






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

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## Degrees of difficulty

<b>Easy</b> , suitable for novice with little experience		<b>Fairly easy</b> , suitable for beginner with some experience		<b>Fairly difficult</b> , suitable for competent DIY mechanic		<b>Difficult</b> , suitable for experienced DIY mechanic		<b>Very difficult</b> , suitable for expert DIY or professional	
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## Specifications

### System type

1761 cc (LFZ engine) models. . . . .	Bosch Motronic MP5.1
1905 cc non-catalyst (D6E engine) models. . . . .	Bosch Motronic MP3.1
1905 cc catalyst (DKZ engine) models. . . . .	Bosch Motronic M1.3
1998 cc 8-valve (RFX engine) models. . . . .	Magneti Marelli 8P.20
1998 cc 16-valve (RFY engine) models. . . . .	Bosch Motronic MP3.2

**Note:** Refer to Chapter 2B for further information on engine code identification

### Fuel system data

Fuel pump type. . . . .	Electric, immersed in tank
Fuel pump regulated constant pressure (at specified idle speed):	
Bosch Motronic systems. . . . .	2.5 to 3.0 bars (depending on system)
Magneti Marelli system. . . . .	2.0 bars
Specified idle speed:	
1905 cc models. . . . .	850 ± 50 rpm (adjustable via screw on the throttle housing)
All other models. . . . .	850 ± 50 rpm (not adjustable - controlled by ECU)
Idle mixture CO content:	
1905 cc non-catalyst (D6E engine) models. . . . .	1.0 to 2.0 % (adjustable via screw on mixture adjustment - potentiometer)
1905 cc catalyst (DKZ engine) models, and all other models. . . . .	Less than 1.0 % (not adjustable - controlled by ECU)

### Recommended fuel

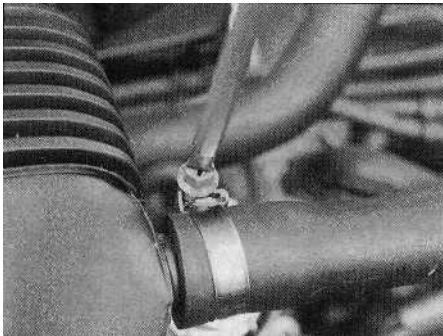
Minimum octane rating:	
1905 cc non-catalyst (D6E engine) models. . . . .	95 RON unleaded (UK unleaded premium) or 97 RON leaded (UK "4-star")
1905 cc catalyst (DKZ engine) models, and all other models. . . . .	95 RON unleaded (UK unleaded premium). Leaded fuel must <b>not</b> be used

Torque wrench settings	Nm	ibf ft
Inlet manifold nuts. . . . .	22	16
Exhaust manifold nuts. . . . .	22	16
Exhaust system fasteners:		
Front pipe-to-manifold nuts. . . . .	10	7
Clamping ring nut(s):		
Clamps secured with one bolt. . . . .	25	18
Clamps secured with two bolts. . . . .	20	15

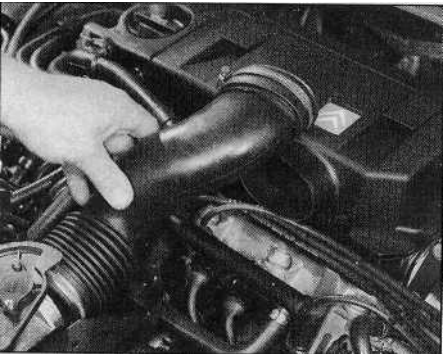
1 General information and precautions

The fuel supply system consists of a fuel tank (which is 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. The fuel filter incorporated in the feed line from the pump to the fuel rail ensures that the fuel supplied to the injectors is clean.


Refer to Section 6 for further information on the operation of each fuel injection system, and to Section 21 for information on the exhaust system. Throughout this Section, it is also occasionally necessary to identify vehicles by their engine codes rather than by engine capacity alone. Refer to the relevant Part of Chapter 2 for further information on engine code identification.



2.1a On 1761 cc and 1998 cc 8-valve models, slacken the clips and disconnect the hose(s) from the air cleaner-to-throttle body duct...



2.1c ... and remove the duct from the engine compartment

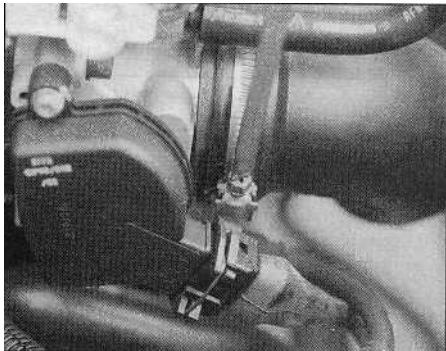
 **Warning:** Many of the procedures in this Chapter require the removal of fuel lines and connections, which may result in some fuel spillage. Before carrying out any operation on the fuel system, refer to the precautions given in "Safety first!" at the beginning of this manual, and follow them implicitly. 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. When disconnecting any fuel line, first depressurise the fuel system as described in Section 7.

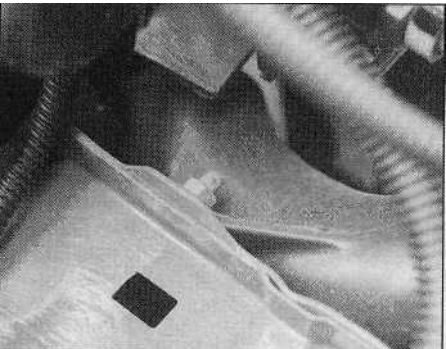
2 Air cleaner assembly and intake ducts - removal and refitting

Removal  
1761 cc and 1998 cc 8-valve models

1 Slacken the retaining clip, and disconnect the breather hose(s) from the side of the air



2.1b ... then slacken the duct retaining clips...



2.3 Intake duct front retaining nut

cleaner-to-throttle housing duct. Slacken the duct retaining clips, then disconnect it from the air cleaner and throttle housing, and remove it from the vehicle (see illustrations). Where necessary, recover the rubber sealing ring from the throttle housing.

2 Release the two retaining clips, then slacken and remove the two retaining screws from the front of the cylinder head cover, and remove the air cleaner element cover from the head. Withdraw the air cleaner element.

3 To remove the intake duct, undo the bolt securing the rear section of the duct to the end of the cylinder head, then slacken the retaining clip and disconnect the duct from the cylinder head cover. Undo the nut securing the front of the duct to the left-hand wing valance, and manoeuvre the duct out of the engine compartment (see illustration).

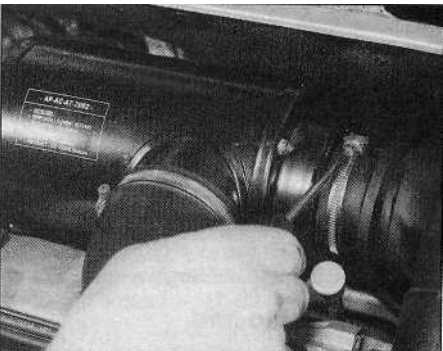
1905 cc models

4 Slacken the retaining clips, and disconnect the intake duct and throttle housing duct from the air cleaner (see illustration).

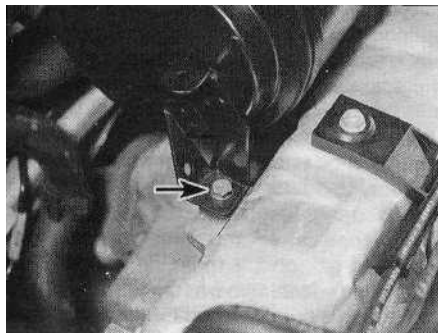
5 Slacken and remove the bolt securing the air cleaner right-hand mounting bracket to the rear of the cylinder head, and the two nuts securing the housing to its left-hand mounting bracket. Lift the air cleaner housing out of the engine compartment (see illustrations).

6 To remove the intake duct, undo the nut(s) securing the front of the duct to the left-hand wing valance, then undo the nut securing the duct to its mounting bracket (where fitted). Disconnect the duct from the air cleaner housing, if not already having done so, and remove it from the vehicle.

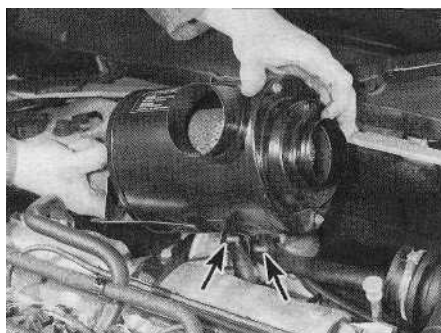
7 On models without a catalytic converter (Bosch Motronic MP3.1 system), to remove the air cleaner-to-throttle housing duct, first



2.4 On 1905 cc models, slacken the retaining clips and disconnect the intake and throttle housing ducts from the air cleaner...



**2.5a ... then undo the retaining bolt (arrowed)...**



**2.5b ... and the two retaining nuts (locations arrowed), then remove the air cleaner housing**

disconnect the wiring connector from the intake air temperature sensor. Slacken the retaining clip, and disconnect the vacuum pipe from the front of the duct. Slacken the clips, disconnect the duct from the air cleaner and throttle housings, and remove the duct. Recover the rubber sealing ring from the throttle housing.

**8** On models with a catalytic converter (Bosch Motronic M1.3 system), the air cleaner-to-throttle housing duct is in two sections, with the airflow meter situated in the middle. Each section can be removed once its retaining clips have been slackened, noting that, in the case of the front duct section, it will also be necessary to disconnect the vacuum pipe.

#### 1998 cc 16-valve models

**9** Slacken the retaining clip, and disconnect the air cleaner-to-throttle housing duct from the throttle housing. Recover the rubber sealing ring. Release the retaining clips, and disconnect the breather hose(s) from the duct.

**10** Apply the handbrake, then jack up the front of the vehicle and support it on axle stands.

**11** From underneath the vehicle, slacken and remove the retaining nuts securing the resonator chamber to the side of the air cleaner housing, and remove the chamber.

**12** Undo the air cleaner housing retaining bolt(s), and remove the housing and duct assembly from underneath the vehicle.

#### Refitting

**13** Refitting is a reversal of the 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 models with automatic transmission, once the accelerator cable is correctly adjusted, check the kickdown cable adjustment as described in Chapter 7B.

#### 4 Accelerator pedal - removal and refitting

Refer to Chapter 4A, Section 8.

#### 5 Unleaded petrol - general information and usage

**Note:** The information given in this Chapter is correct at the time of writing. If updated information is thought to be required, check with a Citroen dealer. If travelling abroad, consult one of the motoring organisations (or a similar authority) for advice on the fuel available.

**1** The fuel recommended by Citroen is given in the Specifications Section of this Chapter, followed by the equivalent petrol currently on sale in the UK.

**2** All Citroen ZX multi-point injection models are designed to run on fuel with a minimum octane rating of 95 (RON). With the exception of those 1905 cc models without a catalytic converter (Bosch Motronic MP3.1 system), all models have a catalytic converter, and so must be run on unleaded fuel only. Under no circumstances should leaded fuel (UK "4-star") be used, as this may damage the converter. However, 1905 cc models without a catalytic converter can use either unleaded or leaded fuel without modification or risk of damage.

**3** Super unleaded petrol (98 octane) can also be used in all models if wished, though there is no advantage in doing so.

#### 6 Fuel injection systems - general information

##### Bosch Motronic MP5.1 system - 1761 cc models

**1** The Bosch Motronic engine management (fuel injection/ignition) system is fitted to all 1761 cc models. The system incorporates a closed-loop catalytic converter and an evaporative emission control system, and complies with the very latest emission control standards. Refer to Chapter 5 for information on the ignition side of the system; the fuel side

of the system operates as follows.

