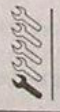
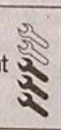
Chapter 4 Part B:
Fuel/exhaust systems - single-point fuel injection models

Contents

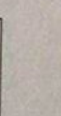
Degrees of difficulty

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 

Specifications

General

System type	Nissan Electronic Concentrated Control System (ECCS) single-point injection
Engine code:	
2.0 litre models	SR20Di

Fuel system data

For idle speed and mixture settings, refer to Chapter 1 Specifications.

Fuel pump type	Electric, immersed in tank
Fuel pump regulated constant pressure (approximate)	2.5 bar

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, and the throttle body assembly (which incorporates the single fuel injector). Additionally, there is the ECCS (Electronic Concentrated Control System) control unit and its various sensors, electrical components and related wiring. The air cleaner is mounted on top of the throttle body, and contains a disposable paper filter element.

Refer to Section 6 for further information on the operation of the fuel injection system, and to Section 16 for information on the exhaust system.

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.

Note: *Residual pressure will remain in the fuel lines long after the vehicle was last used. Before disconnecting any fuel line, depressurise the fuel system as described in Section 7.*

2 Air cleaner assembly - removal and refitting

Removal

1 Slacken and remove the bolt, and free the inlet duct from the side of the air cleaner housing.

2 Unscrew the air cleaner cover nuts, then release the retaining clips and lift off the cover.

3 Withdraw the filter element.

4 Slide the spacers and rubbers off the air cleaner housing studs, then lift off the retaining plate and seal.

5 Slacken and remove the remaining air cleaner housing retaining bolts, and remove the housing from the engine compartment. Disconnect any relevant vacuum and breather hoses from the housing, noting each one's correct fitted location, as they become accessible.

6 The inlet duct and resonator assembly can then be removed, once all its retaining bolts have been removed. If necessary, the two can then be separated.

7 Inspect the mounting rubbers and seals for signs of damage or deterioration, and renew if necessary.

Refitting

8 Refitting is a reverse of the removal procedure, ensuring that all ducts and hoses are securely control reconnected to their original locations, and do not become trapped as the housing is refitted.

3 Accelerator cable - removal, refitting and adjustment

Refer to Chapter 4A, Section 7, substituting 'throttle body' for all references to the carburettor.

4 Accelerator pedal - removal and refitting

Refer to Chapter 4A, Section 8, substituting 'throttle body' 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.

6 Fuel injection system - general information

All single-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 throttle body via a filter mounted on the engine compartment bulkhead. Fuel supply pressure is controlled by the pressure regulator, on the side of the throttle body assembly, which lifts to allow excess fuel to return to the tank when the optimum operating pressure of the fuel system is exceeded. To reduce emissions and to improve driveability when the engine is cold, an electrical heating element is fitted between the throttle body and inlet manifold, to quickly warm it up on cold starts.

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

a) *Throttle potentiometer - informs the ECCS control unit of the throttle valve position, and the rate of throttle opening/closing.*

b) *Coolant temperature sensor - informs the ECCS control unit of engine temperature.*

c) *Airflow meter - informs the ECCS control unit of the mass and temperature of the air entering the throttle body.*

d) *Crank angle sensor (housed in the distributor) - informs the ECCS control unit of the engine speed and crankshaft position (see Chapter 5B for further information).*

e) *Vehicle speed sensor (built into the speedometer) - informs the ECCS control unit of the vehicle speed.*

f) *Power steering and air conditioning system switches - 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.*

g) *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 injector (varying its pulse width - the length of time the 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 body, 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 throttle body passage, and so controls the idle speed.

The throttle body has a built-in fast idle facility, which is controlled by a thermostatic

g) Ensure that the feed and return hoses are correctly reconnected, and are securely retained by their clips.
h) Prior to refitting the access cover, reconnect the battery, then start the engine and check the fuel hoses for signs of leaks.

10 Fuel tank - removal and refitting

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

11 Throttle body - removal and refitting

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

Removal

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 injector wiring loom connector. Also disconnect the wiring connector from the heating element fitted between the throttle body and manifold.
4 Depressurise the fuel system as described in Section 7, then release the retaining clips and disconnect the fuel feed and return hoses from the throttle body assembly.
5 Free the accelerator inner cable from the throttle cam, then slacken the outer cable locknut and adjuster nut, then free the outer cable from its mounting bracket. On automatic transmission models, also disconnect the kickdown cable as described in Chapter 7B.
6 Release the retaining clips, then disconnect the coolant hoses from the rear of the throttle body, and plug the hose ends. Work quickly, to minimise coolant loss.
7 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 body.
8 Slacken and remove the bolts securing the throttle body assembly to the inlet manifold, and remove it from the engine compartment. Remove the heating element. Plug the inlet manifold port with a wad of clean cloth, to prevent the possible entry of foreign matter.
9 If necessary, with the throttle body removed, undo the retaining screws and separate the upper and lower sections, noting the gasket which is fitted between the two.

