

N.T. 2466 A

057K - 057Y

Basic manual : M.R. 295

SPECIAL INFORMATION ON THE CLIO EQUIPPED WITH THE D7F ENGINE

77 11 188 639

APRIL 1996

Edition Anglaise

"The repair methods given by the manufacturer in this document are based on the technical specifications current when it was prepared.

The methods may be modified as a result of changes by the manufacturer in the production of the various component units and accessories from which his vehicles are constructed"

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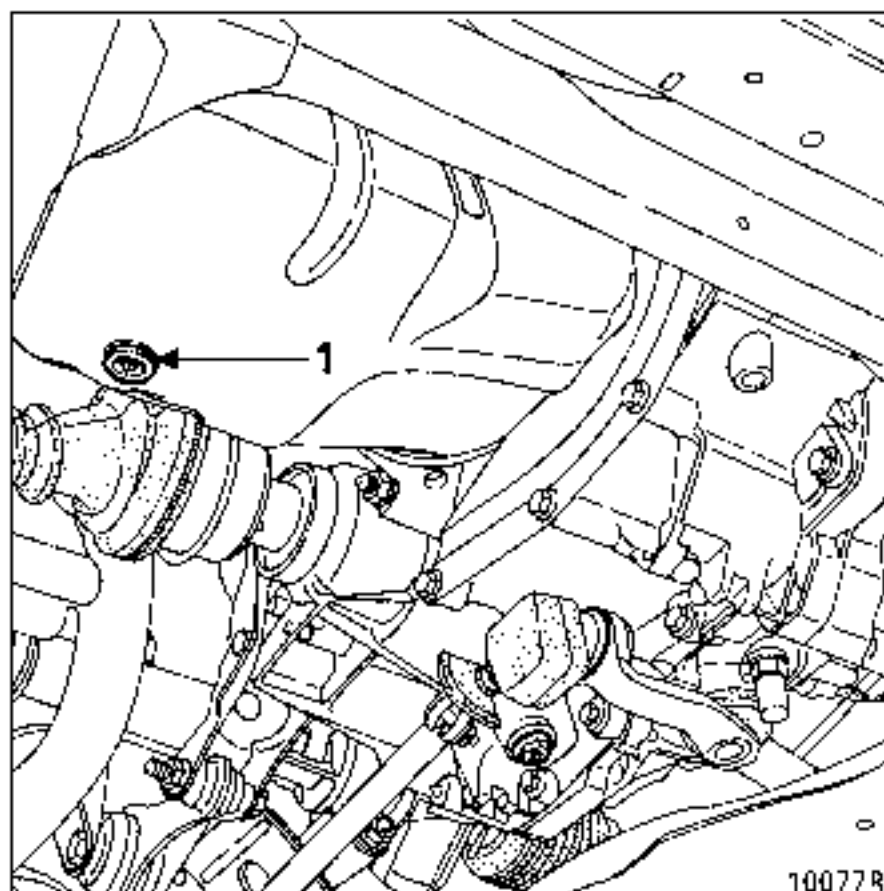
OIL DRAIN- REFILL Engine

05

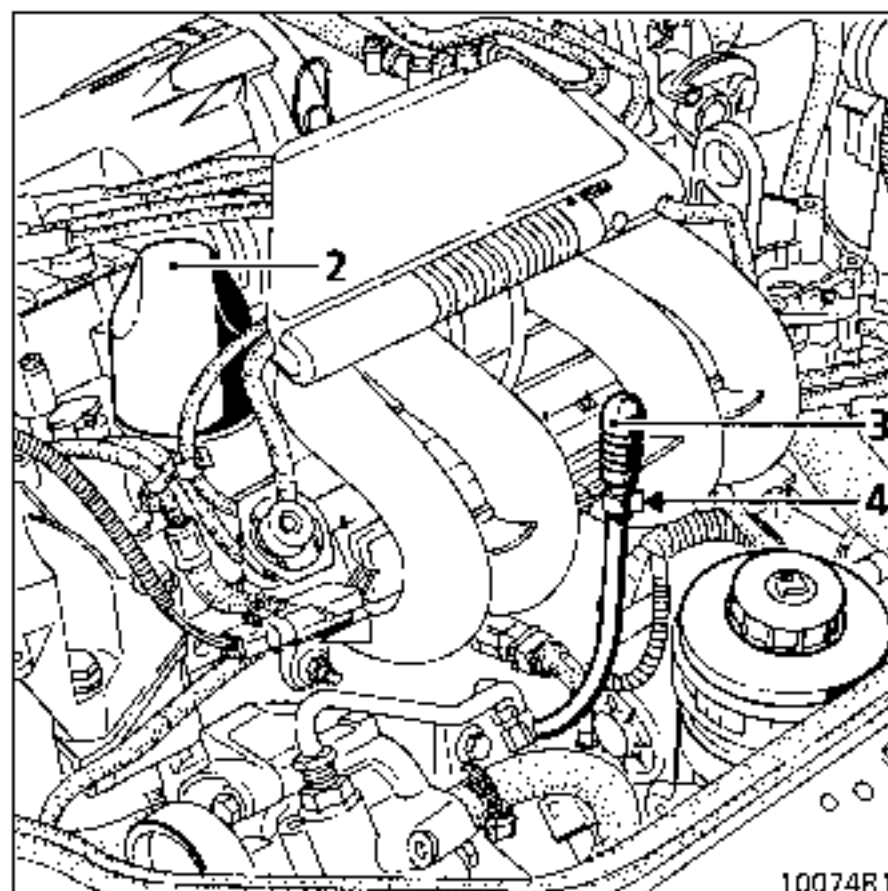
ESSENTIAL SPECIAL TOOLING

Engine oil change wrench

OIL DRAIN : Plug (1)



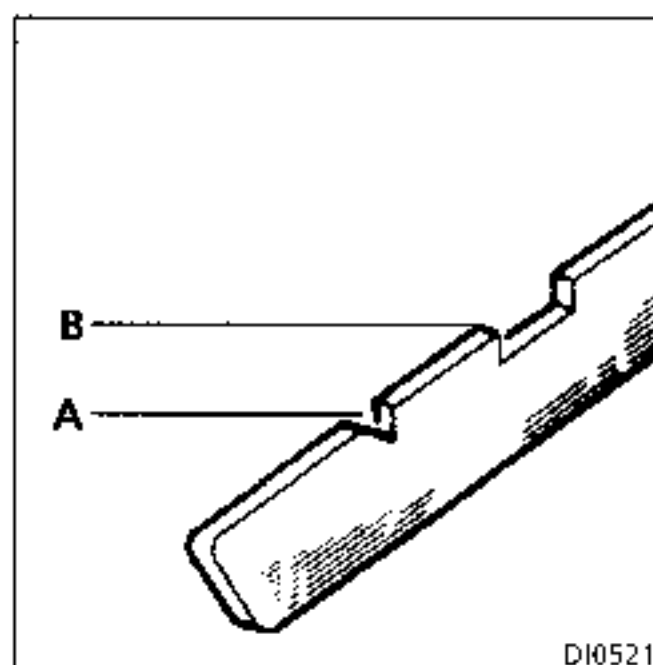
REFILL: Plug (2)



DIPSTICK

It is essential to release clip (4) before pulling out the dipstick (3).

- A Minimum level: 2 litres
- B Maximum level : 4 litres



OIL DRAIN - REFILL

Gearbox

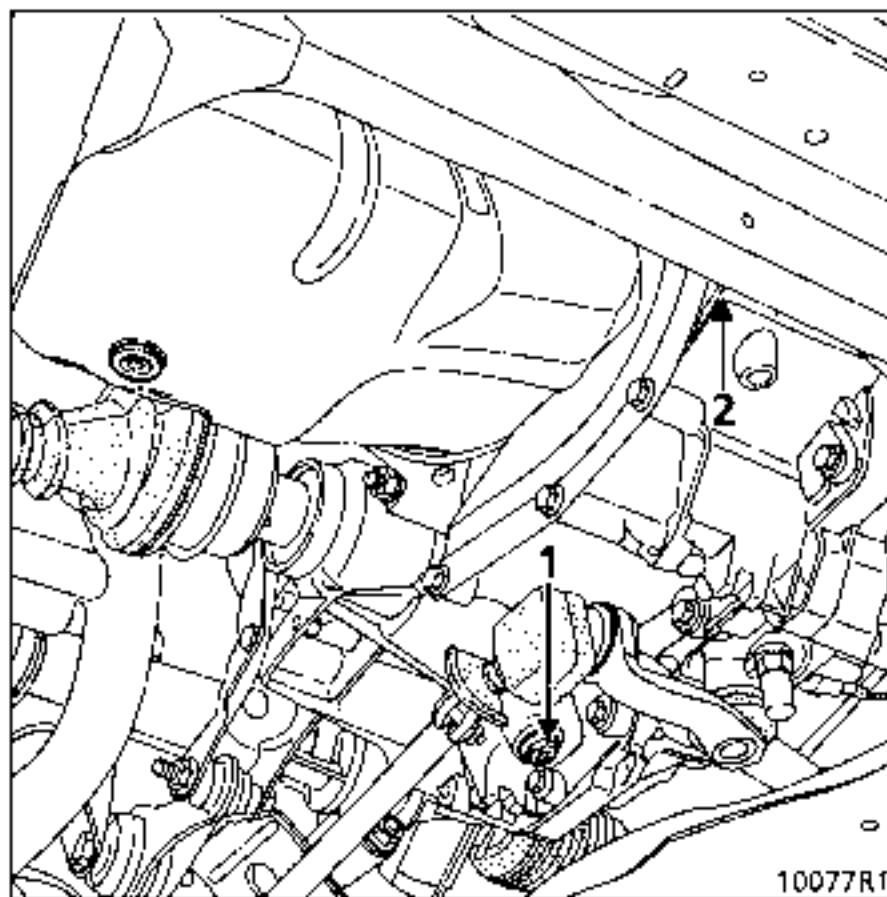
05

ESSENTIAL SPECIAL TOOLING

Gearbox oil change wrench

OIL DRAIN: Plug (1)

REFILL AND CHECK LEVEL: Plug (2)



Oil grade to be used:

- ELF RENAULTMATIC D2 or
- MOBIL ATF 220

Capacity : 1.1 litre

REFILLING THE SYSTEM

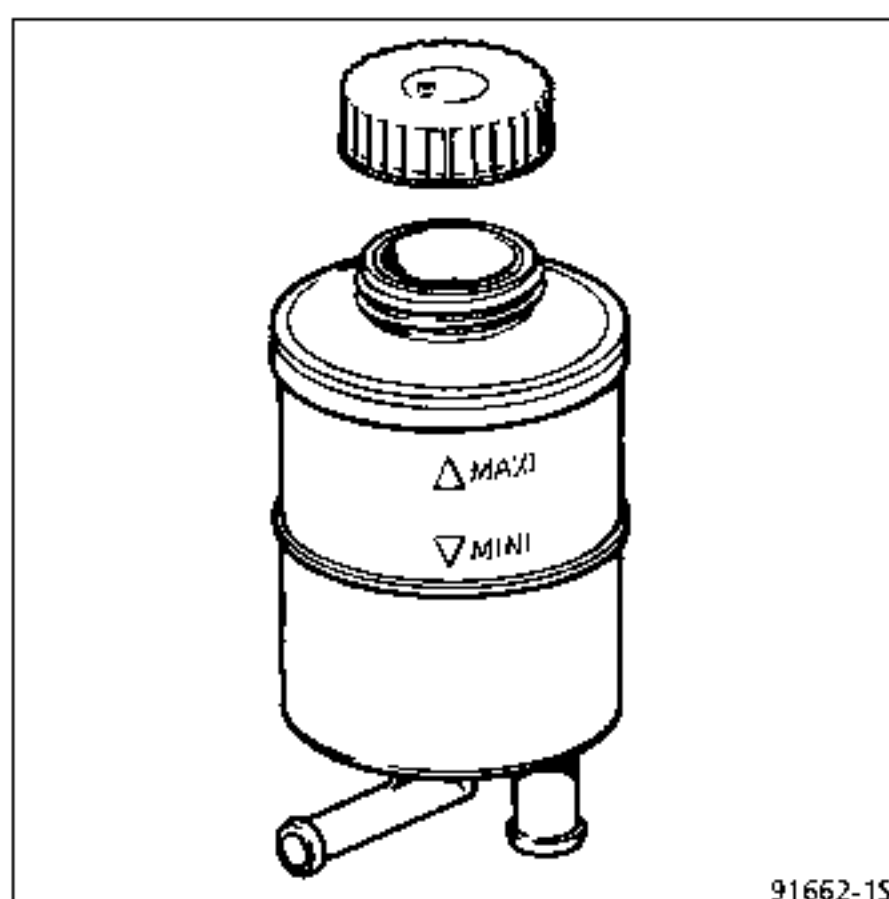
Refill the reservoir completely.

Activate the steering gently in both directions.

Top up the level.

Start the engine and move the steering gently from one side to the other.

Top up the level again.



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The oil should be visible level with the MAX mark.

VALUES AND SETTINGS

Capacity

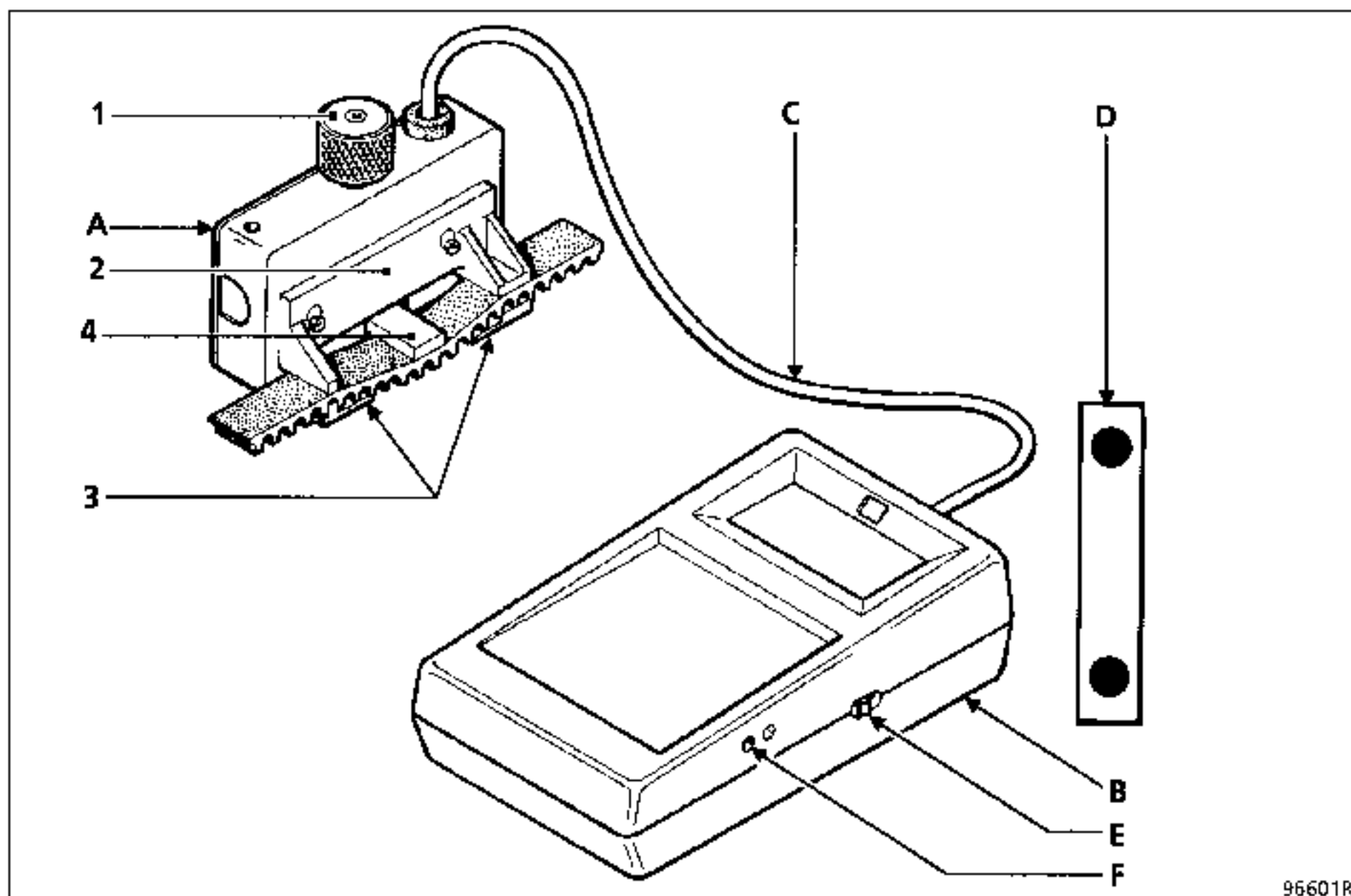
07

Components	Capacity in litres	Grade	Special points
D7F engine	If draining 4 with filter (plus 0.2 litre for the oil filter)	<p>E.C.C. countries</p> <p> -30°C -20°C -15°C -10°C 0°C $+10^{\circ}\text{C}$ $+20^{\circ}\text{C}$ $+25^{\circ}\text{C}$ $+30^{\circ}\text{C}$ </p> <p> CCMC-G4 15W40-15W50 ACEA A2-96/A3-96 15W40-15W50 </p> <p> CCMC-G5 10W30-10W40-10W50 ACEA A2-96/A3-96 10W30-10W40-10W50 </p> <p> CCMC-G5 5W30 ACEA A2-96/A3-96 5W30 </p> <p> CCMC-G5 5W40-5W50 ACEA A2-96/A3-96 5W40-5W50 </p>	
		<p>Other countries</p> <p> -30°C -20°C -15°C -10°C 0°C $+10^{\circ}\text{C}$ $+20^{\circ}\text{C}$ $+30^{\circ}\text{C}$ </p> <p>API SH 15W40</p> <p>API SH 10W40</p> <p>API SH 10W30</p> <p>API SH 5W30</p>	
Gearbox			1st change Oil change intervals Check level Grade * Viscosity
JB1	3.4	All countries	None No oil change Every 12000 miles (20000 km) after 1st service or 1st oil change TRX 75 W 80 W
Brake circuit	0.7	SAE J 1703 and DOT 4	Brake fluids must be approved by the Technical Department
Cooling circuit	5	Glacéol RX (type D) Only add coolant	Protection down to $-20 \pm 2^{\circ}\text{C}$ for hot, temperate and cold climates. Protection down to $-37 \pm 2^{\circ}\text{C}$ for very cold climates.
Fuel tank	43	Unleaded petrol	-

(1) We would advise against the use of 10 W 40 mineral oils which do not comply with CCMC-G3.

* If it is difficult to change gear in very cold countries, use EP75B oil.

ESSENTIAL SPECIAL TOOLING	
Mot. 1273	Tool for checking belt tension



96601R

- A Sensor
- B Display
- C Connecting lead
- D Calibration checking plate

Principle

The sensor, through the adjusting button (1), the pressure device (2) and the outer lugs (3), applies a constant force to the belt.

The reaction from the belt is measured using a test piece (4) fitted with strain gauges.

Any movement on the gauges creates a variation in their electrical resistance. This variation, once it has been converted by the device, is displayed on the display in SEEM units (US).

Calibrating the device

The device is set in the factory. However, it must be recalibrated every six months.

Procedure

Resetting zero:

- Switch the device on (button E) with the adjusting button (1) fully screwed in.
- If 0 is displayed, do not touch anything.
- If nothing is displayed, check the condition of the 9 volt battery in the device.
- If a value other than 0 is displayed, adjust screw (F) until 0 is displayed.

Checking the calibration

Switch the device on (button E).

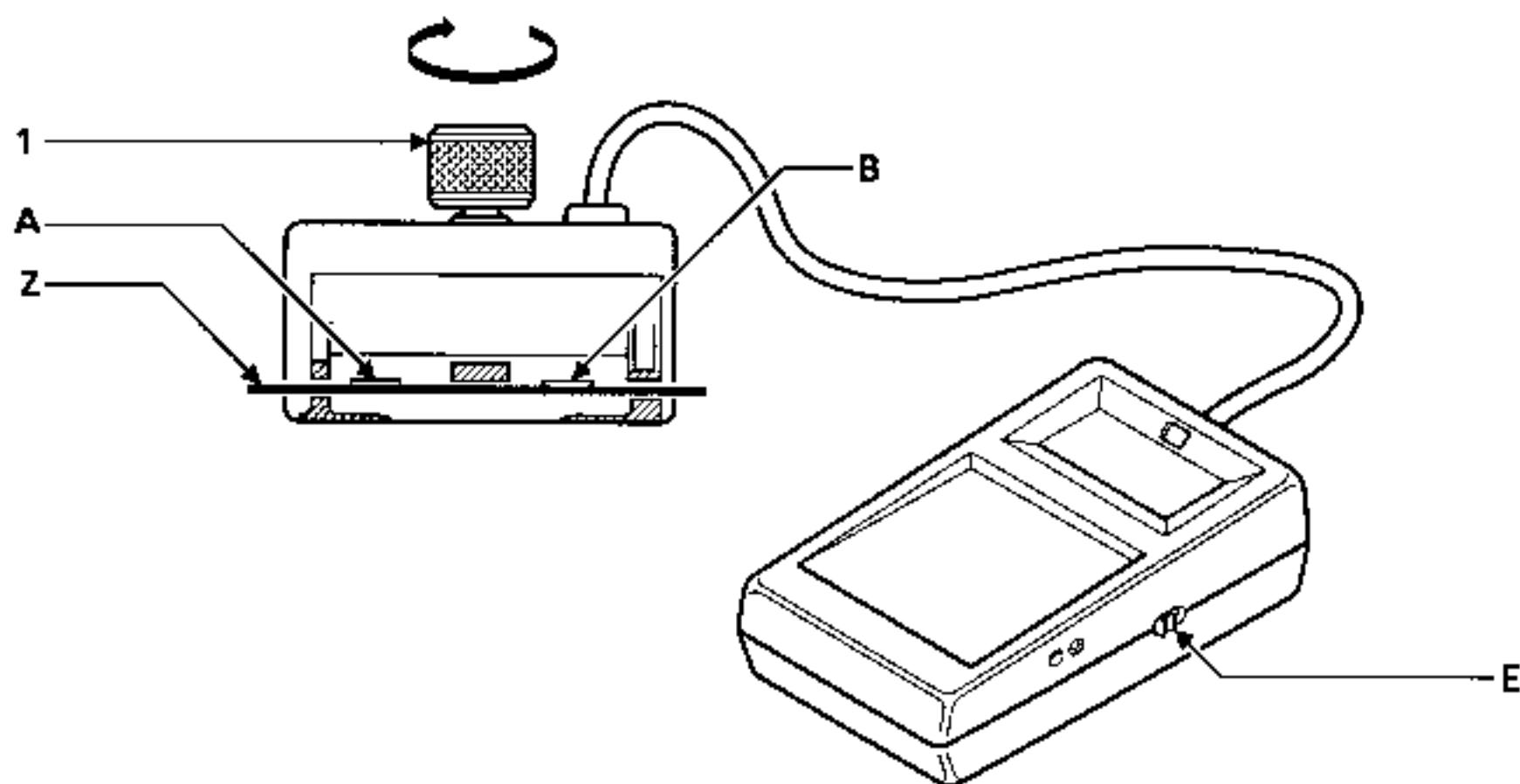
Position the calibration spring plate (Z) on the sensor as shown on the diagram (checking value engraved towards the top - (A) minimum value, (B) maximum value).

Tighten the adjusting button (1) until it clicks three times.

Check that a value X between the values (A and B) ($A \leq X \leq B$) is displayed.

NOTE: It may be necessary to perform several preliminary tests in order to obtain the correct value. If the correct value is still not obtained after several attempts, contact SEEM.

NOTE : Each device has its own calibration spring plate and they are not interchangeable.



- 1 Adjusting button
- A } Calibration plate checking value
- B }
- Z Calibration plate

SEEM

For further information, contact your After Sales Head Office.

GENERAL INSTRUCTIONS :

- Never refit a belt which has been removed, replace it.
- Never retighten a belt for which the tension reading is between the fitting value and the minimum operating value.
- When checking, if the tension is below the minimum operating value, replace the belt.

GROOVED BELT

Tensioning process

Engine cold (ambient temperature).

Fit the new belt.

Position the sensor of **Mot. 1273**.

Turn the adjusting button of the sensor until it operates (three clicks).

Tension the belt until the recommended fitting value is displayed on **Mot. 1273**.

Lock the tensioner, check it, adjust the value.

Turn the crankshaft over three turns.

Check that the tension value is within the fitting tension tolerance, otherwise readjust it.

NOTE :

Never refit a belt which has been removed.

Replace the belt, if the tension is **below the minimum operating tension**.

Small cuts or cracks do not mean that the belt has to be replaced.

ESSENTIAL SPECIAL TOOLING	
Mot. 1273	Tool for checking belt tension

TENSIONING PROCESS

Engine cold (ambient temperature). Fit the new belt

Position the sensor of **Mot. 1273** at the point indicated (→).

Turn the adjusting button of the sensor until it operates.

Tension the belt until the recommended fitting value listed below is displayed **Mot. 1273**.

Lock the tensioner, check it and adjust the value.

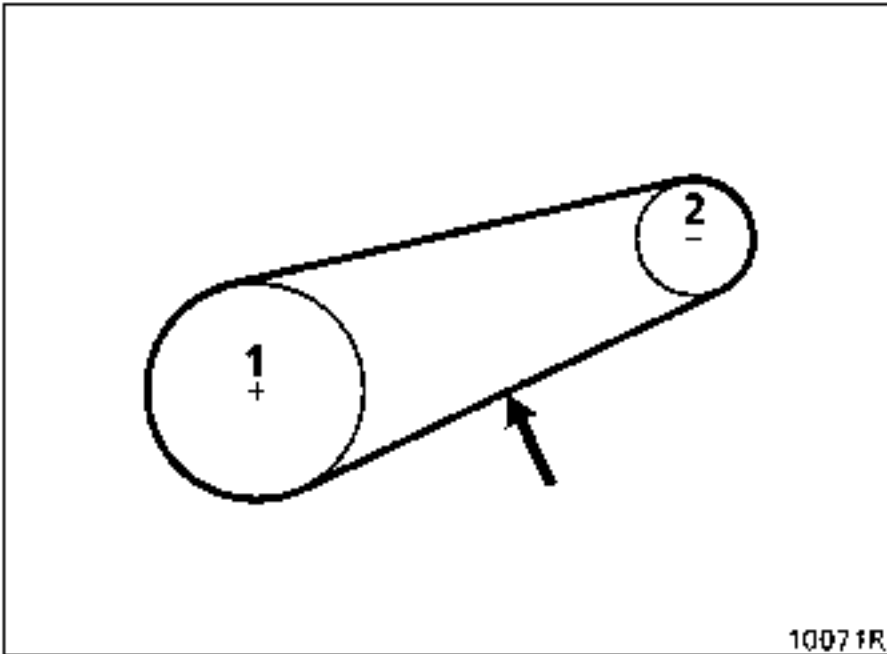
Turn the crankshaft over three times.

Check, adjust the value to the fitting tension if necessary .

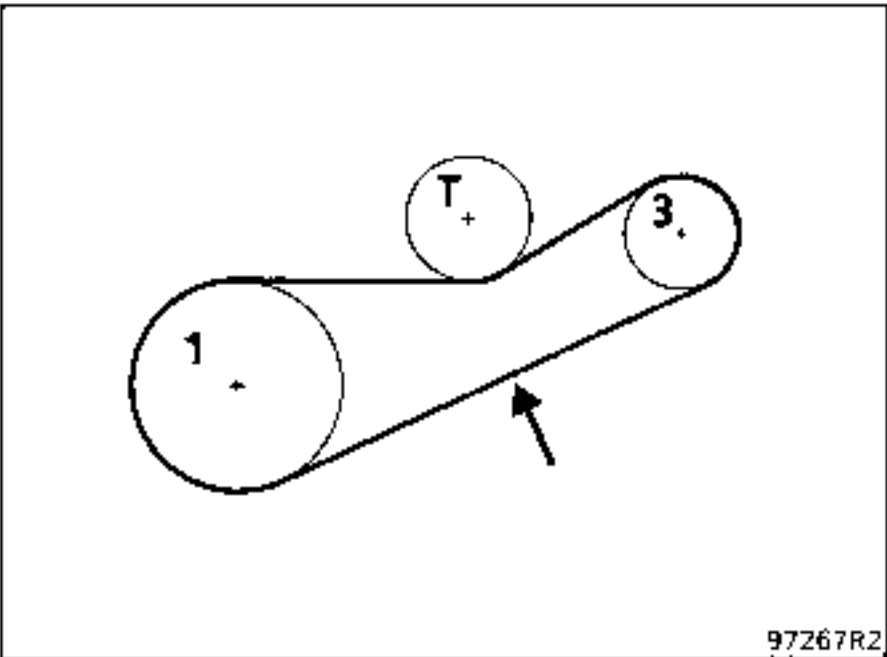
Never refit a belt which has been removed - replace it.

Tension (US = SEEM unit)	Multitoothed power assisted steering belt	Multitoothed alternator belt
Fitting	96 ± 5	102 ± 7
Minimum operating	43	53

Alternator belt



Power steering pump belt



- 1 Crankshaft
- 2 Alternator
- 3 Power assisted steering pump
- T Tensioner
- Tension check point

VALUES AND SETTINGS

Tightening the cylinder head

07

CYLINDER HEAD

Reminder

To ensure that the bolts are correctly tightened, use a syringe to remove any oil which may be in the cylinder head mounting holes.

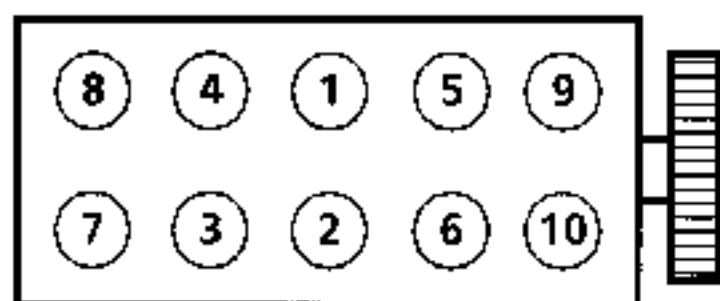
Using engine oil, lubricate the threads and under the heads of the bolts.

The engine should be cold when the rockers and cylinder head are tightened

CYLINDER HEAD TIGHTENING METHOD

a) Preseating the gasket

Tighten all the bolts to **2 daN.m** and then angle tighten to **90°** in the order specified below.



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Wait for **3 minutes** to allow the gasket to stabilise.

b) Tightening cylinder head

Slacken bolts 1 and 2 until they are completely free.

Tighten bolts 1 and 2 to **2 daN.m** and then through an angle of **200°**.

Slacken bolts 3-4-5-6 until they are completely free.

Tighten bolts 3-4-5-6 to **2 daN.m** and then through an angle of **200°**.

Slacken bolts 7-8-9-10 until they are completely free.

Tighten bolts 7-8-9-10 to **2 daN.m** and then through an angle of **200°**.

Type	Amount	Components
RHODORSEAL 5661	Coat	Drive shaft roll pin holes
LOCTITE 518	Coat	Sealing - water pump intake
Loctite FRENBLOC Locking and sealing resin	Coat	Brake calliper mounting bolts
Loctite FRENETANCH Locking and sealing resin	Coat	Crankshaft pulley mounting bolts
ELF Multi	Coat	Wheel bolts
MOLYKOTE CU. 7439	Coat	For centring wheels
Compound for exhaust pipes	Coat	Exhaust sealing

Identification

Vehicle type	Engine	Manual gearbox	Capacity (cc)	Bore (mm)	Stroke (mm)	Compression ratio
057K 057Y	D7F	JB1	1149	69	76.8	9.65/1

Refer to Mot. D (E) for information about engine repairs.

CHECKING PROCEDURE

Oil consumption of 1 litre for 1000 km (620 miles) is acceptable.

Check there is no external oil leak from the engine.

For accurate testing, certain conditions must be observed when draining the engine oil:

- the engine should be warm,
- the dipstick and filling plug should be removed.

Drain the engine and leave the oil running out for 15 minutes minimum.

Refit the drain plug and "seal" (spot of paint covering the plug and the sump) in order to check at a later date that it has not been removed.

Fill with oil, to the maximum mark on the dipstick.

Refit the filling plug and seal it.

Ask the driver to return the vehicle after 1000 km (620 miles) during which time the oil level should be monitored regularly with the dipstick.

When the vehicle is returned, check the drain and filling plugs have not been tampered with.

Use a measuring cylinder to check the amount of oil required to fill the engine.

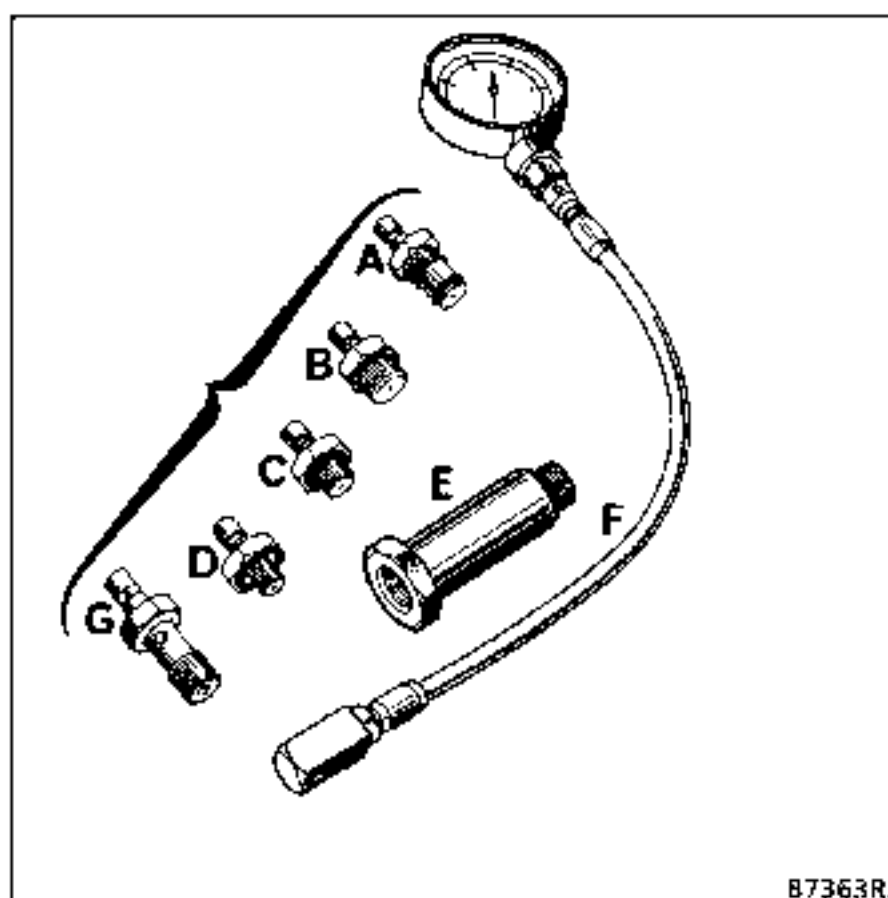
CHECKING

ESSENTIAL SPECIAL TOOLING

Mot. 836 -05 Oil pressure testing kit

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

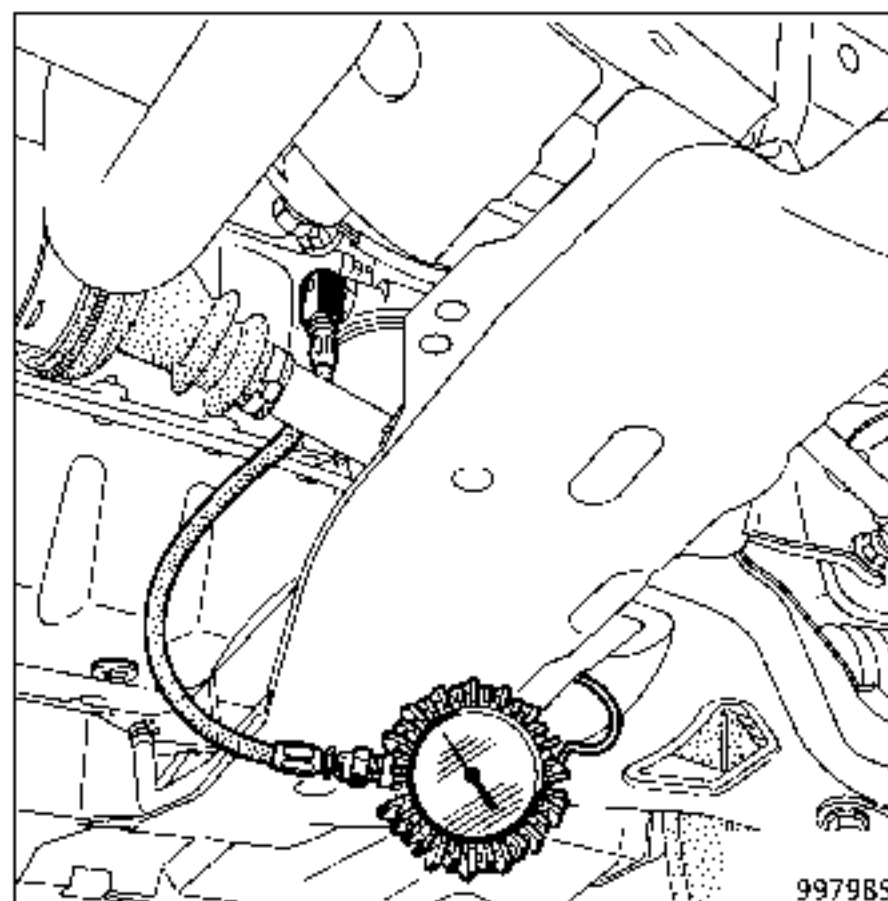
Composition of the kit Mot. 836-05.



USE :

D engine : F + C

Connect the pressure gauge in place of the pressure switch located behind the oil pump.



Check

- At idling speed: 0.8 bar
- at 4000 rpm : 3.5 bars

ESSENTIAL SPECIAL TOOLING	
B. Vi. 31-01	Set of punches
Mot. 453-01	Hose pliers
Mot. 1202	Hose clip pliers
T. Av. 476	Ball joint extractor
SPECIAL EQUIPMENT	
Load positioning tool (example : NAUDER 180S)	

TIGHTENING TORQUE (in daN.m)



Brake calliper mounting bolt	3.5
Mounting bolts for base of shock absorber	11
Steering ball joint	3.5
Wheel bolts	9
Drive shaft gaiter bolt	2.5
Torque reaction arm bolt	6.5
Bolt for mounting front right-hand suspended mounting cover on engine	5.7
Nut for mounting rubber pad on front right-hand suspended mounting cover	2.7
Nut for mounting rubber pad on front left-hand battery support	7.5
Bolt for mounting battery support on front left-hand side member	2

REMOVING

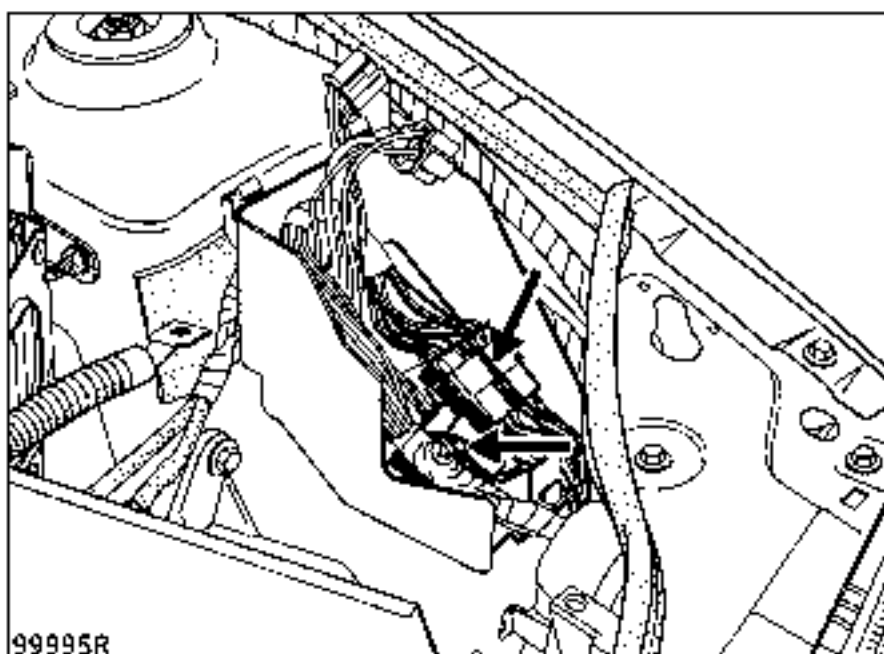
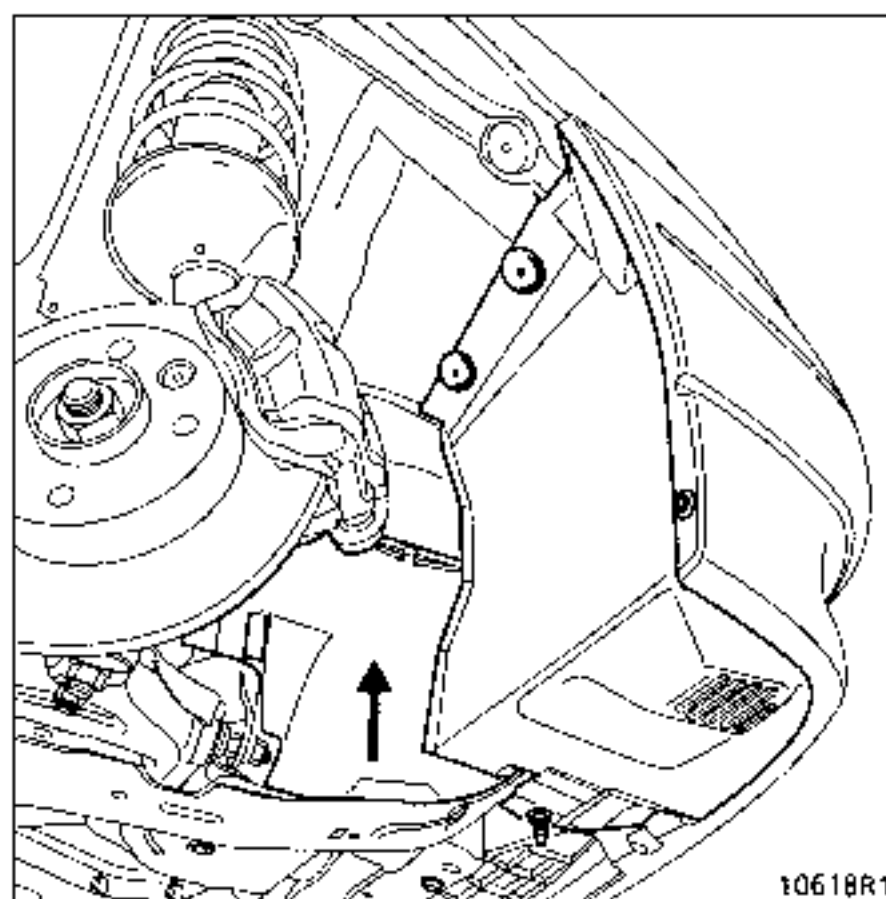
- Remove:
- the battery,
 - the connectors for the engine interconnection unit.

Drain :

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

Remove:

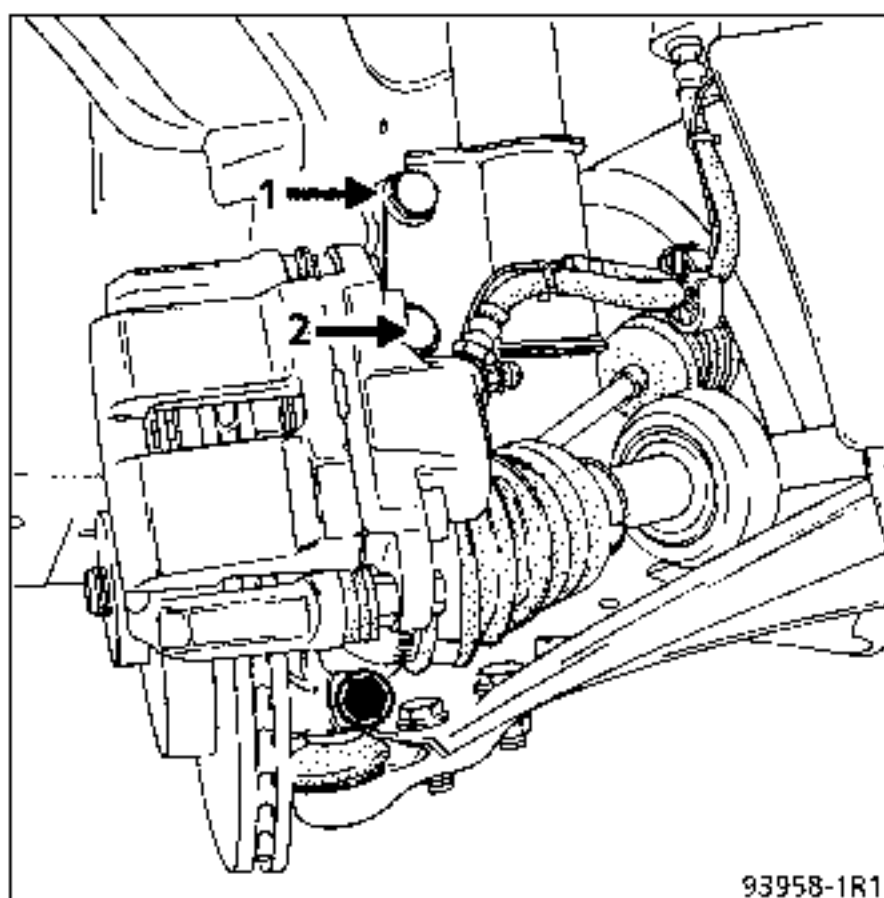
- the bonnet,
- the wheels,
- the right and left mud guards.



Right-hand side

Remove:

- the drive shaft roll pins using punches from B. Vi. 31-01,
- the two brake calliper mounting bolts and then secure the shock absorber spring,
- the steering arm ball joint using tool T. Av. 476,
- the upper bolt (1) from the shock absorber base and slacken off the bolt (2),



Tilt the stub axle and release the drive shaft.

Left-hand side:

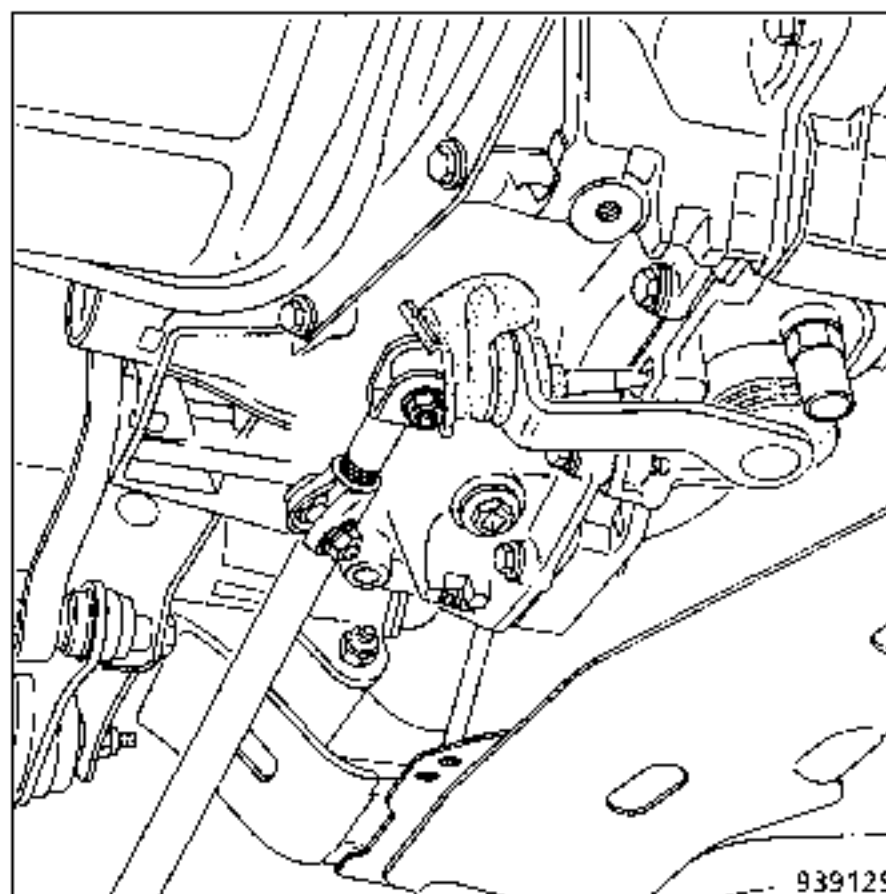
Remove :

- the two brake calliper mounting bolts and then secure it to the shock absorber spring,
- the steering ball joint using extractor T. Av. 476,
- the three bolts securing the drive shaft gaiter,
- the upper shock absorber base bolt.

Slacken off the lower bolt.

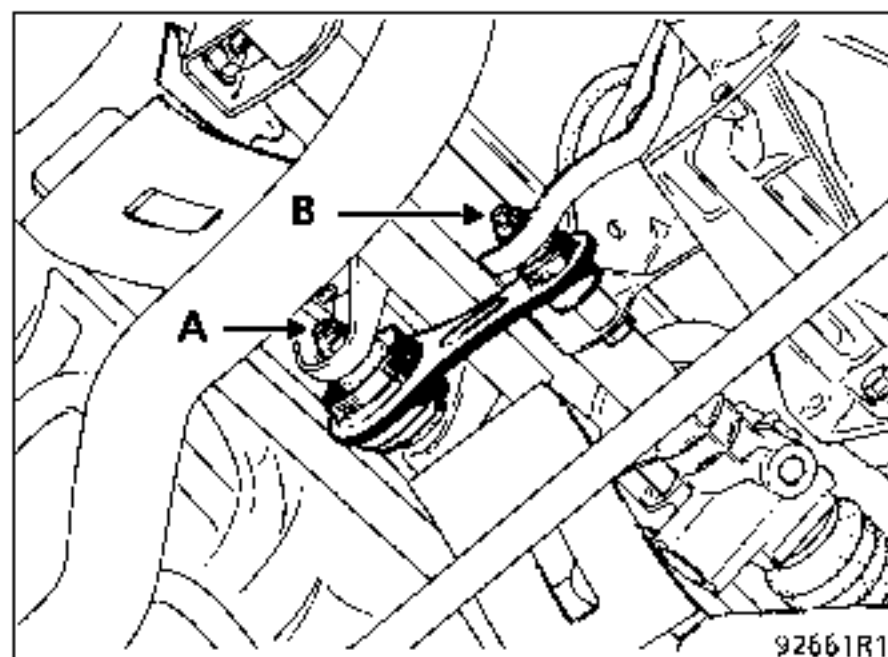
Tilt the stub axle and free the drive shaft.

Disconnect the gear linkage at the gear lever selector end after releasing the protective gaiter.



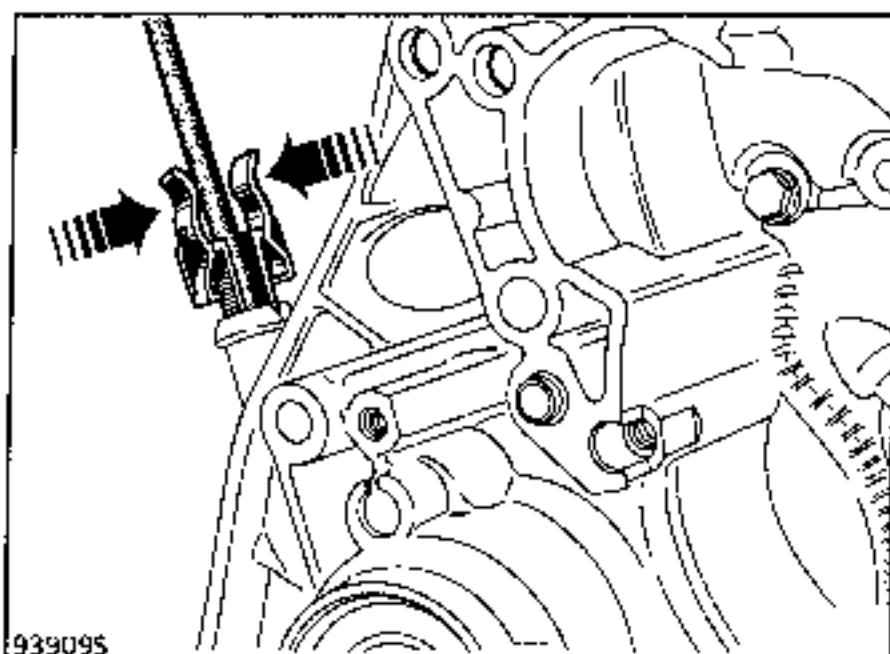
NOTE : Each time the arm - yoke link is removed, the gear linkage must be adjusted.

Slacken off the bolt (A) without removing it and remove the bolt (B) from the torque reaction arm.



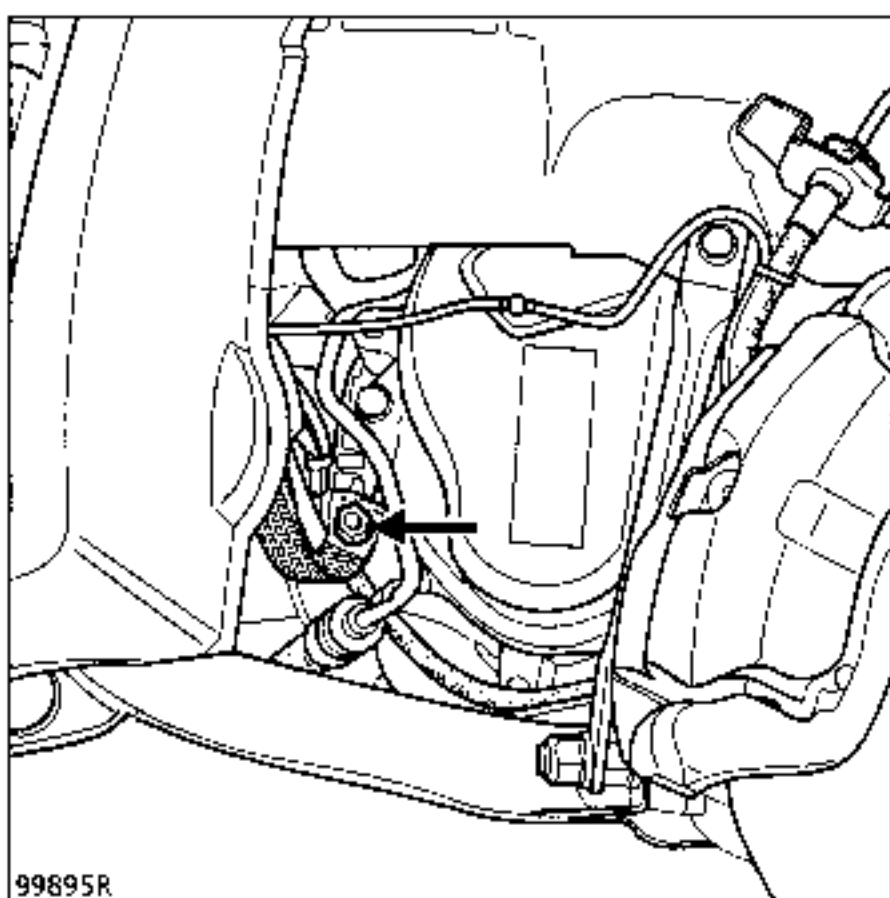
Disconnect:

- the oxygen sensor connector,
- the speedometer cable. To do this, squeeze the tabs and pull the cable.

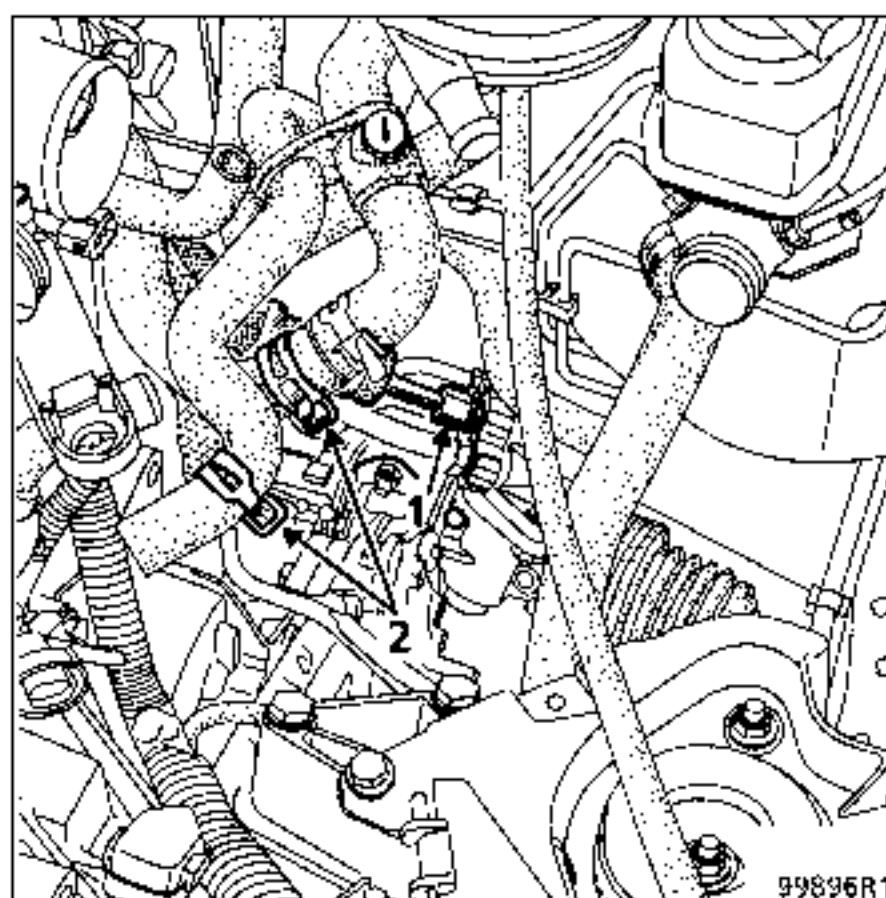


Remove:

- The exhaust down pipe mounting nuts.
- The gearbox earth braiding.



- First fit hose clamps on the two pipes from the power steering reservoir and then remove the upper connection (1) for the power steering (if fitted).



- Remove the fan assembly.

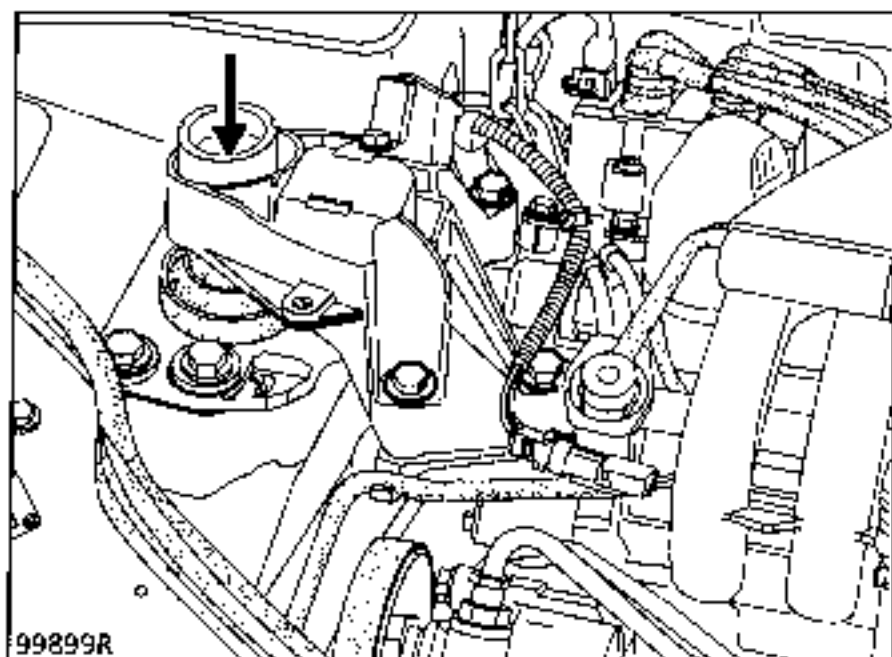
Disconnect:

- the accelerator and clutch cables,
- the heater pipes at (2),
- the petrol supply and return pipes at the timing belt cover on the cylinder head,
- the canister pipe,
- the brake servo vacuum pipe,
- the upper hose on the radiator,
- the thermistor connector on the radiator,
- the injection computer connector and remove its bracket.

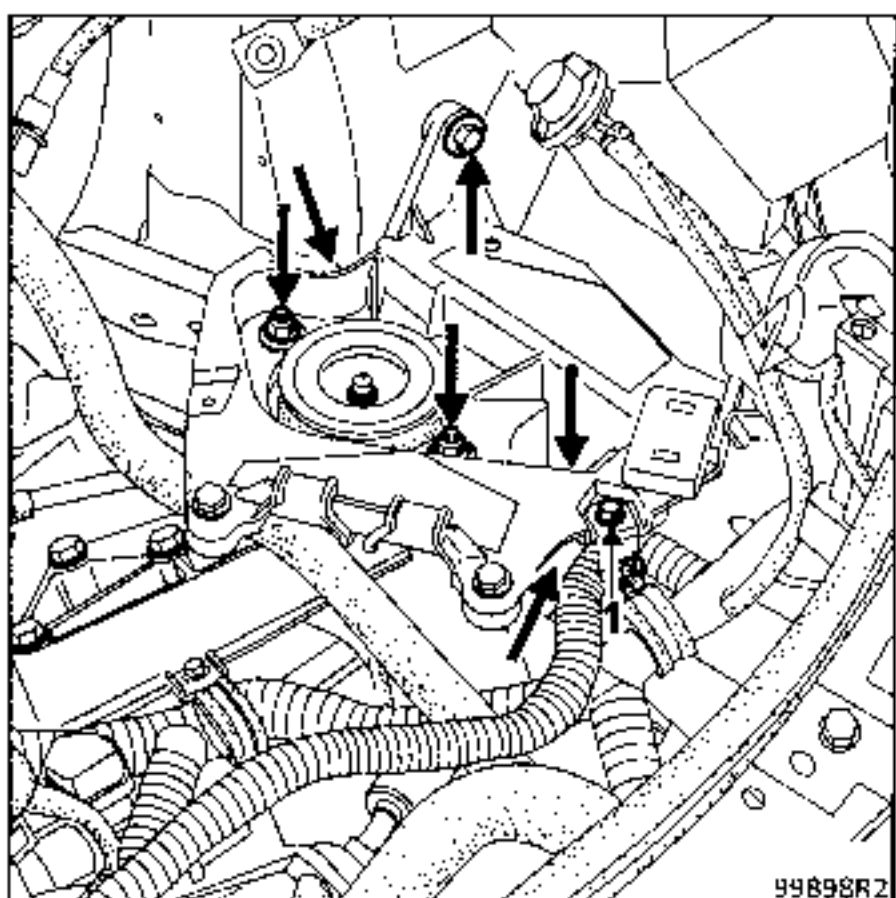
Fit the load positioning tool on the engine lifting rings.

Remove:

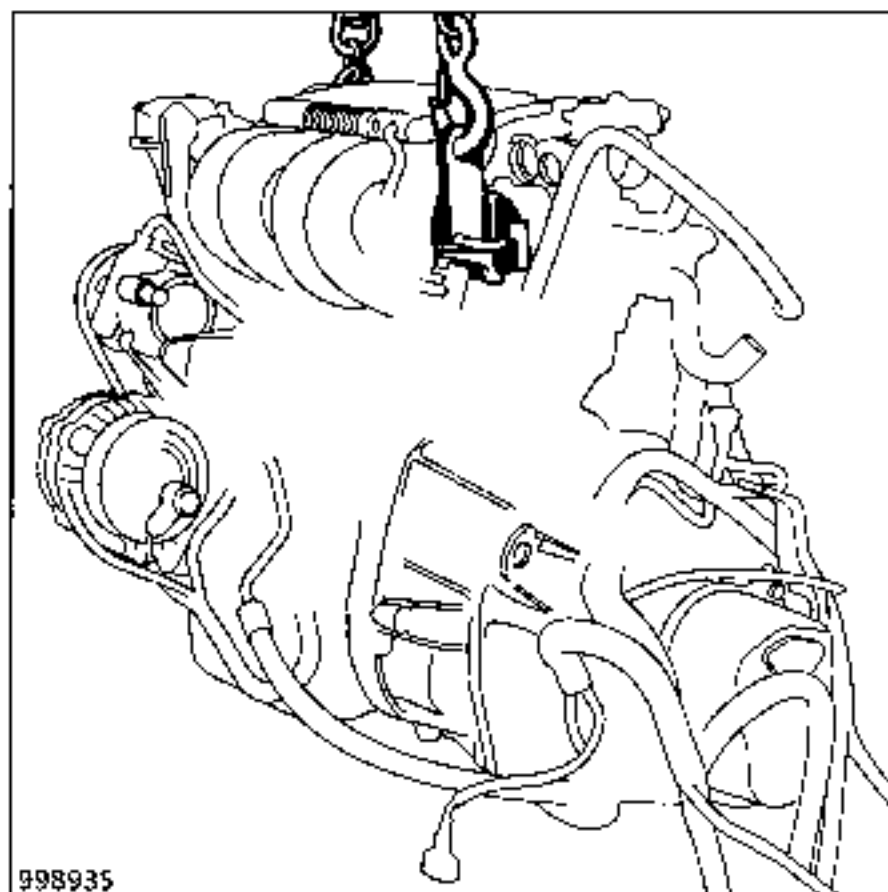
- the engine suspension mounting nut,



- the mounting bolt (1) for the wiring harness bracket,
- the battery support.



