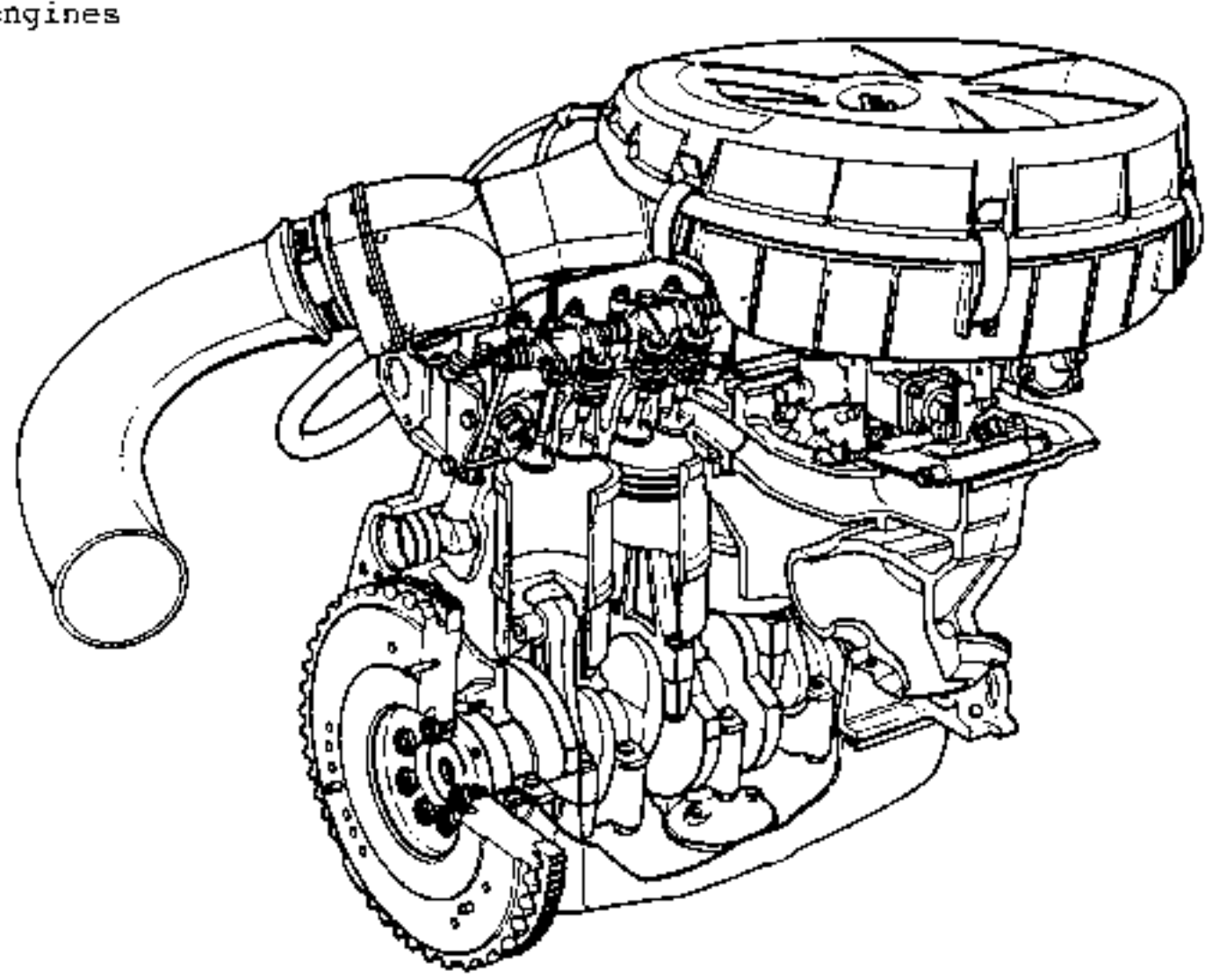
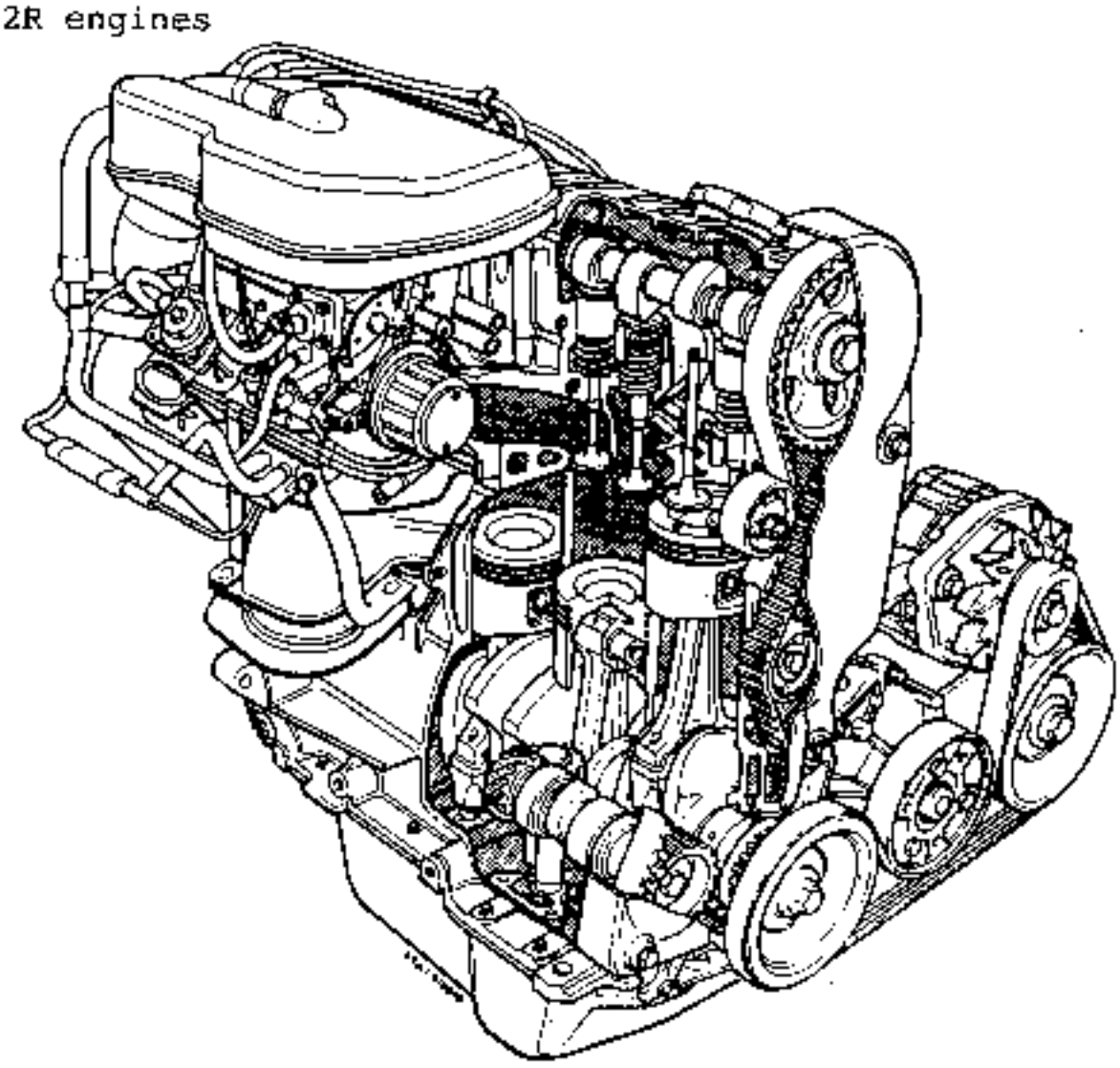
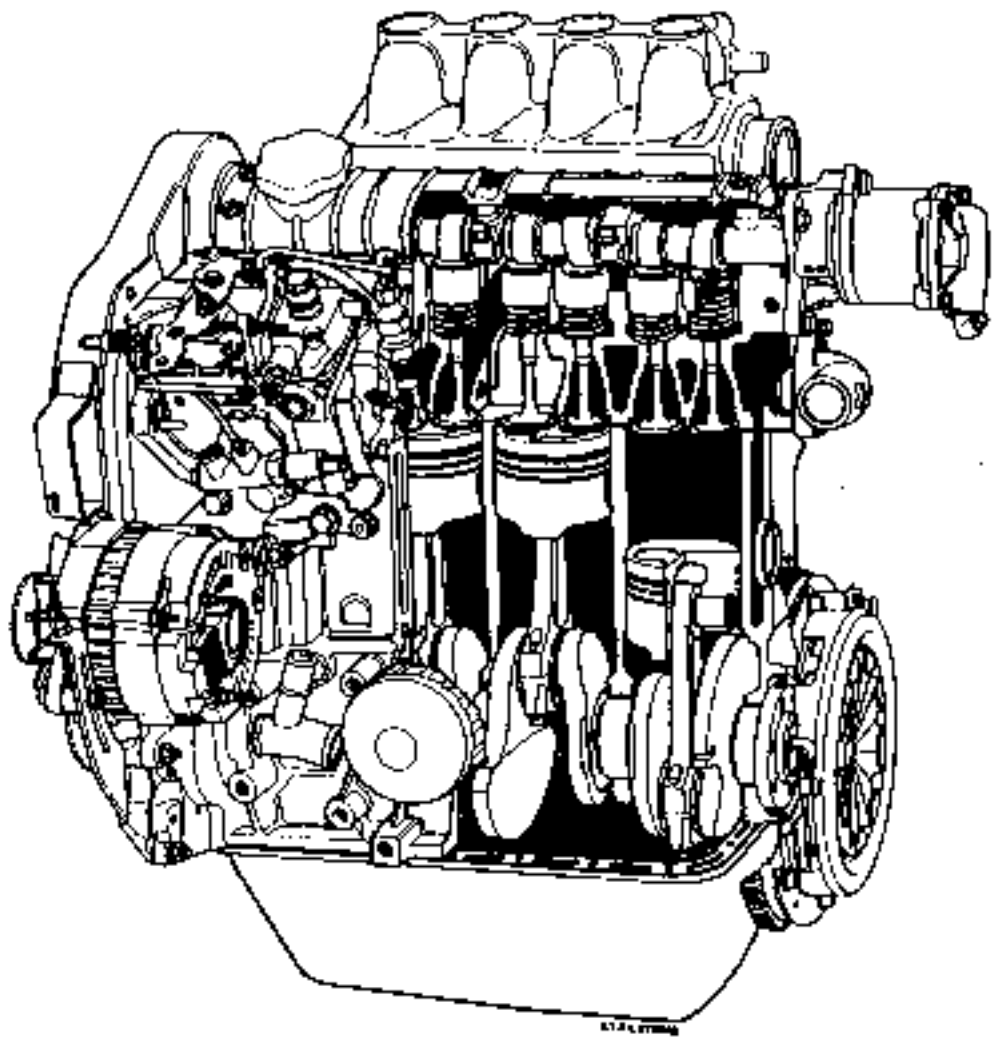
Type C engines



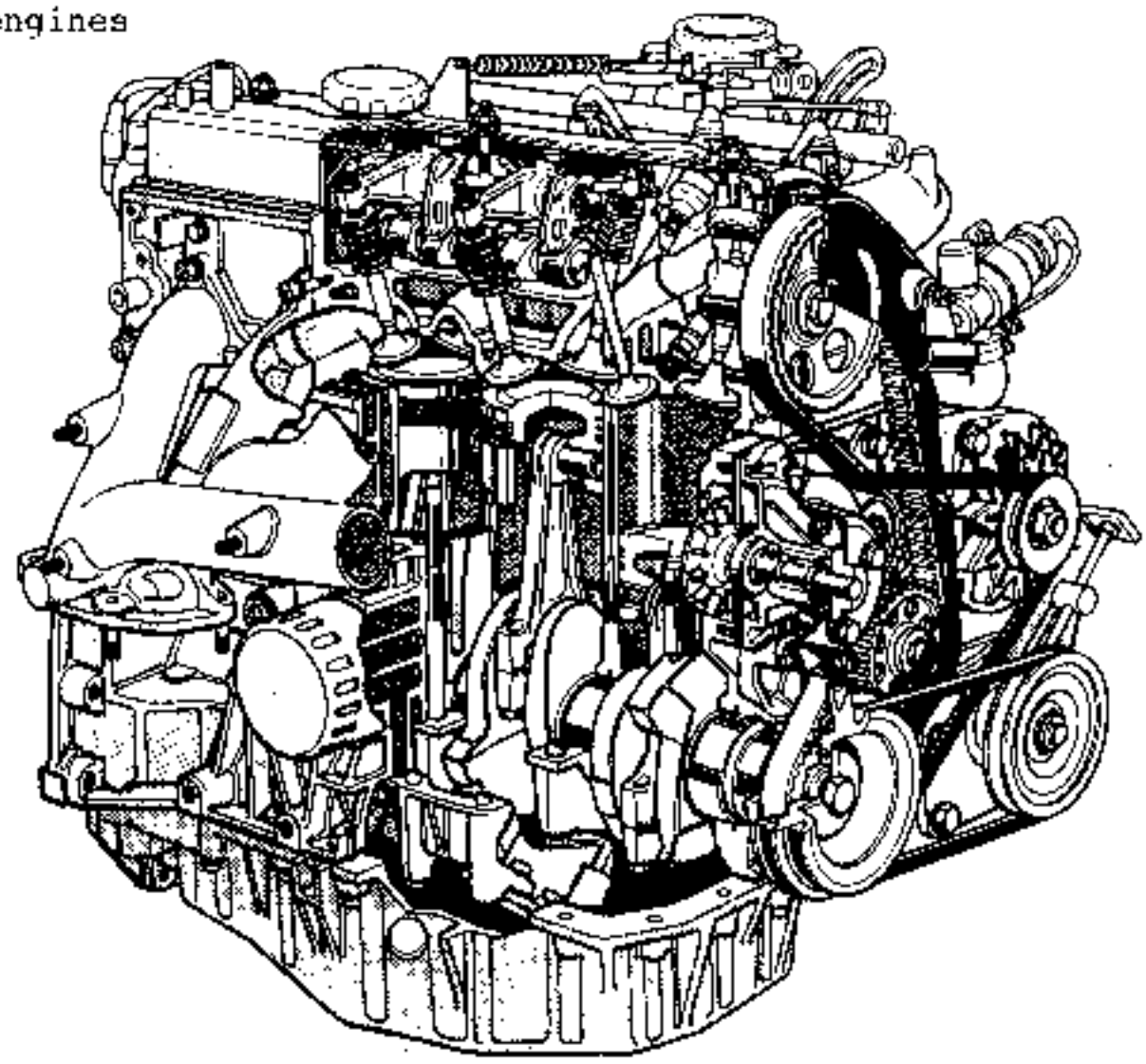
Type F2N-F3N-F2R engines



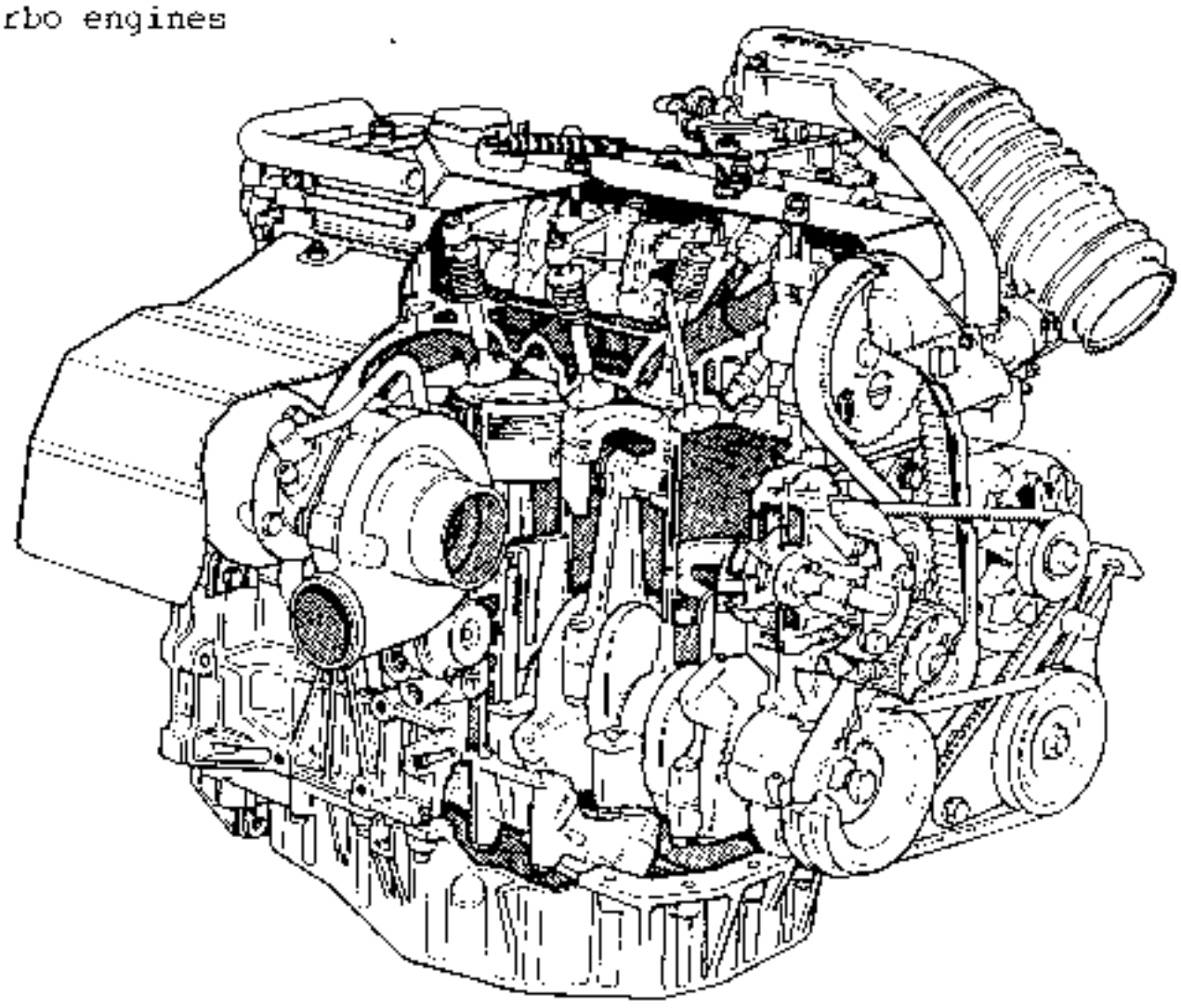
Type F8Q engines



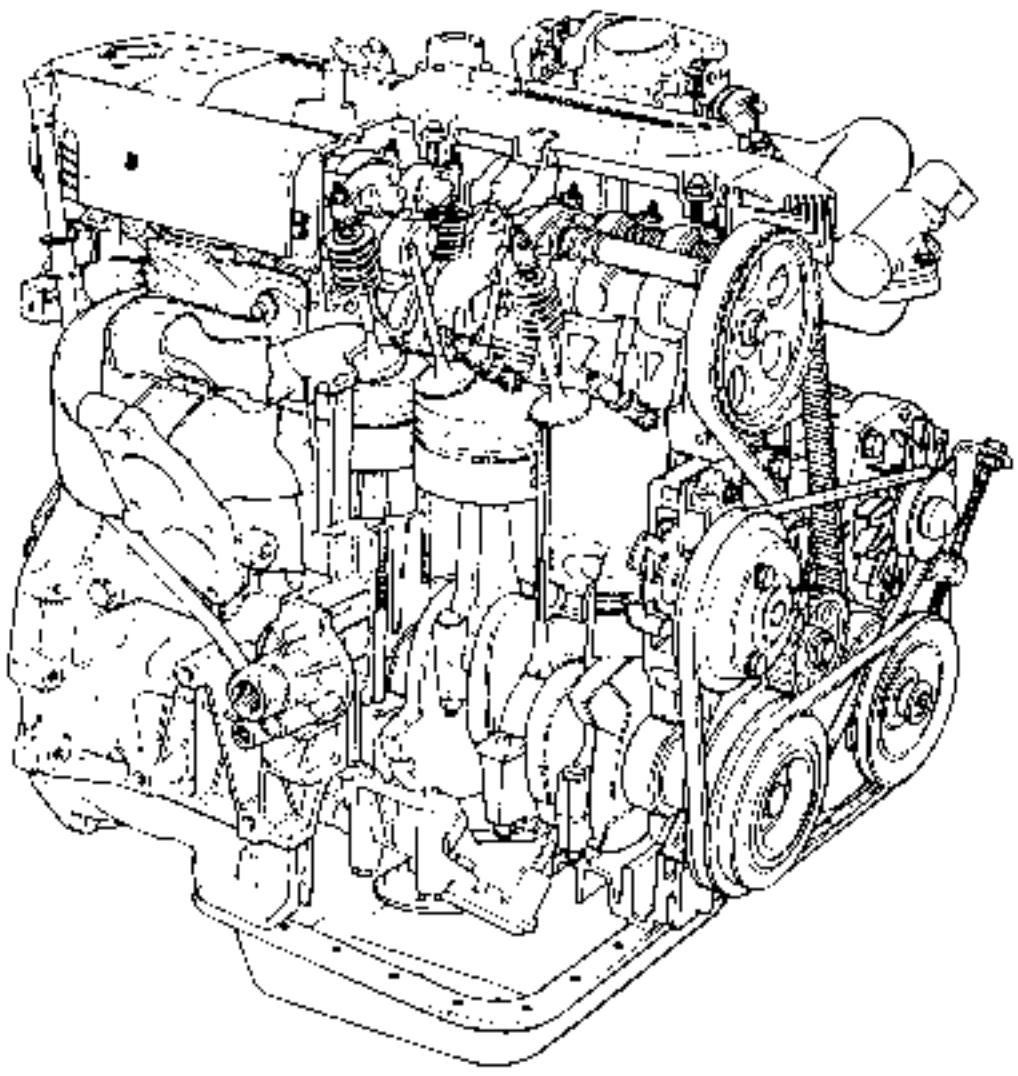
Type J6R-J7R-J7T engines



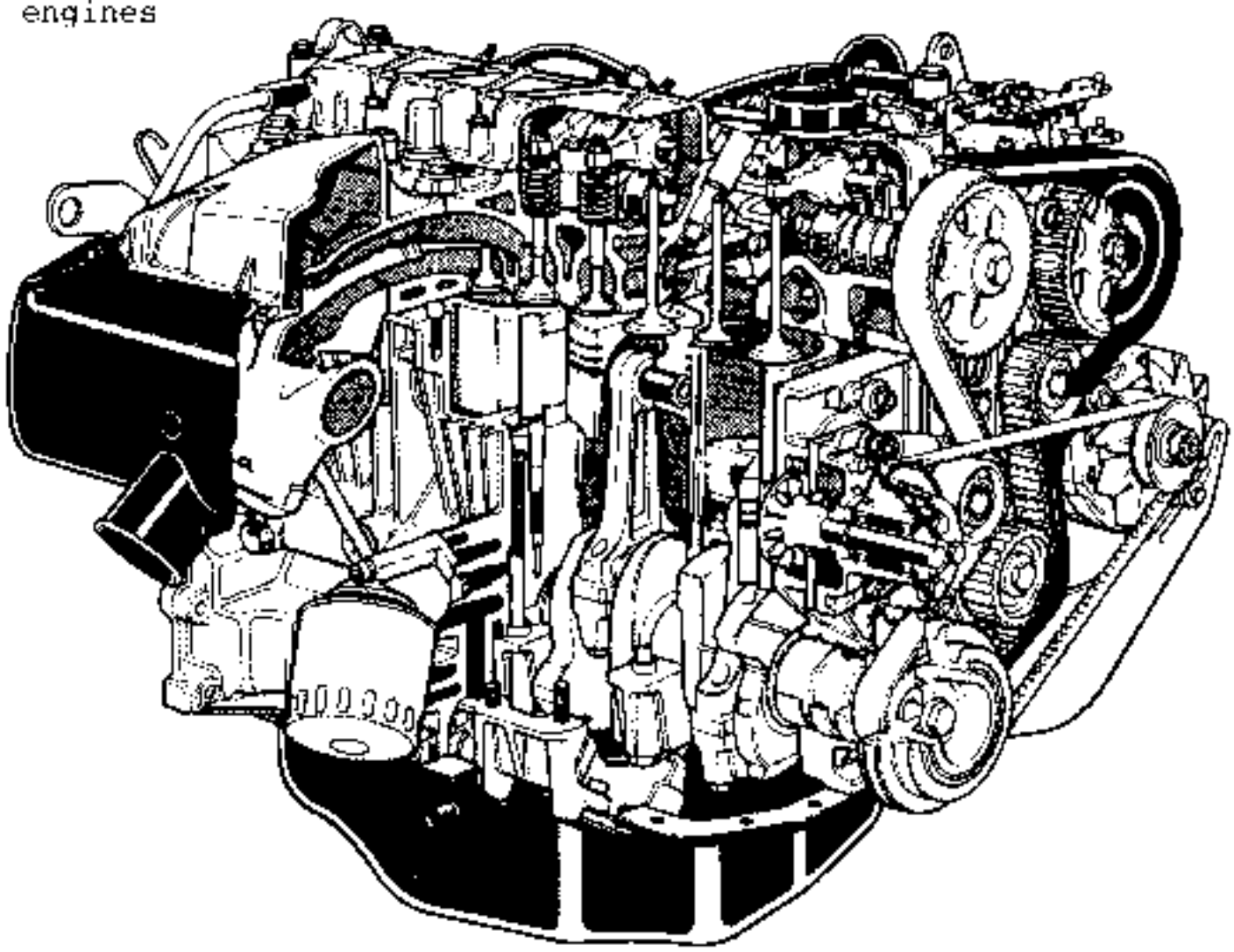
Type J7R Turbo engines



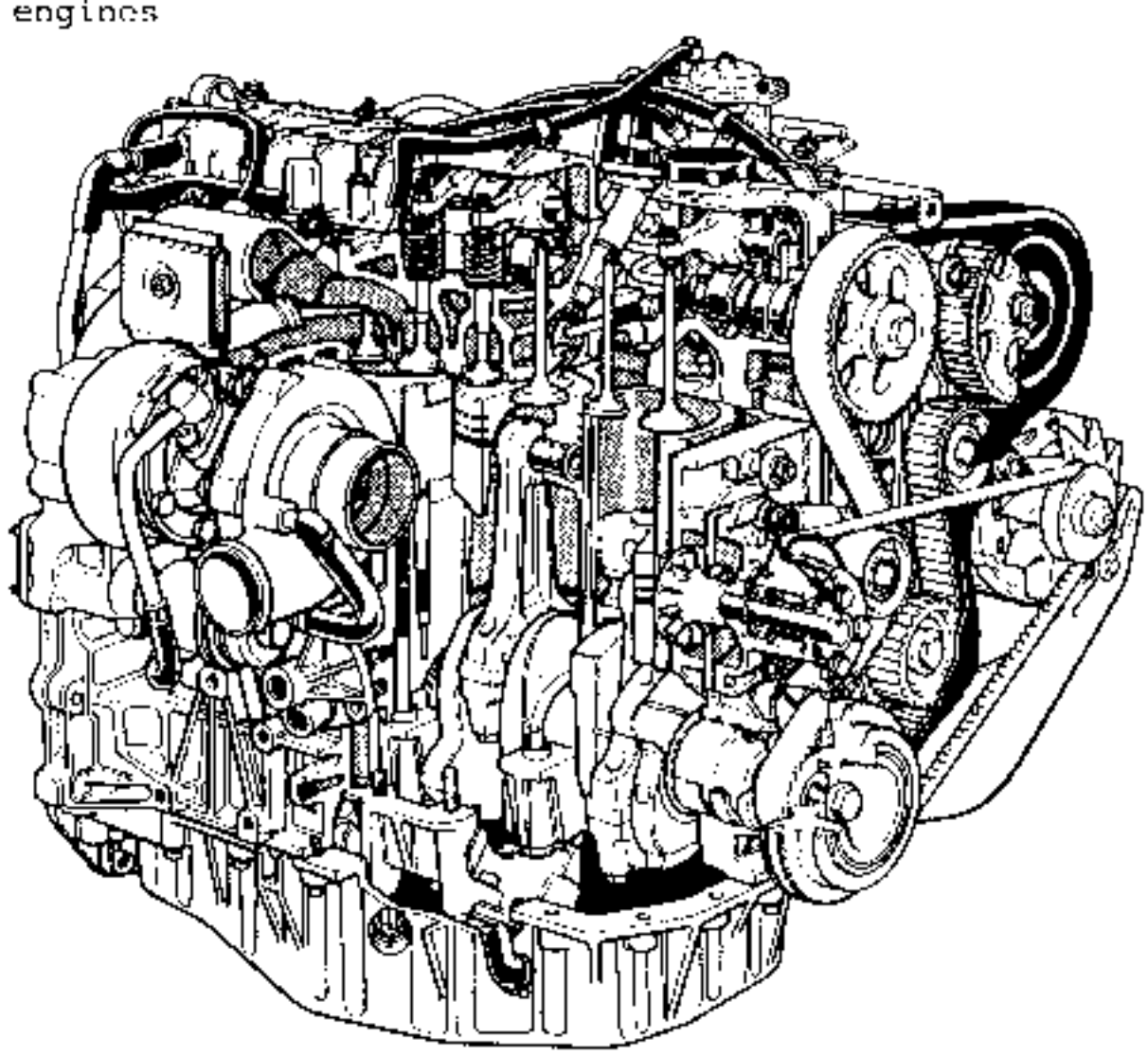
Type J7R 12 Valve engines



Type J8S engines



Type J8S Turbo engines



Type	Quantity	Unit
MOBIL no. 20 X 57 030 grease	Coating	Drive shaft splines at gearbox end. Clutch shaft splines.
CAF 4/60 THIXO	Coating	Drive shaft spring pin holes.
Loctite FRENBLOC Locking and sealing resin	Coating	Brake caliper securing bolts.
Loctite FRENETANCH Locking and sealing resin	Coating	Crankshaft pulley securing bolts.
ELF Multi	Coating	Wheel bolts.
MOLYKOTE CU. 7439	Coating	Wheel locating areas.
Exhaust pipe mastic	Coating	Sealing the exhaust system.

Vehicle type	Engine	Capacity (cm^3)	Bore (mm)	Stroke (mm)	Comp. ratio
B.L.K.S 481	F2N 712 F2N 716	1 721	81	83,5	9,25
L.K.S 482	F2N 710	1 721	81	83,5	10
B.L.K.S 482	F2N 754	1 721	81	83,5	9,5
B.L.K. 483	J7R 750	1 995	88	82	10
L 485	J7R 752	1 995	88	82	8
B.L.K.S 486	J8S 704	2 068	86	89	21,5
B.L.K 488	J8S 714	2 068	86	89	21,5
L 489	J6R 758	1 995	88	82	8,6
B.L 48 D	C2J 770	1 397	76	77	9,25
B.L.K 48 E	F3N 722	1 721	81	83,5	9,5
B.L.K 48 F	F3N 726	1 721	81	83,5	9,5
B.L.K.S 48 H	F8Q 710	1 870	80	93	21,5
B.L.K 48 J	F2R 702	1 965	82	93	8,4
B.L.K 48 K	J7T 754	2 165	88	89	9,2
L.K 48 M	F2N 750	1 721	81	83,5	9,2
L.K 48 N	F2N 752 F2N 756	1 721	81	83,5	9,5
B.L 48 Q B.L 48 Y	J7R 754	1 995	88	82	9,3
B.L.K.S 48 V	J8S 740	2 068	86	89	21,5
K 483 K 486 K 48 K } 4 x 4	J7R 750 J8S 704 J7T 754	1 995 2 068 2 165	88 86 88	82 89 89	10 21,5 9,2
B.L.K 483 BVA B.L.K 48 K BVA L 489 BVA	J7R 751 J7T 755 J6R 759	1 995 2 165 1 995	88 88 88	82 89 82	10 9,2 8,6

Engine workshop manuals to be consulted depending on the type of engine under repair.

Work-shop manual \ Engine	C2J	F2N F3N F2R	F8Q	J6R J7R J7T	J8S
Mot C	X				
Mot F (E)		X			
Mot F (D)			X		
Mot J (E)				X	
Mot J (D)					X

We have described, in the engine section of this workshop manual :

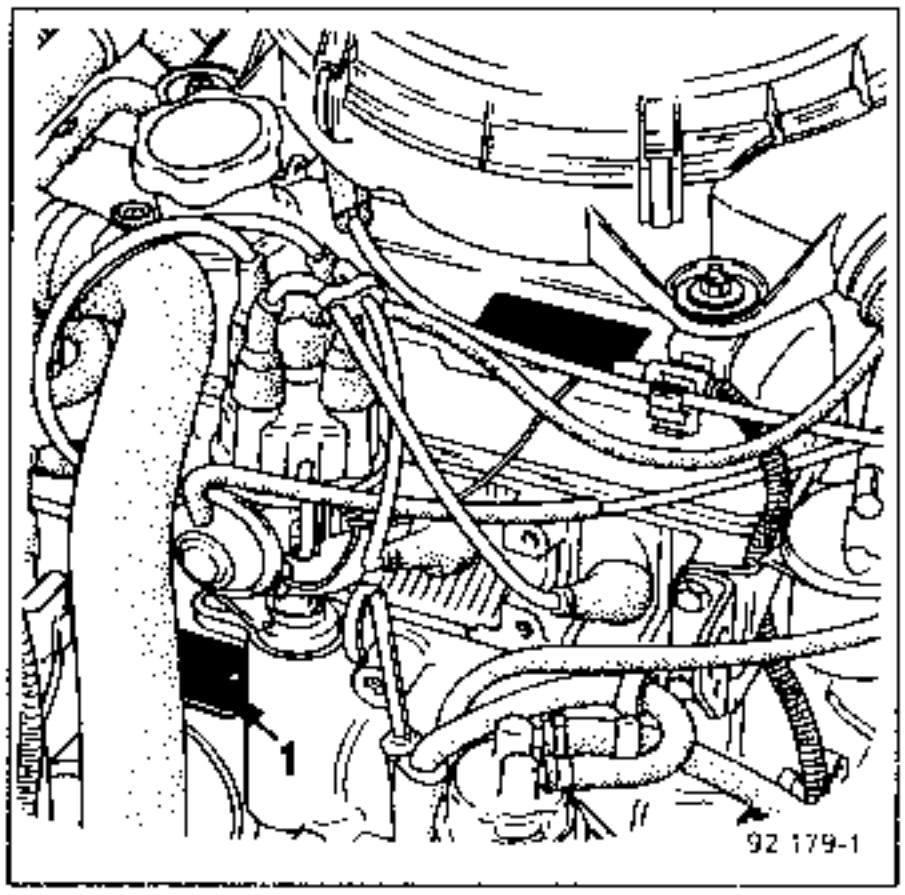
. The operations involved in removing and refitting

- the power unit assembly, to be carried out on a 2 column lift after having familiarised yourself with all the precautions to be taken. See General section,
- engine and gearbox,
- engine only.

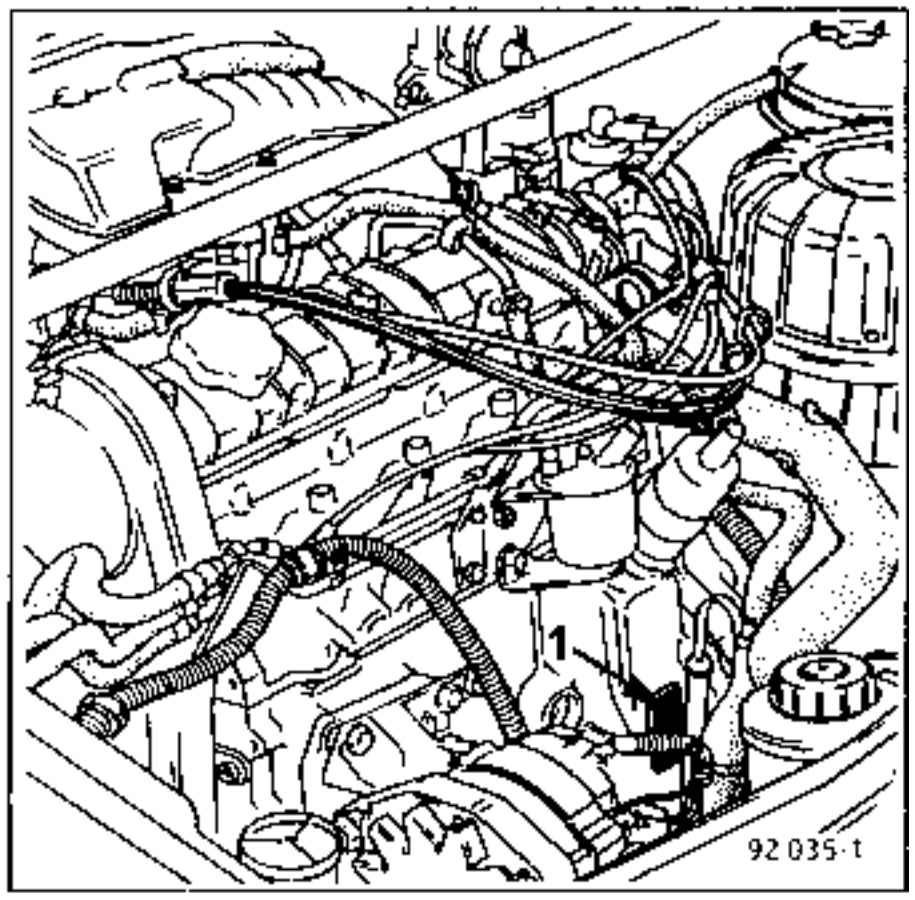
Although they can be carried out with the engine still in the vehicle, other operations such as "Replacing the cylinder head" - "Replacing the pistons and liners or pistons" will not be described in the Workshop Manual for the vehicle itself in that they are no different from those described in the engine Workshop Manual.

THE POSITION OF THE ENGINE IDENTIFICATION PLATE (1)

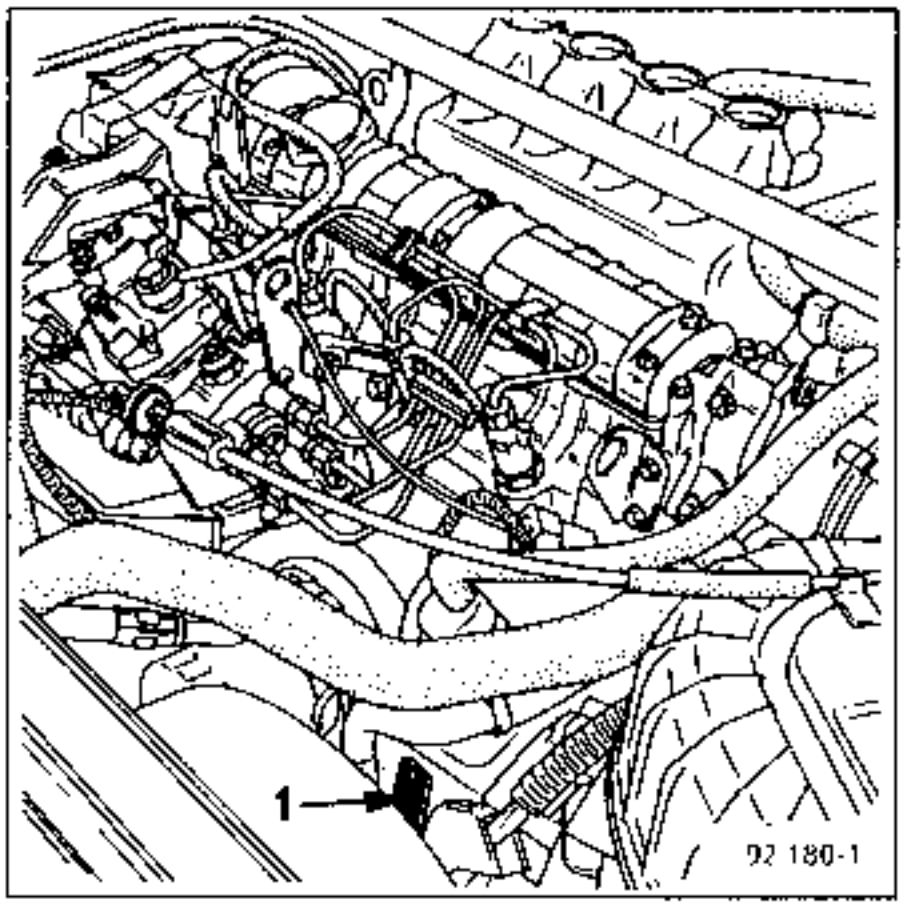
Type C engines



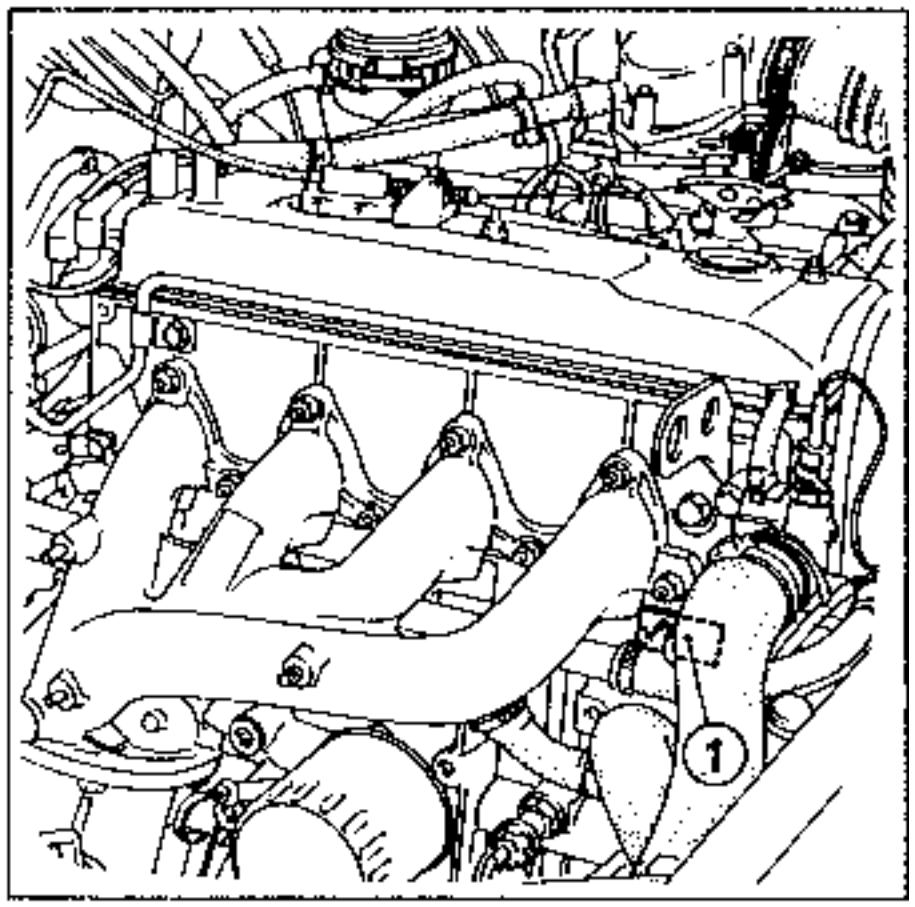
Type F2N-F3N-F2R engines



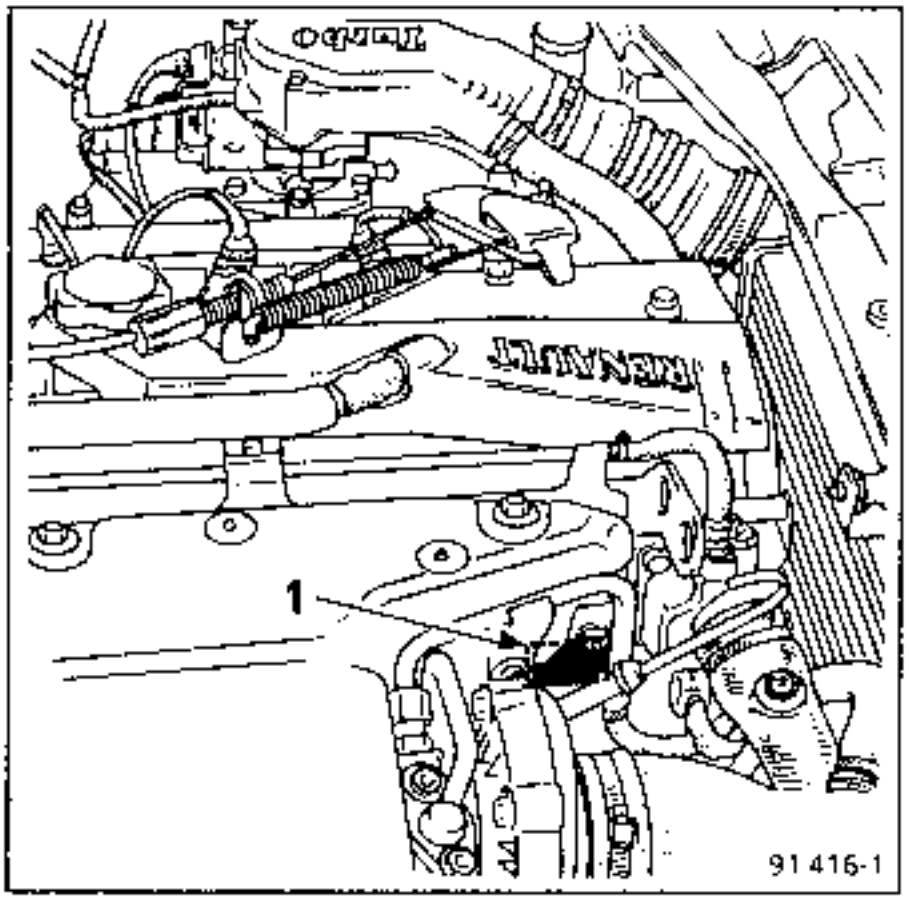
Type F8Q engines



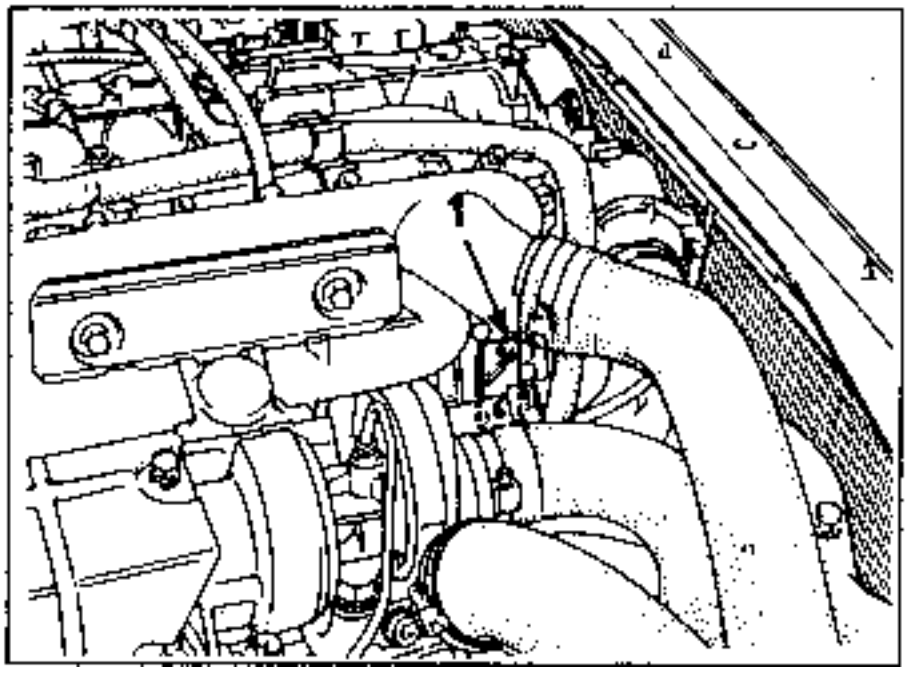
Type J7R-J7T-J6R engines



Type J7R Turbo engines



Type J8S engines



METHOD OF CHECKING

An oil consumption of up to 1 litre (1.76 pints) per 1 000 km (621 miles) is acceptable.

Check that there is no external leakage from the engine.

For the check to be effective, the engine oil must be drained under given specific conditions :

- the engine must be warm,
- place the crankshaft at top dead centre on the firing stroke of no. 1 cylinder,
- remove the dipstick and the oil filler cap.

Allow the engine to drain for at least 15 minutes.

Refit the drain plug and "seal" it (with a dab of paint across both the plug and the sump) to be able to check, later, that it has not been removed.

Using a graduated flask, measure the quantity of oil required to fill the engine :

Engine type :	**C**	**: 3.0 litres,**
	F2R-F3N-F2N	**: 4.7 litres,**
	F8Q	**: 5.0 litres,**
	J6R J7R J7T	**: 5.7 litres,**
	J7R 12 Valves	**: 5.0 litres,**
	J8S	**: 4.8 litres.**

Refit and seal the filler cap.

Ask the vehicle user to come back after he has driven the vehicle for 1 000 km (621 miles) carrying out regular checks on the oil level with the dipstick.

When the vehicle is returned, check that the drain plug and the filler cap have not been touched.

Return the engine to the same conditions :

- engine warm,
- crankshaft at top dead centre on the firing stroke of no. 1 cylinder,
- dipstick and filler cap removed.

Drain off the engine oil and measure its quantity with the graduated flask.

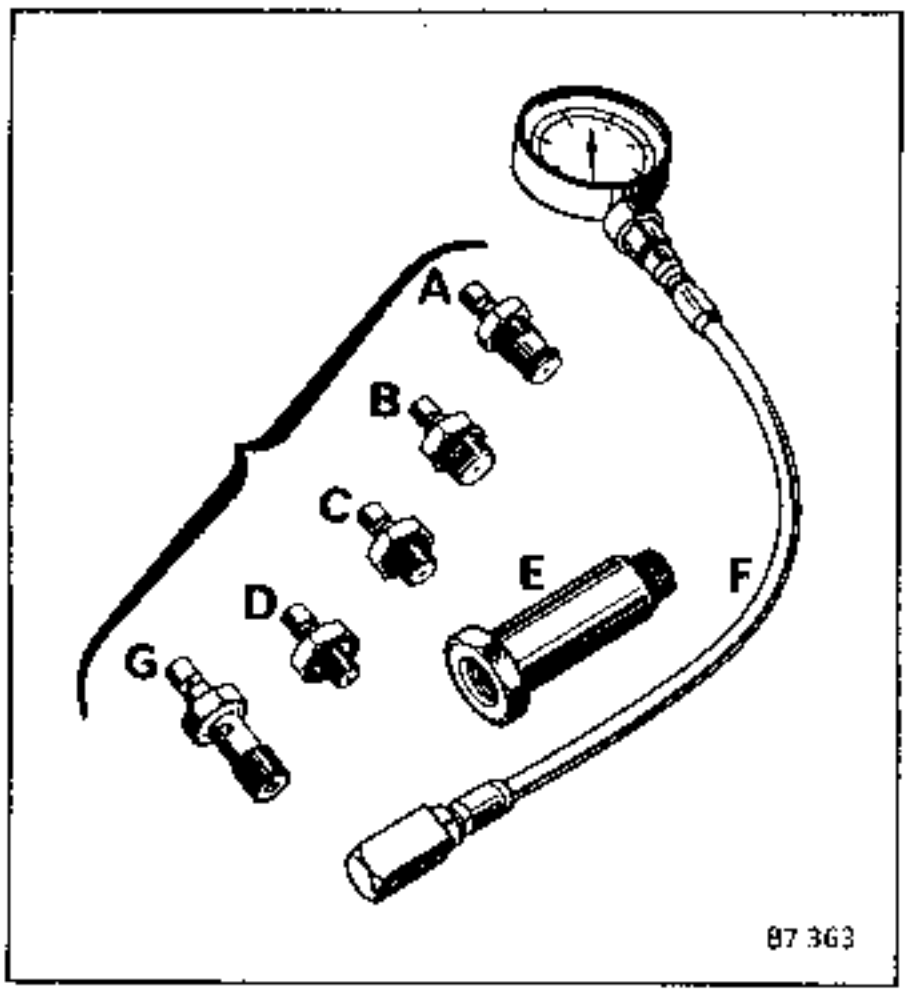
Calculate the oil consumption in litres/1 000 km if the distance covered is not exactly 1 000 km.

CHECKING

ESSENTIAL SPECIAL TOOLS	
Mot. 836-05	Oil pressure test kit

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

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



APPLICATIONS :

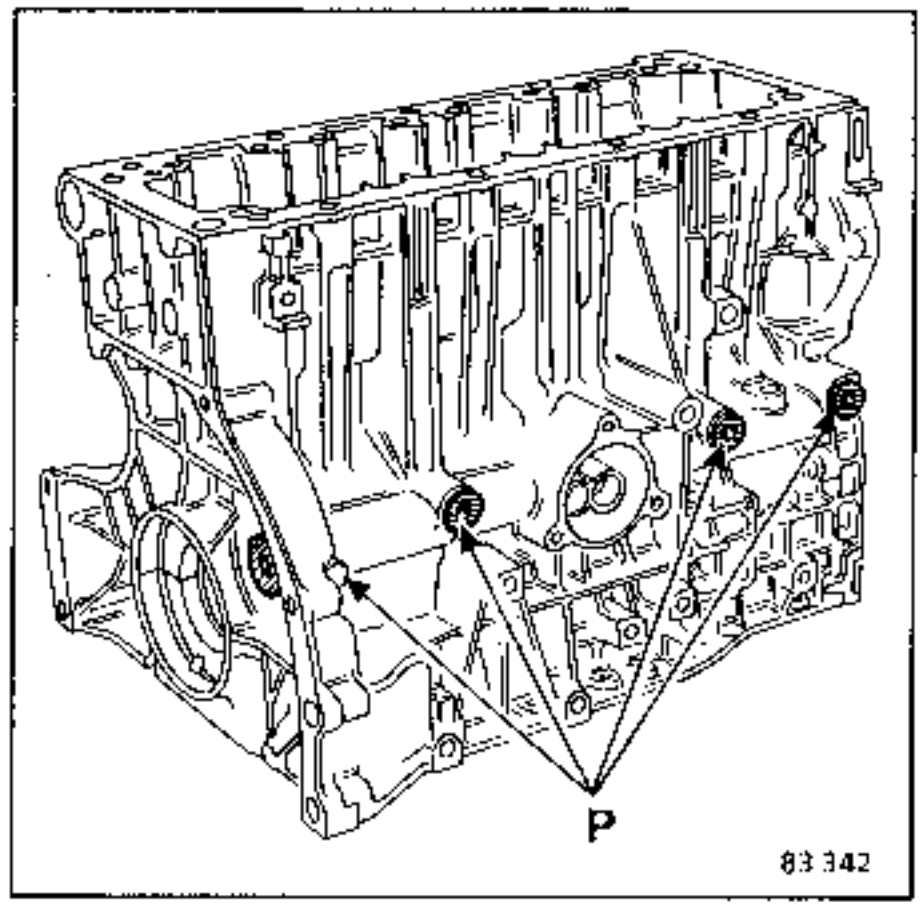
Engines Cxx : E + C + F

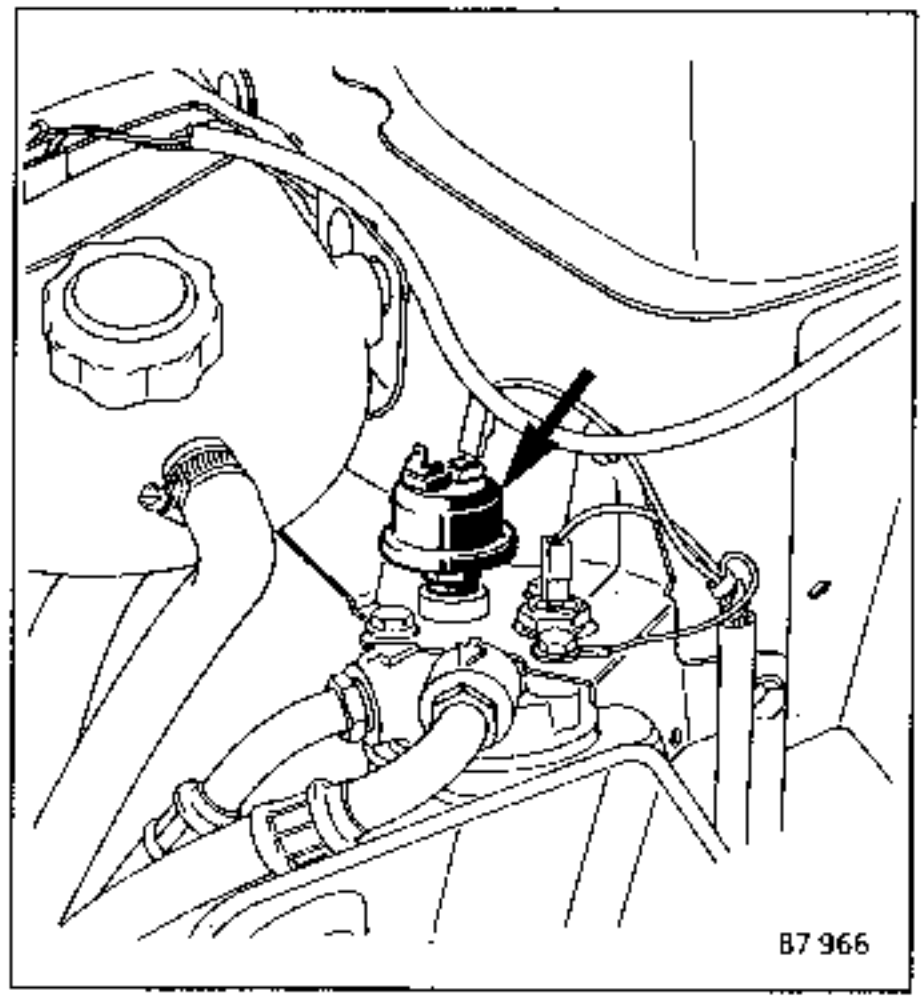
Engines Fxx : B + F

Engines Jxx : B or C + F

The oil pressure can be taken either :

- on the engine at P,
- or on the oil cooler, if the vehicle is equipped with one.



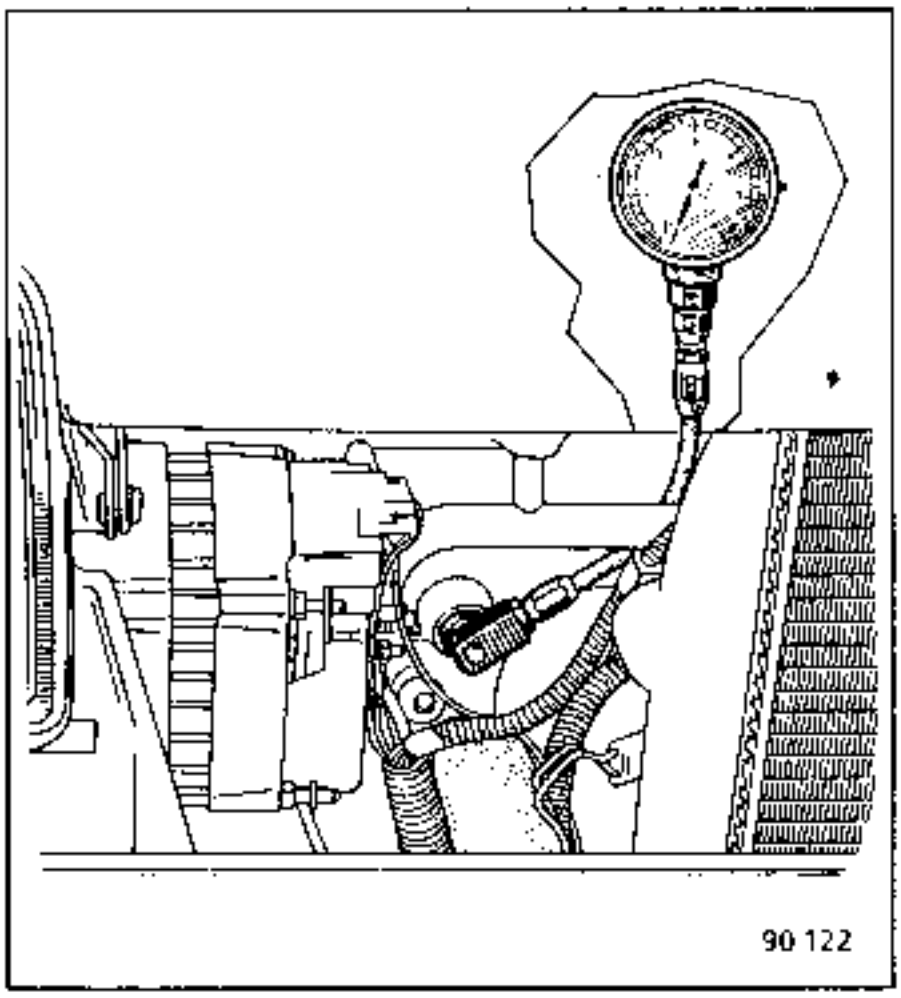


Minimum oil pressure at 80°C

- At idling speed ..... 0.8 bar min.
- At idling speed (J7R turbo engine) ..... 1.0 bar min.
- At idling speed (J7R 12 Valve engine) ..... 1.25 bar min.
- At 3 000 rpm ..... 3.0 bar min.

ENGINE TYPES : Fxx

The operation can be made easier by removing the radiator grille and the air baffle (on certain versions).

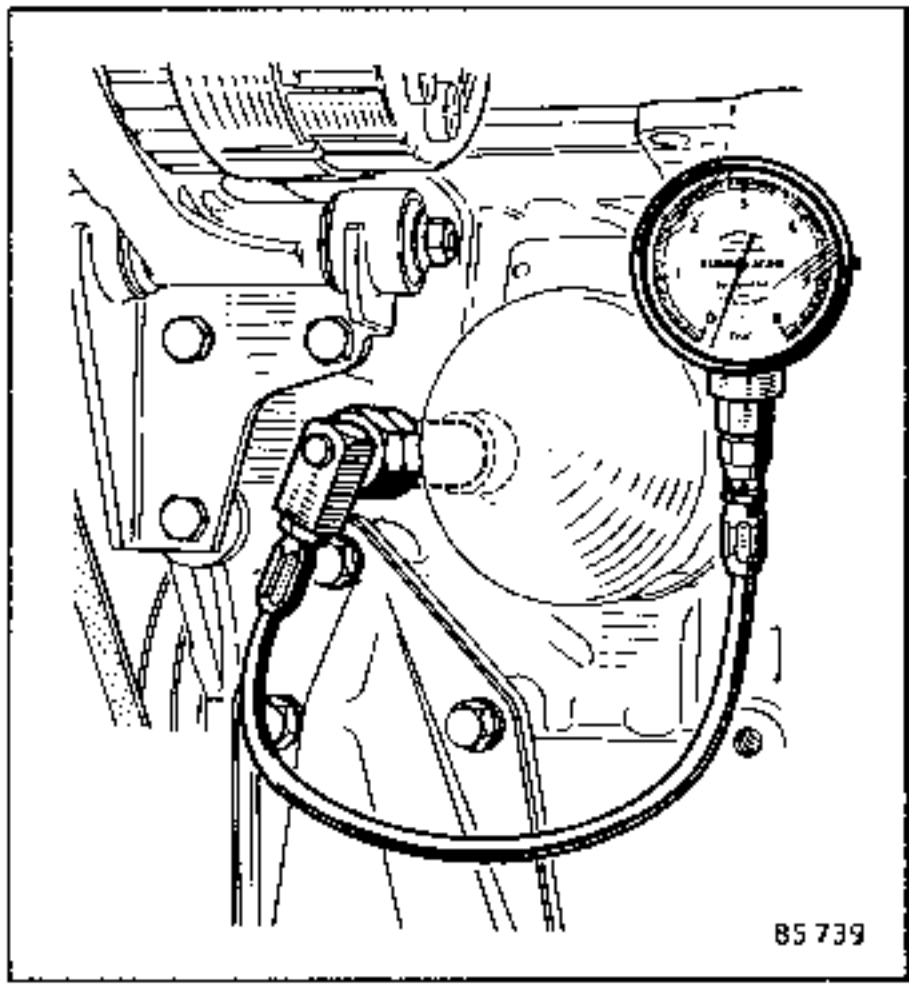


Checking :

Minimum oil pressure at 80°C

- at 1 000 rpm ..... 2 bar min.
- at 3 000 rpm ..... 3.5 bar min.

ENGINE TYPES : C



Checking :

Min. oil pressure 80°C

- at idling speed ..... 0.7 bar min.
- at 4 000 rpm ..... 3.5 bar min.

REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS	
Elé. 346-04	Belt tension tester
Mot. 878	Engine lifting equipment with chain

TIGHTENING TORQUES (in daN.m)	
Crankshaft pulley securing bolts	14
Engine mounting securing nuts	4

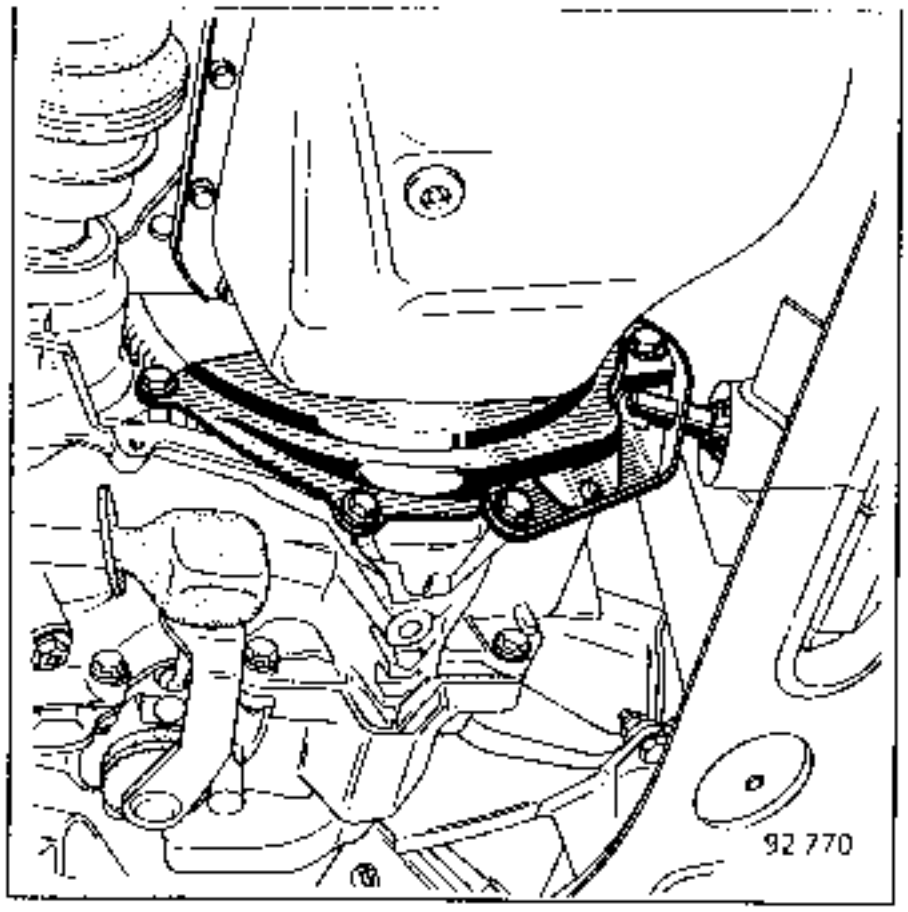
CONSUMABLES
LOCTITE FRENETANCH : Crankshaft pulley securing bolts
GREASE No. 20 : Clutch shaft splines

REMOVING

Disconnect the battery.

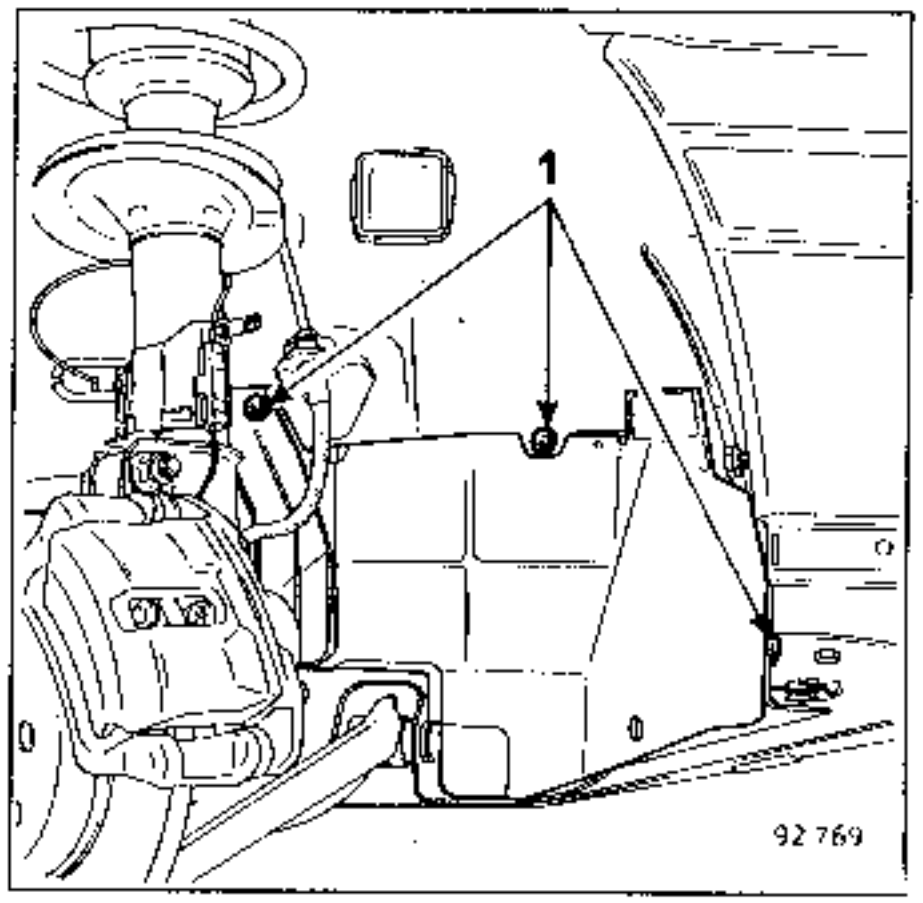
Remove :

- the air filter,
- the coolant pump-alternator drive belt,
- the engine tie bar,
- the flywheel protection plate,



- the front right hand wheel.

Drill out the rivets (1) on the protection plate.

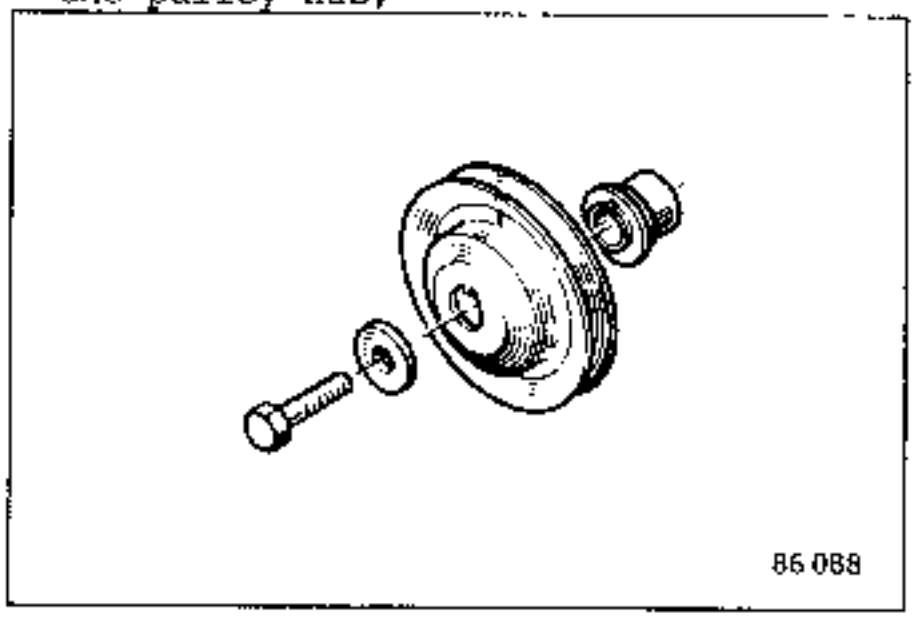


Remove the crankshaft pulley.

Place the crankshaft key at the top.

Remove :

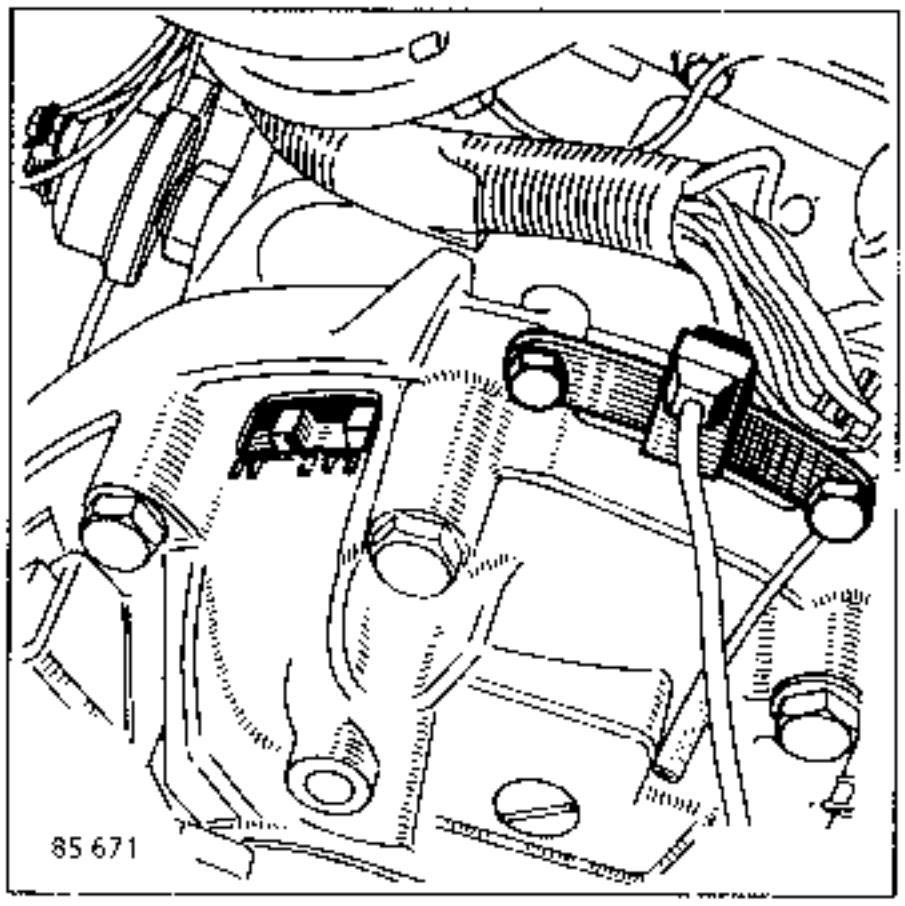
- the pulley hub,



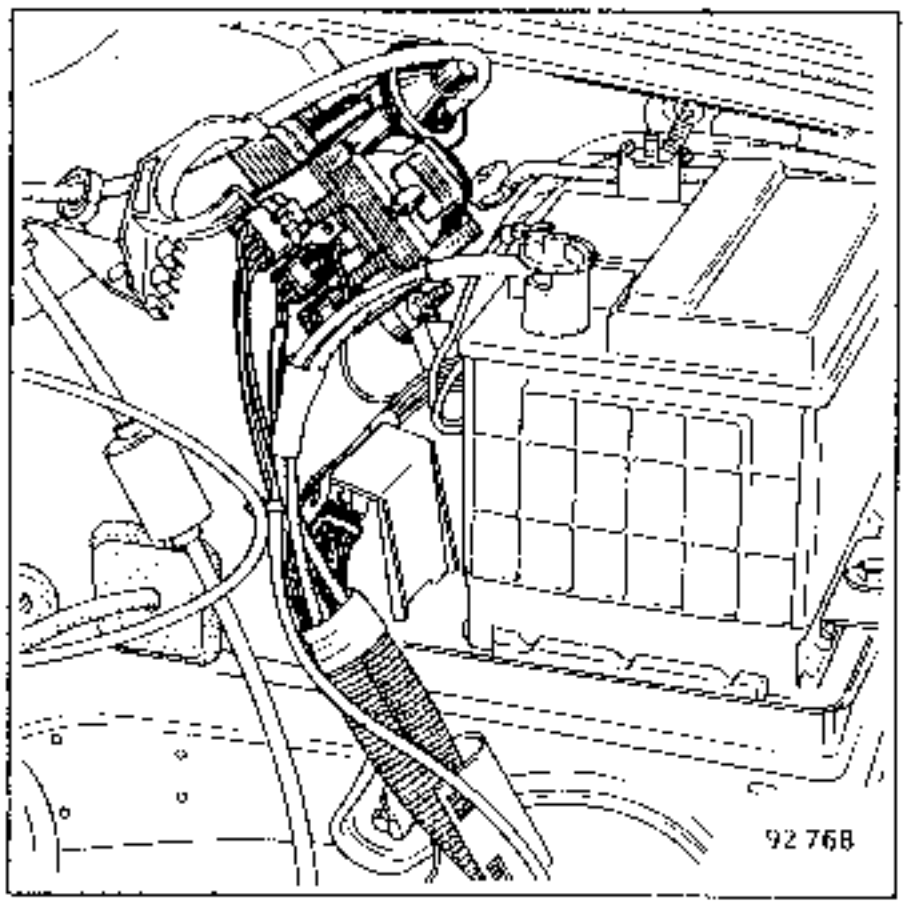
- the starter rear securing bolts and free it,
- the accelerator, choke and speedometer drive cables.

Remove :

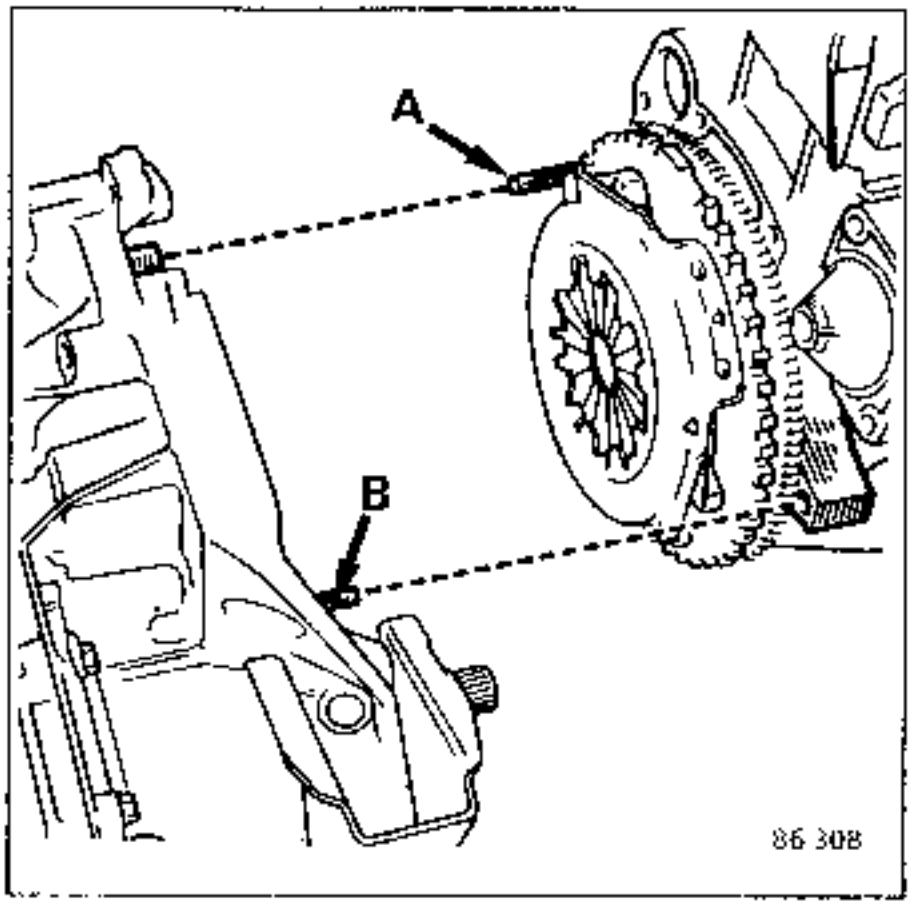
- the electronic ignition sensor,



- the heating system hoses,
- the electrical junction blocks,



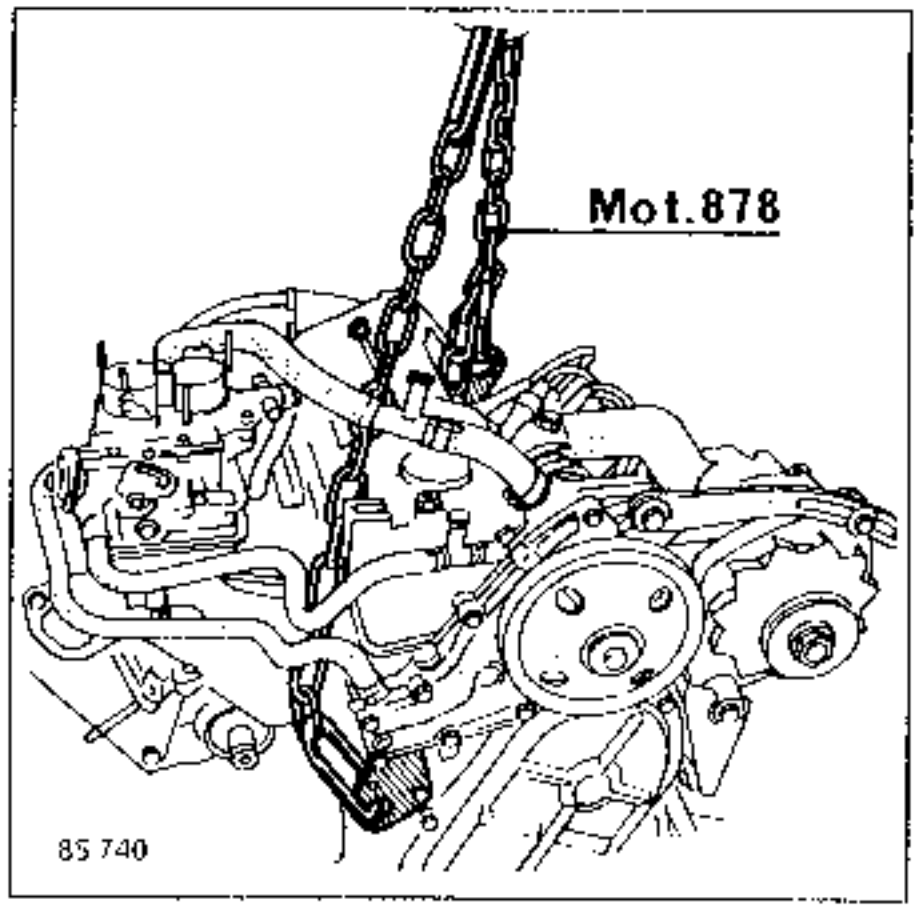
- the exhaust clamp,
- the engine to gearbox securing bolts,
- the studs (A) and (B),



- the bolts that secure the right hand engine mounting.

Using a lifting hook and the chain from tool Mot. 878, gradually lift the engine, keeping an eye on the right hand drive shaft as you do so to avoid it coming out of place.

Place a jack under the gearbox to hold it in position.



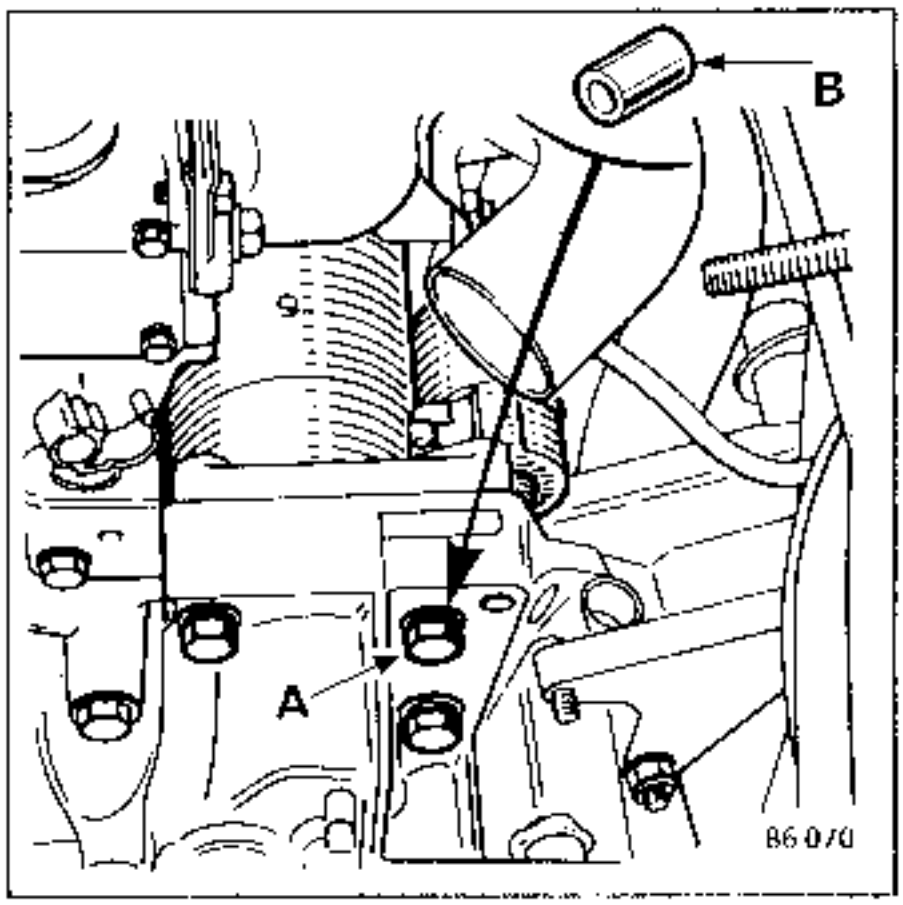
Take out the engine.

REFITTING (special points)

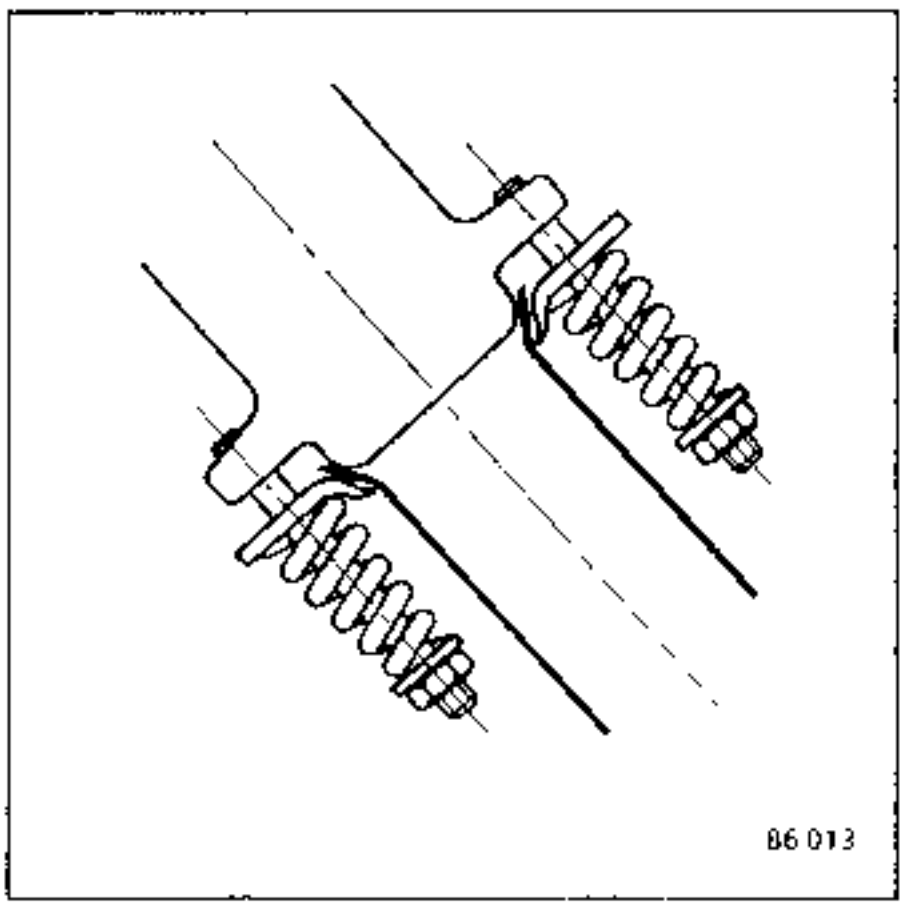
Grease the splines on the clutch shaft.

Ensure that the following are correct :

- the position in which the starter is fitted,



- the method of tightening the exhaust pipe clamp. Tighten the nuts until the springs are coil bound and then loosen them by one and a half turns.

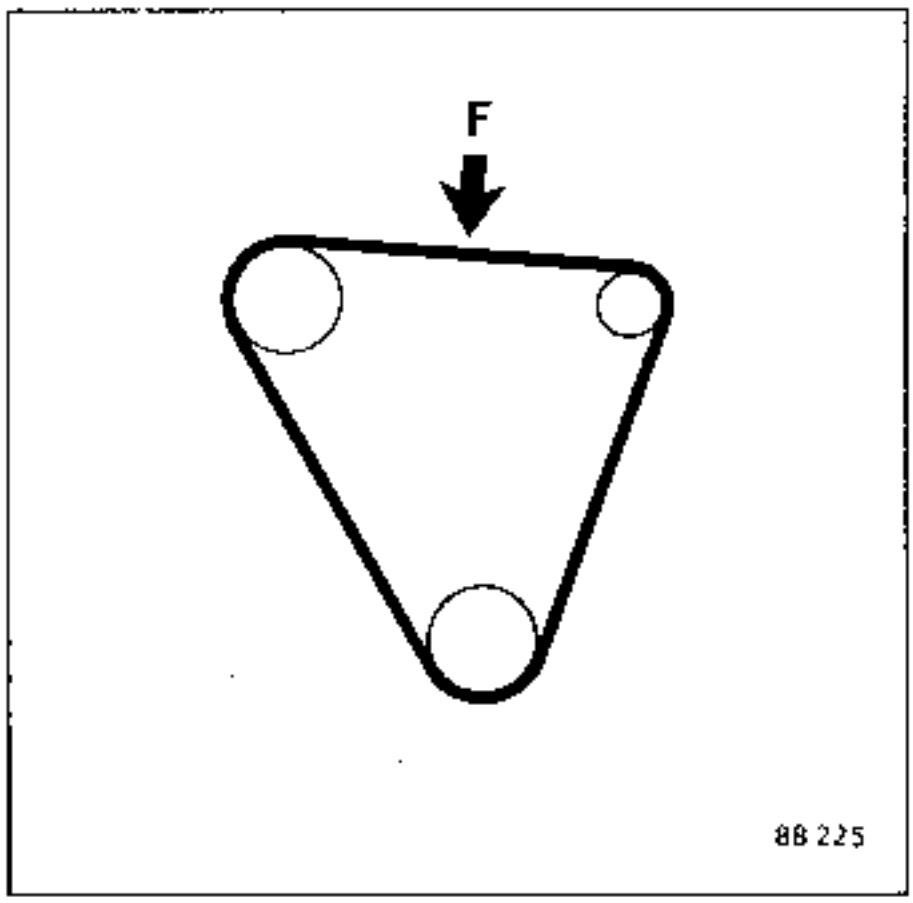


- Fill the engine with oil,

- Fill and bleed the cooling system,

- Correct the belt tension using tool Ele. 346-04 (see section 11).

Adjust the choke cable travel.



REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS	
Elé. 346-04	Belt tension tester
Mot. 878	Lifting chain and rings

THE ENGINE ALONE CAN BE REMOVED FROM ABOVE THE VEHICLE.

TIGHTENING TORQUES (in daN.m)	▽
Engine mounting bolts	4
Crankshaft pulley	10

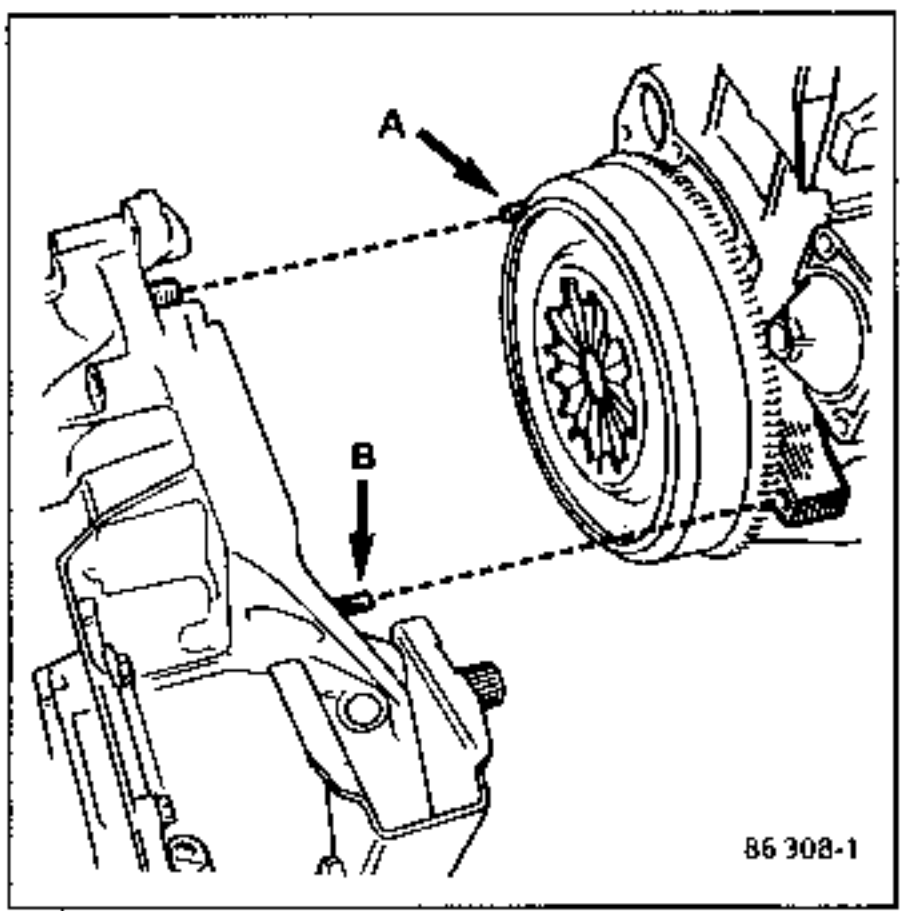
REMOVING

Disconnect :

- the battery,
- the electrical connectors,
- the cables.

Remove :

- the air filter,
- the radiator after first draining the cooling system,
- the coolant pump-alternator belt,
- the coolant pump pulley,
- the crankshaft pulley,
- the exhaust pipe clamp,
- the engine-gearbox tie rod,
- studs (A) and (B),



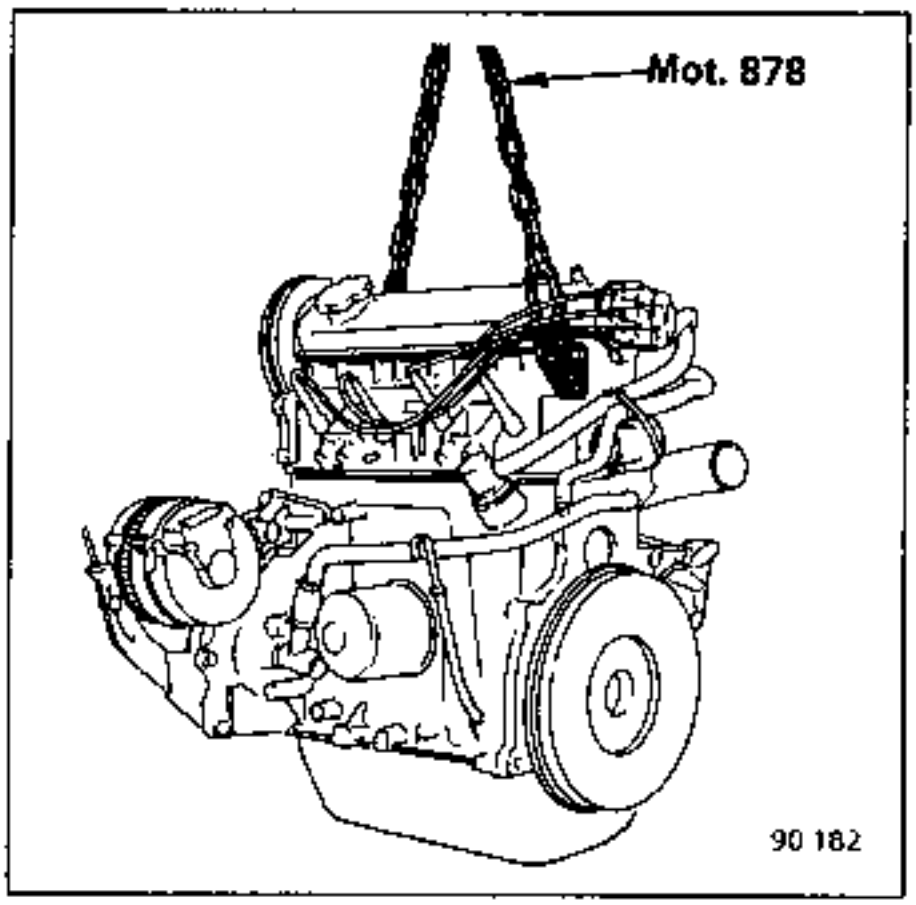
- the bolts from around the box,
- the accelerator and choke cables.

Fit a lifting hook and tool Mot.878 in place.

Remove :

- the front right hand engine mounting assembly,
- the gearbox front left hand flexible mounting.

Move the gearbox to the left and take out the engine from the engine compartment.



REFITTING (special points)

Grease the splines on the clutch shaft.

▽ Refit the pulleys by carrying out the removing operations in reverse.

- Fill the engine with oil, if necessary,
- fill and bleed the cooling system,
- retighten the exhaust pipe clamp,
- adjust the belt tension using tool Ele. 346-04.

Adjust the accelerator and choke cables.

REMOVING-REFITTING

TIGHTENING TORQUES (in daN.m)	
Brake caliper securing bolts	10
Steering universal joint sec.bolt	2,5
Wheel bolts	9
Steering ball joint nuts	4
Lower ball joint nuts	6
Lower bolts on shock absorbers	20

REMOVING

Disconnect the battery.

Remove :

- the bonnet,

- the front cross member.

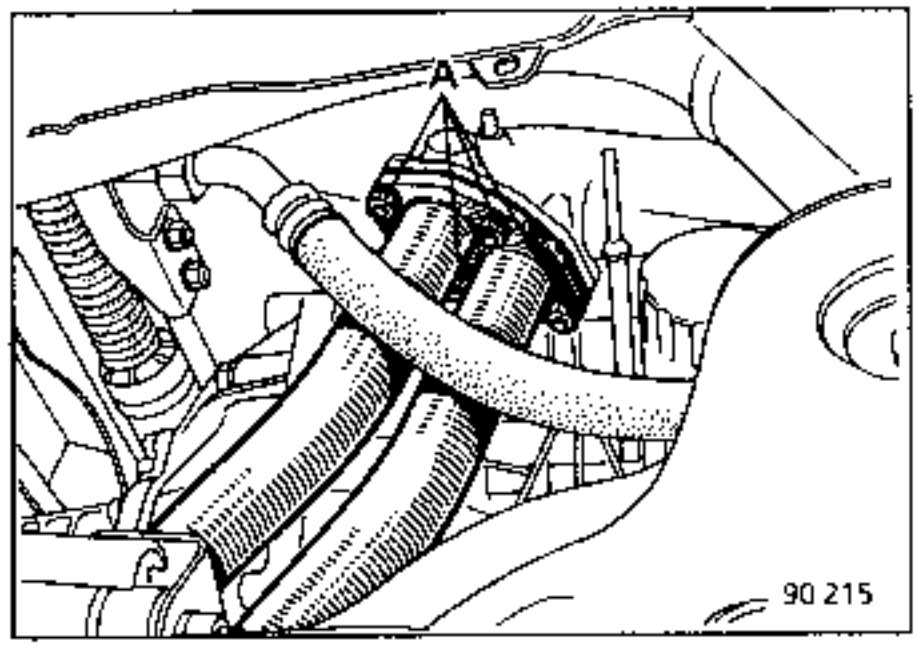
The power steering pump, placing it on one side of the vehicle (on power steering models).

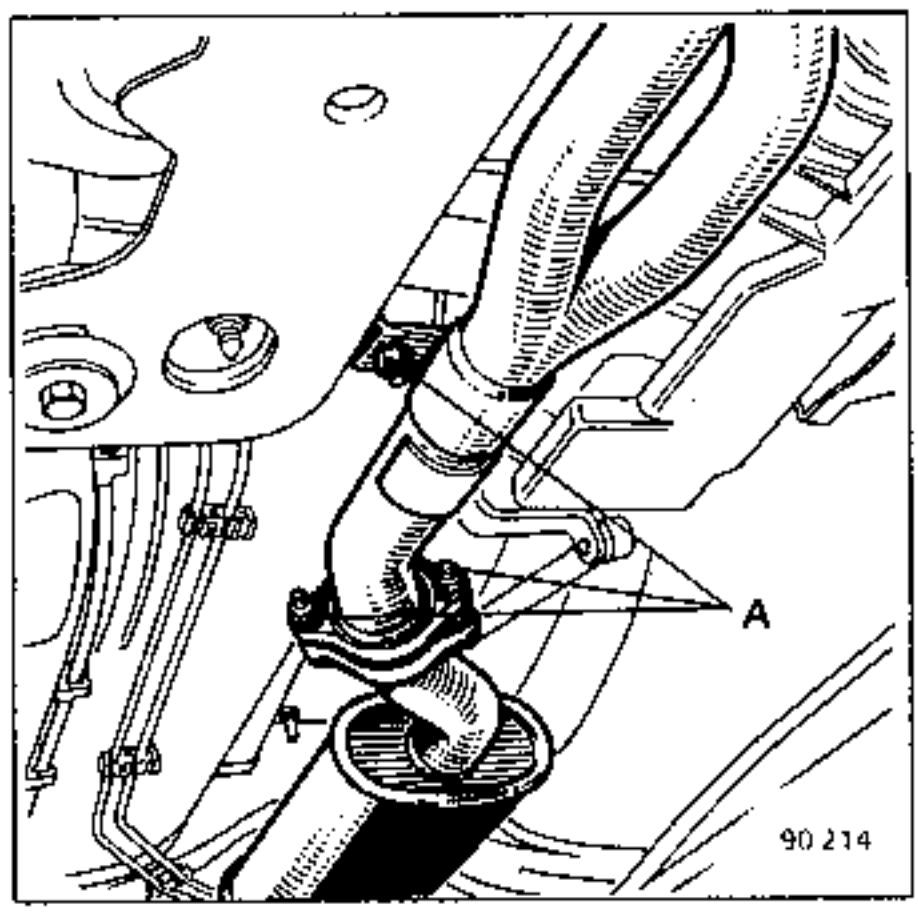
Disconnect :

- the pipes,
- the electrical connections,
- the accelerator cable,
- the clutch cable,
- the ignition sensor.

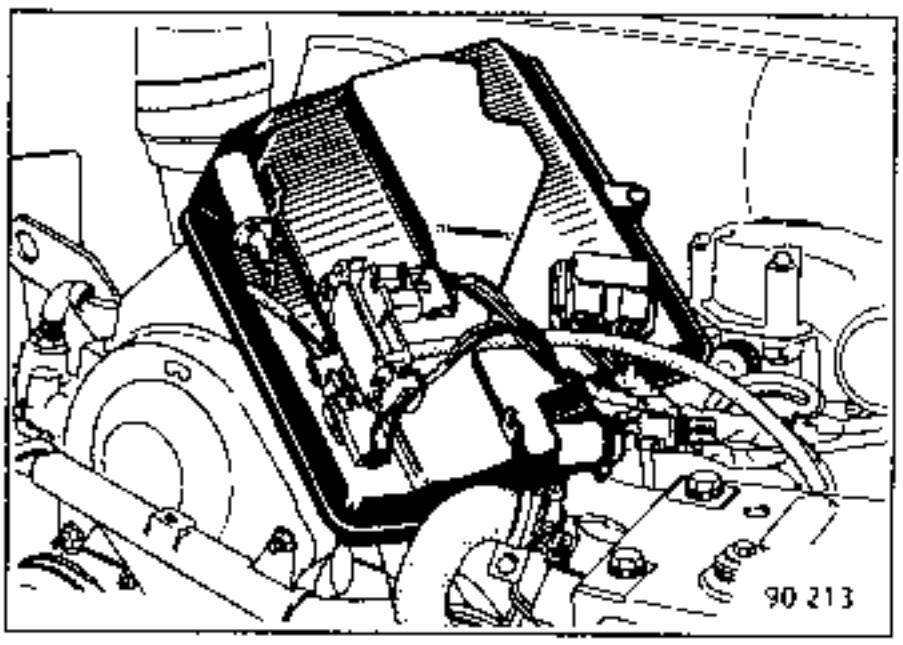
Remove :

- the exhaust down pipe at (A).





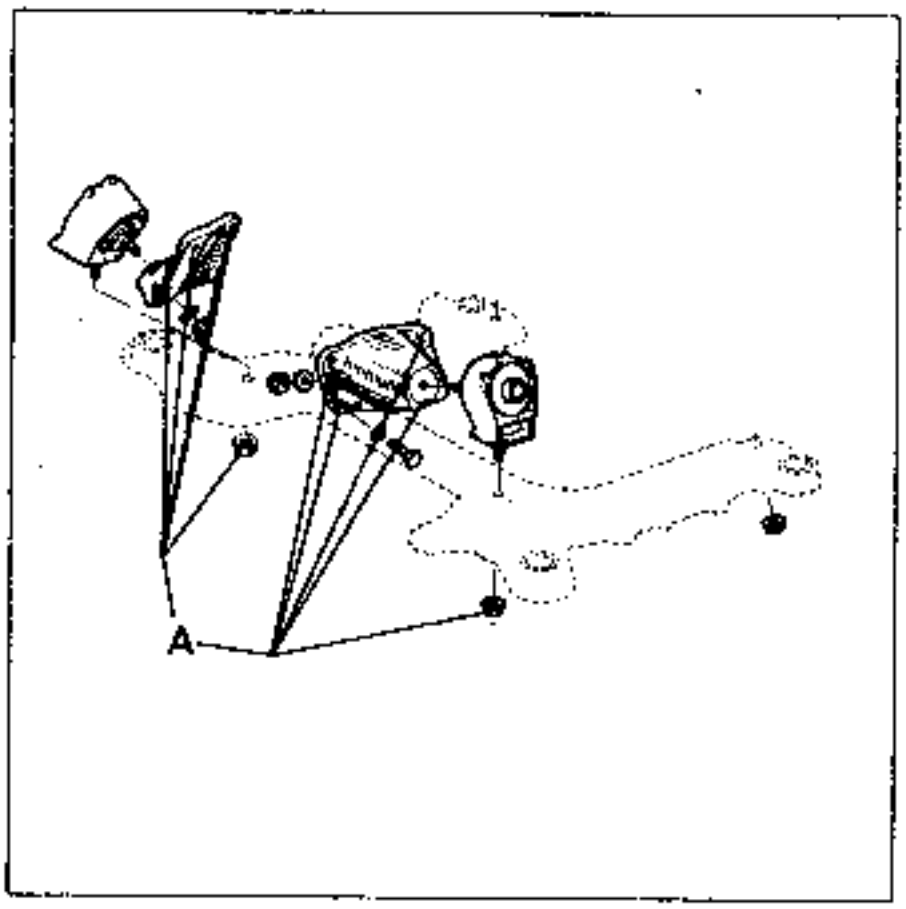
Disconnect the computer and place it on top of the engine.



Remove :

- the bolts from around the gearbox.

Remove the engine mountings at (A).



Remove the engine using tool Mot.878.

REFITTING (Special points)

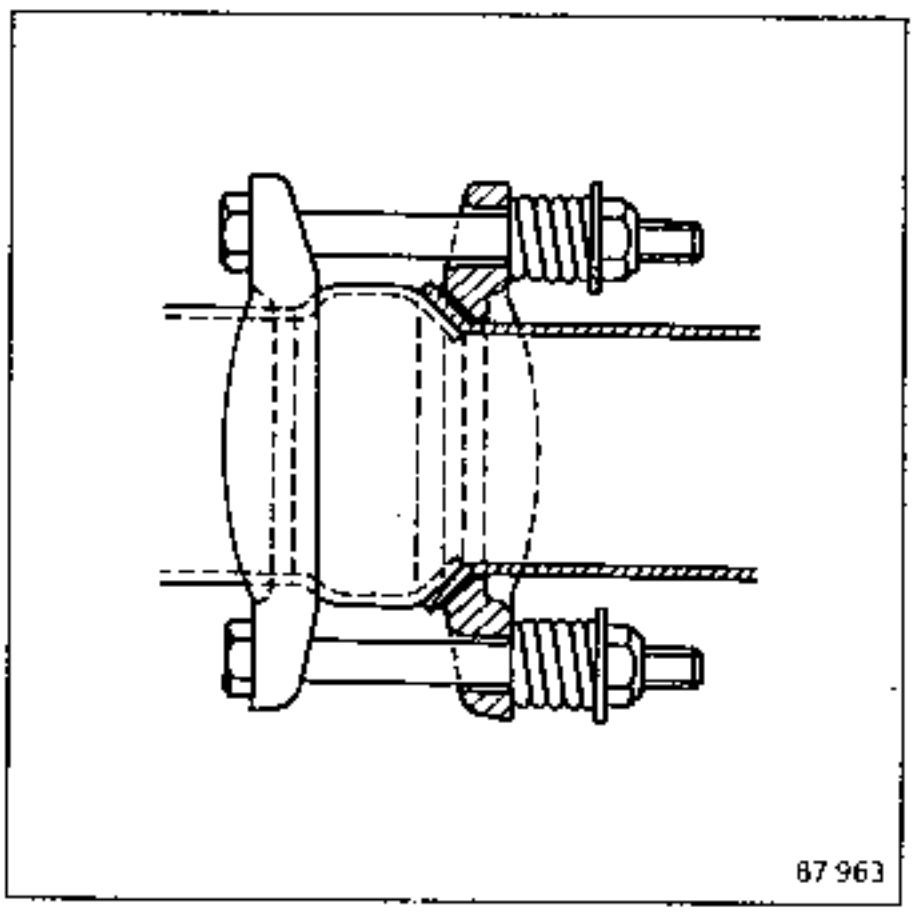
Fill the engine with oil if necessary,

- fill and bleed the cooling system.

Adjust the accelerator cable.

Tighten the exhaust pipe clamp after fitting the springs and anti-rattle bush.

The spherical joint is sufficiently tight as soon as the connection between the 2 pipes is fully sealed.



REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS
Mot. 878 Lifting chain and rings.

The engine or engine-gearbox assembly is removed from above the vehicle, after first removing its front end panel.

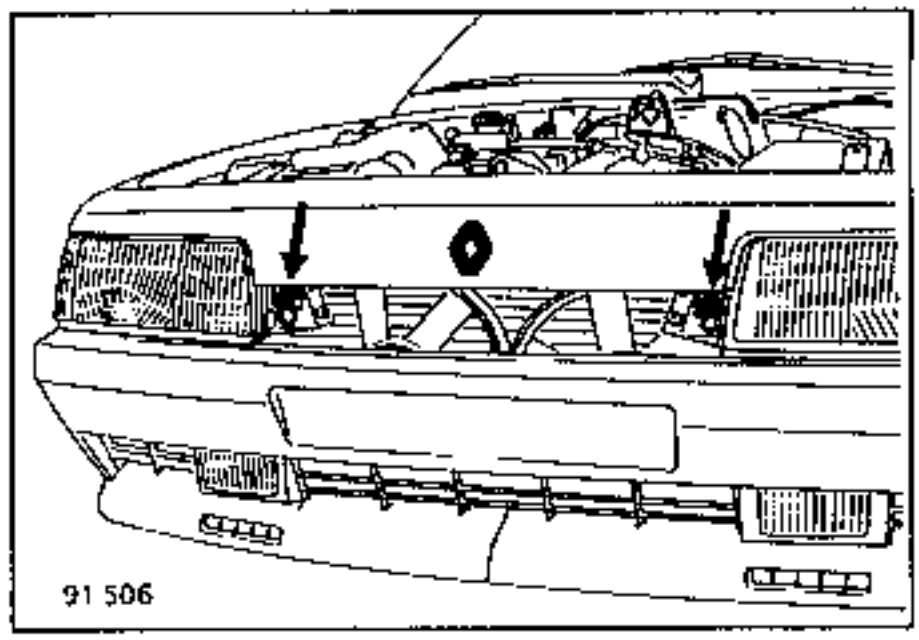
TIGHTENING TORQUES (in daN.m)	▽
Engine mounting securing bolts	4
Wheel bolts	10
Bolts around gearbox	5

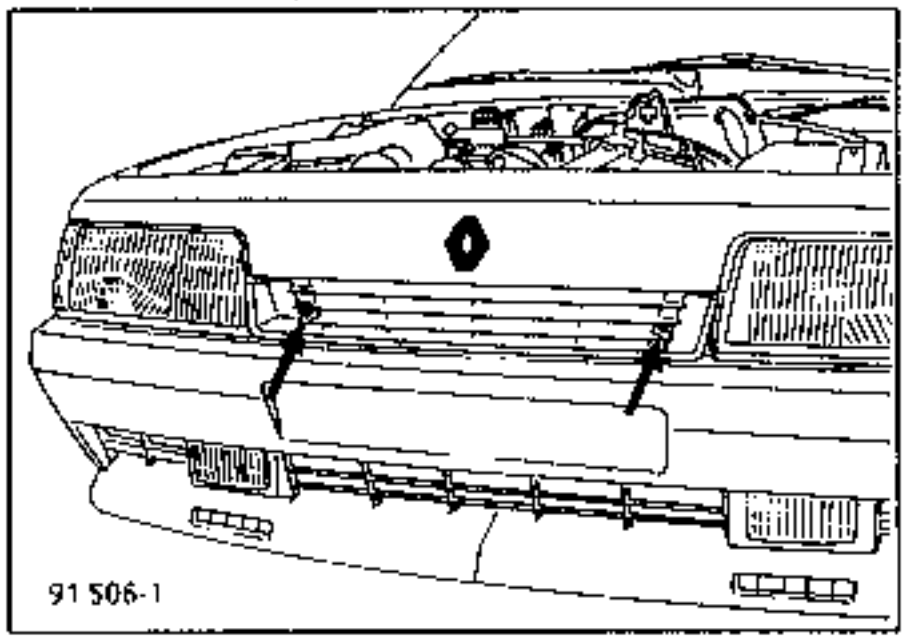
REMOVING the front end panel.

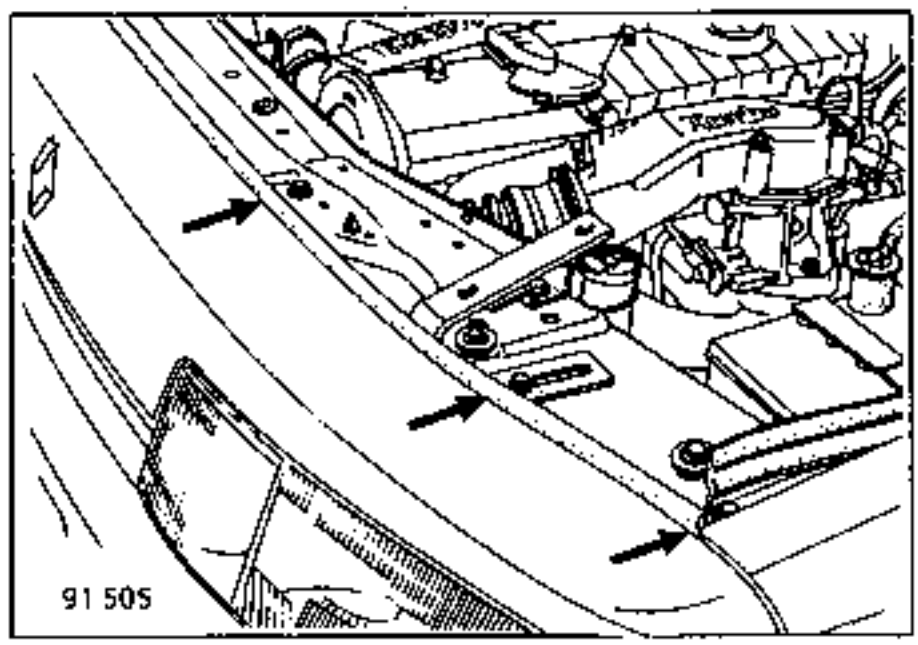
Disconnect the battery.

Remove :

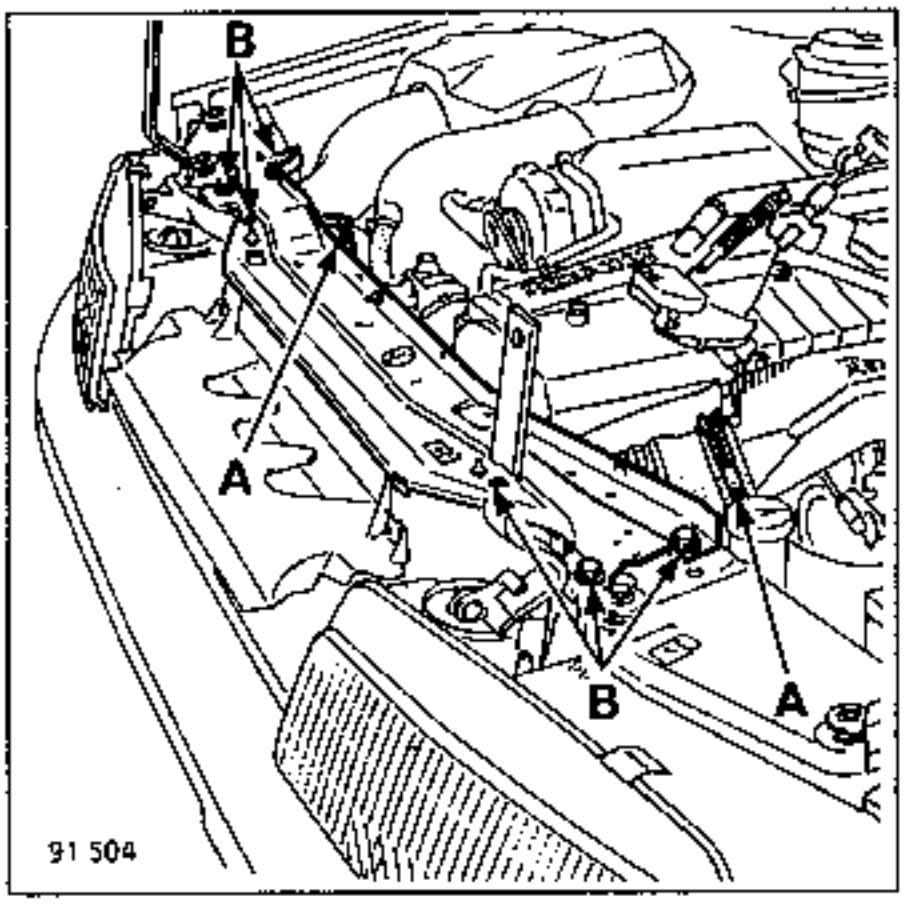
- the bonnet,
- the radiator grille,
- the panel from above the radiator grille,





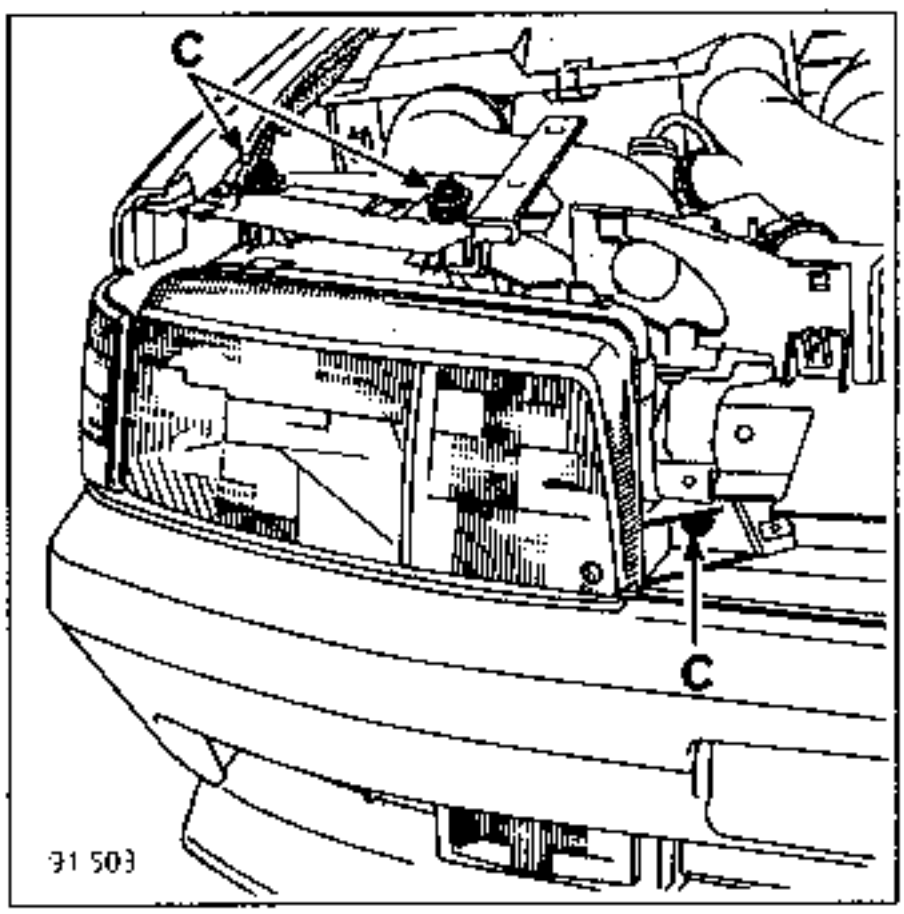


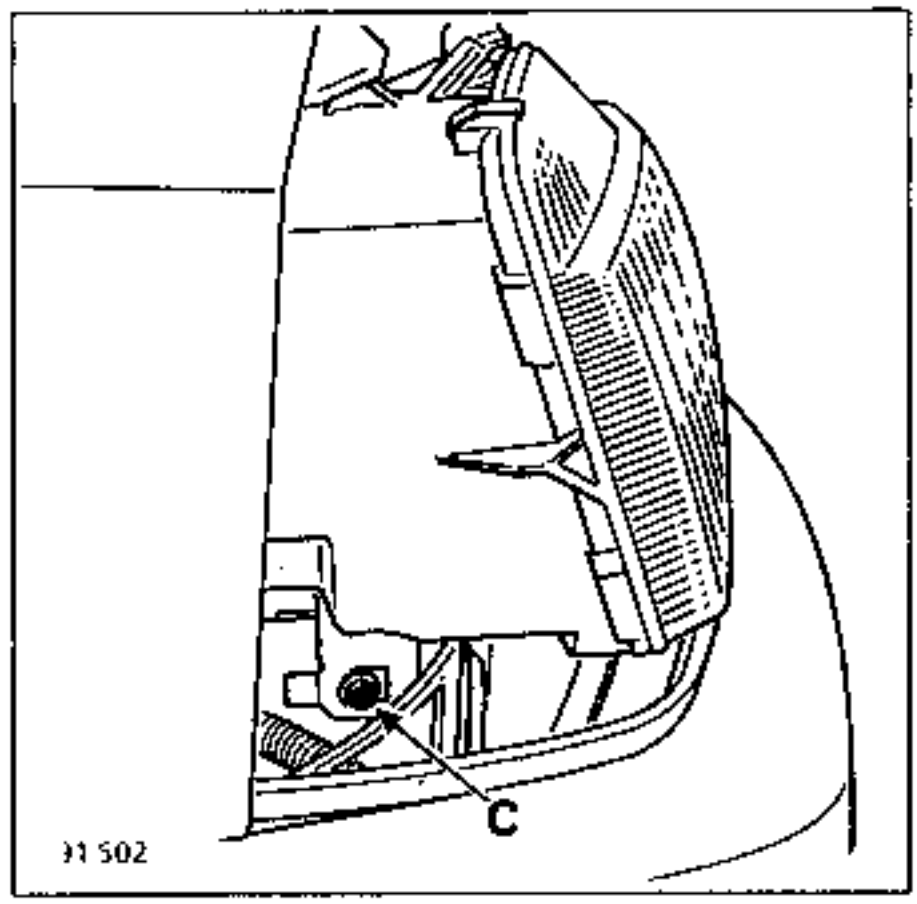
- the upper cross member including the intercooler, clips (A) and bolts (B),



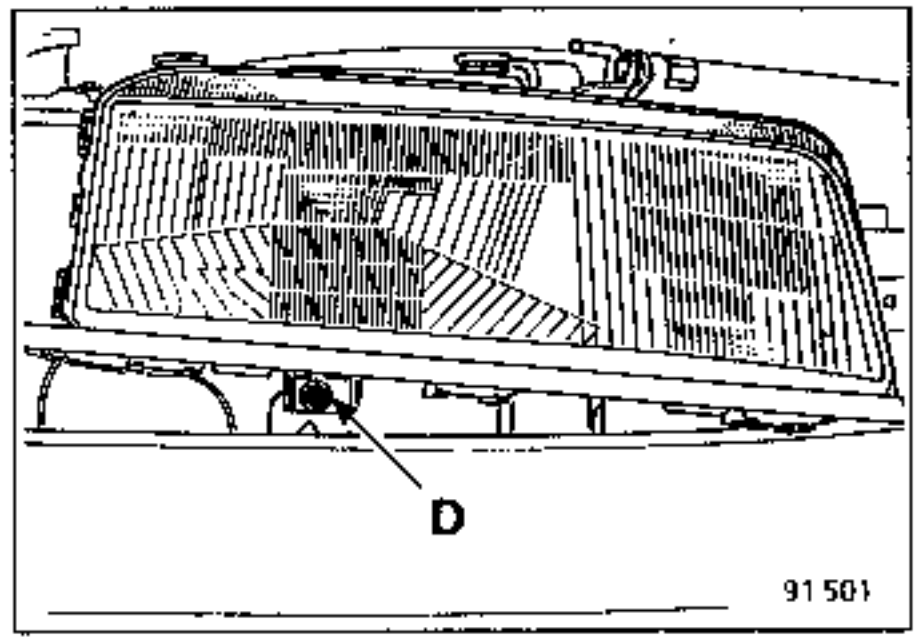
- the direction indicators,

- the headlight beam units, screws (C).

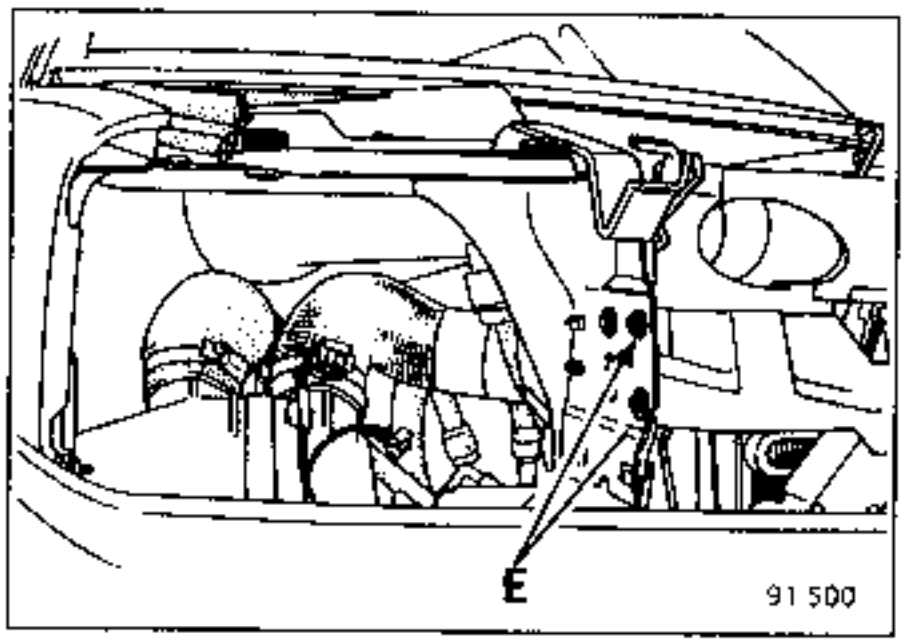




Lift the headlight and remove screw (D).



Remove the radiator grille support lugs, screws (E).



REMOVING the adjacent components

Remove :

- the air filter and the hoses,
- the air filter support casing.

Bleed the air conditioning refrigeration system at one of the unions near the radiator.

Drain the cooling system at the lower radiator hose.

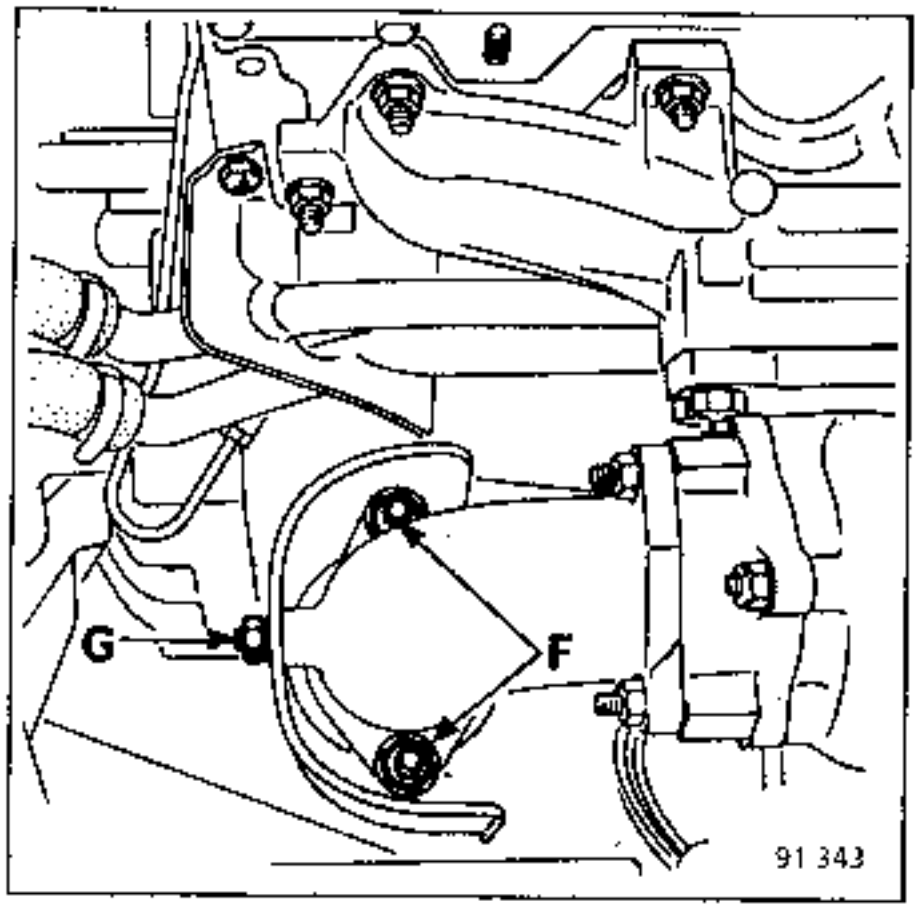
Disconnect :

- the wires supplying the electric fans (at the connection plate before the ignition switch),
- the air conditioning pipes at the radiator,
- the connectors,
- the upper radiator hose,
- the radiator mounting lugs.

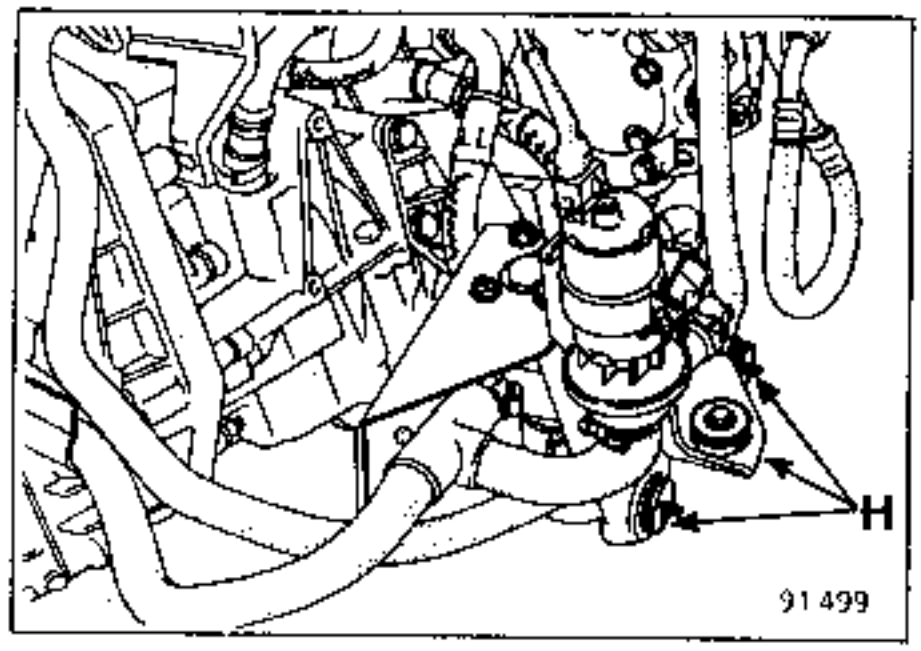
Remove the radiator, condenser and electric fan assembly.

Remove :

- the ignition unit,
- the turbocharger heat shield,
- the exhaust down pipe. To do this, unscrew nuts (F) and (G), then remove the stud at (C).

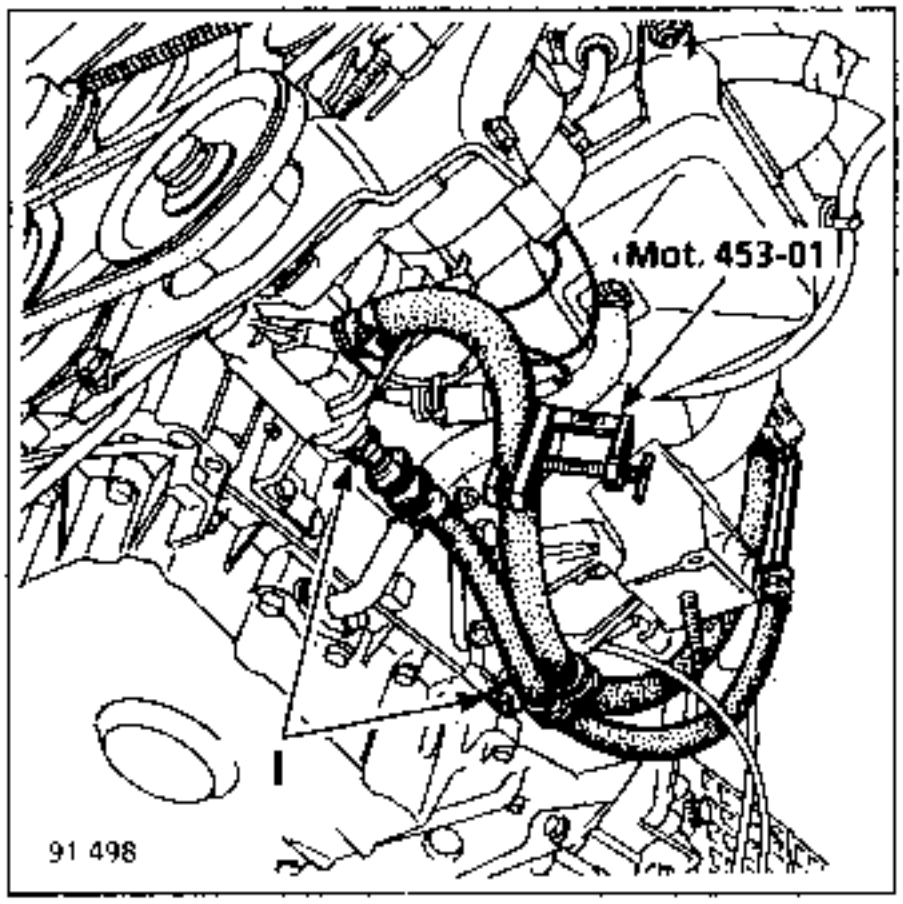


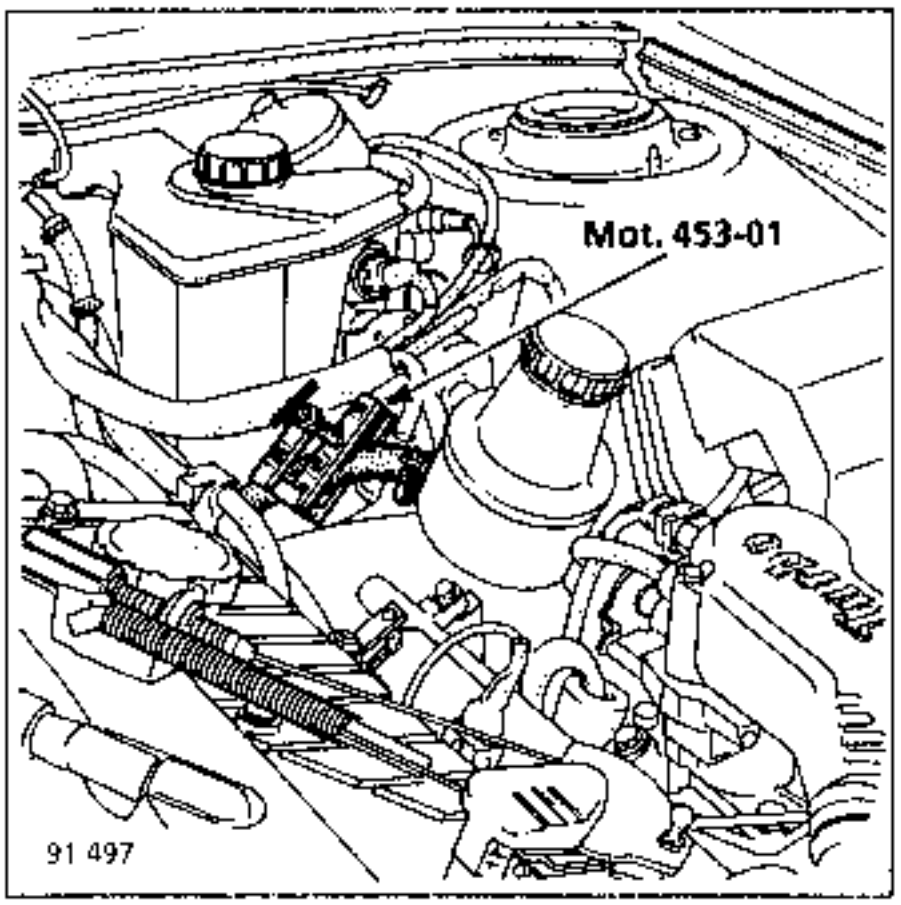
- the bolts from the lower clamp. The pipe is removed from under the vehicle,
- the air conditioning pipe at the compressor,
- the oil cooler (modine) bolts (H).



Place clamps **Mot.453-01** on the power steering reservoir output hoses.

Disconnect one of the pipes from the pump at (I) and other from the steering box and then secure the reservoir to the engine





Disconnect :

- the accelerator cable,
- the engine earthing braid,
- the fuel pipe,
- the electrical wiring and then secure the computer to the engine.

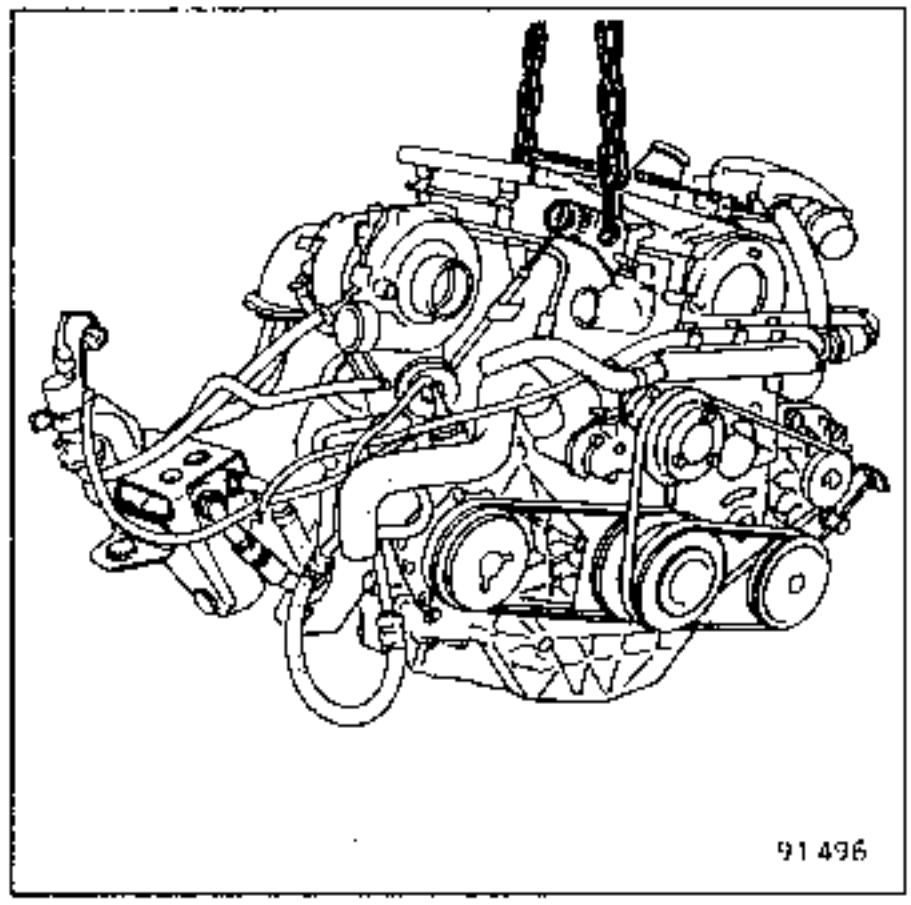
Disconnect the **TDC** sensor.

Remove :

- the bolts from round the gearbox,
- the nuts from the engine mounting pads.

Fit the chains **Mot.878** and lift the engine by its lifting rings.

NOTE : it is essential to fit the chain to the front lifting shackle through the hole nearest the engine.

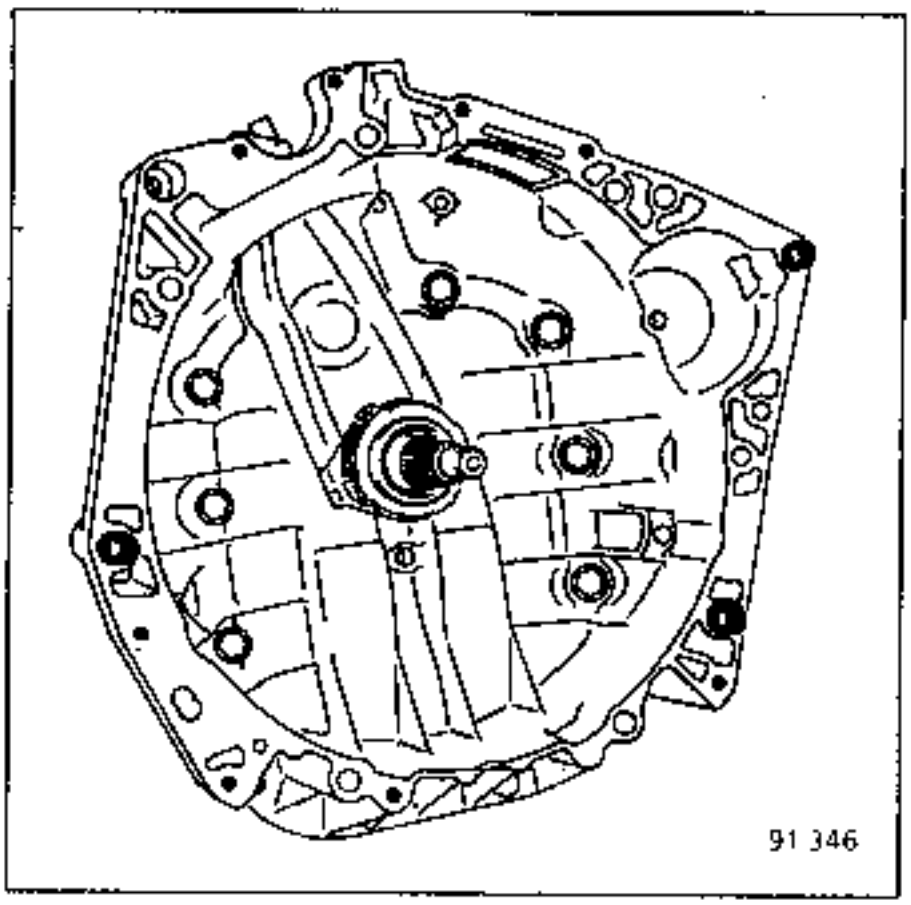


Support the gearbox with a jack.

Take out the engine.

REFITTING the engine (special points)

Before installing the engine, check that the locating dowels are in position.



Grease the splines on the primary shaft with no. 20 grease.

Lift the gearbox with a jack and fit the engine.

Fill and bleed the cooling system, the refrigeration system and the power steering system (see section concerned).

Adjust the accelerator cable.

Tighten the nuts and bolts to the specified torques.

REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS	
Mot. 878	Lifting chain and rings

TIGHTENING TORQUES (in daN.m) ▽	
Engine mounting securing bolts	4
Wheel bolts	9

The engine or engine-gearbox assembly are removed from above the vehicle after taking off the frotn end panel.

REMOVING

Place the vehicle on a lift.

Disconnect the battery.

Remove :

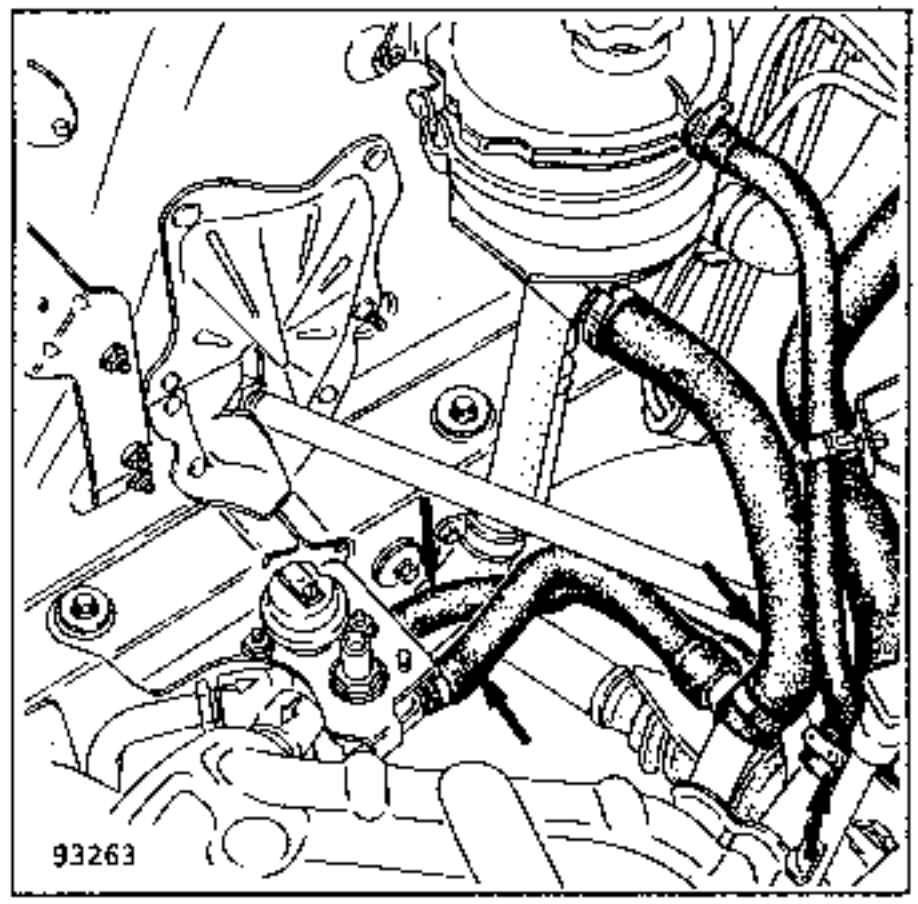
- the bonnet,
- the radiator grille and upper part of radiator grille,
- the air filter and its support,
- the protection from under the engine.

Drain :

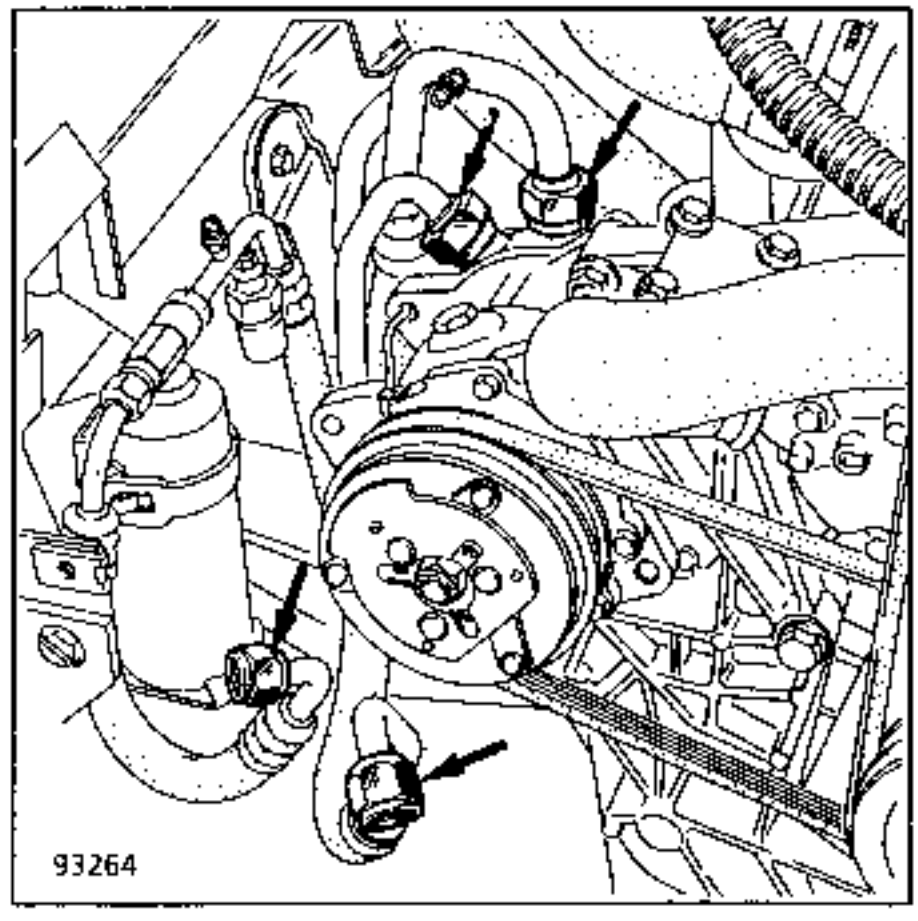
- the engine, if necessary,
- the gearbox, if necessary,
- the cooling system,

Disconnect :

- the electrical connectors (engine, radiator, gearbox),
- the accelerator cable,
- the clutch cable,
- the engine earthing braid,
- the following pipes
  - . heater, at the engine output,
  - . cooling, at the oil filter heater,

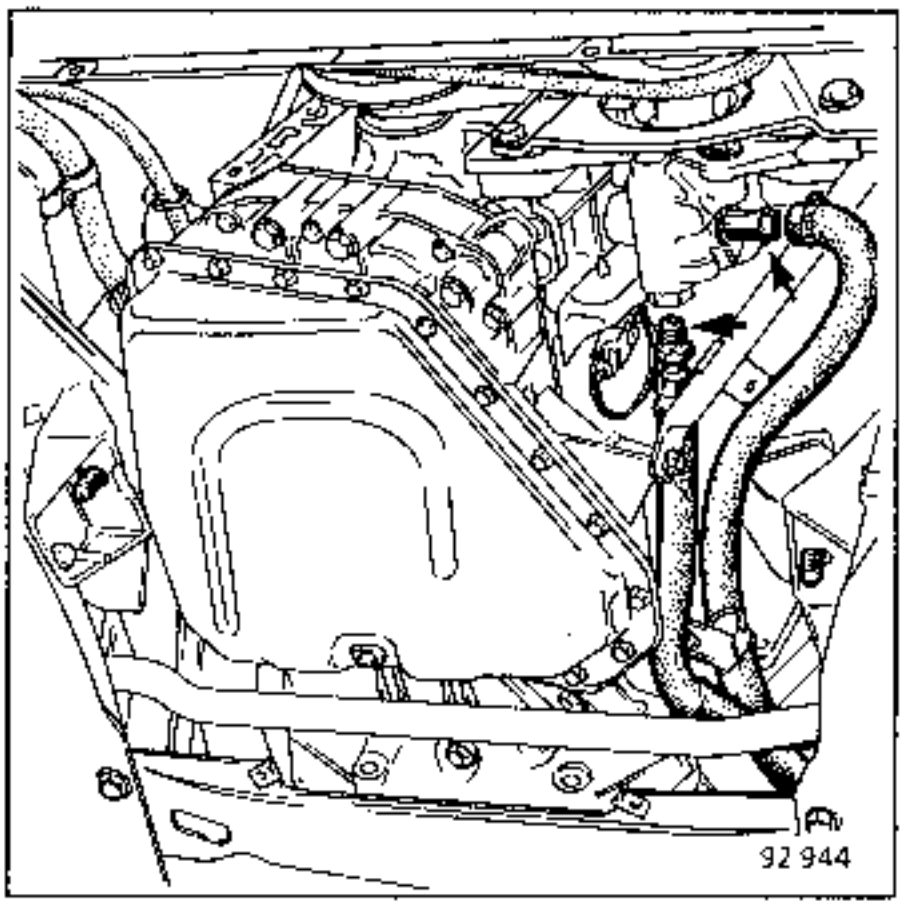


- . fuel,
- . vacuum,
- . HP and LP from the air conditioning compressor and the radiator,
- . radiator upper and lower hoses.



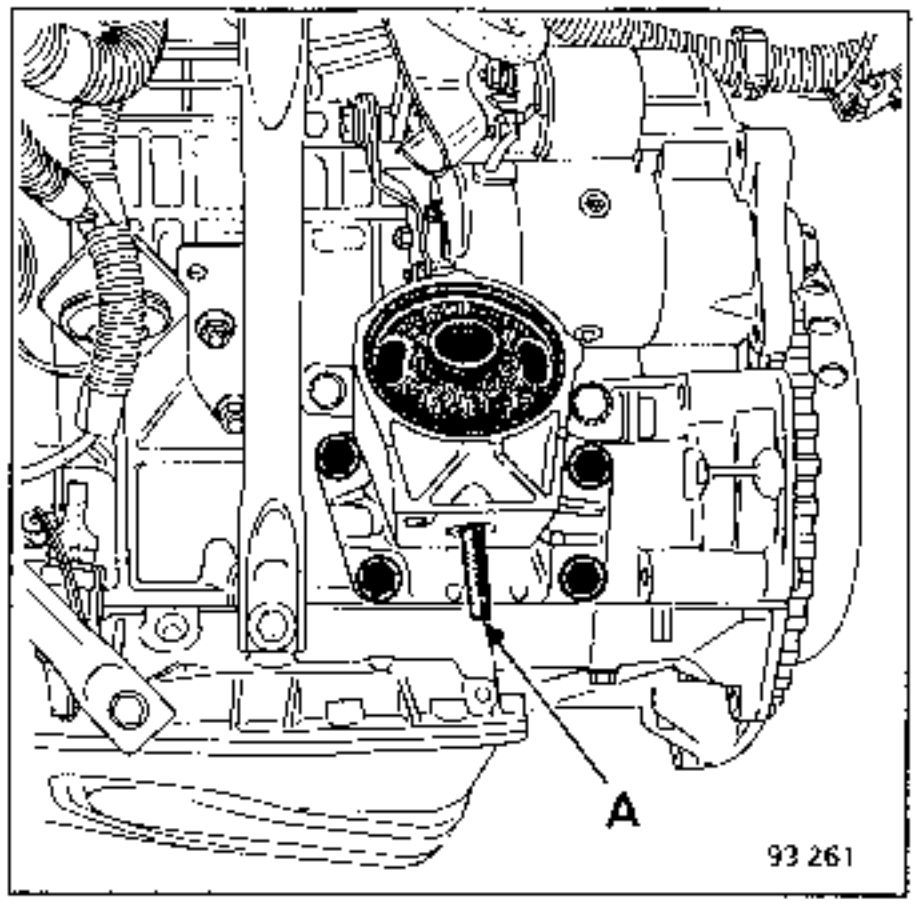
Remove :

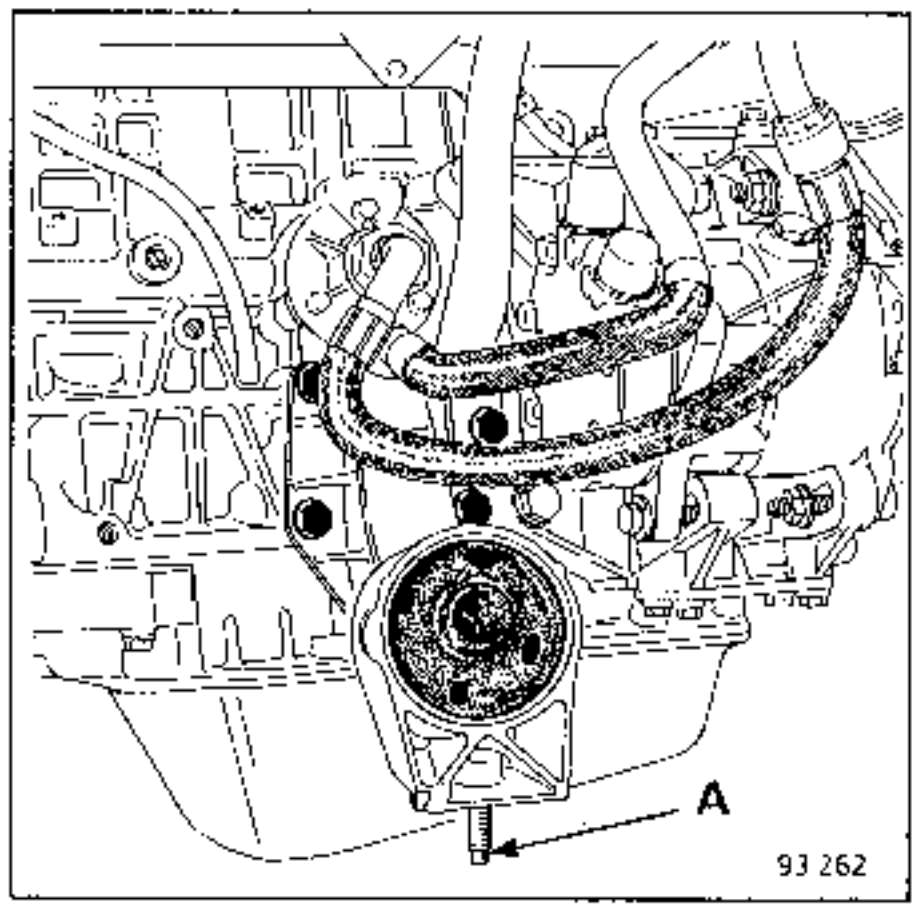
- the radiator mounting cross member,
- the radiator, condenser, electric fan assembly,
- the exhaust manifold clamp,
- the oil filter heater and its support,
- the computer which is to be secured, together with the oil filter heater, to the engine,
- the power steering pipe supports,
- the power steering pipes.



Remove :

- the **TDC** sensor,
- the bolts from round the gearbox,
- the engine mountings at (A).

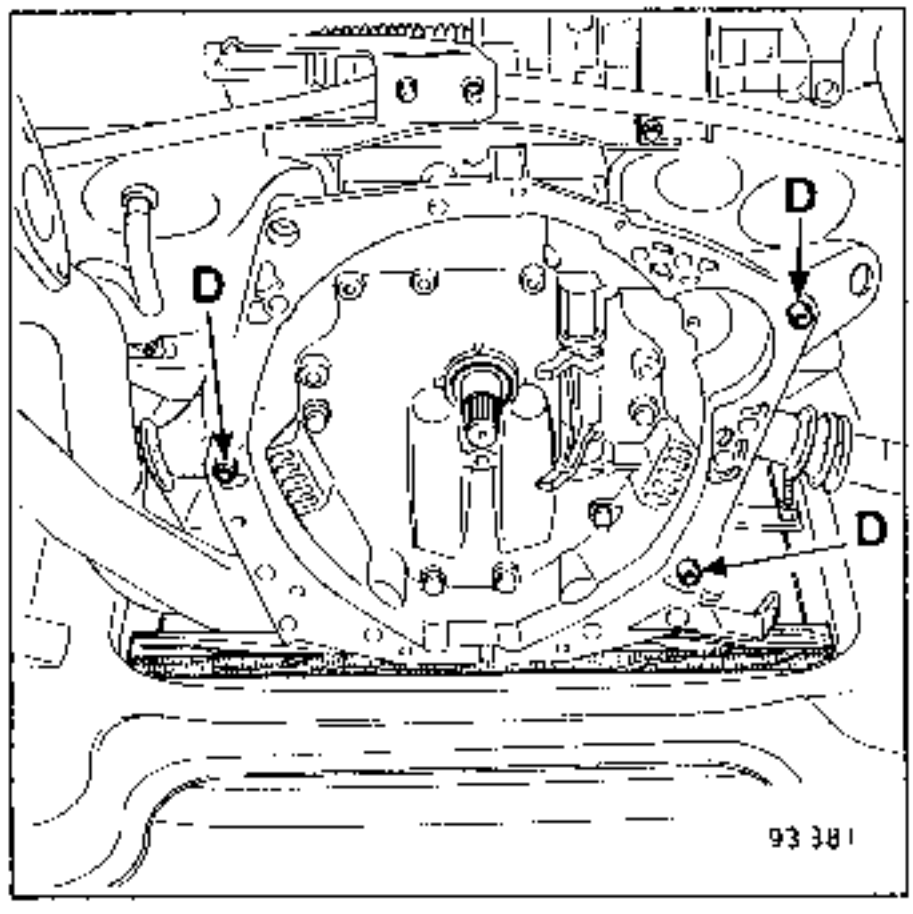




Fit the chains **Mot.878.**

Lift the engine by its lifting rings.

Support the gearbox.



Take out the engine.

REFITTING the engine - Special points

Before fitting the engine, ensure that the locating dowels (D) are in position.

Grease the splines on the primary shaft with grease no. 20.

Fill and bleed the cooling, air conditioning refrigeration and power steering systems.

Adjust the accelerator cable.

Tighten the nuts and bolts to the specified torques. ▽

REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS	
Mot. 878	Lifting chain and rings

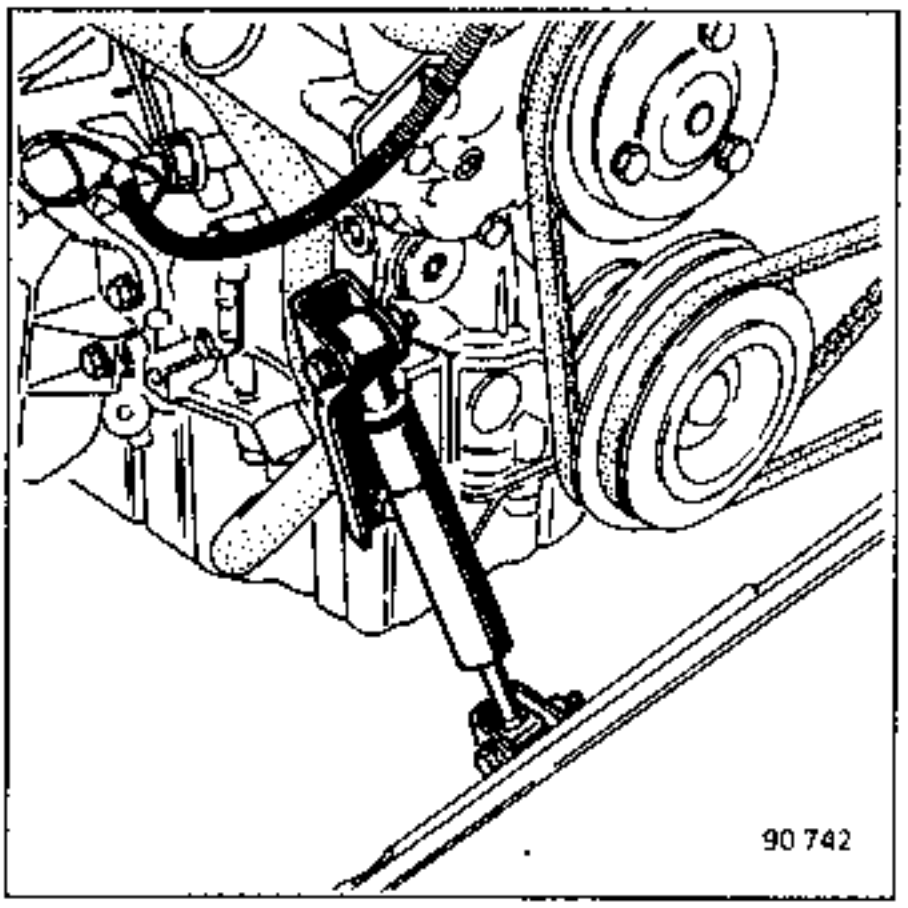
TIGHTENING TORQUES (in daN.m) ▽	
Engine mounting fastenings	4

REMOVING

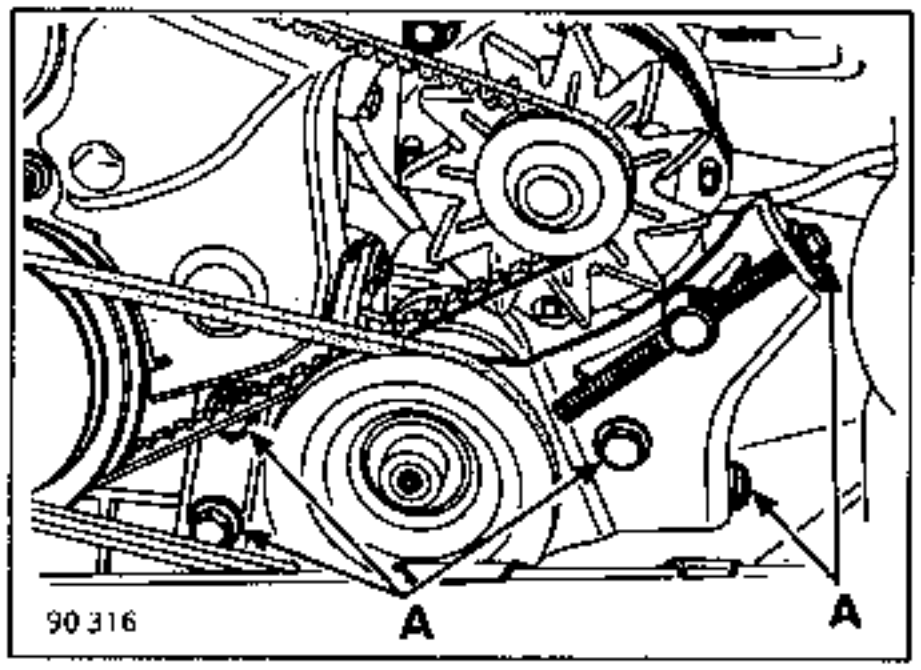
Disconnect the battery.

