twingo

N.T. 2621 A

C 066 - C 067 - S 066

Basic manual: **M.R. 305**

SPECIAL FEATURES OF THE TWINGO FITTED WITH THE D7F ENGINE

77 11 190 948 **September 1996** Edition Anglaise

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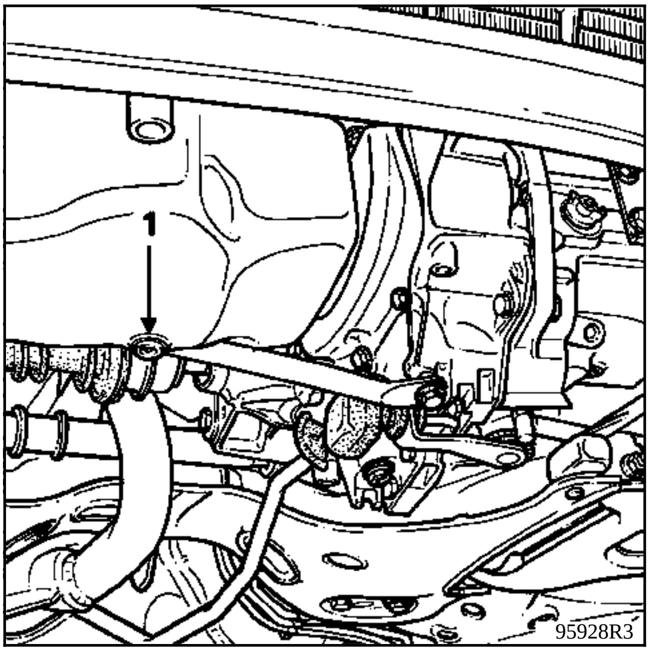
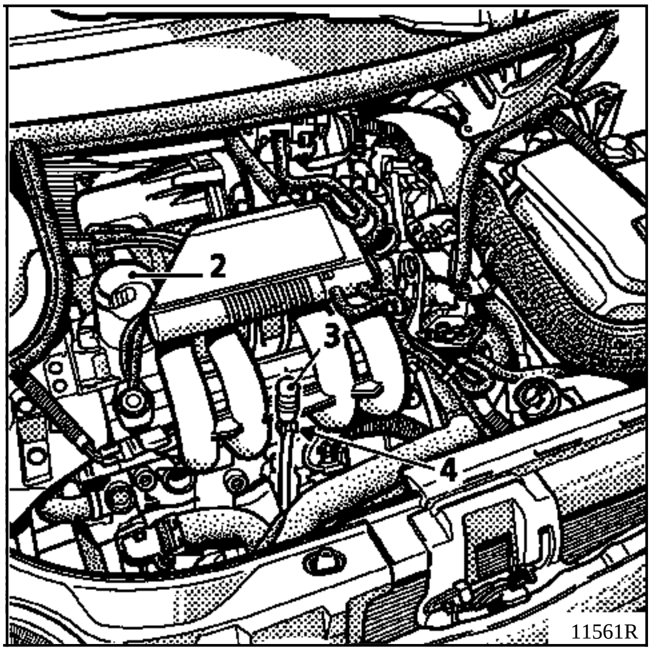
TOOLS REQUIRED
Engine drain plug wrench

DRAIN: plug (1)



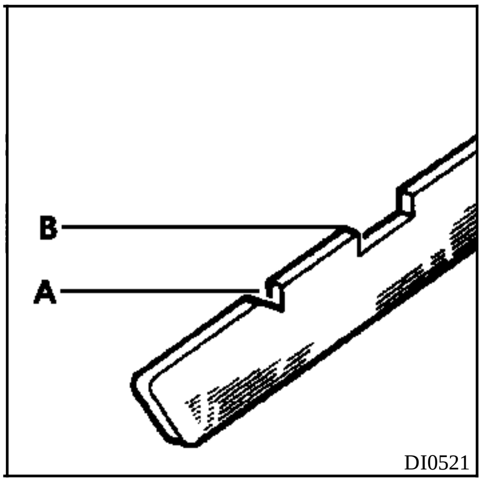
FILL: plug (2)



DIPSTICK

The dipstick (3) must be released from its clip (4) before it can be removed,.

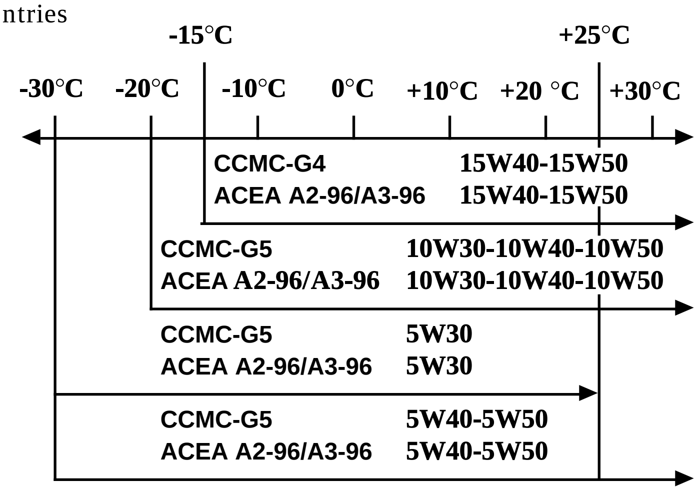
A Minimum level
B Maximum level

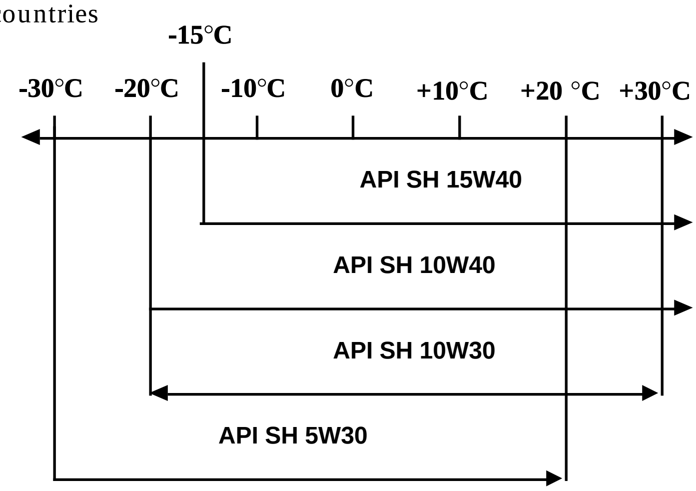


<table>
<tr><th>Units</th><th>Capacity in litres</th><th>Quality</th><th>Special features</th></tr>
<tr><td>Engine

D7F</td><td>When draining

4
with filter

(0.2 litres for the oil filter)</td><td colspan="2">EU countries


Other countries


</td></tr>
<tr><td>Manual gearbox JB1</td><td>3.4</td><td>Quality</td><td>Special features</td></tr>
<tr><td></td><td></td><td colspan="2">All countries :TRANSELF TRX 75 W 80 W
(API G L 5 or MIL - L2105 C or D standards)</td></tr>
<tr><td>Automatic transmission MB1</td><td>4.5</td><td colspan="2">ELF RENAULT MATIC D2
or if this is not available : MOBIL ATF 220</td></tr>
<tr><td>Braking system</td><td>0.7</td><td>SAE J 1703
and DOT 4</td><td>Brake fluids must be approved by the engineering centre</td></tr>
<tr><td>Engine cooling circuit</td><td>5</td><td>Glacéol RX (type D)
only
use
coolant</td><td>Protection to -25 ± 2 °C for hot, temperate and cold climates.
Protection to -37 ± 2 °C for very cold climates.</td></tr>
<tr><td>Fuel tank</td><td>40</td><td>Unleaded petrol</td><td>-</td></tr>
</table>

SPECIAL TOOLS REQUIRED	
Mot. 1273	**Tool for checking belt tension**

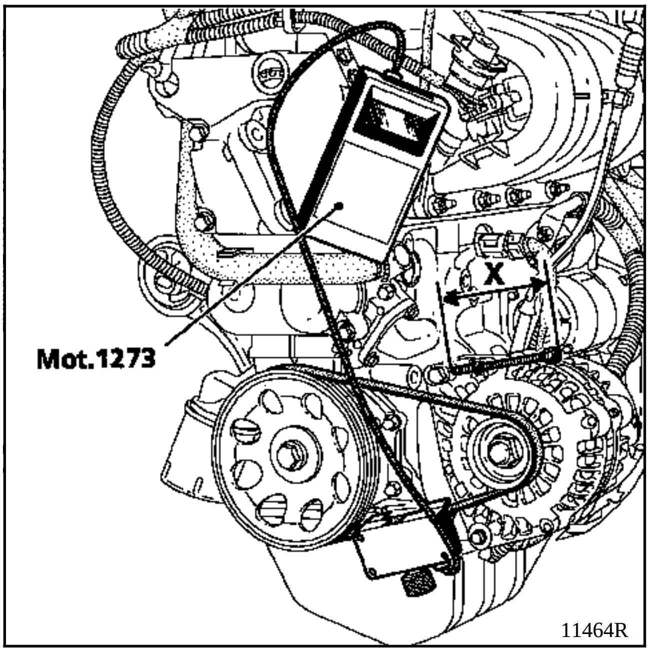
INSTRUCTIONS FOR TENSIONING

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

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

Turn the sensor wheel until it clicks.

The alternator belt is tensioned using the tool made on site, shown below (100mm long threaded rod (X) and three M6 nuts)



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

Lock the tensioner, carry out a check, adjust the value.

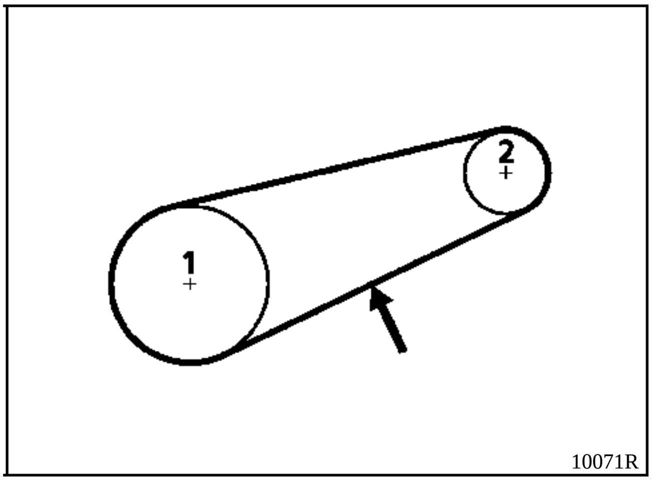
Rotate the crankshaft three times.

Carry out a check and adjust the value to the recommended fitting tension if necessary.

Never refit a belt which has been removed, fit a new belt.

Tension (US = SEEM unit)	Multi-tooth alternator belt
Fitting	102 ± 7
Minimum operating tension	53

Alternator belt



10071R

1 Crankshaft
2 Alternator
→ Tension checking point

CYLINDER HEAD

Refresher

In order to correctly tighten the bolts, remove any oil from the cylinder head mounting holes using a syringe.

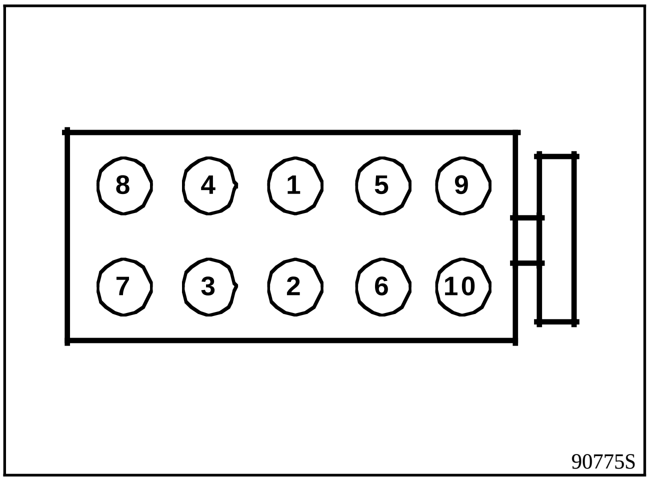
Lubricate the bolt threads and under the bolt heads using engine oil.

Setting of the rockers and tightening of the cylinder head must be carried out when cold.

CYLINDER HEAD TIGHTENING PROCEDURE

a) Pre-seating the seal

Tighten all the bolts to **2 daN.m** then make an angle of 90° in the order shown below.



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Wait for **3 minutes**, to allow stabilisation.

b) Cylinder head tightening

Slacken the bolts marked 1 and 2 until they are completely released.

Tighten bolts 1 and 2 to **2 daN.m**, followed by an angle of **200**°.

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

Tighten bolts 3-4-5-6 to **2 daN.m**, followed by an angle **200**°.

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

Tighten bolts 7-8-9-10 to **2 daN.m**, followed by an angle of **200**°.

The front and rear axle angles are identical to those of vehicle's fitted with engine C.

Type	Quantity	Units
RHODORSEAL 5661	Coat	Coolant pump and oil pump sealing
Loctite FRENBLOC Locking and sealing resin	Coat	Brake caliper mounting bolts
Loctite FRENETANCH Locking and sealing resin	Coat	Crankshaft pulley mounting bolts
MOLYKOTE CU. 7439	Coat	For aligning the wheels.
Exhaust pipes paste	Coat	Exhaust sealing.

Identification

Type of vehicle	Engine	Manual or automatic gearbox	Cubic capacity (cm^3)	Bore (mm)	Stroke (mm)	Compression ratio
C 066 S 066 C 067	D7F	JB1 MB1	1149	69	76.8	9.65 / 1

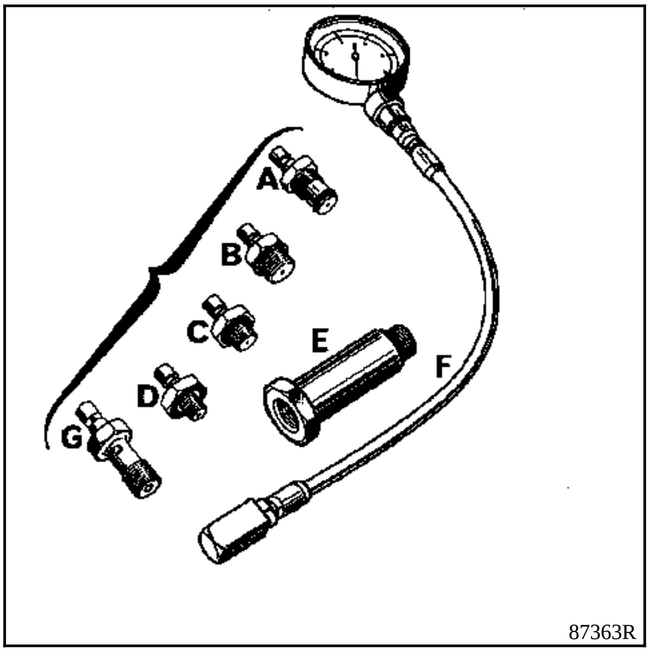
For engine repairs, refer to fascicule Mot. D (E)

CHECK

SPECIAL TOOLS REQUIRED	
Mot. 836-05	**Oil pressure connection kit**

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

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



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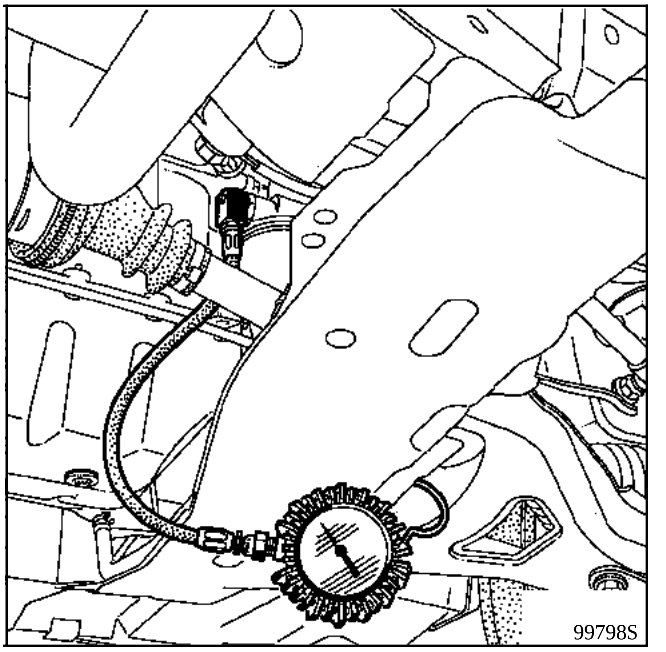
USE:

Engine D : F + C

Connect the pressure gauge in place of the pressure switch to the rear of the oil pump.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Check
- at idle: **0.8 bar**
- at **4000 rpm.** : **3.5 bars**

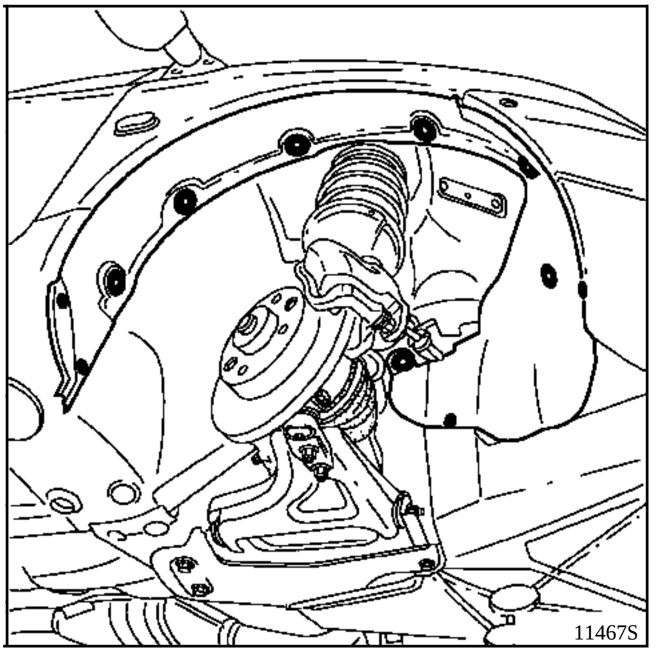
SPECIAL TOOLS REQUIRED	
B. Vi. 31-01	**Roll pin spindles**
Mot. 453-01	**Pliers for flexible pipes**
Mot. 1202	**Spring clip pliers**
T. Av. 476	**Ball joint extractor**
Mot. 1272	**Engine-Gearbox assembly positioning tool**

TIGHTENING TORQUES (in daN.m)	
Brake caliper mounting bolt	**3.5**
Shock absorber base mounting bolt	**11**
Steering ball joint	**3.5**
Driveshaft gaiter mounting bolt	**2.5**
Gearbox rear mounting mounting bolt	**9.5**
Mounting bolt which secures the front mounting to the engine	**5.5**
Mounting bolt which secures the front right mounting to the side member	**5.5**
Mounting bolt which secures the front left mounting to the side member	**4.2**
Mounting bolt which secures the front left mounting to the gearbox	**3.9**

REMOVAL

Place the vehicle on a two post lift.

Remove:
- the battery,
- the wheels
- the left and right hand mud shields,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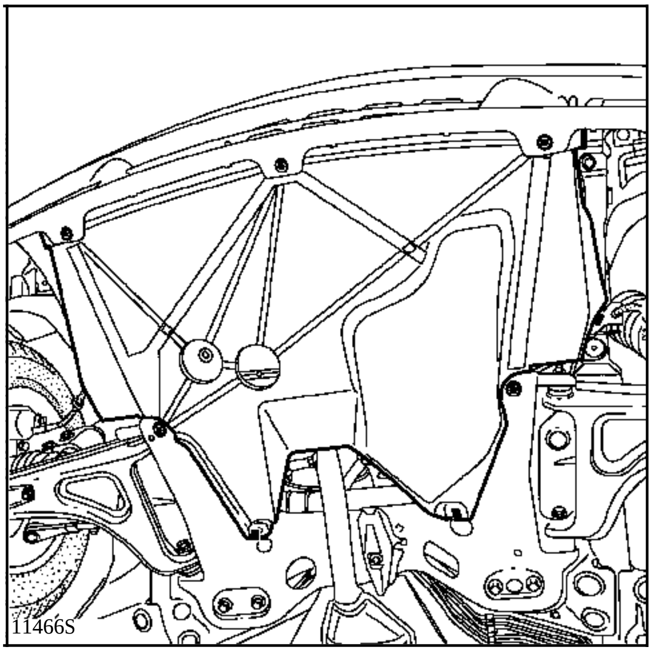
- the engine undertray,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- the bumper,
- the exhaust down-pipe mounting bolts disconnecting the oxygen sensor connector and attaching it to the subframe.

Drain:
- the gearbox oil,
- the engine oil if necessary,
- the cooling circuit (lower radiator hose).

Right hand side

Remove:
- the driveshaft pin with the spindles **B. Vi. 31-01,**
- the steering tie rod ball joint using tool **T. Av. 476,**
- the upper shock absorber base bolt and slacken the lower bolt,

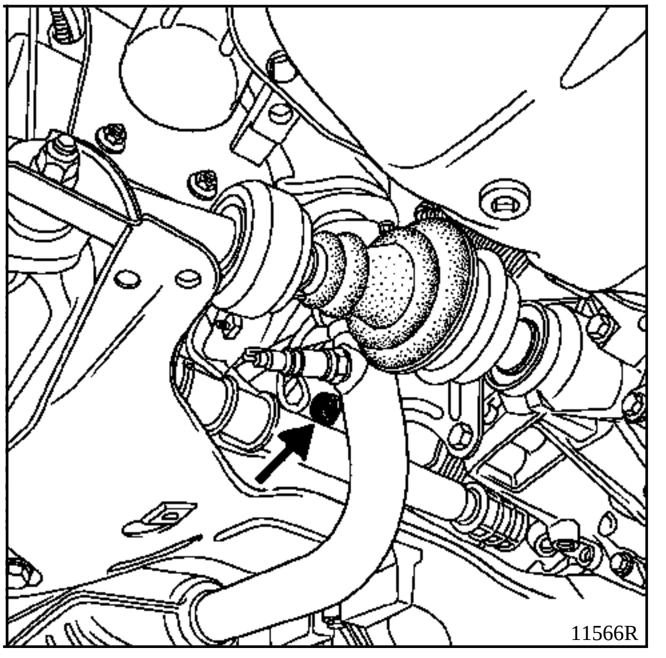
Tilt the stub axle carrier and uncouple the driveshaft.

Left hand side

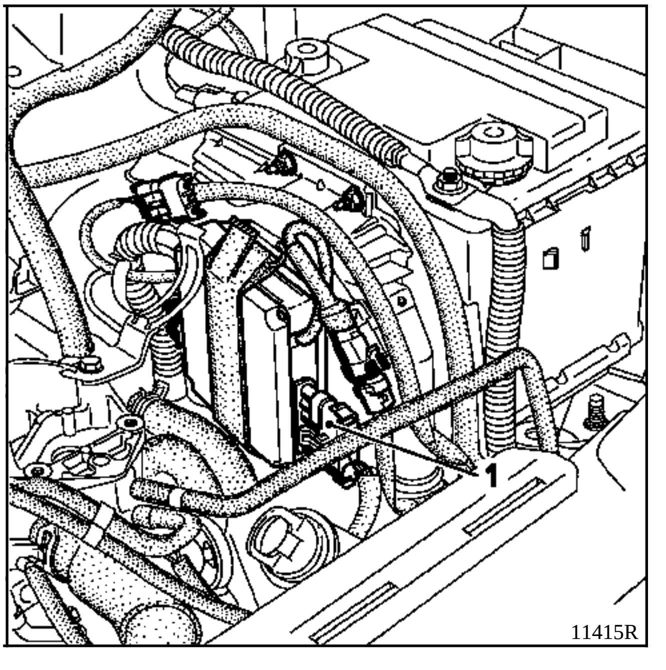
Remove:
- the two brake caliper mounting bolts then secure the caliper to the shock absorber spring,
- the ABS sensor if fitted,
- the steering ball joint using extractor **T. Av. 476,**
- the driveshaft gaiter fasteners,
- the lower ball joint bolt,
- the two shock absorber base bolts,
- the hub assembly assembled with the driveshaft.

Take care to protect the tripod.

Remove:
- the mounting bolt which secures the rear gearbox mounting to the subframe,



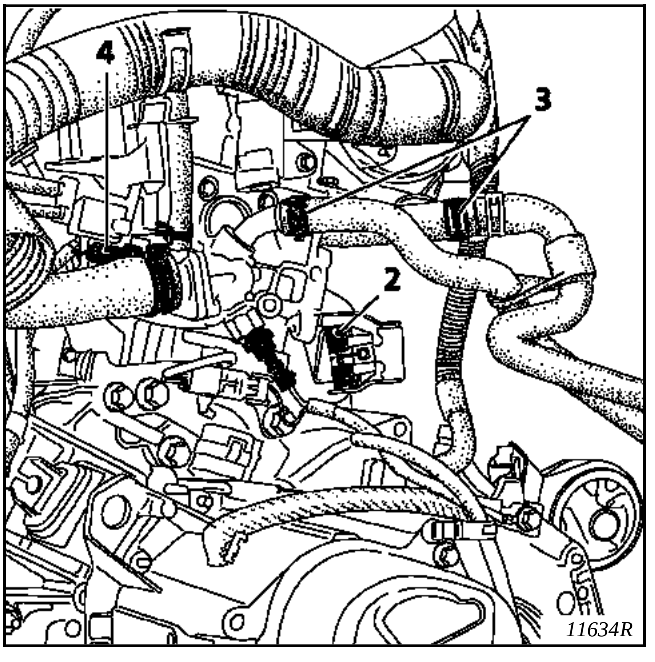
- the flexible air pipe on the air filter,
- the injection computer cover,
- the accelerator cable,
- the injection computer and automatic transmission mountings, and disconnect the connector (1) **on models with automatic transmission**.



- the mounting bolts which secure the injection rail to the inlet manifold.

Unclip the two fuel pipes on the bracket (2).

Disconnect:
- the upper radiator hose,
- the heating hose (3),
- the connector (4) on the thermal switch,



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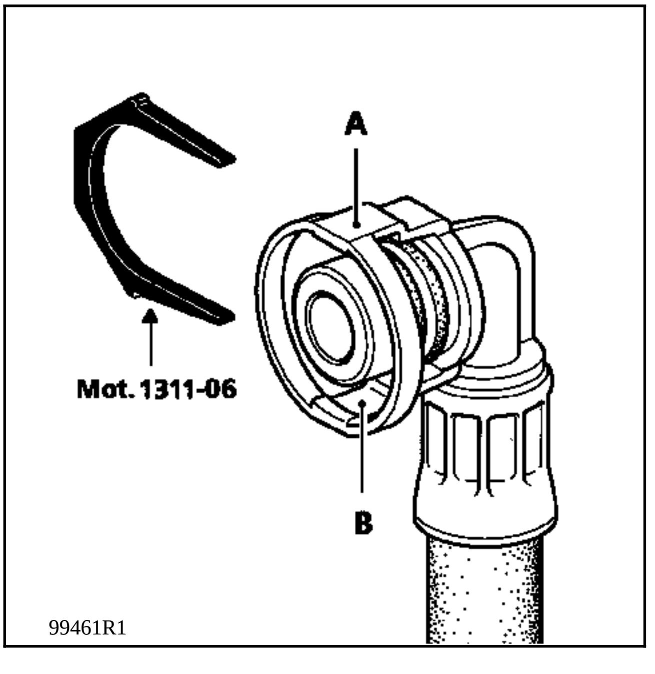
- the fuel supply pipe using tool **Mot.1311-06** (the removal tool is connected to the connector on the vehicle) and the fuel return pipe, then remove them from the injection rail,



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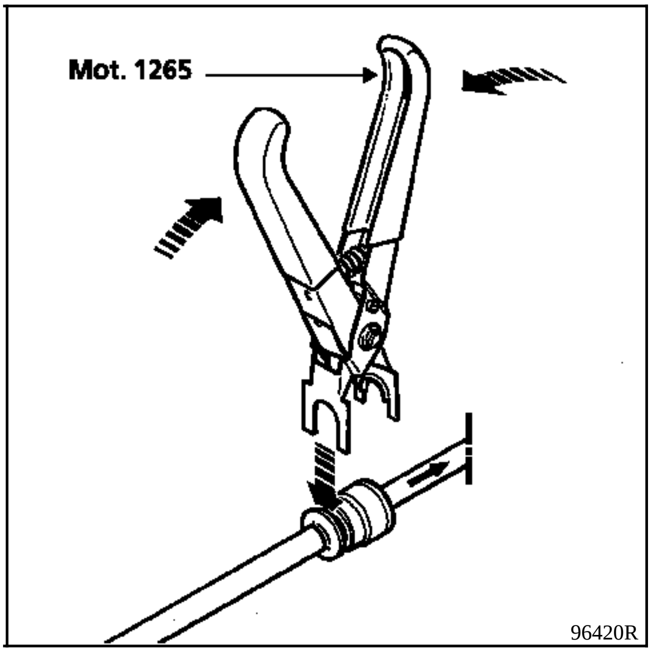
- the vacuum connection pipe on the brake servo,
- the upper expansion bottle pipes moving the windscreen washer bottle aside,
- the thermistor connectors (on the radiator) and the fan assembly connectors,
- the two pipes on the canister using pliers **Mot. 1265** for the pipe from the fuel tank.



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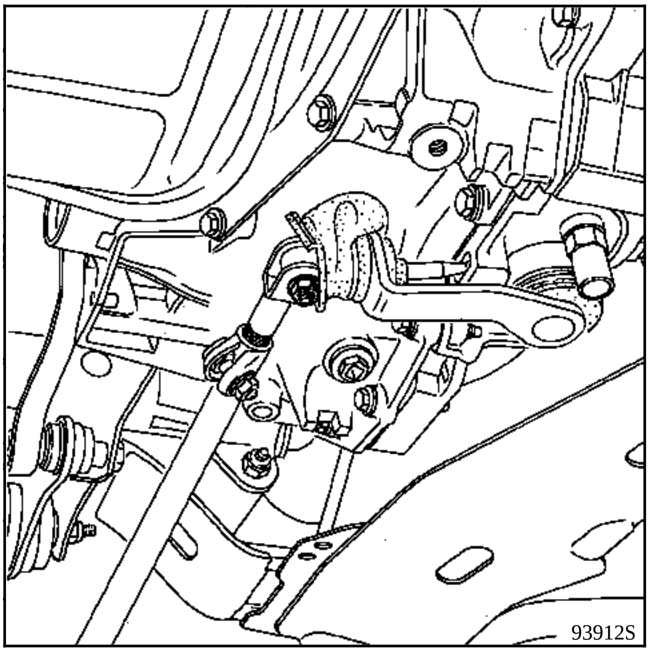
Remove:
- the gearbox control cable

Manual gearbox model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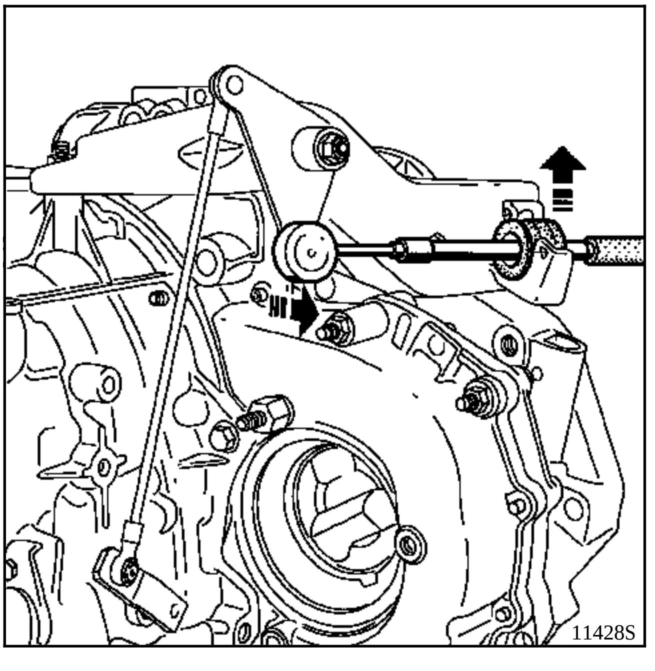
Automatic gearbox model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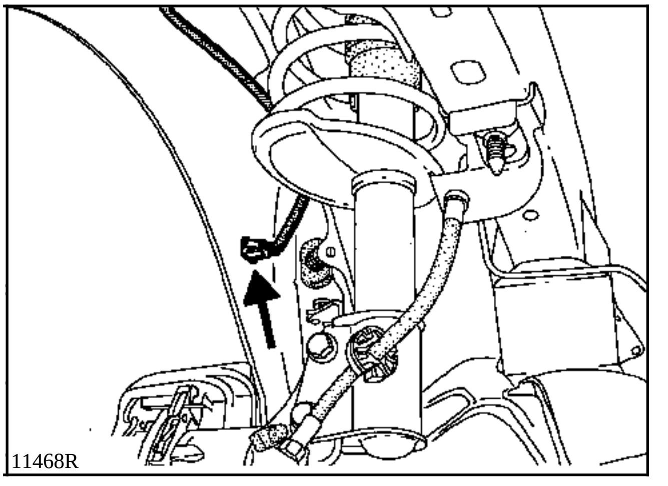
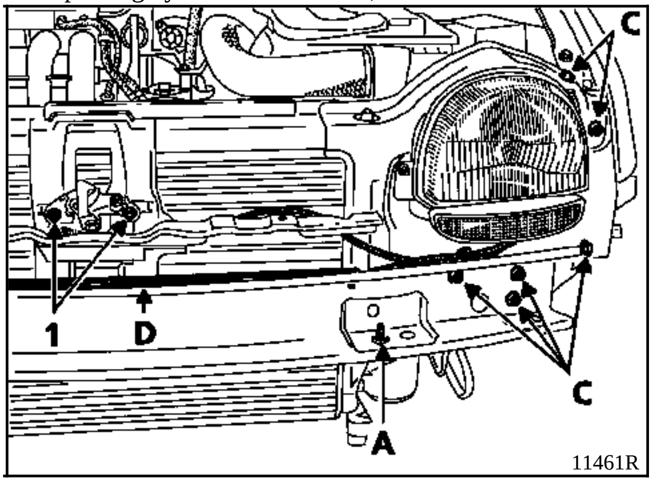
Disconnect the headlight unit connectors and the right wing repeater connector.

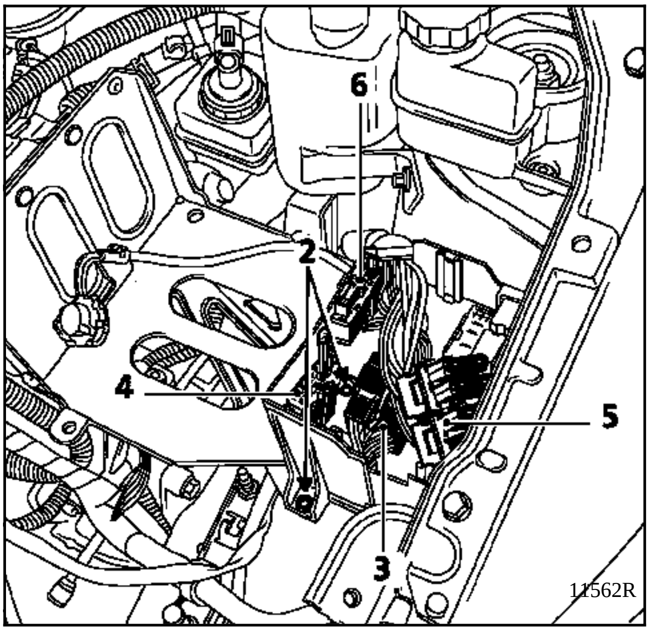

11468R

Remove:
- the radiator mountings (A) and remove the radiator,
- the earth strap on the right wing,
- the bonnet opening system mountings (1) and unhook the cable,
- the headlight unit support panel at (C) moving the electrical harness (D) and the bonnet opening system cable aside,



11461R

- the engine connection unit mounting bolts (2) and the connectors (3) and **((4) on models with automatic transmission)** and the fuse boxes (5) and **((6) on models with automatic transmission)**, then place the unit on the engine.



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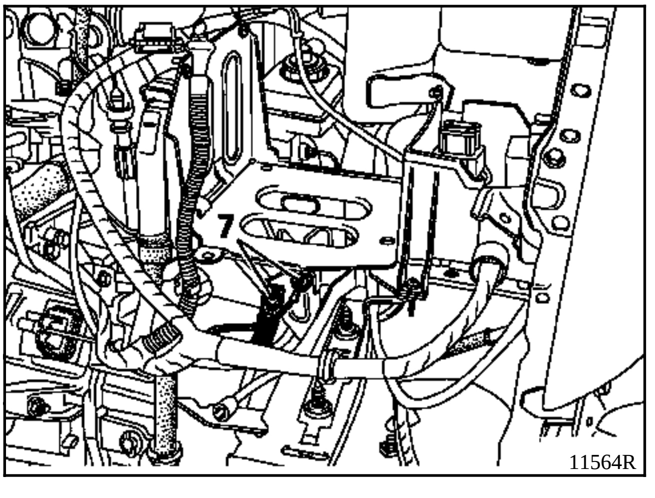
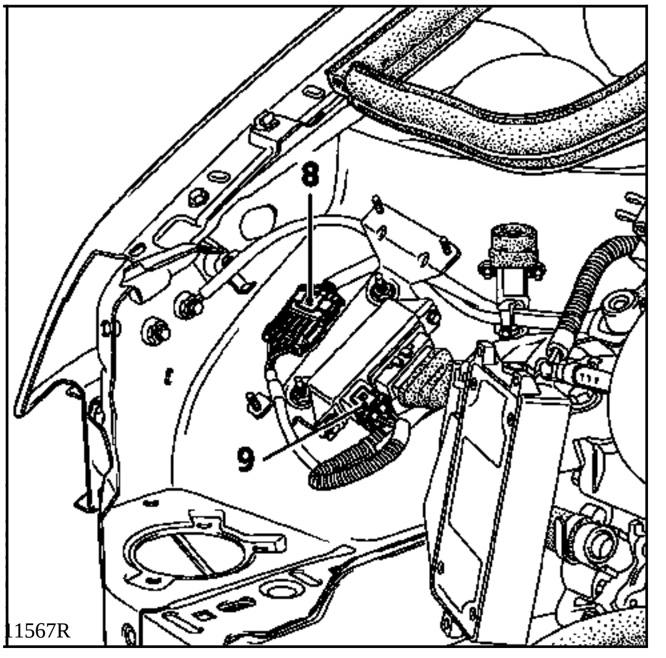
- the two earth straps (7),



11564R

- the ABS computer mountings, if ABS is fitted, then move the computer aside and disconnect the connectors (8) and (9),

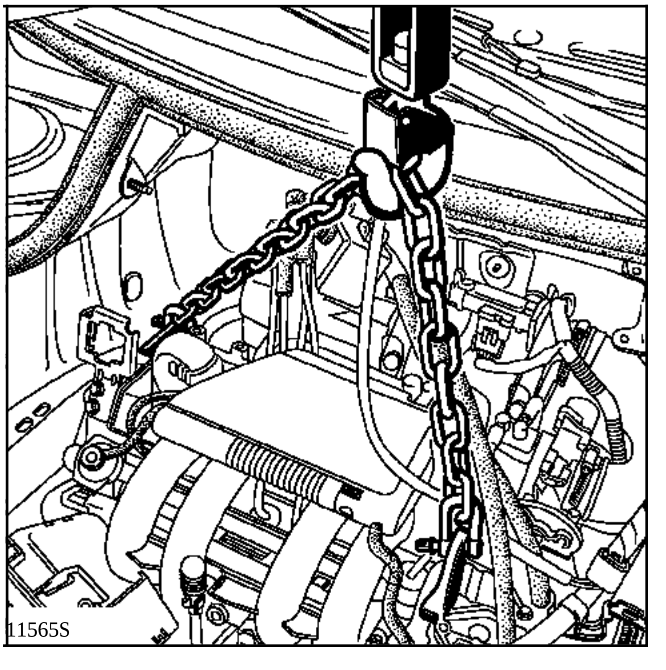


11567R

Disconnect the ignition coil connectors.

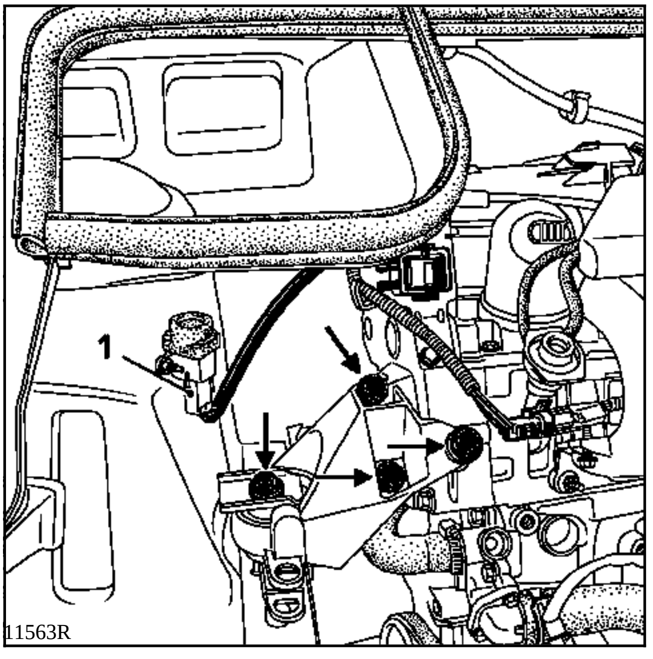
Remove the ignition coil mounting bolts and move the ignition coil aside.

Fit a chain to the lifting plates and raise the engine-gearbox assembly using a workshop crane.


11565S

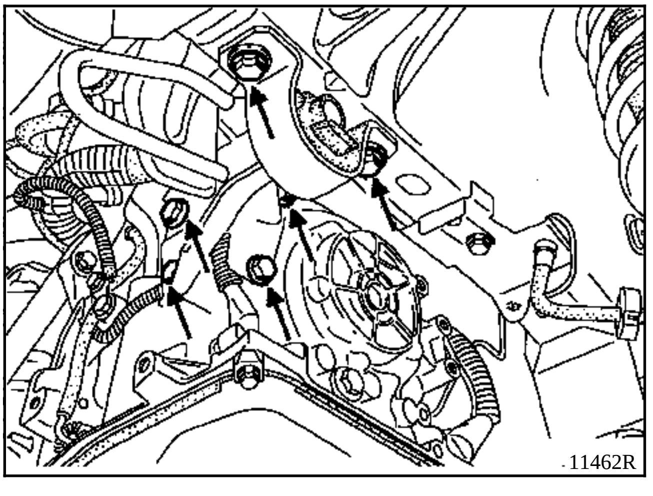
Disconnect the impact switch connector (1).

Remove:
- the engine pendulum mounting system,



11563R

- the gearbox mounting.



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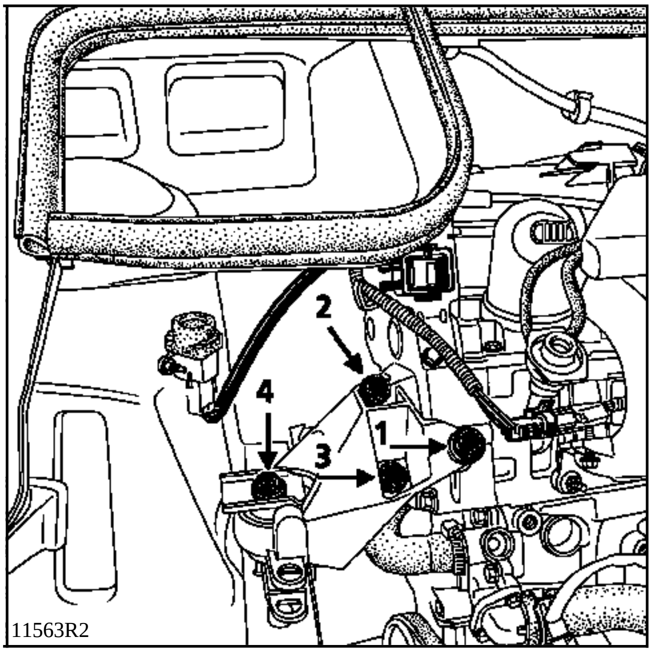
Remove the engine-gearbox assembly.

REFITTING (Special features)

Please note the importance of correctly positioning the engine -gearbox assembly in the engine compartment.

Fit the rear mounting bolt.

Fit the front right engine mounting and pretighten the bolts in the following order:
Bolts (1), (2) and (3) then bolt (4).



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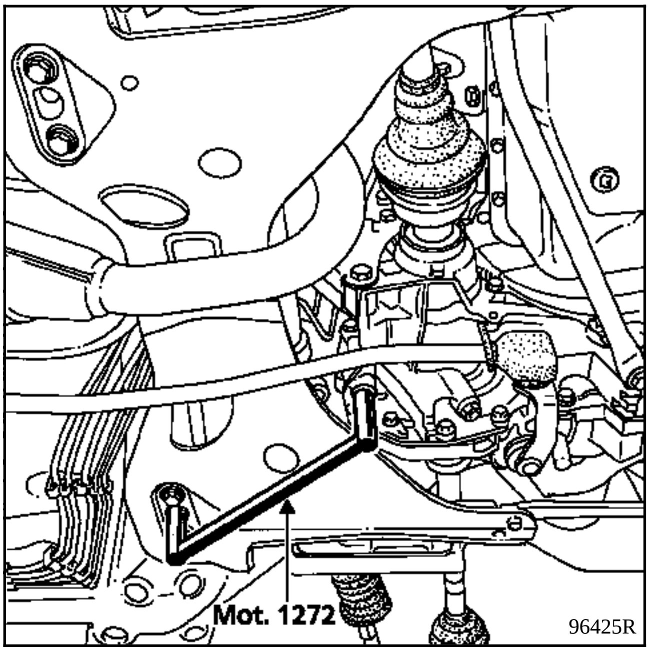
Fit the gearbox mounting without putting it under stress.

Using tool **Mot**, **1272** position the engine-gearbox assembly in relation to the left rear subframe guide hole and the clutch bellhousing guide hole.



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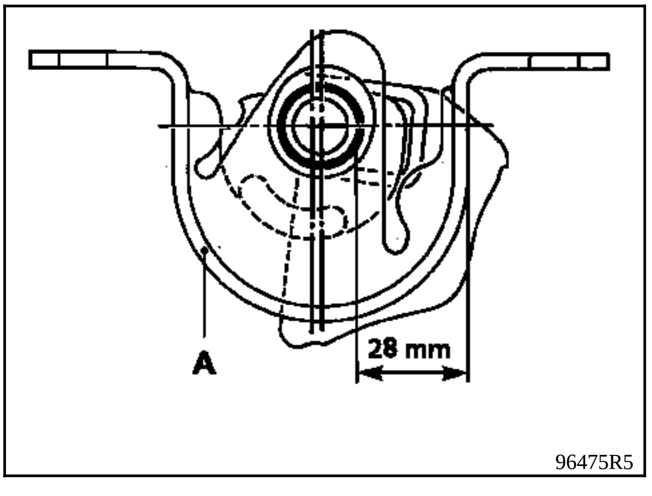
Tighten the gearbox mounting mounting bolts.

CHECK

In order to check that the fan assembly is positioned correctly, the measurement shown below must be taken.



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If this measurement is not correct (28 mm ±1), mark the actual position on the side member.

If the measurement is less than 27 mm, loosen the front mounting concerned and push section (A) back.

Retighten.

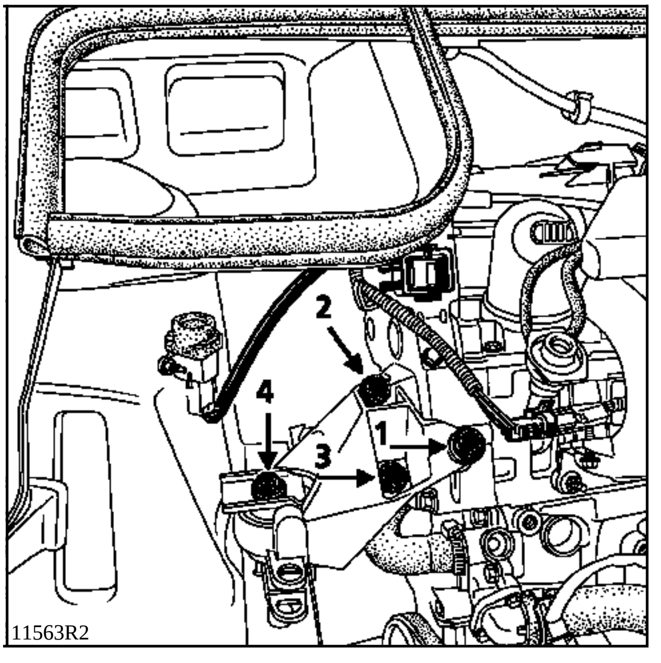
Check the new position and repeat the operation if necessary.

If the measurement is greater than 29 mm, carry out the same procedure but let section (A) move forward.

Next tighten the gearbox mounting mounting bolts to **4.2 daN.m**, making sure that section (A) is not moved by the tightening torque and that it remains parallel with the vertical surface of the side member.

Tighten the engine mounting in the following order:

Bolts (3), (1) and (2) then bolt (4) to **5.5 daN.m.**



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REFITTING (cont)

Refit in the reverse order to removal.
Apply **RHODORSEAL 5661** to the driveshaft pin holes.

Fit the caliper mounting bolts coated with loctite **FRENBLOC** and tighten them to the recommended torque.

Press the brake pedal several times so that the pistons come into contact with the brake pads.

Adjust the accelerator cable.

Carry out the following:
- fill the gearbox
- fill the engine if necessary
- fill and bleed the cooling circuit **(refer to section 19, Fill-Bleed).**

SPECIAL TOOLS REQUIRED	
Mot. 1054	**Top dead centre setting rod**
Mot. 1272	**Engine-gearbox assembly positioning tool**
Mot. 1273	**Tool for checking belt tension**
Mot. 1355	**Crankshaft seal installation tool**
Mot. 1374	**Crankshaft seal removal tool**
Mot. 1399	**Tool for locating the engine on the subframe**

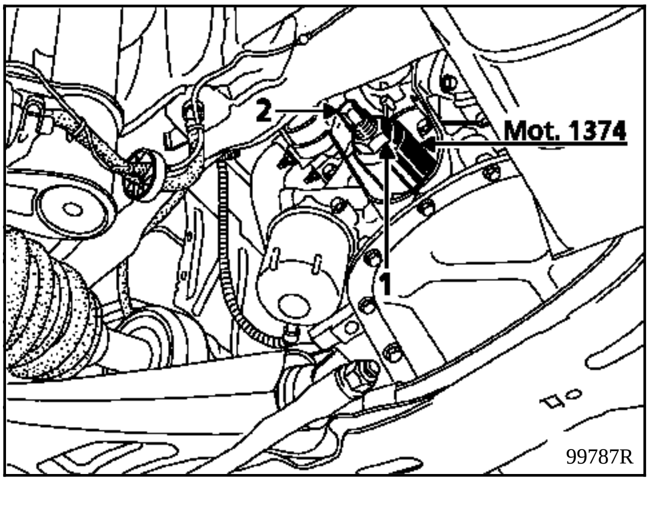
TIGHTENING TORQUES (in daN.m or in degrees)	
Crankshaft outlet mounting bolt	**2 + 80°**
Mounting bolt which secures the front right mounting to the engine	**5.5**
Mounting bolt which secures the front right mounting to the side member	**5.5**
Timing belt tensioner roller nut	**5**
Wheel bolt	**9**

CHANGING

REMOVAL

Remove the timing belt **(refer to section 11, timing belt).**

To remove the crankshaft seal, use **Mot. 1374.**



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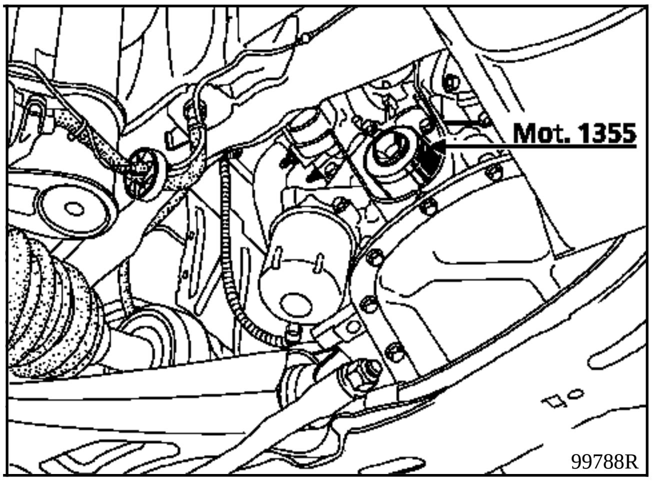
Screw the body of the tool into the seal via nut (1) then act on bolt (2) to extract the seal.

FITTING

Fit the new seal to the crankshaft output shaft without damaging it on passing through the timing gear driving groove.

Fit it using tool **Mot. 1355.**



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Fit:
- the new timing belt (refer to the procedure described in **section 11, timing belt),**
- the new alternator belt (refer to the tensioning procedure and value in **section 07, Accessories belt tensioning).**

TIGHTENING TORQUES (In daN.m)	
Sump mounting bolt	**1**

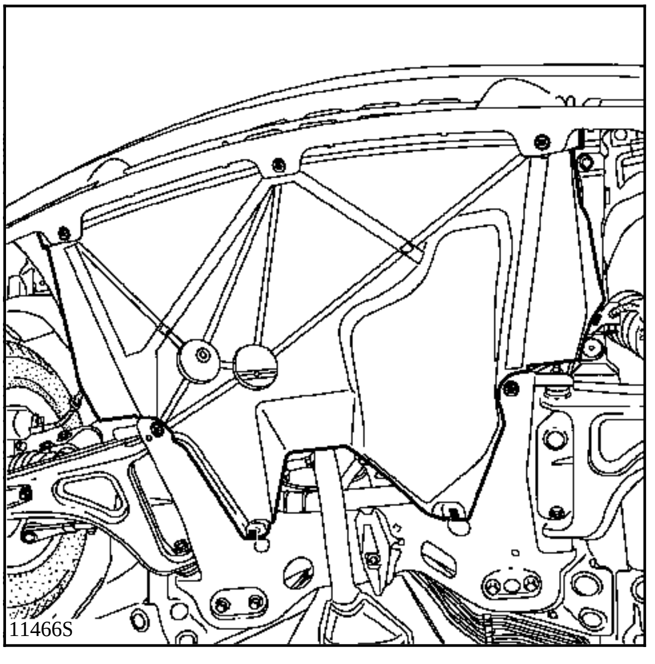
REMOVAL

Place the vehicle on a two post lift.

Disconnect the battery.

Drain off the engine oil.

Remove:
- the engine undertray,

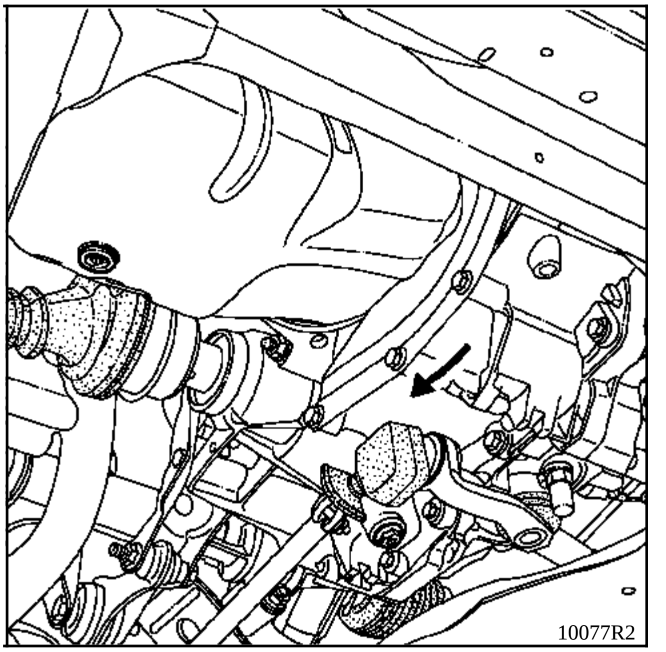

11466S

- the engine flywheel protector.

Slacken the electrical harness bracket bolt.

Remove the sump mounting bolts.

Turn the sump towards the rear of the vehicle, following the direction of the arrow shown below, in order to disengage the oil pump strainer from the sump wall.

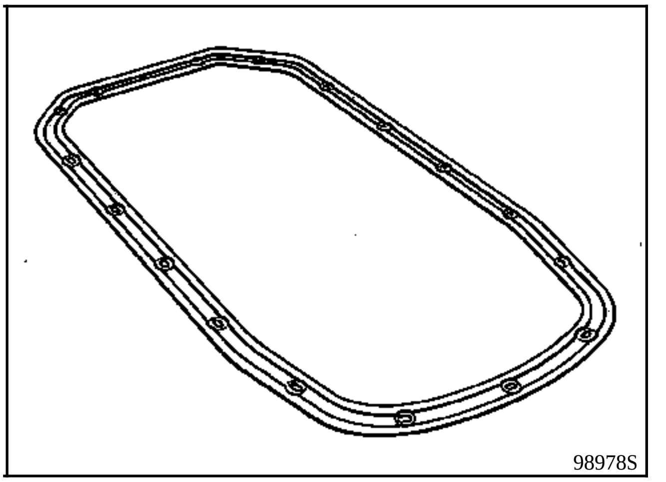

10077R2

REFITTING

Clean the mating surfaces.

NOTE: the sump must only be sealed using the special service seal.

Smooth surface, crankcase end.


98978S

Refit in the reverse order to removal.

Charge with oil.

SPECIAL TOOLS REQUIRED	
Mot. 1054	**Top dead centre setting rod**
Mot. 1272	**Engine-gearbox assembly positioning tool**
Mot. 1273	**Tool for checking belt tension**
Mot. 1355	**Crankshaft seal installation tool**
Mot. 1374	**Crankshaft seal removal tool**
Mot. 1399	**Tool for locating the engine on the subframe**

TIGHTENING TORQUES (in daN.m or in degrees)	
Crankshaft outlet mounting bolt	**2+80°**
Mounting bolt which secures the front right mounting to the engine	**5.5**
Mounting bolt which secures the front right mounting to the side member	**5.5**
Timing belt tensioner roller nut	**5**
Sump mounting bolt	**1**
Oil pump mounting bolt	**0.9**
Wheel bolt	**9**

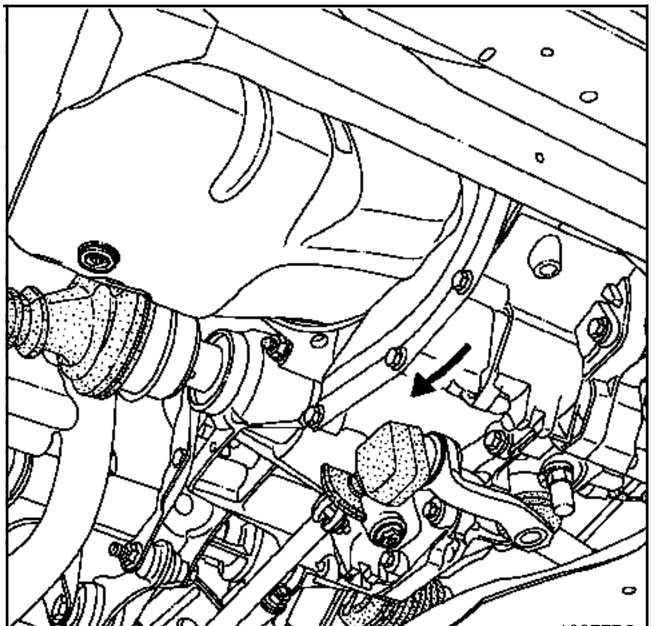
REMOVAL

Drain off the engine oil.

Remove:
- the timing belt (refer to the procedure described in **section 11, Timing belt),**
- the dipstick,

Remove:
- the engine flywheel protector.

Slacken the electrical harness mounting bolt and remove the sump mounting bolts.



10077R2

Turn the sump towards the rear of the vehicle, following the direction of the arrow shown above , in order to disengage the oil pump strainer from the sump wall.

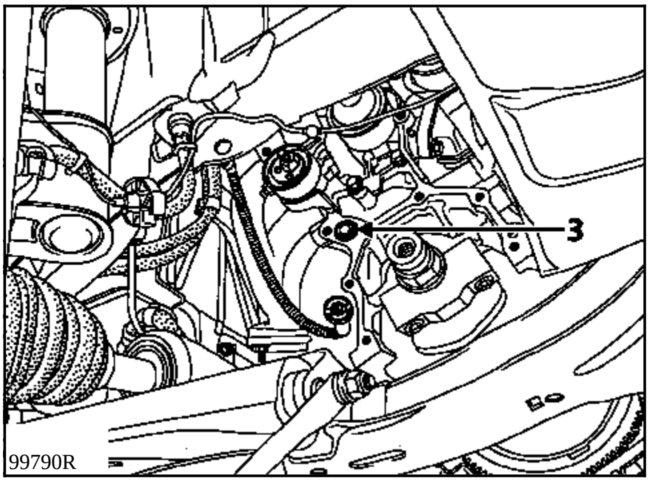
Remove the crankshaft seal using **Mot. 1374 (**refer to **section 11, Timing end crankshaft seal)**

Remove:
- the oil pump strainer,
- the oil pump.

Clean the mating surfaces without scratching the aluminium surfaces.

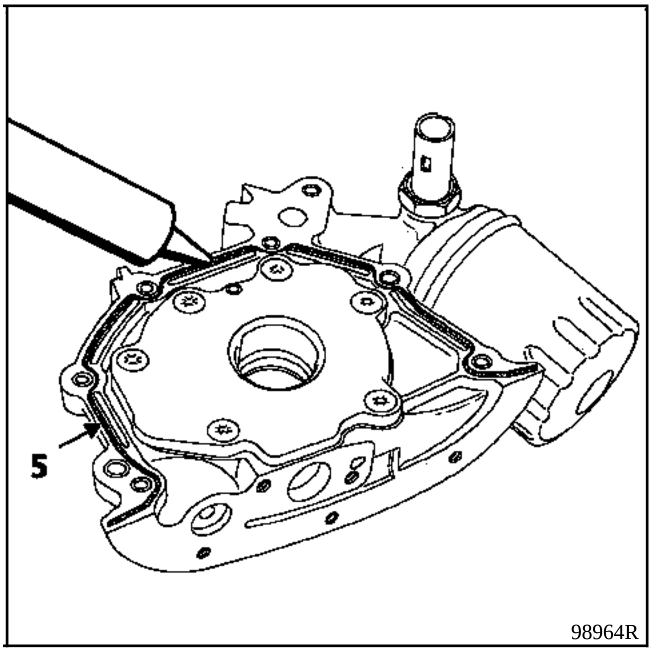
REFITTING

Always replace the oil pressure supply seal (3).



99790R

The oil pump is sealed using **RHODORSEAL 5661,** the bead (5) must be applied as shown in the illustration below.



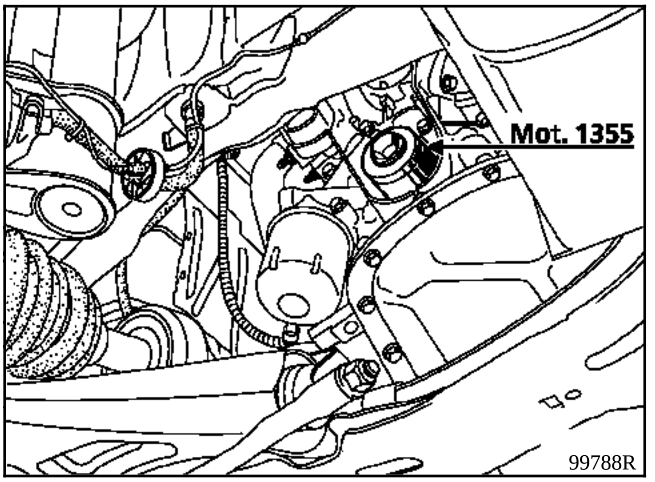
98964R

WARNING: the oil pump is driven by the two actuators on the crankshaft.

Refit the oil pump to the engine, tighten it to : **0.9 daN.m**.

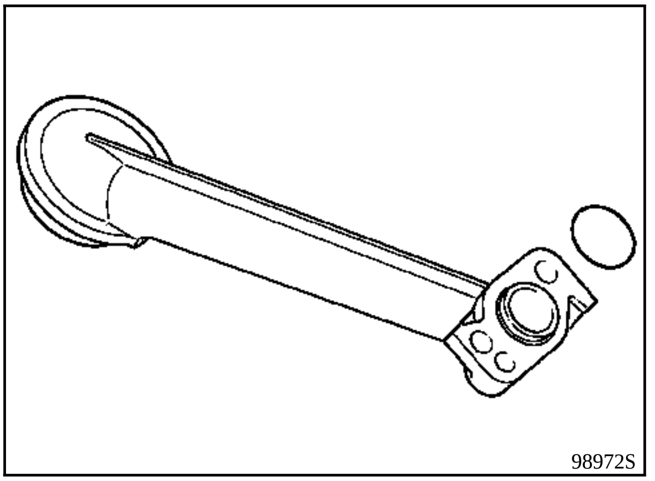
Fit the new seal to the crankshaft output shaft without damaging it on passing through timing gear driving groove.

