

Kangoo

Clio

Mégane

Technical Note 3555A

Basic manual: Technical Notes 2938A and 3305A

<i>Type</i>	<i>Type</i>	<i>Engine</i>
Kangoo	XC0V	F9Q 782
Clio II	XB0V - XB2C	F9Q 782
Mégane	XA10	F9Q 744

Special features of the Kangoo - Clio II - Megane fitted with F9Q 782 and F9Q 744 engines

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Type	Gearbox	Engine							
		Type	Suffix	Bore (mm)	Stroke (mm)	Cubic capacity (cm ³)	Compression ratio	Catalytic converter	Depollution standard
XC0V XB0V XB2C	JC5 JB3	F9Q	782	80	93	1870	19:1	◇ C103	EU 00
XA1U	JC5 JB3	F9Q	744	80	93	1870	19:1	◇ C103	EU 00

ENGINE SPEED (rpm)			SMOKE OPACITY	
IDLE SPEED	Maximum - no load	Maximum - under load	Homologation value	Legal - maximum
850±50	4650 ± 150	4300 ± 100	0.8 m ⁻¹ (28 %)	3 m ⁻¹ (70 %)

DESCRIPTION	MANUFACTURER/TYPE	SPECIAL NOTES
Injection pump	BOSCH VP 37 VE 4 / 11 E 2125 R880	Rotary pump combined with a computer controlling: – the pump (advance and output), – the cold engine starting system, – the EGR, – the thermoplungers, – the fan assembly.
Pump timing, TDC determination, using 8mm empty tag pin Ø (MOT. 1054)	-	Pump piston lift: 0.11 ± 0.02 mm
Injector holders	BOSCH Y 431 K03 091 (cylinders 1 - 2 - 3) Y 431 K03 092 (cylinder 4)	Injector with sensor resistance: 100 ± 10 Ω at 20°C
Injectors	BOSCH DSLA145 P 987	Opening Pressure:between 205 and 215 bar Calibration not possible
Fuel filter	-	Separate priming unit. The filter is fitted with an electric fuel heater.

DESCRIPTION	MANUFACTURER/ TYPE	SPECIAL NOTES
Turbocharger	GARRETT	Calibration: 1200 ± 10 mbar for a rod travel of 1 to 4 mm
Injection computer,	BOSCH EDC 15 VM+	Computer 121 tracks with integrated pressure sensor
Pre/postheating unit	NAGARES BED/7	With pre/postheating function controlled by the injection computer
Pre-heater plugs	BERU or CHAMPION	Resistance: 0.6 Ω connector removed
Thermoplunger	-	Resistance: 0.6 Ω connector removed
Electric solenoid	-	Resistance: 7.5 ± 1 Ω at 25 °C
Idle speed and TDC sensor	MGI	Resistance: 800 ± 80 Ω at 20 °C
flow slide valve	BOSCH (integrated into pump)	Resistance between tracks 4 and 7 of pump connector of 0.4 to 1 Ω at 20 °C
Flow slide valve position sensor	BOSCH (integrated into pump)	Resistance at 20 °C between tracks: – 1 and 3 of the pump connector of 4.9 to 6.5 Ω – 3 and 2 of the pump connector of 4.9 to 6.5 Ω
Diesel fuel temperature sensor	BOSCH (integrated into pump)	Resistance between tracks 5 and 6 of the pump connector of 2200 Ω to 2600 Ω at 20 °C
Advance solenoid valve	BOSCH (integrated into pump)	Resistance between tracks 1 and 2 of the solenoid valve connector of: 10.3 Ω to 17.3 Ω at 20 °C
Engine coolant temperature sensor	ELTH	Resistance: 2252 Ω ± 112 Ω at 25 °C
Air intake temperature sensor	SIEMENS	Integrated in the flow meter Resistance: 2868 Ω ± 200 Ω at 25 °C

DESCRIPTION	MANUFACTURER/ TYPE	SPECIAL NOTES
Air flowmeter	SIEMENS	Flow sensor with integrated air temperature sensor Track 1: air temperature Track 2: earth Track 3: 5 V of reference Track 4: + battery Track 5: airflow signal Track 6: earth
EGR solenoid valve	PIERBURG or COOPER	Track resistance: $8 \pm 0.5 \Omega$ to 20 °C (tracks 1 and 5) Sensor resistance: $4 \pm 1.6 K\Omega$ at 20 °C (tracks 2 and 4)
Accelerator sensor pedal (Clio and Kangoo before June 2001 and Megane)	CTS	Dual track potentiometer Track 1 resistance: $1700 \pm 900 \Omega$ Track 2: resistance: $3000 \pm 2200 \Omega$
Accelerator pedal sensor (Clio II from June 2001)	HELLA	Dual track potentiometer Track 1 resistance: $1200 \pm 480 \Omega$ Track 2 resistance: $1700 \pm 680 \Omega$

Temperature in °C $\pm 1^\circ$	25	50	80	100
CTN type coolant temperature sensor type in Ohms	2360 to 2140	850 to 770	290 to 275	117 to 112

The use of electronic injection in Diesel engines has allowed the operational power of these engines to be optimised, thus reducing the emission rate of pollutant gases.

The system consists of a computer which receives signals from:

- the coolant temperature sensor,
- the flowmeter (with air temperature sensor),
- the engine speed sensor,
- the vehicle speed sensor,
- the accelerator pedal sensor,
- the brake switch,
- the injection start sensor which forms part of the injector of cylinder no. 4
- the fuel temperature sensor (located inside the pump),
- the fuel outlet slide valve position sensor (located inside the pump),
- the atmospheric pressure sensor (located inside the computer),
- the clutch pedal sensor (only on senic with F9Q 744 engine);

It controls:

- the injection pump:
 - fuel flow slide valve,
 - advance solenoid valve,
- the cold start system (heater plugs and pre/postheating unit),
- the immobiliser system,
- the exhaust gas recycling system (**EGR**),
- the injection fault warning light - preheating,
- the electrical solenoid,
- the thermoplungers which reheat the coolant fluid in the cooling circuit (according to model),
- the fan assembly,
- the air conditioning compressor clutch.

SPECIAL NOTES

The accelerator cable only controls the load potentiometer installed in the engine compartment (dual track potentiometer), except on the Clio II manufactured from June 2001, (the potentiometer is installed in the passenger compartment).

Vehicles are fitted with two injection warning lights, injection fault severity 1 warning light (orange preheating warning light) and severity 2 injection warning light (same indicator as the coolant temperature warning light). These warning lights are used during the preheating phase and in the event of an injection fault (or engine overheating).

PRINCIPLE FOR WARNING LIGHTS COMING ON

- The preheating warning light comes on when the ignition is switched on, remains lit during the preheating phase and then goes out (see section **13 Pre/postheating control**).
- When there is an injection fault (level of severity 1), the fault warning light which is also the preheating warning light comes on permanently, indicating the need to consult a RENAULT Dealer. These faults are:
 - engine immobiliser fault,
 - coolant temperature sensor fault,
 - airflow sensor fault,
 - needle lift sensor fault,
 - vehicle speed sensor fault (see ABS),
 - electrical solenoid fault,
 - exhaust gas recirculation valve fault,
 - accelerator potentiometer fault,
 - fuel flow actuator fault
 - fuel flow sensor fault,
 - injection advance sensor fault,
 - main relay fault,
 - power assisted steering pump assembly fault.
- In the case of an injection fault (severity 2), the warning light indicated by a motor with the word "stop" or the coolant temperature warning light come on together with the Stop warning light. In this case the vehicle must be stopped immediately. These faults are:
 - internal computer fault,
 - electrical solenoid fault,
 - TDC sensor fault,
 - fuel flow sensor fault,
 - fuel flow actuator fault,
 - injection advance actuator fault,
 - coolant fluid pressure sensor fault,
- If the engine overheats, the warning light indicated by a motor with the word "stop" or the coolant temperature indicator light comes on.

This vehicle is fitted with a 3rd generation engine immobiliser controlled by a random (encrypted) rolling code key recognition system.

REPLACING AN INJECTION COMPUTER

Injection computers are supplied without a code, but they can all be programmed with one.

If a computer is replaced, it must be programmed with the vehicle code and then 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).

SPECIAL POINTS ON TESTING THE INJECTION COMPUTER

WARNING:

With this immobiliser system, the vehicle keeps the same immobiliser code for life

Furthermore, this system does not have a security code.

Consequently, it is forbidden to perform tests with injection computers borrowed from the stores which must be returned.

The programmed code cannot be erased.

THIS VEHICLE IS FITTED WITH A VARIABLE OUTPUT COMPRESSOR

There is no air conditioning computer on this type of engine. The injection computer controls the compressor clutch according to the request for the compressor to operate (AC function requested by the driver), which can be interrupted at any moment by the tri-function pressure switch.

The tracks used for the air conditioning function are:

- one wire on **track 29** of the computer which controls the air conditioning compressor clutch,
- one wire on **track 34** of the injection computer. The request to operate the compressor is transmitted through this wire (Air conditioning function requested by the driver).

When the air conditioning function is selected, the idle speed increases to: **850 rpm**.

COMPRESSOR OPERATION PROGRAMMING

During certain stages of operation, the injection computer stops the compressor from functioning.

Engine starting program

The compressor is prevented from functioning for **4 seconds** after the engine has been started.

Recovery of performance

In the event of a rapid change in the accelerator pedal position and if the engine speed is less than **3500 rpm**, operation of the compressor is prohibited for **4 seconds**.

