

Chapter 4 Part C: Fuel/exhaust systems - multi-point fuel injection models

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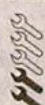
Degrees of difficulty

4C

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



Specifications

General	
System type	Nissan Electronic Concentrated Control System (ECCS) multi-point injection
Engine codes:	
1.6 litre models	GA16DE
2.0 litre models	SR20De and SR20DE
Fuel system data	
<i>For idle speed and mixture settings, refer to Chapter 1 Specifications.</i>	
Fuel pump type	Electric, immersed in tank
Fuel pump regulated constant pressure (approximate):	
1.6 litre models	2.5 bar
2.0 litre (Phase I and Phase II) models	3.0 bar
2.0 litre (Phase III) models	2.5 bar

Recommended fuel

Models without a catalytic converter (non-catalyst models)
 Models with a catalytic converter (catalyst models)

95 RON unleaded or 97 RON leaded
 95 RON unleaded. Leaded fuel must not be used

Torque wrench settings

	Nm	lbf ft
Exhaust manifold nuts and bolts:		15
1.6 litre (Phase I and Phase II) models	21	21
1.6 litre (Phase III) models	29	32
2.0 litre models	43	
Exhaust system fasteners:		36
Catalytic converter-to-tailpipe bolts	49	17
Front pipe mounting bolt	23	36
Front pipe-to-intermediate pipe/catalytic converter nuts	49	
Front pipe-to-manifold nuts:		24
1.6 litre models	32	33
2.0 litre (Phase I) models	45	48
2.0 litre (Phase II and Phase III) models	65	36
Intermediate pipe-to-tailpipe bolts	49	
Fuel rail retaining bolts:		
1.6 litre (Phase I and Phase II) models:		7
Stage 1	10	18
Stage 2	24	
1.6 litre (Phase III) models:		7
Stage 1	10	15
Stage 2	20	
2.0 litre models:		7
Stage 1	10	18
Stage 2	24	15
Inlet manifold nuts and bolts	20	18
Knock sensor bolt - 2.0 litre models	24	
Throttle housing retaining bolts:		7
Stage 1	10	15
Stage 2	20	

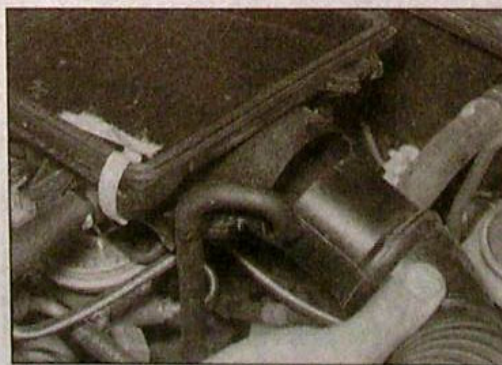
1 General information and precautions

The fuel system consists of a fuel tank mounted under the rear of the car with an electric fuel pump immersed in it, a fuel filter, fuel feed and return lines. The fuel pump supplies fuel to the fuel rail which acts as a reservoir for the four fuel injectors which inject fuel into the inlet tracts. A fuel filter is incorporated in the feed line from the pump to the fuel rail to ensure that the fuel supplied to the injectors is clean.

Refer to Section 6 for further information on the operation of the fuel injection system, and Section 17 for information on the exhaust system.

Note: Throughout 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

In the case of 1.6 litre models, distinction is easy - only Phase II models were fitted with multi-point fuel injection (engine code GA16DE). On 2.0 litre models, the Phases can be distinguished from the shape of the inlet manifold. On Phase I models, the throttle housing is mounted onto the base of the manifold, and the manifold curves upwards towards the cylinder head; the fuel injectors are easily accessible, on the top of the manifold. On Phase II and Phase III models, the throttle housing is mounted on the top of the manifold, and the inlet manifold curves downwards towards the cylinder head; the fuel injectors are not so easily accessible.



2.3 On 1.6 litre models, disconnect the inlet duct . . .



Warning: Many of the procedures in this Chapter require the removal of fuel lines and connections which may result in some fuel spillage. Before carrying out any operation on the fuel system refer to the precautions given in *Safety first!* at the beginning of this Manual and follow them implicitly. Petrol is a highly dangerous and volatile liquid and the precautions necessary when handling it cannot be overstressed. Residual pressure will remain in the fuel lines long after the vehicle was last used, when disconnecting any fuel line, depressurise the fuel system as described in Section 7.

2 Air cleaner assembly - removal and refitting**Removal****1.6 litre models**

- 1 Release the retaining clips, then lift off the air cleaner housing lid along with its seal.
- 2 Lift out the filter element, noting which way around it is fitted.
- 3 Disconnect the inlet duct from the left-hand end of the air cleaner housing (see illustration).

6 Fuel injection system - general information

All multi-point injection models are fitted with a combined fuel injection/ignition (engine management) system, otherwise known as the Electronic Concentrated Control System (ECCS). Refer to Chapter 5B for information on the ignition side of the system, the fuel injection side of the system operates as follows.

The fuel pump, immersed in the fuel tank, supplies fuel from the fuel tank to the fuel rail, via a filter mounted on the engine compartment bulkhead. Fuel supply pressure is controlled by the pressure regulator, on the end of the fuel rail, which lifts to allow excess fuel to return to the tank when the optimum operating pressure of the fuel system is exceeded.

The electrical control system consists of the ECCS control unit, along with the following sensors:

- Throttle potentiometer - informs the ECCS control unit of the throttle valve position, and the rate of throttle opening/closing.
- Coolant temperature sensor - informs the ECCS control unit of engine temperature.
- Airflow meter - informs the ECCS control unit of the mass and temperature of the air passing through the inlet duct.
- Crank angle sensor (Phase I and Phase II models) - housed in the distributor, the sensor informs the ECCS control unit of the engine speed and crankshaft position (see Chapter 5B for further information).
- Camshaft position sensor (Phase III models) - performs the same function as the crank angle sensor used on earlier models.
- Vehicle speed sensor (built into the speedometer) - informs the ECCS control unit of the vehicle speed.
- Power steering and air conditioning system switches (where fitted) - informs the ECCS control unit if the system(s) are in operation, to allow it to adjust the idle speed to compensate for the extra load on the engine.
- Exhaust gas sensor (catalyst models only) - informs the ECCS control unit of the oxygen content of the exhaust gases (see Part D of this Chapter for further information).

All the above signals are analysed by the ECCS control unit. Based on this information, the ECCS control unit selects the response appropriate to those values, and controls the fuel injectors (varying their pulse width - the length of time each injector is held open - to provide a richer or weaker mixture, as

appropriate). The mixture and idle speed are constantly varied by the ECCS control unit to provide the best settings for cranking, starting (with either a hot or cold engine) and engine warm-up, idle, cruising, and acceleration.

The ECCS control unit also has full control over the engine idle speed via the auxiliary air control (AAC) valve. The valve, which is fitted to the throttle housing (1.6 litre models) or inlet manifold (2.0 litre models), controls the opening of an air passage which bypasses the throttle valve. When the throttle valve is closed, the ECCS control unit controls the opening of the valve, which regulates the amount of air which flows through the valve, and so controls the idle speed.

On 1.6 litre models, the throttle housing has a built-in fast idle facility, which is controlled by a thermostatic valve. When the engine is cold, the wax capsule in the valve (which is fitted to the throttle housing), is at its smallest, and the fast idle cam holds the throttle valve slightly open. As the engine warms up, the wax capsule expands, forcing the valve plunger upwards, which in turn rotates the fast idle cam to the required position.

On Phase I and Phase II 2.0 litre models, the fast idle facility is controlled by the air regulator valve, which contains a bi-metallic strip and shutter valve. When the valve is cold, the bi-metallic strip in the valve holds the shutter valve open. Air then passes through the valve, allowing an additional supply of air to enter the inlet manifold. With the engine running, the valve bi-metallic strip is supplied with current, which gradually increases its temperature. As the temperature increases, the bi-metallic strip deforms and closes the shutter valve, so cutting off the additional air supply to the engine. On Phase III 2.0 litre models, fast idle is controlled by the FICD solenoid valve in conjunction with the ECCS control unit.

On all models, there is also a fast idle control (FICD) solenoid valve which is controlled by the ECCS control unit. The solenoid valve controls the opening of an air passage which bypasses the throttle valve, and this is used to raise the idle speed when either the power steering and/or air conditioning systems are in operation. **Note:** On some models, the valve may be fitted but will not be operational.

On models with a catalytic converter, the ECCS control unit also controls the exhaust and evaporative emission control systems, which are described in detail in Chapter 4D.

If there is an abnormality in any of the readings obtained from sensors, the ECCS control unit switches to its back-up mode. If this happens, it ignores the abnormal sensor signal, and assumes a pre-programmed value which will allow the engine to continue running, albeit at reduced efficiency. If the ECCS control unit enters its back-up mode, the warning light on the instrument panel will come on, and the relevant fault code will be stored in the ECCS control unit memory.

If the warning light comes on, the vehicle should be taken to a Nissan dealer at the earliest opportunity. Once there, a complete test of the engine management system can be carried out, using a special electronic diagnostic test unit which is simply plugged into the system's diagnostic connector. **Note:** The ECCS control unit also has a self-diagnostic mode which can be accessed by the DIY mechanic. See Part B, Section 12 for further information.

7 Fuel system - depressurisation

Note: Refer to the warning note in Section 1 before proceeding.



Warning: The following procedure will merely relieve the pressure in the fuel system - remember that fuel will still be present in the system components, and take precautions accordingly before disconnecting any of them. Use clean rags wrapped around the connections to catch escaping fuel, and dispose of any fuel-soaked rags with care. Plug or tape over any open fuel lines, to prevent further loss of fuel or ingress of dirt.

1 The fuel system referred to in this Section is defined as the tank-mounted fuel pump, the fuel filter, the fuel rail and injectors, the pressure regulator, and the metal pipes and flexible hoses of the fuel lines between these components. All these contain fuel which will be under pressure while the engine is running and/or while the ignition is switched on. The pressure will remain for some time after the ignition has been switched off, and must be relieved before any of these components are disturbed for servicing work.

2 Identify and remove the fuel pump fuse from the vehicle fusebox - the fuses are not numbered as such, but can be identified from the label inside the fusebox cover, or from the wiring diagrams at the end of this manual.

3 Start the engine, and allow it to run until it stalls.

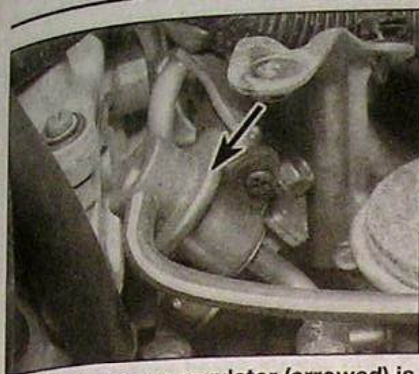
4 Try to start the engine at least twice more, to ensure that all residual pressure has been relieved.

