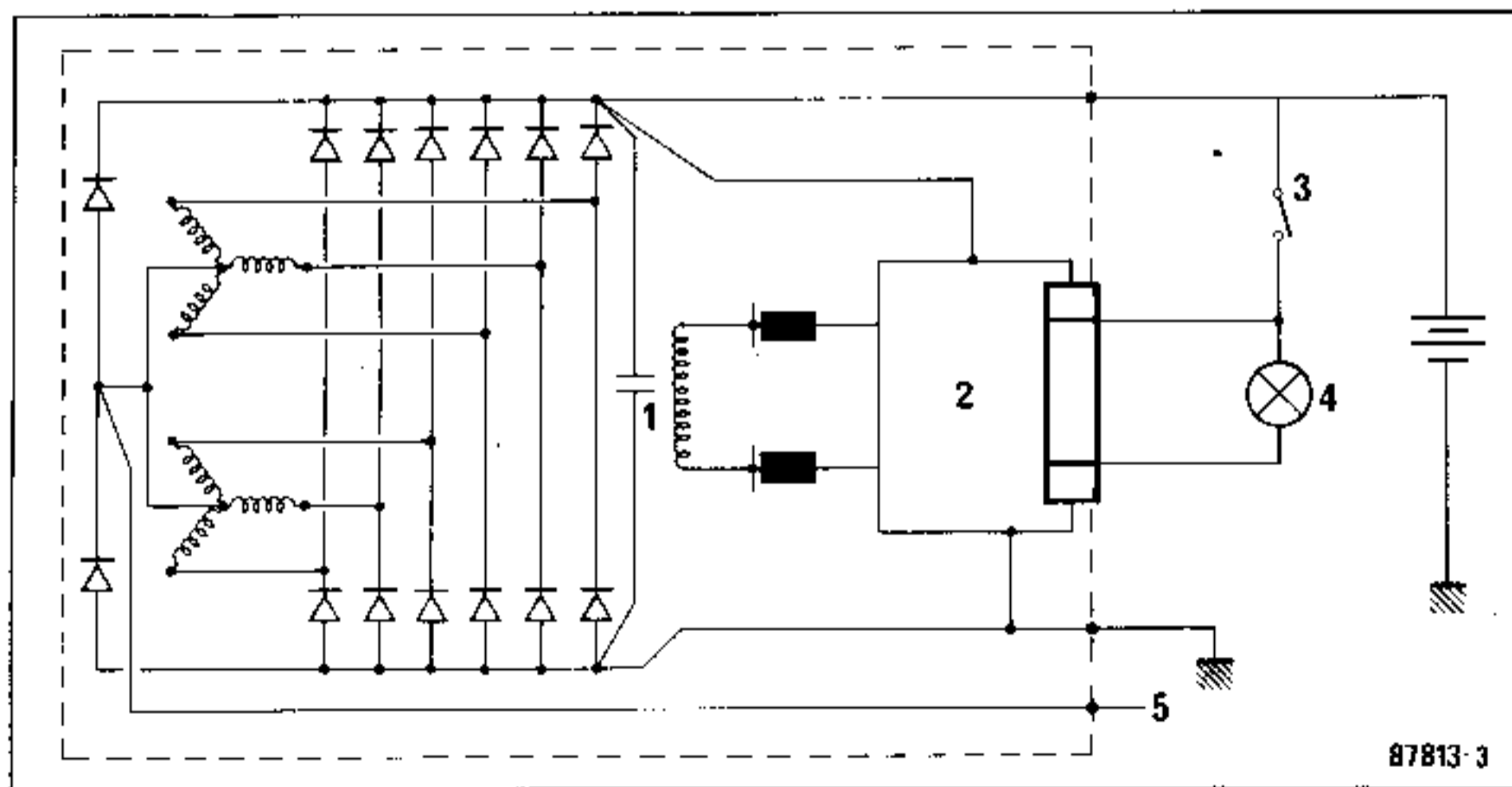
PARIS RHONE





87813-2

A 13 N 87



87813-3

A 14 N 75

- 1 - 2.2 μF capacitor
- 2 - Regulator
- 3 - Ignition switch
- 4 - Warning light
- 5 - Rev. counter

J6R - J7R - J7T ENGINES

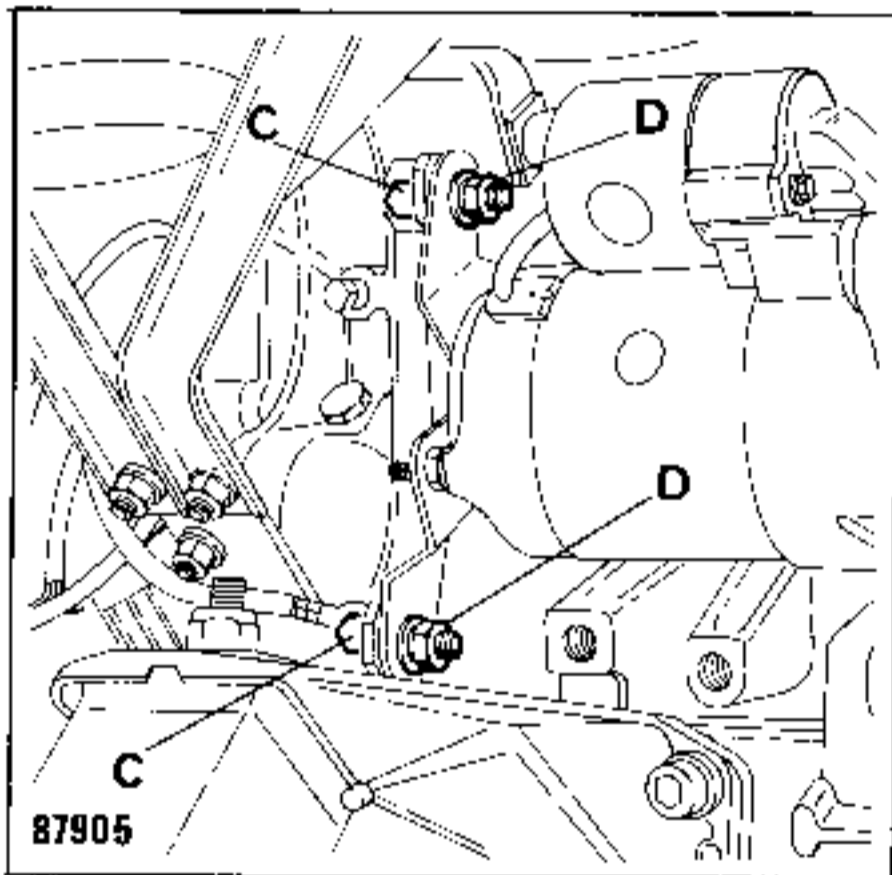
REMOVAL

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.

CHECK

Tighten bolts (C).

Tighten the two bolts (D).

J8S ENGINE

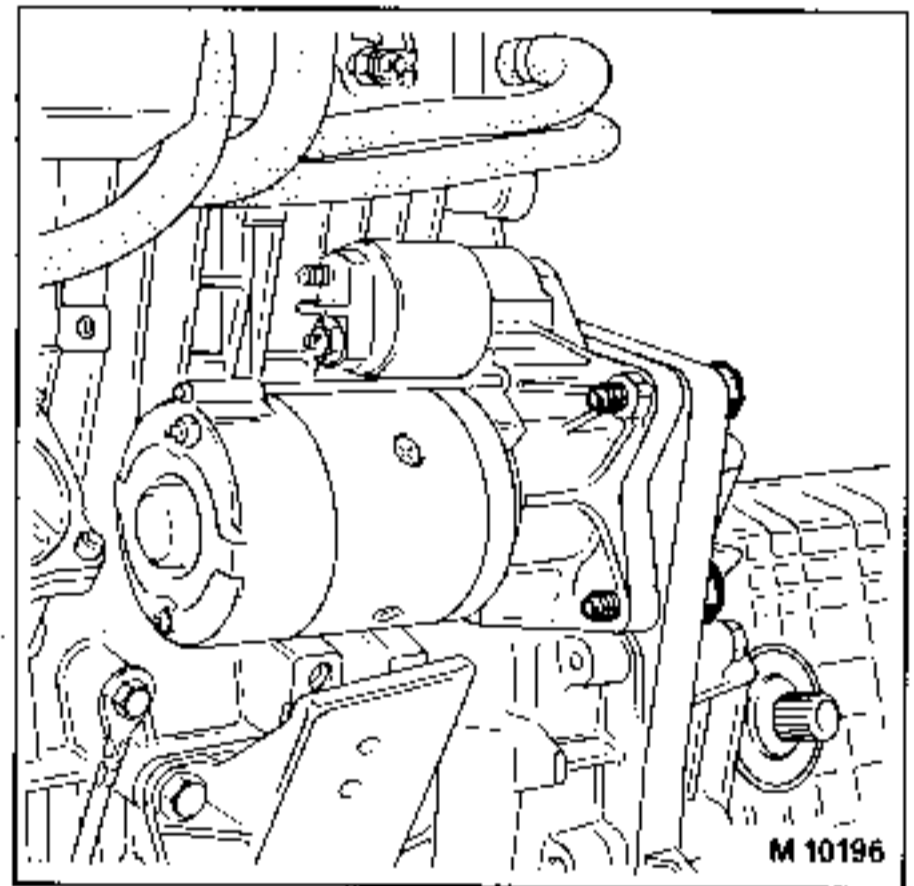
REMOVAL

Disconnect the battery.

Disconnect the leads.

Remove:

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

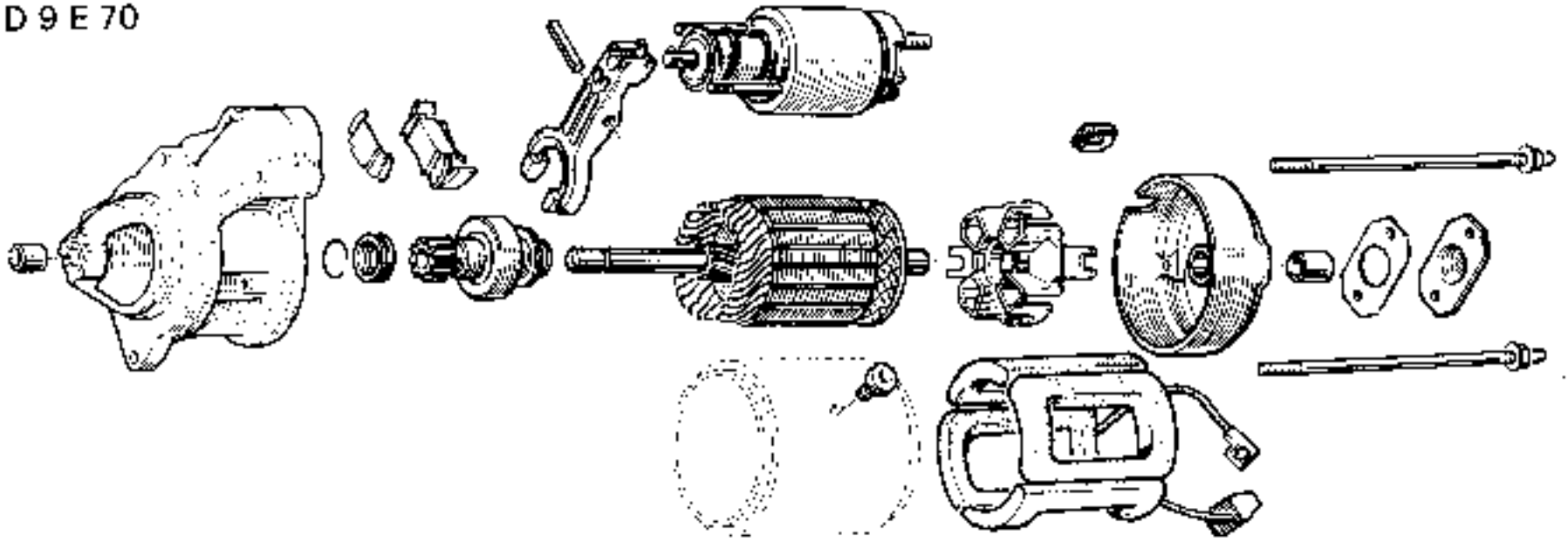


REFITTING

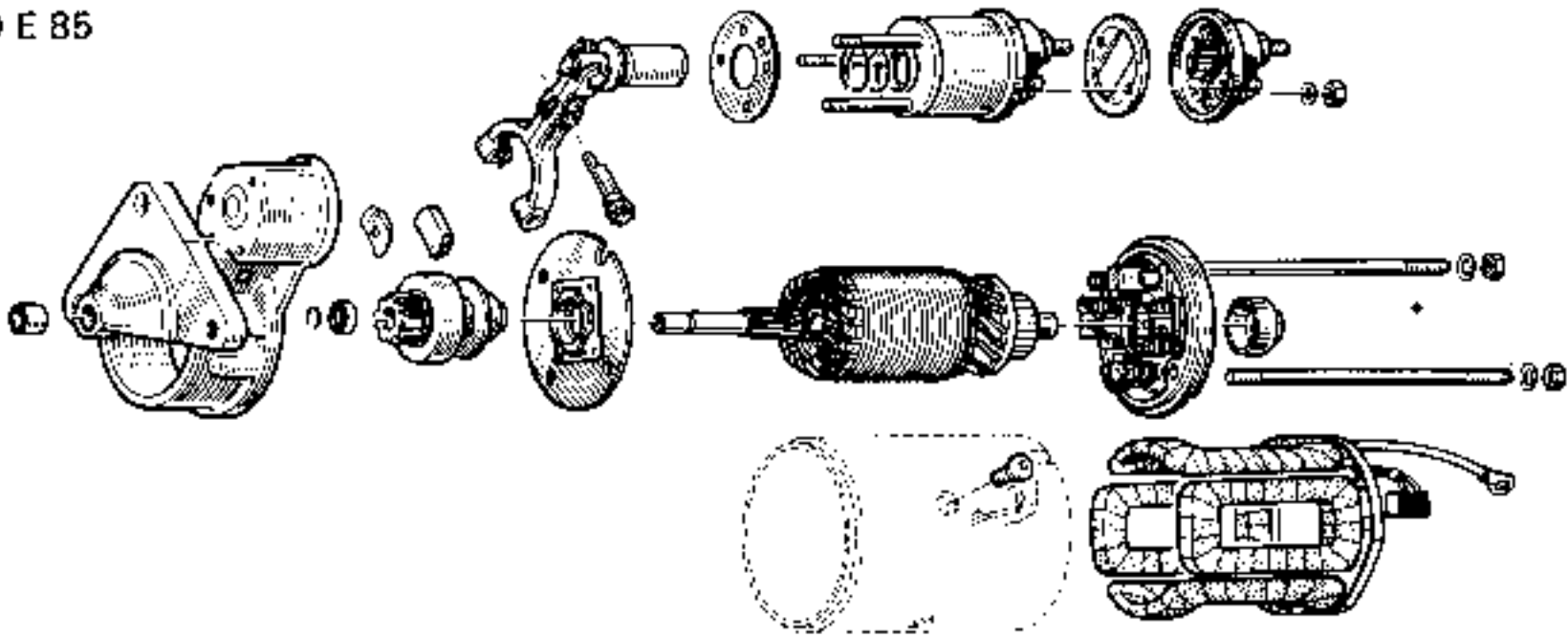
Proceed in the reverse order to removal.

Make	Type	Torque (pinion locked)	Amperage (pinion locked)	When mounted
PARIS RHONE	D 9 E 70	0,8 daN.m	400 A	Carb. and injection
PARIS RHONE	D 9 E 85	1,3 daN.m	400 A	Cold countries
PARIS RHONE	D 11 E 172	3 daN.m	800 A	Diesel
PARIS RHONE	D 9 R 73	6 daN.m	1350 A	Diesel

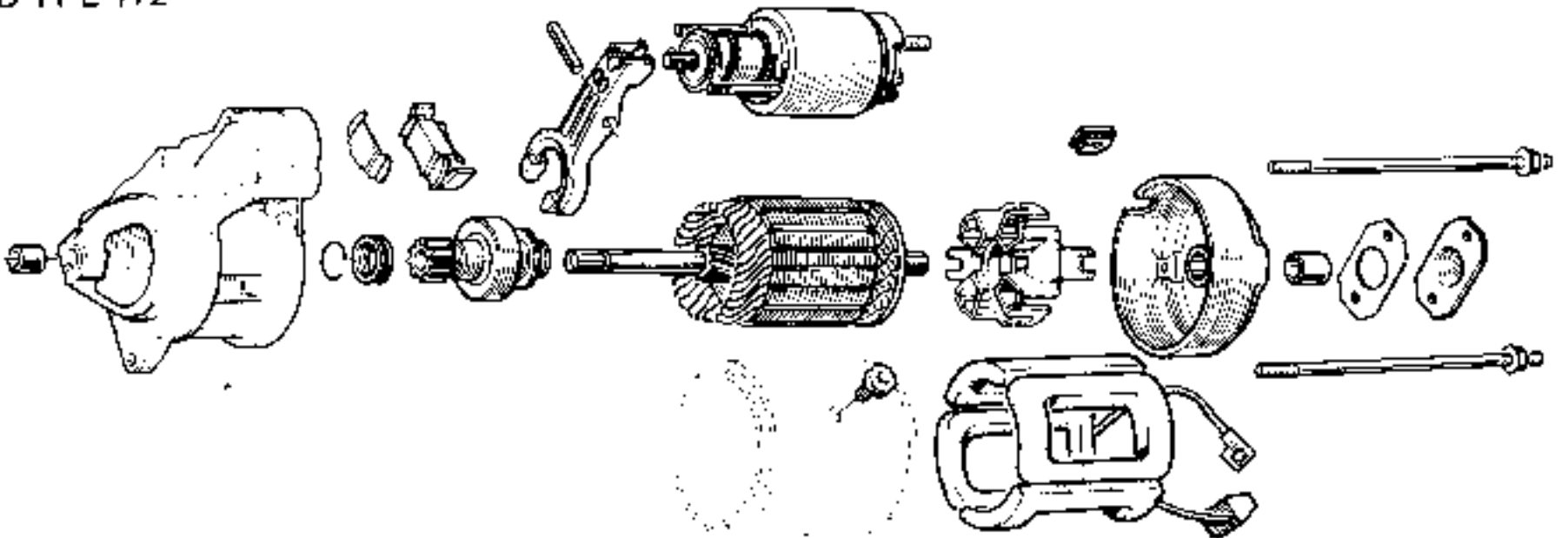
D 9 E 70



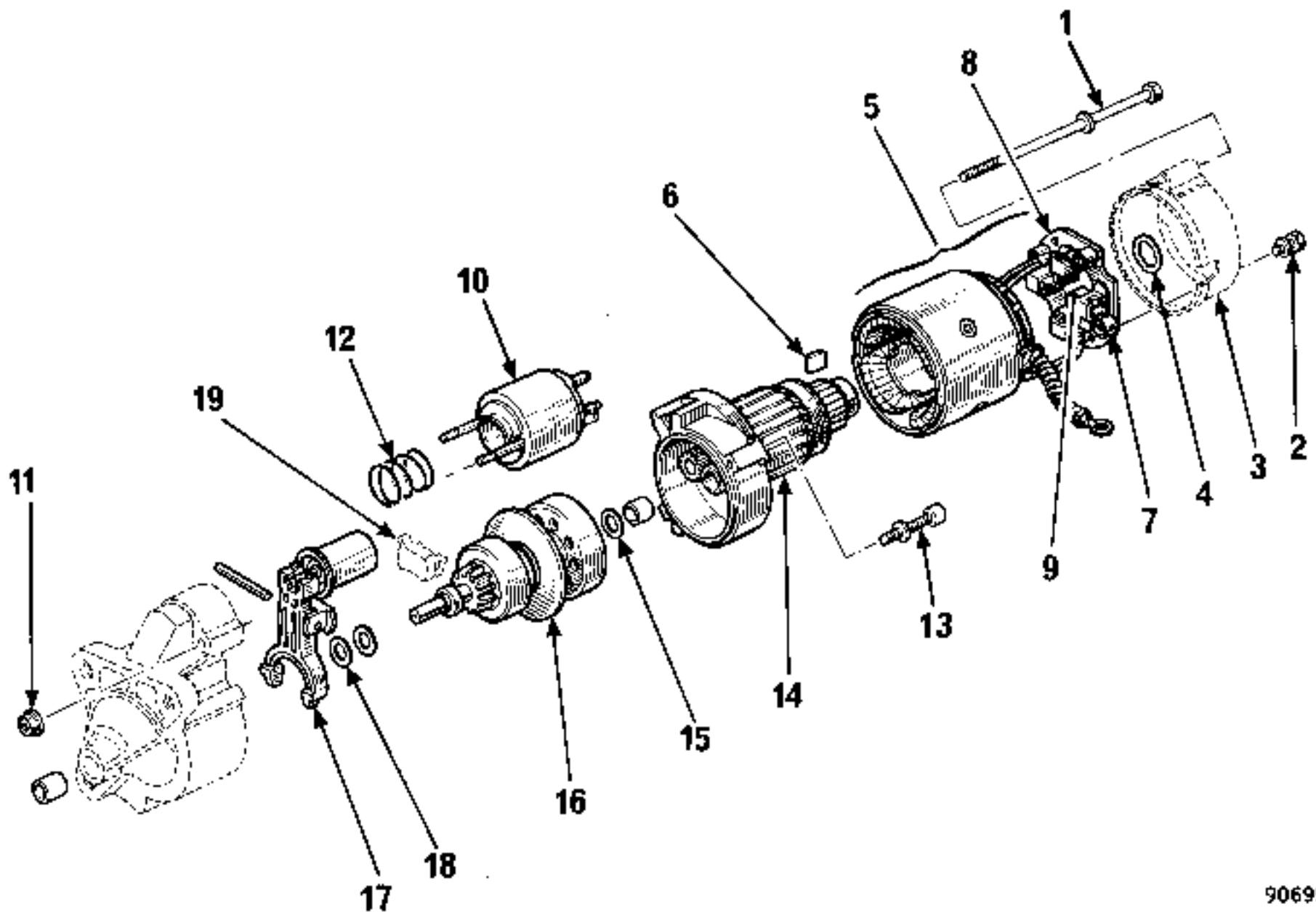
D 9 E 81
D 9 E 85



D 11 E 172



DISMANTLING - REASSEMBLY



90695

DISMANTLING THE REAR OF THE STARTER

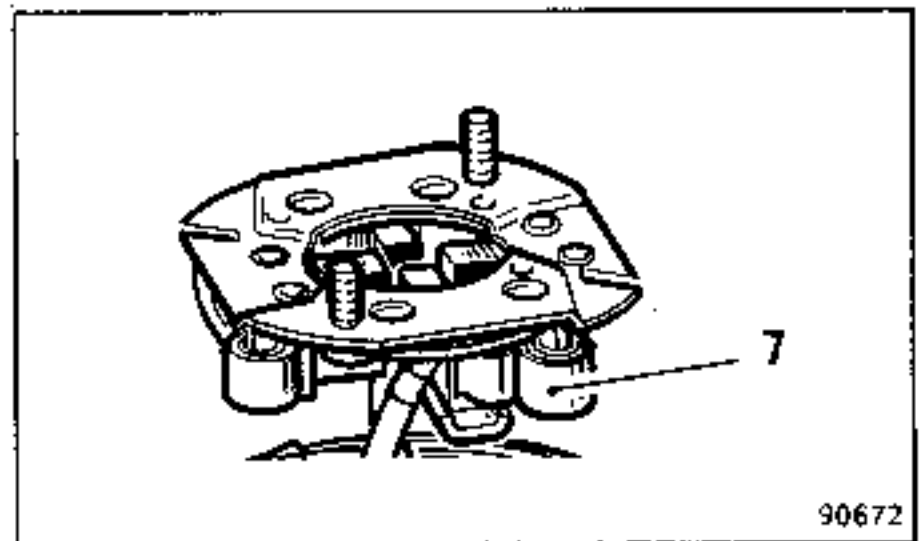
Remove:

- assembly screws (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.



90672

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.

DISMANTLING THE DRIVE

Remove:

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

SPECIAL POINTS

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

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.