Refitting

10 Refitting is a reverse of the removal procedure, bearing in mind the following points:
a) Where necessary, ensure that the mating surfaces of the upper and lower throttle body sections are clean and dry, then fit a new gasket and reassemble the two, tightening the retaining screws securely.
b) Ensure that the mating surfaces of the manifold, throttle body and heating element are clean and dry. Fit the heating element and throttle body. Working in a diagonal sequence, tighten all the retaining bolts first to the specified Stage 1 torque setting, then go around again and tighten them to the specified Stage 2 torque setting.
c) Ensure that all hoses are correctly reconnected and, where necessary, that their retaining clips are securely tightened.
d) On completion, adjust the accelerator cable using the information given in Section 3. On automatic transmission models, adjust the kickdown cable as described in Chapter 7B.

12 Fuel injection/ignition system - general diagnosis and adjustment

General diagnosis

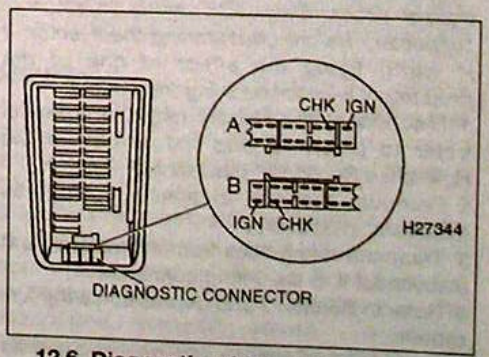
1 If a fault appears in the fuel injection/ignition system, first ensure that all the system wiring connectors are securely connected and free of corrosion. Then ensure that the fault is not due to poor maintenance - ie, check that the air cleaner filter element is clean, that the spark plugs are in good condition and correctly gapped, that the valve clearances are correctly adjusted, the cylinder compression pressures are correct, the ignition timing is correct, and that the emission control systems are operating correctly, referring to Chapters 1, 2, 4 and 5 for further information.
2 If these checks fail to reveal the cause of the problem, a quick check of the fuel injection/ignition circuits can be performed by setting the ECCS control unit to its self-diagnostic mode 2. In mode 2, the ECCS control unit will reveal any fault codes stored in its memory, using the engine check light in the instrument panel and the red LED on the right-hand side of the control unit.
3 Faults detected by ECCS control unit are stored in its memory, until the starter motor has been operated 50 times. If the fault is not detected again within this period, it will automatically be erased from the memory. Fault codes can also be erased from the memory by setting the control unit to self-diagnostic mode 2 and then switching it back to mode 1, as described below, or by leaving the battery disconnected for more than 24 hours.

Setting the self-diagnostic modes

4 Remove the fusebox cover, to gain access to the diagnostic connector which is clipped to the base of the fusebox.
5 Turn the ignition switch to the ON position, but do not start the engine. The ECCS control unit is now in self-diagnostic mode 1.
6 Using a spare piece of wire, connect the IGN terminal of the diagnostic connector to the CHK terminal **(see illustration)**. Keep the terminals connected for at least 2 seconds, then disconnect the wire. The ECCS control unit is now in self-diagnostic mode 2.
7 In mode 2, the control unit will reveal any fault codes stored in its memory.
8 The code is revealed using a series of long (0.6 second) and short (0.3 second) flashes of the instrument panel engine check light and the red LED on the right-hand side of the control unit. The long flashes, which indicate the first digit of the fault code, will be given out first, then after a gap of approximately 0.9 seconds, the short flashes, which indicate the second digit of the fault code, will follow. There will be a gap of 2.1 seconds before any other codes are revealed. Once all codes have been revealed, the ECU will continuously run through the code(s) stored in its memory, revealing each one in turn with a gap of 2.1 seconds between each code. The fault codes are as follows.

Code number	Faulty circuit
11	Crank angle sensor circuit
12	Airflow meter circuit
13	Coolant temperature sensor circuit
21	Ignition signal circuit
34	Knock sensor circuit
43	Throttle potentiometer circuit
55	All circuits operating correctly

Note: *If both codes 11 and 21 are displayed, check the crank angle sensor circuit before checking the rest of the ignition circuit.*



12.6 Diagnostic wiring connector and terminal identification
A 1.6 litre models B 2.0 litre models

32 Disconnect the wiring connector from the airflow meter.
33 Undo the three retaining screws, then remove the meter from the throttle body, and recover its sealing ring.
34 Refitting is the reverse of removal, using a new sealing ring and tightening its retaining screws securely.

Fast idle control device (FICD) solenoid valve

35 The fast idle control device (FICD) solenoid valve is screwed into 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). If necessary, remove the air cleaner housing as described in Section 2 to improve access to the valve.
36 Trace the wiring back from the solenoid to its wiring connector, and disconnect it from the main wiring harness.
37 Unscrew the solenoid valve from the body, and recover the plunger, spring and sealing washer.
38 If the solenoid is to be renewed, it will be necessary to free its wiring from the wiring connector as described in paragraph 7.
39 Alternatively, if it is not wished to disturb the wiring connector, the solenoid valve can be removed complete with the fuel injector and auxiliary air control (AAC) valve. Refer to the relevant sub-headings of this Section for further information.
40 Refitting is the reverse of removal, ensuring that the solenoid plunger and spring are fitted in the correct order and the correct way round.

