Fault tracing

Section	Group
2	24

CI Fuel Injection System 240/260

CI Fuel Injection System 240/260 1976–1978

VOLVO

Contents

Introduction

The fault tracing instructions in this manual are presented with the assumption that all mechanical, electrical or emission system faults which may have existed have been eliminated. The following items in the above mentioned areas should have been checked using appropriate methods specified in the associated Service Manual.

Mechanical
- Compression
- Valve clearance
- All vacuum lines and connections
- Transmission kickdown cable and throttle valve adjustments
- Air cleaner
- Ducts
- Intake manifold (leaks)

Electrical
- Spark plugs
- Spark plug leads
- Distributor cap
- Ignition coil
- Timing (including advance mechanism)
- All electrical connections

Emission Controls
- Crankcase ventilation system (PCV valve)
- Exhaust gas recirculation system
- Air injection reactor system
- Evaporative control system
- Lambda-sond system (see op. 01–07)
- Catalytic converter

Specifications
Refer to the "Specifications" Section 0 (03) in the Service Manuals for proper clearances and other values regarding systems other than the Fuel Injection System.

Common symptoms
Only those symptoms which are most common and easily detected are dealt with in this manual.

Complex symptoms
In the event that several CI System components fail, or more complex symptoms occur, it may be necessary to overhaul the entire system. Perform a complete analysis before proceeding with extensive repairs.

Overhaul
Performing operations B1 to J10 will provide a continuous fault tracing of the fuel injection system. Refer to the "Repair and Maintenance" Section 2 (Group 24) in the Service Manuals for complete overhaul instructions.

Additional information
The Oxygen Sensor Feedback System (Lambda Sond System) is in a way a subsystem within the fuel system.
Information on how to isolate that system is therefore included as operations 01–07.

3-step information
Many of the fault-tracing procedures contain an illustration, a brief statement and a more detailed instruction. This 3-step format is designed to provide the mechanic with an overview of the particular fault-tracing operation or procedure. This, in many cases, is sufficient to enable the experienced mechanic to proceed without additional instruction. Others may need the more detailed instruction to review or learn what is needed to accomplish the operation.

Note: If CI System parts are replaced, the idle speed and CO level must be checked and readjusted as necessary.

TP 12044/1
3000.04.78
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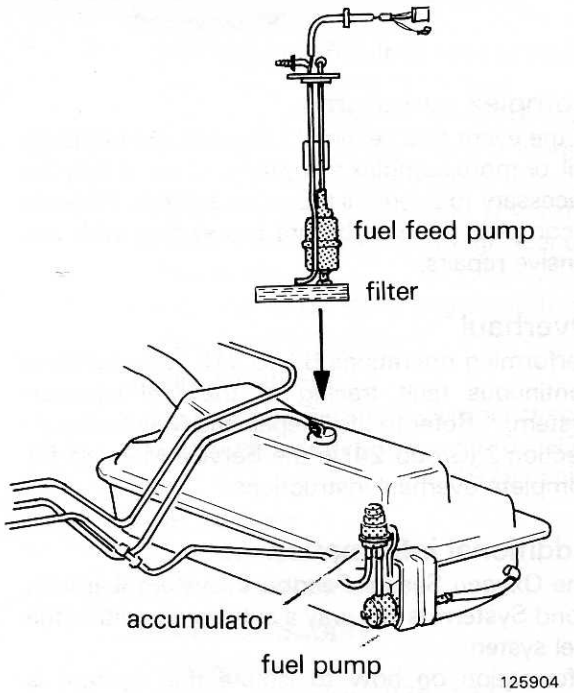
Specifications / Description



Fuel feed pump

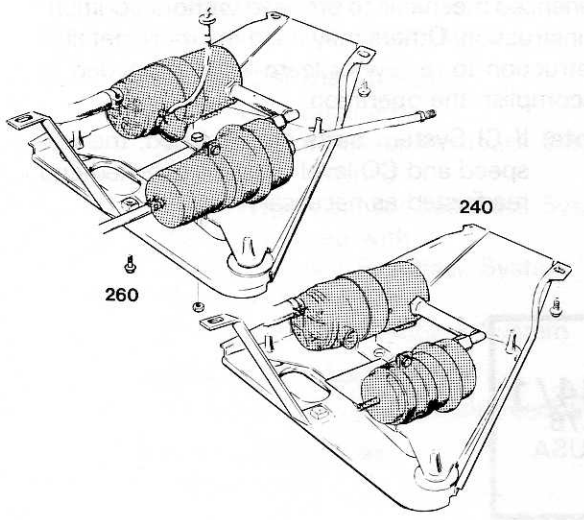
The fuel feed pump was introduced during the 1977 model year. It can be retrofitted on earlier year cars, see Service Bulletins No. 12A and 14, Group 24.

A number of 1976 260 Series Models were equipped with fuel feed pumps.

The fuel feed pump is located in the gas tank (integral with the fuel tank gauge sender). Fuel is thereby supplied under low pressure to the main fuel pump thus reducing the possibility of vapor lock.

A non-return valve causes fuel to be maintained under low pressure in the hose between the two pumps with the engine not running.

Current consumption: 1–2 amps.



Fuel pump and accumulator

1976–1977 Models: located on a bracket attached to the outside of the fuel tank.

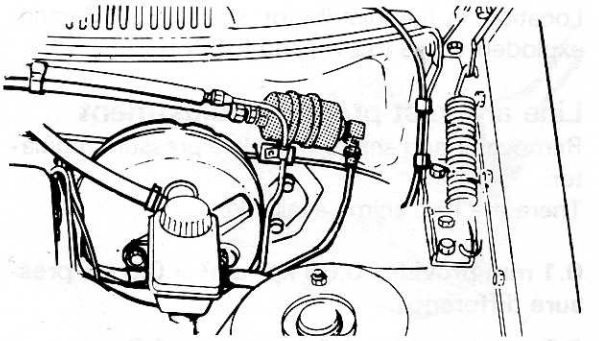
On 1977 Models the protector plate for the fuel pump was redesigned so that the fuel pump can be removed without loosening the fuel pump bracket.

1978 Models: Location for fuel pump and accumulator was changed from the fuel tank to the cross member under the floor of the vehicle (beneath the rear seat).

260 Series: fuel accumulator capacity increased from 20 cm^3 to 40 cm^3, improving starting capabilities at all temperatures.

The fuel pump is an electric, roller type pump, capable of supplying approx. 1.6 liters (1.7 qts) of fuel at 5 kp/cm^2 (=70 psi).

Current consumption: max. 8.5 amps.



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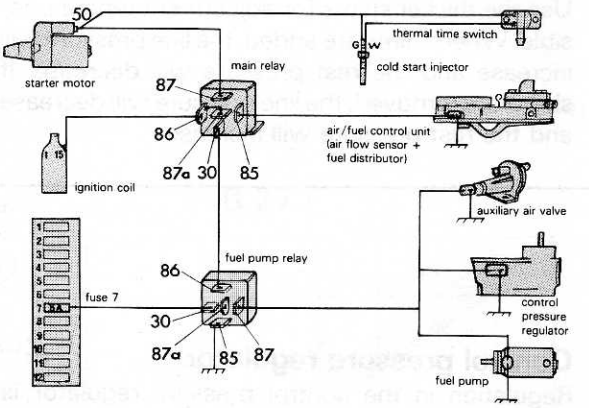
Fuel filter

This paper element filter is located on the firewall, see illustration.

Replacement intervals: **40,000 km**
30,000 miles



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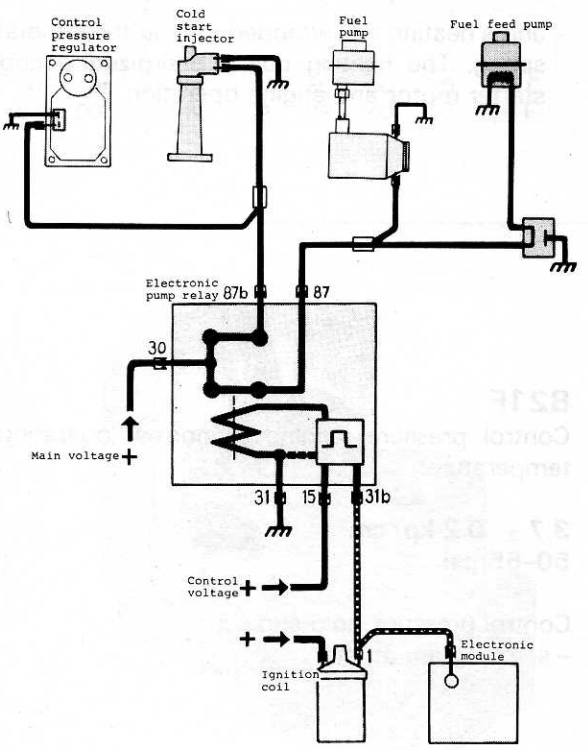
Relays

On 1976 Models, the main relay and the fuel pump relay are located to the left on the front of the firewall, behind the ignition coil.

On 1977 Models, the two relays are moved to the inside of the firewall.



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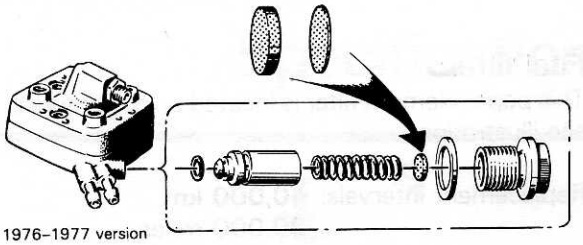
On 1978 Models, the main relay, the fuel pump relay and the switch at the air flow sensor have been replaced by one electronic type relay. It is located in the passenger compartment, to the left up behind the firewall.

The electronic fuel pump relay is a standard cut-in type with a pulse sensor that reacts to the signals from the electronic module in the ignition system. With the engine running (ignition system firing), the pulse sensor allows voltage to pass through from connection 15 and activate the relay.



1976–1977 version

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B21F and B27F

Line pressure:	4.5–5.2 kp/cm²
	64–75 psi
Rest pressure:	
– minimum:	1.7 kp/cm² = 24 psi
– maximum	below injector opening pressure

Line pressure regulator

Location: in fuel distributor, see CI Fuel System exploded views (B21F) and (B27F).

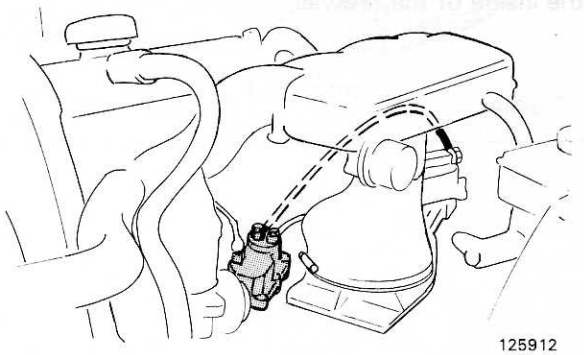
Line and rest pressure adjustment

Remove or add shims in the line pressure regulator.
There are two shims available:

0.1 mm provides 0.06 kp/cm² = 0.8 psi pressure difference.

0.5 mm provides 0.3 kp/cm² = 4.3 psi pressure difference.

Use the thicker shims for adjustment where possible. When shims are added, the line pressure will increase and the rest pressure will decrease. If shims are removed, the line pressure will decrease and the rest pressure will increase.



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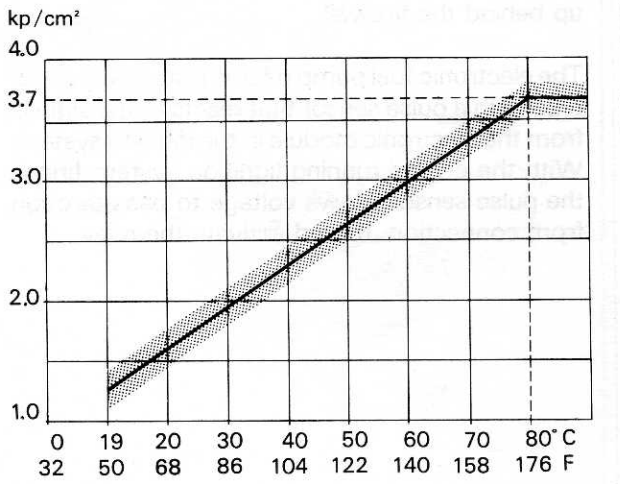

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Control pressure regulator

Regulation in the control pressure regulator is provided by a bimetal spring which is influenced by:

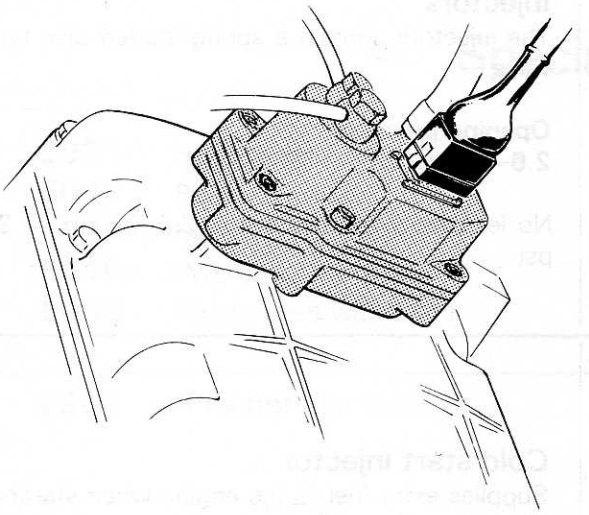
- ambient temperature
- and a heating coil wrapped around the bimetal spring. The heating coil is energized during starter motor and engine operation.

B21F

Control pressure, engine at normal operating temperature:

3.7 ± 0.2 kp/cm²
50–55 psi

Control pressure, cold engine:
– see diagram at left



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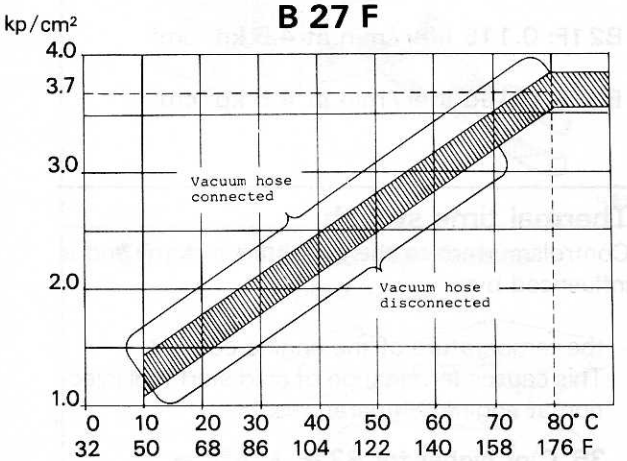
B27F

The B27 control pressure regulator contains a tube with one of the following connections:

- Federal specification vehicles to the rear of the intake manifold which provides vacuum to the tube. This causes enrichment of the air/fuel mixture at maximum speed.
- California specification vehicles (also Lambda sond equipped) to open air.

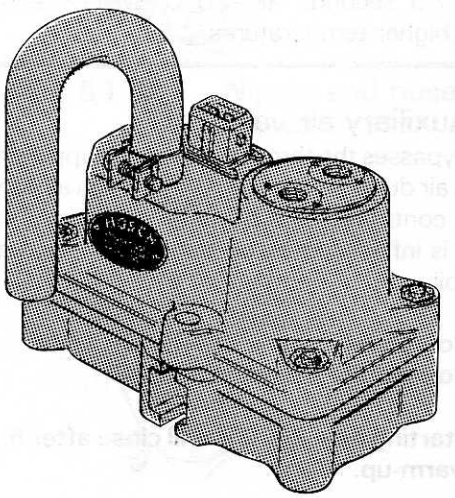


Control pressure, engine at normal operating temperature:

Tube vented to atmospheric pressure:
3.3 ± 0.15 kp/cm²
45–49 psi

Tube connected to vacuum:
3.7 ± 0.2 kp/cm²
50–55 psi

Control pressure, cold engine:
– see diagram at left.



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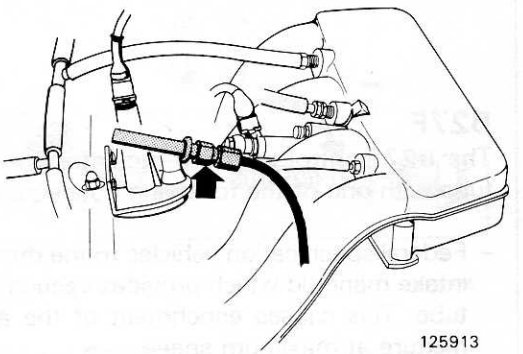
High altitude areas

B21F and B27F (1977 year models):
A special control pressure regulator Volvo P/N 1219952 is used. It incorporates an altitude compensating device and is ventilated to open air.

(Bosch P/N 0 438 140 021)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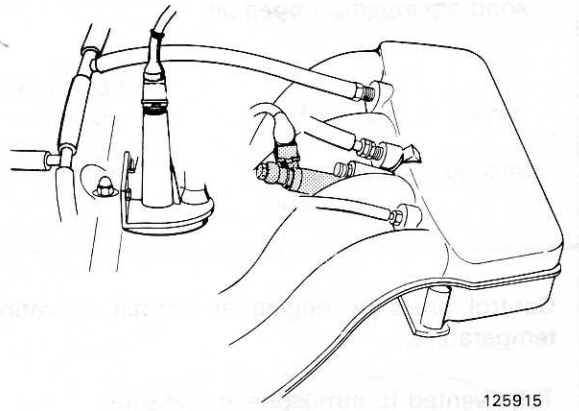
Injectors

The injectors contain a spring-loaded disc type valve.

Opening pressure:
2.6–3.6 kp/cm² = 37–51 psi

No leakage permitted below 2.4 kp/cm² = 34 psi.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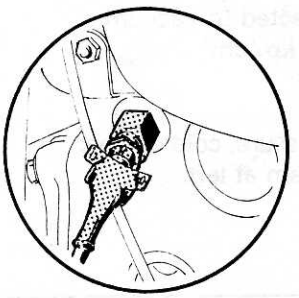
Cold start injector

Supplies extra fuel to the engine when starting. The solenoid operated valve operates each time the starter is energized and is calibrated to deliver fuel at the following rates:

B21F: 0.115 liter/min at 4.5 kp/cm²

B27F: 0.165 liter/min at 4.5 kp/cm²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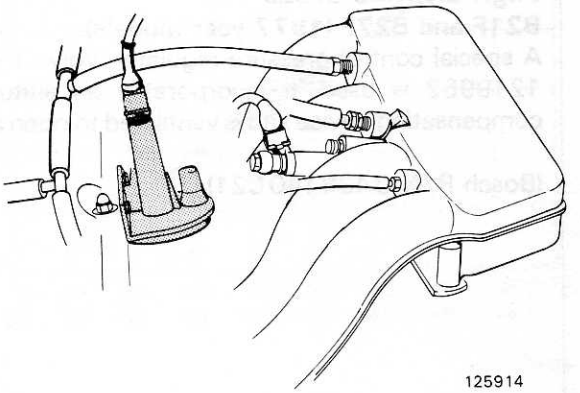
Thermal time switch

Controls current to the cold start injector and is influenced by:

- the temperature of the engine coolant.
  This causes termination of cold start fuel injection at engine temperatures:

  35° C or higher for B21F
  15° C or higher for B27F

- a heating coil acting on the bi-metal switch. This provides for a maximum injection time of 7.5 seconds at –20° C, which decreases at higher temperatures.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Auxiliary air valve

Bypasses the throttle valve and supplies additional air during warm-up. Contains an air valve which is controlled by a bi-metallic spring.
It is influenced by air temperature and a heating coil.

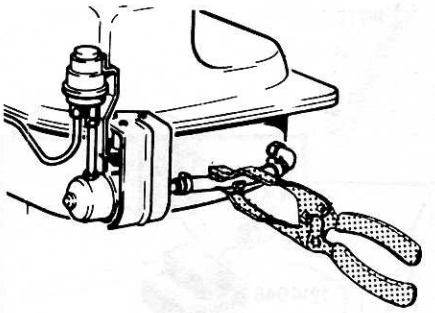
Completely opens at –30° C
Completely closes at +70° C

Starting at + 20° C it will close after 5 minutes warm-up.

Special Tools

2901	Pinchers for fuel line	**5102**	Wrench
5011	Pressure gauge	**5116**	Hose, used with 5011
5014	Measuring glasses	**5151**	Valve and hose kit
5015	Wrench	**5170**	Test relay
5032	Nipple, used with 5011	**9934**	Test instrument

2901 **Pinchers** for fuel line



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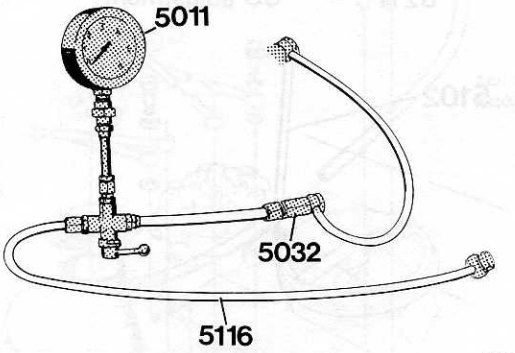
5011 **Pressure gauge**



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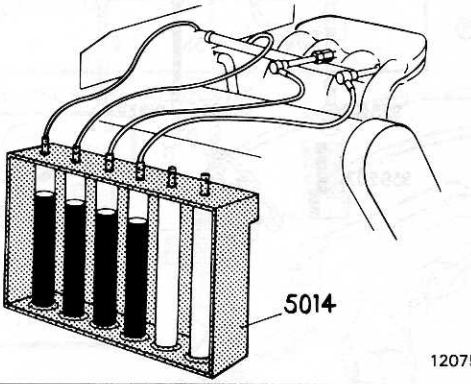
5014 **Measuring glasses**
Applied for B21F



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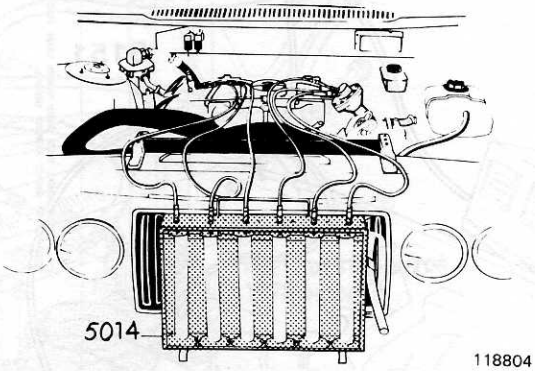
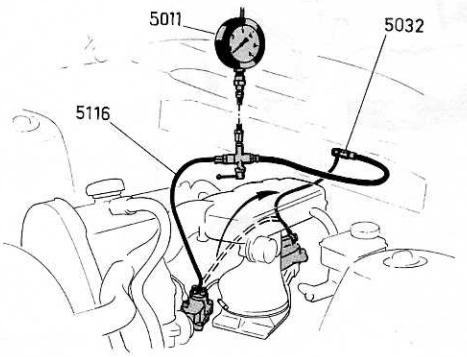
5014 **Measuring glasses**
Applied for B27F



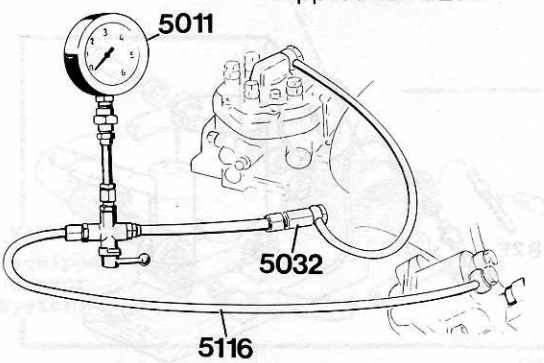
118804

5032 +5116 **Nipple and hose**
Applied for B21F



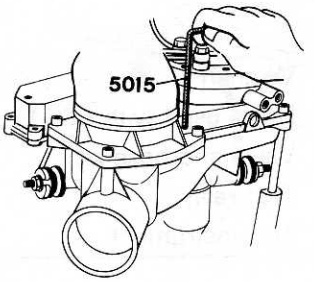
112729

5032+5116 **Nipple and hose**
Applied for B27F



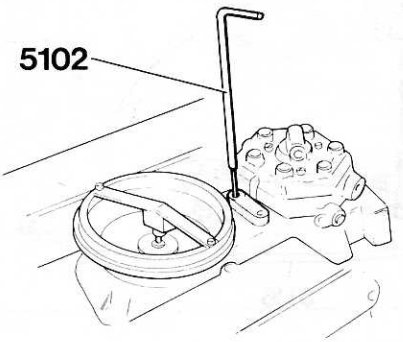
117746

5015 **Wrench**
B21F CO adjustment

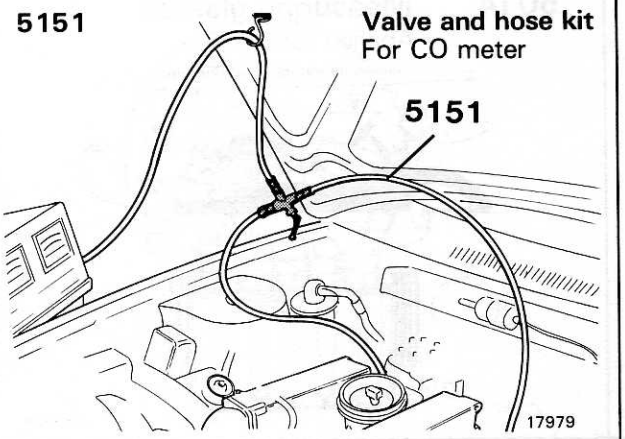


119834

5102 **Wrench**
B27F CO adjustment



5151 **Valve and hose kit**
For CO meter



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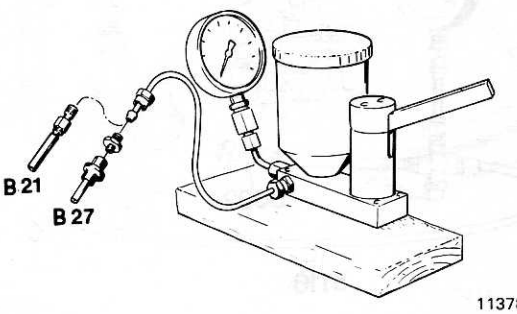
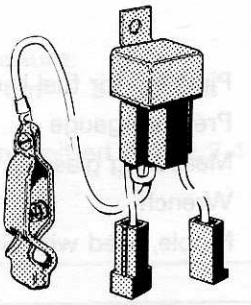
9934 **Injector tester**



