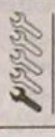
Chapter 4 Part D:
Emissions control systems

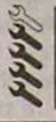
Contents

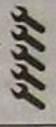
Degrees of difficulty

Easy, suitable for novice with little experience 

Fairly easy, suitable for beginner with some experience 

Fairly difficult, suitable for competent DIY mechanic 

Difficult, suitable for experienced DIY mechanic 

Very difficult, suitable for expert DIY or professional 

1 General information

Note: *In certain Sections of this Chapter references are made to Phase I, Phase II and Phase III models according to year of production. This classification has been necessary where modifications to the model range affect the repair procedure being described. The Phases relate to the model years as follows:*

***Phase I** - 1990 to June 1993*
***Phase II** - June 1993 to October 1996*
***Phase III** - October 1996 to September 1999*

1 All Nissan Primera models covered in this manual are capable of using unleaded petrol, and also have various other features built into the fuel system to help minimise harmful emissions.

2 All models are fitted with a crankcase emissions control system, along with the following systems, according to model:

***1.6 litre non-catalyst carburettor models** - idle compensator system and a dashpot.*
***1.6 litre catalyst carburettor models** - catalytic converter, exhaust gas recirculation (EGR) system, evaporative emissions control system, air induction system, idle compensator system, and a dashpot.*
***1.6 litre multi-point injection models** - catalytic converter, exhaust gas recirculation (EGR) system, and evaporative emissions control system.*
***2.0 litre single-point injection non-catalyst models** - anti-afterburn system and a dashpot*
***2.0 litre single-point injection catalyst models** - catalytic converter, exhaust gas recirculation (EGR) system, evaporative emissions control system, anti-afterburn system, and a dashpot.*
***2.0 litre multi-point injection non-catalyst models** - no other emissions control systems fitted.*
***2.0 litre multi-point injection Phase I catalyst models** - catalytic converter and evaporative emissions control system.*
***2.0 litre multi-point injection Phase II models** - catalytic converter, evaporative emissions control system, and an exhaust gas recirculation (EGR) system.*
***2.0 litre multi-point injection Phase III models** - catalytic converter and evaporative emissions control system.*

3 The various emissions control systems operate as follows.

Crankcase emissions control

4 To reduce the emission of unburned hydrocarbons from the crankcase into the atmosphere, the engine is sealed, and the blow-by gases and oil vapour are drawn from inside the crankcase, through the PCV valve, into the inlet tract, to be burned by the engine during normal combustion.

5 Under conditions of high manifold vacuum, the gases will be sucked positively out of the crankcase. Under conditions of low manifold vacuum, the gases are forced out of the crankcase by the (relatively) higher crankcase pressure; if the engine is worn, the raised crankcase pressure (due to increased blow-by) will cause some of the flow to return under all manifold conditions.

Catalytic converter

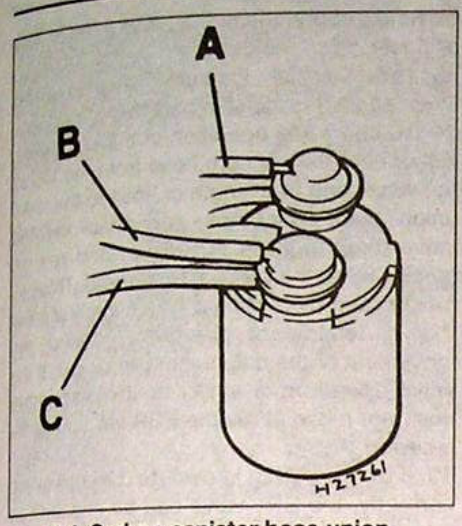
6 To minimise the amount of pollutants which escape into the atmosphere, some models are fitted with a catalytic converter in the exhaust system. On all models where a catalytic converter is fitted, the system is of the closed-loop type, in which an exhaust gas sensor provides the fuel system control unit constant feedback, enabling the unit to adjust the mixture to provide the best possible conditions for the converter to operate.

7 The sensor's tip is sensitive to oxygen, and sends the control unit a varying voltage depending on the amount of oxygen in the exhaust gases; if the intake air/fuel mixture is too rich, the sensor sends a high-voltage signal. The voltage falls as the mixture weakens. Peak conversion efficiency of all major pollutants occurs if the intake air/fuel mixture is maintained at the chemically-correct ratio for the complete combustion of petrol - 14.7 parts (by weight) of air to 1 part of fuel (the stoichiometric ratio). The sensor output voltage alters in a large step at this point, the control unit using the signal change as a reference point, and correcting the intake air/fuel mixture accordingly by altering the fuel injector pulse width (injector opening time). On later models, the sensor has a built-in heating element (controlled by the control unit), to quickly bring the sensor's tip to an efficient operating temperature.

Evaporative emissions control system

8 To minimise the escape of unburned hydrocarbons into the atmosphere, an evaporative emissions control system is fitted to models with a catalytic converter. The fuel tank filler cap is sealed, and a carbon canister collects the petrol vapours generated in the tank (fuel-injected models) or tank and carburettor float chamber (carburettor models) when the car is parked. It stores them until the vapours can be cleared into the inlet tract when the engine is running.

9 On carburettor models, the system is controlled by a thermal vacuum valve (TVV) which is screwed into the manifold; the TVV also controls the EGR system. When the



2.4 Carbon canister hose union identification - carburettor models

For A, B and C, refer to text

4 The carbon canister and associated valves can be tested as follows **(see illustration)**. The canister is located in the right-hand rear corner of the engine compartment.

