Kangoo

Clio

N.T. 3522A

Basic manual: Workshop Repair Manuals 325 and 337

Vehicle	*Type*
Kangoo	**XC05 - XC06 - XC0T - XC0W**
Clio II	**XB05 - XB06 - XB0W - XB11**

Special notes about Kangoo - Clio fitted with D4D and D4F engines

77 11 305 102 **AUGUST 2001** **EDITION ANGLAISE**

Contents

Page

17 IGNITION - INJECTION

19 COOLING - EXHAUST - ENGINE MOUNTINGS

Components	Average capacity* in litres	
	Capacity without oil filter	After replacing the oil filter
Petrol engine (oil)		
D4F - D4D	**4.65**	**4.8**
Manual gearbox		
JB1	**3.4**	
JH1	**3.4**	

* Check with dipstick

NOTE: never exceed the maximum mark on the dipstick.

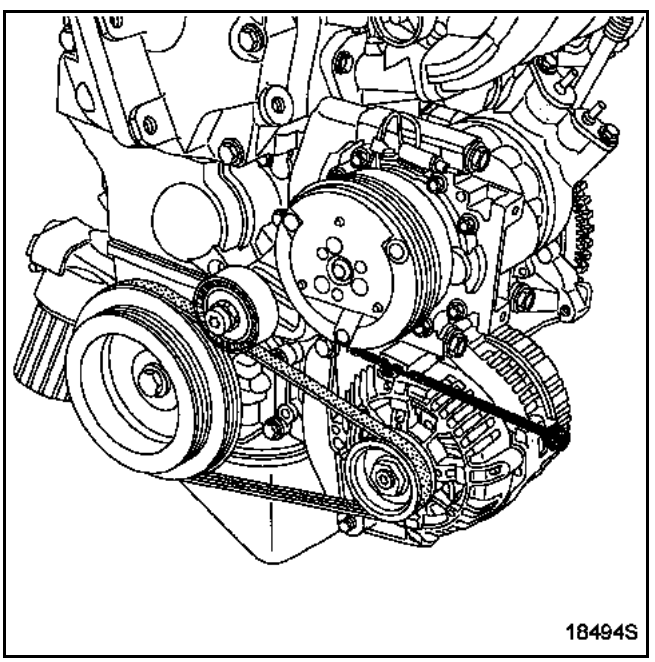
Components	Capacity in litres	Grade
Brake circuit	Standard: 0.7 ABS: 1	SAE J 1703 and DOT 4

Brake fluids must be approved by the Technical Department.

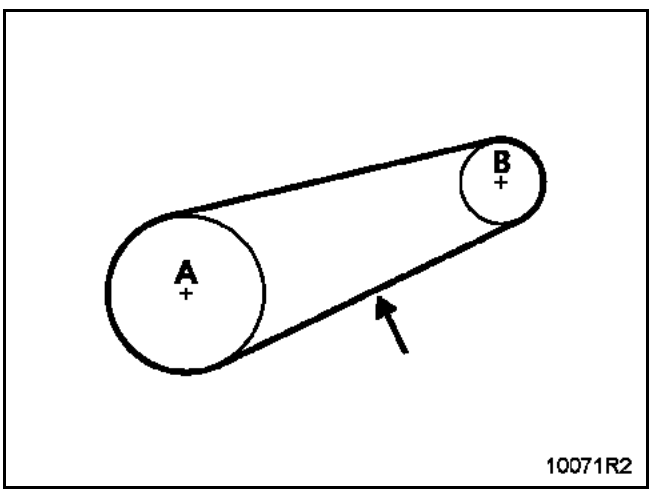
Components	Capacity in litres	Grade
Fuel tank	50 litres	Unleaded petrol
Power assisted steering	Separate reservoir: 1.1	ELF RENAULT MATIC D2 or MOBIL ATF 220
Coolant circuit	5 litres	GLACEOL RX(type D)Add only coolant

SPECIAL TOOLING REQUIRED	
Mot. 1505	Belt tension measuring tool

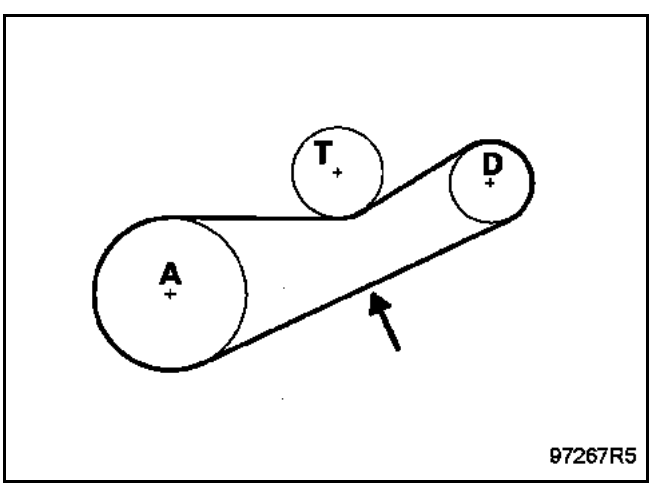
The alternator belt is tensioned either using a long bolt (approximately **100 mm**) and an M6 nut (see diagram below) or a locally manufactured tool (threaded rod of **100 mm** and three M6 nuts).



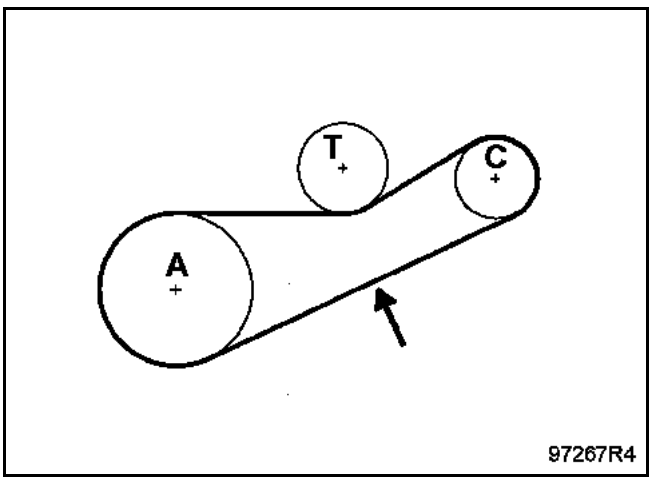
Alternator belt



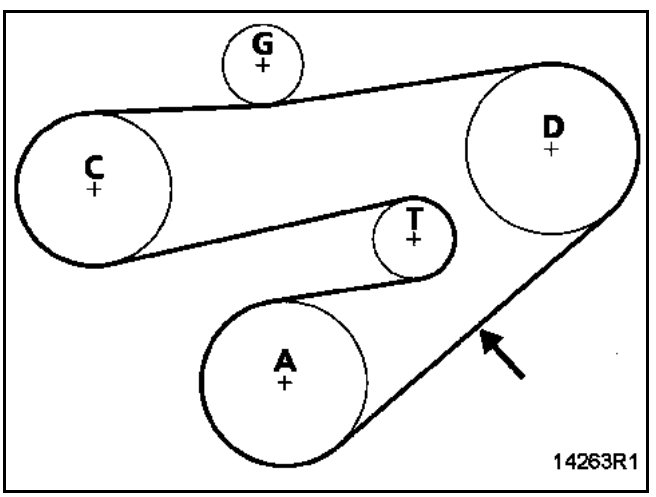
Air conditioning belt



Power-assisted steering belt



Air conditioning - power-assisted steering belt



A Crankshaft
B Alternator
C Power-assisted steering pump
D Air conditioning compressor
G Wheel
T Tensioner
→ Point for checking belt tension

Tension (Hertz)	Multi-tooth alternator belt	Multi-tooth power-assisted steering pump belt	Multi-tooth air conditioning compressor belt	Multi-tooth air conditioning / power-assisted steering belt
Fitting tension	**260 ± 5**	**210 ± 5**	**210 ± 5**	**210 ± 5**

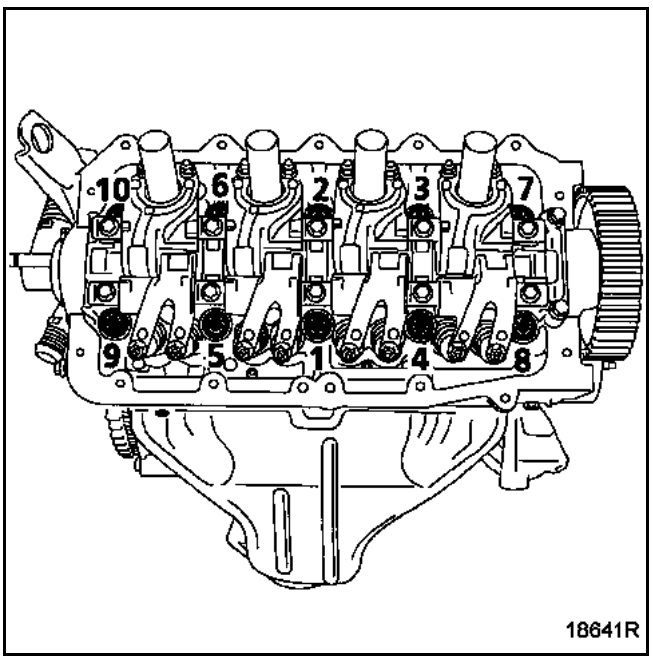
CYLINDER HEAD

Cylinder head tightening procedure

REMINDER: Use a syringe to remove any oil which may have entered the cylinder head mounting bolt holes to achieve correct tightening of the bolts.

Always change all cylinder head bolts after removal. Do not oil the new bolts.

Tighten all the bolts to a torque of **2 daN.m**.



Check that all the bolts are tightened to a torque of **2 daNm**, then angle tighten (bolt by bolt) by **230 ± 6º.**

Do not retighten the cylinder head bolts after performing this procedure.

Sump

SPECIAL TOOLING REQUIRED	
Mot.1233-01	Threaded rods for lowering the sub-frame
EQUIPMENT REQUIRED	
8 Torx socket Torque wrench	

TIGHTENING TORQUES (in daNm)	▽
Sub-frame front mounting bolts	6.2
Sub-frame rear mounting bolts	10.5
Sump bolts	1.4
Steering shaft yoke mounting bolt	3
Engine tie bar bolt	6.2
Wheel bolt	9

REMOVAL

Put the car on a two-post lift.

Disconnect the battery.

Drain the engine.

Remove:
– the front wheels,
– the engine undertray,
– the front mudguards,
– the mountings of the front bumper on the sub-frame,
– the nut and the eccentric bolt of the steering shaft yoke, after pushing back the guard.

SPECIAL NOTES FOR VEHICLES FITTED WITH A DRIVER'S AIRBAG

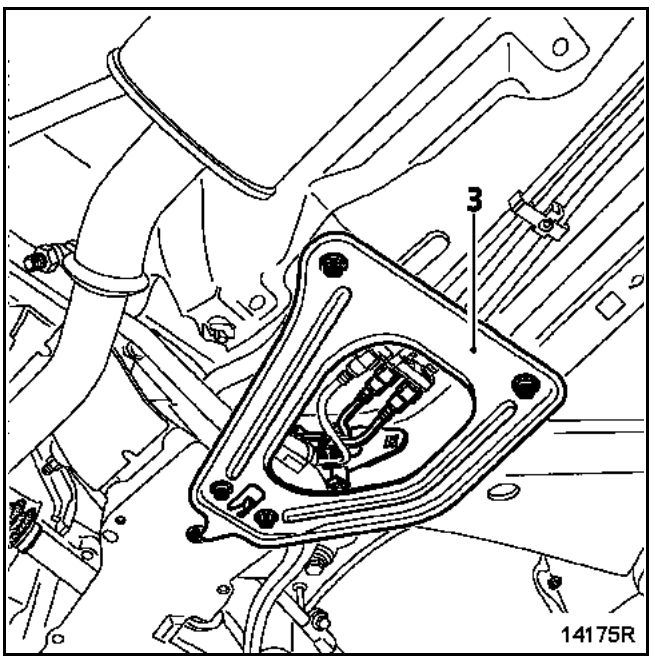
WARNING:

In order to eliminate any risk of damaging the steering wheel rotary switch, observe the recommendations below:
- **Before the steering column and the steering rack are uncoupled, the steering wheel MUST be immobilised with the wheels straight for the duration of the operation using a steering wheel locking tool.**
- **If there is any doubt regarding the correct alignment of the rotary switch the steering wheel must be removed so that the alignment procedure described in section 88 Air bag can be applied.**

REMINDER: in this case, only qualified personnel who have received training may carry out the operation.

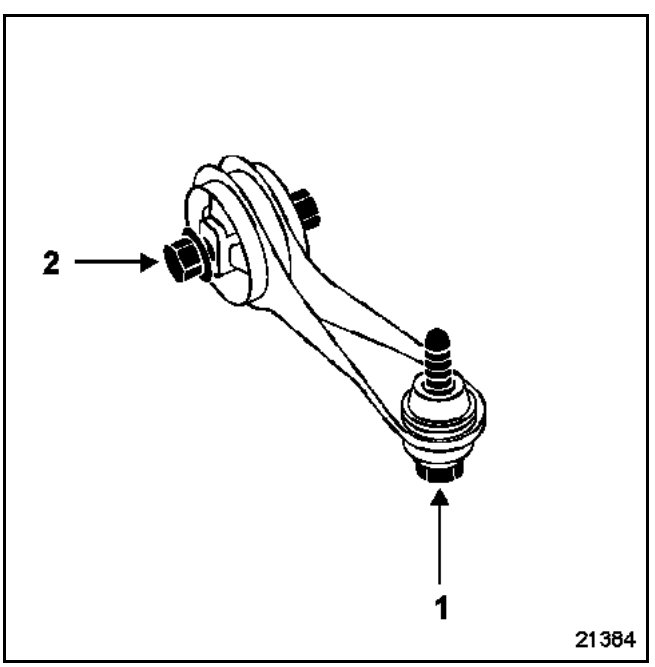
Remove the lower ball joint mountings as well as the track rod ends.

Remove:
– the sub-frame and body tie rods (3),

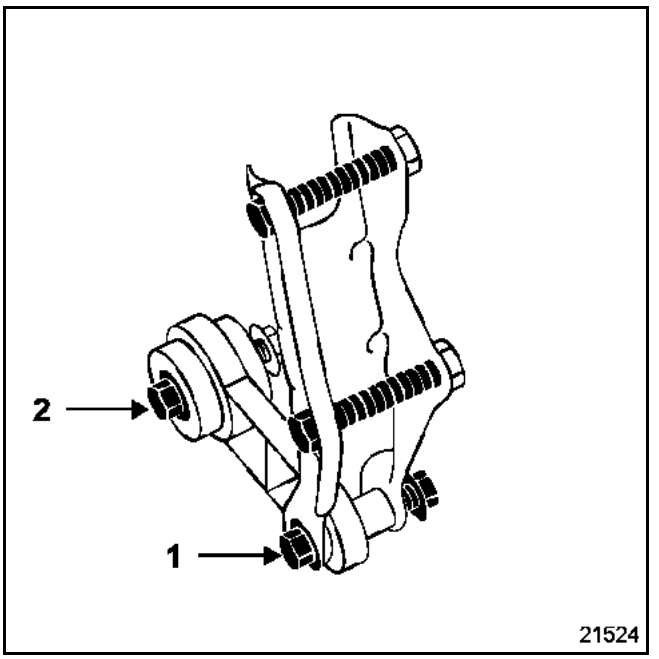


– the gearbox control (gearbox side only),
– the bolt (1) of the engine tie-bar and slacken it without removing the bolt (2).

CLIO

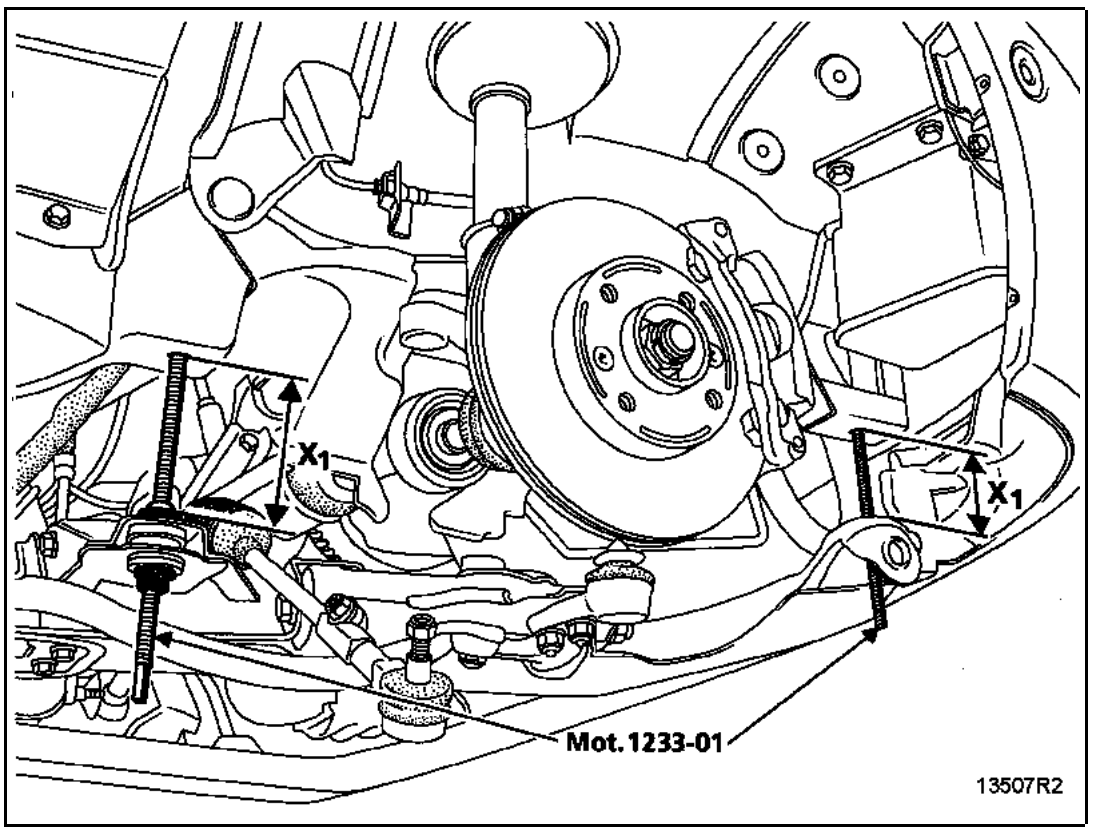


KANGOO



Remove the sub-frame mounting bolts, inserting the threaded rods **Mot. 1233-01** successively.

Lower the sub-frame gradually using threaded rods **Mot. 1233-01** until the dimension **X1 = 9 cm** is reached.



Remove:
– the oil level sensor,
– the dipstick guide on the sump,
– the sump.

REFITTING

It is essential to follow these instructions in order to ensure correct fitting of the oil sump and After Sales gasket.

CLEANING

It is very important not to scratch the mating surfaces of any aluminium components.

Wear gloves whilst carrying out this operation.

Use **"Décapjoint"**, part number **77 01 405 952**, to dissolve any part of the gasket which remains stuck to the metal surface.

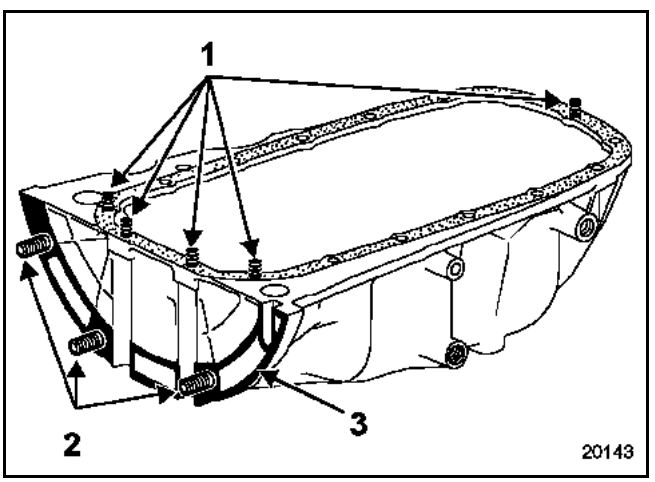
Apply the product to the part to be cleaned (oil sump and cylinder block); wait for about ten minutes, then remove it using a wooden spatula.

REFITTING METHOD

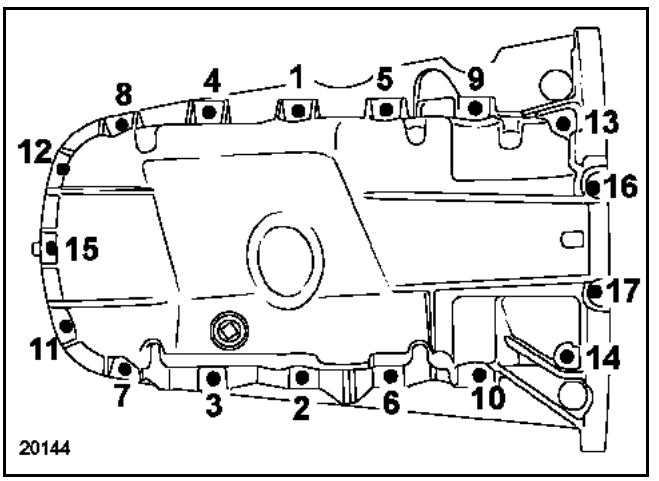
Fit the gasket on the sump using five bolts (1).

Refit:
– the sump on the cylinder block by tightening all the bolts **without locking them**,
– the three bolts (2) joining the sump to the clutch housing **without locking them**.

Place the edge (3) of the oil sump against the clutch housing.



Tighten the 17 bolts on the oil sump to a torque of **1 daNm** in the recommended order.



Check that all the bolts are correctly tightened to **1 daNm**.

Tighten the three bolts (2) joining the sump to the clutch housing to a torque of **4 daNm**.

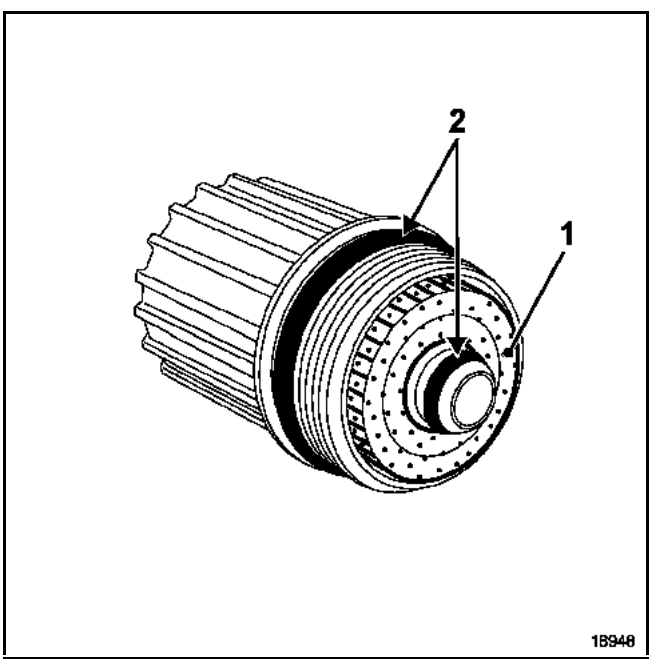
Top up the engine oil.

Refit in the reverse order to removal.

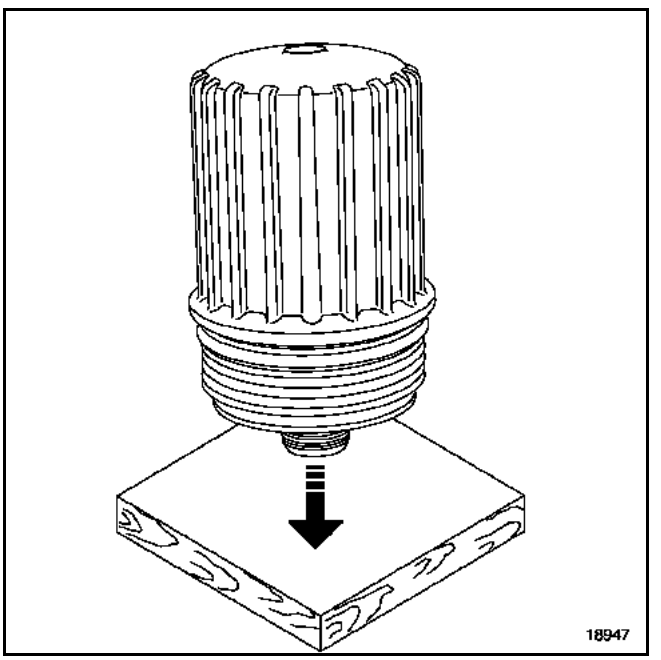
SPECIAL TOOLING REQUIRED	
Mot. 1330	Oil filter removing tool

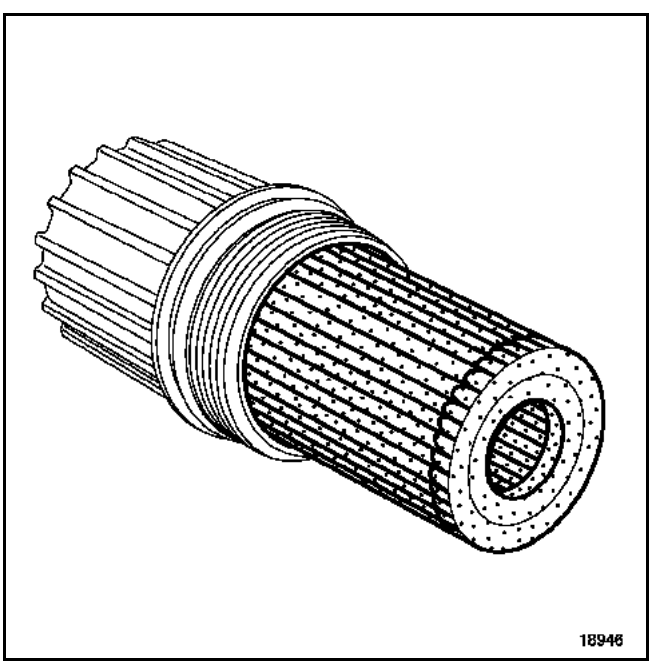
TIGHTENING TORQUES (in daNm)	
Oil filter	2

The two seal gaskets (2) must be replaced when the oil filter (1) is replaced.



Hold the filter upside down and tap it on a piece of wood to remove the filter element.





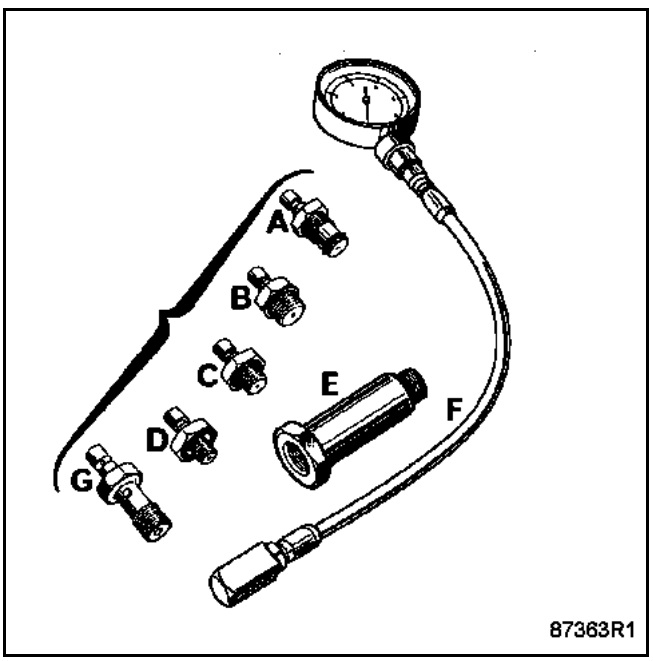
When refitting the oil filter, it is essential to oil the two seals (2) then tighten the oil filter to a torque of **2 daNm** using **Mot. 1330**.