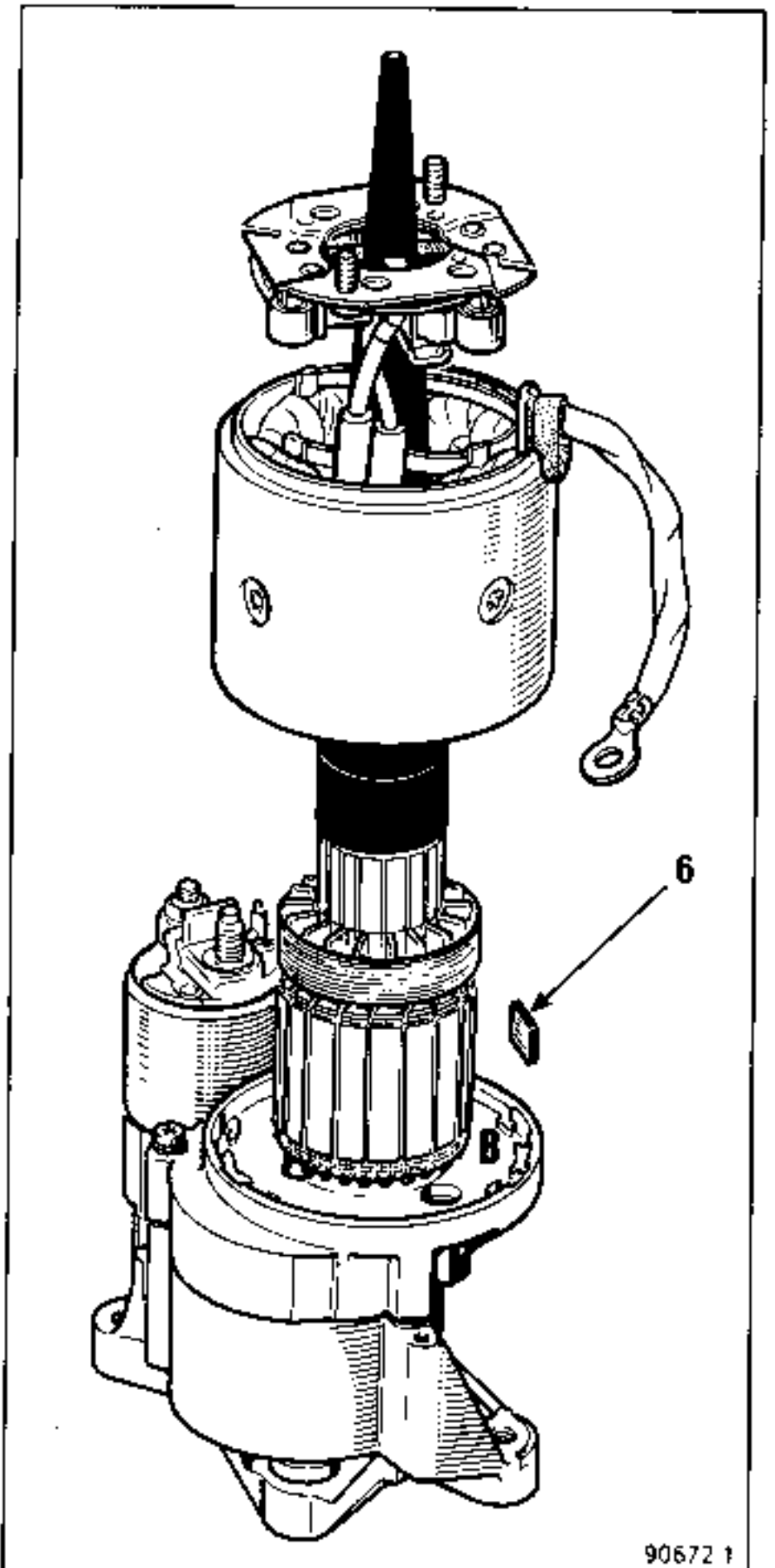
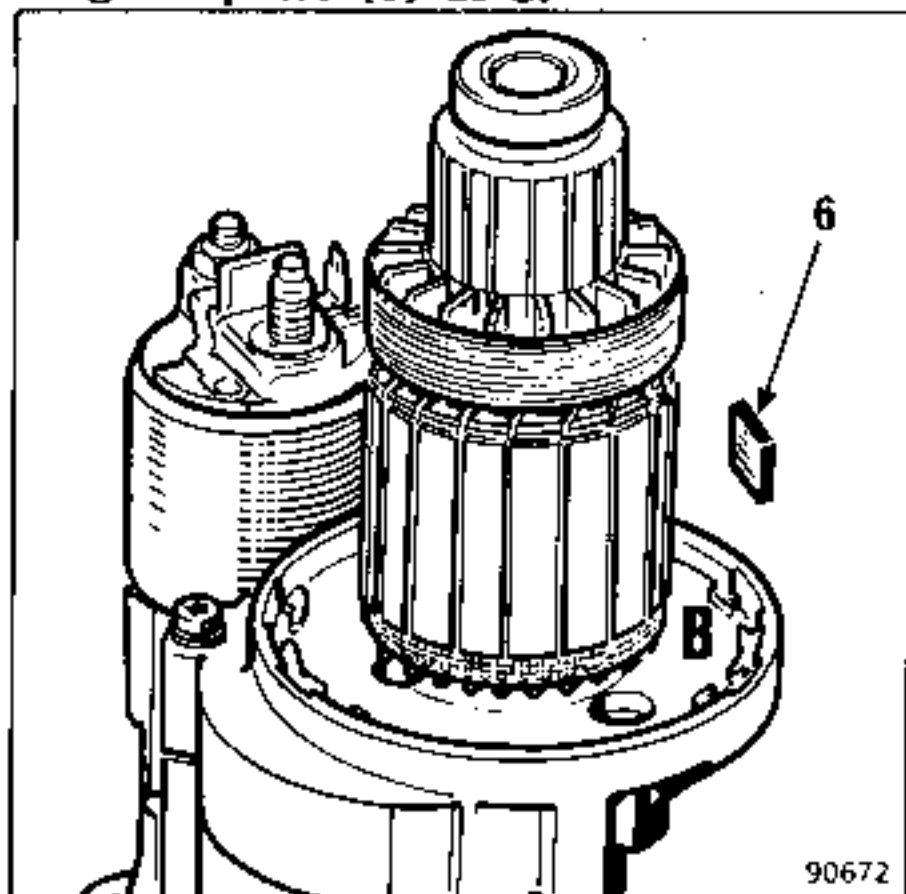
Refit the components in the reverse order to removal.

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
J 112 / S 112	J6R 234 J6R 236	RE 001 RE 020
J 112 as from February 88	J6RD 734	RE 243
J 116	J7RE 760	RENIX injection
J 117	J7TN 770	RENIX Injection

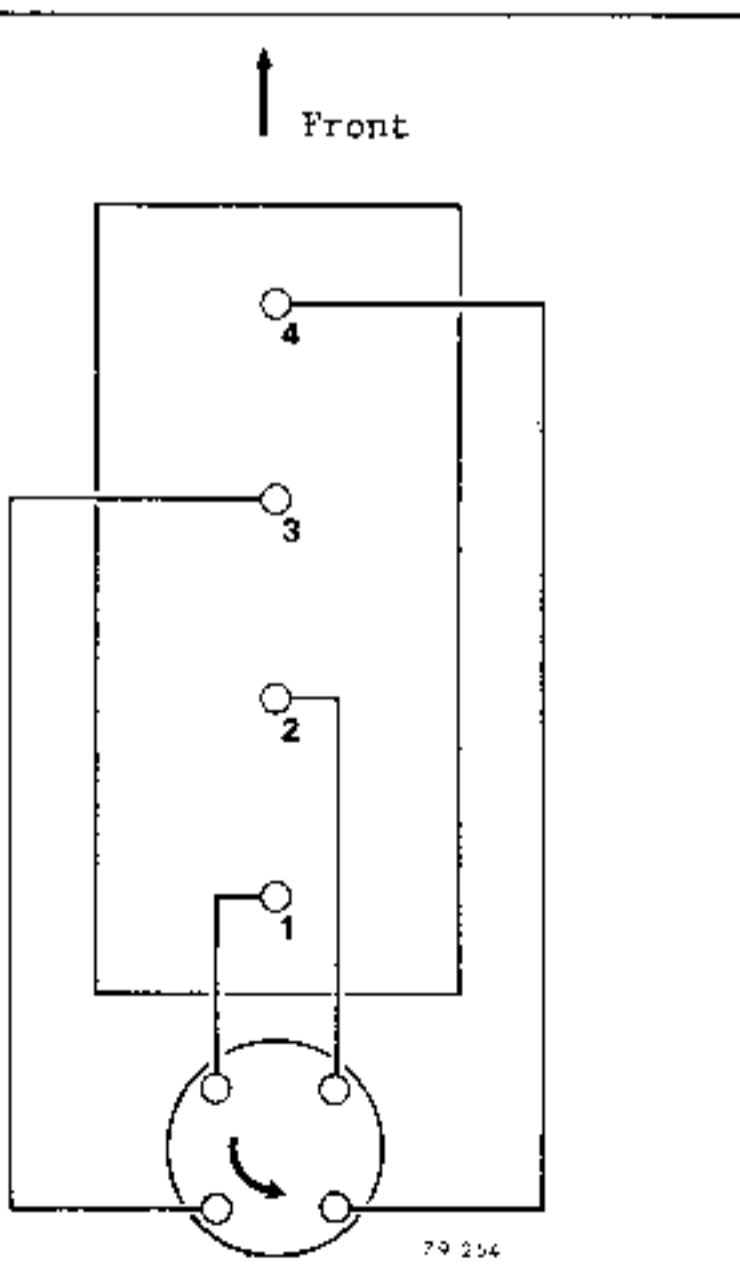
Checking the curves:

Use a diagnostic bay or tool **MS 760** or an **RX3** and a vacuum pump.

CONNECTION

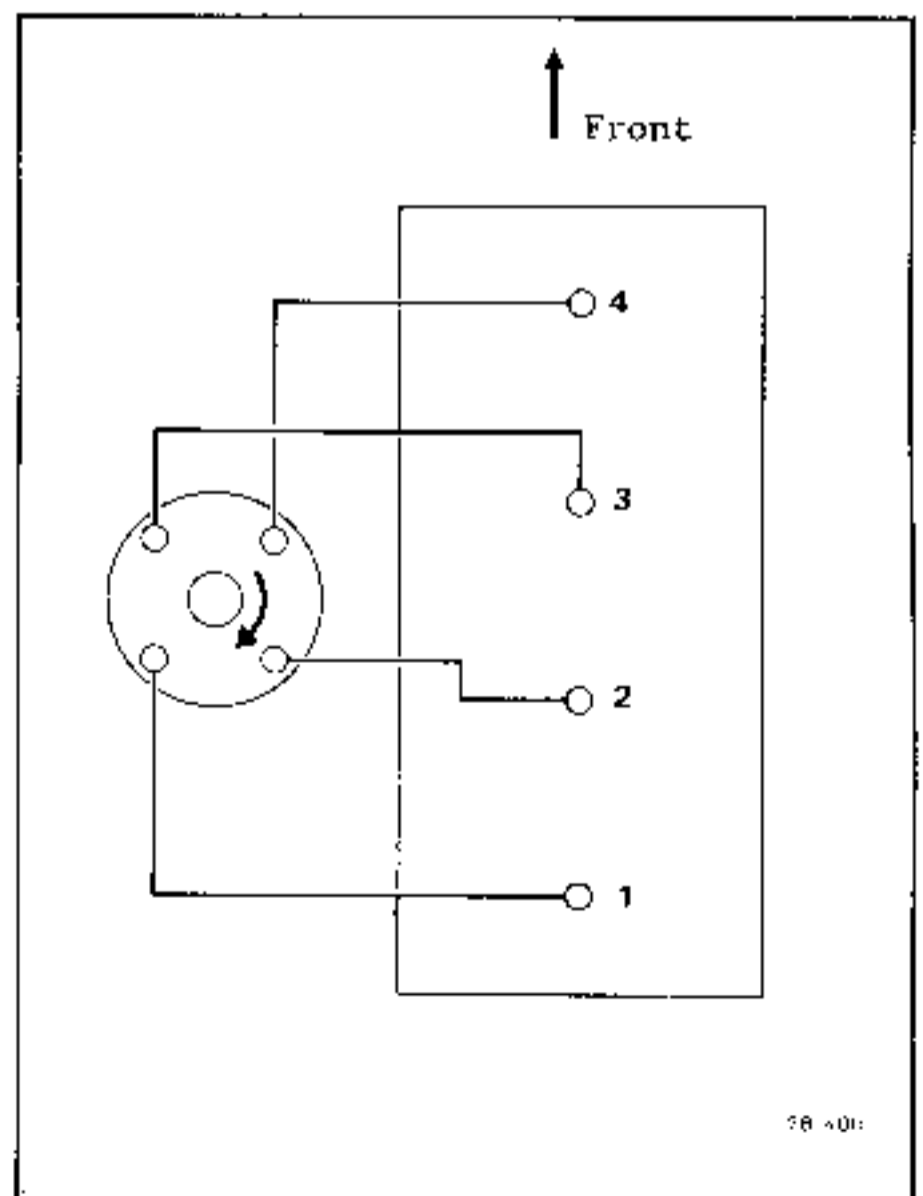
Injection engine

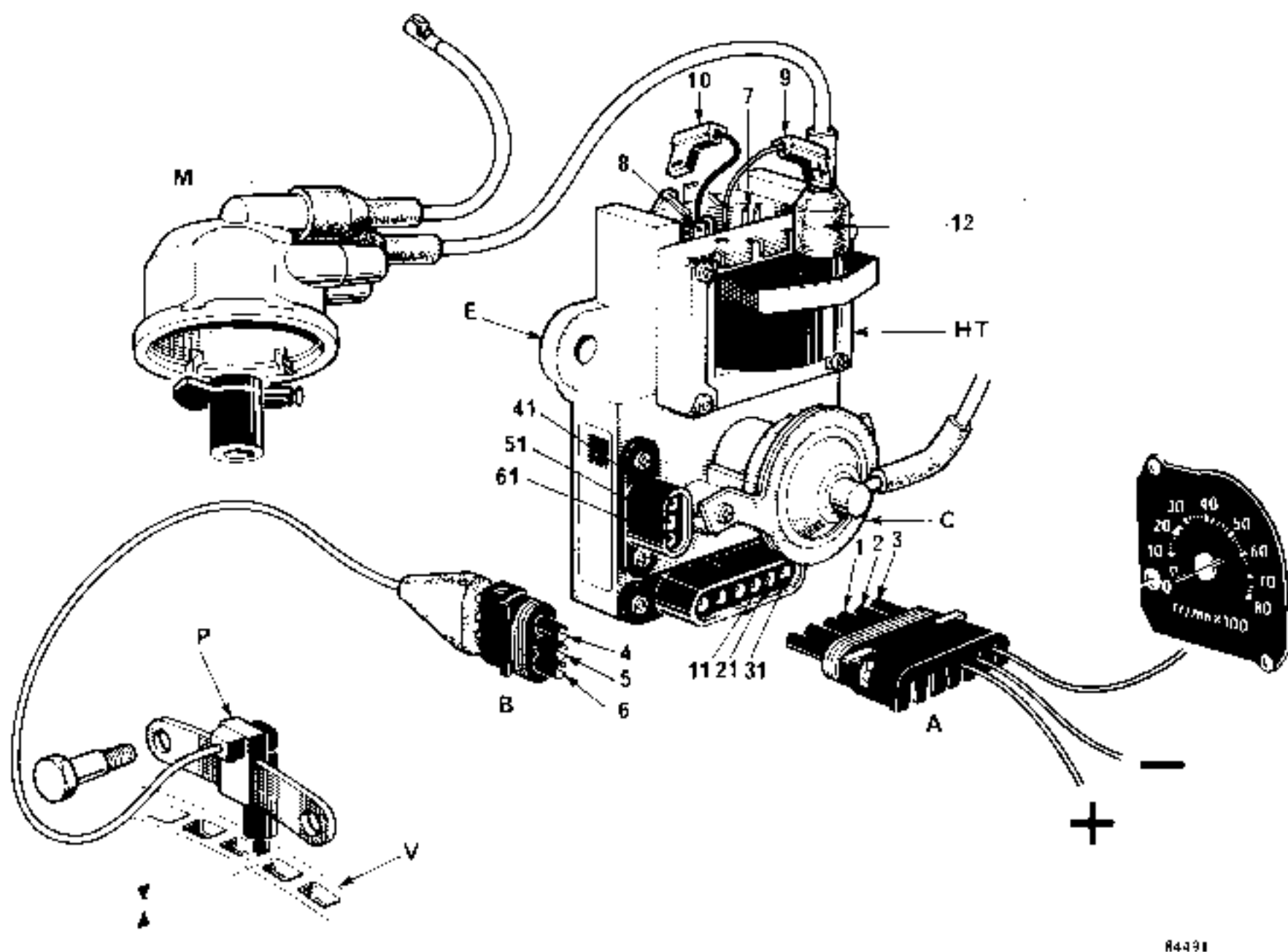
J7T and J7R engines



Engine with carburettor

J6R 234
J6R 236
J6R 734 engines



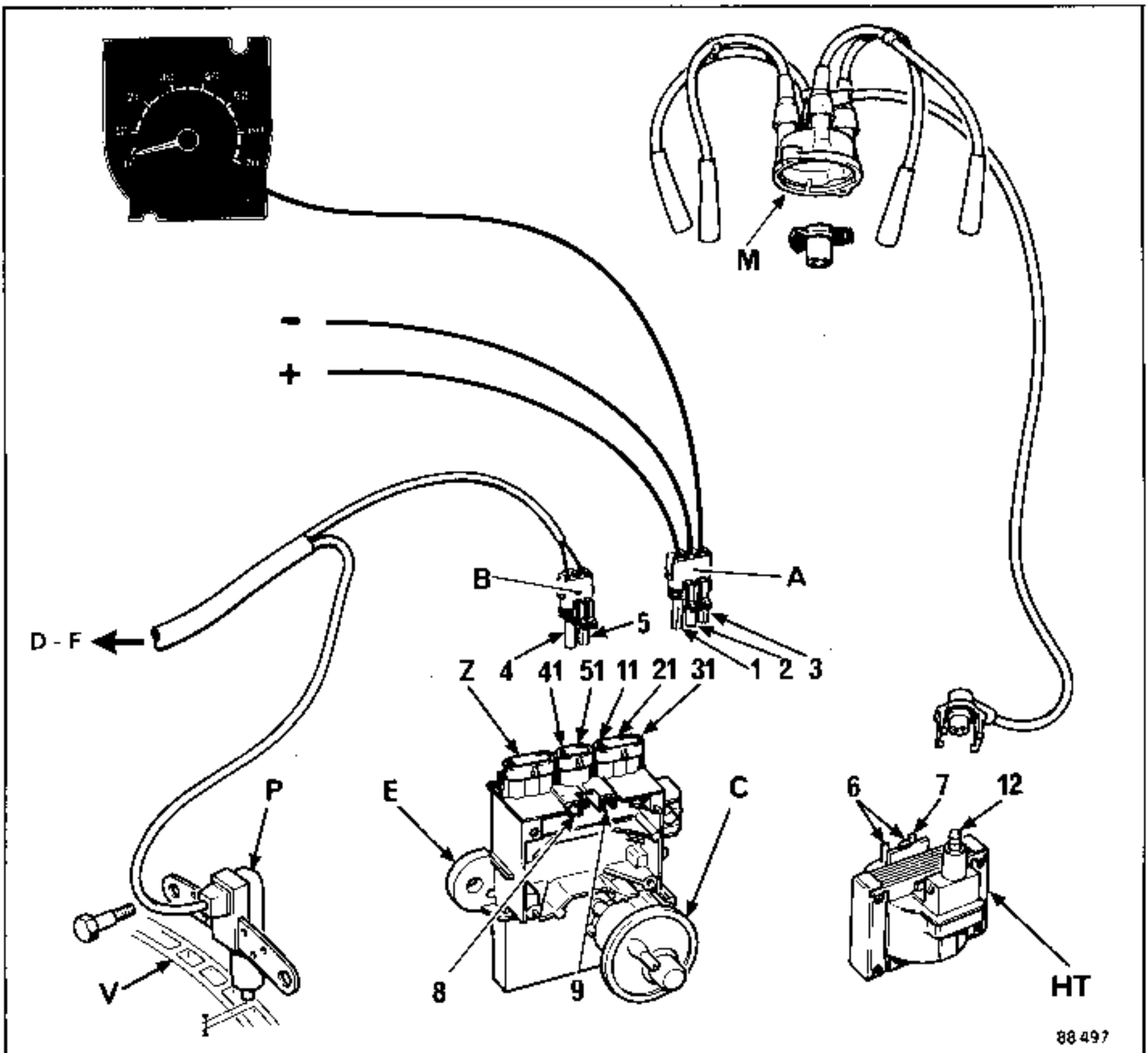


84491

Mark	Description
1	Positive feed
2	Earth
3	Rev. counter
4	Sensor winding
5	Sensor winding
6	Screening
7	Coil + terminal
8	Coil - terminal
9	Coil + lead
10	Coil - lead
11	Module + input
12	Secondary pin

Mark	Description
21	Module earth
31	Rev counter output
41	Sensor data
51	Sensor data
61	Screening
M	Distributor cap
HT	High tension coil
C	Vacuum capsule
E	Computer or module
P	Position magnetic sensor
V	Flywheel

Note: Terminals 9 and 10 are directly connected inside the unit.



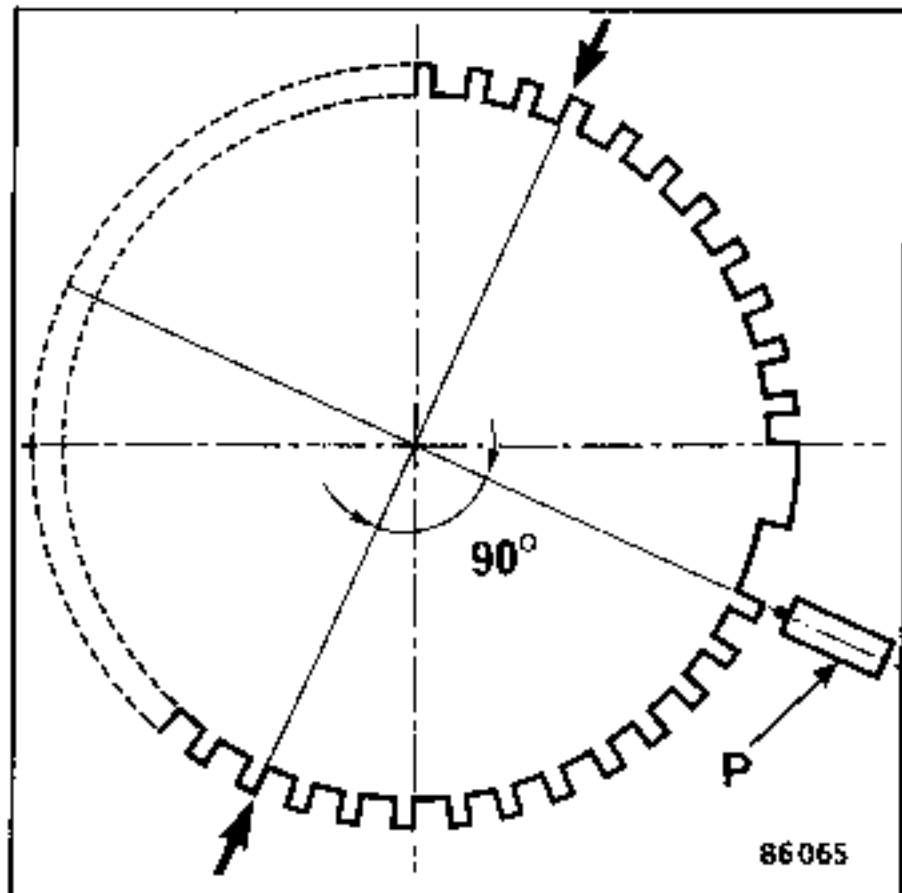
88497

Mark	Description	Mark	Description
1	Positive feed	41	Sensor data
2	Earth	51	Sensor data
3	Rev. counter	M	Distributor cap
4	Sensor winding	HT	High tension coil
5	Sensor winding	C	Vacuum capsule
6	Coil + terminal and anti-interference capacitor terminal	E	Computer
7	Coil - terminal	P	Position magnetic sensor
8	Coil + contact	V	Flywheel
9	Coil - contact	A	Feed connector
11	Module + input	B	Position sensor connector
12	Secondary pin	Z	See special points on following page
21	Module earth		
31	Rev. counter output	D	Injection computer
		F	Injector computer connector

Note: Terminals 8 and 11 are directly connected inside the unit.

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.