5 Trace hose a back from the canister, and disconnect it from the T-piece connector. Start the engine and suck on the hose; there should be no sign of leakage, and the engine speed should increase slightly. Reconnect the hose to the T-piece.

6 Trace hose C back from the canister, and disconnect it from the carburettor float chamber. Start the engine and blow down the hose; there should be no sign of leakage. Reconnect the hose to the carburettor.

7 Trace hose B back from the canister, and disconnect it from the inlet manifold. With the engine stopped, blow and suck on the hose; there should be no sign of leakage. Reconnect the hose to the manifold.

8 If any trace of leakage is found whilst performing the checks described in paragraphs 5 to 7, the canister and valve assembly is faulty, and must be renewed.

Testing - Phase I 2.0 litre multi-point injection models

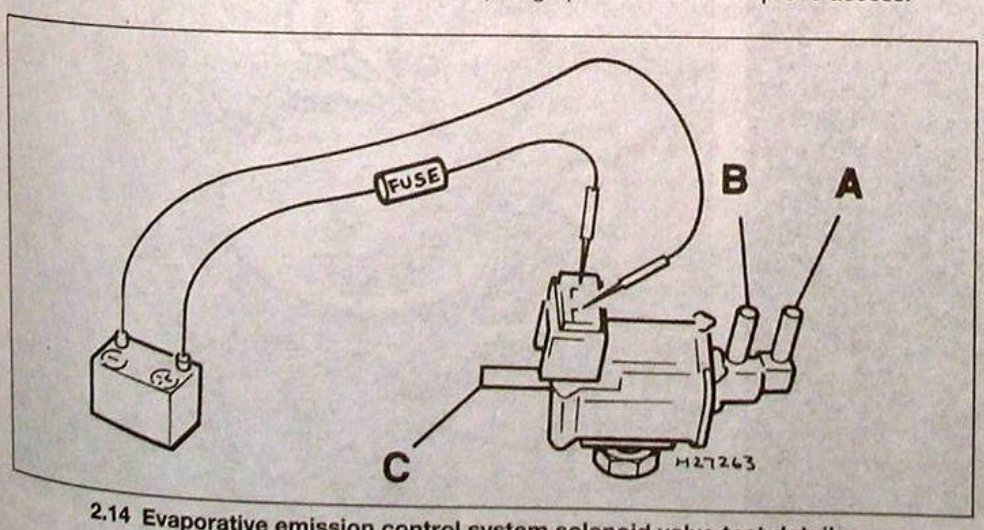
9 If the system is thought to be faulty, disconnect the hoses from the carbon canister, which is mounted in the right-hand rear corner of the engine compartment, and check that they are clear by blowing through them.

10 The carbon canister and valve can be tested as follows **(see illustration)**. Disconnect the hoses from the canister, and blow down port A of the canister; there should be no sign of leakage. Blow down each of the ports B in turn. Both ports should be clear, and should freely pass air. If the checks do not give the expected results, the canister and valve assembly is faulty and must be renewed.

Testing - all other fuel-injected models

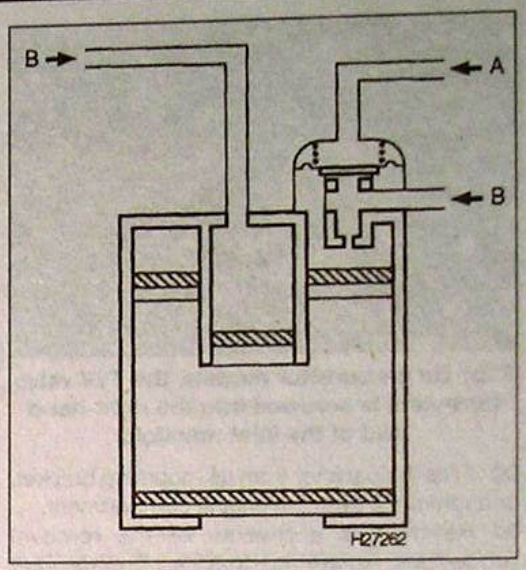
11 If the system is thought to be faulty, disconnect the hoses from the carbon canister and solenoid control valve, and check that they are clear by blowing through them. On Phase I and Phase II 1.6 litre models, the canister is located in the left-hand rear corner of the engine compartment, and the solenoid valve is mounted onto the rear of the inlet manifold. On Phase III 1.6 litre models, the canister is located in the right-hand rear corner of the engine compartment, and the solenoid valve is mounted on the inlet manifold next to the throttle housing. On Phase II 2.0 litre models, the canister is located on the left-hand side of the engine compartment, and the solenoid valve is mounted on the left-hand end or underside of the inlet manifold. On Phase III 2.0 litre models, the canister is located on the left-hand side of the engine compartment, and the solenoid valve is mounted adjacent to the canister.

12 The solenoid valve can be checked as follows, referring to illustration 2.14. If necessary, remove the valve as described in paragraphs 28 to 31 to improve access.



2.14 Evaporative emission control system solenoid valve test details - fuel-injected models

For A, B and C, refer to text



2.10 Carbon canister hose union identification - Phase I 2.0 litre multi-point injection models

For A and B, refer to text

13 Blow down port A, and check that no air flows through the valve. Blow down port B, and check that air passes through the valve and flows out of port C.

14 Connect a fused 12-volt supply to the solenoid valve as shown **(see illustration)**. With the voltage applied, blow down port A, and check that air passes through the valve and flows out of port B. Blow down port B, and check that no air flows through the valve.