SPECIAL TOOLING REQUIRED	
Mot. 836-05	**Boxed kit for measuring oil pressure**

CHECKING

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

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



USE

D engine: F + C

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

Check
– when idling: **0.8 bar**
– at **4000 rpm**: **3.5 bars**

Vehicle type	Engine	Gearbox	Cubic capacity (cm^3)	Bore (mm)	Stroke (mm)	Compression ratio
XB06 XC06	D4D 700	JB1	999	69	66.8	9.8/1
XB05 XB0W XB11 XC05 XC0W XC0T	D4F 706 D4F 712	JB1 JB1	1149	69	76.8	9.8/1

Refer to section **Mot. D4** for overhauling the engine

SPECIAL TOOLING REQUIRED	
Mot. 1054	TDC setting pin
Mot. 1272	Engine - gearbox assembly positioning tool
Mot. 1355	Tool for fitting crankshaft seal
Mot. 1374	Tool for removing crankshaft seal
Mot. 1399	Tool for holding engine on subframe
Mot. 1505	Belt tension measuring tool
EQUIPMENT REQUIRED	
Angular torque wrench	

TIGHTENING TORQUES (in daNm)	
Tension wheel nut	2.4
Crankshaft pulley bolt	4 + 70 ± 5°
Front right support mounting bolt on the engine	6.2
Front right support mounting bolt on the side member	6.2
Oil pump bolts	0.9
Sump mounting bolt	1
Wheel bolts	9

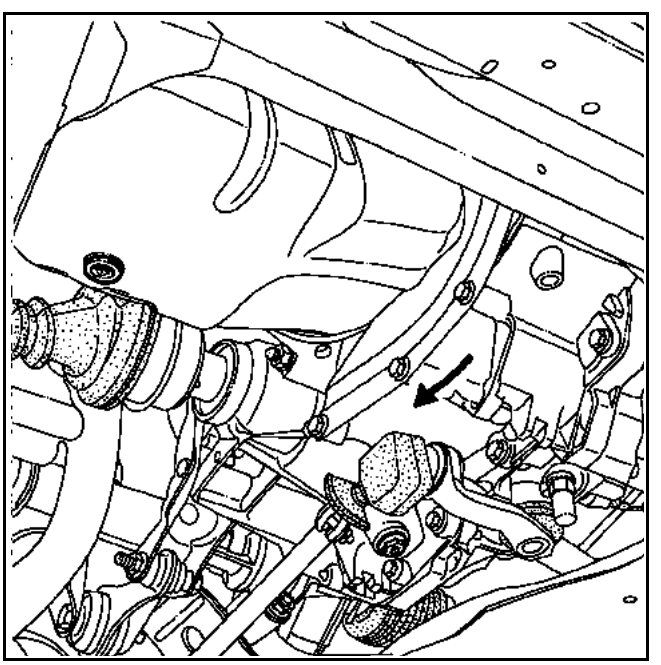
REMOVAL

Put the car on a two-post lift.

Disconnect the battery.

Remove:
– the timing belt (see the method described in section **11, Timing belt**).
– the dipstick,
– the engine flywheel guard,
– the sump mounting bolts,
– the sump.

To do this, pivot the sump towards the back of the vehicle, following the arrow below, so as to be able to release the oil pump strainer from the sump partition.



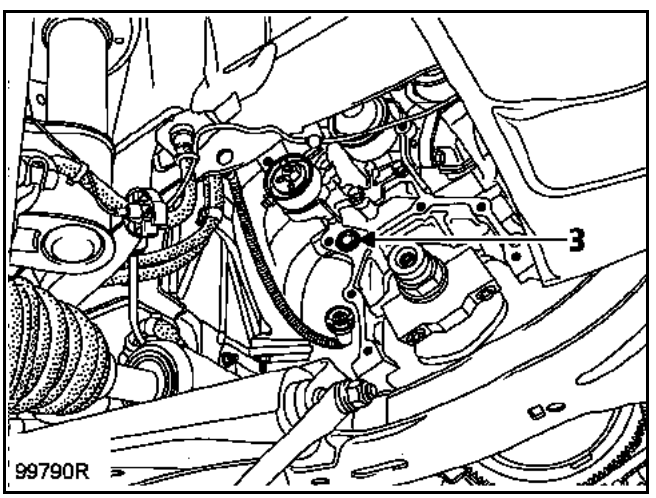
Extract the crankshaft seal using tool **Mot. 1374.**

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

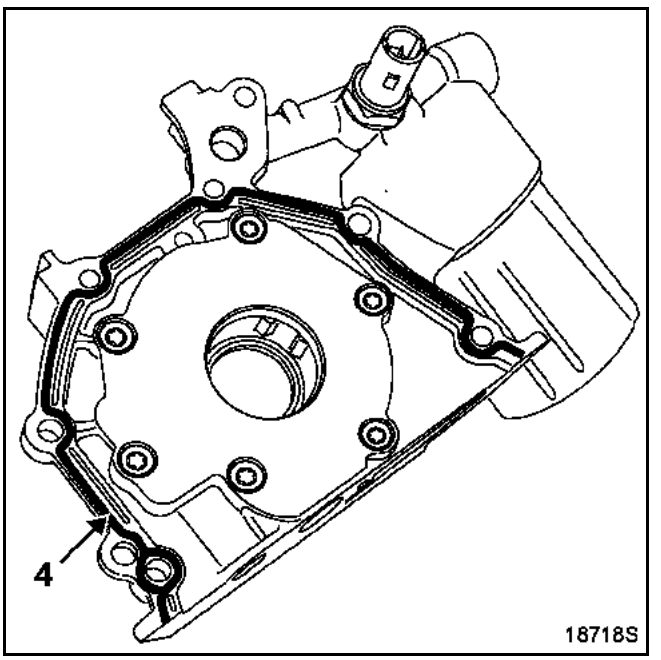
Clean the sealing surfaces without scratching the aluminium.

REFITTING

Systematically replace the oil pressure seal (3).

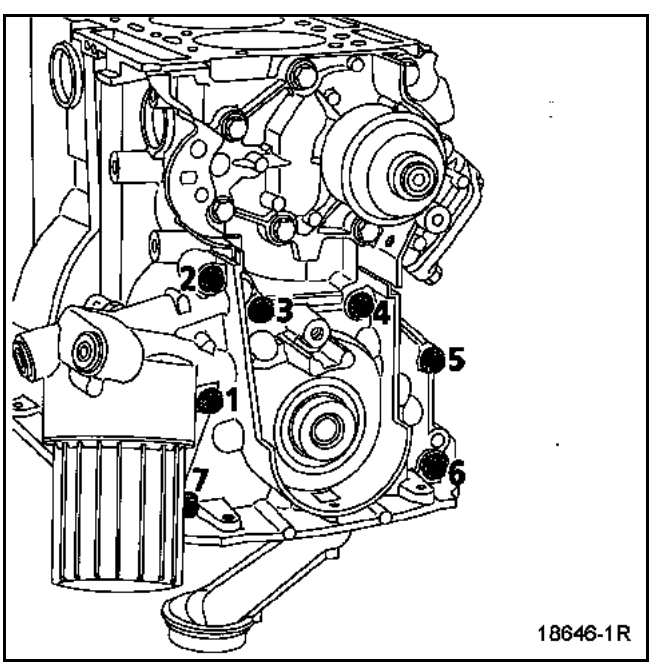


The oil pump is sealed with **RHODORSEAL 5661**. The bead (4) must be **1.3 mm** wide and be applied as shown in the diagram below.



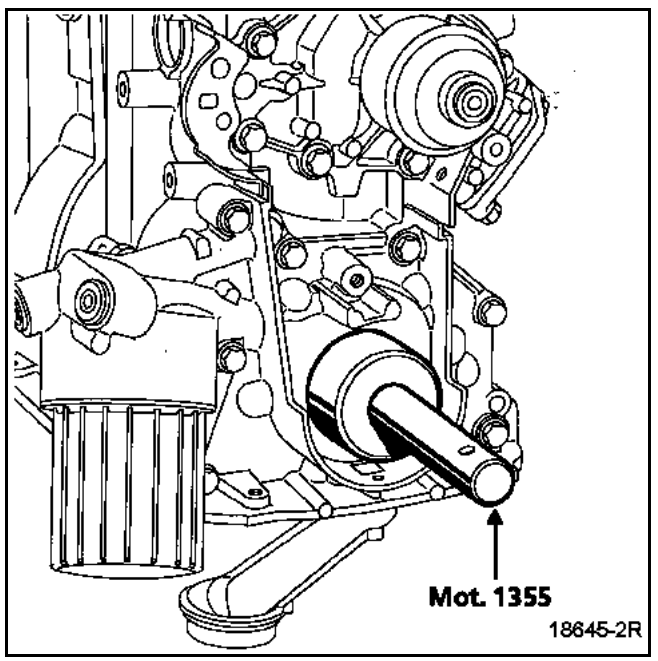
IMPORTANT: the oil pump is driven by two studs located on the crankshaft.

Refit the oil pump to the engine and tighten it to a torque of **0.9 daN.m** in the recommended order.

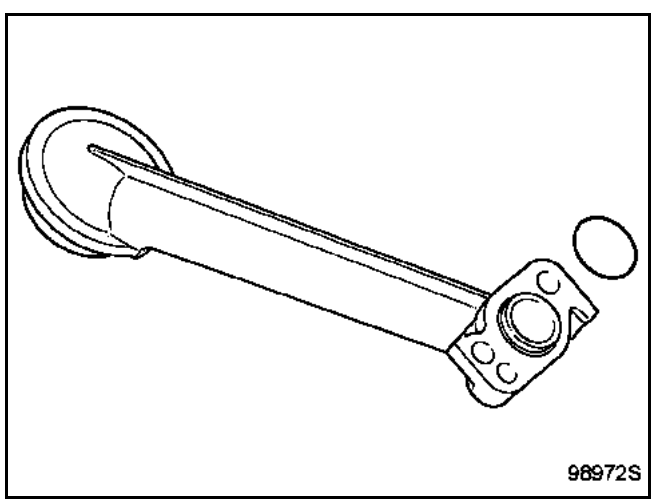


Refit the new seal onto the crankshaft output shaft without damaging it when passing the timing sprocket drive groove.

Position it using tool **Mot. 1355**.



Refit the strainer with a new O-ring.



Refit the sump.

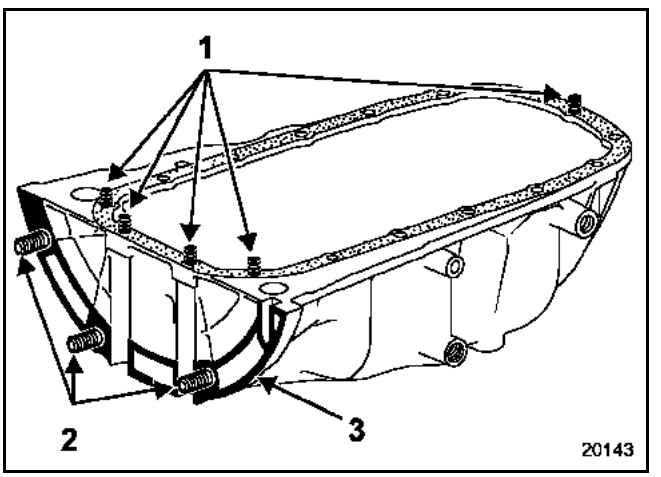
NOTE: the gasket faces must be clean, dry and free from grease (in particular, avoid finger marks)**.**

METHOD FOR FITTING

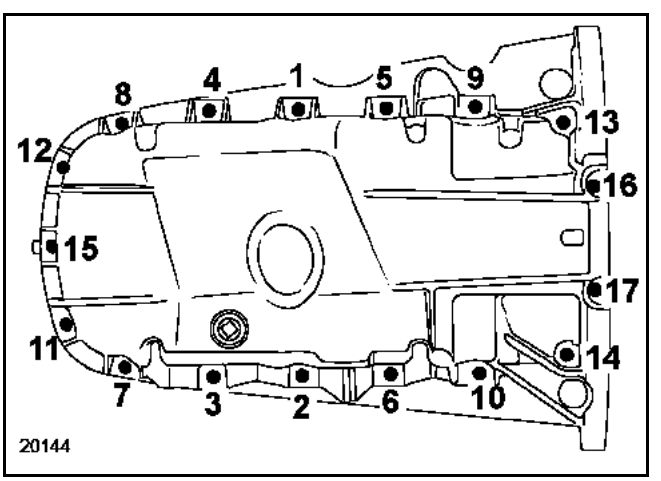
Fit the gasket on the oil sump using five bolts (1).

Refit:
– the oil sump on the cylinder block by tightening all the bolts without locking them,
– the three bolts (2) joining the sump to the clutch housing without locking them.

Place the side (3) of the oil sump against the clutch housing.



Tighten the 17 bolts on the oil sump to a torque of **1 daNm** in the recommended order.



Check that all the bolts are correctly tightened to **1 daNm**.

Tighten the three bolts (2) joining the oil sump to the clutch housing to a torque of **4 daNm**.

SPECIAL TOOLING REQUIRED	
Mot. 1054	TDC setting pin
Mot. 1379	Tool for holding engine on subframe
Mot. 1505	Belt tension measuring tool
EQUIPMENT REQUIRED	
Torque wrench Angular torque wrench	

TIGHTENING TORQUES (in daNm)	
Tension wheel nut	2.4
Crankshaft pulley bolt	4 ± 70° ± 5°
Right-hand suspended mounting support bolt	3.7
Wheel bolts	9

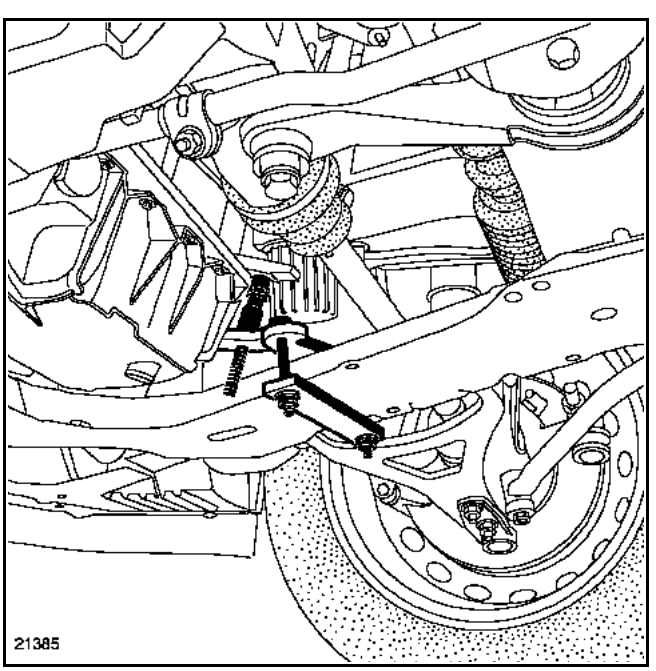
REMOVAL

Put the car on a two-post lift.

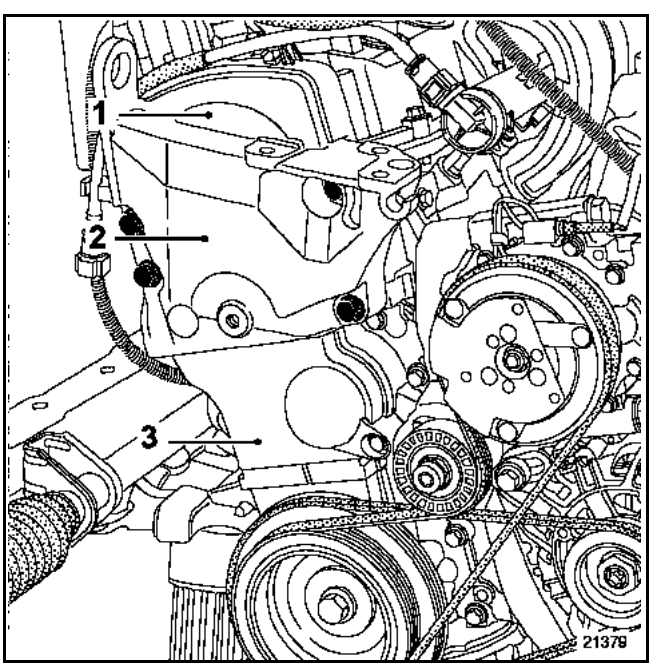
Disconnect the battery.

Remove:
– the right hand wheel and the wheel-arch liner,
– the bonnet (**Kangoo** only).

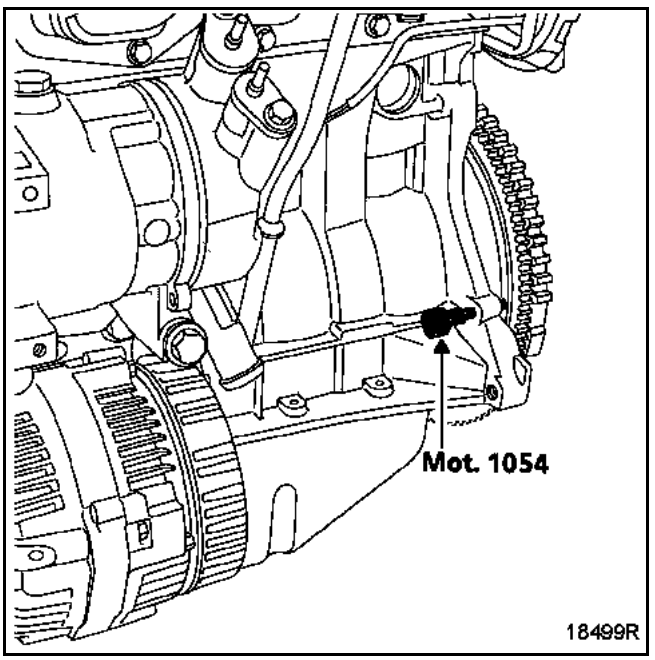
Fit the engine support tool, **Mot. 1379**.

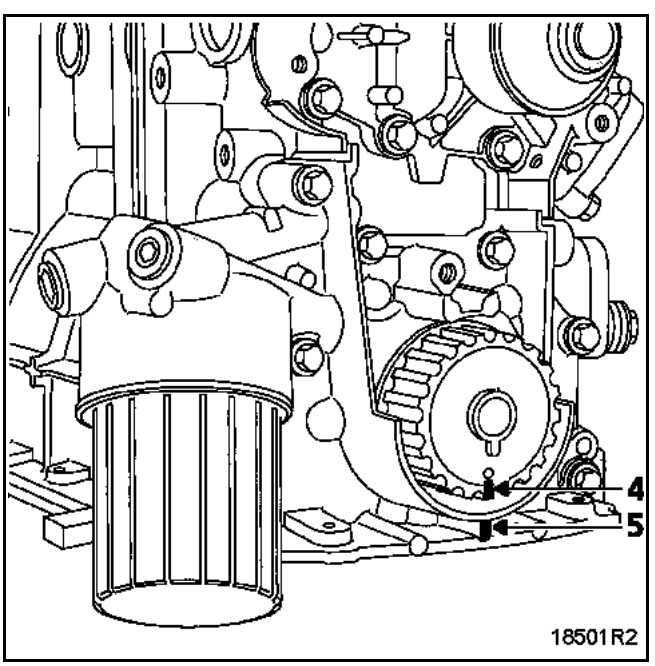


Remove:
– the front right hand suspended mounting,
– the cylinder head suspended mounting support,
– the power-assisted steering pump belt,
– the alternator belt,
– the crankshaft pulley, locking the flywheel using a screwdriver,
– the timing covers (1), (2) then (3).



Peg the engine at top dead centre using tool **Mot. 1054**, aligning the mark (4) on the crankshaft pinion with the fixed mark (5).



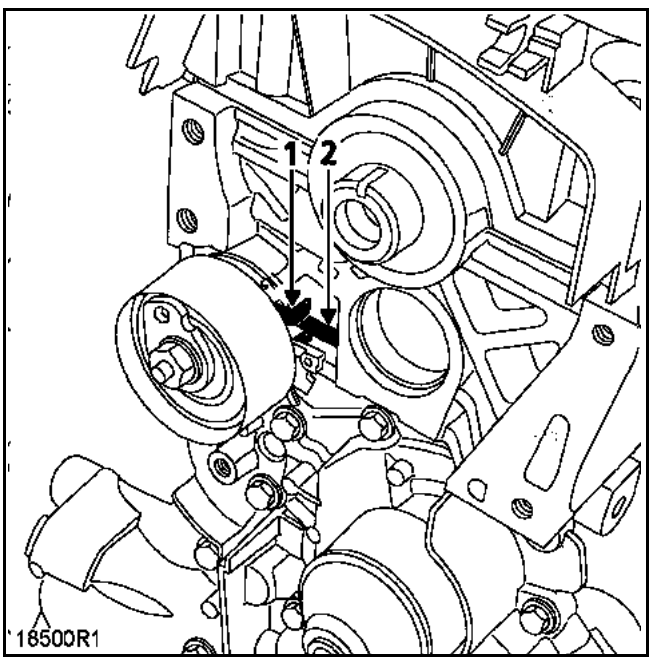


Undo the nut of the tension wheel then remove the timing belt.

REFITTING

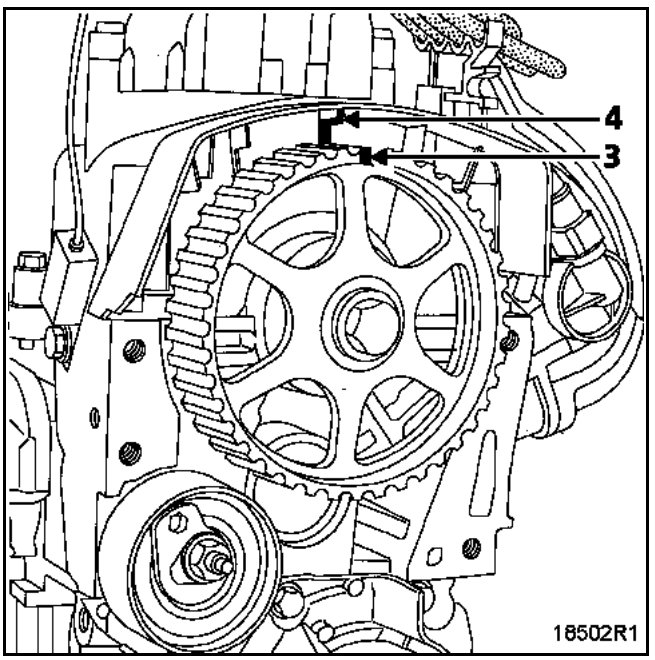
Check that pin **Mot. 1054** is in place.

Ensure that the lug (1) of the tension wheel is correctly positioned in the groove (2).

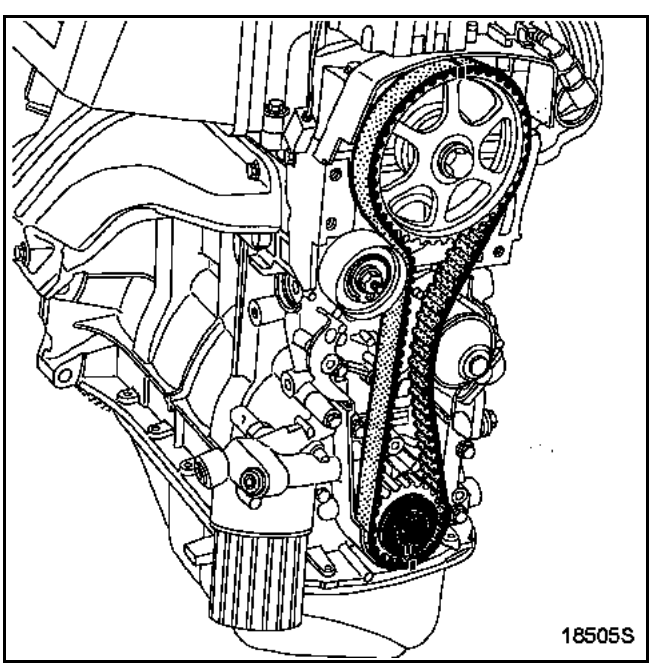


Tighten the crankshaft accessories pulley bolt fitted with its washer, tightening it to a torque of **1.5 daNm**, to hold the timing sprocket in place.

Check that mark (3) on the camshaft pulley is aligned with the fixed mark (4).

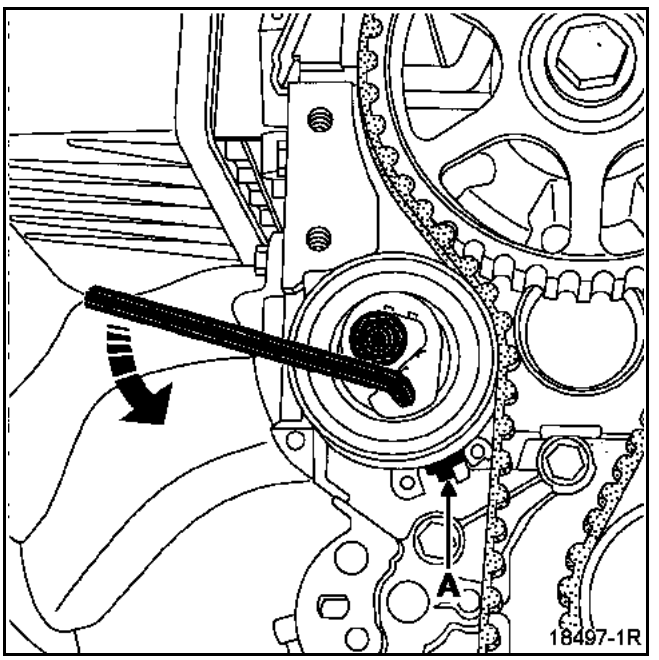


Fit the timing belt, aligning the marks on the belt with the marks on the camshaft and crankshaft sprockets (the mark on the belt is on the inside).



Remove pin **Mot. 1054**.

Using a **6 mm** Allen key, bring the movable index (A) of the tension wheel to the position shown below.

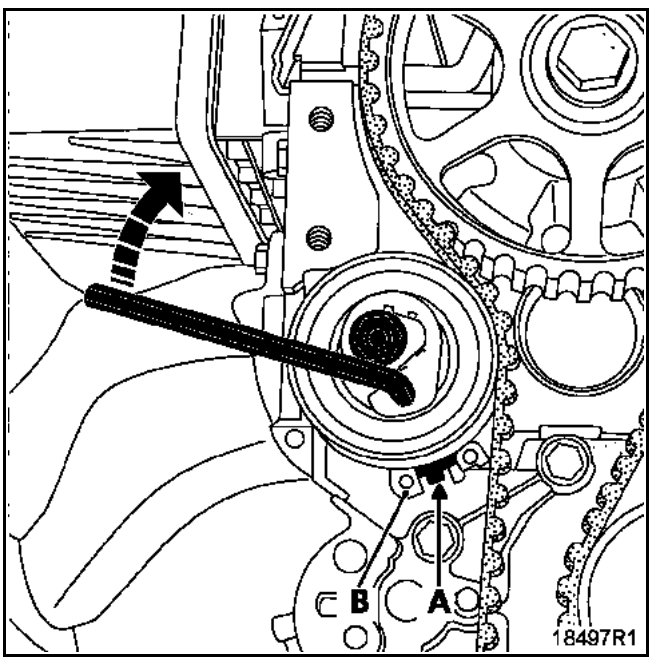


Tighten the nut of the tension wheel to a torque of **2.4 daNm**.

Rotate the crankshaft through six revolutions in a clockwise direction (timing side).

Peg the engine at top dead centre to check that the marks line up, then remove the pin.

Loosen the tension wheel nut by a maximum of one revolution while holding it using a **6 mm** Allen key, then gradually bring the movable index (A) to the centre of the timing window (B) and tighten the nut to a torque of **2.4 daNm**.



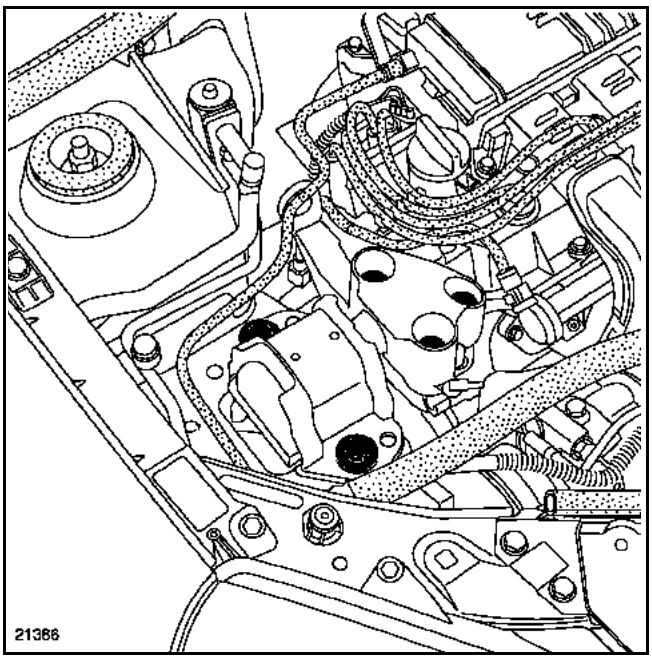
Remove the crankshaft accessories pulley bolt.