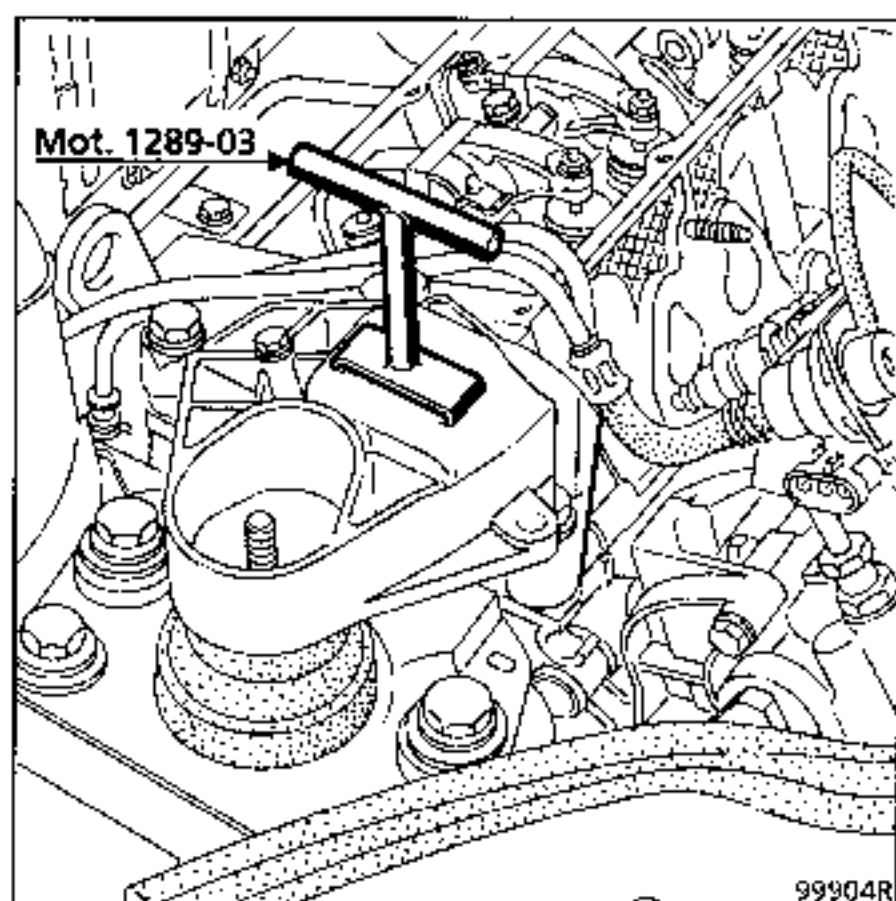
Extract the engine - gearbox assembly.



REFITTING (special points)

Refit in reverse order to removal.

Use tool Mot. 1289-03 to check that the suspension cover is correctly centred.



Apply RHODORSEAL 5661 to the drive shaft roll pin holes.



Fit the brake calliper bolts with **FRENBLOC** and tighten to the correct torque.

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

Adjust the accelerator cable.

Fit the speedometer cable.

- Top up the gearbox.
- Top up and bleed the cooling circuit (see chapter 19).

ESSENTIAL SPECIAL TOOLING

Mot. 1040-01	Dummy cradle for removing and refitting the engine and transmission assembly
Mot. 1202	Hose clip pliers
Mot. 1379	Tool for holding engine on sub-frame

TIGHTENING TORQUES (in daN.m)



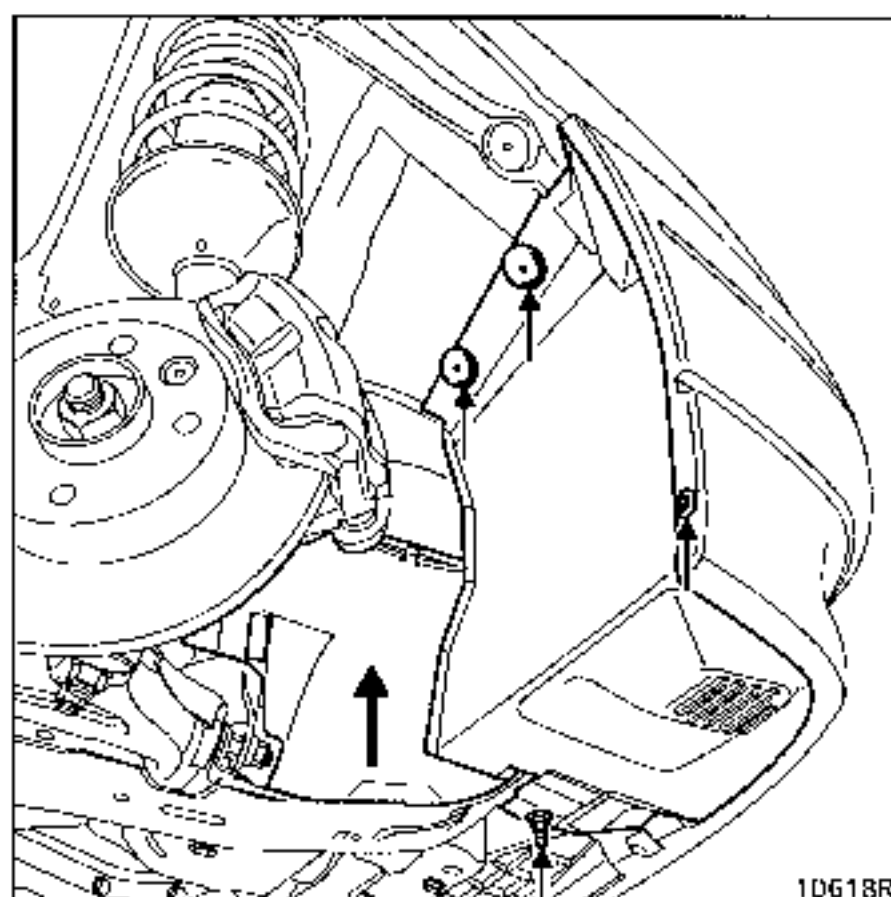
Front sub-frame mounting bolt	6
Rear sub-frame mounting bolt	11
Brake calliper mounting bolts	3.5
Upper shock absorber cup mounting nut	6
Steering yoke mounting bolt	3
Wheel bolts	9
Bolts securing front right-hand suspended mounting cover on engine	5.7
Nut securing suspended mounting cover on rubber pad	2.7
Nut securing left-hand rubber pad on battery support	7.5

REMOVING

Put the vehicle on a 2-post lift.

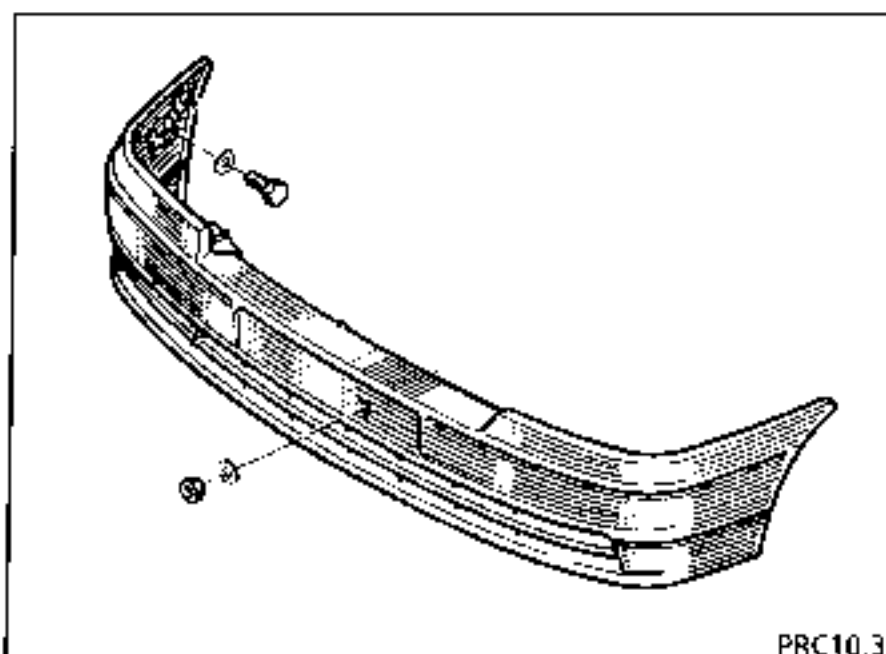
Remove:

- the bonnet,
- the battery,
- the front wheels,
- the right-hand and left-hand mud guards,



10G18R

- the front shield.

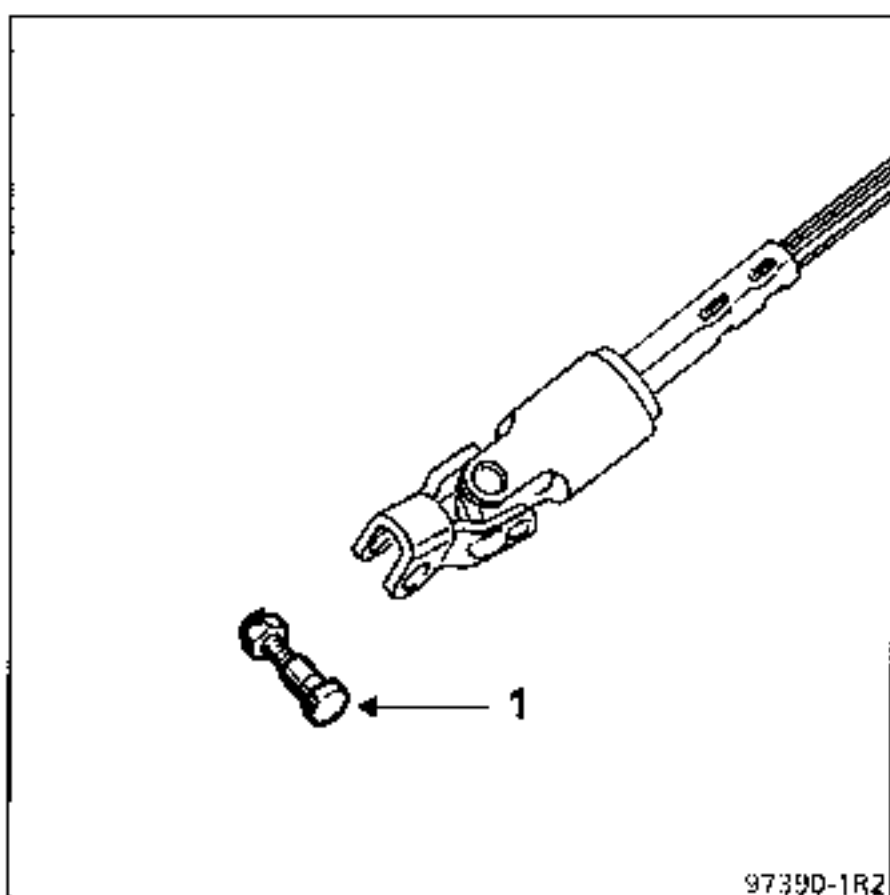


Drain:

- the cooling circuit by disconnecting the lower radiator hose (at the radiator end),
- the engine and gearbox, if necessary.

Remove:

- the exhaust down pipe,
- the gear linkage at the gearbox end (move it back and attach it to the exhaust tube),
- the bolt (1) from the steering yoke (after first pushing the protector back).



SPECIAL NOTES FOR VEHICLES FITTED WITH A DRIVER'S AIRBAG

IMPORTANT

To avoid any risks of destroying the rotary switch under the steering wheel, comply with the following instructions:

- Before removing the steering column and the rack, the steering wheel **MUST** be immobilised with the wheels straight using a "steering wheel locking tool" throughout the whole operation.
- Any doubts about whether the steering wheel is centred means that the steering wheel will have to be removed. Use the centring method described in the Technical Note dealing with the second generation airbag.

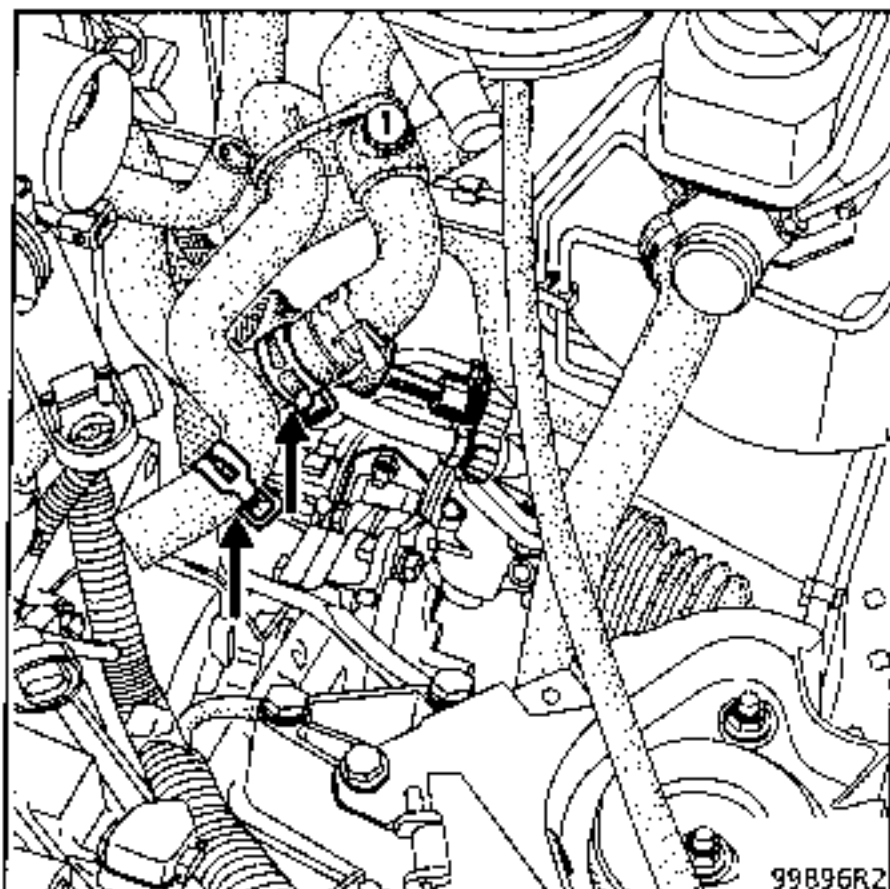
REMINDER: In this case, only qualified trained staff can carry out this operation.

Remove:

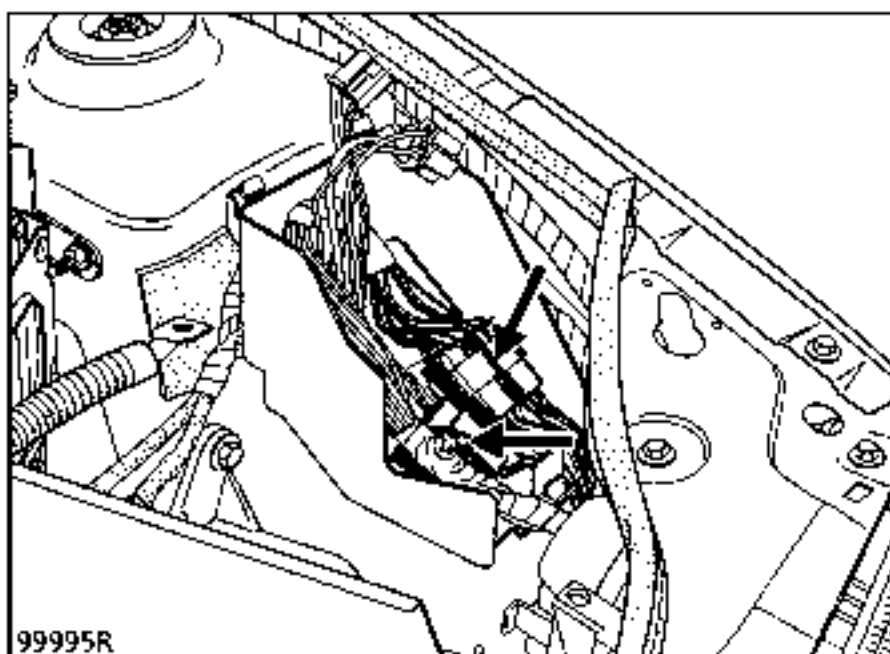
- the brake callipers and attach them to the body,
- the tie rods connecting the sub-frame to the body,
- the injection computer connector and its bracket,
- the air intake pipe on the air filter,
- the expansion bottle strap.

Disconnect:

- the two heater pipes,



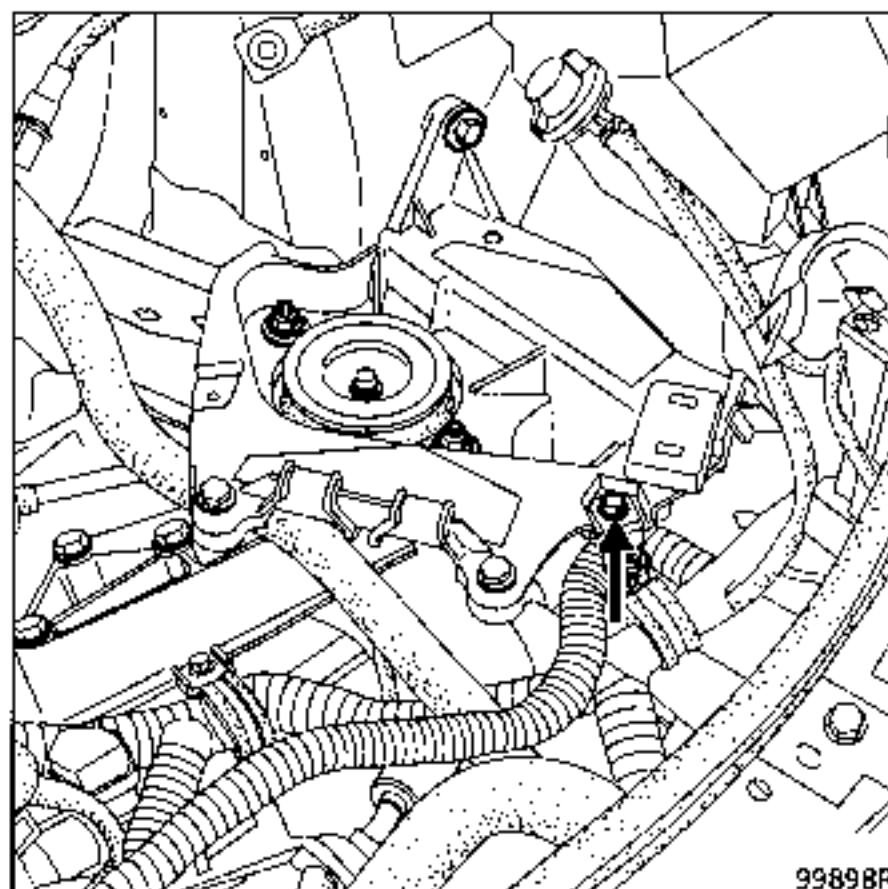
- the brake servo vacuum pipe,
- the two connectors for the engine interconnection unit,



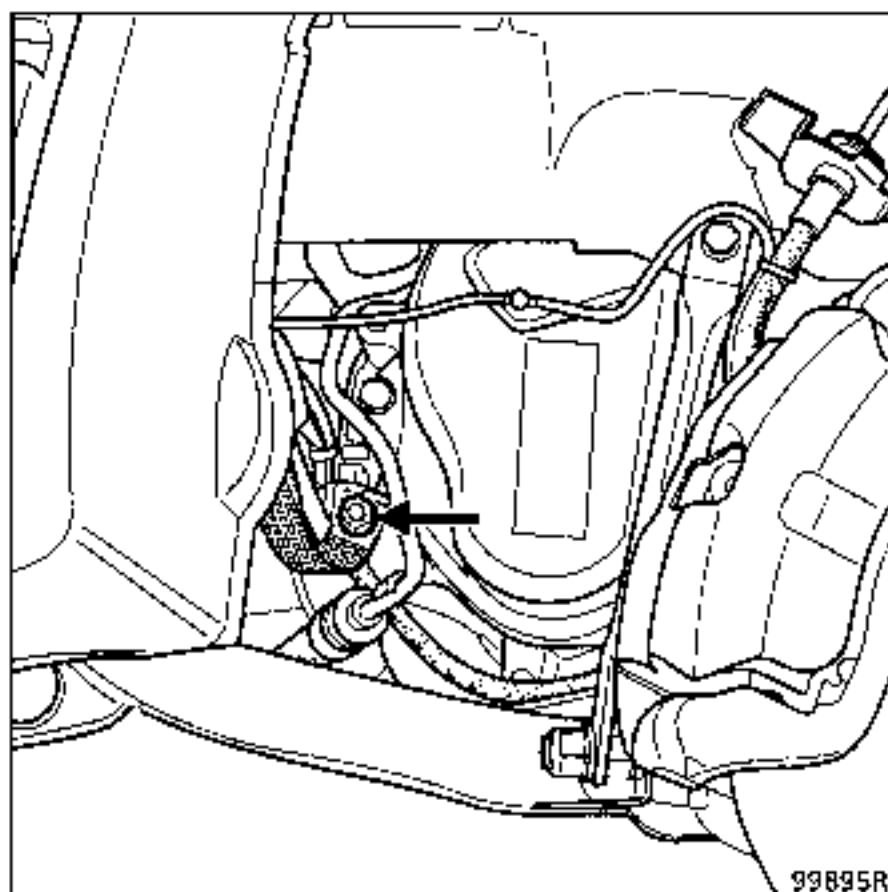
- the clutch and accelerator cables,
- the upper pipe on the radiator,
- the canister pipe,
- the fuel delivery and return lines at the timing belt cover on the cylinder head.

Remove:

- the mounting screw on the wiring harness support bracket,

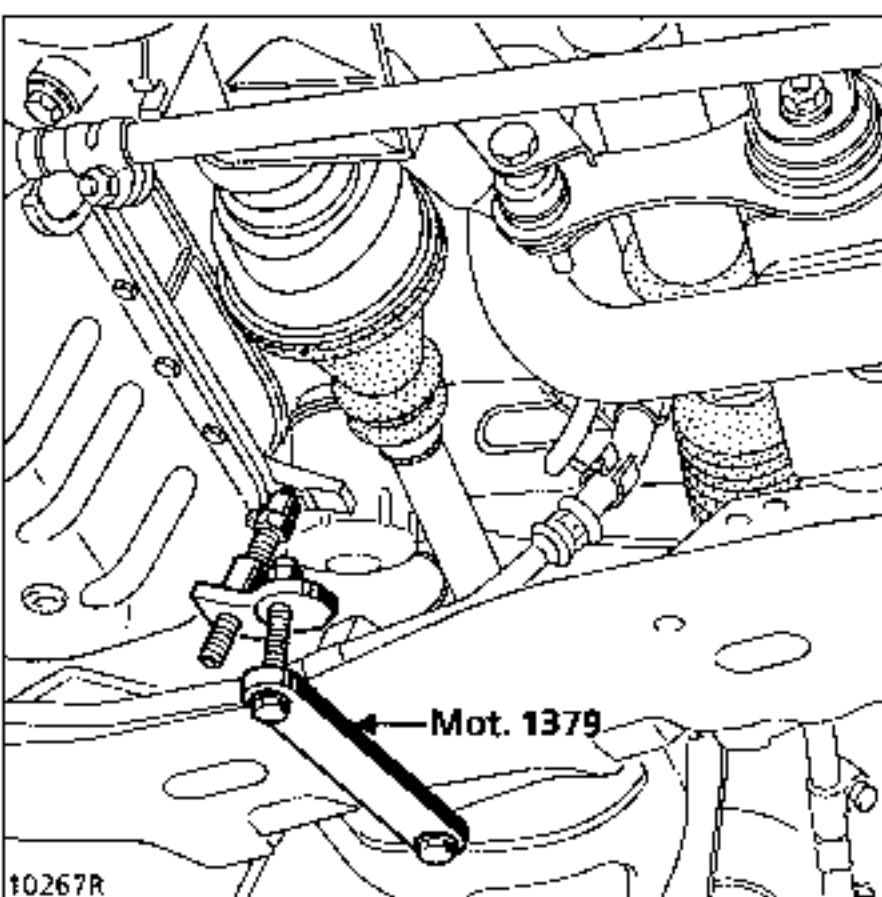


- the earth braiding on the gearbox,

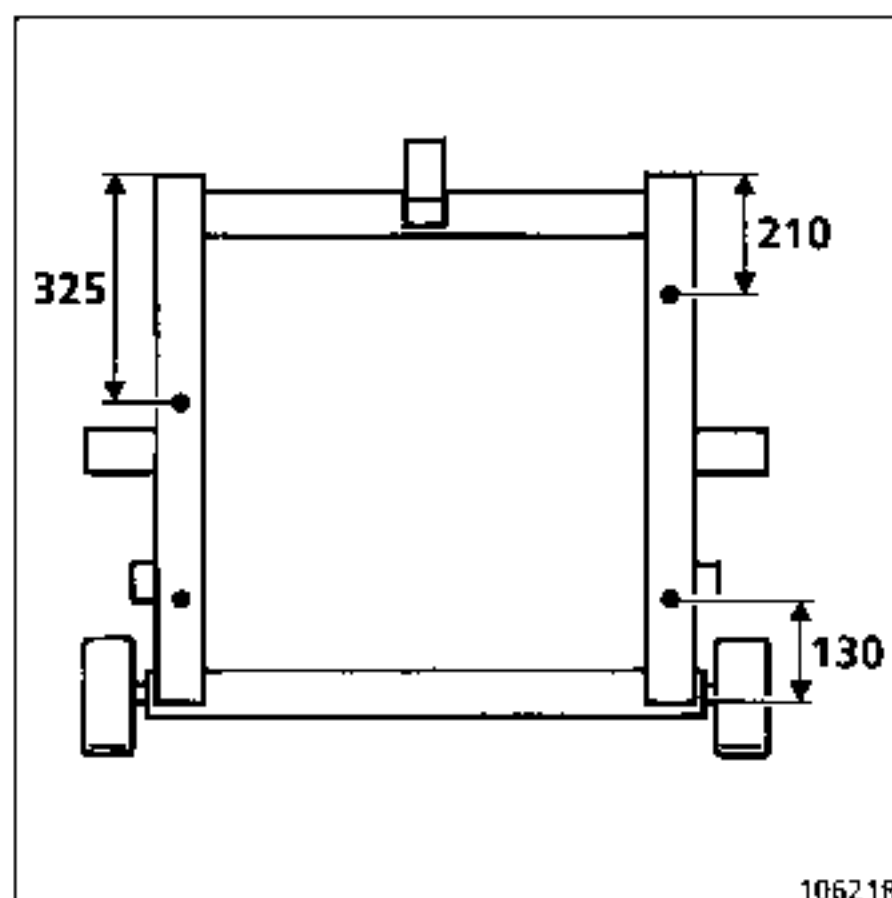


- the upper shock absorber mounting nuts, tightening the centre bolt with a hexagonal wrench.

Fit **Mot. 1379** on the sub-frame and take a little strain off the engine using the threaded rod.

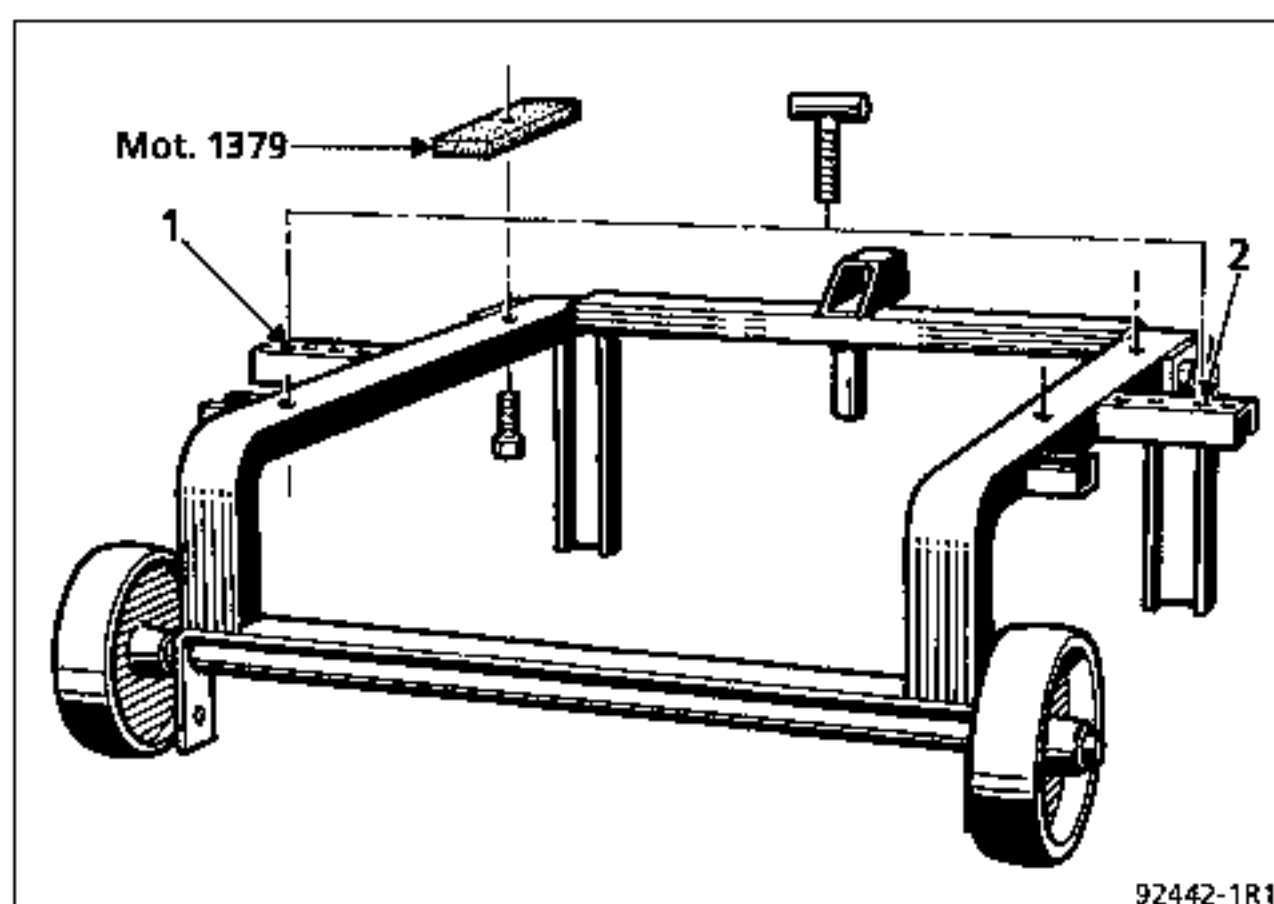


Drilling diagram for **Mot. 1040-01** (dimensions in mm).



Drill oblong holes at (1) and (2) by increasing the size of the old holes.

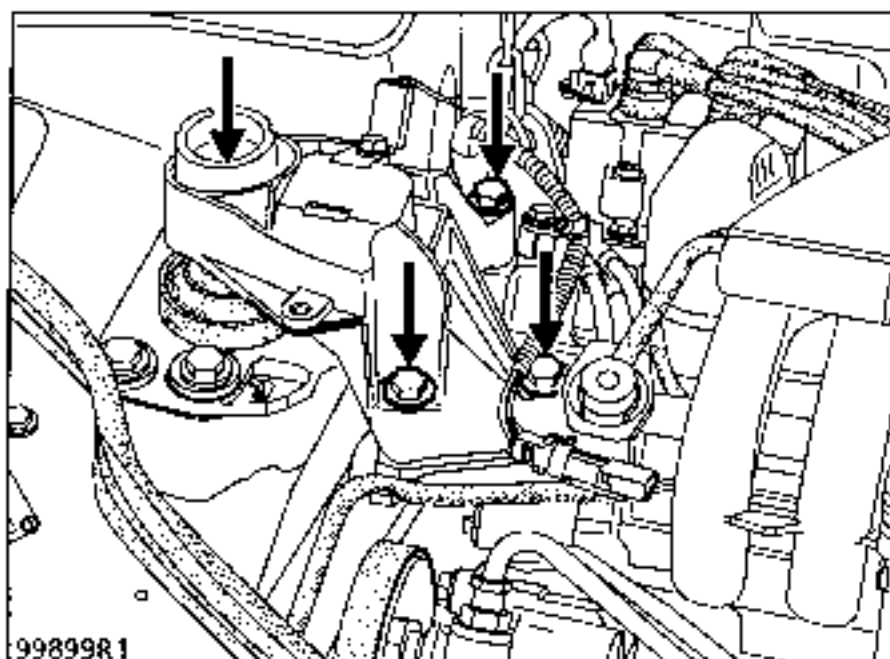
First attach spacers **Mot. 1379** to **Mot. 1040-01** and then fit **Mot. 1040-01** under the sub-frame.



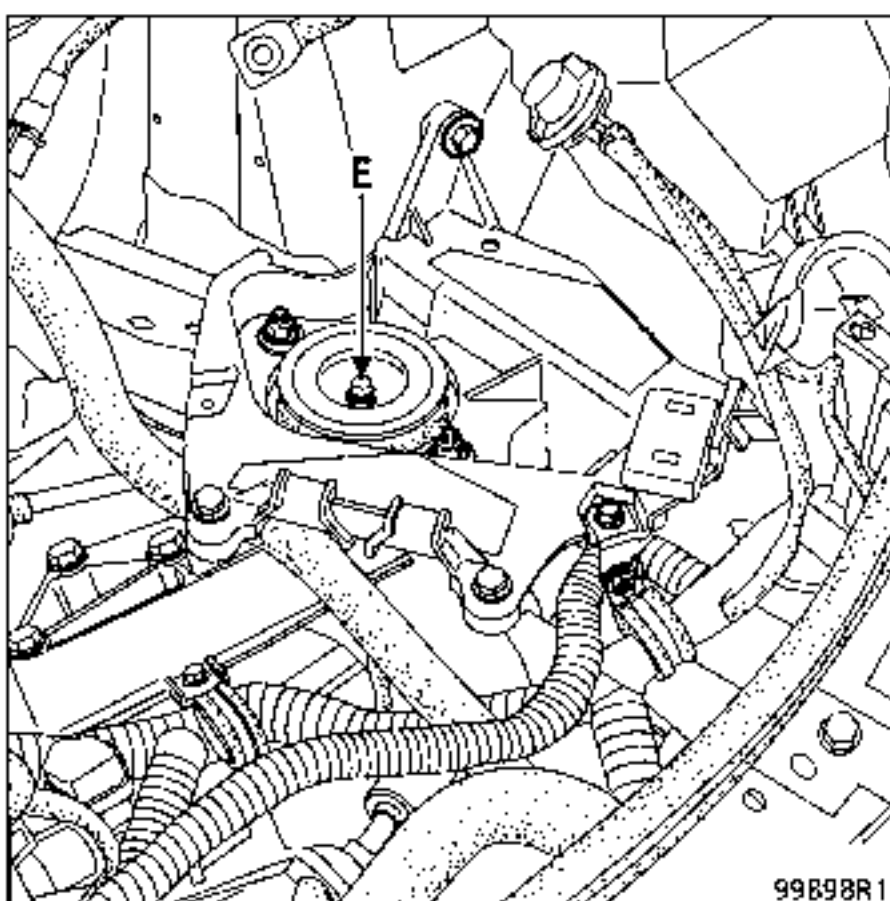
Place a block of wood between the gearbox and the sub-frame.

Remove :

- the suspended mounting cover on the right-hand side,



- nut (E), then use a bronze punch to release the pin securing the left-hand suspended mounting,



- the four sub-frame mounting bolts. Lift the body and remove the engine and transmission assembly.

Tie the spring - shock absorber units together using rope.

REFITTING

It is easier to align the engine/transmission assembly with the bodywork by positioning the two approximately 100 mm long threaded rods into the two front mountings of the body sub-frame.

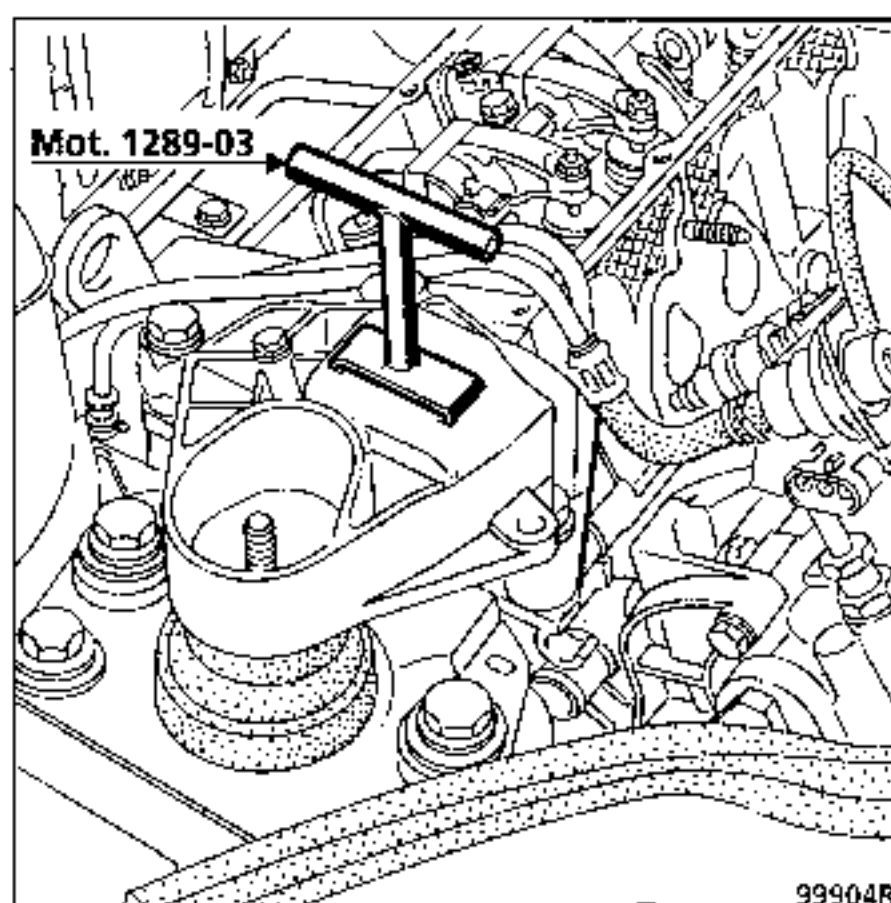
Tighten the sub-frame mounting bolts to a torque of:


- 6 daN.m at the front,
- 11 daN.m at the rear.

Refitting is the reverse of removal.

When the right-hand and left-hand hanging mountings have been refitted, **DO NOT FORGET** to remove the block of wood under the gearbox and **Mot. 1379**.

Check that the longitudinal movement limiter is correctly adjusted using **Mot. 1289-03** and readjust if necessary.



 Tighten all bolts, nuts and screws to the recommended torques.

Fit the calliper mounting bolts using **Loctite FRENLOC** and tighten them to the correct torque.

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

Fill:

- the cooling circuit and bleed it (see section 19),
- the engine and gearbox if required.

ESSENTIAL SPECIAL TOOLING

Mot. 1273	Tool for checking belt tension
Mot. 1289-03	Tool for adjusting suspended mounting
Mot. 1379	Tool for holding engine on sub-frame

TIGHTENING TORQUES (in daN.m)



Crankshaft output mounting bolt	2 + 80°
Bolt for securing front right-hand suspended mounting cover to engine	5.7
Nut for securing rubber pad on front right-hand suspended mounting cover	2.7
Timing belt tensioner nut	5
Sump mounting bolt	1

REMOVING

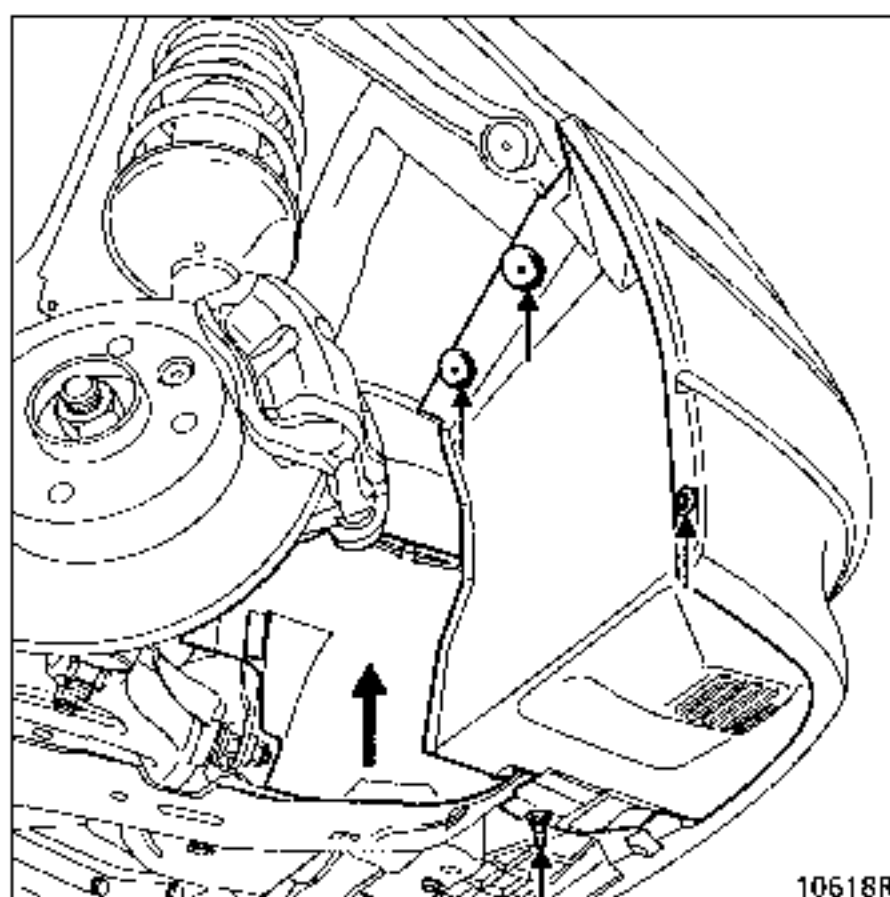
Put the vehicle on a 2-post lift.

Disconnect the battery.

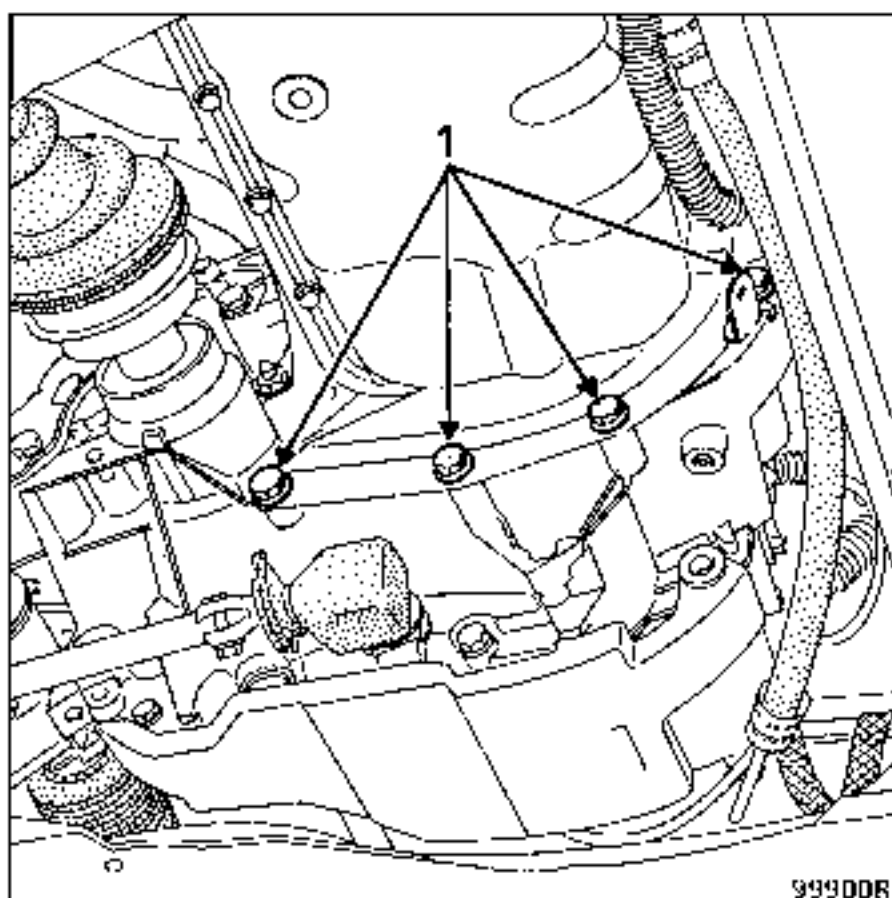
Drain the engine oil.

Remove :

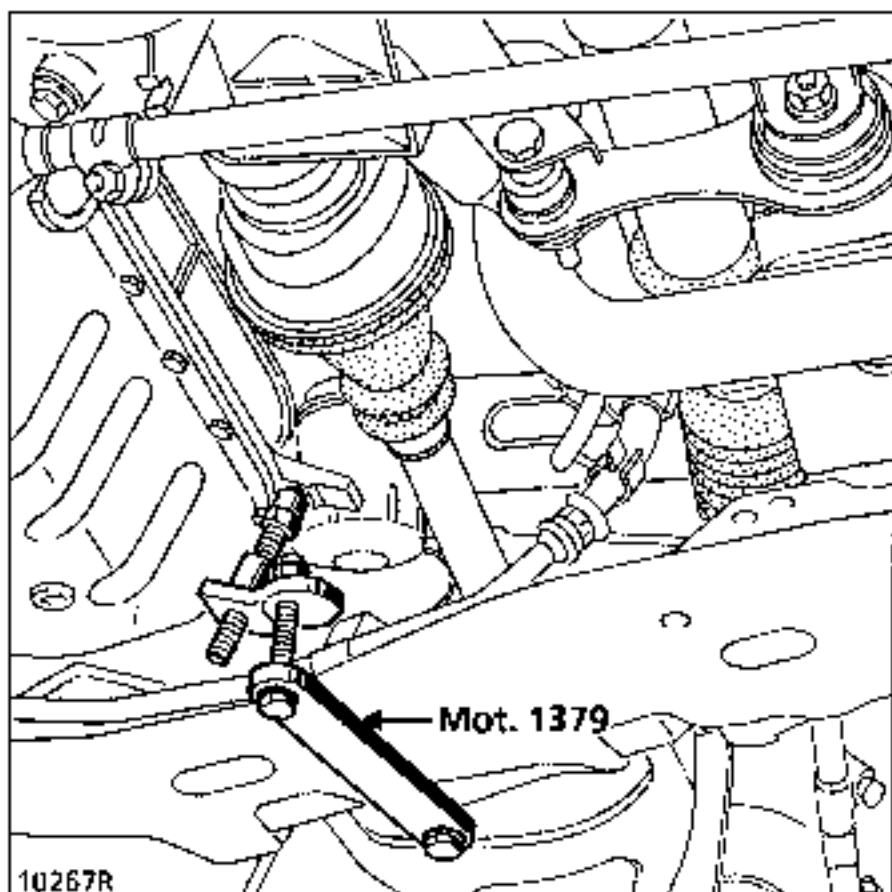
- the bonnet,
- the two front right-hand mud guards,



- the belts for the alternator and power-assisted steering pump (if fitted),
- the crankshaft output pulley,
- the protective plate for the engine - gearbox assembly(1).

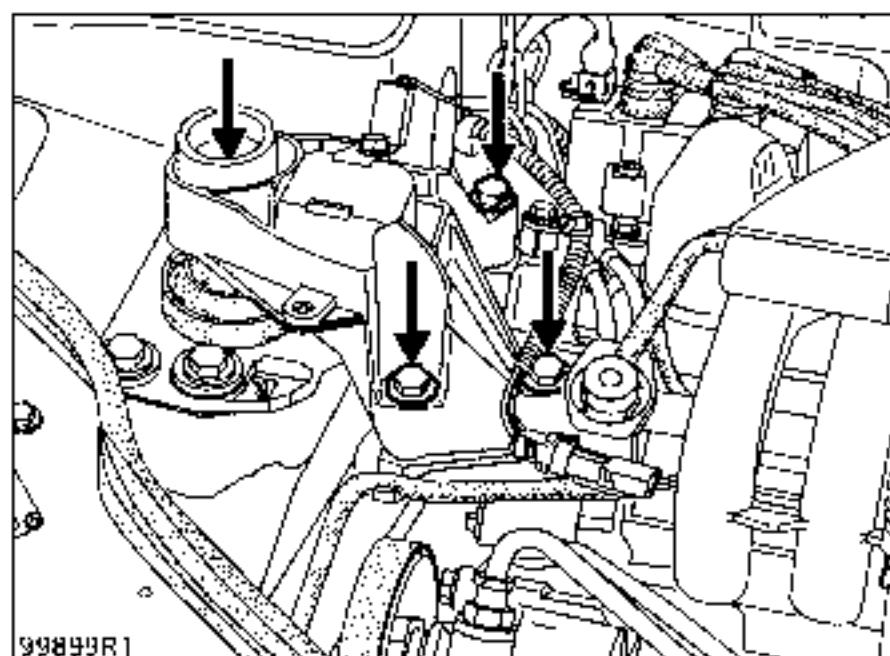


Fit Mot. 1379 in position.



Remove:

- the suspended mounting cover,

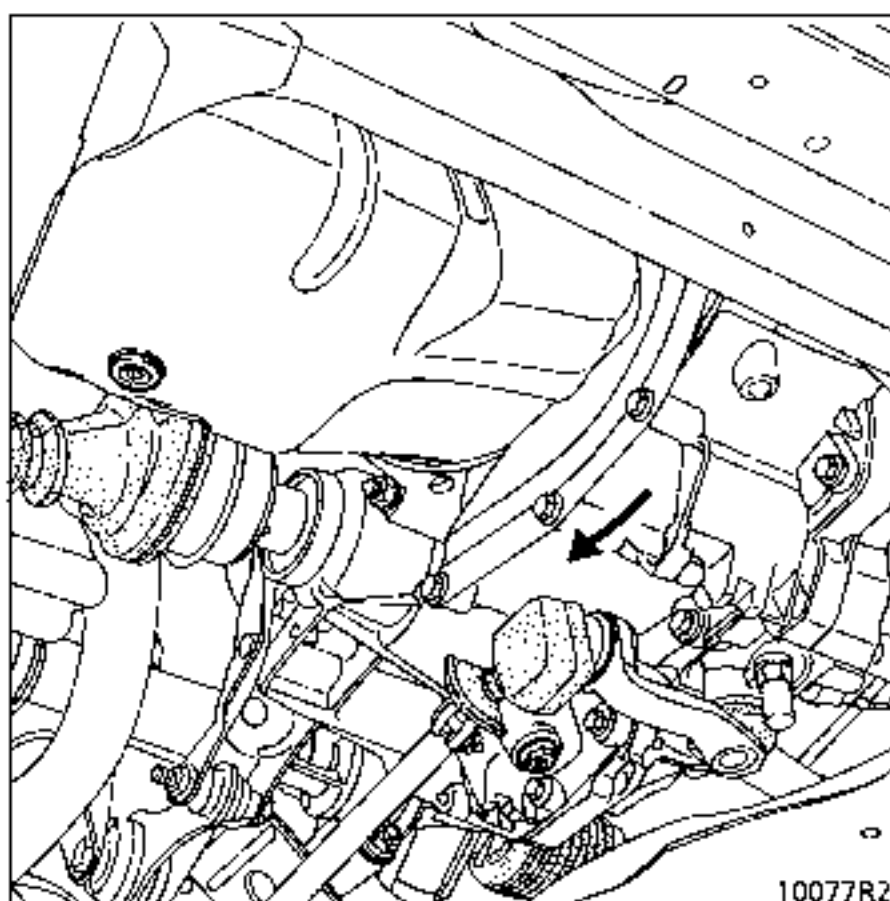


- the oil level sensor,
- the dipstick.

Use Mot. 1379 to lift the engine - gearbox assembly.

Remove the sump mounting bolts.

Turn the sump towards the rear of the vehicle, as shown by the arrow in the diagram below. This is to allow the oil pump strainer to be separated from the sump baffle.

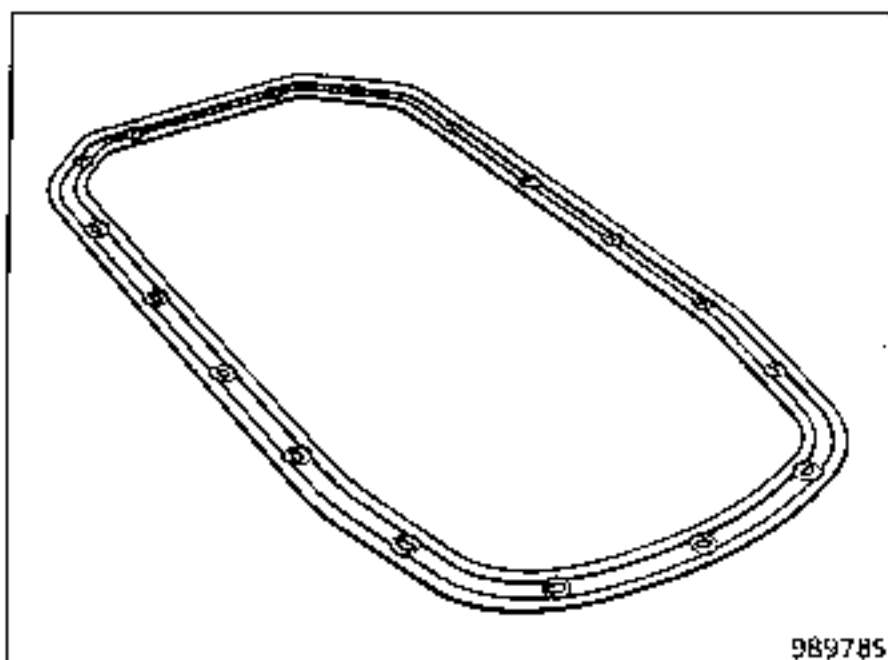


REFITTING

Clean the gasket mating surfaces.

NOTE : The sump can only be sealed effectively with the special After Sales gasket.

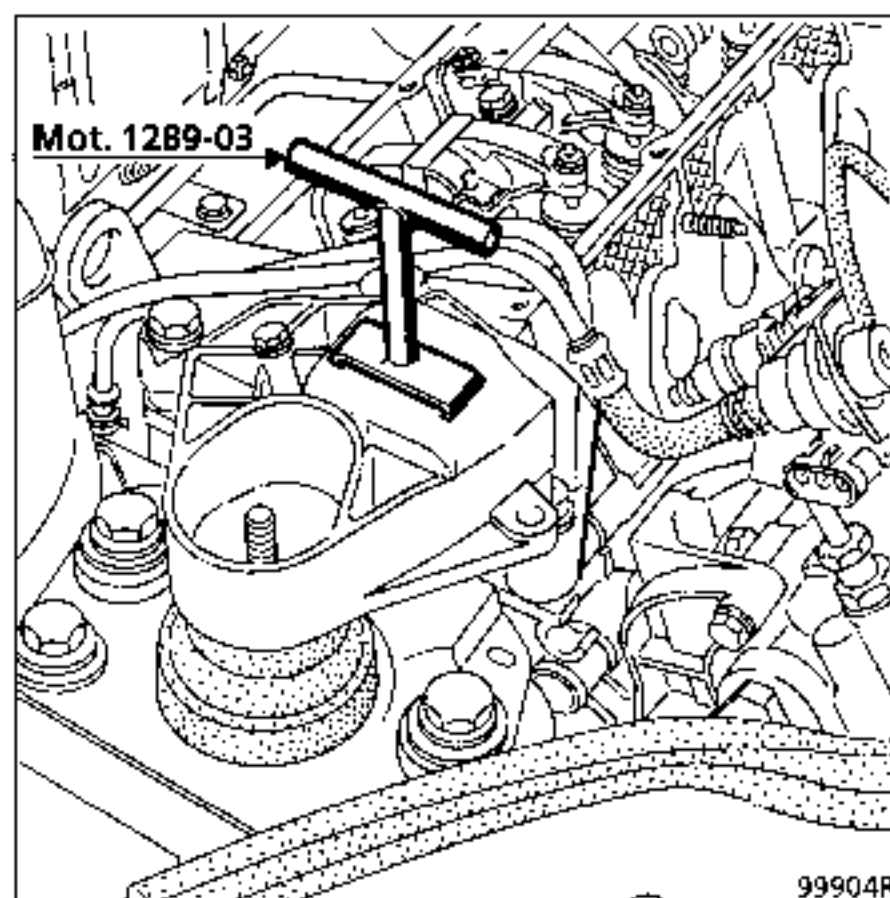
(Flat surface on cylinder block side)



Refitting the the reverse of removal.

Fit the suspended mounting cover.

Use **Mot. 1289-03** to check the movement limiter and centre it, if necessary.



Fit the new belts for the alternator and power-assisted steering pump (see tensioning values section 07, tension of accessories belts).

Fill the engine with oil.

ENGINE ASSEMBLY AND LOWER ENGINE UNITS

Crankshaft seal at timing gear end

10

ESSENTIAL SPECIAL TOOLING

Mot. 1054	TDC pin
Mot. 1273	Tool for checking belt tension
Mot. 1289-03	Fork for centring suspended mounting limiter
Mot. 1379	Tool for holding engine on sub-frame

TIGHTENING TORQUES (in daN.m)



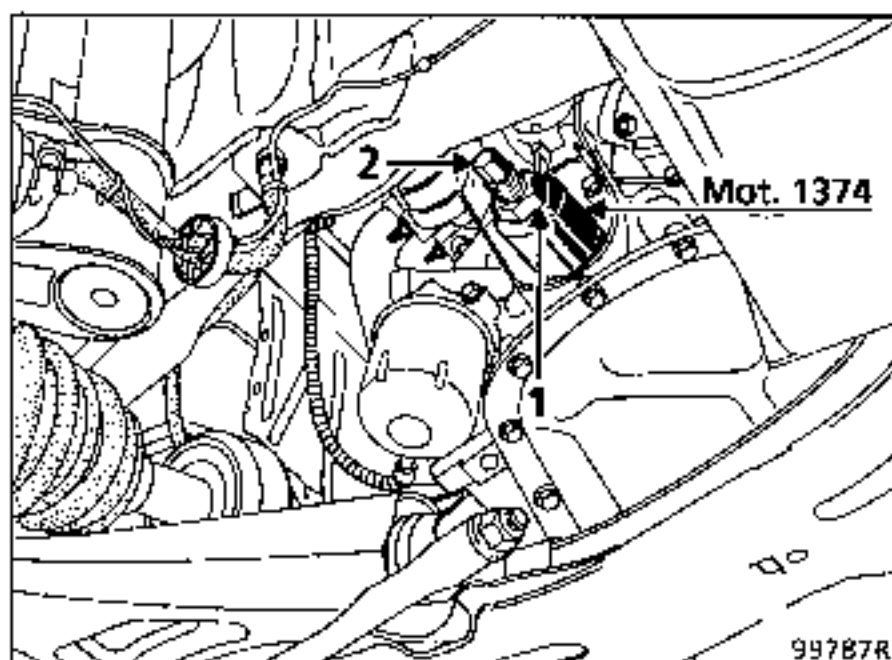
Crankshaft output mounting bolt	2 + 80°
Bolt for securing front right-hand suspended mounting cover on engine	5.7
Nut for securing rubber pad on front right-hand suspended mounting cover	2.7
Timing belt tensioner nut	5

REPLACEMENT

REMOVING

Remove the timing belt (see section 11, timing belt).

Use Mot. 1374 to remove the crankshaft seal.

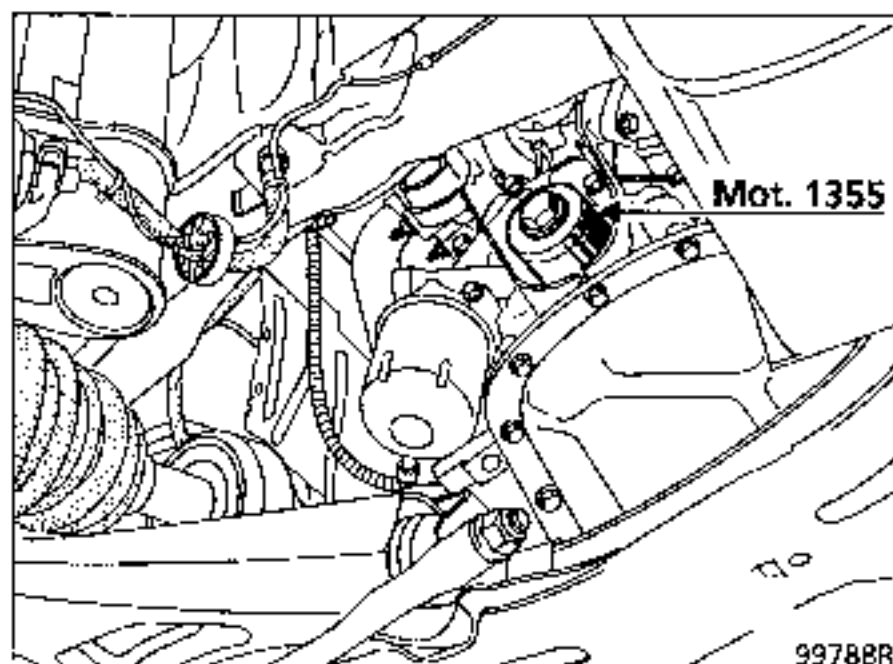


Screw the body of the tool into the seal via nut (1) and then turn screw (2) to extract the seal.

REFITTING

Refit the new seal on the crankshaft output shaft without damaging it at the timing gear drive groove.

Fit it in position using tool Mot. 1355.



Refit the new timing belt (see method described in section 11, timing belt).

ESSENTIAL SPECIAL TOOLING

Mot. 1054	TDC pin
Mot. 1273	Tool for checking belt tension
Mot. 1289-03	Tool for adjusting suspended mounting
Mot. 1379	Tool for holding engine on sub-frame

TIGHTENING TORQUE (in daN.m)



Crankshaft output mounting bolt	2 + 80°
Bolt securing front right-hand suspended mounting cover to engine	5.7
Nut securing rubber pad on front right-hand suspended mountin cover	2.7
Timing belt tensioner nut	5
Sump mounting bolt	1
Oil pump mounting bolt	0.9

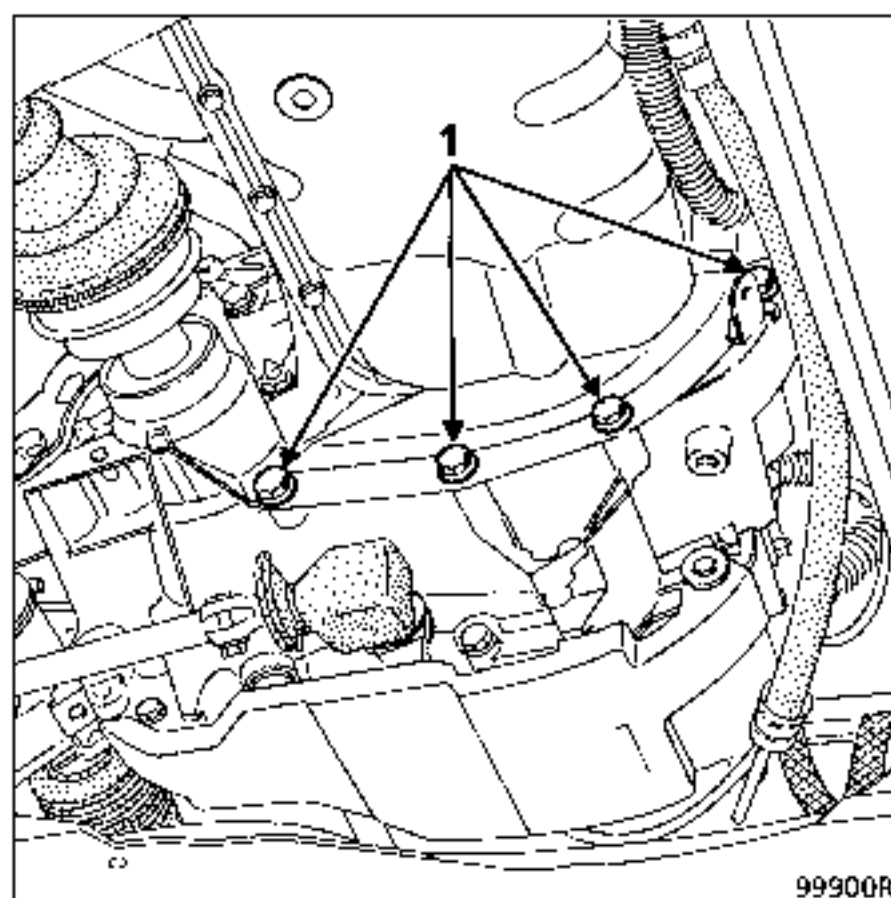
REMOVING

Drain engine oil.