5 Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

6 For safety, the fuel pump fuse should not be refitted until all work on the fuel system has been completed. If you refit the fuse now, do not switch on the ignition until completion of work.

8 Fuel pump - removal and refitting

Refer to Chapter 4B, Section 8.



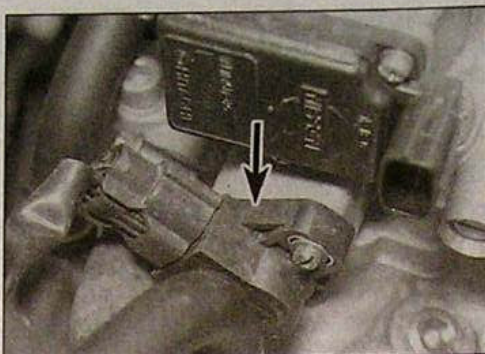
13.10 Fuel pressure regulator (arrowed) is mounted on the left-hand end of the fuel rail

- c) Fit a new seal to each injector, and ease the fuel rail assembly into position in the manifold. Fit the spacers between the rail and manifold then, working in a diagonal sequence from the centre outwards, tighten the bolts to their specified Stage 1 torque setting. Go around again in sequence, and tighten them to the specified Stage 2 torque.
- d) On completion, start the engine and check for fuel leaks.

Fuel pressure regulator

Note: Refer to the warning note in Section 1 before proceeding.

- 9 Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).
- 10 Disconnect the vacuum hose from the fuel pressure regulator, which is mounted on the left-hand end of the fuel rail (see illustration).
- 11 Depressurise the fuel system as described in Section 7, then slacken the retaining clips and disconnect the fuel hose from base of the regulator.
- 12 Undo the two retaining bolts, and remove the regulator from the end of the fuel rail. Recover the sealing ring fitted to the regulator



13.14 Throttle potentiometer (arrowed) is mounted on the right-hand side of the throttle housing

and discard it; a new one must be used on refitting.

- 13 Refitting is the reverse of removal, using a new sealing ring. On completion, start the engine and check for fuel leaks.

Throttle potentiometer

14 The throttle potentiometer is mounted onto the right-hand side of the throttle housing (see illustration). Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

- 15 Disconnect the wiring connector from the throttle potentiometer.

16 Using a dab of white paint or a suitable marker pen, make alignment marks between the potentiometer and the throttle housing.

- 17 Undo the two retaining screws, and remove the potentiometer.

18 On refitting, offer up the potentiometer, making sure its lever is correctly engaged with the throttle valve spindle lever.

- 19 Align the marks made prior to removal, and lightly tighten the retaining screws. Adjust the potentiometer as follows.

20 Using a multi-meter set to the resistance scale, check that the potentiometer resistance readings are as given in the Specifications at

the start of this Chapter. If necessary, slacken the retaining screws and reposition the potentiometer until its resistances are as specified.

- 21 When the potentiometer is correctly positioned, securely tighten its retaining screws and reconnect the wiring connector.

22 Reconnect the battery negative terminal.

Auxiliary air control (AAC) valve

23 The auxiliary air control (AAC) valve is mounted onto the front of the throttle body. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

- 24 Disconnect the wiring connector from the control valve (see illustration).

25 Undo the retaining screws, then remove the valve from the throttle body and recover the gasket.

26 If necessary, with the valve removed, separate the two halves of the valve by removing the retaining screws, then recover the sealing ring. Check that the valve plunger is free to move easily, and returns quickly under spring pressure. If not, the valve assembly must be renewed.

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

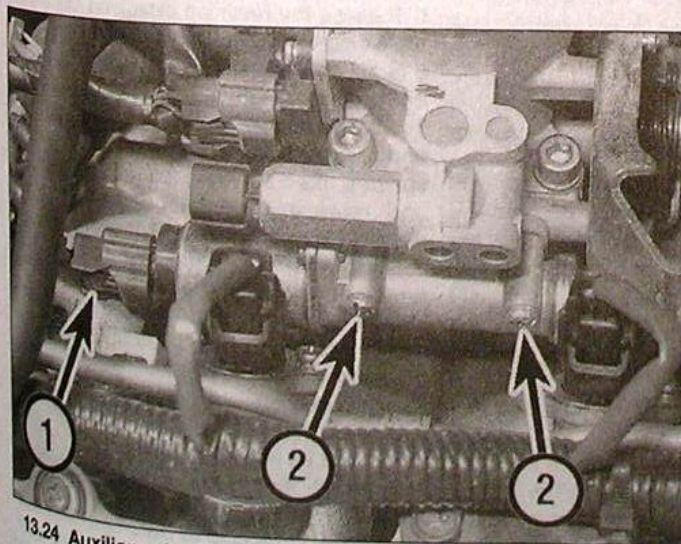
Airflow meter

28 The airflow meter is mounted onto the right-hand side of the throttle body. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

- 29 Disconnect the wiring connector from the airflow meter (see illustration).

30 Undo the retaining screws, then remove the meter from the throttle body (see illustration). Recover its sealing ring (where fitted).

- 31 Refitting is the reverse of removal, using a new sealing ring (where applicable) and tightening its retaining screws securely.



13.24 Auxiliary air control (AAC) valve wiring connector (1) and retaining screws (2)



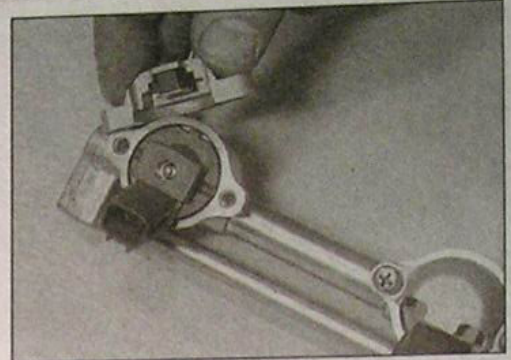
13.29 Disconnect the wiring connector . . .



14.6a On 2.0 litre Phase II and Phase III models, remove the fuel rail ...



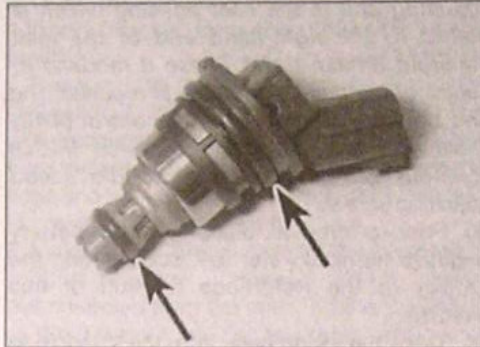
14.6b ... and recover its spacers from the manifold



14.7a Remove the retaining plate ...



14.7b ... and withdraw the injector from the fuel rail



14.9a Prior to installation, fit new O-rings (arrowed) to each disturbed injector ...



14.9b ... and fit new injector seals to the manifold

to aid installation, then ease the injectors into the fuel rail. Ensure that the insulator is fitted the correct way round, then refit the retaining plate and securely tighten its retaining screws.

c) Fit new injector seals to the manifold (see illustration), and fit the fuel rail spacers to the manifold. Ease the fuel rail assembly into position in the manifold, and fit its retaining bolts. Working from the centre outwards, tighten the bolts first to their specified Stage 1 torque, then go around again and tighten them to the specified Stage 2 torque.

d) Install the upper section of the manifold as described in Section 15.

e) Ensure that all hoses are reconnected to their original locations and, where necessary, are securely held with the retaining clips.

f) Adjust the accelerator cable as described in Section 3.

g) On completion, start the engine and check for fuel leaks.

Fuel pressure regulator

Note: Refer to the warning note in Section 1 before proceeding.

10 Refer to Section 13 (see illustration).

Throttle potentiometer

11 The throttle potentiometer is mounted onto the rear of the throttle housing (see illustration). Prior to removal, disconnect the battery negative terminal (refer to Disconnecting the battery in the Reference Section of this manual).

12 Disconnect the wiring connector from the throttle potentiometer.

13 Using a dab of white paint or a suitable marker pen, make alignment marks between the potentiometer and the throttle housing.

14 Undo the two retaining screws and remove the potentiometer.

15 On refitting, offer up the potentiometer, making sure that its lever is correctly engaged with the throttle valve spindle lever.

16 Align the marks made prior to removal, and lightly tighten the retaining screws. Adjust the potentiometer as follows.

17 Using a multi-meter set to the resistance scale, check that the potentiometer resistance readings are as given in the Specifications at the start of this Chapter. If necessary, slacken the retaining screws and reposition the potentiometer until its resistances are as specified.

18 When the potentiometer is correctly positioned, securely tighten its retaining screws, and reconnect the wiring connector.

19 Reconnect the battery on completion.

Airflow meter

20 The airflow meter is mounted onto the air cleaner housing lid. Prior to removal, disconnect the battery negative terminal (refer to Disconnecting the battery in the Reference Section of this manual).

21 Slacken the retaining clip, and disconnect the inlet duct from the airflow meter.

22 Disconnect the wiring connector from the airflow meter (see illustration).

23 Undo the four bolts, and remove the meter from the air cleaner housing (see illustration). Recover the sealing ring and discard it; a new one must be used on refitting.



14.10 Slacken the retaining clip and disconnect the return hose from the pressure regulator (arrowed)



14.11 Throttle potentiometer location (arrowed)

ECCS control unit

51 Refer to Section 13.

Neutral switch - manual transmission models

52 Refer to Chapter 7A.

Starter inhibitor/reversing light switch - automatic transmission models

53 Refer to Chapter 7B.

ECCS control unit and fuel pump relays

54 Refer to Chapter 12.

Power steering idle-up switch

55 Refer to Section 13.

Air conditioning system idle-up switch

56 The air conditioning switch is screwed into the air conditioning pipe, in the left-hand front corner of the engine compartment. Removal and refitting of the switch requires the air conditioning system to be discharged and recharged (see Chapter 3, Section 10), and this should not be attempted by the home mechanic.

Vehicle speed sensor

57 The vehicle speed sensor is an integral part of the speedometer. Refer to Chapter 12 for removal and refitting details.