Refit the timing covers.

Fit the crankshaft pulley and tighten to a torque of **4 daN.m** plus an angle of **70** ± **5**°.

Refit the accessories belt(s) (see section **07 "Accessories belt tension"**).

Fit the engine mounting.



SPECIAL TOOLING REQUIRED	
Mot. 1054	TDC setting pin
Mot.1202-01	Pliers for large hose clips
Mot. 1272	Engine - gearbox positioning tool
Mot. 1379	Tool for holding engine on subframe
Mot. 1448	Remote operation clip pliers for cooling system hose clips
Mot. 1505	Belt tension measuring tool

EQUIPMENT REQUIRED
12 Torx socket Torque wrench Angular torque wrench Cylinder head testing tool

TIGHTENING TORQUES (in daNm)	
Tension wheel nut	2.4
Crankshaft pulley bolt	4 ± 70° ± 5°
Front right-hand suspended mounting support bolt	6.2
Inlet manifold mounting bolts	1
Cylinder head cover mounting bolt	1
Ignition coil mounting bolt	0.7
Wheel bolts	9

REMOVAL

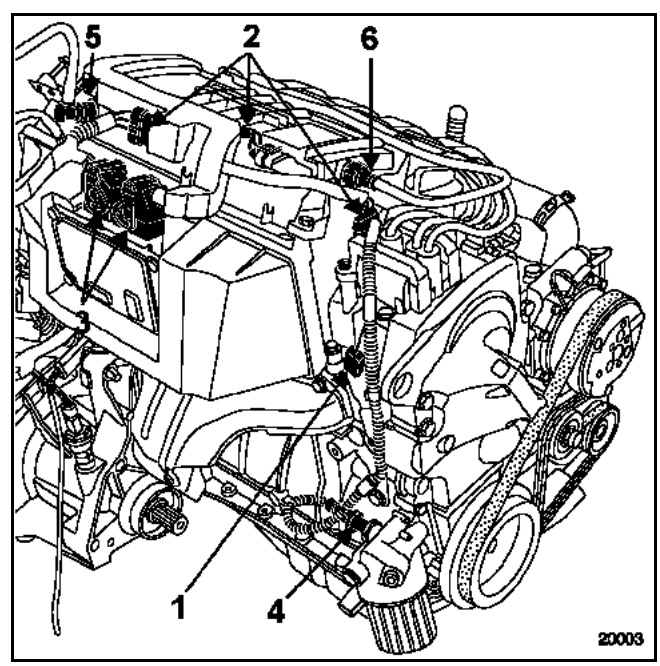
Put the car on a two-post lift.

Disconnect the battery.

Remove the timing belt (see the method described in section **11 "Timing belt**").

Drain the cooling circuit through the lower radiator hose.

Remove:
– the dipstick,
– the air filter unit,
– the engine cover,
– the interference suppressor mounting (1),
– the connectors (2), (3) and (4),
– the pipes (5) and (6) then remove them by disconnecting them from the canister,



– the high tension leads from the spark plugs,
– the fuel pipe from the injection rail,
– the coolant temperature sensor connector from the cylinder head.

Release the wiring harness of the pinking sensor from the inlet manifold.

Remove the inlet manifold mounting bolts.

Disconnect the connectors of the motorised throttle valve, the air temperature sensor and the injectors them remove the inlet manifold.

Remove:
– the ignition coil,
– the cylinder head cover bolts,
– the cylinder head cover,
– the hoses on the cylinder head coolant pipe housing outlet,
– the exhaust downpipe mountings,
– the cylinder head mounting bolts,
– the cylinder head.

CLEANING

It is very important not to scratch the mating surfaces of any aluminium components.

Wear gloves whilst carrying out this operation.

Use the **Décapjoint** product to dissolve any part of the gasket which remains attached.

Apply the product to the part to be cleaned, wait approximately 10 minutes, then remove it using a wooden spatula.

Do not allow this product to drip on to the paintwork.

Great care should be taken when performing this operation, to prevent foreign objects entering the pipes taking oil under pressure to the camshafts (pipes in both the cylinder head and its cover) and the oil return pipes.

CHECKING THE GASKET FACE

Check for mating surface bow using a ruler and a set of shims.

Maximum authorised deformation: **0.05 mm**.

NO REGRINDING OF THE CYLINDER HEAD IS PERMITTED.

Test the cylinder head to detect possible cracks using the cylinder head test tools (comprising a tray and a kit suited to the cylinder head, plug, sealing plate, blanking plate). The approval number of the cylinder head test tray is **664000.**

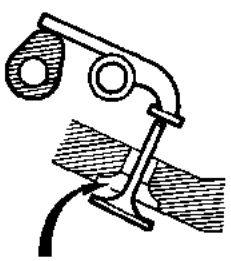
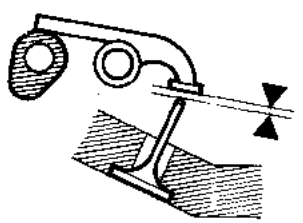
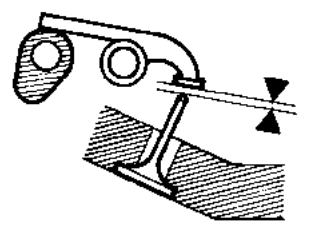
Setting the valve clearances

Valve clearance setting values (in mm):
– inlet **0.12 - 0.05**
– exhaust **0.22 - 0.15**

Open exhaust valve method

Bring the exhaust valve of cylinder **n° 1** to the fully open position, then adjust the inlet valve clearance for cylinder **n° 3** and the exhaust valve clearance for cylinder **n° 4**.

Follow the same method for the other cylinders, in the order shown by the table below.

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

REFITTING

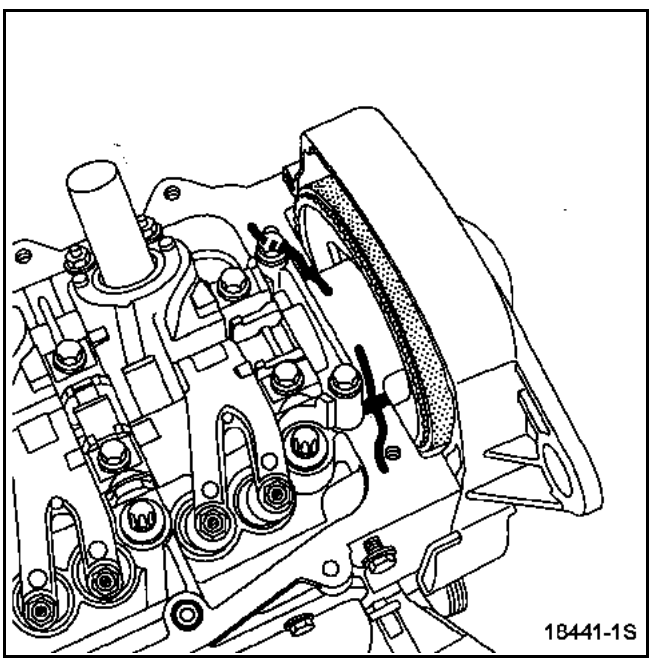
Position the pistons at mid-stroke.

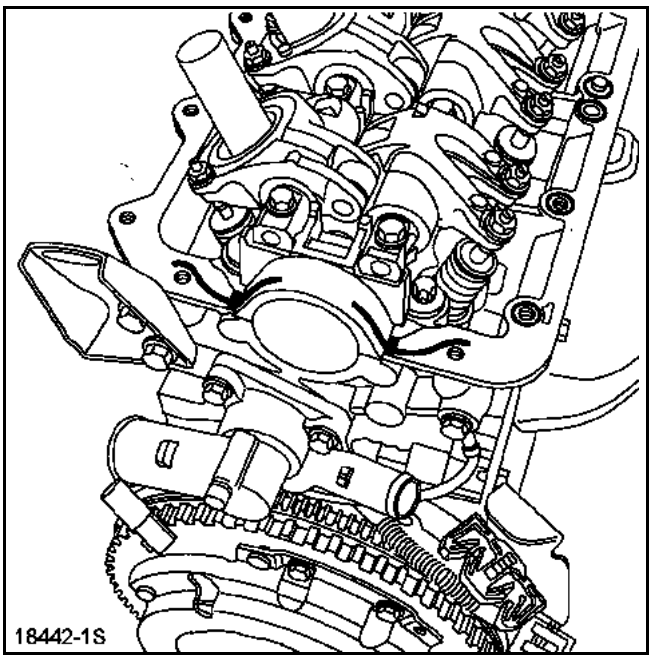
Fit the cylinder head gasket using the centring sockets of the cylinder block.

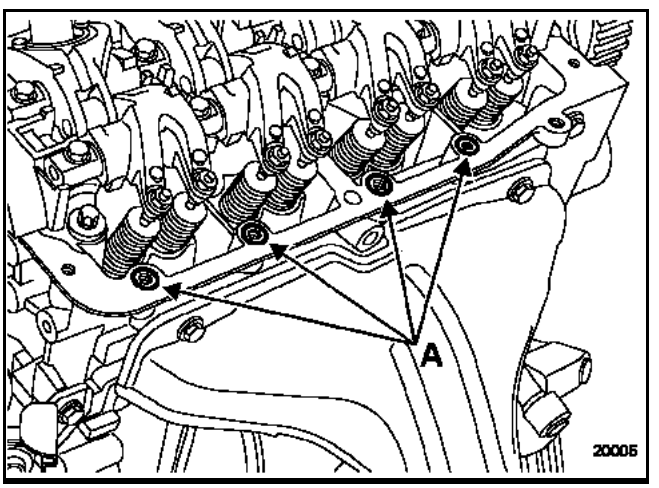
Tighten the cylinder head using an angular tightening wrench (see **section 07: Tightening the cylinder head**).

Replace the cylinder head cover seal.

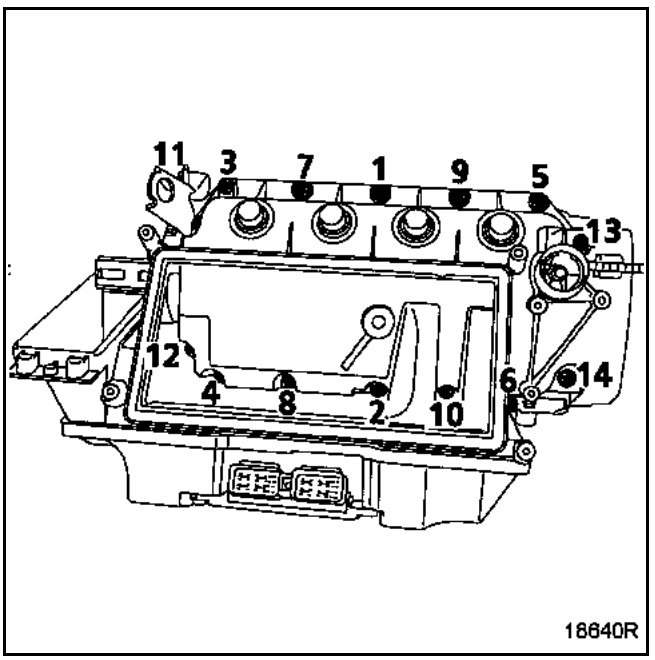
Apply **RHODORSEAL 5661** to bearings 1 and 5 of the camshaft as well as to the four mounting holes (A) of the cylinder head cover.



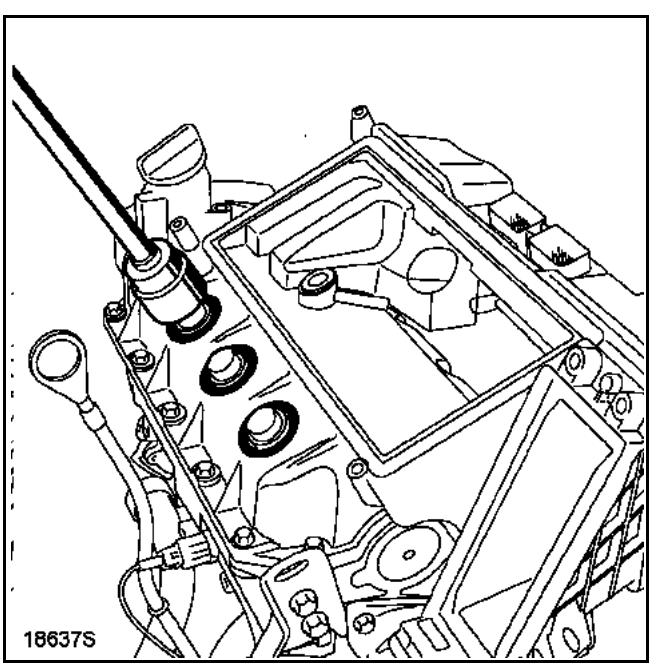




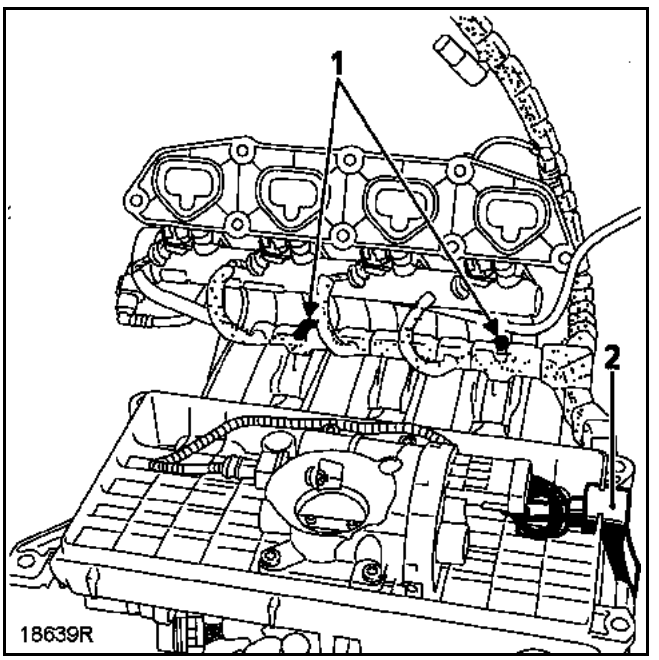
Refit the cylinder head cover, tightening the bolts to a torque of **1 daN.m** in the recommended order.



Refit new spark plug well seals using a socket with an external diameter of **41 mm** (**32 mm** socket for example).



Check that the wiring harness is correctly positioned at (1) and (2) before refitting the inlet manifold.



Replace the inlet manifold seals and the oil vapour rebreathing seal.

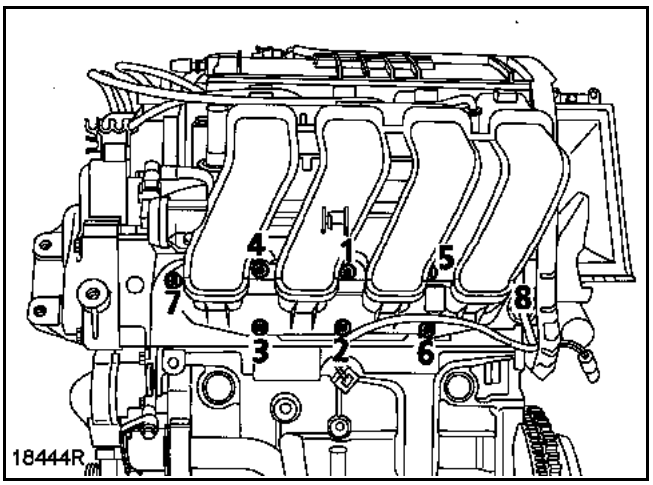
Fit the inlet manifold by reconnecting the injectors, the air temperature sensor and the motorised throttle valve.

Place a drop of **Loctite FRENETANCH** on the inlet manifold bolts.

Tighten the eight bolts by hand, then pretighten bolts (4) and (5) to a torque of **0.6 daNm**.

Loosen bolts (4) and (5) until they are completely free.

Tighten the eight bolts to a torque of **1 daNm** in the recommended order.



Tighten the four upper bolts in a cross on the inlet manifold to a torque of **1 daNm**.

Refit the timing belt (see method described in **section 11 "Timing belt"**).

Refit in the reverse order to removal.

Fill and bleed the cooling system (see **Section 19 Filling and Bleeding**).

FUEL MIXTURE
Specifications

Vehicles	Gearbox	Engines							
		Type	Suffix	Bore (mm)	Stroke (mm)	Cubic capacity (cm^3)	Compression ratio	Catalytic converter	Depollution standard
X B0 5	JB1	D4F	712	69	76.8	1149	9.8/1	C127	EU 00
X B0 W									IF05
X B1 1		D4F	706						EU 96
X B0 6	JB1	D4D	700	69	66.8	999	9.8/1	C165	US 87
X C0 5	JB1	D4F	712	69	76.8	1149	9.8/1	C127	EU 00
X C0 W									IF05
X C0 T									EU 96
X C0 6	JB3	D4D	700	69	66.8	999	9.8/1	C165	US 87

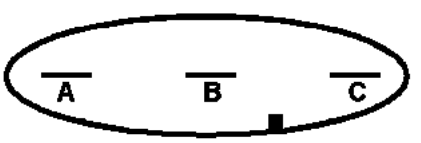
Engine		Checks performed at idle speed (warm engine)*					Fuel*** (minimum octane rating)
		Engine speed (rpm)	Pollutant emission **				
Type	Suffix		CO (%) (1)	CO2 (%)	HC (ppm)	Lambda (λ)	
D4F	712	750 ± 50	0.5 max	14.5 min	100 max	0.97<λ<1.03	Super unleaded (95 RON)
D4D	700	850±50	0.5 max	-	-	-	Unleaded (OR 91)

(1) at **2500 rpm**, the **CO** content should be **0.3** max.

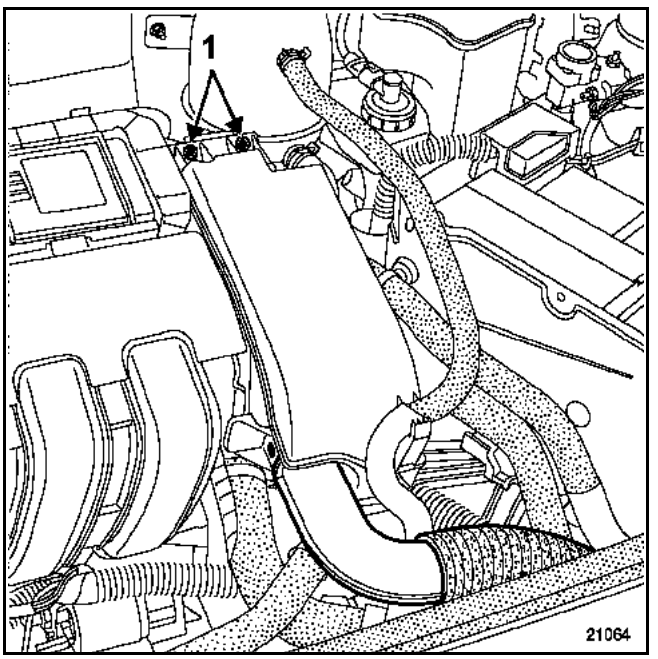
* For a coolant temperature greater than **80 ºC** and after the engine speed has stabilised at **2500 rpm** for approximately **30 seconds**.
** Refer to your country specification for the values required by legislation.
*** **OR 91** unleaded compatible.

Temperature in C° ± 1	-10	25	50	80	110
Air sensor NTC type resistance in Ohms	10 450 - 8625	2 065 - 2040	815 - 805	-	-
Coolant sensor NTC type resistance in Ohms	-	2 360 - 2140	850 - 770	290 - 275	117 - 112

Temperature in C° ± 1	-10	25	50	80	110	120
Air sensor NTC type in Ohms	10 450 - 8 625	2 174 - 1928	857 - 763	326 - 292	-	-
Coolant sensor NTC type in Ohms	13 588 - 11 332	2 364 - 2140	850 - 772	290 - 275	117 - 112	89 - 86

DESCRIPTION	MAKE/TYPE	SPECIAL NOTES
Injection and ignition computer	**MAGNETI MARELLI** **5 NR**	**96 tracks** Sequential multipoint injection Static ignition
Motorised throttle valve ∅ **40 mm** (double track integrated potentiometer)	**MAGNETI MARELLI**	-
Accelerator pedal sensor Before June 2001 From June 2001	**CTS**	Double track potentiometer Track 1 resistance = **1700** ± **900** Ω Track 2 resistance = **3000** ± **2200** Ω
	HELLA	Track 1 resistance = **1200** ± **480** Ω Track 2 resistance = **1700** ± **680** Ω
Ignition coil	**ELECTRICFIL**	Two coils with two grouped outputs Primary resistance = **0.4** ± **0.02** Ω Secondary resistance (including HT lead = **9.8** ± **0.5** Ω)
Manifold pressure sensor	**DELCO**	Piezoelectric type A. Earth B. Output signal C. **5 volt** supply  DI1330
Pinking sensor	**SAGEM**	Piezoelectric type
Magnetic sensor (TDC and engine speed)	**SIEMENS**	Variable reluctance type Resistance = **200 - 270** Ω **at 25°C**
Oxygen sensors	**NTK**	Heating resistance = **3.3** ± **0.5** Ω **at 25°C** Rich mixture > **850 mV** Lean mixture < **100 mV**
Injectors	**MAGNETI MARELLI "PICO"**	Resistance: **14.5** ± **0.7** Ω **at 20ºC**
Canister solenoid valve	**SAGEM**	Integrated into the canister Normally closed at rest type Resistance: **26** ± **4** Ω **at 23°C**
Coolant pressure sensor.	**TEXAS INSTRUMENTS**	-
Fuel pump	**-**	Pressure: **3.5 bars + 0.06** Minimum flow: **80 at 100 l/h**
Spark plugs	**Champion REA 8 MCL**	Gap: **0.9 mm**
Idle speed manifold pressure	**-**	**350** ± **50 mbars**

REPLACING THE FILTER ELEMENT



Disconnect the air inlet hose.

Release the air filter unit hose.

Remove the two mountings bolts (1) of the air filter unit then access the filter element.

TIGHTENING TORQUES (in daNm)	
Inlet manifold - cylinder head (bolts 4 and 5)	**0.6**
then all other bolts	**1**
Inlet manifold - cylinder head cover	**1**

REMOVAL

Disconnect the battery.

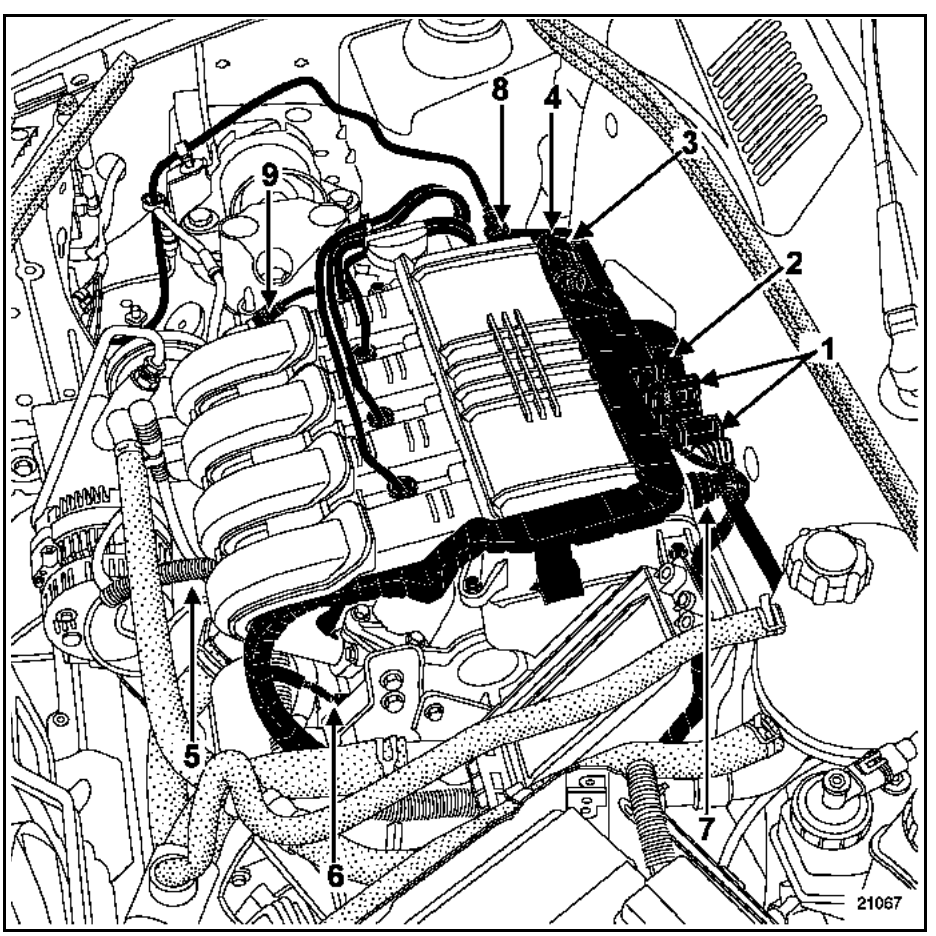
Remove:
– the air filter unit,
– the engine cover.

Disconnect:
– the injection computer connectors (1),
– the interconnection (2) on the engine wiring harness,
– the manifold pressure sensor (3).

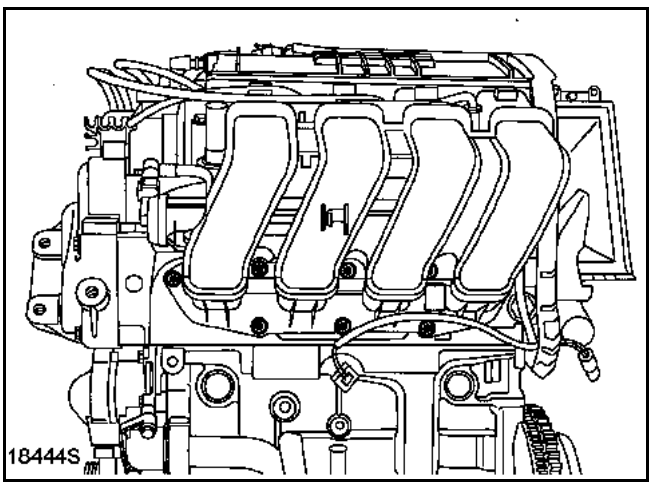
Remove the interference suppressor (4) located behind the engine.

Disconnect:
– the oil pressure sensor under the engine,
– the ignition coil connector then release the harness,
– the high tension ignition leads, pulling them by the extension cable,
– the pinking sensor (5) and unclip the harness from the inlet manifold,
– the coolant temperature sensor (6).

Disconnect:
– the starter cables,
– the brake servo vacuum pipe (7) (manifold side),
– the fuel vapour rebreathing pipe (8),
– the fuel inlet pipe (9),



Remove:
– the four bolts of the inlet manifold on the cylinder head cover,
– the bolts of the inlet manifold on the cylinder head,
– the inlet manifold by moving it to the side while disconnecting the motorised throttle valve connector, the air temperature sensor and the injectors, then release the harness from the side.

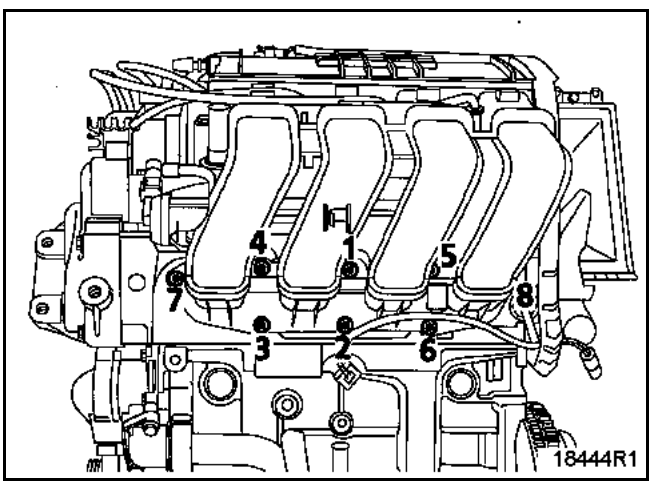


REFITTING

WARNING: the mounting bolts on the inlet manifold on the cylinder head open into the cylinder head. It is vital that you fit them using Loctite FRENETANCH.

Replace the seals on the inlet manifold, the cylinder head cover / inlet manifold seal and the oil vapour rebreather pipe seal.

