RENAULT Clio

T.N. 2234A

X57 - 057

Basic manual: M.R. 295 - T.N. 1912 - BOSCH monopoint injection

Special Points
of Vehicles

This Technical Note contains information on changes in the injection fault finding and special points relating to **CLIO** vehicles equipped with the new engine.

Vehicle code	Engine type	Injection type	No. of diagnostic fiche
X57 A	E7F 708	BOSCH Monopoint injection	Fiche No. 28
X57 B	E7J 601		
X57 C	F3P 710		
X57 S	E7F 750		
X57 Y	E7J 754		
057 G	E7F 708		
057 J	E7F 750		
X57 H	F3P 758	SIEMENS Multipoint injection	Fiche No. 03
X57 8	F3P 755		
057 A	F3P 755		
057 D	F3P 755		
057 E	F3P 758		

77 11 178 351 MARCH 1994 Edition Anglaise

FUEL MIXTURE
General

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Engine						Type of injection
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cc)	Compression ratio	
X57 A 057 G X57 S 057 J	E7F E7F E7F E7F	708 708 750 750	75.8	64.9	1171	9.5	BOSCH Monopoint depolluted

Tests carried out at idle speed *					Fuel * * * (minimum octane rating)
Engine speed (rpm)	Pollutant emissions * *				
	CO (%)	CO_2 (%)	HC (ppm)	Lambda (λ)	
750 ± 50	0.3 max.	14.5 min.	100 max.	$0.97 < \lambda < 1.03$	Unleaded (OR 95)

* For a coolant temperature above 80 °C and after the engine speed has been a steady 2500 rpm for approx. 30 seconds.
* * For legal values refer to specification for the country.
* * * Compatible with OR 91 unleaded.

Type of fuel supply :	Regulated monopoint injection
Submerged fuel pump in fuel tank Type : BOSCH	Voltage: 12 volts Pressure: 1.06 bar Flow: 65 l/h minimum
Fuel filter mounted under vehicle in front of fuel tank	Replace every 36,000 miles (50,000 km)
BOSCH monopoint throttle body	32 mm dia.
Pressure regulator (integrated in throttle body)	Pressure : 1.06 ± 0.05 bar (not adjustable)
Solenoid injector Type : BOSCH	Voltage: 12 volts Resistance : 1.2 ± 0.5 ohms
Idle speed regulation micromotor	Not adjustable Integral no load switch
Throttle position potentiometer (not adjustable)	Check using XR25 #17 During idle speed regulation : 17 to 40 Throttle fully open : > to 208

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Computer	Siemens No.	Homologation No.	Renault No. *
X57 A	SIEMENS 35 tracks	S 102 730 101	77 00 861 423	77 00 869 732
X57 S		S 102 730 102	77 00 864 274	77 00 869 313
057 G		S 102 730 110	77 00 864 452	77 00 864 277
057 J		S 102 730 113	77 00 864 457	77 00 864 278

* Renault No. may be read using the XR25 in D03 and then G70*.

Temperature in °C (± 1°)	0	20	40	80	90
Air temperature sensor Type: Bosch CTN, resistance in ohms	5290 to 6490	2400 to 2600	1070 to 1270	.....	.....
Coolant temperature sensor Type: Siemens CTN, resistance in ohms	.....	3060 to 4045	1315 to 1600	300 to 370	210 to 270

Heated oxygen sensor, NTK	Voltage at 850 °C : – rich mixture : > 625 mV – lean mixture : 0 to 80 mV
Catalytic converter (under vehicle)	E7F 708 : ◇ C27 E7F 750 : ◇ C31
Paper cartridge air filter, thermostat control from 26 to 36 °C	Replace every 12,500 miles (20,000 km)
Anti-evaporation system	Canister : CAN 01 Solenoid bleed valve : Delco Remy resistance : 35 ± 3 ohms
Ignition	Advance integral in injection computer – Ignition power module – Pinking detector
Plugs	EYQUEM NGK FC 42 LS BCP 5 ES Gap: 0.9 ± 0.05 mm (adjustable)

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Engine						Type of injection
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cc)	Compression ratio	
X57 Y X57 B	E7J E7J	754 601	75.8	77	1390	9.5	BOSCH monopoint depolluted

Tests at idle speed *					Fuel* * * (minimum octane rating)
Engine speed (rpm)	Pollutant emissions * *				
	CO (%)	CO_2 (%)	HC (ppm)	Lambda (λ)	
825 ± 50 (for automatic transmission in park or neutral)	0.3 max.	14.5 min.	100 max.	$0.97 < \lambda < 1.03$	Unleaded (OR 95)

* For coolant temperature above 80°C and after the engine speed has been a steady 2500 rpm for approx. 30 seconds.
* * For legal values refer to your country specification.
* * * Compatible with OR 91 unleaded.

Type of fuel supply:	Regulated monopoint injection
Submerged pump in fuel tank Type : BOSCH	Voltage: 12 volts Pressure: 1.06 bar Flow: 65 l/h minimum
Fuel filter mounted under vehicle in front of fuel tank	Replace every 30,000 miles (50,000 km)
Bosch monopoint throttle body	36 mm dia.
Pressure regulator (integrated in throttle body)	Pressure: 1.06 ± 0.05 bar (not adjustable)
Solenoid injector Type : BOSCH	Voltage: 12 volts Resistance : 1.2 ± 0,5 Ohm
Idle speed regulation micromotor	Not adjustable Integral no load switch
Throttle position potentiometer (not adjustable)	Check using XR25 #17 During idle speed regulation : 17 to 40 (14 to 40 for E7J 601) Throttle fully open: > to 208

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Computer	Siemens No.	Homologation No.	Renault No.*
X57 Y X57 8	SIEMENS 35 tracks	S 102 730 106 S 101 726 203	77 00 860 340 77 00 861 419	77 00 873 636 77 00 867 286

* Renault No. may be read using the XR25 in D03 and then G70*.

Temperature in °C (± 1°)	0	20	40	80	90
Air temperature sensor Type: Bosch CTN, resistance in ohms	5290 to 6490	2400 to 2600	1070 to 1270	.....	.....
Coolant temperature sensor Type: Siemens CTN, resistance in ohms	.....	3060 to 4045	1315 to 1600	300 to 370	210 to 270

Oxygen sensor: E7J 754 : NTK reheated E7J 601 : BOSCH LSH 24	Voltage at 850 °C : – rich mixture : > 625 mV – lean mixture : 0 to 80 mV
Catalytic converter (under vehicle)	◇ C31
Paper cartridge air filter, thermostat control from 26 to 36 °C	Replace every 12,500 miles (20,000 km)
Anti-evaporation system	Canister : CAN 01 Solenoid bleed valve: E7J 754 : Delco Remy; resistance 35 ± 3 ohms E7J 601 : Eaton; resistance 30 ± 2 ohms
Ignition	Advance integral in injection computer – Ignition power module – Pinking sensor
Plugs	EYQUEM FC 42 LS NGK BCP 5 ES Gap: 0.9 ± 0.05 mm (adjustable)

FUEL MIXTURE
General

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Engine						Type of injection
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cc)	Compression ratio	
X57 C	F3P	710	82.7	83.5	1794	9.7	Bosch monopoint polluted

Tests carried out at idle speed *					Fuel* * * (minimum octane rating)
Engine speed (rpm)	Emission des polluants * *				
	CO (%)	CO_2 (%)	HC (ppm)	Lambda (λ)	
750 ± 50	0.3 max.	14.5 min.	100 max.	$0.97 < \lambda < 1.03$	Unleaded (OR 95)

* For coolant temperature above 80 °C and after the engine speed has been a steady 2500 rpm for approx. 30 seconds.
* * For legal values refer to your country specification.
* * * Compatible with OR 91 unleaded.

Type of fuel supply :	Regulated monopoint injection
Submerged fuel pump in fuel tank Type : Bosch	Voltage: 12 volts Pressure : 1.06 bar Flow: 65 l/h minimum
Fuel filter mounted under vehicle in front of fuel tank	Replace every 36,000 miles (50,000 km)
Bosch monopoint throttle body	38 mm dia.
Pressure regulator (integrated in throttle body)	Pressure : 1.06 ± 0.05 bar (not adjustable)
Solenoid injector Type : Bosch	Voltage: 12 volts Resistance : 1.2 ± 0.5 ohms
Idle speed regulation micromotor	Not adjustable Integral no load switch
Throttle position potentiometer (not adjustable)	Check using XR25 #17 During idle speed regulation : 5 to 30 Throttle fully open : > to 208

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Computer	Siemens No.	Homologation No.	Renault No. *
X57 C	Siemens 35-track	S 101 726 106	77 00 864 455	77 00 871 779

* Renault No. may be read using the XR25 in D03 and then G70*.

Temperature in °C (± 1°)	0	20	40	80	90
Air temperature sensor Type: CTN Bosch, resistance in ohms	5290 to 6490	2400 to 2600	1070 to 1270	.....	.....
Coolant temperature sensor Type: CTN Bosch, resistance in ohms	.....	3060 to 4045	1315 to 1600	300 to 370	210 to 270

Heated oxygen sensor, BOSCH LSH 6	Voltage at 850 °C : – Rich mixture : > 625 mV – Lean mixture: 0 to 80 mV
Catalytic converter (under vehicle)	◇ C10
Paper cartridge air filter, thermostat control from 16 to 40 °C	Replace every 12,500 miles (20,000 km)
Anti-evaporation system	Canister : CAN 01 Solenoid bleed valve : Eaton resistance : 30 ± 2 ohms
Ignition sensor	Advance integral in injection computer – Ignition power module – Pinking sensor
Plugs	BOSCH W7 DC Gap: 0.9 ± 0.05 mm (adjustable)

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Engine						Type of injection
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cc)	Compression ratio	
X57 8 057 A 057 D	F3P	755	82.7	83.5	1794	9.8	Siemens multipoint depolluted

Test carried out at idle speed *					Fuel * * * (Minimum octane rating)
Engine speed (rpm)	Pollutant emissions * *				
	CO (%)	CO_2 (%)	HC (ppm)	Lambda (λ)	
750 ± 50 (in neutral or park)	0.3 max.	14.5 min.	100 max.	$0.97 < \lambda < 1.03$	Unleaded (OR 95)

* For coolant temperature above 80°C and after the engine speed has been a steady 2500 rpm for approx. 30 seconds.
* * For legal values refer to your country specification.
* * * Compatible with OR 91 unleaded.

Type of fuel supply :	Regulated multipoint injection
Submerged fuel pump in fuel tank Type : WALBRO	Voltage: 12 volts Pressure : 3 bars Flow: 80 l/h minimum
Fuel filter mounted under vehicle in front of fuel tank	Replace every 30,000 miles (50,000 km)
Throttle body	PIERBURG : double barrel 35 × 52
Pressure regulator	Pressure: – under zero vacuum : 3 ± 0.2 bars – under vacuum of 500 mbar : 2.5 ± 0.2 bars
Solenoid injector Type : Siemens DEKA 2 (blue connector)	Voltage: 12 volts Resistance : 14.5 ± 0.5 ohms
Idle speed regulation valve : HITACHI single winding	Type : AESP 207.10 Resistance : 9.5 ⊥ 1 ohms
Throttle position potentiometer (not adjustable)	Check using XR25 #17 During idle speed regulation: 20 to 45 Throttle fully open : 190 to 240

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Computer	Siemens No.	Homologation No.	Renault No.	Diag. code
X57 8 057 A 057 D	Siemens 35 tracks	S 101 714 204	77 00 863 468	77 00 868 324	146

Temperature in °C (± 1°)	0	20	40	80	90
Air temperature sensor Type: Siemens CTN, resistance in ohms	7470 to 11970	3060 to 4045	1315 to 1600	.....	.....
Coolant temperature sensor Type: CTN Siemens, resistance in ohms	.....	3060 to 4045	1315 to 1600	300 to 370	210 to 270

Reheated oxygen sensor, Bosch Type : LSH 6 or LSH 24	Voltage at 850 °C : – rich mixture: > 625 mV – lean mixture : 0 to 80 mV
Catalytic converter (under floor)	X57 8, 057 A : ◇ C34 057 D : ◇ C10
Paper cartridge air filter	Replace every 12,500 miles (20,000 km)
Anti-evaporation system	Canister : CAN 01 Solenoid bleed valve : Delco Remy resistance : 35 ± 3 ohms
Ignition	Advance integral in injection computer – Ignition power module – Pinking sensor
Plugs	EYQUEM C 52 LS / BOSCH W7 DCO / CHAMPION N7 YCX Gap: 0.9 ± 0.05 mm (adjustable)

SPECIFICATIONS AND ADJUSTMENT VALUES

Vehicle	Engine						Type of injection
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cc)	Compression ratio	
X57 H 057 E	F3P	758	82.7	83.5	1794	9.8	Siemens multipoint depolluted

Tests at idle speed*					Fuel* * * (Minimum octane rating)
Engine speed (rpm)	Pollutant emissions* *				
	CO (%)	CO_2 (%)	HC (ppm)	Lambda (λ)	
780 ± 50	0.3 max.	14.5 min	100 max.	$0.97 < \lambda < 1.03$	Unleaded (OR 95)

* For coolant temperature above 80°C and after the engine speed has been a steady 2500 rpm for approx. 30 seconds.
* * For legal values refer to your country specification.
* * * Compatible with OR 91 unleaded.

Type of fuel supply :	Regulated multipoint injection
Submerged fuel pump in fuel tank Type : WALBRO	Voltage: 12 volts Pressure : 3 bars Flow: 80 l/h minimum
Fuel filter mounted under vehicle in front of fuel tank	Replace every 30,000 miles (50,000 km)
Throttle body	PIERBURG : Double barrel 35 × 52
Pressure regulator	Pressure: – under zero vacuum : 3 ± 0.2 bars – under vacuum of 500 mbar : 2.5 ± 0.2 bars
Solenoid injector Type: Siemens Deka 2 (blue connector)	Voltage: 12 volts Resistance : 14.5 ± 0.5 ohms
Idle speed regulation valve: HITACHI single winding	Type : AESP 207.10 Resistance : 9.5 ± 1 ohms
Throttle position potentiometer (not adjustable)	Check using XR25 #17 Regulated idle speed : 20 to 45 Full load : 190 to 240

SPECIFICATIONS AND ADJUSTMENT VALUES

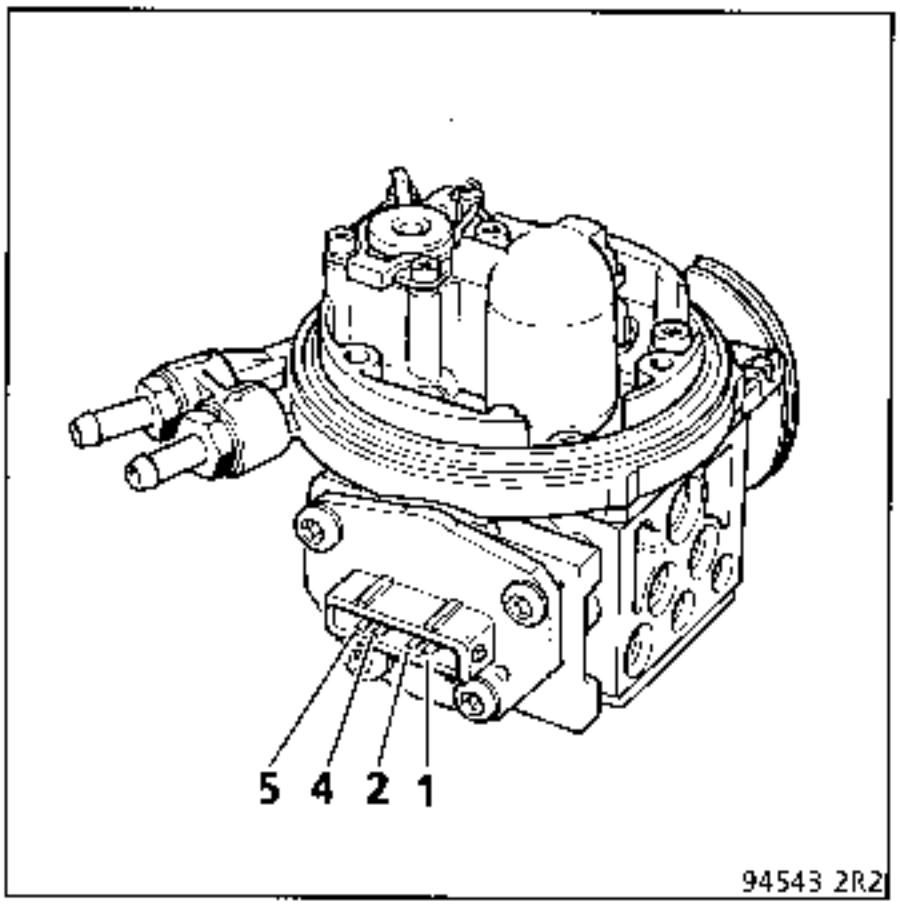
Vehicle	Computer	Siemens No.	Homologation No.	Renault No.	Diag. code
X57 H 057 E	SIEMENS 35 tracks	S 101 714 104	77 00 863 469	77 00 868 325	144

Temperature in °C (± 1°)	0	20	40	80	90
Air temperature sensor Type: Siemens CTN, resistance in ohms	7470 to 11970	3060 to 4045	1315 to 1600	.....	.....
Coolant temperature sensor Type: Siemens CTN, resistance in ohms	.....	3060 to 4045	1315 to 1600	300 to 370	210 to 270

Heated oxygen sensor, Bosch Type : LSH 6 or LSH 24	Voltage at 850 °C : – Rich mixture : ≥ 625 mV – Lean mixture : 0 to 80 mV
Catalytic converter (under vehicle)	X57 H : ◇ C34 057 E : ◇ C10
Paper cartridge air filter	Replace every 12,500 miles (20,000 km)
Anti-evaporation system	Canister : CAN 01 Solenoid bleed valve : Delco Remy resistance : 35 ± 3 ohms
Ignition	Advance integral in injection computer – Ignition power module – Pinking sensor
Plugs	EYQUEM C 52 LS / BOSCH W7 DCO / CHAMPION N7 YCX Gap: 0.9 ± 0.05 mm (adjustable)

THROTTLE POSITION POTENTIOMETER

The potentiometer has one track only. If this has to be renewed, the lower section of the throttle body needs to be replaced.