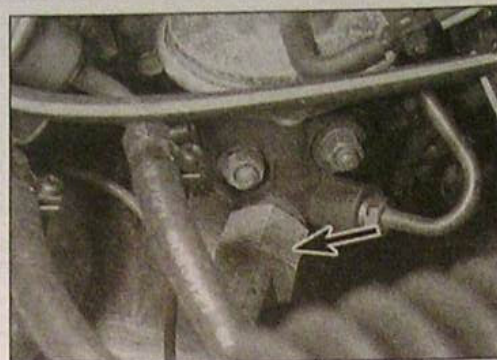
15 Inlet manifold - removal and refitting

Note: Refer to the information in Section 1 for details of model identification.

Removal

1.6 litre models

- 1 Drain the cooling system as described in Chapter 1.
- 2 Carry out the operations described in paragraphs 1 to 6 of Section 12, and disconnect all components from the throttle housing.
- 3 Make a note of the correct fitted locations of all the relevant inlet manifold vacuum hose connections, and disconnect them from the manifold and (where necessary) from the associated vacuum valves. To avoid confusion on refitting, it may be wise to label each hose as it is disconnected.
- 4 Unscrew the union nut and free the EGR pipe linking the inlet and exhaust manifolds, from the control valve on the left-hand end of the inlet manifold (see illustration).
- 5 Disconnect the wiring connectors from the injectors and the engine coolant temperature sensor. Free the wiring from any relevant retaining clips, and position it clear of the manifold. Where necessary, also undo the retaining bolt(s) and free the earth lead(s) from the manifold (see illustration).



15.4 Unscrew the union nut (arrowed) and disconnect the EGR pipe from the valve

6 Undo the retaining bolts and remove the support bracket from the underside of the manifold.

7 Depressurise the fuel system as described in Section 7, then slacken the retaining clips and disconnect the fuel feed and return hoses from the left-hand end of the fuel rail. Plug the hose and rail unions, to minimise fuel loss and to prevent dirt entering the system.

8 Make a final check that all the necessary vacuum/breather hoses have been disconnected from the manifold then, working in the reverse of the sequence shown in illustration 15.52, slacken and remove the manifold retaining nuts and bolts.

9 Manoeuvre the manifold away from the head, and out of the engine compartment. Remove the manifold gasket and discard it.

2.0 litre Phase I models

10 To improve access, apply the handbrake, then jack up the front of the car and support it on axle stands (see *Jacking and vehicle support*). Access to the manifold and associated components can then be gained from above and below.

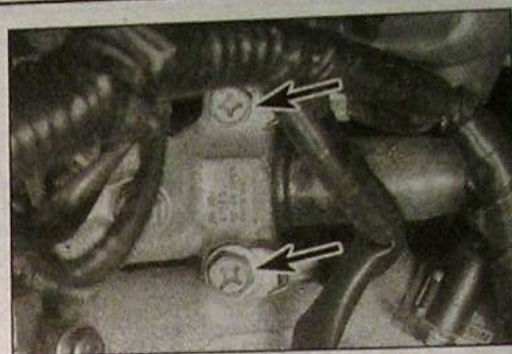
11 Slacken the retaining clip, and disconnect the inlet duct from the throttle housing. Free the accelerator cable from the throttle cam, then slacken the locknut and adjuster nut, and free the outer cable from its mounting bracket.

12 Depressurise the fuel system as described in Section 7, then slacken the retaining clips and disconnect the fuel feed and return hoses from the left-hand end of the fuel rail. Plug the hose and rail unions, to minimise fuel loss and to prevent dirt entering the system.

13 Release the retaining clip(s), then disconnect the coolant hose(s) from the throttle housing and manifold. Plug the hose end(s), working quickly to minimise coolant loss.

14 Make a note of the correct fitted locations of all the relevant inlet manifold vacuum hose connections, and disconnect them from the manifold and (where necessary) from the associated vacuum valves. To avoid confusion on refitting, it may be wise to label each hose as it is disconnected.

15 Disconnect the wiring connectors from the throttle potentiometer, the air regulator valve, the injectors, the coolant temperature



15.5 Undo the bolts, and free the earth leads (arrowed) from the right-hand end of the manifold

sensor, and the idle air adjusting (IAA) unit. Free the wiring from any relevant retaining clips, and position it clear of the manifold.

16 Undo the retaining bolts, and remove the support brackets from the left- and right-hand ends of the manifold.

17 Make a final check that all the necessary vacuum/breather hoses have been disconnected from the manifold.

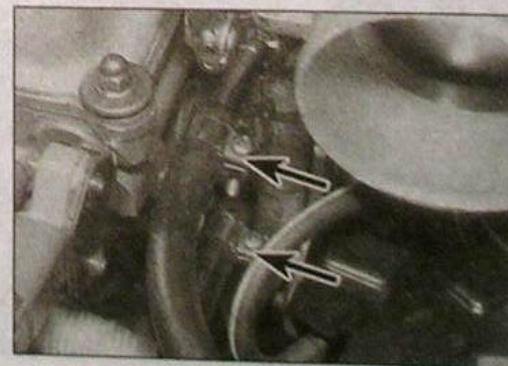
18 Working in the reverse of the sequence shown in illustration 15.53, slacken and remove the manifold retaining nuts and bolts. Note that it may be necessary to remove the oil filter and/or oil filter housing from the rear of the block to gain access to the lower manifold nuts and bolts (refer to Chapters 1 and 2 for further information).

19 Manoeuvre the manifold away from the head, and out of the engine compartment. Remove the manifold gasket, and discard it.

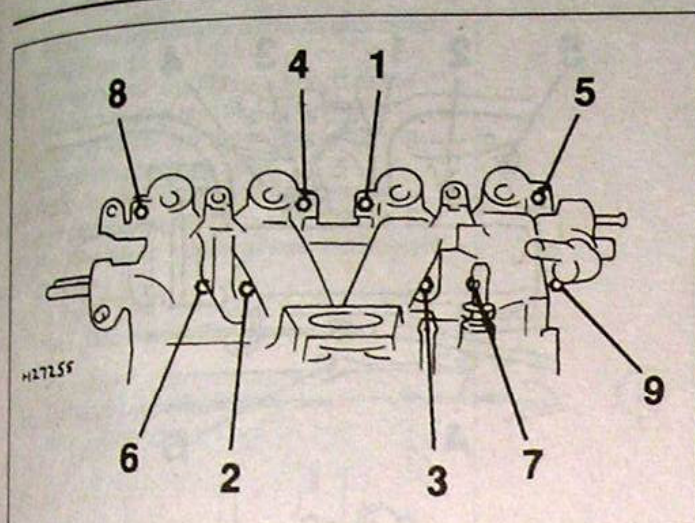
2.0 litre Phase II models

20 To improve access, apply the handbrake, then jack up the front of the car and support it on axle stands (see *Jacking and vehicle support*). Access to the manifold and associated components can then be gained from above and below.

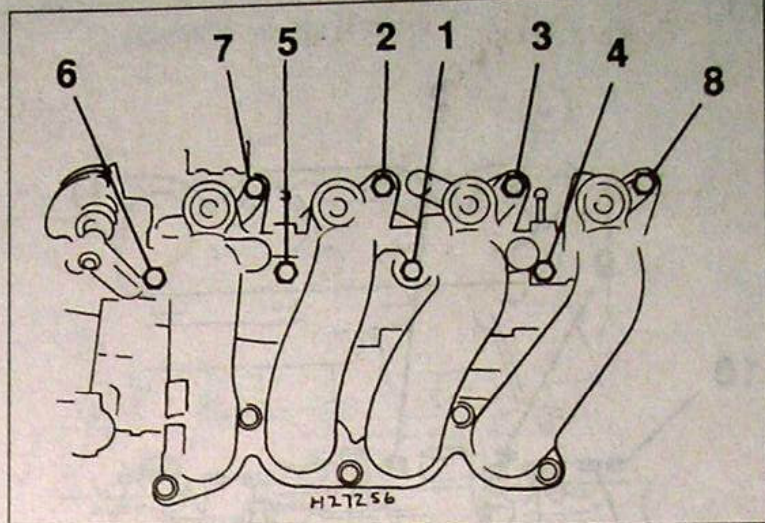
21 Depressurise the fuel system as described in Section 7, then slacken the retaining clips and disconnect the fuel feed and return hoses from the left-hand end of the fuel rail (see illustration). Plug the hose and rail unions, to minimise fuel loss and to prevent dirt entering the system. Label the hoses if wished, to avoid confusion when refitting.



15.21 Fuel rail feed and return hoses (arrowed)



15.52 Inlet manifold nut and bolt tightening sequence - 1.6 litre models



15.53 Inlet manifold nut and bolt tightening sequence - 2.0 litre Phase I models

34 Drain the cooling system as described in Chapter 1.

35 Undo the nuts and remove the support brace from the left-hand and right-hand suspension strut towers.

36 Depressurise the fuel system as described in Section 7, then slacken the retaining clips and disconnect the fuel feed and return hoses from the left-hand end of the fuel rail. Plug the hose and rail unions, to minimise fuel loss and to prevent dirt entering the system. Label the hoses if wished, to avoid confusion when refitting.

37 Slacken the retaining clip, and disconnect the inlet duct from the throttle housing. Free the accelerator inner cable from the throttle cam. Slacken the outer cable locknut and adjuster nut, then free the outer cable from its mounting bracket.

38 Make a note of the correct fitted locations of all the relevant hose connections, and disconnect them from the throttle housing and inlet manifold upper section. To avoid confusion on refitting, it may be wise to label each hose as it is disconnected.

39 Disconnect the wiring connectors from the throttle potentiometer, auxiliary air control (AAC) valve and fast idle control device (FICD) solenoid valve from the centre of the manifold. Free the wiring from all its relevant retaining clips, and position the loom clear of the manifold.

40 Disconnect the wiring connectors from the coolant temperature sensors on the right-hand end of the manifold. Free the wiring from all its relevant retaining clips, and position the loom clear of the manifold.

41 Undo the bolts and remove the two support brackets from the upper section of the inlet manifold.

42 Working in the reverse of the sequence shown in illustration 15.55b, slacken and remove the seven retaining bolts, then lift off the upper section of inlet manifold complete with the throttle housing. Recover the gasket and discard it.

43 Disconnect the vacuum pipe from the fuel pressure regulator.

44 Release the retaining clips, and disconnect the wiring connectors from the four injectors. Free the wiring from any relevant retaining clips, and position it clear of the manifold.

45 Slacken and remove the fuel rail retaining bolts, then carefully ease the fuel rail and injector assembly out from the inlet manifold, and remove it from the vehicle. Recover the spacers fitted between the rail and manifold, and remove the injector seals from the manifold.

46 Remove the auxiliary drivebelts as described in Chapter 1, then unbolt the coolant pump pulley from the front of the pump.

47 Remove the power steering pump as described in Chapter 10.

48 Drain the engine oil and remove the oil filter as described in Chapter 1. If the filter is damaged during removal, a new filter must be used on refitting.