113782

5170 **Test relay**
For testing operation of the electronic fuel pump relay



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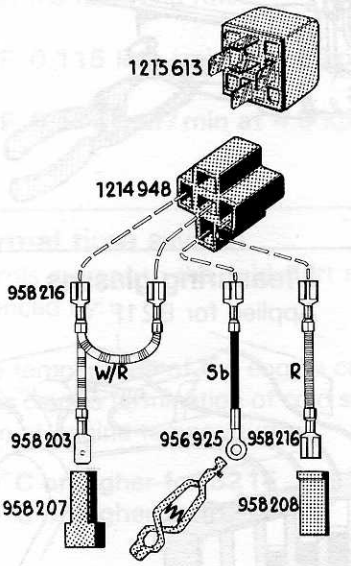
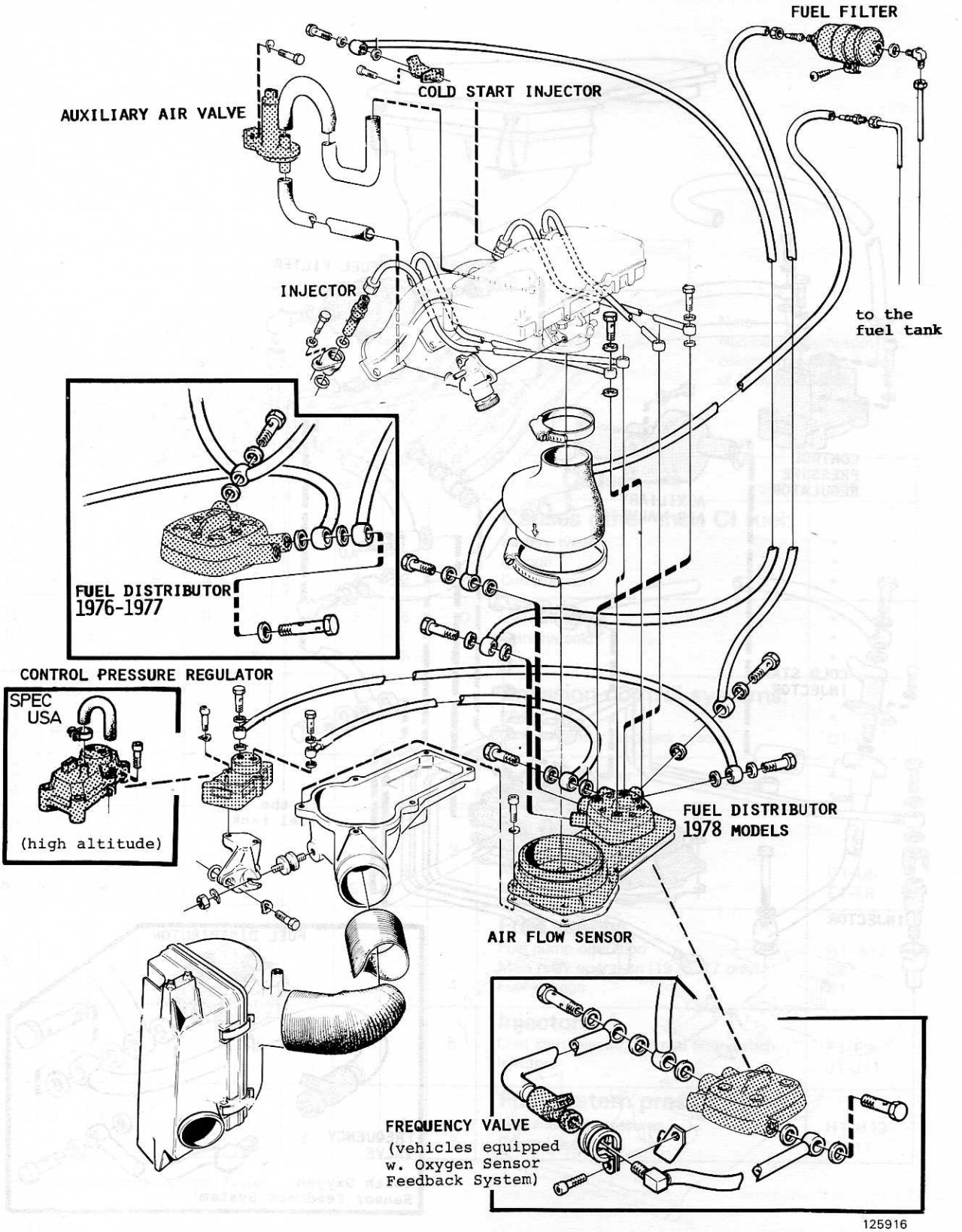
If test relay is not available, assemble from existing parts

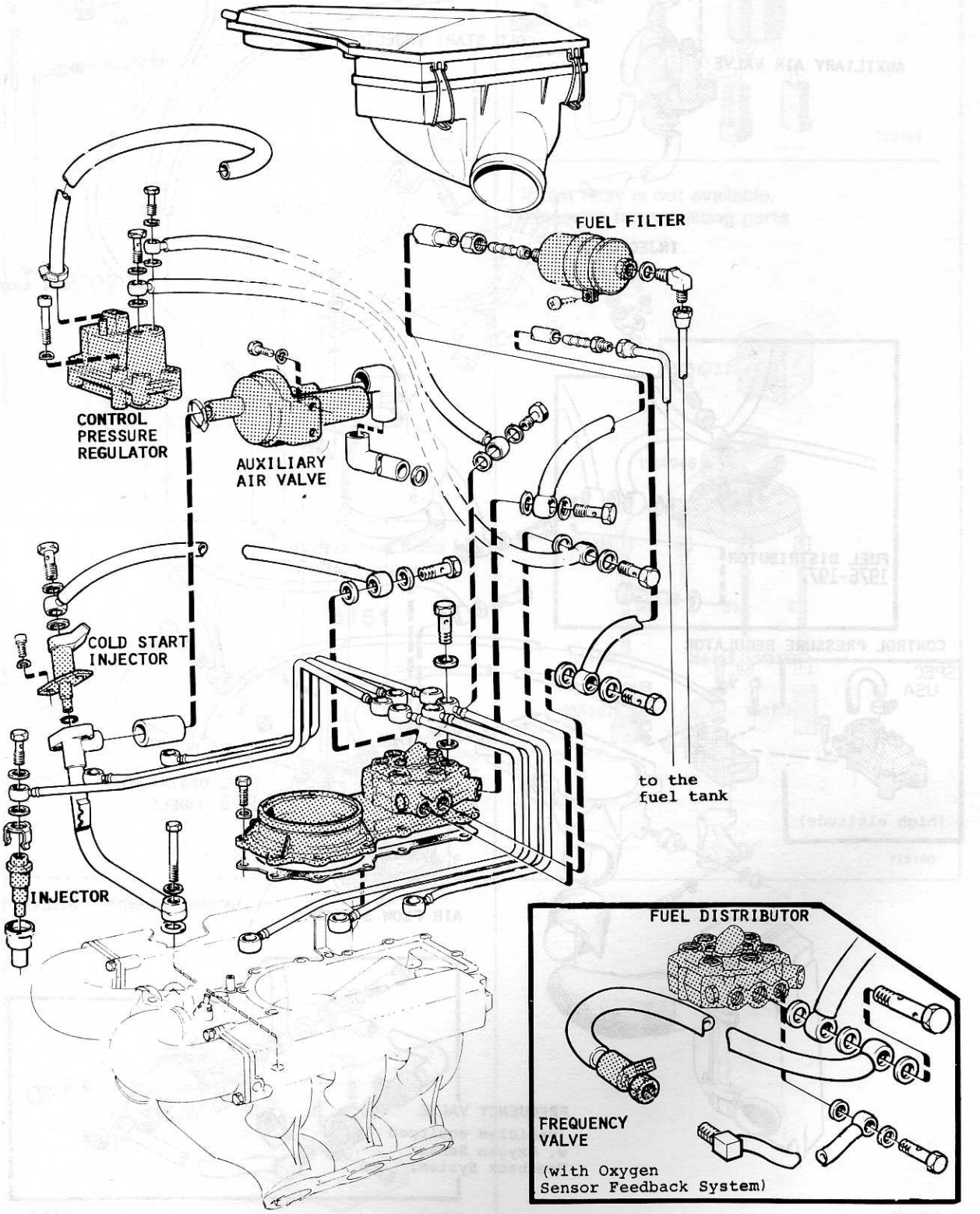


123190

CI System, B21F – Exploded View



CI System, B27F – Exploded View



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Quick reference fault tracing guide

Causes	Info	Cold engine difficult to start, or no start	Warm engine difficult to start	Cold and warm engine difficult to start	Erratic running engine, cold or during warmup	Erratic running, warm engine	Erratic running, engine cold and warm	Erratic running engine and high fuel consumption	Rough idle	Low top speed (poor engine performance)	High fuel consumption
Causes other than CI fuel:											
Battery weak	*	1									
Ignition	*	2	1 2	3 4	2 3	1 2	1 2	1 2	1 2	1 2	10
Compression	*										
Vacuum leaks	*	15	7	5	6	8	8	7	6	10	
Extreme cold	*	16									
CO	*		6			6	6	3	5	8	
Emission control systems:											
EGR	*	11	4		2	4	7	7	6	9	
Oxygen sensor feedback system	01–07	12	5			5	5	5		6	
Catalytic converter	*	13							7		
Evaporative control	*	14									
Air supply:											
Air intake system		3								3	
Air induction system	D1–D5	5	3			3		4	3		
Air flow sensor	E1–E8	8	4					5			
Fuel supply:											
Fuel pump operation	A1–A17	4									
Main relay operation (1976–77 only)	C2	6									
Fuel leakage	B1									4	
Injectors:											
Cold start injector, thermal time switch	F1–F9	7					3			5	
Injectors	J1–J11										
Fuel system pressures:											
Line and rest pressures	H1–H13		3	5					4		
Control pressure	I1–I11				1	1	4	4		7	

Note:
Numbers in Symptom columns represent order of likely occurance.

* Refer to appropriate Service Manual

Symptom – cold engine difficult to start or no start

Probable cause	*Remedy*
Battery weak	Operate starter and note engine cranking speed. If too slow, check condition of battery and connections.
Weak or no ignition spark	Check by holding spark plug wire 5/16" to 3/8" (8–10 mm) away from engine block while engine is cranked. A strong spark should be noted.
Air intake system blocked	Check air filter. Replace as necessary.
Fuel supply	See below:

Perform simple checks:

Fuel pump operation
Refer to op. A1–A3

Air induction system
B21F – op. D1–D2
B27F – op. D3–D5

Main relay operation
1976–1977 only.
Refer to op. C2

Cold start injector
Refer to op. F1–F9

Air flow sensor plate
B21F – op. E1–E4
B27F – op. E5–E8

Injector operation
Check that injectors whine with air flow sensor plate lifted (depressed on B27F) and fuel pump operating.

If all injectors are quiet, check pressures in the fuel system as follows:

Line and rest pressures:
– op. H1–H13
Control pressure:
– op. I1–I11

Continued next page

Symptom – cold engine difficult to start or no start

Continued from previous page

Malfunction in system other than CI fuel

See below:

Ignition
Check ignition timing

Compression
Check engine compression

Emission control

EGR
Check for stuck EGR valve or refer to Emission System Repair and Maintenance Manual, TP 11121

Oxygen Sensor Feedback System (Lambda sond)
Eliminate system using op. 01–07 or refer to Oxygen Sensor Feedback System Manual.

Catalytic converter
Check for damage and/or blockage.

Evaporative control
Check for stuck valves or vacuum leaks. (Refer to Emission System Repair & Maintenance Manual.)

Other possible trouble areas...

Vacuum leaks
Inspect all hoses and connections.

Extreme cold
Install winterizing kit.

CI fuel system malfunction

Troubleshoot entire CI fuel system.
Perform procedural operations within Groups A through J in this manual.

Effect repair using the following Repair & Maintenance Manuals, as necessary:

B21F – TP 11121
B27F – TP 11122

Symptom – warm engine difficult to start

Probable cause	*Remedy*
Ignition system	Check ignition timing.
Compression	Check engine compression.
CI fuel system rest pressure and pressure drop	Refer to op. H1–H13.
EGR system	Check operation of EGR valve or refer to Emission Repair & Maintenance Manual, TP 11123.
Oxygen sensor feedback system (Lambda sond)	Eliminate system using op. 01–07 or refer to Oxygen Sensor Feedback System Manual.
CI fuel system malfunction	Troubleshoot entire CI fuel system. Perform procedural operations within Groups A through J in this manual. Effect repair using the following Repair & Maintenance Manuals, as necessary: B21F – TP 11121 B27F – TP 11122

Symptom – cold & warm engine difficult to start

Probable cause	*Remedy*
Ignition system	Check ignition timing.
Compression	Check engine compression.
Air induction system	B21F – op. D1–D2 B27F – op. D3–D5
Air flow sensor	B21F – op. E1–E4 B27F – op. E5–E8
CI fuel system line pressure	Refer to op. H1–H4
CO adjustment	B21F – op. K1-K3 B27F – op. L1–L7 B21F w/Lambda sond – op. M1-M7 B27F w/Lambda sond – op. N1-N11
Vacuum leaks	Inspect all hoses and connections.
CI fuel system malfunction	Troubleshoot entire CI fuel system. Perform procedural operations within Groups A through J in this manual. Effect repair using the following Repair & Maintenance Manuals as necessary: B21 F – TP 11121 B27F – TP 11122

Symptom – erratic running engine/cold or during warmup

(Start all checks with engine cold.)

Probable cause	*Remedy*
CI fuel system control pressure	Refer to op. I1–I11.
EGR system	Check operation of EGR valve or refer to Emission Repair & Maintenance Manual, TP 11123.
Ignition system	Check ignition timing.
Compression	Check engine compression.
Vacuum leaks	Check all hoses and connections.
CI fuel system malfunction	Troubleshoot entire CI fuel system. Perform procedural operations within Groups A through J in this manual. Effect repair using the following Repair & Maintenance Manuals, as necessary: B21F – TP 11121 B27F – TP 11122

Symptom – erratic running, warm engine

Probable cause	*Remedy*
CI fuel system control pressure	Refer to op. I1–I11
Ignition system	Check ignition timing.
Compression	Check engine compression
EGR system	Check operation of EGR valve or refer to Emission Repair & Maintenance Manual, TP 11123.
Oxygen sensor feedback system (Lambda sond)	Eliminate system using op. 01–07 or refer to Oxygen Sensor Feedback System Manual.
Vacuum leaks	Check all hoses and connections.
CI fuel system malfunction	Troubleshoot entire CI fuel system. Perform procedural operations within Groups A through J in this manual. Effect repair using the following Repair & Maintenance Manuals, as necessary: B21F – TP 11121 B27F – TP 11122

Symptom – Erratic running, engine cold & warm

Probable cause	*Remedy*
Ignition system	Check ignition timing.
Compression	Check engine compression.
Air induction system	B21F – op. D1 B27F – op. D3
CI fuel system control pressure	Refer to op. I1–I11
Oxygen sensor feedback system (Lambda sond)	Eliminate system using op. 01–07 or refer to Oxygen Sensor Feedback System Manual.
CO adjustment	B21F – op. K1–K3 B27F – op. L1–L7 B21F w/Lambda sond – op. M1–M7 B27F w/Lambda sond – op. N1–N11
Throttle valve(s)	B21F – refer to op. D2 B27F – refer to op. D4–D5
EGR system	Check operation of EGR valve or refer to Emission Repair & Maintenance Manual, TP 11123.
Vacuum leaks	Check all hoses and connections.
CI fuel system malfunction	Troubleshoot entire CI fuel system. Perform procedural operations within Groups A through J in this manual. Effect repair using the following Repair & Maintenance Manuals, as necessary: B21F – TP 11121 B27F – TP 11122

Symptom – erratic running engine and high fuel consumption

(Start all checks with a cold engine.)

Probable cause	*Remedy*
Ignition system	Check ignition timing.
Compression	Check engine compression.
Cold start injector leaking	Refer to op. F1–F4.
CI fuel system control pressure	Refer to op. I1–I11.
Oxygen sensor feedback system (Lambda sond)	Eliminate system using op. 01–07 or refer to Oxygen Sensor Feedback System Manual.
CO adjustment	B21F – op. K1–K3 B27F – op. L1–L7 B21F w/Lambda sond – op. M1–M7 B27F w/Lambda sond – op. N1–N11.
EGR system	Check operation of EGR valve or refer to Emission Repair & Maintenance Manual, TP 11123.
Vacuum leaks	Check all hoses and connections.
CI fuel system malfunction	Troubleshoot entire CI fuel system. Perform procedural operations within Groups A through J in this manual. Effect repair using the following Repair & Maintenance Manuals, as necessary: B21F – TP 11121 B27F – TP 11122

Symptom – rough idle

Probable cause	*Remedy*
Ignition system	Check ignition timing.
Compression	Check engine compression.
Engine cylinders **Injectors**	Check ignition spark at each cylinder. Check injection at each cylinder, see op. J1–J10.
CO adjustment	B21F – op. K1–K3 B27F – op. L1–L7 B21F w/Lambda sond – op. M1–M7 B27F w/Lambda sond – op. N1–N11
Air induction system	B21F – op. D1 B27F – op. D3
Air flow sensor and/or fuel distributor binding or seizing	B21F – refer to op. E1–E4 B27F – refer to op. E5–E8
EGR system	Check operation of EGR valve or refer to Emission Repair & Maintenance Manual, TP 11123.
Vacuum leaks	Check all hoses and connections.
CI fuel system malfunction	Troubleshoot entire CI fuel system. Perform procedural operations within Groups A through J in this manual. Effect repair using the following Repair & Maintenance Manuals, as necessary: B21F – TP 11121 B27F – TP 11122

Symptom – low top speed (poor engine performance)

Probable cause	*Remedy*
Ignition system	Check ignition timing.
Compression	Check engine compression.
Throttle valve(s)	B21F – refer to op. D2. B27F – refer to op. D4–D5.
Fuel supply (line pressure)	Refer to op. H1–H4.
CO adjustment	B21F – op. K1–K3 B27F – op. L1–L7 B21F w/Lambda sond – op. M1–M7 B27F w/Lambda sond – op. N1–N11
Vacuum leaks	Check all hoses and connections.
Catalytic converter	Check for damage and/or blockage.
CI fuel system malfunction	Troubleshoot entire CI fuel system. Perform procedural operations within Groups A through J in this manual. Effect repair using the following Repair & Maintenance Manuals, as necessary: B21F – TP 11121 B27F – TP 11122

Symptom – high fuel consumption

(Start all checks with engine cold.)

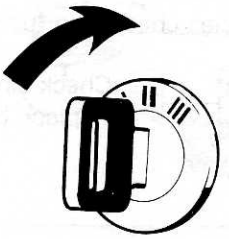
Probable cause	*Remedy*
Ignition system	Check ignition timing.
Compression	Check engine compression.
Air cleaner	Check for blockage.
External fuel leakage	Perform visual check, op. B1.
Cold start injector leaking	Refer to op. F1–F4.
Oxygen sensor feedback system (Lambda sond)	Eliminate system using op. 01–07 or refer to Oxygen Sensor Feedback System Manual.
CI fuel system control pressure	Refer to op. I1–I11.
CO adjustment	B21F – op. K1–K3 B27F – op. L1–L7 B21F w/Lambda sond – op. M1–M7 B27F w/Lambda sond – op. N1–N11
EGR system	Check operation of EGR valve or refer to Emission Repair & Maintenance Manual, TP 11123.
Vacuum leaks	Check all hoses and connections.
CI fuel system malfunction	Troubleshoot entire CI fuel system. Perform procedural operations within Groups A through J in this manual. Effect repair using the following Repair & Maintenance Manuals, as necessary: B21F – TP 11121 B27F – TP 11122

Fault analysis

Fuel pump operation – simple check

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

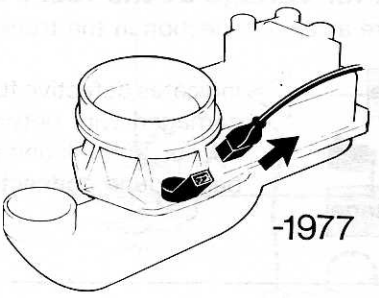
A1



123267

Set ignition switch to ON.
(Do not attempt to engage starter at this time.)

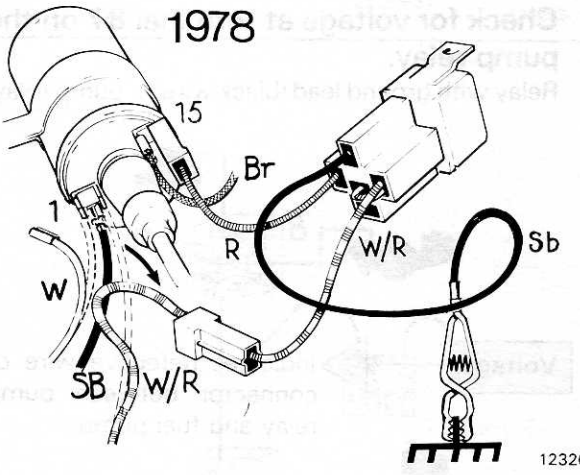
A2



123267

1976–1977 Vehicles
Remove the connector from the air flow sensor to enable fuel pump operation.

A3



123268

1978 Vehicles:

Install test relay 5170.
(This relay simulates electronic module pulses from the ignition system.)

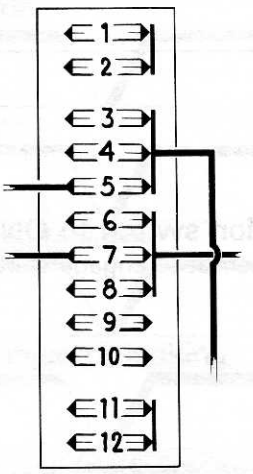
Listen
Listen at rear of vehicle for fuel pump motor operation. (This test should be conducted in a relatively quiet work area.)

Fuel pump inoperative

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.
Reference wiring diagram at rear of this manual.

1976–1977 Vehicles

A4



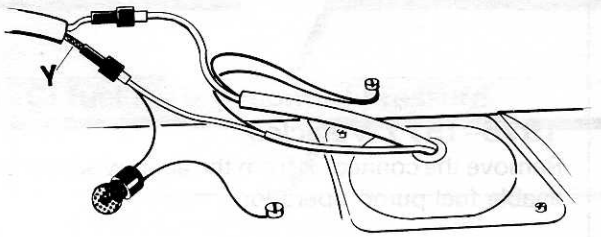
123275

Check fuse No. 7.
(On 1976 vehicles check also fuse No. 5.)

Fuse blown or defective. → Check circuit for shorts. Replace blown fuse.

Fuse not defective.

A5



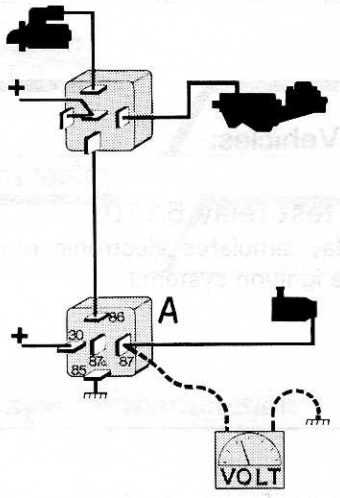
123276

Check for voltage at the fuel pump.
(Measure at the connection in the trunk.)

Voltage → Indicates defective fuel pump, damaged wire between connection in trunk and pump, or bad ground connection.

No voltage

A6



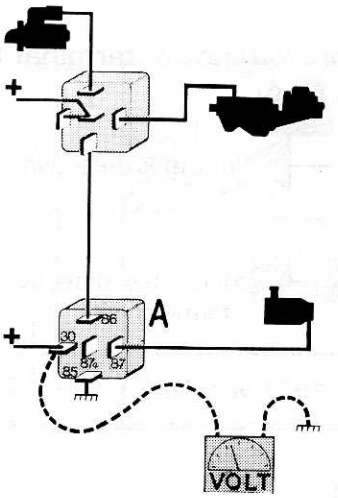
123277

Check for voltage at terminal 87 on the pump relay.
Relay with ground lead (black wire) = pump relay.

Voltage → Indicates defective wire or connector between pump relay and fuel pump.

No voltage

A7



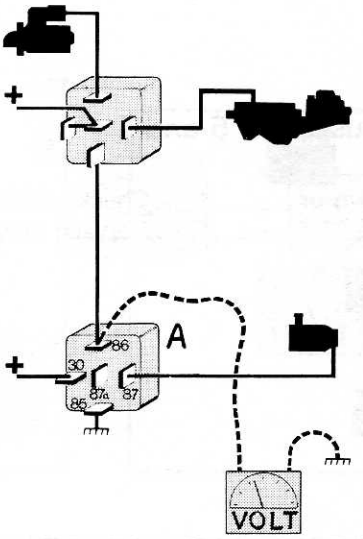
123277

Check for voltage at terminal 30/51 on the pump relay.

Voltage → Indicates defective wire between fuse No. 7 and pump relay.

No voltage

A8



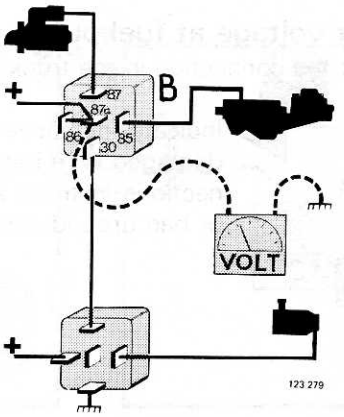
123278

Check for voltage at terminal 86 on the pump relay.

Voltage → Check the relay ground connection. If ground is OK replace the pump relay.

No voltage

A9



123 279

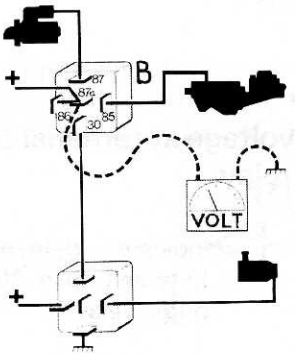
123279

Check for voltage at terminal 30 on the main relay.

Voltage → Indicates defective wire between the main relay and the pump relay.

No voltage

A10



123279

Check for voltage at terminal 87a on the main relay.

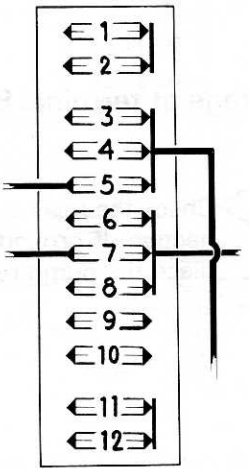
Voltage → Indicates defective main relay.

No voltage → Indicates defective wire to terminal 87a.

End of fuel pump fault tracing 1976–1977 vehicles.

1978 Vehicles

A11

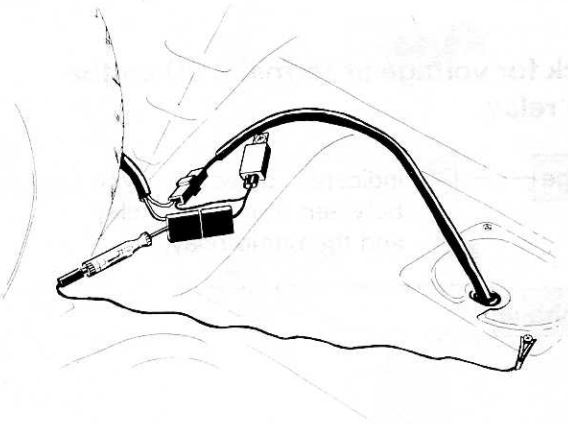


Check fuses No. 5 and 7.

Fuse blown or defective → Check circuit for shorts. Replace blown fuse.

Fuses OK

123275 A12



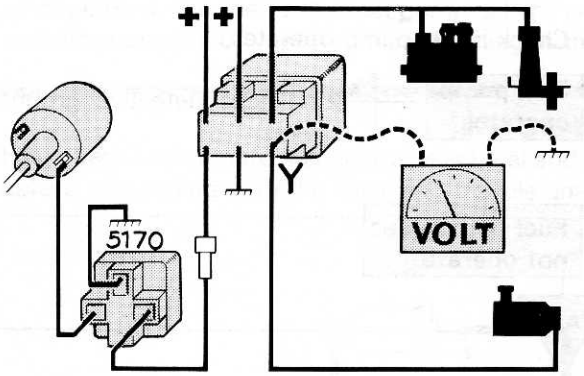
Check for voltage at fuel pump.
(Measure at the connection in the trunk.)

Voltage → Indicates defective fuel pump, damaged wire between connections in trunk and pump, or bad ground connection.

No voltage

123280

A13



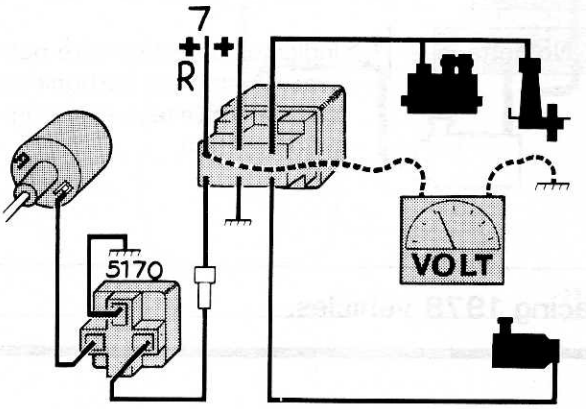
123281

Check for voltage at terminal 87 on the (main) relay (yellow wire).