Identification of connector :

1 : Earth
2 : Supply + 5 volts
4 : Throttle position information (voltage moving between 0 and 5 volts)
5 : Not used

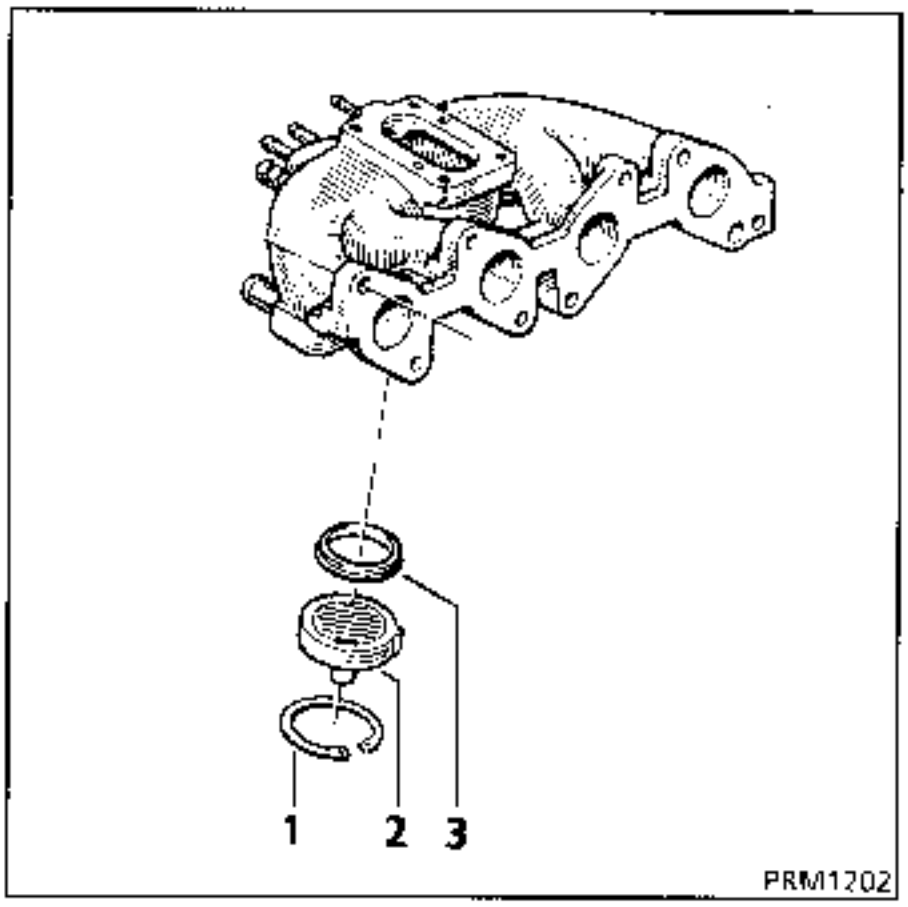
REHEATING P.T.C.

E7F 708, E7F 750 and E7J 754 engines are equipped with a PTC for reheating the fuel mixture.

This is fitted in the intake manifold, opposite the throttle, and held in position by circlips.

This P.T.C. is fed by the computer via a relay until a coolant temperature of 68 °C is reached.

The coolant sensor is fed permanently if it is defective.



1 : Retaining circlips
2 : Reheating P.T.C.
3 : Seal

FUEL SUPPLY
Fuel pump

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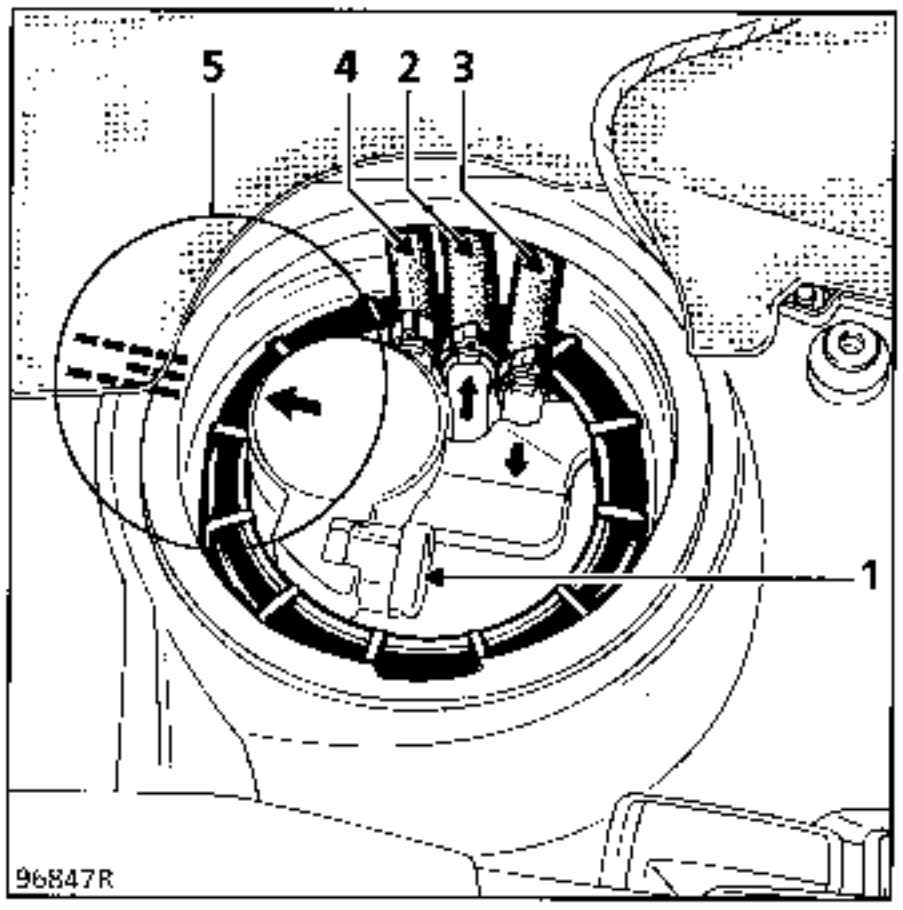
IMPORTANT
For all operations on the fuel tank or the fuel supply circuit, never smoke. Keep all sources of heat away from the working area.

Ensure protection against fuel spray when removing pipes (due to residual pressure).

REPLACING

The pump - gauge assembly can be removed directly via the flap situated under the rear bench seat. The pump and gauge cannot be separated: the assembly is sold complete.



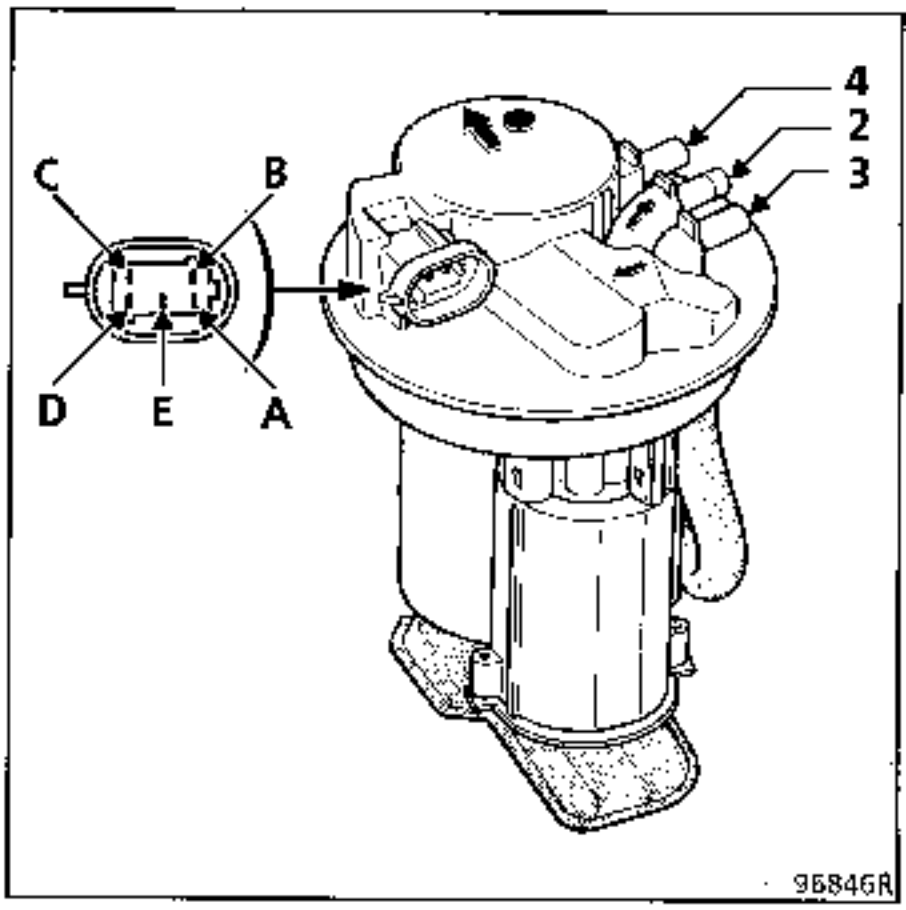
Disconnect the battery.

Remove:
- the rear seat cushion,
- the blanking plate.

Disconnect:
- the connector (1),
- the fuel supply pipe (2),
- the fuel return pipe (3),
- the gauge breather pipe (4) connected to the tank.

Remove the mounting nut using tool **Mot. 1264.**

Remove the pump - gauge assembly.



2 : Fuel supply
3 : Fuel return
4 : Breather

A : + fuel pump
B : - fuel pump
C : Low fuel level warning light
D : - fuel gauge
E : Fuel gauge information

When refitting:
- Check that the seal has not been damaged and replace it if necessary.
- Replace the seal on the fuel tank before refitting the assembly.
- Position the pump - sender unit assembly (see index 5).
- Tighten the nut to a torque of 5 daN.m.

ANTI-POLLUTION
Oil vapour rebreathing

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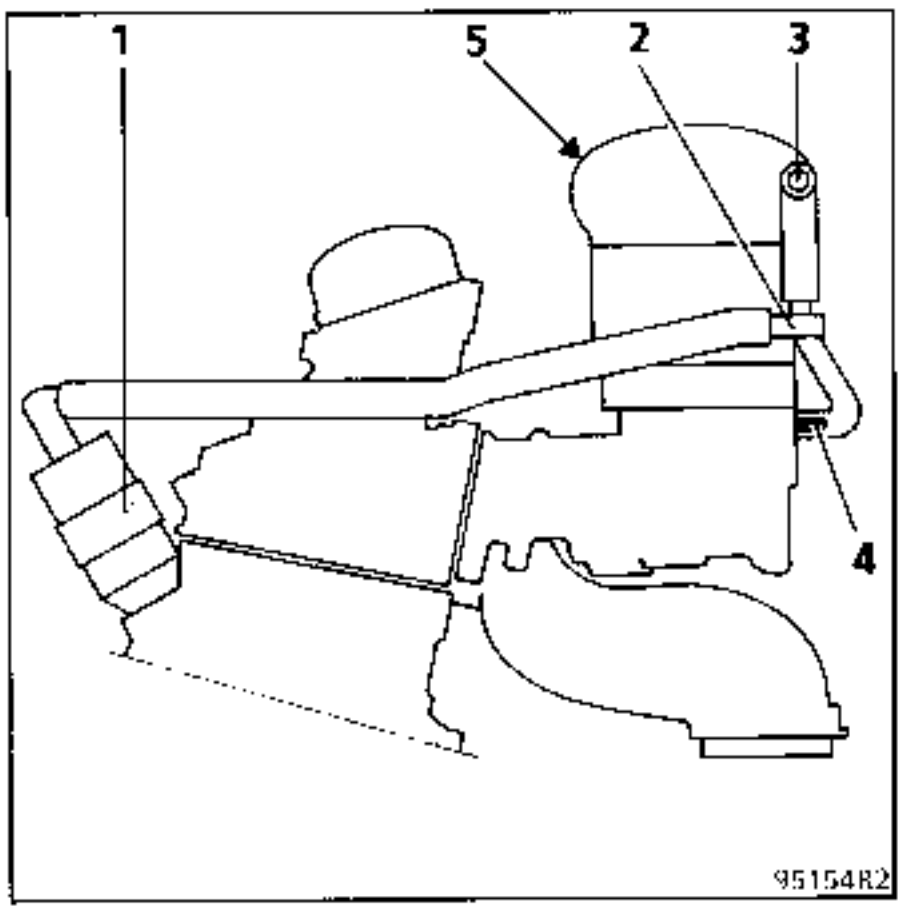
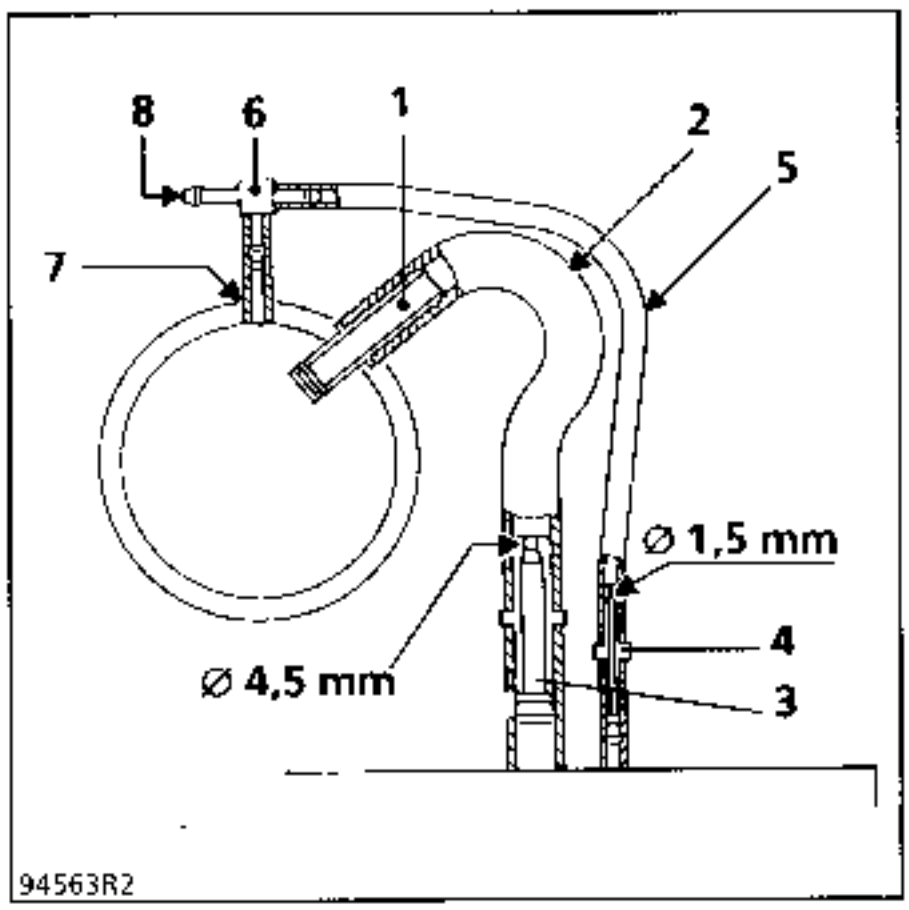
F3P 710 ENGINES



1 : Oil decanter
2 : 3-way union for upstream and downstream rebreathing
3 : 6 mm dia. restrictor in circuit upstream of throttle (integrated in air filter cover)
4 : 1.7 mm dia. restrictor in circuit downstream of throttle (integrated in manifold)
5 : Air filter cover

E7J 601/754 ENGINES



Rebreathing circuit - upstream

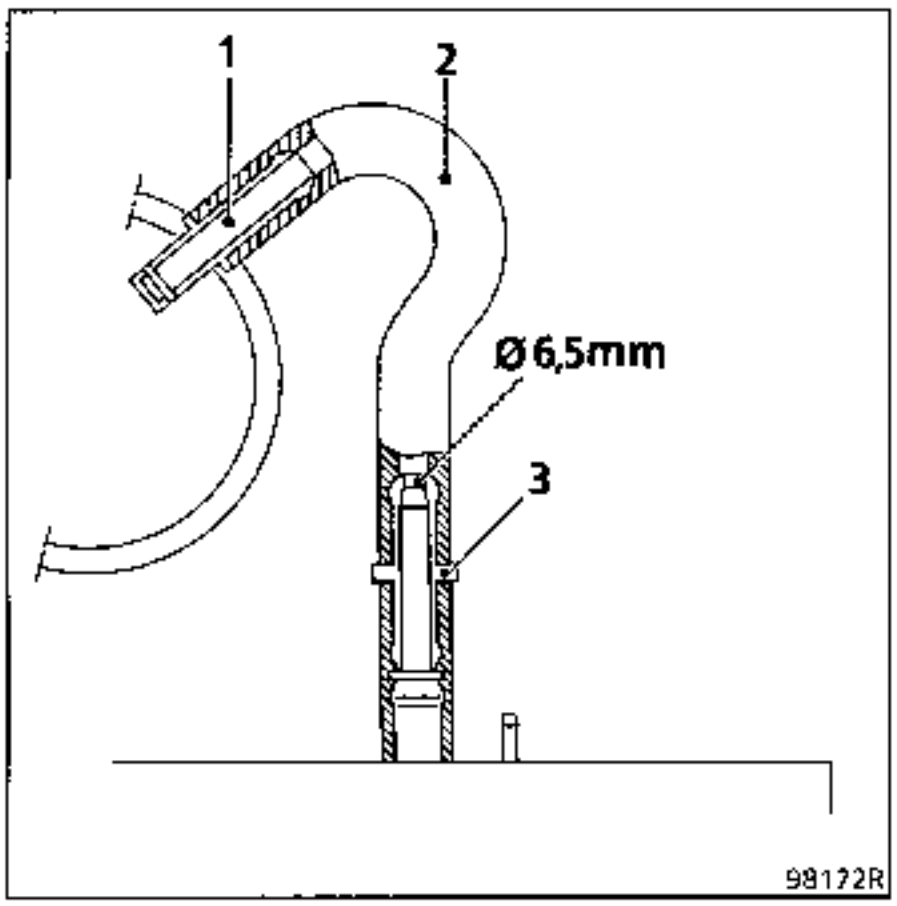
1 : Take-off on air filter
2 : Connecting pipe on restrictor filter
3 : Restrictor, 4.5 mm dia.