Remove :

- the bonnet,
- the front cross member,
- the radiator grille,
- the intercooler,
- the air filter, (for Turbo engines),
- the securing bolts from the engine damper,

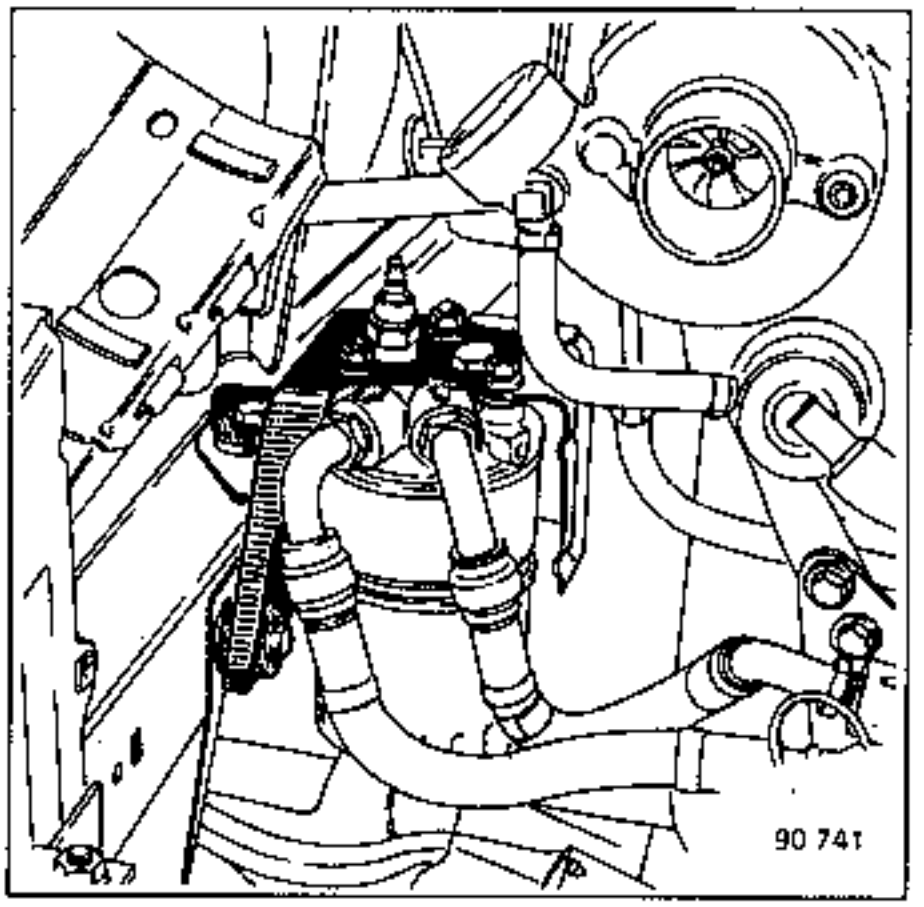


- the power steering pump securing bolts (A),



and place the pump on one side of the vehicle (on power steering versions),

- the engine oil cooler assembly.



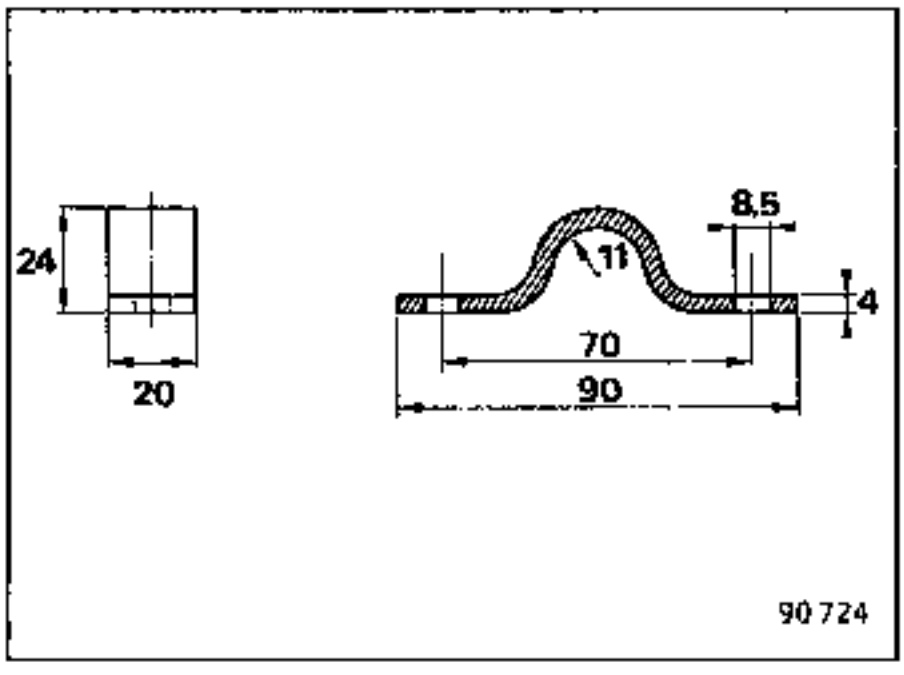
Disconnect :

- the pipes,
- the electrical connections,
- the accelerator cable,
- the clutch cable,
- the exhaust down pipe.

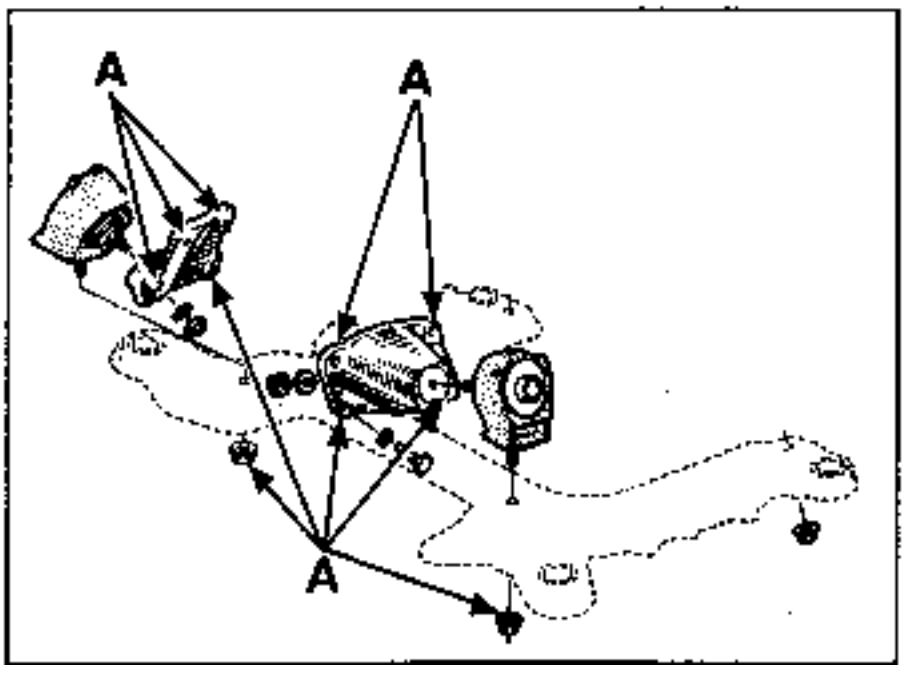
Remove :

- the starter,
- the fastenings from round the gearbox.

Fit a tool, made locally to the dimensions shown in the diagram below, to the rocker arm cover at the front of the engine :



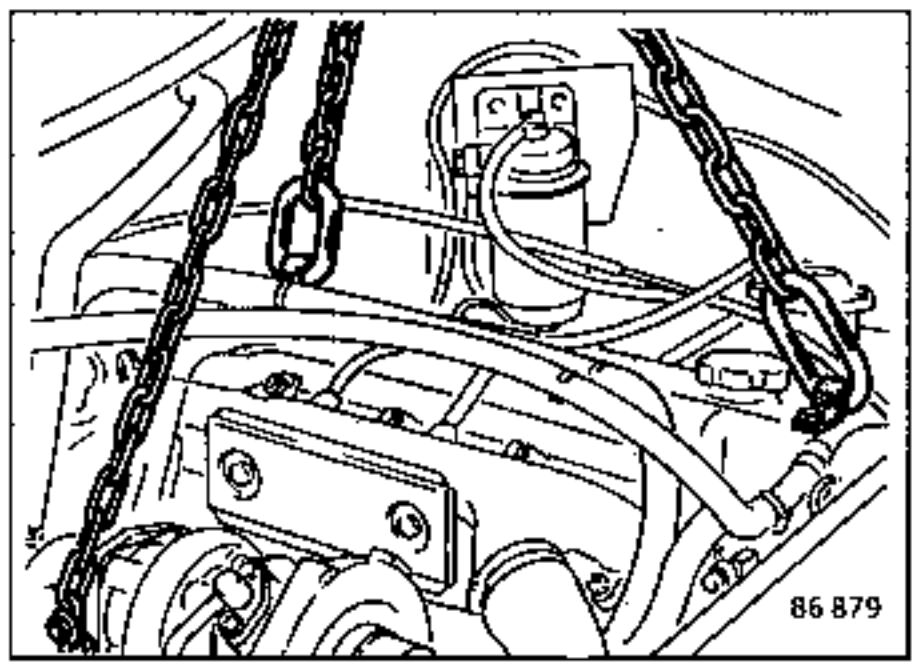
Remove the engine mountings at (A).



Remove the engine using tool **Mot.878.**

Special features of the J8S Turbo engine

To prevent the engine assembly turning fit an additional chain, securing it to the exhaust manifold.

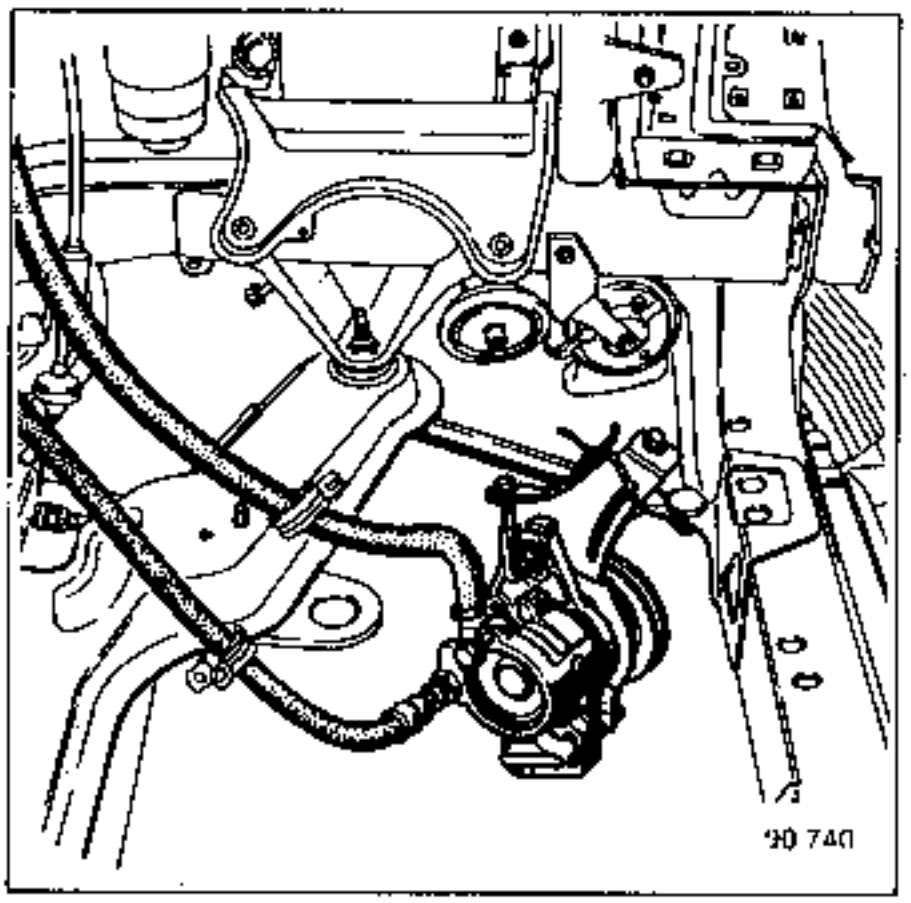


Place a jack under the gearbox.

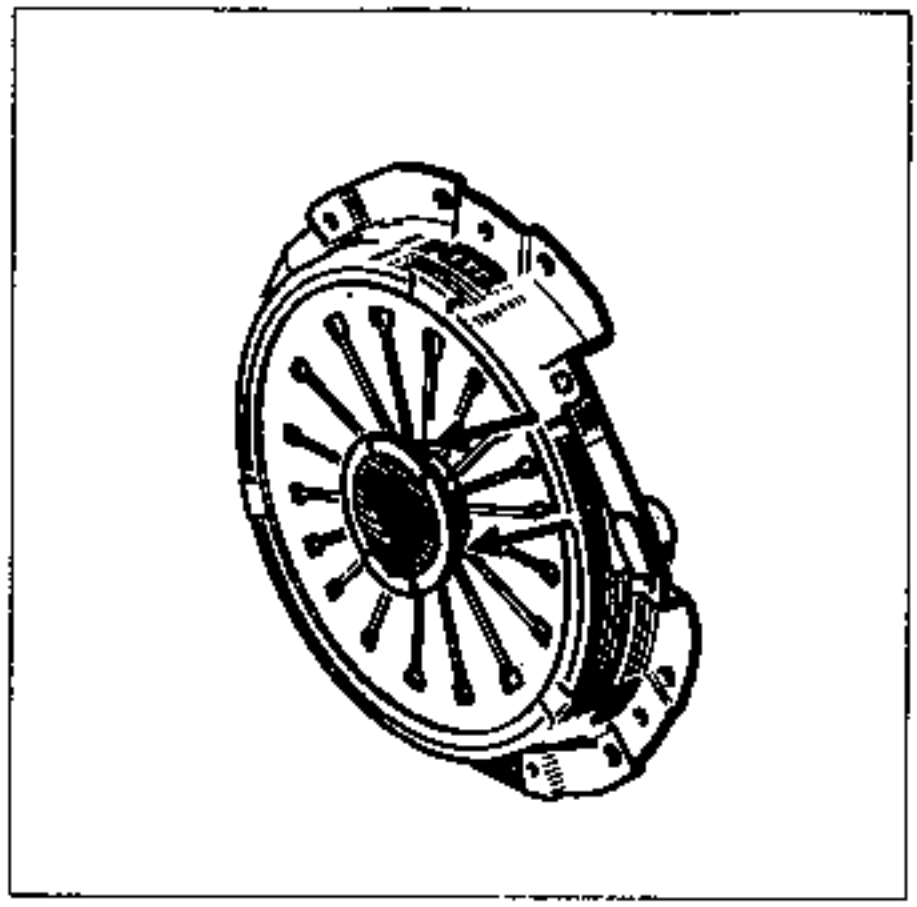
REFITTING (special features)

. Vehicles equipped with power steering

Before refitting the engine, ensure that the power steering pump pipes pass either side of the front left hand engine mounting pad.



Fit the engine, ensuring that the clutch fork lugs are correctly positioned behind the shoulder on the withdrawal bearing (the bearing is an integral part of the clutch unit).



Fill the engine with oil, if necessary, and fill and bleed the cooling system.

Adjust the accelerator cable.

Do not forget to remove the engine lifting ring (the locally manufactured tool).

REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS	
Mot. 878	Lifting chain and rings
B.Vi. 31-01	Spring pin punches
T.Av. 476	Ball joint extractor

TIGHTENING TORQUES (in daN.m) ▽	
Brake caliper securing bolts	10
Shock absorber securing bolts	8
Steering ball joint	4
Wheel bolts	8
Drive shaft bellows sec. screws	2,5

CONSUMABLES
LOCTITE FRENBLOC : Brake caliper securing bolts
LOCTITE FRENETANCH Crankshaft pulley securing bolts
CAF 4/60 THIXO : Drive shaft pins
MOLYKOTE BR2 Drive shaft splines

REMOVING

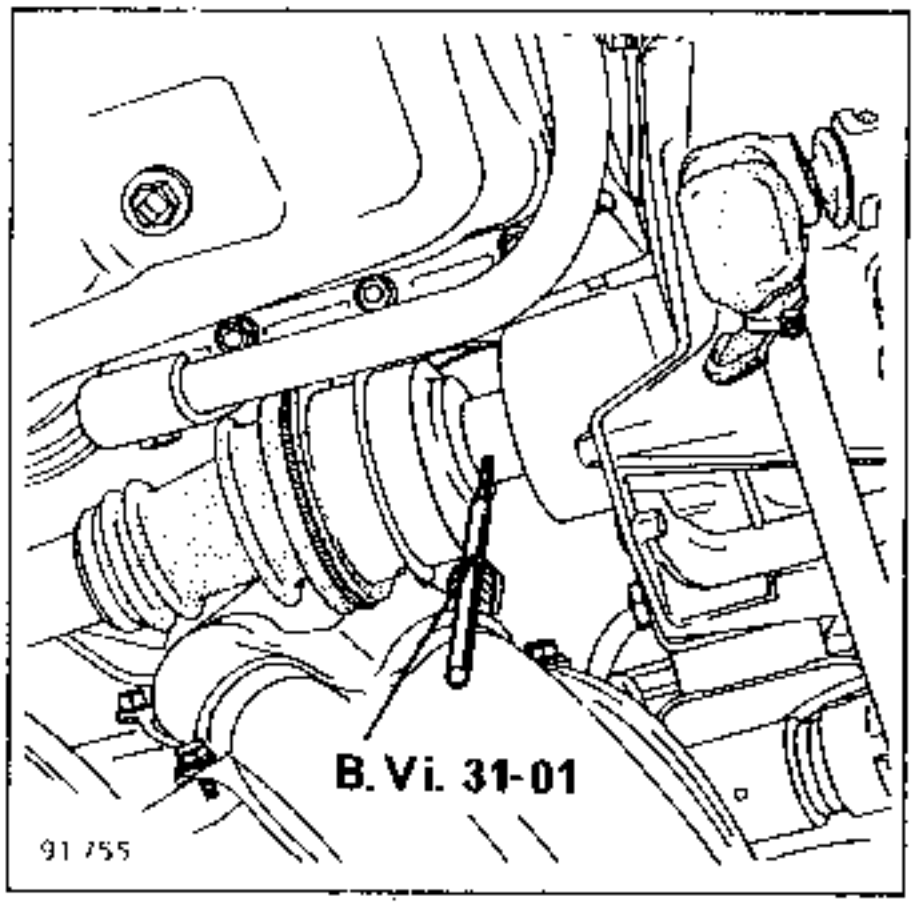
Disconnect the battery.

Drain :

- the cooling system (at the lower radiator hose),
- the gearbox oil,
- the engine oil, if necessary.

Remove :

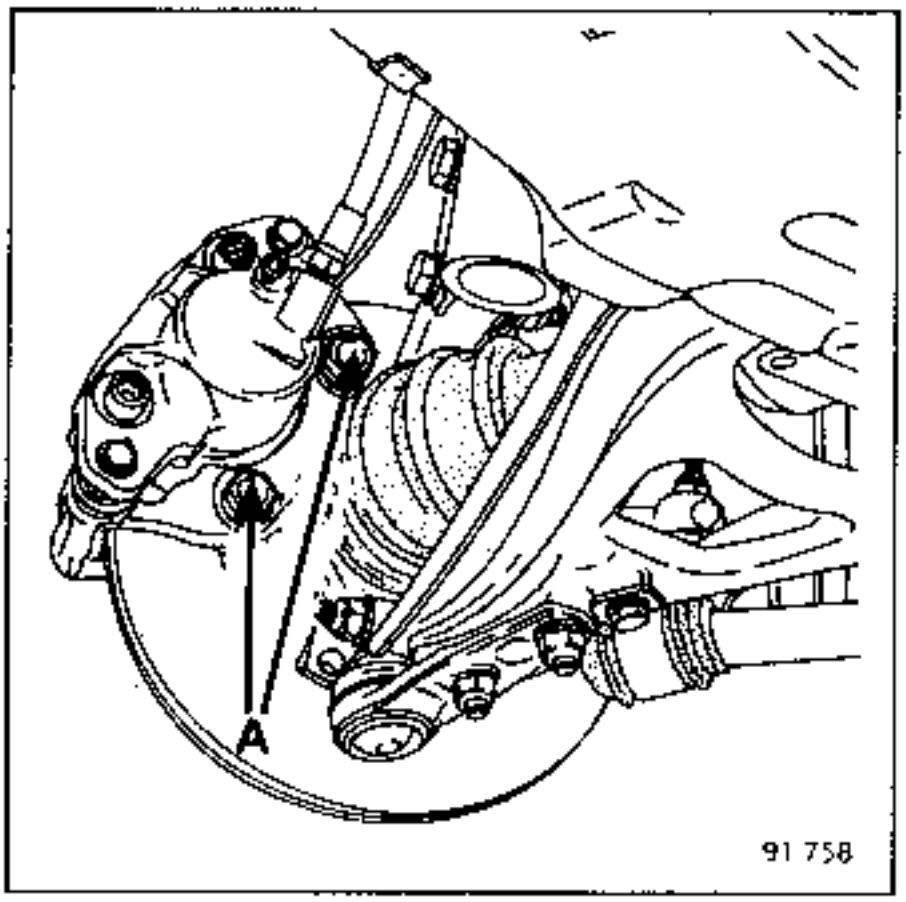
- the wheels,
- the drive shaft pin using pin punches **B.Vi.31-01**



- the two bolts that secure the bottom end of the shock absorber and free the drive shafts taking care not to damage the bellows. Secure the stub axle carrier to avoid tension being applied to the brake hose.

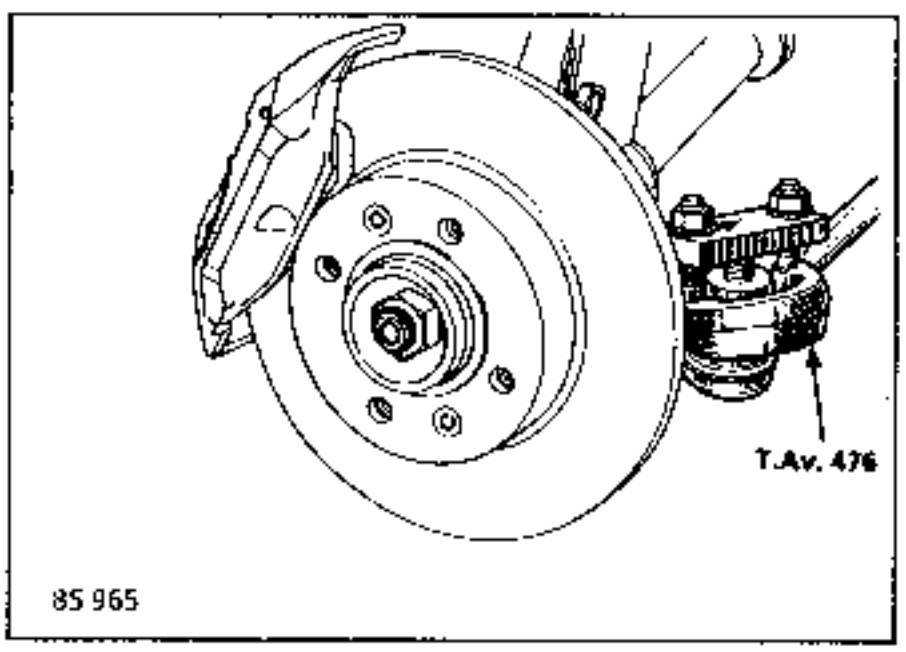
On the left hand side of the vehicle :

Remove the two caliper securing bolts (A) and secure the caliper to the suspension spring to avoid applying tension to the hose.

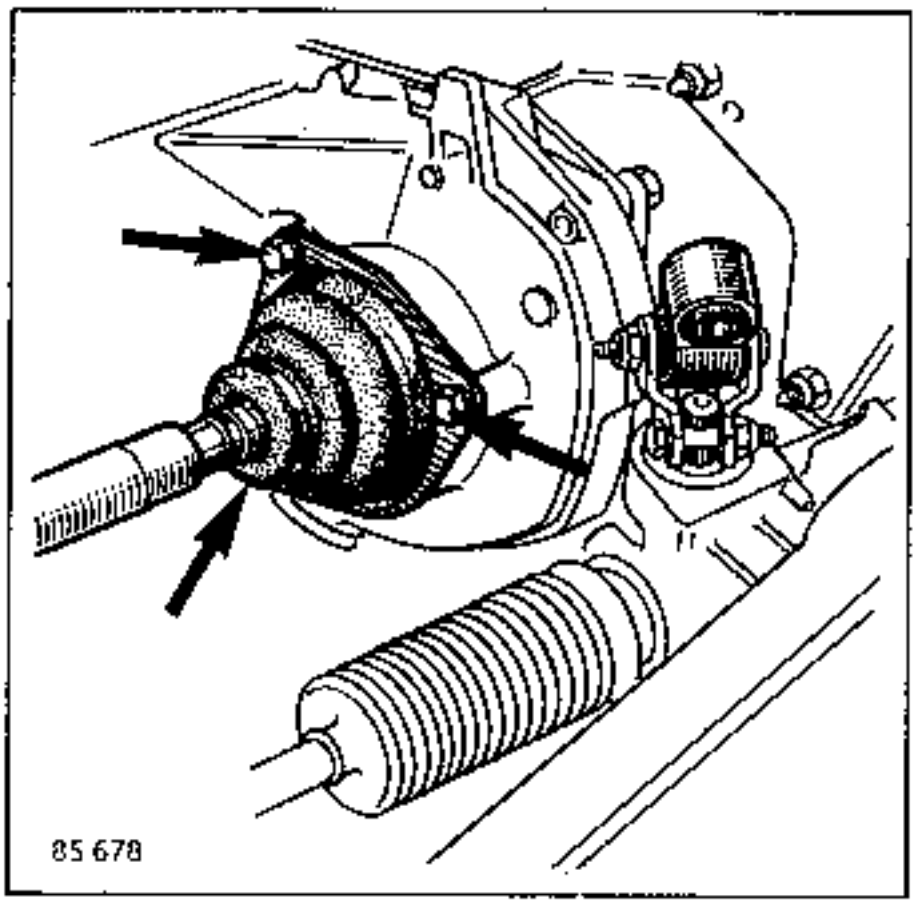


Remove :

- the steering ball joint using tool **T.Av.476,**



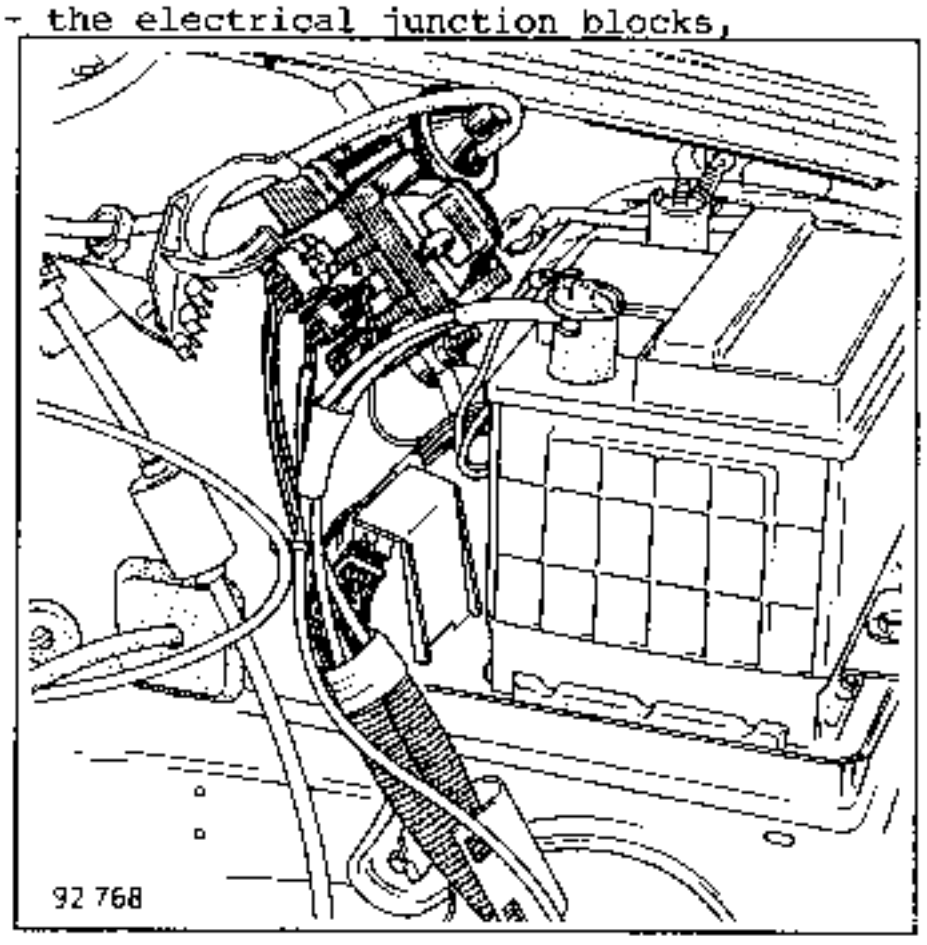
- the three screws that secure the drive shaft bellows,



- the two bolts that secure the lower end of the shock absorber and free the drive shaft.

Disconnect :

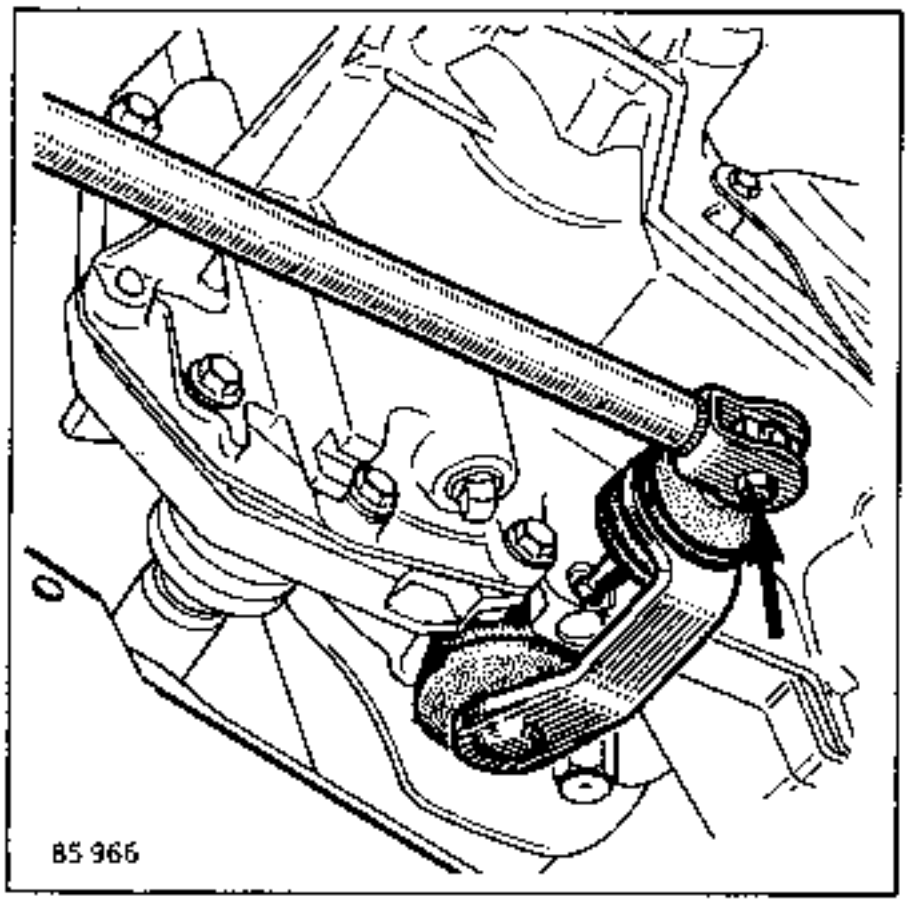
- the heater hoses at the coolant pump, the fuel lines and the brake servo vacuum pipe at the servo,
- the electrical junction blocks,



- the accelerator, choke and speedometer drive cables,
- the engine and gearbox earthing braids,
- the electronic ignition sensor.

Remove :

- The gear shift controls,



- the exhaust pipe clamp,
- the engine mounting nuts and bolts,
- the complete engine-gearbox assembly using the lifting chain **Mot.878.**

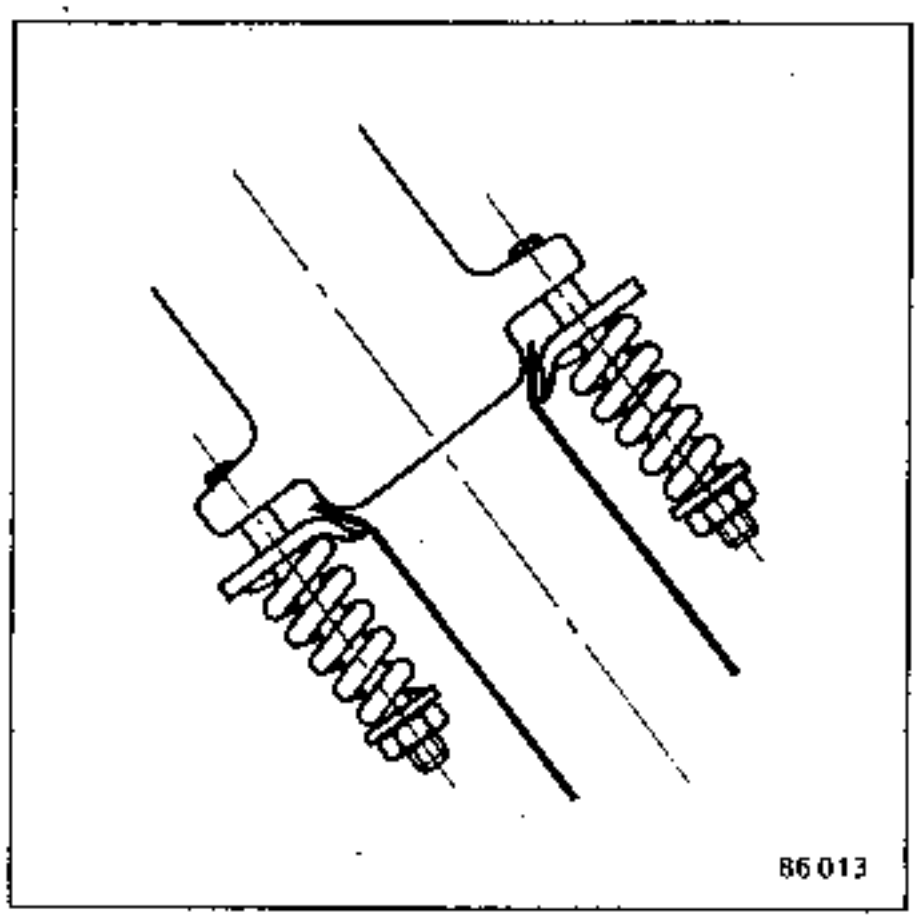
REFITTING

Coat the caliper securing bolts with **LOCTITE FRENBLOC,** fit them and tighten them to the specified torque.

Press the brake pedal a number of times to bring the psitons into contact with the brake pads.

Re-tighten thc exhaust pipe clamp.

Tighten the nuts until the springs are coil bound and then loosen them by one and a half turns. Never leave the springs coil bound.

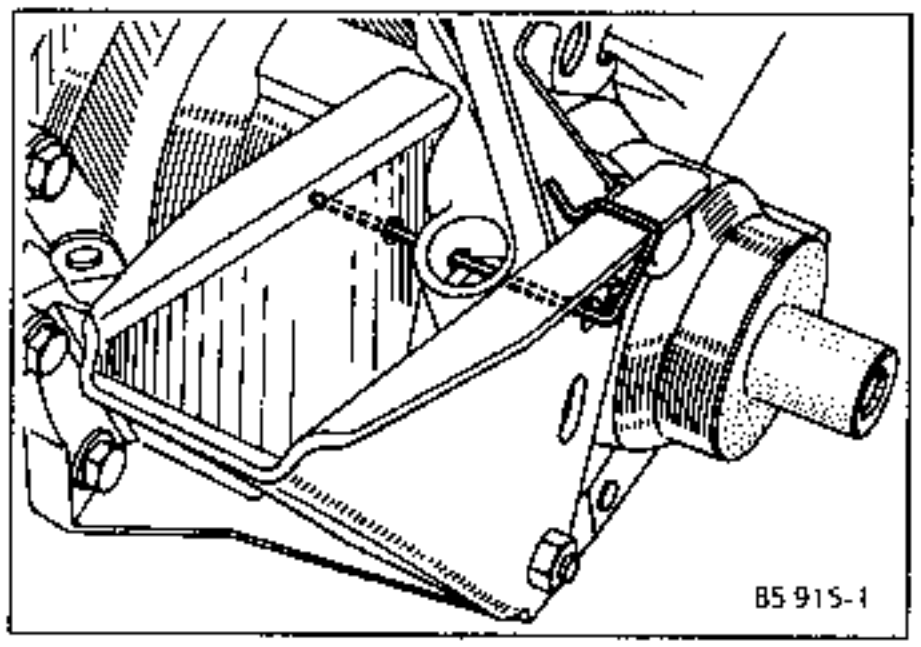


- Fill the engine and gearbox with oil (when applicable),
- fill and bleed the cooling system,

Adjust the accelerator cable and choke cable travels.

Apply **CAF 4/60 THIXO** compound to the drive shaft spring pin holes.

Fit the speedometer drive cable retaining clip.



ESSENTIAL SPECIAL TOOLS	
B.Vi. 31-01	Punches for spring pins
Mot. 878	Lifting chain and rings
T.Av. 476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)	
Brake caliper securing bolts	10
Shock absorber lower securing bolts	11
Steering ball joints	4
Engine mounting securing bolts	4
Wheel bolts	9
Drive shaft bellows securing screws	2,5
Lower ball joint nuts	6

Removing the unit is a perfectly straight forward operation, however attention should be paid to the following points :

REMOVING

Disconnect :

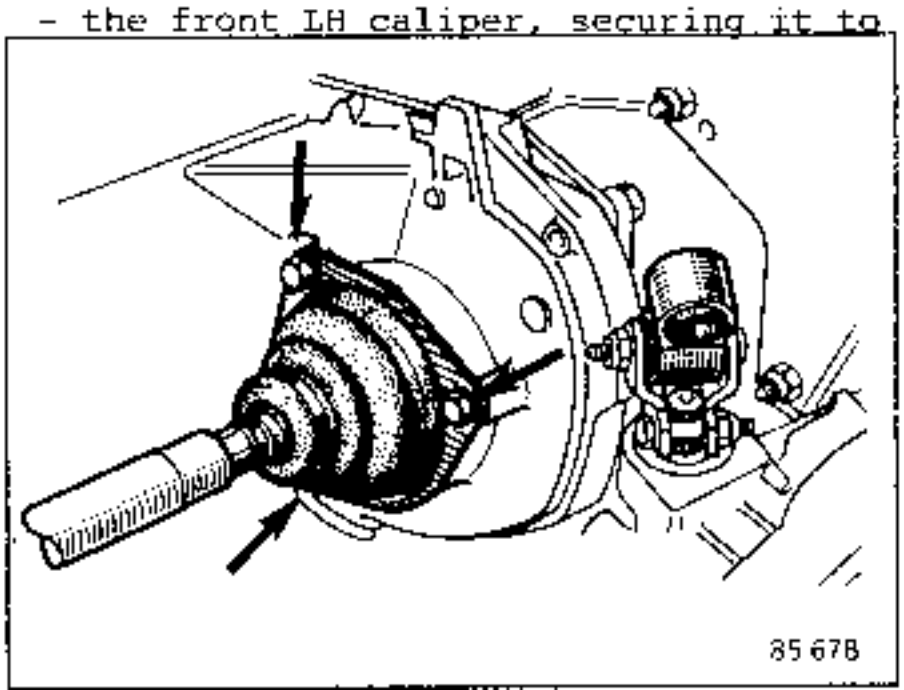
- the battery,
- the electrical connections,
- the pipes,
- the cables.

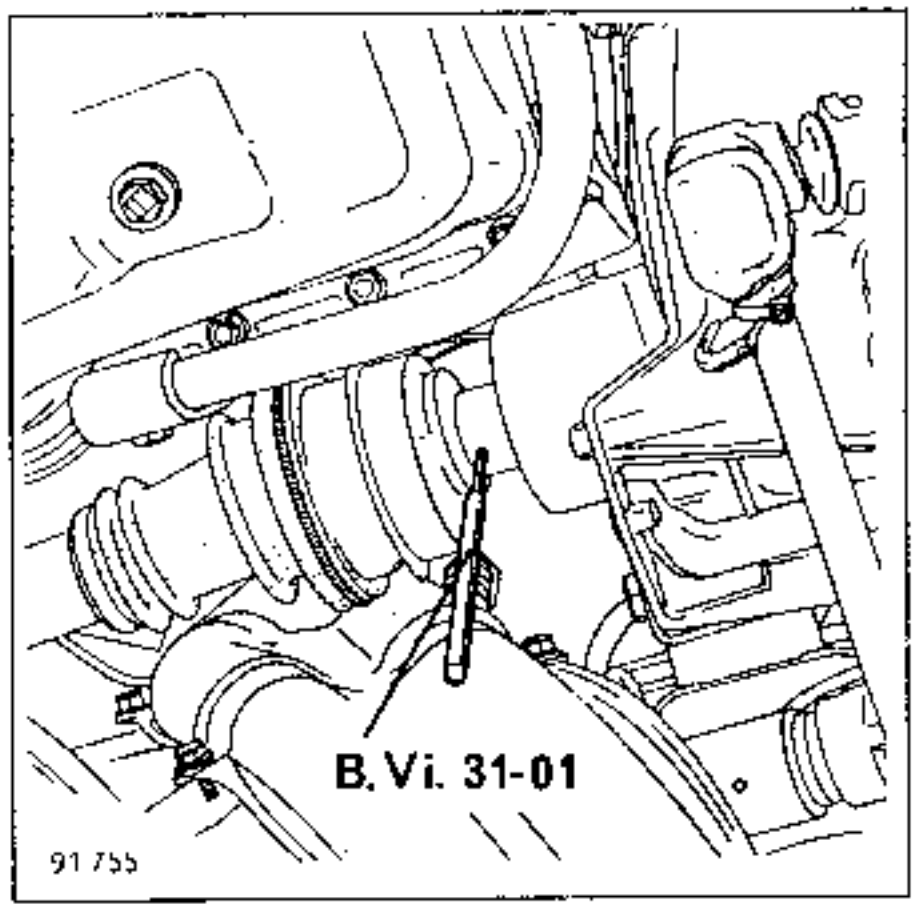
Drain :

- the gearbox,
- the engine if necessary.

Remove :

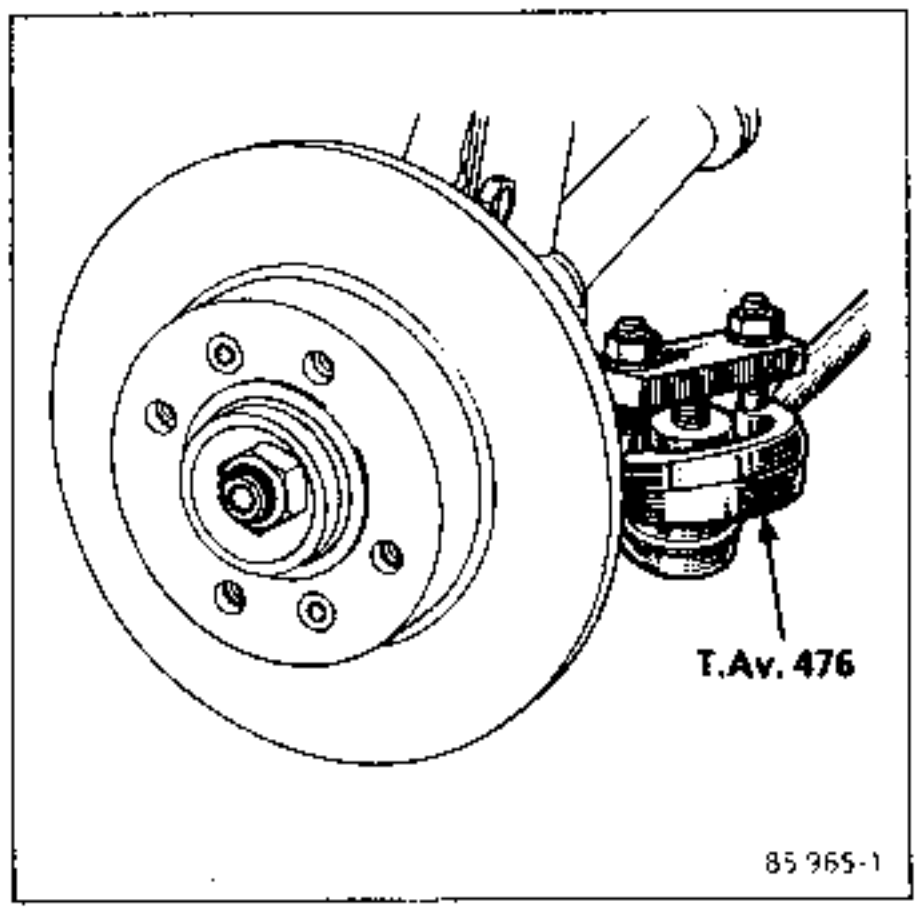
- the radiator,
- the drive shaft pin using punches **B.Vi.31-01**,
- the three screws from the front left hand bellows,
- the front LH caliper, securing it to the body.





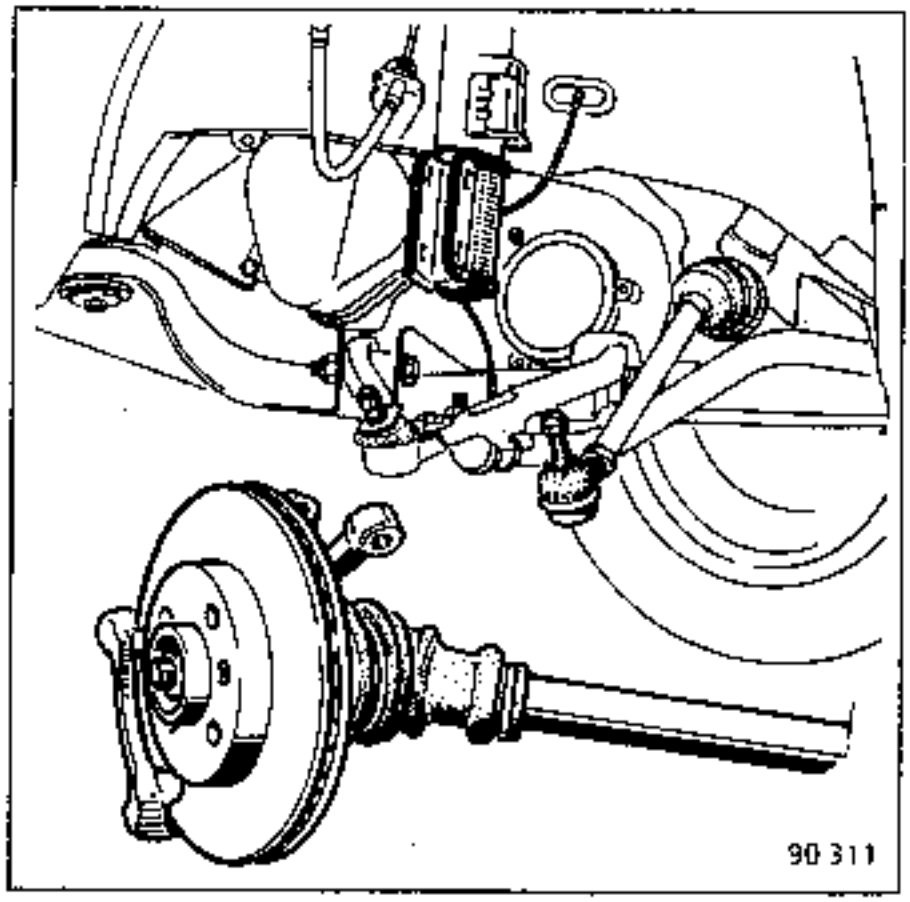
Free the drive shaft taking care not to damage its bellows at the wheel end.

Remove the steering ball joints using extractor **T.Av.476**.



Remove the bolts from the bottoms of the shock absorbers.

On the left hand side, remove the drive shaft, stub axle carrier assembly, disconnecting it at the lower ball joints. Protect the spider.



The engine-gearbox assembly is lifted out using the lifting chain and rings **Mot.878.**

REFITTING

Tighten the nuts and bolts to the specified torques.

When fitting the caliper bolts, apply Loctite Frenbloc to them and tighten them to the specified torques.

Press down the brake pedal a number of times bringing the pistons into contact with the brake pads.

- Fill the gearbox with oil,
- fill the engine with oil if necessary,
- fill and bleed the cooling system.

Retighten the exhaust pipe clamp.

Apply **CAF 4/60 THIXO** compound to the spring pin holes.

Adjust the accelerator and choke cables.

REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS	
B.Vi. 31-01	Punches for spring pins
Mot. 878	Lifting chain and rings
T.Av. 476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)	
Brake caliper securing bolts	10
Shock absorber low. sec. bolts	8
Steering ball joints	4
Engine mounting securing bolts	4
Wheel bolts	9
Drive shaft bellows securing screws	2,5
Lower ball joint nuts	6
Nuts on suspension rubber bushes	2,2

REMOVING

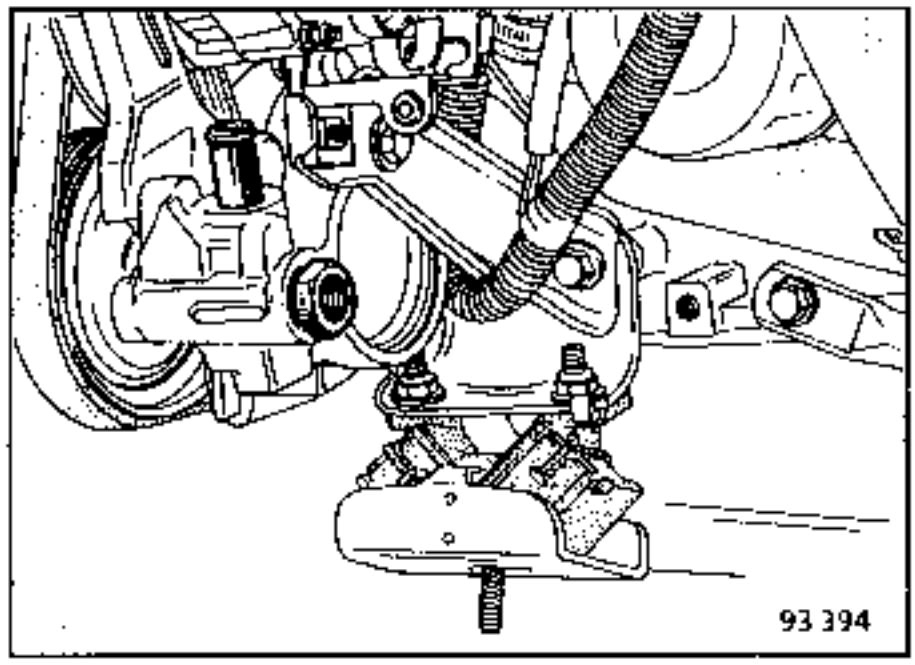
Place the vehicle on a lift and disconnect the battery.

Remove :

- the wheels,
- the protection under the gearbox,
- the gear shift control.

Drain :

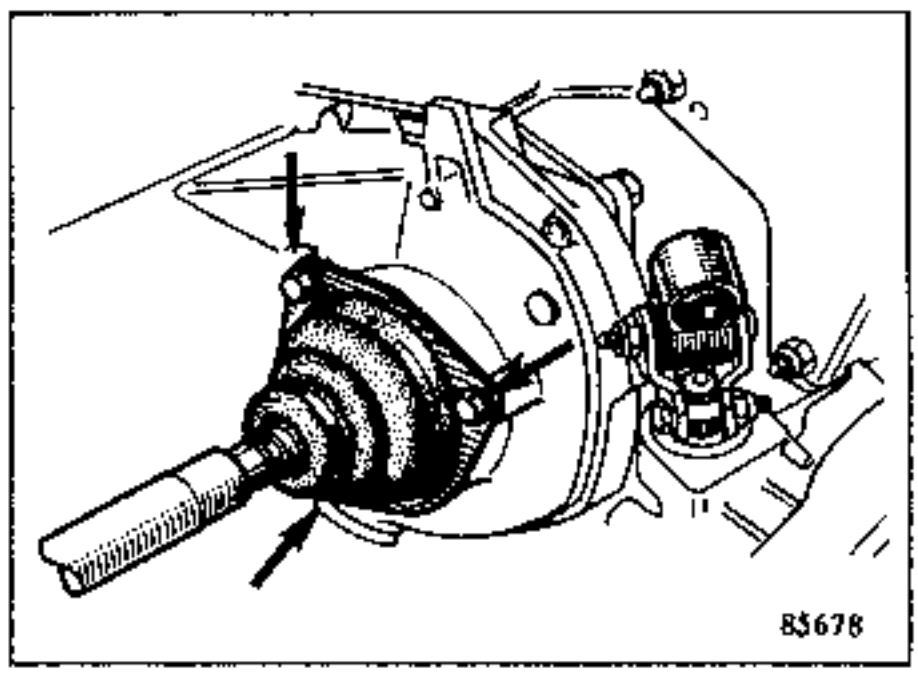
- the engine (if necessary),
- the gearbox,
- the cooling system at the upper and lower radiator hoses,
- the power steering system (on power steering models, disconnecting the pipes at the pump).



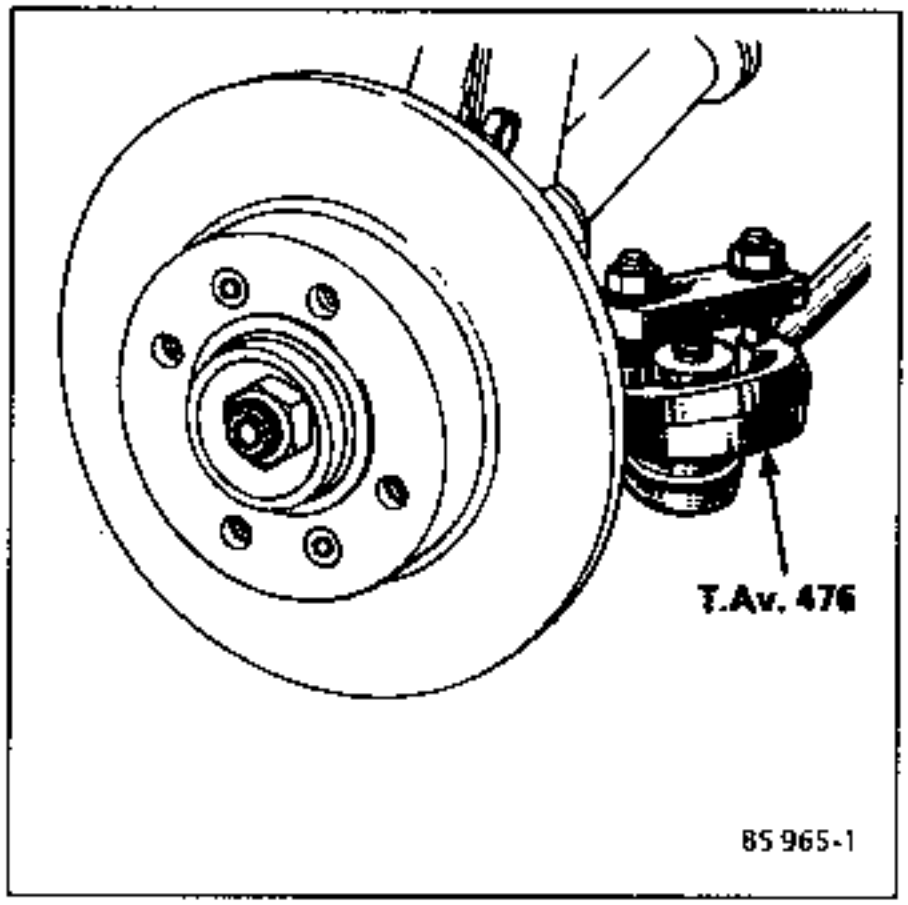
Remove :

On the left hand side

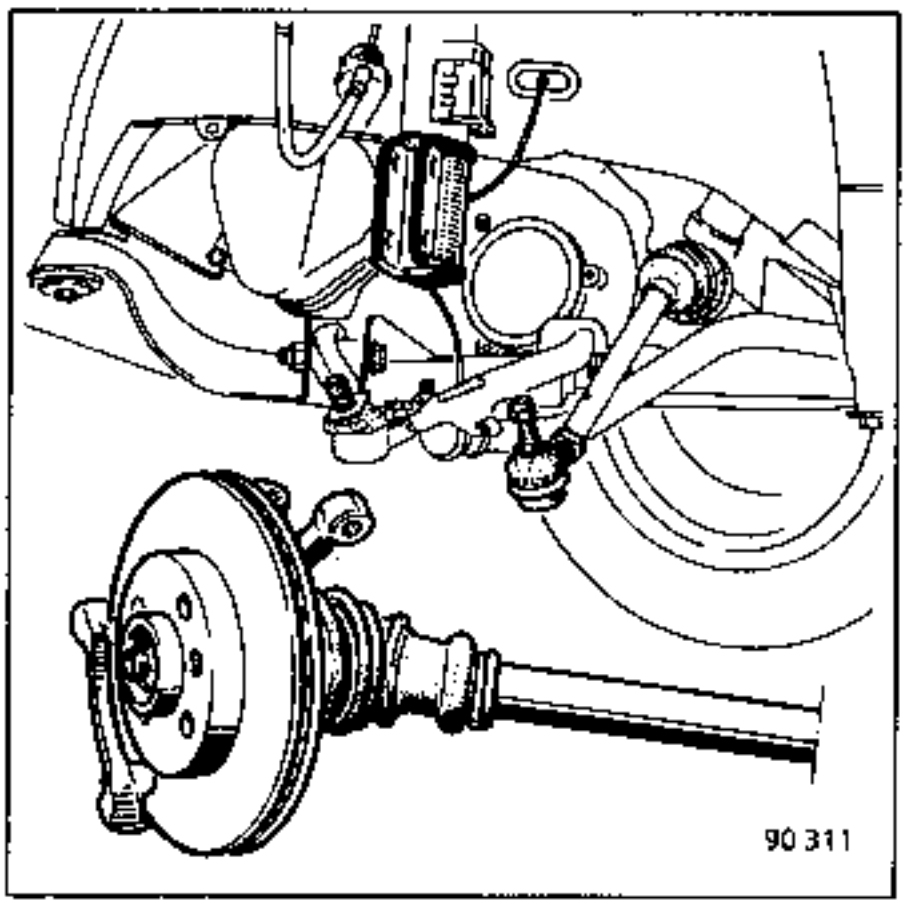
- the brake caliper and attach it to the body,
- the 3 screws from the bellows,



- the bolt on the lower ball joint,
- the steering ball joint using extractor **T.Av.476.**

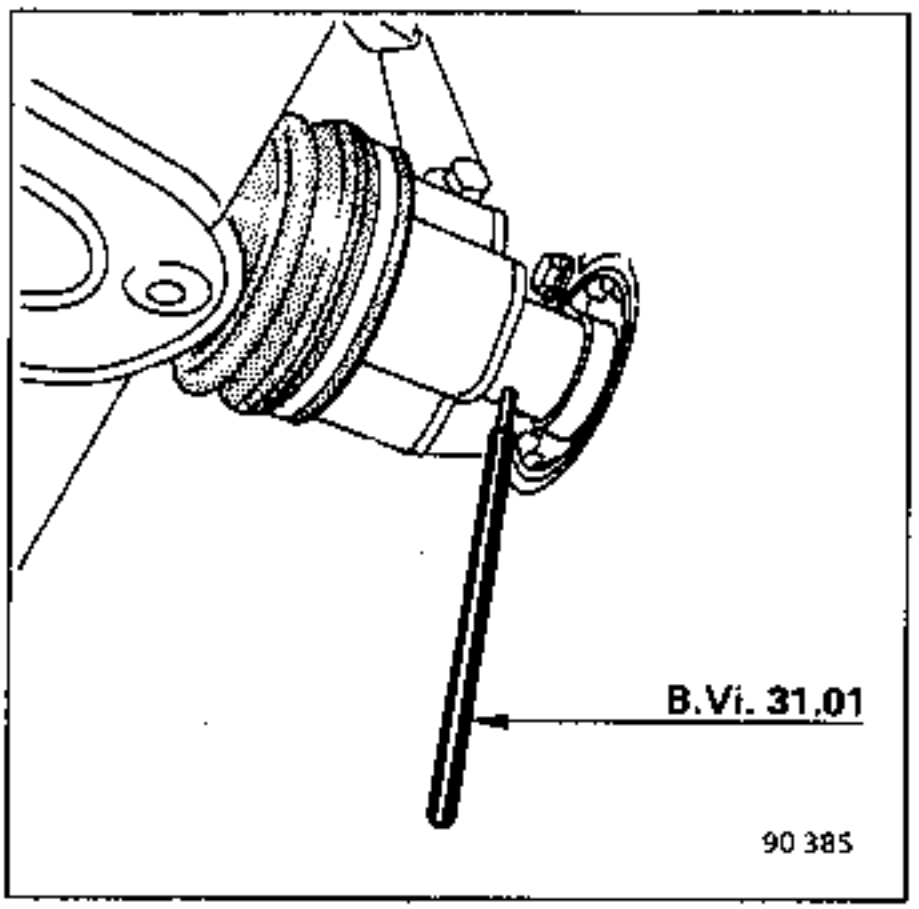


- the bolts from the lower ends of the shock absorbers,
- the stub axle carrier - drive shaft assembly, protecting the spider joint.



On the right hand side

- the pin from the drive shaft using punches **B.Vi 31-01.**

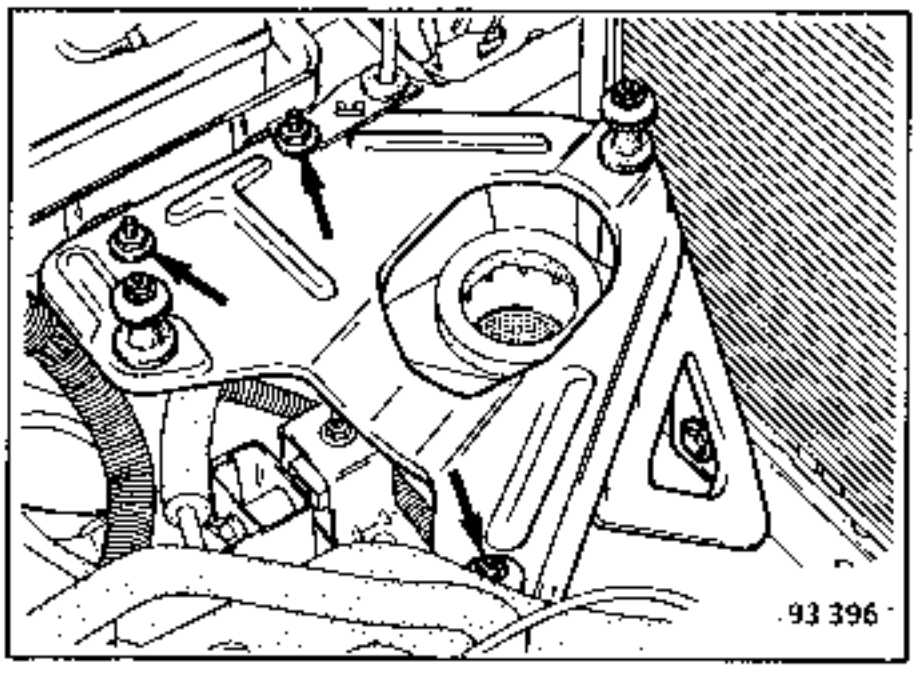


- the shock absorber upper securing bolt.

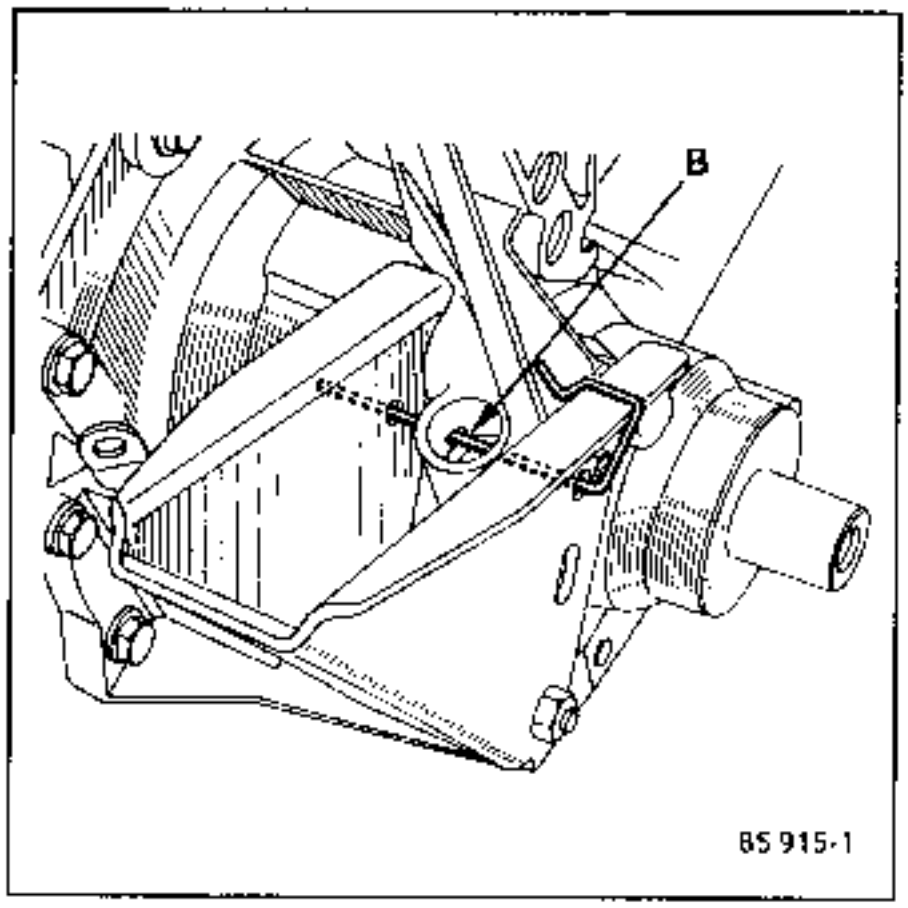
Free the drive shaft.

Remove :

- the bonnet,
- the air filter and its support,



- the clutch, accelerator and speedometer drive cables, removing clip B,



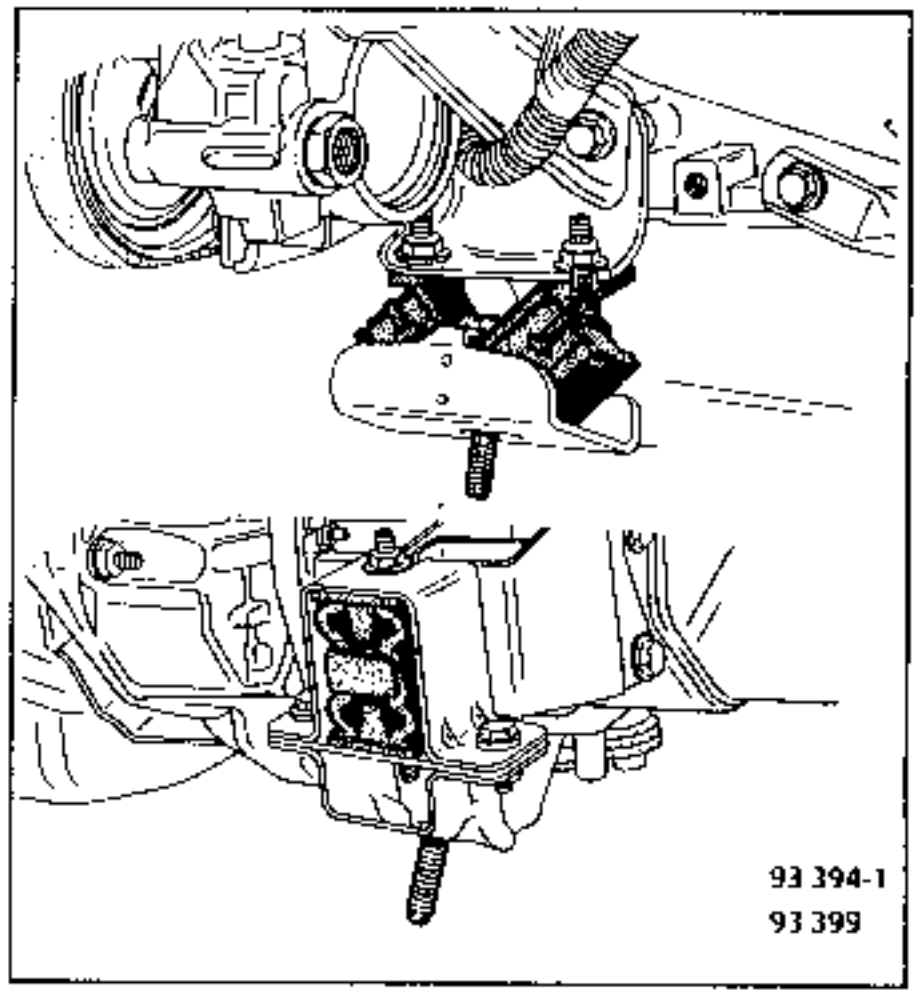
- the exhaust manifold output clamp,
- the power steering pipe supports,
- the expansion chamber and secure it to the engine,
- the nuts from the engine and gearbox earthing braids.

Disconnect

- the electrical wiring harness from the preheater unit, from the electric fan and the engine harness pin, securing them to the engine,
- the following pipes :
  - . heating system, at the engine,
  - . fuel filter heater,
  - . the fuel input and return pipes at the injection pump.

Remove :

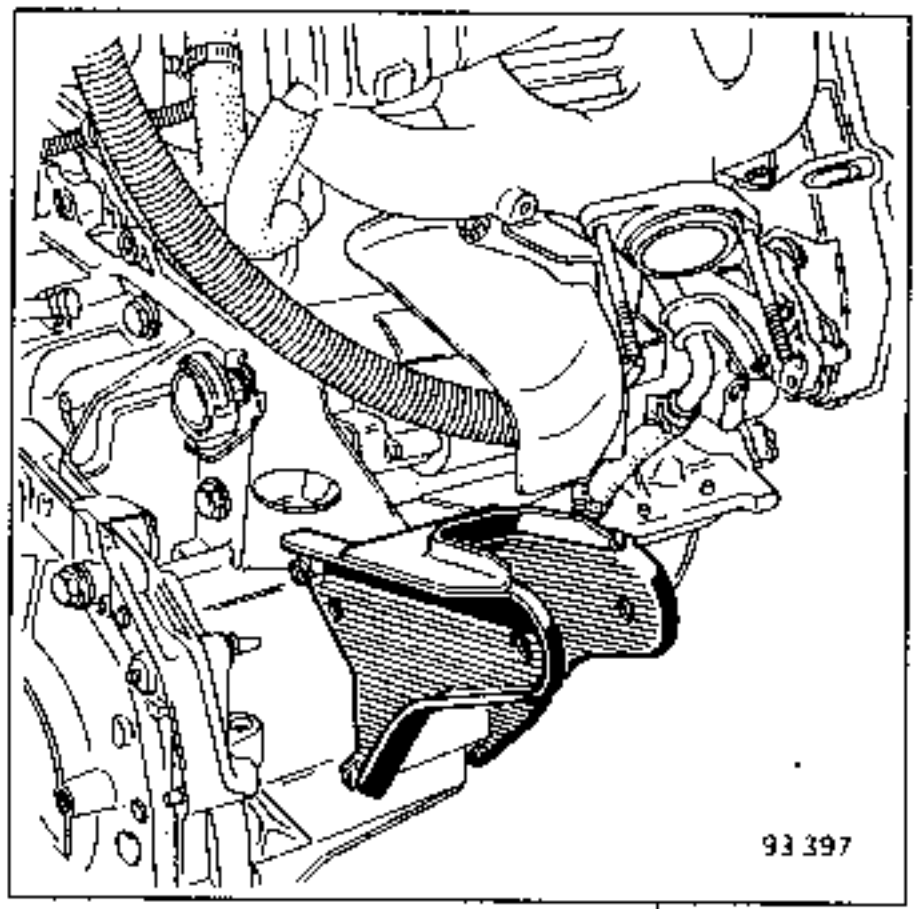
- the expansion chamber support,
- the two nuts from the engine and gearbox front mounting pad.



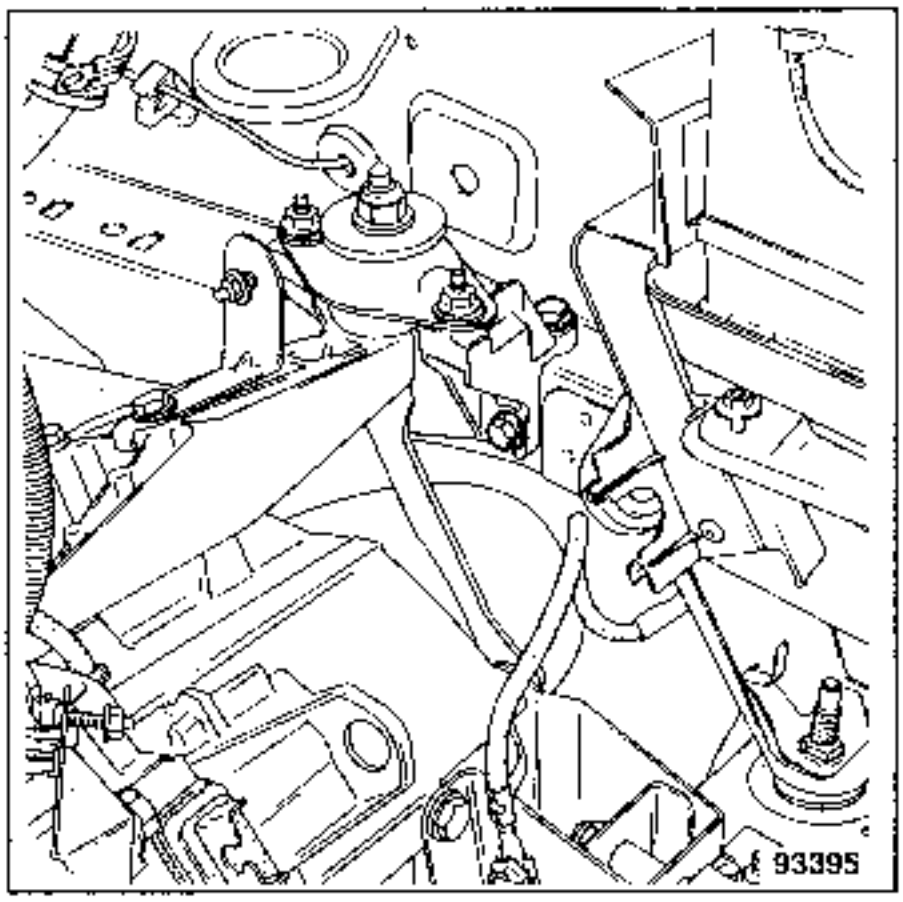
Fit the lifting chain and rings **Mot.878**

Remove :

- the bolt from the gearbox mounting,



- the bolts that secure the suspended flexible mounting.



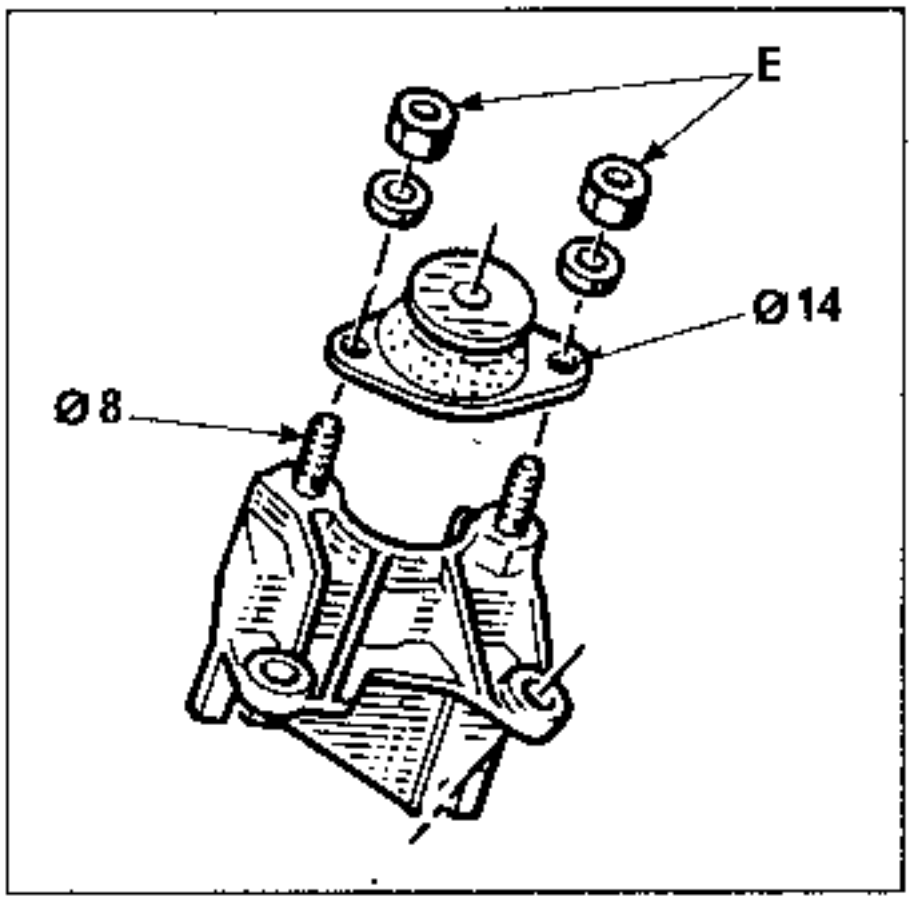
Remove the engine-gearbox assembly.

REFITTING (special points)

When refitting the engine, loosen the 2 nuts (E) that secure the suspended mounting.

Refit the suspended flexible mounting.

Retighten the flexible mounting placing the screwed rods that secure it in the centre of the suspended flexible mounting holes (8 mm Ø rod, 14 mm Ø holes).



Tighten the nuts and bolts to the specified torque.

Fit the caliper securing bolts, coating them with Loctite Frenbloc.

Press the brake pedal a number of times to reposition the pads.

- Fill the gearbox and engine (when applicable) with oil,
- fill and bleed the cooling system and the power steering system (when applicable),
- retighten the exhaust pipe clamp until the springs are coil bound and then loosen the nuts by one and a half turns,
- apply **CAF 4/60 THIXO** to the spring pin holes,
- adjust the accelerator cable,
- bleed the fuel system.

REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS	
B.Vi. 31-01	Spring pin punches
Mot. 878	Lifting chain and rings
T.Av. 476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)	
Shock absorber lower securing bolts	20
Steering ball joint	4
Engine mounting securing bolts	4
Wheel bolts	9

REMOVING

Disconnect the battery.

Remove :

- the bonnet,
- the front cross member,
- the radiator grille,
- the air filter,
- the bumper shield.

On vehicles with power steering, remove the power steering pump and place it on the vehicle side.

Disconnect :

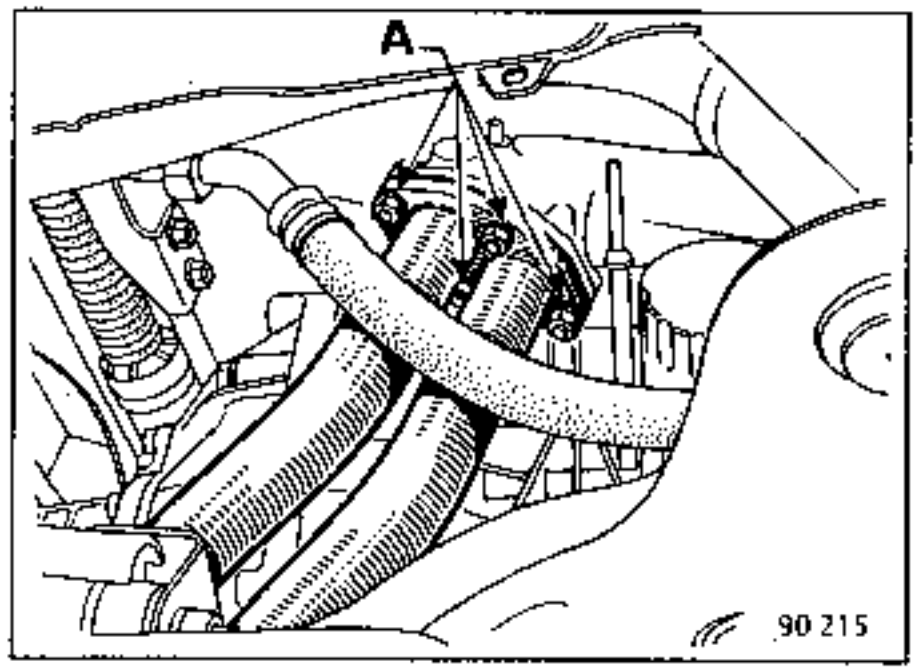
- the electrical connections,
- the accelerator cable,
- the clutch cable,
- the ignition sensor.

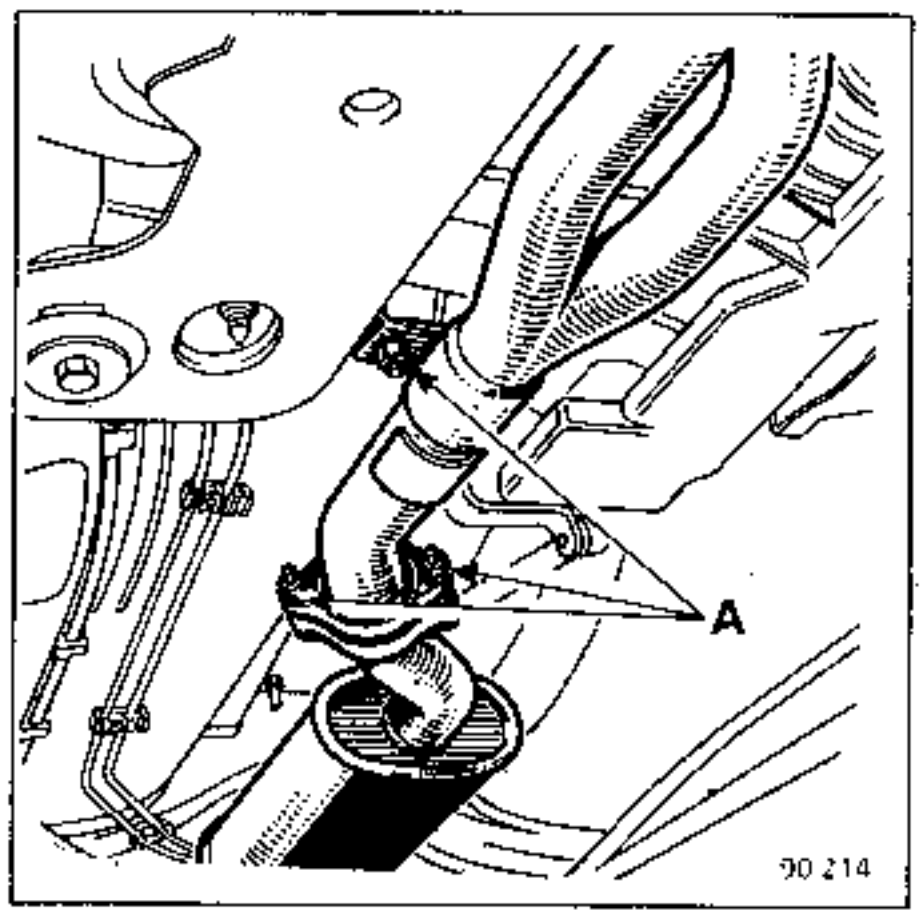
Drain :

- the gearbox,
- the engine, if necessary.

Remove :

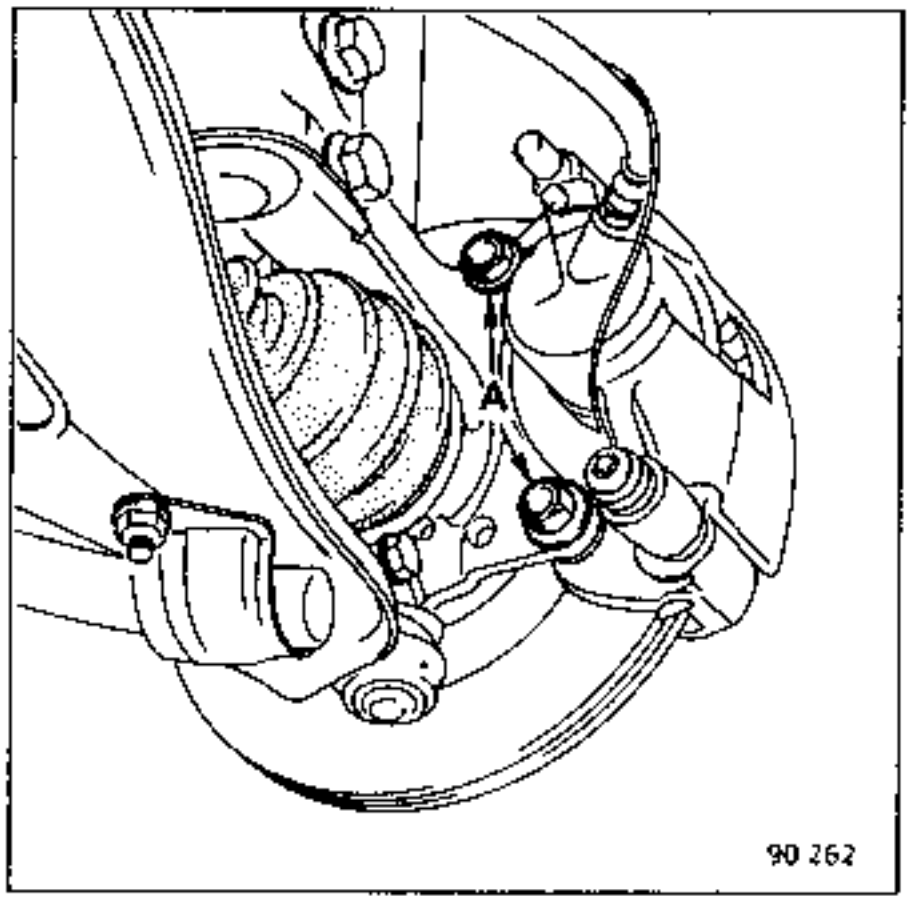
- the exhaust down pipe at (A).



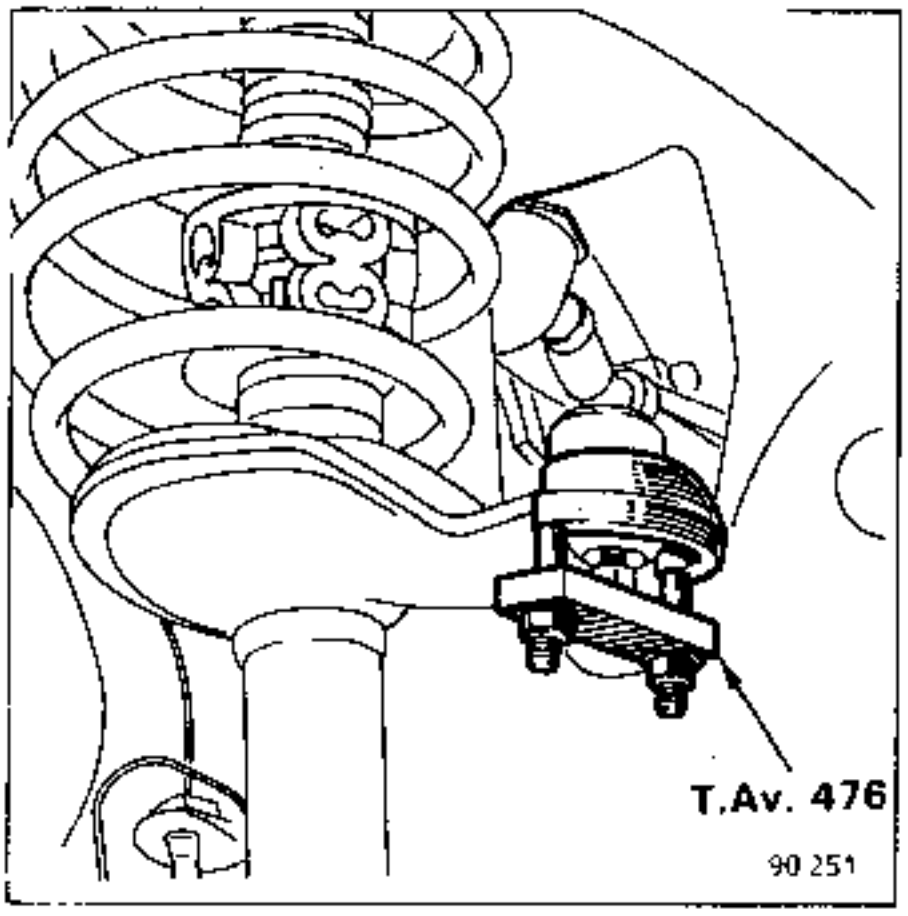


Remove :

- the BENDIX series IV.M calipers (bolts A),



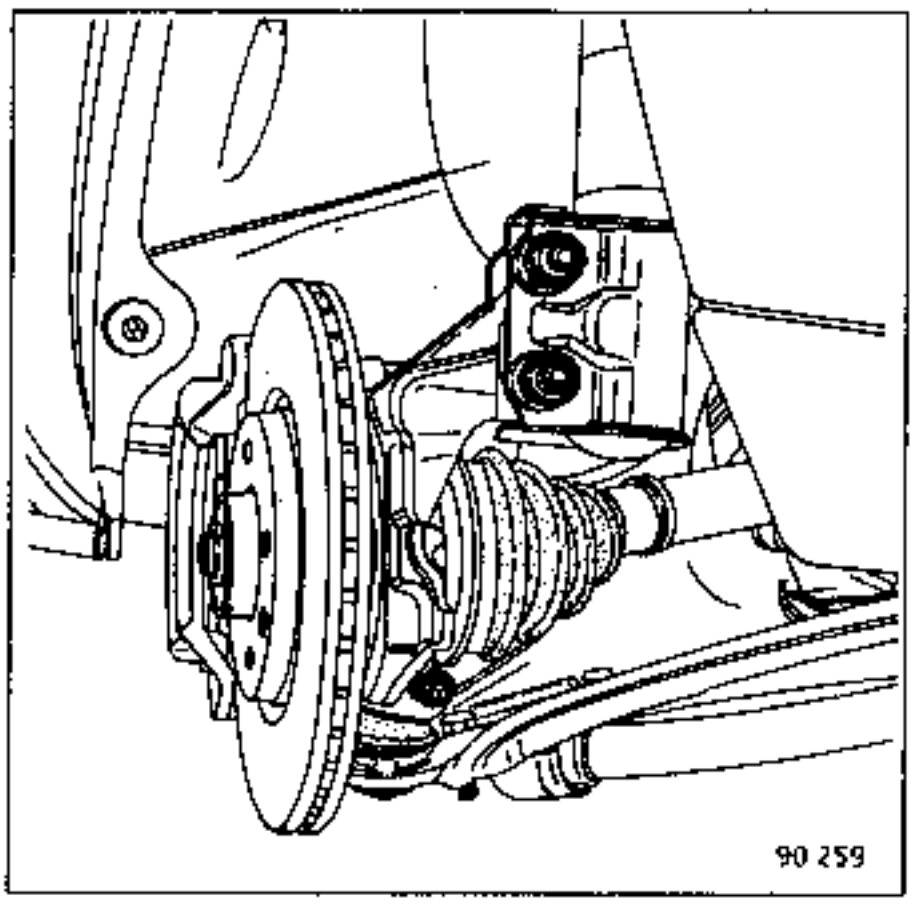
- the pins from the drive shafts using punches **B.Vi.31-01**,



- the nuts from the steering ball joints and extract the ball joints using tool **T.Av.476.**

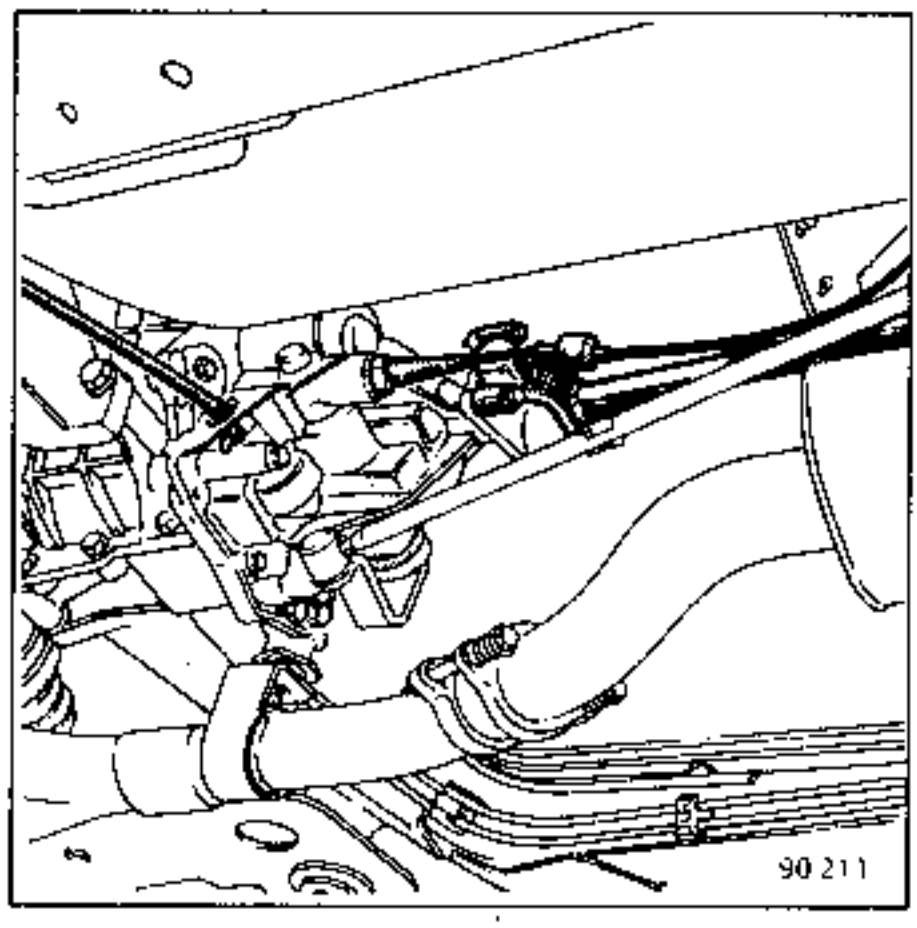
Remove :

- the upper bolts from the lower end of the shock absorbers. Loosen the lower bolts without removing them.



Disconnect :

- the speedometer drive cable,
- the gear shift control.



Remove :

- the securing bolts from the gearbox mounting pads.

Lift out the complete engine-gearbox assembly using tool **Mot.878.**

REFITTING

Carry out the removing operations in reverse.

Tighten the bolts and nuts to the specified torque. ▽

- Fill the gearbox with oil,
- fill the engine with oil, if necessary,
- fill and bleed the cooling system.

Adjust the accelerator cable.

. REFITTING THE EXHAUST SPHERICAL JOINT

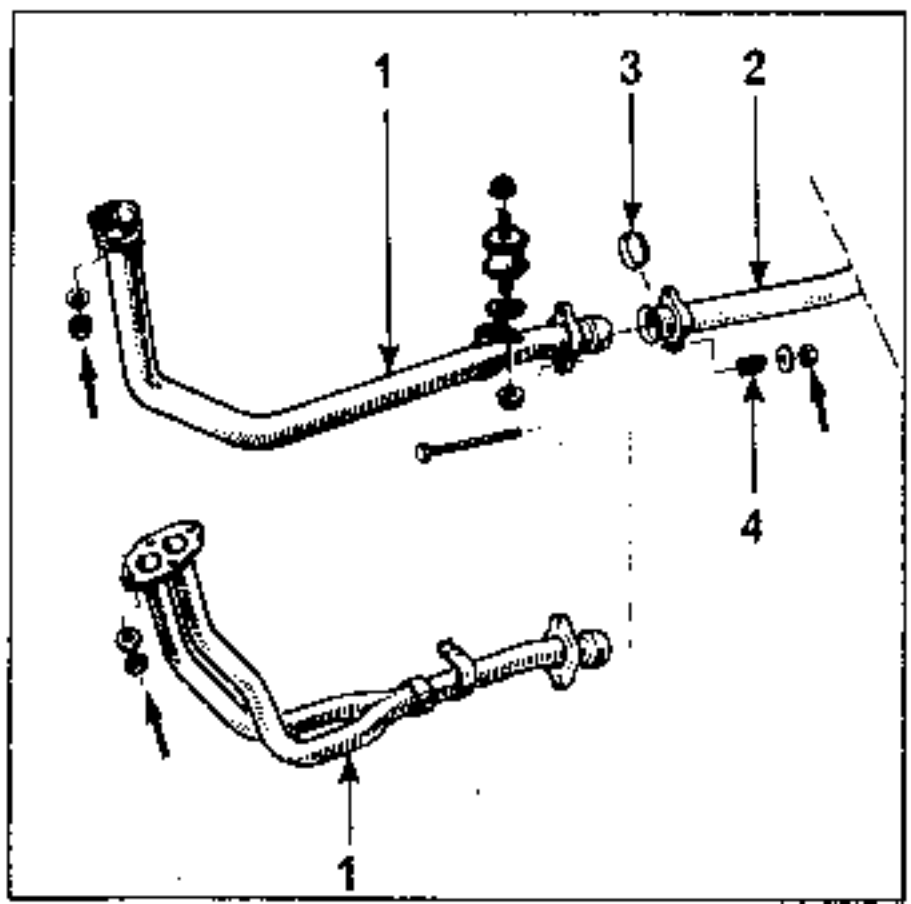
Place the anti-rattle ring (3) part no. **60 25 071 196** between the down pipe (1) and the flared part of the next pipe (2).

. TIGHTENING THE SPHERICAL JOINT

The spherical joint is sufficiently tight as soon as the joint between the 2 pipes is fully sealed.

Carry out a leak test with the engine in its various positions.

For example : Test the system during starting, with the vehicle moving forward, moving backwards, on a slope or with the hand brake applied.



REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS	
B.Vi.606	Spring pin punches
Mot.878	Lifting chain and rings
T.Av.476	Ball joint extractor
Mot.453-01	Set of 2 hose clamps
SEF.689	Load positioner

The engine or engine-gearbox assembly can be removed from above the vehicle after the front end panel has been removed.

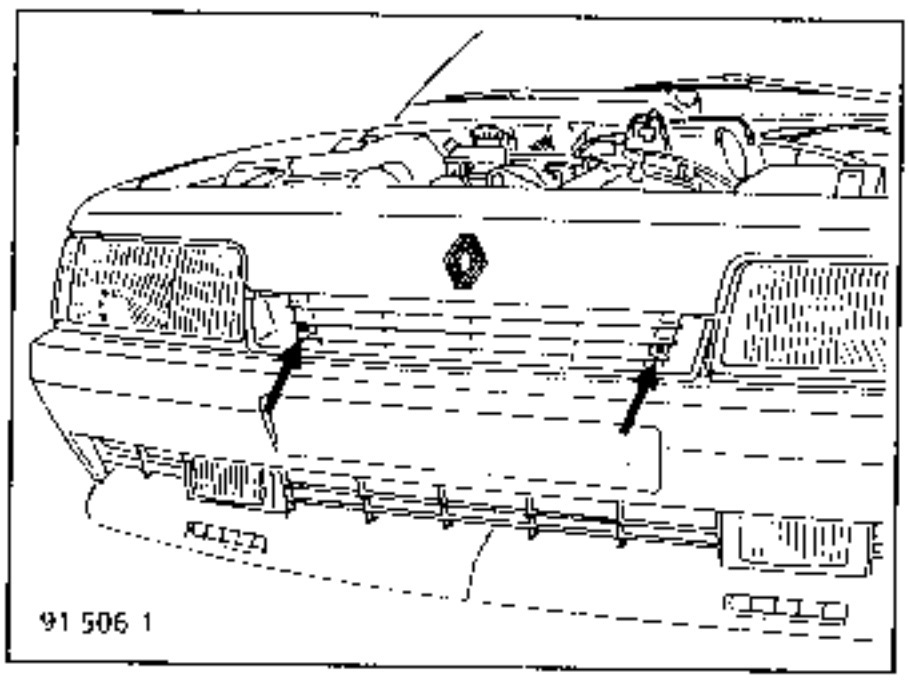
TIGHTENING TORQUES (in daN.m)	
Shock absorber lower securing bolts	20
Steering ball joints	3,5
Engine and gearbox mounting securing bolts	4
Wheel bolts	10
Bolts round the gearbox	5

REMOVING the front end panel

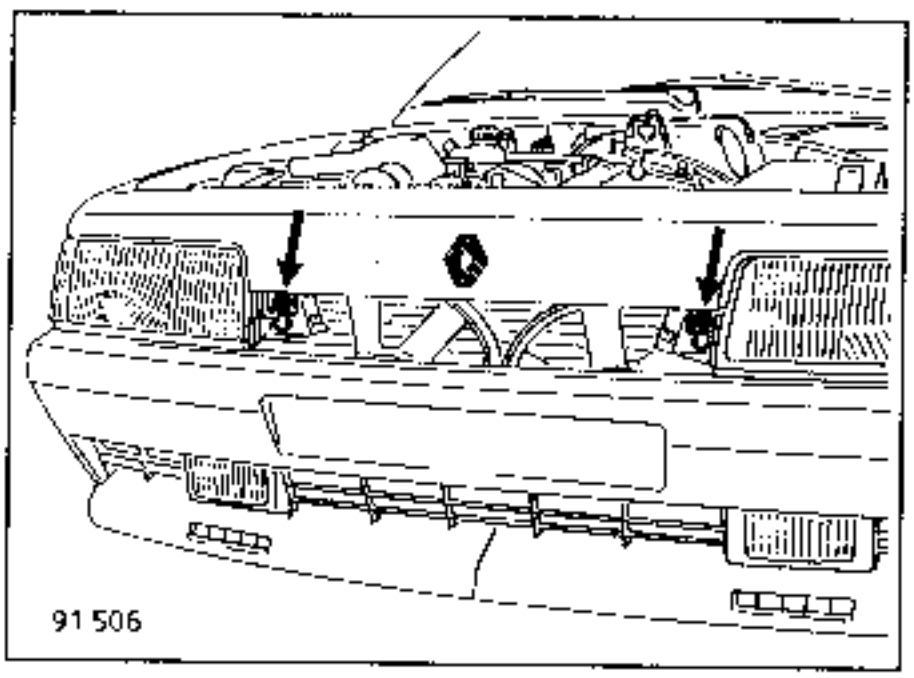
Disconnect the battery

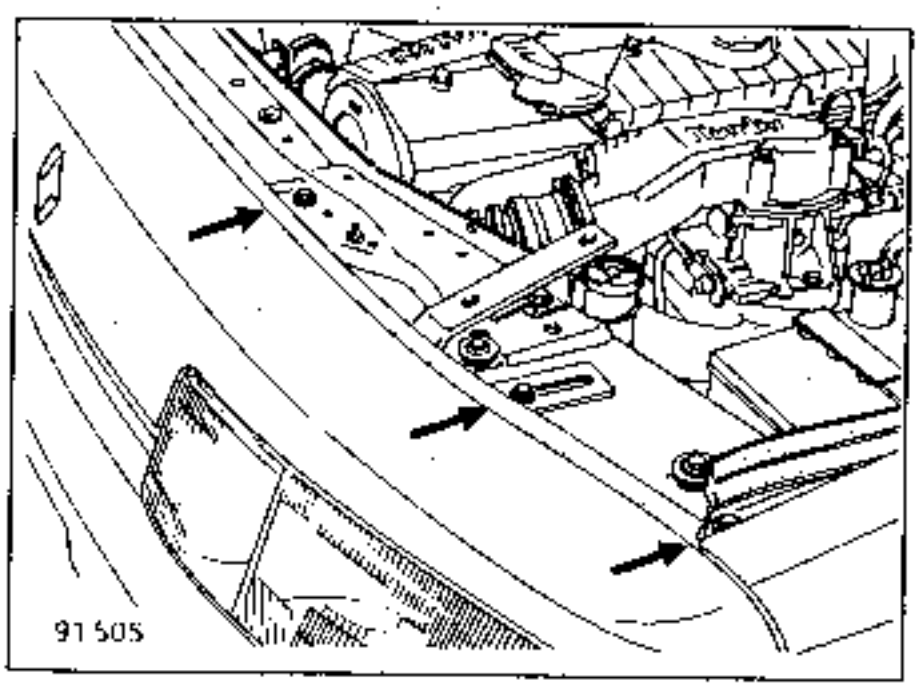
Remove :

- the bonnet,
- the radiator grille,

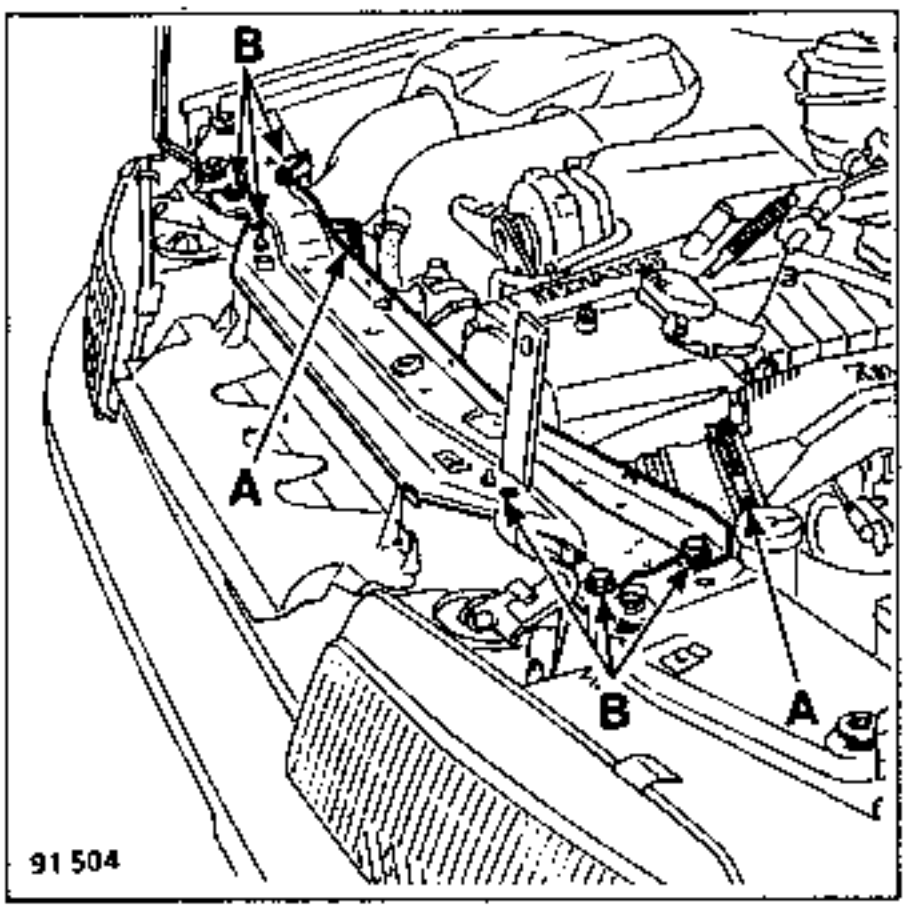


- the radiator grille upper panel,

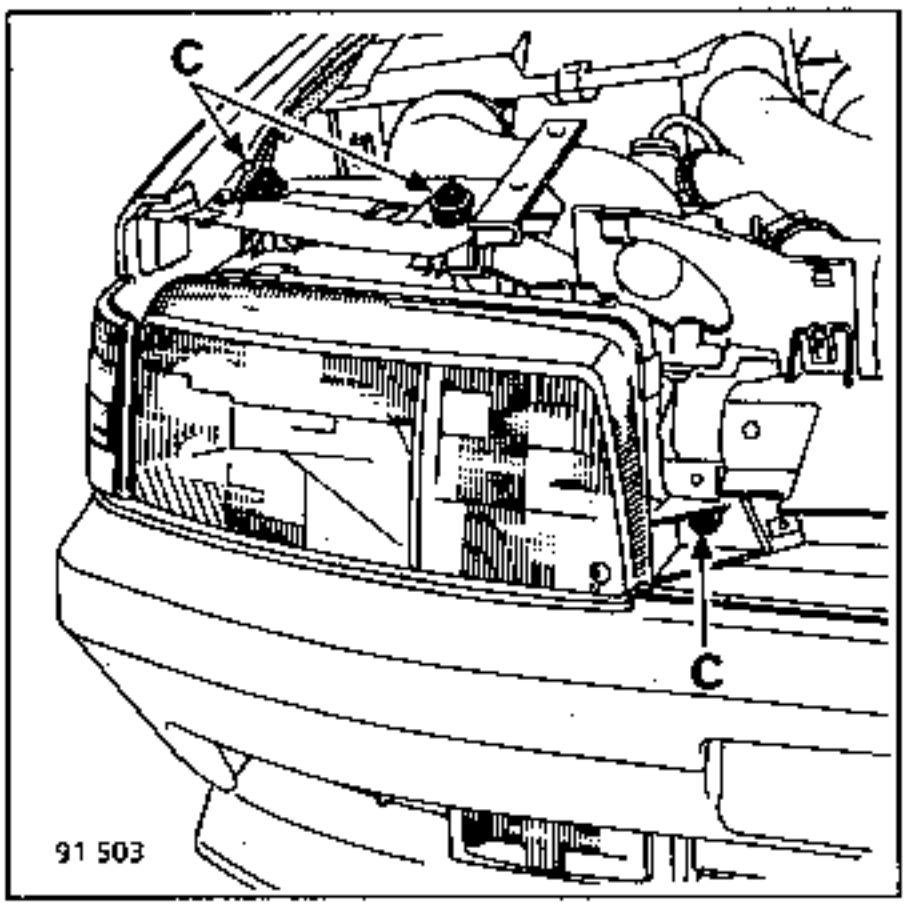


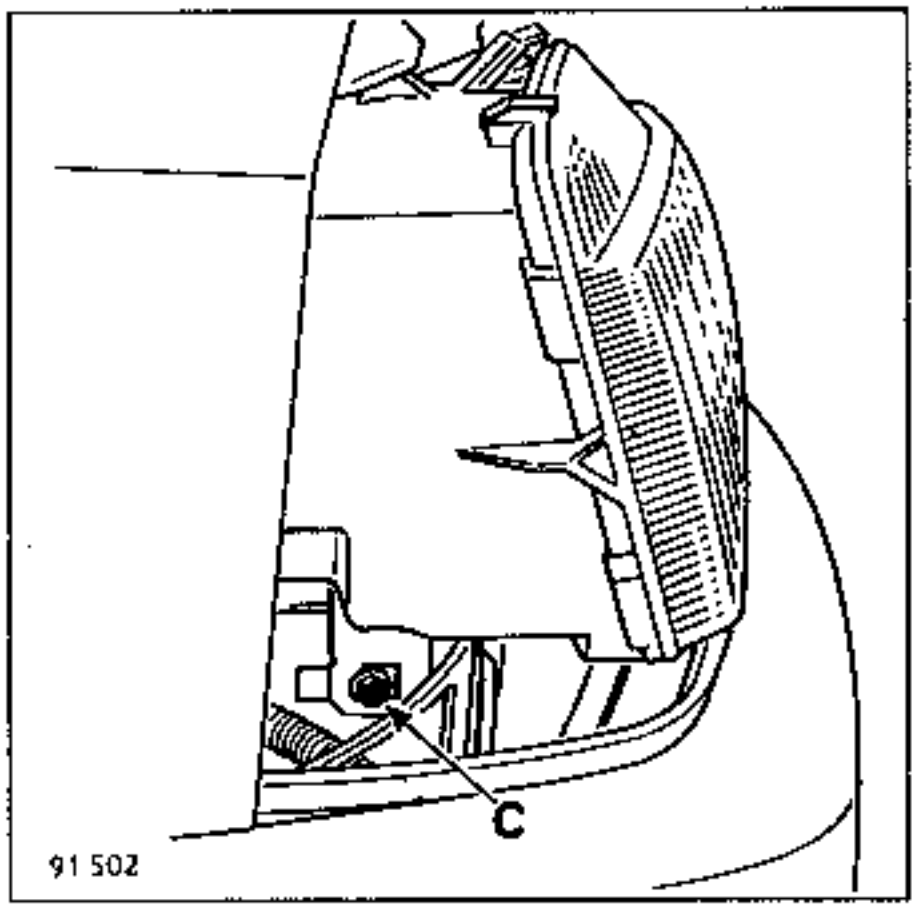


- the upper cross member together with the intercooler, clips (A) and bolt (B),

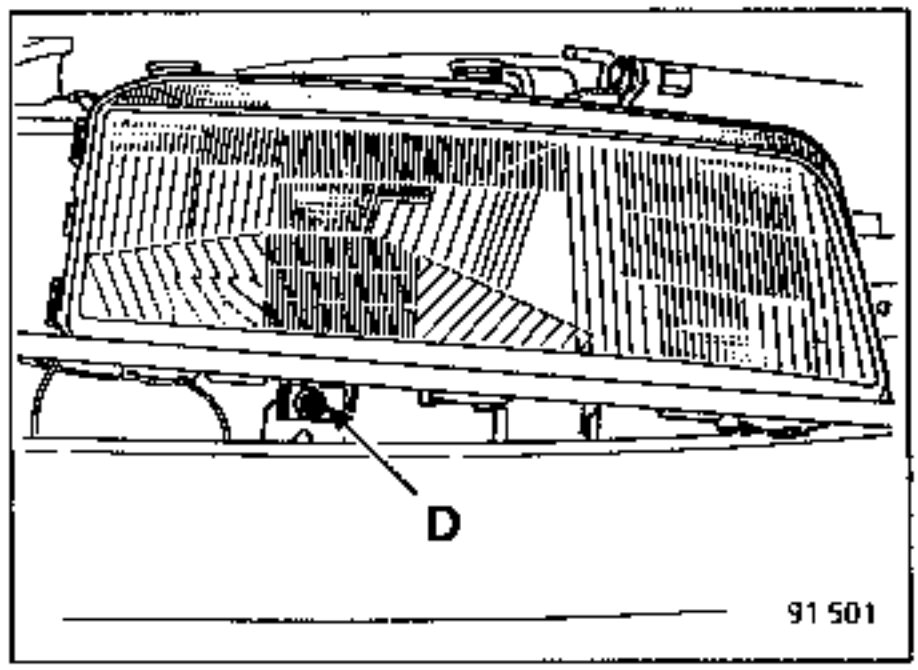


- the direction indicators,
- the beam units, bolts (C).

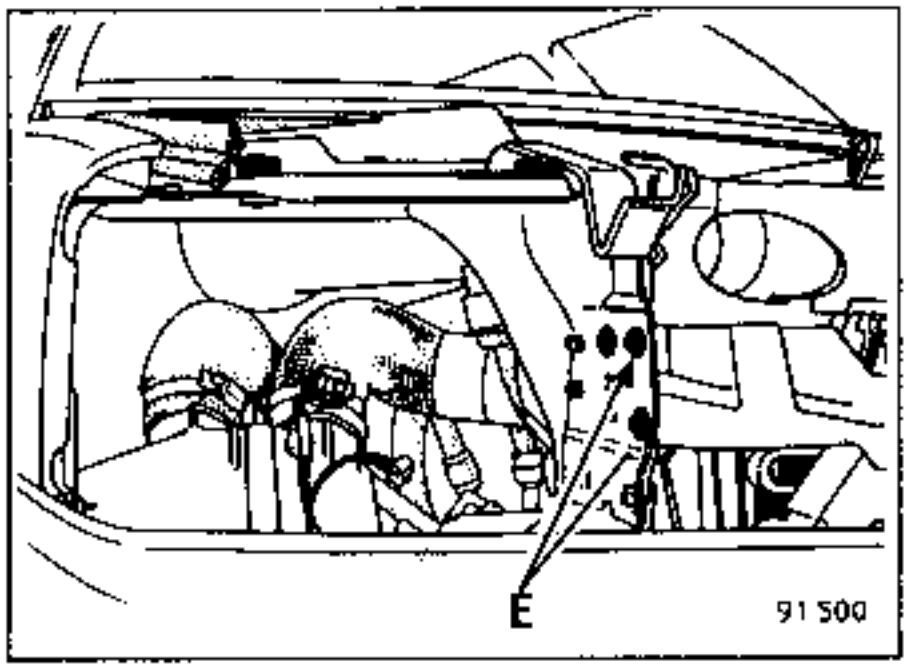




Lift the headlight and remove bolt (D).



Remove the radiator grille support lugs, screws (E).



REMOVING the adjacent components

Remove :

- the air filter and its hoses,
- the air filter support casing.

Bleed the air conditioning refrigeration system at one of the unions on the radiator.

Drain the cooling system at the lower radiator hose.

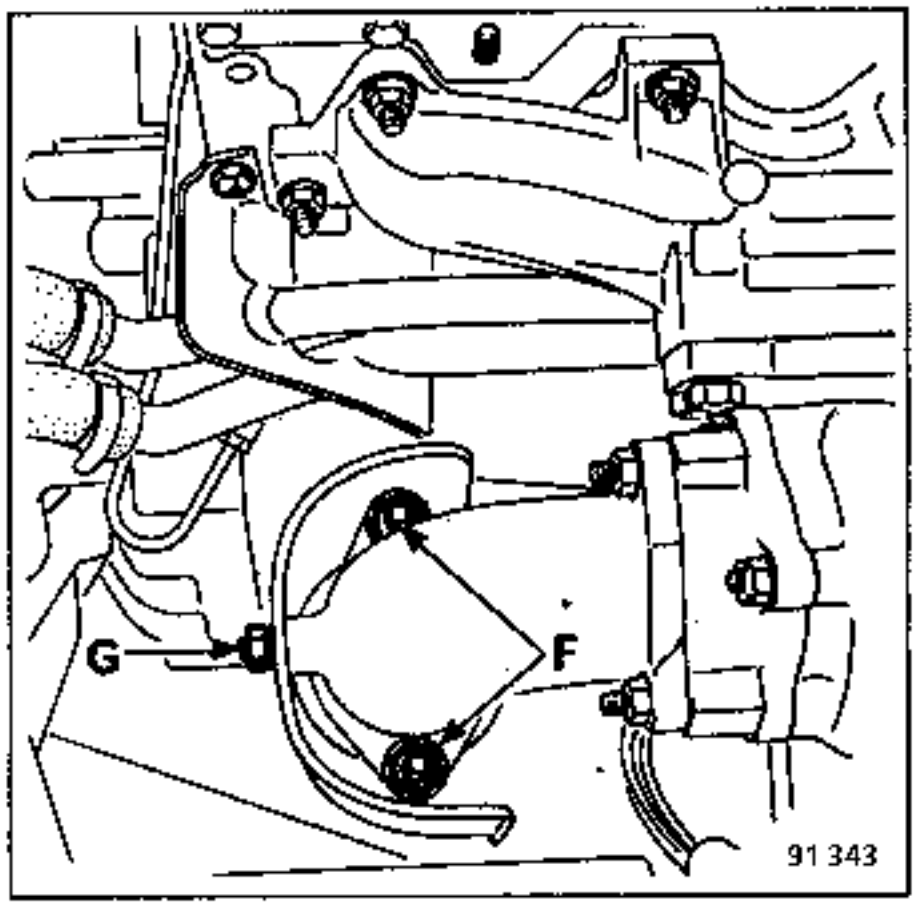
Disconnect :

- the electric fan supply wires (at the connection plate before the ignition switch),
- the air conditioning pipes at the radiator,
- the connectors,
- the upper radiator hose,
- the radiator mounting lugs.

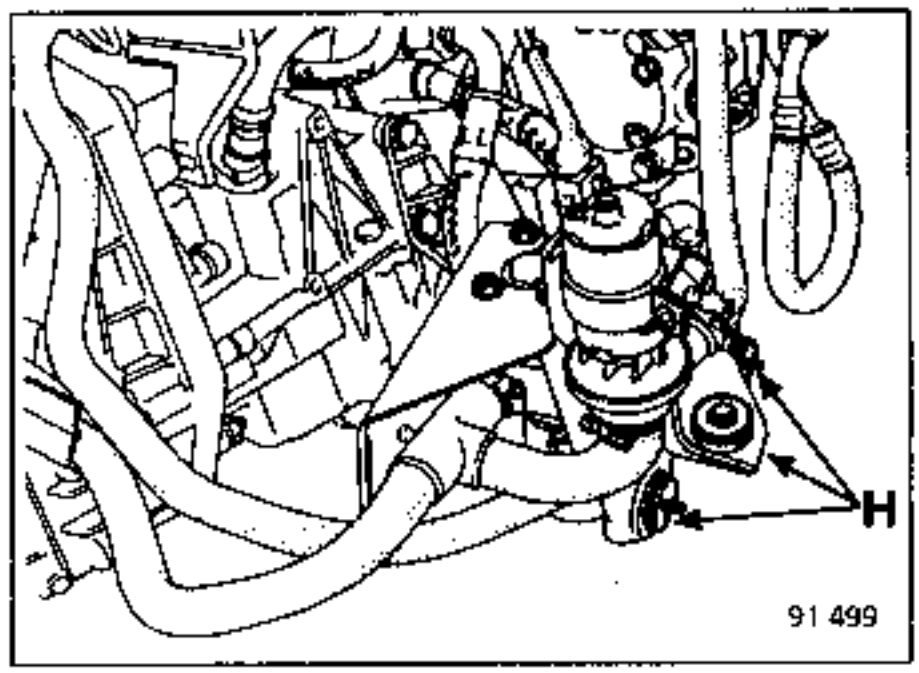
Remove the assembly formed by the radiator, the condenser and the electric fan.

Remove :

- the ignition unit,
- the turbocharger heat shield,
- the exhaust down pipe. To do this, one must unscrew nut (F) and (G) and then remove the stud at (G).

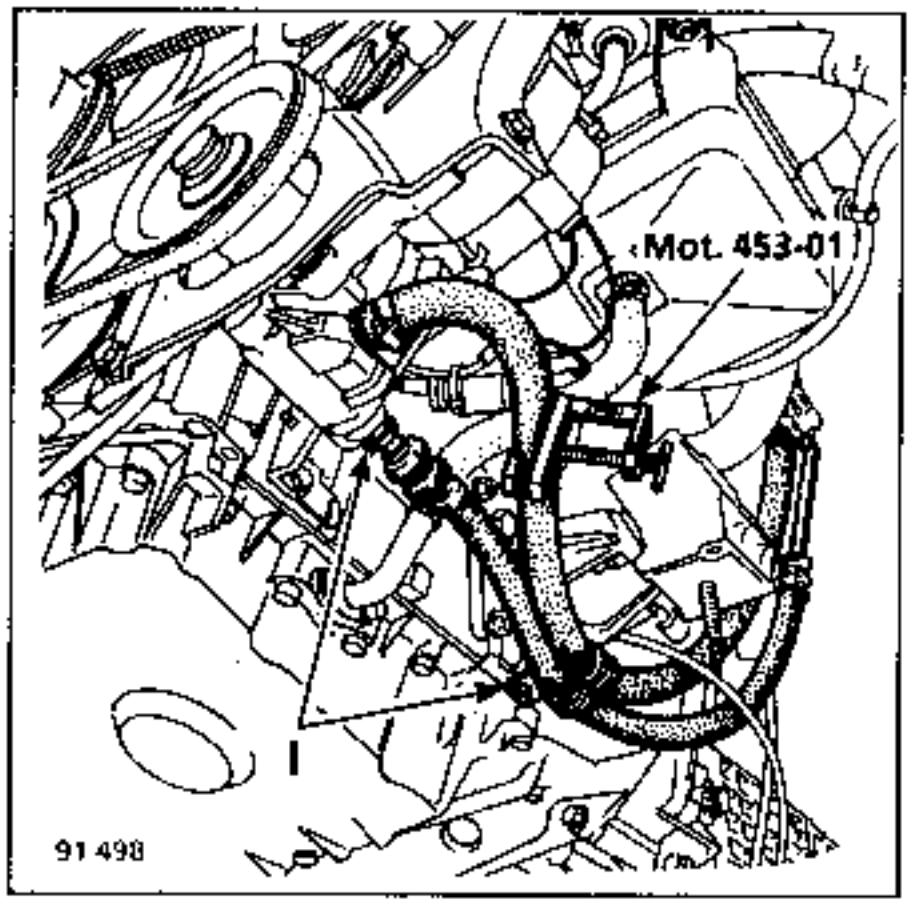


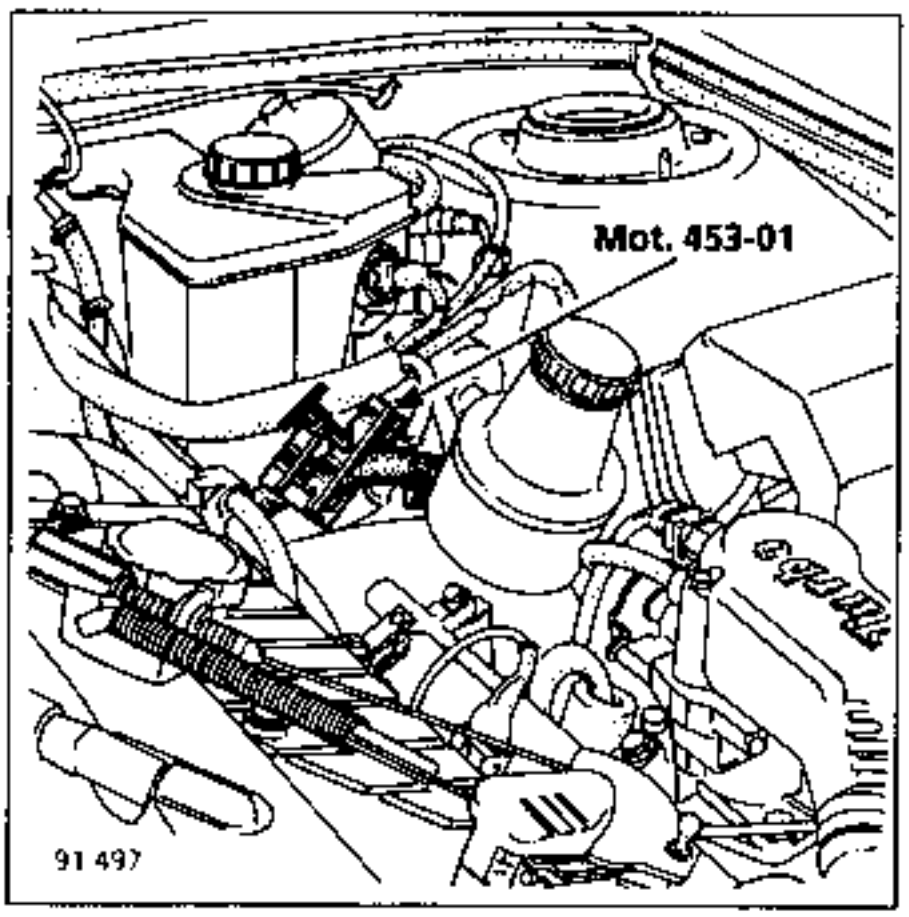
- the bolts from the lower clamp. The is removed from under the vehicle,
- the air conditioning pipe at the compressor,
- the oil cooler (modine) bolt (H).



Fit the 2 clamps **Mot.453-01** to the power steering reservoir output hoses.

Disconnect one hose at the pump (T) and the other at the steering box, then secure the reservoir to the engine.





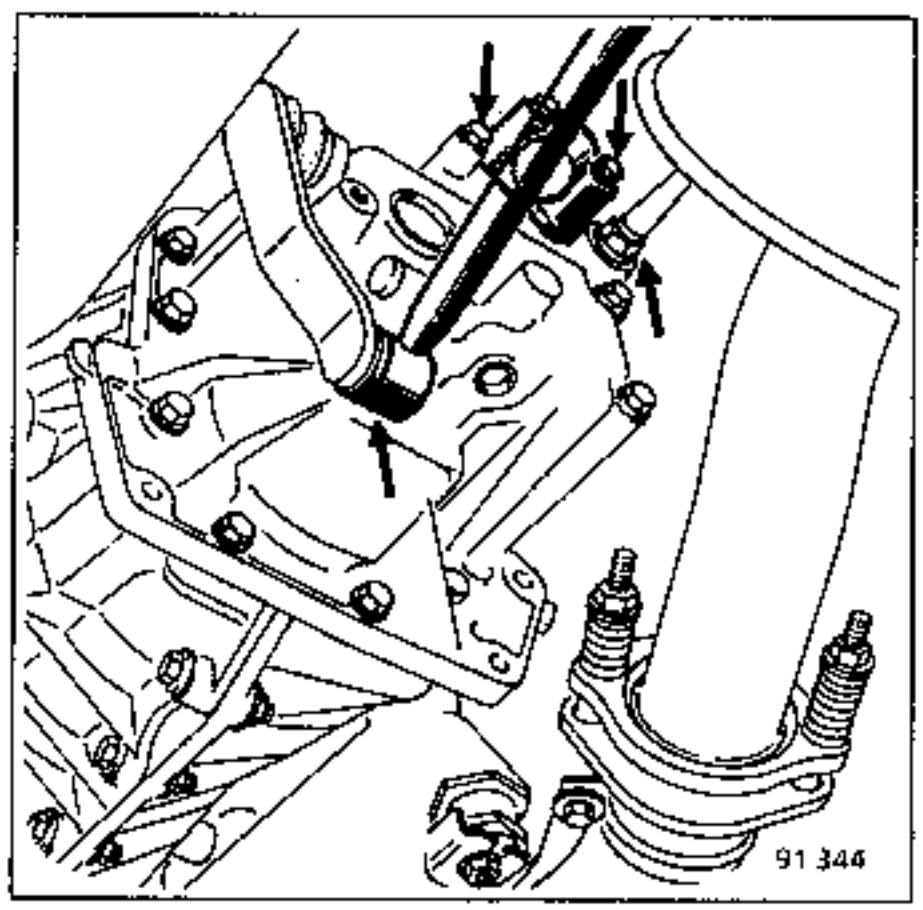
Disconnect :

- the accelerator cable,
- the engine earthing braid,
- the fuel pipes,
- the electrical wiring harnesses, then secure the computer to the engine.

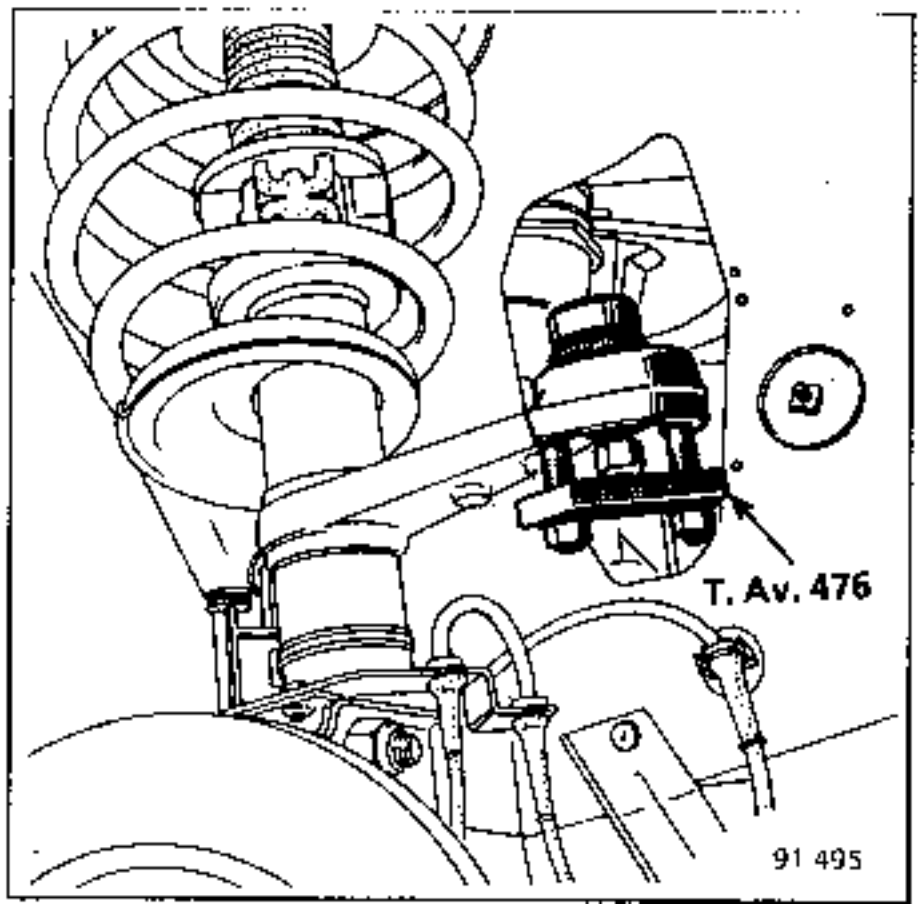
Drain the gearbox.

Remove :

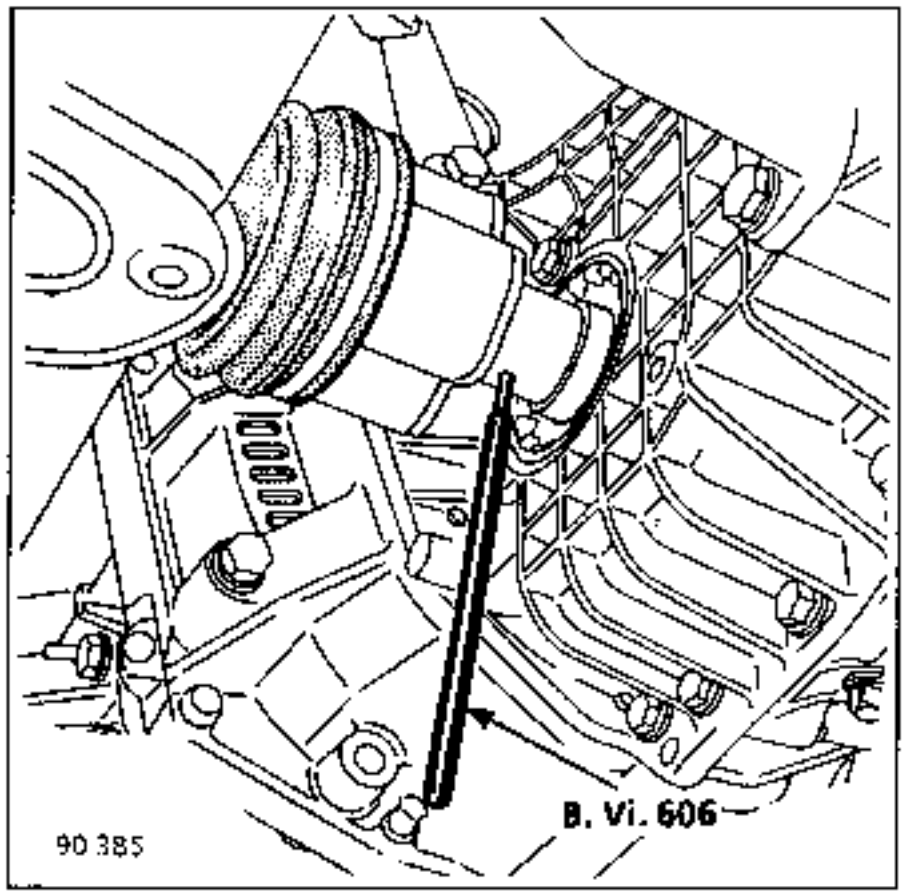
- the gear shift control,



- the speedometer drive cable,
- the gearbox earthing braid,
- the tie rod under the gearbox,
- the wheels,
- one of the steering ball joints.

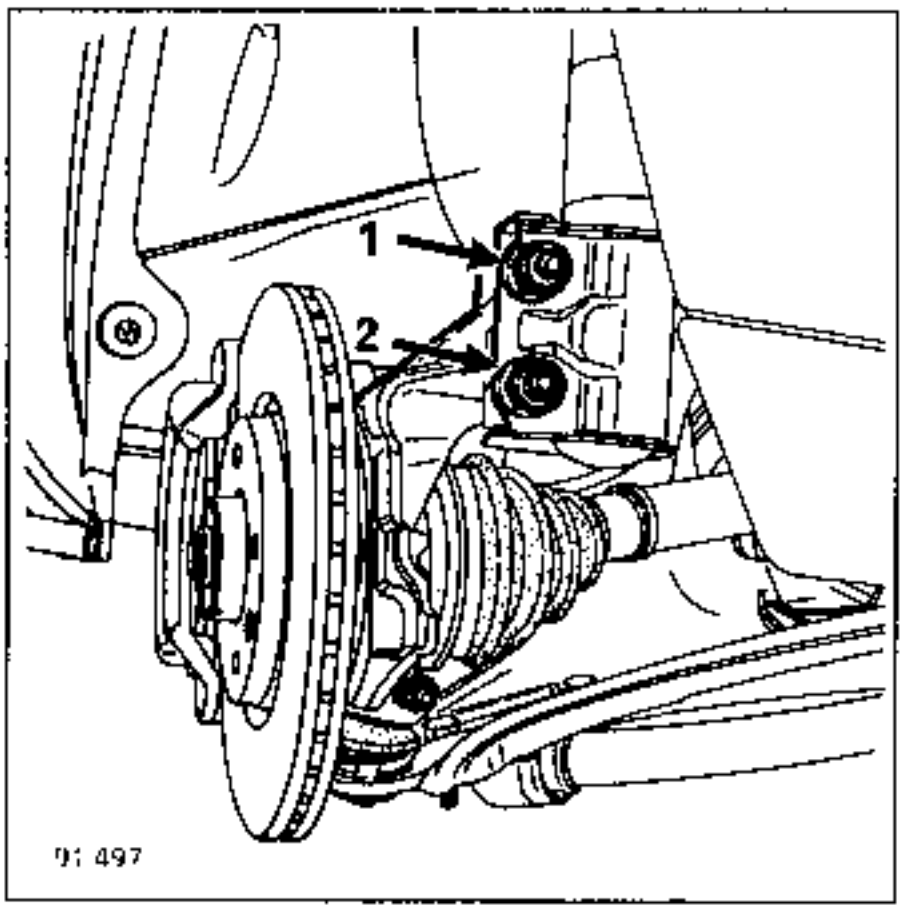


Knock out the spring pins from the drive shafts.

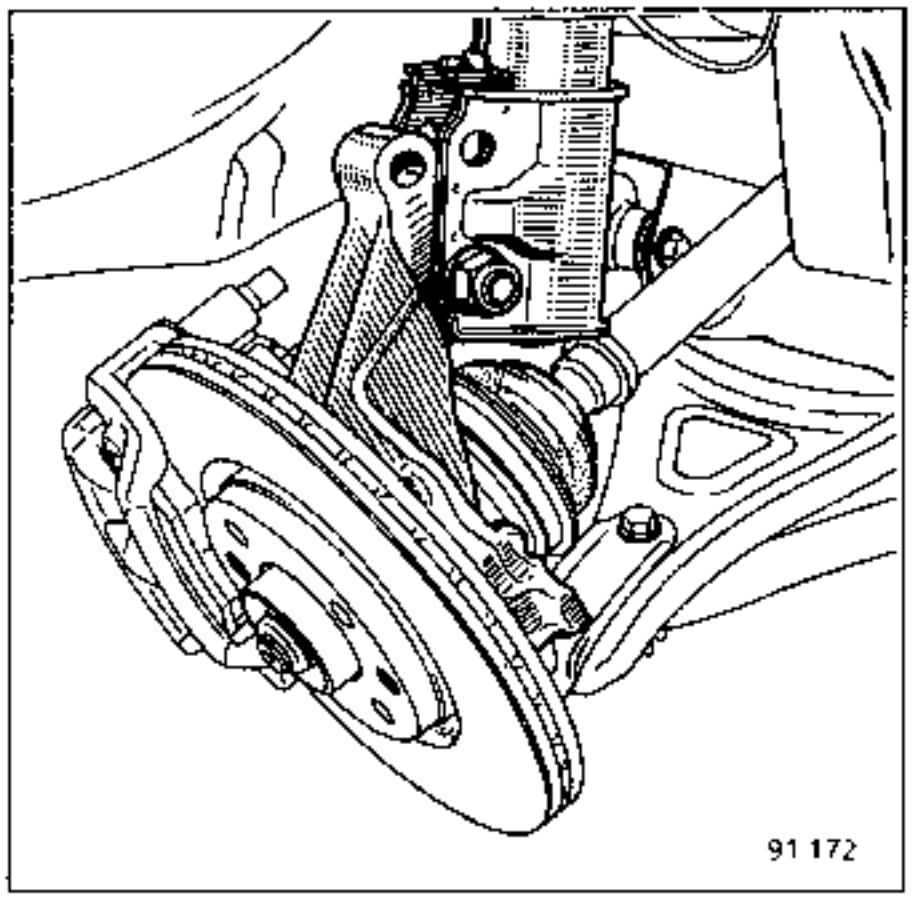


Loosen the lower bolts (2) at the bottom of the shock absorbers and remove the upper bolts (1).

NOTE : these bolts have a spline on them and therefore have to be knocked out with a mallet.

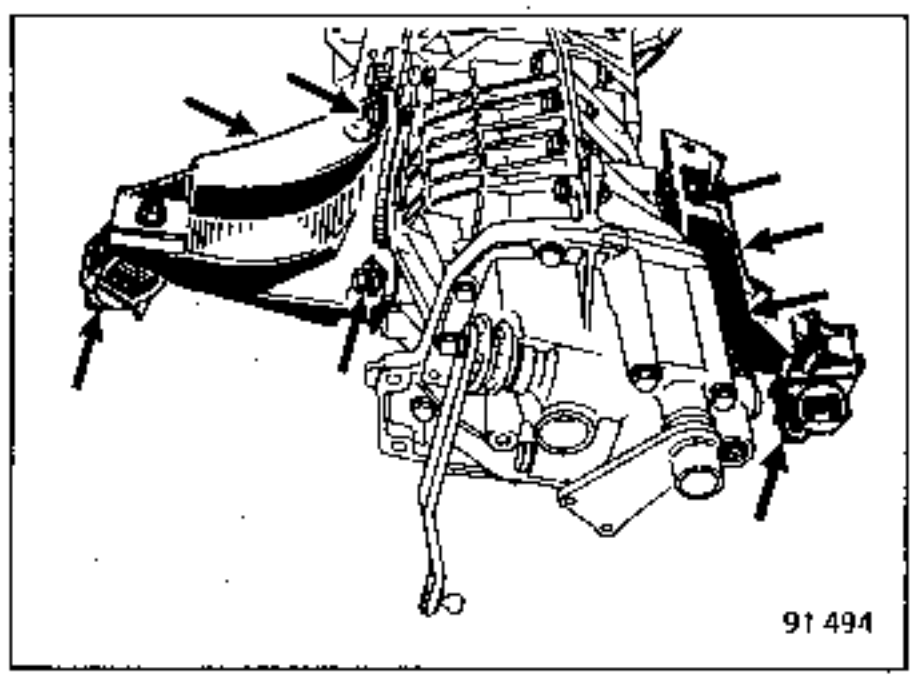


Tilt the stub axle carriers and disconnect the drive shafts.



Pull the rigid coolant pipes to one side and remove the clutch slave cylinder (secure it to the steering box).

Support the weight of the gearbox and remove the gearbox mounting pad assemblies.



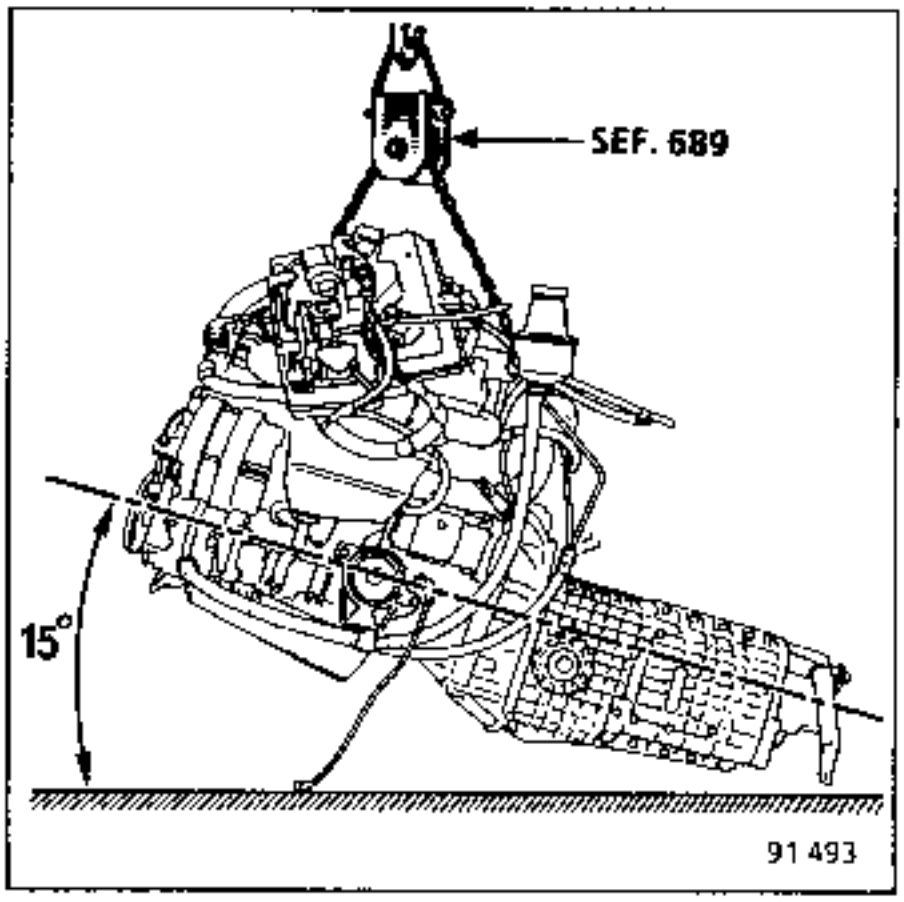
Secure the computer unit and the power steering reservoir to the engine.

Fit the load positioner SEF.689 (SEFAC unit) and remove the Engine-Gearbox assembly.

NOTE : it is essential to attach tool SEF.689 by the hole in the engine front lifting ring that is nearest to the engine (see removing the engine only).

REFITTING the engine-gearbox assembly - Special points

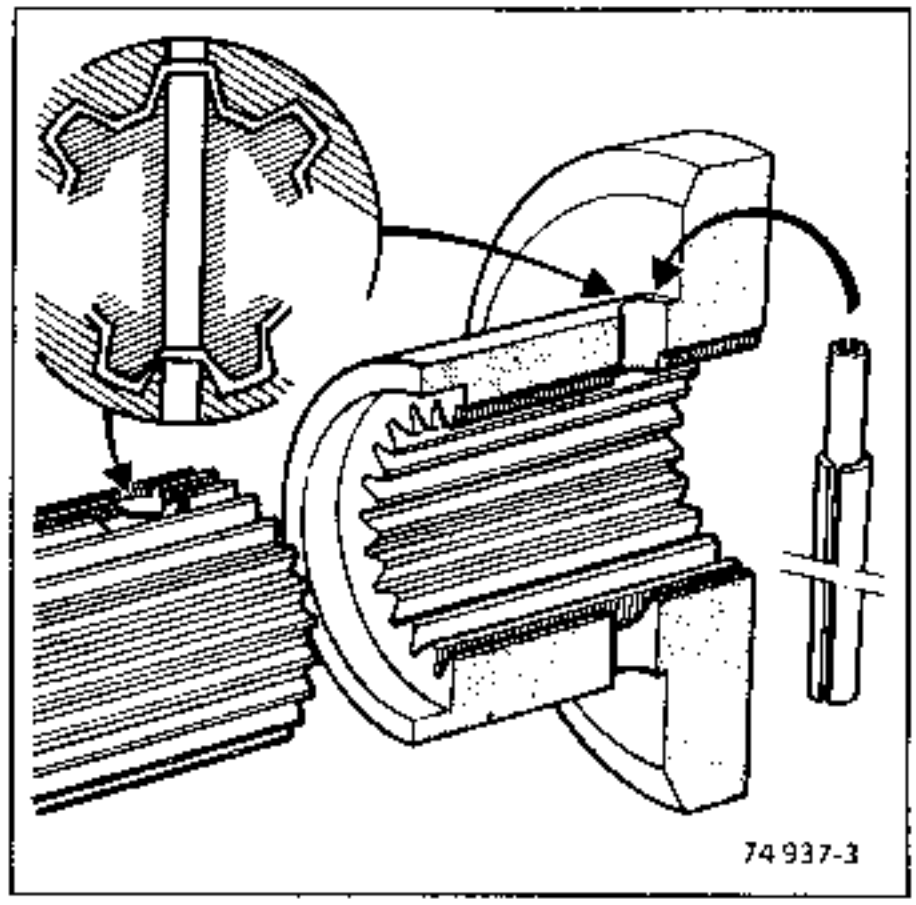
To refit the engine, tilt it at an angle of approximately 15°.



Refit the gearbox side mountings.

Fit the drive shafts :

- coat the splines with grease no. 20,
- ensure that the rubber washer is in place. It should be between the end of the sun wheel shaft and the bottom of the drive shaft yoke,
- correctly position the drive shafts with reference to the sun wheels and then swing up the stub axle carriers whilst pushing the drive shafts on to the sun wheels. Use cranked pin punch **B.Vi.606** to align the holes.



Fit new spring pins and seal their ends (CAF 4/60 THIXO).

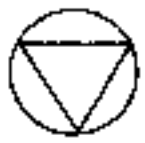
Reconnect :

- the gear shift controls,
- the reverse lock (coating their threads with CAF 4/60 THIXO) compound.

Fill the gearbox.

Fill and bleed the cooling, air conditioning refrigeration and power steering systems (see the section concerned).

Adjust the accelerator cable.



Tighten the nuts and bolts to the specified torques.

ESSENTIAL SPECIAL TOOLS	
B.Vi. 31-01	Spring pin punches
Mot. 878	Lifting chain and rings
T.Av. 476	Ball joint extractor

TIGHTENING TORQUES (in daN.m) ▽	
Shock absorber lower securing bolts	20
Steering ball joints	4
Mounting securing bolts	4
Wheel bolts	9

The engine or engine-gearbox assembly is removed from above the vehicle after taking off the front end panel.

REMOVING

Place the vehicle on a lift.

Disconnect the battery.

Remove :

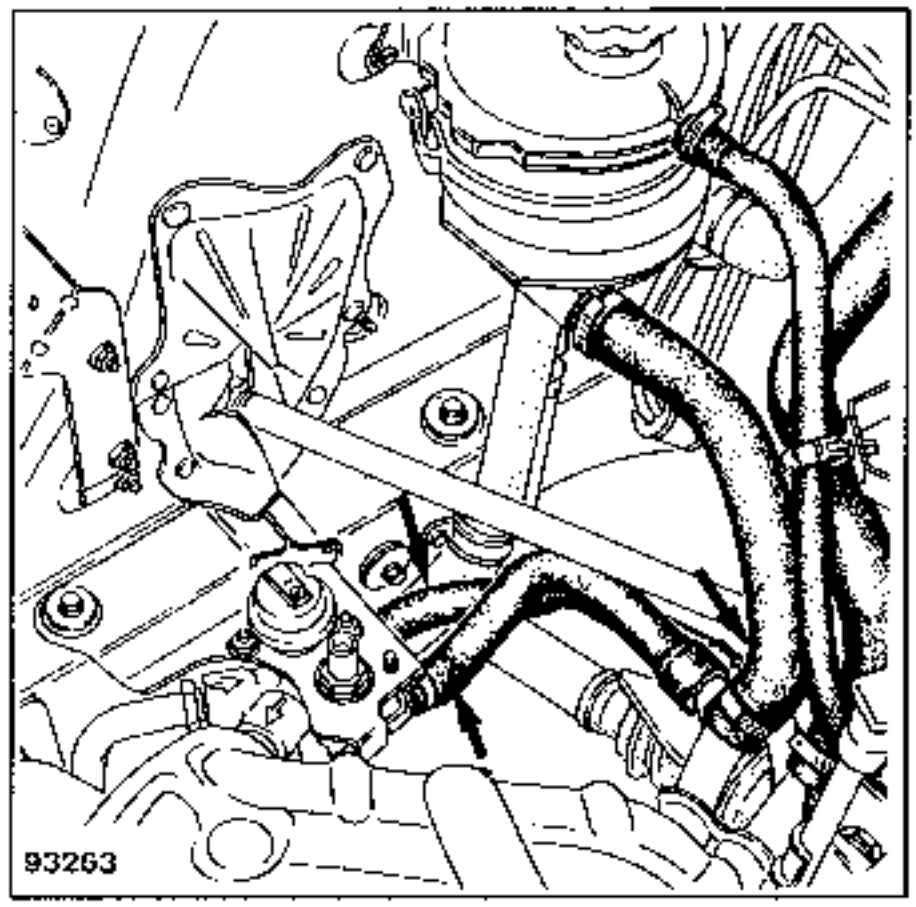
- the bonnet,
- the radiator grille and its upper panel,
- the air filter and its support,
- the protection under the engine.

Drain :

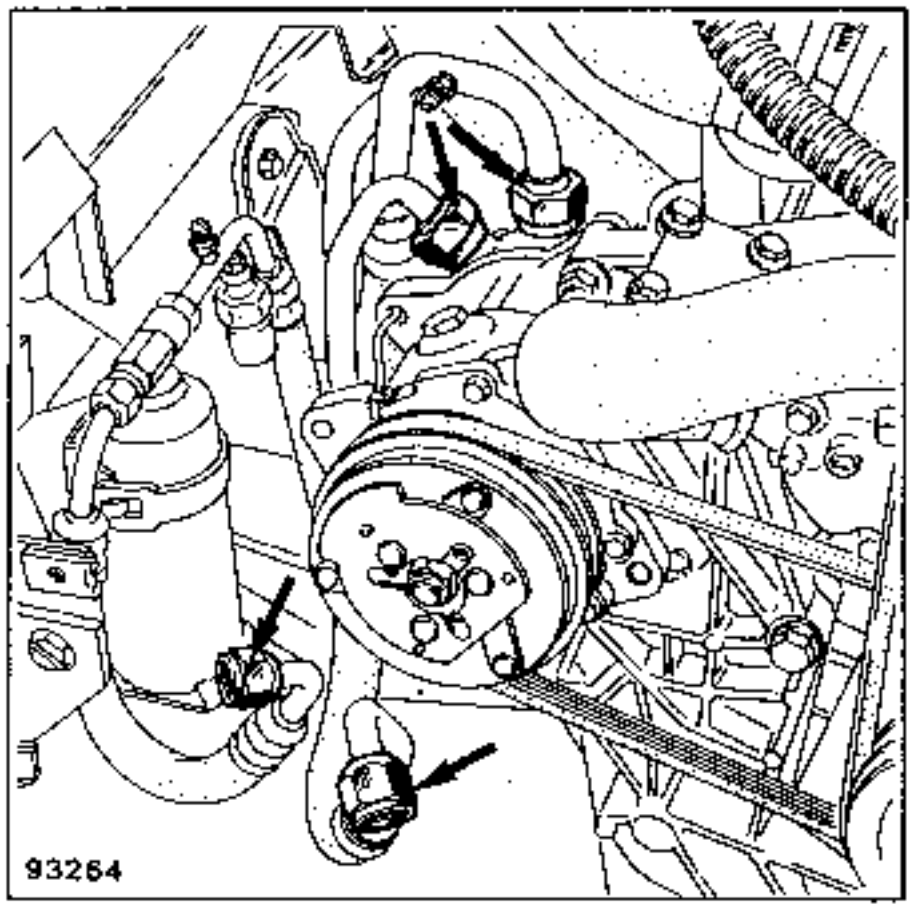
- the engine, if necessary,
- the gearbox, if necessary,
- the cooling system,
- the air conditioning refrigeration system.

Disconnect :

- the electrical connectors (engine, radiator, gearbox),
- the accelerator cable,
- the clutch cable,
- the engine earthing braid,
- the following pipes and hoses :
  - . heater, at the engine outlet,
  - . oil filter cooling at the heater assembly,

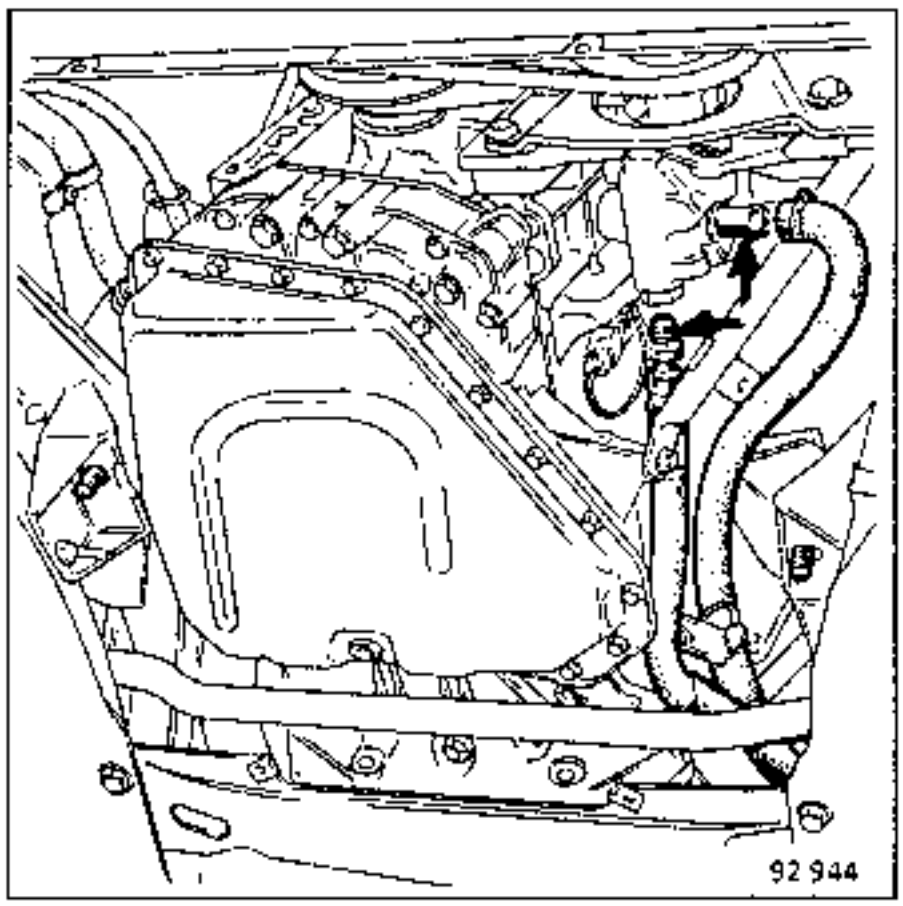


- . fuel,
- . vacuum,
- . HP and LP at the air conditioning compressor and on the radiator,
- . radiator upper and lower hoses.



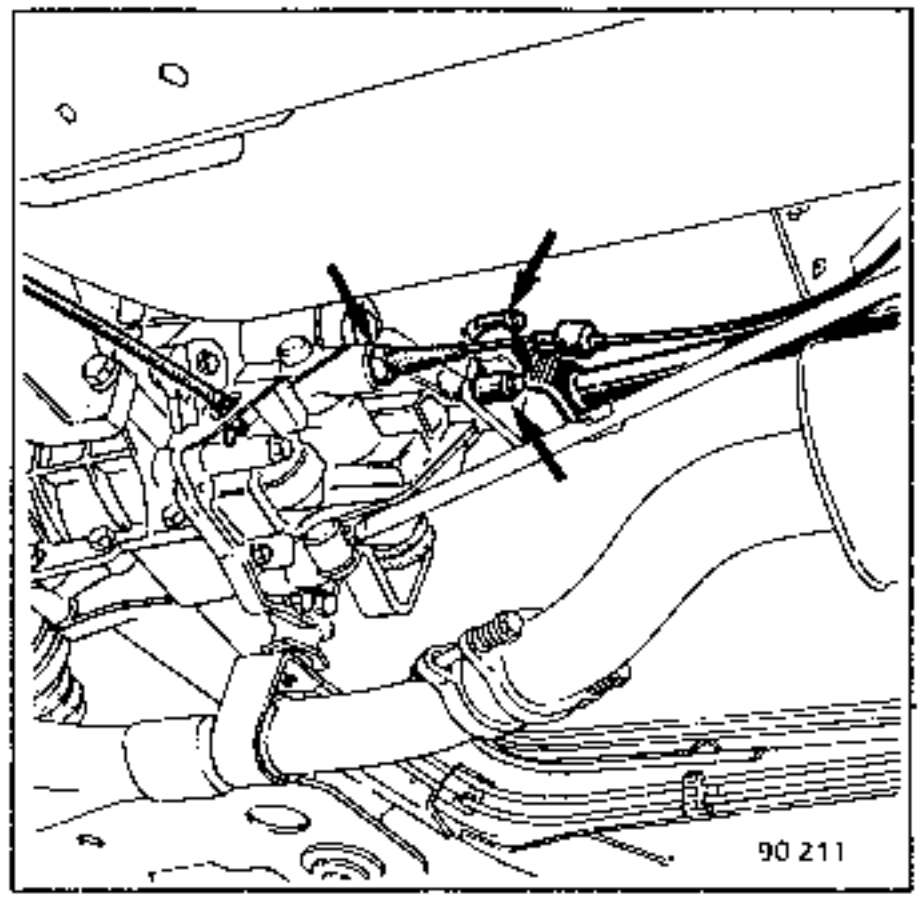
Remove :

- the engine mounting cross member,
- the radiator, condenser and electric fan assembly,
- the exhaust manifold clamp,
- the oil filter heater and its support,
- the computer which is to be secured, together with the oil filter heater, to the engine,
- the power steering pipe supports,
- the power steering pipes.