49 Undo the retaining bolts and remove the support brackets from the rear of the manifold.

50 Make a note of the correct fitted locations of all the relevant hose connections, and disconnect them from the lower section of the manifold. To avoid confusion on refitting, it may be wise to label each hose as it is disconnected. Make a final check that all the necessary vacuum/breather hoses have been disconnected from the manifold.

51 Working in the reverse of the sequence shown in illustration 15.55a, slacken and remove the manifold retaining nuts and bolts. Note that it may be necessary to remove the oil filter housing from the rear of the block to gain access to the manifold right-hand end nuts and bolts (refer to Chapter 2B for further information). Manoeuvre the manifold away from the head, and out of the engine compartment. Remove the manifold gasket and discard it.

Refitting

1.6 litre models

52 Refitting is the reverse of the removal procedure, noting the following points:

- Ensure that the manifold and cylinder head mating surfaces are clean and dry, and fit the new gasket to the head studs. Install the manifold, and tighten its retaining nuts and bolts to the specified torque setting in the order shown (see illustration).
- Ensure that all relevant hoses are reconnected to their original positions, and are securely held (where necessary) by their retaining clips.
- Adjust the accelerator cable as described in Section 3.
- On completion, refill the cooling system as described in Chapter 1.

2.0 litre Phase I models

53 Refitting is the reverse of the removal procedure, noting the following points:

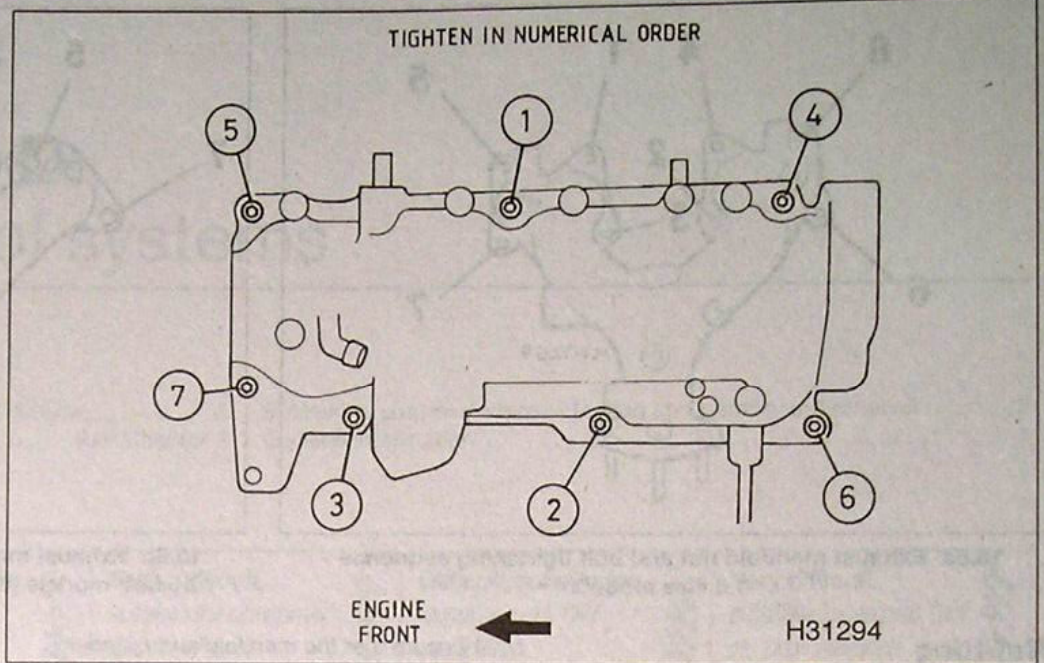
- Ensure that the manifold and cylinder head mating surfaces are clean and dry, and fit the new gasket to the head studs. Install the manifold, and tighten its retaining nuts and bolts to the specified torque setting in the order shown (see illustration).
- Ensure that all relevant hoses are reconnected to their original positions, and are securely held (where necessary) by their retaining clips.
- Ensure that the fuel injection system wiring is correctly routed, and retained by all the necessary clips.
- Adjust the accelerator cable as described in Section 3.
- Where necessary, fit new O-rings to the oil filter housing recesses, and refit the housing to the cylinder block, tightening its retaining bolts securely.
- Fit the oil filter, and refill the engine with oil as described in Chapter 1.

- e) Adjust the accelerator cable as described in Section 3.
- f) Where necessary, fit new O-rings to the oil filter housing recesses, and refit the housing to the cylinder block, tightening its retaining bolts securely.
- g) Refit the coolant pump pulley (Chapter 3) and the power steering pump (Chapter 10). Refit the auxiliary drivebelts as described in Chapter 1.
- h) Fit the oil filter, and refill the engine with oil as described in Chapter 1.

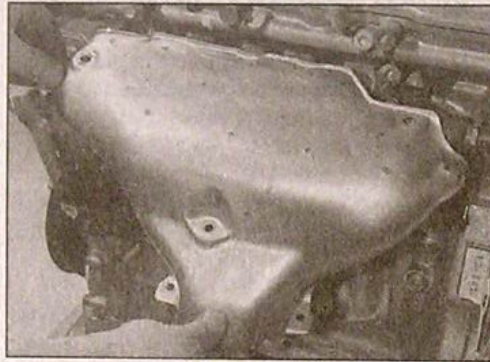
16 Exhaust manifold - removal and refitting

Removal

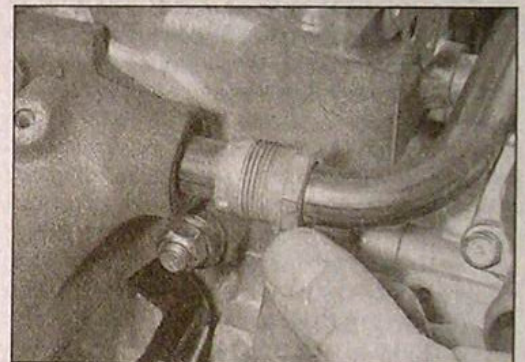
- 1 On models with an exhaust gas sensor fitted to the exhaust manifold, trace the wiring back from the sensor to its wiring connector, and disconnect it from the main wiring harness.
- 2 On all models, slacken and remove the retaining screws, and remove the shroud from the top of the exhaust manifold (see illustration).
- 3 Where necessary, unscrew the union nut, and free the EGR pipe from the side of the manifold (see illustration). Note that it may be necessary to slacken the inlet manifold end of the pipe, and the pipe mounting bolts (where fitted), in order to free the pipe from the manifold.
- 4 Apply the handbrake, then jack up the front of the car and support it on axle stands (see Jacking and vehicle support).
- 5 Undo the nuts securing the exhaust front pipe to the manifold, and the bolt securing the front pipe to its mounting bracket. Free the front pipe from the manifold, and recover the gasket(s). On 2.0 litre models fitted with a catalytic converter, either disconnect the exhaust gas sensor wiring connector, or support the pipe to ensure that no strain is placed on the wiring.



15.55b Inlet manifold upper section nut and bolt tightening sequence - 2.0 litre Phase III models



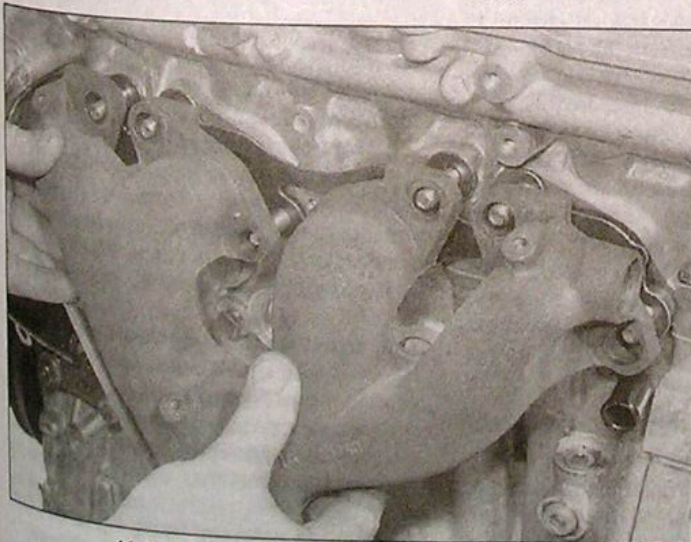
16.2 Removing the exhaust manifold shroud



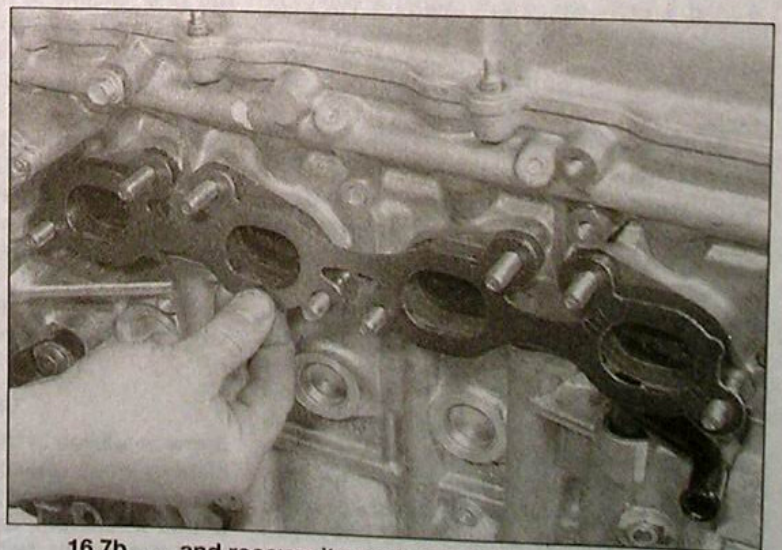
16.3 Unscrew the union nut, and free the EGR pipe from the side of the manifold

- 6 Working in the reverse of the sequence shown in illustration 16.8a or 16.8b, slacken and remove the manifold retaining nuts and bolts.

