8. If the blocking plate does not close, check the electrical power supply to the auxiliary air valve. The minimum voltage at the connector should be 11.5 volts.
9. Finally, using an ohmmeter, check the heating coil in the auxiliary air valve for an open circuit. Should the coil prove faulty, fit a new air valve.

Procedure 5 Checking the operation of the primary fuel circuit

Fuel delivery

1. Fit the pressure tester RH 9612 (Bosch Number KDEP 1034).
2. Open the valve screw(s) on the pressure tester valve block.
3. Disconnect the fuel return line to the fuel tank at the fuel distributor. Using a 'firtree' type nipple and nut (SPM 1390/1), connect one end of an auxiliary fuel return hose to the connection. Hold the other end of the hose in a graduated measuring container capable of holding at least 2 litres (3.5 Imp pt).
4. Disconnect the electrical plug from the warm-up regulator and the auxiliary air valve.
5. Apply electrical power to operate the fuel pump for 30 seconds (refer to page B2-33). At least 1000 ml of fuel should be delivered into the measuring container.
6. If the delivery quantity is satisfactory, check the primary system pressure. However, if the delivery quantity is below the prescribed amount proceed as follows, checking the fuel pump delivery after each operation.
7. Check the voltage at the fuel pump. When the pump is operating this should be 11.5 volts.
8. Check the fuel lines for blockage.
9. Fit a new main fuel filter.
10. Fit a new fuel pump.
11. After establishing that the fuel delivery is correct remove the test equipment.
12. Connect the fuel return pipe to the fuel distributor.

Primary system pressure

To carry out this test, fit the pressure tester RH 9612 (Bosch Number KDEP 1034).

1. Close the valve screw on the pressure tester three-way block. If the valve block has two screws, this is the screw situated adjacent to the warm-up regulator connection.
2. Apply electrical power to operate the fuel pump (refer to page B2-33). The pressure gauge will now show primary system pressure which should be between 5,2 bar and 5,8 bar (75.4 lbf/in² and 84.1 lbf/in²).
3. If the primary system pressure is too low.

a. Check the fuel supply.

b. Check the setting of the pressure regulator and service if necessary.

4. If the primary system pressure is too high.

a. Check for a restriction in the return line to the fuel tank.

b. Check the setting of the pressure regulator and service if necessary.

Procedure 6 Checking the control pressure

Control pressure is determined by the warm-up regulator and governs the basic mixture strength.

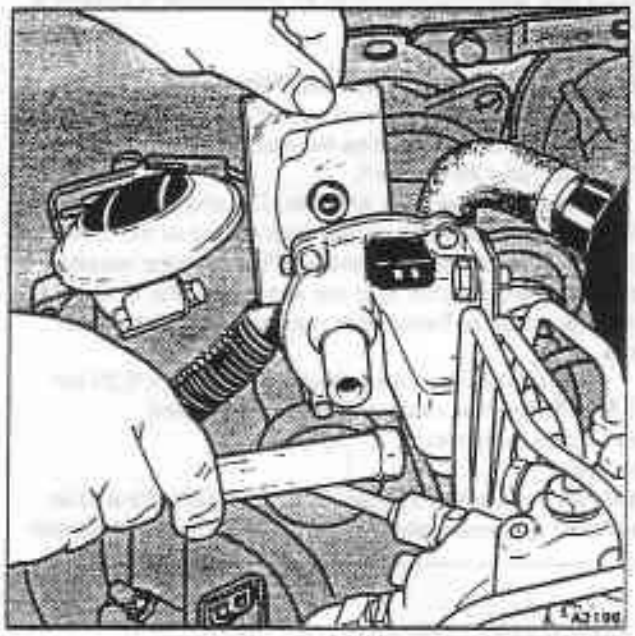


Fig. B2-27 Checking the auxiliary air valve

The warm-up regulator contains a temperature sensitive bi-metal. Therefore, the control pressure depends upon the warm-up regulator bi-metal temperature.

On cars produced to Australian, Japanese, and North American specifications, the warm-up regulator contains two temperature sensitive bi-metals and an aneroid capsule (see fig. B2-18) which responds to atmospheric pressure.

The control pressure depends upon the warm-up regulator bi-metal temperature and on certain cars it is further influenced by atmospheric pressure (which is reduced with increasing altitude).

Fit the pressure tester RH 9612 (Bosch Number KDEP 1034).

Cold control pressure

The engine must be cold to enable this test to be properly carried out. The engine must not have been run for at least four hours; **preferably** left overnight.

The ambient temperature at the time of the test must also be known.

1. Disconnect the electrical plug situated on the warm-up regulator.
2. Apply control pressure to the system (refer to page B2-32).
3. Open the valve(s) on the pressure tester valve block. Note that the pressure tester gauge will show cold control pressure.
4. Refer to figure B2-28 for the correct cold control pressure.

Examples of readings for vehicles fitted with altitude compensation are as follows.

If the test site is at sea level the correct control pressure should be within ± 0,2 bar (3 lbf/in²) of the

solid line (corresponding to an atmospheric pressure of 984 millibars).

Example

With an atmospheric pressure of 984 millibars or above and an ambient air temperature of 20°C (68°F), the cold control pressure should be between 2,0 bar and 2,4 bar (29 lbf/in² and 34.8 lbf/in²).

If the test site is at altitude [i.e. above 600 m (1968 ft)], determine the atmospheric pressure at the time of the test. This should be obtained from a local weather station or airport that is at the same altitude, or from a reliable mercury barometer reading taken at the test site.

The control pressure should be within ± 0,25 bar (3.6 lbf/in²) of the value corresponding to the atmospheric pressure.

Example

With an atmospheric pressure of 838 millibars and an ambient air temperature of 20°C (68°F), the cold control pressure should be between 2,45 bar and 2,95 bar (35.5 lbf/in² and 42.8 lbf/in²).

To carry out a basic functional test on the altitude compensation device at sea level, connect the Mityvac pump RH 12495 to the breather connection on the warm-up regulator and evacuate the body (see fig. B2-29).

Ensure that the control pressure rises as the pressure within the warm-up regulator decreases.

If the cold control pressure is incorrect fit a new warm-up regulator.

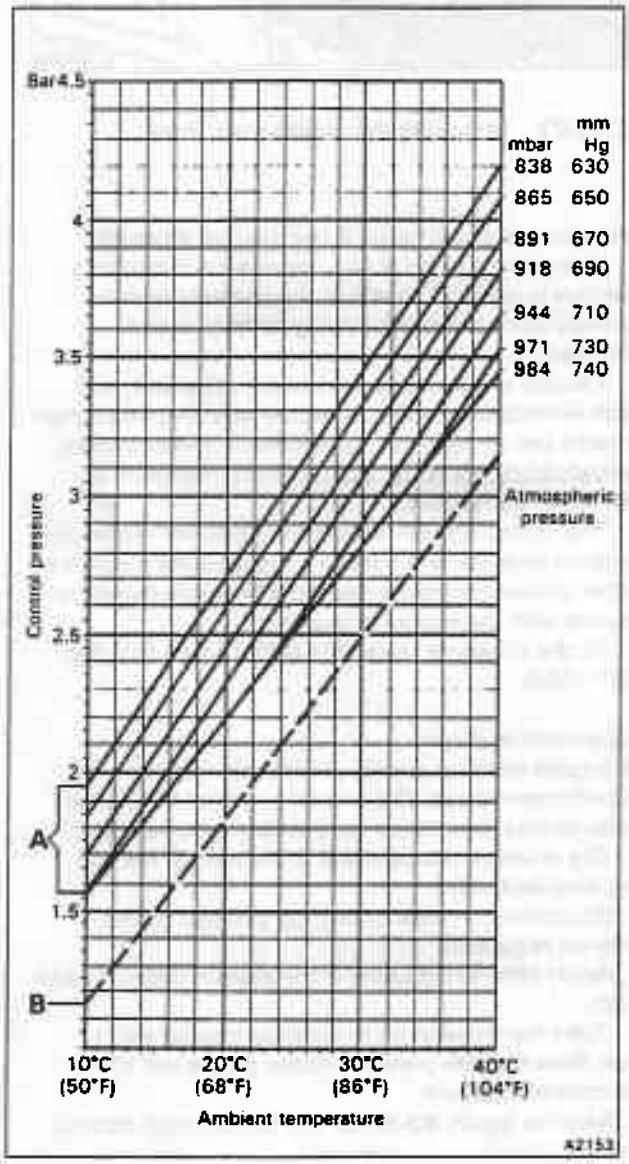


Fig. B2-27 'Cold' control pressure

A Cars with altitude compensation

B Cars without altitude compensation

Warm control pressure

1. Connect the electrical plug to the warm-up regulator.
2. Apply control pressure to the system (refer to page B2-32).
3. Ensure that the valve(s) on the valve block of the pressure tester is open.
4. The control pressure should begin to rise. When it has stabilized, the warm control pressure should be 3,6 bar (52.2 lbf/in²) ±0,15 bar (±2.2 lbf/in²). This should take no more than one minute at 20°C (68°F).
5. On vehicles produced to an Australian, Japanese, or North American specification (i.e. vehicles fitted with altitude compensation), refer to figure B2-30 for the correct warm control pressure at the corresponding test site altitude.
6. If the pressure is incorrect, check that there is an electrical feed to the warm-up regulator. If the electrical feed is correct the warm-up regulator is faulty and should be replaced.

Procedure 7 Checking the fuel system for leaks

1. Fit the pressure tester RH 9612 (Bosch Number KDEP 1034).

Ensure that the valve(s) on the pressure tester valve block is open.

2. Ensure that the engine temperature is between 30°C and 50°C (86°F and 122°F).
3. Apply control pressure to the system (refer to page B2-32).
4. Allow one minute for warm control pressure to be registered on the gauge of the pressure tester.
5. Switch off the ignition.
6. Note the time taken for the pressure to fall to zero and compare this time with the data given in figure B2-32.
7. If the pressure drops too quickly, repeat the test with the control pressure circuit disconnected. To carry out this test, close the valve on the pressure tester valve block (adjacent to the warm-up regulator connection on the two valve type) and repeat the test given in Operations 2 to 6 inclusive.

Should the pressure loss now be acceptable, there is a leak either

a. Externally from the control circuit pipes and/or pipe connections.

b. At the push valve situated within the primary system pressure regulator. This indicates that the rubber sealing rings are defective and should be changed.