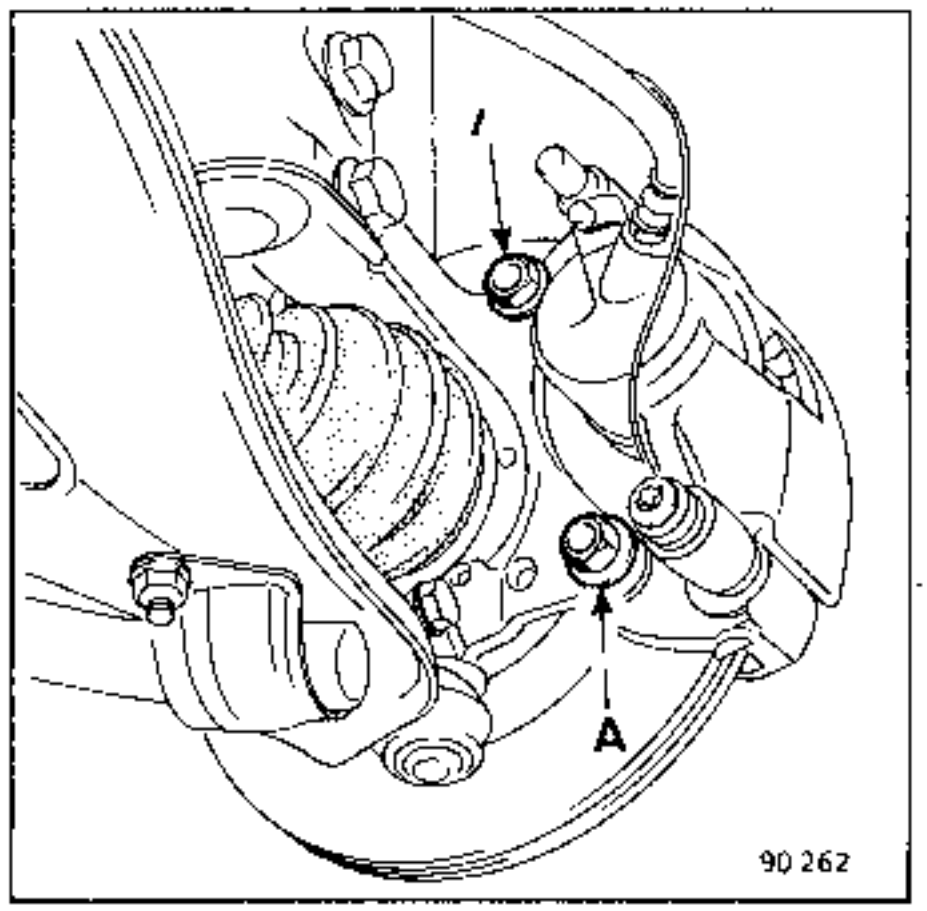


Remove :

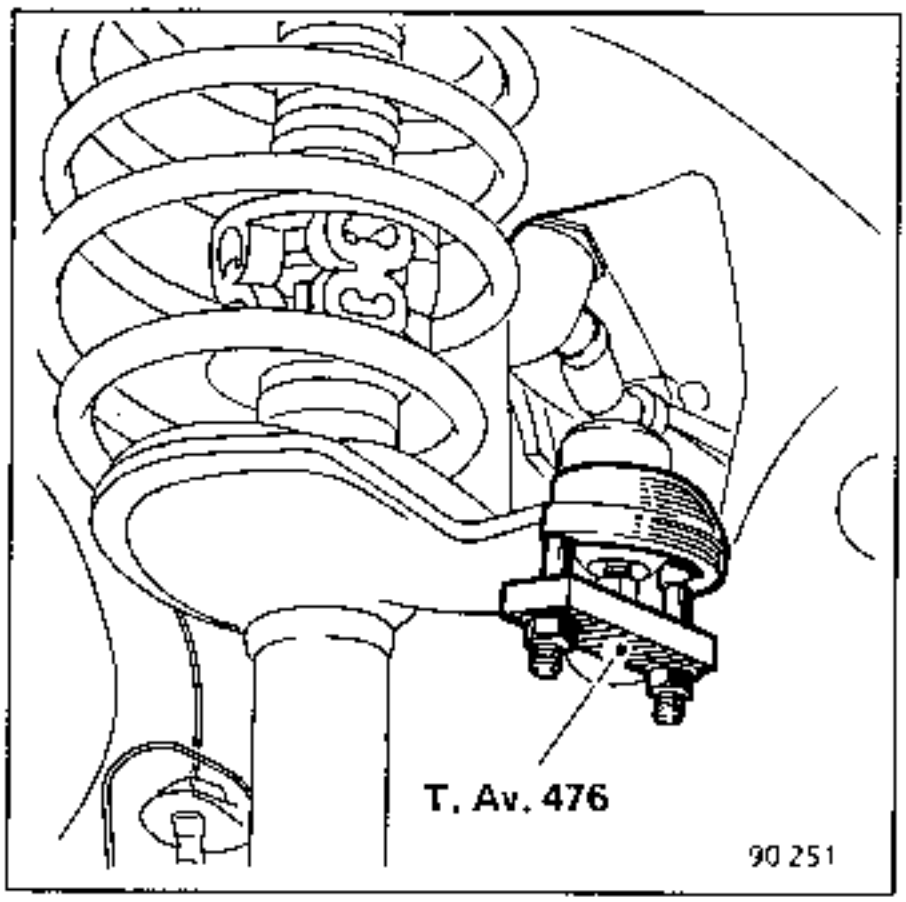
- the exhaust down pipe,
- the speedometer drive cable,
- the gear shift control,



- the calipers (bolts A),



- the pins from the drive shafts using punches **B.Vi.31-01**,

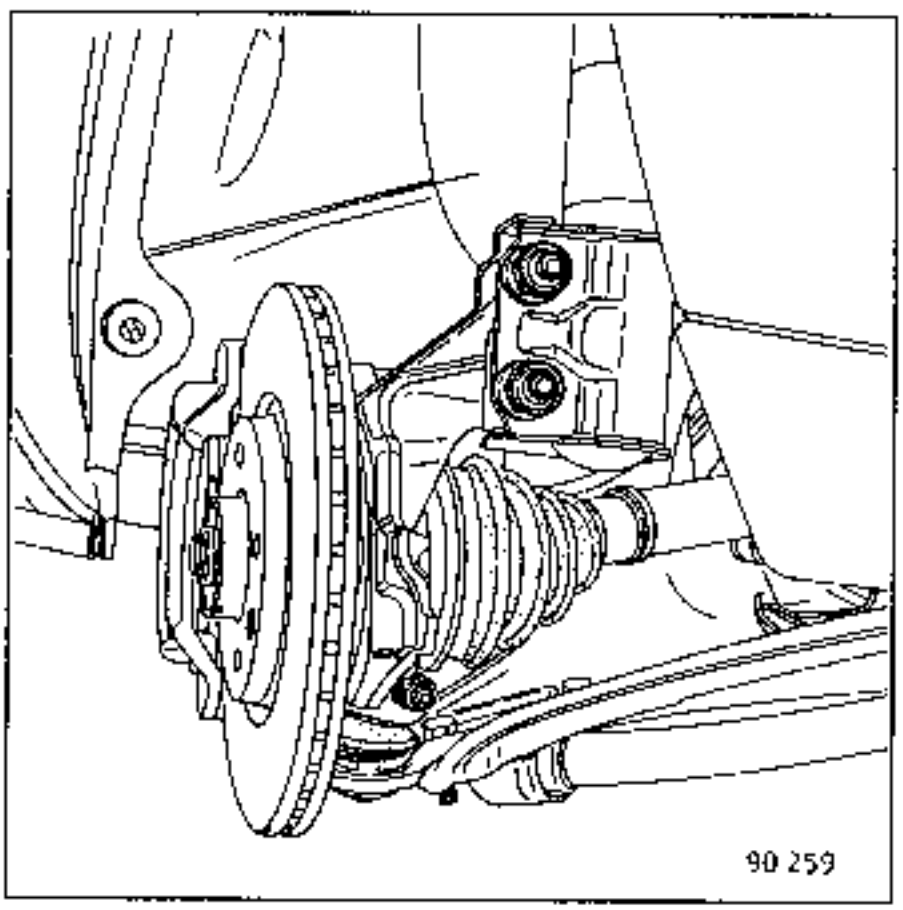


- the steering ball joint nuts.

Extract the ball joints using tool **T.Av. 476.**

Remove the upper bolts from the lower ends of the shock absorbers.

Loosen the lower bolts without removing them.



- Tilt the stub axle carriers and free the drive shafts.

Remove the bolts from the gearbox mounting pads.

Remove the engine-gearbox assembly using tool **Mot.878.**

REFITTING

Carry out the removing operations in reverse, tightening the nuts and bolts to the specified torque. ▽

- Fill the engine and gearbox with oil if necessary,
- Fill and bleed the cooling, air conditioning refrigeration and power steering systems.

Adjust the accelerator cable.

REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLS	
B.Vi. 31-01	Spring pin punches
Mot. 878	Lifting chain and rings
T.Av. 476	Ball joint extractor
Elé. 346-04	Belt tension tester

TIGHTENING TORQUES (in daN.m)	
Shock absorber lower securing bolts	20
Steering ball joints	4
Engine and gearbox mounting pad securing bolts	4
Wheel bolts	9

REMOVING

Disconnect :

- the battery,
- the electrical connectors,
- the accelerator, clutch and speedometer drive cables,
- the earthing braids (engine and gearbox),
- the fuel pipes.

Remove :

- the bonnet,
- the front cross member,
- the radiator grille,

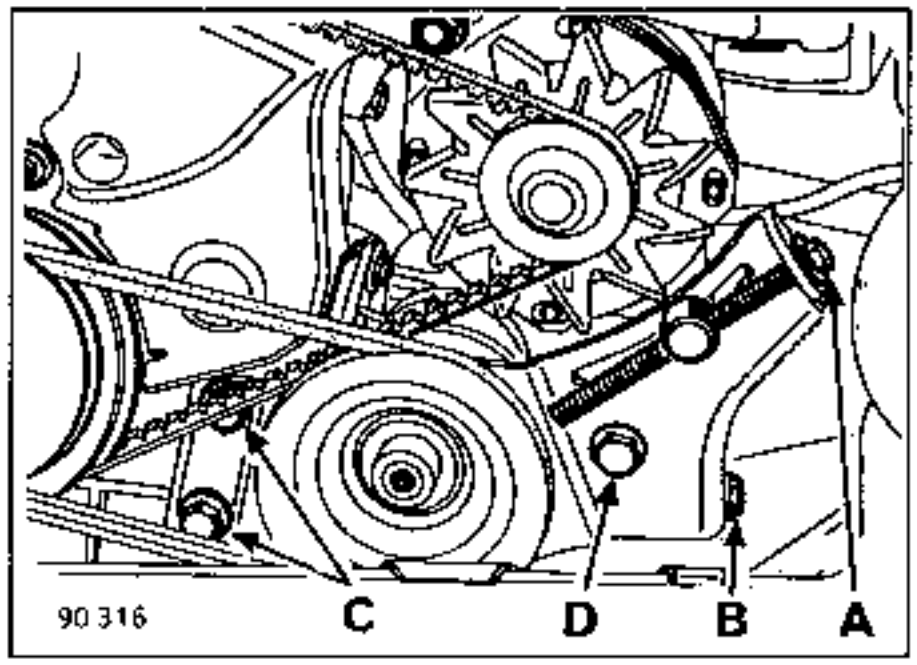
. for turbocharged engines :

- the air filter and the intercooler (protect the compressor and air intake apertures),
- the oil cooler bolts, securing the cooler to the side member.

. on vehicles equipped with power steering :

Loosen :

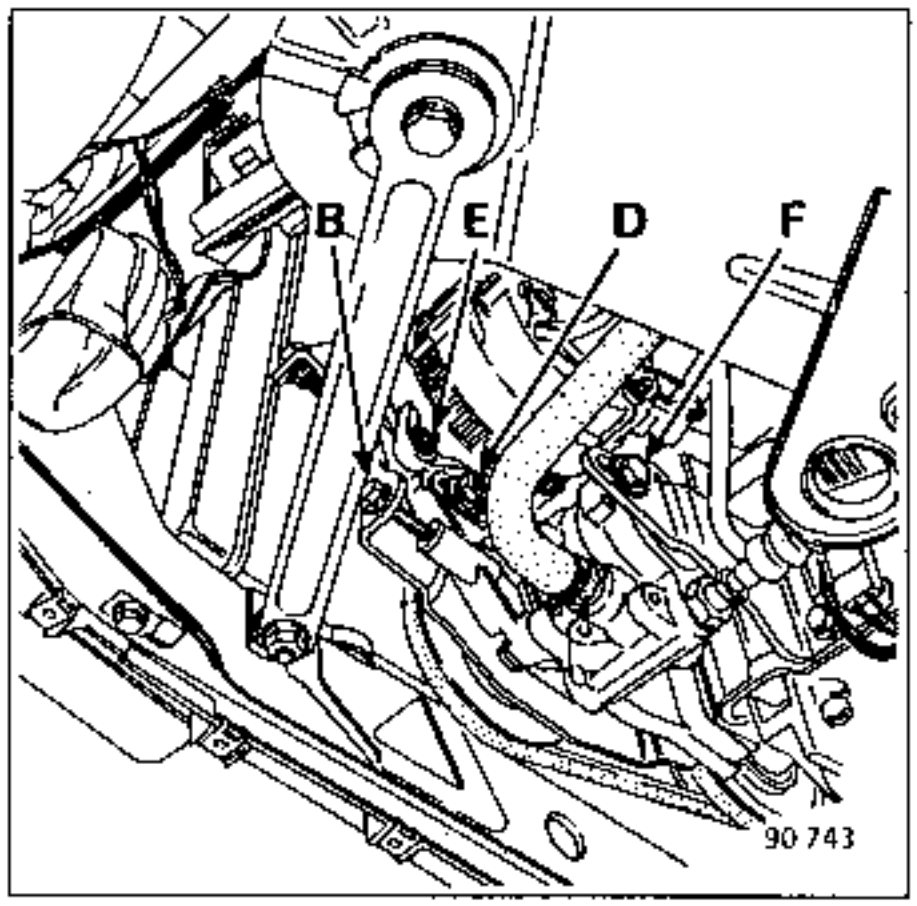
- the alternator tensioner (A) and remove the alternator lower securing nut (E),
- the power steering pump tensioner (B),
- the two screws (C), bolt (D) and the screw from the pump rear support (F).



Take off the drive belt.

Remove :

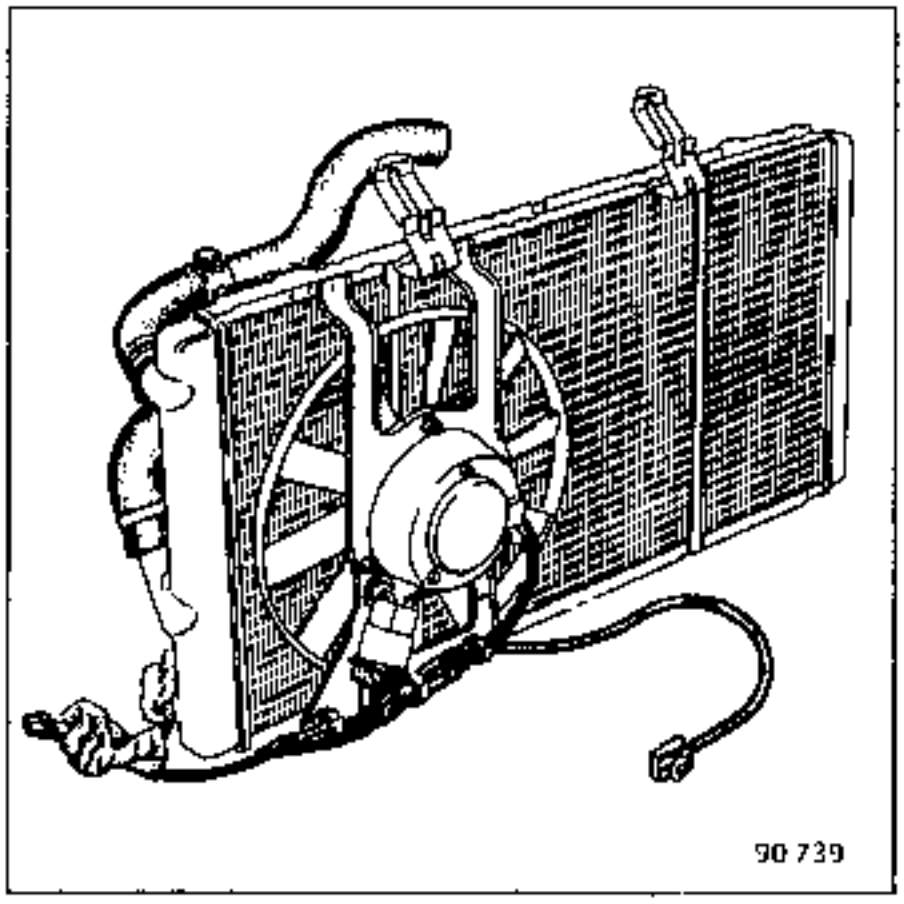
- the screw on the pump rear support (F),
- the two screws (C).



Pull the pump-support assembly to one side and secure it to the body.

Drain the cooling system.

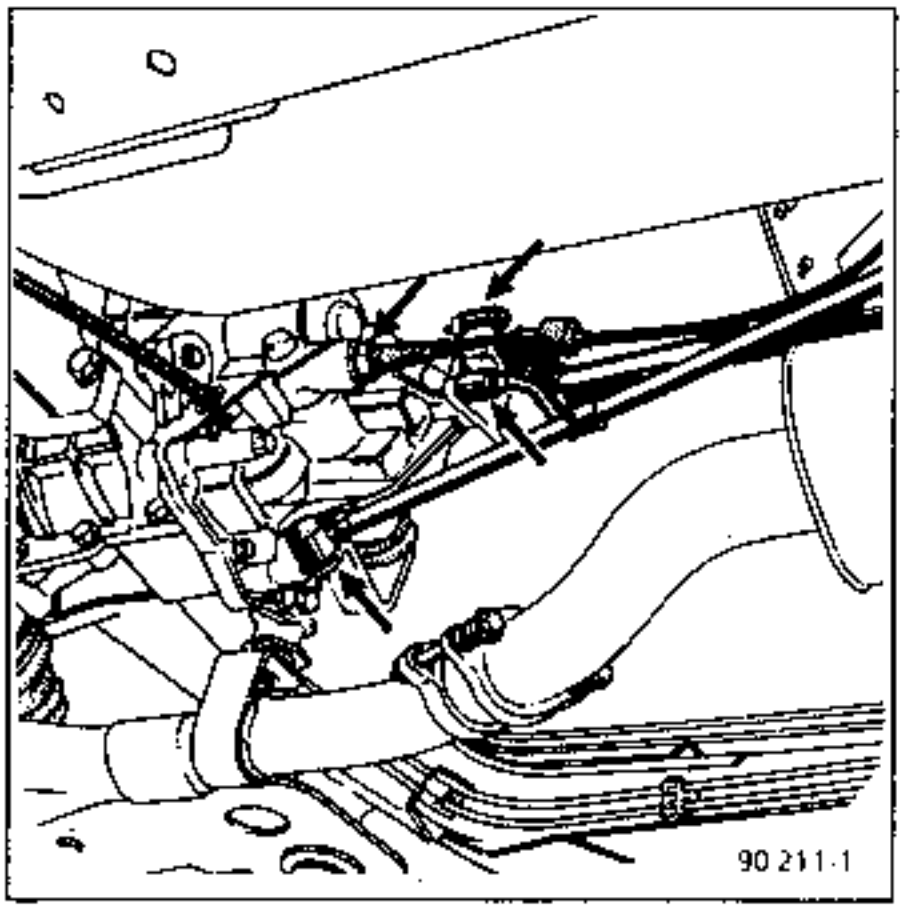
Remove the radiator and its wiring.



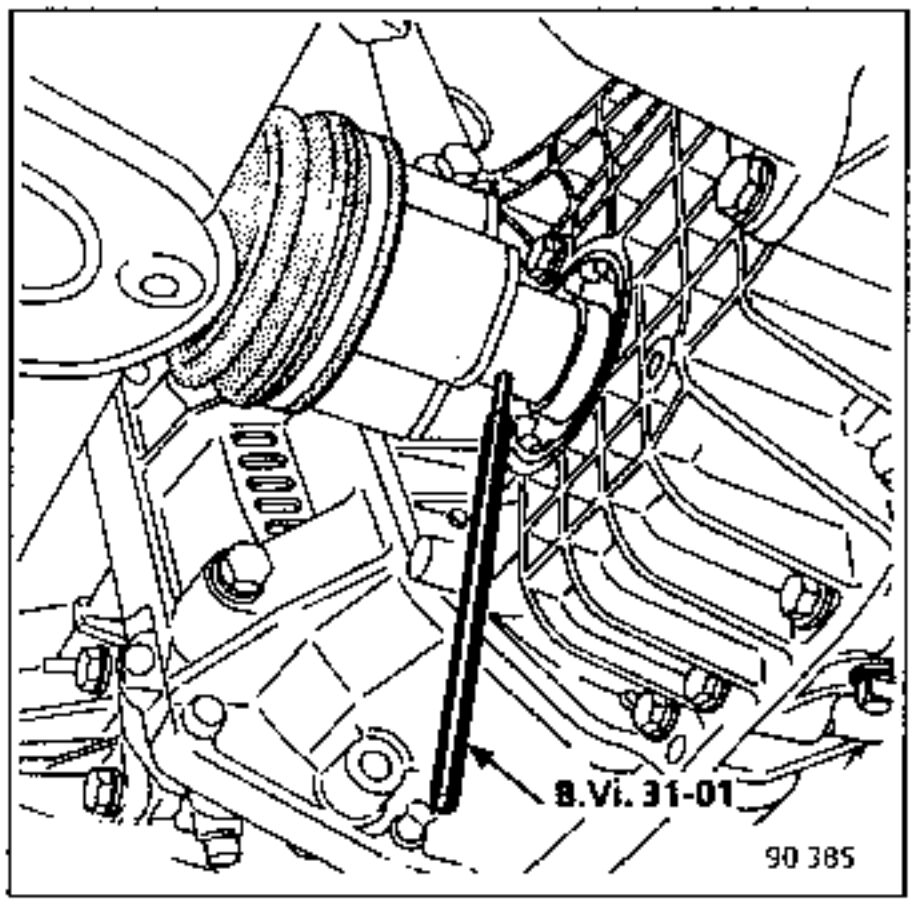
- Disconnect the heater hoses.

Remove :

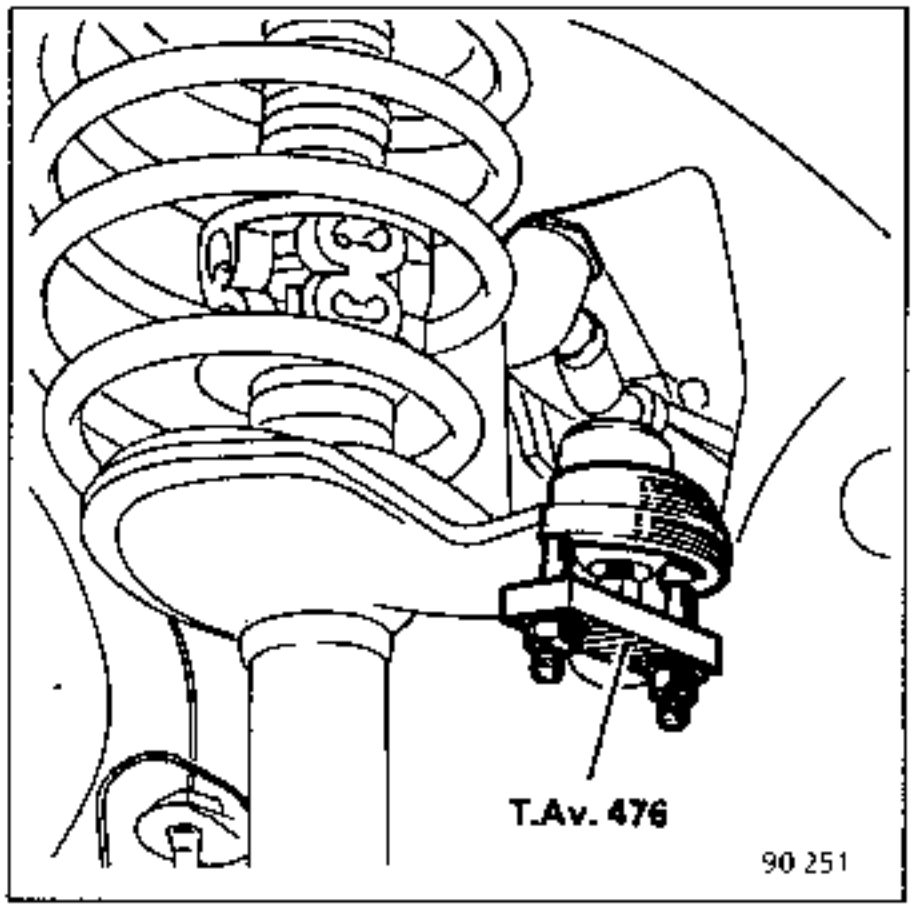
- the lower bolt from the engine damper,
- the gear shift control,



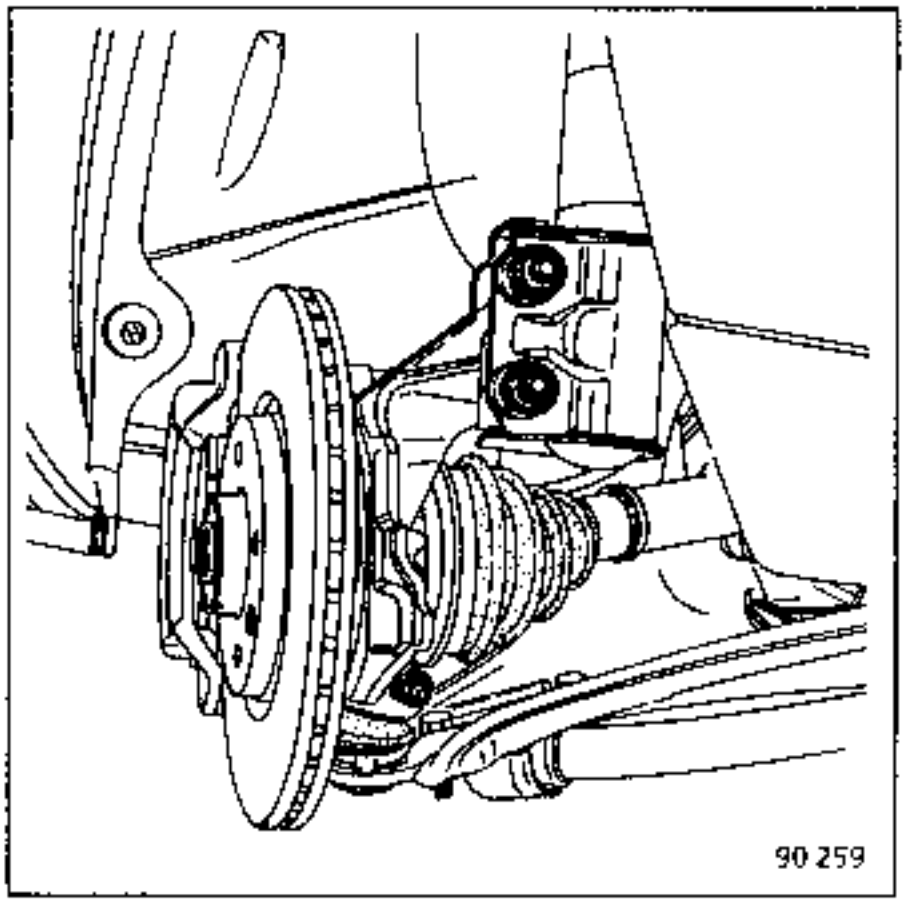
- the wheels,
- the pins, at the gearbox ends, using tool **B.Vi.31-01**,



- the steering ball joints using tool **T.Av.476.**



Remove the upper bolts securing the lower ends of the shock absorbers and loosen the lower bolts without removing them.



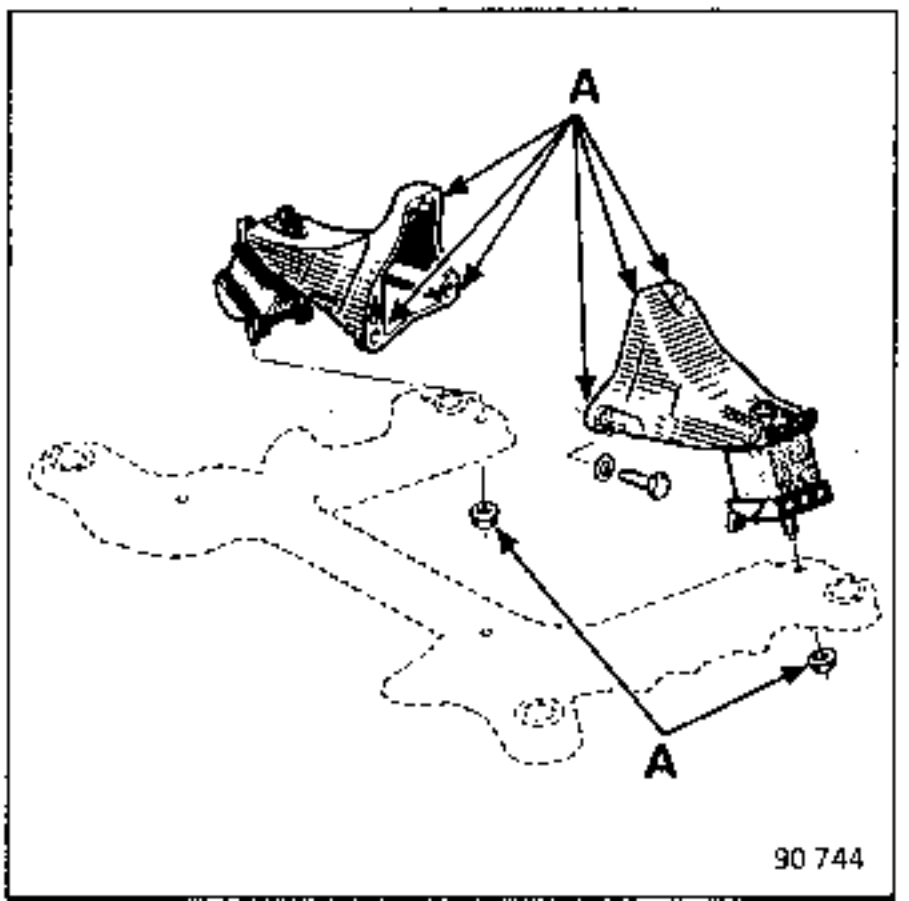
Tilt the stub axle carriers and extract the drive shafts from the sun wheels.

Remove :

- the exhaust pipe clamp from the manifold or turbocharger outlet,
- the tie rod under the gearbox.

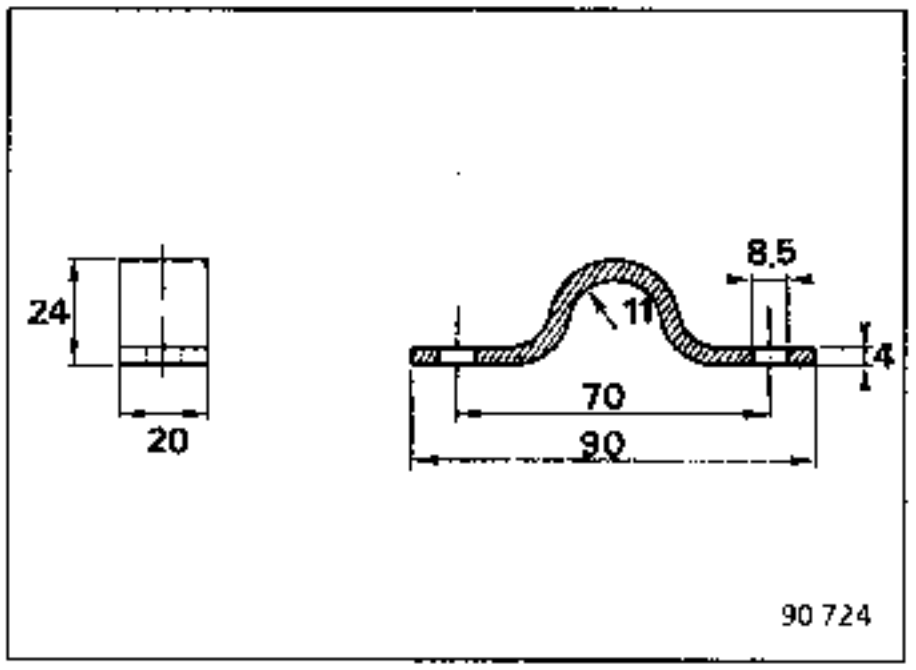
Place jack **DESVIL V 710** or **SEF 6 050** in position.

Remove the gearbox side mounting pad assemblies (bolts A).



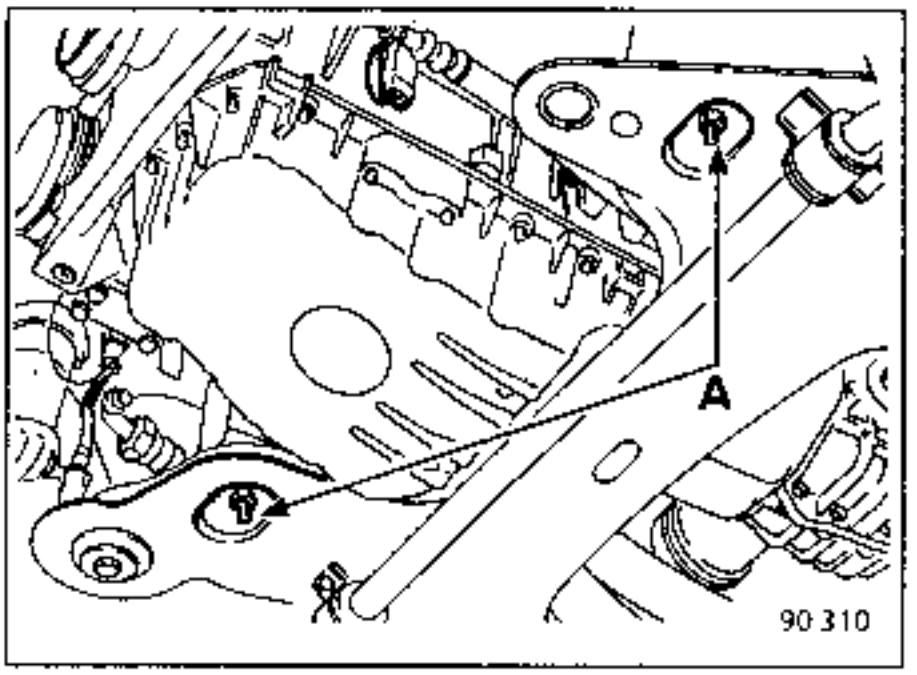
Fit a second lifting lug to the rocker arm cover.

Drawing of lifting lug to be manufactured locally : (dimensions in mm).



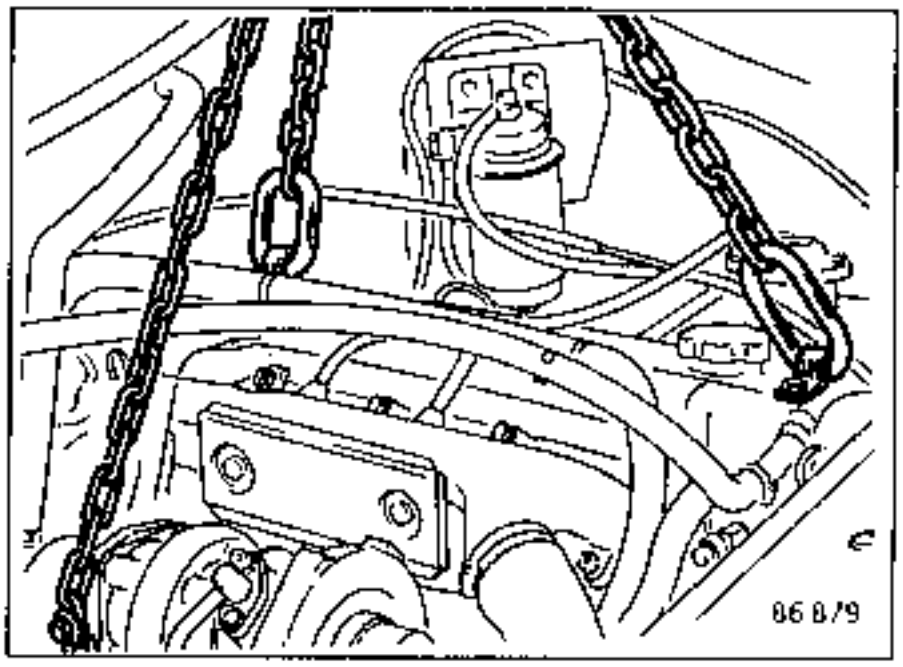
Use tool **Mot.878** securing the engine-gearbox assembly at the lifting lugs.

Remove the two nuts (A).



Special features of the J8S Turbo engine

To prevent the assembly turning, fit an additional chain, securing it to the exhaust manifold.

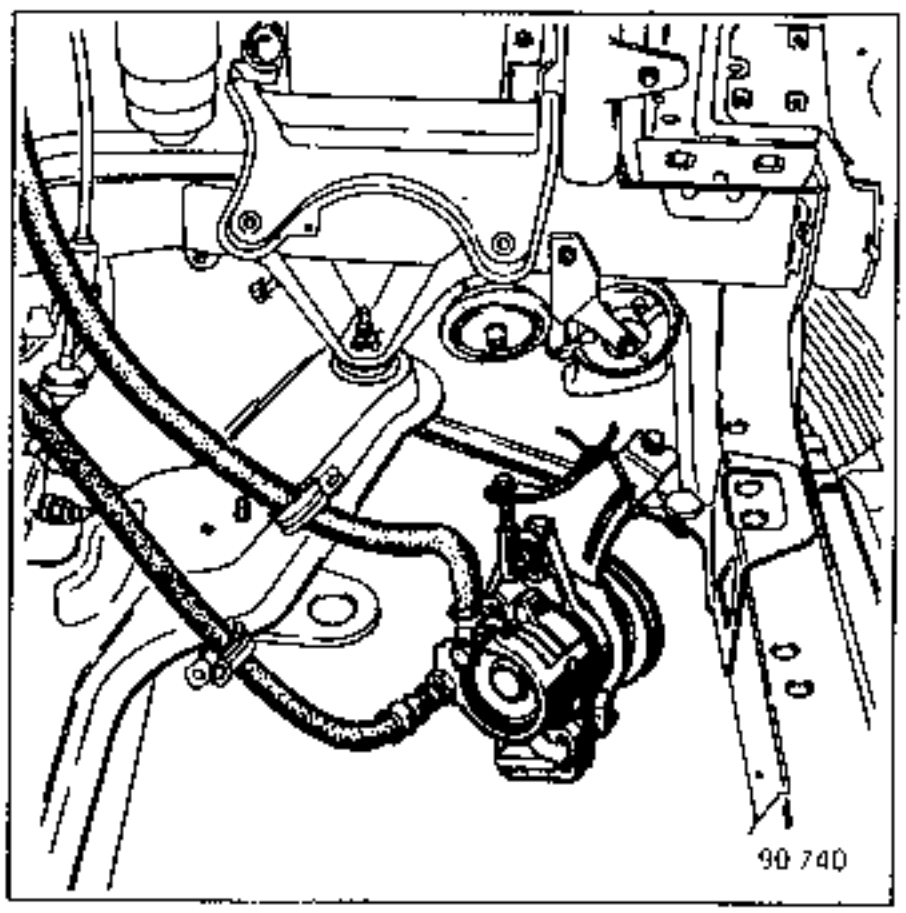


Lift out the engine-gearbox assembly

REFITTING (special points)

. Vehicles equipped with power steering

Before refitting the engine-gearbox assembly, ensure that the power steering pipes pass on either side of the front LH engine mounting pad.



After fitting the power steering pump, check the drive belt tensions using tool **Ele.346-04.**

Fit the drive shafts :
Coat the splines with grease no. 20 **Mobil X57 030.**

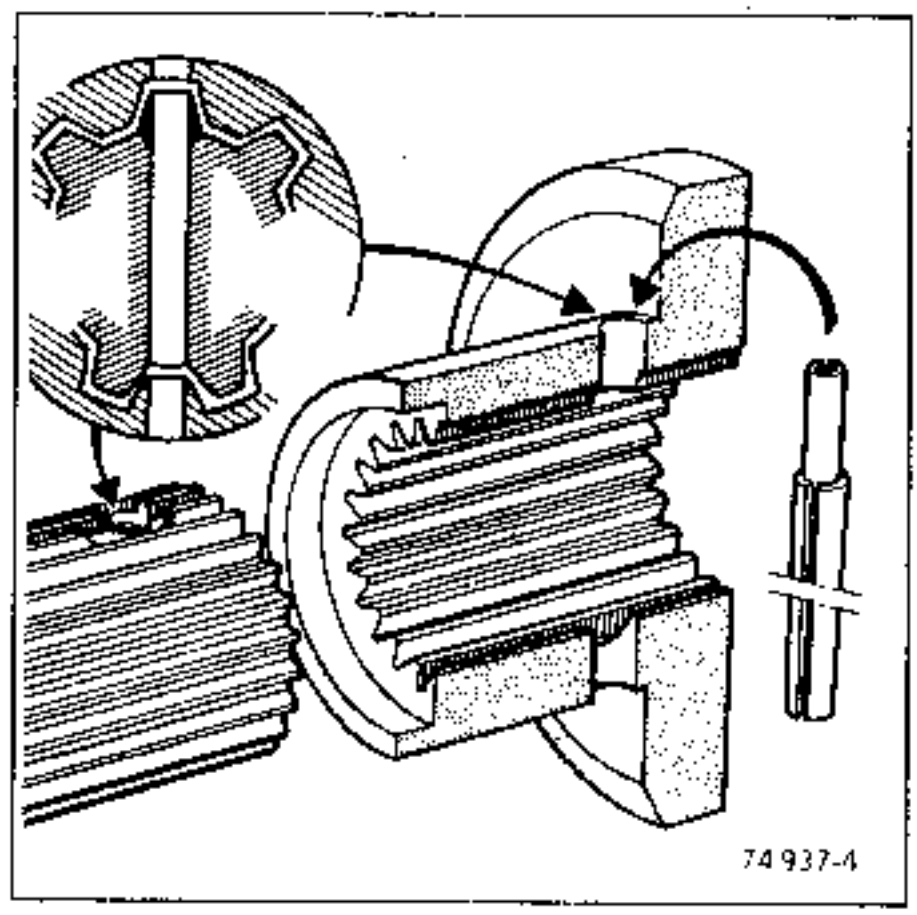
Ensure that the rubber washer that should be between the end of the sun wheel and the bottom of the drive shaft yoke is in position.

Position the drive shaft with reference to the sun wheel and insert it..

Check that it is correctly positioned using the crankpin from set **B.Vi.31-01.**

Lead chamfers on the sun wheel shafts make it easier to enter the new spring pins using tool **B.Vi.31-01.**

Seal the pin holes with **CAF 4/60 THIXO** compound.



Remove the locally manufactured lifting lug.

Tighten the nuts and bolts to the specified torques.

Fill and bleed the cooling system.

REMOVING-REFITTING

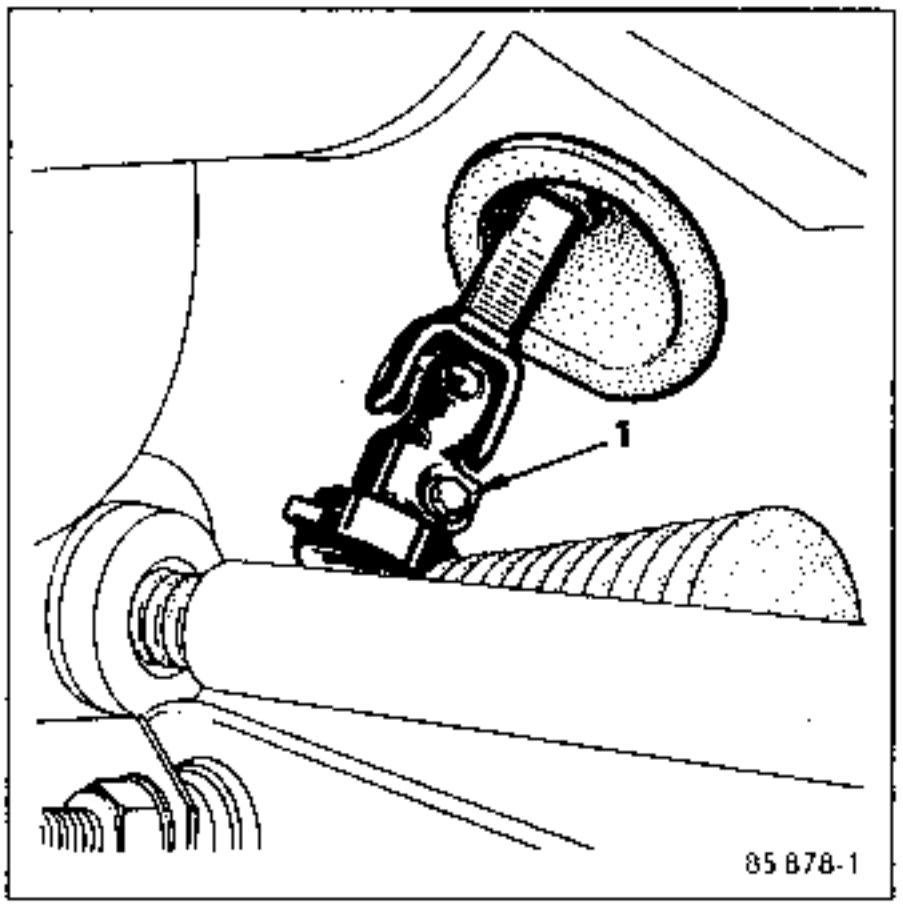
ESSENTIAL SPECIAL TOOLS	
Mot 1040-01	Dummy sub frame for removing and refitting the power unit assembly

TIGHTENING TORQUES (in daN.m)	▽
Sub frame securing bolts	8,5
Shock absorber upper cup securing bolts	2,5
Brake caliper securing bolts	10
Steering column universal joint securing bolt	2,5
Wheel bolts	9

REMOVING

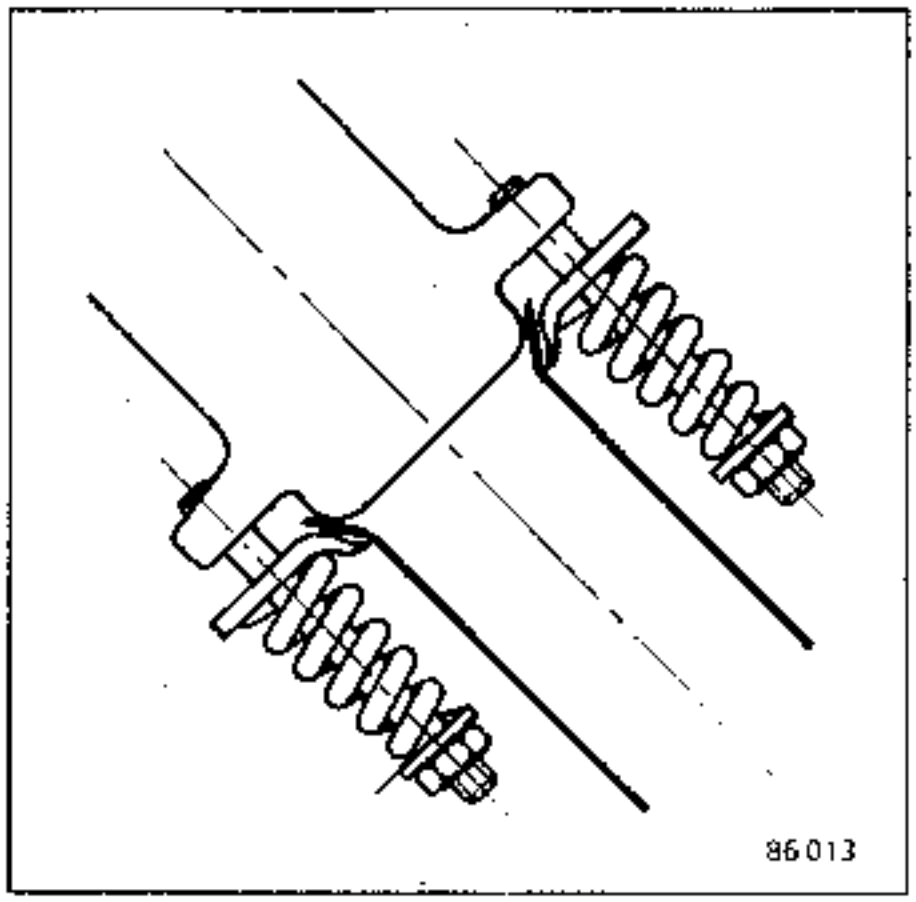
Disconnect:

- the battery,
- the choke cable,
- the accelerator cable,
- the speedometer drive cable,
- the pipes and hoses,
- the electrical wiring,
- the gear shift control,
- the steering column universal joint, bolt (1), after having marked its position on the steering box.



Remove:

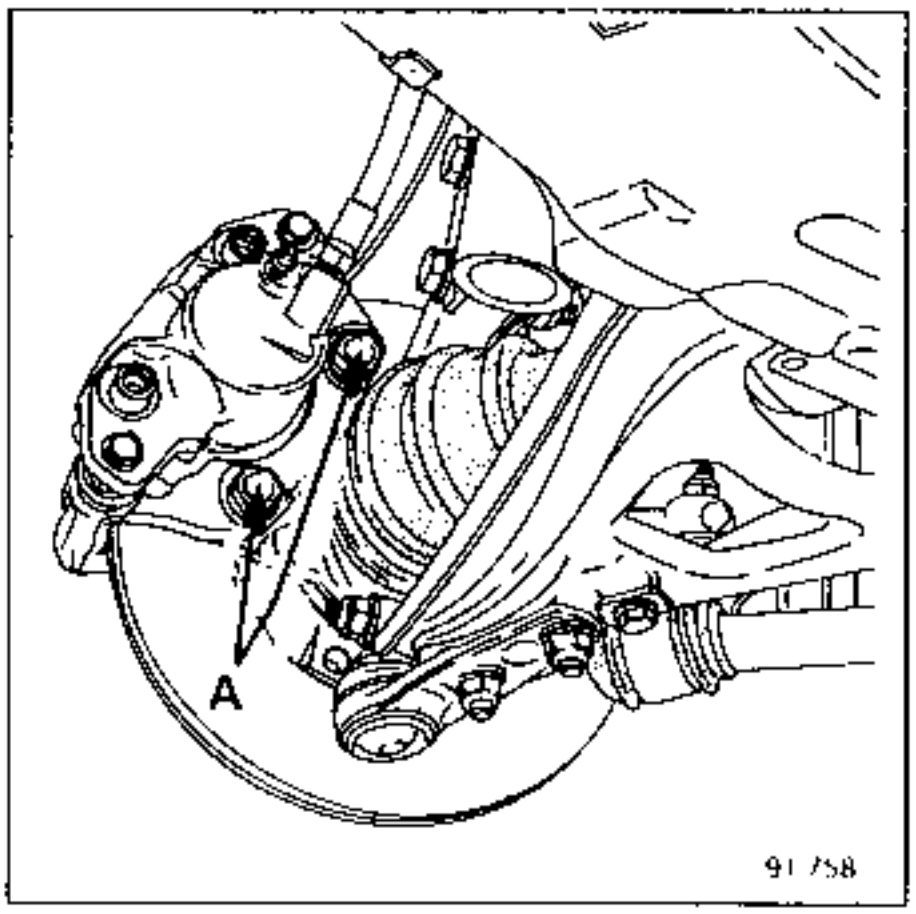
- the clamp on the exhaust manifold and remove the down pipe.



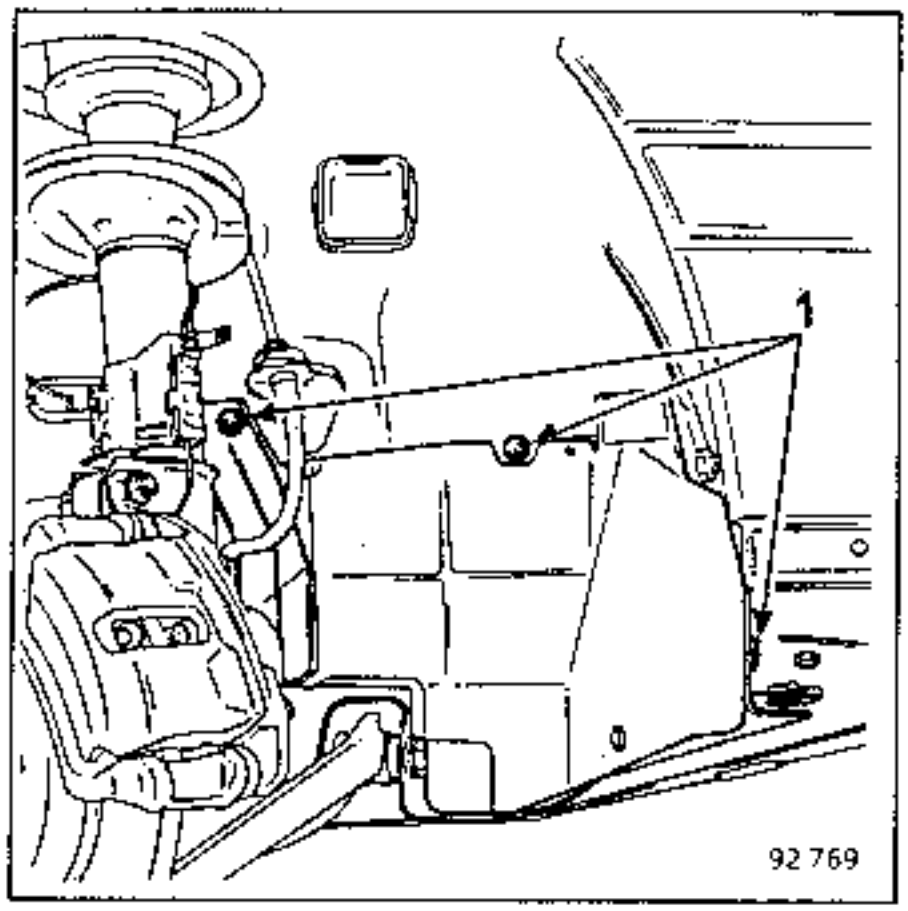
Fit clamps Mot.453-01 to the heating system hoses, then disconnect the hoses from the coolant pump.

Remove:

- the brake calipers and secure them to the body.

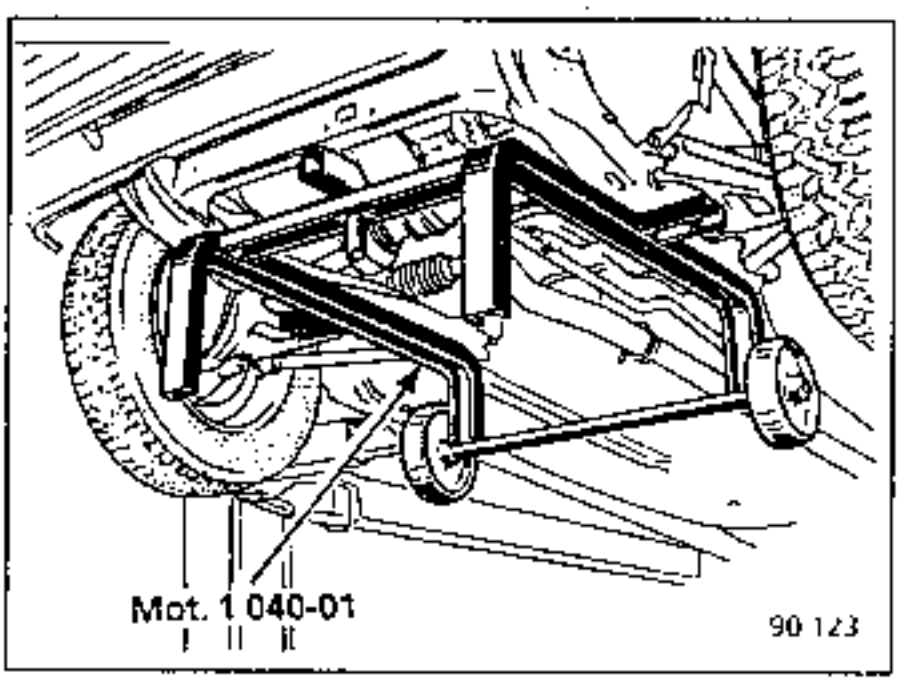


Drill out the rivets (1) on the protective panel.



The tie bars securing the sub-frame to the body.

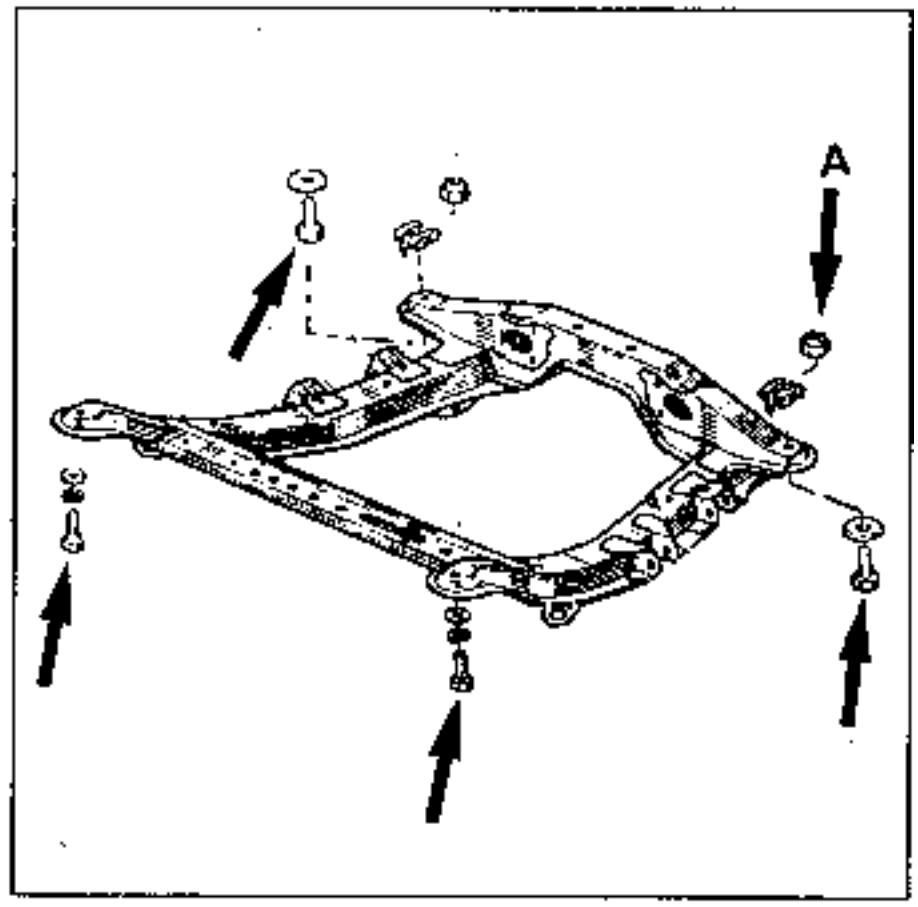
Fit tool Mot.1 040-01.



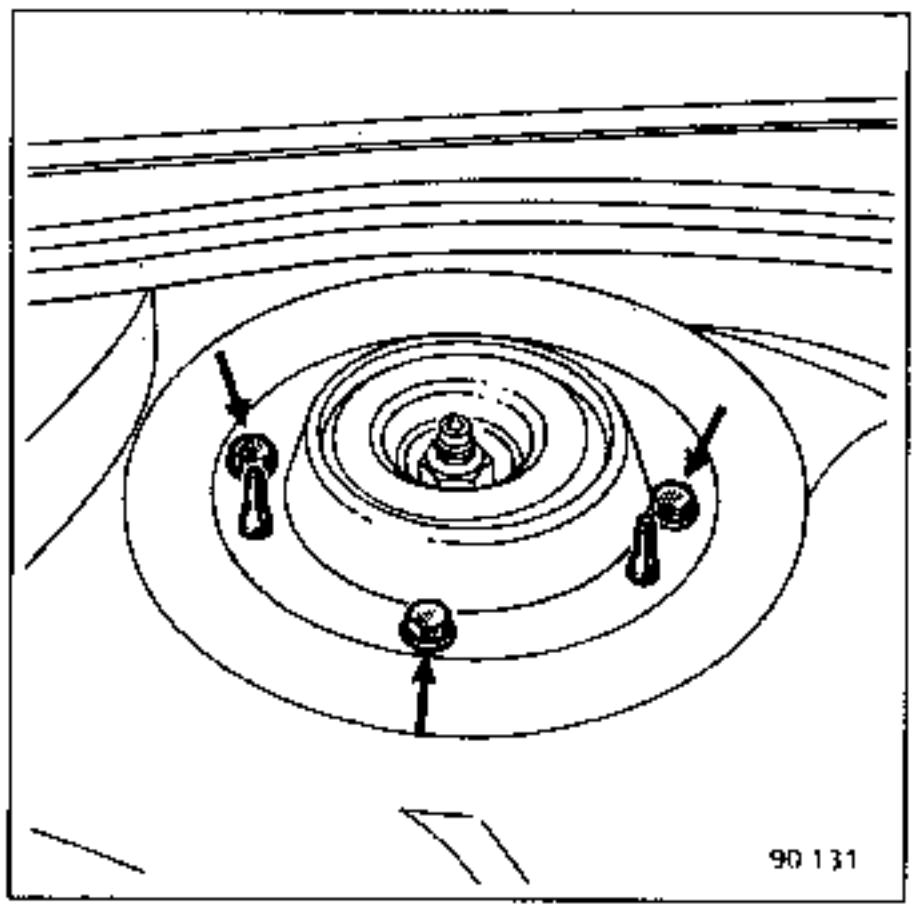
Lower the vehicle to the ground.

Remove:

- the four sub-frame securing bolts.

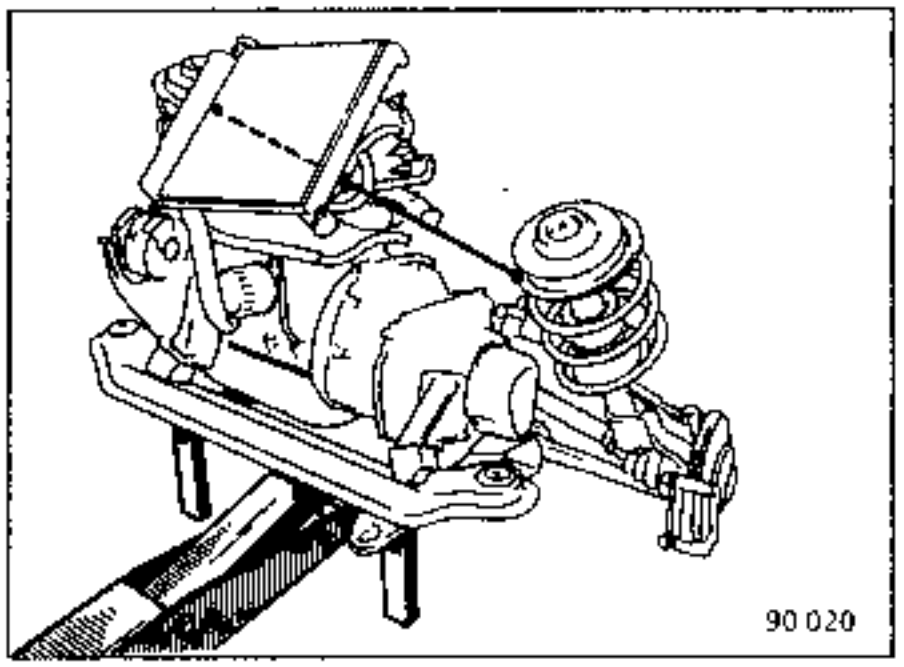


- the bolts from the shock absorber upper cups.



Lift the body and take out the power unit assembly.

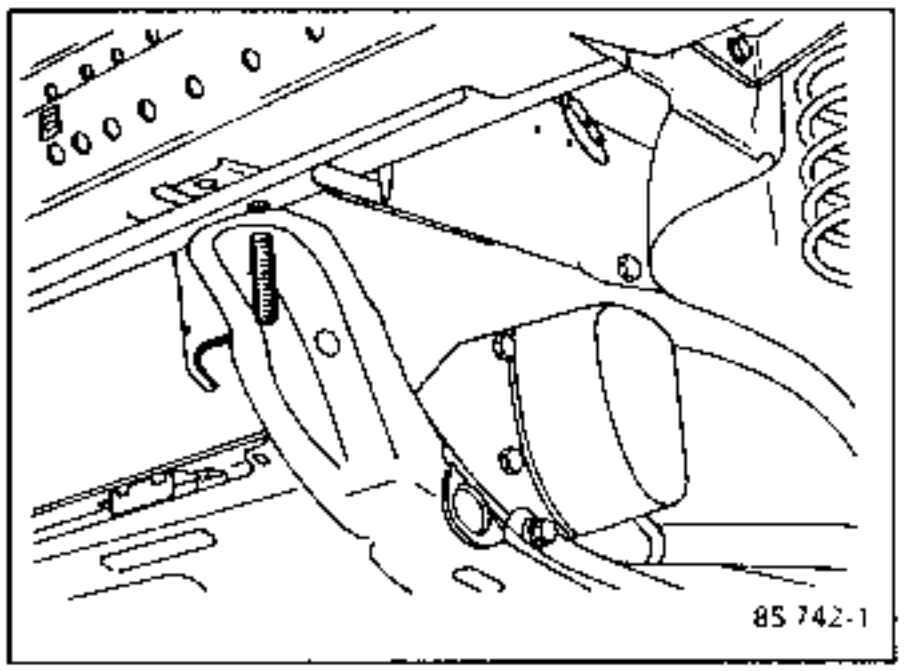
After Removing the Power Unit Assembly



Secure the spring-shock absorber assemblies with string.

REFITTING (special points)

It will be found easier to align the body with the engine sub-frame if screwed rods approximately 100mm long are fitted.



To obtain the correct clutch free travel, see M.R.291.

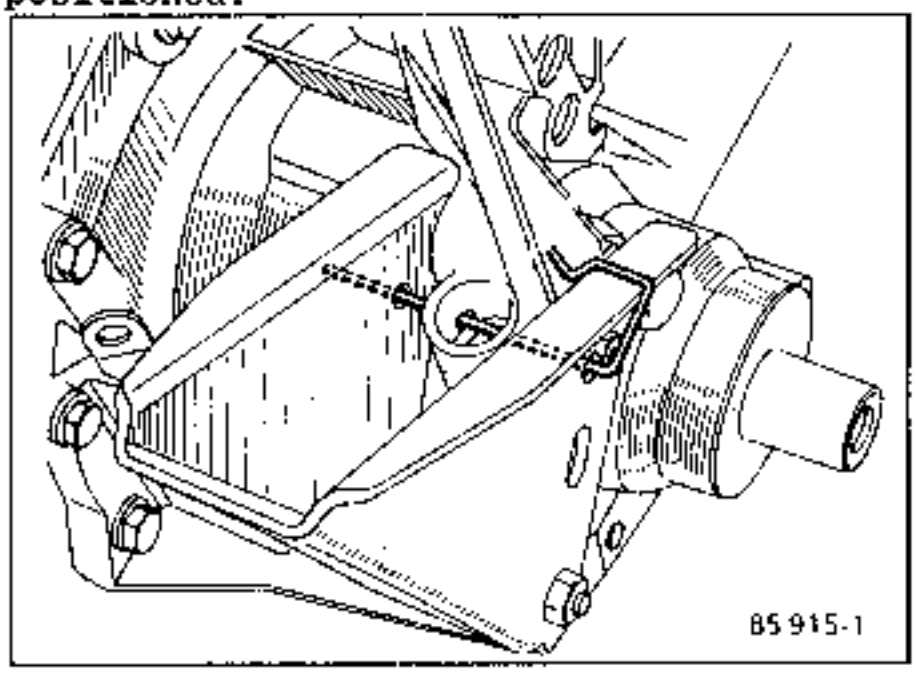
Tighten the brake caliper securing bolts to a torque of 10 daN.m after first coating them with Loctite FRENBLOC.

Press down the brake pedal a number of times to bring the caliper pistons against the brake pads.

Fill and bleed the cooling system.

Ensure that the steering column universal joint is tightened in the correct position (see M.R.291).

Reconnect the speedometer drive cable, ensuring that the clip is correctly positioned.



Adjust the accelerator and choke cables.

Retighten the exhaust pipe clamp until the springs are coil bound then loosen the nuts by one and a half turns.

REMOVING - REFITTING

ESSENTIAL SPECIAL TOOLS	
Mot 1040-01	Dummy sub-frame for removing and refitting the power unit assembly

TIGHTENING TORQUES (in daN.m) ▽	
Sub-frame securing bolts	8,5
Shock absorber upper cup securing bolts	2,5
Brake caliper securing bolts	10
Steering column universal joint securing bolt	2,5
Wheel bolts	9

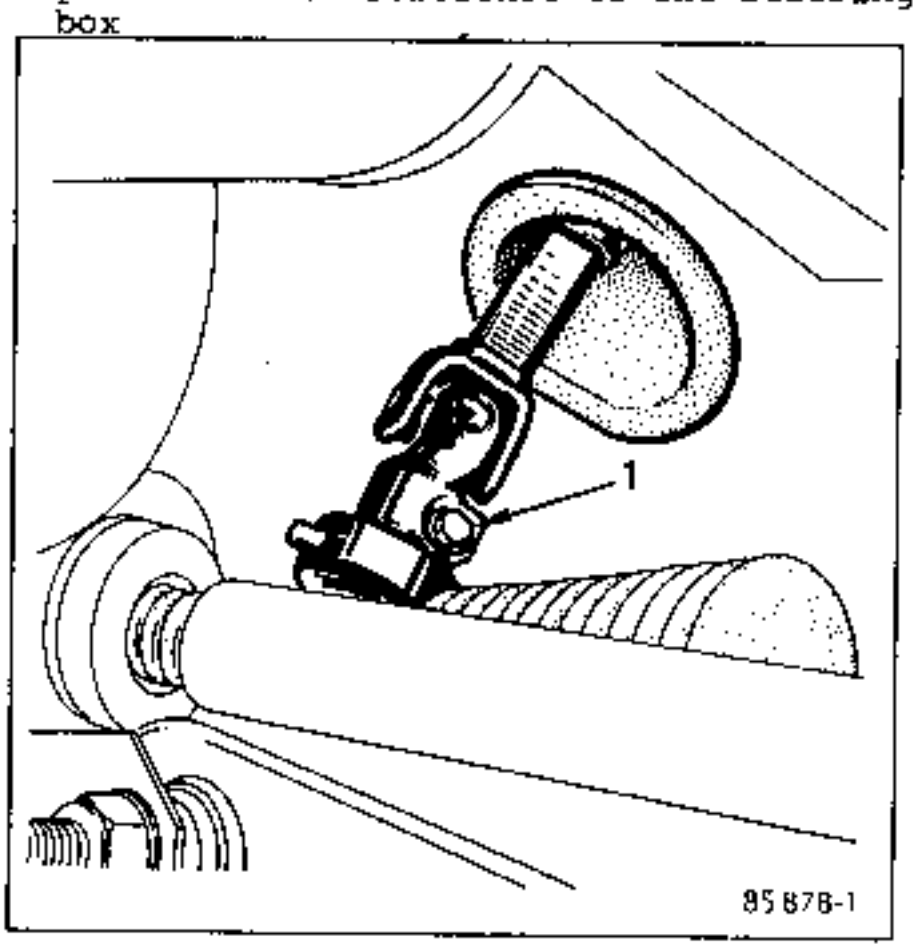
REMOVING

Disconnect the battery.

Remove the air filter.

Disconnect:

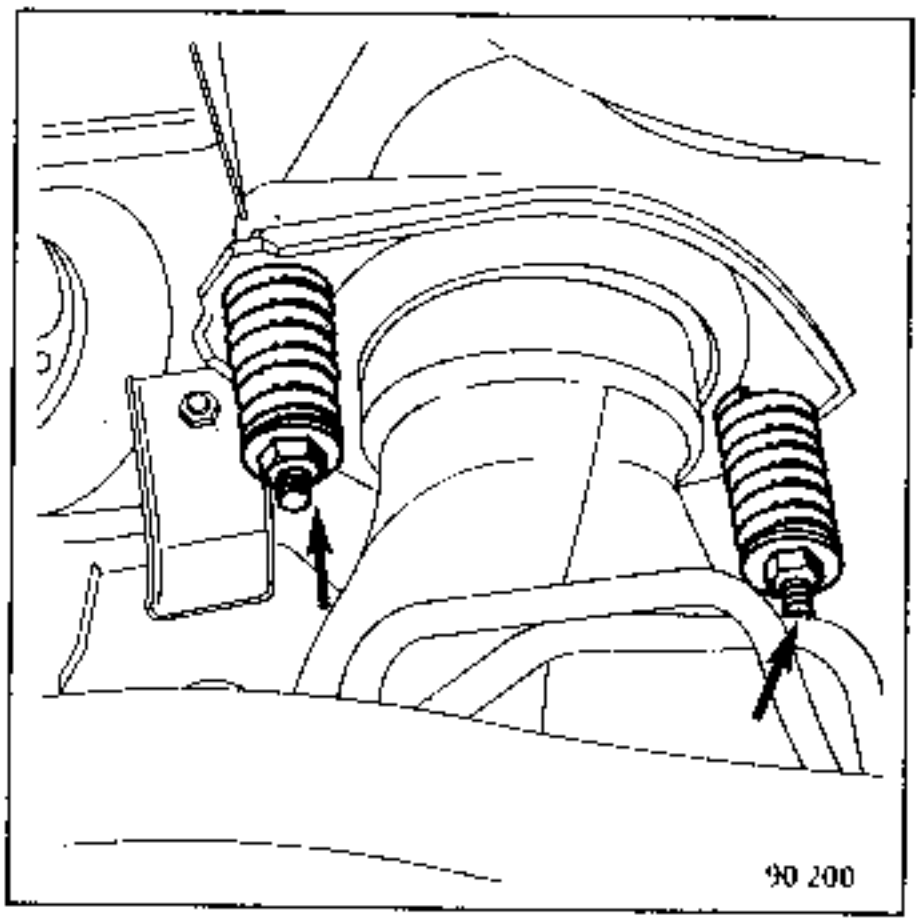
- the choke cable,
- the accelerator cable,
- the speedometer drive cable,
- the pipes and hoses,
- the electrical wiring,
- the gear shift control,
- the steering column universal joint, bolt (1) after having marked its position with reference to the steering box



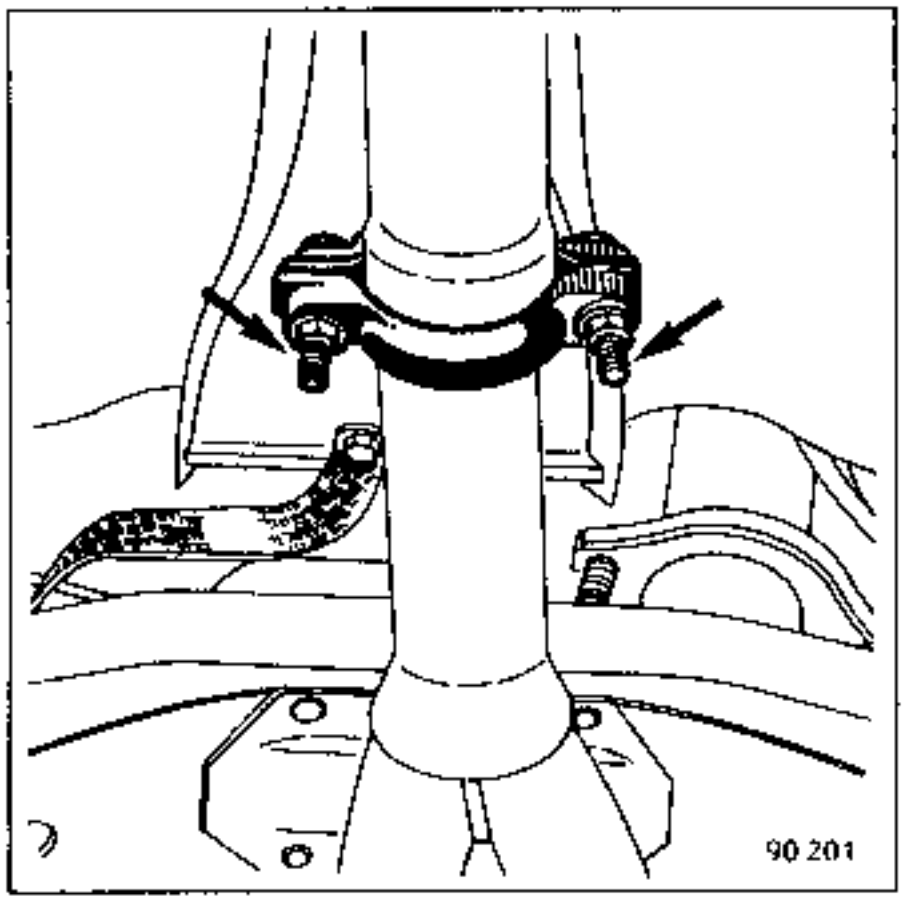
Remove:

The three bolts which secure the power steering pump support (on vehicles fitted with power steering)

The clamp securing the exhaust down pipe to the manifold.

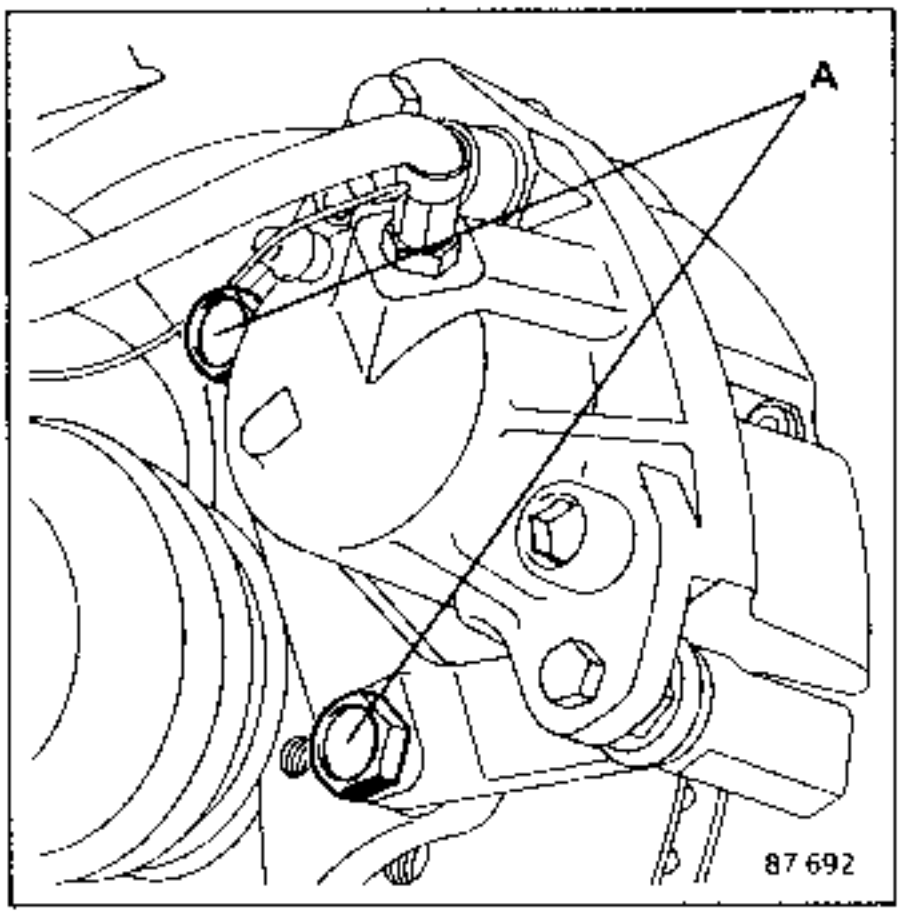


The exhaust downpipe from under the vehicle.

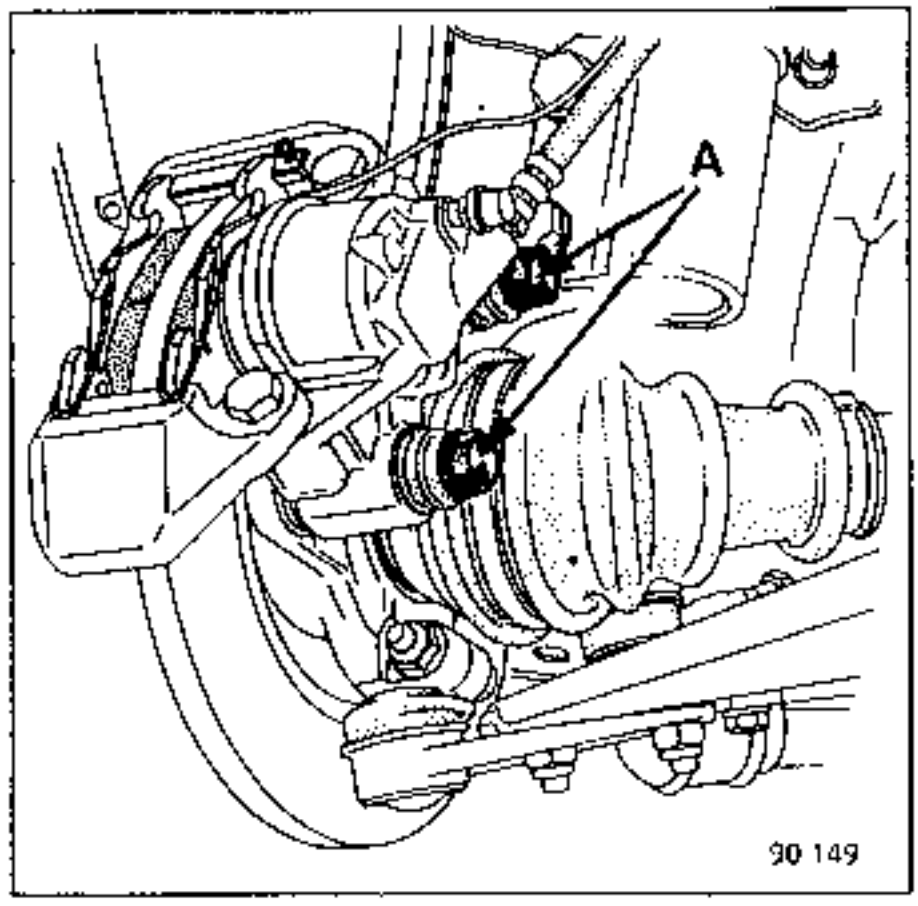


The brake calipers (bolt A) securing them to the vehicle body.

GIRLING



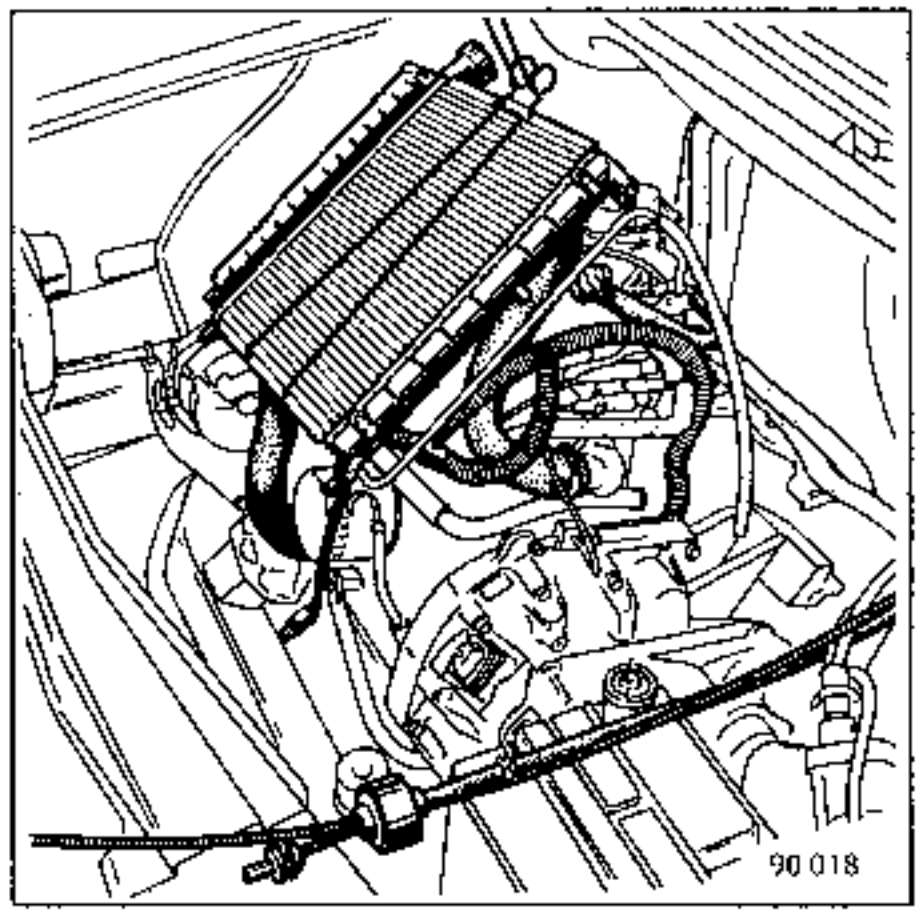
BENDIX Series IV.



Disconnect:

- the radiator temperature sensor,
- the electric fan unit.

Unclip the radiator and secure it to the engine.



Fit the 2 clamps Mot. 453-01 to the heater hoses, then disconnect them from its inlet and outlet sides.

If a "dummy engine sub-frame" Mot. 1040-01 is available, it will not be necessary to carry out the following modification to convert the Mot. 1040.

To use Mot. 1040 for this operation, it will have to be modified as follows:

Drill 2 holes 11mm in diameter at a between centres dimension of 670mm and make up 2 securing lugs (see the illustrations below).

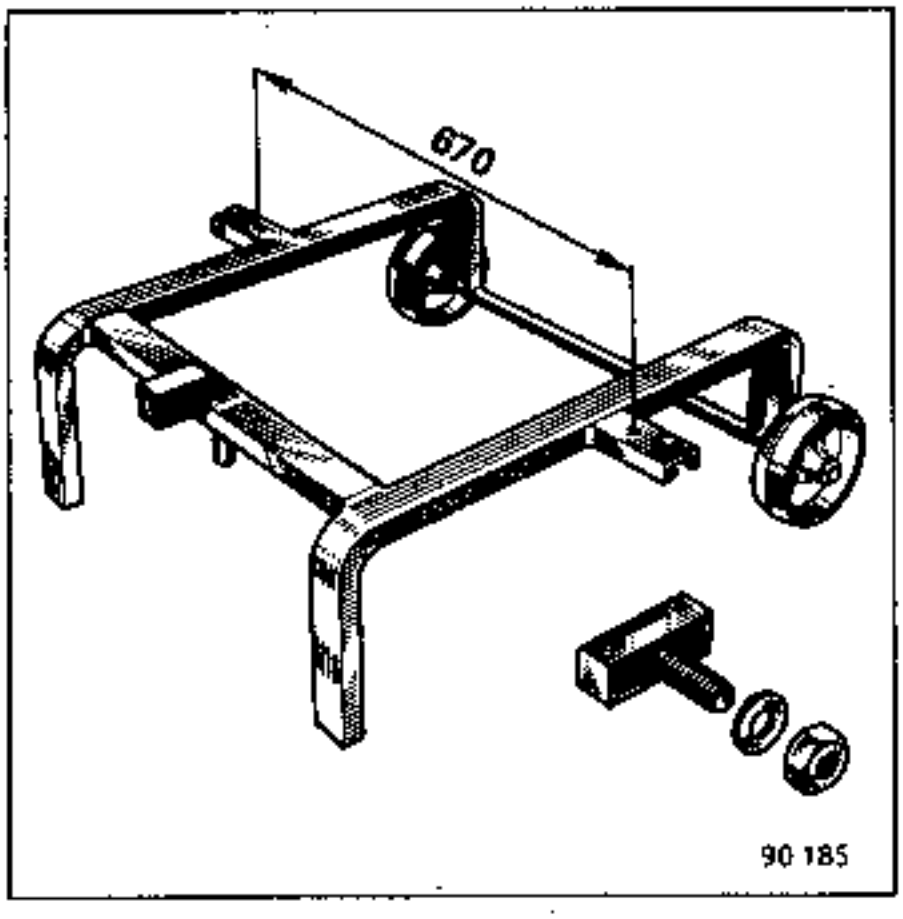
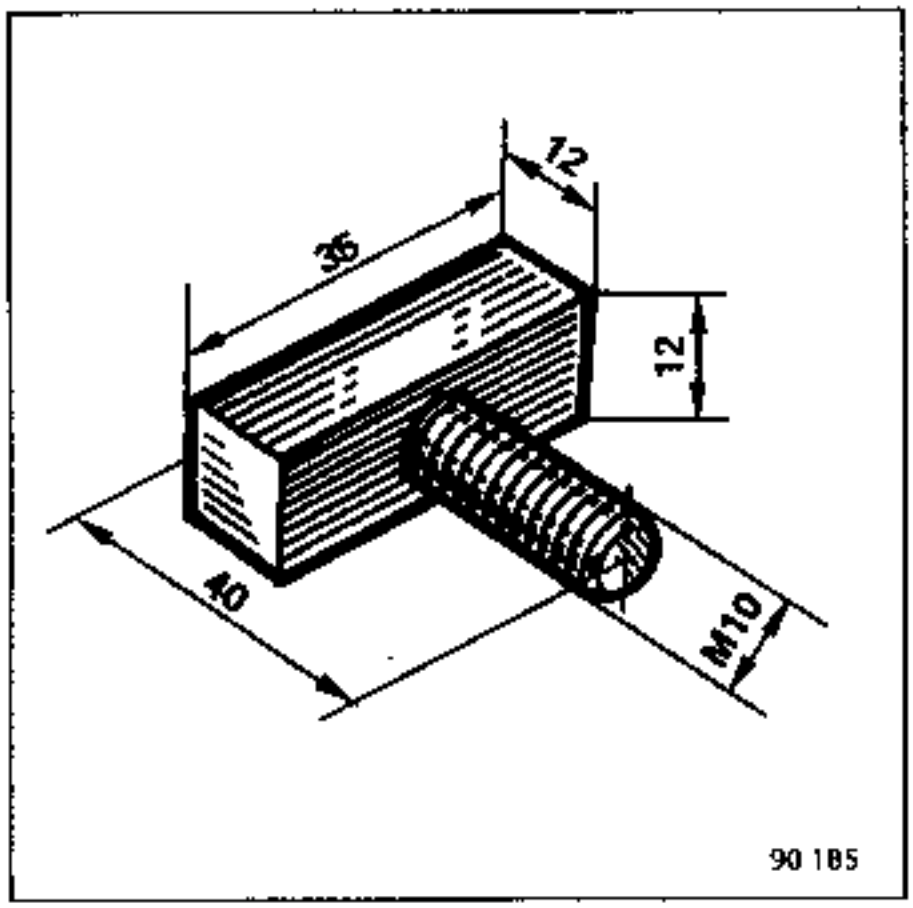
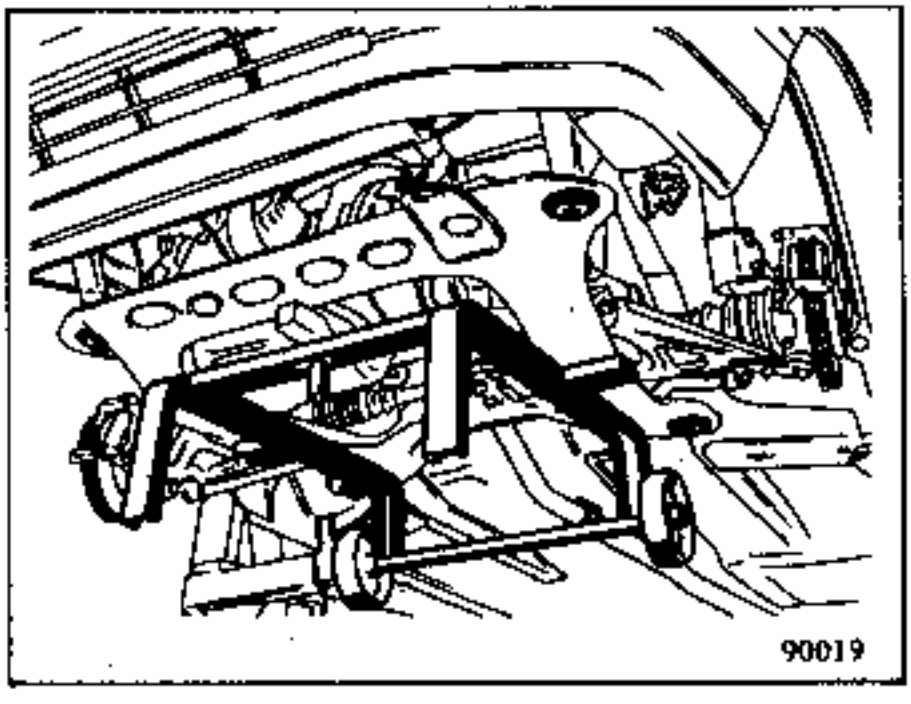


DIAGRAM OF TOOLS TO BE MADE LOCALLY
(Dimensions in mm)



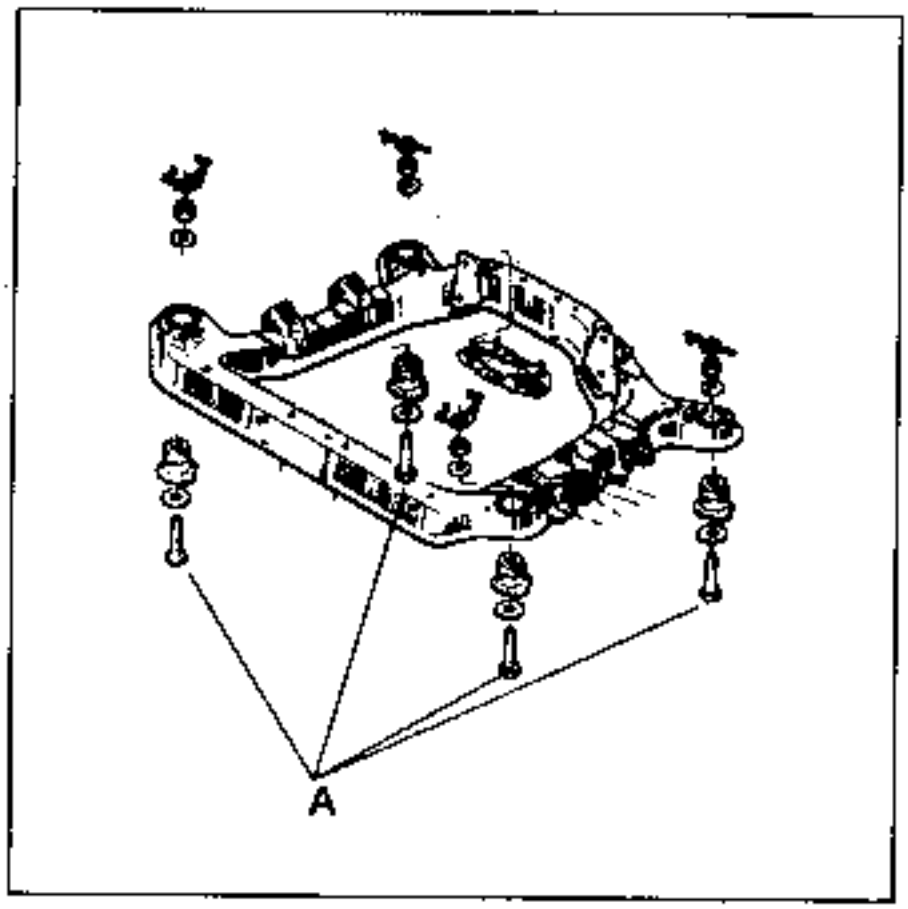
Then fit them to the dummy sub-frame.



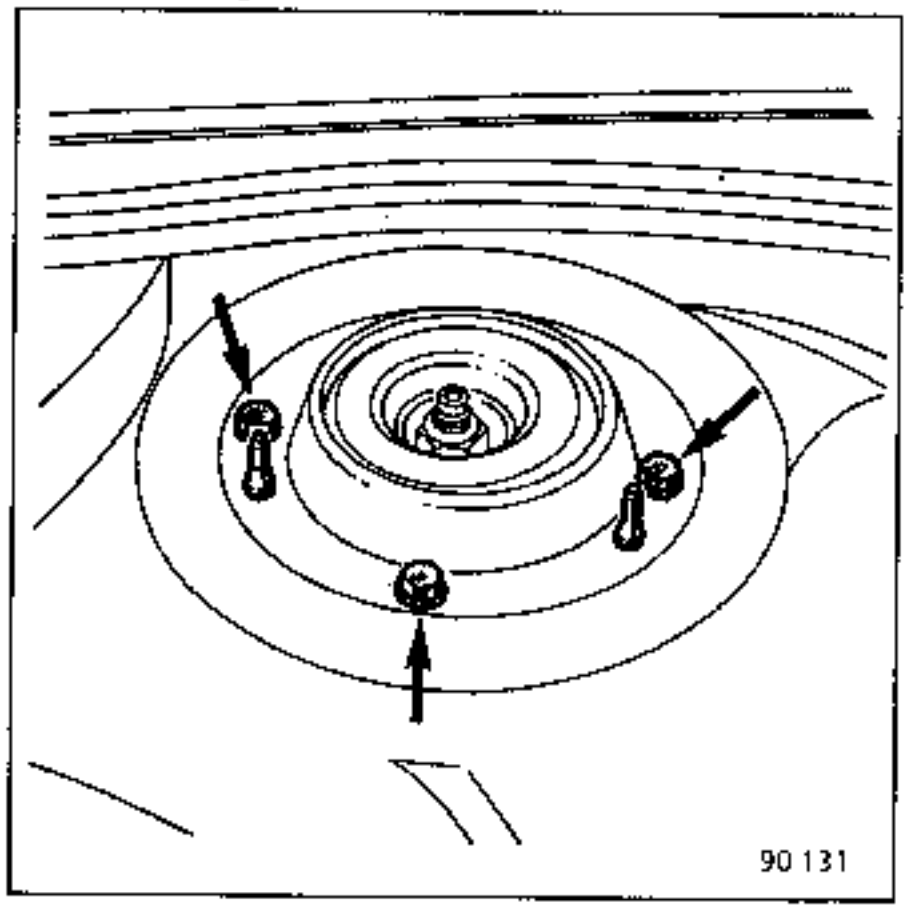
Lower the lift until the dummy frame makes contact with the floor.

Remove:

- the four sub-frame securing bolts (A),

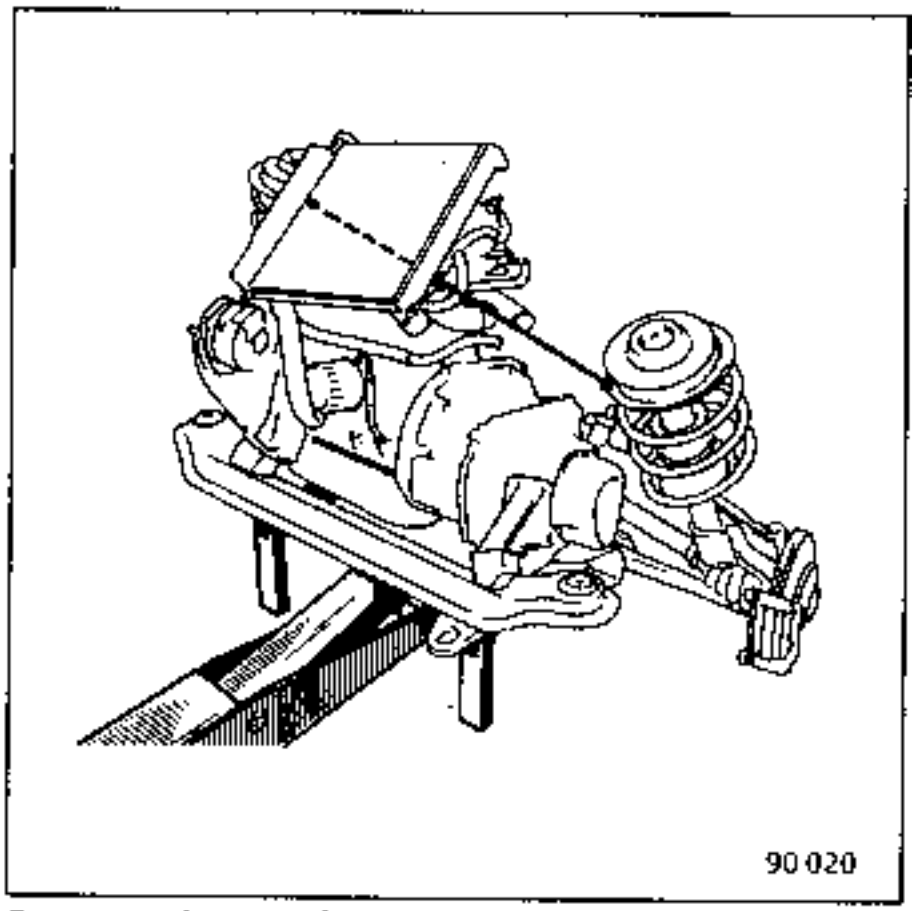


- the bolts from the shock absorber upper cups,



Lift the body and take out the power unit assembly.

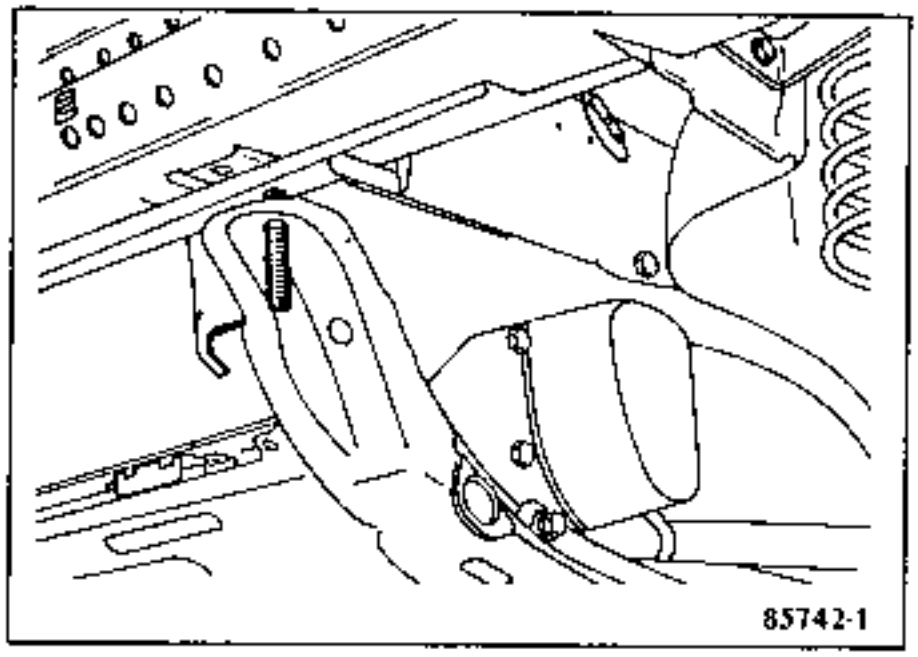
After removal of the power unit assembly



Secure the spring-shock absorbers in place with the string.

REFITTING (special points)

It will be found easier to align the engine sub-frame with the body if two screwed rods approximately 100mm are fitted.



To obtain the correct clutch free travel, see the section entitled CLUTCH.

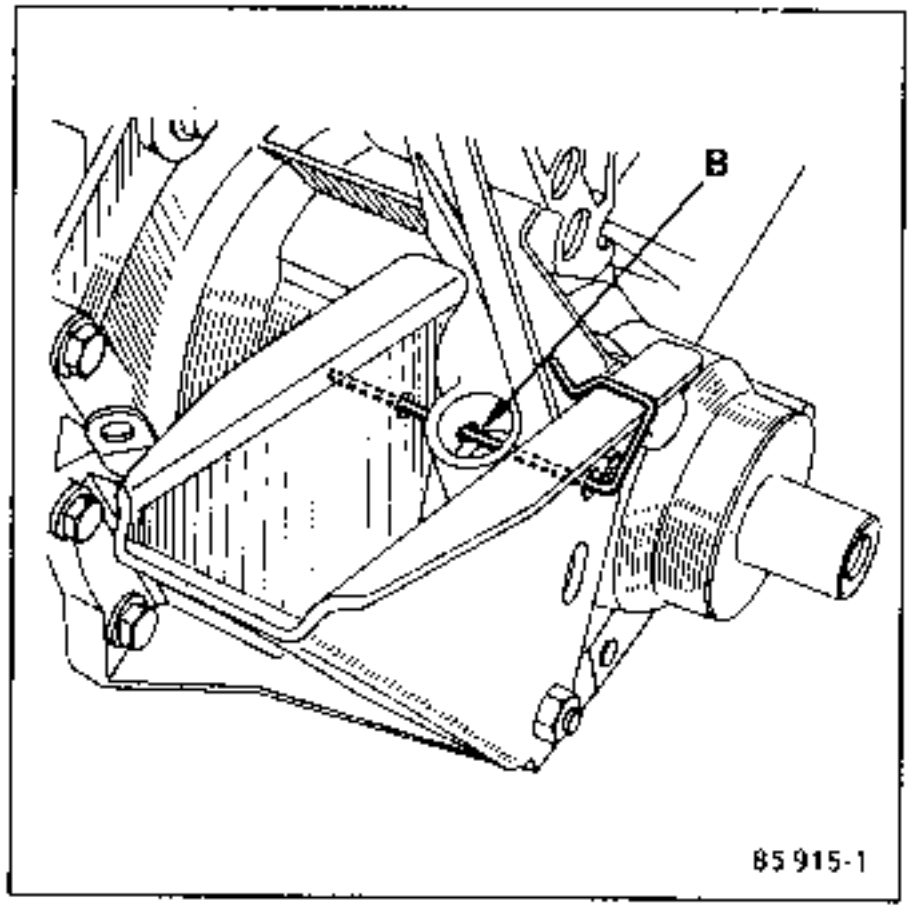
Tighten the brake caliper securing bolts to a torque of 10 daN.m after first coating them with Loctite Frenbloc.

Press down the brake pedal a number of times to bring the caliper pistons into contact with the brake pads.

Fill and bleed the cooling system.

Ensure that the steering column universal joint is tightened in the correct position.

Reconnect the speedometer drive cable, ensuring that the clip is in the correct position.



Adjust the accelerator and choke cables.

Retighten the exhaust pipe clamp.

REMOVING - REFITTING

ESSENTIAL SPECIAL TOOLS	
Mot 1040	Dummy sub-frame for removing and refitting the power unit assembly.

TIGHTENING TORQUES (in daN.m) ▽	
Sub-frame securing bolts	8,5
Shock absorber upper cup securing bolts	2,5
Brake caliper securing bolts	10
Steering column universal joint securing bolt	2,5
Wheel bolts	9

Place the vehicle on a lift and disconnect the battery.

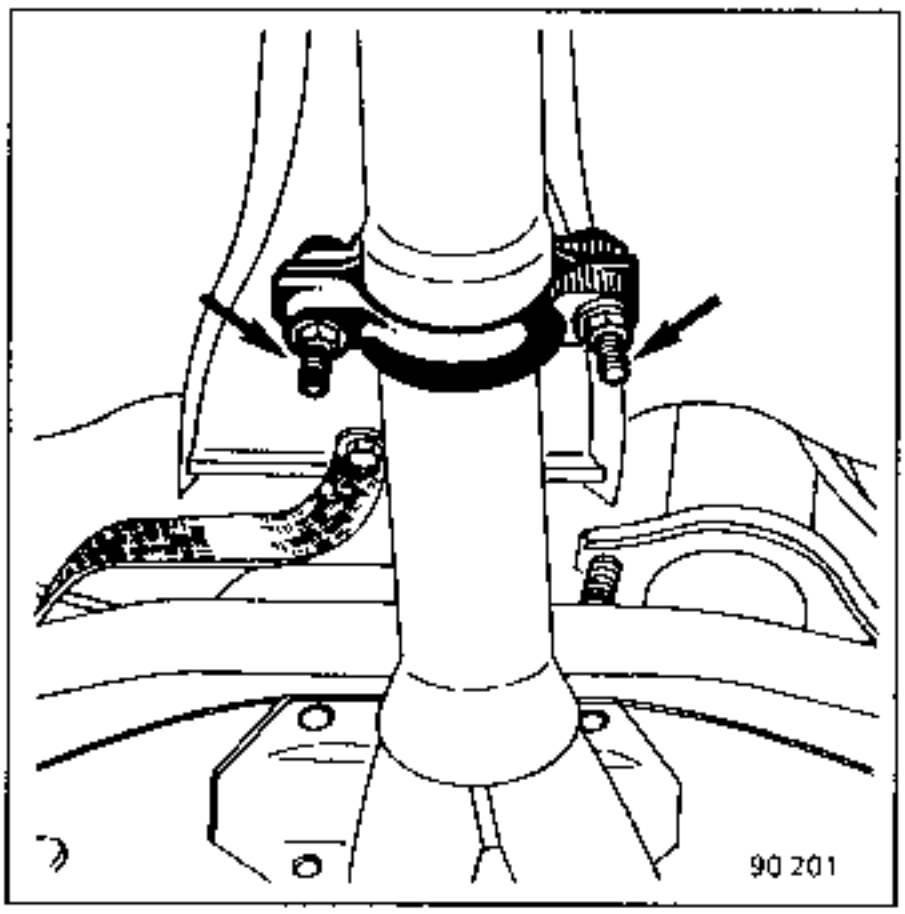
Remove:

- the wheels,

- the protective panels from under the engine and gearbox,

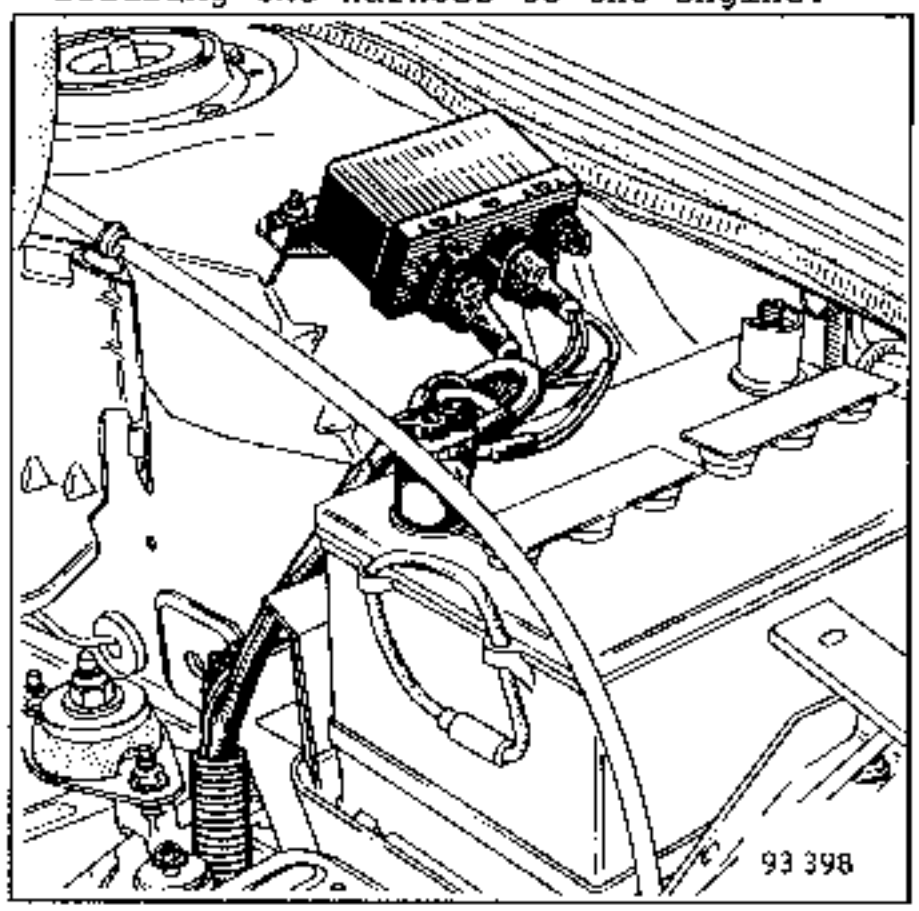
- the gear shift lever,

- the exhaust pipe clamp at the exhaust downpipe.



Disconnect:

- the electrical wiring from the pre-heater unit and the electric fan, together with the engine harness pin, securing the harness to the engine.



- the following pipes and hoses:

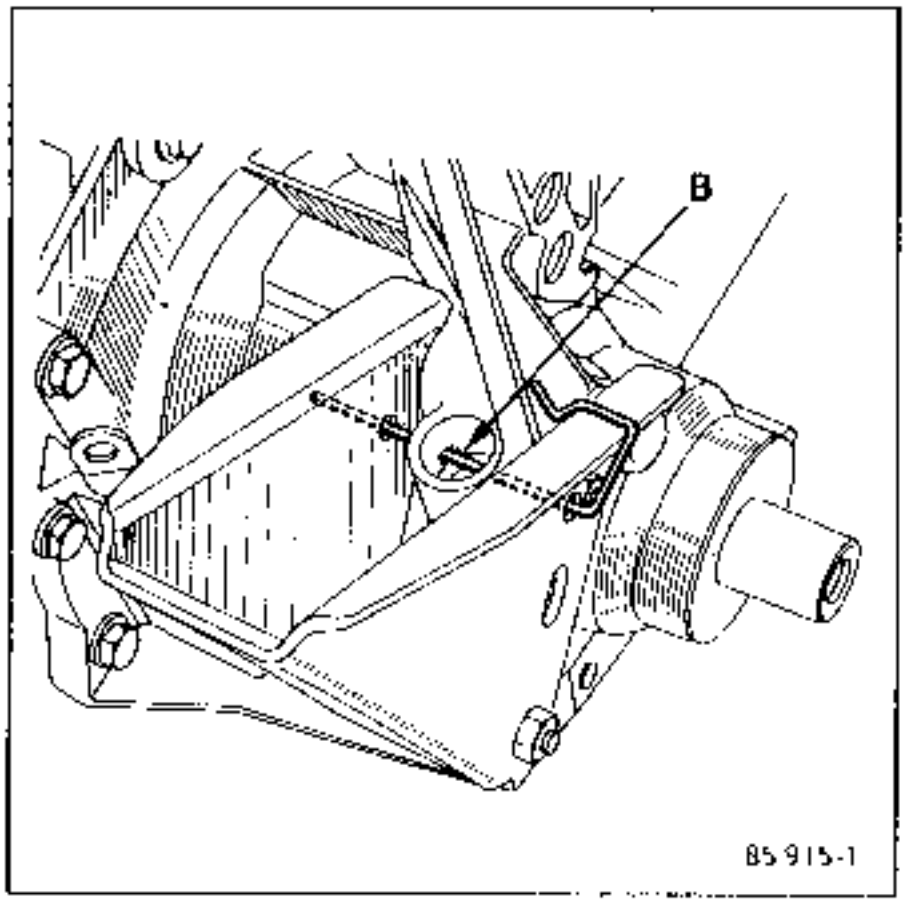
  . heater hoses at the engine,
  . fuel filter heater,
  . injection pump fuel supply and return pipes.

Remove:

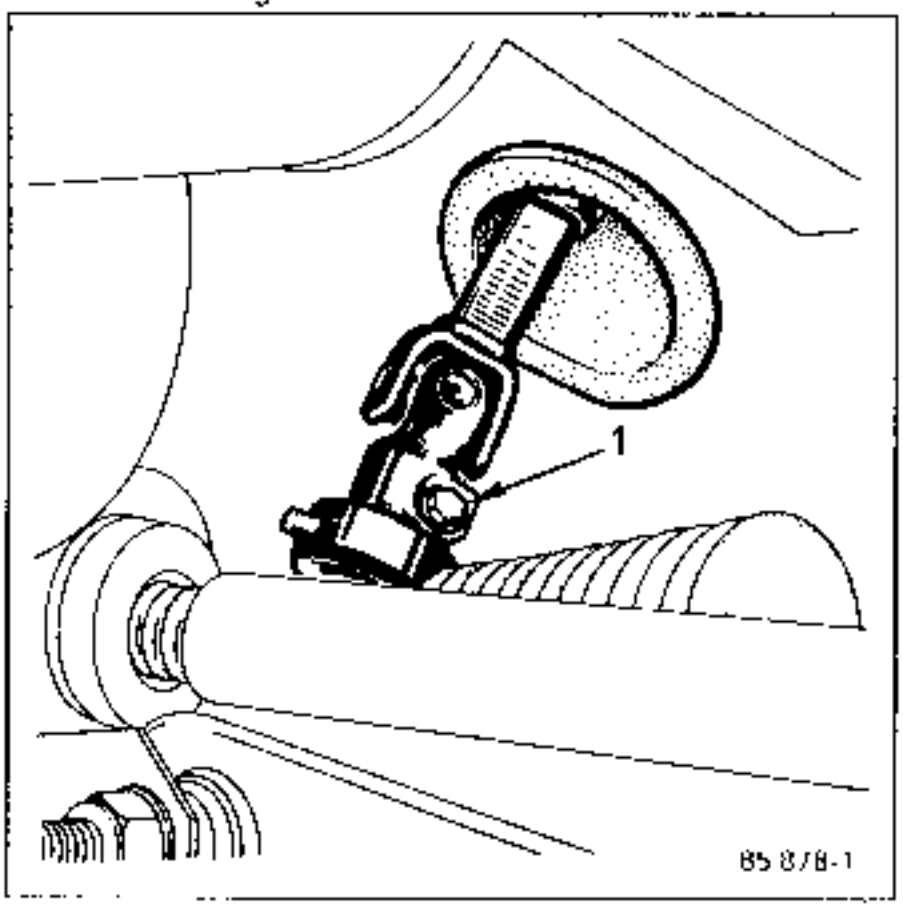
- the air filter,
- the expansion bottle and the power steering reservoir (when applicable), securing them to the engine,

- the following cables:

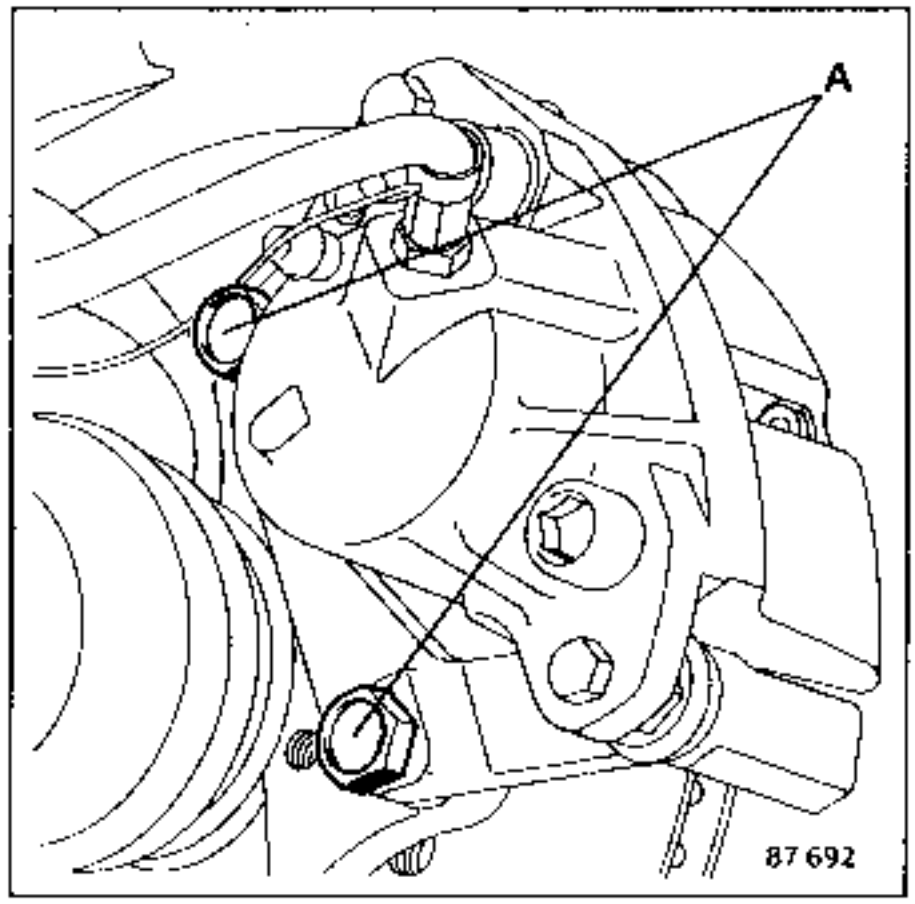
  . clutch,
  . accelerator,
  . speedometer drive, removing clip B.



The steering column universal joint, bolt (1) after marking its position on the steering box.



The brake calipers (bolts A) securing them to the vehicle body.



Loosen the sub-frame securing bolts.

Fit the dummy sub-frame Mot. 1040.

Sub-frame Mot. 1040 will have to be modified, as follows, to carry out this operation:

Drill 2 holes 11mm in diameter at a between centres dimension of 670mm and make up 2 securing lugs (see below).

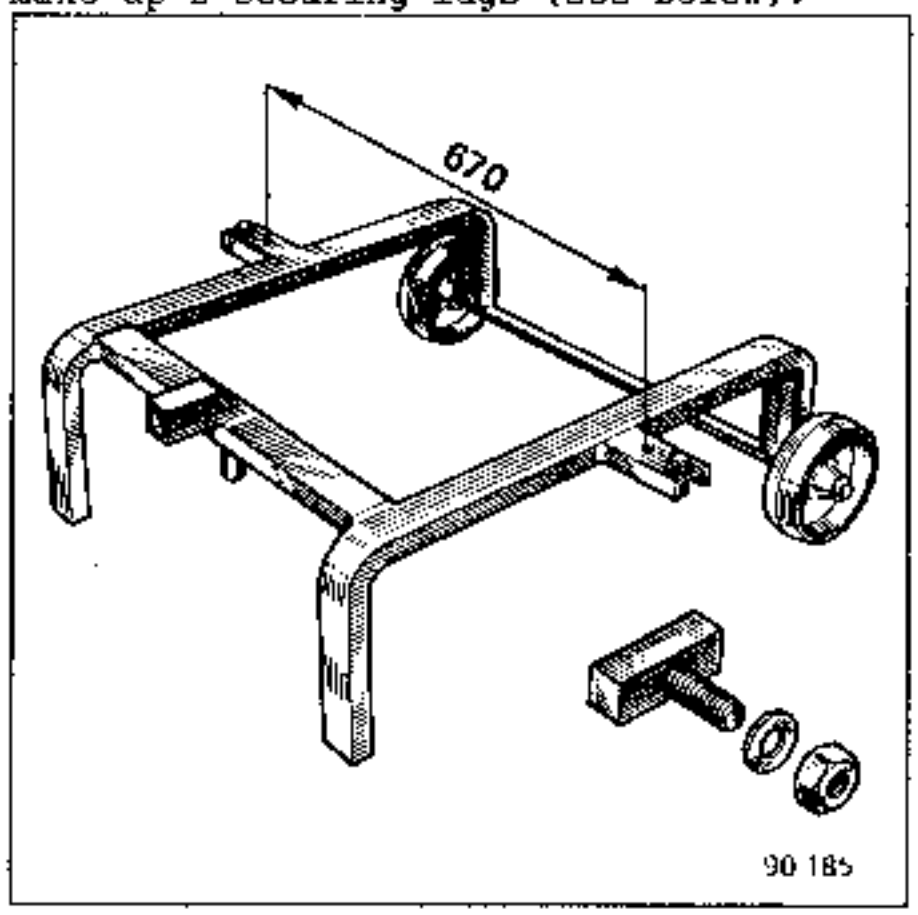
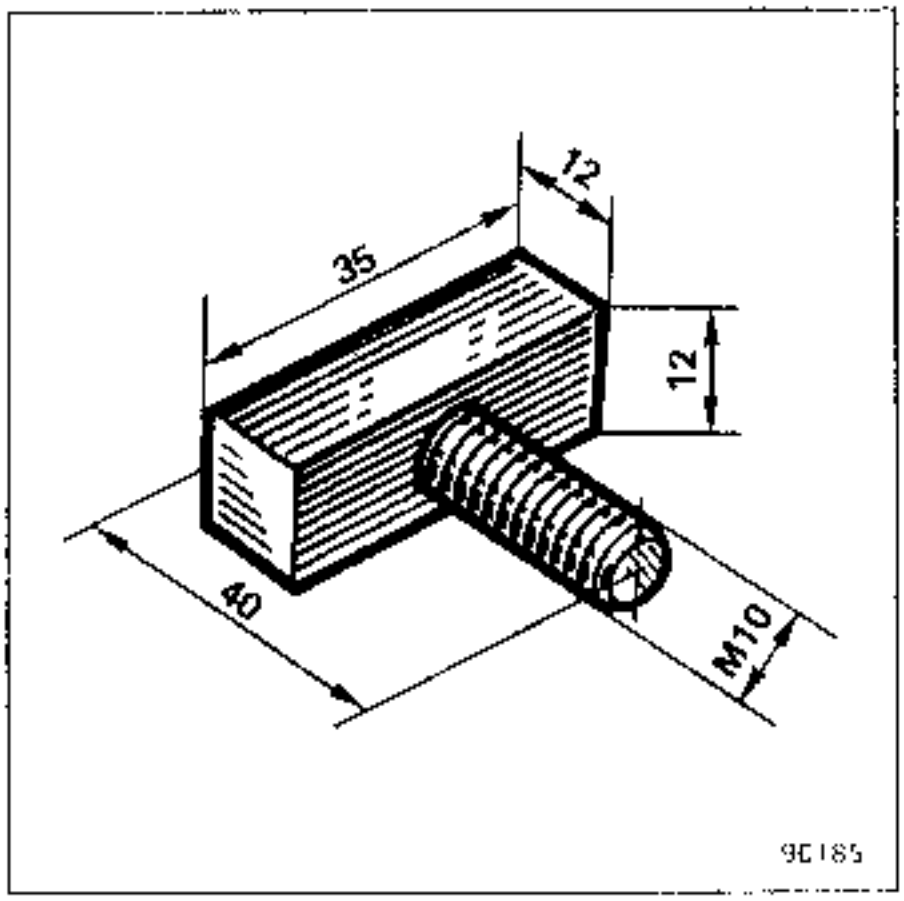
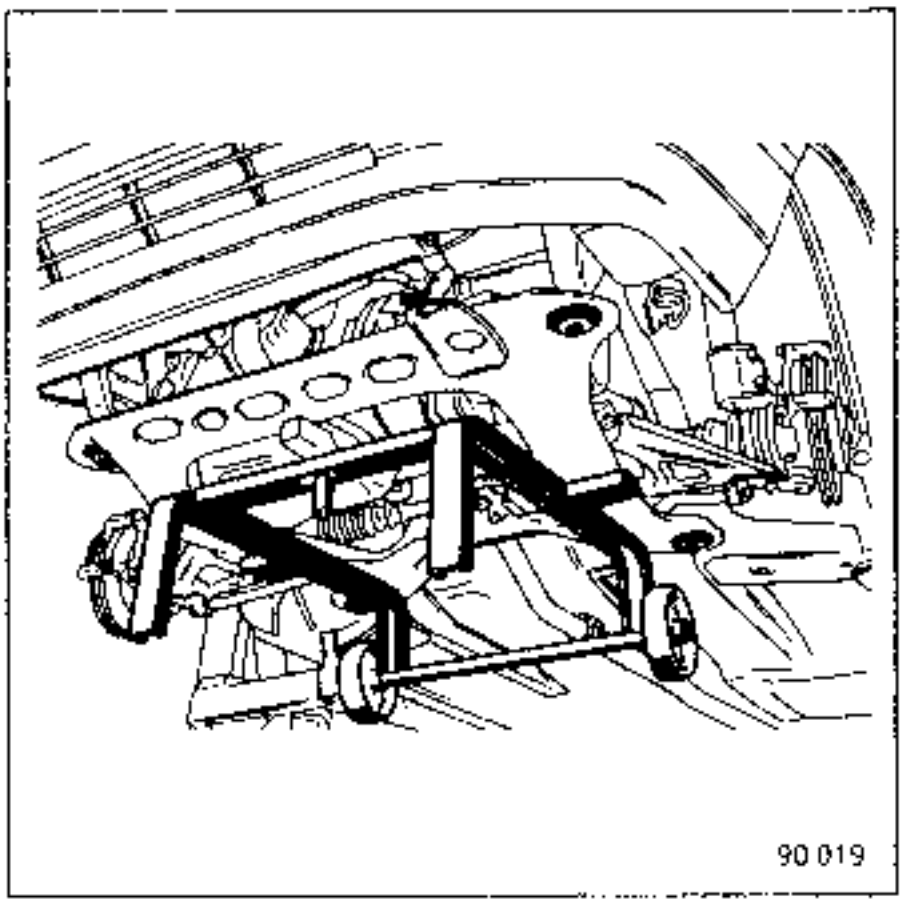


DIAGRAM OF TOOLS TO BE MADE LOCALLY
(Dimensions in mm)



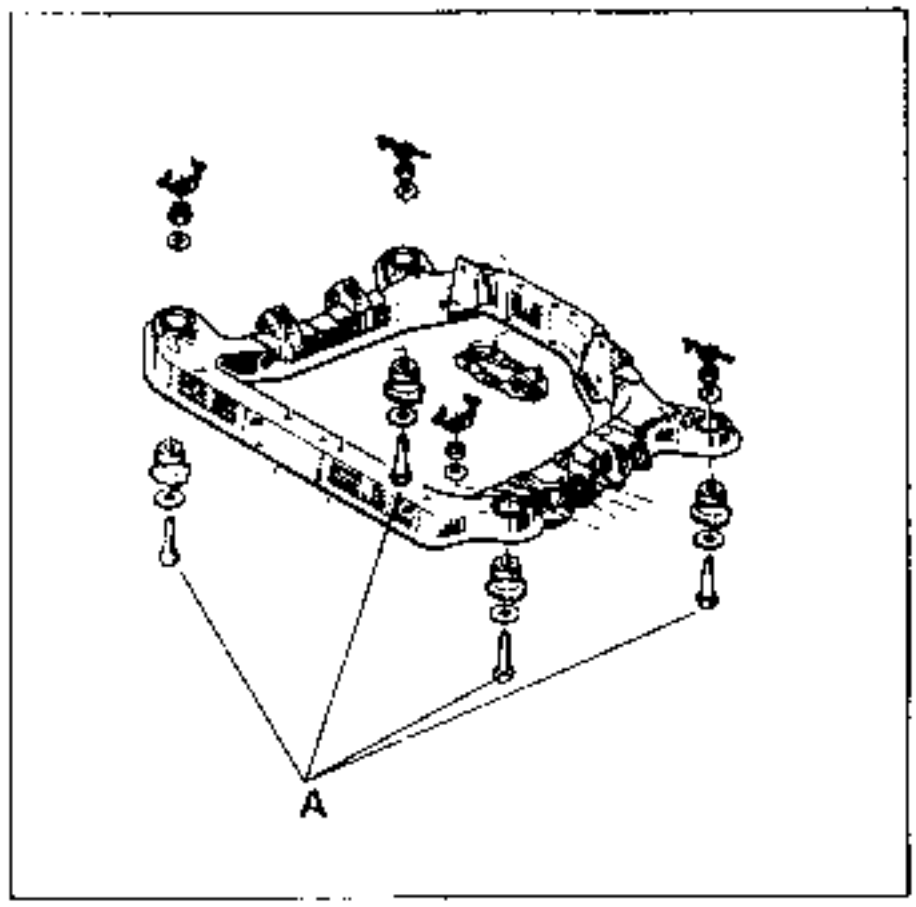
Then fit these to the dummy sub-frame.



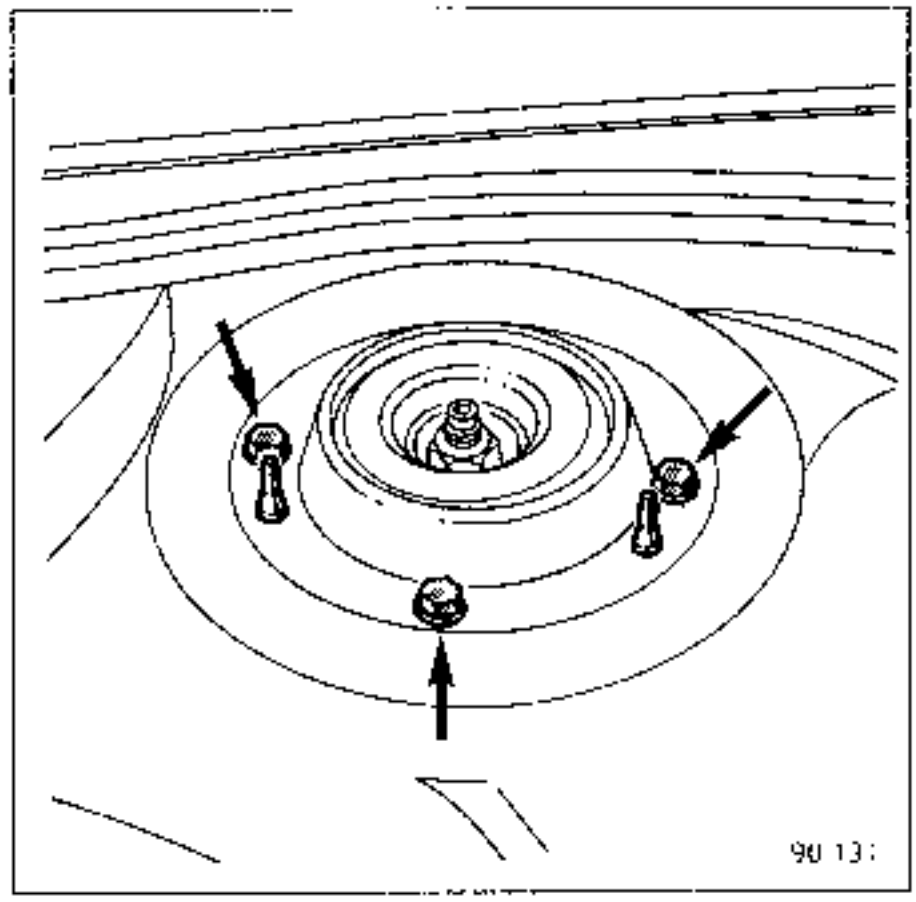
Lower the lift until the dummy sub-frame makes contact with the floor.

Remove:-

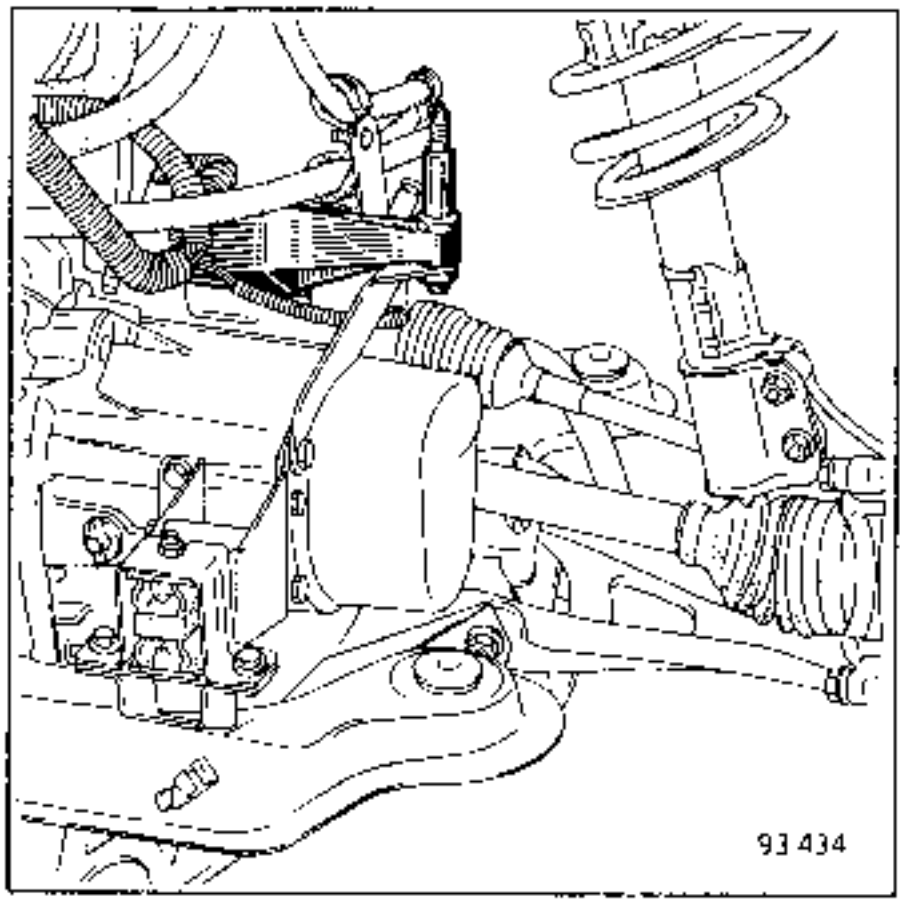
- the four sub-frame securing bolts (A).



- the shock absorber upper cup securing bolts.



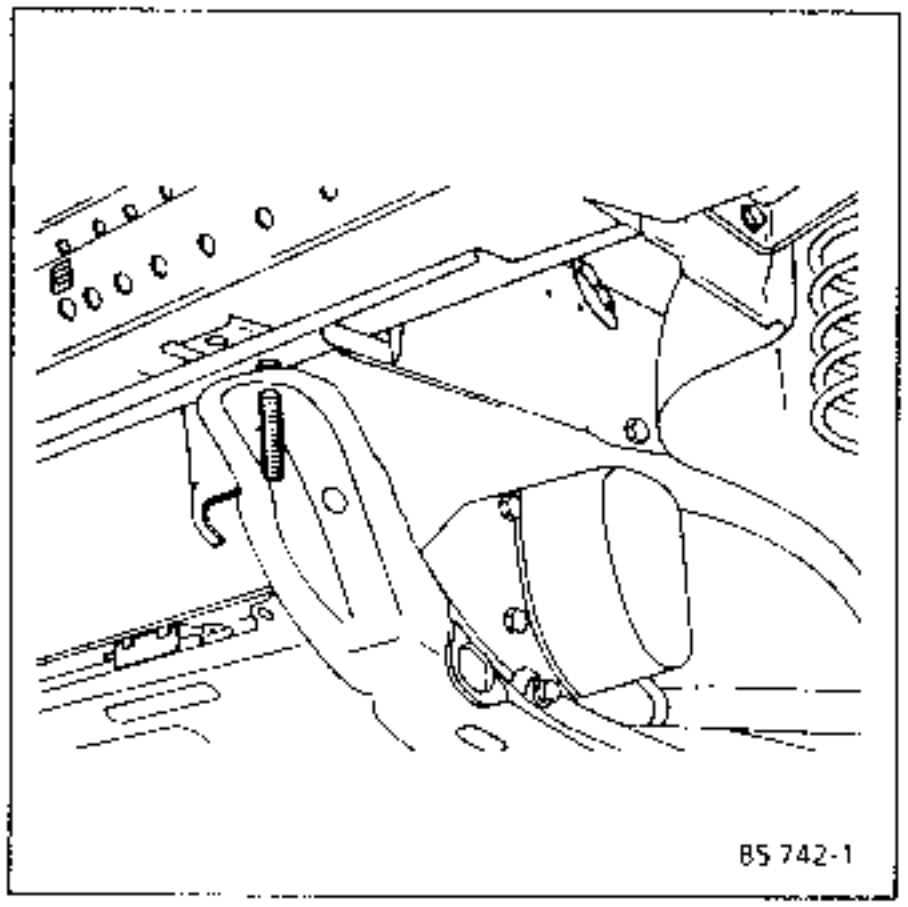
Remove the nut from the suspended flexible mounting and free the screwed rod from the flexible bush by knocking it with a bronze drift.



Lift the vehicle body and take out the power unit assembly.
Secure the spring-shock absorber assemblies with string.

REFITTING (special points)

It will be found easier to align the engine sub-frame with the body if two screwed rods approximately 100mm long are fitted.



Tighten the nuts and bolts to the specified torques.
Coat the brake caliper securing bolts with Loctite Frenbloc before fitting them.

Press down the brake pedal a number of times to reposition the brake pads.

Fill the engine with oil (if necessary).

- Fill and bleed the cooling system.

- Adjust the accelerator cable.

- Bleed the fuel system.

- Ensure that the steering column universal joint is tightened in the correct position.

REMOVING - REFITTING

ESSENTIAL SPECIAL TOOLS	
Mot 1040-01	Dummy sub-frame for removing and refitting the power unit assembly
T.Av 476	Ball joint extractor

TIGHTENING TORQUES (in daN.m) ▽	
Brake caliper securing bolts	10
Shock absorber cup securing bolts	2,5
Wheel bolts	9
Sub-frame securing bolts	8,5

REMOVING

Disconnect:

- the battery,

- the electrical connectors,

- the accelerator cable,

- the clutch cable,

- the speedometer drive cable.

Drain:

- the cooling system,

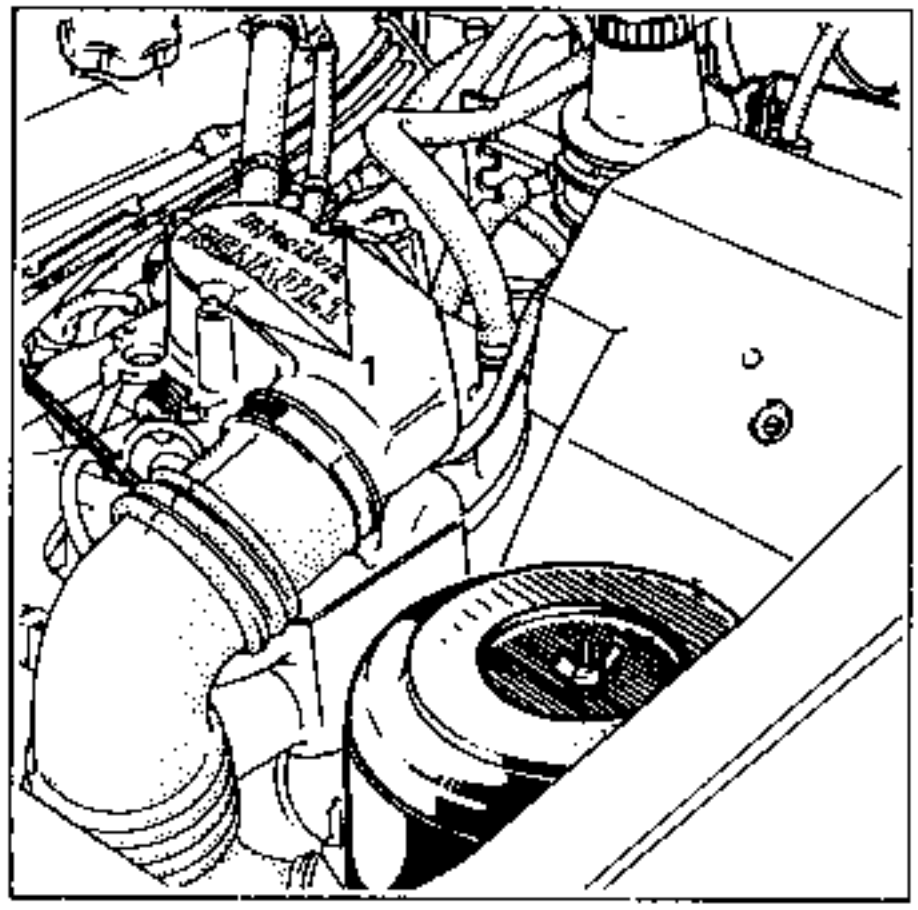
- the engine,)
) if necessary
- the gearbox.)

Disconnect:

- the heater hoses,

- the radiator hoses, leaving the hoses on the vehicle,

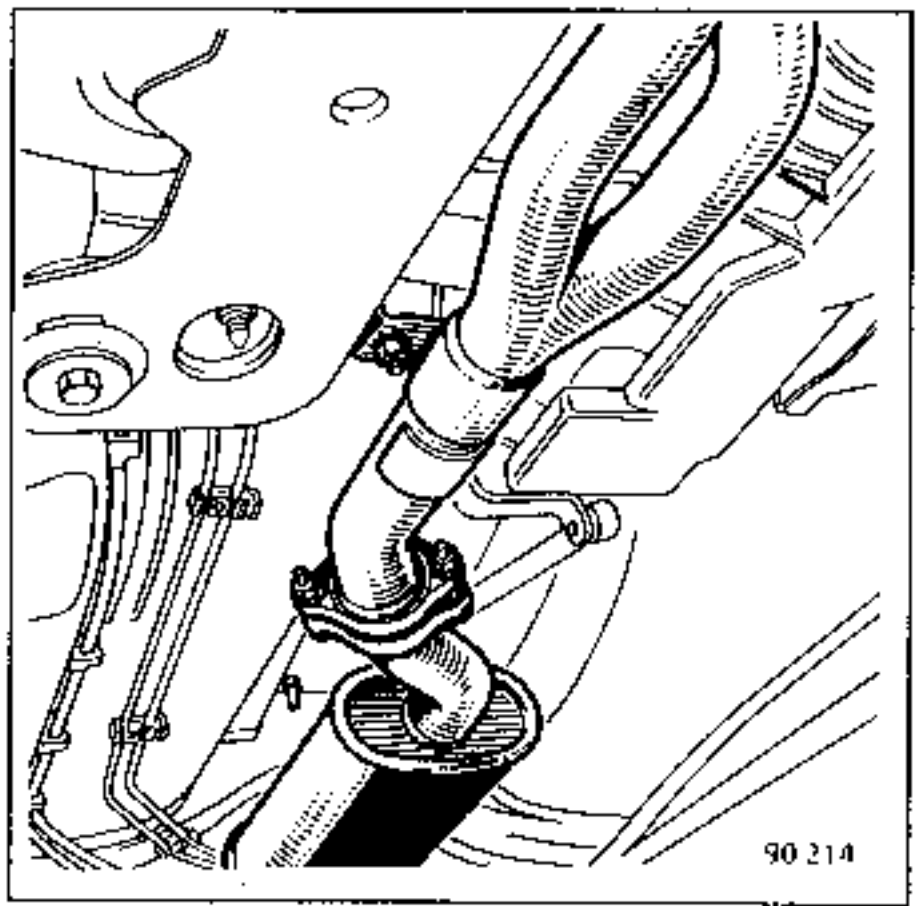
- the earthing braids (Engine and Gearbox).



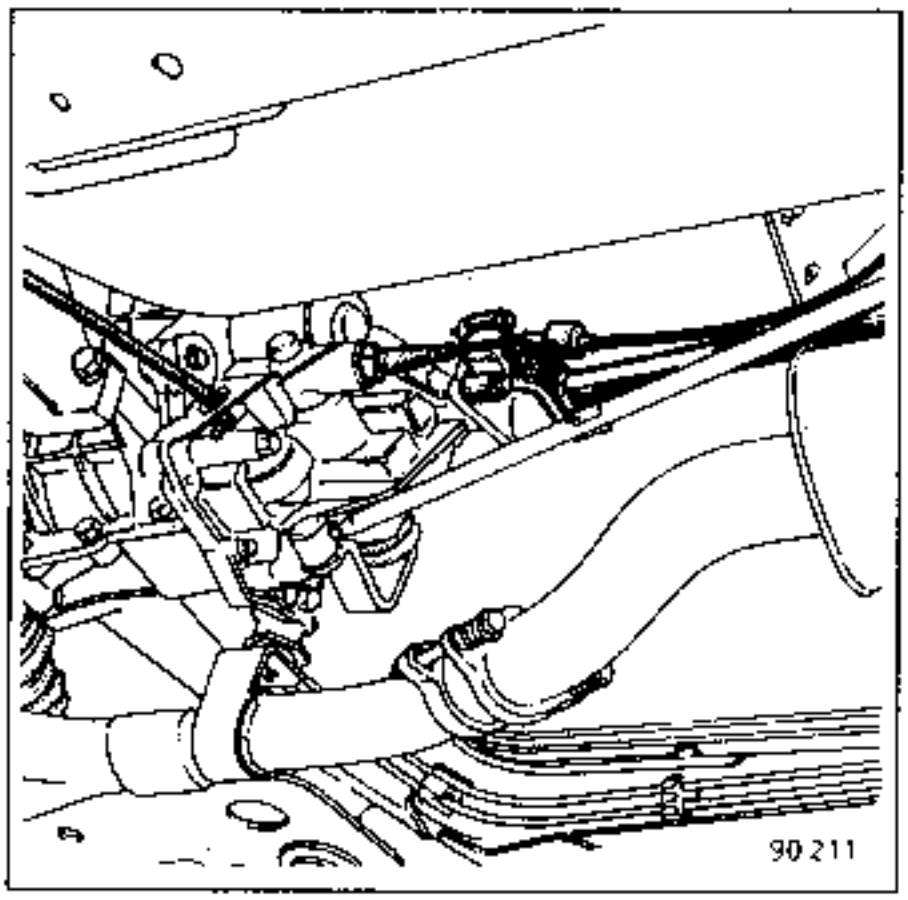
Remove:

- the screws which secure the throttle casing cover (1),

- the exhaust pipe spherical joint,

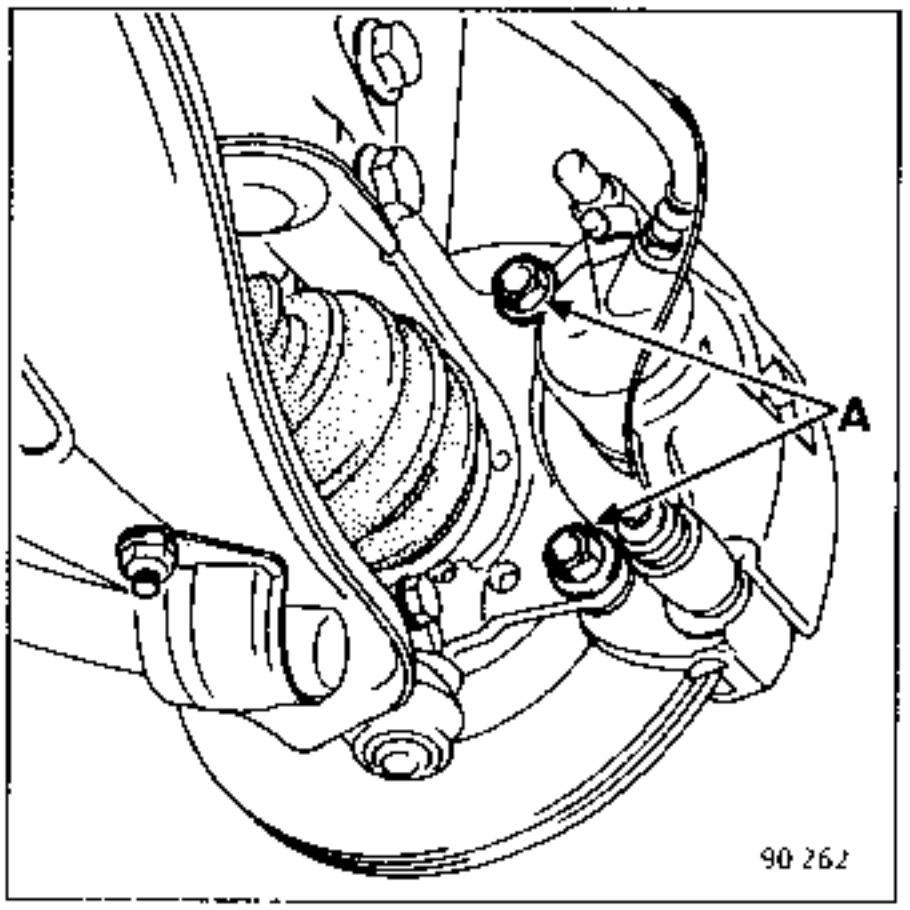


- the gear shift controls,

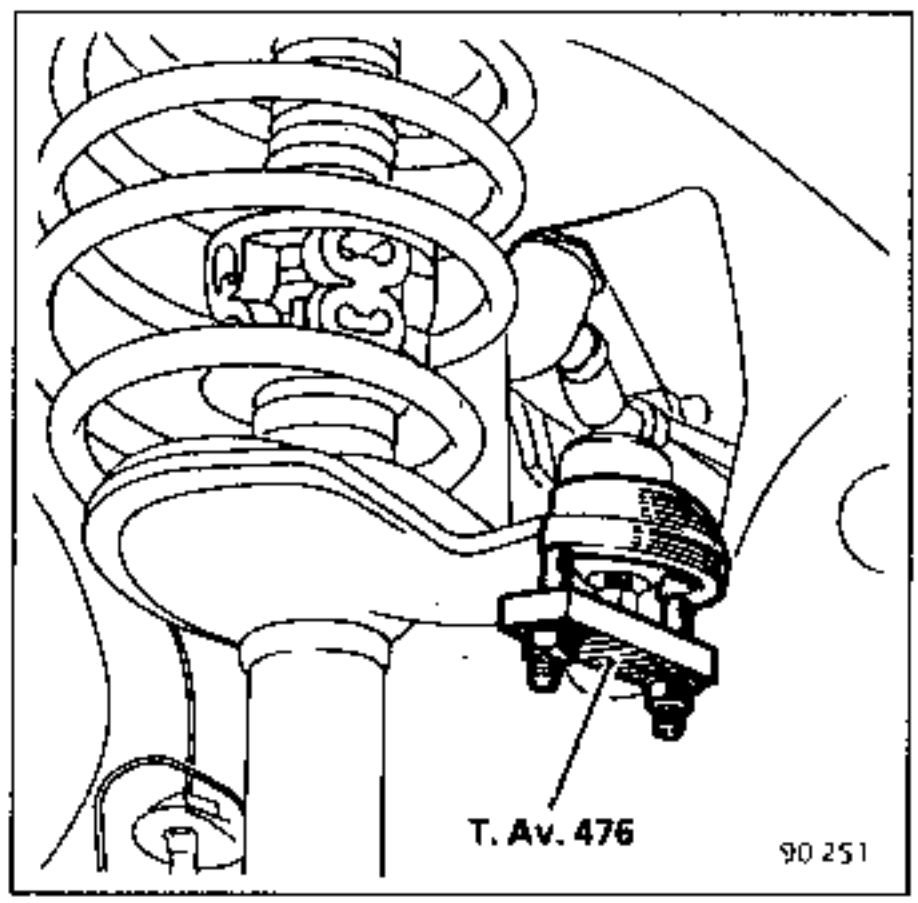


- the wheels,

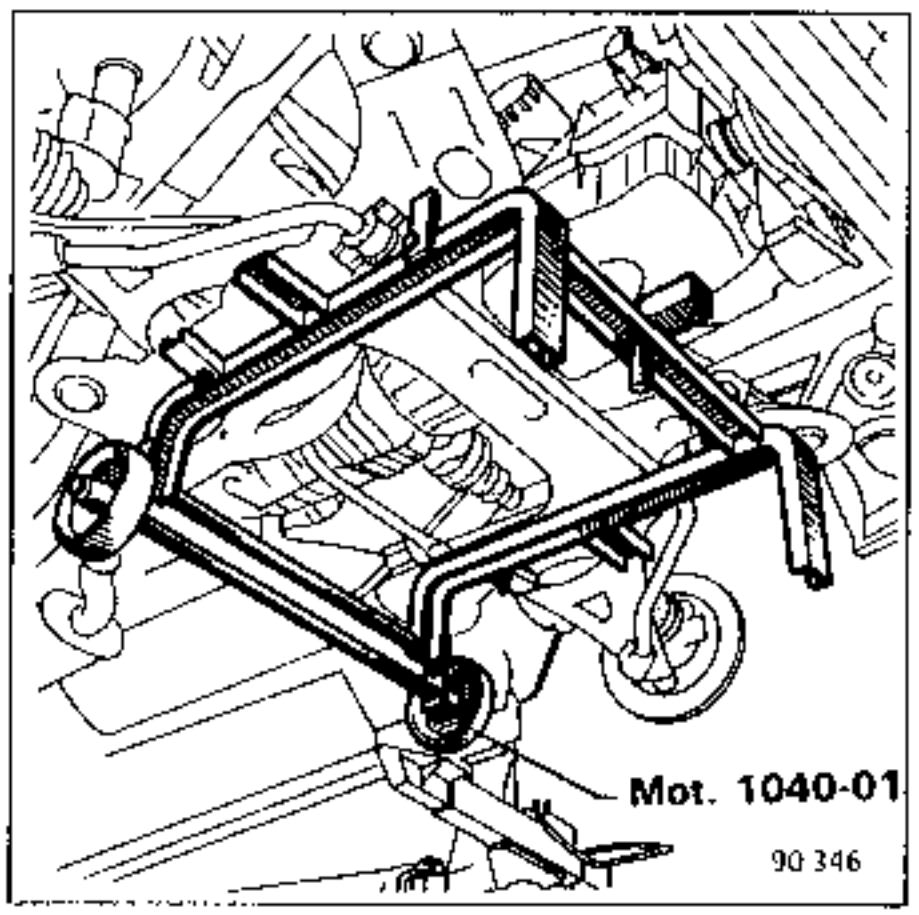
- the brake calipers (bolts A) and secure the calipers to the body.



- the steering ball joints, using tool T.Av.476.



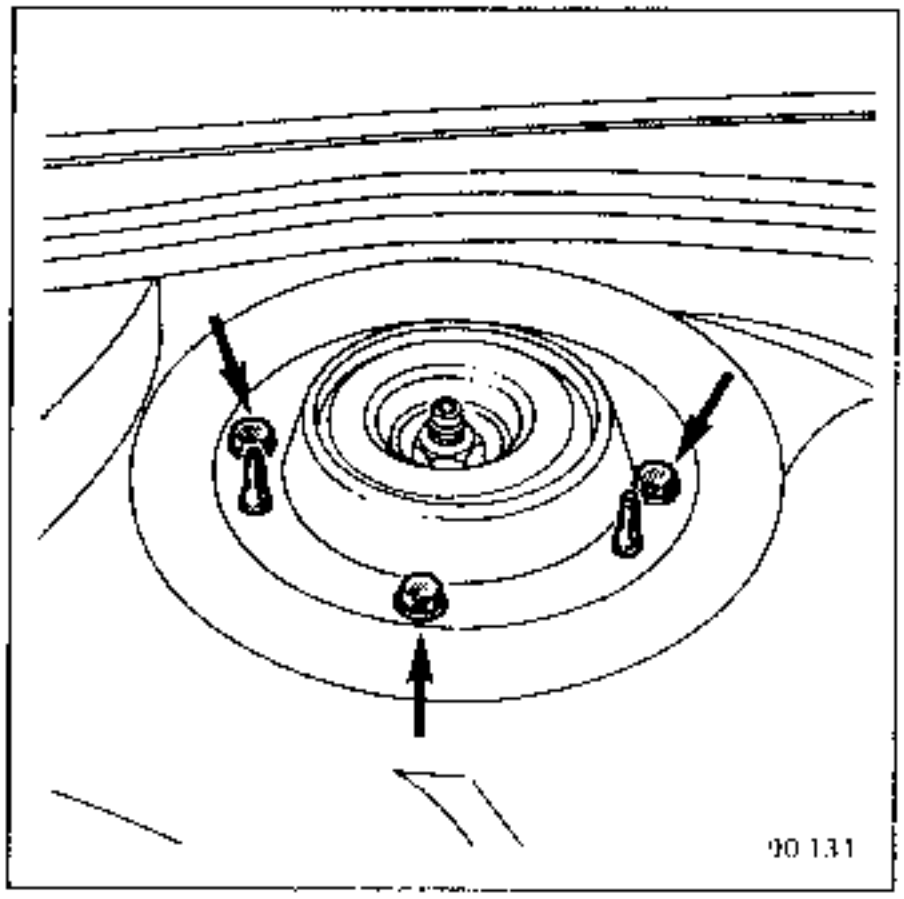
Fit dummy sub-frame 1040-01 to the engine sub-frame.



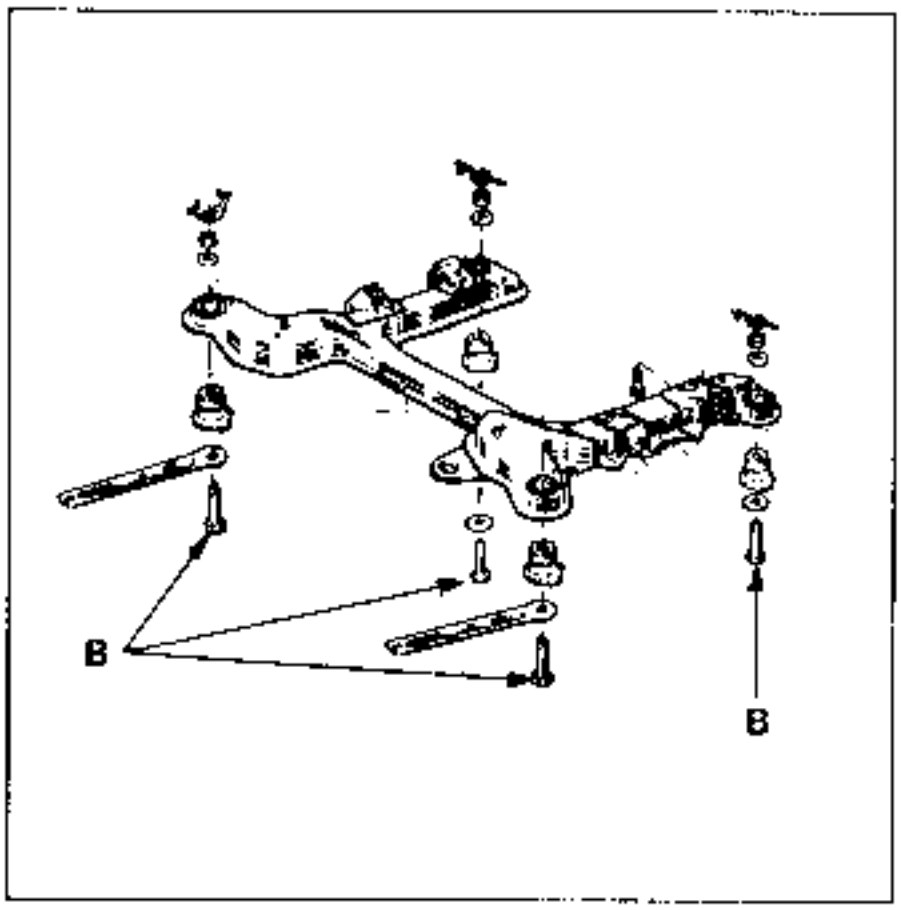
Lower the vehicle, fitted with sub-frame Mot. 1040-01 to the ground.

Remove:

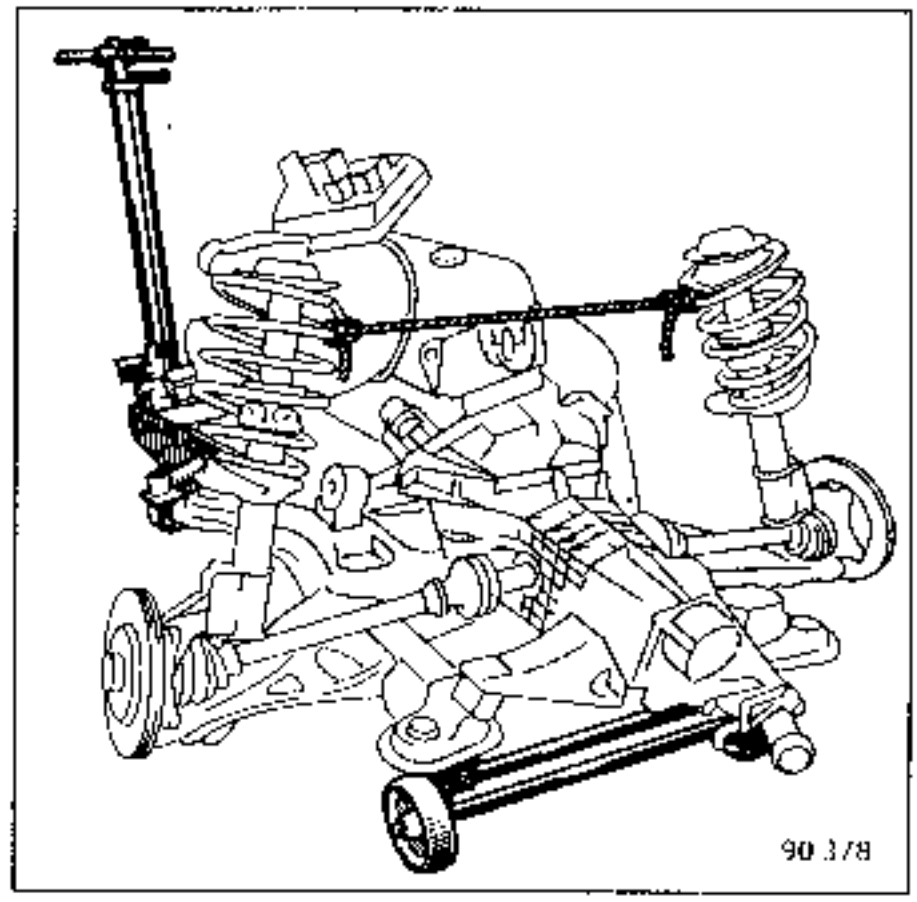
- the shock absorber upper cup securing bolts,



- the sub-frame securing bolts (B).



Take out the power unit assembly by lifting the body.



Secure the spring-shock absorber assemblies with string.

REFITTING (special points)

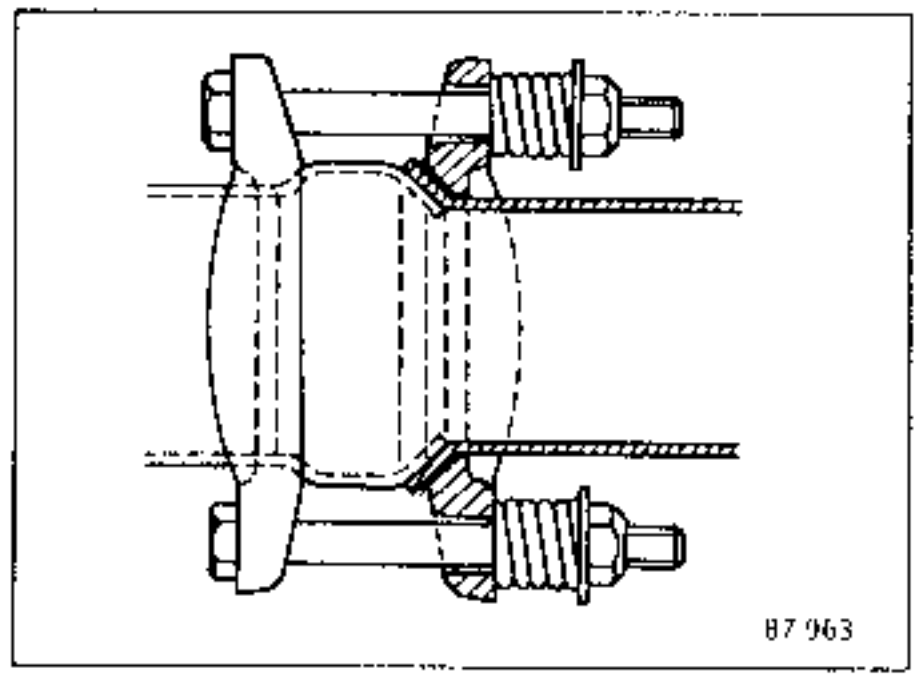
Aligning the body with the engine sub-frame can be made easier by using screwed rods approximately 100mm long.

Tighten the nuts and bolts to the specified torques.

Fill the engine and gearbox with oil (if necessary).

Fill and bleed the cooling system.
Adjust the accelerator cable.

Tighten the exhaust clamp, fitting the springs and the anti-rattle bush.



The spherical joint is sufficiently tight as soon as an effective seal between the 2 pipes is obtained.

REMOVING - REFITTING

ESSENTIAL SPECIAL TOOLS	
T.Av. 476	Ball joint extractor
Mot. 1040-01	Dummy sub-frame for removing and refitting the power unit assembly

TIGHTENING TORQUES (in daN.m)	
Brake caliper securing bolts	10
Shock absorber cup securing bolts	2.5
Steering column ball joint	3.5
Wheel bolts	10
Sub-frame securing bolts	8.5

REMOVING

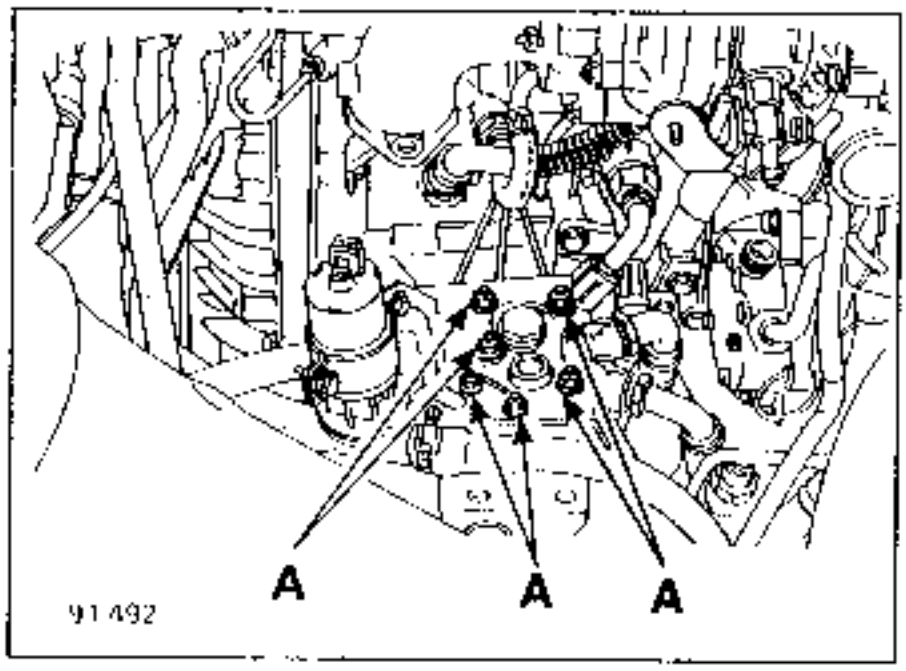
Remove the bonnet.