15 If the solenoid valve does not perform as expected, it is faulty and must be renewed.

16 The carbon canister and valve assembly can be checked as described in paragraph 10.

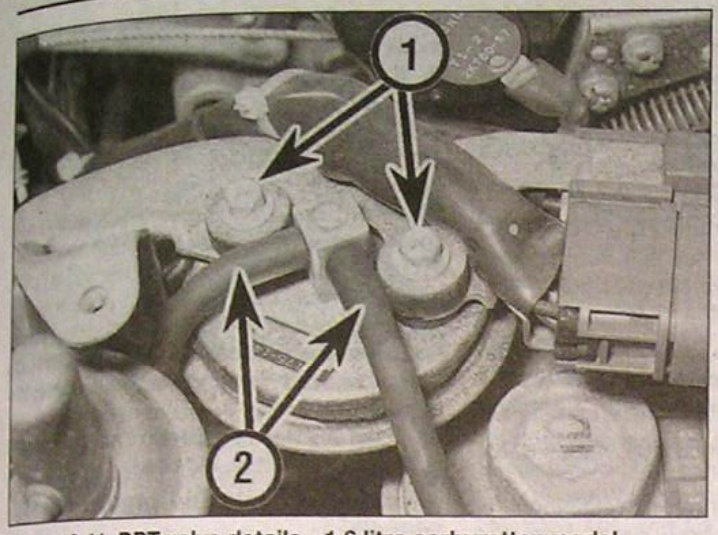
Carbon canister - renewal

17 The carbon canister is located either in right-hand rear corner of the engine compartment or on the left-hand side of the engine compartment, depending on model **(see illustration)**.

18 Make a note of the correct fitted location of each hose on the canister. To avoid the possibility of connecting the hoses incorrectly on refitting, make identification marks between each hose and its canister union.

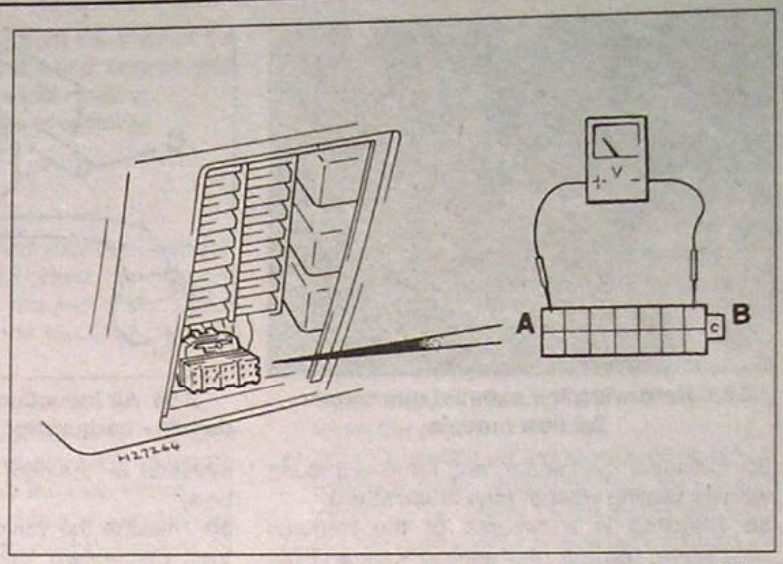
19 Release the retaining clips (where fitted) and disconnect the hoses from the top of the canister.

2.17 Carbon canister assembly - 1.6 litre fuel-injected model



2.41 BPT valve details - 1.6 litre carburettor model (other models similar)

1 Retaining screws *2 Vacuum pipes*



2.49 On carburettor models with a catalyst, connect the multi-meter to the fusebox check connector as shown, and test the exhaust gas sensor as described in text

Where necessary, remove the air cleaner housing to improve access to the valve. On some models, access can be further improved by first removing the BPT valve (see below).

38 Slacken the union nuts, and disconnect the EGR pipe and BPT valve pipe from the EGR valve.

39 Unscrew the two retaining nuts/bolts and washers, and remove the valve from the manifold. Remove the gasket and discard it.

40 Refitting is the reverse of removal, using a new gasket.

Back-pressure transducer (BPT) valve - renewal

41 The BPT valve is mounted on the left-hand side of the inlet manifold **(see illustration)**. Where necessary, remove the air cleaner housing to improve access to the valve.

42 Disconnect both vacuum hoses from the top of the valve.

43 Undo the two retaining bolts and remove the valve from the manifold, disconnecting it from the exhaust gas pipe.

44 Refitting is the reverse of removal

Thermal vacuum valve renewal - carburettor models

45 Refer to paragraphs 22 to 26 of this Section.

Solenoid control valve renewal - fuel-injected models

46 Refer to paragraphs 27 to 31 of this Section.

Exhaust emissions control system

Testing - carburettor models

47 Adjust the idle mixture (exhaust gas CO content) as described in Chapter 1.

48 Remove the fusebox cover, to gain access to the diagnostic connector which is clipped to the base of the fusebox.

49 Using multi-meter set to its voltage function, connect the probes of the meter to the check connector as shown **(see illustration)**

50 Start the engine, raise the engine speed to approximately 2000 rpm, and hold it there for approximately 2 minutes whilst observing the meter. If the exhaust gas sensor is functioning correctly, the meter reading should switch from 0 volts to approximately 12 volts at least 5 times every 10 seconds. If not, the sensor is probably faulty. A more detailed check of the sensor and catalytic converter can be carried out by a Nissan dealer.