Should the pressure loss remain outside the acceptable limits, the leak is in the primary fuel circuit and may be due to.

a. The sealing ring in the primary system pressure regulator being defective and indicating that the rubber sealing rings in the assembly should be changed.
b. The cold start injector leaking.
c. A faulty non-return valve in the fuel pump outlet.
d. Leaking accumulator diaphragm.
e. An external leak from one of the fuel system pipes.
f. One or more of the injectors leaking.

If an injector leak is suspected, switch on the ignition to restore the system pressure then slightly depress the air sensor plate. If the pressure reading drops continuously with the sensor plate depressed an injector is leaking. Remove the sparking plugs for inspection, the plug removed from the cylinder having the sticking injector will often be found in a sooty condition.

Procedure 8 Checking the injectors

1. Remove the injectors from the engine.
2. Connect the injector to the test equipment RH 9614 (Bosch Number KDJE 7452), see figure B2-34.

Opening pressure

3. Bleed the discharge tube by moving the operating lever several times with the union slackened. Tighten the union.
4. Check the injector for dirt by operating the lever slowly at approximately one stroke per two seconds, with the valve on the pressure gauge open.

If the pressure does not rise to between 1,0 bar and 1,5 bar (14.5 lbf/in² and 21.75 lbf/in²) the valve of the injector has a bad leak, possibly caused by dirt. Attempt to flush the valve by operating the lever rapidly several times. If the injector valve does not clear, the injector should be discarded.

5. Check the opening pressure of the injector by closing the valve of the test equipment and bleeding the injector by operating the test equipment lever rapidly several times. Open the valve and move the lever slowly at approximately one stroke per two seconds, note the pressure at which the injector begins to spray.

The correct pressure for the injector to commence spraying is between 3,5 bar and 4,1 bar (50.75 lbf/in² and 59.45 lbf/in²). If this is not correct, fit a new injector.

Leakage test

6. Open the valve on the test equipment and slowly operate the lever until the pressure reading is 0,5 bar (7.25 lbf/in²) below the previously determined opening pressure.
7. Hold this pressure constant by moving the lever.
8. No drops should appear from the injector for the next 15 seconds.

Evaluation of spray and 'chatter' test

9. Operate the lever of the test equipment at one stroke per second, as this is done the valve in the end of the injector should be heard to 'chatter'.

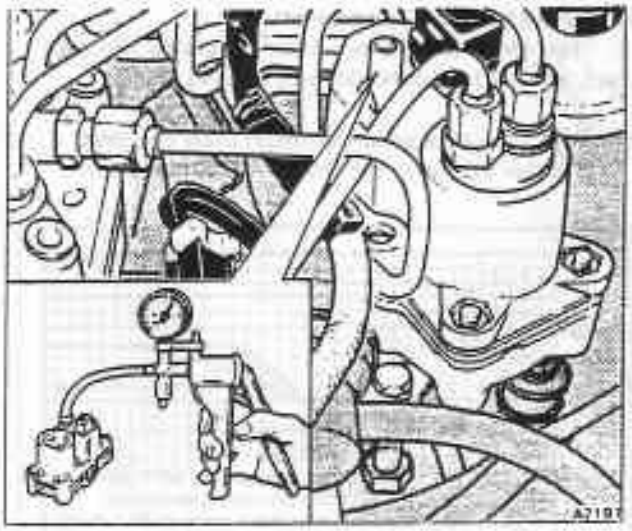


Fig. B2-29 Evacuating the warm-up regulator

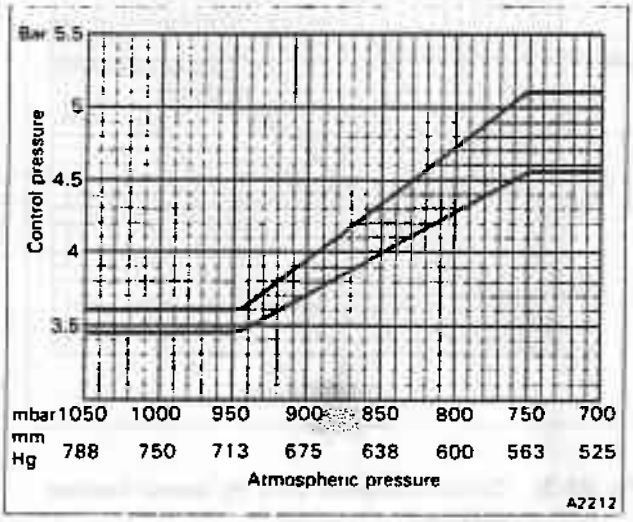


Fig. B2-30 Warm control pressure (vehicles fitted with altitude compensation)

10. The injector should also produce an even spray with an approximate spray angle of 35°. If drops form at the mouth of the injector valve or if the spray is excessively one-sided, the injector should be discarded.

The various spray formations and angles are shown in figure B2-33.

Note It is important that any replacement injectors are tested in the above manner before fitting to the engine.

Procedure 9 Checking the delivery balance of the fuel distributor

1. Fit the delivery quantity comparison tester RH 9613 (Bosch Number KDJE 7455), see figure B2-39.
2. Remove the air intake elbow to reveal the air sensor plate.
3. Apply electrical power to operate the fuel pump (refer to page B2-33).

4. Bleed the test equipment.
5. This test is carried out under simulated idle, part load, and full load conditions as follows.

Note The test equipment rotameter scale may read either ml/min or cm^3/min. Whichever scale is used, the flow figures are identical (i.e. 1 ml/min=1 cm^3/ min).

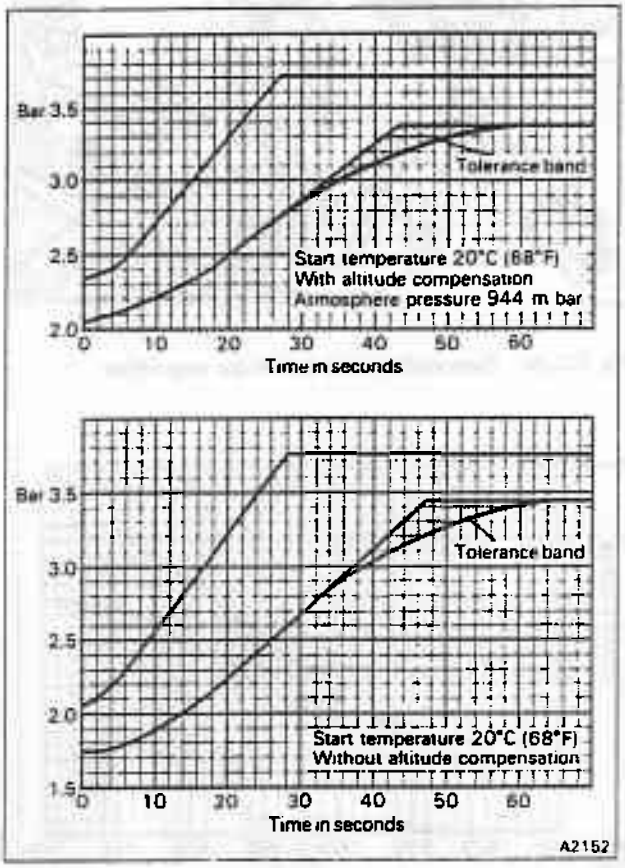


Fig. B2-31 Time taken from 'cold' to 'warm' control pressure

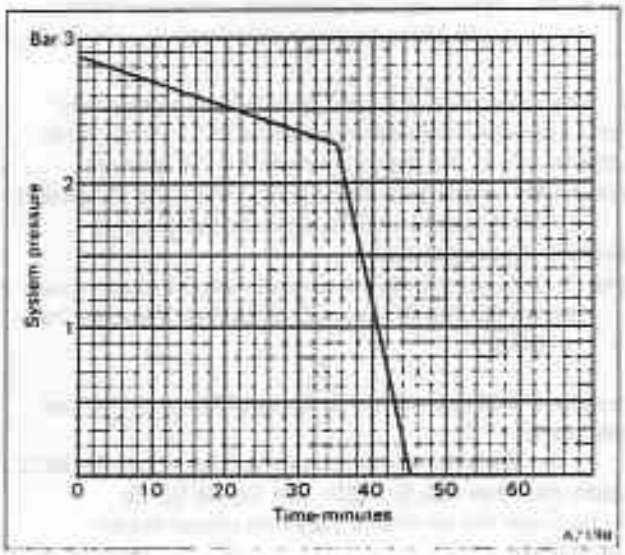


Fig. B2-32 Fuel system 'leak down'

Idle conditions

6. Press switch number one on the test equipment and move the air flow sensor plate downwards (using the adjusting device shown in figure B2-35) until the reading on the small rotameter indicates a flow of approximately 6,7 ml/min.
7. Test the remaining outlets and determine which one has the lowest fuel delivery.
8. Press the switch of the outlet with the lowest fuel delivery. Using the adjusting device, adjust the height of the air flow sensor plate until the reading on the rotameter is 6,7 ml/min.
9. Measure the fuel delivery from each outlet, noting that none of them should exceed 7,7 ml/min.

Part load conditions

10. Repeat Operations 6 to 9 inclusive, moving the air flow sensor plate downwards, until a fuel delivery of 20,8 ml/min is measured (on the large rotameter) from the fuel outlet with the lowest delivery.
11. Measure the fuel delivery from each outlet, noting that it should not exceed 22,4 ml/min.

Full load conditions

12. Repeat Operations 6 to 9 inclusive, moving the air flow sensor plate further downwards until a fuel delivery of 94 ml/min is measured from the fuel outlet with the lowest delivery.
13. Measure the fuel delivery from each outlet, noting that it should not exceed 99 ml/min.

If the fuel delivery exceeds the limits quoted, a new fuel distributor should be fitted.

Procedure 10 Checking the engine idle speed

Refer to Idle speed – To set.

Procedure 11 Checking the idle mixture strength

The idle mixture strength should be checked and adjusted in accordance with the instructions given under the heading idle mixture strength – To set.

The idle mixture strength should always be checked if either a new warm-up regulator or fuel distributor have been fitted.

Procedure 12 Checking the operation of the throttle plates

1. Depress the accelerator pedal fully and observe the position of the throttle levers.
2. Ensure that the throttle levers are fully open (i.e. against the stops).
3. Also, ensure that the throttle linkage operates smoothly through both primary and secondary stages.
4. If the throttles do not open fully, or if the linkage does not operate smoothly, the problem should be investigated and corrected as described in Chapter K.