Refit:
– the inlet manifold, reconnecting the injectors, the air temperature sensor and the motorised throttle valve,
– the eight bolts on the inlet manifold using **Loctite FRENETANCH** and pre-tighten to **0.6 daNm** on bolts (4) and (5).



Loosen bolts (4) and (5).

Finally, tighten bolts (1) - (8) applying a torque of **1 daNm.**

Refit and tighten the four upper mounting bolts on manifold in a crosswise pattern, applying a torque of **1 daNm.**

Continue the refitting procedure in the reverse order to removal.

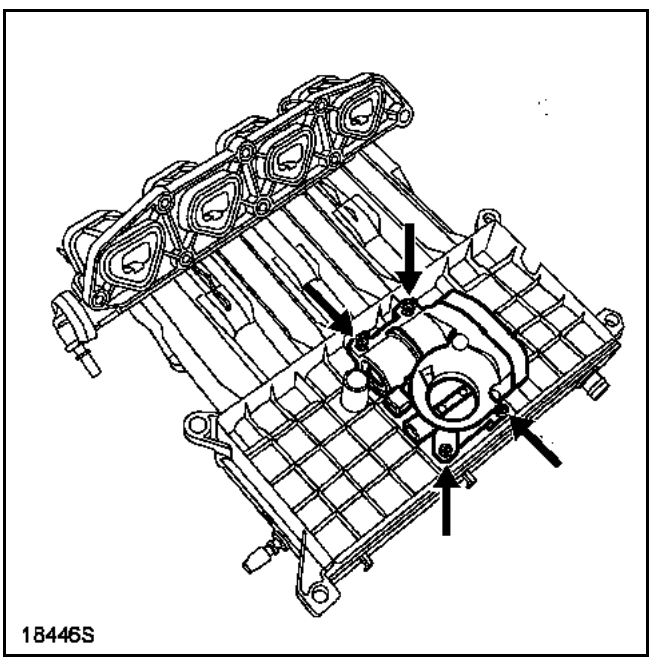
TIGHTENING TORQUES (in daNm)	
Motorised throttle valve bolt	**0.7**

IMPORTANT: the motorised throttle valve cannot be repaired after removing.

REMOVAL

To remove the motorised throttle valve you must remove the inlet manifold (see section **12 "Fuel mixture - inlet manifold")**.

Remove:
– the four mounting bolts on the throttle valve.
– the motorised throttle valve.



REFITTING

Replace the O-ring on the throttle valve.

Clean the threads on the four mounting bolts on the throttle valve.

Refit the throttle valve.

Tighten the bolts in the correct order.

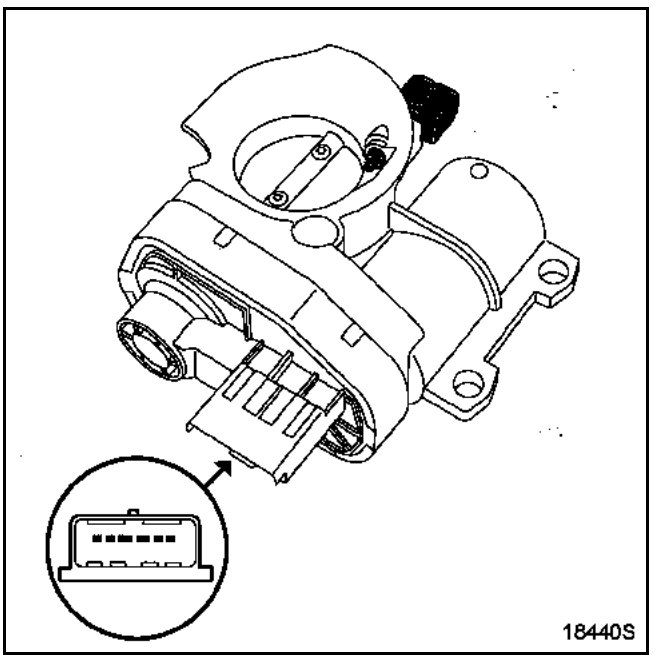
NOTE: when replacing the motorised throttle valve, the minimum throttle stop has to be reprogrammed.

Using the diagnostic tool, erase all fault codes and reprogram the values.

The minimum throttle stop is programmed the first time the ignition is switched on and to do this:
– switch on the ignition for approximately **3 seconds** then start the engine,
– switch off the engine then the ignition,
– wait for the end of the computer self-supply phase (power latch) of approximately **5 seconds**, then restart the engine.

Allow the engine to idle to reach a coolant temperature of **60°C** (estimated time from a coolant temperature of **20°C**: approximately **3 minutes**), then perform a road test to program the throttle valve adaptives.

ALLOCATION OF CONNECTOR TRACKS



MOTORISED THROTTLE BODY CONNECTOR

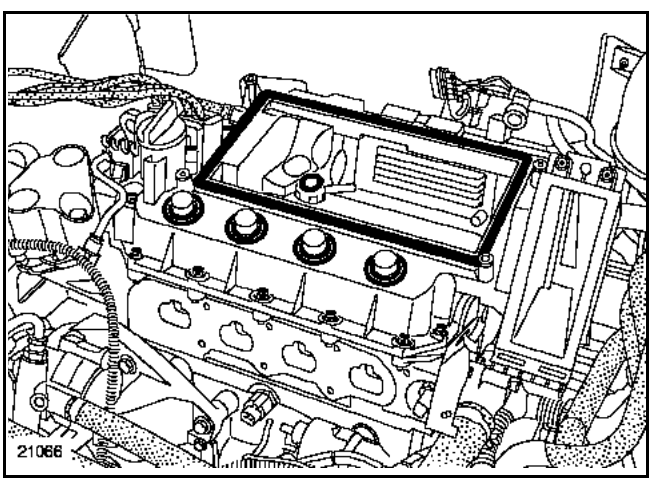
Track	Description
1	Potentiometer earth
2	Track 1 potentiometer signal
3	Engine supply
4	Engine earth
5	**5 volt** supply
6	Track 2 potentiometer signal

TIGHTENING TORQUES (in daNm)	
Ignition coils	**0.7**
Cylinder head cover	**1**

REMOVAL

To remove the cylinder head cover you must remove the inlet manifold (see section **12 "Fuel mixture - inlet manifold")**.

Remove:
– the ignition coils
– the fourteen bolts on the cylinder head cover,
– the cylinder head cover by shifting it towards the battery,

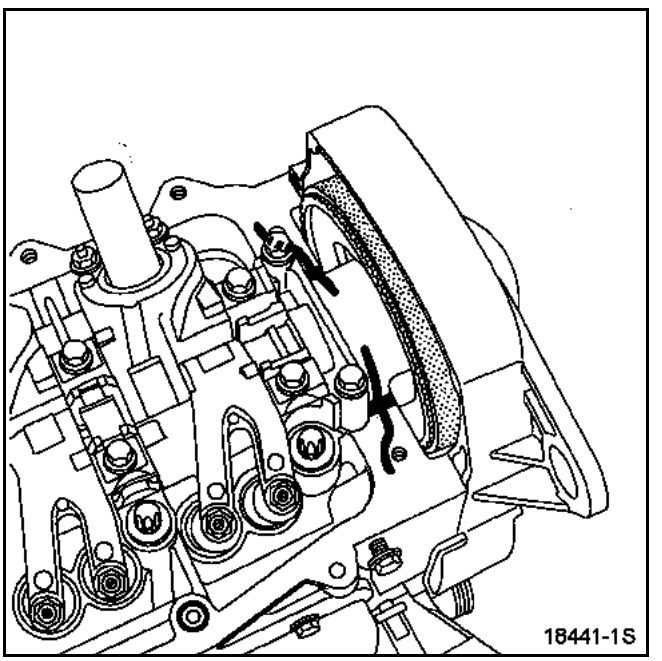


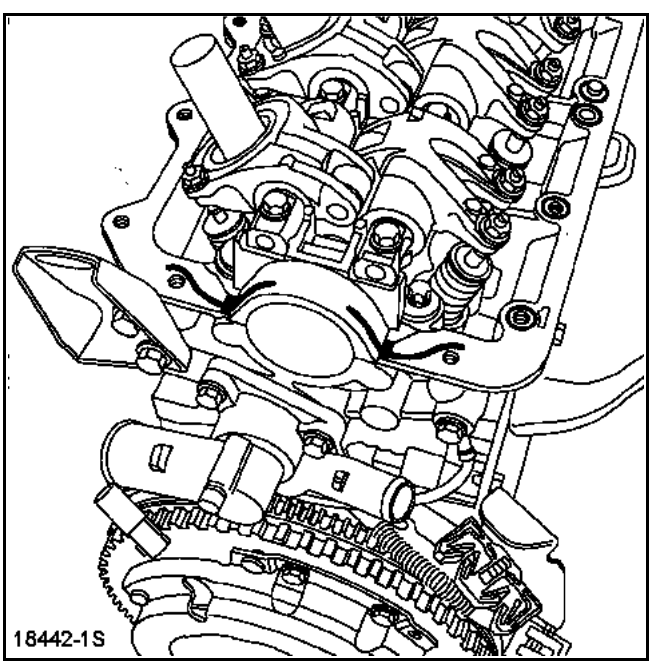
– the plug well seals.

REFITTING

Replace the gasket with a new gasket.

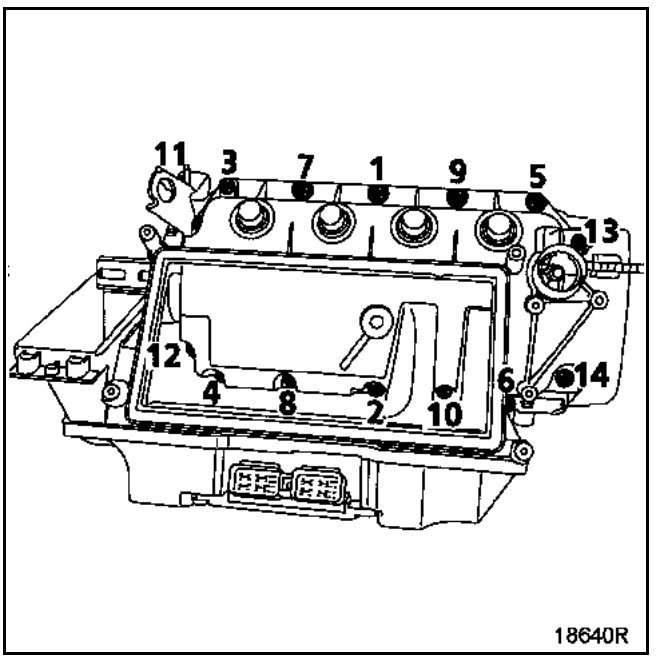
Apply **RHODORSEAL 5661** to bearings 1 and 5 of the camshaft as well as to the four rear mounting holes of the cylinder head cover.



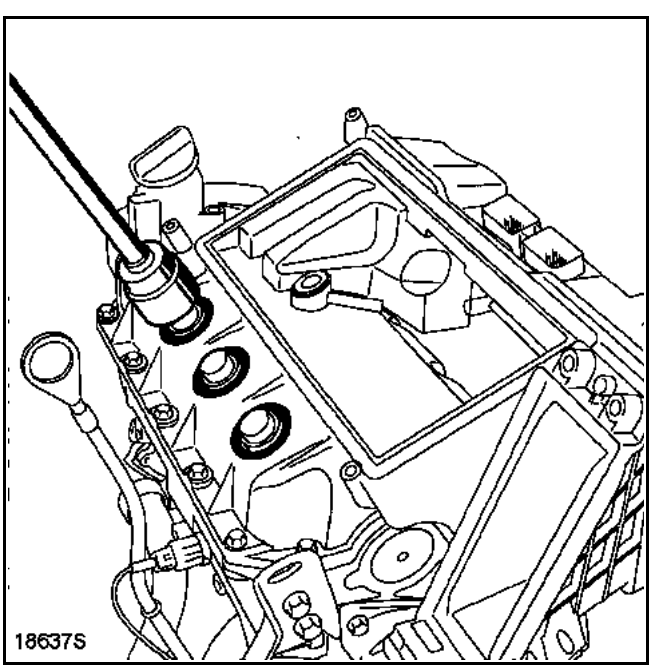


Refit the fourteen bolts on the cylinder head cover and finger tighten them.

Tighten to **1 daN.m** observing the tightening order.



Refit new spark plug well seals using a socket with an external diameter of **42 mm**, e.g. a **32 mm** socket.



TIGHTENING TORQUES (in daNm)	
Manifold mounting nut	**2.5**
Manifold mounting stud (Loctite Frenétanch)	**1.2**
Heat shield mounting bolt	**1.5**
Exhaust downpipe mounting stud	**1.2**
Exhaust downpipe mounting nut	**2.5**
Oxygen sensor	**4.4 ± 0.7**

REMOVAL

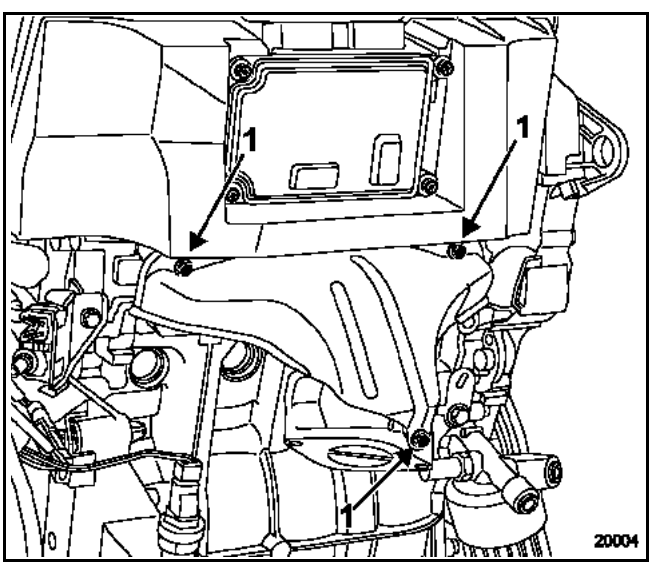
Put the car on a two-post lift.

Disconnect the battery.

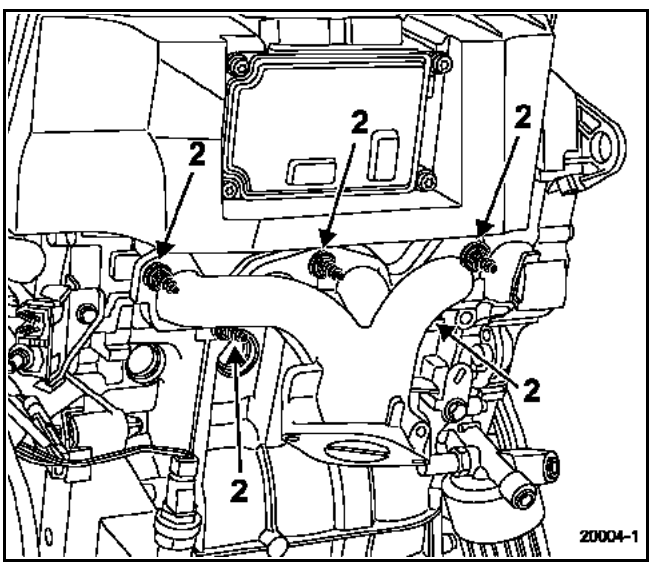
Remove the engine undertray.

Disconnect the upstream then downstream oxygen sensors.

Unclip the downstream sensor harness.



Remove:
- the exhaust downpipe mounting nuts then disconnect and remove the catalytic converter,
- the three mounting bolts (1) of the heat shield then release it,
- the five mounting nuts (2) of the exhaust manifold using a flex-head spanner through the sub-frame and the body,
- the manifold.

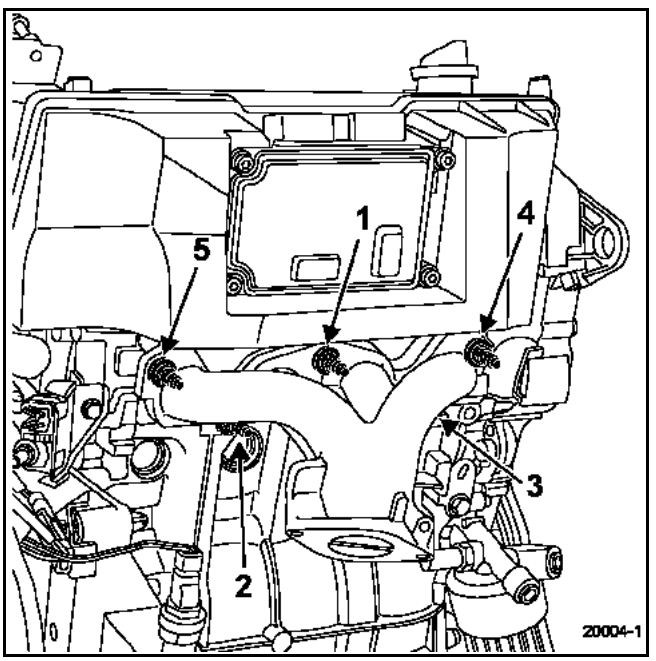


REFITTING

Replace the gasket of the manifold and exhaust downpipe.

Refit the manifold then tighten the nuts, using the correct torque and tightening order.

Refit in the reverse order to removal for the other refitting operations.

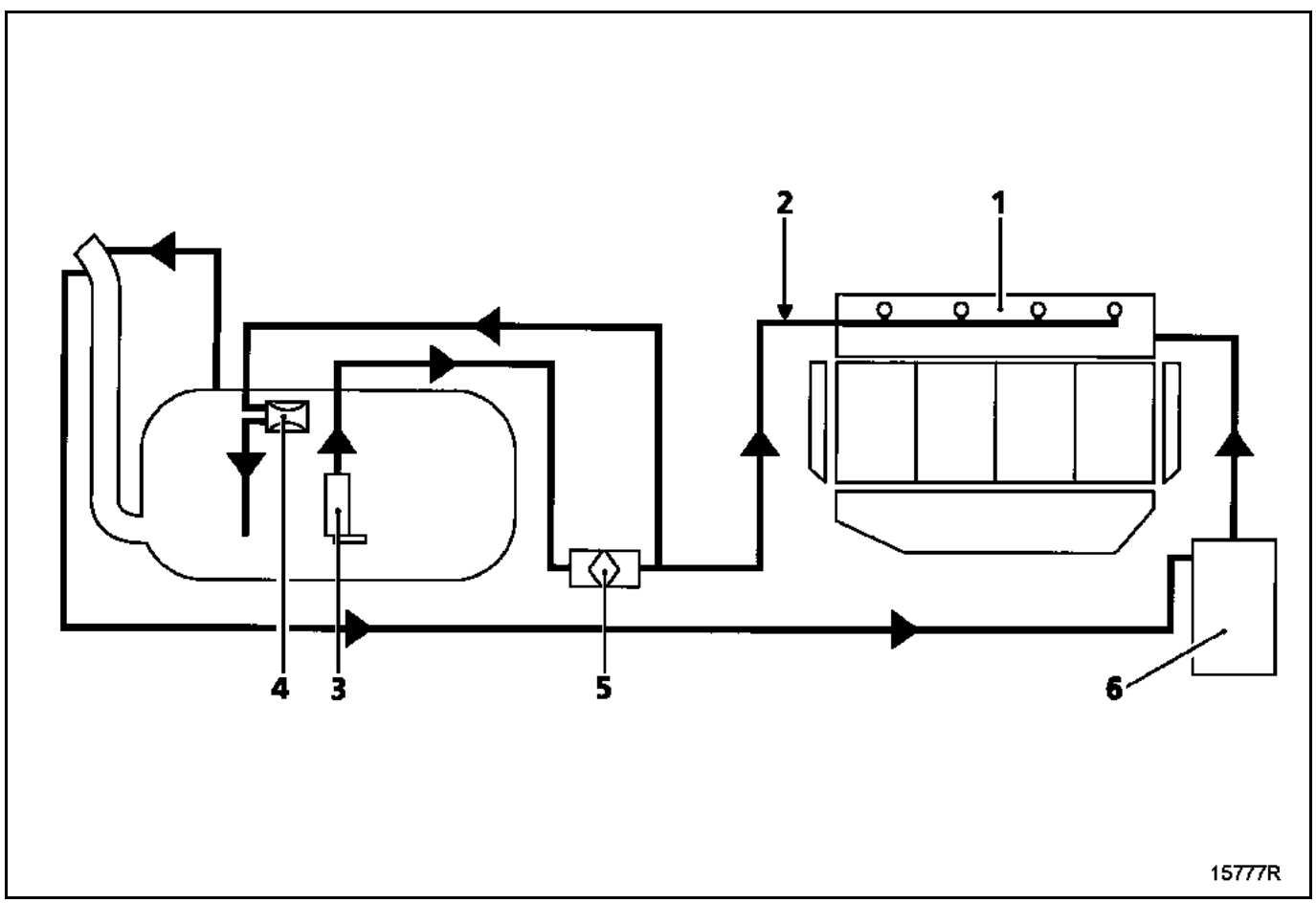


The petrol fuel supply system for the engine is a non return circuit.

The petrol fuel pressure no longer varies as a function of the engine load.

The circuit comprises:
– a rail (1) without a return pipe connector and without a supply pressure regulator,
– a single pipe (2) coming from the tank,
– a pump/sender assembly (3) fitted with a pressure regulator (4) (located in the tank),
– a fuel filter (5) located under the car,
– a tank for reabsorbing fuel vapour (6).

OPERATING DIAGRAM OF THE PETROL CIRCUIT

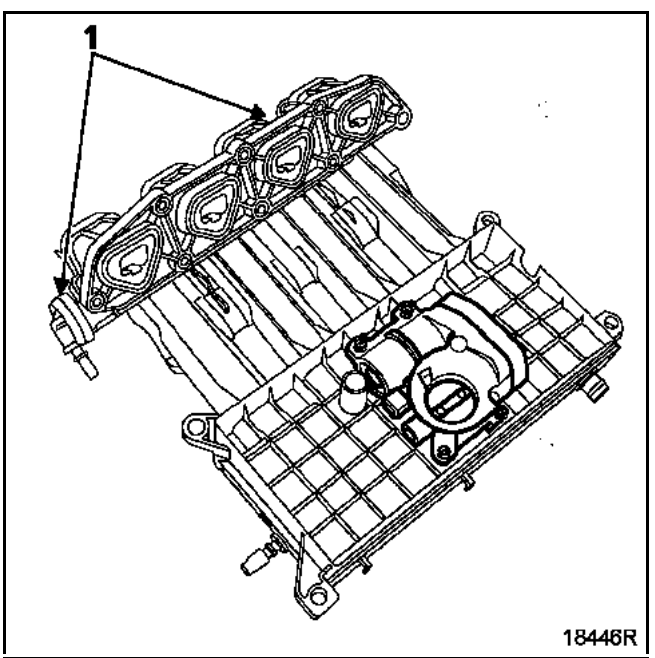


TIGHTENING TORQUES (in daNm)	
Injection rail mounting bolt	**0.7**

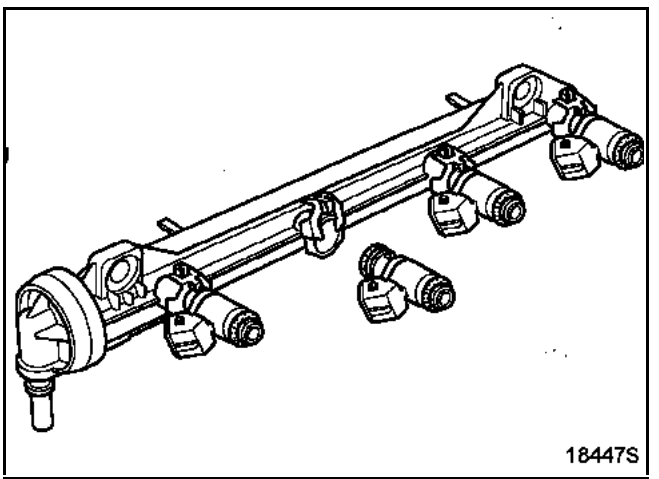
The inlet manifold must be removed in order to remove the injector rail (see section **12 "Fuel mixture - inlet manifold"**.

REMOVAL

Remove:
– the two injection rail mounting bolts (1) on the inlet manifold,



– the injector mounting clips,
– the injectors.



REFITTING

The injector O-rings must be replaced with new seals. The fastening clips also need replacing.

Use the correct tightening torque for the rail mounting bolts.

Listen for the click that indicates the fuel supply union is correctly fastened.

For information on other removal operations, see **section 12 "Fuel mixture - Inlet manifold"**.

SPECIAL TOOLING REQUIRED	
Mot. 1311-01	**Fuel pressure testing unit with pressure gauge and petrol connectors**
Mot.1311-08	**"T" adaptor**

IMPORTANT: during this operation, it is essential to:
– refrain from smoking or bringing incandescent objects close to the work area,
– use suitable protection against petrol splashes caused by the residual pressure in the pipes,
– protect sensitive areas from petrol.

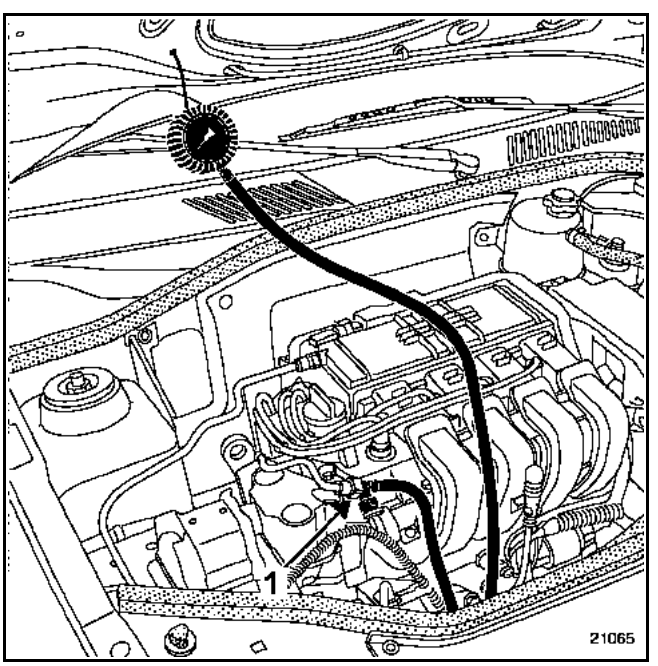
Disconnect the quick-release union (1) from the supply rail.

To the union (1), fit the **"T" adaptor, Mot. 1311-08** along with the pressure gauge from the test kit **Mot. 1311-01.**

Start the engine in order to start the fuel pump.

Read the pressure, which should be constant.

Pressure read: **3.5 bars** ± **0.06.**

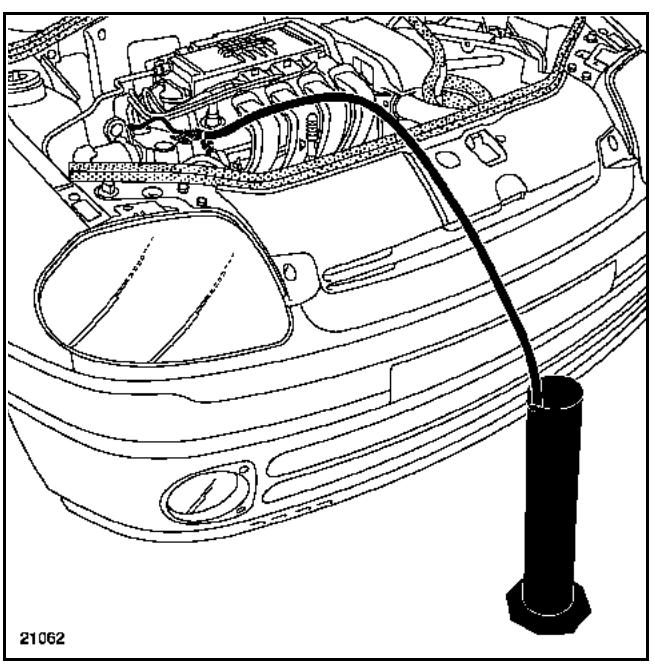


SPECIAL TOOLING REQUIRED	
Mot. 1311-01	Fuel pressure testing unit with pressure gauge and petrol connectors
Mot.1311-08	"T" adaptor
EQUIPMENT REQUIRED	
2 000 ml measuring cylinder	

IMPORTANT: during this operation, it is essential to:
– refrain from smoking or bringing incandescent objects close to the work area,
– use suitable protection against petrol splashes caused by the residual pressure in the pipes,
– protect sensitive areas from petrol.