Testing - fuel-injected models

51 If the CO level at the tailpipe is too high, the operation of the exhaust gas sensor should be tested using the ECCS control unit self-diagnosis facility as described in Chapter 4B, Section 12. Detailed testing of the sensor and catalytic converter must be left to a Nissan dealer.

Catalytic converter - renewal

52 Refer to Part A, B or C of this Chapter (as applicable).

Exhaust gas sensor - renewal

Note: *The exhaust gas sensor is delicate, and it will not work if it is dropped or knocked, if its power supply is disrupted, or if any cleaning materials are used on it.*

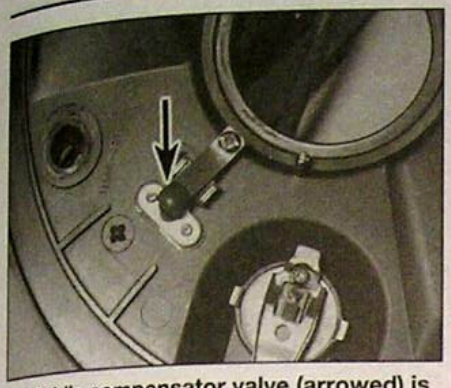
53 On 1.6 litre models, and 2.0 litre Phase III models, trace the wiring back from the exhaust gas sensor, which is screwed into the exhaust manifold **(see illustration)**. Disconnect the wiring connector, and free the wiring from any relevant retaining clips or ties.

54 On 2.0 litre Phase I and Phase II models, firmly apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*). Trace the wiring back from the sensor (which is screwed into the front pipe), freeing it from any relevant retaining clips. Disconnect the wiring at the connector **(see illustrations)**.

2.53 On 1.6 litre models, the exhaust gas sensor is screwed into the manifold

2.54a On 2.0 litre models, free the exhaust gas sensor wiring from its retaining clips . . .

2.54b . . . then disconnect its wiring connector



2.79 Idle compensator valve (arrowed) is mounted onto the base of the air cleaner housing

77 Undo the mounting bolts and remove the valve from the engine compartment.

78 Refitting is the reverse of removal, ensuring that the hoses are correctly reconnected and securely retained by their clips.

Idle compensator system

Testing

79 Remove the air cleaner housing lid and filter as described in Chapter 1 for access to the valve **(see illustration)**.

80 The operation of the valve can be checked using a thermometer and a hairdryer. Position the thermometer as close as possible to the valve, then gently heat the valve using the hairdryer. The valve should remain closed below 38°C (100°F), start to open between 38° and 48°C (100 and 118°F), and be fully open at 48°C (118°F). Allow the valve to cool, and check that it closes fully.

81 If the valve does not open and close as specified; it is faulty and must be renewed.

Idle compensator valve - renewal

82 Remove the air cleaner filter element as described in Chapter 1.

83 Disconnect the hose from the base of the valve, then undo the retaining screws and remove it from the air cleaner housing.

84 Refitting is the reverse of removal.

Dashpot

Testing

85 Push the dashpot rod into the dashpot, making sure that the rod enters the dashpot slowly, then release the rod and check that it returns quickly. If not, the dashpot must be renewed.

Dashpot - renewal

86 On carburettor models, undo the two retaining screws, and remove the dashpot assembly from the side of the carburettor.

87 On fuel-injected models, unscrew the retaining nut, and lift the dashpot out of its throttle housing mounting bracket.

88 Refitting is the reverse of removal. On completion, start the engine and warm it up to normal operating temperature. With the engine idling, have an assistant slowly depress the accelerator pedal, while you observe the dashpot. Note the engine speed at which the adjustment screw comes into contact with the end of the dashpot rod. This should happen at 2500 ± 200 rpm. If adjustment is necessary, slacken the locknut and rotate the screw as required. Recheck the dashpot contact speed, tightening the locknut securely when the screw is correctly adjusted.

3 Catalytic converter - general information and precautions

The catalytic converter is a reliable and simple device which needs no maintenance in itself, but there are some facts of which an owner should be aware if the converter is to function properly for its full service life.

a) DO NOT use leaded petrol in a car with a catalytic converter - the lead will coat the precious metals, reducing their converting efficiency, and will eventually destroy the converter.

b) Always keep the ignition and fuel systems well-maintained in accordance with the manufacturer's schedule (see Chapter 1).

c) If the engine develops a misfire, do not drive the car at all (or at least as little as possible) until the fault is cured.

d) DO NOT push- or tow-start the car - this will soak the catalytic converter in unburned fuel, causing it to overheat when the engine does start.

e) DO NOT switch off the ignition at high engine speeds - ie do not 'blip' the throttle immediately before switching off.

f) DO NOT use fuel or engine oil additives - these may contain substances harmful to the catalytic converter.

g) DO NOT continue to use the car if the engine burns oil to the extent of leaving a visible trail of blue smoke.

h) Remember that the catalytic converter operates at very high temperatures. DO NOT, therefore, park the car in dry undergrowth, over long grass, or over piles of dead leaves, after a long run.

i) Remember that the catalytic converter is FRAGILE - do not strike it with tools during servicing work.

j) In some cases, a sulphurous smell (like that of rotten eggs) may be noticed from the exhaust. This is common to many catalytic converter-equipped cars when new - once the car has covered a few thousand miles, the problem should disappear.

k) The catalytic converter, used on a well-maintained and well-driven car, should last for between 50 000 and 100 000 miles, but if the converter is no longer effective, it must be renewed.