Voltage → Indicates defective wire between (main) relay and fuel pump.

No voltage

A14



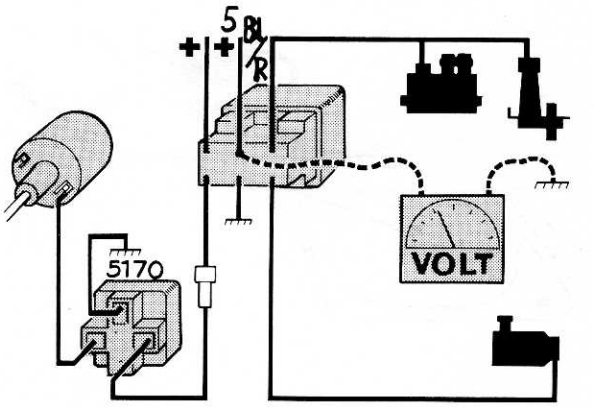
123282

Check for voltage at terminal 30 on the (main) relay (red wire).

No voltage → Indicates defective wire between (main) relay and fuse No. 7.

Voltage

A15



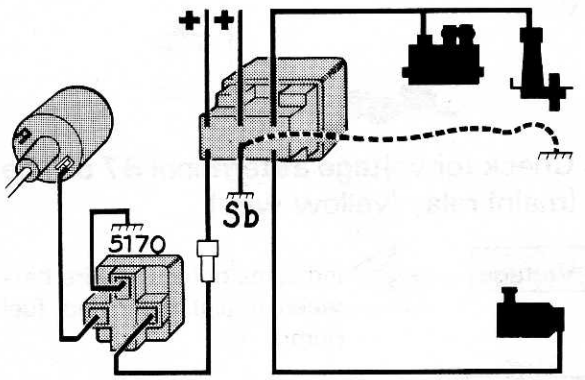
123283

Check for voltage at terminal 15 on the (main) relay (blue/red wire).

No voltage → Indicates defective wire between relay and fuse No. 5.

Voltage

A16



123284

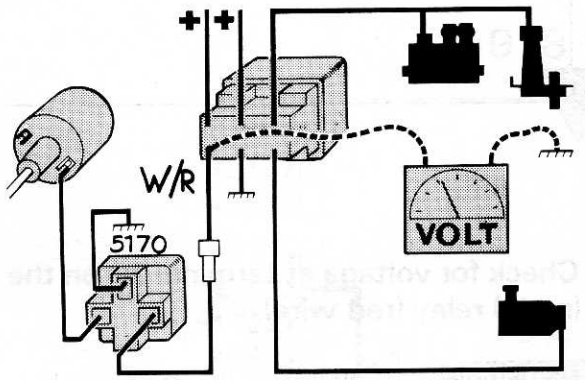
Ground the (main) relay (terminal 31 – black wire).

Check if fuel pump operates.

Fuel pump operates → Indicates defective ground wire.

Fuel pump does not operate

A17



123285

Check for pulsating voltage at terminal 31b on the (main) relay (white/red wire).

Voltage → Indicates defective relay.

No voltage → Indicates defective wire between (main) relay and ignition coil, defective test relay or ignition system.

End of fuel pump fault tracing 1978 vehicles.

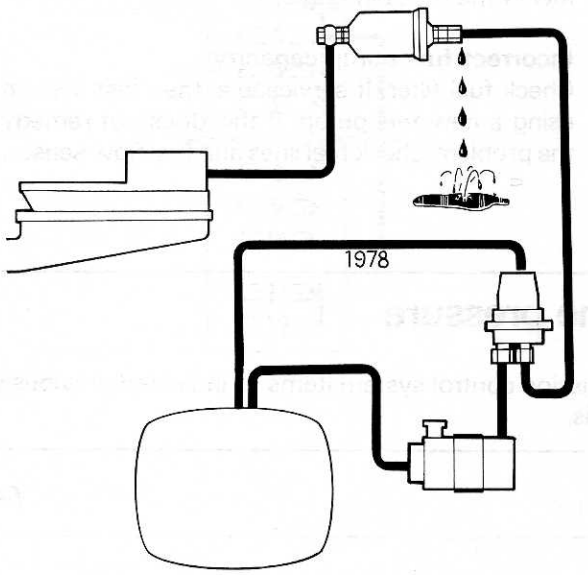
Fuel supply

Some 1976 models and all 1977–78 models are equipped with a fuel feed pump (tank pump). With this arrangement, the line to the fuel pump is kept under approximately 0.2 kp/cm² (=3 psi) pressure. This will eliminate risk of vapor pockets forming in the fuel line to the main fuel pump.

Line pressure too low

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

B1



123290

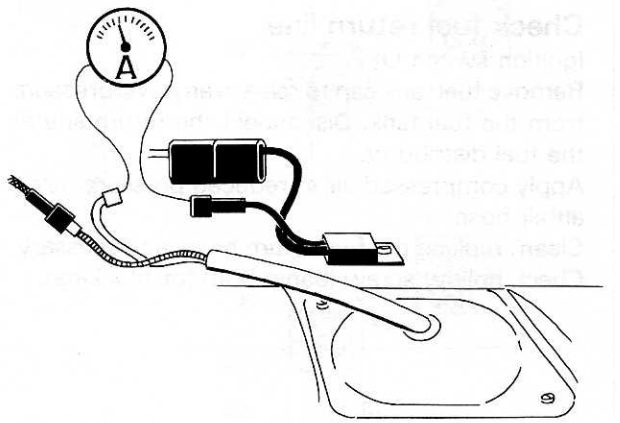
Check for leakage between the fuel pump and the fuel distributor (external leakage).

Also check for leakage at the fuel accumulator.

1978: Remove the fuel tank cap to release any overpressure in the fuel tank. Disconnect the hose (fuel accumulator-fuel tank) from the fuel accumulator. Check the fuel accumulator for leakage and re-install the hose.

Repair as necessary.

B2



113681

Check fuel feed (tank) pump

Connect an ammeter between the interference suppressor and the tank pump.

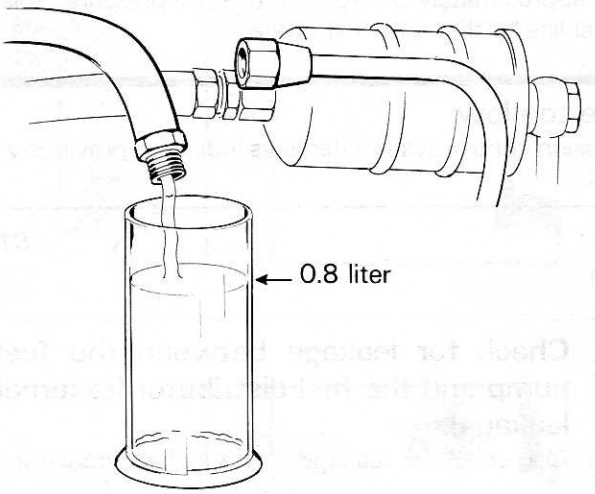
Set ignition to ON (activate fuel pump).
(See op. A1–A3).

Correct current flow is 1–2 amps.

No current flow:
Check – fuse in trunk.
– for voltage to the fuel feed pump.

Incorrect current flow:
Check the fuel feed pump and filter. If current flow is below normal, check the fuel level.

B3



123295

Check fuel pump capacity

Remove the fuel tank cap to release any overpressure.
Disconnect the return line at the connection in the engine compartment. Hold the disconnected end of the return line over a measuring glass.
Set ignition to ON (activate fuel pump) for 30 seconds and then switch OFF again.
There should be a minimum quantity of 0.8 liter fuel in the measuring glass.

Incorrect fuel pump capacity:
Check fuel filter. If serviceable, then test system using a new fuel pump. If this does not remedy the problem, check fuel lines and fuel flow sensor.

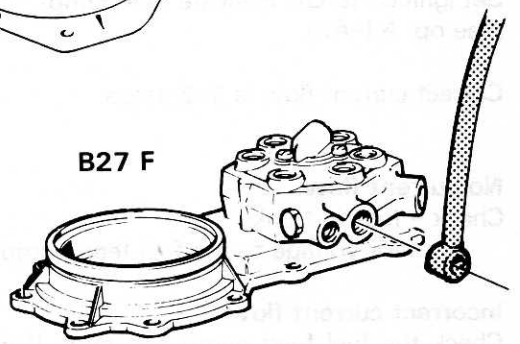
Excessive line pressure

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

B4

B21 F

B27 F



125923

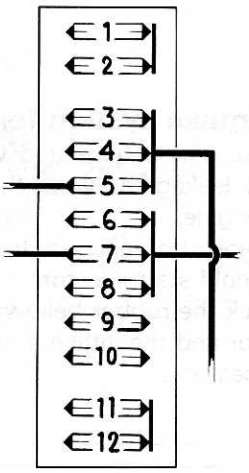
Check fuel return line

Ignition switch OFF.
Remove fuel tank cap to release any overpressure from the fuel tank. Disconnect the return line at the fuel distributor.
Apply compressed air at reduced pressure using an air hose.
Clean/replace the fuel return hose, as necessary.
Check hollow screw (banjo bolt) for blockage.

Electrical supply

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

C1



123275

Check fuses

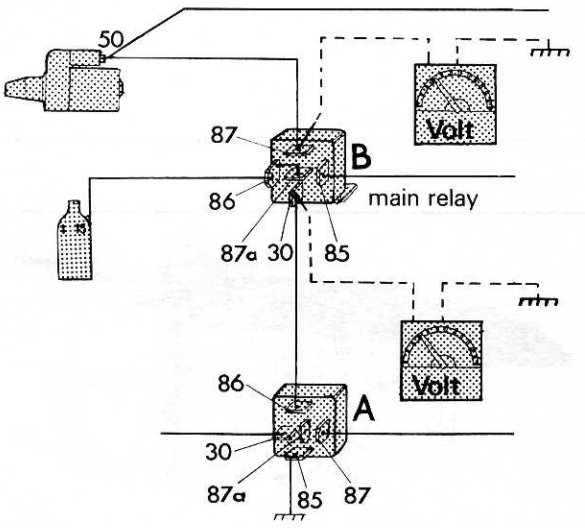
1976–77:
Fuse No. 5, 8 amps.
Protects the main relay and the fuel pump relay circuits.

Fuse No. 7, 16 amps.
Protects the fuel pump, fuel feed pump, control pressure regulator and the auxiliary air valve circuits.

1978:
Fuse No. 5, 8 amps.
Protects the electronic fuel pump relay circuit.

Fuse No. 7, 16 amps.
Protects the fuel pump, fuel feed pump, control pressure regulator and the auxiliary air valve circuits.

C2



125219

Check main relay (1976–1977)

Operate the starter motor. Check for voltage at main relay terminal 30/51 with the starter motor energized.
If there is no voltage, check for voltage at main relay terminal 87 with the starter motor energized.

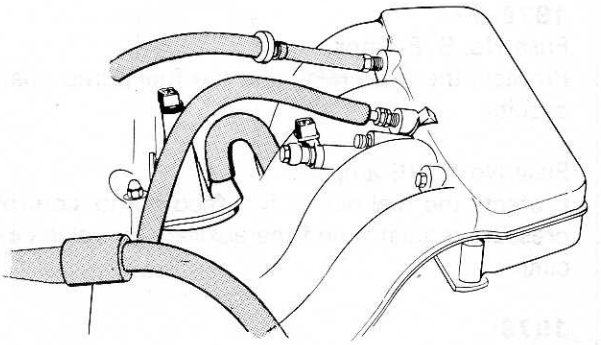
No voltage:
Indicates that the wire from the starter motor to main relay terminal 87 is defective.

Voltage:
Indicates that the main relay is defective.

Air intake/throttle valve (B21F)

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

D1

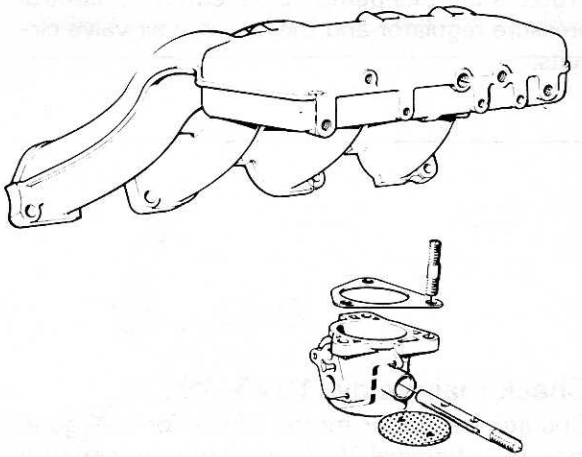


120756

Check air intake system for leakage

Check all hose connections and O-rings. There must be no air leakage between the air flow sensor and the engine.
Check that there is no leakage at the injector holders or at the cold start injector.
Carefully check the rubber bellows between the air flow sensor and the intake manifold.
Repair as necessary.

D2



125918

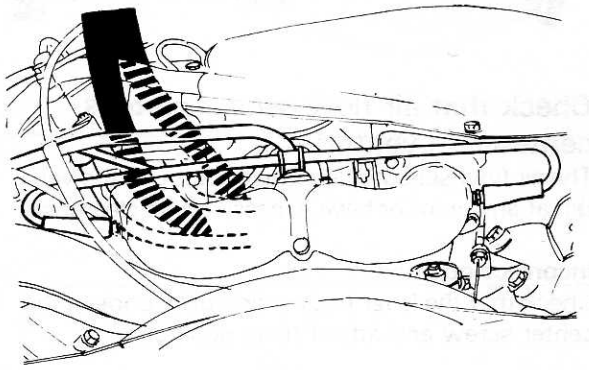
Throttle valve

Check that the throttle valve is securely attached and correctly installed.

Air intake / throttle valves (B27F)

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

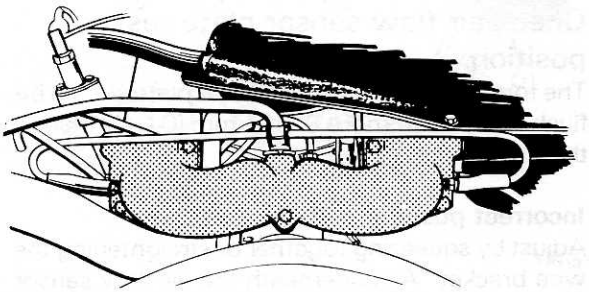
D3



Check air intake system for air leaks (visual inspection).

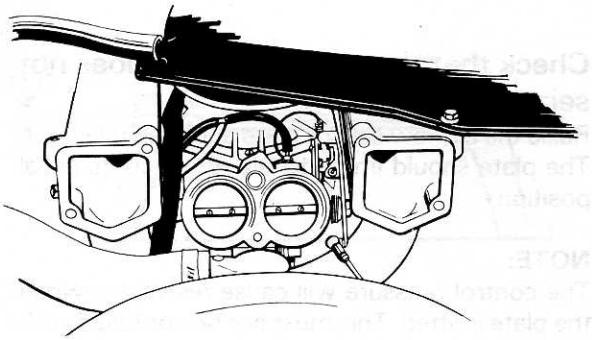
Check:
1. Auxiliary air valve hose connections.
2. Cold start injector hose connections.
3. CO adjustment plug.
4. Remaining hose connections.
5. For leaks in O-rings and gaskets.

D4



Remove the front intake manifold to check the throttle valves.

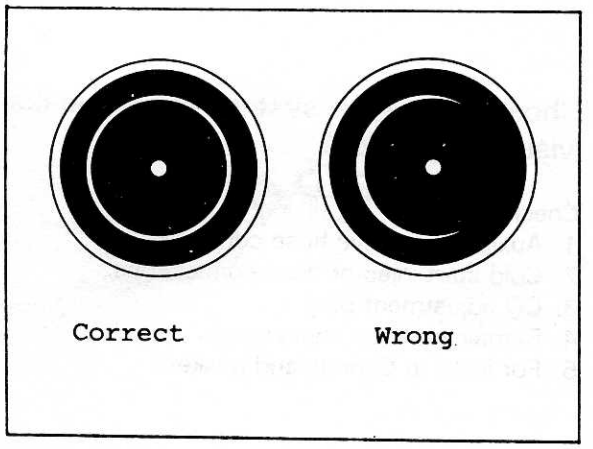
D5



Throttle valves.
Check that the throttle valves are securely attached, correctly centered and do not bind.
Use new O-rings and gaskets when re-installing the front intake manifold.

Air flow sensor (B21F)

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

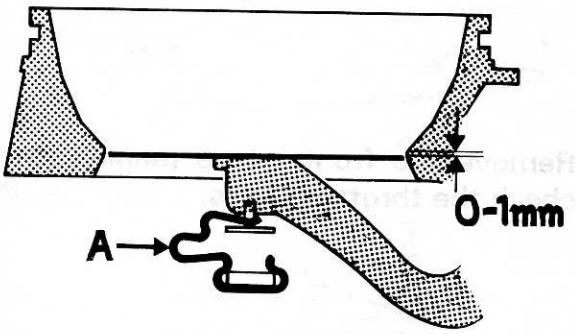


108604

E1

Check that air flow sensor plate is centered in venturi.
The air flow sensor plate must not touch the venturi at any point or have excessive side clearance.

Incorrect position:
Check that the lever has no side play. Loosen the center screw and adjust plate position.

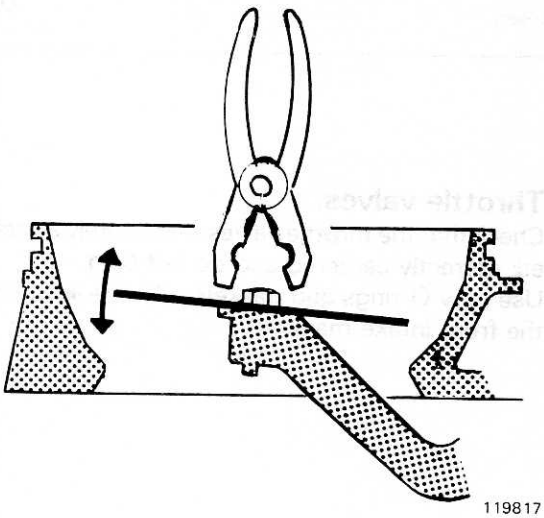


108603

E2

Check air flow sensor plate rest position.
The top side of the air flow sensor plate should be flush with, or no more than 1 mm (0.04") below, the lower edge of the cone.

Incorrect position:
Adjust by squeezing together or straightening the wire bracket "A" underneath the air flow sensor plate.



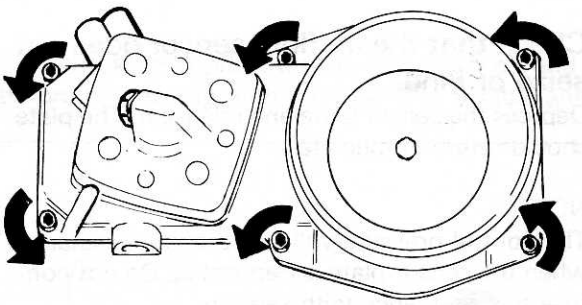
119817

E3

Check that the air flow sensor does not seize or bind.
Raise the air flow sensor plate and then release it. The plate should immediately return to its initial position.

NOTE:
The control pressure will cause resistance when the plate is lifted. This must not be confused with jamming.

E4



120784

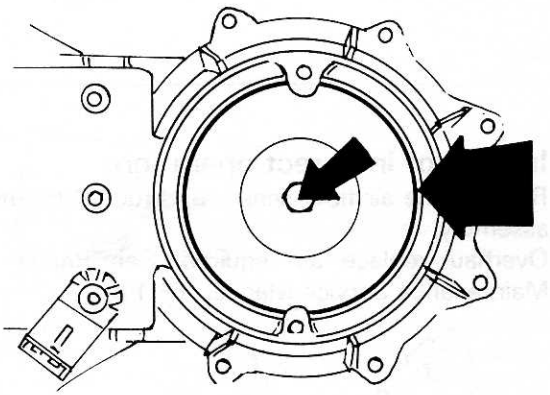
In case of incorrect operation.

Remove the air flow sensor and fuel distributor assembly.

Overhaul/replace as necessary. See Repair & Maintenance Service Manual, TP 11121.

(B27F)

E5



121018-2V

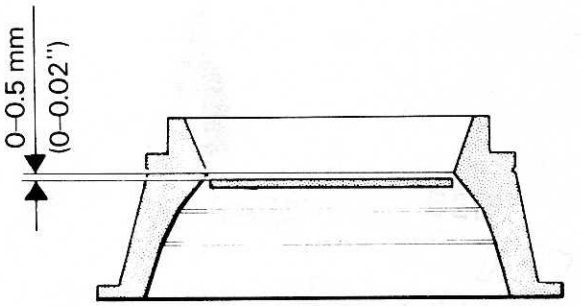
Check that air flow sensor plate is centered in venturi.

The air flow sensor plate must not touch the venturi at any point or have excessive side clearance.

Incorrect position:

Check that the lever has no side play. Loosen the center screw and adjust plate position.

E6



121018-2X

Check air flow sensor plate rest position.

The distance shown should be 0–0.5 mm (0–0.02").

If misaligned, check plate lever for distortion and position of contact pin.

Check that the plate stop does not touch the plate.

Contact pin is adjustable (inward) using a drift and mallet. Light to moderate tapping is sufficient to move pin. Removal of the air flow sensor is necessary to drive pin outward.

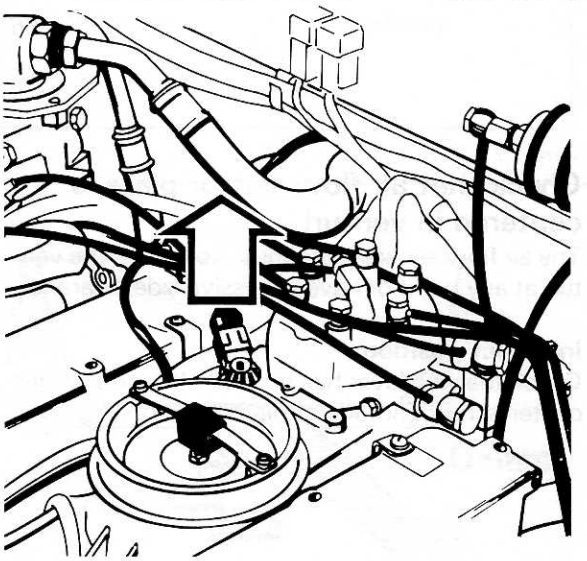
E7

Check that the air flow sensor does not seize or bind.

Depress the sensor plate and release it. The plate should return immediately.

NOTE:
The control pressure will cause some resistance when the sensor plate is depressed. Do not confuse this resistance with seizing.

Possible faults:
- Lever seizes in housing.
- Lever pivot seizes in housing.
- Plunger binds.



E8

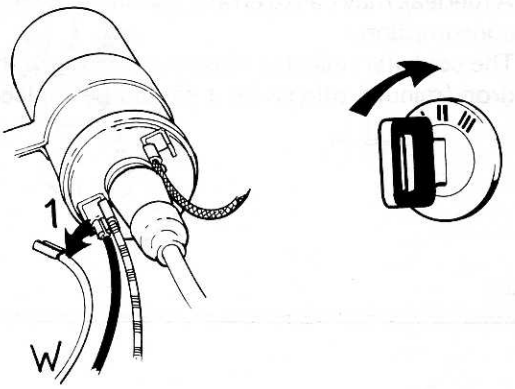
In case of incorrect operation:

Remove the air flow sensor and fuel distributor assembly.
Overhaul/replace as required. See Repair & Maintenance Service Manual, TP 11122.

Cold start injector / thermal time switch

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

F1

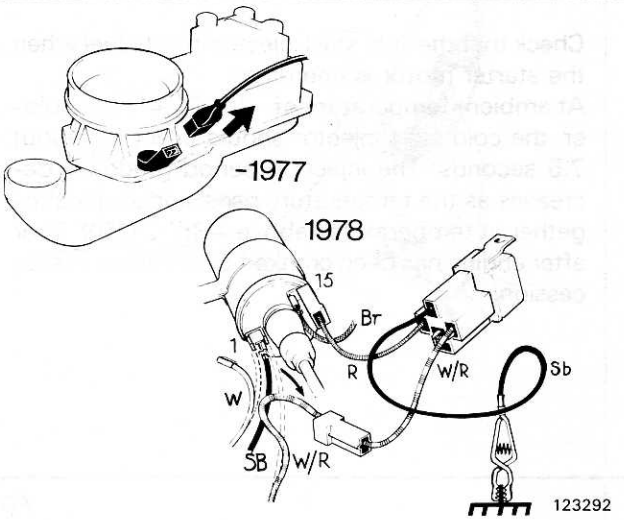


123298

Disconnect the white wire from terminal 1 on the ignition coil (safety measure).

Set ignition switch to ON.

F2



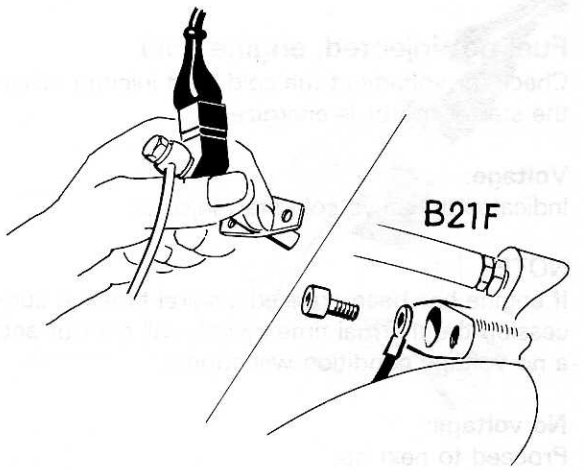
123292

Operate the fuel pump.

1976–1977:
Remove the connector from the air flow sensor to start the fuel pump.

1978:
Install test relay 5170 to start the fuel pump.

F3



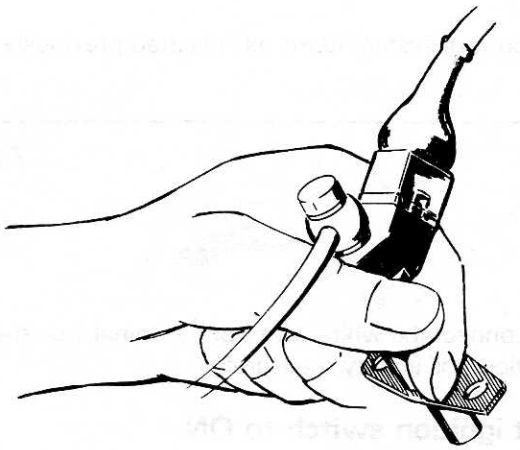
123272

Remove cold start injector from intake manifold.

B21F:
Reconnect the ground wire to one of the retaining screws for the cold start injector to allow cold start injector to function.
Check whether engine is warm (above +35° C = 109° F) or cold.

Warm engine: proceed to op. F8.
Cold engine: proceed to next operation.

F4



120375

Check for cold start injector leakage.

A fuel leak may cause erratic running and high fuel consumption.
The cold start injector must not leak more than 1 drop/minute, otherwise it should be replaced.

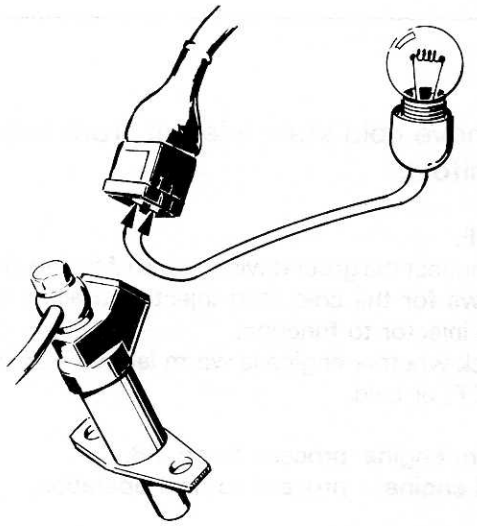
F5

120373

Cold engine

Check that the cold start injector injects fuel when the starter motor is energized.
At ambient temperature of –20° C (–4° F) or colder, the cold start injector should inject for about 7.5 seconds. The injection period gradually decreases as the temperature rises, and stops altogether at temperatures above +35° C (109° F) or after engine has been cranked a few times in succession.