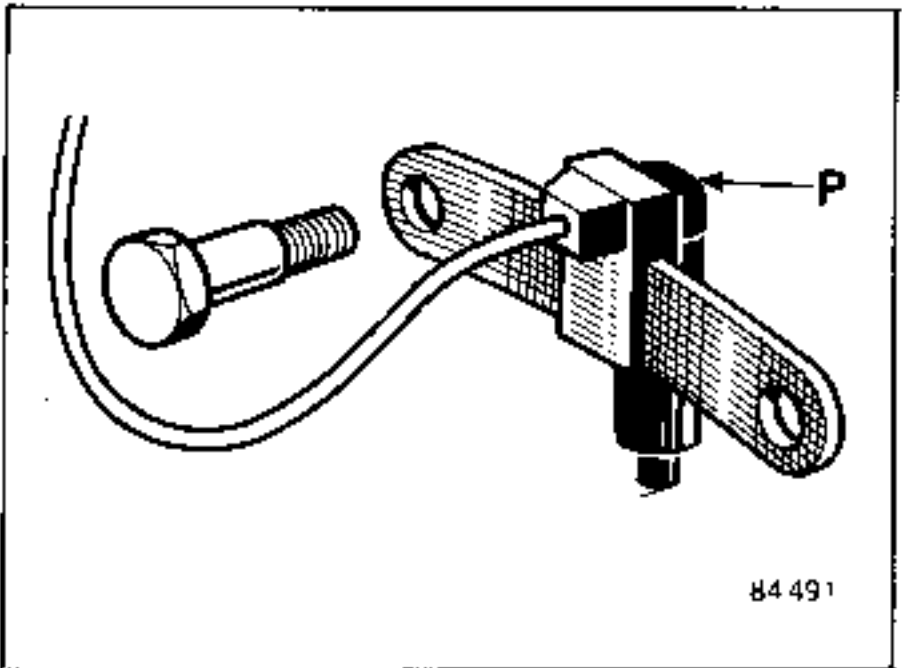


2 - POSITION SENSOR (P)

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.

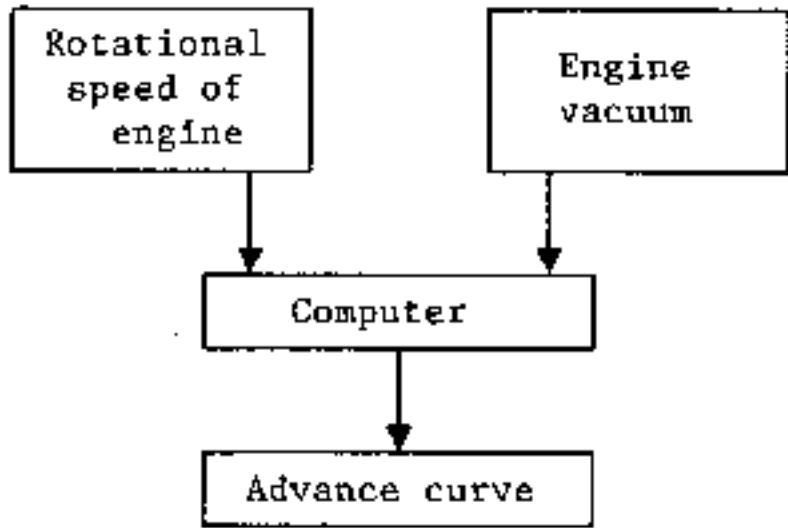


3 - VACUUM SENSOR

The exterior of this sensor is identical to the vacuum sensor of a conventional ignition system but its internal operation is different.

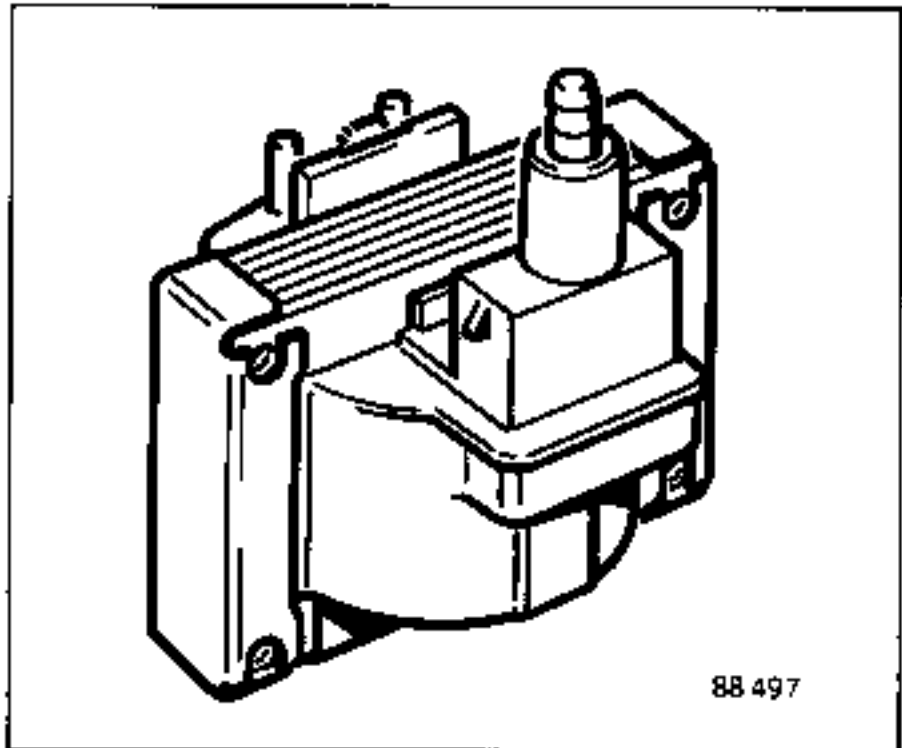
4 - COMPUTER

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



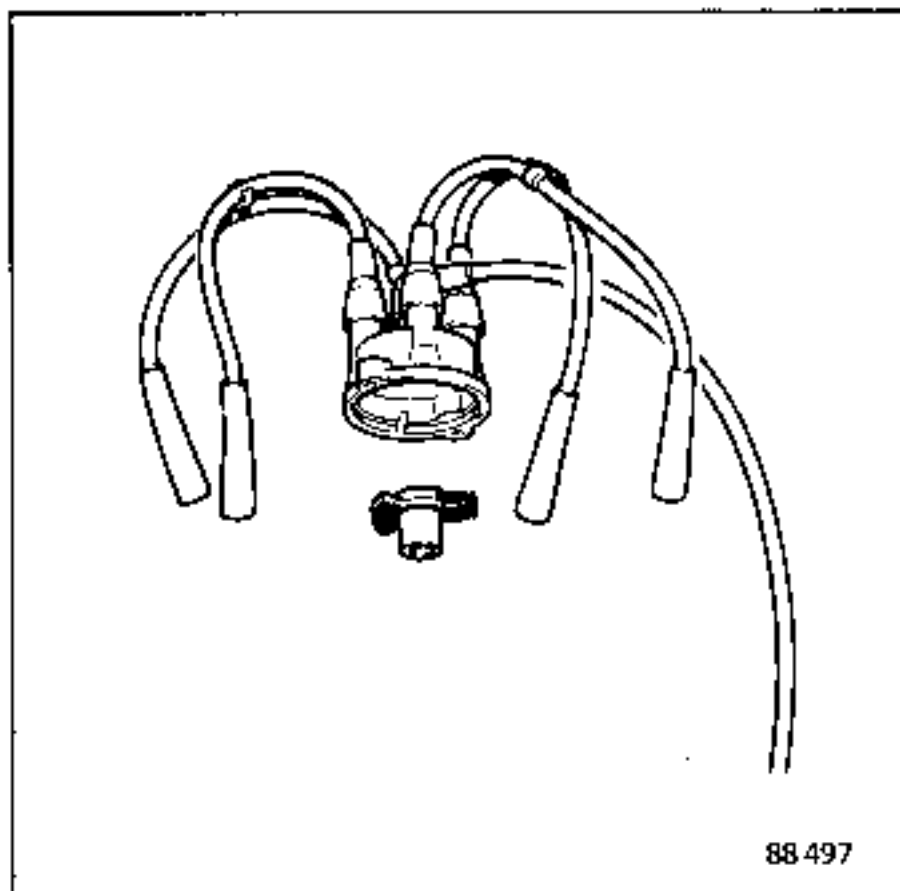
5 - COIL

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.



CHECKING

The centrifugal and vacuum curves can be checked but not adjusted (the ignition advance can only be checked visually).

CHECKING METHODS

Identical to those used throughout the range:

- voltmeter
 - ohmmeter
 - strobe light
- } recommended model
- diagnostic bay (with connections identical to those on a vehicle which does not have a diagnostic plug and with the "electronic" key depressed).

IMPORTANT

Precautions to be taken:

- do not allow any surges in high tension on the computer;
- do not earth the primary or secondary winding of the coil.

FAULT-FINDING

NO IGNITION

Inspect :

- the spark plugs;
- the plug leads;
- the distributor cap,
- the coil high tension lead.

Clean pins on connectors (A) and (B) : Unplug and replug connectors several times. Clean terminals if necessary. Do this before replacing any parts.

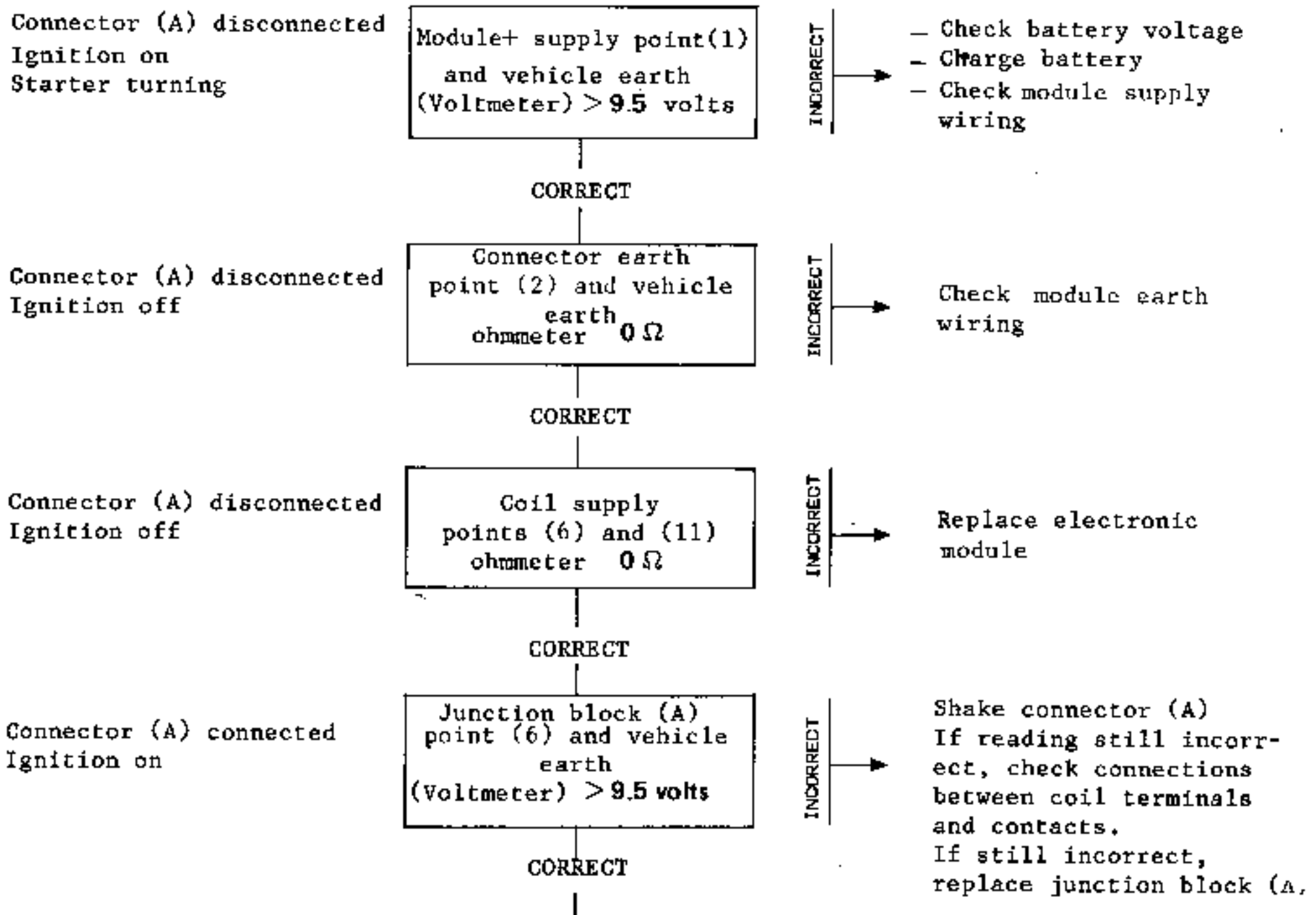
PRELIMINARY CHECK

Check between point 6 (coil supply + at interference suppression capacitor outlet) and earth (ignition on) that the voltage is more than **9.5 volts**.

MEASURING CONDITIONS

READINGS

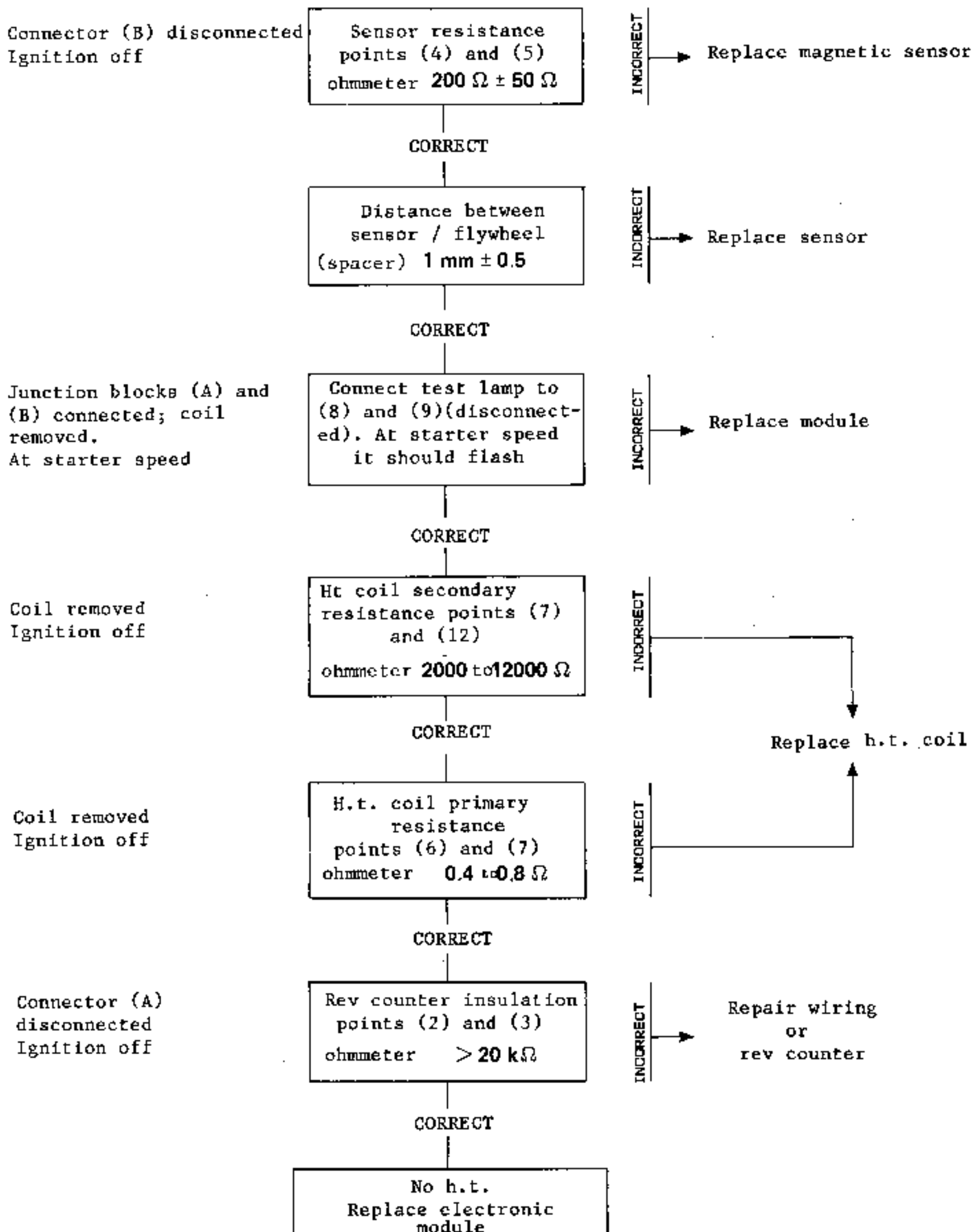
FAULT-FINDING



MEASURING CONDITIONS

READINGS

FAULT-FINDING



STARTING DIFFICULT BUT NO DEFECT WHEN ENGINE IS RUNNING

Inspect or check on test equipment :

- the spark plugs;
- the plug leads;
- the distributor cap;
- the coil high tension lead.

Checking the high tension at starter speed :

- disconnect the high tension lead from the distributor cap;
- hold the lead 2 cm from the cylinder block.

NOTE : DO NOT TOUCH THE ELECTRONIC MODULE WITH THE HIGH TENSION LEAD.

Operate the starter

If the high tension spark is even

CORRECT

Check : carburation, mechanical condition, engine, initial timing

INCORRECT

Check the module supply : > 9.5 volts
Check battery charge
Charge battery

CORRECT

Measure sensor resistance points (4) and (5)
ohmmeter : $200 \Omega \pm 50 \Omega$
If incorrect, replace

CORRECT

Check distance sensor/flywheel (spacer)
 $1 \text{ mm} \pm 0,5$
If incorrect, replace

CORRECT

Clean sensitive face on sensor

CORRECT

Replace sensor

CHECKING THE MECHANICAL CONDITION OF THE VACUUM CAPSULE

Stabilise the engine speed at 3000 rpm.

Disconnect the vacuum pipe from the capsule.

Engine speed falls

YES

Capsule good

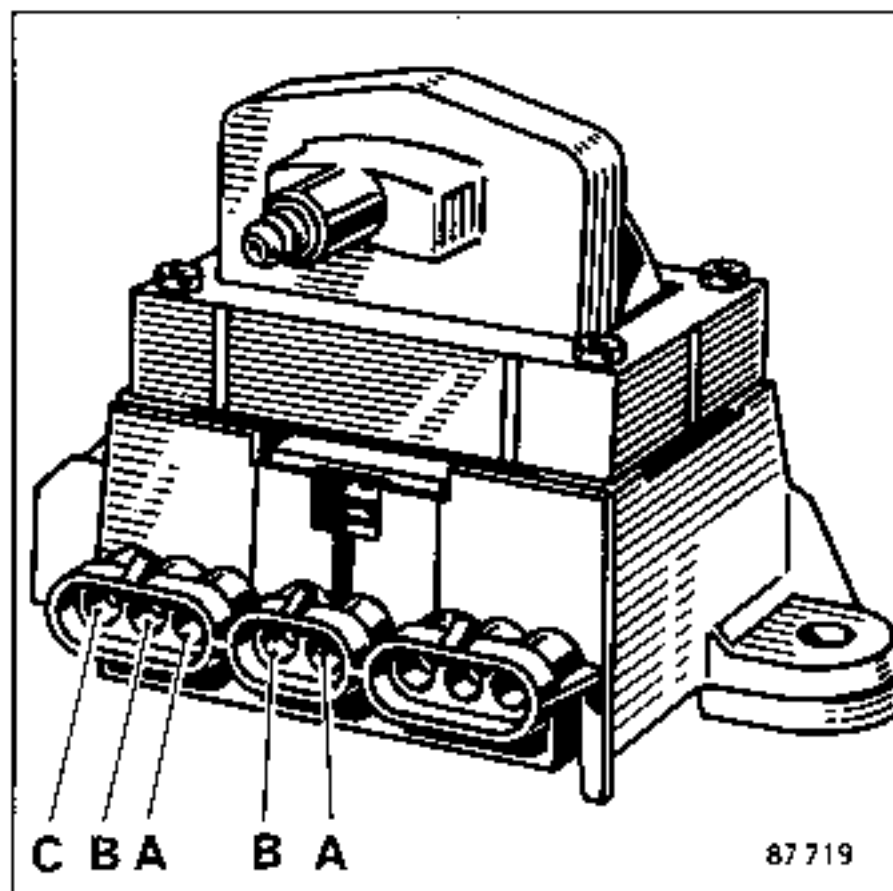
NO

Check condition of vacuum pipe

CORRECT

Replace electronic module

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

TYPES

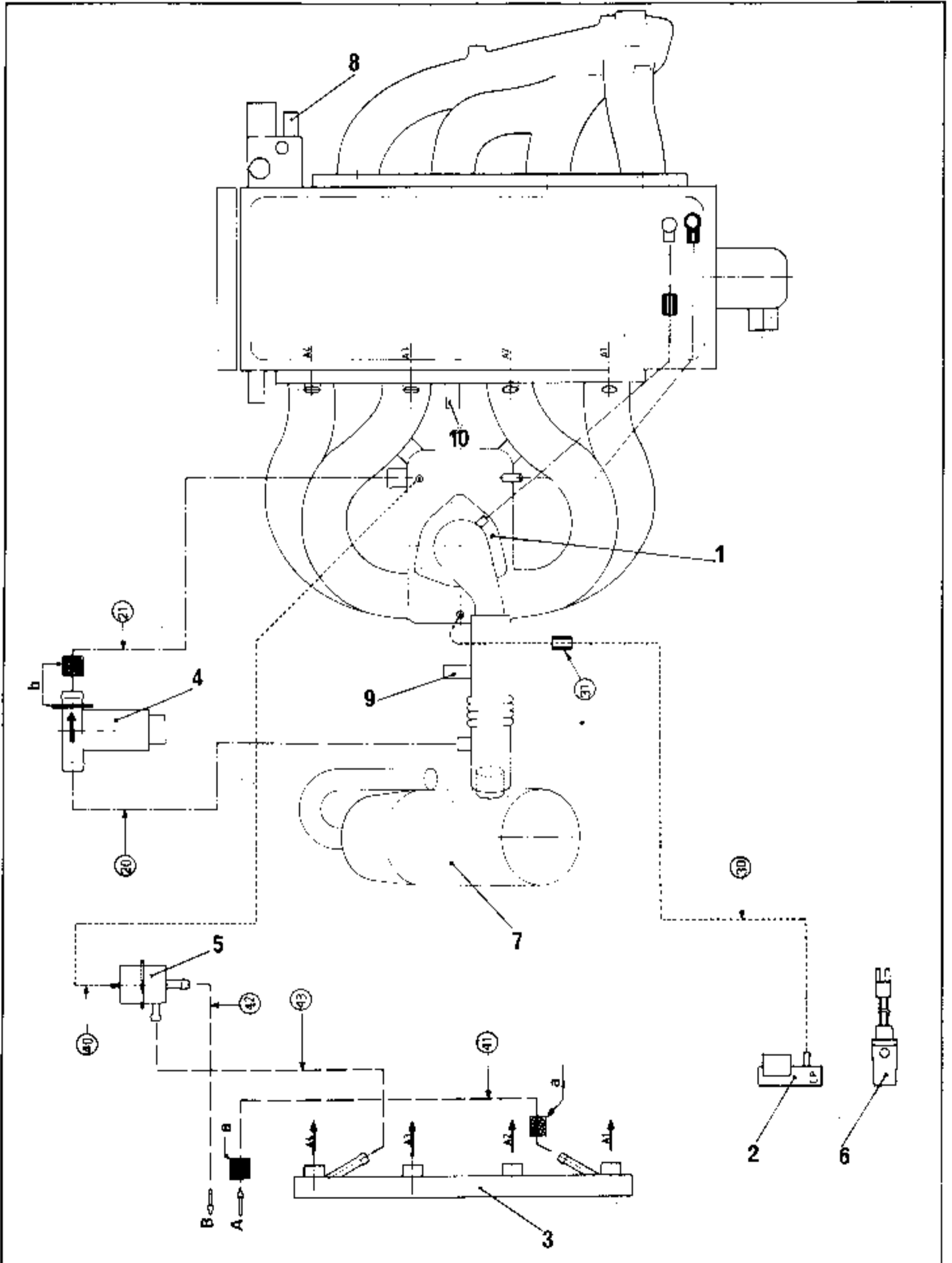
Vehicle	Engine	SPARK PLUGS		Electrodes gap (mm)
		AC	CHAMPION	
J 112 S 112	J6R 234 J6R 236 J6R 734	C 42 LTS	S 279 YC	0,8 ± 0,5
J 116	J7RE 760		S 6 YC	0,8 ± 0,5
J 117	J7T 770	CR 41 CLTS or C 41 CLTS	S 7 YC or RS 7 YC	0,8 ± 0,5

The Renix injection system fitted to the Espace J117 and J116 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 numbers 2 and 3, under the air distributor, on the ignition harness side;
- the computer is mounted in the passenger compartment, on the tunnel under the centre console;
- the injection relays are mounted on the lefthand headlight carrier panel;
- the 50 mm diameter throttle casing has an integral air by-pass and is of the inverse type;
- the idling speed regulating valve is mounted on the air distributor;
- the absolute pressure sensor is mounted under the ignition power module;
- the specifications of the air and coolant temperature sensors are identical;
- the oxygen or Lambda sensor is screwed into the exhaust downpipe (J117);
- the idling mixture adjusting potentiometer is clipped onto the ignition power module bracket (J116);
- the injection warning light on the instrument panel is operational on J116 versions;
- on the J116 transitory incidents are stored in the computer's memory.