2.55 Removing the exhaust gas sensor - 2.0 litre models

55 Unscrew the sensor, and remove it along with its sealing washer **(see illustration)**.

56 Refitting is a reverse of the removal procedure, using a new sealing washer. Prior to installing the sensor, apply a smear of high-temperature grease to the sensor threads. Ensure that the sensor is securely tightened. Check that the wiring is correctly routed, and in no danger of contacting either the exhaust system or the engine.

Anti-afterburn (AB) system

Testing

57 Remove the air cleaner lid and filter as described in Chapter 1.

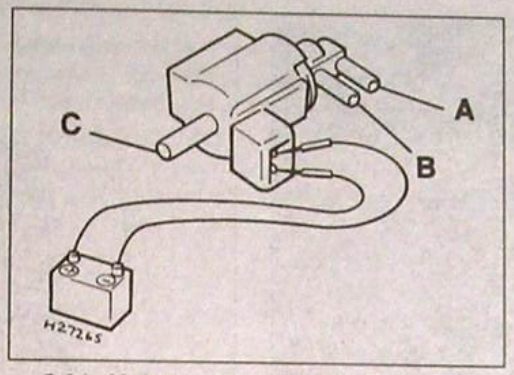
58 Start the engine, steadily increase the engine speed, and hold it at approximately 3000 rpm. Place a finger over the anti-afterburn (AB) valve vacuum hose union in the base of the air cleaner housing, then quickly release the throttle valve so that the engine returns to its normal idle speed. As the throttle valve is released and the engine speed falls, a vacuum should be felt in the AB valve hose. If this is not the case, the AB valve is faulty and must be renewed.

Anti-afterburn (AB) valve - renewal

59 The valve is located on the top of the manifold, on the right-hand side of the throttle body.

60 Release the valve from its retaining clip, then disconnect the three hoses from the valve, noting each one's correct fitted location.

61 Refitting is the reverse of removal, ensuring that the hoses are correctly reconnected.



2.64 Air induction solenoid valve test details - carburettor models with a catalyst

Air induction system

Testing

62 If the system is thought to be faulty, disconnect the hoses from the air induction solenoid control valve and the air induction valve (AIV), and check that they are clear by blowing through them. The solenoid valve is located on the left-hand end of the inlet manifold, and the air induction valve (AIV) is mounted on the left-hand suspension mounting turret.

63 The solenoid valve can be checked as follows. If preferred, remove the valve as described in paragraphs 69 to 73 to improve access.

64 Connect a 12-volt supply to the solenoid valve as shown **(see illustration)**. Blow down port A - air should pass through the valve, and flow out of port B. Blow down port B, and check that no air flows through the valve.

65 If the solenoid valve does not perform as expected, it is faulty and must be renewed.

66 To check the AIV, first remove it as described in paragraphs 75 to 77 then check it as follows.

67 Blow down port B **(see illustration)**, and check that no air passes through the valve. Apply a vacuum to port A of the valve, then blow down port B - air should pass through the valve, and flow out of port C. Blow down port C, and check that no air passes through the valve, both with and without a vacuum applied to port A.

68 If the AIV does not perform as expected, it is faulty and must be renewed.

Air induction solenoid control valve - renewal

69 The solenoid control valve is mounted on the left-hand end of the inlet manifold.

70 To renew the solenoid valve, disconnect the battery negative terminal, then depress the retaining clip and disconnect the wiring connector from the valve.

71 Make a note of the correct fitted location of each hose on the valve. To avoid the possibility of connecting the hoses incorrectly on refitting, make identification marks between each hose and its valve union.

72 Release the retaining clips (where fitted), and disconnect the hoses from the valve.

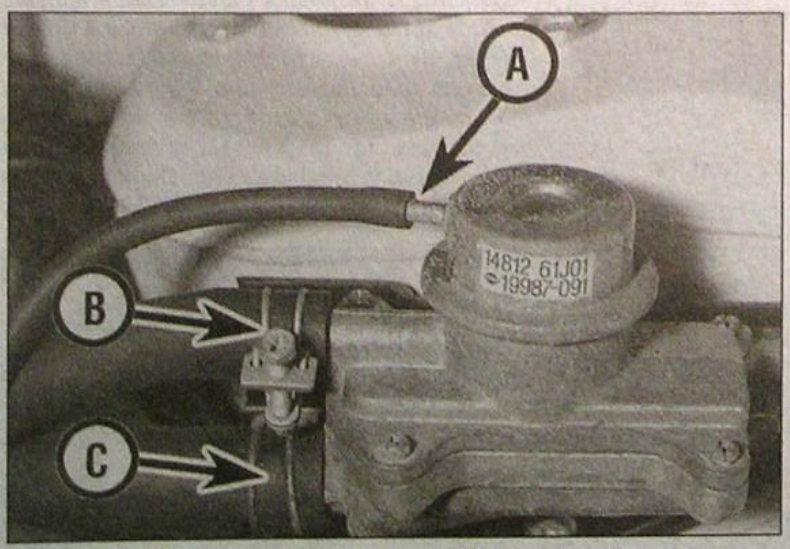
73 Free the valve from its mounting bracket, and remove it from the engine compartment.