Fast idle thermostatic valve

41 The fast idle thermostatic valve is fitted to the left-hand side of the throttle body, sandwiched between the upper and lower halves of the body. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).
42 Remove the air cleaner housing as described in Section 2.
43 Rotate the fast idle cam to disengage it from the throttle linkage. Align its hole with the hole in the throttle body, and lock the cam in position by inserting a 3 mm diameter rod or drill.
44 Undo the upper throttle body retaining screws, then carefully disengage the upper body assembly from the lower body, and position it clear of the fast idle valve. Recover the gasket and discard it; a new one must be used on refitting.
45 Undo the two retaining screws, and remove the fast idle valve retaining plate from the lower throttle body. Lift the valve out of position, and recover its sealing ring.
46 Refitting is the reverse of removal, using a new sealing ring and throttle body gasket.

Dashpot

47 The dashpot is fitted to the left-hand side of the throttle body. The dashpot can be checked as described in Part D of this Chapter.
48 To remove it, unscrew its retaining nut, and lift the dashpot out of its retaining bracket.
49 To refit, install the dashpot and tighten its retaining nut to the specified torque.

Crank angle sensor

50 The crank angle sensor is an integral part of the distributor, and cannot be renewed separately. If the sensor is faulty, the complete distributor body assembly must be renewed. Refer to Chapter 5 for further information.

Power transistor

51 Refer to Chapter 5B.

Coolant temperature sensor

52 Refer to Chapter 3.

Knock sensor

Note: *The knock sensor is delicate, and will not work correctly if it is dropped or knocked.*
53 The knock sensor is mounted onto the rear face of the cylinder block.
54 To gain access to the sensor, 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 sensor can then be gained from underneath the vehicle.
55 Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual) then disconnect the wiring connector from the sensor.
56 Slacken and remove the bolt securing the sensor to the cylinder block, and remove it from underneath the vehicle.
57 On refitting, ensure that the sensor and block mating surfaces are clean and dry. Position the sensor so that its wiring connector is facing the right-hand end of the engine, then fit the mounting bolt and tighten it to the specified torque. Ensure that no other component is contacting the sensor, then lower the vehicle to the ground and reconnect the battery.

ECCS control unit

58 The ECCS 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).
59 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 (see Chapter 11).
60 Undo the retaining screws and release the control unit from its mounting bracket, then disconnect the wiring connector(s) and remove the unit from the vehicle.
61 Refitting is the reverse of removal, ensuring that the wiring connector is securely reconnected.

Mixture heater

62 Refer to Section 11.

Neutral switch - manual transmission models

63 Refer to Chapter 7A.

Starter inhibitor/reversing light switch - automatic transmission models

64 Refer to Chapter 7B.

ECCS control unit, mixture heater and fuel pump relays

65 Refer to Chapter 12.

Power steering idle-up switch

66 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).
67 Locate the switch, and disconnect its wiring connector.
68 Unscrew the switch, recover its sealing washer, and plug its opening in the pipe. Work quickly, to minimise fluid loss and prevent dirt entering the hydraulic system.
69 Refitting is the reverse of removal, using a new sealing washer.

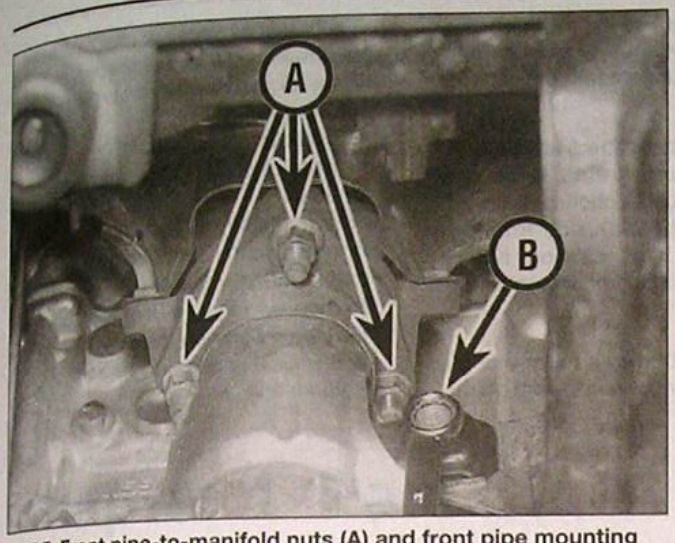
Air conditioning system idle-up switch

70 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 should not be attempted by the home mechanic.

