Chapter 4 Part A:
Fuel and exhaust systems - carburettor models

Contents

Degrees of difficulty

Easy, suitable for novice with little experience 

Fairly easy, suitable for beginner with some experience 

Fairly difficult, suitable for competent DIY mechanic 

Difficult, suitable for experienced DIY mechanic 

Very difficult, suitable for expert DIY or professional 

4A

Specifications

General

Fuel tank capacity	61.0 litres
Fuel octane rating:	
Leaded	98 RON (4-star)
Unleaded	95 RON (Premium)
Carburettor type (all models)	Pierburg 2E3

Air cleaner element

Application:	
Round type	Champion W103
Square type	Champion U512

14 NV engine

Idle speed	925 ± 25 rpm	
Idle mixture (CO content)	0.5 to 1.5%	
Fast idle speed	2200 to 2600 rpm	
Choke valve gap	1.5 to 3.5 mm	
Choke pull-down gap:		
"Small"	1.7 to 2.1 mm	
"Large"	2.5 to 2.9 mm	
Idle fuel jet	45	
Idle air bleed	130	
	Primary	**Secondary**
Venturi diameter	20.0 mm	24.0 mm
Main jet	X95	X110

16 SV engine

Idle speed		
Manual transmission	925 ± 25 rpm	
Automatic transmission	825 ± 25 rpm (in 'park' or 'neutral')	
Idle mixture (CO content)	0.5 to 1.5%	
Fast idle speed	2000 to 2400 rpm	
Choke valve gap	1.5 to 3.5 mm	
Choke pull-down gap:		
Up to 1990:		
"Small"	1.3 to 1.7 mm	
"Large"	1.9 to 2.3 mm	
From 1990:		
"Small"	1.5 to 1.7 mm	
"Large"	2.0 to 2.2 mm	
Idle fuel jet	45	
Idle air bleed	132.5	
	Primary	**Secondary**
Venturi diameter	20.0 mm	24.0 mm
Main jet:		
Up to 1990	X95	X105
From 1990	X92.5	X105

18 SV engine

Idle speed	925 ± 25 rpm	
Idle mixture (CO content)	0.5 to 1.5%	
Fast idle speed	1900 to 2300 rpm	
Choke valve gap	1.5 to 3.5 mm	
Choke pull-down gap:		
"Small"	2.2 ± 0.2 mm	
"Large"	3.3 ± 0.2 mm	
Idle fuel jet	42.5	
Idle air bleed	132.5	
	Primary	**Secondary**
Main jet	107.5	125

Torque wrench settings

	Nm	**lbf ft**
Exhaust manifold nuts	22	16
Exhaust downpipe-to-manifold bolts	25	18
Exhaust fixings except flexible joint bolts	25	18
Exhaust flexible joint bolts	12	9
Fuel pump bolts	18	13
Fuel tank mounting strap bolts	20	15
Inlet manifold nuts	22	16

1 General description

The fuel system on all carburettor models comprises a fuel tank, a fuel pump, a vapour separator (1.6 and 1.8 litre models only), a downdraught carburettor, and a thermostatically-controlled air cleaner.

The fuel tank is mounted under the rear of the vehicle, forward of the rear suspension. The tank is ventilated to the atmosphere, and has a simple filler pipe and a fuel gauge sender unit.

The fuel pump is a mechanical diaphragm type, actuated by a pushrod bearing on the camshaft.

The fuel vapour separator is used to stabilise the fuel supply to the carburettor. Vapour is purged from the carburettor fuel supply, thus improving hot starting qualities.

The carburettor is a Pierburg 2E3 type, a full description of which is given in Section 12.

The air cleaner has a wax or vacuum-controlled air inlet supplying a blend of hot and cold air to suit the prevailing engine operating conditions. A fuller description is given in Section 4.

All engines available within the Cavalier range can be operated on unleaded petrol - see Chapter 5.

2 Fuel system - precautions

1 Certain adjustment points in the fuel system are protected by tamperproof caps, plugs or seals. In some territories, it is an offence to drive a vehicle with broken or missing tamperproof seals. Before disturbing a tamperproof seal, check that no local or national laws will be broken by doing so, and fit a new tamperproof seal after adjustment is complete, where required by law. Do not break tamperproof seals on a vehicle that is still under warranty.