Disconnect:

- the battery,
- the electrical connectors,
- the accelerator and speedometer drive cables,
- the earthing braids (engine and gearbox),
- the fuel pipes.

Remove:

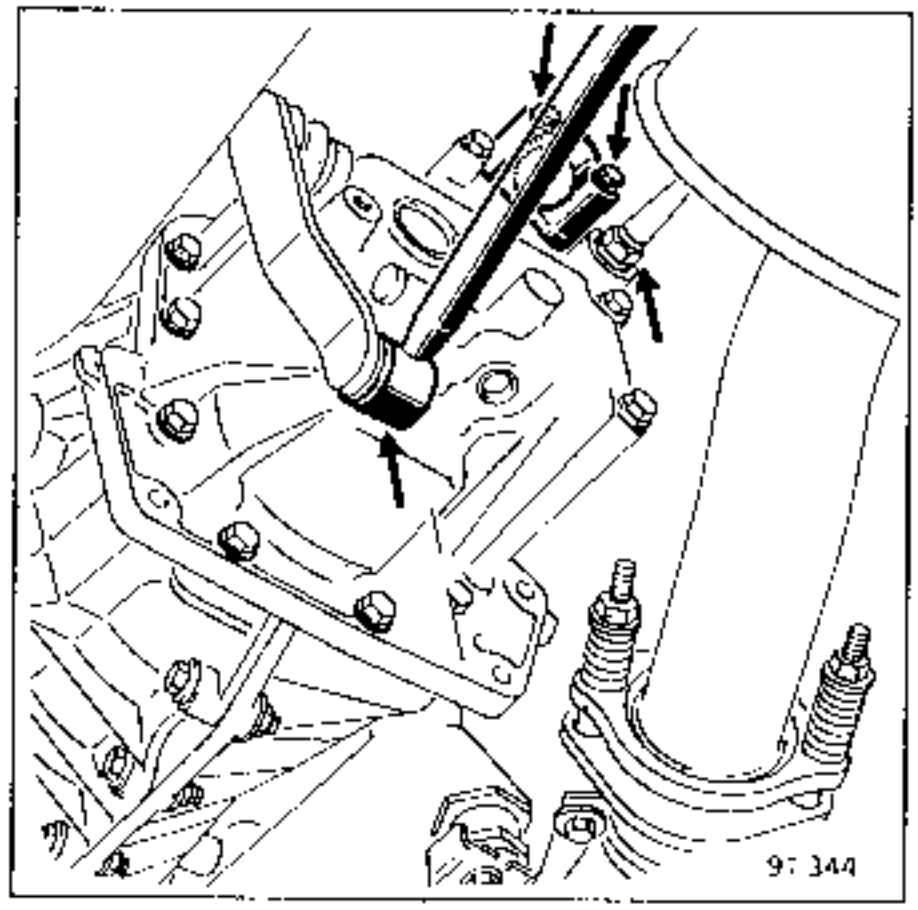
- the air filter together with its ducting. Protect the compressor and intercooler apertures,
- the oil cooler, bolts (A),
- the oil cooler (modine) support.



Drain the cooling, power steering and air conditioning systems.

Disconnect:

- the refrigeration system pipes,
- the cooling system pipes at the radiator and the heater,
- the diagnostic plug and the ignition unit connectors,
- the gear shift control,
- the exhaust pipe clamp.



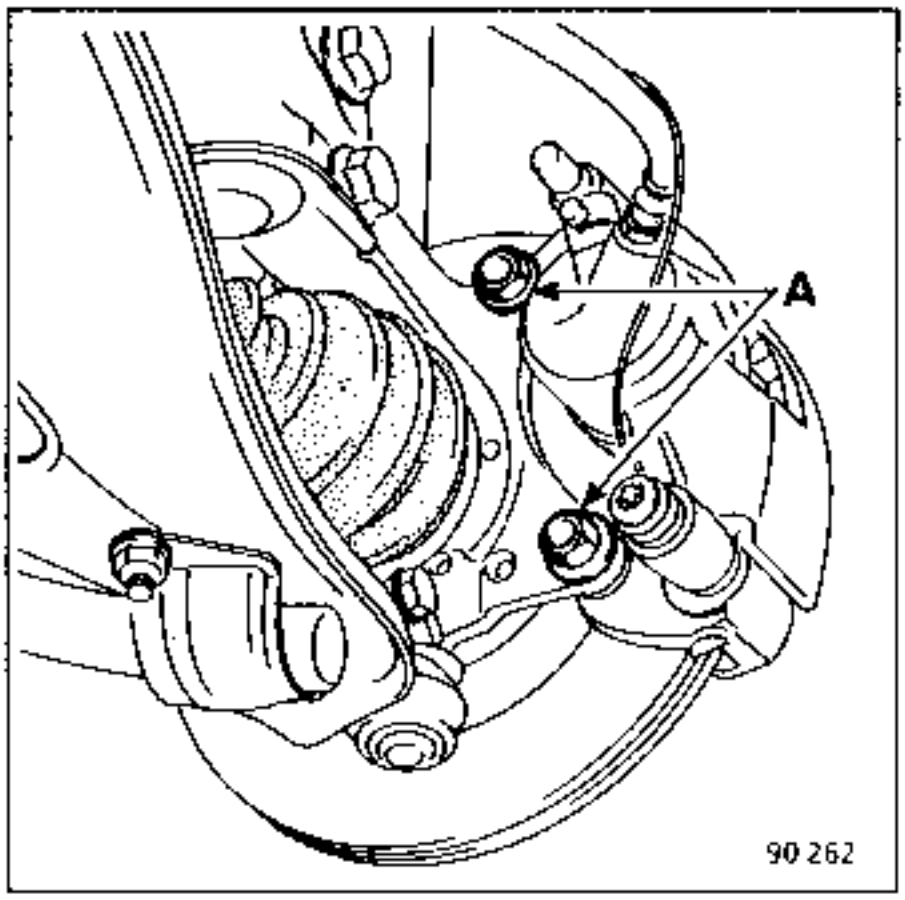
Remove:

- the wheels,

- the brake cooling ducts,

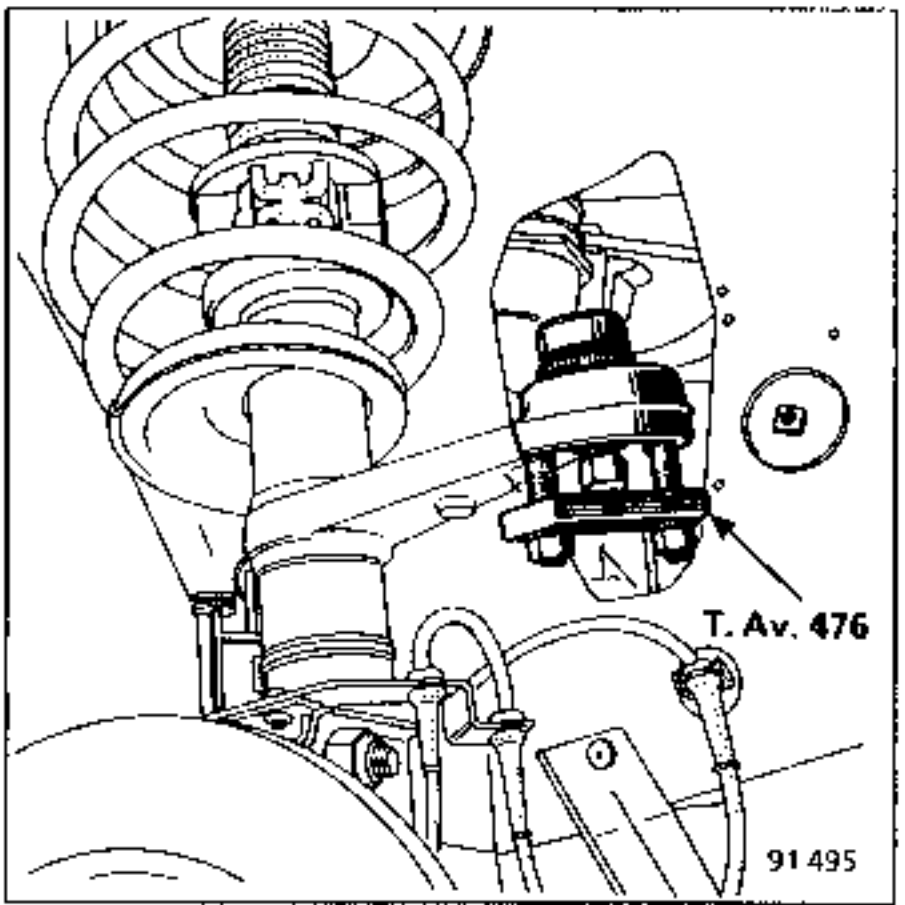
- the wheel sensors (A.B.S),

- the caliper securing bolts (A), securing the calipers to the body.



Disconnect:

- the steering ball joints using tool T.Av.476.



- the 2 pipes from the power steering pump,

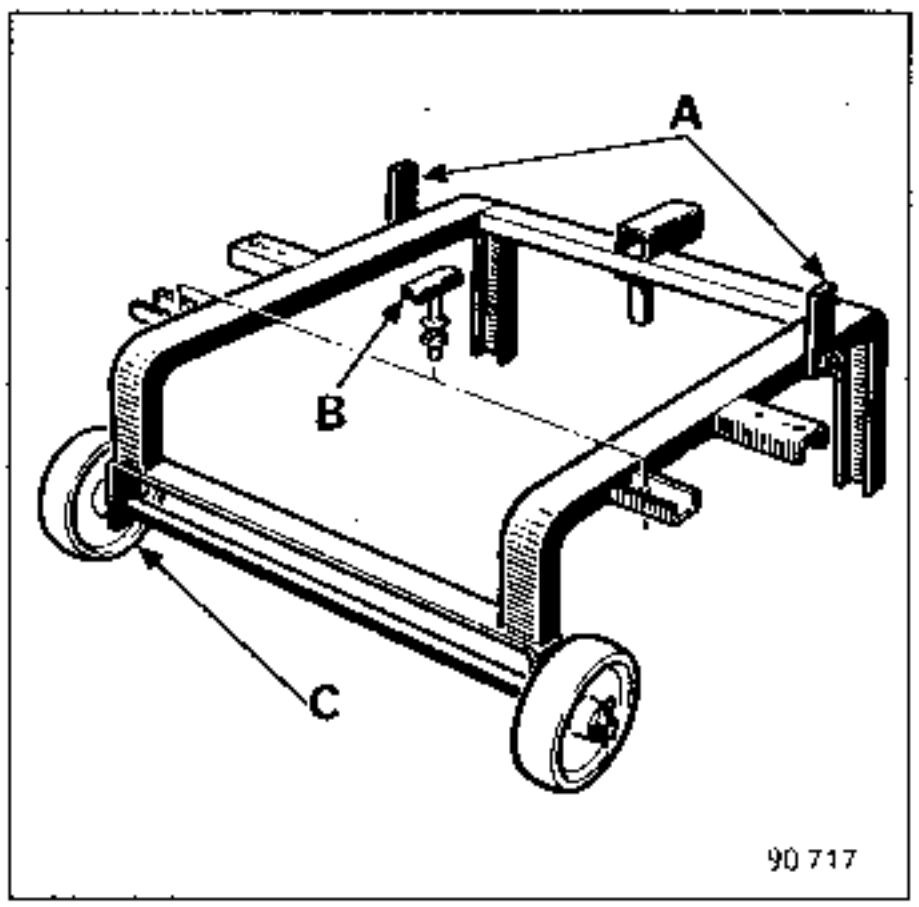
- the clutch slave cylinder pipe, at the union.

Preparing dummy sub-frame Mot.1040-01:

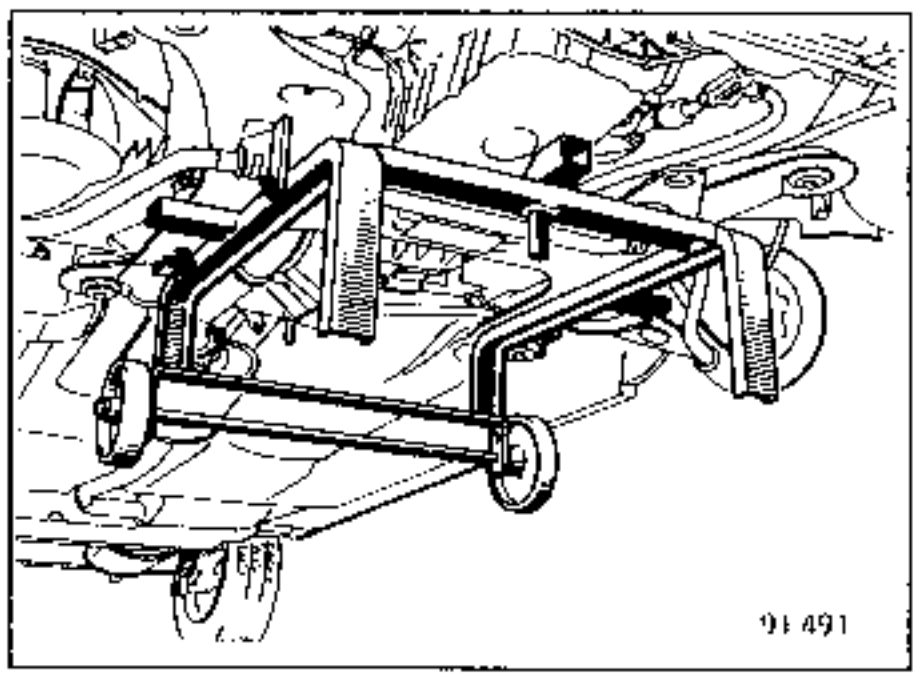
Fit the wheel axle in the lower holes (C).

Lift the retaining lugs (A).

The fastenings, under the sub-frame, consist of hooks, (B).

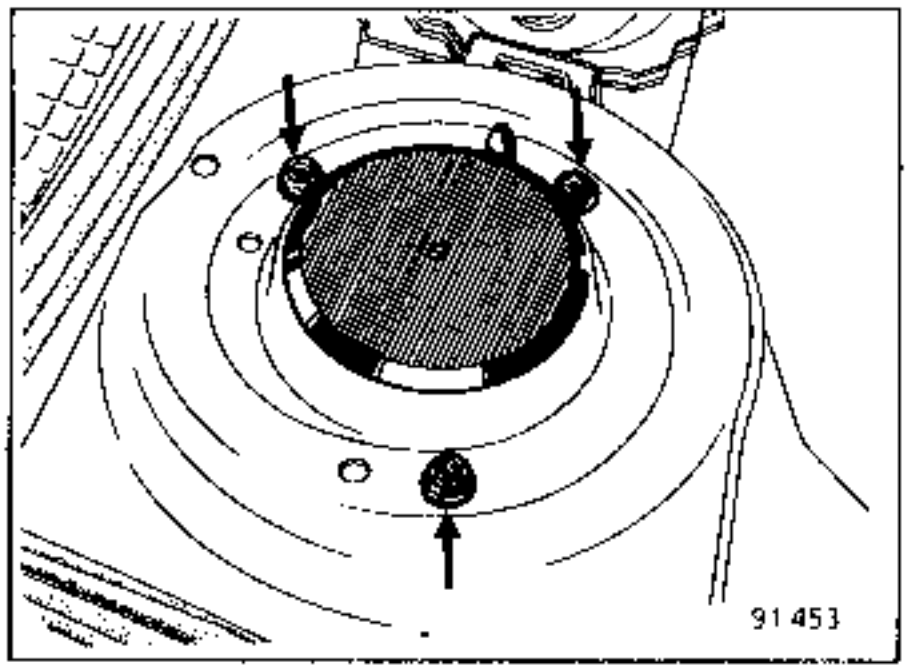


Secure the dummy sub-frame 1040-01 under the engine sub-frame.



Lower the lift until the dummy sub-frame makes contact with the floor.

Remove the shock absorber upper cup securing bolts.

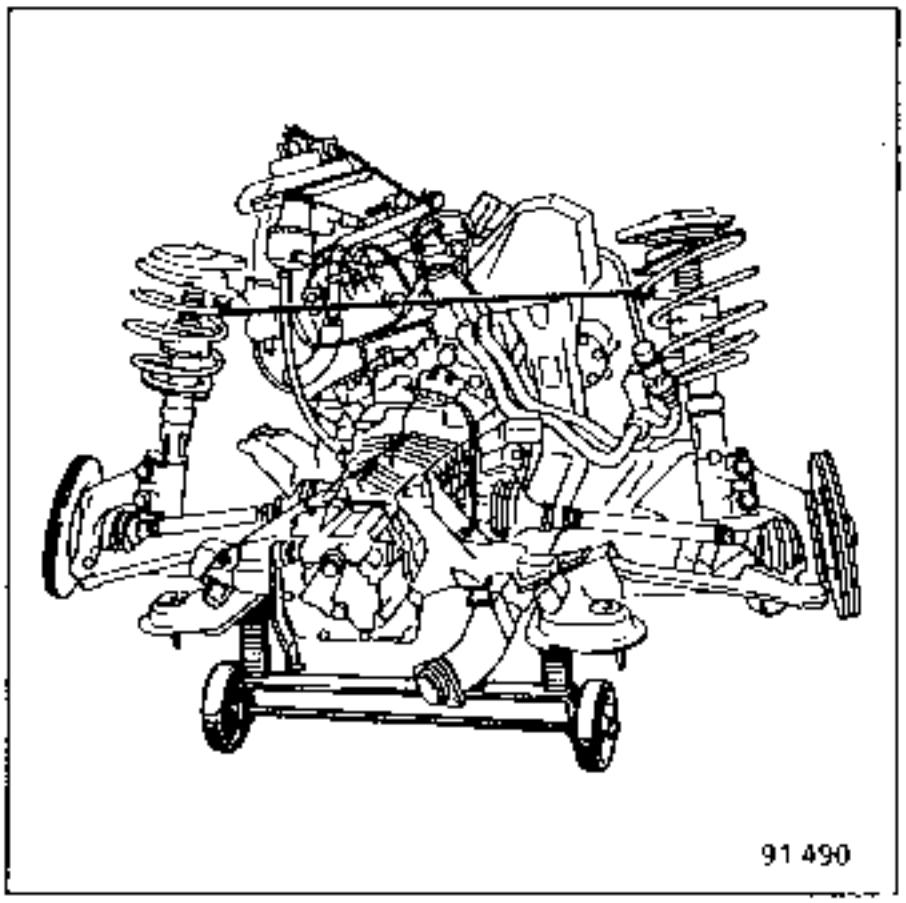


Remove the sub-frame securing bolts.

Place the injection unit on the engine or disconnect it, at its connector, and remove it.

Take out the power unit assembly by lifting the body.

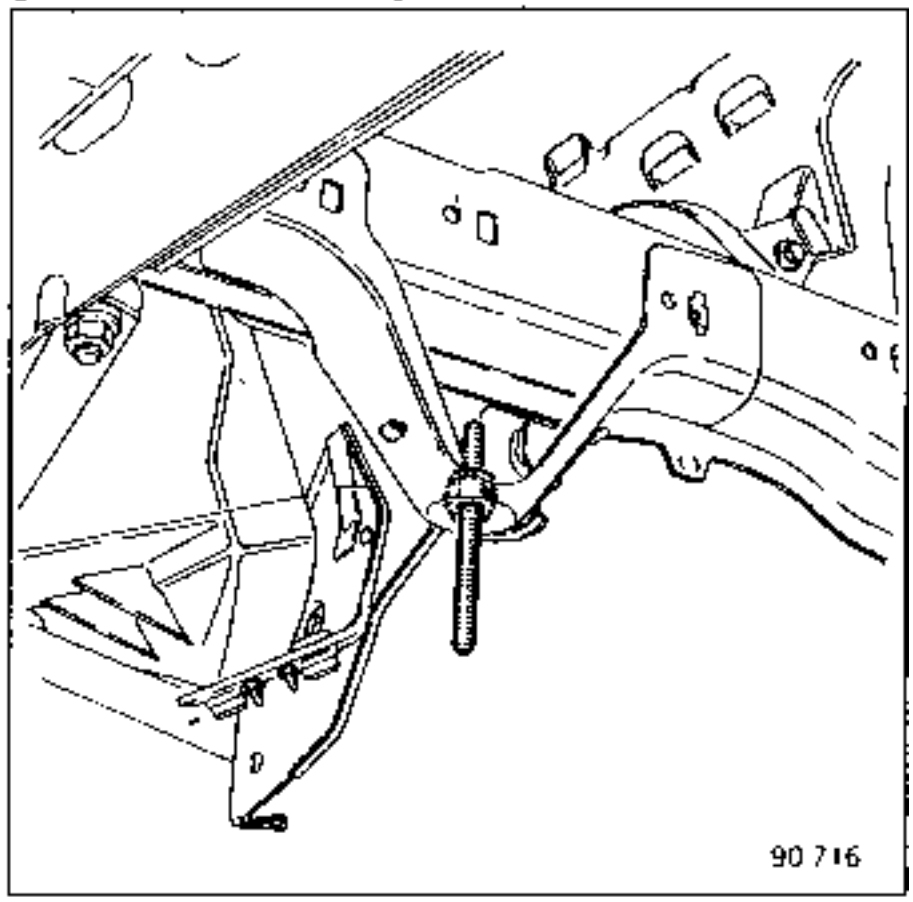
After removal of the power unit assembly:

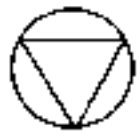


Secure the spring-shock absorber assemblies with string, and also the injection unit.

REFITTING (special points)

Aligning the body with the engine sub-frame can be made easier by fitting two screwed rods approximately 100mm long into the front two sub-frame securing points on the body.





Tighten the nuts and bolts to the specified torques.

Tighten the brake caliper securing bolts to a torque of 10 daN.m after coating the bolts with Loctite FRENBLOC.

Press down the brake pedal a number of times to bring the caliper pistons into contact with the pads.

Adjust the accelerator cable.

Fill and bleed the cooling, power steering, clutch control and air conditioning systems (see the section concerned).

REMOVING - REFITTING

ESSENTIAL SPECIAL TOOLS	
Mot.1040-01	Dummy sub-frame for removing and refitting the power unit assembly.
T.Av.476	Ball joint extractor

TIGHTENING TORQUES (in daN.m) ▽	
Brake caliper securing bolts	10
Shock absorber upper cup securing bolts	2.5
Wheel bolts	9
Sub-frame securing bolts	8.5

Place the vehicle on a 2 column lift and remove the protection from under the engine.

REMOVING

Disconnect:

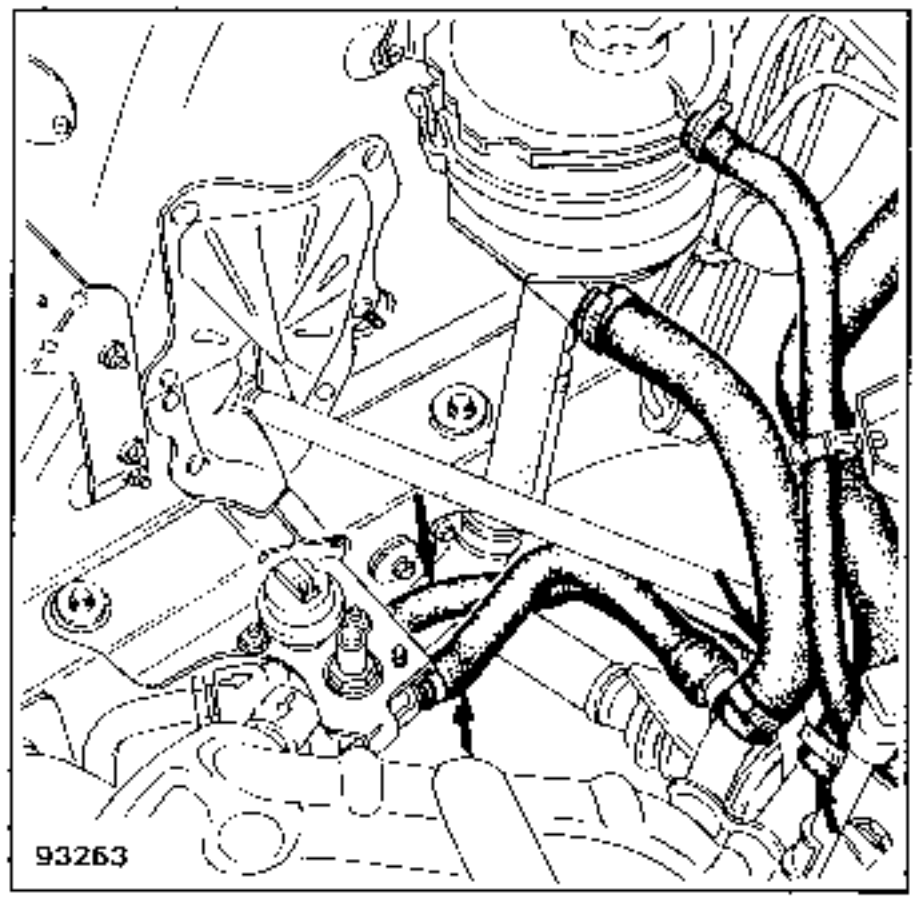
- the battery,
- the electrical connectors,
- the accelerator cable,
- the clutch cable,
- the speedometer drive cable.

Drain:

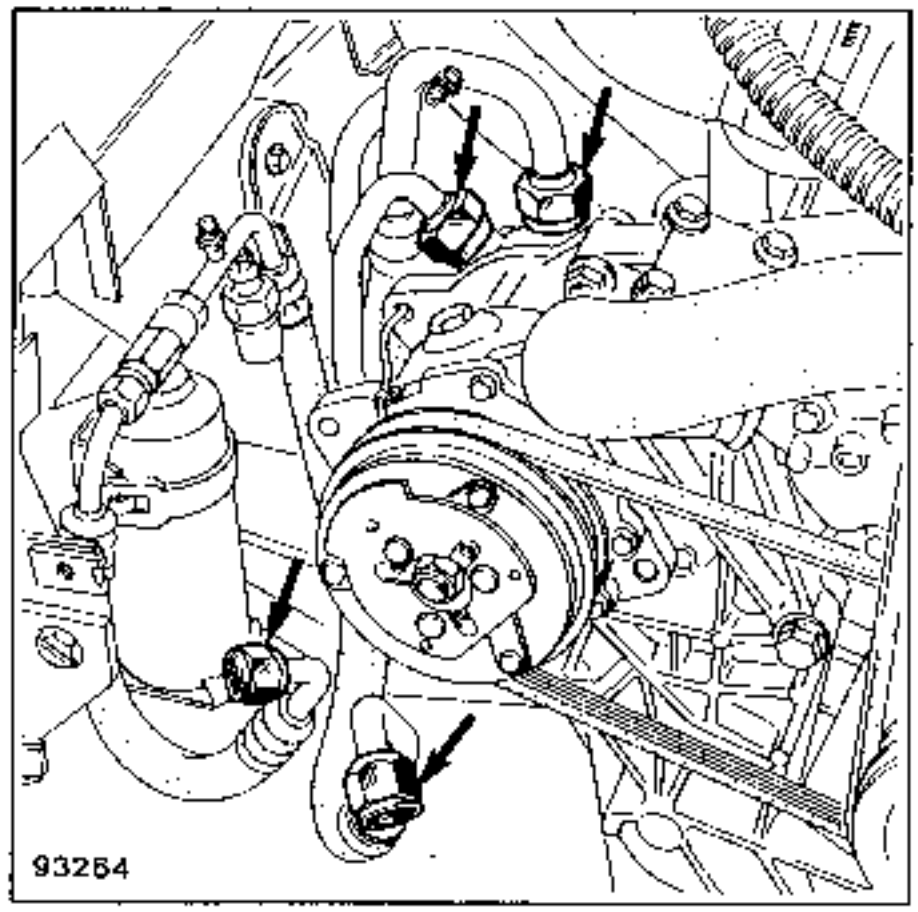
- the cooling system,
- the engine, if necessary,
- the gearbox, if necessary,
- the air conditioning refrigeration circuit.

Disconnect the following pipes and hoses:

- heater hoses at the engine outlets,
- oil filter cooling pipes on the oil cooler,
- fuel pipes,
- vacuum pipes,
- expansion bottle degassing pipes,



- the HP and LP connections on the air conditioning compressor,
- the radiator (this will be left on the vehicle).



Remove:

- the oil filter heater and its support,
- the exhaust manifold clamp,

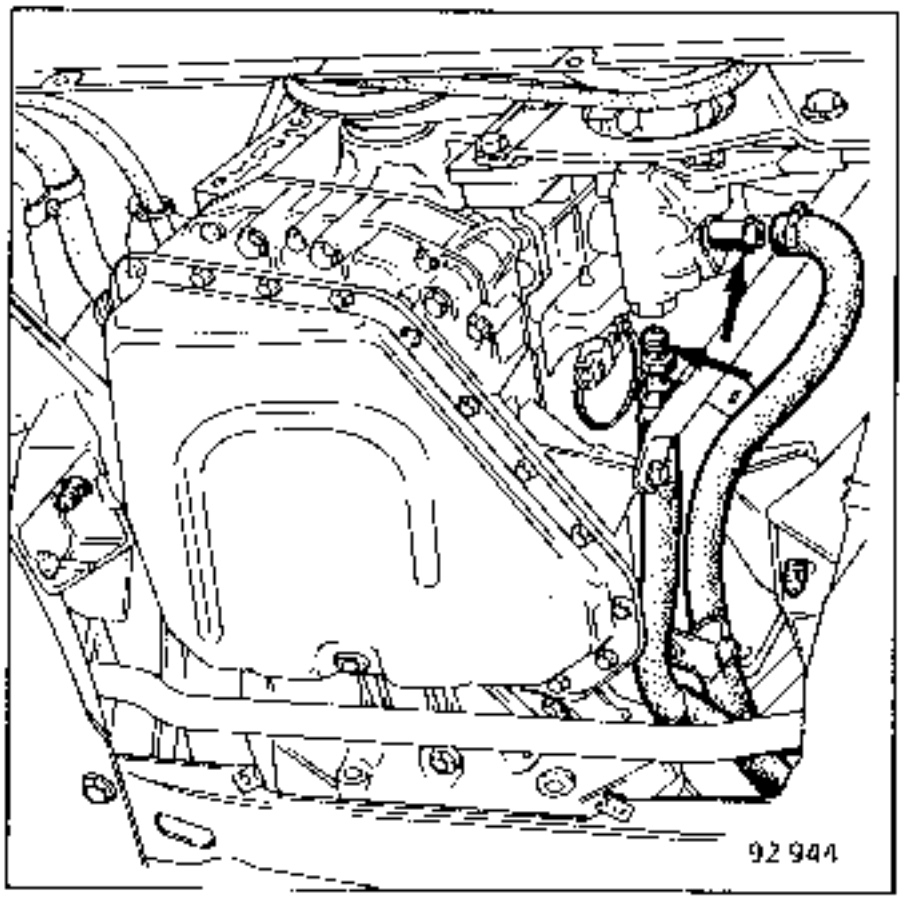
- the air filter and its support,

- the computer, which is to be secured, together with the oil filter heater, to the engine,

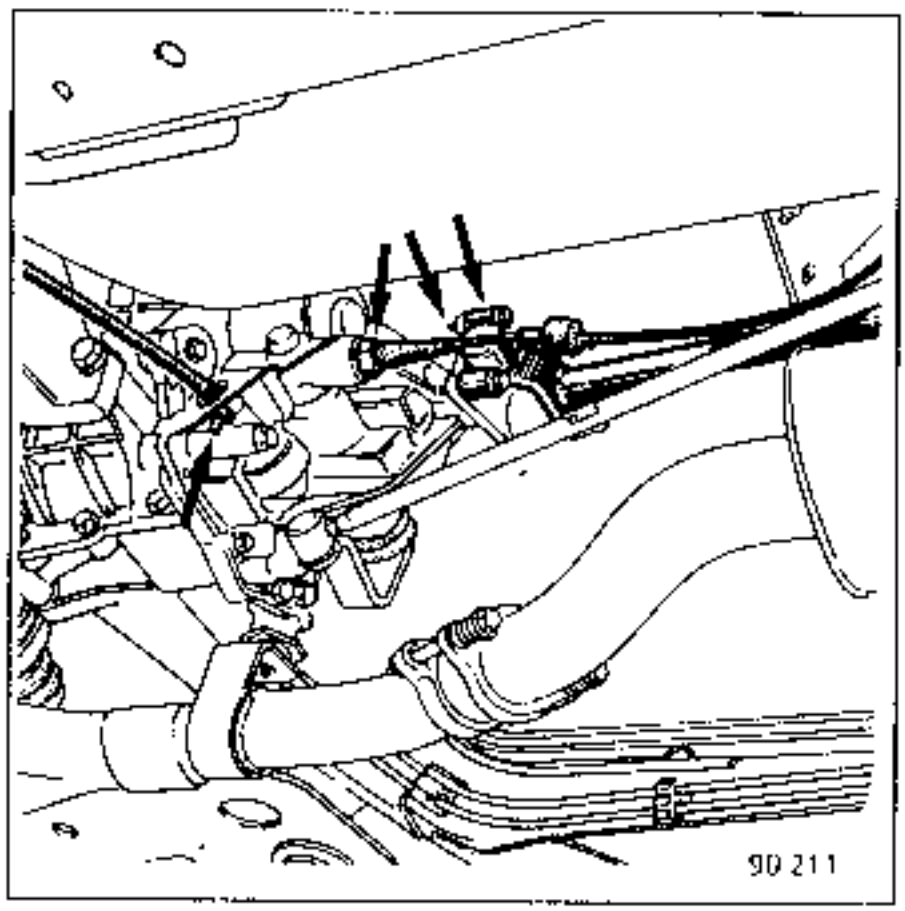
- the exhaust pipe spherical joint,

- the power steering pipe supports,

- the power steering pipes,

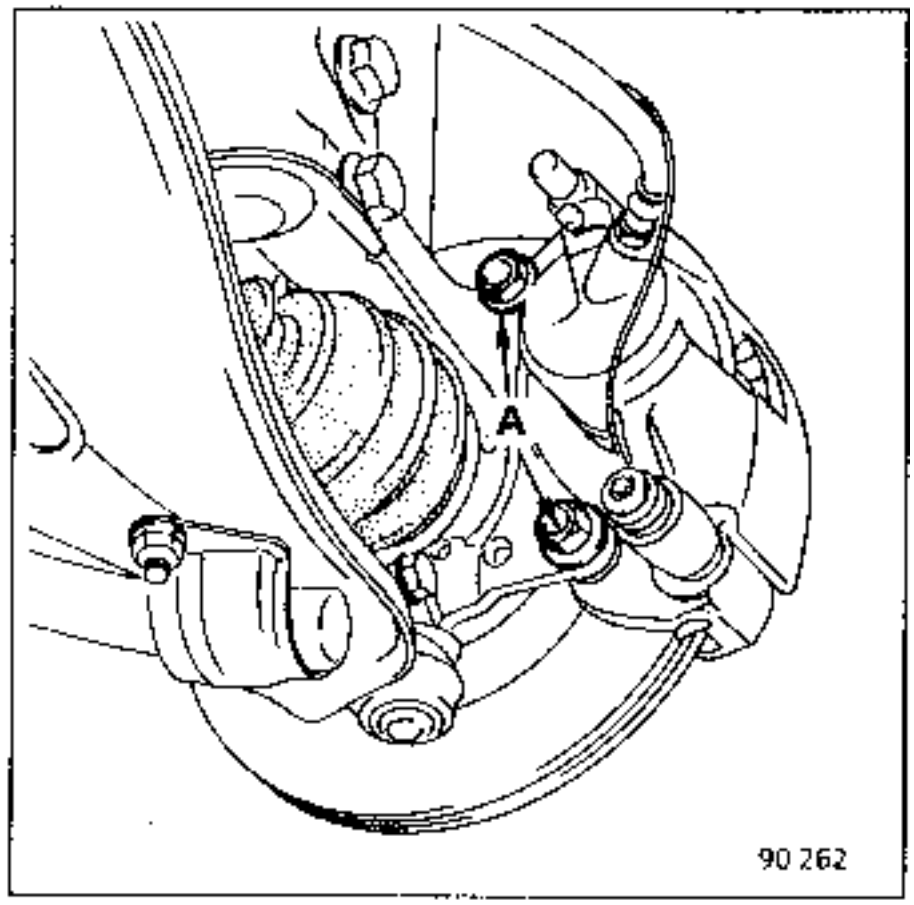


- the gear shift controls,

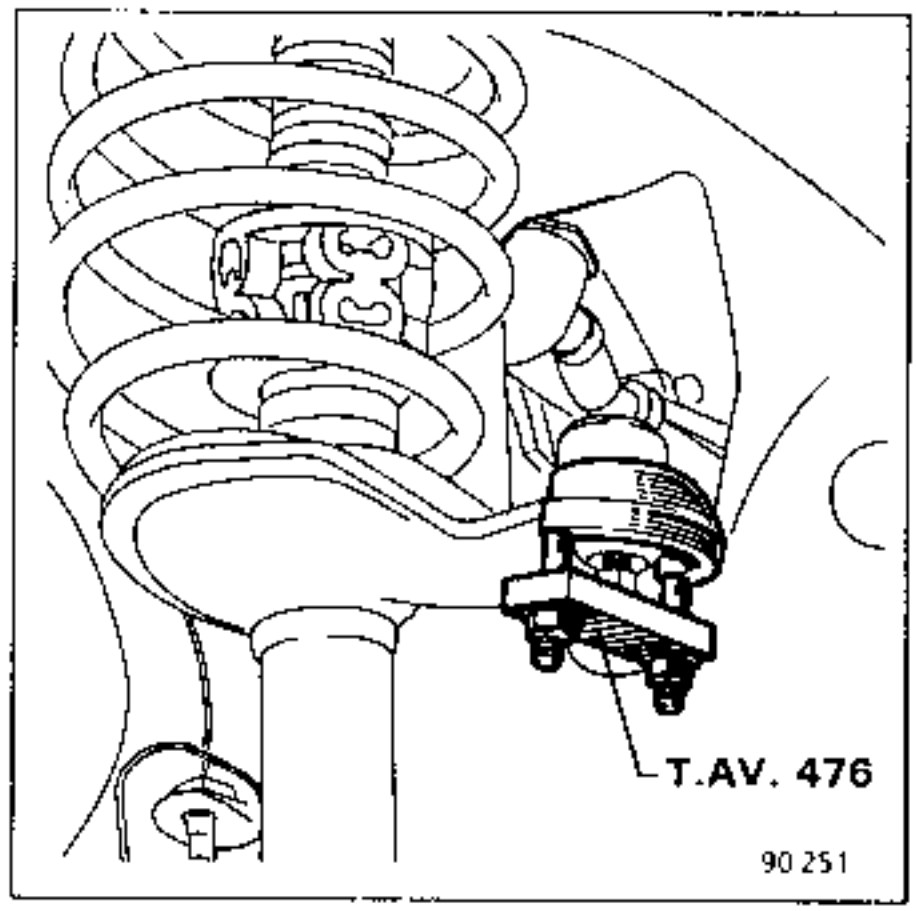


- the wheels,

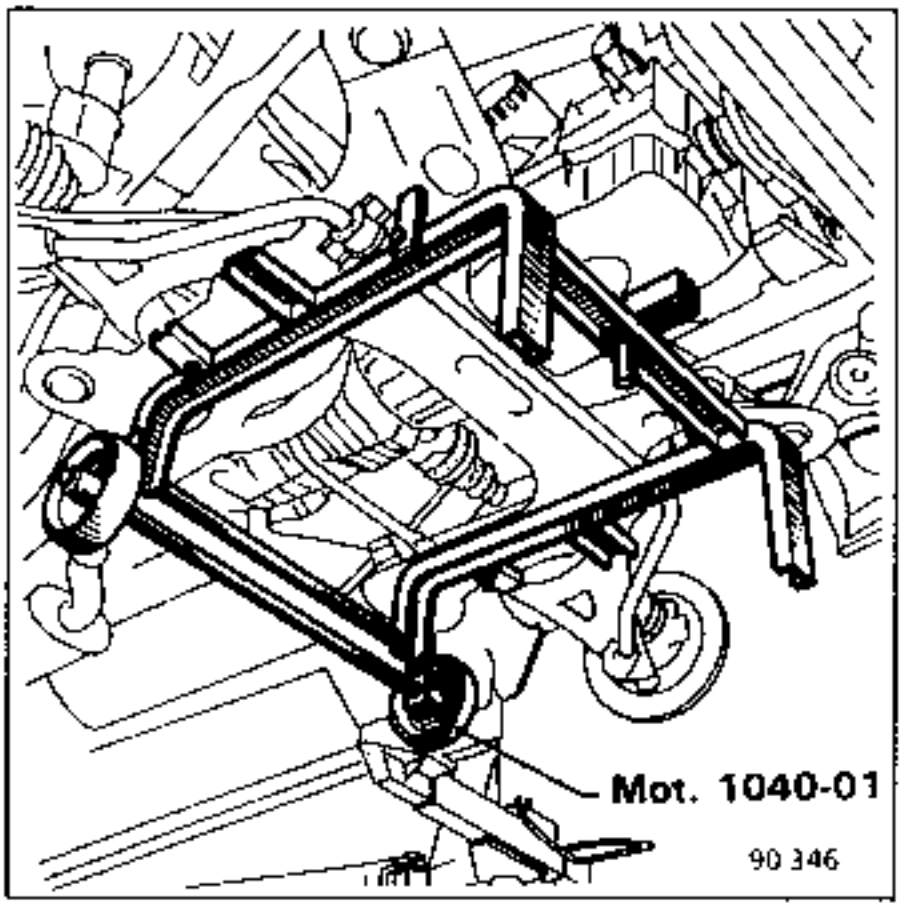
- the brake calipers (bolt A) and secure the calipers to the body.



- the steering ball joints using tool T.Av.476.



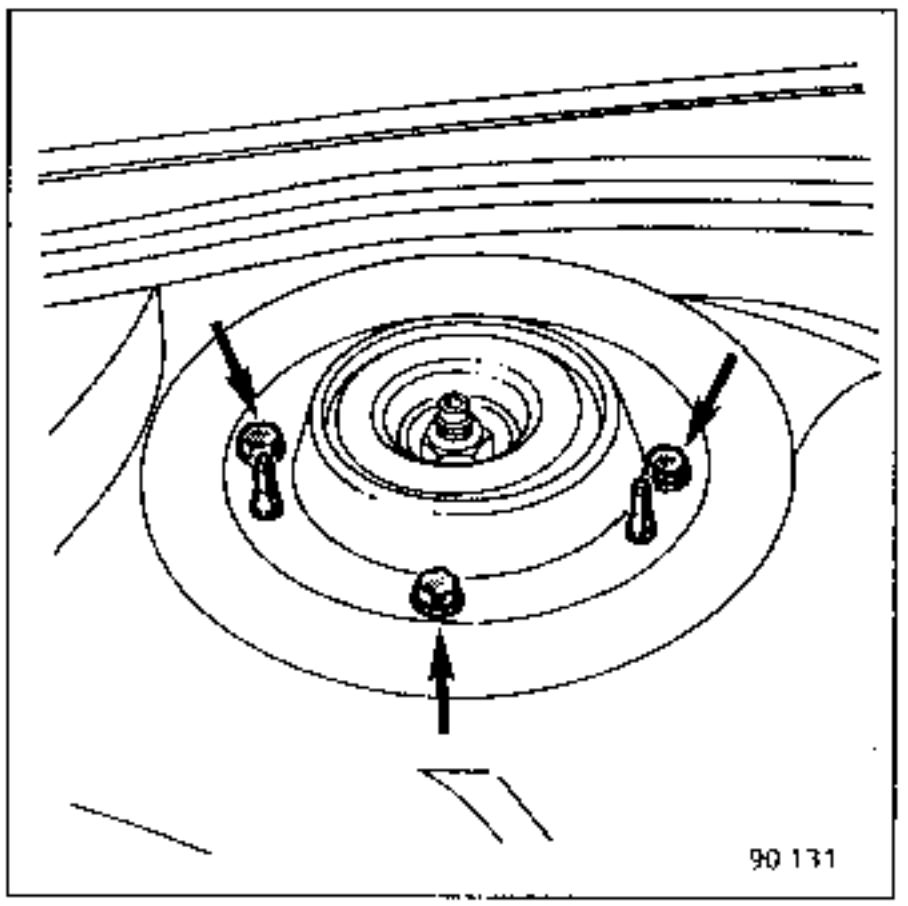
Place dummy sub-frame Mot. 1 040-01 on the engine sub-frame.



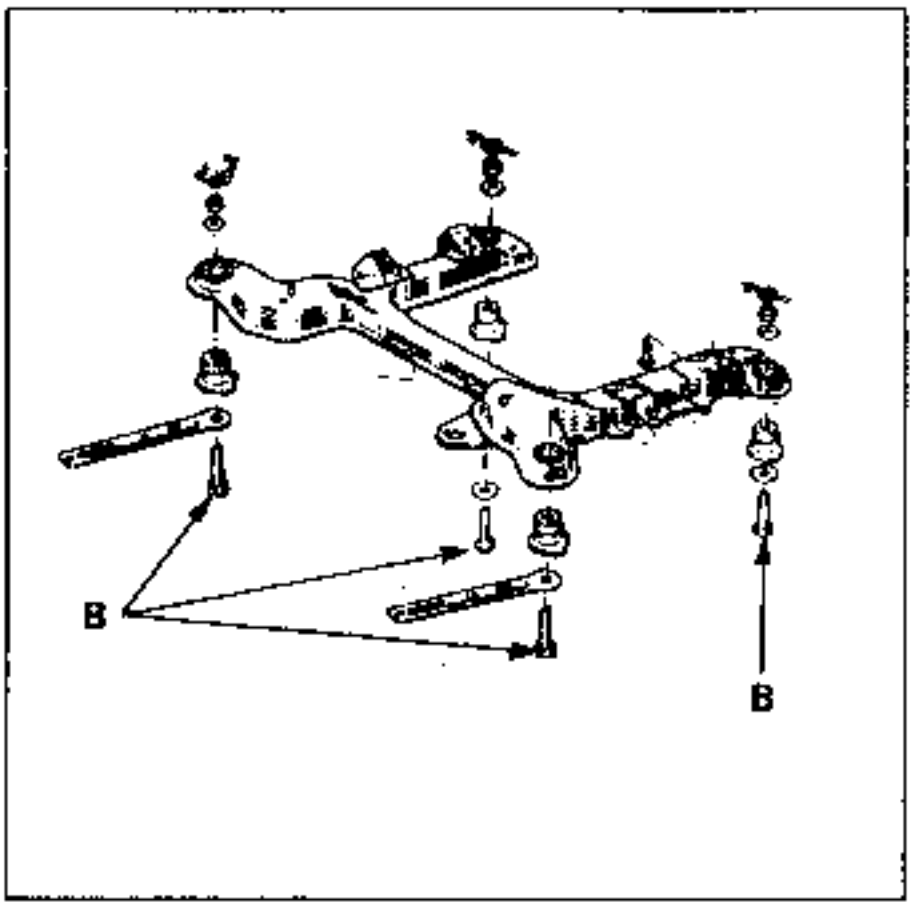
Lower the vehicle, fitted with sub-frame Mot. 1040-01, until it makes contact with the ground.

Remove:

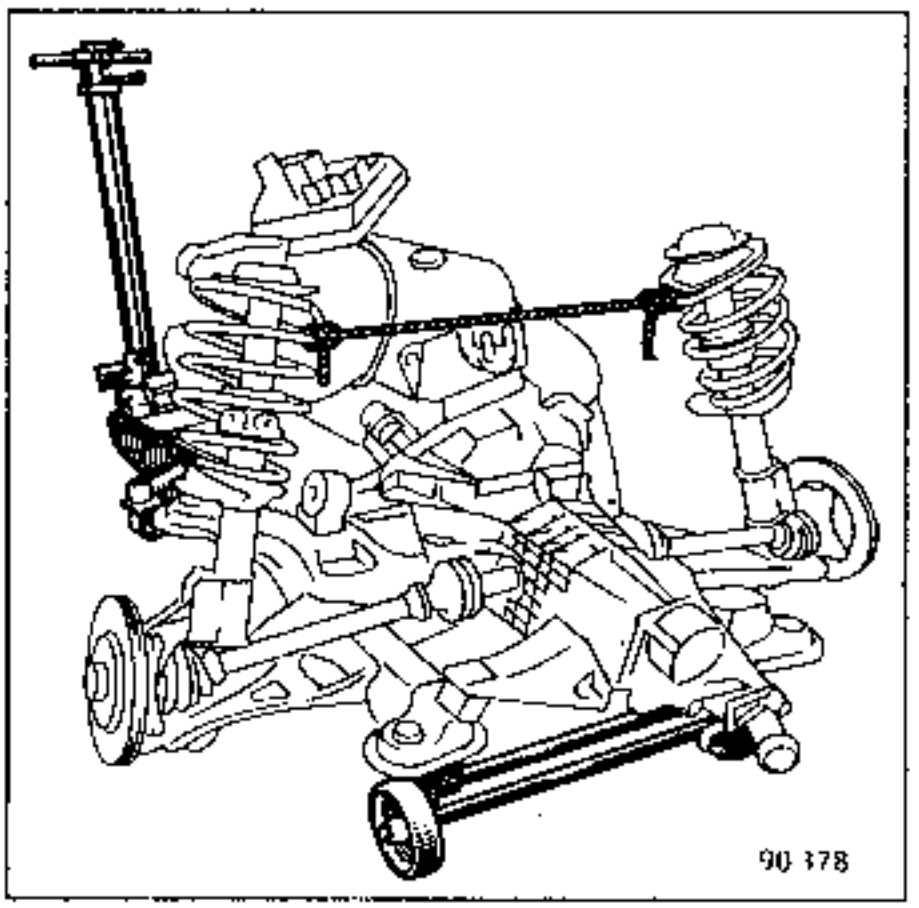
- the shock absorber upper cup securing bolts,



- the engine sub-frame securing bolts (B).



Lift the body and take out the power unit assembly.



Secure the spring-shock absorber assemblies with string.

REFITTING (special points)

Aligning the body with the engine sub-frame can be made easier by fitting screwed rods approximately 100mm long.

Tighten the nuts and bolts to the specified torques.

Fill the engine and gearbox with oil, if necessary.

Fill and bleed the cooling system.

Fill the air conditioning and power steering systems.

Adjust the accelerator cable.

REMOVING - REFITTING

ESSENTIAL SPECIAL TOOLS	
Mot. 1040-01	Dummy sub-frame for removing and refitting the power unit assembly
Mot. 453-01	Hose clamps.

TIGHTENING TORQUES (in daN.m)	
Brake caliper securing bolts	10
Shock absorber upper cup securing bolts	2.5
Wheel bolts	9
Sub-frame securing bolts	8.5
Steering ball joint nuts	4

REMOVING

Remove the bonnet.

Disconnect:

- the battery,

- the electrical connectors,

- the accelerator, clutch and speedometer drive cables,

- the earthing braids (engine and gearbox),

- the fuel pipes.

Remove:

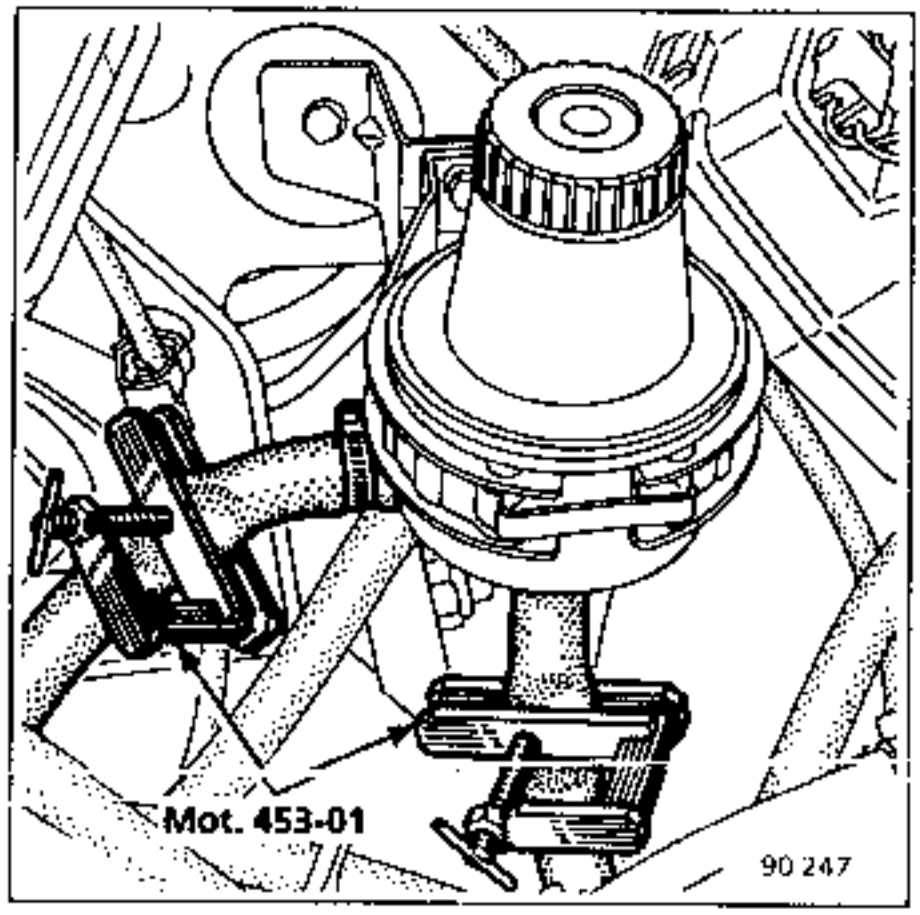
. in the case of turbo charged engines:

  - the air filter and the inter-cooler (protect the compressor apertures),

  - the bolts securing the oil cooler to the side member.

. in the case of vehicles fitted with power steering:

  - place one clamp Mot. 453-01 on each of the pipes leaving the oil reservoir and free the reservoir.

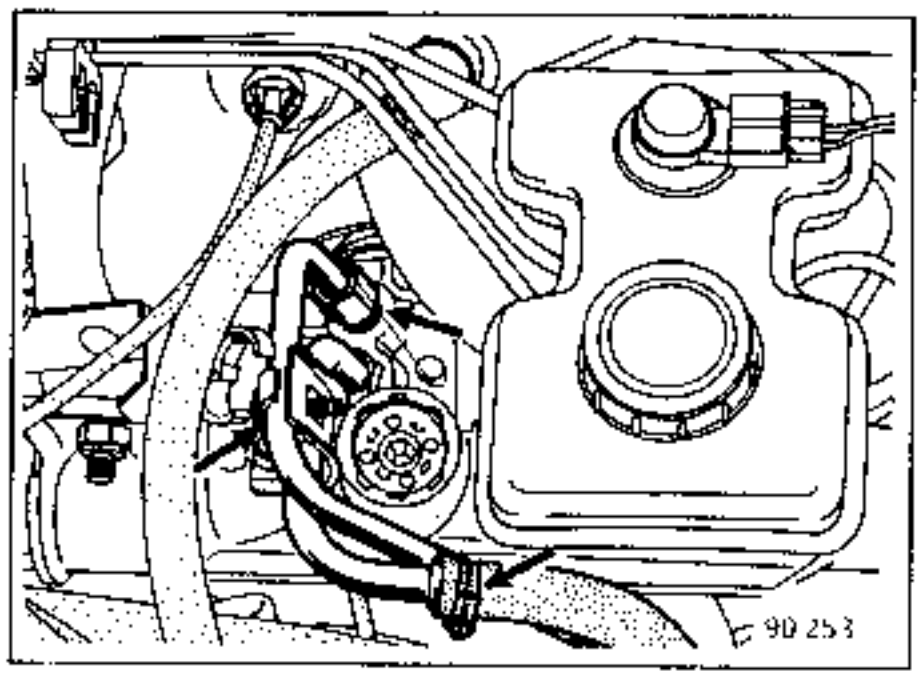


Remove:

- the pipe retaining clamp,

- the high pressure pipe at the union on the valve,

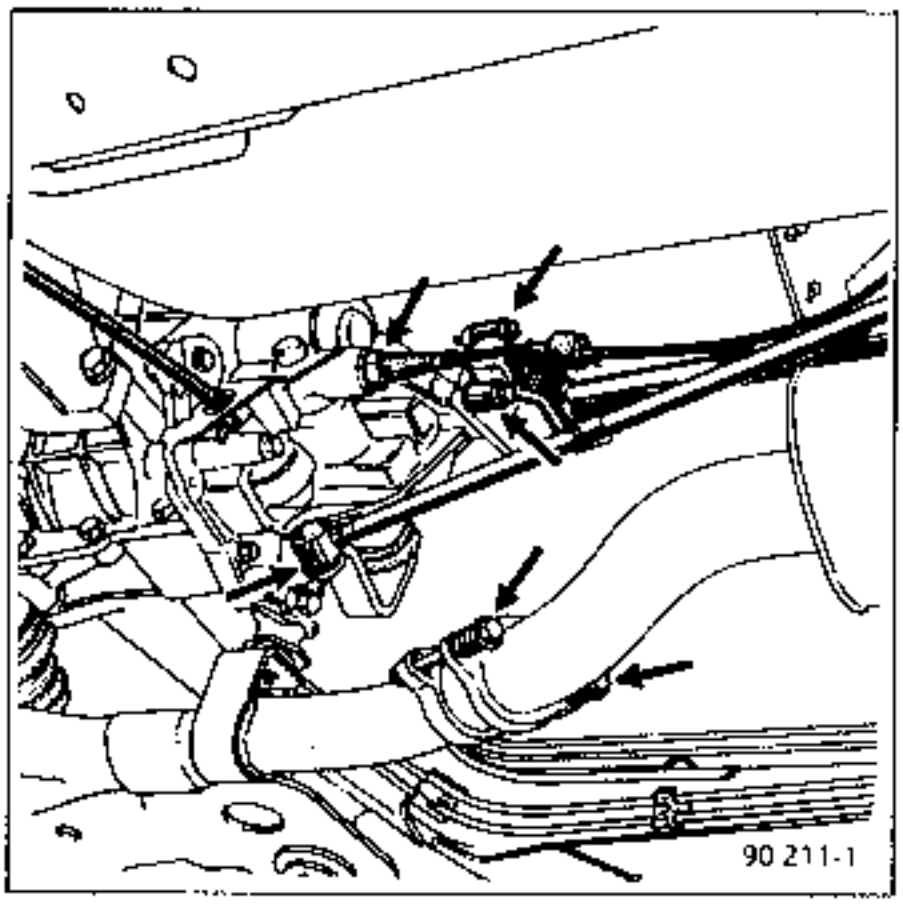
- the low pressure pipe at the union on the pipe.



Drain the cooling system.

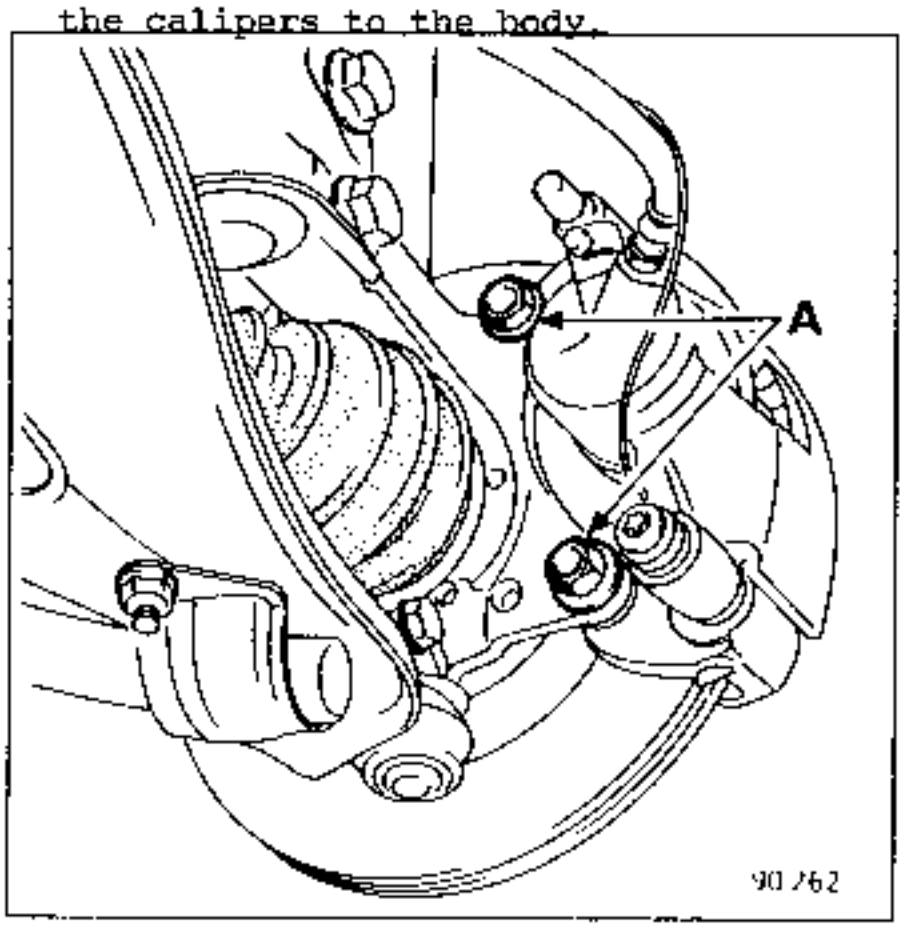
Disconnect:

- the heater hoses,
- the radiator hoses, followed by the radiator after removing the front cross member,
- the engine damper upper securing point,
- the gear shift controls,
- the exhaust pipe clamp.

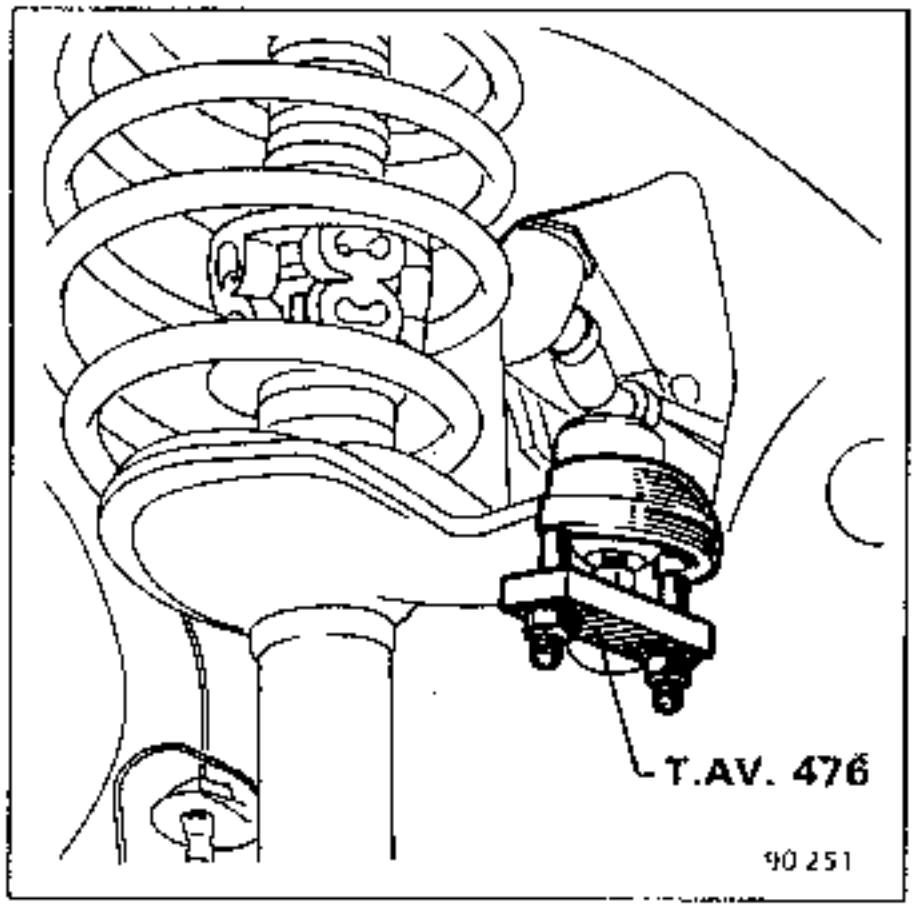


Remove:

- the wheels,
- the brake calipers (bolts A), securing the calipers to the body.



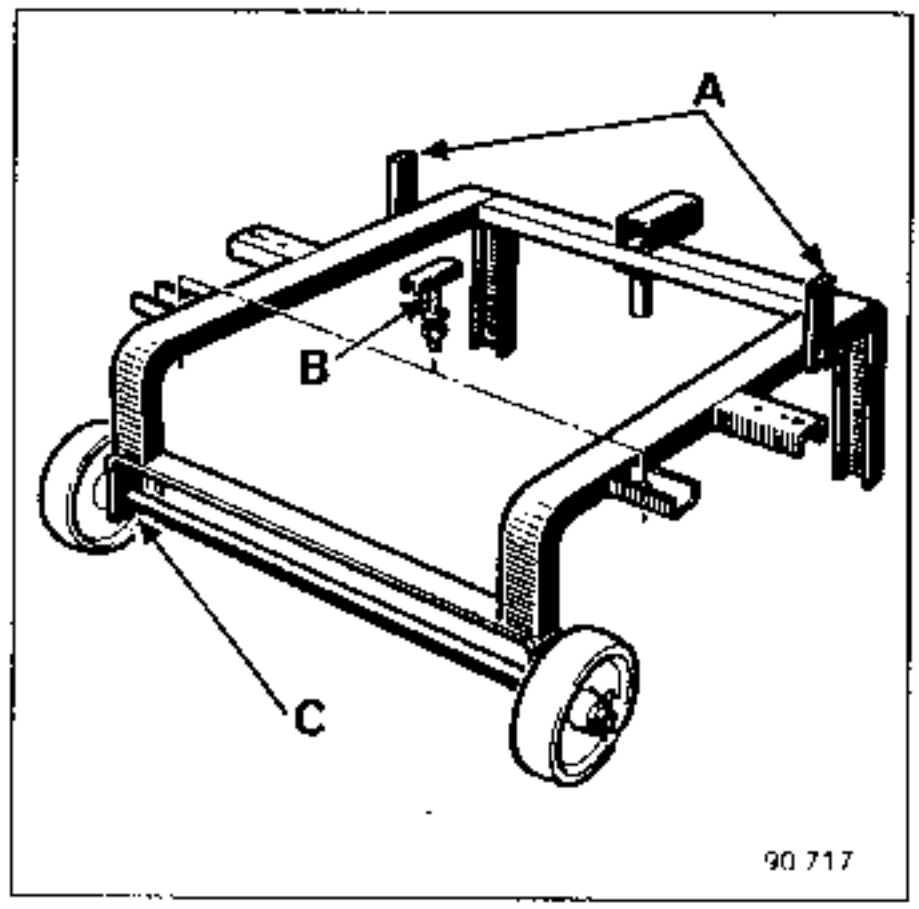
Disconnect the steering ball joints using tool T.Av.476.



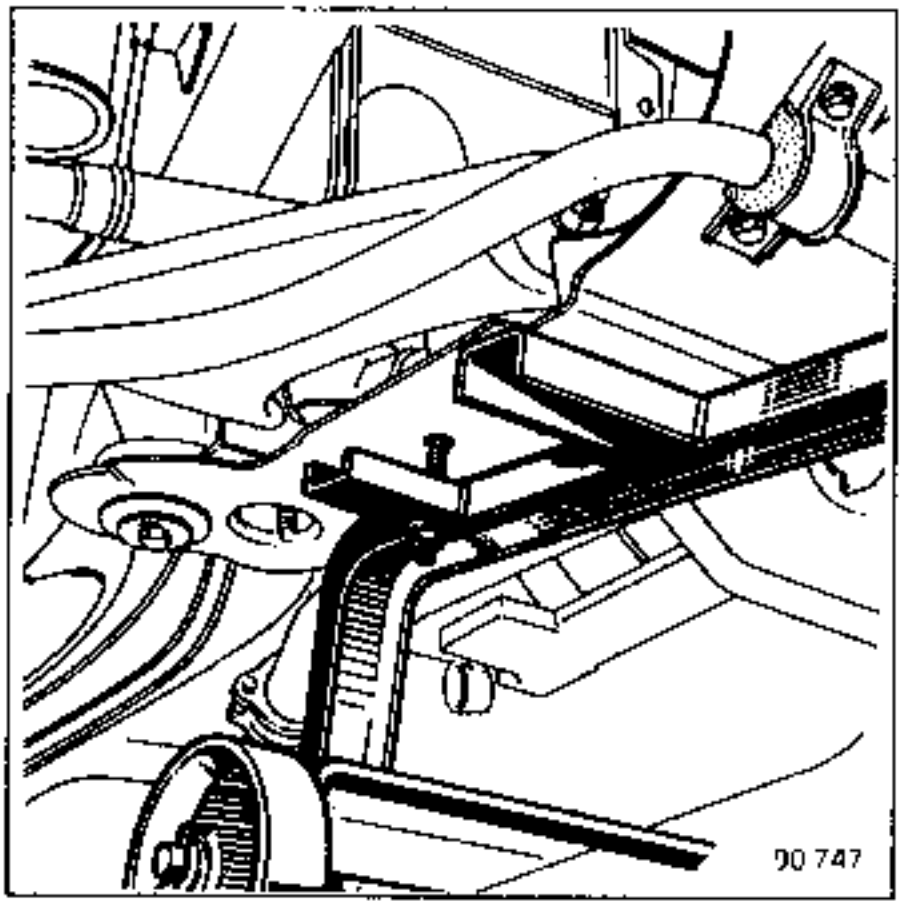
Preparing dummy cradle Mot. 1 040-01:
Place the wheel shaft in the lower holes (C).

Lift up the retaining lugs (A).

The fastenings under the sub-frame consist of hooks (B).

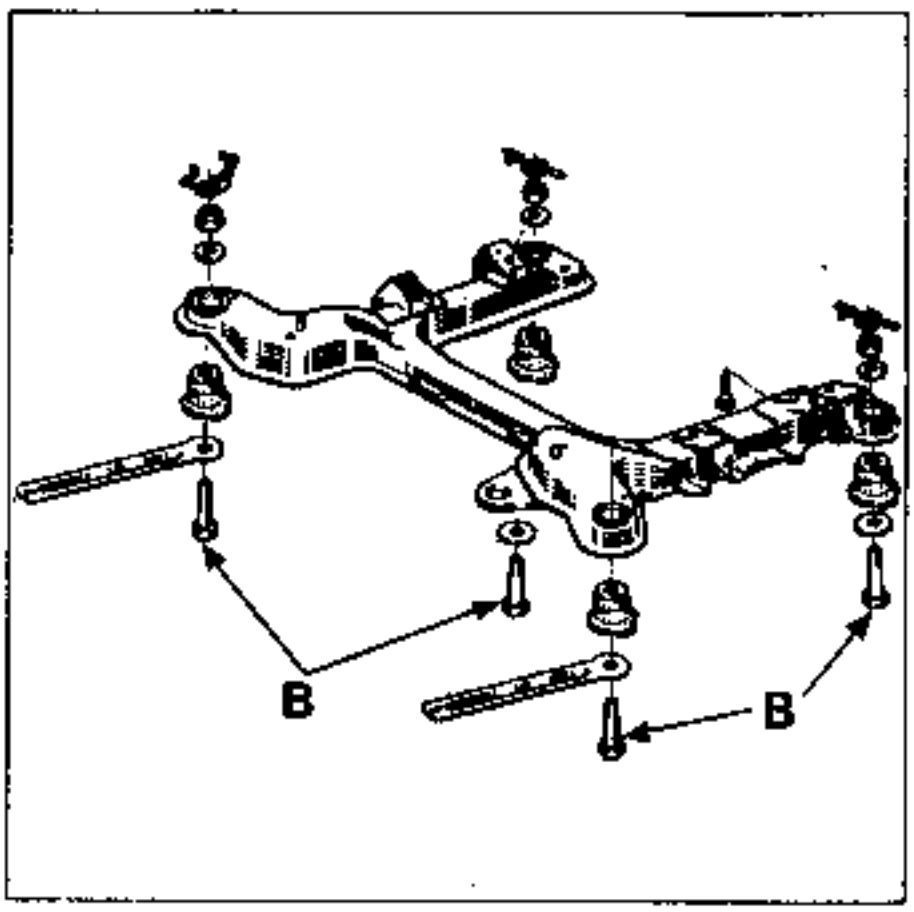


Secure frame Mot. 1 040-01 under the sub-frame.



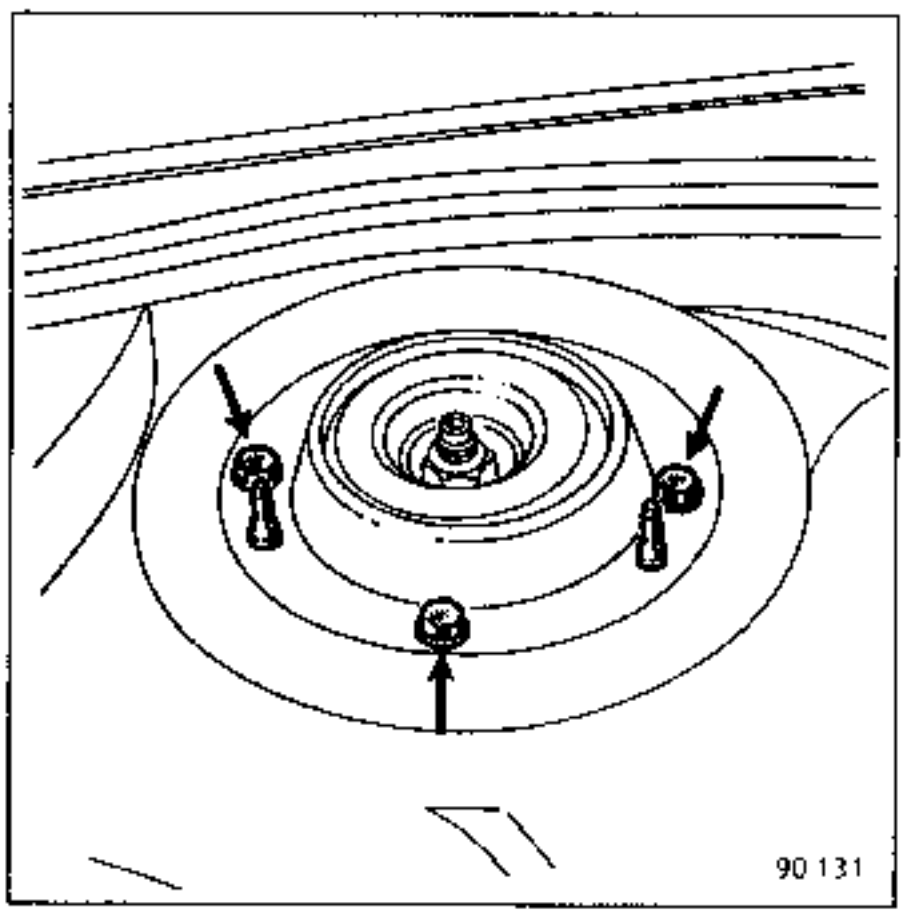
Remove the securing bolts from the shock absorber upper cups,

Remove the engine sub-frame securing bolts (B).

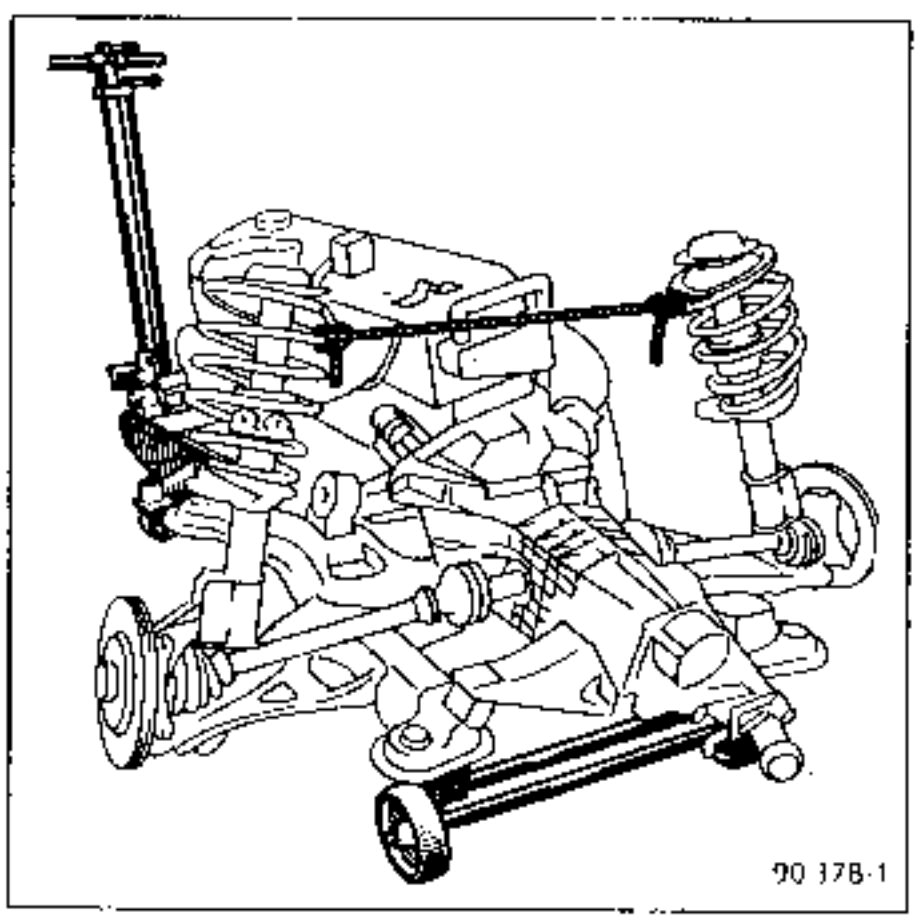


Take out the power unit assembly by lifting the body.

After removing the power unit assembly:



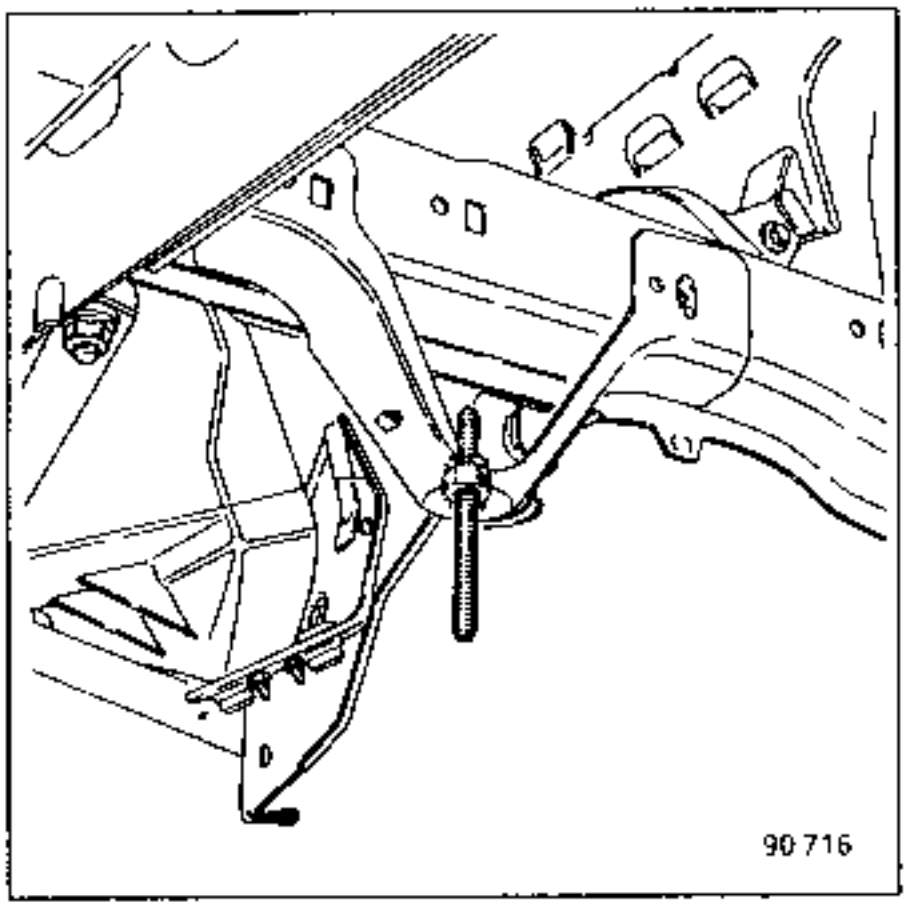
Lower the lift until the dummy sub-frame makes contact with the floor.



Retain the spring-shock absorber assemblies with string.

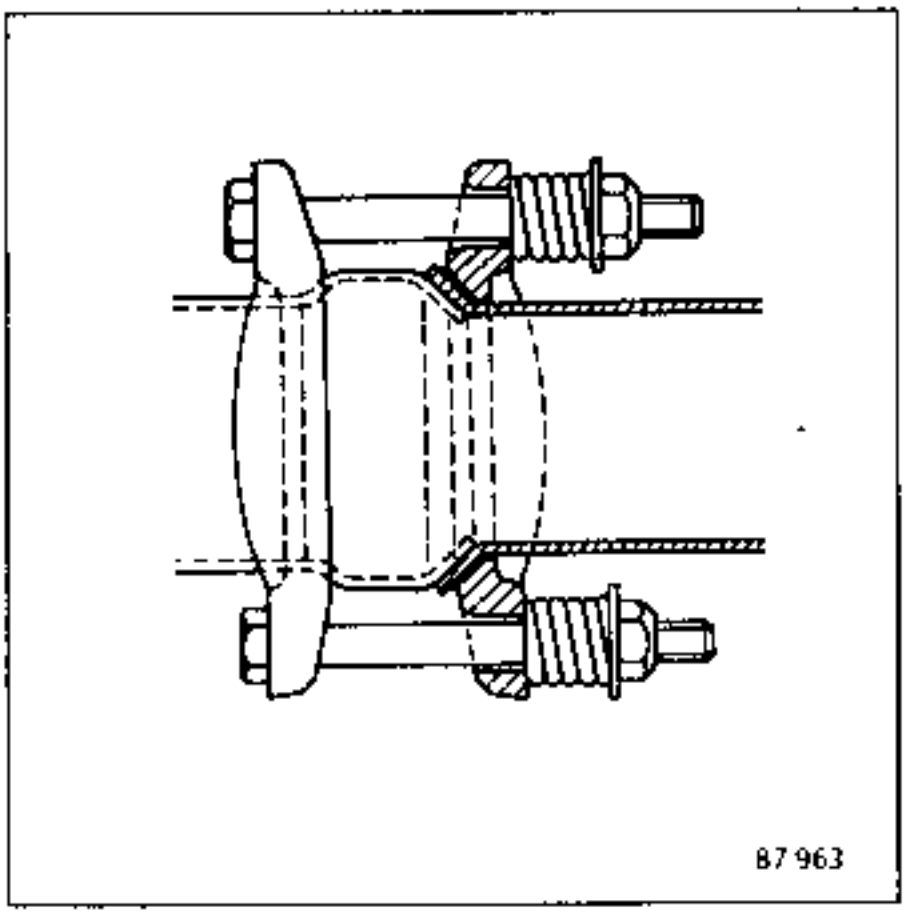
REFITTING (special points)

Aligning the engine sub-frame with the body can be made easier by fitting two screwed rods approximately 100mm long into the two front sub-frame to body securing points.



Tighten the nuts and bolts to the specified torques.

Tighten the exhaust pipe clamp, fitting the springs and the anti-rattle bush.



The joint is sufficiently tight as soon as an effective seal is obtained between the two pipes.

Fill and bleed the cooling system and the power steering system (on vehicles fitted with power steering).

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

REMOVING - REFITTING

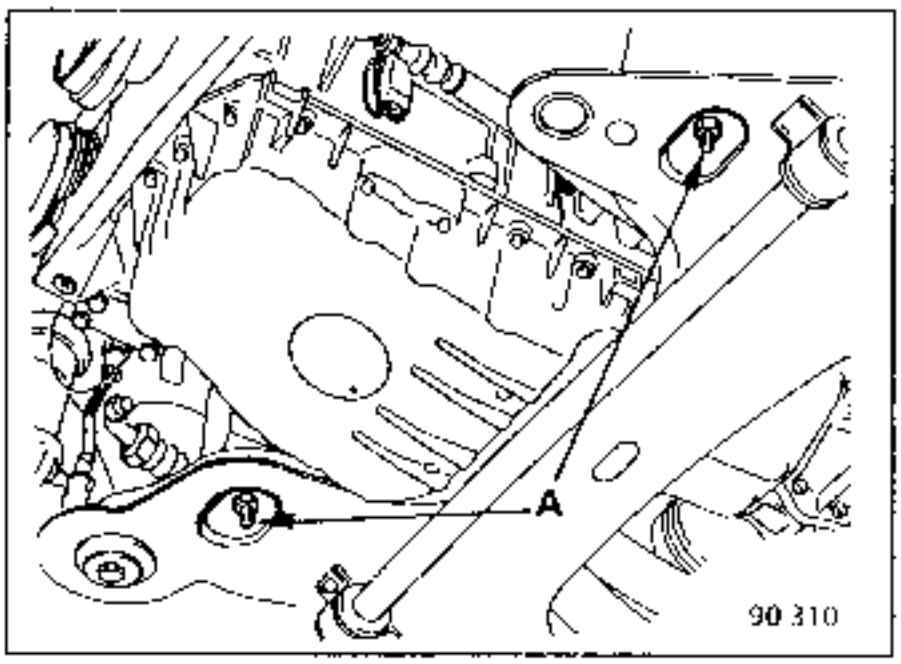
ESSENTIAL SPECIAL TOOLS
Mot. 1063 Hinged key for sump screws

TIGHTENING TORQUES (in daN.m)	
Sump securing screws	1.4 to 1.7

REMOVING

Disconnect the battery.
Drain the engine.

Remove the two nuts (A).



Lift the engine, either by means of an engine lifting cross piece FACOM WM103, or with a workshop crane secured to the front lifting lug.

Remove the screws from the sump. They are of the Torx type, and special tool Mot. 1063 is necessary to remove them.

Special features of diesel engines.

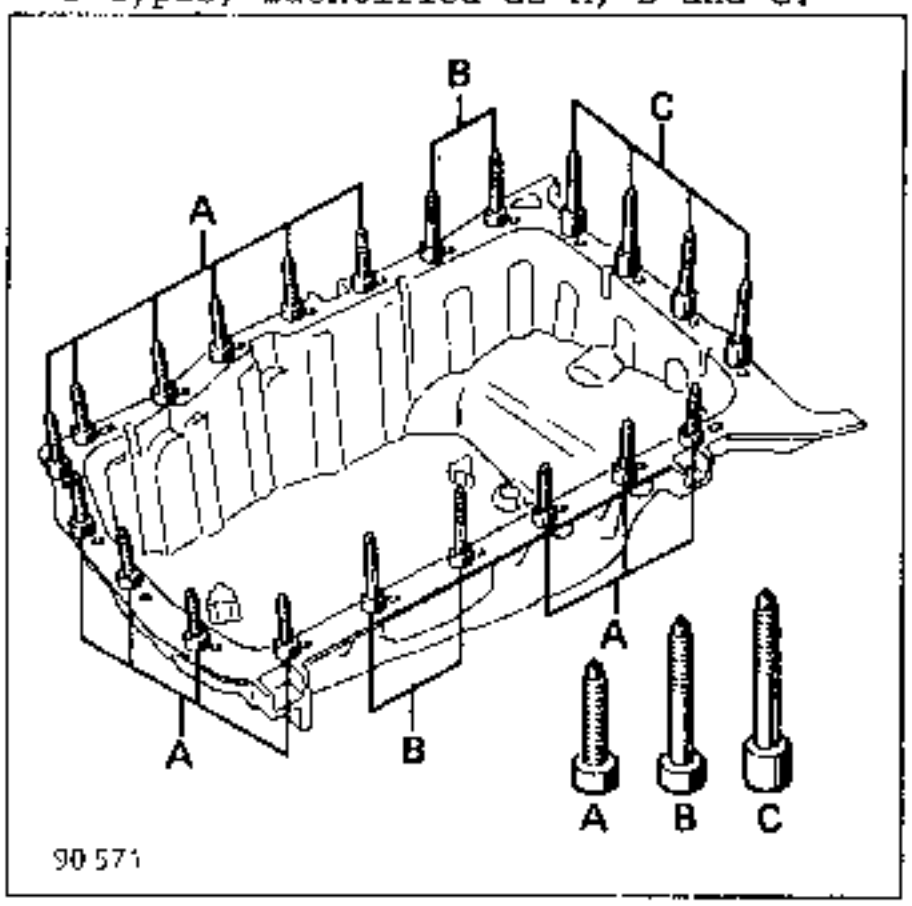
Move the engine lifting ring to the front of the engine. Do not forget to return the lifting ring to its original position after the operation has been carried out.

REFITTING

Replace the gasket, which is to be fitted dry.

Sump screw identification:

- 3 types, identified as A, B and C.



Do not refit the engine to the vehicle before tightening the sump screws.

Tighten the three bolts between the clutch housing and the sump before tightening the sump screws.

Fill the engine with oil.

REMOVING - REFITTING

ESSENTIAL SPECIAL TOOLS	
Mot. 1063	Hinged key for sump screws

TIGHTENING TORQUES (in daN.m)	
Sump securing screws	1.4 to 1.7

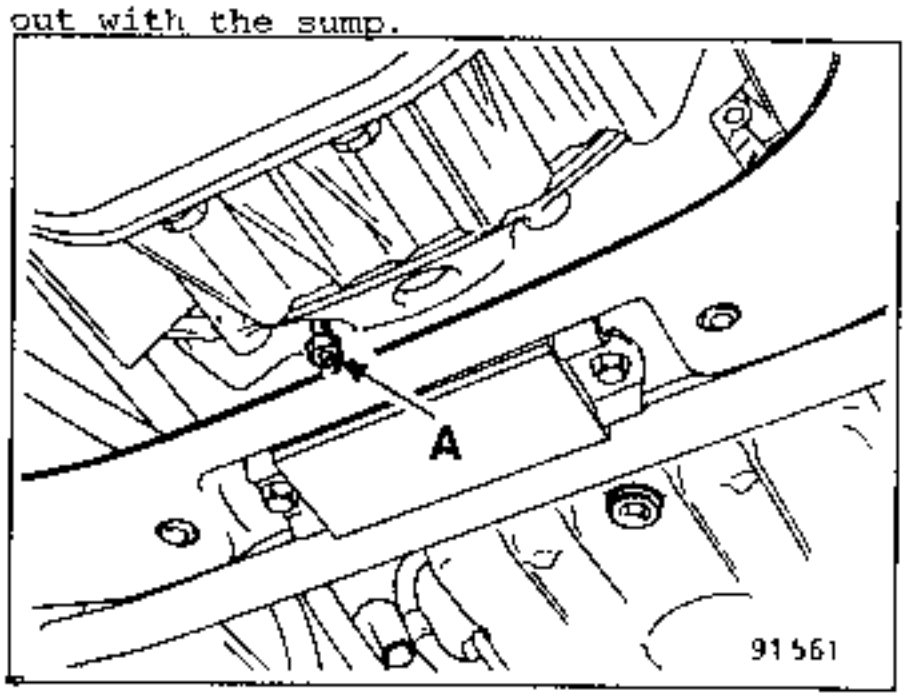
REMOVING

Disconnect the battery.

Drain the engine.

Remove the dipstick and position the crankshaft so that the pistons are half way up the bores.

Remove the sump securing screws; only screw (A) is left in place. It comes out with the sump.

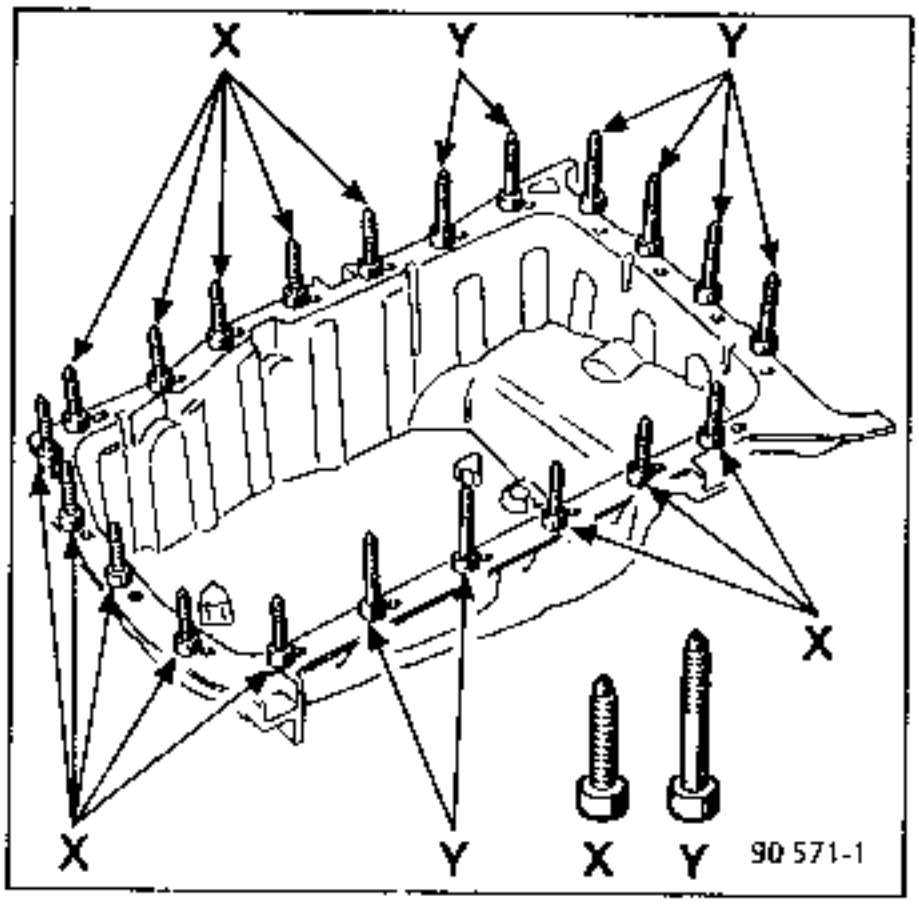


REFITTING

Replace the gasket, which is to be fitted dry.

When fitting the sump, do not forget to refit the screw (A).

Sump securing screw identification: there are 2 sorts of screw, identified as X and Y.



The screws are of the Torx type and tool Mot. 1 063 must be used.

Tighten the three bolts between the clutch housing and the sump first, and then tighten the sump screws.

Fill the engine with oil.

J7R Turbo, J7R 125
engines: J7T
This operation can be carried out with the engine still on the vehicle.

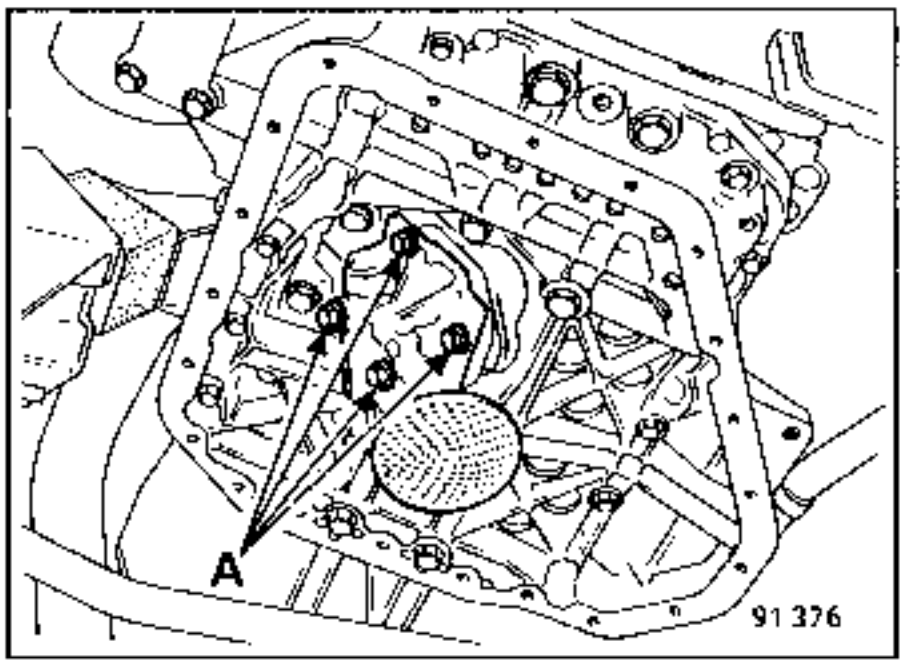
REMOVING

- Drain the engine.

Remove:

- the pressed steel sump,

- the oil pump strainer, screws A, and take out the pump gears,



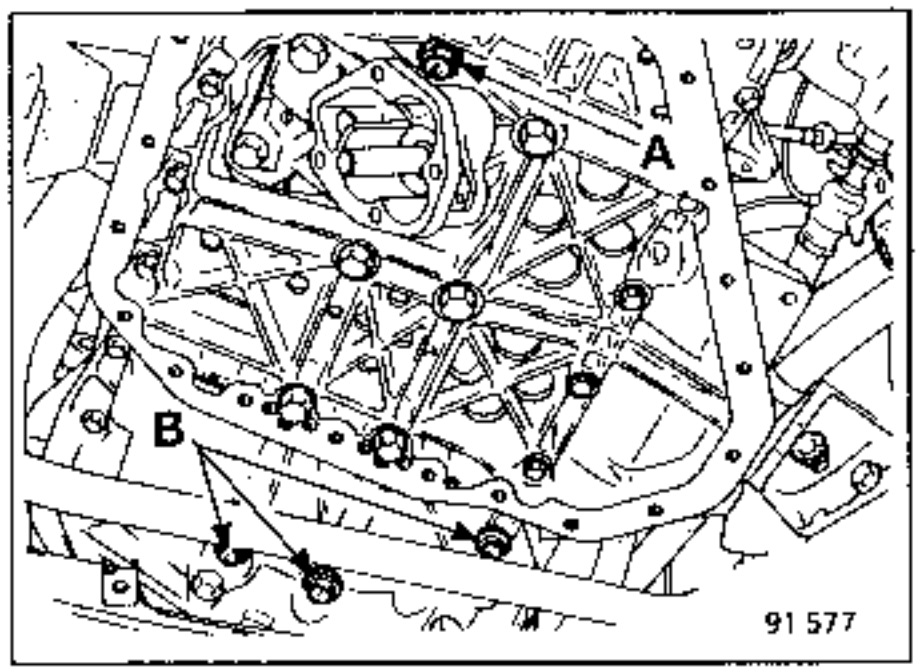
- the 2 bolts from the oil pump body,

- the oil pump body,

- the oil level sensor (if necessary),

- the base securing screws (see screw identification marks and tightening torques),

- the 3 bolts B are removed at the same time as the base.



REFITTING

Thoroughly clean the housing and base:

- stick the gasket to the base with a few dabs of CAF 4/60 THIXO,

- place the oil pump drive shaft in position with the circlip towards the pump,

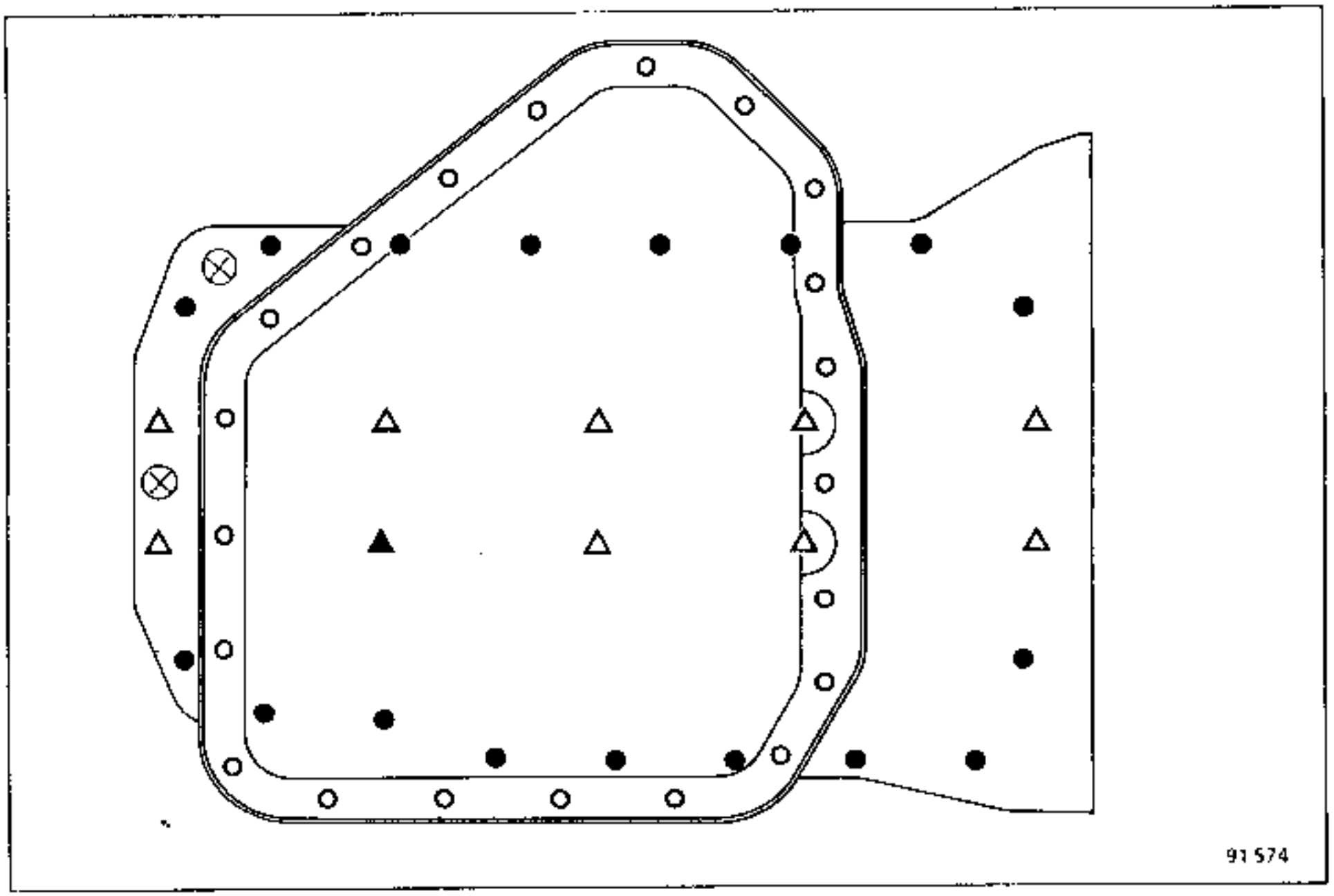
- tighten the base securing screws (see the chart showing the identification marks and torques on the following page),

- fit and tighten the oil pump body in place (4 to 4.5 daN.m) (ensure that the drive shaft is correctly positioned),

- fit the gears and the pump body cover and tighten it to torque,

- fit the pressed steel sump and tighten the screws to the specified torque.

Identification of the screws securing the base to the cylinder and the sump to the base.



There are 4 types of screw, identified as follows:

● : 17 screws (M7 x 100-50), tightening torque: 1.2 to 1.8 daN.m.

o : 21 screws (M6 x 100-16), tightening torque: 0.7 to 1.1 daN.m.

▲: 1 screw (M10 x 150-40), tightening torque: 3.2 to 4.8 daN.m.

△: 9 screws (M10 x 150-75), tightening torque: 3.2 to 4.8 daN.m.

⊗: screws not used

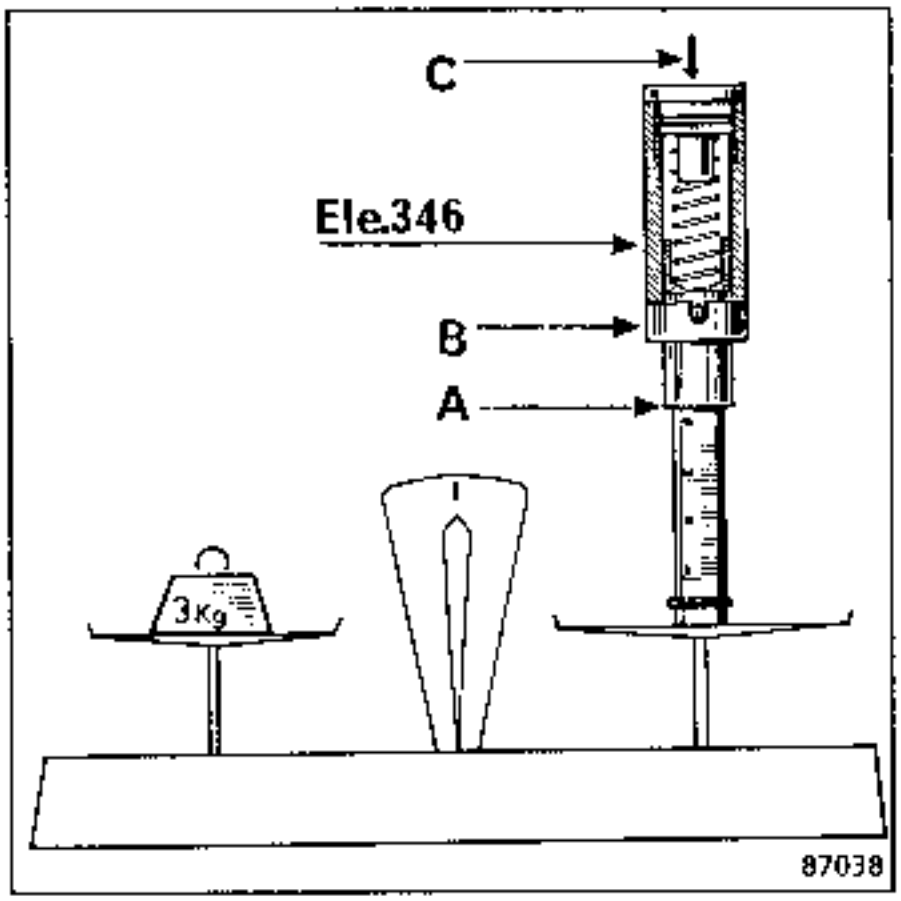
ESSENTIAL SPECIAL TOOLS	
Ele. 346	Belt tension tester
B.Vi. 906	Force measurer

ZEROING TOOL Ele. 346.

There are two methods

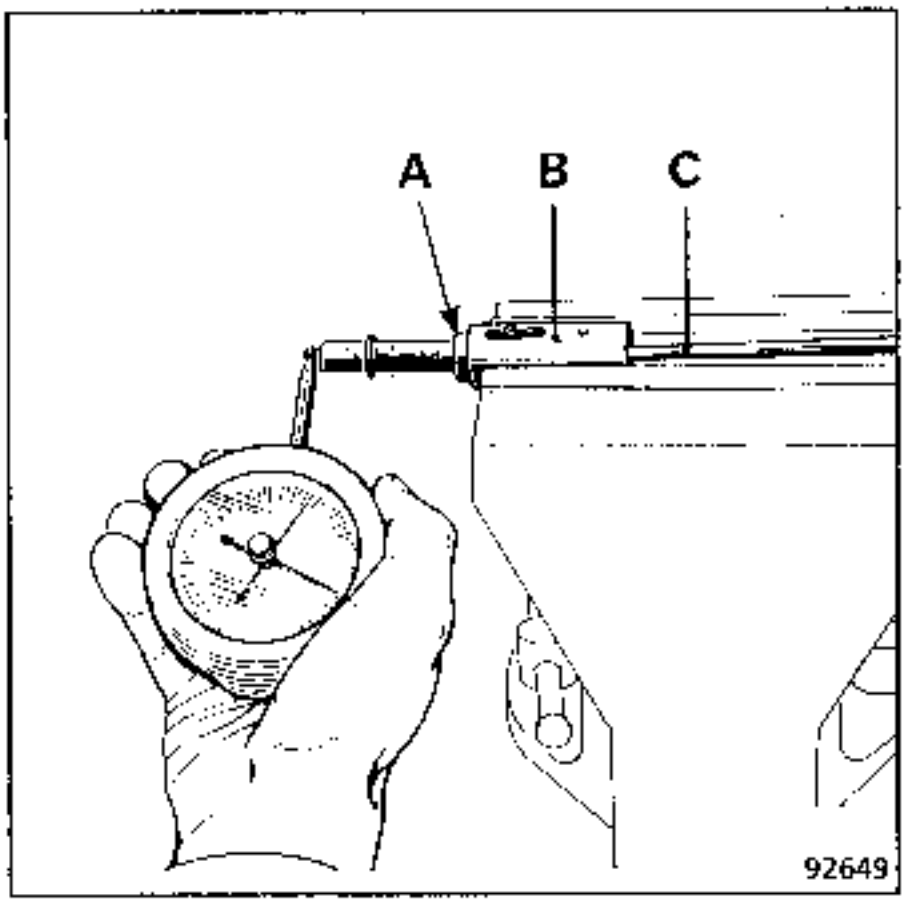
It is essential to check that tool Ele. 346 is correctly zeroed before the first time it is used (new tool) and periodically after this.

1st Method:



Apply a force of 3 daN (weight of 3 kg) to the tool. The shoulder (A) should be flush with the plunger body (B). If it is not, turn the screw (C) to increase or reduce the spring pressure.

2nd Method:

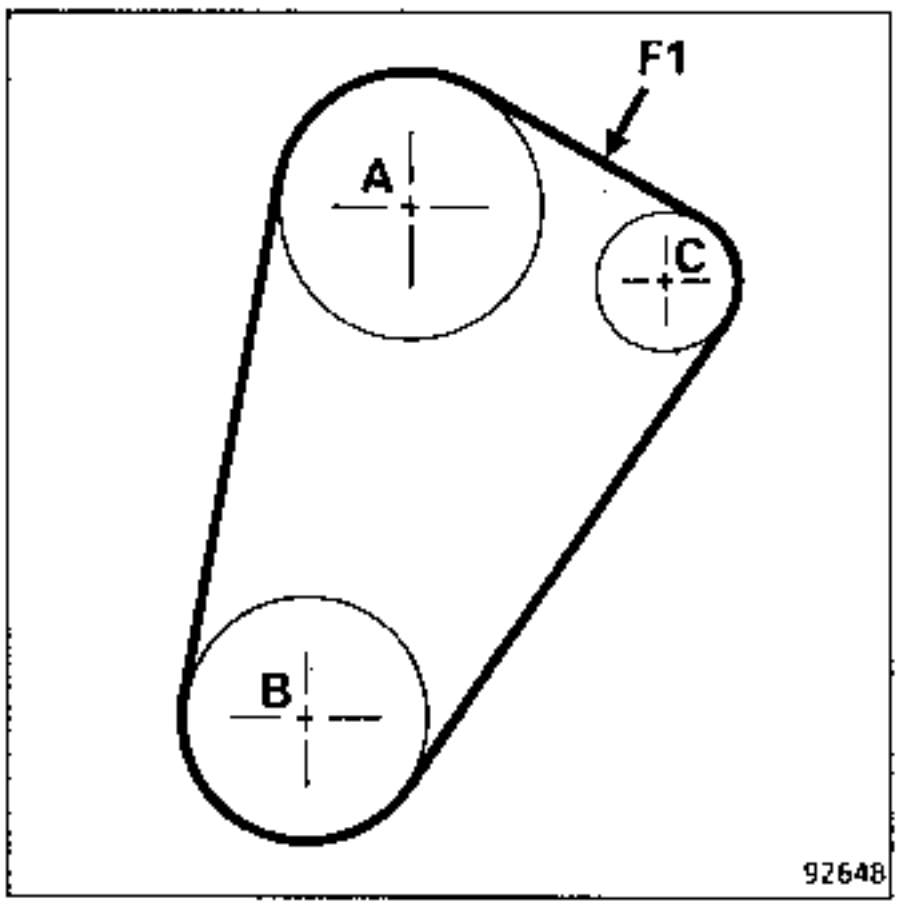


Grip tool Ele. 346 in a vice after first removing its plug. Apply the cylindrical part of tool B.Vi.906 to the end of the sliding part. The shoulder (A) should be flush with the plunger body (B) when the pointer shows 3 daN. If it is not, adjust screw (C) to increase or reduce the spring pressure.

Checking the Belt Tension

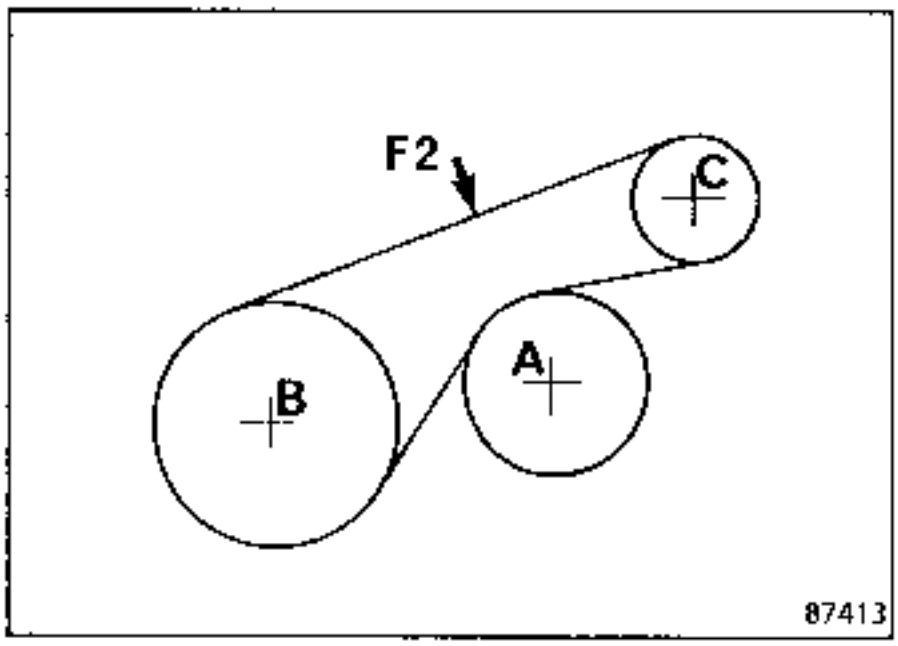
Fit the belt and apply the "cold" tension. Run the engine until the electric fan cuts in and readjust the tension if it is less than that specified for a "warm" belt.

ENGINE TYPE C



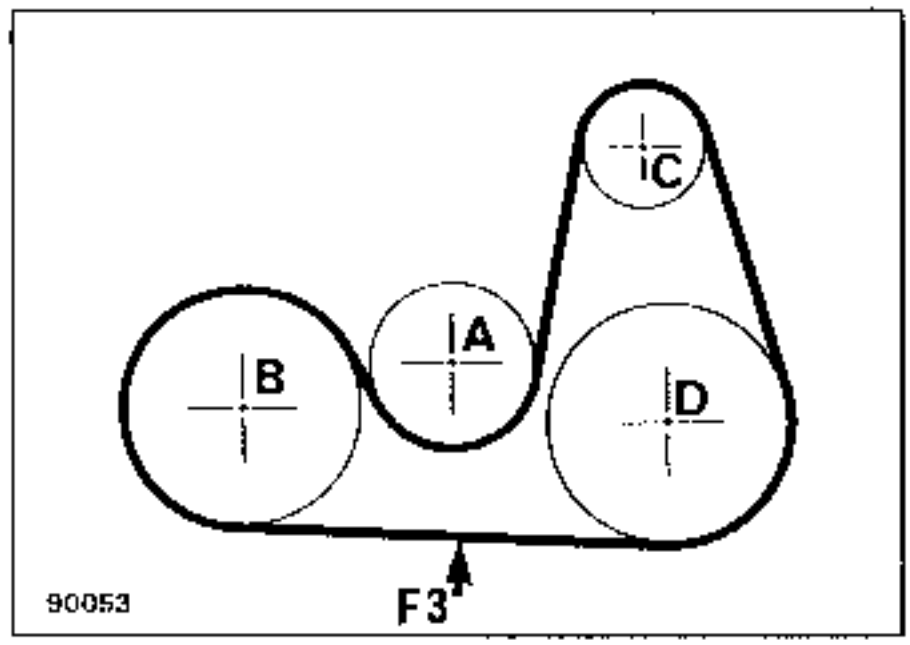
Alternator drive belt: F1 = 4mm.

ENGINE TYPE F



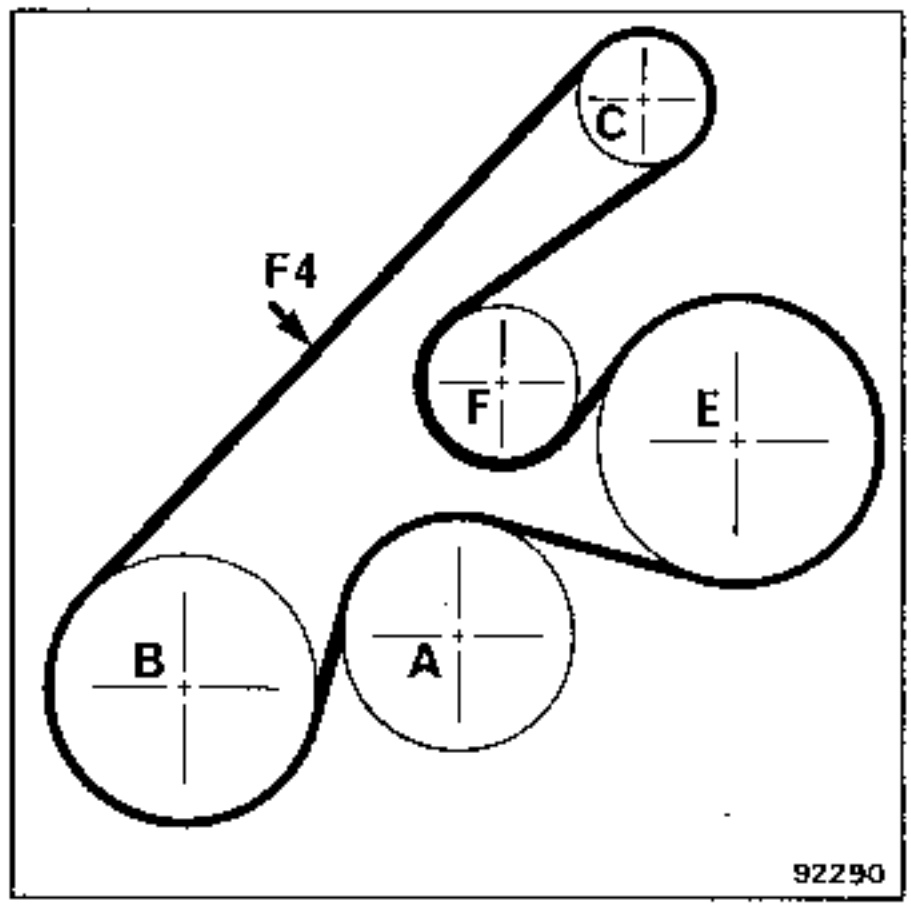
Coolant pump-alternator belt

Deflection "cold" (F2) = 3mm
Deflection "warm" (F2) = 4mm



Coolant pump-Power steering- alternator belt

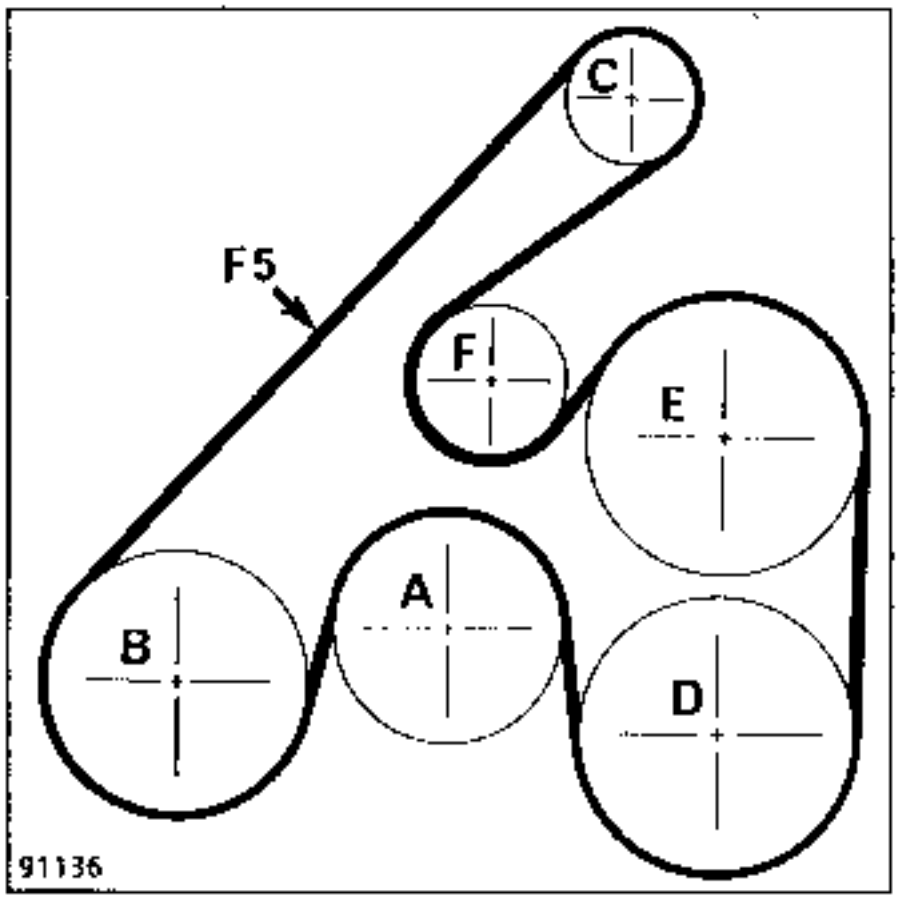
Deflection "cold" (F3) = 2.5 to 3mm
Deflection "warm" (F3) = 3 to 3.5 mm



Coolant pump-compressor-alternator belt

Deflection "cold" (F4) = 4 to 5mm

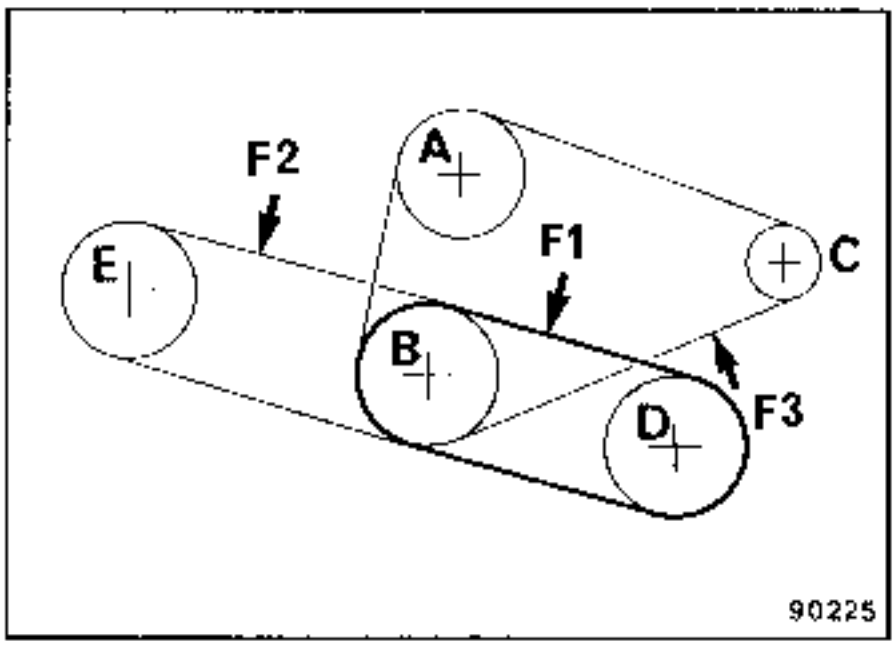
ENGINE TYPE F



Coolant pump-power steering
Compressor-alternator belt

Deflection "cold" (F5) = 4 to 5mm
Deflection "warm" (F5) = 6 to 6.5mm

ENGINE TYPE J



Deflection "cold":
F1 = 3 to 3.5mm
F2 = 4mm
F3 = 4.5 to 5mm

Deflection "warm":
F1 = 4 to 5mm
F2 = 4.5 to 5.5mm
F3 = 6 to 6.5mm

Pulley identification:
A Coolant pump pulley
B Crankshaft pulley
C Alternator pulley
D Power steering pump pulley
E Compressor pulley
F Tensioner roller

IDLING SPEEDS

Vehicle	Engine	Capacity (cm³)	Fuel	Fuel System	Idling (rpm.)	C.O. (%)
X 481	F2N 712 F2N 716	1721 C Ratio 9,2/1	Regular I.O. 92	SOLEX 28-34 Z10 Rep. 867 Rep. 867 (D) Rep. 970 (D)	700 ± 25	1 ± 0,5
	F2N 716	1721 C Ratio 9,2/1	Super I.O. 98	SOLEX 28-34 Z10 Rep. 913	700 ± 25	1 ± 0,5
X 482	F2N 710	1721 C Ratio 10/1	Super I.O. 98	SOLEX 28-34 Z10 Rep. 889 (D)	700 ± 50	1,5 ± 0,5
	F2N 754	1721 C Ratio 9,5/1	Super I.O. 95 (1)	SOLEX 28-34 Z13 Rep. 967 (C) (D)	800 ± 50	1,5 ± 0,5
X 483	J7R 750 (BM) J7R 751 (TA)	1995 C Ratio 10/1	Super I.O. 95 (1)	Bendix Multipoint Injection	775 ± 50 775 ± 50 (N)	1,5 ± 0,5
X 485	J7R 752 (Turbo)	1995 C Ratio 8/1	Super I.O. 95 (1)	Multipoint Injection	800 ± 25	1,5 ± 0,5
X 486	J8S 704	2068 C Ratio 21,5/1	Diesel	BOSCH or CAV Roto Diesel Injection	825 ± 25	-
X 488 Turbo	J8S 714 J8S 742	2068 C Ratio 21,5/1	Diesel	BOSCH Injection	825 ± 25	- -
X 489	J6R 758 (BM) J6R 759 (TA)	1995 C Ratio 8,6/1	Ordinary I.O. 89	WEBER 32 DARA 59 WEBER 32 DARA 60	800 ± 50 900 ± 50 (N)	1,5 ± 0,5 1 ± 0,5
X 48 D	C2J 770	1397 C Ratio 9,25/1	Super I.O. 98	WEBER 32 DRT 21	800 ± 50	1,5 ± 0,5
X 48 E	F3N 722	1721 C Ratio 9,5/1	Regular (2) I.O. 91 min.	Bendix Multipoint Injection	800 ± 50 (3)	-
X 48 F	F3N 726	1721 C Ratio 9,5/1	Regular (2) I.O. 91	Bendix Monopoint Injection	750 ± 50 (3)	-
X 48 H	F8Q 710	1870 C Ratio 21,5/1	Diesel	BOSCH or CAV Roto Diesel Injection	850 ± 50 825 ± 25	-
X 48 J	F2R 702	1965 C Ratio 8,4/1	Regular I.O. 91 min.	SOLEX 28-34 Z9 Rep. 915 (C)	700 ± 25	1,5 ± 0,5
X 48 K	J7T 754 (BM) J7T 755 (TA)	2165 C Ratio 9,2/1	Regular (2) I.O. 91 min.	Bendix Multipoint Injection	800 ± 25 (3) 800 ± 25 (3)	- -
X 48 M	F2N 750	1721 C Ratio 9,2/1	Regular (2) I.O. 91 min.	SOLEX 28-34 Z10 Rep. 926	725 ± 25	1 ± 0,5 w/out pulsair
X 48 N	F2N 752	1721 C Ratio 9,5/1	Euro Super I.O. 95 (4)	SOLEX 28-34 Z10 Rep. 927 (D)	850 ± 50	1,25 ± 0,25 w/out pulsair
X48 Q X 48 Y	J7R 754	1995 C Ratio 9,3/1	Super I.O. 95 (1)	Bendix Multipoint Injection	850 ± 75	1,8 ± 0,2
X 48 V	J8S 740	2068 C Ratio 21,5/1	Diesel	BOSCH or CAV Roto Diesel Injection	850 ± 50 825 ± 25	-

(1) Compatible with Eurosuper I.O.95
(2) Operates on unloaded fuel I.O. 91.
(I.O. = octane rating)
(3) These figures are non adjustable.
(4) Operates on unleaded Eurosuper I.O.95

For those items not dealt with in this workshop manual, see manuals M.R. Carb. S and W, INJ R(E), M.R. INJ(D) latest edition.

Vehicle	Engine						Gearbox	Injection type	Ignition Type
	Type	Index	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp Ratio			
X 48 F	F3N	726	81	88,5	1 721	9,5	Manual	Monopoint + Mixture Regulation	I.P.M. with pinking detector

Engine	Idling		Fuel	
	Speed (rpm)	Mixture (CO)	Special features	Octane Rating
F3N 726	700 to 800* (non adjustable)	0.5% max (non adjustable)	Unleaded	I.O. 92

* At a coolant temperature of between 80 and 100°C.

Fuel System Type	Monopoint Renix Regulated Injection System
Fuel pump (on the front of the rear cross member, right hand side)	Voltage: 12 volts Pressure: 3 bars Delivery: 130 l/h
Fuel filter (beside fuel pump)	Replacement: 50 000 km
Paper cartridge air filter	Replacement: 20 000 km
Pressure regulator (integral part of throttle unit)	Pressure 1,2 ± 0,05 bar
Electromagnetic injector	Voltage: : 12 volts Resistance: 1,4 Ω must be less than 10 Ω
Catalyzer (under the floor)	◇ C02 N° 8934202175
Oxygen sensor or Lambda sensor	Make: Autolite n° 8933002455 A 800 °C : - Rich mixture : 625- 1 100 mV - Lean mixture : 0 to 150 mV
E.G.R.	WITH Valve No. 8933003184
Anti-evaporation system	With or without depending on the country

Computer mounted in the engine compartment				REMARKS
Renix No.	Approval No.	RNUR No.	Diagnostic Code	- mixture adjusted by oxygen sensor - speed adjusted by electro-actuator - pinking detector - transitory defects not placed on memory - inj. warning light non operational
S 100 811 101	77 00 731 802	77 00 738 169	202.3	
S 100 811 102	77 00 731 802	77 00 744 410	204.3	

Specifications and Adjustments

Vehicle	Engine						Gearbox	Injection Type	Ignition Type
	Type	Index	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. Ratio			
X48E	F3N	722	81	83,5	1721	9,5	Manual	Renix Multipoint + Mixture Regulation	I.P.M. with pinking detector

Engine	Idling		Fuel	
	Speed (rpm)	Mixture (CO)	Special Features	Octane Rating
F3N 722	750 to 850* (non adjustable)	0,5 % max (non adjustable)	Unleaded	I.O. 91 min.

* At a coolant temperature of between 80 and 100°C.

Fuel System Type	Regulated Multipoint Injection
Fuel pump mounted on the right hand side of the rear cross member	Voltage: 12 volts Pressure: 3 bars Delivery: 130 l/h
Fuel filter mounted above the fuel pump.	Replacement : 50 000 km
Pressure regulator	Pressure: - zero vacuum (A)(B): 2.5 ± 0.2 bars (C) : 3.0 ± 0.2 bars - at a vacuum of 500 mbars (A)(B): 2.0 ± 0.2 bars (C) : 2.5 ± 0.2 bars
Electromagnetic injectors	Will only operate with a computer: Voltage : 12 volts Resistance : $2,5 \pm 0,5\ \Omega$
Throttle unit	WEBER: double-barrelled Ø32 x 36 CFR Ref.: 2
Full throttle/no throttle switch, with three wires	A: idling: throttle open less than 1° B: partial load: throttle open more than 1° C: fully open: throttle open more than 70°
Idling speed regulator valve	Bosch - voltage: 12 volts

For the meanings of the references, see next page.

Specifications and Adjustments

Computer	Rénix No.	Approval No.	R.N.U.R. No.	Diagnostic Code
Renix or Bendix mounted in the engine compartment	S 100 812 101 S 100 812 101 S 100 812 101 S 101 263 101	77 00 735 559 77 00 735 559 77 00 735 559 77 00 746 044	77 00 736 401 77 00 740 149 77 00 745 344 77 00 744 412	210 - 3 (A) 211 - 3 (B) 213 - 3 or 215 - 3 (B) 216 (C)

(A) Without an anti-fuel evaporation system
(B) With an anti-fuel evaporation system
(C) With a pressure regulator (3 bars)

Air temperature sensor	Bendix: type CTP (A and B) CTN(C)
Coolant temperature sensor	Bendix: type CTP (A and B) CTN(C)

Oxygen Sensor	Make: BOSCH at 800°C: - Rich mixture: 625 to 100 mV - Lean mixture: 0 to 150 mV
Catalyzer (mounted under the floor)	Type : three function Reference: CO 5
Paper cartridge air filter	Replacement: 20,000 km
E.G.R.	
Anti-evaporation system (for certain countries)	Using GM Canister (B)
Ignition system	Curves: programmed into the injection computer M.P.A.: Ignition Power Module with (I.P.M.) pinking detector

Specifications and Adjustments

Vehicle	Engine						Gearbox	Injection Type	Ignition Type
	Type	Index	Bore (mm)	Stroke (mm)	Capacity (mm)	Comp. Ratio			
X 483	J7R J7R	750 751	88	82	1995	10	BM (A) TA (B) (E)	Renix Multipoint	I.P.M. with pinking detector

Engine	Idling		Fuel	
	Speed (rpm)	Mixture (CO)	Special Features	Octane Rating
J7R 750 J7R 751	775 50* (non adjustable)	1,5 ± 0,5	Super (Premium)	I.O. 98

* At a coolant temperature of between 80 and 100°C.

Fuel System Type	Multipoint Injection
Fuel pump, mounted on the rear right hand side member	Voltage : 12 volts Pressure : 3 bars Delivery : 130 l/h
Fuel filter: mounted above the fuel pump	Replacement: 50 000 km
Pressure Regulator	Pressure: - at zero vacuum 2,5 ± 0,2 bars - at a vacuum of 500 mbar 2,0 ± 0,2 bars
Electromagnetic injectors	Will only operate with a computer: Voltage : 12 volts Resistance : 2,5 ± 0,5 Ω
Throttle unit	SOLEX: single barrel Ø 50mm Ref. : 863 BM ; 864 TA
Full throttle/no throttle switch, with three wires	A : idling: throttle open less than 1° B : partial load: throttle open more than 1° C : fully open: throttle open more than 70°
Idling regulator valve	Bosch - voltage: 12 volts

Specifications and Adjustments

Computer	Renix No.	Approval No.	R.N.U.R. No.	Diagnostic Code
Renix or Bendix mounted in the engine compartment	S 100 805 101 S 100 805 101 S 100 805 103 S 100 805 201 S 100 805 204	77 00 731 803 77 00 731 803 77 00 731 803 77 00 731 804 77 00 740 605	77 00 733 848 77 00 740 150 77 00 736 594 77 00 733 984 77 00 740 932	20 - 3 (A) 20 - 3 (A) 20 - 3 (A) 23 - 3 (B) 22 - 3 (E)

(E) BVA AR4 (Automatic transmission)

Air temperature sensor	Bendix: type CTP
Coolant temperature sensor	Bendix: type CTP

Oxygen sensor	
Catalyzer	
Paper cartridge air filter	Replacement : 20 000 km
E.G.R.	
Anti-evaporation system	
Ignition system	Curves: programmed into the injection computer M.P.A. (I.P.M.) : Ignition Power Module with pinking detector

Specifications and Adjustments

Vehicle	Engine						Gearbox	Injection Type	Ignition Type
	Type	Index	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. Ratio			
L 485	J7R	752	88	82	1995	8	Manual	Renix Multipoint	I.P.M. with pinking detector

Engine	Idling		Fuel	
	Speed (rpm)	Mixture (CO)	Special features	Octane Rating
J7R 752	800 ± 25 * (non adjustable)	1,5 ± 0,5 %	Super	I.O. 98

* For a coolant temperature of between 80 and 100°C.

Fuel System Type	Multipoint injection
Fuel pump: mounted on the rear right hand side member	Voltage : 12 volts Pressure : 3 bars Delivery : 130 l/h
Fuel filter: mounted above the fuel pump	Replacement: 50 000 km
Pressure Regulator	Pressure: - at zero vacuum : 2,5 ± 0,2 bars - at a vacuum of 500 mbar : 2,0 ± 0,2 bars
Electromagnetic injectors	Will only operate with a computer: Voltage : 12 volts Resistance : 2,5 ± 0,5 Ω
Throttle unit	SOLEX: single barrel Ø 50mm Ref.: 875
Load potentiometer	A : idling: XR25 reading = 5 to 15 B : partial load: XR25 reading = 20 to 190 C : fully open: XR25 reading = 225 min
Idling regulator valve	Bosch - voltage: 12 volts

Specifications and Adjustments

Computer	Renix No.	Approval No.	R.N.U.R. No.	Diagnostic Code
Renix or Bendix mounted in the engine compartment	S 100 805 102 S 101 100 103 S 101 100 104	77 00 731 805 77 00 731 805 77 00 745 306	77 00 733 985 77 00 733 985 77 00 744 404	25 - 3 83 - 3 27 - 3 (1)

NOTE: The computer controls a turbocharger pressure regulator.

(1) Fitted, after manufacture, with an oxydization catalyzer - Germany.

Air temperature sensor	Bendix : type CTN
Coolant temperature sensor	Bendix : type CTN

Oxygen Sensor	
Catalyzer	
Paper cartridge air filter	Replacement : 20 000 km
E.G.R.	
Anti-evaporation system	
Ignition system	Curves: programmed into the injection computer M.P.A. (I.P.M.) : Ignition Power Module with pinking detector

Specifications and Adjustments

Vehicle	Engine						Gearbox	Injection Type	Ignition Type
	Type	Index	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. Ratio			
X 48 K	J7T J7T	754 755	88	89	2 165	9,2	Manual BM (1) Automatic TA (2)	Renix Multipoint + Mixture Regulator	I.P.M. with Pinking Detector

Engine	Idling		Fuel	
	Speed (rpm)	Mixture (CO)	Special Features	Octane Rating
J7T 754 J7T 755	800 ± 25* (non adjustable)	0,5 % max (non adjustable)	Unleaded	I.O. 91

* For a coolant temperature of between 80 and 100°C with the automatic transmission in (N).

Fuel system type	Regulated multipoint injection
Fuel pump: mounted on the rear right hand side member	Voltage : 12 volts Pressure : 3 bars Delivery : 130 l/h
Fuel filter: mounted above the fuel pump	Replacement : 50,000 km
Pressure regulator	Pressure: - at zero vacuum : 2,5 ± 0,2 bars - at a vacuum of 500 mbar : 2,0 ± 0,2 bars
Electromagnetic injectors	Will only operate with a computer: Voltage : 12 volts Resistance : 2,5 ± 0,5 Ω
Throttle unit	SOLEX : single barrel Ø 50mm Ref. 863 manual; 864 automatic
Full throttle/no throttle switch with three wires	A : idling: throttle open by less than 1° B : partial load: throttle open more than 1° C : fully open: throttle open more than 70°
Idling regulator valve	Bosch - voltage: 12 volts

Specifications and Adjustments

Computer		Renix No.	Approval No.	R.N.U.R. No.	Diagnostic Code
Renix or Bendix mounted in the engine compartment	(1)	S 100 810 101	77 00 735 562	77 00 736 398	32 - 3
	(1)	S 101 108 103	77 00 735 562	77 00 748 183	45 - 3
	(2)	S 100 810 201	77 00 735 563	77 00 736 399	33 - 3
	(2)	S 100 810 204	77 00 742 418	77 00 742 313	41 - 3 (A)
	(2)	S 101 108 203	77 00 742 418	77 00 748 184	47 - 3 (A)

(A) BVA AR4 (Automatic Transmission)

Air temperature sensor	Bendix: type CTP
Coolant temperature sensor	Bendix: type CTP
Oxygen sensor	Make : BOSCH At 800°C: - Rich mixture : 625 to 1,100mV - Lean mixture : 0 to 150mV
Catalyzer (mounted under the floor)	Type : Three function Reference: CO 1
Paper cartridge air filter	Replacement: 20,000 km
E.G.R.	
Anti-evaporation system	In certain countries, by means of GM Canister
Ignition system	Curves : programmed into the injection computer M.P.A. (I.P.M.) : ignition power module without pinking detector

Specifications and Adjustments

Vehicle	Engine						Gearbox	Injection Type	Ignition Type
	Type	Index	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. Ratio			
X 48 Q X 48 Y	J7R	754	88	82	1 995	9,3	Manual	Renix Multipoint	I.P.M. with pinking detector

Engine	Idling		Fuel	
	Speed (rpm)	Mixture (CO)	Special Features	Octane Rating
J7R 754	850 ± 75* (non adjustable)	1,8 ± 0,2 %	Super Eurosuper Unleaded	I.O. 98 I.O. 95

* At a coolant temperature of between 80 and 100°C.

Fuel system type	Multipoint injection
Fuel pump: mounted on the rear right hand side member	Voltage : 12 volts Pressure : 3 bars Delivery : 130 l/h
Fuel filter: mounted above the fuel pump	Replacement: 50 000 km
Pressure regulator	Pressure: - at zero vacuum : 3,0 ± 0,2 bars - at a vacuum of 500 mbars : 2,5 ± 0,2 bars
Electromagnetic injectors	Will only operate with a computer: Voltage : 12 volts Resistance : 2,5 ± 0,5 Ω
Throttle unit	SOLEX: single barrel Ø 55mm Ref. : 937
Load potentiometer	A : idling: XR 25 reading = 4 to 10 B : partial load: XR 25 reading = 20 to 190 C : fully open: XR 25 reading = 225 min
Idling regulator valve	HITACHI: Voltage : 12 volts Coil resistance : 9 - 30 Ω

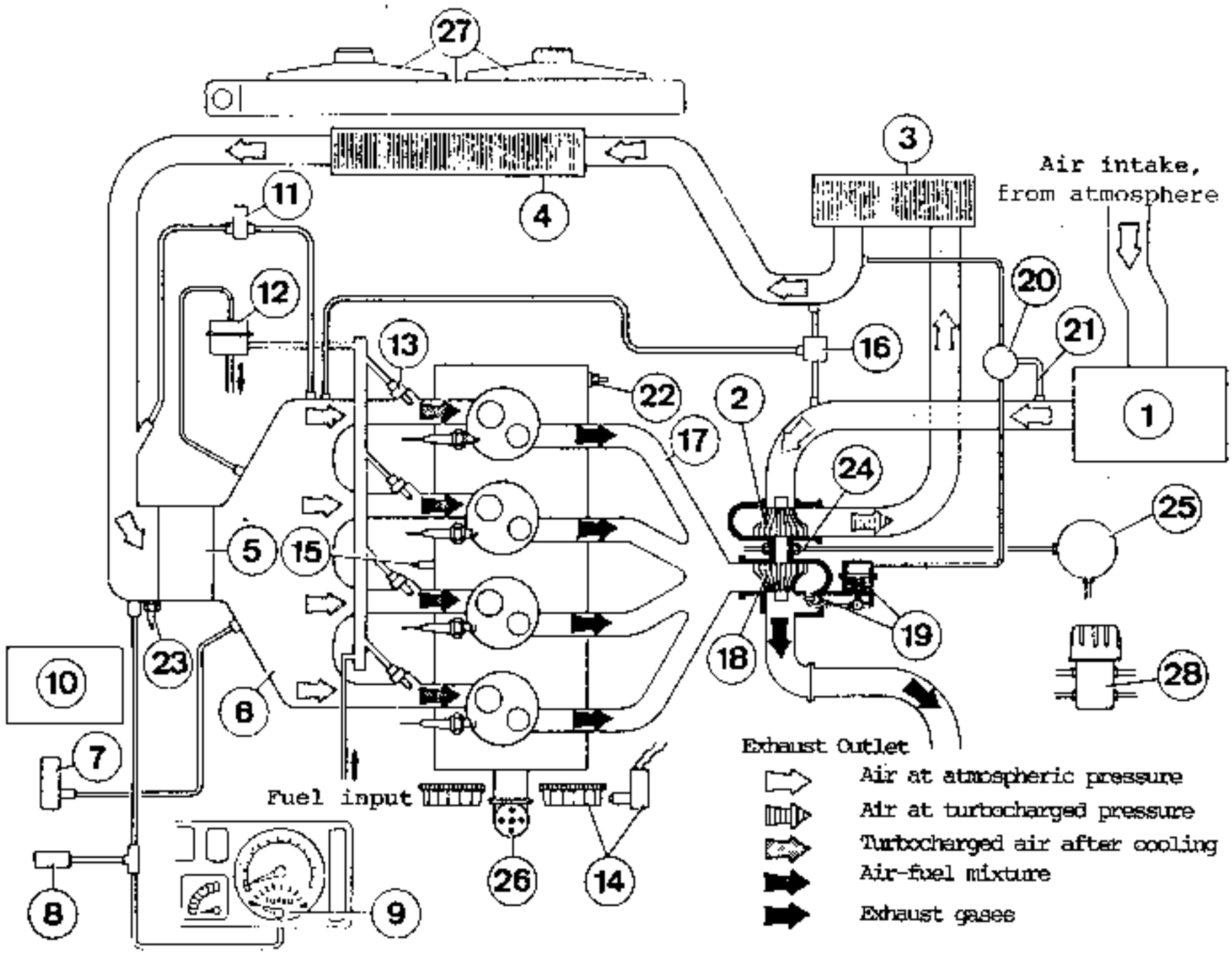
Specifications and Adjustments

Computer	Renix No.	Approval No.	R.N.U.R. No.	Diagnostic Code
Renix or Bendix mounted in the engine compartment	S 101 266 101	77 00 745 990	77 00 744 407	28 - 3

Air temperature sensor	Bendix: type CTN
Coolant temperature sensor	Bendix: type CTN

Oxygen sensor	
Catalyzer	
Paper cartridge air filter	Replacement : 20 000 km
E.G.R.	
Anti-evaporation system	
Ignition system	Curves : programmed into the injection computer M.P.A. (I.P.M.) : Ignition Power Module with pinking detector
Spark plugs: EYQUEM	FC62LS3 spark gap 1.2mm (non adjustable)

FUEL SYSTEM DIAGRAM (X 485)



1 - Air filter
2 - Compressor
3)
4) Intercoolers
5 - Throttle unit and potentiometer
6 - Inlet manifold
7 - Engine air intake pressure sensor
8 - Safety pressure switch
9 - Turbocharged pressure gauge
10 - Engine electronic management computer
11 - Idling speed regulator solenoid valve
12 - Fuel pressure regulator
13 - Injectors
14 - Flywheel position/speed sensor
15 - Pinking detector
16 - Turbo bypass valve
17 - Exhaust manifold
18 - Turbine
19 - Turbo regulator capsule and valve
20 - Solenoid valve which controls the turbocharging pressure regulation
21 - Variable "leak" across solenoid valve 20
22 - Coolant temperature sensor
23 - Air temperature sensor
24 - Turbine bearing water cooling system
25 - Electric coolant pump which operates with the ignition switched off
26 - Ignition distributor
27 - Engine cooling radiator with 2 electric blower fans
28 - Oil cooler

INLET MANIFOLD ELECTRIC HEATER

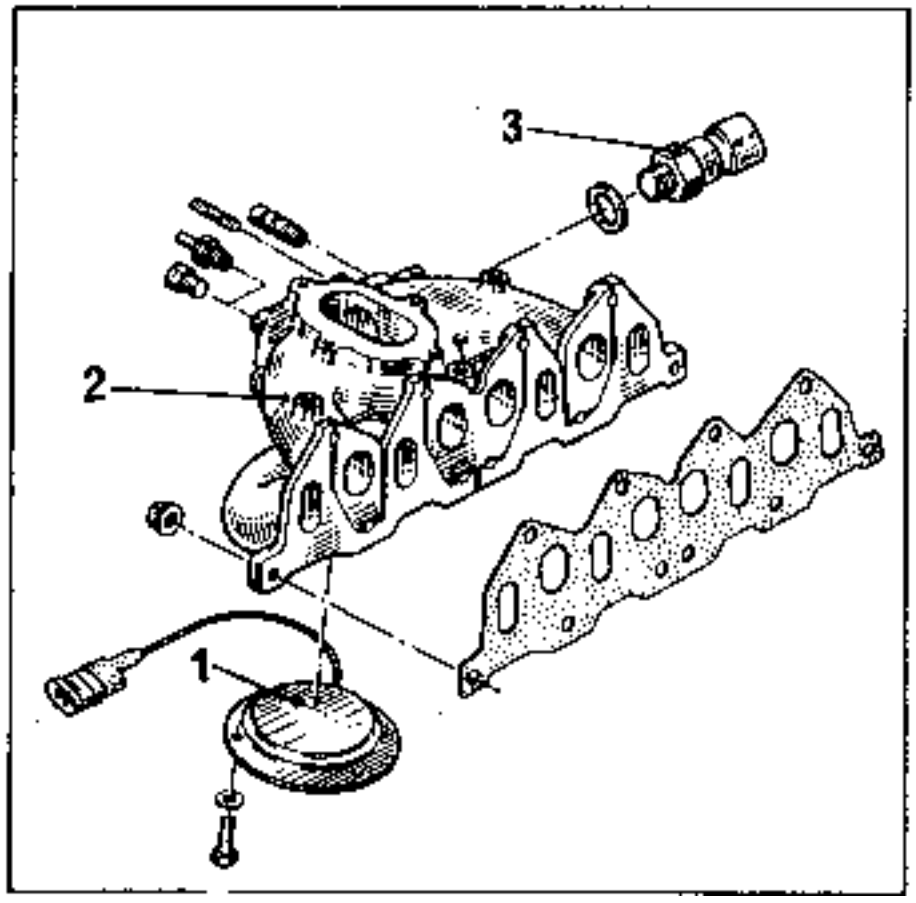
Vehicles fitted with type F2N 754 engines are fitted with an electric heater (1) in the lower part of the inlet manifold (2).

Its current supply is from the + after ignition switch circuit during the engine warmup phase.

A temperature switch (3) switches off the circuit at temperatures above 60°C.

Temperature switch:

- switches off the circuit: 63 ± 3°C,
- switches the circuit back on: 56 ± 3°C



METHOD OF ADJUSTING THE IDLING SPEED

This adjustment must be carried out accurately to obtain a CO percentage that remains stable between two maintenance inspections. We should also like to remind you that its adjustment must be carried out under accurately defined conditions:

1) The vehicle must be run in for a minimum of 1,000 km (600 miles)(any adjustment carried out on a vehicle which is not run-in could change 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 the engine at approximately 2,000 rpm until the thermostat opens; however, do not leave it to warm up at idling speed as an engine which has run at idling speed for only a few minutes provides a CO reading which is not valid.

4) The idling speed must be within the manufacturer's limits (see chart).

5) The air filter must be fitted and its cartridge clean.

6) The ignition system must be in good condition and correctly adjusted.

7) There are to be no air leaks into the system (vacuum pipes, emission control system etc...).

8) There should be no extensive leakage of the exhaust system.

9) None of the heavy electrical consumers is to be operating (electric fan, heated rear screen etc...).

For the carburettor settings, consult the data sheets in the following workshop manuals,

M.R. Carb. S
M.R. Carb. W
M.R. Carb. Z

and the latest editions of their data sheets.

ADJUSTING THE IDLING SPEED USING AN EXHAUST GAS ANALYZER

In those countries where they are fitted, remove the tamper proofing cap from the mixture screw (B).

Turn screw (A) to obtain the average idling speed stated on the chart for the vehicle concerned.

Turn screw (B) to obtain the CO percentage stated on the chart.

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

Repeat these two operations until both the CO percentage and the idling speed are correct.

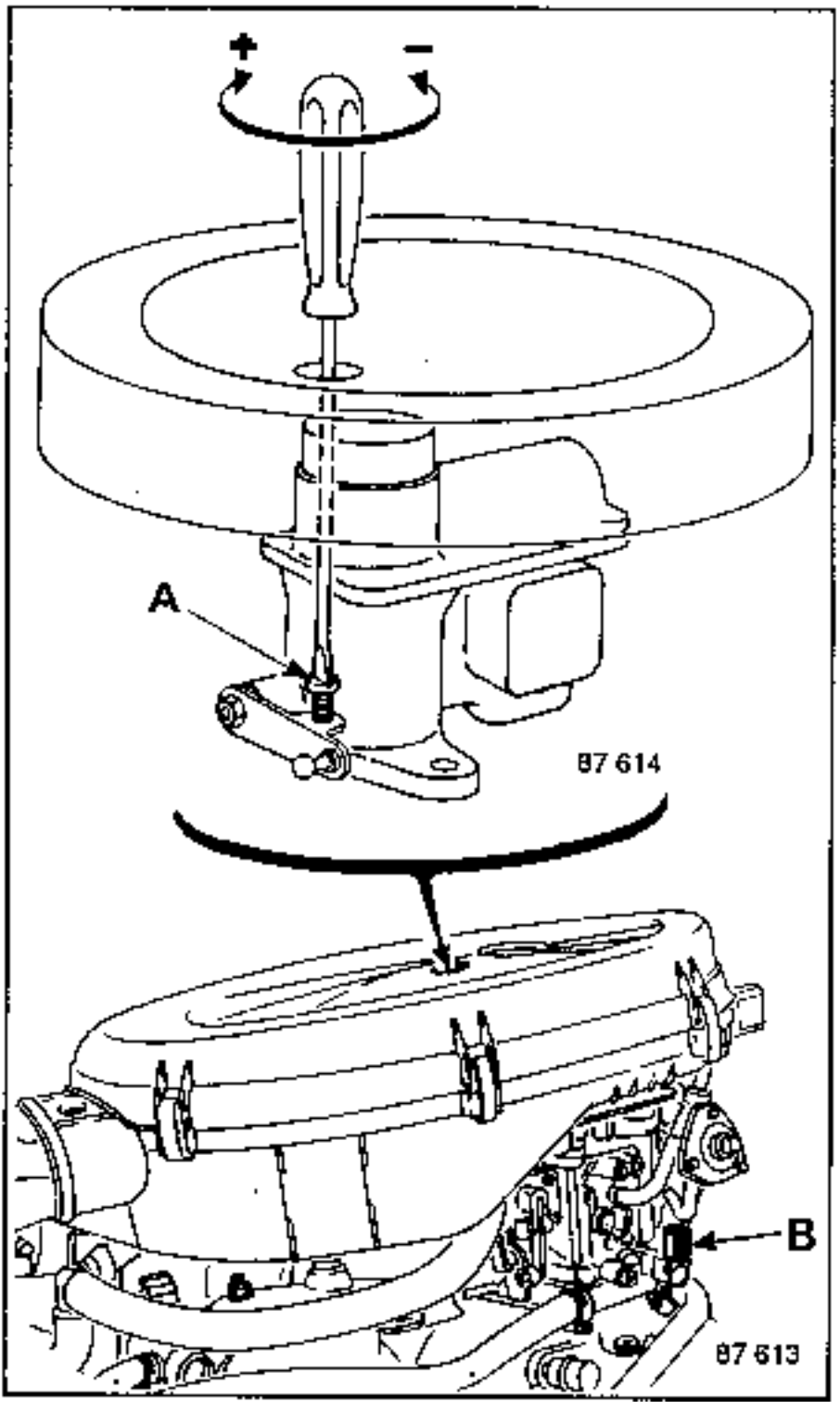
In those countries where the regulations require it, fit a tamper proofing cap to screw (B) after the adjustment.

TAMPER PROOFING CAP

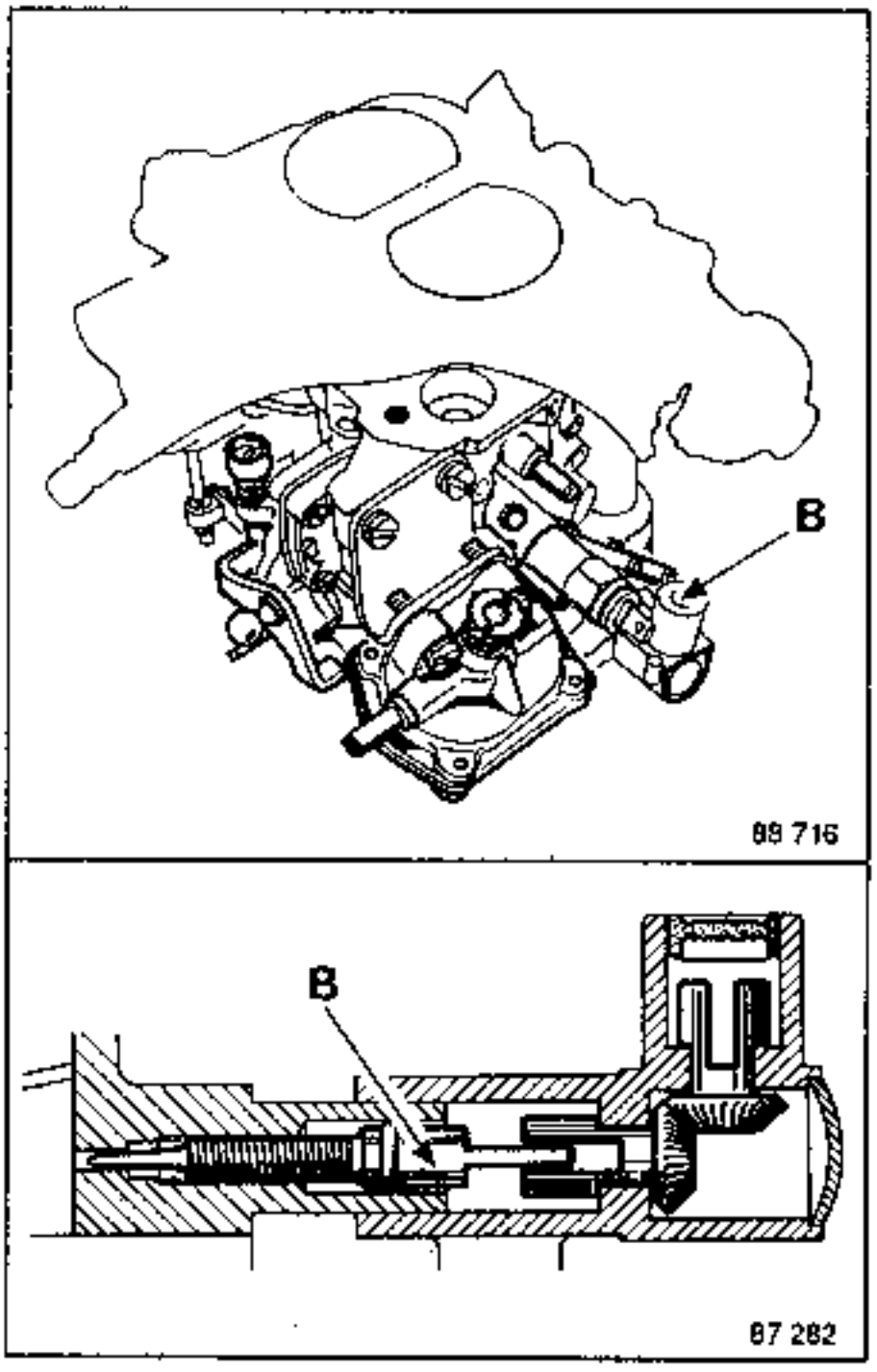
CARBURETTOR	Tamper Proofing Cap Part No.
SOLEX 28 x 34 Z	77 01 200 831
WEBER 32 DRT	77 01 200 833
Injection Bendix	77 01 200 832

Method of Adjusting the Idling Speed:
WEBER 32 DRT

Screw A:

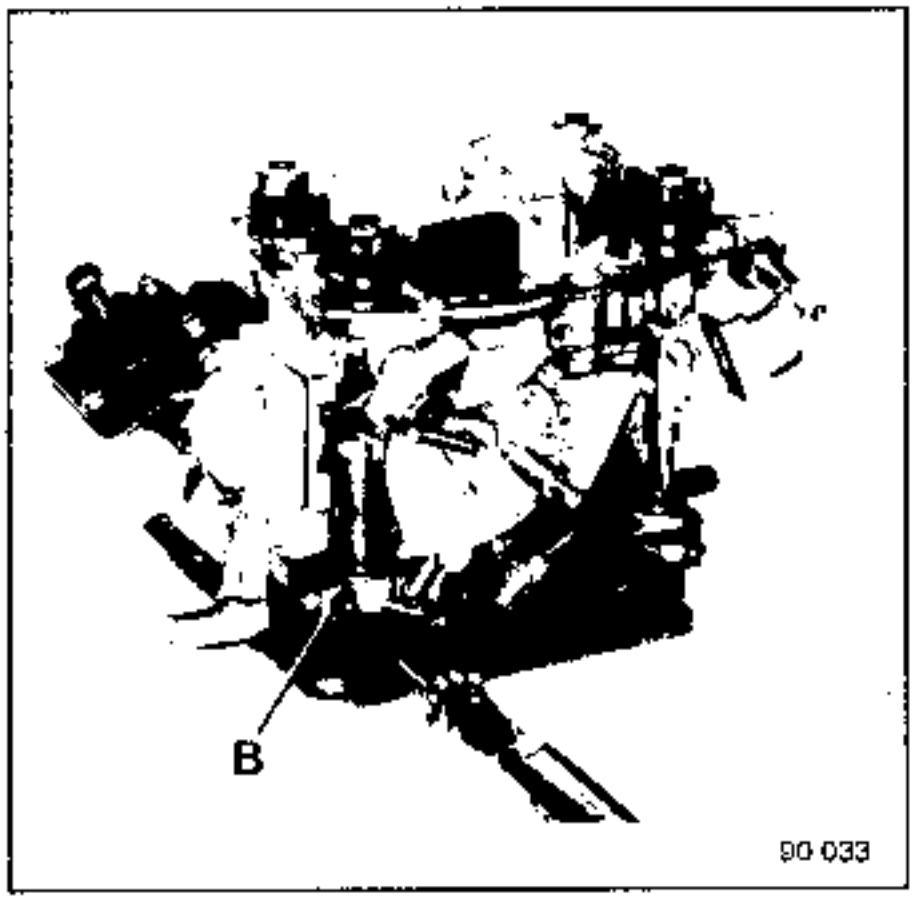


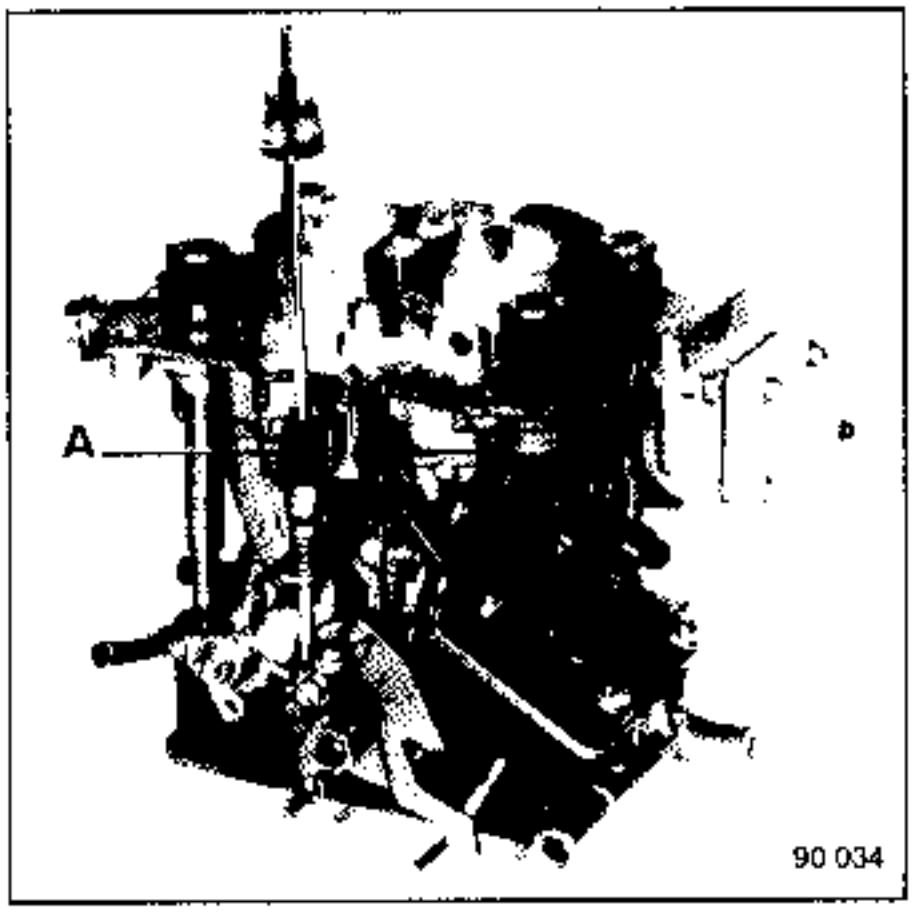
Screw B:



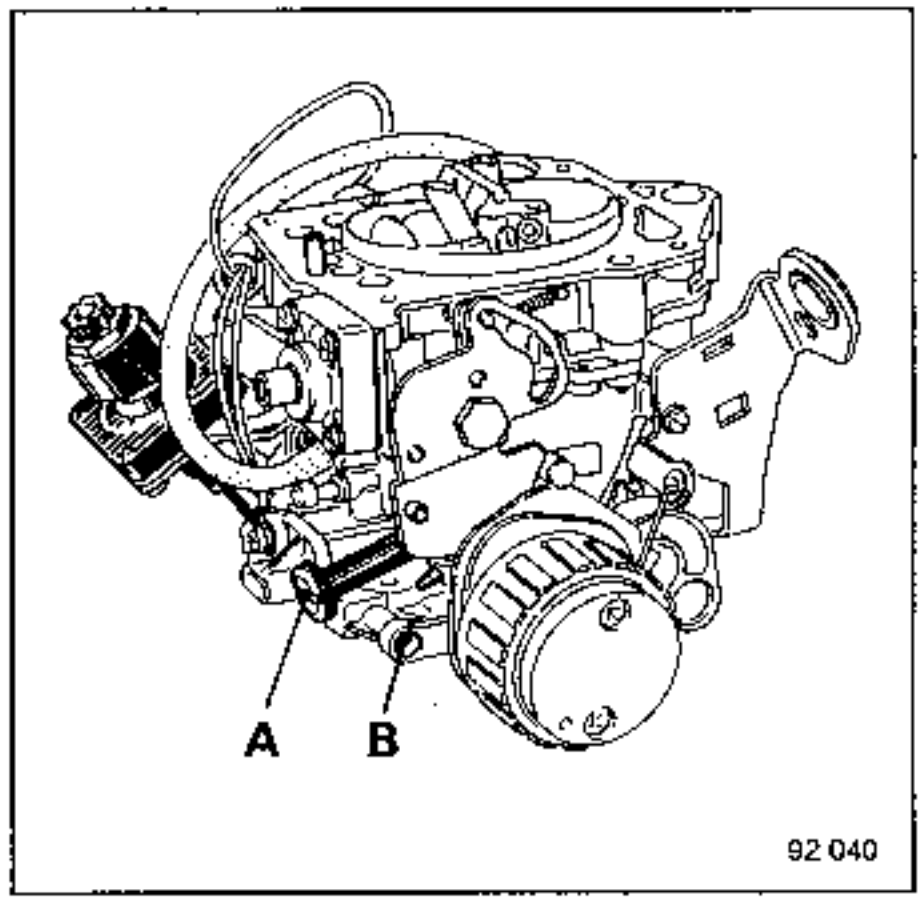
Method of Adjusting the Idling Speed:

SOLEX 28 x 34 Z 10

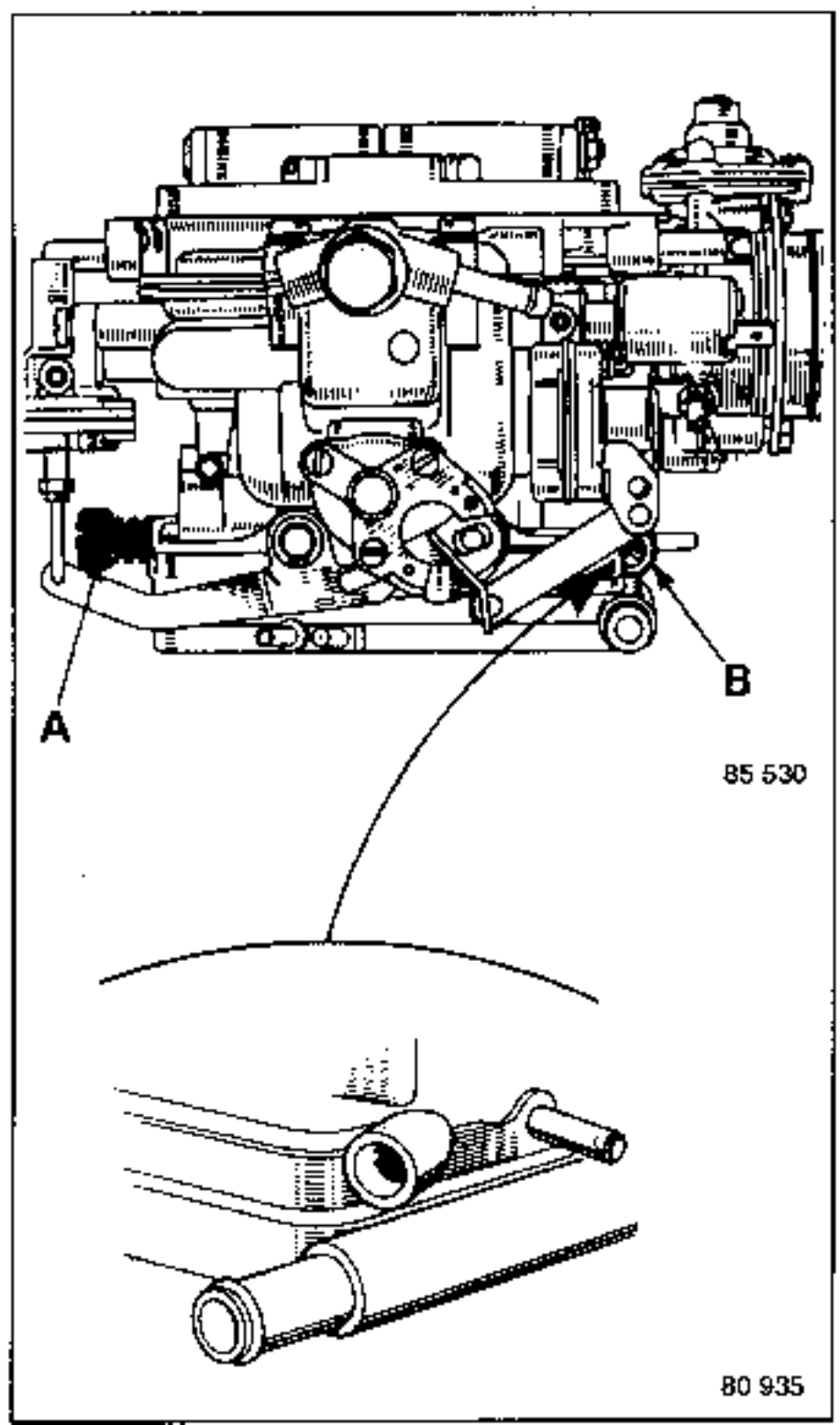




SOLEX 32 x 34 Z 13

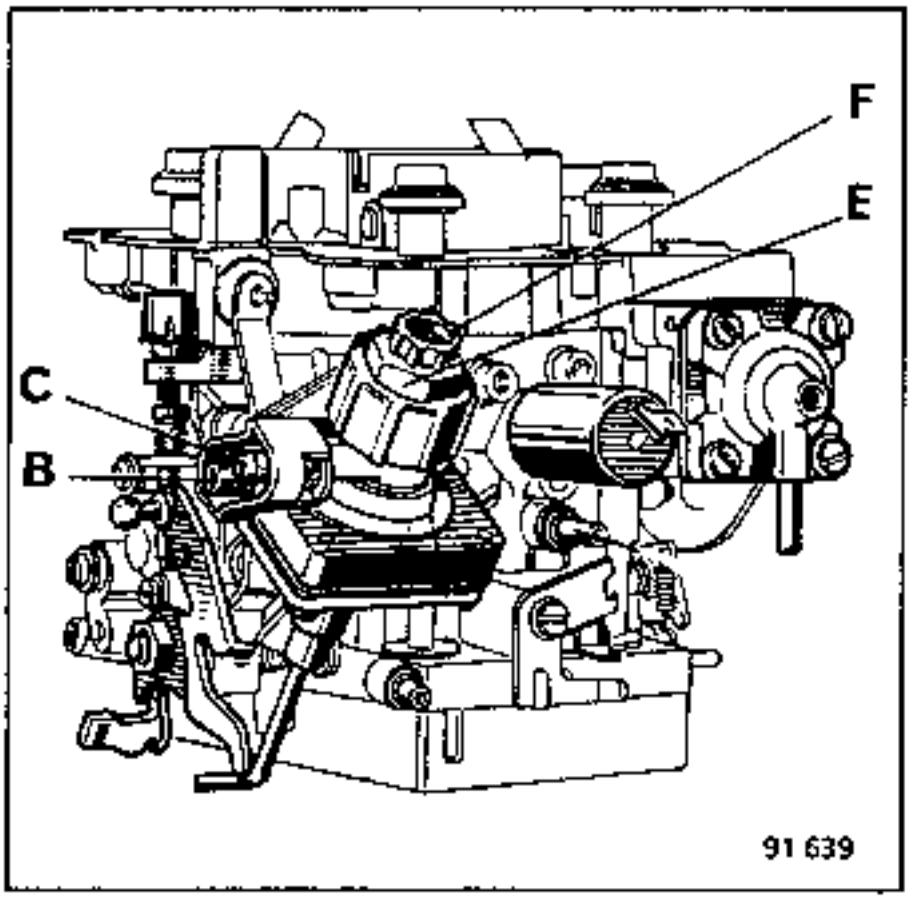


WEBER 32 DARA



VEHICLES X 481 and X 482

Fast Idling A.C. or P.S. or AC and PS



NOTE: Before adjusting the fast idling P.S. or A.C. or P.S. + A.C., check that the normal idling speed is correctly adjusted.