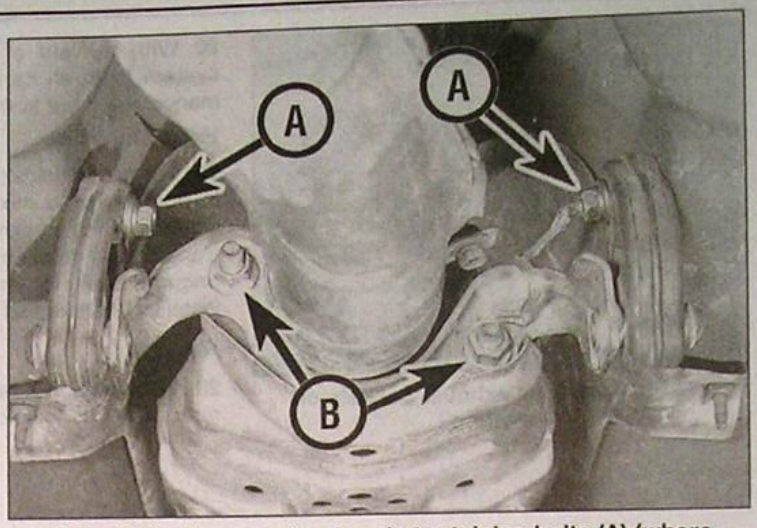
14 Inlet manifold - removal and refitting

Removal

1 Remove the throttle body as described in Section 11.
2 Drain the cooling system as described in Chapter 1.
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, the associated vacuum valves. To avoid confusion on refitting, it may be wise to label each hose as it is disconnected.
4 On models with a catalytic converter, unscrew the union nut and free the EGR pipe,



16.7 Front pipe-to-manifold nuts (A) and front pipe mounting bolt (B)



16.8a Undo the mounting bracket retaining bolts (A) (where fitted), noting the earth lead fitted to right-hand bolt, and the front pipe nuts (B) . . .

Front pipe

6 On models with a catalytic converter, trace the wiring back from the exhaust gas sensor to its wiring connector. Disconnect the connector, and free the wiring from any relevant retaining clips so that it is free to be removed with the front pipe.

7 On all models, undo the nuts securing the front pipe to the manifold, and the bolt securing the front pipe to its mounting bracket. Separate the front pipe from the manifold, and collect the gaskets **(see illustration)**.

16.8b . . . then remove the mounting bracket assembly and front pipe

8 Slacken and remove the two nuts/bolts and springs (as applicable) securing the front pipe flange joint to the intermediate pipe/catalytic converter (as applicable). Withdraw the front pipe from underneath the vehicle, and recover the gasket from the joint. Note that it may be necessary to undo the bolts and release the mounting bracket from the vehicle body to allow the front pipe to be withdrawn **(see illustrations)**.

Catalytic converter (where fitted)

9 Slacken and remove the two nuts/bolts and springs (as applicable) securing the front pipe flange joint to the catalytic converter.

10 Unscrew the two nuts/bolts securing the intermediate pipe to the catalytic converter, and recover the gasket from between the two **(see illustration)**.

11 Free the catalytic converter from the front pipe, and recover the gasket.

Intermediate pipe

12 On models with a catalytic converter, unscrew the two bolts securing the intermediate pipe to the catalytic converter, and recover the gasket from between the two.

13 On models without a catalytic converter, undo the two nuts securing the front pipe flange joint to the intermediate pipe, then separate the joint and recover the gasket.

14 On all models, slacken and remove the bolt securing the mounting rubber to the rear of the intermediate pipe.

15 Undo the two bolts securing the tailpipe to the intermediate pipe **(see illustration)**, then manoeuvre the intermediate pipe out from underneath the vehicle. Recover the gasket from the tailpipe joint.

Tailpipe

16 Slacken and remove the two bolts securing the tailpipe to the intermediate pipe.

17 Unhook the tailpipe from its mounting rubbers, then remove it from the vehicle and recover the gasket.

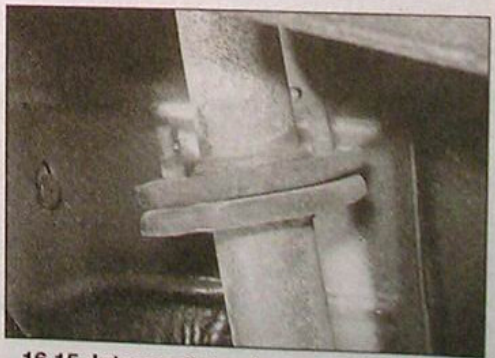
Complete system

18 On models with a catalytic converter, trace the wiring back from the exhaust gas sensor to its wiring connector. Disconnect the connector, and free the wiring from any relevant retaining clips so that it is free to be removed with the exhaust system.