Rebreathing circuit - downstream

4 : Restrictor, 1.5 mm dia.
5 : Connecting pipe, calibrated, to 3-way union
6 : 3-way union
7 : Take-off on inlet manifold
8 : To canister purge

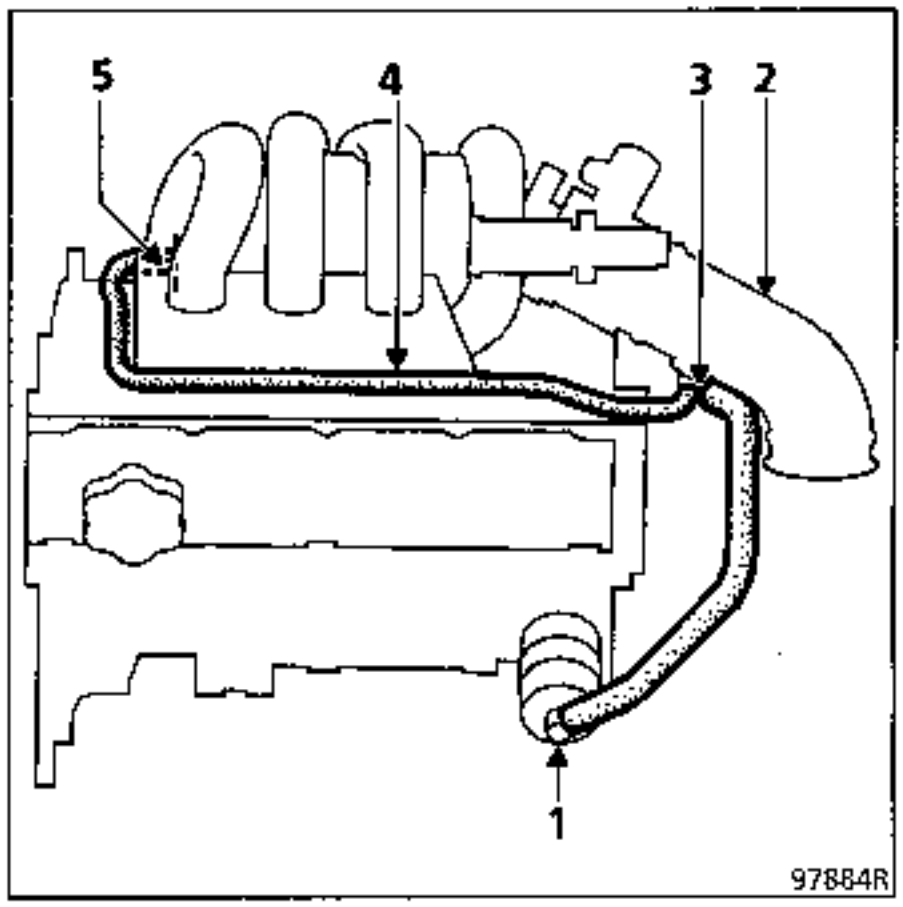
ANTI-POLLUTION
Oil vapour rebreathing

E7F 708/750 ENGINES



1 : Take-off on air filter
2 : Pipe connecting filter to restrictor
3 : Restrictor, 6.5 mm dia.

F3P 755/758 ENGINES



1 : Decanter
2 : Pneumatic pipe between air filter and throttle body
3 : 3-way union for upstream rebreathing
4 : Intermediate pipe for downstream rebreathing
5 : Take-off on integrated restrictor manifold (1.5 mm dia.)

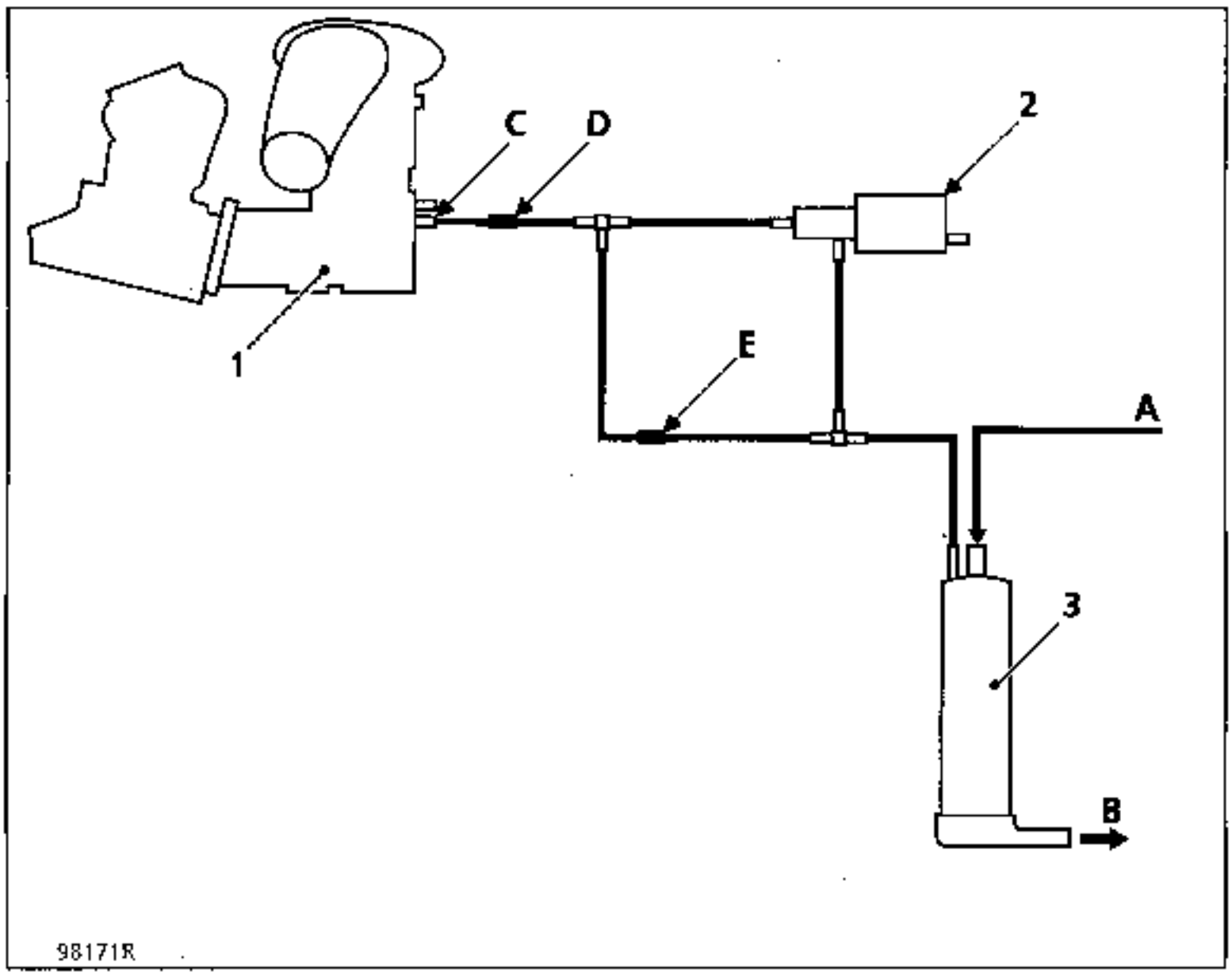
Note: On the pneumatic pipe (2) side of the 3-way connector (3) a restrictor should be present. On F3P 755 engines this is 4 mm dia. and on F3P 758 engines
5 mm dia.

CHECK

The oil vapour rebreathing circuit must be kept in good condition and the restrictors in the circuit must be correct and clean for the anti-pollution system to operate correctly. Check that all restrictors are clean and to specification.

ANTI-POLLUTION
Fuel vapour rebreathing

DIAGRAM SHOWING OPERATION OF SYSTEM



1 : Inlet manifold

2 : Canister purge control solenoid

3 : Fuel vapour absorber (or canister)

A : Pipe from fuel tank for recycling fuel vapours

B : Breather

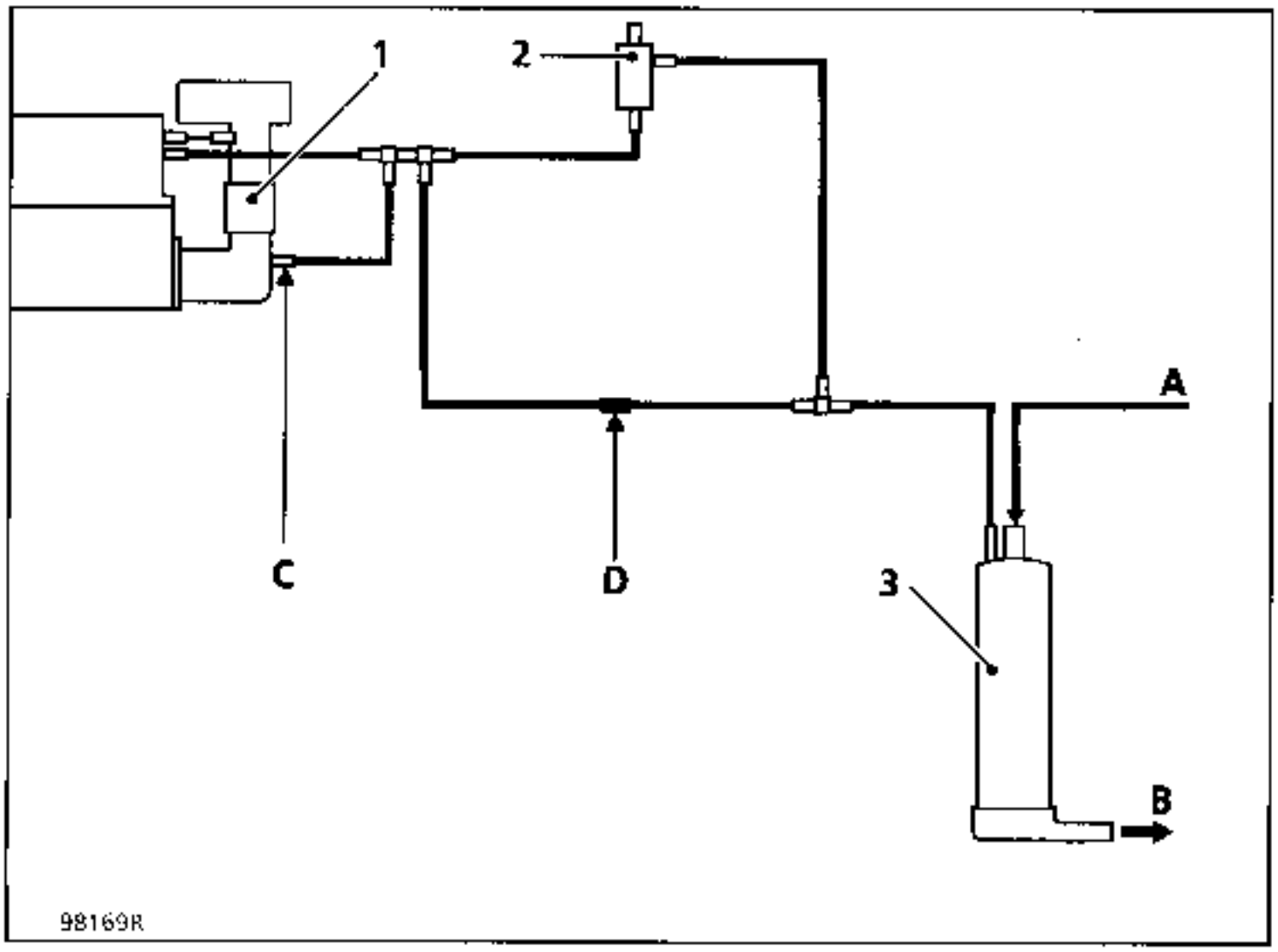
C : Take-off downstream of throttle

D : Restrictor, 1.1 mm dia.

E : Restrictor, 0.5 mm dia.

ANTI-POLLUTION
Fuel vapour rebreathing

DIAGRAM SHOWING OPERATION OF SYSTEM



1 : Throttle body

2 : Canister purge control solenoid

3 : Fuel vapour absorber (or canister)

A : Pipes from fuel tank for fuel vapour recycling

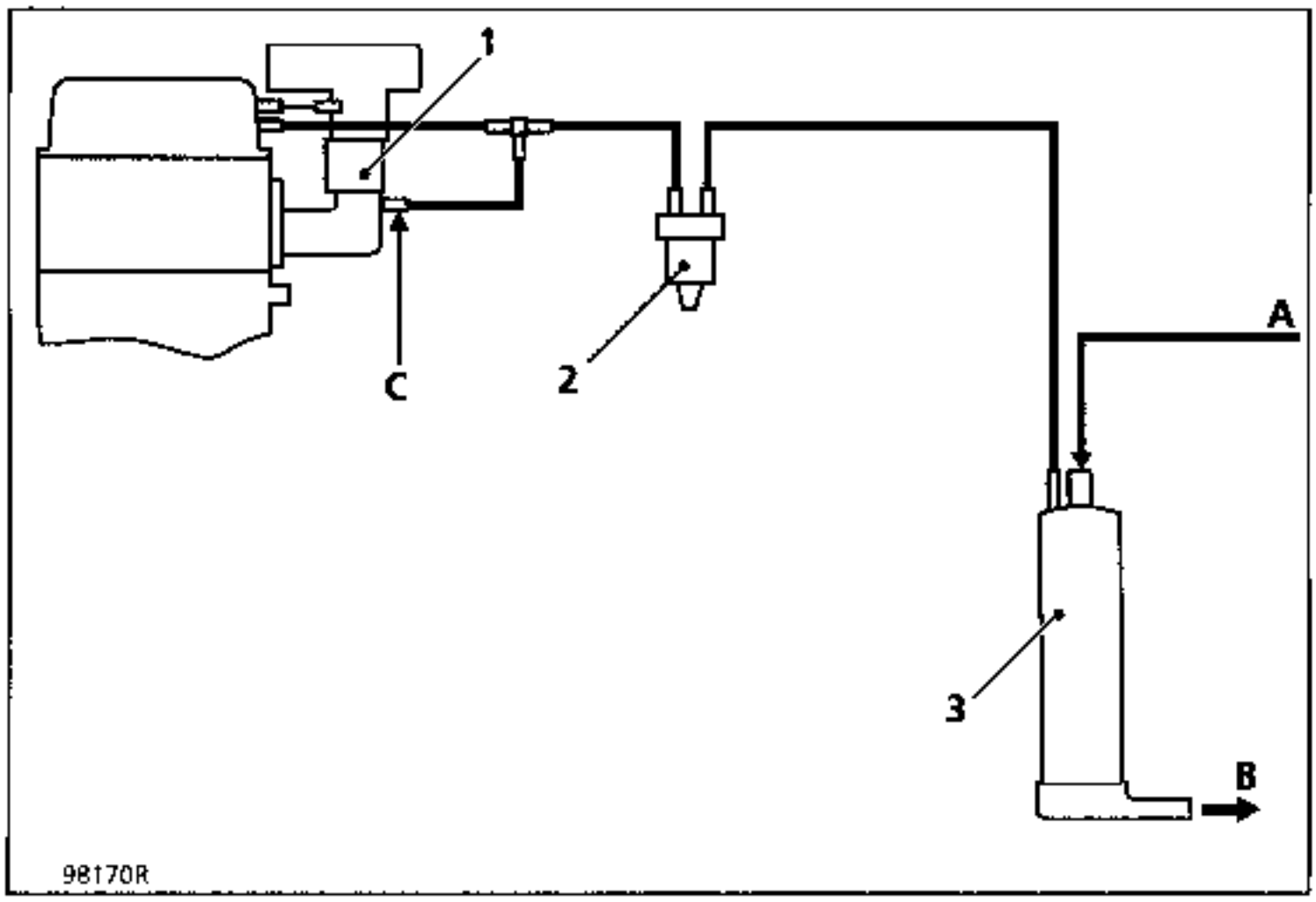
B : Breather

C : Take off downstream of throttle

D : Restrictor, 0.55 mm dia.

ANTI-POLLUTION
Fuel vapour rebreathing

DIAGRAM SHOWING OPERATION OF SYSTEM



1 : Throttle body

2 : Canister purge control solenoid

3 : Fuel vapour absorber (or canister)

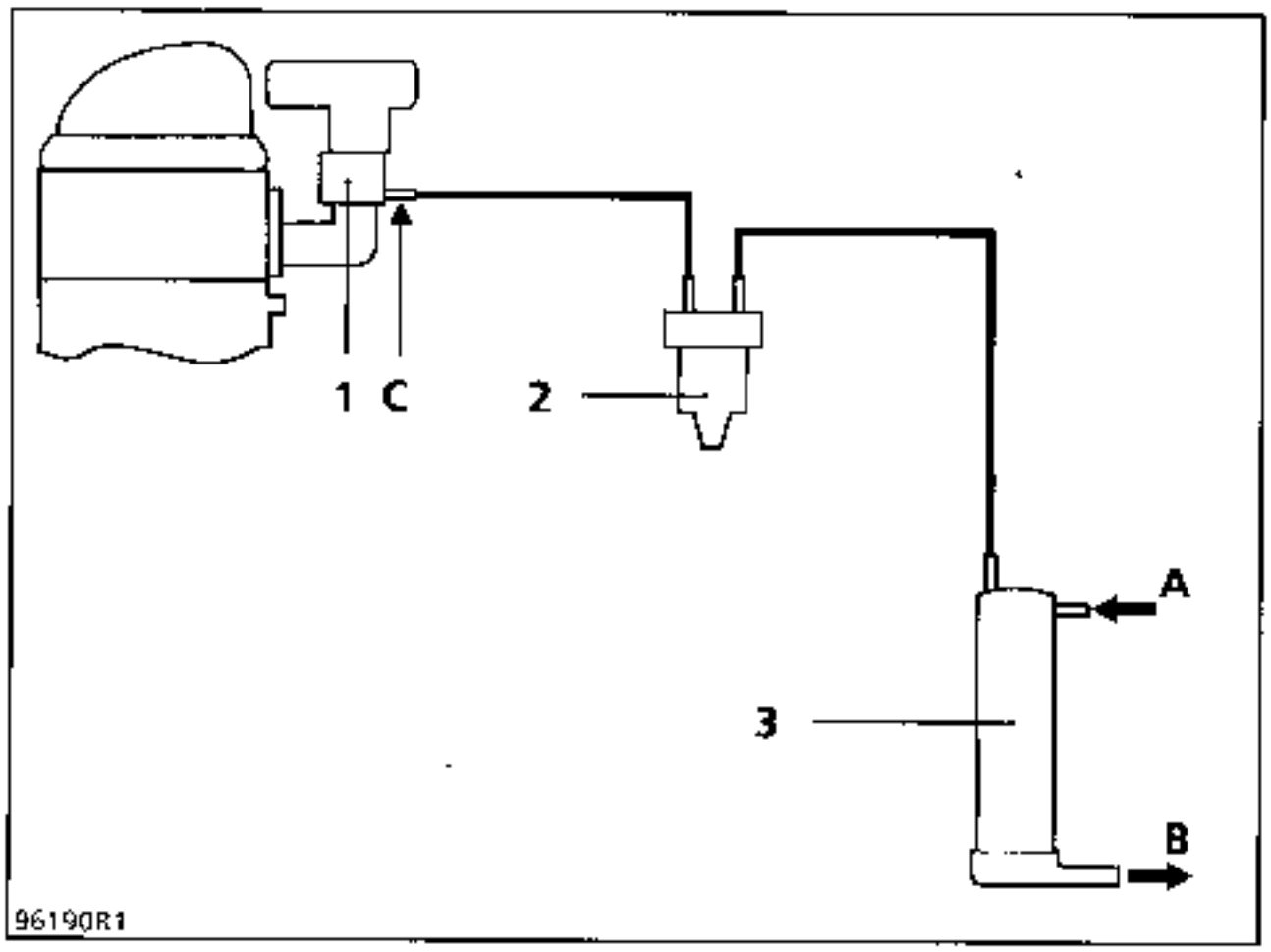
A : Pipes from fuel tank for fuel vapour recycling