**2** The fuel pump (which is immersed in the fuel tank) supplies fuel from the tank to the fuel rail, via a filter mounted underneath the rear of the vehicle. Fuel supply pressure is controlled by the pressure regulator in the fuel rail. When the optimum operating pressure of the fuel system is exceeded, the regulator allows excess fuel to return to the tank.

**3** The electrical control system consists of the ECU, along with the following sensors:

- (a) *Throttle potentiometer - informs the ECU of the throttle position, and the rate of throttle opening/closing.*
- (b) *Coolant temperature sensor - informs the ECU of engine temperature.*
- (c) *Intake air temperature sensor - informs the ECU of the temperature of the air passing through the throttle housing.*
- (d) *Lambda sensor - informs the ECU of the oxygen content of the exhaust gases (explained in greater detail in Part D of this Chapter).*
- (e) *Crankshaft sensor - informs the ECU of the crankshaft position and speed of rotation.*
- (f) *Manifold Absolute Pressure (MAP) sensor - informs the ECU of the load on the engine (expressed in terms of inlet manifold vacuum).*
- (g) *Vehicle speed sensor - informs the ECU of the vehicle speed.*

**4** All the above signals are analysed by the ECU, and it selects the fuelling response appropriate to those values. The ECU controls the fuel injectors (varying the pulse width - the length of time the injectors are held open - to provide a richer or weaker mixture, as appropriate). The mixture is constantly varied by the ECU, to provide the best setting for cranking, starting (with either a hot or cold engine), warm-up, idle, cruising, and acceleration.

**5** The ECU also has full control over the engine idle speed, via an auxiliary air valve which bypasses the throttle valve. When the throttle valve is closed, the ECU controls the opening of the valve, which in turn regulates the amount of air entering the manifold, and so controls the idle speed.

**6** The ECU also controls the exhaust and evaporative emission control systems, which are described in detail in Part D of this Chapter.

**7** An electric heating element is fitted to the throttle housing; the heater is supplied with current by the ECU, and warms the throttle housing on cold starts to prevent possible icing of the throttle valve.

**8** If there is an abnormality in any of the readings obtained from either the coolant temperature sensor, the intake air temperature sensor or the lambda sensor, the ECU enters its back-up mode. In this event, 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 ECU enters this back-up mode, the warning light on the

instrument panel will come on, and the relevant fault code will be stored in the ECU memory.

9 If the warning light comes on, the vehicle should be taken to a Citroen dealer at the earliest opportunity. A complete test of the engine management system can then be carried out, using a special electronic diagnostic test unit which is simply plugged into the system's diagnostic connector.

### **Bosch Motronic MP3.1 system - 1905 cc models without a catalytic converter**

10 The Bosch Motronic MP3.1 engine management (fuel injection/ignition) system is fitted to all 1905 cc models without a catalytic converter (D6E engine). Refer to Chapter 5 for information on the ignition side of the system.

11 The MP3.1 system is very similar in operation to the MP5.1 system described above, noting the following differences:

- (a) *On the MP3.1 system, there is no lambda (oxygen) sensor or vehicle speed sensor. The idle mixture (exhaust gas CO content) can be manually adjusted via the mixture adjustment potentiometer.*
- (b) *The ECU has no control over the engine idle speed; the idle speed is manually set using a screw on the throttle housing. An auxiliary air valve (not to be confused with the idle speed control valve on the MP5.1 system) is incorporated in the system, but this is used purely as an additional air supply on cold starts and during the warm-up period.*
- (c) *There is no heating element fitted to the throttle housing. The engine coolant is circulated around the housing, to warm the housing after cold starts.*
- (d) *There is no evaporative emission control system.*

### **Bosch Motronic M1.3 system - 1905 cc models with a catalytic converter**

12 The Bosch Motronic M1.3 engine management (fuel injection/ignition) system is fitted to all 1905 cc models with a catalytic converter (DKZ engine). Refer to Chapter 5 for information on the ignition side of the system.

13 The M1.3 system is very similar in operation to the MP5.1 system described above, noting the following differences:

- (a) *On the M1.3 system, there is no vehicle speed sensor or MAP sensor. In place of the MAP sensor, an airflow meter is fitted to the throttle housing intake duct, to inform the ECU of the volume of air passing through the duct and entering the throttle housing.*
- (b) *The ECU has no control over the engine idle speed; the idle speed is manually set using a screw on the throttle housing. An auxiliary air valve (not to be confused with the idle speed control valve on the MP5.1 system) is incorporated in the system, but this is used purely as an additional air*

*supply on cold starts and during the warm-up period.*

- (c) *There is no heating element fitted to the throttle housing. The engine coolant is circulated around the housing, to warm the housing after cold starts.*

### **Bosch Motronic MP3.2 system - 1998 cc 16-valve models**

14 The Bosch Motronic MP3.2 engine management (fuel injection/ignition) system is fitted to all 1998 cc 16-valve models. Refer to Chapter 5 for information on the ignition side of the system.

15 The MP3.2 system is very similar in operation to the MP5.1 system described above, noting that, in addition to the sensors listed, a camshaft position sensor is incorporated into the system. The camshaft position sensor is fitted to the left-hand end of the cylinder head, directly over the top of the inlet camshaft, and informs the ECU when No 1 cylinder is at Top Dead Centre (TDC).

16 The MP3.2 system differs from all the other fuel injection systems in that it is a "sequential" system. This means that each of the four fuel injectors is triggered individually, just before the inlet valve on that particular cylinder opens. This is in contrast to all other systems, on which all four injectors are triggered simultaneously; this happens once for every revolution of the crankshaft.

### **Magneti Marelli 8P.20 system - 1998 cc 8-valve models**

17 The Magneti Marelli 8P.20 engine management (fuel injection/ignition) system is fitted to all 1998 cc 8-valve models. Refer to Chapter 5 for information on the ignition side of the system.

18 The system is very similar in operation to the Bosch MP5.1 system described above, apart from the idle speed control system.

19 On the Magneti Marelli system, the idle speed is controlled by the ECU via a stepper motor fitted to the throttle housing. The motor has a pushrod controlling the opening of an air passage which bypasses the throttle valve. When the throttle valve is closed, the ECU controls the movement of the motor pushrod, which regulates the amount of air which flows through the throttle housing passage, so controlling the idle speed. The bypass passage is also used as an additional air supply during cold starting.

## **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.



1 The fuel system referred to in this Section is defined as the tank-mounted fuel pump, the fuel filter, the fuel injectors, the fuel rail 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 it must be relieved in a controlled fashion when any of these components are disturbed for servicing work.

- 2 Disconnect the battery negative terminal.
- 3 Place a container beneath the connection/union to be disconnected, and have a large rag ready to soak up any escaping fuel not being caught by the container.
- 4 Slowly loosen the connection or union nut to avoid a sudden release of pressure, and position the rag around the connection, to catch any fuel spray which may be expelled. Once the pressure is released, disconnect the fuel line. Plug the pipe ends, to minimise fuel loss and prevent the entry of dirt into the fuel system.

## **8 Fuel pump - removal and refitting**



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

### **Removal**

- 1 Disconnect the battery negative lead.
- 2 For access to the fuel pump, tilt or remove the rear seats, as described in Chapter 11.
- 3 Using a screwdriver, carefully prise the plastic access cover from the floor, to expose the fuel pump (located under the right-hand cover).
- 4 Disconnect the wiring connector from the fuel pump, and tape the connector to the vehicle body, to prevent it disappearing behind the tank.
- 5 Mark the hoses for identification purposes, then slacken the feed and return hose retaining clips. Where the original crimped-type Citroen hose clips are fitted, cut the clips and discard them; use standard worm-drive hose clips on refitting. Disconnect both hoses from the top of the pump, and plug the hose ends.
- 6 Noting the alignment marks on the tank, pump cover and the locking ring, unscrew the ring and remove it from the tank. This is best accomplished by using a screwdriver on the raised ribs of the locking ring, as follows. Carefully tap the screwdriver to turn the ring anti-clockwise until it can be unscrewed by hand.
- 7 Displace the pump cover, then reach into the tank and unclip the pump from the tank base. Carefully lift the fuel pump assembly out of the fuel tank, taking care not to damage the filter, or to spill fuel onto the interior of the vehicle.

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

**8** Note that the fuel pump is only available as a complete assembly - no components are available separately.

### Refitting

**9** Ensure the fuel pump pick-up filter is clean and free of debris. Fit the new sealing ring to the top of the fuel tank.

**10** Carefully manoeuvre the pump assembly into the fuel tank, and clip it into position in the base of the tank.

**11** Align the mark on the fuel pump cover with the centre of the three alignment marks on the fuel tank, then refit the locking ring. Securely tighten the locking ring, and check that the locking ring, pump cover and tank marks are all correctly aligned.

**12** Reconnect the feed and return hoses to the top of the fuel pump, using the marks made on removal to ensure they correctly reconnect, and securely tighten their retaining clips.

**13** Reconnect the pump wiring connector.

**14** Reconnect the battery negative terminal, and start the engine. Check the fuel pump feed and return hoses unions for signs of leakage.

**15** If all is well, refit the plastic access cover, and tilt or refit the rear seat as described in Chapter 11 (as applicable).

### 9 Fuel gauge sender unit - removal and refitting

Refer to Chapter 4A, Section 5, noting that there are no fuel pipe connections to the sender unit.

### 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 (see Section 7). It will also be necessary to disconnect the wiring connector from the fuel pump before lowering the tank out of position (see Section 8).

## 11 Fuel injection system - testing and adjustment

### Testing

**1** If a fault appears in the fuel injection system, first ensure that all the system wiring connectors are securely connected and free of corrosion. Ensure that the fault is not due to poor maintenance; ie, check that the air cleaner filter element is clean, the spark plugs are in good condition and correctly gapped, the cylinder compression pressures are correct, the ignition timing is correct, and that the engine breather hoses are clear and undamaged, referring to Chapters 1, 2 and 5 for further information.

**2** If these checks fail to reveal the cause of the problem, the vehicle should be taken to a suitably-equipped Citroen dealer for testing. A wiring block connector is incorporated in the engine management circuit, into which a special electronic diagnostic tester can be plugged; the connector is located inside either the engine compartment junction box, or directly in front of the box (**see illustration**). The tester will locate the fault quickly and simply, alleviating the need to test all the system components individually, which is a time-consuming operation that carries a risk of damaging the ECU.

### Adjustment

**3** On 1905 cc models without a catalytic converter (Motronic MP3.1 system), both the idle speed and idle mixture (exhaust gas CO level) are adjustable. On 1905 cc models with a catalytic converter (Motronic M1.3 system), only the idle speed is adjustable (mixture adjustment is not possible). Refer to Chapter 1 for information on adjustment procedures.

**4** On all other models, experienced home mechanics with a considerable amount of skill and equipment (including a tachometer and an accurately calibrated exhaust gas analyser) may be able to check the exhaust CO level and the idle speed. However, if these are found to be in need of adjustment, the car *must* be taken to a suitably-equipped Citroen dealer for further testing. Neither the mixture

adjustment (exhaust gas CO level) nor the idle speed are adjustable, and should either be incorrect, a fault must be present in the fuel injection system.

## 12 Throttle housing - removal and refitting

### Removal

**1** Disconnect the battery negative terminal.

#### 1761 cc and 1998 cc 8-valve models

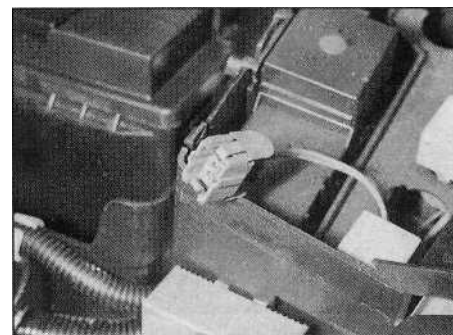
**2** Remove the air cleaner-to-throttle housing duct as described in Section 2.