Procedure 13 Checking the air intake filter and ducting for blockage

1. Remove the air filter element.

2. Examine the condition of the element and fit a new one if necessary.
3. Inspect the filter housing assembly. Particular attention should be given to the intake 'scoop' that diverts air from behind the front bumper into the filter housing; ensure that this is not obstructed.
4. Slacken the worm drive clips that secure the flexible hose to the intake elbow on the mixture control unit; ensure that the elbow and ducting are not blocked.
5. Carry out the tests given in the Workshop Procedures 3 and 12.
6. Fit all hoses, clips, and the filter element upon satisfactory completion of the tests.

Procedure 14 Checking the cold start system
When checking the cold start system it is **essential** that the information given in the Workshop safety precautions is observed.

Thermal time switch
1. Withdraw the electrical plug from the thermal time switch.
2. Connect a test lamp between one of the two plug terminals and earth.
3. Switch on the ignition and crank the engine. The bulb of the test lamp should illuminate. Repeat the check on the other plug terminal. If the bulb does not illuminate in either test the electrical connections and wiring of the respective circuit are suspect.
4. Produce a test lead using a Bosch electrical plug and two lengths of cable, each approximately 500 mm (20 in) long.
5. Connect the test cables to the thermal switch via the plug.
6. Refer to figure B2-36 and measure the resistance between.
a. Terminals W and G.
b. Each terminal and the brass body of the switch.
Depending upon the temperature of the switch, the resistance measured should be within the values given in figure B2-36.
7. If the values do not correspond with those given in figure B2-36 fit a new switch.
8. After the test has been satisfactorily carried out, remove the test lead assembly and connect the electrical loom plug.

Cold start injector
9. Detach the electrical plug from the cold start injector.
10. Produce a test lead using a Bosch electrical plug, two lengths of cable and a micro-switch.
11. Remove the cold start injector from the induction manifold with its feed pipe attached. Place the nozzle of the injector into a suitable clean container so that its operation can be observed.
12. Connect the electrical plug to the cold start injector and the two cables, one to an auxiliary electrical feed and the other to an earth point.
Note Exercise care to eliminate the possibility of an electrical spark (use the micro-switch to make and break the circuit).

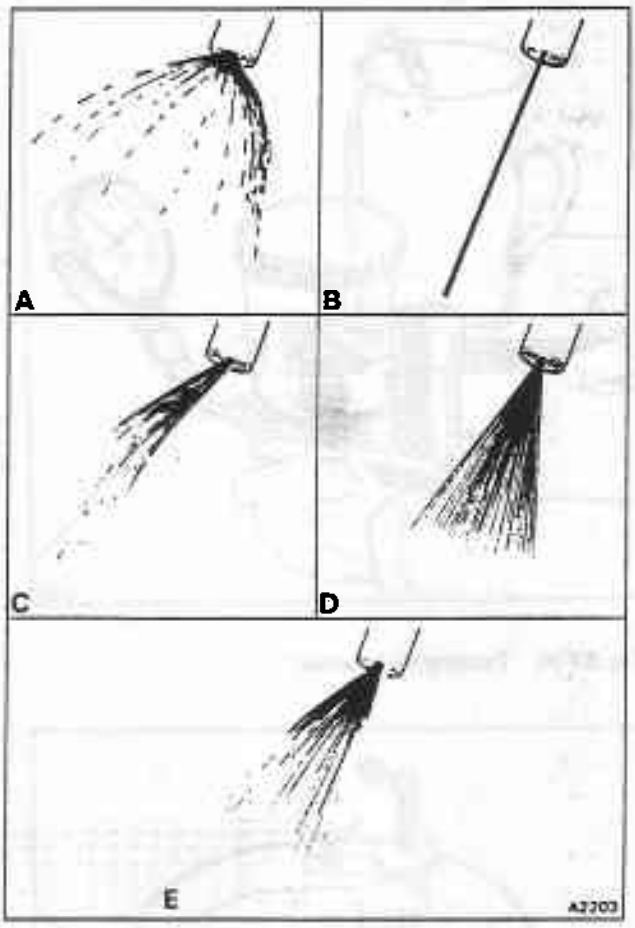


Fig. B2-33 Injector spray patterns
Unacceptable spray patterns
A Drop formation
B Cord spray
C Spray in strands

Acceptable spray patterns
D Good spray formation
E Single-sided but still a good spray formation

13. Apply electrical power to operate the fuel pump (refer to page B2-33).
14. Operate the micro-switch to complete the auxiliary electrical circuit. The cold start injector should spray fuel as the contacts in the micro-switch complete the electrical circuit; if it does not spray fuel, fit a new injector.
15. Dry the nozzle of the cold start injector.
16. Repeat Operation 13 but do not operate the micro-switch. Note that no drops of fuel should form on or drip from the injector nozzle. If the injector is defective a new one should be fitted.
17. Remove the auxiliary test lead from the injector and connect the loom plug.

Procedure 15 Checking the engine running sensor
1. Switch on the ignition, the fuel pumps should not operate.

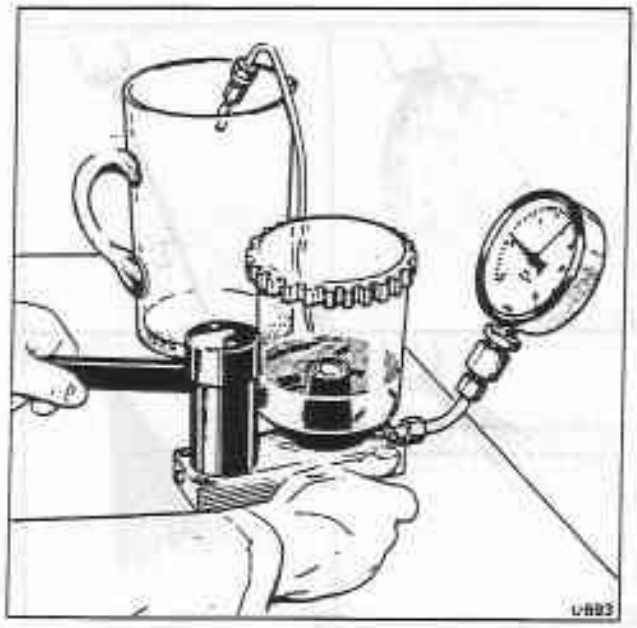


Fig. B2-34 Testing an injector

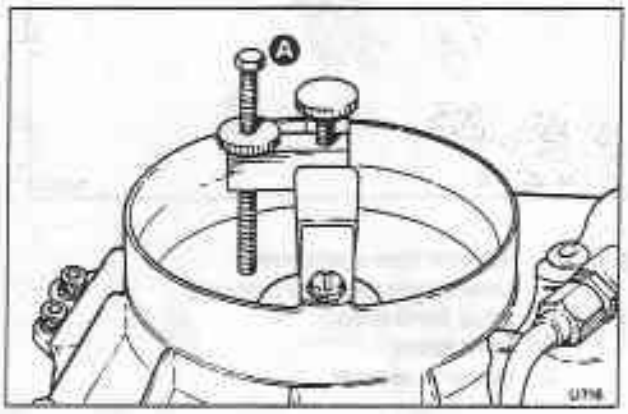


Fig. B2-35 Air flow sensor plate movement adjustment device
A Adjusting screw (part of accessory kit RH 9960)

2. Switch off the ignition.
3. Disconnect the engine running sensor electrical plug and socket situated approximately 75 mm (3 in.) along the loom from the sensor.
4. Produce a test lead with an appropriate 'TTS' type connection on each end. Bridge the white/pink and pink on the vehicle loom socket.
5. Switch on the ignition, the fuel pumps should operate.

This test isolates the engine running sensor from the fuel pump circuit.

If the fuel pumps still do not operate, check for a fault in one of the following.

a. The pink cable to the vehicle loom socket via fuseboard F2, fuse B5, 20 Amp.
b. The white/pink cable to the main fuel pump.
c. The fuel pump.

6. Switch off the ignition, remove the bridging wire and reconnect the engine running sensor.
7. Bridge the engine cranking interlock relay, the fuel pumps should operate.

This test proves that the cranking by-pass situated inside the engine running sensor is operating.

If the fuel pumps do not operate, check for a fault in the following.

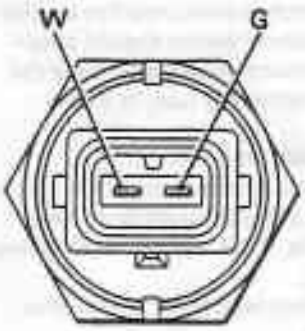
a. The auxiliary white/red cable on the starter relay (12 volts).
b. The brown/black cable from the starter relay to the loom socket.
c. Check for continuity of the white/black (coil-ve).

Normally, a symptom of a fault in this supply is that the engine will start when cranked by the starter motor but stops immediately the key is released.

If the fault diagnosis indicates that the loom and ancillary components are satisfactory, fit a new engine running sensor.

Procedure 16 Checking the fuel accumulator diaphragm for a leak

1. Locate the flexible hose connecting the accumulator to the fuel tank return pipe.
2. Suitably clamp the hose to prevent unpressurized fuel from flowing out during the test.
3. Unscrew the worm drive clip securing the flexible



Country	Switch temperature	Resistance ohms (meter reading) Between terminal G and earth	Between terminal W and earth	Between terminal G and W
Australia Japan North America	Less than 10°C (50°F) More than 20°C (68°F)	50 - 70 50 - 70	0	50 - 70
Other than Australia Japan North America	Less than 35°C (95°F) More than 35°C (95°F)	36 72	0 144	36 72

A2154

Fig. B2-36 Thermal time switch

hose to the connection on the fuel accumulator.
4. Withdraw the hose from the connection.
5. Apply electrical power to operate the fuel pump (refer to page B2-33) and pressurize the fuel accumulator.
6. Ensure that no fuel flows from the open connection on the fuel accumulator during the test.
7. If fuel does flow from the open connection, the accumulator diaphragm is leaking and a new fuel accumulator must be fitted.
8. Connect the fuel pipe and remove the clamp.

Procedure 17 Checking the operation of the idle speed by-pass solenoid
1. Ensure that the parking brake is applied. Warm-up the engine.
2. Allow the engine to idle at 580 rev/min in park with the air conditioning system switched on.
3. Apply the footbrake and engage drive. Check that the idle speed is between 560 rev/min and 620 rev/min.
If the idle speed falls below 560 rev/min check the following.
a. Test for electrical feed to the solenoid when in drive.
b. Check for a blocked hose.
If the above are found to be satisfactory, the solenoid valve is faulty and should be replaced.
Note This solenoid does not operate with the gear range selector lever in the reverse position.