Remove:

- the timing belt (see method described in section 11, timing belt),
- the oil level sensor,
- the dipstick,
- the crankshaft pulley,

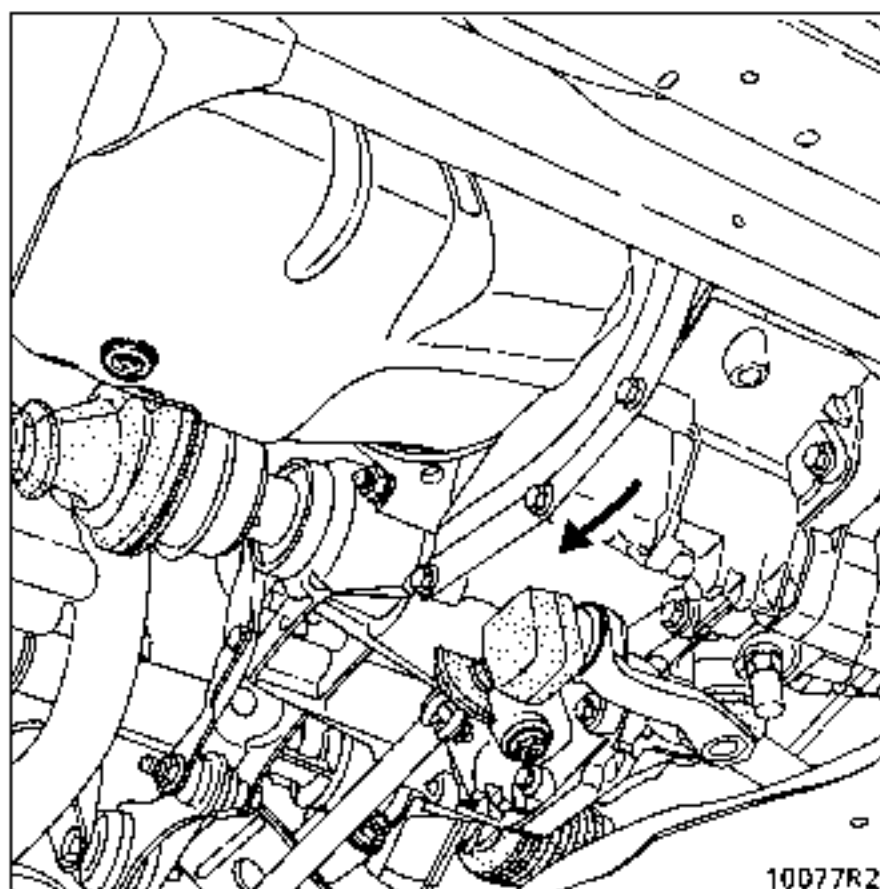
- the protective plate for the engine - gearbox assembly (1).



Use Mot. 1379 to lift the engine - gearbox assembly.

Remove the sump mounting bolts.

Turn the sump towards the rear of the vehicle, as shown by the arrow in the diagram below. This is to allow the oil pump strainer to be separated from the sump baffle.



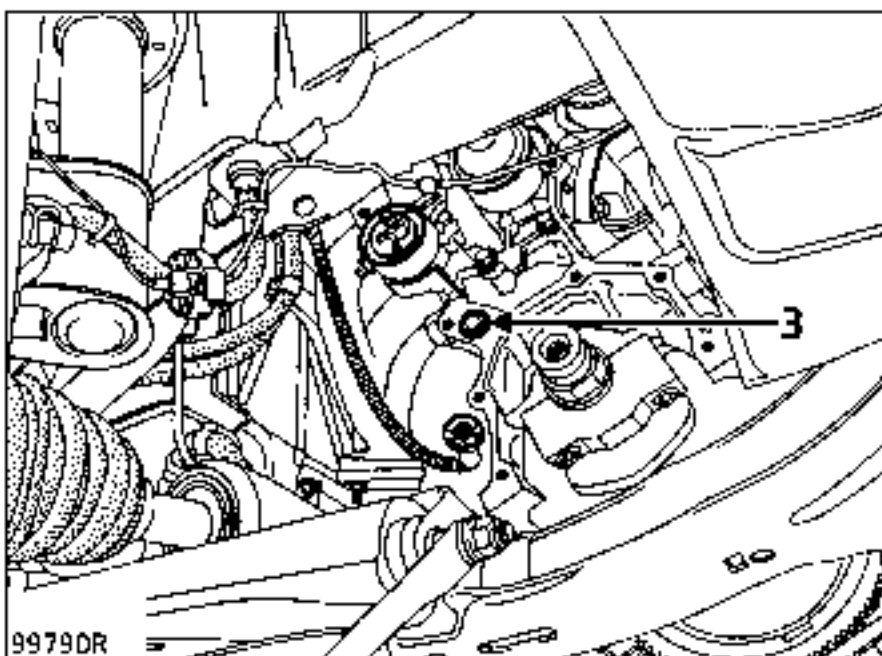
Remove:

- the oil pump strainer,
- the oil pump.

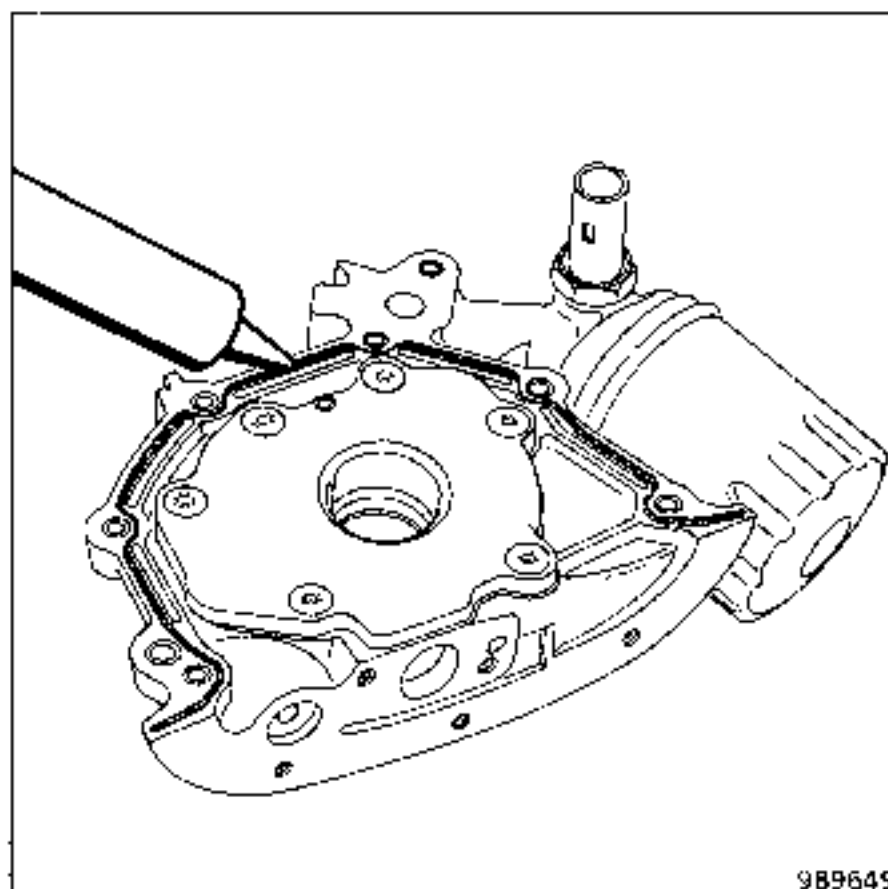
Clean the gasket mating surfaces without scratching the aluminium.

REFITTING

Always replace the oil pressure feed seal (3).



Apply a bead of RHODORSEAL 5661 around the seal mating surface.

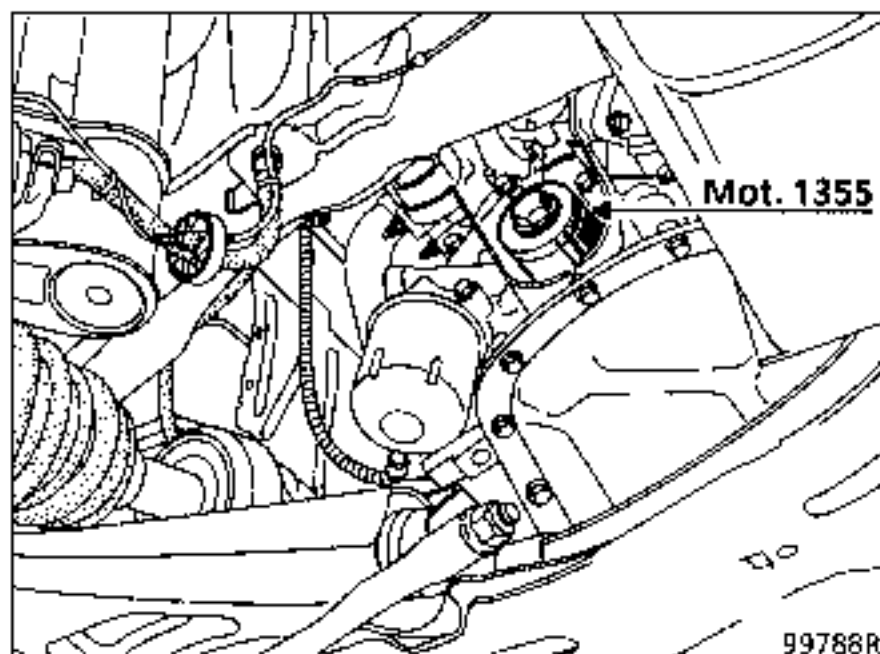


IMPORTANT: The oil pump is driven by two lugs on the crankshaft.

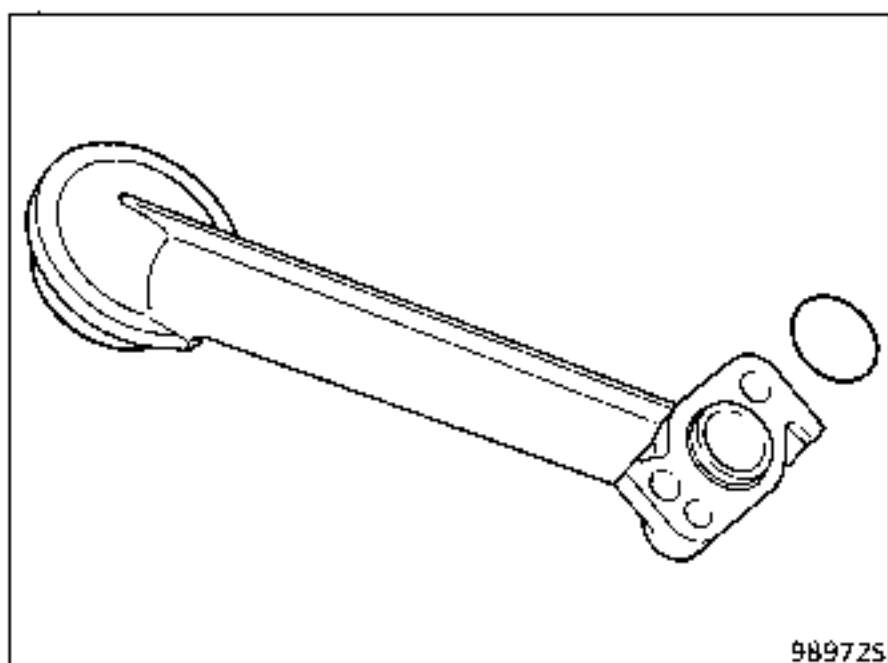
Fit the oil pump on the engine and torque tighten it to 0.9 daN.m.

Refit the new seal on the crankshaft output shaft without damaging it at the timing gear drive groove.

Fit it in position using tool Mot. 1355.



Refit the strainer with a new O-ring in position.



Clean the gasket mating surfaces (cylinder block, sump).

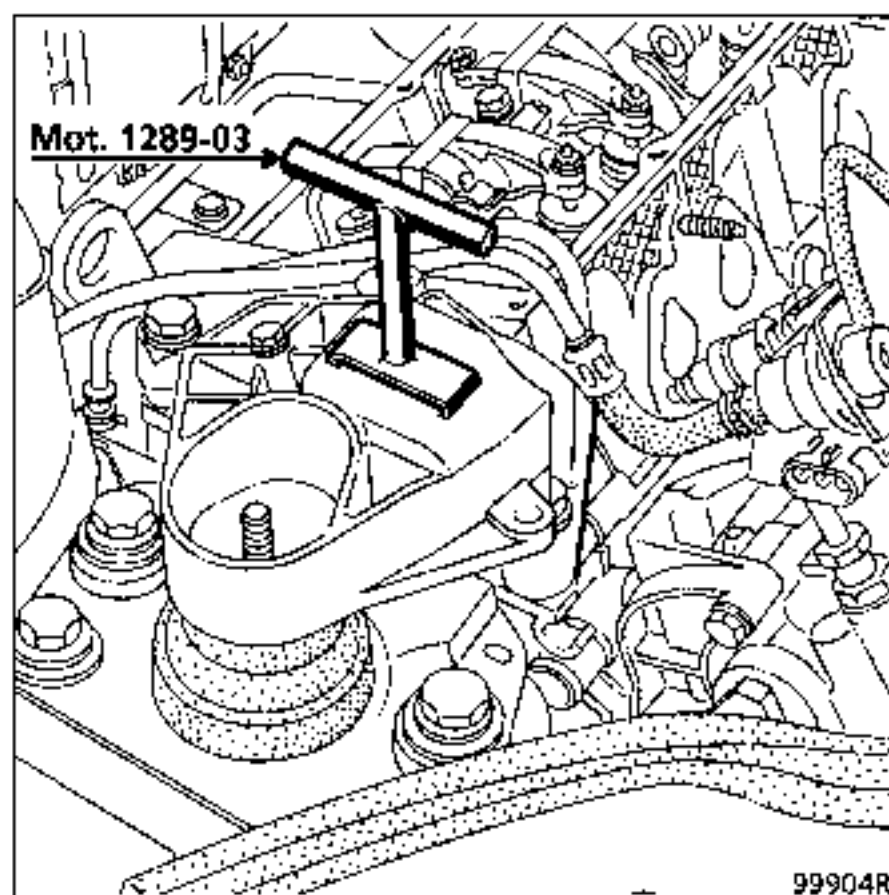
Refit the sump.

Tighten the bolts to a torque of 1 daN.m.

Refit:

- the timing belt (see method described in section 11, timing belt),

- the new belts for the alternator and power-assisted steering pump (see tensioning values in section 07, tension of accessories belts),
- the suspended mounting cover and use tool Mot. 1289-03 to check it is properly adjusted



Fill the engine with oil.

ENGINE TOP AND FRONT

Timing belt

11

ESSENTIAL SPECIAL TOOLING

Mot. 1054	TDC pin
Mot. 1273	Tool for checking belt tension
Mot. 1289-03	Fork for centring suspended mounting limiter
Mot. 1379	Tool for holding engine on sub-frame

TIGHTENING TORQUES (in daN.m)



Crankshaft output mounting bolt	2 + 80°
Bolt for securing front right-hand suspended mounting on engine	5.7
Nut for securing rubber pad on front right-hand suspended mounting	2.7
Timing belt tensioner nut	5

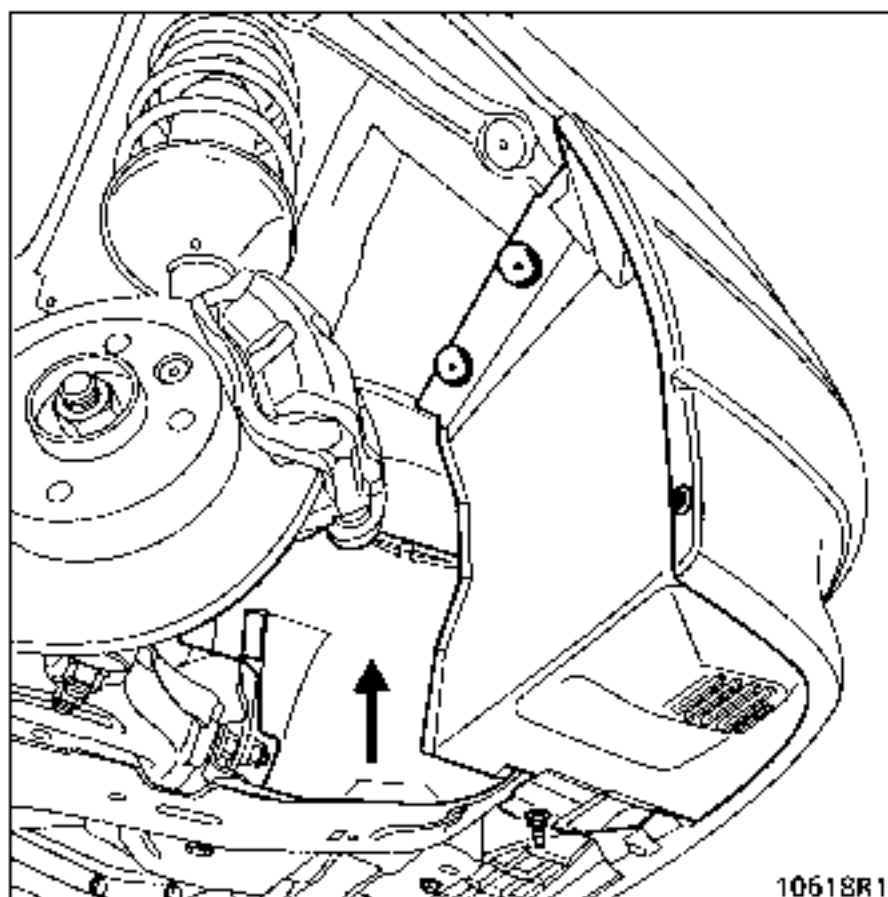
REMOVING

Put the vehicle on a 2-post lift.

Disconnect the battery.

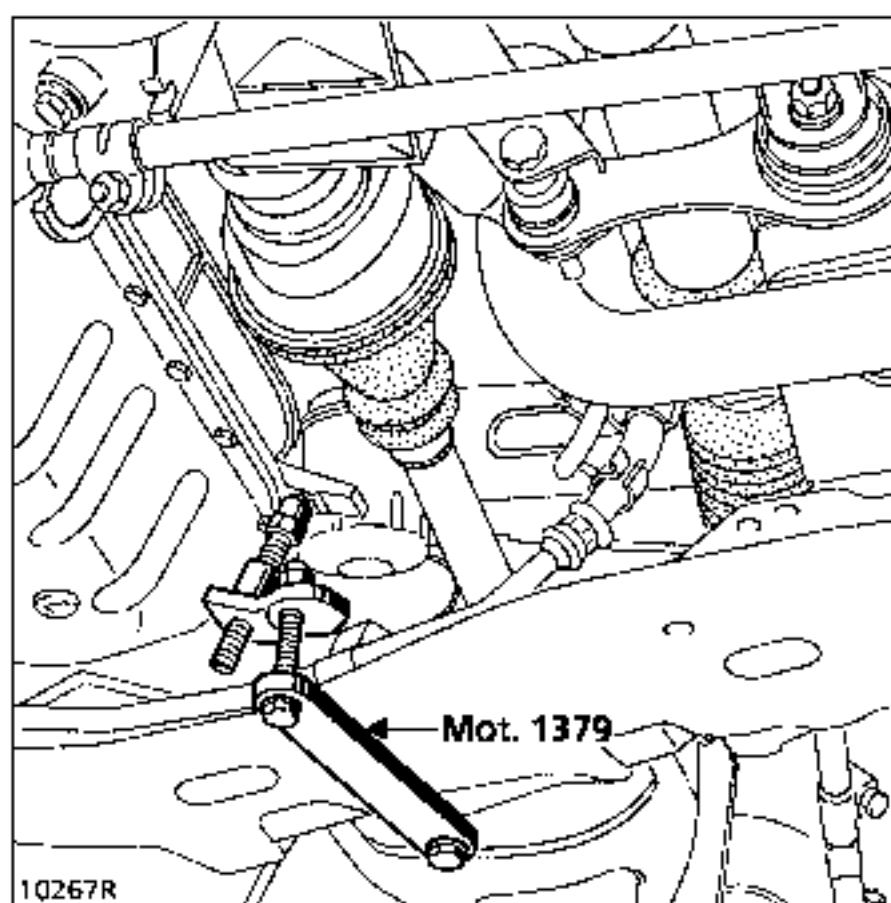
Remove:

- the bonnet,
- the front right-hand wheel,
- the two front right-hand mud guards,



- the belts for the alternator and power-assisted steering pump (if fitted),
- the crankshaft output pulley.

Fit Mot. 1379.



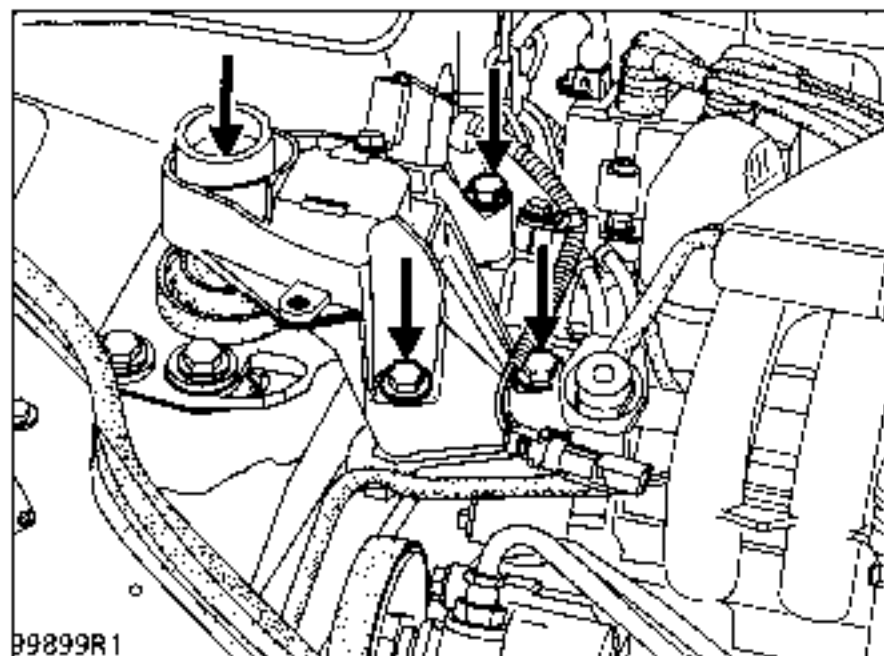
ENGINE TOP AND FRONT

Timing belt

11

Remove:

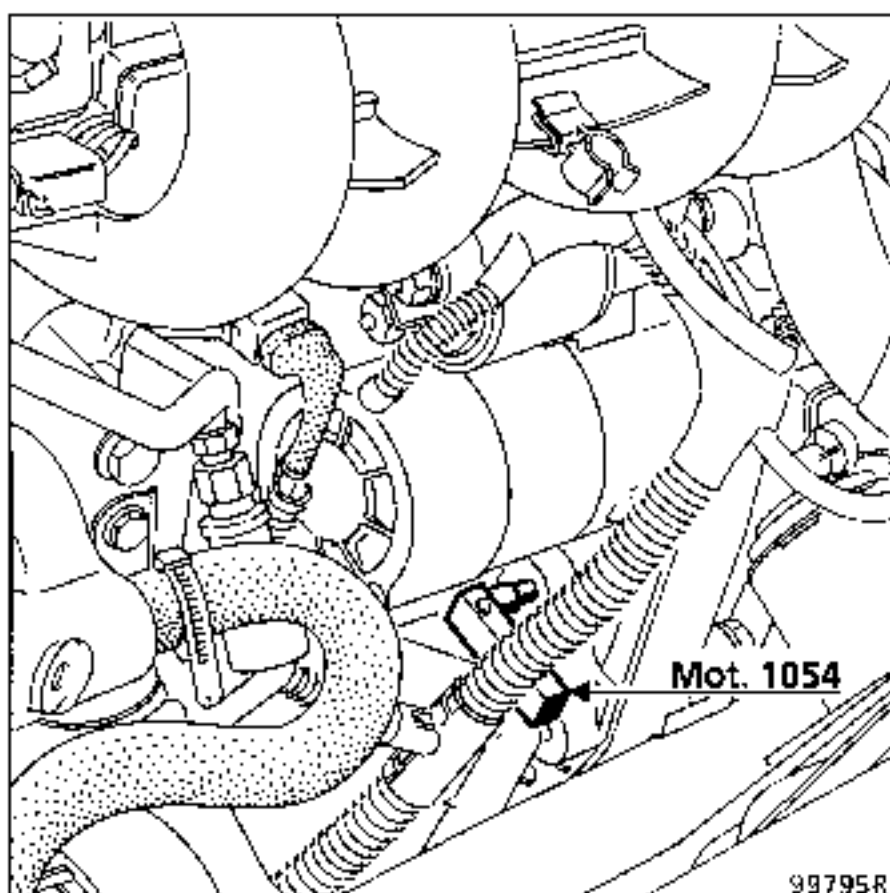
- the suspended mounting cover,



- the lower timing gear casing.

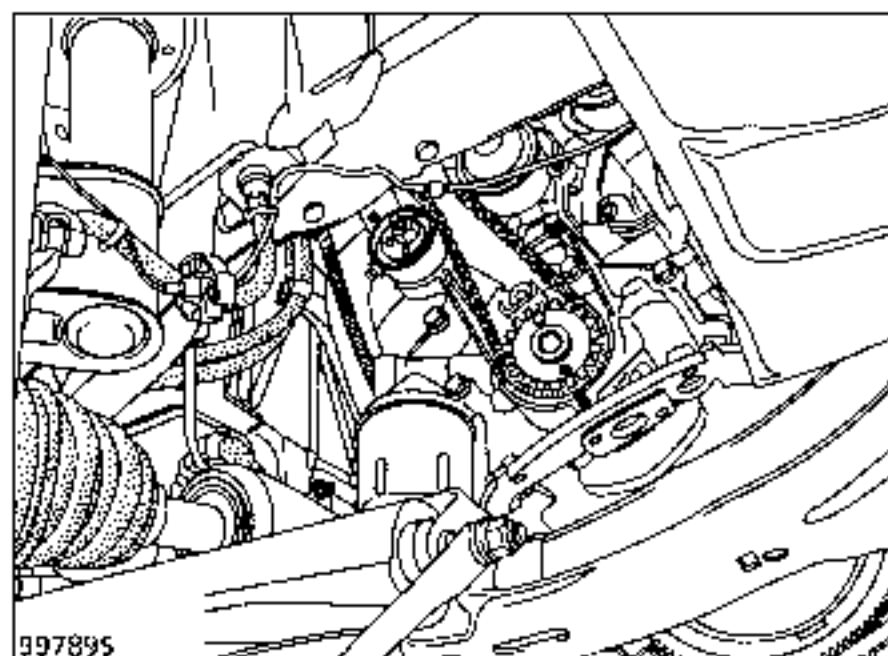
Set the engine to TDC.

Use Mot. 1054 to set flywheel

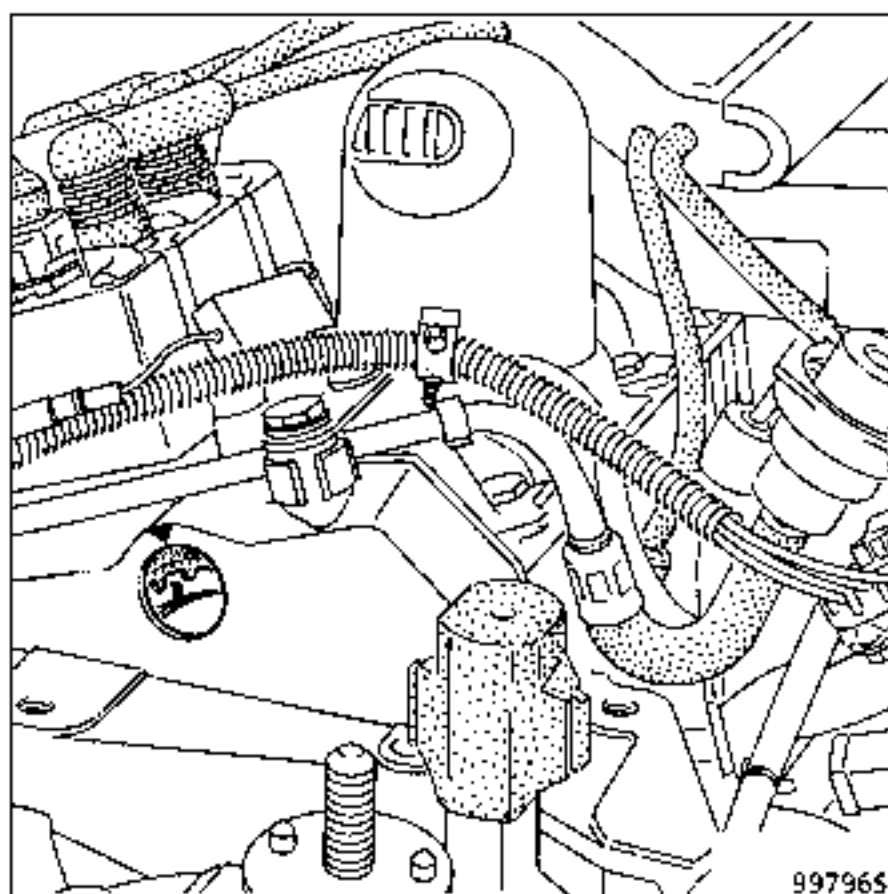


Check reference marks on :

- crankshaft side,

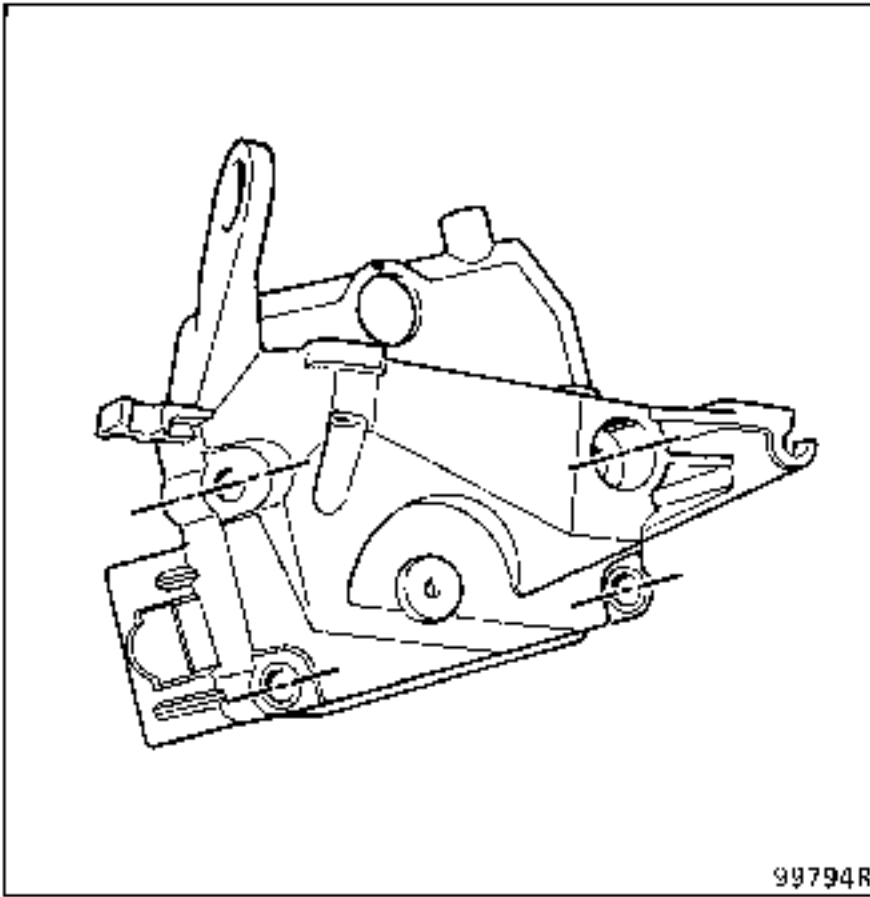


- camshaft side.



Remove:

- the timing gear casings for the water pump and the suspended mounting on the engine,



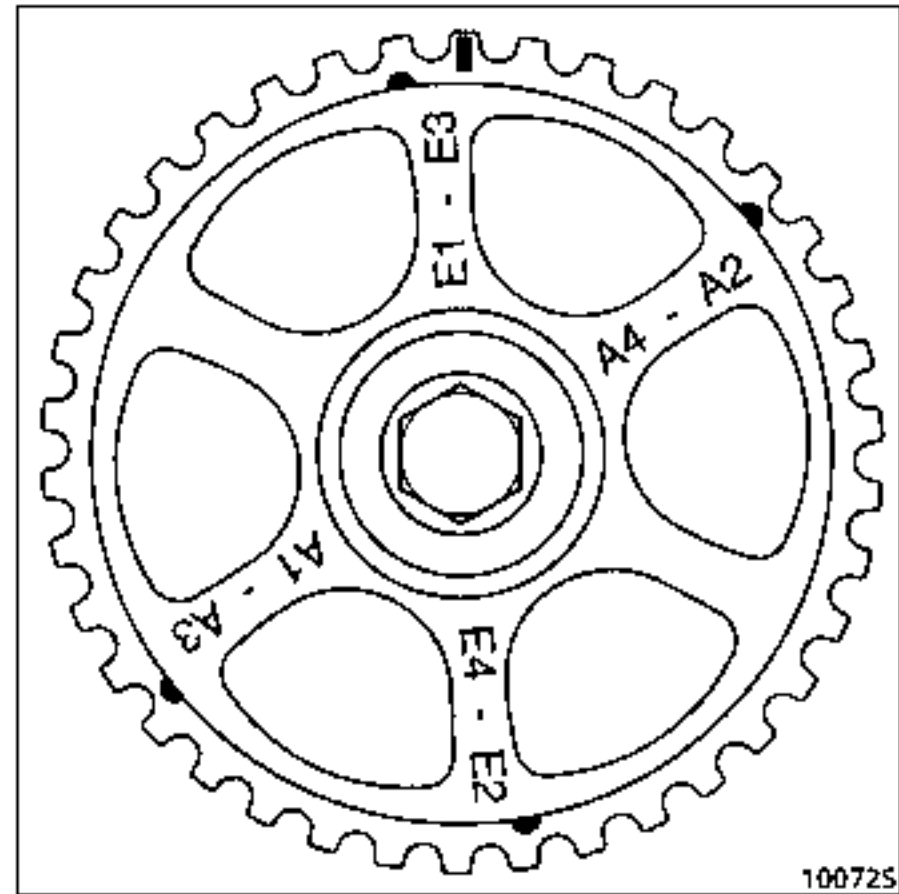
- the timing belt.

Once a belt has been removed it must be replaced.

REFITTING

Align the timing belt reference marks with the reference marks for the camshaft gear and crankshaft.

IMPORTANT: The camshaft gear has five reference marks. Only the rectangular reference mark on one of the teeth represents top dead centre. The other marks are used to adjust the rockers.



ENGINE TOP AND FRONT

Timing belt

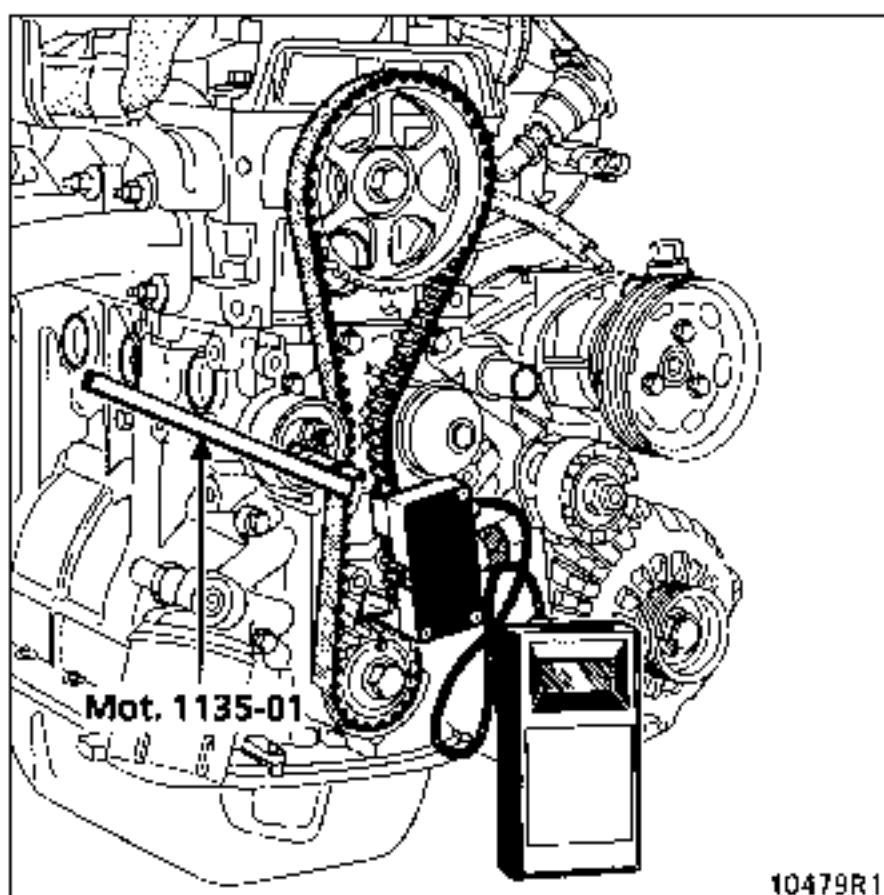
11

METHOD FOR TIGHTENING TIMING BELT

Remove pin Mot. 1054.

Fit spacer (1) from Mot. 1386 and tighten the crankshaft pulley bolt.

- a) Fit Mot. 1273 and, using Mot. 1135-01, rotate the tensioner in an anti-clockwise direction until a value of **20 US** is obtained. (Turn the sensor wheel until three clicks can be heard.)



Tighten the tensioner nut.

Turn the engine at least two turns (but never turn backwards).

Set the engine to TDC and then remove the pin.

Check correct timing at the crankshaft end of the timing gear and the camshaft.

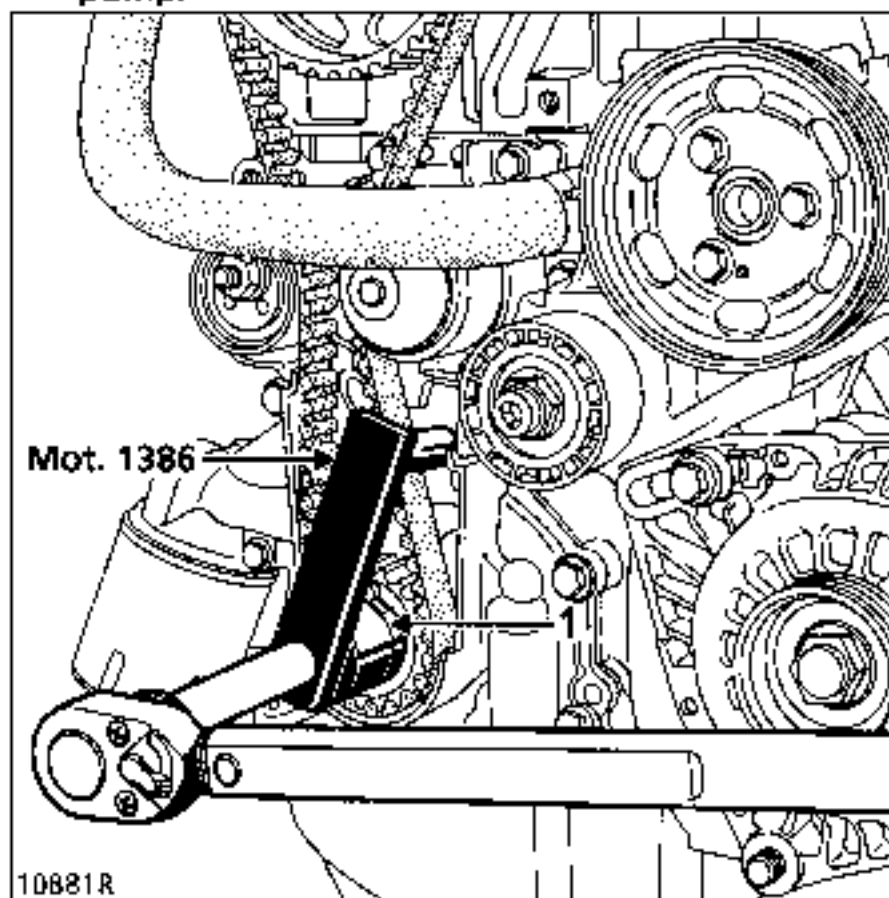
Slacken off the tensioner nut and turn this slightly in a clockwise direction using Mot. 1135-01 until a position is obtained where the two apertures on the tensioner are roughly horizontal.

Retighten the tensioner nut.

- b) Turn the engine at least two times (but never turn backwards).

Set the engine to TDC and then remove the pin.

Use Mot. 1386 to apply preloading of 10 daN.m between the crankshaft pulley and the water pump.



Fit Mot. 1273 and read off the value of the tension which should be approximately 20 ± 3 US (fitting tension). If this reading is not correct, adjust the belt by changing the position of the tensioner using Mot. 1135-01 and follow the tensioning procedure at b.

Tighten the tensioner nut to a torque of 5 daN.m.

IMPORTANT :

It is essential :

- to rotate the engine at least twice each time the position of the tensioner has been changed so that the tension can be measured,
- preload by 10 daN.m to eliminate all the play relating to the belt.

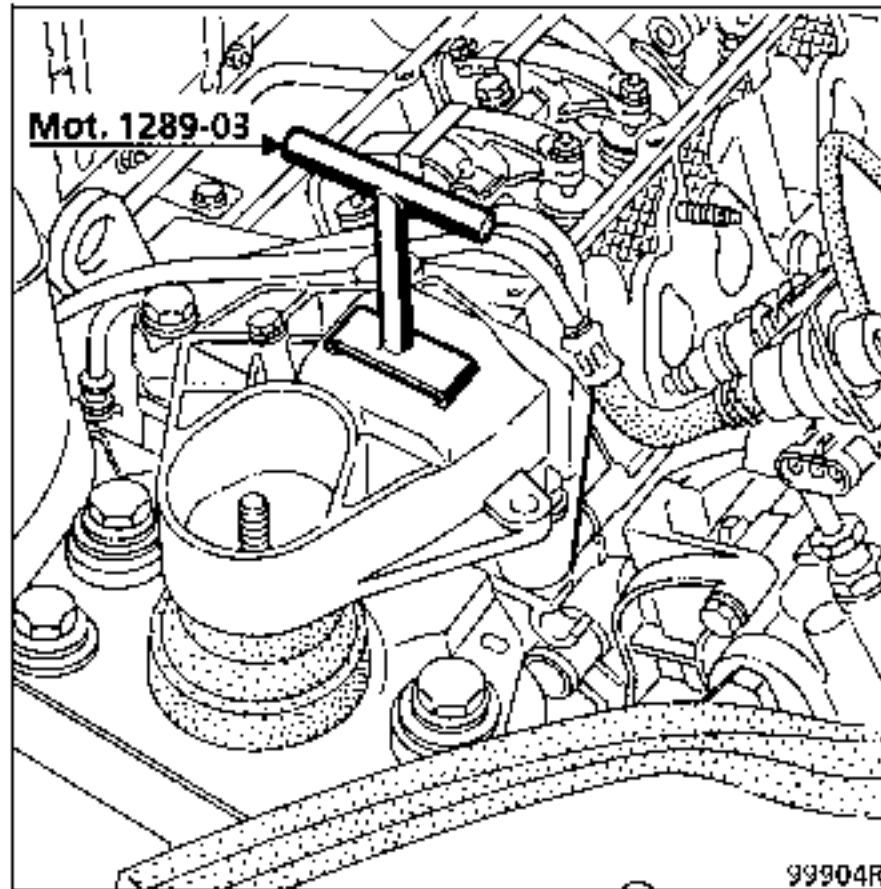
NOTE :

- Do not refit a belt which has been removed.
- Replace the belt if the tension is below the minimum operating level of (10 US).


Refit in reverse order to removal.

Fit the suspended mounting cover.

Check the movement limiter and centre if necessary using Mot. 1289-03.



ESSENTIAL SPECIAL TOOLING	
Mot. 591-04	Angular wrench for tightening the cylinder head and index
Mot. 1202	Hose clip pliers
Mot. 1273	Tool for checking belt tension
Mot. 1289-03	Tool for adjusting suspended mounting
Mot. 1379	Tool for holding engine on sub-frame
EQUIPMENT REQUIRED	
12 mm start socket (example : FACOM SIX12)	
Angular tightening tool (example : STANWILL Part No. 5401003 or FACOM Part No. DM 360)	

TIGHTENING TORQUES (in daN.m) 	
Crankshaft output mounting bolt	2 + 80°
Bolts for securing front right-hand suspended mounting cover on engine	5.7
Nut for securing rubber pad on front right-hand suspended mounting cover	2.7
Timing belt tensioner nut	5
Wheel bolts	9

Remove :

- the timing belt (see method described in section 11, timing belt),
- dipstick,
- the brake servo line,
- the air filter,
- the accelerator cable,
- the fuel delivery and return lines at the timing belt cover on the cylinder head.

REMOVING

Put the vehicle on a 2-post lift.

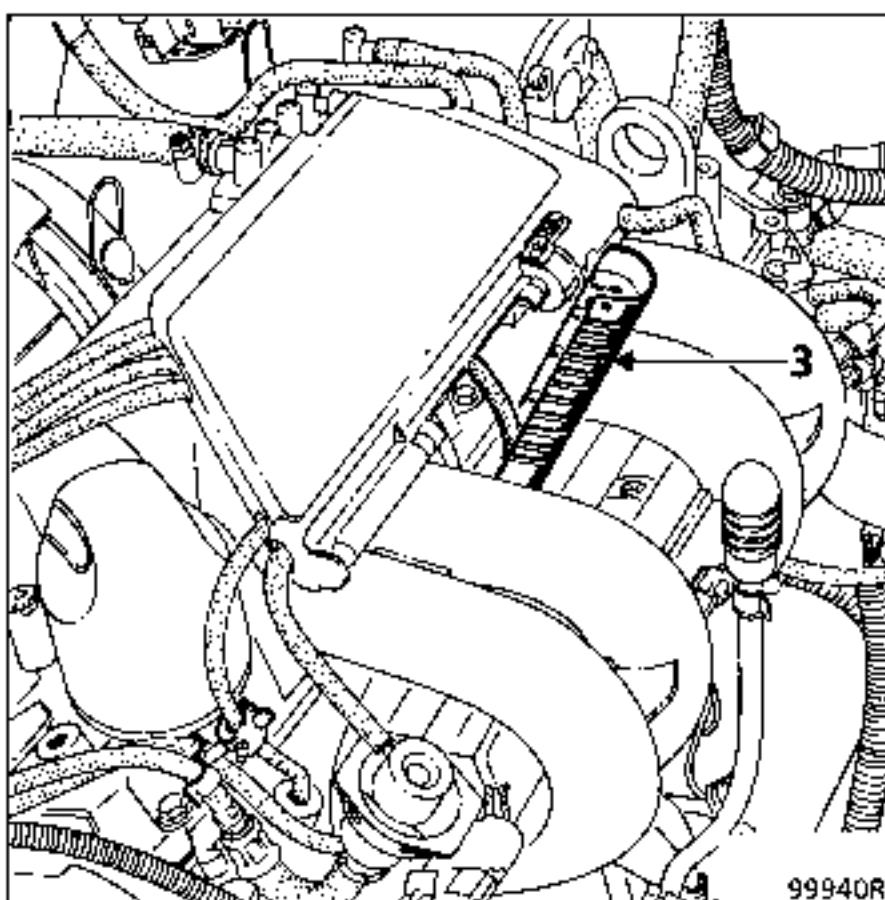
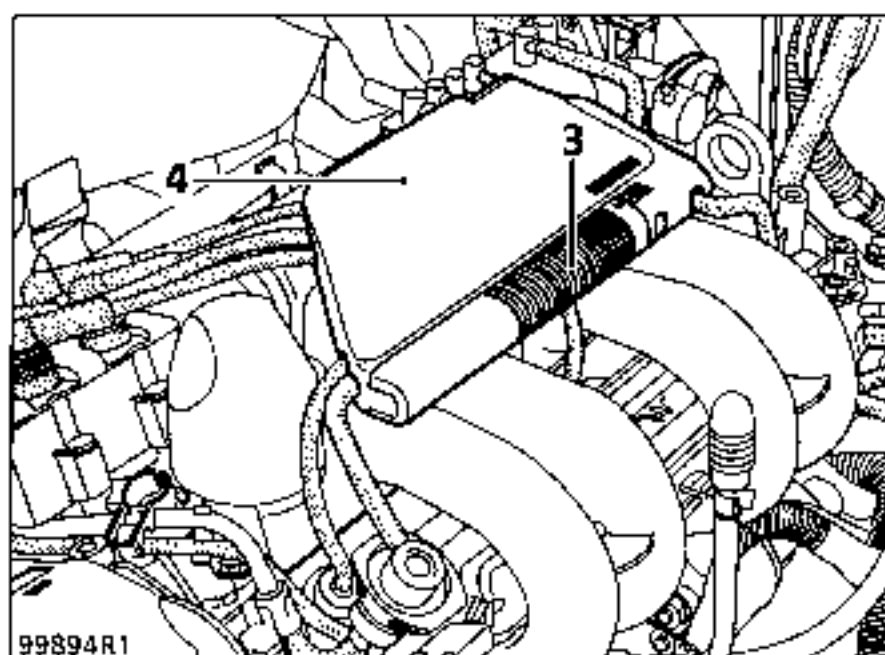
Remove the bonnet.

Disconnect the battery.

Drain the cooling circuit.

Disconnect:

- the spark plug leads using tool (3) integrated in the plastic protector (4),

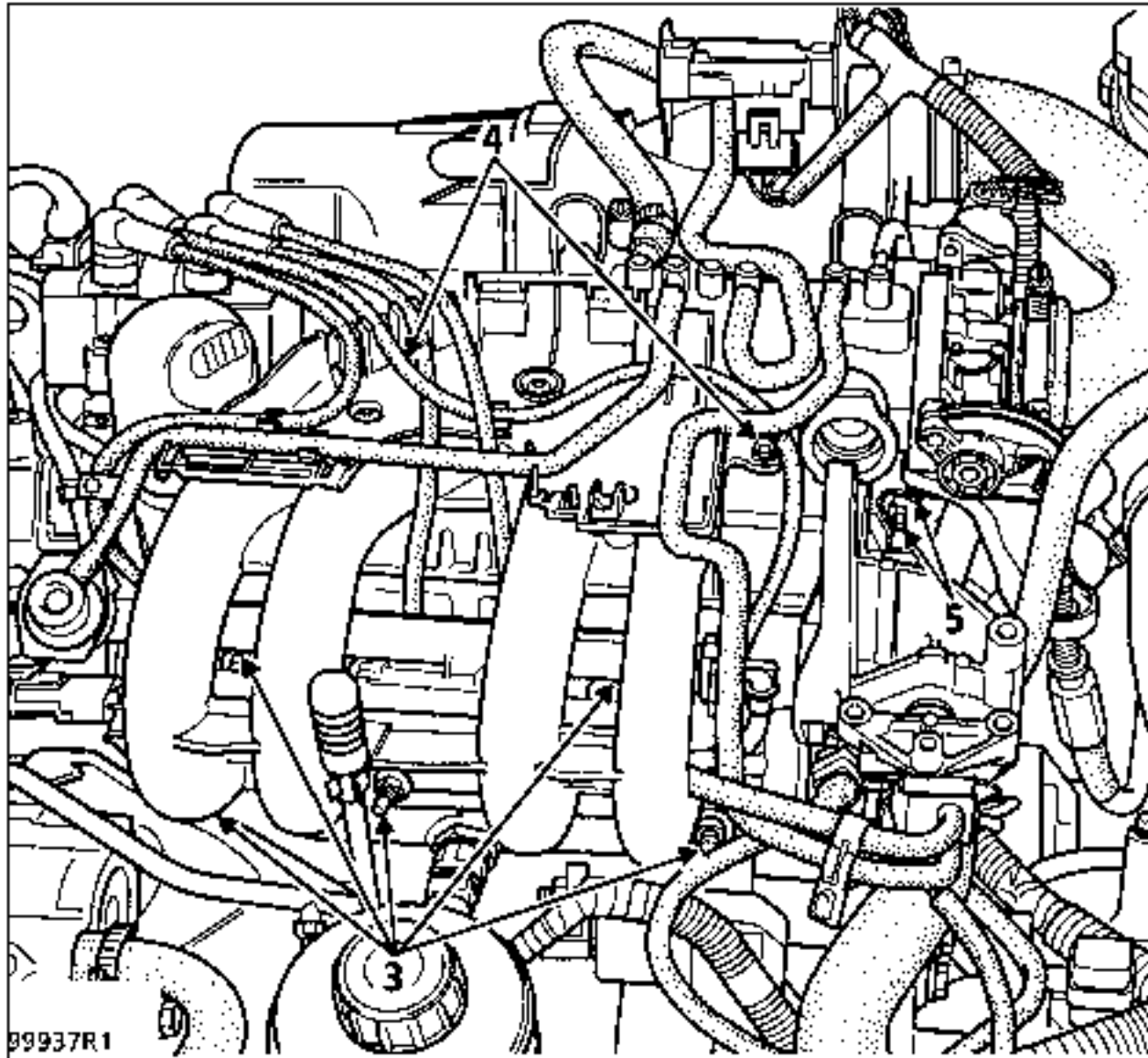


- the canister pipe and the petrol vapour rebreathing hoses on the solenoid valve,
- the connectors for:
 - ignition module,
 - injectors,
 - idling speed regulation stepping motor,
 - the throttle position potentiometer,
 - the air temperature sensor.

Take the water pump - heater matrix hose and the wiring harness out of the heat shield on the rocker cover.

Remove :

- the mounting bolts (5) for the throttle body stiffening lug on the cylinder head,
- the nuts (3) for securing the manifold to the cylinder head,
- the bolts (4) for securing the manifold to the rocker cover,
- the intake manifold, throttle body and injector gallery assembly,



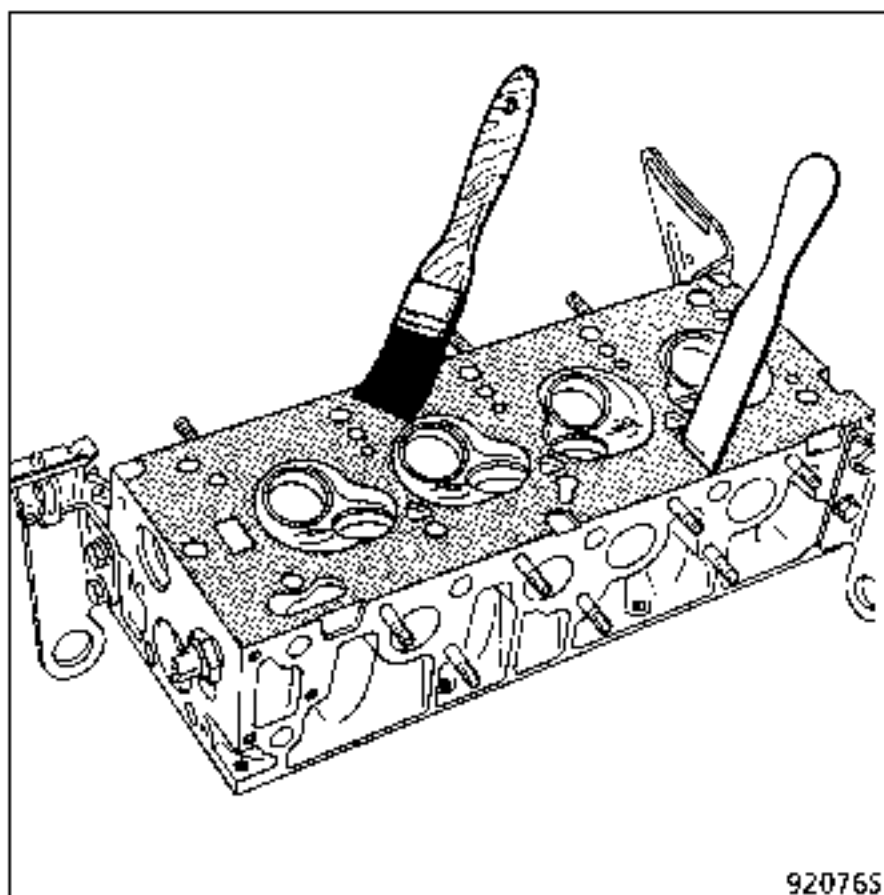
- the hoses on the thermostat,
- the rocker cover,
- the cylinder head mounting bolts,
- the cylinder head.

CLEANING

It is very important not to scratch the gasket mating surfaced of parts in aluminium.

Use **Décapjoint** to dissolve any gasket remaining on the metal.

Apply the product to the area to be cleaned; wait approximately ten minutes then remove using a wooden spatula.



Gloves should be worn during this operation.

Remember that this operation should be carried out with extreme care to avoid the risk of foreign bodies being introduced into the oilways bringing oil under pressure to the rocker shaft (oilways are located in both the cylinder head and the cylinder block).

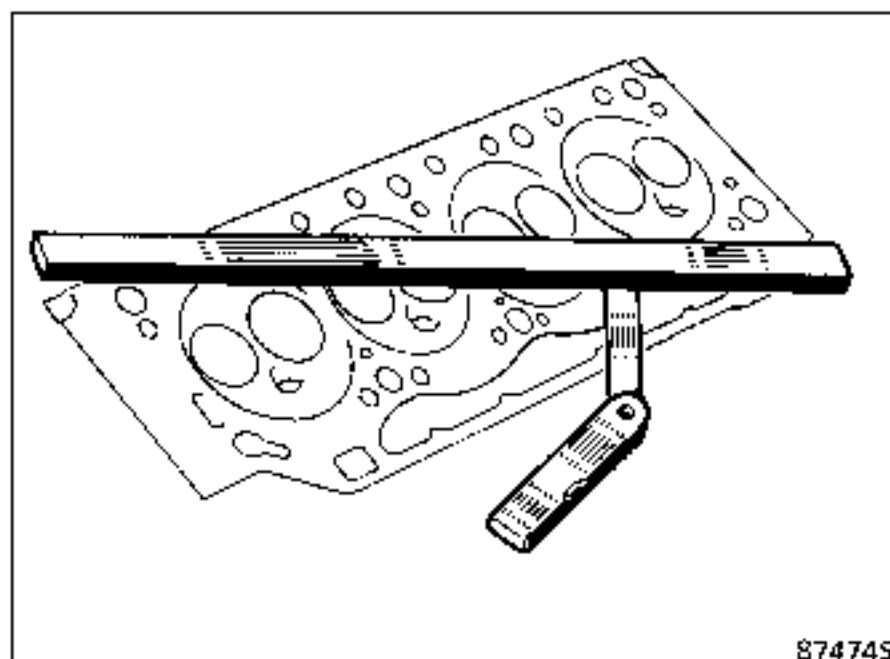
If these instructions are not observed, there is a risk that the rocker jets may become blocked and damage may occur rapidly to the rocker cams and tappets.

CHECKING THE GASKET FACE

Use a straight edge and a set of shims to check for gasket face deformation.

Maximum bow : 0.05 mm

The cylinder head may not be reground.



REFITTING

Two dowels placed at the back of the engine are used to centre the cylinder head.

Reminder :

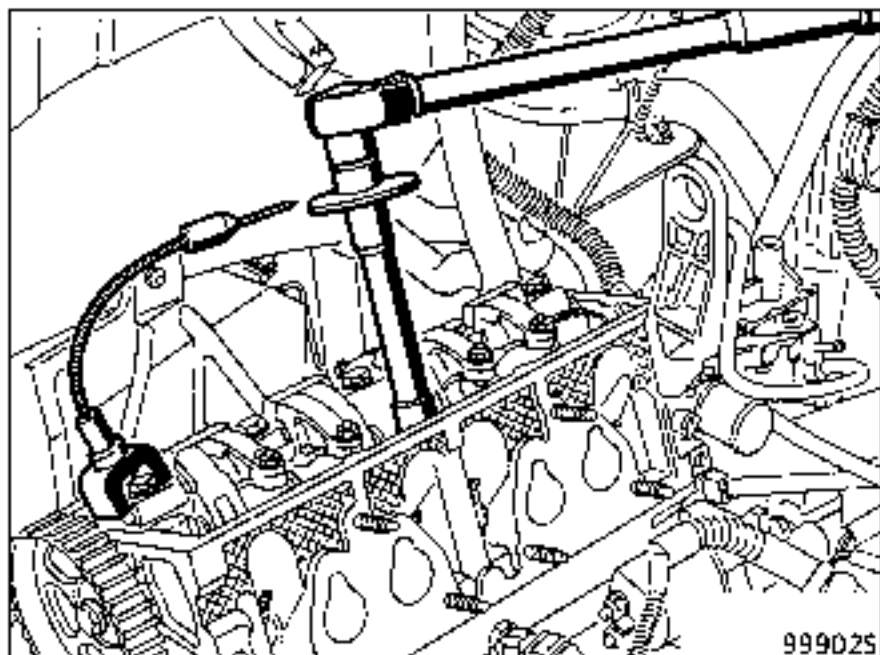
To ensure the bolts are correctly tightened, use a syringe to remove any oil which may be in the cylinder head mounting holes.

Using engine oil, lubricate the threads and under the heads of the bolts.

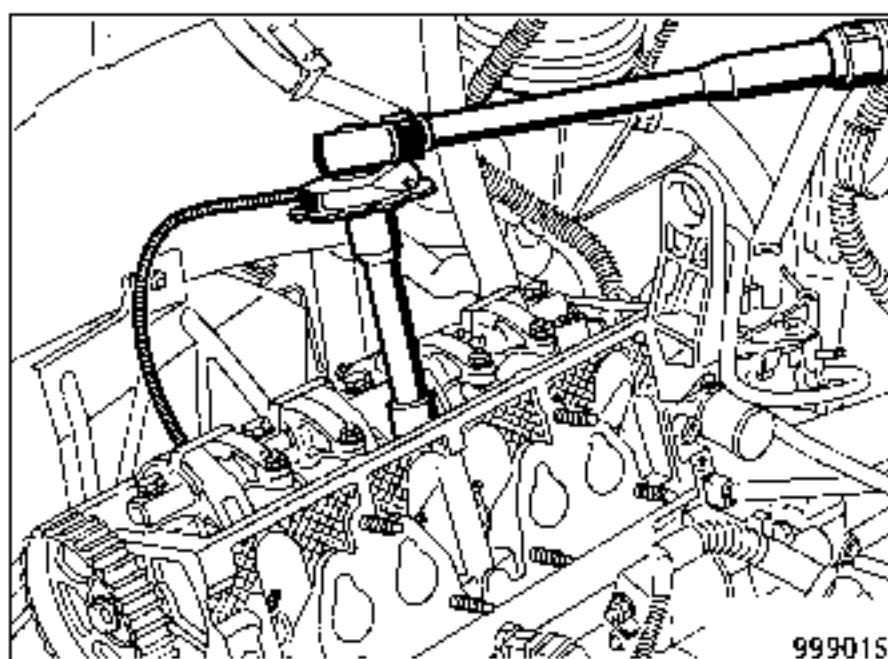
The engine should be cold when the rocker and cylinder head are tightened.

Tighten the cylinder head bolts using the angular tightening tool (see section 07, tightening cylinder head).

Tighten using Mot. 591-04.

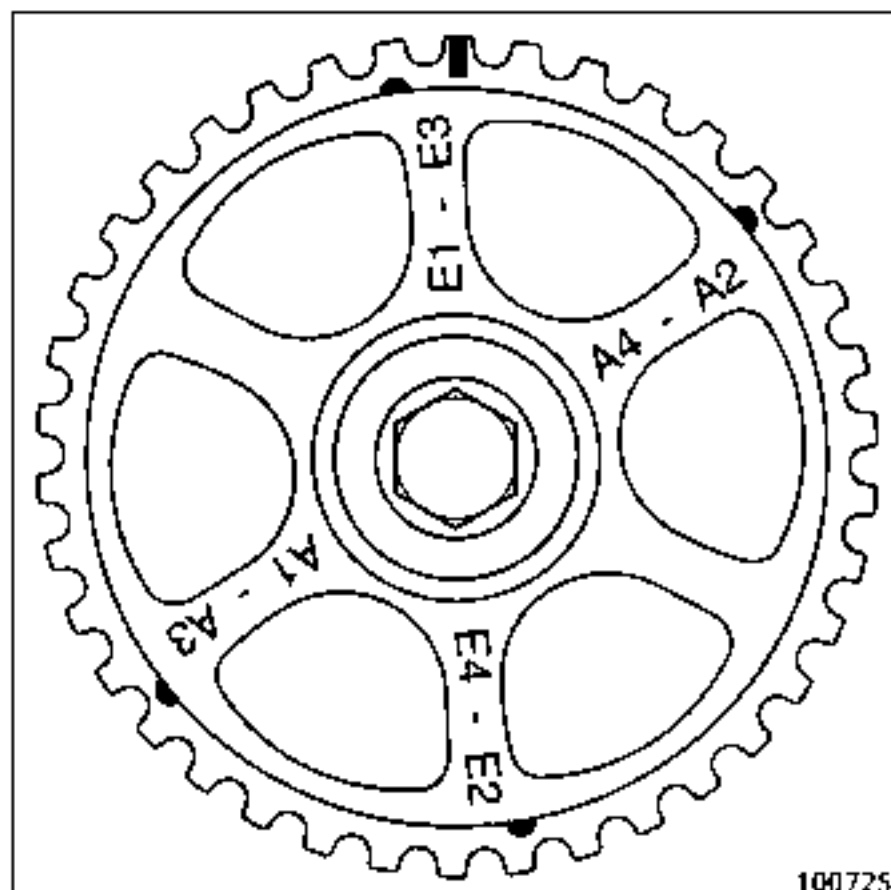


or
FACOM DM 360
or
STAHWILLE 540 1003



Align the timing belt marks with the reference marks on the toothed wheels.

IMPORTANT: The camshaft gear has five reference marks. Only the rectangular reference mark on one of the teeth represents top dead centre. The other marks are used to adjust the rockers.



Remove the Top Dead Centre pin.

Refit the timing belt (see the method described in section 11, timing belt).

ENGINE TOP AND FRONT

Cylinder head gasket

11

ADJUSTING ROCKERS IF NECESSARY

Partially refit the suspended mounting timing gear casing on the engine using two bolts.