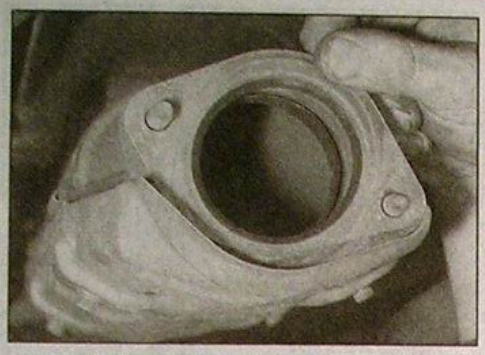
19 Undo the nuts securing the front pipe to the manifold, and the bolt securing the front pipe to its mounting bracket. Separate the front pipe from the manifold, and collect the gaskets.

16.8c On some models, the front pipe is secured to the intermediate pipe by bolts and springs (arrowed)

16.10 Catalytic converter-to-intermediate pipe joint



16.15 Intermediate pipe-to-tailpipe joint



16.22 Renew all exhaust gaskets on refitting

20 With the aid of an assistant, free the system from all its mounting rubbers, and manoeuvre it out from underneath the vehicle.

Heat shield(s)

21 The heat shields (where fitted) are secured in position by a mixture of nuts, bolts and clamps. When an exhaust section is renewed, transfer any relevant heat shields from the original over to the new section before installing the exhaust section on the vehicle.

Refitting

22 Each section is refitted by a reverse of the removal sequence, noting the following points:

a) *Ensure that all traces of corrosion have been removed from the flanges, and renew all necessary gaskets* ***(see illustration)****.*

b) *Inspect the rubber mountings for signs of damage or deterioration, and renew as necessary.*

c) *Prior to tightening the exhaust system fasteners to the specified torque, ensure that all rubber mountings are correctly located, and that there is adequate clearance between the exhaust system and vehicle underbody/suspension components, etc.*

linking the inlet and exhaust manifolds, from the control valve on the left-hand end of the inlet manifold.
5 Disconnect the wiring connector from the coolant temperature sensor on the right-hand end of the manifold. Where necessary, undo the retaining bolt and free the earth lead from the manifold.
6 Undo the retaining bolts and remove the support bracket from the rear of the manifold.
7 Make a final check that all the necessary vacuum/breather hoses have been disconnected from the manifold.
8 Working in the **reverse** of the sequence shown in illustration 14.10, slacken and remove the manifold retaining nuts and bolts.
9 Manoeuvre the manifold away from the head and out of the engine compartment, then remove the manifold gasket and discard it.

Refitting

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

a) 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).***

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

c) Refit the throttle body as described in Section 11.

d) On completion, refill the cooling system as described in Chapter 1.

15 Exhaust manifold - removal and refitting

Removal

1 Disconnect the hot-air inlet hose from the manifold shroud, and remove it from the vehicle.
2 On models with a catalytic converter, unscrew the union nut and free the EGR pipe from the side of the manifold.
3 On all models, slacken and remove the retaining screws, and remove the shroud from the top of the exhaust 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 gaskets. Either disconnect the exhaust gas sensor wiring connector, or support the pipe to ensure that no strain is placed on the wiring.
6 Working in the **reverse** of the sequence shown in illustration 15.8, slacken and remove the manifold retaining nuts and bolts.
7 Manoeuvre the manifold away from the head, and out of the engine compartment. Remove the manifold gasket and discard it.

Refitting

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

a) Examine all the exhaust manifold studs for signs of damage and corrosion; remove all traces of corrosion, and repair or renew any damaged studs.

b) Ensure that the manifold and cylinder head sealing faces are clean and flat, and fit a new manifold gasket. Tighten the manifold retaining nuts and bolts to the specified torque in the order shown ***(see illustration).***

c) Reconnect the front pipe to the manifold using the information given in Section 16.

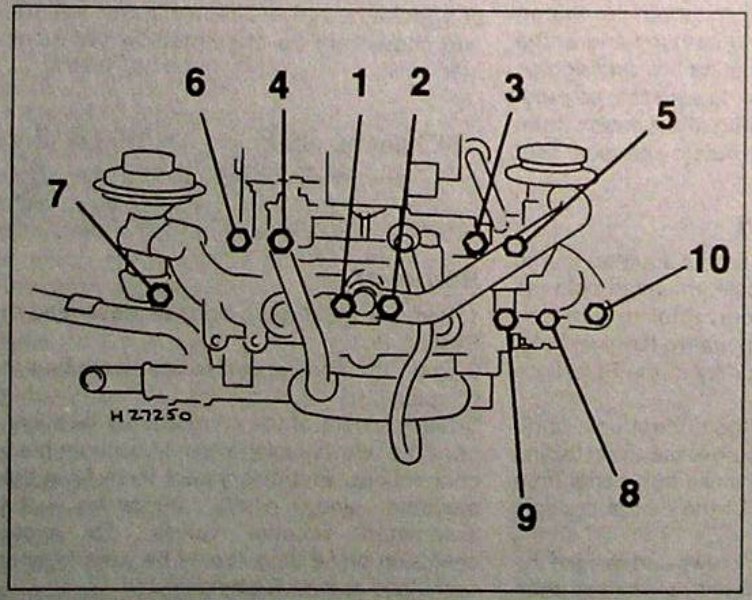
16 Exhaust system - general information and component removal