2 When working on fuel system components, scrupulous cleanliness must be observed, and care must be taken not to introduce any foreign matter into fuel lines or components. Carburettors in particular are delicate instruments, and care should be taken not to disturb any components unnecessarily. Before attempting work on a carburettor, ensure that the relevant spares are available. Full overhaul procedures for carburettors have not been given in this Chapter. Complete stripdown of a carburettor is unlikely to cure a fault that is not immediately obvious, without introducing new problems. If persistent problems are met, it is recommended that the advice of a Vauxhall dealer or carburettor specialist is sought. Most dealers will be able to provide carburettor re-setting and servicing facilities, and if necessary it should be possible to buy a reconditioned carburettor.

3 Refer to Chapter 5, for precautions to be observed when working on vehicles fitted with an engine management system.

Warning: Many of the procedures given in this Chapter involve the disconnection of fuel pipes and system components, which may result in some fuel spillage. Before carrying out any operation on the fuel system, refer to the precautions given in the "Safety first!" Section at the beginning of this manual and follow them implicitly. Petrol is a highly dangerous and volatile substance, and the precautions necessary when handling it cannot be overstressed.

3 Air cleaner - removal and refitting

Removal

1 Remove the air cleaner element, as described in Chapter 1.
2 Release the crankcase ventilation hose from the plastic clip on the left-hand side of the air cleaner body**.**
3 Disconnect the inlet duct from the hot air hose on the exhaust manifold **(see illustration)**, and lift the air cleaner body from the carburettor.
4 With the body tilted to the rear, disconnect the crankcase ventilation hose from the stub on the underside of the body **(see illustration).** Where applicable, disconnect the vacuum hose from the air temperature control flap thermostat.
5 Remove the seal from under the air cleaner body.

Refitting

6 Check the hot air hose for condition, and renew it if necessary.
7 Fit a new air cleaner body-to-carburettor seal.
8 Connect the crankcase ventilation hose to the stub on the underside of the body, and connect the vacuum hose for the air temperature control flap.
9 Locate the body on the carburettor, and at the same time locate the inlet duct on the hot air hose on the exhaust manifold.
10 Engage the crankshaft ventilation hose in the plastic clip.
11 Refit the air cleaner element, referring to Chapter 1 if necessary.

4 Air cleaner inlet air temperature control - description and testing

Description

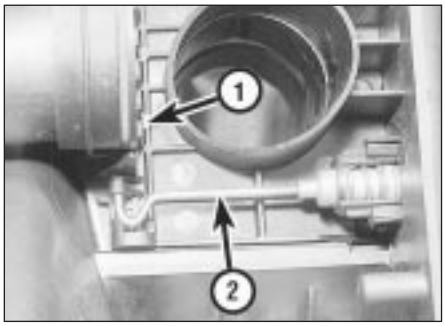
1 The air cleaner is thermostatically-controlled, to provide air at the most suitable temperature for combustion with minimum exhaust emission levels.
2 The optimum air temperature is achieved by drawing in cold air from an inlet at the front of the vehicle, and blending it with hot air drawn from a shroud on the exhaust manifold. The proportion of hot and cold air is varied by the position of a flap valve in the air cleaner inlet spout, which is controlled by either a vacuum diaphragm or wax-type unit. The vacuum diaphragm type is regulated by a heat sensor located within the air cleaner body **(see illustration)**.

3.3 The air cleaner body locates over the hot air hose

3.4 Disconnecting the crankcase ventilation hose (arrowed)

Testing

3 To check the operation of the air temperature control, the engine must be cold. First check the position of the flap valve. On the vacuum type, remove the air cleaner cover and check that the flap is open to admit only cold air from outside the car. Then start the engine and check that the flap now moves to admit only hot air from the exhaust manifold. On the wax type, the flap should already be positioned to admit only hot air from the exhaust manifold.
4 Temporarily refit the cover on the vacuum type.
5 Run the engine until it reaches its normal operating temperature.
6 On the vacuum type, remove the air cleaner cover and check that the flap is now positioned to admit only cold air from outside the car. In cold weather it should be a mixture of hot and cold air. Refit the cover after making the check. On the wax type, use a mirror to check that the flap is positioned in the same way as given for the vacuum type.
7 If the flap does not function correctly, the air cleaner casing must be renewed. Note that the vacuum type thermostat can be renewed separately if necessary.



4.2 Air cleaner flap valve operating mechanism
1 Flap valve 2 Operating rod

5 Fuel pump - testing

Note: *Refer to Section 2 before proceeding*
1 Disconnect the ignition coil LT lead.
2 Place a clean piece of rag under the pump outlet, then disconnect the pump outlet hose. Be prepared for fuel spillage, and take adequate fire precautions.
3 Have an assistant crank the engine on the starter. Well-defined spurts of fuel must be ejected from the pump outlet - if not, the pump is probably faulty (or the tank is empty). Dispose of the fuel-soaked rag safely.
4 No spare parts are available for the pump, and if faulty, the unit must be renewed.