Set the engine to Top Dead Centre, cylinder no. 1 at ignition.

Turn the crankshaft in a clockwise direction (seen from timing gear end) until the first reference mark is reached.

ADJUST: exhaust 1
exhaust 3

Advance to the second mark :

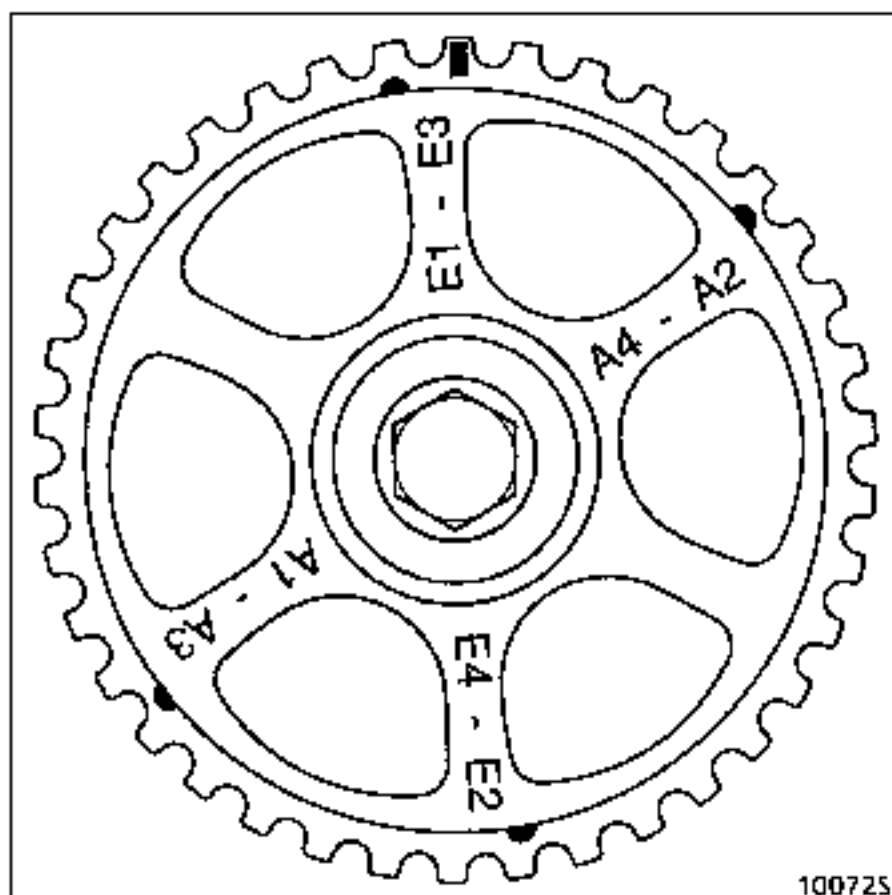
ADJUST: inlet 1
inlet 3

third mark :

ADJUST: exhaust 2
exhaust 4

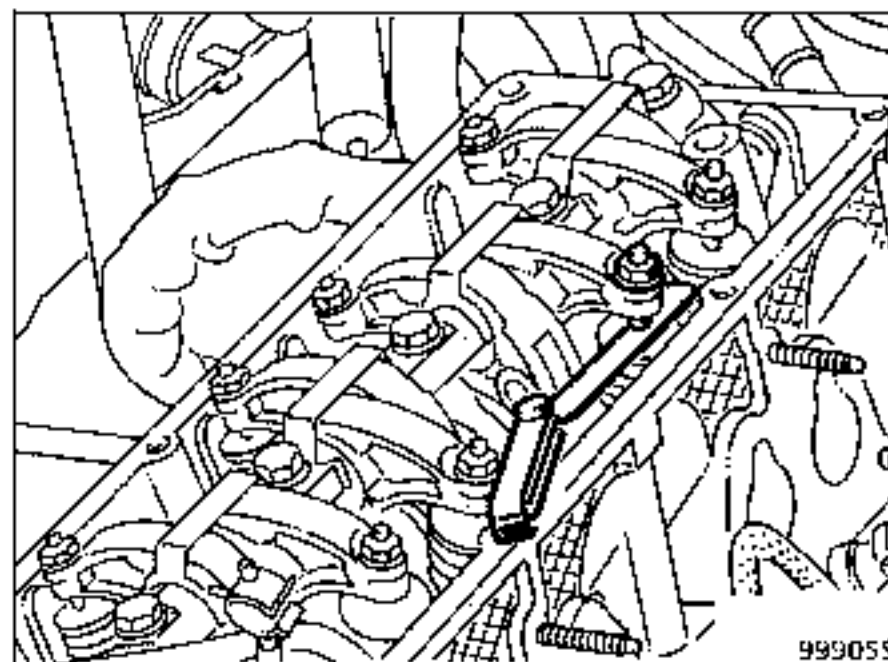
fourth mark :

ADJUST: inlet 2
inlet 4



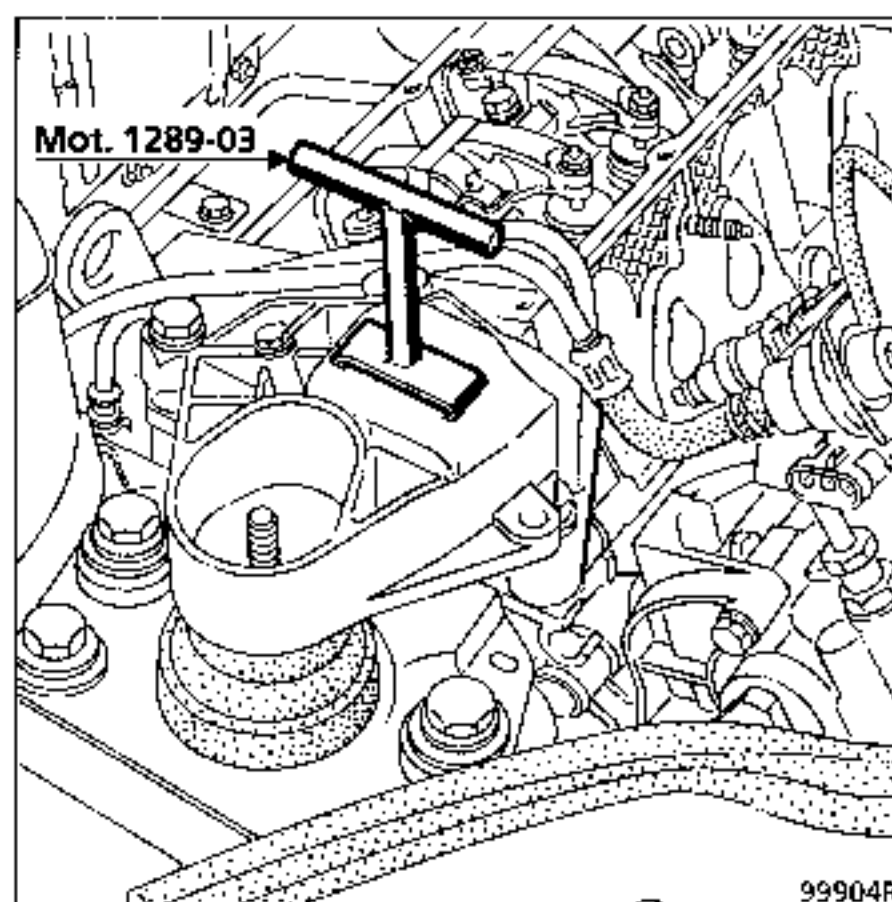
VALVE CLEARANCE ADJUSTING VALUES (mm)

Intake	0.05
Exhaust	0.15



Refit in reverse order to removal.

Refit the suspended mounting cover and check that this is correctly centred **Mot. 1289-03**.



Remove tool **Mot. 1379** holding the engine on the sub-frame.

NOTE : Tightening the intake manifold :

- Gradually tighten the six nuts until the manifold makes contact with the cylinder head. Then torque tighten to 1.5 daN.m,
- Fit the upper bolts in position and tighten them to a torque of 0.9 daN.m.

Fill up and bleed the cooling circuit.

Adjust the accelerator cable.

FUEL MIXTURE Specifications

12

Vehicle	Gear-box	Engine							Depollution standard
		Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cc)	Compression ratio	Catalytic converter	
057K	JB1	D7F	730	69	76.8	1149	9.65/1	◇ C61	EU 96
057Y	JB1	D7F	730	69	76.8	1149	9.65/1	◇ C61	EU 96

Engine		Tests carried out at idle speed *					Fuel *** (minimum octane rating)
		Engine speed (rpm)	Emission of pollutants **				
Type	Suffix		CO (%) (1)	CO ₂ (%)	HC (ppm)	Lambda (λ)	
D7F	730	740 ± 50	0.5 max.	14.5 min.	100 max.	0.97 < λ < 1.03	Unleaded (OR 95)

(1) At 2500 rpm CO should be a maximum of 0.3.

Vehicle	Computer	Supplier No.	Homologation No.	Renault No. (G70 *)
057K	SAGEM 35-track (SAFIR)	21616927-0	77 00 868 295	77 00 101 909
057Y	SAGEM 35-track (SAFIR)	21616968-3	77 00 867 277	77 00 101 910

- * For a coolant temperature greater than 80 °C and after a stabilised engine speed of 2500 rpm for approximately 30 seconds. Check to be made after returning to idling speed.
- ** For legal values, refer to specification for individual country.
- *** Compatible with OR 91 unleaded

Temperature at °C (± 1°)	0	20	40	80	90
Air temperature sensor CTN type Resistance in ohms	5000 to 7000	1700 to 3300	800 to 1550	—	—
Coolant temperature sensor CTN type Resistance in ohms	—	3060 to 4045	1315 to 1600	300 to 370	210 to 270

FUEL MIXTURE
Specifications

DESCRIPTION	MAKE/TYPE	SPECIAL NOTES		
Computer	SAGEM/SAFIR	35-tracks		
Injection		Semi-sequential regulated multipoint injection		
Ignition		Static with two dual output coils Power module integral in computer. One pinking sensor Tightening torque: 2.5 daN.m	Tracks	Resistance
			1 - 2	2 Ω
			1 - 4 1 - 3 2 - 3 2 - 4	1,6 Ω
			3 - 4	1,1 Ω
			HT - HT	10 KΩ
Top dead centre sensor		Resistance 220 Ω		
Spark plugs	EYQUEM FN 52 LS	Gap : 0.9 mm Tightening : 2.5 to 3 daN.m		
Air filter		Replace every other oil change		
Petrol filter		Mounted in front of the fuel tank under the vehicle Replace at major service		
Fuel pump	WALBRO	Submerged in fuel tank Flow : 80 litres/hour minimum for regulated pressure of 3 bar and voltage of 12 volts		
Pressure regulator		Regulated pressure Zero vacuum : Vacuum of 500 mbars :	3 ± 0.2 bars 2.5 ± 0.2 bars	
Solenoid injectors	SIEMENS	Voltage : Resistance :	12 Volts 14.5 ± 1 Ω	

FUEL MIXTURE Specifications

12

DESCRIPTION	MAKE/TYPE	SPECIAL NOTES			
Throttle body	MAGNETI MARELLI 873 633	36 mm dia.			
Idling speed regulation stepping motor	AIR PAX	Voltage : 12 V (at high frequency) Resistance : tracks A-D $53 \pm 5 \Omega$ tracks B-C $53 \pm 5 \Omega$			
Throttle body		Voltage : 5 V Resistance :	Track	No load	Full load
			AB	1200 Ω	1200 Ω
			AC	1260 Ω	2200 Ω
			BC	2200 Ω	1260 Ω
Fuel vapour rebreathing canister Solenoid valve	CAN 01 DELCO REMY	Voltage: 12 Volts Resistance : $35 \pm 5 \Omega$			
Heated oxygen sensor	BOSCH LSH 24	Voltage at 850 °C Rich mixture > 625 mvolts Lean mixture : 0 to 80 mvolts Reheating resistance, track A-B : 3 to 15 Ω Tightening torque : 5 daN.m			
Fault finding	FICHE No.27 CODE D13 SELECTOR S8	Throttle potentiometer: At idling speed regulation: $10 \leq \# 17 \leq 36$ At full load: $193 \leq \# 17 \leq 240$ R.C.O. idling speed: $4 \% \leq \# 12 \leq 20 \%$ Adaptive R.C.O. idling speed: $-4.3 \% \leq \# 21 \leq +3.9 \%$ Adaptive richness operation: $96 \leq \# 30 \leq 160$ Adaptive richness idling speed: $96 \leq \# 31 \leq 160$			

TIGHTENING TORQUES (in daN.m)

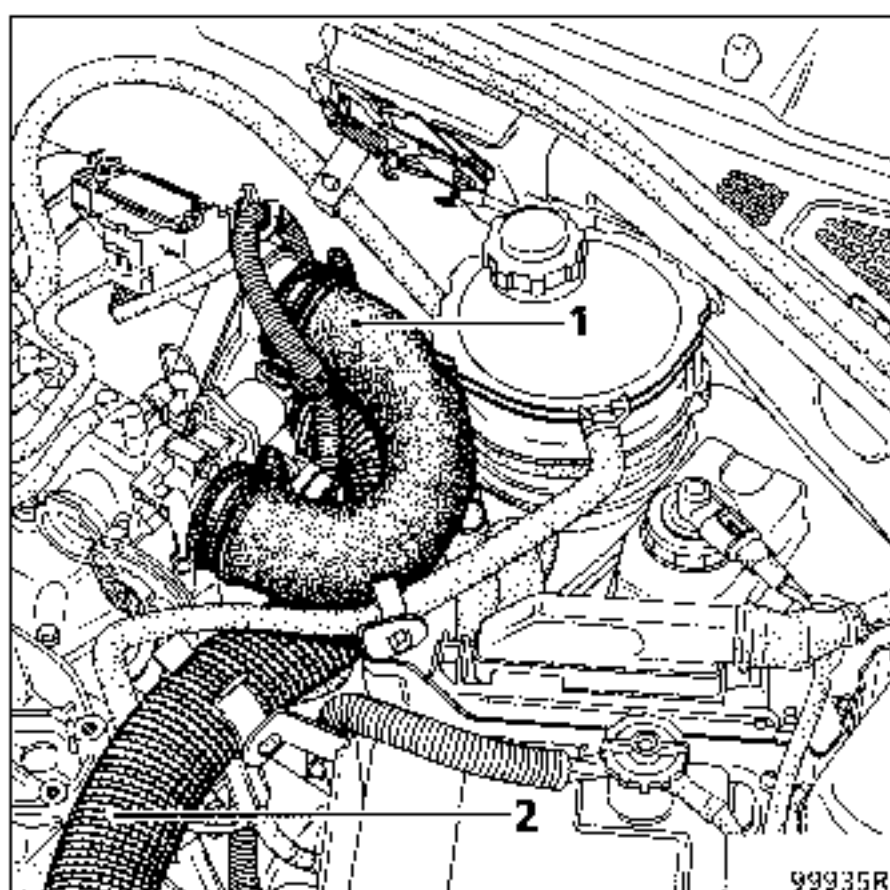


Throttle body mounting bolt on inlet manifold	1
Bolt securing throttle body stiffening lug on cylinder head	1

REMOVING

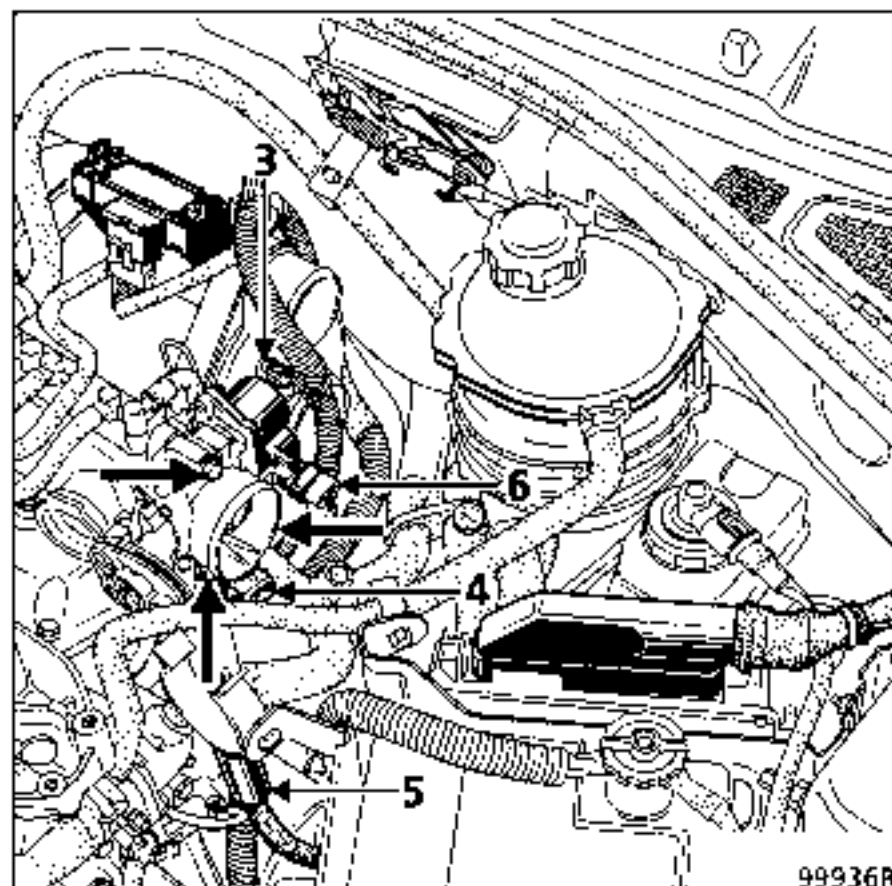
Disconnect the battery.

Remove air ducts (1) and (2).



Disconnect:

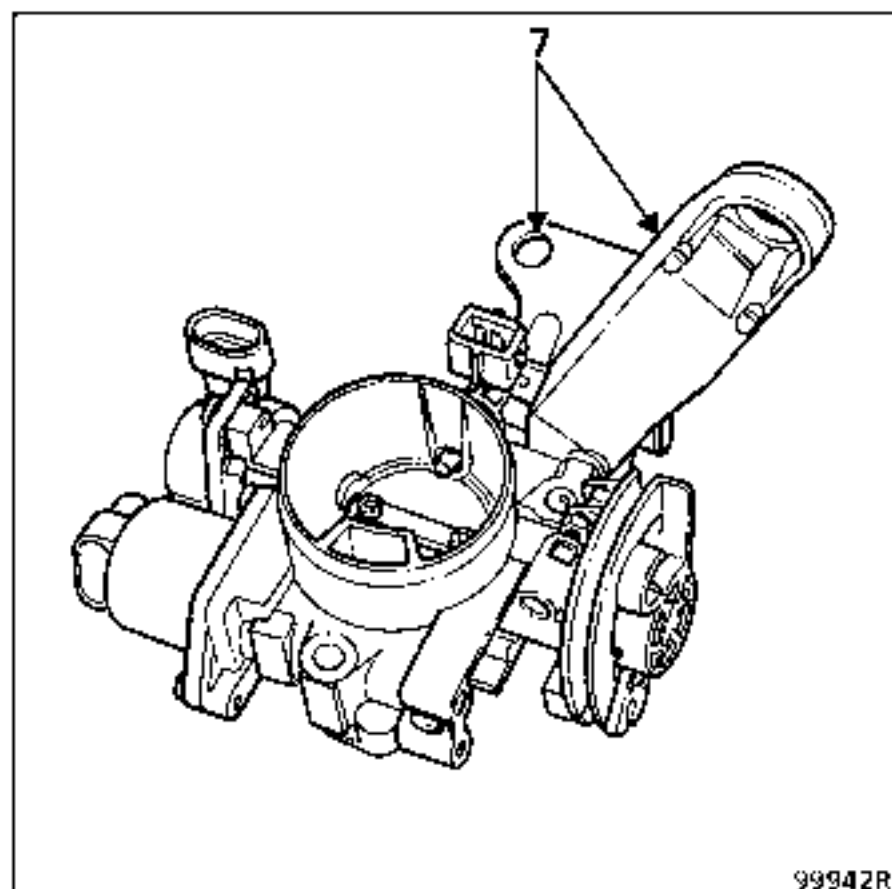
- the stepping motor (3),
- the air temperature sensor (4),
- the accelerator cable (5),
- the throttle body potentiometer (6).



Remove the three throttle body mounting bolts.

Remove the two bolts (7) securing the stiffening lug to the cylinder head (leave the lug fixed to the throttle body).

Take out the throttle body and the stiffening lug.



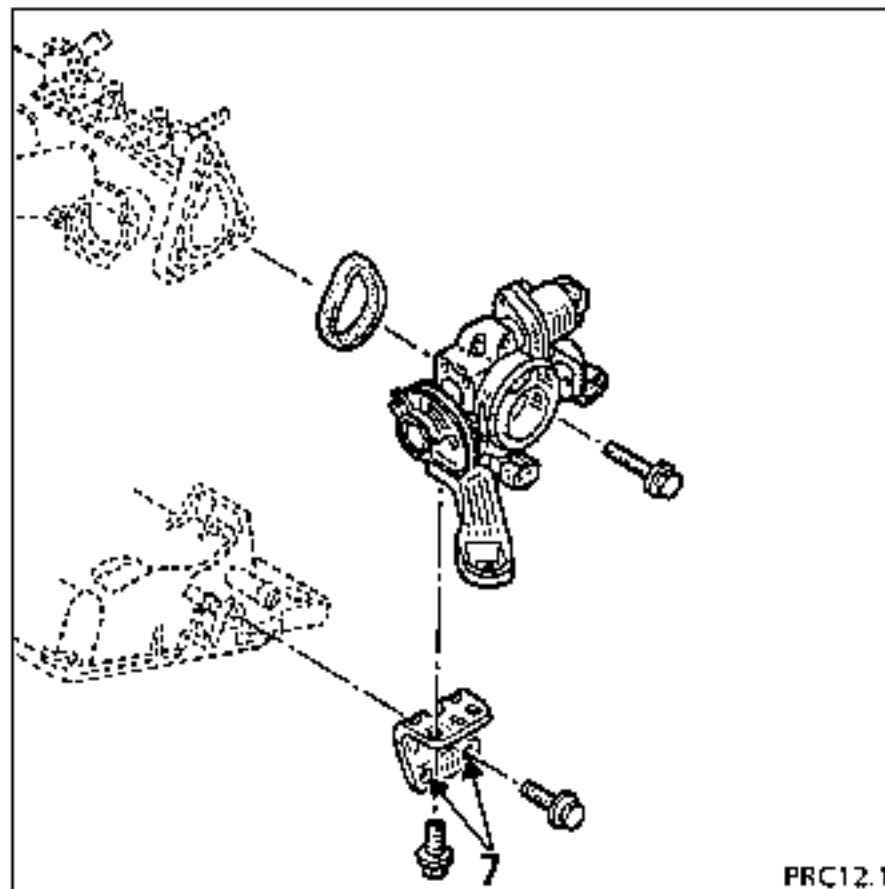
The throttle position potentiometer can be removed without removing the throttle body.

The throttle position potentiometer is not adjustable.

REFITTING

Renew the gasket between the throttle body and the manifold.

The remaining refitting operations are the reverse of removal.



TIGHTENING TORQUES (in daN.m)



Bolts for securing injection gallery to manifold	1
Nut securing manifold on cylinder head	1.7
Stud securing manifold on cylinder head	1

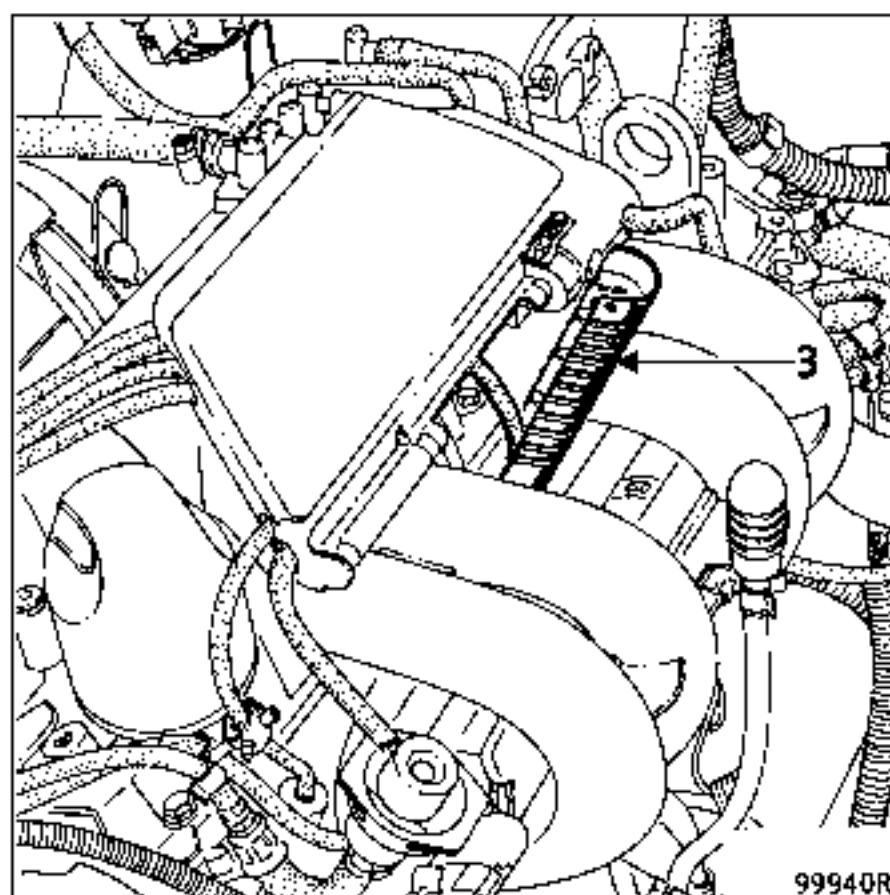
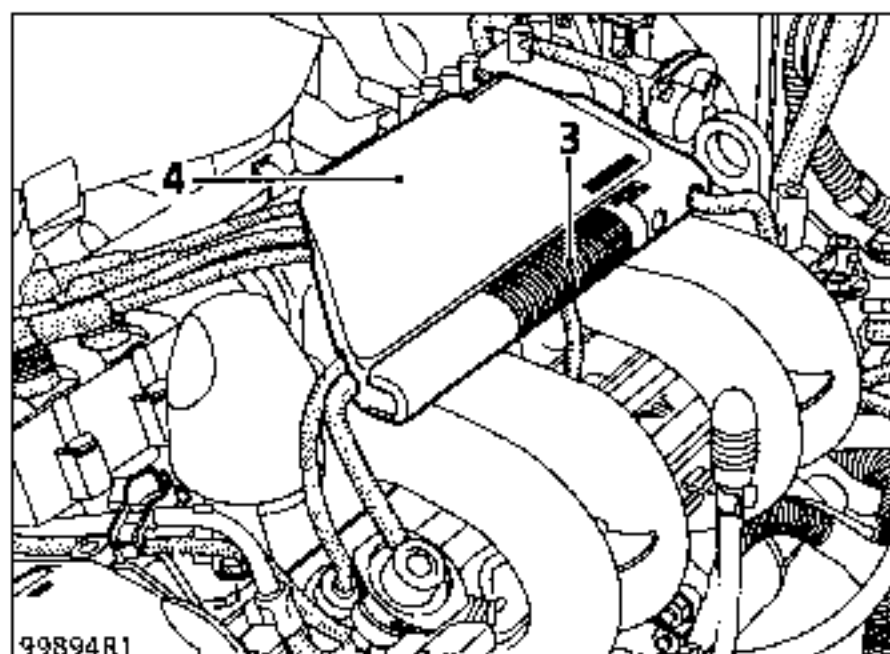
REMOVING

Disconnect the battery.

Remove air ducts (1) and (2).



Disconnect spark plug wires using tool (3) integrated in the plastic protector (4).



Remove the upper part of the plastic protector.

Tilt the spark plug cables to the right-hand side of the vehicle.

Disconnect:

- the oil vapour rebreathing pipe (3) on the intake manifold,
- petrol vapour rebreathing pipes (4) on the solenoid valve
- the pressure take-off pipe (5) on the pressure regulator,
- the vacuum take-off pipe (6) of the brake servo,
- the vacuum take-off pipe (7) for the pressure sensor,
- the petrol delivery (8) and return (9) pipe,
- the idling speed regulation stepping motor connector (10),

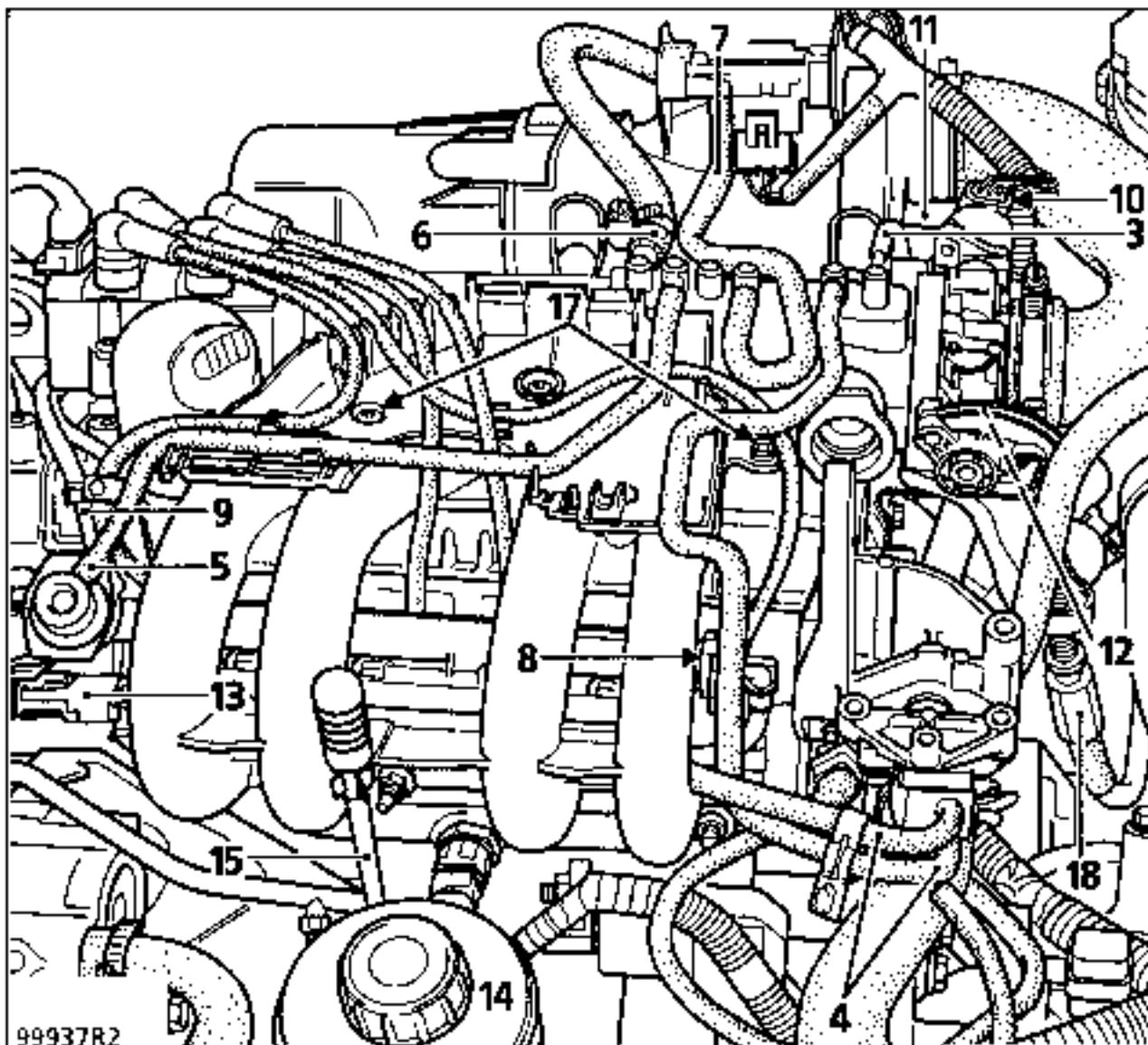
- the throttle body position potentiometer connector (11),
- the air temperature sensor connector (12),
- the injector connector (13),
- the accelerator cable (18).

Tilt the PAS reservoir (14) to the right-hand side of the vehicle.

Remove the dipstick (15).

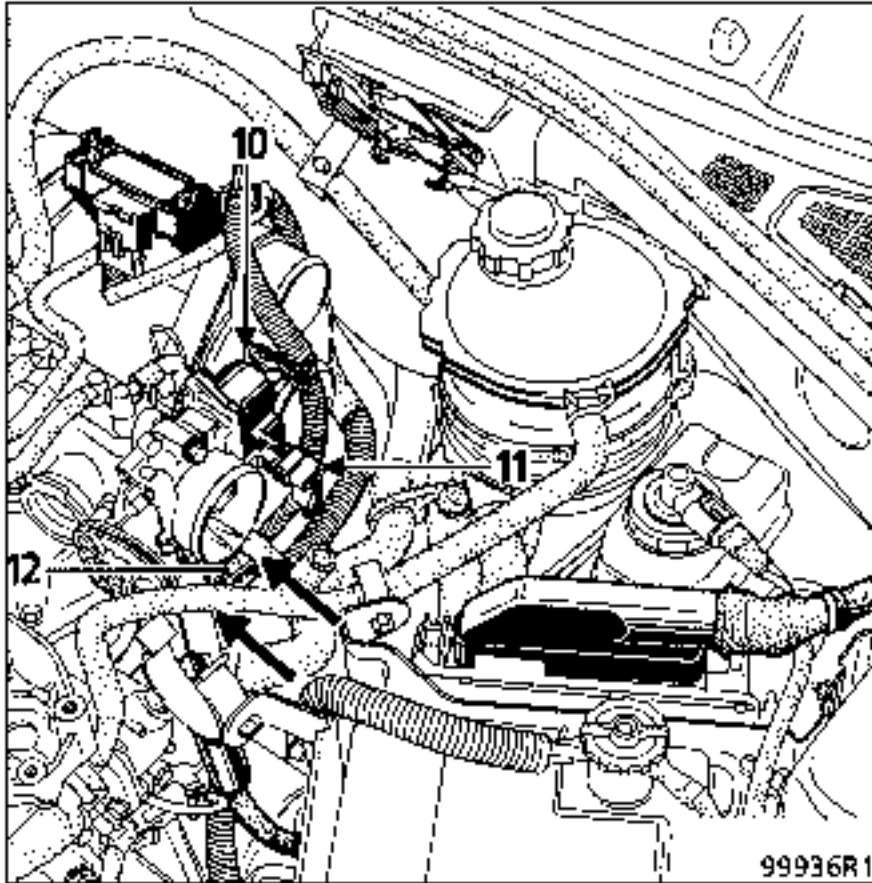
Remove the six nuts securing the manifold to the cylinder head.

Remove the two bolts (17) securing the manifold on top of the cylinder head.



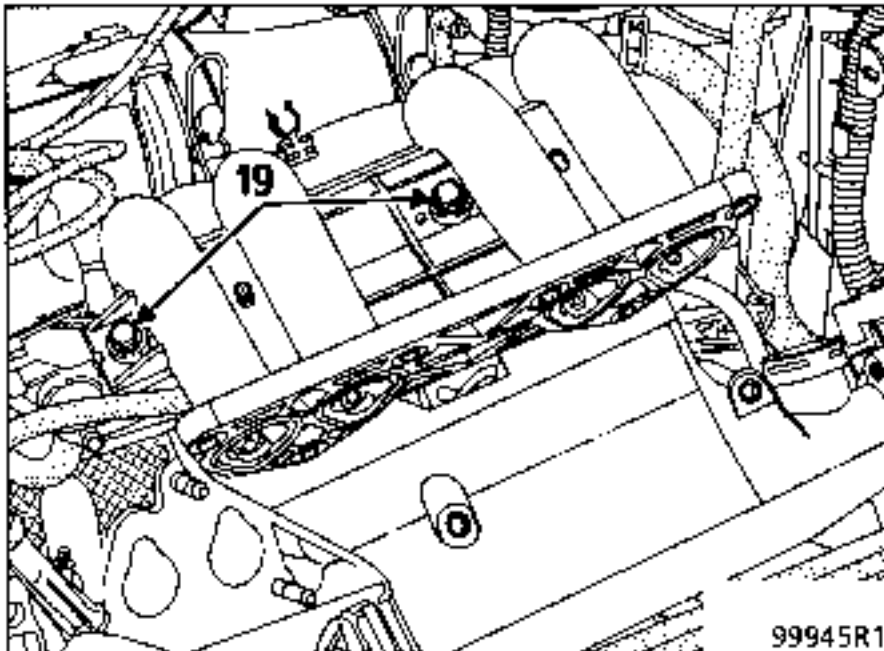
99937R2

Remove the two bolts securing the throttle body stiffening lug to the cylinder head.



Disconnect the cylinder head manifold and turn it through 180 degrees.

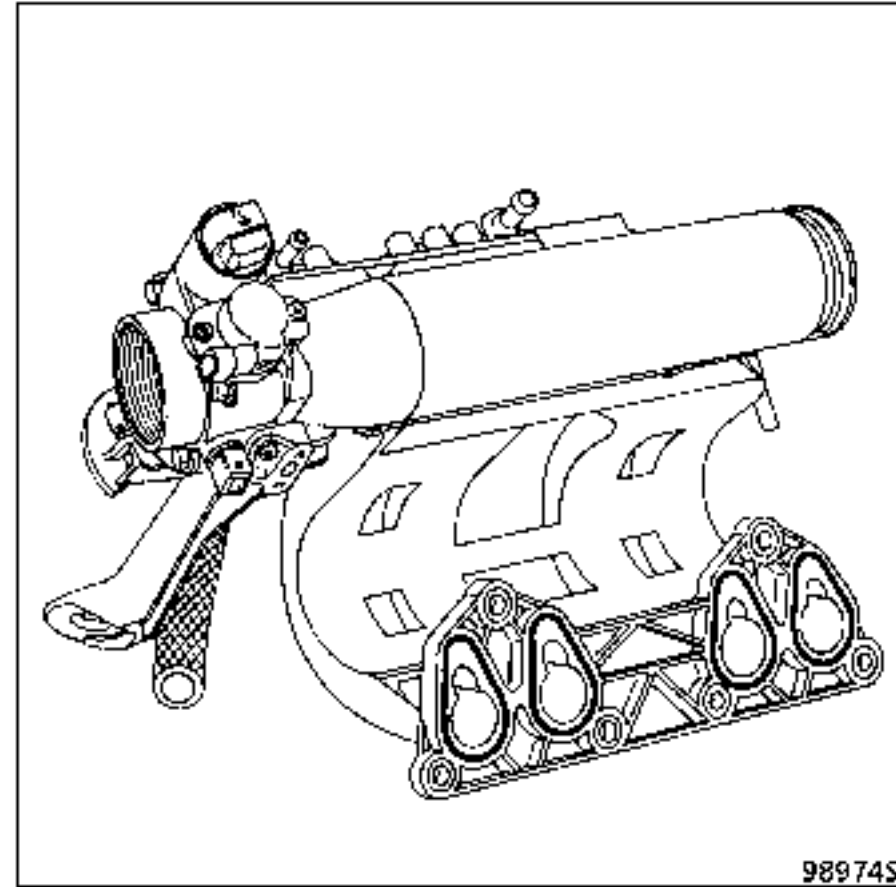
Remove the two bolts (19) securing the injection gallery to the manifold.



Take out the injection gallery.

Tilt the petrol vapour rebreathing pipe and the petrol delivery line.

Take out the manifold.

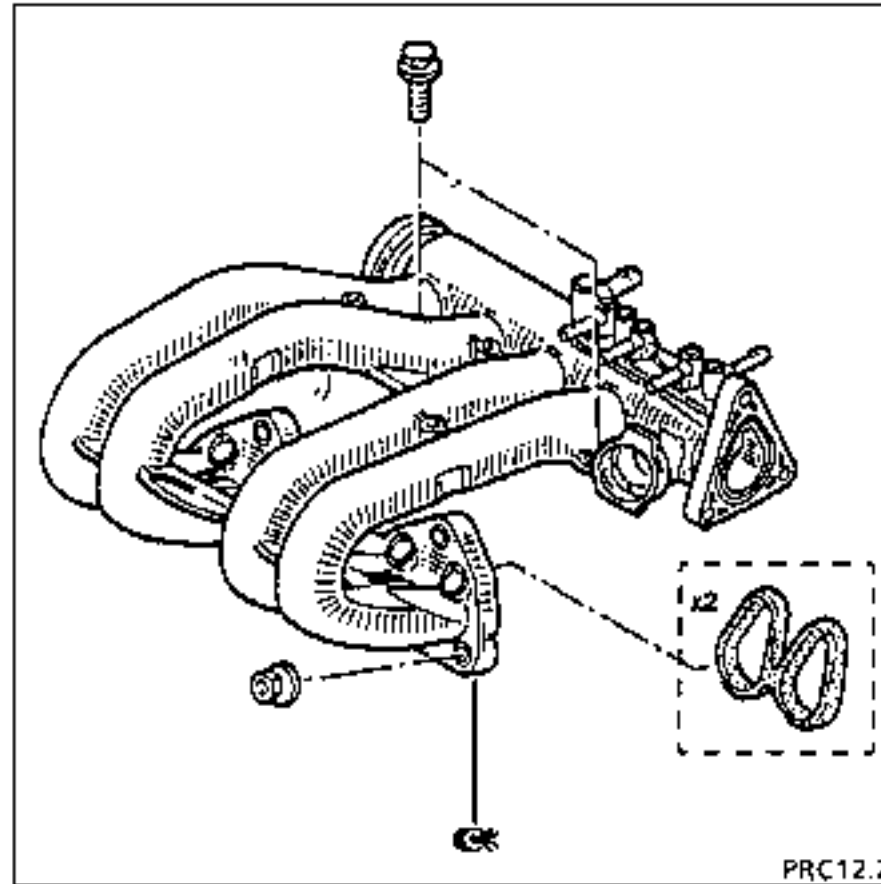


REFITTING

Fit a new manifold gasket.

Refit the petrol delivery line and the petrol vapour rebreathing pipe before reinstalling the injection gallery.

For other operations, proceed in reverse order to removal.



TIGHTENING TORQUES (in daN.m)



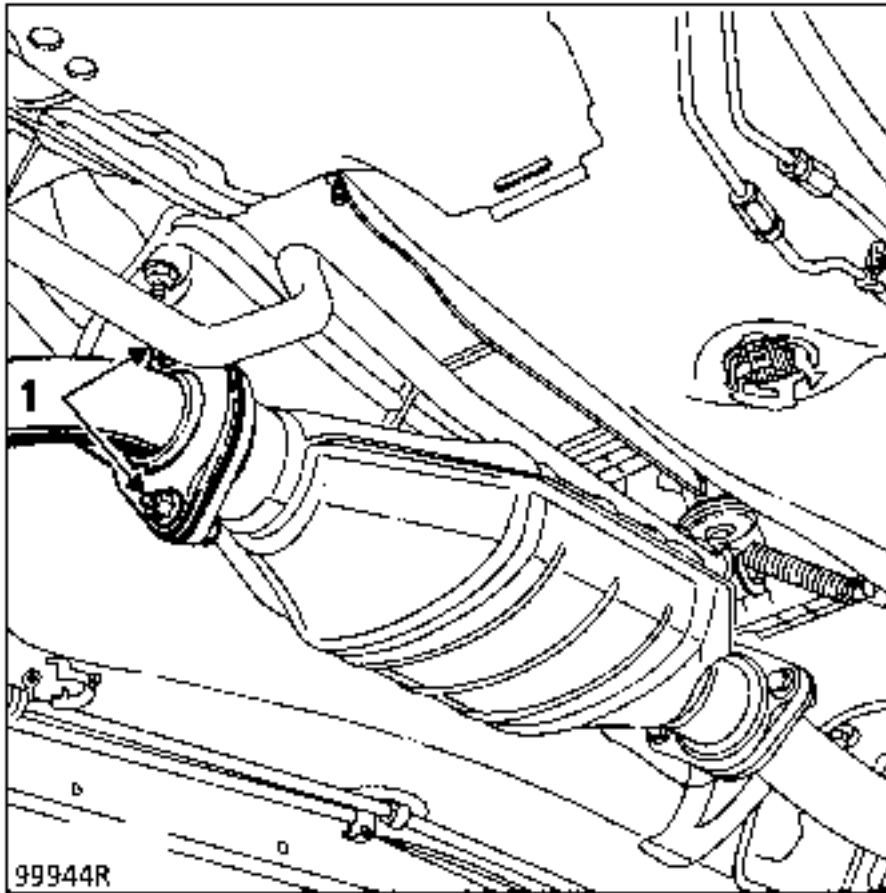
Manifold mounting nut	2.5
Manifold mounting stud	1
Bolt securing exhaust down pipe	2.2

REMOVING

Raise the vehicle.

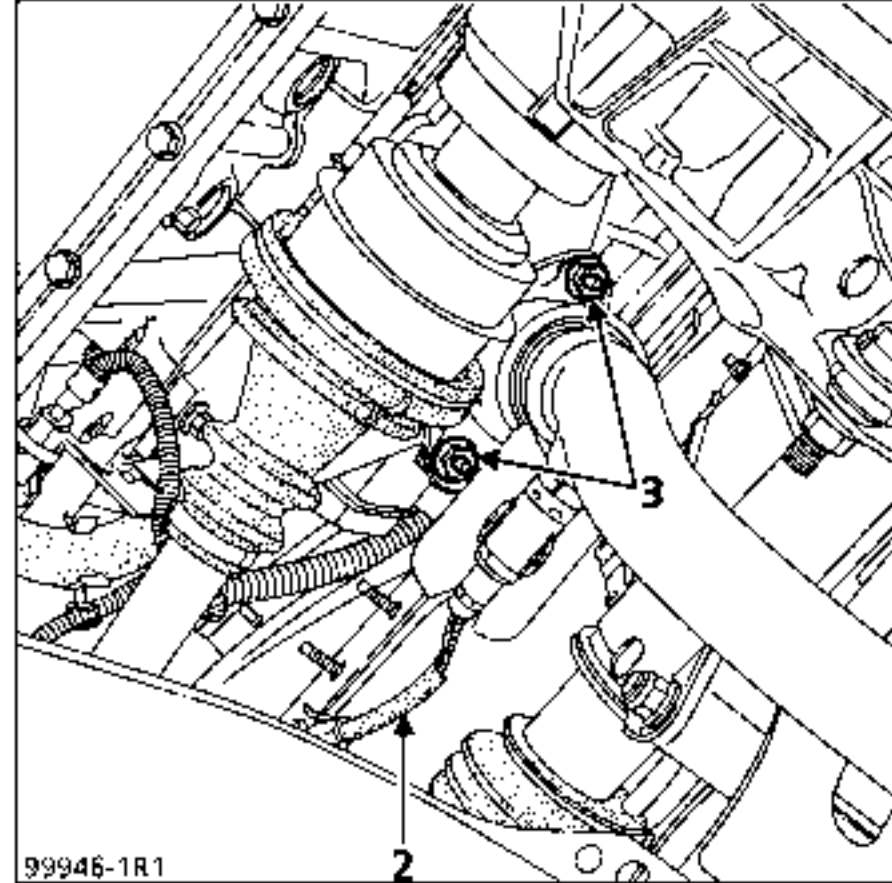
Attach the exhaust system to the body shell using string.

Unscrew the two bolts (1) securing the exhaust down pipe to the catalytic converter.



Disconnect the oxygen sensor (2).

Remove the 2 bolts (3) securing the exhaust manifold to the exhaust down pipe and then take out the down pipe.

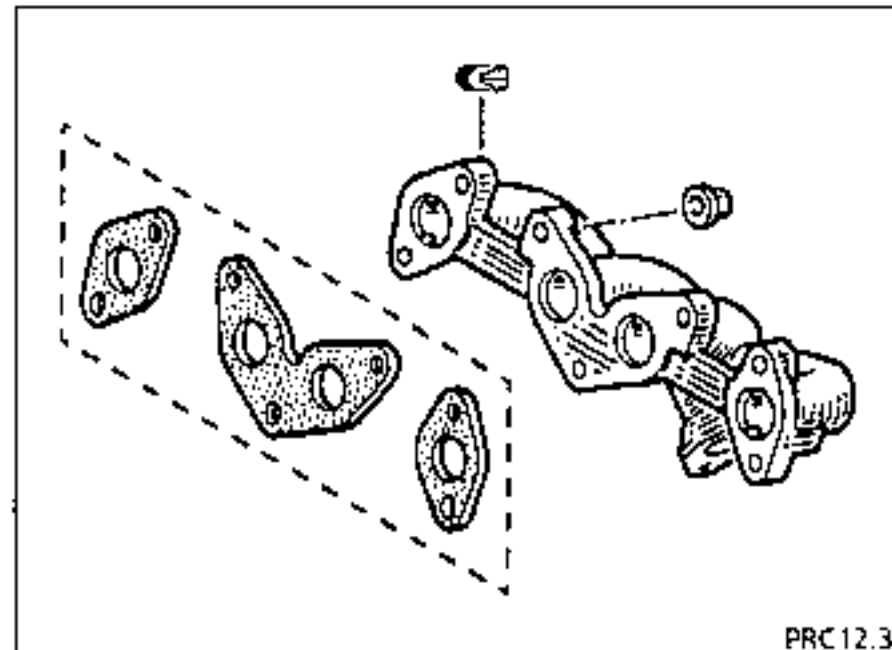


Remove the seven bolts securing the exhaust manifold to the cylinder head and then take out the manifold.

REFITTING

Fit a new manifold gasket.

Refit in reverse order to removal.



ESSENTIAL SPECIAL TOOLING

Mot. 1311-06	Tool for removing fuel line unions
--------------	------------------------------------

TIGHTENING TORQUE (in daN.m)



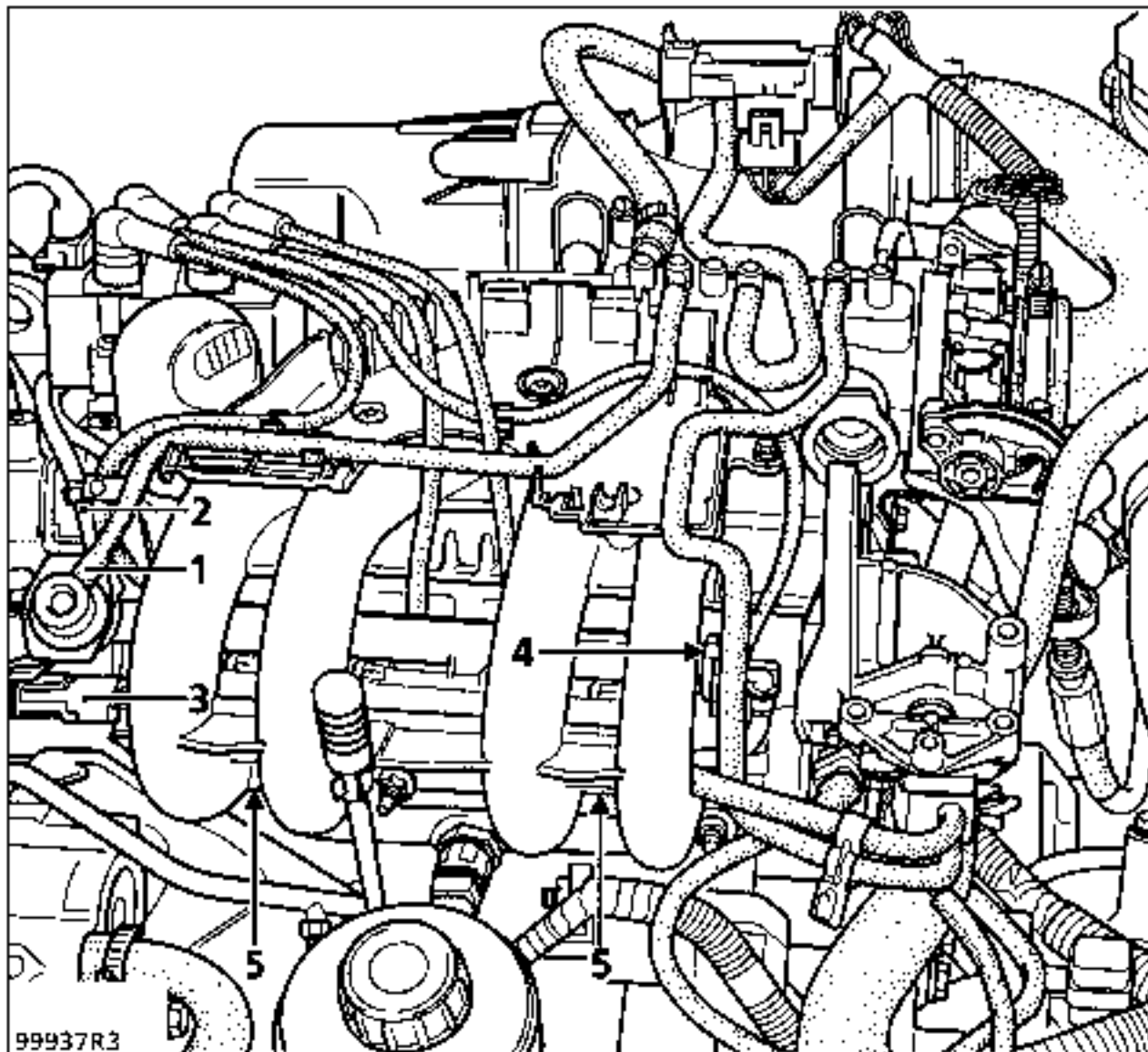
Injection gallery mounting bolt on manifold

1

REMOVING

Disconnect:

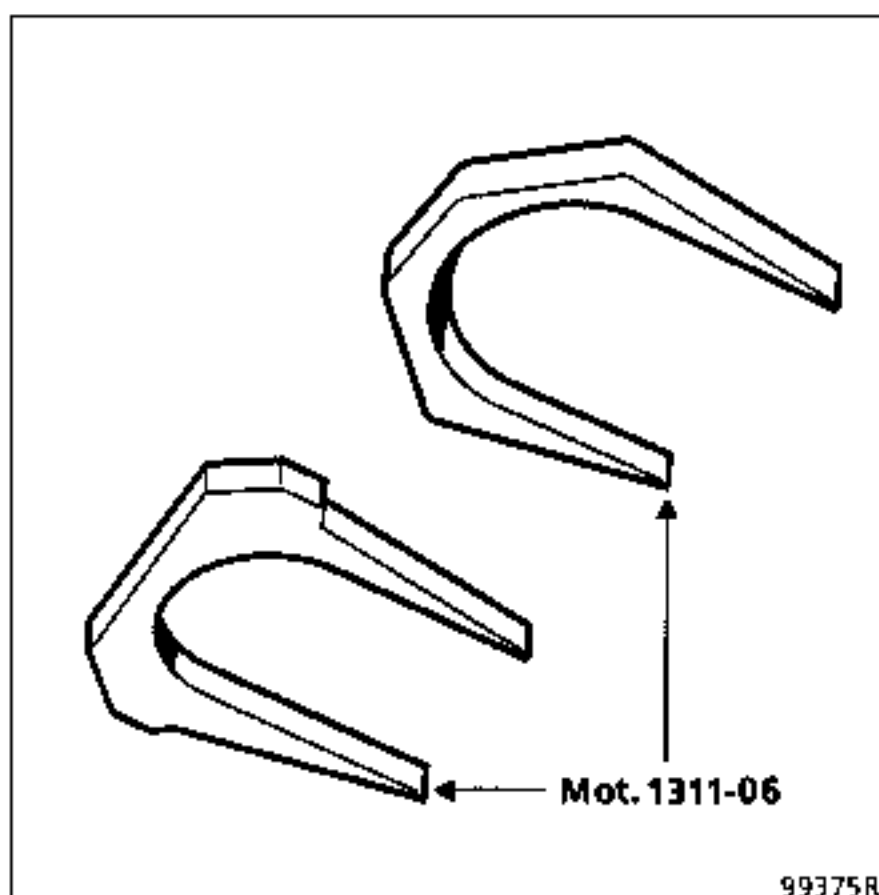
- the battery,
- the pressure take-off pipe (1) of the pressure regulator,
- the fuel return pipe (2),
- the connector (3) for the injectors.



99937R3

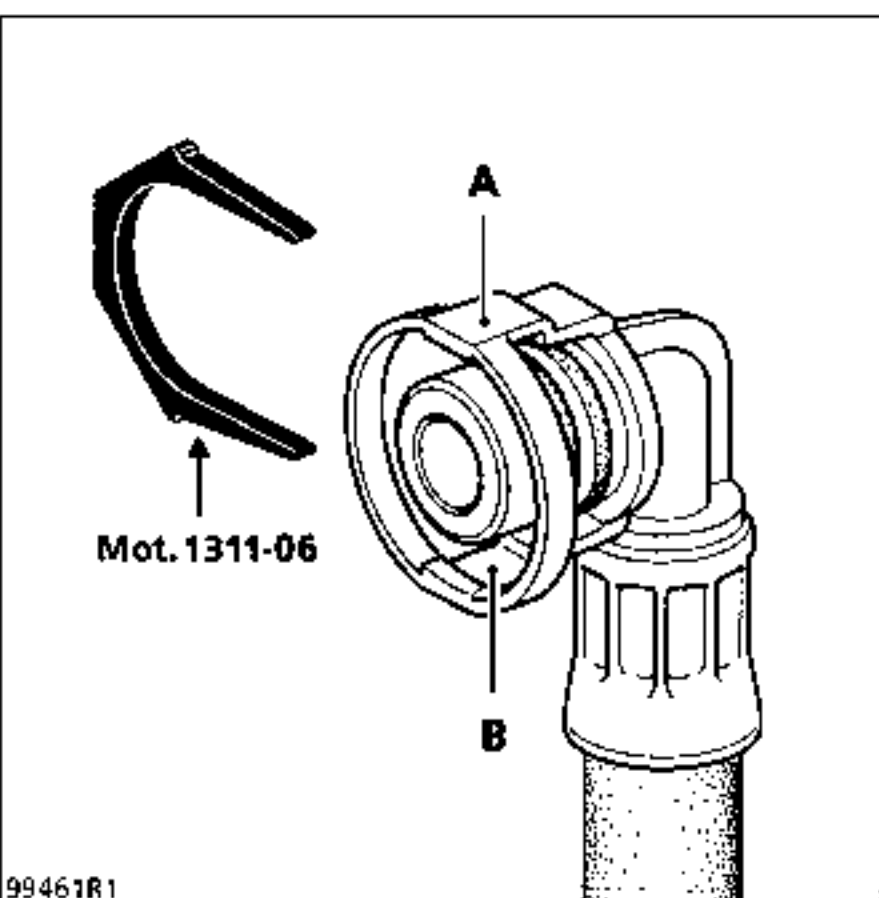
Disconnect:

- the petrol supply line (4) using tool Mot. 1311-06 with a large cross-section. (The fuel supply pipe uses a removal tool connected to the union fitted on the vehicle.)



To remove the unions, fit tool Mot. 1311-06 between the two parts (A) and (B).

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



Remove the two bolts (5) securing the gallery to the manifold.

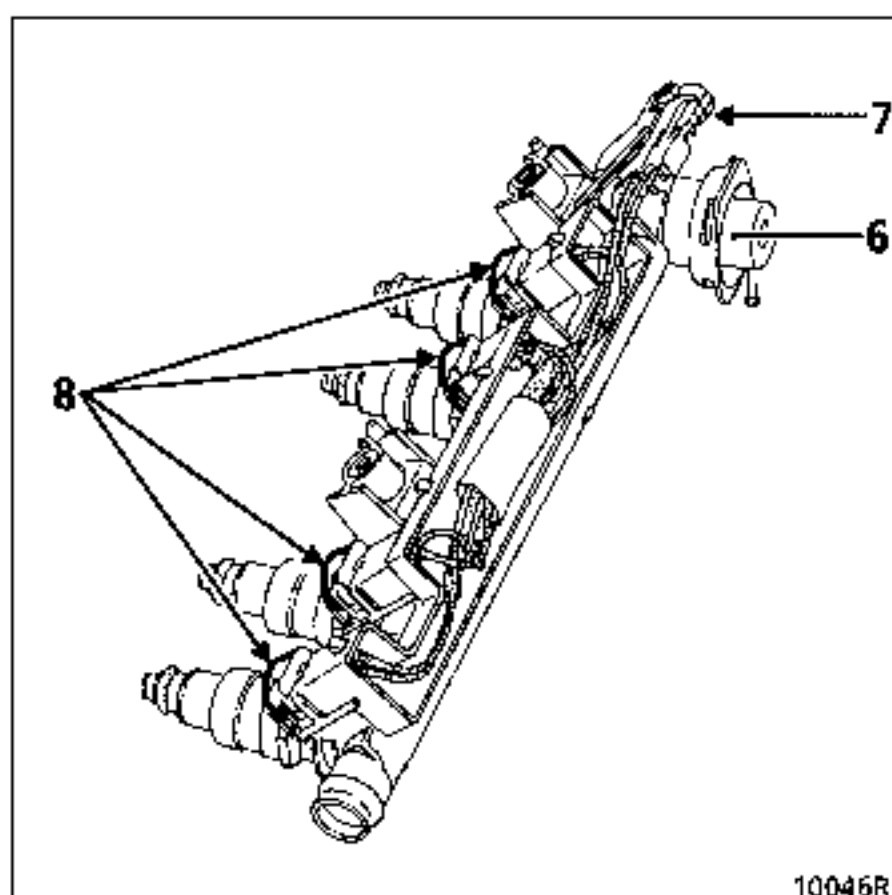
Slide the injection gallery and the injectors between the manifold and the cylinder head.

Take out the injection gallery from the right-hand side of the vehicle.

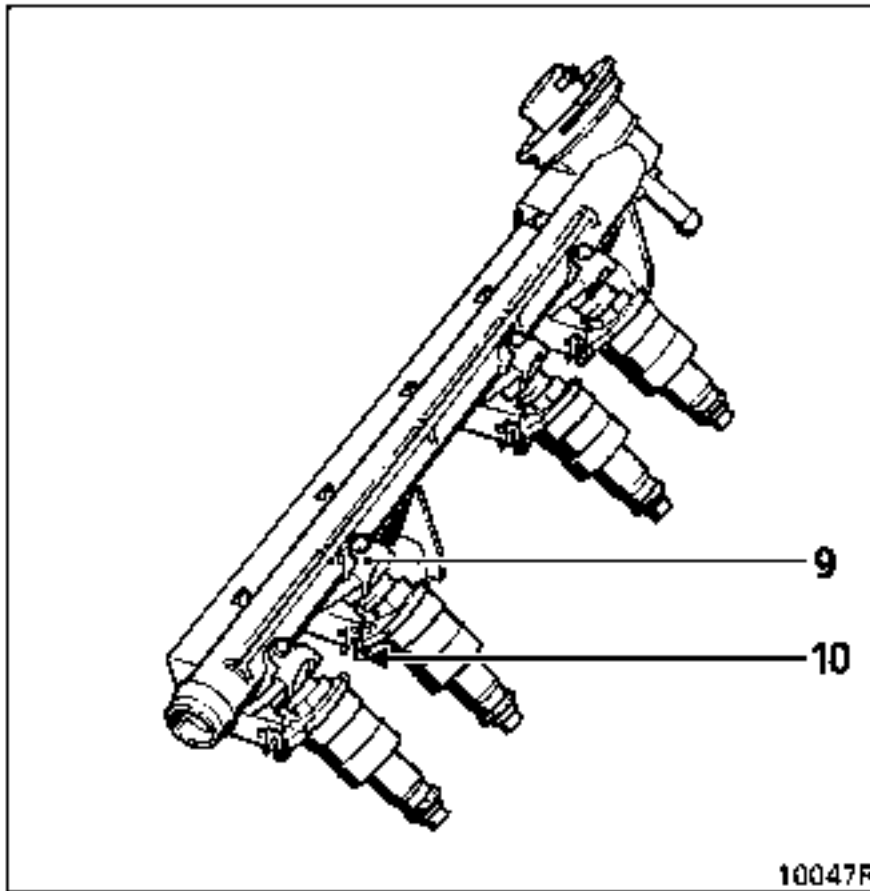
NOTES

The pressure regulator (6) is clipped to the injection gallery.

There is a connector (7) between the injector (8) and the computer.



To take out the injector, remove clips (9) and then press clip (10). Then pull injector.