**3** Disconnect the accelerator inner cable from the throttle cam, then withdraw the outer cable from the mounting bracket, along with its flat washer and spring clip (**see illustration**).

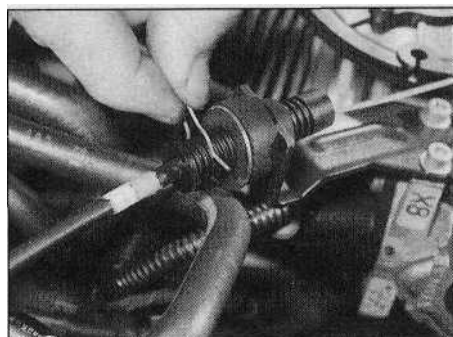
**4** Depress the retaining clips, and disconnect the wiring connectors from the throttle potentiometer, the electric heating element, the air temperature sensor and idle control stepper motor (as applicable) (**see illustration**).

**5** Release the retaining clips (where fitted), and disconnect all the relevant vacuum and breather hoses from the throttle housing (**see illustration**). Make identification marks on the hoses, to ensure they are connected correctly on refitting.

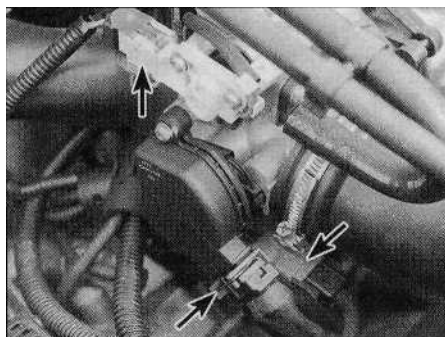
**6** Slacken and remove the three retaining screws, and remove the throttle housing from



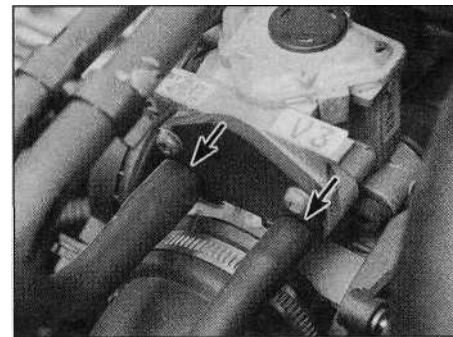
**11.2 Diagnostic wiring connector located in the engine compartment junction box**



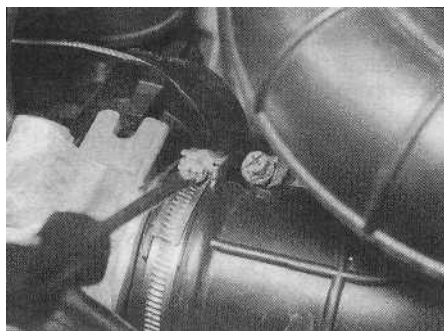
**12.3 Disconnecting the accelerator cable - 1998 cc 8-valve model**



**12.4 Throttle housing wiring connectors (arrowed) - 1761 cc model**



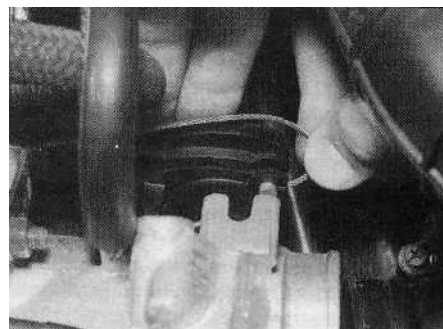
**12.5 Throttle housing vacuum hoses (arrowed) - 1761 cc model**



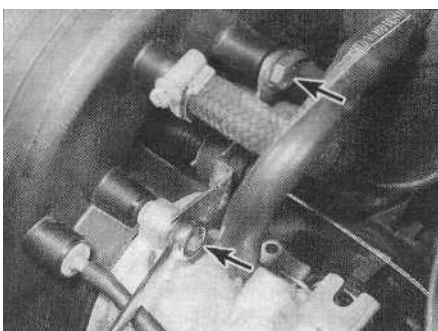
**12.7a** On 1905 cc models, slacken the retaining clip ...



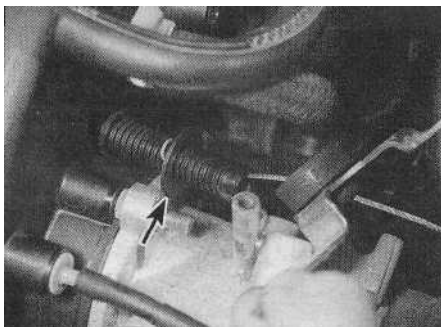
**12.7b** ... then disconnect the duct and recover the rubber sealing ring



**12.8a** Disconnect the accelerator cable from the throttle cam ...



**12.8b** ... then undo the retaining nut and bolt (arrowed)...



**12.8c** ... and remove the bracket. Remove the flat washer (arrowed) for safekeeping

the inlet manifold. Remove the O-ring from the manifold, and discard it - a new one must be used on refitting.

#### 1905 cc models

**7** Slacken the retaining clip, disconnect the intake duct from the end of the throttle housing, and recover the rubber sealing ring (where fitted) (see illustrations).

**8** Disconnect the accelerator inner cable from the throttle cam. Slacken and remove the bolt and nut securing the outer cable mounting bracket to the manifold, then withdraw the bracket. Remove the flat washer from the end of the cable for safekeeping (see illustrations). On models with automatic transmission, free the kickdown cable from the throttle cam.

**9** Depress the retaining clip, and disconnect the wiring connector from the throttle potentiometer (see illustration).

**10** Relieve any pressure in the cooling system by unscrewing the filler cap. Slacken the retaining clips, and disconnect the two coolant hoses from the base of the throttle housing. Plug the hose ends, working quickly to minimise coolant loss.

**11** Release the retaining clips (where fitted), and disconnect all the relevant vacuum and breather hose(s) from the throttle housing (see illustration). Make identification marks on the hoses, to ensure they are correctly reconnected on refitting.

**12** Undo the remaining two retaining nuts,

and remove the throttle housing from the manifold. On early models, it will also be necessary to remove the nut and bolt securing the base of the housing to its support bracket (see illustration). Remove the O-ring from the manifold, and discard it - a new one must be used on refitting.

#### 1998 cc 16-valve models

**13** Slacken the retaining clip, disconnect the intake duct from the end of the throttle housing, and recover the rubber sealing ring (where fitted).

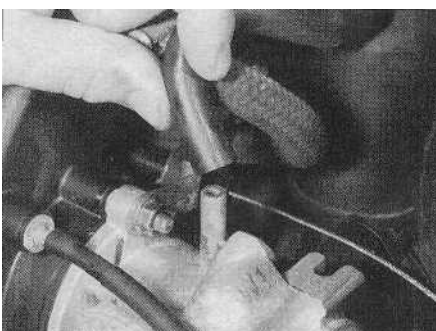
**14** Disconnect the accelerator inner cable from the throttle cam, then withdraw the outer cable from the mounting bracket, along with its flat washer and spring clip.

**15** Depress the retaining clips, and disconnect the wiring connectors from the throttle potentiometer, the electric heating element, and the air temperature sensor.

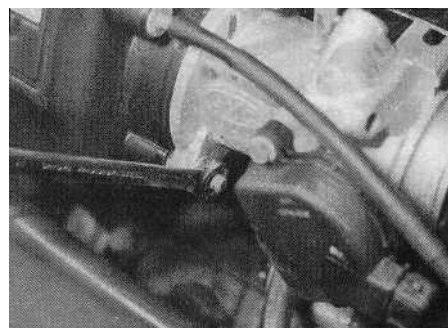
**16** Slacken the retaining clips (where fitted), and disconnect all the relevant vacuum and breather hoses from the throttle housing. Make identification marks on the hoses, to ensure they are connected correctly on refitting.

**17** Slacken the nut securing the throttle housing lower mounting bracket to the transmission housing.

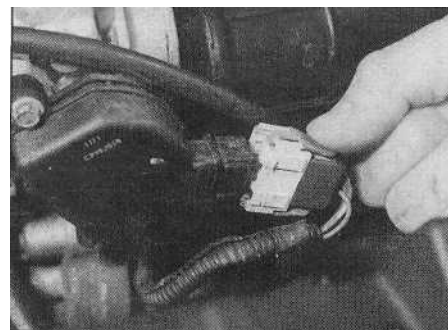
**18** Slacken and remove the housing retaining screws, then remove the throttle housing from the inlet manifold. Remove the O-ring from the manifold, and discard it - a new one must be used on refitting.



**12.11** ... and the breather hose from the throttle housing

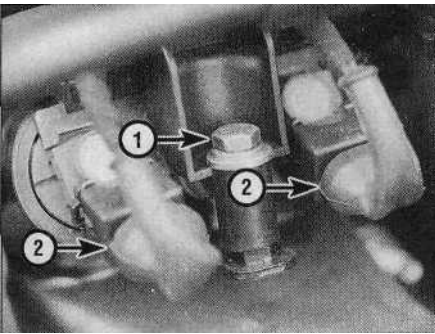


**12.12** Undo the two remaining nuts, and remove the throttle housing

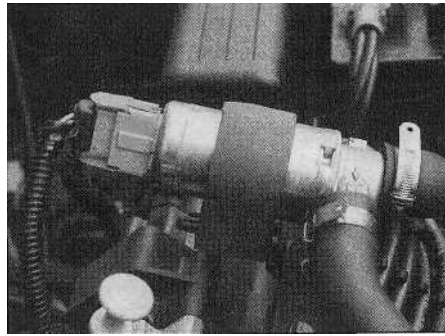


**12.9** Disconnect the throttle potentiometer wiring connector ...

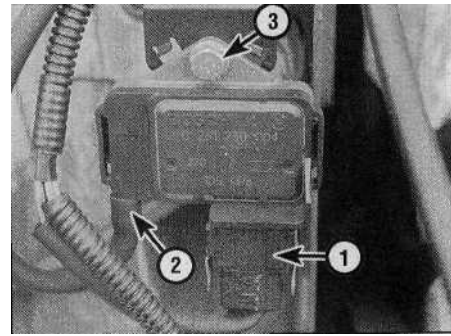




**13.13 Wiring tray retaining bolt (1) and injector wiring connectors (2) - 1761 cc model**



**13.17 Idle speed auxiliary air valve - 1761 cc model**



**13.22 MAP sensor wiring connector (1), vacuum hose (2) and retaining nut (3) - 1761 cc model**

## Refitting

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

- Fit a new O-ring to the manifold, then refit the throttle housing and securely tighten its retaining nuts or screws (as applicable).
- Ensure all hoses are correctly reconnected and, where necessary, are securely held in position by the retaining clips.
- Ensure all wiring is correctly routed, and that the connectors are securely reconnected.
- On completion, adjust the accelerator cable as described in Section 3.
- On 1905 cc models, check the coolant level and top up if necessary (Chapter 1).

## 13 Bosch Motronic MP5.1 system components - removal and refitting



**Note:** Check parts availability with a Citroen dealer prior to removing individual components. At the time of writing, certain components are only available as part of a larger assembly - eg the throttle potentiometer is only available as part of the throttle housing assembly.

## Fuel injectors

**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.

- Disconnect the battery negative terminal.
- Remove the air cleaner-to-throttle housing duct as described in Section 2.
- Undo the two bolts securing the wiring tray to the top of the manifold, and position the tray clear of the injectors (**see illustration**).
- Depress the retaining clip(s), and disconnect the wiring connector(s) from the injector(s).
- Slacken the retaining screw, and remove the injector retaining plate; Nos 1 and 2 injectors are retained by one plate, Nos 3 and 4 by another.