Disconnect the quick-release union from the supply rail.

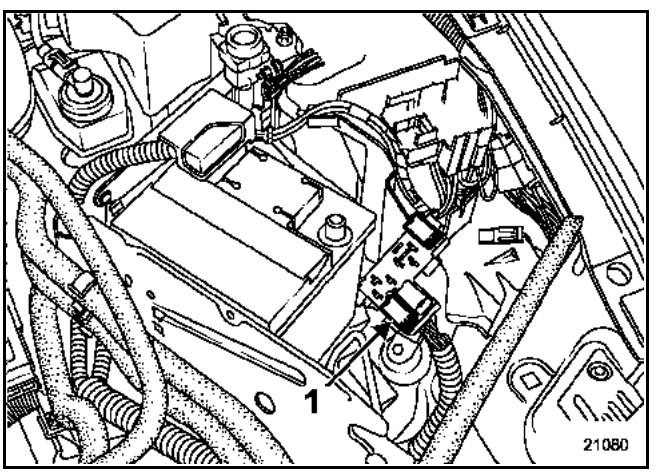
To the rail union, fit the **"T" adaptor, Mot. 1311-08** then connect a sufficiently long pipe so that fuel can be pumped into a graduated measuring cylinder.



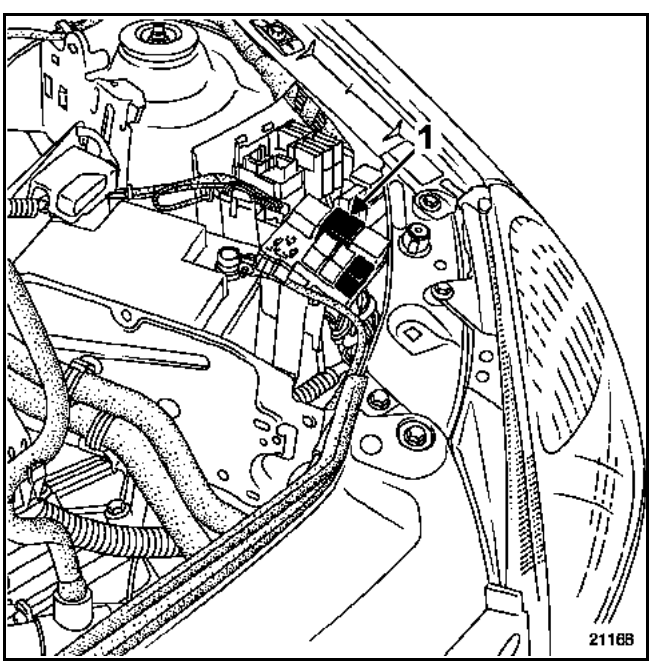
Start the pump running by shunting tracks 3 and 5 of the fuel pump relay (1). In one minute, the pump flow must be a minimum of **1.3 litres** with a voltage of **12 volts.**

Flow read: **80 - 100 litres/hour.**

Before June 2001

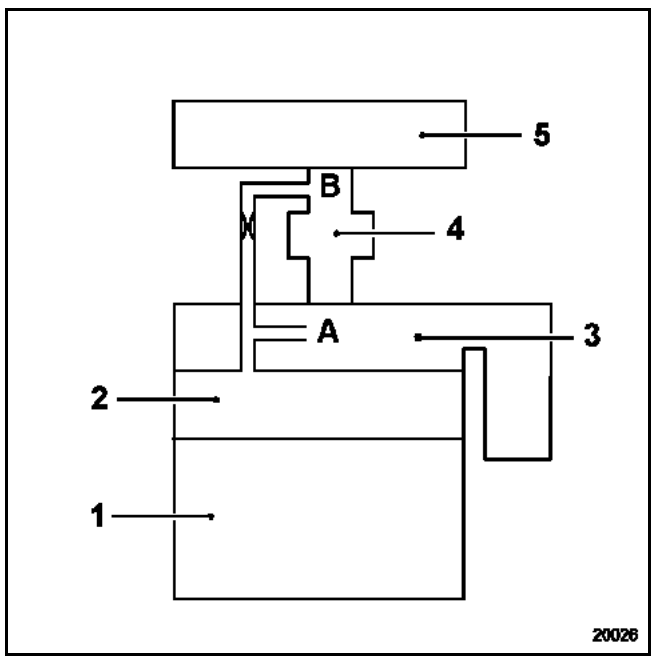


From June 2001



The oil decanter is located in the cylinder head cover and is joined during manufacture.

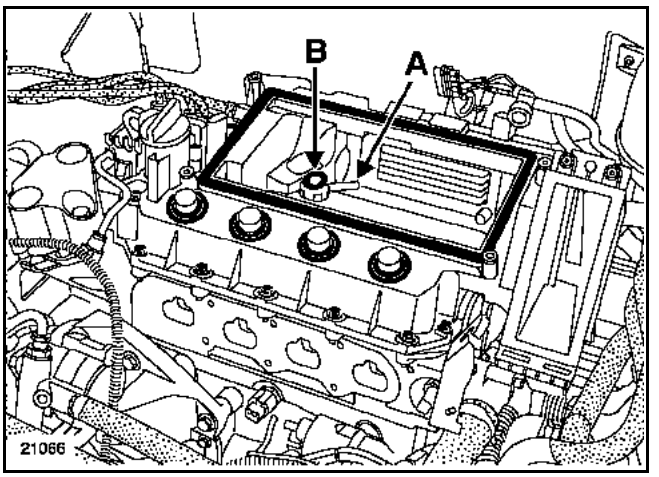
CIRCUIT DIAGRAM



1 Engine
2 Cylinder head cover
3 Air inlet housing
4 Throttle housing
5 Air manifold

A Circuit upstream of the throttle valve.
This circuit is used for medium and heavy loads. The vapours are rebreathed by the vacuum set up in the air duct.

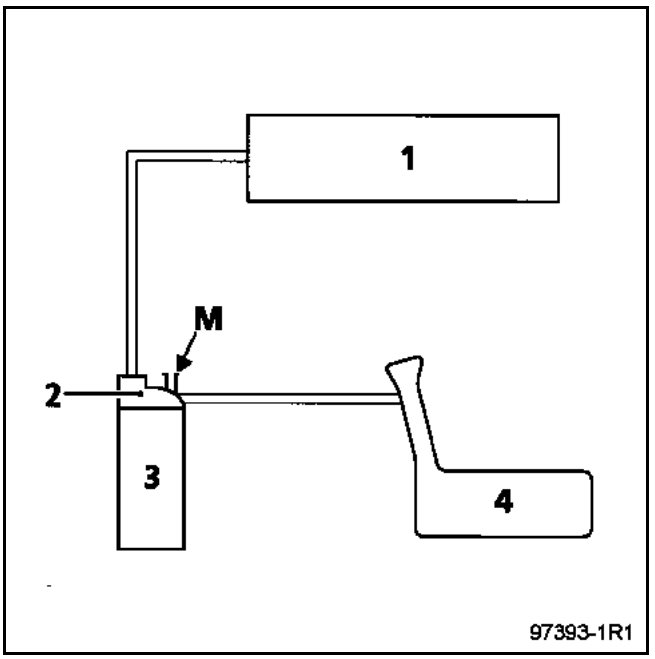
B Circuit downstream of the throttle valve.
This circuit is used for low loads. The vapours are rebreathed, via a calibrated orifice, by the vacuum between the throttle and the engine.



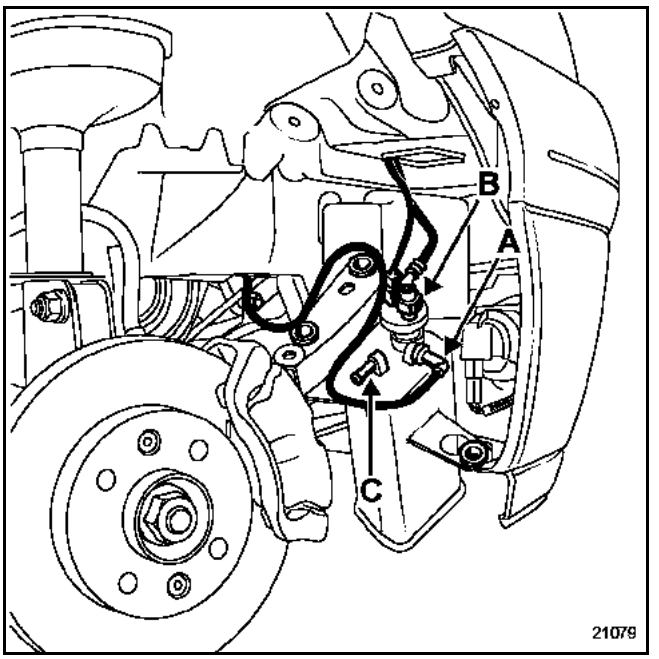
CHECKING

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

OPERATING DIAGRAM OF THE CIRCUIT



1 Inlet manifold
2 Recycling solenoid valve
3 Fuel vapour absorber with solenoid valve
4 Fuel tank
M Breather



A Rebreathing of the fuel vapours coming from the tank.
B Rebreathing of the fuel vapours going to the engine.
C Breather

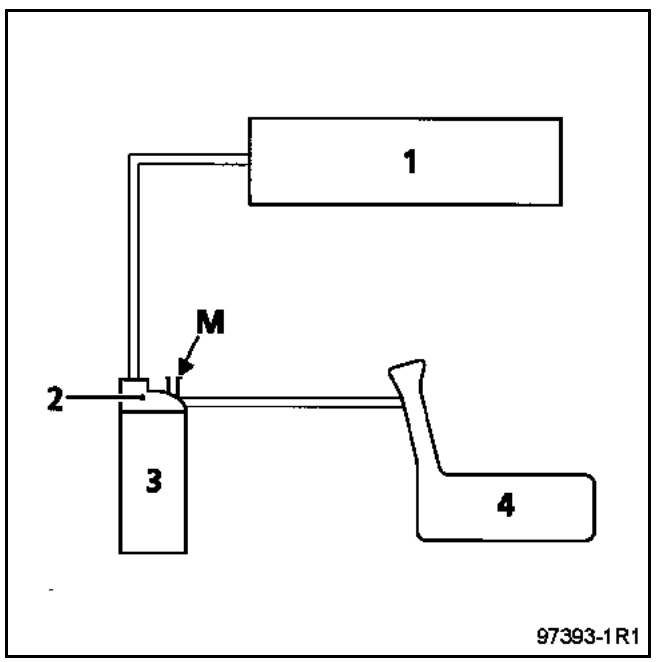
IMPORTANT: the breather must not be blocked during normal operation.

CHECKING CANISTER BLEED OPERATION

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

Check the conformity of the circuit (see operational diagrams)

Check the condition of the pipes to the fuel tank.



1 Inlet manifold
2 Recycling solenoid valve
3 Fuel vapour absorber with solenoid valve
4 Fuel tank
M Breather

CANISTER BLEED CONDITIONS

The canister bleed solenoid valve, of Normally Closed type, is controlled by track **A M3** of the computer when:
– the coolant temperature is greater than **70°C**,
– the engine is not idling,
– the engine speed is steady, during an acceleration phase (not during injection cut-off whilst decelerating),
– the upstream and downstream sensor loop is closed and the richness adaptives are correct.

The cyclic ratio can be viewed using the diagnostic tools by consulting parameter **PR023 "Canister bleed solenoid valve OCR"**.

The solenoid valve is closed for a value of **0%.**

REMOVING THE CANISTER

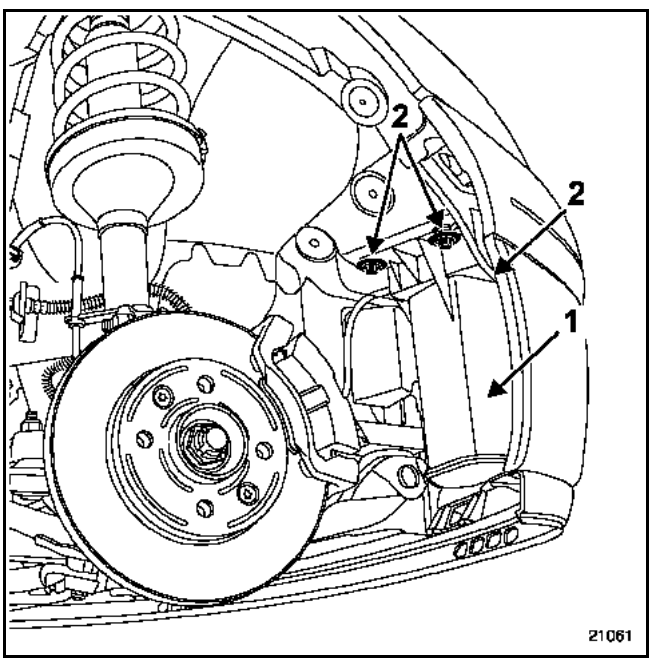
The canister (1) is located behind the front right hand wheel arch liner and is secured to the body.

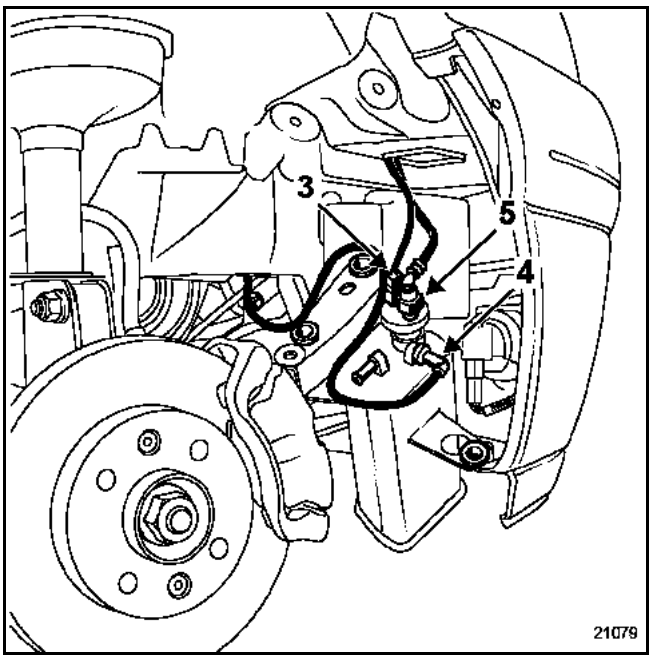
Put the car on a two-post lift.

Disconnect the battery.

Remove:
– the front right wheel,
– the front section of the mudguard,
– the three mounting bolts (2) of the canister.

Gently release the canister then disconnect:
– the connector (3) of the canister bleed solenoid valve,
– the petrol vapour inlet pipe (4) from the tank,
– the petrol vapour rebreathing pipe (5) to the inlet manifold.





REFITTING

Refitting is the reverse of removal.

Check:
– at idle speed,
– by blocking the circuit coming from the tank at the canister,
– by connecting a pressure gauge (± **3 bars Mot. 1311-01**) to the outlet of the canister breather,
– that there is no vacuum (likewise, the control value read by the diagnostic tool on parameter **PR023 "Canister bleed solenoid valve OCR"** remains minimal **X < 1.5%**.)

Is there a vacuum?

YES: with the ignition off, use a vacuum pump to apply a vacuum of **500 mbars** to the solenoid valve at its output. The vacuum should not vary by more than **10 mbars in 30 seconds.**

Does the pressure vary?

YES: replace the solenoid valve as it is faulty.

NO: there is an electrical problem, check the circuit.

NO: In the bleed conditions (see bleed conditions) an increase in the vacuum should be detected (at the same time, the value of the parameter should increase on the diagnostic tool).

CHECKING THE CONNECTION BETWEEN CANISTER AND TANK

This connection can be checked by connecting a vacuum pump onto the pipe going to the canister.

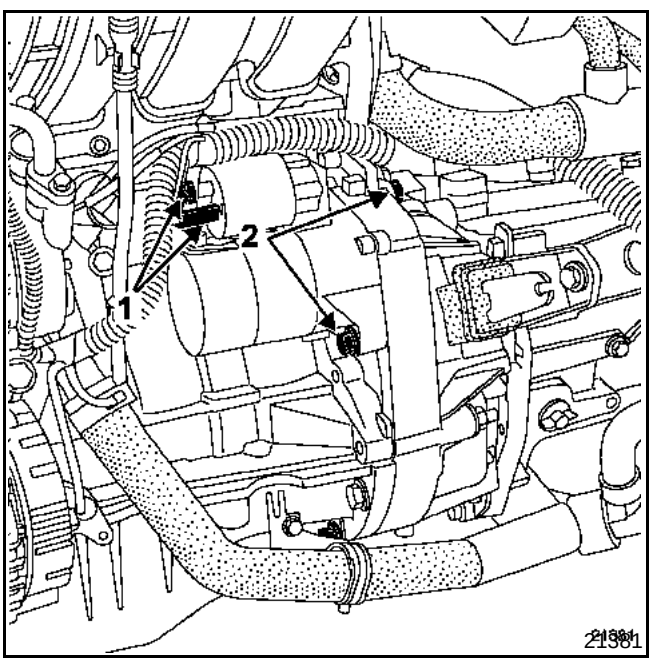
IDENTIFICATION

Vehicle	Engine	Starter
CLIO KANGOO	D4F D4D	Valeo 15I00401RA

REMOVAL

Disconnect the battery.

Remove:
– the starter motor electrical connections (1),
– the starter motor mountings (2),
– the starter motor.



REFITTING

Refit in reverse order to removal.

IDENTIFICATION

Vehicle	Engine	Alternator	Current
CLIO	D4F	Valeo A11VI 110	75 A
		Valeo S67S 012	75 A
KANGOO	D4D	Valeo S69B 035	90 A

CHECKING

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

Rpm	75 Amps	90 Amps
1300	28	-
1500	-	52
2000	40	52
2700	60	-
3000	-	76
4000	72	82

SPECIAL TOOLING REQUIRED	
Mot. 1505	**Belt tension measuring tool**

REMOVAL

Disconnect the battery.

Remove:
– the alternator belt,
– the alternator electrical connectors,
– the alternator mountings,
– the alternator.

REFITTING

Refit in the reverse order to removal.

Refer to Section **07 "Accessories belt tension"** for the tensioning process.

TIGHTENING TORQUES (in daNm)	
Ignition coils	**0.7**

Electrical connector

Terminal	Description
1	Ignition coil control of cylinders 2 - 3
2	+ after ignition
3	+ interference suppressor
4	Ignition coil control of cylinders 1 - 4

Track n° 1 must point towards the front of the vehicle.

The High Tension leads are marked and cannot be disconnected from the coil.

Checks at the coil terminals

Primary resistance:
– A and B: **0.40** ± **0.02** Ω
– C and D: **0.40** ± **0.02** Ω

Resistance between B and C: **0** ± **0.02** Ω**.**

Checks on the HT leads

NOTE: as the HT leads cannot be disconnected from the coil, the check of the secondary winding includes the HT leads.

Secondary resistance (including HT leads):
– leads 1 and 4: **9.8** ± **0.5** kΩ
– leads 2 and 3: **9.6** ± **0.5** kΩ

Resistance between 1 - 2, 1 - 3, 2 - 4, 3 - 4: infinite.

Lengths of the HT leads

Cylinder n° 1: **640 mm**
Cylinder n° 2: **545 mm**
Cylinder n° 3: **445 mm**
Cylinder n° 4: **385 mm**

NOTE: only pull on the spark plug lead extension cables when disconnecting the spark plug leads.

PRESENTATION

The system comprises:
– the injection computer (1) (the ignition power stage is integrated into the computer),
– two coils (2) with dual monoblock output (they are moulded into a single piece),
– four HT leads which cannot be removed from the coil unit,
– four spark plugs,
– an interference suppressor (3).

DESCRIPTION - OPERATING PRINCIPLE

THE COMPUTER

The injection computer (1), depending on the information received from various sensors, but principally depending on the engine speed and load, determines:
– the number of degrees of advance to be used and consequently the ignition point,
– which cylinders are at TDC and consequently the ignition coil to be operated.

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

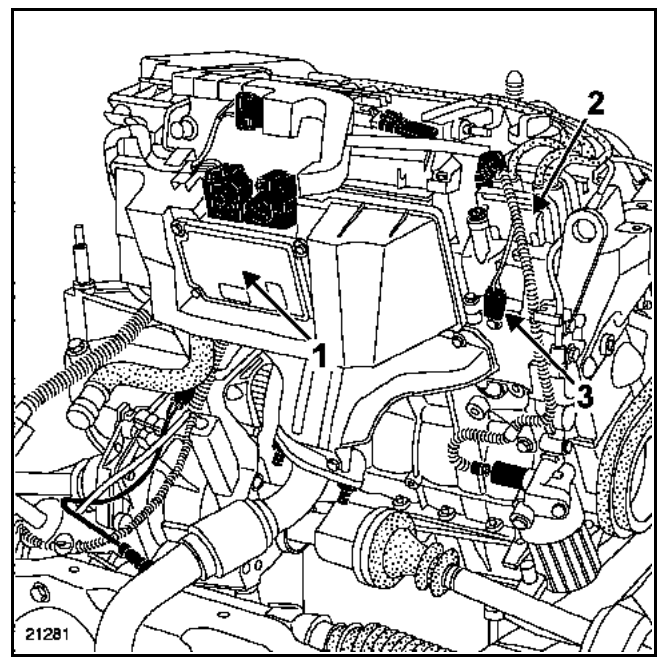
THE COILS

There are two coils. They are of with dual monoblock output (they cannot be separated).

They are controlled separately by the computer.

They create two sparks simultaneously.

Both coils are connected to an interference suppressor.

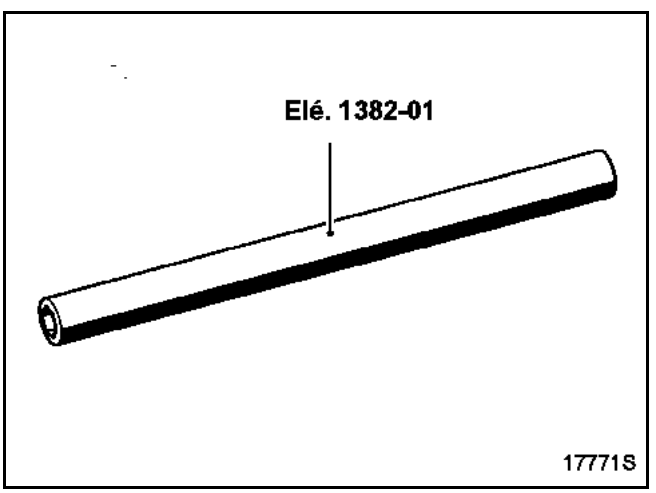


Engine	Make	Type
D4F and D4D	CHAMPION	REA 8 MCL
Flat skirt with seal		
Gap: **0.9 mm**		
Tightening: **2** - **2.7 daN.m**		

For information, the spark plugs sold in after-sales are of Renault make.

Remove the style cover then disconnect the spark plug leads by pulling on the extension cables.

Remove the spark plugs using tool **Elé. 1382-01.**



TIGHTENING TORQUES (in daNm)	
Computer:	
– **tightening after replacing the manifold**	**0.7**
– **tightening on a reused manifold**	**0.5**

REMOVAL

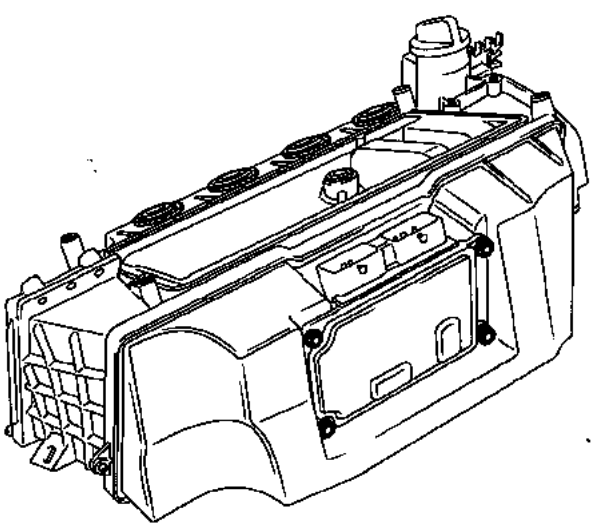
Disconnect the battery.

Remove the engine cover.

Disconnect the two computer connectors.

Undo the four computer mounting bolts, following the correct order.

Remove the computer then the seal.



REFITTING

Refit the computer by replacing the O-ring with a new one. Use a mirror if necessary to ensure it is positioned correctly.

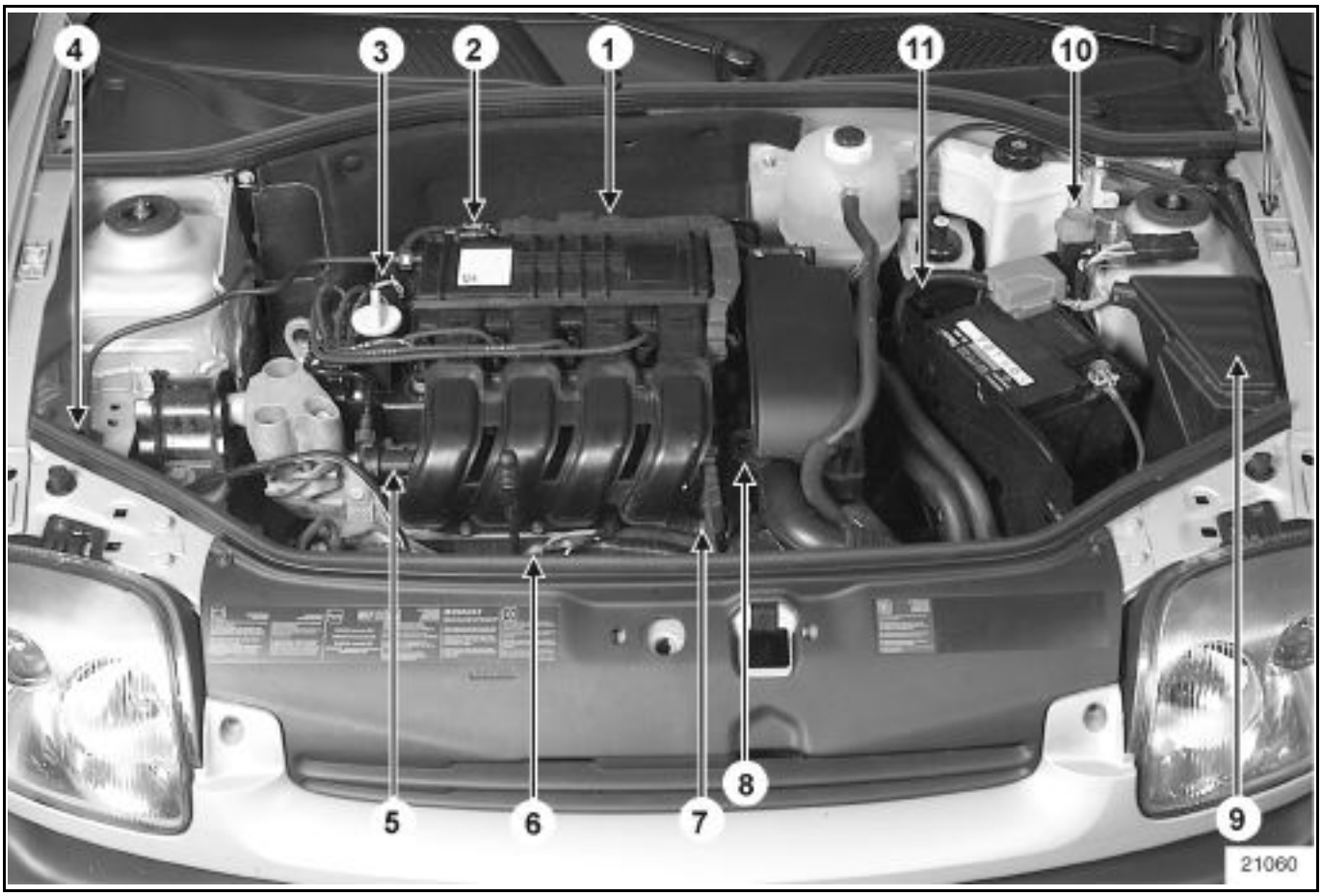
Clean the threads of the four computer mounting bolts then tighten these carefully, using the correct tightening order.

NOTE: when replacing the computer, the minimum throttle stop has to be reprogrammed.