6 Fuel pump - removal and refitting

Note: *Refer to Section 2 before proceeding*

Removal

1 The fuel pump is located at the rear right-hand end of the camshaft housing.
2 Disconnect the battery negative lead.
3 Disconnect the fuel hoses from the pump **(see illustration)**. If necessary, label the hoses so that they can be reconnected to their correct locations. Be prepared for fuel spillage, and take adequate fire precautions. Plug the open ends of the hoses to prevent dirt ingress and further fuel spillage.

6.3 Disconnecting a fuel hose from the fuel pump - 1.6 litre model

6.4 Withdrawing the fuel pump and plastic insulating block - 1.6 litre model

4 Unscrew the two securing bolts, and withdraw the pump from the camshaft housing **(see illustration)**.
5 Recover the plastic insulating block.

Refitting

6 Refitting is a reversal of removal, but ensure that the fuel hoses are reconnected to their correct locations as noted during removal, and tighten the securing bolts to the specified torque.
7 Run the engine and check for leaks on completion. If leakage is evident, stop the engine immediately and rectify the problem without delay. Note that the engine may take a longer time than usual to start when the pump has been removed, as the pump refills with fuel.

7 Fuel tank - removal, examination and refitting

Note: *Refer to Section 2 before proceeding*

Removal

1 Disconnect the battery negative lead.
2 Siphon out any remaining fuel in the tank through the filler pipe. Siphon the fuel into a clean metal container that can be sealed.
3 Chock the front wheels, then jack up the rear of the vehicle, and support securely on axle stands (see "*Jacking and Vehicle Support*") placed under the body side members.
4 Disconnect the exhaust system front flexible joint. Suspend the front section of the exhaust system with wire or string from the underbody.
5 Disconnect the rear section of the exhaust system from its rubber mountings, and allow it to rest on the rear suspension torsion beam. It is advisable to support the rear section of the exhaust at its front end, with wire or string from the underbody, to avoid straining the system.
6 Unclip the handbrake cable from the bracket on the left-hand fuel tank securing strap.
7 Disconnect the fuel hoses from the fuel level sender unit located in the right-hand side of the fuel tank. Make a note of the hose positions for use when refitting. Be prepared for fuel spillage, and take adequate fire precautions. Plug the open ends of the hoses, to prevent dirt ingress and further fuel loss.
8 Disconnect the wiring plug from the fuel level sender unit.
9 Disconnect the filler and vent hoses from the rear of the fuel tank.
10 Support the weight of the fuel tank on a jack with an interposed block of wood.
11 Unscrew the securing bolts from the tank mounting straps, then remove the straps and lower the tank sufficiently to enable the disconnection of the remaining vent hose.
12 With the aid of an assistant, withdraw the tank sideways from the right-hand side of the vehicle. Note that as the tank is withdrawn, some residual fuel may be released.

Examination

13 If the tank contains sediment or water, it may be cleaned out using two or three rinses with clean fuel. Shake vigorously using several changes of fuel, but before doing so, remove the fuel level sender unit, as described in Section 8. This procedure should be carried out in a well-ventilated area, and it is vital to take adequate fire precautions - refer to the "Safety first!" Section at the beginning of this manual for further details.
14 Any repairs to the fuel tank should be carried out by a professional. Do not under any circumstances attempt to weld or solder a fuel tank. Removal of all residual fuel vapour requires several hours of specialist cleaning.

Refitting

15 Refitting is a reversal of removal, ensuring that all hoses are reconnected to their correct locations as noted during removal.
16 On completion, fill the fuel tank, then run the engine and check for leaks. If leakage is evident, stop the engine immediately and rectify the problem without delay. Note that the engine may take a longer time than usual to start when the fuel tank has been removed, as the pump refills with fuel.

8 Fuel level sender unit - removal and refitting

Note: *Refer to Section 2 before proceeding*

Removal

1 Disconnect the battery negative lead.
2 Siphon out any remaining fuel in the tank through the filler pipe. Siphon the fuel into a clear metal container that can be sealed.
3 Chock the front wheels, then jack up the rear of the vehicle, and support securely on axle stands (see "*Jacking and Vehicle Support*") placed under the body side members.
4 The sender unit is located in the right-hand side at the fuel tank.
5 Make alignment marks on the sender unit and the fuel tank, so that the sender unit can be refitted in its original position.
6 Disconnect the fuel hoses from the sender unit. Be prepared for fuel spillage, and take adequate fire precautions. Plug the open ends of the hoses, to prevent dirt ingress and further fuel loss.
7 Disconnect the wiring plug from the fuel level sender unit.
8 To remove the sender unit, engage a flat piece of metal as a lever between two of the slots on the sender unit rim, and turn it anti-clockwise.
9 Withdraw the unit carefully, to avoid bending the float arm.
10 Recover the sealing ring.