**6** Place a wad of clean rag over the injector, to catch any fuel spray which may be released, then carefully ease the relevant injector(s) out of the manifold. Remove the O-ring from the end of each disturbed injector, and discard it - these must be renewed whenever they are disturbed.

**7** On refitting the injectors, fit a new O-ring to the end of each injector. Apply a smear of engine oil to the O-ring, to aid installation, then ease the injector(s) back into position in the manifold.

**8** Ensure each injector connector is pointing upwards, then refit the retaining plate and securely tighten its retaining screw. Reconnect the wiring connector(s) to the injector(s).

**9** Refit the wiring tray to the top of the manifold, and securely tighten its retaining bolts.

**10** Refit the air cleaner-to-throttle body duct, and reconnect the battery. Start the engine, and check the injectors for signs of leakage.

## Fuel pressure regulator

**11** Refer to Section 14.

## Throttle potentiometer

**12** The throttle potentiometer is fitted to the right-hand side of the throttle housing. To remove the potentiometer, first disconnect the battery negative terminal.

**13** Depress the retaining clip, and disconnect the potentiometer wiring connector.

**14** Slacken and remove the two retaining screws, and remove the potentiometer from the throttle housing.

**15** Refitting is the reverse of removal, ensuring that the potentiometer is correctly engaged with the throttle valve spindle.

## Electronic Control Unit (ECU)

**16** Refer to Section 17.

## Idle speed auxiliary air valve

**17** The idle speed auxiliary air valve is mounted on the left-hand end of the cylinder head, directly above the ignition HT coil (**see illustration**). To remove the valve, first disconnect the battery negative terminal.

**18** Depress the retaining clip, and disconnect the wiring connector from the top of the valve.

**19** Slacken the retaining clip(s), and disconnect the two hoses from the valve. Slide the valve rubber retaining clip off its pegs, and remove the valve from the engine compartment.

**20** Refitting is a reverse of the removal sequence, ensuring that the hoses are securely reconnected.

## Manifold absolute pressure (MAP) sensor

**21** The MAP sensor is situated on the right-hand side of the engine compartment, attached to the engine/transmission mounting point. To remove the MAP sensor, first disconnect the battery negative terminal.

**22** Depress the retaining clip, disconnect the wiring connector from the sensor, then disconnect the vacuum hose from the sensor (**see illustration**).

**23** Undo the retaining bolt, and remove the sensor from the engine compartment.

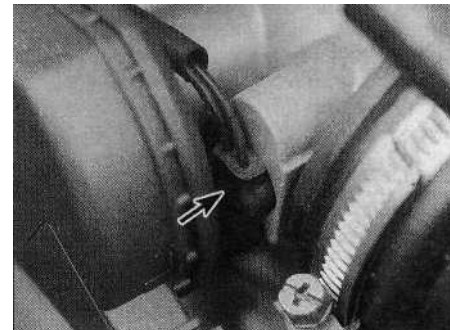
**24** Refitting is a reverse of the removal procedure.

## Coolant temperature sensor

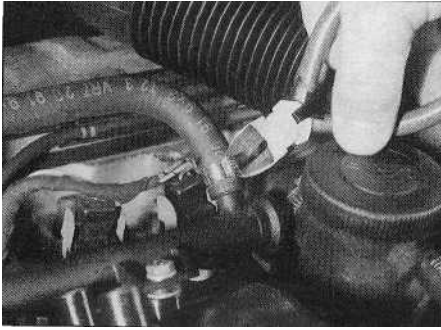
**25** Refer to Chapter 3, Section 6.

## Intake air temperature sensor

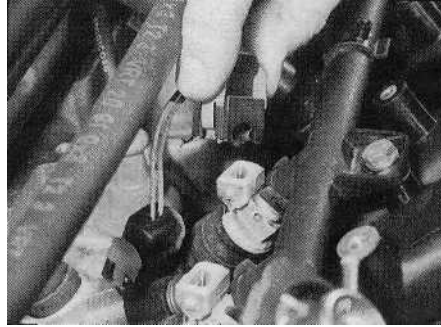
**26** The intake air temperature sensor is located in the throttle housing (**see illustration**).



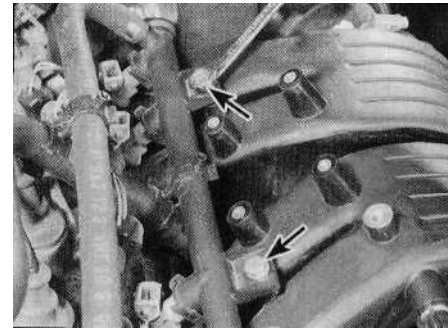
**13.26 On 1761 cc models, the intake air temperature sensor (arrowed) is situated behind the throttle potentiometer**



**14.3** Where original crimped-type Citroen hose clips are fitted, cut them and discard



**14.4** Disconnecting the injector wiring connectors -1905 cc model



**14.5** On 1905 cc models, the fuel rail is retained by two bolts (arrowed)

**27** To remove the sensor, first remove the throttle potentiometer as described in paragraphs 12 to 14.

**28** Depress the retaining clip, and disconnect the wiring connector from the air temperature sensor.

**29** Remove the screw securing the sensor connector to the top of the throttle housing, then carefully ease the sensor out of position and remove it from the throttle housing. Examine the sensor O-ring for signs of damage or deterioration, and renew if necessary.

**30** Refitting is a reversal of the removal procedure, using a new O-ring where necessary, and ensuring that the throttle potentiometer is correctly engaged with the throttle valve spindle.

### Crankshaft sensor

**31** Refer to Section 14.

### Fuel injection system relay unit

**32** Refer to Section 14.

### Throttle housing heating element

**33** Refer to Section 17.

### 14 Bosch Motronik MP3.1 system components - removal and refitting



**Note:** Check parts availability with a Citroen dealer prior to removing individual components. At the time of writing, certain components are only available as part of a larger assembly - eg the throttle potentiometer is only available as part of the throttle housing assembly.

### Fuel rail and injectors

**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.

**2** Disconnect the vacuum pipe from the fuel pressure regulator.

**3** Bearing in mind the information given in

Section 7, slacken the retaining clips, and disconnect the fuel feed and return hoses from the either end of the fuel rail. Where the original crimped-type Citroen hose clips are still fitted, cut them off and discard them; use standard worm-drive hose clips on refitting (see illustration).

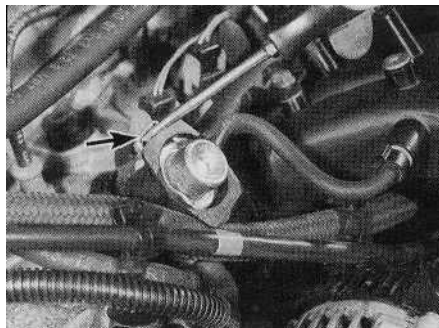
**4** Depress the retaining tangs, and disconnect the wiring connectors from the four injectors (see illustration).

**5** Slacken and remove the two fuel rail retaining bolts, then carefully ease the fuel rail and injector assembly out from the inlet manifold and remove it from the vehicle (see illustration). Remove the O-rings from the end of each injector, and discard them; these must be renewed whenever they are disturbed.

**6** Slide out the retaining clip(s), and remove the relevant injector(s) from the fuel rail. Remove the upper O-ring from each injector as it is removed, and discard it; all O-rings must be renewed once they have been disturbed.

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

- Fit new O-rings to all disturbed injectors.
- Apply a smear of engine oil to the O-rings to aid installation, then ease the injectors and fuel rail into position, ensuring that none of the O-rings are displaced.
- On completion, start the engine and check for fuel leaks.



**14.9** Fuel pressure regulator retaining clip (arrowed) can be prised out of position using a flat-bladed screwdriver

### Fuel pressure regulator

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

**8** Disconnect the vacuum pipe from the regulator.

**9** Place a wad of clean rag over the regulator, to catch any fuel spray which may be released. Remove the retaining clip, and slide the regulator out of the end of the fuel rail (see illustration).

**10** Refitting is a reversal of the removal procedure. Examine the regulator seal for signs of damage or deterioration, and renew if necessary.

### Throttle potentiometer

**11** Disconnect the battery negative terminal.

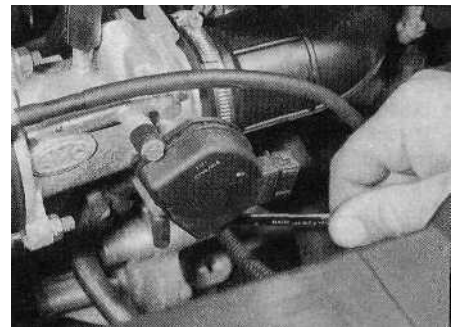
**12** Depress the retaining clip, and disconnect the wiring connector from the throttle potentiometer.

**13** Slacken and remove the two retaining screws, then disengage the potentiometer from the throttle valve spindle and remove it from the vehicle (see illustration).

**14** Refitting is a reverse of the removal procedure, ensuring that the potentiometer is correctly engaged with the throttle valve spindle (see illustration).

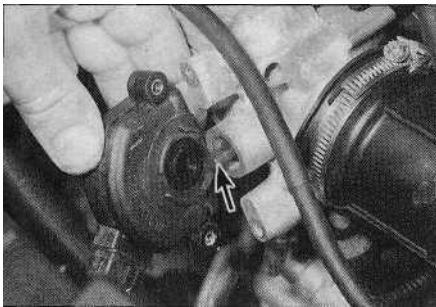
### Electronic Control Unit (ECU)

**15** The ECU is located in the rear left-hand corner of the engine compartment. To remove

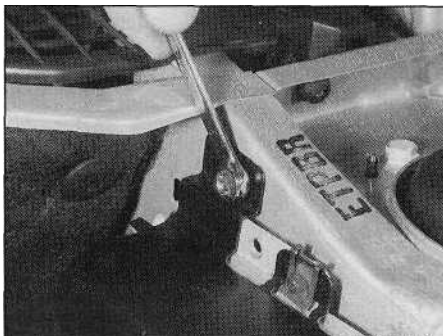


**14.13** Throttle potentiometer is secured to the throttle housing by two screws

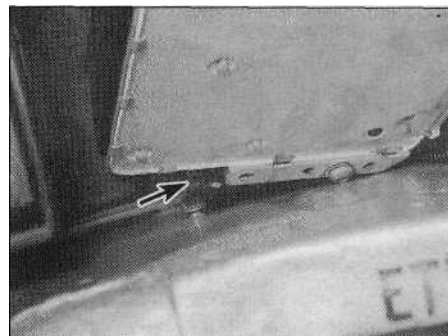




**14.14** On refitting, ensure that the potentiometer is correctly engaged with the throttle valve spindle (arrowed)



**14.17a** Undo the ECU upper retaining bolt...



**14.17b** ... and loosen its lower mounting nut. The lower mounting is slotted to ease removal

the ECU, first disconnect the battery negative terminal.

**16** Depress the retaining clip, and disconnect the wiring connector from the idle mixture adjustment potentiometer.

**17** Slacken and remove the upper bolt securing the ECU mounting bracket to the wing valance, then loosen the lower bolt (there is no need to remove the lower bolt, as the mounting is slotted). Withdraw the bracket and ECU assembly from the engine compartment, disconnecting the wiring connector and vacuum pipe from the ECU as they become accessible (see illustrations).

**18** With the assembly on the bench, undo the bolts securing the ECU to the bracket, and separate the two components.

**19** Refitting is a reversal of the removal procedure, ensuring that the wiring connector and vacuum pipe are securely reconnected.

### Idle speed mixture adjustment potentiometer

**20** The idle speed mixture adjustment potentiometer is situated in the rear left-hand corner of the engine compartment, mounted onto the ECU bracket. To remove it, first disconnect the battery negative terminal.

**21** Depress the retaining tangs and disconnect the wiring connector, then undo the retaining screw and remove the potentiometer from the vehicle (see illustrations).