B : Breather

C : Take off downstream of throttle

ANTI-POLLUTION
Fuel vapour rebreathing

DIAGRAM SHOWING OPERATION OF SYSTEM



1 : Throttle body

2 : Canister purge control solenoid

3 : Fuel vapour absorber (or canister)

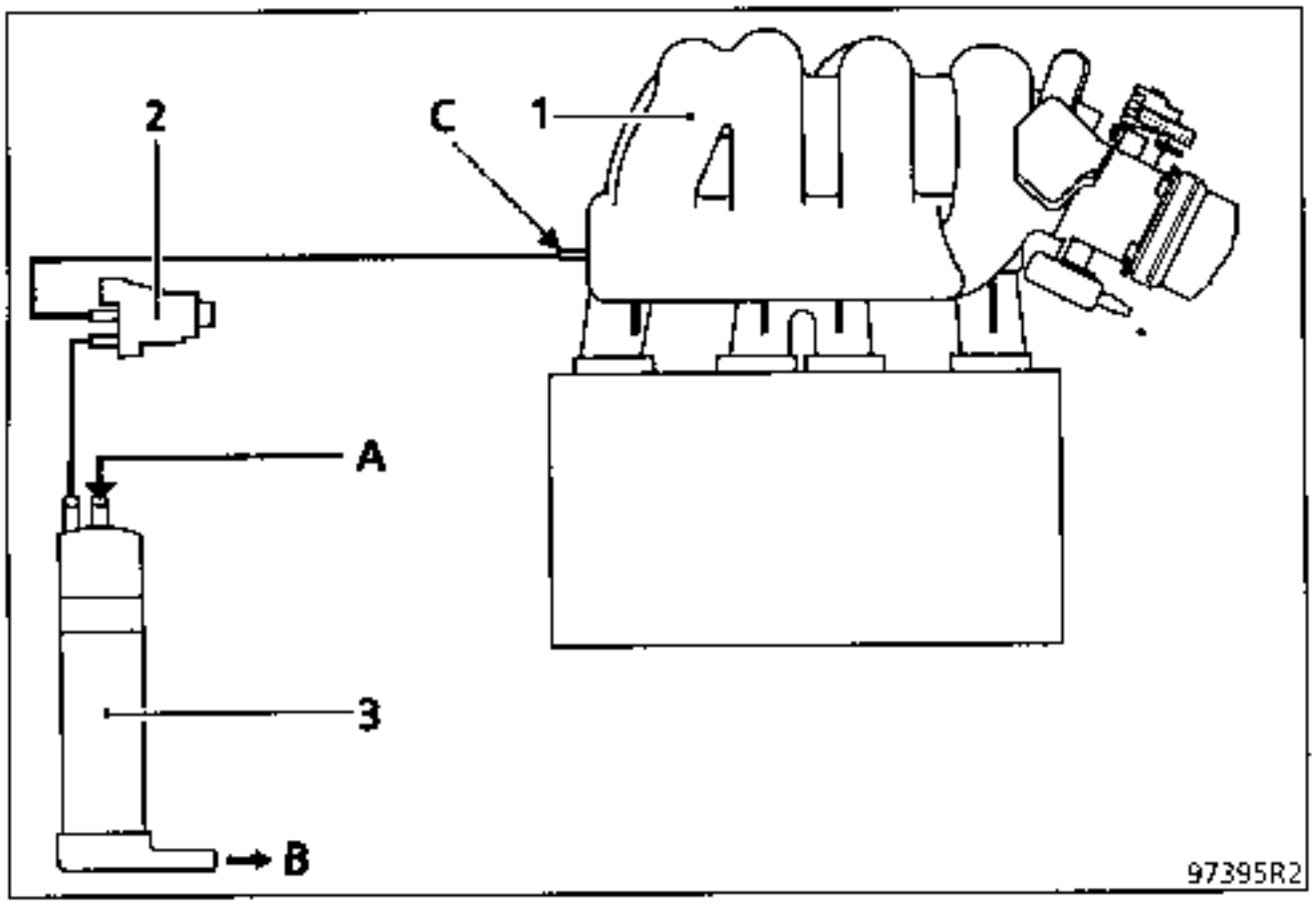
A : Pipes from fuel tank for fuel vapour recycling

B : Breather

C : Take off downstream of throttle

ANTI-POLLUTION
Fuel vapour rebreathing

DIAGRAM SHOWING OPERATION OF SYSTEM



1 : Inlet manifold

2 : Canister purge control solenoid

3 : Fuel vapour absorber (or canister)

A : Pipes from fuel tank for fuel vapour recycling

B : Breather hole

C : Take off downstream of throttle

OPERATING PRINCIPLE

E7F 708, E7F 750, E7J 754, F3P 755, F3P 758 engines :

The fuel tank breather is connected by a pipe through the fuel vapour absorber.

The fuel vapour passing through the canister is trapped by the active carbon in the canister.

The computer determines the cyclical opening ratio (R.C.O.) for the canister bleed solenoid depending on various parameters (depending on the idle speed and manifold pressure).

The solenoid valve allows a variable amount of recycled fuel vapour (depending on the R.C.O.) to be sent from the canister to the inlet manifold.

The variation in the diameter of the fuel vapour passage in the solenoid valve is caused by the magnetic field created by feeding the coil and the force of the return spring which closes the valve.

The canister may be bled when the engine is in the richness regulation phase (#35 variable), except when there is no engine load, if the coolant and air temperatures are above a certain threshold (see table below).

If a fault is detected in one of the components, the canister may be bled under different conditions.

	Coolant temperature threshold	Air temperature threshold
E7F	60° C	20° C
F7J	70° C	20° C
F3P 758	20° C	0° C
F3P 755	5° C	0° C

F3P 710 and E7J 601 engines:

Solenoid valve not supplied with power :

The canister is partially bled by the pipes equipped with the 0.5 mm dia. restrictor (0.55 mm dia. for the E7J 601 engine).

Solenoid valve supplied with power :

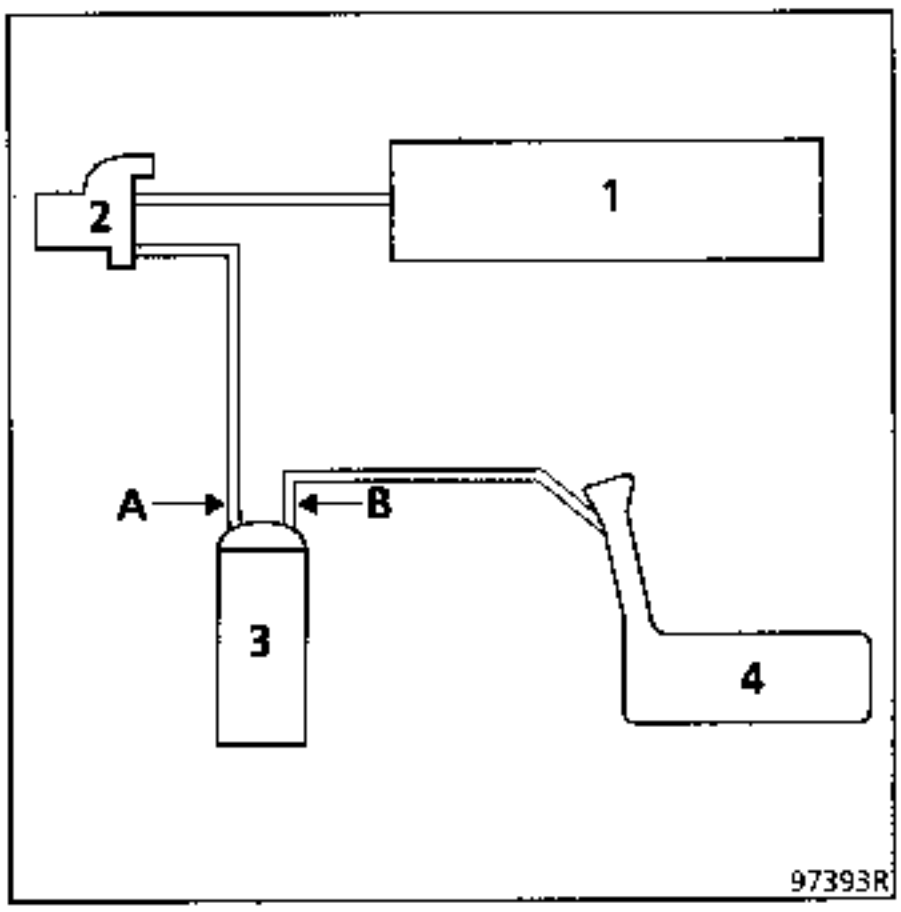
Depending on specific operating conditions (pressure, speed, coolant temperature above 70° C, without engine operating at no load or full load), the canister is mainly bled via the solenoid valve.

CHECKING CANISTER BLEED OPERATION

E7F 708, E7F 750, E7J 754, F3P 755 and F3P 758 engines :

Check that the circuit is to specification (see preceding diagrams). In particular, check that the pipe marked "CAN" on the solenoid is connected to the canister and check the condition of the pipes to the fuel tank.

ANTI-POLLUTION
Fuel vapour recirculation



1 : Inlet manifold
2 : Canister purge valve
3 : Canister
4 : Tank

The canister bleed operation, which is controlled by the injection computer, does not take place when the engine is running at idle speed, that is, when the engine is in a no-load condition.

Under these conditions, if a vacuum pump is connected to the outlet marked "CAN" (A), no vacuum should be read at idle speed.

However, under bleeding conditions (engine running at a speed other than idle speed, engine warm), an increase in the vacuum should be noted.

The breather may also be checked as follows:

With the fuel filler cap removed, apply a vacuum to the pipe at (B), using the vacuum pump.

If a vacuum can be applied to the pipe, it shows that the overfill prevention valve is working correctly.

If, when the fuel filler cap is refitted, the vacuum disappears quickly, the pipe is not blocked by the valve and the degassing volumes inside the full tank are not sealed from each other.

F3P 710 and E7J 601 engines

Disconnect the canister pipe (between the canister and the manifold) and fit the vacuum pump on to the pipe .

Connect the XR25, enter injection code D03 and #01 to display the manifold pressure.

With the engine warm :

Check that the pressure is practically zero at idling speed.

Accelerate freely and feel the solenoid valve. The solenoid should click. (It is controlled by the computer under certain conditions.)

Apply the handbrake. Select a gear and engage the clutch slightly in order to obtain manifold pressure of around 500 mb.

The value read at the vacuum pump should be approximately equal to the manifold pressure.

CHECKS TO BE CARRIED OUT BEFORE THE ANTI-POLLUTION TEST

Ensure :

- The ignition system is operating correctly (plugs of the correct type and correctly set, HT leads correctly connected and in good condition).
- The injection system is operating correctly (correct supply, use **XR25** to check that it is to specification).
- The exhaust system is to specification and that it is not leaking.

Obtain information of the vehicle's history, if possible (has it run out of fuel, is there a lack of power, has incorrect fuel been used).

CHECKING THE ANTI-POLLUTION SYSTEM

Let the vehicle warm up until the engine cooling fan has operated twice.

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

Keep the engine at a speed of **2500 rpm** for 30 seconds, then return to idling speed and read off the pollutant values:

CO $\leq$ **0,3 %**
CO_2 $\geq$ **14.5 %**
HC $\leq$ **100 ppm**
0.97 $\leq \lambda \leq$ **1.03**

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

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

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

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

It is necessary to:
- check the condition of the engine (condition of the oil, valve clearances, timing, etc.),
- check the oxygen sensor (see section 17),
- test for the presence of lead (see next page).

If the test for lead is positive, wait until the vehicle has used two or three full tanks of unleaded fuel before replacing the oxygen sensor.

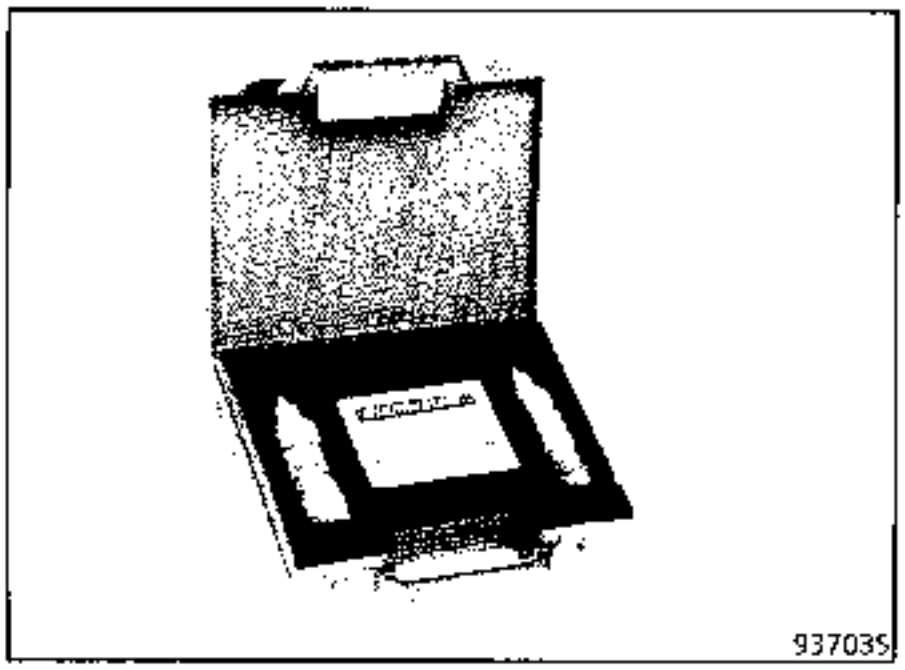
If, after all these tests have been carried out, the values are still incorrect, replace the catalytic converter.

ANTI-POLLUTION
Test for lead

The Nauder lead testing kit is required for this test.

Contact your After Sales Head Office for further information.

Part Number : – Complete kit : **T900**
– 40 test papers : **T900/1**



METHOD

DETECTING LEAD AT THE EXHAUST

a - **Test conditions:**
– Engine stationary.
– Exhaust pipes hot but not burning.
– Do not test when the temperature is below **0 °C**.

b - If necessary, use a soft cloth to clean the inside of the exhaust pipe so any soot deposits are removed.

c - Wearing the gloves, take a test paper and moisten it slightly with distilled water. (The paper is not effective if it is too wet.)

d - Press the damp paper on to the cleaned exhaust pipe immediately and hold it there firmly for about a minute.

e - Remove the test paper and allow to dry. The test paper will turn red or pink if lead is present.

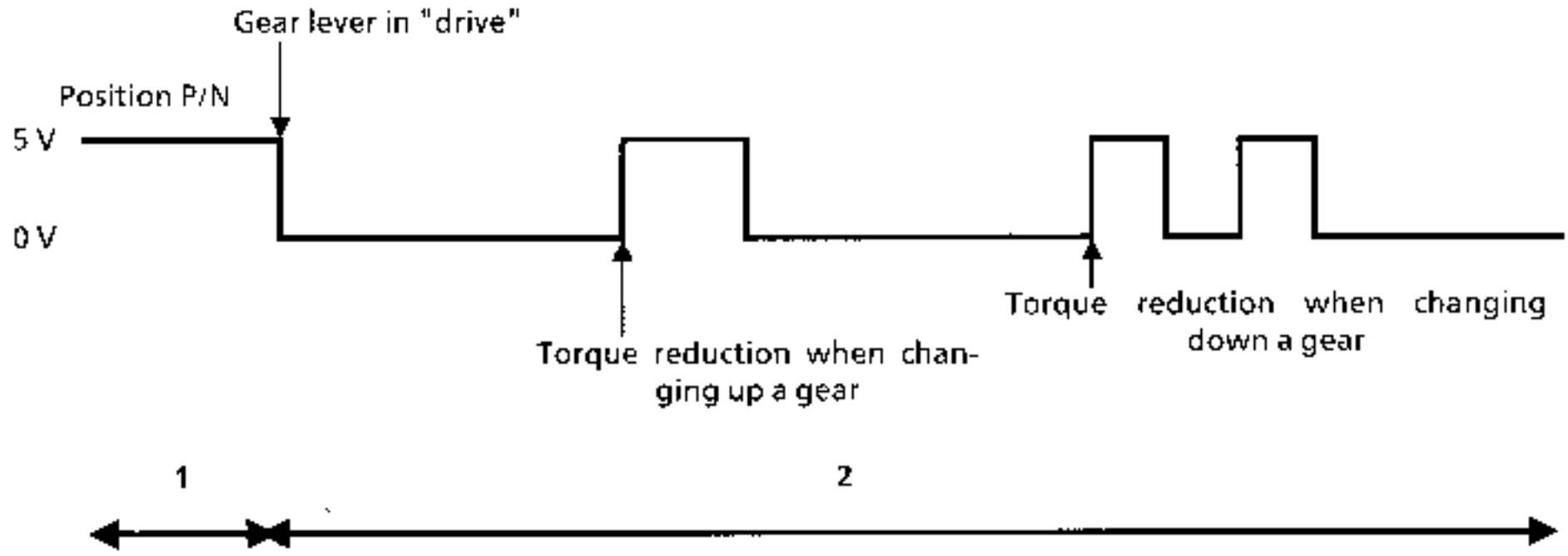
ATTENTION : The test for lead should only be carried out on the exhaust pipe, not on the oxygen sensor.

AUTOMATIC TRANSMISSION COMPUTER CONNECTION TO INJECTION COMPUTER :

The injection computer is connected to the automatic transmission computer by three wires:

- a wire informing the automatic transmission computer of the engine speed (track no. 12 of the injection computer);
- a wire informing the automatic transmission of the throttle position (track no. 22 of the injection computer).
- a wire informing the injection computer of the park position, neutral position and torque reduction request (track no. 8 of injection computer).

Signal transmitted to track no. 8 :



Observations

1. In "park" or "neutral" position the voltage can be checked that it is correct at approximately 5 V when measured using a voltmeter between track 8 and the earth.
   However, as soon as "drive" (or "another gear") is selected, the voltage drops to around 0 V.

2. From position "drive"onwards, and when the vehicle is moving, single or double pulses are transmitted by the automatic transmission computer.
   In this case, the injection computer recognises the request for retarding the ignition which softens the take-up of the upper or lower gear.

INJECTION COMPUTER CONNECTION TO AIR CONDITIONING COMPUTER

The link between these computers is made by only one wire which carries information from the air conditioning unit to the injection computer (air conditioning on/off and requests for compressor operation).

The compressor clutch relay is controlled by the injection computer (track no. 13).