SPECIFICATIONS OF THE AIR AND COOLANT TEMPERATURE SENSORS

Coolant temperature sensor	Temperature °C	20 ± 1	80 ± 1	90 ± 1
	Resistance Ω	283 - 297	383 - 397	403 - 417
Air temperature sensor	Temperature °C	0 ± 1	20 ± 1	40 ± 1
	Resistance Ω	254 - 266	283 - 297	315 - 329



- 1 - Throttle casing
- 2 - Absolute pressure sensor
- 3 - Fuel injection gallery
- 4 - Idling speed electronic regulator
- 5 - Fuel pressure regulator
- 6 - Idling mixture potentiometer (J116)
- 7 - Resonator-type air filter
- 8 - Coolant temperature sensor
- 9 - Air temperature sensor
- 10 - Pinking sensor

A : Fuel inlet
B : Fuel return

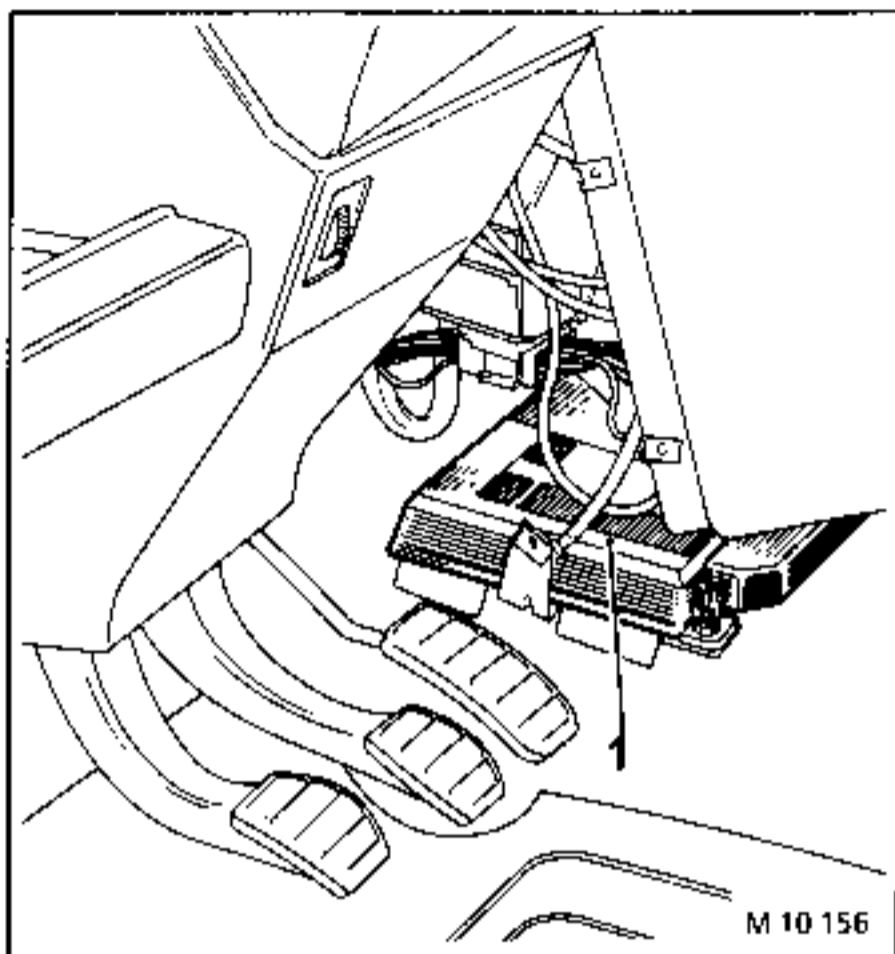
ELECTRONIC IDLING SPEED REGULATOR				
MARK	DESCRIPTION/ FUNCTION	CLIP	RING COLOUR	COMMENTS
20	Inlet hose	2	None.	On electronic regulator, blue ring (b)
21	Outlet hose	2	Blue (b)	Return side

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

FUEL LINES				
MARK	DESCRIPTION/FUNCTION	CLIP	RING COLOUR	
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	

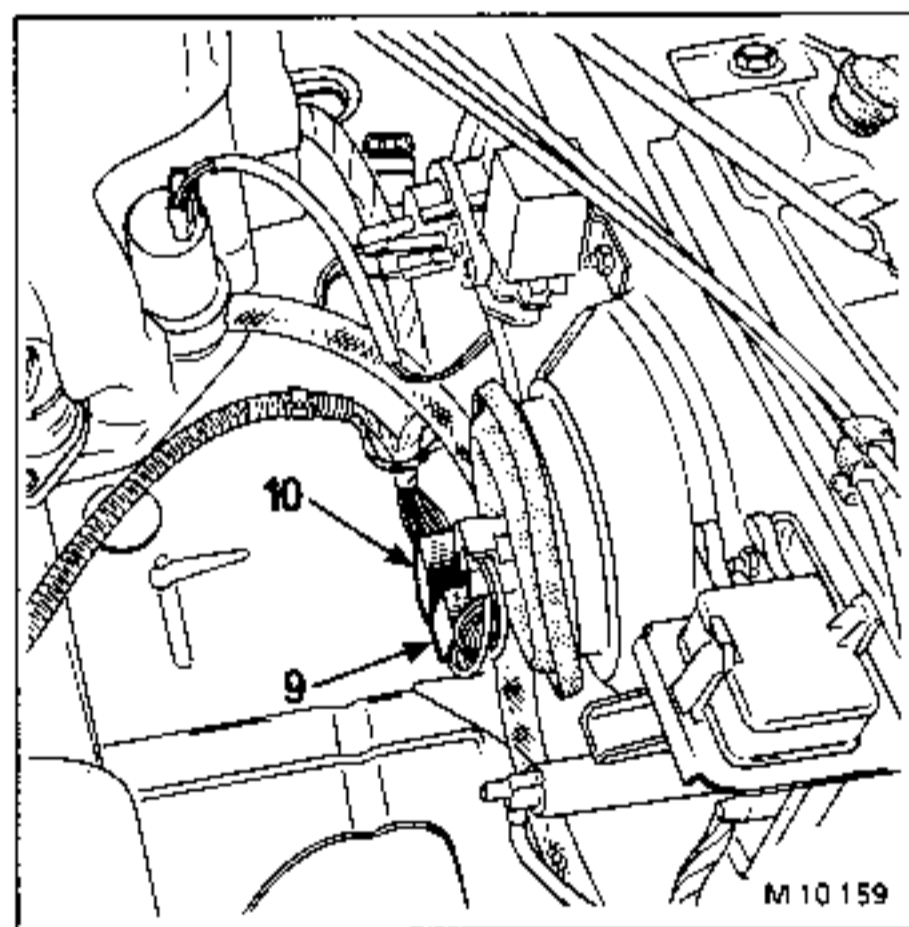
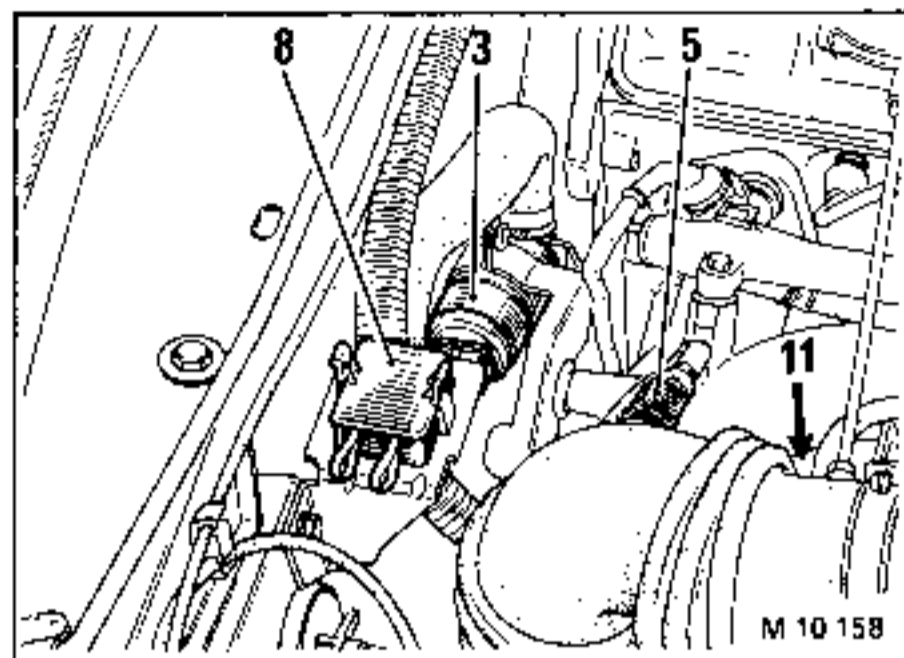
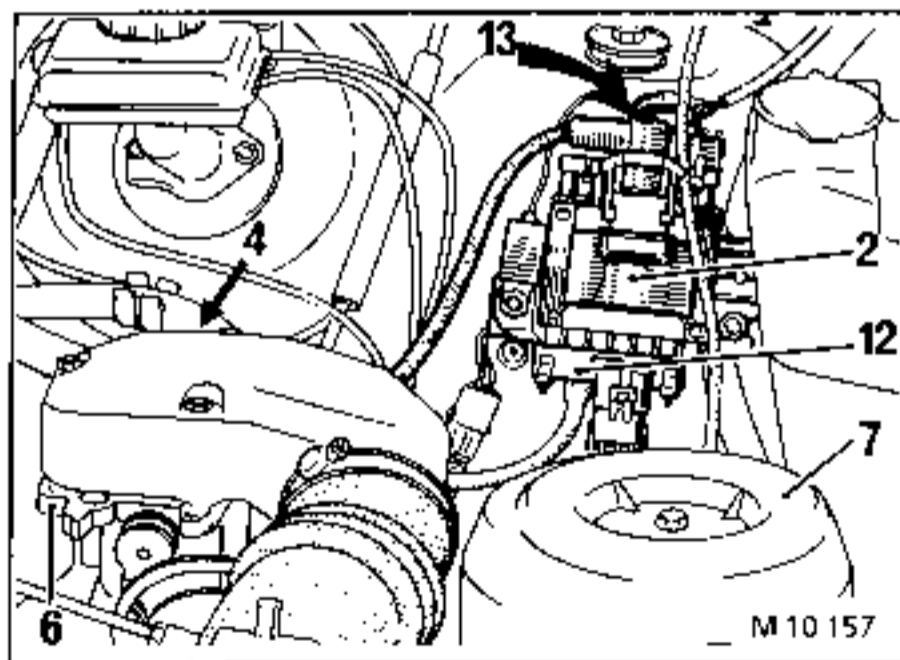
a : pink
b : blue

IN THE PASSENGER COMPARTMENT



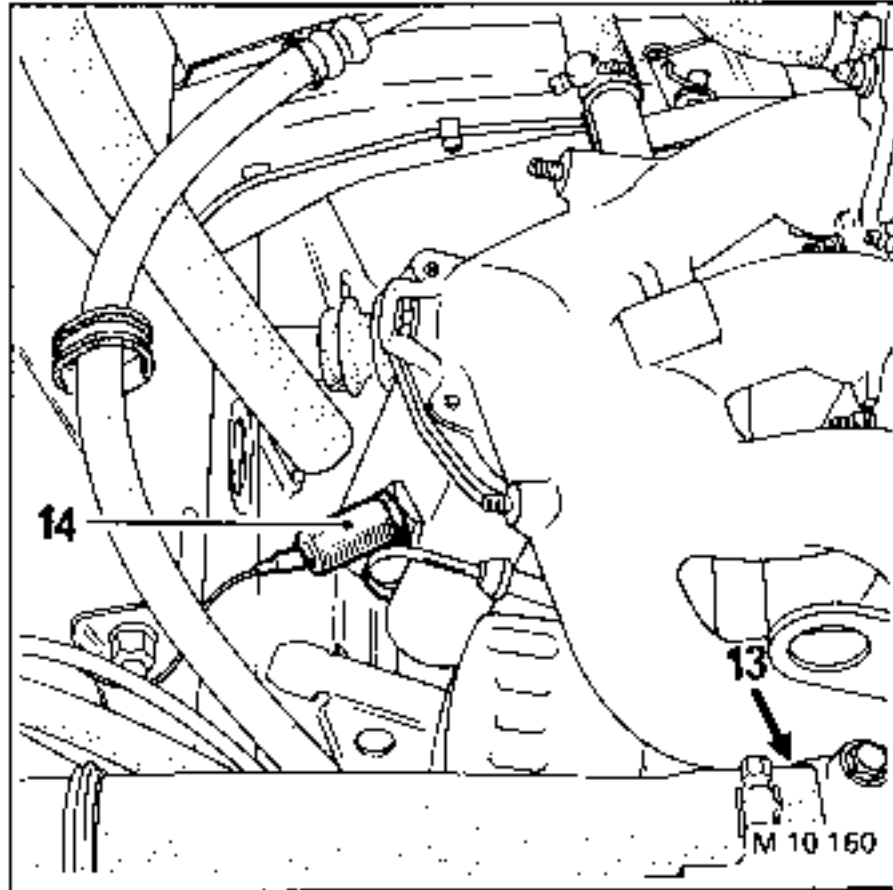
1 - Computer mounted under centre console

IN THE ENGINE COMPARTMENT



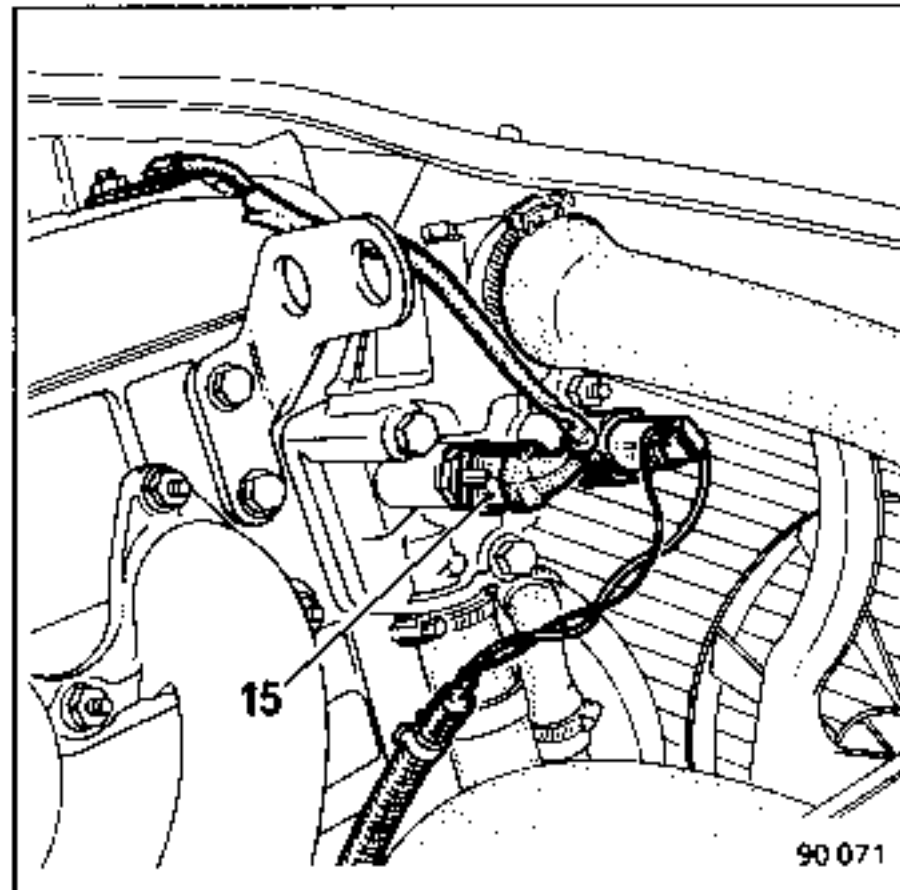
Left-hand section

- 2 Ignition power module
- 3 Idling regulation valve
- 4 No load/full load switch
- 5 Air temperature sensor
- 6 Throttle casing
- 7 Air filter
- 8 Diagnostic plug
- 9 Fuel pump relay
- 10 Injection relay
- 11 Pressure regulator
- 12 Absolute pressure sensor
- 13 Idling mixture regulating potentiometer



Righthand section

- 14 Oxygen sensor (J117)
- 15 Coolant temperature sensor

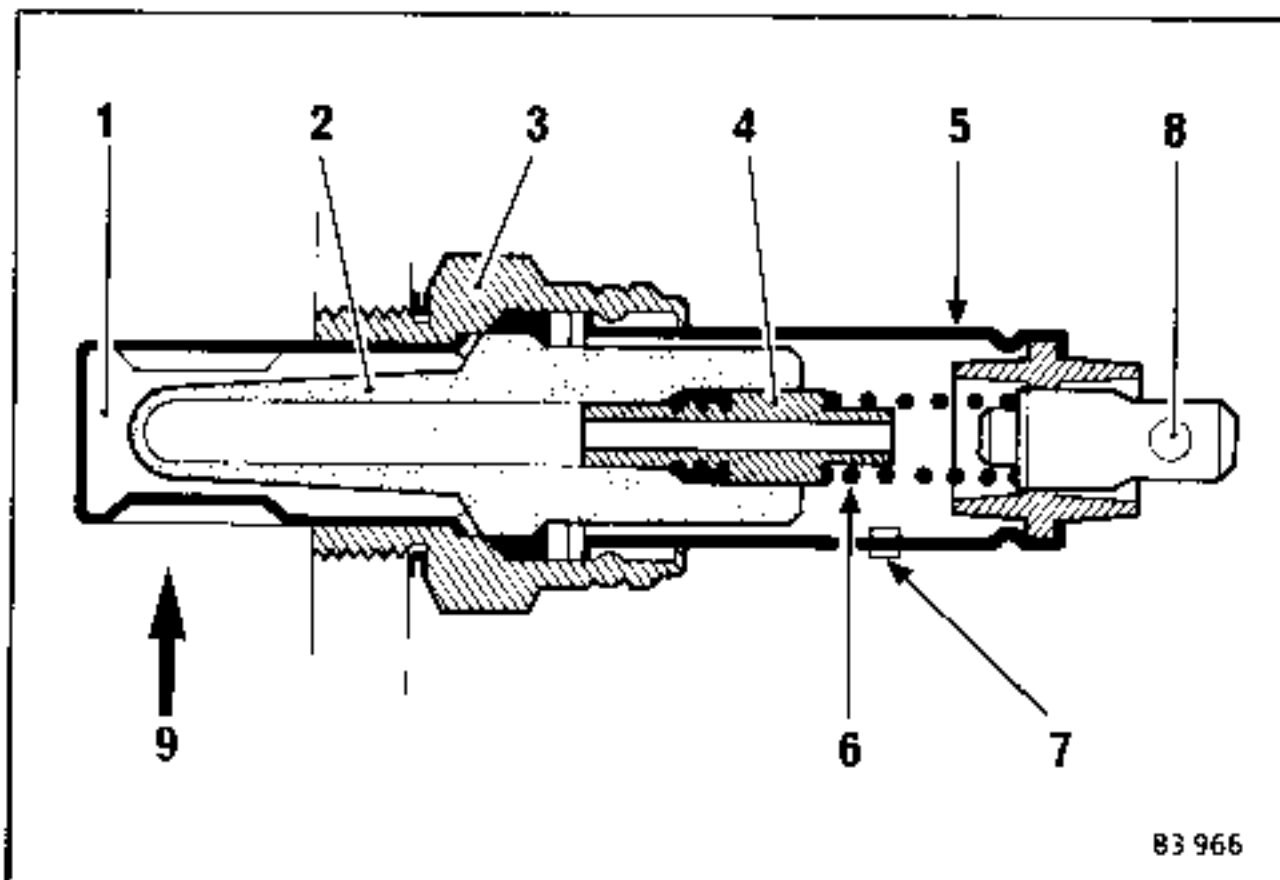


MIXTURE REGULATION**METHOD OF OPERATION OF THE OXYGEN (LAMBDA) SENSOR**

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 ($\text{Lambda} = 1$) is manifested as a variation in the output voltage.

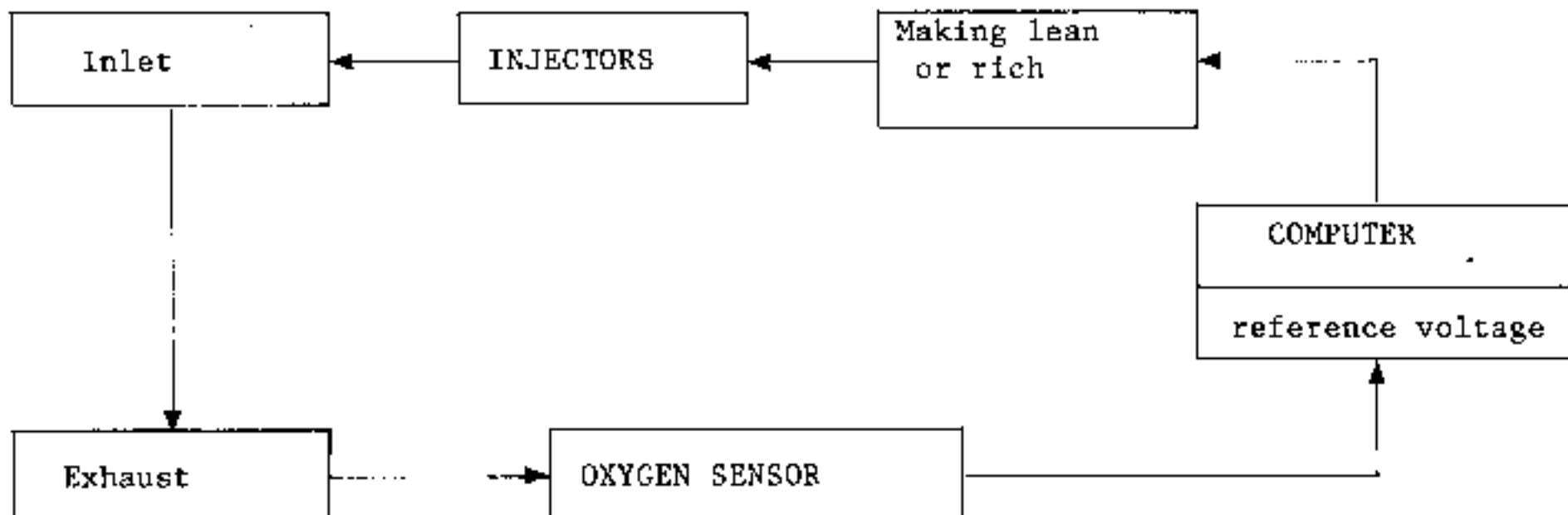
The computer adjusts the air-fuel ratio so that the carburated mixture is always as close as possible to the stoichiometric ratio ($\text{Lambda} = 1$) which, together with the use of catalysts, provides better "de-pollution" of the exhaust gases.

The operating method is based on a special property of the ceramic used, namely that it can conduct oxygen ions from a temperature of approximately 250°C . If the oxygen content is not the same on both sides of the sensor, an electric voltage is established between the two limit surfaces according to the property of the material used. This voltage enables the oxygen content either side of the sensor to be measured.



- 1 - Protective sheathing
- 2 - Ceramic sensor
- 3 - Base
- 4 - Contact pin
- 5 - Protective pin
- 6 - Contact spring
- 7 - Venting aperture
- 8 - Electrical connection
- 9 - Exhaust gas

83 966

MIXTURE REGULATION**PRINCIPLE OF REGULATION BY THE OXYGEN OR LAMBDA SENSOR****OXYGEN SENSOR LOCATION**

On the J7T engine the oxygen or Lambda sensor is in the exhaust downpipe.

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.