**22** Refitting is the reverse of removal. On completion, check and, if necessary, adjust

the idle mixture setting (exhaust gas CO level) as described in Chapter 1.

### Auxiliary air valve

**23** The auxiliary air valve is mounted on the left-hand end of the cylinder head, directly beneath the ignition HT coil (see illustration).

**24** To improve access to the valve, remove the ignition HT coil as described in Chapter 5.

**25** Depress the retaining clip, and disconnect the wiring connector from the air valve.

**26** Slacken the retaining clips, and disconnect the vacuum hoses from either end of the auxiliary air valve.

**27** Undo the two retaining bolts, and remove the auxiliary air valve from the engine compartment.

**28** Refitting is a reversal of the removal procedure.

### Manifold absolute pressure (MAP) sensor

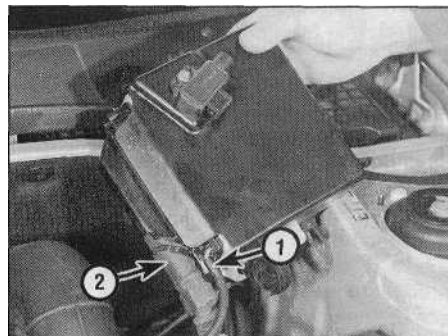
**29** The MAP sensor is an integral part of the electronic control unit (ECU). Refer to paragraphs 15 to 19 for removal and refitting details.

### Coolant temperature sensor

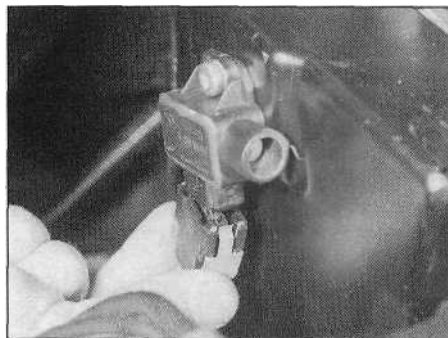
**30** Refer to Chapter 3, Section 6.

### Intake air temperature sensor

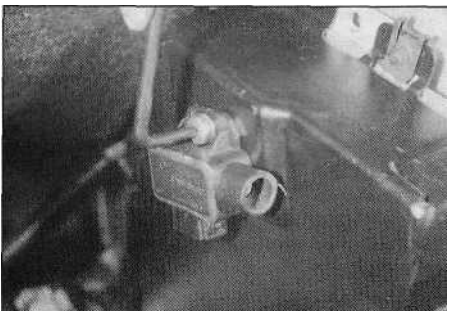
**31** The intake air temperature sensor is located in the air cleaner-to-throttle housing duct (see illustration). To remove the sensor, first disconnect the battery negative terminal.



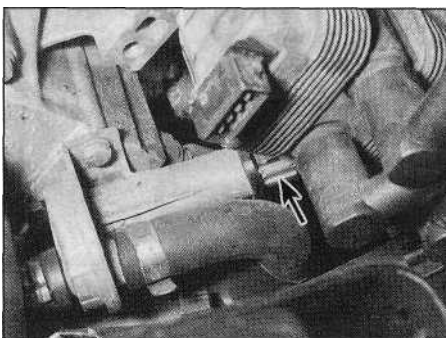
**14.17c** Remove the ECU, disconnecting its vacuum hose (1) and wiring connector (2) as they become accessible



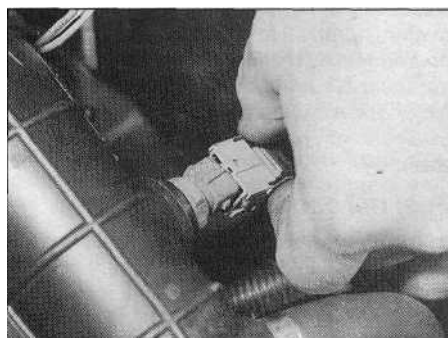
**14.21a** Disconnect the wiring connector...



**14.21b** ... then undo the retaining screw and remove the idle speed mixture potentiometer



**14.23** Auxiliary air valve location - wiring connector arrowed



**14.31** Disconnecting the wiring connector from the intake air temperature sensor

**32** Disconnect the wiring connector, then unscrew the sensor from the intake duct and remove it from the vehicle.

**33** Refitting is the reverse of removal.

### Crankshaft sensor

**34** The crankshaft sensor is mounted on top of the transmission housing, next to the left-hand end of the cylinder block. To remove the sensor, first disconnect the battery negative terminal.

**35** Access to the sensor is poor, and it will be necessary to remove the battery and battery tray (see Chapter 5) and/or the intake duct assembly (see Section 2) to improve access (depending on model and specification). On some models, it will also be necessary to remove the metal plate from the top of the transmission housing; the plate is retained by one of the engine-to-transmission bolts, and by a second bolt securing the plate to the top of the transmission.

**36** Trace the wiring back from the sensor to its wiring connector, and disconnect it from the main wiring harness. Undo the retaining bolt, and remove the sensor from the top of the transmission housing.

**37** Refitting is a reversal of the removal procedure, ensuring that the sensor wiring is correctly routed.

### Fuel injection system relay unit

**38** The fuel injection system relay unit is mounted on the front of the engine compartment junction box. To remove the relay unit, first disconnect the battery negative terminal.

**39** Open up the junction box lid, then slacken and remove the relay mounting nut and washer. Release the retaining clip, then disconnect the wiring connector and remove the relay unit from the engine compartment (see illustrations).

**40** Refitting is the reverse of removal.

### 15 Bosch Motronic M1.3 system components - removal and refitting

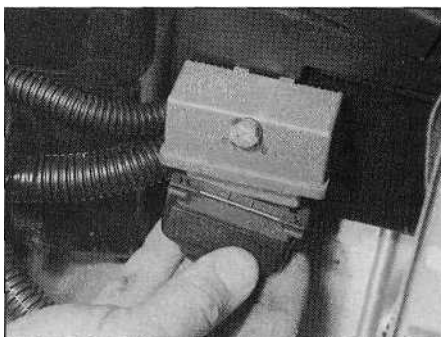
**Note:** Check parts availability with a Citroen dealer prior to removing individual components. At the time of writing, certain components are only available as part of a larger assembly, eg the throttle switch is only available as part of the throttle housing assembly.

### Fuel rail and injectors

**1** The fuel rail and injectors can be removed as described in Section 14, noting that it will first be necessary to remove the ignition HT coil as described in Chapter 5.

### Fuel pressure regulator

**2** Refer to Section 14.



**14.39a** Disconnect the wiring connector...

### Throttle switch

**3** Disconnect the battery negative terminal.

**4** Depress the retaining clip, and disconnect the wiring connector from the throttle potentiometer.

**5** Slacken and remove the two retaining screws, then disengage the potentiometer from the throttle valve spindle and remove it from the vehicle.

**6** When refitting the switch, ensure it is correctly engaged with the throttle valve spindle, and lightly tighten its retaining screws. Slowly operate the throttle valve whilst listening to the switch; the switch should click as soon as the throttle valve starts to open, and again just before it is fully closed. Position the switch until this is so, then securely tighten its retaining screws.

**7** Reconnect the wiring connector, and reconnect the battery.

### Electronic Control Unit (ECU)

**8** Refer to the information given in Section 14, noting that there is no idle mixture adjustment potentiometer to disconnect.

### Airflow meter

**9** Disconnect the battery negative terminal.

**10** Depress the retaining clip, and disconnect the wiring connector from the airflow meter.

**11** Slacken the retaining clips, and disconnect the intake ducts from either end of the airflow meter.

**12** Slacken and remove the retaining nuts and bolts, and remove the airflow meter from the engine compartment.

**13** Refitting is a reverse of the removal procedure.

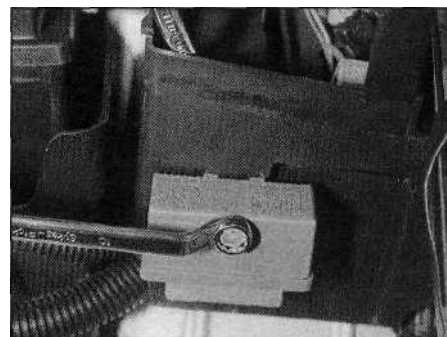
### Auxiliary air valve

**14** The auxiliary air valve is mounted on the left-hand end of the cylinder head, directly beneath the airflow meter.

**15** To improve access to the valve, remove the airflow meter as described above.

**16** Depress the retaining clip, and disconnect the wiring connector from the air valve.

**17** Slacken the retaining clips, and disconnect the vacuum hoses from either end of the auxiliary air valve.



**14.39b** ... then undo the retaining bolt, and remove the fuel injection relay unit from the front of the junction box

**18** Undo the two retaining bolts, and remove the auxiliary air valve from the engine compartment.

**19** Refitting is a reversal of the removal procedure.

### Manifold absolute pressure (MAP) sensor

**20** Refer to Section 14.

### Coolant temperature sensor

**21** Refer to Chapter 3, Section 6.

### Intake air temperature sensor

**22** The intake air temperature sensor is an integral part of the airflow meter, and is not available separately. Refer to paragraphs 9 to 13 for airflow meter removal and refitting details.

### Crankshaft sensor

**23** Refer to Section 14.

### Fuel injection system relay unit

**24** Refer to Section 14.

### 16 Bosch Motronic MP3.2 system components - removal and refitting

**Note:** Check parts availability with a Citroen dealer prior to removing individual components. At the time of writing, certain components are only available as part of a larger assembly, eg the throttle potentiometer is only available as part of the throttle housing assembly.

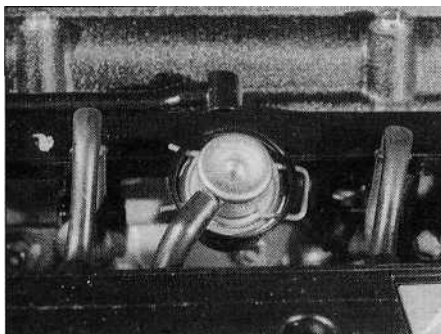
### Fuel rail and injectors

**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.

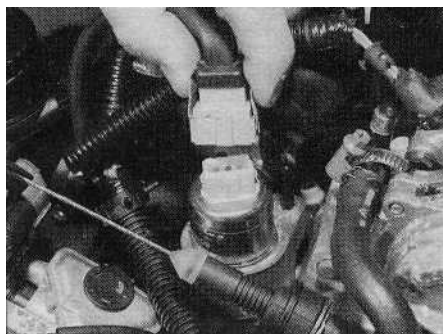
**1** Disconnect the battery negative terminal.

**2** Disconnect the vacuum pipe from the fuel pressure regulator.

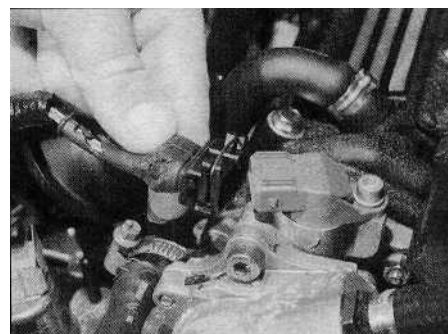
**3** Bearing in mind the information given in Section 7, slacken the retaining clips, and disconnect the fuel feed and return hoses



**16.8 Fuel pressure regulator location - 1998 cc 16-valve models**



**16.16 Disconnecting the wiring connector from the idle speed auxiliary air valve - 1998 cc 16-valve models**



**16.27 Disconnecting the wiring connector from the camshaft position sensor - 1998 cc 16-valve models**

from the right-hand end of the fuel rail. Where the original crimped-type Citroen hose clips are still fitted, cut them off and discard them; use standard worm-drive hose clips on refitting.