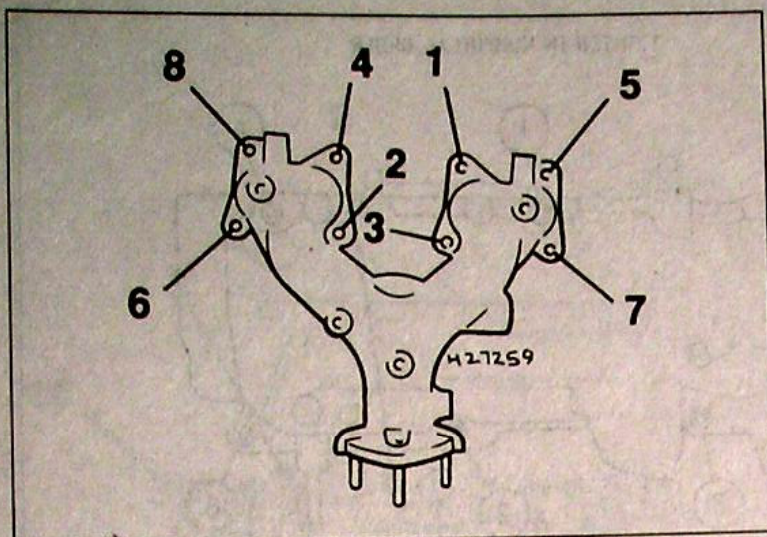
- 7 Manoeuvre the manifold out of the engine compartment, and discard the manifold gasket(s) (see illustrations).



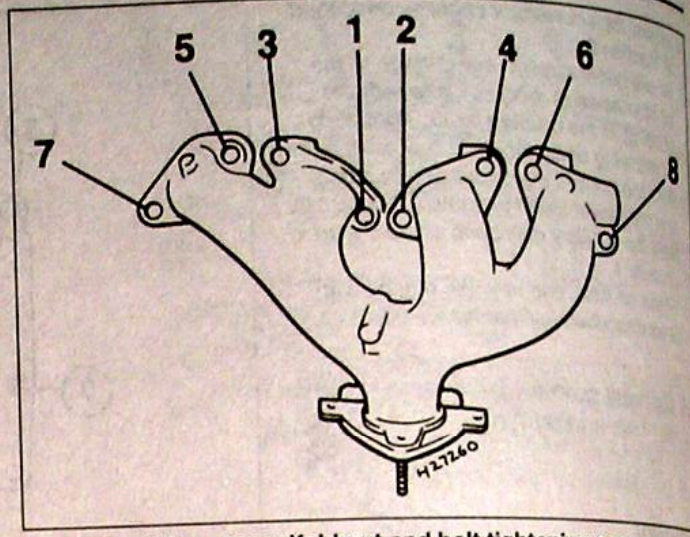
16.7a Remove the exhaust manifold ...



16.7b ... and recover its gasket (2.0 litre model shown)



16.8a Exhaust manifold nut and bolt tightening sequence - 1.6 litre models



16.8b Exhaust manifold nut and bolt tightening sequence - 2.0 litre models (SR20De engine shown - DE model similar)

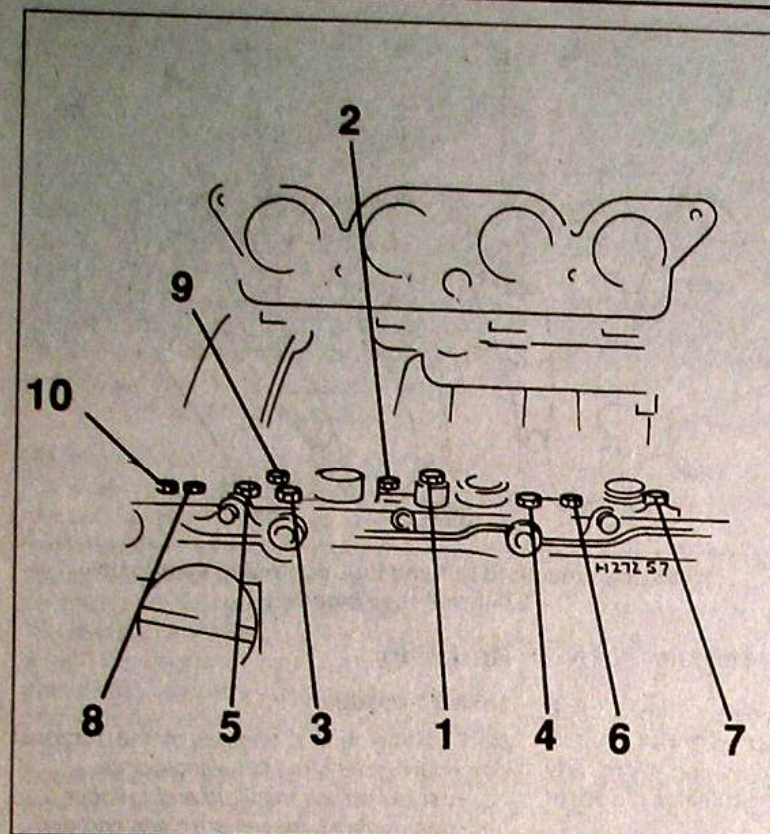
Refitting

8 Refitting is the reverse of the removal procedure, noting the following points:

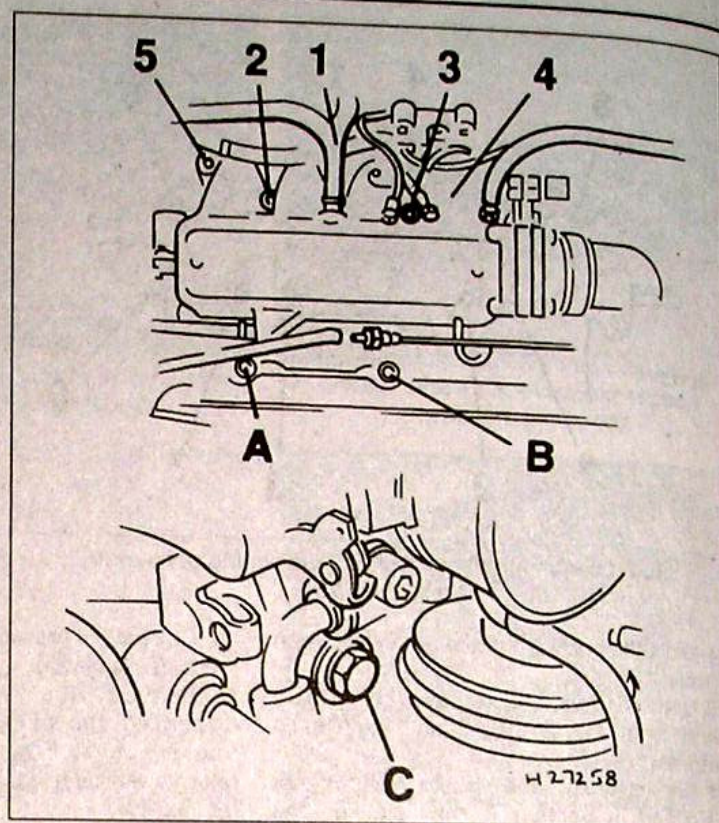
- Examine all the exhaust manifold studs for signs of damage and corrosion; remove all traces of corrosion, and repair or renew any damaged studs.
- Ensure that the manifold and cylinder head sealing faces are clean and flat, and fit the new manifold gasket(s). Tighten the manifold retaining nuts and bolts to the specified torque in the order shown (see illustrations).
- Reconnect the front pipe to the manifold, using the information given in Section 17.

17 Exhaust system - general information and component removal

Refer to Chapter 4B, Section 16.



15.54a Inlet manifold lower section nut and bolt tightening sequence - 2.0 litre Phase II models



15.54b Inlet manifold upper section nut and bolt tightening sequence - 2.0 litre Phase II models

1 to 5 Rear bolts

a to c Front bolts

2.0 litre Phase II models

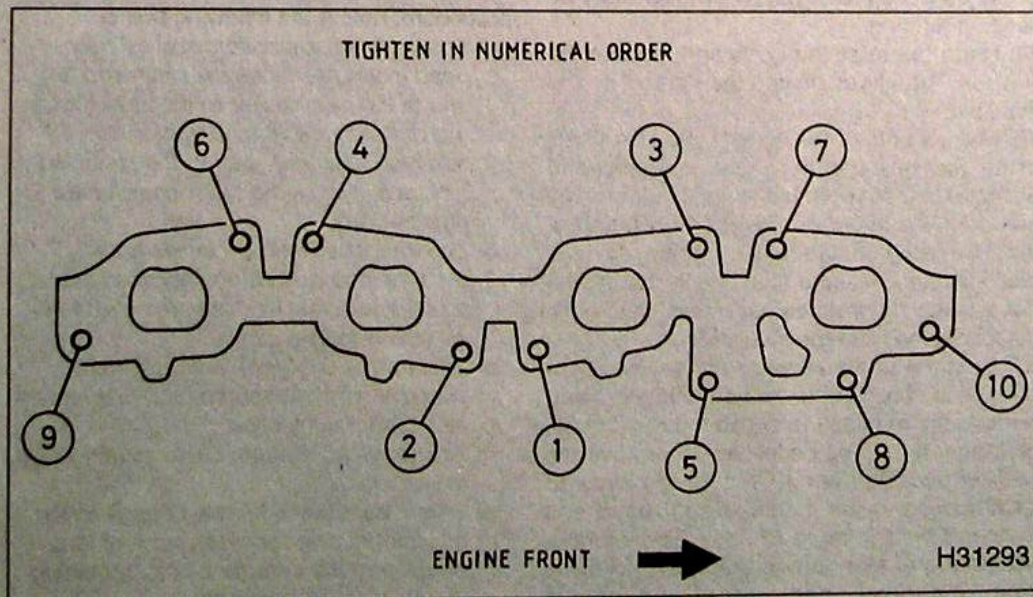
54 Refitting is the reverse of the removal procedure, noting the following points:

- Ensure that the manifold lower section and cylinder head mating surfaces are clean and dry, and fit the new gasket to the head studs. Install the manifold lower section, and tighten its retaining nuts and bolts to the specified torque setting in the order shown (see illustration 15.54a).

- Fit a new gasket to the lower section, then install the manifold upper section, and lightly tighten all its retaining bolts. Tighten the rear retaining bolts securely in the order shown (see illustration 15.54b), then securely tighten the three front retaining bolts.

- Ensure that all relevant hoses are reconnected to their original positions, and are securely held (where necessary) by their retaining clips.

- Ensure that the fuel injection system wiring is correctly routed, and retained by all the necessary clips.
- Adjust the accelerator cable as described in Section 3.
- Where necessary, fit new O-rings to the oil filter housing recesses, and refit the housing to the cylinder block, tightening its retaining bolts securely.
- Fit the oil filter, and refill the engine with oil as described in Chapter 1.



15.55a Inlet manifold lower section nut and bolt tightening sequence - 2.0 litre Phase III models

2.0 litre Phase III models

55 Refitting is the reverse of the removal procedure, noting the following points:

- Ensure that the manifold lower section and cylinder head mating surfaces are clean and dry, and fit the new gasket to the head studs. Install the manifold lower section, and tighten its retaining nuts and bolts to the specified torque setting in the order shown (see illustration 15.55a).
- Fit a new gasket to the lower section, then install the manifold upper section and tighten its retaining nuts and bolts to the specified torque setting in the order shown (see illustration 15.55b).
- Ensure that all relevant hoses are reconnected to their original positions, and are securely held (where necessary) by their retaining clips.
- Ensure that the fuel injection system wiring is correctly routed, and retained by all the necessary clips.