General information

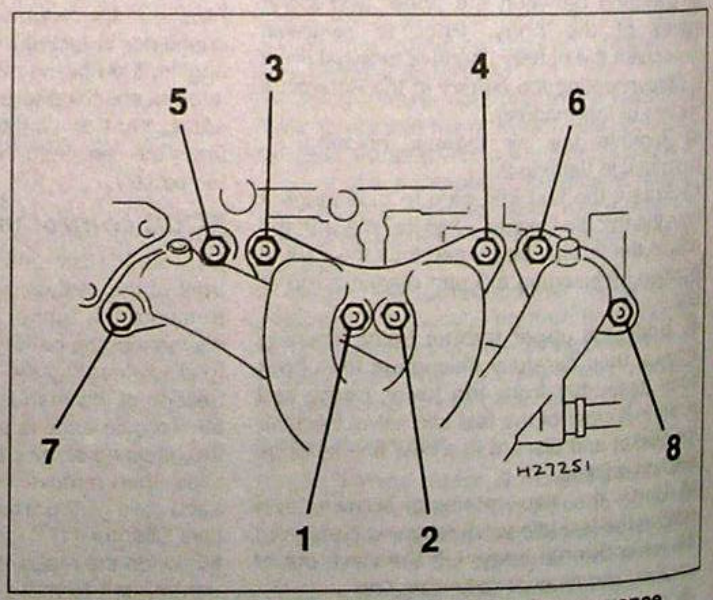
1 On models without a catalytic converter, the exhaust system consists of three sections; the front pipe, the intermediate pipe and silencer box, and the tailpipe and main silencer box.
2 On models with a catalytic converter, the exhaust system consists of four sections, the front pipe, the catalytic converter, the intermediate pipe and silencer box, and the tailpipe and main silencer box.
3 The system is suspended throughout its entire length by rubber mountings, and all exhaust sections are joined by flanged joints which are secured together by nuts and/or bolts.

Removal

4 Each exhaust section can be removed individually or, alternatively, the complete system can be removed as a unit.
5 To remove the system or part of the system, first jack up the front or rear of the car, and support it on axle stands (see *Jacking and vehicle support*). Alternatively, position the car over an inspection pit, or on car ramps.



14.10 Inlet manifold nut and bolt tightening sequence



15.8 Exhaust manifold nut and bolt tightening sequence

9 On models with a catalytic converter, with the control unit in mode 2, if the engine is started it will automatically enter its exhaust gas sensor check mode. In this mode, the light and LED indicate the condition of the exhaust gases. When the light and LED are illuminated, the exhaust gas mixture is lean, and when they are off, the mixture is rich. To check the sensor, with the control unit in self-diagnostic mode 2, start the engine and warm it up to normal operating temperature. Once it is warm, raise the engine speed to approximately 2000 rpm, and hold it there for approximately 2 minutes whilst observing the instrument panel light or control unit LED. If the exhaust gas sensor is functioning correctly, the light/LED should flash on and off at least 5 times every 10 seconds.

10 When all the checks are complete, exit the self-diagnostic mode 2. If the engine has not been started, this can be achieved by reconnecting the IGN and CHK terminals of the diagnostic connector again for at least two seconds. If the engine is running, exit mode 2 by switching the ignition switch to the OFF position and disconnecting the battery negative terminal.

11 If a more detailed check of the fuel injection/ignition system is required, take the vehicle to a Nissan dealer. They will have access to the special electronic diagnostic test unit which is plugged into the system's diagnostic connector, and can carry out a full check of the system components.

Adjustment

12 On models without a catalytic converter, both the base idle speed and the mixture setting (exhaust gas CO level) are adjustable. On models with a catalytic converter, only the base idle speed is adjustable. Refer to Chapter 1 for the adjustment procedures.

13 Fuel injection system components - removal and refitting

Fuel injector

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

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

3 Trace the wiring back from the injector, and disconnect it at the wiring connector.

4 Refer to Section 7 and depressurise the fuel system.

5 Undo the two injector cap retaining screws then lift off the cap and recover the gaskets.

6 Lift the injector out of the throttle body, and recover the injector sealing washer and seals.

Note: *The injector may be a tight fit in the throttle body - if this is the case, **do not** try and pull it out using the wiring. Removal will require the upper half of the throttle body to be removed, so that the injector can be pushed out of position.*

7 If the injector is to be renewed, it will be necessary to free its wiring from the wiring connector. To do this, slide out the retaining clip from the rear of the connector then, using a small, flat-bladed screwdriver, free the relevant wires of the component to be removed, and push them out of the connector (see illustration 12.22 in Part A). Note the correct fitted location of each wire, and take great care not to damage the wiring terminals as they are removed.

8 Alternatively, if it is not wished to disturb the wiring connector, the injector can be removed complete with the fast idle control device (FICD) solenoid valve and auxiliary air control (AAC) valve. Refer to the relevant sub-headings of this Section for further information.