4 Depress the retaining tangs, and disconnect the wiring connectors from the four injectors. To avoid the possibility of the wiring connectors being incorrectly reconnected on refitting, mark each connector with its cylinder number (No 1 is at the transmission end of the engine).

5 Slacken and remove the two fuel rail retaining bolts, then carefully ease the fuel rail and injector assembly out from the inlet manifold, and remove it from the vehicle. Remove the O-rings from the end of each injector, and discard them; these must be renewed whenever they are disturbed.

6 Slide out the retaining clip(s), and remove the relevant injector(s) from the fuel rail. Remove the upper O-ring from each injector as it is removed, and discard it; all O-rings must be renewed once they have been disturbed.

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

- (a) Fit new O-rings to all disturbed injectors.
- (b) Apply a smear of engine oil to the O-rings to aid installation, then ease the injectors and fuel rail into position, ensuring that none of the O-rings are displaced.
- (c) Using the marks made on removal, ensure that all the injector wiring connectors are correctly reconnected.
- (d) On completion, start the engine and check for fuel leaks.

## **Fuel pressure regulator**

8 Refer to Section 14 (see illustration).

## **Throttle potentiometer**

9 The throttle potentiometer is fitted to the rear of the throttle housing.

10 To improve access to the potentiometer, remove the throttle housing as described in Section 12.

11 Undo the two retaining screws, and remove the potentiometer from the base of the throttle housing.

12 On refitting, ensure that the potentiometer is correctly engaged with the throttle valve spindle, and securely tighten its retaining screws.

13 Refit the throttle housing as described in Section 12.

## **Electronic Control Unit (ECU)**

14 Refer to Section 17.

## **Idle speed auxiliary air valve**

15 The idle speed auxiliary air valve is mounted on the left-hand end of the inlet manifold, directly in front of the braking system vacuum pump. To remove the valve, first disconnect the battery negative terminal.

16 Depress the retaining clip, and disconnect the wiring connector from the top of the valve (see illustration).

17 Free the valve from its mounting rubber, then disconnect the two hoses from the base of the valve and manoeuvre the valve out from the engine compartment.

18 Refitting is a reverse of the removal sequence, ensuring that the hoses are securely reconnected.

## **Manifold absolute pressure (MAP) sensor**

19 The MAP sensor is an integral part of the electronic control unit (ECU). Refer to Section 17 for ECU removal and refitting details.

## **Coolant temperature sensor**

20 Refer to Chapter 3, Section 6.

## **Intake air temperature sensor**

21 The intake air temperature sensor is located in the throttle housing.

22 To remove the sensor, first remove the throttle potentiometer as described in paragraphs 9 to 11.

23 Trace the wiring back from the sensor to its wiring connector, and remove the screw securing the connector to the top of the throttle housing.

24 Carefully ease the sensor out of position, and remove it from the throttle housing. Examine the sensor O-ring for signs of damage or deterioration, and renew if necessary.

25 Refitting is a reversal of the removal procedure, using a new O-ring where necessary. Refit the potentiometer as described in paragraphs 12 and 13.

## **Camshaft position sensor**

26 The camshaft position sensor is located on the left-hand end of the cylinder head, directly over the end of the inlet camshaft. To remove the sensor, first disconnect the battery negative terminal.

27 Depress the retaining clip, and disconnect the wiring connector from the sensor (see illustration).

28 Undo the retaining screw, and withdraw the sensor from the end of the cylinder head. Examine its O-ring for signs of damage or deterioration, and renew if necessary.

29 Refitting is a reversal of the removal procedure, using a new O-ring where necessary.

## **Crankshaft sensor**

30 Refer to Section 14.

## **Fuel injection system relay unit**

31 Refer to Section 14.

## **Vehicle speed sensor**

32 The vehicle speed sensor is an integral part of the transmission speedometer drive assembly. Refer to Chapter 7A for removal and refitting details.

## **Knock sensor**

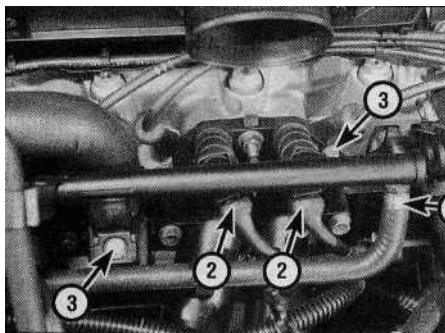
33 The knock sensor is screwed onto the rear face of the cylinder block.

34 To gain access to the sensor, firmly apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Access to the sensor can then be gained from underneath the vehicle.

35 Trace the wiring back from the sensor to its wiring connector, and disconnect it from the main loom.

36 Slacken and remove the bolt securing the sensor to the cylinder block, and remove it from underneath the vehicle.

37 Refitting is a reversal of the removal procedure, ensuring that the sensor wiring is



**17.5 Fuel feed hose connection (1), injector wiring connectors (2) and (two of the three) fuel rail retaining bolts (3) - 1998 cc 8-valve models**

correctly routed and its retaining bolt securely tightened.

### Throttle housing heating element

**38** The throttle housing heating element is fitted to the top of the throttle housing, and is an integral part of the throttle housing. At the time of writing, no information is available on element removal and refitting. Refer to your Citroen dealer for further information.

### 17 Magneti Marelli 8P.20 system components - removal and refitting

**Note:** Check parts availability with a Citroen dealer prior to removing individual components. At the time of writing, certain components are only available as part of a larger assembly, eg the throttle potentiometer is only available as part of the throttle housing assembly.

### Fuel rail and injectors

**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.
- 2** Remove the air cleaner-to-throttle housing duct, using the information given in Section 2.
- 3** Disconnect the vacuum pipe from the fuel pressure regulator.
- 4** Release the retaining clip, and free the various hoses from the top of the fuel rail.
- 5** Bearing in mind the information given in Section 7, slacken the retaining clip, and disconnect the fuel feed and return hoses from the ends of the fuel rail. Where the original crimped-type Citroen hose clips are still fitted, cut them off and discard them; use standard worm-drive hose clips on refitting (see illustration).
- 6** Depress the retaining clips, and disconnect the wiring connectors from the four injectors.
- 7** Slacken and remove the three fuel rail retaining bolts, then carefully ease the fuel rail and injector assembly out from the inlet



**17.16 Unclip the lid from the plastic box to gain access to the ECU**

manifold, and remove it from the vehicle. Remove the O-rings from the end of each injector, and discard them; these must be renewed whenever they are disturbed.

**8** Slide out the retaining clip(s), and remove the relevant injector(s) from the fuel rail. Remove the upper O-ring from each injector as it is removed, and discard it; all O-rings must be renewed once they have been disturbed.

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

- (a) Fit new O-rings to all disturbed injectors.
- (b) Apply a smear of engine oil to the O-rings to aid installation, then ease the injectors and fuel rail into position, ensuring that none of the O-rings are displaced.
- (c) On completion, start the engine and check for fuel leaks.

### Fuel pressure regulator

**10** Refer to Section 14.

### Throttle potentiometer

**11** Remove the throttle housing as described in Section 12.

**12** Undo the two retaining screws, and remove the potentiometer from the base of the throttle housing.

**13** On refitting, ensure that the potentiometer is correctly engaged with the throttle valve spindle, and securely tighten its retaining screws.

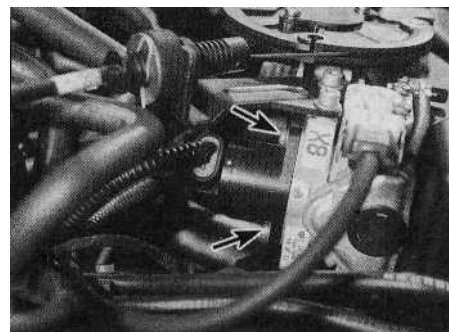
**14** Refit the throttle housing as described in Section 12.

### Electronic control unit (ECU)

**15** The ECU is situated inside its own protective plastic box, located directly behind the battery, on the left-hand side of the engine compartment. To remove the ECU, first disconnect the battery negative terminal.

**16** Unclip the lid from the plastic box, and slide the ECU and mounting plate out of position (see illustration).

**17** Disconnect the wiring connector from the ECU, then undo the retaining screws and remove the ECU from the engine compartment.



**17.21 Idle speed control stepper motor is retained by two screws (arrowed) - 1998 cc 8-valve models**

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

### Idle speed control stepper motor

**19** The idle speed control stepper motor is located on the right-hand side of the throttle housing assembly. To remove the motor, first disconnect the battery negative terminal.

**20** Release the retaining clip, and disconnect the wiring connector from the motor.

**21** Slacken and remove the two retaining screws, and withdraw the motor from the throttle housing (see illustration).

**22** Refitting is a reversal of the removal procedure.

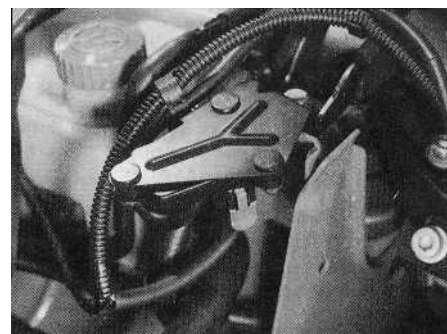
### Manifold absolute pressure (MAP) sensor

**23** The MAP sensor is situated on the right-hand side of the engine compartment, mounted on the front of the engine/transmission mounting (see illustration). To remove the sensor, first disconnect the battery negative terminal.

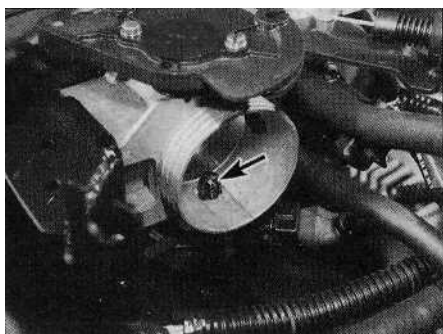
**24** Undo the three retaining nuts, and free the sensor from the underside of the mounting bracket.

**25** Depress the retaining clip, disconnect the wiring connector and vacuum hose from the sensor, and remove the sensor from the engine compartment.

**26** Refitting is a reversal of the removal procedure.



**17.23 MAP sensor location - 1998 cc 8-valve models**



**17.28** On 1998 cc 8-valve models, the intake air temperature sensor (arrowed) is located in the base of the throttle housing

### Coolant temperature sensor

27 Refer to Chapter 3, Section 6.

### Intake air temperature sensor

**28** The intake air temperature sensor is located in the base of the throttle housing (see illustration).

**29** To remove the sensor, first remove the throttle housing as described in Section 12, then undo the two retaining screws and remove the throttle potentiometer from the base of the housing.

**30** Trace the wiring back from the sensor to its wiring connector, and remove the screw securing the connector to the throttle housing.

**31** Carefully ease the sensor out of position, and remove it from the throttle housing. Examine the sensor O-ring for signs of damage or deterioration, and renew if necessary.

**32** Refitting is a reversal of the removal procedure, using a new O-ring where necessary.

### Crankshaft sensor

**33** Refer to Section 14.

### Fuel injection system relay unit

**34** Refer to Section 14.

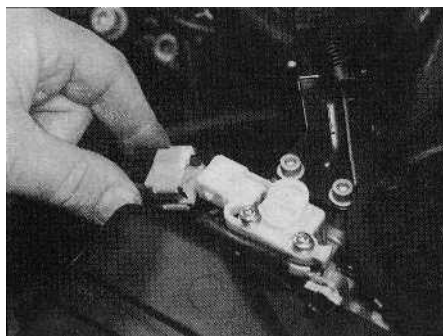
### Throttle housing heating element

**35** The throttle housing heating element is fitted to the top of the throttle housing. To remove the element, first disconnect the battery negative terminal.