15.22a Free the accelerator inner cable from the throttle cam . . .



15.22b . . . and release the outer cable from its mounting bracket



15.25 Inlet manifold upper support brackets (arrowed)

22 Slacken the retaining clip, and disconnect the inlet duct from the throttle housing. Free the accelerator inner cable from the throttle cam. Slacken the outer cable locknut and adjuster nut, then free the outer cable from its mounting bracket (see illustrations).

23 Make a note of the correct fitted locations of all the relevant hose connections, and disconnect them from the throttle housing and inlet manifold upper section. Plug the coolant hose ends, working quickly to minimise coolant loss. To avoid confusion on refitting, it may be wise to label each hose as it is disconnected.

24 Disconnect the wiring connectors from the throttle potentiometer, auxiliary air control (AAC) valve, the fast idle control device (FICD) solenoid valve, and the coolant temperature sensors on the right-hand end of the manifold. Free the wiring from all its relevant retaining clips, and position the loom clear of the manifold.

25 Slacken and remove the eight retaining bolts (see illustration 15.54b) and the upper support bracket bolts (see illustration), then lift off the upper section of inlet manifold complete with the throttle housing. Recover the gasket and discard it.

26 Disconnect the wiring connectors from the air regulator valve and the injectors. Free

the wiring from any relevant retaining clips, and position it clear of the manifold.

27 Release the retaining clip(s), then disconnect any remaining coolant hose(s) from the manifold. Plug the hose end(s), working quickly to minimise coolant loss.

28 Undo the retaining bolts and remove the support brackets from the rear of the manifold.

29 Unscrew the union nut and free the EGR pipe linking the inlet and exhaust manifolds, from the control valve on the left-hand end of the inlet manifold (see illustration).

30 Make a note of the correct fitted locations of all the relevant hose connections, and disconnect them from the lower section of the manifold. Plug the coolant hose ends, working quickly to minimise coolant loss. To avoid confusion on refitting, it may be wise to label each hose as it is disconnected. Make a final check that all the necessary vacuum/breather hoses have been disconnected from the manifold.

31 Drain the engine oil and remove the oil filter as described in Chapter 1. If the filter is damaged during removal, a new filter must be used on refitting.

32 Working in the reverse of the sequence shown in illustration 15.54a, slacken and remove the manifold retaining nuts and bolts. Note that it may be necessary to remove the

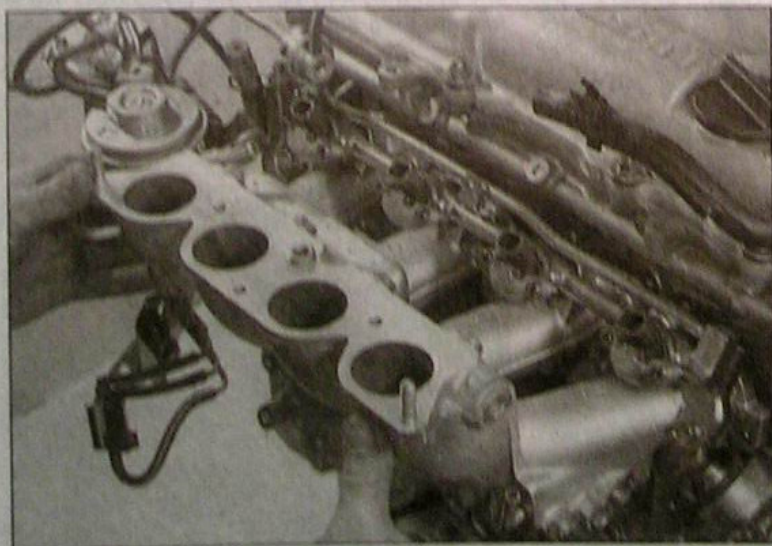


15.29 Undo the retaining nut, and free the EGR pipe from the valve

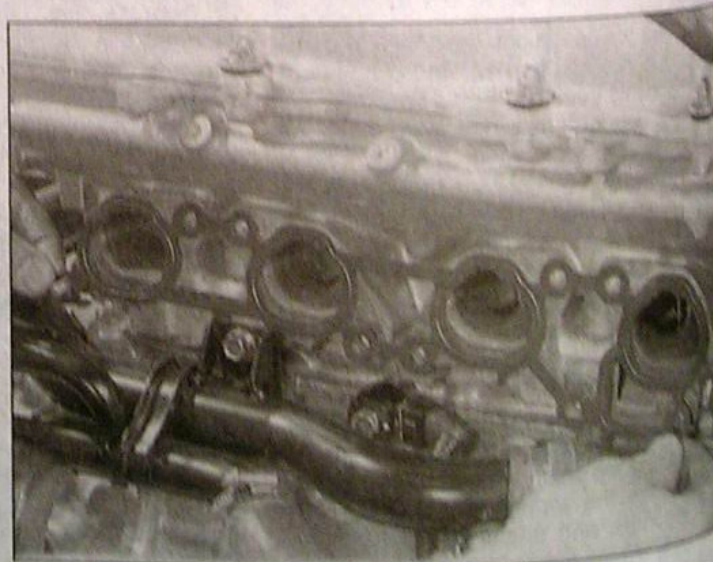
oil filter housing from the rear of the block to gain access to the manifold right-hand end nuts and bolts (refer to Chapter 2B for further information). Manoeuvre the manifold away from the head, and out of the engine compartment. Remove the manifold gasket and discard it (see illustrations).

2.0 litre Phase III models

33 To improve access, apply the handbrake, then jack up the front of the car and support it on axle stands (see *Jacking and vehicle support*). Access to the manifold and associated components can then be gained from above and below.



15.32a Remove the inlet manifold lower section . . .



15.32b . . . and recover the gasket



14.22 Disconnect the wiring connector ...

24 Refitting is the reverse of removal, using a new sealing ring.

Auxiliary air control (AAC) valve

Note: The auxiliary air control valve is not available separately. If the valve is faulty, the complete idle air adjusting (IAA) unit must be renewed. The idle air adjusting unit is the cast housing which is bolted to the right-hand end of the inlet manifold (Phase I and Phase II models) or centre of the manifold (Phase III models). The unit contains the auxiliary air control (AAC) valve, the fast idle control device (FICD) solenoid valve, and the base idle speed adjusting screw.

25 Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

26 Disconnect the wiring connector from the control valve.

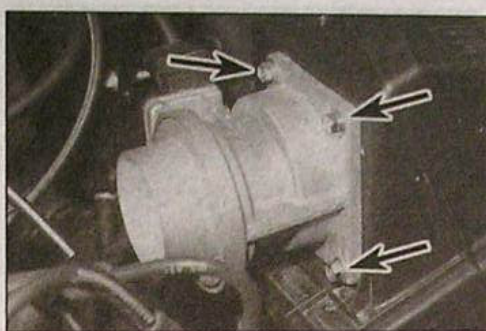
27 Undo the retaining screws, or unscrew the valve body, then remove the valve from the manifold, along with its plunger and spring.

28 Check the valve plunger and spring for signs of wear or damage, and renew if necessary.

29 Refitting is the reverse of removal. Ensure that the plunger and spring are fitted in the correct order, and that the plunger is installed the correct way round.

Fast idle control device (FICD) solenoid valve

Note: The fast idle control device (FICD) solenoid valve is not available separately. If the valve is faulty, the complete idle air adjusting (IAA) unit must be renewed. The idle air



14.23 ... then undo the retaining bolts (three arrowed) and remove the airflow meter from the air cleaner housing

adjusting unit is the cast housing which is bolted to the right-hand end of the inlet manifold (Phase I and Phase II models) or centre of the manifold (Phase III models). The unit contains the auxiliary air control (AAC) valve, the fast idle control device (FICD) solenoid valve, and the base idle speed adjusting screw.

30 Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

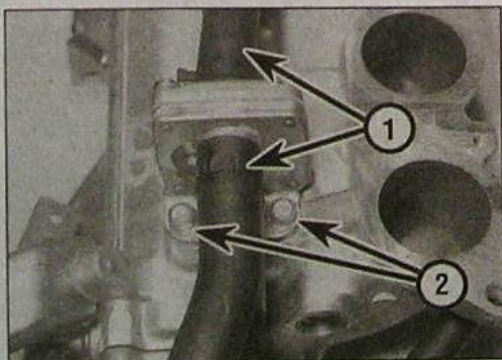
31 Trace the wiring back from the solenoid to its wiring connector, and disconnect it from the main wiring harness. On later models, disconnect the wiring connector from the control valve itself.

32 Unscrew the solenoid valve from the manifold, and recover the plunger, spring, and sealing washer.

33 Refitting is the reverse of removal, ensuring that the solenoid plunger and spring are fitted in the correct order, and that the plunger is installed the correct way round.

Idle air adjusting (IAA) unit

34 The idle air adjusting unit is the cast housing which is bolted to the right-hand end of the inlet manifold (Phase I and Phase II models) or centre of the manifold (Phase III models). The unit contains the auxiliary air control (AAC) valve, the fast idle control device (FICD) solenoid valve, and the base idle speed adjusting screw. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).



14.45 Air regulator valve vacuum hoses (1) and retaining bolts (2)



14.50 Knock sensor (arrowed) is situated directly beneath the inlet manifold

35 Disconnect the wiring connectors from the auxiliary air control (AAC) valve and the fast idle control device (FICD) solenoid valve, and free the wiring from any relevant retaining clips.

36 Undo the retaining bolts, and remove the unit from the manifold. Recover the gasket and discard it; a new one must be used on refitting.

37 On refitting, ensure that the unit and manifold faces are clean and dry, then offer up the new gasket. Fit the idle air adjusting unit, and securely tighten its mounting bolts. Reconnect the wiring connectors and the battery negative terminal.

Air regulator valve

Phase I models

38 The air regulator valve is located underneath the inlet manifold. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

39 To improve access, firmly apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Access to the valve can then be gained from both above and below.

40 Disconnect the wiring connector from the valve, then release the retaining clips and disconnect both the vacuum and coolant hoses. Plug the coolant hose ends, working quickly to minimise coolant loss.