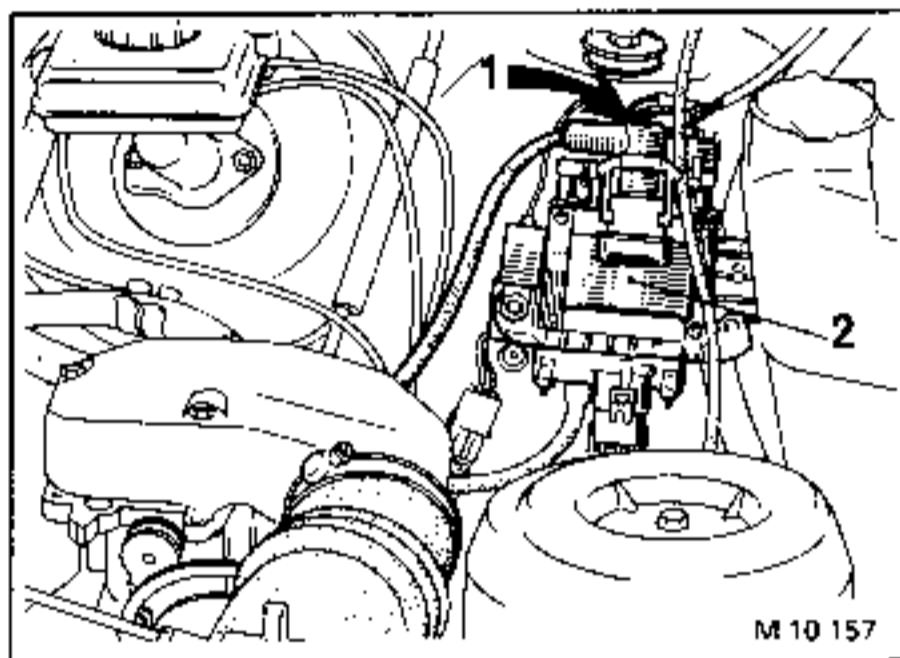
NOTE:

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

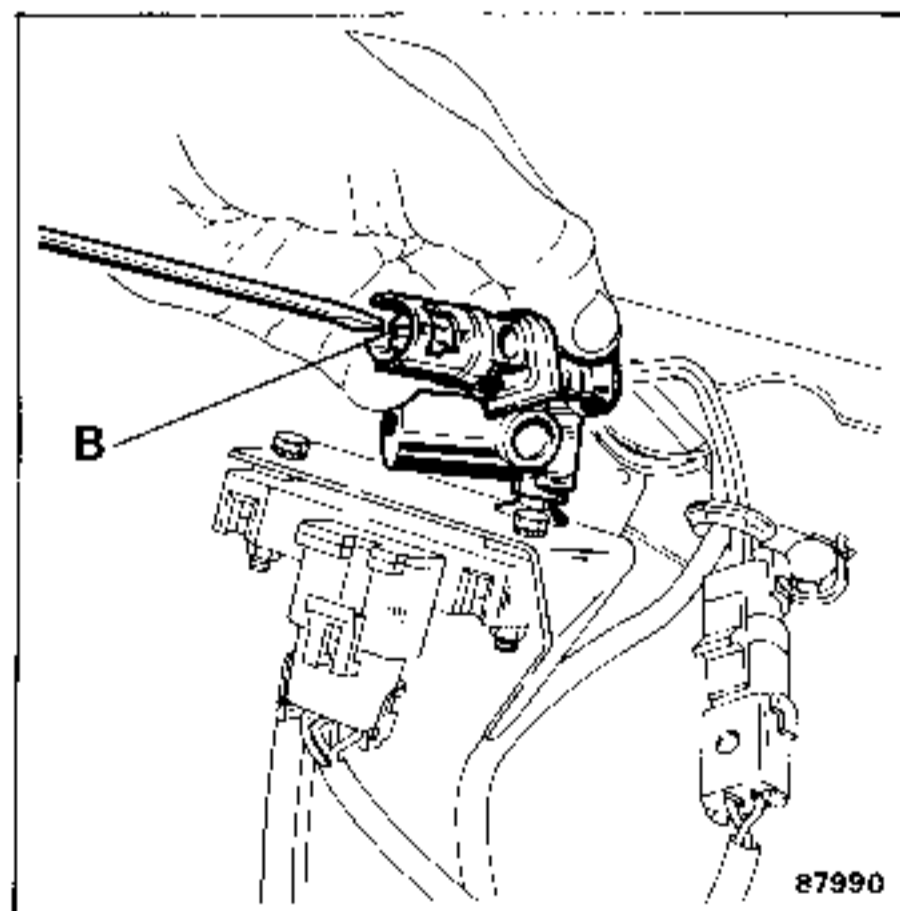
IDLING REGULATION METHOD

Remove the tamperproof cap from screw (B) on the idling mixture regulating potentiometer.

Regulating potentiometer (1) is located behind the ignition power module.



Turn screw (B) to obtain the CO percentage value given in the table.



The idling speed cannot be adjusted.

When the engine is hot and the cooling fan has stopped spinning, adjust the CO percentage to the value given by turning screw (B).

When the CO percentage has been adjusted, fit a tamperproof cap on screw (B).

Tamperproof cap part no. 77 01 200 832.

NOTE: If the correct mixture cannot be obtained when screw (B) is turned fully from Min. to Max., disconnect the fuel vapour rebreathing hose from the rocker cover.

If the mixture decreases by more than 1% the engine oil must be replaced.

CHECKING THE REGULATION

Engine hot, connect a rev. counter (XR 25).

Disconnect one injector, the engine speed should stabilise again at approximately 800 rpm.

Disconnect a second injector, the engine speed should stabilise once again at approximately 800 rpm.

Special point:

There is an electronic incident warning light on the instrument panel. When this light illuminates it indicates that an incident has occurred in the injection system.



87970

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



90028

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.

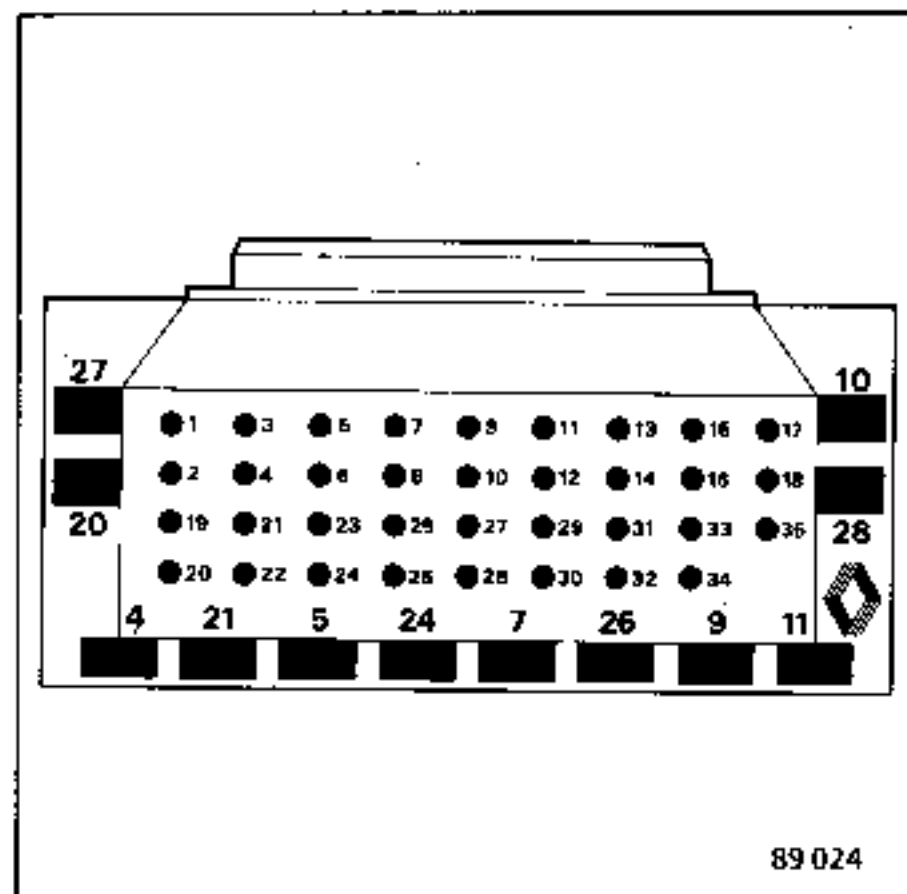
A connection error may damage the component parts of the injection system.

CHECKING THE INLET CIRCUIT FOR LEAKS

If the idling speed is unstable (pumping) the condition of the hoses and unions in the inlet 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.

M.S. 1048 terminal holder



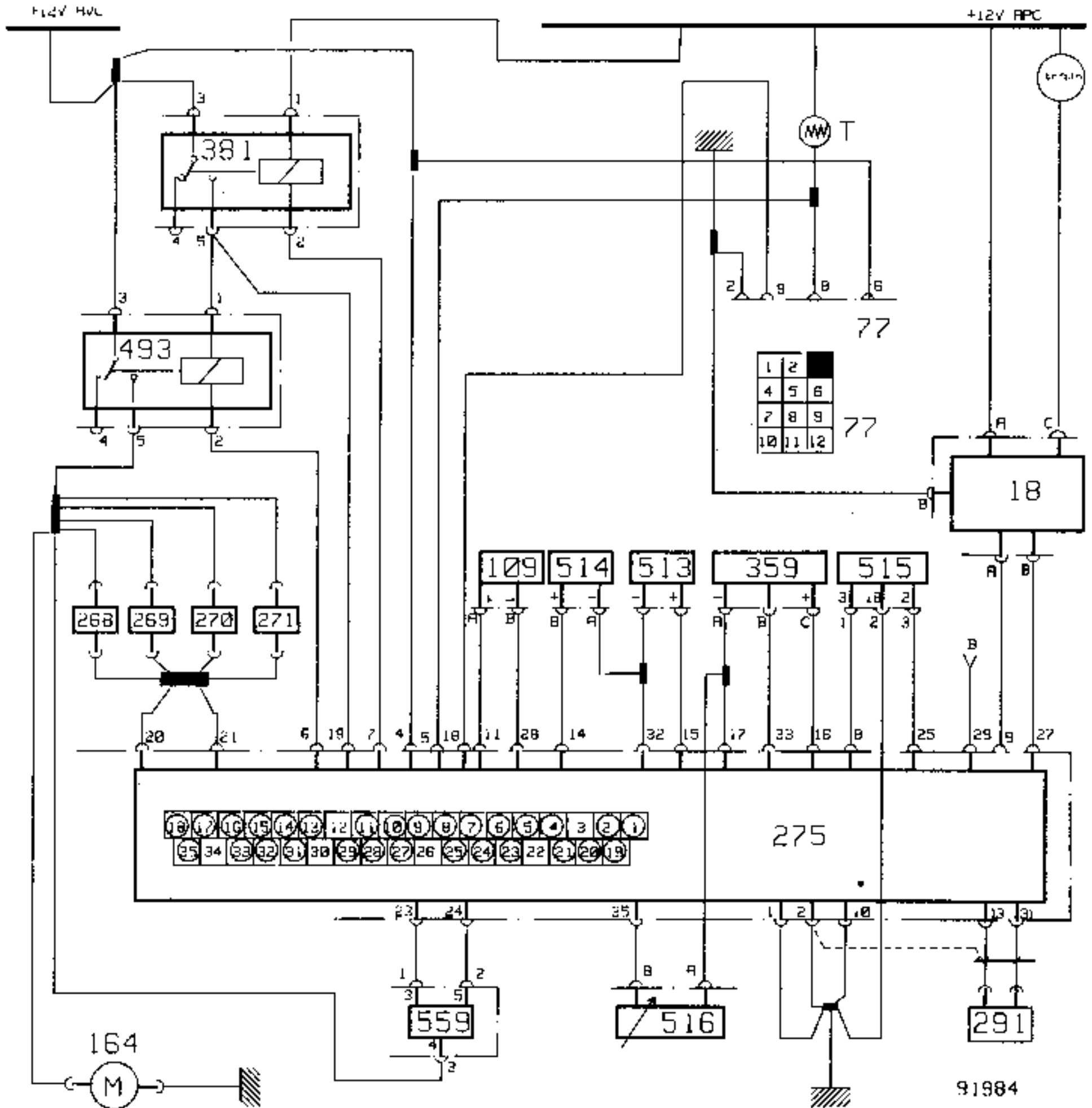
89 024

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).

OPERATING DIAGRAM

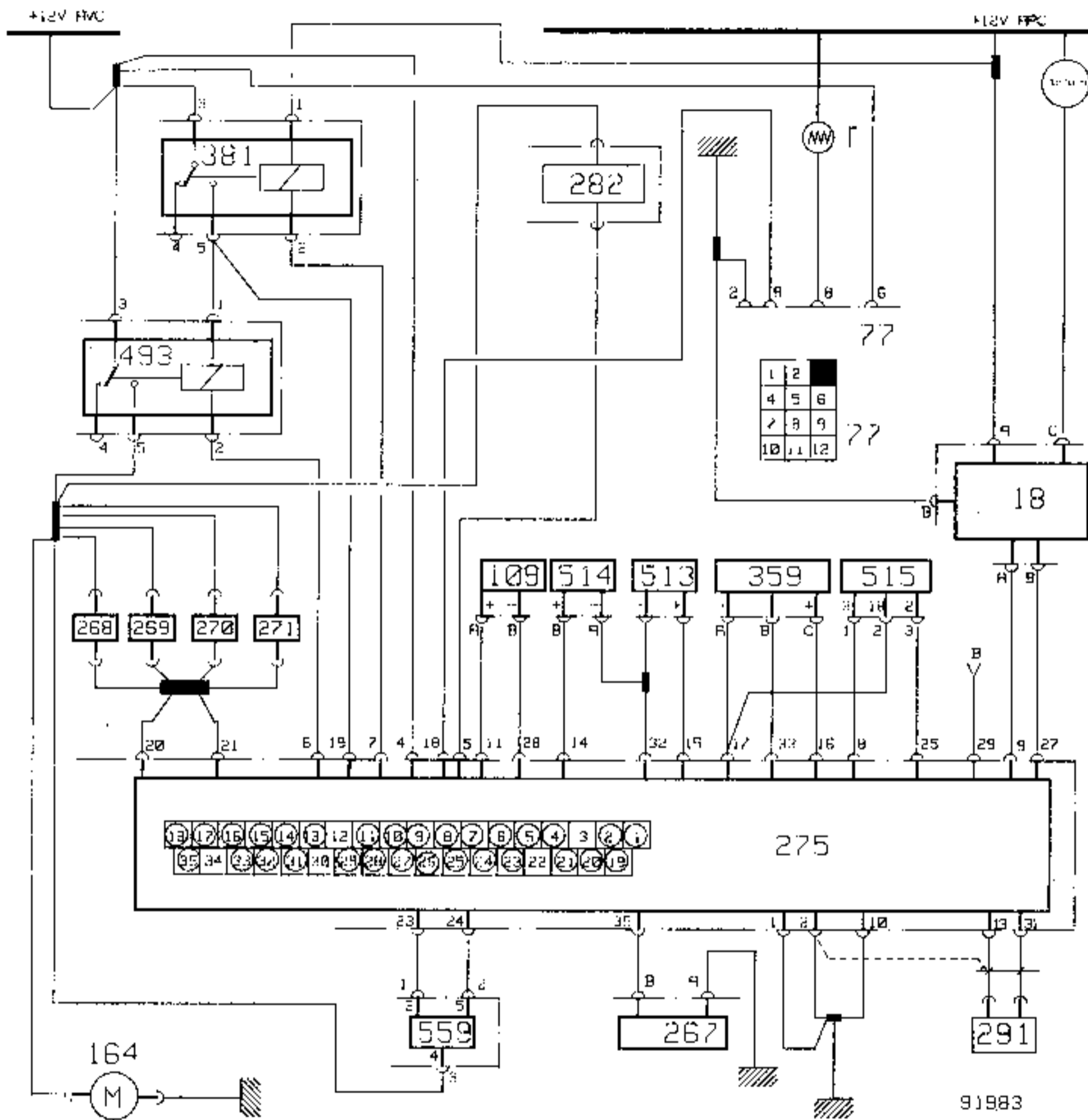


- 18 Ignition power module
- 77 Diagnostic base (seen from above)
- 109 Flywheel sensor
- 164 Fuel pump (motor)
- 268 to Injectors
- 271
- 275 Injection and ignition computer
- 291 Pinking sensor
- 359 Pressure measuring sensor
- 381* Feed relay
- 493 Pump relay

- 513 Coolant temperature sensor
- 514 Air temperature sensor
- 515 No load/full load switch
- 516 Regulating potentiometer
- 559 Idling regulation solenoid valve

- B - Starter data
- ⌋ - Connectors
- T - Diagnostic warning light (operational)
- * - 2 leads on terminal no. 5 of relay 381

OPERATING DIAGRAM



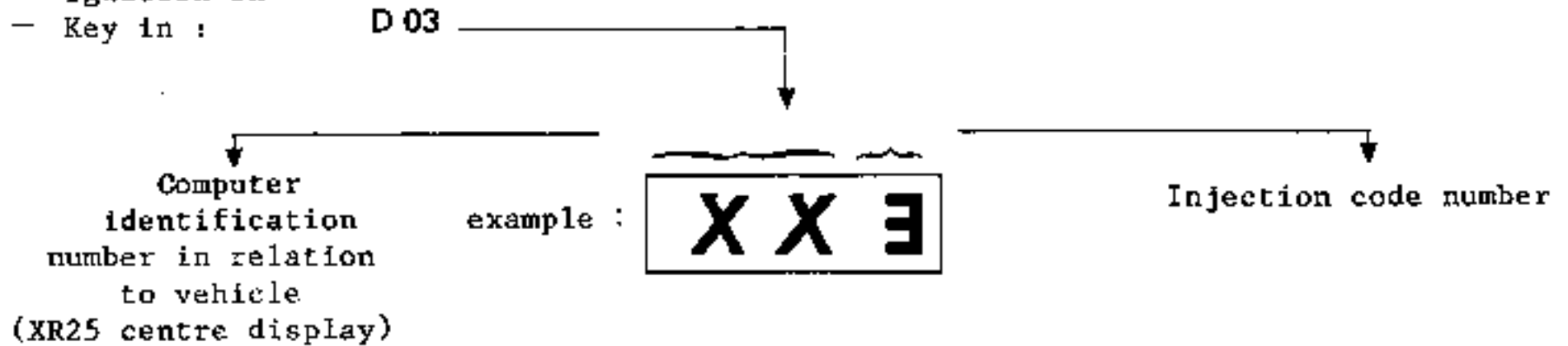
91983

- | | | | |
|-----|--|--|--|
| 18 | Ignition power module | 359 | Pressure measuring sensor |
| 77 | Diagnostic base (seen from above) | 381 | Feed relay |
| 109 | Flywheel sensor | 493 | Fuel pump relay |
| 164 | Fuel pump (motor) | 513 | Coolant temperature sensor |
| 267 | Oxygen sensor | 514 | Air temperature sensor |
| 268 | to Injectors | 515 | No load/full load switch |
| 271 | | 559 | Idling regulation solenoid valve |
| 275 | Injection and ignition computer | B | Starter data |
| 282 | Canister bleeding solenoid valve (only for certain countries and models) | ⌋ | Connectors |
| 291 | Pinking sensor | Note: 2 leads on terminal no. 5 of relay 381 | |
| | | T | Diagnostic warning light (not operating) |

FAULT-FINDING USING THE XR25 TEST BOX

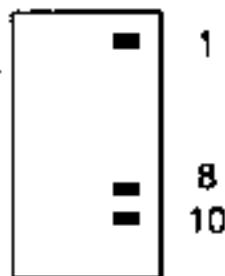
DISPLAYS READ IN ABSENCE OF INCIDENTS

- Connect the XR 25 to the vehicle's diagnostic plug
- Ignition on
- Key in : **D 03**



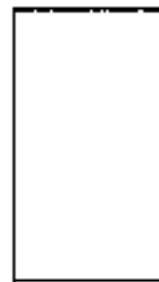
XX = 24 : J 11605
XX = 26 : J 11605 & J 11608

TEST 1
(ignition on)



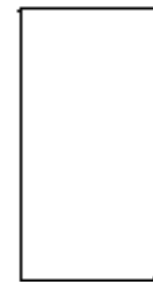
GOOD

TEST 2
(engine running)



GOOD

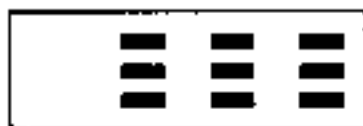
TEST 3*
(at starter speed if vehicle does not start)



GOOD

* Ignition on 1/8/10 are illuminated. If these three lines go 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.

FAULT-FINDING USING THE XR25 TEST BOX

- Connect the XR25 test box to the vehicle's diagnostic plug
- Ignition on, engine stopped
- Key in : D 03
- Latest cassette
- Transitory incidents memorised

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

85 A		
1	CODE PRESENT	TEST 1 IGNITION ON ENGINE STOPPED
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	
9	INJECTOR FEED	
10	NO/LOAD - FULL LOAD SWITCHES	
"R" INJECTION CARD CODE : D 03		TEST 3 TEST AT STARTER SPEED (if vehicle does not start)
11	FLYWHEEL SENSOR	
12	PINKING SENSOR	
13	OXYGEN SENSOR	
14	AIR CONDITIONING DATA	TEST 2 ENGINE RUNNING
Engine stopped #03 Air temperature: degrees #01 Pressure in mb #04 Battery voltage: volts #02 Coolant temperature: degrees		
Engine running #06 Engine speed: rpm		
20	MEMORY FUNCTION	Code 00

• Tests performed

TEST 3

only if engine does not start (battery well charged)

Under starter speed :
- 8 should extinguish : Good
- 9 should remain extinguished: Good

THROTTLE SWITCH

Engine running*: activate accelerator, watching line 10

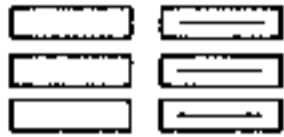
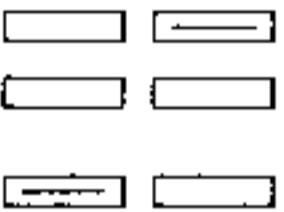
* May be performed with engine stopped on vehicles with idling speed regulation

PINKING SENSOR


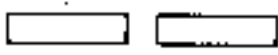
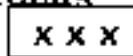
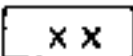
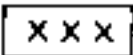
Road test : if 12 illuminates, check wiring or pinking sensor

At the end of a test and after performing repairs, disconnect the computer power supply to erase its internal memory.

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	xx3 xx = 24 : J11605 xx = 26 : J11605 J11608 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			xxxxx 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			xxx 80°C to 110°C
Checking air temperature sensor	Engine stopped (cold)	# 03			xxx Ambient temperature $\pm 2^{\circ}\text{C}$
Checking idling speed regulation speed	Engine hot and idling - No consumer switched on - cooling fan - headlights - wheels locked	# 06 # 12			Measure speed xxx 725 to 825 rpm Measure cyclic opening ratio (RCO) xxx 2.8 to 3.5

CONFORMITY TEST

Function to be checked	Conditions	Selection on test box	Bar graph line number	Bar graph display	Display on digital display Remarks
Checking no load switch engine running	Engine running: - no load - light throttle - gradual return to no load position		L10 L10 L10		
Checking pinking sensor Measure noise	Engine hot unladen 3600 + 200* - 0	# 13	L12		Measure the min. and max. values over approximately 10 seconds  Value should not be zero and should vary
C.O on idling	Engine hot and idling After fan has cut it once - CO tester - no consumer switched on	# 02 # 06			 80° to 110°C  775 to 825 **C.O. = 1.5 ± 0.5 %

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.

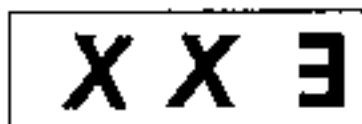
** When the CO has been adjusted, fit a tamperproof cap part no. 77 01 200 832.

FAULT-FINDING USING THE XR25 TEST BOX
DISPLAYS READ OFF WHEN NO DEFECTS OCCUR

- Connect the XR25 to the vehicle's diagnostic plug with corresponding cassette
- Ignition on
- Key in : D 03

Computer identification number in relation to vehicle

example :

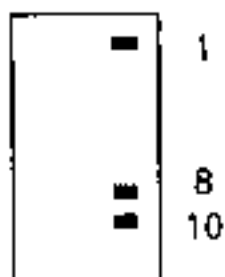


(XR25 centre display)

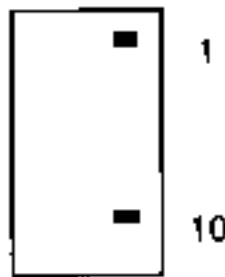
XX = 30 : J 11705
XX = 38 : J 11705 & J11708

Injection code number

TEST 1
(ignition on)



TEST 2
(engine running)



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



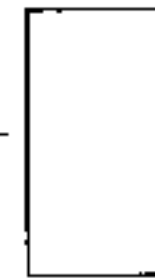
In all three tests : 13 should be extinguished when the engine is cold
(13 should illuminate when the engine has been running for approximately 3 minutes)



GOOD



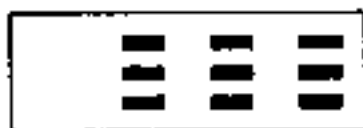
GOOD



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 that computer conforms to vehicle type, but diagnosis may be interpreted by XR 25.