Refitting

11 Refitting is a reversal of removal, remembering the following points.
12 Examine the condition of the sealing ring, and renew if necessary.
13 Ensure that the marks made on the sender unit and fuel tank before removal are aligned.
14 Ensure that the hoses are reconnected to their correct locations as noted during removal.
15 On completion, fill the fuel tank, then run the engine and check for leaks. Also check that the fuel gauge reads correctly. If leakage is evident, stop the engine immediately and rectify the problem without delay. Note that the engine may take a longer time than usual to start when the sender unit has been removed, as the fuel pump refills with fuel.

9 Fuel vapour separator (1.6 and 1.8 litre models) - removal and refitting

Note: *Refer to Section 2 before proceeding*

Removal

1 The fuel vapour separator is located on a bracket attached to the side of the carburettor.
2 Note the locations of the three fuel hoses, labelling them if necessary for use when refitting, then disconnect the hoses from the vapour separator. Be prepared for fuel spillage, and take adequate fire precautions. Plug the open ends of the hoses, to prevent dirt ingress and further fuel spillage.
3 Remove the two securing screws, and lift the vapour separator from its bracket.
4 Check the body of the separator for cracks or leaks before refitting, and renew if necessary.

Refitting

5 Refitting is a reversal of removal, but ensure that the three fuel hoses are connected to their correct locations as noted during removal.
6 Run the engine and check the hose connections for leaks on completion. If leakage is evident, stop the engine immediately and rectify the problem without delay.

10 Throttle pedal - removal and refitting

Removal

1 Working inside the vehicle, remove the lower trim panel from the driver's footwell.
2 Slide the cable retainer from the bracket on the top of the pedal, and disconnect the cable end from the pedal.
3 Extract the circlip from the right-hand end of the pedal pivot shaft, then slide out the pivot shaft from the left-hand side of the pivot bracket **(see illustration)**. Recover the pivot bushes and the pedal return spring.
4 Examine the pivot bushes for wear, and renew if necessary.

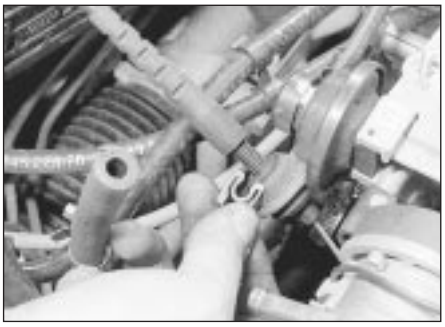
Refitting

5 Refitting is a reversal of removal, but on completion check the throttle mechanism for satisfactory operation, and check the throttle cable adjustment, as described in Section 11.

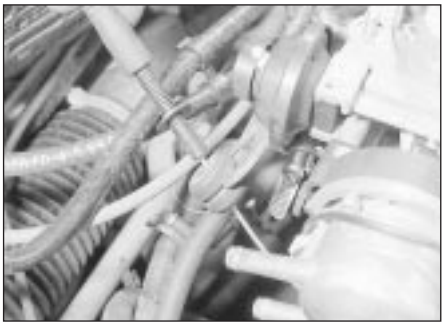
11 Throttle cable - removal, refitting and adjustment

Removal

1 Remove the air cleaner, on early models. On later models, disconnect the air trunking from the air cleaner, then disconnect the vacuum pipe and breather hose from the air box. Extract the three securing screws and lift off the air box, complete with air trunking **(see illustration).**
2 Extract the clip from the cable end fitting at the bracket on the carburettor, then slide the cable end grommet from the bracket **(see illustrations)**.
3 Slide the cable end from the throttle valve lever on the carburettor.
4 Working inside the vehicle, remove the lower trim panel from the driver's footwell.
5 Slide the cable retainer from the bracket on the top of the pedal, and disconnect the cable end from the pedal.
6 Make a careful note of the cable routing, then withdraw the cable through the bulkhead into the engine compartment.



11.2A Extract the throttle cable end clip . . .