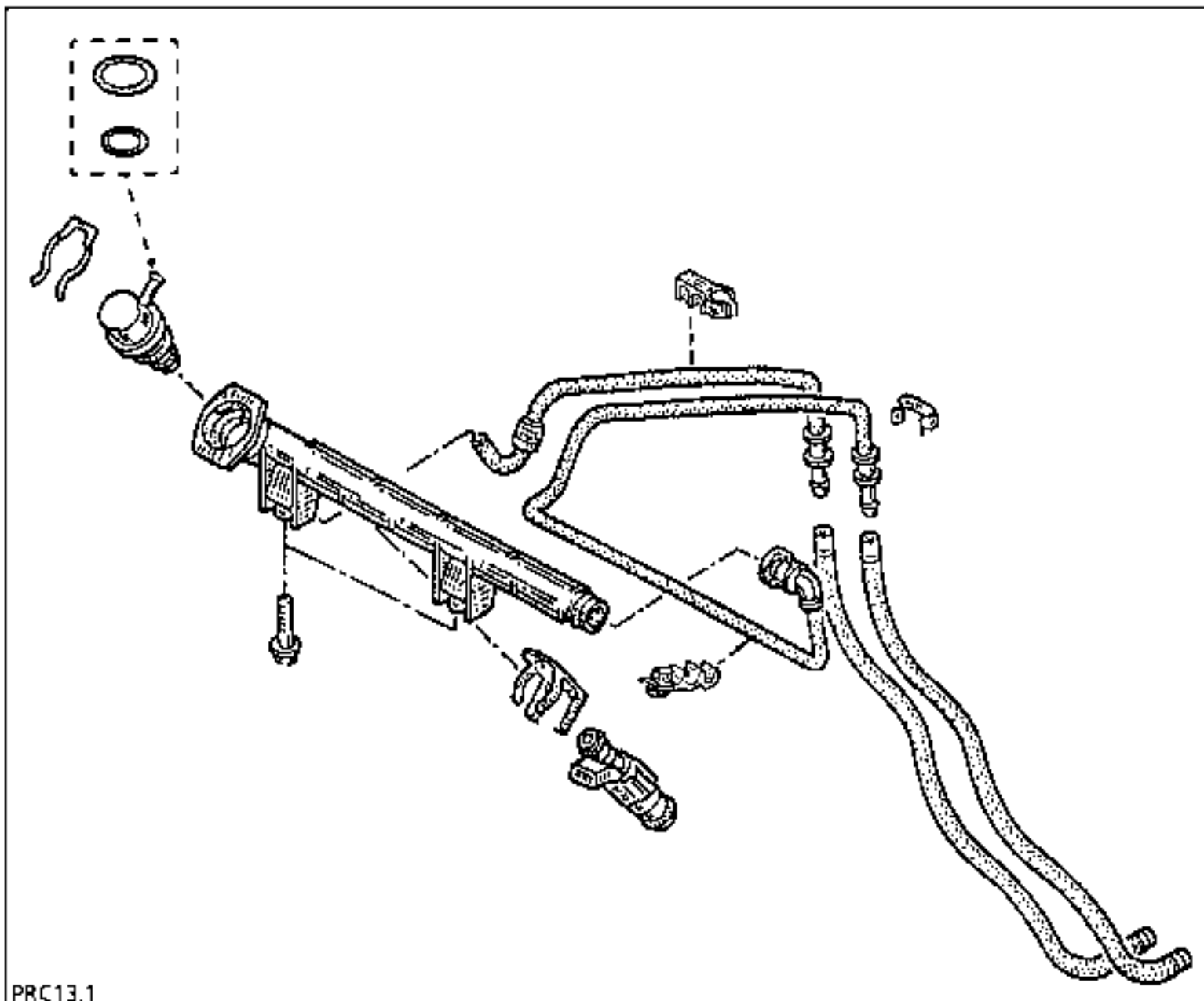


REFITTING

Renew the O-rings at the base of the injectors (if the injector has been removed, also renew the seal at the head of the injector).

The fuel supply and return unions should click when they are correctly connected.

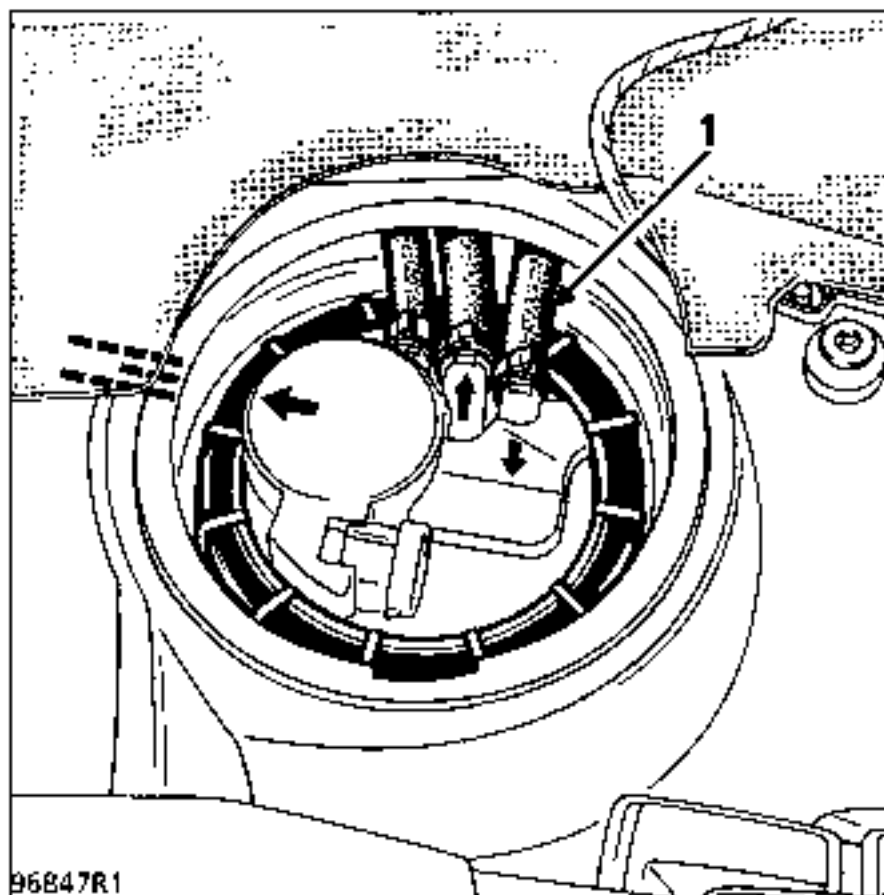
The other refitting operations are performed in reverse order to removal.



ESSENTIAL SPECIAL EQUIPMENT

1 measuring cylinder, 2000 ml

It is advisable to check the fuel pump flow using the fuel return pipe connected to the sender unit assembly.



IMPORTANT

During this operation the following points must be observed :

- Do not smoke and keep all heat sources away from the working area.
- Take precautions to guard against fuel spray due to the residual pressure in the pipes when they are removed.

CHECKING THE PUMP FLOW

Lift the rear seat.

Remove the plastic cover.

Disconnect the fuel return line (1).

Connect the end of the line to a hose and insert this in a 0-2000 ml measuring cylinder.

Shunt terminals (3) and (5) of the fuel pump relay (located in the engine fuse box). With a power supply of 12 volts, the pump flow should be a minimum of 1.3 litres in a period of 1 minute.

If the flow is low, check the pump feed voltage (a drop of approximately 10 % is caused for a drop in voltage of 1 volt).

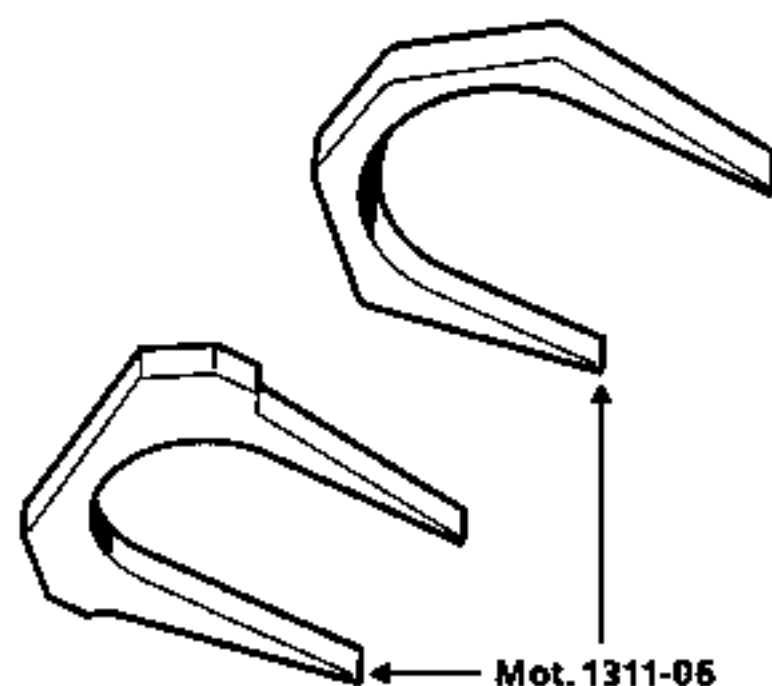
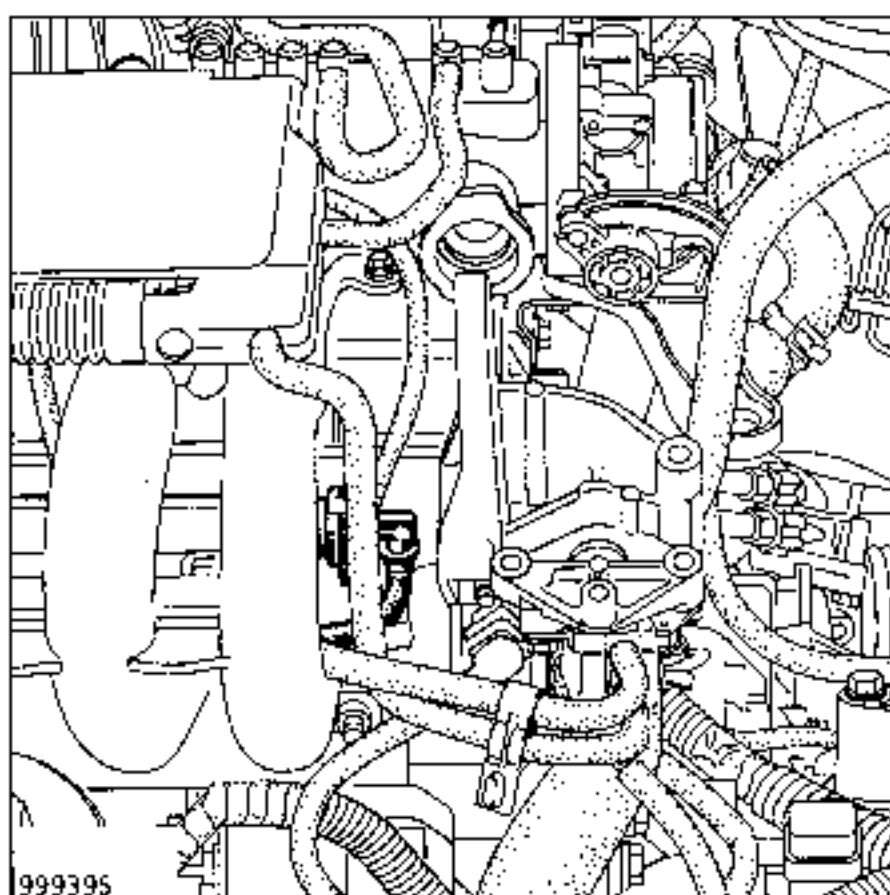
CHECKING THE FUEL SUPPLY PRESSURE

ESSENTIAL SPECIAL TOOLING

Mot. 1311-01	Fuel pressure test kit (with 0 + 10 bars pressure gauge included)
Mot. 1311-05	T piece (K union)
Mot. 1311-06	Tool for removing fuel lines

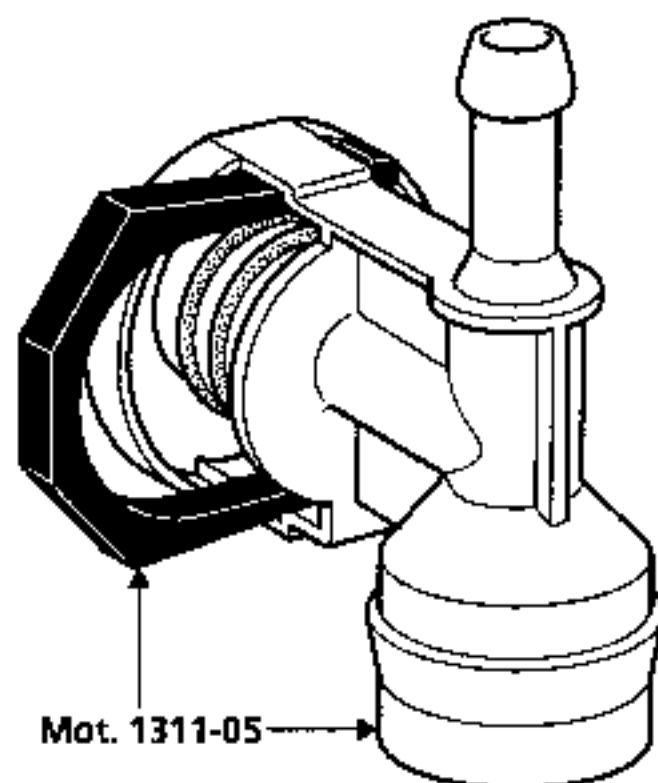
Disconnect :

- the fuel supply line using **Mot. 1311-06** with a large cross section (method described in section 13 "injection gallery").



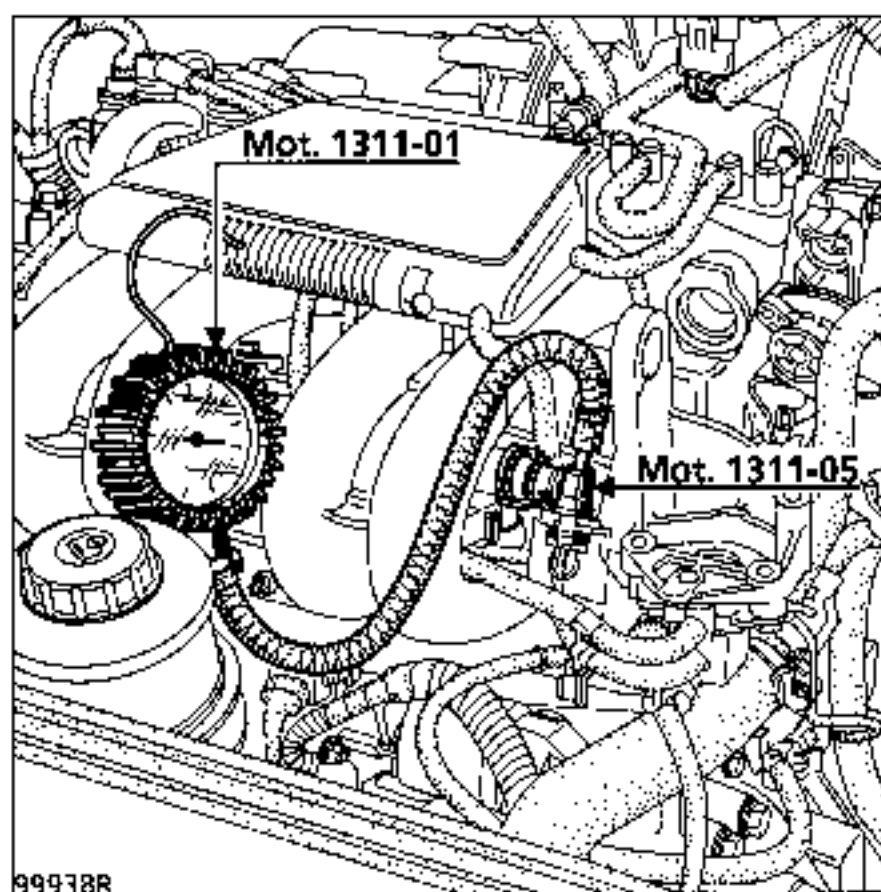
99375R

Connect the T piece **Mot. 1311-05** to the gallery, then reconnect the fuel supply line to the T piece.



99934R1

Fit the 0 - 10 bar pressure gauge and the hose
Mot. 1311-01.



Shunt terminals (3) and (5) on the fuel pump relay
located in the engine fuse box .

The pressure should be $3 \text{ bar} \pm 0.2$.

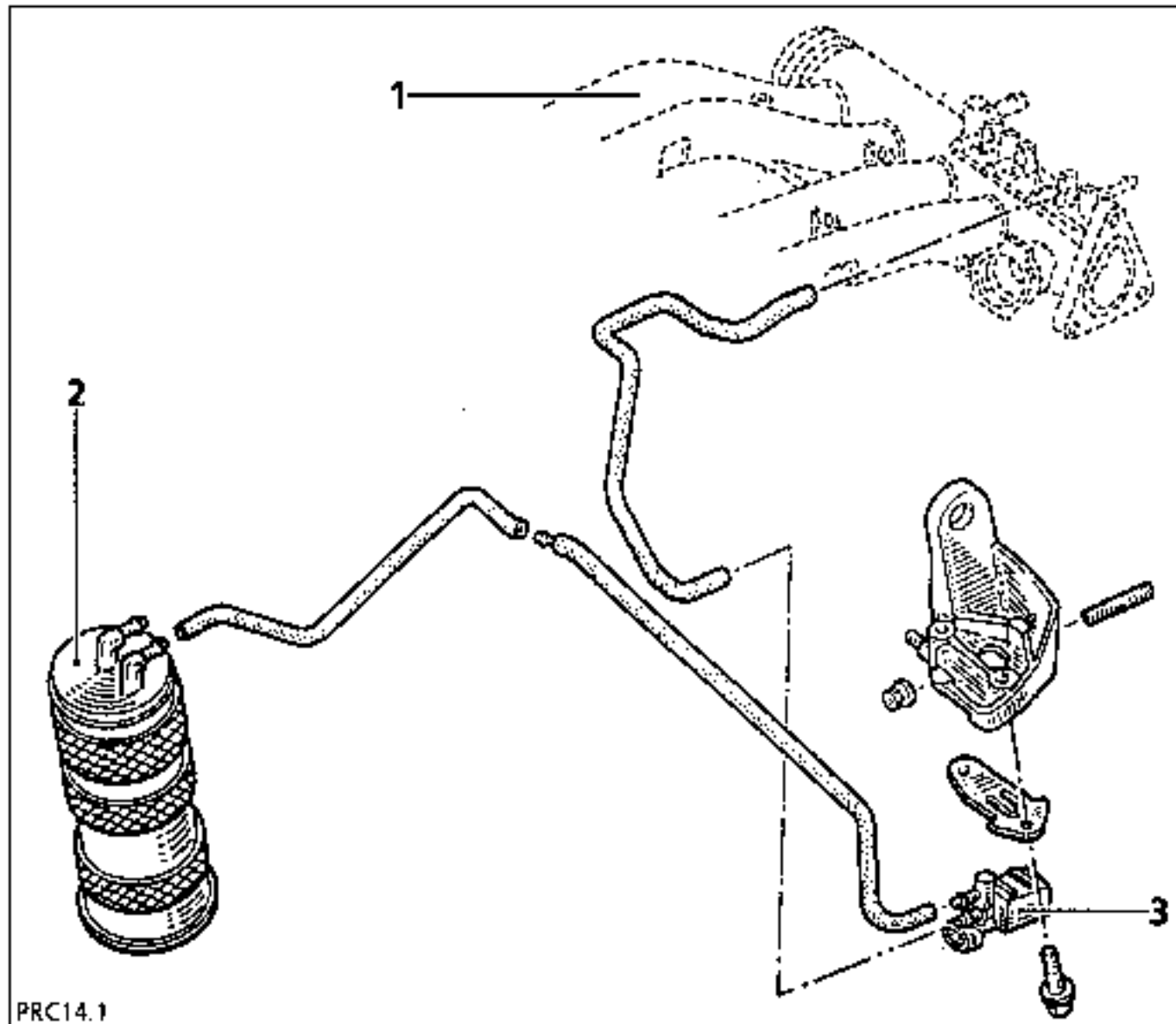
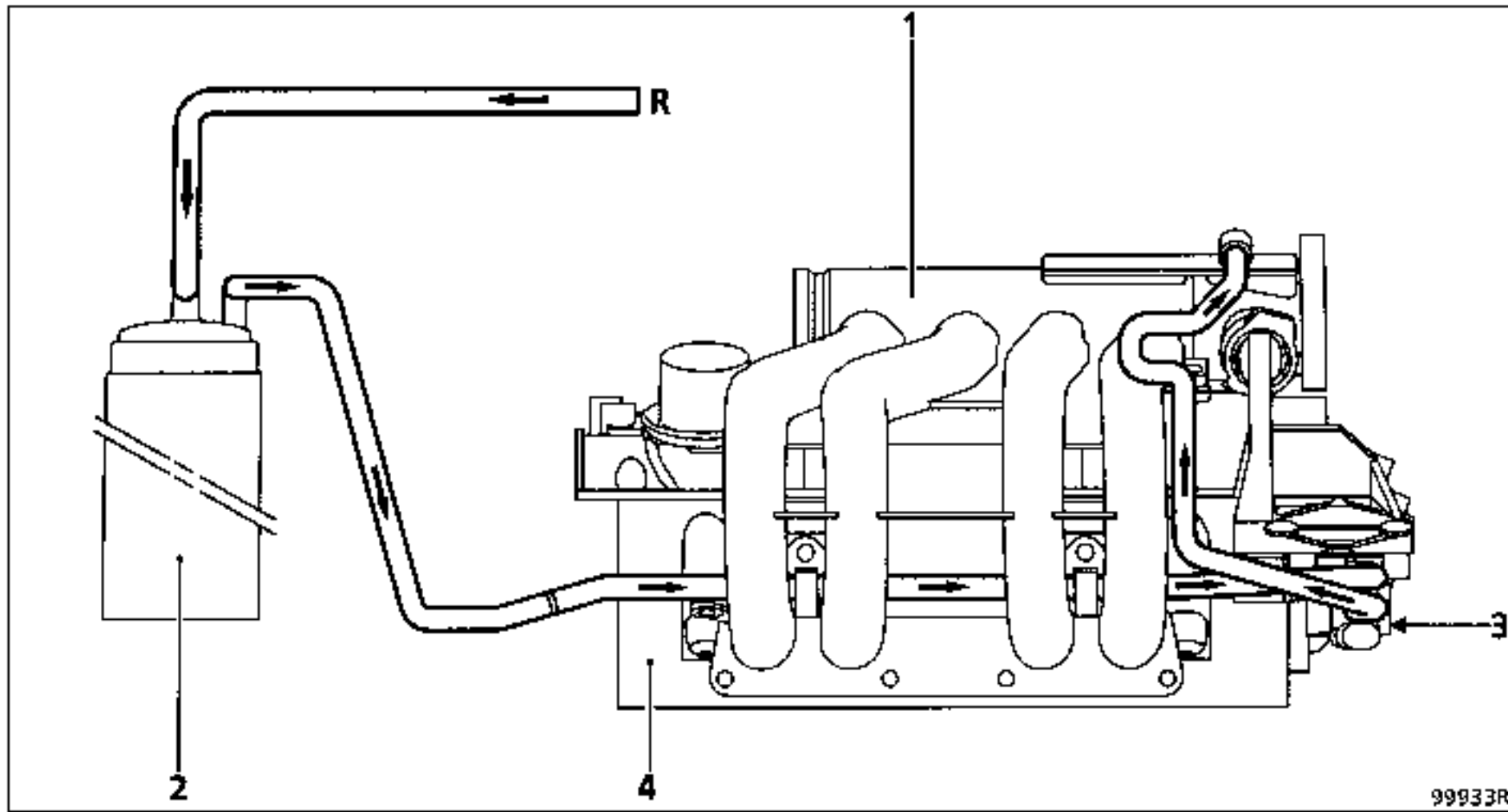
When a vacuum of 500 mbars is applied to the
pressure regulator, the fuel pressure should be $2.5 \text{ bar} \pm 0.2$.

CHECKING THE PUMP SAFETY VALVE (under the
same conditions as previously)

Shunt terminals (3) and (5) of the fuel pump relay.

When the fuel return pipe is clamped briefly, the
pressure should stabilise between 4.5 and 7.5 bar.

CIRCUIT OPERATIONAL DIAGRAM



OPERATING PRINCIPLE

The fuel tank is vented via the petrol vapour absorber (canister).

Fuel vapour is retained by the active carbon in the absorber (canister).

So that the fuel vapour contained in the canister does not evaporate into the atmosphere when the fuel tank is opened, a valve isolates the canister from the fuel tank when the fuel filler cap is removed.

The fuel vapour contained in the canister is eliminated and burnt by the engine.

To do this, a pipe connects the canister and the inlet manifold. A solenoid valve is located on this pipe to control bleeding of the canister.

The operating principle for the solenoid valve is to give a variable passage diameter (depending on an RCO signal from the injection computer).

The variation in the selection of passage diameter for the fuel vapour in the solenoid valve results from the balance between a magnetic field created by the feed to the coil and the force of a return spring ensuring the valve remains closed.

CONDITIONS FOR CANISTER BLEEDING

- During richness regulation
- Coolant temperature greater than : + 20 °C
- Air temperature greater than : + 20 °C
- "No load" position not recognised (if the throttle position sensor is faulty, the non-recognition of the no load condition is replaced by an engine speed condition $R > 1500 \text{ rpm}$).

If the oxygen sensor is faulty, the canister is bled when there is no load.

The cyclical opening ratio for the canister bleed solenoid valve may be seen using the XR25 and #23. The solenoid is closed for #23 = 0 %.

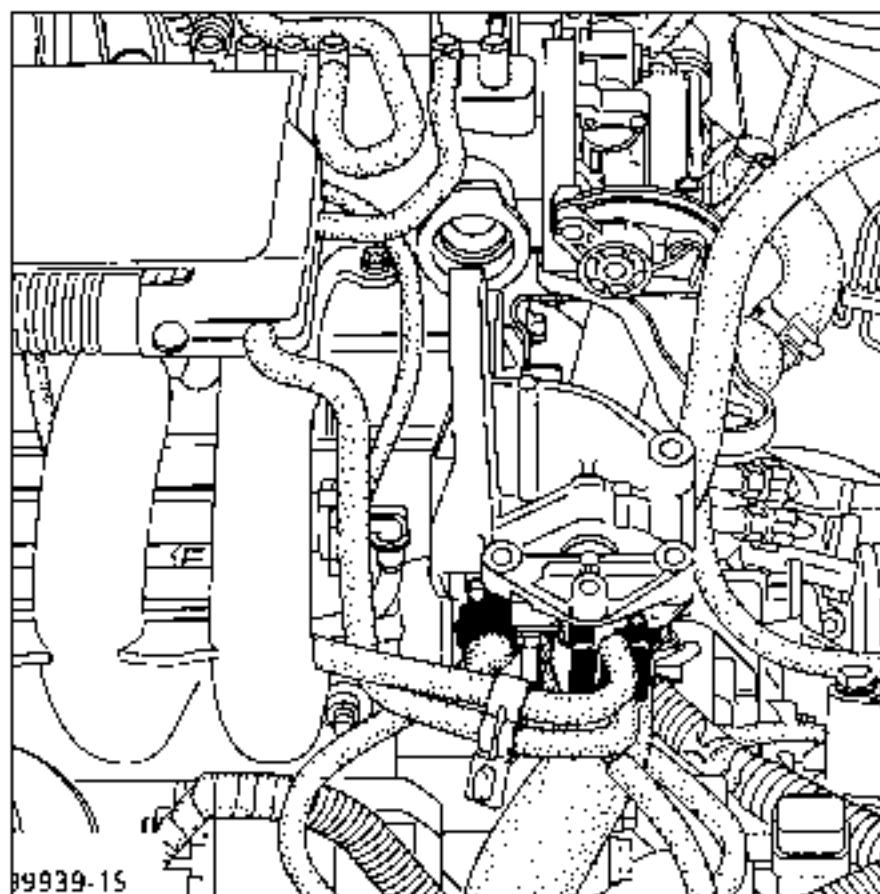
If bargraph 7 right is illuminated at idling speed. This does not mean that the canister purge solenoid valve is controlled.

To establish when the solenoid valve is controlled, verify the value output by the XR25 at #23.

LOCATION - REMOVING

CANISTER BLEED SOLENOID VALVE

It is secured at the front on the lifting lug.



PETROL VAPOUR ABSORBER

It is located at the front of the vehicle.

REMOVING

Disconnect :

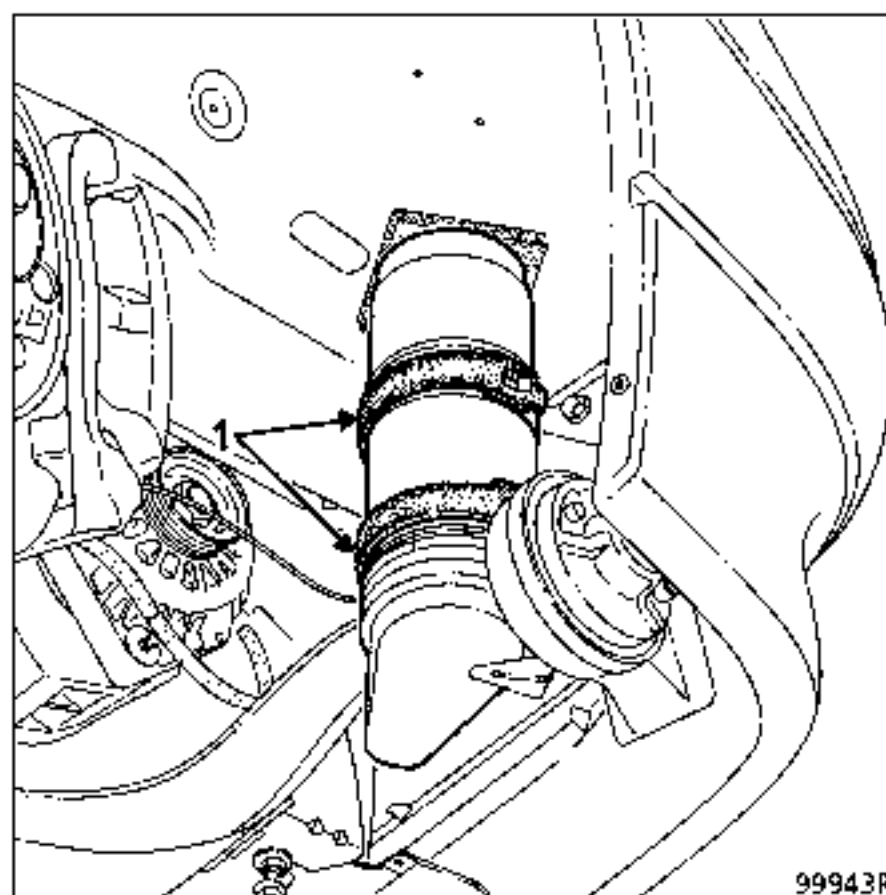
- the pipe connected to the fuel tank
- the pipe connected to the solenoid valve.

From under the vehicle:

Remove :

- wing protective fitting,
- the two elastic straps (1).

Take out the canister.



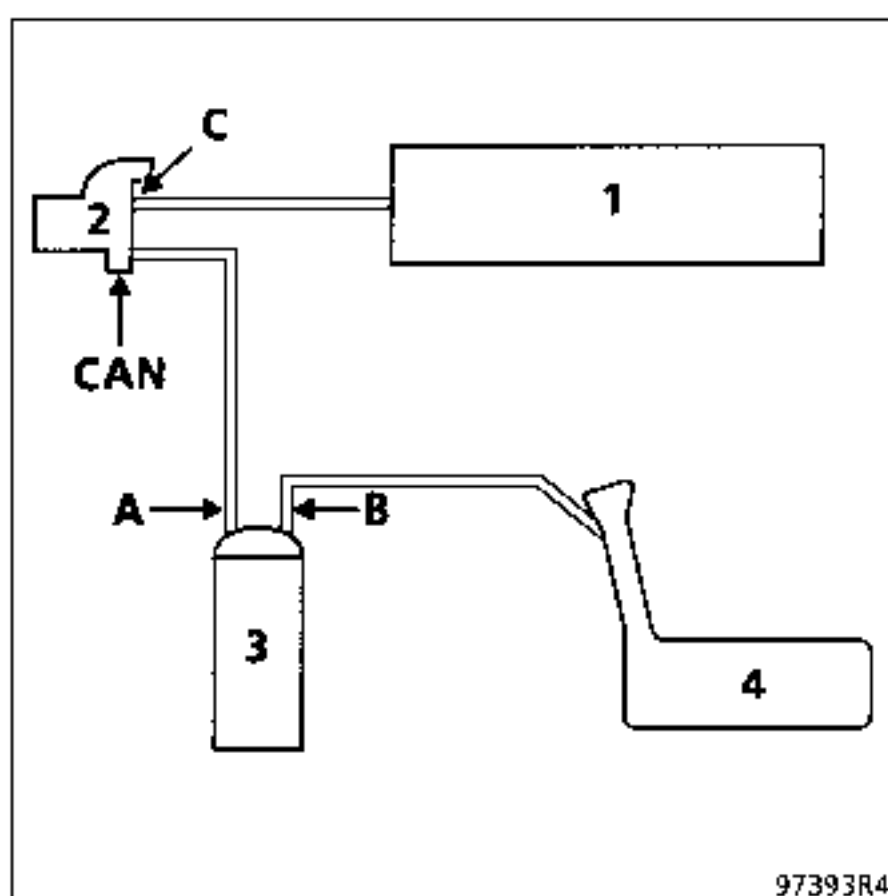
CHECKING THE OPERATION OF THE CANISTER BLEED VALVE

A malfunction in the system could cause the idle speed to be unstable or the engine to stall.

Check that the circuit is to specification (see diagrams).

Take care to check that the pipe marked "CAN" on the solenoid valve is connected to the canister.

Check the condition of the pipes up to the fuel tank.



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

At idle speed, check by connecting a pressure gauge (-3 ; +3 bars) (Mot. 1311-01) to the "CAN" outlet on the solenoid valve that there is no vacuum (in the same manner, check the command value read by the XR25 using #23 remains at a minimum X = 0 %).

Is there a vacuum ?

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

Does the pressure vary?

YES The solenoid valve is faulty, renew it. Air must also be blown into the pipe connecting the solenoid valve to the canister to eliminate any particles of active carbon.

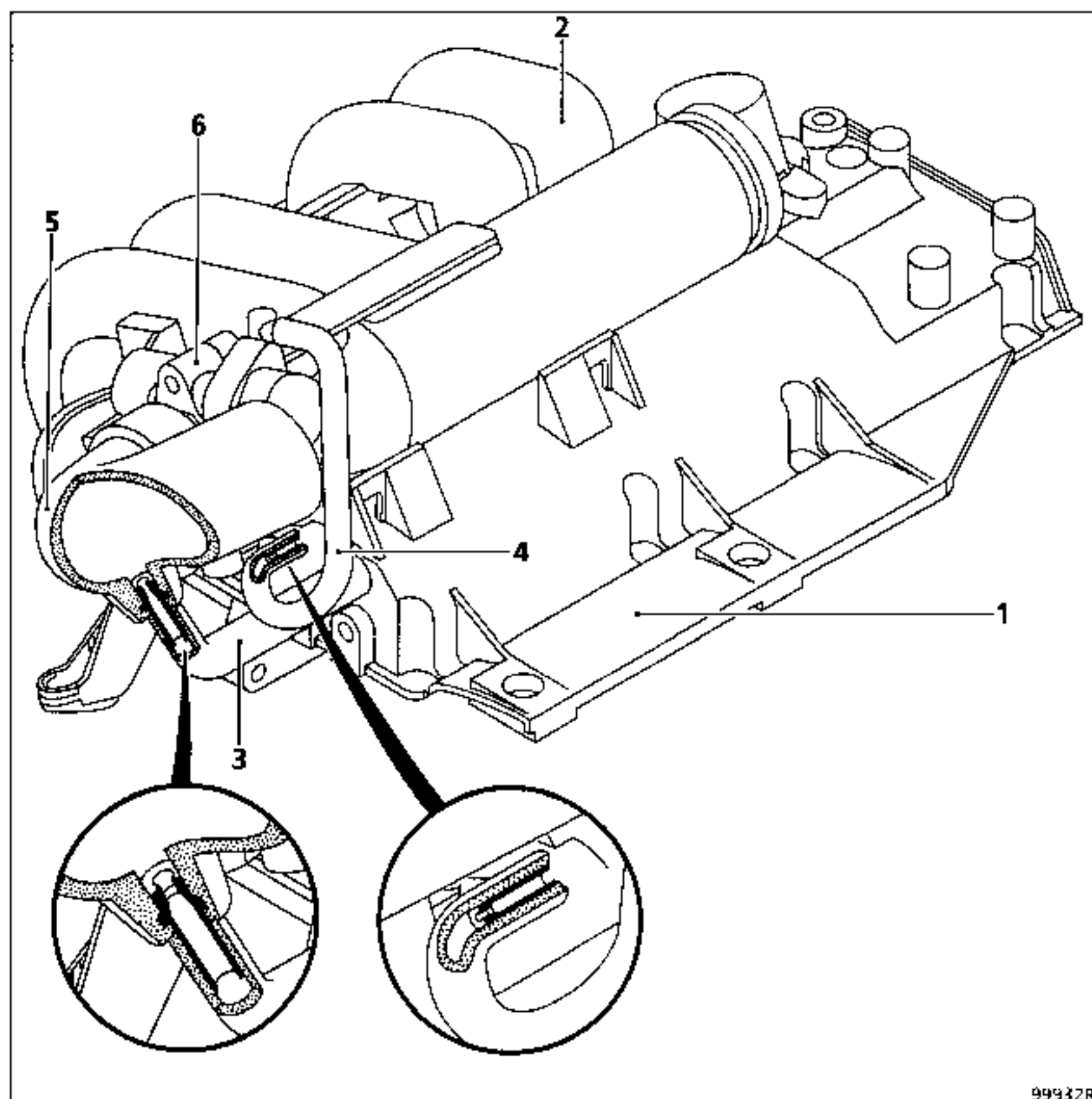
NO There is an electrical fault - check the circuit.

NO Under bleeding conditions (engine not at idling speed, engine warm), there should be an increase in the vacuum (at the same time, the value for #23 on the XR25 should increase).

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

As soon as the filler cap is replaced, however, the vacuum should disappear quickly as the pipe is no longer blocked and the internal degassing chambers in the fuel tank are connected

DIAGRAM OF THE CIRCUIT

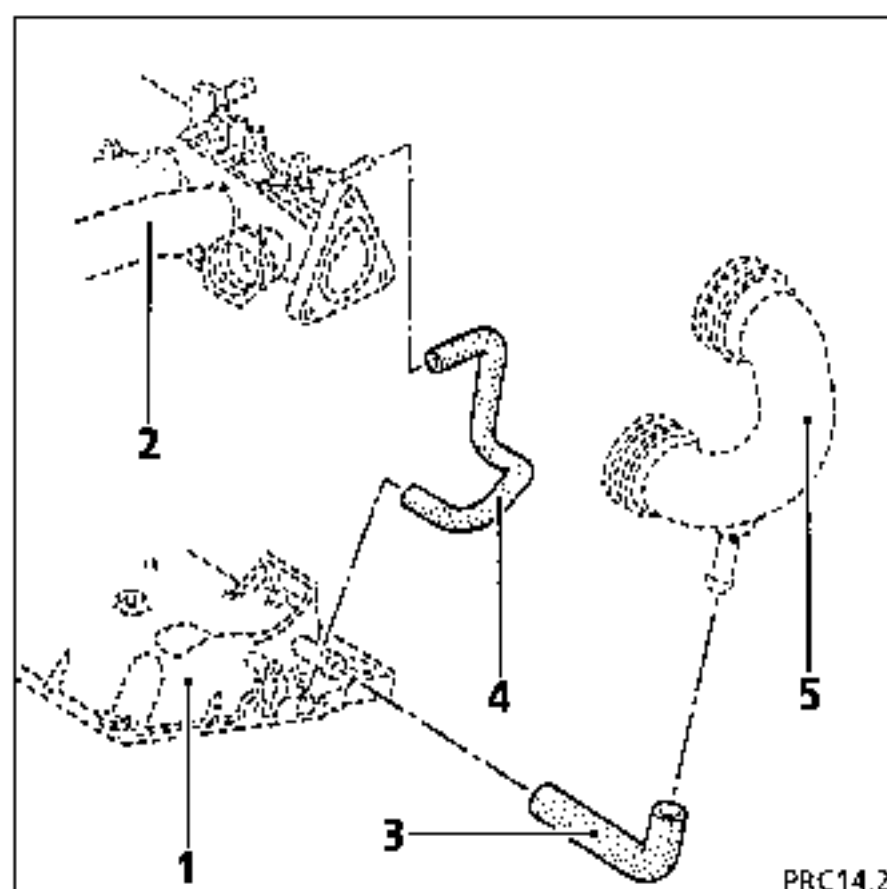


99932R

- 1 Cylinder head cover
- 2 Manifold
- 3 Oil vapour rebreathing pipe connected upstream of the throttle body (the circuit is used for average and high loads)
- 4 Oil vapour rebreathing pipe connected downstream of the throttle body
- 5 Air duct
- 6 Throttle body

CHECKING

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



CHECKS TO BE MADE BEFORE THE ANTIPOLLUTION TEST

Ensure :

- the ignition system is operating correctly (correct spark plugs, correctly set plug gap, high voltage leads in good condition and correctly connected),
- the injection system is operating correctly (supply is correct - check using the XR25),
- the exhaust pipe is correct and is sealed.

Check the vehicle history if possible (run out of fuel, lack of power, use of incorrect fuel).

CHECKING ANTIPOLLUTION SYSTEMS

Run the engine until the engine cooling fan has operated twice.

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

Keep the engine speed at 2500 rpm for approximately 30 seconds and then let the engine return to idle speed and note the pollutant values:

CO \leq 0.3 %
CO₂ \geq 14.5 %
HC \leq 100 ppm
0.97 \leq λ \leq 1.03

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

$\lambda > 1 \rightarrow$ lean mixture

$\lambda < 1 \rightarrow$ rich mixture

If, after these tests, the values are correct, the antipollution system is correct.

If the values are not correct, additional tests must be carried out.

Check:

- the condition of the engine (condition of the oil, valve clearances, timing, etc.),
- check the correct operation of the oxygen sensor (see section 17),
- test for the presence of lead (see following page).

If the test for the presence of lead is positive, ensure the vehicle uses two or three full tanks of unleaded fuel before replacing the oxygen sensor.

If, after all these tests have been carried out, the values still do not conform, the catalytic converter must be replaced.

ANTI POLLUTION

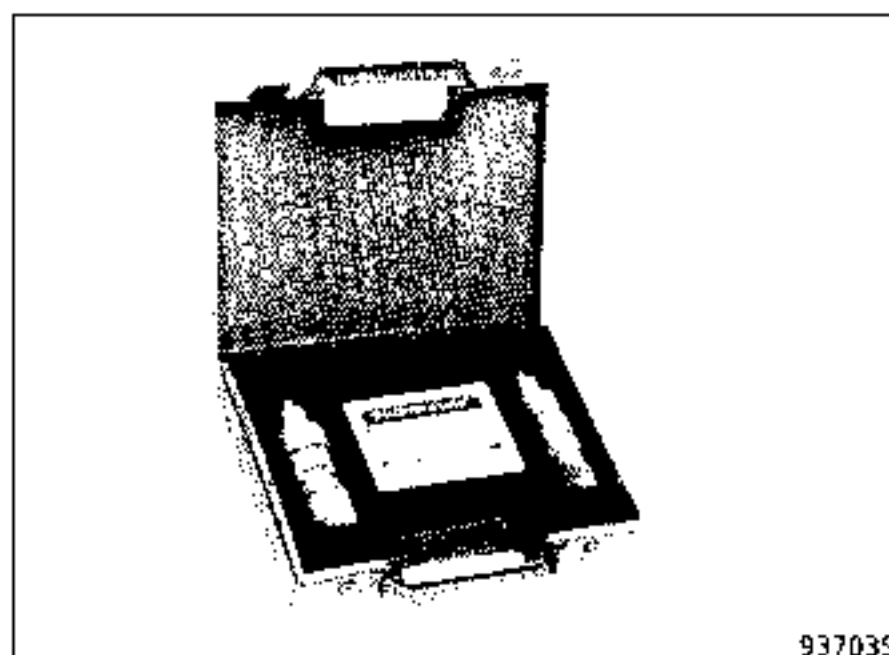
Test for the presence of lead

14

This test is only possible using the Nauder lead test kit.

To obtain a test kit, contact your After Sales Head Office :

Part numbers : - For the complete kit: **T900**
 - For a set of 40 test papers: **T900/1**



937035

METHOD

Detecting lead at the exhaust

- a - Conditions for the test :**
 - Engine not running.
 - Exhaust pipe warm but not burning.
 - Do not perform the test if the temperature is below 0 °C.
- b - If necessary, use a dry cloth to clean the inside of the exhaust pipe to remove soot deposits.**
- c - Wearing gloves, moisten a test paper slightly with distilled water (if the paper becomes too wet, it will lose its efficiency).**
- d - Apply the moistened test paper to the cleaned section of the exhaust pipe and hold it there with slight pressure for approximately one minute.**
- e - Remove the test paper and leave it to dry. If lead is present, the paper will be a red or pinkish colour.**

ATTENTION : The test for lead should be carried out on the exhaust tail pipe. It should never be carried out on the oxygen sensor.

IDENTIFICATION

Vehicle	Engine	Alternator	Current
057K 057Y	D7F	CS 130 D	75 A

CHECKING

After 15 minutes warming up with a voltage of 13.5 volts.

rpm	75 amps
1300	28 A
2000	40 A
2700	60 A

ESSENTIAL SPECIAL TOOLING

Mot. 1273	Tool for testing belt tension
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REMOVING

Put the vehicle on a 2-post lift.

Disconnect the battery.

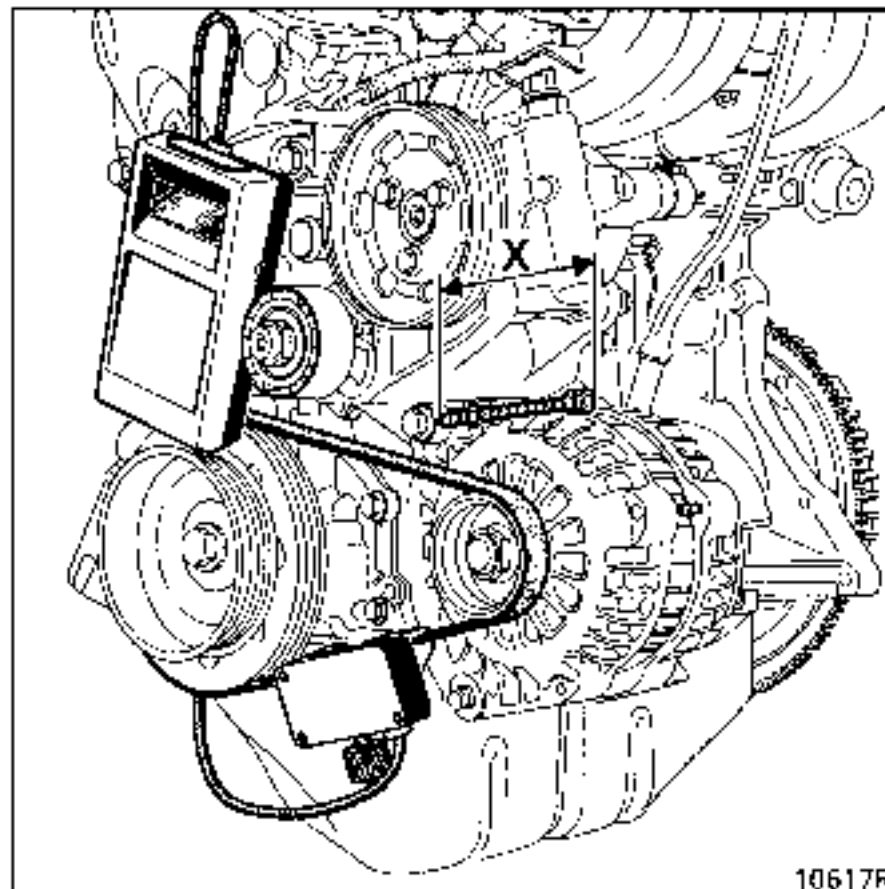
Remove :

- the bonnet,
- the belts for the power-assisted steering pump (if fitted) and the alternator,
- the alternator electrical connections,
- the alternator.

REFITTING (Special point)

Refit in reverse order to removal.

The alternator belt is tensioned using a locally manufactured tool as shown below (100 mm long threaded spindle (X) and three M6 nuts).



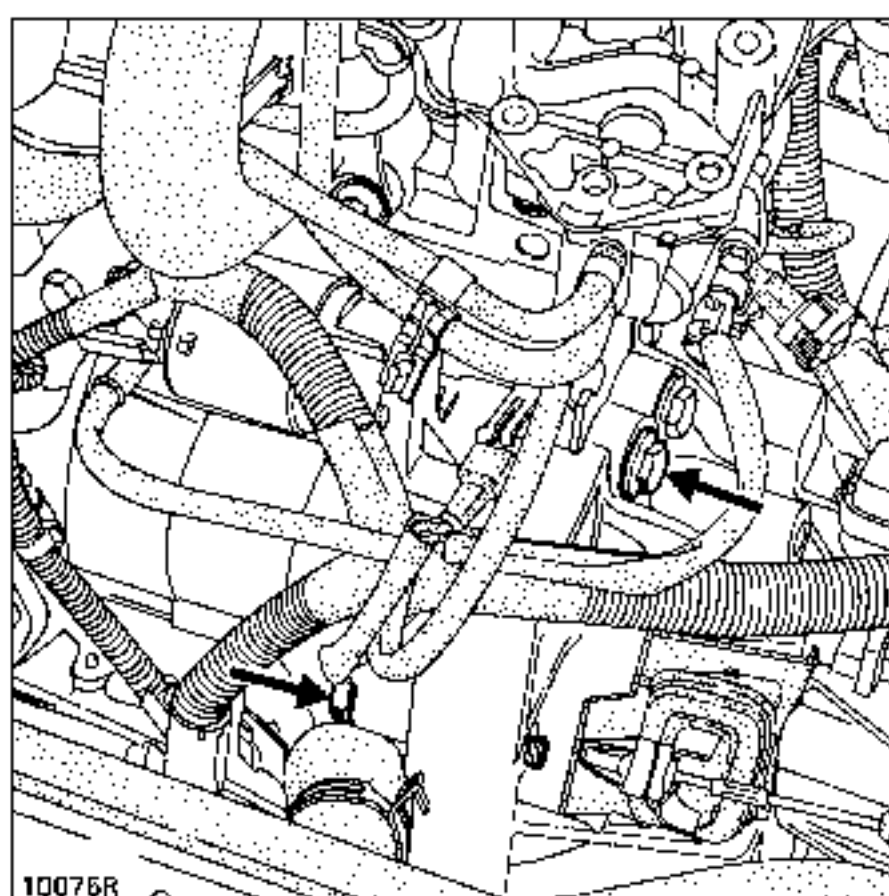
Refer to chapter 07, auxiliaries belt tension for information on the tensioning values for the power-assisted steering pump belt (if fitted) and the alternator belt.

Vehicle	Engine	Starter
057K 057Y	D7F	VALEO D7E1

REMOVING

With the vehicle on a lift, disconnect the battery.

Disconnect the alternator electrical connections.



Remove the two alternator mounting bolts.

REFITTING

Refit in reverse order to removal.

The differences between static ignition with two coils and distributed ignition are :

- the high voltage distributor is no longer used,
- two dual output coils are used.

PRESENTATION

The system consists of :

- the injection computer (the ignition power stage is integrated into the computer),
- two dual output coils (they are moulded into a single piece),
- four spark plugs,
- an anti-interference capacitor.

DESCRIPTION - OPERATING PRINCIPLE

COMPUTER

The injection computer (120), depending on the information received from various sensors, but principally depending on the engine speed and load, determines:

- the number of degrees of advance to be used and consequently the ignition point,
- which cylinders are at TDC and consequently the ignition coil to be operated.

The spark is created at the two cylinders at TDC by cutting the earth to the coil concerned.

THE COILS

There are two coils. They are of the dual output type (they cannot be separated).

They are controlled separately by the computer.

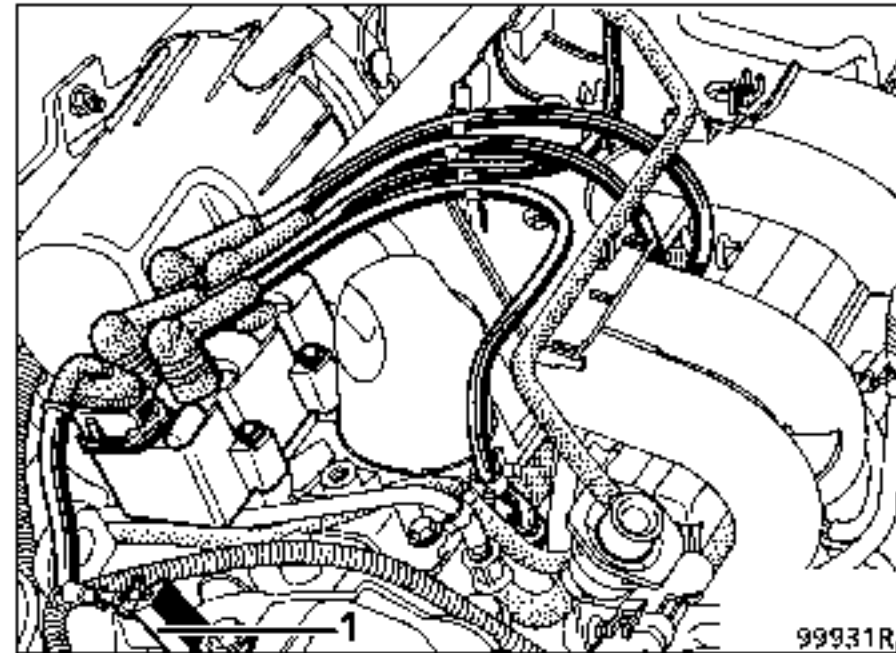
They create two sparks at the same time.

They are on the plugs.

The coil of cylinders 1 and 4 is controlled by track 35 of the injection computer.

The coil of cylinders 2 and 3 is controlled by track 17 of the injection computer.

The two coils are connected to an anti-interference capacitor (1).



Electric connector

Tracks	Description
1	Coil control of cylinders 1-4
2	Coil control of cylinders 3-2
3	- after ignition
4	+ anti-interference capacitor

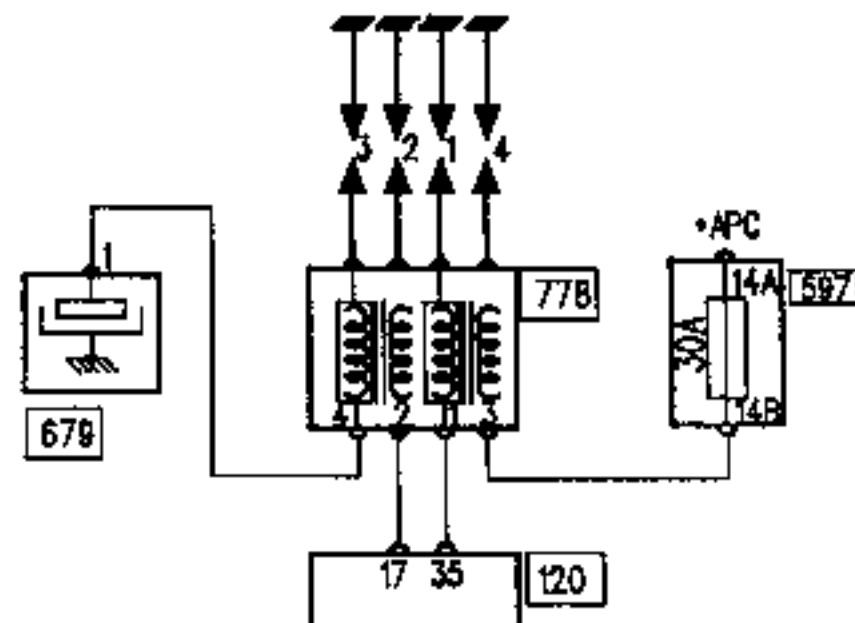
Coil connector track identification

Track no. 1 of the coil is on the scuttle side.

Information on HT lead assignment is engraved next to the coil mounting screws.

Test to be made between tracks	Resistance
1 - 2	2 Ω
1 - 3	1.6 Ω
1 - 4	1.6 Ω
2 - 3	1.6 Ω
2 - 4	1.6 Ω
3 - 4	1.1 Ω
HT - HT	7.2 k Ω

OPERATIONAL WIRING DIAGRAM



PRC10064

KEY TO COMPONENTS

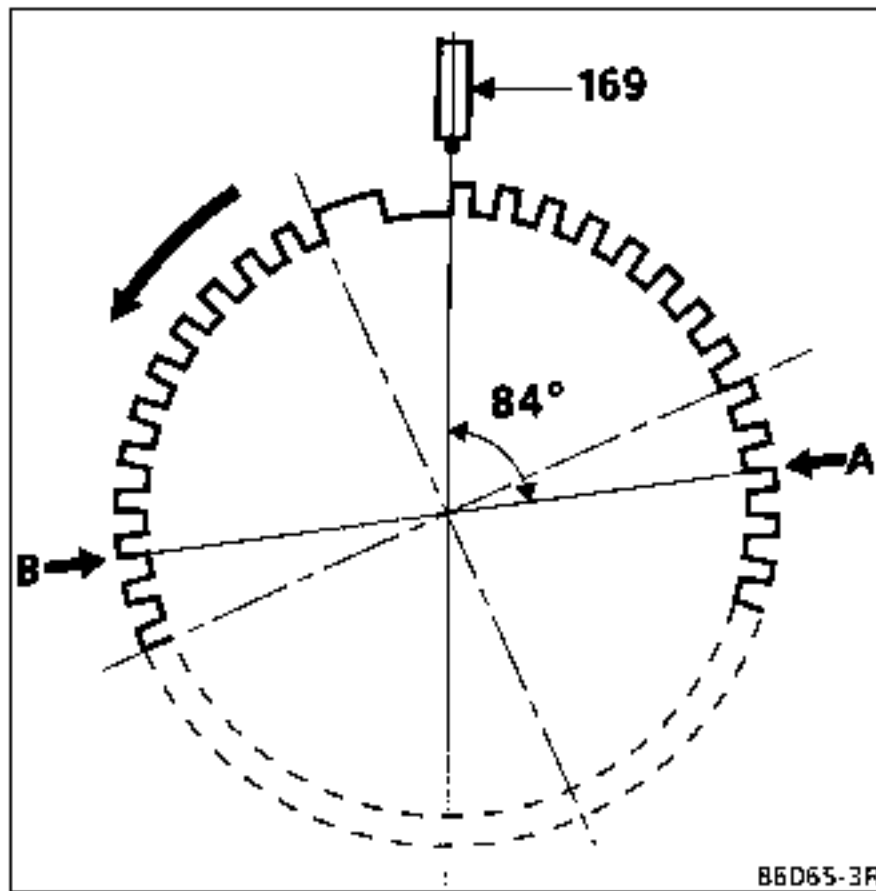
- 120 Injection computer
- 597 Engine fuse box
- 679 Radio anti-interference capacitor
- 778 Double coils with four outputs

APC = AFTER IGNITION

SPECIAL NOTES ON THE FLYWHEEL

Description

The flywheel has 60 regularly spaced teeth. Two teeth have been removed to create a fixed marker gap at 84° or 14 teeth before TDC for cylinders 1 and 4. There are therefore in fact only 58 teeth.



Cylinders 1 and 4 are at TDC when the arrow (A) passes in front of the engine speed sensor (169).

Cylinders 2 and 3 are at TDC when the arrow (B) passes in front of the engine speed sensor (169).

Operating principle

The computer knows that TDC for cylinders 1 and 4 is located on the rising edge of the 15th tooth after the fixed gap. Consequently, depending on the amount of advance to be used, the computer knows exactly where to locate the ignition point by counting the number of teeth.

TDC for cylinders 2 and 3 is located on the rising edge of the 4th tooth after the fixed gap.

NOTE : Advance correction depending on the signal from the pinking sensor is dealt with in section 17 injection.

Cylinder 1 is at the flywheel end.

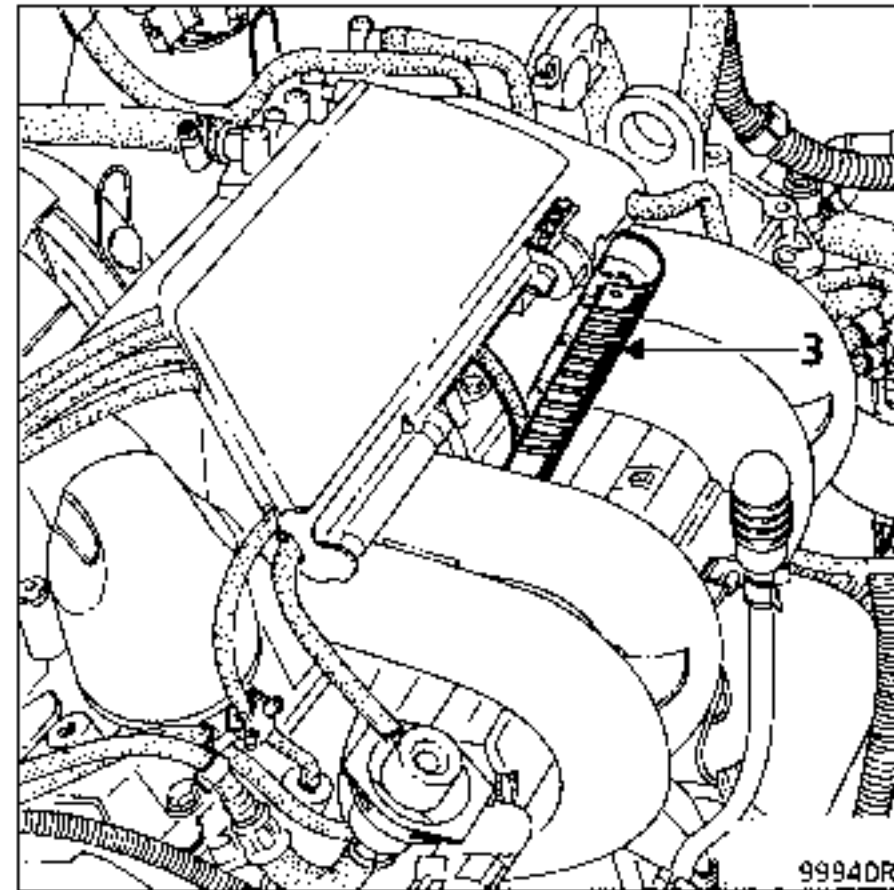
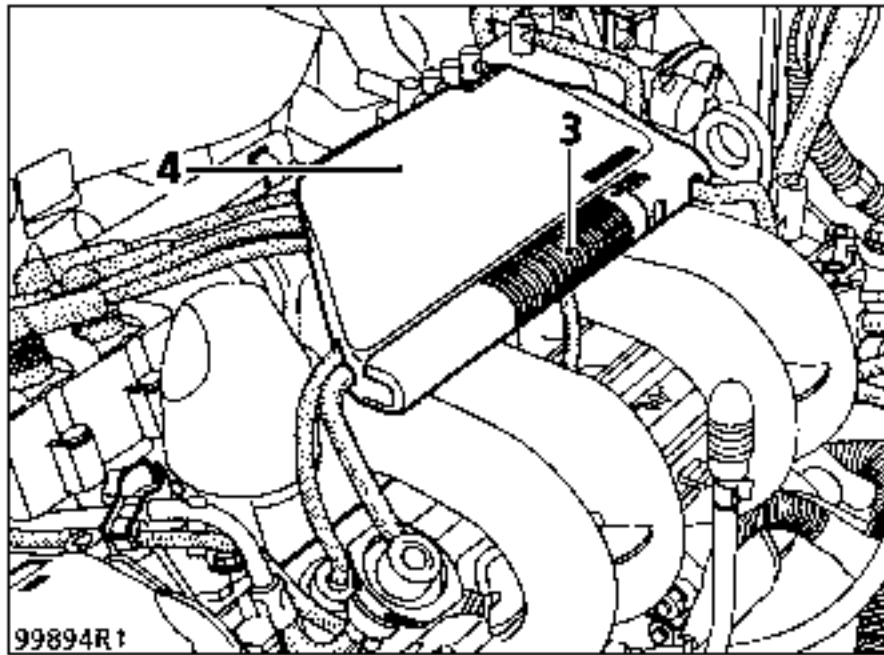
IGNITION

Spark plugs

17

Engine	Make	Type
D7F	EYQUEM	FN 52 LS
Flat base with seal		
Gap: 0.9 mm		
Tightening torque: 2.5 to 3 daN.m		

To disconnect the spark plug cables, use tool (3) integrated in the plastic protector (4) on the cylinder head.