FAULT-FINDING USING THE XR25 TEST BOX

- No incidents memorised
- Cassette no. 5 (or } J 11705, phase 1
following cassettes)
- Latest cassette } J 11705, phase 2 &
J 11708

DIAGNOSTIC CODE

XXE

XX = 30 J 11705, phase 1
XX = 38 J 11705, phase 2 & J 11708

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

85 A		
1	CODE PRESENT	TEST 1 IGNITION ON ENGINE STOPPED
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 STARTER SPEED (if vehicle does not start)
9	INJECTOR FEED	
10	NO-LOAD / FULL SWITCHES	
"R" INJECTION CARD CODE : D 03		
11	FLYWHEEL SENSOR	TEST 2 ENGINE RUNNING
12	PINKING SENSOR	
13	OXYGEN SENSOR	
14	AIR CONDITIONING DATA	
Engine stopped #03 Air temperature: degrees #01 Pressure in mb #04 Battery voltage: volts #02 Coolant temperature: degrees		
Engine running #06 Engine speed: rpm		
20	MEMORY FUNCTION	Code 00

• Tests performed

PINKING SENSOR

Engine idling
Key in #13
Read off centre display :
the value should vary with the engine speed. If it is still less than 5 :
check pinking sensor and wiring

TEST 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)**

- Throttle switch : No load/Full load
- Pinking sensor
- Oxygen sensor

THROTTLE SWITCH

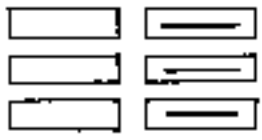

Engine running* : activate accelerator, watching line 10
*May be performed with engine stopped

OXYGEN SENSOR


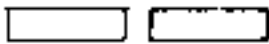
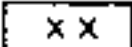

- 13 Defect
- 13 Engine not warm enough
- 13 Oxygen sensor wait 30 seconds

NOTE : If the sensor has been disconnected before a test is performed again, switch off the ignition.

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	xx3 xx = 30 : J11705 phase 1 xx = 38 : J11705 phase 2 and J11708 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			xxxxx 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			xxx 80°C to 110°C
Checking air temperature sensor	Engine stopped (cold)	# 03			xx Ambient temperature +2°C
Checking idling speed regulation speed	Engine hot and idling - No consumer switched on - cooling fan - headlights - wheels locked	# 06 # 12			Measure speed xxx 775 to 825 rpm Measure cyclic opening ratio (RCO) xxx 2.8 to 3.5

CONFORMITY TEST

Function to be checked	Conditions	Selection on test box	Bar graph line number	Bar graph display	Display on digital display Remarks
Checking no load switch engine running	Engine running: - no load - light throttle - gradual return to no load position		L10 L10 L10		
Checking pinking sensor Measure noise	Engine hot unladen: 3600 + 200* - 0	# 13	L12		Measure the min. and max. values over approximately 10 seconds  Value should not be zero and should vary
Checking oxygen sensor	Engine hot and idling		L13	Test possible  ↑ MUST be extinguished on RH side	Sensor activated

The check for conformity is performed using the XR25 test box and:

- cassette no. 5 or following cassettes (J11705 Phase 1);
- latest cassette (J11705 Phase 2 and J11708); 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.

SYMPTOMS

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% : J117; > 2% : J118)
9. Pinking
10. Idling speed too high
11. Idling speed too low (engine stalls)

CAUSE

REMEDY - CHECK

•	•									Defective relay assembly (3 sec. timing)	Check the voltage supply
•										Electric fuel pump not working	Check the fuel pressure Are the relays and fuel pump switched on ? If they are, change the fuel pump
	•	•		•						Idling switch badly adjusted or defective	Check the timing of the switch or replace it if defective
•	•	•								Air intake system not sealed	Check that the inlet manifold, the elements connected to it and all the hose connections are leaktight
•	•		•	•						Faulty injectors	Check the injector pulses by feeling, elimination of electrical feed (drop in idling speed)
•	•			•						Fuel pressure too low or non-existent Air sensor defective	Check the fuel pressure, filter and pipes, the pressure regulator and the pump Check the sensor, change it if necessary
						•				Fuel pressure too high	Is the hose connecting the pressure regulator to the inlet manifold connected ? Fuel return hose blocked or trapped Defective pressure regulator
								•	•	Idling regulation valve Coolant sensor Idling switch defective	Check valve operation, if defective, change it Check coolant sensor, change it, if necessary Adjust or change the switch
								•	•	Idling regulation valve feed defect	Check electric circuit, computer conformity, if defective or not to specification, change it
							•	•		Poor ignition, excessive engine temperature, incorrect mixture, incorrect fuel grade	Check the cooling circuit, the ignition system, fuel supply, full load switch, mixture regulation

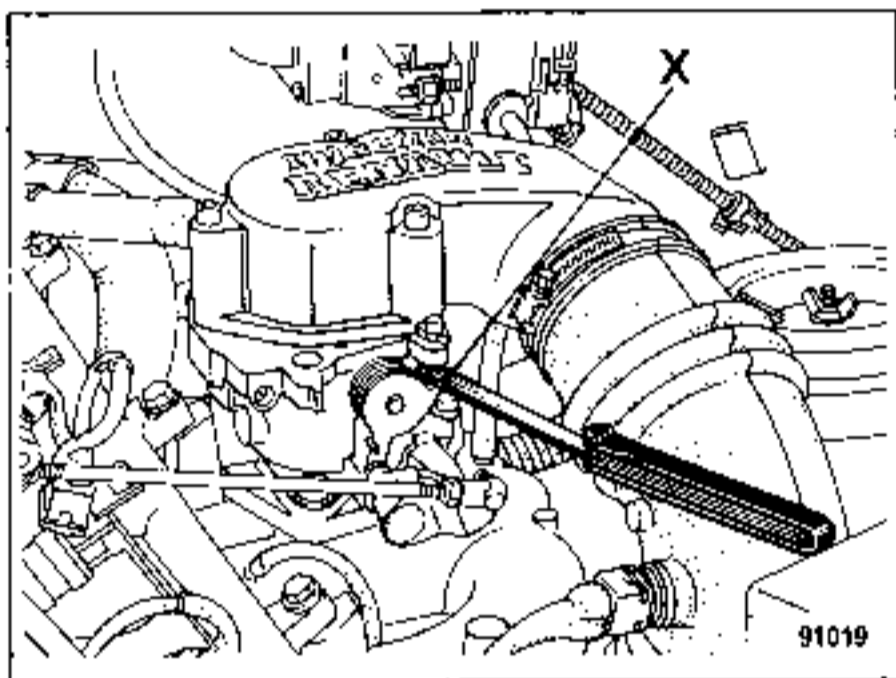
1	2	3	4	5	6	7	8	9	10	11	CAUSE	REMEDY - CHECK
						•		•			Air sensor defective	Check air sensor. change it, if necessary
		•		•							Faulty flywheel sensor target	Check that notches or apertures on flywheel are regular and to specification
		•	•				•	•			Faulty full-load switch Faulty idling switch Faulty oxygen sensor (J17) Fuel pressure	Check and change it, if necessary Check and change it, if necessary Change it, if necessary Check fuel pressure. Check fuel circuit, if necessary
•	•										Defective pressure sensor	Check the hose connecting the inlet manifold. Check the electrical supply of the sensor (+5 volts)
•											Defective speed sensor	Check resistance and air gap
•											Defective ignition power module	Check the feed to the module and the resistance of the coil
		•					•				Defective air sensor	Check resistance and circuit
•					•						Defective coolant temperature sensor on engine	Measure resistance and circuit
			•								Throttle butterfly not closing	Free the butterfly throttle, adjust the accelerator rods and then adjust the throttle butterfly
							•				Throttle butterfly not opening completely	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 the entire assembly before changing the computer

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 (Ω)	
	A B	B 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

Connect the XR 25 test box equipped with the latest cassette (engine hot and idling), with the CO correctly adjusted (J116).

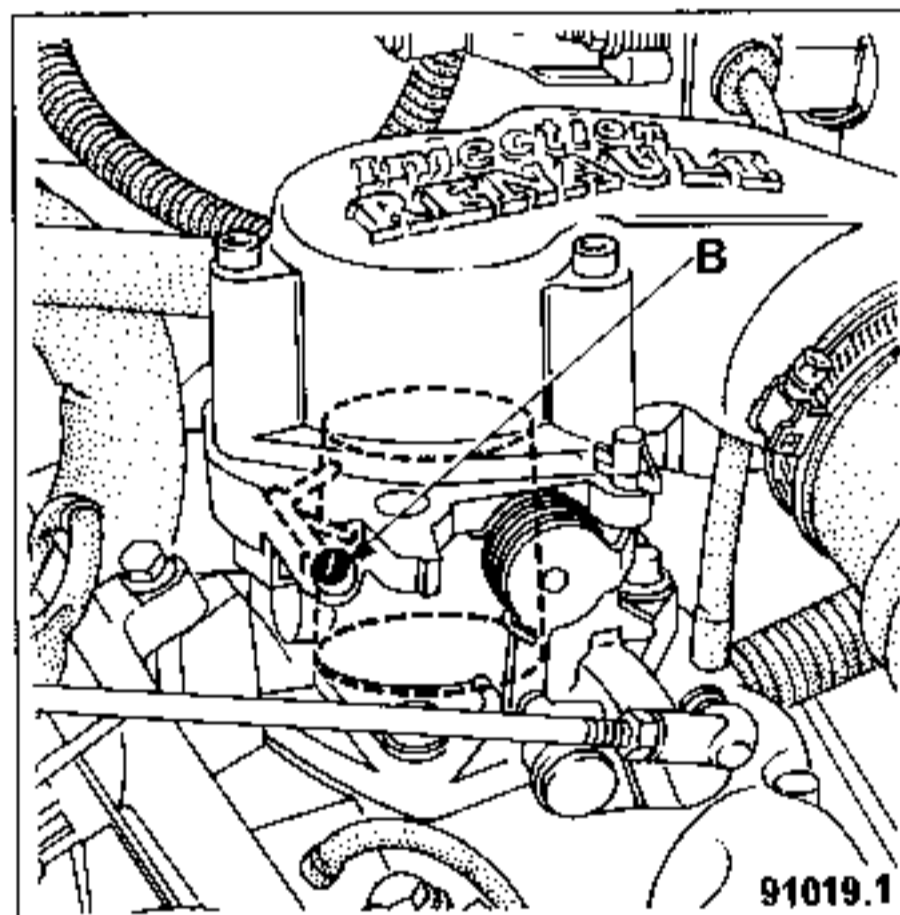
Enter D 03 # 12 and read off the value on the centre display.

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: Min. value: 2.8 ms
Adjust to 3.05 ± 0.05 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 the by-pass adjusting screw,

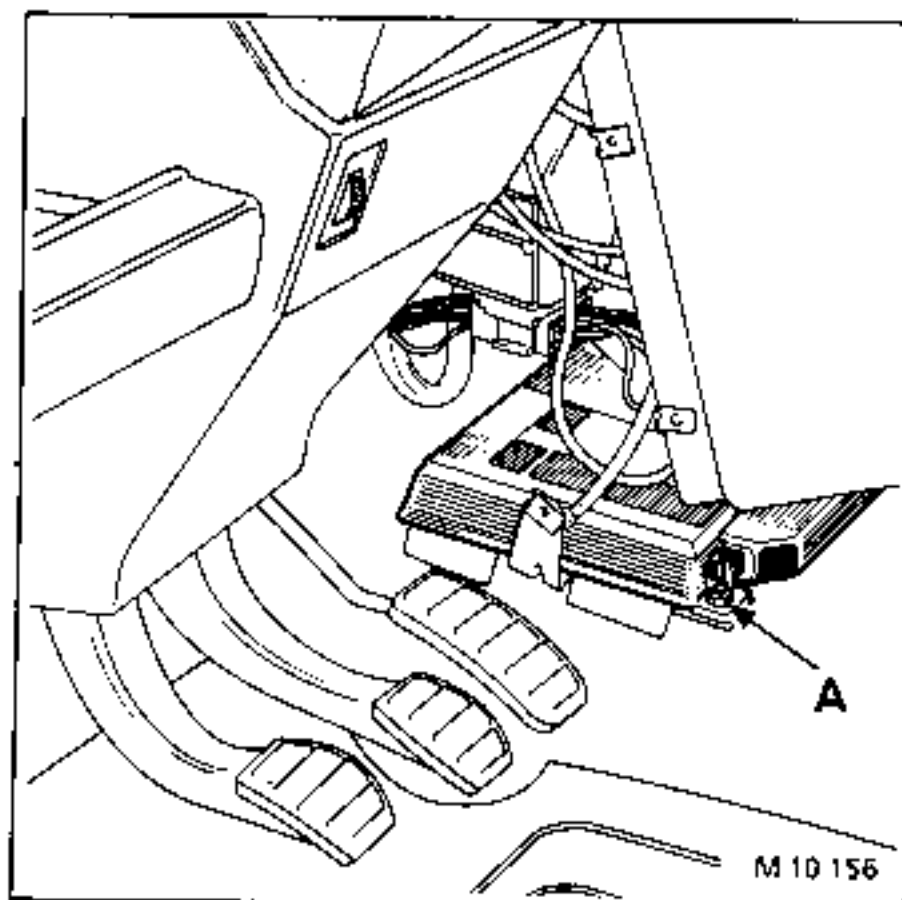
part no. 77 01 200 832.

REMOVAL - REFITTING

Remove the lefthand flange of the console.

The computer is held by two bolts (A).

Disconnect the connector. The computer can be removed from the rear.

**RELAYS**

IMPORTANT: Disconnect the battery before dismantling the relays.

REMOVING - REFITTING

REMOVING

Disconnect the wiring harness connector.

Remove the air duct connecting the air filter to the throttle casing.

REFITTING

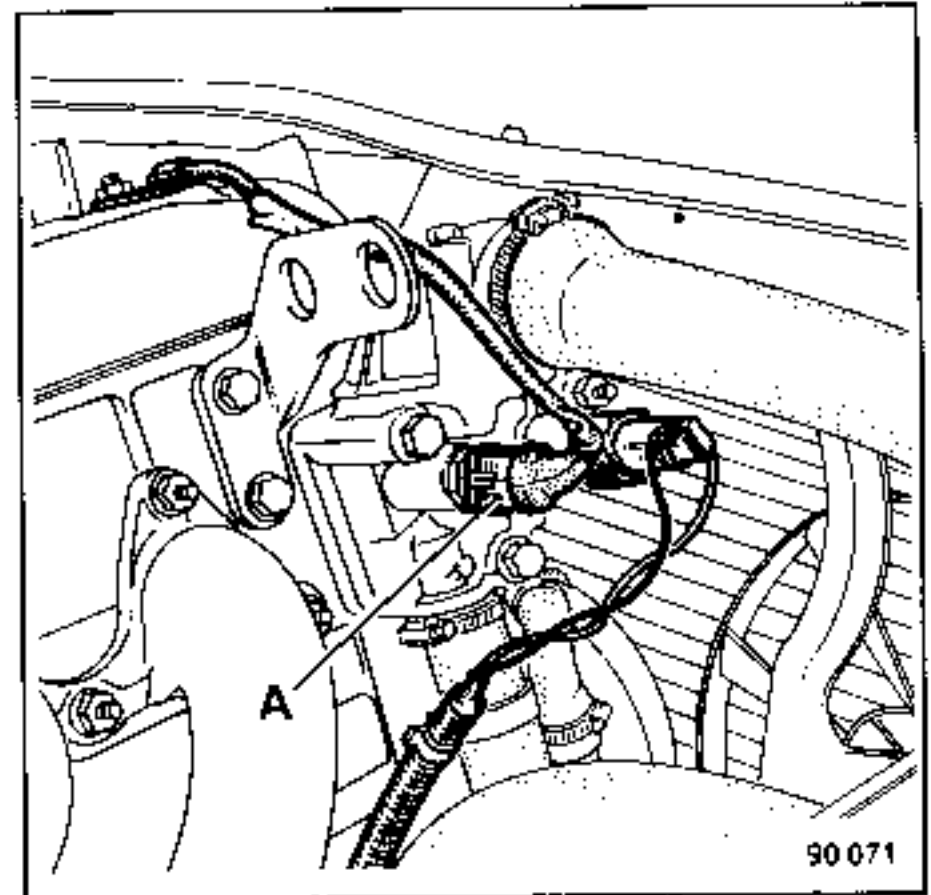
Check that all lines are connected.

Coolant temperature sensor

PRECAUTION: Remove the sensor when the engine is cold.

Disconnect the wiring harness connector.

Unscrew sensor (A) and plug the aperture in the coolant pump rapidly to avoid losing coolant.



REMOVING - REFITTING

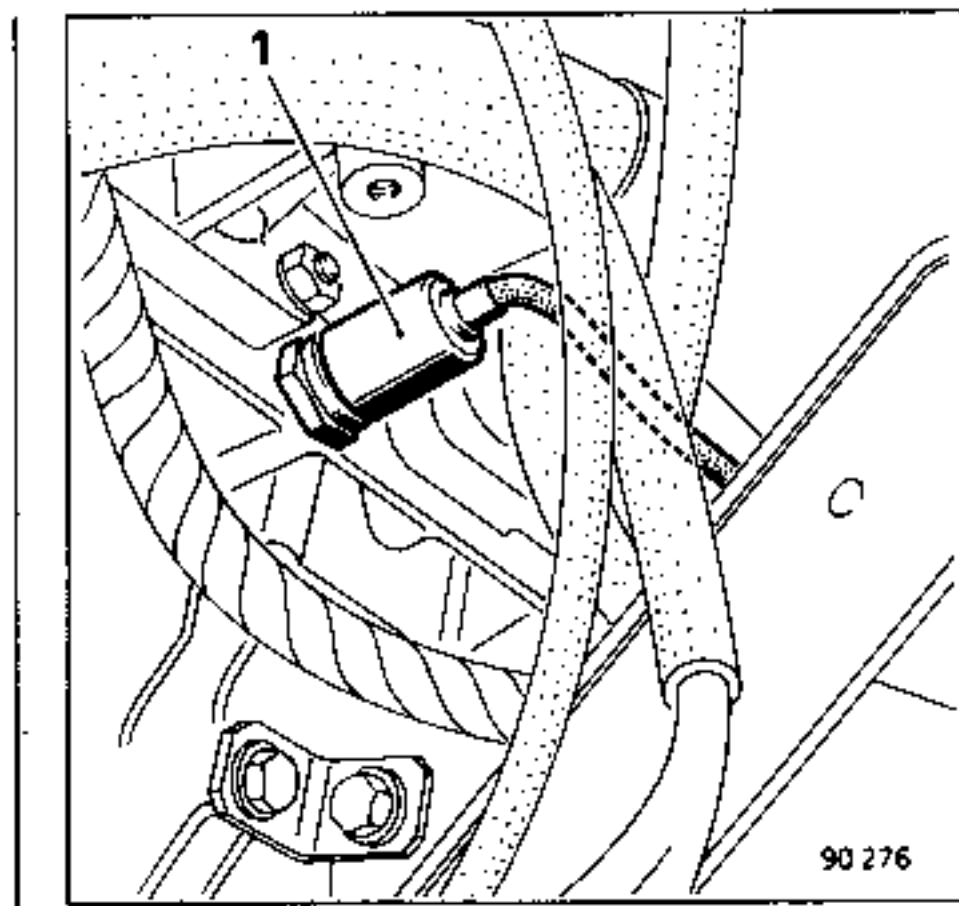
Disconnect:

- 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 flat open spanner, reaching it from underneath the air distributor.



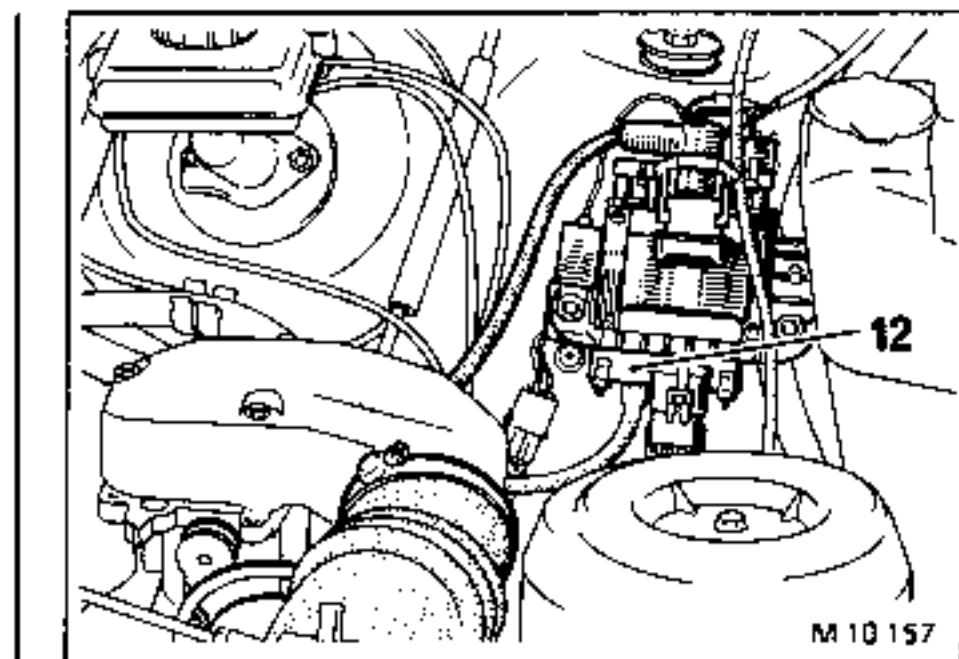
Absolute pressure sensor

REMOVAL

Disconnect the connector connecting the absolute pressure sensor to the wiring harness.

Using a screwdriver as a lever, disconnect the sensor hose. Do not pull on the hose.

Remove sensor (12).



IDLING REGULATION VALVE (1)

REMOVAL

Disconnect:

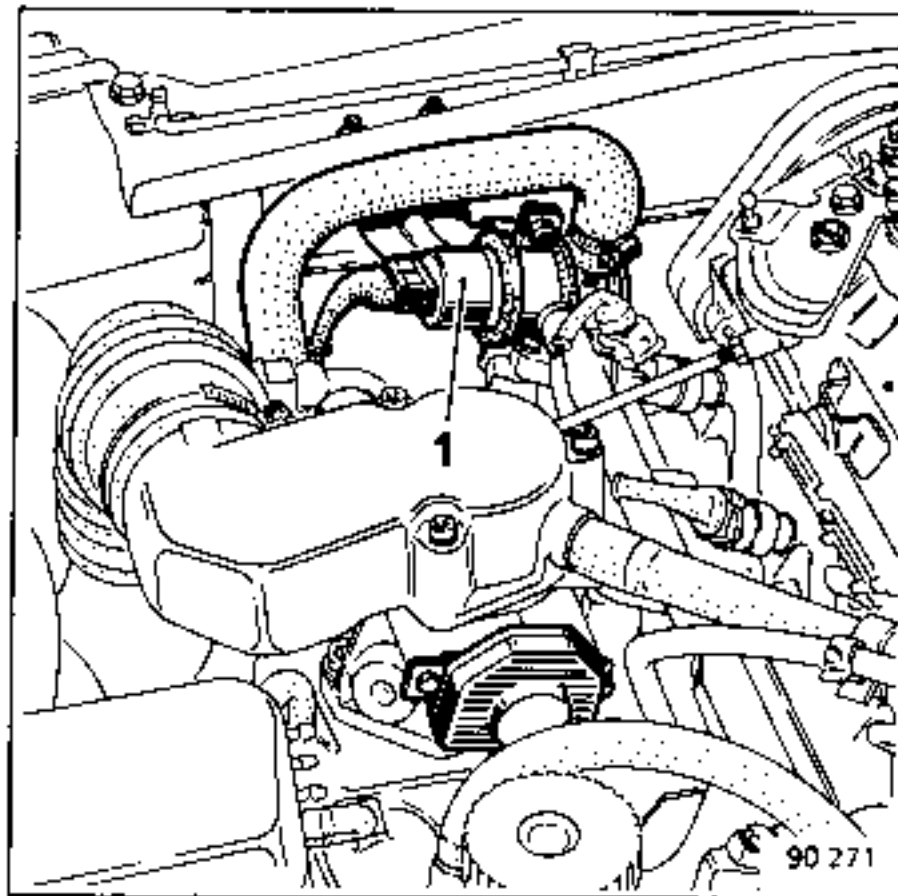
- the connector connecting the regulating valve to the wiring harness;
- the air hoses;
- the screws from the clip retaining the regulating valve;
- remove the retaining clip;
- take out the regulating valve.

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).