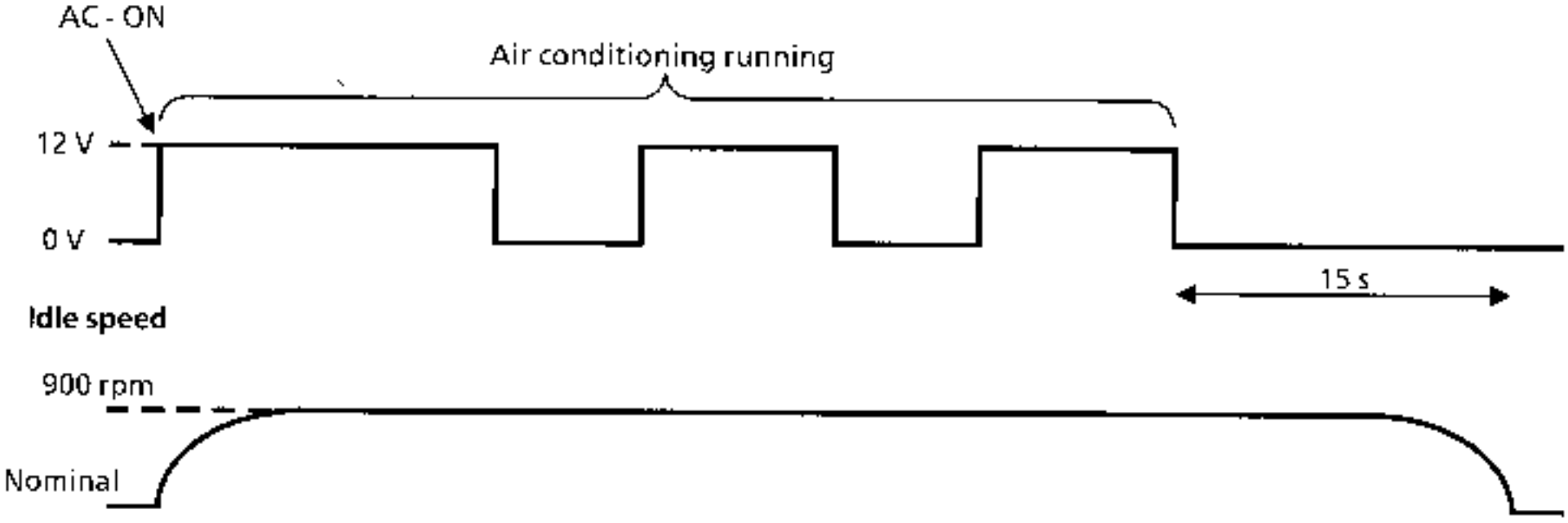
Operating principle :

As soon as the air conditioning system is turned on (AC - ON), this information is sent to the injection computer. The injection computer increases the idle speed and controls the compressor clutch relay (depending on certain conditions - see below).

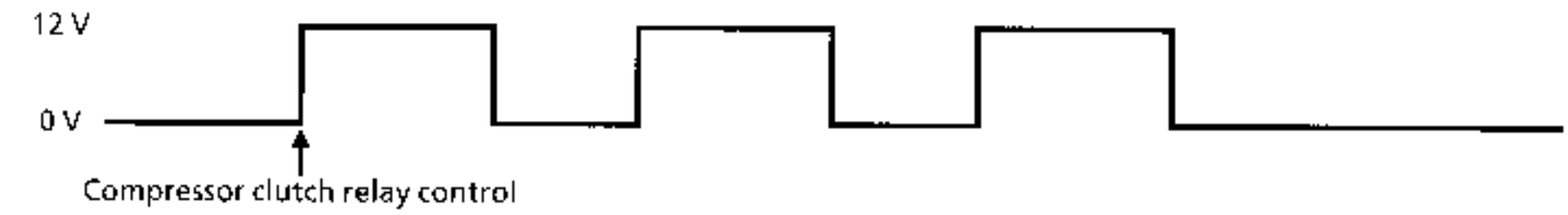
The air conditioning unit relies on the injection computer for compressor on and off instructions as approprite for the conditions.

If the air conditioning system does not request compressor operation for over 15 seconds, the injection computer returns the idle speed to normal

Track 34 :



Track 13 :



PROGRAMMING TO PREVENT COMPRESSOR OPERATION

Under certain circumstances, the injection computer may prevent the compressor from operating through the air conditioning unit:

Thermal protection

If the temperature is greater than or equal to 115 °C, the compressor clutch will not engage for 10 seconds.

Air conditioning operation (AC - ON)

As soon as the air conditioning system is turned on, the compressor is prevented from operating for 3 seconds to give the engine speed time to increase.

Starting the engine

The compressor cannot operate for 5 to 10 seconds after the engine has been started.

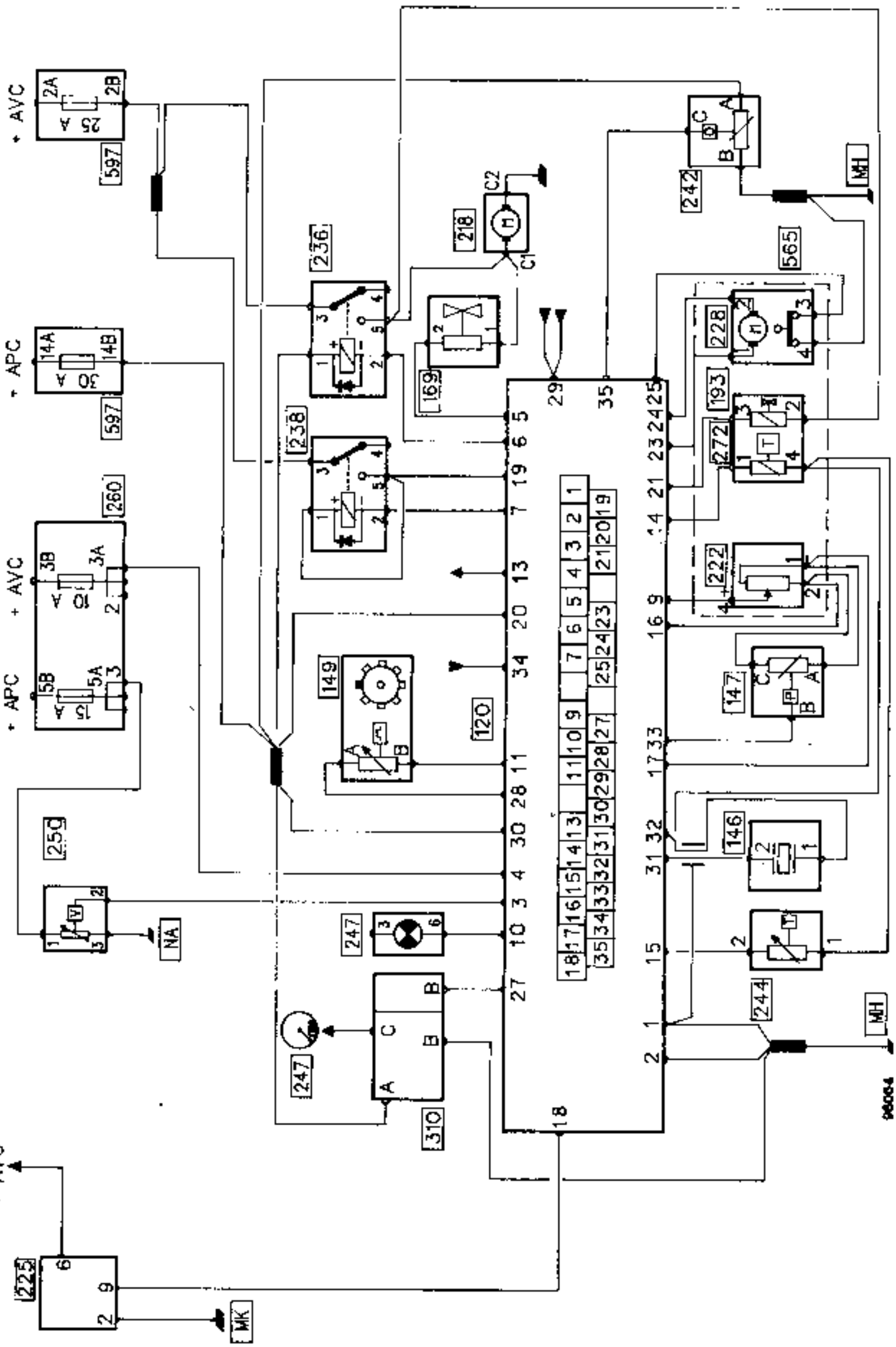
Performance retention

- **F3P 710 engine :**
  When accelerating sharply, the compressor will not operate for 5 seconds.

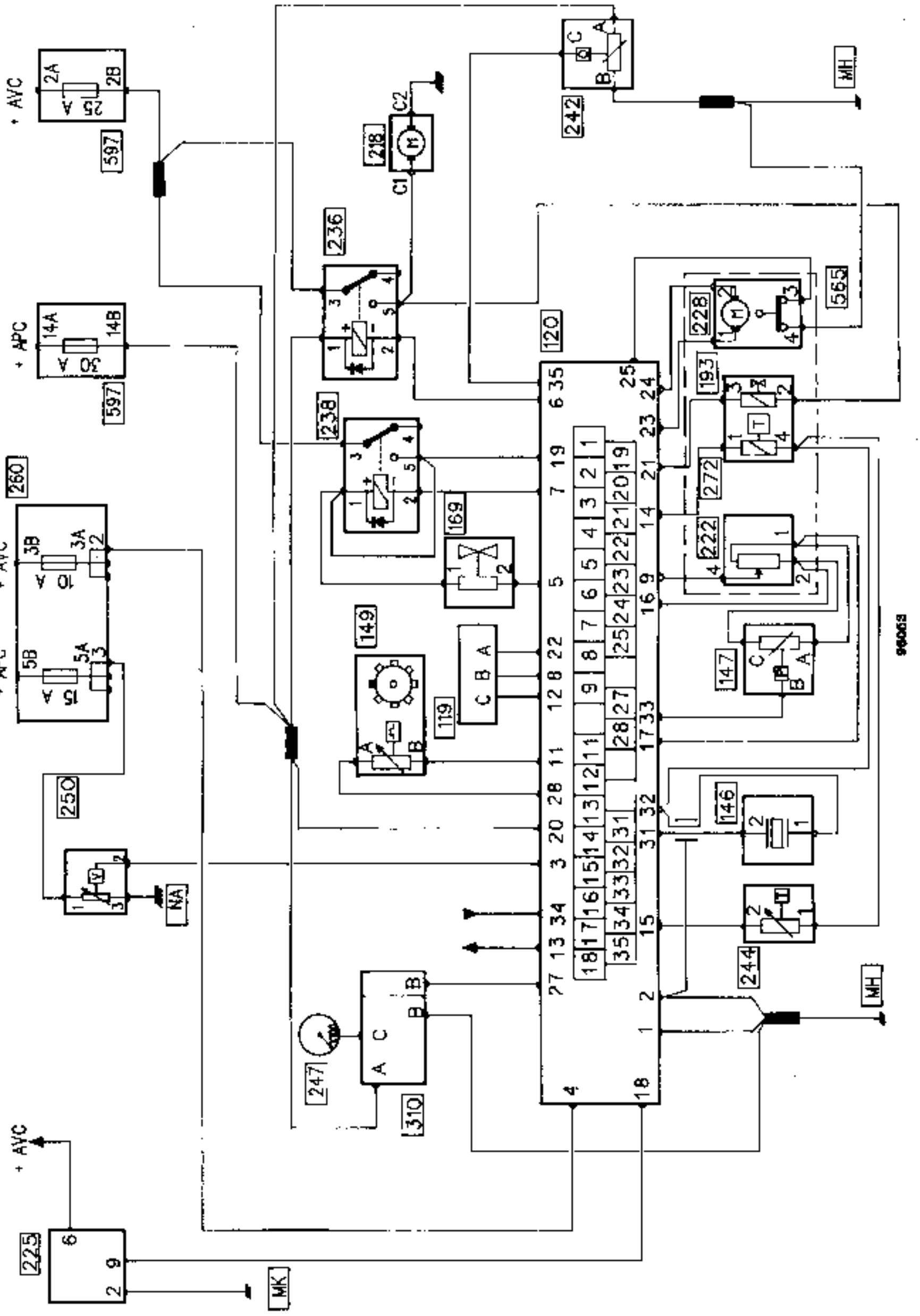
High engine speed protection

If the engine speed is greater than **5400 rpm** or **5650 rpm** for the **E7J 601 engine**, the compressor may not be operated (to avoid damage to the compressor).

MONOPOINT INJECTION
Operating wiring diagram

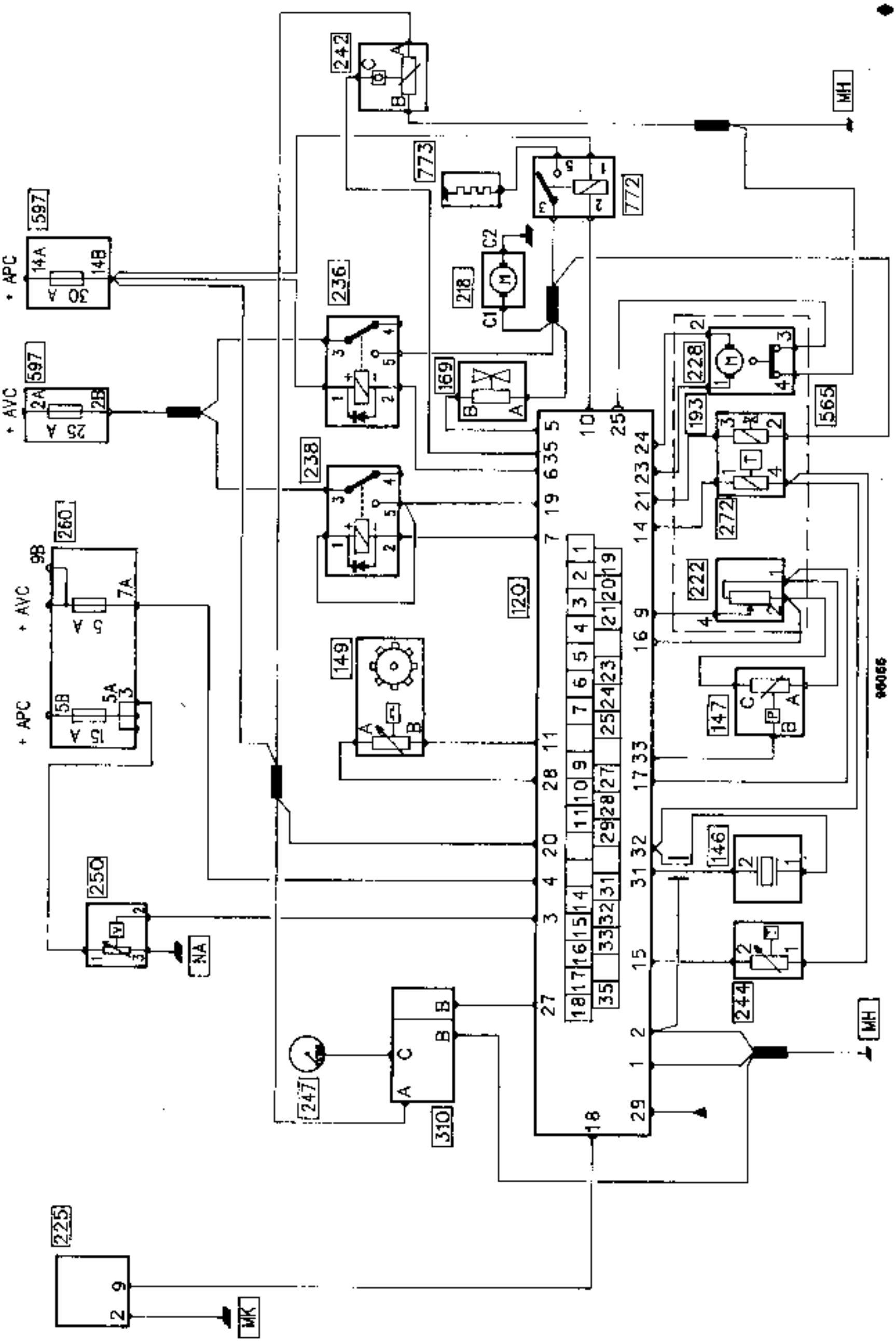


MONOPOINT INJECTION
Operating wiring diagram



PRM1704

MONOPOINT INJECTION
Operating wiring diagram



PRM1705

MONOPOINT INJECTION
Operating wiring diagram

KEY FOR OPERATING WIRING DIAGRAM

AVC = Before ignition **APC** = After ignition

UNIT NO.	DESIGNATION
119	Automatic transmission computer
120	Injection computer
146	Pinking sensor
147	Atmospheric (absolute) pressure sensor
149	TDC sensor
169	Gas recycling solenoid valve
193	Injector
218	Fuel pump
222	Throttle position potentiometer
225	Diagnostic socket
228	Idle speed regulation micromotor
236	Fuel pump relay
238	Injection feed locking relay
242	Oxygen sensor
244	Coolant temperature sensor
247	Instrument panel (to injection and rev counter warning light)
250	Vehicle speed sensor
260	Passenger compartment fuse box
272	Air temperature sensor
310	Ignition power module
565	Throttle housing assembly
597	Engine fuse box
772	Feed relay, PTC for reheating fuel mixture
773	PTC for reheating fuel mixture
MH	Engine electrical earth
MK	Front left-hand pillar electrical earth
NA	Front right-hand pillar electrical earth

MONOPOINT INJECTION
Operating wiring diagram

LIST OF COMPUTER TRACKS

Tracks	F3P 710	E7J 601	E7F 708 - E7F 750 - E7J 754
1	Power module earth		
2	Electronic earth		
3	Vehicle speed information		
4	+ 12 volts before ignition		
5	Control for canister purge solenoid		
6	Control for fuel pump relay		
7	Control for injection locking relay		
8	–	P/N AT information	–
9	Throttle position potentiometer information		
10	Connection, inj. warning light	–	PTC relay control
11	TDC sensor signal (track B)		
12	–	Engine speed information for AT computer	–
13	AC compressor clutch relay control		–
14	Air temperature information		
15	Coolant temperature information		
16	+ 5 volts feed for potentiometer and absolute pressure sensor		
17	Common earth for potentiometer and absolute pressure sensor		
18	Link with diagnostic socket (diagnostic output signal)		
19	Main computer feed via injection lock relay		
20	+ 12 volts after ignition		
21	Injector control via earth		
22	–	Throttle angle information for automatic transmission	–
23	Idle speed regulation micromotor + or – feed (track 1)		

MONOPOINT INJECTION
Operating wiring diagram

LIST OF COMPUTER TRACKS (continued)

Tracks	F3P 710	E7J 601	E7F 708 - E7F 750 - E7J 754
24	Idle speed regulation micromotor + or – feed (track 2)		
25	No load information		
26	–	–	–
27	Ignition power module control signal		
28	TDC sensor signal (track A)		
29	Engine electronic immobiliser code line entered via decoder box or screen wiper stalk	–	Power steering pressostat information
30	+ 12 volts after ignition	–	–
31	Pinking sensor noise signal input		
32	Common earth for coolant, air and pinking sensors		
33	Manifold pressure information transmitted by absolute pressure sensor		
34	AC on/off information and request for compressor start up		–
35	Voltage information supplied by oxygen sensor		

Fault finding for BOSCH monopoint injection is carried out using the XR25 in conjunction with **fiche no. 28.**

N°28 | S8 code : D 0 3 | read : 7 8.nJ

1	■	COMPUTER	CODE PRESENT	■
2	■	CONNECTION FAULT COMP. → MPA	ENGINE IMMOBILISER	■
3	■	REVERSE FLYWHEEL DATA	FLYWHEEL SIGNAL DEF.	■
4			INJECTOR SHORT CIRCUIT	■
5	■	IDLING REG. CIRCUIT ⚠	AIR TEMPERATURE CIRCUIT	■
6			COOLANT TEMPERATURE CIRCUIT	■
7	■	IGNITION KEY DATA		
8	■	02 SENSOR CIRCUIT	PRESSURE SENSOR CIRCUIT	■
9	■	COMP. CONNECTION A.T. → INJ.	VEHICLE SPEED CIRCUIT	■
10	■	THROTTLE POT. CIRCUIT	PINKING SENSOR CIRC.	■

INJECTION

7 nJ **Erase memory : disconnect battery**
8 nJ **Erase memory : G 0 ★★**

11	□	Full load ← THROTTLE POSITION → No load	■
12	◪	Illuminates if A.T. select. on P/N	TORQUE ADJUSTEMENT □
13	◪	ACTIVE ENGINE IMMOBILISER	PAS PRESSOSTAT ACTIVE □
14	■	FLYWHEEL SIGNAL ▭ Engine running	
15	□	PUMP ACTIVE	
16	□	IDLING REG. ACTIVE	CANISTER PURGE AUTHORIZED □
17	◪	SELECTION ↓	AIR CONDITIONING
18	□	REQUEST → AUTHORIZATION	□
19	■	+ After IGN. PRESENT if Eng. Immobiliser	RICHNESS REG. ACTIVE □
20	□	THROTTLE VALVE HEATER	XR25 MEMORY 0 □

⚠ SEE REPAIR MANUAL

ADDITIONAL CHECKS : # . .