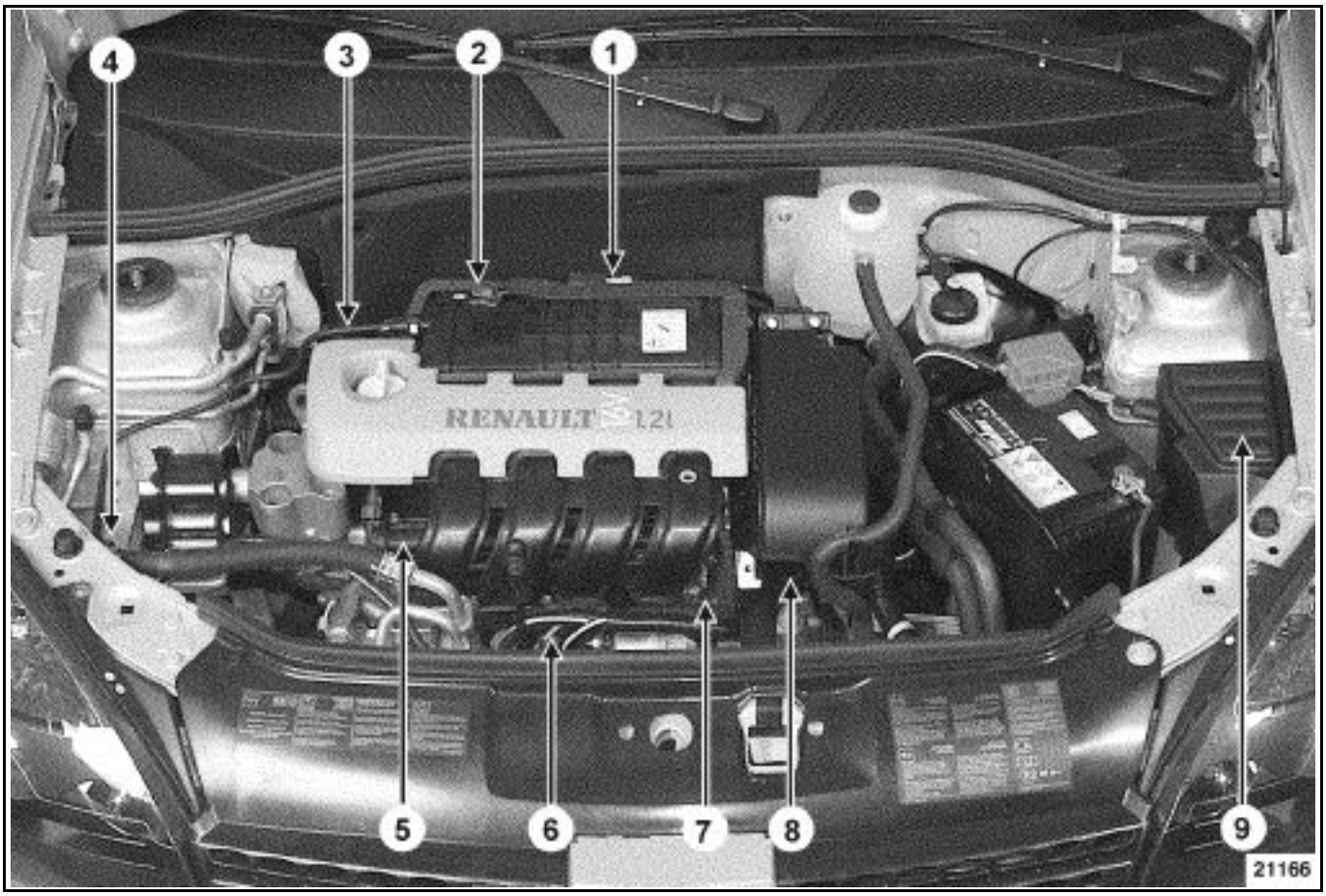
Using the diagnostic tool, erase all fault codes and reprogram the values.

The minimum throttle stop is programmed the first time the ignition is switched on. To do this:
– switch on the ignition for approximately **3 seconds** then start the engine,
– switch off the engine then the ignition,
– wait for the end of the computer self-supply phase (power latch) of approximately **5 seconds**, then restart the engine.

Allow the engine to idle to reach a coolant temperature of **60°C** (estimated time from a coolant temperature of **20°C**: approximately **3 minutes**), then perform a road test to program the throttle valve adaptives.

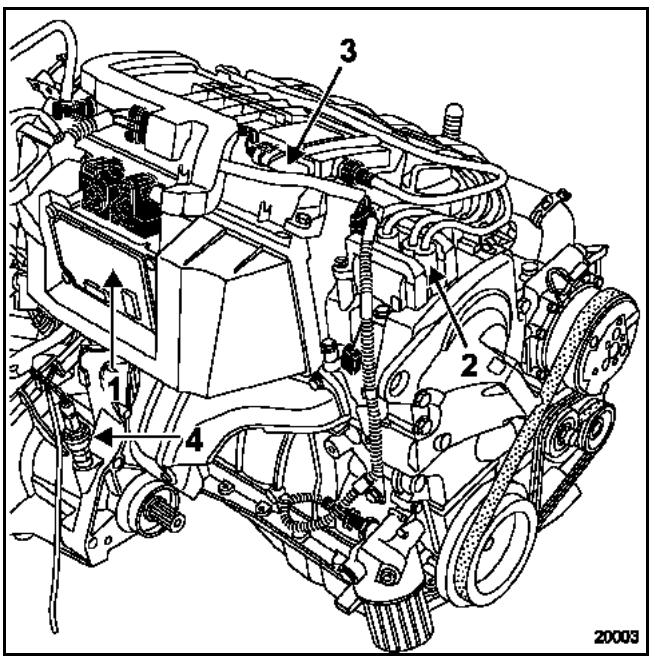


1 Injection computer
2 Manifold pressure sensor
3 Double output coils
4 Fuel vapour tank (canister) with integrated solenoid valve
5 Injector rail
6 Pinking sensor
7 Coolant temperature sensor
8 TDC sensor
9 Relay unit
10 Impact sensor
11 Accelerator pedal potentiometer



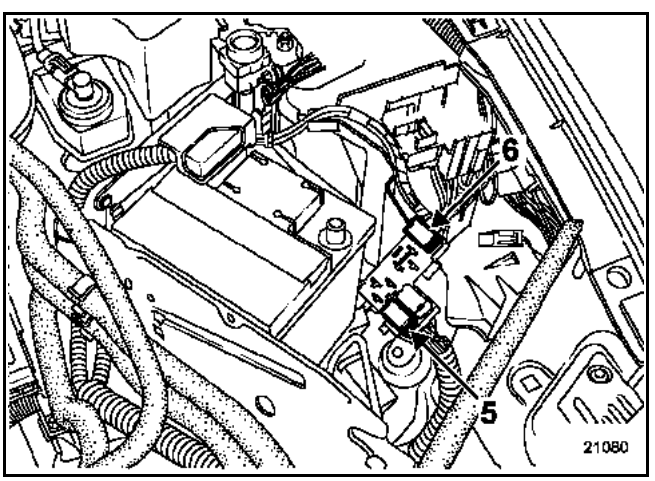
1 Injection computer
2 Manifold pressure sensor
3 Double output coils
4 Fuel vapour tank (canister) with integrated solenoid valve
5 Injector rail
6 Pinking sensor
7 Coolant temperature sensor
8 TDC sensor
9 Relay unit

1 Injection computer
2 Double output coil
3 Manifold pressure sensor
4 Vehicle speed sensor **(only before June 2001)**

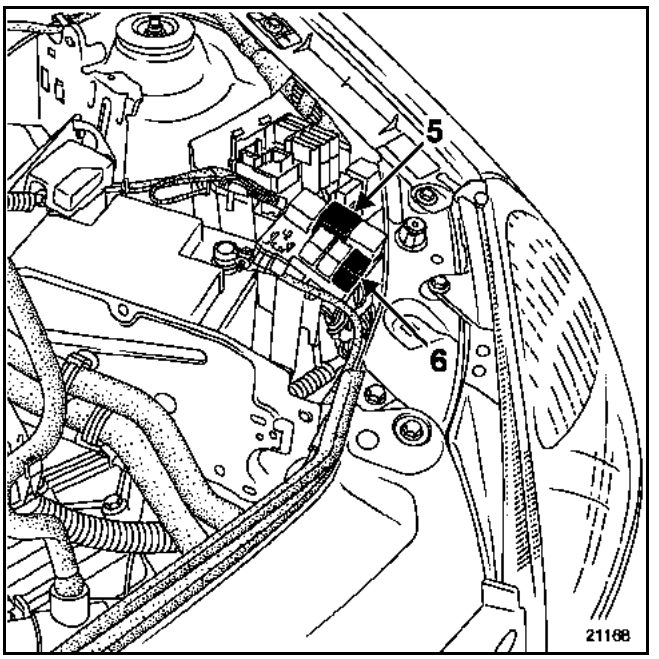


5 Fuel pump relay
6 Injection locking relay

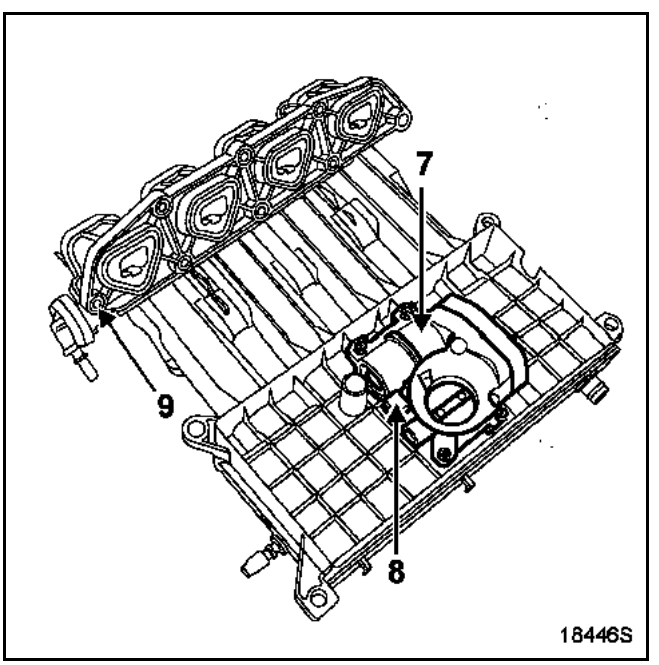
Before June 2001



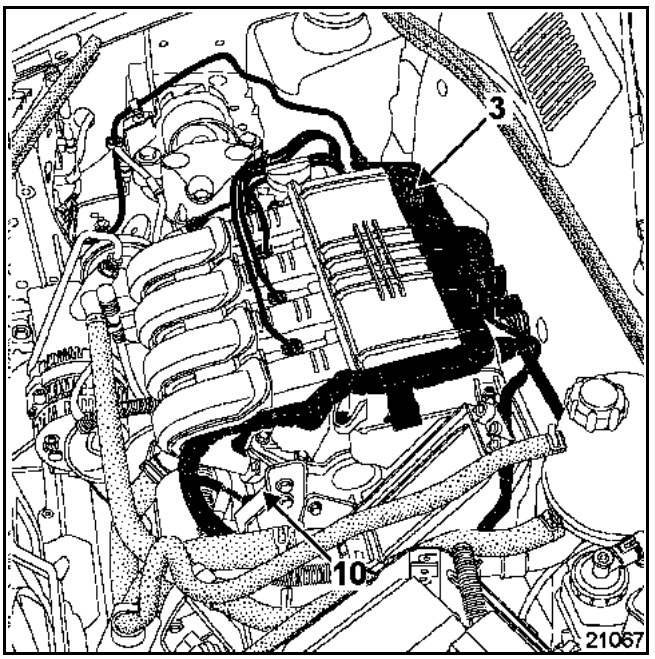
From June 2001



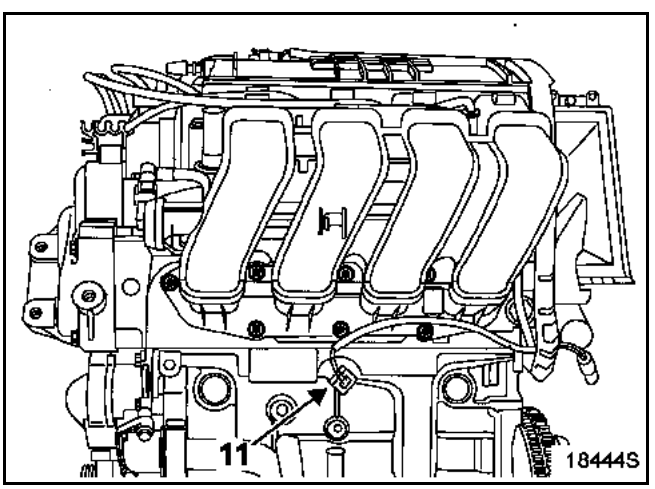
7 Motorised throttle valve
8 Air temperature sensor
9 Injector rail



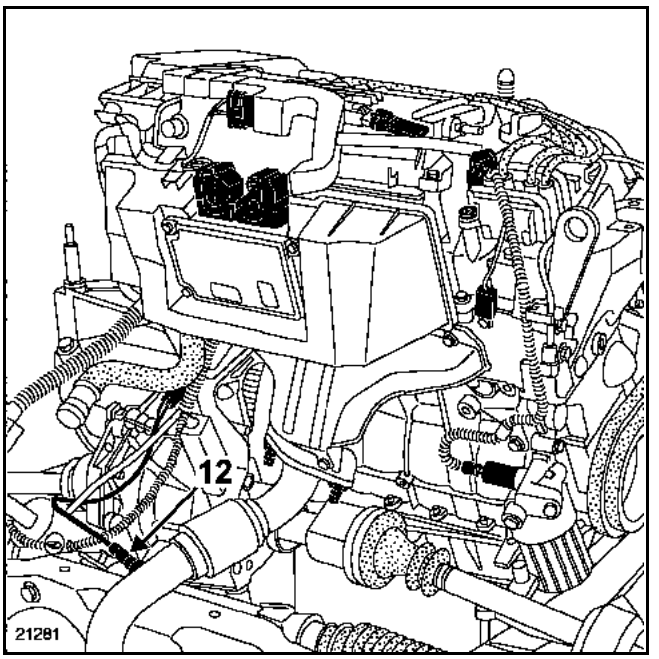
10 Coolant temperature sensor



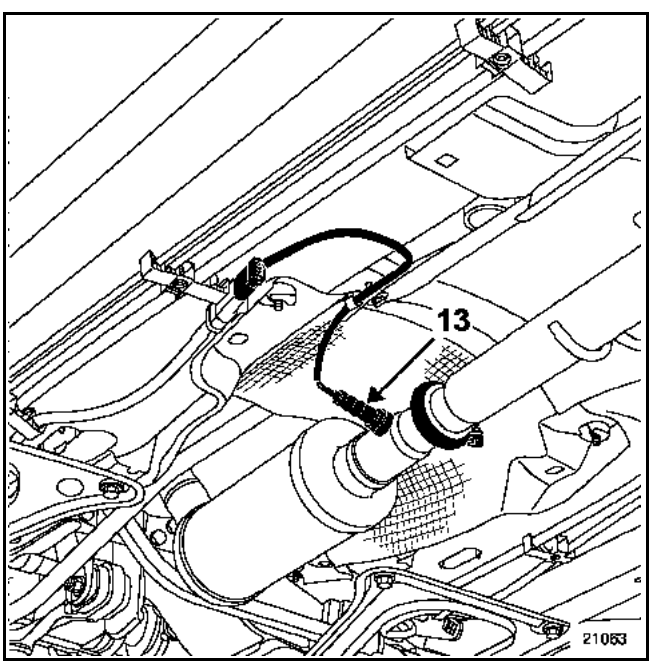
11 Pinking sensor



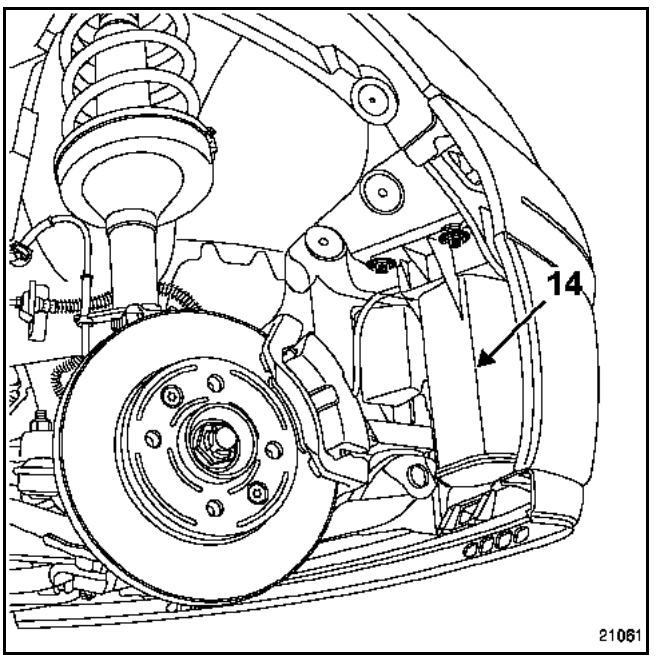
12 Upstream oxygen sensor



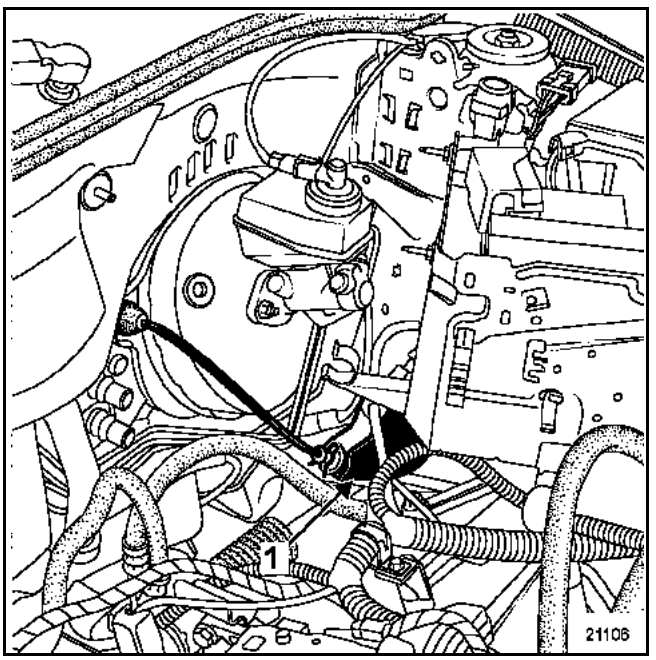
13 Downstream oxygen sensor (only on **D4F 712** engine with **EOBD**)



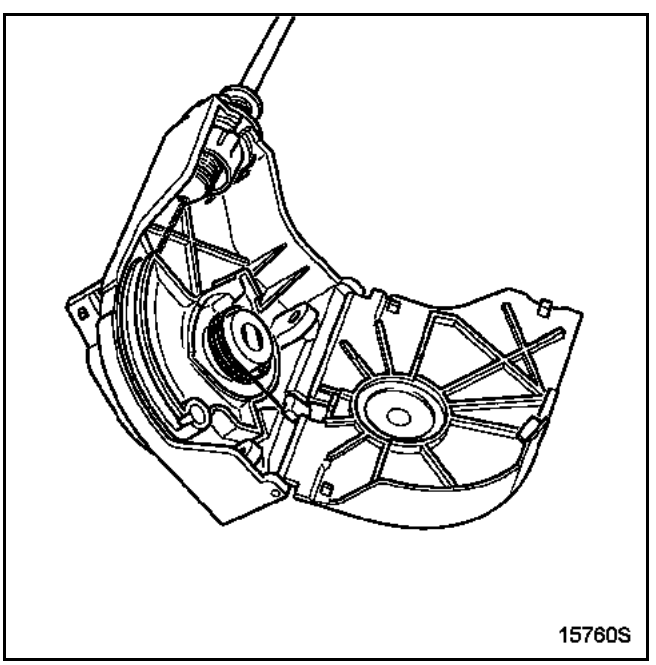
14 Canister with integrated solenoid valve



The accelerator pedal potentiometer (1) is mounted on the rear part of the battery tray.

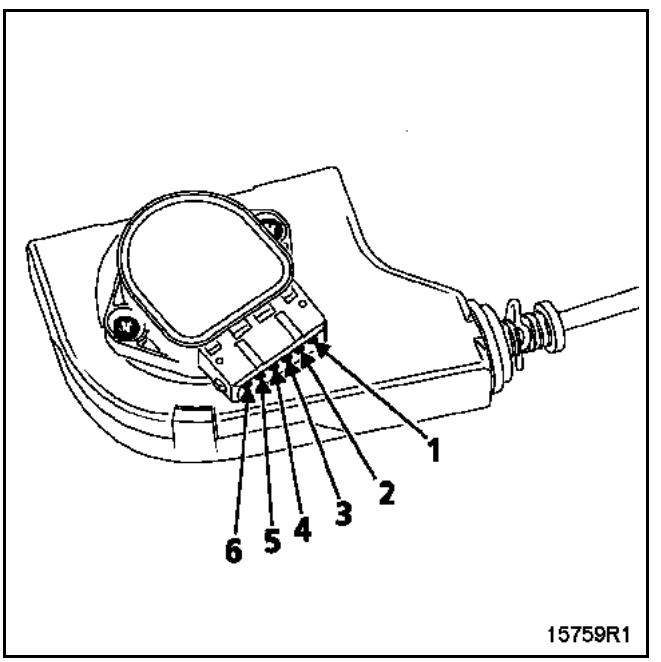


There are no specific features regarding its removal. However, the power-assisted steering fluid reservoir must be released on the side in order to access it.



Track allocation:

1 Track 2 potentiometer signal
2 Track 1 potentiometer signal
3 Track 2 feed
4 Track 1 earth
5 Track 2 earth
6 Track 1 feed



Accelerator pedal potentiometer

The accelerator pedal potentiometer is connected to the pedal by a linkage.

There are two types of pedal: **with or without point of resistance.**

Vehicles with cruise control/speed limiter have an accelerator pedal with a point of resistance at the end of their travel (kickdown)

This point of resistance makes it possible to exit the speed limiter function if the driver has to increase vehicle speed.

IMPORTANT: it is permitted to fit a potentiometer with a point of resistance in place of a potentiometer without a point of resistance. However, it is forbidden to fit a potentiometer without a point of resistance in place of a potentiometer with a point of resistance.

REMOVAL

Disconnect:
– the battery,
– the potentiometer connector.

Release the linkage from the accelerator pedal.

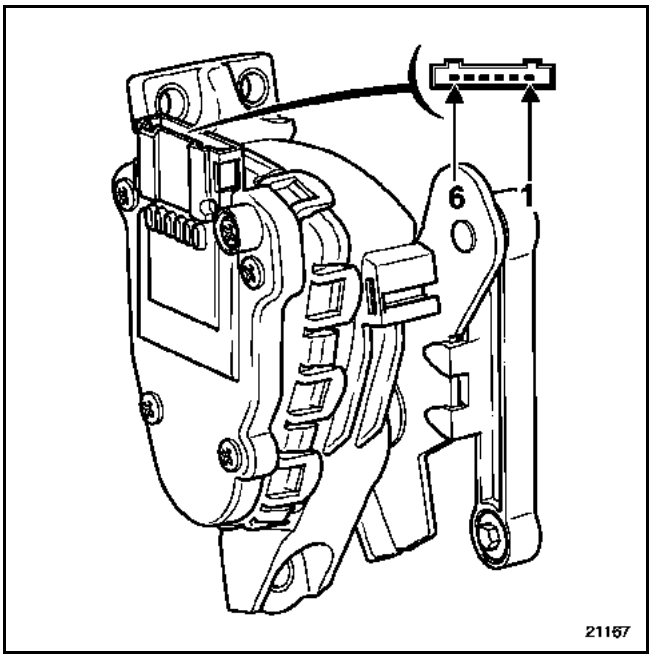
Remove the three potentiometer mounting bolts.

REFITTING

Refitting is the reverse of removal.

Track allocation:

1 Track 2 earth
2 Track 1 earth
3 Track 1 signal
4 Track 1 feed
5 Track 2 feed
6 Track 2 signal



SPECIAL FEATURES OF THE SEQUENTIAL MULTIPOINT INJECTION

- MAGNETI MARELLI 96 track, "5 NR" flash EEPROM computer controlling the injection and the ignition.

- Multipoint injection operating in sequential mode without a **camshaft position sensor**. This means that phasing is carried out by software using the TDC sensor.

- Injection warning light on the instrument panel. Installation of a special injection warning light (**OBD** "**O**n **B**oard **D**iagnostic" warning light). It is fitted due to the presence of the **EOBD "E**uropean **O**n **B**oard **D**iagnostic**"** system.

- Only **D4F/712** engines complying with the EURO 2000 standards and taxation incentives (IF05), designed for Germany, use the **EOBD "E**uropean **O**n **B**oard **D**iagnostic**"** system.
  D4F/712 engines complying with EURO 96 standard do not use the **EOBD** system. Consequently, they are not fitted with a second oxygen sensor.
  D4D/700, engines complying with US 87 standards do not use **EOBD**. Consequently, they are not fitted with a second oxygen sensor.
  D4F/706, engines complying with EURO 96 standards do not use **EOBD**. Consequently, they are not fitted with a second oxygen sensor.

- The "5 NR" injection system has a motorised throttle valve to control the air flow and idle speed.

- When replacing the **computer or the motorised throttle valve**, the minimum throttle stop has to be reprogrammed.
  Using the diagnostic tool, erase all fault codes and reprogram the values.
  The minimum throttle stop is programmed the first time the ignition is switched on. To do this:
  – switch on the ignition for approximately **3 seconds** then start the engine,
  – switch off the engine then the ignition,
  – wait for the end of the computer self-supply phase (power latch) of approximately **5 seconds**, then restart the engine.
  Allow the engine to idle to reach a coolant temperature of **60°C** (estimated time from a coolant temperature of **20°C**: approximately **3 minutes**), then perform a road test to program the throttle valve adaptives.

- Fuel circuit without return to the tank (the pressure regulator is located on the pump/sender unit).

- The idle speed is corrected as a function of:
– resistant mechanical torque and electrical consumers,
– air conditioning.

- The maximum engine speed is **6300 rpm**.

- Canister bleed solenoid valve controlled by **O**pening **C**yclic **R**atio (**OCR**). It is of Normally Closed type and is located on the canister.

- Control of the fan assembly and of the coolant temperature warning light on the instrument panel by the injection computer.

- The injection computer also controls the air conditioning (the air conditioning computer is no longer fitted).

From June 2001

- Multiplex connection between the vehicle's various computers. Consequently, the warning lights on the instrument panel are illuminated via the multiplex network.

- Inertia switch discontinued. In the event of an impact, the fuel supply circuit is cut off by the air bag computer. This sends the order via the multiplex network to the injection computer to lock the control of the fuel pump relay and the injectors.
  Unlocking is only possible after the ignition has been switched off for 10 seconds. This operation will cause the fault warning light to illuminate for longer than usual when the ignition is switched on. The warning light will only return to normal operation after the fault has been erased using the diagnostic tool.

- Discontinuation of the vehicle speed sensor on the gearbox. The vehicle speed information on the instrument panel is transmitted by the ABS computer on a wire connection, then sent via the multiplex network to the instrument panel. The main users of the vehicle speed information are the injection computer and the air bag computer.

- The cruise control - speed limiter function is controlled by the injection computer.

This vehicle is fitted with an engine immobiliser system which is controlled by a key recognition system.

REPLACING AN INJECTION COMPUTER

The injection computers are supplied without a code but they must all be programmed with one.

If a computer is replaced, it must be programmed with the code of the vehicle and the correct operation of the engine immobiliser function must be checked.

To do this, switch on the ignition for a few seconds without starting the engine, then switch it off. With the ignition off, the engine immobiliser function comes into operation after approximately **10 seconds** (the red engine immobiliser warning light flashes).

WARNING:

These vehicles have a special injection computer which does not function unless it is coded.

Consequently, it is strongly recommended not to carry out tests using computers borrowed from the stores or from another vehicle, to prevent coding and uncoding problems which could render the computers useless.

UNCODING PROCEDURE

If the injection computer has been programmed with a code and if it has to be returned to the workshop, it is imperative that you uncode it before removing it. (See the Workshop Repair Manual or the engine immobiliser Technical Note).

This vehicle is fitted with a 3rd generation immobiliser system, which requires a special method for replacing the computer.

REPLACING AN INJECTION COMPUTER

See section 17 "**Injection computer**" for the method of removing and refitting the computer.