74 Refitting is a reverse of the removal procedure, ensuring that the hoses are correctly reconnected.

Air induction valve (AIV) - renewal

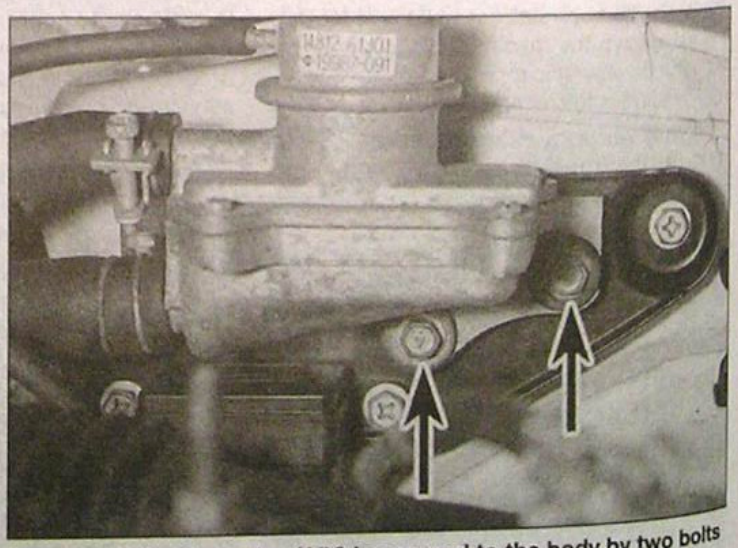
75 The AIV is mounted on the left-hand suspension turret.

76 To renew the valve, slacken the retaining clips (where fitted), and disconnect the hoses from the valve **(see illustration)**.

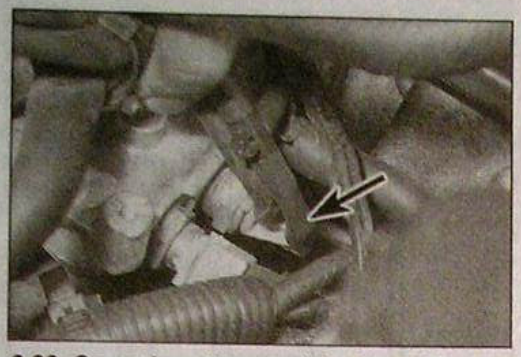


2.67 Air induction valve (AIV) port details - carburettor catalyst models

A Vacuum pipe from solenoid
B From air cleaner housing



2.76 Air induction valve (AIV) is secured to the body by two bolts (arrowed)



2.22 On carburettor models, the TVV valve (arrowed) is screwed into the right-hand end of the inlet manifold

20 Free the canister from its mounting bracket, and remove it from the engine compartment.

21 Refitting is a reverse of the removal procedure, ensuring that the hoses are correctly reconnected.

Thermal vacuum valve (TVV) renewal - carburettor models

22 The thermal vacuum valve (TVV) is screwed into the right-hand end of the inlet manifold **(see illustration)**. The engine and manifold should be cold before removing the valve.

23 Either partially drain the cooling system (as described in Chapter 1) to just below the level of the valve, or have ready a suitable plug which can be used to plug the valve aperture in the manifold whilst it is removed. If a plug is used, take great care not to damage the manifold, and do not use anything which will allow foreign matter to enter the cooling system.

24 Disconnect both hoses from the valve.

25 Carefully unscrew the valve from the manifold, and recover the sealing ring (where applicable).

26 Refitting is the reverse of removal, using a new sealing ring (where fitted). If a sealing ring was not fitted to the valve, apply a smear of sealing compound to its threads prior to refitting.

Solenoid control valve renewal - fuel-injected models (except 2.0 litre Phase I multi-point injection models)

27 On Phase I and Phase II 1.6 litre models, the solenoid valve is mounted onto the rear of the inlet manifold. On Phase III 1.6 litre models, the solenoid valve is mounted on the inlet manifold next to the throttle housing. On Phase II 2.0 litre models, the solenoid valve is mounted on the left-hand end or underside of the inlet manifold, and on Phase III 2.0 litre models, the solenoid is located on the left-hand side of the engine compartment, adjacent to the carbon canister **(see illustration)**. To improve access on 1.6 litre models, remove the air cleaner housing (see Section 2). On Phase II 2.0 litre models, raise the vehicle and support it on axle stands so access can be gained from underneath the vehicle (where necessary).

28 To renew the solenoid valve, disconnect the battery negative terminal, then depress the retaining clip and disconnect the wiring connector from the valve.

29 Make a note of the correct fitted location of each hose on the valve. To avoid the possibility of connecting the hoses incorrectly on refitting, make identification marks between each hose and its valve union.

30 Release the retaining clips (where fitted) then disconnect the hoses from the valve, and free the valve from its mounting bracket.

31 Refitting is a reverse of the removal procedure, ensuring that the hoses are correctly reconnected.

Exhaust gas recirculation (EGR) system

Testing - carburettor models

32 If the system is thought to be faulty, disconnect the hoses from the exhaust gas recirculation (EGR) valve, the back-pressure transducer (BPT) valve and thermal vacuum valve (TVV), and check that they are clear by blowing through them. If all is well, reconnect all hoses.

33 The thermal vacuum valve can be checked as described in paragraph 3.

34 To check the operation of the EGR valve, disconnect the vacuum hose from the top of the valve, and fit a length of hose to the valve union. Suck on the hose end; check that the valve diaphragm is pulled up, and returns quickly when the vacuum is released. This can be checked by placing a finger lightly against the underside of the valve where the movement of the diaphragm can be felt. If the valve operation is sticky or the diaphragm does not move at all, the EGR valve must be renewed.