F6



120374

Fuel not injected, engine cold:

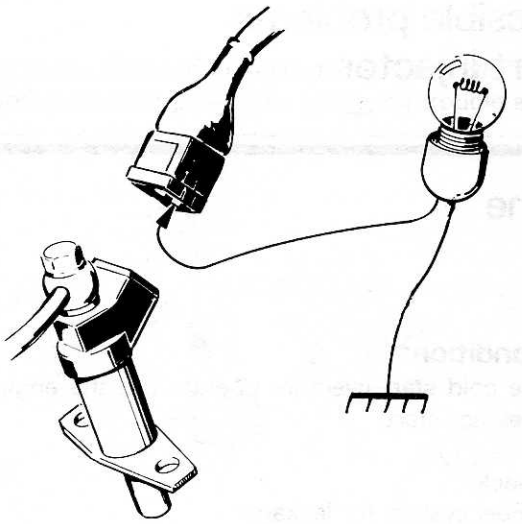
Check for voltage at the cold start injector when the starter motor is energized.

Voltage:
Indicates defective cold start injector.

NOTE:
If engine has been cranked several times in succession the thermal time switch will cut out and a no voltage condition will appear.

No voltage:
Proceed to next op.

F7



123273

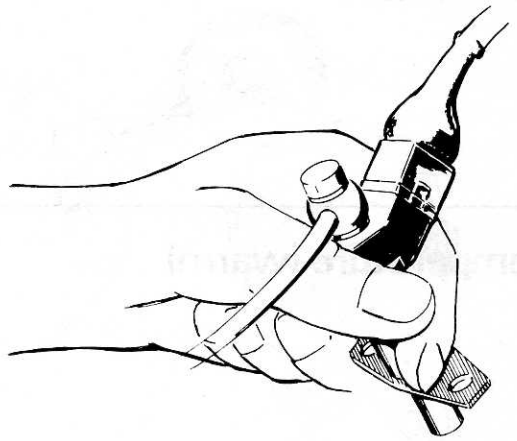
No voltage in op. F6:

Check for voltage between the connector and the chassis with the starter motor energized.
1976–1978 = blue/yellow cable – chassis.

Voltage:
Indicates thermal time switch cutout or defective thermal time switch. Check also for defective wire between thermal time switch and cold start injector.

No voltage:
Indicates defective wire between starter motor and cold start injector.

F8



120375

Warm engine

Check if the cold start injector injects fuel when the starter motor is energized.
The injector must not inject fuel when the engine is warm (above +35° C = 112° F).

If fuel is injected with warm engine, there may be two causes:
1. Thermal time switch defective.
2. Cold start injector defective.

To establish correct cause, proceed to next op.

F9

123274

Cold start fuel injected, engine warm:

Remove the connector from the cold start injector to eliminate influence from the thermal time switch. If there is injection when the starter motor is energized, the cold start injector is defective. No injection at this time indicates a defective thermal time switch.

Quick reference for possible problems involving cold start injector

Cold engine

Condition:
Cold start injector does not inject fuel when the starter motor is energized:

Action:
Check for voltage to the cold start injector.

- Voltage:
  Indicates a defective cold start injector.
- No voltage:
  Indicates defective thermal time switch or electrical wires.

Condition:
The cold start injectors operate but the engine does not start.

Check:
- Fuel system for leakage.
- Auxiliary air valve.
- Control pressure.

Engine at normal operating temperature (warm)

Condition:
The cold start injector operates when engine temperature is above 35° C (109° F):

Action:
Disconnect the wire connector at the cold start injector.

- Injector still injects: replace it.
- Injection stops: indicates defective thermal time switch.

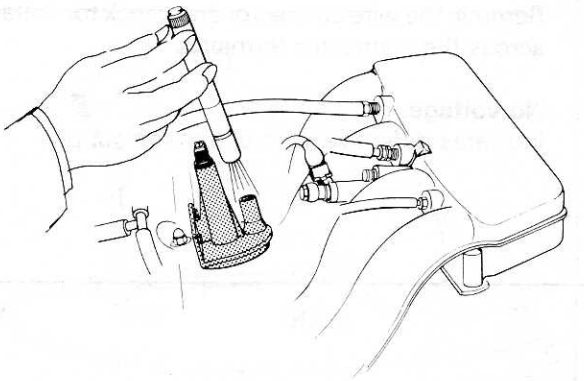
Condition:
Cold start injector does not operate and engine does not start.

Check:
- Leaking fuel system.
- Injectors leaking.
- Incorrect line pressure.
- Incorrect rest pressure.
- Incorrect CO adjustment.

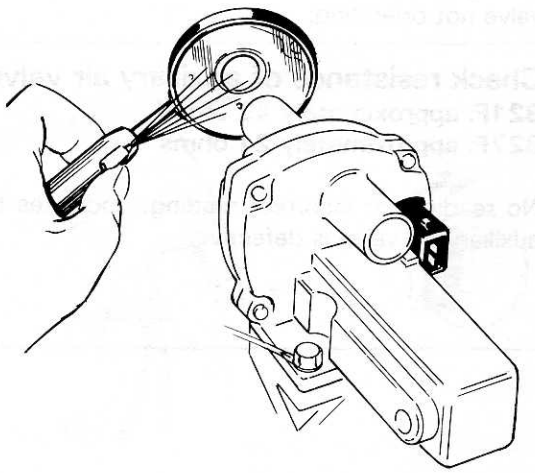
Auxiliary air valve

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

G1



120762



120388

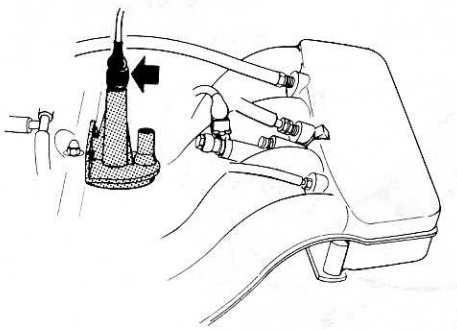
Check auxiliary air valve.

The auxiliary air valve should be partly open at room temperature, fully open at –30° C(=–22° F) and fully closed at +70° C (=158° F), or after 5 minutes of engine operation.

NOTE:
After heating up, it may take an hour for the auxiliary air valve to return to a position which corresponds to the ambient temperature.

For B27F: Use mirror and light to check.

G2

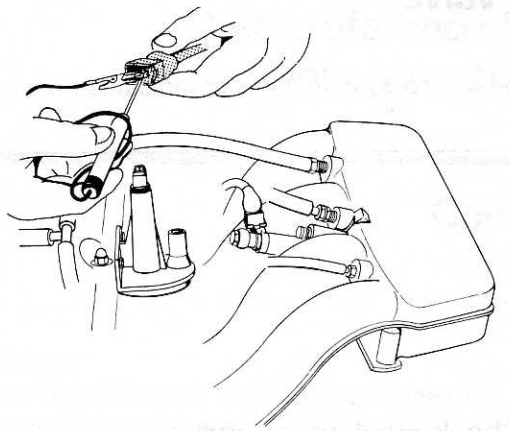


119818

Check operation of bi-metallic spring (with engine off).

For this check, the wires at the auxiliary air valve should be connected, ignition ON and the fuel pump running (see op. A1-A3). (The auxiliary air valve and control pressure regulator are also energized.)
The valve should be fully closed after approximately 5 minutes of operation.
If not, tap lightly on the valve as engine vibrations normally contribute to closing.

G3



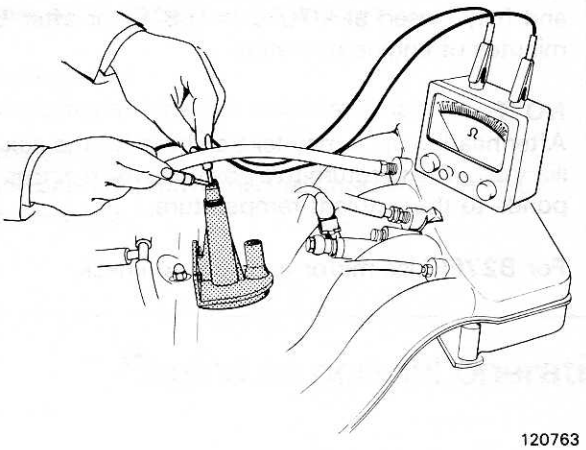
119819

If the auxiliary air valve still does not close:

Check for voltage.
Remove the wire connector and check for voltage across the connector terminals.

No voltage:
Indicates defective wire or voltage supply.

G4



120763

Voltage across the wire terminals, auxiliary air valve not operating:

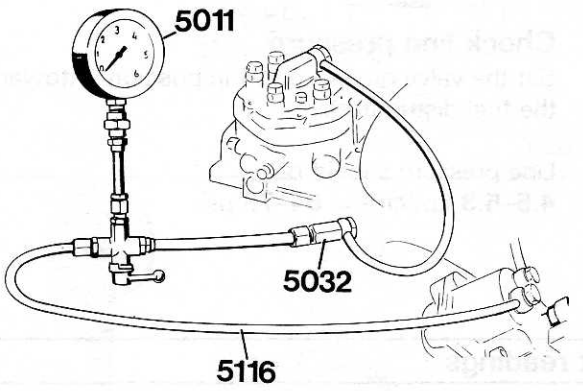
Check resistance of auxiliary air valve.
B21F: approximately 49 ohms
B27F: approximately 21 ohms

No reading, or incorrect reading, indicates the auxiliary air valve is defective.

Line and rest pressure

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

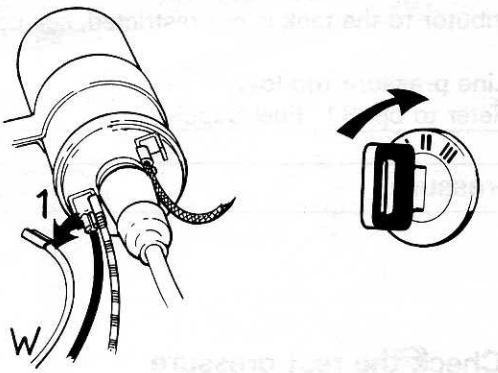
Prepare for test



117746

H1

Connect pressure gauge 5011 between control pressure regulator and fuel distributor.

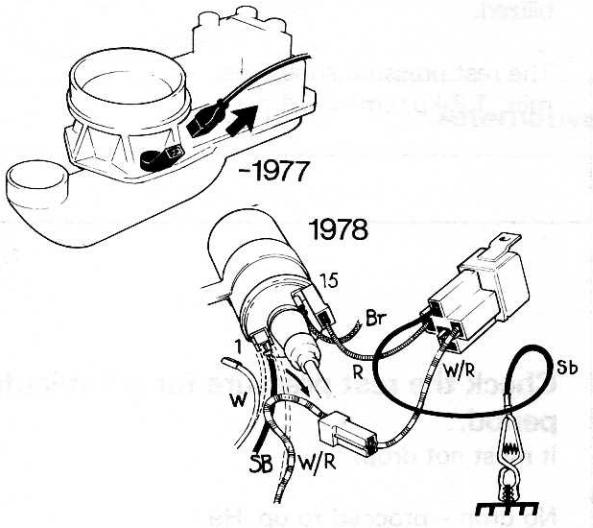


123298

H2

Disconnect the white wire from terminal 1 on the ignition coil (safety measure).

Set ignition switch to ON.



123292

H3

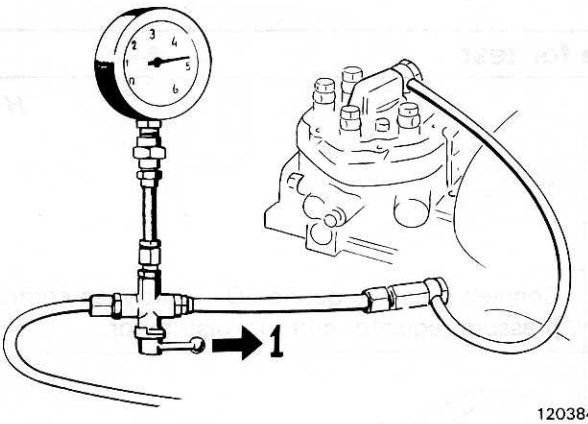
Operate the fuel pump.

1976–1977:
Remove the connector from the air flow sensor to start the fuel pump.

1978:
Install test relay 5170 to operate the fuel pump.

Check line pressure

450–530 kPa
(4.5–5.3 kp/cm²)



120384

H4

Check line pressure

Set the valve on tool 5011 in position 1 (toward the fuel distributor).

Line pressure should be:
4.5–5.3 kp/cm² = 64–75 psi.

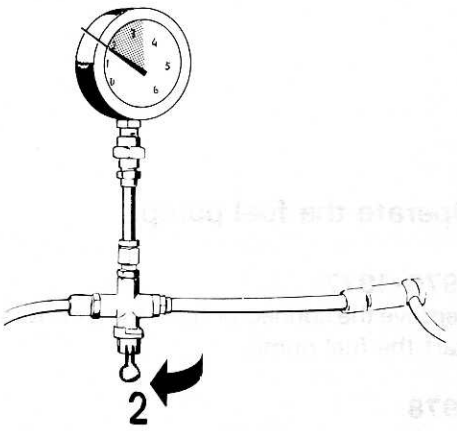
Incorrect readings

Excessive pressure:
Check that the fuel return line from the fuel distributor to the tank is not restricted, see op. B4.

Line pressure too low:
Refer to op. B1 "Fuel Supply".

Check rest pressure

170 kPa
(1.7 kp/cm²)



120764

H5

Check the rest pressure

Place the valve on tool 5011 to position 2 (right angle to the hoses) and set ignition switch to OFF. Note the rest pressure when the reading has stabilized.

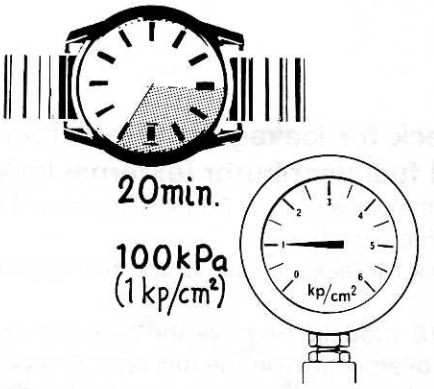
The rest pressure should be:
min. 1.7 kp/cm² = 24 psi.

H6

Check the rest pressure for a 1 minute period.

It must not drop.

No drop – proceed to op. H9.



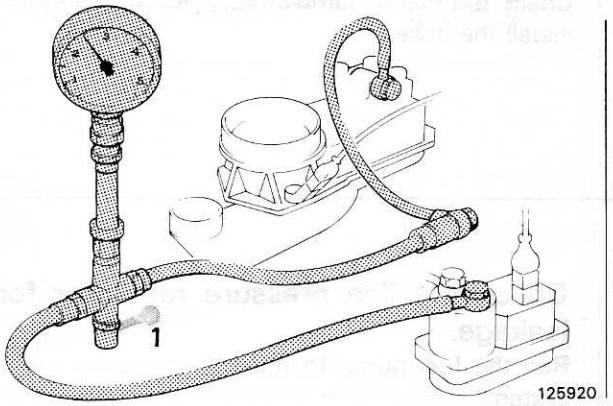
120393

H7

Pressure drop:

Check the rest pressure during a 20 minute period.
After 20 minutes there should be a remaining pressure of:

min. 1 kp/cm² = 14 psi

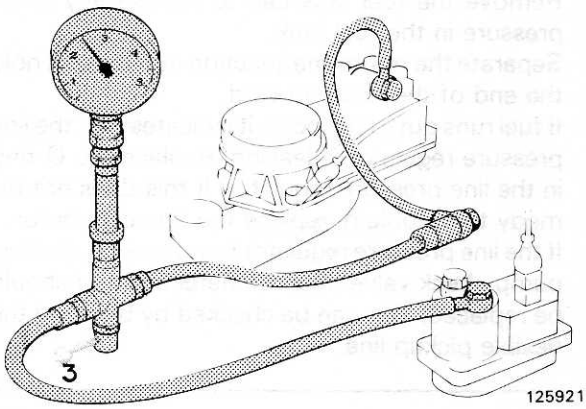


125920

H8

Pressure drops too low:

Check the rest pressure with the valve on tool 5011 in position 1.
The control pressure regulator must be warm. Repeat op. D5 (run fuel pump) to build up pressure in the system.
Set the valve on tool 5011 to position 1 (toward the fuel distributor) and note the pressure.



125921

H9

Check the rest pressure with the valve on tool 5011 in position 3.
If necessary, run the fuel pump again to build up pressure in the system.
Set the valve on tool 5011 to position 3 (towards the control pressure regulator) and note the pressure.

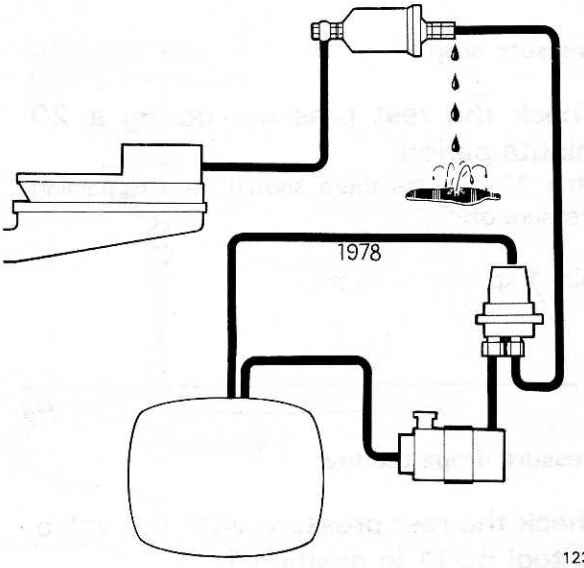
Alternative readings

Consistent but incorrect rest pressure in position 1 and 3.
Proceed to op. H12.

Rest pressure drops or is incorrect in position 3.
First check that the control pressure regulator is warm. Test using a new control pressure regulator.

Rest pressure drops in position 1.
Proceed to op. H10.

H10



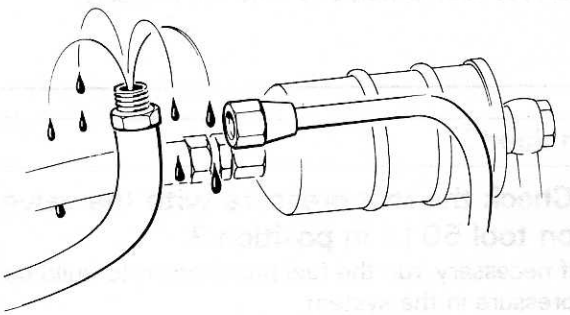
123290

Check for leakage between fuel pump and fuel distributor (external leakage).

Set the valve on tool 5011 to position 1 (toward the fuel distributor).
Check for leakage (also at the fuel accumulator).

1978 models: Remove the tank cap to release any overpressure in the fuel tank. Disconnect the hose from the fuel tank at the fuel accumulator. Check the fuel accumulator for leakage and re-install the hose.

H11



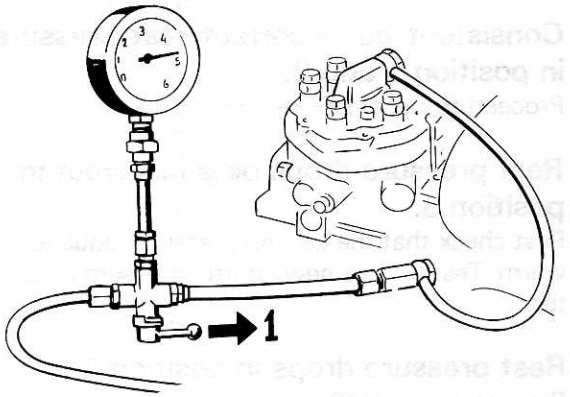
123291

Check the line pressure regulator for leakage.

Run the fuel pump to build up pressure in the system.
Remove the fuel tank cap to release any over-pressure in the fuel tank.
Separate the return line (junction at filter) and hold the end of the hose upward.
If fuel runs out of the hose, it indicates that the line pressure regulator is leaking. Replace the O-ring in the line pressure regulator. If this does not remedy the problem, replace the fuel distributor.
If the line pressure regulator is not leaking, the fuel pump check valve must be defective and should be replaced. This can be checked by blocking the flexible pickup line.

H12

450–530 kPa
(4.5–5.3 kp/cm²)

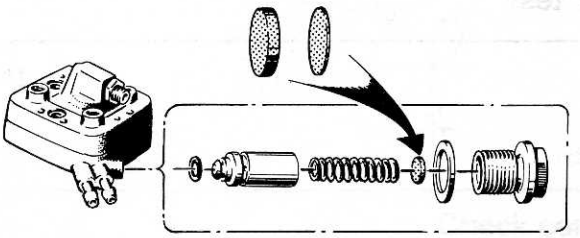


120384

Check and adjust line and rest pressures.

Line pressure:
Set the valve on tool 5011 to position 1 (toward the fuel distributor).
Operate the fuel pump.
Read line pressure. It should be:
4.5–5.3 kp/cm² = 64–75 psi.

H13



108978

Adjusting line and rest pressures.

Adjustment is made by adding or removing shims in the line pressure regulator.
Both the line and shut-off pressures are equally affected when adjusting. Both pressures increase if additional shims are installed and reduce if shims are removed.

Shims are available in two thicknesses:
0.1 mm (0.004") = provides a pressure change of 6 kPa (0.06 kp/cm² = 0.85 psi)

0.5 mm (0.020") = provides a pressure change of 30 kPa (0.3 kp/cm² = 4.3 psi)

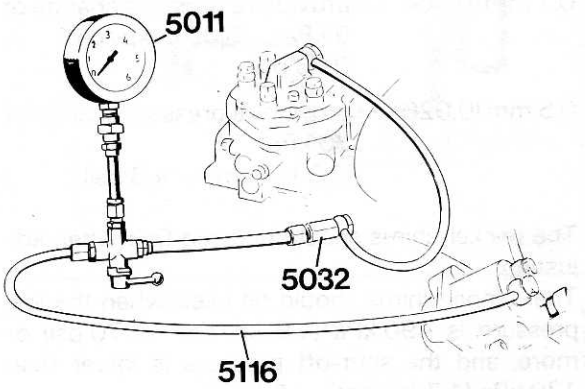
The thicker shims should be used first when adjusting.
The thinner shims should be used when the line pressure is 490 kPa (4.9 kp/cm² = 70 psi) or more, and the shut-off pressure is lower than 170 kPa (1.7 kp/cm² = 24 psi).

Control pressure

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

Prepare for test

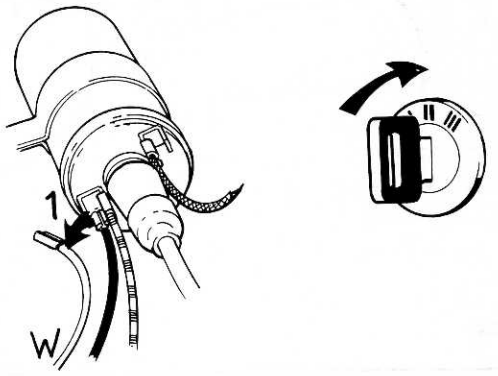
I1



117746

Connect pressure gauge 5011 between control pressure regulator and fuel distributor.

I2

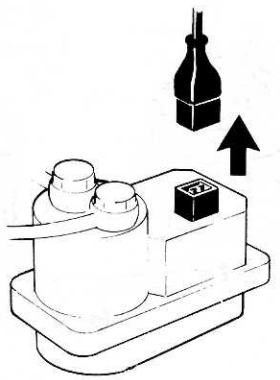


123298

Disconnect the white wire from terminal 1 on the ignition coil (safety measure).

Set ignition switch to ON.

I3

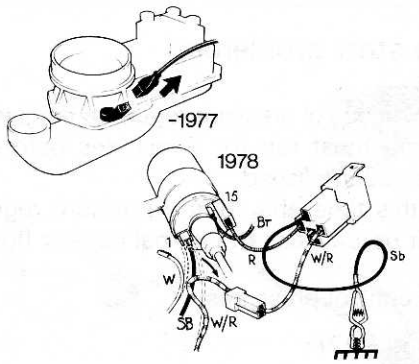


1232-97

Cold engine.
Disconnect the connector from the control pressure regulator.

Omit this op. if the test concerns engine with warm start problems.

I4



123292

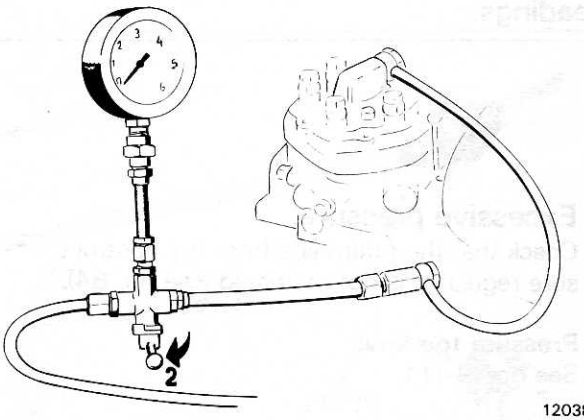
Operate the fuel pump.

1976–1977:
Remove the connector from the air flow sensor to start the fuel pump.

1978:
Install test relay 5170 to start the fuel pump.

Check control pressure.

I5

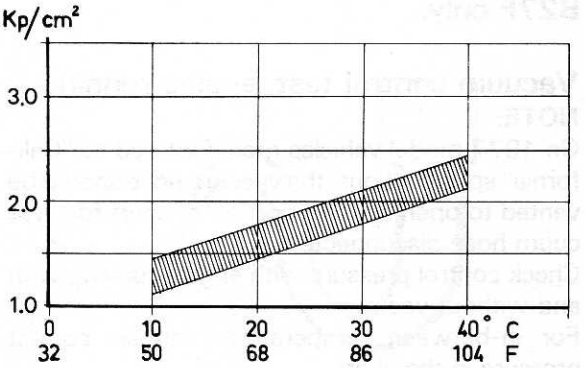


120385

Set the valve on tool 5011 to position 2 (at right angle to the hoses).

Read the control pressure.

I6

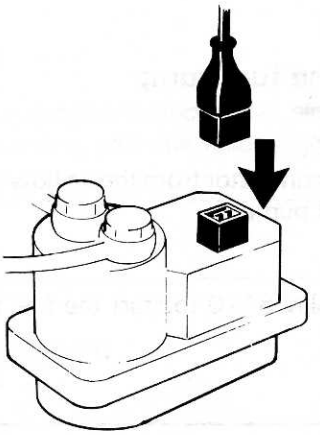


Cold start problems.

The control pressure regulator should be at ambient temperature.
Proper control pressure for different ambient temperatures can be obtained from the chart.

Pressure too low:
Test using new control pressure regulator.

Excessive pressure:
1. Set ignition switch to OFF.
2. Remove the cap from the fuel tank to release any over pressure.
3. Check if the return line from the control pressure regulator is blocked (refer to op. B4).
4. If the line is not blocked replace control pressure regulator and re-check pressure.



123302

I7

Warm start problems.

NOTE:
With cold control pressure regulator (engine), the fuel pump must run for 5 minutes before this check is accomplished.
During this time, the control pressure regulator will heat up because of internal current flow.

Correct control pressures:

B21F and B27F:
3.7 ± 0.2 kp/cm²
(3.5–3.9 kp/cm² = 50–55 psi).

Incorrect readings.

Excessive pressure.

Check that the return line from the control pressure regulator is not restricted (see op. B4).