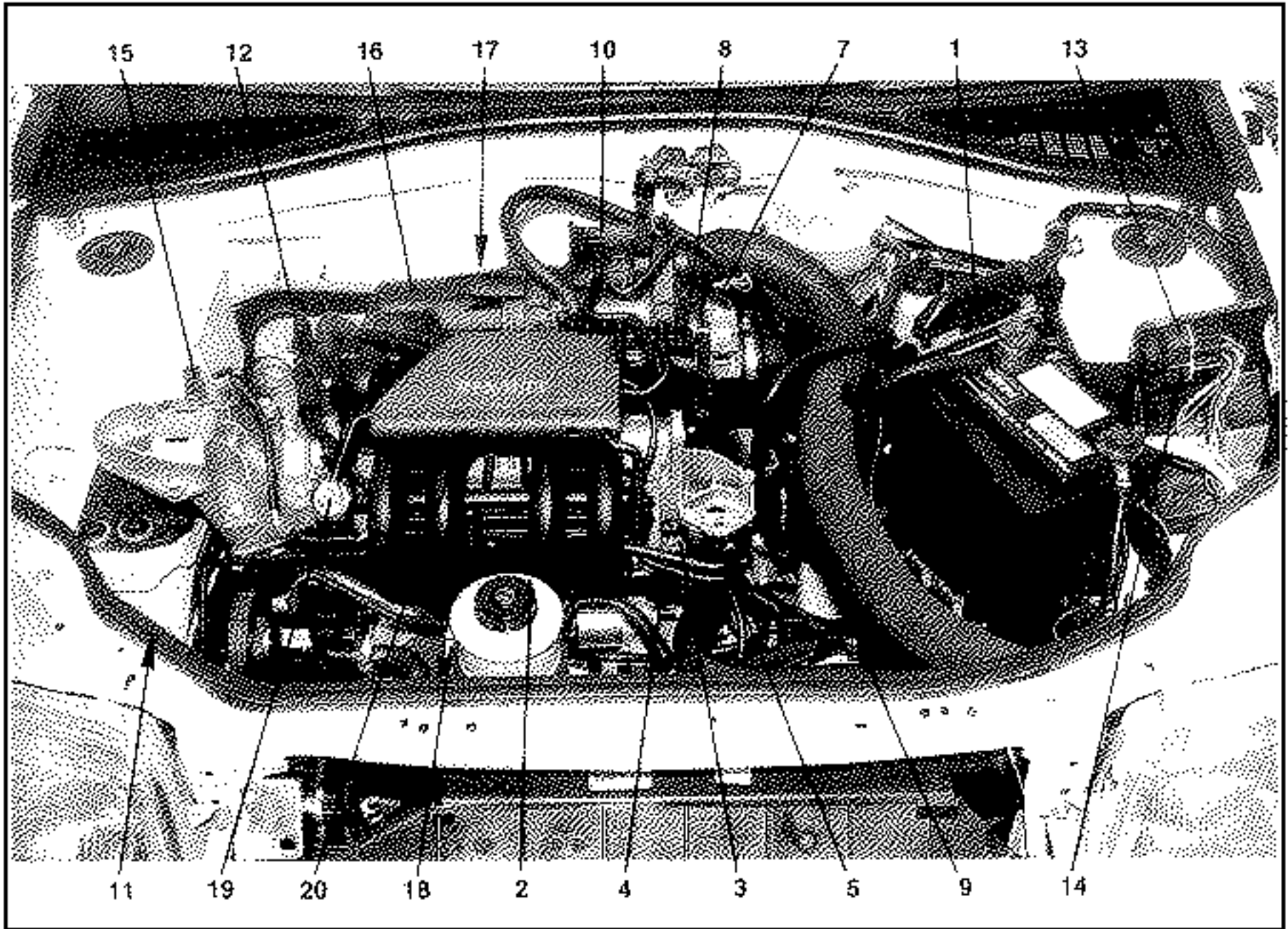


SPECIAL NOTES ON MULTIPPOINT INJECTION

- 35-track computer, make SAGEM and type SAFIR.
- Semi-sequential multipoint injection. Injector control in groups of two (injectors for cylinders 1 and 4 then injectors for cylinders 2 and 3).
- Static ignition with two coils.
- Canister bleed solenoid controlled by RCO signal.
- Computer configuration depending on gearbox type (manual or automatic).
- Idle speed correction depending on:
 - the power-assisted steering pressostat,
 - the battery voltage.
- Injection warning light on instrument panel not operational.
- Use fault finding fiche no. 27.

FITTING A SECOND GENERATION ENGINE IMMOBILISER REQUIRES A SPECIAL PROCEDURE FOR REPLACING THE COMPUTER.

IMPLANTATION DES ELEMENTS



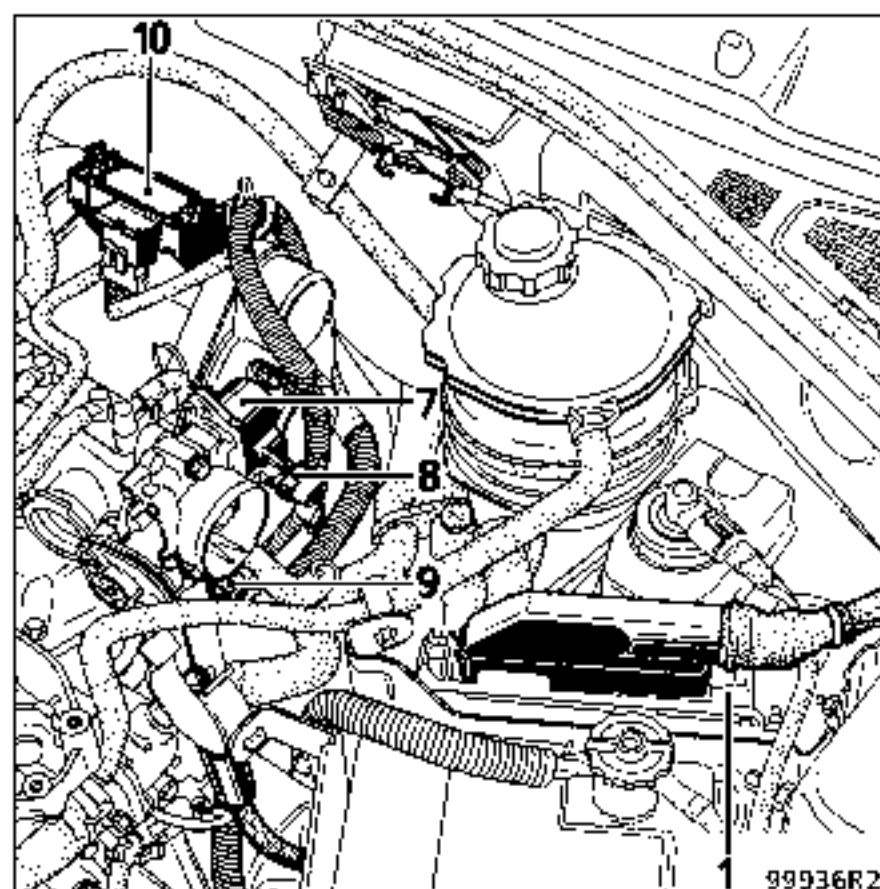
- 1 Calculateur d'injection
- 2 Capteur de cliquetis
- 3 Capteur de température d'eau
- 4 Capteur de point mort haut
- 5 Electrovanne de recyclage des vapeurs de carburant
- 7 Moteur pas à pas de régulation de ralenti
- 8 Potentiomètre de position papillon
- 9 Capteur de température d'air
- 10 Capteur de pression absolue
- 11 Absorbeur des vapeurs d'essence (canister)
- 12 Bobine
- 13 Relais de verrouillage
- 14 Relais pompe à carburant
- 15 Condensateur antiparasitage
- 16 Filtre à air
- 17 Sonde à oxygène
- 18 Pressostat de direction assistée
- 19 Régulateur de pression
- 20 Outil pour dépose des fils de bougie

INJECTION

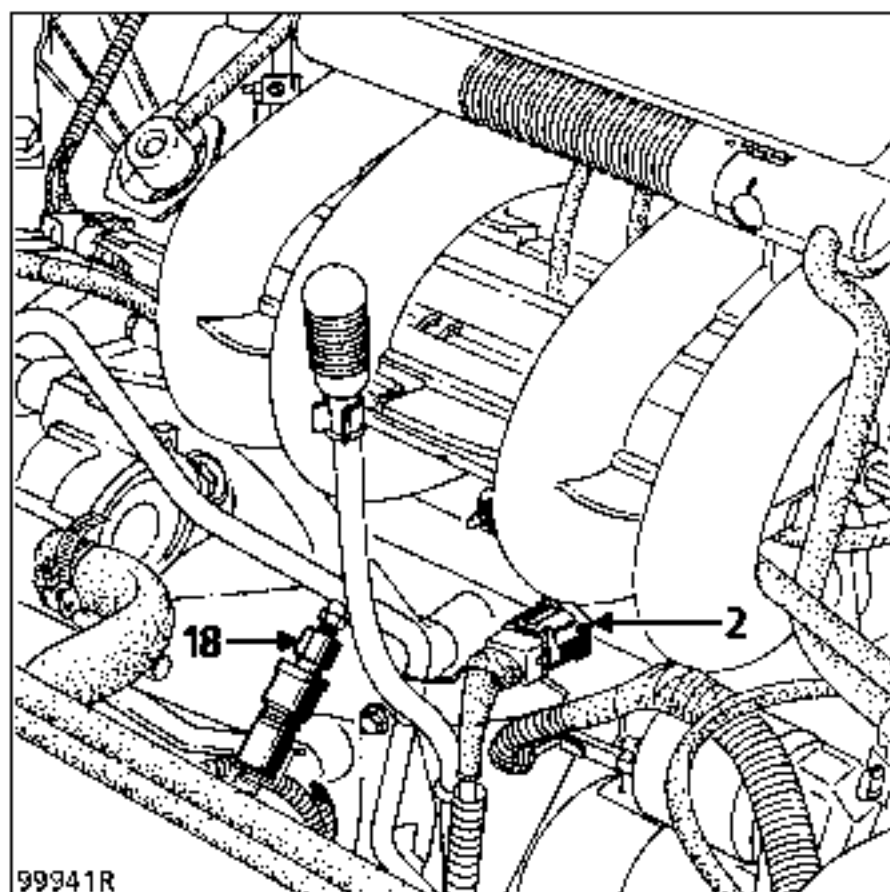
Location of components

17

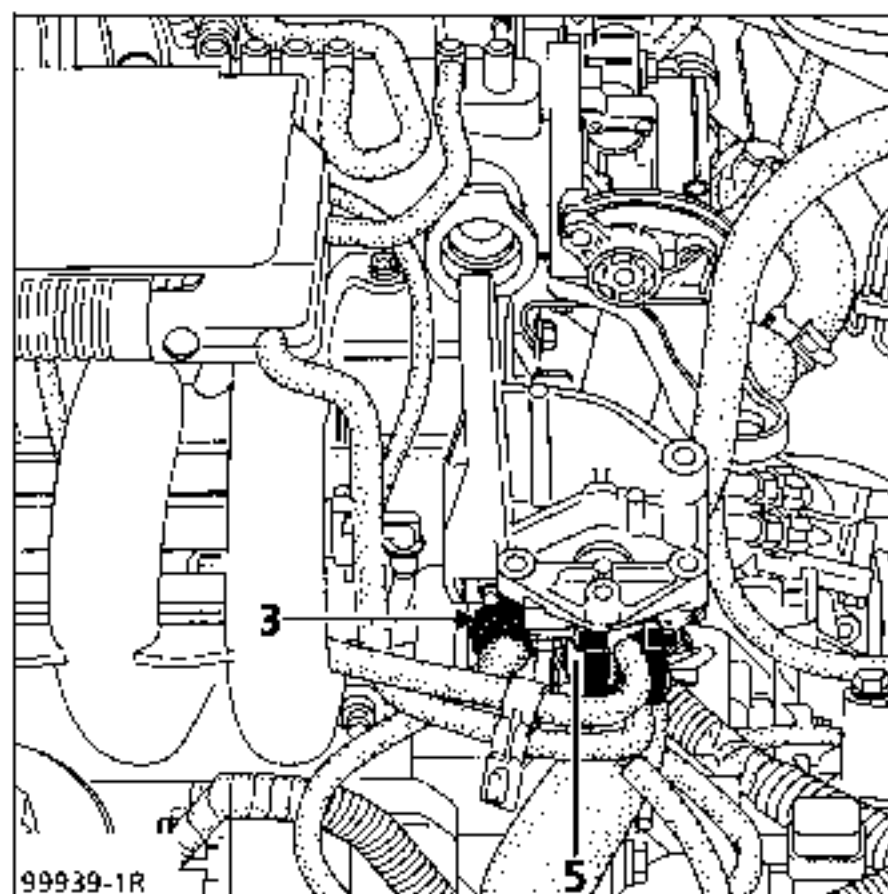
- 1 Injection computer
- 7 Idling speed regulation stepping motor
- 8 Throttle position potentiometer
- 9 Air temperature sensor
- 10 Absolute pressure sensor



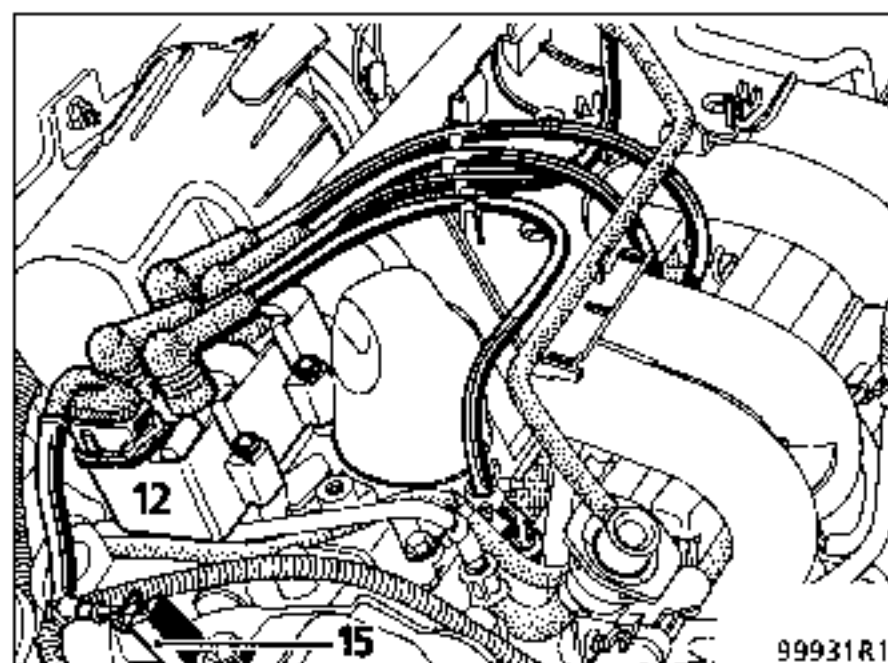
- 2 Pinking sensor
(tightening torque: 2.5 daN.m)
- 18 Power-assisted steering pressostat



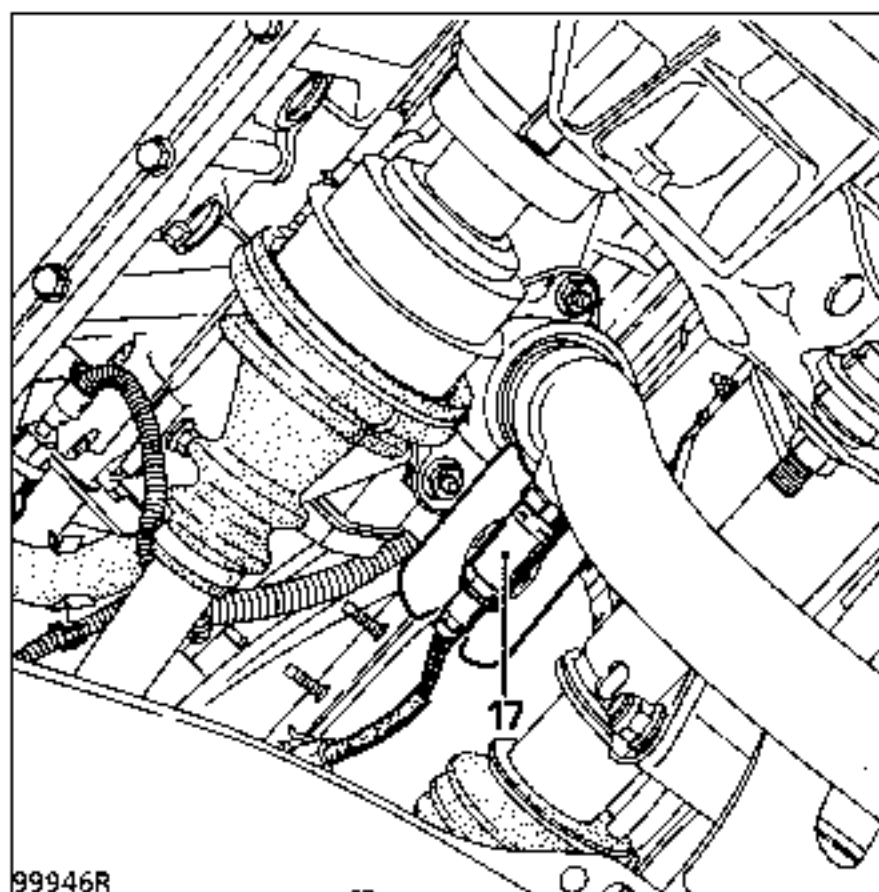
- 3 Coolant temperature sensor
- 5 Fuel vapour recirculation solenoid valve



- 12 Coil
- 15 Anti-interference capacitor



- 17 Oxygen sensor
(tightening torque: 5 daN.m)



99946R

OPERATING PRINCIPLE

The engine is fitted with semi-sequential injection.

Injection of fuel is carried out simultaneously to cylinders 1 - 4 and cylinders 2 - 3.

To do this, the two pairs of injectors are connected to two injection computer tracks:

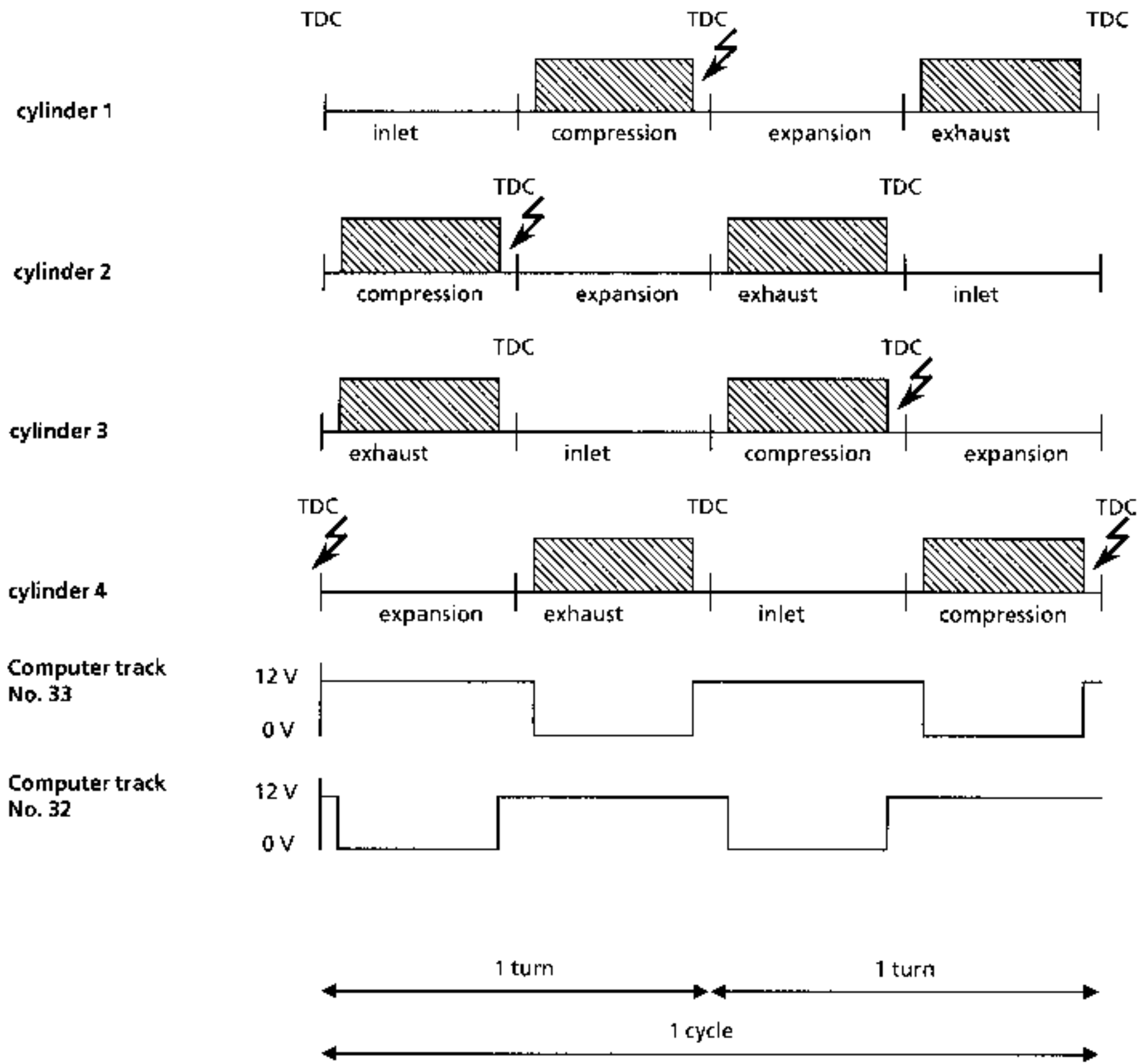
- the injectors for cylinders 1 and 4 are connected to computer track 33,
- the injectors for cylinders 2 and 3 are connected to computer track 32.

For each cylinder, there is one injection per revolution, i.e. two per engine cycle. These injections take place during the compression and exhaust phases.

The injection computer uses the same system as that used to control the ignition coils for determining when to control which injector. By analysing the signal from the flywheel, it knows the TDC point for cylinders 1 - 4 and cylinders 2 - 3 (see principle in section 17 "Ignition"). By counting the number of teeth, the engine phases preceding TDC may be determined.

INJECTION

Special notes on semi-sequential injection



⚡ ignition

 Fuel injection

PRINCIPLE FOR ILLUMINATION OF THE INJECTION FAULT WARNING LIGHT ON THE INSTRUMENT PANEL

- **Vehicle without engine immobiliser system**

When the ignition is turned on, the warning light illuminates for 3 seconds then extinguishes.

- **Vehicle with engine immobiliser system deactivated**

When the ignition is turned on, the warning light illuminates for 3 seconds and then extinguishes.

When the doors are unlocked, the red immobiliser warning light, which was previously flashing, extinguishes. When the ignition is turned on, it illuminates for 3 seconds then extinguishes.

- **Vehicle with engine immobiliser system activated**

When the ignition is turned on, the computer does not identify the code and the vehicle cannot be started. The injection warning light illuminates for 3 seconds and then extinguishes.

Before the ignition is turned on, the red immobiliser warning light flashes. When the ignition is turned on, this light flashes considerably faster.

If a fault in the immobiliser system is detected when the engine is running, the injection warning light will flash in the engine speed range from idle speed to approximately 1 500 rpm.

- **Fault with an injection system component**

A fault in an injection system component no longer causes a warning light to illuminate.

This vehicle is equipped with a second generation engine immobiliser system.

REPLACEMENT OF THE INJECTION COMPUTER

The computers are supplied uncoded but are capable of being programmed with a code.

When replacing the computer, the vehicle code must be programmed in and then check that the immobiliser system is operational.

To do this, carry out the following operations:

- **Vehicle equipped with PLIP engine immobiliser system**
 - Lock and unlock the doors using the PLIP.
 - Turn the ignition on for a few seconds.
 - Lock the doors using the PLIP, the immobiliser function is operational.

- **Vehicle fitted with a coded key engine immobiliser system**

Turn the ignition on for a few seconds and then turn it off again.

CHECKING THE IMMOBILISER FUNCTION

- **Vehicle equipped with a PLIP engine immobiliser system**
 - Turn the ignition off, lock the doors from inside the vehicle using the PLIP. The red immobiliser warning light should flash.
 - Turn the ignition on. The red immobiliser warning light should flash considerably faster.

- **Vehicle fitted with a coded key engine immobiliser system**

Remove the key from the ignition switch. After 10 seconds the red immobiliser warning light should flash.

TESTING AN UNCODED INJECTION COMPUTER FROM STOCK OR FROM A VEHICLE NOT FITTED WITH AN IMMOBILISER SYSTEM

To avoid coding the injection computer before the test, it is vital to cut the + 12 V before ignition feed to the immobiliser system. Remove the decoder fuse (door locking symbol). (For more details, refer to the technical note on the engine immobiliser.)

NOTE : If the injection computer has been coded by mistake, a method exists for decoding it. (Refer to the technical note on the engine immobiliser.)

SPECIAL NOTES

Using the XR25 it is possible to see if the injection computer is coded. The computer is uncoded if bargraph 2 right-hand side is illuminated and if *22 = 2 DEF

A CODED COMPUTER FITTED TO A VEHICLE WITH AN ENGINE IMMOBILISER MAY NOT BE USED FOR TESTING ANOTHER VEHICLE, REGARDLESS OF WHETHER THIS VEHICLE HAS AN ENGINE IMMOBILISER OR NOT.

CONFIGURING THE COMPUTER DEPENDING ON THE GEARBOX TYPE (MANUAL OR AUTOMATIC)

Each time the injection computer is replaced, the gearbox type for the vehicle must be programmed (manual or automatic). The computer is designed to operate with both these types of gearbox.

Procedure for configuring the computer :

Connect the XR25

ISO selector on 58

Turn on the ignition

Enter D13 then

For a vehicle fitted with a manual gearbox:

Enter G51*

For a vehicle fitted with an automatic transmission :

Enter G50*

The display shows:

def

if the configuration has not been programmed

bon

F in

then

10.nJ

once the configuration is complete

After programming the configuration, turn the ignition off to store it in the memory. Memorisation is effective after the ignition has been turned off, once the computer has left the monitoring mode.

The monitoring mode varies from 30 seconds to 13 minutes.

Computer configuration as a function of the gearbox type

To check that storing has been correctly carried out, turn the ignition on using fault finding fiche no. 27, fault bargraph 20 LH side should be extinguished, status bargraph 19 RH or LH side should be illuminated.

There is also a method for configuring the computer which does not require the use of the XR25. To do this: :

- Turn on the ignition.
- Start the engine.
- Accelerate the engine to a speed greater than 2500 rpm for 10 seconds.
- Turn the ignition off.
- Turn the ignition on again and start the engine.
- Accelerate the engine to a speed greater than 2500 rpm for 10 seconds.
- Turn the ignition off.

The memorisation procedure is the same as that described previously.

NOTE: The configuration procedure using the XR25 may be used to reconfigure an incorrectly configured computer (automatic transmission instead of manual gearbox). The procedure which does not use the XR25 will however only work for an unconfigured blank injection computer from stock.

POWER-ASSISTED STEERING PRESSOSTAT - INJECTION COMPUTER CONNECTION

The injection computer receives information from the power-assisted steering pressostat. This depends on the pressure in the hydraulic circuit. The higher the pressure, the more energy is used by the power-assisted steering pump.

The injection computer, to compensate for this energy use, increases the percentage opening of the idle speed regulation stepping motor.

The information is received on track 7 of the injection computer. With the pressostat closed, the computer receives an earth. The idle speed is adjusted to 850 rpm.

IDLE SPEED CORRECTION DEPENDING ON THE BATTERY VOLTAGE

This correction compensates for the drop in voltage due to operation of consumers when the battery is poorly charged. To do this, the idle speed is increased, allowing the alternator to rotate more and consequently increase the charging voltage.

The lower the voltage, the greater the degree of correction. Correction of the engine speed is therefore variable. It begins when the voltage drops to below 12.7 volts. Correction begins at the nominal engine speed and may reach a maximum of 880 rpm.

PRINCIPLE

Under normal warm operating engine conditions, the RCO idle speed value using #12 varies between an upper and a lower value to obtain the nominal idle speed.

If the engine operating conditions are different (running in, engine contaminated, etc.) the idle RCO speed value may be situated close to the upper or lower value.

Adaptive correction (#21) for the RCO idle speed (#12) allows compensation to be made for slow variations in the engine's air requirements, in order to recentre the RCO value (#12) to a nominal average value.

This correction is only operational if the coolant temperature is greater than 70°C, 30 seconds after starting the engine and if the engine is in the nominal idle speed regulation phase.

RCO IDLE SPEED VALUES AND ADAPTIVE CORRECTION

Nominal idle speed (#06)	$X = 740 \text{ rpm}$
RCO idle speed (#12)	$4 \% \leq X \leq 20 \%$
Adaptive idle speed (#21)	Threshold: – min.: – 4.3 % – max.: – 3.9 %

INTERPRETATION OF THE GATE VALUES

If there is an excess of air (air leak, throttle stop incorrectly set, etc.), the idle speed increases, the RCO idle speed value for #12 decreases to return to the nominal idle speed; the RCO idle speed adaptive correction value for #21 reduces to recentre the RCO idle speed for #12.

If there is a lack of air (contamination, etc.), the strategy is reversed:

The RCO idle speed for #12 increases and adaptive correction for #21 also increases, in order to recentre #12 to a nominal average value.

IMPORTANT: After erasing the computer memory (disconnecting the battery), the engine must be allowed to run at idle speed before returning the vehicle to the customer so that the adaptive correction may correctly reset itself.

OXYGEN SENSOR VOLTAGE (#05)

Reading #05 on the XR25: the value read is the voltage sent to the computer by the oxygen sensor; it is expressed in volts (the value actually varies between 0 and 1 000 millivolts).

When the engine is in the loop phase, the voltage should oscillate rapidly and should be between 50 ± 50 mV (lean mixture) and 850 ± 50 mV (rich mixture) and vice versa.

The smaller the gap between the upper and lower oscillating values, the poorer the information from the sensor. (This gap is usually at least 500 mV.)

RICHNESS CORRECTION (#35)

The value given under #35 on the XR25 represents the average value of richness corrections made by the computer depending on the richness of the burnt mixture as seen by the oxygen sensor. (The oxygen sensor actually analyses the oxygen content of the exhaust gases directly from the richness of the burnt mixture.)

The richness correction has a centre point of 128 with thresholds of 0 and 255. (Experience has shown that under normal operating conditions #35 is located close to 128 with only a small amount of variation.)

- Value less than 128 : request for mixture to be made leaner
- Value greater than 128 : request for mixture to be made richer

ENTRY INTO RICHNESS REGULATION MODE

Loop phase

Richness regulation begins after the timed starting period:

- for no load if the coolant temperature has reached 22°C
- outside no load conditions if the coolant temperature is greater than 22°C

The timed starting period is dependent on the coolant temperature:

- at 20°C it is a maximum of 1 minute,
- at 80°C it is a maximum of 40 seconds.

if richness regulation has not yet started, $\#35 = 128$

Non-loop mode

When richness regulation is occurring, the operating phases when the computer ignores the voltage information from the oxygen sensor are:

- Full load: #35 = variable and greater than 128,
- Sharp acceleration: #35 = variable and greater than 128,
- Deceleration with no load information (injection cut-out*) : #35 = 128,
- Oxygen sensor fault: #35 = 128,
- Deceleration because of manifold vacuum : #35 = 128.

* No injection cut-out in first.

DEFECT MODE IN THE EVENT OF AN OXYGEN SENSOR FAULT

If the voltage from the oxygen sensor is incorrect (#05 varies only slightly or not at all) during richness regulation, the computer will only enter defect mode (#35 = 128) if the fault has been present for 3 to 5 minutes. The fault will be memorised in this case only.

If an oxygen sensor fault is present and recognised and if the fault has already been stored, the system enters the loop mode directly (#35 = 128).

PRINCIPLE

In the loop mode (see section 17 "Richness regulation"), richness regulation (#35) corrects the injection timing to give fuel metering which is as close as possible to richness 1. The correction value is close to 128, with limit values of 0 and 255.

Variations may affect the components of the injection system and the correction may drift towards 0 or 255, to ensure richness 1 is obtained.

Adaptive correction allows the injection mapping to be adjusted to recentre the richness regulation to 128 and to ensure a constant authority of correction to make the mixture leaner or richer.

Adaptive correction to richness regulation has two parts:

- Adaptive correction for average and high engine loads (#30),
- Adaptive correction for idle speed and low engine loads (#31).

Adaptive corrections take 128 as the average value after initialisation (erasing the memory) and have the following threshold values:

$96 \leq \#30 \leq 160$
$96 \leq \#31 \leq 160$

Adaptive correction only takes place when the engine is warm, in the loop phase (#35 variable) and for a specified manifold pressure range.

The engine must have operated in the loop mode for several pressure zones in order that adaptive correction begins to change to compensate for the variations in engine operating richness.

Following reinitialisation of the computer (return to 128 for #30 and #31) a special road test must therefore be carried out.

ROAD TEST

Conditions

- Engine warm (coolant temperature > 75 °C)
- Do not exceed engine speed of 4000 rpm.

For this test, start from a fairly low engine speed, in 3rd or 4th gear using progressive acceleration to stabilise the required pressure for 10 seconds in each zone (see table).

NOTE: For example, for zone no. 1, try to maintain the average of 280 mbars for at least 10 seconds.

Pressure zones to cover during the test (#01)

Zone no. 1 (mbars)	Zone no. 2 (mbars)	Zone no. 3 (mbars)	Zone no. 4 (mbars)	Zone no. 5 (mbars)
220 ----- 340	----- 460	----- 580	----- 700	----- 930
Average 280	Average 400	Average 520	Average 640	Average 815

Following this test the corrections will be operational.

#31 varies more significantly for idle speed and low loads and #30 for average and high loads, but both are operational over all of the manifold pressure ranges.

The test should be followed by a normal, varied drive, covering 3 to 6 miles (5 to 10 km).

After the test, read the values for #30 and #31. Initially 128, they should now have changed. If they have not changed, repeat the test, taking care to ensure the test conditions are correctly observed.

INTERPRETING VALUES COLLECTED AFTER A ROAD TEST

If there is a lack of fuel (injectors dirty, fuel pressure and flow too low, etc.), richness regulation #35 increases to obtain the richness as close as possible to richness 1 and adaptive correction #30 and #31 increases until the richness correction returns to oscillate around 128.

If there is an excess of fuel, the situation is reversed:

Richness regulation #35 reduces and adaptive correction #30 and #31 also reduces to recentre the richness correction (#35) around 128.

NOTE: The analysis which may be made using #31 remains difficult since this correction mainly operates for idle speed and low loads and is also very sensitive.

Hasty conclusions should not therefore be drawn from this gate value, rather the position of #30 should be examined.

The information from these two gates gives an idea about the engine operation richness, and may be used as a guide for fault finding. For them to be of use during fault finding, conclusions may only be drawn if the values are at the minimum or maximum correction thresholds, and if both values have drifted in the same direction.

IMPORTANT : #30 and #31 should only be examined and analysed after a customer complaint, an operating fault and if they are at the threshold with the value for #35 (#35 varies above 175 or below 80).

INJECTION

Operational wiring diagram

17

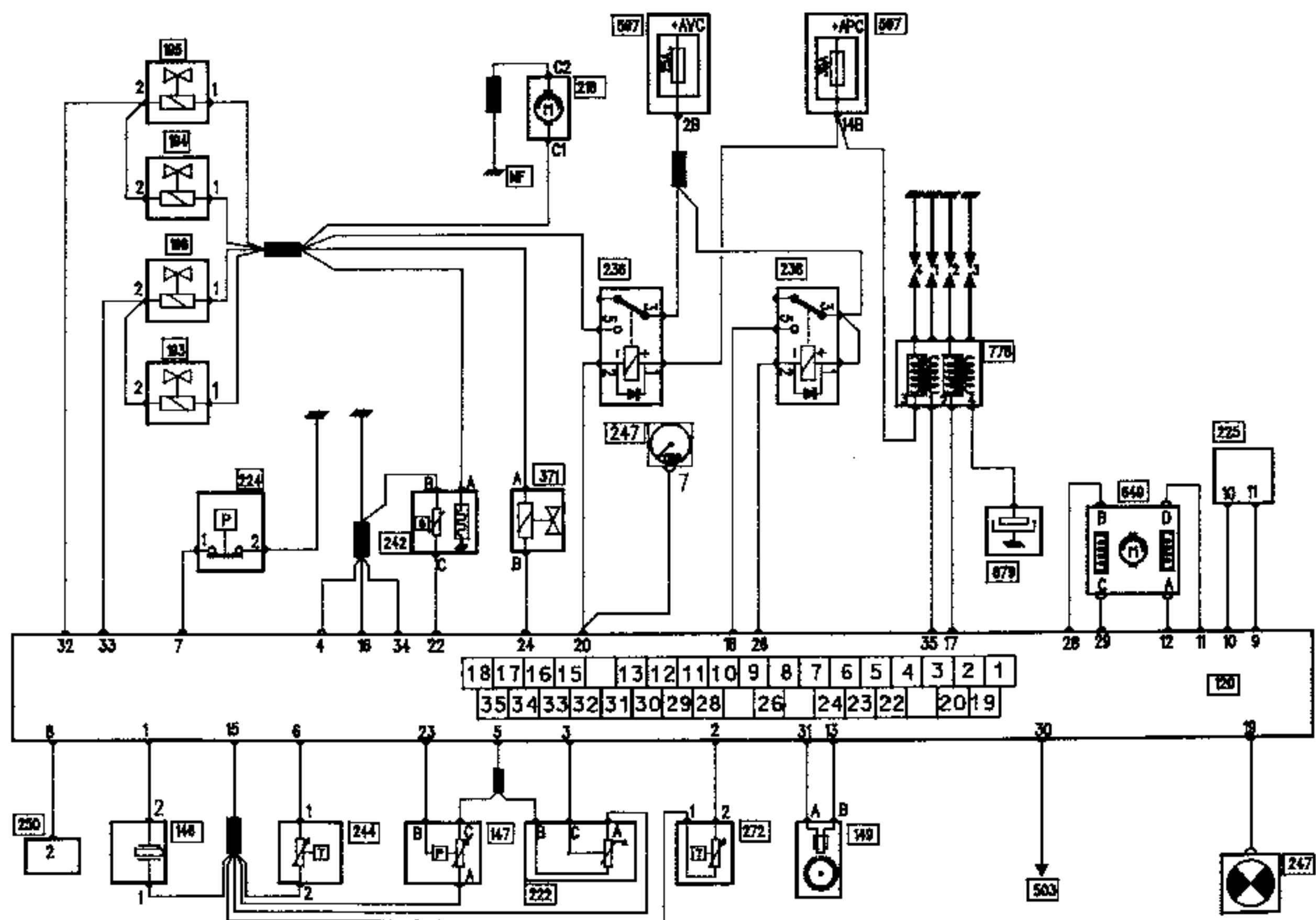
KEY TO OPERATIONAL WIRING DIAGRAM

COMPONENT NO.	DESCRIPTION
120	Injection computer
146	Pinking sensor
147	Absolute pressure sensor
149	TDC sensor
193 to 196	Injectors
218	Fuel pump
222	Throttle position potentiometer
224	Power-assisted steering pressostat
225	Diagnostic socket
236	Fuel pump relay
238	Injection feed locking relay
242	Oxygen sensor
244	Coolant temperature sensor
247	Instrument panel
250	Vehicle speed sensor
272	Air temperature sensor
319	Air conditioning control panel
371	Fuel vapour recirculation solenoid valve
503	Electronic decoder
597	Engine fuse box
649	Idle speed regulation stepping motor
679	Radio anti-interference capacitor
778	Double coil with four outputs
MH	Engine electrical earth
AVC	Before ignition
APC	After ignition

INJECTION

Operational wiring diagram

17



PRC10065

INJECTION

Operational wiring diagram

17

COMPUTER TRACK ALLOCATION

Tracks	DESCRIPTION
1	Pinking sensor signal
2	Air temperature sensor information
3	Throttle position potentiometer information
4	Oxygen sensor earth
5	+ 5 V feed for absolute pressure sensor and throttle position potentiometer
6	Coolant temperature sensor information
7	Power-assisted steering pressostat information
8	Vehicle speed information
9	Bi-directional diagnostic line K used for entry into fault finding mode (looking for computer), emission of diagnostic signal from computer, application of command modes (G.. *), erasing the memory (G0**) and ending fault finding (G13*)
10	Uni-directional diagnostic line L for entry into diagnostic mode only (looking for computer)
11	Stepping motor control (0-12 V at high frequency)
12	Stepping motor control (0-12 V at high frequency)
13	TDC sensor signal
14	Not used
15	Common earth for pinking sensor, throttle position sensor, manifold pressure sensor, air temperature sensor and coolant temperature sensor
16	Power earth no. 1
17	Control for coil for cylinders 2 and 3
18	+ 12 volts information for injection locking relay

INJECTION

Operating wiring diagram

17

COMPUTER TRACK ALLOCATION (continued)

Tracks	DESCRIPTION
19	Control for injection fault warning light on instrument panel (by earthing)
20	Control (via earth) for fuel pump relay and engine speed information
21	Not used
22	Voltage information from oxygen sensor
23	Manifold pressure information transcribed by absolute pressure sensor
24	RCO control (sequential earth period) for canister bleed solenoid
25	Not used
26	Control (via earth) of injection locking relay
27	Not used
28	Stepping motor control (0-12 V at high frequency)
29	Stepping motor control (0-12 V at high frequency)
30	Engine immobiliser coded line input
31	Top Dead Centre sensor signal
32	Control for injectors no. 2 and 3 (by earthing)
33	Control for injectors no. 1 and 4 (by earthing)
34	Power earth no. 2
35	Control for coil for cylinders 1 and 4

SETTING UP A DIALOGUE BETWEEN THE XR25 AND THE COMPUTER

- Connect the test kit to the diagnostic socket.
- Ignition on.
- ISO selector on S8
- Type **D13**

9.INJ

COMPUTER IDENTIFICATION

The computer is not identified by reading a fault code but by reading the Part Number directly from the computer. After having set up a dialogue with the computer:

ENTER **G70***

7700

XXX

XXX

The Part Number will then appear on the central display in three sequences..

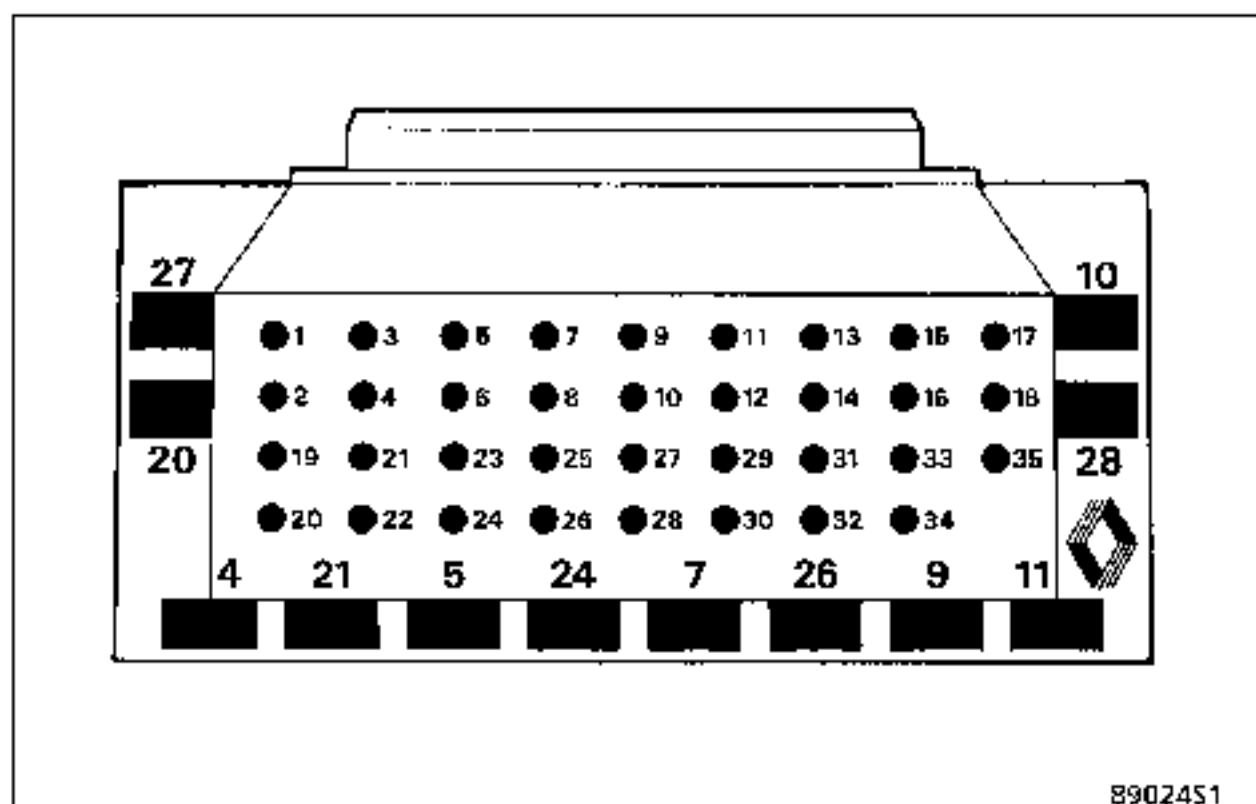
Each sequence is displayed for approximately two seconds. Each sequence is repeated twice. (To find the number, refer to the Workshop Repair Manual, section 12).

ERASING THE MEMORY (engine off, ignition on)

After the injection system has been worked on, the computer's memory can be erased by using the code **G0**** (Erasing memorised faults in diagnostic mode D13, ISO selector in position S8, enter G0**).

The memories of other components on the vehicle are not erased when this operation is used.

If information obtained from the XR25 means that electrical continuities have to be checked, connect the bornier MS 1048.



(The MS 1048 consists of a 35 track base unit which has an integral printed circuit comprising 35 copper coated areas, numbered from 1 to 35).

Using the wiring diagrams, the tracks connecting the component or components to be checked can easily be identified.

IMPORTANT:

- All checks with the bornier MS 1048 should only be performed with the battery disconnected.
- The bornier is designed to work with an ohmmeter only. Under no circumstances should a 12 volts supply be connected to the control points.

PRESENTATION OF FICHE N° 27 SIDE 1/2 WITH FAULT BARGRAPHS

N° 27 1/2		S8		code :	D	1	3	read :	9 . n J
1		ILLUMINATED → EXTINGUISHED →	FAULT TEST TURN CARD	CODE PRESENT					
2		COMPUTER		ENGINE IMMOBILISER * 22					
3		AIR TEMPERATURE		O2 SENSOR * 23					
4		COOLANT TEMPERATURE		VEHICLE SPEED					
5		PRESSURE		FLYWHEEL SIGNAL * 25					
6		* 06 PINKING		THROTTLE POSITION					
7		CAMSHAFT		FUEL TANK PRESSURE					
8		* 08 FUEL PUMP		BLOCKING * 28					
9		* 09 ANTI - PERCOLATION		AIR PUMP * 29					
10		* 10 O2 SENSOR OVERHEATING		BI MODE * 30					

INJECTION (faults)

Memory del. : G 0 * *
Status check request : G 0 1 *

11		* 11 INJECTOR CIRCUIT	CONNECTION A.T. → INJ.	
12		* 12 WARN. LAMP CIRCUIT FAULT	DATA + FUEL PUMP	
13		SAVE DATA IN MEMORY		
14		* 14 IDLE SPEED REG CIRCUIT	CANISTER PURGE CIRCUIT * 34	
15		CONNECTION INJ. → A / C	EGR CIRCUIT * 35	
16		* 16 IGNITION COILS	COLD START INJECTORS * 36	
17		* 17 MIL WARNING LIGHT		
18				
19				
20		* 20 COMPUTER CONFIGURATION	XR25 MEMORY	

ADDITIONAL CHECKS : # ..

01	Pressure	mb
02	Coolant temp.	°C
03	Air temp.	°C
04	Computer feed	V
05	O2 sensor	V
06	Engine speed	rpm
12	Idling RCO	%
13	Pinking signal	
14	Speed difference	rpm
15	Pinking correct.	°
16	Atmos. pressure	mb
17	Throttle pot.	
18	Vehicle speed	km per h
21	Auto. correct. of RCO idle speed	%
23	Canister purge RCO	%
24	RCO EGR	%
30	Auto. correct. of richness under high loads	
31	Auto. correct. of richness under low loads	
35	Mixture regulation	

END OF TEST : G 1 3 *

Part No. : G 7 0 *

Diagnostic faults :

Press V and 9

Return to diagnostic mode : 0

15 ANG

PRESENTATION OF FICHE N° 27 SIDE 2/2 WITH STATUS BARGRAPHS

N° 27 2/2		read : 10.n J	
1	<input type="checkbox"/> ILLUMINATED <input type="checkbox"/> EXTINGUISHED	STATUS TEST TURN CARD	CODE PRESENT <input type="checkbox"/>
2	<input type="checkbox"/> Full Load ← THROTTLE POSITIONS → No load <input type="checkbox"/>	CONTROL MODES : G 0 ★ (if engine stationary)	
3	<input type="checkbox"/> FLYWHEEL SIGNAL	ACTIVE ENGINE IMMOBILISER <input type="checkbox"/>	10 Fuel pump relay
4	<input type="checkbox"/> PARK/NEUTRAL POSITION	+ APC COMPUTER <input type="checkbox"/>	11 Blocking relay
5	<input type="checkbox"/> TORQUE ADJUSTMENT	RELAY CONTROL LOCKING <input type="checkbox"/>	12 A/C compressor
6	<input type="checkbox"/> RICHNESS REGULATION	IDLING REGULATION <input type="checkbox"/>	14 Idle speed reg. valve
7	<input type="checkbox"/> FUEL PUMP CONTROL	CANISTER PURGE AUTHORIZED <input type="checkbox"/>	16 Canister purge valve
8	<input type="checkbox"/> ANTI-PERCOLATION CONTROL	ELECT. WINDSCREEN CONTROL <input type="checkbox"/>	17 Anti percolation relay
9	<input type="checkbox"/> SELECTION	ACCELERATED IDLE SPEED <input type="checkbox"/>	21 Warning lamp fault
10	<input type="checkbox"/> REQUEST	AIR CONDITIONING AUTHORIZATION <input type="checkbox"/>	22 Air pump relay
			23 EGR valve
			24 Bi-mode inlet valve
			COMPUTER CONFIGURATION (Vehicle with AT or MAN. GEARBOX) See procedure in Workshop Manual
(IMPORTANT : monitor bar graph 20 left)			ADDITIONAL CHECKS : # ..
INJECTION (status)			01 Pressure mb
Memory del. : G 0 ★ ★			02 Coolant temp. °C
Request fault test : G 0 2 ★			03 Air temp. °C
11	<input type="checkbox"/> SIGNAL CAMSHAFT	BLEED CANISTER + ACTIVE SOL. VALVES <input type="checkbox"/>	04 Computer feed V
12	<input type="checkbox"/> EGR SOLENOID CONTROL	ERASE MEMORISED FAULTS <input type="checkbox"/>	05 O2 sensor V
13	<input type="checkbox"/> AIR PUMP CONTROL	POWER STEERING PRESSOSTAT <input type="checkbox"/>	06 Engine speed rpm
14	<input type="checkbox"/> BI-MODE INLET CONTROL	COLD START INJECTORS <input type="checkbox"/>	12 Idling RCO %
15			13 Pinking signal
16			14 Speed difference rpm
17			15 Pinking correct. d°
18			16 Atmos. pressure mb
19	<input type="checkbox"/> Veh. with AT	COMPUTER CONFIGURATION	17 Throttle pot.
20	<input type="checkbox"/> FAULT PRESENT	XR25 MEMORY <input type="checkbox"/>	18 Vehicle speed km per h
			21 Auto. correct. of RCO Idle % speed
			23 Canister purge RCO %
			24 RCO EGR %
			30 Auto. correct. of richness under high loads
			31 Auto. correct. of richness under low loads
			35 Mixture regulation
			END OF TEST : G 1 3 ★
			Part No. : G 7 0 ★
			Diagnosed faults : Press V and 9 Return to diagnostic mode : D
			15 ANG

REPRESENTATION OF THE BARGRAPHS



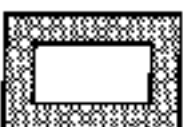
Illuminates when a dialogue has been established with the product computer. If it remains extinguished:

- the code does not exist,
- there is a fault in the tool, the computer or the line.

REPRESENTATION OF THE FAULTS (always on a coloured background)



If illuminated, indicates a fault on the tested product, the associated text defines the fault.



If extinguished, indicates that the fault has not been found on the tested product.

REPRESENTATION OF THE STATUSES (always on a white background)

Engine off, ignition on, no operator action

The status bargraphs on the fiche are represented as the status which they should have when the engine is off, the ignition is on and there is no operator action

- If on the fiche the bargraph is represented as



the test kit should give as information



- If on the fiche the bargraph is represented as



the test kit should give as information

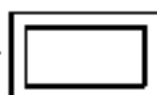


- If on the fiche the bargraph is represented as



the test kit should give as information

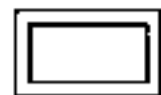
either



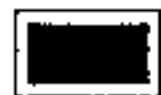
or



Engine running



Extinguishes when the function or condition given on the fiche can no longer be performed.



Illuminates when the function or condition given on the fiche is performed.

FUNCTION V9

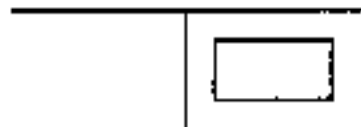
Fiche no. 27 side 1/2 and side 2/2 is a generic fiche used for several engines.

The different engines do not use all the bargraphs. To find out the bargraphs dealt with by the injection computer, after having set up a dialogue with the computer, press the V and 9 buttons simultaneously. The bargraphs dealt with will:

- illuminate permanently for non memorisable fault bargraphs or status bargraphs,
- flash for memorisable fault bargraphs.

To return to fault finding mode, press button D.

1

**Bargraph 1 RH extinguished**
XR25 circuit

Fiche no. 27 side 1/2

XR25 assistance: no connection, CO, CC EARTH,
display on XR25 ≡ ≡ ≡**NOTES**For fault finding this bargraph should be illuminated.
See "Fault finding - assistance" for resistance values.**Check:**

- injection fuses, passenger compartment F30 (5 A), F12 (30 A), engine 30 A,
- the connection between the XR25 and the diagnostic socket,
- the position of the selector (S8),
- that the cassette is to specification.

Repair if necessary.

Check:

- The presence of – 12 V on track 16 and earth on track 4 of the diagnostic socket.
- The connection between the XR25 and the diagnostic socket.

Diagnostic socket	10	→	4	XR25
	11	→	8	socket

Repair if necessary.

Connect bornier **MS 1048** instead of the computer and, with the ignition on, check 12 V between :

Bornier	16 (earth)	→	20	Bornier
	16	→	26	

If no voltage is present, check the relays, fuses (plenum chamber), insulation and continuity of connections. Repair.

Connect bornier **MS 1048** in place of computer and check insulation and continuity between tracks :

Bornier	10	→	11	Diagnostic socket
	9	→	10	Diagnostic socket
	26	→	2	Injection locking relay
	20	→	2	Fuel pump relay

If the fault persists, replace the computer.

**AFTER
REPAIR**

Carry out a conformity check.

Fault finding - Interpretation of XR25 bargraphs

1



Bargraph 1 RH illuminated and 12 AC or ≡ ≡ ≡ on XR25 display

Fiche no. 27 side 1/2

INJECTION LOCKING RELAY CIRCUIT

XR25 assistance: No connection, CO, CC EARTH

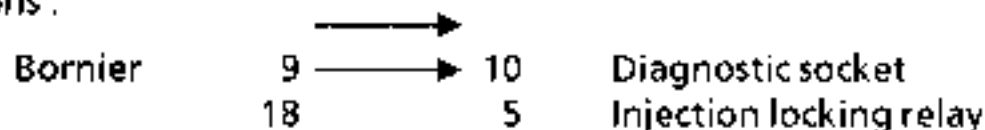
NOTES

For fault finding, this bargraph should be illuminated.

With the ignition on and during the time delay period, check that 12 V is present at the back of clip 5 of the fuel pump locking relay.

If there is no voltage, check the relays, connections and repair.

Connect bornier MS 1048 instead of the computer and check insulation and continuity between connections :



Repair.

If the fault persists, replace the computer.

AFTER REPAIR

Carry out a conformity check.

2

Bargraph 2 LH illuminated

Fiche no. 27 side 1/2

COMPUTER CIRCUIT

XR25 assistance : Computer fault if bargraph 2LH illuminated

NOTES

None

Computer is not to specification or is faulty.

Replace the injection computer.

AFTER REPAIR

Carry out a conformity check.

2



Bargraph 2RH illuminated

Fiche no. 27 side 1/2

ENGINE IMMOBILISER CIRCUIT

XR25 assistance : CO, CC EARTH or CC + 12 V line 30 of computer

*22 = 1.dEF

*22 = 2.dEF

NOTES

If the vehicle is not equipped with an engine immobiliser, *22 = 2 def, ignore this bargraph.

Connect bornier **MS 1048** instead of the computer and check the insulation and continuity of the line :

Bornier 30 —————> B2 Decoder

Repair if necessary.

If the fault persists, see "Engine immobiliser fault finding".

AFTER REPAIR

Erase the computer memory using G0**.
Carry out a conformity check

3



Bargraph 3LH illuminated

Fiche no. 27 side 1/2

AIR TEMPERATURE SENSOR CIRCUIT

XR25 assistance : #03 - -40 CO LINE 2 OR 15 ; CC - 12V LINE 2
#03 = 119 CC EARTH LINE 2; CC LINE 15/2

NOTES

If bargraph 4LH + bargraph 3LH are illuminated, refer to bargraph 4LH.
See "Fault finding - assistance" for resistance values.

Check the resistance of the air temperature sensor.

Resistance is not
correct

Replace the air temperature sensor and erase the computer memory using G0**.

Resistance is
correct

Connect bornier **MS 1048** instead of the computer and check the insulation and continuity of the electrical wiring between tracks:

1 sensor connector 15 bornier
2 sensor connector 2 bornier

If the electrical wiring is correct, replace the computer.

AFTER REPAIR

Erase the computer memory using G0**.
Carry out a conformity check.

3



Bargraph 3RH illuminated

Fiche no. 27 side 1/2

OXYGEN SENSOR CIRCUIT

XR25 assistance: #35 = 128 CO LINE 4 ; CC + 12V LINE 22

NOTES


None

Refer to Technical Note 23 81 A for fault finding instructions on the oxygen sensor.
(Use XR25 fiche number A1 - O₂ sensor)

**AFTER
REPAIR**

Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Interpretation of XR25 bargraphs

<p>4</p> 	<p>Bargraph 4LH illuminated Fiche no. 27 side 1/2</p> <p>COOLANT TEMPERATURE SENSOR CIRCUIT</p> <p>XR25 assistance: #02 = -40°C CC + 12V LINE 6 ; CO LINE 15 or 6 #02 = 119°C CC EARTH LINE 6 ; CC LINE 6/15</p>
--	---

<p>NOTES</p>	<p>If BG3LH+ BG4LH are illuminated, refer to BG4LH. See "Fault finding - assistance" for resistance values.</p>
---------------------	---

Check the resistance of the coolant temperature sensor.

The resistance is
not correct

Fit a new sensor.

The resistance is
correct

Connect bornier **MS 1048** instead of the computer and check the continuity and the insulation of the electrical wiring between the tracks:

1 coolant temperature sensor	6 bornier
2 coolant temperature sensor	15 bornier

Repair if necessary.

If the fault persists, replace the injection computer.

**AFTER
REPAIR**

Erase the computer memory using G0**.
Carry out a conformity check.

4



Bargraph 4RH illuminated
VEHICLE SPEED SENSOR CIRCUIT

Fiche no. 27 side 1/2

XR25 assistance: CO or CC LINE 8

NOTES

See "Fault finding - Aid" for resistance values.

Carry out a road test, check the speed on the speedometer and using #18 (vehicle speed)

If the speed is zero, repair the wiring of track 8 of the computer and 2 of the sensor.

With the ignition on, check the connection and the feed of the speed sensor:
+ 12V on track 1
earth on track 3

Repair if necessary.

If the fault persists, replace the speed sensor.

AFTER REPAIR

Erase the computer memory using G0**.
Carry out a road test.
Carry out a conformity check

5



Bargraph 5LH illuminated

Fiche no. 27 side 1/2

ABSOLUTE PRESSURE SENSOR CIRCUIT

XR25 assistance : #01 = 103 mb CO LINE 5 or LINE 23 or CC EARTH LINE 23
#01 = variable CC EARTH LINE 5

NOTES

If BG6RH – BG5LH are illuminated, refer to BG5LH
See "Fault finding - assistance" for resistance values.

Check the pressure sensor is electrically and pneumatically connected and check that the pipe is to specification. It must not be blocked or pierced.

With the ignition on, check that there is + 5V between track C and earth on track A.

There is not
+ 5V between
track C and
track A

Connect bornier **MS 1048** instead of the computer and check the insulation and continuity between the tracks:

A sensor connector	15 bornier
C sensor connector	5 bornier

Repair if necessary.

If the fault persists, replace the computer.

There is + 5V
between track C
and track A

With the ignition on, check the return voltage on track B of the sensor.
Note : For this measurement, a vacuum pump can be used to check the voltage variation.

The voltage
does not vary

Replace the sensor.

The voltage
varies

Connect bornier **MS 1048** instead of the computer and check the insulation and the continuity between track B of the sensor and 23 of the bornier.


Repair if necessary.

If the fault persists, replace the computer.

AFTER REPAIR

Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Interpretation of XR25 bargraphs

<div>5</div> 	<div>Bargraph 5RH illuminated or flashing Fiche no. 27 side 1/2</div> <div><u>FLYWHEEL SIGNAL CIRCUIT</u></div> <div>XR25 assistance : *25 = CO or DEF flashing CO or CC + 12V LINE 13 or 31</div> <div style="margin-left: 150px;">*25 = CC.O INTERFERENCE</div> <div style="margin-left: 150px;">*25 = In SENSOR WIRE INVERTED</div>
--	--

NOTES	See "Fault finding - assistance" for resistance values
-------	--

Disconnect the sensor connector and check the resistance of the sensor between terminals A and B.

The resistance is not correct.	Replace the sensor.
--------------------------------	---------------------

The resistance is correct.	<p>Connect bornier M5 1048 instead of the computer and check the continuity and the insulation of the wiring between the tracks:</p> <p style="margin-left: 100px;">A sensor 31 bornier</p> <p style="margin-left: 100px;">B sensor 13 bornier</p>
	Repair if necessary.
	If the fault persists, replace the computer.

AFTER REPAIR	<p>Erase the computer memory using G0**.</p> <p>Carry out a conformity check.</p>
--------------	---

6



Bargraph 6 LH illuminated

Fiche no. 27 side 1/2

PINKING SENSOR CIRCUIT

XR25 assistance: #13 = 0 CC EARTH LINE 1 or CO LINE 1

NONE

None

Check the wiring of the faulty sensor.

Repair if necessary

Connect bornier MS 1048 instead of the computer and check the insulation and continuity of the wiring between tracks:

2 sensor	1 bornier
1 sensor	15 bornier

Repair if necessary.

If the fault persists, replace the pinking sensor

**AFTER
REPAIR**

Erase the computer memory using G0**.
Carry out a conformity check.

6



Bargraph 6RH illuminated

Fiche no. 27 side 1/2

THROTTLE POTENTIOMETER CIRCUIT

XR25 assistance: CO LINE 3 or 5 or CC EARTH LINE 3 or 5 or CC LINE 15/3 or
CC + 12V LINE 3
#17 = 255 CC LINE 5/3

NOTES

If BG5LH + BG6RH are illuminated, refer to BG5LH.
See "Fault finding - assistance" for resistance values.

Check the resistance of the throttle potentiometer between tracks A and B.

Check the variation of the throttle potentiometer between tracks B and C.

R between A
and B is not
correct or B-C
does not vary

Replace the throttle potentiometer.

R between A
and B is correct
and B-C varies.

Connect bornier MS 1048 instead of the computer and check the insulation and the continuity between tracks:


A potentiometer	15 bornier
B potentiometer	5 bornier
C potentiometer	3 bornier

Repair if necessary.

If the fault persists, replace the computer

AFTER REPAIR

Erase the computer memory using G0**.
Carry out a conformity check.

<p>8</p> 	<p>Bargraph 8LH illuminated</p> <p style="text-align: right;">Fiche no. 27 side 1/2</p> <p><u>FUEL PUMP RELAY COMMAND CIRCUIT</u></p> <p>XR25 assistance : *08 = CC.1 CC + 12V LINE 20 *08 = Def MEMORISED FAULT</p>
--	--


<p>NOTE</p>	<p>See "Fault finding - assistance" for resistance values.</p>
--------------------	--

With the fuel pump relay in position, check the presence of + 12V between tracks 1 and 2 when the ignition is turned on, during the time delay phase.

<p>+ 12V present between 1 and 2</p>	<p>Replace the relay.</p>
<p>Not + 12V between 1 and 2</p> <p>Not + 12V on track 1</p> <p>+ 12V on track 1</p>	<p>With the ignition on, check that + 12V are present on track 1 of the petrol pump relay.</p> <p>Check the line of track 1 as far as fuse F12.</p> <p>Connect bornier MS 1048 in place of the computer and check the insulation and continuity of the line between track 2 of the relay and track 20 of the bornier.</p> <p>Repair if necessary.</p> <p>If the fault persists, replace the injection computer</p>

<p>AFTER REPAIR</p>	<p>Erase the computer memory using G0**.</p> <p>Carry out a conformity check.</p>
--------------------------------	---

Fault finding - Interpretation of XR25 bargraphs

<p>11</p> 	<p>Bargraph 11LH illuminated Fiche no. 27 side 1/2</p> <p>INJECTION CIRCUIT</p> <p>XR25 assistance : *11 — 2.3 CO CO or CC EARTH LINE 32 *11 = Def MEMORISED FAULT *11 = 1.4 CO CO or CC EARTH LINE 33</p>
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NOTES	See "Fault finding - assistance" for resistance values.
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BG11LH only	NOTES	NONE
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Check the resistance of each injector.

The resistance is not correct	Replace the faulty injector(s).
The resistance is correct	<p>Connect bornier MS 1048 instead of the computer and check the continuity and insulation between the injector connectors on track 2 and tracks 32 and 33.</p> <p>Repair the wiring if necessary.</p> <p>During the time delay phase, check the presence of 12 V on track 1 of each injector.</p> <p>Repair the wiring if necessary.</p>


If the fault persists, repair the computer.

BG11LH & 14RH	NOTES	NONE
--------------------------	--------------	------

With the ignition on and during the time delay phase, check the presence of 12 V on track 5 of the petrol pump relay.