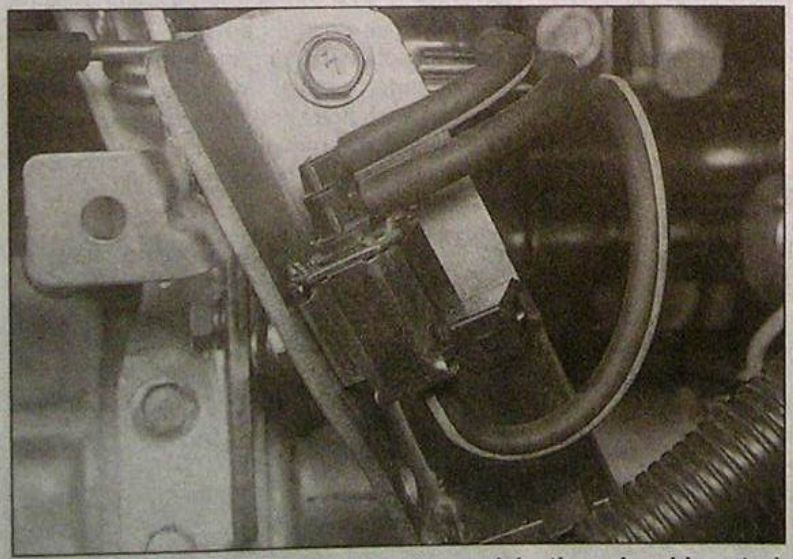
35 If the TVV is known to be operating correctly, the BPT valve can be checked as follows. Warm the engine up to normal operating temperature, and disconnect the vacuum hose from the EGR valve. Place a finger over the end of the disconnected hose, and rev the engine in short bursts. As the engine speed (and exhaust gas pressure) increases, a vacuum should be felt in the pipe. As the engine speed falls, the vacuum should be switched off by the BPT valve. If this is not the case, the BPT valve is faulty and should be renewed.

Testing - fuel-injected models

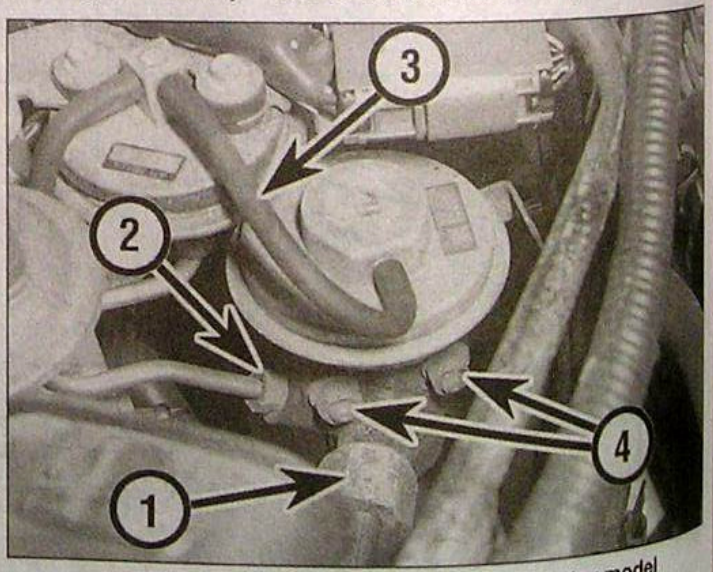
36 The system can be tested as described above in paragraphs 32 to 35, ignoring the information about the TVV. Instead of the TVV, a solenoid control valve is fitted. The solenoid valve is the same valve that controls the evaporative emissions control system, and can be tested as described above in paragraphs 12 to 15.

Exhaust gas recirculation (EGR) valve - renewal

37 Disconnect the vacuum hose from the EGR valve, which is mounted on the left-hand end of the inlet manifold **(see illustration)**.



2.27 On Phase II 2.0 litre multi-point models, the solenoid control valve is mounted onto the inlet manifold main support bracket



2.37 EGR valve details - 1.6 litre carburettor model (other models similar)

1 EGR pipe
2 BPT valve pipe
3 Vacuum pipe
4 Retaining nuts

engine is cold, the TVV cuts off the vacuum supply to the canister vacuum diaphragm valve, and the canister remains closed. When the engine reaches operating temperature (approximately 70°C), the TVV opens, and allows the vacuum (depression) present in the inlet manifold to act on the canister diaphragm. The diaphragm valve then opens, and all the vapours stored in the canister are drawn into the inlet tract to be burned during normal combustion.

10 On Phase I 2.0 litre multi-point injection models, the canister is connected directly to the manifold, and the system is controlled by means of a restrictor valve on the canister vacuum diaphragm valve. When the engine is started, the vacuum present in the inlet manifold acts on the diaphragm, via the restrictor. At idle, the valve remains closed, but as the engine speed increases, so does the inlet manifold vacuum (depression). The restrictor governs the vacuum acting on the diaphragm, and so controls the valve opening in relation to engine speed - ie the valve is only slightly open at low engine speeds, but fully open at high engine speeds.

11 On all other fuel-injected models, the system is controlled by the ECCS control unit via a solenoid valve; the same solenoid valve also operates the EGR (where fitted) system. To ensure that the engine runs correctly when it is cold and/or idling, and to protect the catalytic converter from the effects of an over-rich mixture, the solenoid valve is not opened by the control unit until the engine has warmed up and is under load. Once these conditions are met, the valve solenoid is modulated on and off to allow the stored vapour to pass into the inlet tract.