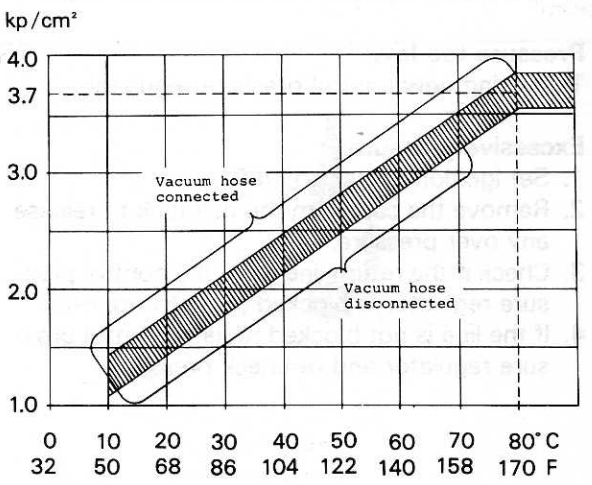
Pressure too low:
See op. I9–I11.

I8

B27F only:

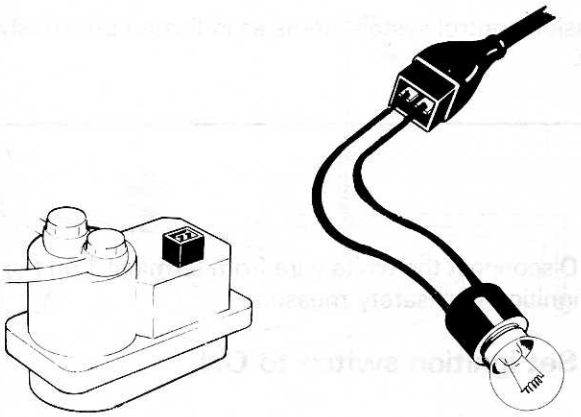
Vacuum control test, engine running.

NOTE:
On 1977 model vehicles manufactured to "California" specifications, the vacuum hose should be vented to open air. Use portion of chart for "vacuum hose disconnected".
Check control pressure with engine running with and without vacuum.
For in-between temperatures, obtain correct pressure in the chart.
With engine at normal operating temperature, the control pressure should drop from **3.7 ± 0.2** kp/cm² to **3.3±0.2** kp/cm² = 44–50 psi.
If the control pressure is incorrect or changes to incorrect pressure, this indicates a defective control pressure regulator.



Control pressure too low.

I9



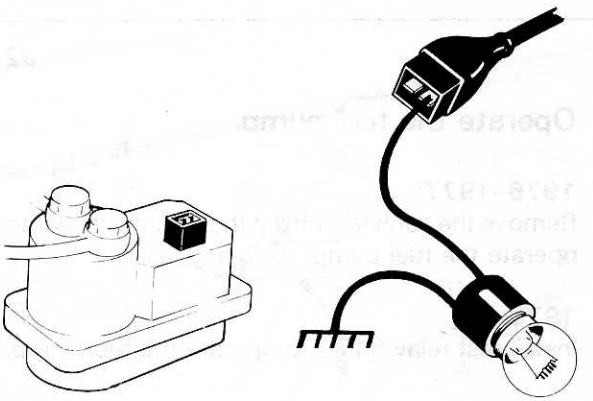
Check for voltage to the control pressure regulator.

Measure the voltage between two pins on the connector.

Voltage: proceed to op. I11.

No voltage: proceed to op. I10.

I10



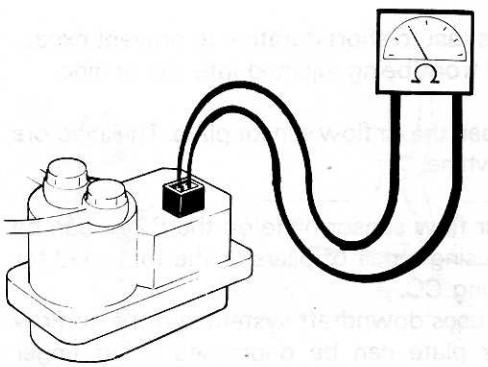
Check for voltage between the connector and the chassis.

1976–1978 = blue wire – chassis.

Voltage:
Indicates defective ground wire to the chassis.

No voltage:
Indicates defective wire between the pump relay and the control pressure regulator.

I11



.123301

Check electrical resistance in the control pressure regulator.

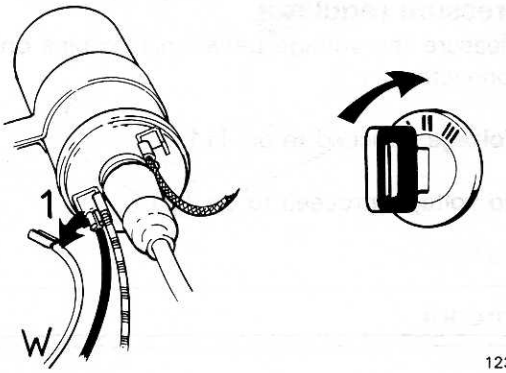
Resistance: B21F = 20–30 ohms
B27F = 20–24 ohms.

Correct resistance:
This indicates that there is poor continuity in the connector.

Incorrect resistance:
Replace the control pressure regulator.

Injectors and fuel distributor

First check appropriate mechanical, electrical and emission control system items as indicated previously before proceeding with the following trouble analysis.

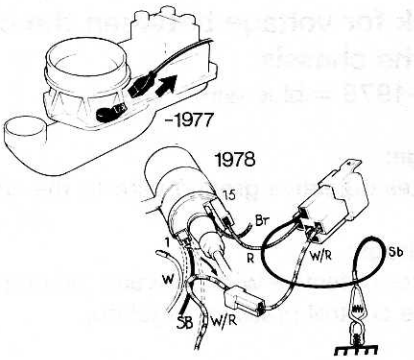


123298

J1

Disconnect the white wire from terminal 1 on the ignition coil (safety measure).

Set ignition switch to ON.



123292

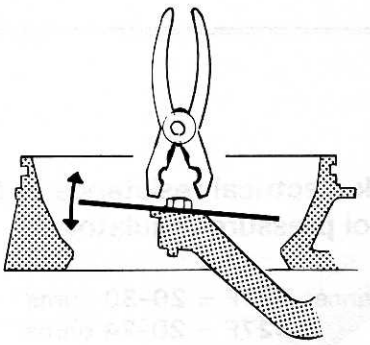
J2

Operate the fuel pump.

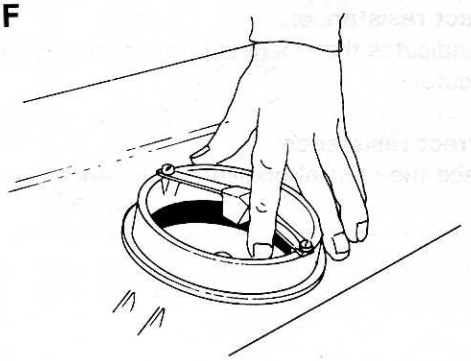
1976–1977:
Remove the connector from the air flow sensor to operate the fuel pump.

1978:
Install test relay 5170 to operate the fuel pump.

B21F



B27F



J3

Check injector operation:

Fuel pump operating.

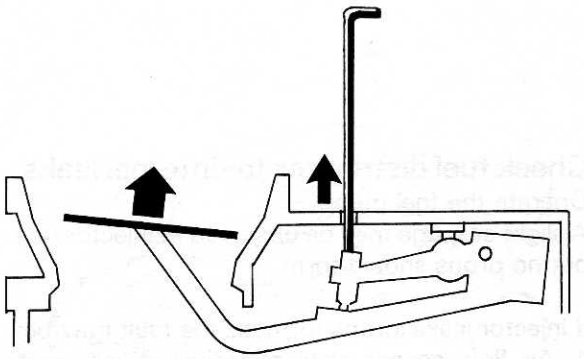
NOTE:
Limit this test to short duration to prevent excessive fuel from being injected into the engine.

Force open the air flow sensor plate. The injectors should whine.

- The air flow sensor plate on the B21F can be lifted using a pair of pliers or the tool used for adjusting CO.
  B27F uses downdraft system and the air flow sensor plate can be depressed using finger pressure.

The injectors are quiet:
Check all pressures of the Fuel System, see op. H1–H13 and I1–I11.

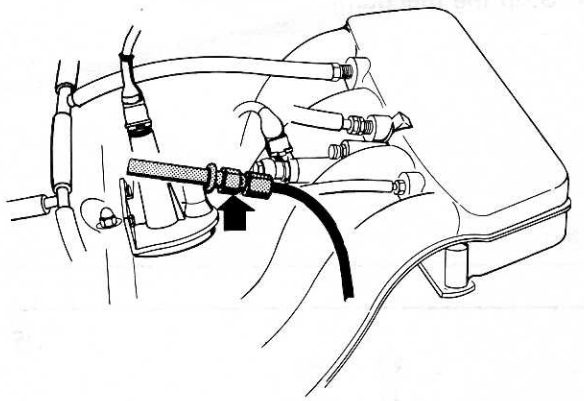
J4



123269

When the air flow sensor is allowed to close, the whine from the injectors should stop.
If they continue to whine, the control plunger in the fuel distributor may have jammed.

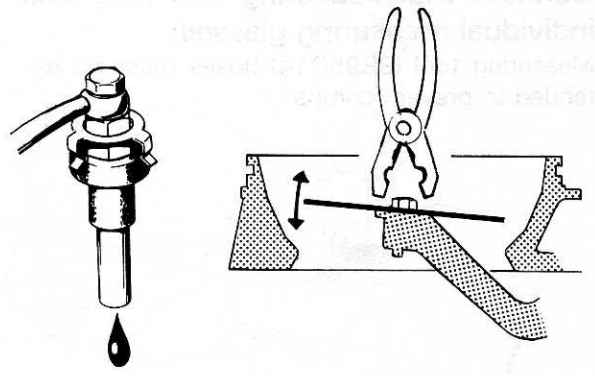
J5



125913

Stop the fuel pump from operating and remove the injectors from the cylinder head.

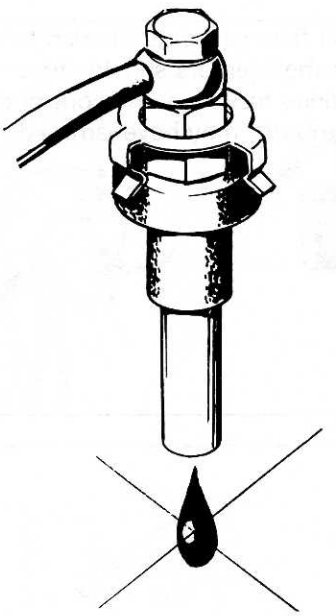
J6



Not more than one drop in 15 seconds.

Check the injectors for leakage.
Operate the fuel pump a few seconds, then stop. Check for leaks at rest pressure. Lift the air flow sensor plate to open fuel distributor slots. Each injector must not leak more than one drop in 15 seconds.
If one injector leaks, see "Testing and Cleaning Injectors" in Service Manual TP 11121 (B21F) or TP 11122 (B27F).
If all injectors leak, the rest pressure may be too high.

J7



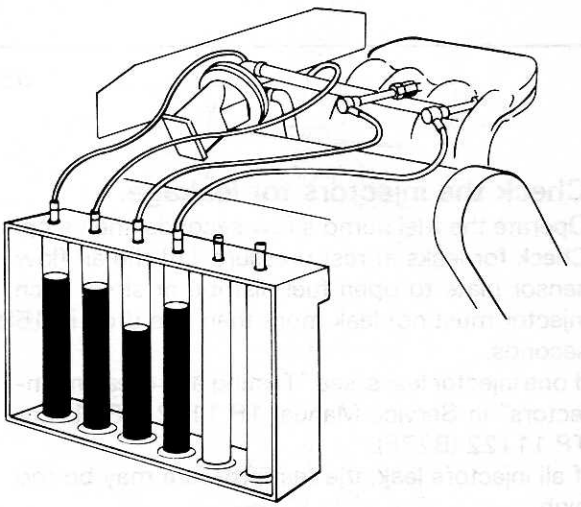
Check fuel distributor for internal leaks.

Operate the fuel pump.
A slight seepage may be observed at injector tips but no drops should form.

If injector leaks (drops formed), the fault may be:

1. Air flow sensor plate misadjusted (incorrect height). Refer to op. E1–E4 (B21F) or op. E5–E8 (B27F), in this manual.
2. Fuel distributor plunger seizes. See op. J10.
3. Internal leaks in fuel distributor (faulty seals in fuel distributor). The fuel distributor must not be disassembled. Complete replacement is required.
4. Stop the fuel pump.

J8

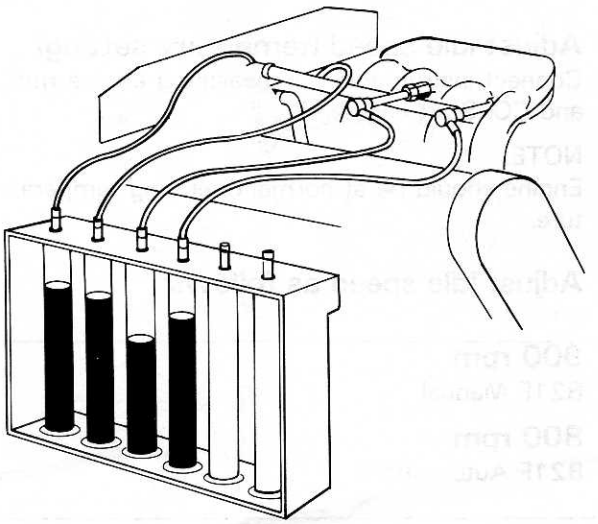


119820

Connect the measuring tool (contains individual measuring glasses).

Measuring tool (9995014) hoses must be extended to prevent crimps.

J9



119822

Check injector deviation (test only in case of obvious engine malfunction).

Note: To obtain correct reading, all hoses should be empty or full at start of test.

With fuel pump running, lift the air flow sensor plate halfway. Hold it there until one of the measuring glasses has been filled to 100 cm^3. Read the other measuring glasses. Maximum deviation 20 %.

In case of malfunction:

If injector deviation exceeds 20 %, repeat the test to confirm.

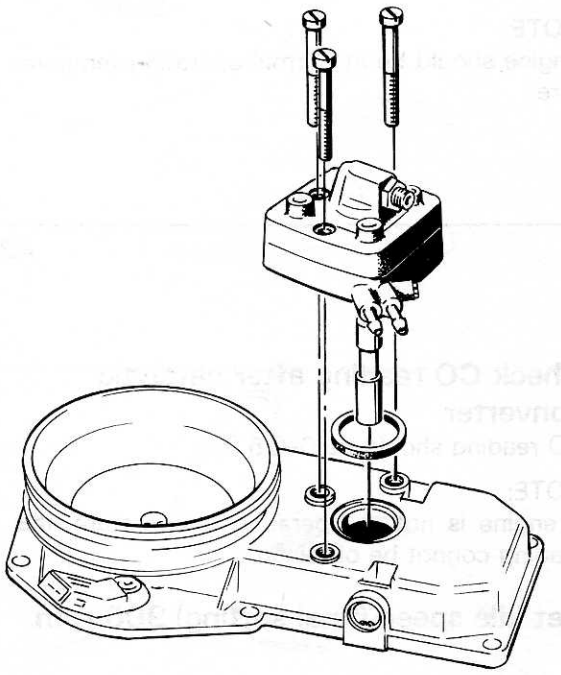
If test results are confirmed:

Swap two injector hoses at the distributor (exchange hoses of one incorrect and one correct operating injector) and repeat the test.

If same injector persists faulty, injector or injector fuel supply line is defective. See "Testing and Cleaning Injectors" in Service Manual TP 11121 (B21F) or TP 11122 (B27F).

If fault changes to the other injector, the fuel distributor is defective.

J10



108970

Service the fuel distributor.

Procedures:

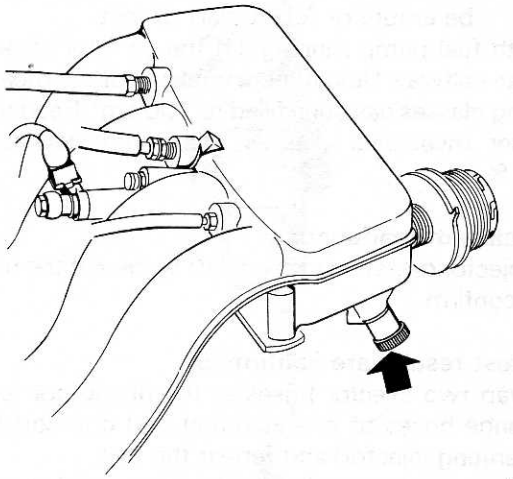
- Remove fuel distributor. Check O-ring.
- Remove plunger. Check for scratches or deposits. Deposits may be removed, using finger nail, NO TOOLS.
- Check for seizure by turning plunger and at the same time move the plunger in and out. If seizing occurs, replace the fuel distributor assembly.
- Install O-ring and fuel distributor assembly.

NOTE:
Do not overtighten fuel distributor retaining screws.

For complete overhaul see "Air-Fuel Control Unit" in Service Manual TP 11121 (B21F) or TP 11122 (B27F).

CO emissions check
B21F NOT equipped with oxygen sensor feedback system

K1



119822

Adjust idle speed (temporary setting)

Connect instruments for measuring engine rpm and CO. Start engine.

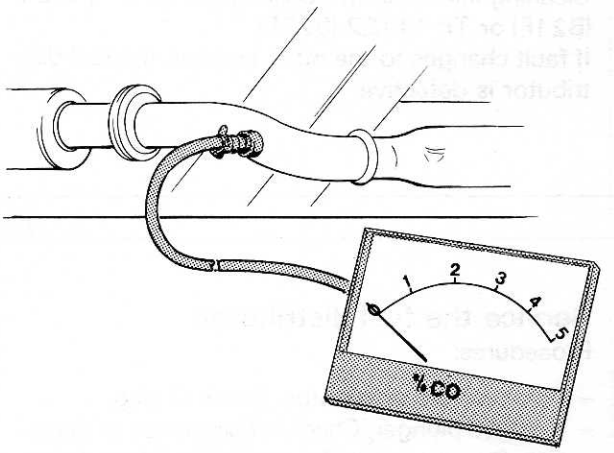
NOTE.
Engine should be at normal operating temperature.

Adjust idle speed as follows:

900 rpm
B21F Manual

800 rpm
B21F Automatic

K2

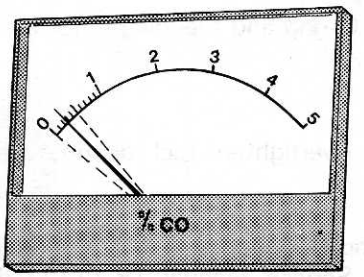


Check CO reading before catalytic converter

Attach CO gauge at fitting on header pipe just before catalytic converter.
Check CO. If necessary adjust CO to 1.0 % ± 0.3 %.

NOTE:
Engine should be at normal operating temperature.

K3



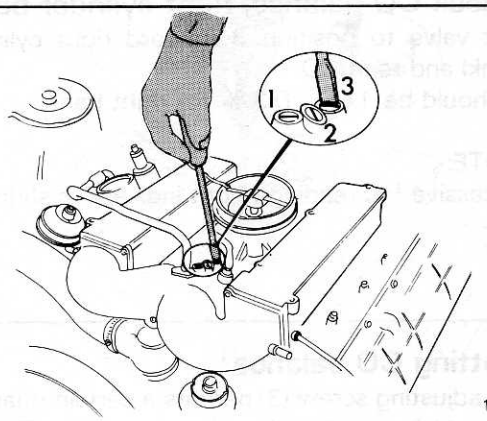
Check CO reading after catalytic converter

CO reading should be 0–0.5 %.

NOTE:
If engine is not at operating temperature, this reading connot be obtained.

Set idle speed (final setting) 900 rpm.

B27F NOT equipped with oxygen sensor feedback system



126442

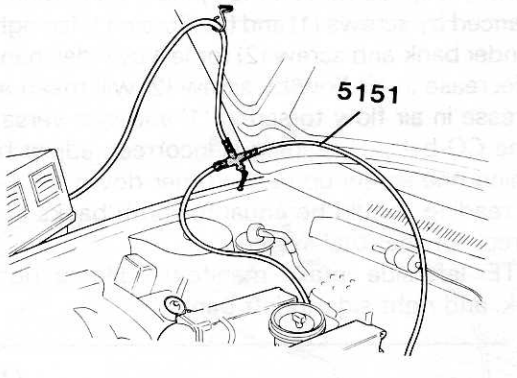
L1

Adjust idle speed

Connect instruments for measuring engine rpm and CO. Start engine.

NOTE:
Engine should be at normal operating temperature.

Adjust idle speed.
900 rpm



117979

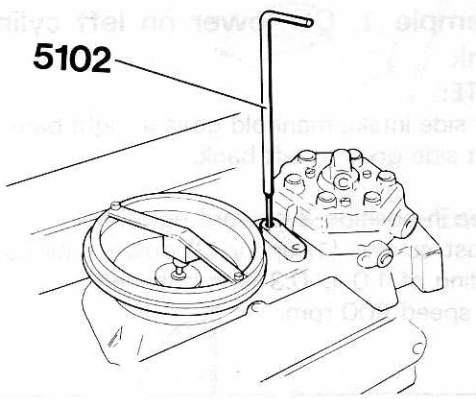
L2

Check CO

Set valve to position 2 (center position).
In this position exhaust gases are admitted from both engine banks = total reading.
CO should be 1.0 ± 0.3 % (0.7–1.3 %).

NOTE:
When reading, the plug in the CO adjustment hole (on top of fuel distributor) must be installed, or the hole blocked.

From now on, air filter and hoses must be attached, otherwise emissions will be affected.

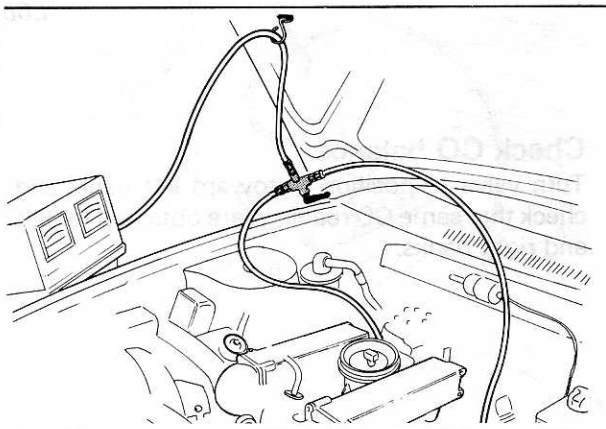


L3

Adjust CO

Valve in position 2.
Remove plug and copper washer for CO adjustment. Use inhex wrench 5102 to adjust CO. Engine idle rpm should be 900.

NOTE:
After each adjustment, wrench 5102 must be removed and the hole covered to prevent a lean mixture while the CO reading is made.
Counterclockwise adjustment reduces CO, clockwise adjustment increases CO.
Reinstall plug and copper washer.

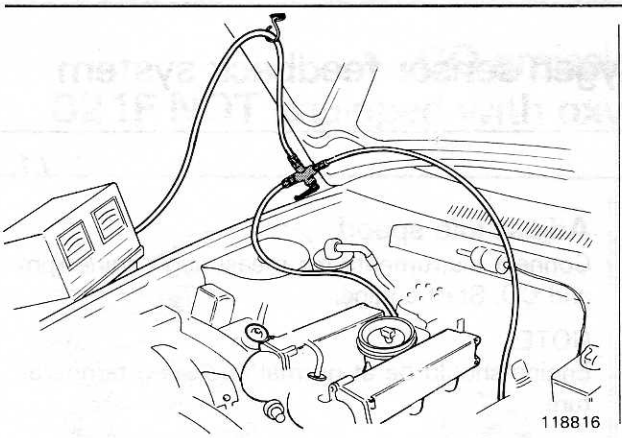


L4

Check CO balance, left cylinder bank.

Set valve to position 1 (toward left cylinder bank) and read CO.
It should be 1.0 ± 0.3 % for left bank.

NOTE:
Excessive HC reading might indicate misfiring.

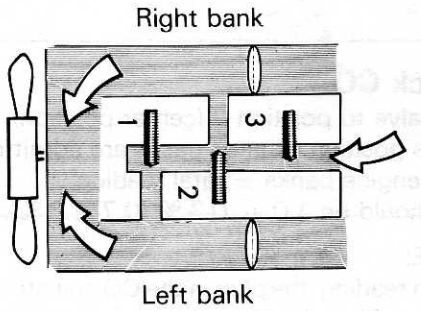


L5

Check CO balance, right cylinder bank

Set valve to position 3 (toward right cylinder bank) and read CO.
It should be 1.0 ± 0.3 % for right bank.

NOTE:
Excessive HC reading might indicate misfiring.

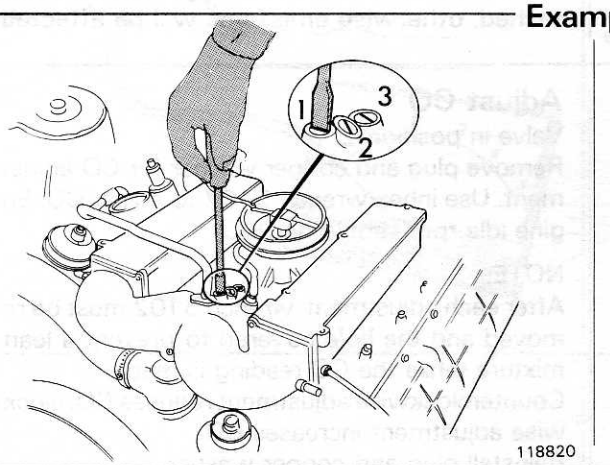


L6

Setting CO balance

Air adjusting screw (3) permits a certain quantity of air to bypass the throttle valve at idle. This air quantity is split between the cylinder banks and is balanced by screws (1) and (2). Screw (1) for right cylinder bank and screw (2) for left cylinder bank.
A decrease in air flow by screw (2) will mean an increase in air flow to screw (1) and vice versa.
If the CO balance reading is incorrect, adjust by turning one screw up or the other down.
CO reading should be equal for both banks and correct for the total system.
NOTE: left side intake manifold goes to right bank, and right side to left bank.

Examples

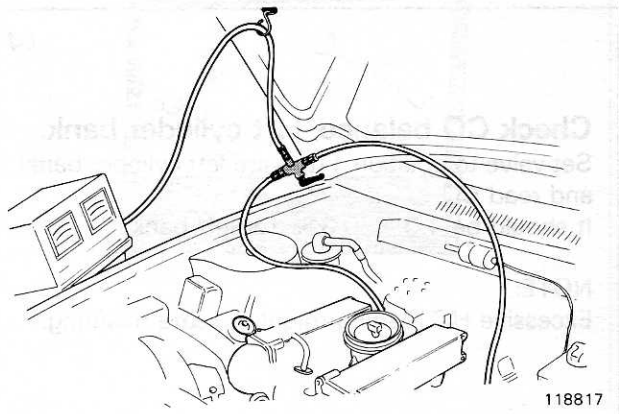


L6a

Example 1: CO lower on left cylinder bank

NOTE:
Left side intake manifold goes to right bank, and right side goes to left bank.

Valve in position 3 (toward right bank).
Adjust screws (1) up or (2) down until correct reading of 1.0 ± 0.3 % is obtained.
Idle speed 900 rpm.

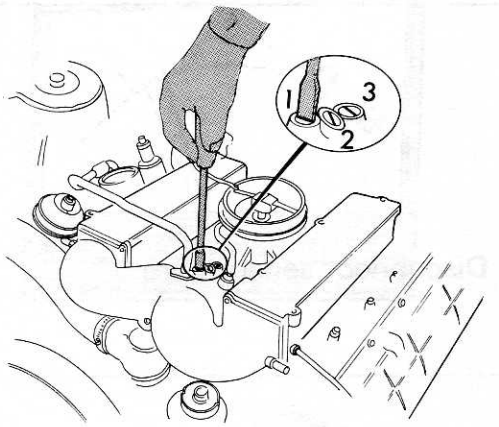


L6b

Check CO balance

Turn valve to position 1 (toward left bank) and check that same CO readings are obtained for left and right banks.