01	Pressure	mb
02	Coolant temp.	°C
03	Air temp.	°C
04	Computer feed	V
05	02 sensor	V
06	Engine speed	rpm
12	Idle difference	
13	Pinking signal	
14	Speed difference	rpm
15	Pinking correct.	d°
16	Atmos. pressure	mb
17	Throttle pot.	
18	Vehicle speed	km/h
30	Auto. correct. of richness under high loads	
31	Auto. correct. of richness under low loads	
35	Mixture regulation	

Help : V 9
Return to diag. mode : D
Part No. : G 7 0 ★

14 ANG

H21428

MONOPOINT INJECTION
Fault finding using the XR25

REPRESENTATION OF BARGRAPHS

⊠ Bargraph does not operate for this vehicle

– Representation of faults (always on a **coloured** background)

■ If illuminated, there is a fault in the product being diagnosed - the associated text defines the fault.

– Representation of a status (always on a **white** background)

▭ Illuminates when dialogue with the computer has been established - if it remains extinguished:
- the code does not exist,
- there is a fault in the test kit, the computer or the line.

The representation of the following bargraphs indicates their initial status:
- after the ignition has been turned on,
- after entering the code associated with the product,
- without operator intervention.

Initial status
(ignition on, engine not running, without operator intervention)

↓

◪ or ◪ Indefinite
▭ Extinguished
} is illuminated if the **Function** or **Condition** specified on the fiche is met

■ Illuminated — Extinguished if the **Function** or **Condition** specified on the fiche is not met

ACCESS TO COMPUTER INFORMATION USING THE # KEY

Key #	Tests carried out	Units of measure
01	Manifold pressure	Millibars
02	Coolant temperature	Degrees
03	Air temperature	Degrees
04	Feed voltage	Volts
05	Oxygen sensor voltage	Volts
06	Engine speed	rpm
13	Pinking sensor signal	No units
14	Engine speed variation	rpm
15	Pinking correction	Degrees
16	Atmospheric pressure	Millibars
17	Throttle position potentiometer value	No units
18	Vehicle speed	Km/h
30	Richness adaptive correction (mostly for average and high engine load)	No units
31	Richness adaptive correction (mostly for low engine load)	No units
35	Richness correction	No units

MONOPOINT INJECTION
Fault finding using the XR25

INTERPRETATION OF BARGRAPH ILLUMINATION, FICHE NO. 28 :

Line number	Bargraph display	
1	▒▒▒	Bargraph illuminates as soon as the ignition is turned on: shows the diagnostic signal is being received by the XR25.
	■	Computer internal diagnostics. If illuminated, the computer does not conform or is faulty.
2	■	**Engine immobiliser circuit (F3P 710 engine)** Diagnosing an open circuit or short circuit (+ 12 volts or earth) on the line between the decoder unit and track 29 of the computer.
	⊠	
3	■	**TDC detection fault** There is a fault with the sensor, its circuit or there is a cyclical irregularity (target fault).
	■	**Flywheel information inverted** Indicates that the TDC sensor connector has been incorrectly connected.
4	■	**Injector short circuit** There is a short circuit in the injector or on its line (CC to + 12 volts or to earth). If the fault appears after 5 seconds when the starter is activated, the pump relay is no longer controlled.
5	■	**Air temperature sensor circuit** There is a fault in the sensor or on its circuit. #03 = 119 °C for a CC to earth and #03 = – 40 °C for a CO or CC on +
		Comment: The default value taken by the computer if there is a fault is for coolant temperature of max. 20 °C.
	⊠	**Idle speed regulation circuit** There is no fault finding for this function at the moment.
6	■	**Coolant temperature sensor circuit** There is a fault in the sensor or on its circuit. #02 – 119 °C for a CC to earth and #02 = – 40 °C for a CO or CC on +
		Comment: (The value taken by the computer if there is a fault is equal to the air temperature when the ignition was turned on and increases in a regular manner to 90 °C after the engine has been started.)
7	■	**Ignition key information** (F3P 710) No + 12 volts after ignition on track 30 of the computer (CO or CC to earth).

CO: open circuit
CC: short circuit

INTERPRETATION OF BARGRAPH ILLUMINATION, FICHE NO. 28 (continued)

CO = open circuit, CC = short circuit

Line Number	Bargraph display	
8	■	**Absolute pressure sensor circuit** CO or CC to earth on the sensor or its line. When the ignition is on: #01 = 1021 mb. **Note:** As soon as the engine is started, the injection computer recreates the manifold pressure as a function of the engine speed and throttle position and permits almost normal operation of the engine. #01 shows the recreated value. (There is no diagnosis for CC + ; in this case, check the manifold pressure when the starter is activated.)
	■	**Oxygen sensor circuit** There is a fault in the sensor or on its circuit. #05 is fixed and #35 = 128. If there is a fault, it is important to check the sensor heating and ensure it is not contaminated. **Note:** The fault is only memorised when 10 cycles (128 to 255 or 128 to 0) have been completed.
9	■	**Vehicle speed circuit** There is a fault in the sensor or on its circuit (CO or CC). This may be accompanied by a lack of vehicle speed information at the instrument panel; check the conformity of #18 on a road test. (The fault is only detected when the vehicle is moving under hard acceleration.) The fault is not memorised.
	■	**AT --- injection computer circuit (E7J 601 engine)** When this bar graph illuminates, it identifies the absence of a signal between the automatic transmission and injection computers (track no. 8). The fault is not memorised.
10	■	**Pinking sensor circuit** CO, CC to earth on the sensor or its circuit. **Comment:** The fault is detected when the engine is warm and is running above 4000 rpm. The fault is memorised immediately.
	■	**Throttle potentiometer circuit** Diagnostic of a CO or CC on the potentiometer or its line (track 9 of the computer). In this case the reading is #17 = 128. The fault is accompanied by incorrect idle speed.
11	■	No load position recognised.
	▭	Full load position recognised.
12	▭	**Torque reduction (E7J 601 engine)** This bargraph illuminates at each gear change. It indicates the reduction in the advance to the engine on request from the automatic transmission computer.
	◪	**"Park - Neutral" position (E7J 601 engine)** This is illuminated if the automatic transmission selector lever is in one of the positions "park" or "neutral". One of these positions must be recognised in order that the engine may be started.

INTERPRETATION OF BARGRAPH ILLUMINATION, FICHE NO. 28 (continued)

Line Number	Bargraph display	
13	▭	**PAS pressostat information active (E7F 708/750, E7J 754)**
	◪	**Engine immobiliser active (F3P 710)** The engine immobiliser function is not de-activated.
14	■	**Flywheel signal** Bargraph illuminates when the ignition is turned on. It should extinguish when the engine is started. If not, check bargraphs for line 3.
15	▭	**Fuel pump control** Bargraph illuminates during the delay period when the ignition is turned on, then when the engine is running (request for earth on track 2 of relay 236 via track 6 on the computer).
16	▭	**Canister bleed authorised** This bar graph illuminates when the computer authorises the canister bleed solenoid valve to be operated, if the engine conditions are met.
	▭	**Idle speed regulation active** This bargraph illuminates when the idle speed is being regulated at the same time as no load is recognised.
17	◪	Air conditioning system operation recognition bargraph. This bargraph illuminates as soon as the first operation request is made. It extinguishes after the air conditioning system has been turned off, 15 seconds after the last operation request.
18	▭	Air conditioning operation request recognition bargraph for operation of the air conditioning compressor.
	▭	Air conditioning compressor relay control effective.
19	▭	**Richness regulation active** This bargraph illuminates when the engine conditions cause the loop mode to be activated.
	■	Presence of + 12 volts after ignition on track 30 of the computer (F3P 710).
20	▭	If illuminated, the memory function is active.
	▭	**PTC reheating control (E7F 708/750, E7J 754)** This bargraph is illuminated when the PTC feed relay is controlled (for coolant temperature below 68 °C).

CO: open circuit
CC: short circuit

MONOPOINT INJECTION
Fault finding using the XR25

CHECKING CONFORMITY

Engine cold - Ignition on

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - Notes
Dialog with XR25	D03 (Selector on S6)			**7.NJ** Use of fiche no. 28
Computer correct	G70*			**XXXX** Part Number is displayed in 3 sequences (see Chap. 12)
Interpretation of bargraphs normally illuminated		1 11 14 19	□ ■ □ ■ ■ □ ■	Code present Recognition of no load position No TDC sensor signal (should extinguish when engine is cranked) +12 volts information after ignition
Throttle position potentiometer	– No load #17 – Part load – Full load #17	11 11 11	□ ■ □ □ ■ □	X ≥ 35 * X ≥ 208
Absolute pressure sensor	#01	8	□	X = Local atmospheric pressure
Coolant temperature sensor	#02	6	□	X = Ambient temperature ± 5 °C
Air temperature sensor	#03	5	□	X – Ambient temperature ± 5 °C

MONOPOINT INJECTION
Fault finding using the XR25

Engine warm at idle speed, after at least one operation of the engine cooling fan.

Function to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Battery voltage	#04			13 V < X < 14.5 V
Idle speed	– AC not operating #06 #17 – AC selected #06	 16 11 17		 X = 750 ± 50 rpm 5 < X < 30 X = 900 ± 50 rpm
Pinking sensor Noise measurement	#13 (3500 rpm in neutral)	10		X variable and not zero
Manifold pressure	#01 no consumers			X is variable and is approximately 310 ± 50 mb (Value also reduces depending on altitude)
Richness regulation (adaptive test)	Engine speed stabilised at 2500 rpm then at idling speed #05 #35	19		X varies between approx. 50 and 900 mV X fluctuates around 128 with a maximum of 255 and a minimum of 0

MONOPOINT INJECTION
Fault finding using the XR25

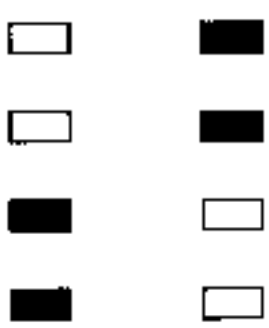
In the course of a road test

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Vehicle speed information	#18	9	▭	X = speed read on speedometer
Pinking sensor	Vehicle under load and engine speed > 2000 rpm #13 #15			X variable and not zero X = 0 (If there is a fault in one of the sensors, the advance is always retarded Not visible on #15)
Richness regulation (adaptive test)	After the testing phase #30 #31			96 < X < 160 (Average value after clearing memory : 128) 0 < X < 255 (Average value after clearing memory : 128)

MONOPOINT INJECTION
Fault finding using the XR25

CHECKING CONFORMITY

Engine cold - ignition on

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Dialogue with XR25	D03 (selector on S6)			**7.NJ** Use fiche no. 28
Computer correct	G70*			**X X X X** Part number is displayed in 3 sequences (see Chap. 12)
Interpretation of bargraphs normally illuminated		1 11 12 14		Code present Recognition of no load position P/N information No TDC sensor signal (should extinguish when engine is cranked)
Throttle position potentiometer	– No load #17 – Part load – Full load #17	11 11 11		X ≥ 40 X ≥ 208
Absolute pressure sensor	#01	8		X – Local atmospheric pressure
Coolant temperature sensor	#02	6		X = Ambient temperature ± 5 °C
Air temperature sensor	#03	5		X = Ambient temperature + 5 °C

MONOPOINT INJECTION
Fault finding using the XR25

Engine warm at idle speed, after at least one operation of the engine cooling fan

Function to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Battery voltage	#04			13 V < X < 14.5 V
Idling speed (at P or N)	– AC not operating	16 11	■ ■	X − 825 ± 50 rpm 14 < X < 40
		17	■	X = 900 ± 50 rpm
Pinking sensor Noise measurement	#13 (3500 rpm, in neutral)	10	□	X variable and not zero
Manifold pressure	#01 no consumers			X is variable and is approximately 340 ± 50 mb (Value also reduces depending on altitude)
Richness regulation (adaptive test)	Engine speed stabilised at 2500 rpm then at idling speed #05 #35	19	■	X varies between approx. 50 and 900 mV X fluctuates around 128 with a maximum of 255 and a minimum of 0

MONOPOINT INJECTION
Fault finding using the XR25

In the course of a road test

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Vehicle speed information	#18	9	▭	X = vehicle speed displayed on speedometer
Pinking sensor	Vehicle under load and engine speed > 2000 rpm #13 #15			X variable and not zero X = 0 (if there is a fault in one of the sensors, the advance is always retarded Not visible on #15)
Richness regulation	After the testing phase #30 #31			96 < X < 160 (Average value after clearing memory : 128) 0 < X < 255 (Average value after clearing memory : 128)

MONOPOINT INJECTION
Fault finding using the XR25

CHECKING CONFORMITY

Engine cold - ignition on

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Dialogue with XR25	D03 (selector on 56)			7.NJ Use fiche no. 28
Computer correct	G70*			X X X X Part Number is displayed in 3 sequences (see Chap. 12)
Interpretation of bargraphs normally illuminated		1	□ ■	Code present
		11	□ ■	Recognition of no load position
		14	■ □	No TDC sensor signal (should extinguish when engine is cranked)
Throttle position potentiometer	– No load #17	11	□ ■	X ≥ 43
	– Part load	11	□ □	
	– Full load #17	11	■ □	X ≥ 208
Absolute pressure sensor	#01	8	□	X = Local atmospheric pressure
Coolant temperature sensor	#02	6	□	X = Ambient temperature + 5 °C
Air temperature sensor	#03	5	□	X = Ambient temperature ± 5 °C

MONOPOINT INJECTION
Fault finding using the XR25

Engine warm at idle speed, after at least one operation of the engine cooling fan

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Battery voltage	#04			13 V < X < 14.5 V
Idling speed	#06 #17	16 11	■ ■	X − 750 ± 50 rpm 17 < X < 40
Pinking sensor Noise measurement	#13 (3500 rpm unladen)	10	□	X variable and not zero
Manifold pressure	#01 No consumers			X is variable and is approximately 310 ± 50 mb (Value also reduces depending on altitude)
Richness regulation	On idle speed stabilised at 2500 rpm then at idling speed #05 #35	19	■	X varies between approx. 50 and 900 mV X fluctuates around 128 with a maximum of 255 and a minimum of 0
Canister bleeding	At idle speed. On acceleration no load or stabilised.	16 16	□ ■	Canister bleed is authorised but the solenoid is not controlled specially

In the course of a road test

Functions to check	XR25 selections Conditions	Line No.	Bargraph display	Central display - notes
Vehicle speed information	#18	9	▭	X = vehicle speed displayed on speedometer
Pinking sensor	Vehicle under load and at > 2000 rpm #13 #15			X variable and not zero X = 0 (if there is a fault in one of the sensors, the advance is always retarded by 5 ° Not visible on #15)
Richness regulation (adaptive test)	After the testing phase #30 #31			116 < X < 160 (Average value after clearing memory : 128) 96 < X < 160 (Average value after clearing memory : 128)

MONOPOINT INJECTION
Fault finding using the XR25

CHECKING CONFORMITY

Engine cold - ignition on

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Dialogue with XR25	D03 (selector on S6)			7.NJ Use fiche no. 28
Computer correct	G70*			XXXX Part No. is displayed in 3 sequences (see Chap. 12)
Interpretation of bargraphs normally illuminated		1 11 14	□ ■ □ ■ ■ □	Code present Recognition of no load position No TDC sensor signal (should extinguish when starter is cranked)
Throttle position potentiometer	– No load #17 – Part load – Full load #17	11 11 11	□ ■ □ □ ■ □	X ≥ 45 X ≥ 208
Absolute pressure sensor	#01	8	□	X = Local atmospheric pressure
Coolant temperature sensor	#02	6	□	X = Ambient temperature ± 5 °C
Air temperature sensor	#03	5	□	X = Ambient temperature ± 5 °C

MONOPOINT INJECTION
Fault finding using the XR25

Engine warm at idle speed, after the engine cooling fan has cut in at least once.

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Battery voltage	#04			13 V < X < 14.5 V
Idling speed	– AC not operating #06 #17 – AC selected #06	 16 11 17		 X = 825 ± 50 rpm 17 < X < 40 X = 925 ± 50 rpm
Pinking sensor Noise measurement	#13 (3500 rpm in neutral)	10		X value read is not zero and is variable
Manifold pressure	#01 No consumers			X is variable and approximately 300 ± 50 mb (Value reduces depending on altitude)
Richness regulation	At stable 2500 rpm then at idle speed #05 #35	19		 X varies from 50 to approx. 900 mV X fluctuates around 128 with a maximum of 255 and a minimum of 0
Canister bleed	At idling speed At acceleration, in neutral or stabilised	16 16	 	 The canister bleed is authorised but the solenoid is not controlled separately

MONOPOINT INJECTION
Fault finding using the XR25

During road test

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Vehicle speed information	#18	9	▭	X ≃ vehicle speed read at counter
Pinking sensor	Vehicle under load at > 2000 rpm #13 #15			X variable and not zero X = 0 (if one of the sensors is faulty the system always retards the advance which cannot be seen under #15)
Richness regulation (adaptive test)	After programming phase #30 #31			112 < X < 160 (average value after erasing memory : 128) 0 < X < 255 (average value after erasing memory : 128)

FAULT FINDING FOR THE OXYGEN SENSOR

Oxygen sensor voltage (# 05)

Reading # 05 on the XR25: the value read represents the voltage sent to the computer by the oxygen sensor; it is expressed in Volts. (The value varies between 0 and 1000 millivolts.)