11.2B . . .and slide the grommet from the bracket

Refitting

7 Refitting is a reversal of removal, remembering the following points.
8 Ensure that the cable is correctly routed, as noted before removal.
9 Ensure that the bulkhead grommet is correctly seated in its hole.

Adjustment

10 On completion, check the throttle mechanism for satisfactory operation, and if necessary adjust the cable, as described in the following paragraphs.
11 Two points of cable adjustment are provided. A stop screw is located on the pedal arm to control the fully released position of the pedal stop **(see illustration).** A clip is located on a threaded section of the cable sheath at the bracket on the carburettor, to adjust the cable free play.

11.11 Throttle pedal stop screw

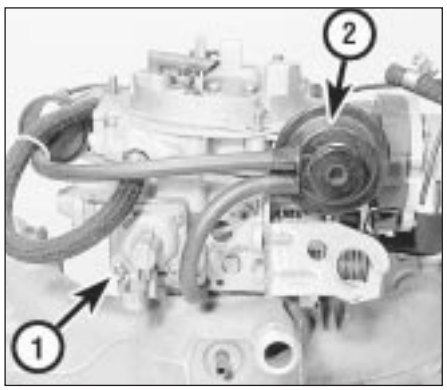
10.3 Throttle pedal pivot assembly. Circlip arrowed

11.1 Removing an air box securing screw

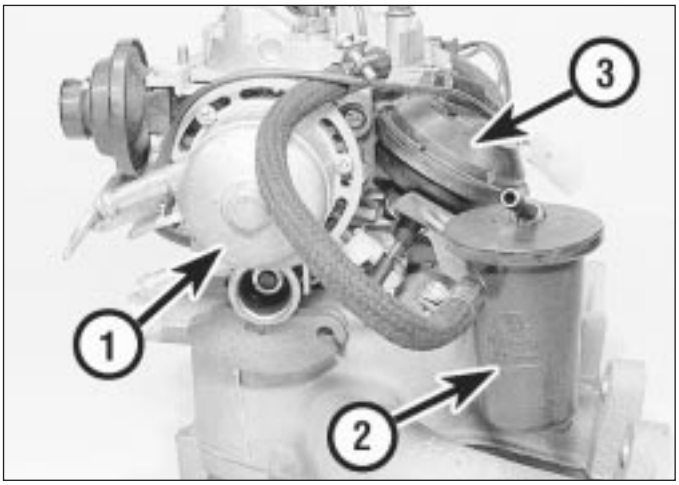
12 The cable should be adjusted so that when the throttle pedal is released, there is very slight free play in the cable at the carburettor end.
13 Check that when the throttle pedal is fully depressed, the throttle valve is fully open. Adjust the position of the clip on the cable sheath, and the pedal stop screw, to achieve the desired results.

12 Carburettor - general

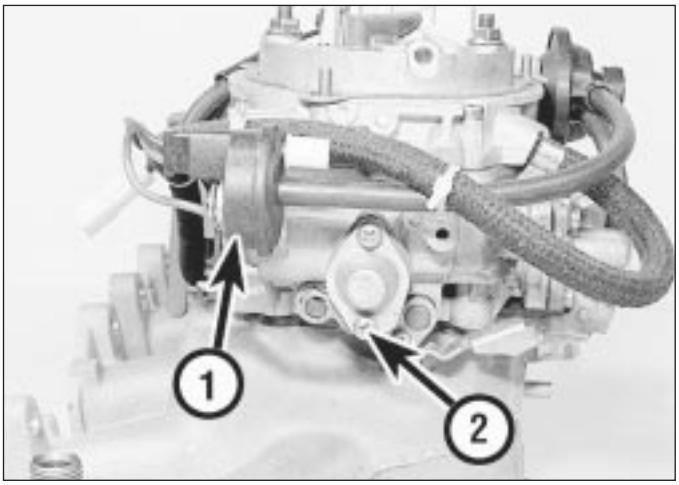
1 The Pierburg 2E3 carburettor is of twin-venturi, fixed-jet sequential throttle type. The primary throttle valve operates alone except at high engine speeds and loads, when the secondary throttle valve is operated, until at full-throttle, both are fully open. This arrangement allows good fuel economy during light acceleration and cruising, but also gives maximum power at full-throttle. The secondary throttle valve is vacuum-operated, according to the vacuum produced in the primary venturi. The primary throttle barrel and venturi diameters are smaller than their secondary counterparts. The carburettor is a complicated instrument, with various refinements and sub-systems added to achieve improved driveability, economy and exhaust emission levels **(see illustrations).**



12.1A Side view of carburettor, showing accelerator pump (1) and main choke pull-down diaphragm unit (2)



12.1B Side view of carburettor, showing automatic choke housing (1), vapour separator (2) and secondary throttle valve vacuum diaphragm (3)



12.1C Side view of carburettor, showing secondary choke pull-down solenoid (1) and power valve (2)

2 A separate idle system operates independently from the main jet system, supplying fuel by way of the mixture control screw.