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

a) Fit a new injector sealing washer and seals, and injector cap gaskets.

b) Where a new injector is being fitted, slide its wires into the correct positions in the connector. Check they are securely retained, then refit the retaining clip to the rear of the connector. Ensure that the wires are correctly seated in the connector. If they are not, a poor electrical connection will be made when the two halves of the connector are joined, which could result in the injector not functioning correctly.

Fuel pressure regulator

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

10 The fuel pressure regulator 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). Note that access to the fuel pressure regulator is greatly improved if the air cleaner housing is removed (see Section 2).

11 Depressurise the fuel system as described in Section 7. Slacken the retaining clip and disconnect the fuel hose from the fuel pressure regulator.

12 Disconnect the vacuum hose from the regulator.

13 Slacken and remove the two retaining screws, then remove the regulator from the throttle body, and recover both of its sealing rings.

14 Refitting is the reverse of removal, using new sealing rings.

Auxiliary air control (AAC) valve

15 The auxiliary air control (AAC) valve is mounted onto the front of the throttle body. Prior to removal, disconnect the battery negative terminal.

16 Trace the wiring back from the injector, and disconnect it at the wiring connector.

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

18 If the valve is to be renewed, it will be necessary to free its wiring from the wiring connector as described in paragraph 7.

19 Alternatively, if it is not wished to disturb the wiring connector, the valve can be removed complete with the fast idle control device (FICD) solenoid valve and fuel injector. Refer to the relevant sub-headings of this Section for further information.

20 If necessary, with the valve removed, undo the retaining screws, and separate the two halves of the valve. Check that the valve plunger is free to move easily, and returns quickly under spring pressure. If not, the valve assembly must be renewed.

21 Refitting is the reverse of removal using a new gasket.

Throttle potentiometer

22 The throttle potentiometer 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). Note that access to the throttle potentiometer is greatly improved if the air cleaner housing is removed (see Section 2).

23 Disconnect the wiring connector from the throttle potentiometer.

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

25 Slacken and remove the two retaining screws, then remove the retaining plate and potentiometer.

26 On refitting, offer up the potentiometer, making sure its lever is correctly positioned on the top of the throttle valve spindle lever.

27 Install the retaining plate, then align the marks made prior to removal, and lightly tighten the retaining screws. Adjust the potentiometer as follows.

28 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.

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

30 Connect the battery and, where necessary, refit the air cleaner housing.

Airflow meter

31 The airflow meter is mounted onto the rear of the throttle body. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual). Note that access to the airflow meter is greatly improved if the air cleaner housing is removed (see Section 2).

valve. When the engine is cold, the wax capsule in the valve (which is fitted to the throttle body), 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. In addition to this, there is also a fast idle control device (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.

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 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 injector and 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

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

Removal

1 The pump is removed as an assembly along with the fuel gauge sender unit. Remove the sender unit, and separate it from the fuel pump as described in Section 9.

2 If necessary, unclip the filter element from the base of the fuel pump, then release the retaining clips, and separate the fuel pump from its plastic covers.

3 Wash the pump filter in a high flash-point solvent. Examine the filter for signs of clogging or splitting, and renew if necessary.

Refitting

4 Where necessary, reassemble the pump and covers, and refit the filter.

5 Ensure that the covers are clipped securely onto the pump, then join the pump to the sender unit and install the assembly as described in Section 9.

9 Fuel gauge sender unit - removal and refitting

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

Removal

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

2 To gain access to the sender unit, remove the rear seat cushion as described in Chapter 11.

3 Undo the retaining screws, and lift up the access cover to expose the sender unit.

4 Disconnect the wiring connector(s) from the fuel gauge sender unit, and tape the connector to the vehicle body to prevent it disappearing behind the tank.

5 Depressurise the fuel system as described in Section 7. Mark the hoses for identification purposes, then slacken the feed and return hose retaining clips. Disconnect both hoses from the top of the sender unit, and plug the hose ends.

6 Note the correct fitted position of the alignment mark on the sender unit (the arrow should be pointing towards the front of the vehicle). If no alignment mark exists, make one.

7 On models where the sender unit is retained by a large ring, unscrew the locking ring and remove it from the tank. This is best accomplished by using a screwdriver on the raised ribs of the locking ring. Carefully tap the screwdriver to turn the ring anti-clockwise until it can be unscrewed by hand.

8 On models where the sender unit is bolted to the tank, slacken and remove all the retaining bolts and washers.

9 On all models, carefully lift the sender unit from the top of the fuel tank, taking great care not to bend the sender unit float arm, or to spill fuel onto the interior of the vehicle. As the sender unit is being removed, disconnect the pump wiring connector from its base; reach into the tank, and depress the retaining clip to release the fuel pump from the base of the tank. The fuel pump and sender unit can then be removed as an assembly.