12 V present	<p>Check the insulation and continuity of the connection between 5 pump relay / 1 injector.</p> <p>Repair.</p>
12V not present	Check the pump relay and the insulation and continuity of the connection between 25 A fuse (before ignition) / 3 relay

AFTER REPAIR	<p>Erase the computer memory using G0**.</p> <p>Carry out a conformity check.</p>
---------------------	---

<p>14</p> 	<p>Bargraph 14LH illuminated Fiche no. 27 side 1/2</p> <p>IDLE SPEED REGULATION CIRCUIT</p> <p>XR25 assistance :</p> <table border="0"> <tr> <td>*14 = CO.O</td> <td>CO or CC EARTH LINE 11 ; 28 ; 12 ; 29</td> </tr> <tr> <td>*14 = CC.1</td> <td>CC + 12V LINE 11 ; 28 ; 12 ; 29</td> </tr> <tr> <td>*14 = Def</td> <td>MEMORISED FAULT</td> </tr> </table>	*14 = CO.O	CO or CC EARTH LINE 11 ; 28 ; 12 ; 29	*14 = CC.1	CC + 12V LINE 11 ; 28 ; 12 ; 29	*14 = Def	MEMORISED FAULT
*14 = CO.O	CO or CC EARTH LINE 11 ; 28 ; 12 ; 29						
*14 = CC.1	CC + 12V LINE 11 ; 28 ; 12 ; 29						
*14 = Def	MEMORISED FAULT						

<p>NOTES</p>	<p>With no fault, #12 should be variable.</p> <p>See "Fault finding - assistance" for resistance values.</p>
---------------------	--

Check the resistance of the stepping motor coils between :				
A and B				
C and D				
If the resistance is not correct, replace the stepping motor.				
Connect bornier MS 1048 instead of the computer and check the insulation and continuity of the line:				
Bornier	11	→	A	stepping motor
	28	→	B	stepping motor
	12	→	C	stepping motor
	29	→	D	stepping motor
Repair the wiring if necessary.				
If the fault persists, replace the stepping motor.				
If the fault persists, replace the computer.				

<p>AFTER REPAIR</p>	<p>Erase the computer memory using G0**.</p> <p>Carry out a conformity check.</p>
----------------------------	---

Fault finding - Interpretation of XR25 bargraphs

14



Bargraph 14 RH illuminated

Fiche no. 27 side 1/2

CANISTER BLEED CIRCUIT

XR25 assistance : *34 = DEF CO or CCEARTH LINE 24

NOTES

IF BG 11LH + BG14RH are illuminated, refer to BG11LH.
See "Fault finding - assistance" for resistance values.

Check that the pipes are to specification. Rectify if necessary.

Check the resistance of the canister bleed valve between tracks A and B.

The resistance is
not correct

Replace the canister bleed valve.

The resistance is
correct

With the engine idling, check for the presence of + 12V on track A of the canister bleed valve.

There is not
+ 12V on track A

Repair the wiring between track A of the canister bleed valve and track 5 of the fuel pump relay in the engine wiring.

There is + 12V
on track A

Connect bornier MS 1048 instead of the computer and check the insulation and the continuity of the electrical wiring between track B of the canister bleed valve and 24 of the bornier.

Repair if necessary.

If the fault persists, replace the injection computer.

AFTER REPAIR

Erase the computer memory using G0**.
Carry out a conformity check.

16



Bargraph 16 LH illuminated

Fiche no. 27 side 1/2

IGNITION COIL CIRCUIT

XR25 assistance :

*16 = 1.4 CO CO / CC EARTH LINE 35

*16 = 2.3 CO CO / CC EARTH LINE 17

NOTES

See "Fault finding - assistance" for resistance values.

Check the resistance of the faulty coil.

The resistance is
not correct

Replace the faulty coil.

The resistance is
correct

Connect bornier **MS 1048** instead of the computer and check the insulation and continuity of line 17/2 for coil 1 or 35/1 for coil 2 (bornier / coil).


Check that + 12 V are present on tracks 1 and 2 of each coil.

Repair the faulty line.

If the fault persists, replace the computer.

AFTER REPAIR

Erase the computer memory using G0**.
Carry out a conformity check.

<div>2</div> <div>  </div>	<div>Bargraph 2 LH, 2 RH, incorrect illumination</div> <div>Fiche no. 27 side 2/2</div> <div>THROTTLE POSITION CIRCUIT</div> <div> <div>XR25 assistance :</div> <div> <div>BG 2LH illuminated if full load</div> <div>BG 2RH illuminated if no load</div> <div>BG 2LH and BG 2RH extinguished if middle position</div> <div>CC +12V LINES 5 and 23</div> </div> </div>
--	--

NOTES	No fault bargraph should be illuminated.
-------	--

Check the mechanics of the accelerator circuit (cable, accelerator pedal, etc.).	
--	--

Check the throttle potentiometer resistance between tracks A and B.	
---	--

Check the throttle potentiometer variation between tracks B and C.	
--	--

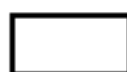
R between A and B is not correct or B-C does not vary	Replace the throttle potentiometer.
---	-------------------------------------

R between A and B is correct and B-C varies	<div>Connect bornier MS 1048 instead of the computer and check the insulation to 12V of the lines :</div> <div> <div> <div>Bornier</div> <div>5</div> <div>→</div> <div>B</div> <div>potentiometer</div> </div> <div> <div>23</div> <div>→</div> <div>B</div> <div>pressure sensor</div> </div> <div> <div>5</div> <div>→</div> <div>C</div> <div>pressure sensor</div> </div> </div> <div>Repair if necessary.</div>
	If the fault persists, replace the computer.

AFTER REPAIR	Carry out a conformity check
--------------	------------------------------

Fault finding - Interpretation of XR25 bargraphs

3



Bargraph 3 LH, incorrect illumination

Fiche no. 27 side 2/2

FLYWHEEL SIGNAL CIRCUIT

XR25 assistance :

BG 3LH illuminated with engine running
CO LINE 31

NOTES

There should not be any fault bargraphs illuminated.

Disconnect the sensor connector and check the sensor resistance between terminals A and B.

The resistance is
not correct

Replace the sensor.

The resistance is
correct

Connect bornier **MS 1048** instead of the computer and check the continuity of the wiring between tracks:

Sensor A → 31 bornier

Repair if necessary.

If the fault persists, replace the computer.

AFTER REPAIR

Carry out a conformity check.

3

Bargraph 3 RH incorrect illumination

Fiche no. 27 side 2/2

ENGINE IMMOBILISER CIRCUIT

XR25 assistance :

BG 3RH illuminated, engine immobiliser active

BG 3RH permanently illuminated CO LINE 30

NOTES

There should not be any fault bargraphs illuminated.
Check that the correct PLIP is being used

Connect bornier MS 1048 and check the line for insulation and continuity:

bornier 30 → B2 decoder

Repair if necessary.

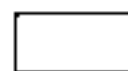
If the fault persists, see engine immobiliser fault finding.

AFTER REPAIR

Carry out a conformity check.

Fault finding - Interpretation of XR25 bargraphs

6



Bargraph 6 LH incorrect illumination

Fiche no. 27 side 2/2

RICHNESS REGULATION CIRCUIT

XR25 assistance : BG 6LH illuminated when richness is regulated (engine running)
BG 6LH extinguished permanently if CC EARTH LINE 22

NOTES

There should not be any fault bargraphs illuminated.
If status bargraph 2RH is extinguished at part load, refer to information for BG 2RH.

With the ignition off, connect bornier **M5 1048** in place of the computer and check line continuity and insulation:

Sensor connector C \longrightarrow 32 Bornier

Repair if necessary.

If the fault persists, see Technical Note 2381 A for fault finding on the oxygen sensor.

AFTER REPAIR

Carry out a conformity check.

Fault finding - Interpretation of XR25 bargraphs

6

Bargraph 6 RH incorrect illumination

Fiche no. 27 side 2/2

IDLE REGULATION CIRCUIT

XR25 assistance :

BG 6RH illuminated with engine running under part load

NOTES

Dealt with in the fault bargraphs.

7

Bargraph 7 LH incorrect illumination

Fiche no. 27 side 2/2

FUEL PUMP CONTROL CIRCUIT

XR25 assistance :

BG 7LH illuminated with ignition on during the time delay phase and with the engine running

NOTES

Dealt with in the fault bargraphs.

7

Bargraph 7 RH incorrect illumination

Fiche no. 27 side 2/2

CANISTER BLEED CIRCUIT

XR25 assistance :

BG 7RH illuminated when canister bleed authorised.
See #23 to display the effective command.

NOTES

Dealt with in the fault bargraphs.

**AFTER
REPAIR**

None

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed
See "Fault finding - assistance" for resistance values.

STARTING PROBLEMS

- Does not start
- Starts but stalls
- Starting is too long

Chart 1

Chart 2

Chart 3

IDLE PROBLEMS

- Too fast
- Too slow
- Engine unstable
- Hunting

Chart 4

Chart 5

Chart 6

Chart 7

BEHAVIOUR WHEN DRIVING

- Lacks performance
- Misfiring and hesitation

Chart 8

Chart 9

SMOKE - POLLUTION

- CO and/or HC too high

Chart 10

HIGH PETROL CONSUMPTION

Chart 11

ENGINE NOISE

- Pinking

Chart 12



The method without the OPTIMA station does not comply with a sufficient quality criterion.
Use the method with the OPTIMA station to obtain this quality criterion.

Fault finding - Chart without OPTIMA station

CHART 1

STARTING PROBLEMS

Does not start

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Check engine fuses (plenum chamber) :

F6 = 30 A } On engine connection
F10 = 25 A } unit

Repair if necessary.
Does the fault persist?

no

End of fault finding.

yes

Does the fuel pump make a noise when the
ignition is turned on?

yes

See Chart 1A.

no

Perform control mode G10*
and check if the relay makes a noise
(several clicking noises). Is it correct?

no

Replace the relay.

yes

Check for the presence of 12 V on track 3
of this relay.
Repair if necessary.
If the fault persists

During the timed phase, check for the
presence of 12 V on track 5 of this relay.
Is it correct?

no

Replace the relay.

yes

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

CHART 1 CONTINUED

A

During the timed phase,
check for the presence of + 12 volts
between tracks C1 and C2 of the fuel pump
connector.
Is it correct?

no

Repair the wiring between
tracks :

Fuel pump
relay

C2 → earth MG

C1 → track 5 fuel pump relay

yes

Replace the petrol pump.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

CHART 1A

STARTING PROBLEMS

Does not start

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Connect the OPTIMA station and check for the presence of a high voltage under the action of the starter motor on the spark plug leads. Is there a high voltage?

yes

Check the petrol flow and pressure (refer to vehicle Workshop Repair Manual).

Repair the fuel circuit if necessary (pump, filter, pipes, regulator, injectors...).
If the fault persists

no

Check the HT circuit.
Repair if necessary.
If the customer complaint persists

This is an engine problem and the injection is not faulty.

With the ignition on, check coils for the presence of + 12 V on track 3.
Is there + 12 V?

no

Check the continuity of the wiring between track 3 (coils) and fuse + after ignition (30 A) in the engine connection unit (in plenum chamber).
Repair.

yes

Check resistance on the coil between tracks 3/1 and 3/2.
Is it correct?

no

Replace the faulty coil.

yes

Check the insulation on the coil between the primary and secondary stage.
Is it correct?

no

Replace the coil.

yes

Replace the computer.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

CHART 2

STARTING PROBLEMS The engine starts but stalls

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.
The engine immobiliser should not be active.

With the engine running,
use the XR25 to check
the value of #12.
Is it between 4 and 20 %?

no

Refer to bargraph 14 LH fault
finding chart.

yes

Check the air inlet circuit and the exhaust
pipe.
Repair if necessary.
If the fault persists.

Check the petrol flow and pressure.
Repair if necessary [pump, filter, regulator,
pipes, injectors (sealing) ...]
If the fault persists

This is an engine problem
and the injection is not faulty.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

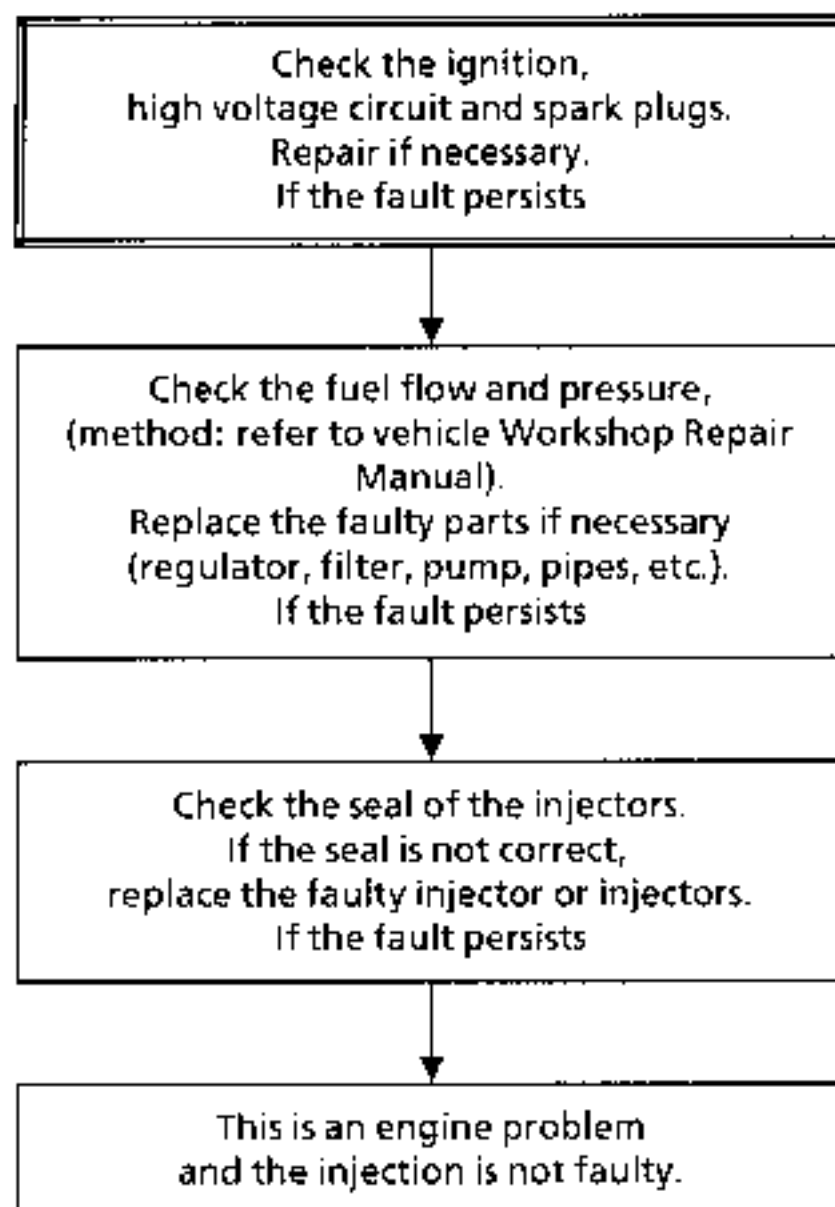
CHART 3

STARTING PROBLEMS

Starting is too long

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.



AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

CHART 4

IDLE PROBLEMS

Idle too fast

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.
R > 750 rpm

Disconnect the power-assisted steering pressostat connector. With the engine running (without touching the steering), is there an earth on track 1 on the wiring side ?

yes

Connect bornier MS 1048 and check/ensure insulation to earth of the following line is correct :
Bornier 7 → 1 pressostat
If the insulation is correct, change the computer.

no

Is there an earth on tack 1 of the pressostat (engine running) ?

yes

Replace the pressostat.

no

Check there is no air leak on the inlet (seals, take-off points on the inlet manifold, plugs, etc.).
Repair if necessary.
If the fault persists

no

End of fault finding.

yes

Check on the throttle body that it is up against the lower mechanical stop (#17 < theoretical value). Also check the accelerator control.
Repair if necessary.
If the fault persists

no

End of fault finding.

yes

A

AFTER
REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

CHART 4 CONTINUED

A

Check the fuel pressure is not too high.
Repair if necessary
(injectors, pump, pressure regulator,
pipes,etc.).

Does the fault persist?

no

End of fault finding.

yes

The injection is not faulty.
Check the engine.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

Chart 5

IDLE PROBLEMS Idle too slow

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.
R < 650 rpm

Is the idling speed too low when the steering wheel is turned to full lock?

yes

Disconnect the power-assisted steering pressostat. Turn steering wheel to full lock with the engine running and check track 1 of the pressostat. Is an earth present?

yes

no

Replace the pressostat

Check the ignition, high voltage leads, spark plugs, coil and power stages.
Repair if necessary.

If the fault persists

Check the fuel pressure is not too low.
Repair if necessary
(injectors, pump, regulator, pipes, etc.).

If the fault persists

The injection is not faulty.
Check the engine.

Connect the bornier instead of the computer and check the continuity of the line :
pressostat 1 → 7 bornier
Repair.
If the fault persists

Replace the injection computer.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 6

IDLE PROBLEMS Engine unstable

NOTE

Only refer to these customer complaints after a complete test using the XR25 has been performed. If the unstable running only appears at idling speed when the steering is at full lock, see Chart 5.

Engine idling,
check the coherence of #01.
The value read should be < 500 mbar.
Is it correct?

no

Check the absolute pressure sensor and its
wiring loom
Repair, if necessary,
replace the sensor.

yes

Check the value of the pollutants and
Lambda.
- CO < 0.3 %
- HC ≤ 100 ppm
- CO2 ≥ 14.5 %
- 0.97 ≤ Lambda ≤ 1.03
Is it correct?

no

Check:

- The catalytic converter (melted, blocked, etc.).
- The oxygen sensor (polluted, heating faulty, etc.).
- Air leak upstream of the oxygen sensor.
- The seal of the exhaust pipe.
- The type of fuel used.
- The ignition (spark plugs, high voltage leads, coils).
- The general condition of the engine (timing, etc.).

yes

Disconnect the oxygen sensor and wait for
#35 to stabilise at 128 and #05 = 0.402, and
for bargraph 3 RH to illuminate.
Does the fault persist?

no

Before replacing the oxygen sensor,
check there is no lead in the exhaust outlet.

yes

Check the petrol flow and pressure (methods,
refer to vehicle Workshop Repair Manual).
Repair if necessary (regulator, pump, filter,
pipes, injectors).
Does the fault persist?

no

End of fault finding.

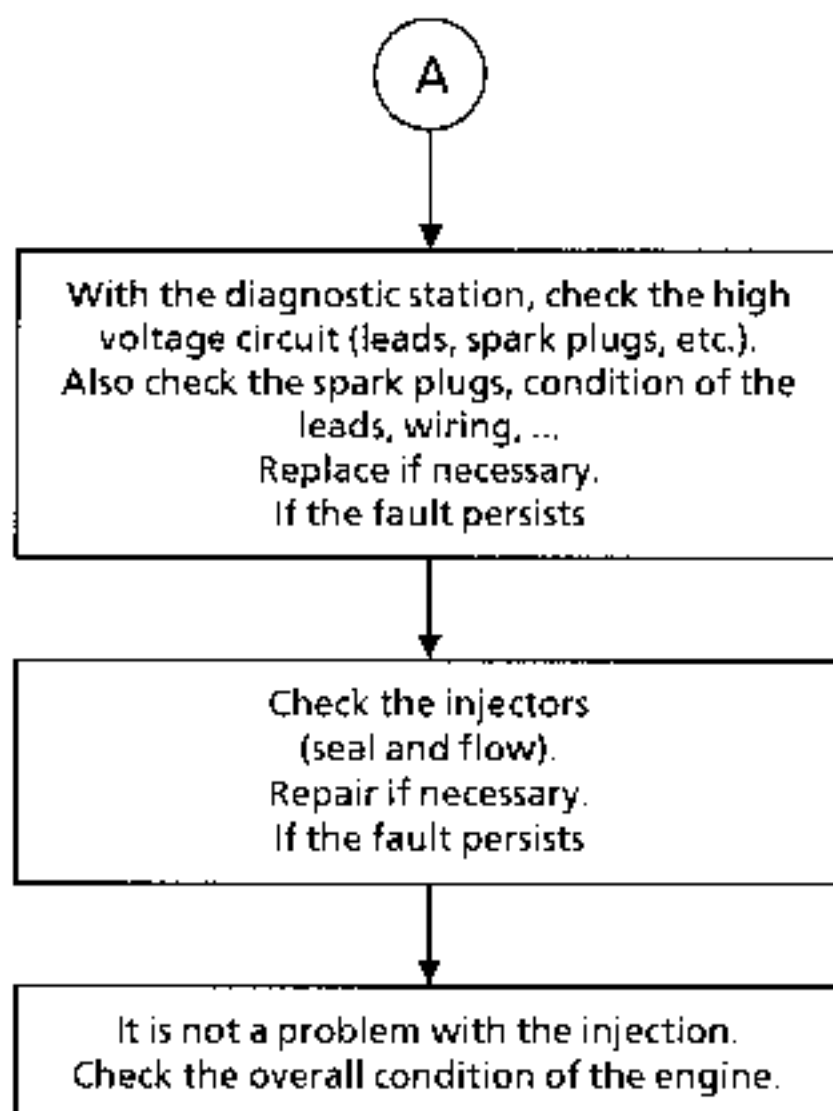
yes

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected
Erase the computer memory using G0**
Carry out a conformity check

CHART 6 CONTINUED



AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 7

IDLE PROBLEMS Hunting

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Use the XR25 to check
if the bargraph part load (2 RH) is illuminated.
Is it illuminated?

no

If the no load bargraph is extinguished or
flashes but does not illuminate bargraph 6
RH, there may be a short circuit to + 5 V
or + 12 V from line 23 of the computer
(#17 = variable).
Check wiring insulation and repair.

yes

Check the value of the pollutants and
Lambda.

- CO < 0.3 %
 - HC ≤ 100 ppm
 - CO₂ ≥ 14.5 %
 - 0.97 ≤ Lambda ≤ 1.03
- Is it correct?

no

- Check:
- The catalytic converter (melted, blocked, etc.).
 - The oxygen sensor (polluted, heating faulty, etc.).
 - Air leak upstream of the oxygen sensor.
 - The seal of the exhaust pipe.
 - The type of fuel used.
 - The ignition (spark plugs, high voltage leads, coils, etc.).
 - The general condition of the engine (timing, etc.).

yes

Disconnect the oxygen sensor and wait for
#35 to stabilise at 128 and #05 = 0.402, and
for bargraph 3 RH to illuminate.
Is the engine stable?

no

Check there is no air leak on the inlet
manifold (plugs, seals, take-off points, etc.)
Repair if necessary.

yes

Replace the oxygen sensor.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected
Erase the computer memory using G0**
Carry out a conformity check

Fault finding - Chart without OPTIMA station

CHART 8

BEHAVIOUR WHEN DRIVING Lacks performance

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Check the throttle opens fully
(full load bargraph illuminated).
Check the adjustment of the accelerator
control.
Repair if necessary.
If the fault persists

no

End of fault finding.

yes

Check the conformity of the spark plugs and
their condition.
Repair if necessary.
Does the fault persist?

no

End of fault finding.

yes

Check the values of the pollutants and
Lambda.

- CO < 0.3 %
 - HC < 100 ppm
 - CO2 ≥ 14.5 %
 - 0.97 ≤ Lambda ≤ 1.03
- Is it correct?

no

- Check:
- The catalytic converter (melted, blocked, etc.).
 - The oxygen sensor (polluted, heating faulty, etc.).
 - Air leak upstream of the oxygen sensor.
 - The seal of the exhaust pipe.
 - The type of fuel used.
 - The ignition (spark plugs, high voltage leads, coils, etc).
 - The general condition of the engine (timing, etc.).

yes

Check the air inlet circuit (air filter,...) and the
exhaust pipe.
Repair if necessary.
Does the fault persist?

no

End of fault finding.

yes

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 8 CONTINUED

A

With the XR25, check on #15.
Is #15 = 0?

yes

Perform a road test,
driving in 4th or 5th full load and listen to the
engine (pinking).
Does bargraph 6LH illuminate?

no

yes

Refer to fault chart 12 pinking.

This is an engine
problem and the
injection is not
faulty.

Refer to
bargraph 6LH fault
chart
pinking sensor.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 9

BEHAVIOUR WHEN DRIVING Misfiring and hesitation

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Perform a road test with the customer if possible to confirm the fault.
Is the fault reproduced?

no

Before returning the vehicle to the customer, check with the XR25 that everything is correct, especially the oxygen sensor (# 05-35).

yes

Check the value of the pollutants and Lambda.

- CO < 0.3 %
 - HC ≤ 100 ppm
 - CO₂ ≥ 14.5 %
 - 0.97 ≤ Lambda ≤ 1.03
- Is it correct?

no

Check:

- The catalytic converter (melted, blocked, etc.).
- The oxygen sensor (polluted, heating faulty, etc.).
- Air leak upstream of the oxygen sensor.
- The seal of the exhaust pipe.
- The type of fuel used.
- The ignition (spark plugs, high voltage leads, coils, etc.).
- The general condition of the engine (timing, etc.).

yes

Check the condition of the high voltage wiring, the spark plugs and wiring, the coils and the TDC sensor (possible cause may be interference), injectors.

Replace the faulty parts if necessary.
If the customer complaint persists,

Check for the presence and the cleanliness of the restriction in the absolute pressure sensor pipe.

Repair if necessary.

If the customer complaint persists

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0⁺.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

**ALP 9
CONTINUED**

A

Disconnect the oxygen sensor and wait for
#35 to stabilise at 128 and #05 = 0.402, and
for bargraph 3 RH to illuminate.
Perform a road test.
Does the fault persist?

no

Replace the oxygen sensor.

yes

Check the condition of the flywheel target.
Repair if necessary.
If the fault persists

Check the petrol flow and pressure
(methods, refer to vehicle Workshop Repair
Manual).
Replace the faulty parts (fuel pump,
regulator, filter, pipes, etc.).
If the fault persists

Clean the injectors.
If the fault persists,

Check the valves are not clogged.
Clean the valves if necessary.
After cleaning, does the fault persist?

no

End of fault finding.

yes

This is an engine problem,
the injection is not faulty.

**AFTER
REPAIR**

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

CHART 10

SMOKE - POLLUTION CO and/or HC too high

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed. CO and/or HC too high.
CO > 0.3 % - HC > 100 ppm

With the XR25, check on #05, 35.
Checking, refer to Workshop Repair Manual.
Is it correct?

no

Test for the presence of lead
(refer to Workshop Repair Manual).
Is there lead?

yes

no

B

Check the high voltage circuit,
(spark plugs, spark plug leads).
Repair if necessary.
If the fault persists,

Check the air supply,
the air filter, the pipes, etc.
After the repair has been carried out, does
the fault persist?

no

End of fault finding.

yes

Check the conformity of the restriction and
the condition of the pipe for the absolute
pressure sensor.
Repair if necessary.
If the fault persists,

Check injector sealing.
(especially the O-rings).
Repair if necessary.
Does the fault persist?

no

End of fault finding

yes

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 10 CONTINUED

A

Check the fuel flow and pressure
(methods, refer to Workshop Repair Manual).
Repair or replace the faulty parts (fuel pump,
pressure regulator, pipes).

If the fault persists,

Ask the customer if he has experienced an
ignition or starting problem.
Has he experienced a problem?

yes

Replace the catalytic
converter.

no

This is an engine
problem and the
injection is not
faulty.

B

Check the oxygen sensor heating
(+ 12 volts between A and B).
Is it correct?

no

Repair the
electrical circuit.

yes

Check:

- The catalytic converter (melted,
blocked, etc.).
- The oxygen sensor (polluted, heating
faulty, etc.).
- Air leak upstream of the oxygen
sensor.
- The seal of the exhaust pipe.
- The type of fuel used.
- The ignition (spark plugs, high
voltage leads, coils, etc.).
- The general condition of the engine
(timing, etc.).

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

CHART 11

HIGH PETROL CONSUMPTION

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Check there are no fuel leaks.
Repair if necessary.
Does the fault persist?

no

End of fault finding.

yes

Check the idle speed
(# 06 on the XR25).
Is it correct?

no

Refer to fault chart 4 or 5, idle problems
(Idle speed too fast or too slow).

yes

Check the vehicle complies with its definition
and is in good condition.
Repair if necessary.
Does the fault persist?

no

End of fault finding.

yes

Check the value of the pollutants and
Lambda.

- CO < 0.3 %
 - HC ≤ 100 ppm
 - CO₂ ≥ 14.5 %
 - 0.97 ≤ Lambda ≤ 1.03
- Is it correct?

no

- Check:
- The catalytic converter (melted, blocked, etc.).
 - The oxygen sensor (polluted, heating faulty, etc.).
 - Air leak upstream of the oxygen sensor.
 - The seal of the exhaust pipe.
 - The type of fuel used.
 - The ignition (spark plugs, high voltage leads, coils, etc).
 - The general condition of the engine (timing, etc.).

yes

A

AFTER
REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 11 CONTINUED

A

Check the petrol flow and pressure
(methods, refer to vehicle Workshop Repair
Manual) and the canister bleed circuit.

Repair if necessary
(regulator, pump, filter, pipes).
Does the fault persist?

no

End of fault finding

yes

This is not an injection problem,
this is an engine problem,
check :
- the engine oil level
- engine cooling
- axle assemblies
- the general condition of the
engine.

If necessary, perform a consumption test with
the ECONOTEST consumption device.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 12

ENGINE NOISE Pinking

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Perform a road test with the XR25 and check
13, 15.
Is the fault reproduced?

no

The customer probably uses his vehicle under
specific conditions, check with the customer.

yes

Check value of pollutants and Lambda.

- CO < 0.3 %
 - HC ≤ 100 ppm
 - CO₂ ≥ 14.5 %
 - 0.97 ≤ Lambda ≤ 1.03
- Is it correct?

no

Check:

- The catalytic converter (melted, blocked, etc.).
- The oxygen sensor (polluted, heating faulty, etc.).
- Air leak upstream of the oxygen sensor.
- The seal of the exhaust pipe.
- The type of fuel used.
- The ignition (spark plugs, high voltage leads, coils, etc.).
- The general condition of the engine (timing, etc.).

yes

Ask the customer what type
of fuel he uses.
Is it suitable?

no

Remind the customer what type of fuel he
should use.

yes

Check the condition and the conformity of
the spark plugs.
Replace the spark plugs if necessary.
Does the fault persist?

no

End of fault finding.

yes

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart without OPTIMA station

CHART 12
CONTINUED

A

Check the conformity of the routing of the
inlet air pipes.
Repair if necessary.
Does the fault persist?

no

End of fault finding.

yes

Using a stroboscopic light and the XR25, #51,
check the ignition advance.
Are the values the same?

no

Refer to bargraph 5 RH fault finding chart.

yes

This is not an injection problem.
Also check the engine cooling. The
combustion chambers may have to be
cleaned.

AFTER
REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.
See "Fault finding - assistance" for resistance values.

STARTING PROBLEMS

- Does not start Chart 1
- Starts but stalls Chart 2
- Starting is too long Chart 3

IDLE PROBLEMS

- Too fast Chart 4
- Too slow Chart 5
- Engine unstable Chart 6
- Hunting Chart 7

BEHAVIOUR WHEN DRIVING

- Lacks performance Chart 8
- Misfiring and hesitation Chart 9

SMOKE - POLLUTION

- Gas analysis not correct Chart 10
- Testing the oxygen sensor Chart 11

HIGH PETROL CONSUMPTION

Chart 12

ENGINE NOISE

- Pinking Chart 13

CHART 1

STARTING PROBLEMS

Does not start

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Check all the fuses (for the injection) in the passenger compartment and engine connection units. Repair if necessary.
Does the fault persist?

no

End of fault finding.

yes

Check to see if the engine immobiliser is operating.
Does the fault persist?

no

End of fault finding.

yes

Does the fuel pump make a noise when the ignition is turned on?

yes

See chart 1A.

no

When the ignition is switched on, does the fuel pump relay make a noise?

no

Check for the presence of + 12 V on 1 of this relay. Repair.

yes

A

Connect bornier instead of the injection computer and check the insulation and the continuity of bornier line 20 relay 2.
Repair.

The fault persists, replace the relay.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart with OPTIMA station

Chart 1 CONTINUED

A

Check for the presence of 12 V on track 3
of this relay.
Repair if necessary.
If the fault persists,

During the timed phase, check for the
presence of 12 V on track 5 of this relay.
Is it correct?

no

Replace the relay.

yes

During the timed phase,
check for the presence of + 12 volts between
tracks C1 and C2 of the fuel pump connector.
Is it correct?

no

Repair the wiring
between tracks C1 and C2 of the fuel pump
connector.

yes

Replace the fuel pump.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0^{**}.
Carry out a conformity check.

CHART 1A

STARTING PROBLEMS
Does not start

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Connect the OPTIMA 5800 diagnostic station and perform a starting test.
Does the station detect a fault?

yes

Repair if necessary.
If the fault persists,

Check the exhaust pipe is not blocked. Repair if necessary.
If the fault persists,

Replace the injection computer.

no

Check the fuel flow and pressure (refer to vehicle Workshop Repair Manual).
Repair the fuel circuit if necessary (pump, filter, pipes, regulator, injectors, etc.).
If the fault persists

Connect the OPTIMA 5800 diagnostic station and carry out an engine compression test.
Is it normal?

yes

no

There is a problem with the engine.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 2

STARTING PROBLEMS The engine starts but stalls

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Check to see if the engine immobiliser is operating.
If the fault persists,

Ignition on,
on the XR25, check the value of
#12 and 21.
Are these values coherent?

no

Refer to bargraph 14 LH fault finding chart.

yes

Check the air inlet circuit and the exhaust pipe.
Repair if necessary.
If the fault persists,

Check the fuel flow and pressure.
Repair if necessary [pump, filter, regulator,
pipes, injectors (seals) ...]
If the fault persists,

There is a problem with the engine
and the injection is not faulty.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 3

STARTING PROBLEMS
Starting is too long

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Connect the OPTIMA 5800 diagnostic station and perform a starting test. Does the station detect a fault?

yes

Follow the instructions.

no

Perform a test on the station with the engine running. Does the station detect a fault?

yes

Follow the instructions.

no

Check the fuel flow and pressure.
(Refer to vehicle Workshop Repair Manual.)
Repair the fuel circuit if necessary (pump, filter, pipes, regulator, injectors, etc.).

If the fault persists,

Check the injectors are correctly sealed.
If they are not correctly sealed, replace the faulty injector or injectors.
If the fault persists,

There is a problem with the engine and the injection is not faulty.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 4

IDLE PROBLEMS

Idle too fast

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

R > theoretical idle speed or #12 < theoretical value.

Disconnect the power-assisted steering pressostat connector. With the engine running (without touching the steering), is there an earth on track 1 wiring side ?

yes

Connect the bornier and check the line insulation to earth :
bornier 7 → 1 pressostat
Repair if necessary.
If there is still an earth on track 1,

Replace the injection computer.

no

Is there an earth on track 1 of the pressostat (with the engine running) ?

yes

Replace the pressostat.

no

Check no air is leaking into the manifold (seals, take-off points on the inlet manifold, plugs, etc.).
Repair if necessary.
If the fault persists,

Check on the throttle body that it is up against the lower mechanical stop (#17 < theoretical value). Also check the accelerator control. Repair if necessary.
If the fault persists,

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected
Erase the computer memory using G0**
Carry out a conformity check

Fault finding - Chart with OPTIMA station

CHART 4 CONTINUED

A

Check the fuel pressure is not too high.
Repair if necessary
(injectors, pump, pressure regulation,
pipes, etc.).

If the fault persists,

Check the engine oil level
(breather)
If the fault persists,

The injection is not faulty.
Check the engine.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart with OPTIMA station

CHART 5

IDLE PROBLEMS Idle too slow

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.
R < theoretical idle speed #12 > theoretical value

Is the idling speed too slow at the moment
when the steering is turned to full lock?

yes

See Chart 5A

no

Connect the OPTIMA 5800 diagnostic station
and perform an ignition test with the
engine running.
Does the station detect a fault?

yes

Follow the instructions.

no

Check the fuel flow and pressure
(refer to vehicle Workshop Repair Manual).
Repair the fuel circuit if necessary (pump,
filter, pipes, regulator, injectors, etc.).

If the fault persists,

Check the engine oil level
(oil splashing)
If the fault persists,

The injection is not faulty.
Check the engine.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart with OPTIMA station

CHART 5A from CHART 5

IDLE PROBLEMS Idle too slow

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.
R < theoretical idle speed or #12 > theoretical value

Disconnect the power-assisted steering
pressostat. Turn to full lock with the engine
running, and check track 1 of the pressostat.
Is an earth present ?

no

Replace the pressostat.

yes

Connect the bornier instead of the computer
and check the continuity of the line:
bornier 7 → 1 pressostat
Repair if the customer complaint persists.

Replace the injection computer.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 6

IDLE PROBLEMS Engine unstable

NOTE

Only refer to these customer complaints after a complete test using the XR25 has been performed. If engine running is only unstable when at idling speed with the steering wheel at full lock, see Chart 5A.

Perform a gas analysis
(Refer to fault chart 10 - smoke/pollution).
If the fault persists,

Connect the OPTIMA 5800 diagnostic station
and perform an ignition test with the engine
running.
Does the station detect a fault?

yes

Follow the instructions.

no

Check the operation of the oxygen sensor
(Refer to fault chart 11 - smoke/pollution).
If the fault persists,

Engine idling, check the coherence of #01
(the value read should be less than 500 mbar).
Is it correct?

no

Check the absolute pressure sensor and its
wiring loom. Repair,
and if necessary replace the sensor.

yes

Check the fuel flow and pressure
(refer to vehicle Workshop Repair Manual).
Repair the fuel circuit if necessary (pump,
filter, pipes, regulator, injector, etc.).
If the fault persists,

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 6
CONTINUED

A

Check the sealing and the flow of the
injectors.
Repair if necessary.
If the fault persists,

Check the general condition of the engine
using engine compression tests with the
OPTIMA 5800 station.

AFTER
REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart with OPTIMA station

CHART 7

IDLE PROBLEMS Hunting

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Perform a gas analysis
(Refer to fault chart 10 - smoke/pollution)
If the fault persists,

Connect the OPTIMA 5800 diagnostic station
and perform an ignition test with the engine
running.
Does the station detect a fault?

yes

Follow the instructions,

no

Check the operation of the oxygen sensor
(Refer to fault chart 11 - smoke/pollution).
If the fault persists

Check there is no air leak on the inlet
manifold and check the operation of the
injectors (seizing, etc.).

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart with OPTIMA station

CHART 8

BEHAVIOUR WHEN DRIVING Lacks performance

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Check the throttle opens fully
(full load bargraph illuminated).
Check the adjustment of the accelerator
control. Repair if necessary.
If the fault persists,

Check the air filter: dirty, deformed. Repair if
necessary.
If the fault persists,

Connect the OPTIMA 5800 diagnostic station
and perform an ignition test with the engine
running.
Does the station detect a fault?

yes

Follow the instructions.

no

Perform a gas analysis
(Refer to fault chart 10 - Smoke/pollution).
If the fault persists,

Connect the OPTIMA 5800 diagnostic station
and perform an engine compression test
Is it normal?

no

There is a problem with the engine.

yes

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart with OPTIMA station

CHART 8 CONTINUED

A

Check the exhaust pipe
(obstruction ...). Is it correct?

yes

With the XR25, check #15.
Does #15 = 0?

yes

Perform a road test,
driving in 4th or 5th full load and listen to the
engine (pinking).
Does bargraph 6LH illuminate?

no

yes

Refer to fault chart 12 pinking.

There is a problem
with the engine and
the injection is not
faulty.

Refer to
bargraph 6LH fault
chart
pinking sensor.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 9

BEHAVIOUR WHEN DRIVING Misfiring and hesitation

NOTE

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Perform a road test, if possible with the customer present, to highlight the fault.
If the fault is reproduced,

Connect the OPTIMA 5800 diagnostic station and perform an ignition test with the engine running.
Does the station detect a fault?

yes

Follow the instructions.

no

Perform a gas analysis
(Refer to fault chart 10 - Smoke/pollution).
If the fault persists,

Check the oxygen sensor
(Refer to fault chart 11 - Smoke/pollution).
If the fault persists,

Check for the presence and the cleanliness of the restriction in the absolute pressure sensor pipe.
Repair if necessary.
If the fault persists,

Check injector sealing and the fuel flow and pressure (refer to Workshop Repair Manual).
Repair if necessary.
If the fault persists,

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart with OPTIMA station

CHART 9 CONTINUED

A

Check the condition of the flywheel target.
This is done by using the engine speed sensor
signal display function on the OPTIMA 5800
station.

Repair if necessary.
If the fault persists,

Check the valves are not clogged.
Clean the valves if necessary.
After cleaning, does the fault persist?

no

End of fault finding.

yes

There is a problem with the engine,
the injection is not faulty.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 10

SMOKE - POLLUTION Gas analysis not correct

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Connect the OPTIMA 5800 diagnostic station and connect it to a 4040, 5040 or AGM 1500 type 4 gas analyser.
Perform an anti-pollution/ gas analysis test.

Does the station detect a fault?

no

End of fault finding using fault chart 10
NOTE: a correct gas analysis indicates that the catalytic converter is working correctly.

yes

Is the CO too high (CO > 0.5 when idling or CO > 0.3 at 2500 rpm.) ?

yes

Check the oxygen sensor
(Refer to fault chart 11 - Smoke/pollution).
Does the fault persist?

no

Check there is not a problem with the engine
by performing a compression test
(OPTIMA 5800 diagnostic station).

Check the catalytic converter (efficient, fusion, presence of lead, etc.), the air supply (filter, manifold, etc.), and the condition of the engine (abnormal oil consumption).

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 10
CONTINUED 1

A

Is (Lambda < 0.97) ?

yes

Connect the OPTIMA 5800 diagnostic station and perform an ignition test with the engine running.
If the station does not detect a fault,

Check the oxygen sensor
(Refer to fault chart 11 - Smoke/pollution).
If the fault persists,

Check there is not a problem with the engine
by performing a compression test
(OPTIMA 5800 diagnostic station).

Check the catalytic converter (efficient, fusion, presence of lead, etc.), the air supply (filter, manifold, etc.), and the condition of the engine (abnormal oil consumption).

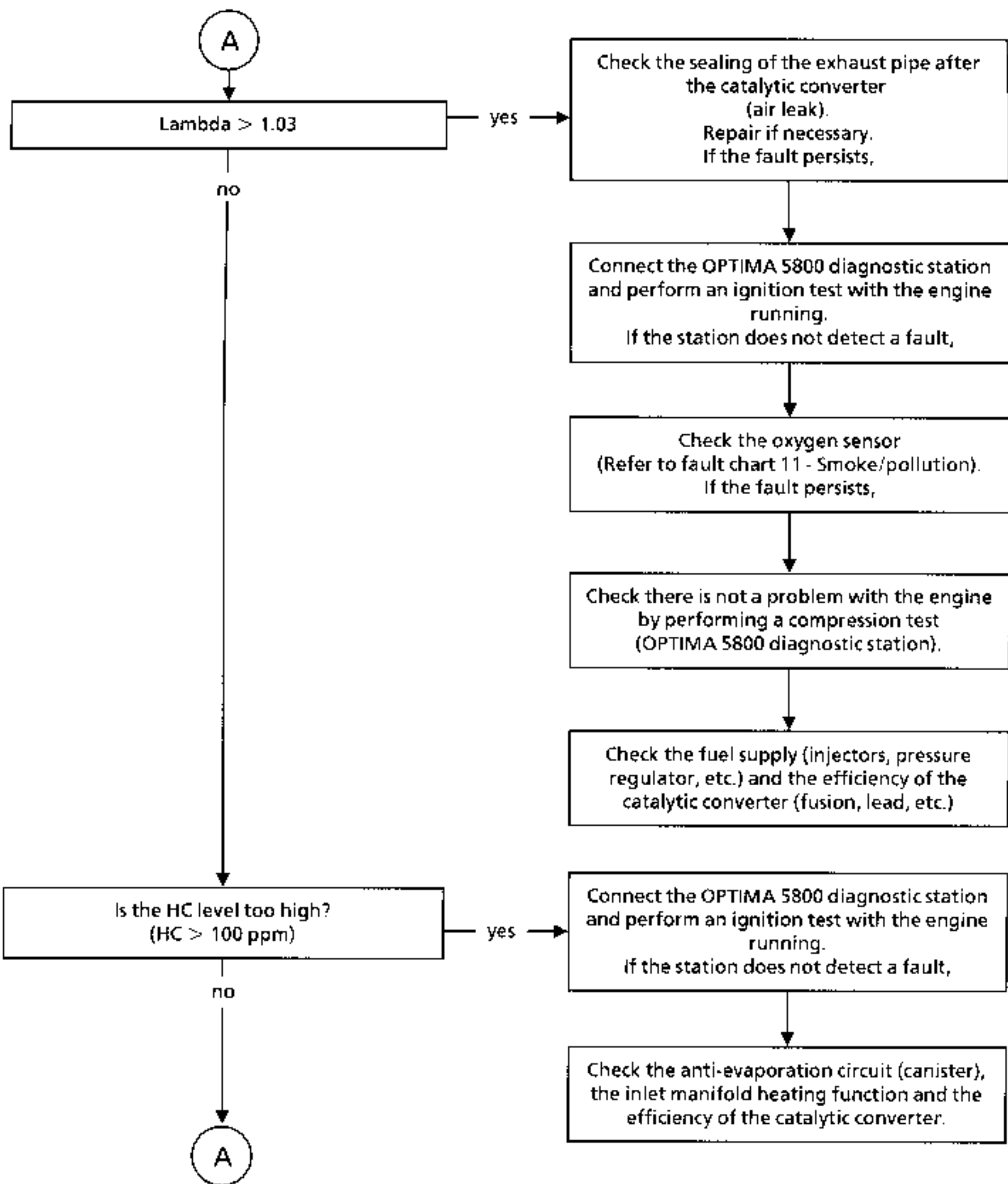
no

A

**AFTER
REPAIR**

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 10 CONTINUED 2



AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 10 CONTINUED 3

A

Is the oxygen level too high ($O_2 > 0.8\%$)?

yes

Connect the OPTIMA 5800 diagnostic station and perform an ignition test with the engine running.
If the station does not detect a fault,

Check there is no air leak on the inlet manifold and check the operation of the injectors (seizing, etc.).

no

CO₂ too low.

yes

Check the sealing of the exhaust pipe after the catalytic converter and check the operation of the injectors (seizing, etc.).

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 11

SMOKE - POLLUTION Testing the oxygen sensor

NOTES

Only refer to these customer complaints after a complete test using the XR25, especially the following parameters:

- #35 (richness correction) : this should oscillate around 128
- #30 and #31 (adaptive richness): under no circumstances should they be at their limits.

Connect the OPTIMA 5800 diagnostic station and perform an anti-pollution / oxygen sensor test.
Does the station detect a fault?

no

End of fault finding using fault chart 11.
The oxygen sensor is not faulty.

yes

Check the sensor heating:

- presence of + 12 V at the connector with the engine running,
- the sensor heating resistor is not in an open circuit or short circuited to earth.

If the heating is correct

Is the minimum voltage too high?
(Umin > 300 mV: signal offset towards richness).

yes

Connect the OPTIMA 5800 diagnostic station and perform an ignition test with the engine running.
If the station does not detect a fault,

no

Check the fuel pressure (regulator), the injectors (seal,...) the anti-evaporation circuit (canister) and the fuel grade.
Repair if necessary.

If the fault persists,

Replace the sensor.

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 11 CONTINUED 1

A

Is the maximum voltage too low?
($U_{max} < 600 \text{ mV}$: signal offset towards a lean mixture).

yes

Check there is no air leak before the oxygen sensor (exhaust manifold leak, etc.) and the fuel pressure.
Repair if necessary.
If the fault persists,

Replace the sensor.

no

Is the difference between maximum and minimum too low ($< 500 \text{ mV}$)?

yes

The sensor is probably clogged.
Perform a road test to unclog it and redo the test on the station.
If the test is not correct

Connect the OPTIMA 5800 diagnostic station and perform an ignition test with the engine running.
If the station does not detect a fault

Check there is no air leak on the inlet manifold and check the operation of the injectors (seizing, etc.).
Repair if necessary.
If the fault persists,

Replace the sensor.

no

A

AFTER REPAIRS

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 11 CONTINUED 2

A

Sensor period incorrect (> 1 second).

yes

The sensor may become clogged or polluted (silicone) if the sensor is open for a long time. An additional fault finding operation is possible using a 4 gas analyser (SOURIAU 4040-5040 or SAGEM AGM 1500) since, in this case, $\text{Lambda} > 1.03$ and $\text{O}_2 > 1\%$. Perform a road test to unclog the sensor.

Does it open correctly?

no

Replace the sensor.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

Fault finding - Chart with OPTIMA station

CHART 12

HIGH FUEL CONSUMPTION

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Check there are no fuel leaks.
Repair if necessary.
If the fault persists,

Check the idle speed
(#06 on XR25).
Is it correct?

no

Refer to fault chart 4 or 5, idle problems
(idle speed too fast or too slow).

yes

Check the vehicle complies with its definition
and is in good condition.
Repair if necessary.
If the fault persists,

Perform a gas analysis
(Refer to fault chart 10 - Smoke/pollution).
If the fault persists,

Check the operation of the O₂ sensor
(Refer to fault chart 11 - Smoke/pollution).
If the fault persists,

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 12 CONTINUED

A

Connect the
OPTIMA 5800 diagnostic station and perform
an engine compression test.
Is it normal?

no

There is a problem with the engine.

yes

Check the petrol flow and pressure
(methods, refer to vehicle Workshop Repair
Manual) and the canister bleed circuit.
Repair if necessary
(regulator, pump, filter, pipes).
Does the fault persist?

yes

This is not an injection problem, there is a
problem with the engine.

Check:

- engine oil level
- coolant
- axle assemblies
- the general condition of the
engine.

If necessary, perform a consumption test with
the ECONOTEST consumption device.

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using GO**.
Carry out a conformity check.

CHART 13

ENGINE NOISE Pinking

NOTES

Only refer to these customer complaints after a complete test using the XR25 has been performed.

Perform a road test with the XR25 and check
13, 15.
Is the fault reproduced?

no

The customer must use his vehicle under
specific conditions, check with the customer.

yes

Perform a gas analysis
(Refer to fault chart 10 - Smoke/pollution).
If the fault persists

Check the operation of the O₂ sensor
(Refer to fault chart 11 - Smoke/pollution).
If the fault persists

Ask the customer what type of fuel he uses.
Is it suitable?

no

Remind the customer what type of fuel he
should use.

yes

Check the condition and the conformity of
the spark plugs.
Replace the spark plugs if necessary.
Does the fault persist?

no

End of fault finding.

yes

A

AFTER REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

CHART 13
CONTINUED

A

Check the conformity: of the routing of the
inlet air pipes and the air filter.
Repair if necessary.
Does the fault persist?

yes

Using a stroboscopic light and the XR25, #51,
check the ignition advance.
Are the values the same?

no

Refer to bargraph 5 RH fault chart.

yes

This is not an injection problem.
Also check the engine cooling. The
combustion chambers may have to be
cleaned.

AFTER
REPAIR

Check the sensors disconnected during the operation are correctly reconnected.
Erase the computer memory using G0**.
Carry out a conformity check.

NOTES	Engine cold, ignition on
-------	--------------------------

Order of operations	Function to be checked	Action	Bargraph	Display and Notes
1	Dialogue with XR25	D13 (selector on S8)		<div>9.NJ</div> Use fiche no. 27 fault test side
2	Interpretation of normally illuminated bargraphs		<div><div>1</div><div><div></div><div></div></div><div>1</div><div><div></div><div></div></div></div>	 Fault test Code present
3	Specification of computer	G70*		<div>XXXX</div> Part Number displayed in three sequences (refer to section 12)
4	Switching to status test	G01*		<div>10.NJ</div> Use fiche no. 27 status test side

NOTES	Engine cold, ignition on
-------	--------------------------

Order of operations	Function to be checked	Action	Bargraph	Display and Notes
5	Interpretation of normally illuminated bargraphs		<div>1</div> <div> <div></div> <div></div> </div> <div>2</div> <div> <div></div> <div></div> </div> <div>4</div> <div> <div></div> <div></div> </div> <div>5</div> <div> <div></div> <div></div> </div> <div>19</div> <div> <div></div> <div></div> </div> <div>19</div> <div> <div></div> <div></div> </div>	<div>Code present</div> <div>No load recognition</div> <div>Receiving – after ignition information</div> <div>Locking relay command effective</div> <div>Computer configured to work with: Manual gearbox (G51*)</div> <div>Automatic transmission (G50*)</div>

NOTES	Engine cold, ignition on
-------	--------------------------

Order of operations	Function to be checked	Action	Bargraph	Display and Notes
6	Throttle position potentiometer	No load # 17	<div>2</div> <div><div></div><div></div></div>	$10 \leq X \leq 36$
		Accelerator pedal lightly pressed	<div>2</div> <div><div></div><div></div></div>	
		Full load # 17	<div>2</div> <div><div></div><div></div></div>	$193 \leq X \leq 240$
7	Absolute pressure sensor	# 01		$X = \text{local atmospheric pressure}$
8	Coolant temperature sensor	# 02		$X = \text{ambient temperature} \pm 5^{\circ}\text{C}$
9	Air temperature sensor	# 03		$X = \text{ambient temperature} \pm 5^{\circ}\text{C}$
10	Idle regulation solenoid valve	# 12		The value is variable depending on the coolant temperature $19 \% \leq X \leq 80 \%$
11	Engine speed	# 06		$X = 0 \text{ rpm}$
12	Canister bleed	# 23		$X = 0 \%$








NOTES

Engine warm, at idle speed after the fan unit has operated at least once (air conditioning and heated windscreen not selected, automatic transmission in Park or Neutral position)

Order of operations	Function to be checked	Action	Bargraph	Display and Notes
1	Switching to status test	G01*		<div>10.NJ</div> <p>Use fiche no. 27 status test side</p>
2	No fault		<div>20</div> <div> <div></div> </div>	<p>Check this bargraph is not flashing; otherwise type G02* and turn the fiche over. Repair the faulty component then erase the fault memory (G0**) and return to status test (G01*)</p>
3	Battery voltage	# 04 if in # 04 otherwise in # 06		<p>13 volts < X < 14.5 volts</p> <p>X < 12.7 volts</p> <p>Nominal engine speed < X < 880 rpm</p>

NOTES

Engine warm, at idle speed after the fan unit has operated at least once (air conditioning and heated windscreen not selected, automatic transmission in Park or Neutral position)

Order of operations	Function to be checked	Action	Bargraph	Display and Notes
4	Interpretation of normally illuminated bargraphs	—	<div>1</div> <div>  </div> <div>Code present</div> <div>2</div> <div>  </div> <div>No load recognition</div> <div>3</div> <div>  </div> <div>Receiving engine speed information</div> <div>4</div> <div>  </div> <div>Receiving + after ignition information</div> <div>5</div> <div>  </div> <div>Locking relay command effective</div> <div>6</div> <div>  </div> <div>Richness regulation active</div> <div>6</div> <div>  </div> <div>Richness regulation active</div> <div>(flashing or steady)</div>	

NOTES

Engine warm, at idle speed after the fan unit has operated at least once (air conditioning and heated windscreen not selected, automatic transmission in Park or Neutral position)

Order of operations	Function to be checked	Action	Bargraph	Display and Notes
4 (continued)	Interpretation of normally illuminated bargraphs (continued)	# 23	<div><div>7</div><div><div></div><div></div></div></div> <div><div>7</div><div><div></div><div></div></div></div> <div><div>19</div><div><div></div><div></div></div></div> <div><div>19</div><div><div></div><div></div></div></div>	Canister bleed solenoid control $X = 0$ Fuel pump active Computer configured to work with: Manual gearbox (G51*) Automatic transmission (G50*)
5	Idle speed	Without air conditioning # 06 # 12	<div><div>6</div><div><div></div><div></div></div></div>	$X = 740 + 50 \text{ rpm}$ $4 \% < X < 20 \%$
6	Anti-pinking noise measurement	# 13 (3500 rpm, no load)		X variable and not zero

NOTES

Engine warm, at idle speed after the fan unit has operated at least once (air conditioning and heated windscreen not selected, automatic transmission in Park or Neutral position)

Order of operations	Function to be checked	Action	Bargraph	Display and Notes
7	Manifold pressure	# 01 without consumer		X is variable and is around 270 $\leq X \leq 410$ mb (this pressure varies as a function of the altitude)
8	Richness regulation	With stable engine speed of 2500, then at idle speed # 05 # 35	<div>6</div> <div> <div></div> <div></div> </div> <div>6</div> <div> <div></div> <div></div> </div>	<p>X varies in a range of 50 to 900 mV approximately</p> <p>X is around and varies slightly about 128 with a maximum of 255 and a minimum of 0</p>
9	Adaptive idle correction	# 21		$-4.3\% \leq X \leq +3.9\%$ (average value after erasing memory : 0)
10	Canister bleed	# 23	<div>11</div> <div> <div></div> <div></div> </div>	<p>Canister bleed is forbidden. The solenoid valve remains closed</p> <p>X = 0 %</p>

NOTES

Test to be performed during a road test

Order of operations	Function to be checked	Action	Bargraph	Display and Notes
1	Switching to status test	G01*		<div>10.NJ</div> <p>Use fiche no. 27 status test side</p>
2	No fault		<div>20</div> <div> <div></div> <div></div> </div>	<p>Check this bargraph is not flashing; otherwise type G02* and turn the fiche over. Repair the faulty component then erase the fault memory (G0**) and return to status test (G01*)</p>
3	Canister bleed	# 23	<div>7</div> <div> <div></div> <div></div> </div>	<p>Canister bleed is authorised X = variable</p>
4	Vehicle speed information	# 18	<div></div> <div> <div></div> <div></div> </div>	<p>X = vehicle speed read on the speedometer</p>
5	Pinking sensor	<p>Vehicle loaded and engine speed of 2000 rpm.</p> <p># 13</p> <p># 15</p>		<p>X = variable and not zero</p> <p>$0 \leq X \leq 6$ (cassette 15 on #15 gives an incorrect value) (if the sensor is faulty, the advance is systematically retarded by 4° which is not visible on # 15)</p>

NOTES

Test to be performed during a road test

Order of operations	Function to be checked	Action	Bargraph	Display and Notes
6	Adaptive richness	After programming phase # 30 # 31		$96 \leq X \leq 160$ (average value after erasing memory: 128) $96 \leq X \leq 160$ (average value after erasing memory: 128)

Injector resistance	= 14.5 Ω ± 1 Ω			
Idle speed regulation stepping motor resistance	:	A - D = 53 Ω ± 5 Ω		
		B - C = 53 Ω ± 5 Ω		
Canister bleed valve resistance	= 35 Ω ± 5 Ω			
Ignition coil resistance	:	1-2 = 2 Ω	2-3 = 1.6 Ω	
		1-3 = 1.6 Ω	2-4 = 1.6 Ω	
		1-4 = 1.6 Ω	3-4 = 1.1 Ω	
		HT-HT = 7.2 kΩ		
Flywheel signal resistance	= 220 Ω			
Air temperature sensor resistance	= 800 to 1500 Ω at 40°C			
Throttle potentiometer resistance	:	No load	C-A = 1260 Ω	Full load
			C-B = 2200 Ω	C-A = 2200 Ω
			B-A = 1200 Ω	C-B = 1260 Ω
			B-A = 1200 Ω	
Coolant temperature sensor resistance	= 210 to 270 Ω at 90°C			
O2 sensor resistance	:	A-B = 3 to 15 Ω		
Petrol pressure	= 3 bar or 2.5 bars at idling speed			
Values for:	CO	= 0.3 % max		
	HC	= 100 ppm max		
	CO2	= 14.5 % max		
	Lambda (λ)	= 0.97 < λ < 1.03		

ESSENTIAL SPECIAL TOOLING

OPTIMA 5800 diagnostic station
4040-5040 or AGM 1500 4 gas analyser

ANALYSING EXHAUST GASES USING THE DIAGNOSTIC STATION

The OPTIMA 5800 diagnostic station connected to an analyser (SOURIAU 4040-5040 or SAGEM AGM 1500) allows the gases to be checked in accordance with the legislation relating to vehicles with catalytic converters. This test is performed at mid-load and at idle speed with the following limits.

Idle speed	2 500 rpm
CO < 0.5 %	CO < 0.3 %
HC < 100 ppm	HC < 100 ppm

Independently to the legislation, other measurements supplied by the analyser fall within certain tolerances:

Idle speed	2 500 rpm
CO ₂ > 13.5 %	CO ₂ > 13.5 %
O ₂ < 0.8 %	O ₂ < 0.8 %
0.97 < Lambda < 1.03	0.97 < Lambda < 1.03

NOTE : Lambda = 1 / Richness

- Lambda > 1 → Lean mixture
- Lambda < 1 → Rich mixture

The condition Lambda = 1 is essential to ensure the catalytic converter functions correctly.

The station causes the following phases:

- Warming up the engine (oil temperature greater than 60°C).
- Holding for one minute at 2 500 rpm to activate richness regulation and simultaneous gas measurements.
- If the gas analysis at 2 500 rpm is correct, a measurement at idle speed is taken.

If the analysis is deemed to be incorrect by the station, diagnostic messages appear where the priority of the gases is

1) CO 2) Lambda 3) HC 4) O₂ 5) CO₂

NOTE : The report for the whole anti-pollution test can be printed.

ESSENTIAL SPECIAL TOOLING

OPTIMA 5800 diagnostic station

CHECKING THE OXYGEN SENSOR WITH THE DIAGNOSTIC STATION

Obvious faults relating to the oxygen sensor are detected by the XR25:

- Open circuit.
- Short circuit to earth.
- Short circuit to + 12 V.

The diagnostic station allows operating faults to be highlighted which could not be detected with the XR25. The sensor can be checked for the following customer complaints:

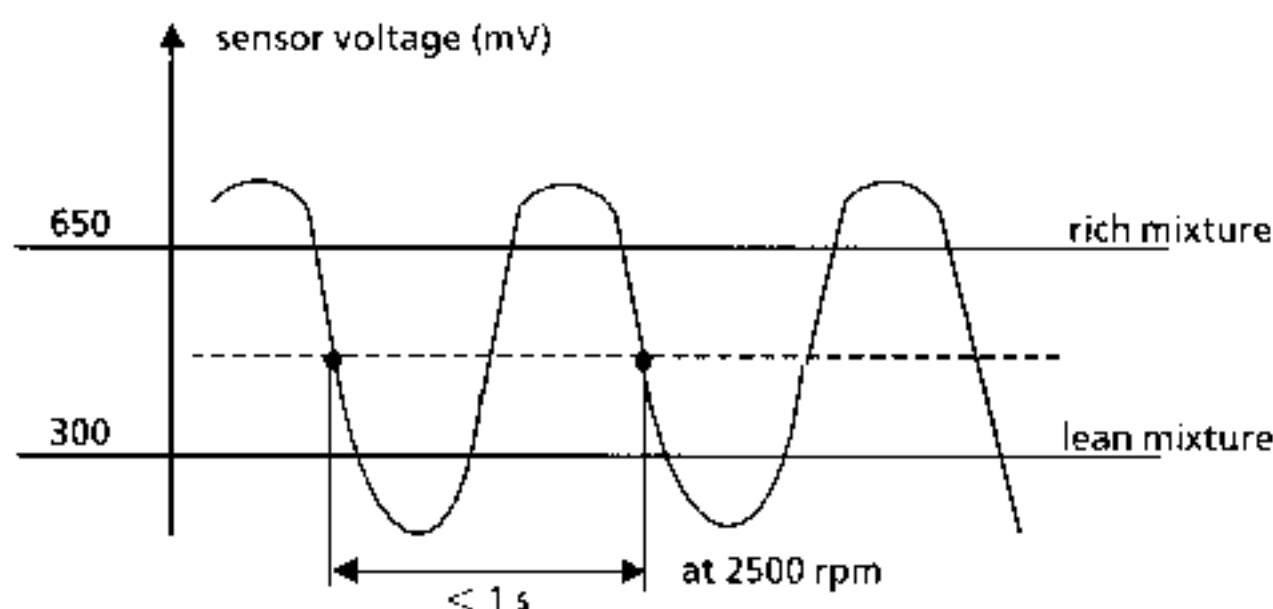
- Excess fuel consumption.
- Irregular idle, hunting.
- Hesitation.
- Incorrect gas analysis.

The station performs the check by being connected in parallel to the signal emitted by the oxygen sensor. This sensor is analysed at a stable engine speed (2500 rpm), when the richness regulation conditions are concurring (engine warm, etc.).

CONNECTION:

The 4-track connector of the sensor is located on the clutch bellhousing.

During normal operation, the signal is in the form of a sine wave:



The characteristic parameters of this signal are the maximum voltage, the minimum voltage and the period. For all engine types, the correct values are:

- Maximum voltage > 600 mV.
- Minimum voltage < 200 mV.
- Difference (Maximum voltage - minimum voltage) > 500 mV.
- Period < 1 second.

ESSENTIAL SPECIAL TOOLING

OPTIMA 5800 diagnostic station

CHECKING THE IGNITION USING THE DIAGNOSTIC STATION

The OPTIMA 5800 diagnostic station allows the ignition to be checked in two ways:

- **STARTING TEST:** If the vehicle does not start. When no fault finding operations can be performed with the XR25, this operation checks for the presence and the quality of the ignition under the action of the starter motor.
- **TEST WITH ENGINE RUNNING:** These measurements are in addition to those from the XR25 for customer complaints such as: hesitation, misfiring, incorrect gas analysis, unstable idle ...

In addition, the station's measuring module allows static ignition to be checked using two high voltage clamps, where the coils are dual output (when a firing order is given, two sparks are produced simultaneously: one in the cylinder at the combustion phase and the other in the cylinder at the exhaust phase). During the measurements, the two clamps have to be moved from one coil to the other.

Their power is controlled directly by the computer (the amplifier module is integral with the computer): the station is therefore connected directly to the coil inputs.

CONNECTIONS:

- D7F engine : Connect to two coils (unit to left of rocker cover).

MEASUREMENTS:

The ignition is characterised by the following values:

Engine running:

- Spark duration.
- Arcing voltage (or ionising voltage).
- Arcing voltage during the exhaust phase (static ignition).