Recovery of output when the vehicle starts moving

If the potentiometer position is greater than **70 %**, if the engine speed is less than **3500 rpm** and if the vehicle speed is below **30 km/h**, the compressor is cut for **4 seconds**.

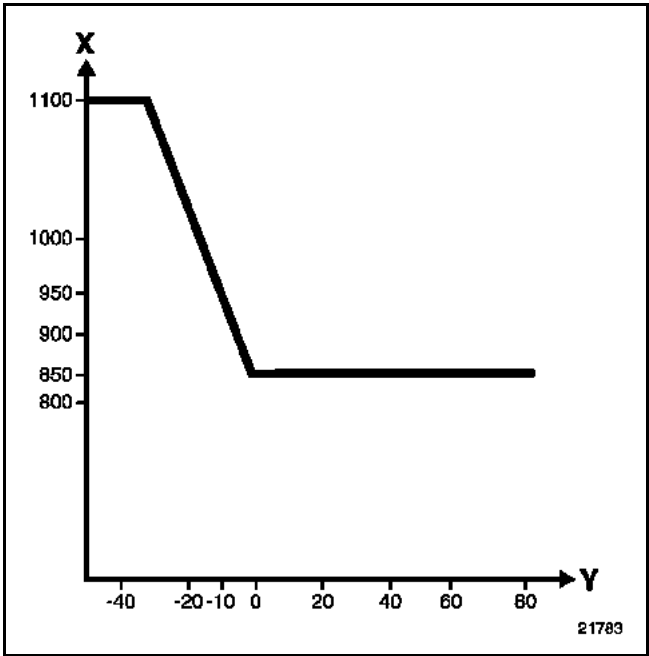
Anti-stall protection

If the no load position is not detected and if the engine speed is less than **675 rpm**, the compressor is inhibited. It is re-engaged after **4 seconds** if the engine speed is increased.

Thermal protection program

The compressor does not come into operation when the coolant temperature is greater than **102 °C**.

IDLE SPEED CORRECTION ACCORDING TO COOLANT TEMPERATURE



X: Engine speed in rpm.
Y: Coolant temperature in °C

IDLE SPEED CORRECTION WHEN THE POTENTIOMETER IS FAULTY

If the accelerator pedal potentiometer is faulty, the idle speed is maintained at **1300 rpm** and decreases to **900 rpm** when the brake pedal is pressed.

If the information from the accelerator pedal position potentiometer and the brake switch information does not correspond, the speed is increased to **1300 rpm**.

IDLE SPEED CORRECTION WHEN DRIVING

The idle speed with the vehicle moving is **875 rpm**, vehicle moving at more than **4.5 mph (7.5 km/h)**.

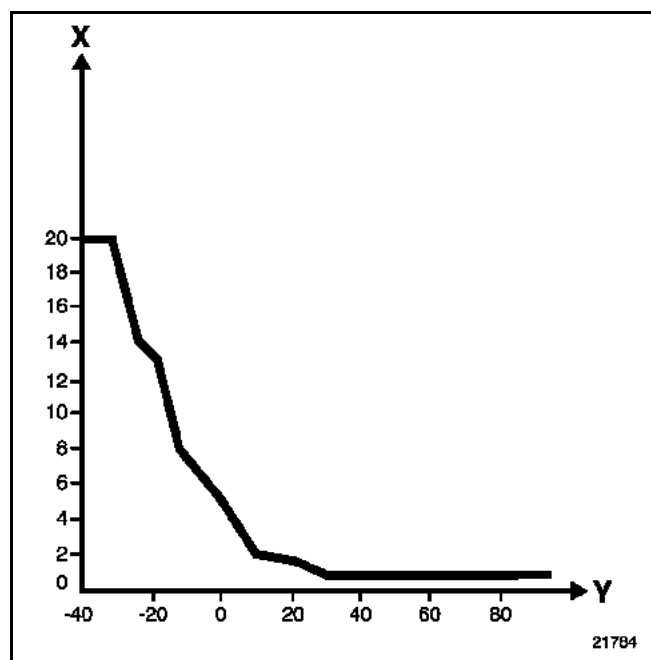
The pre/postheating function is controlled by the preheating unit.

PRE/POSTHEATING OPERATING PRINCIPLE

1) Switching on the - preheating

a) Variable preheating

The length of time the warning light is on and the supply time to heater plugs depends on the coolant temperature and the battery voltage.



X Time in **seconds**

Y Coolant temperature in **°C**

In all cases the length of time the preheating warning light is on cannot exceed **15 seconds**.

b) Fixed preheating

After the warning light goes out the plugs continue to be supplied for a fixed period of **8 seconds**.

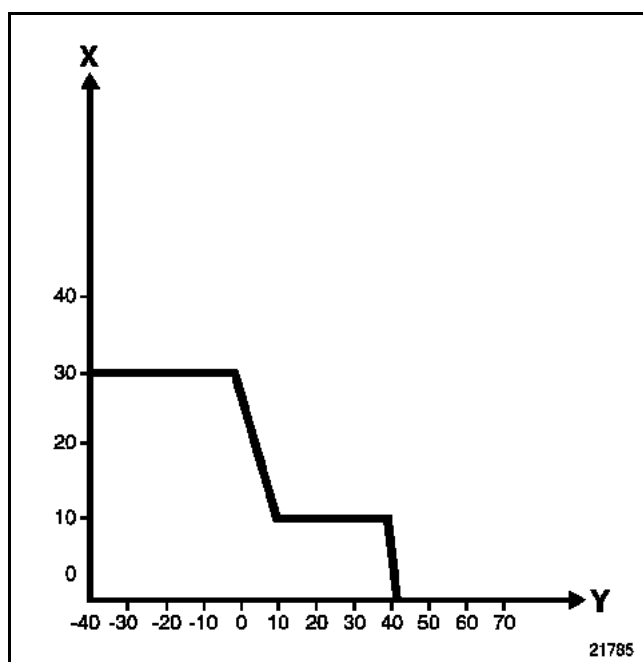
2) Starting the engine

The plugs remain supplied while the starter is being activated.

3) Postheating with the engine running

During this phase, the plugs are supplied continuously according to the coolant temperature.


For idle speed without pressing the accelerator pedal.



X Time in **seconds**

Y Coolant temperature in **°C**

The preheating plug resistance is **0.6 Ω** (connector disconnected).

TIGHTENING TORQUE (in daNm)	
Pre-heater plugs	1.1

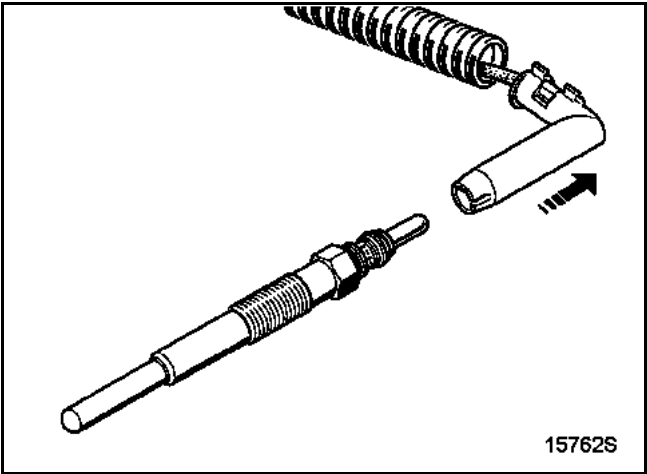
Plugs may be removed without having to open the high pressure circuit.

REMOVAL

Unclip the plug connector.

Clean the outside of the plug to avoid any dirt entering the cylinder.

Loosen and remove the plugs.



REFITTING

Proceed in the reverse order to removal.

Ensure that no contamination enters the cylinder during this operation.

The three thermoplungers are located on a plenum chamber fixed on the gear box mounting.

The purpose of the system is to reheat the coolant.

The thermal plungers are supplied with **12 volts** by two relays. One relay controls two thermoplungers, the other relay controls one thermoplunger. This enables control of one, two or three thermoplungers as required.

The resistance of the thermoplungers is:
 $0.6 \pm 0.1 \Omega$ at 20°C

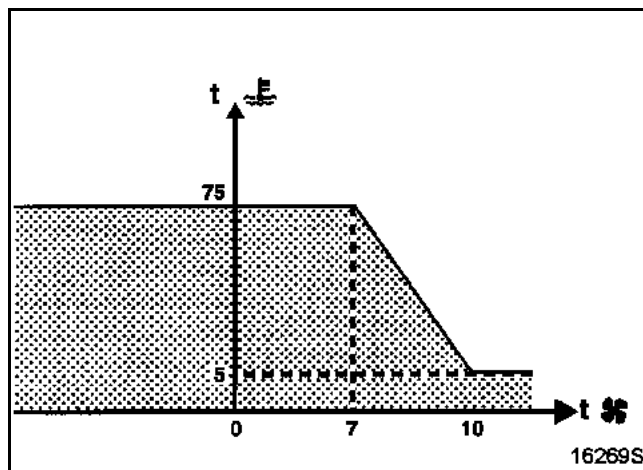
Control strategy

When the thermoplungers are operating, the idle speed is increased to **900 rpm** for the F9Q 744 engine and **950 rpm** for the F9Q 782 engine.