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

The smaller the difference between the upper and lower limits, the less useful the information from the oxygen sensor. (The difference is usually at least 500 mV.)

Richness correction (# 35)

The value read under # 35 on the XR25 represents the richness correction made by the computer depending on the richness of the burnt fuel mixture as detected by the oxygen sensor. (The oxygen sensor analyses the amount of oxygen in the exhaust gasses directly from the burnt fuel mixture.)

The correction value should oscillate around 128 with limits of 0 and 255. (Experience has shown that under normal operating conditions the value for # 35 is between 80 and 175.)

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

Starting richness regulation

Loop phase

Richness regulation is active after a timed period when the engine is started, if the coolant temperture has reached a certain threshold at no load (35 ± 5°C depending on engine).

When richness regulation is not active # 35 = 128.
The time delay when the engine is started is approximately 2 minutes if the engine is cold (coolant temperature ≃ 20°C) and is shortened to at least one minute if the engine is warm (coolant temperture ≃ 90°C).

Non-loop phase

When richness regulation is active, the operating phases during which the computer does not take account of the voltage from the oxygen sensor are:

- Full load : # 35 = fixed value
- Sharp acceleration :# 35 = 128
- Sharp deceleration : # 35 = 128
- Oxygen sensor fault.

Defect mode for oxygen sensor faults

If the oxygen sensor is operating incorrectly (# 05 varies only slightly or not at all during the loop phases), the computer makes several successive corrections.
After 10 to 15 corrections have been made (# 35 changes from 128 to 255 or from 128 to 0), the computer decides the oxygen sensor is faulty and adopts the defect mode (# 35 = 128).

ADAPTIVE RICHNESS CORRECTION

Principle

In the loop phase richness regulation (# 35) corrects the injection timing to obtain metering which is as close as possible to richness 1. The correction value oscillates around 128, with limits 0 and 255. (Experience has shown that under normal engine operating conditions #35 is between 80 and 175.)

Variations may affect the injection system components and the correction value may tend towards 0 or 255, to obtain richness 1.

The adaptive correction permits the injection mapping to be altered to re-centre the richness regulation value around 128 to continuously enable correction to increase or reduce the mixture richness.

The adaptive correction of richness regulation is formed of two parts:

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

The adaptive corrections take 128 as the average value after initialisation (erasing the memory) and have the following limits:

E7F 708 / 750 engines	E7J 601 - F3P 710 engines	E7J 754 engine
116 ≤ # 30 ≤ 160	96 ≤ # 30 ≤ 160	112 ≤ # 30 ≤ 160
96 ≤ # 31 ≤ 160	0 ≤ # 31 ≤ 255	0 ≤ # 31 ≤ 255

Adaptive correction only operates when the engine is warm (coolant temperature ≥ 80° C), in the loop phase (#35 variable) and for given manifold pressure and engine speed ranges.

Programming conditions :

Adaptive correction for idle speed and low engine loads can only operate when adaptive correction for average and high loads has already been programmed. To do this, it is necessary to carry out a road test and afterwards let the engine run at idle speed for a few minutes.
During the road test, stabilise the engine speed for a few moments between 2000 and 4000 rpm, keeping the manifold pressure within the range specified for the engine concerned:

Engine type	E7F engine	E7J - F3P engine
Manifold pressure	450 ≤ # 01 ≤ 680	500 ≤ # 01 ≤ 1000

It can be considered that programming is correct when adaptive corrections (#30 and #31) have evolved.

Interpretation

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

If there is too much fuel the process is reversed :
Richness regulation under # 35 reduces and adaptive correction under # 30 and # 31 reduces to re-centre richness correction (# 35) around 128.

NOTE: The analysis of # 31 remains uncertain since this correction mainly operates at idle speed and low loads and is extremely sensitive.

Do not draw any hasty conclusions from this reading, rather use the value of # 30.

The information from these two gates gives an indication of the engine richness operation which is useful for guiding fault finding. For use in fault finding, a conclusion may only be drawn if they are at the maximum or minimum limit values.

IMPORTANT : # 30 and # 31 should only be used following a customer complaint, an operating fault and if they are at a maximum or minimum value where # 35 is not correct (# 35 varies above 175 or below 80)

AUTOMATIC TRANSMISSION COMPUTER CONNECTION TO INJECTION COMPUTER :

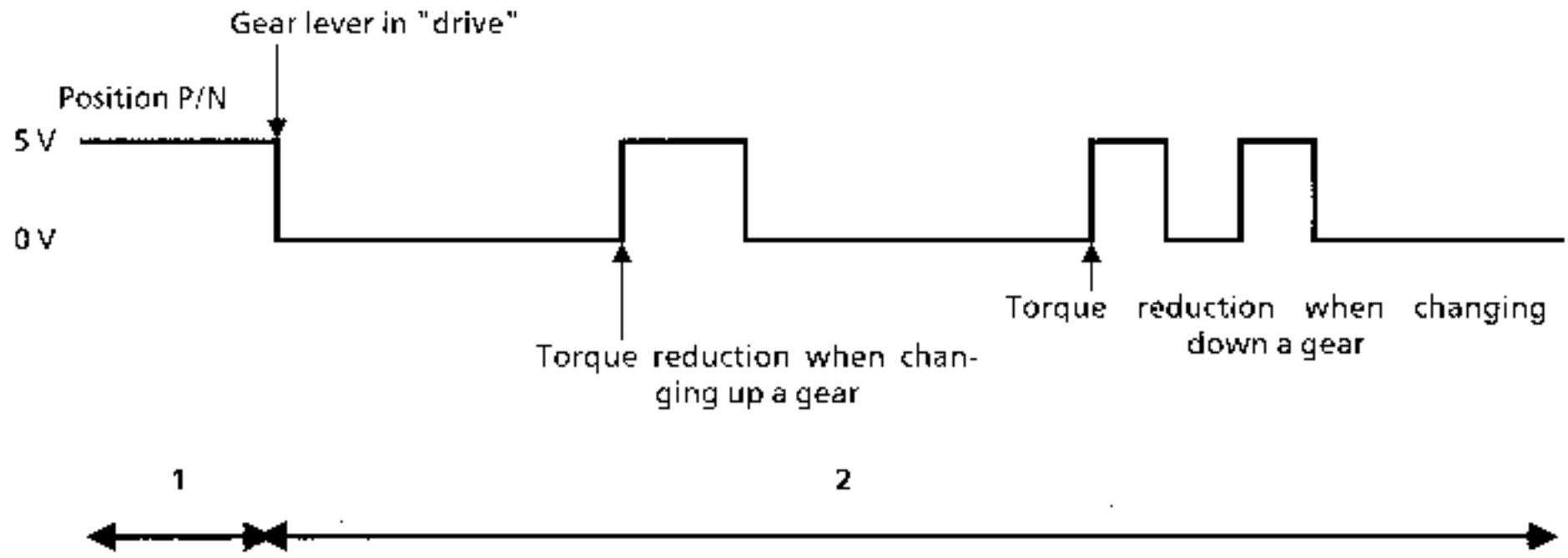
The injection computer is connected to the automatic transmission computer by two wires :

- a wire informing the injection computer of the park position, neutral position and the torque reduction request (track no. 8 of injection computer).

- a wire informing the automatic transmission computer of the engine speed (track no. 12 of the injection computer).

The engine load information is supplied to the automatic transmission computer via a dual-track potentiometer.

Signal transmitted to track no. 8 of injection computer :



Observations

1. In "park" or "neutral" position the voltage can be checked that it is correct at approximately 5 V when measured using a voltmeter between track 8 and the earth.
   However, as soon as "drive" (or "another gear") is selected, the voltage drops to around 0 V.

2. From position "drive" onwards, and when the vehicle is moving, single or double pulses are transmitted by the automatic transmission computer.
   In this case, the injection computer recognises the request for retarding the ignition which softens the take-up of the upper or lower gear.

INJECTION COMPUTER - AIR CONDITIONING CONNECTION :

The injection computer - air conditioning connections are made by two wires:

- A wire (track 30) informing the injection computer that the air conditioning has been switched on or off so that the injection computer can increase the idling speed.
- A wire (track 34) informing the injection computer that air conditioning compressor activation is requested so that the compressor can control (via track 23) the compressor clutch relay depending on certain engine conditions.

PROGRAMMING TO PREVENT COMPRESSOR OPERATION

Under certain circumstances the injection computer may prevent the compressor clutch relay from operating .

Thermal protection

When the coolant temperature is greater than 110 °C, the compressor cannot operate.

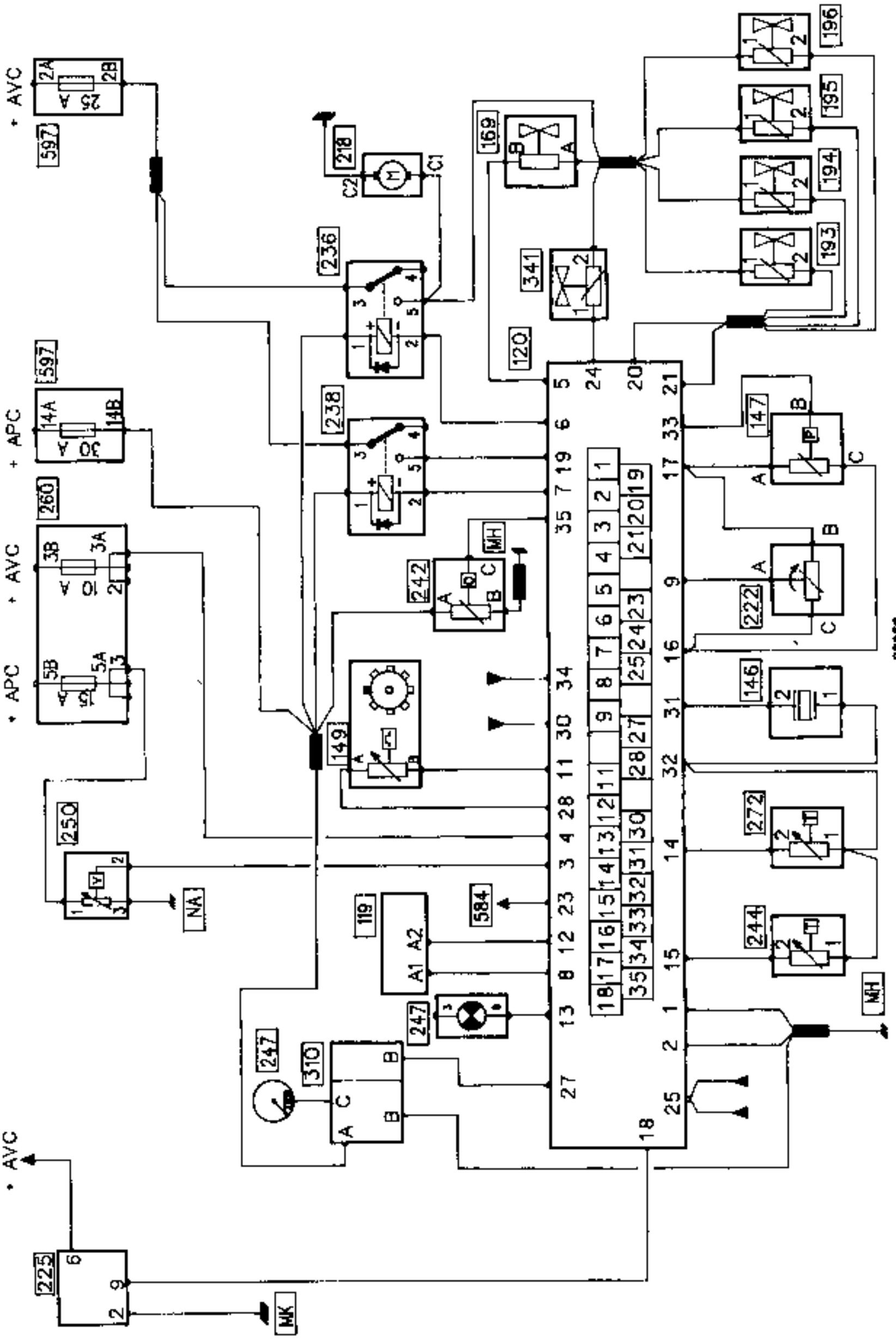
Starting the engine

The compressor cannot operate for 5 to 10 seconds after the engine has been started.

Performance retention

If full load position is detected, the compressor will not operate.

MULTIPOINT INJECTION
Operating wiring diagram



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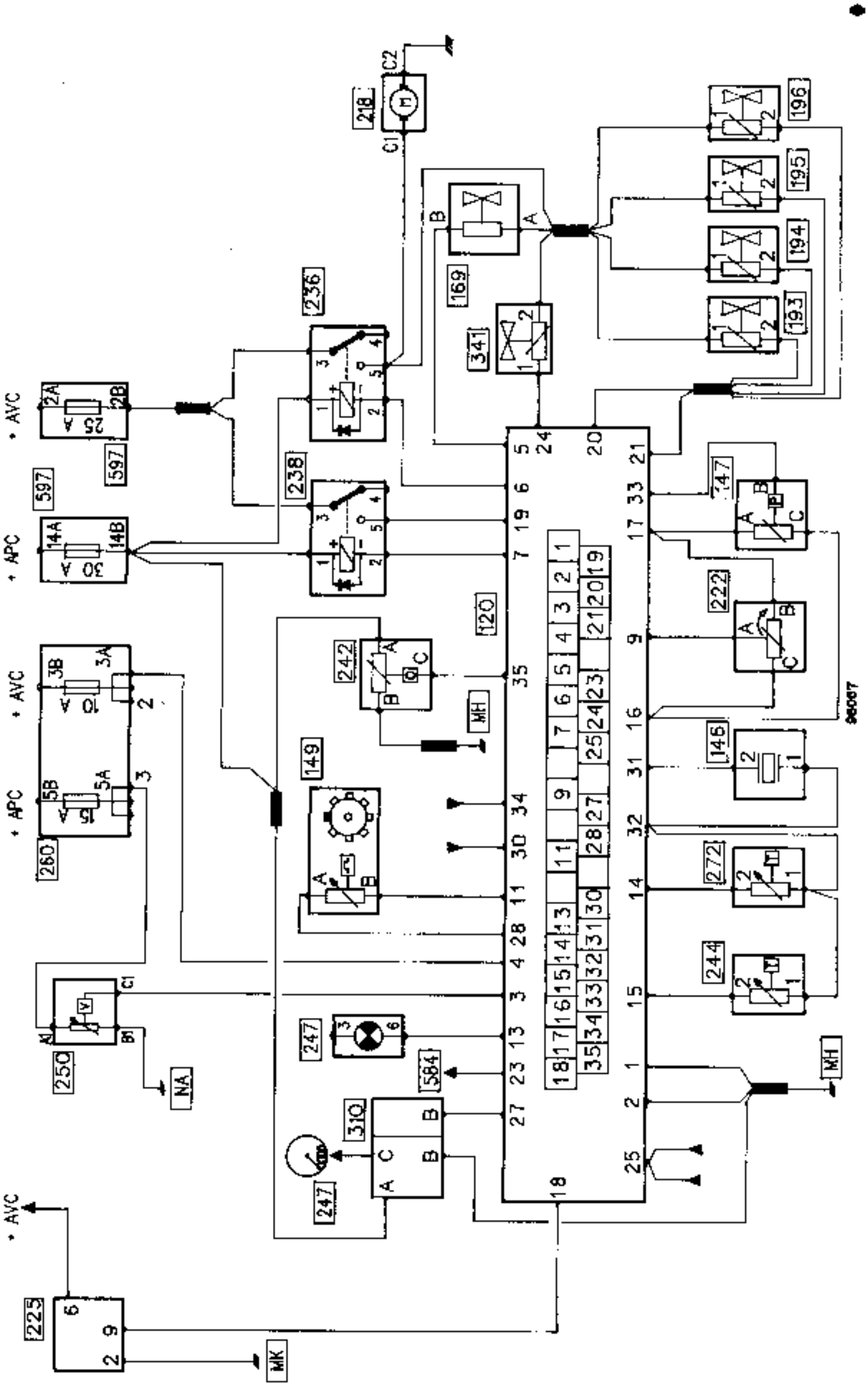
MULTIPOINT INJECTION
Operating wiring diagram



MULTIPOINT INJECTION
Operating wiring diagram

OPERATING WIRING DIAGRAM KEY

COMPONENT NO.	DESCRIPTION
119	Automatic transmission computer
120	Injection computer
146	Pinking sensor
147	Absolute pressure sensor
149	TDC sensor
169	Fuel vapour recirculation solenoid
193 to 196	Injectors
218	Fuel pump
222	Throttle position potentiometer
225	Diagnostic socket
236	Fuel pump relay
238	Injection lock relay
242	Oxygen sensor
244	Coolant temperature sensor
247	Instrument panel (rev counter or injection warning light)
250	Vehicle speed sensor
260	Passenger compartment fuse box
272	Air temperature sensor
310	Ignition power module
341	Idling speed regulation valve
584	Air conditioning compressor clutch relay
597	Engine compartment fuse box
MH	Engine electrical earth
MK	Front left-hand pillar electrical earth
NA	Front right-hand pillar electronic earth