Fit it using tool **Mot. 1355**.



99788R

Refit the strainer fitted with its new O-ring.

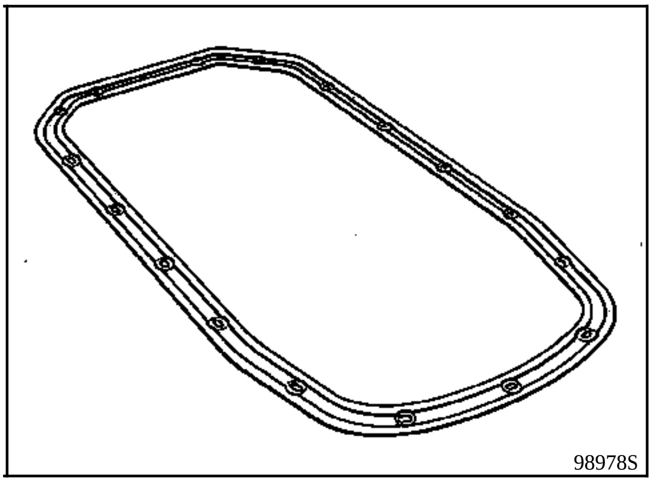


98972S

Refit the sump.

NOTE: the sump must only be sealed using the special service seal.

Smooth surface, crankcase end



98978S

Tighten the bolts to: **1 daN.m.**

Fit:
- the new timing belt (refer to the procedure described in **section 11, Timing belt**),
- the new alternator belt (refer to the tensioning procedure and values in **section 07, Accessories belt tensioning**).

Charge with engine oil.

SPECIAL TOOLS REQUIRED	
Mot.1054	**Top dead centre setting rod**
Mot 1135-01	**Timing belt tensioner**
Mot. 1272	**Engine-gearbox assembly positioning tool**
Mot. 1273	**Tool for checking belt tension**
Mot. 1386	**Timing belt pre-stressing tool**
Mot. 1399	**Tool for locating the engine on the subframe**

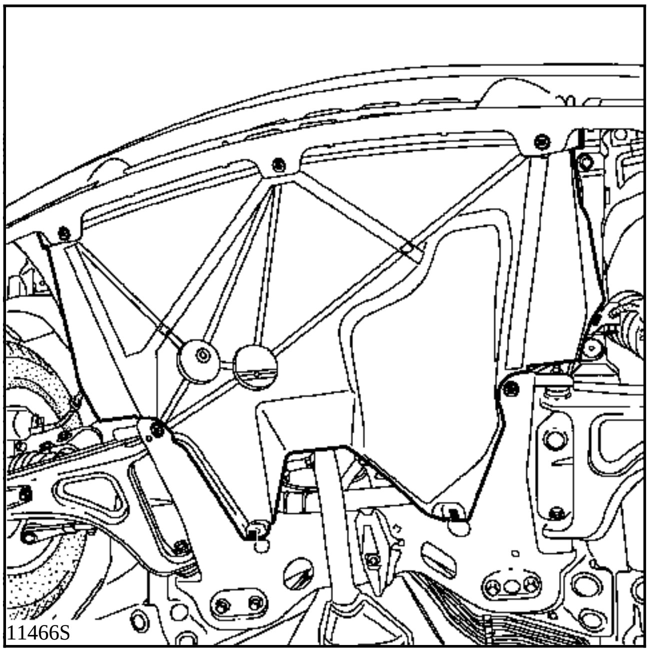
TIGHTENING TORQUES (In daN.m or degrees)	
Crankshaft pulley mounting bolt	**2 + 80°**
Mounting bolt which secures the front right mounting to the engine	**5.5**
Mounting bolt which secures the front right mounting to the side member	**5.5**
Timing belt tensioner roller nut	**5**
Wheel bolt	**9**

REMOVAL

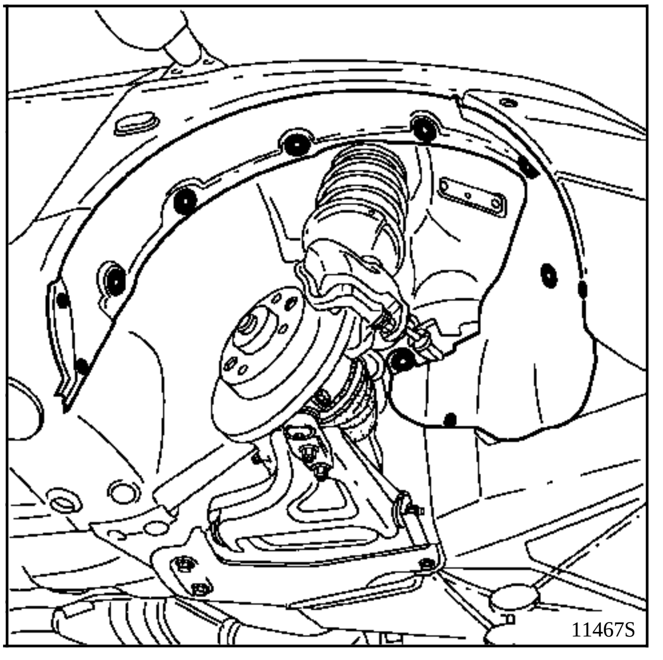
Place the vehicle on a two post lift.

Disconnect the battery.

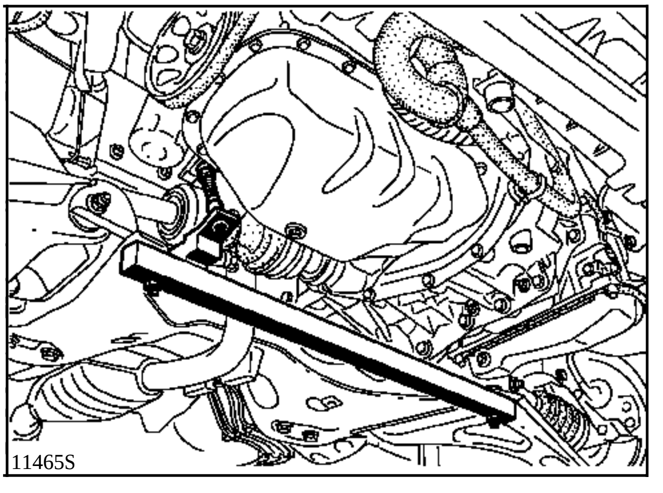
Remove:
- the engine undertray,


11466S

- the front right wheel,
- the front right mud shield.

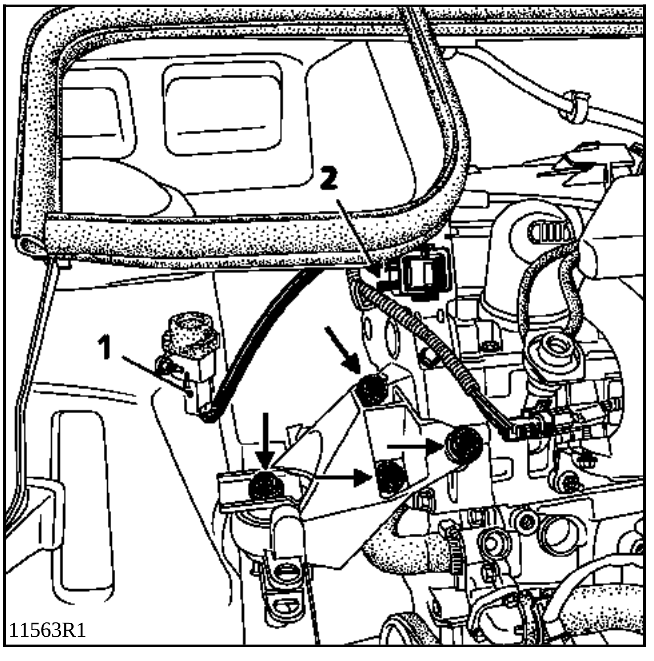

11467S

Fit the engine mounting **Mot. 1399**.


11465S

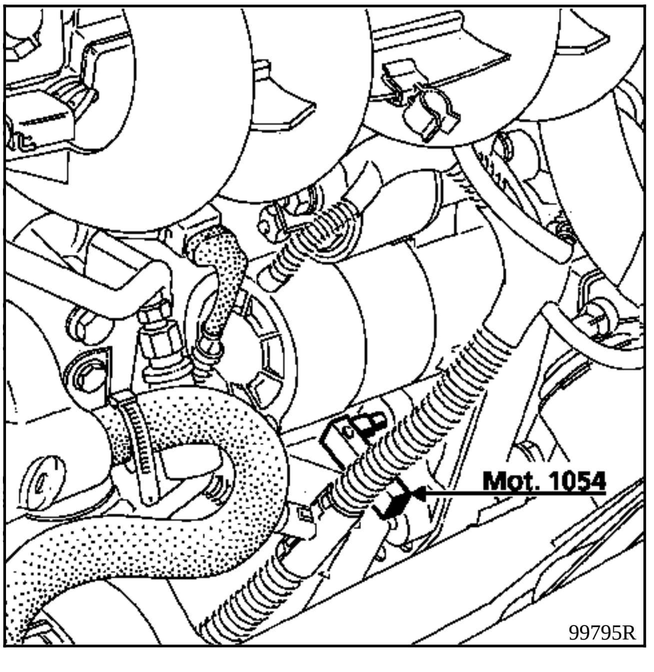
Remove:

- the alternator belt,
- the crankshaft pulley,
- the pendulum mounting system, disconnecting the connector (1) and the diagnostics socket (2).

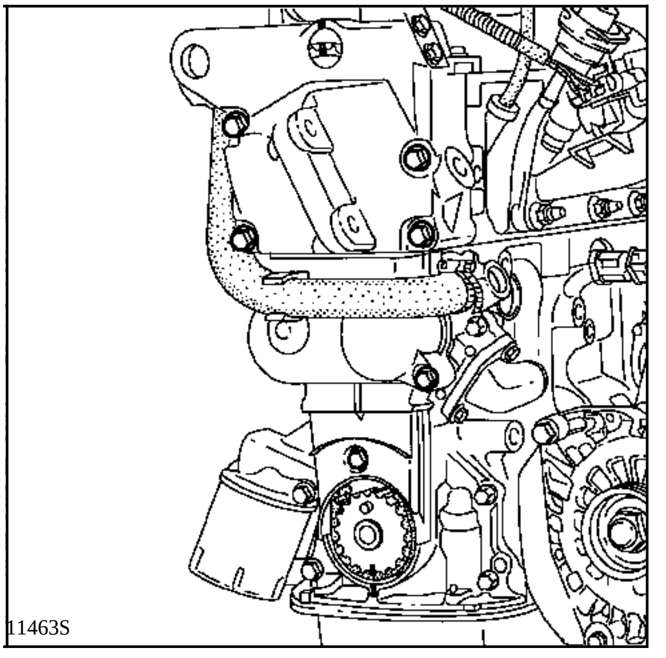


11563R1

Position the engine at Top Dead Centre using **Mot. 1054**, aligning the marks on the camshaft and crankshaft gear with the fixed marks.



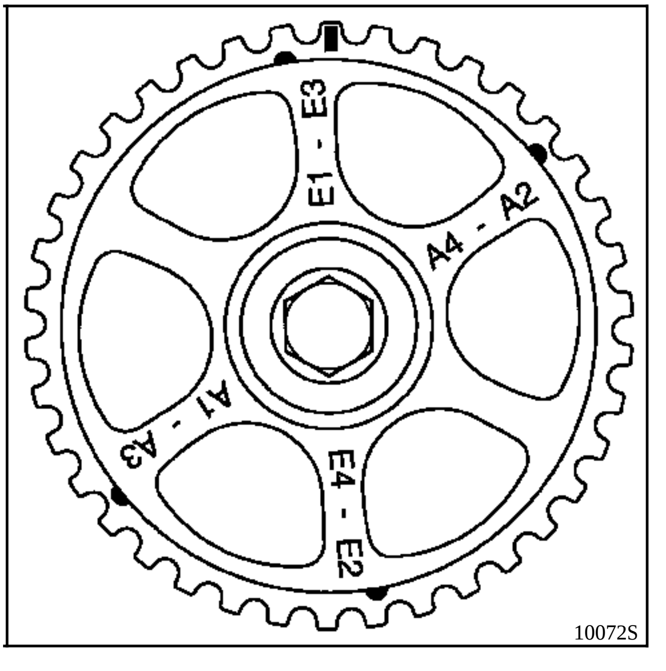
99795R



11463S

Remove the timing covers and the timing belt.

WARNING: the camshaft gear has five marks, only the rectangular mark on the surface of a tooth represents Top Dead Centre; the other marks are for setting the rockers.



10072S

REFITTING

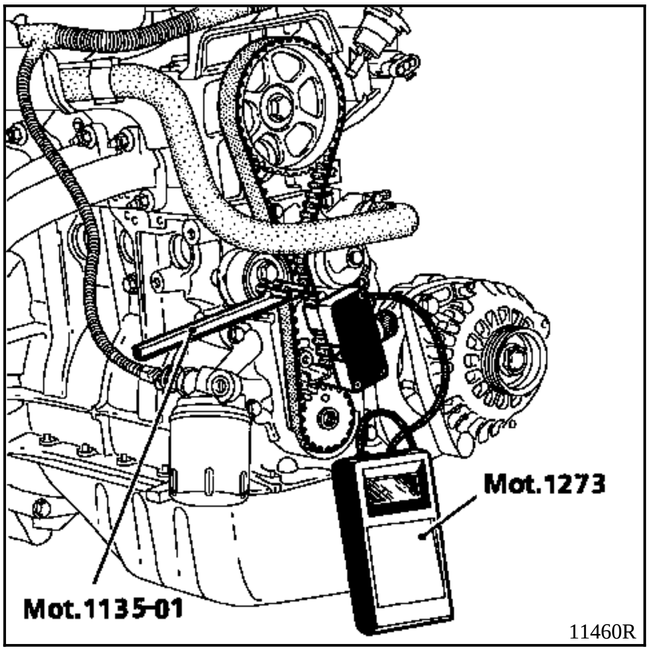
Align the marks on the timing belt with the marks on the crankshaft and camshaft gear.

PROCEDURE FOR TENSIONING THE TIMING BELT

Remove the setting rod **Mot. 1054**.

Fit the spacer of **Mot. 1386** (1) and tighten the crankshaft gear bolt.

a) Fit **Mot. 1273** and using **Mot. 1135-01,** turn the tensioner roller anti-clockwise until a value of **20 US** is obtained (turn the sensor wheel until it clicks three times).



Tighten the tensioner roller nut.

Turn by a minimum of two engine revolutions **(without ever turning backwards)**.

Set the engine at TDC, then remove the setting rod.

Check that the timing setting is correct on the crankshaft and camshaft end.

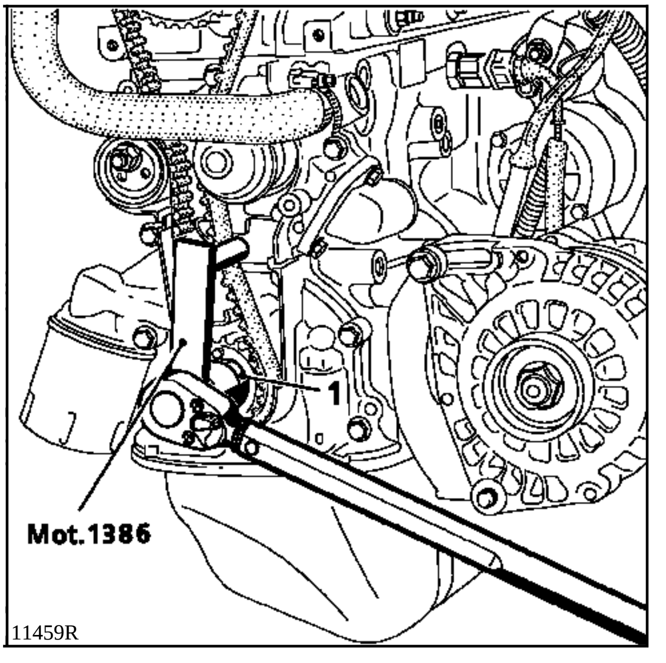
Slacken the tensioner roller nut and turn the tensioner roller slightly anti-clockwise using **Mot. 1135-01** until the two openings on the tensioner roller are approximately horizontal.

Retighten the tensioner roller nut.

b) Turn by a minimum of two engine revolutions **(without ever turning backwards)**.

\Set the engine at TDC, then remove the setting rod.

Apply a pre-stress of **10 daN.m** using **Mot. 1386 between the crankshaft gear and the coolant pump.**



Fit **Mot. 1273** and read the **tension** value which must be **20 ± 3 US (Fitting tension)**, otherwise adjust it by altering the position of the tensioner roller using **Mot. 1135-01** and restart the tensioning procedure at **b)**.

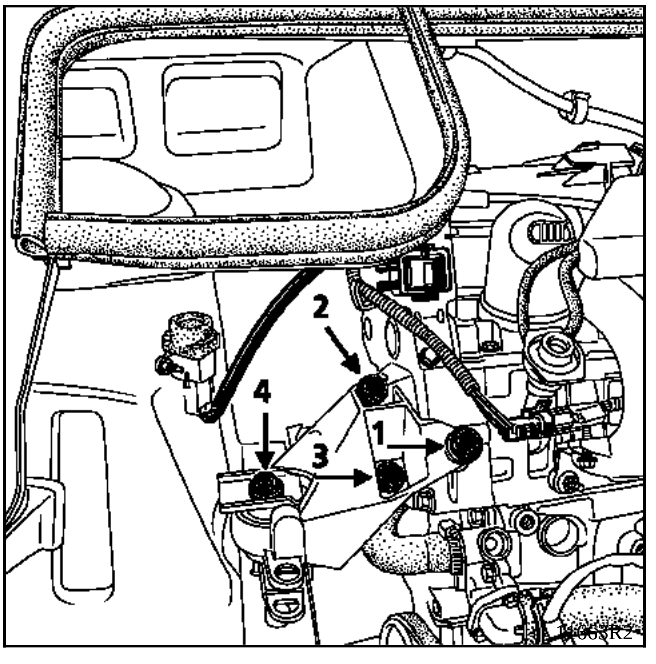
Tighten the tensioner roller nut to **5 daN.m**.
Fit the new alternator belt (refer to the tensioning procedure and value **section 07, Accessories belt tensioning).**

IMPORTANT :
The following is **imperative :**
- turn by a minimum of two engine revolutions after each alteration of the tensioner roller position in order to measure the tension.
- pre-stress to **10 daN.m** in order to eliminate all belt slack.

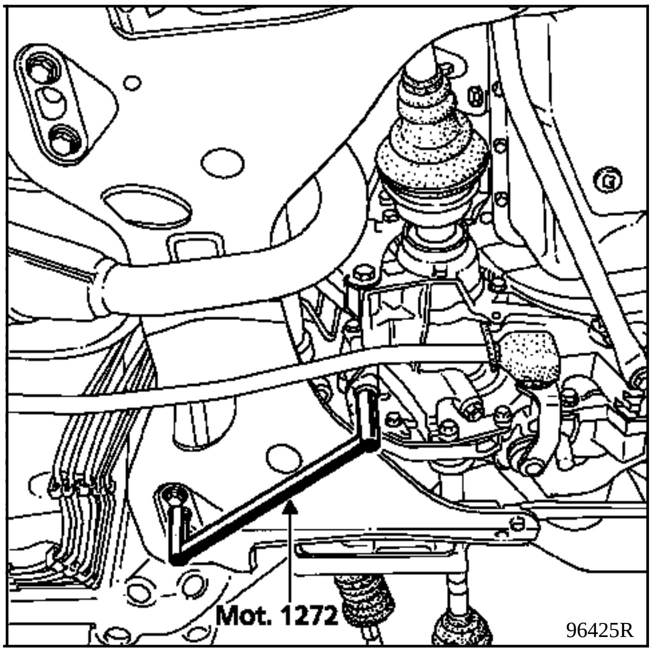
NOTE :-never refit a belt which has been removed,
- change the belt if the tension is **below the minimum operating tension (10 US)**.

Refit in the reverse order to removal.

Fit the engine mounting and pretighten in the following order:
Bolts (1), (2) and (3), then bolt (4).



Using tool **Mot. 1272** position the engine-gearbox assembly in relation to the left rear subframe guide hole and the clutch bellhousing guide hole.



Tighten bolts (1), (2) and (3) and then bolt (4) to **5.5 daN.m**.

SPECIAL TOOLS REQUIRED	
Mot. 591-04	**Angular wrench for tightening the cylinder head and index**
Mot. 1054	**Top dead centre setting rod**
Mot. 1135-01	**Timing belt tensioner**
Mot. 1202	**Spring clip pliers**
Mot. 1272	**Engine-gearbox assembly positioning tool**
Mot. 1273	**Tool for checking belt tension**
Mot. 1386	**Timing belt pre-stressing tool**
Mot. 1399	**Tool for locating the engine on the subframe**

EQUIPMENT REQUIRED
Sixe 12 torx socket
Angular tightening locking device

TIGHTENING TORQUES (in daN.m or in degrees)	
Crankshaft outlet mounting bolt	**2 + 80°**
Mounting bolt which secures the front right mounting to the engine	**5.5**
Mounting bolt which secures the front right mounting to the side member	**5.5**
Timing belt tensioner roller nut	**5**
Wheel bolt	**9**

REMOVAL

Place the vehicle on a two post lift.

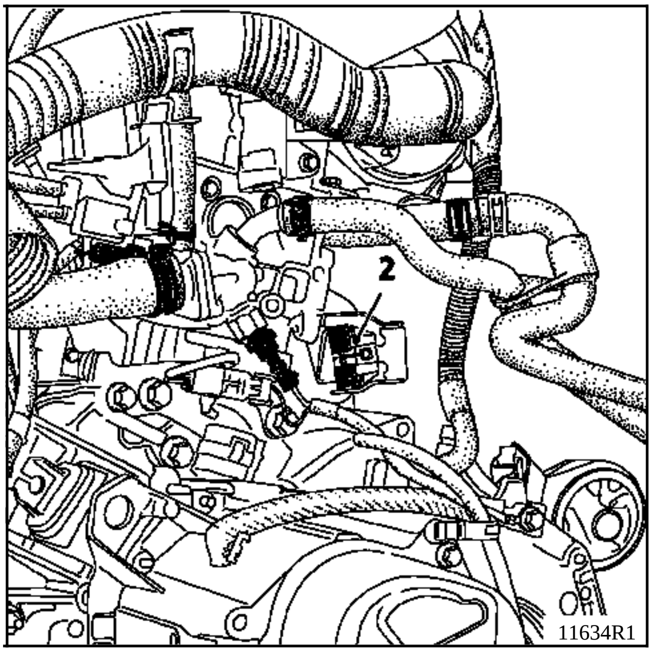
Disconnect the battery.

Remove:
- the timing belt (refer to the procedure described in **section 11, Timing belt**),
- the dipstick,
- the two air filter air pipes,
- the accelerator cable.

Drain the cooling circuit via the lower radiator hose.

Remove the hoses and the connectors on the thermostat and the cylinder head.

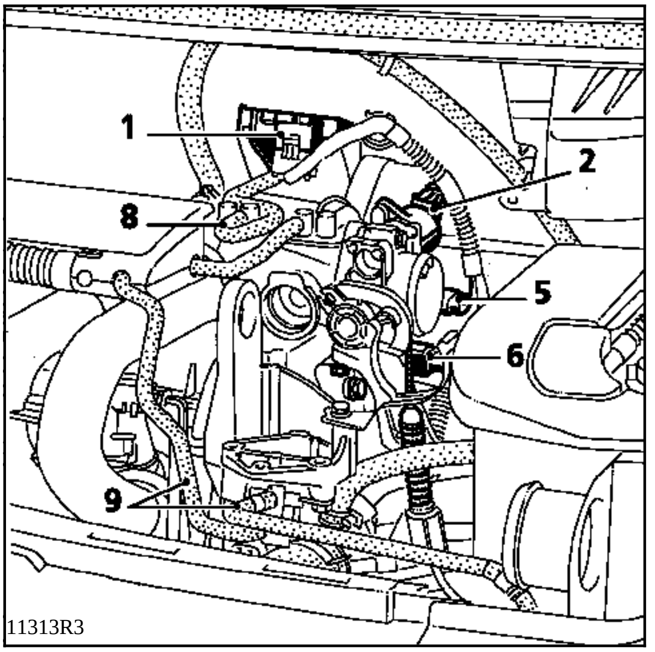
Unclip the two fuel pipes on the bracket (2).



Disconnect:

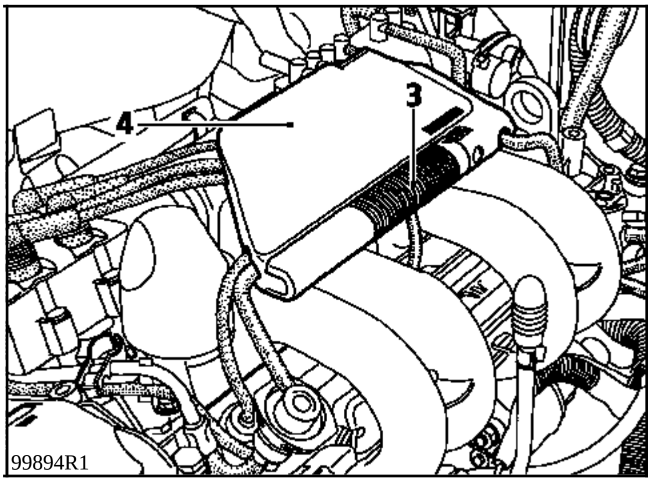
- the following connectors:
  - absolute pressure sensor (1),
  - idle regulation stepping motor (2),
  - throttle position potentiometer (5),
  - air temperature sensor (6),

- the vacuum connection pipe (8), the fuel vapour rebreather (9) and the solenoid valve connector,

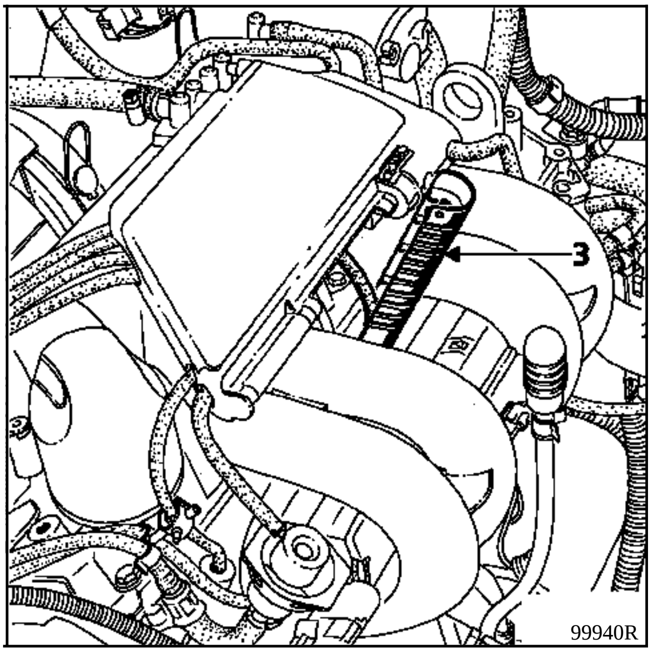


11313R3

- the vacuum connection pipe on the brake servo,
- the connectors on the ignition coil and the injection rail,
- the spark plug wires using tool (3) integral with the plastic protector (4).

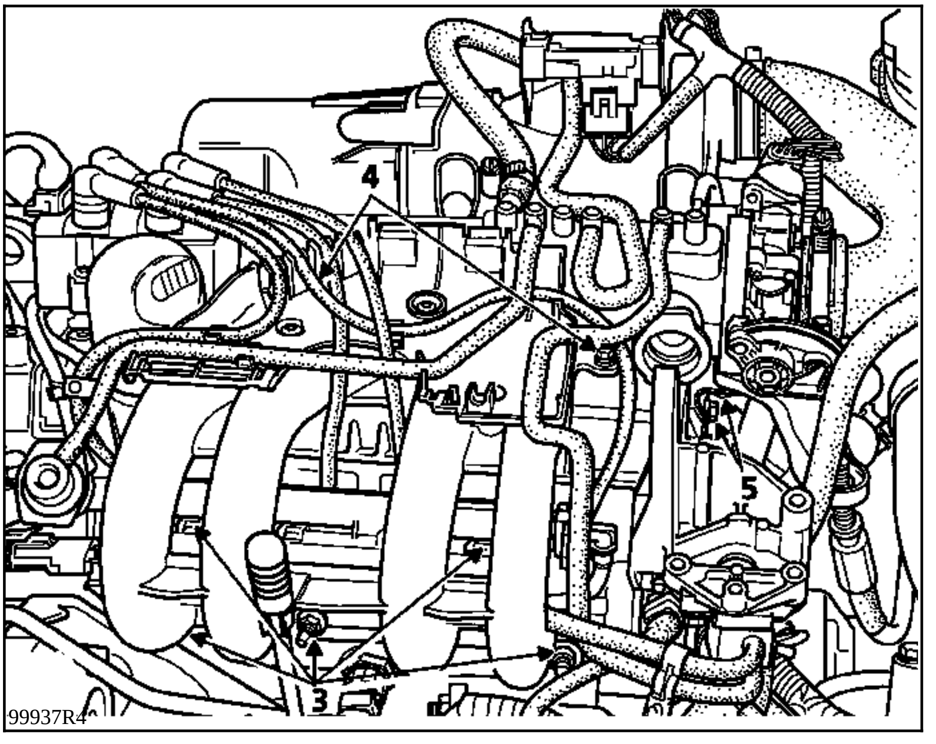


99894R1



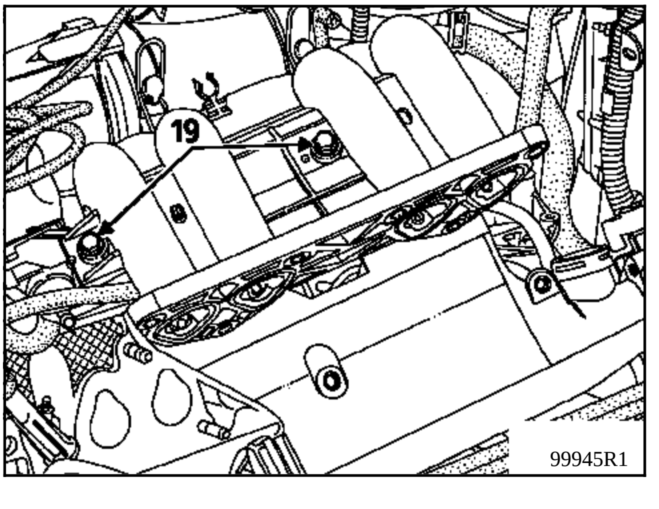
99940R

Remove:
- the mounting bolts (5) which secures the throttle housing stiffening plate to the cylinder head,
- the mounting nuts (3) which secure the manifold to the cylinder head,
- the mounting bolts (4) which secure the manifold to the cylinder head cover,



Uncouple the manifold from the cylinder head and turn it a half turn.

Remove the injection rail mounting bolts (19) and remove the manifold.



Remove the air filter.

Remove the coolant pump-heater matrix hose and the electrical harness from the heat shield on the cylinder head cover.

Remove:

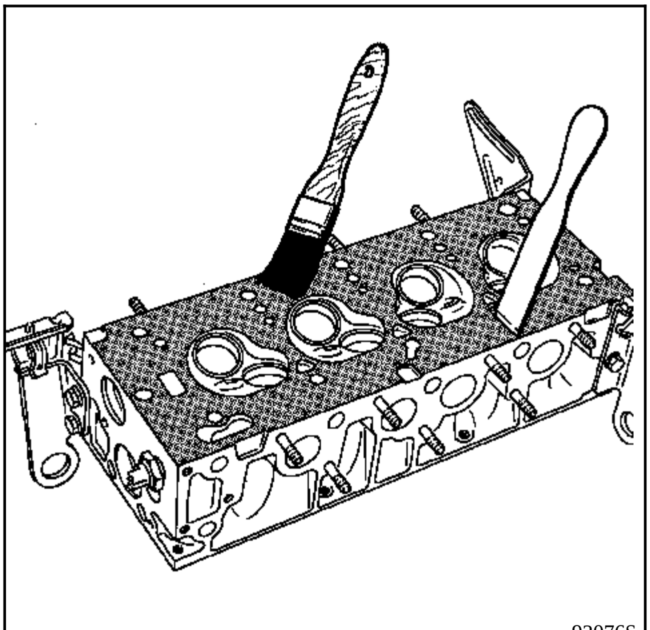
- the cylinder head cover,
- the exhaust down-pipe,
- the oxygen sensor connector,
- the cylinder head mounting bolts,
- the cylinder head.

CLEANING

It is very important that the mating surfaces of the aluminium parts are not scratched.

Use **Décapjoint** to detach the part of the seal which remains attached.

Apply the product to the section to be cleaned. Wait for approximately ten minutes then remove it using a wooden spatula.



92076S

You are advised to wear gloves when carrying out this operation.

Please note that care must be taken when carrying out this operation in order to prevent the entry of foreign bodies into the pipes which supply oil under pressure to the camshaft (pipes located both in the crankcase and in the cylinder head).

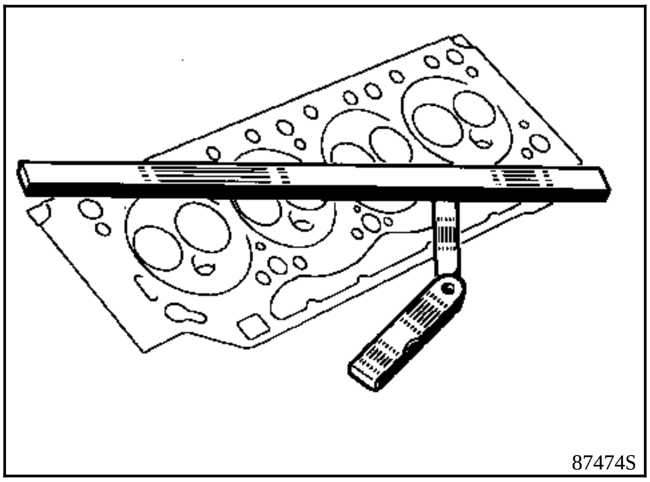
If this advice is not followed there is a risk that the jets may become clogged and the cams and tappets will quickly become damaged.

CHECKING THE SEAL SURFACE

Using a ruler and a set of shims, check whether the mating surface is deformed.

Maximum deformation: **0.05 mm**

Grinding of the cylinder head is strictly forbidden.



87474S

REFITTING

The cylinder head is aligned by two dowel pins at the rear of the engine.

Refresher:
In order to correctly tighten the bolts, remove any oil from the cylinder head mounting holes using a syringe.

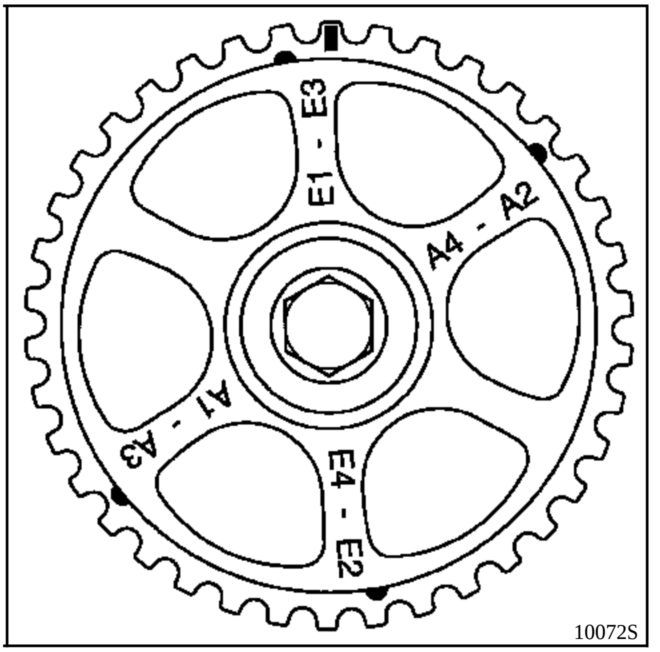
Lubricate the bolt threads and under the bolt heads using engine oil.

Setting of the rockers and tightening of the cylinder head must be carried out when cold.

Tighten the cylinder head using an angular tightening locking device (refer to **section 07, cylinder head tightening**).

Fit:
- the new timing belt (refer to the procedure described in **section 11, Timing belt**).
- the new alternator belt (refer to the tensioning procedure and value **section 07, Accessories belt tensioning).**

WARNING: the camshaft gear has five marks, only the rectangular mark on the surface of a tooth represents Top Dead Centre; the other marks are for setting the rockers.



10072S

Remove the Top Dead Centre setting rod.

ADJUSTMENT OF THE ROCKERS IF NECESSARY

Partially refit the pendulum mounting system timing cover to the engine using two bolts.

Set the engine at Top Dead Centre, cylinder n° 1 at ignition.

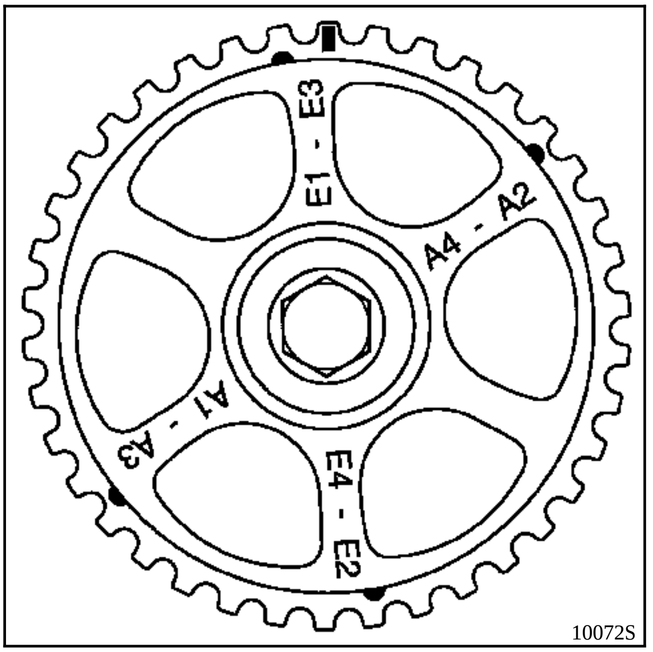
Turn the crankshaft clockwise (as seen from the timing end) to reach the first mark.

SET: **exhaust 1**
exhaust 3

advance to the second mark:
SET: **intake 1**
intake 3

third mark:
SET: **exhaust 2**
exhaust 4

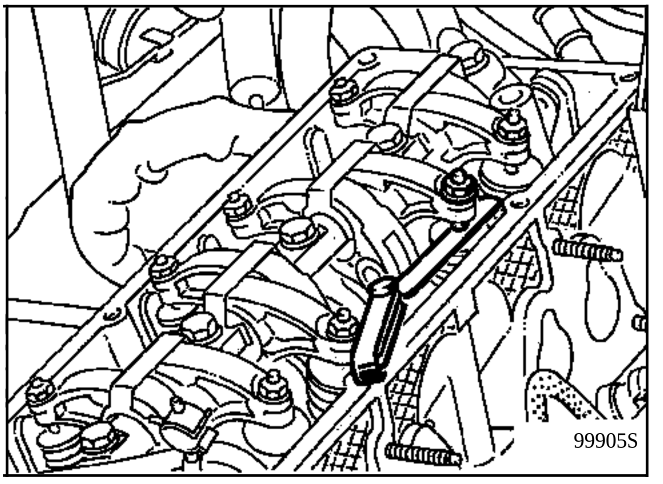
fourth mark:
SET: **intake 2**
intake 4



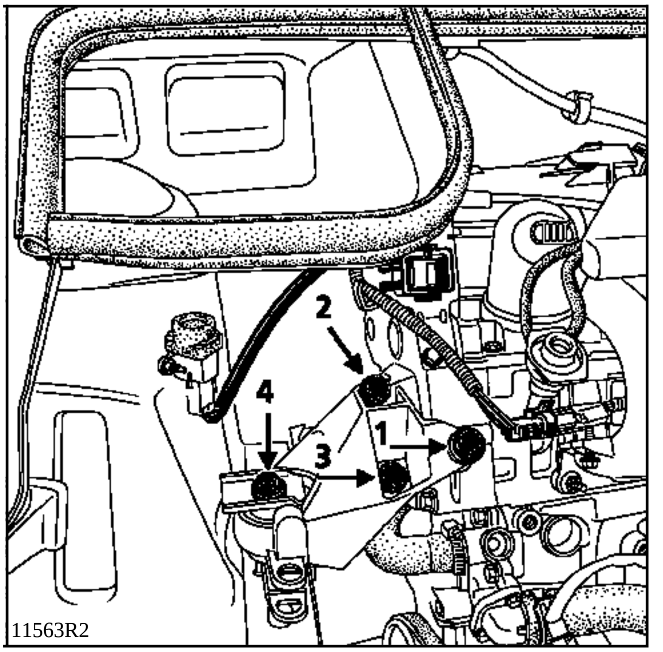
10072S

CLEARANCE SETTING VALUE AT THE VALVES (mm)

Intake	**0.1**
Exhaust	**0.2**

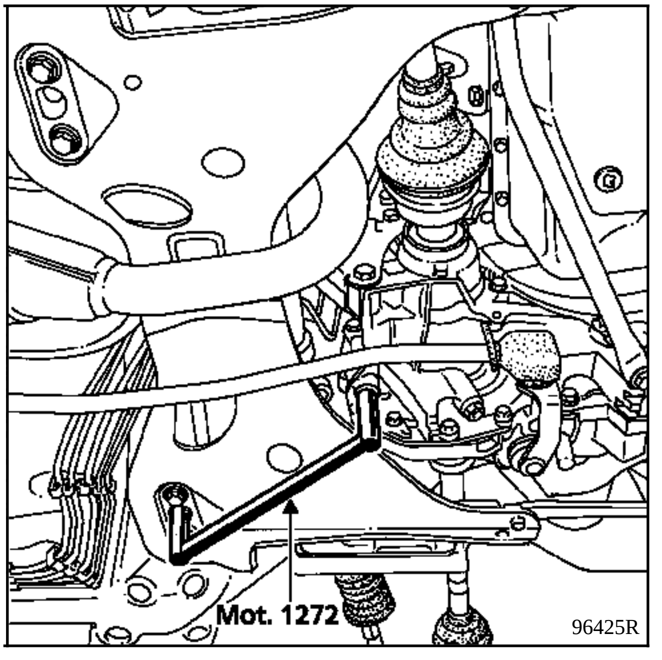

99905S

Fit the engine mounting and pretighten the bolts in the following order:
Bolts (1), (2) and (3) then bolt (4).



11563R2

Using tool **Mot. 1272** position the engine-gearbox assembly in relation to the left rear subframe guide hole and the clutch bellhousing guide hole.



Tighten bolts (3), (1) and (2), and then bolt (4) to **5.5 daN.m**.

Refit in the reverse order to removal.

Remove the tool for locating the engine on the subframe **Mot. 1399**.

NOTE : tightening of the inlet manifold:
- gradually close up the six nuts until the manifold comes into contact with the cylinder head then tighten them to **1.5 daN.m**,
- fit the upper bolts and tighten them to **0.9 daN.m.**

Fill and bleed the cooling circuit (refer to **section 19, Fill and Bleed**).

Adjust the accelerator cable.

Vehicle	Gear-box	Engine							Anti-pollution standard
		Type	Index	Bore (mm)	Stroke (mm)	Cubic capacity (cm^3)	Compression ratio	Catalytic converter	
X 066 X 067	JB1	D7F	700	69	76.8	1149	9.65 / 1	◊ C62	EU 96
X 066 X 067	MB1	D7F	701	69	76.8	1149	9.65 / 1	◊ C62	EU 96

Engine		Checks to be carried out at idle*					Fuel*** (Minimum octane rating)
		Speed (rpm)	Emission of pollutants **				
Type	Index		CO (%) (1)	CO_2 (%)	HC (ppm)	Lambda (λ)	
D7F	700 701 (2)	740 ± 50	0.5 max	14.5 min	100 max	0.97< λ <1.03	Unleaded (IO 95)

(1) at 2500 rpm, the CO level must be 0.3 maximum.
(2) in Park or Neutral.

* For a coolant temperature greater than 80 °C and following a constant engine speed of 2500 rpm for approximately 30 seconds. Check to be carried out after return to idle.
** For legislative values, refer to the specification for the country concerned.
*** IO 91 compatible unleaded.

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

<table>
<tr><th>DESCRIPTION</th><th>BRAND/TYPE</th><th colspan="2">SPECIAL NOTES</th></tr>
<tr><td>Computer</td><td>SAGEM or
MAGNÉTI MARÉLLI</td><td colspan="2">35-way vehicle with manual gearbox with no optional equipment
55-way vehicle with automatic transmission or air conditioning</td></tr>
<tr><td>Injection</td><td>-</td><td colspan="2">Regulated semi-sequential monopoint</td></tr>
<tr><td>Ignition</td><td>-</td><td>Static with a monobloc with two coils with two outlets
Power module integral with the computer.
A pinking sensor tightening torque: 2.5 daN.m</td><td><table><tr><th>Tracks</th><th>Resistance</th></tr><tr><td>1 - 2</td><td>2 Ω</td></tr><tr><td>1 - 4 | 1 - 3
2 -3 | 2 - 4</td><td>1.6 Ω</td></tr><tr><td>3 - 4</td><td>1.1 Ω</td></tr><tr><td>HT - HT</td><td>10 KΩ</td></tr></table></td></tr>
<tr><td>Top Dead Centre Sensor</td><td>-</td><td colspan="2">Resistance 220 Ω</td></tr>
<tr><td>Spark plugs</td><td>EYQUEM / FN 52 LS
NGK / BK5 E SZ</td><td colspan="2">Gap: 0.9 mm
Tightening: 2.5 to 3 daN.m</td></tr>
<tr><td>Air filter</td><td>-</td><td colspan="2">Change after every two draining operations</td></tr>
<tr><td>Fuel filter</td><td>-</td><td colspan="2">Secured to the front of the fuel tank under the vehicle
Change at every service</td></tr>
<tr><td>Feed pump</td><td>WALBRO</td><td colspan="2">Immersed in the fuel tank
Flow: 80 l/h minimum with a regulated pressure of 3 bars and with a voltage of 12 volts</td></tr>
<tr><td>Pressure regulator</td><td>-</td><td colspan="2">Regulated pressure
With zero vacuum : 3 ± 0.2 bars
With 500 mbars vacuum : 2.5 ± 0.2 bars</td></tr>
<tr><td>Electromagnetic injectors</td><td>SIEMENS</td><td colspan="2">Voltage : 12 Volts
Resistance: 14.5 ± 1 Ω</td></tr>
</table>

<table>
<tr><th>DESCRIPTION</th><th>BRAND/TYPE</th><th>SPECIAL NOTES</th></tr>
<tr><td>Throttle housing</td><td>MAGNETI MARELLI
873 633</td><td>∅ 36 mm</td></tr>
<tr><td>Idle regulation stepping motor</td><td>AIR PAX</td><td>Voltage: 12 V (at high frequency)
Resistance: Tracks A-D53 ± 5 Ω
Tracks B-C 53 ± 5 Ω</td></tr>
<tr><td>Throttle potentiometer</td><td>-</td><td>Voltage: 5 V
Resistance:
<table>
<tr><th>Track</th><th>PL</th><th>PF</th></tr>
<tr><td>AB
AC
BC</td><td>1200 Ω
1260 Ω
2200 Ω</td><td>1200 Ω
2200 Ω
1260 Ω</td></tr>
</table></td></tr>
<tr><td>Canister fuel vapour recirculation
Solenoid valve</td><td>CAN 01
DELCO REMY</td><td>Voltage: 12 Volts
Resistance: 35 ± 5 Ω</td></tr>
<tr><td>Heated oxygen sensor</td><td>BOSCH
LSH 24</td><td>Voltage supplied at 850 °C
Rich mixture > 625 mvolts
Lean mixture : 0 to 80 mvolts
Heating resistor tracks A-B : 3 to 15 Ω
Tightening torque : 5 daN.m</td></tr>
<tr><td>Fault-finding</td><td>FICHE n° 27
CODE D13
SELECTOR S8</td><td>Throttle potentiometer :
At idle regulation : 10 ≤ # 17 ≤
At full load: 193 ≤ # 17 ≤240
OCR idle: 4 % ≤ # 12 ≤15 %

Adaptive OCR idle: - 4.3 % ≤ # 21 ≤+3.9 %
Adaptive operating richness: 96 ≤ # 30 ≤160
Adaptive idle richness : 96 ≤ # 31 ≤160</td></tr>
</table>

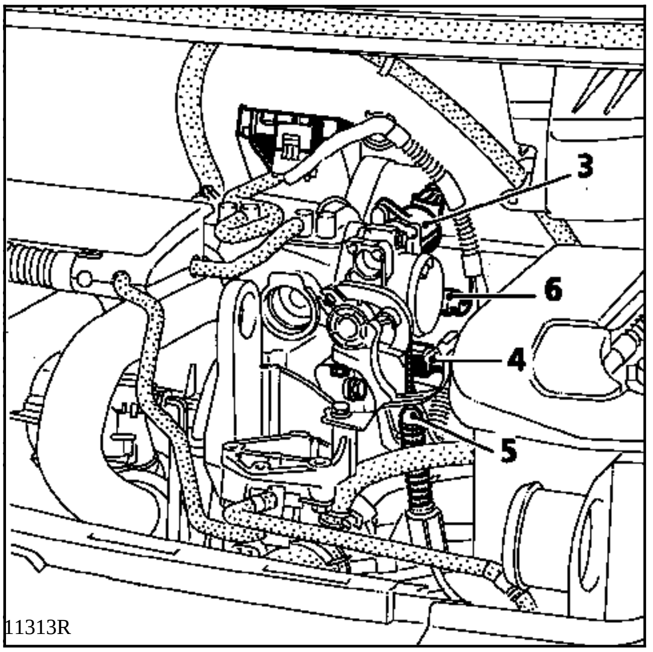
TIGHTENING TORQUES (in daN.m)	
Mounting bolt which secures the throttle housing to the inlet manifold	**1**
Mounting bolt which secures the throttle housing stiffening plate to the cylinder head	**1**

REMOVAL

Disconnect the battery.

Remove the two air pipes on the air filter.

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

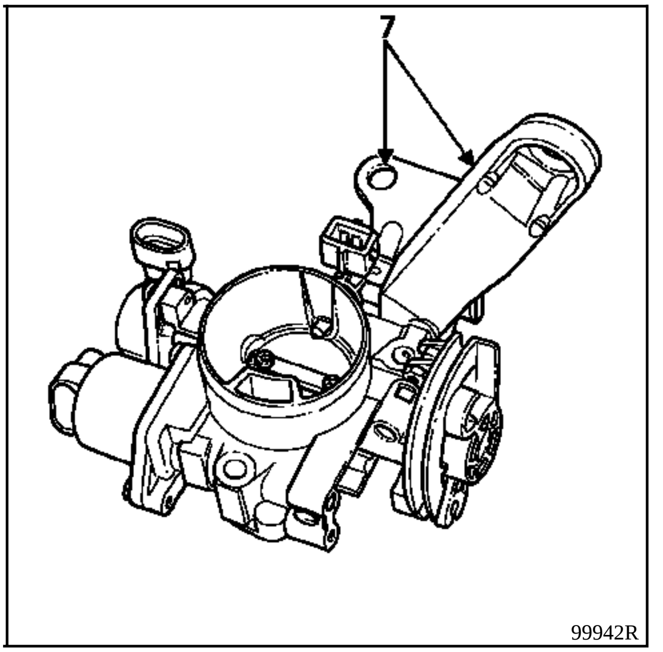


11313R

Remove the three throttle housing mounting bolts

Remove the two mounting bolts (7) which secure the stiffening plate to the cylinder head (leave the plate secured to the throttle housing).

Remove the throttle housing and the stiffening plate.



99942R

The throttle potentiometer and the stepping motor cannot be removed without removing the throttle housing.

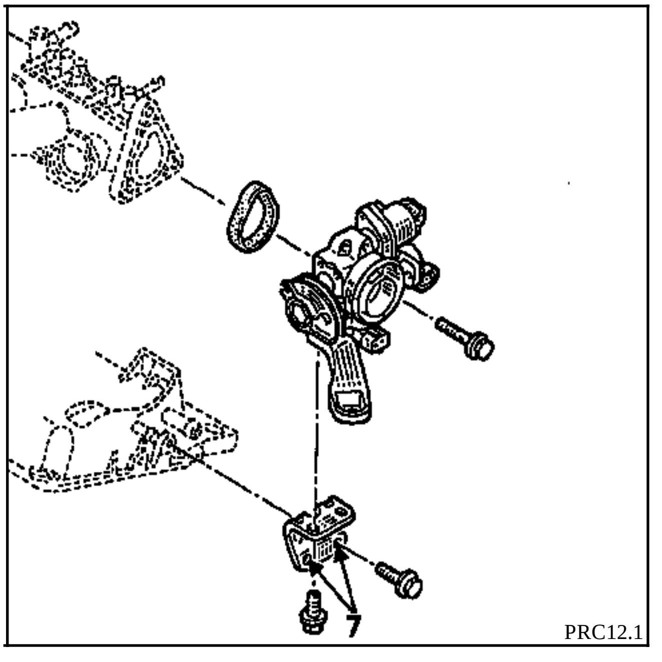
The throttle position potentiometer cannot be adjusted.

REFITTING

Change the seal between the throttle housing and the manifold.

Slacken the two bolts which secure the stiffening plate to the throttle housing. On refitting, tighten the three bolts which secure the throttle housing to the manifold first, then tighten the stiffening plate to the manifold and the throttle. This procedure must be followed in order to avoid a prestress on the throttle housing which will result in an air leak.

Other refitting operations are the reverse of removal.



PRC12.1

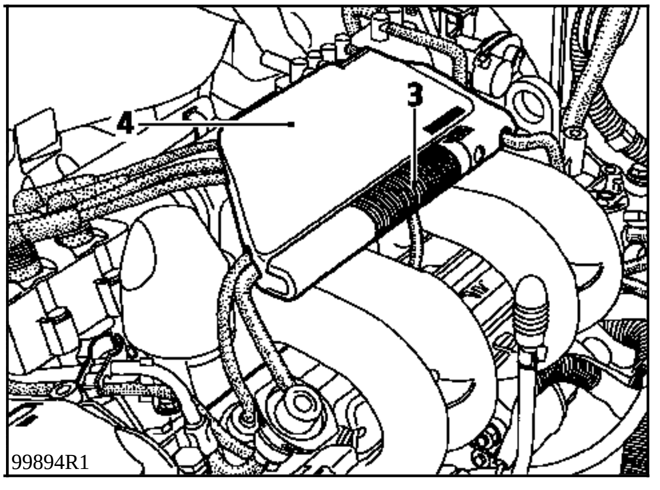
TIGHTENING TORQUES (in daN.m)	
Mounting bolt which secures the injection rail to the manifold	**1**
Mounting nut which secures the manifold to the cylinder head	**1.7**
Mounting stud which secures the manifold to the cylinder head	**1**

REMOVAL

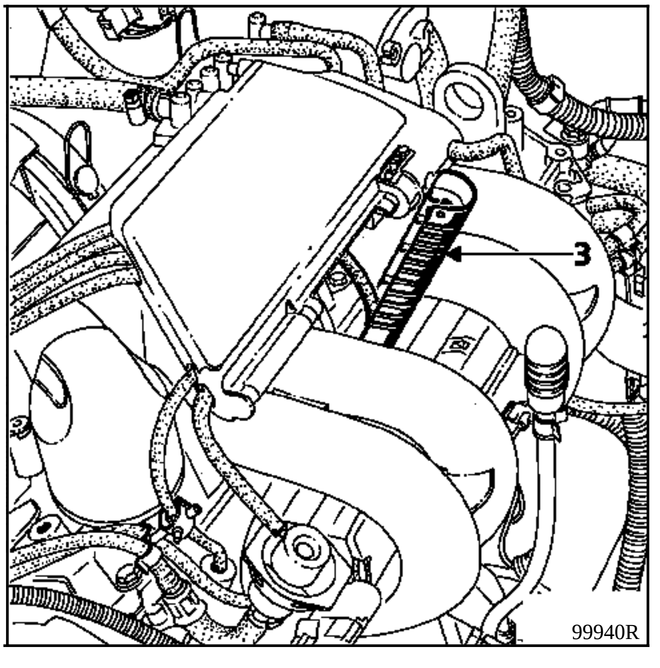
Disconnect the battery.

Remove the two air pipes on the air filter.

Disconnect the spark plug leads using the tool (3) integral with the plastic protector (4).



99894R1



99940R

Remove the upper section of the plastic protector.

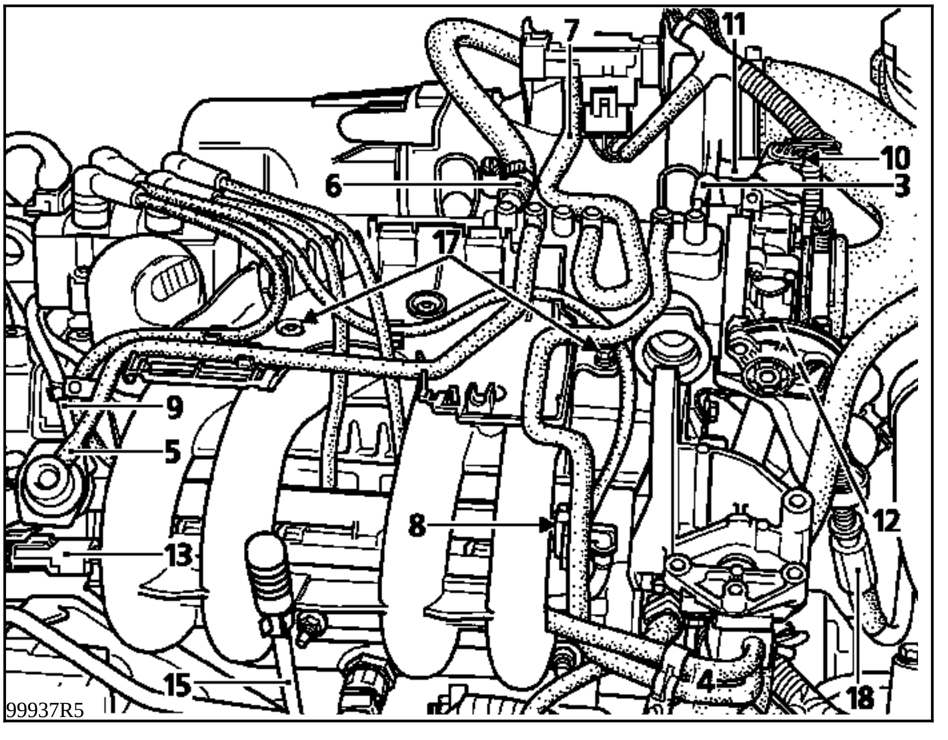
Tilt the spark plug leads to the right hand side of the vehicle.

Disconnect:
- the oil vapour rebreather (3) on the manifold,
- the fuel vapour rebreathers (4) on the solenoid valve,
- the pressure connection pipe (5) on the pressure regulator,
- the brake servo vacuum connection pipe (6),
- the pressure sensor vacuum connection pipe (7),
- the fuel supply pipe (8) and the fuel return pipe (9),
- the idle regulation stepping motor connector (10),
- the throttle position potentiometer connector (11),
- the air temperature sensor connector (12),
- the injectors connector (13),
- the accelerator cable (18).

Remove the dipstick (15).

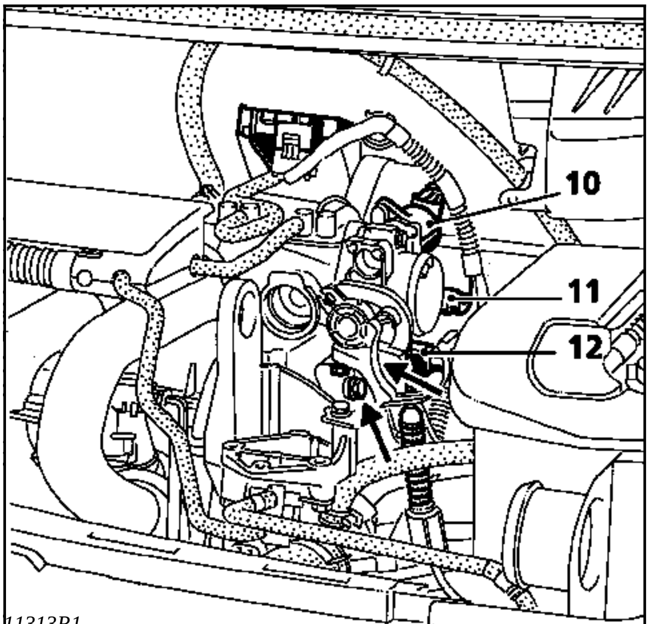
Remove the 6 mounting bolts which secure the manifold to the cylinder head.

Remove the 2 mounting bolts (17) which secure the manifold to the top of the cylinder head.



NOTE: on models with air conditioning, the accessories belt must be removed and the accessories must be unscrewed in order to remove the manifold.

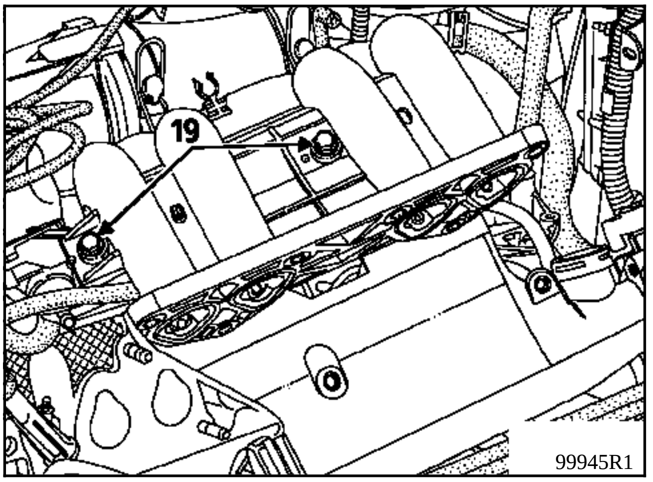
Remove the 2 bolts which secure the throttle housing stiffening plate to the cylinder head.



11313R1

Uncouple the manifold from the cylinder head and turn it a half turn.

Remove the 2 bolts (19) which secure the injection rail to the manifold.

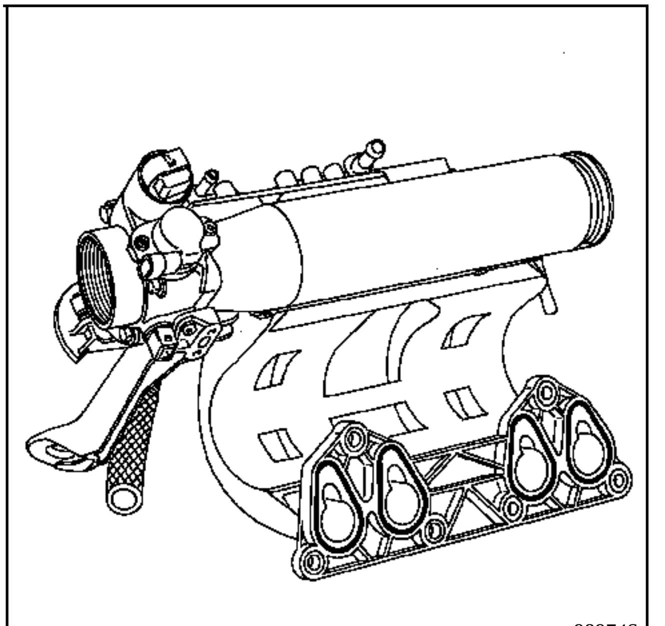


99945R1

Remove the injection rail.

Tilt the fuel supply pipe.

Remove the manifold.


98974S

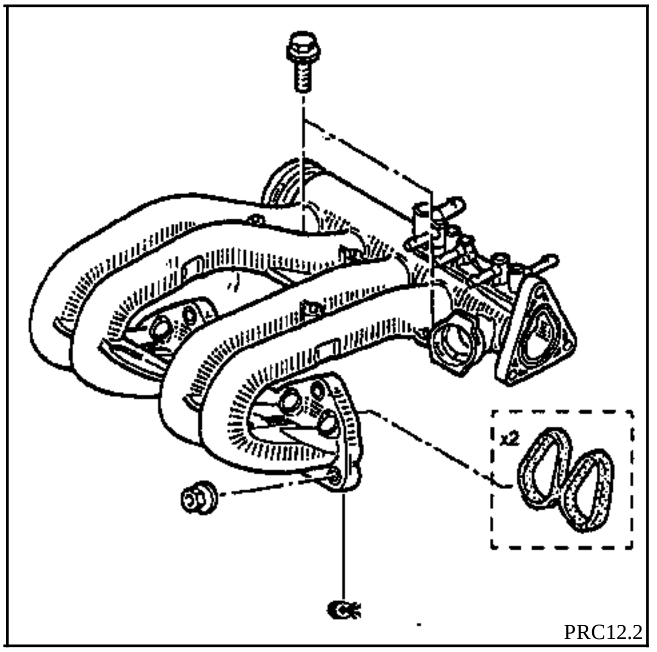
REFITTING

Change the manifold seal.