41 Slacken and remove the mounting bolts, then release the valve from the manifold and remove it from the engine.

42 Refitting is the reverse of removal.

Phase II models

43 The air regulator valve is located on the left-hand end of the manifold, directly beneath the idle air adjusting (IAA) unit. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

44 Remove the upper section of the inlet manifold as described in Section 15.

45 Release the retaining clips, and disconnect both vacuum hoses from the valve (see illustration).

46 Undo the two retaining bolts, and remove the valve from the manifold.

47 Refitting is the reverse of removal.

Crank angle sensor/camshaft position sensor

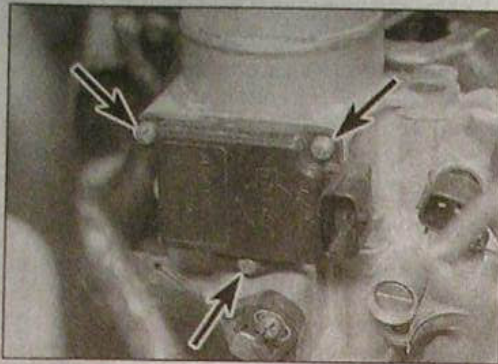
48 The crank angle sensor, or camshaft position sensor used on later models, are integral parts of the distributor. Refer to Chapter 5B.

Power transistor

49 Refer to Chapter 5.B

Knock sensor

50 Refer to Section 13 of Part B of this Chapter, noting that access to the knock sensor is very poor (see illustration).



13.30 ... then undo the retaining screws (arrowed) and remove the airflow meter

Fast idle control device (FICD) solenoid valve

32 The fast idle control device (FICD) solenoid valve is screwed into the front of the throttle body (see illustration). Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual). If necessary, remove the air cleaner housing as described in Section 2 to improve access to the valve.

33 Disconnect the wiring connector from the solenoid.

34 Unscrew the solenoid valve from the body, and recover the plunger, spring and sealing washer.

35 Refitting is the reverse of removal, using a new sealing washer. Ensure that the solenoid plunger and spring are fitted in the correct order, and the correct way around.

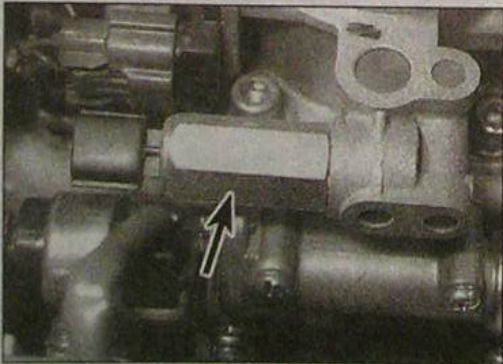
Fast idle thermostatic valve

36 The fast idle thermostatic valve is fitted to the left-hand side of the throttle body. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

37 Remove the air cleaner housing as described in Section 2.

38 Unscrew the nut and washer, then withdraw the fast idle cam retaining plate, spring, spacer and lever, noting each component's correct fitted position.

39 Undo the retaining screw, and remove the fast idle valve retaining plate. Lift the valve out of position, and recover its sealing ring.



13.32 The fast idle control device (FICD) (arrowed) is screwed into the front of the throttle housing

40 Refitting is the reverse of removal. Use a new sealing ring, and ensure that all the fast idle cam components are refitted in their original positions.

Crank angle sensor/camshaft position sensor

41 The crank angle sensor, or camshaft position sensor used on later models, are integral parts of the distributor. Refer to Chapter 5B.

Power transistor

42 Refer to Chapter 5B.

Coolant temperature sensor

43 Refer to Chapter 3.

ECES control unit

44 The ECES control unit is situated just in front of the centre console, mounted onto the transmission tunnel floor. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

45 To gain access to the control unit, undo the retaining screws and release the retaining clips, then remove the small trim panel from each side of the front of the centre console (in the footwell area).

46 Undo the retaining screws, and release the control unit from its mounting bracket. Disconnect the wiring connector(s), and remove the unit from the vehicle.

47 Refitting is the reverse of removal, ensuring that the wiring connector is securely reconnected.

Neutral switch - manual transmission models

48 Refer to Chapter 7A.

Starter inhibitor/reversing light switch - automatic transmission models

49 Refer to Chapter 7B.

ECES control unit and fuel pump relays

50 Refer to Chapter 12.

Power steering idle-up switch

51 The power steering idle-up switch is screwed into the power steering feed pipe, in the right-hand rear corner of the engine compartment. Prior to removal, set the front wheels in the straight-ahead position, then disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

52 Locate the switch and disconnect its wiring connector.

53 Unscrew the switch, recover its sealing washer, and plug the opening in the pipe. Work quickly, to minimise fluid loss and to prevent dirt entering the hydraulic system.

54 Refitting is the reverse of removal, using a new sealing washer.

Air conditioning system idle-up switch

55 The air conditioning switch is screwed into the air conditioning pipe, in the left-hand front corner of the engine compartment. Removal and refitting of the switch requires the air conditioning system to be discharged and recharged (see Chapter 3, Section 10), and this should not be attempted by the home mechanic.

Vehicle speed sensor

56 The vehicle speed sensor is an integral part of the speedometer. Refer to Chapter 12 for removal and refitting details.

14 Fuel injection system components (2.0 litre models) - removal and refitting

Note: Refer to the information in Section 1 for details of model identification.

Fuel rail and injectors

Note: Refer to the warning note in Section 1 before proceeding.

Note: If a faulty injector is suspected, before condemning the injector, it is worth trying the effect of one of the proprietary injector-cleaning treatments.

Phase I models

1 Refer to Section 13, noting that additional insulators are fitted between the top of each injector and the retaining plate.

Phase II and Phase III models

2 Remove the upper section of the inlet manifold as described in Section 15.

3 Disconnect the vacuum pipe from the fuel pressure regulator.

4 Depressurise the fuel system as described in Section 7, then slacken the retaining clips and disconnect the fuel feed and return hoses from the left-hand end of the fuel rail.

5 Release the retaining clips, and disconnect the wiring connectors from the four injectors.

6 Slacken and remove the fuel rail retaining bolts, then carefully ease the fuel rail and injector assembly out from the inlet manifold, and remove it from the vehicle. Recover the spacers fitted between the rail and manifold, and remove the injector seals from the manifold (see illustrations).

7 Undo the two retaining screws, then remove the retaining plate and recover the insulator from the top of the each injector, noting which way round it is fitted. Withdraw the injector, and recover its sealing rings (see illustrations).

8 Discard the seals and sealing rings; new ones must be used on refitting.

9 Refitting is a reversal of the removal procedure, noting the following points:

- Fit new O-rings to all disturbed injectors (see illustration).
- Apply a smear of engine oil to the O-rings

9 Fuel gauge sender unit - removal and refitting

Refer to Chapter 4B, Section 9.

10 Fuel tank - removal and refitting

Refer to Chapter 4A, Section 6, noting that it will be necessary to depressurise the fuel system as the feed and return hoses are disconnected from the fuel gauge sender unit (see Section 9).

11 Fuel injection system - general diagnosis and adjustment

Refer to Chapter 4B, Section 12.

12 Throttle housing - removal and refitting



1.6 litre models

1 Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

2 Remove the air cleaner housing as described in Section 2.

3 Depress the retaining clips and disconnect the wiring connectors from the throttle potentiometer, the auxiliary air control valve, the airflow meter and the fast idle control device (FICD) solenoid valve.

4 Free the accelerator inner cable from the throttle cam. Slacken the outer cable locknut and adjuster nut, then free the outer cable from its mounting bracket.

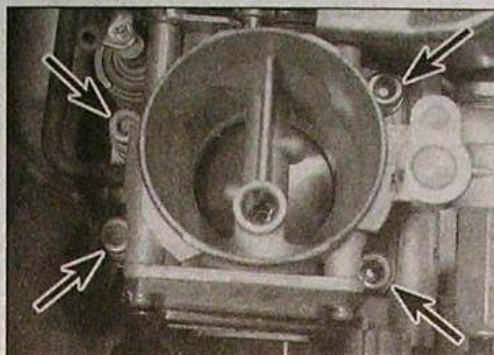
5 Make a note of the correct fitted positions of all the relevant vacuum pipes and breather hoses, to ensure that they are correctly positioned on refitting, then release the retaining clips (where fitted) and disconnect them from the throttle housing.

6 Release the retaining clips, disconnect the coolant hoses from each side of the throttle housing, and plug the hose ends. Work quickly, to minimise coolant loss.

7 Slacken and remove the bolts securing the throttle housing assembly to the inlet manifold, and remove it from the engine compartment (see illustration). Remove the gasket and discard it; a new one must be used on refitting. Plug the inlet manifold port with a wad of clean cloth, to prevent the possible entry of foreign matter.

2.0 litre models

8 Slacken the retaining clip, and disconnect the inlet duct from the throttle housing.



12.7 Throttle housing retaining bolts (arrowed) - 1.6 litre models

9 Disconnect the wiring connector from the throttle potentiometer.

10 On Phase I models, carefully prise the accelerator linkage rod off its throttle housing balljoint.

11 On Phase II and Phase III models, free the accelerator inner cable from the throttle cam. On automatic transmission models, also disconnect the kickdown cable as described in Chapter 7B.

12 On all models, release the retaining clip(s), disconnect the coolant hose(s) from the throttle housing, and plug the hose end(s). Work quickly, to minimise coolant loss.

13 On all models, make a note of the correct fitted positions of all the relevant vacuum pipes and breather hoses, to ensure that they are correctly positioned on refitting, then release the retaining clips (where fitted) and disconnect them from the throttle housing.

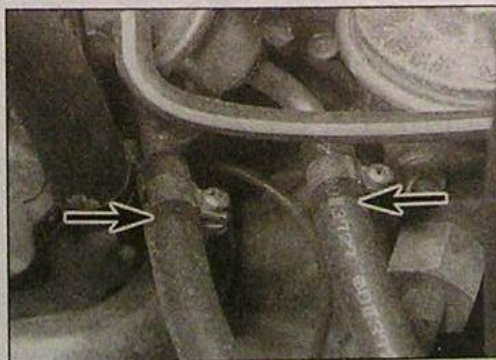
14 Where necessary, unbolt the inlet manifold support bracket to gain access to the throttle housing bolts.

15 Slacken and remove the bolts securing the throttle housing assembly to the inlet manifold, and remove it from the engine compartment. Remove the gasket and discard it; a new one must be used on refitting. Plug the inlet manifold port with a wad of clean cloth, to prevent the possible entry of foreign matter.

Refitting

16 Refitting is a reverse of the removal procedure, bearing in mind the following points:

a) Ensure that the mating surfaces of the



13.3 Fuel rail feed and return hoses (arrowed) - 1.6 litre models

manifold and throttle housing are clean and dry, and fit a new gasket to the manifold. Fit the throttle body then, working in a diagonal sequence, tighten the retaining bolts to the specified Stage 1 torque setting. Go around again in sequence, and tighten them to the specified Stage 2 torque setting.

b) Ensure that all hoses are correctly reconnected and, where necessary, that their retaining clips are securely tightened.

c) On completion, adjust the accelerator cable using the information given in Section 3. On automatic transmission models, also check the kickdown cable adjustment as described in Chapter 7B.