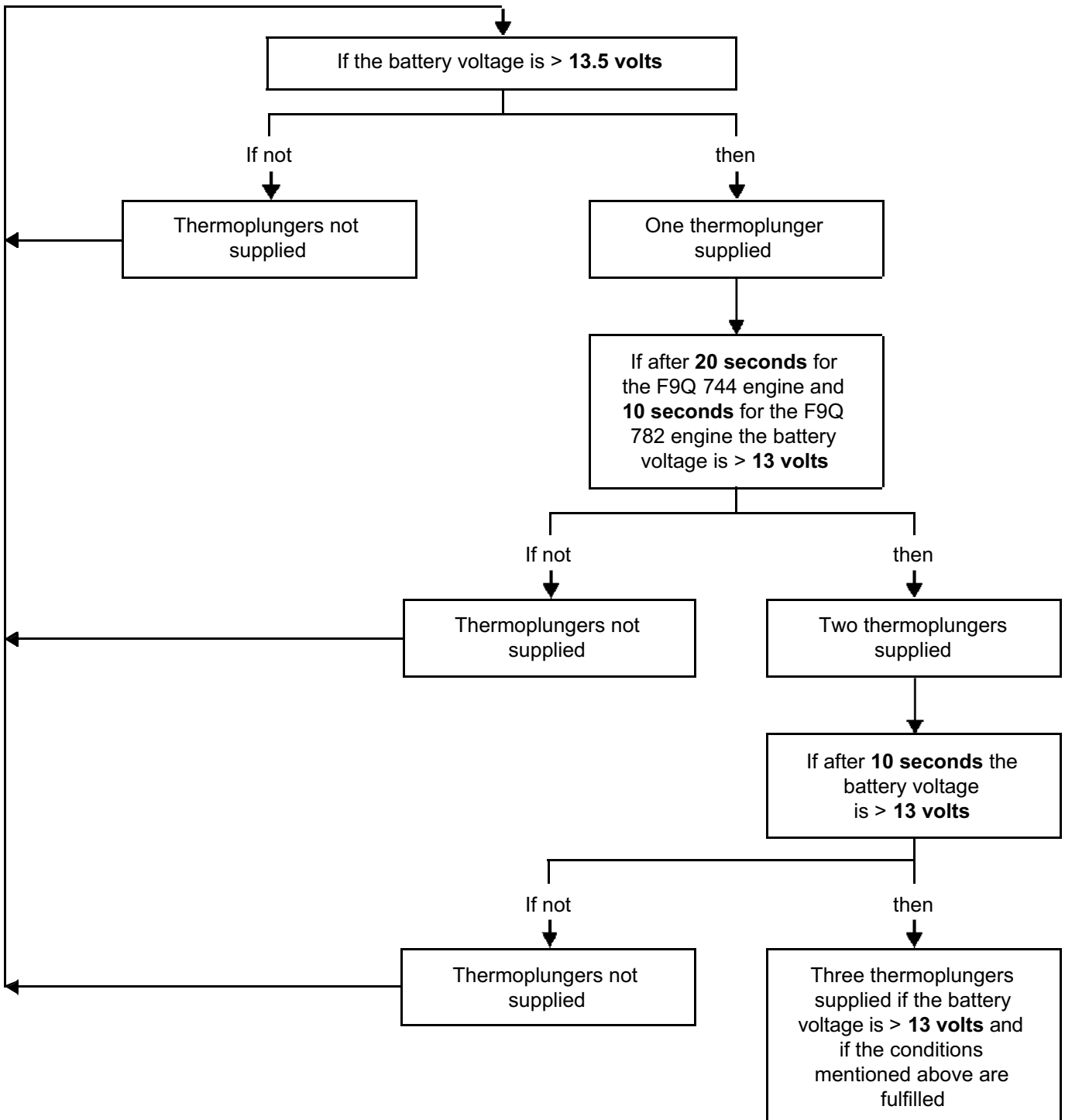
Thermoplungers cannot operate during:

- preheating,
- if the engine speed is below **700 rpm**.

If the conditions mentioned above apply, the thermoplungers are controlled according to a mapping related to the air and coolant temperature.



Unshaded area: thermoplunger not supplied
Shaded area: thermoplunger supplied



SPECIAL TOOLING REQUIRED

Mot. 1054	TDC setting pin
Mot. 1383	Fuel pipe removal tool
Mot. 1453	Adjustable engine support tool
Mot. 1200-02	Pump-pulley retaining tool

TIGHTENING TORQUES (in daNm)



High Pressure pipe	2.5 ± 0.3
the nut securing the pump shaft to the RAM pulley	4.5
Pump mounting bolts	2.5 ± 0.5
Rear pump support mounting nut and screw	2.6 ± 0.3

NOTE: With vehicles fitted with a RAM pulley (micrometric adjustment pulley), it is not necessary to remove the timing belt to remove the pump.

REMOVAL

Put the car on a two-post lift.

Disconnect the battery.

Remove:

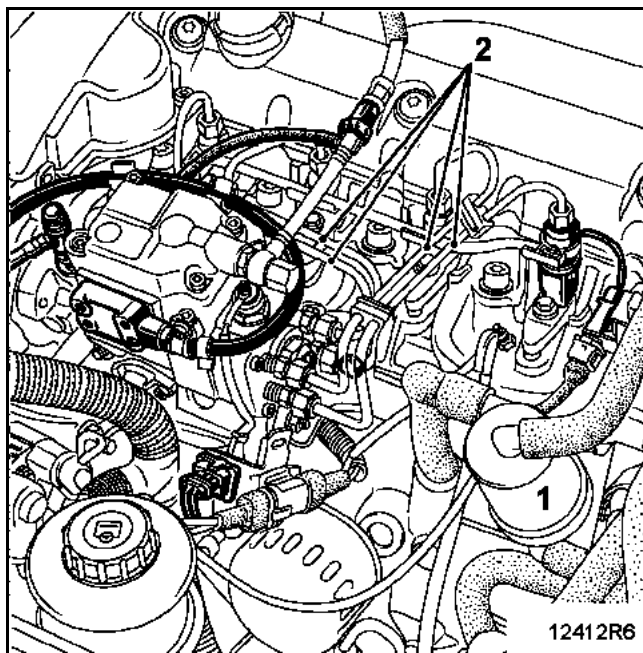
- the front right wheel,
- the front right-hand mudguard,

Disconnect:

- the fuel pump inlet and return pipes,
- the electrical union connected to the pump.

Remove:

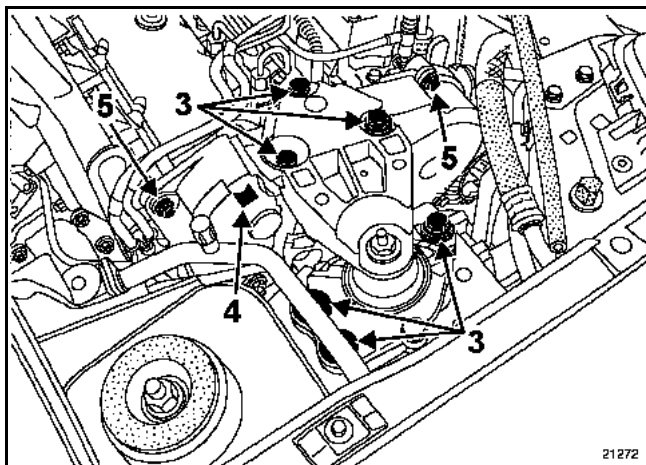
- oil decanter (1),
- the four high pressure valves (2).



Fit the engine support tool **Mot. 1453**.

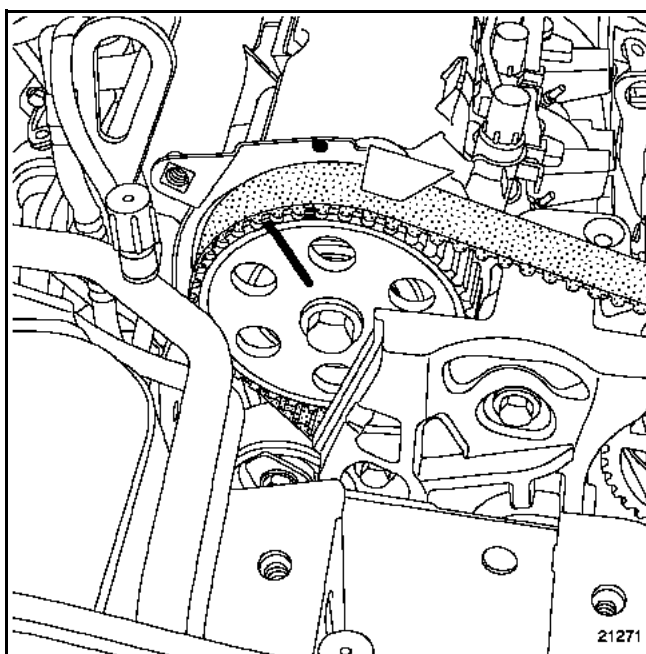
Remove:

- the suspended engine mounting cover and its rubber stopper (screw 3),
- mark the TDC point (4) on the camshaft pulley cover,
- the valve timing cover screw (5).