Adjustment on P.S. Vehicles:

With the engine warm, apply a vacuum of 600 mbars or the manifold vacuum to the throttle actuator (blue ring). With the electric fan switched off and the steering straight ahead, the speed should be 955 ± 50 rpm (with the steering turned through full lock, the speed should be 700 to 730 rpm).

Adjustment on A.C. Vehicles:
(after the P.S. adjustment, with the steering straight ahead and the electric fan switched off).

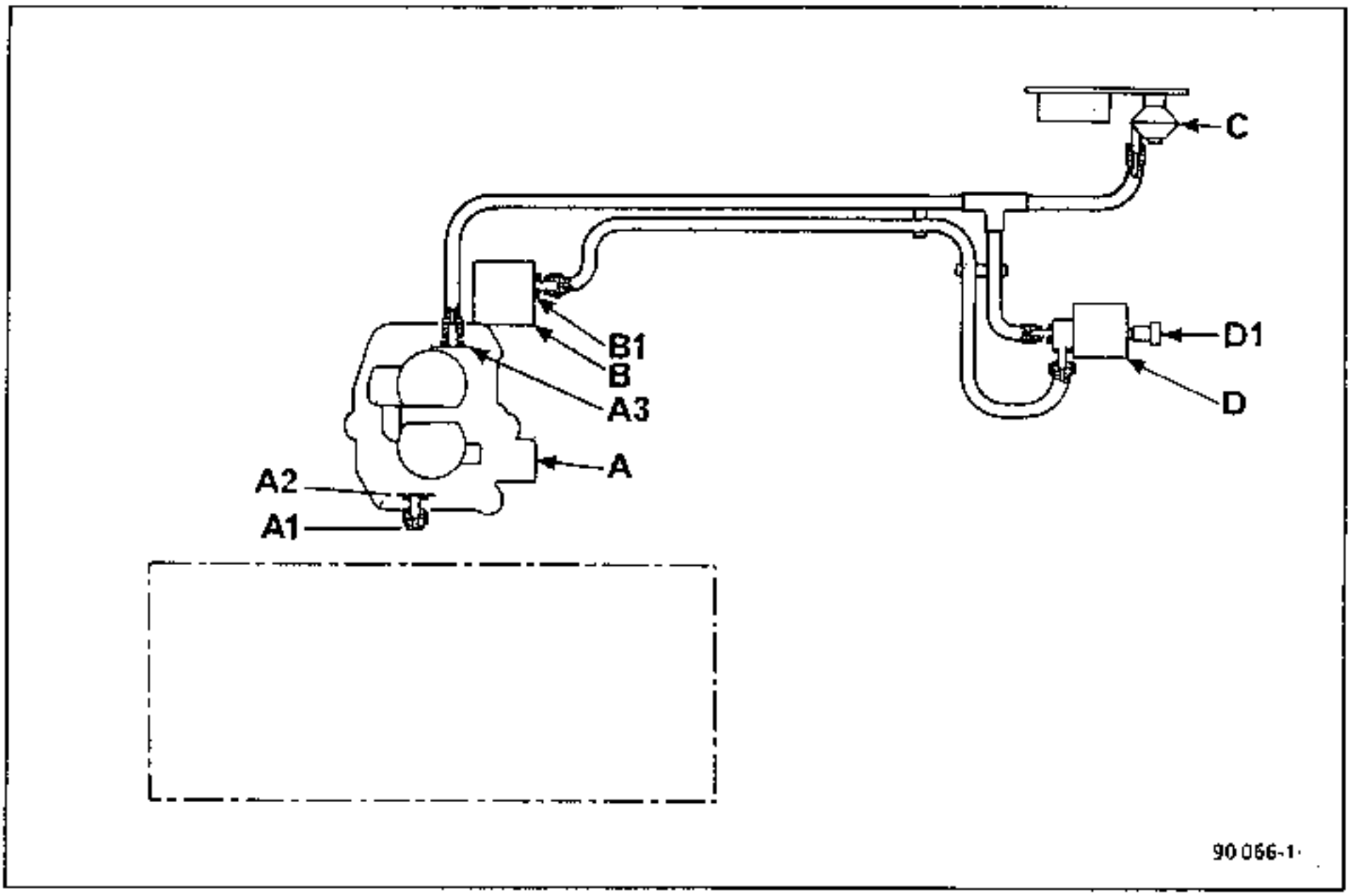
With the air conditioning on maximum, the speed should be 950 rpm.

P.S.: Power Steering
A.C.: Air Conditioning

B : Take-off point on actuator for PS
C : Take-off point on actuator for AC
E : Adjusting screw for P.S.
F : Adjusting screw for A.C.

X 481 - X 482 - 1st Arrangement

Pneumatic control system on vehicled fitted with air conditioning or power steering

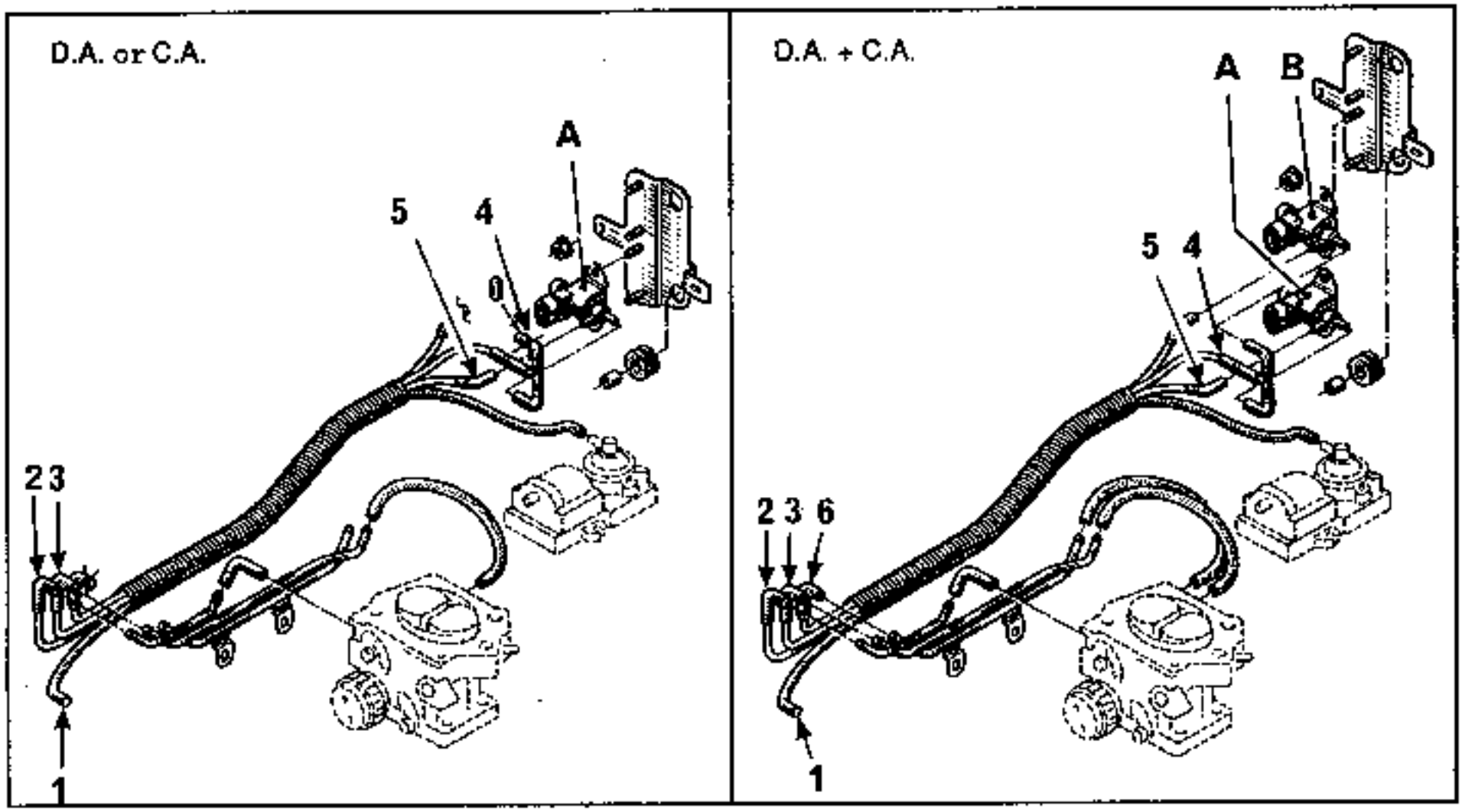


A : Carburettor
A1: Plug on pipe, colour black
A2: Identification ring on carburettor, colour red
A3: Identification ring on carburettor, colour black

B : Throttle actuator
B1: Identification ring, colour dark blue, on actuator
C : Electronic ignition system
On electronic ignition unit: no identification
D : Solenoid valve: near electronic ignition unit
D1: Filter on solenoid valve

X 482 - 2nd Arrangement

Fast Idling P.S. or A.C. or P.S. + A.C.



A.C. or P.S. Arrangement:

1 - Electronic ignition vacuum pipe
2 - Pipe, yellow ring
3 - Pipe, mauve ring
4 - Pipe, red rings
5 - Pipe, blue ring
A - P.S. or A.C. solenoid valve

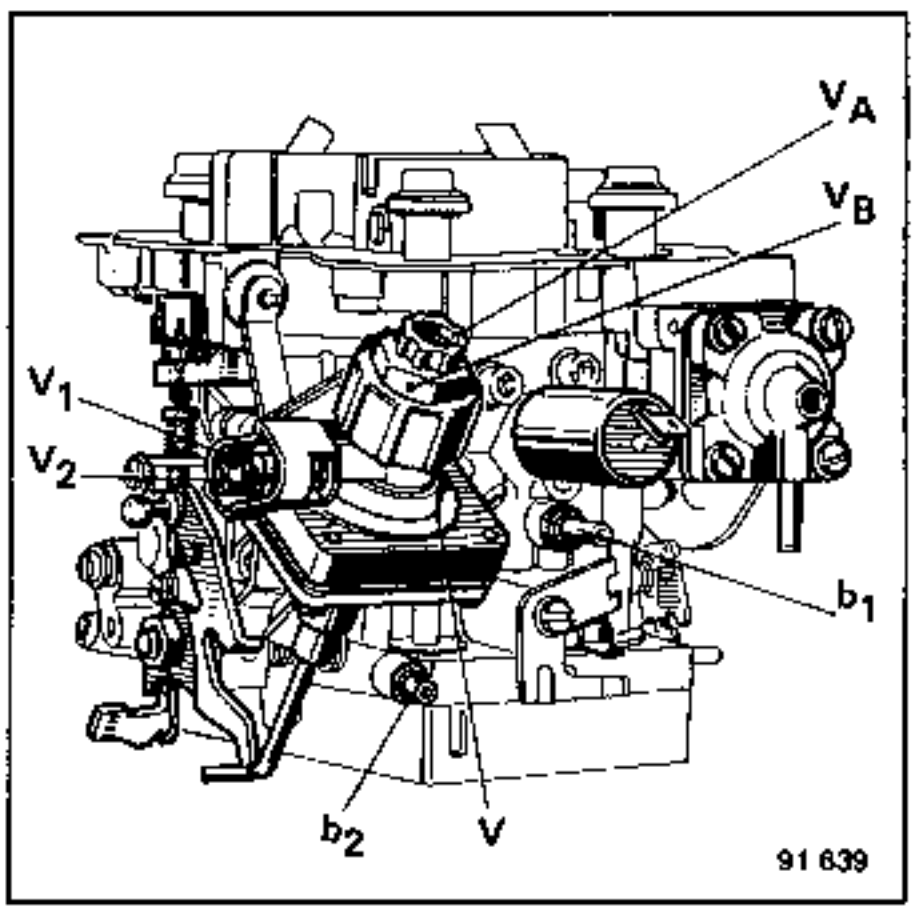
P.S. + A.C. Arrangement:

1 - Electronic Ignition vacuum pipe
2 - Pipe, yellow ring
3 - Pipe, mauve ring
4 - Pipe, red rings
5 - Pipe, blue ring
6 - Pipe, orange ring
7 - Pipe, grey ring
A - P.S. solenoid valve
B - A.C. solenoid valve

A.C.: Air Conditioning
P.S.: Power Steering

VEHICLES X 48 M and X 48 N

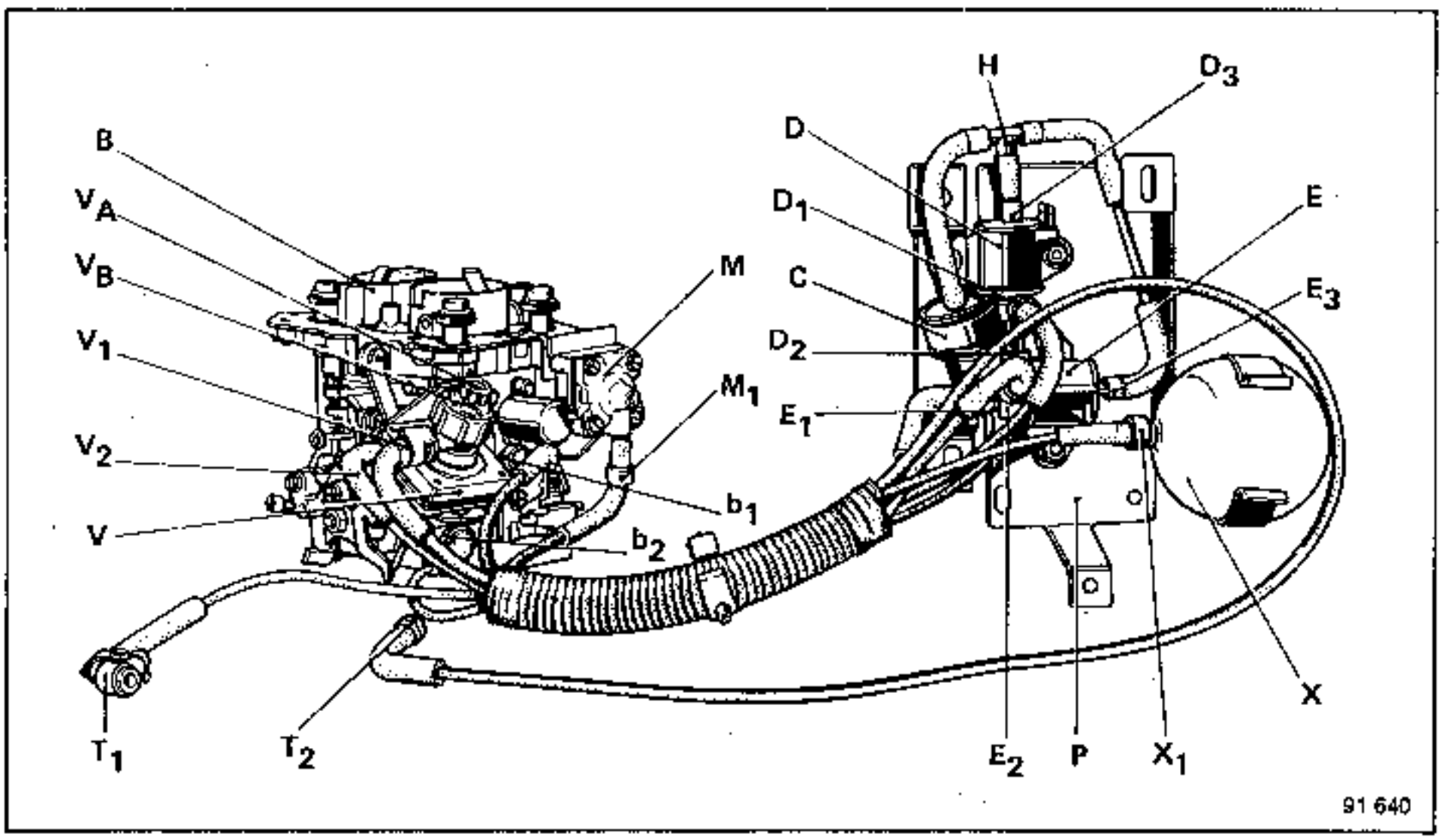
These vehicles are fitted with a two stage actuator. Each stage is controlled separately by its own solenoid valve.



V - Two stage throttle actuator
- V_A - Adjusting screw for air conditioned and emission control models
- V_B - Adjusting screw for power steering models
- V_1 - Take-off point on actuator for air conditioned models
- V_2 - Take-off point on actuator for power steering models
- b_1 - Emission control take-off
- b_2 - Take-off for power steering and air conditioned models

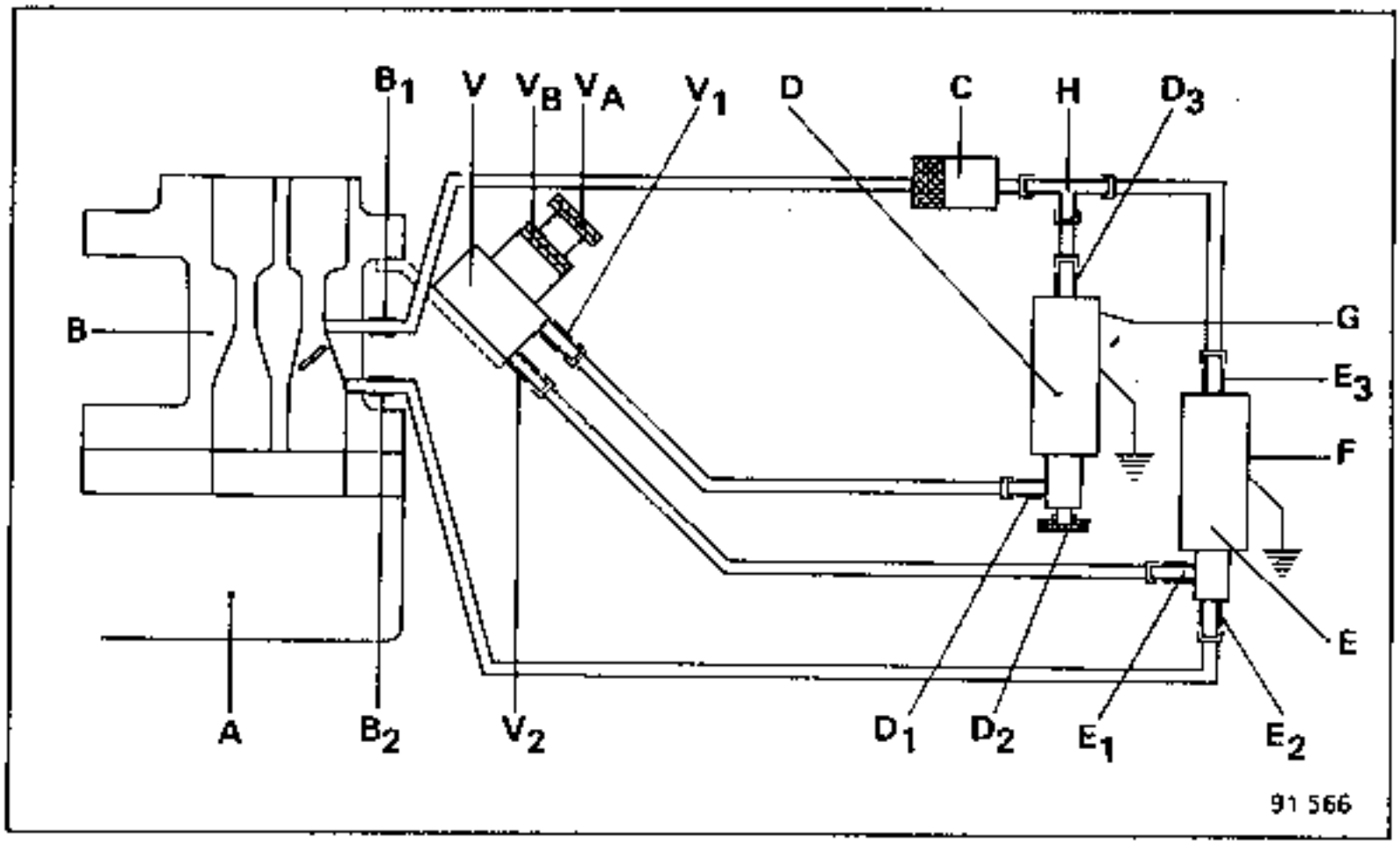
The adjustment of vehicles with air conditioning and power steering:

- Fast idling for power steering (screw V_B): 1050 $\pm$ 50 rpm.
- Fast idling for air conditioned and emission control models (screw V_A): 1500 $\pm$ 100 rpm.



VEHICLES X 48 M and X 49 N

Pneumatic control system circuit diagram:



A - Inlet manifold
B - Carburettor
- B_1 - White identification ring
- B_2 - Red identification ring

C - Retardation valve (coloured face towards carburettor)
D - Solenoid valve controlling stage V_1 on the throttle actuator V
- D_1 - Grey identification ring
- D_2 - Filter
- D_3 - White identification ring

E - Solenoid valve controlling stage V_2 on the throttle actuator V
- E_1 - Light blue identification ring
- E_2 - Red identification ring
- E_3 - White identification ring

F - Power steering signal
G - Air conditioning signal
H - T junction
V - Throttle actuator (on carburettor)
- V_1 - Grey identification ring
- V_2 - Light blue identification ring
- V_A - Adjusting screw for air conditioned and emission control models
- V_B - Adjusting screw for power steering models

M - Starting assistance diaphragm
- M_1 - Green identification ring

X - Starting assistance accumulator
- X_1 - Green identification ring

P - Support plate
T_1 - Electronic ignition take-off on manifold, yellow identification ring
T_2 - Electronic ignition take-off point, yellow identification ring

VEHICLES X 48 M and X 48 N

ADJUSTING THE IDLING SPEED

IMPORTANT:

It is essential, when adjusting or checking the idling mixture:

- **to cut out the exhaust air intake. Using clamp Mot. 453-01, pinch flat the air hose connecting the air filter to the pulsair valve.**
- **to start the adjusting procedure on the vehicle when its engine is cold.**

Adjusting Procedure:

- With the engine cold, the exhaust air intake shut off and the exhaust analyser connected.
- Start the engine on full choke, push in the choke to obtain approximately 900 rpm, and run it at this for approximately 1 minute, then fully push in the choke.
- Wait until the engine cooling fan cuts in for the first time before adjusting the idling speed.

IMPORTANT:

- It is essential to follow this adjusting procedure, and above all not to accelerate the engine to avoid the risk of engaging the catalyzer.
- If, during the gas analysis, the CO percentage tends to fall to 0 and the CO2 percentage rises to above 14%, the catalyzer will be engaged:
  - recommence the adjusting procedure when the engine has cooled down.

NOTE: On vehicles with a CO take off point before the catalyzer, use tool 843-01 to measure the CO percentage. In this case, the engagement of the catalyzer will have no effect on the idling speed adjustment operation.

Adjustment Figures:

Vehicle	Speed (rpm)	Mixture (CO %)	Conditions
K 48 M L 48 M	725 ± 25	1 ± 0,5	No air entering the exhaust system. Carry out the procedure described above.
K 48 N L 48 N	850 ± 50	1,25 ± 0,5	

VEHICLES X 48 M and X 48 N

OVERRUN FAST IDLING SPEED ADJUSTMENT

Vehicles without power steering:

Speeds to be Adjusted	Conditions	Adjustment Figures	Remarks
Normal idling speed	- Engine warm, after warmup procedure and electric fan cutting in. - Hose between pulsair and air filter pinched flat	850 ± 50 rpm CO : 1,25 ± 0,5 % KL 48 N 725 ± 25 rpm CO : 1 ± 0,5 % KL 48 M	Carry out the adjustment, after the electric fan has stopped, with the engine warm, running at idling speed, and the pipe between the air filter and the pulsair pinched flat. The catalyzer will disengage itself. After adjusting the normal idling speed, with the electric fan stopped.
Fast idling	- Engine warm (after normal idling speed adjustment). - Apply a vacuum of 800 mbars to the throttle actuator.	1 500 ± 100 rpm	

Vehicles with power steering:

Speeds to be Adjusted	Conditions	Adjustment Figures	Remarks
Normal idling speed	Identical to vehicle without power steering	See preceding section	Identical to vehicle without power steering
Fast idling speed on power steering model (screw V_B)	- Engine warm (after adjustment of normal idling speed). - Disconnect the pipe from the second stage of the actuator at solenoid valve D (grey identification ring). - Disconnect the pipe with the light blue ring from the first stage of the throttle actuator. - Apply a vacuum of 800 mbars to the first stage of the actuator (V_2 on the diagram).	1 050 ± 50 rpm	- After adjusting the normal idling speed. - Electric fan stopped. - Steering straight ahead.

VEHICLES X 48 M and X 48 N

Overrun Fast Idling Speed Adjustment

Vehicles with power steering:

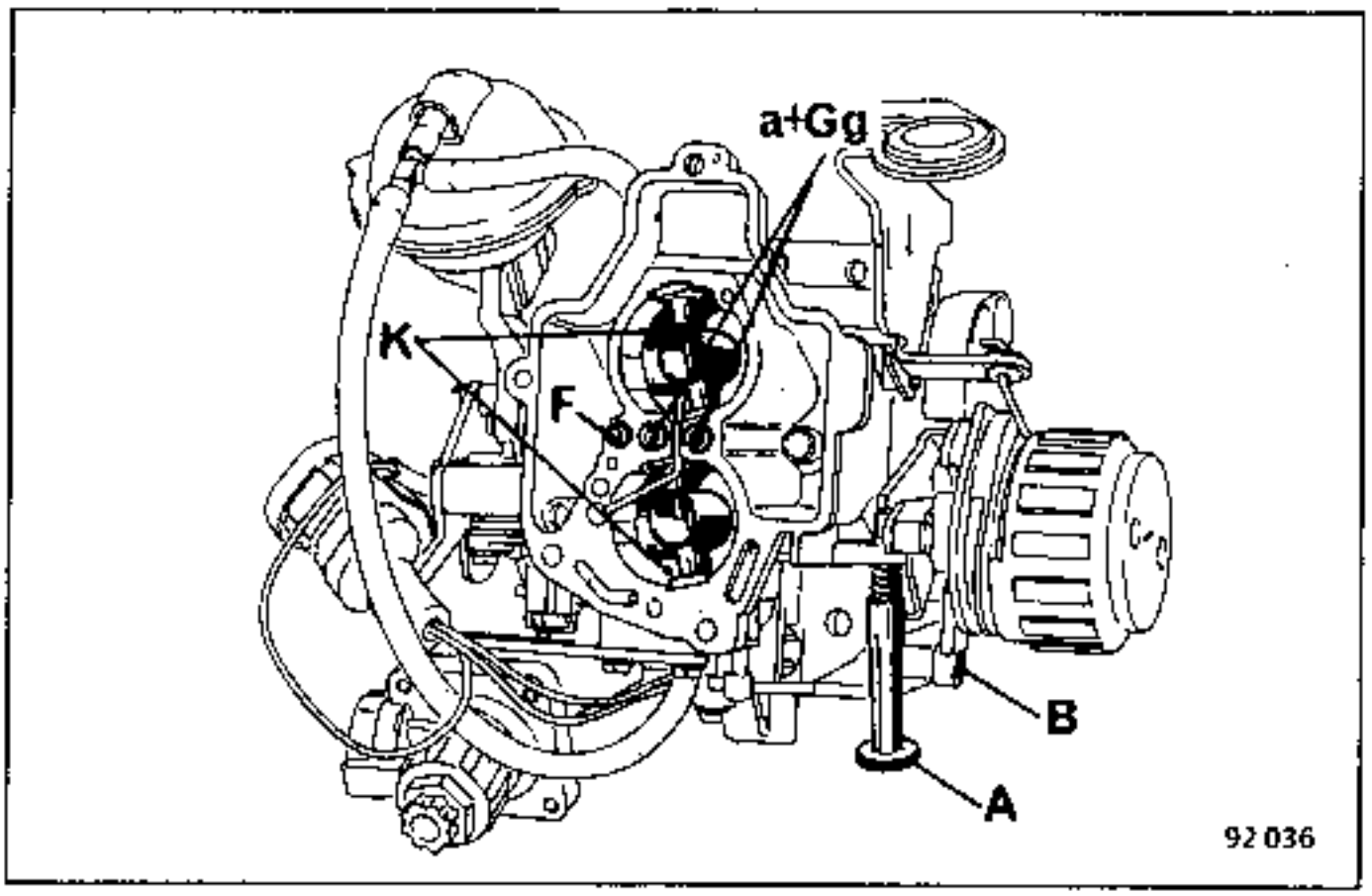
Speeds to be Adjusted	Conditions	Adjustment Figures	Remarks
Fast idling on emission control models (screw V_A).	- Disconnect the pipe from the first stage of the actuator at solenoid valve E (light blue identification ring). - Disconnect the pipe with the grey ring from the second stage of the throttle actuator. - Apply a vacuum of 800 mbars to the second stage of the actuator V_1 on the diagram).	1,500 ± 100 rpm.	- After adjusting the normal idling speed. - With the electric fan stopped. - The power steering stage of the actuator must already have been adjusted.

VEHICLES X 48 M and X 48 N

OVERRUN FAST IDLING SPEED ADJUSTMENT

Test Equipment	Conditions	Requirements	Remarks
NORMAL IDLING SPEED			
Tachometer exhaust gas analyzer	- With the engine warm, after warmup procedure, and electric fan cutting in. - Hose between pulsair and filter pinched flat.	Figures: - speed: 850 ± 50 rpm (2) 725 ± 25 rpm (1) - mixture: CO: 1.25 ± 0.5% (2) 1 ± 0.5% (1)	- Carry out the correct engine warmup procedure. - Adjust, if outside tolerances, with electric fan switched off.
POWER STEERING FAST IDLING (FIRST STAGE) (screw marked VB on the diagram)			
- Tachometer. - Keep the idling speed at the normal figure whilst operating the power steering.	- Engine warm. - Turn the power steering against the lock stop.	- Despite the power steering movement, the engine should maintain its normal idling speed of: 850 ± 50 rpm. DEFECTS: Speed dropping or too high.	- Adjust, if necessary. - Check the electrical connections on the pressure switch and solenoid valves. - Check the solenoid valve pneumatic connection.
EMISSION CONTROL FAST IDLING (SECOND STAGE) PLUS RETARDATION VALVE (screw marked V_A on the diagram)			
- Tachometer. - Stopwatch. - Time to fall from fast idling to normal idling speed.	- Engine warm. - Accelerate the engine to 3,000 rpm, then release the throttle.	- The engine speed should gradually fall after remaining constant at 1,500 ± 100 rpm for a period of 3 to 7 seconds. DEFECTS: Immediate return to idling speed. Return to idling speed after a very long period.	- Throttle actuator operating correctly (second stage). - Check that the retardation valve is fitted the correct way round (coloured face towards carburettor) and the force required to return the throttle. - Check: - The pneumatic connections on the two solenoid valves. - That the retardation valve is of the correct type. - The throttle control.

SOLEX 32 x 34 Z 13 CARBURETTORS (see MANUAL M.R. CARB S and NTs Nos. 1162 and 1380)



SETTINGS

ITEM	967 (C) (1) 967 (D) (2)	
	1st barrel	2nd barrel
Choke tube (K)	24	27
Main jet (Gg)	115	137,4
Air correction jet (a)	165	190
Idling jet (g)	43	50
Econostat	-	120
Enrichener	50	-
Needle valve	1,8	
Float level (mm)	33,5 ± 0,5	
Gauge number	71 644 082	
Accelerator pump injector	40 | 35	
Accelerator pump travel	cam	
Positive throttle opening (mm or °)	0,75 (22°30')	
Pneumatic initial opening (mm) COAS	3,5	
Degassing valve (mm)	0,30	
Fast idling (P.S. + A.C.)	13°	
Fast idling (P.S. or A.C.)	11°15'	
Clearance before diaphragm starts to move dim. X in mm	-	
Idling speed in rpm	800 ± 50	
CO %	1,5 ± 0,5	

(1) : P.S. or A.C.
(2) : P.S. and A.C.
A : Air adjustment screw
B : Mixture adjustment screw
F : Filter in idling fuel circuit

GENERAL - SPECIFICATIONS

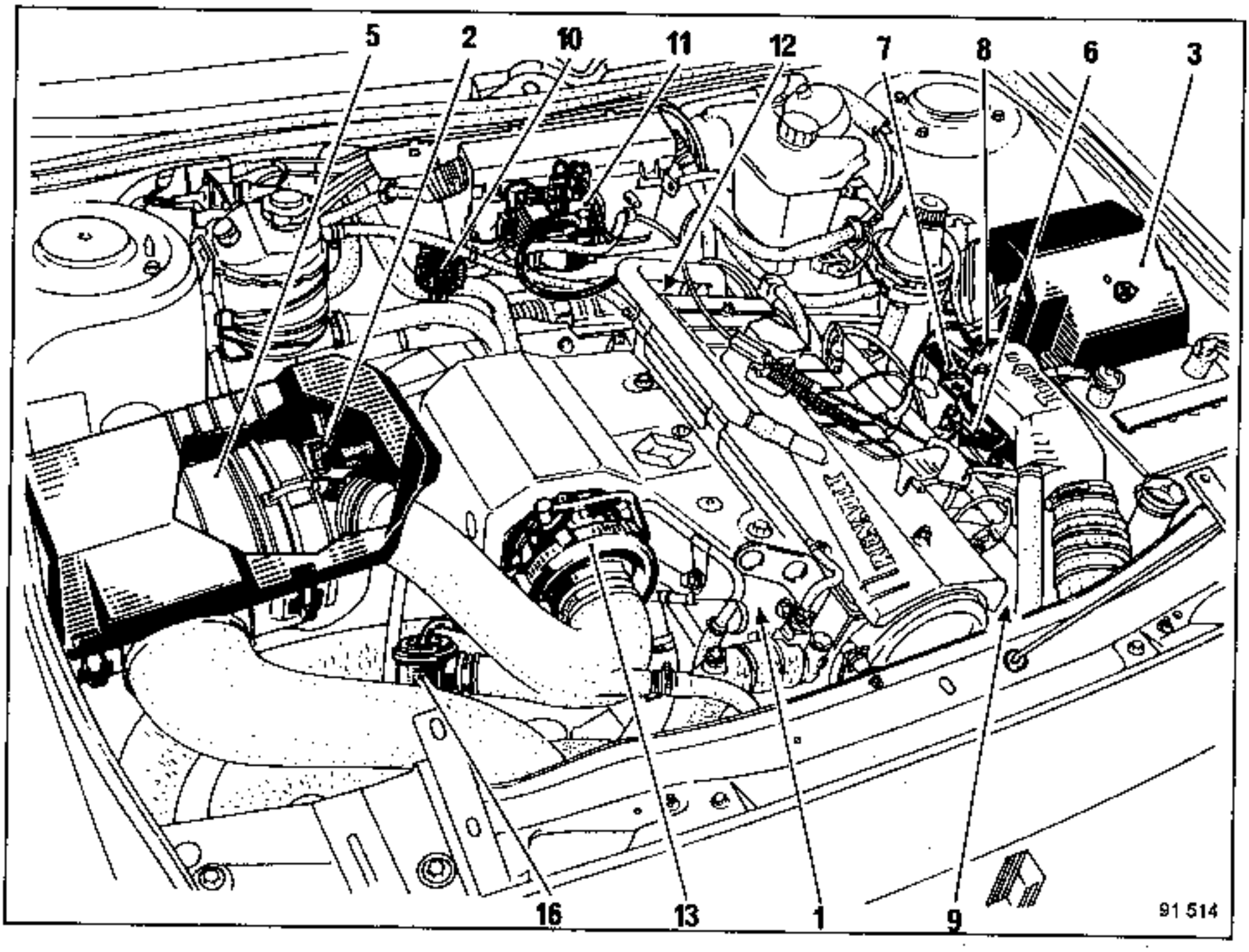
Vehicle Type	Engine	Turbocharger
RENAULT 21 X 488	J8S 714 J8S 742	GARRETT T2

Turbocharger	GARRETT T2	Turbocharging pressure: 0.6 - 0.025 bars at 2500 ± 250 rpm. Static opening pressure: 730 ± 30 mbars for an adjusting rod travel of 0.38 ± 0.02mm.

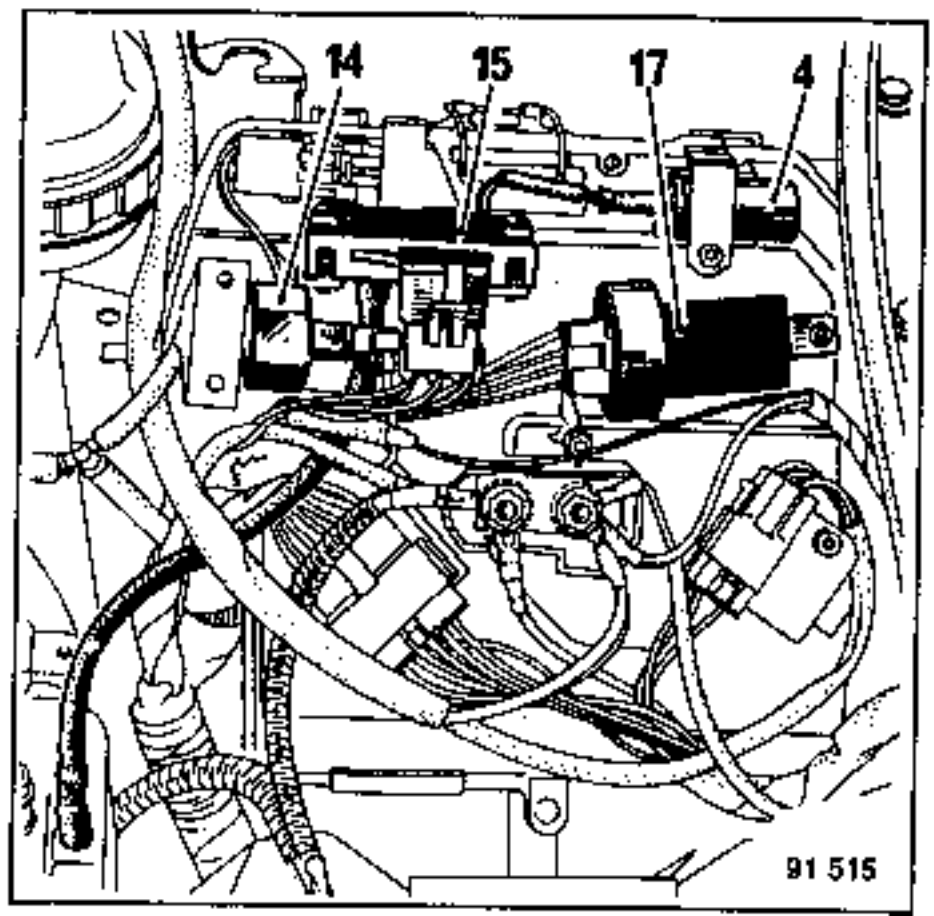
Vehicle Type	Engine	Turbocharger
RENAULT 21 X 485	J7R 752	GARRETT T3 with electronic turbocharging regulation

Turbocharger	GARRETT Type T3 with pressure limiting valve: Static pressure 520 ± 30 mbars for an adjusting rod travel of 0.38 ± 0.02mm
Turbocharging pressure (at full load, on the open road) NOTE: The maximum pressure is controlled by a solenoid valve operated by the injection computer.	Manifold pressure (measured with the XR 25) 900 ± 50 mbars between 2500 & 4000 rpm. (1,900 ± 50 mbars absolute pressure) 800 ± 50 mbars at maximum speed (1,800 ± 50 mbars absolute pressure)
Engine pressure safety switch	Operating pressure: 1,300 to 1,480 mbars
By-pass valve	Opens at a vacuum of: 200 ± 20 mbars

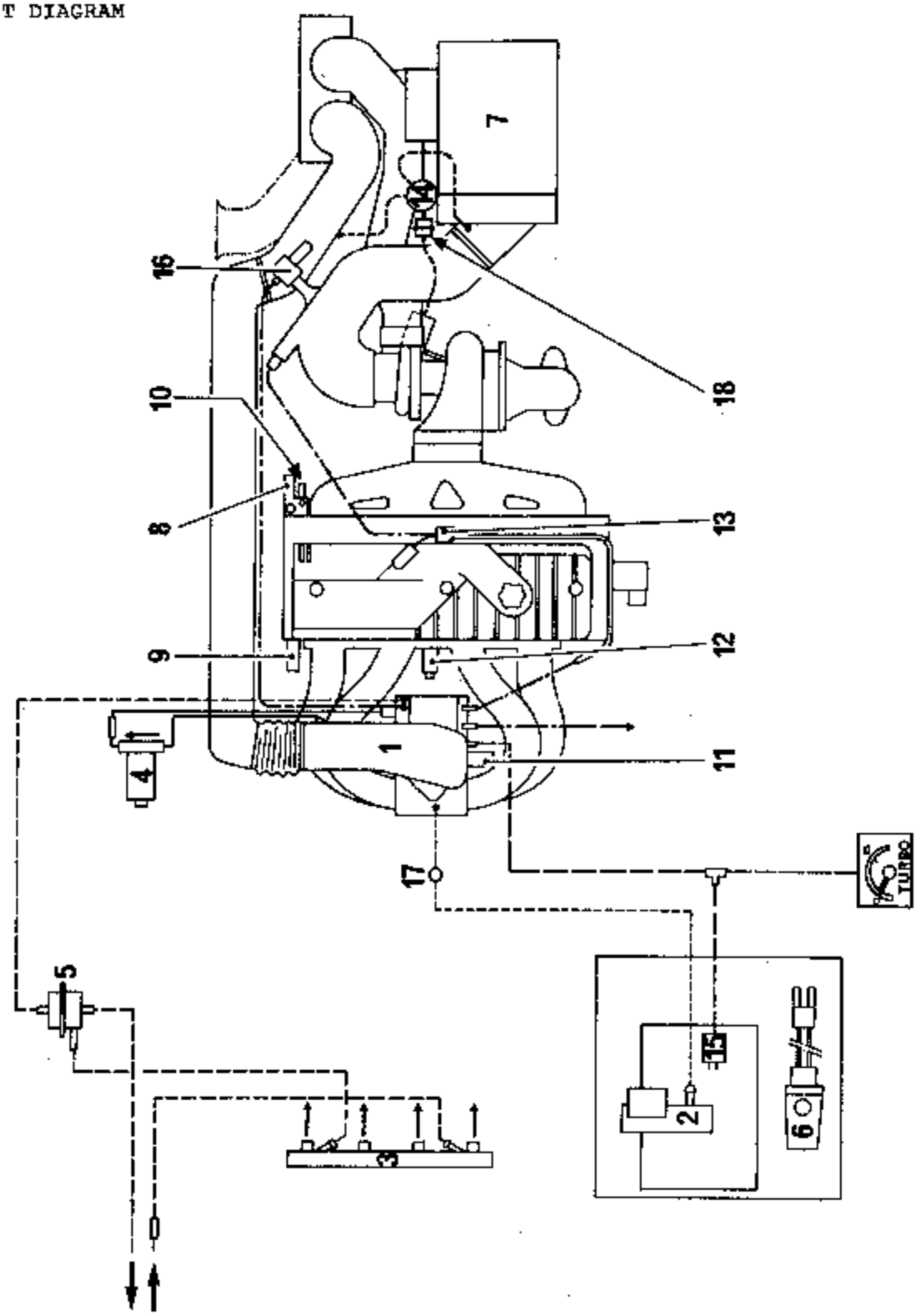
POSITIONS OF COMPONENT UNITS



1 - Coolant temperature sensor
2 - Turbocharging pressure regulator solenoid valve
3 - Computer + protective casing
4 - Idling adjustment potentiometer (CO%)
5 - Air filter
6 - Throttle unit
7 - Throttle potentiometer
8 - Air temperature sensor
9 - Idling speed regulator valve
10 - Diagnostic plug
11 - Ignition module
12 - Distributor
13 - Turbocharger
14 - Turbocharging pressure limiting pressure switch
15 - Pressure sensor
16 - By-pass valve
17 - Electric coolant pump timed relay



PIPE CIRCUIT DIAGRAM



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1 - Throttle unit
2 - Absolute pressure sensor
3 - Fuel injection gallery
4 - Electronic idling regulator
5 - Fuel pressure regulator
6 - Idling mixture potentiometer
7 - Resonator type air filter
8 - Coolant output pipe
9 - Combined temperature switch/ thermistor
10 - Coolant temperature sensor
11 - Air temperature sensor
12 - Pinking detector
13 - Non-return valve
14 - Turbocharging circuit pilot solenoid valve
15 - Turbocharger safety pressure switch
16 - Turbocharger by-pass valve
17 - 1.5mm diameter jet
18 - Resonator

ESSENTIAL SPECIAL TOOLS	
Mot. 1014	Turbocharging pressure checking and adjusting kit

CHECKING - REPLACING AND ADJUSTING THE TURBOCHARGING PRESSURE REGULATOR GATE)

The performance and reliability of a turbocharged petrol engine depends directly on the turbocharging pressure regulator adjustment. It is essential to adjust this component to the specified adjustment figures.

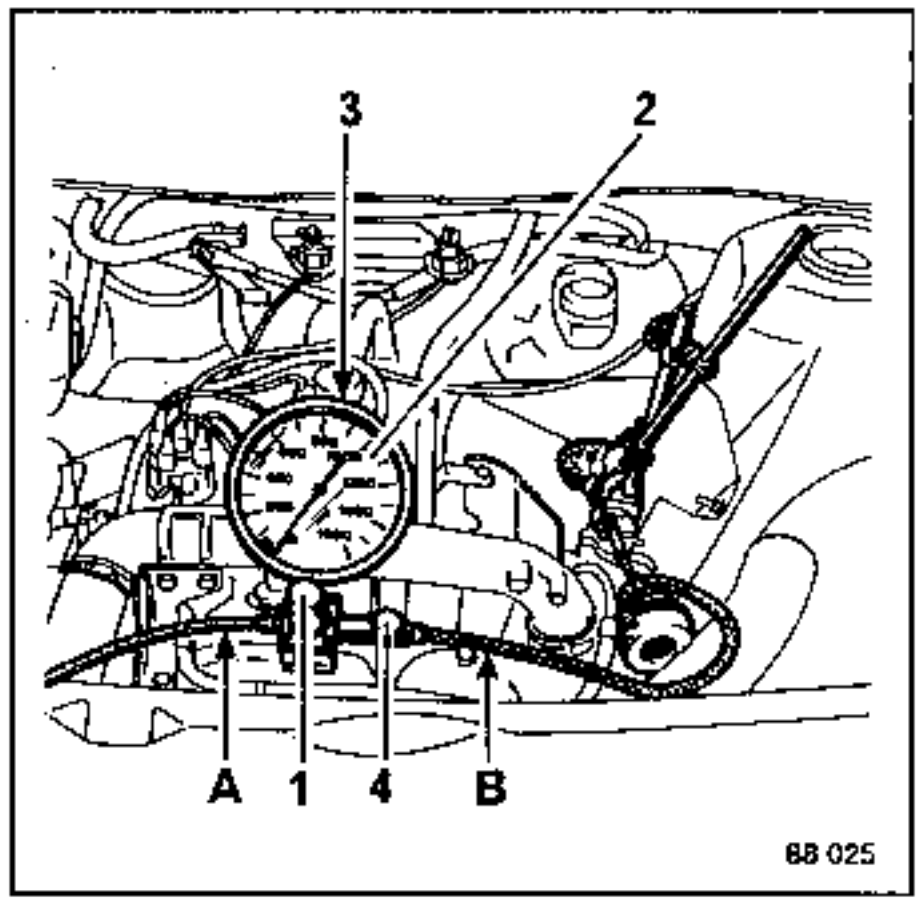
Checking, adjusting or replacing the turbocharging regulator can be carried out with the engine still on the vehicle and the turbocharger in place, by removing the adjacent components such as the heat shield, air filter and its support.

CHECKING AND ADJUSTMENT FIGURES

Checking Figure	Adjustment Figure	Adjustment Rod Travel
490 to 550 mbars	520 to 550 mbars	0.36 to 0.40 mm

METHOD OF USING SPECIAL TOOL KIT Mot. 1014

This kit consists of an adjustable pressure reducing valve (1), a test pressure gauge (2) graduated from 0 to 1.6 bars, fitted with a zeroing screw (3) and a leak screw (4).



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

Connect the output pipe (B) to the take-off point on the turbocharging pressure regulator under test and tighten the leak screw (4).

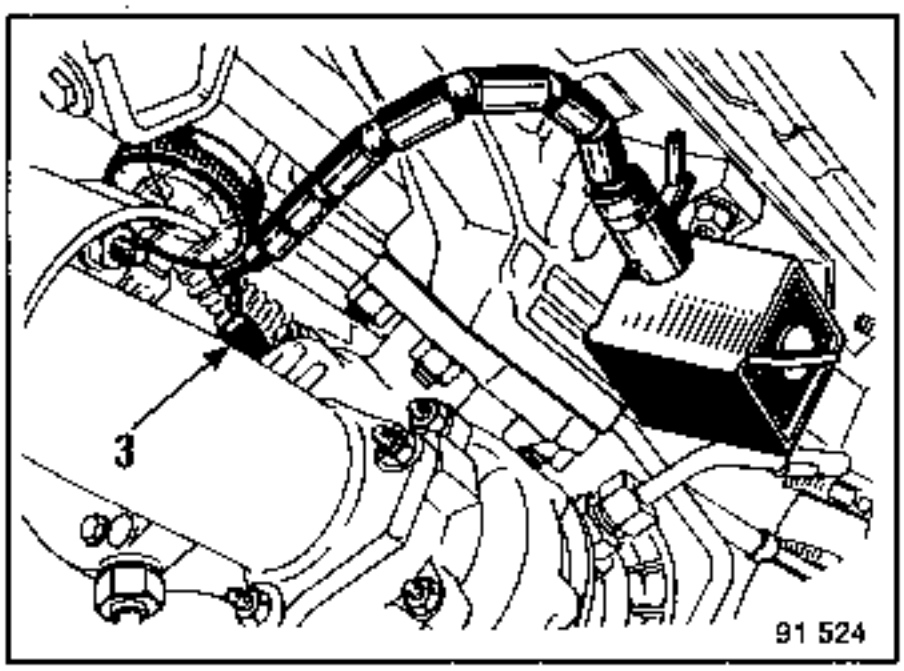
Then slowly screw in the screw on the pressure reducing valve (1) to obtain the required air pressure or the specified regulator rod travel (one stabilizes the pressure by slightly turning back the screw (1).

CHECKING THE SETTING PRESSURE

Remove the heat shield, the air filter and its support.

Disconnect the hose from the regulator unit take-off and connect tool Mot.1014.

Place a dial indicator, mounted on a magnetic base secured to the exhaust manifold, against the end of the adjusting rod (3) and zero the dial indicator.



Slowly increase the pressure until the adjusting rod has moved by 0.38 ± 0.02mm and note the pressure gauge reading which should be within the checking values stated.

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

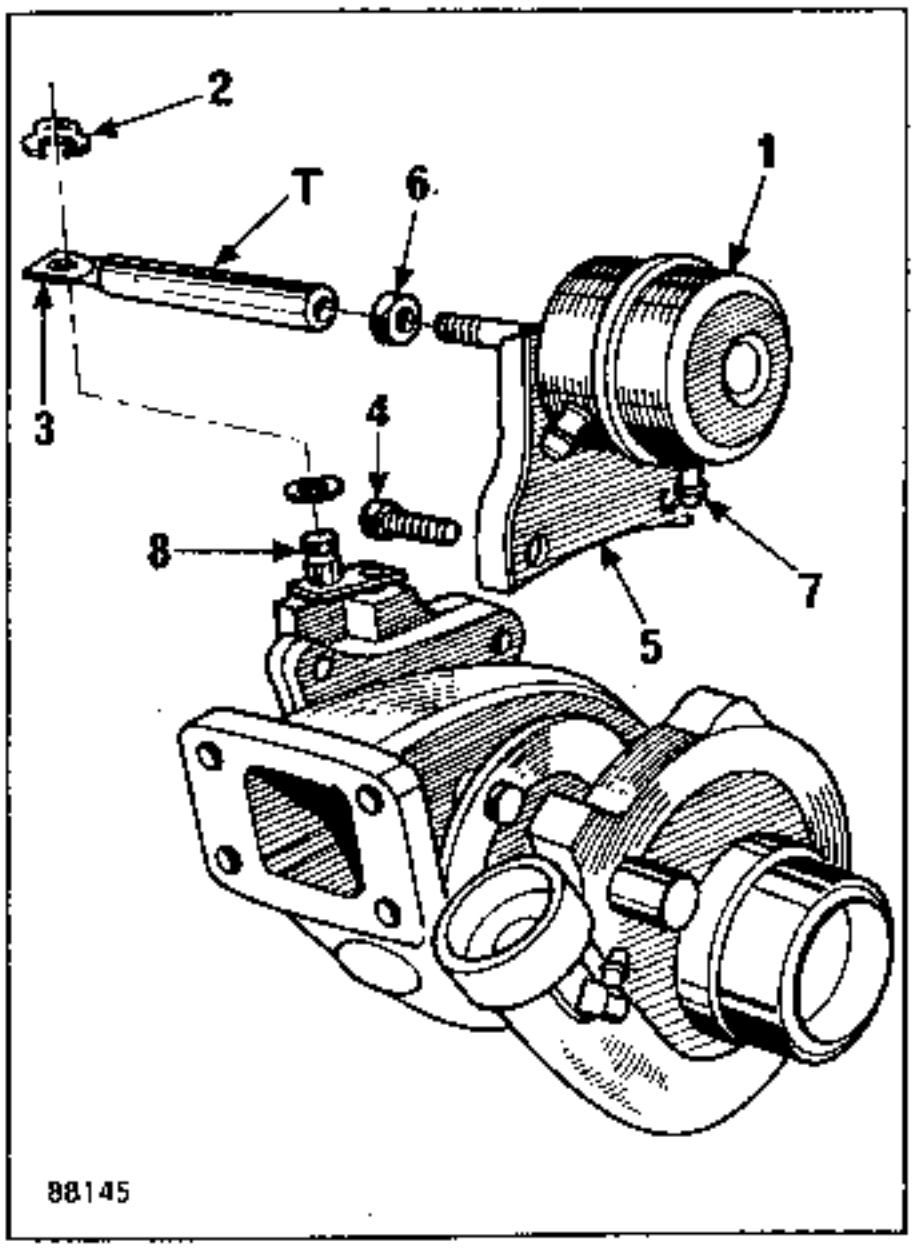
REPLACING THE REGULATOR UNIT

It may be necessary to remove the turbocharger coolant input pipe to facilitate access to the regulator unit.

Disconnect the pipe connected to the regulator unit (1).

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

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



Place the new unit in position, securing it with new bolts (tightening torque 1.65 to 1.85 daN.m).

Tighten the locknut (6) and the screwed end fitting (3) on the rod.

ADJUSTING THE SETTING PRESSURE

NOTE: Regulators the end fitting of which is locked by punching cannot be adjusted.

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

WARNING:

Ensure that there is no air leakage from between the pressure gauge and the regulator unit.

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

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

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

Mount a dial indicator, with a magnetic base, against the end of the adjusting rod and zero the dial indicator.

Slowly increase the pressure until the adjusting rod has moved by 0.38 ± 0.02mm and note the pressure gauge reading, which should be within the tolerances (adjusting pressure) stated on the chart.

If the pressure is outside these tolerances, alter the position of the screwed end fitting (3) (screw it in to increase the pressure or screw it out to reduce the pressure) until the adjusting pressure required is obtained.

Screw up the locknut (6) against the end fitting (3) and tighten it to a torque of 0.6 to 0.7 daN.m

Apply a dab of paint across the locknut and end fitting (area T).

Tube of high temperature paint:
Part No. 77 01 407 679.

WARNING:
Do not get any of the paint on the smooth part of the regulator rod.

ENGINE TURBOCHARGING PRESSURE

Use tester XR 35 to check the actual turbocharging pressure (see injection system test procedure).

CHECKING THE SAFETY PRESSURE SWITCH

Remove the switch.

Connect it to tool Mot. 1014.

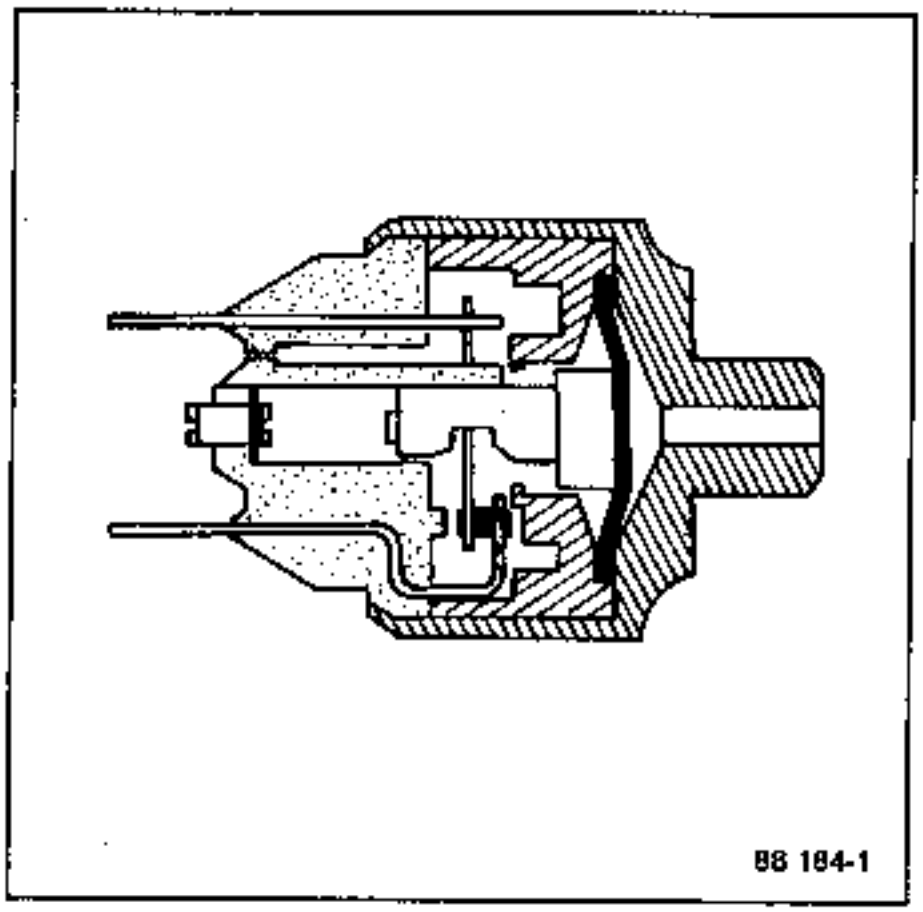
Connect up an ohmmeter.

Apply a rising pressure.

Pressure:
- less than 1,300 mbars
  resistance = 0 Ω

Pressure:
- 1,300 to 1,480 mbars
  resistance = infinity
  (check the readings with the pressure falling)

Pressure:
- approximately 1,100 mbars
  resistance = 0 Ω



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CHECKING THE AIR INTAKE SYSTEM FOR LEAKS

If the idling speed is unstable (hunting), check the condition of the air intake system pipes and connections.

At the same time check the no load/full load switch, which can cause similar symptoms.

FAULT FINDING USING THE XR 25

THE MEMORY FUNCTION

This is useful when carrying out road tests, if the warning light on the instrument panel switches on for a brief period (a flash of approximately 1 second). This function will place the readings on memory, and display them in the form of a bar graph.

Memory Selection (conditions)

The engine must be running or the vehicle moving: enter D 03, D 0 and then 0 at the moment that the warning light switches on or the defect occurs (a "Pip" will be heard and no. 20 on the bar graph will light up). Note down the various parameters held on memory. If the defect is not displayed, carry out several tests with the unit on memory, both with and without the defect, then compare the results.

Electronic turbocharger pressure correction

SOLENOID VALVE OPERATION

The computer controls the maximum turbocharging pressure by means of a solenoid valve, which oscillates at a frequency of 12 Hz. By doing this, the solenoid valve connects the waste gate through, alternately:

- either to the turbocharging pressure at the turbo outlet,

- or to the air intake pressure at the air filter.

The computer holds on memory the maximum turbocharging pressure, which it compares with the reading it obtains from the pressure sensor.

On the basis of the engine speed, the load and the pressure reading, the computer will apply either a positive or a negative correction. This reading can be obtained with tester XR 25 (code no. 20 which is the turbocharging pressure correction).

FAULT FINDING USING THE XR 25

INTERPRETING THE CORRECTION VALUES (no. 20)

(values noted with the engine stopped and the ignition on)

- Turbocharging pressure at its maximum with the computer limiting the pressure to the maximum permissible. In this case, the correction will be negative (0 to 17ms).

- Turbocharging at less than maximum pressure. The computer will correct the system to obtain the maximum permissible value.
  In this case, the correction will be positive (17 to 25.83 ms).

NOTE: A new computer which has never been used, or one on which the memory has been wiped, will show an intermediate reading of 17 ms.

Example of readings: on a vehicle which appears to lack power
Engine stopped - ignition on (no. 20 = 25.83 ms).

The reading shows a computer maximum positive correction if the turbocharging pressure is inadequate. Check the regulator setting, check the turbocharger circuit for leaks, and check its condition.

WARNING: The reading may be displayed or placed on memory on the XR 25 tester during a road test. However, the correction will vary following changes in the engine speed and the results will therefore have to be interpreted (see chart).

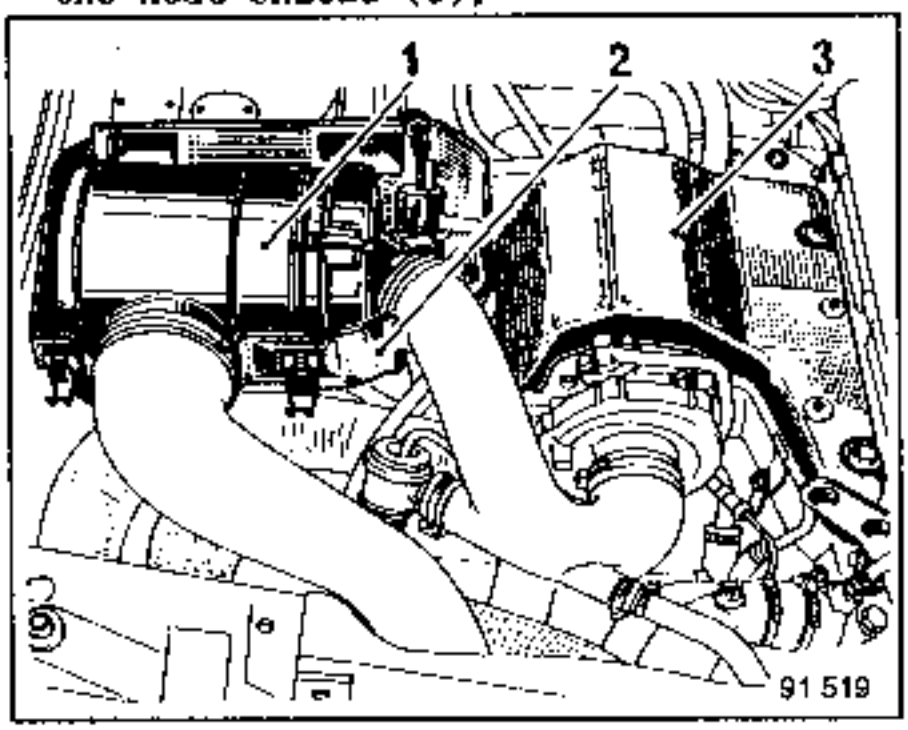
	Engine speed < 2 500 tr/min.	Engine speed < 5 600 tr/min.	Engine stopped Ignition on
Negative correction	0	0	0
Intermediate initial correction	Approximately 10	Approximately 14	17.00
Maximum correction	Approximately 15	Approximately 21	25.83

TURBOCHARGER

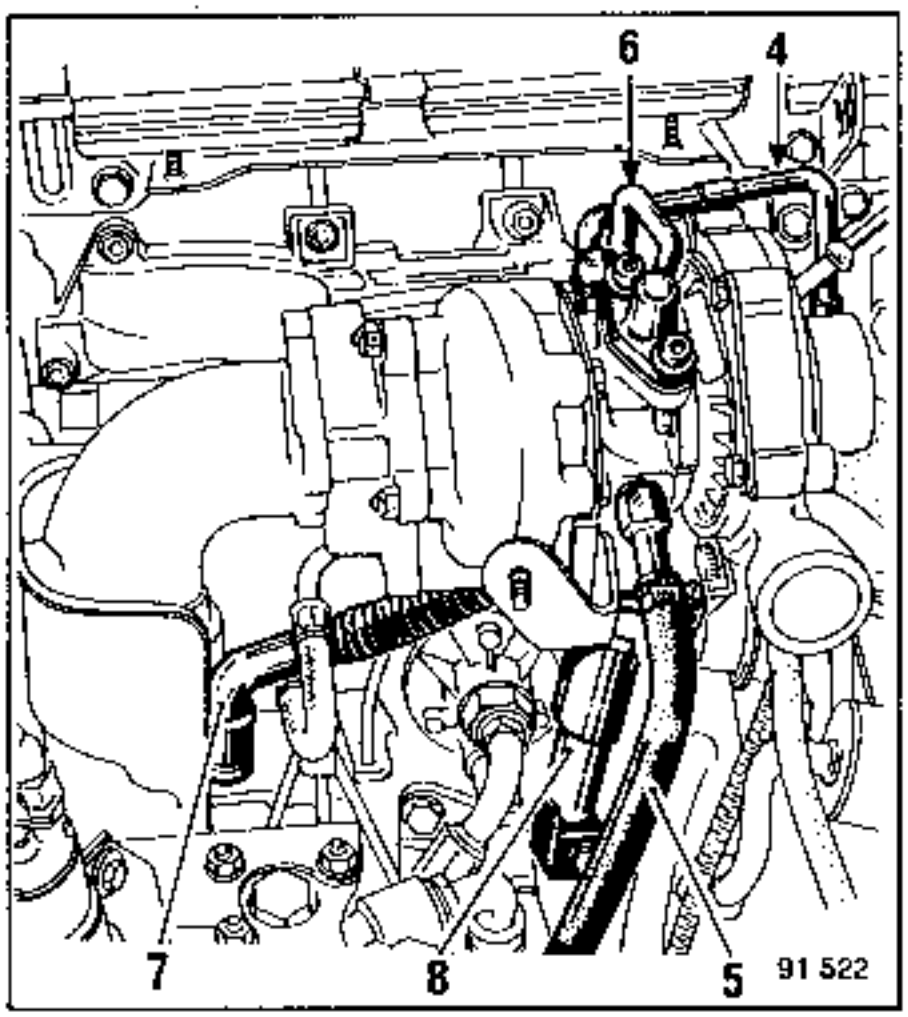
Removing:

Disconnect and remove, one after the other:

- the air filter and its ducting (1),
- the filter support (2),
- the heat shield (3),



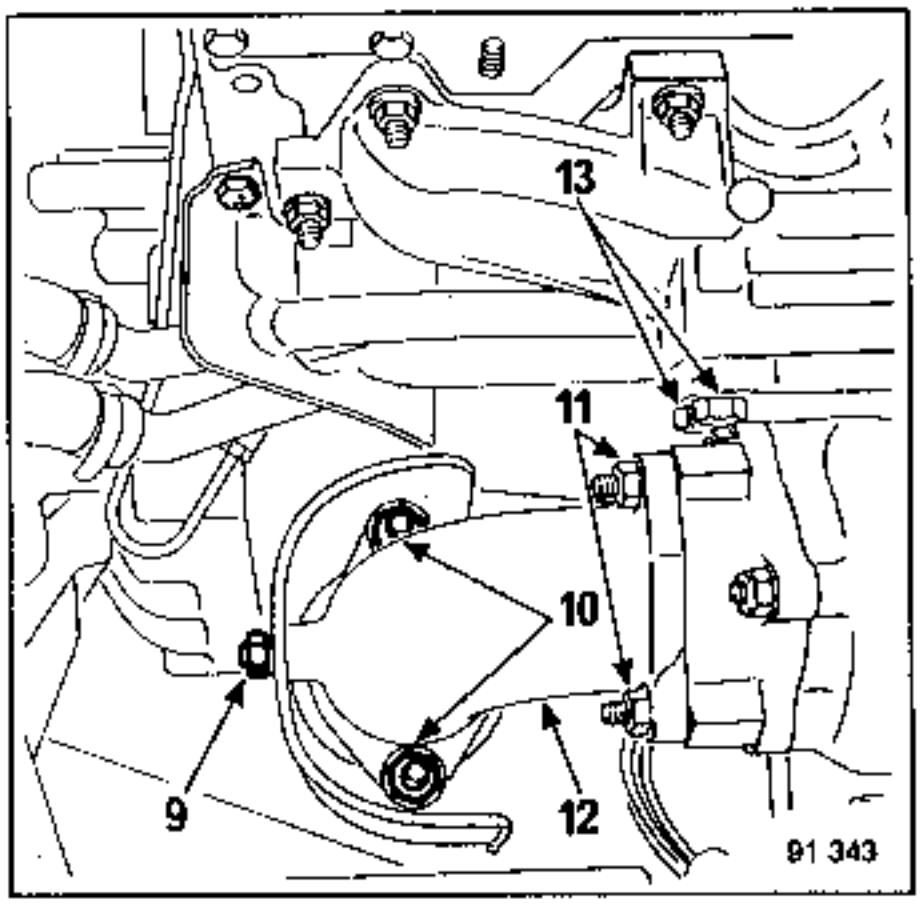
- the turbocharger air input and output ducts.



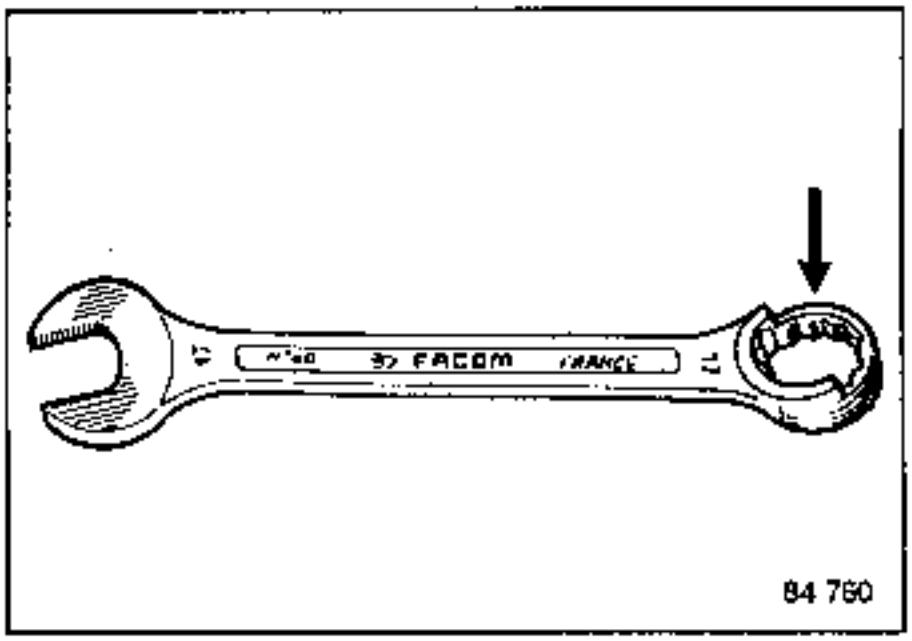
Pinch flat the coolant hoses (4) and (5) and disconnect them (clamps Mot. 453-01).

The oil input (6) and return (7) pipes and the support (8).

Remove the nut and the stud (9), the nuts (10) and (11), and take off the output elbow (12).



Using combination spanner FACOM No. 40, modified as shown in the illustration below, unscrew the turbocharger securing nuts (13) and remove it.



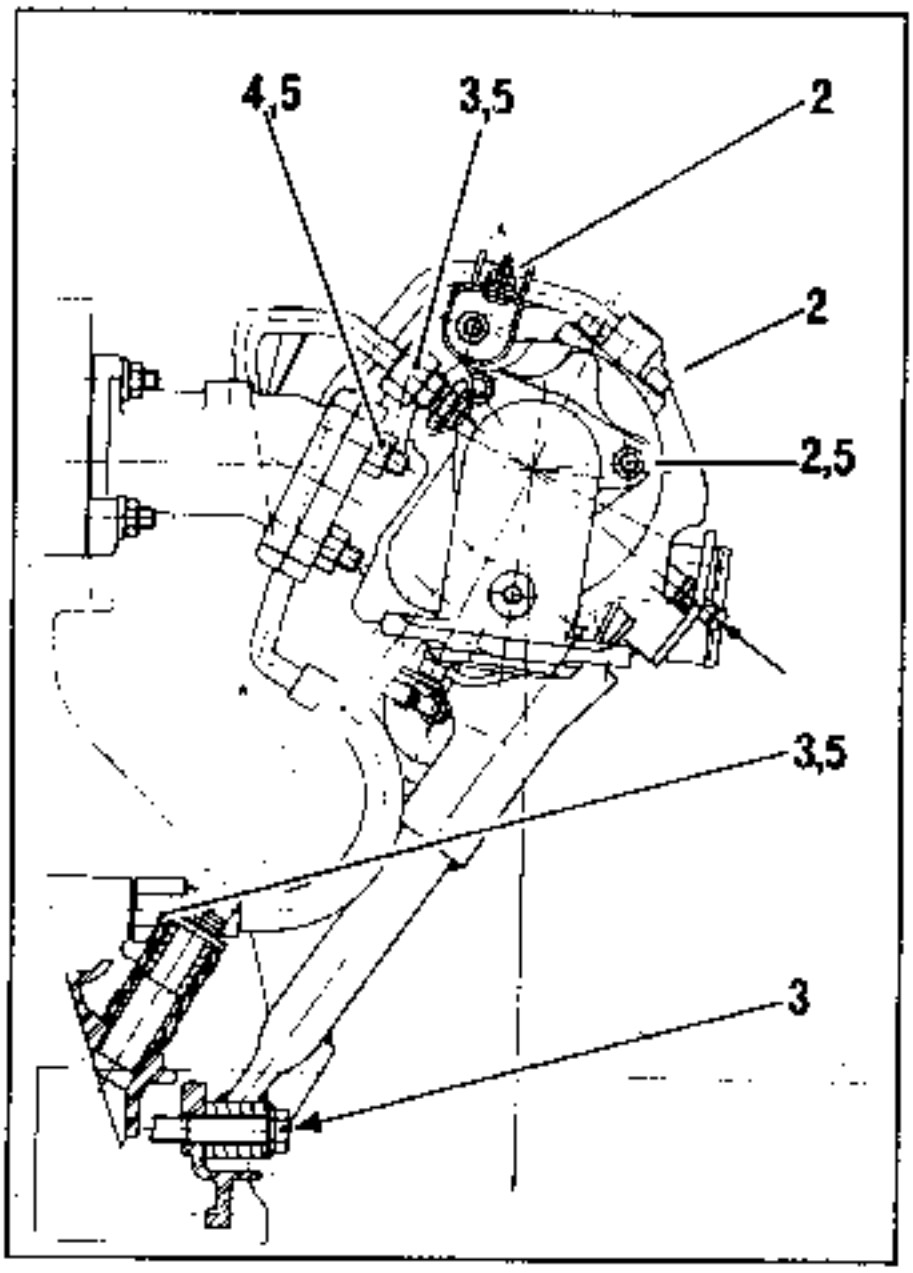
Refitting:

Thoroughly clean the joint faces on the exhaust manifold and the turbocharger and fit a new 'O' ring.

Replace the self-locking nuts securing the turbocharger to the exhaust manifold by new nuts ordered on the correct part number.

Replace the oil input and return seals.

TIGHTENING TORQUES in daN.m:



Fill the turbocharger with engine oil through the input hole.

Disconnect the 3 way connector from the ignition power module and turn the engine, with the starter, until oil runs out of the oil input union.

Tighten the oil input union. Reconnect the 3 way connector, start the engine and run it at idling to cause the oil to circulate.

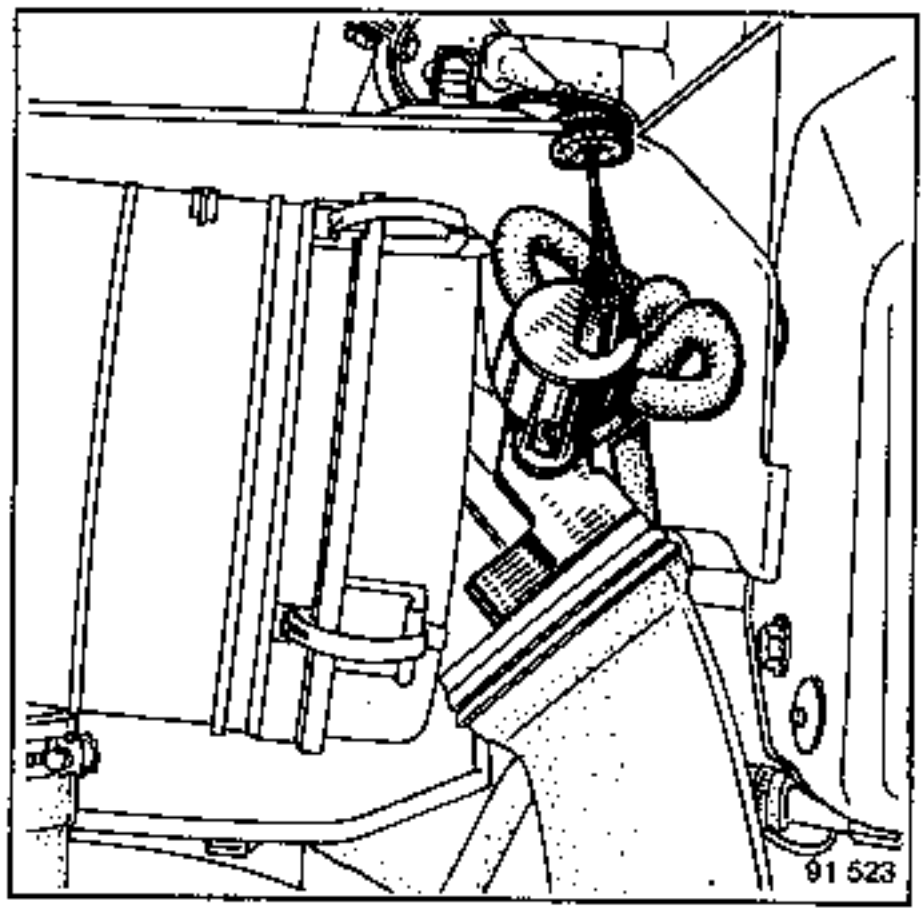
NOTE: Never run the engine with the air intake system disconnected.

TURBOCHARGING PRESSURE REGULATING SOLENOID VALVE

Removing:

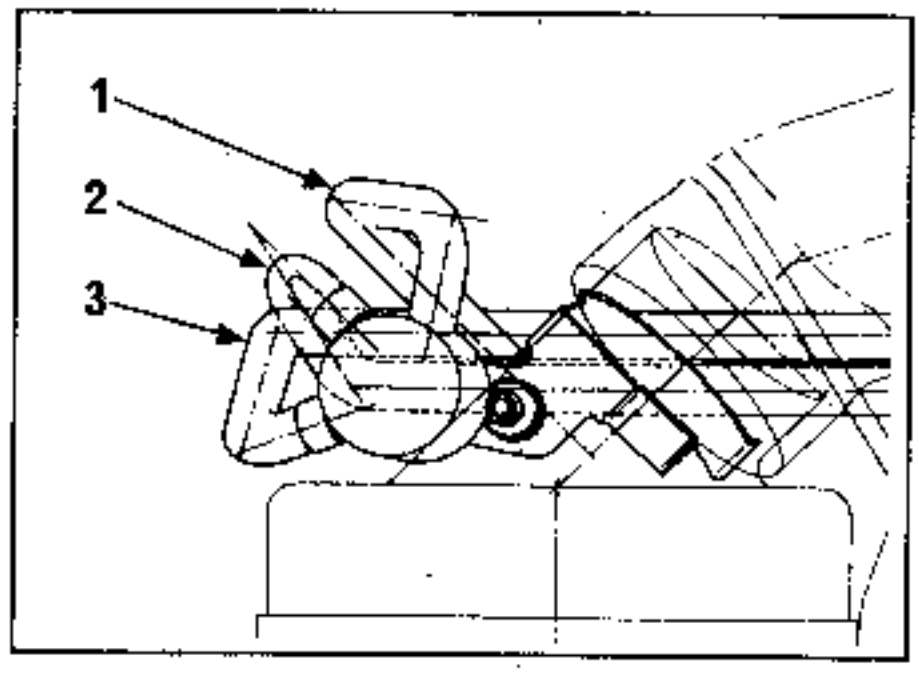
Remove the cover from the air filter support.

Disconnect the connector and the pipes and remove the solenoid valve and its support.



Refitting:

Ensure that the pipes are correctly connected.



1 - Air filter output (3.1mm ø jet)
2 - Intercooler output (2.3mm ø jet)
3 - Pressure regulator output

IDLING SPEED REGULATOR VALVE (1)

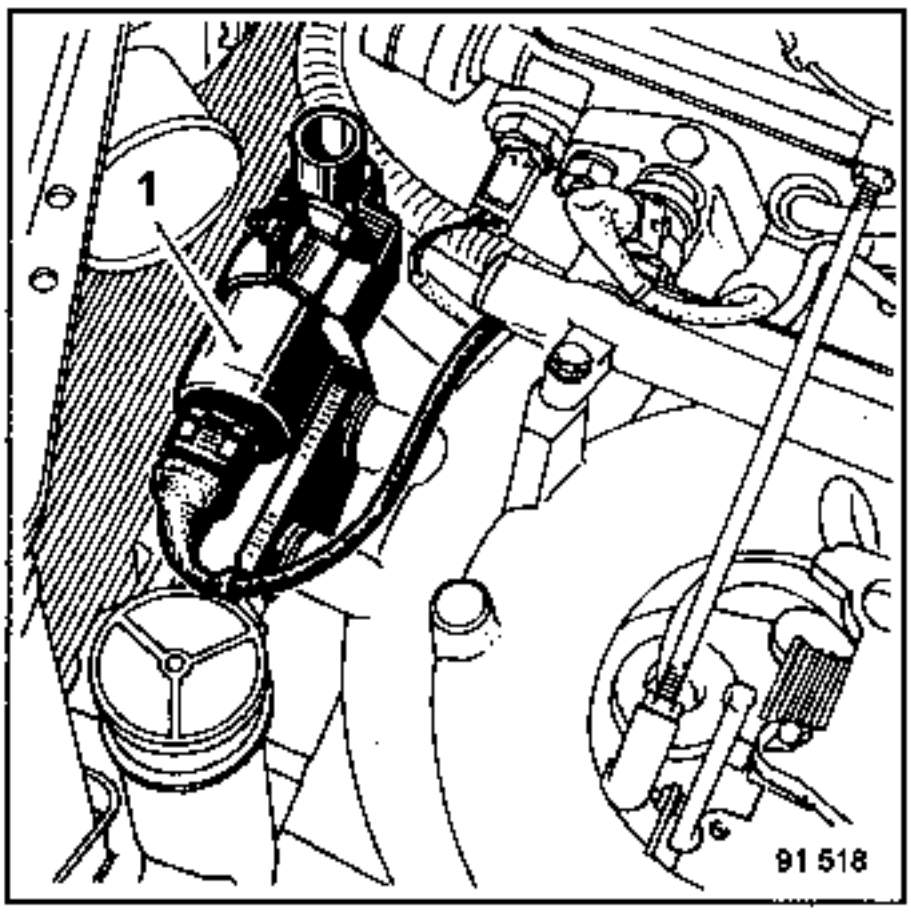
Removing:

Remove the air intake ducting above the throttle unit.

Disconnect:

- the connector which connects the regulator valve to the wiring harness,
- the air ducting,
- the screw from the regulator valve securing clip.

Remove the securing clip and take out the regulator valve.



Refitting:

IMPORTANT:

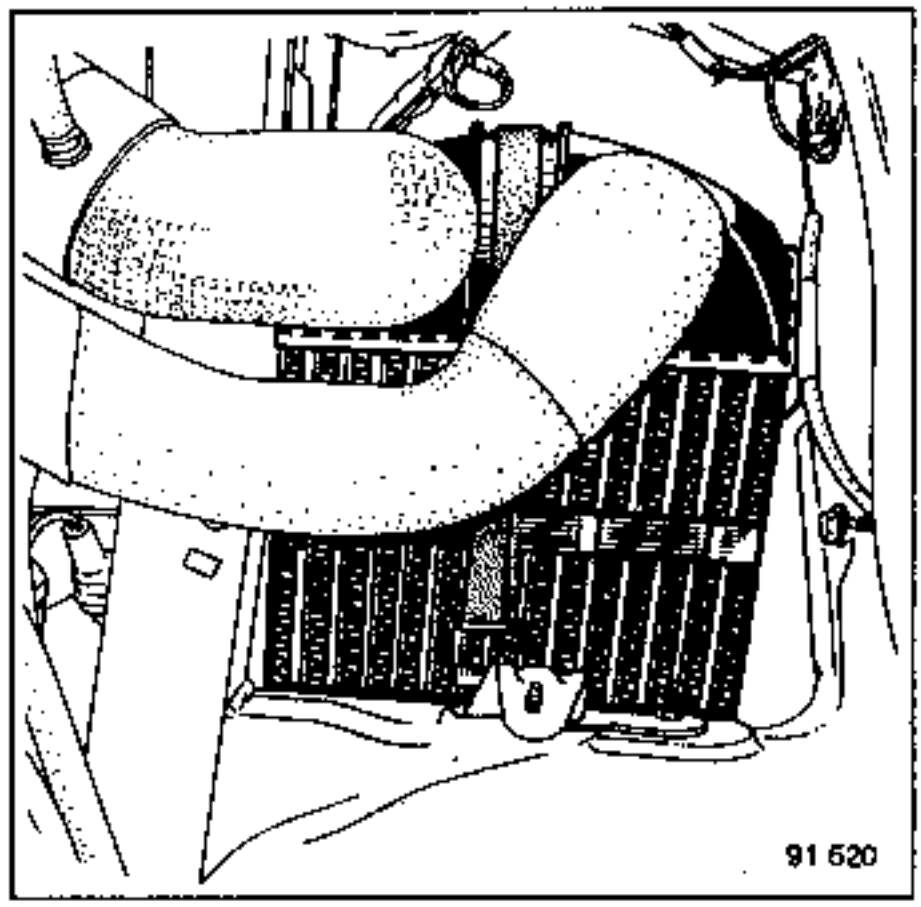
- Position the ducts so that they are not twisted or under stress.
- Ensure that the unit is the correct way round (the arrow on the bottom of the valve shows the direction of the air flow).

INTERCOOLER (under the air filter)

Removing:

Remove the air filter and its support.

Disconnect the 2 air ducts, free the strap and remove the intercooler from its location.



Refitting:

Ensure that the ducts securing clips are correctly tightened.

INTERCOOLER (on the front end panel)

To take out the intercooler, one must first remove the radiator grille and the cross member.

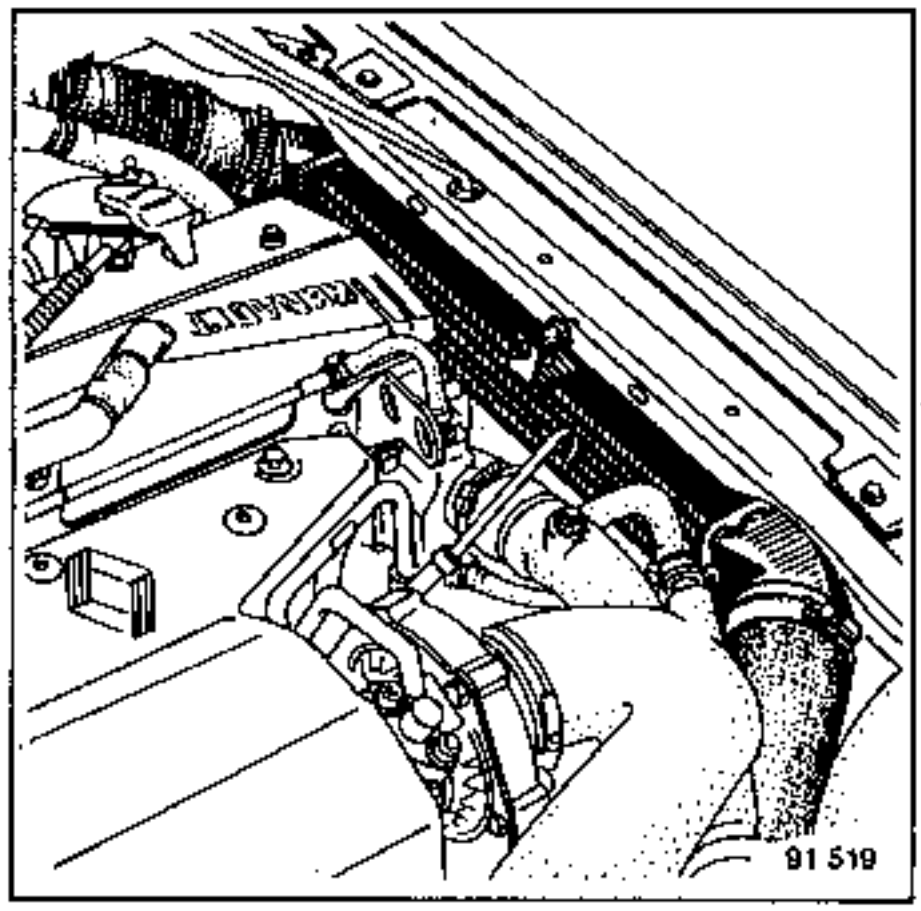
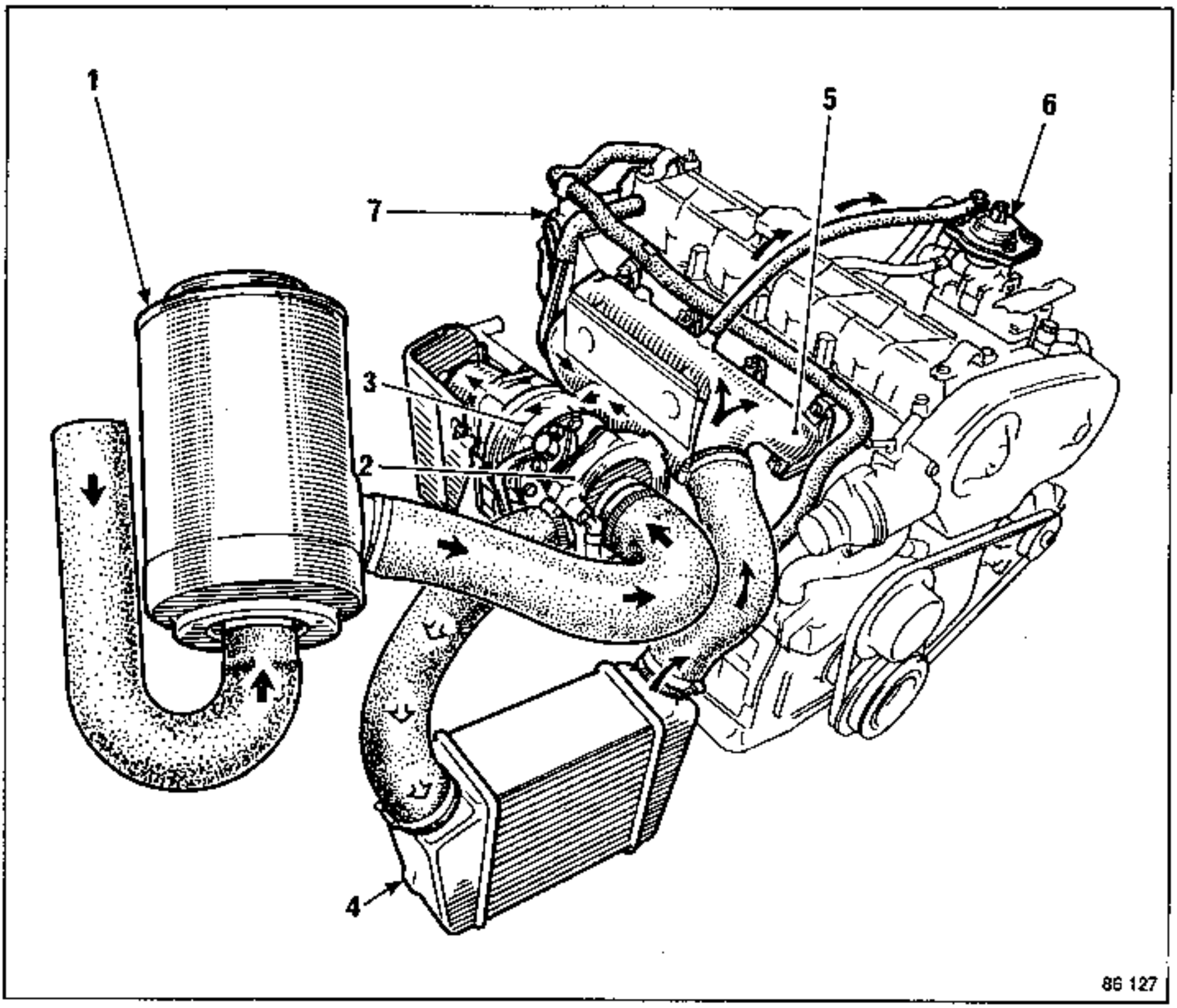


DIAGRAM OF AIR INTAKE SYSTEM



1 - Air filter

2 - Air intake compressor turbine

3 - Drive turbine operated by the exhaust gases

4 - Air intake intercooler

5 - Turbocharged inlet manifold

6 - Injection pump with "LDA" delivery corrector

7 - Oil drain casing

Air at atmospheric pressure

Turbocharged air

Turbocharged air after intercooling

Exhaust gases

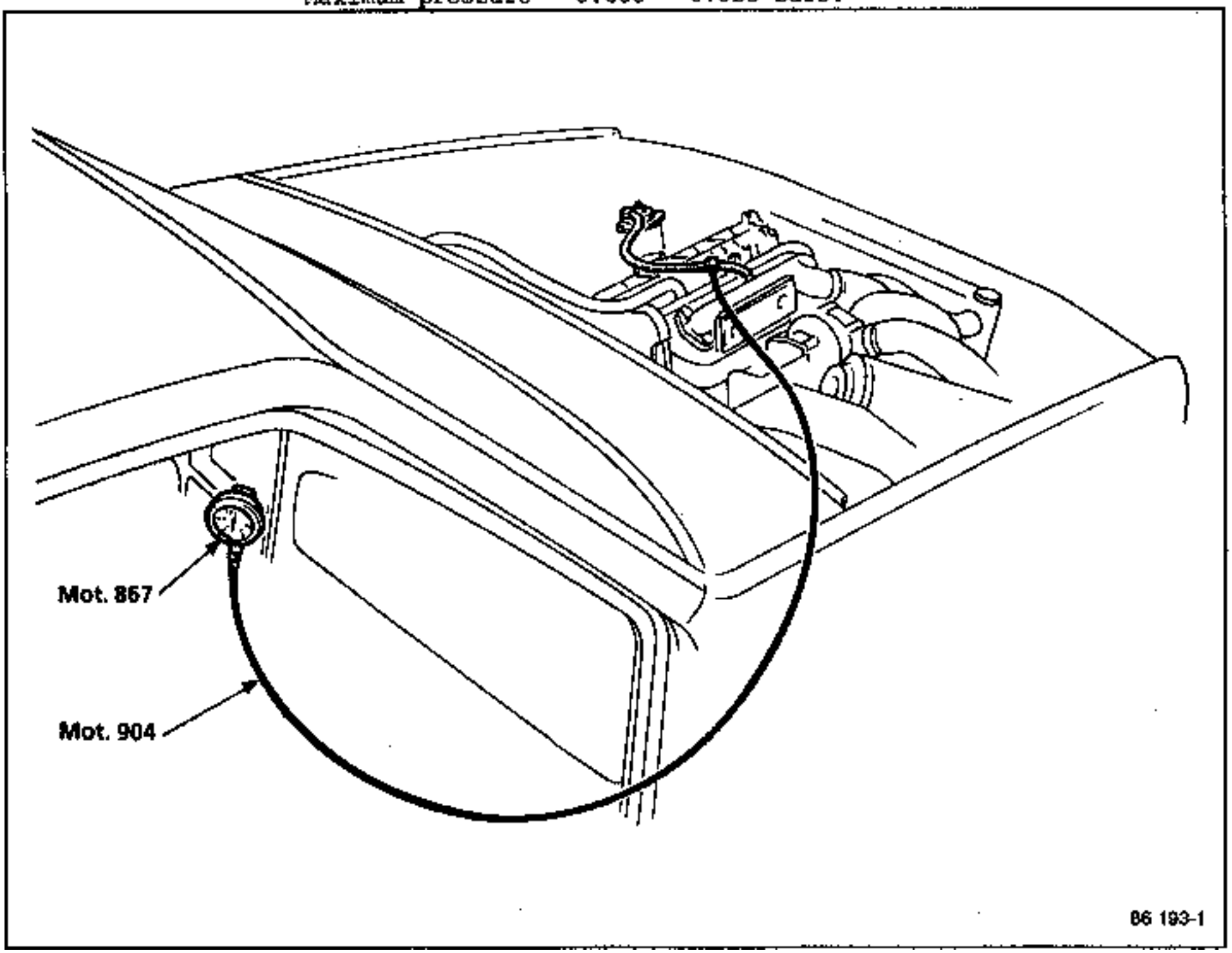
NOTE: The oil vapour from the crankcase condenses in casing (7) which is connected on one hand to the sump and on the other hand to the intake ducting on the input side of the turbocharger.

CHECKING THE TURBOCHARGING PRESSURE

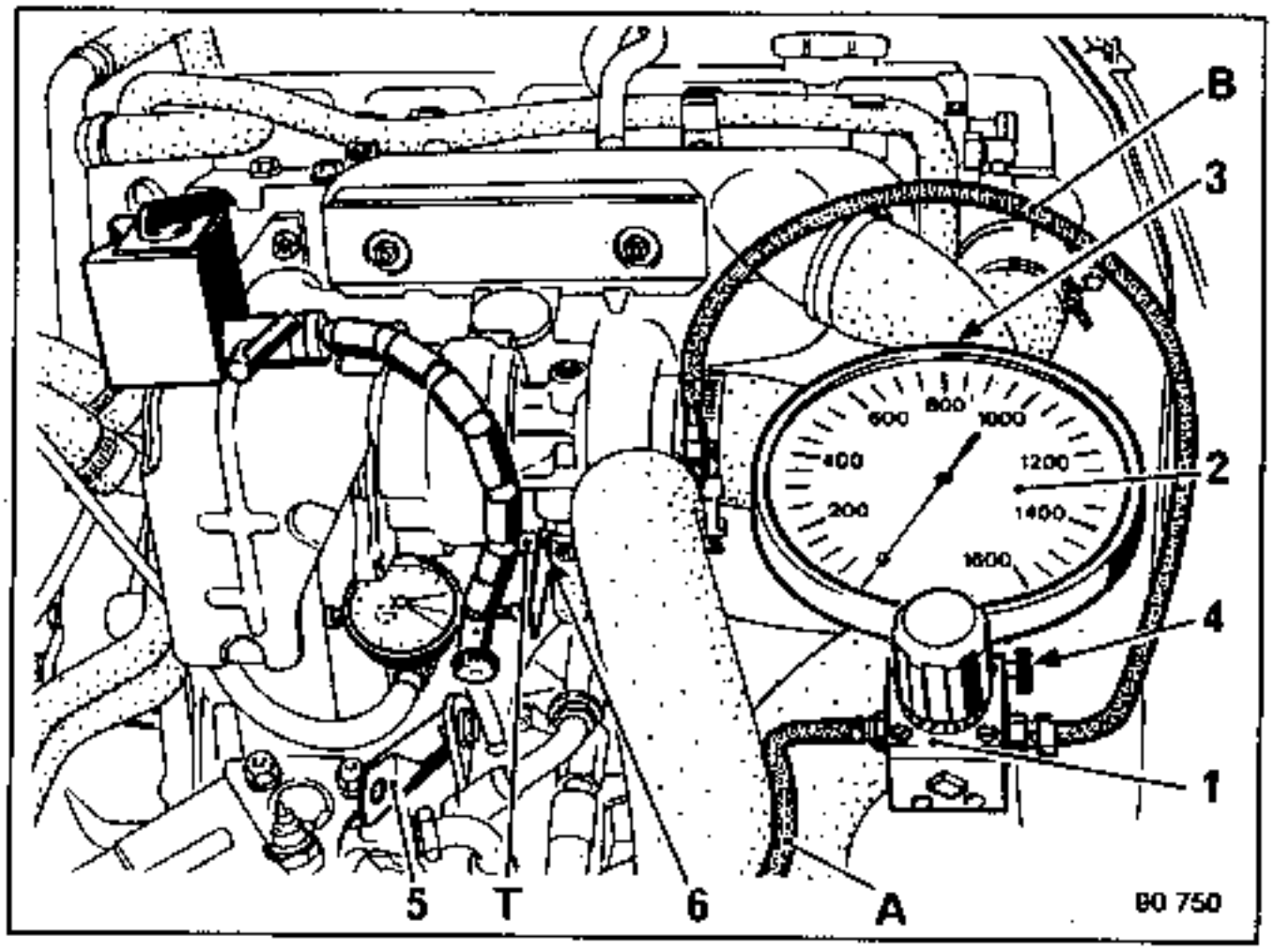
Connect pipe Mot.904 to the pipe which connects the inlet manifold to the "LDA" corrector on the injection pump and connect the other end to the pressure gauge from kit Mot.867.

Pass the pipe outside the bonnet (along the wing seal, securing it in place with adhesive tape, in such a way as to avoid any sharp edges that might cut it), then pass it through the front right hand window and hook the pressure gauge to the instrument panel.

Note the maximum turbocharging pressure when the engine is under load and running at 2 500 rpm $\pm$ 250 rpm.
Maximum pressure = 0.600 $\pm$ 0.025 bars.



CHECKING THE PRESSURE AT WHICH THE REGULATOR OPENS



METHOD OF USING TOOL KIT Mot.1014

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

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

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

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

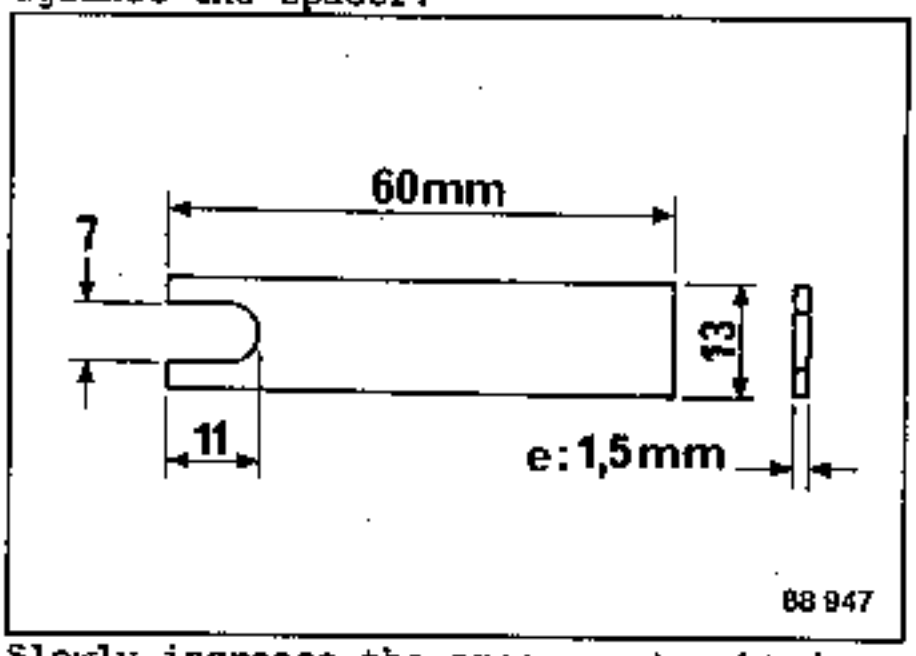
CHECKING THE CALIBRATION PRESSURE

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

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

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

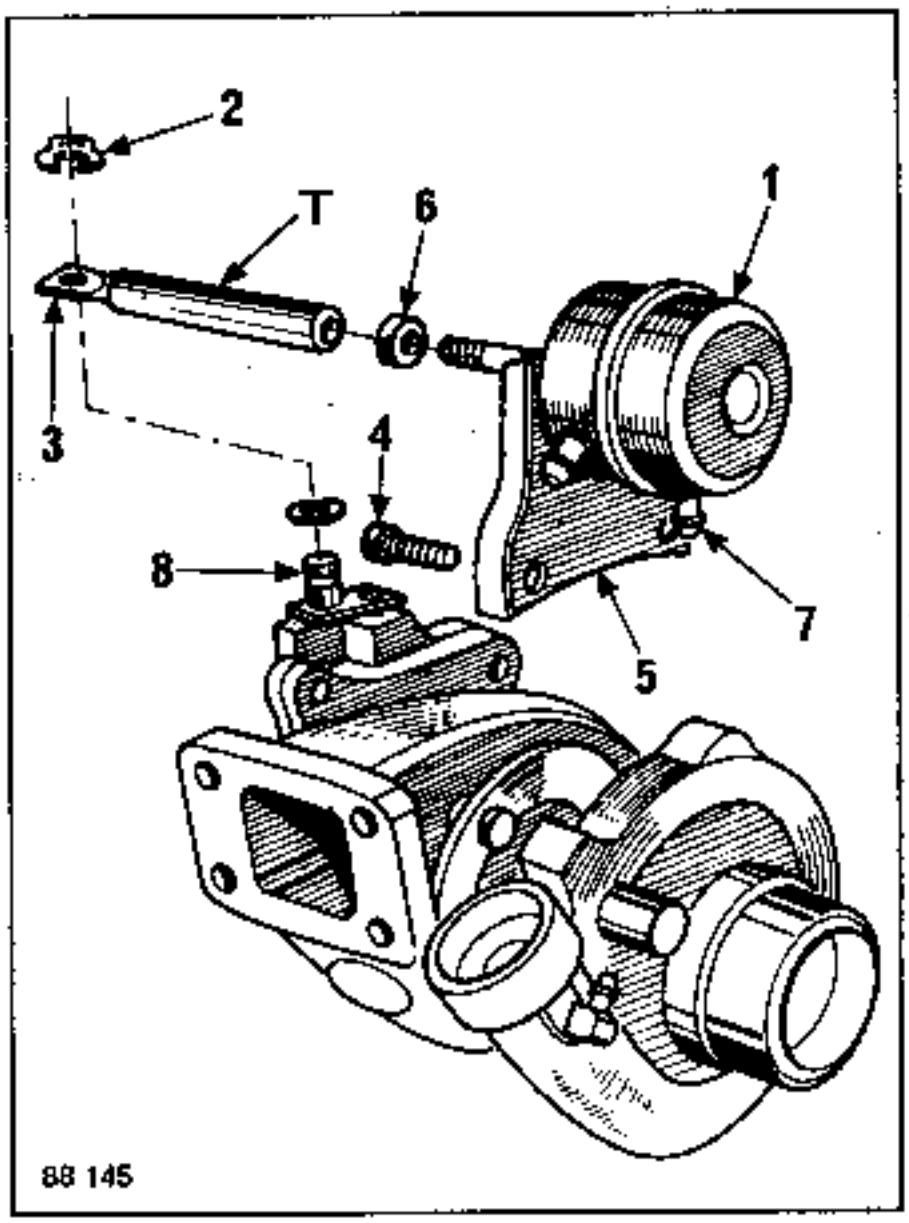
Place a dial indicator, mounted on the heat shield with a magnetic base, against the spacer.



Slowly increase the pressure to obtain a movement of the adjusting rod of 0.38 $^{+}_{-}$ 0.02mm and note the pressure gauge reading, which should be within the test figures stated.

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

REPLACING THE REGULATOR UNIT



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Disconnect the hose from the regulator unit (1).

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

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

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

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

ADJUSTING THE CALIBRATION PRESSURE

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

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

WARNING:

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

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

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

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

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

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

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

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

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

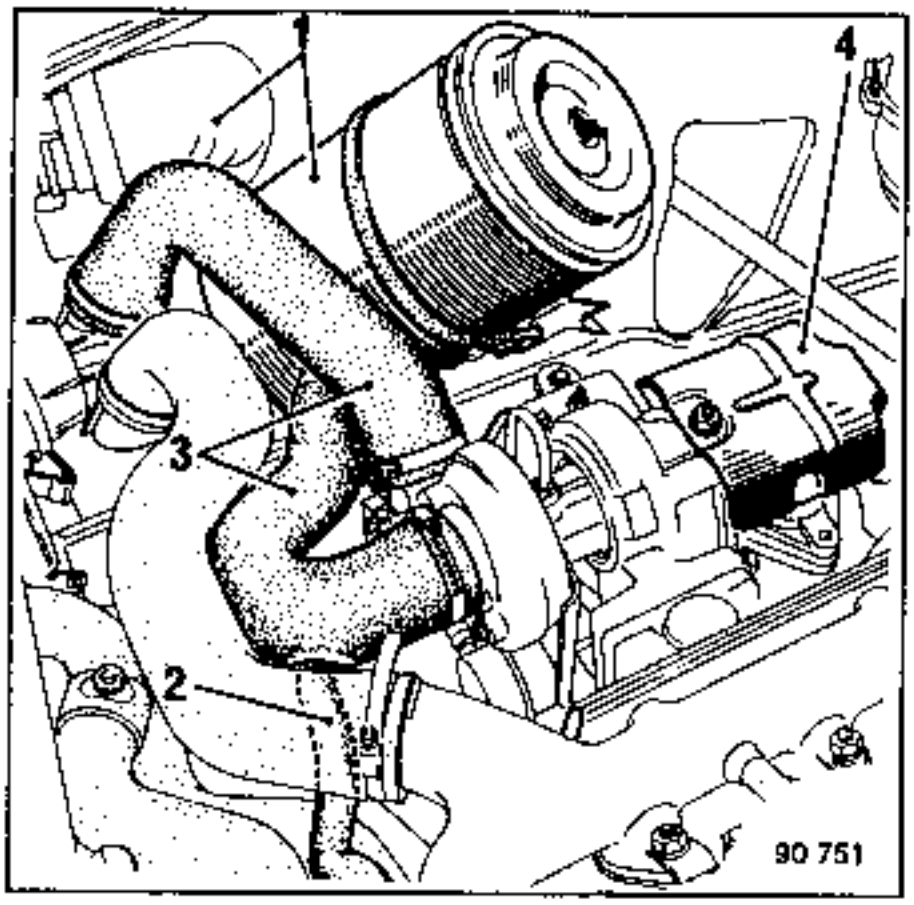
WARNING:

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

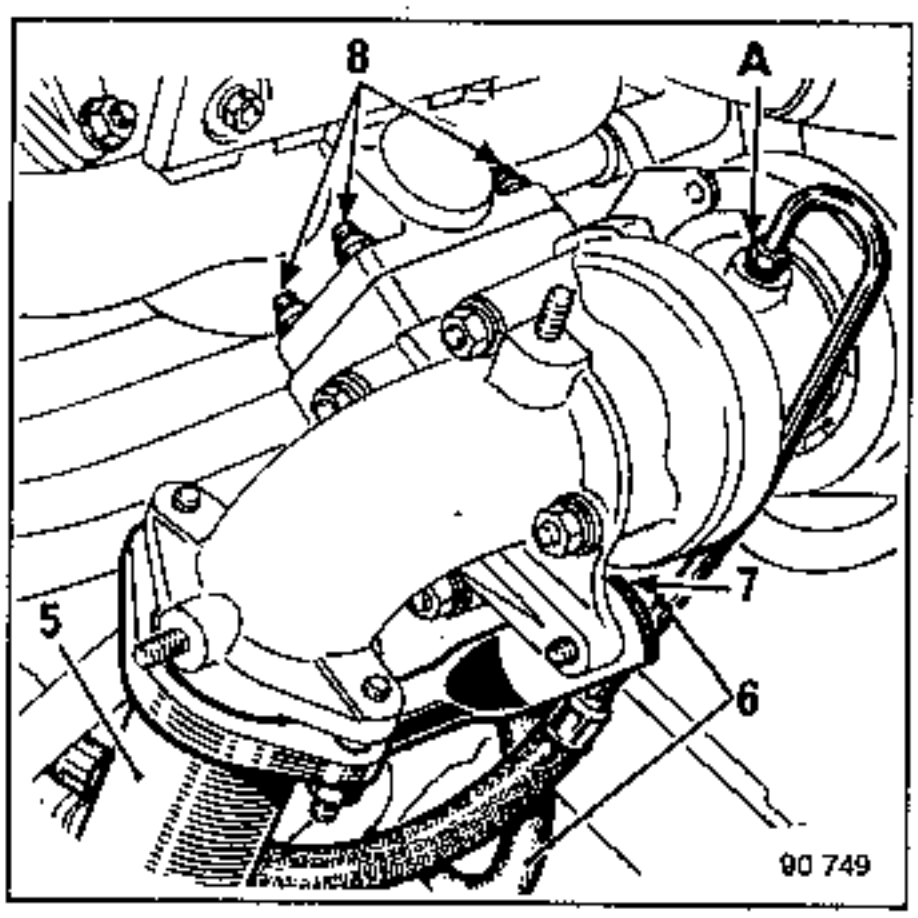
REMOVING - REFITTING

Removing:

Remove, one after the other:



- the air filter and its duct (1) and disconnect the crank case vapour re-intake pipe (2),
- the turbocharger input and output ducts (3),
- the heat shield (4),



- the exhaust downpipe (5),
- the oil input and return pipes (6),
- the support brackets (7),
- the turbocharger securing bolts (8) and remove the turbocharger.

Refitting:

Thoroughly clean the joint faces on the exhaust manifold and the turbocharger.

Replace the self locking nuts which secure the turbocharger to the exhaust manifold by new nuts of the correct part number.

Connect up the oil return pipe and secure it with a new screw type hose clip.

Fill the turbocharger with engine oil through its input orifice (A).

Tighten the union on the oil input pipe and run the engine at idling speed to circulate the oil.

Carburettor Vehicles

ESSENTIAL SPECIAL TOOLS	
Mot. 213-01	Pressure gauge
Mot. 453-01	Hose clamp

TEST METHOD

Before disconnecting the pipe connecting the fuel pump to the carburettor, run the engine at idling speed to be sure that the fuel in the carburettor float chamber is at its maximum level.

Stop the engine.

Disconnect the output pipe from the pump.

Connect up pressure gauge Mot.213-01 (this requires a 6 x 8mm union and a hose with an inside diameter of 8mm).

Pinch flat the hose returning to the tank with a clamp Mot.453-01.

The test connection hose must be:

- transparent,

- as short as possible.

With the pressure gauge held as high as possible (hose roughly vertical), start the engine and run it at idling speed.

When the level of the fuel in the hose becomes stable, lower the pressure gauge until the fuel level is at the same height as the diaphragm in the pump.

Note the static pressure reading.

The static pressure, with no pump output, should be:

- min: 0.170 bars,

- max: 0.320 bars.

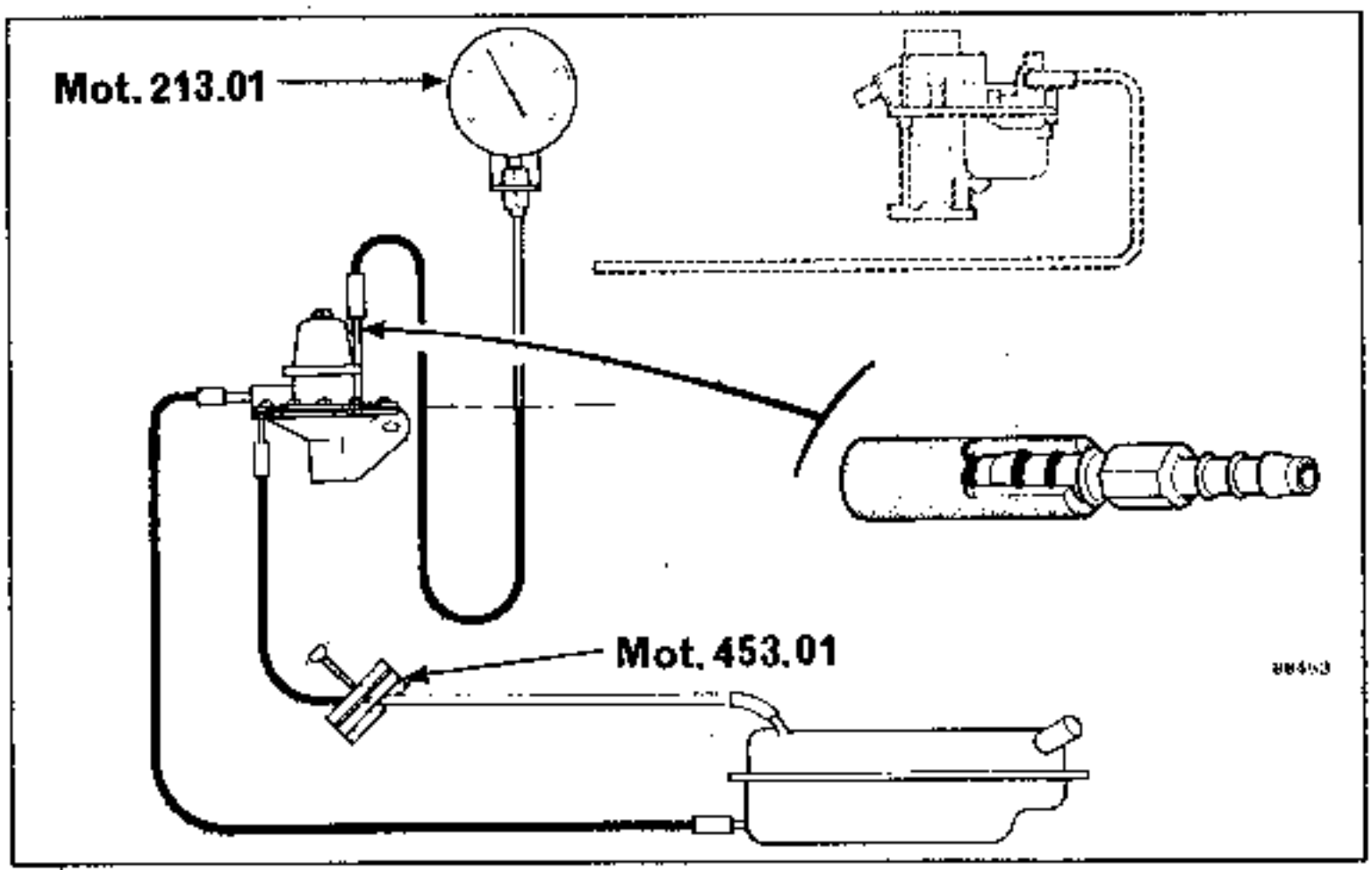
PRECAUTIONS

Under no circumstances must the pressure gauge be connected "in parallel".

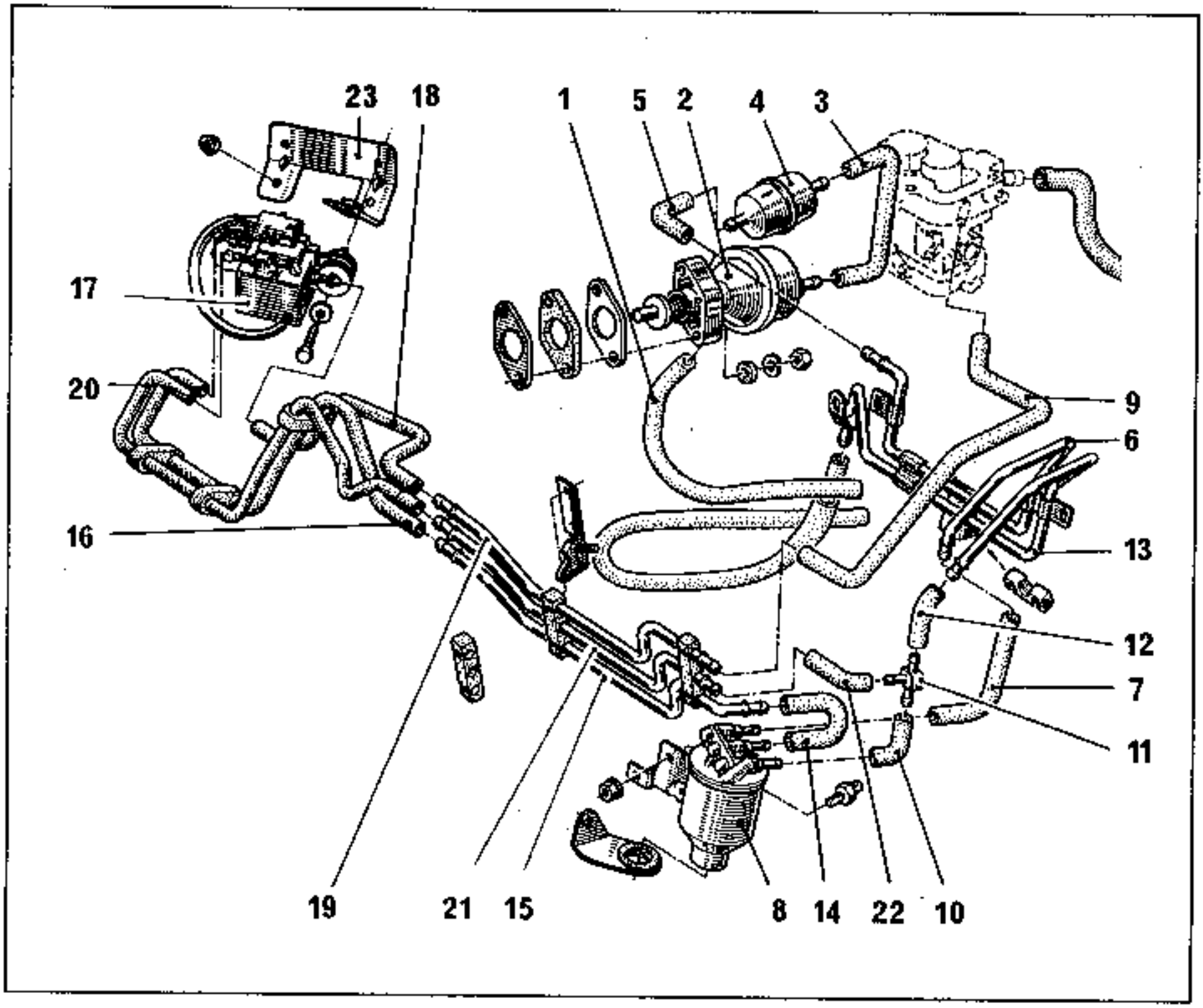
Checking the return to tank.

Check that the circuit is not blocked by loosening clamp Mot.453-01. The pressure should fall by 0.01 to 0.02 bars.

NOTE: For fuel injection vehicles, see MR INJ R(E)



A degassing valve is fitted between the fuel pump and the carburettor to improve starting when hot.



1 - Input pipe
2 - Fuel pump
3 - Pipe between pump and filter
4 - Fuel filter
5 - Connecting pipe
6 - Rigid fuel pipe on the engine
7 - Connecting pipe
8 - Degassing valve
9 - Pump between degassing valve and carburettor
10 - Connecting pipe
11 - "T" union
12 - Connecting pipe
13 - Rigid return pipe on engine
14 - Connecting pipe
15 - Rigid flow sensor input pipe
16 - Connecting pipe
17 - Flow sensor
18 - Connecting pipe
19 - Rigid pipe to carburettor
20 - Connecting pipe
21 - Rigid return to tank pipe
22 - Connecting pipe
23 - Flow sensor support

NOTE:

- components 10 to 12 and 14 to 23 are only fitted when the vehicle is fitted with a trip computer,
- on vehicles with no trip computer, pipes 10 and 12 and the "T" union 11 are replaced by a single pipe.

F2N... and C2J... Engines

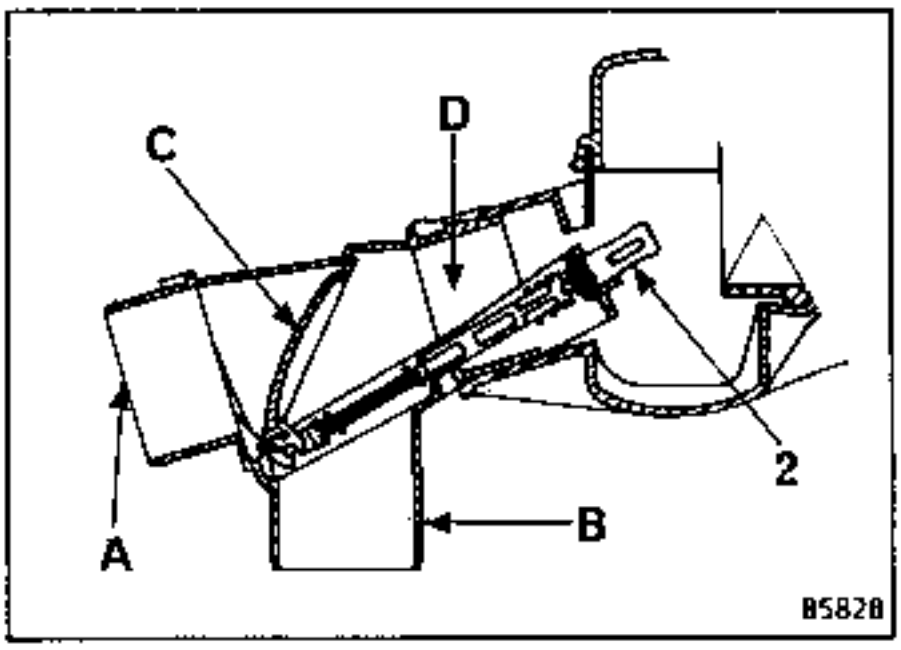
Vehicles fitted with F2N and C2J engines are equipped with an air intake heater.

DESCRIPTION

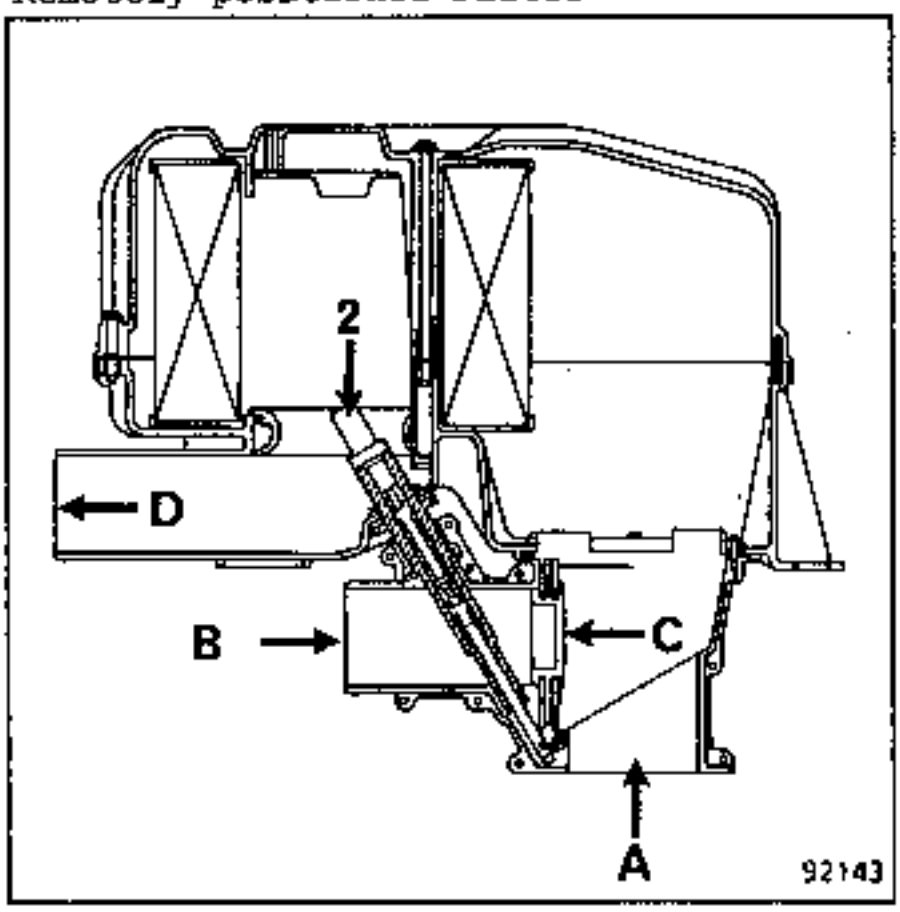
The system comprises an air filter with two inputs and a flap to control the amount of cold air entering the engine.

The control flap is operated by a wax element thermostat (2) mounted on the air filter body in the flow of mixed hot/cold air.

Filter Mounted on top of the Carburettor



Remotely positioned Filter



A - Cold air inlet
B - Warm air inlet
C - Flap
D - Mixed air passed to the carburettor

CHECKING

Immerse the air filter in water up to the height of the filter element.

After 5 minutes immersion:

in water at 26°C, the flap should close off the cold air inlet,

in water at 36°C, the flap should close off the warm air inlet.

ADJUSTING

The air regulator cannot be adjusted.

Replace the control valve and thermostat assembly with a new one.

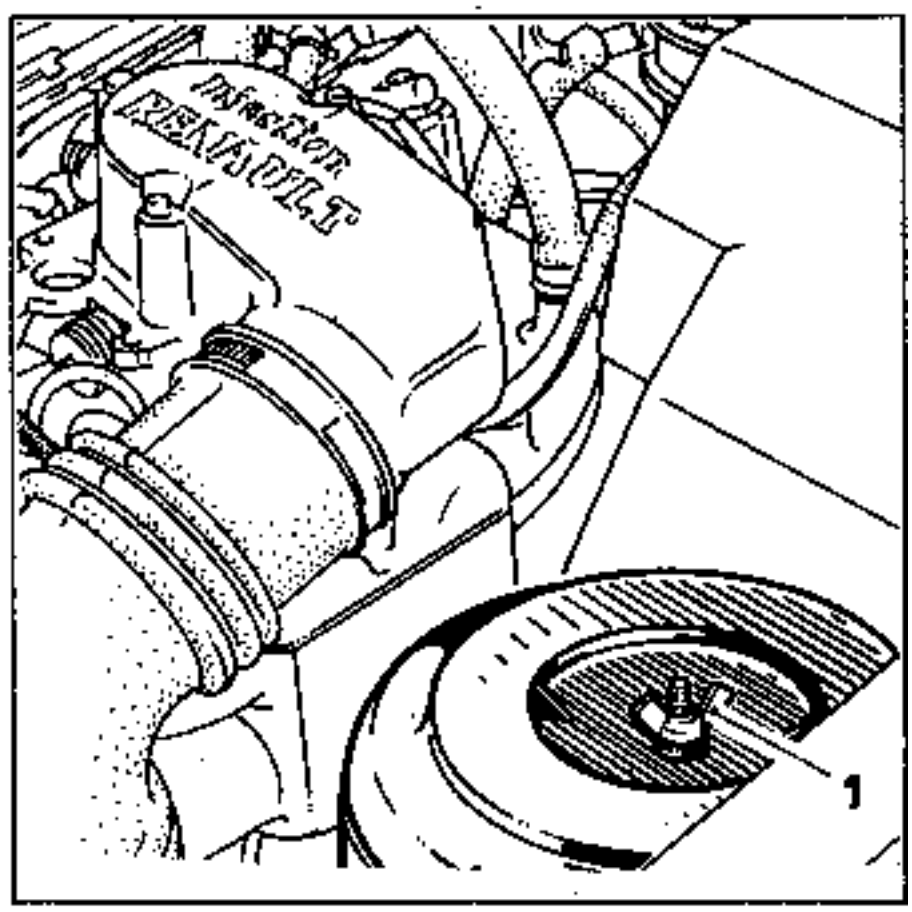
REPLACING THE FILTER ELEMENT (every 12,000 miles (20,000 km))

Remove the air filter cover.

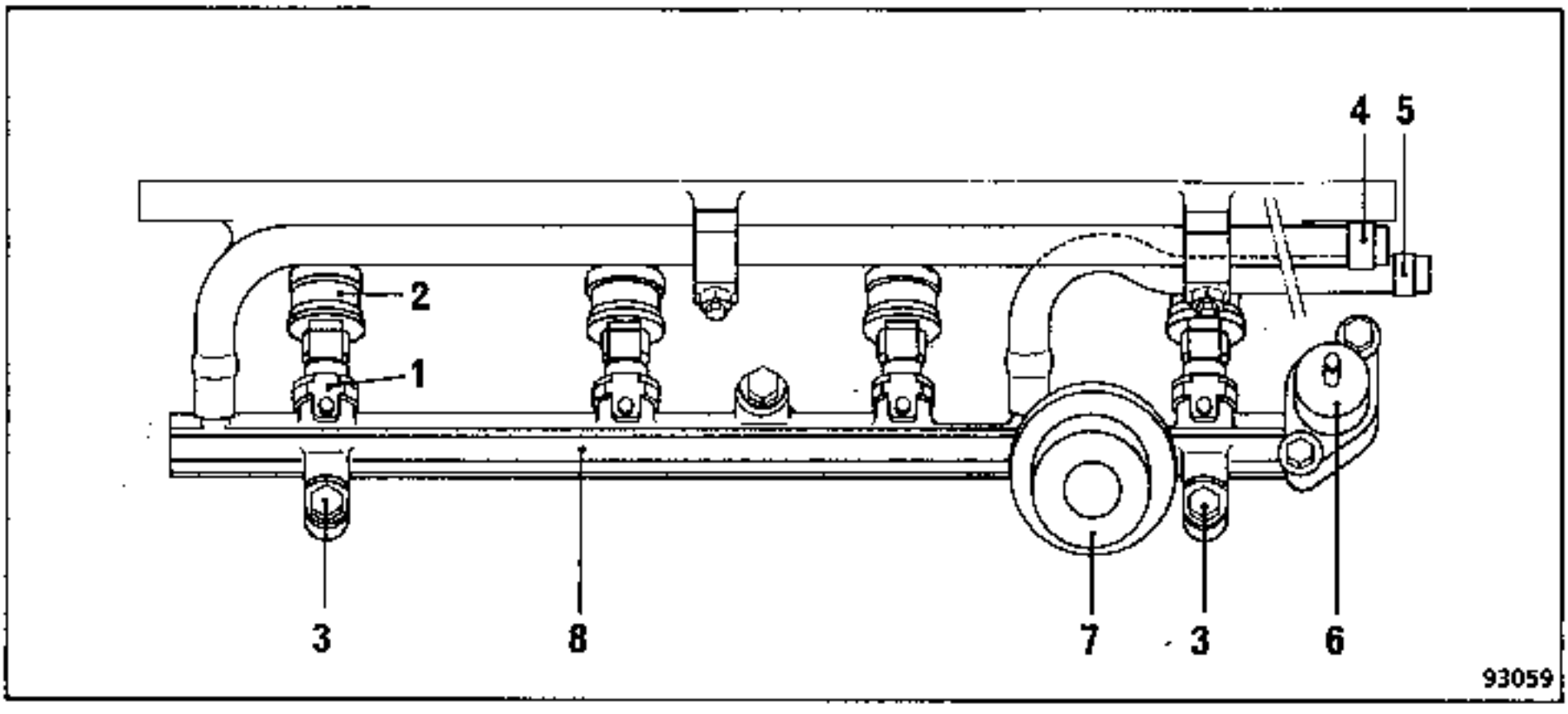
Remove the dirty filter element and replace it with a new one.

Refit the air filter cover and secure it in place.

Remotely positioned Air Filters on JXX Engines



Note: There may be screws round the periphery of the cover instead of the butterfly nut (1).



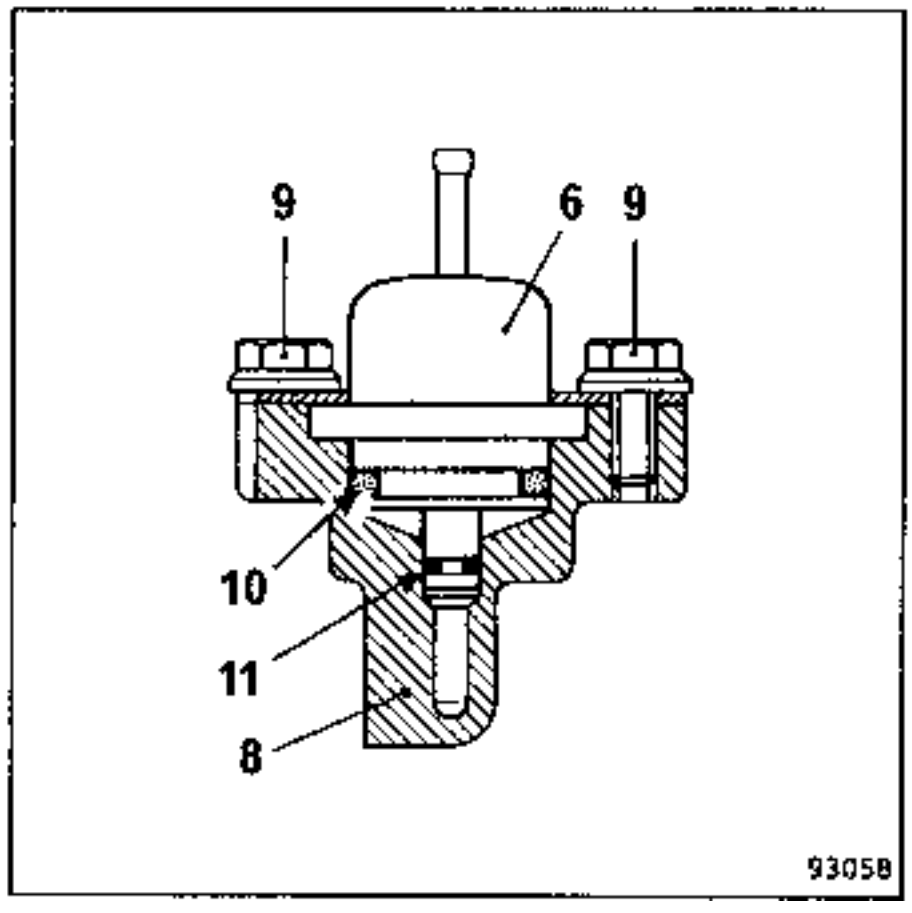
1 - Injector retaining clip
2 - Injector
3 - Injection gallery securing bolt
4 - Fuel input pipe (green colour code)
5 - Fuel return to tank pipe (pink colour code)
6 - Fuel pressure regulator
7 - Pulse damper
8 - Injection gallery.

The fuel pressure regulator is secured to the injection gallery by two bolts (9).

It is sealed by "O" rings (10 and 11).

On refitting:

Replace the seals (10 and 11) if necessary (smear silicone grease (e.g. MOLYKOTE 33 MEDIUM) on the new seals).



SPECIFICATIONS

NOTE: for all rectification or fault finding operations on this system see the "Diesel Injection" workshop manual.

Vehicle Type	Engine	Injection Equipment
RENAULT 21 X 486	J8S 704	BOSCH

Description	Make and Type	Remarks
Injection pump	BOSCH VE 4/9 F 2250 R 158	Single piston rotary pump with a mechanical centrifugal governor, hydraulic automatic advance, cold starting system, automatic fast idling and solenoid shut-off.
Pump timing (pump piston lift with engine at T.D.C.)	0,70 ± 0,02 mm	
Injector holders	BOSCH KBE 48 S 5/4	
Injectors	BOSCH DN OSD 189/	Opening pressure $^{+8}_{+0}$ bars, max. variation 8 bars
Fuel filter	BOSCH or ROTO DIESEL	With built in priming pump Since 1987, the Roto Diesel filter has a heater connected to the engine cooling system.
Injector pipes		Outside ø 6mm Inside ø 2mm Length 290mm

SETTINGS

Idling speed	825 $\pm$ 25 rpm
Maximum speed	4,900 $\pm$ 100 rpm
Smoke Density:	
Type approval figure	1,11m-1: 36%
Max. legal	2m-1: 55%

CHECKING THE TIMING (on diagnostic bay)

Injection Pump	Idling Speed rpm	Injection commences before T.D.C.
BOSCH VE... R 158	825 ± 25	13,5 ± 1°

SPECIFICATIONS

Vehicle Type	Engine	Injection Equipment
RENAULT 21 X 486	J8S 704	ROTO - DIESEL

Description	Make and Type	Remarks
Injection Pump	ROTO DIESEL R8443 A 400 A (A) R8443 A 401 B (A)	Single distributor rotary pump with two pressure pistons, mechanical centrifugal governor, automatic hydraulic advance, automatic fast idling system and solenoid shut-off.
	R8443 B 402 B (B) R8443 B 403 C (B)	
Pump timing T.D.C. Locked with a rod		1.80mm (A) Dimension (X) on pump (B)
Injector holders	ROTO DIESEL RKB 45 S 5456	
Injectors	ROTO DIESEL RDN OSDC 6751 C	Opening pressure 118 $^{+7}_{-5}$ bars Maximum variation 8 bars
Fuel filter	ROTO DIESEL	With built in priming pump. Note: Since 1987, the filter has a heater connected to the engine cooling system
Injector pipes		Outside Ø 6mm Inside Ø 1.5mm Length 330mm
Fast idling thermostat	CALORSTAT	Travel 7 to 8.5mm between 30 and 67°C

SETTINGS

Idling speed 825 $\pm$ 25rpm

Maximum speed 4,750 to 4900rpm

Smoke Density:

Type approval figures 1.11m-1: 36%

Maximum legal 2m-1: 55%

CHECKING THE TIMING (on diagnostic bay)

Injection Pump	Idling Speed in rpm	Injection commences before T.D.C.
ROTO DIESEL R 8443	825 ± 25	9,5 ± 1°

SPECIFICATIONS

Vehicle Type	Engine	Injection Equipment
RENAULT 21 X 488	J8S 714 (1) J8S 742 (2)	BOSCH BOSCH

Description	Make and Type	Remarks
Injection Pump	BOSCH VE 4/9 F 2200 R 153 (1) VE 4/9 F 2200 R 345 (2)	Single piston rotary pump with mechanical centrifugal governor, automatic hydraulic advance, automatic cold starting and fast idling system and solenoid shut-off. Corrector that adjusts the delivery to suit the turbocharging pressure (L.D.A.)
Pump timing (engine at T.D.C., pump piston lift)	0,70 ± 0,02 mm	
Injector holders	BOSCH KBE 48 S 7	
Injectors	BOSCH DN OSD 264	Opening pressure 130 +8 bars -0 Max. variation 8 bars
Fuel filter	BOSCH ROTO DIESEL	With built in priming pump. Since 1987 the Roto Diesel filter has a heater connected to the engine cooling system
Injector pipes		Outside ø 6mm Inside ø 2mm Length 275mm
Thermostat (fast idling)	(2) VERNET (CALORSTAT)	Travel 7 to 9.5mm between 15° and 45°C
Preheater unit	(2) CARTIER	With preheat and postheat functions (3 minutes max.)
Heater plugs	BERU	Current approx. 15A after heating 8sec
Heater plug post-heat temperature switch	(2)	Circuit opens: 65° ± 2°C Circuit closes: 55° ± 2°C
Turbocharger	GARRETT T2	Turbocharging pressure: 0.6 ± 0.025 bars at 2,500 ± 250 rpm Static opening pressure: 730 ± 30 mbars at an adjusting rod travel of 0.38 ± 0.02mm

SETTINGS

Idling speed 825 ± 25rpm (1) and (2)

Fast idling (2) 1,000 ± 50 rpm

Maximum speed 4,700 to 4,800 rpm

Smoke Density:

Type approval figure 1.6m-1: 48%
Maximum legal 2m-1: 55%

CHECKING THE TIMING (on diagnostic bay)

Injection Pump	Idling Speed in rpm	Injection commences before T.D.C.
BOSCH VE... R 153 VE... R 345	825 ± 25	13,5 ± 1°

SPECIFICATIONS

Vehicle Type	Engine	Injection Equipment
RENAULT 21 X 48H	F8Q 710	ROTO DIESEL

Description	Make and Type	Remarks
Injection Pump	ROTO DIESEL DPC : R8443 B471 C	Single distributor rotary pump with two pressure pistons, mechanical centrifugal governor, hydraulic automatic advance, automatic fast idling system and solenoid shut-off.
Pump timing at T.D.C. Locked with a rod		Dimension (x) on the pump
Injector holders	ROTO DIESEL LCR 67334	
Injectors	ROTO DIESEL RDN 4 SDC 6868C	Opening pressure 118 $^{+7}_{-5}$ bars Max. variation 8 bars
Fuel filter	ROTO DIESEL	With built in priming pump. The filter is fitted with a heater connected to the engine cooling system.
Injector pipes		Outside Ø 6 mm Inside Ø 2.5mm Length 330 mm
Fast idling thermostat	CALORSTAT	Travel 7 to 8.5mm between 15° and 45°C
Preheater unit	CARTIER	With preheating and postheating functions (3 minutes max.)
Heater plugs	BERU	Current approximately 15A after heating for 8 seconds
Heater plug post-heating temperature switch		Circuit opens: 65° $\pm$ 2°C Circuit closes: 55° $\pm$ 2°C

SETTINGS

Idling speed 825 $\pm$ 25rpm

Maximum speed 5,200 $\pm$ 100rpm

Smoke Density:

Type approval figure 1.17m-1: 38%

Maximum legal 2m-1: 55%

CHECKING THE TIMING (on diagnostic bay)

Injection Pump	Idling Speed in rpm	Injection commences before T.D.C.
ROTO DIESEL R 8443	825 ± 25	-

SPECIFICATIONS

Vehicle Type	Engine	Injection Equipment
RENAULT 21 X 48V	J8S 740	BOSCH

Description	Make and Type	Remarks
Injection Pump	BOSCH VE4/9F 2350 R 309	Single piston rotary pump with mechanical centrifugal governor, hydraulic automatic advance, thermo-stat controlled fast idling system and solenoid shut-off.
Pump timing (engine at T.D.C. - pump lift)	0,75 ± 0,02 mm	
Injector holders	BOSCH KCA 15S 66	
Injectors	BOSCH DN OSD 252 +	Opening pressure 130 $^{+8}_{-5}$ bars Maximum variation 8 bars
Fuel filter	ROTO DIESEL	With built in primer pump and heater connected to the engine cooling system
Injector pipes		Outside Ø 6 mm Inside Ø 2.5mm Length 400 mm
Thermostat (fast idling)	VERNET (CALORSTAT)	Travel 7 to 9.5mm between 15° and 45°C
Preheater unit	CARTIER	With preheating and postheating functions (3 minutes max.)
Heater plugs	BERU	Current approximately 15A after heating for 8 seconds
Heater plug postheat temperature switch		Circuit opens: 65° $^{+}_{-}$ 2°C Circuit closes: 55° $^{+}_{-}$ 2°C

SETTINGS

Idling speed	825 $^{+}_{-}$	25rpm
Fast idling	1,000 $^{+}_{-}$	50rpm
Maximum speed	5,200 $^{+}_{-}$	100rpm

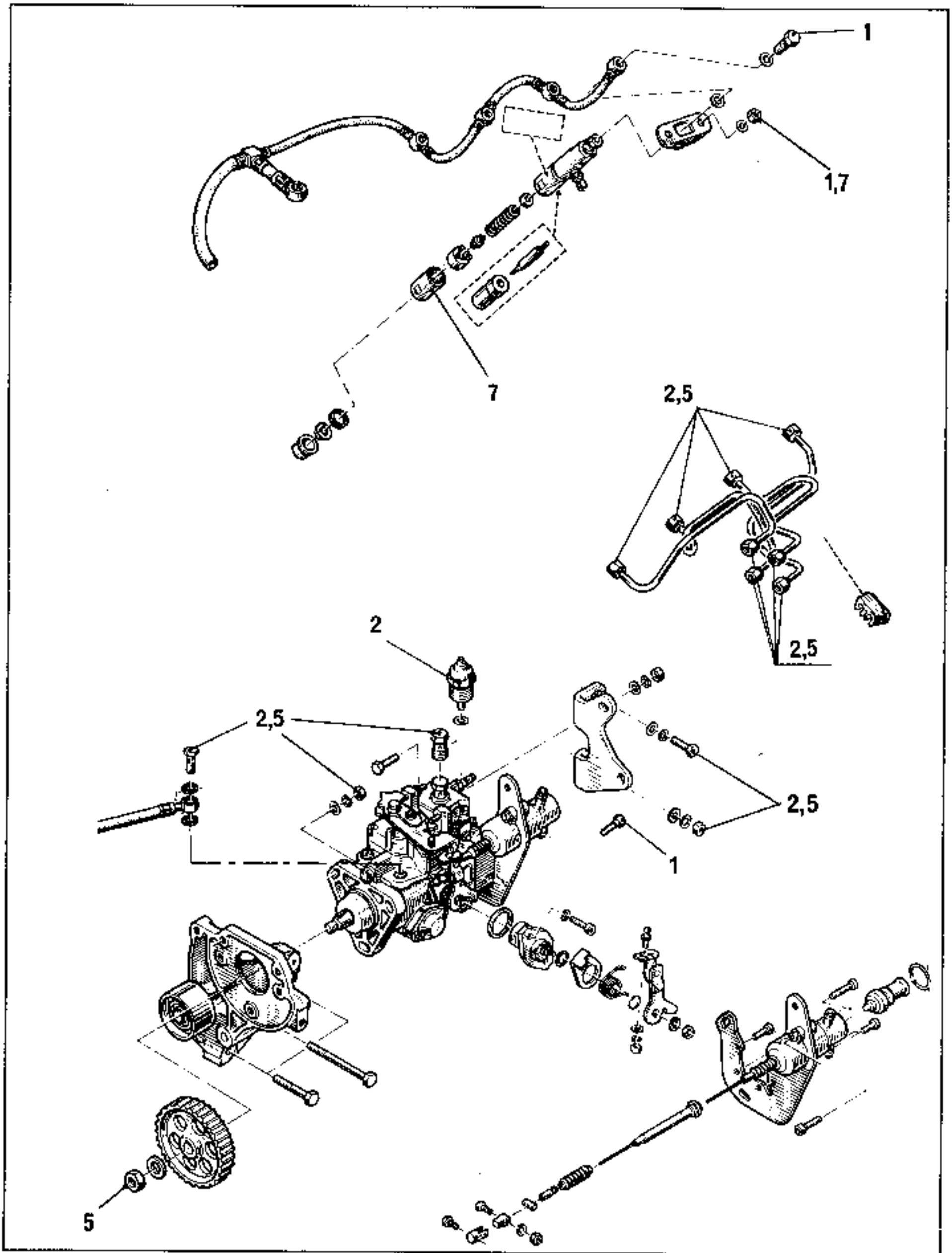
Smoke Density:

Type approval figure	0.77m-1:	28%
Maximum legal	2m-1:	55%

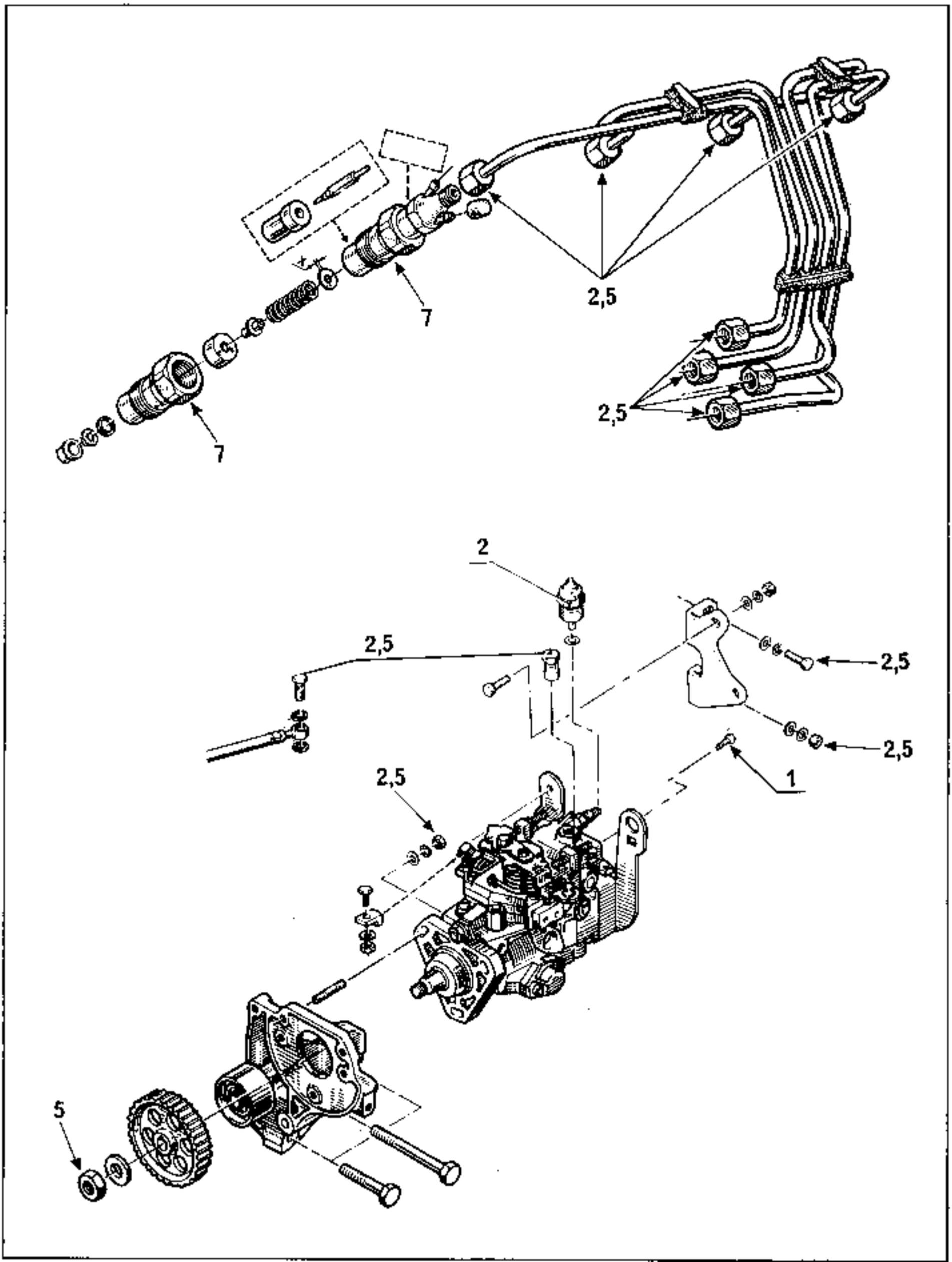
CHECKING THE TIMING (on diagnostic bay)

Injection Pump	Idling Speed in rpm	Injection commences before T.D.C.
BOSCH VE...R309	825 ± 25	14 ± 1°

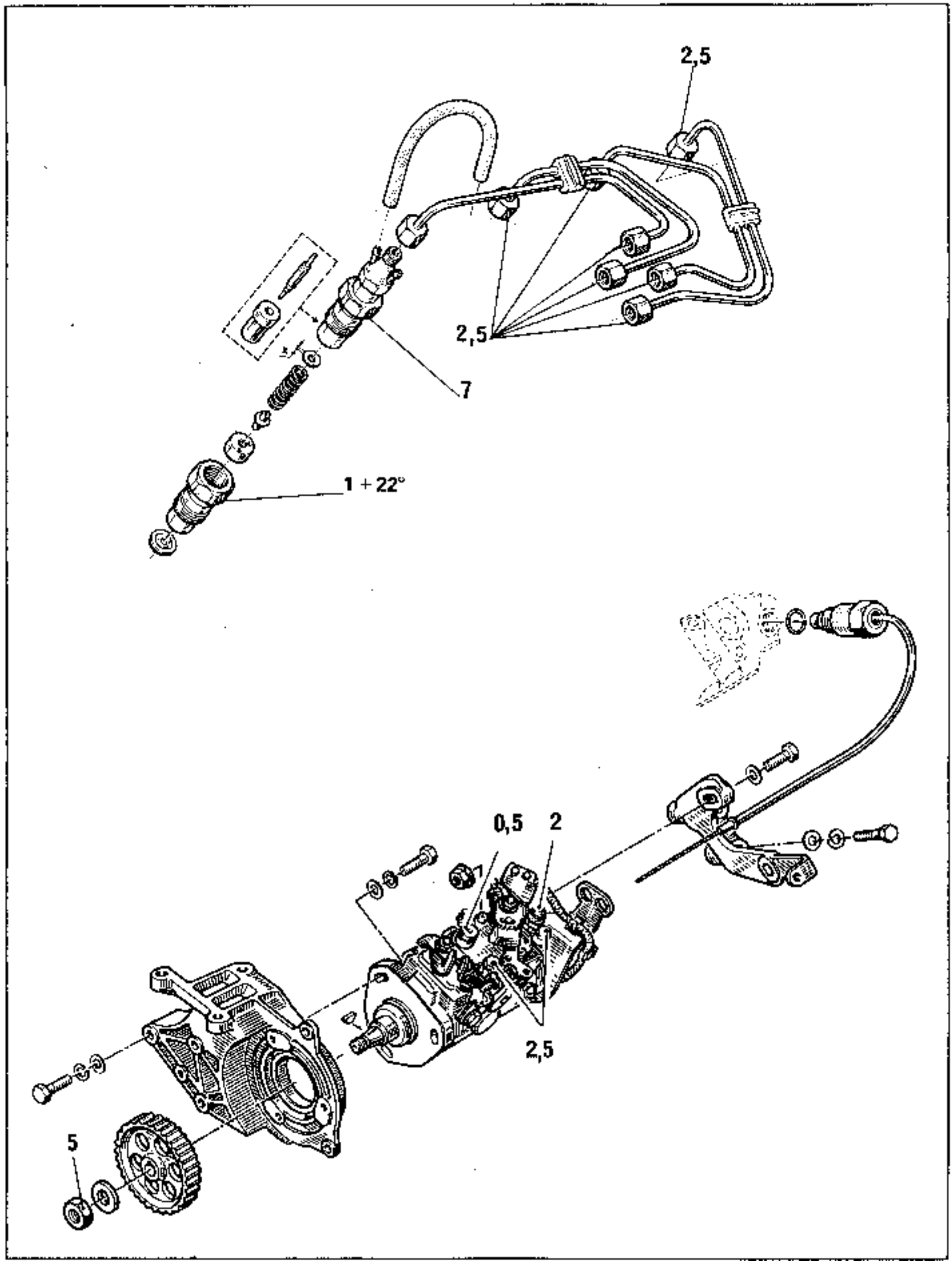
EXPLODED VIEWS - TIGHTENING TORQUES (in daN.m)



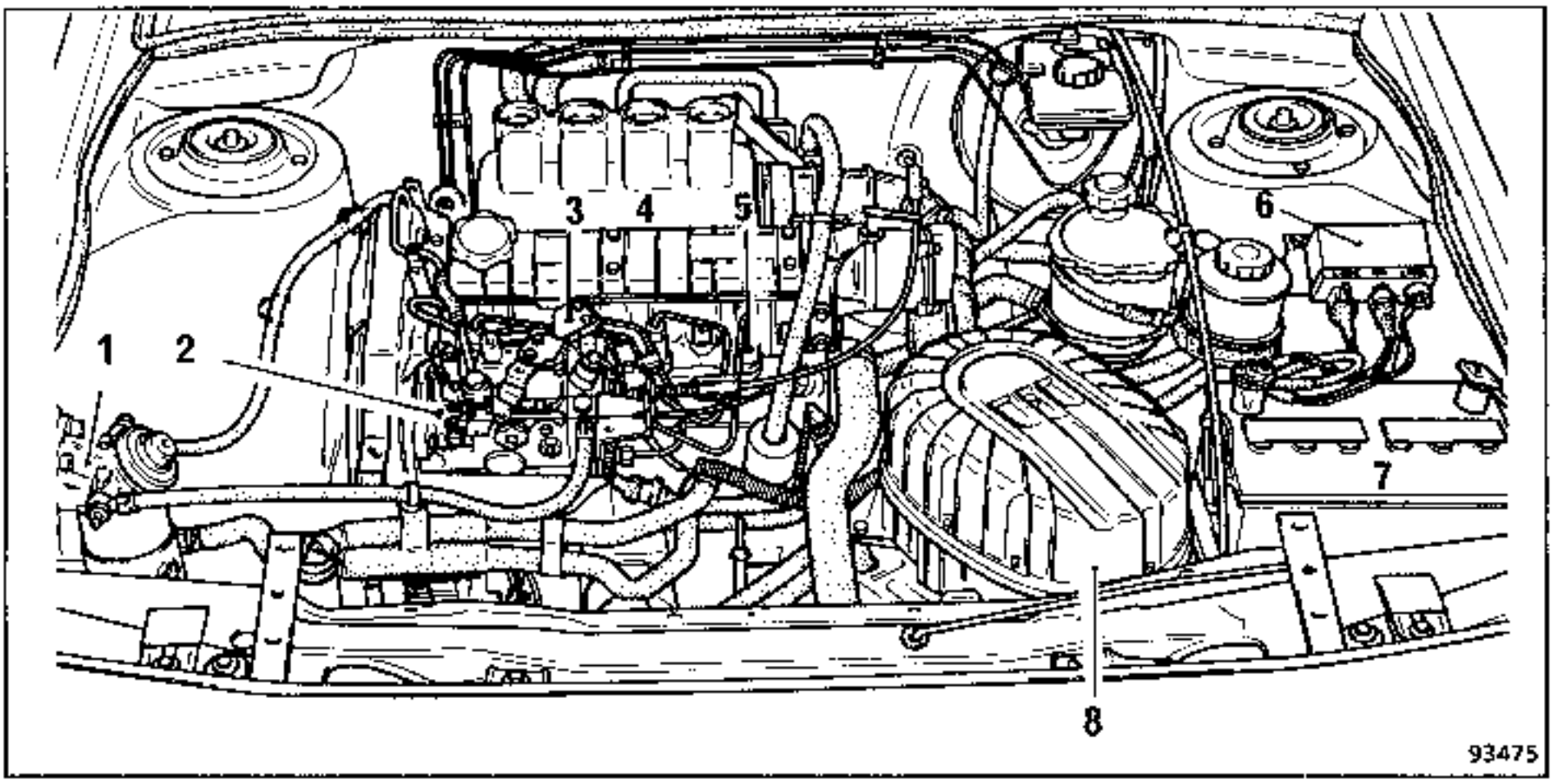
EXPLODED VIEWS - TIGHTENING TORQUES (in daN.m)



EXPLODED VIEWS - TIGHTENING TORQUES (in daN.m)



POSITIONS OF COMPONENT UNITS



1 - Fuel filter

2 - Injection pump

3 - Load microswitch

4 - Inlet manifold

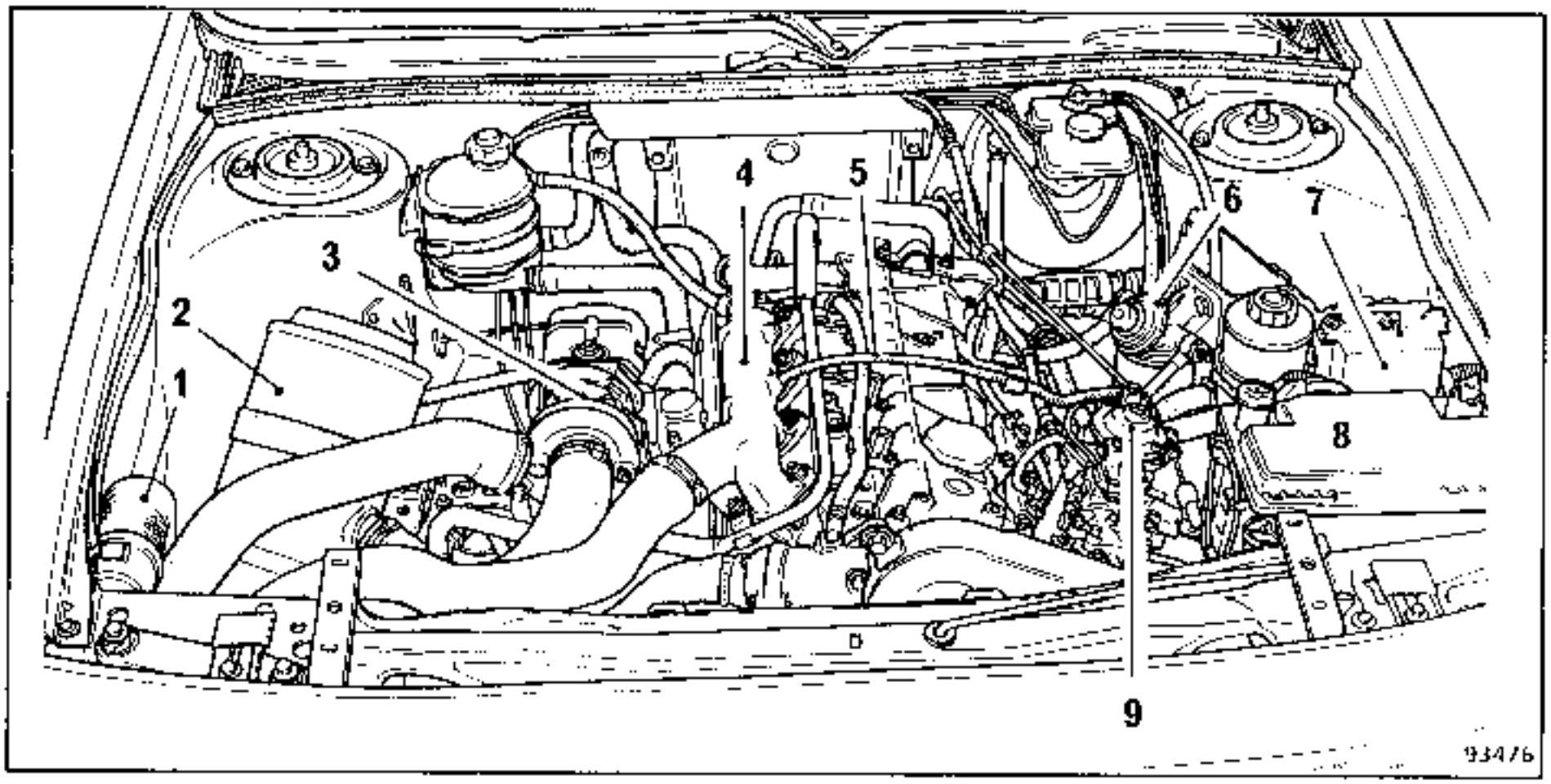
5 - Injector holder

6 - Preheat and postheat unit

7 - Battery

8 - Air filter

POSITIONS OF COMPONENT UNITS



1 - Engine air intake duct

2 - Air filter

3 - Turbocharger

4 - Inlet manifold

5 - Pipe connecting inlet manifold to injection pump supercharging pressure corrector.