10 Recover the rubber sealing ring and discard it; a new one must be used on refitting.

11 Slacken the retaining clip, then disconnect the fuel pump hose from the underside of the sender unit, and separate the pump and sender unit.

12 Wash the pump filter in a high flash-point solvent. Examine the filter for signs of clogging or splitting, and renew if necessary.

Refitting

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

a) Reassemble the fuel pump and sender unit, ensuring that the hoses are correctly reconnected to their original locations, and are securely held by their retaining clips.

b) Fit a new rubber sealing ring to the fuel tank.

c) Ensure that the fuel pump is clipped securely into position before seating the sender unit in the tank.

d) Where the unit is retained by a locking ring, align the sender unit arrow with the mark on the tank, and securely tighten the locking ring.

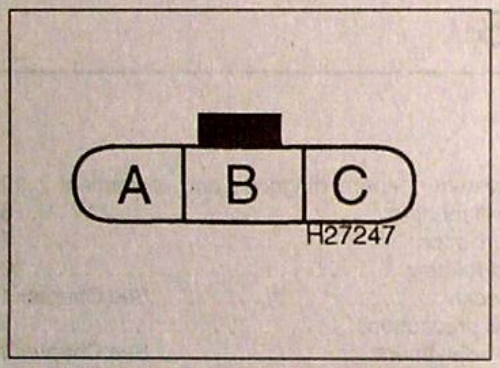
e) Where the unit is retained by bolts, align the marks made on removal, and securely tighten all the bolts.

f) Ensure that the fuel pump is clipped securely in position before seating the sender unit in the tank.

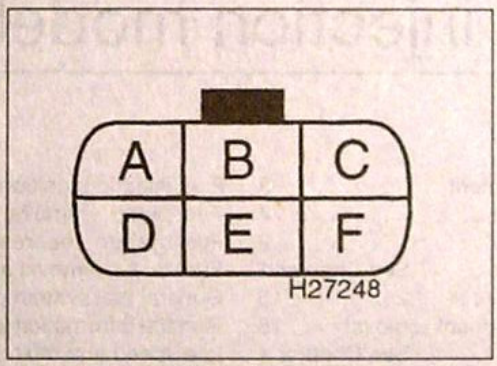
Fuel system component test data

Fuel pump resistance (at fuel gauge sender unit connection)	0.7 ohms
Throttle potentiometer resistances **(see illustration SPEC 1)**:	
Meter connected between terminals A and B:	
Throttle valve closed	1 kilohm
Throttle valve partially open	1 to 9 kilohms
Throttle valve fully open	9 kilohms
Fuel injector resistance **(see illustration SPEC 2)**:	
Meter connected between terminals A and D	1 to 2 ohms
Auxiliary air control (AAC) valve resistance **(see illustration SPEC 2)**:	
Meter connected between terminals B and E	10 ohms
Fast idle control (FICD) solenoid valve **(see illustration SPEC 2)**:	
Apply 12 volts across terminals C (+ supply) and F (- supply)	Solenoid should click, indicating correct operation
Knock sensor **(see illustration SPEC 3)**:	
Meter connected between terminal A and a suitable earth	Continuity should exist (meter must be able to read more than 10 megohms)
Mixture heater	Continuity should exist between heater terminals
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 kilohms
At 80°C (176°F)	0.30 to 0.33 kilohms

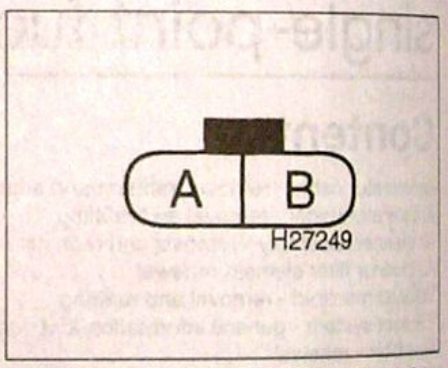
Note: *All resistance readings given are approximate values, which should be used as a guide only. Before condemning a component as faulty, have your findings confirmed by a Nissan dealer.*



SPEC 1 Throttle potentiometer wiring connector



SPEC 2 Throttle body wiring connector



SPEC 3 Knock sensor wiring connector

Recommended fuel

Models without a catalytic converter (non-catalyst models)	95 RON unleaded or 97 RON leaded
Models with a catalytic converter (catalyst models)	95 RON unleaded. Leaded fuel must **not** be used

Torque wrench settings

	Nm	lbf ft
Dashpot retaining nut	29	21
Exhaust manifold nuts and bolts	43	32
Exhaust system fasteners:		
Catalytic converter-to-tailpipe bolts	49	36
Front pipe mounting bolt	23	17
Front pipe-to-intermediate pipe/catalytic converter nuts	49	36
Front pipe-to-manifold nut	45	33
Intermediate pipe-to-tailpipe bolts	49	36
Inlet manifold nuts and bolts	20	15
Knock sensor bolt	24	18
Throttle body retaining bolts:		
Stage 1	10	7
Stage 2	20	15