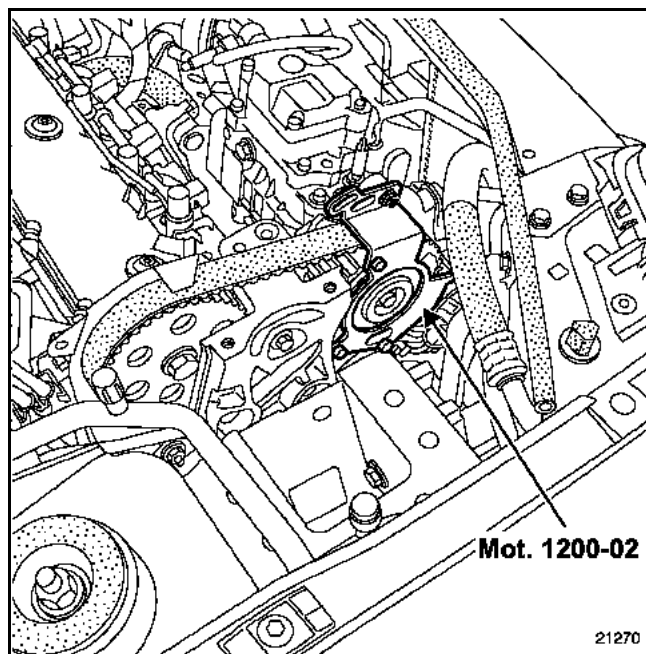


IMPORTANT: run the engine in its operating direction (clockwise timing end), in order to set the engine two notches before the TDC as shown on the diagram below.

This means that pump piston front post cannot be accessed .



Fit the pump pulley retaining tool **Mot. 1200-02**.

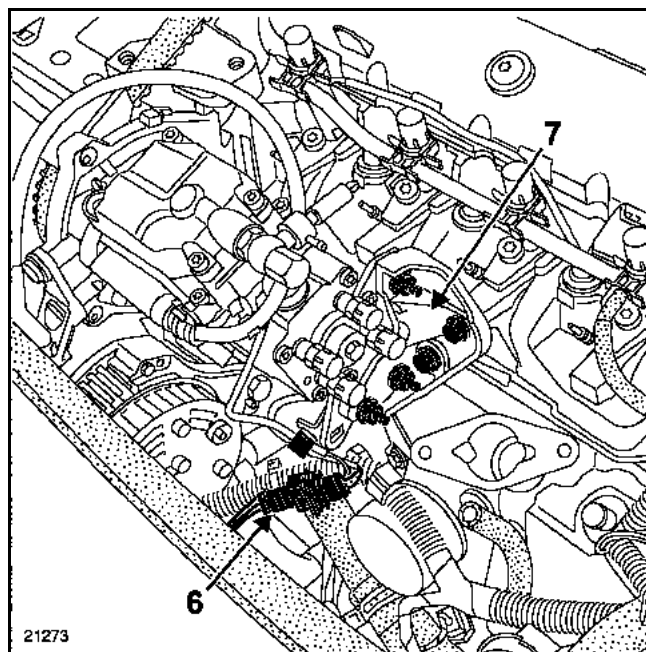


Disconnect:

- the electrical solenoid and advance solenoid valve connector (6).

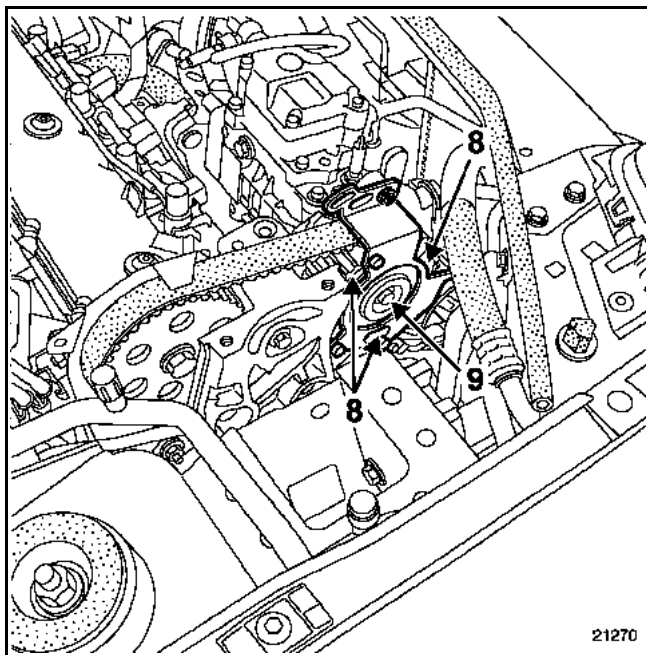
Remove:

- the rear pump support (7).



Undo:

- the three pump mounting bolts by inserting a torx screwdriver into the RAM pulley (micrometric adjustment pulley) slits,
- the central nut (9) securing the pump shaft to the RAM pulley (micrometric adjustment pulley).



Remove the pump by unscrewing alternately the central pump nut and the three pump mounting bolts.

REFITTING

Proceed with refitting the pump in the reverse order to removal

Carry out the timing operation and the timing check operation (see **Section on Pump - Timing**).

For all other operations, refitting is the reverse of removal.

Reprime the fuel circuit using a priming unit while purging the high pressure pipes with the ignition switched on.

RAM PULLEY OPERATION (micrometric adjustment pulley)

WARNING: never open a RAM pulley.

PARTS LIST

1 Aluminium pulley bolt.

It secures the adaptor hub (8) to the pulley hoop (4). Pretighten bolt to **2 daNm**, tighten bolt to **9 ± 0.5 daNm**.

2 Pulley flange.

3 Nut flange.

It attaches the pump shaft to the pulley. Its torque setting is **4.5 + 0.5 daNm**.

4 Pulley hoop.

It is stationary during the timing setting. Its internal section has:

- a bolt thread (a) onto which part (5), is screwed
- three guiding rails (b) where the part (6) is inserted.

5 Micrometric advance ring

It has three slots (c) in which the three tool rods **Mot. 1358-01** are inserted. On its external section it has a bolt thread (d) which is screwed into the pulley (4). It is secured in translation to part (6). Conversely, part (5) moves freely in relation to part (6).

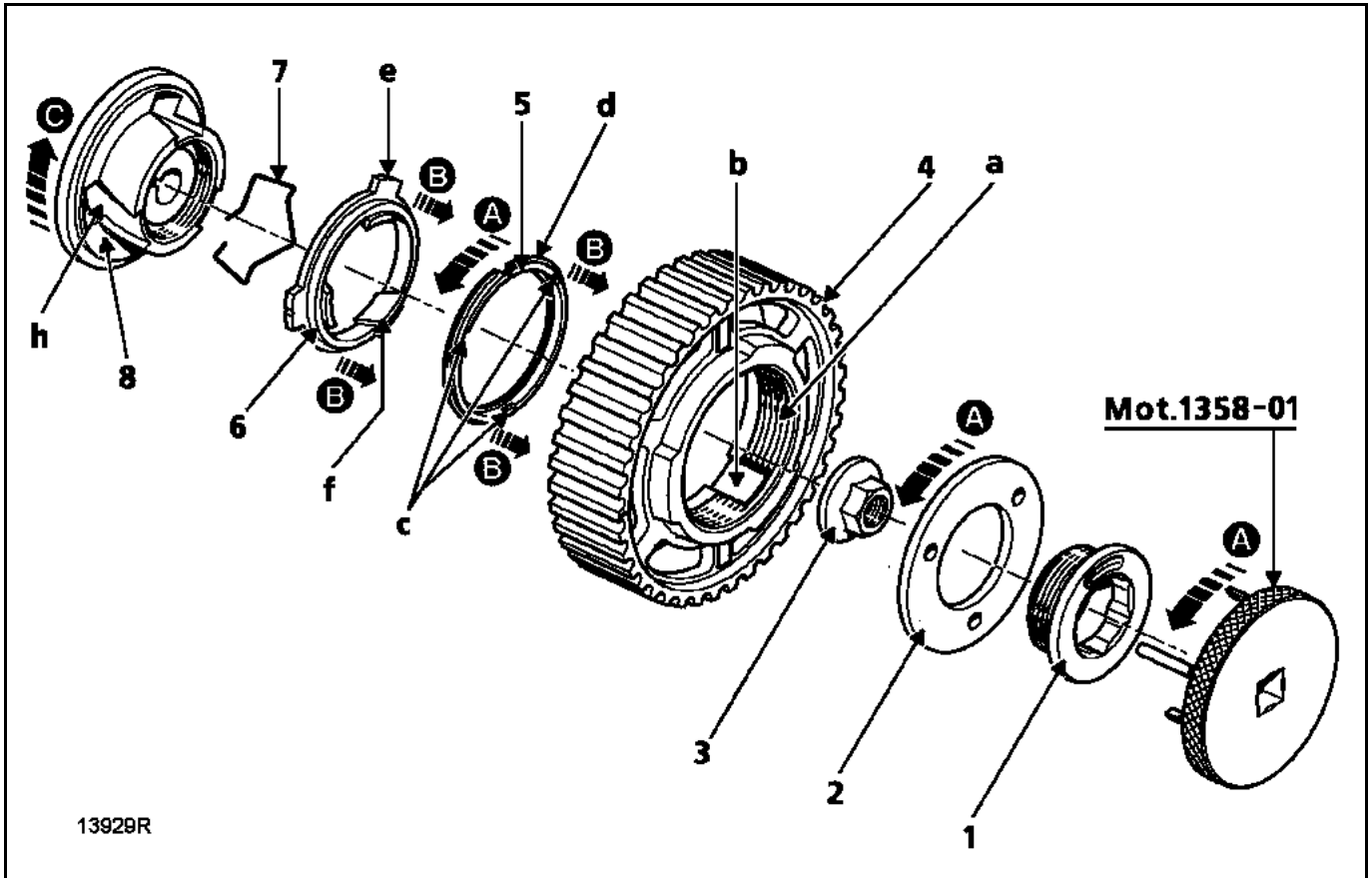
6 Angular adjustment ring.