Reposition the fuel return pipe and the fuel vapour rebreather before repositioning the injection rail.

On models with air conditioning, change the accessories belt.

Other operations are the reverse of removal.



PRC12.2

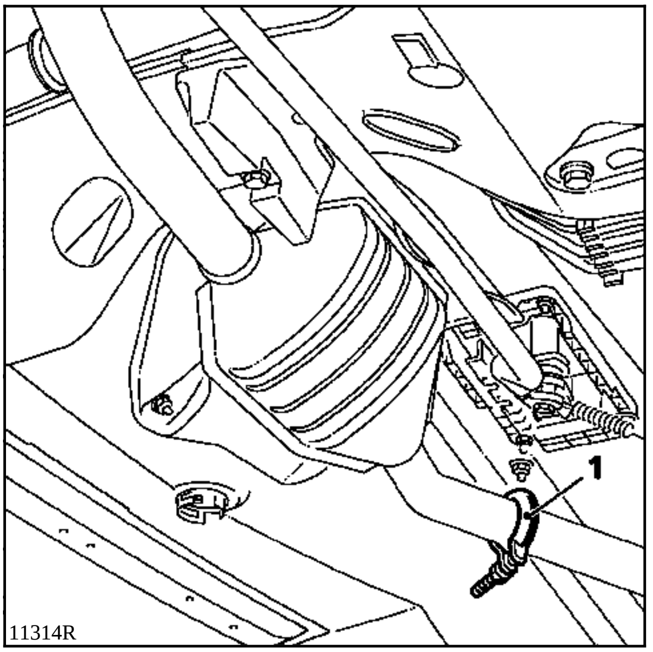
TIGHTENING TORQUES (in daN.m)	
Manifold mounting nut	**2.5**
Manifold mounting stud	**1**
Bolt which secures the exhaust down-pipe	**2.2**

REMOVAL

Raise the vehicle.

Secure the exhaust line to the body using string.

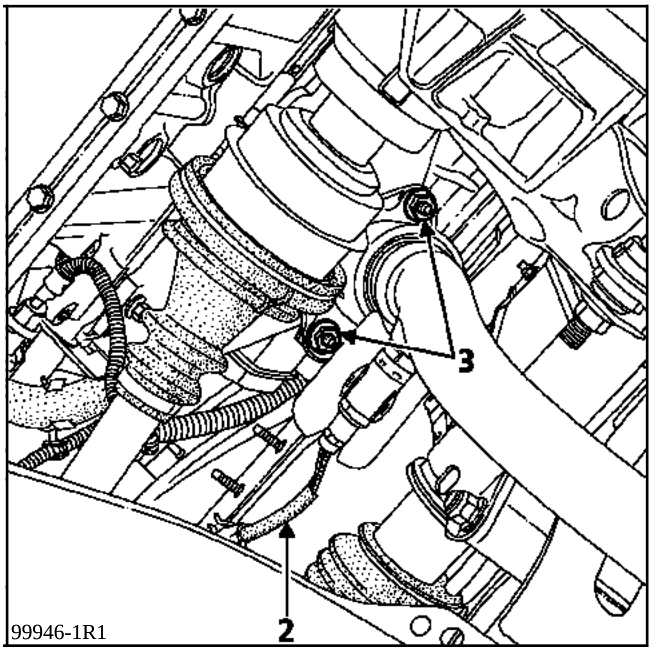
Unscrew the clip (1) which secures the catalytic converter to the exhaust line.



11314R

Disconnect the oxygen sensor (2).

Remove the two bolts (3) which secure the exhaust manifold to the catalytic converter then remove it.



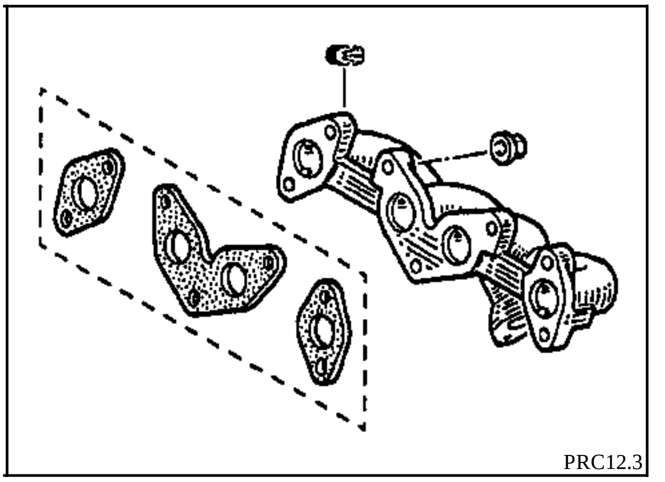
99946-1R1

Remove the 7 bolts which secure the exhaust manifold to the cylinder head, then remove it.

REFITTING

Change the manifold seal.

Refit in the reverse order to removal.


PRC12.3

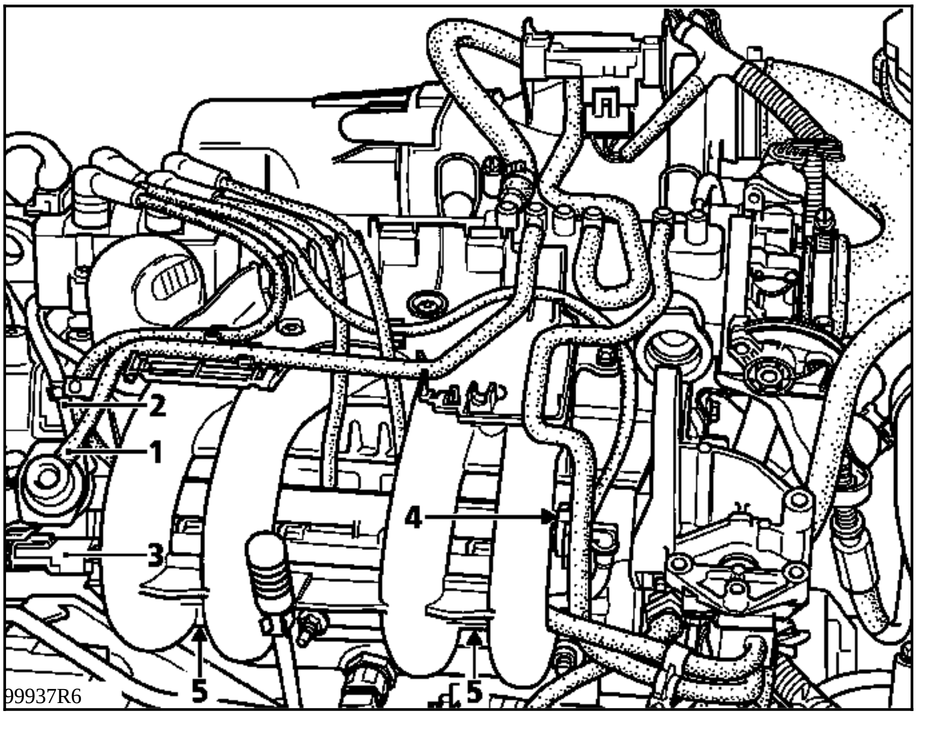
To align the exhaust down-pipe correctly, the positioning measurements must be observed (Procedure and value described in section 19 Exhaust).

SPECIAL TOOLS REQUIRED	
Mot. 1311-06	**Fuel connectors removal tool**

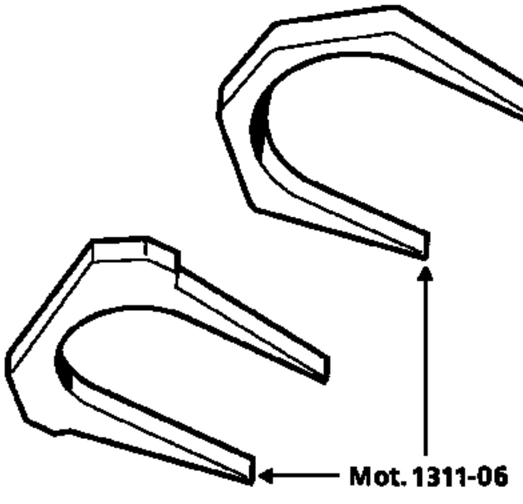
TIGHTENING TORQUES (in daN.m)	
Mounting bolt which secures the injection rail to the manifold	**1**

REMOVAL

Disconnect:
- the battery.
- the pressure regulator pressure connection pipe (1),
- the fuel pipe (2),
- the injectors electrical connector (3).



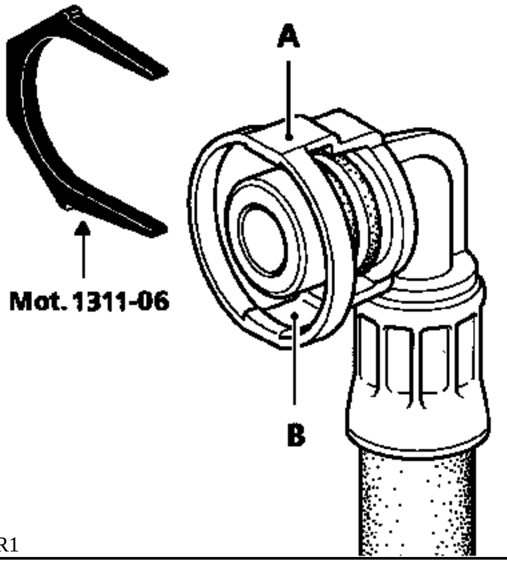
Disconnect:
- the fuel supply pipe (4) using the large cross-section tool **Mot. 1311-06**.



99375R

To remove the connectors, pass tool **Mot. 1311-06** between the two branches (A) and (B).

Press the tool to lift the two retaining clips, then pull the connector.



99461R1

Remove the 2 bolts (5) which secure the injection rail to the manifold.

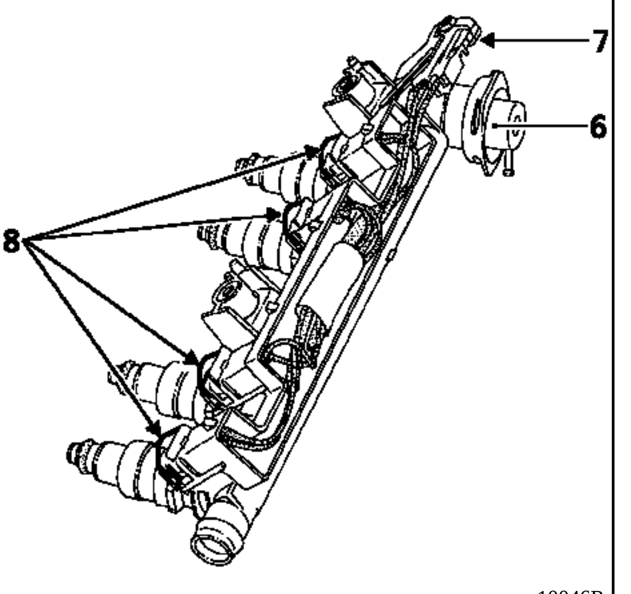
Slide the injection rail and the injectors between the manifold and the cylinder head.

Remove the injection rail from the right hand side of the vehicle.

NOTES

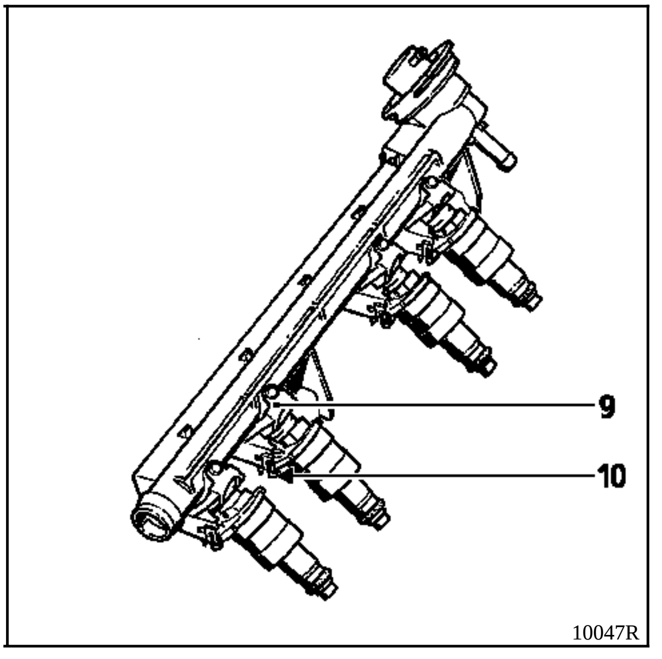
The pressure regulator (6) is clipped to the injection rail.

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



10046R

To remove an injector, remove the clips (9) then press clip (10) before pulling the injector.



REFITTING

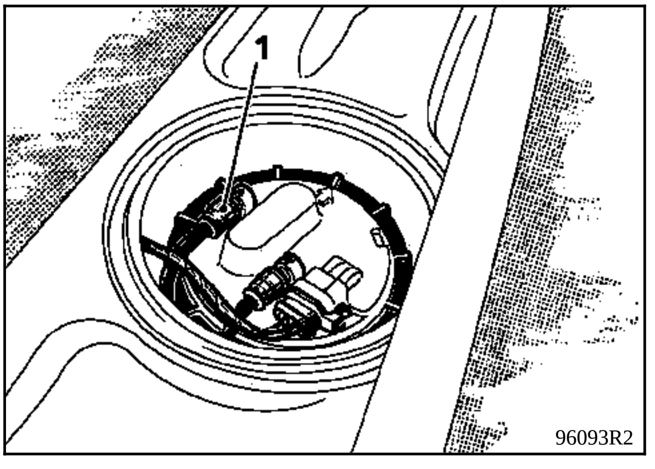
Change the O-rings at the base of the injectors (if the injector has been removed, change the seal at the top of the injector as well).

The fuel supply connectors are engaged correctly when a click is heard.

Other refitting operations are the reverse of removal.

SPECIAL TOOLS REQUIRED
1 2000 ml test tube

It is advisable to check the fuel pump flow via the fuel return pipe connected to the pump-gauge assembly.



96093R2

IMPORTANT

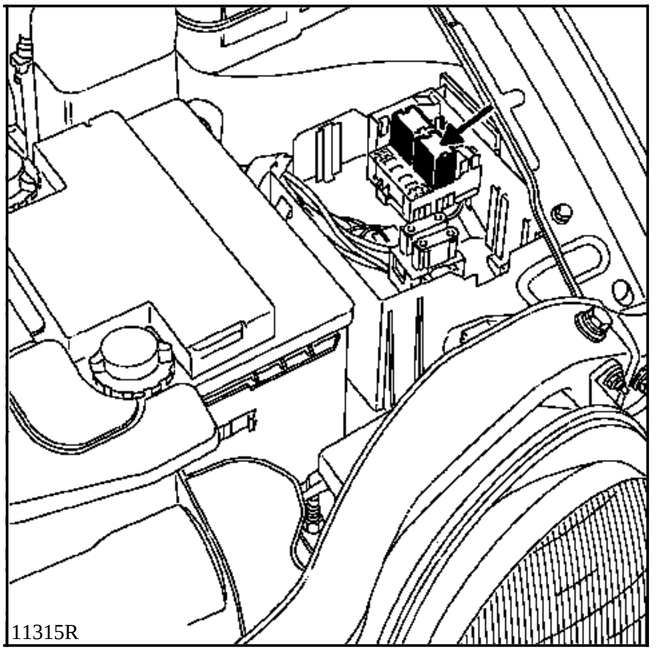
When carrying out this operation it is imperative:
- that you do not smoke and that no incandescent objects are present in the working area.
- that you protect yourself from splashes of fuel resulting from the residual pressure in the pipes when they are removed.

PUMP FLOW CHECK

Disconnect the fuel return pipe (1).

Connect a pipe stub to the hose and extend it into a test tube graduated from 0-2000ml.

Shunt terminals (3) and (5) of the fuel pump relay (located in the engine compartment fuse box). In one minute the pump flow should be at least 1.3 litres at a voltage of 12 volts.

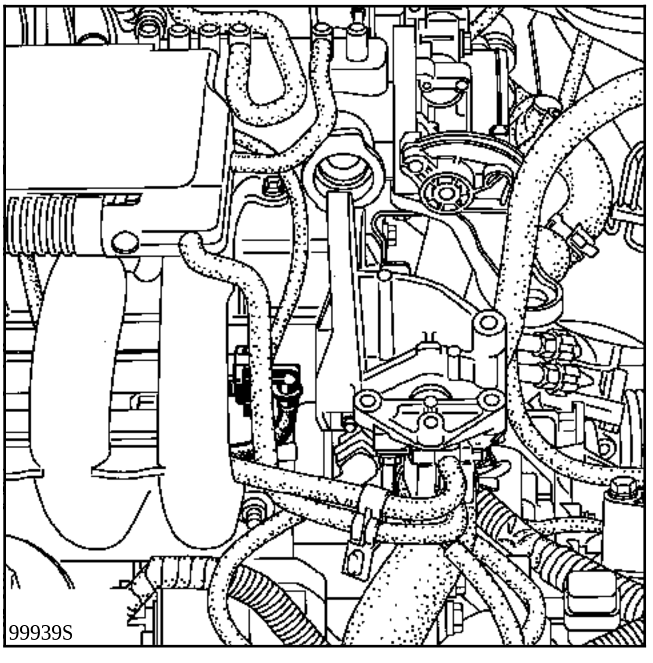

11315R

If the flow is low, check the pump supply voltage (the flow decreases by approximately 10% for every 1 volt drop in voltage).

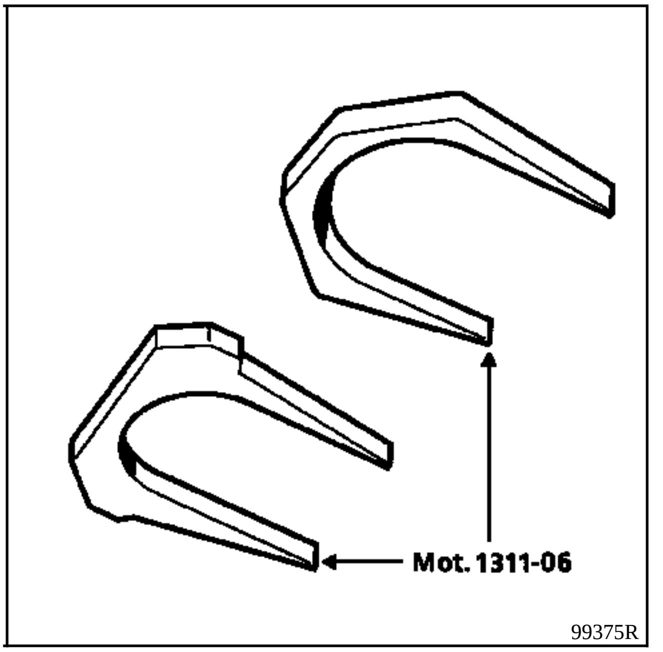
SUPPLY PRESSURE CHECK

SPECIAL TOOLS REQUIRED	
Mot. 1311-01	**Fuel pressure checking equipment (including 0 ; + 10 bars pressure gauge)**
Mot. 1311-05	**T-piece (connector K)**
Mot. 1311-06	**Fuel connectors removal tool**

Disconnect:
- the fuel supply pipe using the large cross-section tool **Mot. 1311-06** (Procedure described in section 13 "Injection rail").

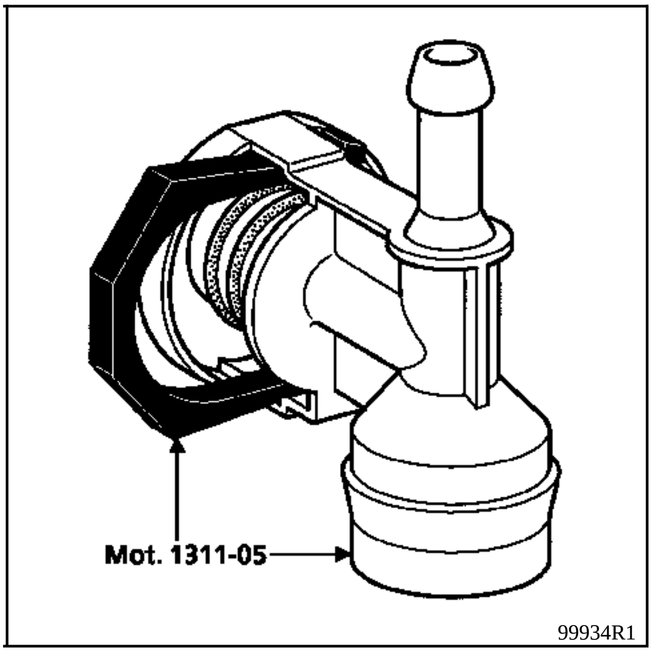


99939S



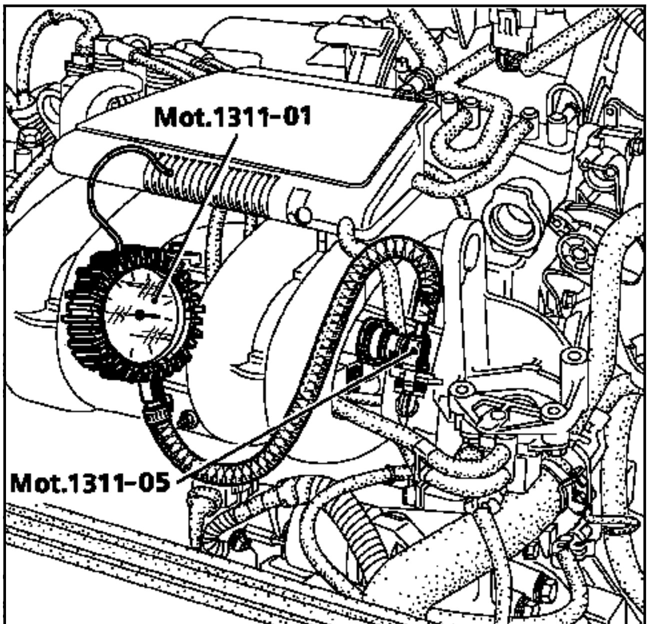
99375R

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



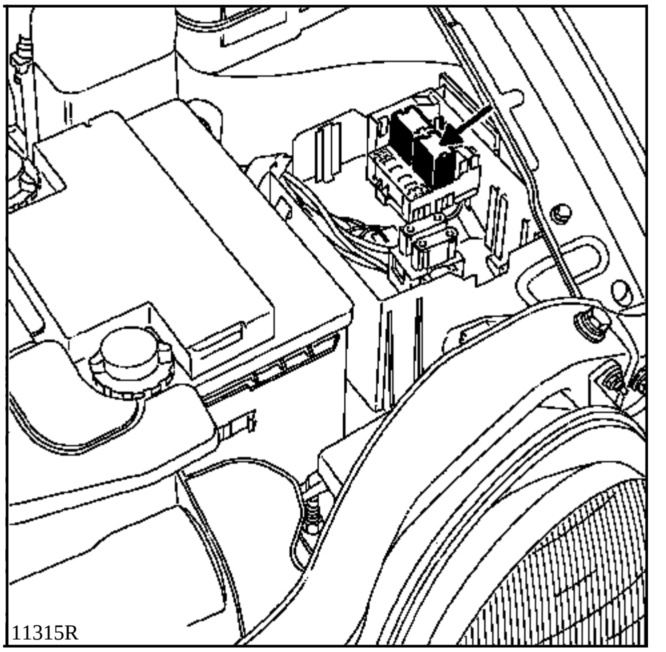
99934R1

Fit the 0 ; 10 bars pressure gauge and the flexible pipe **Mot. 1311-01**.



99938-1R

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


11315R

The pressure should be **3 bars** ± **0.2**.

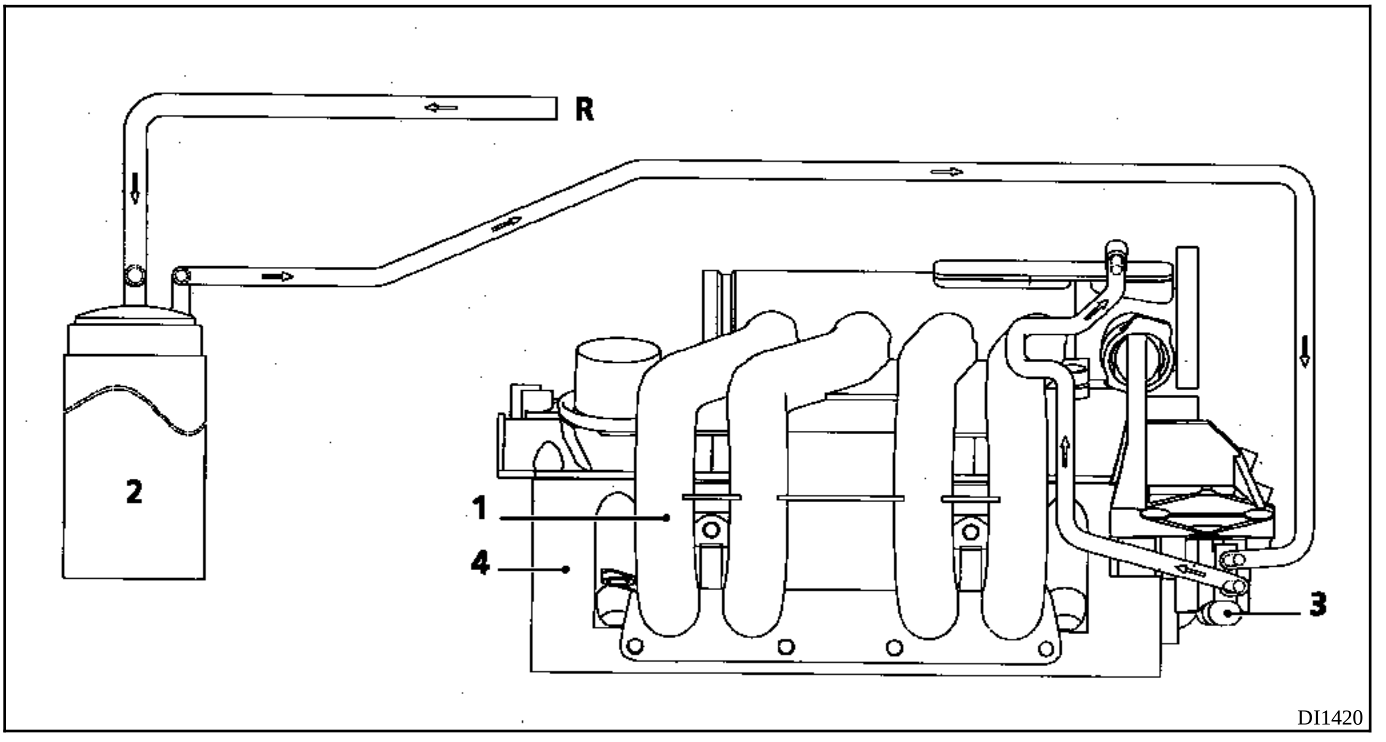
When a vacuum of 500 mbars is applied to the pressure regulator, the fuel pressure should be **2.5 bars** ± **0.2**.

PUMP SAFETY VALVE CHECK (under the same conditions as before)

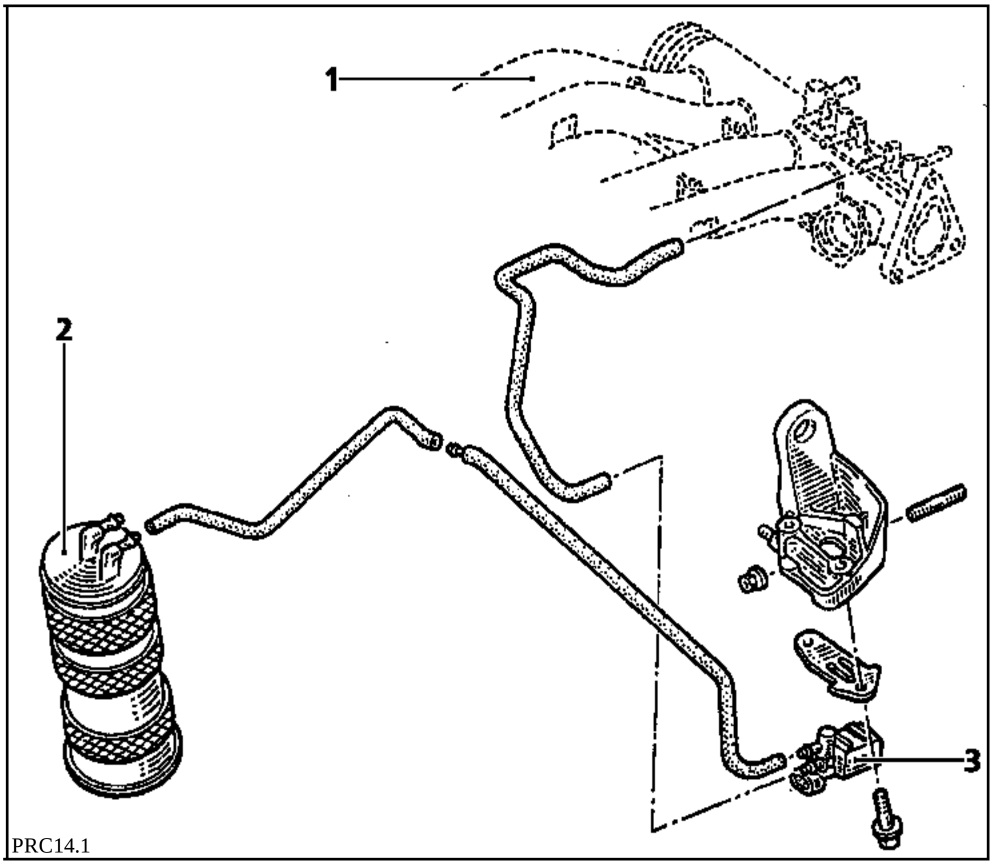
Shunt terminals (3) and (5) of the fuel pump relay.

When the fuel return pipe is pinched briefly, the pressure should stabilise between **4.5** and **7.5 bars**.

CIRCUIT DIAGRAM



1 Inlet manifold
2 Fuel vapour absorber (canister)
3 OCR controlled solenoid valve
4 Cylinder head
R Pipes from the fuel tank



PRINCIPLE OF OPERATION

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

The fuel vapours are retained on passing over the active carbon in the absorber (canister).

In order to prevent the fuel vapours contained in the canister from evaporating 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 vapours contained in the canister are released and burnt by the engine.

This is done by connecting the canister and the inlet manifold via a pipe. A solenoid valve is fitted to this pipe to permit the canister to be bled.

The principle of the solenoid valve is to is to allow a passage of variable cross-section (depending on the OCR signal emitted by the injection computer.

The variation in the cross-section of the fuel vapour passage in the solenoid valve is the result of the equilibrium between the magnetic field created by the power supply to the coil and the force of the return spring which closes the solenoid valve.

CONDITION FOR BLEEDING THE CANISTER

- **At mixture regulation**
- Coolant temperature greater than : + 35 °C
- Air temperature greater than : + 0 °C
- No load position not recognised (in the event of a throttle position sensor fault, the no load position not recognised condition is replaced by an engine speed condition **R > 1500 rpm.**).

In the event of an oxygen sensor fault, bleeding of the canister is permitted outside the no load condition.

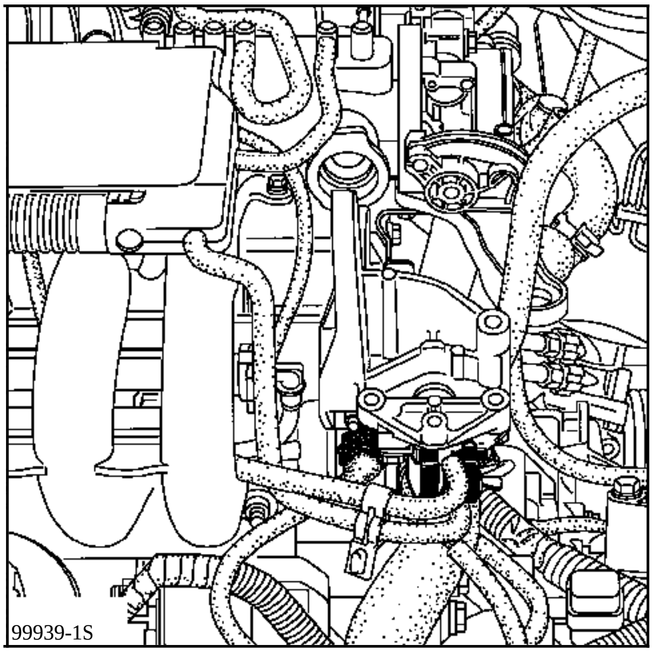
It is possible to display the canister bleed solenoid valve opening cyclic ratio using the XR25 at #23. The solenoid valve is closed is #23 = 0%.

The status bargraph 7 should be illuminated at idle, this does not mean that the canister bleed solenoid valve is controlled.
For an indication of whether or not the solenoid valve is controlled, you must rely on the value given by the XR25 at #23.

LOCATION - REMOVAL

CANISTER BLEED SOLENOID VALVE

This is secured to the front of the lifting plate.



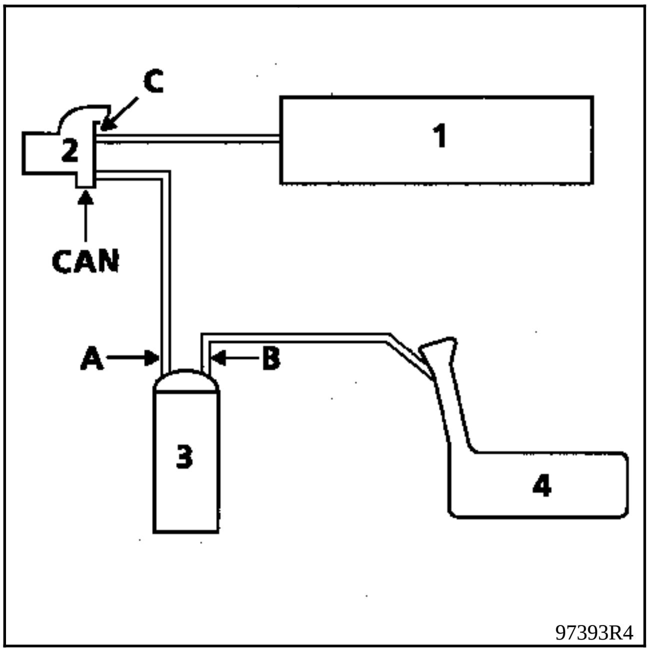
CANISTER BLEED OPERATION CHECK

A system malfunction may result in an unstable idle or stalling of the engine.

Check the conformity of the circuit (refer to the circuit diagrams).

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

Check the condition of the pipes to the fuel tank.



97393R4

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

By connecting a pressure gauge (**- 3 ; +3 bars**) (**Mot. 1311-01**) to the solenoid valve outlet "CAN", check at idle that there is no vacuum (in the same way, the control value read by the **XR25** at#23 remains minimal X = 0 %).

Is there a vacuum?

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

YES The solenoid valve is faulty, change it. Also, it is necessary to blow into the pipe which connects the solenoid valve to the canister in order to remove any pieces of active carbon.

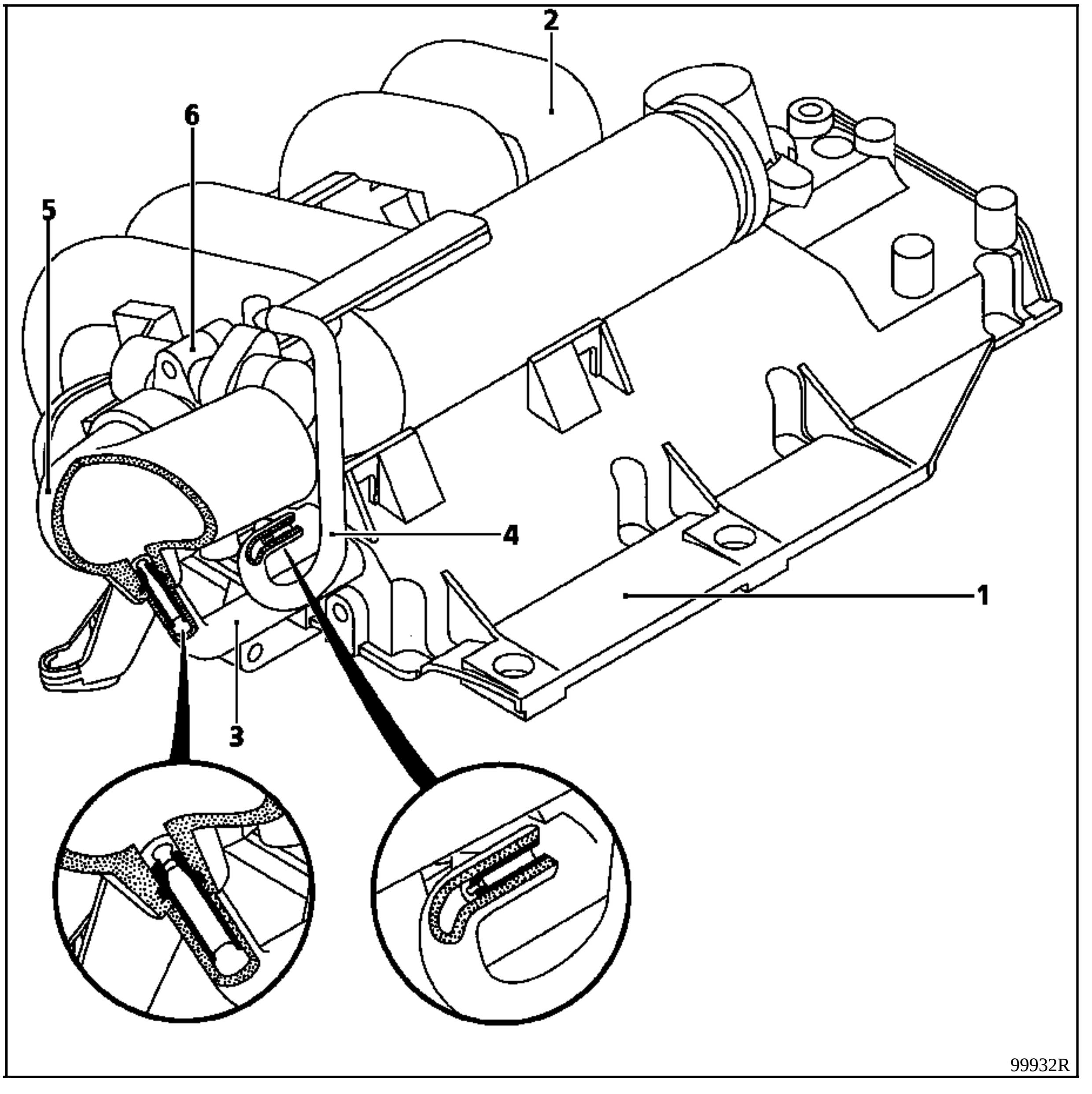
NO There is an electrical problem, check the circuit.

NO In bleed condition (not at idle and engine warm), the vacuum should increase (at the same time, the XR25 #23 value increases).

It is also possible to check the fuel tank breather. After removing the fuel filler cap, apply a vacuum to the pipe at (B) using a vacuum pump. The fact that a vacuum can be created in this pipe shows that the over-filling prevention valve is sealed correctly.

When the fuel filler cap is replaced, the vacuum should quickly disappear showing that the pipe is not blocked and that it is in correct communication with the degassing spaces inside the fuel tank.

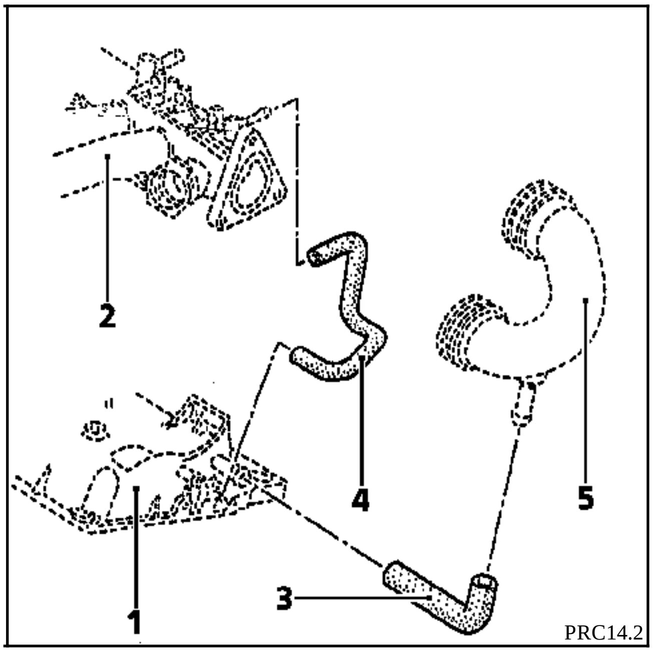
INTRODUCTION TO THE CIRCUIT



1 Cylinder head cover
2 Manifold
3 Oil vapour rebreather connected upstream of the throttle housing (the circuit is used for medium and high loads)
4 Oil vapour rebreather connected downstream of the throttle housing
5 Air pipe
6 Throttle housing

CHECK

To ensure correct operation of the anti-pollution system, the oil vapour rebreathing circuit must be kept clean and in good condition.



CHECKS TO BE CARRIED OUT BEFORE THE ANTI-POLLUTION TEST

Check:
- that the ignition system is operating correctly (conformity and correct setting of the spark plugs, high voltage harness in good condition and connected correctly),
- that the injection system is operating correctly (correct supply, conformity check using the **XR25**),
- the conformity and sealing of the exhaust line.

If possible, obtain information about the previous history of the vehicle (running out of fuel, lack of power, use of the wrong kind of fuel).

ANTI-POLLUTION SYSTEM CHECK

Warm up the vehicle until the cooling fan cuts in twice.

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

Maintain the engine speed at **2500 rpm.** for approximately thirty seconds, then return to idle and read the pollutant level values:

CO $\leq$ **0.3 %**
CO_2 $\geq$ **14.5 %**
HC $\leq$ **100 ppm**
0.97 $\leq \lambda \leq$ **1.03**

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

$\lambda > 1 \rightarrow$ **lean mixture**
$\lambda < 1 \rightarrow$ **rich mixture**

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

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

It is necessary to:
- check the condition of the engine (oil condition, valve clearances, timing, etc.),
- check the correct operation of the oxygen sensor (refer to section 17),
- carry out the lead detection test (refer to the following page).

If this test is positive, it is necessary to wait until the vehicle has consumed two or three full tanks of unleaded petrol before changing the oxygen sensor.

Finally, when all of these tests have been carried out and if the values read are still not correct, the catalytic converter must be changed.

This test can only be carried out using the lead detection kit supplied by NAUDER .

To obtain a kit, send your order to:

NAUDER
Tooling Department
5, avenue Francis de Pressensé
B.P. 09
93211 LA PLAINE SAINT DENIS
Tel. : 00 33 1 4946 3000
Fax : 00 33 1 4946 3336

Quoting part number:
- For the complete kit : **T900**
- For the refill of forty test papers: **T900/1**


93703S

INSTRUCTIONS

LEAD DETECTION AT THE EXHAUST

a - Test conditions :
- Engine off.
- Exhaust pipes warn but not hot.
- Do not carry out the test in temperatures below **0 °C**.

b - If necessary, gently clean the inside of the exhaust outlet with a dry cloth in order to remove any soot deposits.

c - Put on a pair of gloves, take a piece of test paper and moderately dampen it with distilled water (if it is too wet, the paper will be ineffective).

d - Immediately after damping it, press the test paper onto the cleaned part of the exhaust and maintain pressure on it for approximately one minute.

e - Remove the test paper and leave it to dry. If lead is present, the test paper will turn red or pink.

WARNING: the lead detection test must be carried out on the rear exhaust outlet and never on the oxygen sensor.

IDENTIFICATION

Vehicle	Engine	Alternator	Amperage
C 066 **S 066** **C 067**	**D7F**	**CS 130 D**	**75 A**

CHECK

After **15 minutes** of heating with a voltage of **13.5 volts.**

RPM	75 amps
1300	**28 A**
2000	**40 A**
2700	**60 A**

SPECIAL TOOLS REQUIRED	
Mot. 1273	**Belt tensioning tool**

REMOVAL

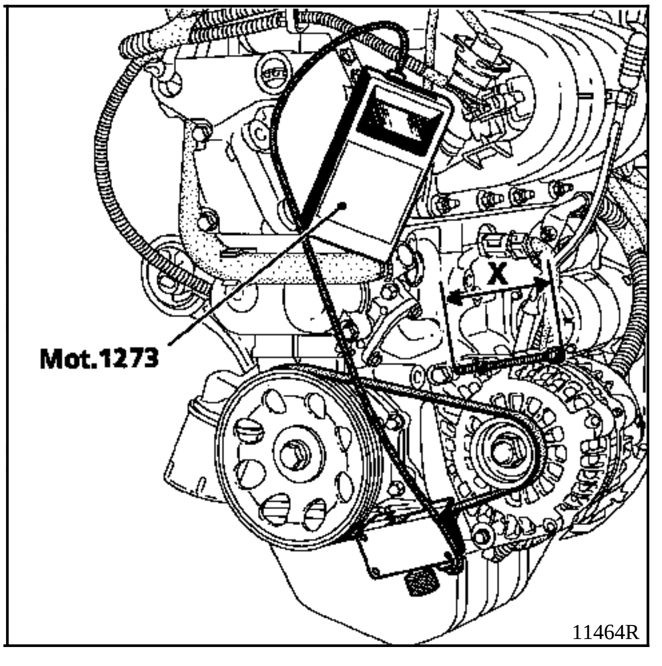
Disconnect the battery.

Remove:
- the alternator belt,
- the alternator electrical connections,
- the alternator.

REFITTING (Special features)

Refit in the reverse order to removal.

The alternator belt is tensioned using the tool made on site, shown below (100 mm long threaded rod (X) and 3 nuts M6).

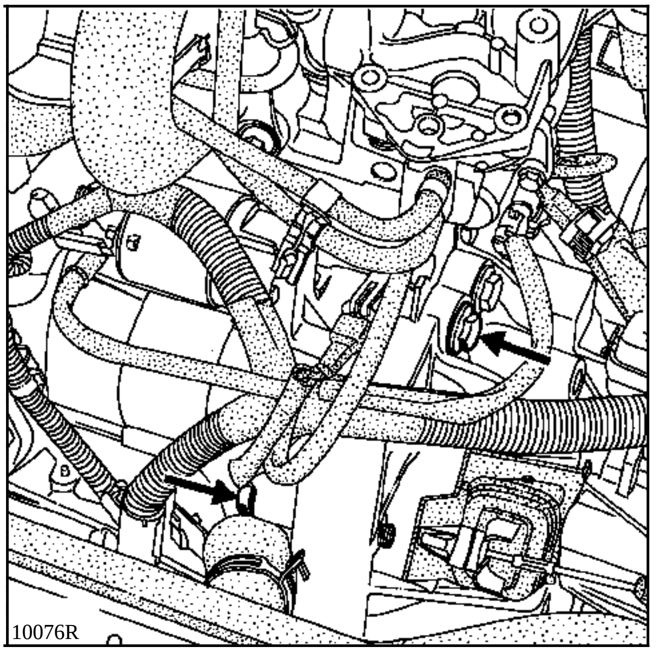


Refer to **section 07, Accessories belt tensioning** for the belt tensioning values.

Vehicle	Engine	Starter
C 066 **S 066** **C 067**	**D7F**	**VALEO D7E1**

REMOVAL

Disconnect:
- the battery,
- the starter electrical connectors.



10076R

Remove the 2 starter mounting bolts.

REFITTING

Refit in the reverse order to removal.

The differences between two coil static ignition and timed ignition are:
- the elimination of the high voltage distributor,
- the introduction of a monobloc with two coils with two outlets.

INTRODUCTION

The system is made up of:
- the injection computer (the ignition power stage is integral with the computer),
- a monobloc with two coils with two outlets (they are moulded into a single part),
- four spark plugs
- an interference suppression capacitor

DESCRIPTION - PRINCIPLE OF OPERATION

THE COMPUTER

Depending on the information received from the various sensors, but mainly depending on the engine speed and engine load, the injection computer determines:
- the number of degrees of advance to apply and consequently the point of ignition
- which cylinders are at top dead centre and consequently which coil to control

It causes a spark at the two cylinders at top dead centre by breaking the connection to earth of the coil concerned.

THE COILS (1)

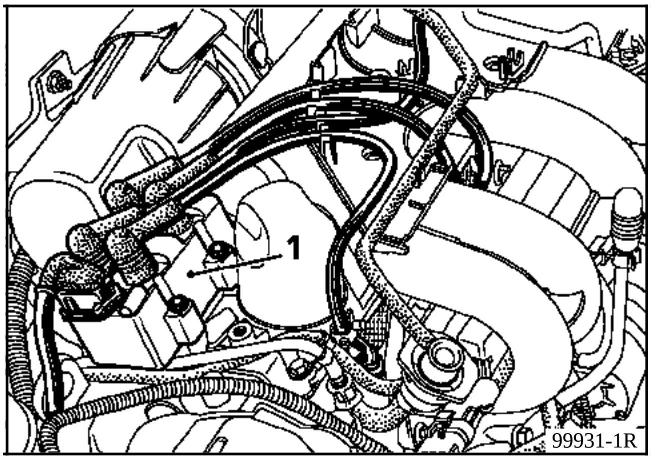
There are two coils. They are of the two outlet monobloc type (they cannot be separated).

They are controlled separately by the computer.

They create two simultaneous sparks.

They are located on the spark plugs.

The two coils are connected to an interference suppression capacitor.



Electrical connector

Tracks	Description
1	control of the coil of cylinders 1-4
2	control of the coil of cylinders 3-2
3	+ after ignition
4	+ interference suppression capacitor

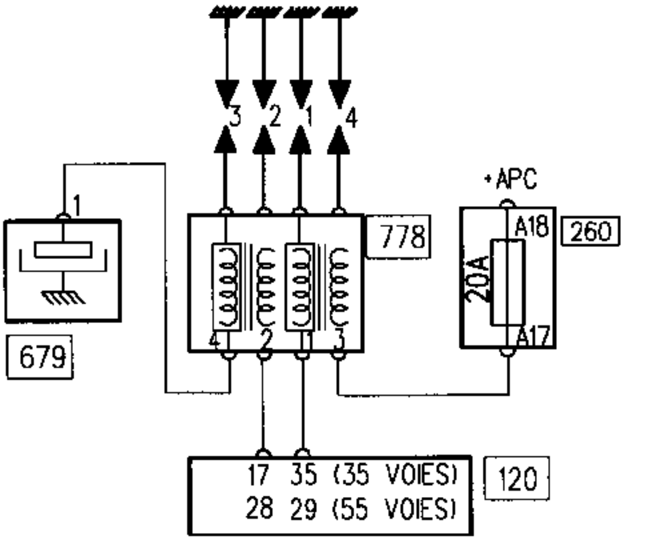
Coil connector track marking

Track n° 1 of the coil is on the bulkhead end.

The allocations of the high voltage wires are marked next to the coil mounting bolts.

Check to be carried out 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 kΩ

WIRING DIAGRAM



PRC11824

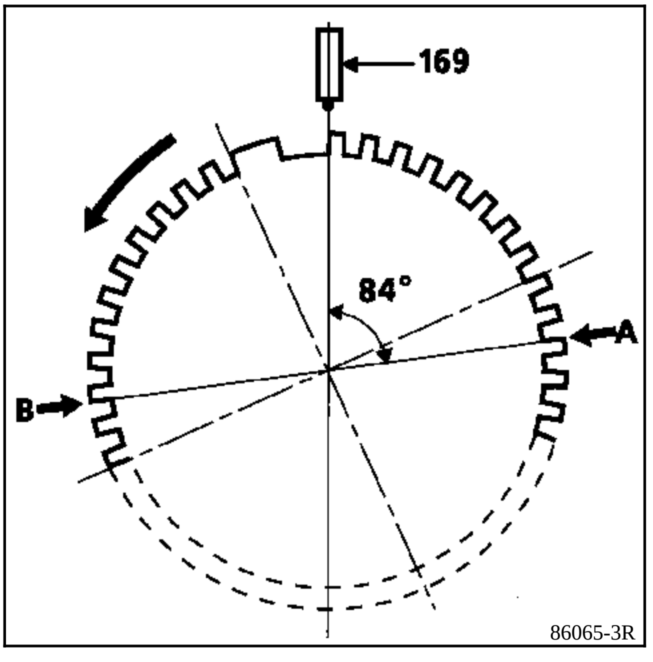
LIST OF UNITS

120 Injection computer
260 Fuse box
679 Radio interference suppression capacitor
778 Two coil monobloc with four outlets

SPECIAL FEATURE OF THE ENGINE FLYWHEEL

Description

The engine flywheel has 60 teeth spaced at regular intervals. Two teeth have been removed to create an absolute mark at 84° or 14 full teeth before top dead centre of cylinders 1 and 4. Therefore, there are actually 58 teeth remaining.



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

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

Principle of operation

The computer knows that the top dead centre of cylinders 1 and 4 is located on the leading edge of the 15th tooth after the long tooth.
Consequently, depending on the degree of advance to be applied, it can locate the ignition point exactly by counting the number of teeth.

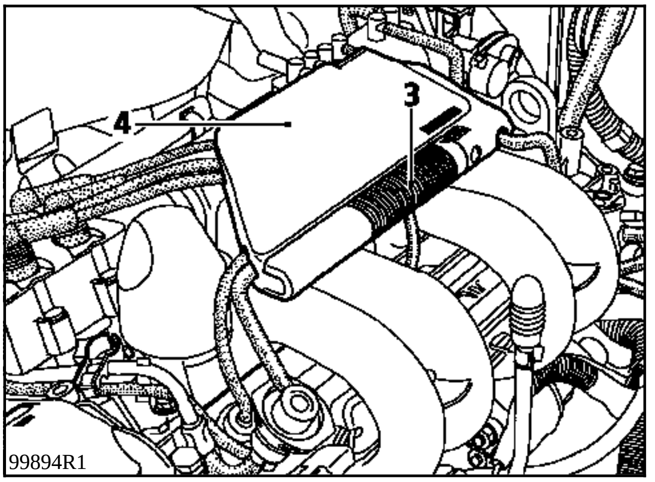
The top dead centre of cylinders 2 and 3 is located on the leading edge of the 45th tooth after the long tooth.

NOTE: advance correction in relation to the signal transmitted by the pinking sensor is described in section 17 Injection.

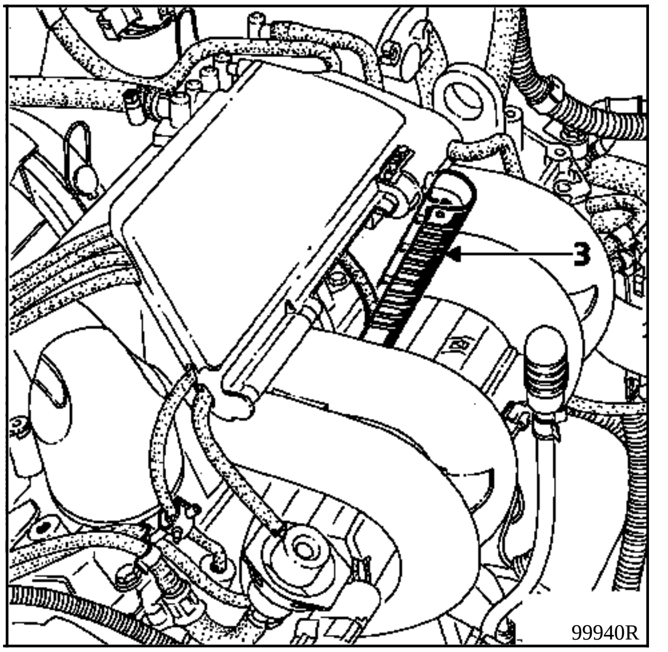
Cylinder 1 is on the engine flywheel end.

Engine	Brand	Type
D7F	EYQUEM NGK	FN 52 LS BK5 E SZ
Flat reach with seal		
Gap: **0.9 mm**		
Tightening: **2.5 to 3 daN.m**		

To disconnect the spark plug leads, use tool (3) integral with the plastic protector (4) on the cylinder head.



99894R1



99940R

SPECIAL FEATURES OF THE MULTIPOINT INJECTION

- 35-way SAGEM or MAGNETI MARELLI computer on models with manual gearbox with no optional accessories.

- 55-way SAGEM computer, SAFIR or MAGNETI MARELLI type on models with automatic transmission or air conditioning.

- Semi-sequential multipoint injection. Two by two control of injectors (injectors of cylinders 1 and 4 then injectors of cylinders 2 and 3).

- Static ignition with monobloc with two coils.

- Canister bleed solenoid valve controlled by opening cyclic ratio.

- Configuration of the computer in relation to the type of gearbox (manual or automatic).

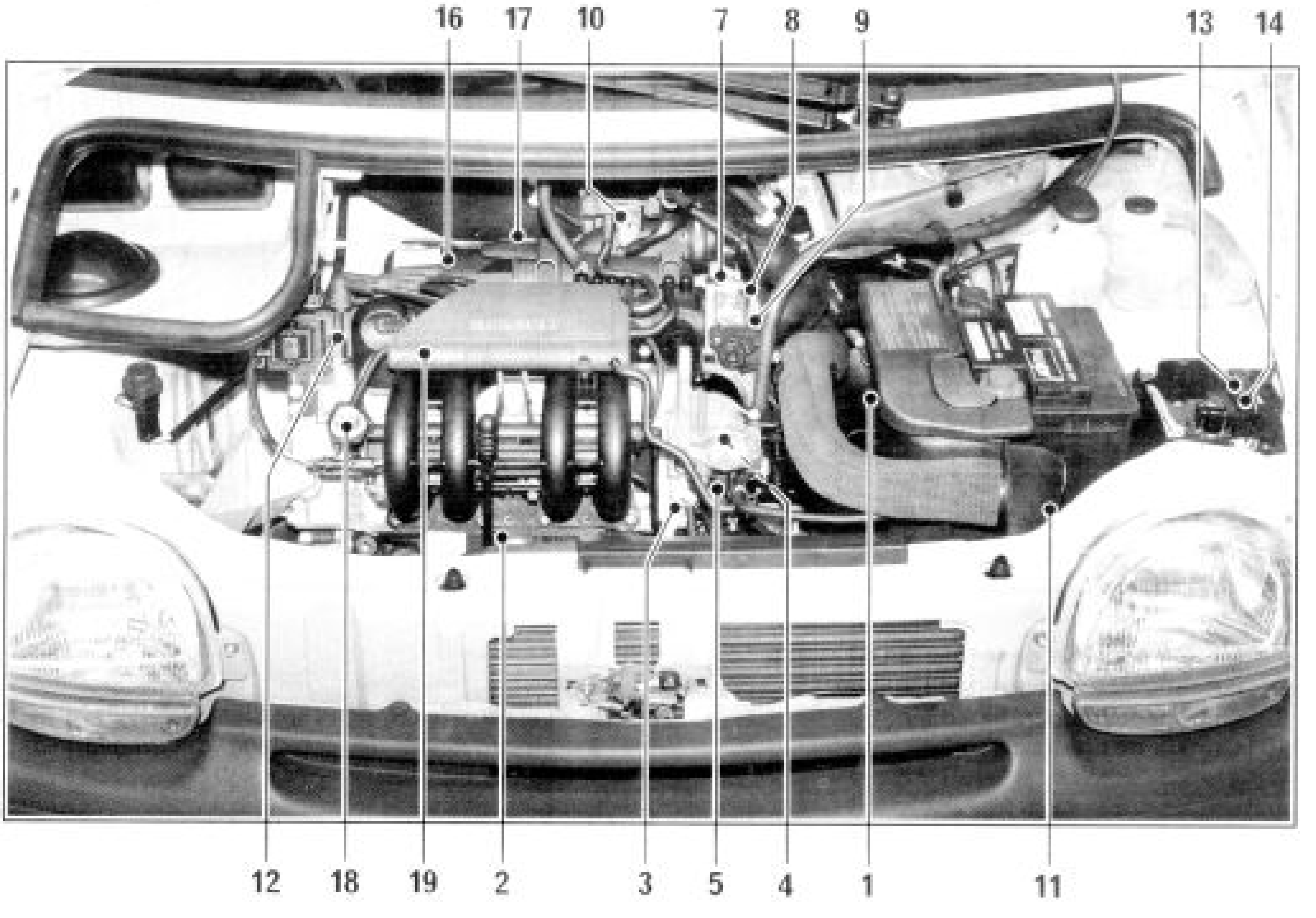
- Idle speed adjustment depending on:
  - the battery voltage,
  - the air conditioning.

- Injection warning light on the instrument panel not operational.

- Use of fault-finding fiche N°27.

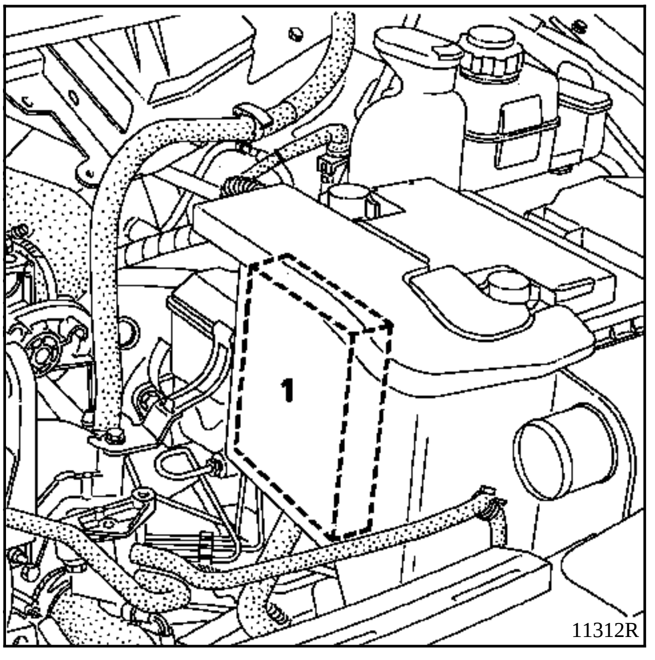
INTRODUCTION OF A 2ND GENERATION CODED ENGINE IMMOBILISER INVOLVES THE USE OF A SPECIAL PROCEDURE FOR CHANGING THE COMPUTER.