QUANTITY AND GRADE OF ANTI-FREEZE

Engine type	Quantity (litres)	Grade	Special point
J6R - J7R J7T	7.3	Coolant	Protection down to -23°C for hot, temperate or cold countries
J8S Turbo	7.7	GLACEOL AL (TYPE C)	Protection down to -40°C for "extreme cold" countries

ANTI-FREEZE DENSITY

Refractometer:

To obtain this contact
your local After-Sales
Head Office

The coolant is to be replaced every
36 000 miles (60 000 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 for hot and temperate climates

Protection reading at 40°C (coolant temperature)	System capacity (litres) 7.5
-5°C	2
-10°C	1.4
-15°C	1
-20°C	0.3

-40° "Extreme cold" climates

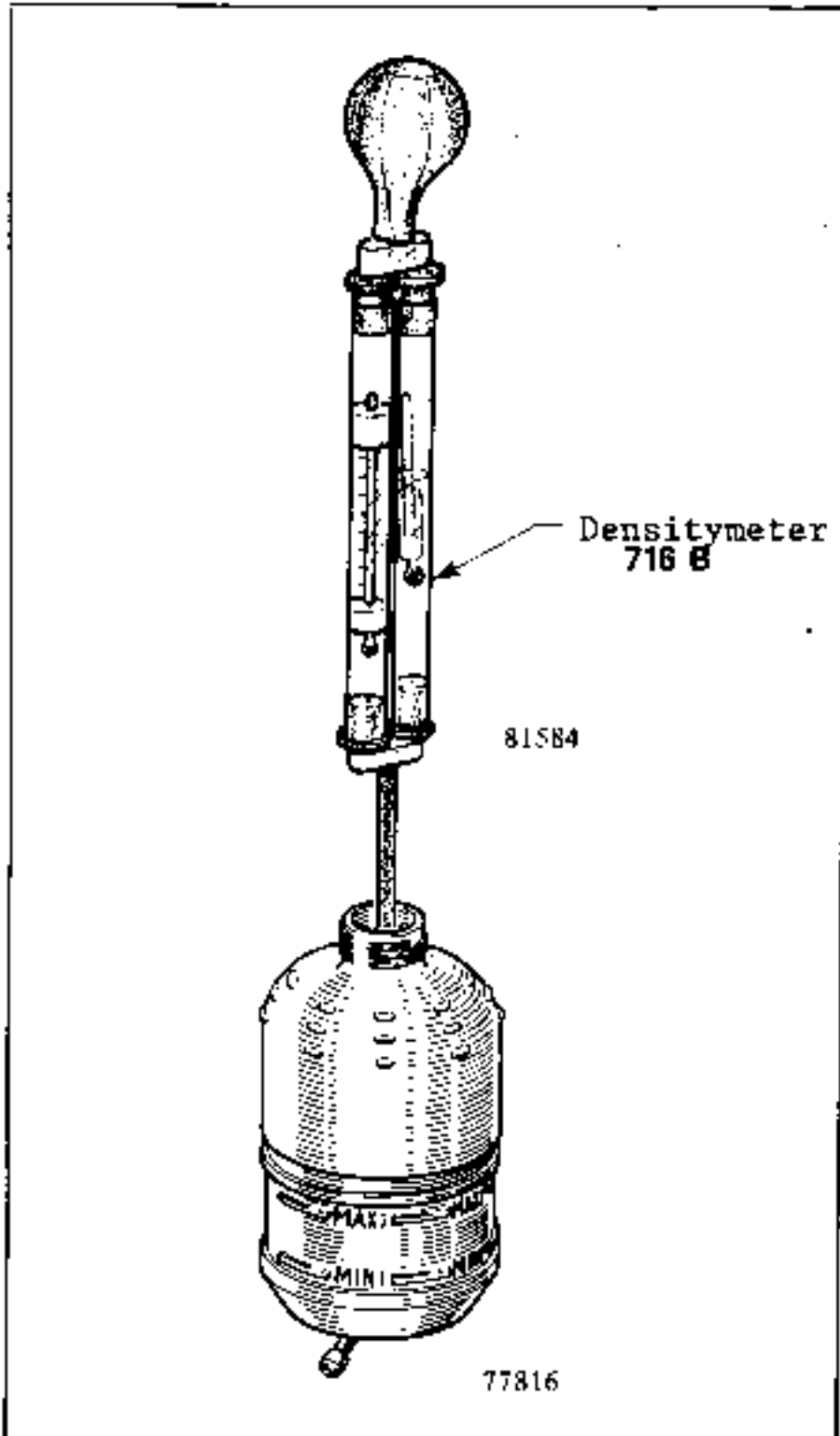
Protection reading at 40°C (coolant temperature)	System capacity (litres) 7.5
-5°C	3.3
-10°C	2.8
-15°C	2.4
-20°C	1.9
-25°C	1.6
-30°C	1.3
-35°C	0.7

Volume of coolant
to be replaced
by Glaceol AL type
C to obtain
protection down
to -23°C .

Volume of coolant
to be replaced by
GLACEOL AL type C
to obtain protect-
ion down to
 -40°C .

ANTI-FREEZE DENSITY

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



- Check that the densitometer:
- 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 DENSITOMETER-FLOAT						
		3	5	10	15	20	30	40
READING ON THERMOMETER	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						

EXAMPLE :

reading on thermometer: 60 } PROTECTION DOWN
reading on densitometer: 10 } TO MINUS 15°C

ALUMINIUM MATRIX RADIATORS

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

1. 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).

2. 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 is 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.

3. Anti-freeze and coolant

It is essential to use the correct type of anti-freeze in these aluminium 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 Drawing 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. 554-03	Cooling system leakage test kit
M.S. 554-01	Adaptor for M.S. 554-03
M.S. 554-04	Adaptor for M.S. 554-03

Checking the system for leaks

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

Connect this to tool **M.S. 554-03**.

Warm up the engine then stop it.

Pump the equipment to pressurise the system.

Stop pumping at 0.1 bars above 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

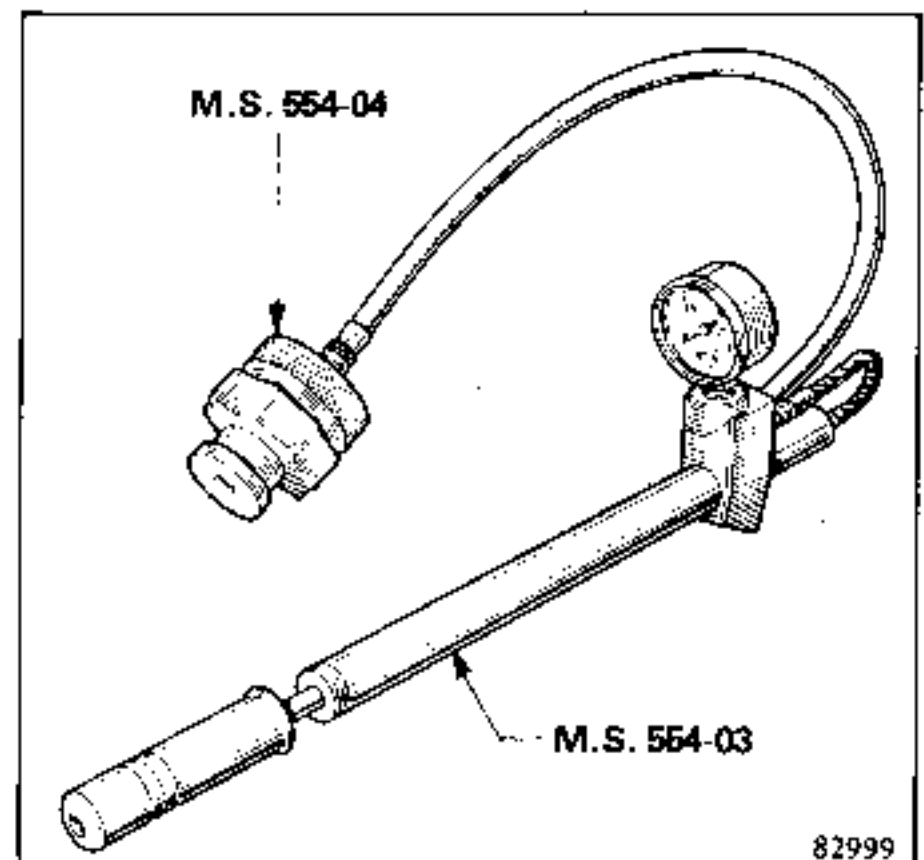
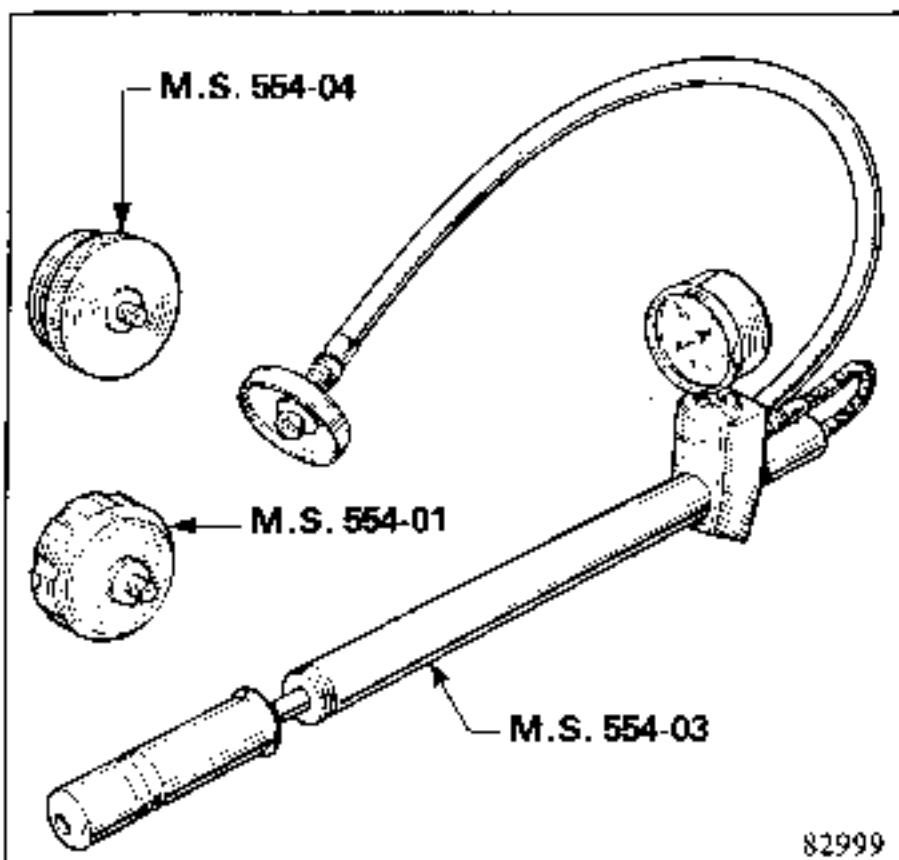
If coolant has flowed through the expansion chamber valve it will have to be replaced by a new one.

Fit tool **M.S. 554-04** to pump **M.S.554-03** 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.

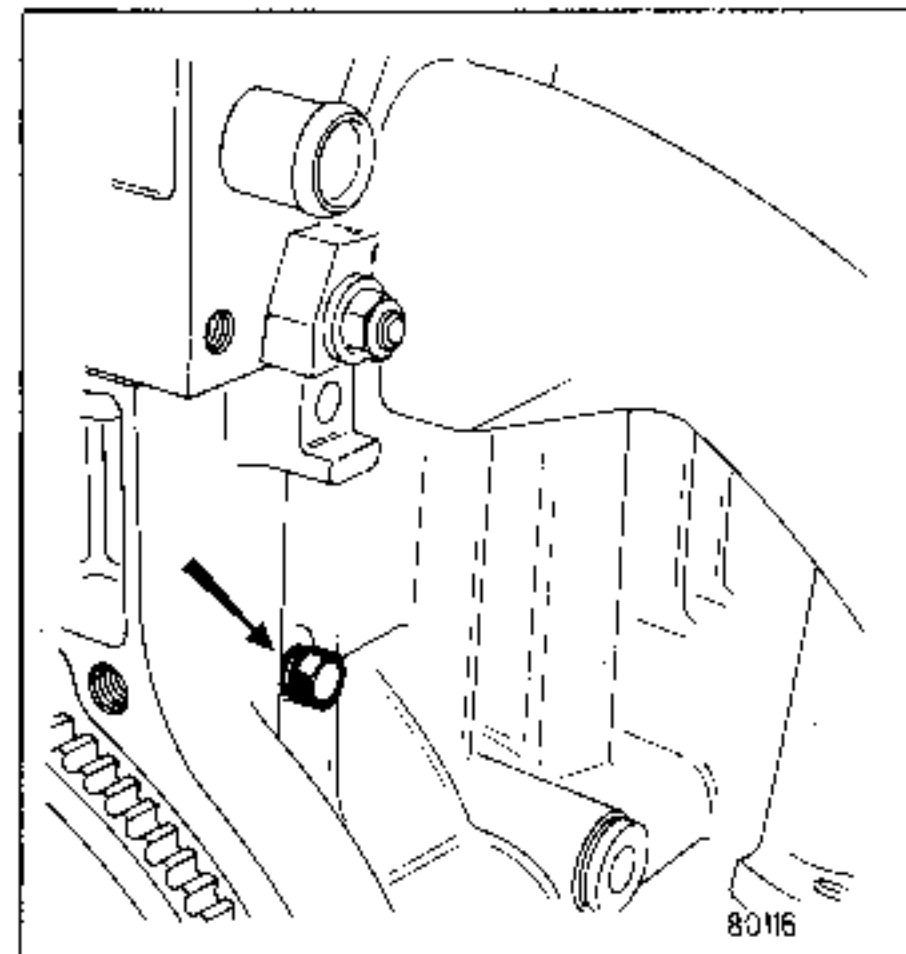
Valve pressure setting

White plastic valve, 0.8 bars
Brown plastic valve, 1.2 bars.



FILLING

Check that the drain plug is tight.



Remove the cap from the expansion chamber.

Prepare the amount of coolant required.

Open the carburettor bleed screw.

Remove the radiator filler cap.

Fill the system through the expansion chamber.

Close the radiator filler cap and the choke bleed screw as soon as coolant flows from them.

Top up the expansion chamber to the **maximum** mark.

Screw the expansion chamber cap and its valve and seal onto the expansion chamber.

Run the engine at **1500 rpm** until the electric cooling fan cuts in.

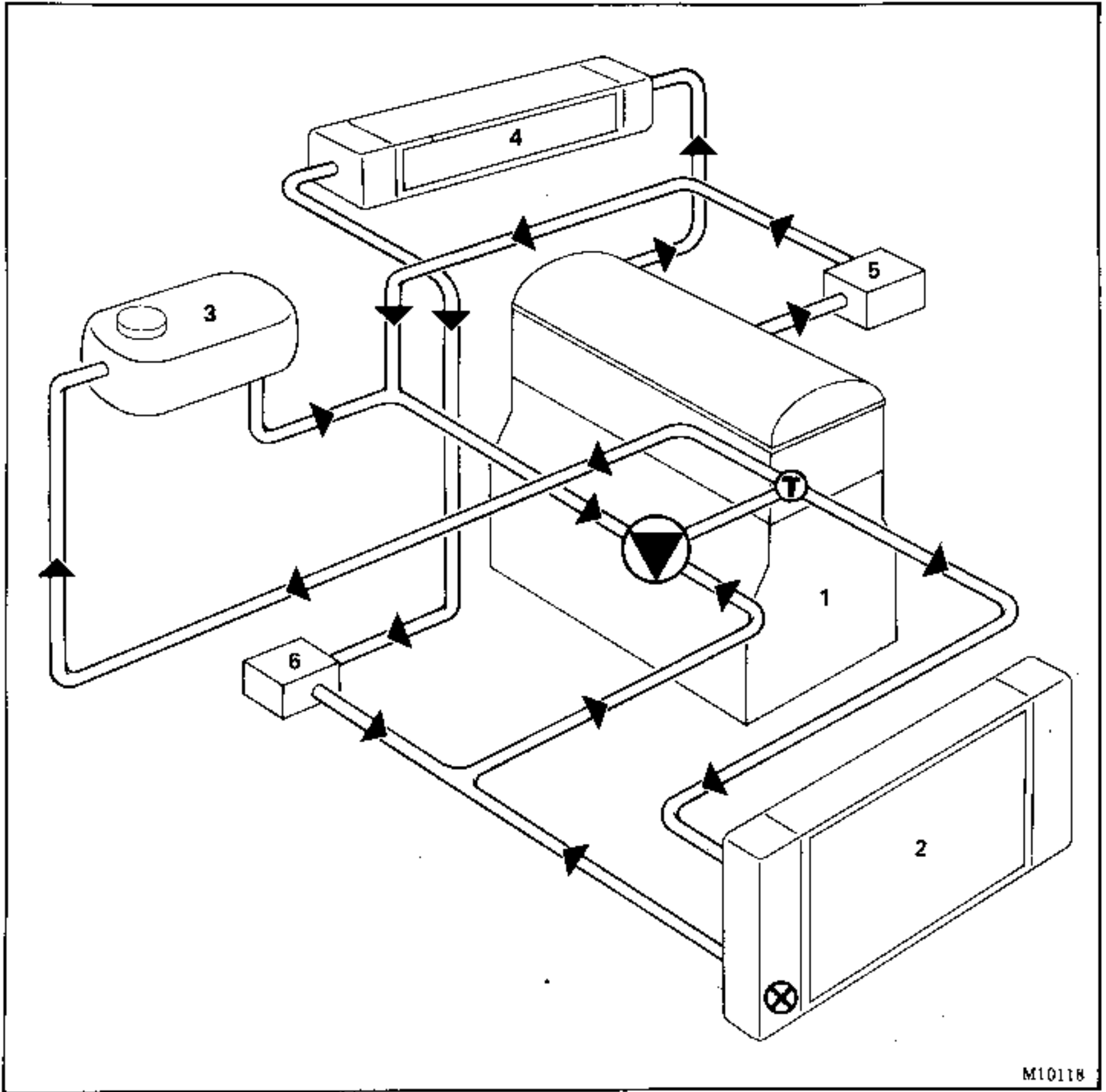
Allow the engine to cool down completely and check and, if necessary, top up the coolant in the expansion chamber.

There is no heater matrix valve

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




NOTE:

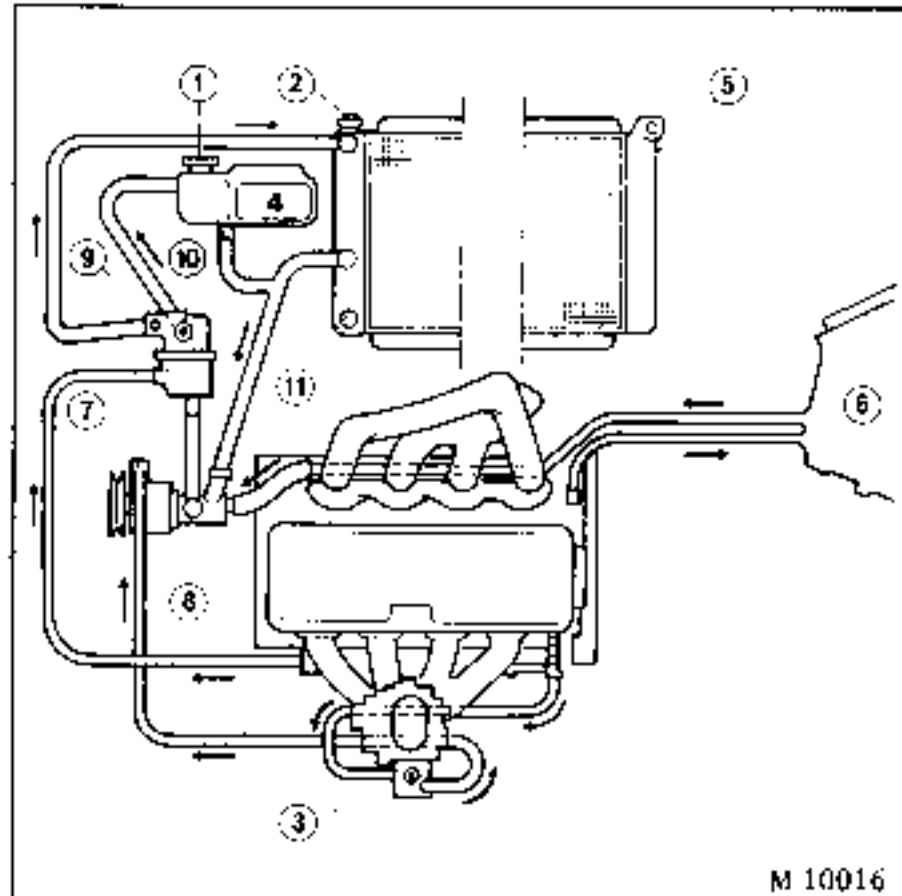
DO NOT OPEN THE BLEED SCREW WHEN THE ENGINE IS RUNNING.



M10118

- 1 Engine
- 2 Radiator
- 3 Expansion chamber
- 4 Heater matrix
- 5 Cold start device
- 6 Oil cooler

-  Coolant pump
-  Thermostat
-  Thermal switch



KEY:

- 1 Expansion chamber cap (1.2 bar calibration)
- 2 Radiator cap or bleed screw (Diesel and Injection versions)
- 3 Bleed screw (carburettor)
- 4 Expansion chamber with permanent defuming
- 5 Radiator
- 6 Heater matrix
- 7 Coolant pump
- 8 Pump inlet manifold
- 9 Thermostat unit
- 10 Calibrated union: 35 mm diameter
- 11 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, inlet manifold reheating circuit and the heater matrix circuit.

The thermostat (figure 1) is in the closed position, it allows the coolant coming from the cylinder head (circuit C) and the inlet manifold (circuit A) to pass to the coolant pump (circuit P) and closes off the passage to the radiator (circuit R).

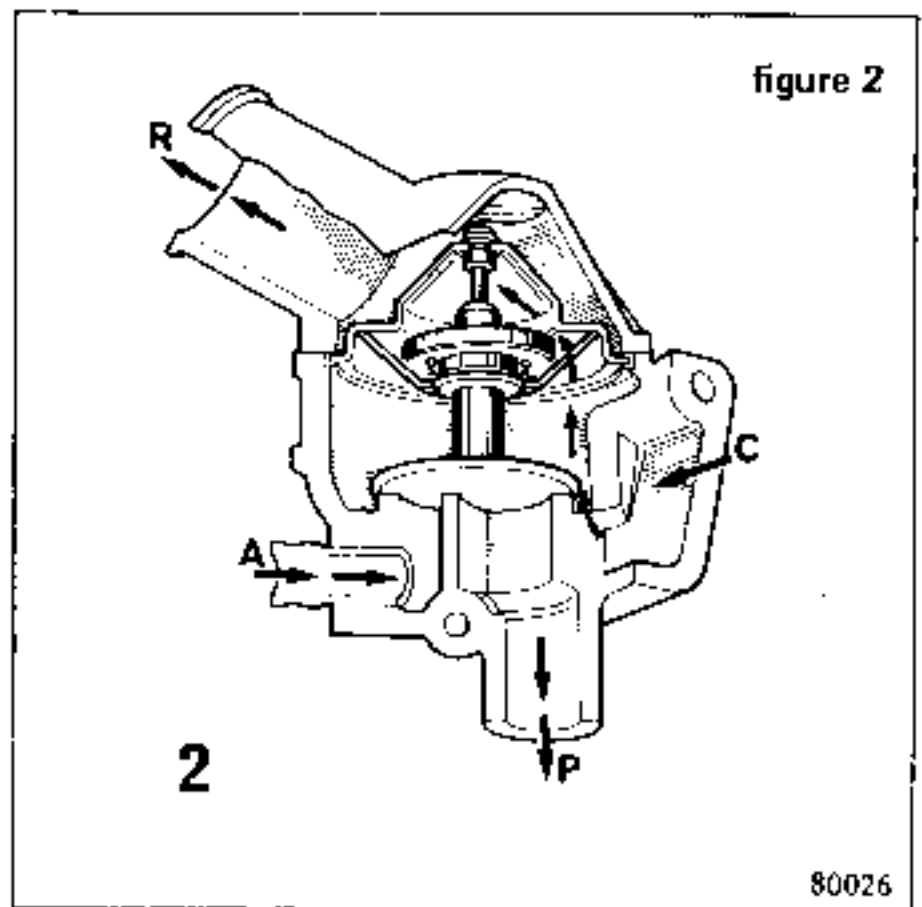
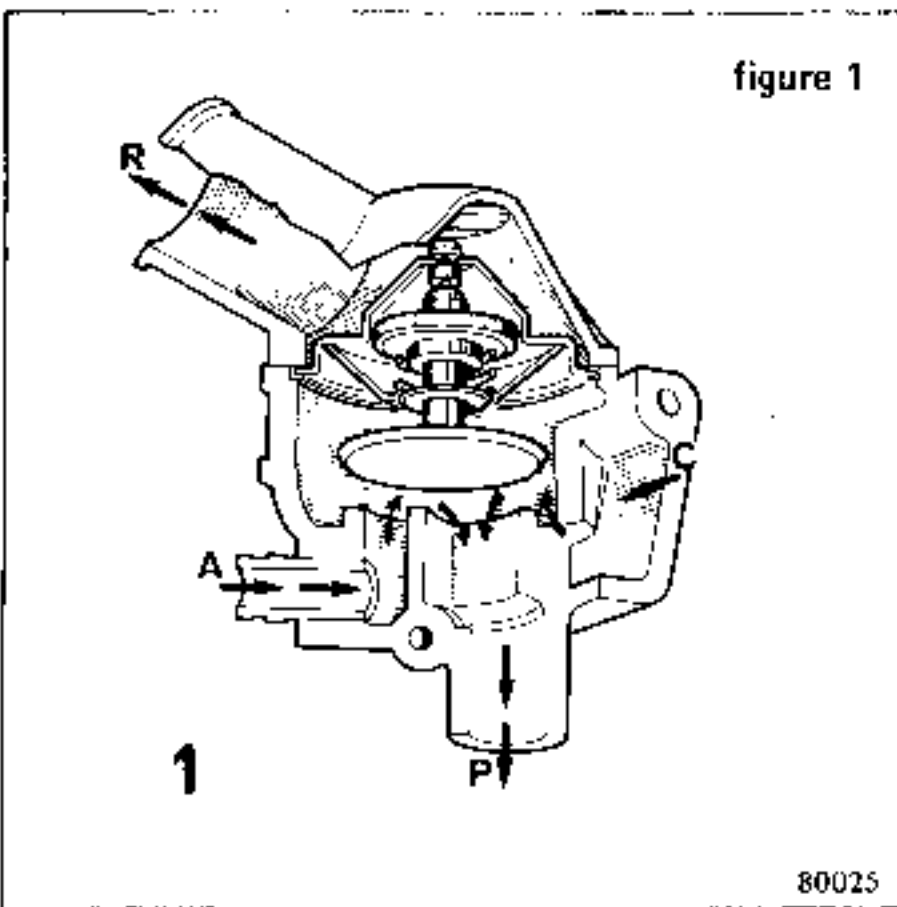
HOT ENGINE

The coolant circulates in the cylinder block, the cylinder head, the inlet manifold reheating circuit and the heater matrix circuit.