Exhaust gas recirculation (EGR) system

12 This system reduces the amount of unburnt hydrocarbons in the exhaust gases before the gases reach the catalytic converter. This is achieved by taking some of the exhaust gases from the exhaust manifold and recirculating them back into the inlet manifold, via a pipe linking the two, where they are burned again during normal combustion. The exhaust gas recirculation (EGR) valve is fitted to the inlet manifold end of the pipe.

13 On carburettor models, the system is controlled by the thermal vacuum valve (TVV) and the back-pressure transducer (BPT) valve; the TVV also controls the evaporative emission system. When the engine is cold, the TVV cuts off the vacuum supply to the EGR valve, and the valve remains closed. When the engine reaches operating temperature (approximately 70°C), the TVV opens, allowing the vacuum supply to act on the EGR valve, via the BPT valve. The BPT valve is sensitive to the exhaust gas back pressure, and regulates the EGR valve on and off accordingly. When the back pressure is high, the BPT valve closes, allowing the vacuum supply to act on the EGR valve, opening the valve. When the back pressure drops, the BPT valve opens, cutting off the vacuum supply to the EGR valve, and so closing the valve.

14 On fuel-injected models, the system is controlled by the ECCS control unit, via a solenoid valve and the back-pressure transducer (BPT) valve; the solenoid valve also operates the evaporative emissions control system. When the engine is cold, the ECCS control unit keeps the solenoid valve closed, cutting off the vacuum supply to the EGR valve. When the engine reaches operating temperature, the ECCS control unit opens the solenoid valve, allowing the vacuum supply to act on the EGR valve, via the BPT valve. The BPT valve is sensitive to the exhaust gas back pressure, and regulates the EGR valve on and off accordingly. When the back pressure is high, the BPT valve closes, allowing the vacuum supply to act on the EGR valve, opening the valve. When the back pressure drops, the BPT valve opens, cutting off the vacuum supply to the EGR valve, and so closing the valve.

Anti-afterburn (AB) system

15 This system prevents excessive hydrocarbon emissions in the exhaust gases, by stopping the exhaust gases from becoming excessively rich. This is achieved by supplying additional air into the manifold when the inlet manifold vacuum is high. The system consists solely of the anti-afterburn (AB) valve.

16 The anti-afterburn (AB) valve is sensitive to inlet manifold vacuum. Under cases of high inlet manifold vacuum (ie. when the throttle valve is shut at high engine speeds), the AB valve diaphragm opens, and the valve allows a charge of fresh filtered air from the air cleaner housing, to enter the manifold.

Air induction system

17 The air induction system reduces emissions of unburned hydrocarbon particles (HC) and carbon monoxide (CO) by passing filtered air directly into the exhaust manifold, so that a considerable proportion of these substances remaining in the exhaust gases after combustion are burned up in the manifold before reaching the catalytic converter. The system consists of the air induction valve (AIV) and a solenoid valve, and is controlled by the ECCS control unit.

18 To ensure that the engine runs correctly when it is cold and/or idling, the solenoid valve is not opened by the control unit until the engine has warmed up and is under load. When both these conditions are met, the valve solenoid is then modulated on and off to allow the fresh, filtered air to enter the exhaust manifold. The system functions by using the pressure variations in the exhaust gases to draw air through from the filter housing, so that there is no need for a separate air pump. The AIV only allows gases to flow only one way, so that there is no risk of hot exhaust gases flowing back into the filter.

Idle compensator system

19 The idle compensator system prevents the idle mixture becoming excessively rich at high engine temperatures. This is achieved by supplying additional air into the manifold when the engine temperature is high. The system consists solely of the idle compensator valve which is fitted to the air cleaner housing.

20 The compensator valve has a bi-metallic strip which is sensitive to temperature. At low temperatures, the valve is closed. As the temperature in the air cleaner housing increases, the bi-metallic strip in the valve deforms, and the valve gradually opens. This allows a charge of fresh, filtered air from the air cleaner housing to enter the manifold, and so weakens the idle mixture.

Dashpot

21 The dashpot is fitted to reduce the amount of unburnt hydrocarbons in the exhaust gases on the overrun. It does this by preventing the throttle valve from being snapped shut, such as when the driver lifts off suddenly at high engine speeds. The dashpot acts as a damper, and slowly closes throttle valve during its final stages. This reduces the amount of unburnt hydrocarbons in the exhaust gases by preventing the excessively-high inlet manifold vacuum which would otherwise draw unburnt fuel into the exhaust.

2 Emissions control systems - testing and component renewal

Note: *Refer to Section 1 for information on which systems are fitted to each model.*

Crankcase emissions control

1 This system requires no attention, other than to check that the hose(s) are clear and undamaged, and to renew the PCV filter (where fitted) at the intervals given in Chapter 1.

Evaporative emissions control system

Testing - carburettor models

2 If the system is thought to be faulty, disconnect the hoses from the carbon canister and thermal vacuum valve (TVV), and check that they are clear by blowing through them.

3 To check the TVV, which is screwed into the right-hand end of the inlet manifold, with the engine cold, disconnect both hoses from the valve. Connect a length of hose to one of the valve ports, and blow down it; the valve should be closed to the passage of air. Start the engine and warm it up to normal operating temperature. With the engine warm, again blow down the valve ports; the valve should now be open, and allow air to pass freely. If the valve does not perform as expected, it is faulty and must be renewed.