LOCATION OF COMPONENTS

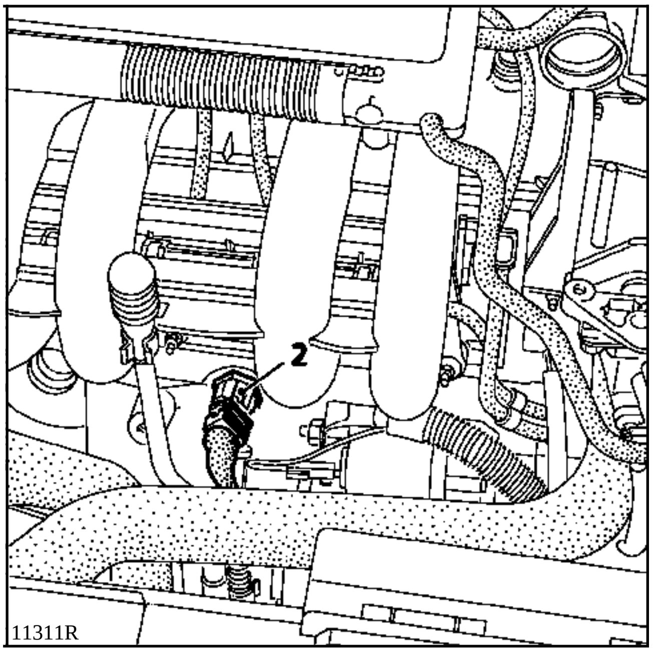


1 Injection computer
2 Pinking sensor
3 Coolant temperature sensor
4 Top dead centre sensor
5 Fuel vapour recirculation solenoid valve
7 Idle regulation stepping motor
8 Throttle position potentiometer
9 Air temperature sensor
10 Absolute pressure sensor
11 Fuel vapour absorber (canister)
12 Coil
13 Locking relay
14 Fuel pump relay
16 Air filter
17 Oxygen sensor
18 Pressure regulator
19 Spark plug wires removal tool

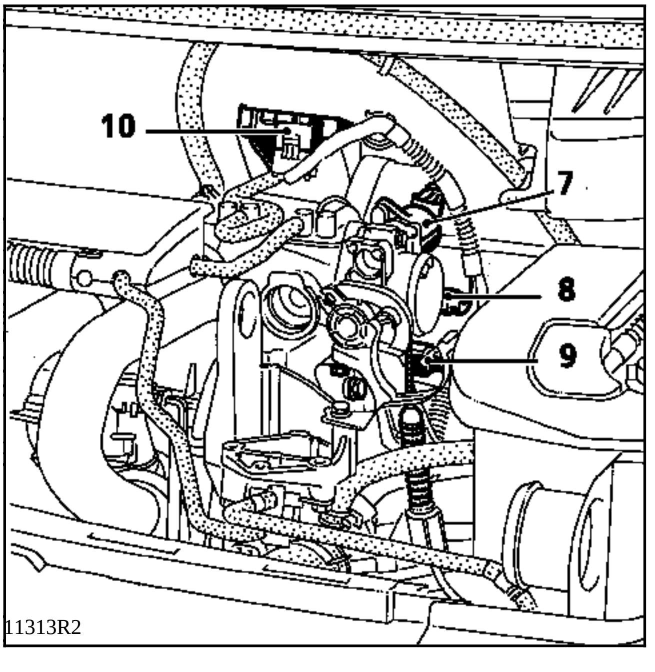
1 Injection computer



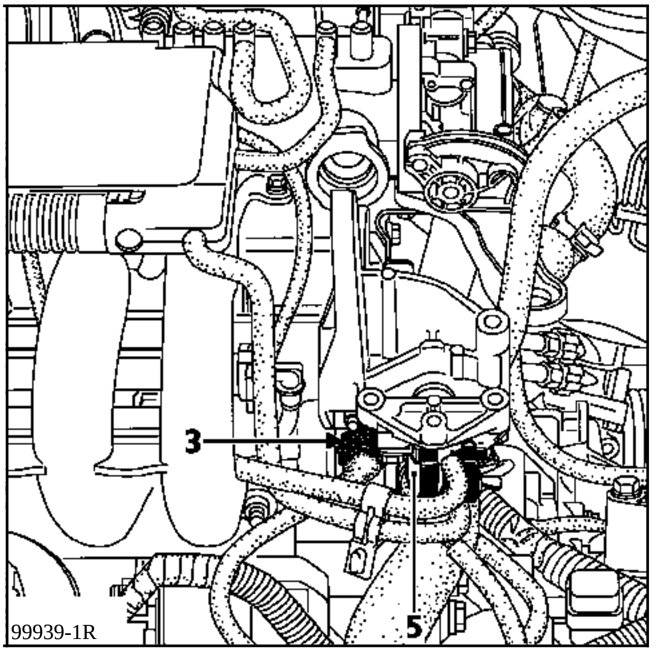
2 Pinking sensor
(tightening torque: **2.5 daN.m**)



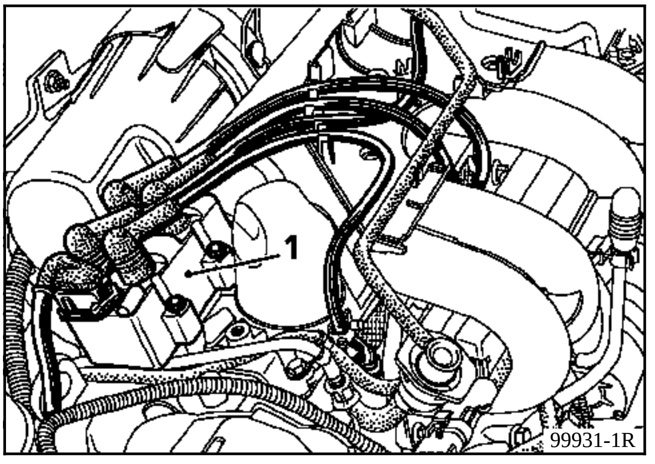
7 Idle regulation stepping motor
8 Throttle position potentiometer
9 Air temperature sensor
10 Absolute pressure sensor



3 Coolant temperature sensor
5 Fuel vapour recirculation solenoid valve

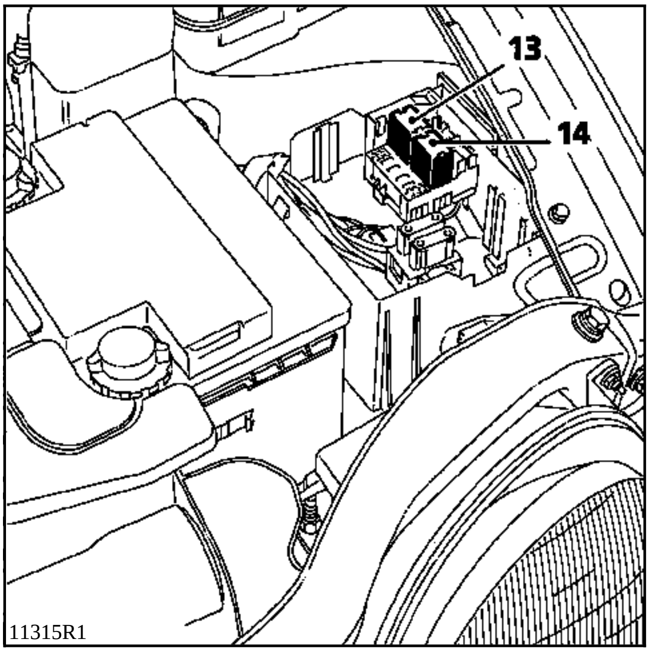


1 Coil



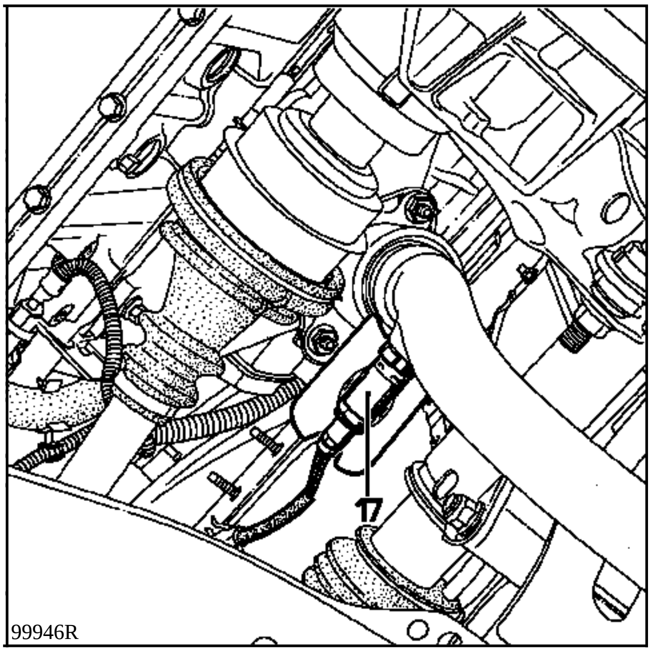
99931-1R

13 locking relay,
14 fuel pump relay,



11315R1

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



99946R

PRINCIPLE OF OPERATION

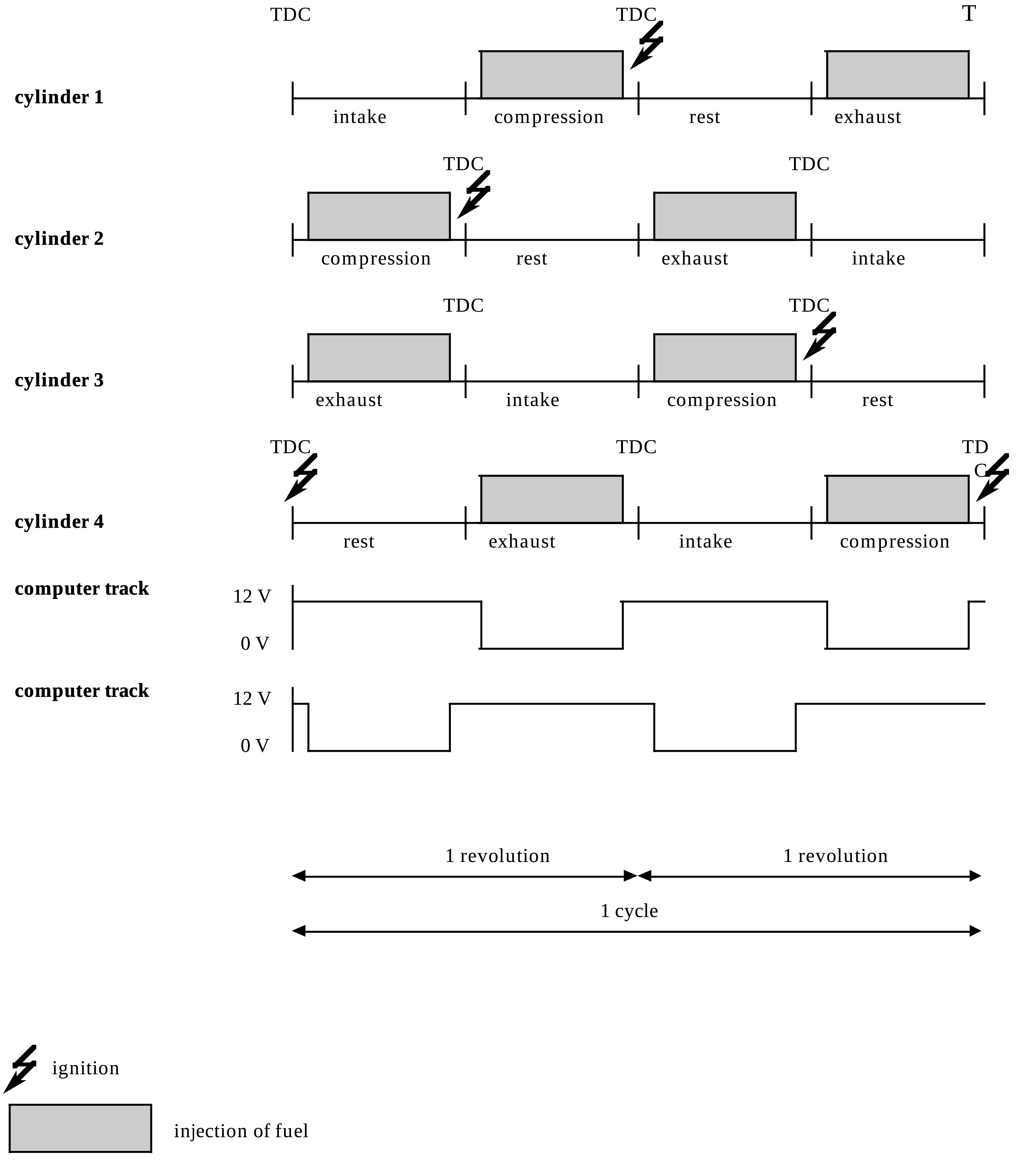
The engine is fitted with a semi-sequential type injection system.

Fuel is injected simultaneously into cylinders 1-4 and cylinders 2-3.

To make this possible, the two pairs of injectors are connected to two tracks of the injection computer:
- the injectors of cylinders **1** and **4** are connected to track **33** of the **35-**way computer or to track **30** of the **5**5-way computer,
- the injectors of cylinders **2** and **3** are connected to track **32** of the **35-**way computer or to track **4** of the **5**5-way computer,

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

The injection computer uses the same system as that used for controlling the ignition coils to determine when and which injector to control. By analysing the engine flywheel signal, it also determines the Top Dead Centre of cylinder 1-4 and 2-3 (see the principle described in section 17 "Ignition"). By counting the number of teeth, it determines the engine phases which precede Top Dead Centre.



TDC
TDC
T
cylinder 1
intake
compression
rest
exhaust
TDC
TDC
cylinder 2
compression
rest
exhaust
intake
TDC
TDC
cylinder 3
exhaust
intake
compression
rest
TDC
TDC
TD
C
cylinder 4
rest
exhaust
intake
compression
computer track
12 V
0 V
computer track
12 V
0 V
1 revolution
1 revolution
1 cycle
ignition
injection of fuel

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

- **Vehicle without engine immobiliser**

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

- **Vehicle with engine immobiliser deactivated**

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

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

- **Vehicle with engine immobiliser active**

  When the ignition is switched on, the computer does not recognise the code and prohibits starting. The injection warning light illuminates for 3 seconds then extinguishes.

  Before the ignition is switched on, the red engine immobiliser indicator light flashes. When the ignition is switched on, this indicator light flashes more rapidly.

  If a fault is detected in the engine immobiliser system while the engine is running, the injection warning light flashes at an engine speed between idle and approximately **1500 rpm**.

- **Injection system component fault**

  If a component of the injection system is faulty this will not cause the warning light to illuminate.

This vehicle is fitted with a 2nd generation engine immobiliser system.

CHANGING THE INJECTION COMPUTER

The computers are not coded when they are supplied but all of them can be coded.

When changing the computer, the new computer must be programmed with the vehicle code and the operation of the engine immobiliser function must then be checked.

To check the operation of the engine immobiliser, simply carry out the following operations:

- **Vehicle fitted with an infra-red remote control engine immobiliser**
  - Lock and unlock the doors using the infra-red remote control.
  - Switch on the ignition for a few seconds.
  - Lock the doors using the infra-red remote control, the engine immobiliser function is operational.

- **Vehicle fitted with a coded key engine immobiliser**
  - Switch on the ignition for a few seconds and then switch it off.
  - When the key is removed, the engine immobiliser function is operational.

CHECKING THE ENGINE IMMOBILISER FUNCTION

- **Vehicle fitted with an infra-red remote control engine immobiliser system**
  - Switch off the ignition, lock the doors from inside using the infra-red remote control. The red engine immobiliser indicator light should flash.
  - Switch on the ignition, the red engine immobiliser indicator light should flash more rapidly.

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

  Remove the key from the ignition, after 10 seconds the red engine immobiliser indicator light should flash.

For the special features of injection computer tests (parts test), refer to the engine immobiliser technical note.

CONFIGURATION OF THE COMPUTER IN RELATION TO THE TYPE OF GEARBOX (MANUAL OR AUTOMATIC)

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

Computer configuration procedure:

Connect the XR25.

Selector at S8

Switch on the ignition

Enter **D13** then

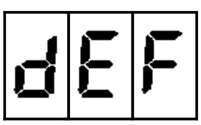
If the vehicle is fitted with a manual gearbox:

Enter **G50* 2***

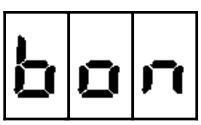
If the vehicle is fitted with automatic transmission:

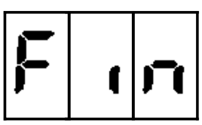
Enter **G50* 1***

The following will be displayed:

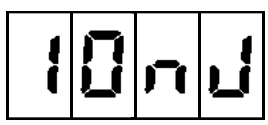


If the computer is not configured





then



if the computer is configured

To check that the computer has been programmed correctly, switch the ignition on again using the fault-finding fiche n°27, left hand fault bargraph 20 should be extinguished, right or left hand status bargraph 19 should be illuminated.

There is also a computer configuration procedure which does not require the use of the XR25. The procedure is as follows:
- switch on the ignition,
- start the engine,
- rev the engine to **2500 rpm** for **10 seconds**,
- switch off the ignition,
- switch the ignition on again and start the engine,
- rev the engine to **2500 rpm** for **10 seconds**,
- switch off the ignition.

The programming procedure is identical to that described previously.

NOTE : the configuration procedure using the XR25 can be used to reconfigure an incorrectly configured computer from scratch (automatic transmission instead of manual gearbox). However, the configuration procedure which does not use the XR25 will only work for a unprogrammed injection computer from the warehouse.

THE COMPRESSOR IS OF THE VARIABLE CYLINDER TYPE

AIR CONDITIONING / INJECTION COMPUTER CONNECTION

The electrical connection:

- from the air conditioning computer to the injection computer is via a wire (track 5). In reality only air conditioning cycle information is transmitted along this track. The injection computer deduces the air conditioning selection information from this (track 6 is connected to the air conditioning computer, but no information is transmitted along this track).

- from the injection computer to the air conditioning computer is via a wire (track 5). Compressor operation authorisation and prohibition information is transmitted along this track

COMPRESSOR OPERATION

During certain phases of operation, the injection computer prohibits operation of the compressor.

On starting the engine
Operation of the compressor is prohibited for 10 seconds after starting the engine.

Heat protection
The compressor clutch is not engaged if the coolant temperature is greater than or equal to: + 119 °C.
The compressor clutch is not engaged if the coolant temperature is greater than or equal to 105°C, if the engine speed is greater than 5792 rpm and the manifold pressure is greater than 1017 mbars.

Over-revving protection
The compressor clutch is released if the engine speed is greater than: 6000 rpm.
Engagement of the compressor clutch is prohibited if the engine speed is greater than 5500 rpm and if the vehicle speed is less than 50 mph (80 km/h).

RESTORATION OF PERFORMANCE

The compressor clutch is released for 12 seconds at full load, at an engine speed greater than 5984 rpm and at a vehicle speed less than 30 mph (45 km/h). If one of the conditions is no longer complied with, the compressor clutch is immediately engaged again.

ANTI-STALL PROTECTION

If the no load position is recognised and the engine speed is less than 608 rpm, the compressor clutch is released.

The compressor clutch is engaged again:
- if the no load position is recognised when the engine speed reaches 864 rpm,
- if the no load position is not recognised when the engine speed reaches 1800 rpm.

ADJUSTMENT OF THE IDLE SPEED IN RELATION TO THE BATTERY VOLTAGE

The purpose of this adjustment is to compensate for the low voltage caused by the operation of a power-consuming unit when the battery is at low charge. This is done by increasing the idle speed which allows increased rotation of the alternator and consequently an increased charging voltage.

The lower the voltage, the greater the adjustment. The engine speed adjustment is therefore variable. Adjustment begins when the voltage falls below **12.7 volts**. The adjustment starts from the nominal engine speed and can reach a maximum of **880 rpm**.

ADJUSTMENT OF THE IDLE SPEED IN RELATION TO THE AIR CONDITIONING

If the air conditioning is selected from the instrument panel, the idle speed is increased to **880** rpm.

PRINCIPLE

Under normal operating conditions when warm, the idle OCR value at #12 varies between an upper value and a lower value in order to obtain the nominal idle speed.

Following abnormalities (running in, clogging of the engine...), it is possible that the idle OCR value will be close to the upper or lower value.

Adaptive adjustment (#21) of the idle OCR (#12) allows compensation for the slow variations in engine air requirements, which realigns the OCR (#12) with an average nominal value.

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

IDLE OCR VALUES AND IDLE OCR ADAPTIVE ADJUSTMENT VALUES

Idle speed nominal (#06)	X = 740 rpm
Idle OCR (#12)	4 %≤X≤15 %
Adaptive idle (#21)	Limit: - minimum : - 4.3 % - maximum : +3.9 %

INTERPRETATION OF THESE VALUES

If there is an excess of air (air leak, throttle stop misadjusted...) the idle speed increases, the idle OCR value at #12 decreases in order to return to the nominal idle speed; the idle OCR adaptive adjustment value at #21 decreases in order to realign the idle OCR at #12.

If there is a lack of air (clogging etc.), the logic is reversed:
The idle OCR at #12 increases and the adaptive adjustment at #21 also increases in order to realign #12 with an average nominal value.

IMPORTANT : after erasing the computer memory (disconnection of the battery), it is imperative to allow the engine to run at idle before returning it to the customer so that the adaptive adjustment can reset itself correctly.

OXYGEN SENSOR VOLTAGE (#05)

Reading of **#05** on the **XR25** : the value read represents the voltage supplied to the computer via the oxygen sensor; it is expressed in volts (in fact, the value varies between **0** and **1000** millivolts).

When the engine is running, the voltage should fluctuate rapidly and should be between **50±50 mV** (lean mixture) and **850 ± 50 mV** (rich mixture) and vice versa.

The smaller the difference between maximum and minimum, the less reliable the sensor data (this difference is usually at least **500 mV**).

MIXTURE ADJUSTMENT (#35)

The value read at **#35** on the **XR25** represents the average of the mixture adjustments made by the computer in relation to the richness of the fuel mixture as determined by the oxygen sensor (the oxygen sensor actually analyses the oxygen content of the exhaust gases, directly related to the richness of the fuel mixture).

The mid-point of the adjustment value is 128 and its limits are 0 and 255 (by experience, under normal operating conditions #35 is situated at and varies slightly around a value close to 128).

- Value less than 128 : mixture too rich
- Value greater than 128 : mixture too lean

ENTERING MIXTURE REGULATION MODE

Loop phase

Entry to mixture regulation mode is effective after a start delay:
- with no load if the coolant temperature has reached **40 °C**
- outside the no load condition if the coolant temperature is greater than **22 °C**

The start delay depends on the coolant temperature:
- at **20°C** it is at most 1 minute 20 seconds,
- at **80°C** it is at most 35 seconds.

when the vehicle is no longer in mixture regulation mode, **#35 = 128**

Unloop phase

When the vehicle is in mixture regulation mode, the phases of operation during which the computer ignores the voltage supplied by the sensor are:
- full load: **#35 =** variable and greater than **128**,
- rapid acceleration : **#35 =** variable and greater than **128**,
- deceleration with no load information (injection cut-off*) : **#35 = 128**,
- oxygen sensor fault : **#35 = 128**,
- deceleration depending on the manifold depression : **#35 = 128**.

* there is no injection cut-off in first gear.

DOWNGRADED MODE IN THE EVENT OF AN OXYGEN SENSOR FAULT

If the voltage supplied by the oxygen sensor is incorrect (#05 varying very little or not at all) in the mixture regulation phase, the computer will only pass into downgraded mode (#35 = 128) if the fault has been recognised as being present for 3 to 5 minutes. Only if this is the case will the fault be stored in memory.

When the presence of an oxygen sensor fault is detected and if the fault has already been stored in memory, the vehicle passes directly to an open loop (#35 = 128)

PRINCIPLE

In the loop phase (refer to section 17 "Mixture regulation"), the mixture regulation (#35) adjusts the injection time in order to obtain a dose as close as possible to mixture 1. The adjustment value is close to 128 with limits of 0 and 255.

However, abnormalities may act on the components of the injection system and cause the adjustment to be move towards 0 or 255 in order to obtain mixture 1.

Adaptive adjustment allows the injection mapping to be moved to realign the mixture regulation around 128 and allow it to maintain a constant authority of adjustment towards making the mixture richer or leaner.

Mixture regulation adaptive adjustment is broken down into two parts:
- adaptive adjustment mainly for average and high engine loads (reading of #30)
- adaptive adjustment mainly for idle and low engine loads (reading of #31)

Adaptive adjustments take 128 as an average value after initialisation (erasing of the memory) and have the following limit values:

96 ≤ #30 ≤ 160
96 ≤ #31 ≤ 160

Adaptive adjustments only operate when the engine is warm in the loop phase (#35 variable) and within a given manifold pressure range.

The engine must have been operating in loop mode over several **pressure ranges** for the adaptive adjustments to start to make modifications to compensate for the engine operation mixture abnormalities.

Following reinitialisation of the computer (return to 128 of #30 and #31) it will therefore be necessary to carry out a special road test.

ROAD TEST

Conditions

- Engine warm (coolant temperature > 75 °C)
- Do not exceed an engine speed of **4 000 rpm.**

For this test, it is advisable to start from a fairly low engine speed, in 3rd or 4th gear with very gradual acceleration **in order to stabilise the pressure required for 10 seconds in each range** (see table).

NOTE: for example, try to maintain an average of **280 mbars** for at least 10 seconds for range n°1.

Pressure ranges to be covered during the test (reading #01)

Range n° 1 (mbars)	Range n° 2 (mbars)	Range n° 3 (mbars)	Range n° 4 (mbars)	Range n° 5 (mbars)
220 ---------- 340	---------- 460	---------- 580	---------- 700	---------- 930
Average 280	Average 400	Average 520	Average 640	Average 815

Following this road test, the adjustments are operational.

#31 varies more significantly at idle and low loads, and #30 varies more significantly at average and high loads, but both operate over all of the manifold pressure ranges.

The test must be continued over a distance of 3 to 6 miles (5 to 10 kilometres) with normal, smooth, varied driving.

After the test, read the #30 and #31 values. Initially at 128, they should have changed. If not, repeat the test taking care to observe the test conditions.

INTERPRETATION OF THE VALUES OBTAINED FOLLOWING A ROAD TEST

In the event of a lack of fuel (clogged injectors, pressure and flow of fuel too low...), the mixture regulation at #35 increases in order to obtain the mixture closest to 1 and the adaptive adjustment at #30 and #31 increases until the mixture adjustment again fluctuates around 128.

In the event of excess fuel, the logic is reversed:
The mixture regulation at #35 decreases and the adaptive adjustment at #30 and #31 decreases as well in order to realign the mixture adjustment around 128.

NOTE: the possible analysis of #31 remains unreliable as this adjustment operates mainly at idle and low engine loads and is also very sensitive.

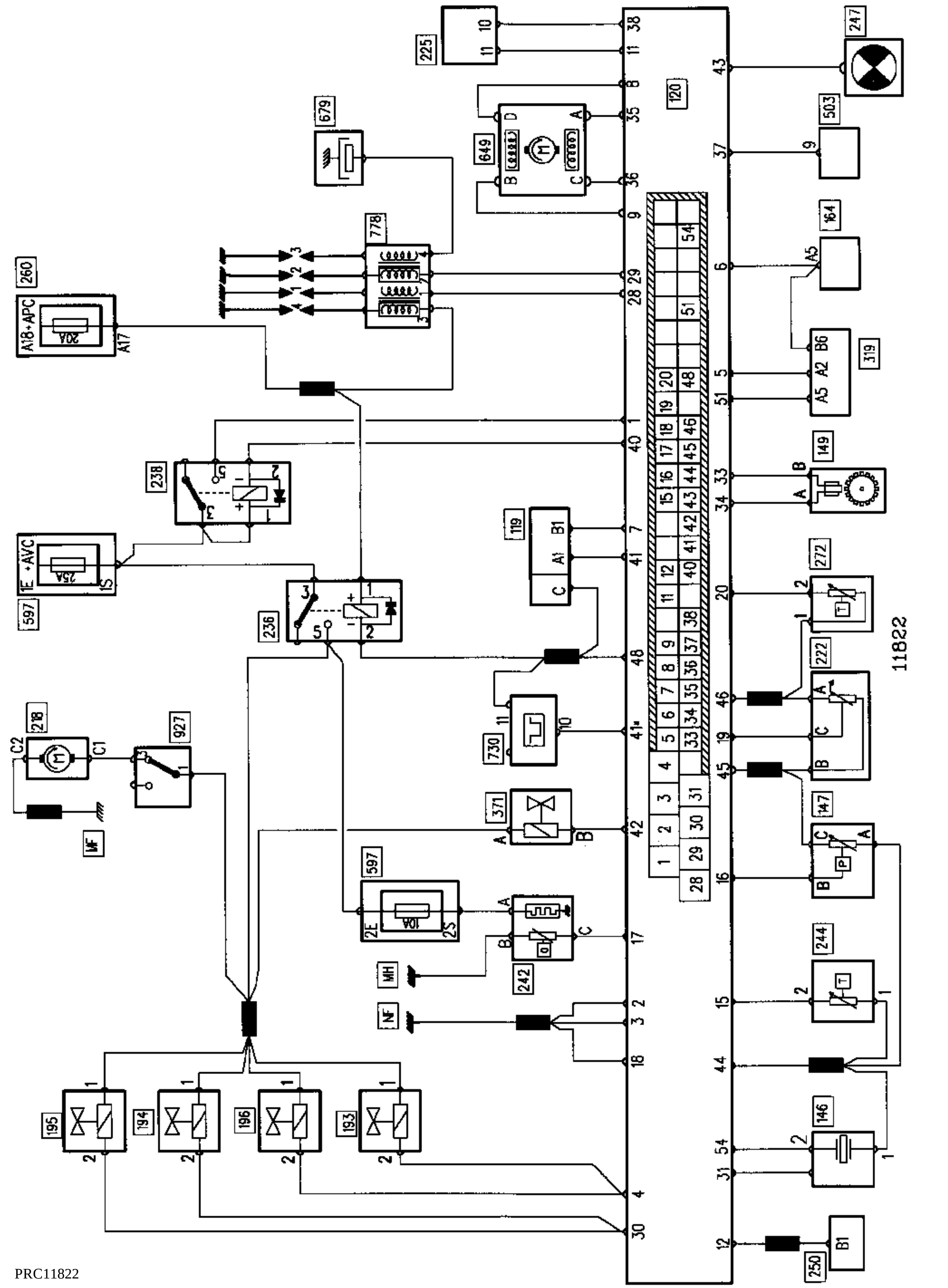
Hasty conclusions must not therefore be drawn from this, the position of #30 must be analysed.

The information supplied by #31 and #30 therefore gives an idea of the engine operating mixture thus allowing fault-finding to be focused. In order for them to be useful in fault-finding, no conclusion can be drawn from their value unless they are at the minimum or maximum adjustment limit and they have both moved in the same direction.

IMPORTANT: #30 and #31 must only be processed and analysed following a customer complaint, an operational fault and if they are at the limit with movement of #35 (#35 varies above 175 or below 80).

KEY TO WIRING DIAGRAM

UNIT N°	DESCRIPTION
119	Automatic transmission computer
120	Injection computer
146	Pinking sensor
147	Absolute pressure sensor
149	Top Dead Centre sensor
193 to 196	Injectors
218	Fuel pump
222	throttle position potentiometer
225	Diagnostics socket
236	Fuel pump relay
238	Locking relay
242	Oxygen sensor
244	Coolant temperature sensor
247	Instrument panel
250	Vehicle speed sensor
260	Fuse box
272	Air temperature sensor
319	Air conditioning control panel
371	Fuel vapour recirculation solenoid valve
503	Decoding computer
597	Engine compartment fuse box
649	Idle regulation stepping motor
679	Radio interference suppression capacitor
730	Automatic clutch computer
778	Monobloc with two coils, 4 outlets
927	Impact detector
MH	Engine earth


225
247
120
649
679
503
778
164
260
319
149
238
119
597
272
236
11822
222
730
218
927
371
147
597
242
244
195
194
196
193
146
250

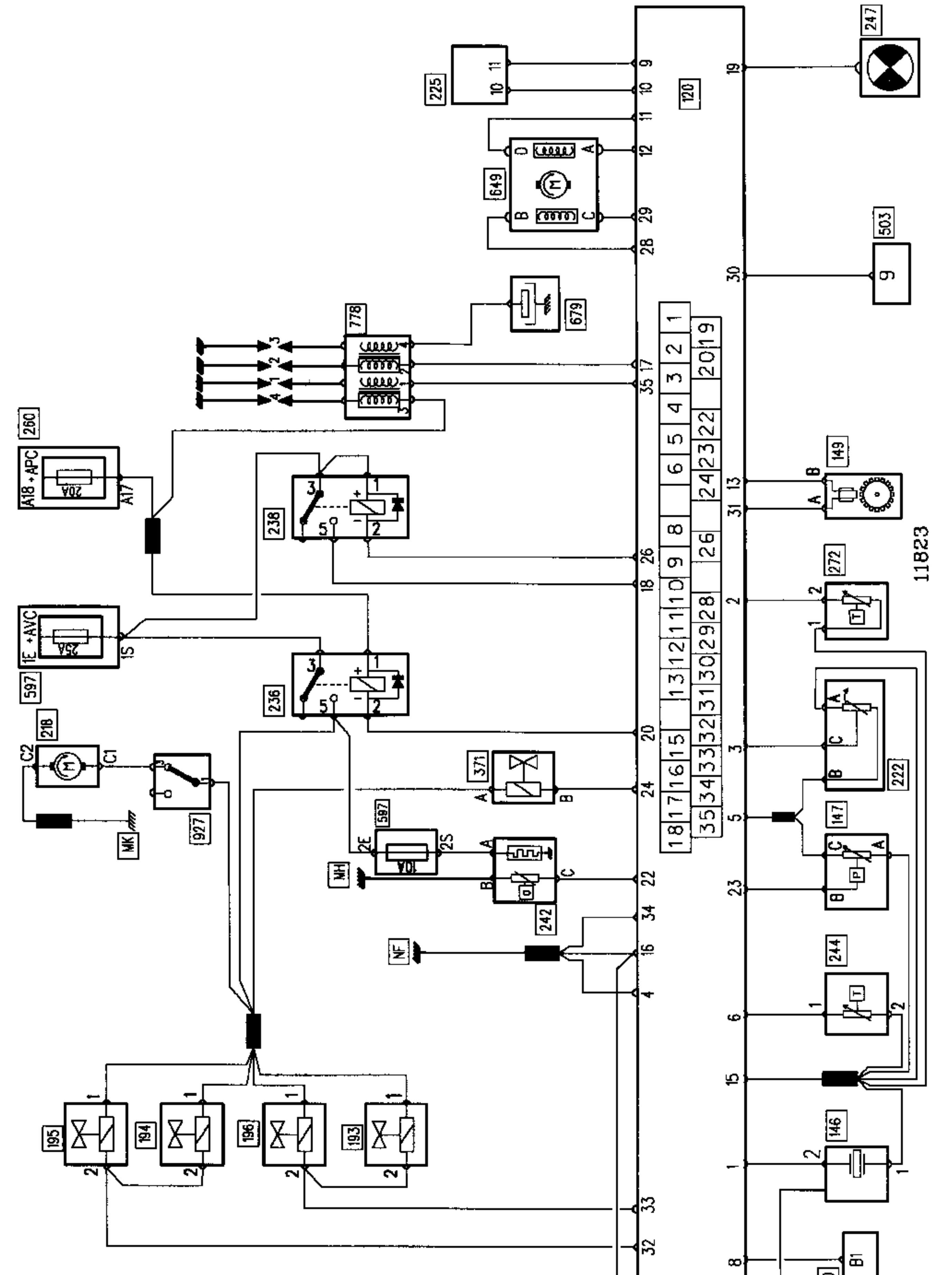
PRC11822

COMPUTER TRACK ALLOCATION LIST

Tracks	DESCRIPTION
1	+ 12 volts after ignition supply from the locking relay
2	Power earth n° 1
3	Power earth n° 2
4	Injector n° 2 and n° 3 control via earth
5	Air conditioning on / off information and compressor operation authorisation request (0 - 12 V)
6	Not used (this track is connected to the air conditioning computer, no information is transmitted along it)
7	Park / neutral / torque damping information
8	Stepping motor control (0 - 12 volts at high frequency) track D
9	Stepping motor control (0 - 12 volts at high frequency) track B
10	Not used
11	Bidirectional fault-finding line K used for entry into fault-finding mode (computer search), transmission of fault-finding information from the computer, application of the control modes (G..*), memory erasing (G0**) and end of fault-finding (G13*) modes
12	Vehicle speed information
13	Not used
14	Not used
15	Coolant temperature sensor information
16	Manifold pressure information re-processed by the absolute pressure sensor
17	Voltage supplied by the oxygen sensor information
18	Earth
19	Throttle position potentiometer information
20	Air temperature sensor information
21	Not used
22	Not used
23	Not used
24	Not used

Tracks	DESCRIPTION
25	Not used
26	Not used
27	Not used
28	Control of the coil of cylinders 1 and 4
29	Control of the coil of cylinders 2 and 3
30	Control of injector n° 1 and° 4 via earth (n° 1 engine flywheel end)
31	Pinking sensor shielded cable
32	Not used
33	Top dead centre sensor signal (track B)
34	Top dead centre sensor signal (track A)
35	Stepping motor control (0 - 12 at high frequency) track A
36	Stepping motor control (0 - 12 at high frequency) track C
37	Electronic ignition cut-off coded line input
38	Unidirectional fault-finding line L used only for entry to fault-finding mode (computer search)
39	Not used
40	Control (by connection to earth) of the locking relay
41	Throttle angle information for the automatic transmission and automatic clutch computer
42	OCR control (sequential earth time of the canister bleed solenoid valve OCR)
43	Control of the injection fault warning light on the instrument panel
44	Common earth for the pinking sensor, the coolant temperature sensor and the absolute pressure sensor
45	+ 5 V supply for the absolute pressure sensor and the throttle position potentiometer
46	Common earth for the air temperature sensor, and the throttle position potentiometer
47	Not used
48	Control (by earth) of the fuel pump relay and engine speed information
49	Not used

Tracks	DESCRIPTION
50	Not used
51	Air conditioning compressor clutch control prohibition (0 V → authorisation ; 12 V →prohibition)
52	Not used
53	Not used
54	Pinking sensor signal
55	Not used


120
225
649
247
503
679
778
260
A18 +APC
A17
20A
238
1E +AVC
1S
25A
597
236
218
927
MK
371
242
10A
MH
NF
149
272
222
147
244
146
250
B1
195
194
196
193
11B23

PRC11823

COMPUTER TRACK ALLOCATION LIST

Tracks	DESCRIPTION
1	Pinking sensor signal
2	Air temperature sensor information
3	Throttle position potentiometer information
4	Earth
5	+ 5 V supply for the absolute pressure sensor and the throttle position potentiometer
6	Coolant temperature sensor information
7	Not used
8	Vehicle speed data
9	Bidirectional fault-finding line K used for entry into fault-finding mode (computer search), transmission of fault-finding information from the computer, application of the control modes (G..*), memory erasing (G0**) and end of fault-finding (G13*) modes
10	Unidirectional fault-finding line L used only for entry to fault-finding mode (computer search)
11	Stepping motor control, (0 - 12 volts at high frequency) track D
12	Stepping motor control, (0 - 12 volts at high frequency) track A
13	Top dead centre sensor signal (track B)
14	Not used
15	Common earth for the pinking sensor, the throttle position sensor the manifold pressure sensor, air temperature sensor and the coolant temperature sensor
16	Power earth N° 1
17	Control of the coil of cylinders 2 and 3
18	Locking relay + 12 volts information

COMPUTER TRACK ALLOCATION LIST (cont)

Tracks	DESCRIPTION
19	Control of the injection fault warning light on the instrument panel
20	Control by earth of the fuel pump relay and engine speed information
21	Not used
22	Voltage supplied by the oxygen sensor information
23	Manifold pressure information re-processed by the absolute pressure sensor
24	Control of the canister bleed solenoid valve by OCR signal (sequential earth time)
25	Not used
26	Control (by earth) of the locking relay
27	Not used
28	Stepping motor control (0 - 12 V at high frequency) track B
29	Stepping motor control (0 - 12 V at high frequency) track C
30	Electronic ignition cut-off coded line input
31	Top Dead Centre sensor signal (Track A)
32	Control of injector N° 2 and 3 (by connection to earth)
33	Control of injector N° 1 and 4 (by connection to earth)
34	Power earth N° 2
35	Control of the coil of cylinders 1 and 4

ESTABLISHING XR25/COMPUTER DIALOGUE

- Connect the XR25 to the diagnostics socket.
- Ignition on.
- Selector in position S8
- Enter **D13** | 9.INJ |

COMPUTER IDENTIFICATION

Computer identification is not linked to the reading of a fault code but to direct reading of the computer part number. After entering into dialogue with the computer:

ENTER **G70***

7700
XXX
XXX

The part number then appears on the central display in three sequences.

Each sequence is displayed for approximately two seconds. The display is repeated twice. (For the number, refer to part number section 12).

ERASING THE MEMORY (engine stopped, ignition on)

Following work on the injection system, the computer memory can be erased using the code GO**.
(Erasing stored fault codes in fault-finding mode D13, enter GO** with the selector in position S8).

This operation will not erase the memory of any other equipment on the vehicle.

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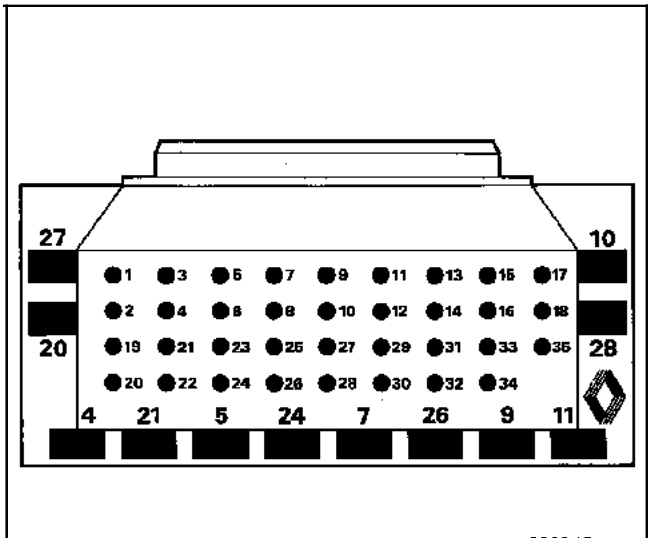
If the information obtained by the XR25 requires checking of the electrical continuity, connect the bornier **MS 1048**.



89024S

(The **MS 1048** is made up of a 35-way base integral with a printed circuit on which there are 35 copper plated surfaces numbered 1 to 35).

Using the wiring diagrams, the tracks which connect the components to be checked can be easily identified.

IMPORTANT :

- All of the checks , using the bornier **MS 1048**, must be carried out with the battery disconnected.
- The bornier is designed to be used only with an ohmmeter. Under no circumstances must 12 volts be applied to the check points.

TEST PROCEDURE

Connect the XR25, ignition off.

Switch on the ignition, enter into dialogue with the injection computer.

Make a note of which fault bargraph is illuminated or flashing.

Erase the computer memory.

Switch off the ignition.

1/ Carry out an XR25 test with the ignition on

Switch off the ignition, connect the XR25 and switch on the ignition.

Enter into dialogue with the injection computer.

Process the illuminated fault bargraph.

2/ Carry out an XR25 test with the engine running or at starter speed

Switch off the ignition, connect the XR25 and switch on the ignition.

Enter into dialogue with the injection computer.

Switch on the engine.

Process the illuminated fault bargraph.

3/ Carry out an XR25 test while driving

Switch off the ignition, connect the XR25 and switch on the ignition.

Enter into dialogue with the injection computer.

Drive the vehicle.

Process the illuminated fault bargraph.

NOTE :
- If illumination of a fault bargraph can be reproduced, it must be processed as an illuminated bargraph even if it has started flashing.
- If no fault bargraph has been illuminated, check the connectors of the faulty circuit.

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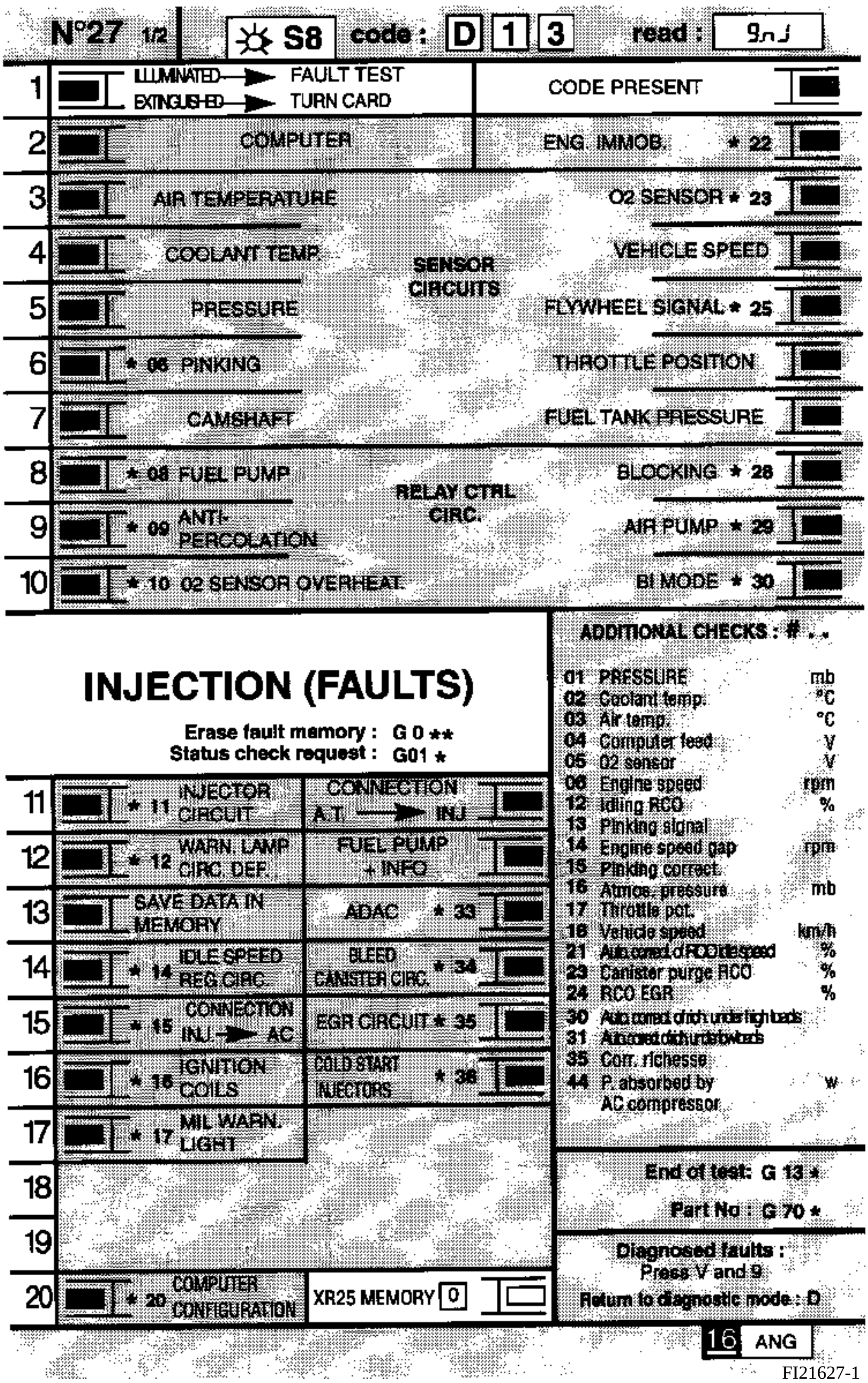
FICHE N° 27 SIDE 1/2 WITH FAULT BARGRAPHS



N°27 1/2 S8 code : D 1 3 read : 9nJ

1	ILLUMINATED → FAULT TEST / EXTINGUISHED → TURN CARD	CODE PRESENT
2	COMPUTER	ENG. IMMOB. * 22
3	AIR TEMPERATURE	O2 SENSOR * 23
4	COOLANT TEMP.	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 OVERHEAT	BI MODE * 30

SENSOR CIRCUITS (bargraphs 3 to 7)

RELAY CTRL CIRC. (bargraphs 8 to 10)

INJECTION (FAULTS)

Erase fault memory : G 0 **
Status check request : G01 *

11	* 11 INJECTOR CIRCUIT	CONNECTION A.T. → INJ
12	* 12 WARN. LAMP CIRC. DEF.	FUEL PUMP + INFO
13	SAVE DATA IN MEMORY	ADAC * 33
14	* 14 IDLE SPEED REG CIRC	BLEED CANISTER CIRC. * 34
15	* 15 CONNECTION INJ → AC	EGR CIRCUIT * 35
16	* 16 IGNITION COILS	COLD START INJECTORS * 36
17	* 17 MIL WARN. LIGHT	
18		
19		
20	* 20 COMPUTER CONFIGURATION	XR25 MEMORY 0

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	Engine speed gap	rpm
15	Pinking correct.	
16	Atmos. pressure	mb
17	Throttle pot.	
18	Vehicle speed	km/h
21	Auto correct. of RCO idle speed	%
23	Canister purge RCO	%
24	RCO EGR	%
30	Auto correct. of rich. under high loads	
31	Auto correct. of rich. under low loads	
35	Corr. richesse	
44	P. absorbed by AC compressor	W

End of test: G 13 *

Part No : G 70 *

Diagnosed faults :
Press V and 9
Return to diagnostic mode : D

16 ANG

FI21627-1

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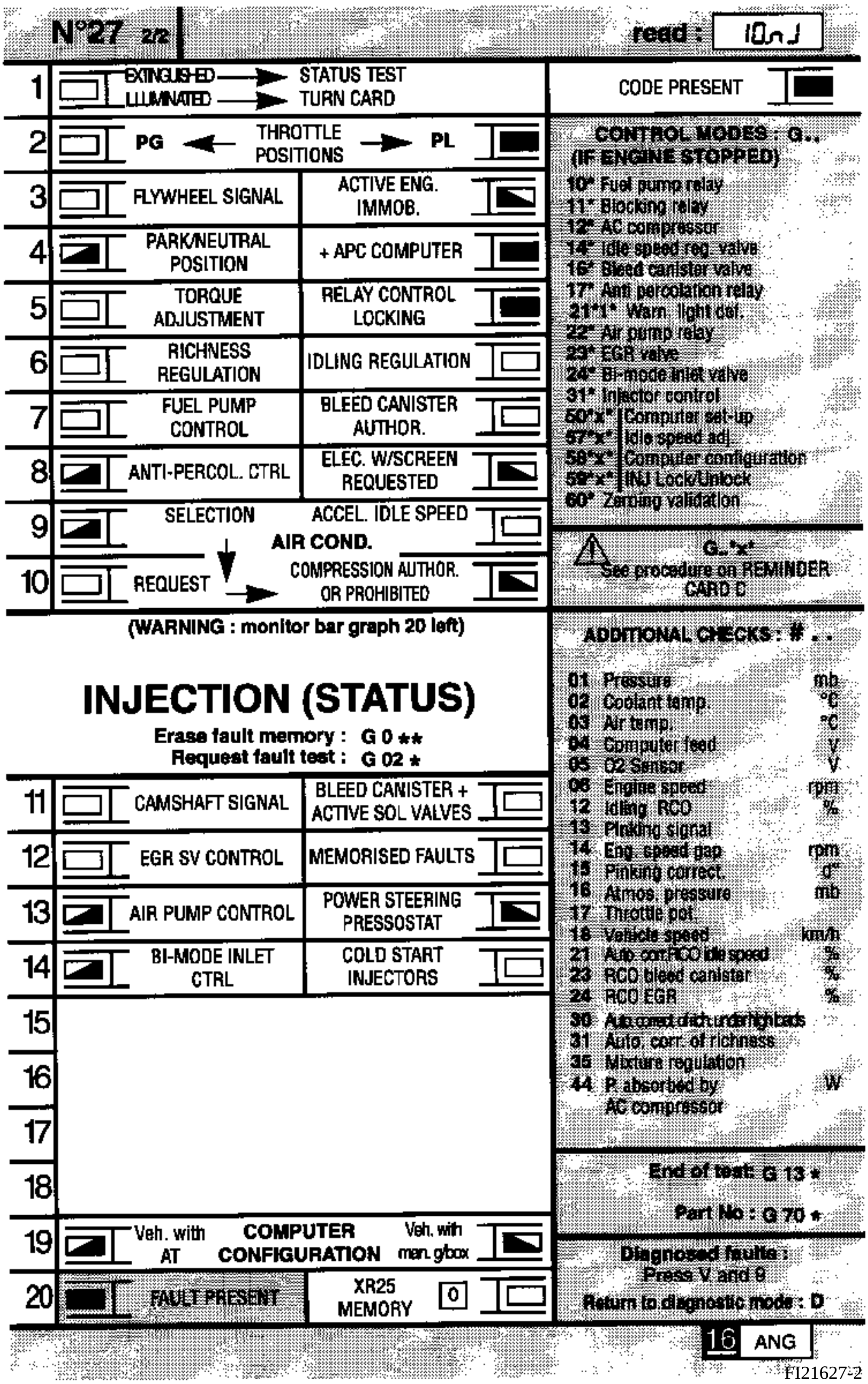
FICHE N° 27 SIDE 2/2 WITH STATUS BARGRAPHS



FI21627-2

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REPRESENTATION OF BARGRAPHS

Illuminates when dialogue is established with the computer. If it remains extinguished:
- the code does not exist,
- there is a line fault or a fault in the equipment or computer

REPRESENTATION OF FAULTS (always on a coloured background)

When illuminated, this indicates a fault on the product being checked, the associated text defines the fault.

When extinguished, this indicates that no fault has been detected on the product being checked.

REPRESENTATION OF STATUS (always on a white background)

With the engine stopped, ignition on, no action by the operator

The status bargraphs on the fiche are represented in the status in which they should be with the engine stopped, ignition on, no action by the operator

- If on the fiche, the bargraph is represented the XR25 should display
- If on the fiche, the bargraph is represented the XR25 should display
- If on the fiche, the bargraph is represented the XR25 should display

either or

Engine running

Extinguished when the function or the condition specified on the fiche is no longer carried out.

Illuminated when the function or the condition specified on the fiche is carried out.

FUNCTION V9

Fiche n° 27 side 1/2 and side 2/2 is a generic fiche used for several engine types.
The different engines do not use all of the bargraphs. For information regarding the bargraphs processed by the injection computer, press keys V and 9 simultaneously after establishing dialogue. The bargraphs processed will illuminate:

- permanently, in the case of fault bargraphs which cannot be stored or for status bargraphs,
- flashing, in the case of fault bargraphs which can be stored.

To return to fault-finding mode, press key D.

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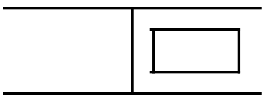
1



Right-hand bargraph 1 extinguished Fiche n° 27 side 1/2

XR25 CIRCUIT

XR25 : no connection, CO, CC TO EARTH, CC + 12

INSTRUCTIONS	For this fault-finding procedure, this bargraph should be illuminated.

Check:
- the Injection fuses, Engine and Passenger Compartment,
- the connection between the XR25 and the diagnostics socket,
- the position of the selector (S8),
- the conformity of the cassette.

Rectify if necessary.

Check:
- the presence of+ 12 V on track 6 and earth on track 2 of the diagnostics socket.
- the connection between the XR25 and the diagnostics socket

Diagnostics socket	10	→	4	XR25 socket
	11	→	8	

Rectify if necessary.

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

Bornier	10	→	10	Diagnostics socket
	9	→	11	Diagnostics socket
	18	→	C5	Main relay
	26	→	C2	Main relay
	20	→	D2	Fuel pump relay

Rectify.

Check the presence of + 12 V on the track:

C1	of the main relay
C3	of the main relay
D1	of the fuel pump relay.

Change the relay(s) if necessary.

AFTER REPAIR	Carry out a conformity check

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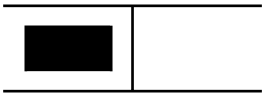
2



Left-hand bargraph 2 illuminated Fiche n° 27 side 1/2

COMPUTER CIRCUIT

XR25 : Computer not operational if left-hand bargraph 2 is illuminated

INSTRUCTIONS	None

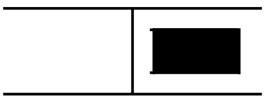
Computer not correct to specification or faulty.

Change the injection computer.

AFTER REPAIR	Carry out a conformity check

JSA031.1

2



Right-hand bargraph 2 illuminated Fiche n° 27 side 1/2

ENGINE IMMOBILISER CIRCUIT

XR25 :	*22 = 1dEF	CO, CC TO EARTH or CC +12 V LINE 30 OF THE COMPUTER
	*22 = 2 dEF	If the vehicle is fitted with an engine immobiliser, refer to the engine immobiliser fault-finding information

INSTRUCTIONS	If the vehicle is not fitted with an engine immobiliser, right-hand bargraph 2 is illuminated and *22 = 2dEF. In this case, ignore right-hand bargraph 2.

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

Bornier 30 ⟶ 9 of the infra-red transmitter

Rectify if necessary.

If the fault persists, refer to "Engine immobiliser fault-finding"

AFTER REPAIR	Erase the computer memory using GO**. Carry out a conformity check

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3	**Left-hand bargraph 3 illuminated** Fiche n° 27 side 1/2 AIR TEMPERATURE SENSOR CIRCUIT **XR25 :** #03 = -40 CO LINE 2 OR 15 ; CC + 5V LINE 2 #03 = 119 CC TO EARTH LINE 2

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Check the resistance of the air temperature sensor.

The resistance is not correct	Change the air temperature sensor.
The resistance is correct	Connect bornier **MS 1048** in place of the computer and check the continuity and insulation of the electrical wiring between the tracks: 1 sensor connector 15 bornier 2 sensor connector 2 bornier
	If the electrical wiring is good, change the computer.

AFTER REPAIR	Erase the computer memory using GO**. Carry out a conformity check

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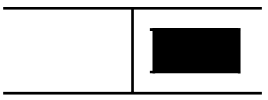
3



Right-hand bargraph 3 illuminated — Fiche n° 27 side 1/2

OXYGEN SENSOR CIRCUIT

XR25 : None

INSTRUCTIONS	Right-hand bargraph 3 may illuminate with the engine running in the event of a fault.

Check the connection and condition of oxygen sensor connector.
With the engine running, check the presence of + 12V between tracks A and B on the oxygen sensor connector.
If there is no 12V supply, repair the sensor heating circuit electrical wiring.
With the ignition off, connect bornier **MS 1048** in place of the computer and check the continuity and insulation of line between track 22 of the bornier and track C of the connector.
If necessary, repair the electrical wiring.
The fault persists! Change the oxygen sensor.
The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory (engine cold) using GO**. Carry out a conformity check

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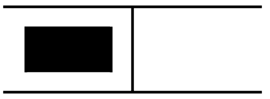
4



Left-hand bargraph 4 illuminated

Fiche n° 27 side 1/2

COOLANT TEMPERATURE SENSOR CIRCUIT

XR25 : #02 = -40°C CC + 5V LINE 6 ; CO LINE 6 or 15
#02 = 119°C CC TO EARTH LINE 15

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Check the resistance of the coolant temperature sensor.

The resistance is not correct	Change the sensor
The resistance is correct	Connect bornier **MS 1048** in place of the computer and check the continuity and insulation of the electrical wiring between the tracks: 1 coolant temperature sensor — 15 bornier 2 coolant temperature sensor — 6 bornier
	Repair if necessary.
	The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO**. Carry out a conformity check

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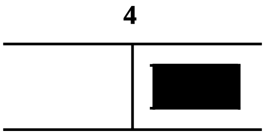

Right-hand bargraph 4 illuminated Fiche n° 27 side 1/2

VEHICLE SPEED SENSOR CIRCUIT

XR25 : CO or CC LINE 12

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Carry out a road test and check the speed on the speedometer.
If the speed is zero, repair the wiring between track 12 of the computer and B1 of the sensor.
With the ignition on, check the connection of the speed sensor and its supply: + 12V on track A earth on track B2
Rectify if necessary.
The fault persists! Change the speed sensor.

AFTER REPAIR	Erase the computer memory using GO** Carry out a road test Carry out a conformity check

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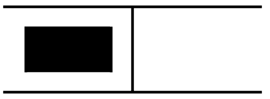
5



Left-hand bargraph 5 illuminated Fiche n° 27 side 1/2

ABSOLUTE PRESSURE SENSOR CIRCUIT

XR25 : #01 = 103 mb CO LINE 23 or 5 CC - LINE 23
#01 ≥ 1020 mb CC+ LINE 8 or 23

INSTRUCTIONS

Left-hand bargraph 5 may illuminate with the engine running in the event of a fault.
Refer to "Fault-finding - Help" for the resistance values.

If the vehicle has idling problems, check that the line between track 8 of the computer and track B1 of the speed sensor is insulated from 12 V.

Check whether the pressure sensor is electrically and pneumatically connected and check the conformity of the pipe. It must not be clogged, punctured...

With the ignition on, check the presence of 5V between track C and the earth at track A.

5V is not present between track C and track A	Connect the bornier **MS 1048** in place of the computer and check the insulation and continuity between the tracks: A sensor connector 15 bornier C sensor connector 5 bornier
	Rectify if necessary.

5V is present between track C and track A	With the ignition on, check the return voltage on track B of the sensor. **Note** : To take this reading, a vacuum pump could be used to check the variation in the voltage.
The voltage does not vary	Change the sensor.

The voltage varies	Connect bornier **MS 1048** in place of the computer and check the insulation and continuity between track B of the sensor and track 23 of the bornier.
	Rectify if necessary.
	The fault persists! Change the computer.

AFTER REPAIR

Erase the computer memory using GO**
Carry out a conformity check

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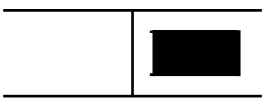
5



Right-hand bargraph 5 illuminated or flashing Fiche n° 27 side 1/2

FLYWHEEL SIGNAL CIRCUIT

XR25 :	*25 = dEF	FAULT STORED, to be confirmed
	*25 = C00	CC - LINE 13 / 31 or 5
	*25 = In	INVERSION OF SENSOR WIRES

INSTRUCTIONS

If right-hand bargraph 5 is flashing, erase the computer memory using GO**.
At starter speed for 10 seconds or with the engine running for 10 seconds minimum, if right-hand bargraph 5 is illuminated or flashing, fault-finding can be carried out.
Refer to "Fault-finding - Help" for the resistance values.

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

The resistance is not correct — Change the sensor.

The resistance is correct — Connect the bornier **MS 1048** in place of the computer and check the continuity and insulation of the wiring between the tracks:

Flywheel signal sensor	A	→	31	bornier
Flywheel signal sensor	B	→	13	bornier
Throttle position sensor	B	→	5	bornier
Pressure sensor	C	→	5	bornier
Earth	earth	→	16	bornier
Earth	earth	→	4	bornier
Earth	earth	→	34	bornier

AFTER REPAIR

Erase the computer memory using GO**

Carry out a conformity check

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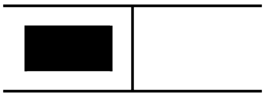
6



Left-hand bargraph 6 illuminated

Fiche n° 27 side 1/2

PINKING SENSOR CIRCUIT

XR25 : CC TO EARTH LINE 1 or CO LINE 1 and 15

INSTRUCTIONS	Left-hand bargraph 6 may illuminate in the event of a fault with the engine running at an engine speed of 2500 rpm.

Check the connectors of the faulty sensor.

Rectify if necessary.

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

1 sensor	15 bornier
2 sensor	1 bornier

Rectify if necessary.

The fault persists! Change the pinking sensor.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

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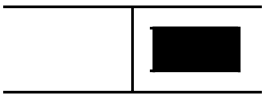
6



Right-hand bargraph 6 illuminated or flashing Fiche n° 27 side 1/2

THROTTLE POTENTIOMETER CIRCUIT

XR25 :	CO	LINE 3
	CC-	LINE 3
	CC+	LINE 3 or 34 or 35 or 17

INSTRUCTIONS	If right-hand bargraph 6 is flashing, erase the computer memory using GO**. With the ignition on, at starter speed or with the engine running, if right-hand bargraph 6 is flashing or illuminated, fault-finding can be carried out.

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	Change the throttle potentiometer.

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

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

A potentiometer	→	15 bornier
B potentiometer	→	5 bornier
C potentiometer	→	3 bornier
Earth	→	34 bornier
1 coil	→	35 bornier
2coil	→	17 bornier

Check the resistance of the coil.

If the coil is not good, it must be changed before the computer is changed.

Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

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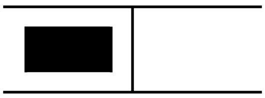

Left-hand bargraph 8 illuminated — Fiche n° 27 side 1/2

FUEL PUMP RELAY CONTROL CIRCUIT

XR25 : CC + 12 V LINE 20

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Check the operation of the impact sensor.

With the fuel pump relay in place, check the presence of + 12V during the timing phase between tracks 1 and 2 when the ignition is switched on.

+12 V is present between 1 and 2	Change the relay.
+1 2 V is not present between 1 and 2	With the ignition on, check the presence of + 12 V on track 1 of the fuel pump relay.
+12V is not present on track 1	Check the line of track 1 as far as the fuse.
+ 12V is present on track 1	Connect the bornier **MS 1048** in place of the computer and check the continuity and insulation between track 2 of the relay and track 20 of the bornier.
	Rectify if necessary.

The fault persists! Change the injection computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

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11	**Left-hand bargraph 11 illuminated**		Fiche n° 27 side 1/2
	INJECTION CIRCUIT		
	XR25 : *11 = XX.CO	CO or CC - LINE 32 or 33	
	*11 = XX.CC	CC + LINE 32 or 33	
	*11 = Def	FAULT STORED	

INSTRUCTIONS	X represents the number of cylinder. Refer to "Fault-finding - Help" for the resistance values.

Check the resistance of the injectors concerned.

The resistance is not correct	Change the faulty injector(s).
The resistance is correct	Connect the bornier **MS 1048** in place of the computer and check the continuity and insulation between track 2 of the injector connectors and tracks 32 and 33.
	Repair the wiring if necessary.
	During the timing phase, check the presence of 12 V on track 1 of the injector concerned.
	Repair the wiring if necessary.

The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA031.1

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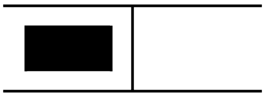


Left-hand bargraph 12 illuminated Fiche n° 27 side 1/2

FAULT WARNING LIGHT CIRCUIT

XR25 : CC - or CC + LINE 19

INSTRUCTIONS	None

Check the insulation and continuity of the line:

computer 19 ⟶ warning light fuse

The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA031.1

13	**Left-hand bargraph 13 illuminated** Fiche n° 27 side 1/2
	STORED MEMORY CIRCUIT **XR25 :** Injection computer supply cut off.

INSTRUCTIONS	Has the battery has been removed? Left-hand bargraph 13 may illuminate after repair work, ignore it.

Check:
- the battery charge,
- the injection fuses,
- the battery wiring.
- the computer supply.

Rectify.

Switch off the ignition for 2 minutes.

Switch on the ignition.

The fault bargraph should be extinguished.

The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA031.1

14	**Left-hand bargraph 14 illuminated or flashing** Fiche n° 27 side 1/2 IDLE REGULATION VALVE CIRCUIT **XR25 :** CO LINE 11 or 28 or 12 or 29 CC - LINE 11 or 28 or 12 or 29 CC + LINE 12 or 29

INSTRUCTIONS	Left-hand bargraph 14 may illuminate with the engine running in the event of a fault. Refer to "Fault-finding - Help" for the resistance values.

Check the resistance of the stepping motor coils between tracks A-D and B-C.

If the resistance is not correct, change the stepping motor.