**36** Depress the retaining tangs, and disconnect the wiring connector from the heating element, which is located on the right-hand side of the throttle housing cam (see illustration).

**37** Undo the two screws securing the wiring connector to the throttle housing, then displace the connector and carefully withdraw the heating element from the throttle housing. Examine the element O-ring (where fitted) for signs of damage or deterioration, and renew if necessary.

**38** Refitting is a reversal of the removal procedure, taking great care to ensure that



**17.36** Disconnecting the wiring connector from the throttle housing heating element - 1998 cc 8-valve models

the element wiring does not become trapped as the wiring connector bolts are tightened.

### Vehicle speed sensor

**39** The vehicle speed sensor is an integral part of the transmission speedometer drive assembly. Refer to Chapter 7 A for removal and refitting details.

### Knock sensor

**40** Refer to the information given in Section 16.

### 18 Inlet manifold - removal and refitting

#### Removal

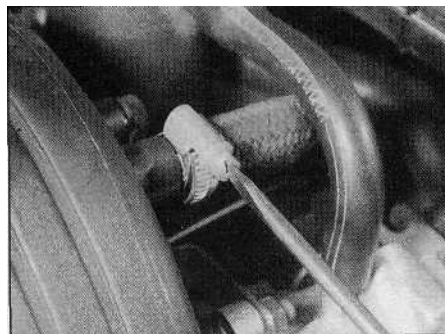
**1** Remove the throttle housing as described in Section 12.

#### 1761 cc models

**2** Undo the two bolts securing the wiring tray to the top of the manifold, and position the tray, and its associated wiring and hoses, clear of the manifold so that it does not hinder removal.

**3** Depress the retaining clips, and disconnect the wiring connectors from the four fuel injectors.

**4** Bearing in mind the information given in Section 7, slacken the retaining clips, and disconnect the fuel feed and return hoses



**18.10** Disconnecting the braking system vacuum servo unit hose from the manifold - 1905 cc models

from the either side of the manifold. Where the original crimped-type Citroen hose clips are still fitted, cut them off and discard them; use standard worm-drive hose clips on refitting.

**5** Slacken the retaining clip(s), and disconnect the braking system vacuum servo unit hose, and all the relevant vacuum/breather hoses, from the top of the manifold. Where necessary, make identification marks on the hoses, to ensure they are correctly reconnected on refitting.

**6** Undo the manifold retaining nuts, and withdraw the manifold from the engine compartment. Recover the two manifold seals, and discard them - new ones must be used on refitting.

#### 1905 cc models

**7** On models with a catalytic converter (Motronic M1.3 system), remove the ignition HT coil as described in Chapter 5.

**8** Depress the retaining clips, and disconnect the wiring connectors from the four fuel injectors.

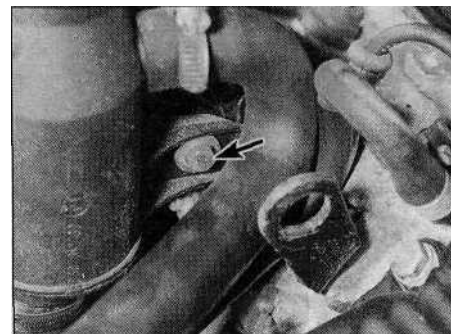
**9** Bearing in mind the information given in Section 7, slacken the retaining clips, and disconnect the fuel feed and return hoses from the either end of the fuel rail. Where the original crimped-type Citroen hose clips are still fitted, cut them off and discard them; use standard worm-drive hose clips on refitting.

**10** Slacken the retaining clip(s), and disconnect the braking system vacuum servo unit hose, and all the relevant vacuum/breather hoses, from the manifold (see illustration). Where necessary, make identification marks on the hoses, to ensure they are correctly reconnected on refitting.

**11** Slacken or cut the retaining clip (as applicable), and disconnect the breather hose from the top of the cylinder head cover.

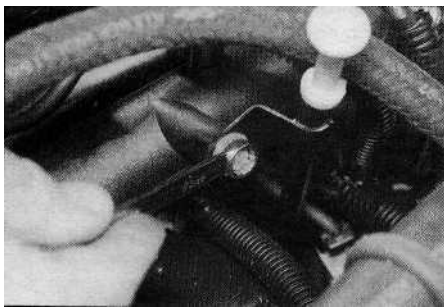
**12** Slacken and remove the bolt securing the support stay to the underside of the manifold, and the bolt securing the oil filler/breather neck to the left-hand side of the manifold (see illustration).

**13** Undo the five manifold retaining nuts, and withdraw the manifold from the engine compartment. Recover the manifold gasket(s), and discard them - new gasket(s) must be used on refitting.

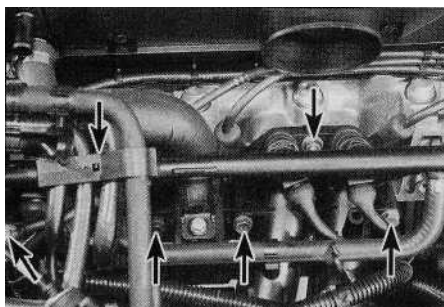


**18.12** On 1905 cc models, undo the bolt (arrowed) securing the oil filler/breather neck to the manifold

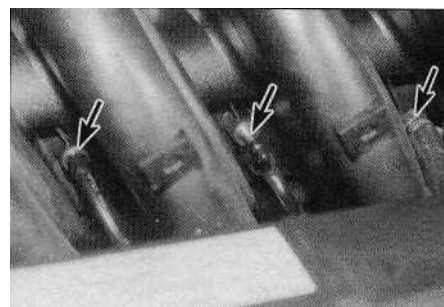




18.16 Removing the dipstick tube retaining bolt - 1998 cc 8-valve models



18.17 Manifold retaining nut and bolt locations (arrowed) - 1998 cc 8-valve models



18.19 On 1998 cc 16-valve models, disconnect the vacuum and breather hoses (arrowed) from the front of the inlet manifold ...

### 1998 cc 8-valve models

14 Carry out the operations described above in paragraphs 8 to 10.

15 Release the retaining clip, and free all the disconnected hoses from the clip on the top of the fuel rail.

16 Slacken and remove the bolt securing the dipstick tube to the side of the manifold (see illustration).

17 Undo the six nuts and bolts securing the manifold to the cylinder head, and remove the manifold from the engine compartment (see illustration). Recover the manifold seals, and discard them - new ones must be used on refitting.

### 1998 cc 16-valve models

18 Slacken the retaining clip, and disconnect the large breather hose from the front of the oil filler neck.

19 Disconnect the vacuum/breather hoses from their unions on the front of the manifold, noting the location of each hose (see illustration).

20 Undo the three retaining screws, and lift off the cover from the top of the inlet manifold-to-ACAV valve assembly joint. Free the wiring loom, and position it clear of the manifold (see illustration).

21 Slacken and remove the screws securing the inlet manifold to the ACAV butterfly valve housing, then manoeuvre the inlet manifold out of the engine compartment. Recover the

four intake tract sealing rings from the manifold, and discard them - new ones must be used on refitting.

### Refitting

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

- On 1905 cc models, ensure that the manifold and cylinder head mating surfaces are clean and dry, and fit new manifold gasket(s) over the studs. Refit the manifold, and tighten its retaining nuts to the specified torque.
- On 1761 cc and 1998 cc models, ensure that the manifold and cylinder head mating surfaces are clean and dry, then locate the new seals in their recesses in the manifold. Refit the manifold and tighten its retaining nuts and bolts (1761 and 1998 cc 8-valve models) to the specified torque; on 16-valve models, tighten the retaining screws securely.
- Ensure that all relevant hoses are reconnected to their original positions and are securely held (where necessary) by the retaining clips.
- Refit the throttle housing as described in Section 12.

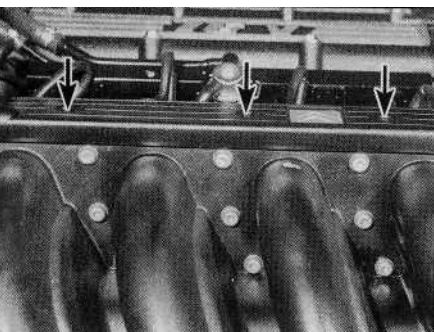
### 19 ACAV intake system (1998 cc 16-valve models) - general information, removal and refitting

#### General information

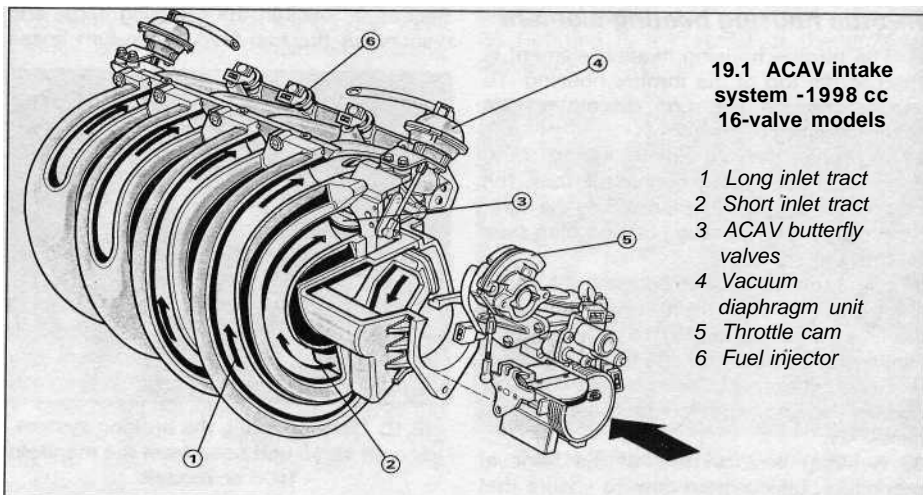
1 To ensure optimum efficiency at high engine speeds, and maximum torque at lower engine speeds, 16-valve models have an inlet manifold with a variable intake tract system. Citroen call this system ACAV (variable acoustic characteristic induction) (see illustration).

2 The inlet manifold is divided into two tracts of different length and diameter; a long tract (for low-speed torque) which is 650 mm long, diameter 36 mm, and a short tract (for high-speed power) which is 370 mm long, diameter 45 mm.

3 Situated between the manifold and the cylinder head is a line of four butterfly valves, mounted in an alloy housing. Mounted on either end of the housing is a vacuum diaphragm assembly. Each diaphragm is connected to the butterfly valve spindles via a pushrod. The vacuum diaphragms are connected to an electrically-operated solenoid valve, which is in turn connected to the braking system vacuum pump. The pump



18.20 ... then undo the three retaining screws (arrowed) and remove the cover from the top of the manifold



19.1 ACAV intake system - 1998 cc 16-valve models

- Long inlet tract
- Short inlet tract
- ACAV butterfly valves
- Vacuum diaphragm unit
- Throttle cam
- Fuel injector

is mounted on the end of the cylinder head, and is driven off the left-hand end of the inlet camshaft.

**4** At engine speeds below 1800 rpm and above 5080 rpm, the ECU closes the solenoid valve, shutting off the vacuum supply to the diaphragms, and the butterfly valves are closed. With the valves closed, the short intake tracts are closed, and the incoming air flows only through the long intake tract, boosting the torque output.

**5** At engine speeds between 1800 rpm and 5080 rpm, the ECU opens the solenoid valve. The vacuum present in the pump is then allowed to act on the vacuum diaphragms, which draws the pushrods into the diaphragm bodies, and opens up the four butterfly valves. With the valves open, the incoming air is allowed to flow through both the short and long intake tracts, for maximum power.

**6** To check the system, start the engine and allow it to idle. Slowly increase the engine speed, whilst observing the vacuum diaphragm pushrods. At approximately 1800 rpm, the pushrods should be drawn into the diaphragm bodies (valves open). Release the throttle cam, and allow the engine to idle again; the pushrods should extend from the diaphragms (valves closed).