It is locked in rotation. On its external section, it has three guiding lugs (e) which slide onto the pulley hoop (4). On its internal section it has three helical guiding rails (f) which slide onto the adaptor hub (8).

7 Brake bolts.

8 Adapter hub.

It drives the pump during adjustment. It is the adapter hub which turns the pump shaft. It has three helical rails (h).



Operating principle

Before making any adjustments, unscrew bolt (1).

Fit tool **Mot. 1358-01** into the three flange openings (B). 2 The three tool rods fit into the three micrometric advance ring slots (5).

Rotating tool (A) **Mot. 1358-01** rotates the micrometric advance ring (5).

The rotating tool is screwed into the pulley rim (4). Part (5) has a rotational movement, and also a translatory movement when it is screwed in (B). It moves towards the bolt (1).

Part (6) is connected to part (5) for translatory movements. It is also locked in rotation. These three lugs slide into the three pulley rim rails (4). As a result, part (6) moves towards bolt (1).

Part (6) has three helical guiding rails. They fit into the helical rails of part (8). Following a transversal movement of part (6), and in view of the fact that part (8) can not make a transversal movement, when part (6) is moved it turns part (8) by way of the helical rails.

A Rotational movement carried out by tool operator.

B Transversal movement of rings

C Rotational movement applied to pump shaft. It is divisible by **180** in relation to movement A.

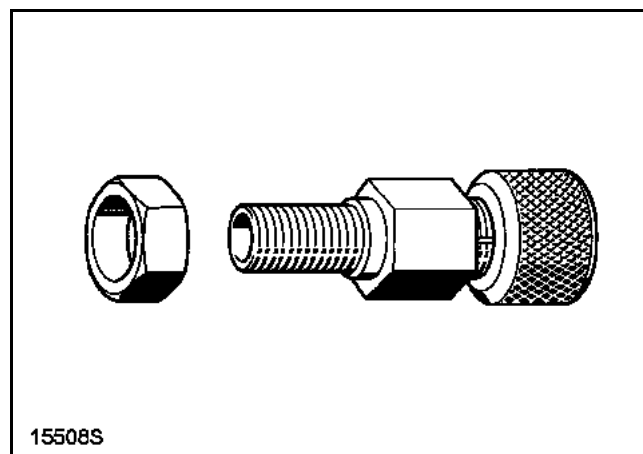
SPECIAL TOOLING REQUIRED	
Mot. 856-02	Timing gauge support plus extension (electronic Bosch pump)
Mot. 1054	TDC setting pin
Mot. 1079	Timing gauge kit
Mot. 1200-02	Pump-pulley retaining tool
Mot. 1453	Adjustable engine support tool Tooling required for work on a micrometric adjustment pulley
Mot. 1358-01	
Mot. 1359	
Mot. 1383	Fuel pipe removal tool
EQUIPMENT REQUIRED	
Angular torque wrench	

IMPORTANT:

- tool **Mot. 1358-01** must be used,
- the engine should only be turning when working on the wheel, **5th** gear selected (engine running slowly and not jumping to avoid backfire resulting from compression change),
- The engine should only turn in its direction of operationIf the engine turns in the opposite direction, repeat the checking procedure or adjust the timing to zero

NOTE: the timing value is **0.11 ± 0.02 mm**.

Place on tool **Mot. 856-02** a **8.4 mm** thick spacer as described in Technical Note **3121A**.



TIGHTENING TORQUE (in daNm)



RAM pulley nut (adjustment locking)

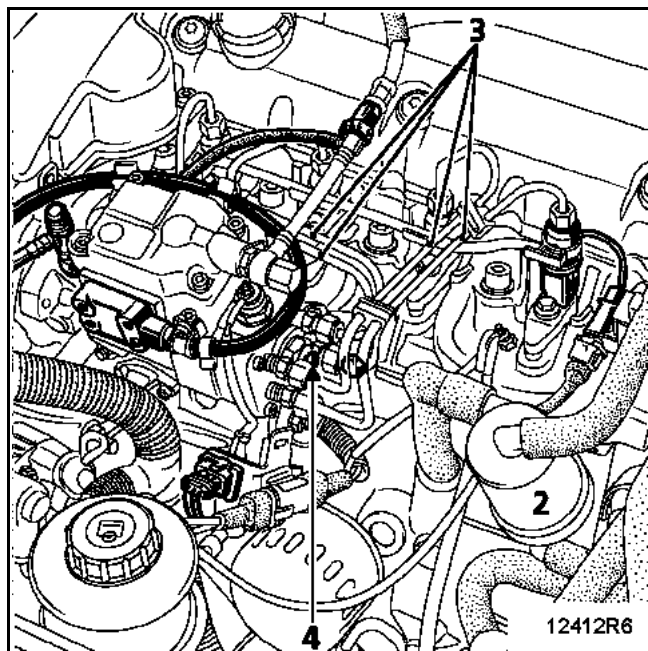
9

CHECKING THE SETTING OF INJECTION PUMPS FITTED WITH RAM PULLEYS

Remove oil decanter (2) and the high pressure fuel pipes (3) **Mot. 1383**.

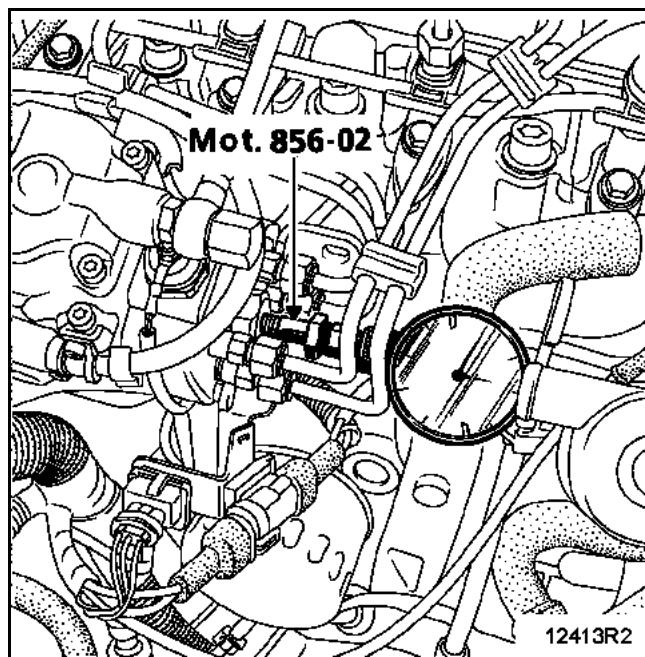
Screw the mounting **Mot. 856-02** fitted with a spacer in place of the cap (4).

On the gauge, tighten the extension supplied with tool **Mot. 856-02** then position and attach to gauge mounting **Mot. 856-02**.



Calibrate the gauge on the injection pump piston bottom dead centre.

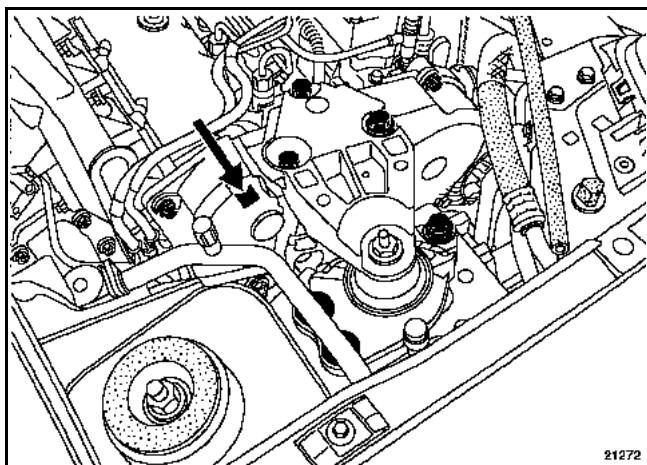
Check that the gauge pin slides neatly into the pump unit and that it is still showing the same value of bottom dead centre (check to be made each time that the engine is turned).



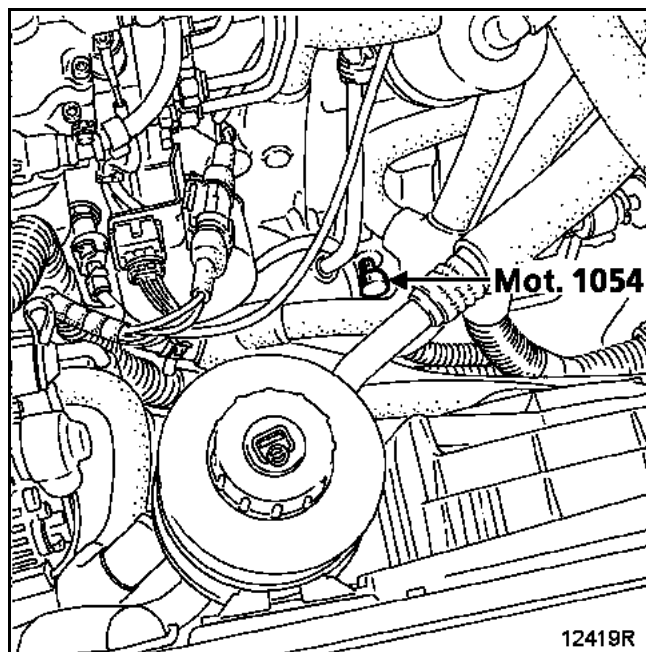
Check that the piston pump travel is less than the gauge travel.