6 - Fuel filter

7 - Preheating and postheating unit

8 - Battery

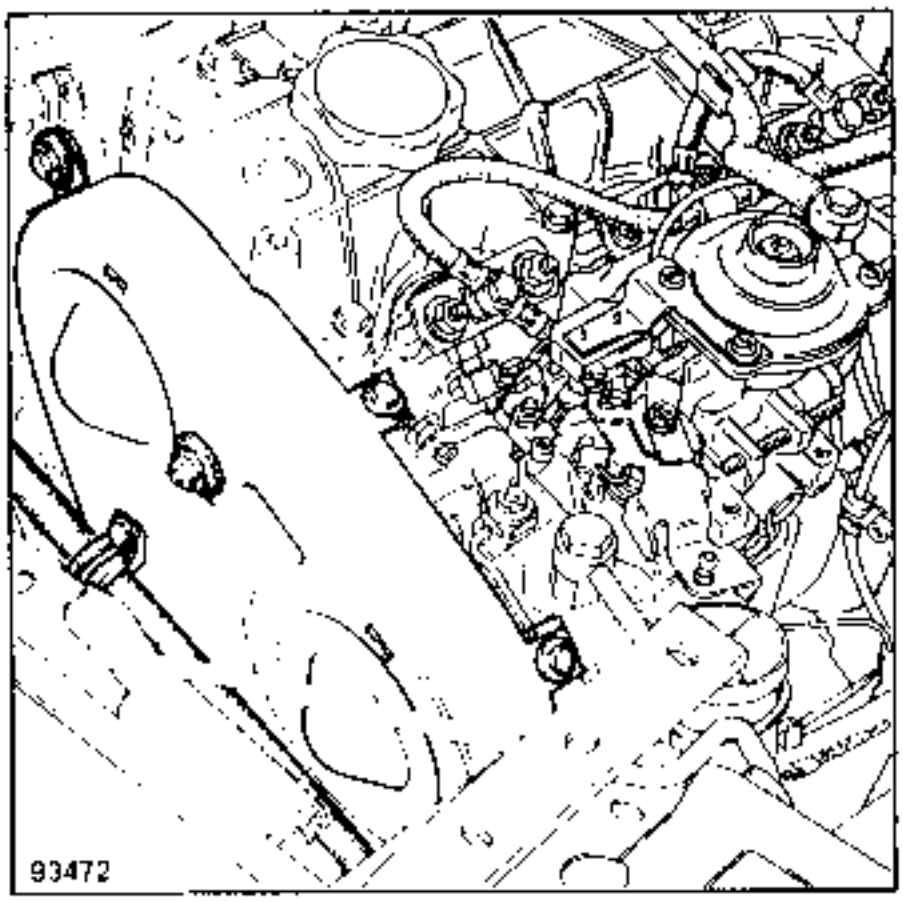
9 - Injection pump

REMOVING-REFITTING THE INJECTION PUMP

The method of removing, refitting and setting the timing of this pump is described in the diesel injection manual.

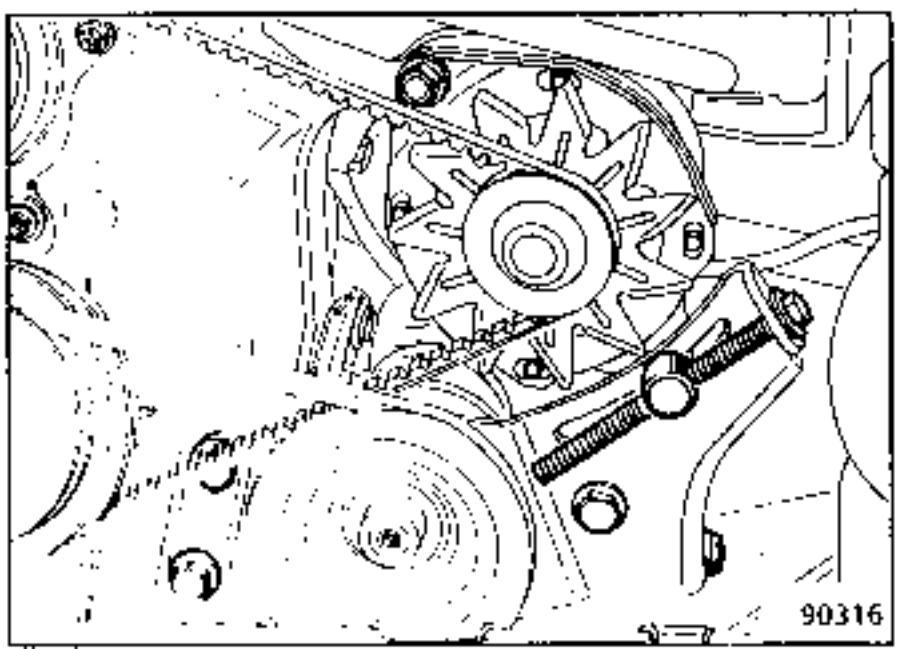
However, certain components have to be removed, depending on the vehicle type, to gain access to the timing gear casing:

- Disconnect and remove the battery.
- Remove the front cross member from above the radiator and push it as far as possible forwards.



Under the vehicle, remove:

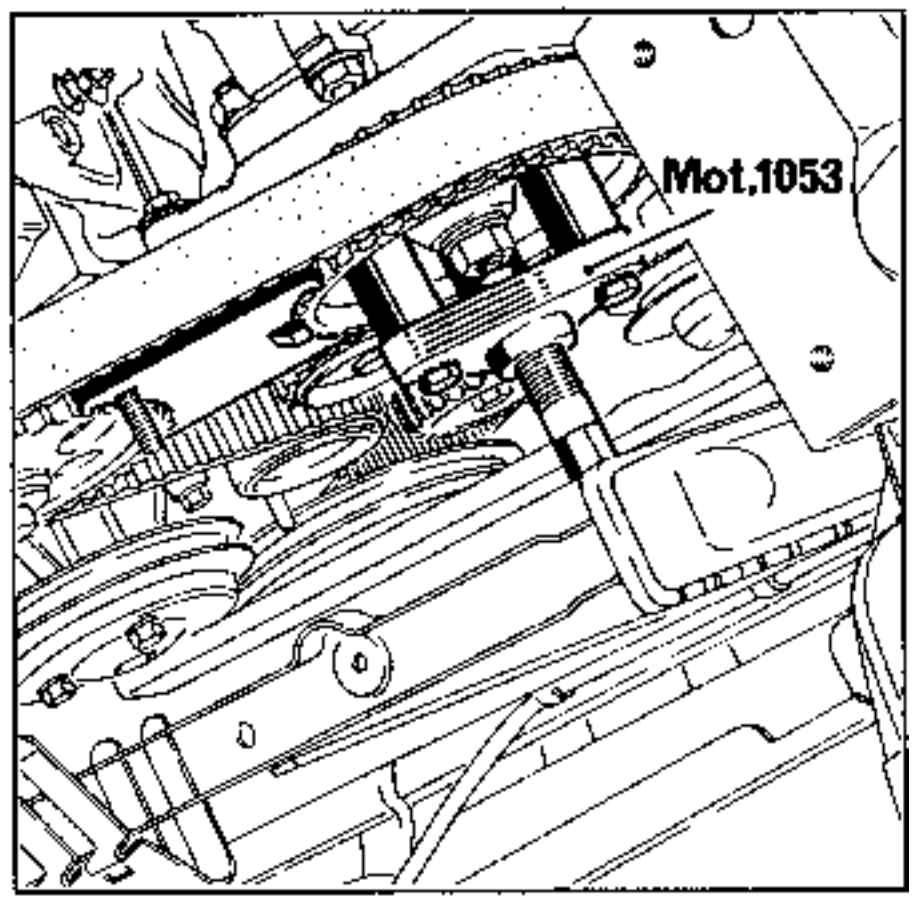
- the power steering pump belt,
- the alternator and coolant pump belt.



Remove the cable protector from the timing gear casing and pull it forwards.

Remove the timing gear casing.

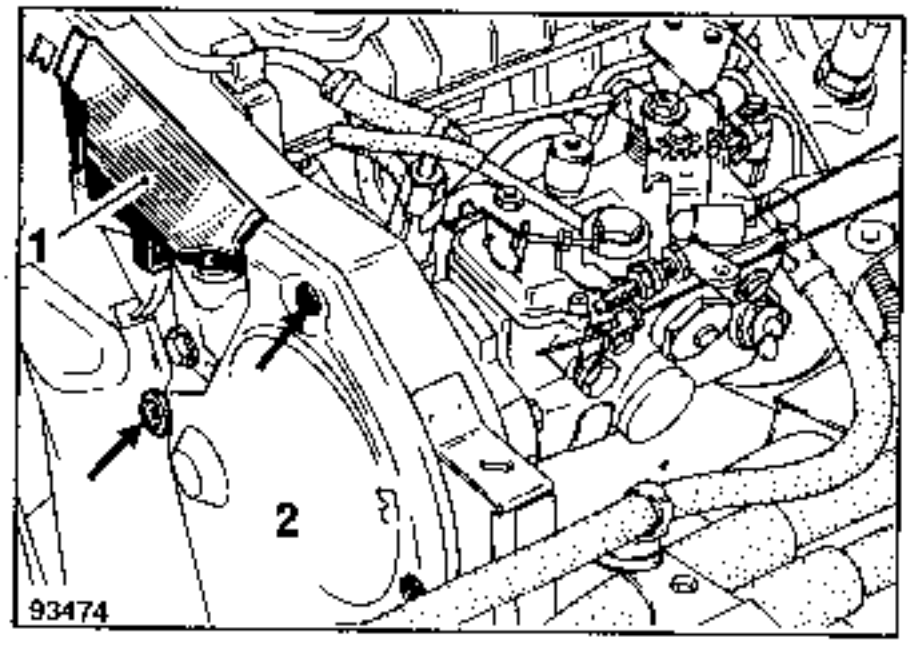
To free the injection pump drive sprocket, use tool Mot.1053.



REMOVING AND REFITTING THE INJECTION PUMP

The method of removing-refitting and adjusting the injection pump timing is described in the diesel injection manual (INJ "D").

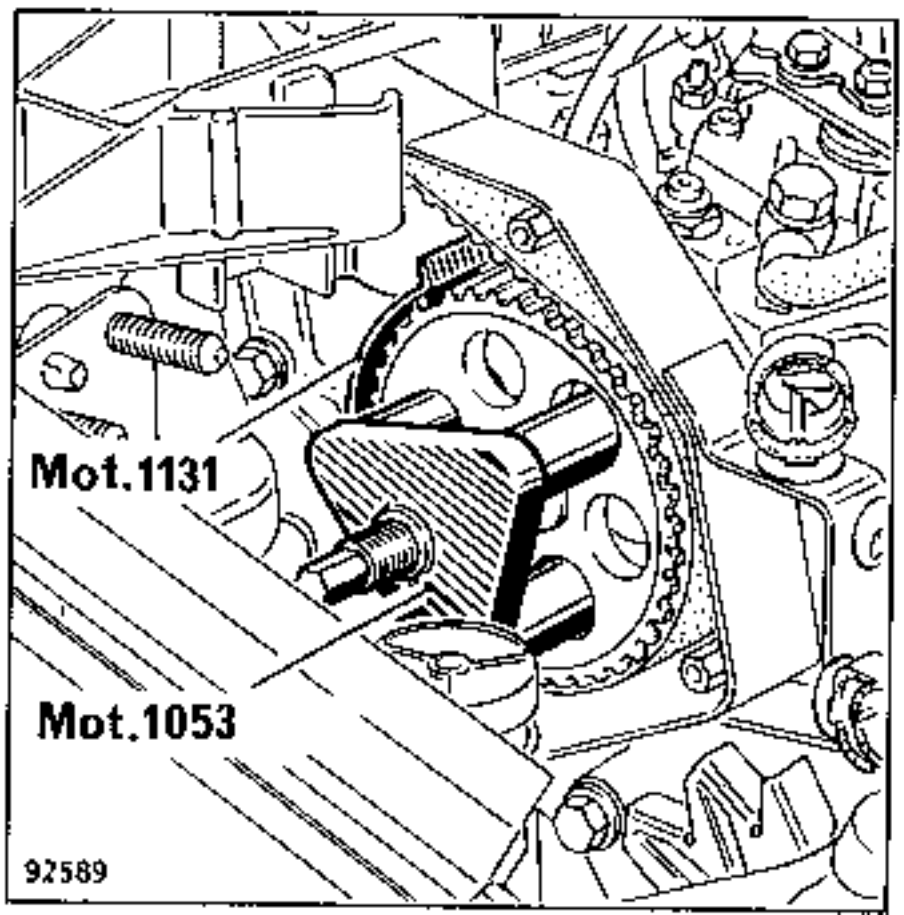
However, access is gained to the pump sprocket as follows:



Remove the plastic cover (1) and the pressed steel casing (2).

With the engine at injection T.D.C. on no. 1 cyl. (flywheel end), move back by one tooth, then insert tool Mot.1131 between the pump support and the sprocket.

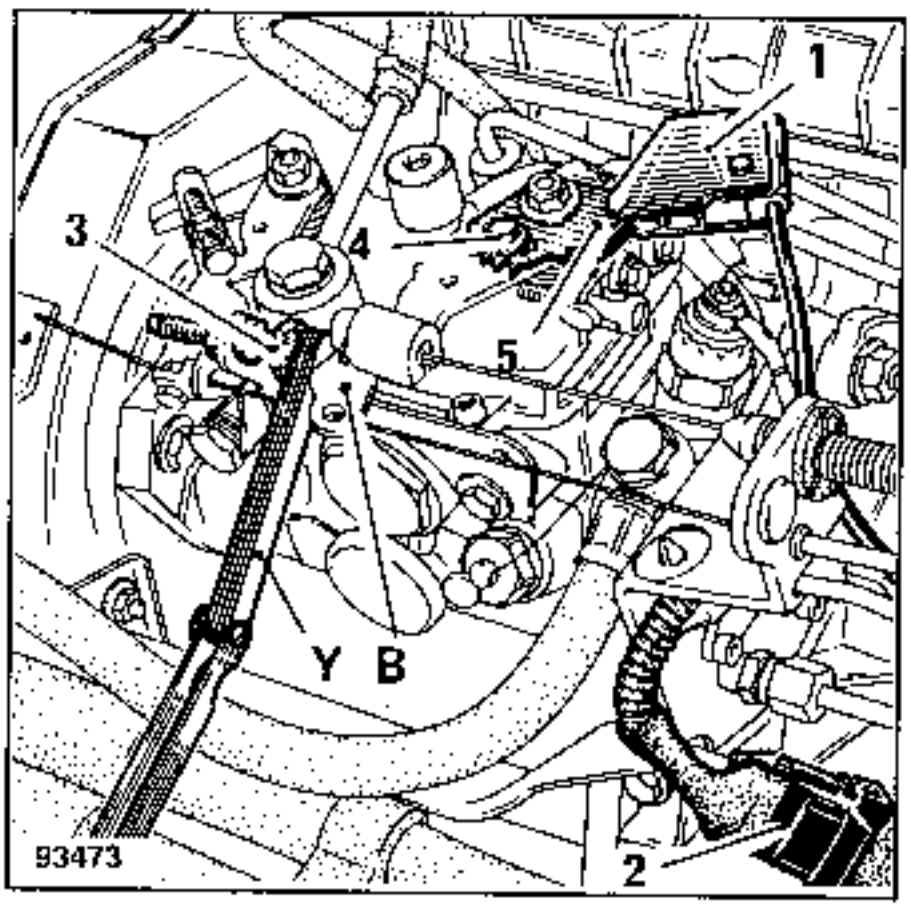
Loosen the pump securing nut without removing it, then, using tool Mot.1053, free the sprocket from its taper.



Load Micro switch (1)

The micro switch is to be adjusted or checked:

- when replacing a micro switch,
- after replacing burned out preheater plugs,
- after work has been carried out on the injection pump at a C.I.R. centre.



Use an ohmmeter or a test lamp connected to pins B and C on connector (2).

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

Feeler th.(Y) in mm	Microswitch	Test Lamp	Ohmmeter
8	closed	on	0Ω
12	open	off	infinite.

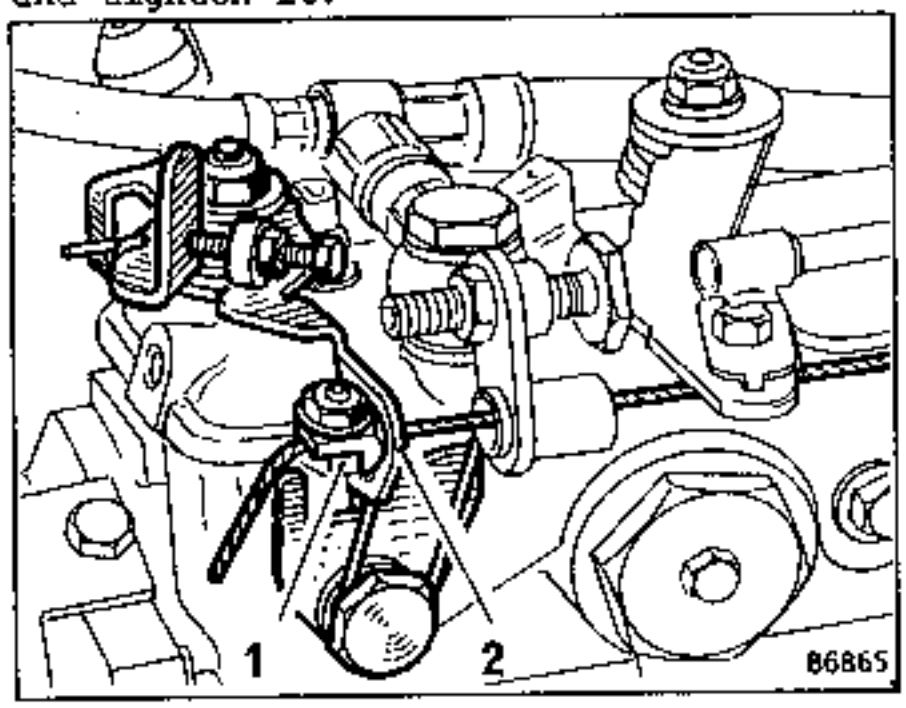
The switch is adjusted by loosening the screw (4) and moving the cam (5) with reference to the throttle lever.

ADJUSTING THE FAST IDLING

Fit the cable, the cable cover end stop and the cable clamp (1).

The engine is to be cold (coolant temperature less than 15°C).

Push the idling speed stop (2) to the end of its travel, tension the cable, hold the cable clamp against the stop and tighten it.



When the engine is warm, after the electric fan has cut in.

Check, with the cable tight, the clearance between the cable clamp (1) and the fast idling lever (2) in the minimum idling speed stop position:

- the clearance should be 2 to 3mm.

- if it is not, adjust the cable clamp (1) to obtain this clearance.

ADJUSTING THE ANTI STALL SYSTEM AND THE IDLING
(With the engine warm, after the electric fan has cut in)

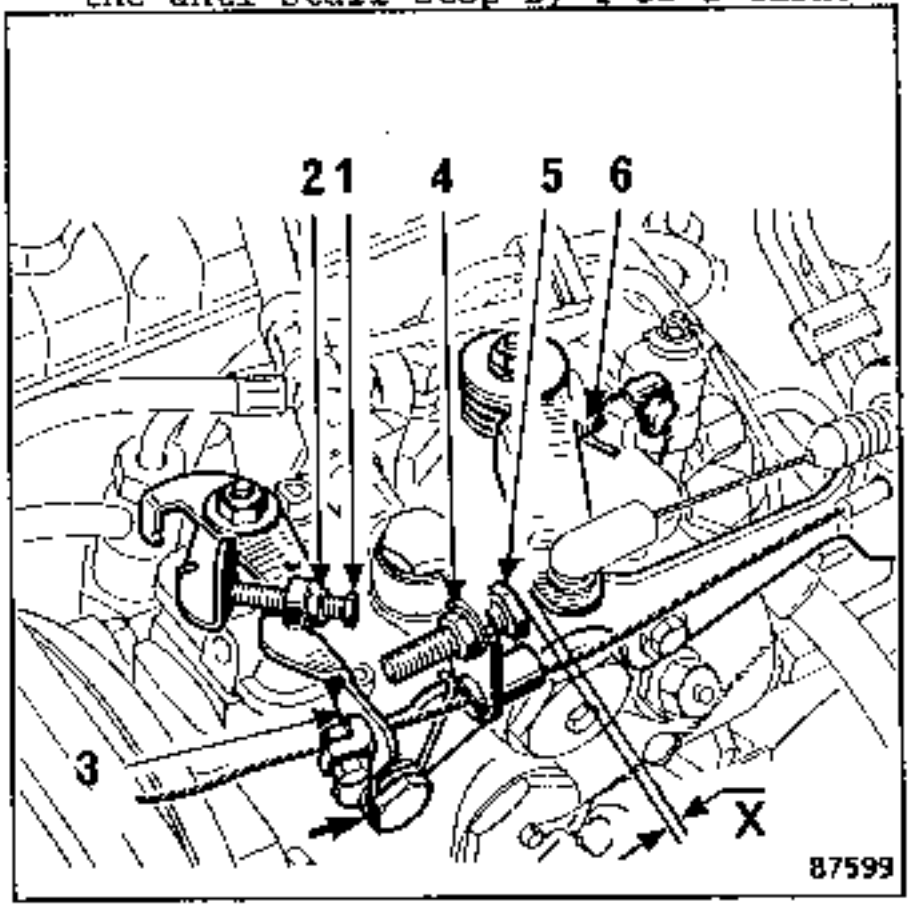
NOTE: When the engine is warm lever (3) should have returned against its minimum stop (see arrow).

Place a 5mm spacer (dim. X) between the stop (5) and the throttle lever, loosen the locknut (4) and move the stop (5) to obtain an idling speed of 1600 $\pm$ 100 rpm. Then remove the 5mm spacer and tighten the locknut (4).

Adjust the idling speed to 825 $\pm$ 25 rpm by turning screw (1), then tighten the locknut (2).

Accelerate positively and allow the engine to return to idling speed, several times in succession:

a) if the engine returns to a speed lower than the idling speed and tends to stall, unscrew the anti stall stop (5) by ¼ of a turn.
b) if the speed falls slowly, screw in the anti stall stop by ¼ of a turn.



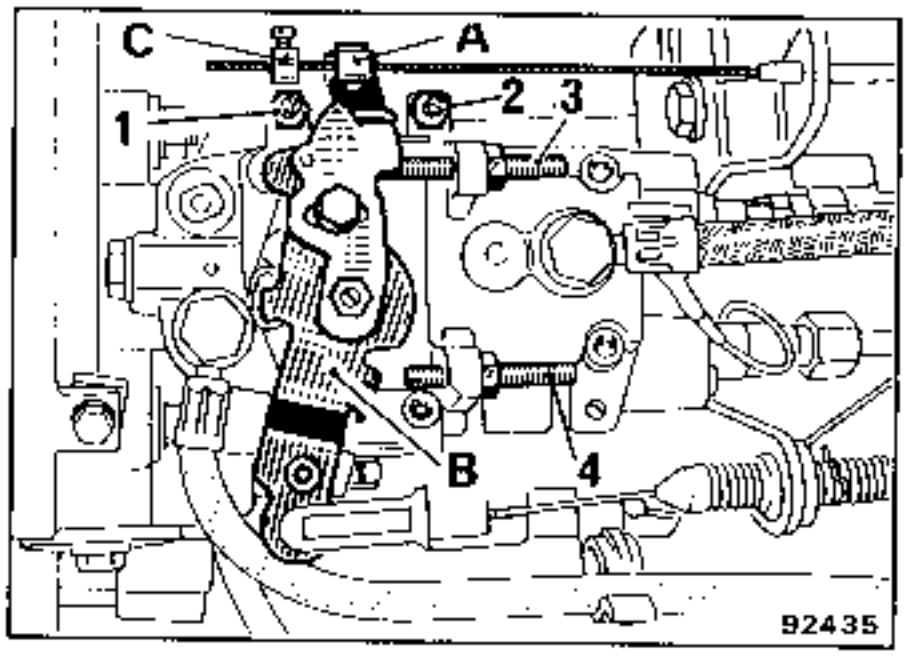
CHECKING THE MAXIMUM SPEED

With the engine warm, fully open the throttle against its stop.

The engine speed should be between 5100 and 5300 rpm.

As the maximum speed stop screw (6) is sealed at the factory, it must not be adjusted except by an injection specialist, who must then reseal the screw.

CHECKING THE SPEEDS



A - Idling and fast idling lever.

B - Throttle lever.

1 - Fast idling adjusting stop screw.

2 - Normal idling adjusting stop screw.

3 - Residual delivery (anti stall) stop screw

4 - Maximum speed stop screw

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

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

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

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

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

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

- If the speed increases by more than 20 rpm, the complete adjusting sequence must be carried out (see II).
- If the speed increases by less than 10 rpm, only adjustment (IId) will be required.

II - FULLY ADJUSTING THE IDLING SPEED

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

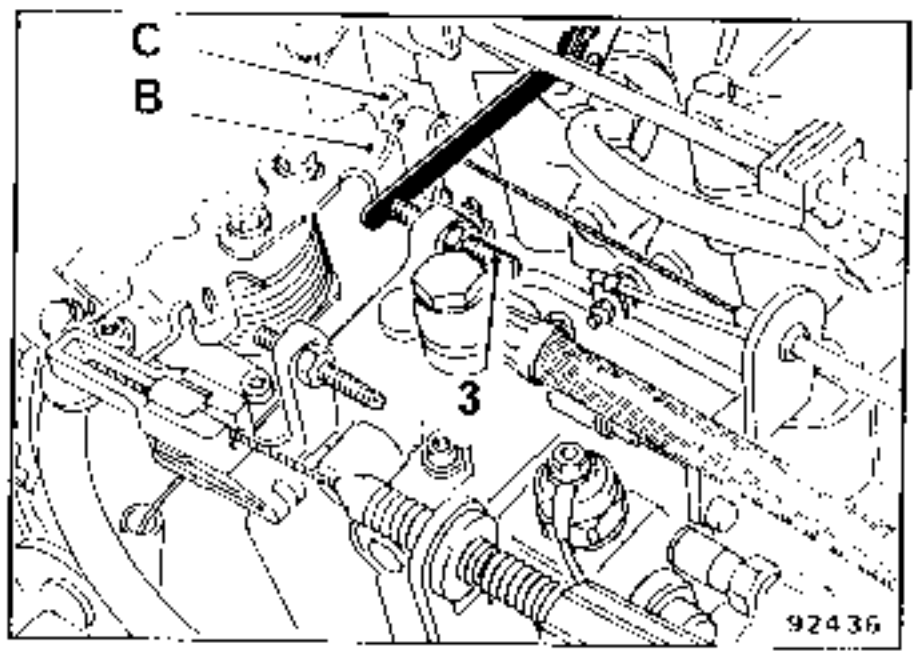
Check that the cable clamp (C) does not interfere with the movement of lever (A).

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

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

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

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



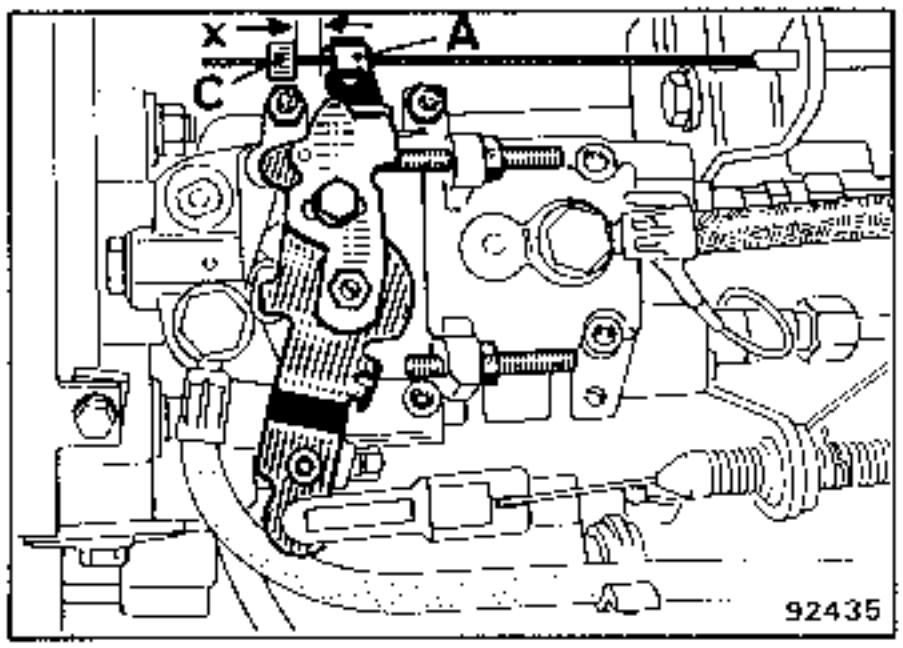
Check the initial idling speeds, with and without the 1mm feeler gauge, and if the speeds have altered, repeat the adjustments (b, c and d).

III - ADJUSTING THE FAST IDLING SPEED

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

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

IV - ADJUSTING THE FAST IDLING THERMO-STAT CABLE CLAMP



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

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

Load micro switch (1).

The micro switch is to be checked or adjusted:

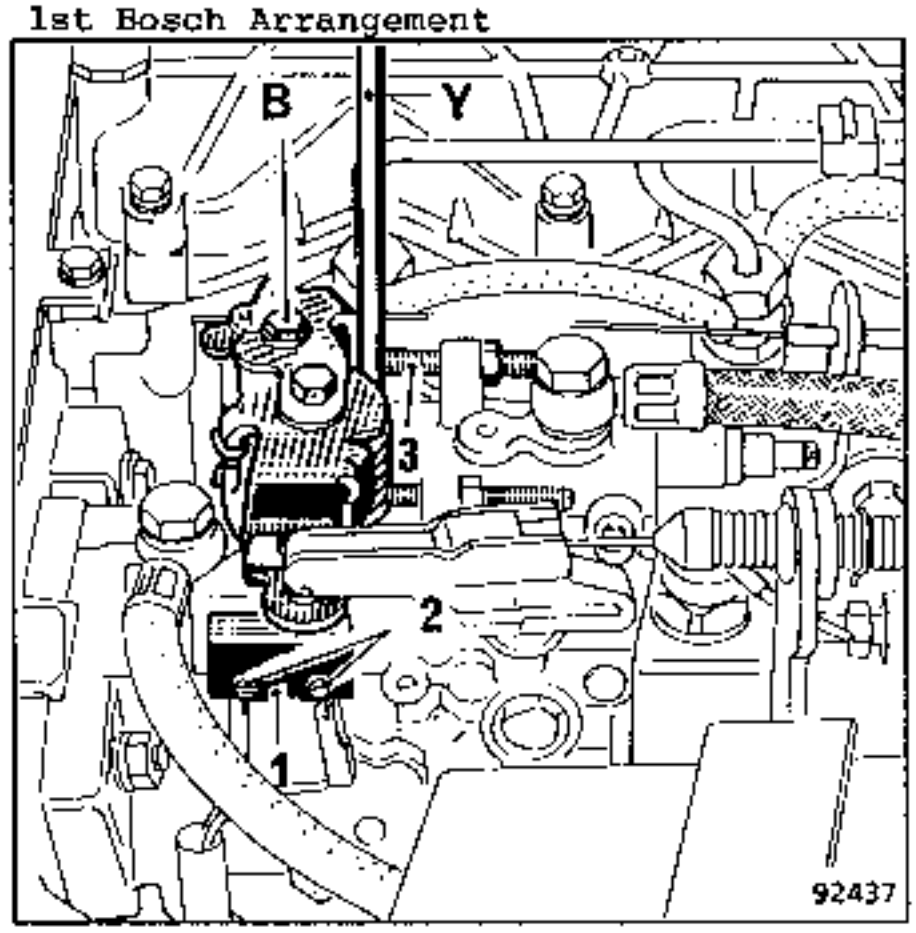
- whenever the micro switch has been replaced,
- following replacement of burnt out heater plugs,
- whenever work has been carried out on the injection pump at an injection centre (C.I.R.).

Use an ohmmeter or a test lamp.

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

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

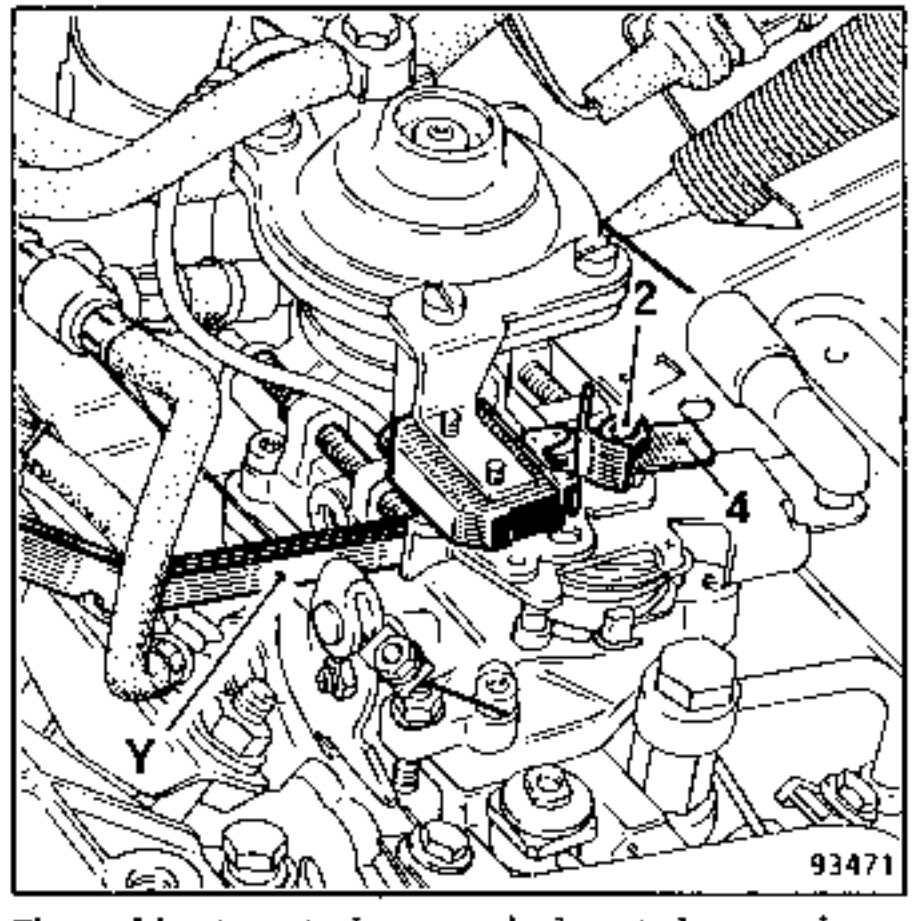
1st Bosch Arrangement



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

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

2nd Bosch Pump Arrangement



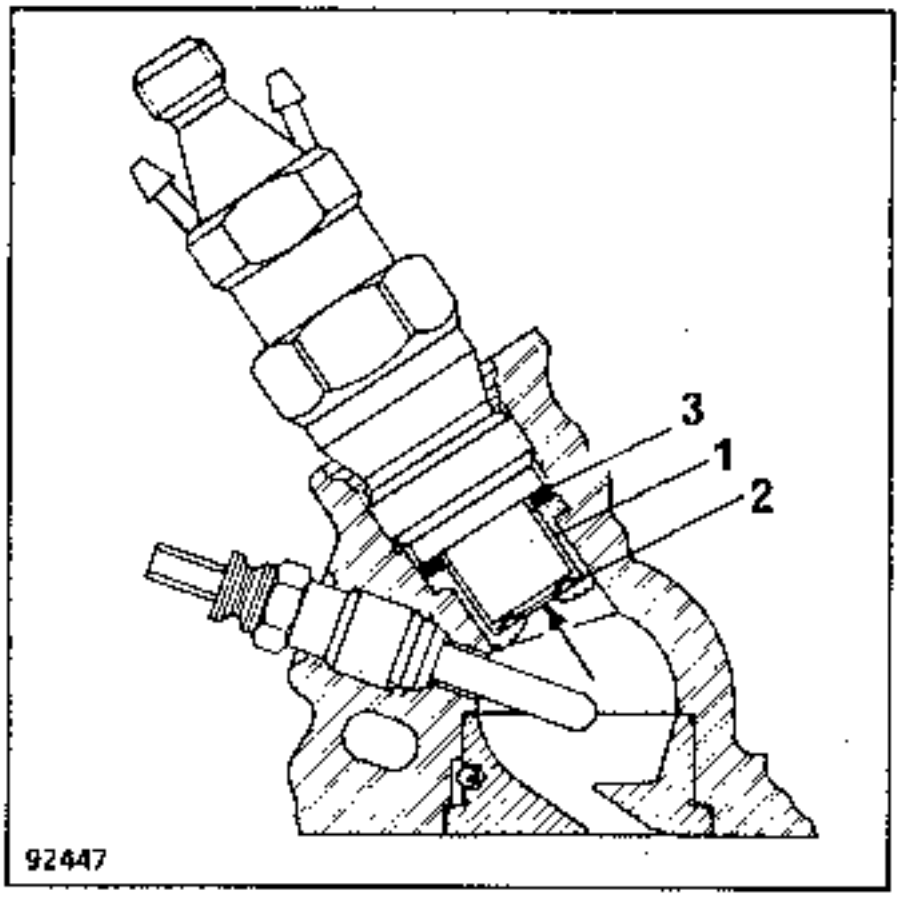
The adjustment is carried out by moving the cam on the throttle lever.

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

Injector Holders (Special Features)

The cylinder head is machined to accommodate a flame baffle cap (1) and a flame baffle washer (2).

NOTE: with screw-in injector holders, the washer (2) is fitted the other way round.



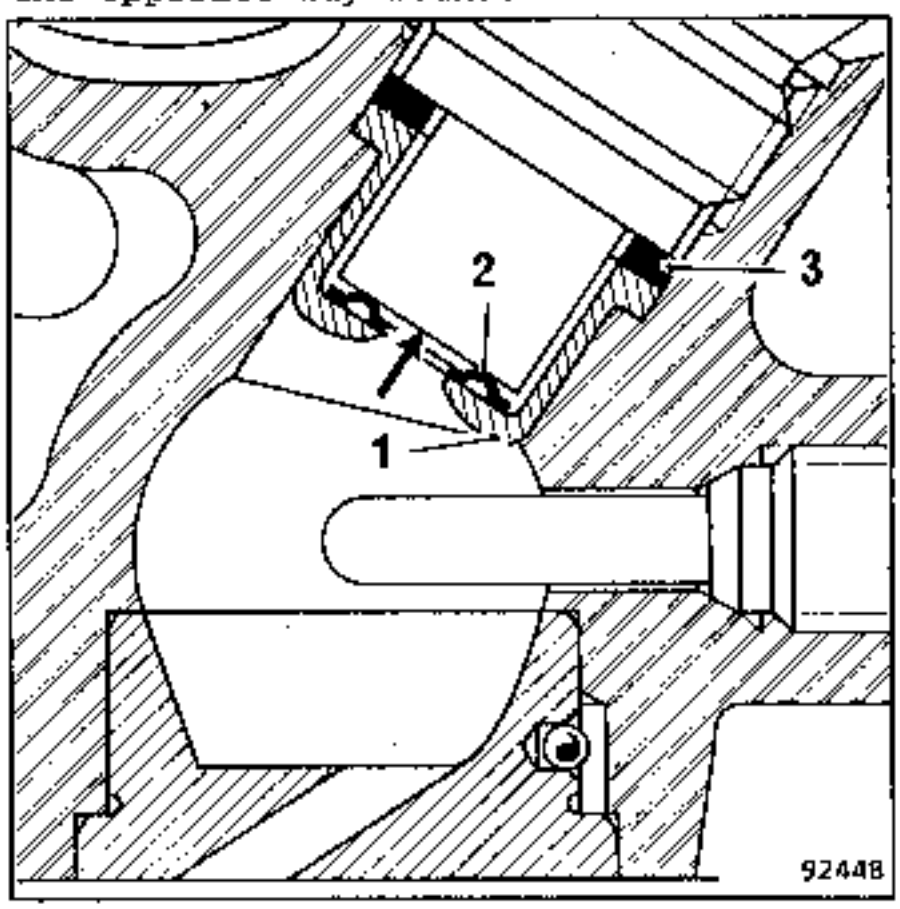
Each time an injector holder is refitted, fit a new seal (3) and a new flame baffle washer (2) (positioned as shown by the arrow).

Tighten the injector holder, using tool Mot.997, to a torque of 7 daN.m.

Injector Holders - Special Features

The cylinder head has been modified to accommodate screw-in injector holders of the BOSCH "KCA" type.

NOTE: with the screw-in injector holder the flame baffle washer (2) is fitted the opposite way round.



1 - Flame baffle cap

2 - Flame baffle washer

3 - Seal

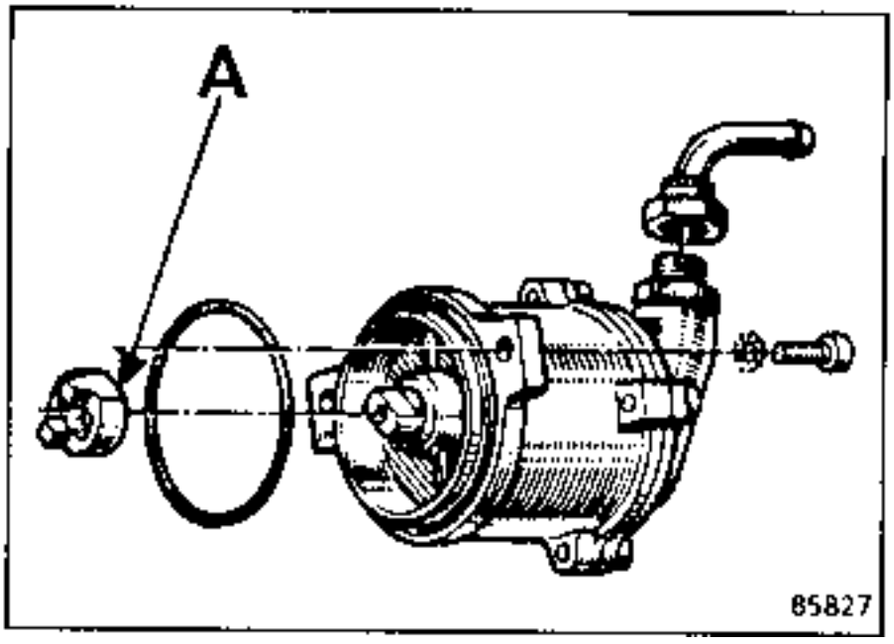
Each time an injector holder is refitted, fit a new seal (3) and flame baffle washer (2) (positioned as shown by the arrow).

Tighten the injector holder, using tool Mot.997, to a torque of 7 daN.m.

ESSENTIAL SPECIAL TOOLS
M.S. 870 Vacuum gauge

Whenever replacing the exhauster, its drive dog (A) must be replaced by a new one.

CHECKING: with the engine warm and running at 4,000 rpm, the vacuum should be a minimum of 700 mbars (525 mmHg) within 3 seconds.



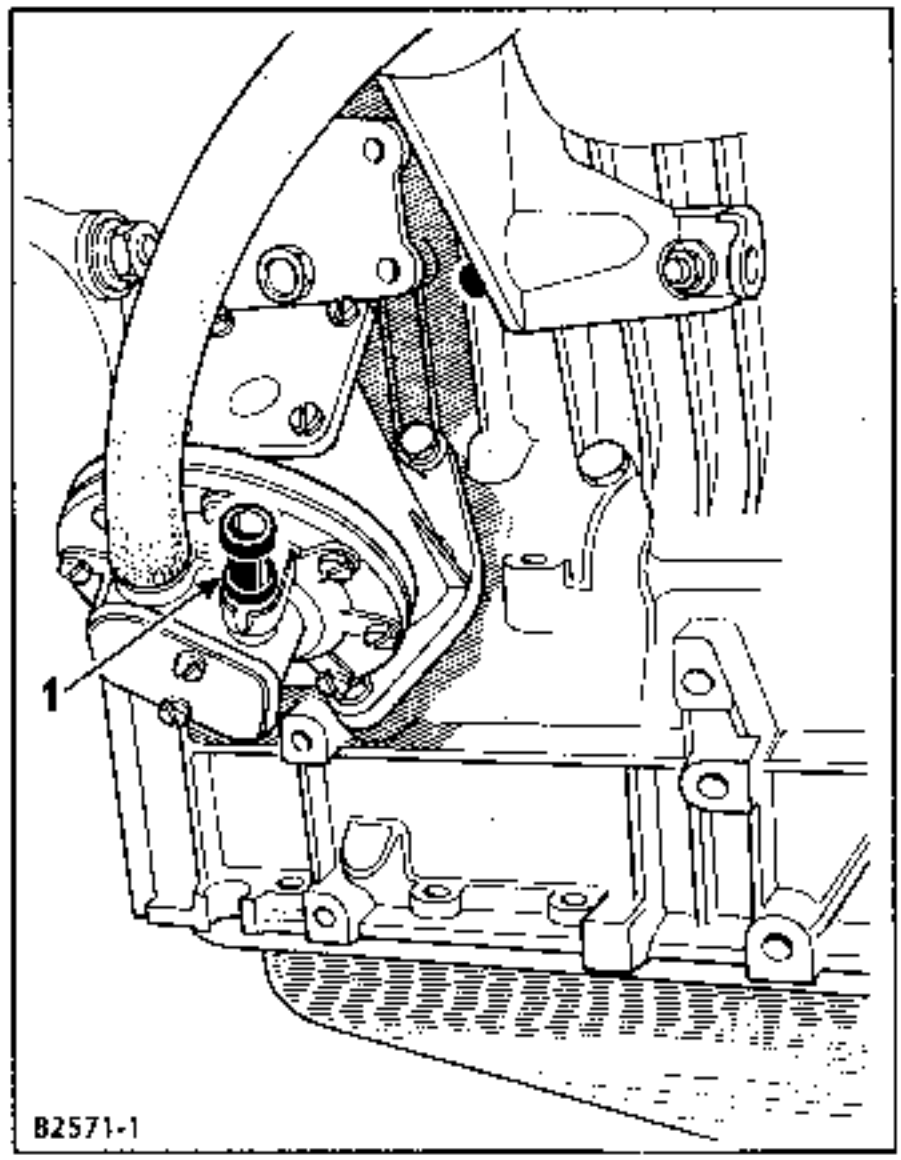
ESSENTIAL SPECIAL TOOLS	
M.S. 870	Vacuum gauge

This operation is carried out with the exhauster still on the vehicle.

Disconnect the vacuum pipe (1) from the exhauster and connect vacuum gauge M.S.870 in its place.

Run the engine at a minimum speed of 2,000 rpm.

The absolute vacuum reading should be greater than 770 mbars (570 mm Hg).



NOTE: the method of checking the entire servo system is identical to that used for the other vehicles in the range.

Grades of oil to be used:

- ELF RENAULTMATIC D2 or
- MOBIL ATF 220 or
- TOTAL DEXRON

CAPACITY: 1.1 litres.

Filling the system.

Fully fill the reservoir.

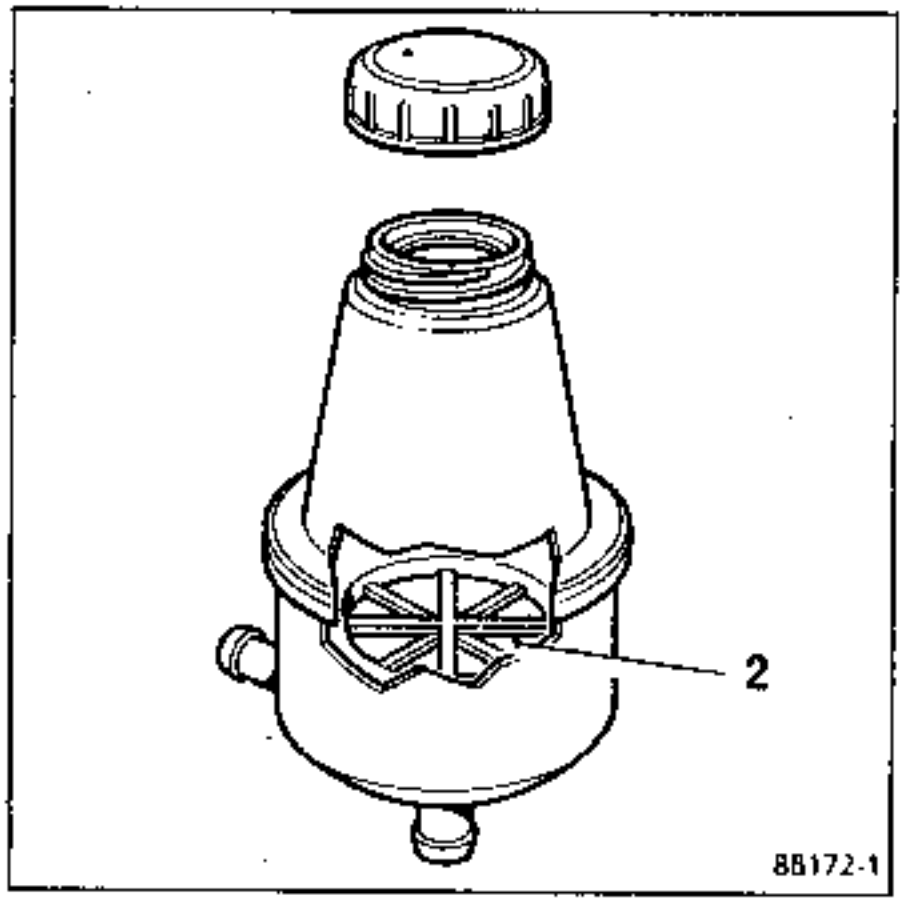
Slowly move the steering in both directions.

Top up the level.

Start the engine and slowly move the steering from lock-stop to lock-stop.

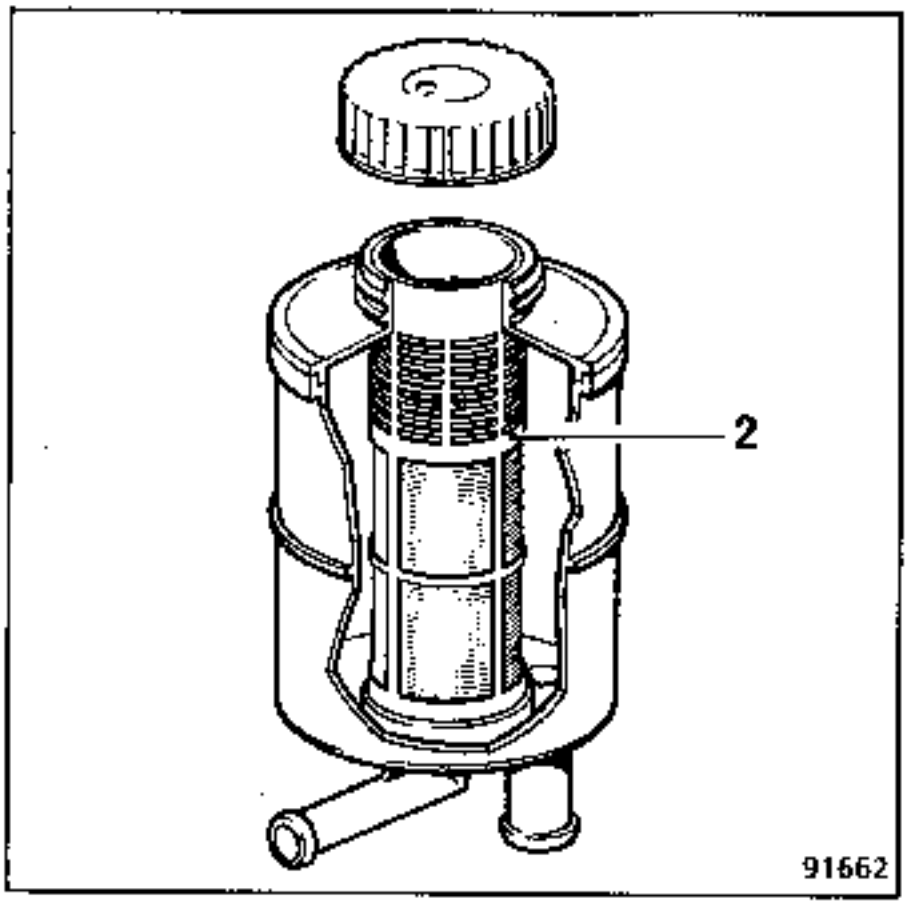
Top up the level.

1st Arrangement



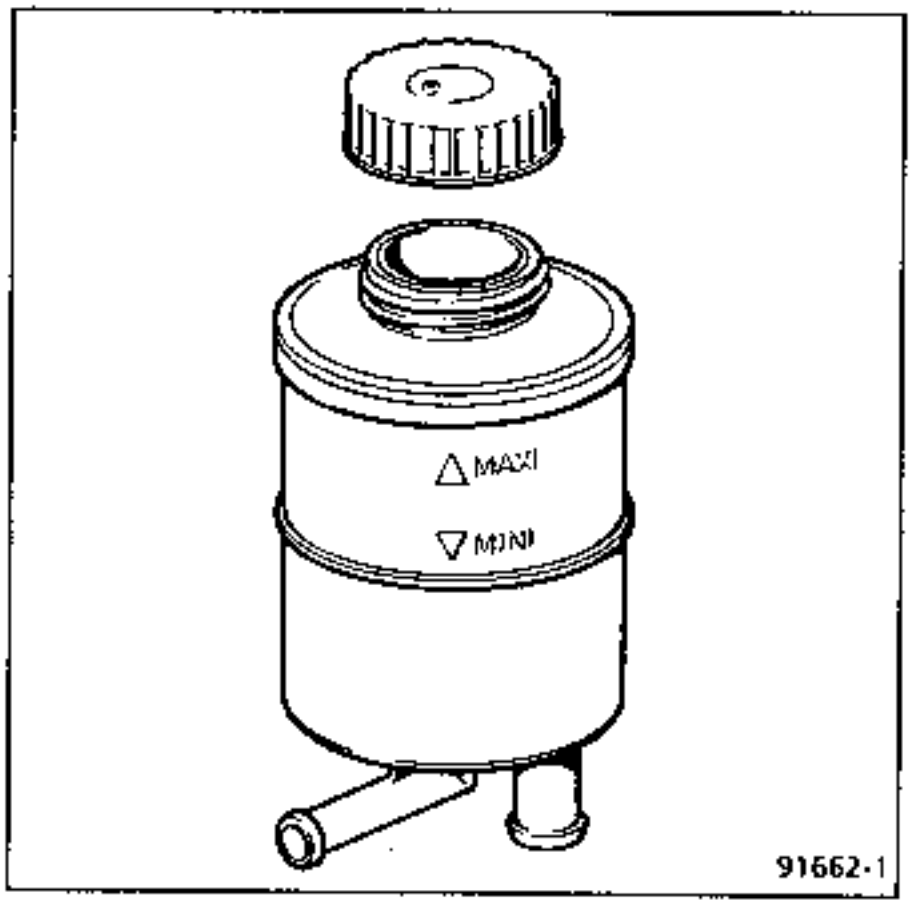
The oil should come up to the grille (2).

2nd Arrangement



The oil should come up to the band (2) on the filter sleeve.

3rd Arrangement



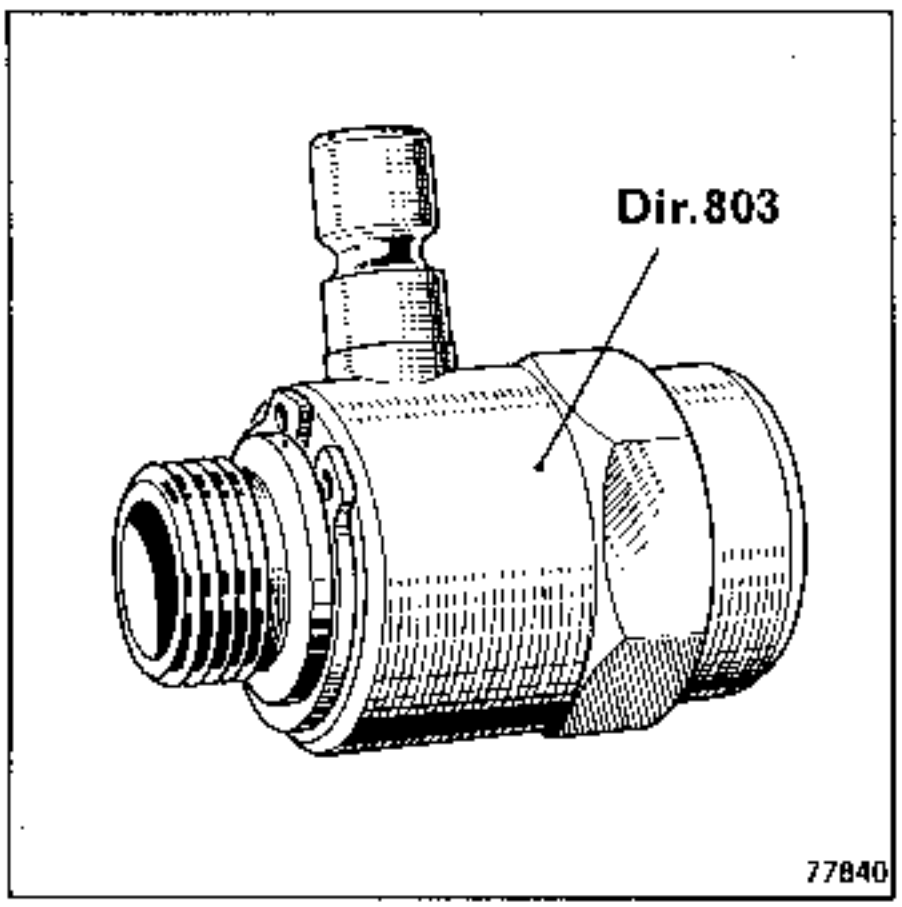
The oil should come up to the MAX level mark.

ESSENTIAL SPECIAL TOOLS		
Mot.	453-01	Hose clamps
Dir.	803	Union, with metric thread
Fre.	1085	
	or	Pressure gauge
Fre.	244-04	

Place a clamp Mot.453-01 on the pump low pressure hose.

Disconnect the high pressure pipe (provide a container to catch the oil).

Insert the metric union Dir.803 between the pipe and the pump.



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

Remove clamp Mot.453-01.

Top up the level in the pump and run the engine to test the pressure.

With the front wheels straight ahead, whatever the engine speed, the pressure must not exceed:
5 to 7 bars.

With the wheels through full lock to one side
Hold the steering on full lock. The maximum pressure should be:
80 to 85 bars.

Do not prolong this operation, as this could cause the oil to overheat rapidly.

Remove union Dir.803 and pressure gauge Fre.1085 or Fre.244-04 after shutting off the oil supply to the pump with clamp Mot.453-01.

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

Top up the level of the oil in the reservoir.

ESSENTIAL SPECIAL TOOLS	
Mot. 453-01	Hose clamps

REMOVING

Remove the alternator (see "Electrical System" section).

On Vehicles with Air Conditioning

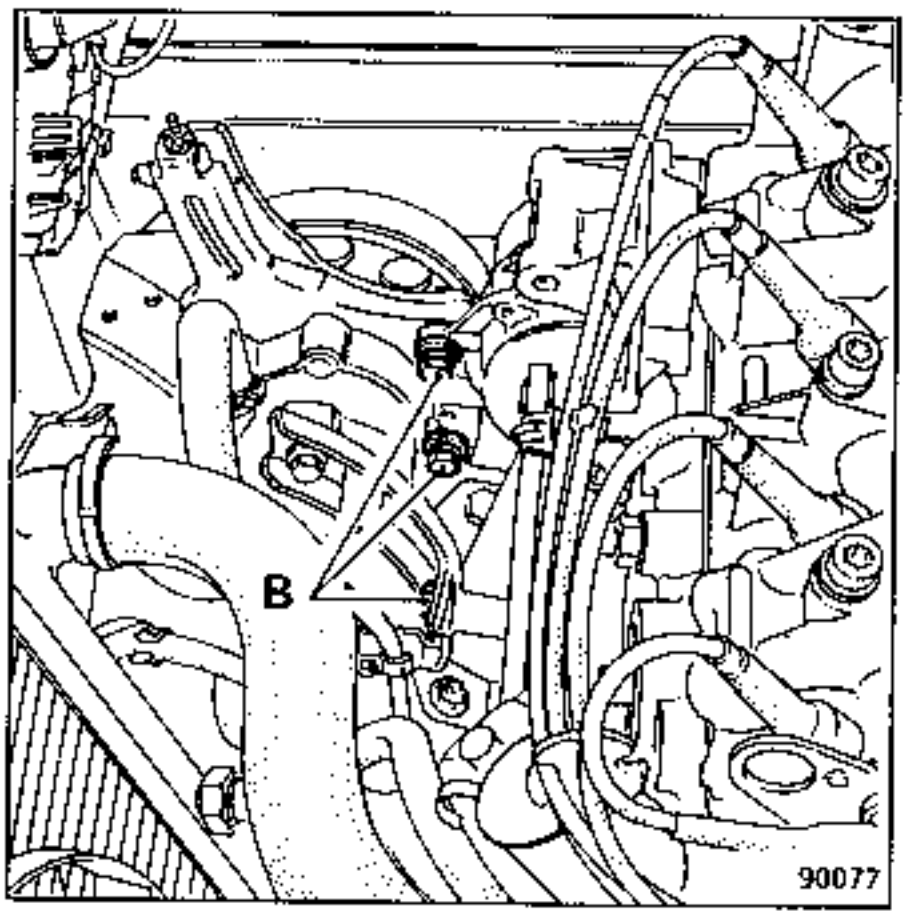
Remove the air conditioning compressor (see "Air Conditioning" section).

All Types

Place a clamp Mot.453-01 on the oil input pipe.

Disconnect the pipes from the:
- input,
- high pressure side.

Remove:
- the three bolts (B) which secure the pump support,



- the support-pump assembly.

If the pump is to be replaced, remove:
- the pulley (see corresponding section),
- the support.

REFITTING

If the pump has been replaced, fit:
- the pump support,
- the pulley (see corresponding section).

Refit:
- the pump-support assembly,
- the input and high pressure pipes.

Remove the clamp Mot.453-01.

On Vehicles fitted with Air Conditioning

Fit the air conditioning compressor.

All Types

Refit the alternator (see "Electrical System" section).

Adjust the belt tension (see corresponding section).

Fill and bleed the system (see corresponding section).

On Vehicles fitted with Air Conditioning

Fill and bleed the refrigeration (freon) system (see corresponding section).

ESSENTIAL SPECIAL TOOLS	
Mot. 453-01	Hose clamps

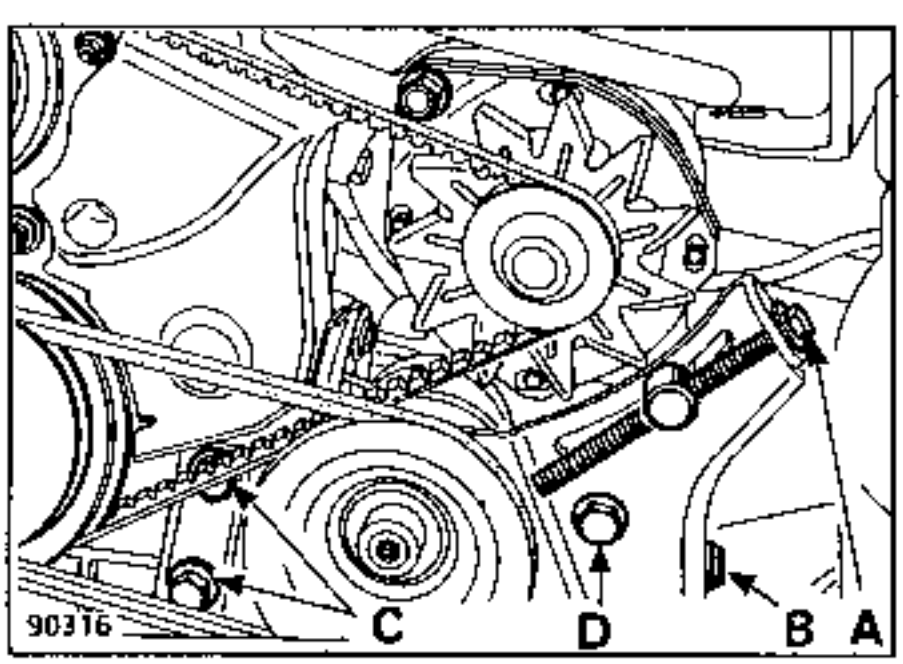
REMOVING

Place a clamp Mot.453-01 on the input pipe.

Position a container to catch the oil.

Disconnect the pipes from the:
- input,
- high pressure side.

Loosen:
- the alternator belt tensioner (A) and remove the alternator lower securing nut,
- the power steering pump tensioner(B),
- the two bolts (C), bolt (D) and the bolt from the pump rear support.



Take off the belt.

Remove:
- the bolt from the pump rear support,
- the two bolts (C),
- the pump-support assembly.

If the pump is to be replaced, remove:
- the pulley (see corresponding section),
- the support.

REFITTING

If the pump has been replaced, fit:
- the pump support,
- the pulley (see corresponding section).

Refit:
- the pump-support assembly,
- the input and high pressure pipes.

Remove the clamp Mot.453-01.

Adjust the belt tension (see corresponding section).

Fill and bleed the system (see corresponding section).

REPLACING THE PULLEY

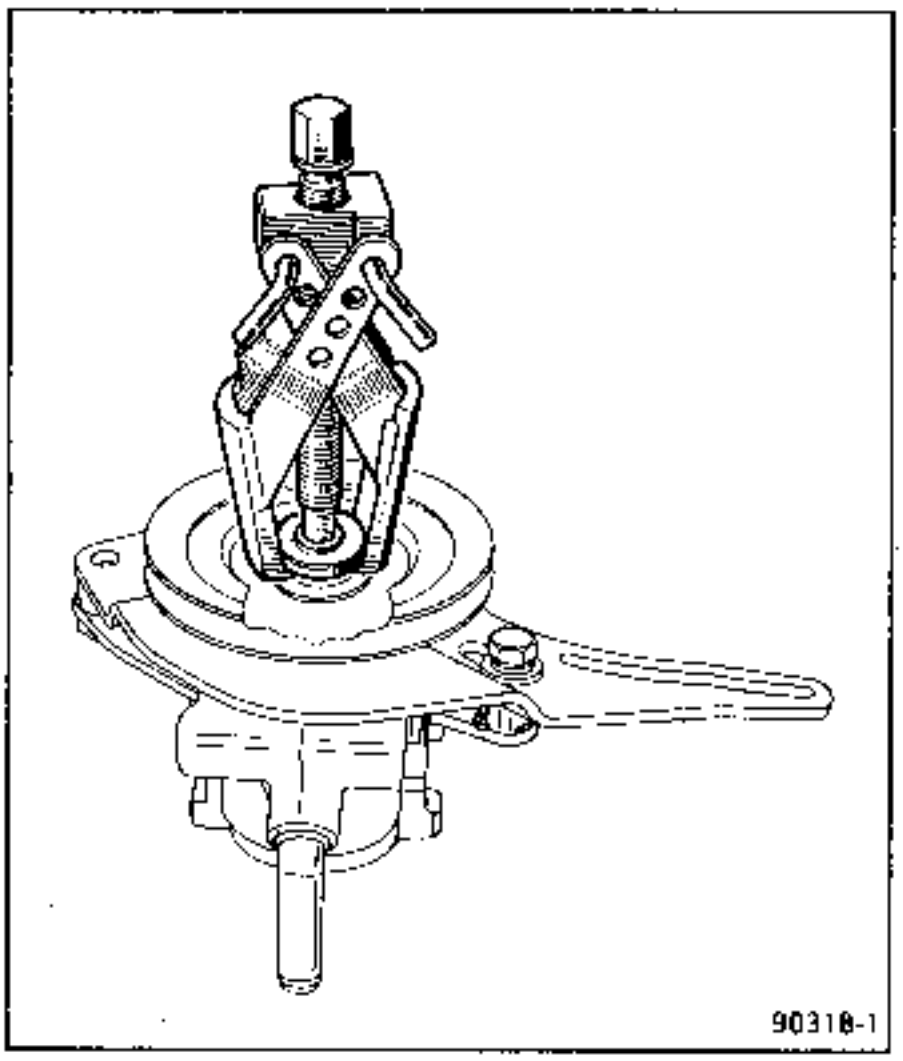
ESSENTIAL SPECIAL TOOLS	
Mot. 1083	Tooling for refitting the power steering pump pulley

REMOVING

Depending on the arrangement, extract the pulley after measuring the distance between it and the end of the shaft.

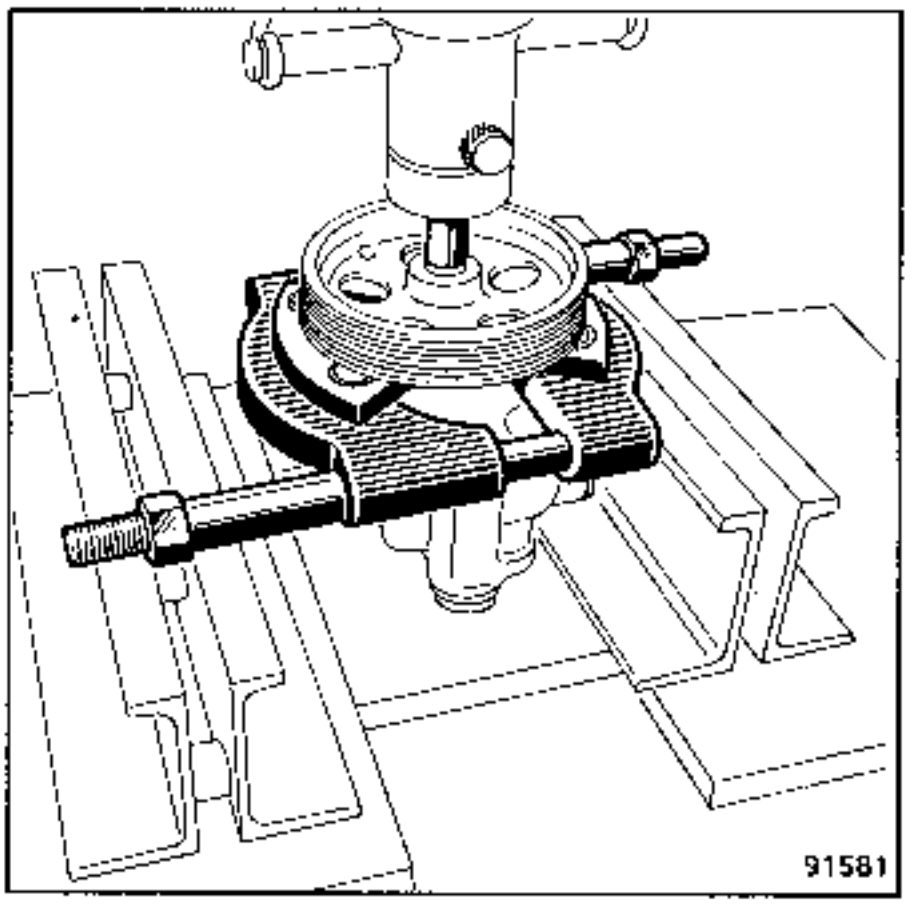
"V" Groove Pulleys

Use an extractor.



Flat Belt Pulleys

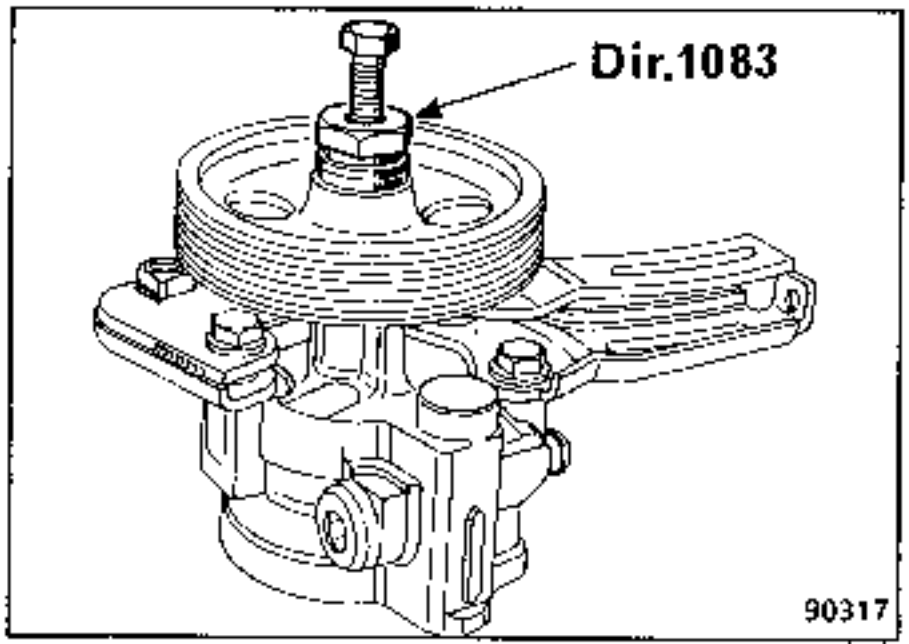
Use a press and an extractor of the FACOM U53G type.



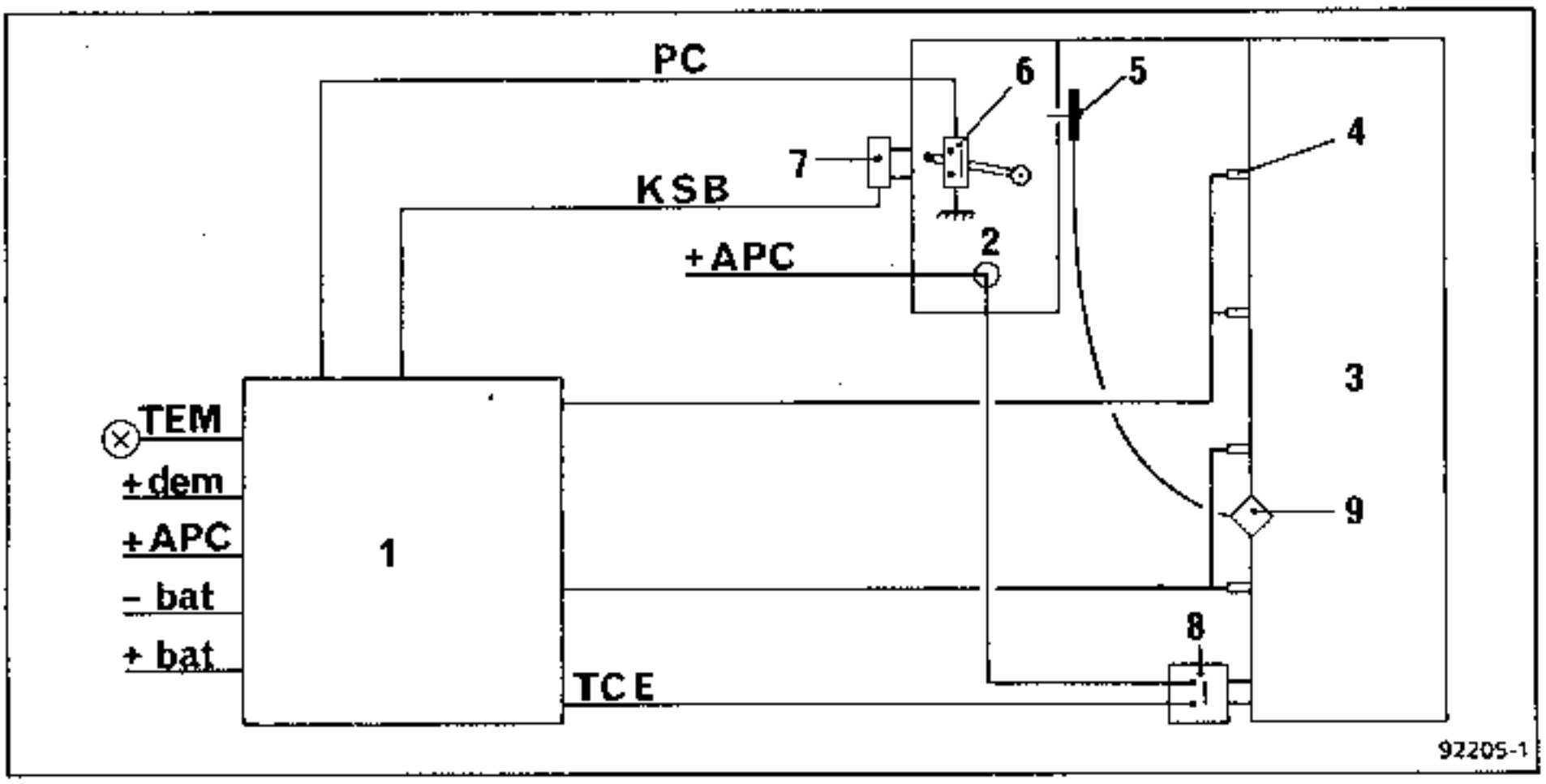
REFITTING

NOTE: before refitting the pulley, it is essential to ensure that the pump support can be fitted afterwards, otherwise place it in position before fitting the pulley.

Fit the pulley, using tool Dir.1083, until the dimension measured during removal has been reobtained (copiously grease the thread and the locating area on the pulley).



COLD STARTING SYSTEM CIRCUIT DIAGRAM



1 - Electronic preheater unit

2 - Injection pump

3 - Engine

4 - Preheater plugs

5 - Idling and fast idling lever

6 - Solenoid valve (circuit closed at idling)

7 - Cold advance solenoid (KSB)

8 - Temperature switch (circuit closed temperatures below approx. 60°C)

9 - Thermostat (providing fast idling when the engine is cold)

Principle of Operation of Electronic Preheater Unit

A - System switched on (ignition - starting switch)(T.I.: preheater plug warmup time)

NOTE: the time the warning light is switched on will vary depending on the temperature of the unit:
- approximately 20 seconds at -30°C
- switches off immediately at 80°C

B - Preheater plug switched off (if the starter does not operate, supply to plug ceases after 4.5 seconds T.2).

C - Engine starts (after the starter operates, the current supply to the plugs continues at 100% for approximately 10 seconds T.3).

D - Postheating period T.4. This period may last for a maximum of 3 minutes during which the preheater plugs are supplied with current, alternately, 2 by 2.

NOTE: period T.3 may be interrupted:

- by the cooling temperature exceeding approx. 60°C (temp. switch 8).
- 3 seconds after the load switch(6) opens, the supply to the plugs is reestablished as soon as the circuit PC is open.

E - Cold starting advance. The KSB solenoid valve is supplied with current, whilst the starter is operating and for 5 to 10 seconds after it stops.

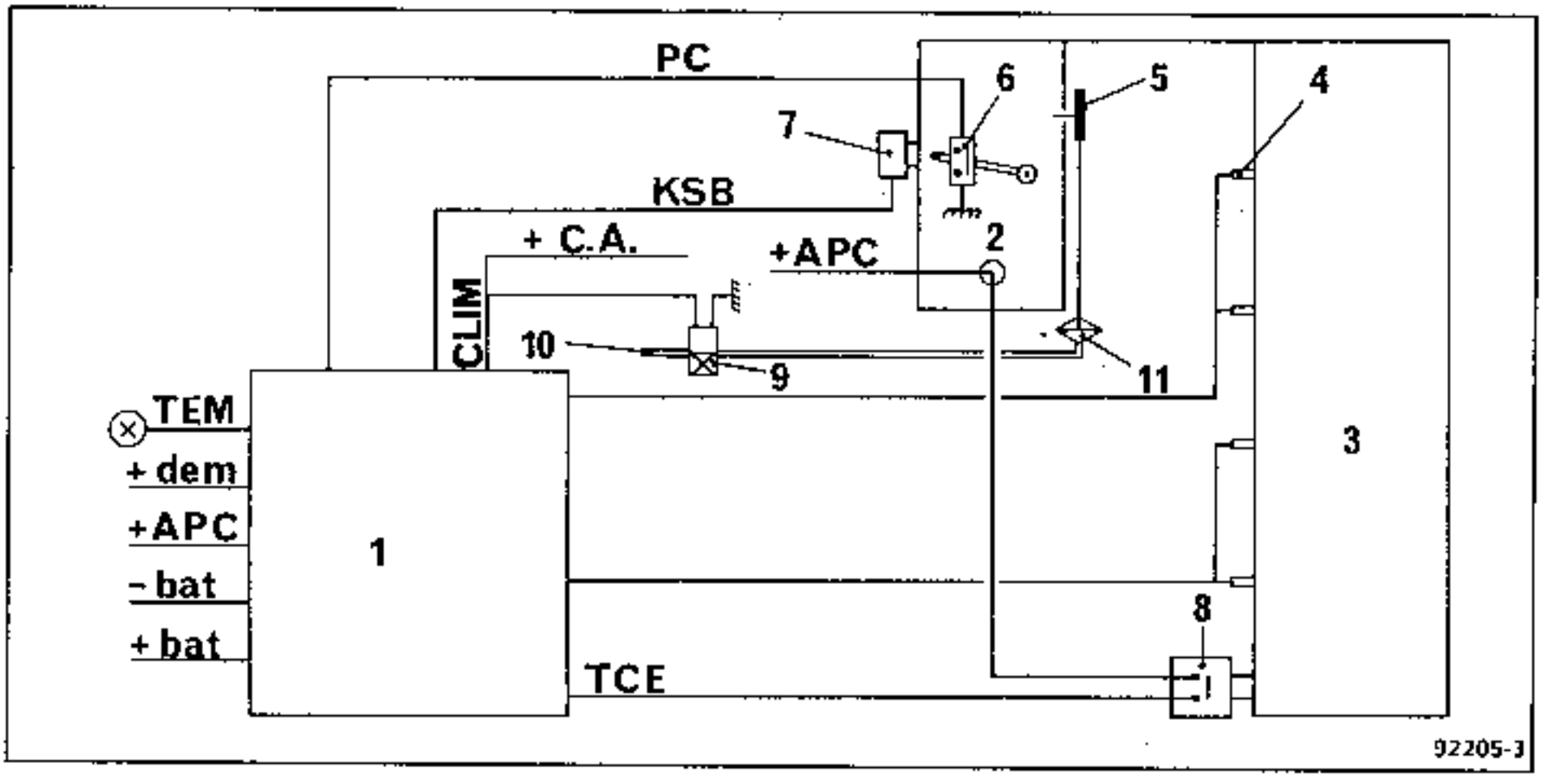
Supplying the KSB solenoid valve with current causes an increase in the injection pump automatic advance.

Fast Idling when the Engine is Cold

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

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

COLD STARTING SYSTEM CIRCUIT DIAGRAM (AIR CONDITIONED VEHICLES)



1 - Electronic preheater unit

2 - Injection pump

3 - Engine

4 - Preheater plugs

5 - Idling and fast idling lever

6 - Solenoid valve (circuit closed at idling)

7 - Cold advance solenoid valve (KSB)

8 - Temperature switch (circuit closed at temperatures lower than approximately 60°C)

9 - Fast idling control solenoid valve (on cold starting and when A.C. is operating)

10 - Vacuum

11 - Fast idling control vacuum capsule

Principle of Operation of Electronic Preheater Unit

A - Circuit closed (ignition-starting switch)(T.1: preheater plug warmup time).

NOTE: the time the warning light is switched on will vary depending on the temperature of the unit:

- approximately 20 seconds at -30°C
- it switches off immediately at 80°C

B - Current supply to plugs switched off (if the starter does not operate, the supply to the plugs ceases after 4.5 seconds T.2).

C - Engine starts (after the starter operates, the current supply to the plugs continues at 100% for approximately 10 seconds T.3).

D - Postheating period T.4. This period may last for a maximum of 3 minutes during which the plugs are supplied alternately at 50% (2 by 2).

NOTE: period T.3 can be interrupted:

- as soon as the coolant temperature exceeds approximately 60°C (temperature switch (8)),
- 3 seconds after the load switch (6) opens. The supply to the plugs is reestablished as soon as circuit PC is open.

E - Cold starting advance. The KSB solenoid valve is supplied with current whilst the starter is operating and 5 to 10 seconds after it has stopped.

Supplying the KSB solenoid valve with current increases the injection pump automatic advance.

F - Fast Idling

On vehicles fitted with air conditioning, the fast idling system (5) is controlled by a vacuum capsule (11) connected to the servo circuit exhaust (10).

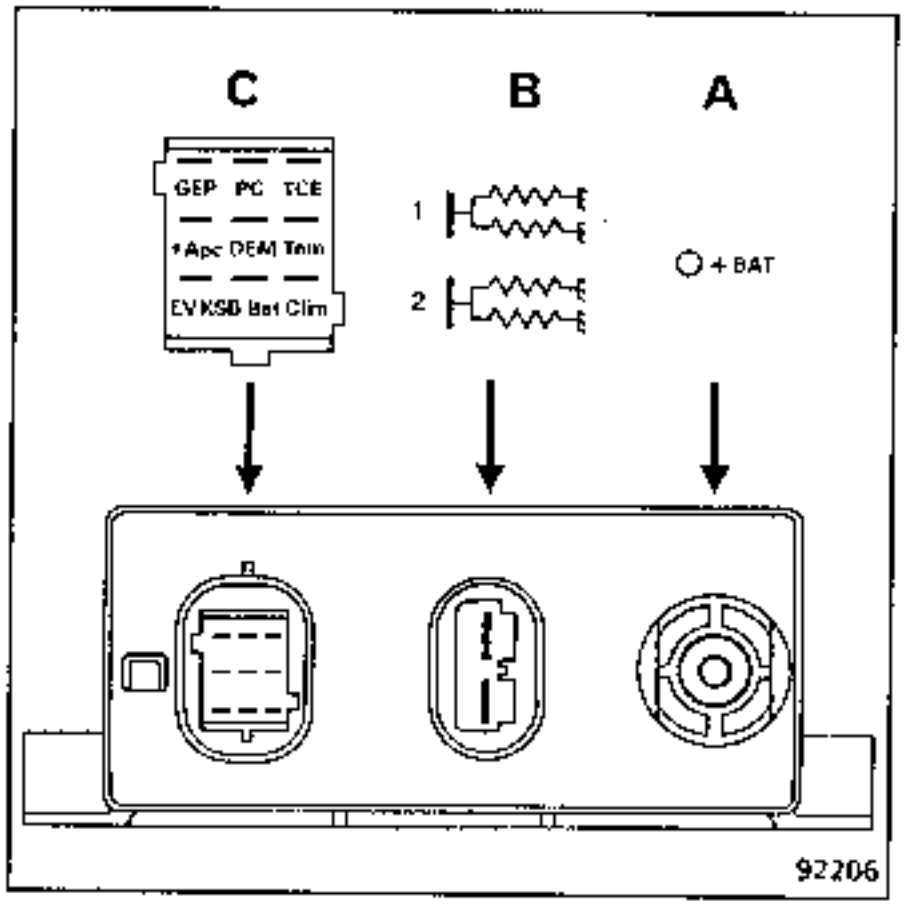
a - Fast Idling when the Engine is Cold

Solenoid valve (9) is supplied with current during the same period as the preheater plugs (T.1 + T.2 + T.3 + T.4).

b - When the Air Conditioning is Operating

The solenoid valve (9) is supplied with current as soon as the air conditioning compressor engages.

ELECTRONIC PREHEATER UNIT



Circuit Channel Functions

A - + BAT = battery +

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

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

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

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

+ APC: + after ignition switch.

DEM: + starter signal

TEM: preheater warning light

EV KSB: cold starting advance solenoid valve.

-BAT: battery earth (ground).

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

FAULT FINDING

GENERAL

The pre and post heating unit is fitted with protective systems which cut it out in part or in full if there is:

- a short-circuit on the plugs or the power circuit,

- a short-circuit on the instrument panel warning light,

- a power supply voltage higher than 16 $\pm$ 1 volt.

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

The cause of the preheater unit not operating can be determined on the basis of the symptoms listed below:

1 - If the preheating warning light is not operating and the engine will not start from cold.

2 - If the preheating warning light is operating, but the engine will not start from cold.

3 - If the preheating warning light is not operating, but the engine starts normally from cold after approximately 10 seconds preheating.

4 - If the preheating system is operating normally, but postheating is not.

5 - If both pre and post heating are operating normally, but the KSB cold starting advance system is not operating.

6 - If the fast idling, when cold (air conditioning option), is not operating.

FAULT FINDING

1 - If the preheating warning light is not operating and the engine will not start from cold.

CHECK	REMEDY
Disconnect the plug supply connector (B) and test the preheating system:	
- if the warning light switches on correctly.	Check the preheater plug wiring. If it is correct, check and replace the defective plug or pluge.
- If the warning light does not switch on, but current is present at the outputs from the connector (B).	Check the preheater plug and instrument panel warning light circuits. Rectify if necessary.
- If the warning light does not switch on, but there is no current at the output from connector (B).	Check: - the battery + on connector (A), - the + after the ignition switch on connector (C), - the battery earth - on connector (C). If the power supply is correct, replace the preheater unit.

2 - If the preheating warning light is operating and the engine will not start from cold.

CHECK	REMEDY
Disconnect the connector (B) and carry out a test on the preheating system:	
- if the warning light switches on and current is available at the outlets from the connector (B).	Check that the plug supply circuit is correct and replace any defective plug or plugs.
- If the warning light switches on, but there is no current available at the outlets of connector (B).	Replace the preheater unit.

3 - If the preheating warning light is not operating, but the engine starts normally from cold, after approximately 10 seconds preheating.

CHECK	REMEDY
Earth the output (warning light) from connector (C) through a two amp fuse, with the ignition switched on:	
- if the fuse burns out.	The instrument panel warning light is short-circuited. Rectify the wiring.
- If the warning light does not switch on.	The bulb is burnt out or the wiring is defective. Réplace the bulb or rectify the wiring.
- If the warning light switches on.	Replace the preheater unit.

FAULT FINDING

4 - If the preheating system is operating normally, but postheating is not.

CHECK	REMEDY
Disconnect the connector (C) and, with a voltmeter/ohmmeter, check:	
- The resistance across the outputs (PC and -bat): . accelerator at idling: resistance = 0 ohms, . accelerator fully depressed: resistance = infinity.	If the circuit is broken, check the wiring, the microswitch and its connectors. Rectify any defects.
- With the ignition on, across the outputs (TCE and -bat):	If the circuit is closed, check that the micro switch is of the correct type and correctly adjusted.
. when the engine is cold, coolant temperature less than 55°C $\pm$ 2°C = 12 Volts.	If there is no current present: check the wiring, the temperature switch and its connector.
. engine warm coolant temperature more than 65°C $\pm$ 2°C = 0 volts.	If current is present: check the wiring and ensure that the temperature switch is of the correct type.
If the checks carried out are correct, but the postheating system will not operate, after cold starting.	Replace the preheater unit.

5 - If both pre and post heating systems are operating normally, but the KSB cold starting advance system is not operating

CHECK	REMEDY
Disconnect the connector (C) and measure the resistance across (EV KSB and -bat).	
The resistance should be around 5 ohms.	If the resistance is not correct, check the wiring and the solenoid valve and rectify.
Start the engine and run it at idling speed with connector (C) disconnected. Connect (+APC to EV KSB). There should be a slight change in the engine note (sharper sound).	If there is no change in the noise, check that a 12V current is available at the KSB solenoid valve and that the valve is correct. If the engine note changes, the preheater unit is defective. WARNING: the KSB system only operates for a very short time (5 to 10 seconds after the engine has started).

FAULT FINDING

6 - If the fast idling when cold (air conditioning option) is not operating.

CHECK	REMEDY
Run the air conditioning:	
- If the fast idling system does not operate.	Check that the solenoid valve (9) does in fact open the pneumatic system. If it does not, check the wiring and replace the solenoid valve if it is defective.
- If the fast idling system is not operating, despite the solenoid valve being selected.	Check the pneumatic system between the exhaust, the solenoid valve (9) and the capsule (11). Rectify any defects or poor connections.
If the fast idling system operates when the air conditioning starts, but does not operate for cold starting (whilst the preheating warning light is switched on).	Check the electrical wiring between the preheater unit and the solenoid valve. If there is no current from output point "CLIM" whilst the preheater warning light is switched on, replace the preheater unit.
If the fast idling system is operating normally during preheating, but switches off and on again during postheating.	The preheater unit is defective. Replace it.

X 48 M and X 48 N engines are equipped with a system which injects air into the exhaust.

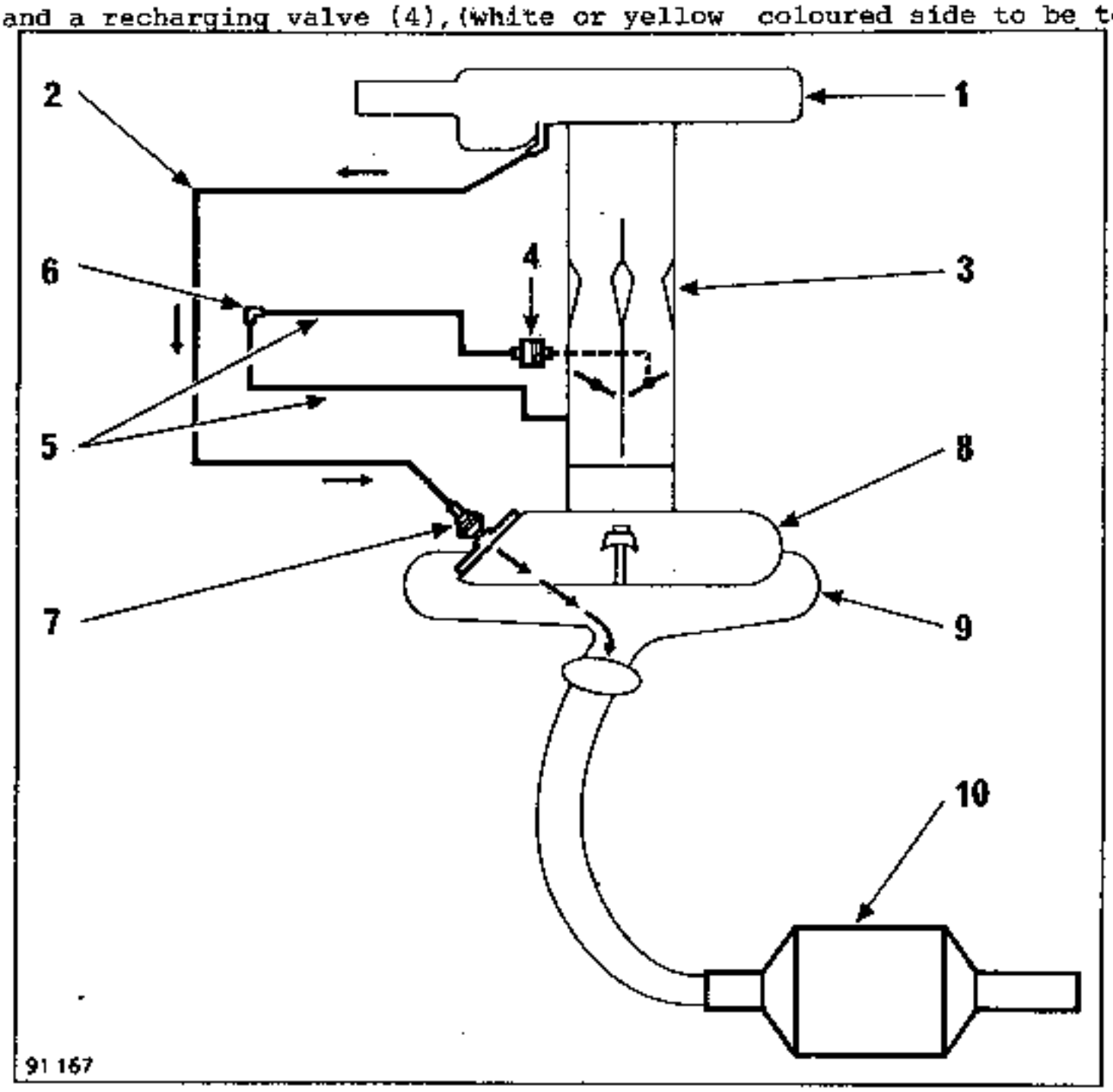
PRINCIPLE OF OPERATION

The emission control system consists of a valve known as a pulsair (7) mounted on the inlet manifold (8) and connected to the air filter (1) on one side and to the exhaust manifold (9) on the other.

Pulses in the exhaust manifold (9) set up a vacuum behind the pulsair (7) and thus open the air circuit between the air filter (1) and the exhaust (9) on the input side of the catalyzer (10).

The entry of carbon free air (oxygen) into the exhaust system, before the catalyzer, raises the temperature of the exhaust gases, by combustion, and permits a catalytic reaction to take place in the catalyzer. This causes the oxydization and reduction of the hydrocarbons (HC) and carbon monoxide (CO).

The hydrocarbon output during overrun is reduced by means of a device that opens the throttle and a recharging valve (4), (white or yellow coloured side to be towards the



output connection on the carburettor).

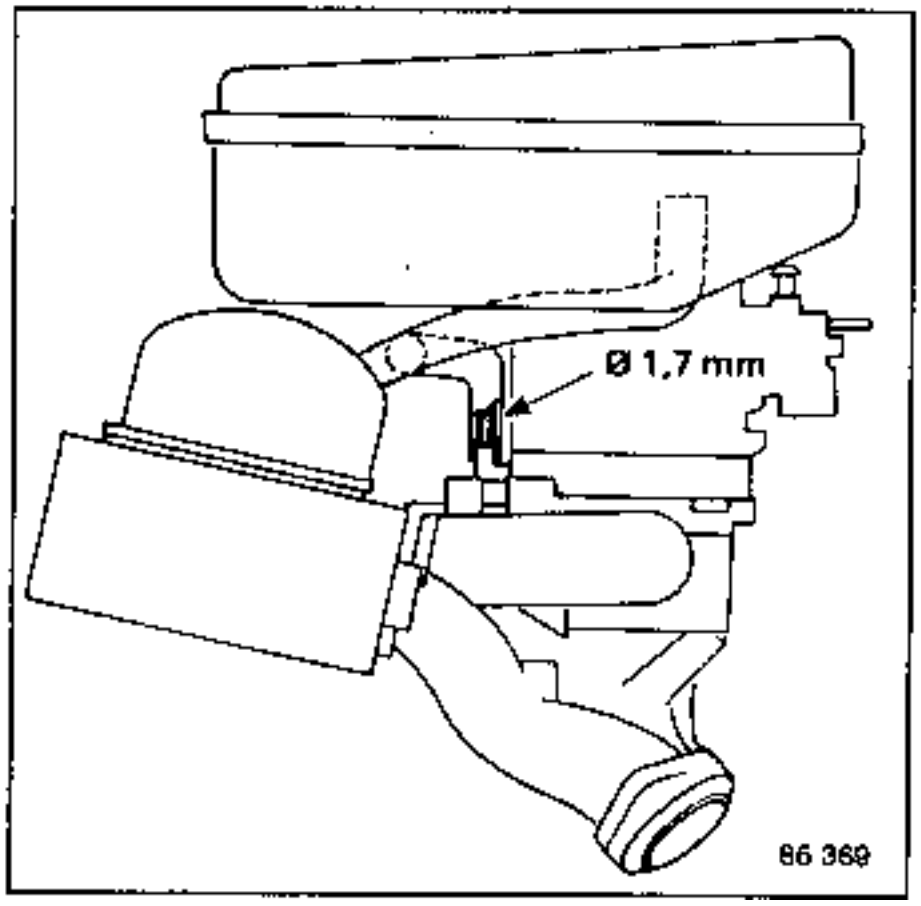
1 - Air filter
2 - Pipe connecting air filter (1) to pulsair (7)
3 - Carburettor
4 - Retardation valve
5 - Pipe connecting vacuum takeoff to the actuator
6 - 2 way union
7 - Pulsair valve
8 - Inlet manifold
9 - Exhaust manifold
10 - Catalyzer

The crankcase gases are recirculated by being passed from the rocker arm cover into the inlet manifold through a dual circuit (input and output) so that they are burnt in the combustion chambers.

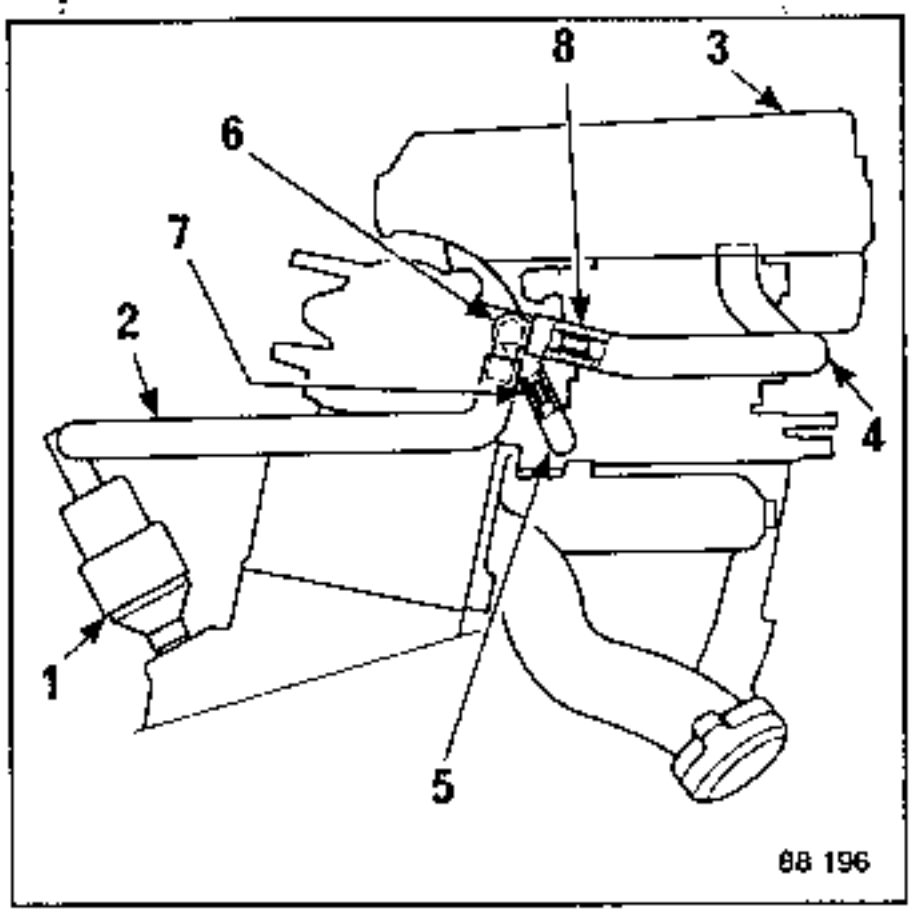
CHECKING

To ensure that the emission control system is operating correctly, the crankcase oil vapour reintake system must always be kept clean and in good condition. Check that the jets are in place and are of the correct sizes.

C2J Engine

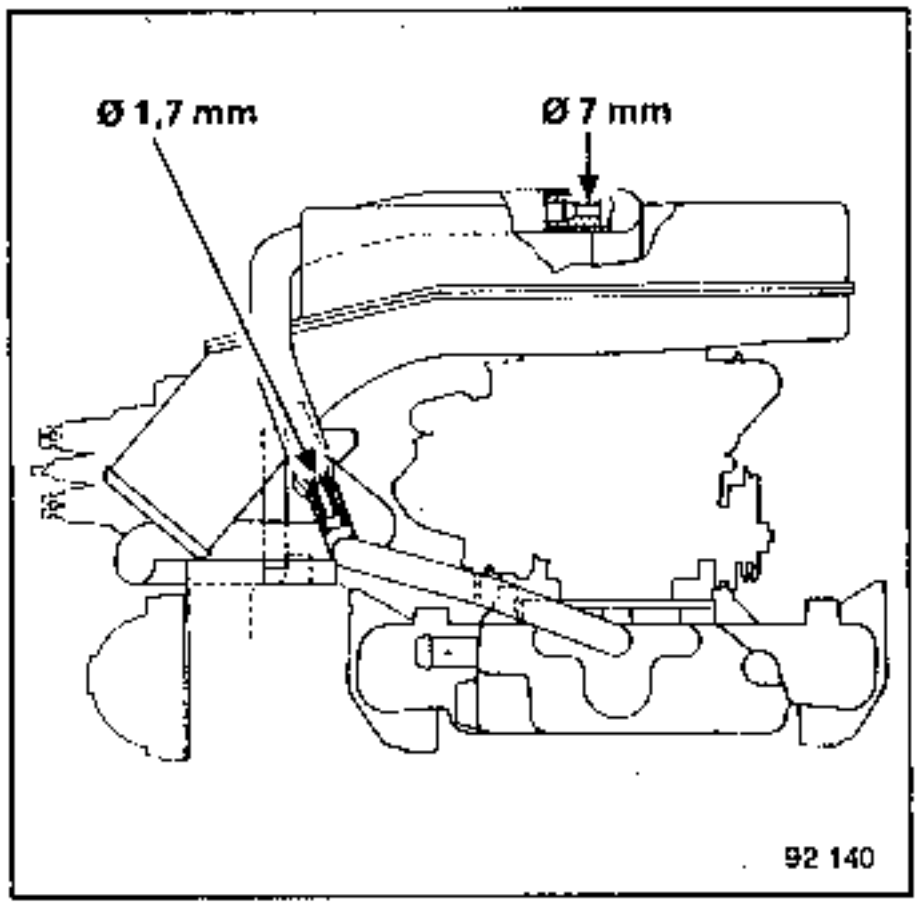


F2N... engine with the filter mounted on top of the carburettor

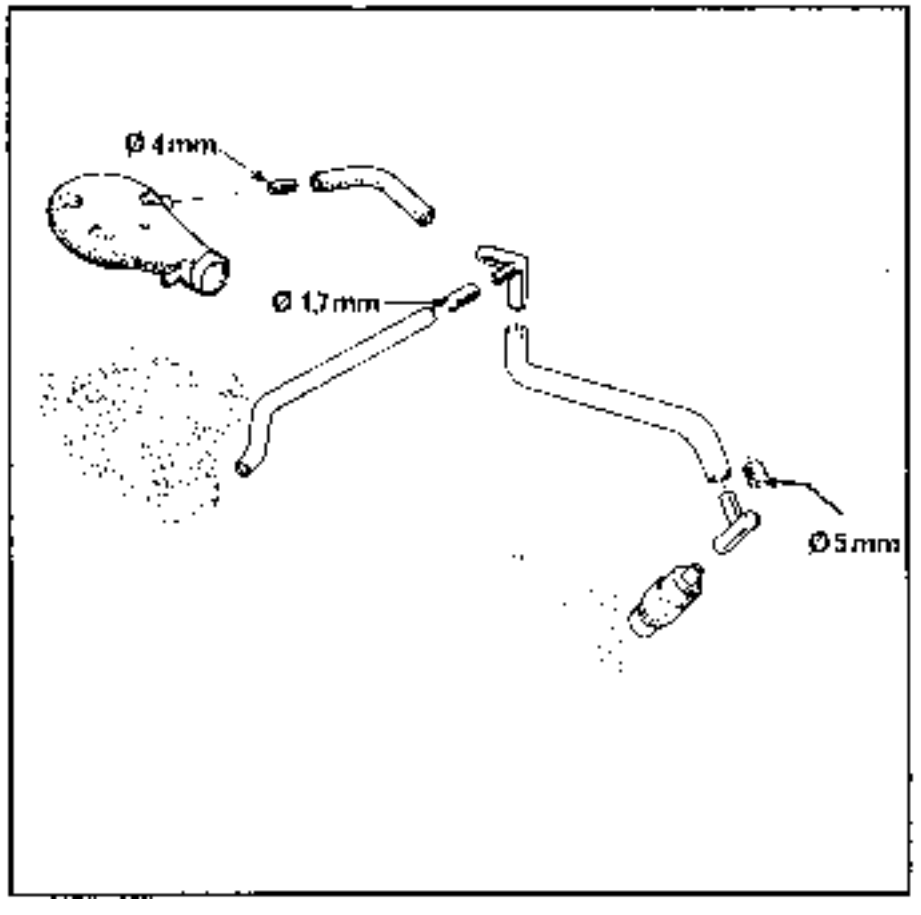


1 - Drain unit
2 - Pipe (drain casing, 3 way union)
3 - Air filter
4 - Pipe (filter, 3 way union)
5 - Pipe (3 way union to carburetter base)
6 - 3 way union
7 - 1.7mm Ø jet
8 - 7mm Ø jet

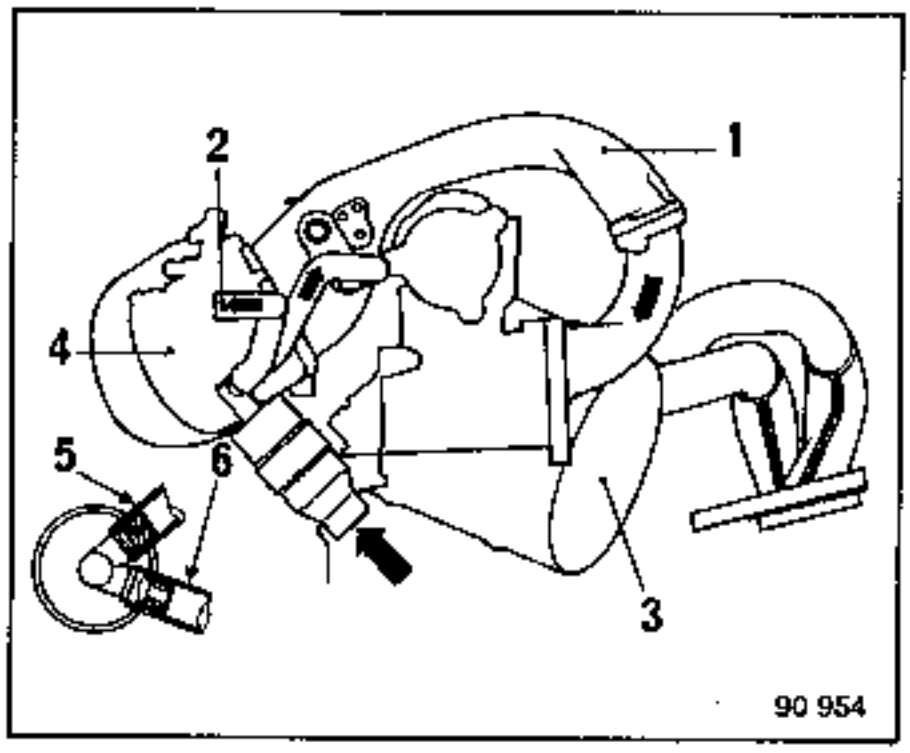
F2N... engine with remotely mounted filter



F2R... Engine

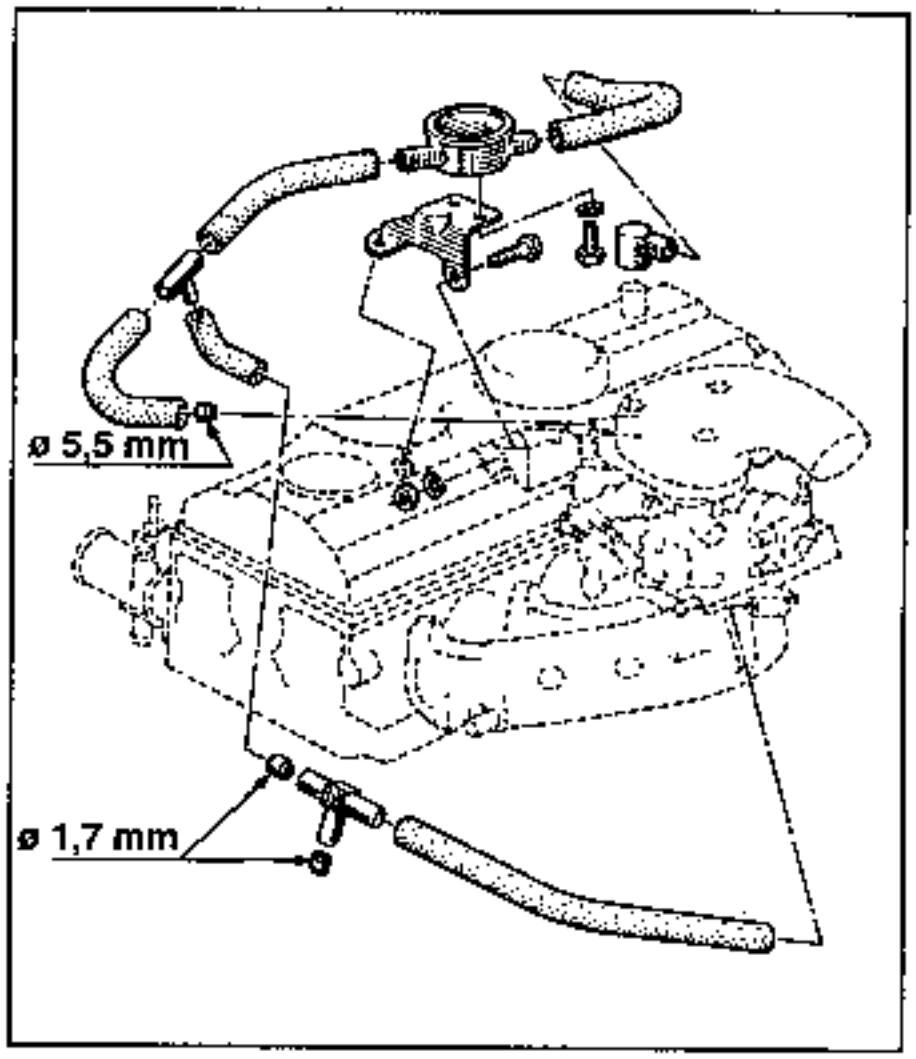


F3N... Engine

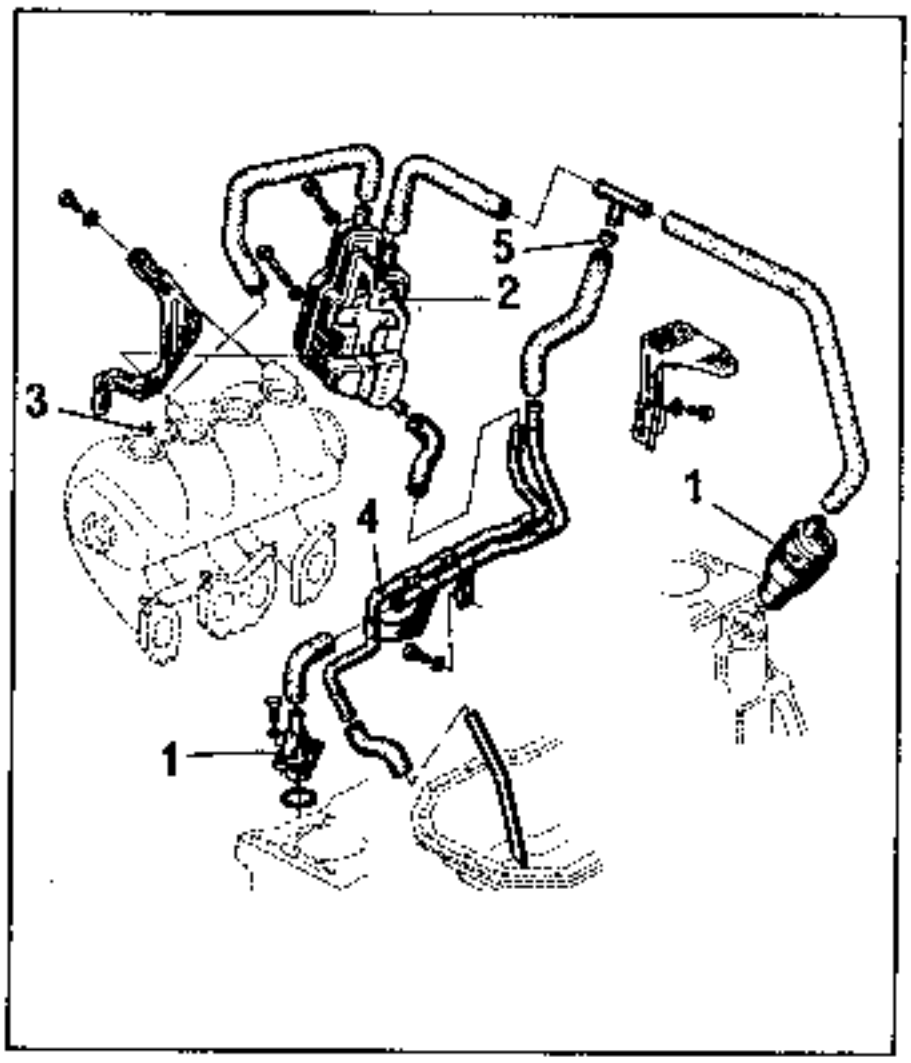


1 - Air intake distributor
2 - Connecting pipe
3 - Air filter
4 - Throttle unit
5 - 1.5mm jet (on distributor side)
6 - 6.5mm jet (on connecting pipe side)

J6R... Engine

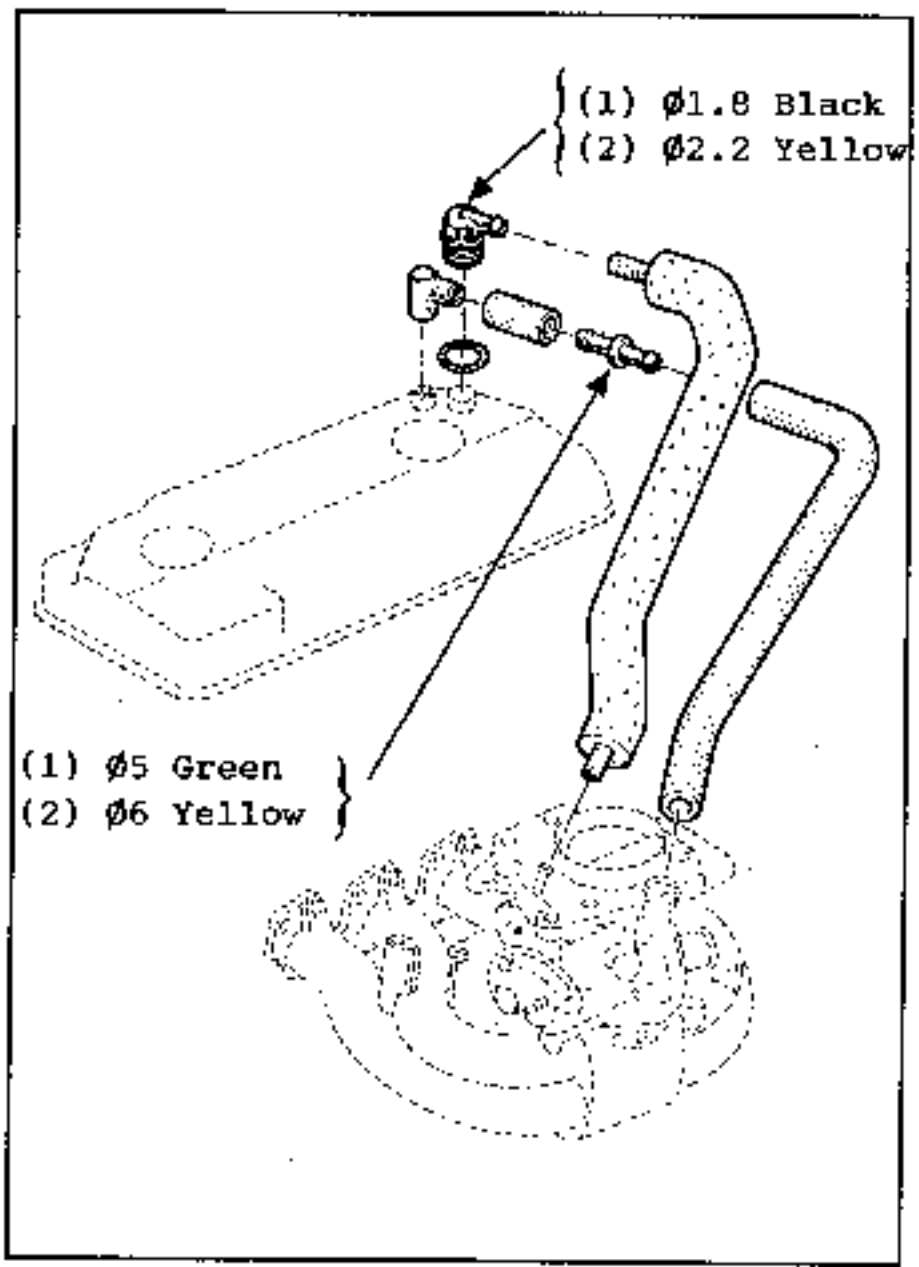


F8Q Engine

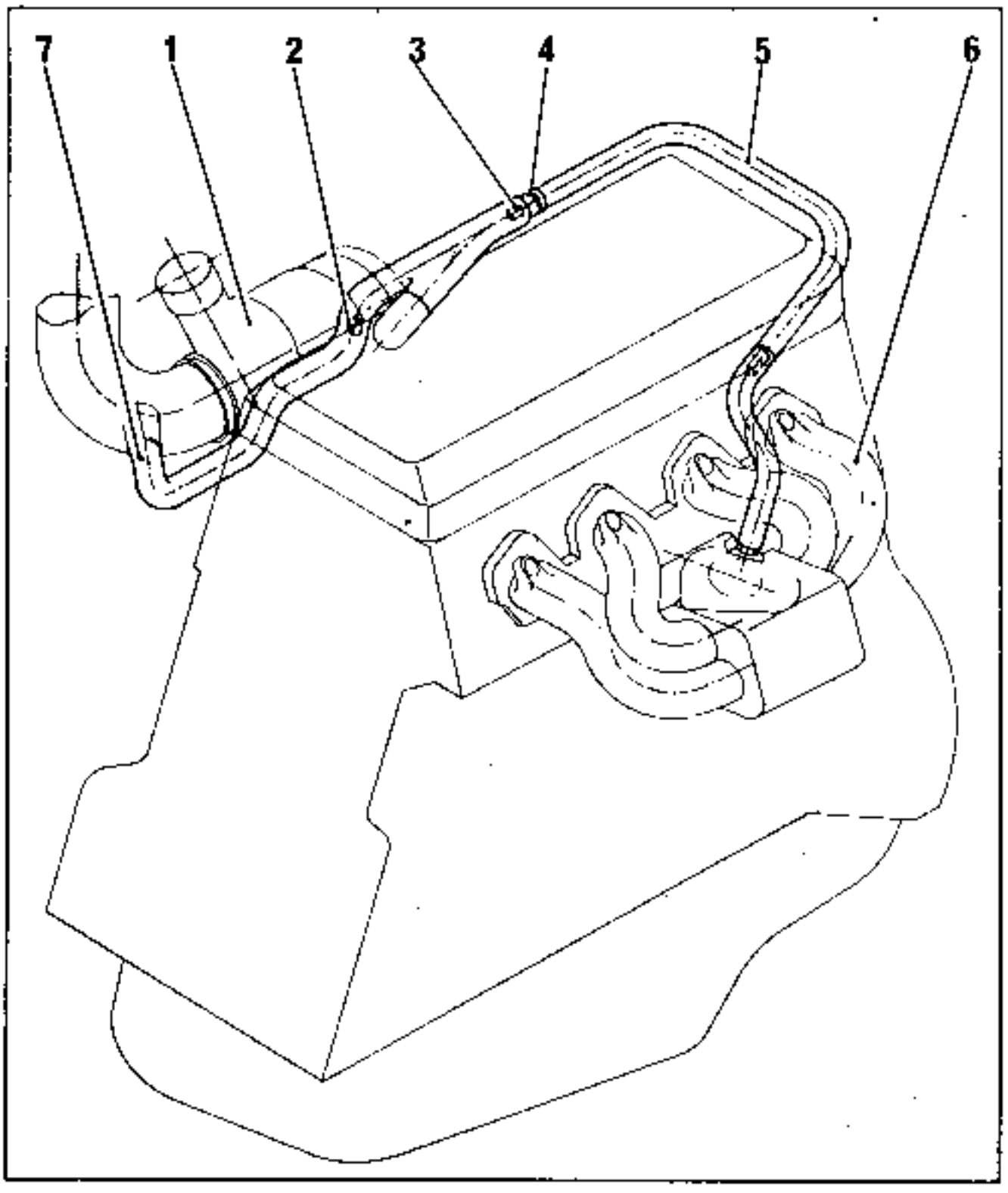


1 - Drain unit
2 - Drain unit
3 - Resonator
4 - Return pipe to crankcase
5 - 8mm Ø jet

J7R... (1) J7T...(2) Engine



RENAULT 21 - 2 l. Turbo X 485



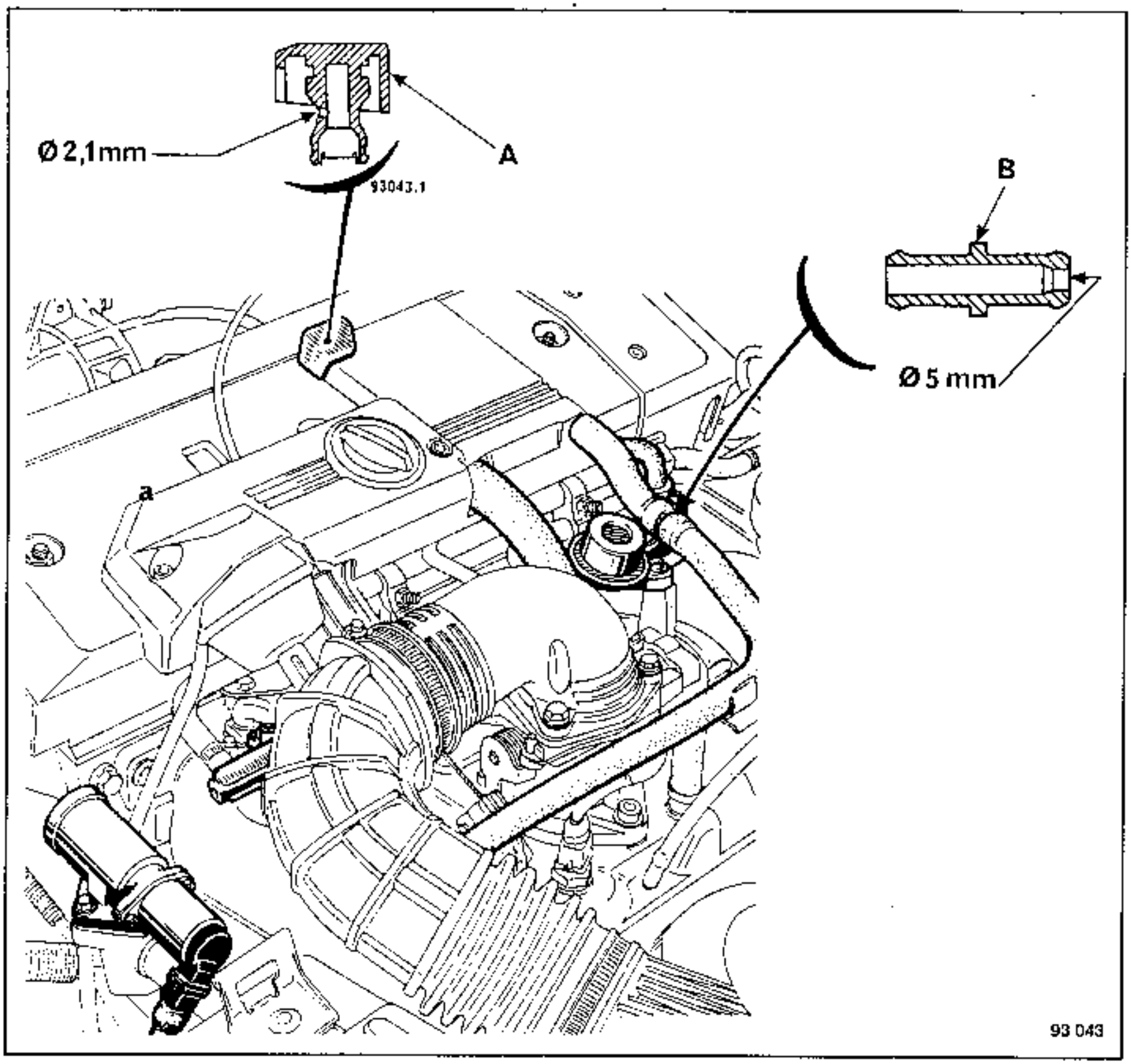
The crankcases gases are recirculated. They are taken from the rocker arm cover to the inlet manifold through a dual circuit (input and output) to be burnt in the combustion chambers. When the turbocharger is operating, valve (4) closes the output circuit.

1 - Turbocharger
2 - 6mm jet
3 - 2.2mm jet
4 - Non return valve
5 - Output circuit
6 - Air intake distributor
7 - Input circuit

CHECKING

For the emission control system to operate correctly, the crankcase oil vapour reintake system must be kept clean and in good condition.

Check that the jets are in position and are the correct sizes.



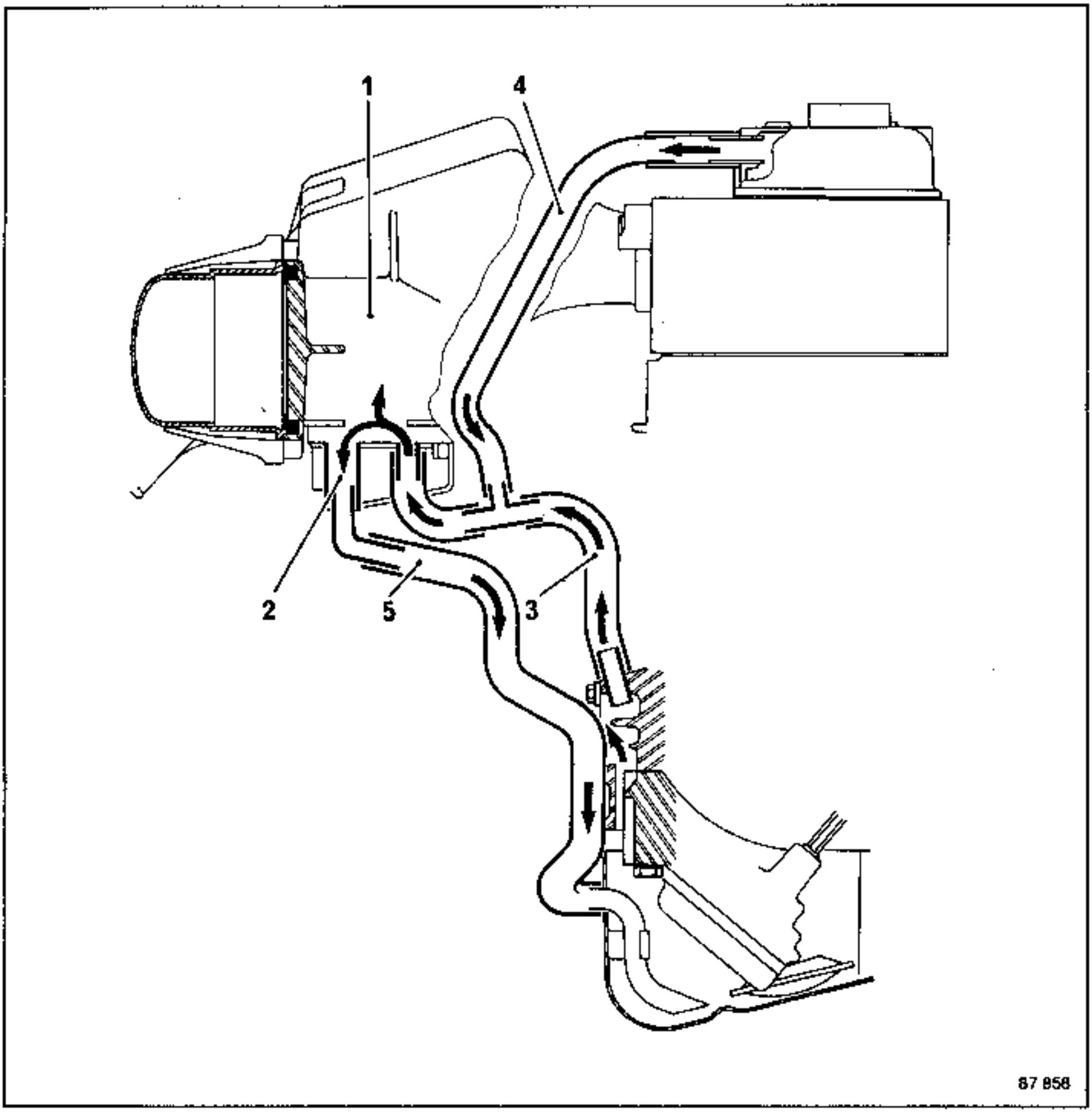
A - Output side reintake (jet Ø 2.1mm, colour yellow)
B - Input side reintake (jet Ø 5mm, colour yellow).

CHECKING

For the emission control system to operate efficiently, the crankcase oil reintake system must be kept clean and in good condition.

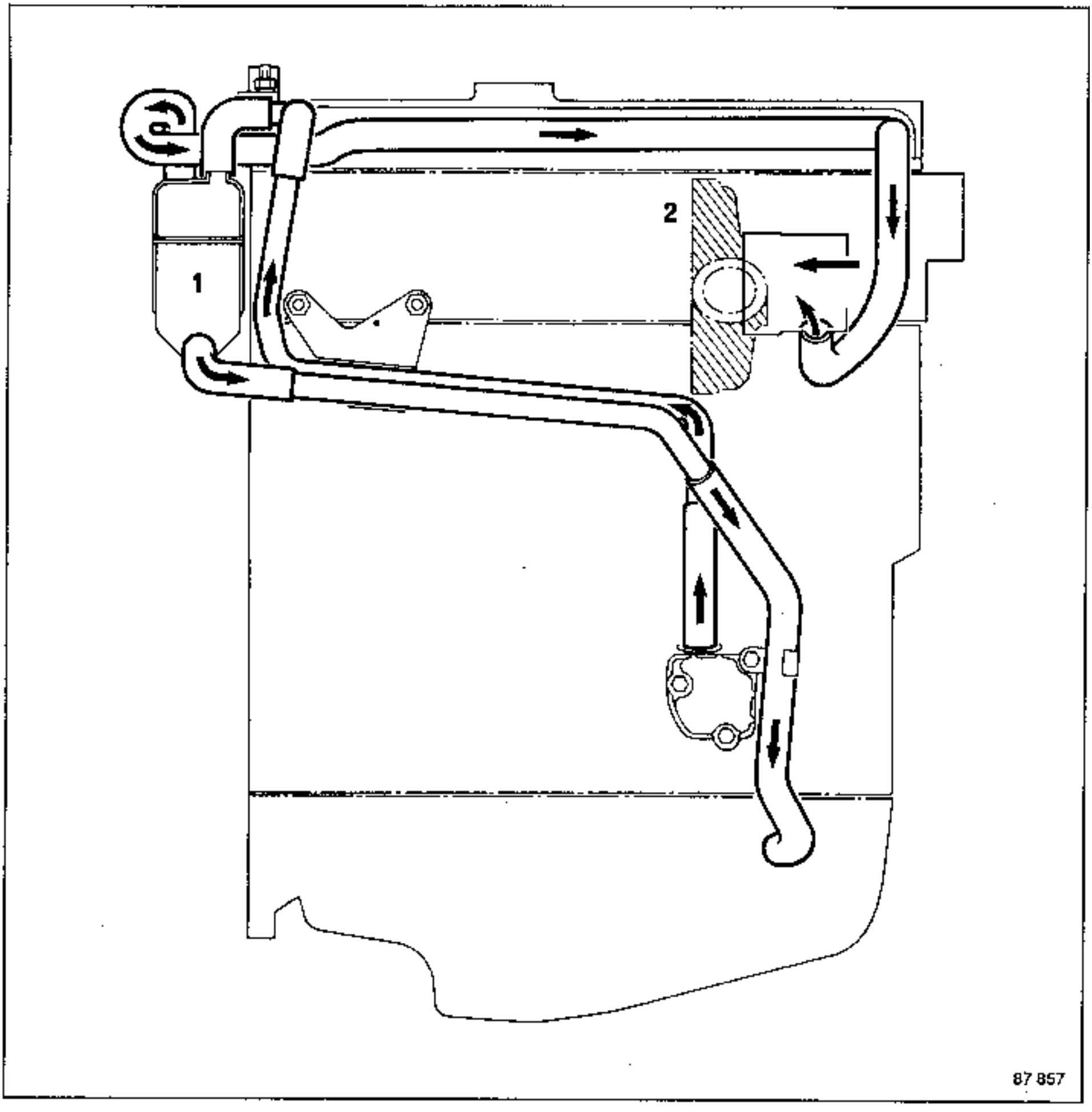
Check that the jets are in position and of the correct sizes.

J8S Naturally Aspirated Engine



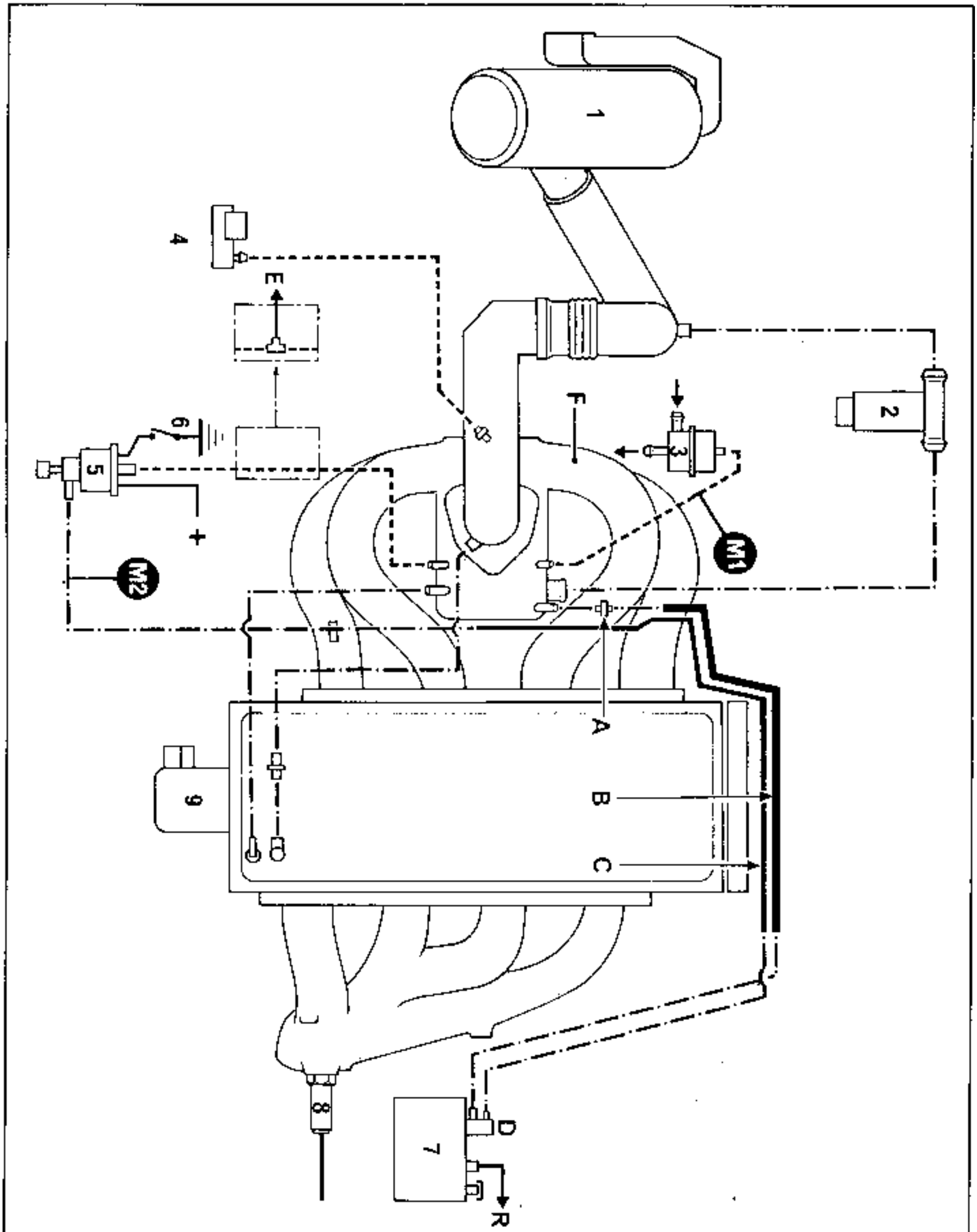
1 - Air casing
2 - Drain unit
3 - Oil vapour reintake pipe (lower engine)
4 - Oil vapour reintake pipe (upper engine)
5 - Return to sump pipe

J8S Turbo Engine



1 - Drain unit
2 - Turbocharger

X 48 Vehicles (for certain markets)



1 - Air filter
2 - Idling speed regulator valve
3 - Fuel pressure regulator
4 - Pressure sensor
5 - Solenoid valve controlling fuel vapour absorption canister
6 - Electronic computer
7 - Fuel vapour absorption canister
8 - Oxygen sensor or Lambda sensor
9 - Ignition distributor

A - 1.8mm Ø jet: colour white
B - Fuel vapour canister bleed pipe (intake distributor - canister)
C - Fuel vapour canister bleed control pipe (canister - solenoid valve)
D - Fuel vapour canister valve
E - To automatic transmission
F - Air intake distributor
R - To fuel tank

For certain markets, X 48K vehicles are fitted with a system for absorbing the vapours emanating from the fuel tank:

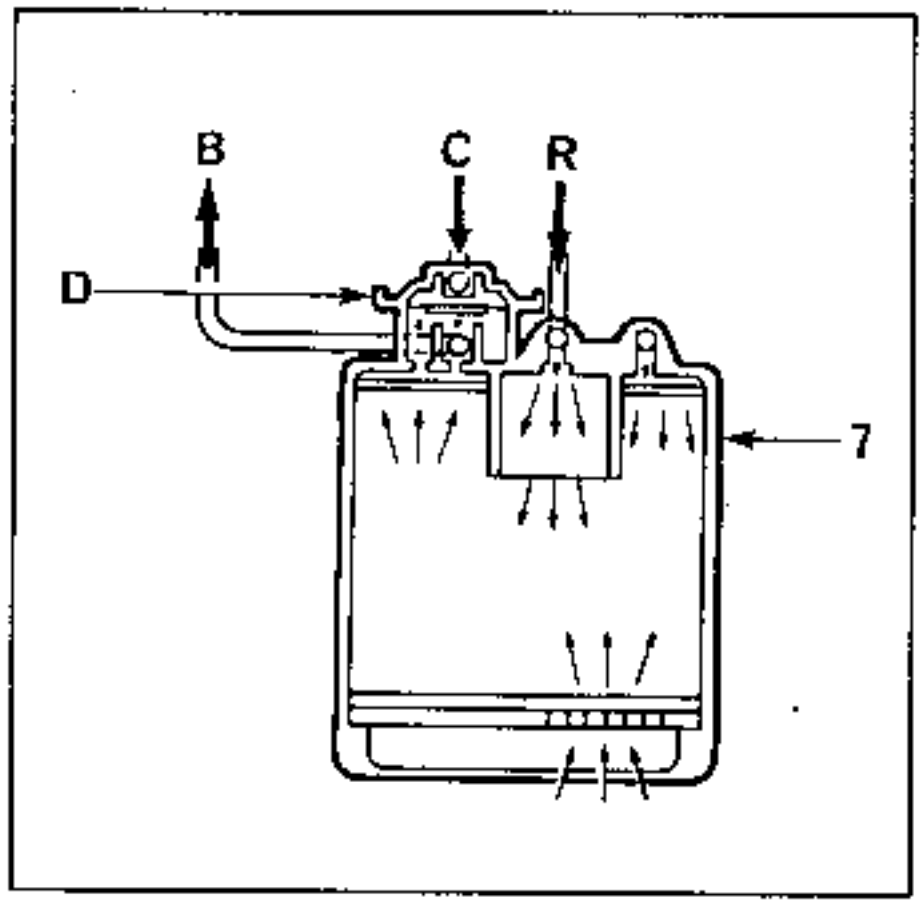
- The circuit consists of a fuel vapour absorption canister connected to the tank by a pipe (R).

- The fuel vapour absorption canister contains active carbon. It carries a valve (D) connected to the air intake distributor and controlled by the injection computer (6) through solenoid valve (5) and pipe (C). The fuel vapour canister is bled via pipe (B) calibrated by a jet (A) 1.8mm in diameter and colour white.

PRINCIPLE OF OPERATION:

- When the engine is stopped:
  The fuel vapour is collected in the fuel vapour absorption canister.

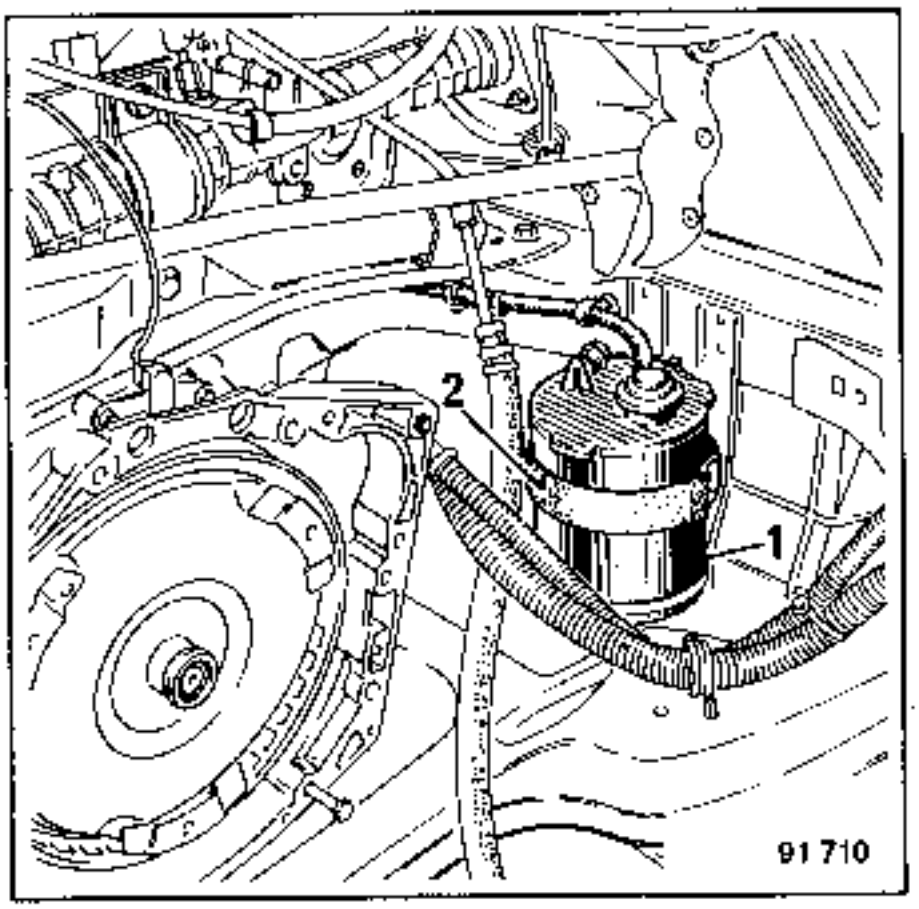
- When the engine is running at idling speed:
  There is no bleed signal to the solenoid valve (5) (no control signal from the injection computer (6)).



- When the engine is running at speeds other than idling:
  Under certain conditions, when the system is warm, the injection computer (6) sends an electrical signal to the solenoid valve (5) to open the pneumatic circuit (C) between the air intake distributor (F) and the fuel vapour canister (7). The fuel vapour contained in it is then bled off.

POSITIONS OF THE ANTI-EVAPORATION SYSTEM COMPONENTS

The fuel vapour absorption canister (1) is secured to the left hand side member (on the same side as the air intake distributor and below the injection and ignition computer).

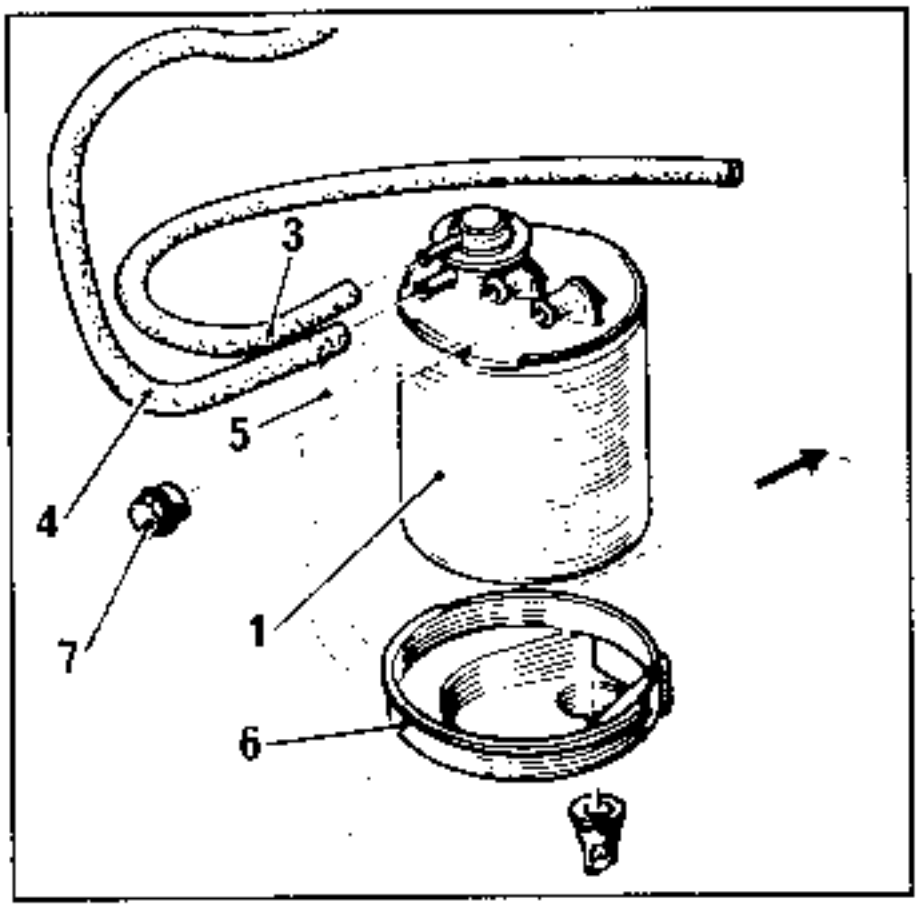


The canister bleed solenoid valve is mounted, together with the pressure sensor, on the injection computer protective casing.

REPLACING THE FUEL VAPOUR ABSORPTION CANISTER

Disconnect the pipes from the top of the canister.

Remove the securing strap (2) and take out the canister from under the vehicle.



1 - Fuel vapour absorption canister
2 - Securing strap (left hand drawing)
3 - To solenoid valve
4 - To air intake distributor
5 - To fuel tank
6 - Support
7 - Plug

When refitting the canister, ensure that the pipes are correctly connected.