Procedure 18 Pressure control valve damper failure
To check the pressure control valve damper for failure of the diaphragm, check for evidence of fuel around the small diameter metal pipe at the front of the damper assembly. If a diaphragm failure is suspected **do not run the engine** as high pressure fuel will emerge from the damper pipe.
Fit a new damper assembly if a failure of the diaphragm is suspected.

Procedure 19 Cold start acceleration enrichment switch
1. Disconnect the electrical feed to the cold start injector.
2. Connect the 'closed loop' system test meter RH 9615 (Bosch Number KDJE-P600) to the vehicle.
3. Switch the test meter scale to 100%.
4. If the coolant temperature is above 33°C (91°F), bridge the system temperature switch situated in the thermostat housing (see fig. B2-37).
5. Disconnect the vacuum hose at the acceleration enrichment switch. Connect the Mityvac pump RH 12495 to the switch connection and apply a vacuum of 508 mm Hg (20 in Hg).
6. Apply electrical power to the 'closed loop' system test meter (refer to page B2-32). Note that the test meter reading should be 50%.
7. Release the vacuum and observe that the reading on the test meter momentarily increases to 65%.
8. If the meter reading does not increase, it could be due to the following.
a. A cable fault involving the acceleration enrichment switch wiring.

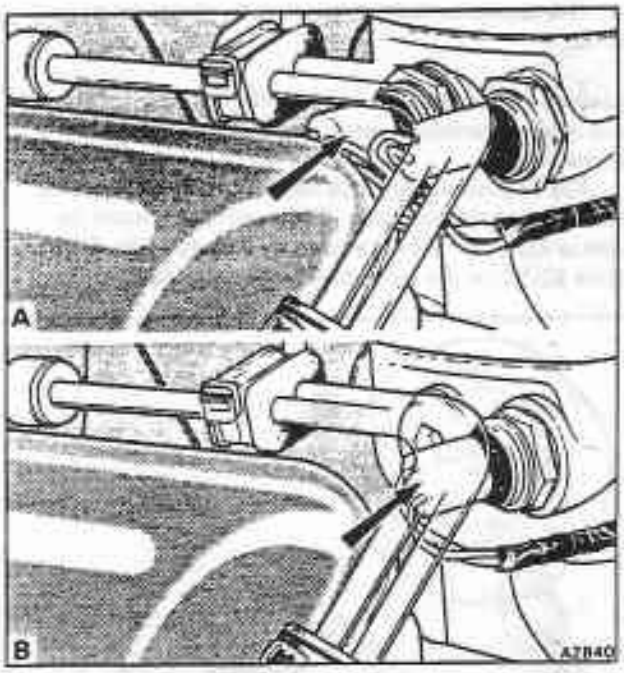


Fig. B2-37 Acceleration enrichment temperature switch
A Cars produced to either a Japanese or North American specification
B Cars produced to an Australian specification

b. A faulty switch.
c. A faulty ECU.
9. Remove the test equipment and replace the starter relay.
10. Release the vacuum, disconnect the pump and fit the vacuum hose to the switch.
11. Remove the bridge from the temperature switch plug. Before connecting the plug to the switch in the thermostat housing, check the switch using a multimeter. Check that the switch is open circuit if the coolant temperature is above 33°C (91°F) or closed circuit if the coolant temperature is below 33°C (91°F).

Full throttle enrichment
This function is operated by the throttle position switch, details of which are given in Chapter K.

Fault diagnosis test equipment and special procedures
This section contains information relating to the fitting procedures for the test equipment used when diagnosing a fault. Also included are the special procedures associated with the fuel injection system.

Depressurizing the fuel system
The fuel in the system may be pressurized (except for the fuel tank and return lines). Therefore, unless the engine has been stationary for a minimum of four hours, it is recommended that the fuel system be depressurized before dismantling any parts of the system.

The depressurizing procedure is given on page B2-15.

Pressure tester valve block assembly
Two types of pressure tester valve block may be encountered.

The original valve block has two valve screws and the later type has only one. Either valve block can be used to carry out the necessary workshop tests. See figure B2-38 for the valve block assembly details.

Note Whenever the pressure tester valve block is not in use, always ensure that the valve screw(s) is open to relieve the pressure on the internal sealing ring(s).

The pressure tester and associated parts are fitted into the control pressure line (see fig. B2-38); the line connecting the fuel distributor to the warm-up regulator. With the test equipment suitably connected

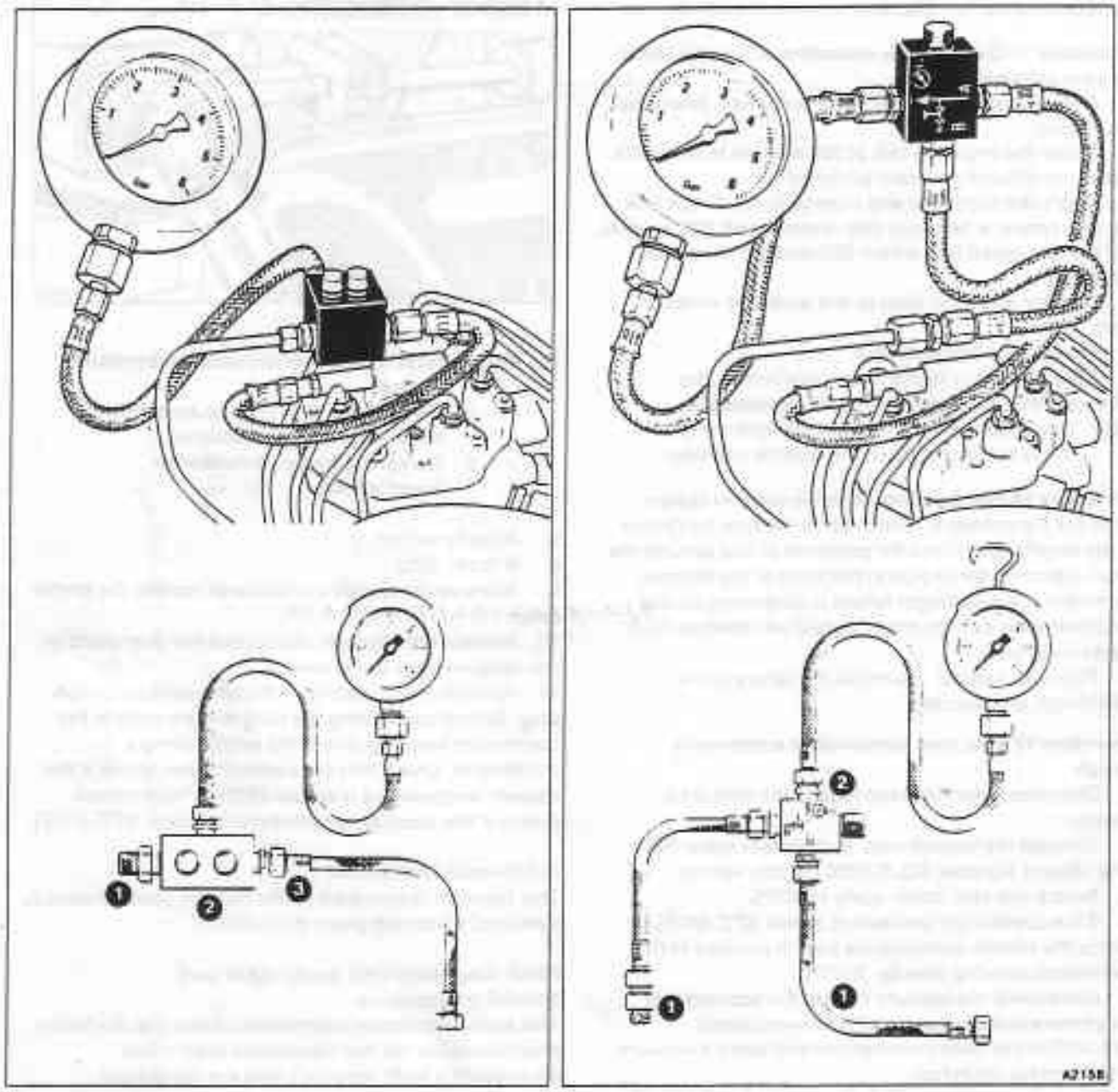


Fig. B2-38 Pressure tester valve block assembly

Original design — 2 valve screws
1 Special adapter RH 9607
2 Pressure gauge and valve block RH 9612 (Bosch No. KDEP-1034)
3 Hose and adapter RH 9645 (Bosch No. KDJE-P100/11)

Later design – 1 valve screw
1 Hose and adapter RH 9645 (Bosch No. KDJE-P100/11)
2 Pressure gauge and valve block RH 9873 (Bosch No. KDJE-P100)

at this point, the fuel injection system can be checked for.

a. Cold and warm control pressure.
b. Fuel system leakage (internal and external).
c. Primary system fuel circuit operation and pressure.

Installation of the test equipment

1. Carry out the usual workshop safety precautions. Switch on the ignition. Ensure that the gear range selector lever is in the park position. Switch off the ignition and remove the gear range selector fuse from the fuseboard.
2. Disconnect the battery.
3. Depressurize the fuel system (refer to page B2-15).
4. Loosely assemble the test equipment and then install it onto the engine as shown in figure B2-38. Ensure that all pipe nuts and unions are tight.

Bleeding the test equipment

After fitting but prior to using the test equipment, always ensure that it is properly bled as follows.

5. Disconnect the electrical plugs from the warm-up regulator and the auxiliary air valve.
6. Connect the battery.
7. Allow the pressure gauge to hang down under its own weight with the flexible hoses fully extended.
8. Ensure that the valve screw(s) on the pressure tester valve block is open.
9. Apply electrical power to operate the fuel pump and build-up pressure in the system (see page B2-33).
10. Open and close the valve screw on the valve block (valve screw number 1 on the early type of block) six or seven times in a ten second rhythm.
11. After the equipment has been satisfactorily bled, lift the gauge up and suspend it from a bonnet catch. Finally, ensure that the valve screw(s) is open.
12. The pressure gauge and associated parts are now ready for use.

Fuel delivery quantity comparison tester RH 9613 (Bosch Number KDJE 7455)

If there is any discrepancy in the quantity of fuel delivered by the individual fuel distributor outlets, it can be measured by a comparison test, using the test equipment RH 9613 (Bosch Number KDJE 7455). This equipment is illustrated in figure B2-39.

The test equipment is designed in such a way that the tests can be carried out without removing the fuel distributor from the engine.

Ideally, the tester should be set permanently on a mobile trolley, so that once it is levelled-up only the trolley needs to be manoeuvred to the test site. However, the tester can be set up on a table close to the test vehicle and the test equipment levelled-up for each test using the levelling screws and spirit level.