Measure the engine with the **Mot. 1054** tool (two people required):

- Turn the engine in its operating direction (clockwise from timing end).
- Locate the spot on the camshaft pulley where the reference mark will appear.
- **Stop turning the engine half a notch before the two marks align.**



- Fit pin **Mot. 1054**.



- Keep a constant pressure on the pin.
- Turn the engine slowly until the pin enters the slot in the crankshaft.
- Check the pump piston lift, read on the gauge; the timing value is 0.11 ± 0.02 mm.

If the value is not correct, adjust the timing (see below).

DIESEL EQUIPMENT

Pump - Timing adjustment

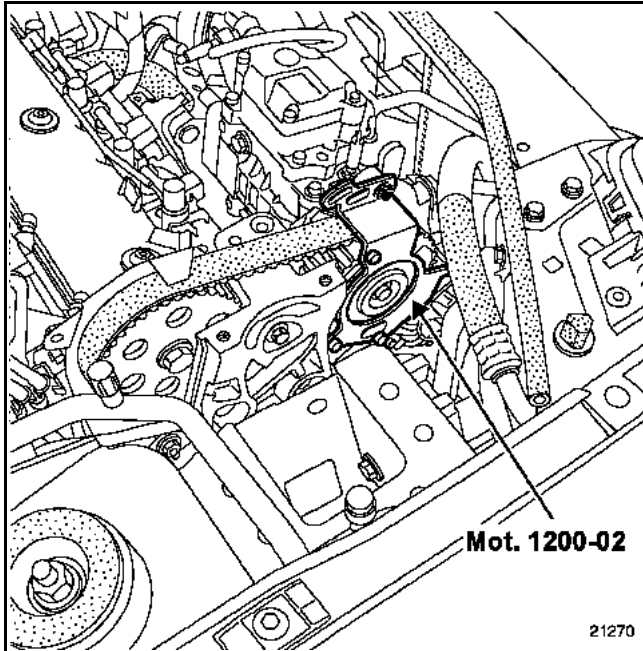
13B

ADJUSTING THE TIMING FOR INJECTION PUMPS FITTED WITH RAM PULLEYS (to be carried out after checking adjustment, see above)

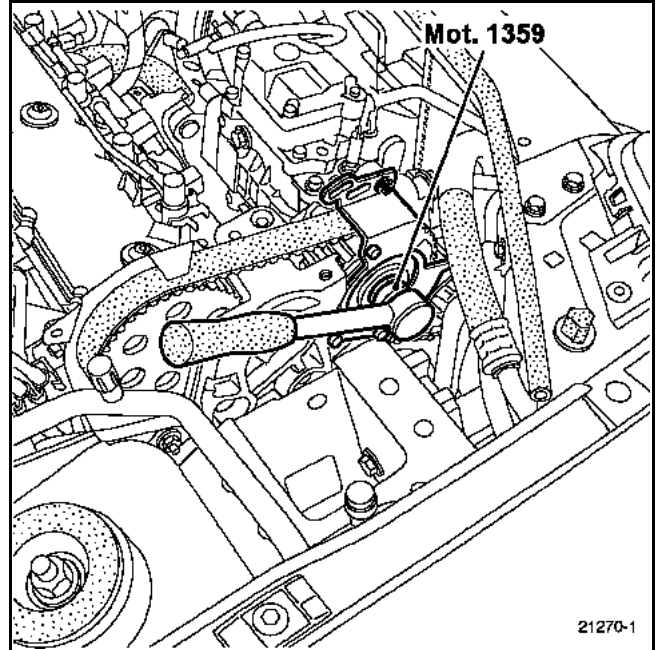
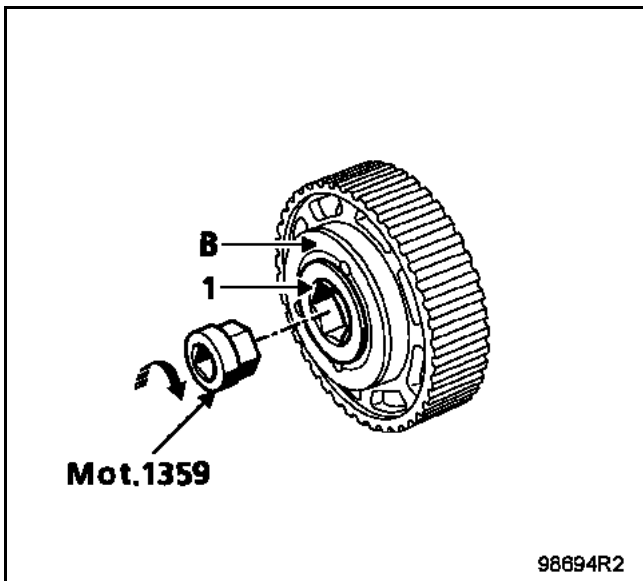
Remove:

- pin **Mot. 1054**,
- the engine suspended mounting,
- the valve timing cover.

Fit the pulley locking tool **Mot. 1200-02**.

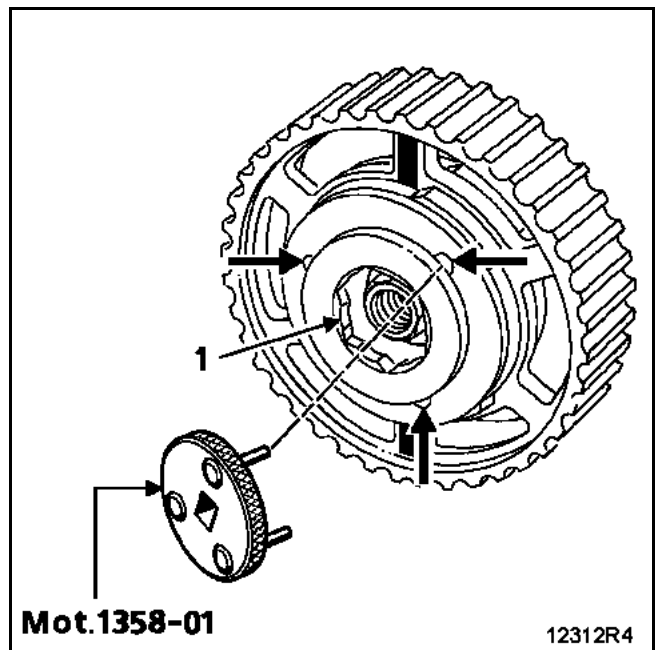


ATTENTION: slowly loosen the bolt (1) using tool **Mot. 1359** (**IMPORTANT: its a left threaded bolt**) so that it can release the rotation flange (B).



Fit tool **Mot. 1358-01** into the three flange openings (B).

Turn the tool - flange assembly so that the three pins of the tool fit into the three slots in the adjusting ring bolt.

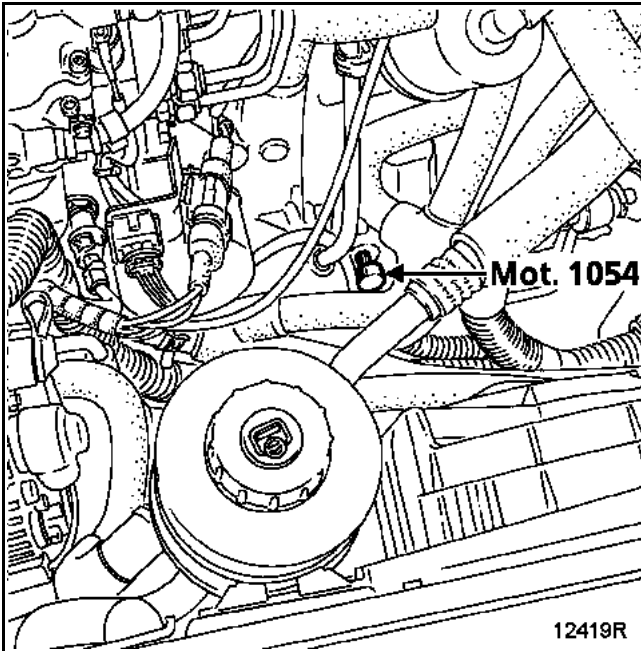


Turn the tool-flange assembly **Mot. 1358-01** clockwise until the pulley reaches the stop, allowing the pulley to be positioned at the start of adjustment.

Remove the locking tool **Mot. 1200-02**.

Measure the engine with the **Mot. 1054** tool (two people required):

- Turn the engine in its operating direction (clockwise from timing end).
- Locate the spot on the camshaft pulley where the reference mark will appear.
- **Stop turning the engine half a notch before the two marks align.**
- Fit pin **Mot. 1054**.



- Keep a constant pressure on the pin.
- Turn the engine slowly until the pin enters into the slot in the crankshaft.
- Fit the pulley locking tool **Mot. 1200-02**.
- Using tool **Mot. 1358-01**, set the timing, turning the tool anti-clockwise until the timing value is obtained

If the value is not correct, adjust the timing (see below).

NOTE: if the timing value is exceeded during adjustment, bring the engine back by two revolutions to recuperate the play using tool **Mot. 1358-0,1** then repeat the previous timing operation.