CHECKING THE SYSTEM

FUNCTION TESTED	TEST EQUIPMENT	CONDITIONS	FINDINGS	REMARKS
Anti-evaporation system bleed	Vacuum gauges connected, in parallel: - at M1 - at M2 - voltmeter	Engine hot, after electric fan has cut in twice: At idling When accelerator is depressed	Zero vacuum at M2 Voltage = 12 volts across the 2 solenoid valve terminals Note the voltage across the solenoid valve terminals Vacuum at M2 = vacuum at M1 Voltage drops to 0 volts when accelerator is depressed	If the vacuum at M2 = M1, check the air and electrical circuits If there is a voltage at the solenoid valve and vacuum M2 does not equal vacuum M1, check the wiring between the solenoid valve and the computer
Anti-evaporation system bleed Checking the solenoid valve	Test XR 25 2 vacuum gauges - at M1 - at M2 - tachometer	Engine hot after electric fan has cut in twice At idling	Disconnect one of the wires from the solenoid valve Disconnect the 2 wires from the solenoid valve. Connect one (+)12 volts to the solenoid valve terminal and earth (-) to the other terminal, then disconnect one of these 2 wires vacuum at M1 = vacuum at M2 Engine speed and vacuum at M1 fall	At idling: variation in idling speed and R.C.O. Select 12 on the XR 25 If not: check the operation of the solenoid valve and the air circuit connections
Check on the air circuits			Disconnect the pipe from the solenoid valve at M2. Apply a vacuum of approximately 300 mbars with a manual vacuum pump connected to the pipe	At idling: there should be a change in the speed (increase) and a reduction in the R.C.O. If there is not: check the air circuits

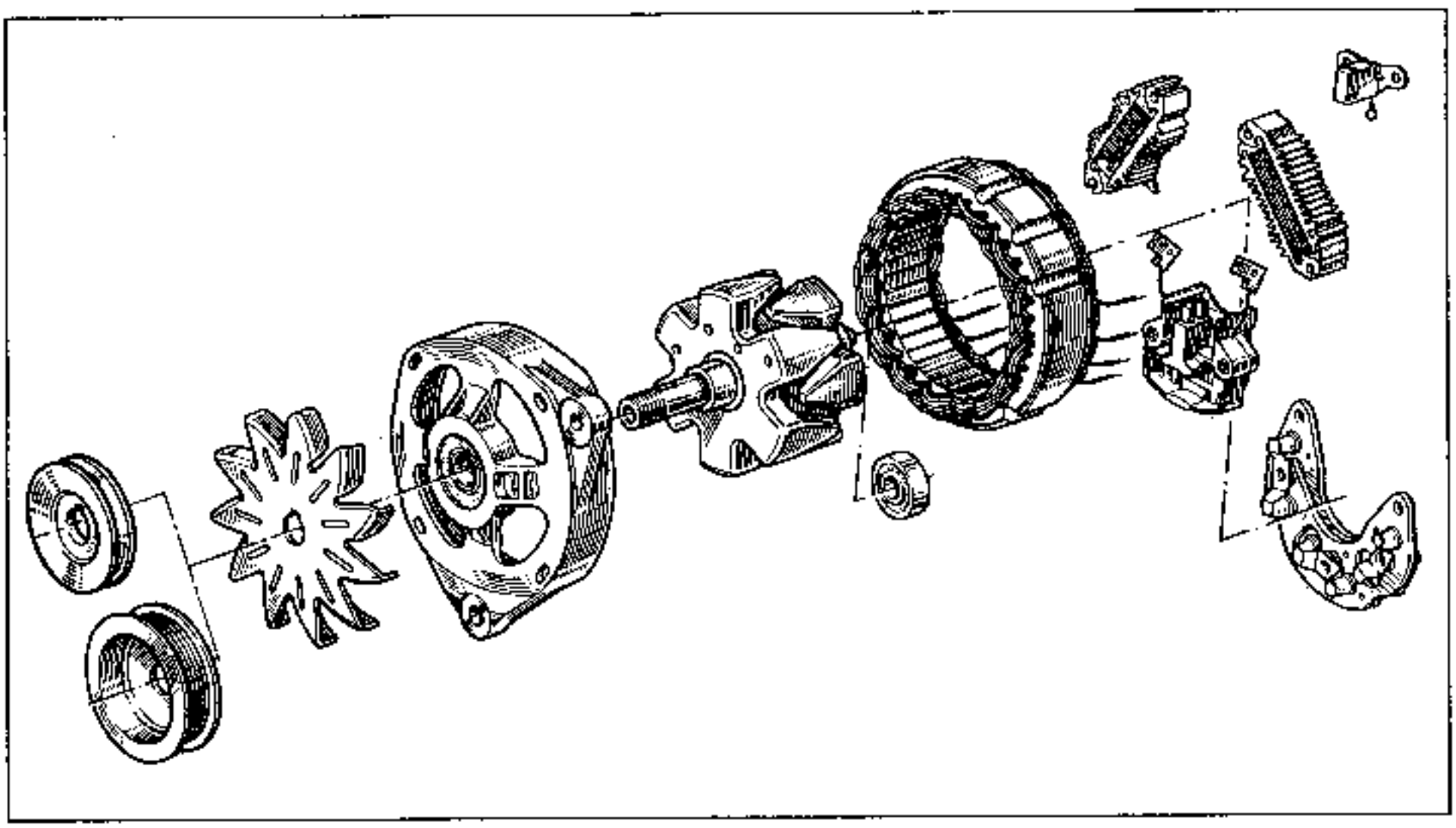
CHECKING

After 15 minutes warmup at 13.5 volts.

rpm	PARIS RHONE A 13 N 87 A 13 N 88 A 13 N 120 A 13 N 124 60 amperes	PARIS RHONE A 14 N 62 A 14 N 64 70 amperes	PARIS RHONE A 14 N 73 A 14 N 75 A 14 N 140 105 amperes	PARIS RHONE A 14 N 102 A 13 N 159 A 13 N 164 70 amperes	PARIS RHONE A 13 N 172 A 14 N 134 A 14 N 171 A 14 N 173 70 amperes	DUCELLIER 516067 60 amperes
1 250	5 A	22 A	30 A	5 A	12 A	35 A
3 000	53 A	61 A	82 A	62 A	61 A	50 A
6 000	60 A	70 A	105 A	70 A	70 A	58 A

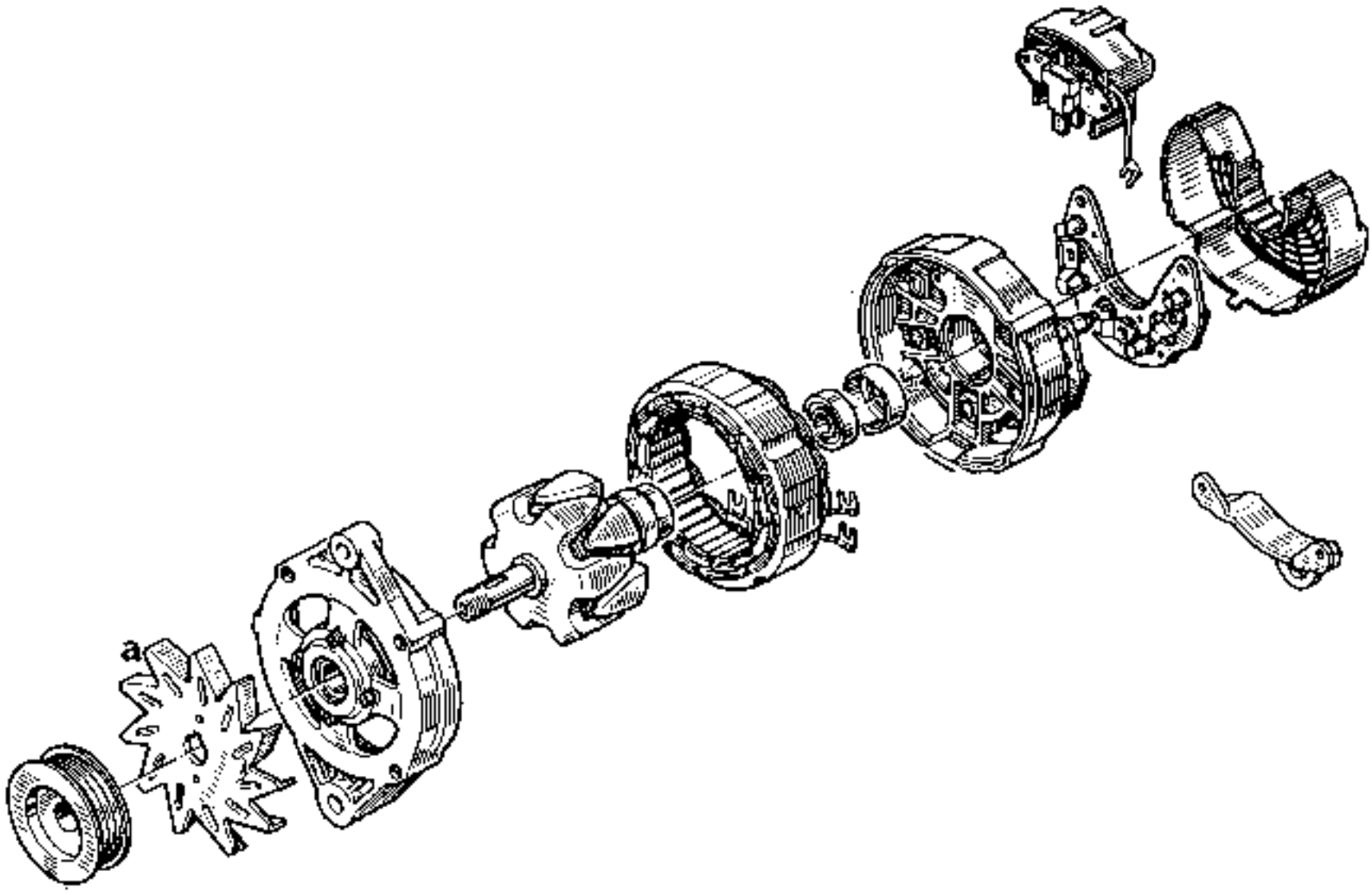
EXPLODED VIEW

PARIS RHONE 105 A

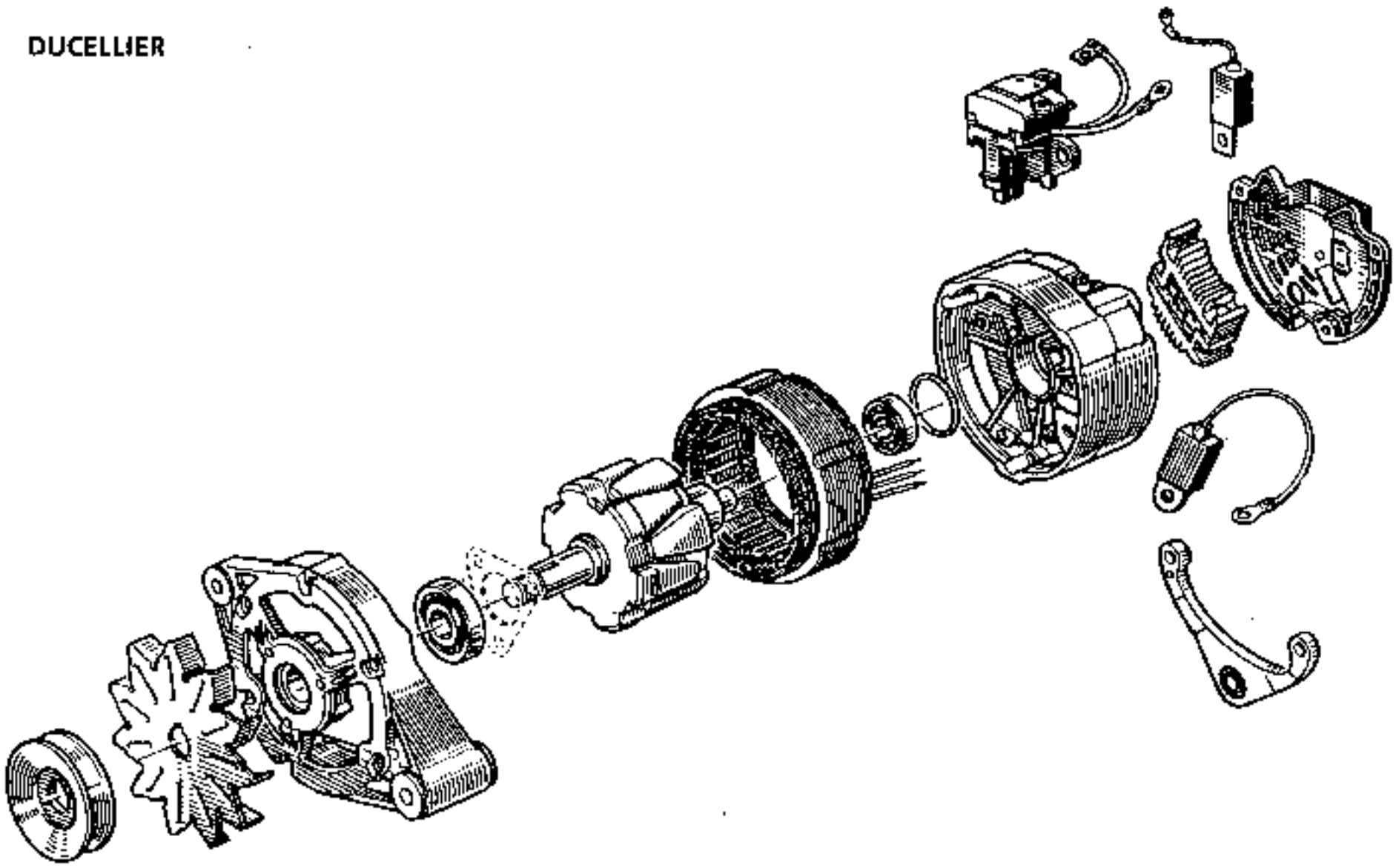


rpm	PARIS RHONE A 14 N 150 75 amperes	PARIS RHONE A 14 N 142 90 amperes
1 250	-	-
3 000	61 A	76 A
6 000	72 A	90 A

PARIS RHONE

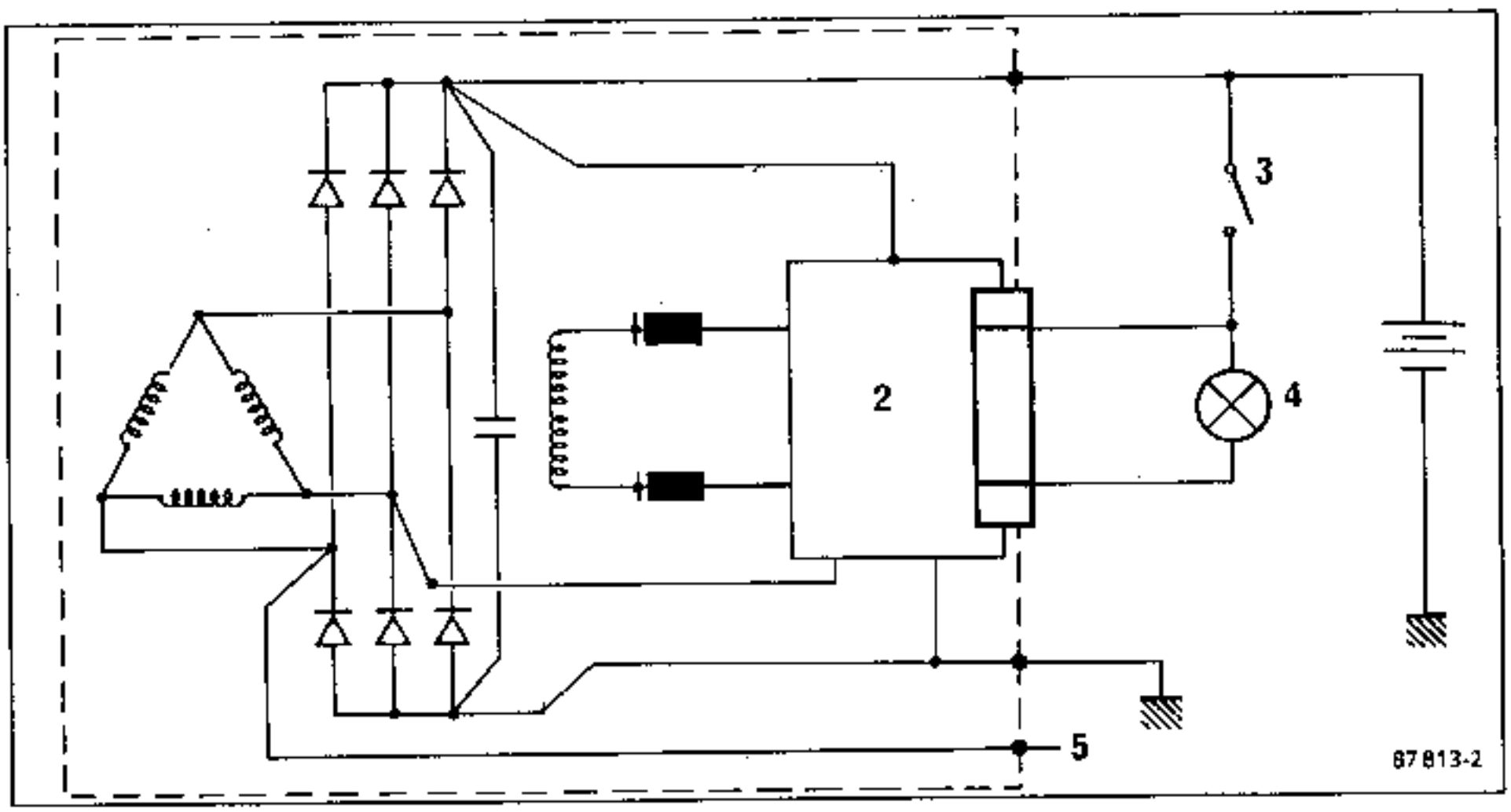


DUCELLIER

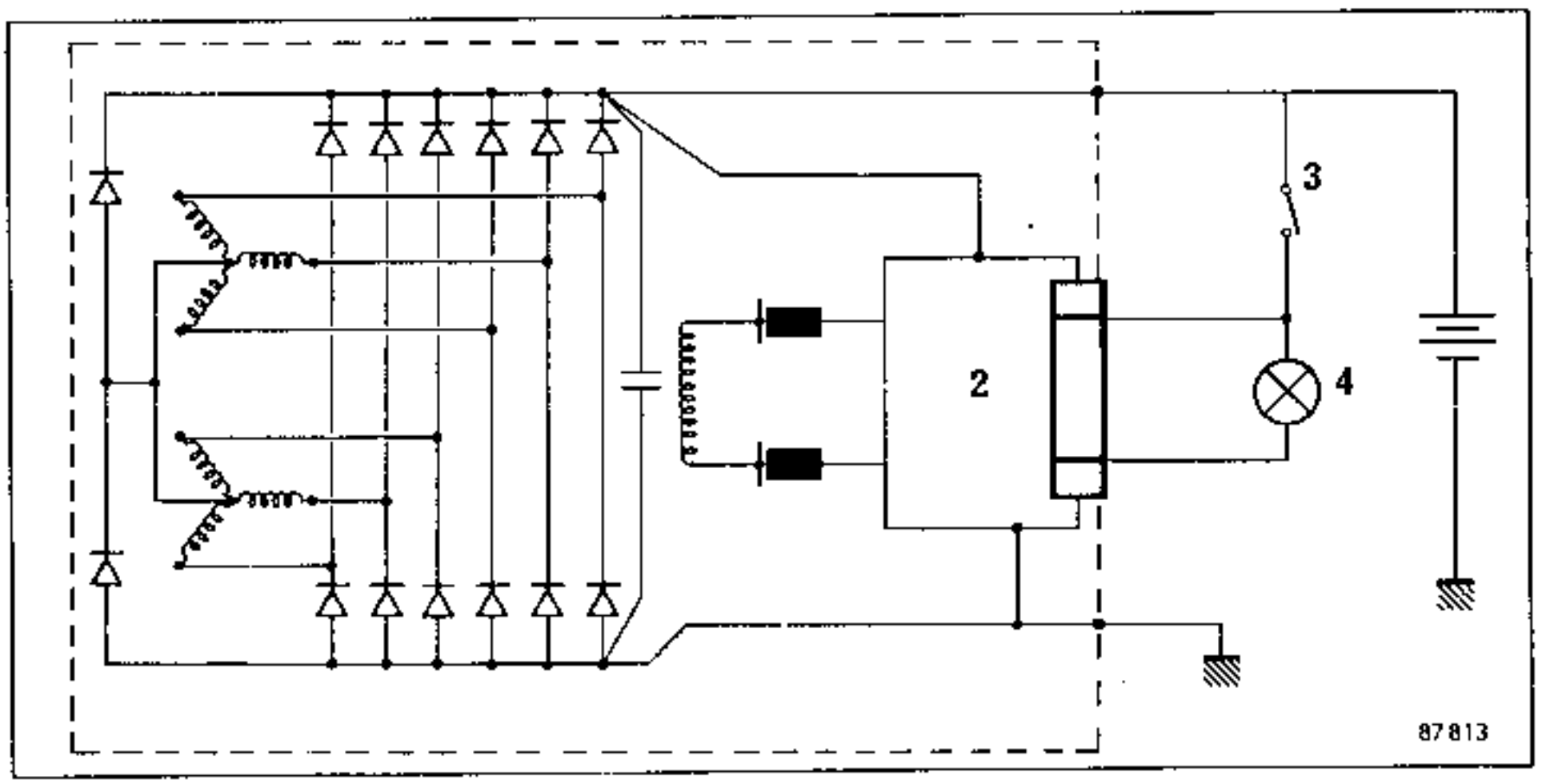


CIRCUIT DIAGRAM

All types except the 105 A



105 A



2 Regulator
3 Starter switch
4 Light on instrument panel

OPERATION-FAULT FINDING

These vehicles are equipped with an alternator with a built in regulator and a warning light in the instrument panel which operates as follows:

- when the ignition is switched on, the light switches on,

- when the engine starts, the light switches off,

- if the warning light switches on whilst the engine is running, it is an indication of a "charging" defect.

FAULT FINDING

If the warning light does not switch on when the ignition is switched on.

Check if the connector on the regulator is connected.

Check whether the bulb has burnt out (to do this, earth the 6.3mm pin on the connector. The light should switch on).

If the warning light switches on when the engine is running:

It is an indication of a "charging" defect, the source of which may be:

- breakage of the alternator drive belt, breakage of the charging wire,

- internal damage to the alternator (rotor, stator, diodes or brushes),

- defective regulator.

If the customer complains of a charging defect, but the warning light operates correctly.

If the regulated voltage is less than 13.5 V, check the alternator. The source of the defect may be:

- a damaged diode,

- a phase broken,

- fouled or worn tracks.

Checking the Voltage

Connect a voltmeter to the battery terminals and note the battery voltage.

Start the engine and raise its speed until the voltmeter pointer stabilizes at the regulated voltage.

This voltage should be between 13.5 V and 14.8 V.

Switch on as many current consuming accessories as possible. The regulated voltage should remain between 15.5 V and 14.8 V.

WARNING: It is essential to disconnect the battery and the voltage regulator before carrying out any arc welding work on the vehicle.

REMOVING-REFITTING

REMOVING

Never remove a belt by levering it off with a screwdriver. It is made up of synthetic fibres and could be damaged.

Disconnect:

- the battery,

- the electrical wires.

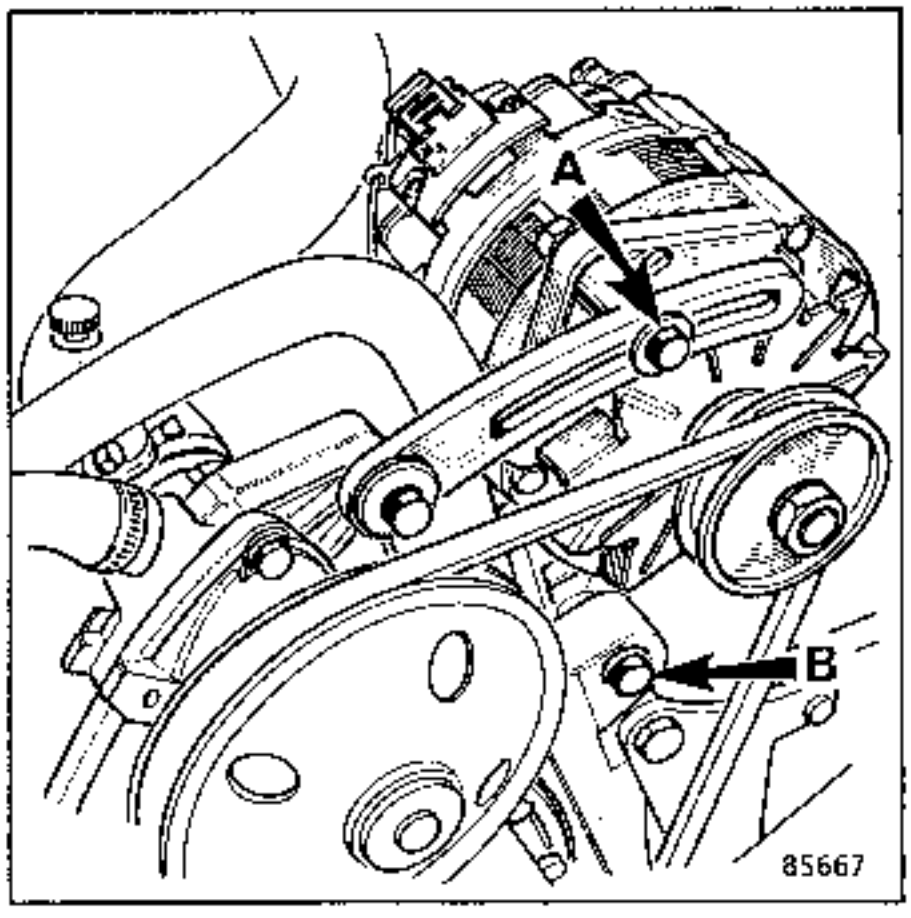
Remove:

- the bolt from the tensioner (A),

- the securing bolt (B) and remove the alternator.

REFITTING

After refitting the alternator, tension the belt.



REMOVING-REFITTING

REMOVING

Never remove a belt by levering it off with a screwdriver. It is made up of synthetic fibres which may be damaged.

Disconnect:

- the battery,

- the electrical wires.

Loosen the tensioner (A).

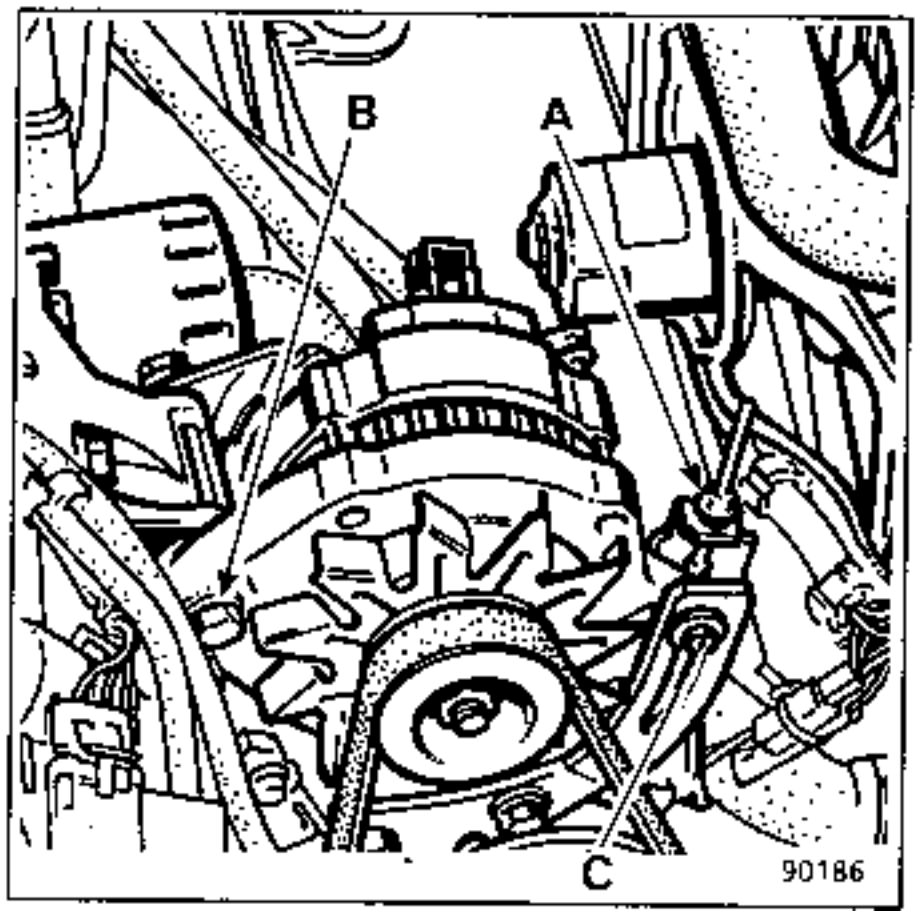
Remove the bolt (C).

Remove the alternator securing bolt (B).

Remove the alternator.

REFITTING

After refitting the alternator, tension its belt.



REMOVING-REFITTING

REMOVING

Never remove a belt by levering it off with a screwdriver. It is made up of synthetic fibres which could be damaged.

Disconnect:

- the battery,

- the electrical wires.

Loosen bolt (B) and remove the nut.

From below:

- remove the engine protection panel,

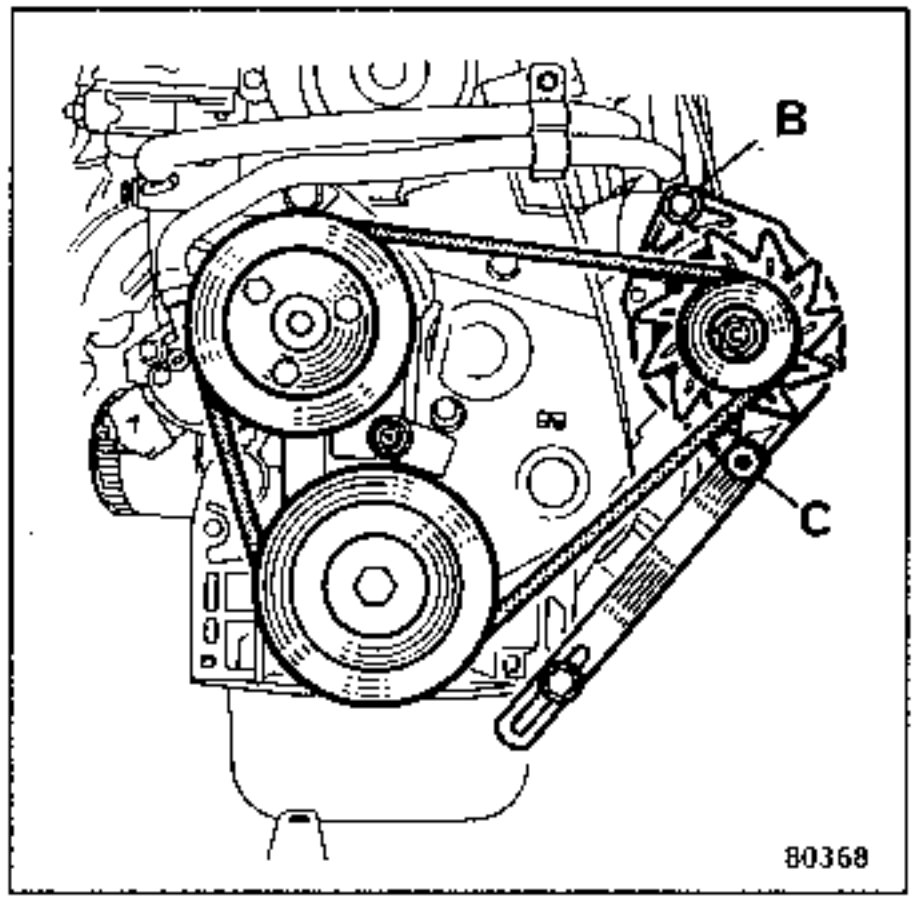
- remove the bolt (C),

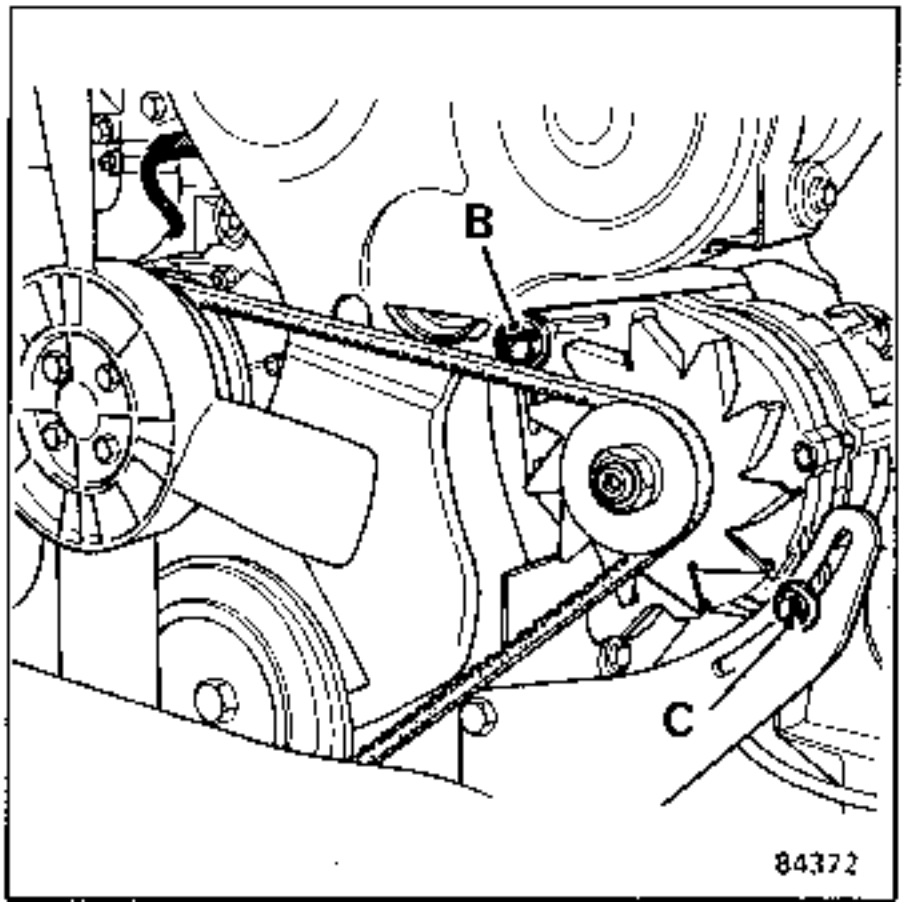
- remove the alternator securing bolt (B),

- remove the alternator.

REFITTING

After refitting the alternator, tension the belt.

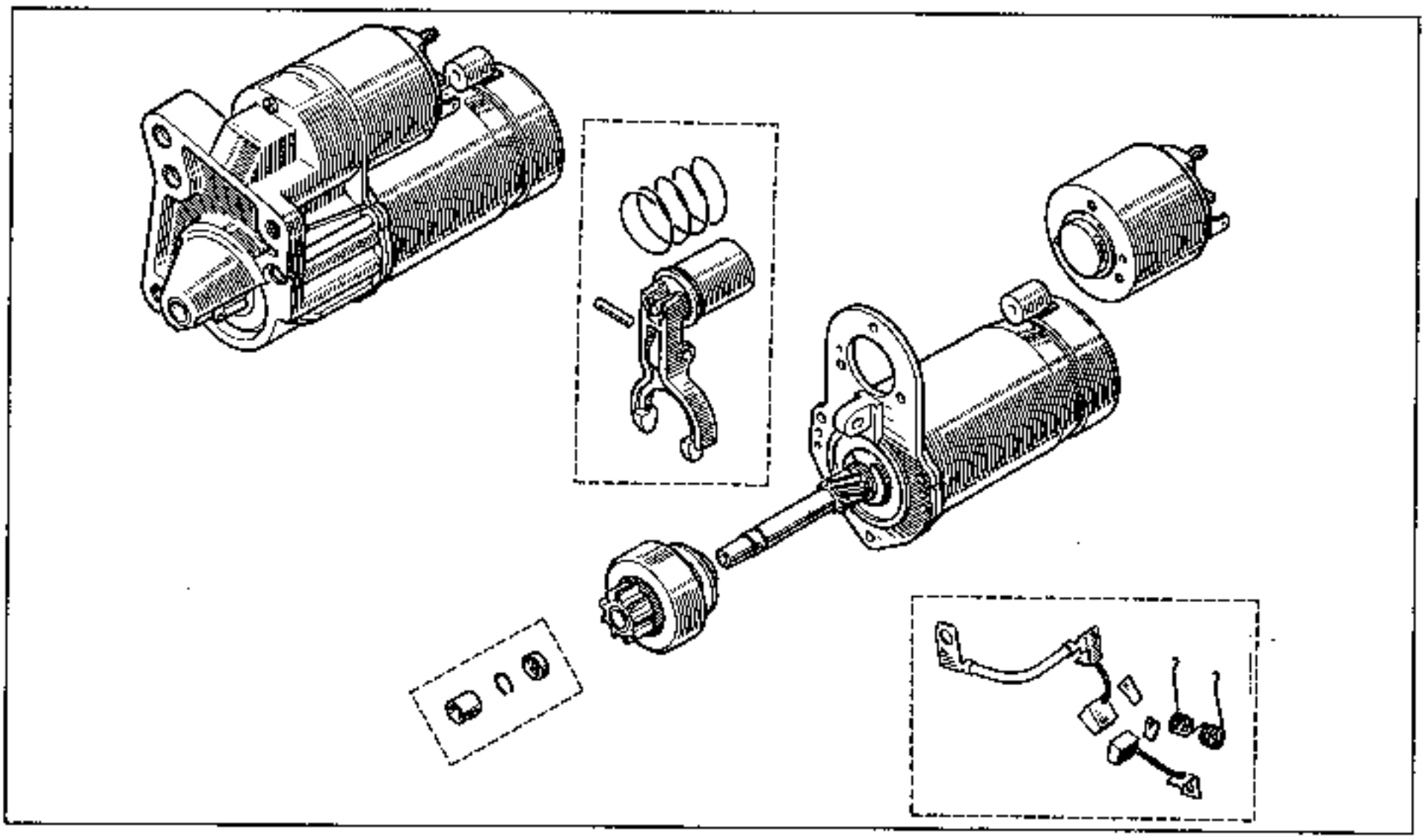




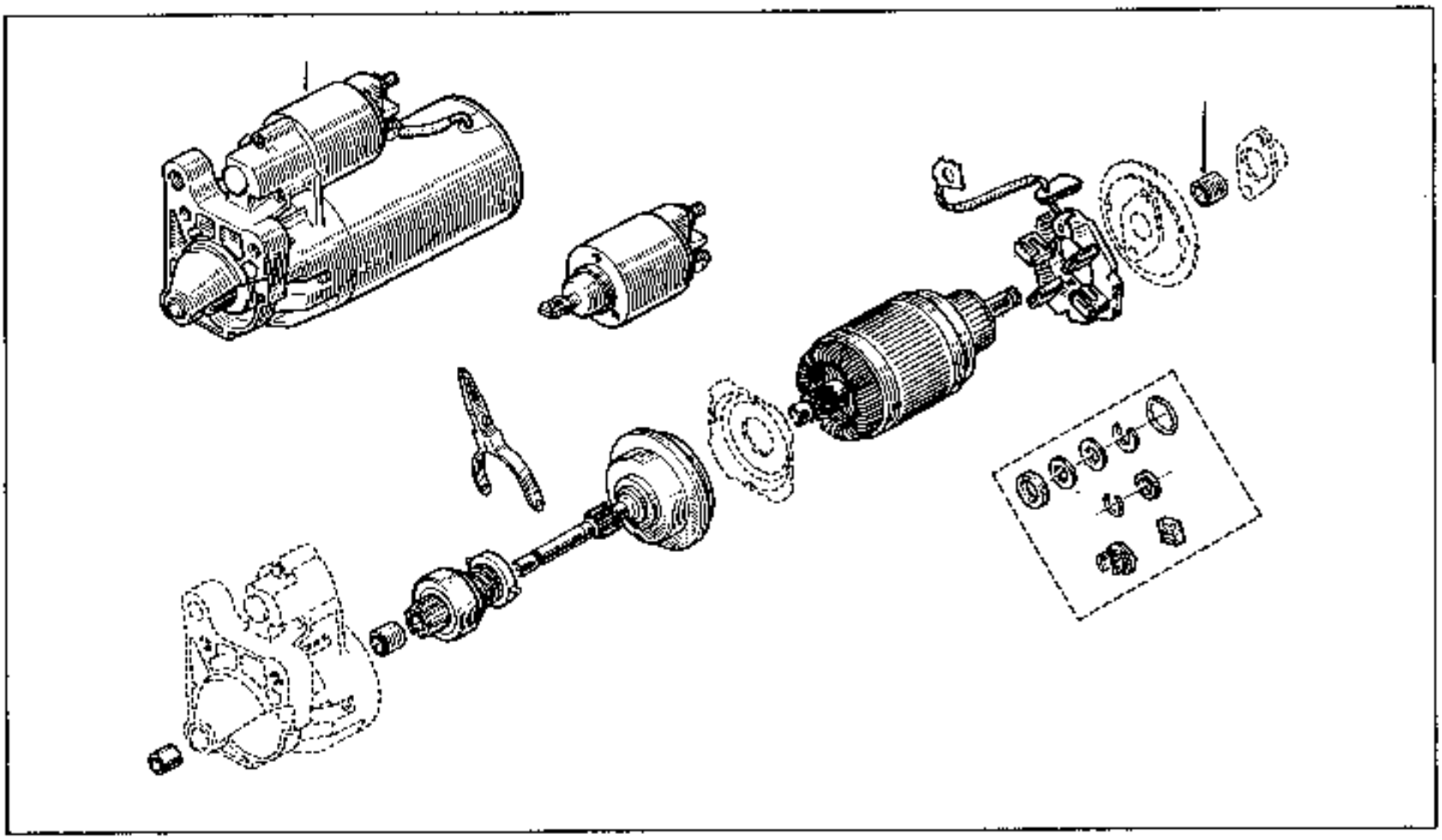
CHECKING

Make	Type	Torque (pinion locked)	Current (pinion locked)
BOSCH	00 01 110 026	3,4 daN.m	1 000 A
BOSCH	90 00 333 117	1,1 daN.m	350 A
BOSCH	90 00 333 114	1,3 daN.m	400 A
PARIS RHONE	D 9E 70	1,3 daN.m	470 A
PARIS RHONE	D 9E 76	1,3 daN.m	420 A
PARIS RHONE	D 9E 85	1,3 daN.m	400 A
PARIS RHONE	D 9R 73	6 daN.m	1 350 A
PARIS RHONE	D 9E 701	0,8 daN.m	300 A
PARIS RHONE	D 9E 771	0,8 daN.m	460 A
PARIS RHONE	D 9E 851	0,8 daN.m	350 A
PARIS RHONE	D 9E 881	1,5 daN.m	500 A
PARIS RHONE	D 10E 74	2,2 daN.m	650 A
PARIS RHONE	D 10E 88	1,2 daN.m	500 A
PARIS RHONE	D 10E 92	2,4 daN.m	725 A
PARIS RHONE	D 6RA 6	-	-
MITSUBISHI	JM 003 A329 86	-	-
MITSUBISHI	JM 003 A425 81	-	-

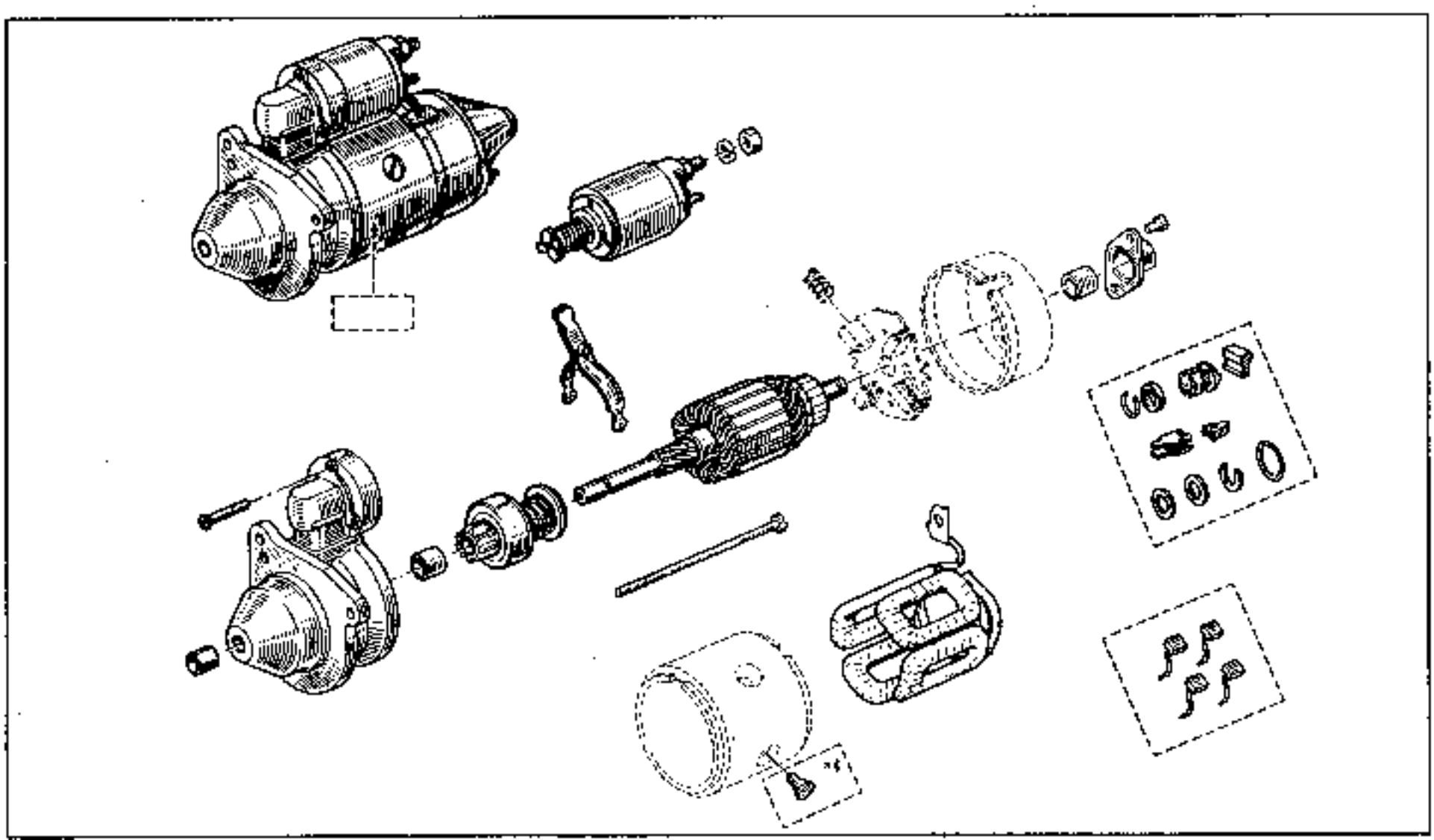
EXPLODED VIEW
PARIS RHONE
D 6R A6



EXPLODED VIEW
BOSCH
0 001 110 026

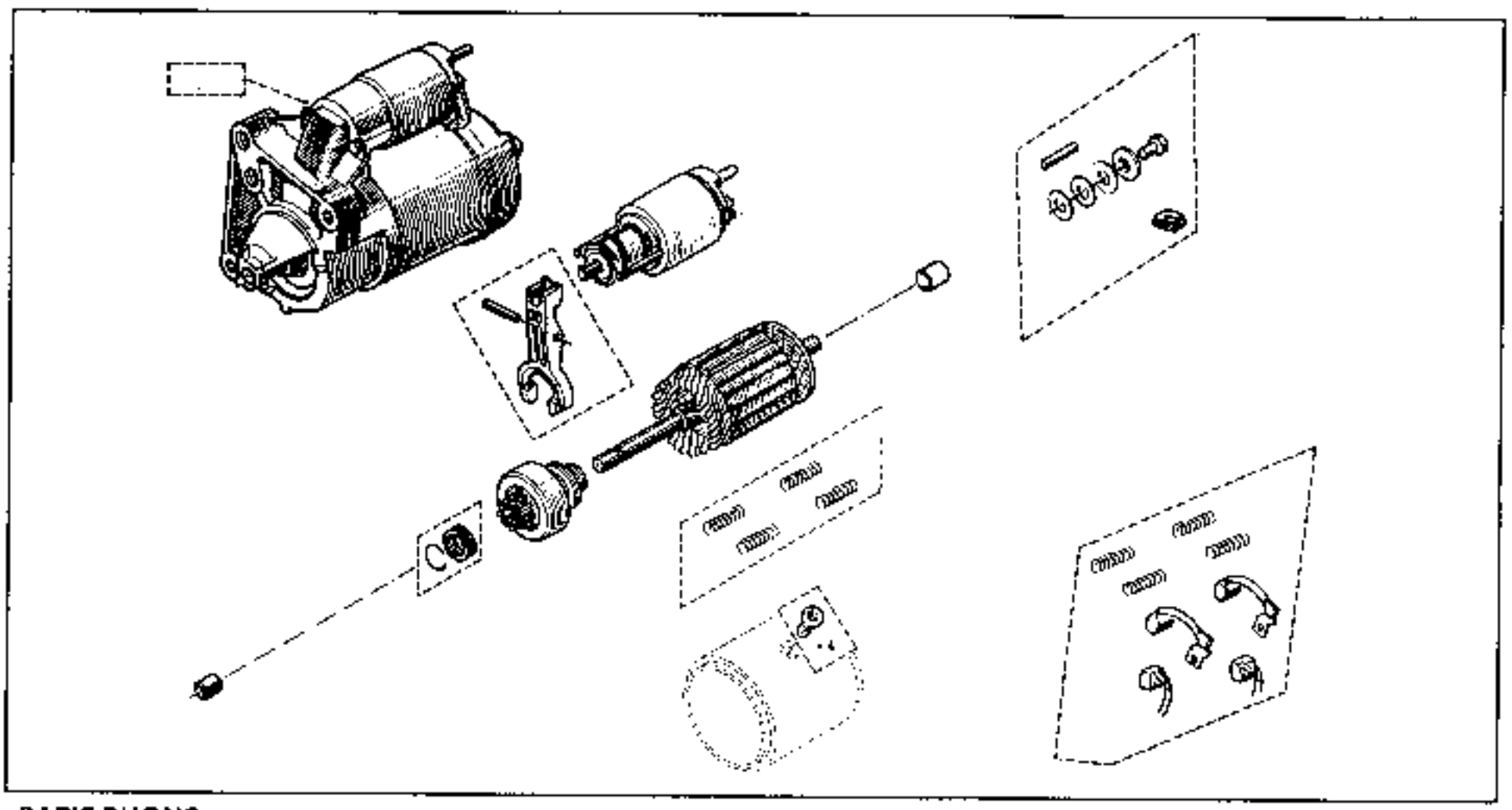


BOSCH
9 000 333 117
9 000 333 114

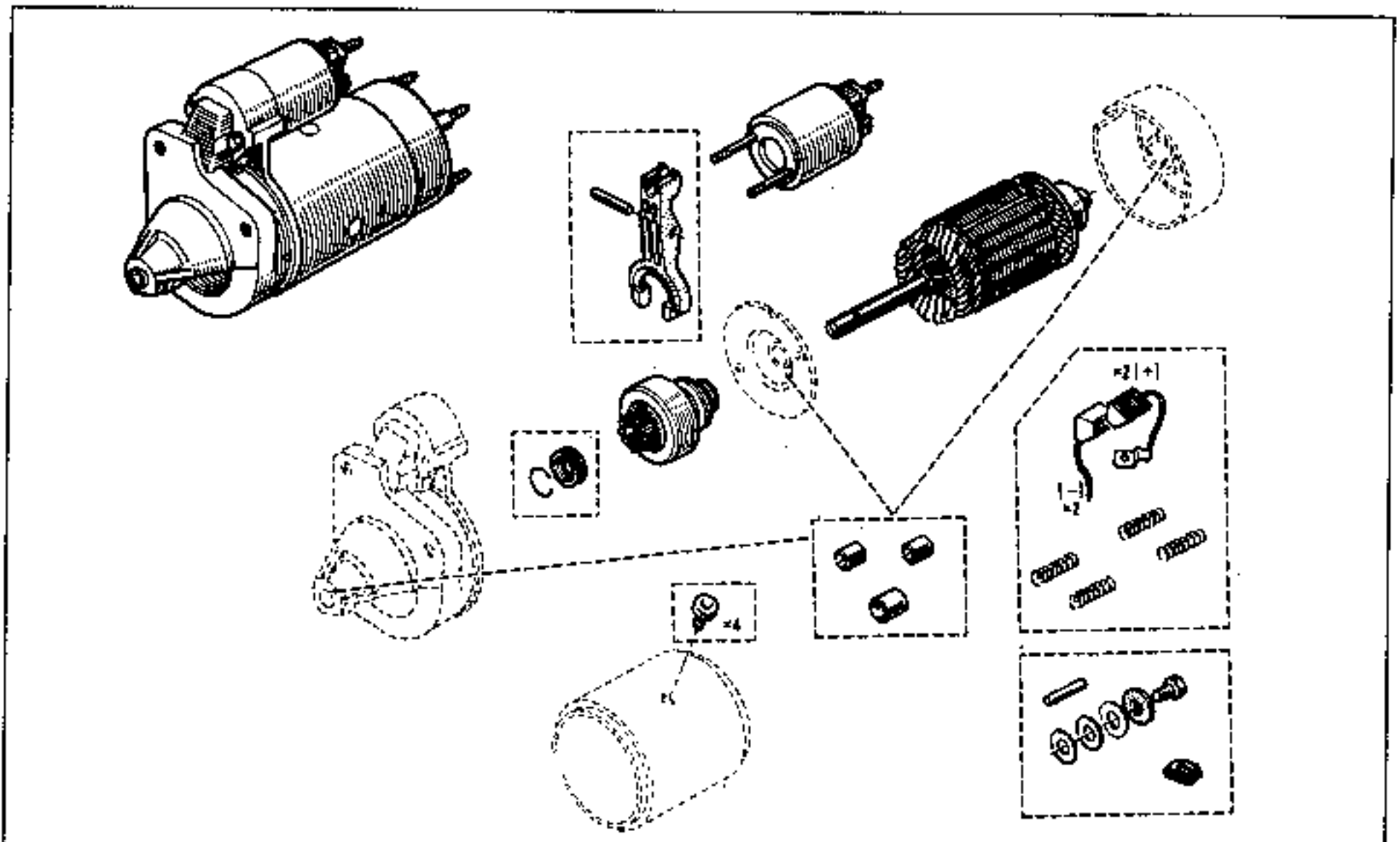


EXPLODED VIEWS

PARIS RHONE
D 9E 85
D 9E 771

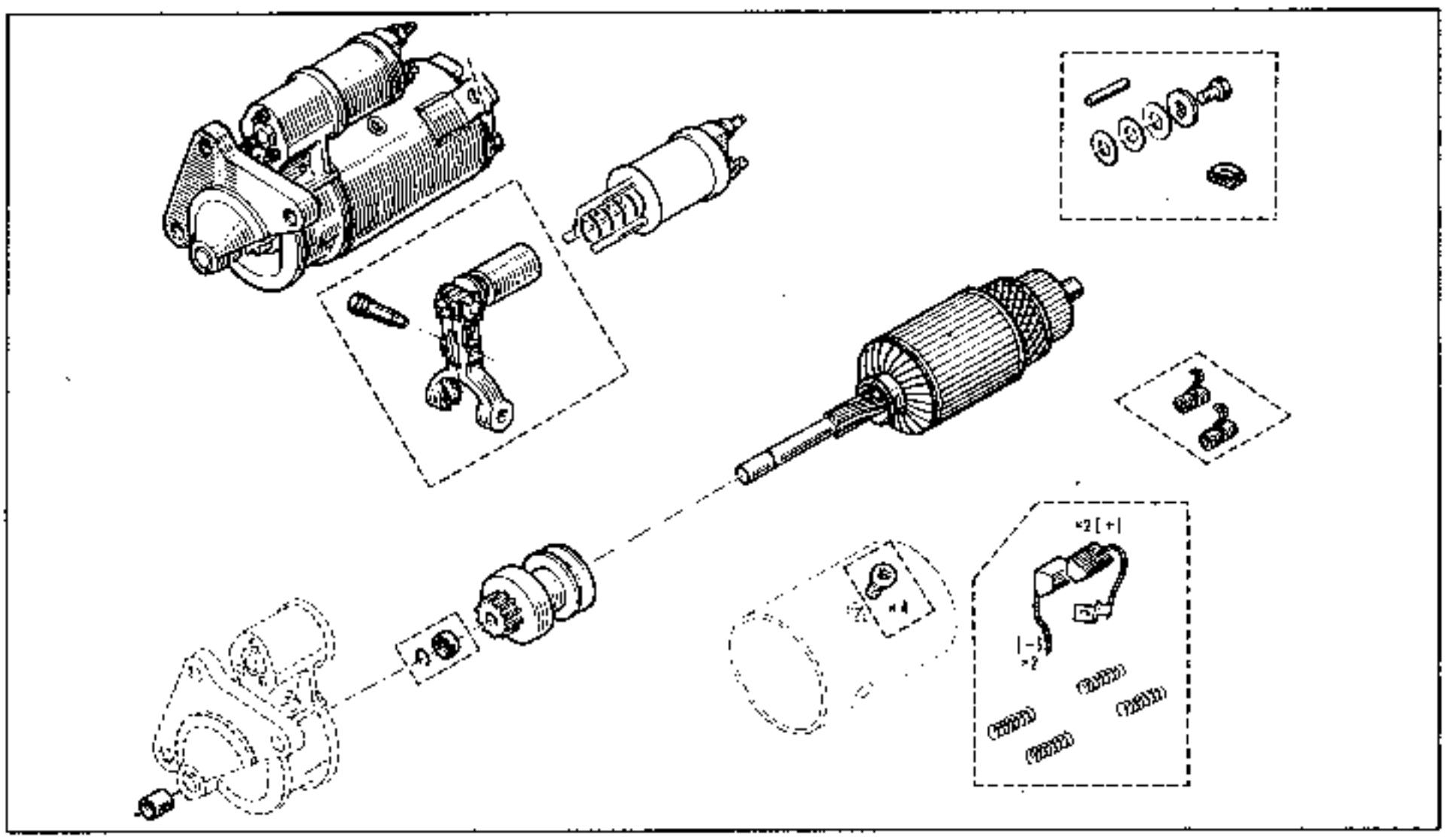


PARIS RHONE
D 10E 88
D 10E 92

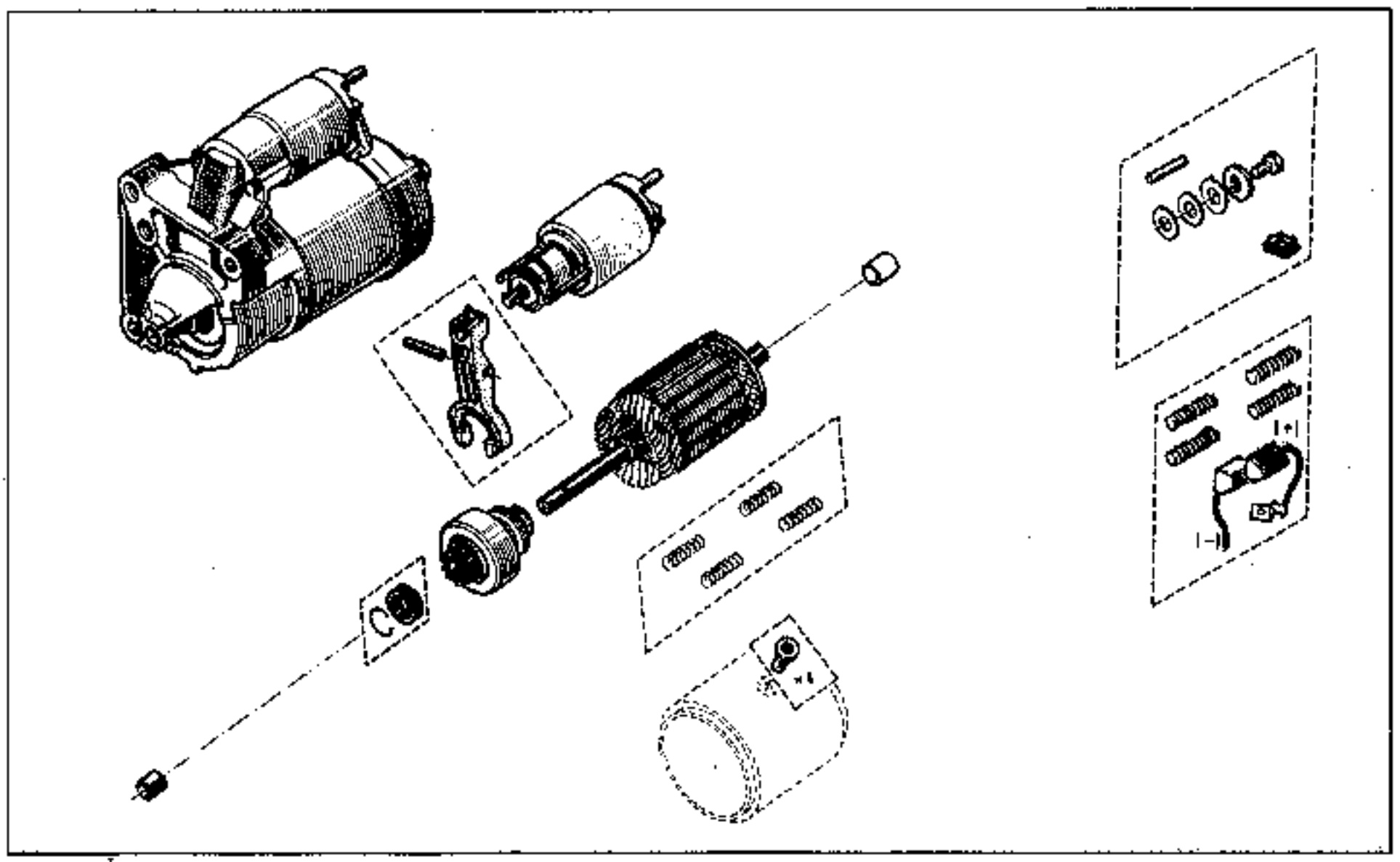


EXPLODED VIEWS

PARIS RHONE
D 10E 74

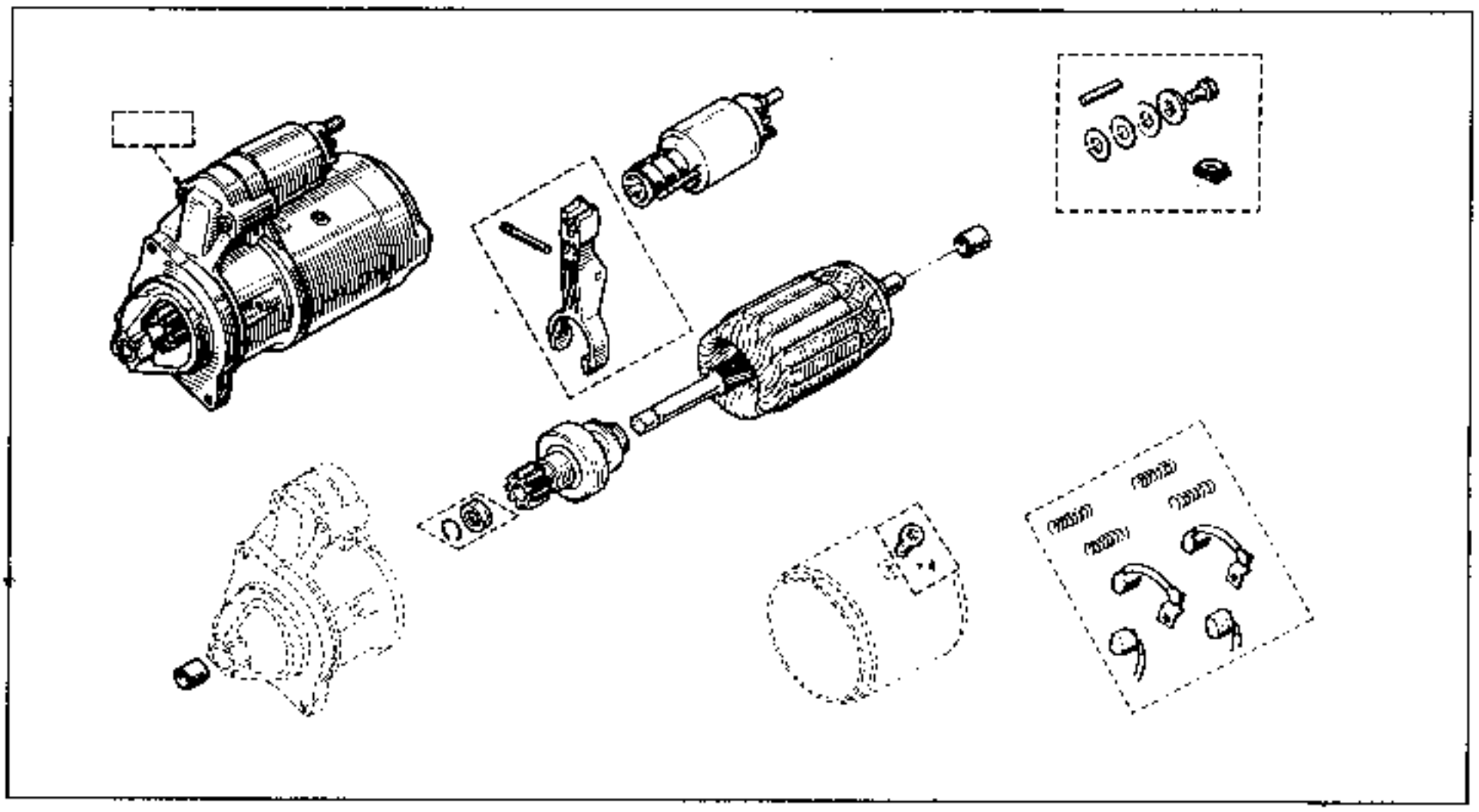


PARIS RHONE
D 9E 76

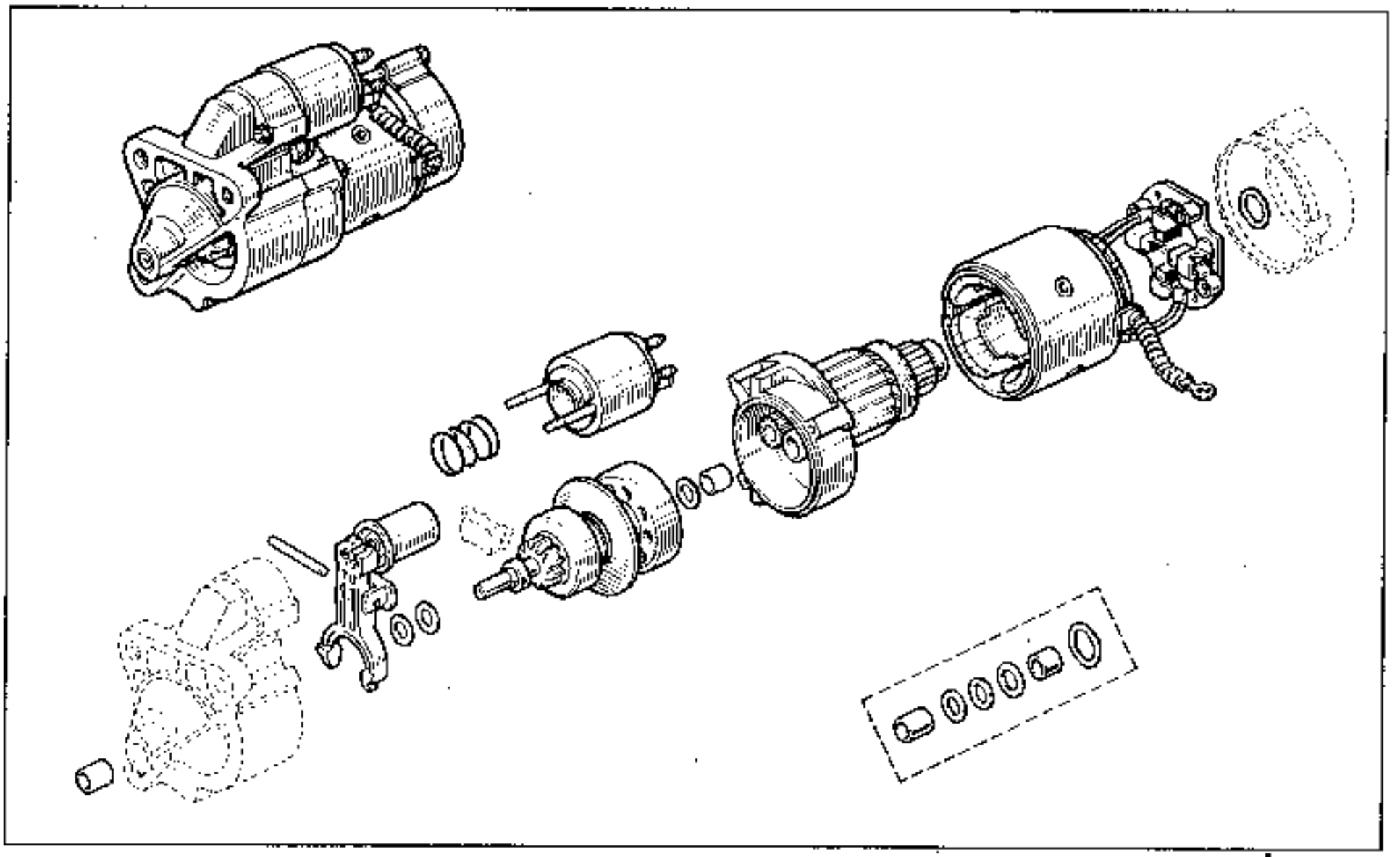


EXPLODED VIEWS

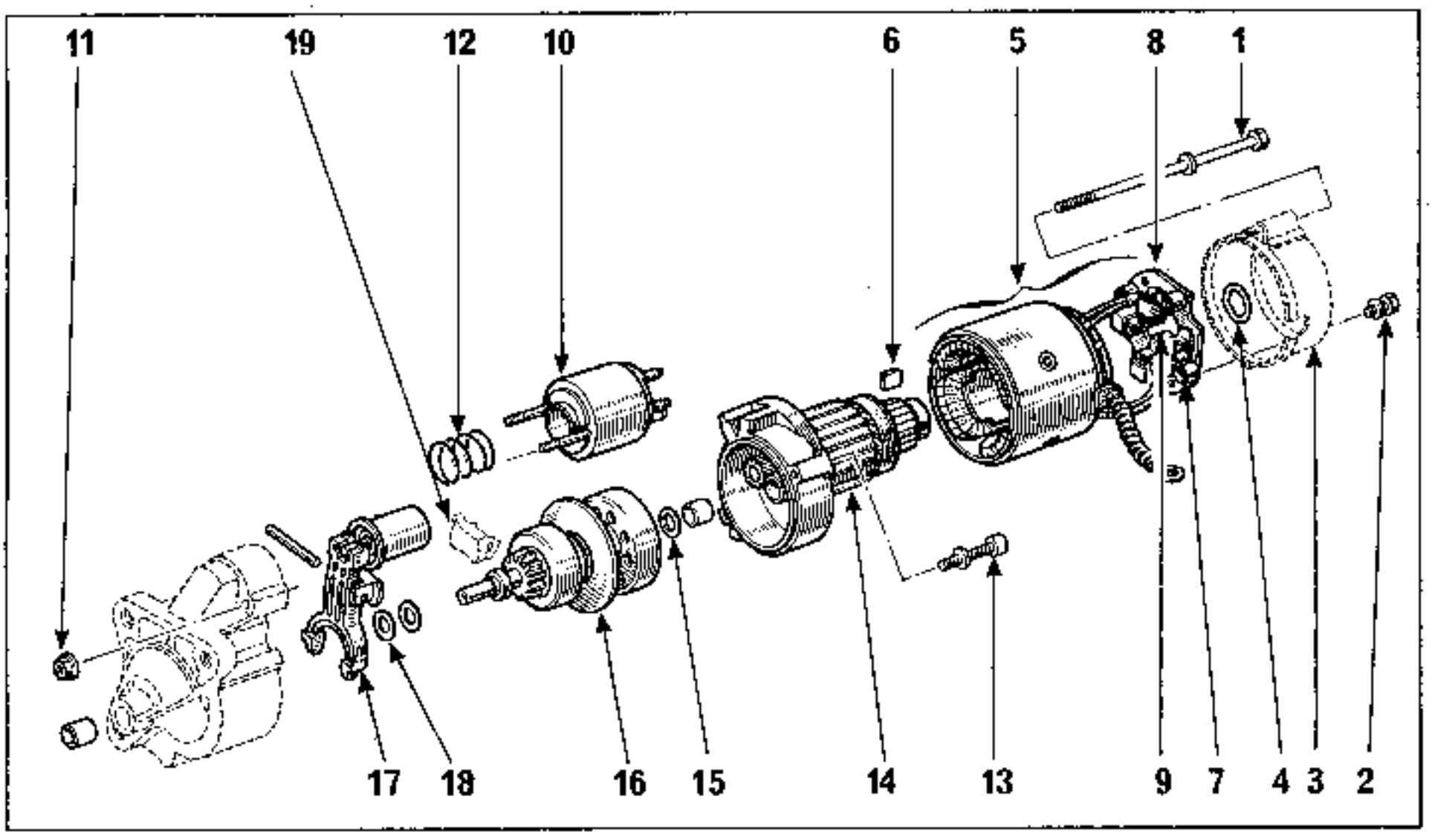
PARIS RHONE
D 9E 70



PARIS RHONE
D 9R 73



OVERHAULING THE D 9R 73



SPECIFICATIONS

- Low weight and overall dimensions.
- Relatively high power.
- High speed armature (17,000 rpm).

REMOVING THE REAR END OF THE STARTER

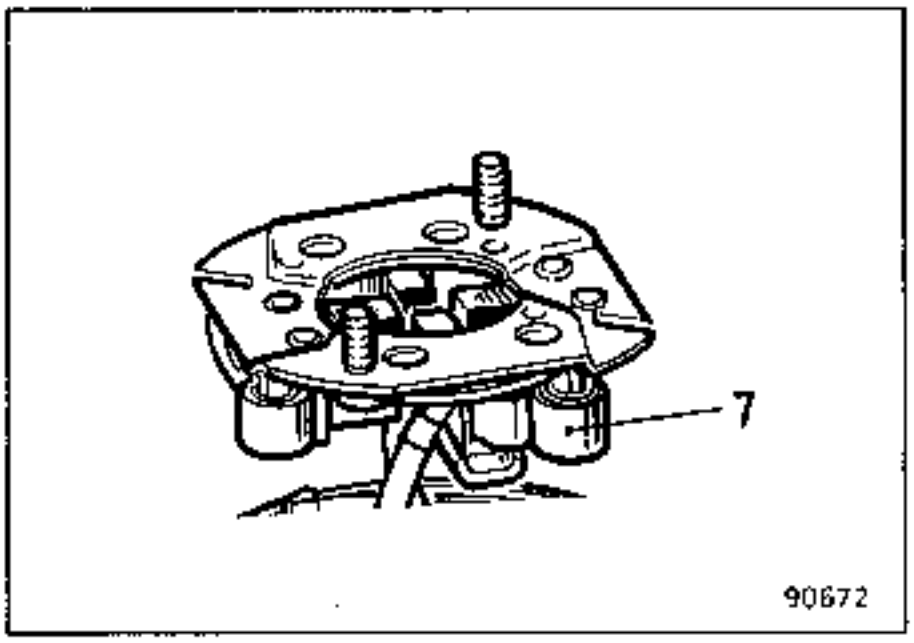
Remove:

- the assembly tie bolts (1),
- the nuts (2) securing the brush holders,
- the casing (3),
- the washer (4),
- the field coil and brush holder assembly (5).

Remove positioning plate (6).

WARNING

Removing the brush springs (7) is forbidden. This type of starter has brushes which are held down at high pressure (force applied: 5.5daN.m) by springs (7). Removing these could be highly dangerous.



REPLACING THE BRUSHES

It is not possible to replace just the brushes (9).

As the operating temperature in the region of the brushes is high, it is forbidden to soft solder the brushes.

Consequently, the brushes are supplied on their plate (8), together with the field coils, as a complete assembly.

OVERHAULING THE D 9R 73

DISMANTLING THE STARTER PINION ASSEMBLY

Remove:

- the switch (10) by taking off the nuts (11) and take out its spring (12)
- the reduction gear housing retaining bolt (13),
- the armature (14),
- the washer (15),
- the seal (19),
- the pinion assembly (16) and control lever (17),
- the shim washers (18).

SPECIAL FEATURES

The armature and reduction gear housing assembly cannot be dismantled (the pinion is bonded to the armature).

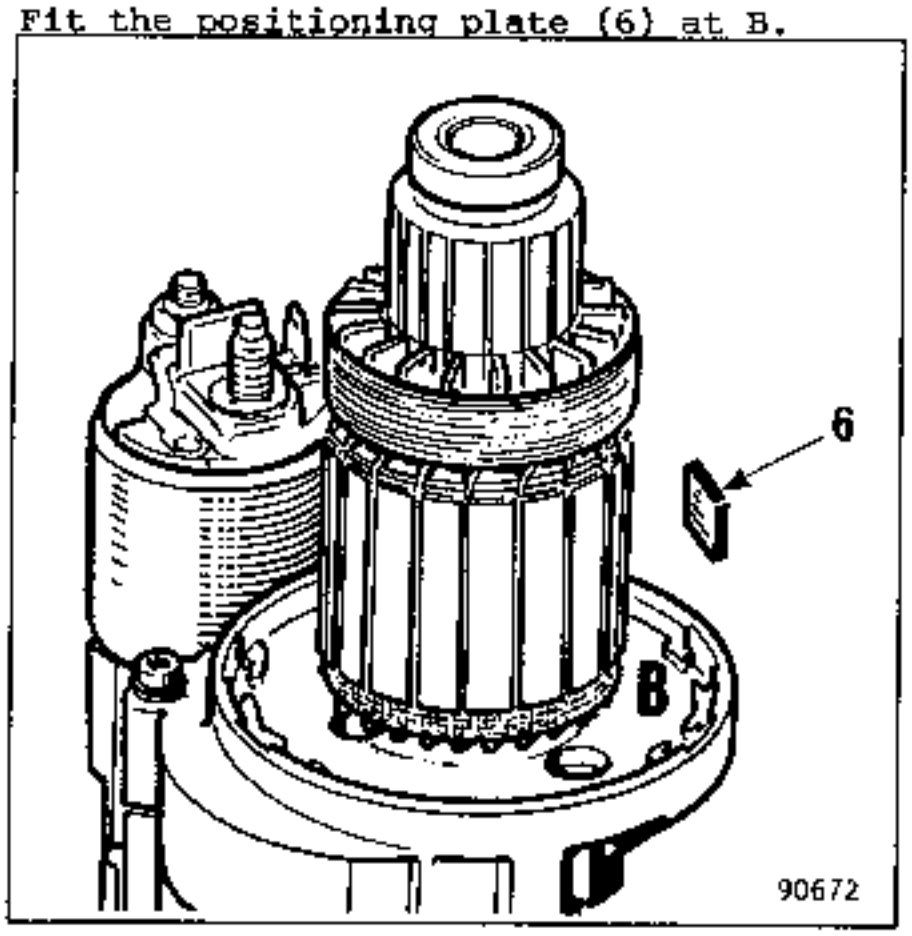
The pinion and ring gear assembly cannot be dismantled (the ring gear is crimped on to the shaft).

REASSEMBLING THE STARTER PINION ASSEMBLY

Refit the shim washers removed during dismantling.
Grease the pinion assembly.
Refit all the parts in reverse order.

SPECIAL FEATURES

Refitting the field coil and brush assembly.
Fit the positioning plate (6) at B.



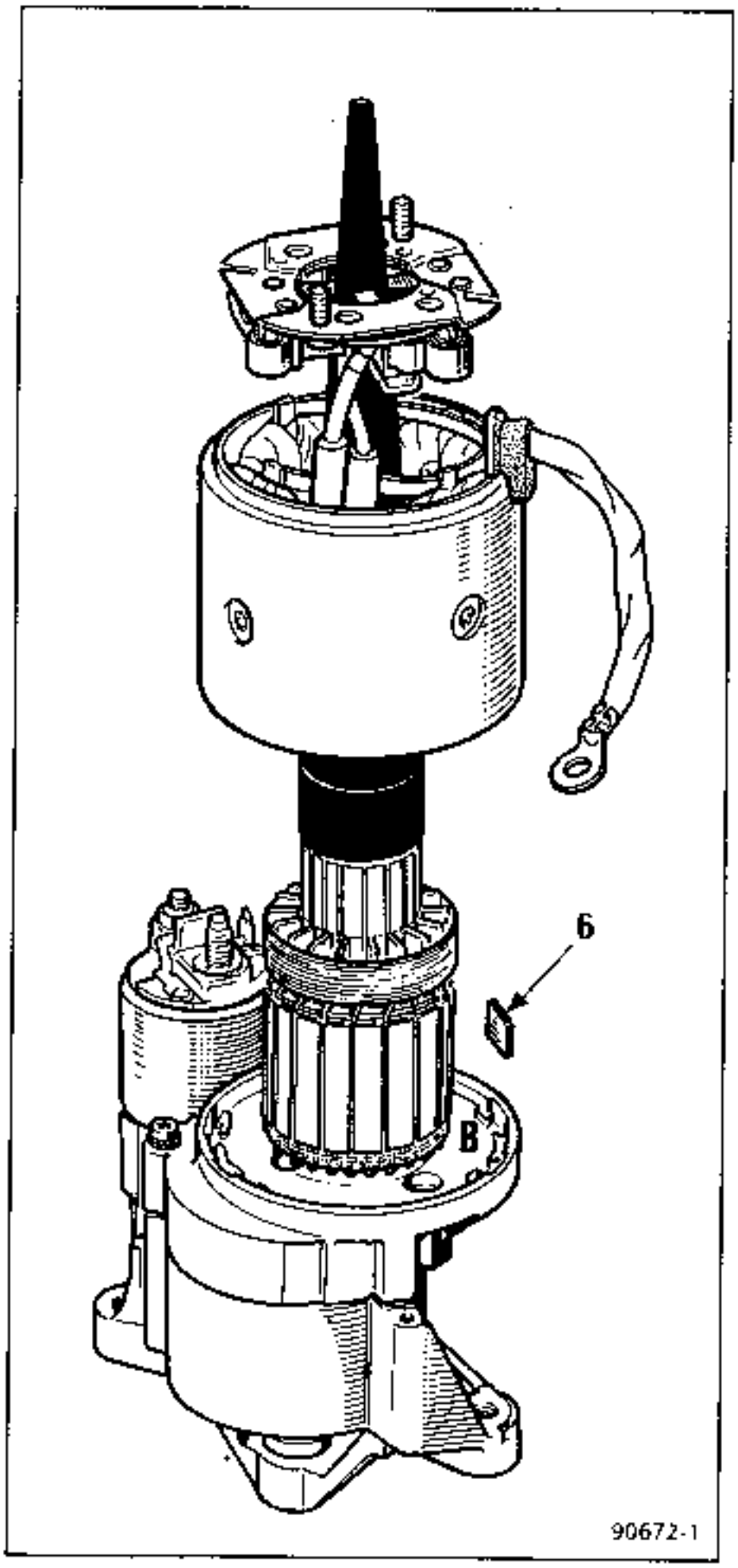
Place VALEO tool reference 182 144 M* on the armature bearing and place the field coil and brush carrier plate assembly on the tool. Slide it into place.

Correctly position the field coil assembly with reference to the positioning plate (6).

When the brushes are in position, remove the tool.

(*) NOTE:

This tool is to be ordered from VALEO.



REMOVING-REFITTING

REMOVING

Disconnect the battery.

Remove the exhaust heat shield.

Disconnect the wires.

Remove the three starter securing bolts.

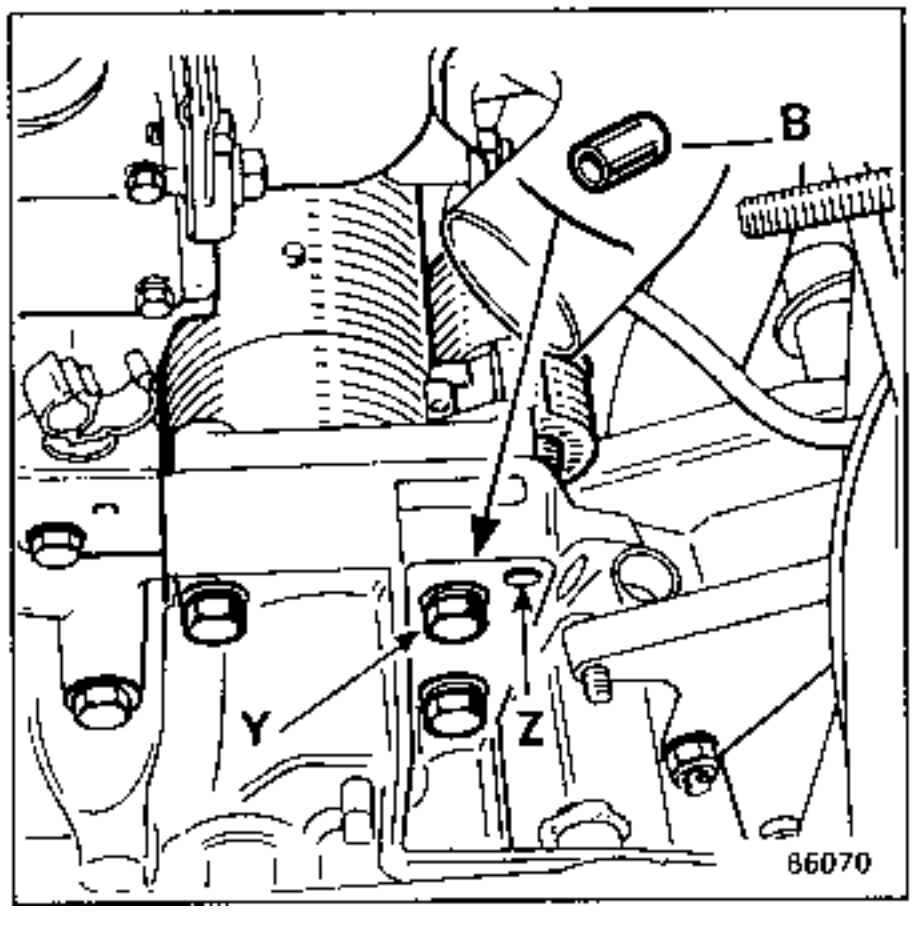
Remove the two bolts from the starter securing lug.

Remove the starter.

REFITTING

Special Point

Ensure that the locating dowel (B) is in position. It must be in bolt hole (Y) on type (C) engines and bolt hole (Z) on type (F) engines.



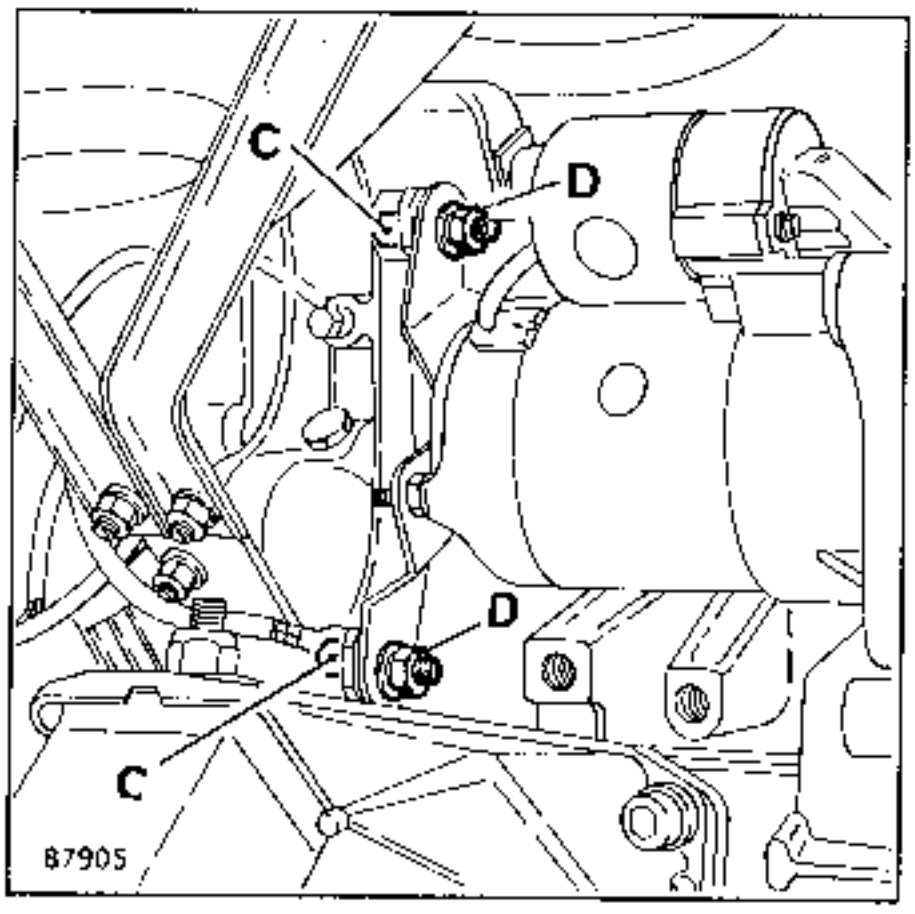
REMOVING

Disconnect the battery.

Disconnect the wires.

Remove:

- the two rear securing bolts (D),
- the two bolts (C) securing the unit to the cylinder block,
- the three bolts securing the unit to the clutch housing,
- the starter.



REFITTING

Special Points:

Fit and tighten the three bolts on the clutch housing.

Screw up the rear securing bolts on the starter and those on the cylinder block, finger tight.

Tighten the two bolts (C).

Tighten the two bolts (D).

REDUCTION GEAR TYPE STARTER

Disconnect the battery.

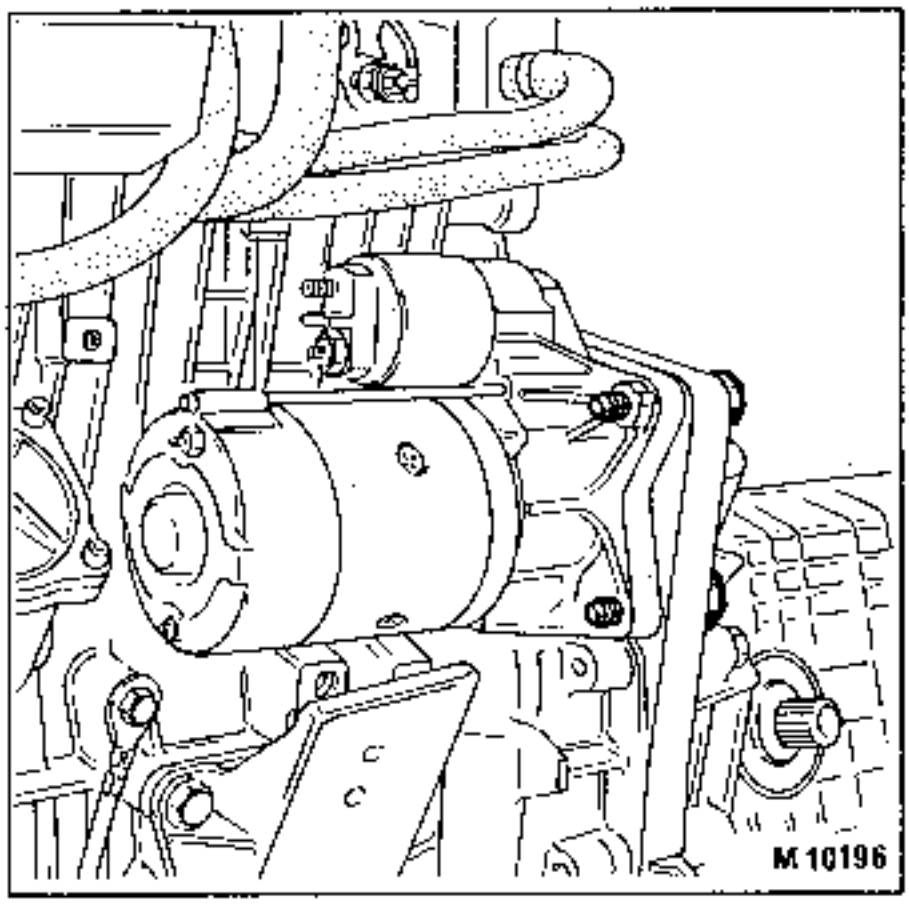
Remove the engine protection panel.

Disconnect the wires.

Remove:

- the 3 bolts securing the unit to the clutch housing,

- the starter.

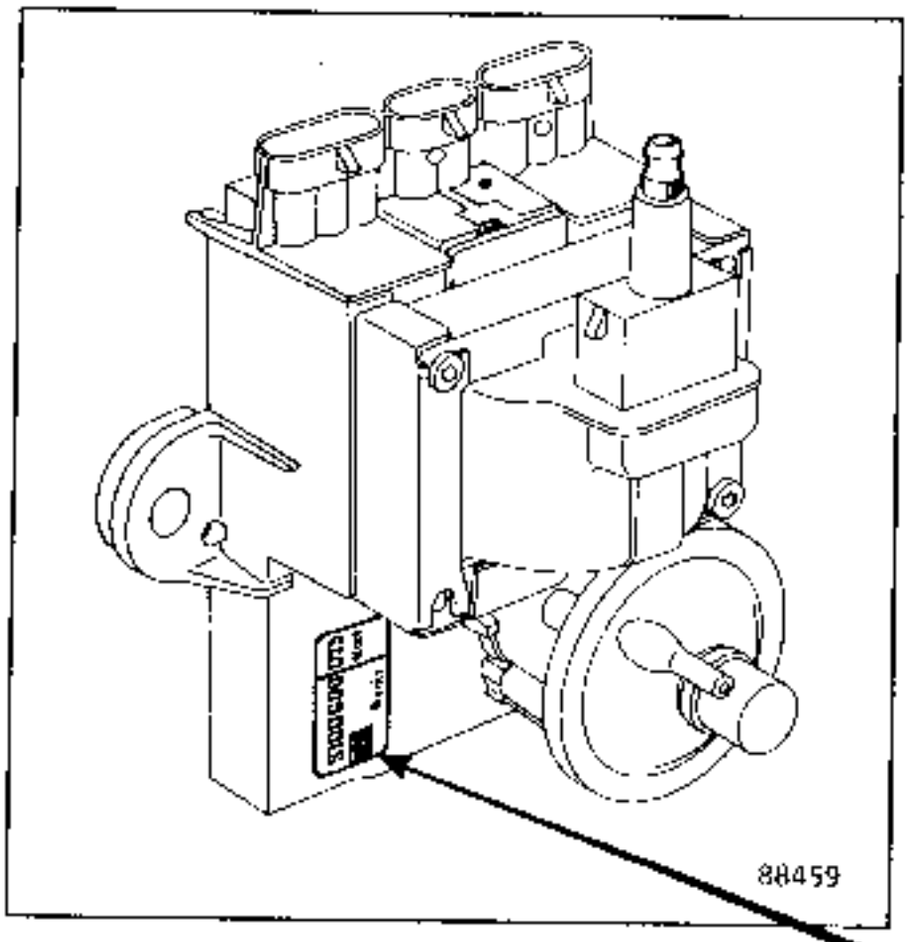


REFITTING

Carry out the removing operations in reverse.

Vehicle	Engine	Curves
X 481	F2N 712 F2N 716	RE 234
X 482	F2N 710	RE 232
X 482	F2N 754	RE 282
L 489	J6R 758 J6R 759	RE 001
L 48 D B 48 D	C2J 770	RE 278
X 48 J	F2R 702	RE 232
L 48 M K 48 M	F2N 750	RE 258
L 48 N K 48 N	F2N 752	RE 259

TYPE F IGNITION UNIT

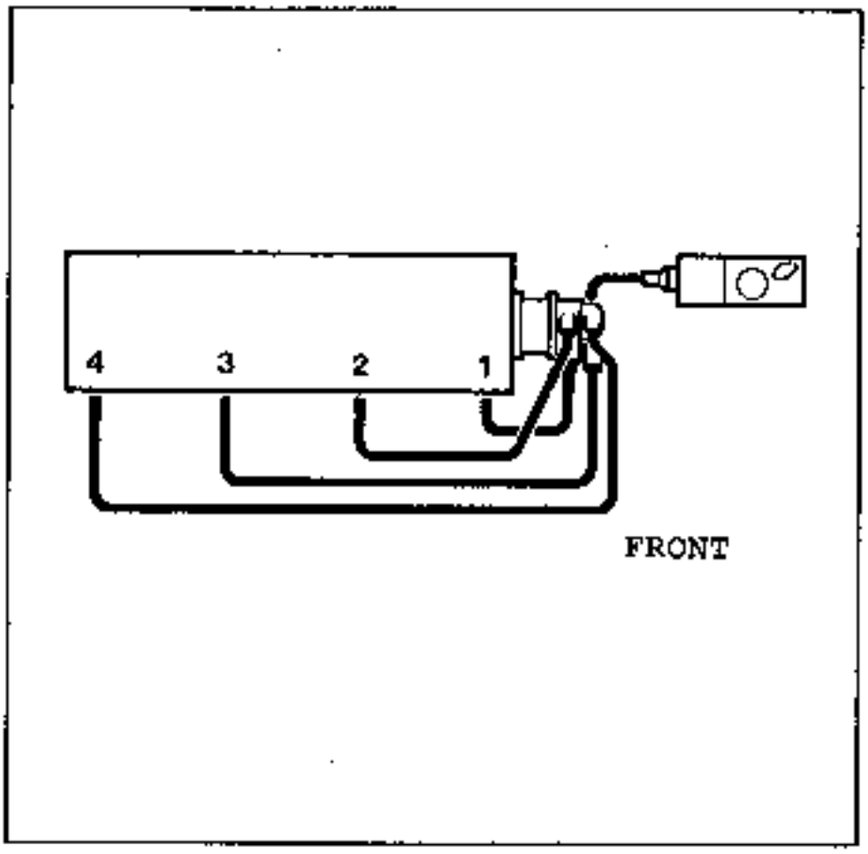


CURVE IDENTIFICATION

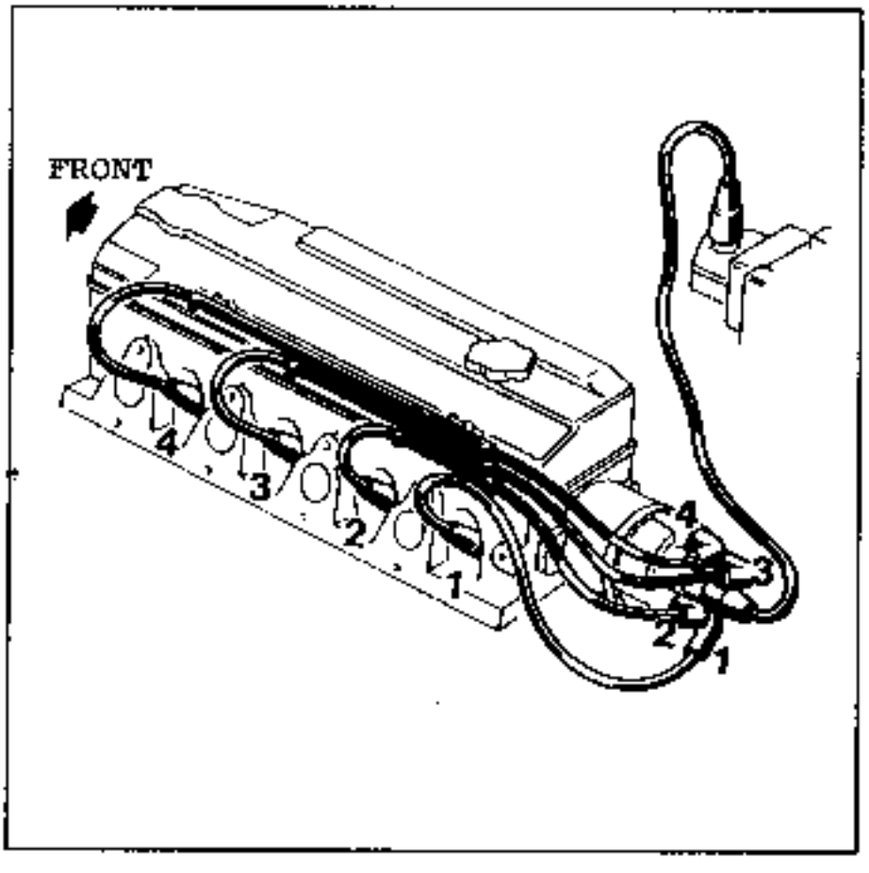
The curves are identified by a label stuck to the body of the electronic computer.

PLUG LEAD CONNECTIONS:

1-3-4-2



TYPE F ENGINE



TYPE J ENGINE

Special Features of the Electronic Units used on type F Engines

Certain integral electronic ignition system units have an additional ignition advance correction take-off, which is connected to socket (Z) by a "packard" 3 way connector.

Two wires are connected to channels A and C of this connector or only one wire to channel A (depending on the type of system).

Each wire has its own correction function

ELECTRONIC IGNITION SYSTEMS RE232 and RE234.

Two temperature switches are used. They are earthed to bring them into operation.

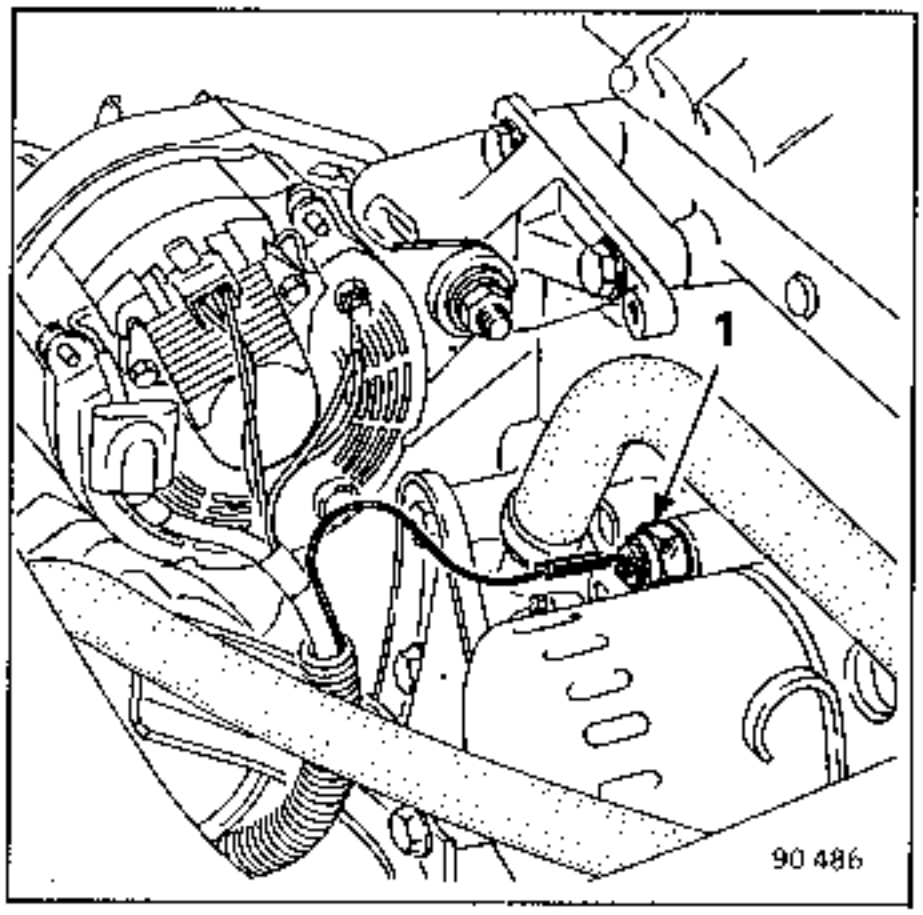
On channel (A) the wire is connected to the electric fan coolant temperature switch mounted on the radiator. It operates as follows:

	Temperature (°C)	
	Below 90	Above 90
Advance correction between 1200 rpm and 4700 rpm at a vacuum of 0 to 270 mb.	0	-4 ± 2

This correction prevents pinking.

On channel (C), the wire is connected to the oil temperature switch (1) on the cylinder block. This operates as follows:

	Temperature (°C)		
	Below 15	From 15 to 70	Above 70
Advance correction between 1200 & 2500 rpm at a vacuum of 380 to 920 mb.	+10° ± 2	0	+10° ± 2



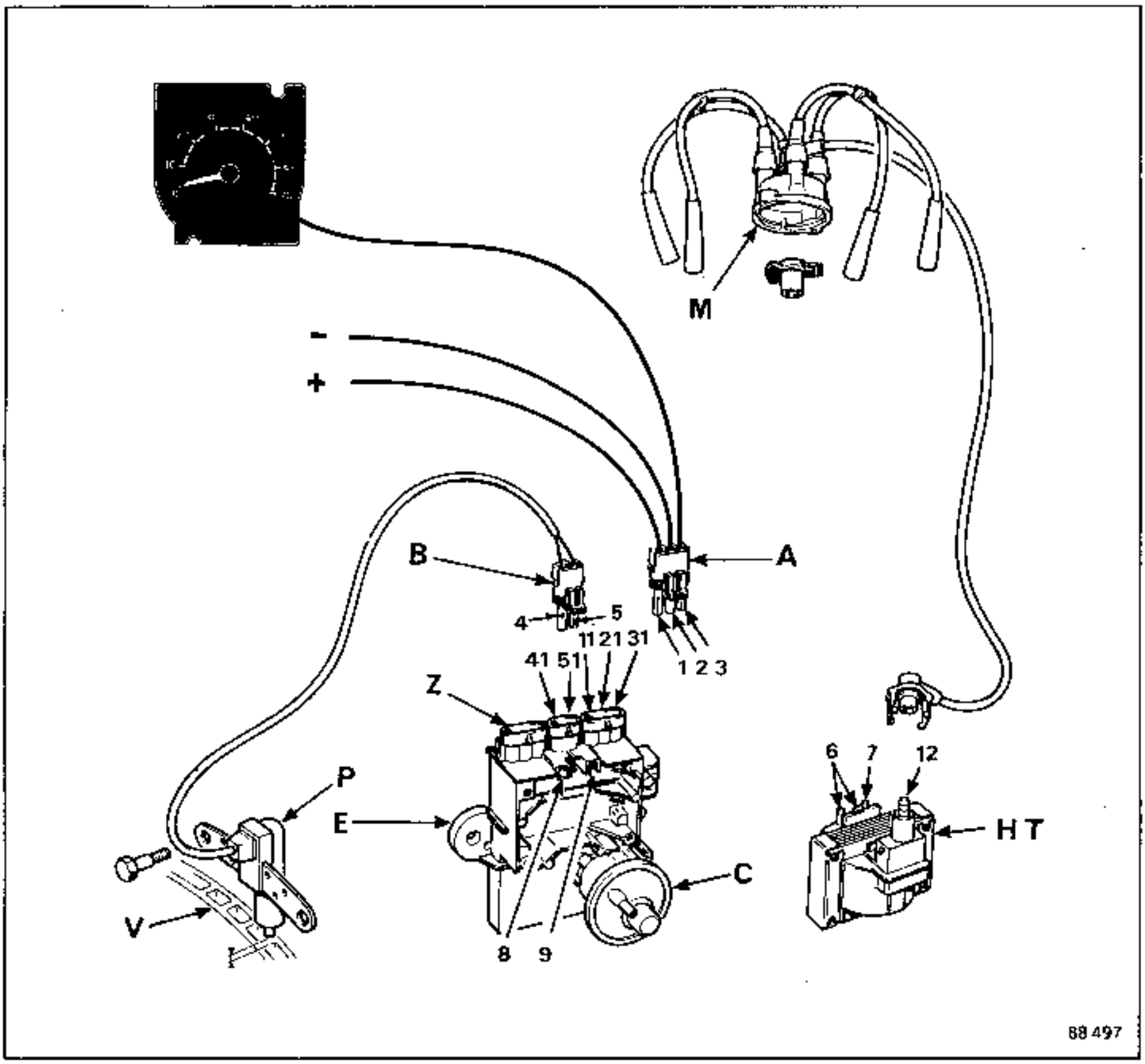
AEI RE282

Only the coolant temperature switch is used.

The oil temperature switch is replaced by the oil pressure warning light pressure switch, which was formerly at the back of the cylinder block near the engine intermediate shaft.

	Temperature (°C)	
	Below 90	Above 90
Advance correction between 1200 rpm and 4700 rpm at a vacuum of 0 to 270 mb.	0	-3 ± 2

This correction prevent pinking.



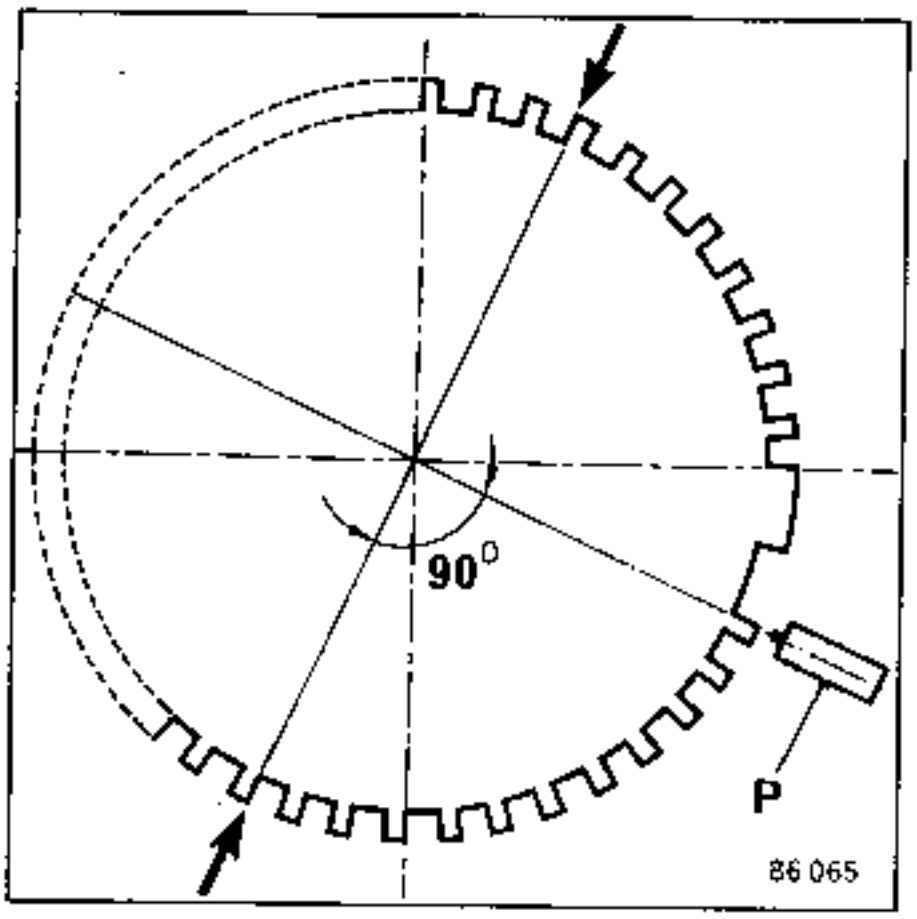
Item	Description
1	+ supply
2	Earth
3	Tachometer
4	Sensor coil
5	Sensor coil
6	Coil + terminal and interference suppression capacitor terminal
7	Coil - terminal
8	Coil + contact
9	Coil - contact
11	Module + "input"
12	Secondary contact stud
21	Module earth
31	Tachometer "output"

Item	Description
41	Sensor signal
51	Sensor signal
M	Distributor cap
HT	Ignition coil
C	Vacuum capsule
E	Electronic computer
P	Magnetic position sensor
V	Flywheel
A	Supply connector
B	Position sensor connector
Z	See special features on page 4

NOTE: Terminals 8 and 11 are directly interconnected inside the housing.

1 - FLYWHEEL

This has 44 evenly spaced teeth on it, of which two are removed each half turn to form an absolute precision index 90° before top and bottom dead centres. In reality, therefore, there are only 40 teeth.



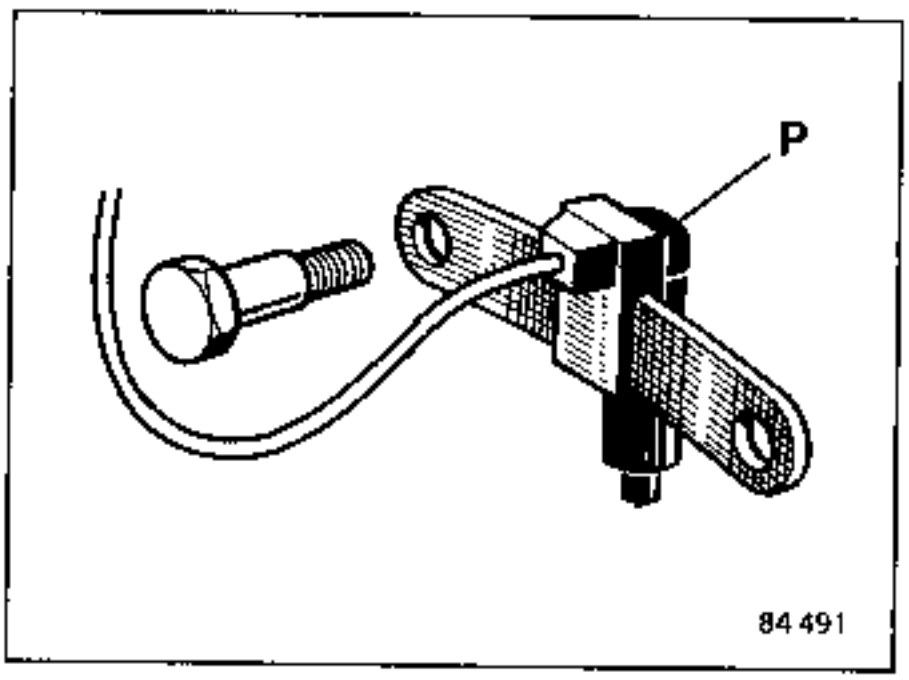
2 - POSITION SENSOR (P)

This detects:

- the positions of top and bottom dead centre,
- the engine speed.

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

It must be secured to the clutch housing with shouldered bolts.

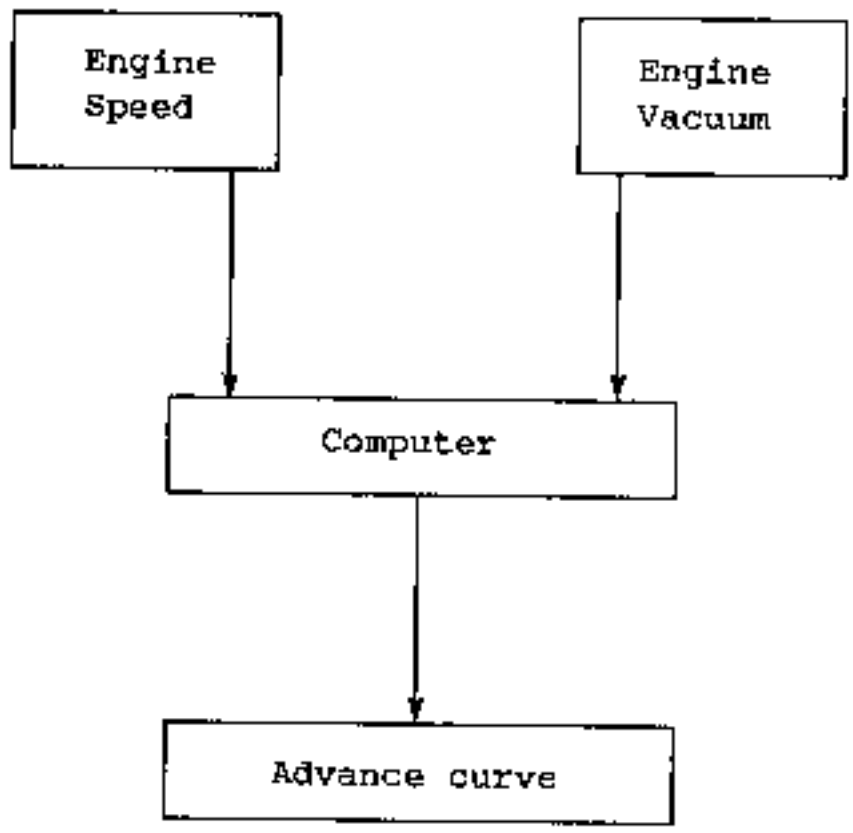


3 - VACUUM SENSOR

The external appearance of this vacuum capsule is identical to that on a conventional ignition system, but internally it is different.

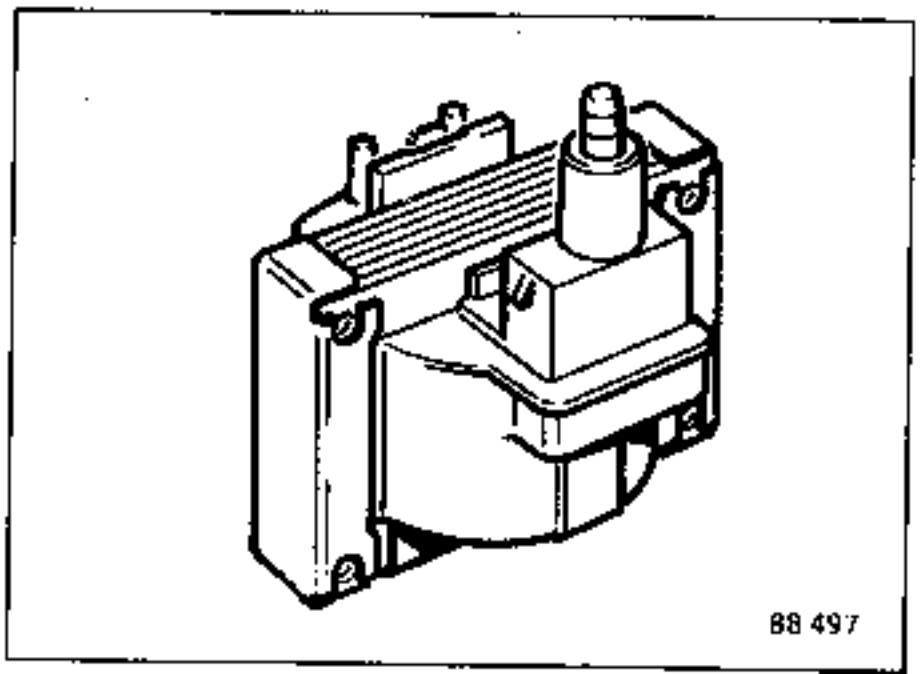
4 - THE COMPUTER

This is an electronic system which defines the timing curve to suit the engine speed and vacuum.



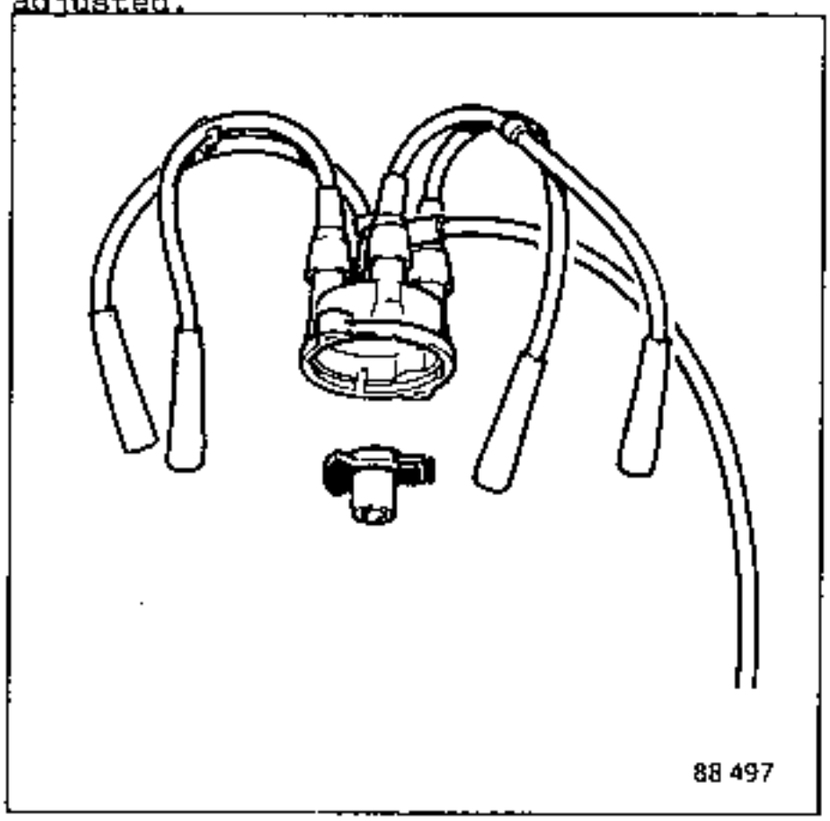
5 - THE COIL

This is separate from the computer and can therefore be replaced separately.



6 - THE DISTRIBUTOR CAP

This is a distributor the sole function of which is to distribute the high tension current to the spark plugs in the correct firing order. It cannot be adjusted.



CHECKING

The centrifugal and vacuum advance curves can be checked, but they cannot be adjusted (only a visual check on the ignition advance variation can be carried out).

TEST EQUIPMENT

Identical to that used on the other vehicles in our range:

voltmeter)
ohmmeter) of the specified type
strobe light
diagnostic bay (the connections being identical to those for vehicles which do not have a diagnostic plug and with the "electronic" key depressed).

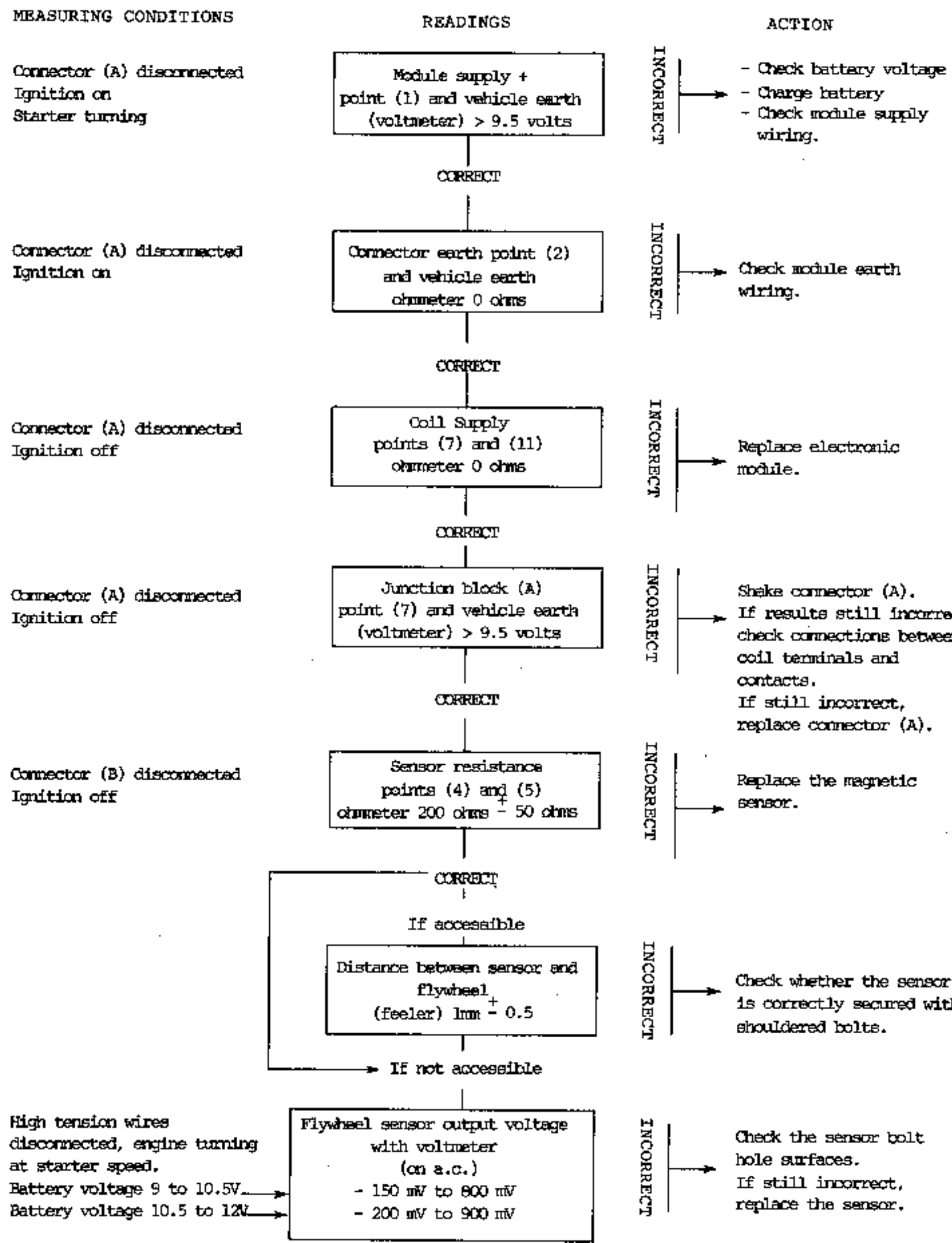
IMPORTANT

Precautions to be taken:

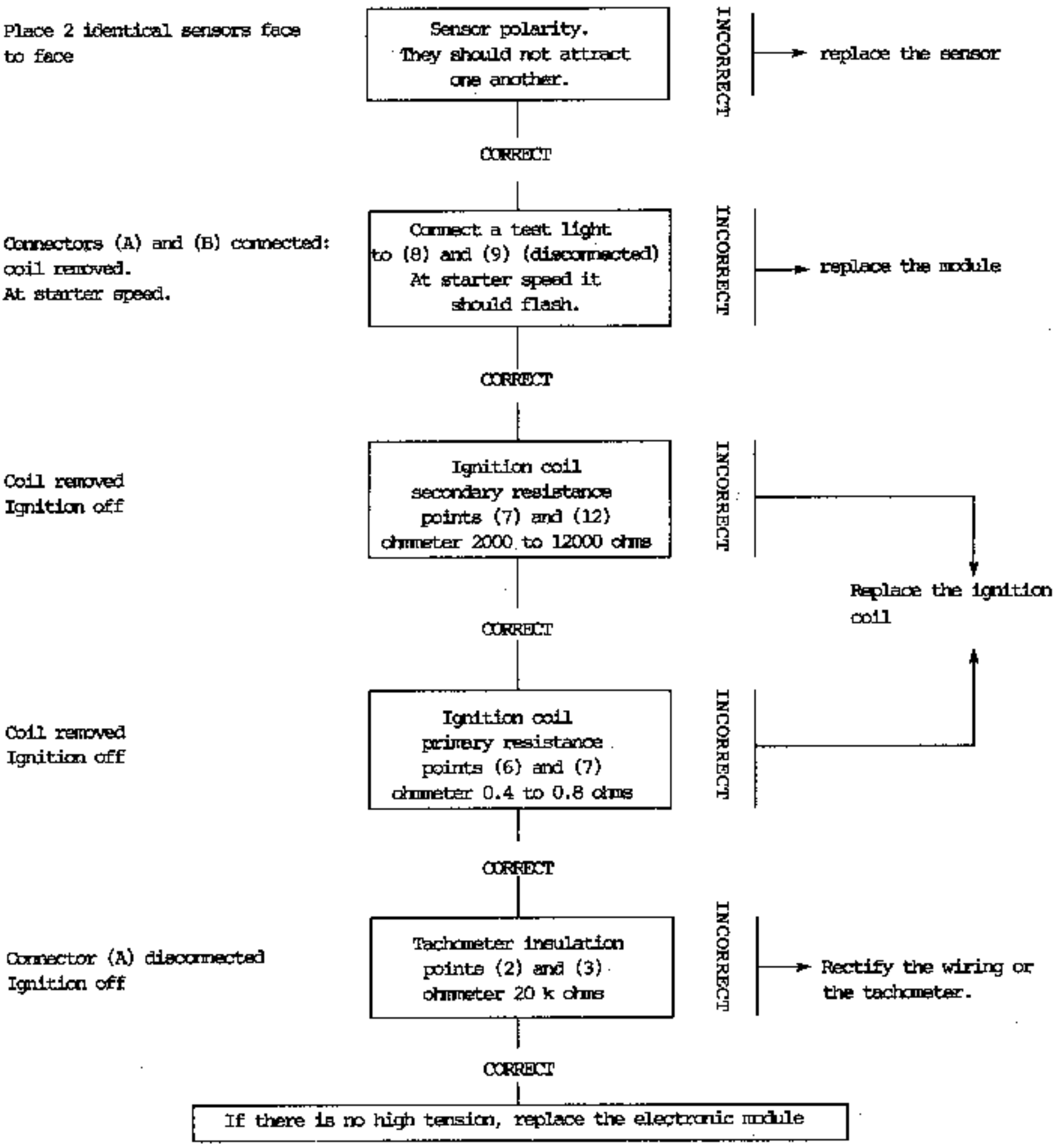
- do not strike a high tension spark on the electronic computer,

- do not earth the coil primary or secondary currents.

FAULT FINDING (cont'd)



FAULT FINDING (continued)



FAULT FINDING (continued)

STARTING DIFFICULT, BUT NO TROUBLE WHEN THE ENGINE IS RUNNING

Check, visually or with checking equipment:

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

Check the high tension at starter speed:

- disconnect the high tension lead at the distributor cap end,
- place the lead 2 cm from the cylinder block.

NOTE: NEVER BRING HIGH TENSION CURRENT INTO CONTACT WITH THE ELECTRONIC MODULE

Operate the starter.

READING

The high tension spark is even.

INCORRECT → ACTION: Check module supply: > 9.5 volts. Check battery charge. Charge battery

CORRECT

Check the carburation, mechanical condition of engine and initial timing

CORRECT

Measure sensor resistance points (4) and (5) ohmmeter: 200 ± 50 ohms. If incorrect, replace

CORRECT

If accessible

Check distance between sensor and flywheel (feeler) 1mm ± 0.5. If incorrect, replace

If not accessible

Check that flywheel sensor output voltage is higher than 150 mV (in a.c. position). Replace if incorrect

CORRECT

Check flywheel sensor polarity (2 identical sensors should not attract one another). If incorrect, replace sensor

CORRECT

Clean sensitive face of sensor

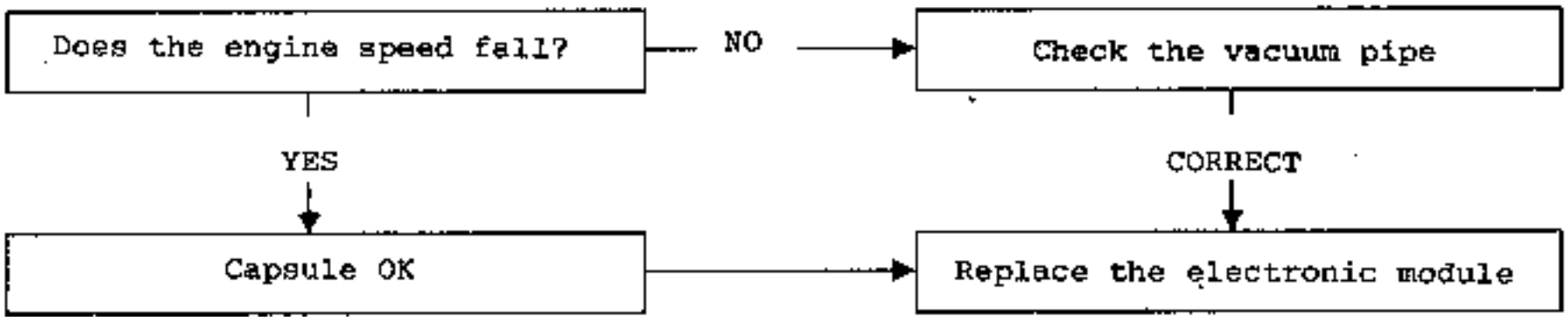
CORRECT

Replace sensor

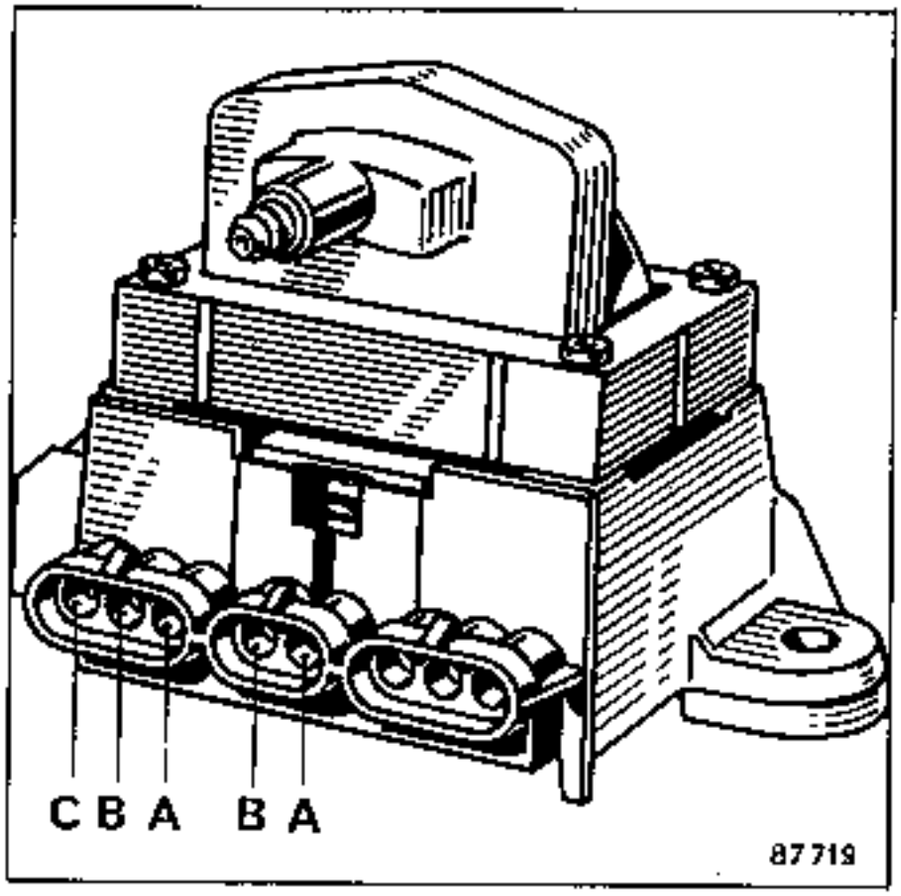
FAULT FINDING (continued)

CHECK THE MECHANICAL CONDITION OF THE VACUUM CAPSULE

- Stabilize the engine speed at 3000 rpm.
- Disconnect the vacuum pipe from the capsule.



The RENAULT injection unit is programmed with the ignition advance curves and sends a control signal (5 volts) to the ignition power module.



3 way connector

A Battery +
B Earth
C Tachometer

2 way connector

A Control signal earth
B Control signal

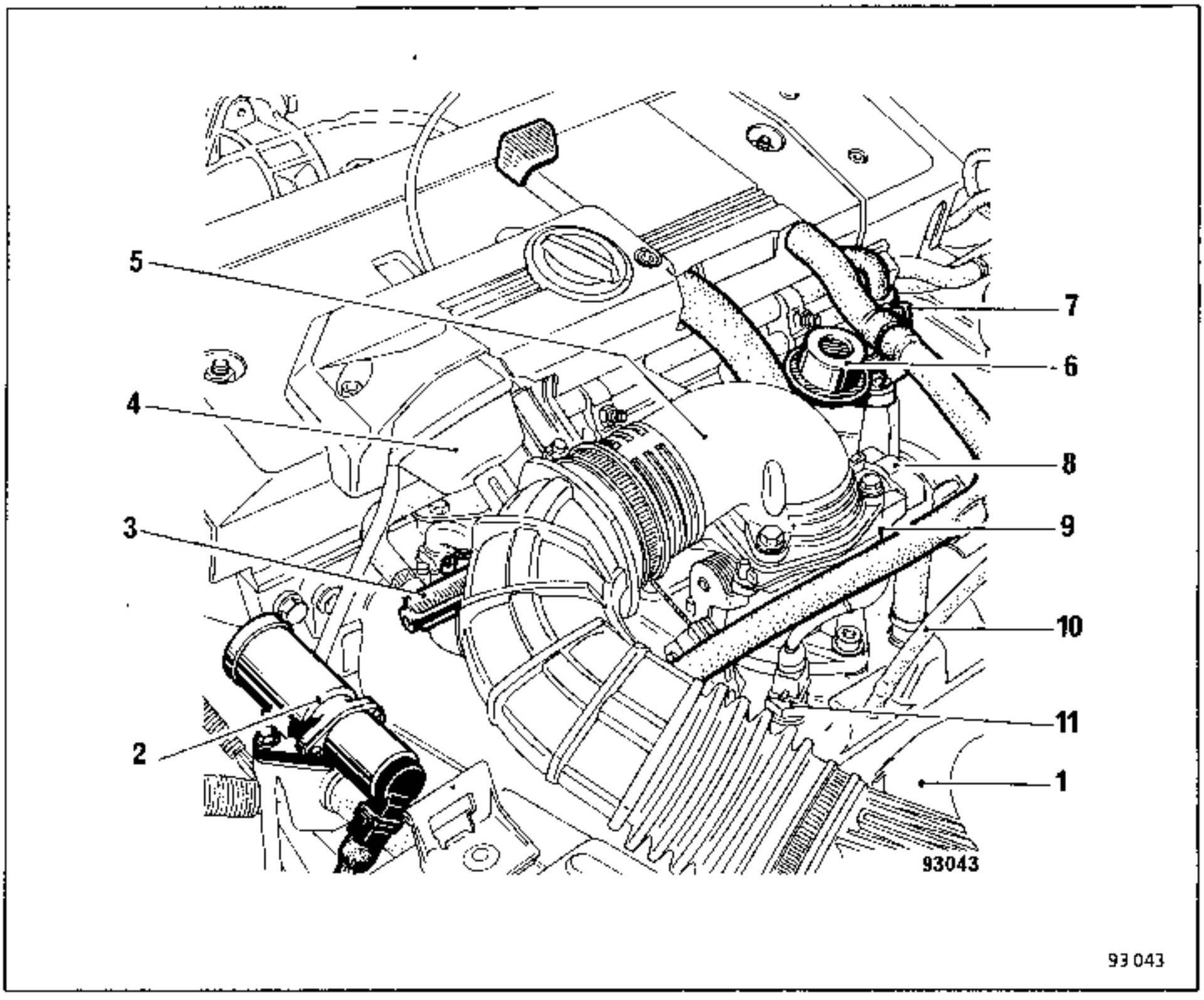
SPARK PLUGS

Type	ENGINE	AC	CHAMPION	EYQUEM RENAULT	SPARK GAP ± 0.5(mm)
L481 K481 S481 B481	F2N	C41CXLS	N279YC	C82LS	0,8
L482 K482 S482	F2N 710	C41CXLS	N279YC	C82LS	0,8
B482 L482 S482 K482	F2N 754	-	-	C82LS	0,8
L483 K483 B483	J7R		S6YC	C82LJS	0,9
L485	J7R 752			803LJSP	0,6
L489	J6R	C42CLTS	S279YC		0,8
L48D B48D	C2J		N281YC		0,8
L48E K48E B48E	F3N 722	C41CXLS	N6YC	C82LS	0,8
L48F K48F B48F	F3N 726		RN9YC		0,8
L48J K48J B48J	F2R 702	C41CXLS	N279YC	C82LS	0,8
L48K K48K B48K	J7T 754 J7T 755	C41CLTS	S7YC		0,8
L48M K48M	F2N 750	C41CXLS	N279YC	C82LS	0,8
L48N K48N	F2N 752	C41CXLS	N279YC	C82LS	0,8
L48Q/L48Y B48Q/B48Y	J7R 754	-	-	FC62LS3	1,2

WARNING: Fit only the make and type of spark plugs epecified. The thermal index is not the only factor in the selection of spark plugs.

On the following pages we have covered the special features of 12 valve (X48Q or X48Y) vehicles. For other fuel injection types, consult manuals MR INJ R(E) and INJ single point.

Special Features of the J7R 754 Engine



1. Air filter
2. Regulator valve (HITACHI)
3. Fuel injection gallery
4. Speed regulator capsule
5. Air intake ducting
6. Pulse damper
7. Fuel pressure regulator
8. Load potentiometer
9. Throttle unit
10. Pressure sensor pipe with 1.5mm jet
11. Air temperature sensor

The J7R-754 engine differs from the others at its cylinder head (12 valves):

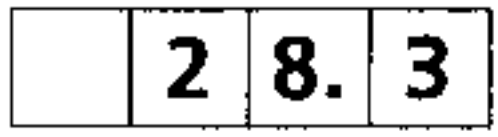
- the spark plugs are on the exhaust side,

- the inlet manifold is special, as is the fuel injection gallery, which is fitted with a pulse damper and a pressure regulator which is integral with the gallery.

- the idling speed regulator valve (HITACHI) is mounted directly on the inlet manifold. It is fitted with a 2 wire connector (one + after the ignition switch and one - leading to computer terminal 24).

The fault finding sequences and the method of using test XR 25 are described in manual MR INJ R(E) Section 17.

Identification number reading on the XR 25 central display

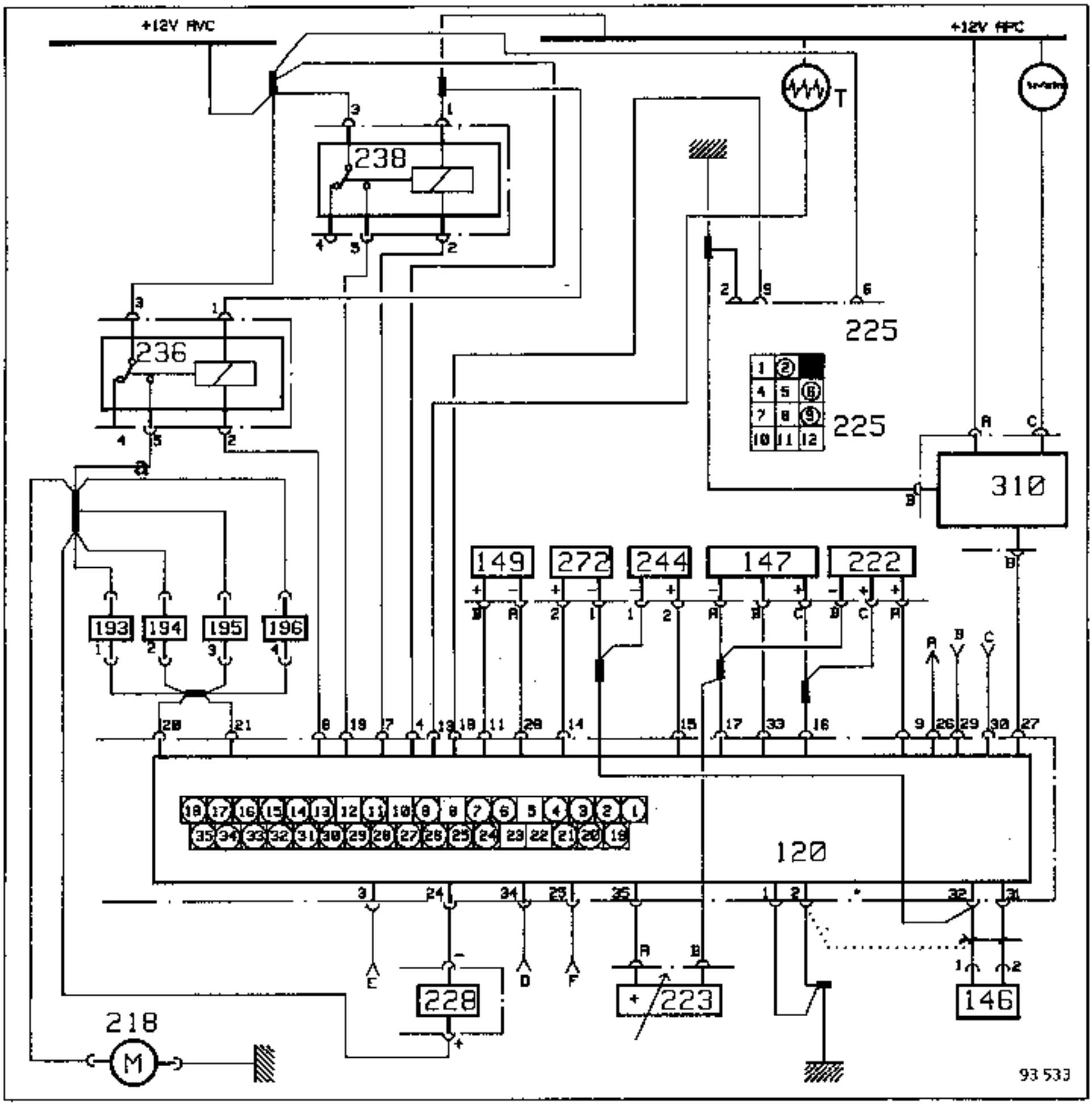


TESTS CARRIED OUT (on the basis of the number displayed by the XR 25)	Keys	28	
Pressure sensor	01	x	Millibars
Coolant temperature	02	x	Degrees
Air temperature	03	x	Degrees
Supply voltage	04	x	Volts
CO Potentiometer	05	x	Ohms
Sensor 02	05		Millivolts
Engine speed	06	x	rpm
Turbo pressure RCO	11		Milliseconds
Idling regulator valve RCO	12	x	Milliseconds %
Pinking sensor signal	13	x	No units
Engine speed variation	14	x	rpm
Pinking correction	15	x	No units
Atmospheric pressure correction	16	x	Millibars
No load/full load potentiometer reading	17	x	No units
Vehicle speed	18	x	Km/h
Turbo pressure correction	20		Milliseconds

NOTE: The tests and data checks described on the following pages are to be carried out with the XR 25 fitted with cassette no. 7 or subsequent cassettes and using test data sheet no. 87A.

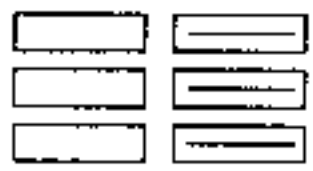
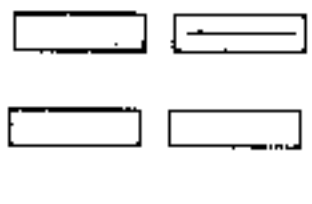
The computer is of the type which memorizes transitory defects. The diagnosis output is permanent and the diagnostic warning light on the instrument panel operates.

INJECTION CIRCUIT DIAGRAM

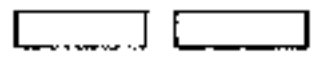
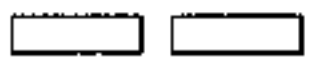


120	Computer
146	Pinking sensor
147	Pressure sensor
149	Flywheel sensor
193 - 196	Injectors
218	Fuel pump (engine)
222	Throttle unit potentiometer
223	Adjusting potentiometer
225	Diagnostic socket (plan view)
228	Idling regulator solenoid valve
236	Pump relay
238	Supply relay
244	Coolant temperature sensor
272	Air temperature sensor
310	Ignition power module (M.P.A.)
	Connectors
T	Diagnostic warning light
A	To flow sensor
B	Starter signal
C	Air conditioning - on/off signal
D	Air conditioning thermostat signal
E	Vehicle speed signal
F	Power steering pressure switch signal

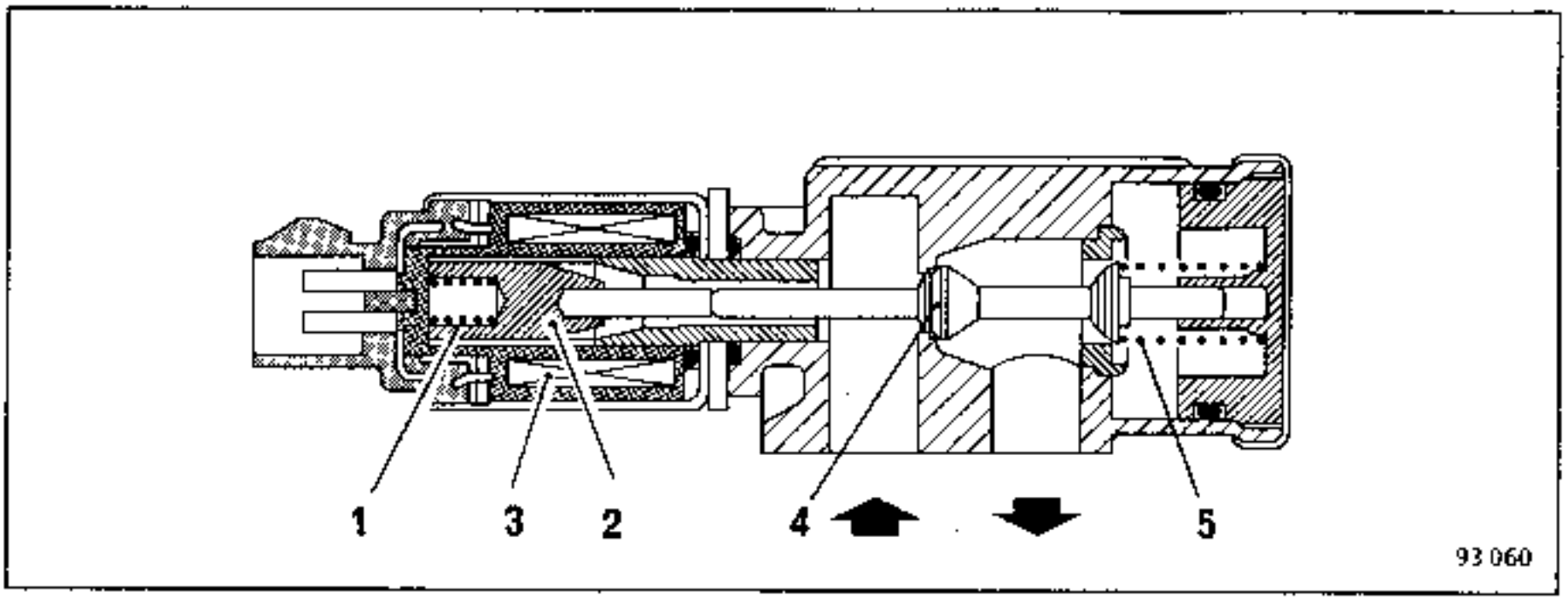
CHECKING THE SPECIFICATIONS

Function to be Checked	Conditions	Selection on Tester	Bar Graph Line No.	Bar Graph Display	Digital Display Remarks
Injection diagnostic position	Engine stopped Ignition on	D03	L1 L8 L10	 L1 : presence code L8 : TDC code L10 : no throttle position	XXXX 28.3 3 = injection diagnostic
Throttle potentiometer check	Engine stopped Ignition on, - no throttle, - accelerator slightly depressed - accelerator fully depressed	# 17	L10 L10 L10		XXXX 4 to 10 min 225
Check on absolute pressure sensor	Engine stopped, ignition on	# 01			XXXX at local barometric pressure
Coolant temperature sensor check	Engine cold - stopped - ignition on	# 02			XXX Ambient temperature ± 5°C
Air temperature sensor check	Engine cold - stopped - ignition on	# 03			XXX Ambient temperature ± 5°C
Battery voltage	Engine warm - running at idling	# 04			Reading XXX 13.2 to 14.4
Coolant temperature sensor check	Engine warm - at idling - after electric fan has cut in once If tester returns to 0	# 02 D03 # 02			XXX 80°C to 110°C

CHECKING THE SPECIFICATIONS

Function to be Checked	Conditions	Selection on Tester	Bar Graph Line No.	Bar Graph Display	Digital Display Remarks
Idling speed regulation and CO percentage check	Engine warm running at idling No current consumer operating such as: - electric fan - power steering (steering lock	# 06 # 12			XXXX Idling speed: 850 + 75 rpm C.O. = 1.8 ± 0.2 % R.C.O. = 30 35 %
Check on idling speed with air conditioning running	Engine warm running at idling - air conditioning control on - compressor engaged	# 06 # 06	L14 L14	 	Check speed XXX 900 to 1000rpm Check speed XXX 900 to 1000rpm
Check on pinking detection system Noise measurement	Engine warm, running off load at: 3600 +200 rpm -0	# 13	L12		Take min and max readings over approx. 10 secs. XXX The reading should be more than zero and variable
Vehicle speed	Vehicle moving	# 18	L15		XXX The reading should be the same as the actual vehicle speed.

"HITACHI" REGULATOR VALVE



PRINCIPLE OF OPERATION

The HITACHI regulator valve has a single winding (2 wires on the connector).

In the "off" position

The air circuit is closed, the spool (4) is pushed back towards the coil (3) by the spring (5). The core (2) is held against the spool by the small spring (1).

With the ignition switched on and the engine stopped

(period during which the fuel pump is running). The coil is supplied with current. The magnetic field pushes over the core (2), the spool (4) moves and opens the valve:

R.C.O. 0% = valve closed
R.C.O. 100% = valve open

With the ignition on and the engine running at idling speed

The computer maintains a cycling rate (R.C.O.) which will maintain the air delivery that keeps the idling speed at the figure programmed on the computer (for example, 850 rpm when the engine is warm).

TESTING BY MEANS OF THE XR 25

Special features:

The total sequence time for the HITACHI valve is approximately 6 m.s.

Example of XR 25 readings

	Diag. output 12	Voltmeter output connector G.O.
Valve closed	0 %	6 m.s
Valve open	100 %	0.3 m.s
Engine warm Idling regulation	37 %	3.9 m.s

FAULT FINDING

If there is something wrong with the idling regulation system, the engine will stall when the foot is removed from the accelerator.

Check:

The coil resistance (9 to 30 ohms).

That the + supply, after the ignition switch, is present at the connector supply wire (current present, with the engine stopped, for approximately 1 second after the ignition is switched on)

Check the continuity of the circuit between:

- channel 24 on computer connector (computer disconnected and replaced by junction block M.S.1048) and channel 5 on the pump relay connector (236). See circuit diagram.

ANTI-FREEZE QUANTITIES AND GRADES

Cooling System Engine Types	Capacities, in litres for the various versions				Specific Requirements
	Phase I	Phase II	C.A.	Aut. Trans.	
C2J	5,5	5,5	-	-	
F2N	5,2	6,4	6,4	6,4	
F2R	7	7	7	-	Glaceol AL (type C)
F3N single point	4,7	6	-	-	
F3N multipoint	4,7	6	6	6,4	Add only demineralized
F8Q	-	7	-	-	water
J6R	6,8	6,8	6,8	7,2	
J7R	6,8	6,8	7	7,2	Protection down to -23°C
J7R Turbo	6,2	6,2	6,2	-	for temperate, hot and cold
J7R 12 valve	-	7,1	7,1	-	climates
J7T	5,7	5,7	7	7,2	Protection down to -40°C
J8S	7,1	-	-	-	for very cold climates.
J8S Turbo	7,2	7,2	7,2	-	
J8S +	7	7	-	-	

THERMOSTAT

Engine Type	Starts to open (in °C)	Fully open (in °C)	Travel (in mm)
C2J	89	101	7,5
F2N F3N	89	101	8
F2R	78	90	7,5
F8Q	82	94	7,5
J6R J7R J7T	89	101	7,5
J8S	81	93	7,5

ANTI-FREEZE CONCENTRATION

Refractometer

Supplier:
CEPAC
33 rue Julles Auffret-
BP55
93130 NOISY LE SEC

OR

S.G. Meter

Supplier:
FACOM
6 and 8, rue Gustave
Eiffel-BP99
91423 MORANGIS

Take coolant from the expansion chamber.

Read the protection provided with the refractometer.

Hot, temperate and cold climates:

Protection -23°C (35% anti-freeze solution)

Very cold countries

Protection -40°C (50% anti-freeze solution)

If the anti-freeze concentration exceeds 60%, the protection is reduced.

The protection levels shown in these charts are valid for coolant at a temperature of 40°C.

Using the Chart

If a vehicle with an anti-freeze capacity of 6 litres shows a protection reading of -15°C.

To take the protection down to -23°C, one must replace 0.7 litres of the mixture in the system by 0.7 litres of pure anti-freeze.

To take the protection down to -40°C, one must replace 1.9 litres of the mixture in the system by 1.9 litres of pure anti-freeze.

PURE ANTI-FREEZE TO BE ADDED

-23°C
Hot, temperate and cold climates

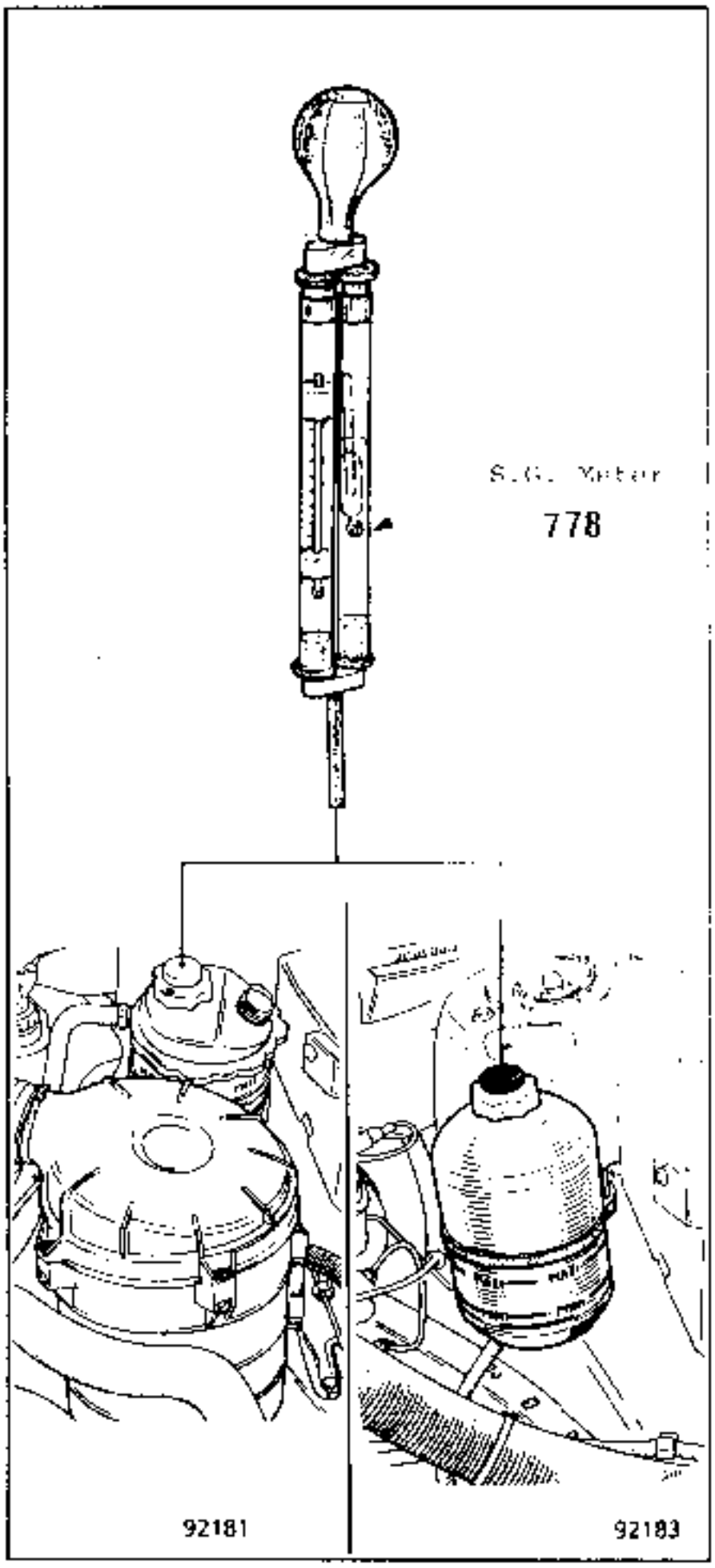
Protection noted at a coolant temp. of 40°C	Volume of coolant to be replaced by Glacelf AL TYPE C anti-freeze to obtain protection down to -23°C	System capacity (litres) 5	6	7	8	9
- 5°C		1,3	1,6	1,8	2,1	2,4
- 10°C		1	1,1	1,3	1,5	1,7
- 15°C		0,6	0,7	0,9	1	1,1
- 20°C		0,2	0,2	0,2	0,3	0,3

-40°C
Very Cold Climates

Protection noted at a coolant temp. of 40°C	Volume of coolant to be replaced by Glacelf AL TYPE C anti-freeze to obtain protection down to -40°C	System Capacity (litres) 5	6	7	8	9
- 5°C		2,2	2,6	3,1	3,5	3,6
- 10°C		1,9	2,3	2,7	3	3,4
- 15°C		1,6	1,9	2,2	2,6	3
- 20°C		1,3	1,6	1,8	2	2,3
- 25°C		1	1,2	1,4	1,7	1,9
- 30°C		0,9	1	1,2	1,4	1,5
-35°C		0,5	0,5	0,6	0,7	0,8

SPECIFIC GRAVITY METER

Draw in coolant until it surrounds the base of the thermometer and freely lifts the float.



Check that the float:

Is not making contact with the upper end of the tube (too much coolant).

Is not sticking to the sides of the tube. If necessary, tap it gently to free it.

Read:

The coolant temperature.

The specific gravity of the coolant.

Consult this correction table to determine the actual frost protection provided by the coolant.

	READING ON S.G. METER						
	3	5	10	15	20	30	40
10	0	0	5	8	11	14	18
20	1	2	6	10	14	18	24
30	2	3	8	12	17	24	33
40	3	5	10	15	20	30	40
50	4	7	12	18	24	35	
60	6	9	15	22	28	40	
70	8	12	18	25	32		
80	10	14	22	32	37		

CORRECTED PROTECTION IN DEGREES

EXAMPLE { Thermometer reading 60 / S.G. meter reading: 10 } PROTECTION DOWN TO MINUS 15°C

ALUMINIUM MATRIX RADIATORS

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

Flushing Out

Never flush out these radiators, or the cooling system, with caustic soda or alkaline products (they can corrode light alloy components and cause leakage)

Storage

A radiator can be stored, after removal, for a maximum of 48 hours without taking any particular precautions.

For longer than this, however, particles of the brazing flux used in the radiator during manufacture and the dichlorides in the coolant that the radiator contained, cause, when they make contact with the air, oxydization of the aluminium components of the radiator, resulting in leakage.

One must therefore carry out the following on a radiator which is to remain off the vehicle for more than 48 hours:

- Either THOROUGHLY FLUSH IT OUT with water, BLOW THROUGH IT with compressed air, then PLUG all the orifices.

- Or keep it filled with coolant, if possible.

Anti-Freeze

The correct type of anti-freeze must be used in an aluminium radiator.

The AL type C anti-freeze marketed by the RENAULT network fulfils the specifications laid down by our Design Office, in particular in that:

- it does not attack the various aluminium and cast iron components,

- it has an alkaline content which is specifically adapted to the special requirements of light alloy systems,

- it contains special additives providing effective protection against the acid products of combustion found in both high speed diesel and petrol engines,

- the premixed coolant solutions provide for correct frost protection and efficient running at all temperatures.

ESSENTIAL SPECIAL TOOLS	
M.S. 554-03	Cooling system leak test equipment
M.S. 554-01	Adaptor for M.S.554-03
M.S. 554-04	Adaptor for M.S.554-03

1 - Checking the System for Leaks

Replace the valve on the expansion bottle by adaptor M.S.554-01.

Connect tool M.S.554-03 to it.

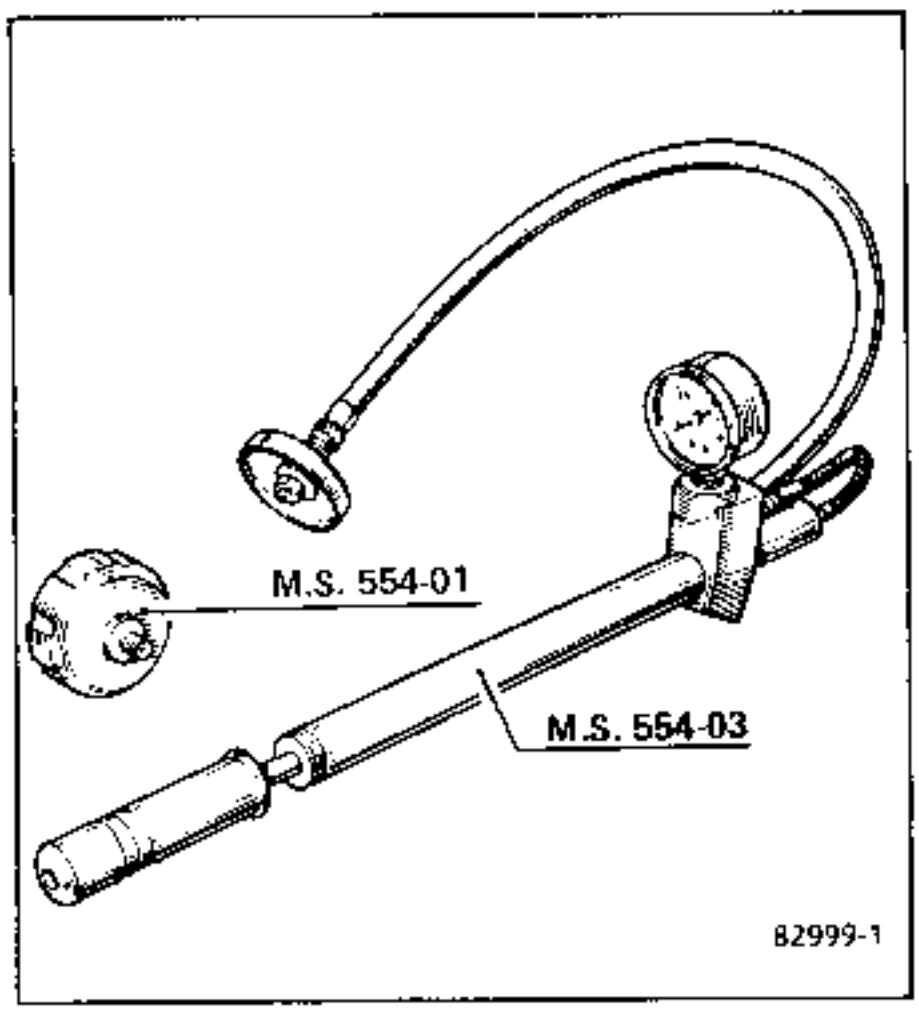
Warm up the engine and stop it.

Pump the equipment to pressurize the system.

Stop pumping at 0.1 bars below the figure at which the valve opens.

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

Slowly unscrew the union on tool M.S.554-03 to release the pressure from the cooling system, then remove tool M.S.554-01 and refit the expansion bottle valve using a new seal.



2 - Checking the Valve Setting

If coolant has passed through the expansion bottle valve, the valve must be replaced by a new one.

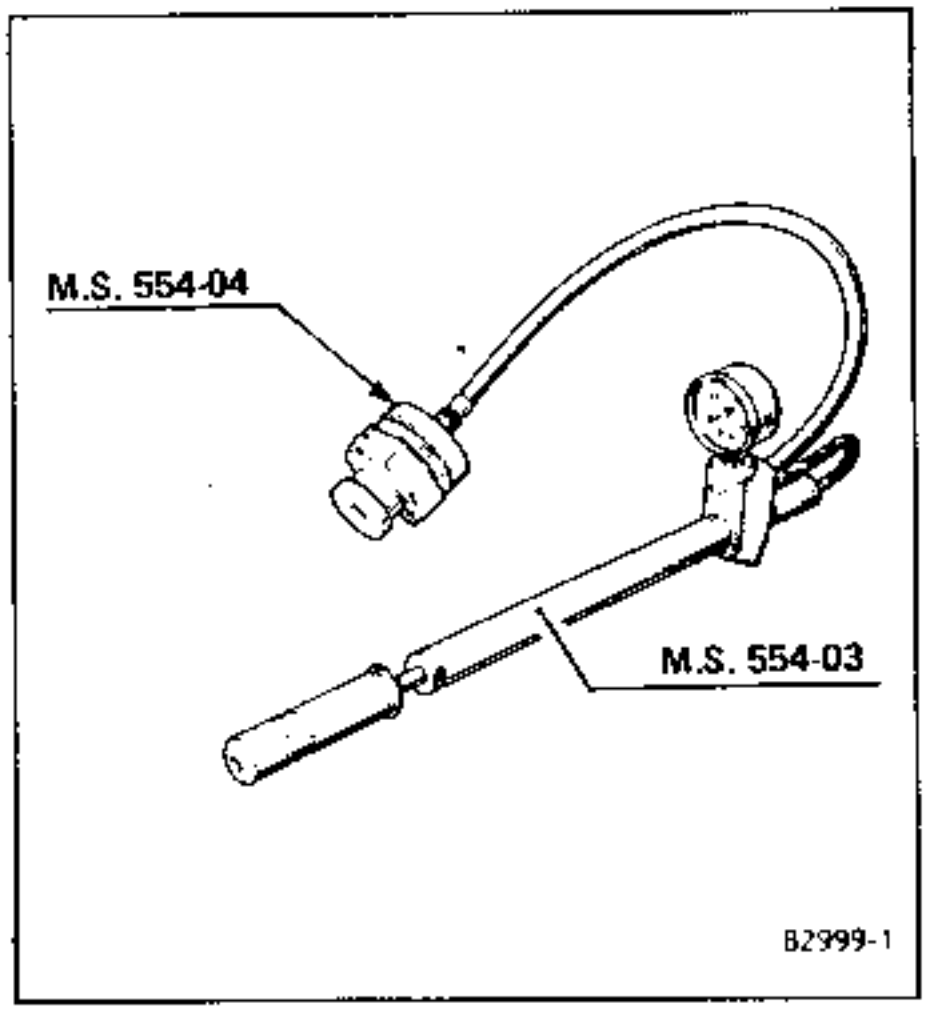
Fit tool M.S.554-04 to pump M.S.554-03 and fit the valve under test to the tool.

Raise the pressure. It should stabilize at the valve opening pressure to within a test tolerance of $\pm$ 0.1 bars.

Valve Setting Pressure

Brown plastic valve 1.2 bars.

Blue plastic valve 1.6 bars.



EXPANSION BOTTLES THAT ARE NOT AN INTEGRAL PART OF THE RADIATOR

There is no heater hot water valve. There is a continuous flow of water through the heater which contributes towards engine cooling.

FILLING

Check that the drain plug or plugs are fully tightened.

Open the bleed screw or screws.

Fill the system through the expansion bottle.

Close the bleed screws as soon as coolant runs from them in a continuous jet.

Start the engine (run it at 1500 rpm).

Top up the level to overflowing, for approximately 4 minutes.

Close the bottle.

BLEEDING THE SYSTEM

Leave the engine running for approximately 10 minutes at 1500 rpm until the electric fan or fans cut in (time required for the automatic degassing of the system.)

Check that the coolant level is near the "Max" mark.

DO NOT OPEN THE BLEED SCREW OR SCREWS WITH THE ENGINE RUNNING.

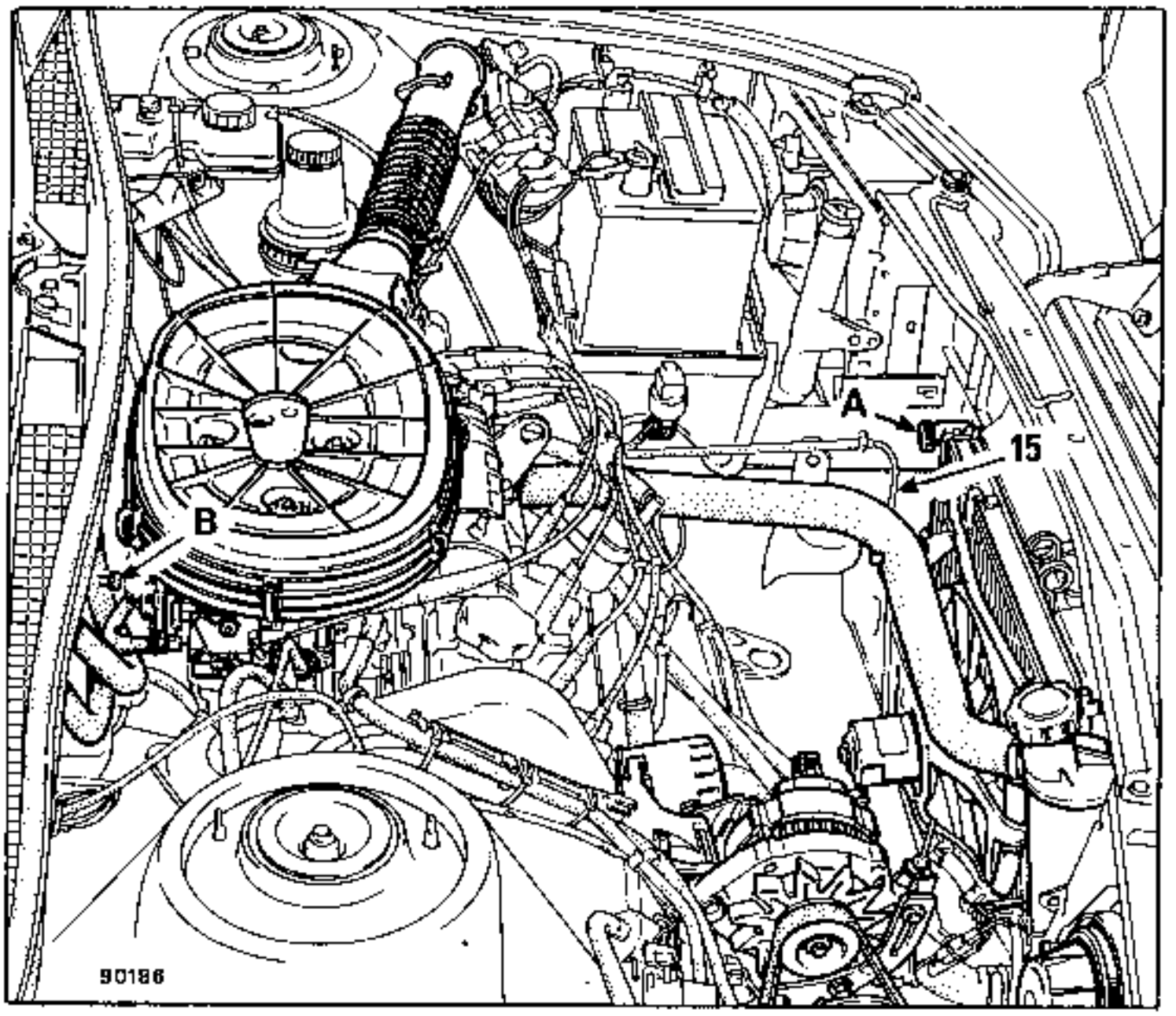
TIGHTEN THE EXPANSION BOTTLE CAP WHEN THE ENGINE IS WARM.