The test equipment should be fitted to the vehicle as follows.

1. Disconnect the battery.
2. Unscrew the unions securing the fuel injector lines to the fuel distributor outlets.
3. Screw the special adapters supplied with accesssory kit RH 9960 into the fuel distributor outlets.

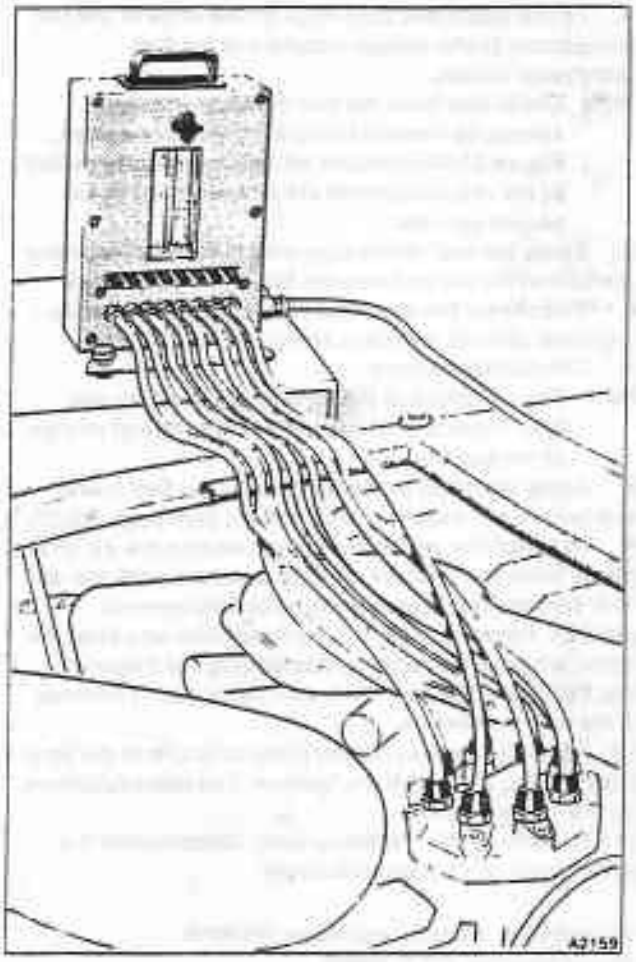


Fig. B2-39 Installation of comparison tester

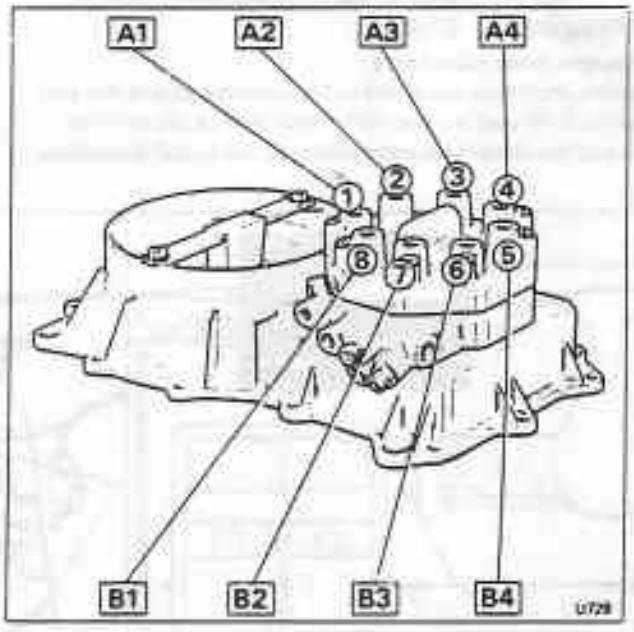


Fig. B2-40 Fuel distributor connections
○ Key number on test equipment (left to right)
□ Engine cylinder

4. Fit the automatic couplings on the ends of the test equipment, to the special adapters in the fuel distributor outlets.

Note Outlet one from the fuel distributor should always be nearest to the fuel inlet connection. Figure B2-40 indicates which test line and switch of the test equipment are connected to which engine cylinder.

5. Route the fuel return pipe across the engine, along the side of the car and into the filler for the fuel tank.
6. Disconnect the electrical plug from the warm-up regulator and the auxiliary air valve.
7. Connect the battery.

Note The condition of the battery is critical for this test. Therefore, always check the state of charge of the battery.

8. Apply electrical power to operate the fuel pump and build-up pressure in the system (see page B2-33).
9. To bleed the test equipment, remove the air intake elbow from the mixture control unit and push the air flow sensor plate downwards to its fully opened position. Press each key on the flowmeter one after the other, whilst simultaneously operating the three-way tap. Continue this operation until there are no bubbles in the two rotameters.
10. Allow the air flow sensor plate to return to the zero position and switch off the ignition. The test equipment is now ready for use.
11. To remove the test equipment, depressurize the system and reverse the procedure.

'Closed loop' system test meter RH 9615 (Bosch Number KDJE-P600)

1. Fit the two test cables into the side of the test meter.
2. Fit the other ends of the cables to the vehicle as follows (see fig. B2-41).

Five pin, three core cable
Locate the black/slate test cable situated above the side scuttle trim pad on the right-hand side of the vehicle. Attach the small test connection to the Lucar connector.

Connect the main brown (feed) cable to a known 12 volts supply and the green/yellow cable to a good earth point. For convenience, it is suggested that the cables be fitted to an adapter that will fit into the cigar lighter socket.

Two volts output cable
Disconnect the oxygen sensor, three pin cable connector. This is situated in the rear right-hand corner of the engine compartment. Fit the test cable to the light green cable in the connector plug to the ECU.

3. Withdraw the starter relay.
4. The test meter is now ready to be used.
5. Use the test meter by turning and holding the ignition key in the switchbox to the START position.

Apply control pressure to the system

1989 model year (4 door cars)

1. Raise the bonnet and remove the relays cover.
2. Locate the right-hand valance to engine 7-way socket (only connected on turbocharged cars).
3. Produce a test cable incorporating a micro-switch.
4. Bridge the 3.0 pink cable and the 3.0 white/pink cable at the socket (see fig. B2-42).
5. Operate the micro-switch. The fuel pump will run and pressure will build-up in the system.
6. Always remove the bridging cable immediately the test is complete.

1987/88 model years (2 and 4 door cars)
1989 model year (2 door cars)

1. Withdraw the starter inhibit relay (see fig. B2-42).
2. Produce a bridge cable of suitable length.
3. Bridge the green cable in the windscreen washer reservoir motor and the white/pink cable connection on the starter inhibit relay mounting block.
4. Switch on the ignition.
5. The fuel pump will run and pressure will build-up in the system.
6. Always remove the bridging cable immediately the test is complete.

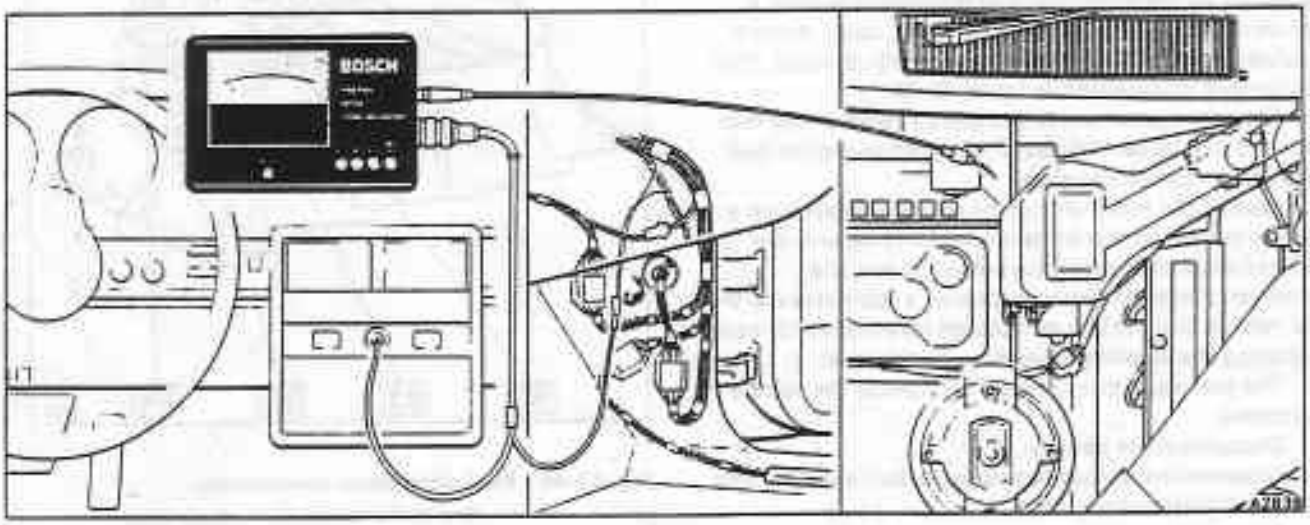


Fig. B2-41 'Closed loop' system tester

Apply electrical power to operate the fuel pump and build-up pressure in the system

1. Carry out the operations listed under the heading, Apply control pressure to the system.

Apply electrical power to the heaters in the auxiliary air valve and the warm-up regulator

1. Carry out the operations listed under the heading, Apply control pressure to the system.

Removal and fitting of components

Before dismantling any connections and removing components always depressurize the system. Always blank off any open connections to prevent the ingress of dirt.

Mixture control unit (see figs. B2-40 and B2-45)

The mixture control unit comprises the air meter, the fuel distributor, and the primary system pressure regulator.

The fuel distributor and/or the primary system pressure regulator can be removed separately from the assembly. However, in the process of general dismantling the components would be removed as one assembly.

Fuel distributor – To remove and fit

1. Disconnect the battery and depressurize the fuel system (refer to page B2-15).
2. Unscrew and remove the following connections on the fuel distributor.

a. The union securing the warm-up regulator feed pipe to the adapter on the top of the fuel distributor.
b. Fuel supply to the fuel distributor.
c. Connection to the pressure control valve (if fitted).
d. Fuel supply to the cold start injector.
e. Fuel return to the fuel tank.
f. Fuel return from the warm-up regulator.