Leave pin **Mot. 1054** in place.

Gently pretighten the bolt (1) using **Mot. 1359** being careful not to exceed **2 daNm** (left thread, the gauge needle should not move).

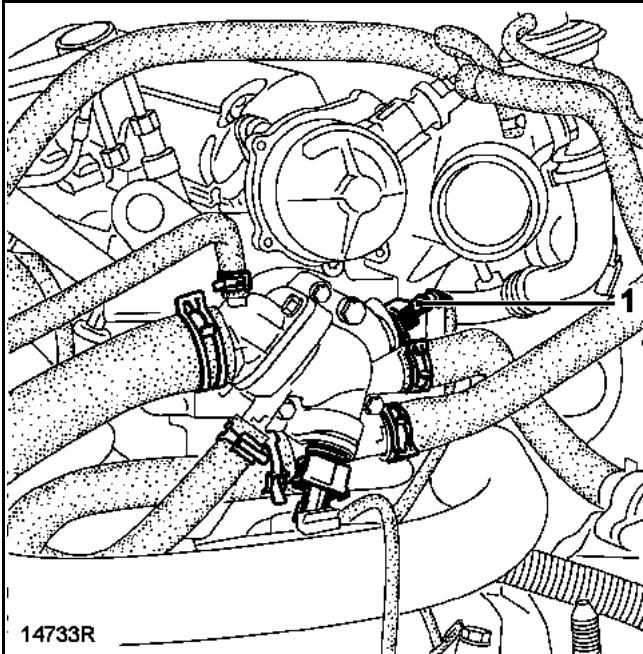
IMPORTANT: the torque wrench used for this operation must operate to the left.

Remove pin **Mot. 1054**.

Tighten bolt (1) to a torque of **9 daNm**, using tool **Mot. 1359**.

Remove the locking tool **Mot. 1200-02**.

Turn the engine over twice and check the pump timing once again.



The coolant temperature sensor (1) (injection and coolant temperature indicator on the instrument panel) is a sensor with three tracks.

Two tracks for sending coolant temperature information to the computer (**tracks 104** and **112**) and one track to inform the instrument panel.

This system allows the engine cooling fan to be controlled by the injection computer. It consists of a single temperature sensor used for the injection, the engine cooling fan, the temperature indicator and the temperature warning light on the instrument panel.

OPERATION

The injection computer uses the coolant temperature to control:

- the injection system,
- the EGR,
- the engine fan relay:
 - the engine fan assembly is switched on if the coolant temperature exceeds **99 °C** and is switched off when the temperature falls below **96 °C**,
 - the fan unit is operated at high speed if the coolant temperature exceeds **102 °C** and is switched off when the temperature falls below **99 °C**.
 - the fan assembly can be controlled (at slow speed) for the air conditioning.

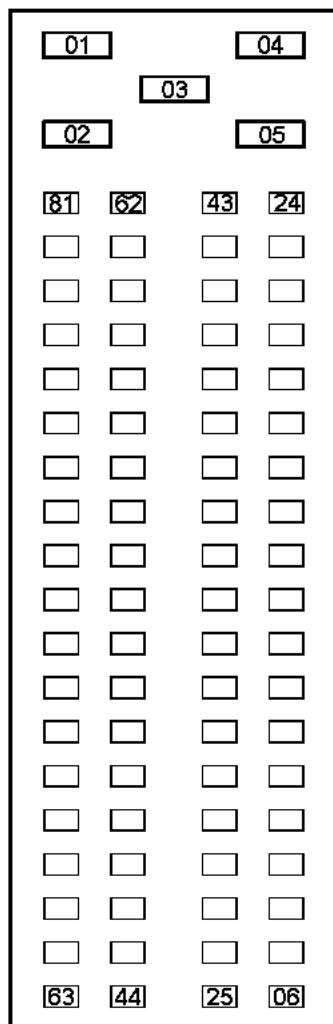
COOLANT TEMPERATURE WARNING LIGHT

The warning light is operated by the computer (**track 80** or on Clios manufactured from June 2001 the multiplex network).

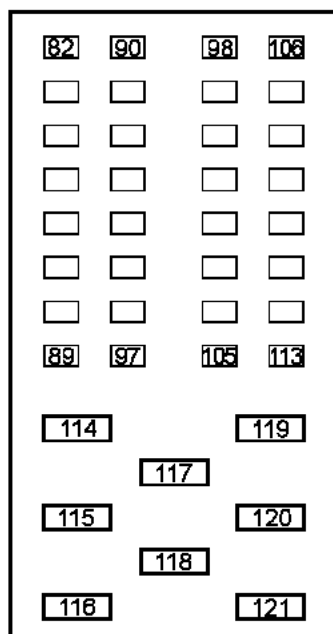
It comes on when the coolant temperature exceeds **118 °C** and goes off when the temperature falls below **115 °C**.

COMPUTER TRACK ALLOCATION

CONNECTOR TRACKS 1 TO 81

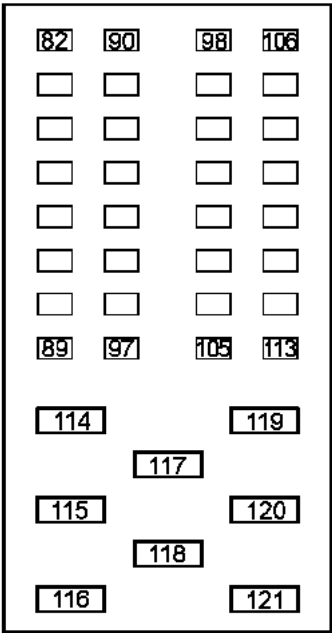
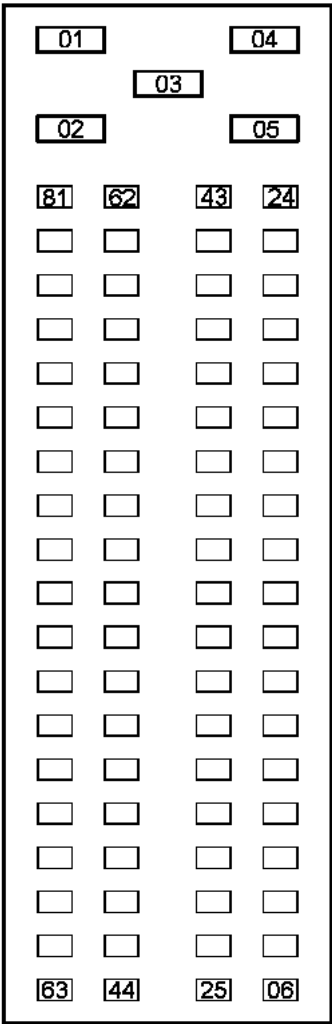


1	---	Main after relay supply
2	---	Main after relay supply
4	---	Earth
5	---	Earth
6	→←	CAN L Diagnostic socket (Megane and Clio from June 2001)
7	→←	CAN L Diagnostic socket (Megane and Clio from June 2001)
12	---	Load potentiometer feed (track 1)
14	→←	Diagnostic line L
15	←	Immobiliser input
16	→←	K diagnostic line
18	→	Main control relay
20	←	Vehicle speed signal
21	→	Thermoplunger (thermoplunger 1) relay control
28	→	Fuel consumption signal
29	→	Air conditioning authorisation or compressor control relay
30	---	EGR Potentiometer and airflow meter supply
31	---	Pedal potentiometer feed (track 2)
33	←	Preheating relay diagnostic input
34	←	Air conditioning request input
37	---	+after ignition supply
40	→	Thermoplunger relay (2 thermoplungers) control
41	→	Fault warning light severity 1 control
42	→	Preheating control relay
46	←	Brake lock switch input
49	---	Air flowmeter earth
50	---	Pedal potentiometer earth (track 1)
51	---	Pedal potentiometer earth (track 2)
52	---	EGR potentiometer earth
60	→	Low speed fan assembly control relay
61	→	EGR solenoid control
62	→	High speed fan assembly control relay
65	←	Brake opening switch input
66	←	Clutch pedal switch signal
68	←	Airflow sensor signal input
69	←	Pedal potentiometer signal input (track 1)
70	←	Pedal potentiometer signal input (track 2)
71	←	EGR potentiometer signal input
73	←	Air temperature and air flow meter sensor signal input
80	→	Fault warning light severity 2 control
81	→	Power assisted steering control relay