L6c

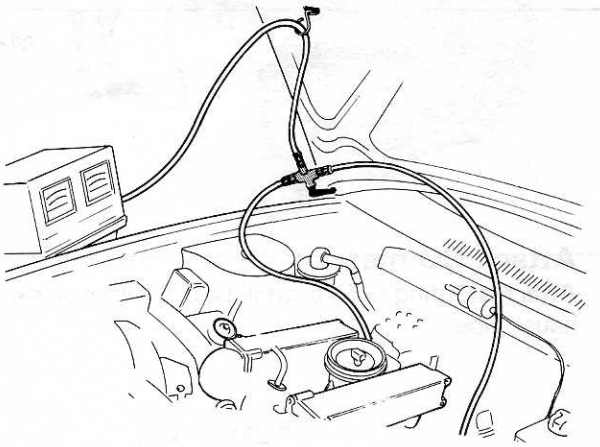


118820

Example 2: CO higher on left bank

Valve in position 3 (toward right bank).
Adjust screw (1) down or screw (2) up until correct reading of 1.0 ± 0.3% is obtained.
Idle speed 900 rpm.

L6d



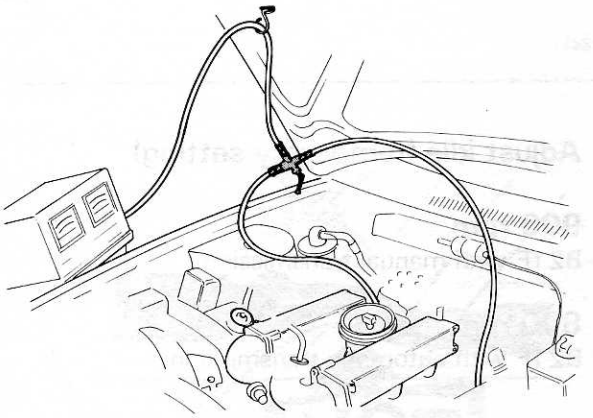
118817

Check CO balance

Turn valve to position 1 (toward left bank) and check that same CO readings are obtained for left and right banks, total system must have correct reading with valve in position 2, center position.

End of examples

L7



118818

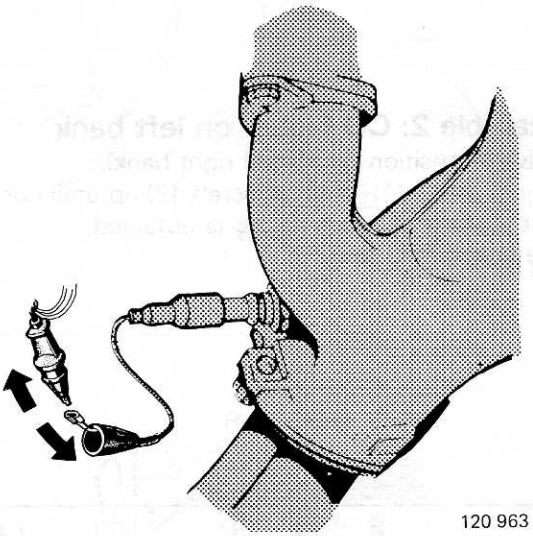
Make final CO adjustment

Valve in position 2 (for total CO).
Adjust CO to 1.0 ± 0.3 %.

Engine speed 900 rpm.

B21F equipped with oxygen sensor feedback system

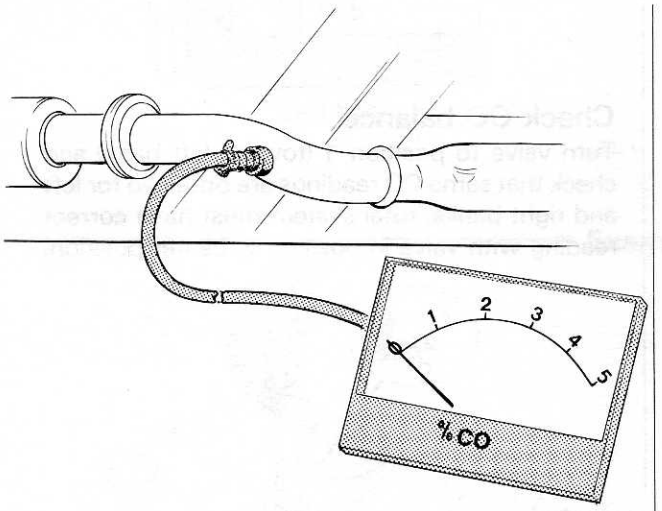
M1



120 963

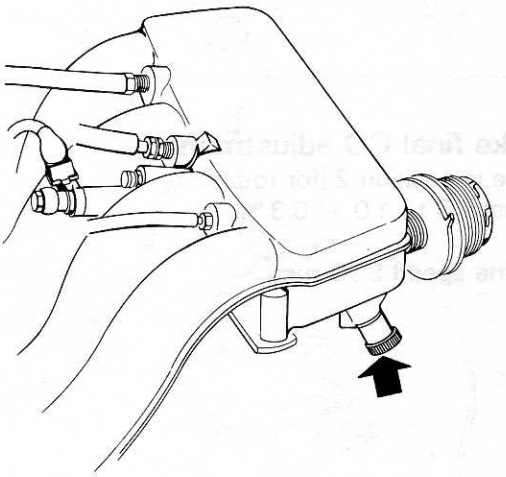
Disconnect sensor wire

M2



Attach CO meter
Attach at fitting before catalytic converter on exhaust pipe.

M3



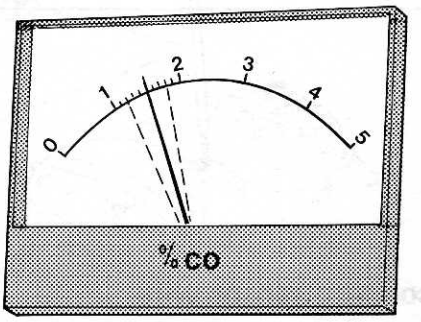
119811

Adjust idle (temporary setting)

900 rpm
B21F with manual transmission.

800 rpm
B21F with automatic transmission.

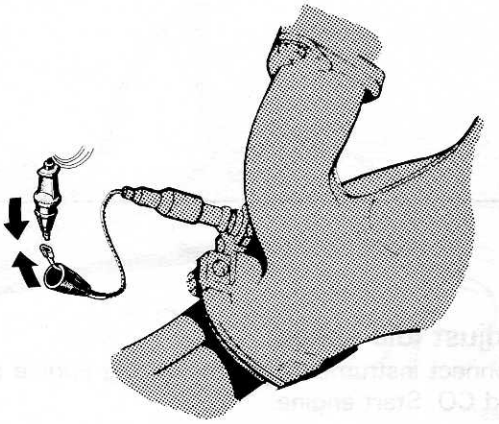
M4



Check CO
If necessary adjust to:

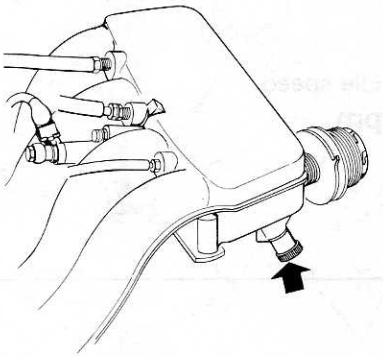
2.0 $^{+\ 0.5\ \%}_{-\ 1.0\ \%}$ = 1.0–2.5 %

M 5



Reconnect sensor wire
Read CO meter. CO should drop below 1 %.

M6

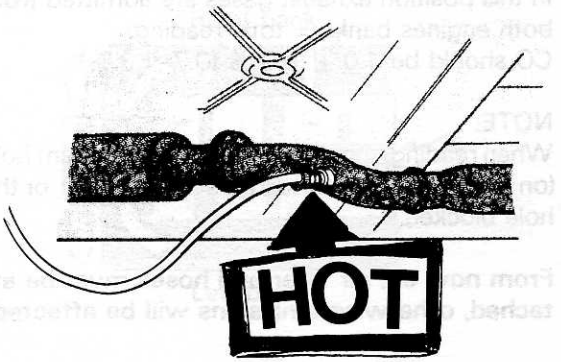


119811

Set idle speed (final setting)

900 rpm

M7



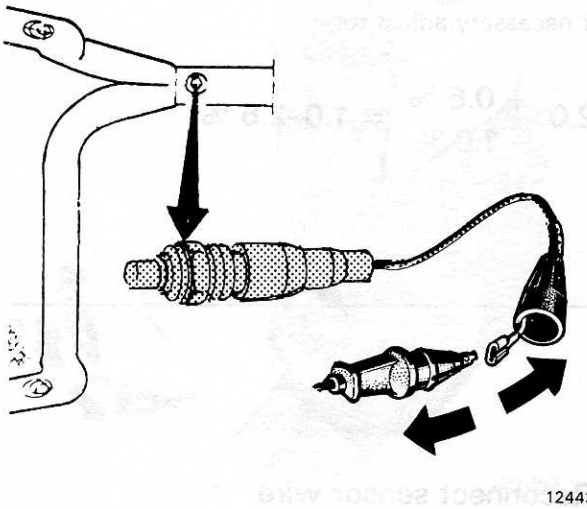
Stop engine
Disconnect instruments and CO gauge.

CAUTION:
Connecting nipples for CO gauge are VERY HOT.

Reinstall exhaust pipe plugs.

B27F equipped with oxygen sensor feedback system

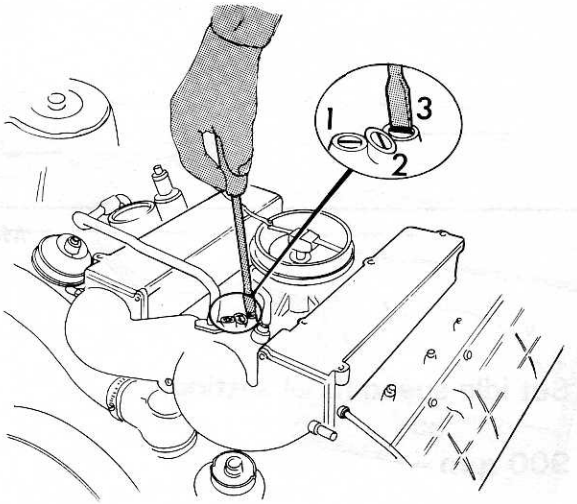
N1



124439

Disconnect sensor wire

N2



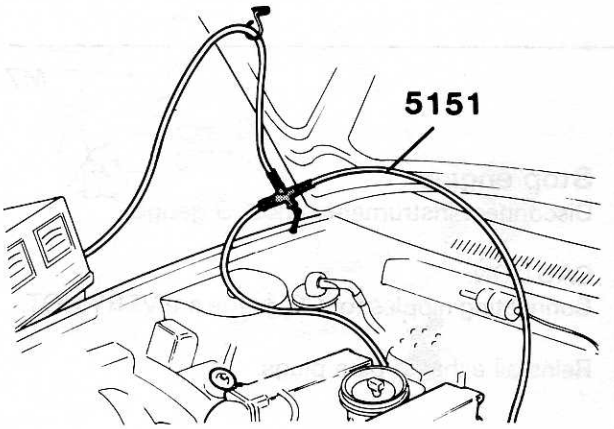
126442

Adjust idle speed
Connect instruments for measuring engine rpm and CO. Start engine.

NOTE:
Engine should be at normal operating temperature.

Adjust idle speed.
900 rpm

N3

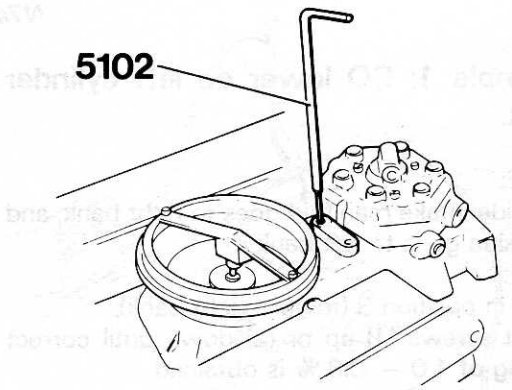


117979

Check CO
Set valve to position 2 (center position).
In this position exhaust gases are admitted from both engines banks = total reading.
CO should be 1.0 ± 0.3 % (0.7–1.3 %).

NOTE:
When reading, the plug in the CO adjustment hole (on top of fuel distributor) must be installed, or the hole blocked.

From now on, air filter and hoses must be attached, otherwise emissions will be affected.



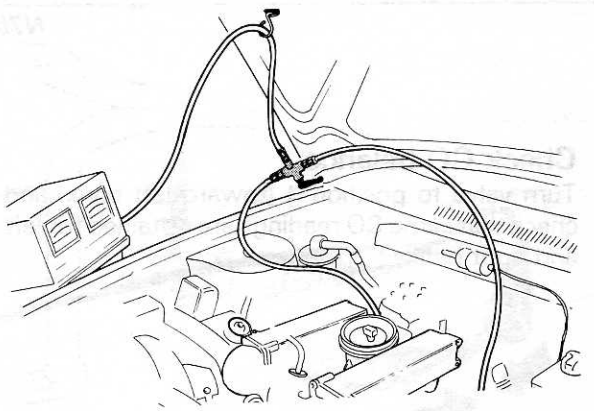
117477

N4

Adjust CO

Valve in position 2.
Remove plug and copper washer from CO adjustment. Use inhex wrench 5102 to adjust CO.
Engine idle rpm should be 900.

NOTE:
After each adjustment, wrench 5102 must be removed and the hole covered to prevent a lean mixture while the CO reading is made.
Counterclockwise adjustment reduces CO, clockwise adjustment increases CO.
Re-install plug and copper washer.

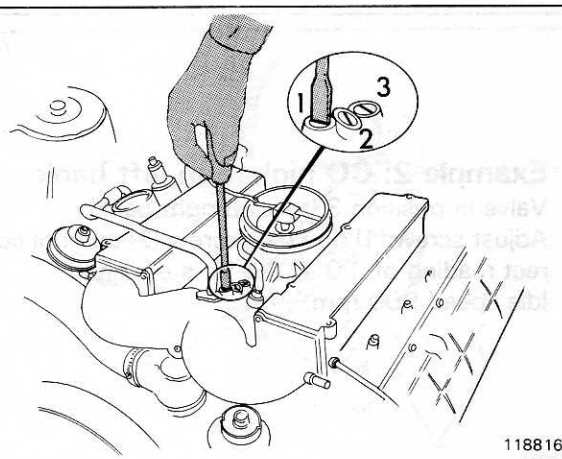

118817

N5

Check CO balance, left cylinder bank

Set valve to position 1 (toward left cylinder bank) and read CO.
It should be 1.0 ± 0.3 % for left bank.

NOTE:
Excessive HC reading might indicate misfiring.



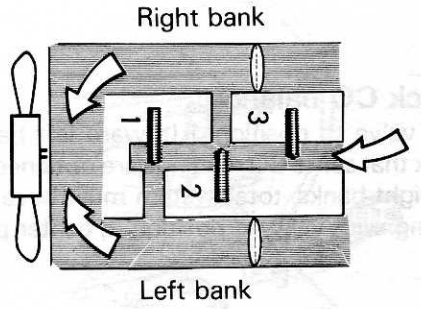
118816

N6

Check CO balance, right cylinder bank

Set valve to position 3 (toward right cylinder bank) and read CO.
It should be 1.0 ± 0.3 % for right bank.

NOTE:
Excessive HC reading might indicate misfiring.



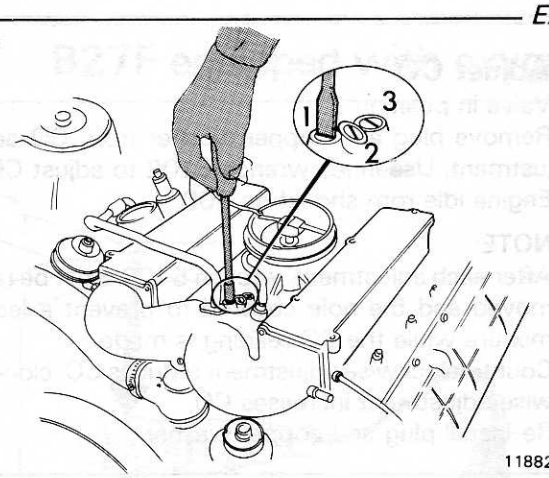
118821

Setting CO balance

N7

Air adjusting screw (3) permits a certain quantity of air to bypass the throttle valve at idle. This air quantity is split between the cylinder banks and is balanced by screws (1) and (2). Screw (1) for right cylinder bank and screw (2) for left cylinder bank.
A decrease in air flow by screw (2) will mean an increase in air flow to screw (1) and vice versa. If the CO balance reading is incorrect, adjust by turning one screw up or the other down.
CO reading should be equal for both banks and correct for the total system.
NOTE: left side intake manifold goes to right bank and right side to left bank.

Examples



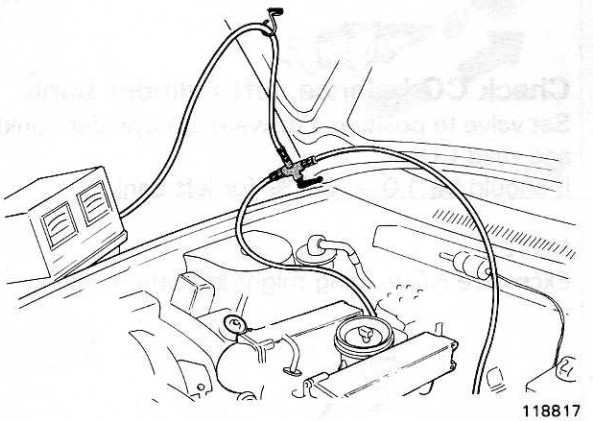
118820

N7a

Example 1: CO lower on left cylinder bank.

NOTE:
Left side intake manifold goes to right bank, and right side goes to left bank.

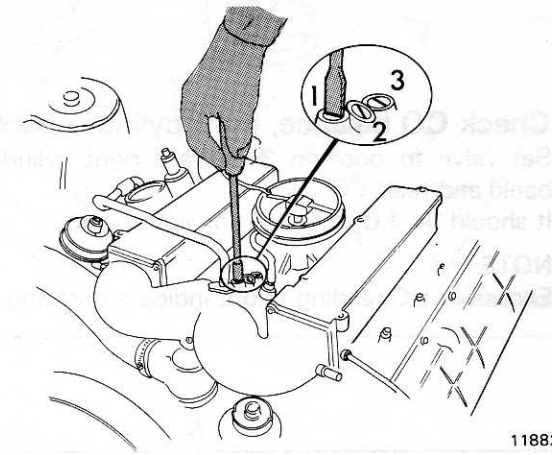
Valve in position 3 (toward right bank).
Adjust screws (1) up or (2) down until correct reading of 1.0 ± 0.3 % is obtained.
Idle speed 900 rpm.


118817

N7b

Check CO balance

Turn valve to position 1 (toward left bank) and check that same CO readings are obtained for left and right banks.

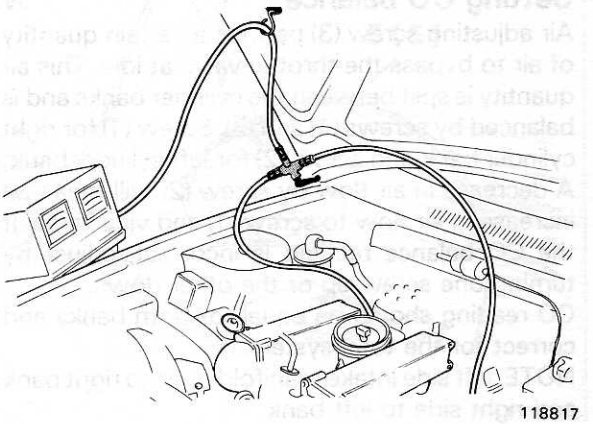


118820

N7c

Example 2: CO higher on left bank

Valve in position 3 (toward right bank).
Adjust screw (1) down or screw (2) up until correct reading of 1.0 ± 0.3 % is obtained.
Idle speed 900 rpm.


118817

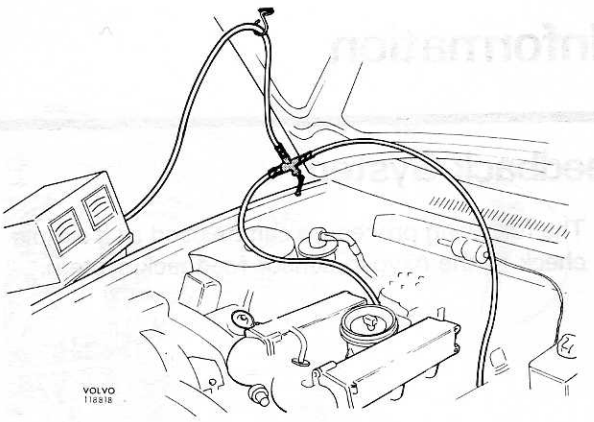
N7d

Check CO balance

Turn valve to position 1 (toward left bank) and check that same CO readings are obtained for left and right banks, total system must have correct reading with valve in position 2, center position.

End of examples

N8



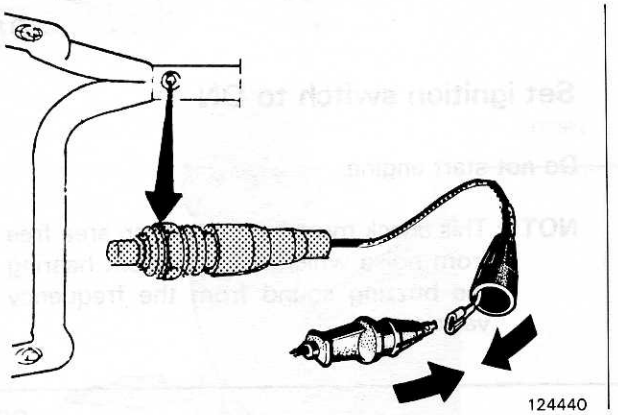
Make final CO adjustment

Valve in position 2 (for total CO).
Adjust CO to 1.0 ± 0.3 %.

Engine speed 900 rpm.

Stop engine

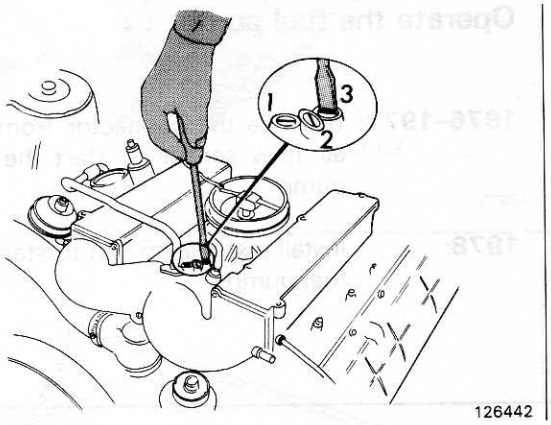
N9



Reconnect sensor wire

Read CO meter. CO should drop below 1 %.

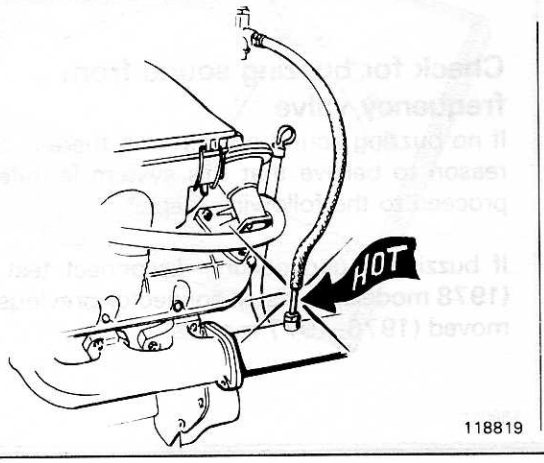
N10



Set idle speed (final setting)

900 rpm

N11



Stop engine

Disconnect instruments and CO gauge.

CAUTION:
Connecting nipples for CO gauge are VERY HOT.

Reinstall exhaust pipe plugs.

Additional Information

Oxygen Sensor Feedback System

A malfunction of this system may appear as:
- Difficult starting with engine at normal operating temperature
- Erratic idle
- Poor engine performance, especially in lower speed ranges
- Poor gas mileage

The following procedure can be used as a simple check of the oxygen sensor feedback system.

O1

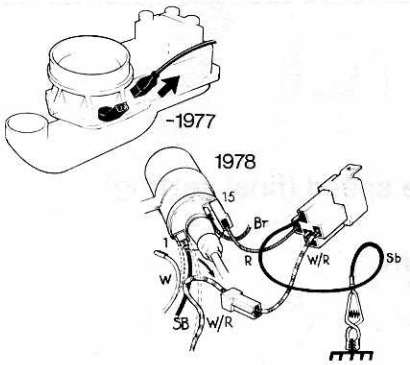
123291

Set ignition switch to ON

Do not start engine.

NOTE: This check must be made in an area free from noise which could prevent hearing the buzzing sound from the frequency valve.

O2



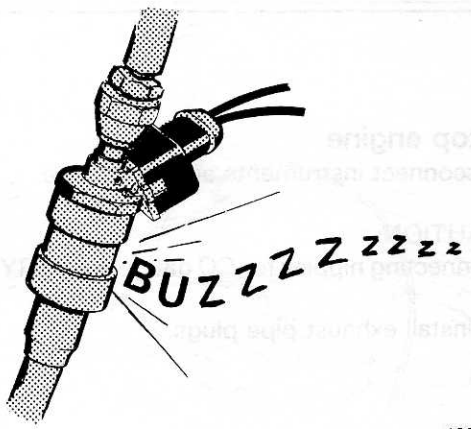
123792

Operate the fuel pump

1976–1977: Remove the connector from the air flow sensor to start the fuel pump.

1978: Install test relay 5170 to start the fuel pump.

O3



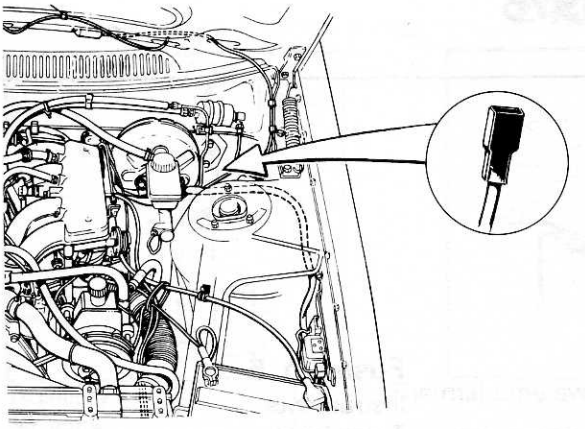
120988

Check for buzzing sound from frequency valve

If no buzzing sound occurs, or if there is strong reason to believe that this system is defective, proceed to the following steps.

If buzzing sound occurs, disconnect test relay (1978 models) or install connector previously removed (1976–1977 models).

04



120962

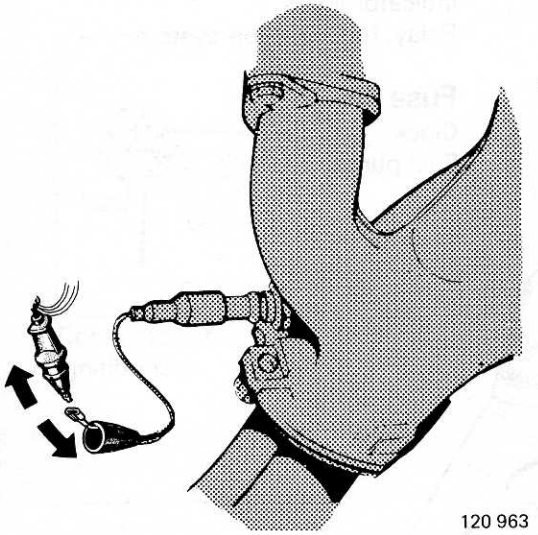
Connect dwell meter

Use dwell meter to check duty cycle (ratio open/close) of frequency valve.