3 The main jets are calibrated to suit engine requirements at mid-range throttle openings. To provide the necessary fuel enrichment at full throttle, a vacuum-operated power valve is used. The valve provides extra fuel under the low vacuum conditions associated with wide throttle openings.

4 To provide an enriched mixture during acceleration, an accelerator pump delivers extra fuel to the primary main venturi. The accelerator pump is operated mechanically by a cam on the throttle linkage.

5 A fully automatic choke is fitted, operated by a coolant and electrically heated bi-metal coil. When the engine is cold, the bi-metal coil is fully wound up, holding the choke plate (fitted to the primary barrel) closed. As the engine warms up, the bi-metal coil is heated and therefore unwinds, progressively opening the choke plate. A vacuum operated pull-down system is employed, whereby, if the engine is under choke but is only cruising (i.e. not under heavy load) the choke plate is opened against the action of the bi-metal coil. The pull-down system prevents an over-rich mixture, which reduces fuel economy and may cause unnecessary engine wear when the engine is cold. A secondary pull-down solenoid is fitted, which operates in conjunction with the main diaphragm unit to modify the pull-down characteristics, improving fuel economy.

6 1.8 litre models are fitted with an idle cut-off solenoid. This is an electrically operated valve, which interrupts the idle mixture circuit when the ignition is switched off, this preventing engine “run-on”.

13 Carburettor - removal, overhaul and refitting

Note: *Refer to Section 2 before proceeding. New gasket(s) must be used when refitting the carburettor. A tachometer and an exhaust gas analyser will be required to check the idle speed and mixture on completion*

Removal

1 Disconnect the battery negative lead.

2 Remove the air cleaner, on early models. On later models, disconnect the air trunking from the air cleaner, then disconnect the vacuum pipe and breather hose from the air box. Extract the three securing screws and lift off the air box, complete with air trunking.

3 On 1.4 litre models, disconnect the fuel supply hose from the carburettor, and on 1.6 and 1.8 litre models, disconnect the fuel supply and return hoses from the vapour separator. Be prepared for fuel spillage, and take adequate fire precautions. Plug the ends of the hoses, to prevent dirt ingress and further fuel spillage.

4 Extract the clip from the throttle cable end fitting at the bracket on the carburettor, then slide the cable end grommet from the bracket, and slide the cable end from the throttle valve lever.

5 Disconnect the coolant hoses from the automatic choke housing noting their locations, as an aid to refitting. Be prepared for coolant spillage, and plug the hoses, or secure them with their ends facing upwards, to prevent further coolant loss.

6 Disconnect the vacuum pipes from the front of the carburettor, noting their locations and routing for use when refitting **(see illustration)**.

7 Disconnect the choke heater wire and any additional wiring.

8 Unscrew the three securing nuts, and withdraw the carburettor from the inlet manifold studs.

9 Recover the gasket(s) and insulator block that fit between the carburettor and the inlet manifold.

Overhaul

HAYNES HiNT

Aerosol cans of carburettor cleaner are widely available and can prove useful in helping to clean internal passages of stubborn obstructions.

10 With the carburettor removed from the vehicle, drain the fuel from the float chamber and vapour separator (where applicable). Clean the outside of the carburettor, then remove the top cover (Section 15).

11 Blow through the jets and drillings with compressed air, or air from a foot pump - do not probe them with wire. If it is wished to remove the jets, unscrew them carefully with well-fitting tools.

12 Remove the fuel filter gauze from the inlet union, refer to Section 21, for details. Vauxhall recommend that it is renewed whenever the carburettor is cleaned.

13.6 Disconnecting the air box vacuum pipe from the carburettor - 1.6 litre model

13 Clean any foreign matter from the float chamber. Renew the float, the float needle valve and seat if wear is evident, or if the float is punctured or otherwise damaged. Check that the needle valve closes completely before the float reaches the top of its movement. See Section 15, for details of float level checking.
14 Renew the diaphragms in the part-load enrichment valve and in the accelerator pump. If additional pump or valve parts are supplied in the overhaul kit, renew these parts also.
15 Further dismantling is not recommended. Pay particular attention to the throttle opening mechanism arrangement if it is decided to dismantle it; the interlocking arrangement is important.
16 Reassemble in the reverse order to dismantling. Use new gaskets and seals throughout; lubricate linkages with a smear of molybdenum based grease.