F9Q engine

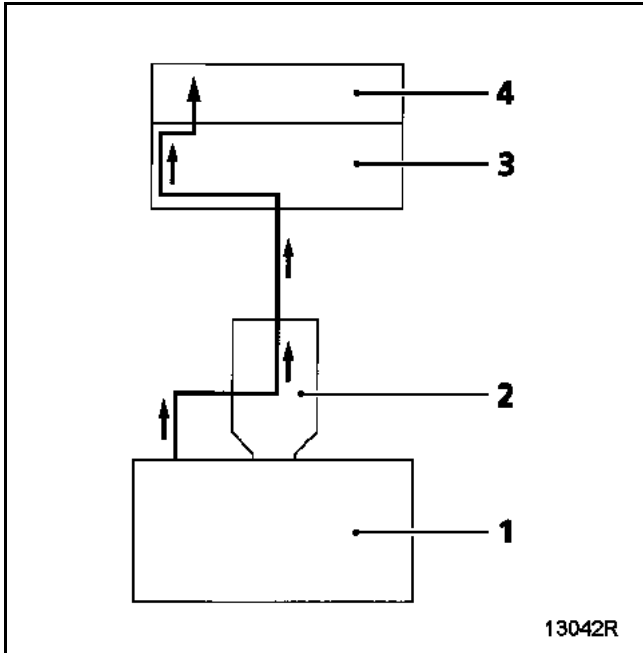
COMPUTER TRACK ALLOCATION



CONNECTOR TRACKS 82 TO 121

- | | | |
|-----|-----|---|
| 89 | --- | Coolant pressure sensor earth |
| 93 | → | Engine speed signal output |
| 94 | --- | Coolant pressure sensor supply |
| 95 | ← | Heated windscreen signal input |
| 97 | ← | Coolant pressure sensor signal input |
| 99 | → | Fuel flow valve position sensor (measurement) |
| 100 | → | Fuel flow valve position sensor (reference) |
| 101 | --- | Needle lift sensor earth |
| 102 | --- | Engine speed sensor earth |
| 103 | --- | Fuel temperature sensor earth |
| 104 | --- | Coolant temperature sensor earth |
| 106 | ← | Fuel flow valve positions sensor (centre point) |
| 107 | → | Fuel flow valve position sensor (measurement) |
| 108 | → | Fuel flow valve position sensor (reference) |
| 109 | ← | Needle lift sensor signal |
| 110 | ← | Engine speed sensor signal |
| 111 | ← | Fuel temperature sensor signal |
| 112 | ← | Coolant temperature sensor signal |
| 114 | → | Injection advance solenoid valve control |
| 116 | → | Fuel flow actuator control |
| 120 | → | Electrical solenoid control |
| 121 | → | Fuel flow actuator control |

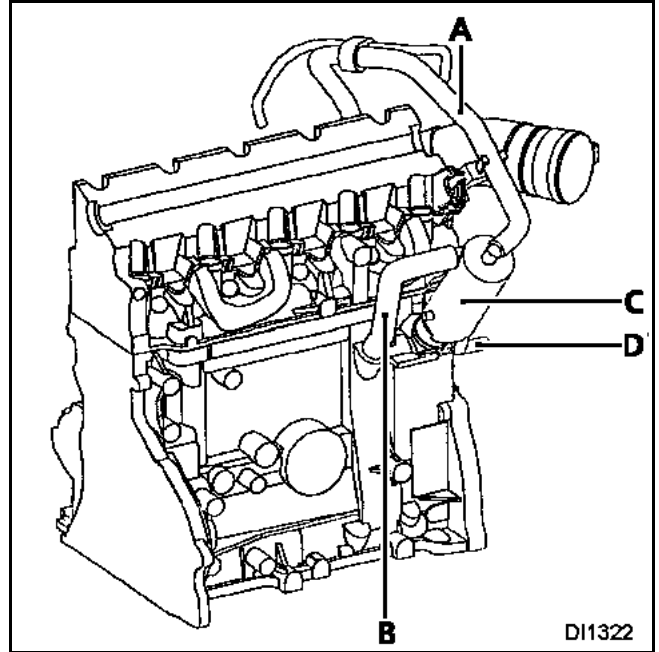
CIRCUIT DIAGRAM



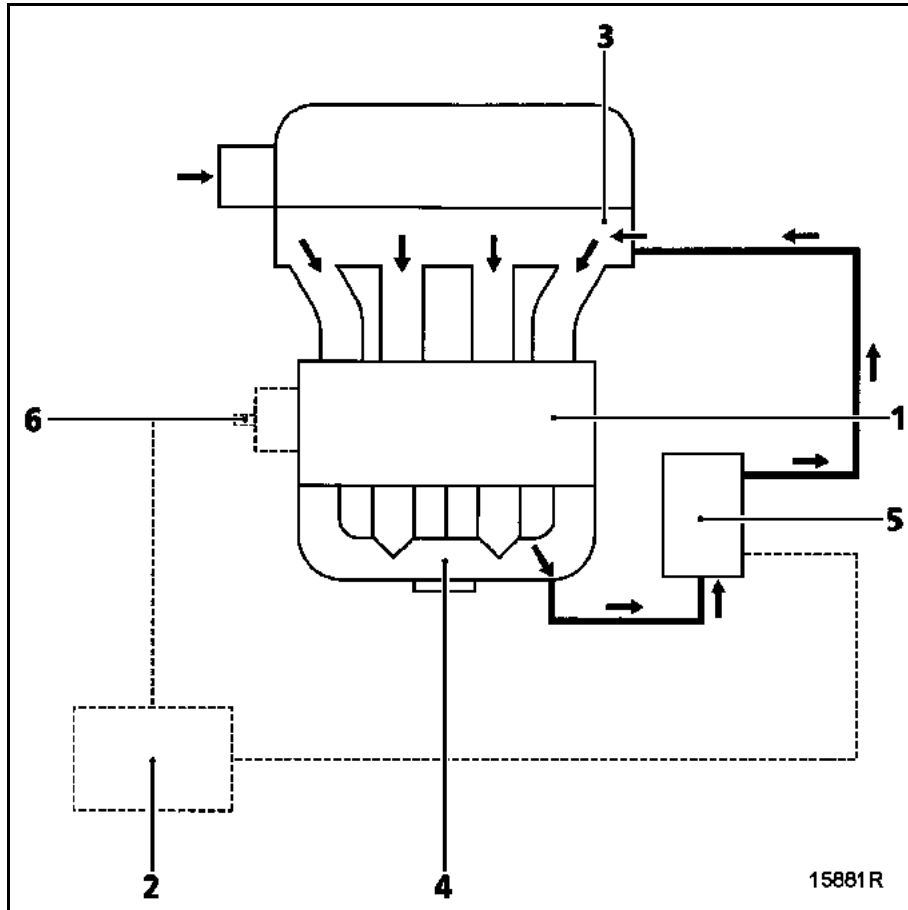
- 1 Engine
- 2 Oil decanter
- 3 Air filter unit
- 4 Inlet manifold

CHECKING

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



- A Oil vapour rebreathing pipe for the bottom of engine
- B Oil vapour rebreathing pipe for the top of engine.
- C Oil decanter
- D Oil vapour rebreathing pipe linked to the intake pipes

CIRCUIT DIAGRAM

- 1 Engine
- 2 Injection manifold
- 3 Inlet manifold
- 4 Exhaust manifold
- 5 EGR solenoid valve
- 6 Coolant temperature sensor

REMOVING THE VALVE

The EGR valve is press-fitted into the intake manifold.

To facilitate its replacement it is preferable to remove the manifolds.

PURPOSE OF THE EGR SYSTEM

The recirculation of the exhaust gases reduces the nitrogen oxide (NOx) content of the exhaust gas.

The injection computer authorises gas to pass by controlling a solenoid valve.

OPERATING PRINCIPLE

The valve is controlled by Opening Cyclic Ratio (RCO) signal issued by the injection computer. The **RCO signal** modulates the opening of the valve and consequently the quantity of exhaust gas directed back to the inlet manifold.

The computer continuously carries out a test to detect the position of the **EGR** valve flap.

OPERATING CONDITIONS

The parameters which determine the activation of the **EGR** solenoid valve are as follows:

- coolant temperature,
- air temperature,
- the air flowmeter,
- atmospheric pressure,
- accelerator pedal position,
- the engine speed.

The EGR function is cut if:

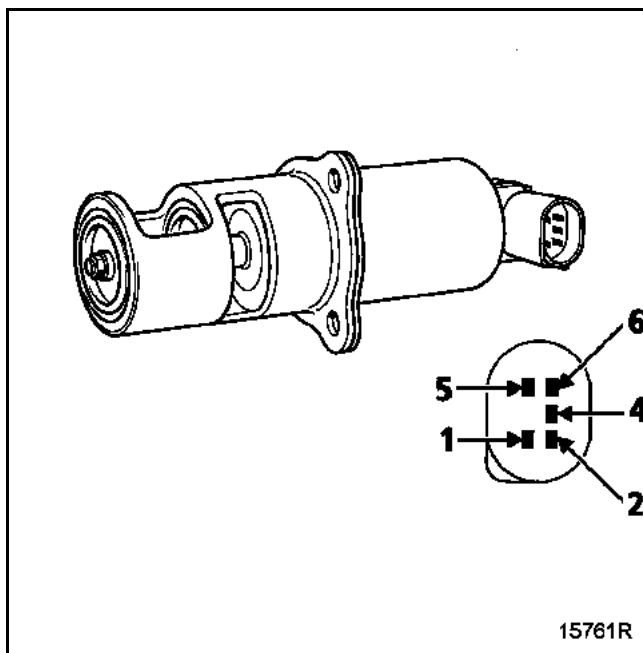
- the battery voltage is less than **9 volts**,
- the engine speed is below **700 rpm**,
- a characteristics map (engine speed/load) exceeds a given threshold,
- the vehicle speed is below **7.5 mph (12 km/h)**, the engine speed is below **1000 rpm** for **40 seconds**.

The EGR valve is not supplied after starting the engine according to a coolant temperature characteristics map.

If there is a fault in:

- the coolant temperature sensor,
- the air temperature sensor,
- the air flowmeter,
- the atmospheric pressure sensor.

The **EGR** solenoid valve is fed for **40 seconds** on each return to idle speed if the air temperature is greater than **15 °C**.



- 1 Solenoid feed
- 2 Sensor feed
- 4 Sensor earth
- 5 Solenoid earth
- 6 Sensor output