3. Unscrew the unions from both ends of the injector pipes and carefully withdraw the pipes.
4. Using a screwdriver, unscrew the securing screws situated on top of the distributor.
5. Lift the fuel distributor from the mixture control unit and collect the rubber sealing ring (resistance will be encountered due to the rubber sealing ring).
6. If the control piston is to be removed, carefully bend the retaining tabs away from the bore of the fuel distributor barrel and withdraw the piston. Clean the control piston in solvent cleaner and lubricate with white spirit.
7. Fit the fuel distributor and control piston by reversing the removal procedure. Note that the rubber sealing ring fitted in between the fuel distributor and mixture control unit must be in good condition. If in doubt, fit a new sealing ring.

When installing the sealing ring ensure that it is lubricated with a suitable grease and that it does not become trapped when the fuel distributor is fitted. This could cause a subsequent air leak which may be difficult to detect. Check the idle mixture strength.

8. If a new fuel distributor is fitted, leave one of the injector lines disconnected so that the following basic setting can be carried out.

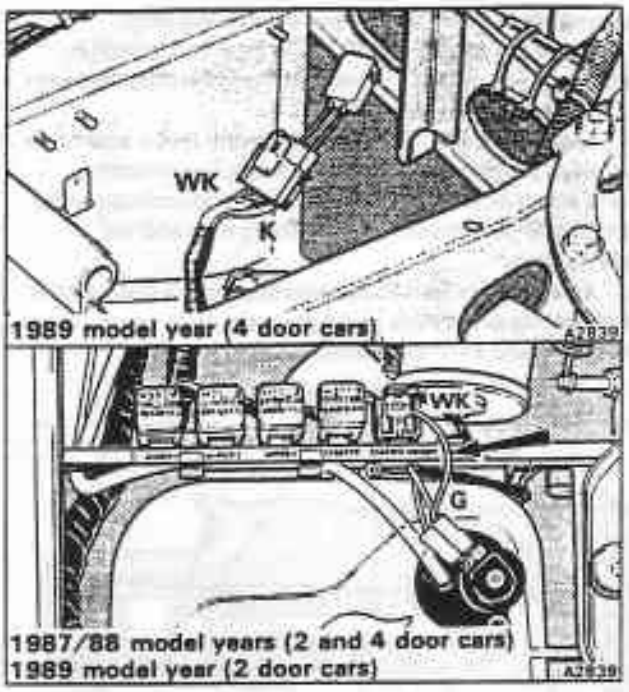


Fig. B2-42 Applying control pressure to the system

9. Apply electrical power to operate the fuel pump and build-up pressure in the system (see page B2-33).
10. Turn the idle mixture adjusting screw clockwise using the spanner RH 9608, until the fuel just starts to be delivered at the open outlet on the fuel distributor. Then, turn the adjusting screw anti-clockwise one half turn.

The basic setting is now correct and assembly can be continued.

Primary system pressure regulator

(see figs. B2-5, B2-43, and B2-44)

The pressure regulator can be removed and serviced separately from the fuel distributor. A service kit is available containing a new system pressure regulator seal, push valve assembly, and system pressure adjusting shims.

1. Disconnect the battery and depressurize the fuel system (refer to page B2-15).
2. Unscrew the large hexagonal locking screw situated in the side of the fuel distributor (see figs. B2-5 and B2-43).
3. Withdraw the complete pressure regulator and push valve assembly. Take care not to lose the shim washer(s) if the regulator plunger and spring become dislodged.
4. Lift off the regulator plunger and spring, collect the shim washer(s).
5. Examine the rubber 'O' ring situated on the end of the regulator plunger. A new 'O' ring can be fitted but the control plunger must remain with the fuel distributor.
6. To fit a new 'O' ring (see fig. B2-44) commence by cutting off the old ring with a very sharp blade. **Do not**

attempt to remove the crimped retaining ring.

7. Draw the new rubber 'O' ring over the crimped retaining ring, using a blunt tool. Take care not to over stretch the new rubber 'O' ring.
8. Check that the 'O' ring is correctly fitted and has not been damaged. Ensure that it can be turned by hand and that there is a clearance of approximately 0,2 mm (0.008 in) between the retaining ring and the sealing ring.
9. To assemble and fit the regulator valve reverse the dismantling procedure using the new push valve assembly and existing shims.

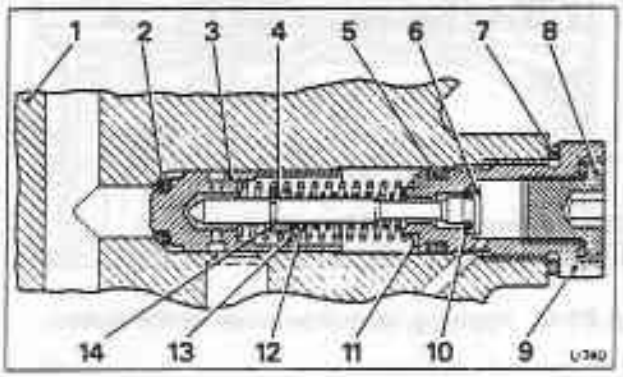


Fig. B2-43 Primary system pressure regulator valve

1 Fuel distributor housing
2 Sealing ring
3 Regulating plunger
4 Retaining ring
5 Sealing ring
6 Push valve
7 Sealing washer
8 Inner locking screw
9 Outer locking screw
10 Sealing ring
11 Shim washers
12 Push valve spring
13 Regulator spring
14 Circlip

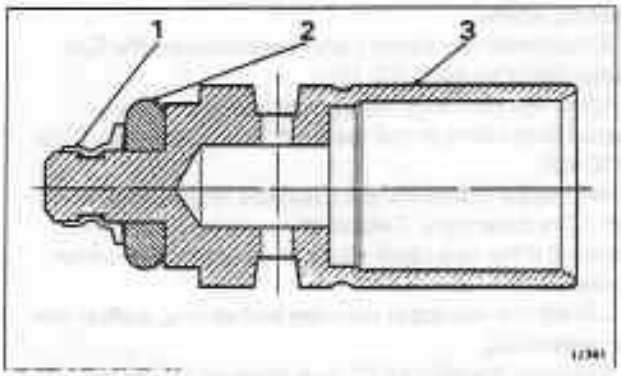


Fig. B2-44 Regulating plunger sealing ring

1 Crimped retaining ring
2 Sealing ring
3 Regulating plunger

10. Upon completion of the work, fit the assembly into the fuel distributor and torque tighten the large hexagonal locking screw.
11. Carry out the workshop procedure for checking the primary system pressure and adjust if necessary using the shims supplied in the service kit. Note that 0,1 mm (0.004 in) of shims is equivalent to 0,15 bar (2.17 lbf/in²) of system pressure.
12. Carry out the workshop procedure for checking the fuel system for leaks.

Mixture control unit assembly – To remove and fit
(see figs. B2-2 and B2-45)

1. Disconnect the battery and depressurize the fuel system (refer to Chapter C).
2. Unscrew the worm drive clip securing the air intake duct, lift the ducting clear of the assembly.
3. Unscrew the worm drive clip securing the breather hose to the air intake elbow, free the hose.
4. Unscrew the two nuts retaining the long reach studs to the mixture control unit.
5. Withdraw the elbow.
6. Disconnect the electrical plug(s) to the auxiliary air valve and the pressure control valve (if fitted).
7. Free the two hoses to the auxiliary air valve and the pressure control valve (if fitted). Free the hose from the rear of the idle speed solenoid.
8. Unscrew the injector pipe unions from on top of the fuel distributor. Free the pipes.
9. Unscrew the pipe nuts connecting the fuel feed and return lines to the fuel distributor.
10. Unscrew the cold start injector fuel feed pipe nut, from the injector. Free the joint.
11. Withdraw the purge hose (if fitted) from the front of the airmeter housing.
12. Withdraw the electrical plug(s) from the warm-up regulator and the acceleration enrichment switch (if fitted).
13. Free the vacuum hose from its connection beneath the acceleration enrichment switch (if fitted).
14. Free the hoses from the solenoid valve(s) mounted between the warm-up regulator and the fuel distributor.
15. Unscrew the mounting nut located beneath the rear of the warm-up regulator mounting bracket.
16. Unscrew the four setscrews retaining the mixture control unit to the throttle housing.
17. Withdraw the mixture control unit with the ancillary units still attached.
18. Remove the upper section of the mixture control unit from the lower half (air outlet duct) by unscrewing the cap nuts situated around the face joint.
19. Fit the assembly by reversing the procedure given for removal, noting that the face joint between the two halves of the assembly should be clean and coated with Wellseal.
20. Ensure that any rubber sealing rings that have been disturbed are in good condition. It is **essential** that the rubber sealing ring between the throttle body and air guide housing is installed correctly (not kinked, etc.).

Note Whenever a hose or an electrical plug is disconnected, it is advisable to attach an identification label to facilitate assembly.

In addition, any open connections should be blanked as soon as possible, to prevent the ingress of dirt.

Throttle body – To service

To remove, fit, and overhaul the throttle body refer to Chapter K.

Warm-up regulator — To remove and fit
(see figs. B2-1 and B2-47)

1. Disconnect the battery and depressurize the fuel system (refer to page B2-15).
2. Detach the electrical plug(s) from the warm-up regulator and the acceleration enrichment switch (if fitted).