AVC = Before ignition **APC** = After ignition

MULTIPOINT INJECTION
Operating wiring diagram

SUMMARY OF COMPUTER TRACK ALLOCATION

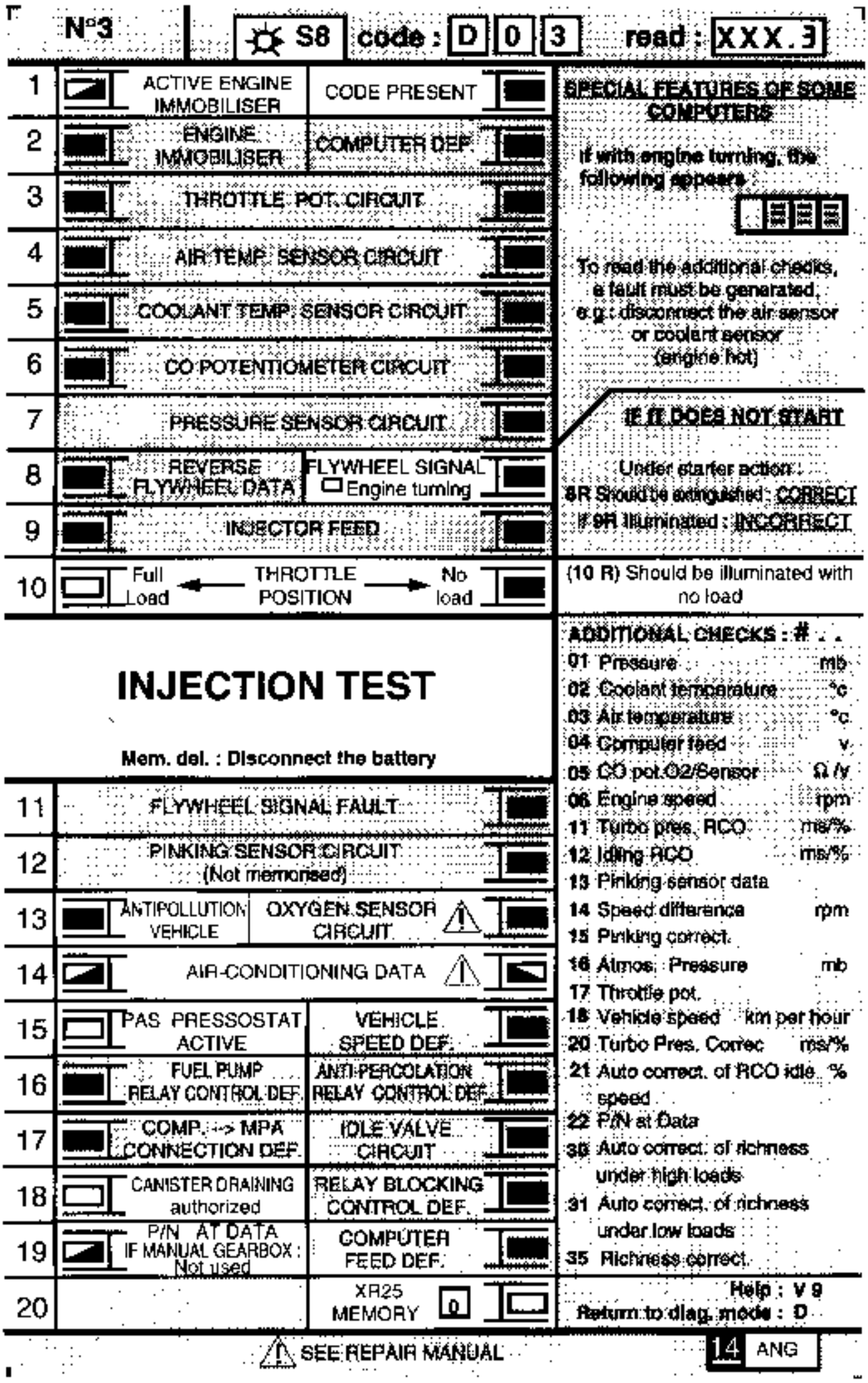
Tracks	F3P 755	F3P 758
1	Power module earth	
2	Electronic earth	
3	Vehicle speed information	
4	+ 12 volts before ignition	
5	Canister bleed solenoid control to RCO	
6	Fuel pump relay control	
7	Injection lock relay control	
8	Automatic transmission P/N information	–
9	Throttle position potentiometer information	
10	–	–
11	TDC sensor signal (track B)	
12	Engine speed information for automatic transmission computer	–
13	Link with injection warning light	
14	Air temperature information	
15	Coolant temperature information	
16	+ 5 volts feed for absolute pressure sensor and throttle potentiometer	
17	Common earth for throttle potentiometer and absolute pressure sensor	
18	Diagnostic signal output to diagnostic socket	
19	Main computer feed via injection lock relay	
20	Injector earth control	
21	Injector earth control	
22	–	–
23	AC compressor clutch relay control	

SUMMARY OF COMPUTER TRACK ALLOCATION (continued)

Tracks	F3P 755	F3P 758
24	Idling speed regulation valve control to RCO	
25	Electronic engine immobiliser coded line input via decoder unit or windscreen stalk switch	
26	-	-
27	Ignition power module control signal	
28	TDC sensor signal (track A)	
29	-	-
30	Air conditioning on/off information	
31	Pinking sensor noise signal input	
32	Common earth for coolant temperature, air temperature and pinking sensors	
33	Manifold pressure information retransmitted by absolute pressure sensor	
34	Air conditioning compressor operation request input	
35	Oxygen sensor voltage input	

MULTIPOINT INJECTION
Fault finding using the XR25

Fault finding for the SIEMENS multipoint injection system for these engines is carried out using the XR25 and **fiche no. 03.**



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MULTIPOINT INJECTION
Fault finding using the XR25

INTERPRETATION OF BARGRAPH ILLUMINATION

Bargraph not operational for this vehicle

- Representation of a fault (**always** on **coloured** background)

If illuminated there is a fault in the product being diagnosed - the associated text defines the fault.

- Representation of a status (**always** on a **white** background)

Illuminates when dialogue with the computer has been established - if it remains extinguished:
- the code does not exist,
- there is a fault in the test kit, the computer or the line.

The representation of the following bargraphs indicates their initial status:
- after the ignition has been turned on,
- after entering the code associated with the product,
- without operator intervention.

Initial status
(Ignition on, engine not running, without operator intervention)

Indefinite or Extinguished	Illuminated if the **function** or **condition** specified on the fiche is met
Illuminated	Extinguished if the **function** or **condition** specified on the fiche is not met

ACCESS TO COMPUTER INFORMATION USING THE # KEY

# Key	Tests carried out	Units of measure
01	Manifold pressure	Millibars
02	Coolant temperature	Degrees
03	Air temperature	Degrees
04	Feed voltage	Volts
05	Oxygen sensor voltage	Volts
06	Engine speed	rpm
12	R.C.O. idling regulation valve	%
13	Pinking sensor signal	No units
14	Engine speed variation	rpm
15	Pinking correction	Degrees
16	Atmospheric pressure	Millibars
17	Throttle position potentiometer value	No units
18	Vehicle speed	Km/h
21	Idling speed adaptive correction	%
30	Richness adaptive correction (mostly for average and high engine load)	No units
31	Richness adaptive correction (mostly for low engine load)	No units
35	Richness correction	No units

INTERPRETATION OF BARGRAPH ILLUMINATION - FICHE NO. 03

Line no.	Bargraph display	
1	▒▒▒	Bargraph illuminates as soon as the ignition is turned on: shows the diagnostic signal is being received by the XR25.
	◪	**Engine immobiliser active** The engine immobiliser is not unlocked.
2	■	Internal computer fault finding. If illuminated, computer not to specification or defective.
	■	**Engine immobiliser circuit** Diagnostic of CO or CC (+ 12 volts or earth) on the line between the decoder unit and track 25 of the computer.
3		**Throttle potentiometer circuit**
	■	Diagnostic of CO or CC to earth on the potentiometer or its wiring.
	■	Diagnostic of CC on the + 5 volts on the potentiometer line.
4		**Air sensor circuit**
	■	Diagnostic of CC to earth on air sensor or its wiring.
	■	Diagnostic of CO or CC + on air sensor or its wiring.
		Note in the two cases #03 – 20° C
5		**Coolant sensor circuit**
	■	Diagnostic of CC to earth on coolant sensor or its wiring.
	■	Diagnostic of CO or CC + on the coolant sensor or its wiring.
		Note in the two cases #02 = #03 with ignition on and #02 = 90° C with the engine running.
6	⊠ ⊠	
7	■	Diagnostic of fault present on absolute pressure sensor; in this case #01 = 103 mb; the fault is not memorised.
8	■	**Flywheel signal** Bargraph illuminates when the ignition is turned on. It should extinguish when the engine is started.
	■	**Flywheel reversed information** Indicates that the TDC sensor is fitted the wrong way round.
9	■ ■	Bargraphs illuminated when the engine is being cranked (minimum of 10 seconds) indicate an injection feed fault (1 injector on CC or 3 on CO). The fault is not memorised.

CO – open circuit, CC = short circuit

INTERPRETATION OF BARGRAPH ILLUMINATION - FICHE NO. 03 (continued)

Line No.	Bargraph display	
10	■ □	No load position recognised. Full load position recognised.
11	■	**TDC detection fault** There is a fault with the sensor, its circuit or there is a cyclical irregularity (target fault).
12	■	**Pinking sensor circuit** CO, CC to earth on the sensor or its circuit. **Note:** The fault is detected when the engine is warm and is running above 3600 rpm; the fault is not memorised.
13	■ ■	**Oxygen sensor circuit** Oxygen sensor which is not operating diagnosed; in this case #05 is fixed and #35 − 128 ; the fault is only memorised for a CC on +. **Vehicle equipped with oxygen sensor.**
14	◪ ◪	Bargraph for request for air conditioning operation. Relay activation control for air conditioning compressor.
15	☒ ☒	
16	☒ ☒	
17	■ ☒	**Fault in the link between the computer and the ignition power module** Diagnostic of a fault on the connection between the computer and ignition power module.
18	□ ☒	**Canister bleed authorised** This bar graph illuminates as soon as the computer controls solenoid bleed when the engine conditions are correct.
19	◪ ☒	**"Park/neutral" position (F3P 755 engine)** Illuminated if the automatic transmission selector is in "park" or "neutral" position. One of these positions should be recognised to allow the engine to start.
20	□	If illuminated, memory function activated.

CO = open circuit, CC = short circuit

CHECKING THAT ENGINE IS TO SPECIFICATION

Engine cold - ignition on

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Dialogue with XR25 (computer correct)	D03 (selector on S8)			**X X X.3** – XXX : diagnostic code (see chapter 12 "general"). – .3 : Use of fiche no. 3.
Interpretation of bargraphs normally illuminated		1	□ ■	Code present
		8	□ ■	No TDC signal (should extinguish when engine is cranked)
		10	□ ■	Recognition of no load position
		13	■	Vehicle equipped with oxygen sensor
		19	■	P/N position recognised (F3P 755)
Throttle position potentiometer	– No load #17	10	□ ■	20 < X > 45
	– Part load	10	□ □	
	– Full load #17	10	■ □	190 < X > 240
Absolute pressure sensor	#01	7	□	X = Local atmospheric pressure
Coolant temperature sensor	#02	5	□ □	X = Ambient temperature ± 5 °C
Air temperature sensor	#03	4	□ □	X = Ambient temperature ± 5 °C
Idling speed regulation valve	#12			Value read varies in line with coolant temperature (45% to 95%)

Engine warm at idle speed, after at least one operation of the engine cooling fan.

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Battery voltage	#04			13 V < X < 14.5 V
Idling speed	– AC not operating #06	14	▭	F3P 755 : X = 750 ± 50 rpm in P or N F3P 758 : X = 780 ± 50 rpm
	#12			27 < X < 40
	– AC selected #06	14	■	X − 900 ± 50 rpm (in P or N)
Pinking sensor Noise measurement	#13 (3500 rpm in neutral)	10	▭	X = value read is not zero and is variable
Manifold pressure	#01 no consumers	7		X is variable and is approximately : F3P 755 : 320 ± 50 mb F3P 758 : 350 ± 50 mb (Value reduces depending on altitude)
Richness regulation	Engine speed stabilised at 2500 rpm and then #05	13	■ ▭	X varies between 50 and approx. 900 mV
	#35			X fluctuates around 128 with a maximum of 255 and a minimum of 0
Canister bleed	At idling sped	18	▭	Canister bleed is authorised but the solenoid is not controlled separately
	Acceleration in neutral or stable speed	18	■	
Adaptive idling speed	#21			X varies around 0 : F3P 755 : min. limit – 12.5 % max. limit 4.3 % F3P 758 : min. limit – 4.3 % max. limit 9.4 %

Checking during road test

Functions to check	XR25 selection Conditions	Line No.	Bargraph display	Central display - notes
Vehicle speed information	#18		▭	X ≃ speed displayed on speedometer
Pinking sensor	Vehicle under load and engine speed > at 2000 rpm #13 #15			X value is not zero and is variable X = 0 (if there is a fault on one of the sensors, the advance is always retarded by 10°. (Not visible on #15)
Richness regulation (adaptive test)	After testing phase #30 #31			F3P 755 : 96 < X < 224 F3P 758 : 96 < X < 192 (average value after erasing the memory : 128) 96 < X < 224 (average value after erasing the memory: 128)

FAULT FINDING FOR THE OXYGEN SENSOR

Oxygen sensor voltage (# 05)

Reading # 05 on the XR25: the value read represents the voltage sent to the computer by the oxygen sensor; it is expressed in Volts. (The value varies between 0 and 1000 millivolts.)

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

The smaller the difference between the upper and lower limits, the less useful the information from the oxygen sensor. (The difference is usually at least 500 mV.)

Richness correction (# 35)

The value read under # 35 on the XR25 represents the richness correction made by the computer depending on the richness of the burnt fuel mixture as detected by the oxygen sensor. (The oxygen sensor analyses the amount of oxygen in the exhaust gasses directly from the burnt fuel mixture.)

The correction value should oscillate around 128 with limits of 0 and 255. (Experience has shown that under normal operating conditions the value for # 35 is between 80 and 175.)

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

Starting richness regulation

Loop phase

Richness regulation is active, after a timed period when the engine is started, at no load if the temperature is above 40°C or under load if the temperature is above 0°C. The time delay at the start depends on the coolant temperature; at 20°C it is approximately 10 seconds.

Non-loop phase

When richness regulation is active, the operating phases during which the computer does not take account of the voltage from the oxygen sensor are :
- Full load.
- Sharp deceleration (for manifold pressure < 220mb or when injection has cut out).
- When the oxygen sensor is registered as defective.

Detection of oxygen sensor fault

If the voltage from the oxygen sensor is incorrect (# 05 varies only slightly or not at all) during richness regulation, the computer will only adopt defect mode (# 35 = 128) if the fault has been recognised for approximately 20 seconds. When a short circuit on the oxygen sensor + line occurs (voltage > at 1.4 V), the computer will automatically pass to defect mode. In this case only the fault will be memorised.

ADAPTIVE RICHNESS CORRECTION

Principle

In the loop phase richness regulation (# 35) corrects the injection timing to obtain metering which is as close as possible to richness 1. The correction value oscillates around 128, with limits 0 and 255. (Experience has shown that under normal engine operating conditions #35 is between 80 and 175.)

Variations may affect the injection system components and the correction value may tend towards 0 or 255, to obtain richness 1.

The adaptive correction permits the injection mapping to be altered to re-centre the richness regulation value around 128 to continuously enable correction to increase or reduce the mixture richness.

The adaptive correction of richness regulation is formed of two parts:

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

The adaptive corrections take 128 as the average value after initialisation (erasing the memory) and have the following limits:

F3P 755 engine	F3P 758 engine
96 ≤ # 30 ≤ 224	96 ≤ # 30 ≤ 192
96 ≤ # 31 ≤ 224	96 ≤ # 31 ≤ 224

Adaptive correction only operates when the engine is warm (coolant temperature ≥ 75° C), in the loop phase (#35 variable) and for given manifold pressure and engine speed ranges.

Programming conditions :

The engine must have been operating in loop mode over several pressure zones before adaptive correction will alter to compensate for the changes in engine operation richness.

MULTIPOINT INJECTION
Fault finding using the XR25

After the memory has been erased (# 30 = # 31 = 128) a specific road test must be carried out.

The engine must be warm for this test (coolant temperature ≥75°C) and the engine speed must be below 3500 rpm.

Range No. 1 (mb)	Range No. 2 (mb)	Range No. 3 (mb)	Range No. 4 (mb)	Range No. 5 (mb)
280 ---------- 400 ---------- 520 ---------- 640 ---------- 750 -------- 870				
Average 340	Average 460	Average 580	Average 695	Average 810

NOTE: For this test, start from a fairly low engine speed in 3rd or 4th gear with progressive acceleration to stabilise the required pressure for 5 to 10 seconds in each zone (see table).

The corrections will be operational after this test.

31 varies more sensitively for idle speed and low engine loads, # 30 varies more for average and high engine loads, but both gates may be used for all manifold pressure ranges.

The test must be carried out driving as normal, with smooth, varied speeds and loads for a distance of 3 to 6 miles (5 to 10 kilometres).

After the test, read the values under # 30 and # 31. Initially 128, they should have changed. If they have not changed, repeat the test, taking care to ensure all the test conditions are met.

Interpretation

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

If there is too much fuel the process is reversed :
Richness regulation under # 35 reduces and adaptive correction under # 30 and # 31 reduces to re-centre richness correction (# 35) around 128.

NOTE: The analysis of # 31 remains uncertain since this correction mainly operates at idle speed and low loads and is extremely sensitive.

Do not draw any hasty conclusions from this reading, instead use the value of # 30.

The information from these two gates gives an indication of the engine richness operation which is useful for guiding fault finding. For use in fault finding, a conclusion may only be drawn if they are at the maximum or minimum limit values.

IMPORTANT : # 30 and # 31 should only be used following a customer complaint, an operating fault and if they are at a maximum or minimum value where # 35 is not correct (# 35 varies above 175 or below 80)

IDLE SPEED ADAPTIVE CORRECTION (# 21)

Under normal warm engine operating conditions, the RCO idle speed value under # 12 varies between an upper and a lower value to obtain the nominal idle speed value (see checking conformity).

If the operating values drift (running in, engine pollution, etc.), the RCO idle speed value may be close to the upper or lower limits.

RCO idle speed adaptive correction permits the slow variation in engine air requirement to be allowed for, so that the RCO value under # 12 is brought back to the nominal average value.

This correction is only effective if the idling speed regulation phase and if the coolant temperature is above a threshold of 70°C for engine F3P 758 and 80°C for engine F3P 755).

RCO idle speed values and adaptive correction

	F3P 755 engine	F3P 758 engine
RCO idle speed (# 12)	27 % ≤ X ≤ 40 %	27 % ≤ X ≤ 40 %
Adaptive idle speed (# 21)	Min. limit: – 12.5 % Max. limit: 4.3 %	Min. limit: – 4.3 % Max. limit: 9.4 %

Interpretation of the gates

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

If there is a lack of air (pollution, etc.), the process is reversed :
The RCO idle speed under #12 increases and the adaptive correction under # 21 also increases, to re-centre # 12 to the average nominal value.

IMPORTANT : After erasing the computer memory (disconnecting the battery), the engine MUST be allowed to run at idle speed before being returned to the customer to allow the adaptive correction to recalibrate correctly.

NOISE IN THE EXHAUST LINE

The vehicle must be tested to determine the location of the noise (if necessary with the customer). The noise should then be reproduced when stationary. To do this, accelerate sharply to cover a wide range of engine speeds and resonances.

Having reproduced the fault:

- ensure that the exhaust line is not touching the body,
- check the alignment, conformity and condition of the exhaust assembly,
- try to eliminate the noise noted by tightening the exhaust line section or heat shields at fault.

If the noise is coming from the catalytic converter, remove it and test as follows :

- visual examination inside the envelope (internal section melted),
- aural examination after shaking the component (internal section broken or foreign body inside).

If the internal section has melted, the cause must be determined (see chapter 14: test to be carried out before anti-pollution tests) and check that catalytic converter particles have not blocked the exhaust system further down.

Only if one of the faults mentioned above is found, replace the converter.