13 Fuel injection system components (1.6 litre models) - removal and refitting



Fuel rail and injectors

Note: Refer to the warning note in Section 1 before proceeding.

Note: If a faulty injector is suspected, before condemning the injector, it is worth trying the effect of one of the proprietary injector-cleaning treatments.

1 Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual). To improve access to the fuel rail, remove the air cleaner housing as described in Section 2.

2 Disconnect the vacuum pipe from the fuel pressure regulator.

3 Depressurise the fuel system as described in Section 7, then slacken the retaining clips and disconnect the fuel feed and return hoses from the left-hand end of the fuel rail (see illustration). Label the hoses if wished, to avoid confusion on refitting.

4 Depress the retaining tangs, and disconnect the wiring connectors from the four injectors.

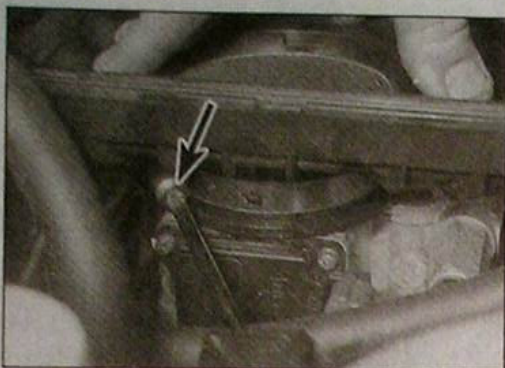
5 Slacken and remove the fuel rail retaining bolts, then carefully ease the fuel rail and injector assembly out from the inlet manifold, and remove it from the vehicle. Recover the spacers fitted between the rail and manifold, and remove each injector seal from the manifold.

6 Undo the two retaining bolts, and remove the retaining plate from the relevant injector. Push the injector out of position, and recover the sealing rings. Repeat the procedure as required to remove any other injectors.

7 Discard the seals and sealing rings; new ones must be used on refitting.

8 Refitting is a reversal of the removal procedure, noting the following points:

a) Fit new O-rings to all disturbed injectors, and fit new injector seals to the manifold.
b) Apply a smear of engine oil to the O-rings to aid installation, then ease the injectors into the fuel rail.



2.4a ... then slacken the retaining clip securing the air cleaner housing to the throttle housing



2.4b Disconnect the breather hose then undo the retaining bolt (arrowed) ...



2.4c ... and lift off the housing, disconnecting the vacuum hose as it becomes accessible



2.4d Recover the sealing ring from the throttle housing and store it with the air cleaner housing

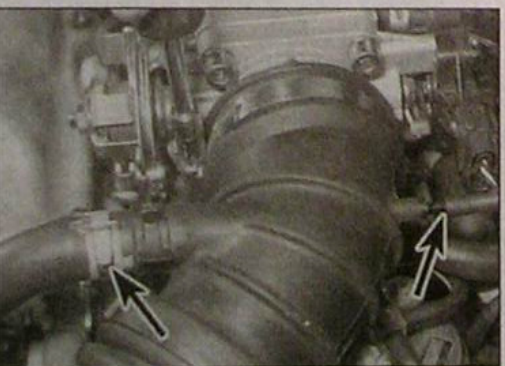
4 Slacken and remove the housing retaining bolt and retaining clip, then free the housing from the top of the throttle housing. Disconnect all the relevant vacuum/breather hoses from the base of the housing, noting their correct fitted positions, and remove the housing. Remove the sealing ring from the top of the throttle housing (see illustrations).

5 If necessary, undo the two retaining bolts, then free the inlet duct from the top of the resonator and remove it from the engine compartment. The resonator can then be lifted out of position.

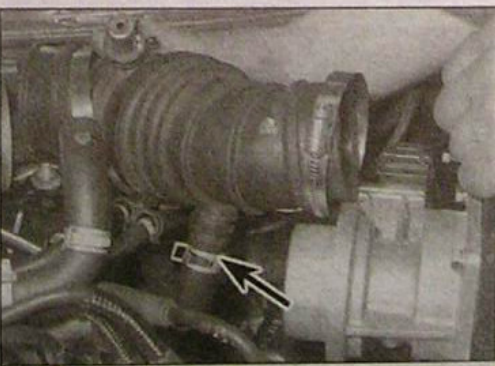
2.0 litre models

6 Slacken the retaining clip, and free the inlet duct from the airflow meter.

7 Disconnect the wiring connector from the airflow meter, then release the retaining clips



2.10a On 2.0 litre models, disconnect the hoses (arrowed) and slacken the duct retaining clips ...



2.10b ... then lift up the duct and disconnect its lower breather hose (arrowed)

and lift the lid off the air cleaner housing.

8 Lift out the filter element, noting which way around it is fitted.

9 Disconnect the inlet duct from the front of the housing, then undo the housing retaining bolts and lift the housing out of the engine compartment.

10 With the housing removed, the various ducts and resonator boxes can then be removed once their retaining bolts have been undone and hoses have been disconnected (see illustrations).

Refitting

11 Refitting is a reversal of the relevant removal procedure, ensuring that all hoses are properly reconnected, and that all ducts are correctly seated and securely held by their retaining clips.

3 Accelerator cable - removal, refitting and adjustment

1 Refer to Chapter 4A, Section 7, substituting 'throttle housing' for all references to the carburettor. On 1.6 litre models, remove the air cleaner housing (see Section 2) to improve access to the throttle housing end of the cable.

2 On 2.0 litre Phase I models, the throttle valve is operated via an intermediate cam which is mounted onto the top of the inlet manifold; once the accelerator cable is correctly adjusted, adjust the cam setting as follows. Slacken the locknut, and unscrew the intermediate cam stopper screw. Hold the cam fully open, then lightly tighten the screw until it is just contacting the stopper lever. From this point, release the cam, then rotate the screw three complete turns clockwise. Hold the screw stationary, and securely tighten its locknut. Fully open the cam, and check that its stopper arm contacts the screw.

4 Accelerator pedal - removal and refitting

Refer to Chapter 4A, Section 8, substituting 'throttle housing' for all references to the carburettor.

5 Unleaded petrol - general information and usage

Note: The information given in this Chapter is correct at the time of writing, and applies only to petrols currently available in the UK. If updated information is thought to be required, check with a Nissan dealer. If travelling abroad, consult one of the motoring organisations (or a similar authority) for advice on the petrols available, and their suitability for your vehicle.

1 The fuel recommended by Nissan is given in the Specifications Section of this Chapter.

2 RON and MON are different testing standards; RON stands for Research Octane Number (also written as RM), while MON stands for Motor Octane Number (also written as MM).

3 All Nissan Primera models are designed to run on fuel with a minimum octane rating of 95 (RON). All models with a catalytic converter must be run on unleaded fuel only. Under no circumstances should leaded fuel be used, as this may damage the catalyst. On models without a catalytic converter, either unleaded or leaded fuel can be used without modification.

Fuel system component test data

1.6 litre models

Fuel pump resistance (at fuel gauge sender unit connection):

Phase I and Phase II models	0.7 ohms
Phase III models	0.2 to 5.0 ohms

Throttle potentiometer resistances (see illustration SPEC 1):

Meter connected between terminals A and B:

Throttle valve closed	0.5 kilohm
Throttle valve partially open	0.5 to 4 kilohms
Throttle valve fully open	4 kilohm

Fuel injector resistance

10 ohms

Auxiliary air control (AAC) valve resistance

10 ohms

Fast idle control device (FICD) solenoid valve:

Apply 12 volts across solenoid terminals

Solenoid should click, indicating correct operation

Power steering pressure switch:

Steering wheel being turned

Continuity between switch terminals

Steering wheel stationary

Open-circuit between switch terminals

Coolant temperature sensor resistances:

At 20°C (68°F)	2.1 to 2.9 kilohms
At 90°C (194°F)	0.24 to 0.26 kilohms
At 110°C (230°F)	0.14 to 0.15 kilohms

2.0 litre models

Fuel pump resistance (at fuel gauge sender unit connection):

Phase I and Phase II models	0.7 ohms
Phase III models	0.2 to 5.0 ohms

Manual transmission model throttle potentiometer resistances (see illustration SPEC 1):

Meter connected between terminals A and B:

Throttle valve closed	2 kilohms
Throttle valve partially open	2 to 11 kilohms
Throttle valve fully open	11 kilohms

Automatic transmission model throttle potentiometer resistances (see illustration SPEC 2):

Meter connected between terminals 1 and 2:

Throttle valve fully closed	Continuity between terminals
Throttle valve open	Open-circuit between terminals

Meter connected between terminals 2 and 3:

Throttle valve fully closed	Open-circuit between terminals
Throttle valve open	Continuity between terminals

Fuel injector resistance

10 to 14 ohms

Auxiliary air control (AAC) valve resistance

10 ohms

Fast idle control (FICD) solenoid valve:

Apply 12 volts across solenoid terminals

Solenoid should click, indicating correct operation

Air regulator valve resistance

70 to 80 ohms

Knock sensor (see illustration SPEC 3):

Meter connected between terminal A and earth

Continuity should exist (meter must be able to read more than 10 megohms)

Power steering pressure switch:

Steering wheel being turned

Continuity between switch terminals

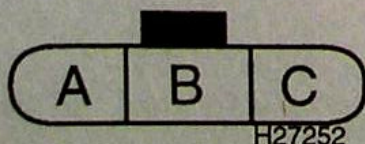
Steering wheel stationary

Open-circuit between switch terminals

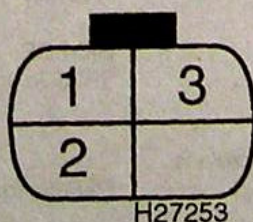
Coolant temperature sensor resistances:

At 20°C (68°F)	2.1 to 2.9 kilohms
At 50°C (122°F)	0.68 to 1.0 kilohms
At 80°C (176°F)	0.30 to 0.33 kilohms

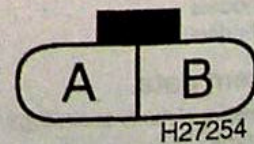
Note: All resistance readings given are approximate values, which should be used as a guide only. Before condemning a component as faulty, have your findings confirmed by a Nissan dealer.



SPEC 1 Throttle potentiometer wiring connector - manual transmission models



SPEC 2 Throttle potentiometer wiring connector - automatic transmission models



SPEC 3 Knock sensor wiring connector