See section 82 "**Immobiliser**" for the method of programming the immobiliser code.

WARNING:

With this engine immobiliser system, the computer keeps its immobiliser code for life.

In addition, this system does not have a security code.

Consequently, it is forbidden to perform tests with computers borrowed from the stores or from another vehicle which must then be returned.

It will no longer be possible to decode them.

The **Magneti Marelli 5 NR** injection system illuminates **three fault warning lights** depending on the severity level of the faults detected, with the aim of informing the driver and aiding the fault finding process.

From June 2001: The fault warning light illumination information reaches the instrument panel via the multiplex network.

- When the ignition is switched on:
  - the orange injection warning light and the red coolant temperature warning light illuminate for **3 seconds** then extinguish,
  - **"OBD" "O**n **B**oard **D**iagnostic**"** illuminates then, when the engine is started, extinguishes after approximately **3 seconds**.

FAULT WARNING LIGHT ILLUMINATION PRINCIPLE

- When an injection fault of severity 1 occurs, **the orange warning light illuminates permanently** and signals a fault on the:
  - motorised throttle valve
  - accelerator pedal potentiometer
  - brake pedal switch
  - inlet pressure sensor
  - inlet air temperature sensor
  - computer
  - actuator supply
  - computer supply

- When a serious injection fault of severity 2 occurs, **the red coolant temperature warning light flashes** and indicates a fault inside the computer, which requires the vehicle to be stopped immediately.

  NOTE: if the engine overheats, this warning light illuminates **permanently** requiring the vehicle to be stopped immediately.

- When a fault causing excessive exhaust gas pollution is detected, **the orange OBD warning light** (On Board Diagnostic) in the shape of an engine:
  - **flashes** in the event of a fault which might cause damage to the catalytic converter (destructive misfires),
  - **illuminates permanently** if the emission control standards are not complied with (pollutant misfires, catalytic converter fault, oxygen sensor fault, fuel supply circuit fault, incoherence between the oxygen sensors and canister fault).

MOTORISED THROTTLE VALVE

- The motorised throttle valve is used to regulate the idle speed and control the air intake and therefore engine torque requirements through the torque sequence calculation (air/advance).

- It consists of an electric motor supplied with **12 volts** through an **OCR** control (opening cyclic ratio) and two inverse information throttle potentiometers (one track increases whilst the other decreases).

- When the engine is idling, the throttle position is adjusted according to the idle speed setting. This setting takes into account the resistant forces of the engine, high consumers (air conditioning) and the engine's operating conditions (air and coolant temperature).

- When the driver presses the accelerator pedal, the request is translated into a throttle opening angle. However, to improve driving pleasure, the throttle opening is not directly proportional to the driver's request.

- To eliminate misfires, facilitate gear changes and perform the safety functions, the throttle valve modulates the engine torque.

MOTORISED THROTTLE BODY DEFECT MODES

The motorised throttle valve has several types of defect mode.

- **Reduced Performance Mode:** this mode covers electrical faults for which there is a viable backup solution for the injection system (loss of one of the two tracks on the pedal potentiometer or the throttle valve).
  This mode results in reduced acceleration and limits the maximum opening of the throttle.

- **Loss of driver's wishes mode:** this mode is also known as **"electrical backup position"** mode. This mode is applied when the accelerator pedal signal disappears completely, but the injection computer still controls the intake of air to the engine (automatic throttle control is still operational).
  In this mode, the injection computer imposes an engine speed between **1100** and **1400 rpm** regardless of the engine operating phase.
  Pressing the brake pedal confirms the driver's wishes to slow down the vehicle (coherence between the accelerator pedal information and brake pedal information).

- **"Mechanical backup position" mode:** this mode covers breakdowns which result in loss of the automatic throttle control (the throttle can no longer be controlled).
  In this case the throttle is in the mechanical rest position and the injection computer limits the engine speed by cutting off the injection.

THE COMPRESSOR IS OF VARIABLE DISPLACEMENT TYPE

There is no air conditioning computer on this type of engine. The injection computer directly controls the compressor clutch, taking into account the power absorbed by the compressor and the pressure of the refrigerant in the circuit.

The following computer tracks are used for the air conditioning function:
– one wire on track **A A4**. This wire conveys information authorising or forbidding operation of the compressor,
– one wire on track **A D2** on which the air conditioning cycling information is conveyed,
– one wire on track **A C1** and **A K2** for the refrigerant pressure sensor supply,
– one wire on track **A J1** for the pressure sensor information.

When the air conditioning is switched on, the injection computer authorises the compressor clutch according to the various parameters and adopts a fast idling speed. This engine speed may reach **850 rpm (D4F engine)** or **950 rpm (D4D engine)** depending on the power absorbed by the compressor and the pressure of the refrigerant.

COMPRESSOR OPERATING PROGRAM

During certain operating phases, the injection computer prevents the compressor from functioning.

Engine starting program

The compressor is prevented from operating for **10 seconds after the engine has started.**

Thermal protection program

The compressor is not engaged if the coolant temperature is above **115°C** or from **110°C** in the event of a high engine speed **(5792 rpm)** and high load **(1017 mbars).**

Anti-stalling strategy

The compressor is disengaged when the engine speed falls below **544 rpm,** and can only be engaged again if the engine speed rises above **744 rpm** in the no load position and **1044 rpm** when not in the no load position and only after **3 seconds.**

Fan assembly control program

When idling and when driving with the air conditioning on, the fan assembly is operated at high or low speed depending on the refrigerant pressure and vehicle speed.

Recovery of performance

The compressor is disengaged for **7 seconds** when the following conditions are combined:

Entry conditions

– throttle position potentiometer at **full load**
– and engine speed less than **2000 rpm**
– and vehicle speed less than **60 km/h** (Clio) and **70 km/h** (Kangoo),
– and power absorbed by the compressor above **0 Watt**

Output conditions

– **Full load** not recognised
– or **7 second** timed period expired
– or engine speed greater than or equal to **2512 rpm**
– or vehicle speed greater than **62 km/h** (Clio) and **72 km/h** (Kangoo)

Recovery of power at full load when the vehicle starts moving

The air conditioning compressor is disengaged if the following conditions are met to help the vehicle move off from stationary:

Entry conditions

– engine speed less than **2208 rpm**
– and vehicle speed less than **4 km/h**
– and driver's request at the pedal more than **45%**
– and power absorbed by the compressor above **608 Watt**

Output conditions

– engine speed greater than **3208 rpm**
– or vehicle speed greater than **5 km/h**
– or driver's request = **No load position**
– and power absorbed by the compressor below **608 Watt**

Air conditioning circuit overpressure and under pressure safety

Overpressure

The compressor is prevented from engaging if the pressure exceeds **28 bars**

The compressor is allowed to engage again when the pressure falls below **22 bars**

Under pressure

The compressor is prevented from engaging if the pressure falls below **2 bars**

The compressor is allowed to engage again when the pressure rises above **3 bars**

CORRECTION AS A FUNCTION OF MECHANICAL AND ELECTRICAL RESISTANT TORQUE

To keep the idle speed at its setting, the system uses the torque sequence calculation (air/advance) in order to compensate for all variations in mechanical or electrical torque.

CORRECTION AS A FUNCTION OF AIR CONDITIONING

If the air conditioning is switched on, the computer increases the idle speed by **100 rpm** in relation to the setting speed.

Engine warm at idle speed, no electrical consumers.

PARAMETERS	D4F/702 ENGINE	D4D/712 ENGINE
Nominal idle speed	**750 ± 50 rpm**	**850 ± 50 rpm**
PR113 Motorised throttle position setting	**0 < X< 20°**	
PR132 Motorised throttle OCR	**30 % < X < 50%**	

Every time the ignition is switched off, during the computer's self-supply phase (power-latch), the computer programs the minimum stop of the motorised throttle valve.

IMPORTANT: after erasing the computer memory, it is essential to program the throttle minimum stop.
This is programmed the first time the ignition is switched on. To do this:
– switch on the ignition for approximately **3 seconds** then start the engine,
– switch off the engine then the ignition,
– wait for the end of the computer self-supply phase (power latch) of approximately **5 seconds**, then restart the engine.

Allow the engine to idle to reach a coolant temperature of **60°C** (estimated time from a coolant temperature of **20°C**: approximately **3 minutes**), then perform a road test to program the throttle valve adaptives.

Engines with the **"Magneti Marelli 5 NR"** computer have two oxygen sensors located upstream and downstream of the catalytic converter (except **D4F/712** engine with **EOBD**).

SENSOR HEATING

The oxygen sensor heating is controlled by the computer using an **OCR** control (Opening Cyclic Ratio) which depends on the various engine operating phases (starting, temperature rise, regulation entry conditions satisfied and engine warm).

UPSTREAM SENSOR VOLTAGE

The value read on the diagnostic tool on parameter: **"Upstream sensor voltage" (PR009)** represents the voltage supplied to the computer by the oxygen sensor located upstream of the catalytic converter. It is expressed in millivolts.

The voltage should fluctuate between two values during richness regulation:
– **20 mV**± **50** for a lean mixture,
– **840 mV**± **70** for a rich mixture.

The smaller the difference between the minimum and maximum values, the poorer the signal from the sensor (the difference is usually at least **500 mV**).

NOTE: if there is a difference, check the sensor heater.

DOWNSTREAM SENSOR VOLTAGE (EXCEPT D4F/712 ENGINE WITH EOBD)

The value read on the diagnostic tool on parameter: **"Downstream sensor voltage" (PR010)** represents the voltage supplied to the computer by the oxygen sensor located downstream of the catalytic converter. It is expressed in millivolts.

The function of this sensor is to locate faults on the catalytic converter and to perform a second more precise check on the richness (slow regulation loop).

When the computer corrects the richness as a function of both sensors, the engine is said to be "looped" (closed loop operation). When the engine is looped and at a steady engine speed, the voltage should vary in the range **600 mV** ± **100.** When decelerating, the voltage should be less than **200 mV**.

MIXTURE CORRECTION

The value read on the diagnostic tool on parameter: **"average richness correction" (PR142)** represents the average of the richness corrections applied by the computer depending on the richness of the fuel mixture seen by the upstream oxygen sensor and corrected if necessary by the adaptives of the downstream sensor (only on **D4F/712** engines with **EOBD**).

The correction value has a mid-point of **0 %** and limits of **-33 %** and **50 %:**
– lower value at **0 %**: request to increase richness,
– higher value at **0 %**: request to decrease richness.

ENTRY INTO RICHNESS REGULATION MODE

Sensor loop phase

Regulation starts as soon as the engine is started, provided that the coolant temperature is above **17°C** and the air temperature above **-15°C**.

Sensor open loop phase

In richness regulation mode, the operating phases during which the computer ignores the value of the voltage from the sensor are:
– at full load,
– during heavy acceleration (high engine speed and high load)
– when decelerating with no load information,
– when the oxygen sensor is faulty.

DEFECT MODE IN THE EVENT OF AN OXYGEN SENSOR FAULT

If the voltage from the oxygen sensor is incorrect (varies only slightly or not at all) during richness regulation, the computer will only enter defect mode (value = **0%**) if the fault has been present for a very short period of time (a few seconds). Only in that case will the fault be memorised.

If an oxygen sensor fault is present and recognised and if the fault has already been memorised, the system enters the open loop mode directly. In this case, the "average richness correction" parameter is equal to **0 %**.

PRINCIPLE

In the loop phase, the richness regulation corrects the injection time to obtain fuel metering as close as possible to a richness of **1**. The correction value is close to **0 %** and has limits of **-33 %** and **50 %:**

Adaptive richness correction makes it possible to offset the injection cartographic map in order to recentre the richness regulation around **0%**. It is operational for a temperature above **70°C.**

Adaptive adjustments take **0 %** as an average value after computer initialisation (erasing the memory) and have the following limit values:

PARAMETERS	D4F and D4D engines
PR030 Operating richness adaptive	**-25.5 < X < 22%**
PR031 Idle speed richness adaptive	**-50.5 < X < 43%**
PR140 Fast richness correction	**-33 < X < 50%**
PR142 Average richness correction	**-33 < X < 50%**

ROAD TEST

The adaptives are updated every time the vehicle is driven following two fan assembly operating cycles (coolant temperature must be above **70° C**).

After the test, record the values of the adaptives. Initially **0%**, they should have changed. If not, repeat the test ensuring that the test conditions are observed.

INTERPRETATION OF VALUES OBTAINED FROM A ROAD TEST

To take into account a lack of or excess fuel and manufacturing variations and ageing of the components, richness regulation increases or decreases in order to obtain a richness as close as possible to **1**. Likewise, the richness adaptive correction increases or decreases until the richness correction once again oscillates around **0%.**

This vehicle is fitted with the **OBD** system (On board diagnostic) which relates to European regulations dealing with controlling pollutant gases.

- When a fault causing excessive pollution is detected, a warning light illuminates on the instrument panel (the **OBD** On board diagnostic light). This warning light informs the driver that they must have their vehicle repaired.

- This system requires the use of a second oxygen sensor which is located downstream of the catalytic converter.

- This new computer diagnostic strategy operates as follows:
  – the depollution components are tested once whilst driving. Only misfires (if the engine target has been programmed) and the fuel supply system are monitored permanently,
  – these test sequences are not always operational. The vehicle must be driven under certain conditions regarding temperature, speed (limit, stability, etc), timed starting period and engine conditions (manifold pressure, engine speed, throttle angle, etc).

- The **OBD** On board diagnostic system is in addition to the normal system for finding electrical faults. To meet this standard the requirements are:
  – to illuminate (or flash for some faults) the **OBD** On board diagnostic warning light,
  – to memorise **OBD** On board diagnostic faults so that they can be read on the diagnostic tool.

CONSEQUENCES FOR FAULT FINDING AND REPAIRS

- Specific attention is required when repairing the vehicle to prevent the **OBD** On board diagnostic warning light from illuminating after the vehicle has been returned to the customer.

- Some faults only appear when the car is being driven, when the adaptives are programmed: **it is therefore essential to validate the repair.**

- In addition, the complexity of the system means that the customer has to be asked about the conditions which led to the illumination of the warning light. This information will enable faults to be found more quickly.

  NOTE: all electrical faults causing the pollution limit to be exceeded will lead to the **OBD** On board diagnostic warning light illuminating.

- **The functional fault finding operations used for OBD On board diagnostic are:**
  – diagnostics of combustion misfires which destroy the catalytic converter,
  – diagnostics of polluting combustion misfires,
  – diagnostics of the upstream oxygen sensor,
  – diagnostics of the catalytic converter,
  – diagnostics of the fuel supply system (checking for variations in richness through the oxygen sensors).

NOTE: misfire diagnostics take precedence over all other diagnostics. They are performed practically continuously as soon as the driving conditions are reached.

IMPORTANT: it is essential that the ignition is not switched off before the result is read on the diagnostic tool at the end of each test. Switching off the ignition will lead to the results being misinterpreted.

CONDITIONS UNDER WHICH THE ON BOARD DIAGNOSTIC (OBD) LIGHT COMES ON

● ELECTRICAL FAULT

Permanent illumination of the light after a fault is detected several times in succession (depending on the component).

● CATALYTIC CONVERTER OR DESTRUCTIVE MISFIRES

Immediate illumination and flashing of the warning light.

● CATALYTIC CONVERTER, OXYGEN SENSOR FAULT, POLLUTING MISFIRES

Illumination of the light after a fault is detected three times consecutively.

WARNING: fault finding of the catalytic converter and the upstream oxygen sensor is sequential and takes place:
– once when driving (it lasts for several seconds per test),
– only under certain specific driving conditions.

During a road test, it may be the case that diagnostics for certain functions are not performed (e.g. when in a traffic jam).

⇒ **Illumination of the light**
If the same **OBD** On board diagnostic fault is detected during three consecutive driving periods or electrical fault.

⇒ **Flashing of the light**
If misfires leading to destruction of the catalytic converter are detected.

⇒ **Extinguishing of the light**
If the **OBD** On board diagnostic fault does not reappear during three consecutive driving periods, the light extinguishes (but the fault remains memorised in the injection computer).
The fault must not be detected during **40 consecutive tests** for the fault to be erased from the computer memory without the use of a diagnostic tool.

NOTE: the fault may not be detected:
– if the fault is temporary,
– due to the way the customer drives, which does not include all of the fault detection conditions.

Conditions under which the On Board Diagnostic light comes on

In order for the **OBD** (On Board Diagnostic) system to function correctly, there must be no electrical faults in the injection system, even if the **OBD** warning light is not illuminated.

Fault finding of the upstream oxygen sensor and the catalytic converter can never be performed at the same time.

TEST PROCEDURE

– Repair all electrical faults.
– Erase all faults.
– Program the injection.

COMPLETE INITIALISATION OF THE OBD USING COMMAND MODES

– Erasing of the fault memory.
– Erasing of the programming.

PROGRAMMING REQUIRED FOR OBD ON BOARD DIAGNOSTIC

Richness adaptives programming
To program these, the vehicle must be driven while complying with the conditions specified in the **"Injection: Richness adaptive correction" section.**

Engine target programming
There are two levels of programming:
– Full programming, used for fault finding which explores all operating ranges. This programming takes place whilst driving in 2nd or 3rd gear up to maximum engine speed at **120 km/h** and then returning to idle speed by a long deceleration.
– Programming using the **OBD** tests. This programming occurs when the tests are started by accelerating with no load up to maximum engine speed then returning to idle speed in order to cover the widest operating range whilst decelerating.

On board diagnostic misfire detection

The aim of detecting combustion misfires is to detect a problem which would cause the **OBD** On board diagnostic limit to be exceeded by HC pollutant emissions and which would damage the catalytic converter.

The diagnostic can detect:
– clogging or flooding of a spark plug,
– clogging of the injectors or an injector flow fault,
– a fault in the supply system (pressure regulator, fuel pump, etc),
– a bad connection in the petrol or injection circuits (coil secondary, etc.).

Fault finding is performed by measuring the instantaneous variations in engine rotation speed.

Observation of a drop in torque detects combustion misfires.

This fault finding is performed practically continuously while the car is being driven. If it is not performed or if a fault is recognised, other **OBD** On board diagnostic functions will be prohibited (catalytic converter and upstream oxygen sensor).

This fault finding allows two types of faults to be detected:
– destructive misfires resulting in destruction of the catalytic converter. They cause the warning light to flash immediately,
– pollutant misfires causing the **OBD** On board diagnostic pollution limit to be exceeded. They cause the warning light to illuminate if they are detected during three consecutive driving periods.

DETECTION CONDITIONS

Before starting, the programming must be checked. The conditions prior to switching on the ignition and the current conditions must also be satisfied.

Destructive misfires are detected as soon as the coolant temperature is above **70°C.**

The pollutant combustion misfire test can also be performed by maintaining the engine at idle speed with all the consumers on **for 2 minutes.**

IMPORTANT: it is essential that the ignition is not switched off before the result is read on the diagnostic tool at the end of this test. Switching off the ignition will lead to the results being misinterpreted.

CONFIRMATION OF THE REPAIR

– DF "Diagnostic of combustion misfires in progress" - ACTIVE
– DF "Pollutant misfires" - No fault detected
– DF "Destructive misfires" - No fault detected

If after the test the diagnostic tool has found combustion misfires, refer to the fault finding method associated to this symptom.

The aim of catalytic converter diagnostics is to detect a problem which would cause the **OBD** On board diagnostic limit to be exceeded by **HC** pollutant emissions.

The ability of the catalytic converter to store oxygen indicates its condition. As the catalytic converter ages, its ability to store oxygen reduces along with its ability to treat pollutant gases.

CONDITIONS FOR STARTING FAULT FINDING

Catalytic converter diagnostics can only be performed with the engine running after the following conditions have been satisfied:
– no electrical faults (no faults),
– cylinder recognition done,
– no combustion misfires detected,
– no catalytic converter fault finding performed since the ignition was switched on,
– programming done,
– upstream and downstream sensor loops done,
– coolant temperature above **70**° **C**,
– set the engine speed to **3000 rpm** with no load (note: two engine speed levels are required).

FAULT DETECTION

Detection is performed by comparing the upstream and downstream oxygen sensors. When the conditions for starting fault finding are satisfied, richness excitation peaks are applied, which has the effect of sending bursts of oxygen into the catalytic converter. If the catalytic converter is in good condition, it will absorb the oxygen and the downstream oxygen sensor value will remain at its average value. If it is worn, it will reject the oxygen and the downstream oxygen sensor will start to vibrate. The older the catalytic converter, the more the downstream oxygen sensor will oscillate. The **OBD** On board diagnostic warning light will start to flash.

IMPORTANT: it is essential that the ignition is not switched off before the result is read on the diagnostic tool at the end of this test. Switching off the ignition will lead to the results being misinterpreted.

CONFIRMATION OF THE REPAIR

– Have the instruction DF "**OBD** On board diagnostic catalytic converter fault finding in progress" - - - ACTIVE
– AND "**OBD** On board diagnostic catalytic converter fault finding: done" - - - - - - - - - - - - - - - - - - ACTIVE
– DF "Catalytic converter functional fault" - INACTIVE
– DF "Validation of the repair to the catalytic converter" - OK

If the diagnostic tool shows "**OBD** On board diagnostic catalytic converter fault finding: done INACTIVE" or "Validation of the repair to the catalytic converter ... 1.DEF", the control cycle has not been performed correctly. In this case, repeat the cycle ensuring that the detection conditions are complied with.

If after the test, the diagnostic fault shows "Catalytic converter functional fault ... ACTIVE" or "Validation of catalytic converter repair ... 2.DEF", refer to the fault finding method associated with this symptom.

On board diagnostic oxygen sensor fault finding

The aim of oxygen sensor fault finding is to detect a problem which would cause the **OBD** On board diagnostic limit to be exceeded by **HC** pollutant emissions. It is performed by measuring and comparing oxygen sensor vibration periods.

There are two types of possible faults on the oxygen sensors:
– mechanical damage to an electrical component (breakage, cut in wire) which leads to an electrical fault,
– chemical damage to the component which causes the response time of the sensor to slow down, thus increasing its switching period.

When the test conditions are obtained, the average of the sensor periods read is taken, after removing interference effects, which are compared with an average period of the **OBD** On board diagnostic limit.

TEST CONDITIONS

Fault finding of the oxygen sensor can only take place after a timed period if the conditions prior to switching on the ignition are satisfied and maintained.
– no electrical faults detected (no faults),
– programming and cylinder recognition done,
– no oxygen sensor fault finding performed since the ignition was switched on,
– no combustion misfires detected,
– coolant temperature above **70° C**,
– set the engine speed to **3000 rpm** with no load.

FAULT DETECTION

Fault finding takes place during use by the customer, under the test conditions. This test is performed over a minimum duration of **40 seconds**. The computer shows "oxygen sensor fault finding: in progress".

IMPORTANT: it is essential that the ignition is not switched off before the result is read on the diagnostic tool at the end of this test. Switching off the ignition will lead to the results being misinterpreted.

CONFIRMATION OF THE REPAIR

– Have the instruction SDF "**OBD** oxygen sensor fault finding: in progress" - - - - - - - - - - - - - - - - - ACTIVE
– AND "**OBD** On board diagnostic oxygen sensor fault finding: done" - ACTIVE
– DF "Oxygen sensor functional fault" - INACTIVE
– DF "Validation of the repair to the oxygen sensor" - OK

If the diagnostic tool shows "**OBD** On board diagnostic oxygen sensor fault finding: done ... INACTIVE" or "Validation of the repair to the oxygen sensor ... 1.DEF", the control cycle has not been performed correctly. In this case, repeat the cycle ensuring that the detection conditions are complied with.

If after the test, the diagnostic fault shows "Oxygen sensor functional fault ... ACTIVE" or "Validation of the repair to the oxygen sensor ... 2.DEF", refer to the fault finding method associated to this symptom.

This fault finding consists of permanently monitoring variations in richness through oxygen sensor regulation.

CONDITIONS FOR STARTING FAULT FINDING

Fault finding is active with the engine running, subject to certain conditions relating to coolant and air temperature and atmospheric pressure. These conditions are satisfied by performing a driving cycle during which the upstream and downstream oxygen sensors enter a richness regulation phase (fan must perform two operating cycles).

Fuel supply fault finding can only be performed with the engine running after the following conditions have been satisfied:
– all non **OBD** faults have been repaired,
– warm up the engine (check that the fan performs at least two operating cycles) until the second richness closed loop is reached,
– return to idle speed,
– read the results obtained,
– deal with any faults found.

IMPORTANT: it is essential that the ignition is not switched off before the results are read on the diagnostic tool at the end of this test. Switching off the ignition will lead to the results being misinterpreted.

The fan assembly is controlled by the injection computer.

ANTI-PERCOLATION FUNCTION (WHEN STATIONARY)

The antipercolation function is controlled by the injection computer.

The coolant temperature signal used is the one from the injection system.

After the ignition is switched off and if the engine has operated, the system enters monitoring mode. If the coolant temperature exceeds the limit of **102 ºC** during the **2 minutes** after the engine is switched off, the fan assembly is switched on at slow speed.

If the coolant temperature falls below **95ºC**, the fan assembly relay is cut off (the fan assembly cannot be controlled for more than **10 minutes**).

FAN ASSEMBLY OPERATION (ENGINE RUNNING)

The fan assembly is operated at low speed if the coolant temperature exceeds **99°C** or if the coolant temperature sensor develops a fault and stops when the temperature falls below **96°C**.

The fan assembly is operated at high speed if the coolant temperature exceeds **104°C** or if low speed is faulty and stops when the temperature falls below **101°C**.

The fan assembly is controlled when the air conditioning function is selected on the instrument panel.

The fan will operate at high speed if low speed is faulty, and under the low speed conditions.

OPERATION OF THE TEMPERATURE WARNING LIGHT

The temperature warning light illuminates permanently if the coolant temperature exceeds **115ºC.** It extinguishes if the temperature falls below **110° C**.

NOTE: it may flash to indicate an injection computer internal fault.

GENERAL INFORMATION

Cruise control: allows the driver maintain a selected speed. This function can be deactivated at any moment by pressing the brake pedal (or the clutch pedal with a manual gearbox), or by using one of the system buttons.

Speed limiter: allows the driver to set a speed limit. The accelerator pedal will not function above the set speed. The speed limit selected can be exceeded at any time by pressing the accelerator pedal beyond its point of resistance.

A warning light on the instrument panel informs the driver of the status of the cruise control/speed limiter:
– Green light: cruise control in operation,
– Amber light: speed limiter in operation,
– Speed setting flashing: the set speed cannot be maintained (e.g. going downhill).

To control these functions, the injection computer receives the following signals on the following tracks:
– **A B3**: Brake switch closing (stop lights)
– **A C3**: Brake switch opening (safety)
– **A F3**: Cruise control button
– **A G2**: Cruise control / speed limiter control earth
– **A G3**: Clutch switch
– **A G4**: Speed limiter control button
– **A J2**: Cruise control / speed limiter control signal

The following signals are received by the injection computer via the multiplex network:
– vehicle speed (instrument panel),
– stop switch closed signal (ABS),
– gear engaged (sequential gearbox).

The injection computer sends the following signals on the multiplex network:
– illumination or flashing of the amber or green warning light on the instrument panel,
– cruise control or speed limit setting to the instrument panel,
– gear change signals from the gearbox (automatic transmission).

The injection computer receives information:
– from the accelerator pedal potentiometer,
– about opening or closing of the brake switch,
– from the clutch switch,
– from the on/off switch,
– from the controls at the steering wheel.

Using these signals, the injection computer controls the motorised throttle valve so as to maintain the set speed for the cruise control and so as not to exceed the set speed for the speed limiter.

CRUISE CONTROL OPERATION

Input conditions:
– switch on "cruise control",
– gear engaged higher than 2nd,
– vehicle speed greater than **30 km/h**
– green cruise control warning light illuminated,
– "+", "-" or "resume" buttons pressed.

Output conditions:
– brief sharp depression of the accelerator pedal (does not deactivate the function),
– brake or clutch pedal pressed,
– "0" button pressed,
– switch set to "off",
– no gear engaged,
– action by the electronic stability program (depending on equipment),
– injection computer operation.