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

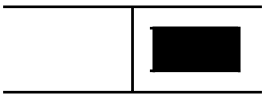
Bornier 11 → D stepping motor
28 → B
12 → A
29 → C

The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA031.1

14



Right-hand bargraph 14 illuminated

Fiche n° 27 side 1/2

CANISTER BLEED CIRCUIT

XR25 : CO or CC - or CC + LINE 24 and #23 = 00

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Check the conformity of the pipes, rectify if necessary.

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

The resistance is not correct	Change the canister bleed valve.
The resistance is correct	With the engine running at idle, check the presence of + 12 V on track A of the canister bleed valve.
+ 12 V is not present on track A	Repair the electrical wiring between track A of the canister bleed valve and track 5 of the fuel pump relay.
+ 12 V is present on track A	Connect the bornier **MS 1048** in place of the computer and check the insulation and continuity of the electrical wiring between track B of the canister bleed valve and track 24 of the bornier.
	Rectify if necessary.

The fault persists! Change the injection computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA031.1

16

Left-hand bargraph 16 illuminated Fiche n° 27 side 1/2

IGNITION COIL CIRCUIT

XR25 : *16 = 1.4 CO CO / CC TO EARTH LINE 35
*16 = 2.3 CO CO / CC TO EARTH LINE 17

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Check the resistance of the coil.

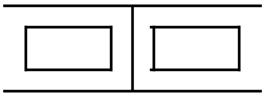
The resistance is not correct	Change the coil.
The resistance is correct	Connect the bornier **MS 1048** in place of the computer and check the insulation and continuity of the line: bornier 35 ⟶ 1 coil bornier 17 ⟶ 2 coil Check the presence of + 12 V on track 3 of the coil and check the insulation and continuity of line 4 of the coil.
	Repair the faulty line.

The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA031.1

2



Left-hand bargraph 2, right-hand bargraph 2, incorrect illumination Fiche n° 27 side 2/2

THROTTLE POSITION CIRCUIT

XR25 : Left-hand bargraph 2 illuminated at full load
Right-hand bargraph 2 illuminated at no load
Left-hand bargraph 2 and right-hand bargraph 2 extinguished at an intermediate position.

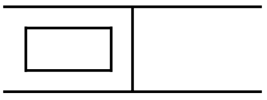
INSTRUCTIONS	No fault bargraph should be illuminated.

If not fault bargraph is illuminated, the problem is not electrical.
Check the mechanics of the accelerator circuit (cable, accelerator pedal,...).

AFTER REPAIR	Carry out a conformity check

JSA031.1

3



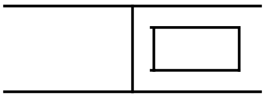
Left-hand bargraph 3, incorrect illumination Fiche n° 27 side 2/2

FLYWHEEL SIGNAL CIRCUIT

XR25 : Left-hand bargraph 3 illuminated with the engine running

INSTRUCTIONS	Covered in the fault bargraphs.

3



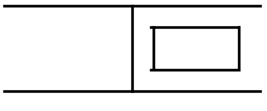
Right-hand bargraph 3, incorrect illumination Fiche n° 27 side 2/2

ENGINE IMMOBILISER CIRCUIT

XR25 : Left-hand bargraph 3 illuminated, engine immobiliser active

INSTRUCTIONS	Covered in the fault bargraphs.

4



Right-hand bargraph 4, incorrect illumination Fiche n° 27 side 2/2

+ AFTER IGNITION CIRCUIT

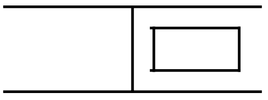
XR25 : Right-hand bargraph 4 illuminated at+ after ignition

INSTRUCTIONS	Covered in the fault bargraphs.

AFTER REPAIR	No action

JSA031.1

5



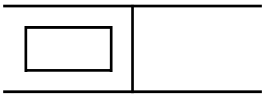
Right-hand bargraph 5, incorrect illumination Fiche n° 27 side 2/2

LOCKING RELAY CIRCUIT

XR25 : Right-hand bargraph 5 illuminated if the locking relay is controlled

INSTRUCTIONS	Covered in the fault bargraphs.

6



Left-hand bargraph 6, incorrect illumination Fiche n° 27 side 2/2

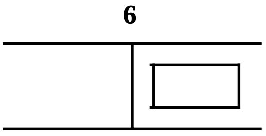
MIXTURE REGULATION CIRCUIT

XR25 : Left-hand bargraph 6 illuminated when the mixture is regulated (engine running)

INSTRUCTIONS	Covered in the fault bargraphs.

AFTER REPAIR	No action

JSA031.1



Right-hand bargraph 6, incorrect illumination Fiche n° 27 side 2/2

IDLE SPEED REGULATION CIRCUIT

XR25 : Right-hand bargraph 6 illuminated with engine running under no load

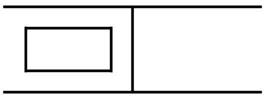
INSTRUCTIONS	No fault bargraph should be illuminated.

Check the insulation of lines 11 and 28 of the injection computer.
If the fault persists and no other bargraph is to be processed, change the computer.

AFTER REPAIR	No action

JSA031.1

7



Left-hand bargraph 7, incorrect illumination Fiche n° 27 side 2/2

FUEL PUMP CONTROL CIRCUIT

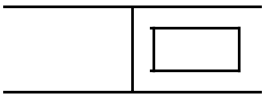
XR25 : Left-hand bargraph 7 illuminated with the ignition on during the timing phase and with the engine running

INSTRUCTIONS	Covered in the fault bargraphs.

AFTER REPAIR	No action

JSA031.1

11



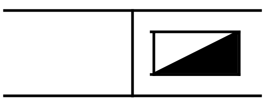
Right-hand bargraph 11, incorrect illumination Fiche n° 27 side 2/2

CANISTER BLEED CIRCUIT ACTIVE

XR25 : Right-hand bargraph 11 illuminated when the canister bleed is active

INSTRUCTIONS	Covered in the fault bargraphs.

12



Right-hand bargraph 12 illuminated or extinguished Fiche n° 27 side 2/2

ERASING MEMORIED FAULTS

XR25 : This bargraph is illuminated when the faults have been erased.

INSTRUCTIONS	None.

AFTER REPARATION	No action

JSA031.1

Fault-finding - Customer complaints not using OPTIMA

INSTRUCTIONS	Only refer to these customer complaints following a full check using the XR25 Refer to "Fault-finding - Help" for the resistance values.

STARTING PROBLEMS

Does not start	CHART 1
Starts but stalls	CHART 2
Starting takes too long	CHART 3

IDLE SPEED PROBLEMS

Too high	CHART 4
Too low	CHART 5
Engine speed unstable	CHART 6
Hunting	CHART 7

HANDLING

Lack of performance	CHART 8
Flat spots and hesitation	CHART 9

FUMES - POLLUTION

CO and / or HC levels too high	CHART 10

HIGH FUEL CONSUMPTION

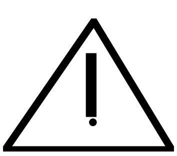
CHART 11

ENGINE NOISE

Pinking	CHART 12

FAULT WARNING LIGHT PROBLEMS

Carry out the left-hand bargraph 12 illuminated fault-finding procedure



The procedure which does not use the OPTIMA is not suitable as an adequate quality criteria.
Follow the procedure using the OPTIMA to obtain this quality criteria.

JSA031.1

CHART 1	**STARTING PROBLEMS** **Does not start**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the injection fuses in the passenger compartment fuse box and in the engine compartment fuse box.
Check the continuity of the line:
- 16 of the computer
- 4 of the computer
- 13 of the computer
- 31 of the compute

Rectify if necessary.
Does the customer complaint persist?

no → End of fault-finding

yes ↓

Can the fuel pump be heard when the ignition is switched on?

yes → Refer to Chart 1A

no ↓

Carry out the fuel pump relay control procedure and check whether the relay makes a noise (several knocks).
Is the relay good?

no → Change the relay.

yes ↓

Check the presence of 12 V on track 3 of the relay. Rectify if necessary.
If the customer complaint persists

↓

During the timing phase, check the presence of 12 V on track 5 of the relay.
Is 12 V present?

no → Change the relay.

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 1
CONT

A

During the timing phase,
check the presence of **+ 12 volts** between
tracks C1 and C2 of the fuel
pump connector.
Is 12 V present?

no →

Repair the electrical wiring between
the tracks:

Fuel pump connector:
C2 → earth
C1 → track 5 of the fuel pump relay.

yes ↓

Change the fuel pump.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 1A	STARTING PROBLEMS Does not start
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the fault-finding equipment and check the presence of a High Voltage on the spark plug wires when the starter is operated.
Is there a High Voltage?

- yes → Check the flow of fuel and the fuel pressure (Refer to vehicle Workshop Repair Manual).
  Repair the fuel circuit if necessary (pump, filter, pipes, regulator, injectors...).
  If the customer complaint persists
  → It is an engine problem, the injection system is no longer implicated.
- no ↓

Check the high voltage circuit.
Rectify if necessary.
If the customer complaint persists

↓

With the ignition on, check the presence of + 12 V on track 2 of the coils.
Is + 12 V present?

- no → Check the continuity of the electrical wiring between track 2 (coils) and the + after ignition fuse in the engine connection unit.
  Rectify.
- yes ↓

With the ignition on,
check the resistance of the coil.
Is it correct?

- no → Change the faulty coil(s).
- yes ↓

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

1 / coil	35 / bornier
2 / coil	17 / bornier

Rectify if necessary.
If the customer complaint persists

↓

Change the injection computer.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 2	**STARTING PROBLEMS** **The engine starts but stalls**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check that the idle regulation stepping motor is not blocked.

↓

Check the air intake circuit and the exhaust line.
Repair if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Repair if necessary [pump, filter, regulator, pipes, injectors (sealing)...].
If the customer complaint persists

↓

It is an engine problem and the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 3	STARTING PROBLEMS Starting takes too long
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the ignition,
the high voltage circuit and the spark plugs.
Repair if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure
(refer to vehicle Workshop Repair Manual).
Change the faulty parts if necessary
(regulator, filter, pump, pipes...).
If the customer complaint persists

↓

Check the sealing of the injectors.
If the sealing is not correct,
change the faulty injector(s)
The customer complaint persists!

↓

It is an engine problem
and the injection system is no longer
implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

CHART 4	**IDLE SPEED PROBLEMS** **Idle speed too high**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the insulation and continuity of the line:
- 32 of the computer
- 18 of the computer

↓

Check that there is no air leak at the intake (seals, take-offs on the inlet manifold, caps,...).
Rectify if necessary.
If the customer complaint persists

↓

Check on the throttle housing that the lower mechanical stop has been reached.
Check the accelerator control as well.
Rectify if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual)
Rectify if necessary
(injectors, pump, pressure regulator, pipes...). canalisations, ...).
The customer complaint persists!

↓

The injection system is no longer implicated.
Check the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 5	**IDLE SPEED PROBLEMS** **Idle speed too low**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the ignition,
spark plug high voltage harness, coil,
power stages.
Rectify if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure
(refer to vehicle Workshop Repair Manual).
Rectify if necessary
(injectors, pump, regulator,
pipes...).
The customer complaint persists!

↓

The injection is no longer implicated.
Check the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

CHART 6	**IDLE SPEED PROBLEMS** **Engine speed unstable**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

With the engine at idle,
check the consistency of #01.
Is it consistent?

no → Check the absolute pressure sensor and its harness. Rectify, if necessary, change 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

Are the values correct?

no → Check:
- Catalytic converter (melted,clogged, ...).
- Oxygen sensor (contaminated, heating faulty, ...).
- Air leak upstream of the oxygen sensor.
- Sealing of the exhaust line.
- Type of fuel used.
- Ignition (spark plugs, high voltage wires, coils).
- General condition of the engine (timing, ...).

yes ↓

Disconnect the oxygen sensor and wait until #35 stabilises at 128, #05 stabilises at ≈ 0.402, and right-hand fault bargraph 3 illuminates . Does the customer complaint persist?

no → Before changing the oxygen sensor, check that there is no lead at the exhaust outlet.

yes ↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Rectify if necessary (regulator, pump, filter, pipes, injectors).
Does the customer complaint persist?

no → End of fault-finding

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 6 CONT	

A

Using the fault-finding equipment, check the high voltage circuit (wires, spark plugs,...).
Also check the spark plugs,
the condition of the wires, the connectors,...
Change parts if necessary.
If the customer complaint persists

Check the injectors
(sealing and flow).
Rectify if necessary.
The customer complaint persists!

It is no longer an injection problem.
Check the general condition of the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 7	IDLE SPEED PROBLEMS Hunting
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

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

Are the values correct?

no →

Check:
- Catalytic converter (melted,clogged, ...).
- Oxygen sensor (contaminated, heating faulty, ...).
- Air leak upstream of the oxygen sensor.
- Sealing of the exhaust line.
- Type of fuel used.
- Ignition (spark plugs, high voltage wires, coils).
- General condition of the engine (timing, ...).

yes ↓

Disconnect the oxygen sensor and wait until #35 stabilises at 128, #05 stabilises at ≈ 0.402, and right-hand fault bargraph 3 illuminates .
Is the engine stable?

no →

Check that there is no leak on the inlet manifold
(caps, seals, take-offs, ...).
Rectify if necessary.

yes ↓

Change the oxygen sensor.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 8	**HANDLING** **Lack of performance**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the conformity of the spark plugs and their condition.
Rectify if necessary.
Does the customer complaint 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

Are the values correct?

- no → Check:
  - Catalytic converter (melted,clogged, ...).
  - Oxygen sensor (contaminated, heating faulty, ...).
  - Air leak upstream of the oxygen sensor.
  - Sealing of the exhaust line.
  - Type of fuel used.
  - Ignition (spark plugs, high voltage wires, coils).
  - General condition of the engine (timing, ...).
- yes ↓

Check the air intake circuit (air filter...) and the exhaust line.
Rectify if necessary.
Does the customer complaint persist?

- no → End of fault-finding.
- yes ↓

Using the XR25, check #15.
Is #15 = 0?

- yes → It is an engine problem and the injection is no longer implicated.
- no ↓

Refer to CHART 12 pinking.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 9	**HANDLING** **Flat spots and hesitation**

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Road test, if possible with the customer, to confirm the fault.
Does the fault occur again?

no → Before returning the vehicle to the customer, using the XR25 check that everything is good in particular 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

Are the values correct?

no → Check:
- Catalytic converter (melted, clogged,...).
- Oxygen sensor (contaminated, heating faulty,...).
- Air leak upstream of the oxygen sensor.
- Sealing of the exhaust line.
- Type of fuel used.
- Ignition (spark plugs, high voltage wires, coils)
- General condition of the engine (timing, ...).

yes ↓

Check the condition of the high voltage wiring, spark plugs-connectors, coils, TDC sensor (interference possible cause), injectors
Change the faulty parts if necessary.
If the customer complaint persists

↓

Check that the gauge is present in the absolute pressure sensor pipe and that it is clean.
Rectify if necessary.
If the customer complaint persists

↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

CHART 9
CONT

A

Disconnect the oxygen sensor and wait until #35 stabilises at 128, #05 stabilises at ≈ 0.402, and right-hand fault bargraph 3 illuminates.
Carry out a road test.
Does the customer complaint persist?

no → Change the oxygen sensor.

yes

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

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Change the faulty parts (fuel pump, regulator, filter, pipes,...).
If the customer complaint persists

Clean the injectors.
If the customer complaint persists

Check the clogging of the vales.
Clean the valves if necessary.
Does the customer complaint persist after cleaning?

no → End of fault-finding.

yes

It is an engine problem,
the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 10	FUMES - POLLUTION CO and/or HC level too high
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Using the XR25, check #05 and #35.
Check, refer to Workshop Repair Manual.
Are the values correct?

no → Carry out the lead detection test
(refer to the Workshop Repair Manual).
Is there lead present?

- yes → Check the type of fuel used.
If the customer has used leaded petrol, the vehicle must consume several full tanks of unleaded petrol before the catalytic converter and the oxygen sensor are changed.
- no → B

yes → Check the High Voltage circuit
(spark plugs, spark plug wires).
Rectify if necessary.
If the customer complaint persists

Check the air supply,
the air filter, the pipes...
Does the customer complaint persist after rectification?

no → End of fault-finding.

yes → Check the conformity of the gauge and the condition of the absolute pressure sensor pipe.
Rectify if necessary.
If the customer complaint persists

Check the sealing of the connectors
(O-rings in particular).
Rectify if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes → A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 10 CONT

A

Check the fuel return pressure and flow (refer to vehicle Workshop Repair Manual). Rectify or change the faulty parts (fuel pump, pressure regulator, pipes). If the customer complaint persists

Ask the customer whether there have been any ignition or starting problems. Was there a problem?

yes

Change the catalytic converter.

no

It is an engine problem and the injection system is no longer implicated.

B

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

no

Repair the electrical circuit.

yes

Check:
- Catalytic converter (melted, clogged,...).
- Oxygen sensor (contaminated, heating faulty,...).
- Air leak upstream of the oxygen sensor.
- Sealing of the exhaust line.
- Type of fuel used.
- Ignition (spark plugs, wires, distributor)
- General condition of the engine (timing, ...).

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 11	HIGH FUEL CONSUMPTION
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check that there are no fuel leaks.
Rectify if necessary.
Does the customer complaint persist?

- no → End of fault-finding.
- yes ↓

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

- no → See Chart 4 or 5, idle speed problems (idle speed too high or too low).
- yes ↓

Check that the vehicle conforms to its specification and is good condition.
Rectify if necessary.
Does the customer complaint persist?

- no → End of fault-finding.
- yes ↓

Check the value of the pollutants and Lambda
- CO < 0.3 %
- HC ≤ 100 ppm
- CO_2 ≥ 14.5 %
- 0.97 ≤ Lambda ≤ 1.03

Are the values correct?

- no → Check:
  - Catalytic converter (melted,clogged, ...).
  - Oxygen sensor (contaminated, heating faulty, ...).
  - Air leak upstream of the oxygen sensor.
  - Sealing of the exhaust line.
  - Type of fuel used.
  - Ignition (spark plugs, coil wires, ...).
  - General condition of the engine (timing, ...).
- yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 11
CONT

A

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual) and the canister bleed circuit.
Rectify if necessary (regulator, pump, filter, pipes).
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

It is no longer an injection system problem, it is an engine problem,
check:
- the level of engine oil
- the engine cooling circuit
- the suspension
- the general condition of the engine.

If necessary, carry out a consumption check using the ECONOTEST consumption equipment.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 12	**ENGINE NOISE** **Pinking**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Carry out a road test using the XR25 and check #13 and #15.
Does the fault occur again?

- no → The customer must use his vehicle under special conditions, discuss this with him.
- yes ↓

Check the condition and the conformity of the spark plugs.
Change the spark plugs if necessary.
Does the customer complaint persist?

- no → End of fault-finding.
- yes ↓

Change the TDC sensor.

↓

Check that the engine target is in good condition.

↓

It is no longer an injection system problem.
Check the engine cooling circuit as well.
The combustion chambers can be cleaned.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25 Refer to "Fault-finding - Help" for the resistance values

STARTING PROBLEMS

Does not start	CHART 1
Starts but stalls	CHART 2
Starting takes too long	CHART 3

IDLE SPEED PROBLEMS

Too high	CHART 4
Too low	CHART 5
Engine speed unstable	CHART 6
Hunting	CHART 7

HANDLING

Lack of performance	CHART 8
Flat spots and hesitation	CHART 9

FUMES- POLLUTION

Gases analysis incorrect	CHART 10
Oxygen sensor check	CHART 11

HIGH FUEL CONSUMPTION CHART 12

ENGINE NOISE

Pinking	CHART 13

FAULT WARNING LIGHT PROBLEMS

Carry out the left-hand bargraph 12 illuminated fault-finding procedure

JSA031.1

CHART 1	STARTING PROBLEMS Does not start
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check all of the passenger and engine compartment injection fuses.
Check the continuity of the line:
- 16 of the computer
- 4 of the computer
- 13 of the computer
- 31 of the computer

Rectify if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

Check the operation of the engine immobiliser.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

Can the fuel pump be heard when the ignition is switched on?

yes → Refer to Chart 1A

no ↓

When the ignition is switched on, can the fuel pump relay be heard?

no → Check the presence of + 12 V at 1 of this relay. Rectify.

↓

Connect the bornier in place of the injection computer and check the insulation and continuity of line between track 20 of the bornier and track 2 of the relay.
Rectify.

↓

If the customer complaint persists, change the relay.

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 1
CONT

A

Check the presence of 12 V on track 3
of the fuel pump relay.
Rectify if necessary.
If the customer complaint persists

During the timing phase, check the presence
of 12 V on track 5 of the relay.
Is 12 V present?

no → Change the relay.

yes

During the timing phase,
check the presence of **+ 12 volts**
between tracks C1 and C2 of the
fuel pump connector.
Is + 12 V present?

no → Repair the line:
- pump connector C1 ---> 5 relay
- pump connector C2 ---> earth

yes

Change the fuel pump.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 1A	**STARTING PROBLEMS** **Does not start**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the OPTIMA 5800 fault-finding equipment and carry out a test on starting.
Does the equipment detect a fault?

yes → Rectify.
If the customer complaint persists

Check whether the exhaust line is blocked.
Rectify if necessary.
If the customer complaint persists

Change the injection computer.

no → Check the flow of fuel and the fuel pressure (refer to the vehicle Workshop Repair Manual). Repair the fuel circuit if necessary (pump, filter, pipes, regulator, injectors...).
If the customer complaint persists

Connect the OPTIMA 5800 fault-finding equipment and carry out an engine compressions test.
Are the compressions normal?

yes → Check whether the exhaust line is blocked.

no → It is an engine problem.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 2	**STARTING PROBLEMS** **The engine starts but stalls**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the operation of the engine immobiliser.
If the customer complaint persists

↓

Check the air intake circuit and the exhaust line.
Rectify if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Rectify if necessary [pump, filter, regulator, pipes, injectors (sealing)..].
If the customer complaint persists

↓

It is an engine problem and the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 3	**STARTING PROBLEMS** **Starting takes too long**

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the OPTIMA 5800 fault-finding equipment and carry out a test on starting.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

Carry out a test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

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

↓

Check the sealing of the injectors.
If the injectors are not sealed correctly, change the faulty injector(s).
If the customer complaint persists

↓

It is an engine problem and the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 4	**IDLE SPEED PROBLEMS** **Idle speed too high**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the insulation and continuity of the line:
- 4 of the computer
- 1 of the computer

↓

Check that there are no air leaks at the air intake (seals, take-offs on the inlet manifold, caps,...).
Rectify if necessary.
If the customer complaint persists

↓

Check on the throttle housing that the lower mechanical stop has been reached (#17 < theoretical value). Check the accelerator control as well. Rectify if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Rectify if necessary.
(injectors, pump, pressure regulator, pipes, ...).
If the customer complaint persists

↓

Check the level of engine oil (suction via the breather).
If the customer complaint persists

↓

The injection system is no longer implicated.
Check the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 5	**IDLE SPEED PROBLEMS** **Idle speed too low**

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

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

↓

Check the level of engine oil (splashing)
If the customer complaint persists

↓

The injection system is no longer implicated.
Check the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out conformity check

JSA031.1

CHART 6	IDLE SPEED PROBLEMS Engine speed unstable

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Analyse the gases.
(refer to Chart 10 - fumes / pollution).
If the customer complaint persists

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no

Check the operation of the oxygen sensor
(refer to Chart 11 - fumes / pollution).
If the customer complaint persists

With the engine at idle speed, check the consistency of #01 (the value should be less than 500 mbars). Is the value correct?

no → Check the absolute pressure sensor and its harness. Rectify, change the sensor if necessary.

yes

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

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 6
CONT

A

Check the sealing and flow of the injectors.
Rectify if necessary.
If the customer complaint persists

Check the general condition of the engine using the OPTIMA 5800 engine compressions test.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity test

JSA031.1

CHART 7	IDLE SPEED PROBLEMS Hunting
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Analyse the gases
(refer to Chart 10 - fumes / pollution).
If the customer complaint persists

↓

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

Check the operation of the oxygen sensor
(refer to Chart 11 - fumes / pollution).
If the customer complaint persists

↓

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

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 8	HANDLING Lack of performance

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check whether the throttle opens fully
(full load bargraph illuminated).
Check the setting of the accelerator control.
Rectify if necessary.
If the customer complaint persists

↓

Check the air filter: dirt, deformation.
Rectify if necessary.
If the customer complaint persists

↓

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

Analyse the gases
(refer to Chart 10 - fumes / pollution).
If the customer complaint persists

↓

Connect the OPTIMA 5800 fault-finding equipment and carry out an engine compression test.
Are the compressions normal?

no → It is an engine problem.

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 8
CONT

A

Check the exhaust line (obstruction ...). Is it good?

yes

Using the XR25, check #15.
Is #15 = 0 ?

yes → It is an engine problem and the injection system is no longer implicated.

no

Refer to Chart 12 pinking.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 9	**HANDLING** **Flat spots and hesitation**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Road test, if possible with the customer, to show up the fault.
If the fault occurs again

↓

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

Analyse the gases (refer to Chart 10 - fumes / pollution).
If the customer complaint persists

↓

Check the oxygen sensor (refer to Chart 11 - fumes / pollution).
If the customer complaint persists

↓

Check the presence of the gauge in the absolute pressure sensor pipe and check that it is clean.
Rectify if necessary.
If the customer complaint persists

↓

Check the sealing of the injectors, the flow of fuel and the fuel pressure (refer to the Workshop Repair Manual).
Rectify if necessary
If the customer complaint persists

↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 9
CONT

A

Check the condition of the flywheel target.
The OPTIMA 5800 speed sensor signal
display function can be used to
make the check easier.
Rectify if necessary.
If the customer complaint persists

Check whether the valves are clogged.
Clean the valves if necessary.Does the
customer complaint persist after cleaning?

no → End of fault-finding.

yes

It is an engine problem,
the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 10	FUMES/POLLUTION Analysis of gases incorrect

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the OPTIMA 5800 fault-finding equipment and connect it to a 4 gas analyser, type 4040, 5040 or AGM 1500.
Carry out an anti-pollution / gases analysis test.
Does the equipment detect a fault?

no → End of fault-finding of Chart 10
NOTE: a correct gases analysis indicates correct operation of the catalytic converter.

yes ↓

Is the CO level too high (CO > 0.5 at idle speed or CO > 0.3 at 2500 rpm)?

yes → Check the oxygen sensor (refer to Chart 11 -fumes / pollution).
If the customer complaint persists

↓

Check whether it is an engine problem using the compressions test (OPTIMA 5800 fault-finding equipment).

↓

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

no ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 10
CONT 1

A

Is Lambda < 0.97?

yes

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the equipment does not detect a fault

Check the oxygen sensor
(refer to Chart 11 -fumes / pollution).
If the customer complaint persists

Check whether it is an engine fault using the compressions test
(OPTIMA 5800 fault-finding equipment).

Check the catalytic converter (efficiency, melting, lead, ...), the air supply (filter, manifold, ...) and the condition of the engine (abnormal oil consumption).

no

B

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

CHART 10
CONT 2

B

Is Lambda > 1.03

yes

Check the sealing of the exhaust line after the catalytic converter (air leak).
Rectify if necessary.
If the customer complaint persists

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the station does not detect a fault

Check the oxygen sensor (refer to Chart 11 -fumes / pollution).
If the customer complaint persists

Check whether it is an engine problem using the compression test.
(OPTIMA 5800 fault-finding equipment).

Check the fuel supply (injectors, pressure regulator,...) and the efficiency of the catalytic converter (melting, lead,...).

no

Is the HC level too high?
(HC > 100 ppm)

yes

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the equipment does not detect a fault.

Check the anti-evaporation circuit (canister), the inlet manifold heating and the efficiency of the catalytic converter.

no

C

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 10
CONT 3

C

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

yes → Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the equipment does not detect a fault

→ Check that there are no air leaks on the inlet manifold and check the operation of the injectors (seizing...).

no

CO_2 level too low.

yes → Check the sealing of the exhaust line after the catalytic converter and the operation of the injectors (seizing...).

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 11	FUMES- POLLUTION Oxygen sensor check

INSTRUCTIONS	Only refer to this chart following a full check using the XR25, checking the following parameters in particular: - #35 (mixture adjustment) : it should fluctuate around 128 - #30 and #31 (adaptive mixture regulation) : values must never be at the limit.

Connect the OPTIMA 5800 fault-finding equipment and carry out an antipollution / oxygen sensor check.
Does the equipment detect a fault?

→ no → End of Chart 11 fault-finding.
The oxygen sensor is not implicated.

↓ yes

Check the heating of the sensor:
- presence of + 12 V at the connector, engine running,
- no sensor heating resistor open circuit or short circuit to earth.

If the heating is operating correctly

↓

Is the minimum voltage too high?
(U minimum > 300 mV : signal moved towards making the mixture richer).

→ yes → Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the equipment does not detect a fault

↓

Check the fuel pressure (regulator), the injectors (sealing,...), the anti-evaporation circuit (canister), the fuel quality.
Rectify if necessary.
If the customer complaint persists

↓

Change the sensor.

↓ no

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 11
CONT 1

A

Is the maximum voltage too low?
(U maximum < 600 mV : signal moved towards making the mixture leaner).

yes → Check that there are no air leaks before the oxygen sensor (exhaust manifold leak,...) and check the fuel pressure.
Rectify if necessary.
If the customer complaint persists

→ Change the sensor.

no ↓

Is there enough of a gap between maximum and minimum (< 500 mV) ?

yes → The sensor is probably clogged.
Carry out a road test to unclog it and carry out another test using the equipment.
If the values are still not correct

→ Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the equipment does not detect a fault

→ Check that there are no air leaks on the inlet manifold and check the operation of the injectors (seizing,...).
Rectify if necessary.
If the customer complaint persists

→ Change the sensor.

no ↓

B

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 11
CONT 2

B

Is the period for which the sensor operates incorrectly > 1 s?

yes

An extensive variation in the operation of the sensor may be the result of clogging or contamination (silicon).
Additional fault-finding is possible using a 4 gas analyser (SOURIAU 4040-5040 or SAGEM AGM 1500) as, in this case,
Lambda > 1.03 and O_2 > 1 %.
Carry out a road test
to unclog the sensor.
If the sensor does not vary correctly

Change the sensor.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 12	FUEL CONSUMPTION HIGH
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check that there are no fuel leaks.
Rectify if necessary.
If the customer complaint persists

↓

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

no → Refer to Chart 4 or 5, idle speed problems (idle speed too high or too low).

yes ↓

Check that the vehicle conforms to its specifications and that it is in good condition.
Rectify if necessary.
If the customer complaint persists

↓

Analyse the gases
(refer to Chart 10 -fumes / pollution).
If the customer complaint persists

↓

Check the operation of the oxygen sensor
(refer to Chart 11 -fumes / pollution).
If the customer complaint persists

↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 12
CONT

A

Connect the OPTIMA 5800 fault-finding equipment and carry out an engine compressions test.
Are the compressions normal?

no → It is an engine problem.

yes

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual) and the canister bleed circuit.
Rectify if necessary (regulator, pump, filter, pipes).
Does the customer complaint persist?

yes

It is no longer an injection problem, it is an engine problem.
Check:
- the level of engine oil
- the engine cooling circuit
- the suspension
- the general condition of the engine.

If necessary, carry out a consumption check using the ECONOTEST consumption equipment.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA031.1

CHART 13	ENGINE NOISE Pinking

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Carry out a road test using the XR25 and check #13and #15.
Does the fault occur again?

no → The customer must use his vehicle under special conditions, discuss this with the customer.

yes ↓

Check the condition and the conformity of the spark plugs.
Change the spark plugs if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

Change the TDC sensor.

↓

Check that the engine target is in good condition.

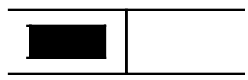
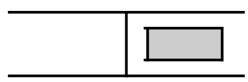
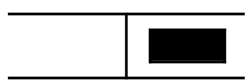
↓

It is no longer an injection problem.
Check the engine cooling circuit as well.
The combustion chambers can be cleaned.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

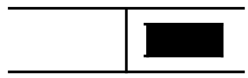
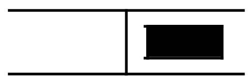
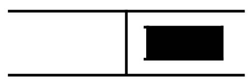
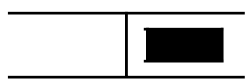
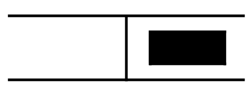
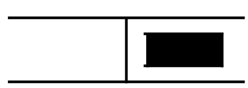
JSA031.1

INSTRUCTIONS	Engine cold, ignition on

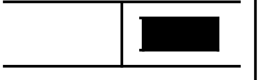
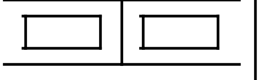
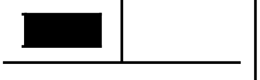
Order of operations	Function to be checked	Action	Bargraph	Display and notes
1	XR25 dialogue	D13 (selector in position S8)		9.NJ Use of fiche n° 27 fault test side
2	Interpretation of normally illuminated bargraphs		1  1 	Fault test Code present
3	Engine immobiliser		2 	If the vehicle does not have an engine immobiliser, this bargraph should be illuminated
4	Conformity of the computer	G70*		X X X X Display in three sequences of the part number (refer to section 12)
5	Changing to status test mode	G01*		10.NJ Use of fiche n° 27 status test side

JSA031.1

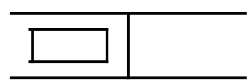
INSTRUCTIONS	Engine cold, ignition on.

Order of operations	Function to be checked	Action	Bargraph	Display and notes
6	Interpretation of normally illuminated bargraphs		**1** 	Code present
			2 	No load position recognised
			4 	Reception of + after ignition information
			5 	Locking relay control effective
			12 	Illuminates after the memories have been erased to confirm that the operation has been carried out correctly
			19 	Computer configured to operate with a: manual gearbox (G50*2*)

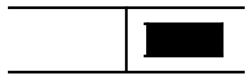
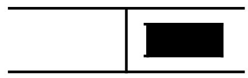
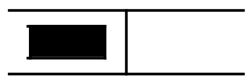
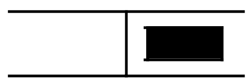
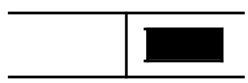
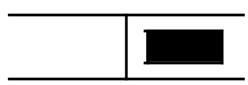
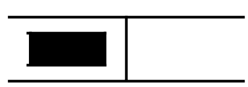
INSTRUCTIONS	Engine cold, ignition on

Order of operations	Function to be checked	Action	Bargraph	Display and notes
7	Throttle position potentiometer	No load # 17 Accelerator pedal slightly pressed Full load # 17	2  2  2 	10 < X < 36 193 < X < 240
8	Absolute pressure sensor	# 01		X = Local atmospheric pressure
9	Coolant temperature sensor	# 02		X =Ambient temperature ± 5°C
10	Air temperature sensor	# 03		X = Ambient temperature ± 5°C
11	Idle regulator stepping motor	# 12		The value varies in relation to the coolant temperature: 19% ≤ X ≤ 80%
12	Engine speed	# 06		X = 0 rpm.
13	Canister bleeding	# 23		X = 0 %

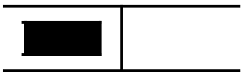
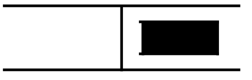
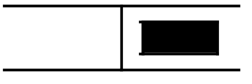
INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once.

Order of operations	Function to be checked	Action	Bargraph	Display and notes
1	Changing to status test mode	G01*		10.NJ Use of fiche n° 27 status test side
2	No fault		**20** 	Check that this bargraph is not flashing; if it is, type GO2* and turn the fiche over. **Warning**: This bargraph may flash if the vehicle is not fitted with an engine immobiliser. Ignore this bargraph if fault right-hand bargraph 2 is illuminated with *22 = 2dEF. Repair the faulty component and then erase the fault memory (GO**) and return to status test mode (GO1*).
3	Battery voltage	# 04 if at # 04 then at # 06		13 volts < X < 14.5 volts X < 12.7 volts Nominal < X < 930 rpm. speed

INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once.

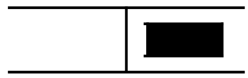
Order of operations	Function to be checked	Action	Bargraph	Display and notes
4	Interpretation of normally illuminated bargraphs	-	**1** 	Code present
			2 	No load position recognised
			3 	Reception of engine speed information
			4 	Reception of + after ignition information
			5 	Locking relay control effective
			6 	Idle regulation active
			6 	Mixture regulation active

INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once.

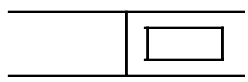
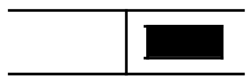
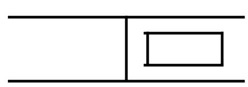
Order of operations	Function to be checked	Action	Bargraph	Display and notes
4 *(cont)*	Interpretation of normally illuminated bargraphs *(cont)*	-	**7**  **12**  **19** 	Fuel pump activated Illuminates after the memories have been erased to confirm that the operation has been carried out correctly Computer configured to operate with a: manual gearbox (G50*2*)

JSA031.1

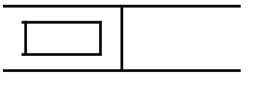
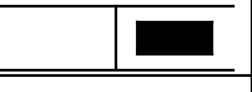
INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once.

Order of operations	Function to be checked	Action	Bargraph	Display and notes
5	Idle speed	# 06 # 12	6 	X = 740 ± 50 rpm. 4 % < X < 15 %
6	Anti-pinking noise measurement	# 13 (3500 rpm. with no load)		X variable and not zero

INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once.

Order of operations	Function to be checked	Action	Bargraph	Display and notes
7	Manifold pressure	# 01 with no power-consuming unit operating		X is variable and is of the order 270 ≤ X ≤ 410 mb (this pressure varies in accordance with the altitude)
8	Mixture regulation	At an constant speed of 2500 rpm then at idle # 05 # 35	6  6 	 X varies with an interval of approximately 50 to 900 mV X is situated and varies slightly around 128 with maximum of 255 and a minimum of 0
9	Adaptive idle adjustment	# 21		- 8.6 % < X < 6.2 % (average value after the memory has been erased: 0)
10	Canister bleeding	# 23	11 	Bleeding of the canister is prohibited. The solenoid valve remains closed. X = 0 %

INSTRUCTIONS	Check to be carried out during a road test

Order of operations	Function to be checked	Action	Bargraph	Display and notes
1	Changing to status test mode	G01*		10.NJ Use of fiche n° 27 status test side
2	No fault		20 	Check that this bargraph is not flashing; if it is, type GO2* and turn the fiche over. **Warning**: This bargraph may flash if the vehicle is not fitted with an engine immobiliser. Ignore this bargraph if fault right-hand bargraph 2 is illuminated with *22 = 2dEF. Repair the faulty component and then erase the fault memory (GO**) and return to status test mode (GO1*).
3	Canister bleeding	# 23		Canister bleeding is authorised X = variable
4	Vehicle speed information	# 18	11 	X = vehicle speed displayed on the speedometer
5	Pinking sensor	Vehicle with load at an engine speed of 2000 rpm. # 13 # 15		X = variable and not zero $0 \leq X \leq 6$ (in the event of a sensor fault the advance is automatically reduced by 4°, not shown at# 15)

INSTRUCTIONS	Check to be carried out during a road test

Order of operations	Function to be checked	Action	Bargraph	Display and notes
6	Adaptive mixture values	After programming		
		# 30		$96 \leq X \leq 160$ (average value after the memories have been erased: 128)
		# 31		$96 \leq X \leq 160$ (average value after the memories have been erased: 128)

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Injector resistance	=	14.5 Ω
Idle regulation stepping motor resistance	=	A - D = 53 ± 5 Ω B - C = 53 ± 5 Ω
Canister bleed valve resistance	=	35 ± 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 position potentiometer	:	PL C-A 1260 Ω PF C-A2200 Ω C-B 2200 Ω C-B 1260 Ω B-A 1200 Ω B-A 1200 Ω
Coolant temperature sensor resistance	=	210 to 270 Ω at 90°C
Oxygen sensor resistance	:	A-B = 3 to 15 Ω
Fuel pressure	=	3 bars or 2.5 bars at idle
Value of: CO	=	0.3 % maximum
HC	=	100 ppm maximum
CO2	=	14.5 % minimum
Lambda (λ)	=	0.97 < λ < 1.03

EQUIPMENT REQUIRED
OPTIMA 5800 fault-finding equipment **4 gas analyser 4040-5040 or AGM 1500**

ANALYSIS OF EXHAUST GASES USING THE FAULT-FINDING EQUIPMENT

Connecting the OPTIMA 5800 fault-finding equipment to an analyser (SOURIAU 4040-5040 or SAGEM AGM 1500) allows the gases to be checked in accordance with the legislation relating to vehicles fitted with catalytic converters. This check assumes measurement at half load and at idle, with the following requirements:

Idle	2 500 rpm
CO < 0.5 %	CO < 0.3 %
HC < 100 ppm	HC < 100 ppm

Irrespective of the legislation, the other measurements given by the analyser are the subject of a tolerance interval:

Idle	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 < 1.3

NOTE : Lambda = 1 / Mixture

- Lambda > 1 → Lean mixture
- Lambda < 1 → Rich mixture

The condition Lambda = 1 is essential for correct operation of the catalytic converter.

The equipment combines the following phases:

- Bringing the engine up to operating temperature (oil temperature greater than 60°C).
- Constant speed of 2500 rpm for one minute to activate the mixture regulation and simultaneous measurement of the gases.
- If the gases analysis at 2500 rpm is correct, measurement at idle.

If the equipment considers the analysis to be incorrect, fault-finding messages appear, the order of gas priority being:

1) CO	2) Lambda	3) HC	4) O_2	5) CO_2

NOTE : It is possible to print the results of the anti-pollution tests.

JSA031.1

EQUIPMENT REQUIRED
OPTIMA 5800 fault-finding equipment

OXYGEN SENSOR CHECK USING THE FAULT-FINDING EQUIPMENT

Straight-forward oxygen sensor faults are detected by the XR25.

- Open circuit.
- Short circuit to earth.
- Short circuit to+ 12 V.

The fault-finding equipment allows operational faults which are not detected by the XR25 to be highlighted.
A sensor check can be carried out for the following customer complaints:

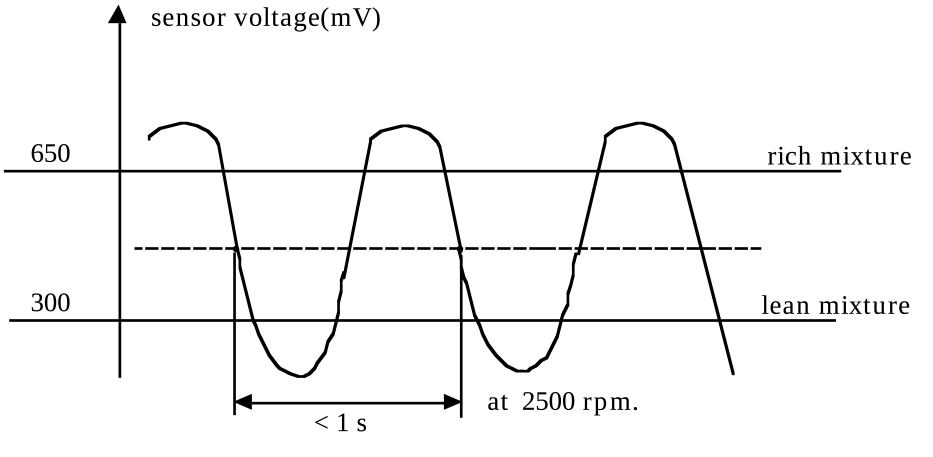
- Excessive consumption.
- Irregular idle speed, hunting.
- Hesitation.
- Gases analysis not correct to specification.

The equipment check scenario assumes connection in parallel with the signal transmitted by the oxygen sensor. This signal is analysed at a constant engine speed (2500 rpm), when the mixture regulation conditions are joined (engine warm...).

CONNECTION:

The 4-way sensor connector is located under the vehicle.

During normal operation, the signal is represented as a sinusoid.



The characteristic parameters of this signal are the maximum voltage, the minimum voltage and the period.
Whatever the engine type, the correct values are:

- Maximum voltage > 600 mV.
- Minimum voltage < 200 mV.
- Gap (maximum voltage - minimum voltage) > 500 mV.
- Period < 1 second.

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EQUIPMENT REQUIRED
OPTIMA 5800 fault-finding equipment

IGNITION CHECK USING THE FAULT-FINDING EQUIPMENT

The OPTIMA 5800 fault-finding equipment allows the ignition to be checked under two conditions:

- TEST ON STARTING: if the vehicle will not start. When fault-finding using the XR25 is not possible, this option checks the presence and the quality of the ignition when the starter is operated.

- ENGINE RUNNING TESTS: These measurements are an addition to the XR25 in the event of customer complaints such as: hesitation, ignition misfiring, incorrect gases analysis, unstable idle speed...

Also, the equipment's measuring module allows the static ignition to be checked using two high voltage clips, the coils having two outlets (when one ignition order is given, two sparks occur simultaneously: one in the combustion chamber, the other in the exhaust cylinder). While these measurements are being taken, the two clips must 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 equipment is therefore connected at the inlet of the coils.

CONNECTIONS:

- DZF engine: Connection to the two coils (bloc located to the left of the rocker cover).

MEASUREMENTS:

The ignition is characterised by the following values:

Engine running:

- Duration of spark.
- Priming voltage (or ionisation voltage).
- Priming voltage during the exhaust phase (static ignition).

Test on starting:

- Ignition supply voltage.
- TDC signal sensor.
- Control signal (MPA).
- Duration of spark.
- Priming voltage (or ionisation voltage).
- Priming voltage during the exhaust phase (static ignition).

The equipment checks the consistency of the values obtained for each cylinder and compares the measurements with a database categorised by engine type.

JSA031.1

ESTABLISHING XR25/COMPUTER DIALOGUE

- Connect the XR25 to the diagnostics socket.
- Ignition on.
- Selector in position S8
- Enter **D13** 9.INJ

COMPUTER IDENTIFICATION

Computer identification is not linked to the reading of a fault code but to direct reading of the computer part number. After entering into dialogue with the computer:

ENTER **G70*** 7700

XXX

XXX

The part number then appears on the central display in three sequences.

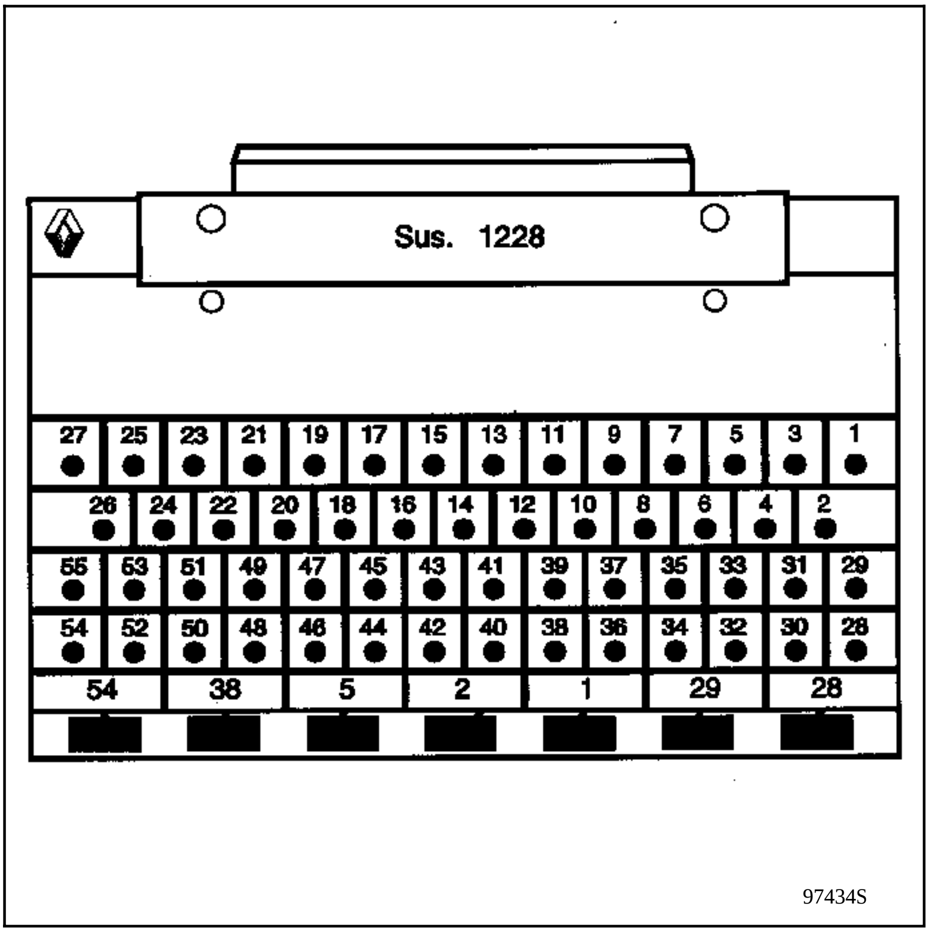
Each sequence is displayed for approximately two seconds. The display is repeated twice. (For the number, refer to part number section 12).

ERASING THE MEMORY (engine stopped, ignition on)

Following work on the injection system, the computer memory can be erased using the code GO**.
(Erasing stored fault codes in fault-finding mode D13, enter GO** with the selector in position S8).

This operation will not erase the memory of any other equipment on the vehicle.

If the information obtained by the XR25 requires checking of the electrical continuity, connect the bornier **Sus 1228**.



(The **Sus 1228** is made up of a 55-way base integral with a printed circuit on which there are 55 copper plated surfaces numbered 1 to 55).

Using the wiring diagrams, the tracks which connect the components to be checked can be easily identified.

IMPORTANT :

- All of the checks , using the bornier **Sus 1228**, must be carried out with the battery disconnected.
- The bornier is designed to be used only with an ohmmeter. Under no circumstances must 12 volts be applied to the check points.

TEST PROCEDURE

Connect the XR25, ignition off.

Switch on the ignition, enter into dialogue with the injection computer.

Make a note of which fault bargraph is illuminated or flashing.

Erase the computer memory.

Switch off the ignition.

1/ Carry out an XR25 test with the ignition on

Switch off the ignition, connect the XR25 and switch on the ignition.

Enter into dialogue with the injection computer.

Process the illuminated fault bargraph.

2/ Carry out an XR25 test with the engine running or at starter speed

Switch off the ignition, connect the XR25 and switch on the ignition.

Enter into dialogue with the injection computer.

Switch on the engine.

Process the illuminated fault bargraph.

3/ Carry out an XR25 test while driving

Switch off the ignition, connect the XR25 and switch on the ignition.

Enter into dialogue with the injection computer.

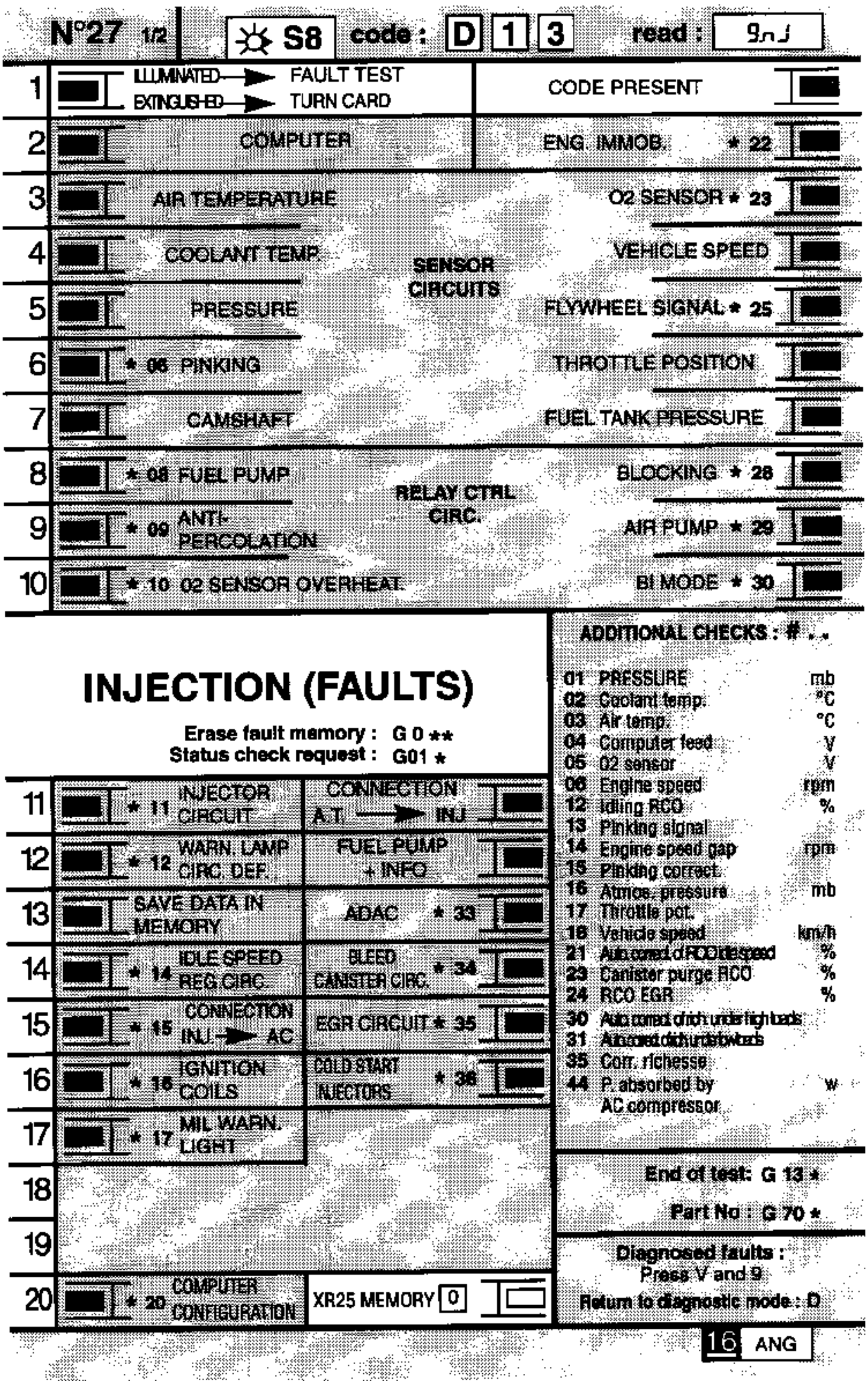
Drive the vehicle.

Process the illuminated fault bargraph.

NOTE :
- If illumination of a fault bargraph can be reproduced, it must be processed as an illuminated bargraph even if it has started flashing.
- If no fault bargraph has been illuminated, check the connectors of the faulty circuit.

JSA021.2

FICHE N° 27 SIDE 1/2 WITH FAULT BARGRAPHS


N°27 1/2 S8 code : D 1 3 read : 9nj

1	ILLUMINATED → FAULT TEST / EXTINGUISHED → TURN CARD	CODE PRESENT
2	COMPUTER	ENG. IMMOB. * 22
3	AIR TEMPERATURE	O2 SENSOR * 23
4	COOLANT TEMP.	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 OVERHEAT	BI MODE * 30

SENSOR CIRCUITS

RELAY CTRL CIRC.

INJECTION (FAULTS)

Erase fault memory : G 0 **
Status check request : G01 *

11	* 11 INJECTOR CIRCUIT	CONNECTION A.T. → INJ
12	* 12 WARN. LAMP CIRC. DEF.	FUEL PUMP + INFO
13	SAVE DATA IN MEMORY	ADAC * 33
14	* 14 IDLE SPEED REG CIRC.	BLEED CANISTER CIRC. * 34
15	* 15 CONNECTION INJ → AC	EGR CIRCUIT * 35
16	* 16 IGNITION COILS	COLD START INJECTORS * 36
17	* 17 MIL WARN. LIGHT	
18		
19		
20	* 20 COMPUTER CONFIGURATION	XR25 MEMORY 0

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	Engine speed gap	rpm
15	Pinking correct.	
16	Atmos. pressure	mb
17	Throttle pot.	
18	Vehicle speed	km/h
21	Auto. correct. of RCO idle speed	%
23	Canister purge RCO	%
24	RCO EGR	%
30	Auto. correct. of rich under high loads	
31	Auto. correct. of rich under low loads	
35	Corr. richesse	
44	P. absorbed by AC compressor	W

End of test: G 13 *

Part No : G 70 *

Diagnosed faults :
Press V and 9
Return to diagnostic mode : D

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FI21627-1

JSA021.2

FICHE N° 27 SIDE 2/2 WITH STATUS BARGRAPHS

N°27 2/2 — read : 10nJ

1	EXTINGUISHED → STATUS TEST; ILLUMINATED → TURN CARD	CODE PRESENT
2	PG ← THROTTLE POSITIONS → PL	
3	FLYWHEEL SIGNAL	ACTIVE ENG. IMMOB.
4	PARK/NEUTRAL POSITION	+ APC COMPUTER
5	TORQUE ADJUSTMENT	RELAY CONTROL LOCKING
6	RICHNESS REGULATION	IDLING REGULATION
7	FUEL PUMP CONTROL	BLEED CANISTER AUTHOR.
8	ANTI-PERCOL. CTRL	ELEC. W/SCREEN REQUESTED
9	SELECTION	ACCEL. IDLE SPEED
10	REQUEST	COMPRESSION AUTHOR. OR PROHIBITED

AIR COND. (bargraphs 9 and 10)

(WARNING : monitor bar graph 20 left)

INJECTION (STATUS)

Erase fault memory : G 0 **
Request fault test : G 02 *

11	CAMSHAFT SIGNAL	BLEED CANISTER + ACTIVE SOL VALVES
12	EGR SV CONTROL	MEMORISED FAULTS
13	AIR PUMP CONTROL	POWER STEERING PRESSOSTAT
14	BI-MODE INLET CTRL	COLD START INJECTORS
15		
16		
17		
18		
19	Veh. with AT — COMPUTER CONFIGURATION	Veh. with man. g/box
20	FAULT PRESENT	XR25 MEMORY 0

CONTROL MODES : G..
(IF ENGINE STOPPED)

10* Fuel pump relay
11* Blocking relay
12* AC compressor
14* Idle speed reg. valve
16* Bleed canister valve
17* Anti percolation relay
21*1* Warn. light def.
22* Air pump relay
23* EGR valve
24* Bi-mode inlet valve
31* Injector control
50*x* Computer set-up
57*x* Idle speed adj.
58*x* Computer configuration
59*x* INJ Lock/Unlock
60* Zeroing validation

G..*x*
See procedure on REMINDER CARD C

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	Eng. speed gap	rpm
15	Pinking correct.	d°
16	Atmos. pressure	mb
17	Throttle pot.	
18	Vehicle speed	km/h
21	Auto. corr. RCO idle speed	%
23	RCO bleed canister	%
24	RCO EGR	%
30	Auto. correct. of rich. under high loads	
31	Auto. corr. of richness	
35	Mixture regulation	
44	P. absorbed by AC compressor	W

End of test: G 13 *
Part No : G 70 *

Diagnosed faults : Press V and 8
Return to diagnostic mode : D

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FI21627-2

JSA021.2

REPRESENTATION OF BARGRAPHS

Illuminates when dialogue is established with the computer. If it remains extinguished:
- the code does not exist,
- there is a line fault or a fault in the equipment or computer

REPRESENTATION OF FAULTS (always on a coloured background)

When illuminated, this indicates a fault on the product being checked, the associated text defines the fault.

When extinguished, this indicates that no fault has been detected on the product being checked.

REPRESENTATION OF STATUS (always on a white background)

With the engine stopped, ignition on, no action by the operator

The status bargraphs on the fiche are represented in the status in which they should be with the engine stopped, ignition on, no action by the operator

- If on the fiche, the bargraph is represented the XR25 should display
- If on the fiche, the bargraph is represented the XR25 should display
- If on the fiche, the bargraph is represented the XR25 should display

either or

Engine running

Extinguished when the function or the condition specified on the fiche is no longer carried out.

Illuminated when the function or the condition specified on the fiche is carried out.

FUNCTION V9

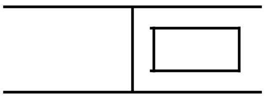
Fiche n° 27 side 1/2 and side 2/2 is a generic fiche used for several engine types.
The different engines do not use all of the bargraphs. For information regarding the bargraphs processed by the injection computer, press keys V and 9 simultaneously after establishing dialogue. The bargraphs processed will illuminate:

- permanently, in the case of fault bargraphs which cannot be stored or for status bargraphs,
- flashing, in the case of fault bargraphs which can be stored.

To return to fault-finding mode, press key D.

JSA021.2

1



Right-hand bargraph 1 extinguished Fiche n° 27 side 1/2

XR25 CIRCUIT

XR25 : no connection, CO, CC TO EARTH, CC + 12

INSTRUCTIONS	For this fault-finding procedure, this bargraph should be illuminated.

Check:
- the Injection fuses, Engine and Passenger Compartment,
- the connection between the XR25 and the diagnostic socket,
- the position of the selector (S8),
- the conformity of the cassette.

Rectify if necessary.

Check:
- the presence of+ 12 V on track 6 and earth on track 2 of the diagnostic socket.
- the connection between the XR25 and the diagnostics socket

Diagnostics socket	10	→	4	XR25 socket
	11	→	8	

Rectify if necessary.

Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity between tracks:

Bornier	38	→	10	Diagnostic socket
	11	→	11	Diagnostic socket
	1	→	C5	Main relay
	40	→	C2	Main relay
	48	→	D2	Fuel pump relay

Rectify.

Check the presence of + 12 V on the track:

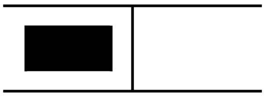
C1 of the main relay
C3 of the main relay
D1 of the fuel pump relay.

Change the relay(s) if necessary.

AFTER REPAIR	Carry out a conformity check

JSA021.2

2



Left-hand bargraph 2 illuminated Fiche n° 27 side 1/2

COMPUTER CIRCUIT

XR25 : Computer not operational if left-hand bargraph 2 is illuminated

INSTRUCTIONS	None

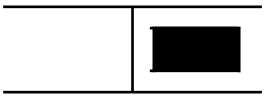
Computer not correct to specification or faulty.

Change the injection computer.

AFTER REPAIR	Carry out a conformity check

JSA021.2

2



Right-hand bargraph 2 illuminated Fiche n° 27 side 1/2

ENGINE IMMOBILISER CIRCUIT

XR25 :	*22 = 1dEF	CO, CC TO EARTH or CC +12 V LINE 37 OF THE COMPUTER
	*22 = 2 dEF	If the vehicle is fitted with an engine immobiliser, refer to the engine immobiliser fault-finding information

INSTRUCTIONS

If the vehicle is not fitted with an engine immobiliser, right-hand bargraph 2 is illuminated and *22 = 2dEF.

In this case, ignore right-hand bargraph 2.

Connect bornier **Sus 1228** in place of the computer and the check the insulation and continuity of the line:

Bornier 37 ⟶ 9 of the infra-red transmitter

Rectify if necessary.

If the fault persists, refer to "Engine immobiliser fault-finding"

AFTER REPAIR

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

JSA021.2

3	**Left-hand bargraph 3 illuminated** Fiche n° 27 side 1/2 AIR TEMPERATURE SENSOR CIRCUIT **XR25 :** #03 = -40 CO LINE 20 OR 46 ; CC + 5V LINE 20 #03 = 119 CC TO EARTH LINE 20

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

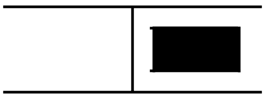
Check the resistance of the air temperature sensor.

The resistance is not correct	Change the air temperature sensor.
The resistance is correct	Connect bornier **Sus 1228** in place of the computer and check the continuity and insulation of the electrical wiring between the tracks: 1 sensor connector 46 bornier 2 sensor connector 20 bornier
	If the electrical wiring is good, change the computer.

AFTER REPAIR	Erase the computer memory using GO**. Carry out a conformity check

JSA021.2

3



Right-hand bargraph 3 illuminated Fiche n° 27 side 1/2

OXYGEN SENSOR CIRCUIT

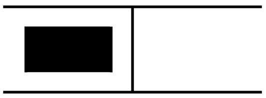
XR25 : None

INSTRUCTIONS	Right-hand bargraph 3 may illuminate with the engine running in the event of a fault.

Check the connection and condition of oxygen sensor connector.
With the engine running, check the presence of + 12V between tracks A and B on the oxygen sensor connector.
If there is no 12V supply, repair the sensor heating circuit electrical wiring.
With the ignition off, connect bornier Sus 1228 in place of the computer and check the continuity and insulation of line between track 17 of the bornier and track C of the connector.
If necessary, repair the electrical wiring.
The fault persists! Change the oxygen sensor.
The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory (engine cold) using GO**. Carry out a conformity check

4



Left-hand bargraph 4 illuminated Fiche n° 27 side 1/2

COOLANT TEMPERATURE SENSOR CIRCUIT

XR25 : #02 = -40°C CC + 5V LINE 15 ; CO LINE 15 or 44
#02 = 119°C CC TO EARTH LINE 15

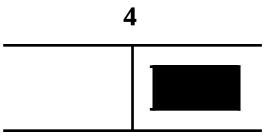
INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Check the resistance of the coolant temperature sensor.