Refitting

17 Carry out the following procedure before refitting.
a) Position the fast idle adjustment screw on the highest step of the fast idle cam.
b) Use a gauge rod or twist drill of the specified diameter to measure the opening of the primary throttle valve.
c) Adjust if necessary at the fast idle adjustment screw.
d) Note that this is a preliminary adjustment; final adjustment of the fast idle speed should take place with the engine running.
18 Refitting is a reversal of removal, but renew the gasket(s).
19 After refitting, carry out the following checks and adjustments.
20 Check the throttle cable free play and adjust if necessary, as described in Section 11.
21 Check and if necessary top-up the coolant level, as described in Chapter 3.
22 Check and if necessary adjust the idle speed and mixture, as described in Section 14.

14 Idle speed and mixture - adjustment

Note: *Refer to Section 2 before proceeding. To carry out the adjustments, an accurate tachometer and an exhaust gas analyser (CO meter) will be required*
1 To check the idle speed and mixture adjustment, the following conditions must be met:
a) The engine must be at normal operating temperature
b) All electrical consumers (cooling fan, heater blower, headlamps, etc.) must be switched off
c) The ignition timing and spark plug gaps must be correctly adjusted - see Chapters 1 and 5
d) The throttle cable free play must be correctly adjusted - see Section 11
e) The air inlet trunking must be free from leaks, and the air filter must be clean

14.3 Carburettor idle speed adjustment (throttle stop) screw (arrowed)

f) On automatic models, always select position, "P".
2 Connect a tachometer and an exhaust gas analyser to the vehicle, according to the equipment manufacturer's instructions.
3 Start the engine, and run it at 2000 rpm for approximately 30 seconds, then allow it to idle. If the idle speed is outside the specified limits, adjust by means of the throttle stop screw **(see illustration)**.
4 When the idle speed is correct, check the CO level in the exhaust gas. If it is outside the specified limits, adjust by means of the idle mixture adjustment screw. In production, the screw is covered by a tamperproof plug; ensure that no local or national laws are being broken before removing the plug **(see illustration)**.
5 On automatic models, when position "D" is selected (all electrical systems switched off), the idle speed should not drop perceptibly. If it does, the vehicle should be taken to a Vauxhall dealer for the idle-up system to be checked using special Vauxhall test equipment.
6 With the idle mixture correct, readjust the idle speed if necessary.
7 If the cooling fan cuts in during the adjustment procedure, stop the adjustments, and continue when the cooling fan stops.
8 When both idle speed and mixture are correctly set, stop the engine and disconnect the test equipment.
9 Fit a new tamperproof plug to the idle mixture adjustment screw, where this is required by law.

14.4 Tamperproof plug (arrowed) covering idle mixture adjustment screw

15 Needle valve and float - removal, inspection and refitting

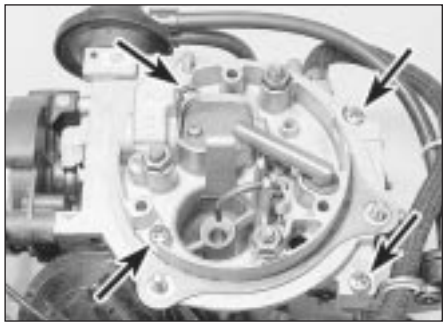
Note: *Refer to Section 2 before proceeding. A new carburettor top cover gasket must be used on reassembly. A tachometer and an exhaust gas analyser will be required to check the idle speed and mixture on completion*

Removal

1 Disconnect the battery negative lead.
2 Remove the round air cleaner, on applicable models. On other models, disconnect the air trunking from the air cleaner, then disconnect the vacuum pipe and breather hose from the air box. Extract the three securing screws and lift off the air box, complete with air trunking.
3 Thoroughly clean all external dirt from the carburettor.
4 Disconnect the fuel supply hose at the carburettor. Be prepared for fuel spillage, and take adequate fire precautions. Plug the end of the hose, to prevent dirt ingress and further fuel spillage.
5 Identify the automatic choke coolant hose locations as an aid to refitting, then disconnect the hoses. Be prepared for coolant spillage, and either plug the hoses, or secure them with their ends facing upwards, to prevent further coolant loss.
6 Disconnect the choke heater wiring plug.
7 Disconnect the lower vacuum hoses from the choke pull-down unit.
8 Remove the four carburettor top cover securing screws, noting their locations, as two lengths of screw are used **(see illustration)**.
9 Lift off the top cover and recover the gasket.