SPEED LIMITER OPERATION

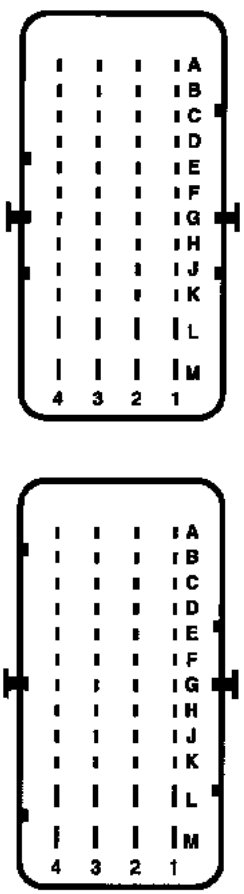
Input conditions:
– switch on "speed limiter",
– gear engaged higher than 2nd,
– vehicle speed greater than **30 km/h**
– amber limiter warning light illuminated,
– "+", "-" or "resume" buttons pressed.

Output conditions:
– brief sharp depression of the accelerator pedal (does not deactivate the function),
– "0" button pressed,
– switch set to "off",
– no gear engaged,
– action by the electronic stability program (depending on equipment),
– injection computer operation.

NOTE: a fault is memorised if it is present for **at least 5 seconds**. It will only disappear after being erased using the diagnostic tool or if it does not reappear during an operating period of approximately two months.

Defect mode
If one of the components is faulty, the cruise control/speed limiter system cannot be activated.

ALLOCATION OF INJECTION COMPUTER INPUTS AND OUTPUTS

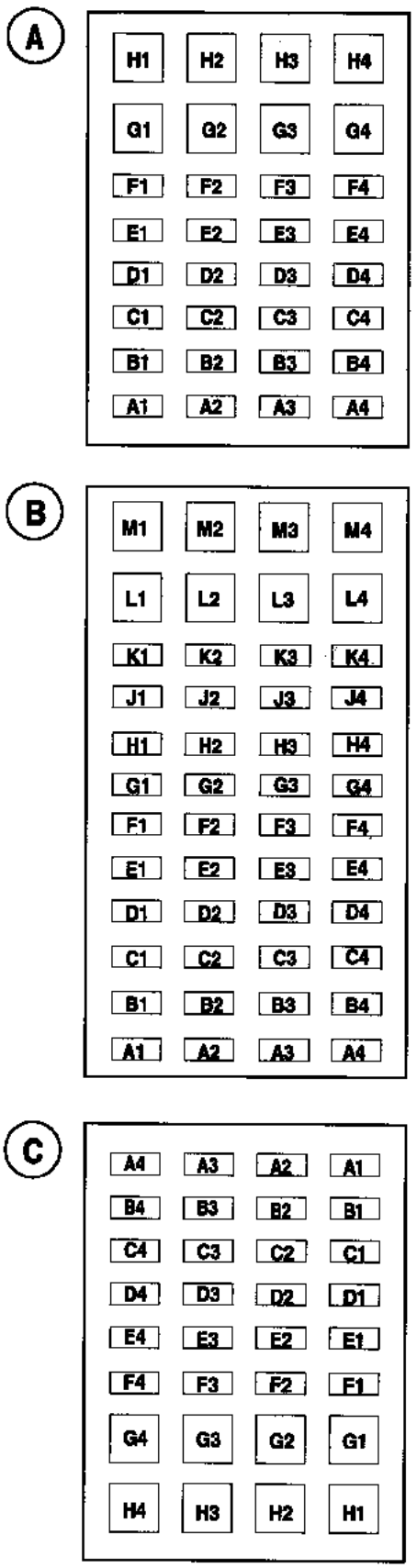


CONNECTOR A (BLACK)

A	A1	→ Injection fault warning light control
A	A3	→ On Board Diagnostic warning light control
A	A4	→ Air conditioning compressor control
A	B1	--- Accelerator pedal potentiometer supply (track 1)
A	B3	← Brake switch (closure)
A	B4	--- Accelerator pedal potentiometer earth (track 2)
A	C1	--- Refrigerant pressure sensor supply
A	C2	→ Low speed fan control
A	C3	← Brake switch (opening)
A	C4	--- Accelerator pedal potentiometer earth (track 1)
A	D2	← Air conditioning cycle information
A	D3	← Engine immobiliser system
A	D4	→ High speed fan control
A	E1	--- Downstream oxygen sensor earth
A	E4	→ Engine speed information
A	F1	--- Accelerator pedal potentiometer supply (track 2)
A	G1	→ Fuel pump control relay
A	H1	← Accelerator pedal potentiometer signal (track 1)
A	H2	← Downstream oxygen sensor signal
A	H3	--- UCH multiplex connection (CAN LOW)
A	J1	← Refrigerant pressure sensor signal
A	J4	--- UCH multiplex connection (CAN HIGH)
A	K1	← Accelerator pedal potentiometer signal (track 2)
A	K2	--- Refrigerant pressure sensor earth
A	K4	--- Diagnostic (line K)
A	L3	--- + after locking relay
A	L4	--- + before ignition
A	M1	→ Downstream oxygen sensor heating control
A	M2	→ Injection locking relay control
A	M3	→ Canister bleed control

18371S

ALLOCATION OF INJECTION COMPUTER INPUTS AND OUTPUTS

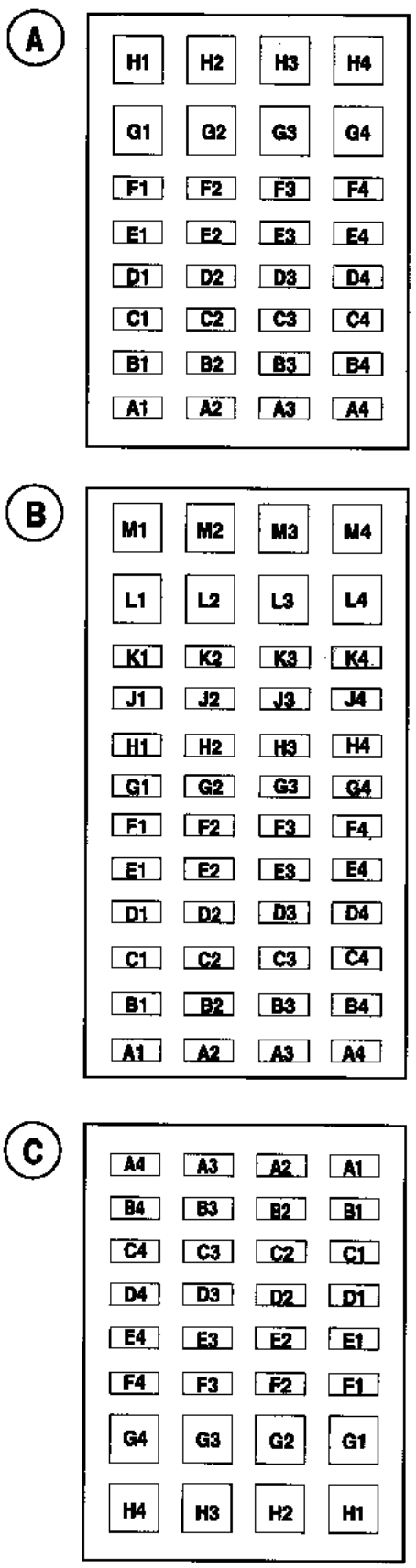


CONNECTOR B (BROWN)

B A1	←	Engine speed sensor
B A2	←	Engine speed sensor
B B2	---	Manifold pressure sensor supply
B C1	---	Motorised throttle potentiometer supply (5 Volts)
B C2	←	Pinking sensor
B C3	←	Pinking sensor
B D1	---	Upstream oxygen sensor earth
B D2	---	Pinking sensor screening
B D3	---	Air temperature sensor earth
B D4	←	Coolant temperature sensor signal
B E3	←	Upstream oxygen sensor signal
B E4	←	Air temperature sensor signal
B F1	---	Coolant temperature sensor earth
B F2	---	Manifold pressure sensor earth
B F3	←	Manifold pressure sensor signal
B F4	←	Throttle position potentiometer signal (track 2)
B G1	---	Throttle position potentiometer earth
B G3	←	Throttle position potentiometer signal (track 1)
B J1	→	Injector command 1
B K1	→	Injector command 2
B K3	→	Injector command 3
B K4	→	Injector command 4
B L1	→	Motorised throttle valve control
B L2	---	Power earth
B L3	---	Power earth
B L4	---	Power earth
B M1	→	Motorised throttle valve control
B M2	→	Ignition coil control, cylinders 2-3
B M3	→	Ignition coil control, cylinders 1-4
B M4	→	Upstream oxygen sensor heating control

SE2009

ALLOCATION OF INJECTION COMPUTER INPUTS AND OUTPUTS

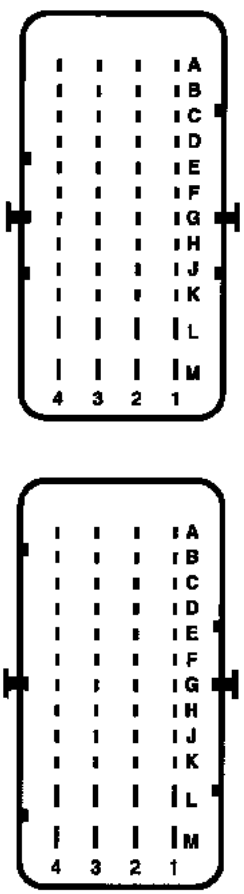


CONNECTOR A (BLACK)

A A4 → Air conditioning compressor control
A B1 --- Accelerator pedal potentiometer supply (track 1)
A B3 ← Brake switch (closure)
A B4 --- Accelerator pedal potentiometer earth (track 2)
A C1 --- Refrigerant pressure sensor supply
A C2 → Low speed fan control
A C3 ← Brake switch (opening)
A C4 --- Accelerator pedal potentiometer earth (track 1)
A D2 ← Air conditioning cycle information
A D4 → High speed fan control
A E1 --- Downstream oxygen sensor earth
A E4 → Engine speed information
A F1 --- Accelerator pedal potentiometer supply (track 2)
A F3 ← Cruise control on/off switch
A G1 → Fuel pump control relay
A G2 --- Cruise control earth
A G3 ← Clutch pedal switch
A G4 ← Speed limiter on/off control
A H1 ← Accelerator pedal potentiometer signal (track 1)
A H2 ← Downstream oxygen sensor signal
A H3 --- UCH multiplex connection (CAN LOW)
A H4 ← Power absorbed by the air conditioning compressor signal
A J1 ← Refrigerant pressure sensor signal
A J2 ← Cruise control / speed limiter control signal
A J3 --- Sequential gearbox multiplex connection (copy of track A J4) (CAN HIGH)
A J4 --- UCH multiplex connection (CAN HIGH)
A K1 ← Accelerator pedal potentiometer signal (track 2)
A K2 --- Refrigerant pressure sensor earth
A K3 --- Sequential gearbox multiplex connection (copy of track A H3) (CAN LOW)
A K4 --- Diagnostic (line K)
A L3 — + After relay
A L4 — + before ignition
A M1 → Downstream oxygen sensor heating control
A M2 → Injection locking relay control
A M3 → Canister bleed control
A M4 --- + after ignition

SE2009

ALLOCATION OF INJECTION COMPUTER INPUTS AND OUTPUTS



CONNECTOR B (BROWN)

B A1	←	Engine speed sensor
B A2	←	Engine speed sensor
B B2	---	Manifold pressure sensor supply
B C1	---	Motorised throttle potentiometer supply (5 Volts)
B C2	←	Pinking sensor
B C3	←	Pinking sensor
B D1	---	Upstream oxygen sensor earth
B D2	---	Pinking sensor screening
B D3	---	Air temperature sensor earth
B D4	←	Coolant temperature sensor signal
B E3	←	Upstream oxygen sensor signal
B E4	←	Air temperature sensor signal
B F1	---	Coolant temperature sensor earth
B F2	---	Manifold pressure sensor earth
B F3	←	Manifold pressure sensor signal
B F4	←	Throttle position potentiometer signal (track 2)
B G1	---	Throttle position potentiometer earth
B G3	←	Throttle position potentiometer signal (track 1)
B J1	→	Injector command 1
B K1	→	Injector command 2
B K3	→	Injector command 3
B K4	→	Injector command 4
B L1	→	Motorised throttle valve control
B L2	---	Power earth
B L3	---	Power earth
B L4	---	Power earth
B M1	→	Motorised throttle valve control
B M2	→	Ignition coil control, cylinders 2-3
B M3	→	Ignition coil control, cylinders 1-4
B M4	→	Upstream oxygen sensor heating control

18371S

TIGHTENING TORQUES (in daNm)	
Exhaust downpipe mounting stud	1.2
Exhaust downpipe mounting nut	2.5
Oxygen sensor	4.4 ± 0.7

REMOVAL

Put the car on a two-post lift.

Disconnect:
– the battery,
– connectors (1) and (2) of the oxygen sensors.

Unclip the downstream sensor harness.

Remove the exhaust downpipe mounting bolts (3).

Undo the catalytic converter clamp (4).

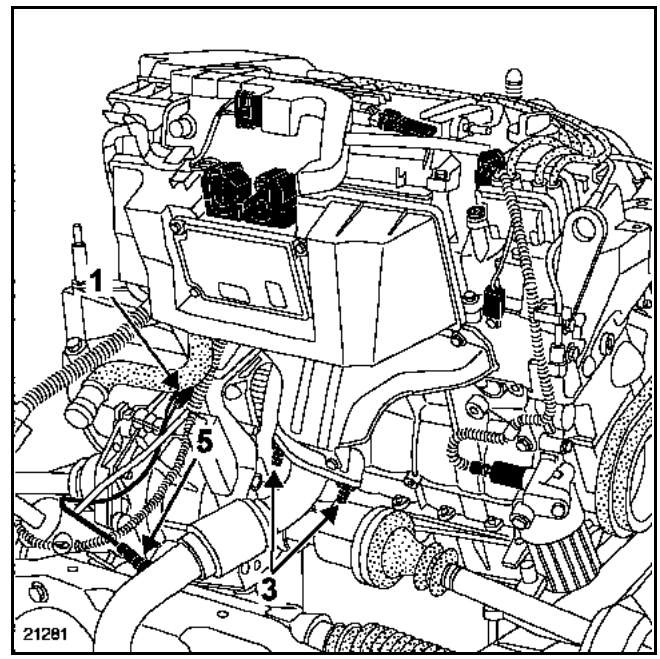
Remove:
– the catalytic converter,
– the upstream and downstream oxygen sensors, (5) and (6).

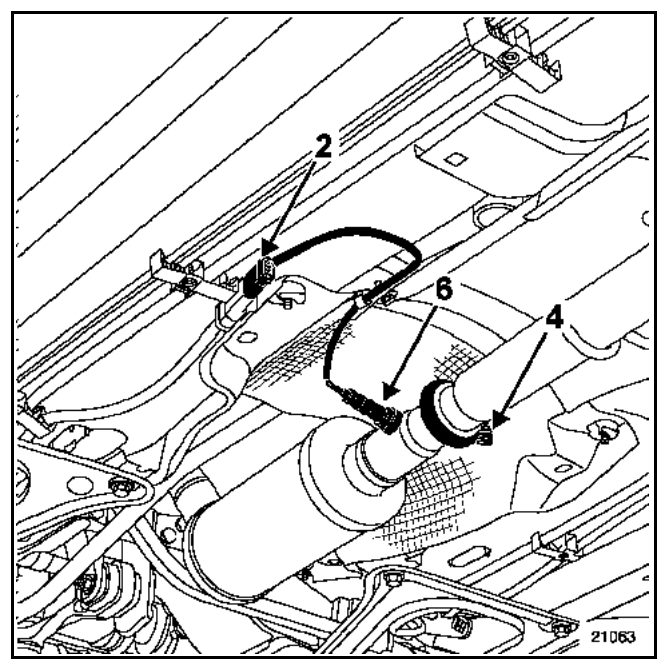
REFITTING

Replace the exhaust downpipe seal.

Refit:
– the catalytic converter then tighten the exhaust downpipe mountings to the recommended torque,
– a new clamp,
– the oxygen sensors.

For refitting operations, proceed in the reverse order to removal.





SPECIAL TOOLING REQUIRED	
Mot.1202-01	**Pliers for large hose clips**
Mot. 1448	**Remote operation clip pliers for cooling system hose clips**

There are no specific points to note regarding the removal and refitting of the radiator.

REMOVAL

Put the car on a two-post lift.

Disconnect the battery.

Remove the engine undertray.

Drain the cooling circuit through the lower radiator hose.

Remove:
– the air inlet duct,
– the connectors of the fan assembly,
– the wiring from the fan assembly support,
– the fan assembly,
– the upper radiator hose,
– the radiator grille,
– the upper radiator mountings,
– the radiator.

REFITTING

Refit in reverse order to removal.

NOTE: ensure that the fins of the radiator or of the condenser (if fitted) are not damaged when removing-refitting, and protect them if necessary.

Fill and bleed the cooling circuit (see section **19 "Filling - bleeding"**).

SPECIAL TOOLING REQUIRED	
Mot. 1054	TDC setting pin
Mot.1202-01 Mot.1202-02	Pliers for large clips
Mot. 1272	Engine - gearbox positioning tool
Mot. 1379	Tool for holding engine on subframe
Mot. 1448	Remote operation clip pliers for cooling system hose clips
Mot. 1505	Belt tension measuring tool
EQUIPMENT REQUIRED	
Torque wrench Angular torque wrench	

TIGHTENING TORQUES (in daNm and/or °)	
Timing tension wheel nut	2.4
Crankshaft pulley bolt	4 + 70° ± 5°
Front right hand support mounting bolt	6.2
Water pump bolts	0.9
Wheel bolts	9

REMOVAL

Put the car on a two-post lift.

Disconnect the battery.

Remove the timing belt (see the method described in section **11 "Timing belt"**).

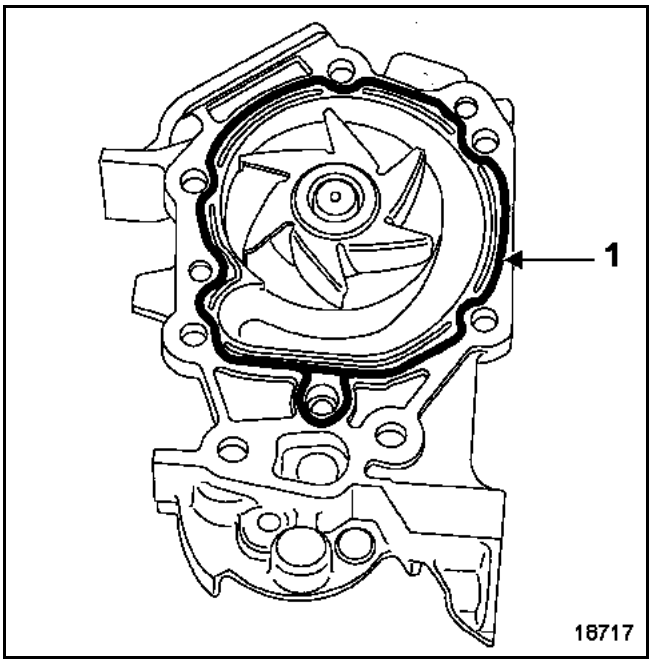
Drain the cooling circuit through the lower radiator hose.

Remove:
- the water pump coolant pipe on the multifunction support (be careful not to loose the seal),
- the timing tension wheel,
- the water pump.

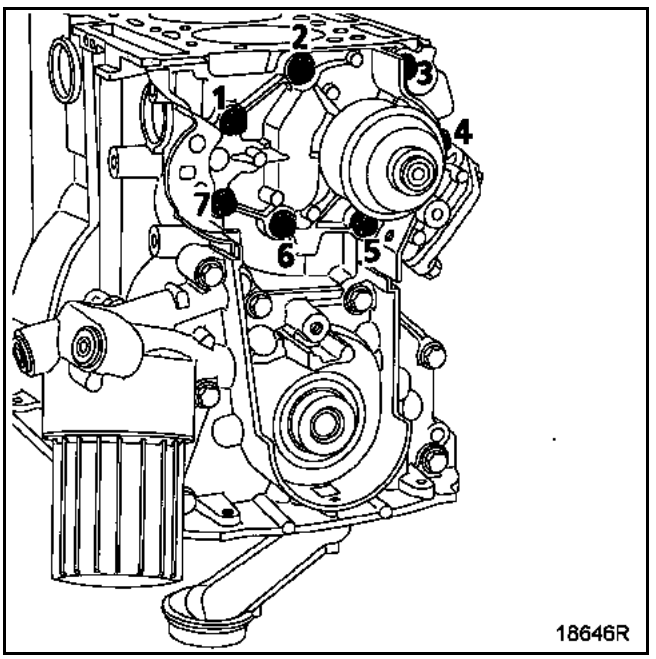
REFITTING

Clean the sealing faces before applying **RHODORSEAL 5661.**

The pump is sealed using **RHODORSEAL 5661**. The bead (1) should be **1.3 mm** wide and be applied as shown in the diagram below.



Tighten the water pump bolts to a torque of **0.9 daNm** in the recommended order.



Refit the timing belt (see method described in **section 11 "Timing belt "**).

Refitting is the reverse of removal.

Fill and bleed the cooling circuit (see section **19 "Filling and bleeding"**).

Coolant flow is continuous in the heater matrix, which contributes to the cooling of the engine.

FILLING

Check the tightness of the drain plug(s).

Open the two bleed screws.

Fill the circuit through the expansion bottle opening.

Close the bleed screw as soon as the fluid runs out in a continuous jet.

Start the engine **(2 500 rpm)**.

Adjust the level by overflow for a period of about **4 minutes**.

Close the bottle.

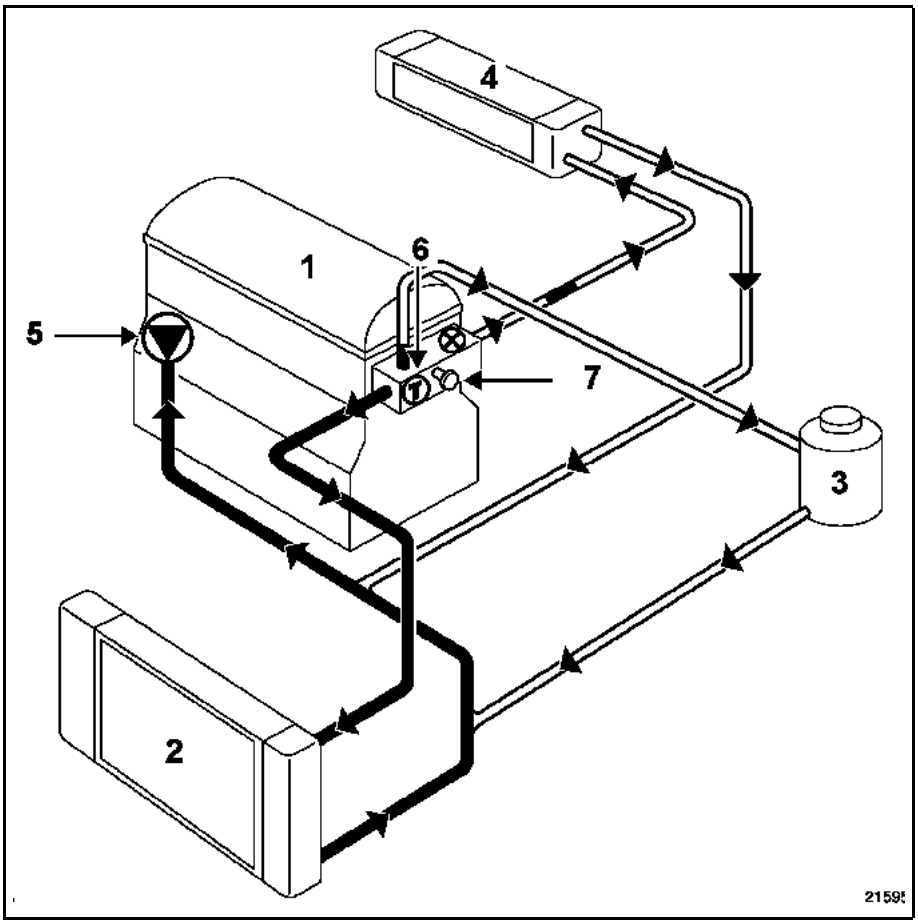
BLEEDING

Allow the engine to run for about **10 minutes** at **2500 rpm**, until the fan(s) operate (time necessary for automatic degassing).

Verify that the liquid level is at or near the **Maximum** marker.

NEVER OPEN THE BLEED SCREW WHEN THE ENGINE IS RUNNING.

RE-TIGHTEN THE EXPANSION BOTTLE CAP WHILE THE ENGINE IS WARM.



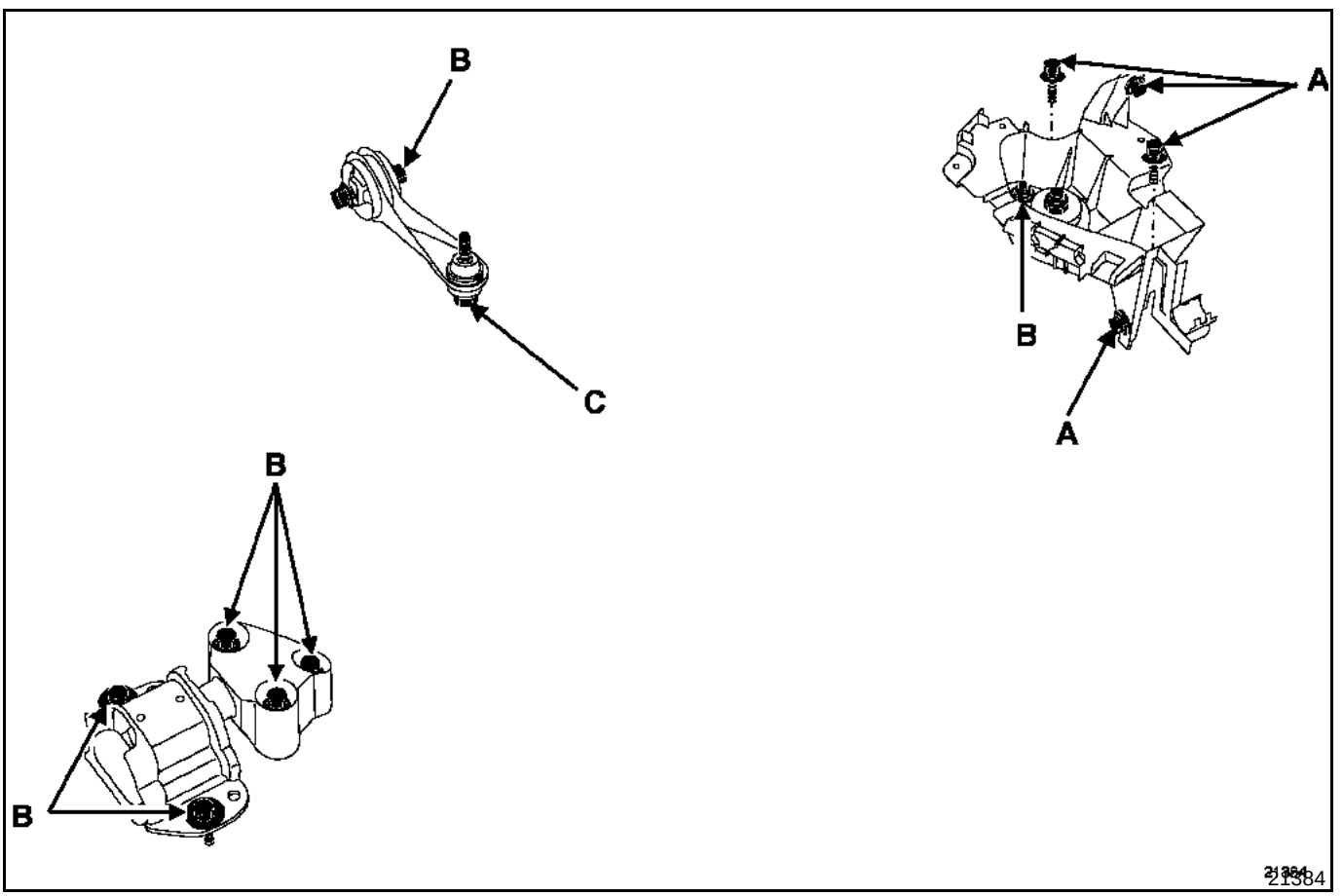
1 Engine
2 Radiator
3 "Hot" bottle with permanent degassing
4 Heater matrix

5 Water pump
6 Thermostat
7 Bleed screw

The expansion bottle valve is brown, and its rating is **1.2 bar**.

TIGHTENING TORQUES (in daNm)

A	**2.1**
B	**6.2**
C	**11**



TIGHTENING TORQUES (in daNm)

A	**2.1**
B	**6.2**