The resistance is not correct	Change the sensor.
The resistance is correct	Connect bornier **Sus 1228** in place of the computer and check the continuity and insulation of the electrical wiring between the tracks: 1 coolant temperature sensor — 44 bornier 2 coolant temperature sensor — 15 bornier
	Repair if necessary.
	The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO**. Carry out a conformity check

JSA021.2



Right-hand bargraph 4 illuminated Fiche n° 27 side 1/2

VEHICLE SPEED SENSOR CIRCUIT

XR25 : CO or CC LINE 12

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Carry out a road test and check the speed on the speedometer.
If the speed is zero, repair the wiring between track 12 of the computer and B1 of the sensor.
With the ignition on, check the connection of the speed sensor and its supply: + 12V on track A earth on track B2
Rectify if necessary.
The fault persists! Change the speed sensor.

AFTER REPAIR	Erase the computer memory using GO** Carry out a road test Carry out a conformity check

JSA021.2

5	**Left-hand bargraph 5 illuminated** Fiche n° 27 side 1/2 ABSOLUTE PRESSURE SENSOR CIRCUIT **XR25 :** #01 = 103 mb CO LINE 16 or 45 CC - LINE 16 #01 ≥ 1020 mb CC+ LINE 12 or 16

INSTRUCTIONS	Left-hand bargraph 5 may illuminate with the engine running in the event of a fault. Refer to "Fault-finding - Help" for the resistance values.

If the vehicle has idling problems, check that the line between track 12 of the computer and track B1 of the speed sensor is insulated from 12 V.

Check whether the pressure sensor is electrically and pneumatically connected and check the conformity of the pipe. It must not be clogged, punctured...

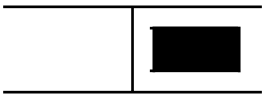
With the ignition on, check the presence of 5V between track C and the earth at track A.

5V is not present between track C and track A	Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity between the tracks: A sensor connector 44 bornier C sensor connector 45 bornier
	Rectify if necessary.
5V is present between track C and track A	With the ignition on, check the return voltage on track B of the sensor. **Note** : To take this reading, a vacuum pump could be used to check the variation in the voltage.
The voltage does not vary	Change the sensor.
The voltage varies	Connect bornier **Sus 1228** in place of the computer and check the insulation and continuity between track B of the sensor and track 16 of the bornier.
	Rectify if necessary.
	The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA021.2

5



Right-hand bargraph 5 illuminated or flashing Fiche n° 27 side 1/2

FLYWHEEL SIGNAL CIRCUIT

XR25 :	*25 = dEF	FAULT STORED, to be confirmed
	*25 = C00	CC - LINE 33 / 34 or 45
	*25 = In	INVERSION OF SENSOR WIRES

INSTRUCTIONS

If right-hand bargraph 5 is flashing, erase the computer memory using GO**.
At starter speed for 10 seconds or with the engine running for 10 seconds minimum, if right-hand bargraph 5 is illuminated or flashing, fault-finding can be carried out.
Refer to "Fault-finding - Help" for the resistance values.

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

The resistance is not correct

Change the sensor.

The resistance is correct

Connect the bornier **Sus 1228** in place of the computer and check the continuity and insulation of the wiring between the tracks:

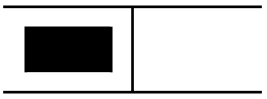
Flywheel sensor signal	A	→	34	bornier
Flywheel sensor signal	B	→	33	bornier
Throttle position sensor	B	→	45	bornier
Pressure sensor	C	→	45	bornier
Earth	earth	→	2	bornier
Earth	earth	→	3	bornier
Earth	earth	→	18	bornier

AFTER REPAIR

Erase the computer memory using GO**
Carry out a conformity check

JSA021.2

6



Left-hand bargraph 6 illuminated

Fiche n° 27 side 1/2

PINKING SENSOR CIRCUIT

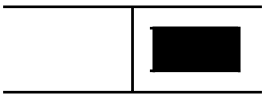
XR25 : CC TO EARTH LINE 54 or CO LINE 54 and 44

INSTRUCTIONS	Left-hand bargraph 6 may illuminate in the event of a fault with the engine running at an engine speed of 2500 rpm.

Check the connectors of the faulty sensor.
Rectify if necessary.
Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity of the electrical wiring between the tracks: 1 sensor 44 bornier 2 sensor 54 bornier
Rectify if necessary.
The fault persists! Change the pinking sensor.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

6



Right-hand bargraph 6 illuminated or flashing Fiche n° 27 side 1/2

THROTTLE POTENTIOMETER CIRCUIT

XR25 : CO LINE 19
CC- LINE 19
CC+ LINE 19 or 18 or 28 or 29

INSTRUCTIONS	If right-hand bargraph 6 is flashing, erase the computer memory using GO**. With the ignition on, at starter speed or with the engine running, if right-hand bargraph 6 is flashing or illuminated, fault-finding can be carried out.

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

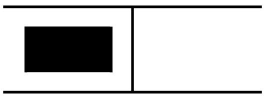
Check the variation of the throttle potentiometer between tracks B and C.

R between A and B is not correct or B-C does not vary	Change the throttle potentiometer.
R between A and B is correct and B-C varies.	Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity between the tracks: A potentiometer → 46 bornier B potentiometer → 45 bornier C potentiometer → 19 bornier Earth → 18 bornier 1 coil → 28 bornier 2 coil → 29 bornier
	Check the resistance of the coil. If the coil is not good, it must be changed before the computer is changed.
	Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA021.2

8



Left-hand bargraph 8 illuminated Fiche n° 27 side 1/2

FUEL PUMP RELAY CONTROL CIRCUIT

XR25 : CC + 12 V LINE 48

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Check the operation of the impact sensor.

With the fuel pump relay in place, check the presence of + 12V during the timing phase between tracks 1 and 2 when the ignition is switched on.

+12 V is present between 1 and 2	Change the relay.
+1 2 V is not present between 1 and 2	With the ignition on, check the presence of + 12 V on track 1 of the fuel pump relay.
+12V is not present on track 1	Check the line of track 1 as far as the fuse.
+ 12V is present on track 1	Connect the bornier **Sus 1228** in place of the computer and check the continuity and insulation between track 2 of the relay and track 48 of the bornier.
	Rectify if necessary.

The fault persists! Change the injection computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA021.2

11	**Left-hand bargraph 11 illuminated** Fiche n° 27 side 1/2 INJECTION CIRCUIT **XR25 :** *11 = XX.CO CO or CC - LINE 4 or 30 *11 = XX.CC CC + LINE 4 or 30 *11 = Def FAULT STORED

INSTRUCTIONS	X represents the number of cylinder. Refer to "Fault-finding - Help" for the resistance values.

Check the resistance of the injectors concerned.

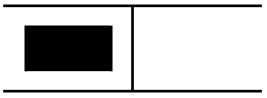
The resistance is not correct	Change the faulty injector(s).
The resistance is correct	Connect the bornier **MS 1048** in place of the computer and check the continuity and insulation between track 2 of the injector connectors and tracks 4 and 30.
	Repair the wiring if necessary.
	During the timing phase, check the presence of 12 V on track 1 of the injector concerned.
	Repair the wiring if necessary.

The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA021.2

12



Left-hand bargraph 12 illuminated Fiche n° 27 side 1/2

FAULT WARNING LIGHT CIRCUIT

XR25 : CC - or CC + LINE 43

INSTRUCTIONS	None

Check the insulation and continuity of the line:

computer 43 ⟶ warning light fuse

The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA021.2

13	**Left-hand bargraph 13 illuminated** Fiche n° 27 side 1/2 STORED MEMORY CIRCUIT **XR25 :** Injection computer supply cut off.

INSTRUCTIONS	Has the battery has been removed? Left-hand bargraph 13 may illuminate after repair work, ignore it.

Check:
- the battery charge,
- the injection fuses,
- the battery wiring.
- the computer supply.

Rectify

Switch off the ignition for 2 minutes.

Switch on the ignition.

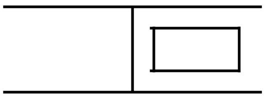
The fault bargraph should be extinguished.

The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA021.2

1



Right-hand bargraph 1 extinguished Fiche n° 27 side 1/2

XR25 CIRCUIT

XR25 : no connection, CO, CC TO EARTH, CC + 12

INSTRUCTIONS	For this fault-finding procedure, this bargraph should be illuminated.

Check:
- the Injection fuses, Engine and Passenger compartment,
- the connection between the XR25 and the diagnostic socket,
- the position of the selector (S8),
- the conformity of the cassette..

Rectify if necessary.

Check:
- the presence of+ 12 V on track 6 and earth on track 2 of the diagnostic socket.
- the connection between the XR25 and the diagnostic socket.

Diagnostics socket	10	→	4	XR25 socket
	11	→	8	

Rectify if necessary.

Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity between the tracks:

Bornier	38	→	10	Diagnostic socket
	11	→	11	Diagnostic socket
	1	→	C5	Main relay
	40	→	C2	Main relay
	48	→	D2	Fuel pump relay

Rectify.

Check the presence of + 12 V on track:

C1 of the main relay
C3 of the main relay
D1 of the fuel pump relay.

Change the relay(s) if necessary.

AFTER REPAIR	Carry out a conformity check

JSA021.2

14	**Left-hand bargraph 14 illuminated or flashing** Fiche n° 27 side 1/2 IDLE REGULATION VALVE CIRCUIT **XR25 :** CO LINE 8 or 9 or 35 or 36 CC - LINE 8 or 9 or 35 or 36 CC + LINE 35 or 36

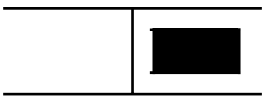
INSTRUCTIONS	Left-hand bargraph 14 may illuminate with the engine running in the event of a fault. Refer to "Fault-finding - Help" for the resistance values.

Check the resistance of the stepping motor coils between tracks A-D and B-C.
If the resistance is not correct, change the stepping motor.
Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity of the line: Bornier 8 → D stepping motor 9 → B 35 → A 36 → C
The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA021.2

14



Right-hand bargraph 14 illuminated Fiche n° 27 side 1/2

CANISTER BLEED CIRCUIT

XR25 : CO or CC - or CC + LINE 42 and #23 = 00

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Check the conformity of the pipes, rectify if necessary.

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

The resistance is not correct	Change the canister bleed valve.
The resistance is correct	With the engine running at idle, check the presence of + 12 V on track A of the canister bleed valve.
+ 12 V is not present on track A	Repair the electrical wiring between track A of the canister bleed valve and track 5 of the fuel pump relay.
+ 12 V is present on track A	Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity of the electrical wiring between track B of the canister bleed valve and track 42 of the bornier.
	Rectify if necessary.

The fault persists! Change the injection computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA021.2

15	**Left-hand bargraph 15 illuminated** Fiche n° 27 side 1/2 AC INJECTION CONNECTION CIRCUIT **XR25 :** CC + 12 V on line 51 of the computer

INSTRUCTIONS	Check that the vehicle is fitted with air conditioning. If there is no air conditioning fitted, study the other prioritised bargraphs

Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity of the line:

Bornier 51 → A5 AC control panel

Rectify if necessary.

If the fault persists, refer to the air conditioning fault-finding information.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

JSA021.2

16	**Left-hand bargraph 16 illuminated** Fiche n° 27 side 1/2 IGNITION COIL CIRCUIT **XR25 :** *16 = 1.4 CO CO / CC TO EARTH LINE 28 *16 = 2.3 CO CO / CC TO EARTH LINE 29

INSTRUCTIONS	Refer to "Fault-finding - Help" for the resistance values.

Check the resistance of the coil.

The resistance is not correct	Change the coil.
The resistance is correct	Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity of the line: bornier 28 → 1 coil bornier 29 → 2 coil Check the presence of + 12 V on track 3 of the coil and check the insulation and continuity of line 4 of the coil.
	Repair the faulty line.

The fault persists! Change the computer.

AFTER REPAIR	Erase the computer memory using GO** Carry out a conformity check

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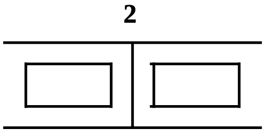


Left-hand bargraph 2, right-hand bargraph 2, incorrect illumination

Fiche n° 27 side 2/2

THROTTLE POSITION CIRCUIT

XR25 : Left-hand bargraph 2 illuminated at full load
Right-hand bargraph 2 illuminated at no load
Left-hand bargraph 2 and right-hand bargraph 2 extinguished at an intermediate position.

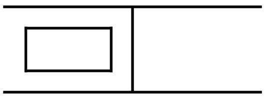
INSTRUCTIONS	No fault bargraph should be illuminated.

If not fault bargraph is illuminated, the problem is not electrical.
Check the mechanics of the accelerator circuit (cable, accelerator pedal,...).

AFTER REPAIR	Carry out a conformity check

JSA021.2

3



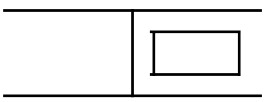
Left-hand bargraph 3, incorrect illumination Fiche n° 27 side 2/2

FLYWHEEL SIGNAL CIRCUIT

XR25 : Left-hand bargraph 3 illuminated with the engine running

INSTRUCTIONS	Covered in the fault bargraphs.

3



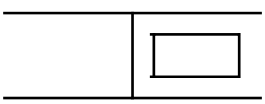
Right-hand bargraph 3, incorrect illumination Fiche n° 27 side 2/2

ENGINE IMMOBILISER CIRCUIT

XR25 : Left-hand bargraph 3 illuminated, engine immobiliser active

INSTRUCTIONS	Covered in the fault bargraphs.

4



Right-hand bargraph 4, incorrect illumination Fiche n° 27 side 2/2

+ AFTER IGNITION CIRCUIT

XR25 : Right-hand bargraph 4 illuminated at+ after ignition

INSTRUCTIONS	Covered in the fault bargraphs.

AFTER REPAIR	No action

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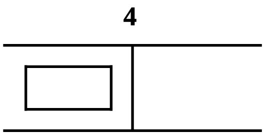


Left-hand bargraph 4, incorrect illumination Fiche n° 27 side 2/2

PARK/NEUTRAL POSITION CIRCUIT

XR25 : Illuminated in the Park/Neutral position

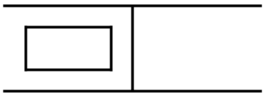
INSTRUCTIONS	Only with automatic gearbox. No fault bargraph should be illuminated.

XR25 at voltmeter $\boxed{V}$ and Vin. Connect a wire to Vin and track 7 of the injection computer. With the ignition on, engage the selector lever in position P/N and then disengage it. The voltage should change from 0 V to 5 V .
If the voltages are correct, change the injection computer.
If the voltages are not 0 V / 5 V, check the insulation and continuity of the line: Injection computer 7 ⟶ Automatic transmission computer Rectify if necessary.
If the fault persists, refer to the automatic transmission fault-finding information.

AFTER REPAIR	Carry out a continuity check

JSA021.2

5



Left-hand bargraph 5, incorrect illumination Fiche n° 27 side 2/2

TORQUE DAMPING CIRCUIT

XR25 : Illuminated each time the automatic transmission gear is changed

INSTRUCTIONS	Only with automatic gearbox. Left-hand status bargraph 4 illuminates correctly. No fault bargraph should be illuminated.

As left-hand status bargraph 4 illuminates correctly, the injection computer is no longer implicated.

Refer to the automatic transmission fault-finding information.

AFTER REPAIR	Carry out the automatic transmission fault-finding procedure if left-hand status bargraph 4 illuminates correctly.

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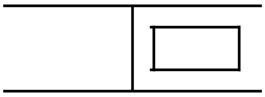
5



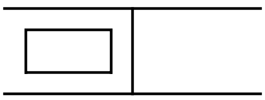
Right-hand bargraph 5, incorrect illumination Fiche n° 27 side 2/2

LOCKING RELAY CIRCUIT

XR25 : Right-hand bargraph 5 illuminated if the locking relay is controlled

INSTRUCTIONS	Covered in the fault bargraphs.

6



Left-hand bargraph 6, incorrect illumination Fiche n° 27 side 2/2

MIXTURE REGULATION CIRCUIT

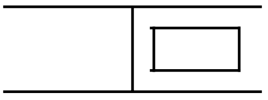
XR25 : Left-hand bargraph 6 illuminated when the mixture is regulated (engine running)

INSTRUCTIONS	Covered in the fault bargraphs.

AFTER REPAIR	No action

JSA021.2

6



Right-hand bargraph 6, incorrect illumination Fiche n° 27 side 2/2

IDLE SPEED REGULATION CIRCUIT

XR25 : Right-hand bargraph 6 illuminated with engine running under no load

INSTRUCTIONS	No fault bargraph should be illuminated.

Check the insulation of lines 8 and 9 of the injection computer.
If the fault persists and no other bargraph is to be processed, change the computer.

AFTER REPAIR	No action

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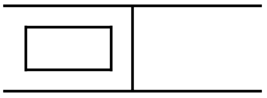
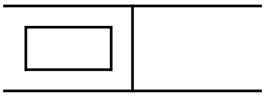
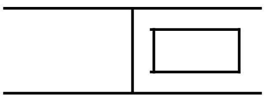
7 	**Left-hand bargraph 7, incorrect illumination** Fiche n° 27 side 2/2 FUEL PUMP CONTROL CIRCUIT **XR25 :** Left-hand bargraph 7 illuminated with the ignition on during the timing phase and with the engine running
INSTRUCTIONS	Covered in the fault bargraphs.

8 	**Left-hand bargraph 8, incorrect illumination** Fiche n° 27 side 2/2 ANTIPERCOLATION CONTROL CIRCUIT **XR25 :** Left-hand bargraph 8 illuminated when the antipercolation function is active
INSTRUCTIONS	Covered in the fault bargraphs.

AFTER REPAIR	No action

JSA021.2

9



Right-hand bargraph 9, incorrect illumination Fiche n° 27 side 2/2

ACCELERATED IDLE CIRCUIT

XR25 : This bargraph should not be illuminated

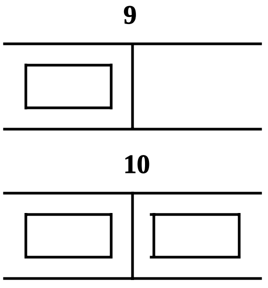
INSTRUCTIONS	No fault bargraph should be illuminated

Check the insulation of track 5 of the computer.

If the fault persists, change the computer.

AFTER REPAIR	No action

JSA021.2



Left-hand bargraph 9, left-hand bargraph 10, right-hand bargraph 10, incorrect illumination

Fiche n° 27 side 2/2

AC CIRCUIT

XR25 :	Left-hand 9	illuminated if AC selected
	Left-hand 10	illuminated if AC requested
	Right-hand 10	illuminated if AC authorised

INSTRUCTIONS	Check that the vehicle is fitted with air conditioning. No fault bargraph should be illuminated.

Connect bornier **Sus 1228** in place of the computer and check the insulation and continuity between the tracks:.

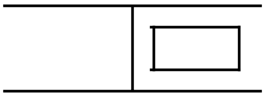
Injection computer	5 ⟶	B4 of the 13-way connector	AC control panel
	51 ⟶	A1 of the 13-way connector	AC control panel

Rectify if necessary.

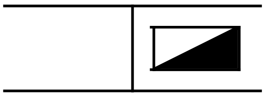
If the fault persists, refer to the air conditioning fault-finding information.

AFTER REPAIR	Carry out a conformity check

JSA021.2

11 	**Right-hand bargraph 11, incorrect illumination** Fiche n° 27 side 2/2 CANISTER BLEED CIRCUIT ACTIVE **XR25 :** Right-hand bargraph 11 illuminated when the canister bleed is active

INSTRUCTIONS	Covered in the fault bargraphs.

12 	**Right-hand bargraph 12 illuminated or extinguished** Fiche n° 27 side 2/2 ERASING MEMORISED FAULTS **XR25 :** This bargraph is illuminated when the faults have been erased.

INSTRUCTIONS	None.

AFTER REPAIR	No action

JSA021.2

INSTRUCTIONS	Only refer to these customer complaints following a full check using the XR25 Refer to "Fault-finding - Help" for the resistance values.

STARTING PROBLEMS

Does not start	CHART 1
Starts but stalls	CHART 2
Starting takes too long	CHART 3

IDLE SPEED PROBLEMS

Too high	CHART 4
Too low	CHART 5
Engine speed unstable	CHART 6
Hunting	CHART 7

HANDLING

Lack of performance	CHART 8
Flat spots and hesitation	CHART 9

FUMES - POLLUTION

CO and / or HC level too high	CHART 10

HIGH FUEL CONSUMPTION — CHART 11

ENGINE NOISE

Pinking	CHART 12

FAULT WARNING LIGHT PROBLEMS — Carry out the left-hand bargraph 12 illuminated fault-finding procedure

The procedure which does not use the OPTIMA is not suitable as an adequate quality criteria.
Follow the procedure using the OPTIMA to obtain this quality criteria.

JSA021.2

CHART 1	STARTING PROBLEMS Does not start
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the injection fuses in the passenger compartment fuse box and in the engine compartment fuse box.
Check the continuity of the line:
- 2 of the computer
- 3 of the computer
- 33 of the computer
- 34 of the computer

Rectify if necessary.
Does the customer complaint persist?

no → End of fault-finding

yes ↓

Can the fuel pump be heard when the ignition is switched on?

yes → Refer to Chart 1A

no ↓

Carry out the fuel pump relay control procedure and check whether the relay makes a noise (several knocks).
Is the relay good?

no → Change the relay.

yes ↓

Check the presence of 12 V on track 3 of the relay. Rectify if necessary.
If the customer complaint persists

↓

During the timing phase, check the presence of 12 V on track 5 of the relay.
Is 12 V present?

no → Change the relay.

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 1
CONT

A

During the timing phase,
check the presence of **+ 12 volts** between tracks C1 and C2 of the fuel pump connector.
Is 12 V present?

no → Repair the electrical wiring between the tracks:

Fuel pump connector:
- C2 → MF earth
- C1 → track 5 of the fuel pump relay.

yes → Change the fuel pump.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 1A	STARTING PROBLEMS Does not start
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the fault-finding equipment and check the presence of a High Voltage on the spark plug wires when the starter is operated.
Is there a High Voltage?

yes → Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Repair the fuel circuit if necessary (pump, filter, pipes, regulator, injectors...).
If the customer complaint persists
↓
It is an engine problem, the injection system is no longer implicated.

no ↓

Check the high voltage circuit.
Rectify if necessary.
If the customer complaint persists

↓

With the ignition on, check the presence of + 12 V on track 2 of the coils.
Is + 12 V present?

no → Check the continuity of the electrical wiring between track 2 (coils) and the + after ignition fuse in the engine connection unit.
Rectify.

yes ↓

With the ignition on, check the resistance of the coil.
Is it correct?

no → Change the faulty coil(s).

yes ↓

Connect the bornier **Sus 1228** in place of the computer and check the insulation and continuity between the tracks:

1 / coil	28 / bornier
2 / coil	29 / bornier

Rectify if necessary.
If the customer complaint persists

↓

Change the injection computer.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 2	**STARTING PROBLEMS** **The engine starts but stalls**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check that the idle regulation stepping motor is not blocked.

↓

Check the air intake circuit and the exhaust line.
Repair if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Repair if necessary [pump, filter, regulator, pipes, injectors (sealing)...].
If the customer complaint persists

↓

It is an engine problem and the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 3	**STARTING PROBLEMS** **Starting takes too long**

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the ignition,
the high voltage circuit and the spark plugs.
Repair if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure
(refer to vehicle Workshop Repair Manual).
Change the faulty parts if necessary
(regulator, filter, pump, pipes...).
If the customer complaint persists

↓

Check the sealing of the injectors.
If the sealing is not correct,
change the faulty injector(s)
The customer complaint persists!

↓

It is an engine problem
and the injection system is no longer
implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 4	**IDLE SPEED PROBLEMS** **Idle speed too high**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the insulation and continuity of the line:
- 4 of the computer
- 1 of the computer

↓

Check that there is no air leak at the intake (seals, take-offs on the inlet manifold, caps,...).
Rectify if necessary.
If the customer complaint persists

↓

Check on the throttle housing that the lower mechanical stop has been reached.
Check the accelerator control as well.
Rectify if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual)
Rectify if necessary (injectors, pump, pressure regulator, pipes...). canalisations, ...).
The customer complaint persists!

↓

The injection system is no longer implicated.
Check the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 5	**IDLE SPEED PROBLEMS** **Idle speed too low**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the ignition,
spark plug high voltage harness, coil,
power stages.
Rectify if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure
(refer to vehicle Workshop Repair Manual).
Rectify if necessary
(injectors, pump, regulator,
pipes...).
The customer complaint persists!

↓

The injection is no longer implicated.
Check the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 6	**IDLE SPEED PROBLEMS** **Engine speed unstable**

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

With the engine at idle,
check the consistency of #01.
Is it consistent?

no → Check the absolute pressure sensor and its harness. Rectify, if necessary, change the sensor.

yes ↓

Check the value of the pollutants and Lambda
- CO < .,3 %
- HC ≤ 100 ppm
- CO2 ≥ 14.5 %
- 0.97 ≤ Lambda ≤ 1.03

Are the values correct?

no → Check:
- Catalytic converter (melted,clogged, ...).
- Oxygen sensor (contaminated, heating faulty,...).
- Air leak upstream of the oxygen sensor.
- Sealing of the exhaust line.
- Type of fuel used.
- Ignition (spark plugs, high voltage wires, coils).
- General condition of the engine (timing, ...).

yes ↓

Disconnect the oxygen sensor and wait until #35 stabilises at 128, #05 stabilises at ≈ 0.402, and right-hand fault bargraph 3 illuminates . Does the customer complaint persist?

no → Before changing the oxygen sensor, check that there is no lead at the exhaust outlet.

yes ↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Rectify if necessary (regulator, pump, filter, pipes, injectors).
Does the customer complaint persist?

no → End of fault-finding

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 6
CONT

A

Using the fault-finding equipment, check the high voltage circuit (wires, spark plugs,...).
Also check the spark plugs,
the condition of the wires, the connectors,...
Change parts if necessary.
If the customer complaint persists

Check the injectors
(sealing and flow).
Rectify if necessary.
The customer complaint persists!

It is no longer an injection problem.
Check the general condition of the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 7	IDLE SPEED PROBLEMS Hunting
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

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

Are the values correct?

no →

Check:
- Catalytic converter (melted, clogged, ...).
- Oxygen sensor (contaminated, heating faulty, ...)
- Air leak upstream of the oxygen sensor.
- Sealing of the exhaust line.
- Type of fuel used.
- Ignition (spark plugs, high voltage wires, coils).
- General condition of the engine (timing, ...).

yes ↓

Disconnect the oxygen sensor and wait until #35 stabilises at 128, #05 stabilises at ≈ 0.402, and right-hand fault bargraph 3 illuminates .
Is the engine stable?

no →

Check that there is no leak on the inlet manifold
(caps, seals, take-offs, ...).
Rectify if necessary.

yes ↓

Change the oxygen sensor.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 8	**HANDLING** **Lack of performance**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the conformity of the spark plugs and their condition.
Rectify if necessary.
Does the customer complaint 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

Are the values correct?

no → Check:
- Catalytic converter (melted, clogged, ...).
- Oxygen sensor (contaminated, heating faulty, ..).
- Air leak upstream of the oxygen sensor.
- Sealing of the exhaust line.
- Type of fuel used.
- Ignition (spark plugs, high voltage wires, coils).
- General condition of the engine (timing, ...).

yes ↓

Check the air intake circuit (air filter...) and the exhaust line.
Rectify if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

Using the XR25, check #15.
Is #15 = 0?

yes → It is an engine problem and the injection is no longer implicated.

no ↓

Refer to CHART 12 pinking.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 9	**HANDLING** **Flat spots and hesitation**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Road test, if possible with the customer, to confirm the fault.
Does the fault occur again?

no → Before returning the vehicle to the customer, using the XR25 check that everything is good in particular 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

Are the values correct?

no → Check:
- Catalytic converter (melted, clogged, ...).
- Oxygen sensor (contaminated, heating faulty, ...).
- Air leak upstream of the oxygen sensor.
- Sealing of the exhaust line.
- Type of fuel used.
- Ignition (spark plugs, high voltage wires, coils, ...).
- General condition of the engine (timing, ...).

yes ↓

Check the condition of the high voltage wiring, spark plugs-connectors, coils, TDC sensor (interference possible cause), injectors.
Change the faulty parts if necessary.
If the customer complaint persists

↓

Check that the gauge is present in the absolute pressure sensor pipe and that it is clean.
Rectify if necessary.
If the customer complaint persists

↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 9
CONT

A

Disconnect the oxygen sensor and wait until #35 stabilises at 128, #05 stabilises at ≈ 0.402, and right-hand fault bargraph 3 illuminates.
Carry out a road test.
Does the customer complaint persist?

no → Change the oxygen sensor.

yes ↓

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

↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Change the faulty parts (fuel pump, regulator, filter, pipes,...).
If the customer complaint persists

↓

Clean the injectors.
If the customer complaint persists

↓

Check the clogging of the vales.
Clean the valves if necessary.
Does the customer complaint persist after cleaning?

no → End of fault-finding.

yes ↓

It is an engine problem,
the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 10	**FUMES - POLLUTION** **CO and/or HC level too high**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Using the XR25, check #05 and #35.
Check, refer to the Workshop Repair Manual.
Are the values correct?

no → Carry out the lead detection test (refer to the Workshop Repair Manual). Is there lead present?

- yes → Check the type of fuel used. If the customer has used leaded petrol, the vehicle must consume several full tanks of unleaded petrol before the catalytic converter and the oxygen sensor are changed.
- no → B

yes ↓

Check the High Voltage circuit
(spark plugs, spark plug wires).
Rectify if necessary.
If the customer complaint persists

↓

Check the air supply,
the air filter, the pipes...
Does the customer complaint persist after rectification?

no → End of fault-finding.

yes ↓

Check the conformity of the gauge and the condition of the absolute pressure sensor pipe.
Rectify if necessary.
If the customer complaint persists

↓

Check the sealing of the connectors
(O-rings in particular).
Rectify if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 10
CONT

A

Check the fuel return pressure and flow (refer to vehicle Workshop Repair Manual). Rectify or change the faulty parts (fuel pump, pressure regulator, pipes). If the customer complaint persists

Ask the customer whether there have been any ignition or starting problems. Was there a problem?

- yes: Change the catalytic converter.
- no: It is an engine problem and the injection system is no longer implicated.

B

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

- no: Repair the electrical circuit.
- yes: Check:
  - Catalytic converter (melted, clogged, ...).
  - Oxygen sensor (contaminated, heating faulty, ...).
  - Air leak upstream of the oxygen sensor.
  - Sealing of the exhaust line.
  - Type o fuel used.
  - Ignition (spark plugs, wires, distributor)
  - General condition of the engine (timing, ...).

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 11	HIGH FUEL CONSUMPTION
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check that there are no fuel leaks.
Rectify if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

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

no → See Chart 4 or 5, idle speed problems (idle speed too high or too low).

yes ↓

Check that the vehicle conforms to its specification and is good condition.
Rectify if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

Check the value of the pollutants and Lambda
- CO < 0.3 %
- HC ≤ 100 ppm
- CO_2 ≥ 14.5 %
- 0.97 ≤ Lambda ≤ 1.03

Are the values correct?

no → Check:
- Catalytic converter (melted, clogged, ...).
- Oxygen sensor (contaminated, heating faulty, ...).
- Air leak upstream of the oxygen sensor..
- Sealing of the exhaust line.
- Type of fuel used.
- Ignition (spark plugs, coil wires, ...).
- General condition of the engine (timing, ...).

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 11
CONT

A

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual) and the canister bleed circuit.
Rectify if necessary (regulator, pump, filter, pipes).
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

It is no longer an injection system problem, it is an engine problem,
check:
- the level of engine oil
- the engine cooling circuit
- the suspension
- the general condition of the engine.

If necessary, carry out a consumption check using the ECONOTEST consumption equipment.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 12	**ENGINE NOISE** **Pinking**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Carry out a road test using the XR25 and check #13 and #15.
Does the fault occur again?

no → The customer must use his vehicle under special conditions, discuss this with him.

yes ↓

Check the condition and the conformity of the spark plugs.
Change the spark plugs if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

Change the TDC sensor.

↓

Check that the engine target is in good condition.

↓

It is no longer an injection system problem.
Check the engine cooling circuit as well.
The combustion chambers can be cleaned.

AFTER {REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25 Refer to "Fault-finding - Help" for the resistance values

STARTING PROBLEMS

Does not start	CHART 1
Starts but stalls	CHART 2
Starting takes too long	CHART 3

IDLE SPEED PROBLEMS

Too high	CHART 4
Too low	CHART 5
Engine speed unstable	CHART 6
Hunting	CHART 7

HANDLING

Lack of performance	CHART 8
Flat spots and hesitation	CHART 9

FUMES - POLLUTION

Gases analysis incorrect	CHART 10
Oxygen sensor check	CHART 11

HIGH FUEL CONSUMPTION CHART 12

ENGINE NOISE

Pinking	CHART 13

FAULT WARNING LIGHT PROBLEMS Carry out the left-hand bargraph 12 illuminated fault-finding procedure

JSA021.2

CHART 1	STARTING PROBLEMS Does not start
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check all of the passenger and engine compartment injection fuses.
Check the continuity of the line:
- 2 of the computer
- 3 of the computer
- 33 of the computer
- 34 of the computer

Rectify if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

Check the operation of the engine immobiliser.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

Can the fuel pump be heard when the ignition is switched on?

yes → Refer to Chart 1A

no ↓

When the ignition is switched on, can the fuel pump relay be heard?

no → Check the presence of + 12 V at 1 of this relay. Rectify.

↓ Connect the bornier in place of the injection computer and check the insulation and continuity of line between track 20 of the bornier and track 2 of the relay.
Rectify.

↓ If the customer complaint persists, change the relay.

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 1
CONT

A

Check the presence of 12 V on track 3 of the fuel pump relay.
Rectify if necessary.
If the customer complaint persists

↓

During the timing phase, check the presence of 12 V on track 5 of the relay.
Is 12 V present?

- no → Change the relay.
- yes ↓

During the timing phase, check the presence of **+ 12 volts** between tracks C1 and C2 of the fuel pump connector.
Is + 12 V present?

- no → Repair the line:
  - pump connector C1 ---> 5 relay
  - pump connector C2 ---> earth
- yes ↓

Change the fuel pump.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 1A	STARTING PROBLEMS Does not start
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the OPTIMA 5800 fault-finding equipment and carry out a test on starting.
Does the equipment detect a fault?

yes → Rectify.
If the customer complaint persists

no → Check the flow of fuel and the fuel pressure (refer to the vehicle Workshop Repair Manual). Repair the fuel circuit if necessary (pump, filter, pipes, regulator, injectors...).
If the customer complaint persists

Connect the OPTIMA 5800 fault-finding equipment and carry out an engine compressions test.
Are the compressions normal?

yes → Check whether the exhaust line is blocked.

no → It is an engine problem.

Check whether the exhaust line is blocked.
Rectify if necessary.
If the customer complaint persists

Change the injection computer.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 2	**STARTING PROBLEMS** **The engine starts but stalls**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the operation of the engine immobiliser.
If the customer complaint persists

↓

Check the air intake circuit and the exhaust line.
Rectify if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Rectify if necessary [pump, filter, regulator, pipes, injectors (sealing)..].
If the customer complaint persists

↓

It is an engine problem and the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 3	**STARTING PROBLEMS** **Starting takes too long**

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the OPTIMA 5800 fault-finding equipment and carry out a test on starting.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

Carry out a test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

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

↓

Check the sealing of the injectors.
If the injectors are not sealed correctly, change the faulty injector(s).
If the customer complaint persists

↓

It is an engine problem and the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 4	IDLE SPEED PROBLEMS Idle speed too high
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check the insulation and continuity of line:
- 4 of the computer
- 1 of the computer

↓

Check that there are no air leaks at the intake (seals, take-offs on the inlet manifold, caps,...).
Rectify if necessary.
If the customer complaint persists

↓

Check on the throttle housing that the lower mechanical stop has been reached (#17 < theoretical value). Check the accelerator control as well. Rectify if necessary.
If the customer complaint persists

↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual).
Rectify if necessary.
(injectors, pump, pressure regulator, pipes, ...).
If the customer complaint persists

↓

Check the level of engine oil (suction via the breather).
If the customer complaint persists

↓

The injection system is no longer implicated.
Check the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 5	**IDLE SPEED PROBLEMS** **Idle speed too low**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair manual).
Repair the fuel circuit if necessary (pump, filter, pipes, regulator, injector,...).
If the customer complaint persists

↓

Check the level of engine oil (splashing)
If the customer complaint persists

↓

The injection system is no longer implicated.
Check the engine.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out conformity check

JSA021.2

CHART 6	IDLE SPEED PROBLEMS Engine speed unstable
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Analyse the gases.
(refer to Chart 10 - fumes / pollution).
If the customer complaint persists

↓

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

Check the operation of the oxygen sensor
(refer to Chart 11 - fumes / pollution).
If the customer complaint persists

↓

With the engine at idle speed, check the consistency of #01 (the value should be less than 500 mbars). Is the value correct?

no → Check the absolute pressure sensor and its harness. Rectify, change the sensor if necessary.

yes ↓

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

↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 6
CONT

A

Check the sealing and flow of the injectors.
Rectify if necessary.
If the customer complaint persists

Check the general condition of the engine using the OPTIMA 5800 engine compressions test.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity test

JSA021.2

CHART 7	**IDLE SPEED PROBLEMS** **Hunting**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Analyse the gases
(refer to Chart 10 - fumes / pollution).
If the customer complaint persists

↓

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

Check the operation of the oxygen sensor
(refer to Chart 11 - fumes / pollution).
If the customer complaint persists

↓

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

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 8	HANDLING Lack of performance

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check whether the throttle opens fully
(full load bargraph illuminated).
Check the setting of the accelerator control.
Rectify if necessary.
If the customer complaint persists

↓

Check the air filter: dirt, deformation.
Rectify if necessary.
If the customer complaint persists

↓

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no ↓

Analyse the gases
(refer to Chart 10 - fumes / pollution).
If the customer complaint persists

↓

Connect the OPTIMA 5800 fault-finding equipment and carry out an engine compression test.
Are the compressions normal?

no → It is an engine problem.

yes ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 8
SUITE

A

Check the exhaust line (obstruction ...). Is it good?

yes

Using the XR25, check #15.
Is #15 = 0 ?

yes → It is an engine problem and the injection system is no longer implicated.

no

Refer to Chart 12 pinking.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 9	HANDLING **Flat spots and hesitation**

INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Road test, if possible with the customer to confirm the fault.
If the fault occurs again

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
Does the equipment detect a fault?

yes → Follow the instructions.

no

Analyse the gases (refer to Chart 10 -fumes / pollution).
If the customer complaint persists

Check the oxygen sensor (refer to Chart 11 - fumes / pollution).
If the customer complaint persists

Check the presence of the gauge in the absolute pressure sensor pipe and check that it is clean.
Rectify if necessary.
If the customer complaint persists

Check the sealing of the injectors, the flow of fuel and the fuel pressure (refer to the Workshop Repair Manual).
Rectify if necessary.
If the customer complaint persists

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 9 CONT	

A

Check the condition of the flywheel target.
The OPTIMA 5800 speed sensor signal display function can be used to make the check easier.
Rectify if necessary.
If the customer complaint persists

Check whether the valves are clogged.
Clean the valves if necessary.Does the customer complaint persist after cleaning?

no → End of fault-finding.

yes → It is an engine problem, the injection system is no longer implicated.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 10	FUMES/POLLUTION Analysis of gases incorrect
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Connect the OPTIMA 5800 fault-finding equipment and connect it to a 4 gas analyser, type 4040, 5040 or AGM 1500.
Carry out an anti-pollution / gases analysis test.
Does the equipment detect a fault?

no

End of fault-finding of Chart 10
NOTE: a correct gases analysis indicates correct operation of the catalytic converter.

yes

Is the CO level too high (CO > 0.5 at idle speed or CO > 0.3 at 2500 rpm)?

yes

Check the oxygen sensor (refer to Chart 11 -fumes / pollution).
If the customer complaint persists

Check whether it is an engine problem using the compressions test (OPTIMA 5800 fault-finding equipment).

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

no

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

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CHART 10
CONT 1

A

Is Lambda < 0.97?

yes → Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the equipment does not detect a fault

Check the oxygen sensor
(refer to Chart 11 -fumes / pollution).
If the customer complaint persists

Check whether it is an engine fault using the compressions test
(OPTIMA 5800 fault-finding equipment).

Check the catalytic converter (efficiency, melting, lead, ...), the air supply (filter, manifold, ...) and the condition of the engine (abnormal oil consumption).

no → B

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 10
CONT 2

B

Is Lambda > 1.03

yes → Check the sealing of the exhaust line after the catalytic converter (air leak). Rectify if necessary. If the customer complaint persists

Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running. If the station does not detect a fault

Check the oxygen sensor (refer to Chart 11 -fumes / pollution). If the customer complaint persists

Check whether it is an engine problem using the compression test. (OPTIMA 5800 fault-finding equipment).

Check the fuel supply (injectors, pressure regulator,...) and the efficiency of the catalytic converter (melting, lead,...).

no ↓

Is the HC level too high? (HC > 100 ppm)

yes → Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running. If the equipment does not detect a fault.

Check the anti-evaporation circuit (canister), the inlet manifold heating and the efficiency of the catalytic converter.

no ↓

C

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 10 CONT 3	

C

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

yes → Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the equipment does not detect a fault

→ Check that there are no air leaks on the inlet manifold and check the operation of the injectors (seizing...).

no

CO_2 level too low.

yes → Check the sealing of the exhaust line after the catalytic converter and the operation of the injectors (seizing...).

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 11	FUMES- POLLUTION Oxygen sensor check

INSTRUCTIONS	Only refer to this chart following a full check using the XR25, checking the following parameters in particular: - #35 (mixture adjustment) : it should fluctuate around 128 - #30 and #31 (adaptive mixture regulation) : values must never be at the limit.

Connect the OPTIMA 5800 fault-finding equipment and carry out an antipollution / oxygen sensor check.
Does the equipment detect a fault?

no → End of Chart 11 fault-finding.
The oxygen sensor is not implicated.

yes ↓

Check the heating of the sensor:
- presence of + 12 V at the connector, engine running,
- no sensor heating resistor open circuit or short circuit o earth.

If the heating is operating correctly

↓

Is the minimum voltage too high?
(U minimum > 300 mV : signal moved towards making the mixture richer).

yes → Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the equipment does not detect a fault

↓

Check the fuel pressure (regulator), the injectors (sealing,...), the anti-evaporation circuit (canister), the fuel quality.
Rectify if necessary.
If the customer complaint persists

↓

Change the sensor.

no ↓

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 11
CONT 1

A

Is the maximum voltage too low?
(U maximum < 600 mV : signal moved towards making the mixture leaner).

yes → Check that there are no air leaks before the oxygen sensor (exhaust manifold leak,...) and check the fuel pressure.
Rectify if necessary.
If the customer complaint persists

→ Change the sensor.

no ↓

Is there enough of a gap between maximum and minimum (< 500 mV) ?

yes → The sensor is probably clogged.
Carry out a road test to unclog it and carry out another test using the equipment.
If the values are still not correct

→ Connect the OPTIMA 5800 fault-finding equipment and carry out an ignition test with the engine running.
If the equipment does not detect a fault

→ Check that there are no air leaks on the inlet manifold and check the operation of the injectors (seizing,...).
Rectify if necessary.
If the customer complaint persists

→ Change the sensor.

no ↓

B

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 11 CONT 2	

B

Is the period for which the sensor operates incorrectly > 1 s?

yes →

An extensive variation in the operation of the sensor may be the result of clogging or contamination (silicon).
Additional fault-finding is possible using a 4 gas analyser (SOURIAU 4040-5040 or SAGEM AGM 1500) as, in this case,
Lambda > 1.03 and O_2 > 1 %.
Carry out a road test
to unclog the sensor.
If the sensor does not vary correctly

Change the sensor.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

CHART 12	FUEL CONSUMPTION HIGH
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Check that there are no fuel leaks.
Rectify if necessary.
If the customer complaint persists

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

no → Refer to Chart 4 or 5, idle speed problems
(idle speed too high or too low).

yes

Check that the vehicle conforms to its specifications and that it is in good condition.
Rectify if necessary.
If the customer complaint persists

Analyse the gases
(refer to Chart 10 -fumes / pollution).
If the customer complaint persists

Check the operation of the oxygen sensor
(refer to Chart 11 -fumes / pollution).
If the customer complaint persists

A

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using G0** Carry out a conformity check

JSA021.2

CHART 12
CONT

A

Connect the OPTIMA 5800 fault-finding equipment and carry out an engine compressions test.
Are the compressions normal?

no → It is an engine problem.

yes ↓

Check the flow of fuel and the fuel pressure (refer to vehicle Workshop Repair Manual) and the canister bleed circuit.
Rectify if necessary (regulator, pump, filter, pipes).
Does the customer complaint persist?

yes ↓

It is no longer an injection problem, it is an engine problem.

Check:
- the level of engine oil
- the engine cooling circuit
- the suspension
- general condition of the engine.

If necessary, carry out a consumption check using the ECONOTEST consumption equipment.

AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

CHART 13	**ENGINE NOISE** **Pinking**
INSTRUCTIONS	Only refer to this customer complaint following a full check using the XR25

Carry out a road test using the XR25 and check #13and #15.
Does the fault occur again?

no → The customer must use his vehicle under special conditions, discuss this with the customer.

yes ↓

Check the condition and the conformity of the spark plugs.
Change the spark plugs if necessary.
Does the customer complaint persist?

no → End of fault-finding.

yes ↓

Change the TDC sensor.

↓

Check that the engine target is in good condition.

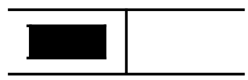
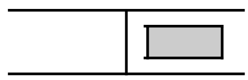
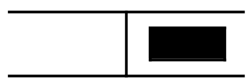
↓

It is no longer an injection problem.
Check the engine cooling circuit as well.
The combustion chambers can be cleaned.

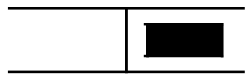
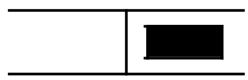
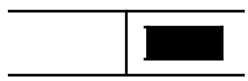
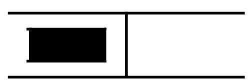
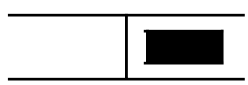
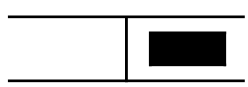
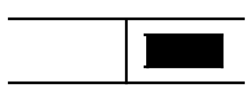
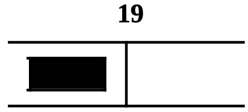
AFTER REPAIR	Check the connection of all of the sensors disconnected during the operation Erase the computer memory using GO** Carry out a conformity check

JSA021.2

INSTRUCTIONS	Engine cold, ignition on

Order of operations	Function to be checked	Action	Bargraph	Display and notes
1	XR25 dialogue	D13 (selector in position S8)		9.NJ Use of fiche n° 27 fault test side
2	Interpretation of normally illuminated bargraphs		1  1 	Fault test Code present
3	Engine immobiliser		2 	If the vehicle does not have an engine immobiliser, this bargraph should be illuminated
4	Computer conformity	G70*		X X X X Display in three sequences of the part number (refer to section 12)
5	Changing to status check mode	G01*		10.NJ Use of fiche n° 27 status test side

INSTRUCTIONS	Engine cold, ignition on.

Order of operations	Function to be checked	Action	Bargraph	Display and notes
6	Interpretation of normally illuminated bargraphs		**1** 	Code present
			2 	No load position recognised
			4 	Reception of + after ignition information
			4 	Illuminated in Park / Neutral position
			5 	Locking relay control effective
			12 	Illuminates after the memories have been erased to confirm that the operation has been carried out correctly
			19 	Computer configured to operate with a: manual gearbox (G50*2*)
			19 	automatic transmission (G50*1*)

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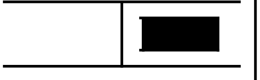
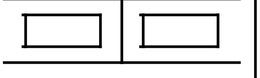
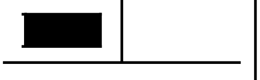
INSTRUCTIONS	Engine cold, ignition on

Order of operations	Function to be checked	Action	Bargraph	Display and notes
7	Throttle position potentiometer	No load # 17 Accelerator pedal slightly pressed Full load # 17	2  2  2 	10 < X < 36 193 < X < 240
8	Absolute pressure sensor	# 01		X = Local atmospheric pressure
9	Coolant temperature sensor	# 02		X = Ambient temperature ± 5°C
10	Air temperature sensor	# 03		X = Ambient temperature ± 5°C
11	Idle regulator stepping motor	# 12		The value varies in relation to the coolant temperature: 19% ≤ X ≤ 80%
12	Engine speed	# 06		X = 0 rpm.
13	Canister bleeding	# 23		X = 0 %

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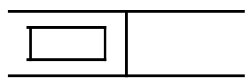
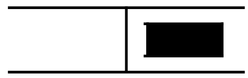
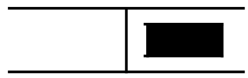
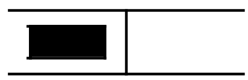
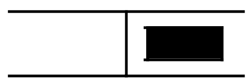
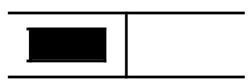
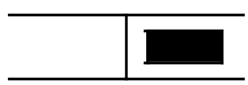
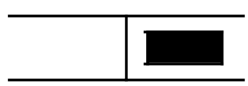
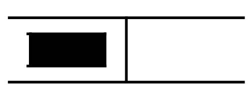
INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once (air conditioning and electric windscreen not selected, automatic transmission in Park or Neutral).

Order of operations	Function to be checked	Action	Bargraph	Display and notes
1	Changing to status test mode	G01*		10.NJ Use of fiche n° 27 status test side
2	No fault		20 	Check that this bargraph is not flashing; if it is, type GO2* and turn the fiche over. **Warning**: This bargraph may flash if the vehicle is not fitted with an engine immobiliser. Ignore this bargraph if fault right-hand bargraph 2 is illuminated with *22 = 2dEF. Repair the faulty component and then erase the fault memory (GO**) and return to status test mode (GO1*).
3	Battery voltage	# 04 if at# 04 then at# 06		13 volts < X < 14,5 volts X < 12.7 volts Nominal < X < 930 rpm. speed

INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once (air conditioning and electric windscreen not selected, automatic transmission in Park or Neutral).

Order of operations	Function to be checked	Action	Bargraph	Display and notes
4	Interpretation of normally illuminated bargraphs	-	**1** 	Code present
			2 	No load position recognised
			3 	Reception of engine speed information
			4 	Reception of + after ignition information
			4 	Illuminated in Park or Neutral
			5 	Locking relay control effective
			6 	Idle regulation active
			6 	Mixture regulation active

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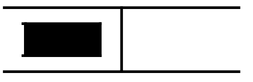
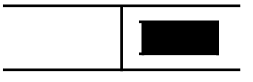
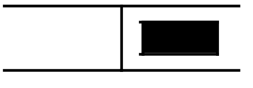
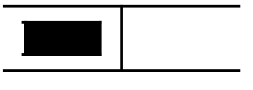
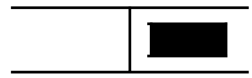
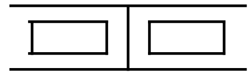
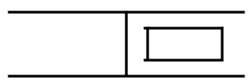
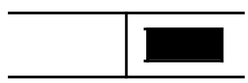
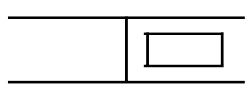
INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once (air conditioning and electric windscreen not selected, automatic transmission in Park or Neutral).

Order of operations	Function to be checked	Action	Bargraph	Display and notes
4 *(cont)*	Interpretation of normally illuminated bargraphs *(cont)*	-	**7** 	Fuel pump activated
			12 	Illuminates after the memories have been erased to confirm that the operation has been carried out correctly
				Computer configured to operate with a:
			19 	manual gearbox (G50*2*)
			19 	automatic transmission (G50*1*)

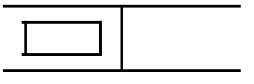
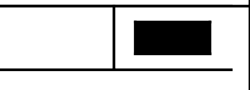
INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once (air conditioning and electric windscreen not selected, automatic transmission in Park or Neutral).

Order of operations	Function to be checked	Action	Bargraph	Display and notes
5	Idle speed	With no air conditioning action # 06 # 12 Accelerated idle required	**6**  **9**  **10** 	 X = 740 ± 50 rpm. 4 % < X < 15 % Illuminated depending on the air conditioning status X = 880 ± 50 rpm.
6	Pinking noise measurement	# 13 (3500 rpm. with no load)		X variable and not zero

INSTRUCTIONS	Engine warn at idle after the fan assembly has cut in at least once (air conditioning and electric windscreen not selected, automatic transmission in Park or Neutral).

Order of operations	Function to be checked	Action	Bargraph	Display and notes
7	Manifold pressure	# 01 with no power-consuming unit operating		X is variable and is of the order $270 \leq X \leq 410$ mb (this pressure varies in accordance with the altitude)
8	Mixture regulation	At an constant speed of 2500 rpm then at idle # 05 # 35	**6**  **6** 	X varies with an interval of approximately 50 to 900 mV X is situated and varies slightly around 128 with maximum of 255 and a minimum of 0
9	Adaptive idle adjustment	# 21		$-8.6\ \% < X < 6.2\ \%$ (average value after the memory has been erased: 0)
10	Canister bleeding	# 23	**11** 	Bleeding of the canister is prohibited. The solenoid valve remains closed. X = 0 %

INSTRUCTIONS	Check to be carried out during a road test

Order of operations	Function to be checked	Action	Bargraph	Display and notes
1	Changing to status test mode	G01*		10.NJ Use of fiche n° 27 status test side
2	No fault		20 	Check that this bargraph is not flashing; if it is, type GO2* and turn the fiche over. **Warning**: This bargraph may flash if the vehicle is not fitted with an engine immobiliser. Ignore this bargraph if fault right-hand bargraph 2 is illuminated with *22 = 2dEF. Repair the faulty component and then erase the fault memory (GO**) and return to status test mode (GO1*).
3	Canister bleeding	# 23		Canister bleeding is authorised X = variable
4	Vehicle speed information	# 18	**11** 	X = vehicle speed displayed on the speedometer
5	Pinking sensor	Vehicle with load at an engine speed of 2000 rpm. # 13 # 15		X = variable and not zero 0 ≤ X ≤ 6 (in the event of a sensor fault the advance is automatically reduced by 4°, not shown at# 15)

INSTRUCTIONS	Check to be carried out during a road test

Order of operations	Function to be checked	Action	Bargraph	Display and notes
6	Adaptive mixture values	After programming # 30 # 31		$96 \leq X \leq 160$ (average value after the memories have been erased: 128) $96 \leq X \leq 160$ (average value after the memories have been erased: 128)

Injector resistance	=	14.5 Ω
Idle regulation stepping motor resistance	=	A - D = 53 ± 5 Ω B - C = 53 ± 5 Ω
Canister bleed valve resistance	=	35 ± 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	:	PL C-A 1260 Ω PF C-A 2200 Ω C-B 2200 Ω C-B 1260 Ω B-A 1200 Ω B-A 1200 Ω
Coolant temperature sensor resistance	=	210 to 270 Ω at 90°C
Oxygen sensor resistance	:	A-B = 3 to 15 Ω
Fuel pressure	=	3 bars or 2.5 bars at idle
Value of: CO	=	0.3 % maximum
HC	=	100 ppm max
CO2	=	14.5 % minimum
Lambda (λ)	=	0.97 < λ < 1.03

EQUIPMENT REQUIRED
OPTIMA 5800 fault-finding equipment **4 gas analyser 4040-5040 or AGM 1500**

ANALYSIS OF EXHAUST GASES USING THE FAULT-FINDING EQUIPMENT

Connecting the OPTIMA 5800 fault-finding equipment to an analyser (SOURIAU 4040-5040 or SAGEM AGM 1500) allows the gases to be checked in accordance with the legislation relating to vehicles fitted with catalytic converters. This check assumes measurement at half load and at idle, with the following requirements:

Idle	2 500 rpm
CO < 0.5 %	CO < 0.3 %
HC < 100 ppm	HC < 100 ppm

Irrespective of the legislation, the other measurements given by the analyser are the subject of a tolerance interval:

Idle	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 / Mixture

- Lambda > 1 → Lean mixture
- Lambda < 1 → Rich mixture

The condition Lambda = 1 is essential for correct operation of the catalytic converter.

The equipment combines the following phases:

- Bringing the engine up to operating temperature (oil temperature greater than 60°C)
- Constant speed of 2500 rpm for one minute to activate the mixture regulation and simultaneous measurement of the gases.
- If the gases analysis at 2500 rpm is correct, measurement at idle.

If the equipment considers the analysis to be incorrect, fault-finding messages appear, the order of gas priority being:

1) CO	2) Lambda	3) HC	4) O_2	5) CO_2

NOTE : It is possible to print the results of the anti-pollution tests.

JSA021.2

EQUIPMENT REQUIRED
OPTIMA 5800 fault-finding equipment

OXYGEN SENSOR CHECK USING THE FAULT-FINDING EQUIPMENT

Straight-forward oxygen sensor faults are detected by the XR25.

- Open circuit
- Short circuit to earth.
- Short circuit to+ 12 V.

The fault-finding equipment allows operational faults which are not detected by the XR25 to be highlighted.
A sensor check can be carried out for the following customer complaints:

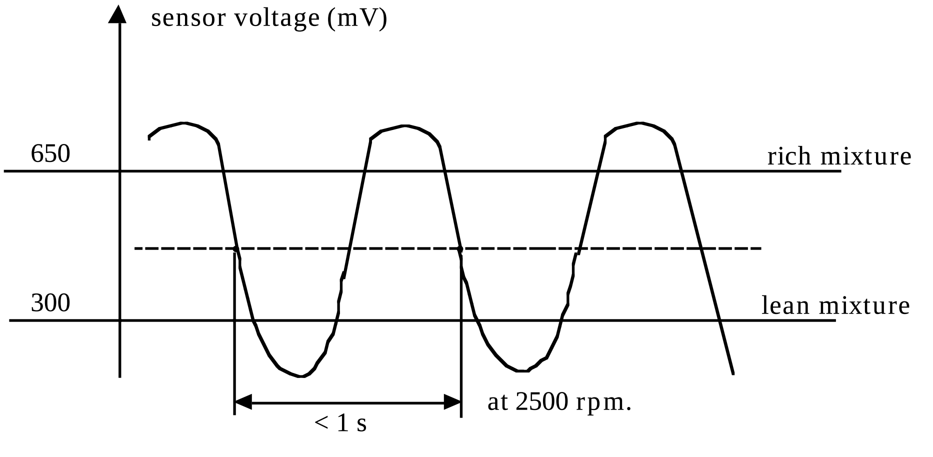
- Excessive consumption.
- Irregular idle speed, hunting.
- Hesitation.
- Gases analysis not correct to specification.

The equipment check scenario assumes connection in parallel with the signal transmitted by the oxygen sensor. This signal is analysed at a constant engine speed (2500 rpm), when the mixture regulation conditions are joined (engine warm...).

CONNECTION:

The 4-way sensor connector is located under the vehicle.

During normal operation, the signal is represented as a sinusoid.



The characteristic parameters of this signal are the maximum voltage, the minimum voltage and the period.
Whatever the engine type, the correct values are:

- Maximum voltage > 600 mV.
- Minimum voltage < 200 mV.
- Gap (maximum voltage - minimum voltage) > 500 mV.
- Period < 1 second.

JSA021.2

EQUIPMENT REQUIRED
OPTIMA 5800 fault-finding equipment

IGNITION CHECK USING THE FAULT-FINDING EQUIPMENT

The OPTIMA 5800 fault-finding equipment allows the ignition to be checked under two conditions:

- TEST ON STARTING: if the vehicle will not start. When fault-finding using the XR25 is not possible, this option checks the presence and the quality of the ignition when the starter is operated.

- ENGINE RUNNING TESTS: These measurements are an addition to the XR25 in the event of customer complaints such as: hesitation, ignition misfiring, incorrect gases analysis, unstable idle speed...

Also, the equipment's measuring module allows the static ignition to be checked using two high voltage clips, the coils having two outlets (when one ignition order is given, two sparks occur simultaneously: one in the combustion chamber, the other in the exhaust cylinder). While these measurements are being taken, the two clips must 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 equipment is therefore connected at the inlet of the coils.

CONNECTIONS:

- DZF engine: Connection to the two coils (bloc located to the left of the rocker cover).

MEASUREMENTS:

The ignition is characterised by the following values:

Engine running:

- Duration of spark.
- Priming voltage (or ionisation voltage).
- Priming voltage during the exhaust phase (static ignition).

Test on starting:

- Ignition supply voltage.
- TDC signal sensor.
- Control signal (MPA).
- Duration of spark.
- Priming voltage (or ionisation voltage).
- Priming voltage during the exhaust phase (static ignition).

The equipment checks the consistency of the values obtained for each cylinder and compares the measurements with a database categorised by engine type.

QUANTITY AND QUALITY OF ANTIFREEZE

Engine	Quantity (in litres)	Quality	Special features
D7F	5	**GLACEOL RX (type D)** only use coolant	Protection to - 25 $^{\pm 2}$ °C for hot, temperate and cold countries. Protection to - 37 $^{\pm 2}$ °C for very cold countries.

THERMOSTAT

Engine type	Start of opening (in °C)	End of opening (in °C)	Stroke (in mm)
D7F	88	≤ 100	9

There is no heater matrix tap.

Circulation is continuous in the heater matrix which contributes to the cooling of the engine.

FILLING

Check the tightening of the drain plug(s).

Open the two bleed screws.

Charge the circuit via the opening in the expansion bottle.

Close the bleed screws when the liquid flows in a continuous stream.

Start the engine (**2500 rpm**).

Adjust the overflow level for approximately **4 minutes**.

Close the bottle.

BLEEDING

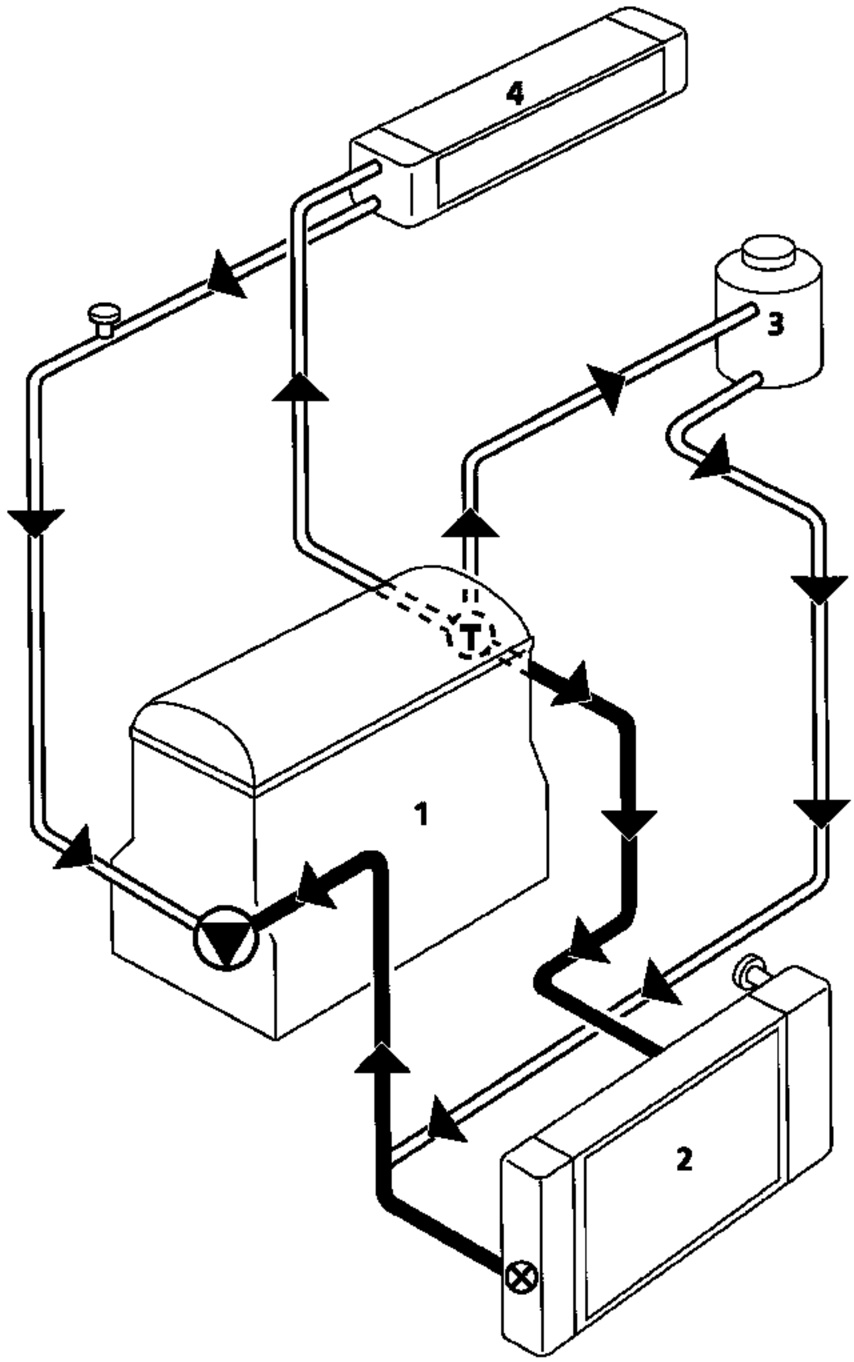
Leave the engine running for **10 minutes** at **2500 rpm**, until the fan(s) cut in (time required for automatic degassing).