NOTE: The dwell meter should be of high quality with a scale reading of at least 70°.

Example: Sun instruments, recent models.

Connect the meter between the pick-up connector and ground (see illustration).



120 963

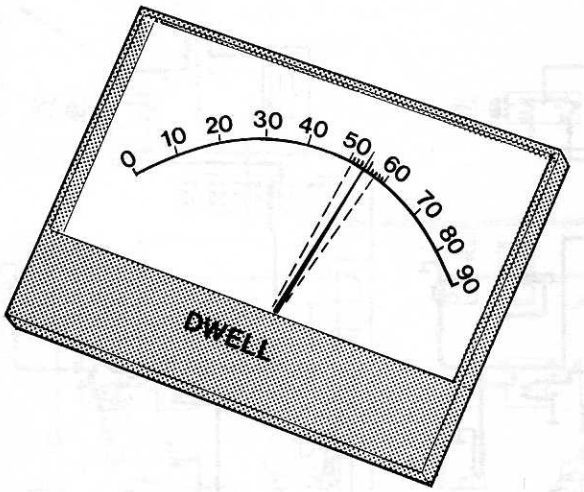
120963

05

Disconnect sensor

Remove wire to Lambda-sond sensor in exhaust manifold.

06



120964

Check dwell meter reading (duty cycle)

Set meter as you would for 4 cylinder engine.

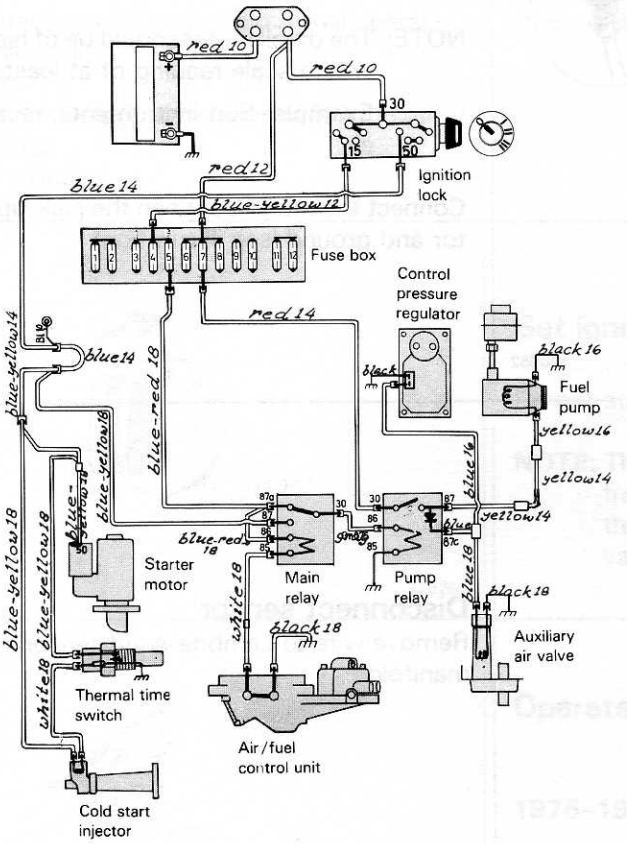
Reading should be:
B21F: 49–59°
B27F: 40–50° – at engine temperature of + 15° C (60° F) or above.

71–81° – at temperatures below + 15° C (60° F).

A thermal switch senses the coolant temperature and closes at temperatures below + 15° C. (This provides for the change in frequency valve duty cycle).

If the readings are not correct, troubleshoot the oxygen sensor feedback system using the associated fault tracing manual.

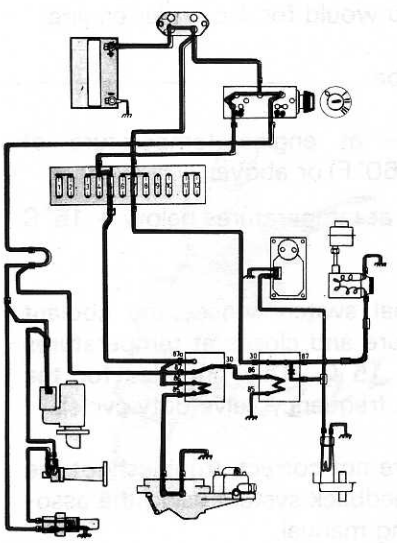
CI Fuel Injection System 240/1976



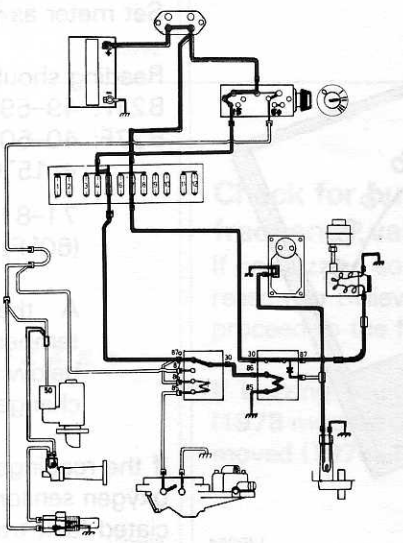
Fuse No. 5
Instruments
Turn signals
Indicator lights
Relay, fuel injection system

Fuse No. 7
Clock
Fuel pump

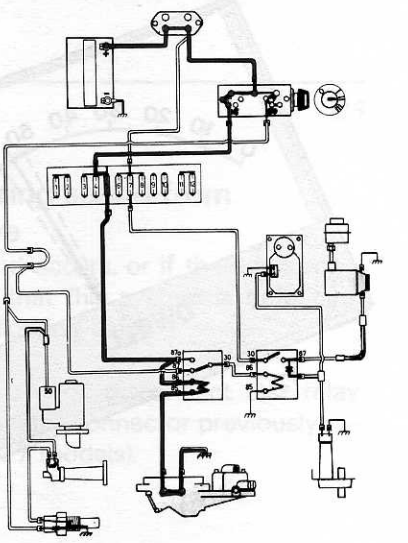
Starting engine



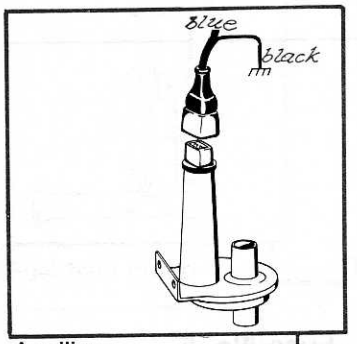
Engine running



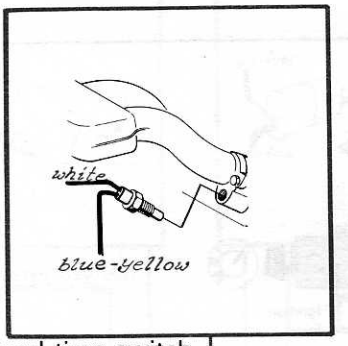
Engine stalled (ignition on, but engine not running)



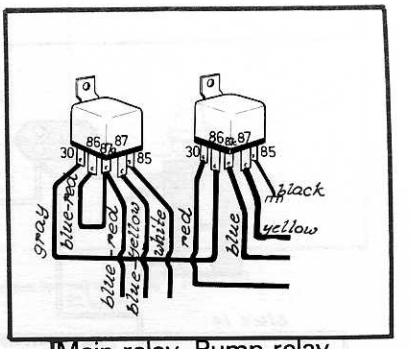
CI Fuel Injection System 240/1976



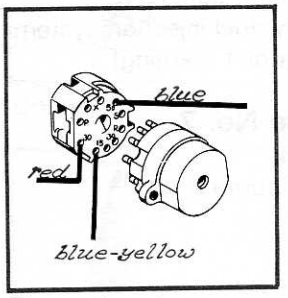
Auxiliary air valve



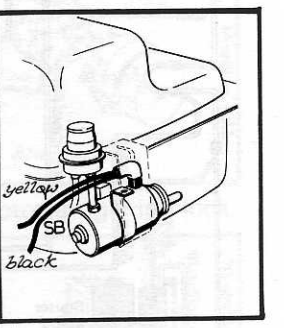
Thermal time switch



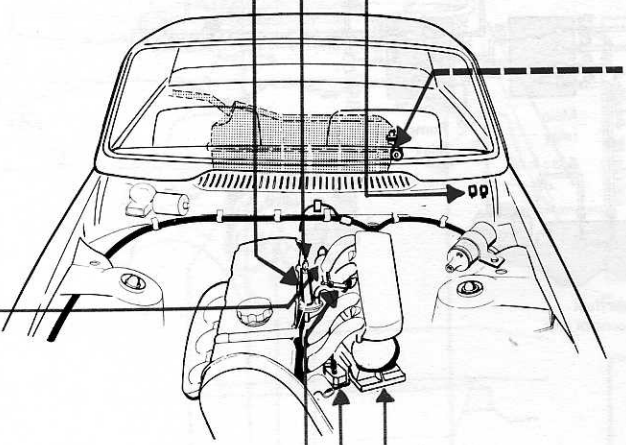
Main relay. Pump relay.

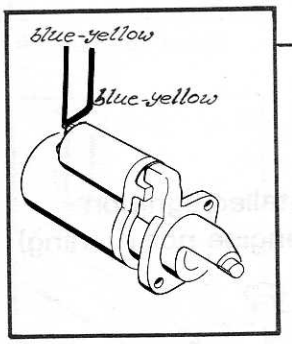


Connector at ignition lock

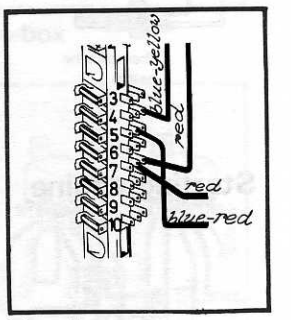


Fuel pump

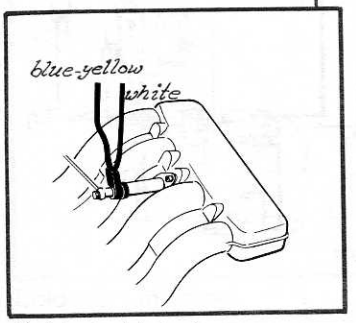




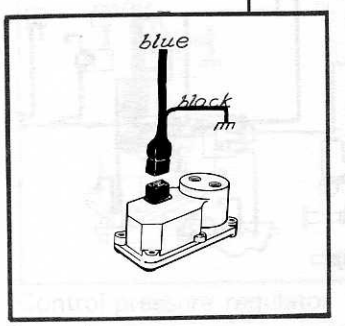
Starter motor



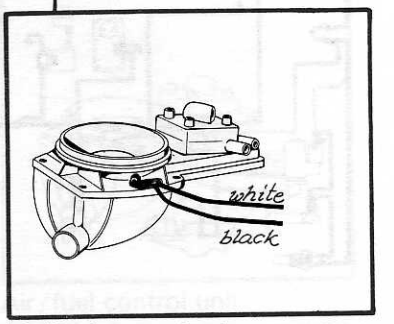
Fuse box



Cold start injector

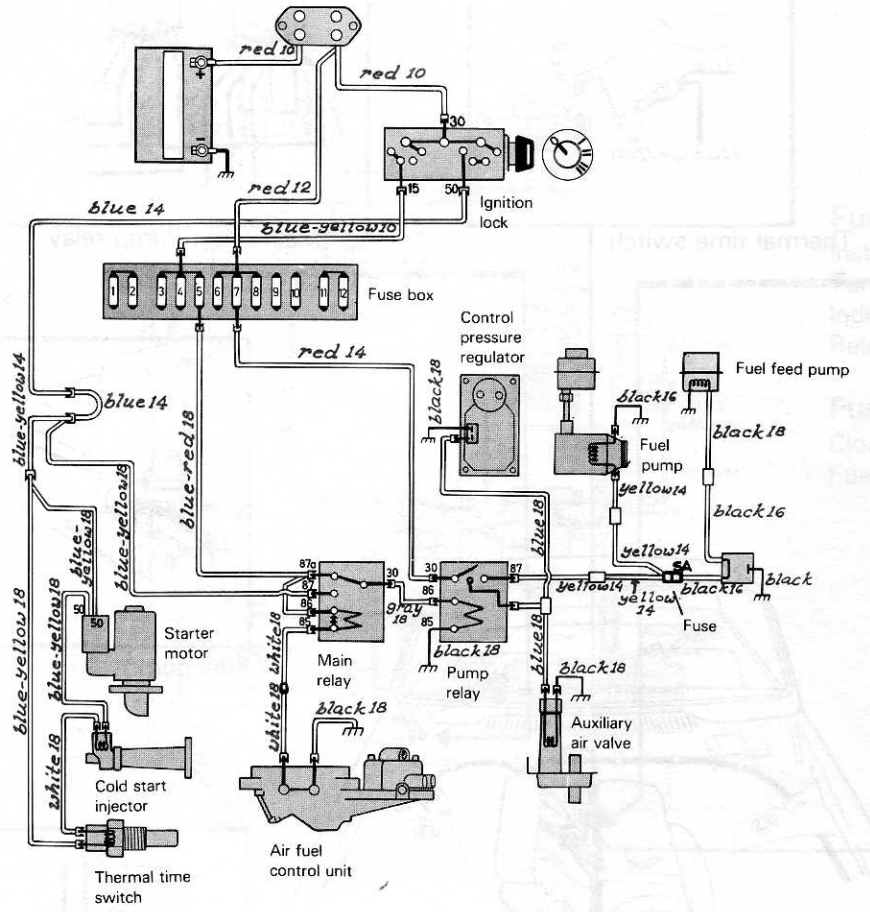


Control pressure regulator



Air/fuel control unit

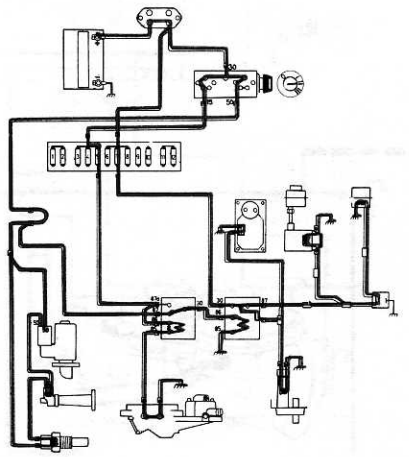
CI Fuel Injection System
240/1977



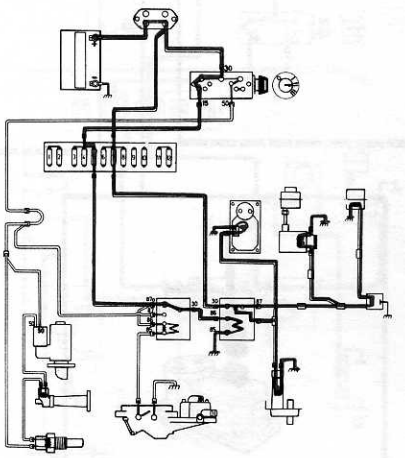
Fuse No. 5
Instruments
Turn signals
Indicator lights
Relay, fuel injection system
(Seat belt warning)

Fuse No. 7
Clock
Fuel pump

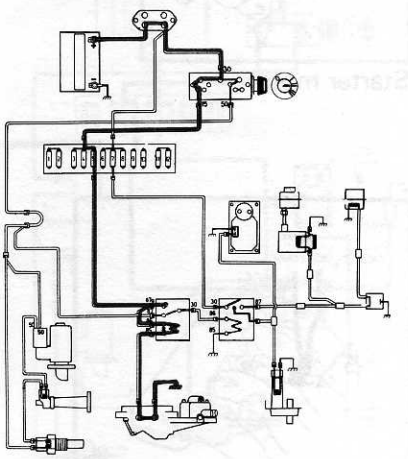
Starting engine



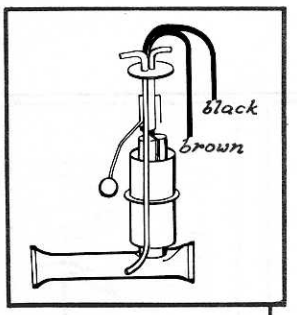
Engine running



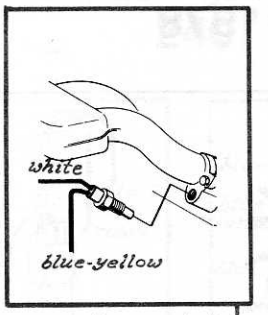
Engine stalled (ignition on, but engine not running)



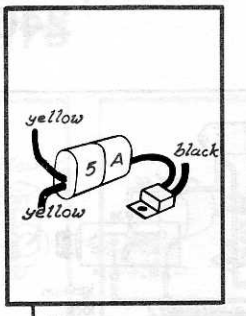
CI Fuel Injection System 240/1977



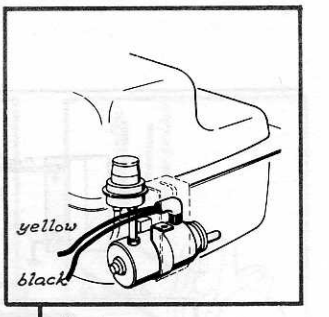
Fuel feed pump



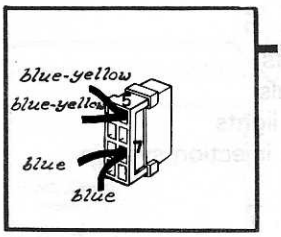
Thermal time switch



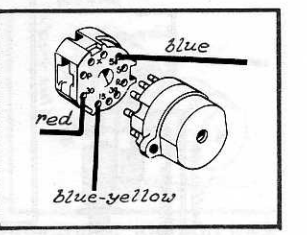
Fuse



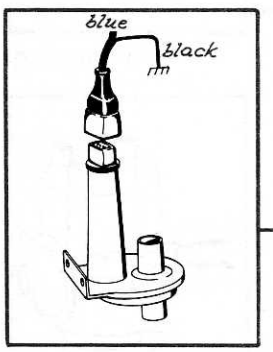
Fuel pump



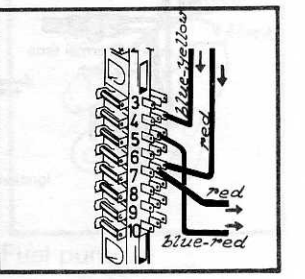
Connector



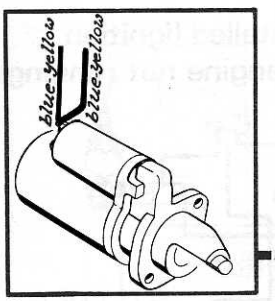
Connector at ignition lock



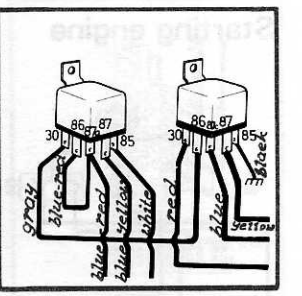
Auxiliary air valve



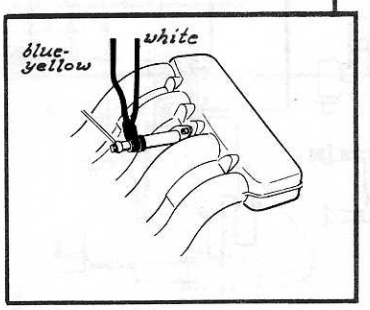
Fuse box



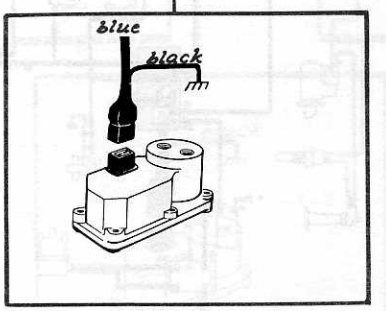
Starter motor



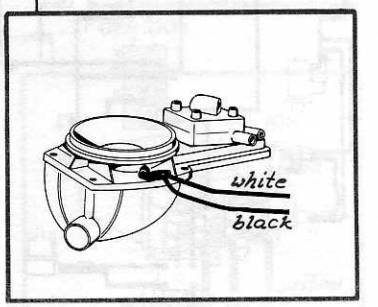
Main relay. Pump Relay.



Cold start injector

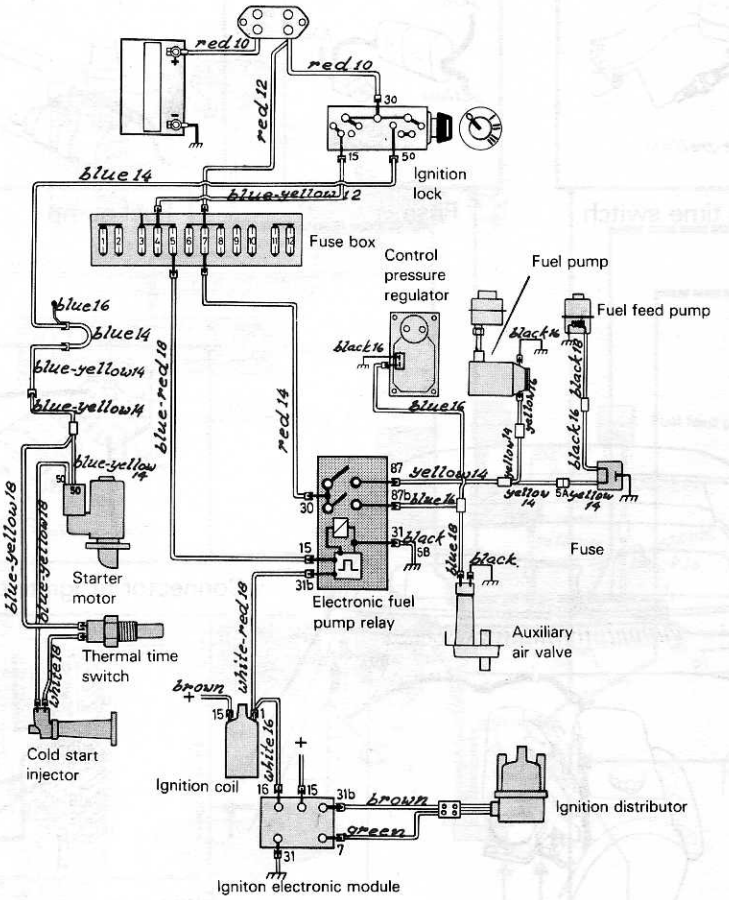


Control pressure regulator



Air/fuel control unit

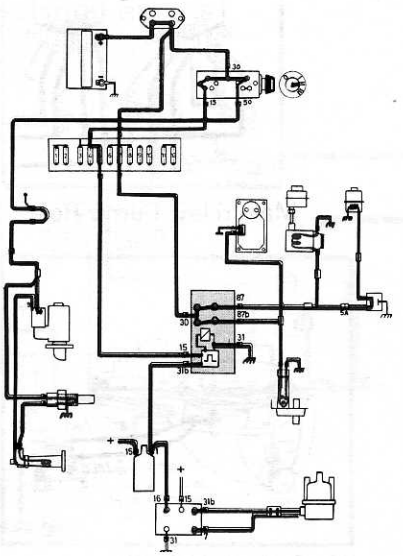
CI Fuel Injection System 240/1978



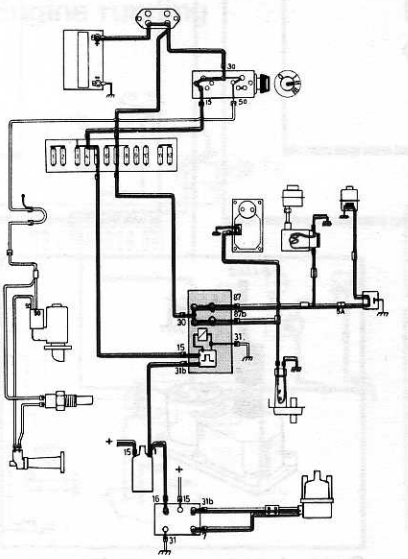
Fuse No. 5
Instruments
Turn signals
Indicator lights
Relay, fuel injection system

Fuse No. 7
Fuel pump, fuel feed pump

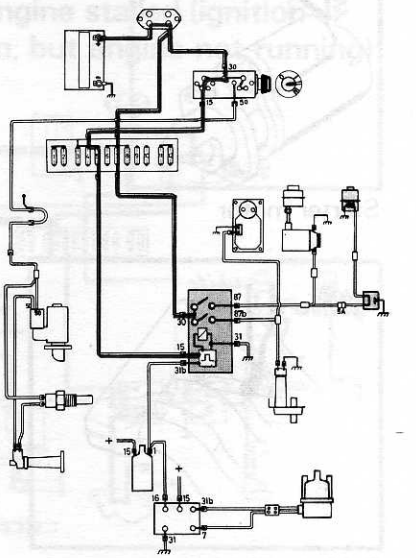
Starting engine



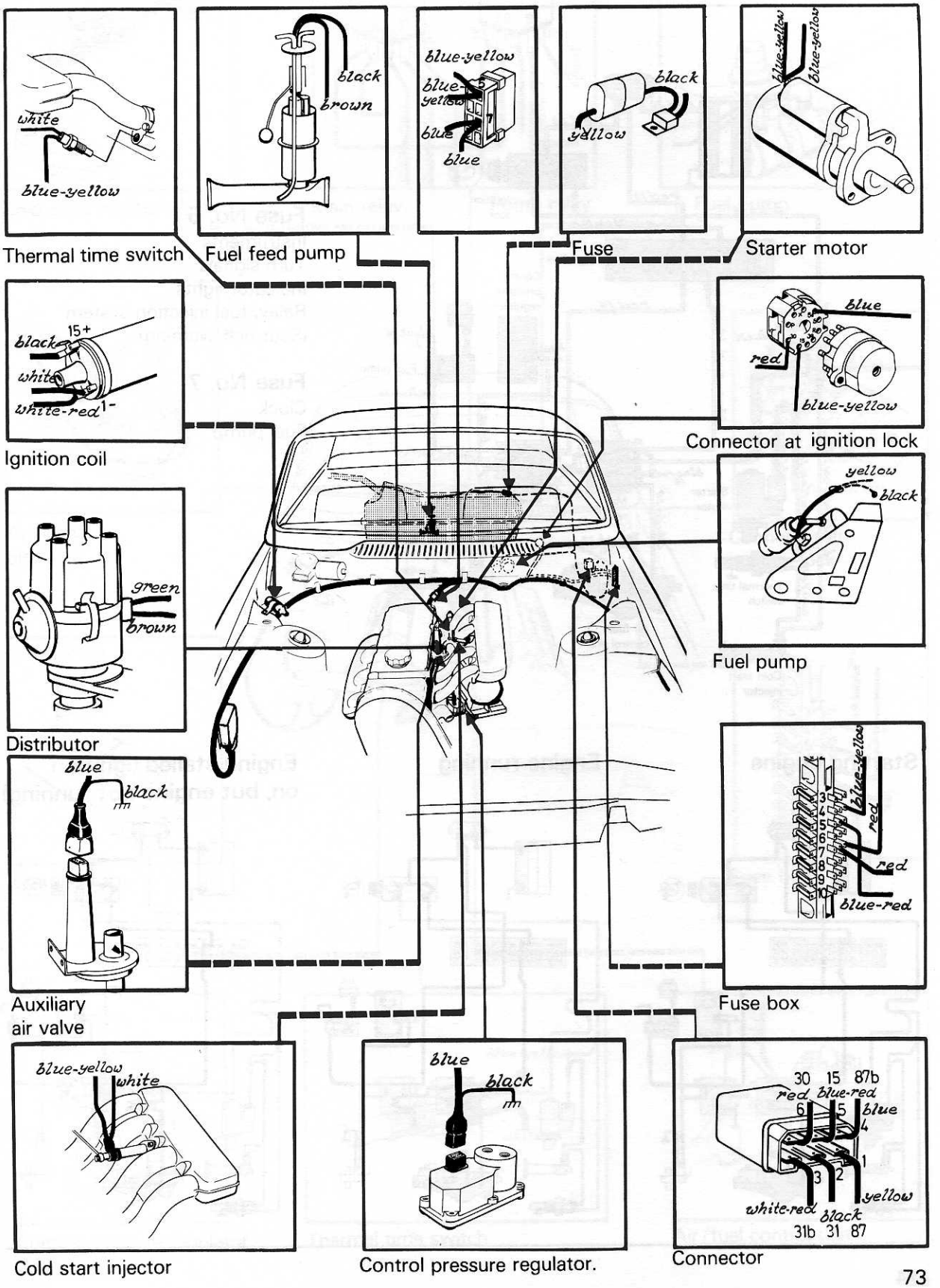
Engine running



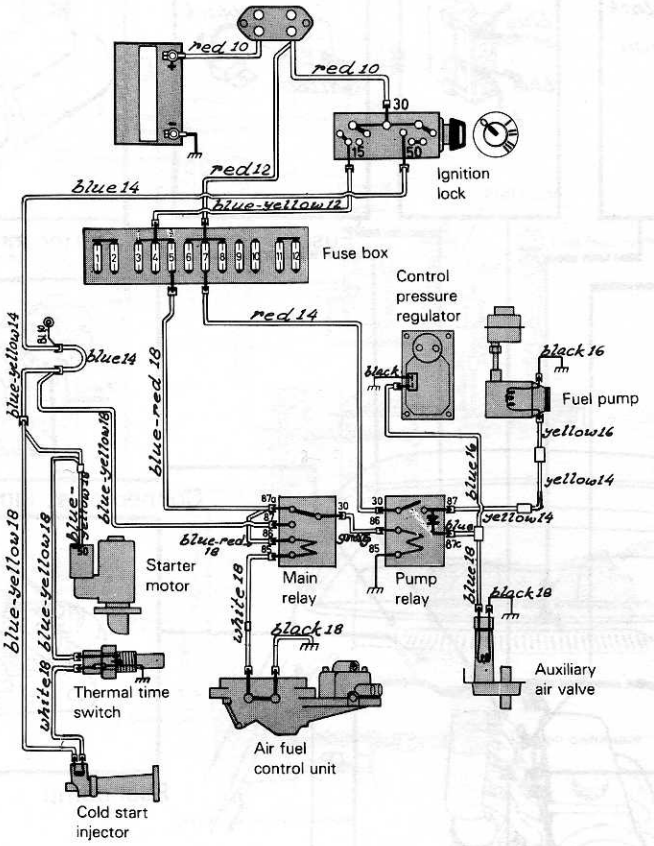
Engine stalled (ignition on, but engine not running)