**7** To check the operation of the solenoid valve, disconnect the vacuum pipe from the diaphragm. Start the engine, and allow it to idle. Place your finger over the end of the pipe; no vacuum should be present in the pipe. Slowly increase the engine speed; at approximately 1800 rpm, vacuum should be felt in the pipe. Allow the engine to idle again, and check that the vacuum supply is switched off. If this is not the case, either the solenoid valve or its supply voltage is at fault.

**8** To check the operation of either vacuum diaphragm assembly, disconnect the vacuum pipe, and suck hard at the control valve stub; the pushrod should be drawn into the diaphragm body, and the valve should open. If this is not the case, the vacuum diaphragm is faulty.

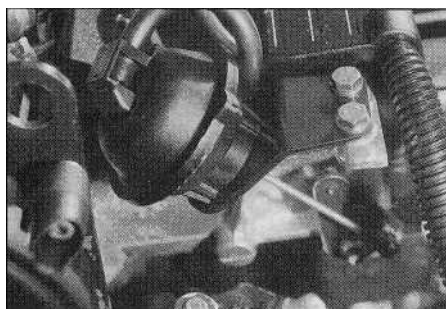
## Removal and refitting ACAV valve assembly

**9** Remove the inlet manifold as described in Section 18.

**10** Bearing in mind the information given in Section 7, slacken the retaining clip, and disconnect the fuel feed and return hoses from their unions on the fuel rail. Where the original crimped-type Citroen hose clips are still fitted, cut them off and discard them; use standard worm-drive hose clips on refitting.

**11** Depress the retaining tangs, and disconnect the wiring connectors from the four injectors. To avoid the possibility of the wiring connectors being incorrectly reconnected on refitting, mark each connector with its relevant cylinder number (No 1 is at the transmission end of the engine).

**12** Disconnect the vacuum hoses from the fuel pressure regulator and the ACAV diaphragm hose T-piece.



**19.16 ACAV vacuum diaphragm unit - 1998 cc 16-valve models**

**13** Slacken and remove the nuts and three bolts securing the valve assembly to the cylinder head, then slide the assembly off its mounting studs and remove it from the engine compartment. Remove the valve assembly gasket from the head, and discard it - a new one must be used on refitting.

**14** Examine the assembly, checking that the butterfly valves open freely and close smoothly. If not, the assembly must be renewed. The only components available separately are the vacuum diaphragm units - if either one is faulty, it must be renewed as described below.

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

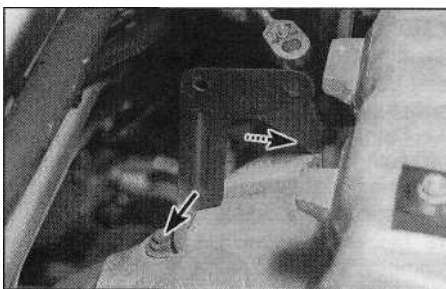
- Ensure that the valve assembly and cylinder head mating surfaces are clean and dry, and fit the new manifold gasket over the studs. Refit the valve assembly, and securely tighten its retaining nuts and bolts.*
- Ensure all relevant hoses are reconnected to their original positions, and are securely held (where necessary) by the retaining clips.*
- Refit the inlet manifold as described in Section 18.*
- On completion, check the operation of the ACAV system as described above.*

## Vacuum diaphragm unit

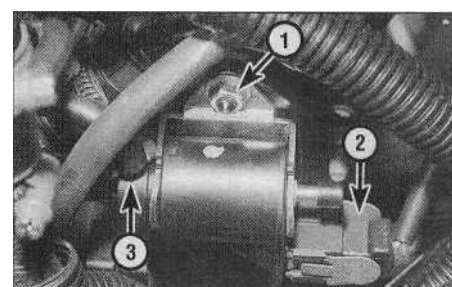
**16** Disconnect the vacuum hose from the diaphragm unit. Using a suitable flat-bladed screwdriver, carefully lever the unit pushrod off the valve linkage balljoint (**see illustration**).

**17** Slacken and remove the two bolts securing the diaphragm unit mounting bracket to the valve assembly, and remove the diaphragm from the engine.

**18** Refitting is a reversal of the removal



**20.2a On 1905 cc models, undo the two retaining bolts (arrowed)...**



**19.19 ACAV solenoid valve retaining nut (1), wiring connector (2) and hose connections (3) - 1998 cc 16-valve models**

procedure, ensuring that the diaphragm pushrod is clipped firmly onto the linkage balljoint.

## Solenoid valve

**19** The solenoid control valve is mounted on the left-hand end of the cylinder head (**see illustration**). To remove the valve, first disconnect the battery negative terminal.

**20** Depress the retaining clip, and disconnect the wiring connector from the valve.

**21** Undo the nut securing the valve to the cylinder head, then withdraw the valve, disconnecting its vacuum hoses as they become accessible.

**22** Refitting is a reversal of the removal procedure. Test the system on completion, as described above.

## 20 Exhaust manifold - removal and refitting

### Removal

**1** Firmly apply the handbrake, then jack up the front of the vehicle and support it on axle stands.

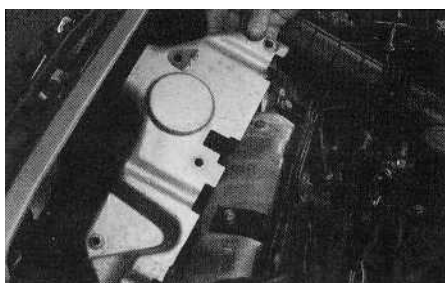
**2** On 1905 cc models, to improve access to the manifold from above, remove the air cleaner housing as described in Section 2, then undo the two mounting bracket retaining bolts, and remove the bracket from the top of the exhaust manifold (**see illustrations**).

**3** On all models, undo the bolts securing the shroud to the top of the manifold, and remove the shroud from the manifold (**see illustration**).

**4** Slacken and remove the two nuts securing the front pipe flange joint to the manifold, and



**20.2b ... and remove the air cleaner mounting bracket from the top of exhaust manifold**



**20.3 Undo the retaining bolts and remove the exhaust manifold shroud (1905 cc model shown)**

recover the springs. Remove the bolts, then free the front pipe from the manifold, and recover the wire-mesh sealing ring. Either support the front pipe, to avoid placing any strain on the lambda sensor wiring (where fitted), or disconnect the lambda sensor wiring connectors.

**5** Undo the retaining nuts securing the manifold to the head. Manoeuvre the manifold out of the engine compartment, and discard the manifold gasket(s) - new ones should be obtained for refitting.

### Refitting

**6** 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 gaskets. Tighten the manifold retaining nuts to the specified torque.*
- Reconnect the front pipe to the manifold, using the information given in Section 21.*

## 21 Exhaust system - general information, removal and refitting

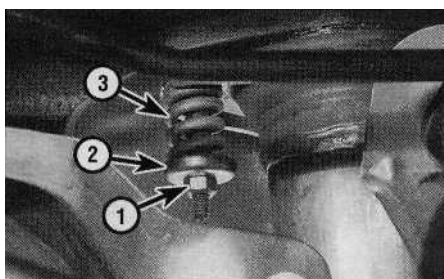


### General information

**1** On 1905 cc models without a catalytic converter, the exhaust system consists of two sections: the front pipe and intermediate silencer box, and the tailpipe and main silencer box. The front pipe-to-manifold joint is of the spring-loaded ball type, to allow for movement in the exhaust system, and the front pipe-to-silencer joint is secured by a clamping ring.

**2** On all other models, the exhaust system consists of three sections: the front pipe and catalytic converter, the intermediate pipe and silencer box, and the tailpipe and main silencer box. All exhaust sections are joined by flanged joints. The front pipe-to-manifold joint is of the spring-loaded ball type, to allow for movement in the exhaust system, and the front pipe-to-intermediate pipe and intermediate pipe-to-silencer joints are secured by clamping rings.

**3** On all models, the system is suspended



**21.6a Exhaust front pipe-to-manifold joint securing nut (1), spring cup (2) and spring (3) - viewed from underneath**

throughout its entire length by rubber mountings.

### Removal

**4** Each exhaust section can be removed individually, or alternatively, the complete system can be removed as a unit. Even if only one part of the system needs attention, it is often easier to remove the whole system and separate the sections on the bench.

**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. Alternatively, position the car over an inspection pit, or on car ramps.

### Front pipe - 1905 cc models without a catalytic converter

**6** Slacken and remove the two nuts securing the front pipe to the manifold, and recover the spring cups and springs. Remove the bolts, then release the front pipe from the manifold, and recover the wire-mesh gasket from the joint (see illustrations).

**7** Slacken the front pipe-to-tailpipe clamping ring bolt(s), and disengage the clamp from the flange joint.

**8** Free the front pipe from its mounting rubbers, and withdraw it from underneath the vehicle.

### Front pipe - all models with a catalytic converter

**9** Trace the wiring back from the lambda (oxygen) sensor to its wiring connectors, and disconnect it from the main wiring harness.

**10** Disconnect the front pipe from the manifold and intermediate pipe as described above in paragraphs 6 and 7, then remove the front pipe from underneath the vehicle. Be careful not to damage the catalytic converter - it is fragile.

### Intermediate pipe - all models with a catalytic converter

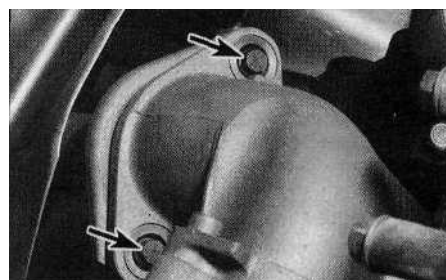
**11** Slacken the intermediate pipe clamping ring bolts, and disengage the clamps from both the flange joints.

**12** Free the intermediate pipe from its mounting rubbers, and withdraw it from underneath the vehicle.

### Tailpipe - all models

**13** Slacken the intermediate pipe-to-tailpipe clamping ring bolt(s), and disengage the clamp from the flange joint.

**14** Unhook the tailpipe from its mounting rubbers, and remove it from the vehicle.



**21.6b Exhaust front pipe-to-manifold joint bolts (arrowed) - viewed from above**

### Complete system - all models

**15** Using the information given under the relevant sub-heading above, unbolt the front pipe from the manifold, and disconnect the lambda sensor wiring (where applicable). Free the system from all its mounting rubbers, and withdraw it from under the vehicle.

### Heat shield(s) - all models

**16** The heat shields are secured to the underside of the body by various nuts and bolts. Each shield can be removed once the relevant exhaust section has been removed. If the shield is being removed to gain access to a component located behind it, it may prove sufficient in some cases to remove the retaining nuts and/or bolts, and simply lower the shield, without disturbing the exhaust system.

### Refitting

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

- Clamping rings which are secured by a single bolt (fitted to all 1998 cc models, and to some others) should be renewed as a matter of course. They are designed to deform on tightening, and cannot be re-used.*
- Ensure that all traces of corrosion have been removed from the flanges, and renew all necessary gaskets.*
- Inspect the rubber mountings for signs of damage or deterioration, and renew as necessary.*
- Prior to assembling the spring-loaded ball type joint, a smear of high-temperature grease should be applied to the joint mating surfaces. Citroen recommend the use of Grippcott AF G2 grease (available from your Citroen dealer).*
- On joints which are secured by clamping rings, apply a smear of exhaust system jointing paste to the joint mating surfaces, to ensure an gas-tight seal.*
- Prior to tightening the exhaust system fasteners, ensure all rubber mountings are correctly located, and that there is adequate clearance between the exhaust system and vehicle underbody.*
- On models with clamping rings which are secured by two bolts, tighten the clamping ring nuts evenly and progressively to the specified torque, to ensure that the clearance between the clamp halves is equal on either side.*