Check that the liquid level is near to the"**Maximum**" mark.

DO NOT OPEN THE BLEED SCREW(S) WHILE THE ENGINE IS RUNNING.

RETIGHTEN THE EXPANSION BOTTLE CAP WHILE THE ENGINE IS WARM.

Diagram



11635-1R

1 Engine
2 Radiator
3 Bottle "warm" with permanent degassing
4 Heater matrix

Coolant pump

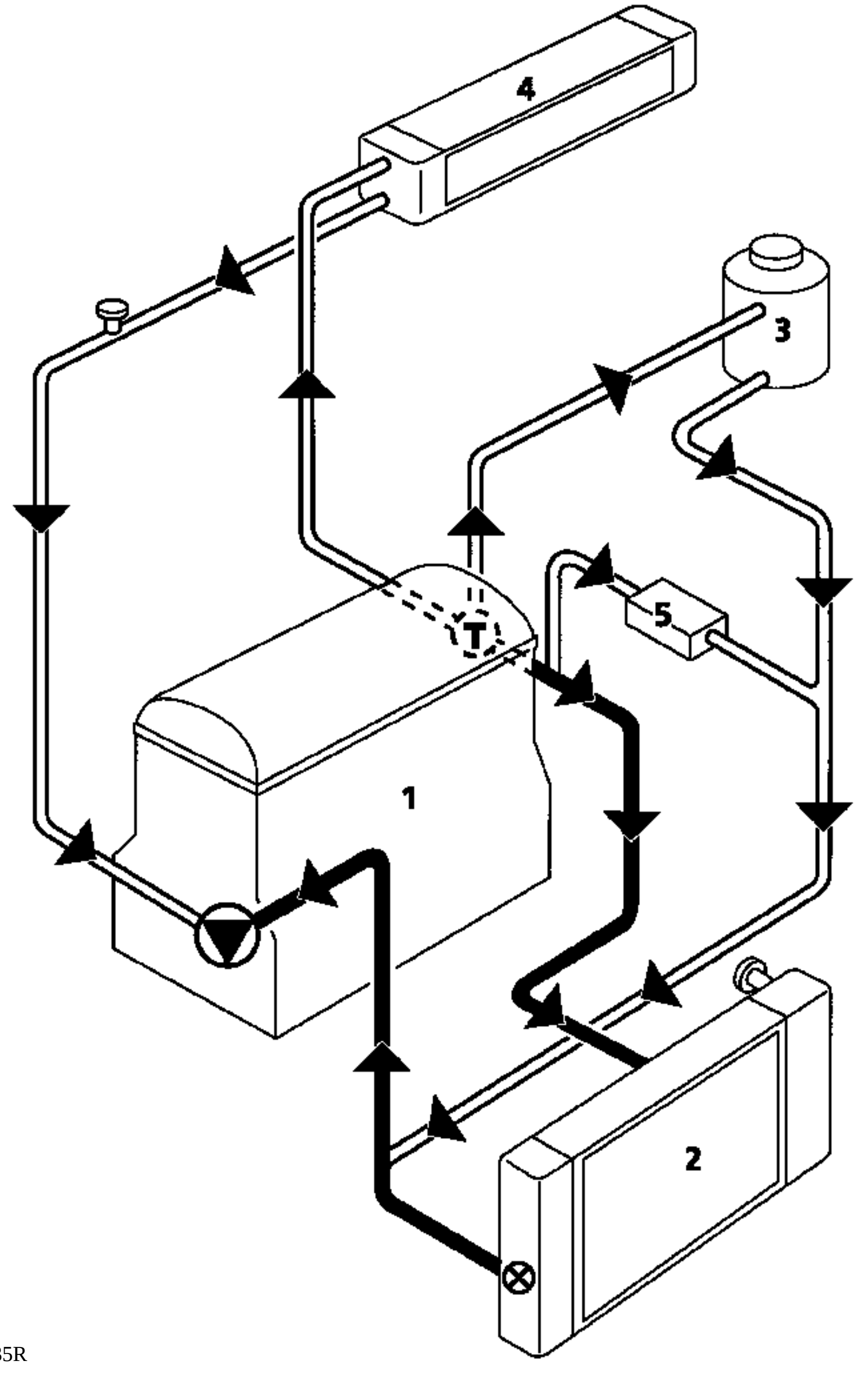
Thermostat

Bleed screw

Temperature switch

The expansion bottle cap is brown, the rating value is 1**.2 bar** .

Diagram



11635R

1 Engine
2 Radiator
3 Bottle "warm" with permanent degassing
4 Heater matrix
5 Automatic transmission oil temperature exchanger

Coolant pump

Thermostat

Bleed screw

Temperature switch

The expansion bottle cap is brown, the rating value is **1.2 bar** .

SPECIAL TOOLS REQUIRED	
Mot. 1054	**Top dead centre setting rod**
Mot. 1202	**Spring clip pliers**
Mot. 1273	**Belt tension checking tool**
Mot. 1399	**Tool for locating the engine on the subframe**

TIGHTENING TORQUES (in daN.m or in degrees)	
Crankshaft outlet mounting bolt	**2 + 80°**
Mounting bolt which secures the front right mounting to the engine	**5.5**
Mounting bolt which secures the front right mounting to the side member	**5.5**
Timing belt tensioner roller nut	**5**
Coolant pump mounting bolt	**0.9**

DEPOSE

Place the vehicle on a two post lift.

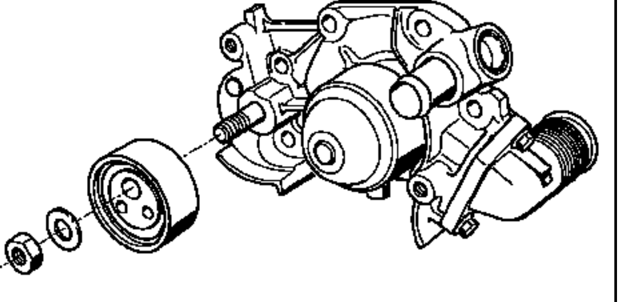
Disconnect the battery.

Remove the timing belt (refer to the procedure described in **section 11, Timing belt).**
Drain the cooling circuit via the lower radiator hose.

Remove:

- the two coolant pump hoses,

- the tensioner roller and the coolant pump.



10478S

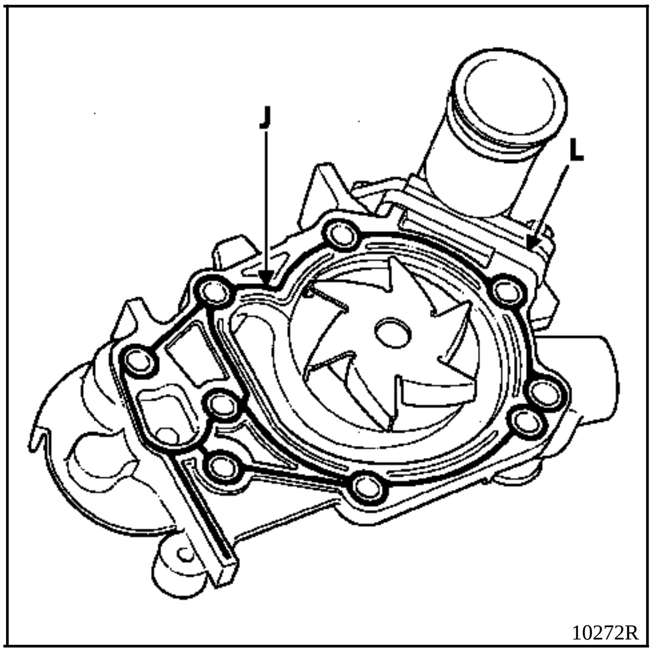
Clean the mating surfaces without scratching the aluminium surfaces.

REFITTING

Special features

The coolant pump is sealed using **RHODORSEAL 5661**, the bead (J) must be applied in accordance with the illustration below.

Fit a new seal to the surface (L) (coolant pump inlet elbow) or apply a bead of **LOCTITE 518** in accordance with the sealing seen on removal.



10272R

Refit in the reverse order to removal.

Fit:
- the new timing belt (refer to the procedure described in **section 11, timing belt).**
- the new alternator belt (refer to the tensioning procedure and value in **section 07, accessories belt tensioning).**

Do not forget to remove the top dead centre setting rod.

Fill and bleed the cooling circuit (refer to **section 19, Fill - Bleed)**.

EXHAUST DOWNPIPE POSITIONING

To check that the exhaust downpipe is positioned correctly, two measurements must be checked.

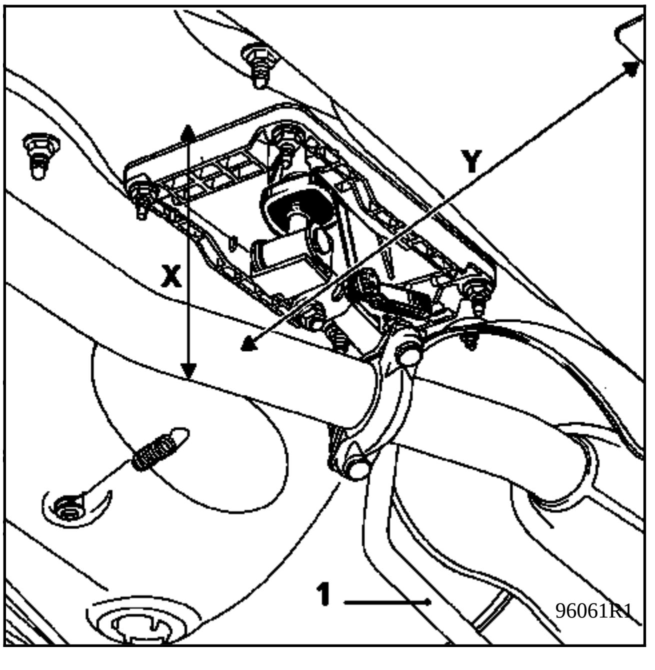
A measurement (X) in the vertical axis of the vehicle.

A measurement (Y) horizontal in the transverse axis of the vehicle.

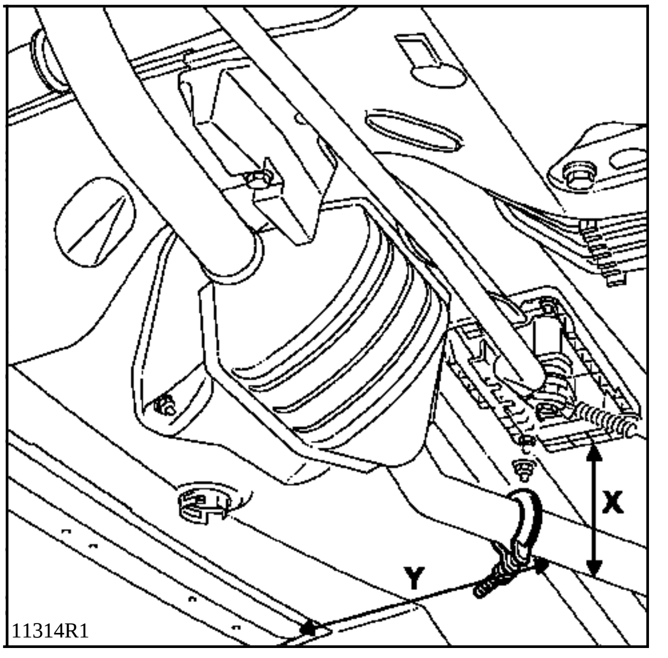
Measurement X is taken on the exhaust line and not on the downpipe, after the clip, just after the elbow.
From the lower section of the exhaust to the level section to the rear of the gear lever, the measurement should be **145 mm**.

Measurement Y is taken at the same level of the exhaust as measurement X, after the elbow.
The only difference is that the measurement is not taken under the exhaust but on its right-hand side.

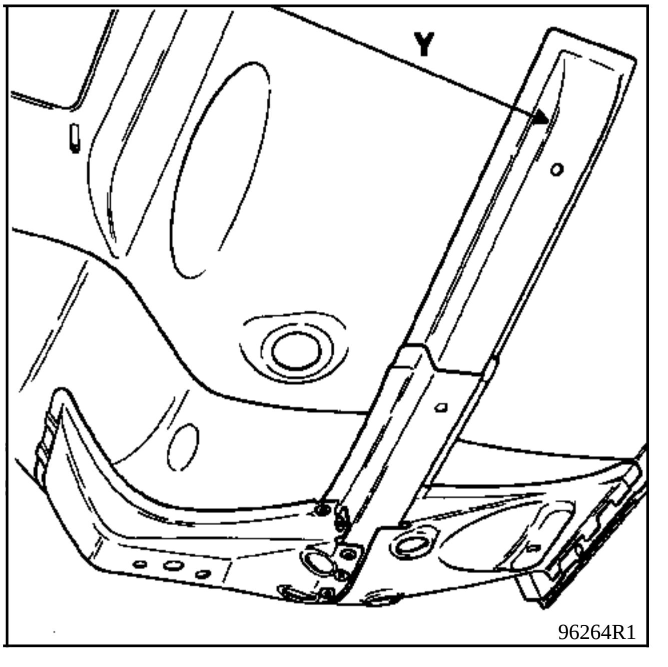
Measurement Y should be **347 mm** between the exhaust and the vertical surface of the right-hand side member.



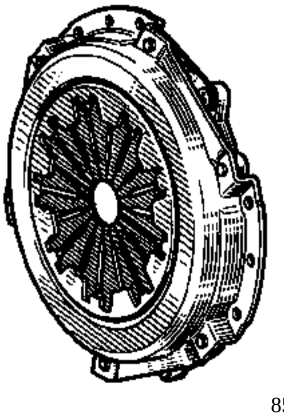
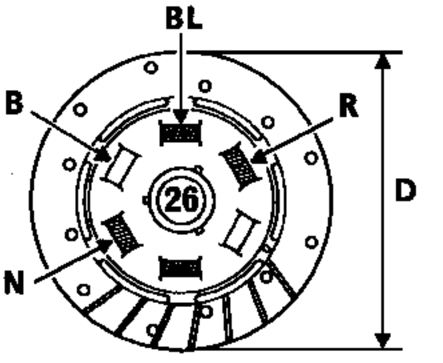
96061R1



11314R1



96264R1

<table>
<tr><th>ENGINE TYPE</th><th>COVER</th><th colspan="2">DISC</th></tr>
<tr><td rowspan="2">D7F</td><td>
85873S</td><td colspan="2">
90693-4R1

76906R</td></tr>
<tr><td>180 DST 3050</td><td>26 grooves
E = 7.8 mm
D = 181.5 mm</td><td>R = Red
BL = White
B = Blue
N = Black</td></tr>
</table>

CHANGING

This operation is carried out after uncoupling the gearbox.

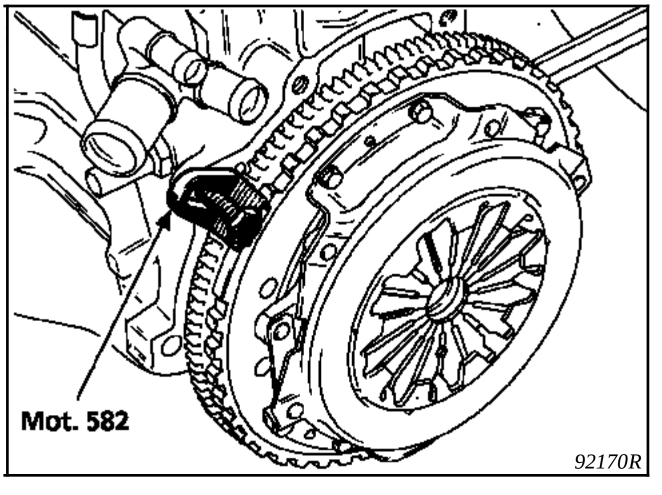
SPECIAL TOOLS REQUIRED	
Mot. 582	**Locking tool**

TIGHTENING TORQUES (in daN.m)	
Cover mounting bolt ∅ 7	**2.5**

REMOVAL

Fit locking tool **Mot. 582.**

Remove the cover mounting bolts and remove the cover and the clutch disc.



92170R

Visually check:
- that there are no scratches on the on the surface of the engine flywheel,
- the wear of the engine flywheel,
- the condition of the starter crown wheel,
- the sealing at the crankshaft and gearbox guide tube lip seal.

Change the faulty parts and clean the clutch shaft grooves.

JB1									
Index	**Vehicle**	**Differential ratio**	**Speedo drive gear**	**1st**	**2nd**	**3rd**	**4th**	**5th**	**Reverse**
132	X 066 C 067	15/56	21/20	11/37	22/41	28/37	30/29	41/31	11/39 26

Capacity - Lubricants

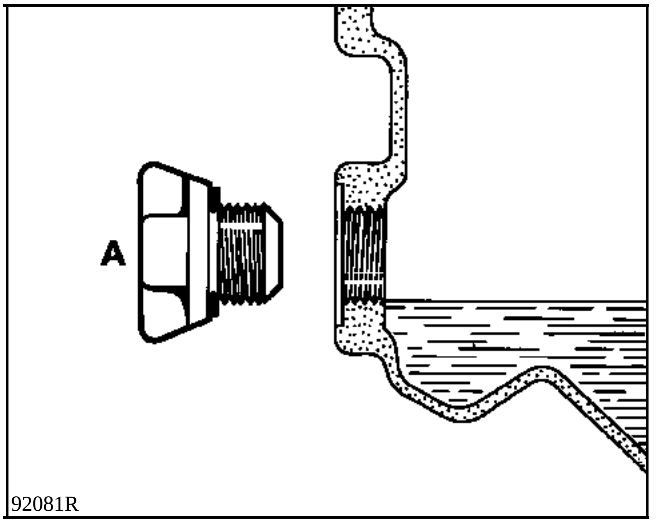
CAPACITY (in litres)

5 speed gearbox JB1 : 3, 4

Quality, viscosity

TRANSELF TRX 75W 80W

LEVEL



Fill to the level of the opening.

JB and JC

TYPE	PACKAGING	PART NUMBER	UNIT
MOLYKOTE BR2	1 kg box	77 01 421 145	Right-hand sun wheel grooves Fork pivot Stop guide Fork pads Clutch
Loctite 518	24 ml syringe	77 01 421 162	Casing assembly surfaces
RHODORSEAL 5661	100 g tube	77 01 404 452	Threaded caps and switches Bearing plug Ends of the spring pins on the drive shafts
LOCTITE FRENBLOC (locking and sealing resin).	24 cc bottle	77 01 394 071	Input and output shaft nuts Fixed gear and 5th gear hub Clawing driver

Parts which must always be changed

When they have been removed:

- the paper seals,
- the lip seals,
- the differential housing mounting bolts,
- the spring pins,
- the reverse gear inverter bolt,
- the O-ring,
- the stop rings,
- the stop guide tubes,
- the input and output gear nuts,
- the speedometer gear,
- the brake caliper bolts.

SPECIAL TOOLS REQUIRED		
B.Vi.	31-01	**Set of brushes**
T.Av.	476	**Ball joint extractor**

EQUIPMENT REQUIRED
Engine support

TIGHTENING TORQUES (in daN.m)	
Mounting bolt and nut which secure the clutch cover to the engine	**5**
Clutch protector mounting bolt	**2.5**
Drain cap	**1.8**
Filler cap	**0.15**
Left-hand driveshaft gaiter mounting bolt	**2.5**
Brake caliper mounting bolt	**10**
Shock absorber base mounting bolts	**11**
Steering ball joint nut	**3.5**
Stub axle carrier cotter nut	**5.5**
Mounting mounting bolt	**4 - 5**
Wheel bolts	**9**

REMOVAL

Place the vehicle on a lift.

Disconnect:
- the battery.
- the air inlet sleeve.

Remove the plastic engine undertray.

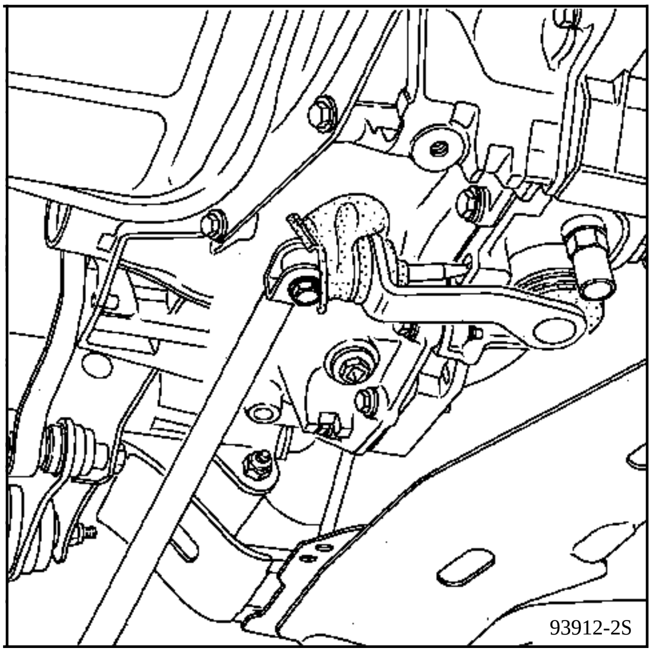
Drain the gearbox.

Remove:

- the front wheels,
- the left-hand driveshaft,
- the left-hand mud shield.

Tilt the stub axle carrier and uncouple the right-hand drive shaft.

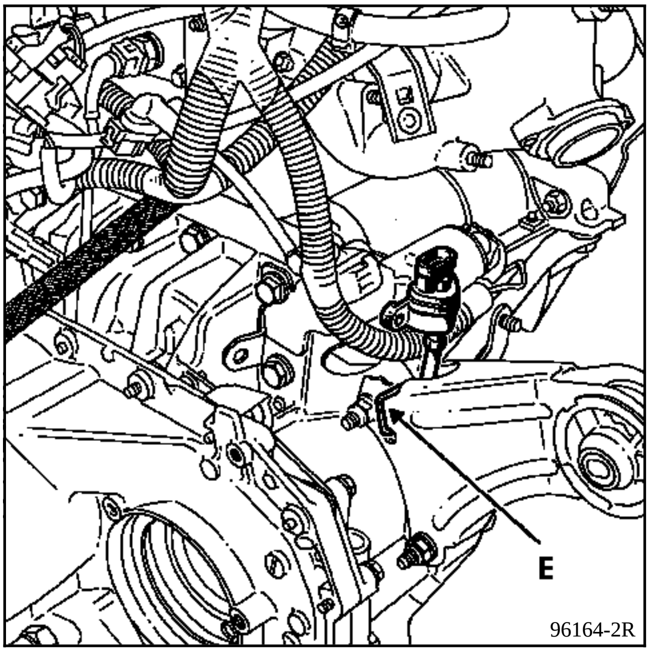
Uncouple the gear control cable at the gearbox outlet lever after detaching the protective gaiter.



93912-2S

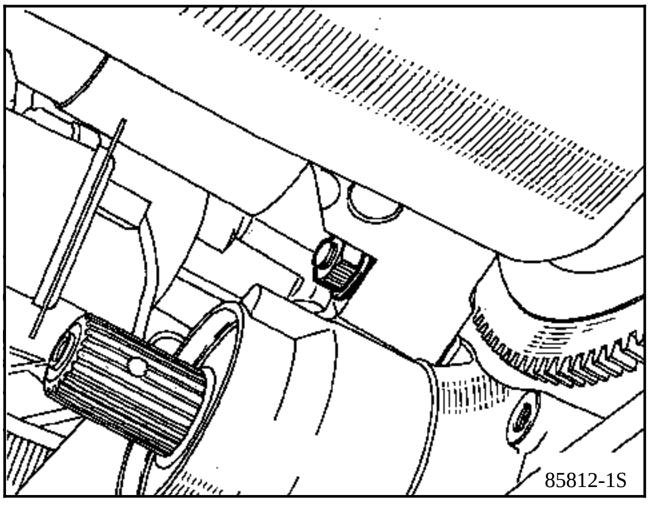
Attach the gear lever to the exhaust pipe, to the rear.

Remove the pin (E) and disconnect the speedometer cable.

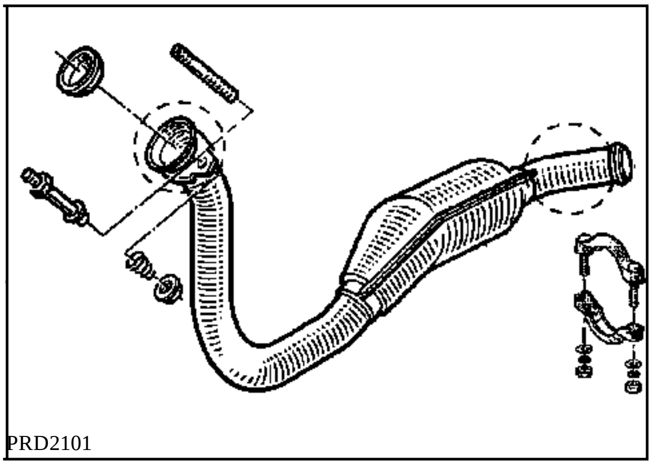


96164-2R

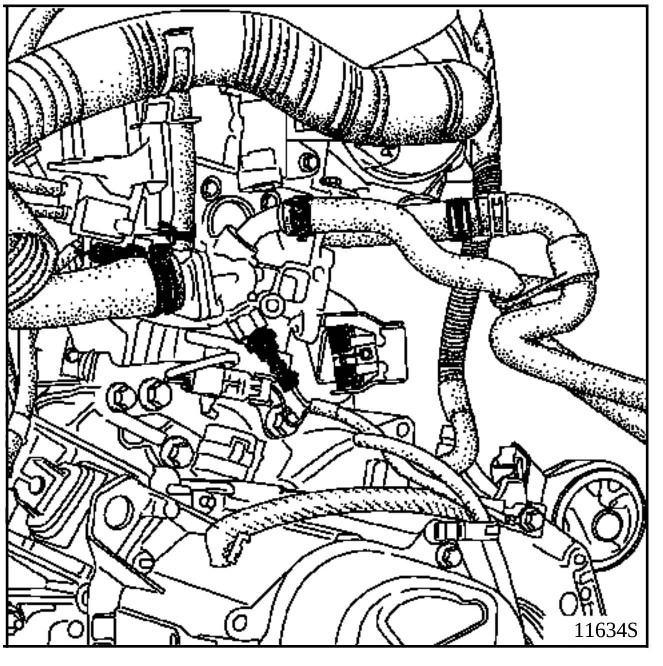
Remove:
- the clutch protective plate,
- the mounting nut which secures the engine to the gearbox,


85812-1S

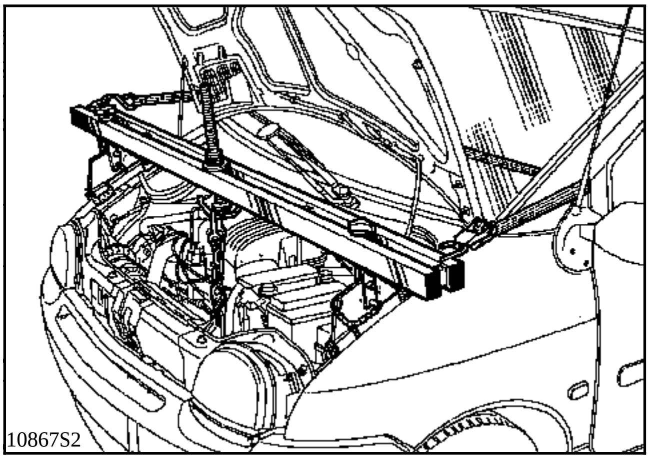
- the exhaust down-pipe,


PRD2101

- the torque pickup central bracket
- the starter,
- the top dead centre sensor,
- the earth strap and connectors

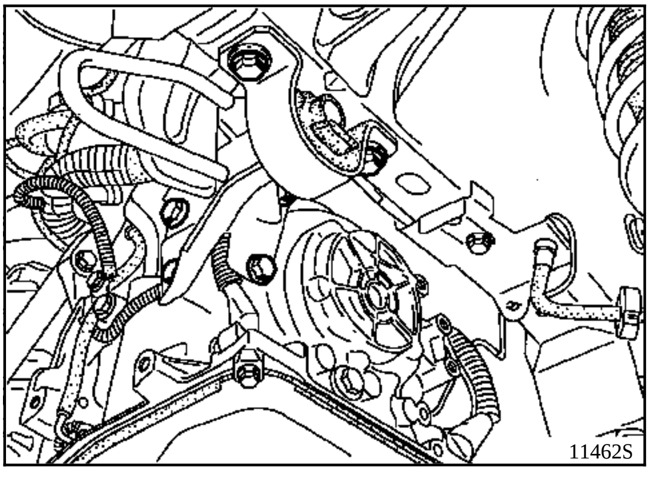

11634S

Position the engine support and strap the engine to it.


10867S2

Disconnect the clutch cable.

Remove:
- the gearbox surround bolts,
- the complete front left mounting.

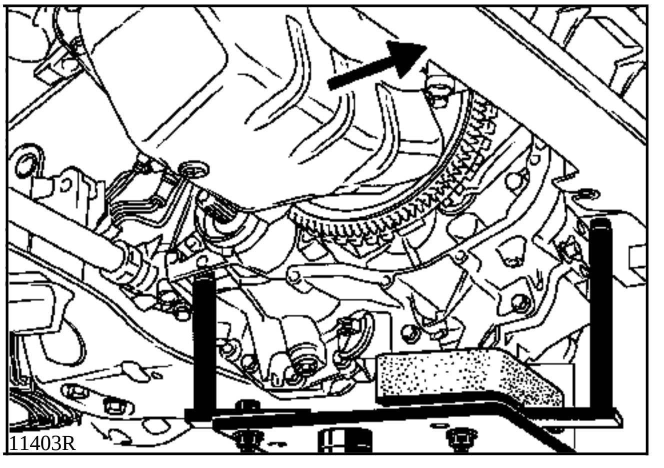

11462S

Disconnect the reversing light connector.

Position a unit jack without the gearbox.

Remove the two dowel pins.

Uncouple the gearbox. To remove the gearbox, move the engine / gearbox assembly forwards and lower the gearbox rotating it a quarter turn clockwise.


11403R

REFITTING

IMPORTANT
The front left mounting setting instructions must be strictly observed on refitting, refer to section 19.

Refit in the reverse order to removal.

Change the brake caliper mounting bolts and tighten them to the specified torque.

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

Tighten the nuts and bolts to the specified torques.

Refill the gearbox.

The Twingo fitted with type M automatic transmission is fitted with the latest generation of computer (M4-3).

Configuration with the D7F engine is identical to that of vehicles fitted with the E7J:
- the "load" information (throttle opening) is transmitted by the injection computer (there is not special load potentiometer on the automatic transmission),
- the engine speed information is transmitted by the injection computer,
- there is no kickdown switch.

Fault-finding for this function using the XR25 is with fiche No. 26. The basic manual for interpretation of the bargraphs and the processing of customer complaints is memo Diag. No. 7.

DIFFERENCES IN RELATION TO FAULT-FINDING IN E7J CONFIGURATION

The only differences relating to the connections between the automatic transmission and injection computers are:

- the load information is transmitted on track 41 of the injection computer connector (track 22 for E7J),
- the Park / neutral / damping information is received on track 7 of the injection computer connector (track 8 for E7J),
- the engine speed information is transmitted on track 48 of the injection computer connector (track 12 for E7J).

This track also controls the fuel pump relay.

The engine speed information is taken on terminal D2 of the fuel pump relay bracket.

Vehicle	AT type	Index	Final drive	Intermediate drive	Speedo drive gear	Oil pressure (in bars)	Computer no.
C 06	MB1	033	15 / 58	29 / 24	21 / 20	4.15 ± 0.05	143

Gear ratios

Gear	1st	2nd	3rd	Reverse
Gear ratios Axle only	2.5	1.5	1	2
Gear ratios Axle +Down-pipe	2.069	1.241	0.827	1.655
Gear ratios Axle + Down-pipe + Drive axle	8	4,8	3,2	6,4
Speed in mph(Km / h)for 1000 rpm	7.78 (12.52)	12.97 (20.87)	19.456 (31.31)	9.73 (15.656)

Tyres : 155 / 70 R 13

Gear change thresholds

Load level	1 → 2	2 → 1	2 → 3	3 → 2
No load	12	6	41	19
Full load	43	18	111	61
Kickdown switch	44	23	112	71

No load: Accelerator pedal released.

Full load: pedal fully pressed.

The figures shown in the tables are the theoretical average gear change speed values (timed speeds). These values may vary depending on the tolerances permitted on the equipment and also with the tyres.

Description	Unit concerned
RHODORSEAL 5661	Sealing of the driveshaft dowel pins
MOLYKOTE BR 2 grease	- Sun wheel grooves - Tool for aligning the drive plate on the converter
Loctite FRENBLOC	Brake caliper mounting bolts

Parts which must always be changed

Parts to be changed when they have been removed:

- the spring pins.
- the self-locking nuts.
- the copper seals.

Oil

MB1 automatic transmission

MECHANISM : ELF RENAULTMATIC D2.

If not available:

MOBIL ATF 220 D.

CAPACITY IN LITRES:

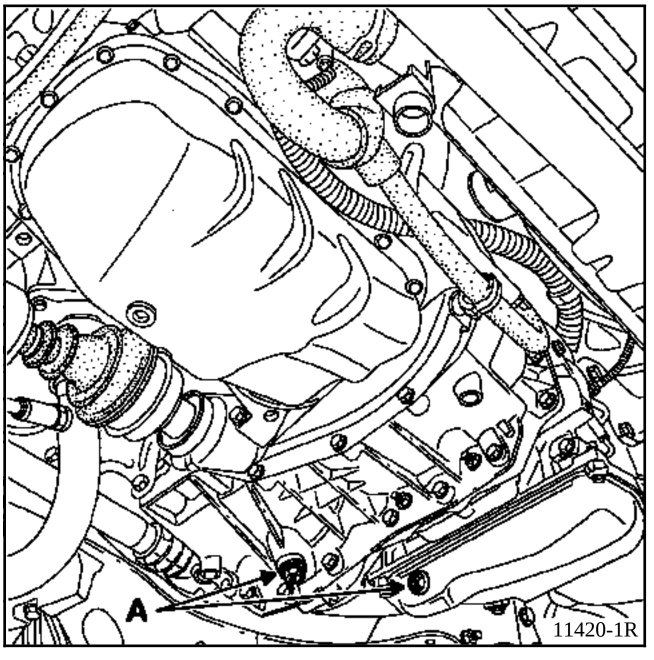
Theoretical total	:	**4.5**
After draining	:	**2**

NOTE: if the automatic transmission is changed, the new unit must be refilled as it is supplied empty by the Parts Department.

DRAIN - FILL

Draining must be carried out when cold, dipstick and cap (A) removed.

Change the strainer.



11420-1R

Refit the cap with a new seal.

Filling with the recommended oil is via the dipstick tube.

Use a funnel with a 15/100 filter in order to prevent the introduction of impurities.

Run the engine at idle.

Check the level and top up if necessary.

OIL LEVEL CHECK WHEN COLD

Place the vehicle with no load on a flat, horizontal area.

Place the selector lever at **"PARK" (P)**.

Start the engine and wait one or two minutes for filling of the converter and the cooler.

The oil is at an ambient temperature of **20°C.**

Remove the dipstick, engine running.

The level must not be below the mark (1) **MINIMUM COLD** (risk of damage) an it must not exceed the mark (2) **MAXIMUM COLD** (risk of damage).

Never exceed the "MAXIMUM COLD" level.

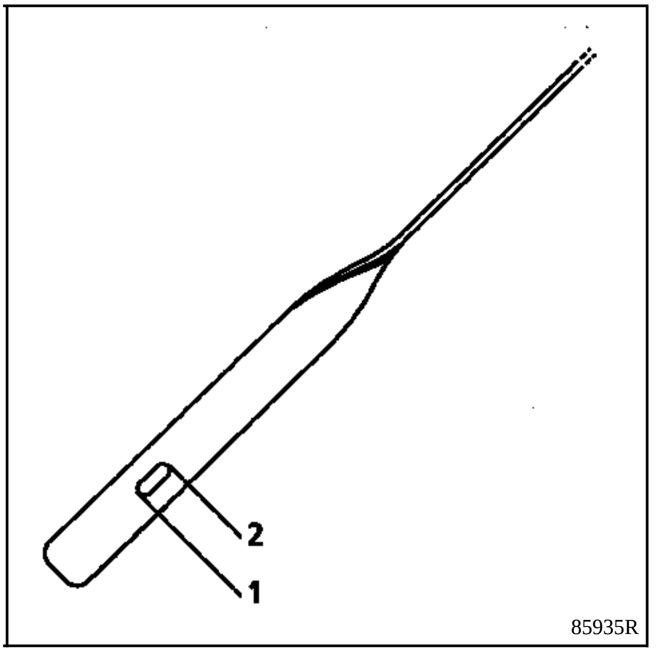
WARNING:

Too much oil will result in:

- abnormal heating of the oil
- leaks

Too little oil will result in:

- a damage to the mechanism.



85935R

Read the level when cold

1 - MINIMUM COLD

2 - MAXIMUM COLD

SPECIAL TOOLS REQUIRED	
B. Vi. 466-06	**Cylindrical end piece**
B.Vi. 466-07	**Oil pressure gauge**

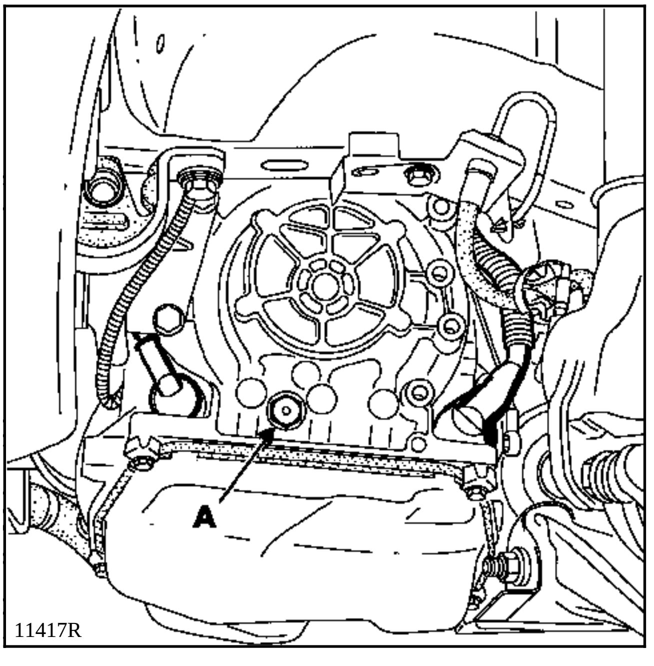
CHECK

Measuring condition

Ensure that:

- the normal operating temperature is 80°C,
- the accelerator cable is adjusted correctly.

Connect the fluid pressure gauge **B. Vi. 466-07** to the end piece **B. Vi. 466-06** at **(A)**.



Measurement

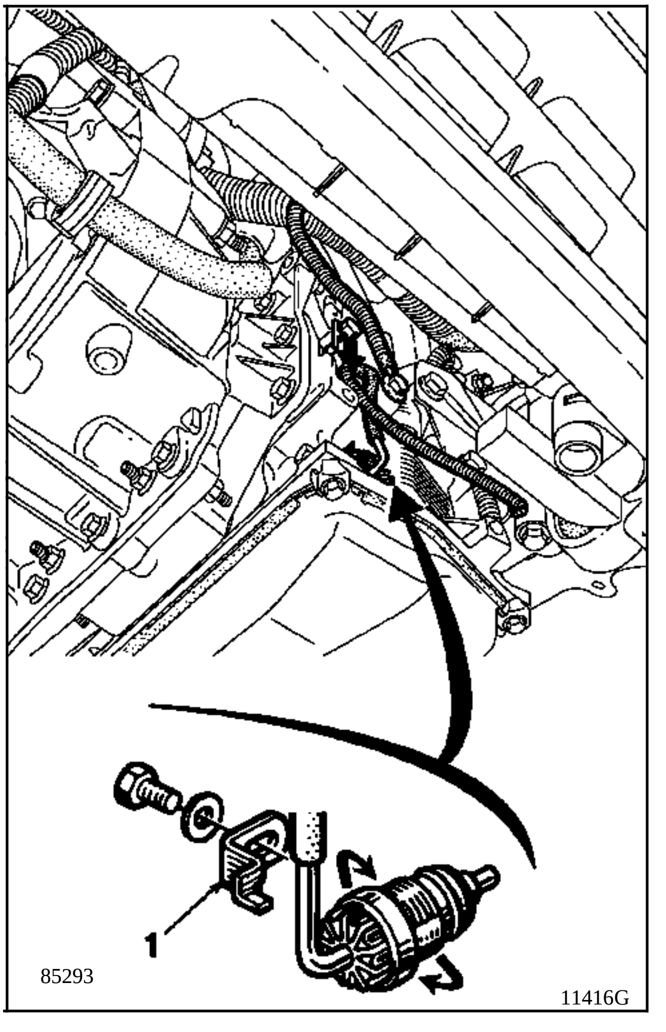
Place the selector lever in the 2nd gear imposed position.

Accelerate fully and brake at the same time to stabilise the speed at **50 mph (80 km/h)**.

The pressure should be **4.15 ± 0.05 bars**.

ADJUSTMENT

Remove the stop **(1)** and turn the capsule. Tightening the capsule increases the pressure and vice versa.

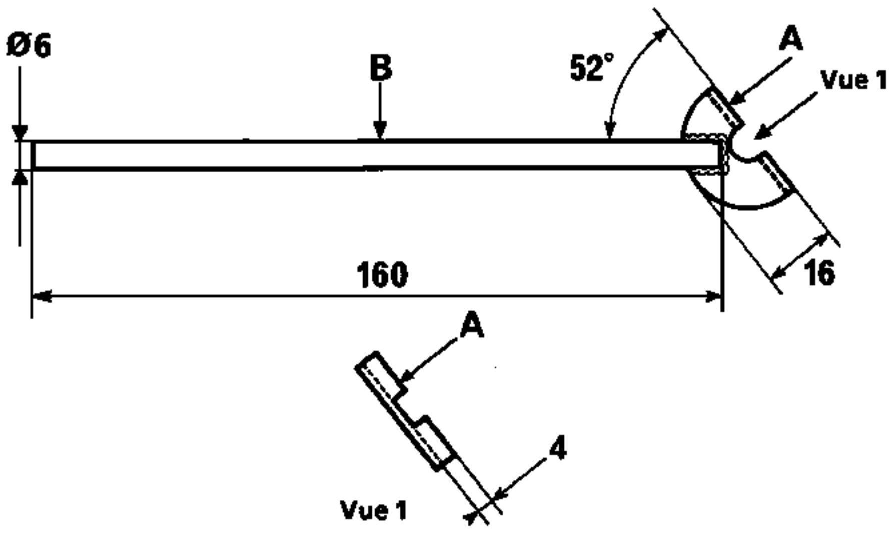


NOTE :

2 notches = approximately 0.1 bar.

A tool can be made to make the operation easier.

A = washer ∅ **8/30 mm**, thickness **1.5 mm**.
B = round pin ∅ **6 mm**.



88862R1

CHANGING

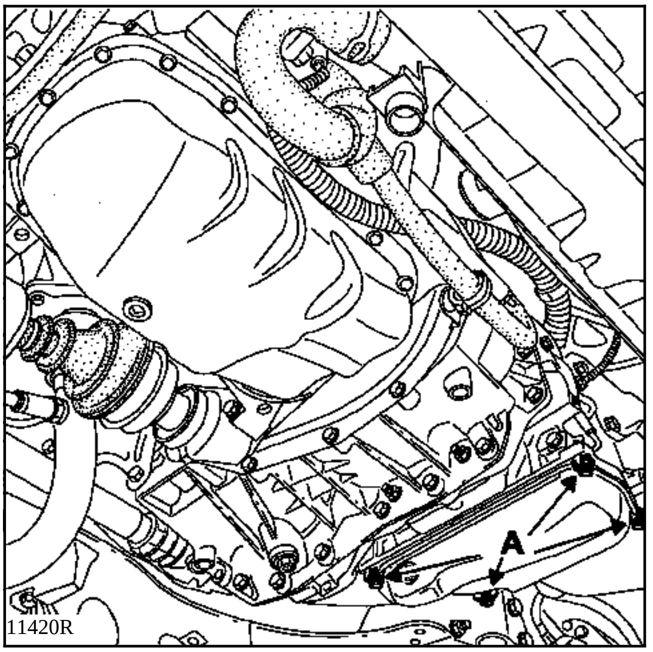
Place the vehicle on a two post lift.

Disconnect the battery.

Drain the automatic transmission.

REMOVAL

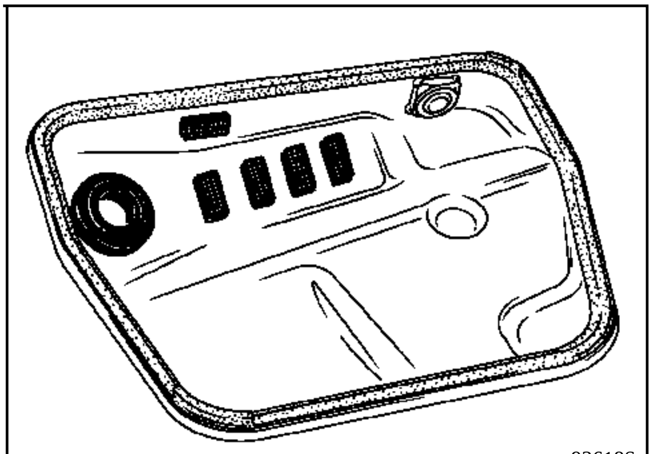
Remove the sump (A) and the strainer with its seal.



11420R

REFITTING

Clean the sump and its magnets (remove them before cleaning).


93618S

Fit the new strainer with its seal and tighten to **0.9 daN.m.**

Refit the sump and refill with oil.

SPECIAL TOOLS REQUIRED		
B. Vi.	31-01	Set of brushes
T. Av.	476	Ball joint extractor
Mot.	582	Engine flywheel locking tool
Mot. 1272		Engine - Automatic transmission assembly positioning tool

SPECIAL EQUIPMENT REQUIRED
Engine support

TIGHTENING TORQUES (in daN.m)	
Brake caliper mounting bolt	3.5
Shock absorber base mounting bolt	11
Steering ball joint nut	3.5
Stub axle carrier cotter nut	5.5
Left-hand driveshaft gaiter mounting bolt	2.5
Central connecting rod bolt	6.5
Mounting bolt which secures the automatic transmission mounting to the side member	4.2
Front left automatic transmission mounting bolt	3.9
Oil cooler bolt	2.5
Bolt which secures the drive plate to the converter	2.8
Automatic transmission retaining surround bolt	5
Front subframe mounting bolt	6
Rear subframe mounting bolt	11
Drain cap	1.8
Filler cap	0.15

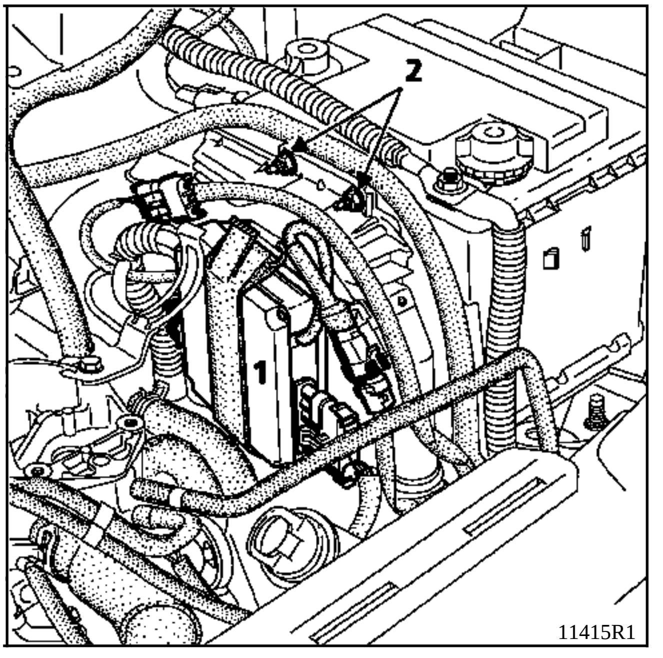
REMOVAL

Place the vehicle on a two post lift.

Remove:

- the battery,
- the air pipe,
- the computer protective housing.

Disconnect and detach the automatic transmission computer (1).



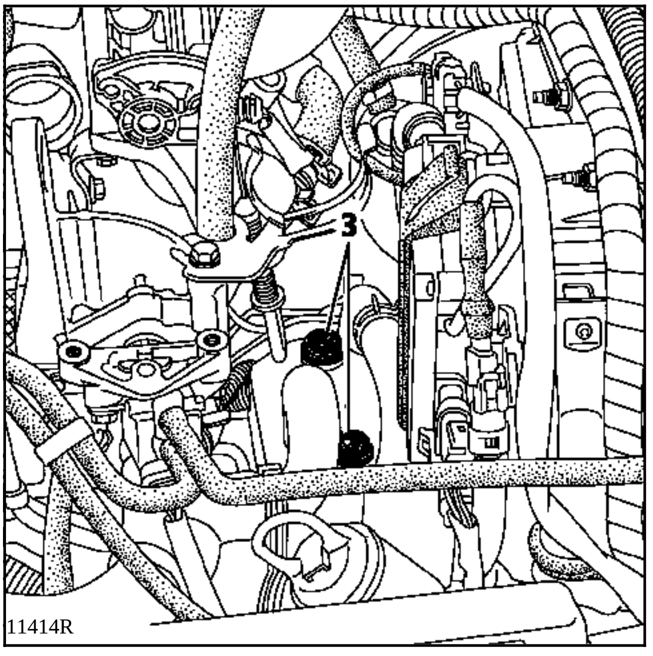
11415R1

Remove the mounting and the injection computer (2)

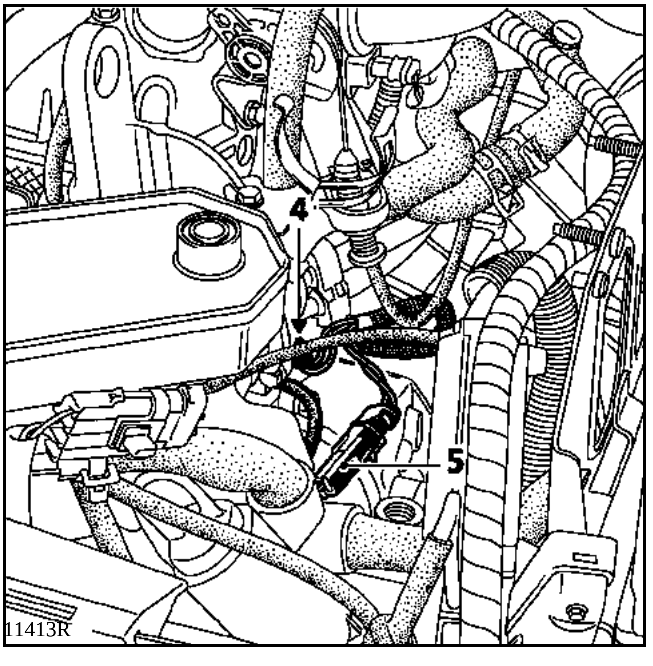
Unclip the electrical harness and the cooling hose.

Remove and detach the oil cooler (3).

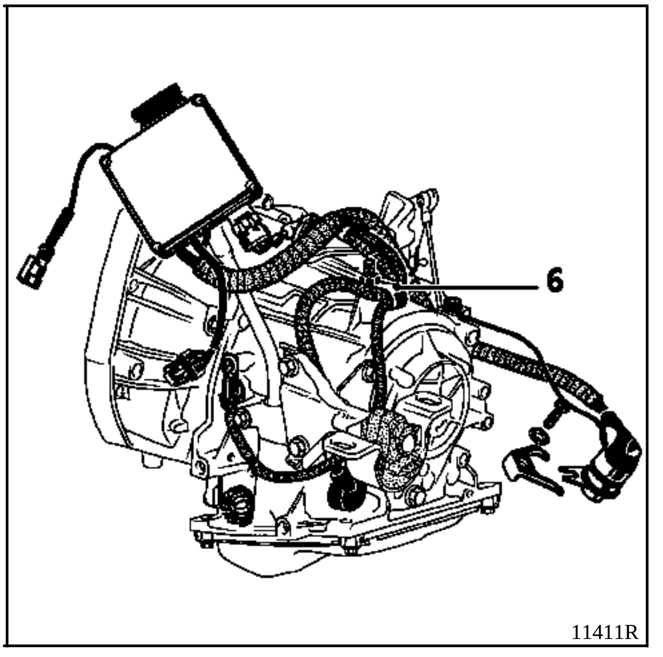
Remove and detach the oil cooler (3).



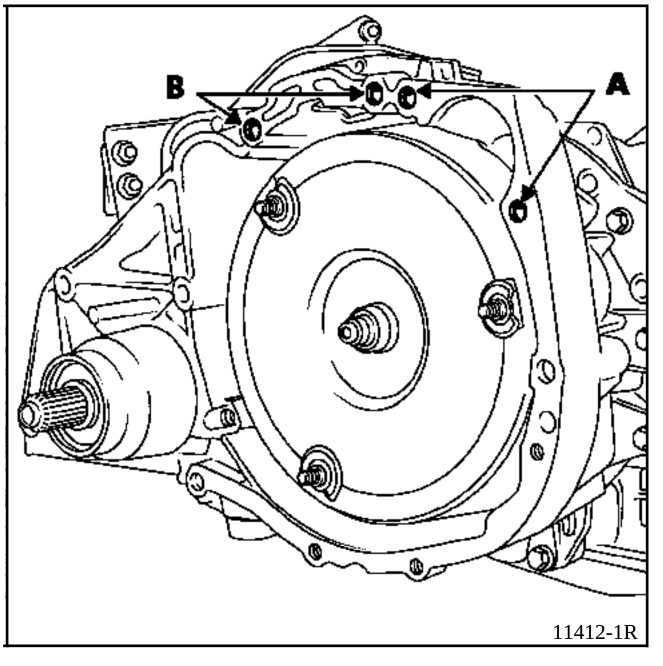
Disconnect the coolant temperature sensor (4) and remove the TDC sensor (5).



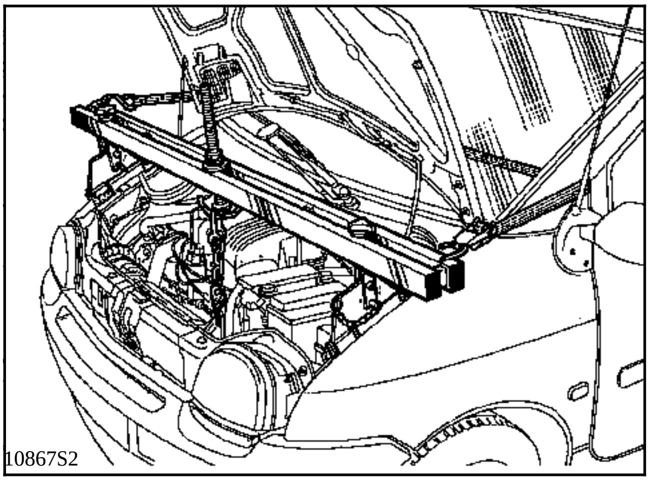
Remove:
- the earth strap and the harness bracket (6),



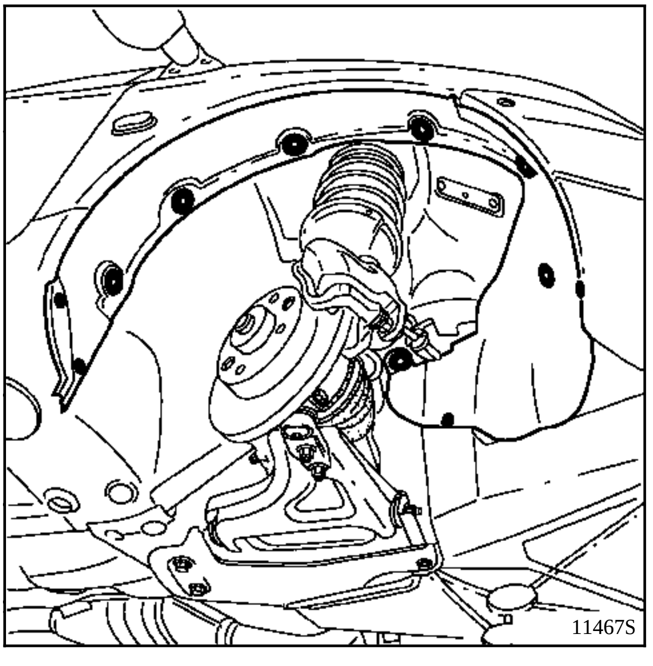
- the 2 starter bolts (A) and the 2 upper gearbox surround bolts (B).



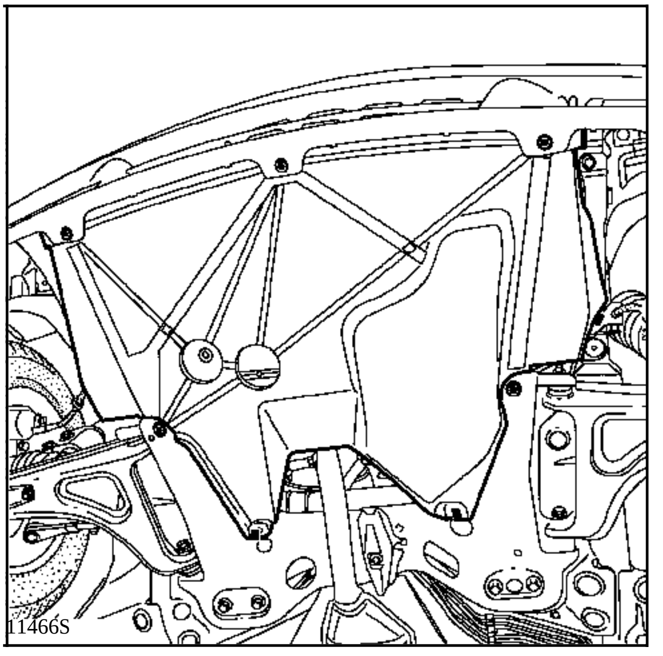
Using the engine support tool, relieve the engine and ensure that the tool is stable.



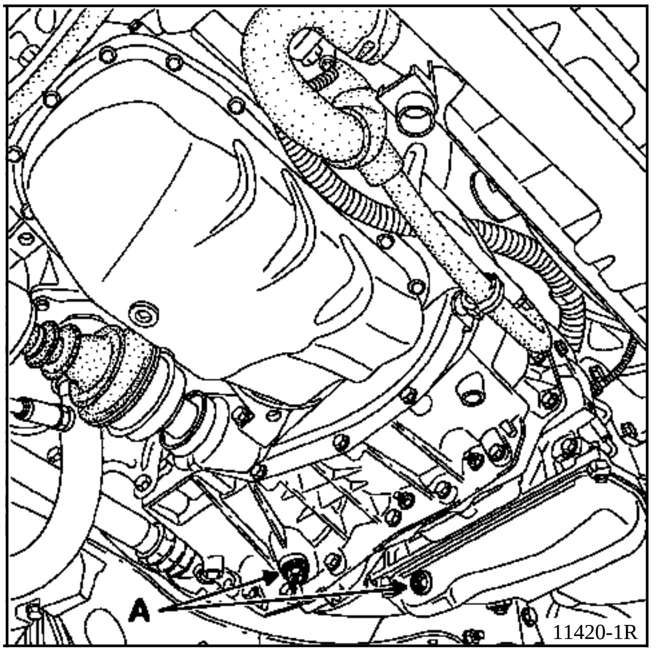
Remove:
- the front wheels,
- the left and right hand mud shields,



- the plastic engine undertray

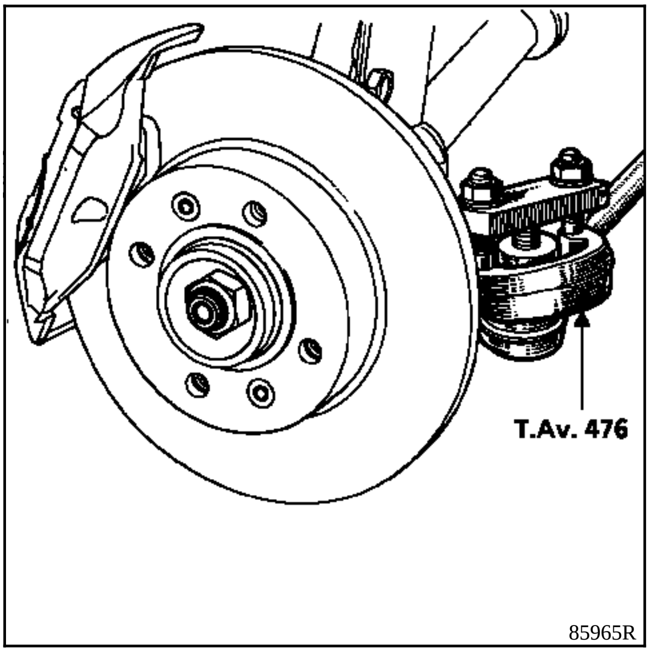


Drain the automatic transmission (A).



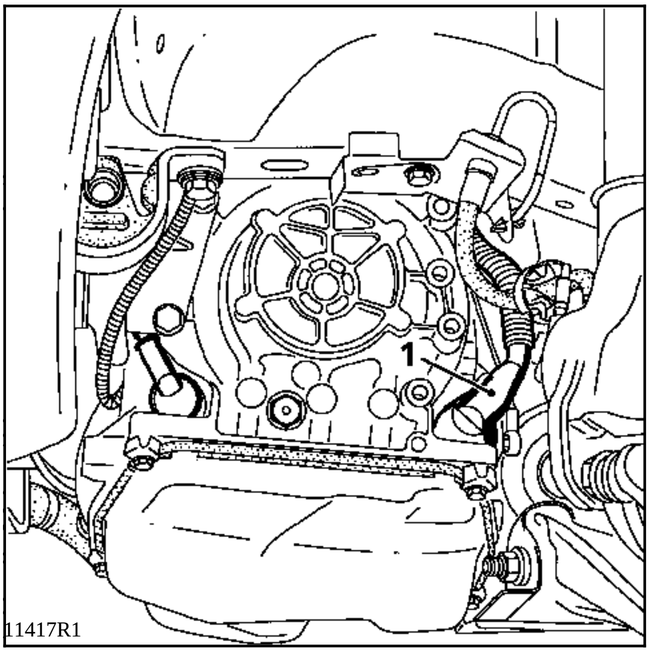
From the right-hand side of the vehicle remove:

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



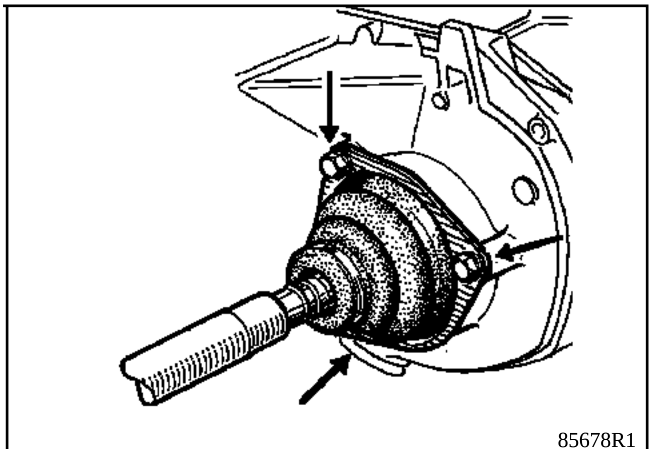
85965R

Remove and detach the multi-function switch (1).