CI Fuel Injection System
240/1978



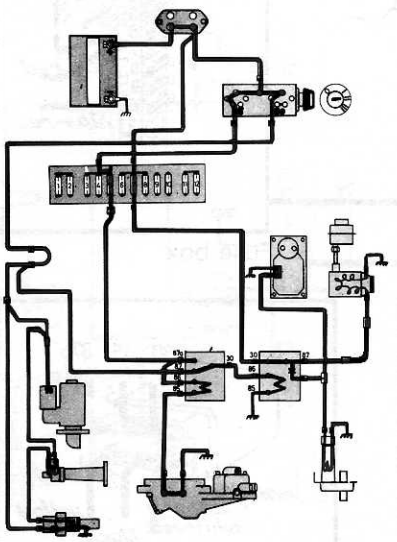
CI Fuel Injection System 260/1976



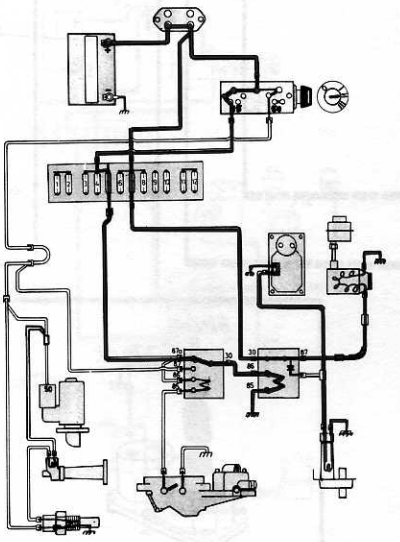
Fuse No. 5
Instruments
Turn signals
Indicator lights
Relay, fuel injection system
(Seat belt warning)

Fuse No. 7
Clock
Fuel pump

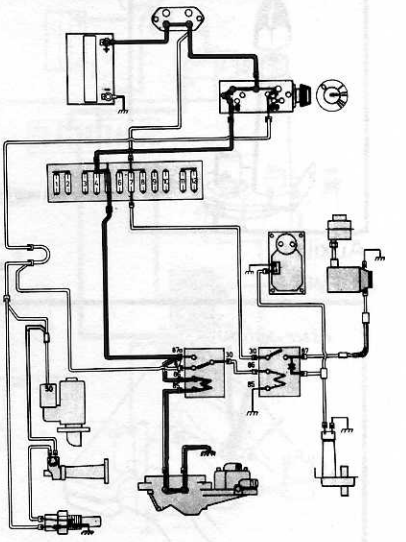
Starting engine



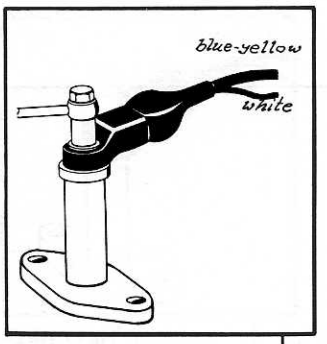
Engine running



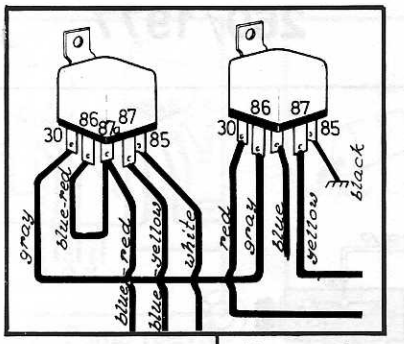
Engine stalled (ignition on, but engine not running)



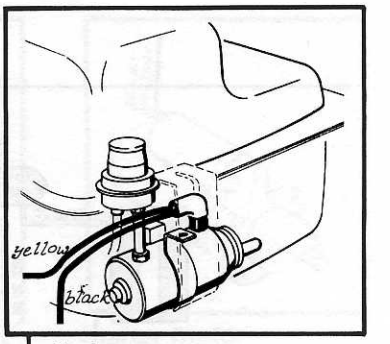
CI Fuel Injection System 260/1976



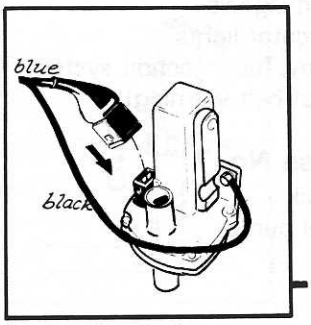
Cold start injector



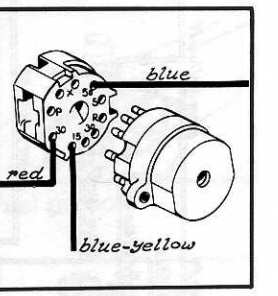
Main relay. Pump relay.



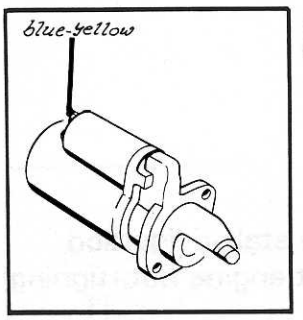
Fuel pump



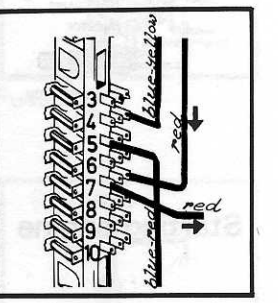
Auxiliary air valve



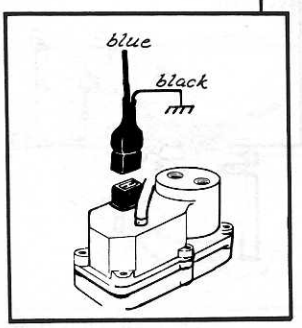
Connector at ignition lock



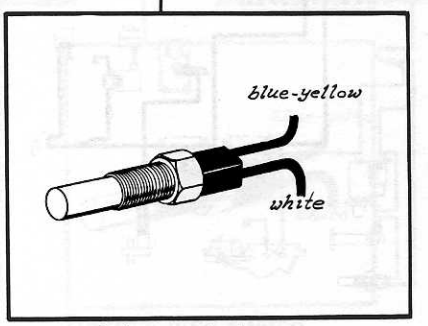
Starter motor



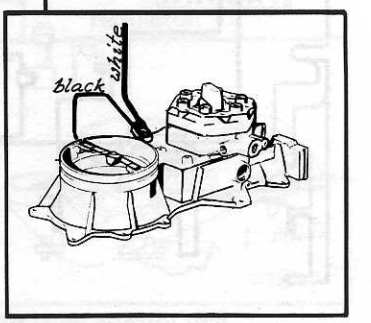
Fuse box



Control pressure regulator.

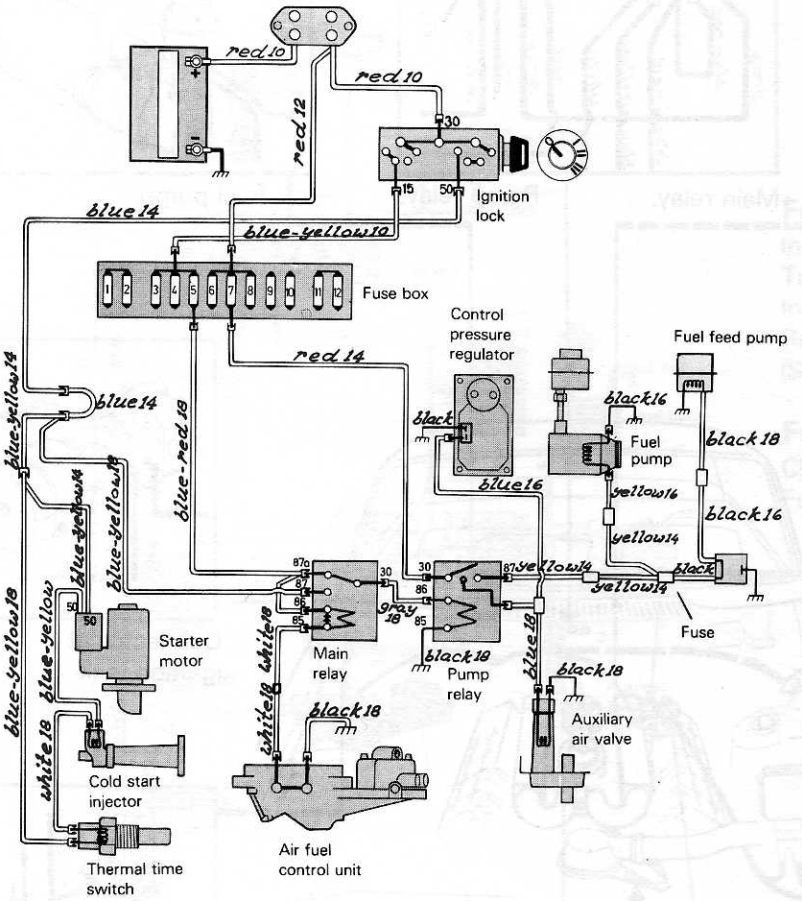


Thermal time switch



Air/fuel control unit

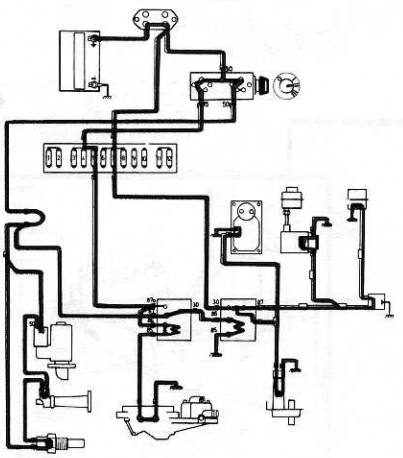
CI Fuel Injection System 260/1977



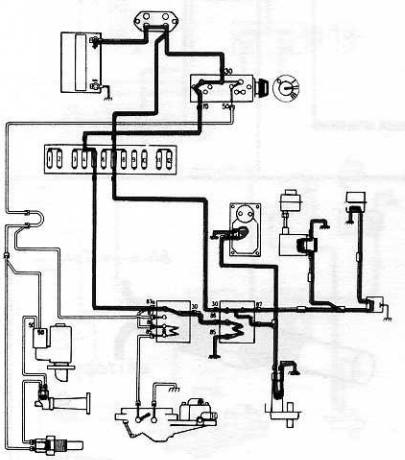
Fuse No. 5
Instruments
Turn signals
Indicator lights
Relay, fuel injection system
(Seat belt warning)

Fuse No. 7
Clock
Fuel pump

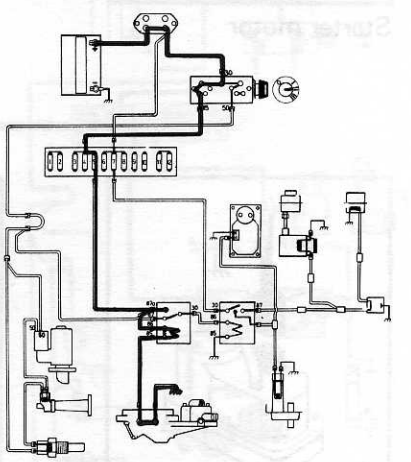
Starting engine



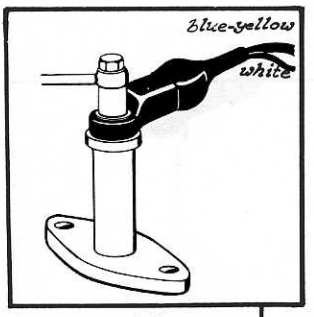
Engine running



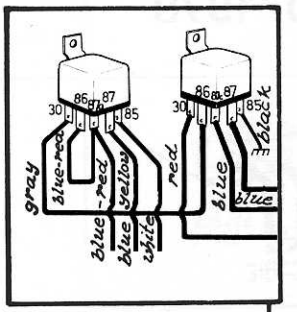
Engine stalled (ignition on, but engine not running)



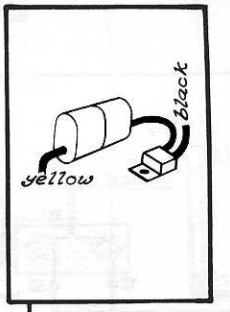
CI Fuel Injection System 260/1977



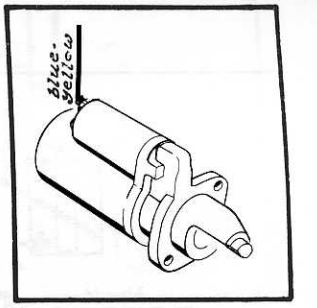
Cold start injector



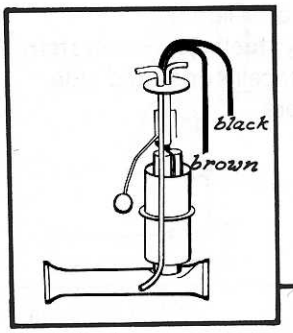
Main relay. Pump relay.



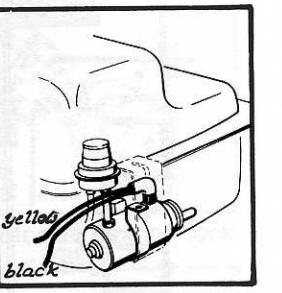
Fuse



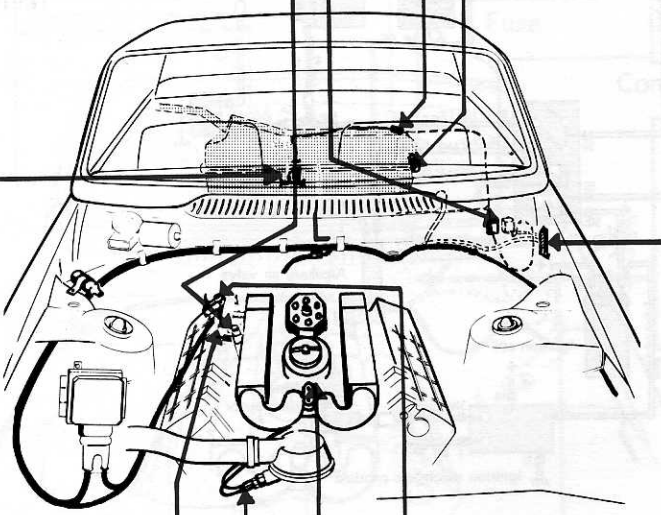
Starter motor

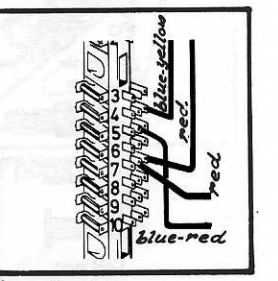


Fuel feed pump

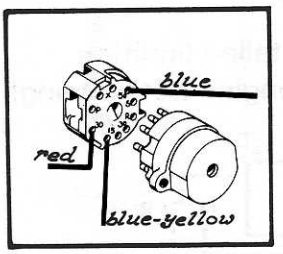


Fuel pump

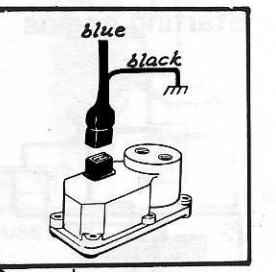




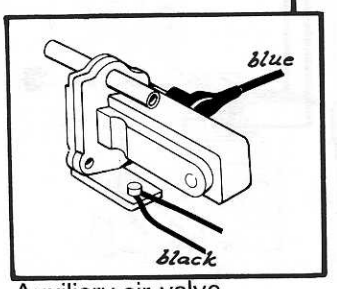
Fuse box



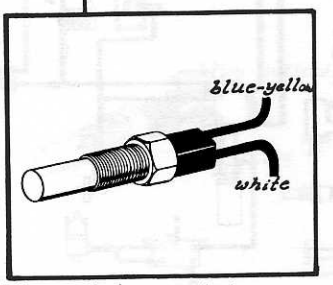
Connector at ignition lock



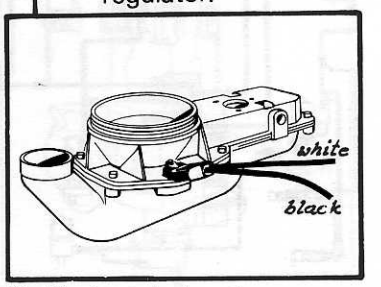
Control pressure regulator.



Auxiliary air valve

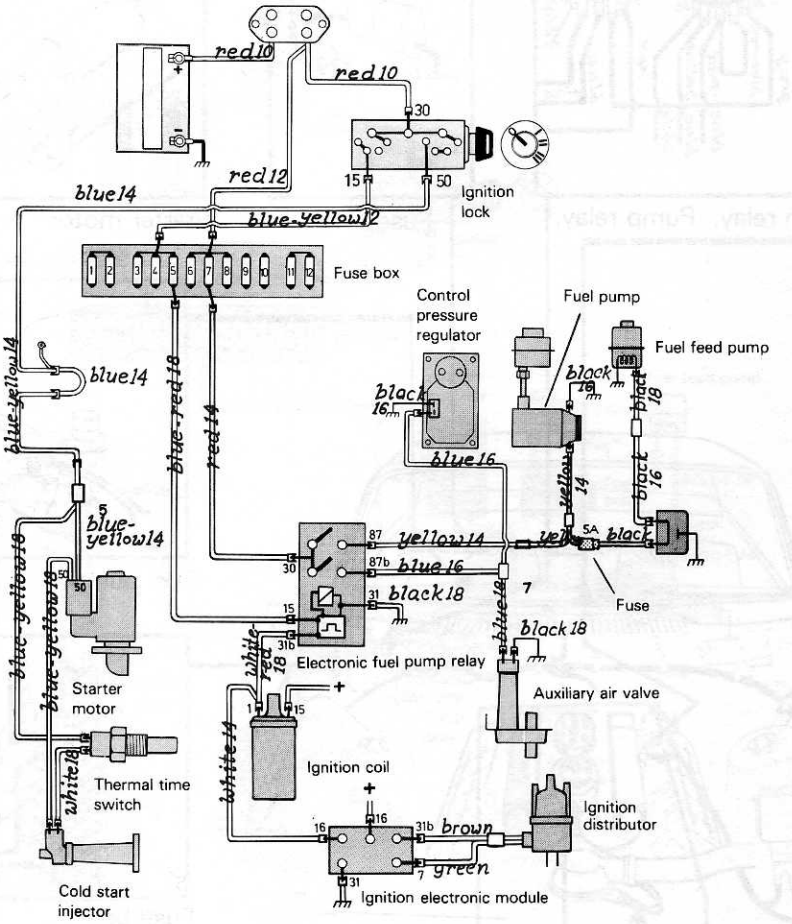


Thermal time switch



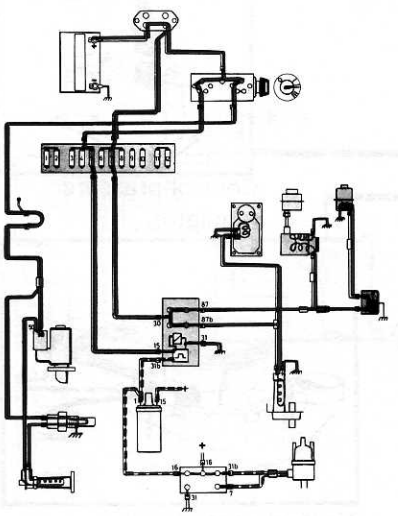
Air/fuel control unit

CI Fuel Injection System 260/1978

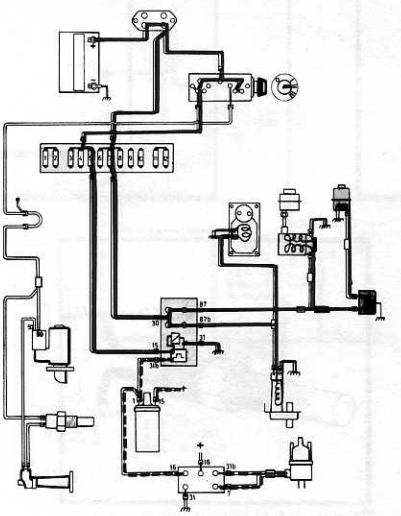


Fuse No. 5
Instruments
Turn signals
Indicator lights
Relay, fuel injection system
Electrically operated side mirrors

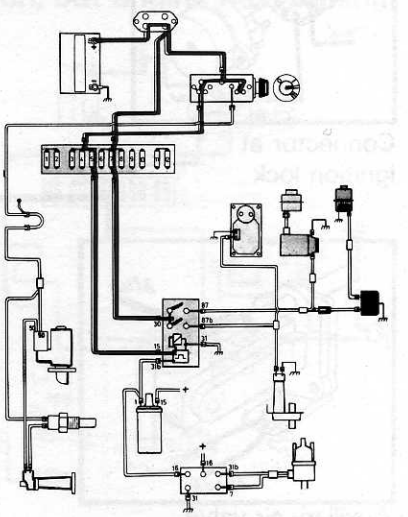
Starting engine

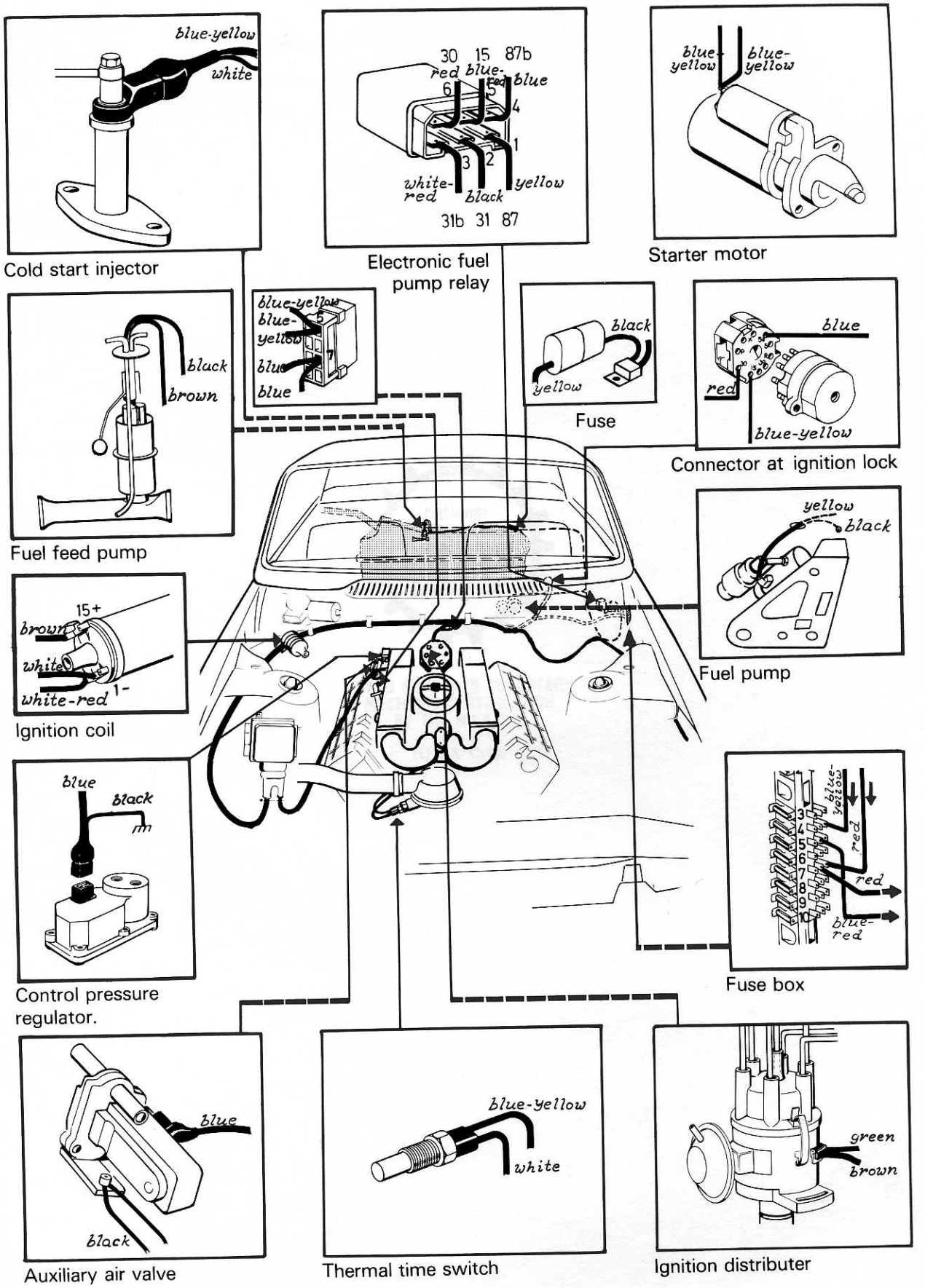


Engine running



Engine stalled (ignition on, but engine not running)




blue-yellow
white
Cold start injector
30 15 87b
red blue-red blue
6 5 4
1
3 2
white-red
black
yellow
31b 31 87
Electronic fuel pump relay
blue-yellow
blue-yellow
Starter motor
black
brown
Fuel feed pump
blue-yellow
blue-yellow
blue
blue
5
7
black
yellow
Fuse
blue
red
blue-yellow
Connector at ignition lock
yellow
black
Fuel pump
15+
brown
white
white-red
1-
Ignition coil
blue
black
Control pressure regulator.
blue-yellow
red
red
blue-red
Fuse box
blue
black
Auxiliary air valve
blue-yellow
white
Thermal time switch
green
brown
Ignition distributer

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