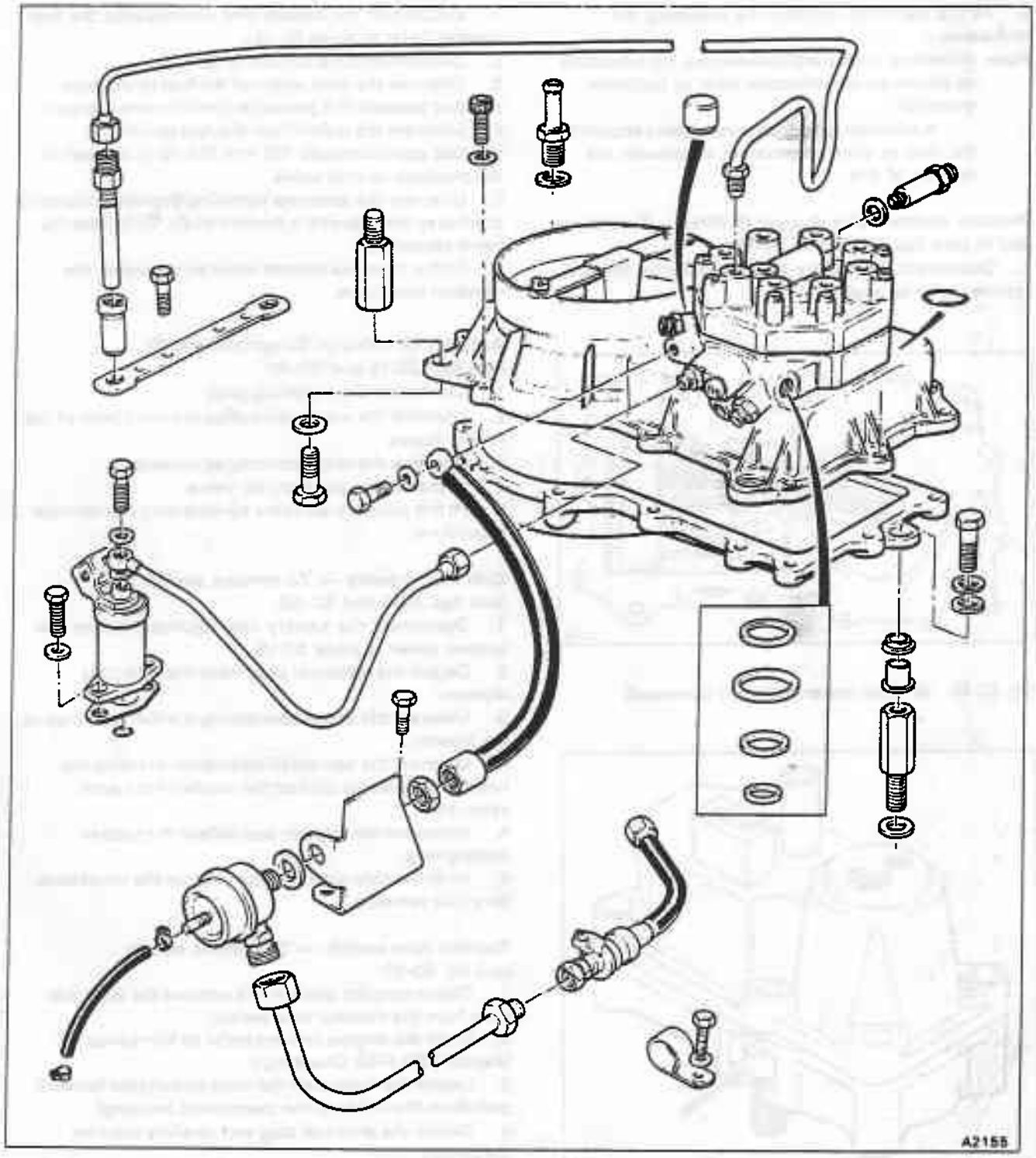


Fig. B2-45 Fuel distributor and associated components
Some of the items shown are not fitted to all cars

3. Unscrew the fuel feed and return pipe connections.
4. Detach the vacuum hose from beneath the acceleration enrichment switch (if fitted).
5. Detach the hoses to the solenoid valve(s) situated between the warm-up regulator and the fuel distributor.
6. Unscrew the two setscrews and the one nut that secure the warm-up regulator mounting bracket to the engine.
7. Withdraw the warm-up regulator.
8. Fit the warm-up regulator by reversing the procedure.

Note Whenever a hose is disconnected, it is advisable to attach an identification label to facilitate assembly.

In addition, any open connections should be blanked as soon as possible, to prevent the ingress of dirt.

Pressure control valve damper (if fitted) – To remove and fit (see figs. B2-12 and B2-45)

1. Disconnect the battery and depressurize the fuel system (refer to page B2-15).

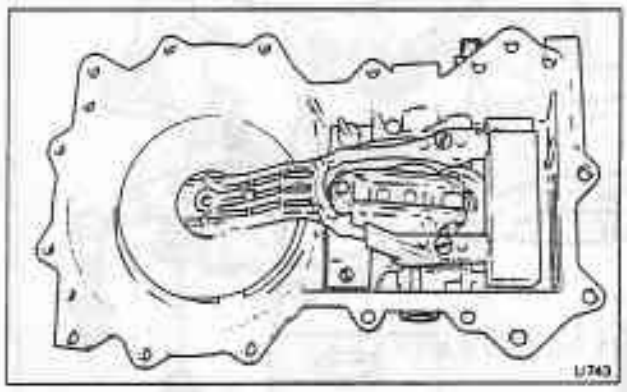


Fig. B2-46 Air flow meter assembly (inverted)

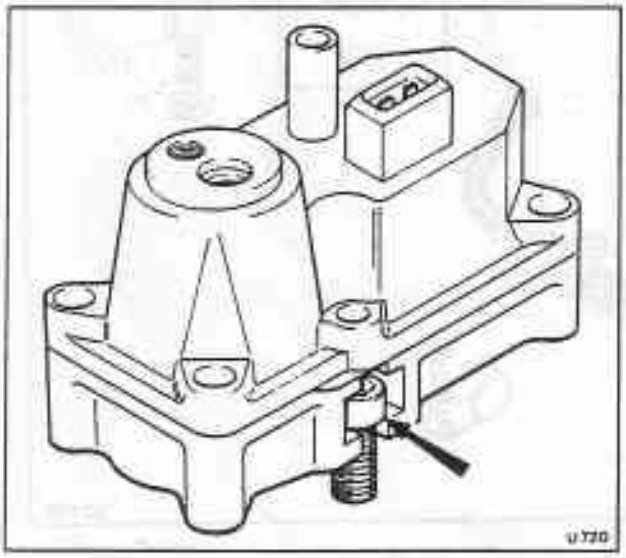


Fig. B2-47 Warm-up regulator mounting screws

2. Unscrew the inlet and outlet unions and detach both pipes.
3. Unscrew the large lock-nut retaining the damper assembly to the mounting bracket.
4. Fit the assembly by reversing the removal procedure.

Pressure control valve (if fitted) – To remove and fit (see figs. B2-12 and B2-45)

1. Disconnect the battery and depressurize the fuel system (refer to page B2-15).
2. Disconnect the electrical plug.
3. Unscrew the pipe union of the fuel return pipe situated beneath the pressure control valve damper.
4. Unscrew the union from the fuel return line situated approximately 150 mm (6.0 in) to the rear of the pressure control valve.
5. Unscrew the setscrew retaining the valve clamping bracket to the side of the throttle body. Withdraw the valve assembly.
6. Fit the pressure control valve by reversing the removal procedure.

Auxiliary air valve — To remove and fit (see figs. B2-19 and B2-48)

1. Disconnect the electrical plug.
2. Unscrew the worm drive clips securing both of the rubber hoses.
3. Unscrew the two mounting setscrews.
4. Withdraw the auxiliary air valve.
5. Fit the auxiliary air valve by reversing the removal procedure.

Cold start injector — To remove and fit (see figs. B2-9 and B2-45)

1. Disconnect the battery and depressurize the fuel system (refer to page B2-15).
2. Detach the electrical plug from the cold start injector.
3. Unscrew the union connecting the fuel feed pipe to the injector.
4. Unscrew the two small setscrews retaining the injector in position. Collect the washer from each setscrew.
5. Withdraw the injector and collect the rubber sealing ring.
6. To fit the cold start injector reverse the procedure given for removal.

Thermal time switch — To remove and fit (see fig. B2-20)

1. Disconnect the battery and remove the electrical plug from the thermal time switch.
2. Drain the engine coolant (refer to Workshop Manual TSD 4700, Chapter L).
3. Locate the brass thermal time switch (the forward switch on the inside of the thermostat housing).
4. Detach the electrical plug and carefully unscrew the switch.
5. Fit the switch by reversing the procedure, noting the following.

Always fit a new aluminium sealing washer.

Always coat the threads of the switch with a suitable sealant (e.g. Loctite 572).

Do not overtighten the switch.

Injector – To remove and fit (see figs. B2-8 and B2-45)

The removal and fitting procedure given below is for one injector but the instructions apply equally to all of the injectors.

1. Disconnect the battery and depressurize the fuel system (refer to page B2-15).
2. Free the loom rail from the respective side of the engine. Manoeuvre the rail away to gain access to the injectors.
3. Unscrew the union connecting the fuel line to the injector.
4. Unscrew the two setscrews securing the injector

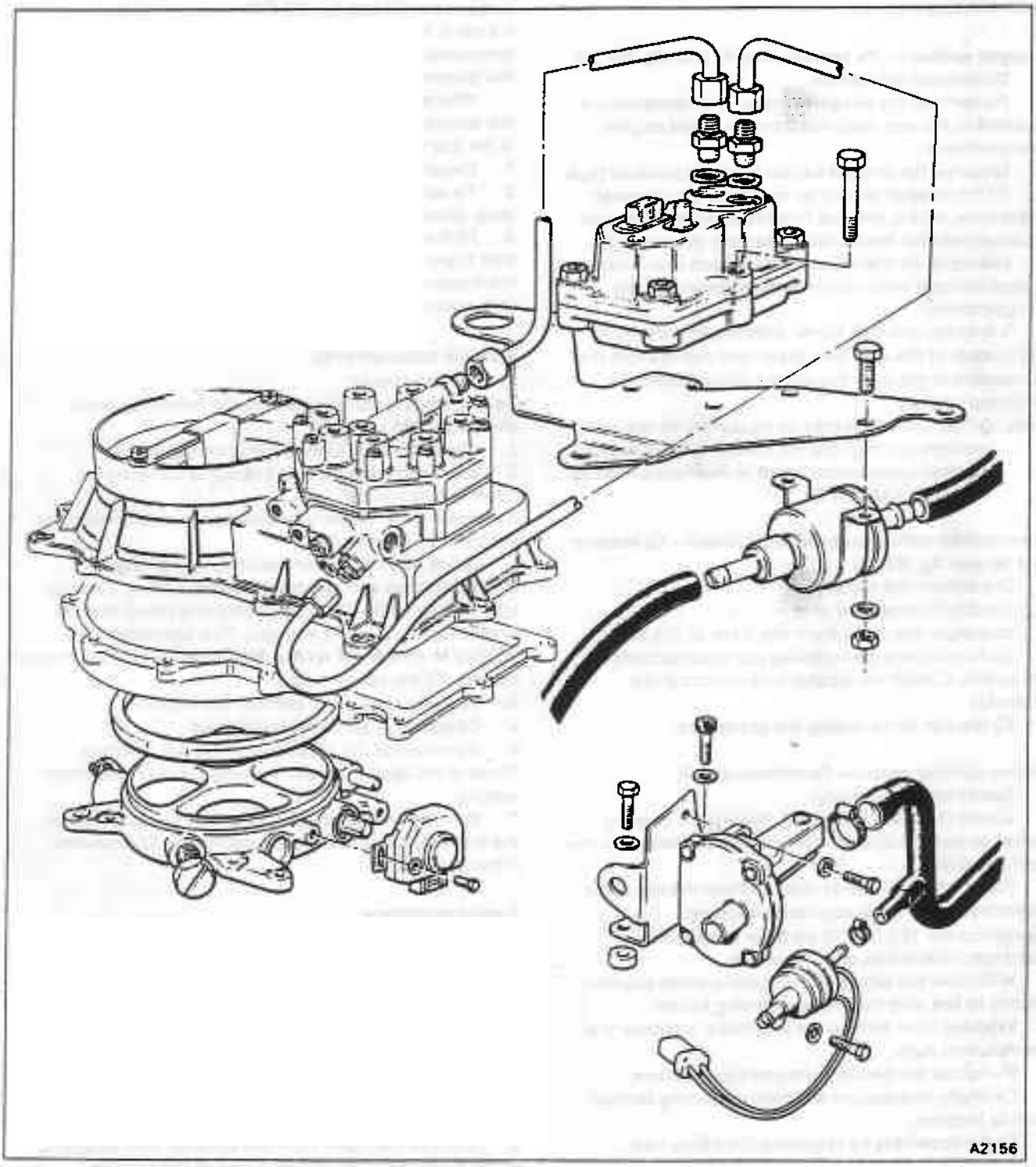


Fig. B2-48 Fuel distributor and associated components

retaining plate to the cylinder head.
5. Remove the retaining plate and withdraw the injector.
6. Fit the injectors by reversing the procedure given for removal, noting that the rubber insulating sleeve must be in good condition.