The thermostat (figure 2) is in the open position. It allows the coolant coming from the cylinder head (circuit C) to pass to the radiator (circuit R).

On the other hand, it closes the passage between the inlet manifold (circuit A) and the coolant pump (circuit P) so the coolant no longer circulates in the inlet manifold.

It still circulates in the inlet manifold reheating circuit, carburettor base and choke as the flexible hose is connected directly to the coolant pump.



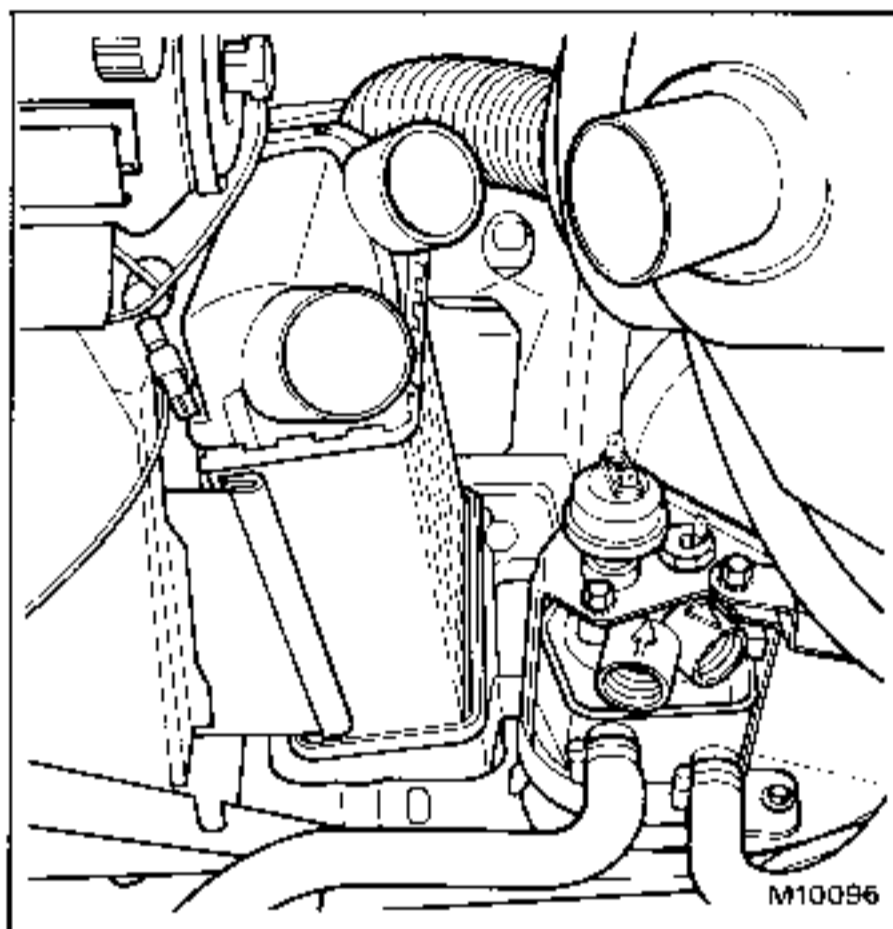
Engine type	Starts to open (°C)	Fully open (°C)	Travel in mm
J6R - J7R - J7T J8S Turbo	81	93	7,5

AIR-TO-AIR INTERCOOLER

REMOVAL

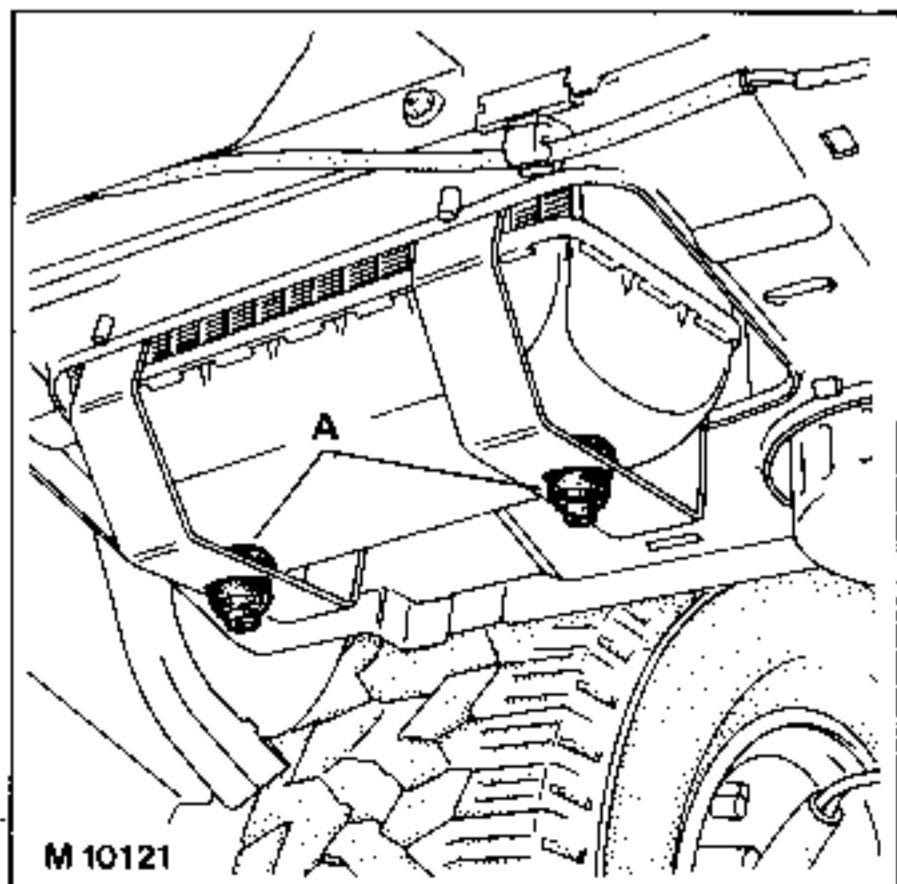
Remove:

- 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 diaphragm 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 hoses air-to-air intercooler
	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.



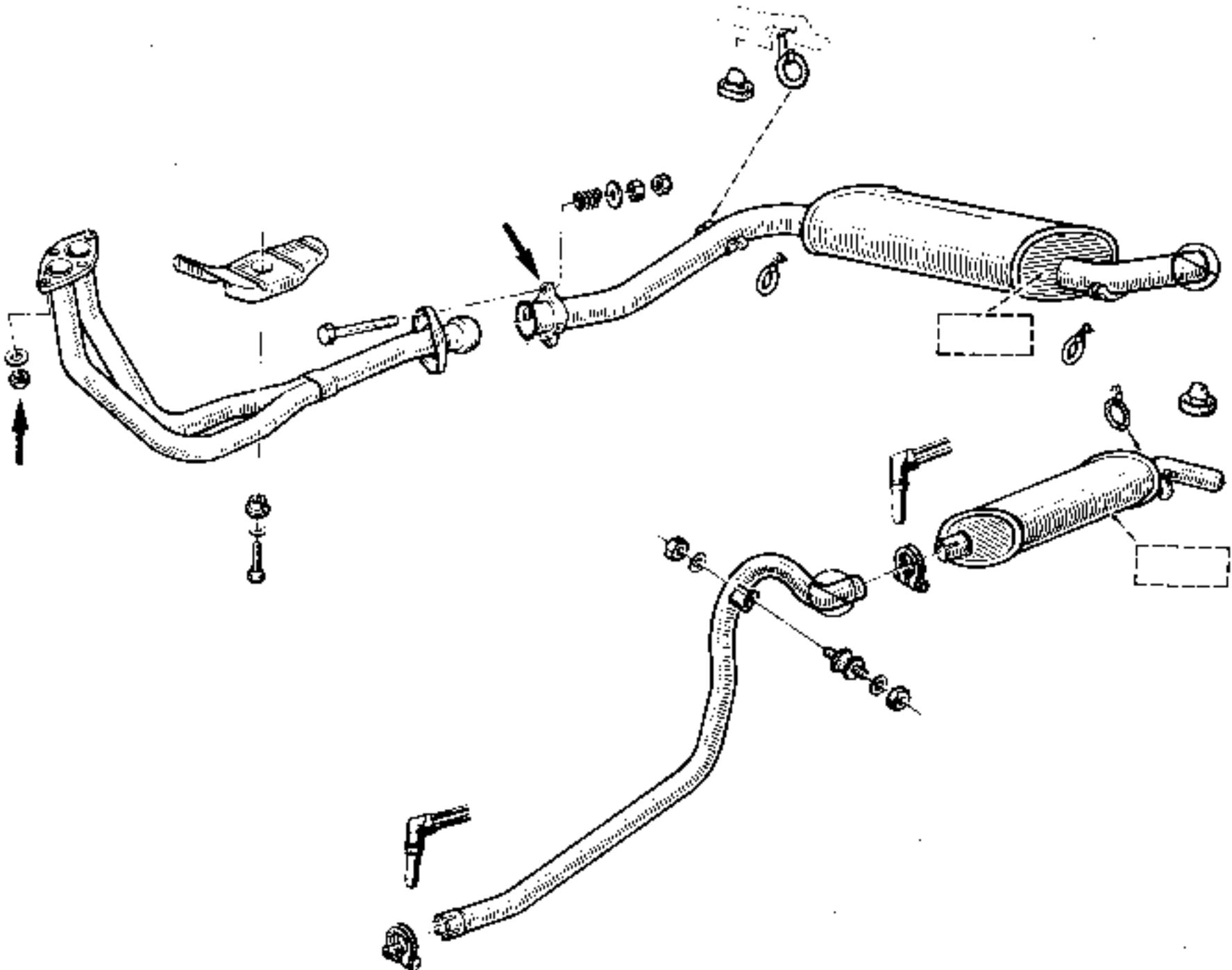
Unscrew completely to remove

Cut:

- either with a torch
- or with a tube cutter.

Cut with a torch only at:

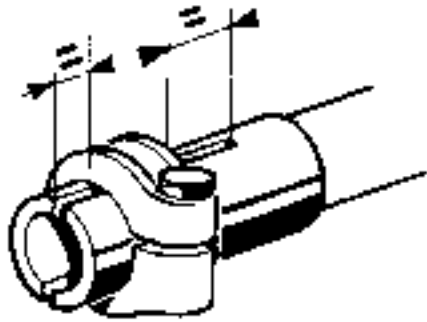
- the flange
- the outer tube at a push-in joint



REPLACING

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

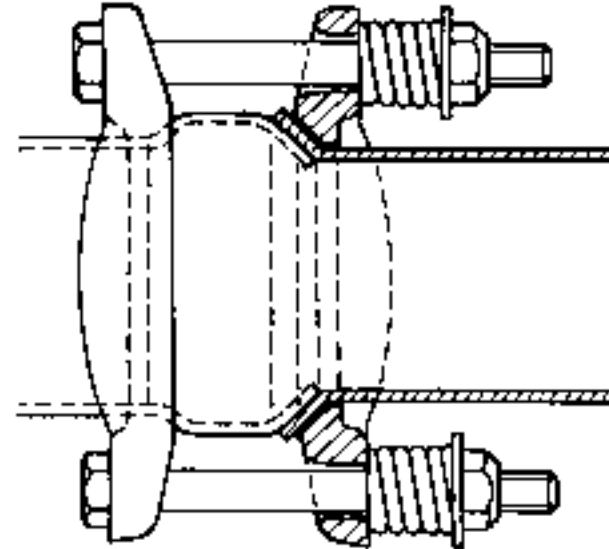
- tighten the different connections in the order given, starting with the exhaust manifold and ending with the silencers;
- position the clips so that their tightening surface bears on the split ends of the hoses and the openings in them are located between two slots on a hose.



88123

- 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.

Tightening the clamp and fitting springs and heat-melting seal



R7963

ESSENTIAL: Replace the heat-melting seal whenever work is performed on these parts and tighten the clamp so that the spring coils are touching (do not slacken).

DE-POLLUTION OF THE EXHAUST GASES BY CATALYTIC CONVERTER**AIM**

The three-way or three-purpose catalytic converter is 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. This mixture is obtained when the engine is fitted with a fuel supply system guided by an oxygen sensor (Lambda sensor) located in the exhaust system upstream of the catalytic chamber; in this case, it is not necessary to have a system which injects air into the exhaust (for the reduction of hydrocarbons and carbon monoxide) and, in certain cases, the E.G.R. system (for reducing the nitrous oxides).

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 can either be flushed out with unleaded petrol or the vehicle can be made 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.

Whenever a seal has been removed it must be **REPLACED**.

DE-POLLUTION OF THE EXHAUST GASES BY CATALYTIC CONVERTER**CHECKING THE CONVERTER**

With the catalytic converter removed, check:

- that there is no damage (visually);
- that there are no suspicious noises (shake the converter);
- that there is nothing blocking the converter either partially or totally.

CATALYTIC CONVERTER IN SITU

Connect a **CO tester** to the rear of the vehicle.

Vehicle cold:
Measure the CO percentage.

Warm up the engine (wait for the cooling fan to cut in twice):
the CO percentage should be near zero.

- . If the CO percentage is greater than **0.5%** disconnect the oxygen sensor.
- . If there is no variation whether or not the CO sensor is connected: replace the oxygen sensor.
- . Using a new oxygen sensor, if the CO percentage is greater than **0.5%**, change the catalytic converter.

ATTENTION:

The variations in CO are not always immediate, they may be transitory and irregular since the CO reading varies according to the characteristics of the CO tester used (sensitivity, response time, condition of the filters, length of the hoses, etc.).

REMOVAL

Place the vehicle on a hydraulic lift.

Before raising the vehicle:

- Disconnect the battery.
- Drain the fuel from the tank using a pump.

Raise the vehicle.

Unscrew the nuts (1) securing the fuel tank retaining straps.

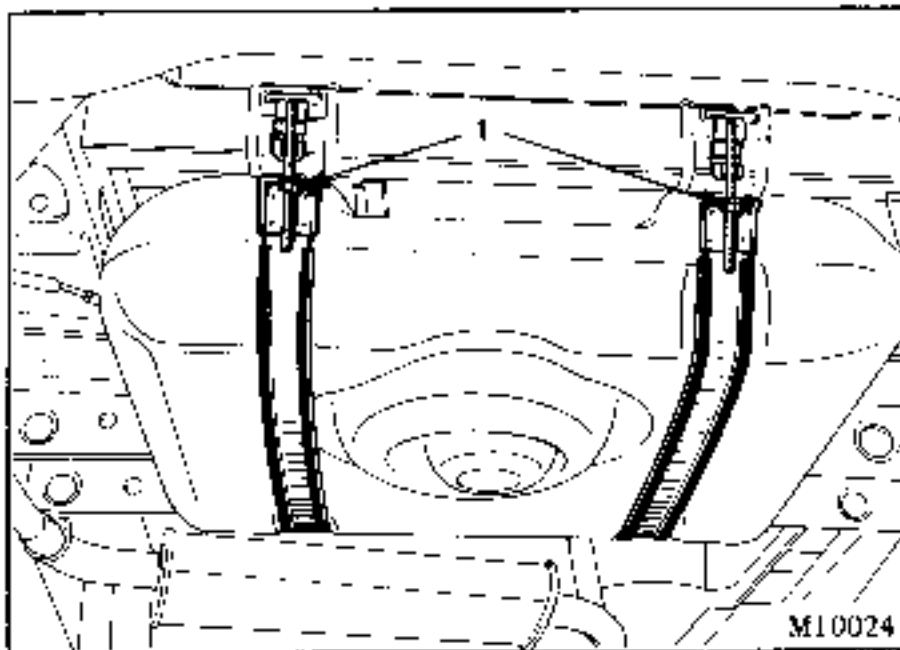
Remove the fastening clip from the filler breather pipe.

Unhook the straps and, using the Desvil V710 stand (for example), lower the tank gradually.

Do not allow the fuel tank to rest on the sender unit well with the sender unit inside it (there is a risk of damaging the latter).

Then disconnect:

- the various flexible hoses;
- the sender unit electric feed.

**REFITTING**

Perform the above operations in reverse order.

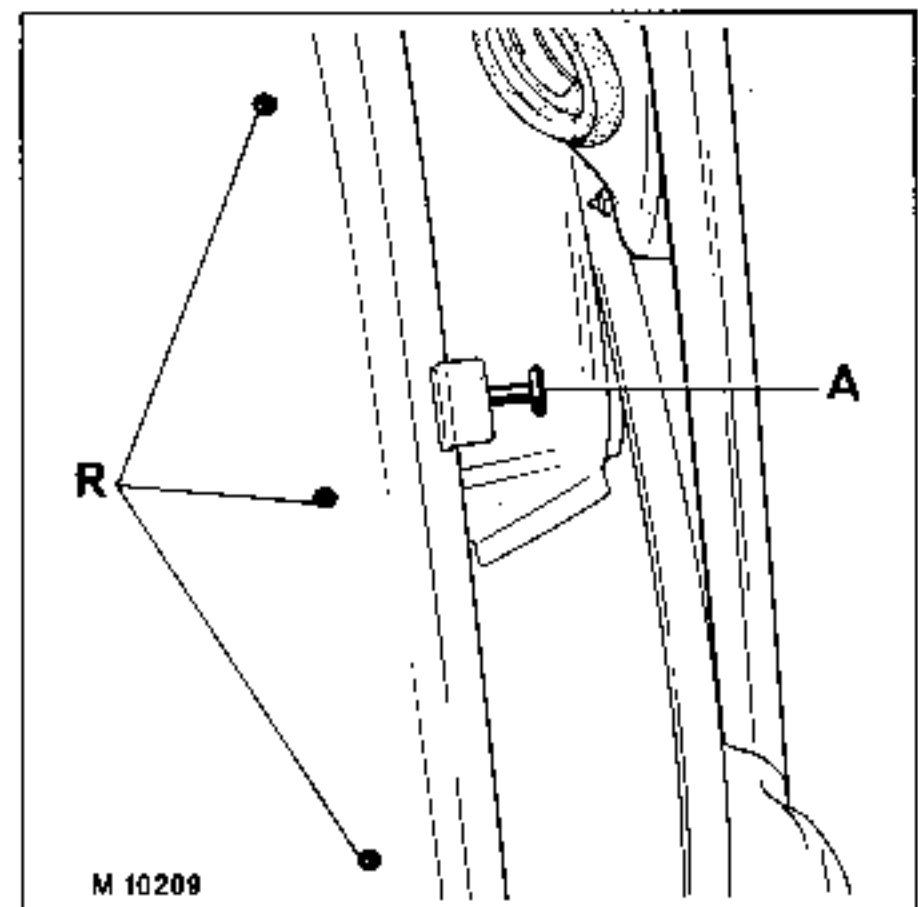
HOWEVER, when refitting the tank in the vehicle, take care not to pinch the fuel feed and return hoses between the body and the fuel tank.

BREATHER PIPE**REMOVAL**

Place the vehicle on a hydraulic lift.

Before raising the vehicle:

- disconnect the battery;
- drain the fuel from the tank using a pump;
- remove the rear righthand wheel;
- remove the wheel arch shield by drilling rivets (R);
- unpick bracket (A) using pliers.

**Disconnect:**

- the breather pipe;
- the vent hoses.

Remove all the hoses.

REFITTING

Attach all the hoses using adhesive tape.

Spread soapy water over the hoses so that they pass through the sidemember more easily.

Fit the hoses in the sidemember.

Position the assembly in the wheel arch.

Then proceed in the reverse order to removal.

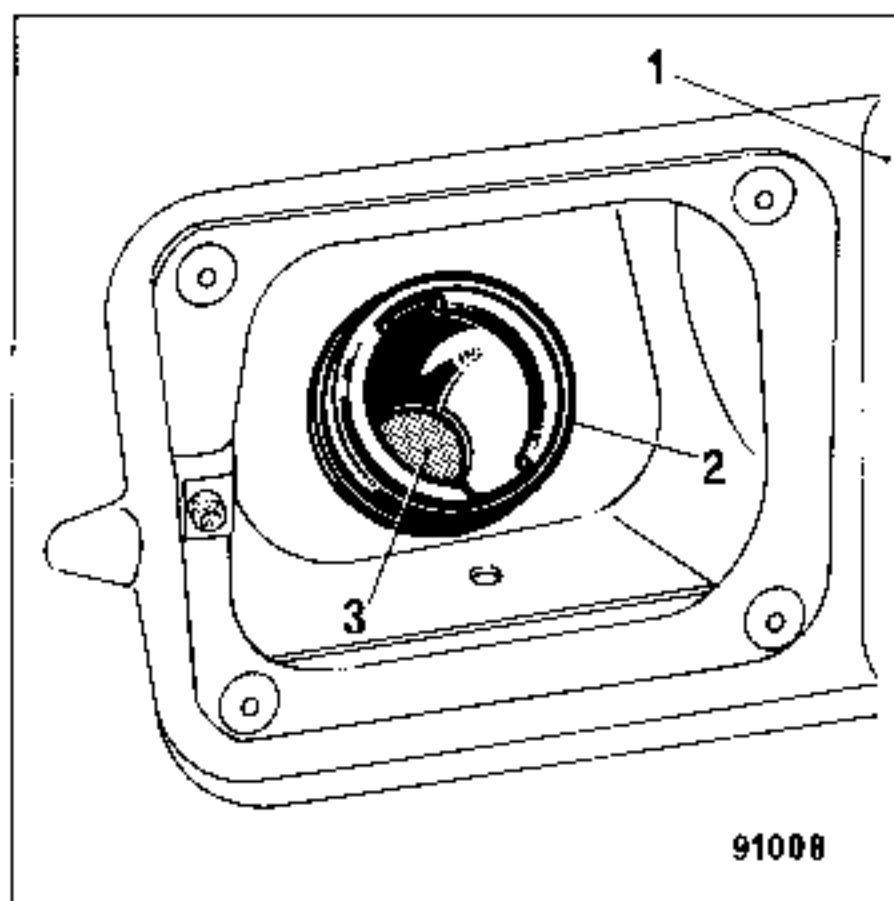
FILLING THE FUEL TANK

The vehicle must only be filled with unleaded petrol. The filler pipe has:

- a filler aperture with a reduced diameter which is incompatible with a filler nozzle for leaded petrol;
- a valve which shuts off the filler aperture.

Inside the fuel filler flap there is a tri-lingual label (in English, French and German) with instructions for using unleaded petrol.

The fuel tank cap is of the "limited tightening" type. A characteristic noise is heard when the cap is tight.



- 1 Flap
- 2 Filler aperture
- 3 Valve