Starting test:

- Ignition feed voltage.
- TDC sensor signal.
- Spark duration.
- Arcing voltage (or ionising voltage).
- Arcing voltage during the exhaust phase (static ignition).

The station checks the coherence of the values obtained for each cylinder, and compares the measurements with a database for each engine type.

FUEL TANK

Pump and sender unit

19

ESSENTIAL SPECIAL TOOLING

Mot. 1264-01	Wrench for removing the pump - sender unit nut.
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IMPORTANT :

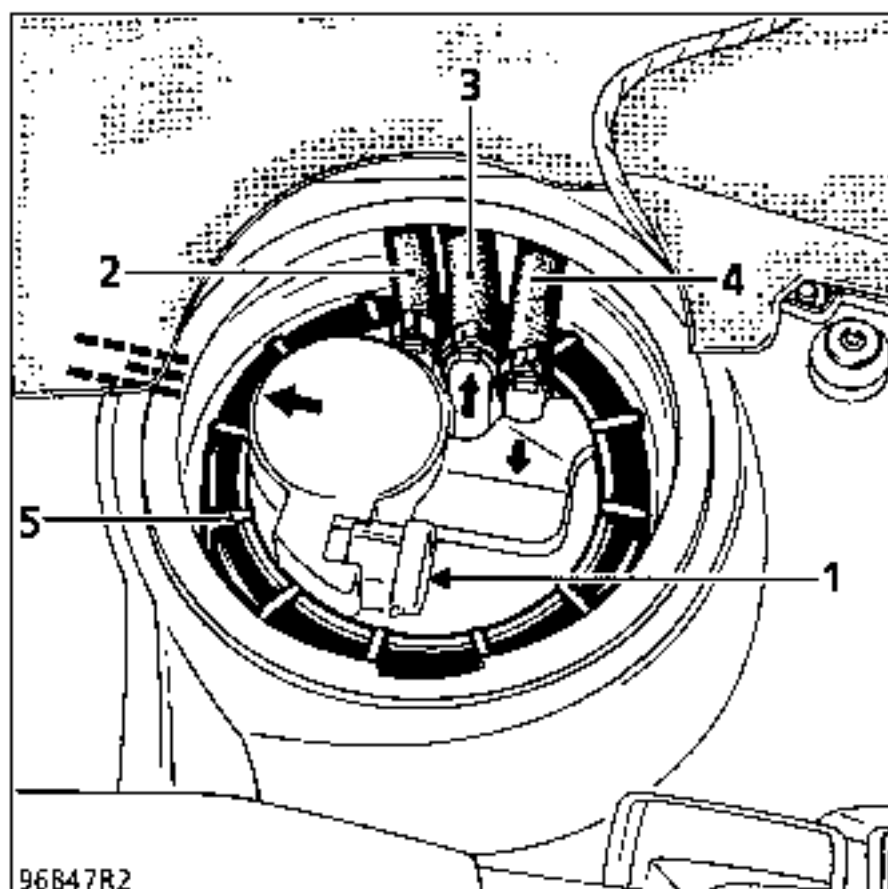
During all operations on the fuel tank or fuel supply circuit, it is vital to :

- avoid smoking and keep all heat sources away from the working area,
- take precautions against fuel splashes due to the residual pressure in the fuel pipes when they are removed.

REMOVING

The fuel tank does not need to be removed to remove the pump and sender unit assembly. It may be reached from inside the vehicle as follows:

- Disconnect the battery.
- Lift the rear bench seat.
- Remove the plastic cover.
- Disconnect the electrical connector (1).



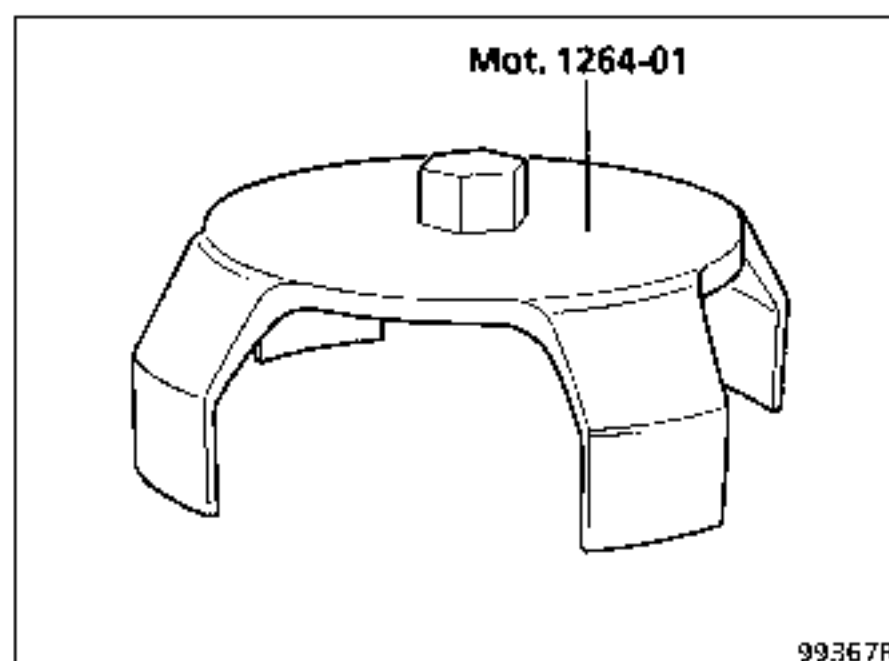
Disconnect :

- the petrol vapour rebreathing pipe (2),
- the fuel supply pipe (3) ,
- the fuel return pipe (4).

Remove mounting nut (5) using tool

Mot. 1264-01. (Release the nut, remove the tool then slacken the nut by hand and remove it.)

Remove the pump and sender unit assembly.



NOTE: If several hours elapse between removing and refitting the pump and sender unit assembly, refit the nut to the fuel tank to prevent it from distorting.

REFITTING

Check the seal is not damaged and renew it if necessary.

Fit the seal on the fuel tank before refitting the assembly.

Position the pump and sender unit assembly (arrow (F) should be aligned with the longitudinal axis of the vehicle, pointing backwards).

Fit the nut and tighten it to a torque of 3.5 daN.m.

Reconnect the petrol pipes.

Reconnect the electrical connector.

Refit the plastic cover.

AMOUNT AND GRADE OF COOLANT MIXTURE

Engine	Quantity (in litres)	Grade	Special points
D7F	5	GLACEOL RX (type D) Use coolant only	Protection down to - 20 ± 2 °C for hot, temperate and cold countries. Protection down to - 37 ± 2 °C for extremely cold countries.

THERMOSTAT

Engine type	Begins to open (in °C)	Fully open (in °C)	Travel (in mm)
D7F	88	± 100	9

There is no water control valve.

Coolant circulates continuously in the heater matrix, assisting with engine cooling.

FILLING

Check that the drain plug(s) *is/are* screwed on correctly.

Open the two bleed screws.

Fill the circuit at the expansion bottle opening.

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

Start the engine (1500 rpm).

Adjust the level by overflow for approximately 4 minutes.

Close the expansion bottle.

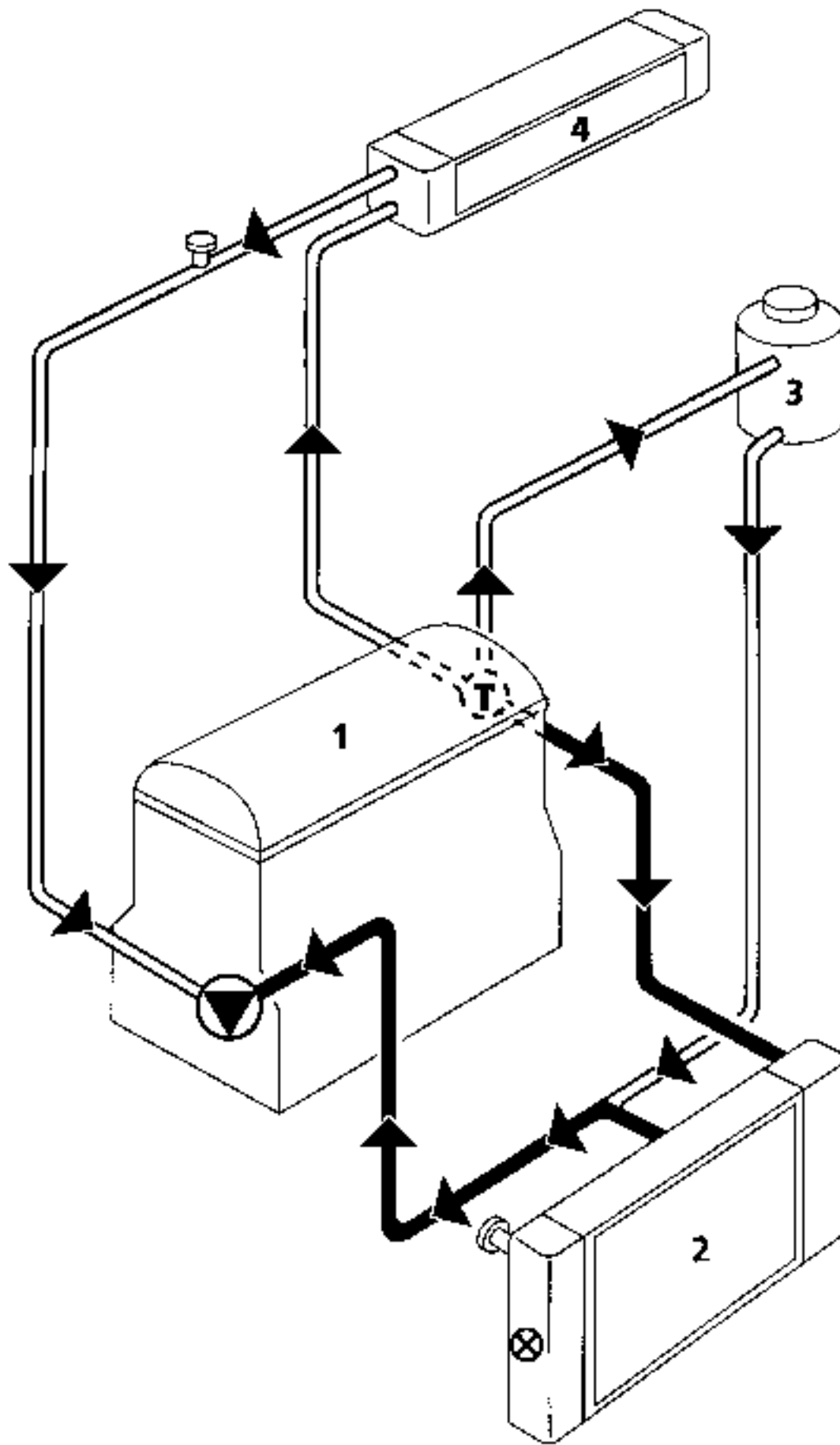
BLEEDING

Let the engine run for 10 minutes at 1500 rpm, until the engine cooling fan operates (time required for automatic degassing).





Check the fluid level is close to the "Maximum" mark.

NEVER OPEN THE BLEED SCREWS WHEN THE ENGINE IS RUNNING.

TIGHTEN THE EXPANSION BOTTLE CAP WHEN THE ENGINE IS WARM.



- 1 Engine
- 2 Radiator
- 3 "Hot" expansion bottle with permanent de-gassing
- 4 Heater matrix

-  Water pump
-  Thermostat
-  Bleed valve
-  Temperature switch

The expansion bottle cap is blue and has a rating of 1.2 bar .

1DQ7QR

ESSENTIAL SPECIAL TOOLING	
Mot. 1054	TDC pin
Mot. 1202	Hose clip pliers
Mot. 1273	Tool for checking belt tension
Mot. 1289-03	Fork for centring suspended engine mounting limiter
Mot. 1679	Tool for holding engine on sub-frame

TIGHTENING TORQUES (in daN.m)



2 + 80°

Crankshaft output mounting bolt

Bolt for securing front right-hand

suspended mounting cover on engine

5.7

Nut for securing rubber pad on

front right-hand suspended mounting

cover

2.7

Timing belt tensioner nut

5

Coolant pump mounting nut

0.9

REMOVING

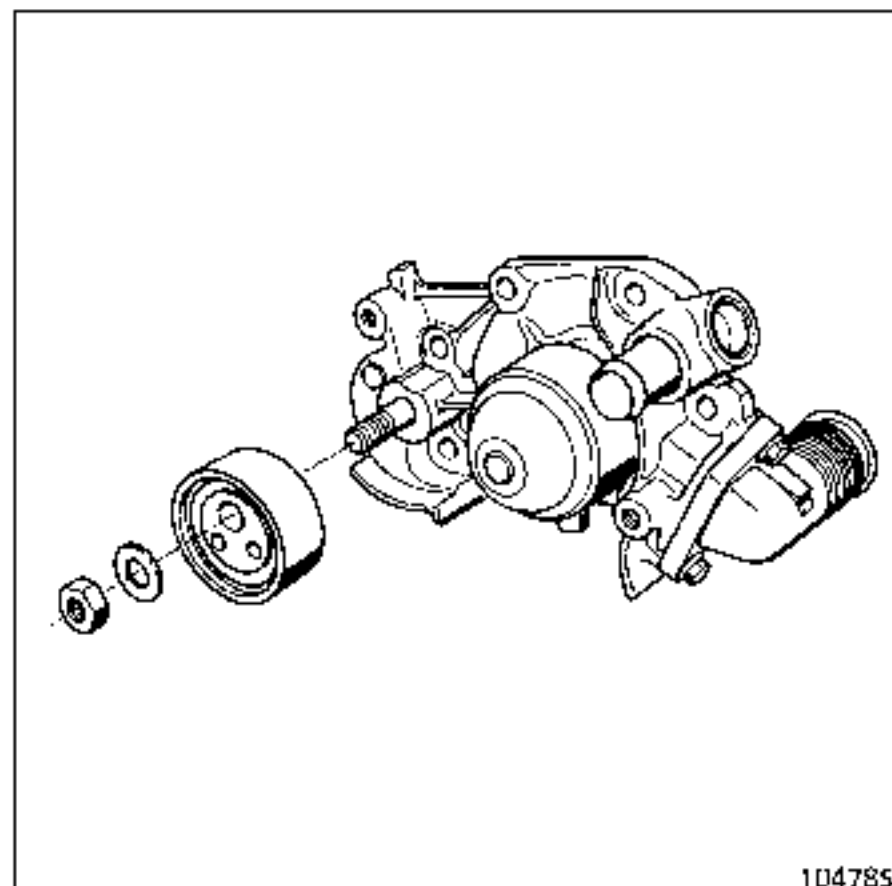
Put the vehicle on a 2-post lift.

Disconnect the battery.

Remove:

- the timing belt (see method described in section 11, timing belt),
- the power-assisted steering pump gear (if fitted),
- the upper mounting bolt for the alternator and slacken off the lower bolt,
- the two PAS pipe mounting bolts on the cylinder block,

- the PAS pump mounting bolts on the pump bracket (move away the PAS pump - pipe assembly),
- the PAS pump bracket,
- the hose on the water pump,
- the tensioner and the water pump.



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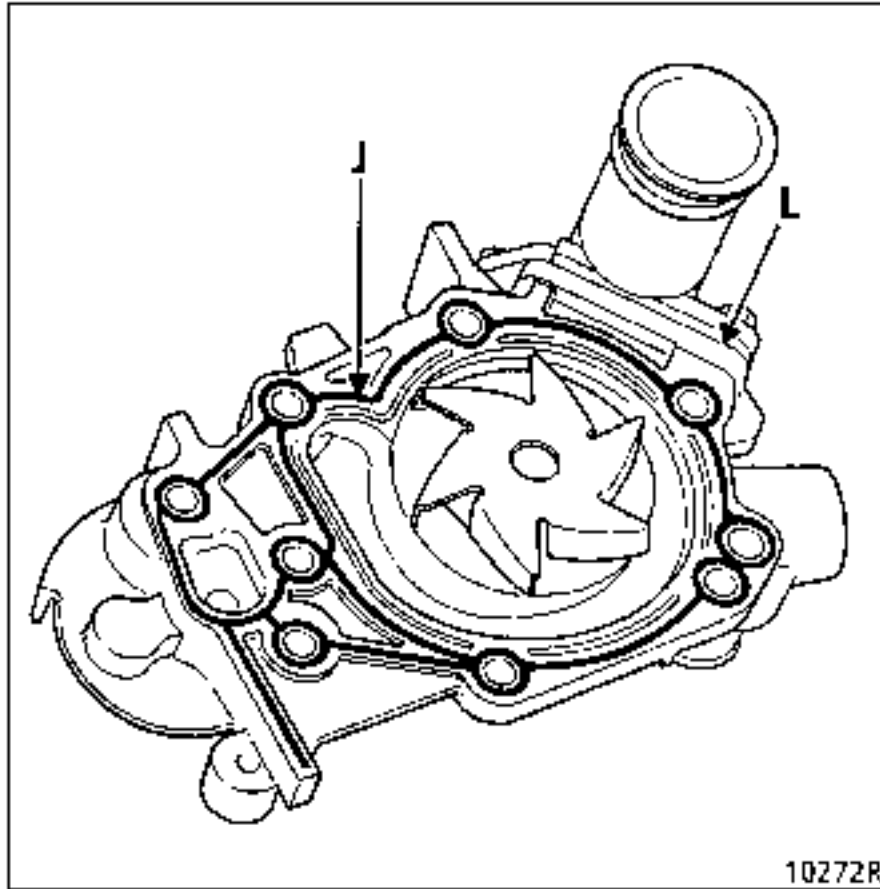
Clean the gasket mating surfaces without scratching the aluminium.

REFITTING

Special points

Apply a bead (J) of **RHODORSEAL 5661** as shown in the diagram below to seal the water pump.

Apply a bead of **LOCTITE 518** to the sealing surface (L) between the inlet elbow and the water pump.

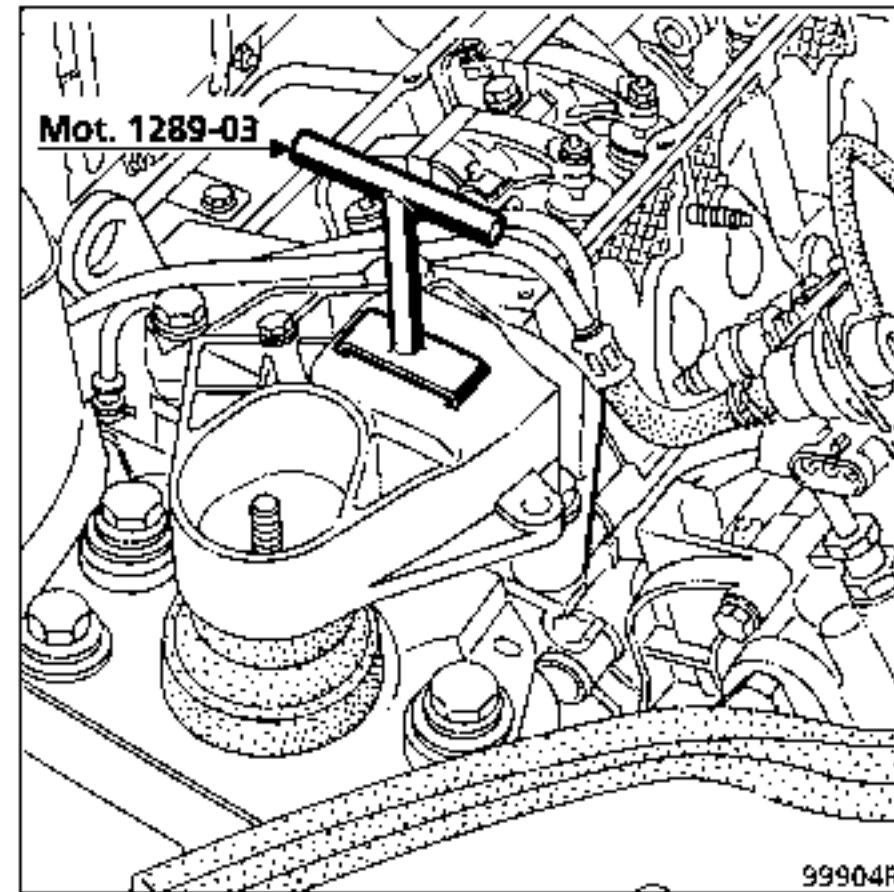


Refit in reverse order to removal.

Refit the timing belt (see method described in section 11, timing belt).

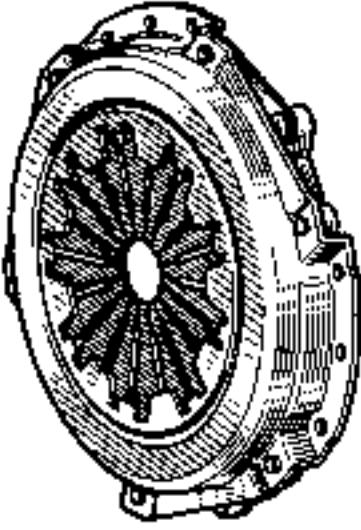
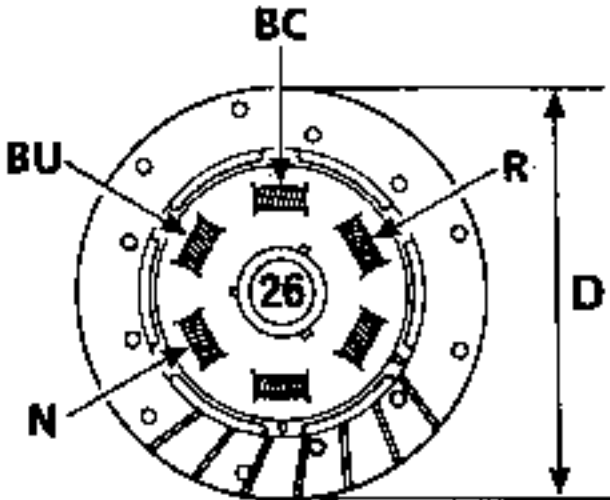

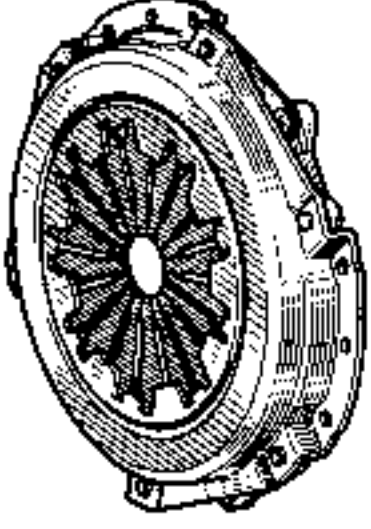
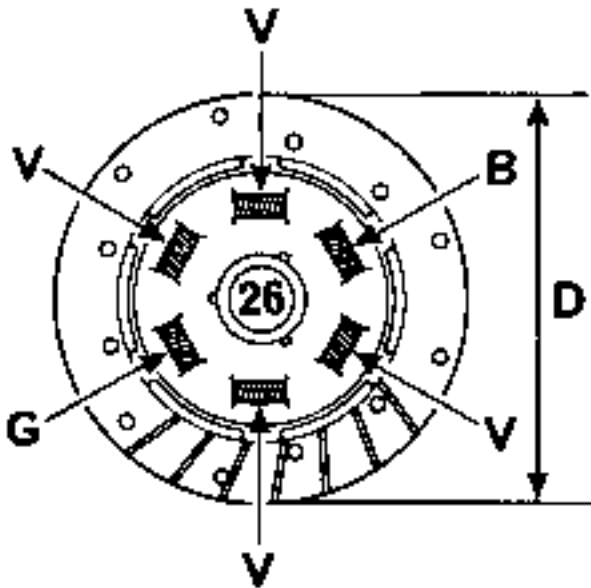

Do not forget to remove the TDC pin.

Use **Mot. 1289-03** to check that the movement limiter setting is correct and readjust if necessary.



CLUTCH Identification

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ENGINE TYPE	MECHANISM	PLATE
D7F	 <p>858735</p> <p>180 DST 3050</p>	  <p>90693R4</p> <p>76906R</p> <p>26 splines E = 8.5 mm D = 181.5 mm</p> <p>BC = White BU = Blue R = Red N = Black</p>
D7F	 <p>858735</p> <p>180 CP 3300</p>	  <p>90693R3</p> <p>76906R</p> <p>26 splines E = 8.3 mm D = 181.5 mm</p> <p>V = Green G = Grey blue B = White</p>

JB1									
Suffix	Vehicle	Step down	Speedo gear	1st	2nd	3rd	4th	5th	Reverse
85	357K	$\frac{15}{56}$	$\frac{21}{20}$	$\frac{11}{41}$	$\frac{21}{43}$	$\frac{28}{39}$	$\frac{34}{35}$	$\frac{34}{28}$	$\frac{11}{39}$ 26

Capacity - Lubricants

CAPACITY (in litres)

5-speed gearbox	
JB1	3.4

Viscosity - Grade
TRANSELF TRX 75W 80W

MANUAL GEARBOX

Gearbox (Removing - Refitting)

21

ESSENTIAL SPECIAL TOOLING		
B.Vi.	31-01	Set of pins
T.Av.	476	Ball joint extractor
Mot.	1040-01	Sub-frame support trolley
ESSENTIAL EQUIPMENT		
Component jack		
DES 900 8	DESVIL engine support	

TIGHTENING TORQUE (in daN.m)



Bolts of the rear linkage of the suspended engine mounting	6.5
Bolts for securing battery mounting on side member	2
Drive shaft gaiter mounting bolt	2.5
Gearbox mounting bolt	3.5
Brake calliper mounting bolt	3.5
Shock absorber base bolts	11
Steering ball joint nut	3.5
Stub axle key nut	5.5
Support mounting bolt	4 to 5
Wheel bolts	9

REMOVING

Put the vehicle on a 2-post lift.

Disconnect the battery.

Remove:

- the bonnet,
- battery.

Disconnect :

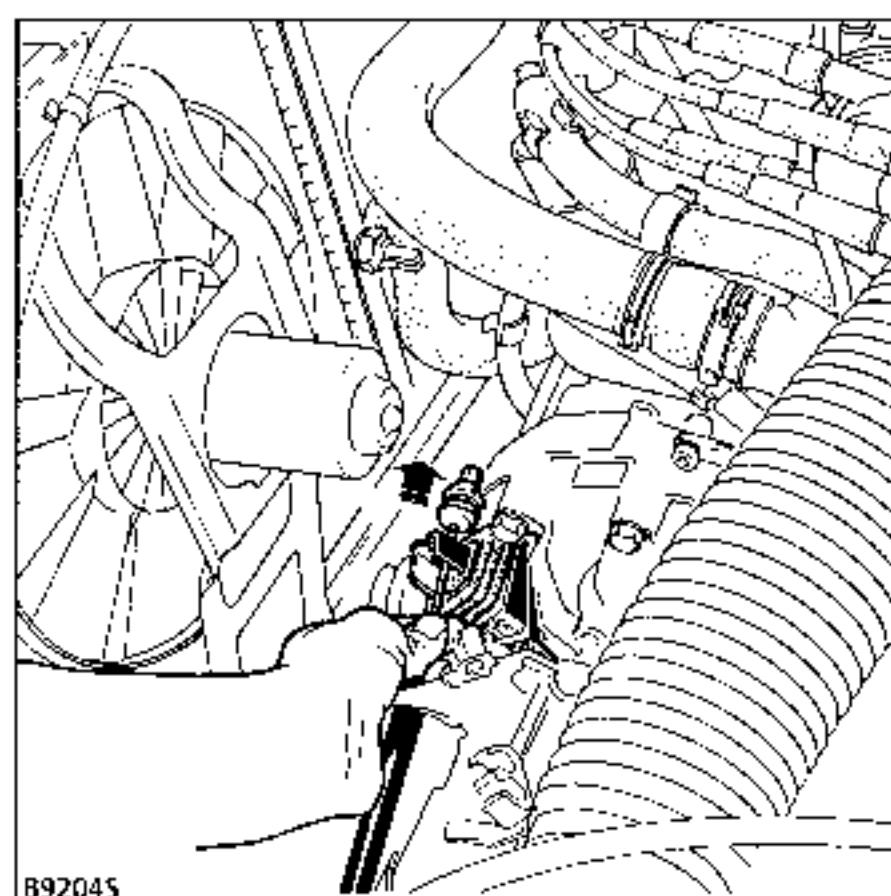
- the injection computer,
- the brake fluid level connector.

Remove the injection computer bracket.

Unclip the wiring.

Remove :

- the air intake pipe,
- the earth mountings on the gearbox,
- the clutch cable.



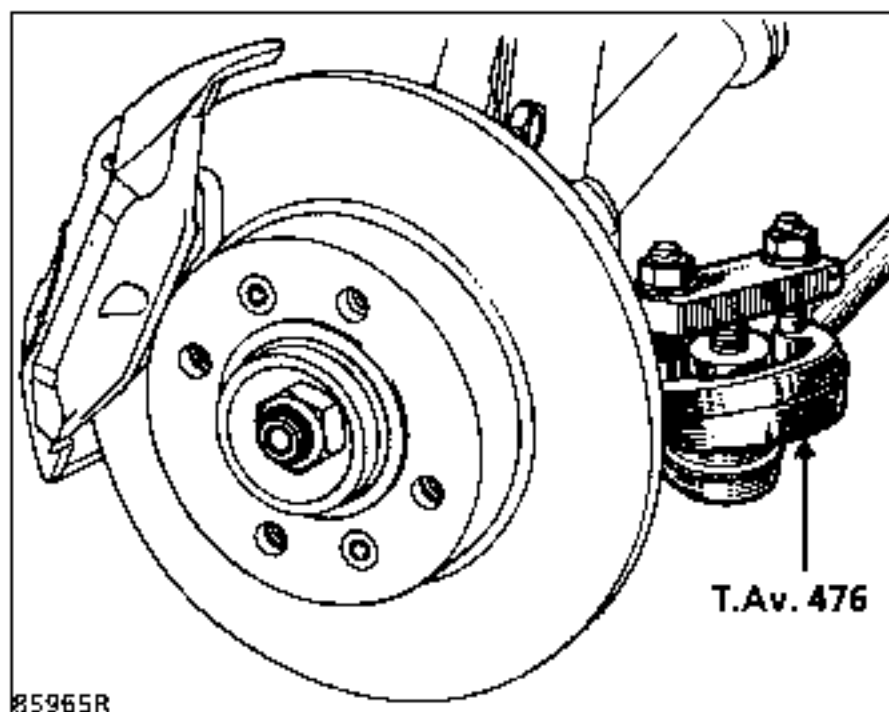
Remove the front wheels.

Drain oil from gearbox.

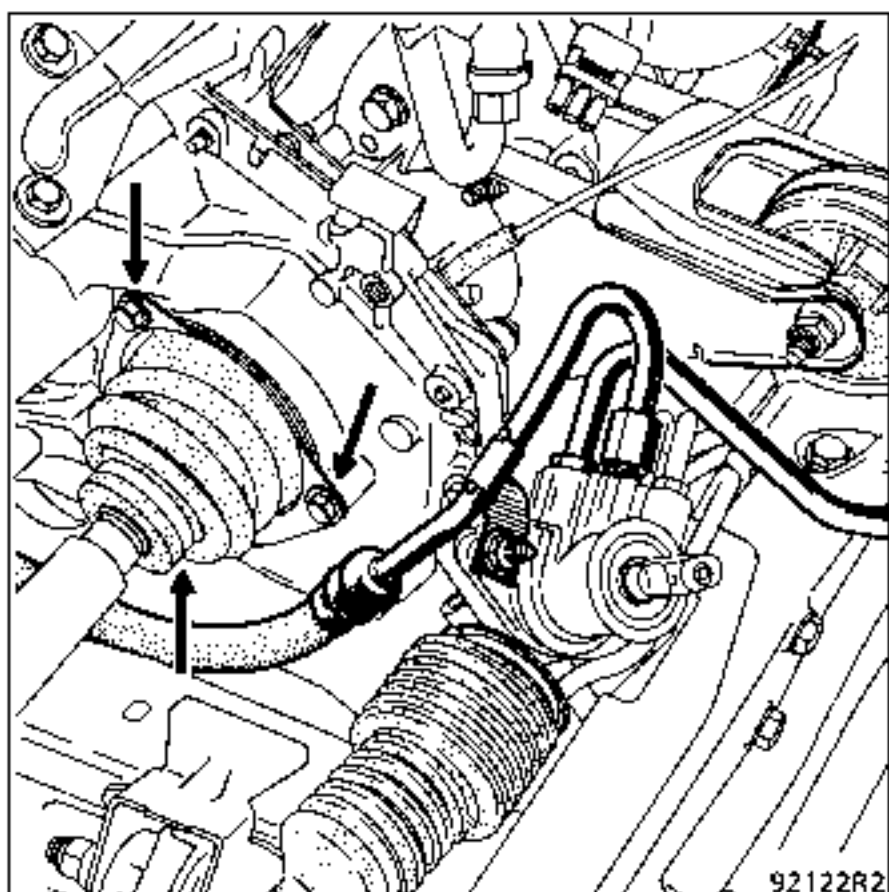
LEFT-HAND SIDE OF VEHICLE :

Remove:

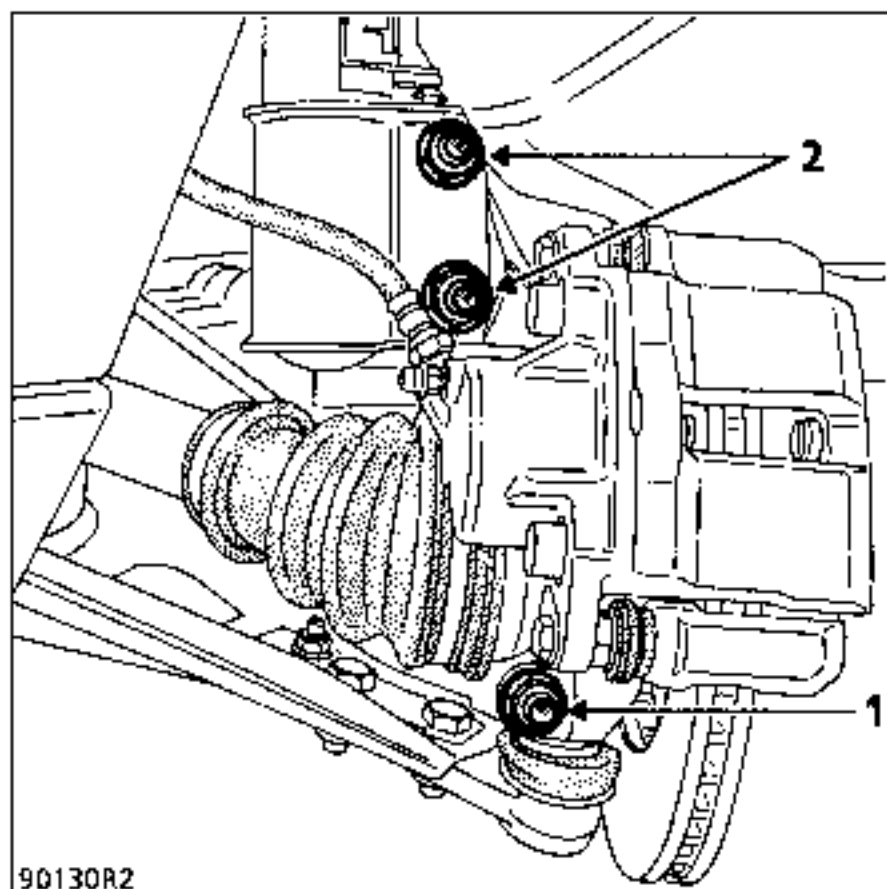
- the two calliper mounting bolts and secure the calliper to the suspension spring to avoid stretching the pipe,
- the track rod end using tool T.Av. 476,



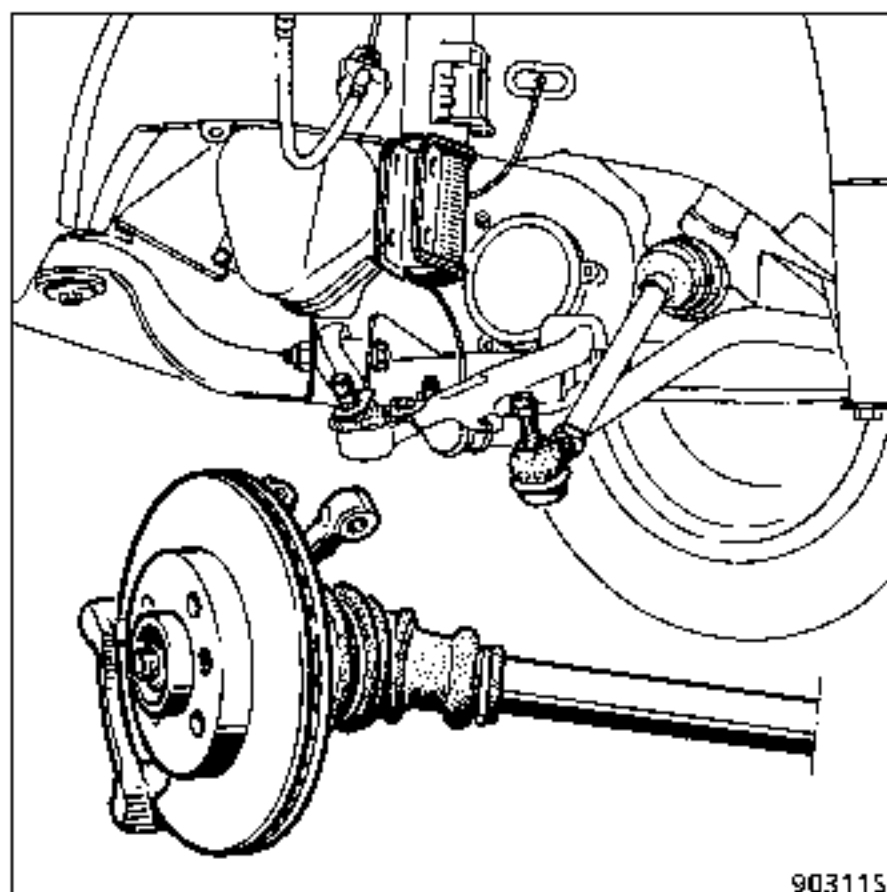
- the three mounting bolts for the drive shaft gaiter,



- the two mounting bolts (1) from the base of the shock absorber,
- the nut and the key (2),



- the tie rod between the sub-frame and body,
- the stub-axle carrier drive shaft assembly by releasing the lower ball joint,



Check that the drive shaft rollers cannot be removed by hand. If this is the case, when refitting check that the needles have not fallen into the gearbox.

Remove the mud guard.

MANUAL GEARBOX

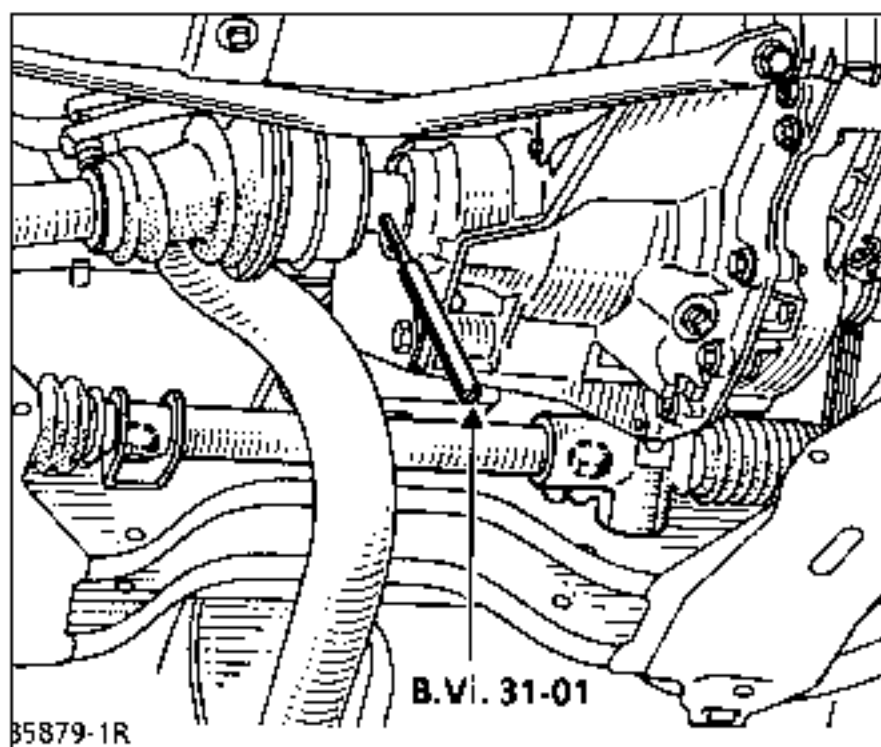
Gearbox (Removing - Refitting)

21

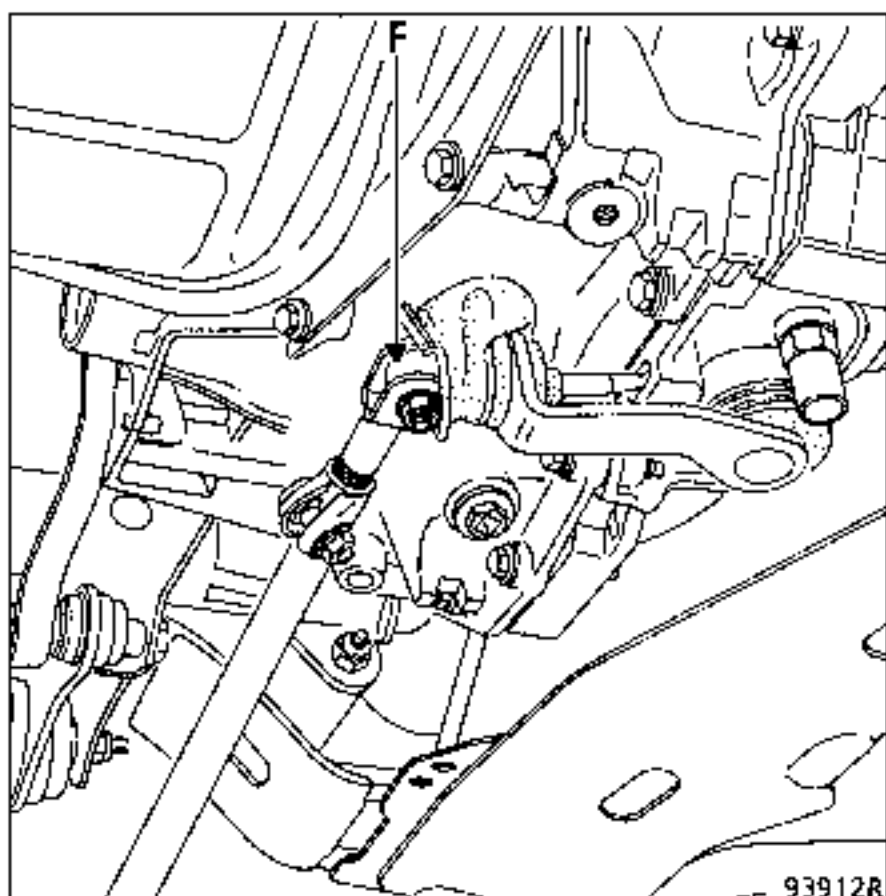
THE RIGHT-HAND SIDE OF THE VEHICLE :

Remove:

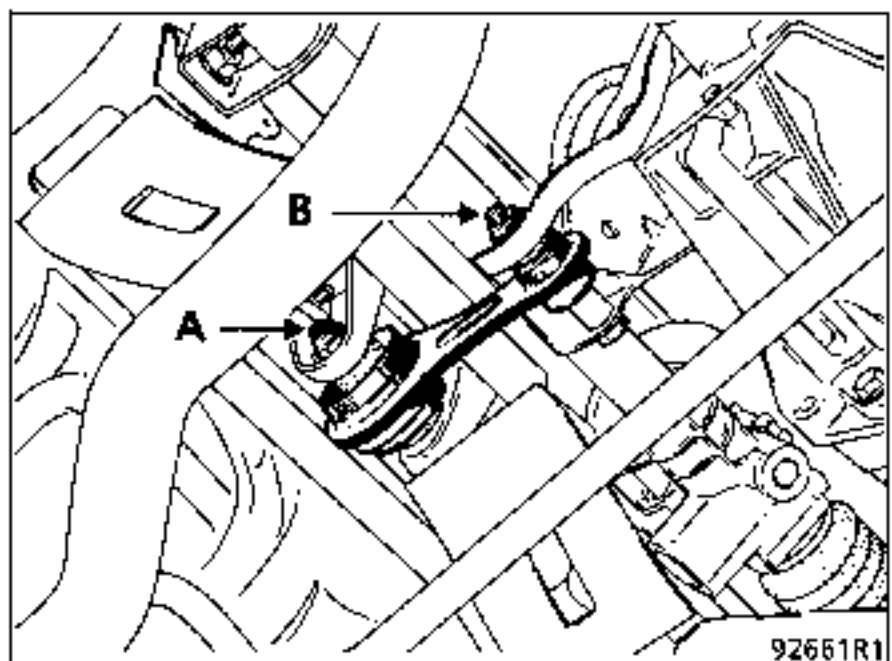
- the drive shaft pins using tool B.Vi. 31-01,



- the tie rod between the sub-frame and body,
- the brake calliper,
- the right-hand drive shaft,
- the mud guard,
- the gear linkage (bolt (F)).



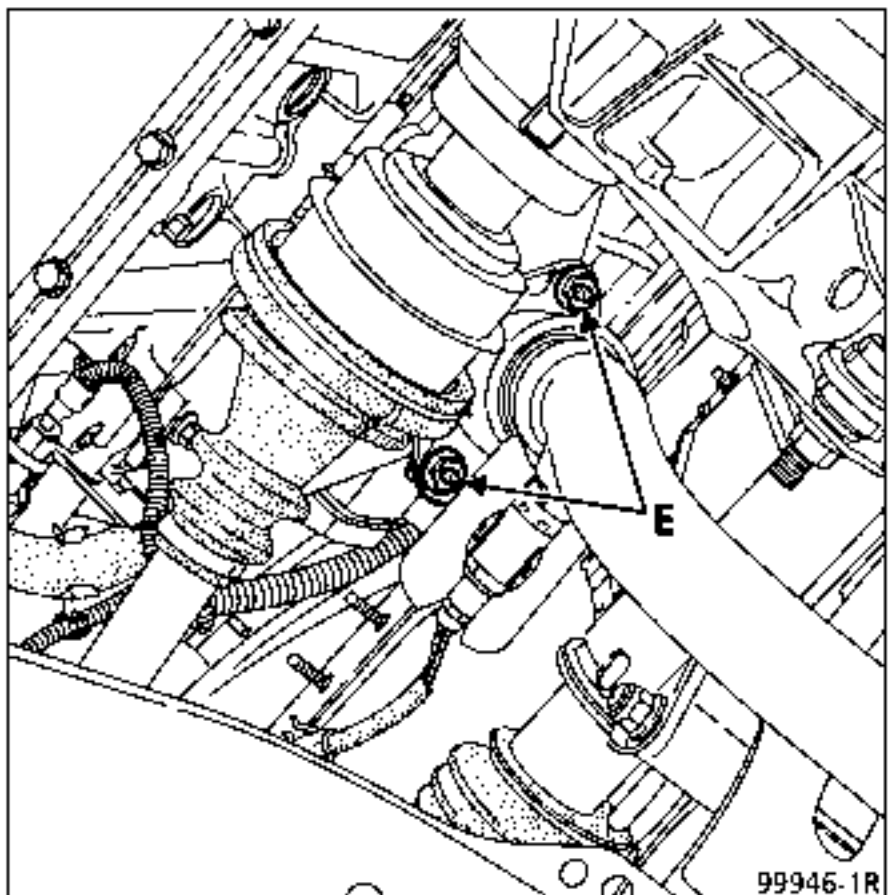
Slacken off bolt (A) but do not remove it. Then remove bolt (B) from the suspended mounting bar and release the bar.



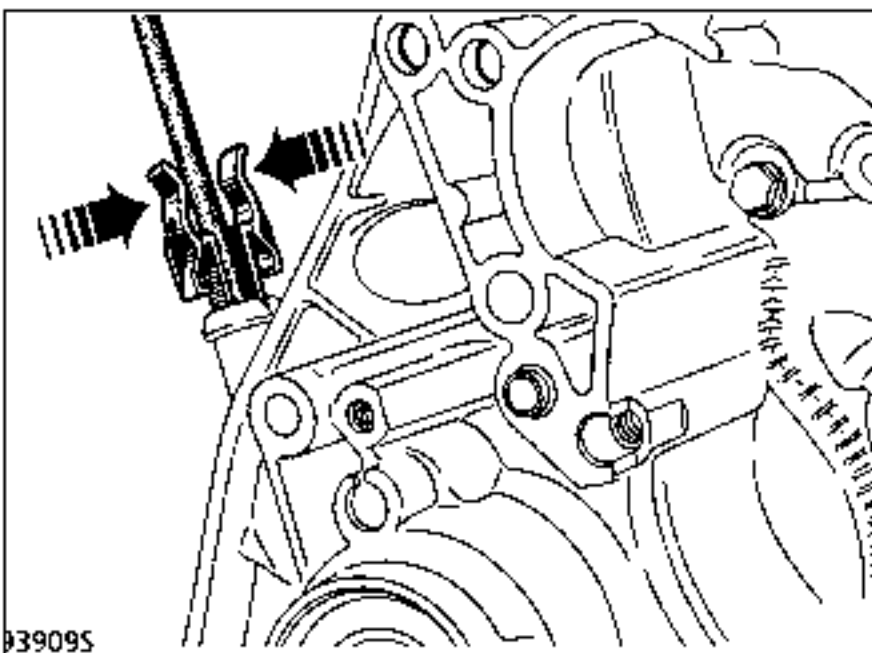
Remove the exhaust down pipe mountings (E).

Disconnect :

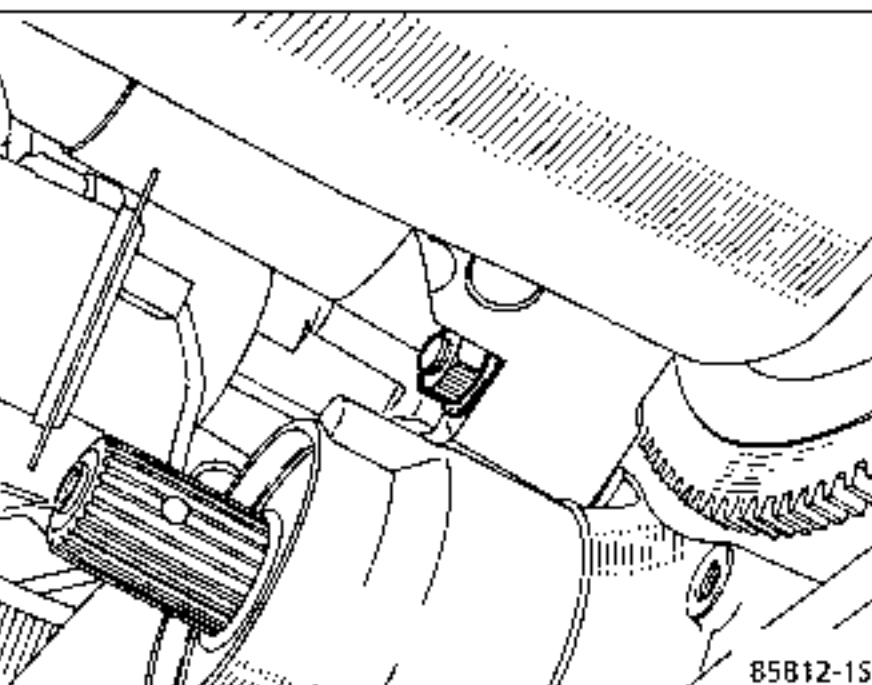
- the oxygen sensor,



- the speedometer cable. To do this, pinch the tabs and pull the cable.



- Remove:
- the clutch protection plate,
 - the engine gearbox mounting nut.

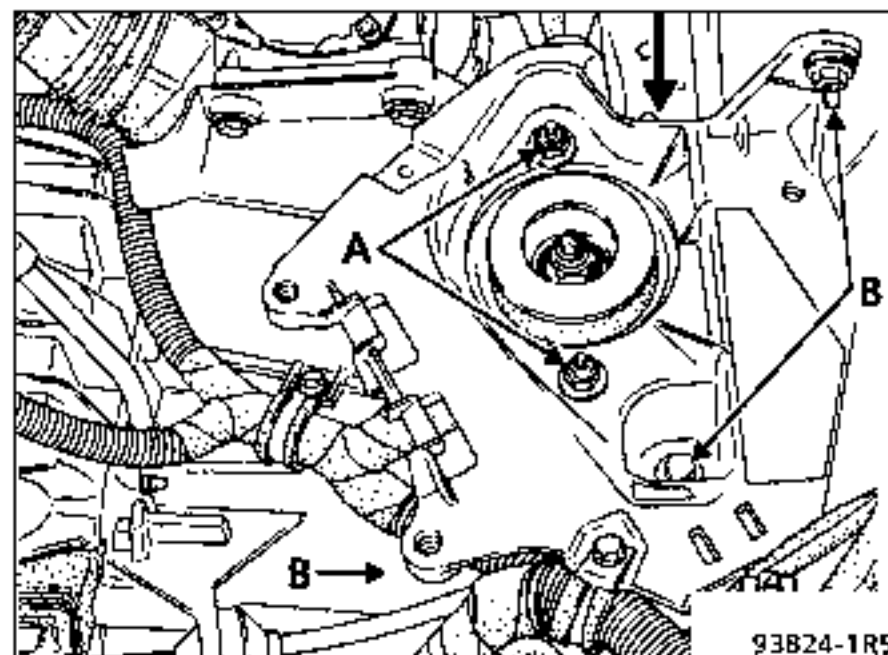


Disconnect:

- the reversing light connector on the gearbox,
- the earth wire under the gearbox (near the re-fill plug).

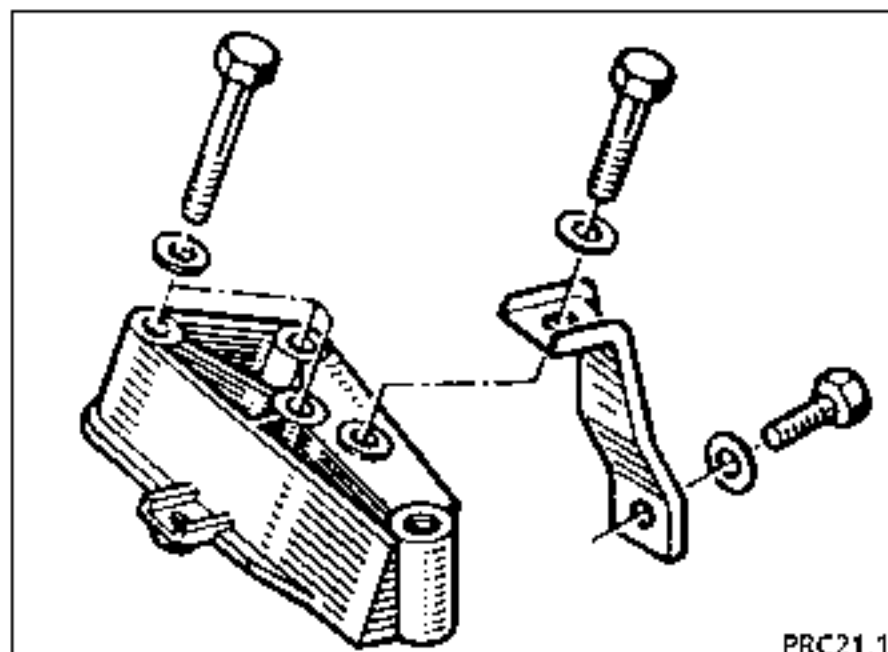
Fit the engine support tool (DESVIL, type DES 300 B).

Remove bolt (A) and then (B) on the suspended mounting.



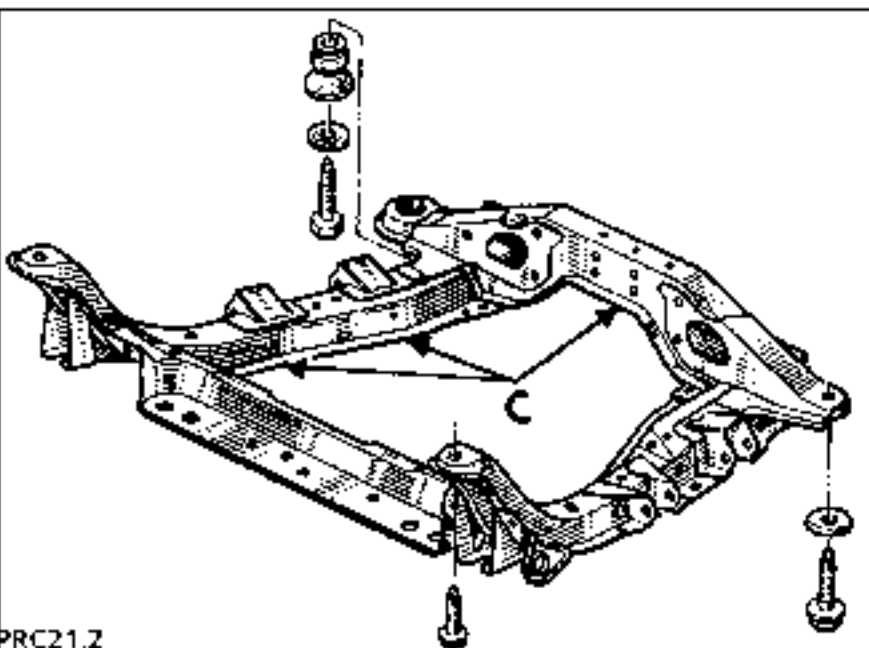
Remove :

- the assembled support on the gearbox,
- the wiring harness on the assembled support.



Remove:

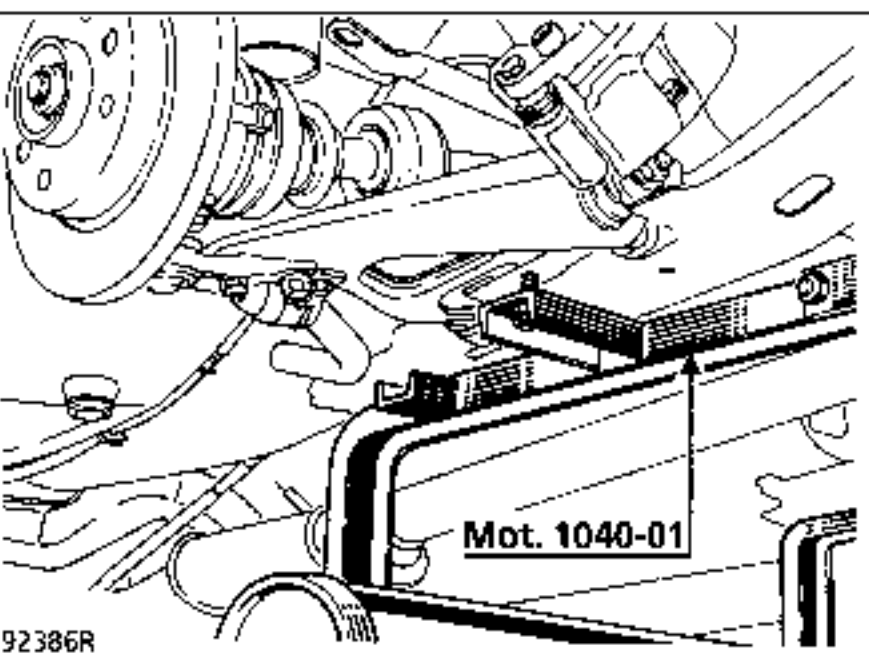
- the starter,
- the AEI sensor,
- the power-assisted steering pipe mountings (3 bolts (C)),



- the 4 mounting bolts for the power-assisted steering gear and attach it to the exhaust manifold.

Slacken off the sub-frame mounting bolts.

Secure tool Mot. 1040-01, with the rollers in the upper position, under the sub-frame.



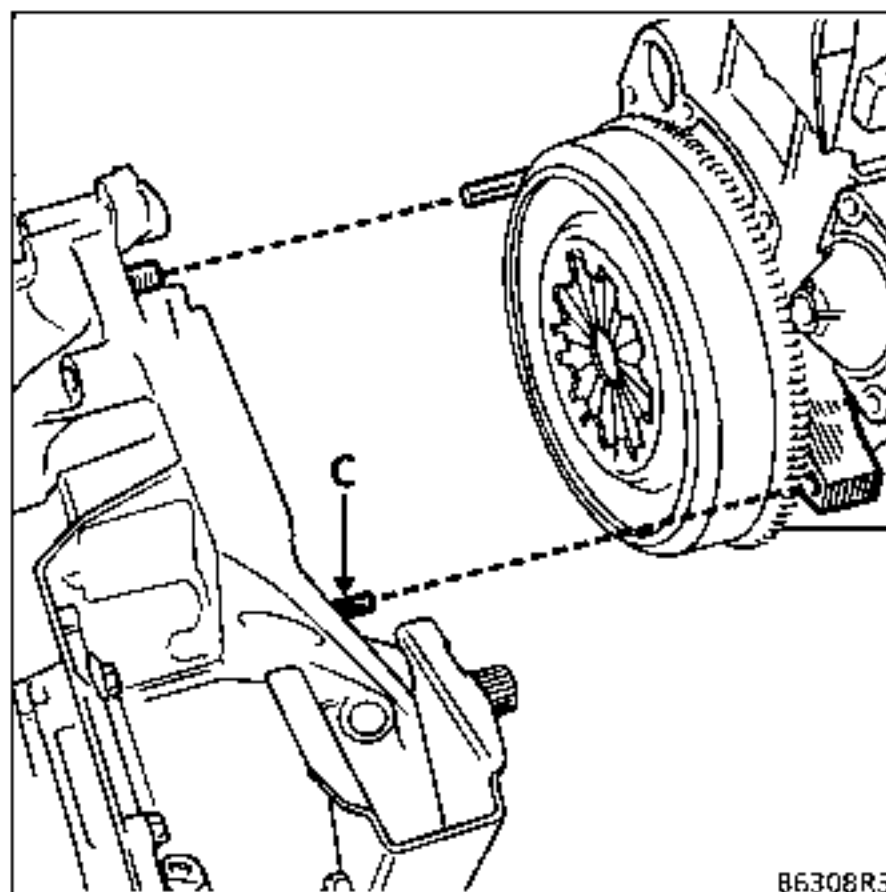
Lower the axle until the tool makes contact with the ground.

Remove:

- the sub-frame,
- the bolts around the upper gearbox,
- the bolts around the lower gearbox.

Under the vehicle :

- Fit the component jack under the gearbox but without lifting it.
- Remove the pin (C) and separate the gearbox from the engine.



REFITTING

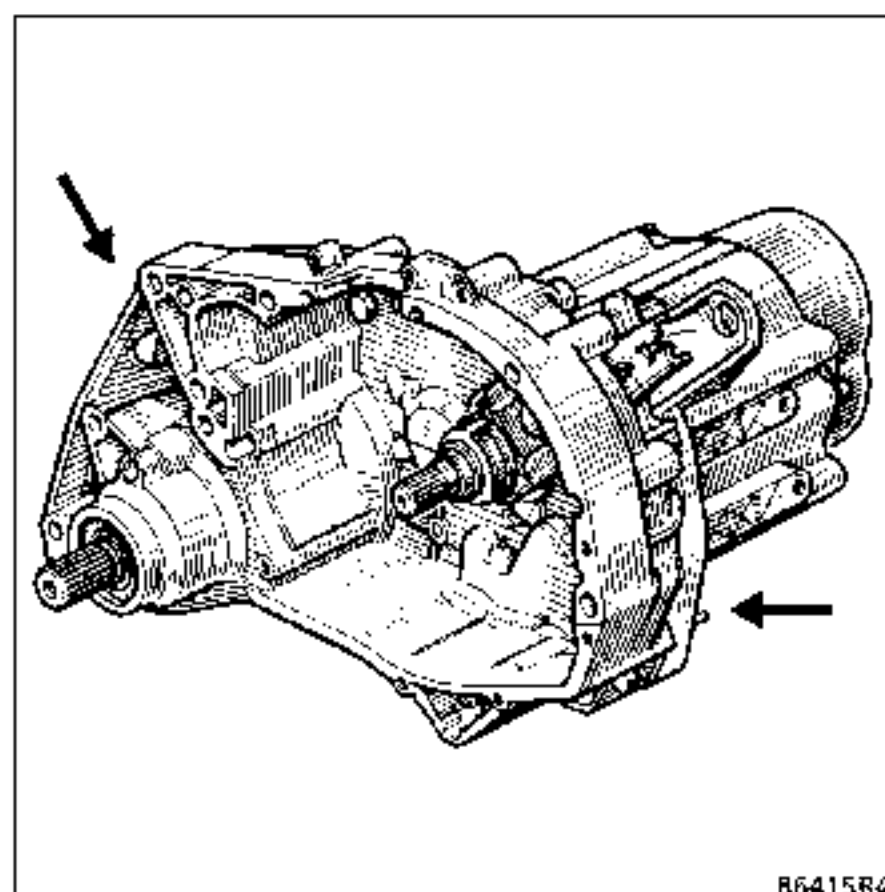
Coat the sides of the guide tube and the fork pads with **MOLYKOTE BR2** grease.

Position the fork on the notches of the clutch thrust pad.

Offer the gearbox up using the component jack.

Connect the engine to the gearbox taking care not to change the height of the engine.

Check that the dowels for centring the engine and gearbox are present and in the correct position.



Refit :

- the assembled support,
- the sub-frame,
- the steering.

Refit :

- the exhaust down pipe,
- the suspended engine mounting bar.

Refit the other components in reverse order to removal.