It is essential to check the spray patterns of the injectors before they are fitted.

New injectors must be thoroughly flushed out before they are tested.

Oxygen sensor — To remove and fit (see fig. B2-14)
1. Disconnect the battery.
2. Disconnect the oxygen sensor. The connection is situated in the rear right-hand corner of the engine compartment.
3. Unscrew the oxygen sensor from the exhaust pipe.
4. Fit the oxygen sensor by reversing the removal procedure, noting that the threads of the sensor must be smeared with Never-seez assembly compound.

Failure to do this will probably result in serious thread damage when subsequently removing the oxygen sensor.

It is important that Never-seez is applied only to the threads of the unit, take great care not to allow the compound to get onto the slotted shield below the threaded portion.

Note On certain cars it may be necessary to remove sections of the grass-fire shields to gain access to the oxygen sensor (refer to Workshop Manual TSD 4700, Chapter Q).

Acceleration enrichment switch (if fitted) – To remove and fit (see fig. B2-16)
1. Disconnect the battery.
2. Detach the electrical plug.
3. Withdraw the hose from the base of the switch.
4. Unscrew the large retaining nut situated beneath the switch. Collect the washer and withdraw the assembly.
5. Fit the unit by reversing the procedure.

Engine running sensor – To remove and fit
1. Disconnect the battery.
2. Locate the main fuseboard, the engine running sensor is located directly behind the fuseboard on the right-hand side.
3. Follow the cables that emerge from the top of the assembly, to the cable connector situated approximately 150 mm (6 in) from the sensor. Disconnect the cables at this junction.
4. Withdraw the relays and mounting block situated directly in line with the engine running sensor.
5. Working from behind the assembly, unscrew the two securing nuts.
6. Withdraw the two long mounting setscrews.
7. Carefully manoeuvre the engine running sensor from its location.
8. Fit the assembly by reversing the procedure.

Electronic control unit – To remove and fit
1. Disconnect the battery.
2. Locate the ECU above the right-hand footwell.
3. Disconnect the multi-pin plug.
4. Unscrew and remove the two mounting setscrews and nuts situated one on either side of assembly.
5. Pull the assembly to release it from the mounting clip, situated at the front of the unit.
6. Fit the unit by reversing the procedure.

Acceleration enrichment temperature switch – To remove and fit (see fig. B2-37)
If a car is fitted with acceleration enrichment, the temperature cut-out switch is situated in the outside of the thermostat housing.

Where the thermostat housing has two switches, the acceleration enrichment temperature switch is the one to the rear.
1. Disconnect the battery and drain the coolant.
2. To remove the switch, disconnect the electrical plug. Unscrew the switch in an anti-clockwise direction.
3. Fit the switch by reversing the procedure, noting that a new sealing washer should always be fitted and the threads of the switch coated with a suitable sealant (e.g. Loctite 572) prior to fitting.

Service adjustments

Preliminary checks
Before carrying out any tuning, the following basic checks should be made.
1. Check the condition of the sparking plugs.
2. Ensure that the throttle linkage is correctly set (refer to Chapter K).
3. Ensure that the throttle position switch is correctly set (refer to Chapter K).
4. Check all air hose connections for tightness.
5. Select park and remove the starter relay. Turn the ignition key to the START position and check that the pressure control valve vibrates. This operation only applies to cars fitted with a 'closed loop' lambda control system. Fit the starter relay.
6. Start the engine and confirm the following.
a. Operation of all 8 engine cylinders.
b. Operation of the 'closed-loop' system (if fitted).
Observe the oxygen sensor warning panel or test meter reading.
7. With the engine running check the fuel system and the entire induction system (including the EGR system, if fitted) for leaks.

Tuning procedure
1. Connect an impluse tachometer to the engine in accordance with the manufacturer's instructions.
2. Connect an ignition stroboscopic lamp to the engine in accordance with the manufacturer's instructions.

Note Operations 1 and 2 can be combined by fitting suitable diagnostic test equipment (e.g. Bosch MOT 201) to the diagnostic socket (refer to Chapter E).

3. Remove the blank from the exhaust pipe adjacent to the oxygen sensor (if fitted) and fit the sample tapping adapter RH 9611.
4. Fit a suitable CO meter.

5. Ensure that the engine is at normal operating temperature.
6. If the complete tuning procedure is to be carried out. the following sequence of operations is recommended.
a. Check the ignition timing (refer to Chapter E).
b. *Check the purge flow rate (refer to Chapter G).
c. Check the idle mixture strength.
d. *Check the operation of the E.G.R. system and the air injection system (refer to Chapter F).
e. Check the engine idle speed.

Note The asterisk denotes a system only fitted to certain cars.

Idle mixture strength – To set

The mixture strength must be checked with the engine stabilized at its normal operating temperature and at an ambient temperature of between 15°C and 30°C (59°F and 86°F).

The engine oil filler cap **must be open** and the idle speed set to 580 rev/min with the air conditioning system switched on.

On cars fitted with a catalytic converter, disconnect the oxygen sensor at the plug in the engine compartment.

Note It is important that the test equipment used to set the idle mixture strength meets the following specification.
Accuracy – CO meter range 0% to 2%
CO concentration within ± 0·1%
Rotational speed within ± 10 rev/min.

1. On cars fitted with a catalytic converter, unscrew the blank from the exhaust (situated in front of the catalytic converter). Fit the sampling probe RH 9876 and connect it to the CO meter.

On cars not fitted with a catalytic converter, insert the sample probe of the CO meter at least 600 mm (24 in) into the exhaust system tailpipe.

On all cars, ensure that the CO meter used is fully warmed-up and correctly adjusted according to the manufacturer's instructions.

2. Briefly accelerate the engine and allow it to return to the idle speed.

The CO concentration should be as follows.

Cars fitted with a catalytic converter	0.5%-0.7%
All other cars	0.6%-0.8%

3. If the CO reading is outside the above range, remove the tamperproof plug and blanking screw (if fitted) from the fuel distributor (see fig. B2-49). Insert the mixture adjusting tool RH 9608 and adjust the mixture strength as follows.

Turn the adjusting screw clockwise to richen the mixture (higher CO %) and anti-clockwise to weaken the mixture (lower CO %).

Note Always approach the final setting from the weak/lean side.

After making an adjustment, remove the adjusting tool and temporarily blank the hole (failure to blank the hole will result in an incorrect CO measurement).

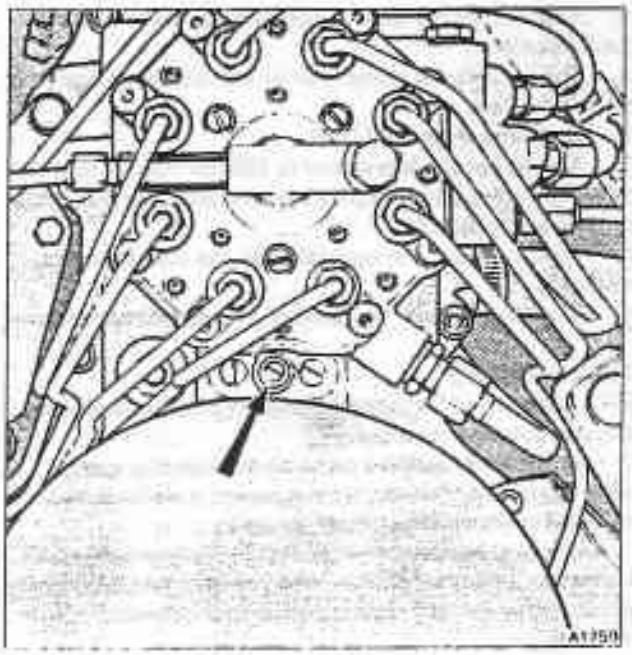


Fig. B2-49 Mixture adjusting screw

4. Reset the idle speed if necessary to 580 rev/min using the idle by-pass screw. Briefly accelerate the engine and re-check the idle CO% reading.
5. Repeat Operations 3 and 4 until the correct CO% reading is obtained.
6. When the CO% reading is correct, remove the sample probe/adapter, close the engine oil filler cap and fit a new tamperproof plug to the fuel metering unit.
7. Connect the oxygen sensor cable (if fitted).

Note Closing the oil filler cap may increase the idle speed. Connecting the oxygen sensor will tend to restore normal idle speed. Do not attempt to correct these small variations in idle speed.

Idle speed – To set

Note It is important that the test equipment used to set the idle speed meets the following specification.
Accuracy – Rotational speed within ± 10 rev/min.

1. To set the idle speed, ensure that the engine has stablized at its normal operating temperature. This can be achieved by allowing the engine to run at idle speed for at least 15 minutes after the thermostat has opened. The opening of the thermostat can be detected by a sudden rise in the temperature of the thermostat elbow pipe.
2. If a fuel evaporative emission control system is fitted, disconnect the purge line at the restrictor (leave the restrictor fitted into the hose to the engine). If there is no restrictor fitted detach the purge line at the valance pipe (refer to Chapter G).
3. If an exhaust emission control system is fitted, disconnect the oxygen sensor cable situated in the rear right-hand corner of the engine compartment.