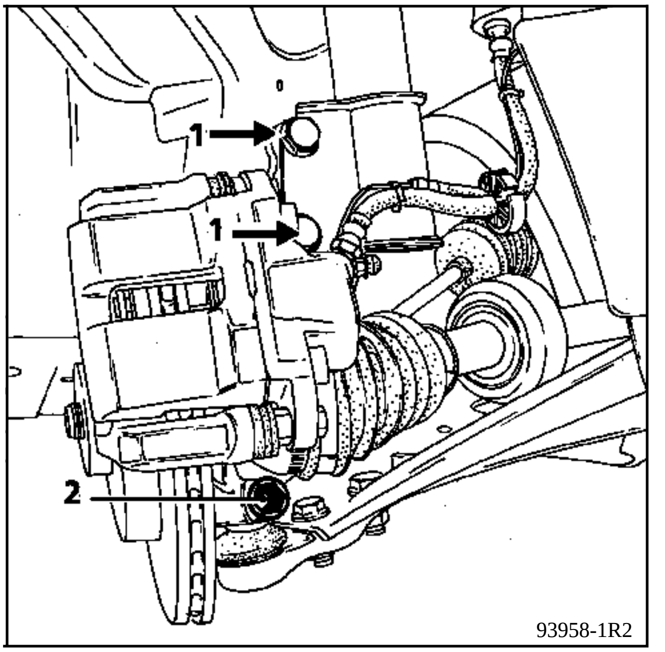


11417R1

Remove:
- the three driveshaft gaiter mounting bolts,

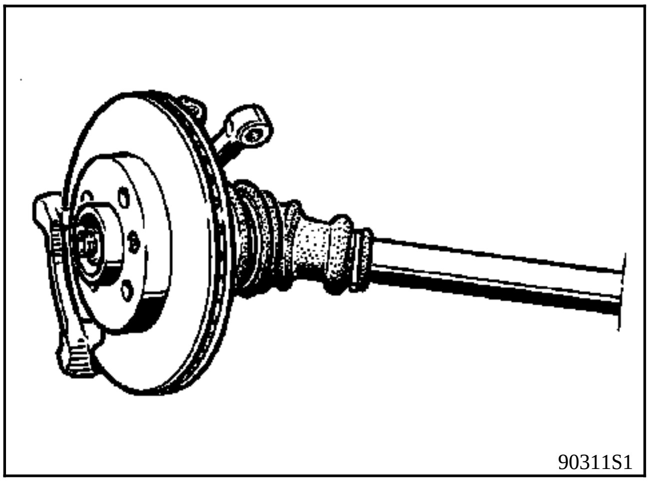

85678R1

- the two caliper mounting bolts, securing the caliper to the suspension spring in order to prevent tensioning of the pipe,
- the two shock absorber base mounting bolts (1)
- the cotter bolt and nut (2),



93958-1R2

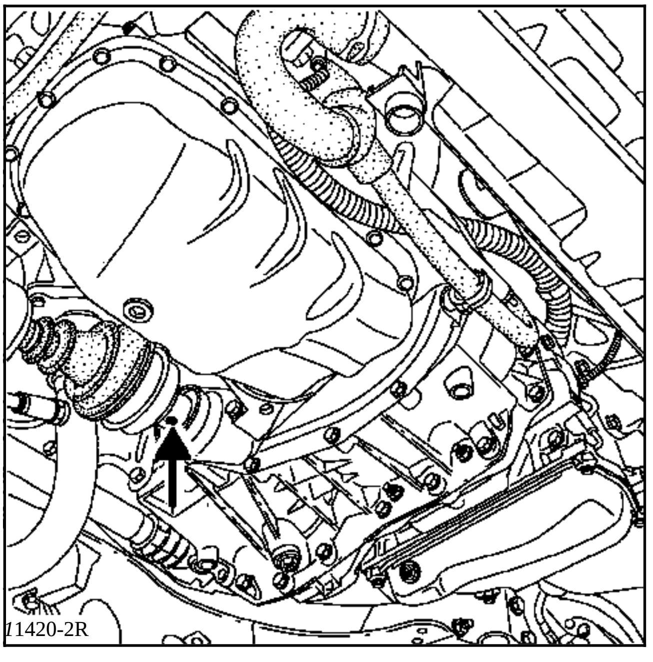
- the driveshaft / stub axle carrier assembly at the lower ball joint.


90311S1

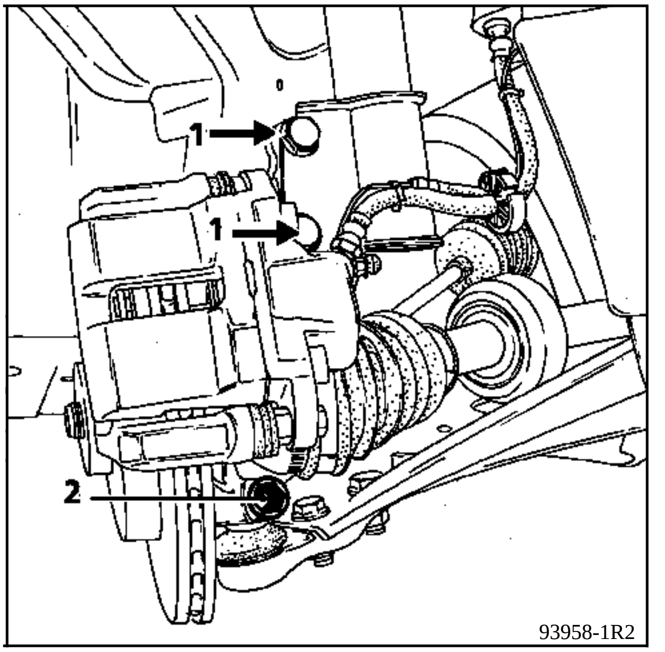
Check that the driveshaft rollers do not come off by hand. If they do, check on refitting that the needles have not fallen into the gearbox.

From the right-hand side of the vehicle remove:

- the driveshaft dowel pin using tool **B. Vi. 31-01**

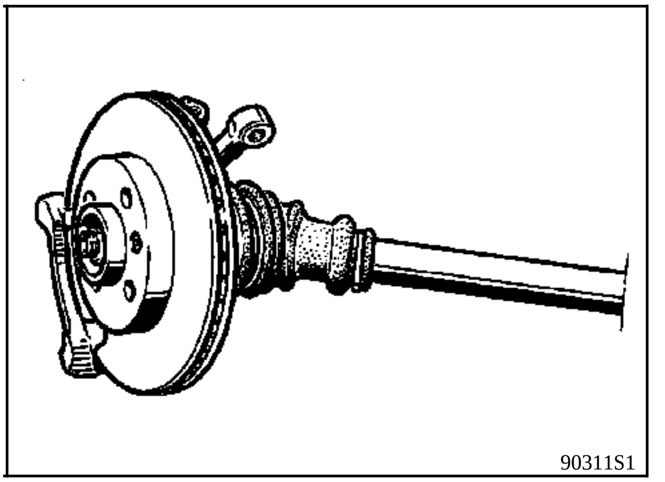

11420-2R

- the two shock absorber base mounting bolts (1),
- the cotter bolt and nut(2),



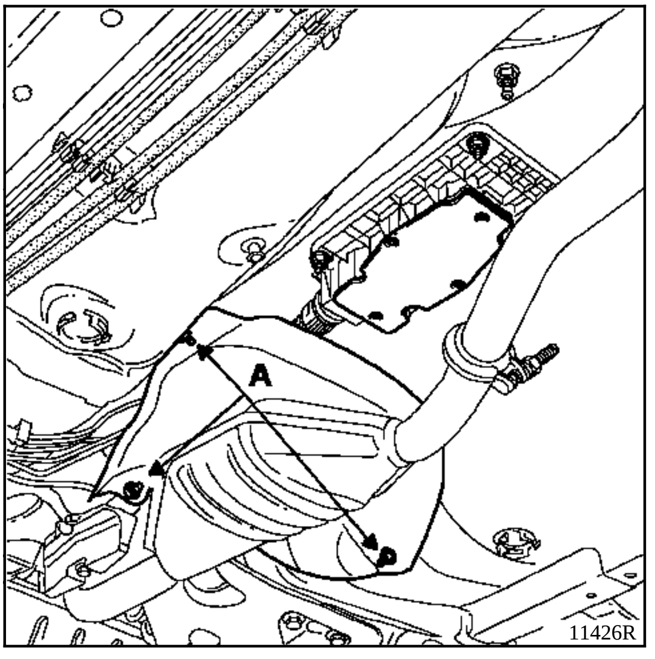
93958-1R2

- the driveshaft / stub axle carrier assembly at the lower ball joint.

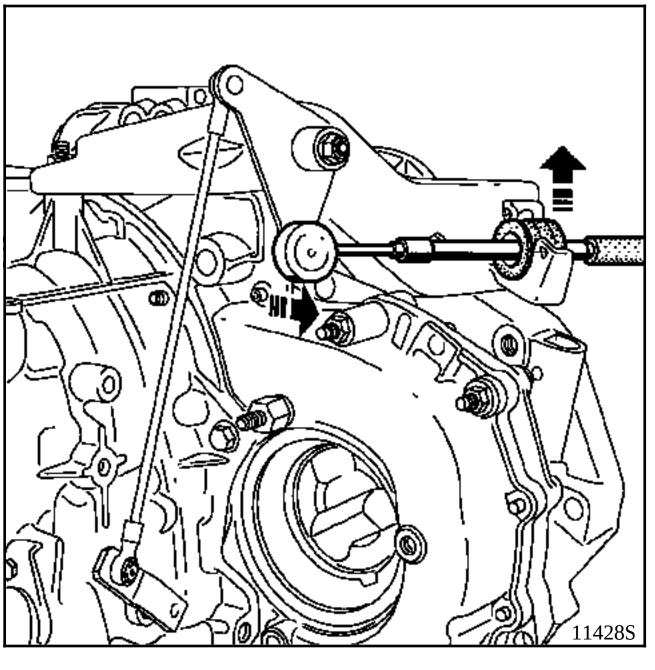

90311S1

Disconnect the oxygen sensor.

Remove:
- the catalytic converter,
- the heat shield (A)



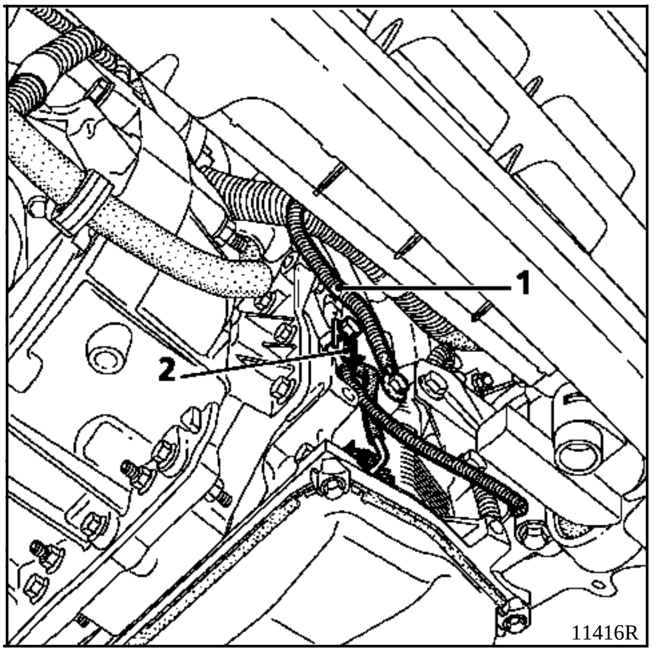
Remove the pin and remove the speedometer housing.



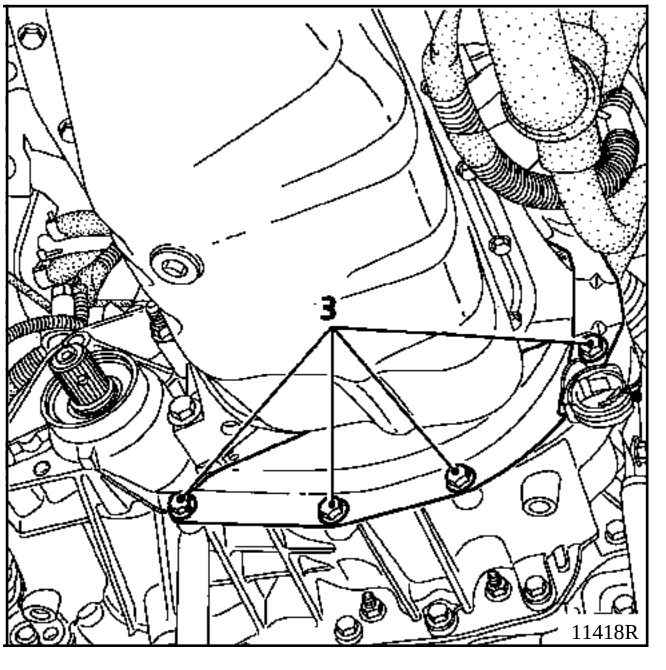
Remove the gear control cable at the attachments.

Remove the earth strap (1).

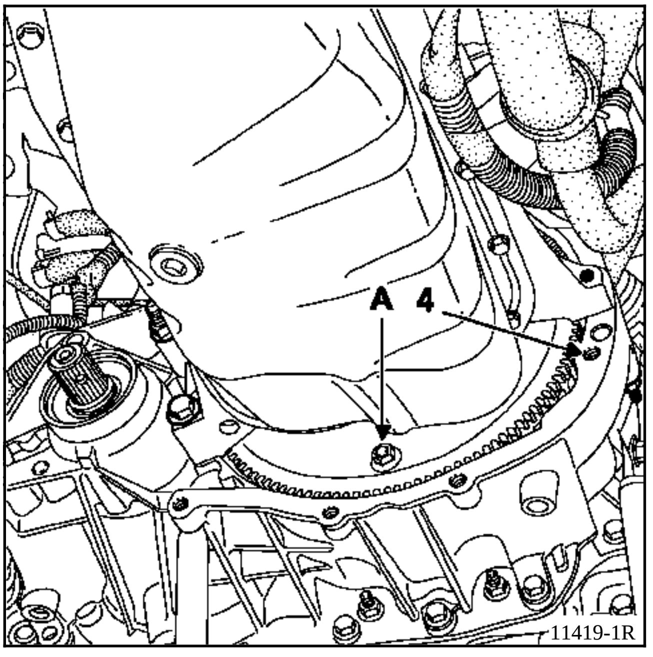
Disconnect the oil pressure gauge (2).



Remove the converter protective plate (3).



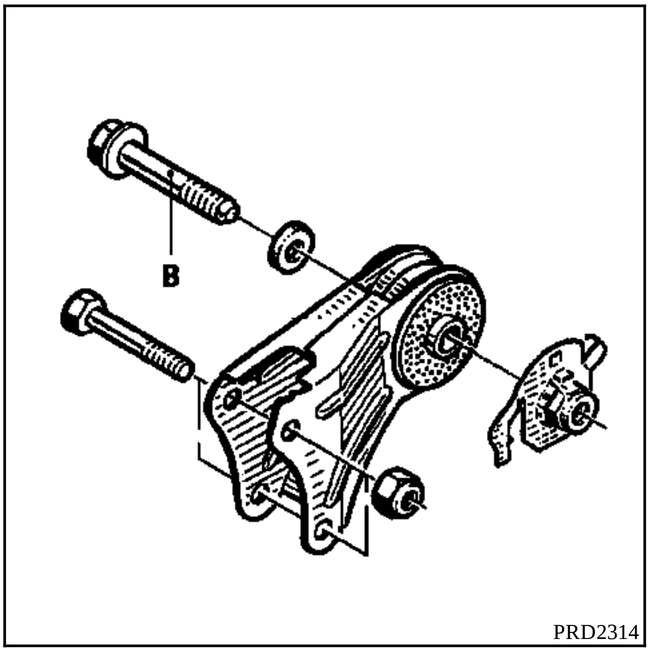
Fit locking tool **Mot. 582** at (4) and remove the bolts (A) which secure the drive plate to the converter.



11419-1R

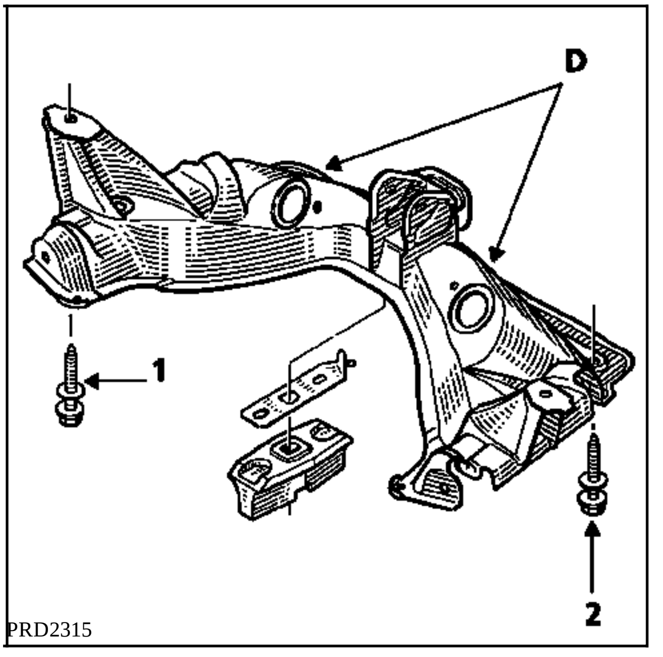
Remove:

- the rear central bracket bolt (B),



PRD2314

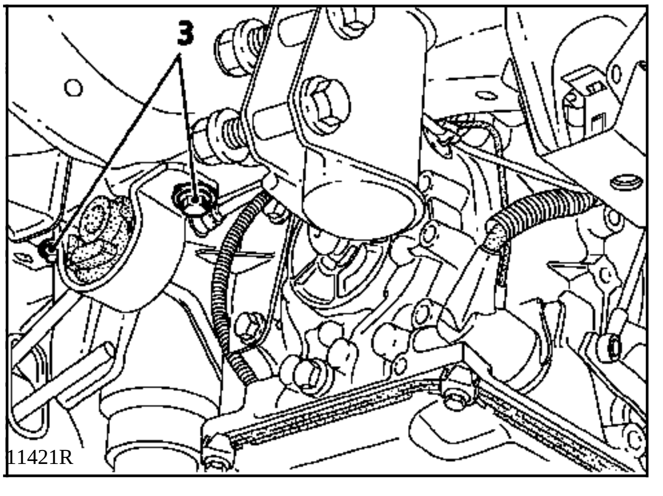
- the steering box bolts (D) and suspend the steering box.



PRD2315

Unclip the brake and fuel pipes from the sub-frame.

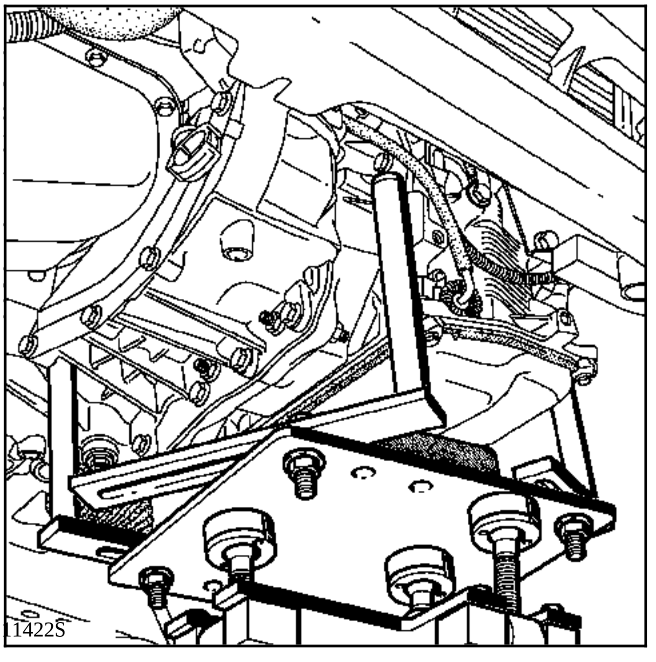
Remove:
- the engine half section mounting bolts (1) and (2),
- the front central bracket bolts and remove the bracket,
- the front left mounting bolts (3) which secure the automatic transmission mounting to the side member.



11421R

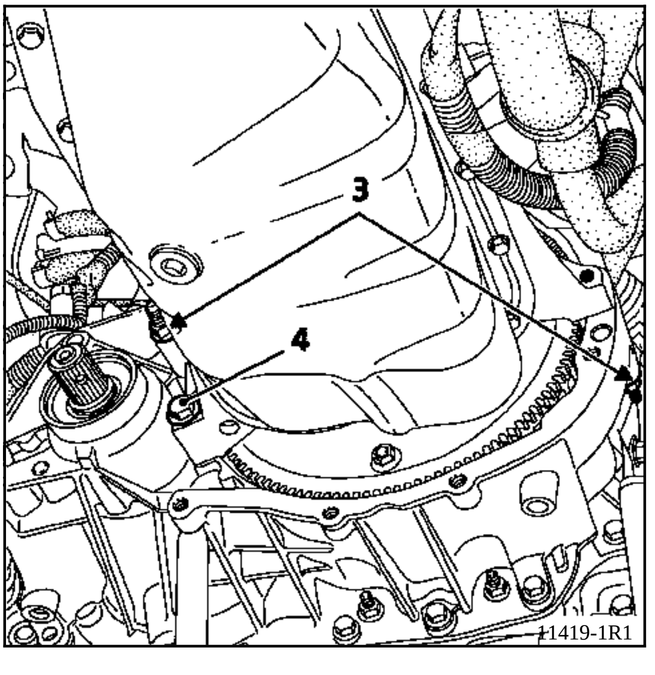
Lower the engine / automatic transmission assembly slightly loosening the DESVIL bracket bolt (for example).

Position the DESVIL V 703 ST 01 unit jack (for example).



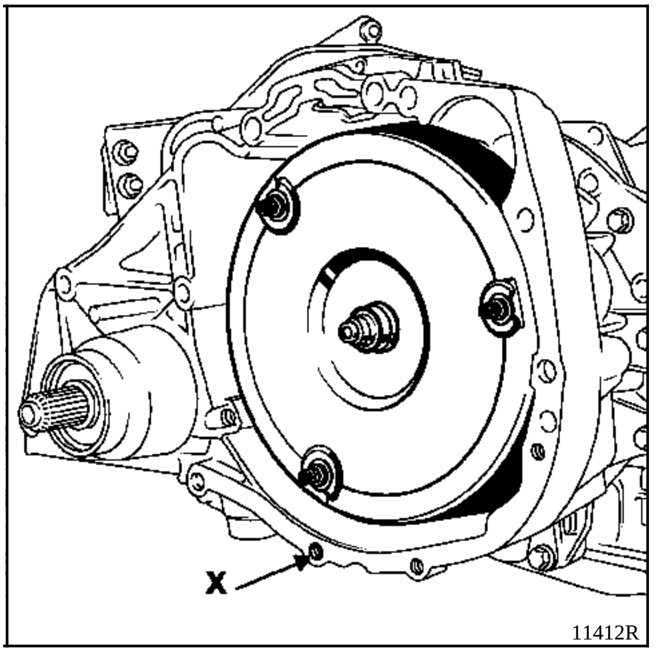
11422S

Remove the dowel pins (3) and the bolt (4) from the gearbox surround.



11419-1R1

Remove the automatic transmission.
Fit the converter retaining plate **B. Vi. 465** at (X).



11412R

Refitting (special features)

Check that the engine / automatic transmission centring rings are present and that they are positioned correctly.

Refit the automatic transmission locating the converter on the drive plate in relation to its mounting bolts.

Tighten the gearbox surround bolts and dowel pins to the specified torque.

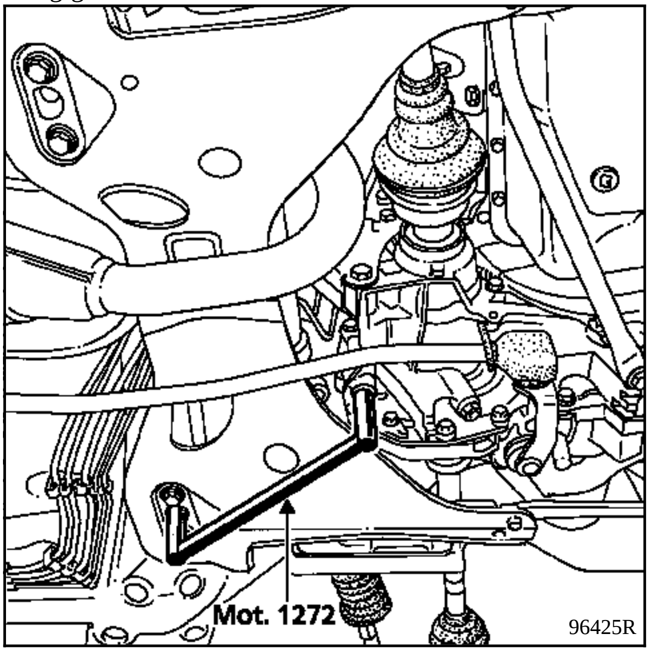
IMPORTANT: The setting values must be strictly observed when refitting the engine half section and the front left mounting. Refer to section 19.

Refit in the reverse order to removal.

NOTE: observe the procedure for refitting the automatic transmission mounting on the side member.

Fit the automatic transmission mounting without placing it under stress.

Using tool **Mot. 1272** position the engine / automatic transmission assembly in relation to the left rear subframe guide hole and the clutch bellhousing guide hole.

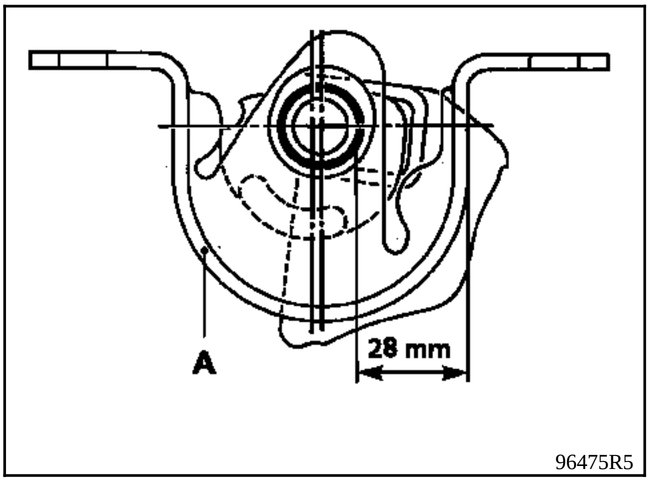


96425R

Tighten the automatic transmission mounting mounting bolts.

CHECK

In order to check that the fan assembly is positioned correctly, the measurement shown below must be taken.



96475R5

If this measurement is not correct (28 mm ±1), mark the actual position on the side member.

If the measurement is less than 27 mm, loosen the front mounting concerned and push section (A) back.

Retighten.

Check the new position and repeat the operation if necessary.

If the measurement is greater than 29 mm, follow the same procedure but allow section (A) to move forwards.

Then tighten the automatic transmission mounting mounting bolts to **4.2 daN.m**, ensuring that section (A) is not moved by the tightening torque and that it remains parallel with the vertical surface of the side member.

Tighten the front and rear subframe mounting bolts to the specified torque.

Tighten all of the bolts nuts and screws to the specified torque.

Fit the caliper mounting bolts with **Loctite Frenbloc.**

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

Refill the automatic transmission with oil.

NOTE : Seal the ends of the driveshaft dowel pin with **Rhodorseal 5661.**

In order to ensure correct sealing, the oil cooler O-rings must be replaced and the bolts must then be tightened gradually to a torque of **2.5 daN.m.**

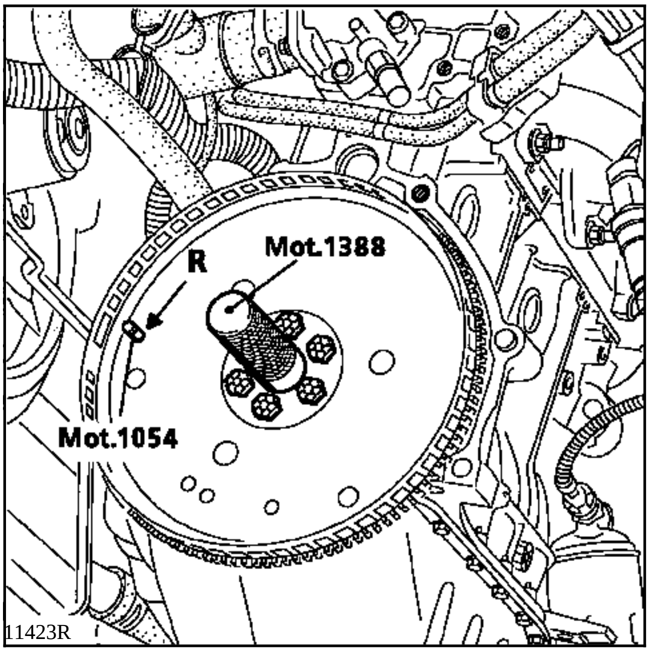
SPECIAL TOOLS REQUIRED	
Mot. 1054	**TDC setting rod**
Mot. 582	**Locking tool**
Mot. 1388	**Starter plate centring tool**

SPECIAL EQUIPMENT REQUIRED
Engine support

TIGHTENING TORQUES (in daN.m)	
Starter plate bolt	**3.8**

This operation can only be carried out after removal of the automatic transmission (refer to the relative section)

REMOVAL



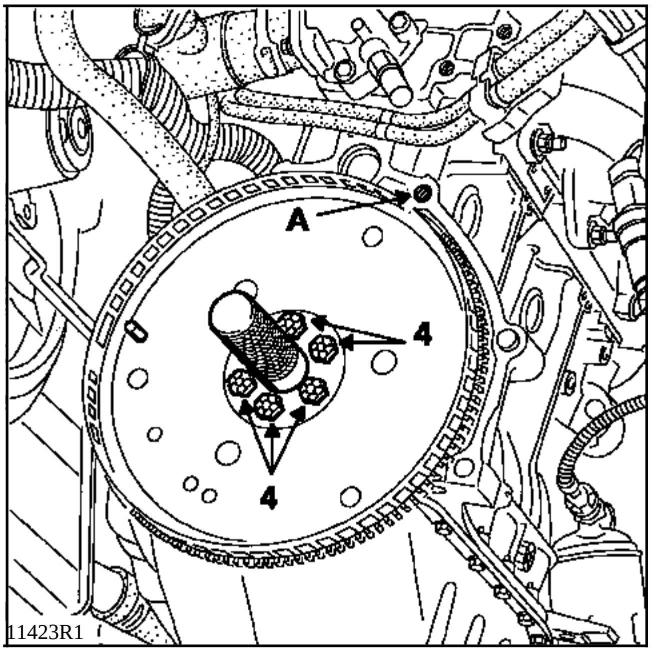
11423R

Position the engine at the setting point (refer to the relative section) position **Mot. 1054** in mark (R), which has a different diameter of 8.25 mm.
In order to avoid any risk of the drive plate falling, position centring tool **Mot. 1388.**

Position **Mot. 582** at (A)**.**

Remove:

- the six eccentric bolts (4),
- the starter plate



11423R1

The maximum offset permitted on the starter plate is 0.5 mm.

REFITTING

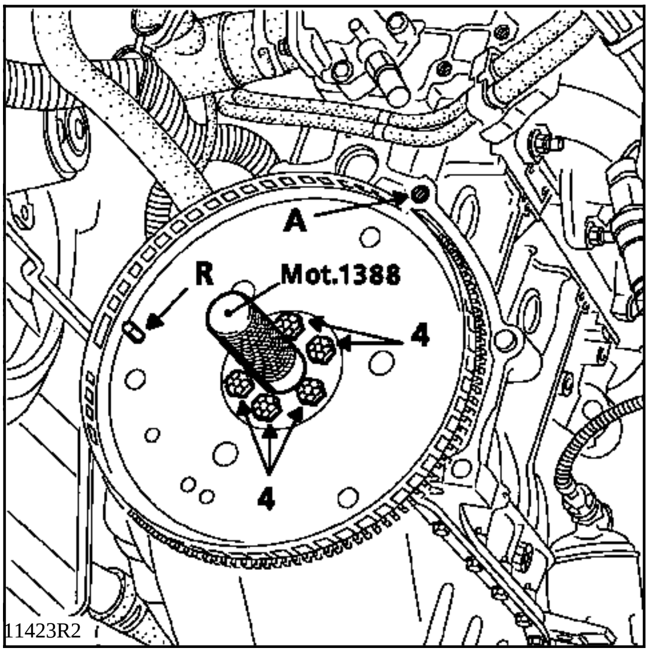
Refit:

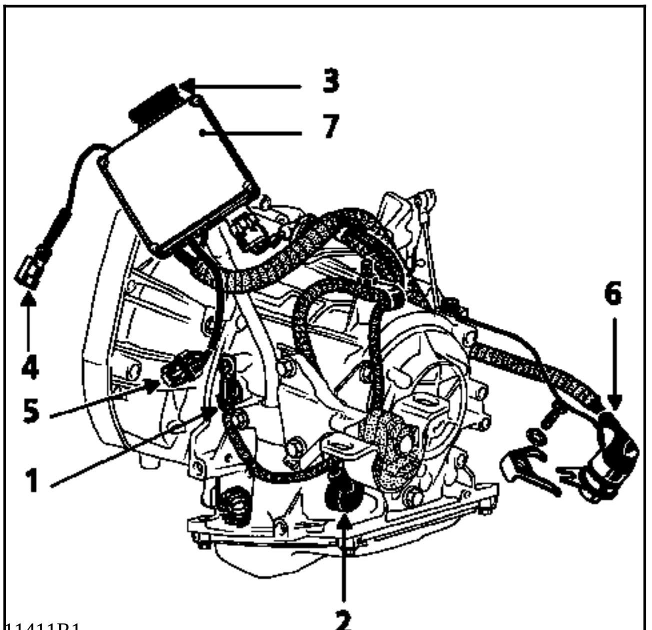
Fit the starter plate, check that it is positioned in relation to the mark (R) and engage centring tool **Mot. 1388.**

NOTE : lubricate the bolt threads (4) before refitting them.

Bring the bolts (4) into contact with the starter plate and tighten them to **3.8 daN.m.**

In order to lock the starter plate, fit tool **Mot. 582** at (A)**.**





11411R1

1 Vehicle speed sensor
2 Electronic control connector
3 6-way socket
4 Fault-finding fault warning light connector
5 3-way connector linking TDC information and torque reduction
6 Multi-function switch and earth
7 injection computer housing

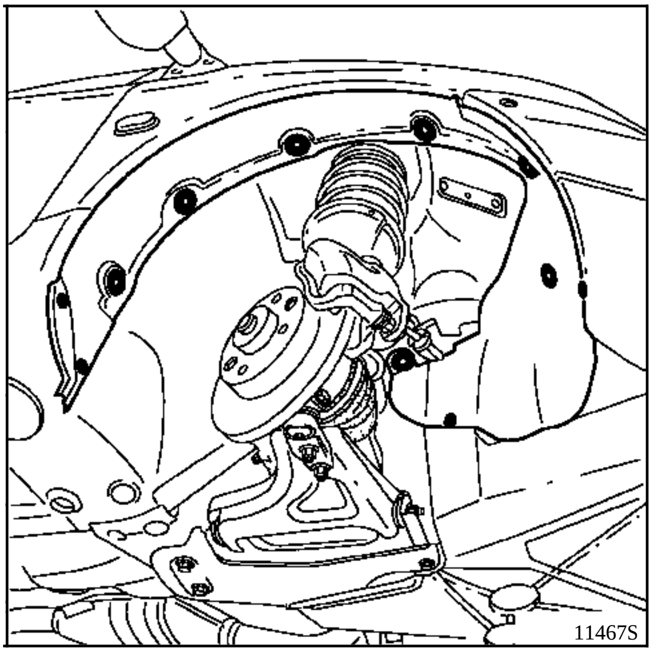
The computer controls the earthing of the electronic controls in accordance with the peripheral information and correct operational check of all of the automatic transmission electrical components.

REMOVAL

Place the vehicle on a two post lift.

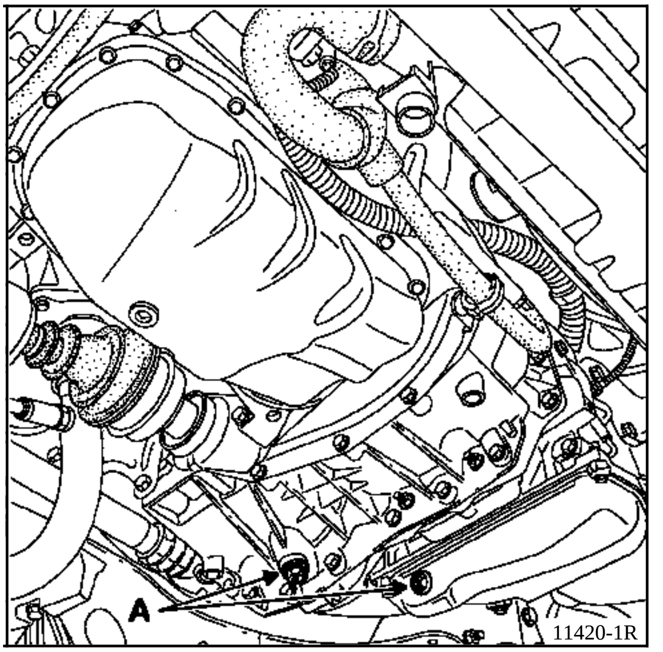
Disconnect the battery.

Remove:
- the front left wheel,
- the front left mud shield,


11467S

- the plastic engine undertray.

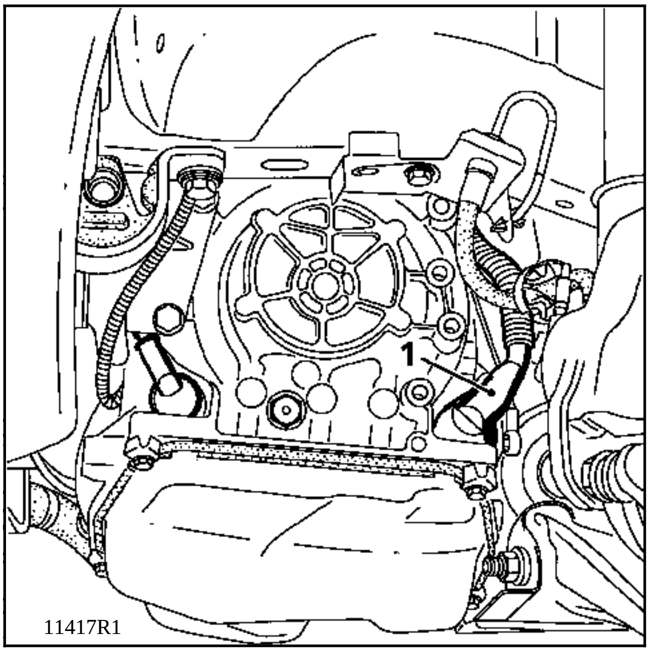
Drain the automatic transmission (caps A).



11420-1R

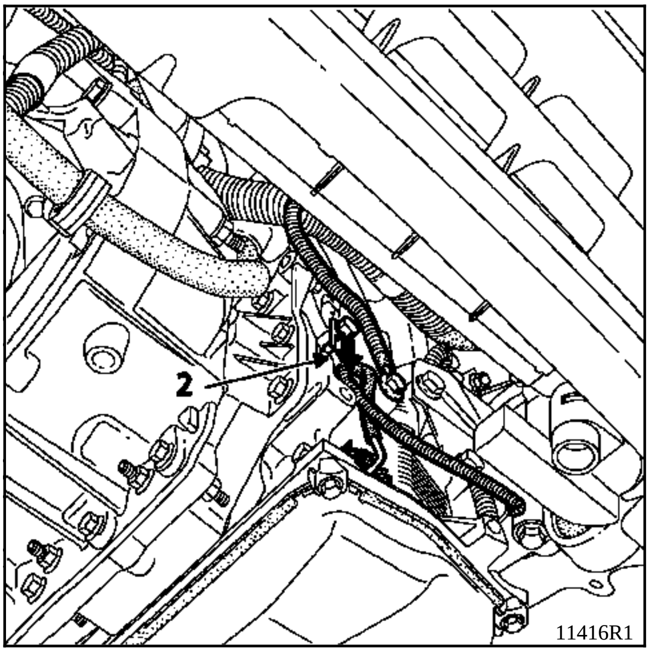
Remove:

- the multi-function switch (1) and detach it,
- the earth strap and the harness bracket,



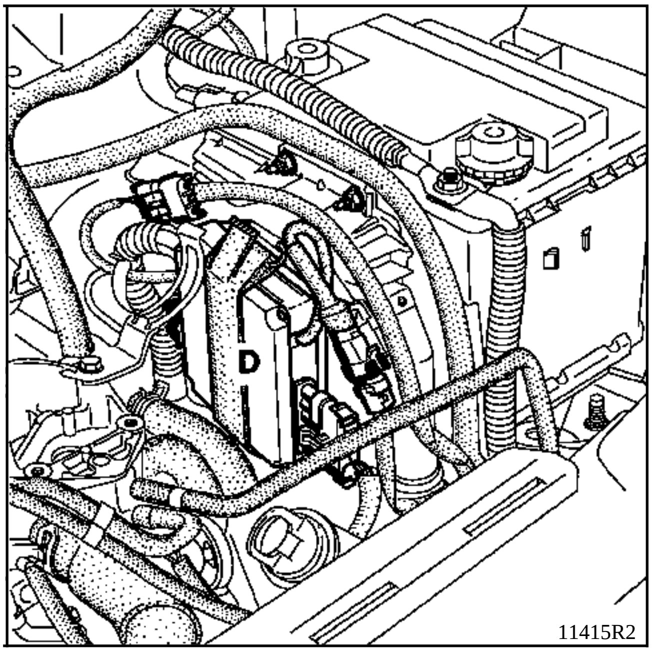
11417R1

- the vehicle speed sensor (2),

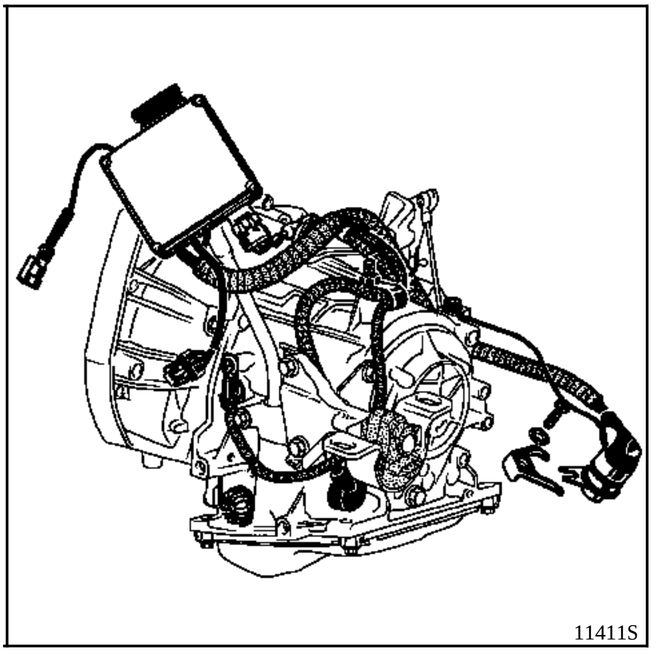


11416R1

- the battery,
- the air pipe,
- the computer protective housing,
- disconnect the connectors and detach the automatic transmission computer (D),
- detach the injection computer bracket,
- the earth strap and its bracket.



11415R2

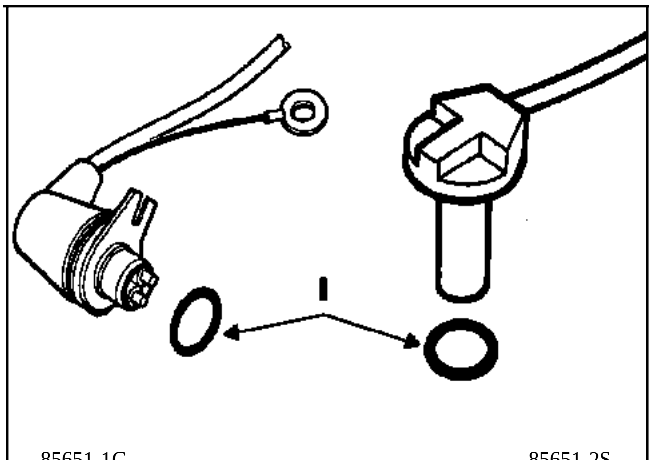


11411S

Unclip the wiring and remove it from the top of the vehicle.

REFITTING

Refitting is the reverse of removal.
Check that the O-rings (I) are present on the speed sensor and the multi-function switch.



85651-1G 85651-2S

NOTE: there are no special features for the changing of the speed sensor and the multi-function switch.
For the procedure, refer to the automatic transmission manual TAM.

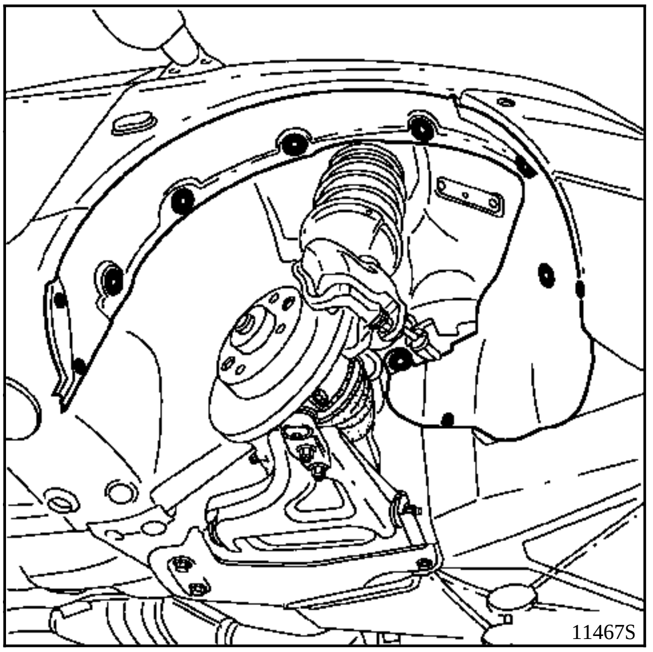
REMOVAL

Place the vehicle on a two post lift.

Disconnect the battery.

Remove:

- the front left wheel,
- the left mud shield,

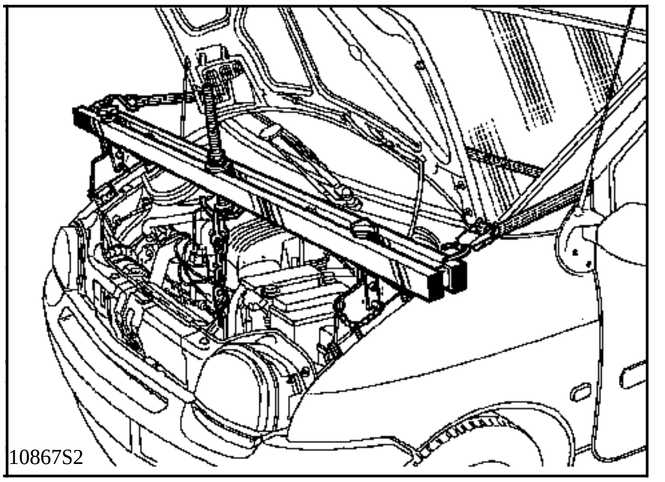

11467S

- the plastic engine undertray,

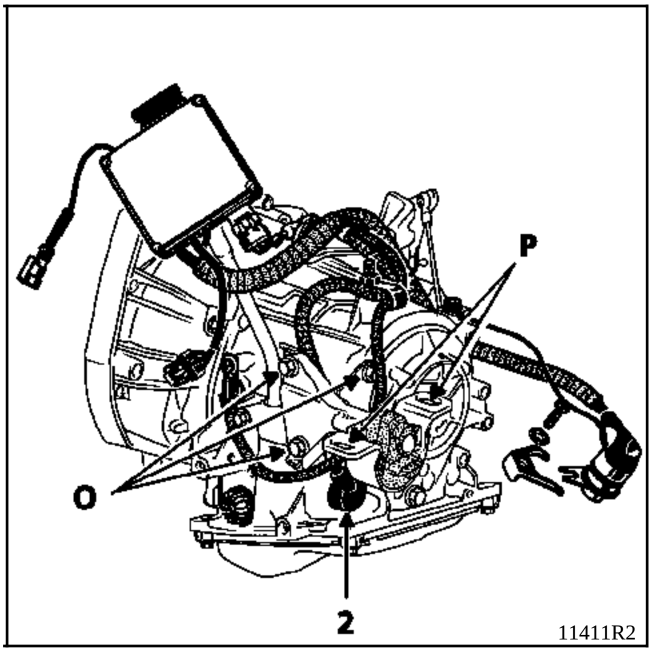
Drain the automatic gearbox.

Remove:
- the battery,
- the computer protective housing,
- the air pipe,
- the earth strap and its harness bracket.

Using the engine support tool, relieve the engine and ensure that the tool is stable.


10867S2

Remove the automatic transmission bolts (O) and (P).



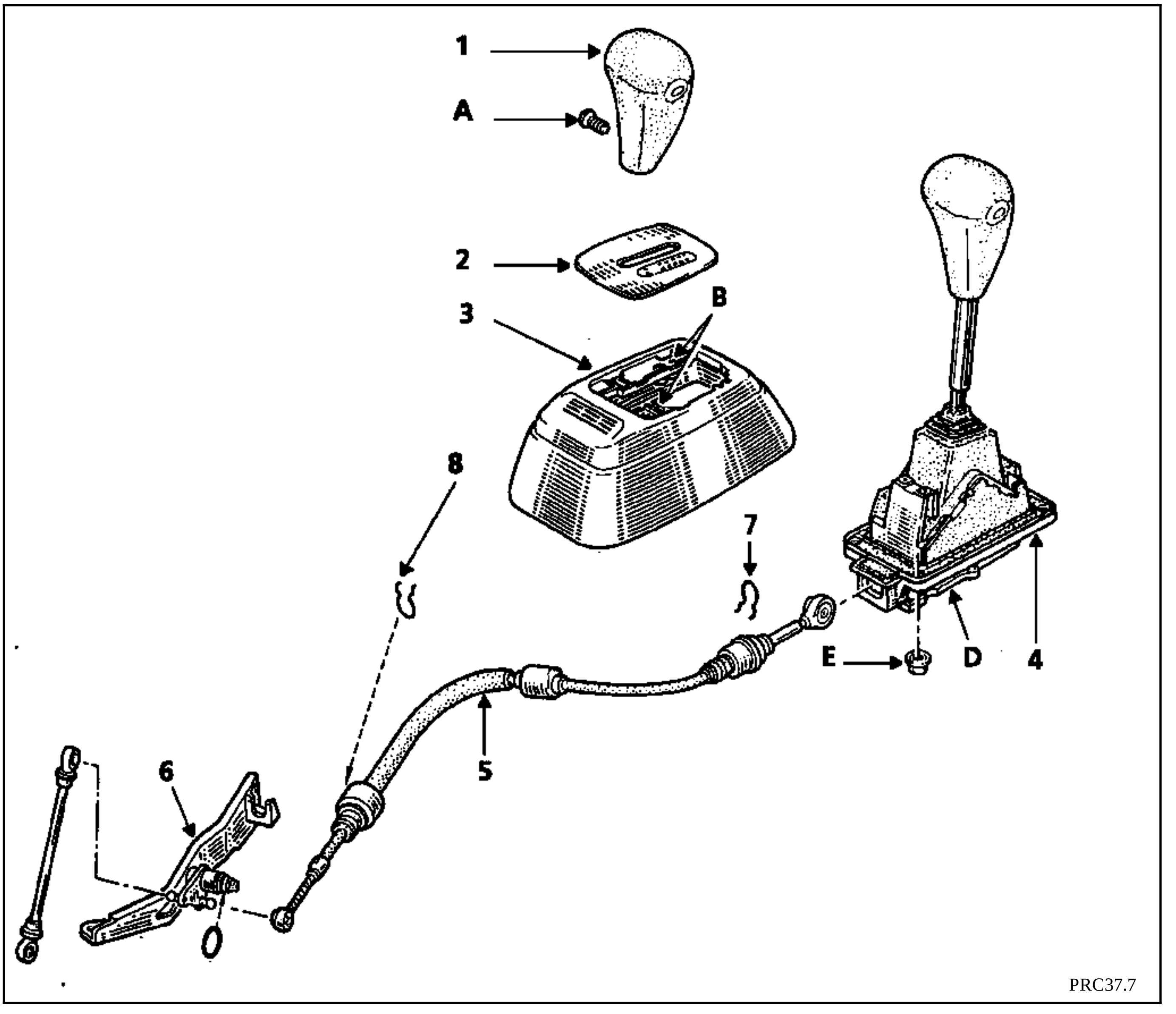
11411R2

The switch (2) can only be detached after removal of the strainer housing (refer to the relative section on the previous page).
The operation has no special features for electronic controls, refer to the automatic transmission manual TAM.

Refit in the reverse order to removal.

Tighten the bolts to the specified torque.

BREAKDOWN



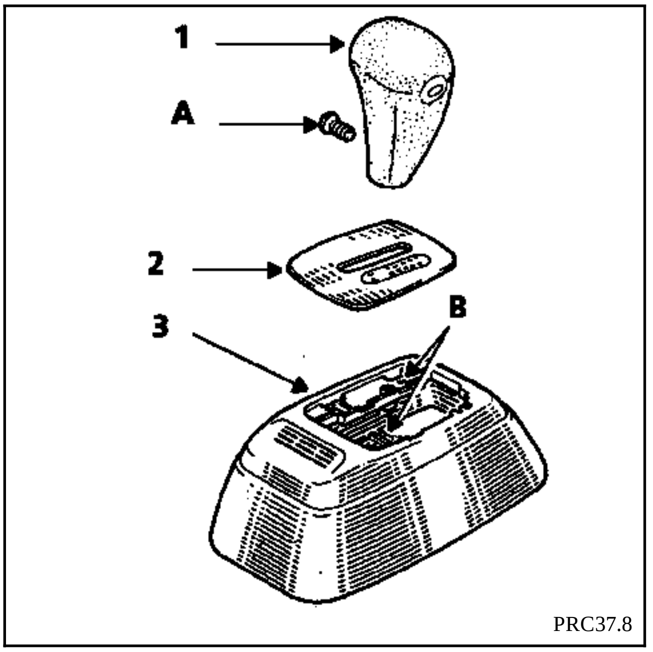
1 - Selector handle
2 - Gear grille
3 - Console
4 - Control computer
5 - Control cable
6 - Control on the automatic transmission.
7 - Control cable clip
8 - Clip for the control on the automatic transmission.

A - Handle retaining bolt
B - Console retaining bolt
D - Computer protective cover
E - Control computer mounting nut

REMOVAL

Passenger compartment end:

Remove:
- the selector handle (1) secured by the bolt (A),
- the gear grille (2) unclipping it,
- the console (3) bolt (B).

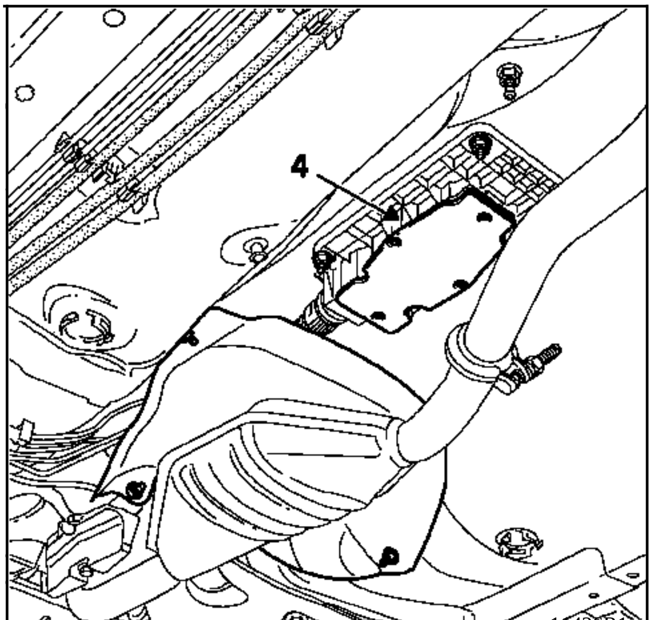


PRC37.8

Under the vehicle:

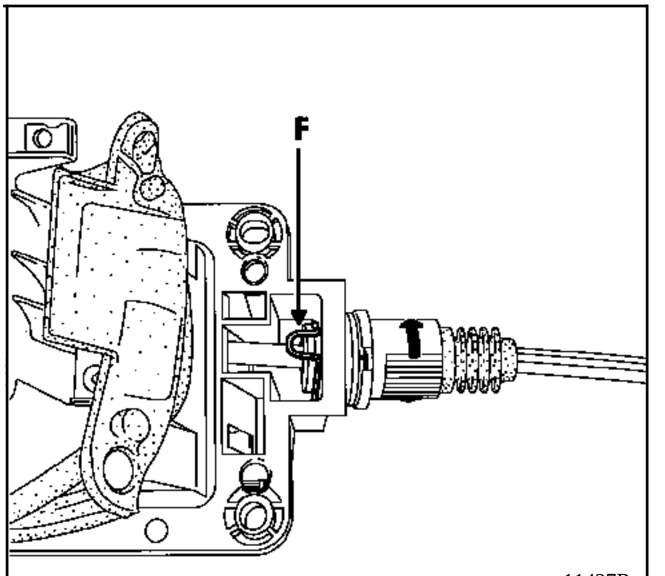
Disconnect the oxygen sensor.

Remove:
- the exhaust down-pipe,
- the heat shield,
- the computer protective cover mounting bolts,
- the four control computer nuts (4) and remove the computer from the top,



11426R1

- the clip (F) retaining the cable on the computer.



11427R

REFITTING

The automatic transmission must be placed in position D.

Check and if necessary adjust the control on the automatic transmission (refer to the relative section on the following page).

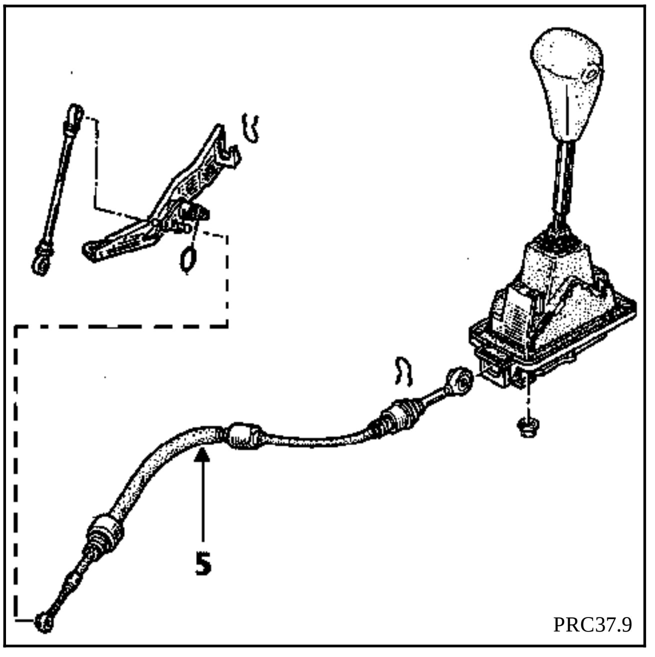
Refit in the reverse order to removal.

Adjust the cable on the computer (refer to the section on the following page).

Check that the gear changes are correct.

Control cable

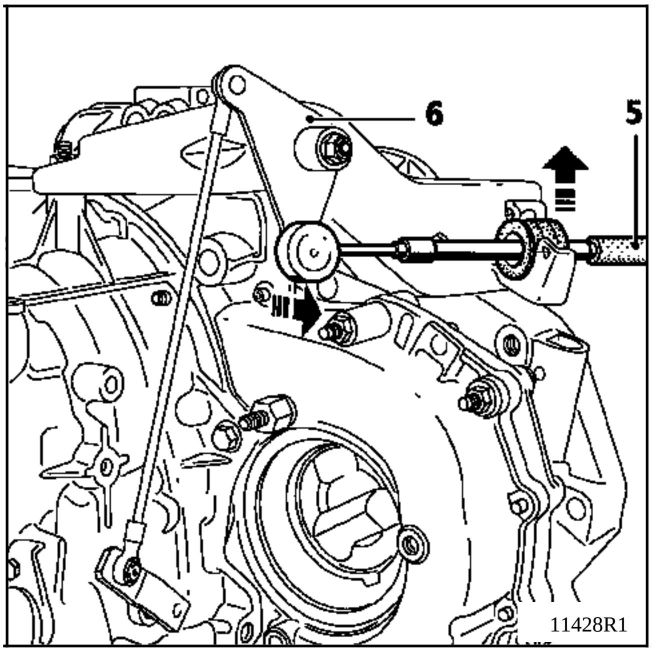
The control cable can only be removed after removal of the control assembly (refer to the relative section).



PRC37.9

Free the cable from its clip.

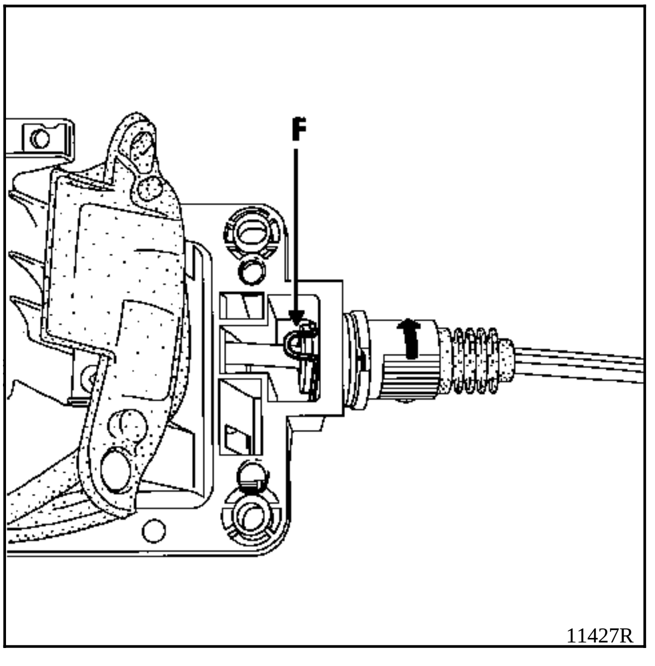
Unclip the control cable (5) lifting it upwards and unhook it from the ball joint.



11428R1

REFITTING

Unclip the cable (F) and unhook it from the control lever ball joint.



11427R

Thread the cable on the engine half section and brake hoses.

Refitting is the reverse of removal.

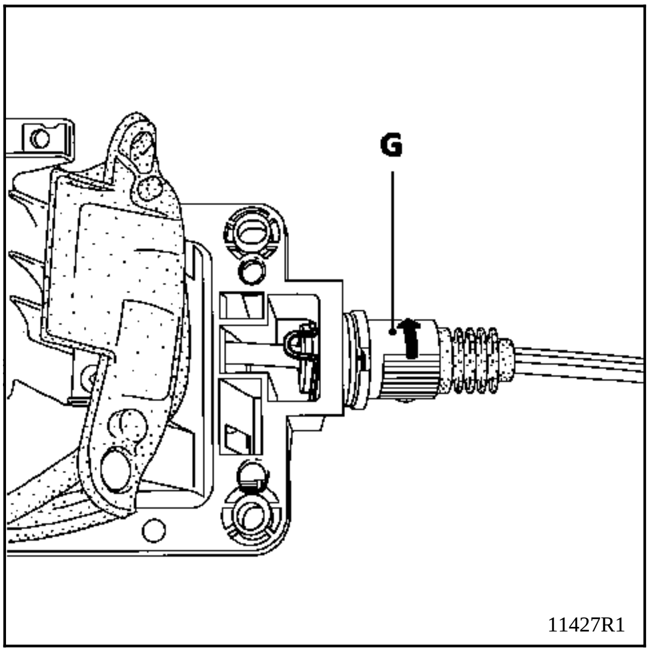
Check and adjust the control (6) (refer to the following page).

CHECKING AND ADJUSTING

Adjusting the cable on the gearbox

The automatic transmission and the control computer must be in position (D) (control computer removed or in place, as the positions are written on the computer).

Unlock the cable stop (G) by rotating it by 90 degrees, and ensure that the cable moves without restriction.



11427R1

Check the setting (G) by turning the ring to stop lateral movement of the cable cover.

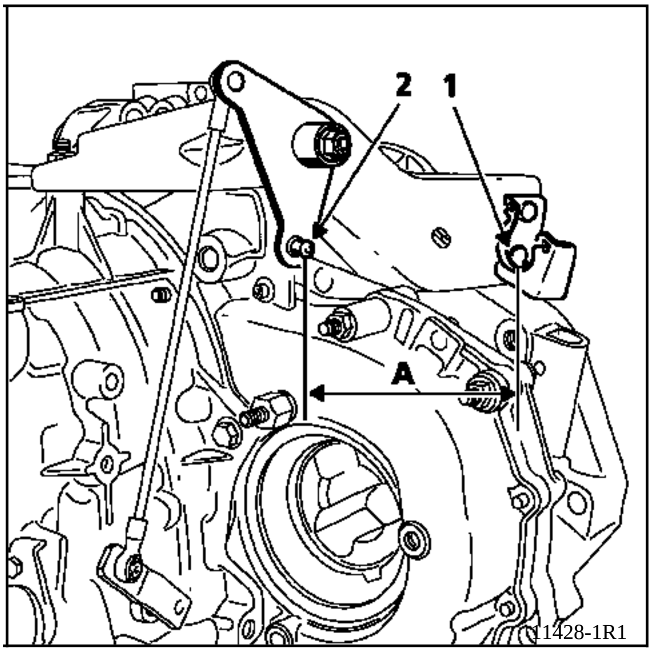
Check:
- that the gear changes are correct.
- the engagement of the starter in position P and N.

Check that the vehicle is correctly immobilised with the Park function engaged.

If the setting is incorrect, unlock the cable cover stop (G) by rotating it by a quarter turn and pull or push the cable depending on the adjustment to be made.

Do not forget to lock the cable cover stop (G) at the end of the operation.

SETTING THE CONTROL ON THE AUTOMATIC TRANSMISSION



11428-1R1

The automatic transmission must be in position (D).

Check the measurement (A) between the contact surface of the cable with the cable cover (1) and the mounting ball joint pin (2).
A=138.6 mm

This operation can be carried out with the automatic transmission removed or in place.