EXPANSION CHAMBER WHICH FORMS PART OF THE RADIATOR

There is no heater hot water valve.

The coolant flow through the heater is continuous and contributes to cooling the engine.

FILLING



Open the bleed screw (A) on the radiator.

Open the bleed screw (B) on the heater hose.

Disconnect the syphon pipe from the radiator and lay it flat (15).

Gradually fill the system through the expansion chamber.

Close the bleed screws (A) and (B) as soon as there is a continuous flow of coolant from them.

Start the engine (1500 rpm).

Depress the accelerator 3 or 4 times (3 to 4000 rpm), then top up the level until it overflows the expansion chamber for approximately 4 minutes.

Close the expansion chamber. Return the syphon pipe to its original position.

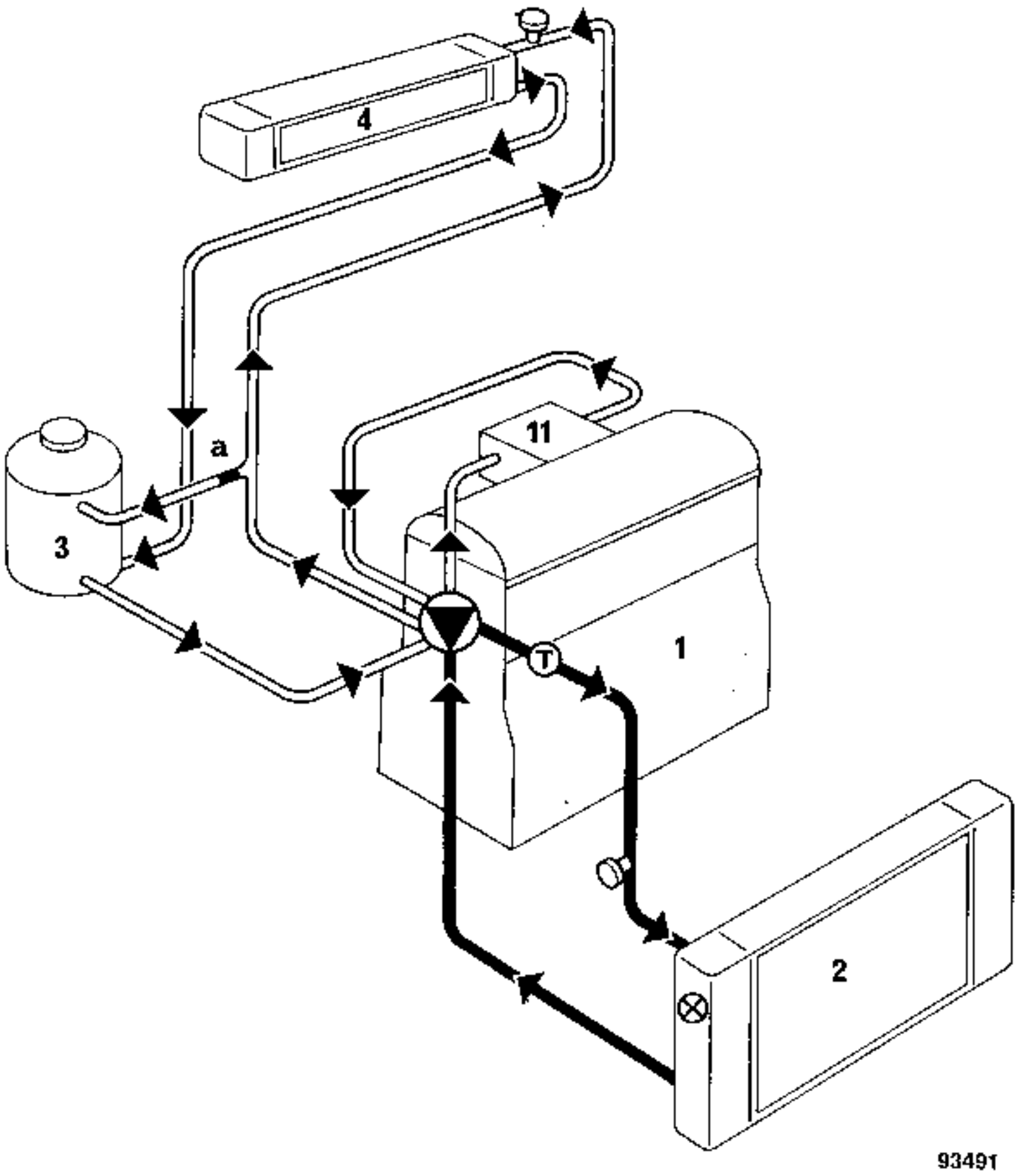
Allow the engine to run for 10 minutes at 1500 rpm until the electric fan cuts in at least three times:
(this is necessary to degas the system automatically).

Check that the coolant level is around the "max" mark (it is acceptable for it to be higher than this).

DO NOT OPEN THE BLEED SCREW OR SCREWS WHILST THE ENGINE IS RUNNING.

RETIGHTEN THE EXPANSION CHAMBER CAP WHEN THE ENGINE IS WARM.

Phases I and II



1. Engine
2. Radiator
3. Expansion bottle
4. Heater
11. Carburettor base heater
a. 3mm Ø jet

Coolant pump

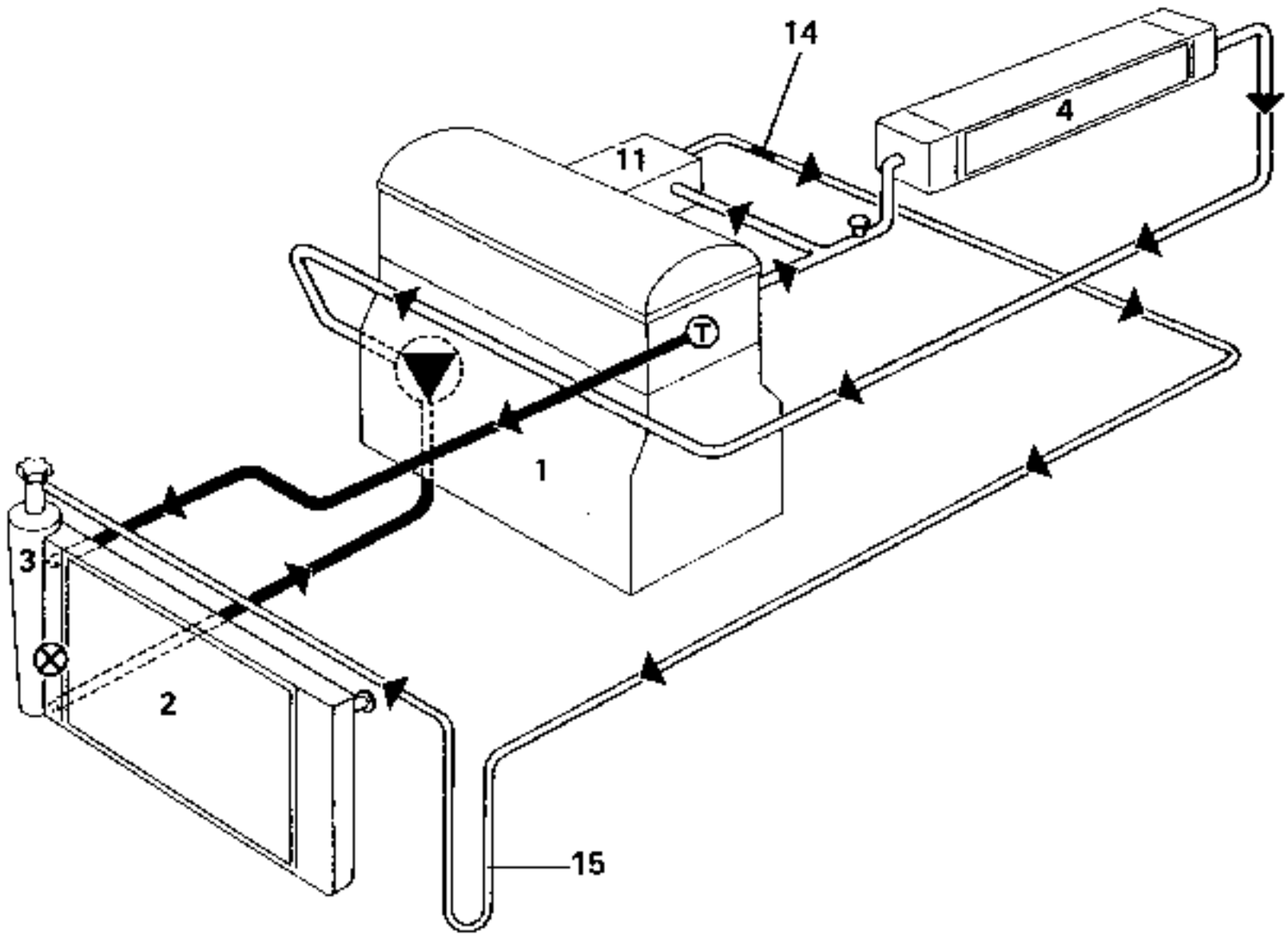
T Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase I



90162

1. Engine
2. Radiator
3. Hot bottle with permanent degassing
4. Heater
11. Carburettor base heater
14. 3.5mm Ø jet
15. Siphon

Coolant pump

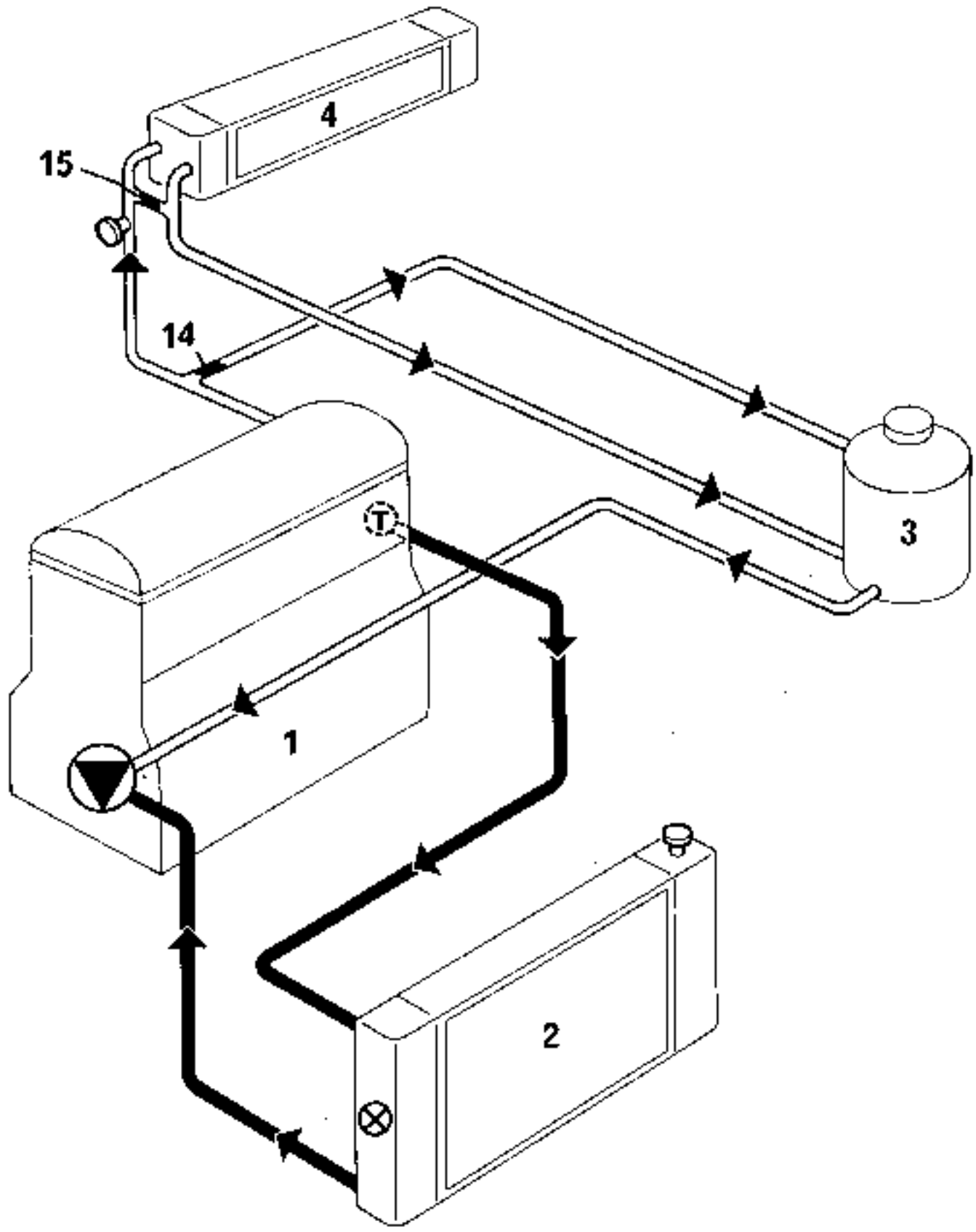
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase II
- temperate climate 76HP
- emission control 75HP



93485

1. Engine
2. Radiator
3. Hot bottle with permanent degassing
4. Heater
14. 3mm Ø jet
15. 8mm Ø bypass jet

Coolant pump

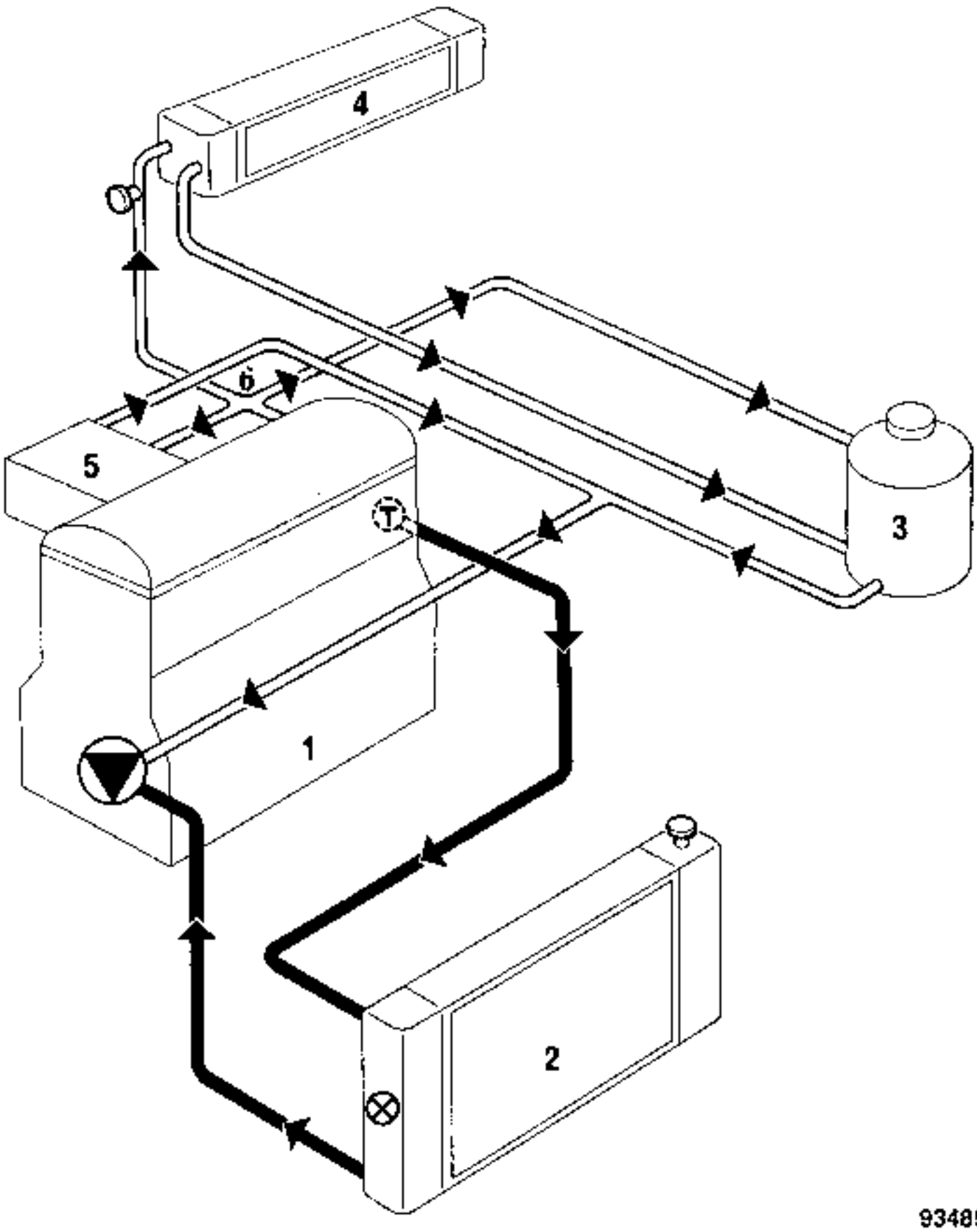
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase II
- emission control 90HP



93485. 1

1. Engine
2. Radiator
3. Hot bottle with permanent degassing
4. Heater
5. Manifold
6. 4 way union
   Jets Ø 16/10/10/3mm

Coolant pump

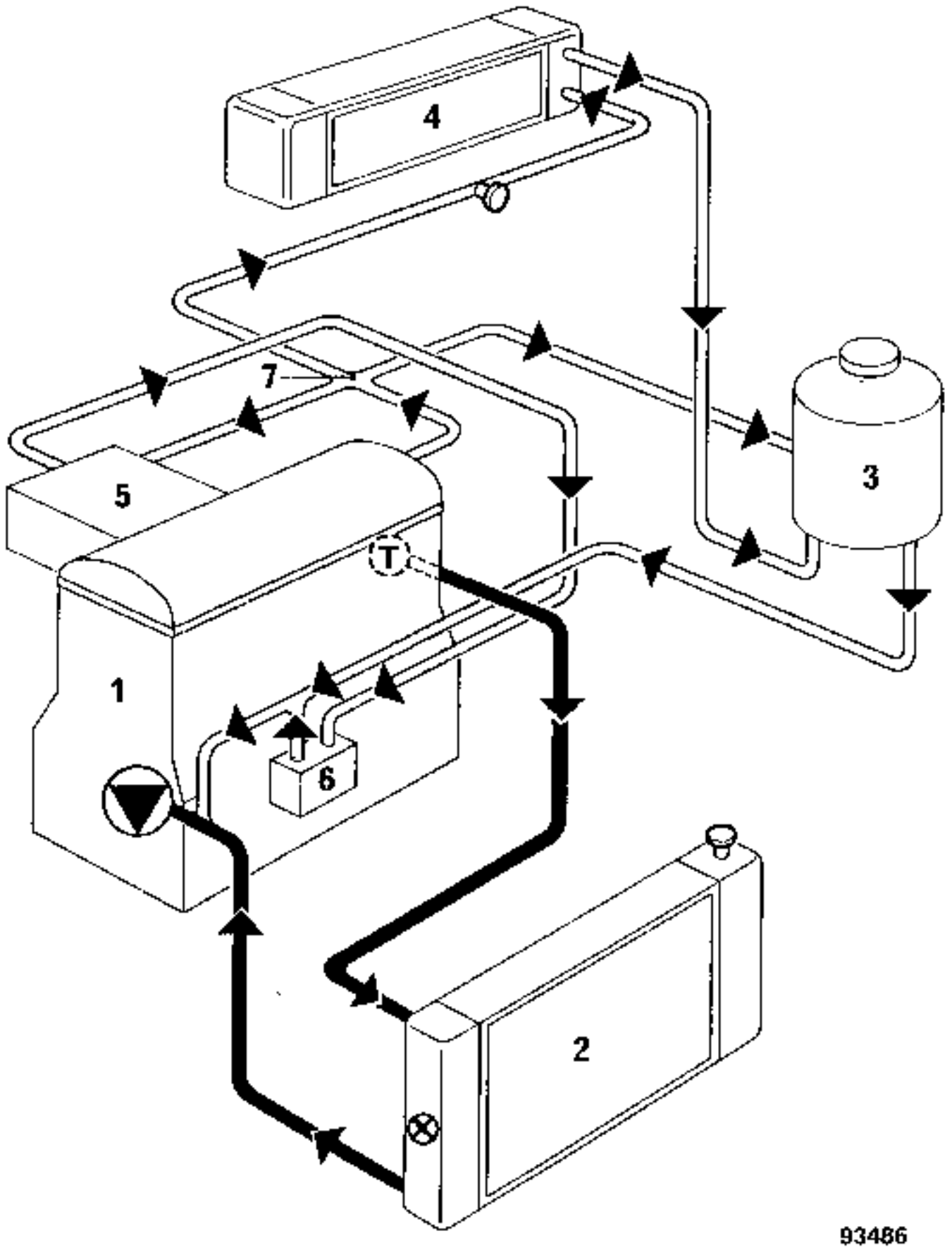
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.6 bars

Phase II
- hot climates, without air conditioning



93486

1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
5. Manifold
6. Modine (oil cooler)
7. 4 way union
   Jets Ø 16/10/10/3mm

Coolant pump

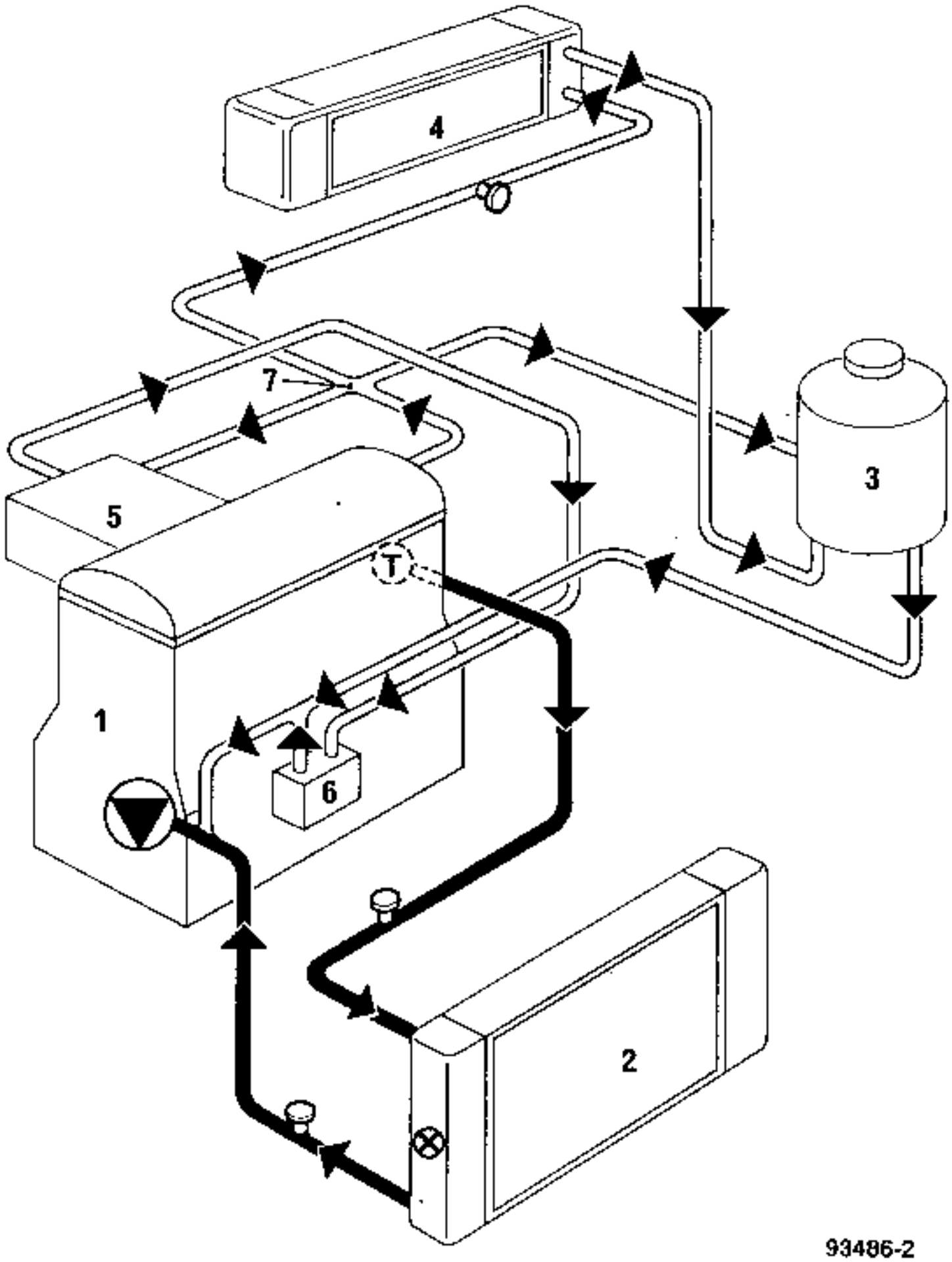
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1,6 bars

Phase II
- hot climates, with air conditioning



93486-2

1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
5. Manifold
6. Modine (oil cooler)
7. 4 way union
   Jets Ø 16/10/10/3mm

Coolant pump

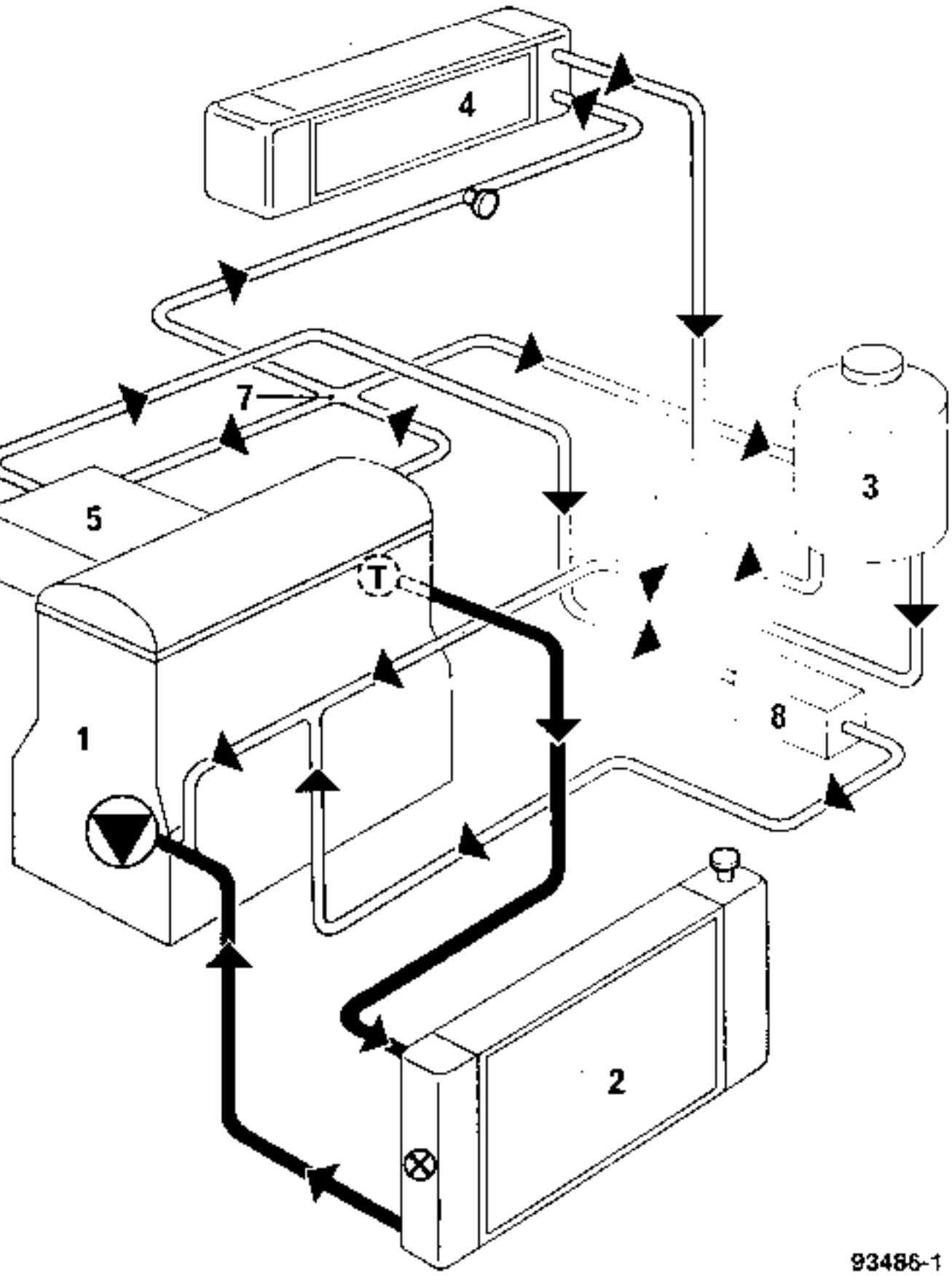
T Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.6 bars

Phase II
- Automatic transmission, temperate climates



1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
5. Manifold
7. 4 way union
   Jets Ø 16/10/10/3mm
8. Aut. trans. oil cooler

Coolant pump

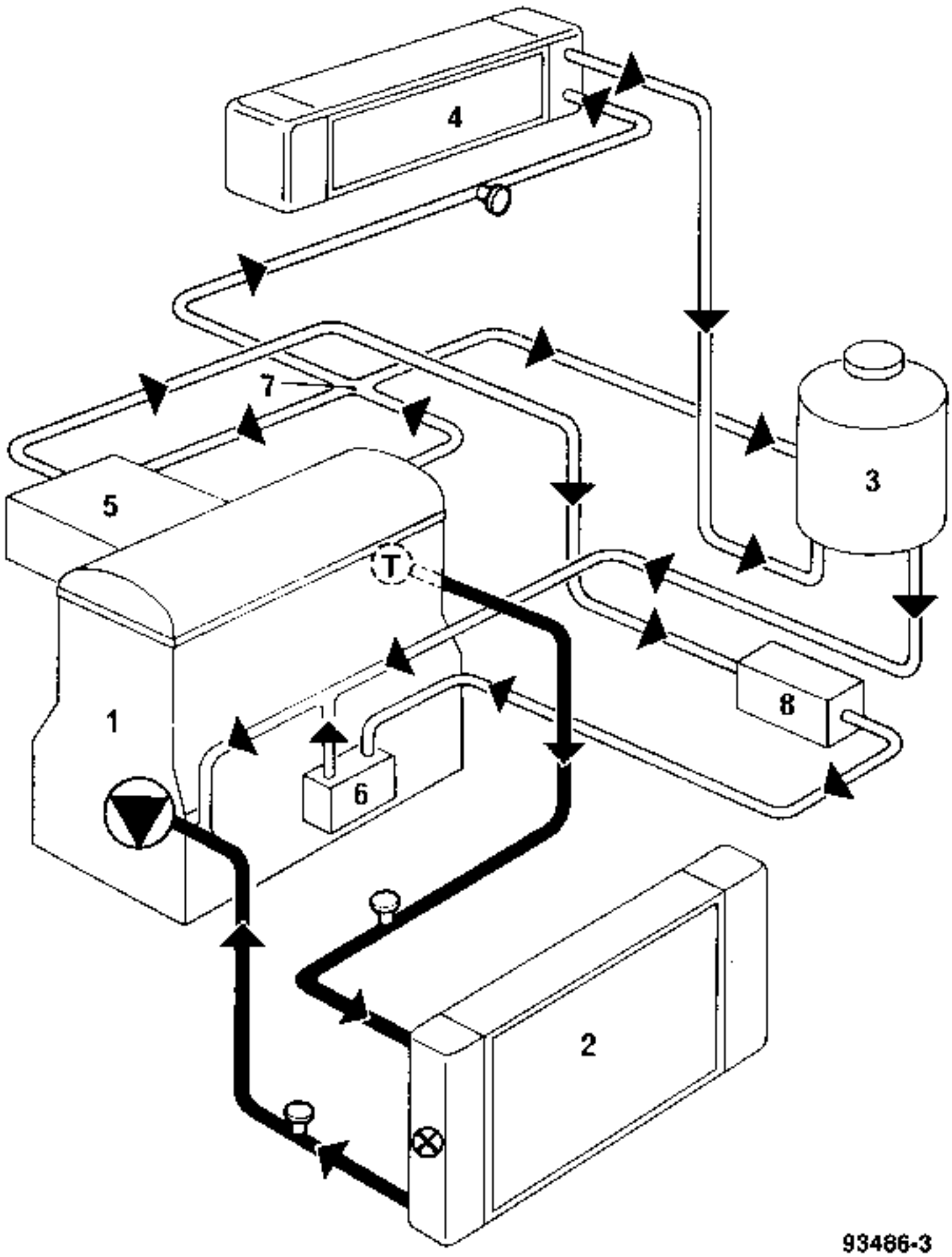
T Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase II
- automatic transmission, hot climates



1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
5. Manifold
6. Modine (oil cooler)
7. 4 way union
   Jets Ø 16/10/10/3mm
8. Aut. trans. oil cooler

Coolant pump

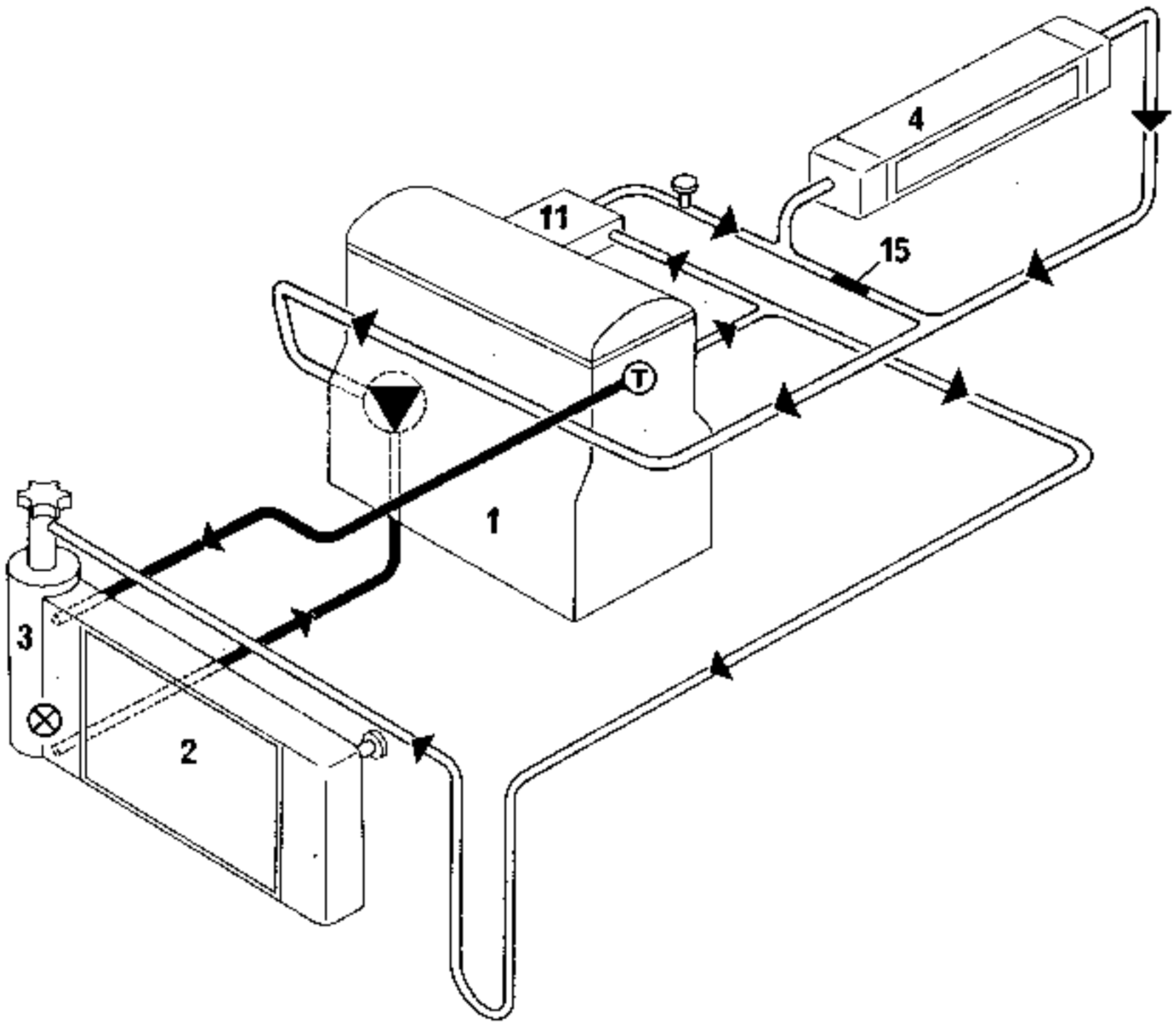
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.6 bars

Phases I and II
- without air conditioning



93559

1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
11. Carburettor base heater
15. Bypass

Coolant pump

Thermostat

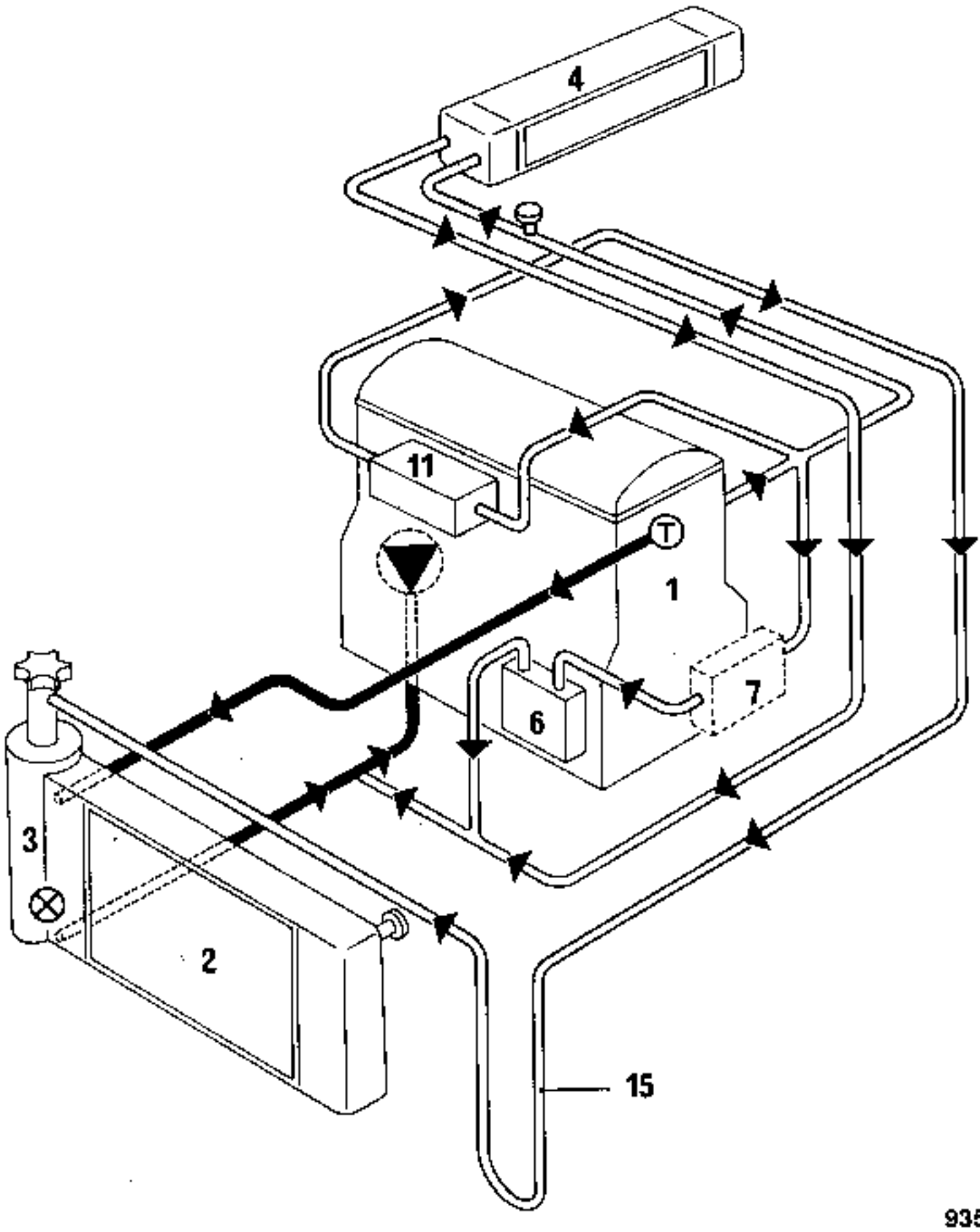
Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phases I and II
- with and without air conditioning

Phase II
- automatic transmission without air conditioning, in dotted lines



1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
6. Modine (oil cooler)
7. Aut. trans. oil cooler
11. Throttle unit
15. Siphon

Coolant pump

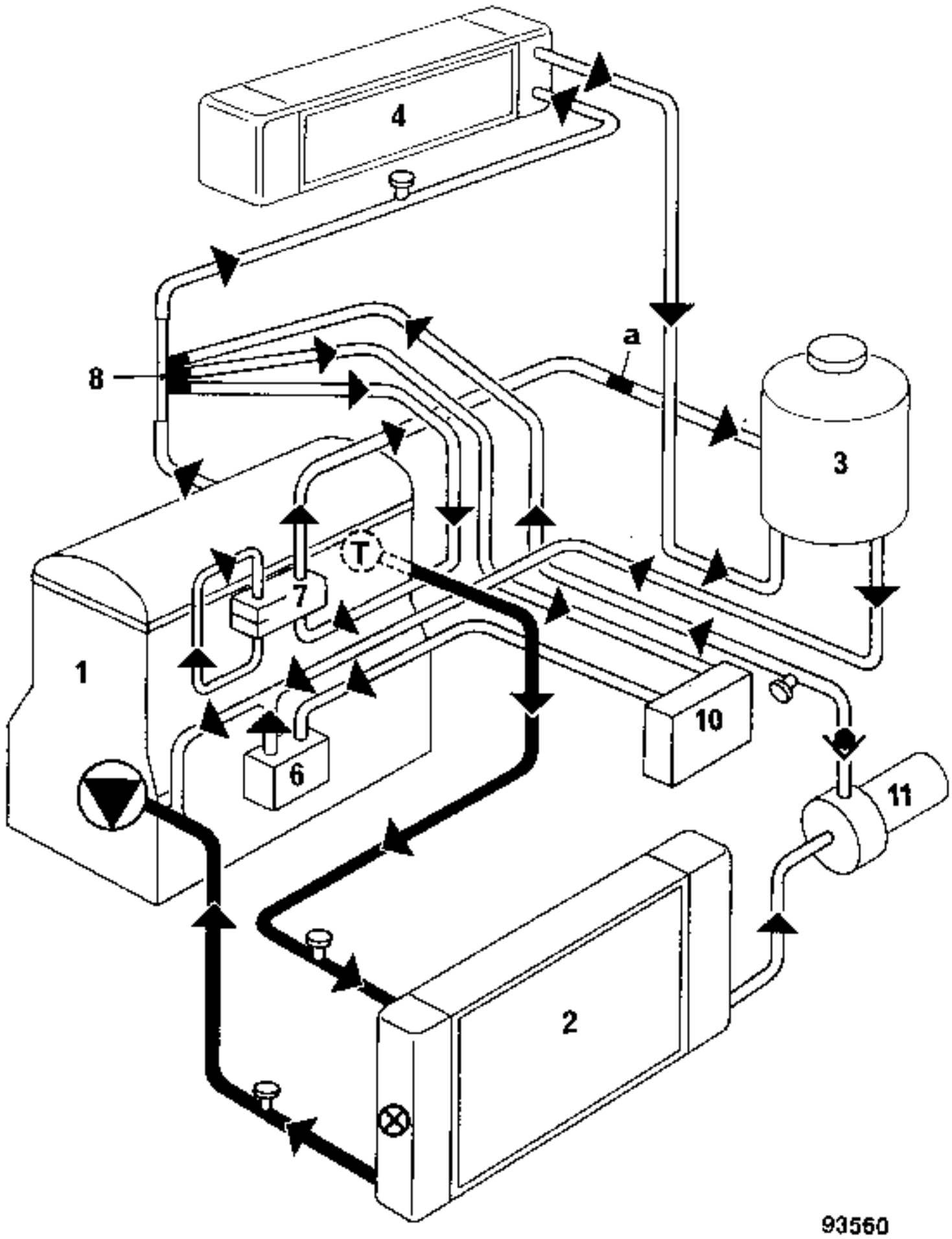
T Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase II
- automatic transmission, without air conditioning



1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
6. Modine (oil cooler)
7. Throttle unit
8. 5 way union
   Jets Ø 16/10/10/6/5.5mm
10. Aut. trans. oil cooler
11. Electric pump
a. 5.5mm Ø jet

Coolant pump

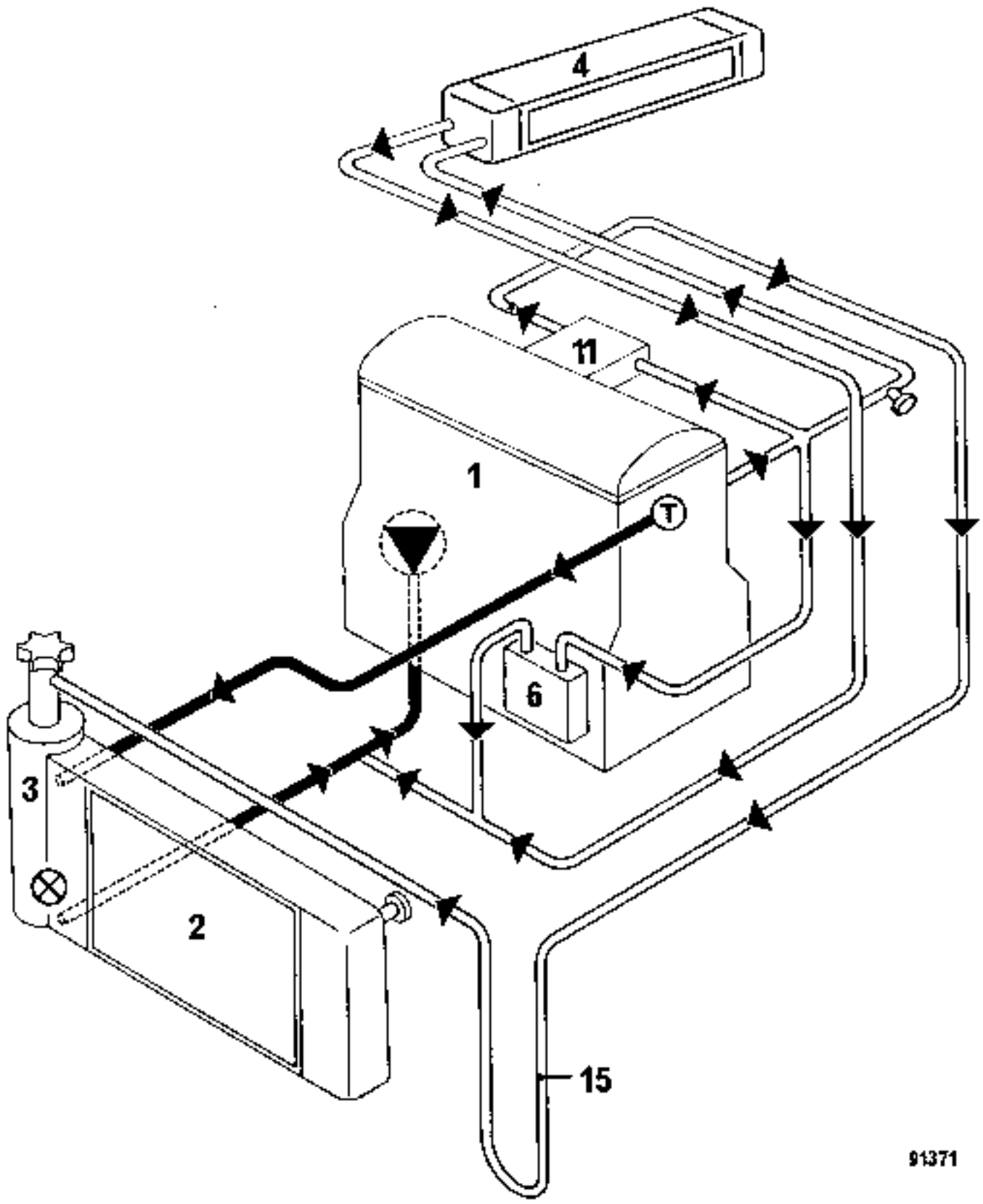
T Thermostat

Bleed screw (4)

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase I
- without air conditioning



1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
6. Modine (oil cooler)
11. Carburettor base heater
15. Siphon

Coolant pump

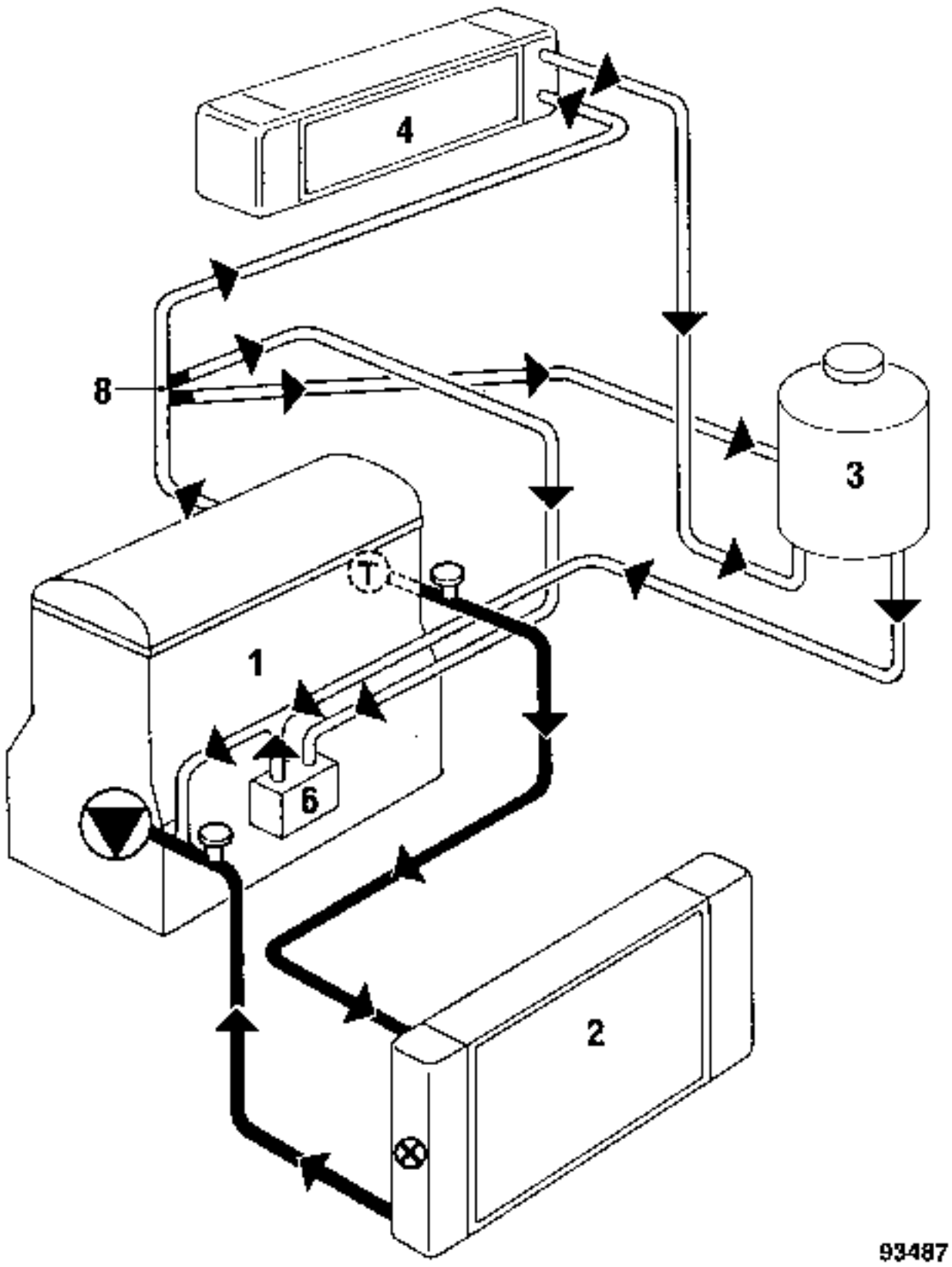
T Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase I
- with air conditioning



1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
5. Modine (oil cooler)
8. 4 way union
   Jets Ø 16/10/10/3mm

Coolant pump

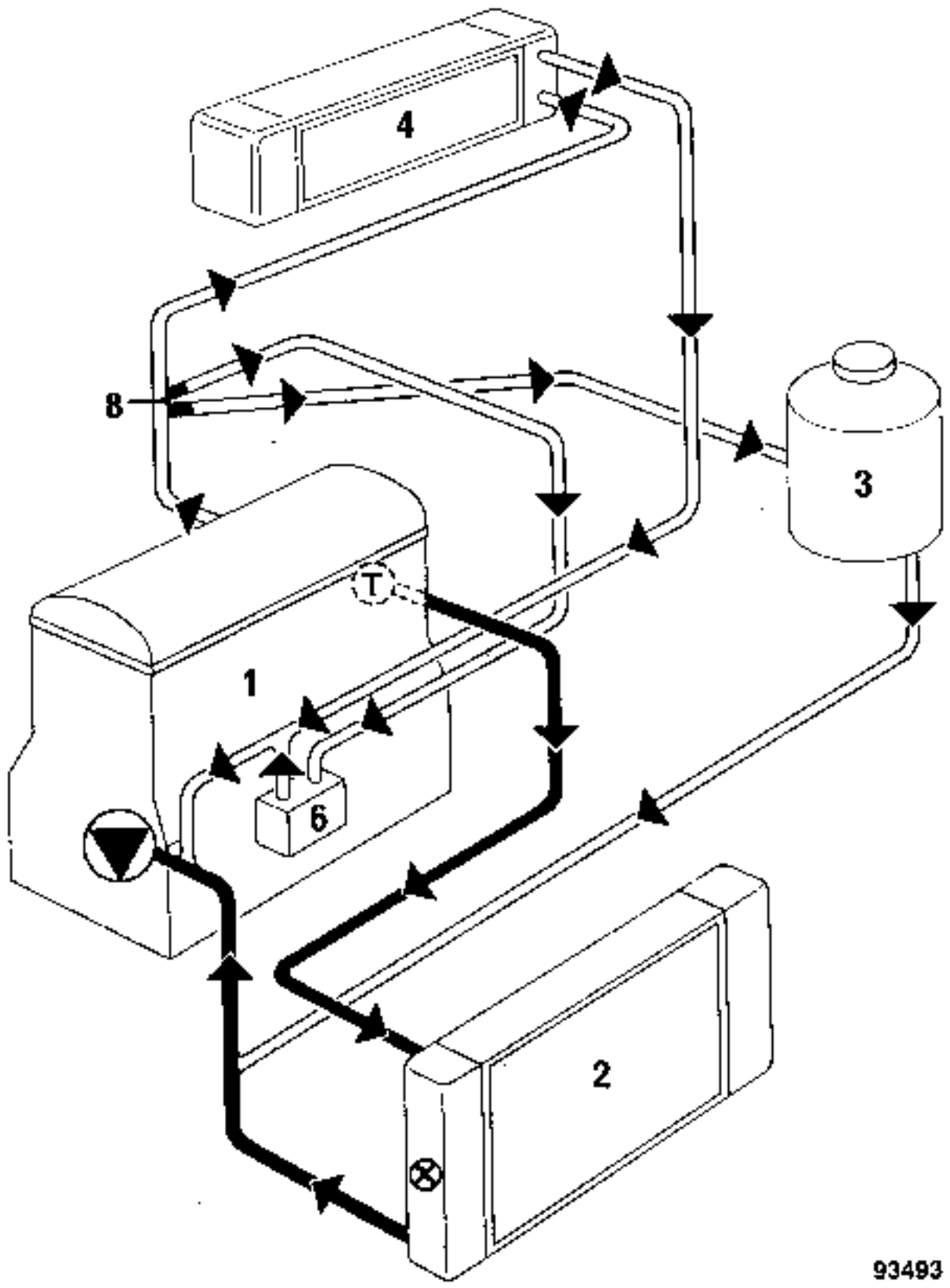
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase II



1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
6. Modine (oil cooler)
8. 4 way union
   Jets Ø 16/10/10/3mm

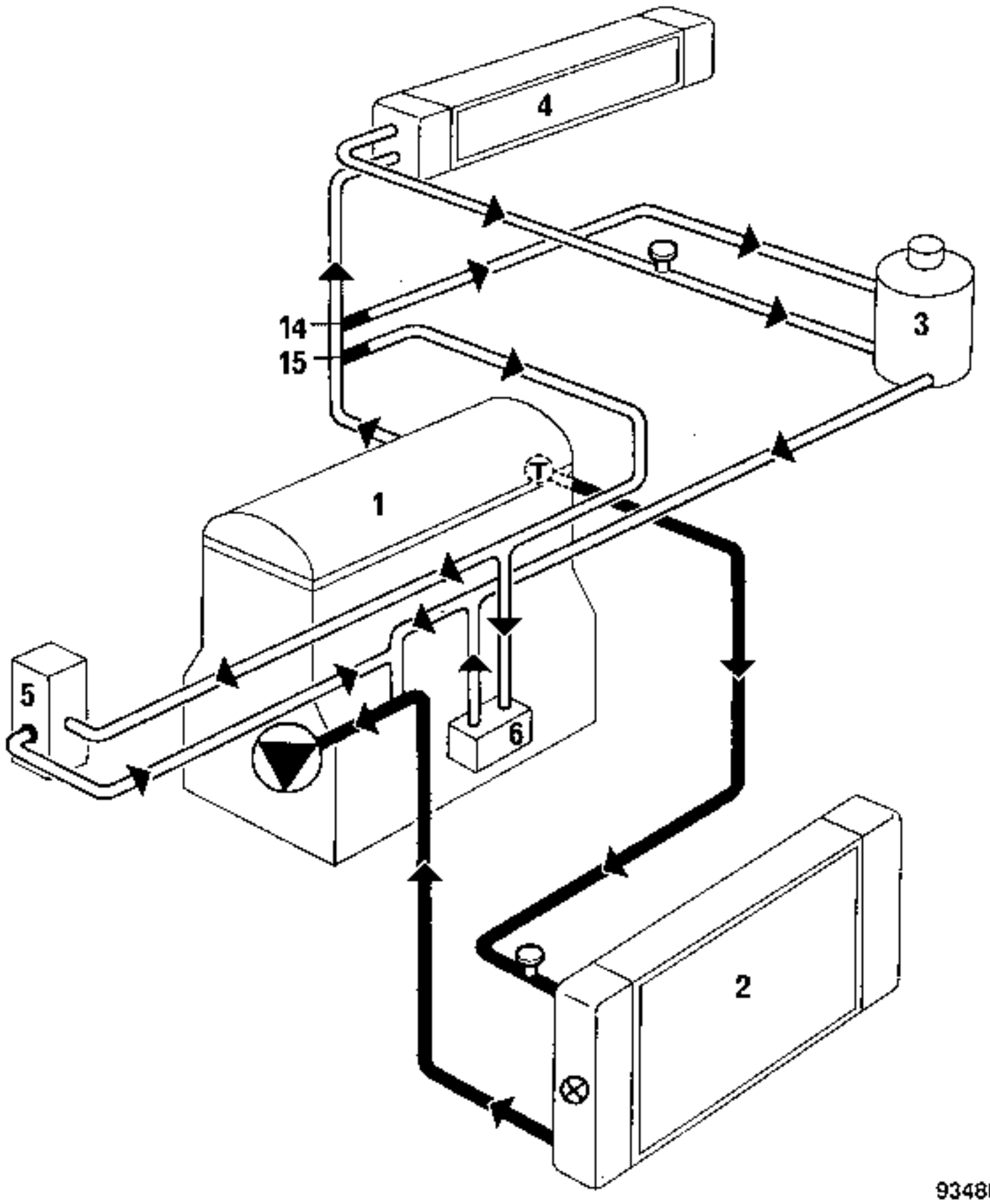
Coolant pump

Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars



1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
5. Fuel heater
6. Modine (oil cooler)
14. 3mm Ø jet
15. 8mm Ø jet

Coolant pump

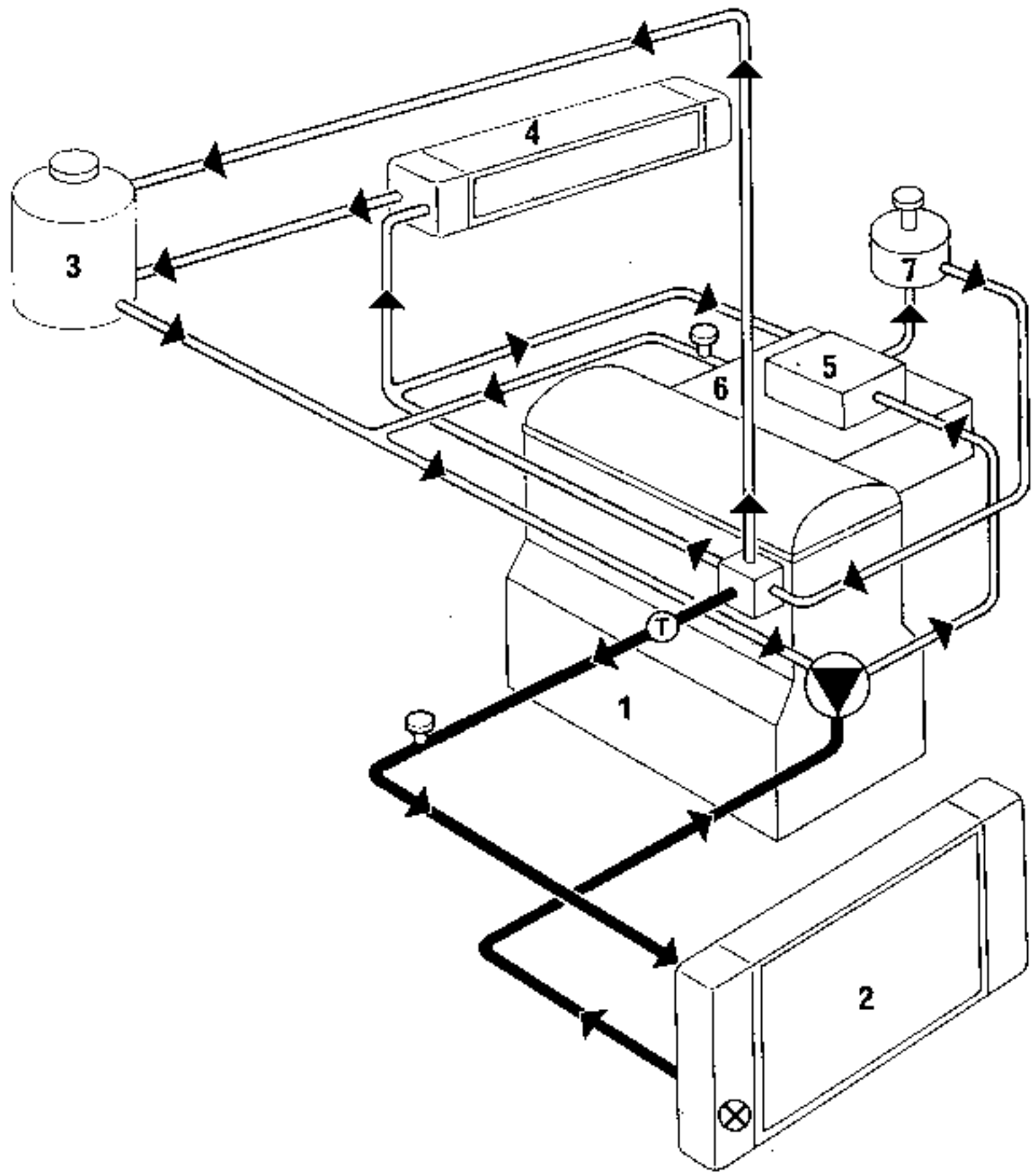
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phases I and II
- with and without air conditioning



93492

1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
5. Carburettor base heater
6. Manifold heater
7. Choke

Coolant pump

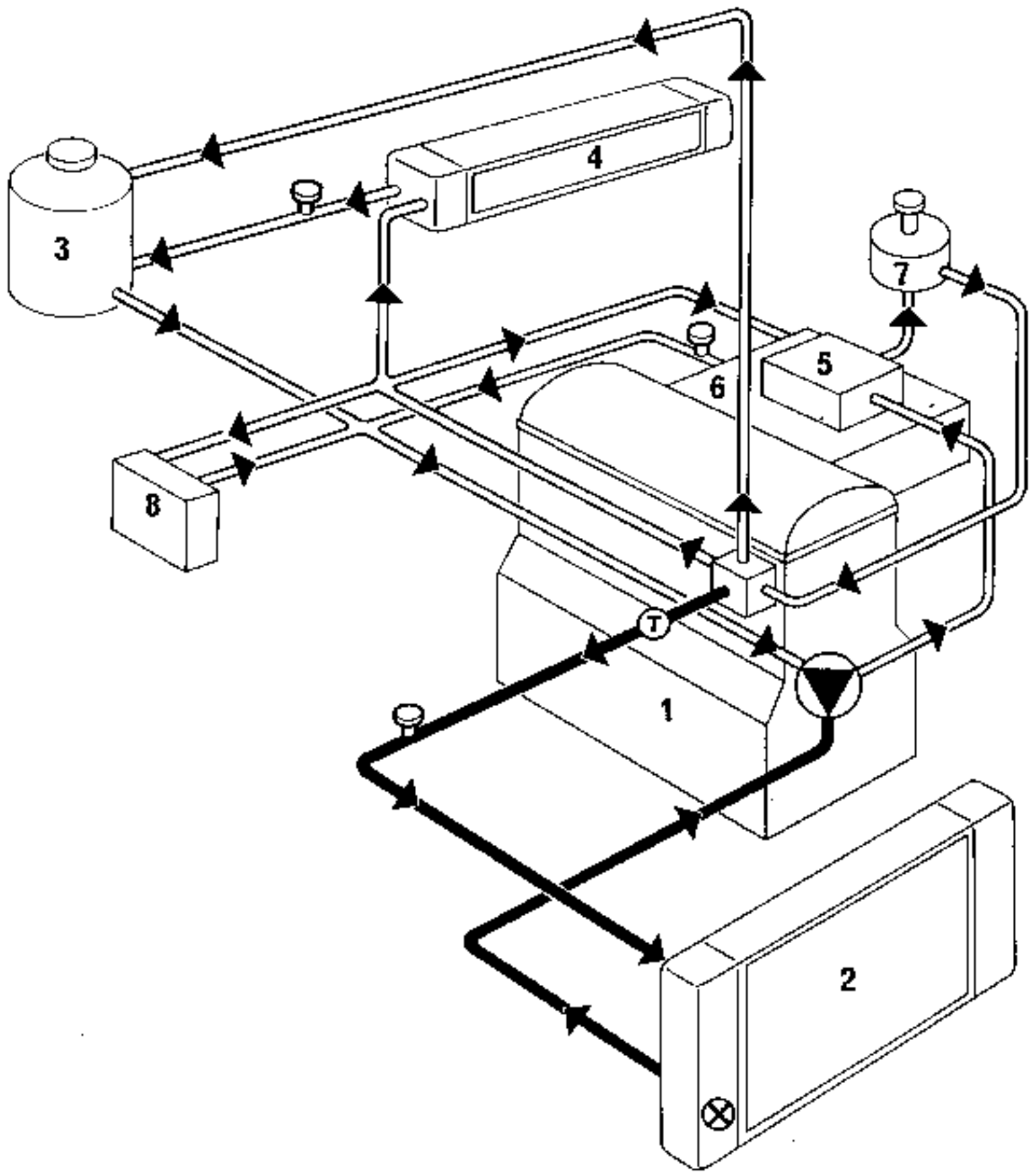
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phases I and II
- automatic transmission



93525

1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
5. Carburettor base heater
6. Manifold heater
7. Choke
8. Aut. trans. oil cooler

Coolant pump

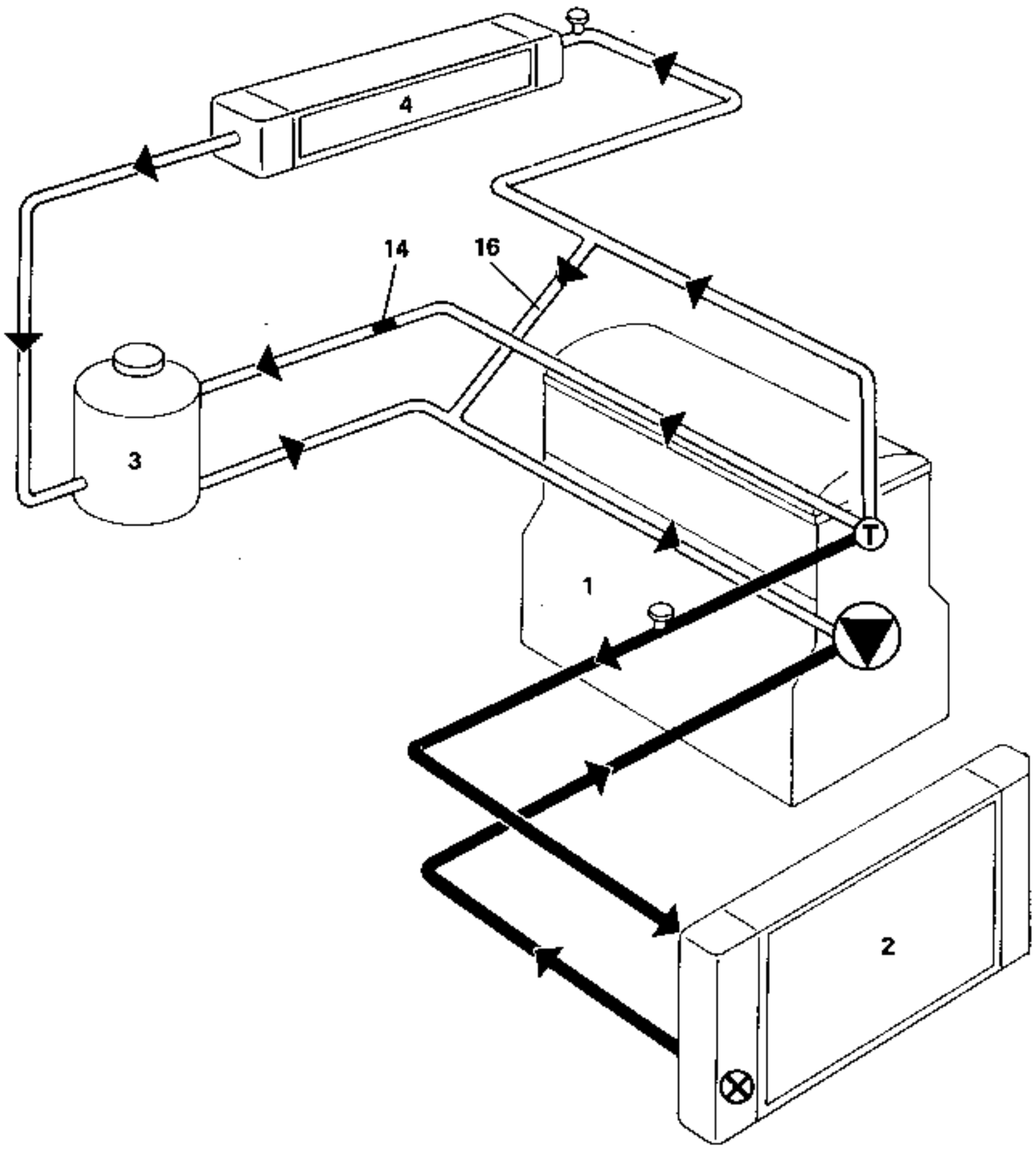
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phases I and **II**
- J7R engine with air conditioning
- J7T engine without air conditioning



1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
14. 3mm Ø jet
16. Bypass

Coolant pump

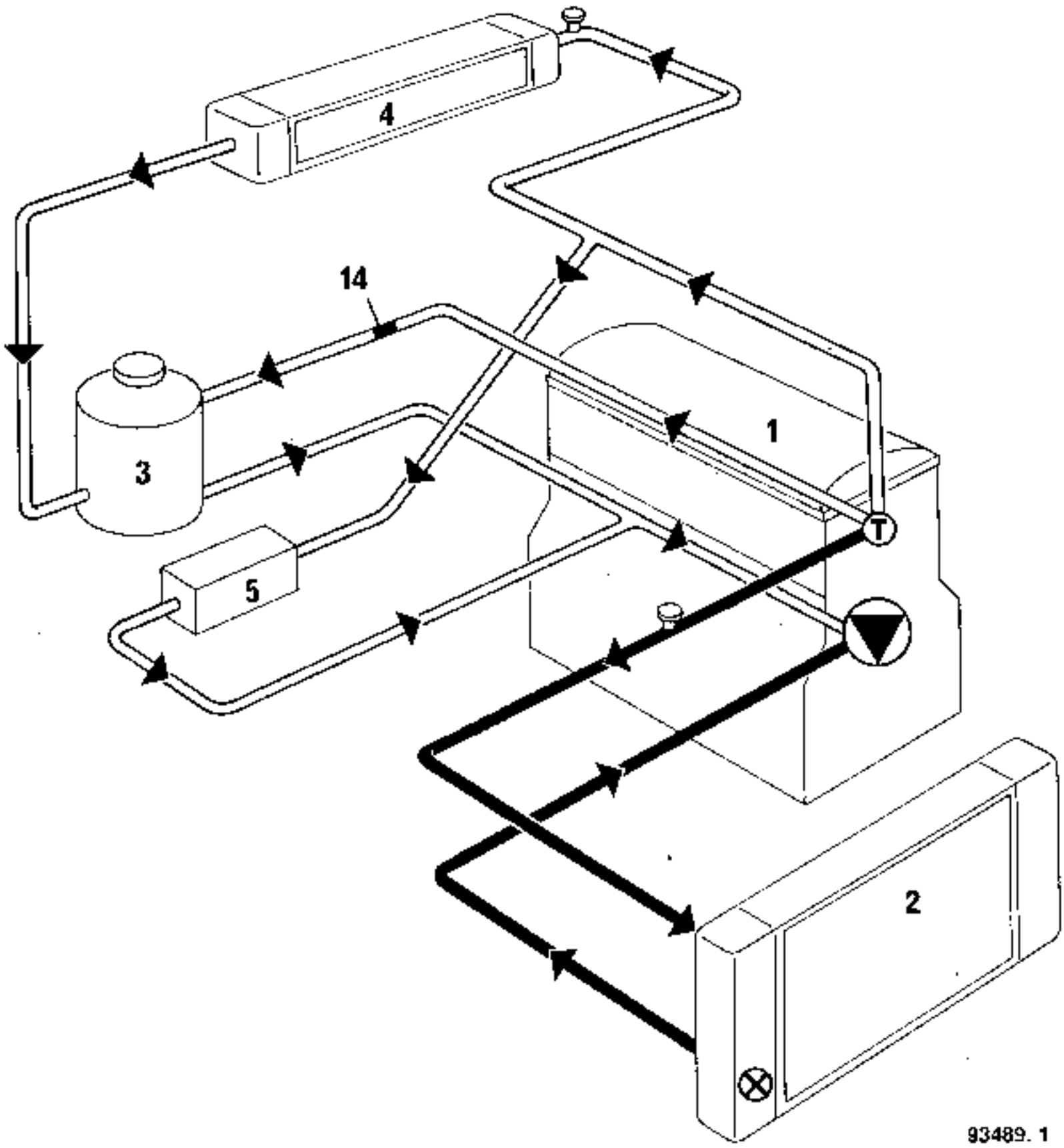
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase II
- J7R engine, aut. trans. with air conditioning
- J7T engine, aut. trans. without air conditioning



1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
5. Aut. trans. oil cooler
14. 3mm Ø jet

Coolant pump

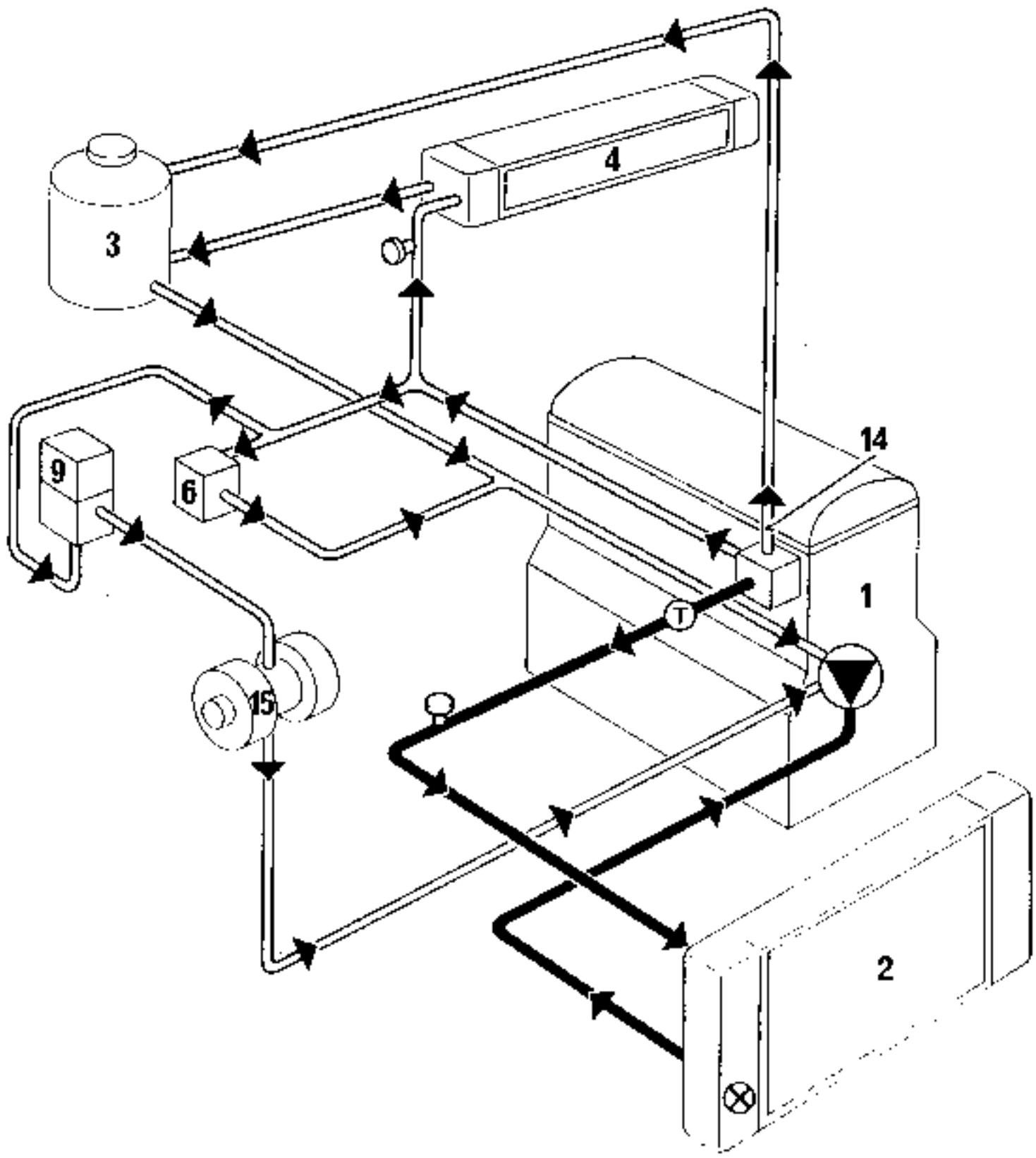
T Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phases I and II



1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
6. Modine (oil cooler)
9. Electric coolant pump
14. 3mm Ø jet
15. Turbocharger

Coolant pump

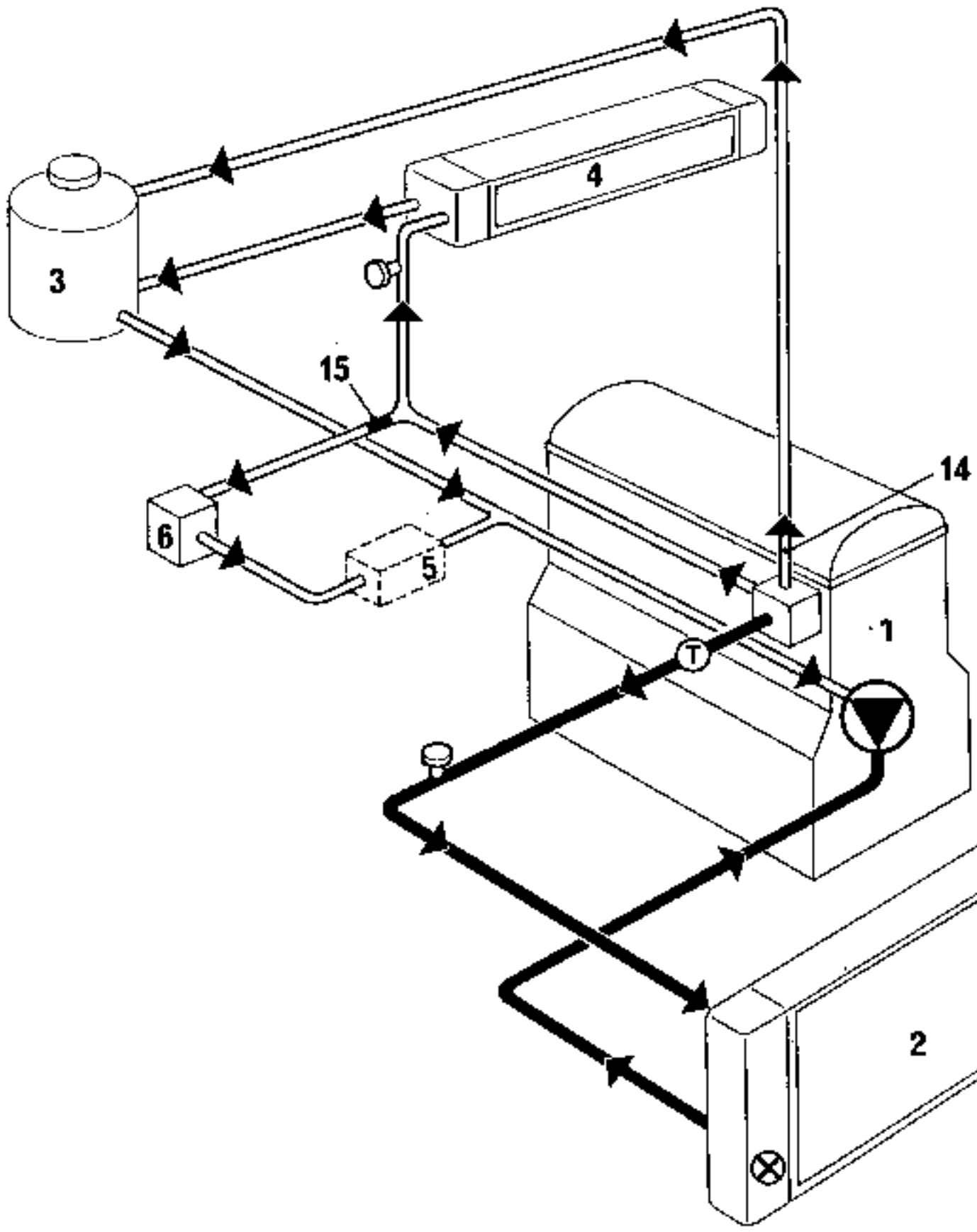
T Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.6 bars

Without air conditioning
Automatic transmission shown in dotted lines



1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
5. Aut. trans. oil cooler
6. Modine (oil cooler)
14. 3mm Ø jet
15. 8mm Ø jet

Coolant pump

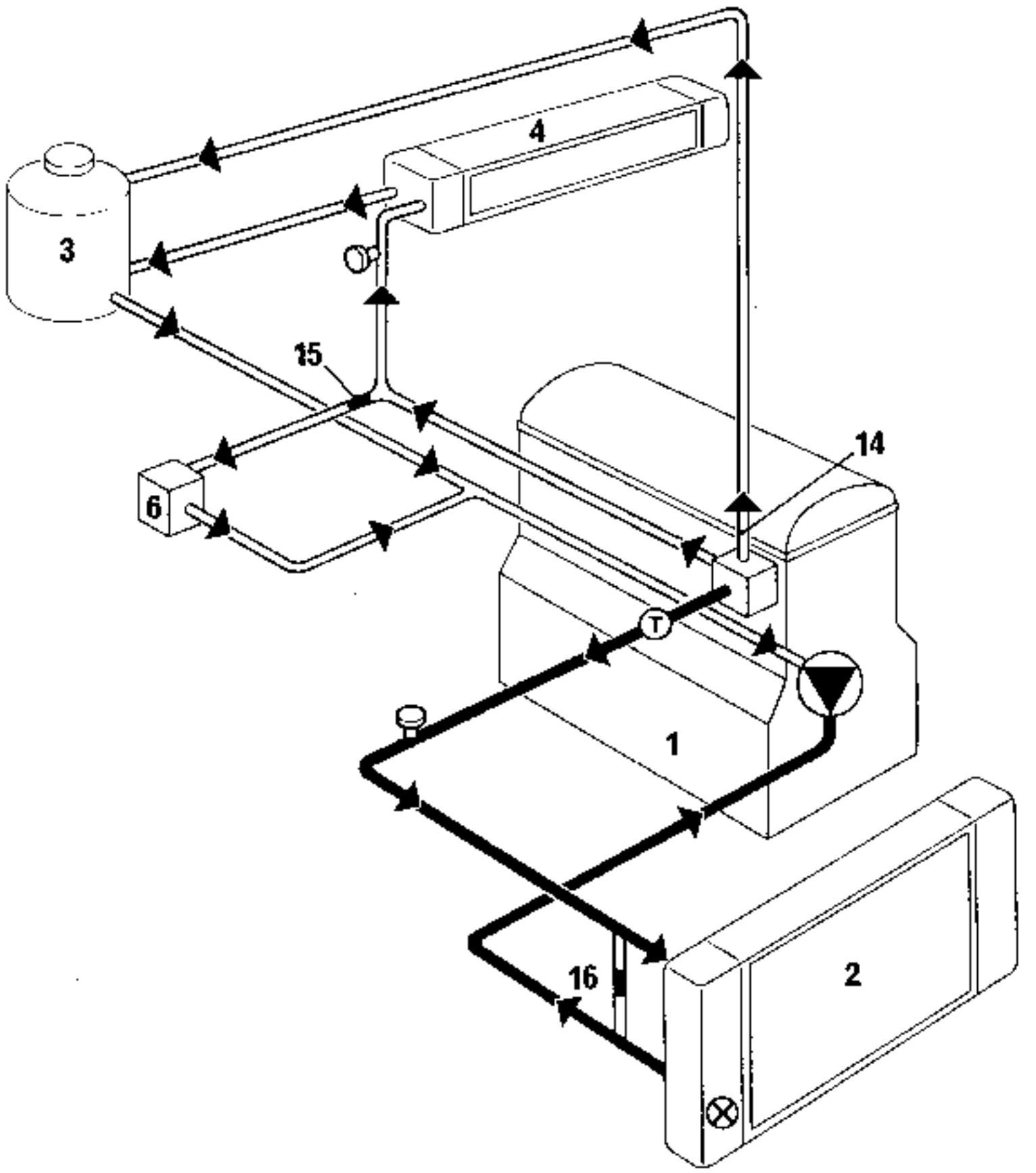
T Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.6 bars

With air conditioning



93490. 1

1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
6. Modine (oil cooler)
14. 3mm Ø jet
15. 8mm Ø jet
16. 10mm Ø bypass

Coolant pump

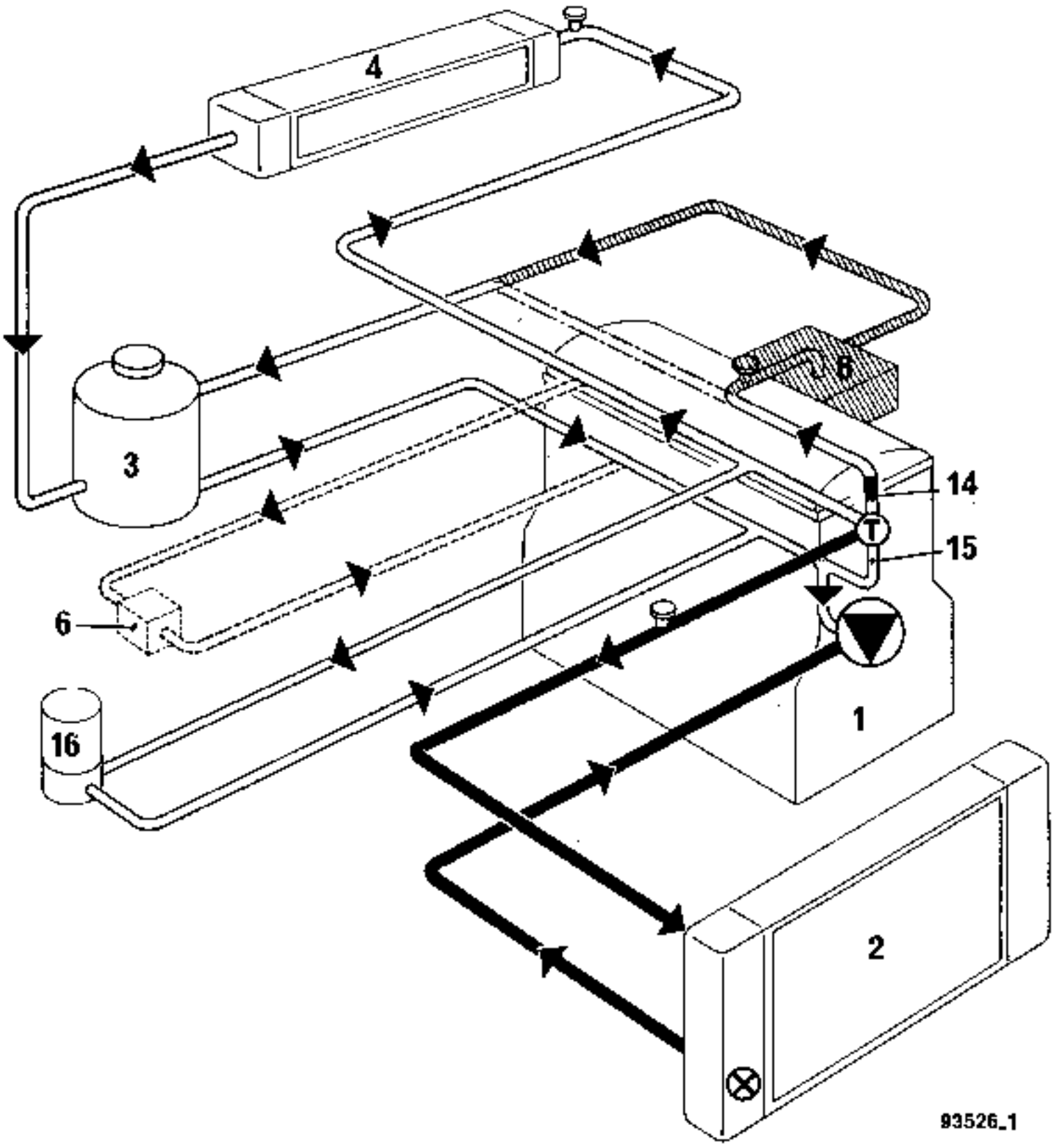
Thermostat

Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.6 bars

Phase I
- with and without air conditioning



Flow through oil cooler, coolant pump (AC)

Flow through Bosch cold starting system

Flow with Roto-Diesel pump

1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
6. Oil cooler for diesel turbo engines
8. Bosch cold starting system
14. 3.5mm Ø jet
15. Circuit P (see operation of thermostat)
16. Fuel heater

Coolant pump

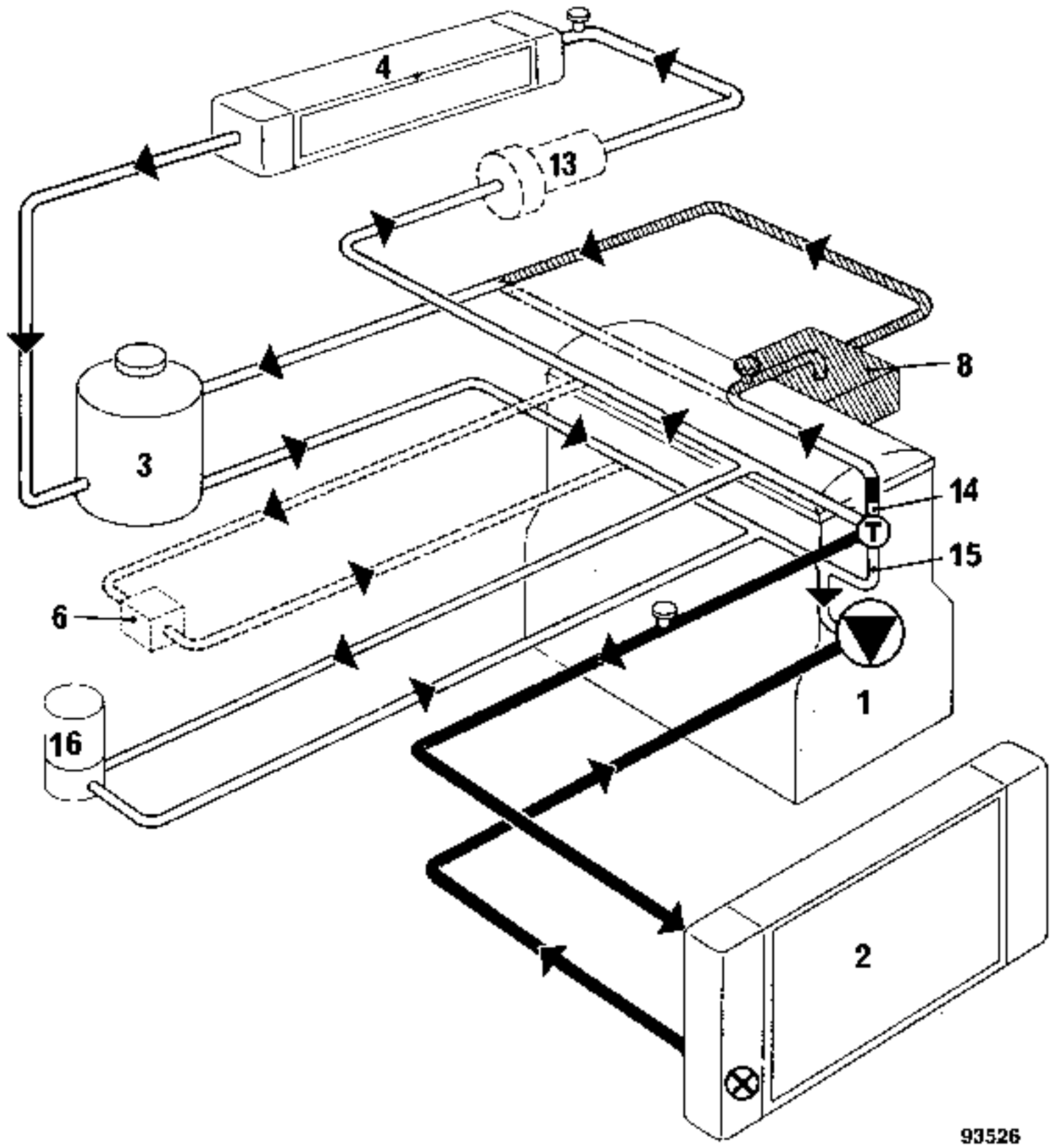
Double acting thermostat

Bleed screws of which there are: 2 (Roto diesel pump)
3 (Bosch pump)

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

Phase II
- without air conditioning



Flow through oil cooler

Flow through Bosch cold starting system

Flow with Roto-diesel pump

1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
5. Aut. trans. oil cooler
6. Oil cooler for diesel turbo engines
13. Electric pump (air conditioned versions)
14. 3.5mm Ø jet
15. Circuit P (see operation of thermostat)
16. Fuel heater

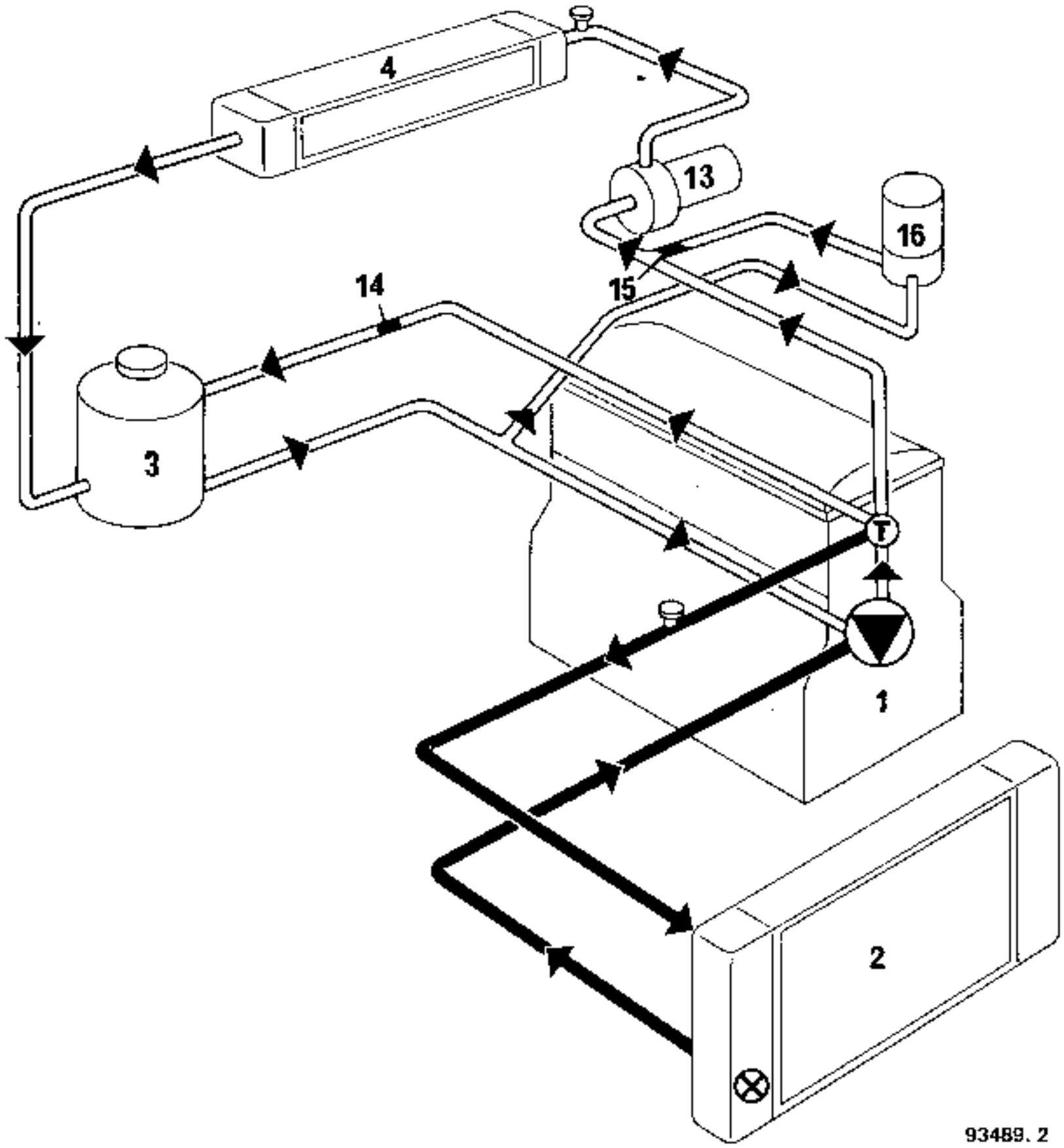
Coolant pump

Double acting thermostat

Bleed screws of which there are: 2 (Roto diesel pump)
2 (Bosch pump)

Temperature switch

The valve on the expansion bottle is set at 1.2 bars



1. Engine
2. Radiator
3. "Hot" bottle with permanent degassing
4. Heater
13. Electric coolant pump
14. 3mm Ø jet
15. 8mm Ø jet
16. Fuel heater

Coolant pump

T Thermostat

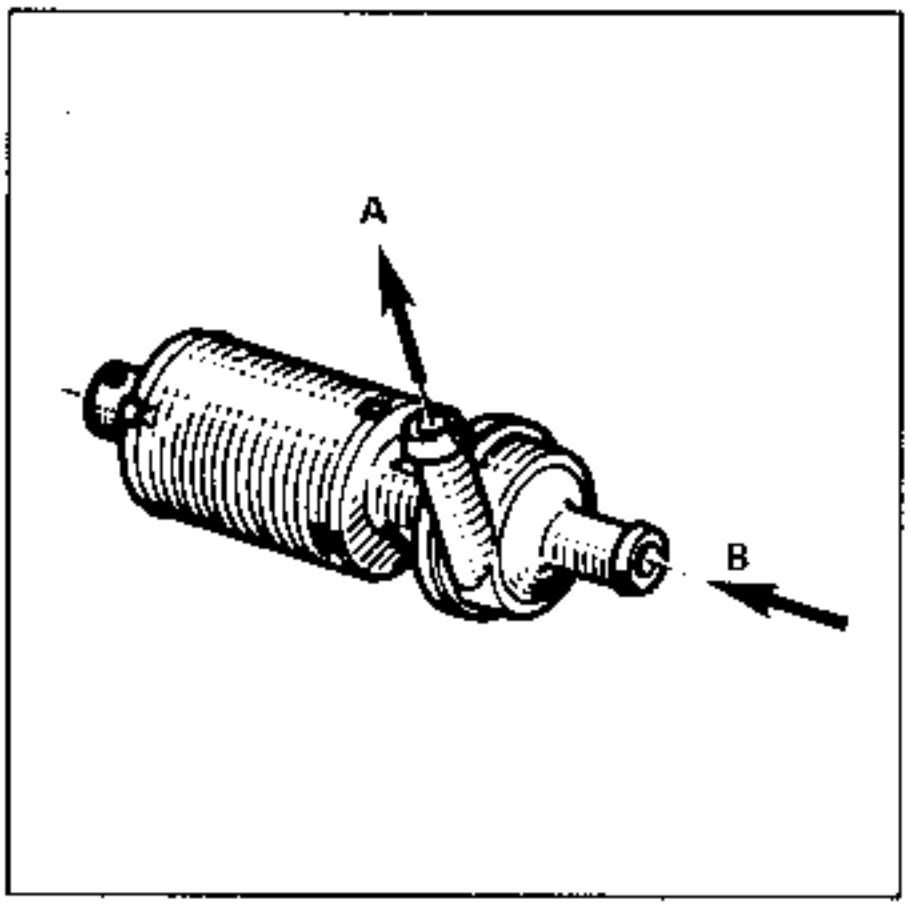
Bleed screw

Temperature switch

The valve on the expansion bottle is set at 1.2 bars

The electric coolant pump is mounted on the side of the front right hand shock absorber turret (centrifugal type).

The pump suction connection is the hole on the centre line of the pump-motor assembly and the pressure output is perpendicular to this centre line.

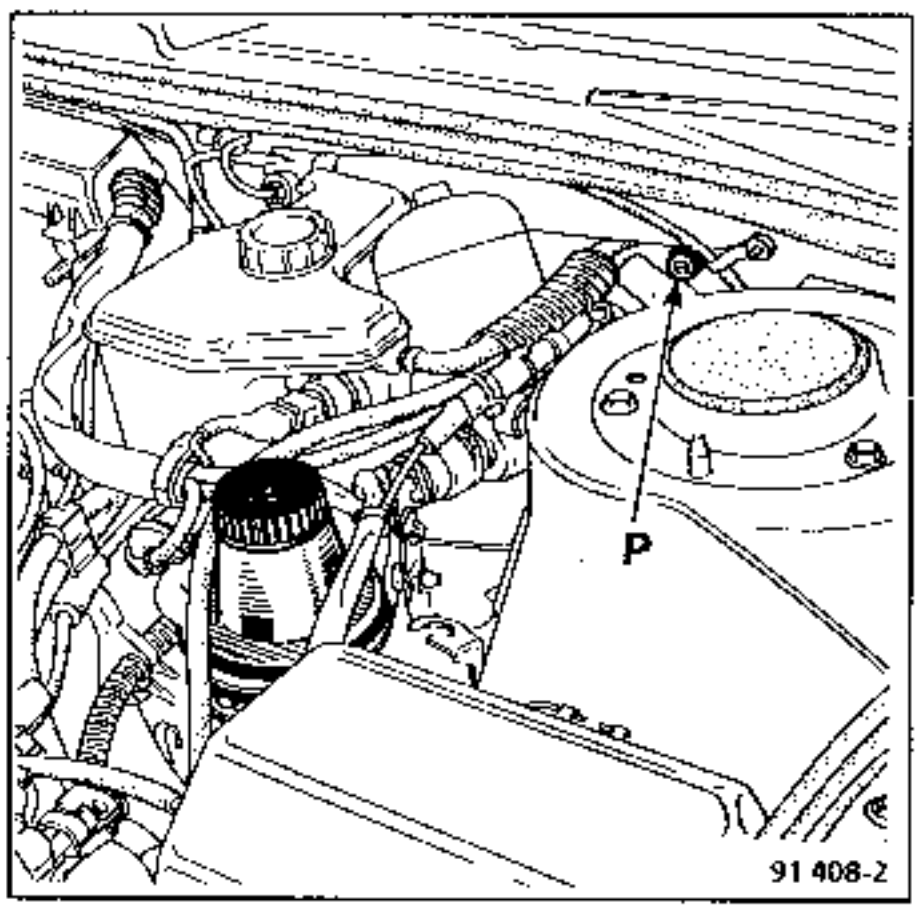


A Pressure output

B Suction input

WARNING:

Bleed screw (P) is not part of the coolant system. It is used to bleed the clutch hydraulic control system.

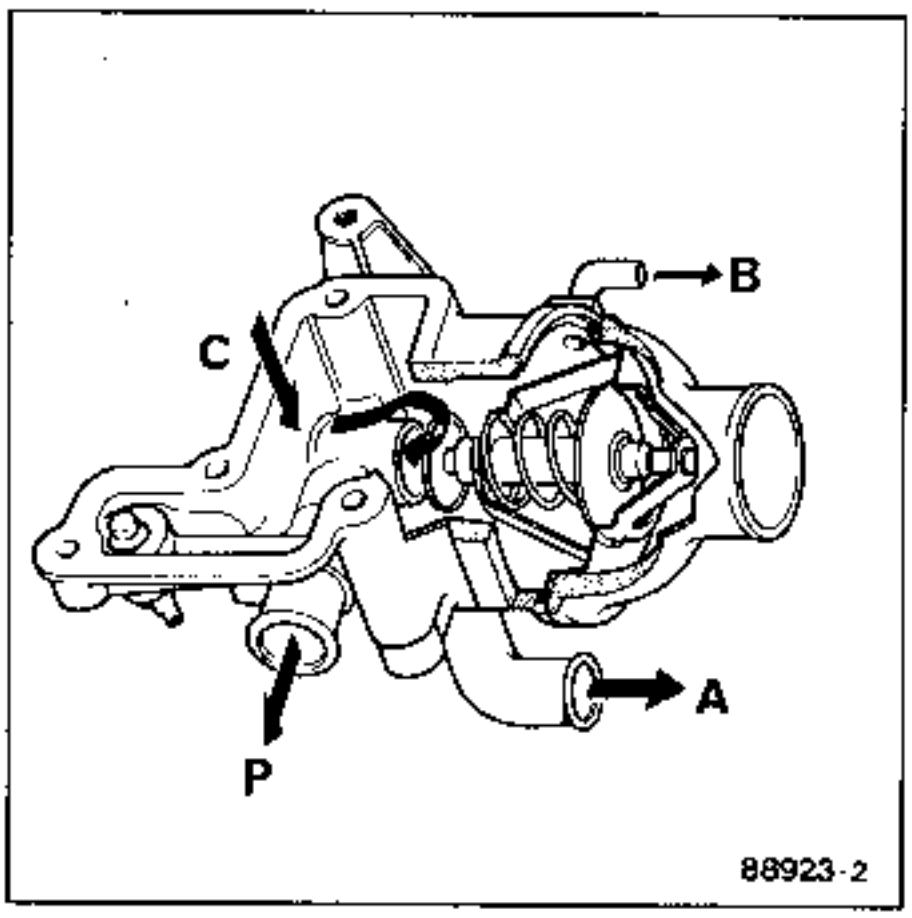


The coolant pump passes coolant into the cylinder block.

WHEN THE ENGINE IS COLD

The coolant flows through the cylinder block, the cylinder head, the cold starting system (Bosch pump only), the heater and the "hot" expansion bottle.

Figure 1

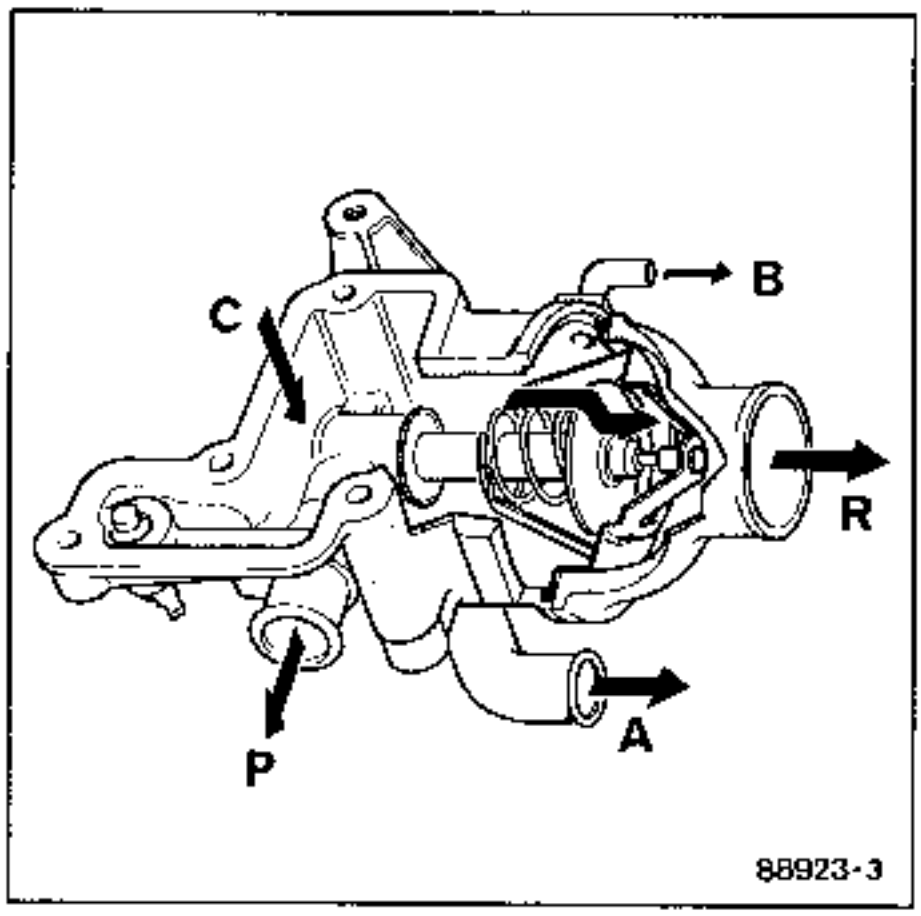


The thermostat (Figure 1) is closed and the coolant from the cylinder head (circuit C) is passed back to the coolant pump through circuit P, the heater through circuit A and the cold starting system (Bosch pump) followed by the "hot" expansion bottle through circuit (B).

WHEN THE ENGINE IS HOT

The coolant flows through the cylinder block, the cylinder head, the radiator, the cold starting system (Bosch pump only), the heater and the "hot" expansion chamber.

Figure 2



The thermostat (figure 2) is "open". It allows the coolant from the cylinder head (circuit C) to pass to the radiator (circuit R) and closes off circuit P, which formerly connected the cylinder head (circuit C) to the coolant pump.

Coolant still flows through connections (A) and (B).

REPLACING

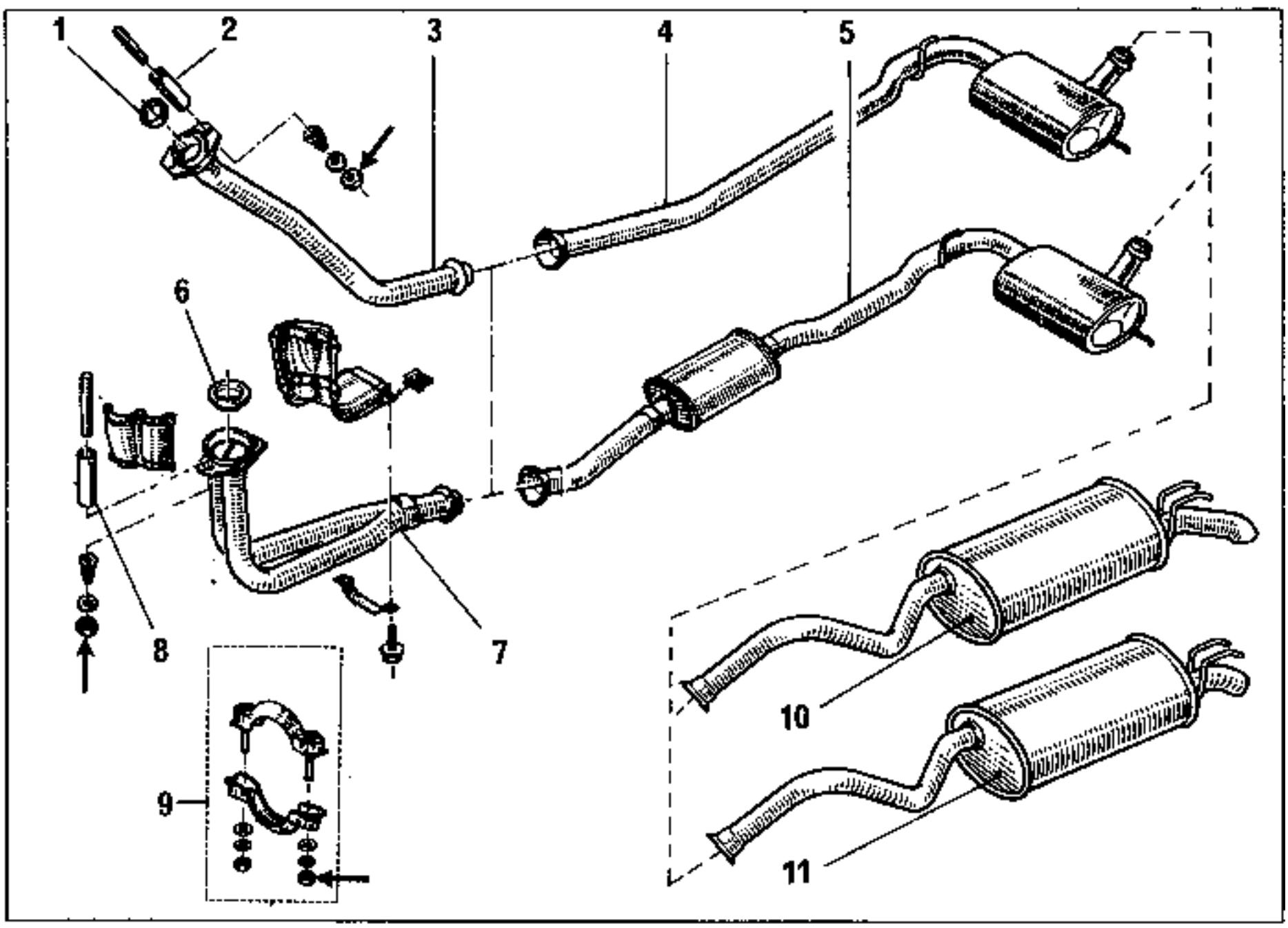
The repair methods refer to diagrams which identify, immediately, the individual points.

To avoid these becoming unnecessarily complicated, we have used symbols to show the details of the operations to be carried out.

→ Fully unscrew to remove.

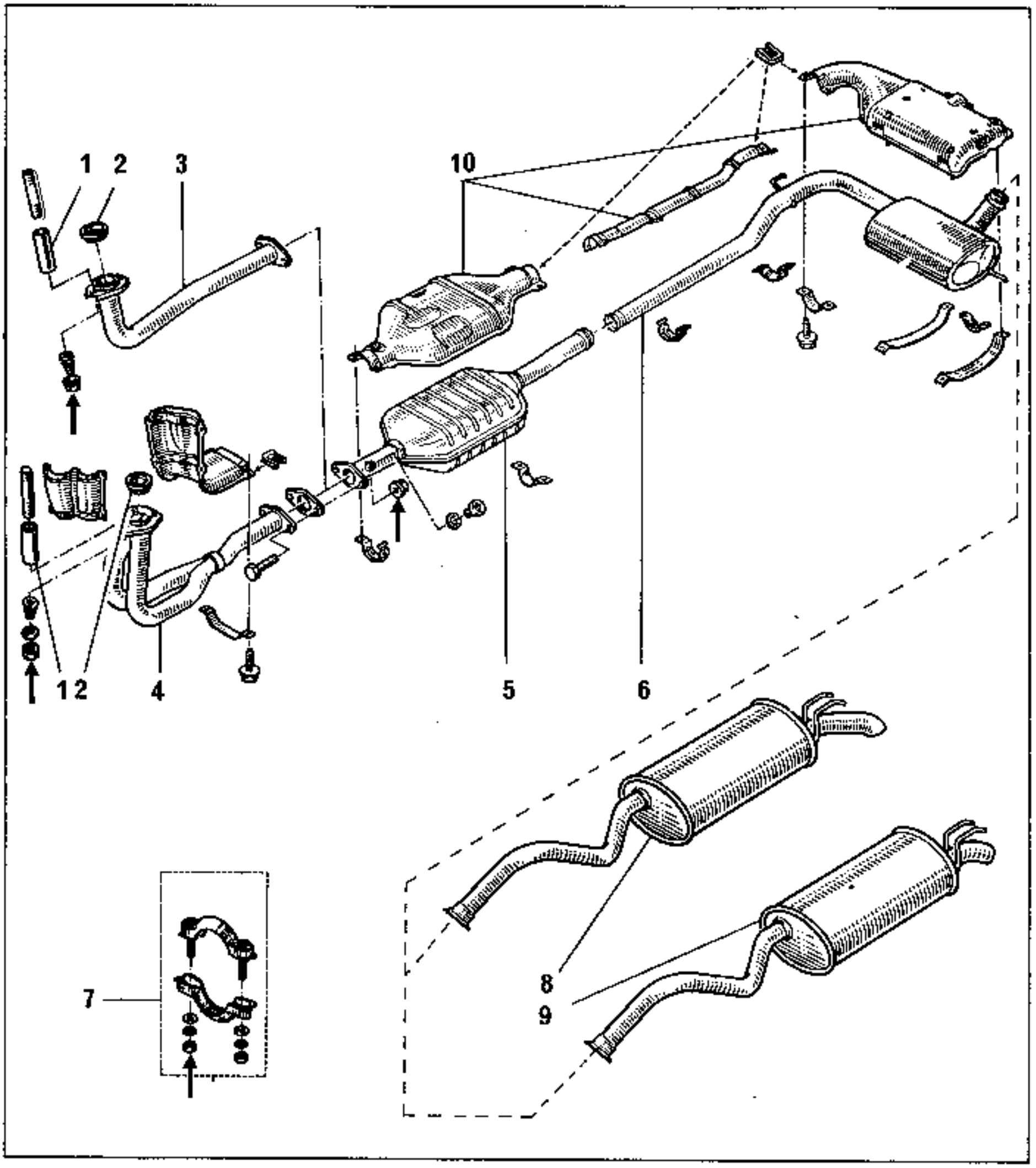
⊘ Cut:
- either with a flame torch,
- or with a pipe cutter.

Cut only with a flame torch:
- the clamp,
- the outside tube of a sleeved joint.



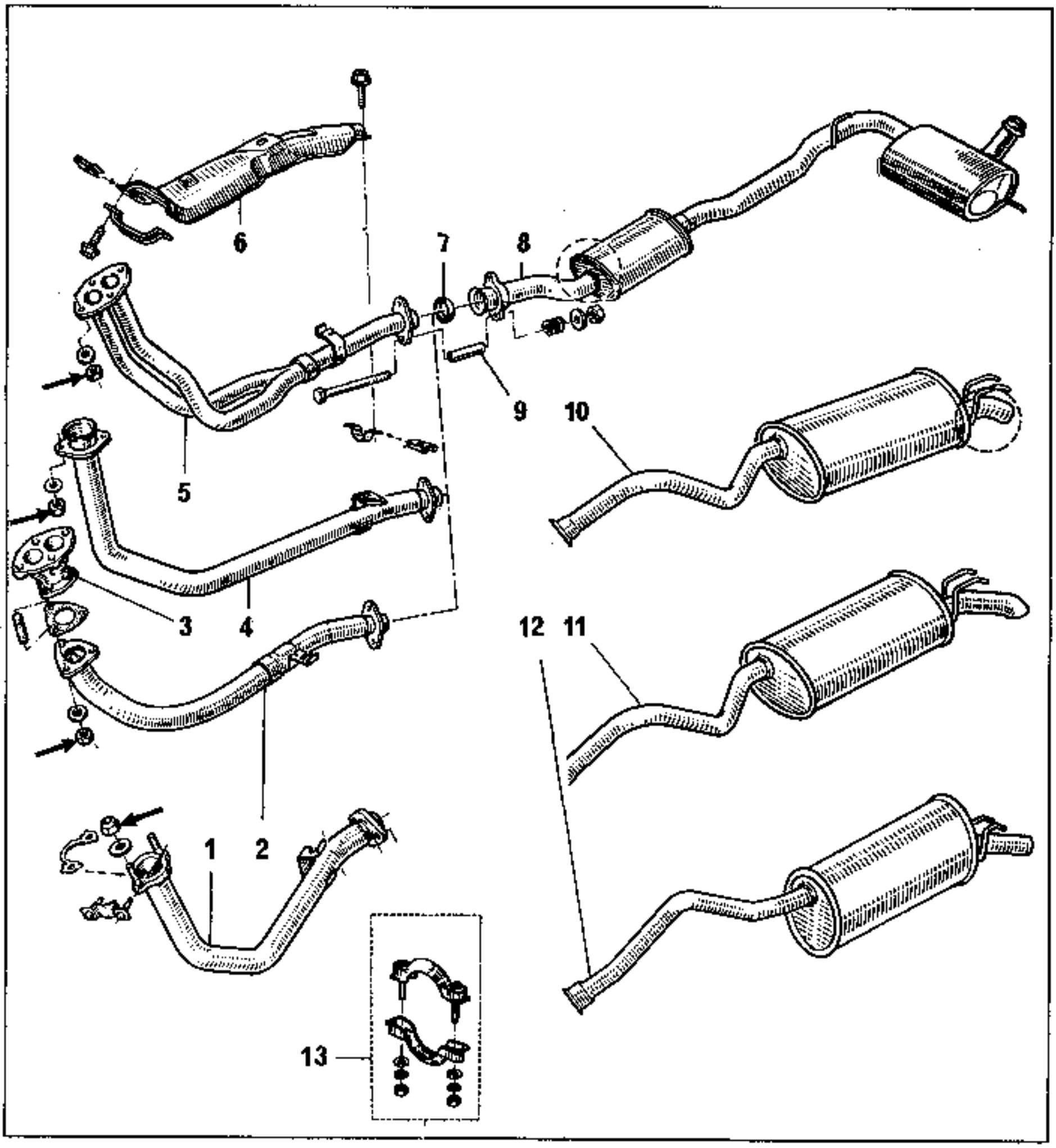
1. Metex ring from (89-05)
2. Torque limiting spacer
3. Down pipe engines C and F8Q
4. Intermediate pipe to (89-04)
5. Intermediate pipe from (89-05)
6. Metex ring engine type F2N...
7. Down pipe engine type F2N...
8. Torque limiting spacer
9. Set of securing clamps
10. Silencer from (89-05)
11. Silencer up to (89-04)

EMISSION CONTROL TYPE VEHICLES (WITH CATALYZER)



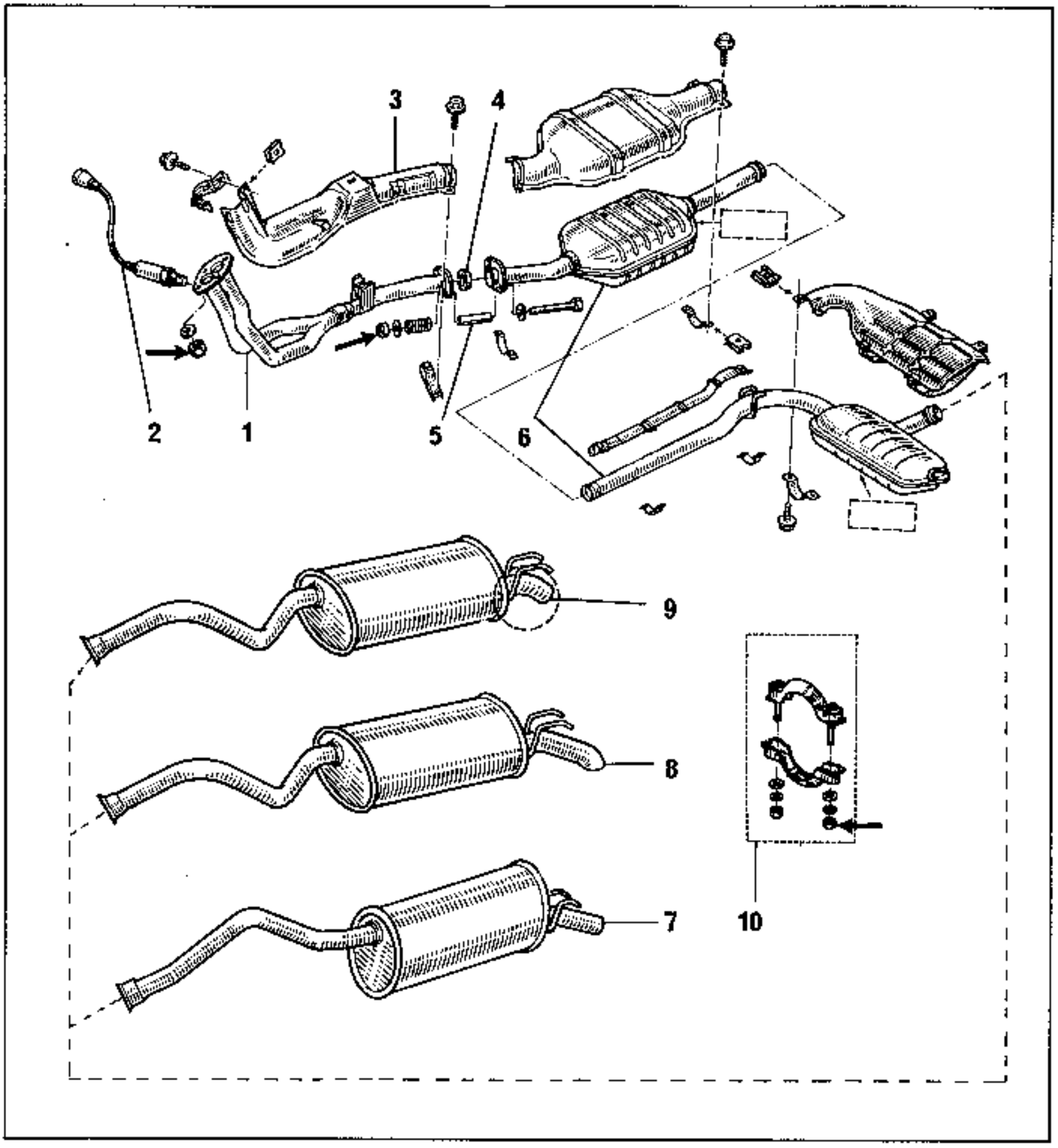
1. Torque limiting spacer
2. Metex friction ring
3. Single flow down pipe
4. Twin flow down pipe
5. Catalytic converter
6. Intermediate pipe
7. Set of securing clamps
8. Silencer from (89-05)
9. Silencer up to (89-04)
10. Heat shields

EXHAUST
Complete exhaust system



1. Down pipe X 485
2. Down pipe X 483 Aut. Trans. AR4
3. Intermediate clamp X 483 aut. trans. AR4
4. Down pipe J8S engine
5. Down pipe X483 X489
6. Heat shield
7. Metex friction ring
8. Intermediate expansion pipe
9. Torque limiting spacer
10. Silencer up to (89-04)
11. Silencer from (89-05)
12. Silencer for (4x4) vehicles
13. Set of securing clamps

EMISSION CONTROL TYPE VEHICLES WITH CATALYZERS



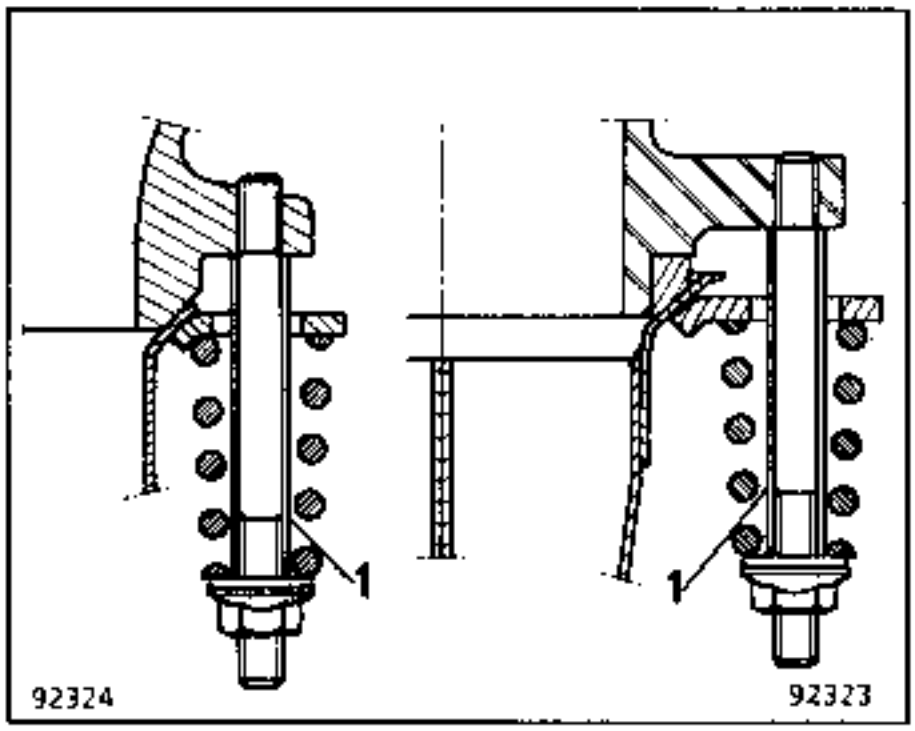
1. Down pipe
2. Oxygen sensor (Lambda)
3. Heat shields
4. Metex friction ring
5. Torque limiting spacer
6. Catalytic converter
7. Silencer for (4x4) vehicles
8. Silencer from (89-05)
9. Silencer up to (89-04)
10. Set of securing clamps

For the exhaust system to be correctly aligned and the clamps to be correctly tightened:

- Tighten the various joints one after the other, starting from the exhaust manifold and ending at the silencer.

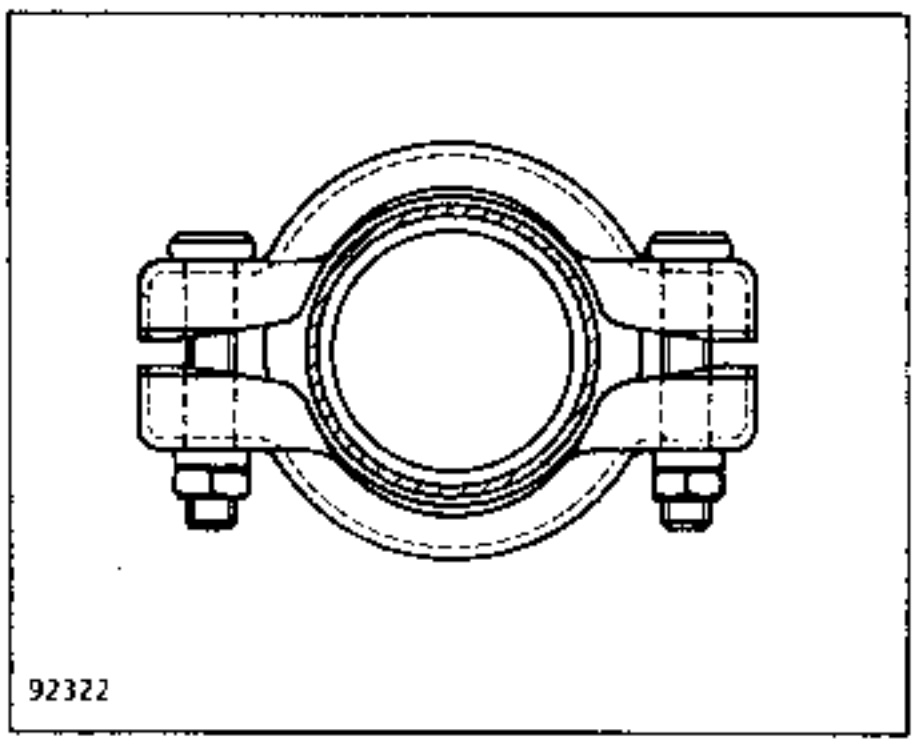
Arrangements:

Type C and F8Q Engines Type F Engine



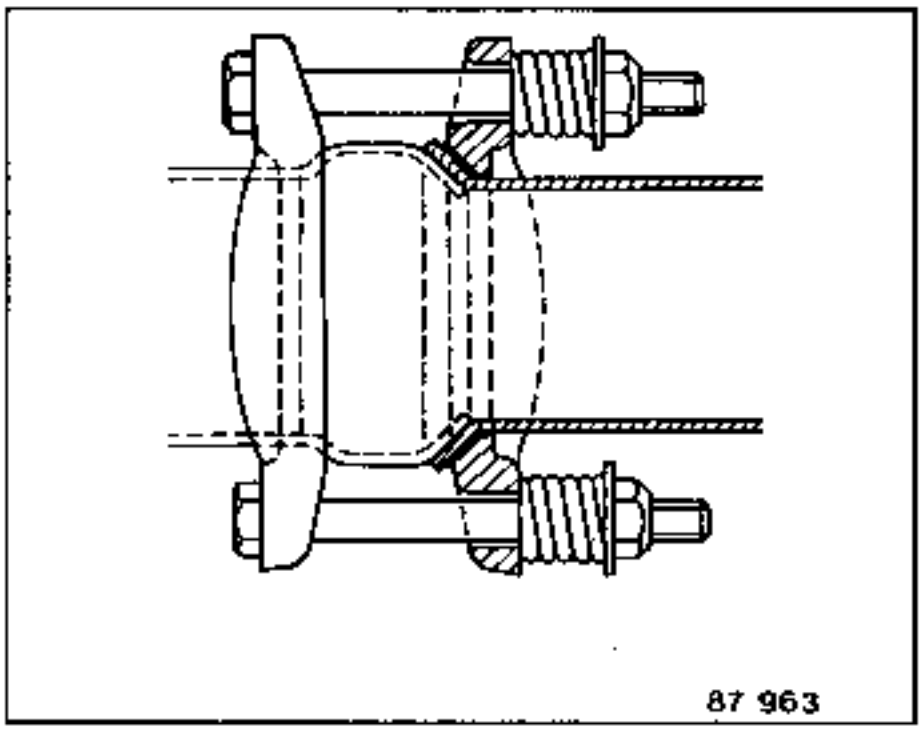
NOTE: the exhaust down pipes are fitted with spacers (1) which determine the spring pressure. Tighten until making contact with the spacers.

- Place the clamps so that their tightening areas bear evenly on both pipes to be clamped.



- Tighten the clamp bolts to the specified torque: 8mm Ø bolts: 2 daN.m to avoid distorting the pipes and clamps which could cause leakage.

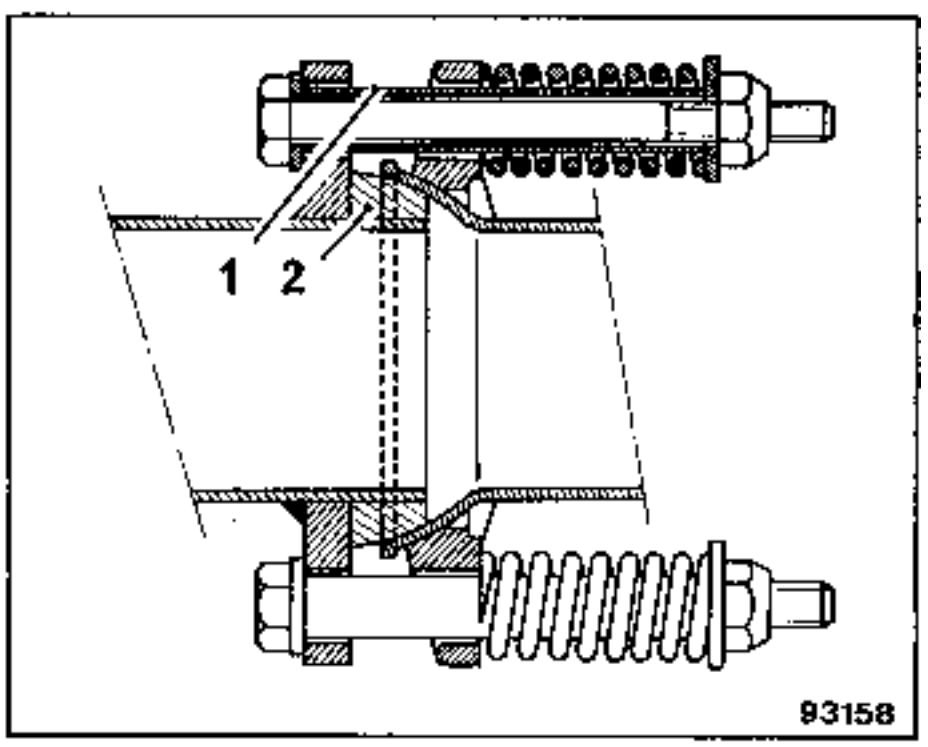
Type J... engine: arrangement with springs and thermoplastic seal.



ESSENTIAL: Replace the thermoplastic seal each time the joint is disconnected by an anti-rattle ring, reference 60 25 071 196. The joint is tight enough as soon as the seal between the two pipes is complete.

Spherical joints with METEX rings

Note: A spacer (1) determines the spring pressure. Tighten the nuts until contact is made with the spacers.



1. Spacer
2. Metex friction ring

ITS OBJECT

The function of an oxydization type catalytic pot, or catalyzer, is to process the main polluting agents contained in exhaust gases.

PRINCIPLE OF OPERATION

The catalyzer is operating under optimum conditions when the fuel-air mixture is around richness proportions 1.

Precious metals such as platinum and palladium are used for the manufacture of catalyzers.

Catalyzation is a process that facilitates a chemical reaction without taking part in it or being consumed.

PRECAUTIONS TO BE TAKEN

Catalyzers are destroyed by certain materials, and this is why fuels completely free of lead additives must be used in vehicles fitted with them. A small quantity of lead will not necessarily destroy the catalyzer, but it will cause it to overheat. This often reaches proportions such as the cell structure of the catalyzer is broken down, thus allowing exhaust pollutants to pass through.

TO PREVENT SUCH OVERHEATING

- The engine must be in good condition (in particular the fuel system and ignition system must be perfectly adjusted) to avoid the catalyzer operating under abnormal conditions.

- The vehicle must be stopped, immediately, if the engine misfires, if there is a defect in the fuel system, if the engine loses power or any other symptom (such as engine overheating) occurs, especially if it happens several times or if the engine backfires.

- The catalyzer can also be overheated by turning the engine for too long a period on the starter or trying to start it by towing it. Under these circumstances, the engine receives an excessively rich mixture for a long period (more than a minute), which occasionally fires.

REMOVING-REFITTING

If the car has been run on leaded fuel, the exhaust pipe on the input side of the catalyzer must be replaced with a new one (when the down pipe and catalyzer are in two parts).

Before replacing any part of the exhaust system, the fuel in the vehicle fuel system must be absolutely free of lead additives.

To obtain this result, either flush out the system with unleaded fuel, or run the vehicle for several tanks full of unleaded fuel.

NOTE: whenever carrying out work on the vehicle exhaust system, ensure that it is entirely free of leaks from the exhaust manifold gasket to the catalyzer, including the catalyzer.

Any seal removed must be REPLACED BY A NEW ONE.

SPECIAL FEATURES

Never park the vehicle or run the engine in a position where combustible materials such as grass or leaves may make contact with the hot exhaust system. Under certain wind and climatic conditions, these materials or substances may catch fire on contact with a hot exhaust.

CHECKING THE CATALYZER:

Ensure, before any inspection of the catalyzer (or the oxygen sensor), that is has not been contaminated by fuel containing lead:

- carry out a test for lead at the vehicle exhaust, using the appropriate test equipment.

Connect an exhaust gas analyzer to the rear of the vehicle.
With the engine cold:

- note the pollutant emission readings,
- warm up the engine (until the electric fan has cut in twice),
- check the pollutant readings at idling speed and at a speed of between 2500 and 3000 rpm,
  - if the CO percentage is higher than 0.2%, disconnect the oxygen sensor,
  - if there is no variation in the CO percentage with the sensor connected and then disconnected, replace the oxygen sensor. (Warning: this may have been contaminated by the lead contained in the fuel. Check this by carrying out a test for the presence of lead on the oxygen sensor. Ensure, also, that it is operating correctly, using test XR25. Its condition is shown by the bar graphs on line 13 and by the variation in the readings no. 05 at idling speed and at a constant speed of between 2500 and 3000 rpm,
  - if, with a new oxygen sensor in place, the CO reading is still higher than 0.2%, check:
    - the catalyzer, by shaking it to see if it makes a noise (confirm this by driving the vehicle)

Remove the catalyzer and check:

- that there is no visible damage.
- that no suspect noises are produced by shaking the catalyzer.
- that nothing is partially or totally blocking the catalyzer.

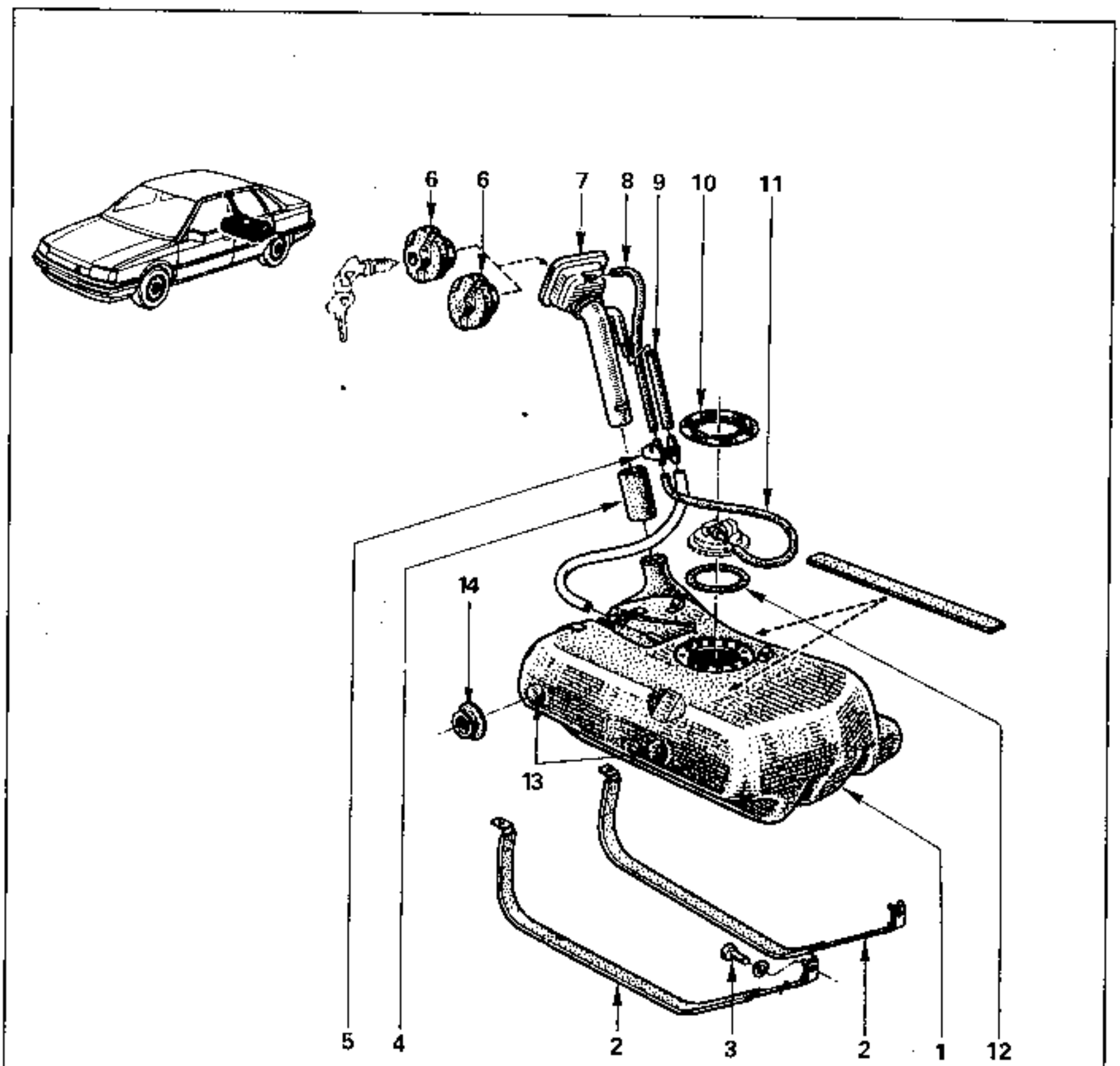
WARNING

Before replacing the catalyzer, check:

- that the vehicle is in perfect running condition:
  Fuel system, ignition, battery charge, mixture regulation by the oxygen sensor all correct (testing with XR 25 and a lead test).
- the vehicle performance by means of a road test.
- that no local noises are produced by the catalyzer during the road test.
- that the exhaust system is entirely free of leaks.
- that there is no lead in the exhaust system, by the appropriate tests.
- the pollutant readings obtained:
  - the engine temperature,
  - take the readings at idling speed and at a speed of between 2500 and 3000 rpm.

NOTE: Variations in the different pollutant levels will not be immediate. They may be transitory and irregular because the reading will vary with the exhaust gas analyzer characteristics (sensitivity, response time, condensation in the systems, the condition of the filters, the lengths of the pipe, etc...).

- Ensure that the instrument is accurately zeroed after the necessary warmup time.



1. Fuel tank
2. Securing straps
3. Securing bolts
4. Sleeve
5. Double connector
6. Filler cap (non ventilated type)
7. Filler pipe
8. Tank vent pipe
9. Tank vent pipe
10. Locking ring
11. Tank vent pipe
12. Tank unit gasket
13. Dowel locating the tank on the vehicle body
14. Spacer

NOTE: on vehicles for certain markets, the tank vent passes through a "CANISTER"

Before removing the fuel gauge tank unit, ensure that the following precautions are observed.

Do not smoke.

Do not bring a naked flame or red hot parts near the working area (welding etc...).

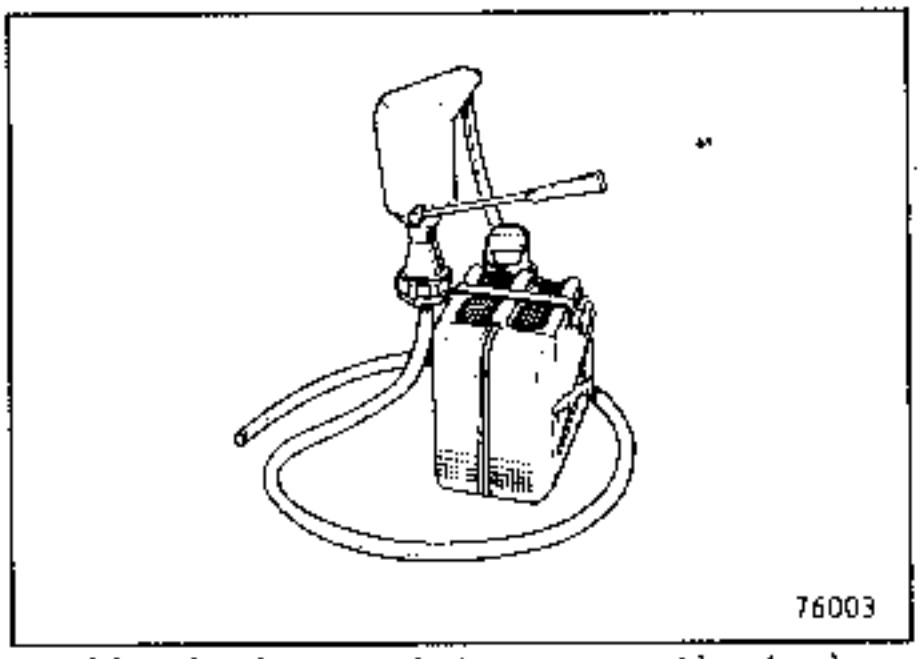
After draining off the fuel, firmly close the container.

REMOVING

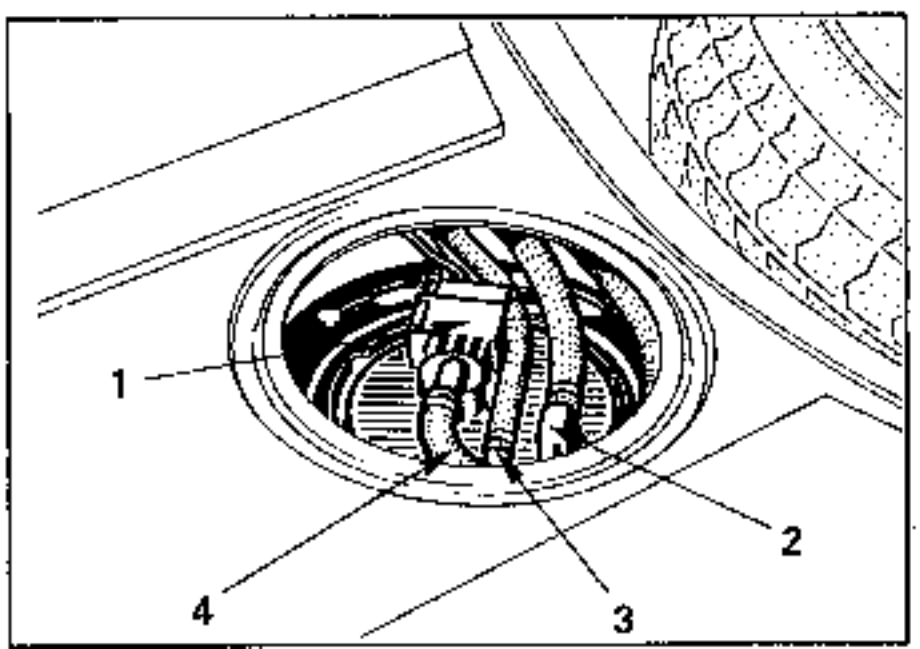
- Place the vehicle on a lift.

Before raising the vehicle:
- Disconnect the battery.
- Drain off the fuel from the tank using, for example, a "piston pump 3000" as supplied by:

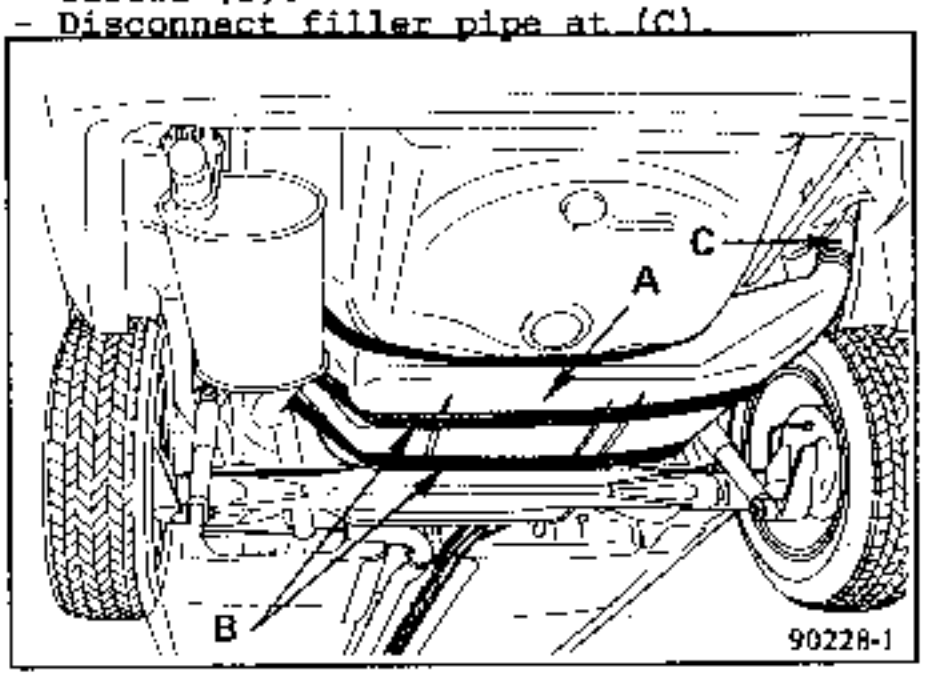
La Compagnie des Pompes et Distributeurs
7, rue J. Macé - 92150 Suresnes
Tél. : 45.06.23.95



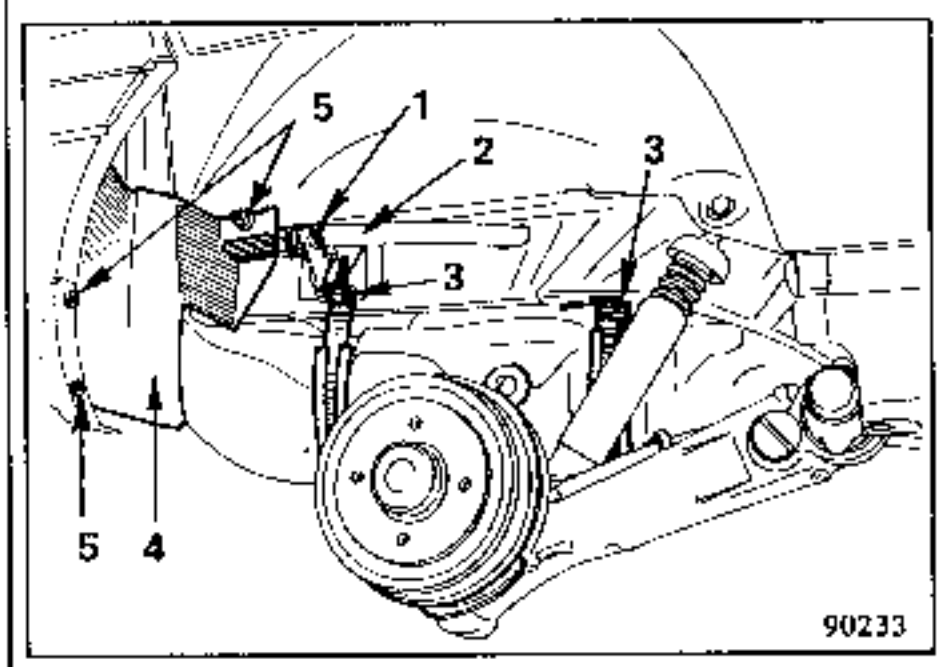
- Lift the boot mat to remove the tank unit connector access panel.
- Disconnect the connector from the tank unit (1).
- Disconnect the output pipe (2), return pipe(3) and vent (4) in the tank unit well.



- Remove the rear right hand wheel.
- Disconnect the two vent pipes from the double connector (1).
- Remove the protector (4) by taking out screws (5).
- Disconnect filler pipe at (C).



A - Tank
B - Securing strap
C - Connection between filler pipe and tank



1. Double connector
2. Vent pipes
3. Tank securing bolts
4. Protector
5. Securing bolts

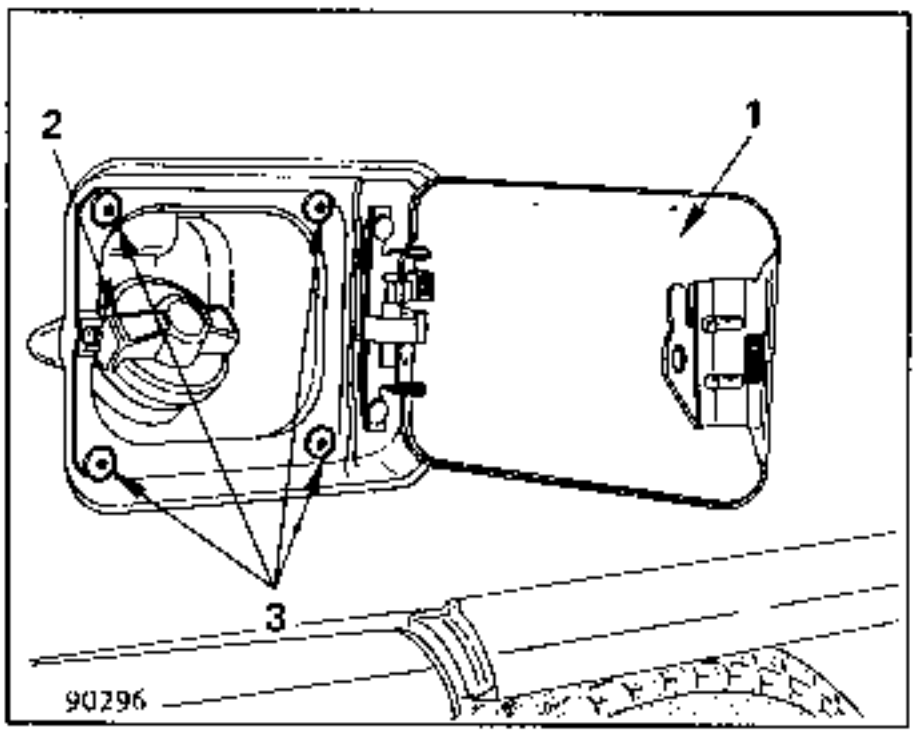
Remove the tank fastenings (3) and, using a Desvil V 710 stand (for example) placing a sheet of rubber between the stand and the tank, slowly lower the tank.

Refitting the Tank:

Take care, when refitting the tank, not to trap the pipes.
Locate the tank dowels in the corresponding recesses on the body.

Removing

The upper part of the filler pipe (cap end) is riveted to the bodywork.
To remove this part, one must drill out the rivets to free the pipe from the vehicle body.

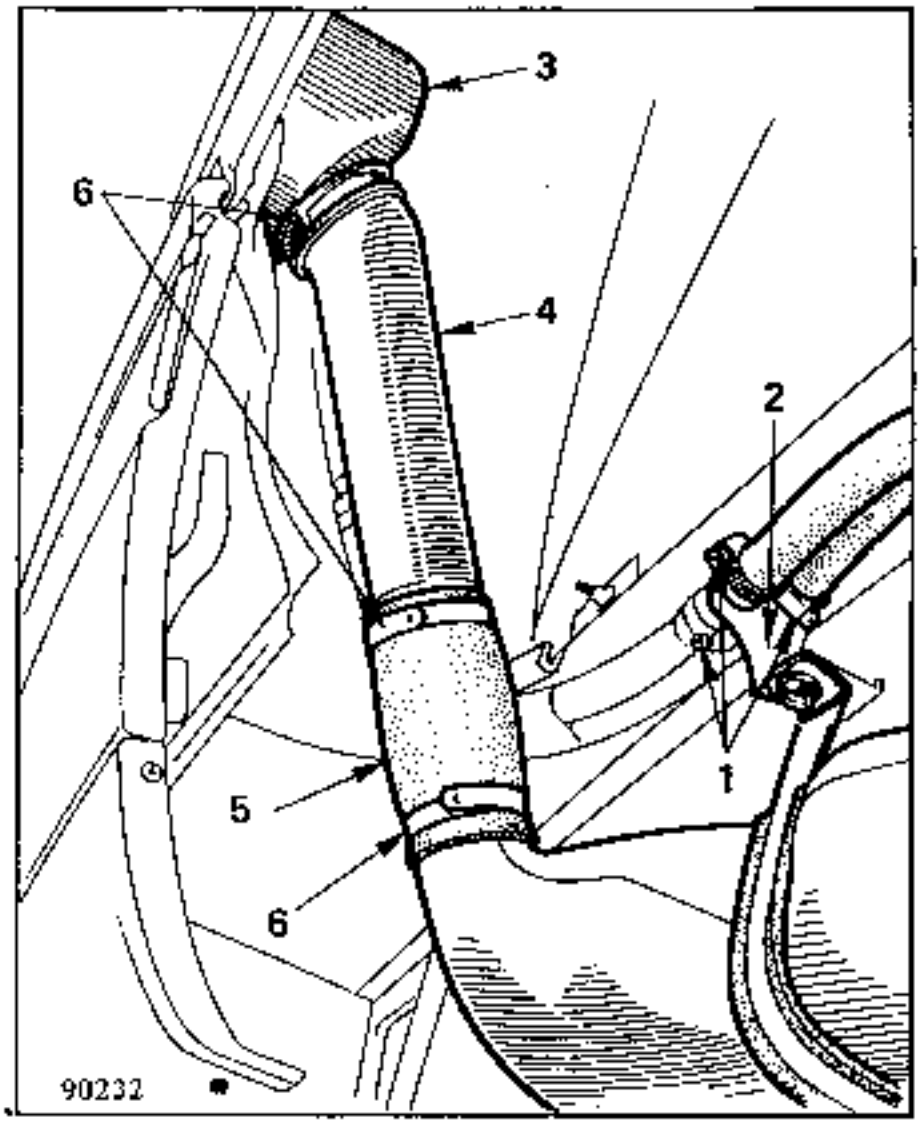


1. Flap
2. Filler cap
3. Securing rivets

- Disconnect the vent pipes from the double connector (2), on the filler pipe side.
- Disconnect the hose connecting the filler pipe to the tank (5) and (6).
- Remove the assembly.

Refitting

IMPORTANT: Take care, when refitting, not to trap the pipes.
Fit new aluminium rivets.
Ø = 4.8mm
L = 12mm
Head Ø = 12mm



1. Vent pipes
2. Double connector
3. Filler pipe
4. Sleeve
5. Connecting hose
6. Hose clips

FILLING THE TANK

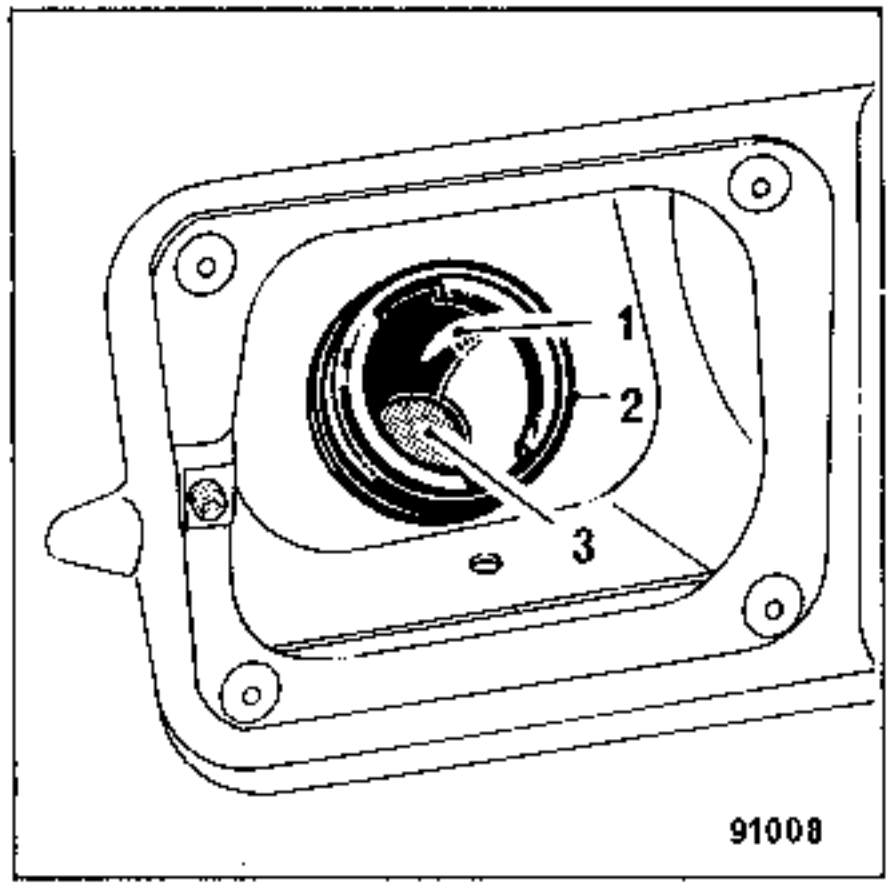
The tank has a useable capacity of
66 litres $^{+}_{-}$ 1 litre or 62 litres
$^{+}_{-}$ 1 litre on 4x4 vehicles.

- Insert the fuel filler nozzle as far as it will go and release the automatic filler system.
- After the automatic filler system has cut out for the first time, when the tank is almost full, one can add a maximum of a further 2 litres.
- The system is designed to retain an expansion volume, and this must not be filled.
- We therefore strongly recommend against filling the tank until it overflows.

FILLING TANK WITH UNLEADED FUEL

If the vehicle is to be used on unleaded fuel, the filler pipe will be fitted:

- with a smaller diameter filler hole into which a filler nozzle on a leaded fuel pump will not fit,
- a valve blocking off the filler pipe.



1. Reduced diameter
2. Filler hole
3. Valve