Inspection

10 Hold the cover vertically, so that the float is hanging from its pivot. Then tilt the cover until the float needle valve is just closed - the needle spring must not be compressed by the weight of the float.
11 Measure the distance, dimension x **(see illustration),** from the bottom of the float to the gasket surface on the top cover's



15.8 Carburettor top cover securing screws (arrowed)

underside. If the distance measured exceeds, or is less than, that specified, the float weight is incorrect and the float must be renewed.

12 When the float level is known to be correct, reassemble the carburettor, using a new top cover gasket. Check the idle speed and mixture settings as described in Section 14.

13 Using a pin punch, tap the float retaining pin from the base of the top cover, and lift out the float and needle valve.

14 Inspect the components for damage, and renew as necessary. Check the needle valve for wear, and check the float for leaks by shaking it to see if it contains petrol.

15 Clean the mating faces of the carburettor body and top cover.

Refitting

16 Refitting is a reversal of removal, remembering the following points.

17 After refitting, check the float and needle valve for full and free movement.

18 Use a new gasket between the top cover and the carburettor body.

19 Ensure that all hoses, pipes and wires are correctly reconnected.

20 On completion, check and if necessary top-up the coolant level, as described in Chapter 3, and check and if necessary adjust the idle speed and mixture, as described in Section 14.

16 Secondary throttle valve vacuum diaphragm - testing, removal and refitting

Note*: The diaphragm unit must be renewed in its entirety, as no spares are available*

Testing

1 If a vacuum source incorporating a gauge is available, apply approximately 300 mbars (9 in Hg) to the diaphragm unit, at the hose nearest the carburettor body. Close off the vacuum source, and check that the vacuum is held. If there is a leak, rectify or renew the leaking component. Alternately, testing of a suspect vacuum unit must be by the substitution of a known good item.

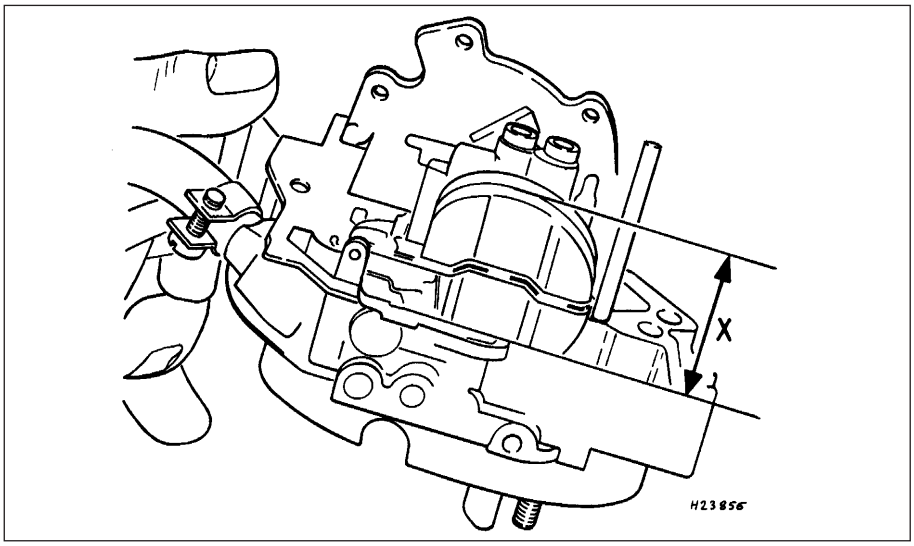
Removal

2 Remove the air cleaner, on early models. On later models, disconnect the air trunking from the air cleaner, then disconnect the vacuum pipe air breather hose from the air box. Extract the three securing screws and lift off the air box, complete with air trunking.

3 Disconnect the vacuum pipe from the diaphragm unit.

4 Prise the diaphragm operating rod balljoint from the secondary throttle valve linkage.

5 On 1.6 and 1.8 litre models, remove the two securing screws and lift the vapour separator from the bracket. Move the vapour separator to one side, taking care not to strain the fuel hoses.



15.11 Measuring the float level "X"

6 Remove the three securing screws, and withdraw the diaphragm unit complete with its bracket from the carburettor body.

Refitting

7 Refitting is a reversal of removal.

17 Power valve diaphragm - removal and refitting

Note: *Refer to Section 2 before proceeding*

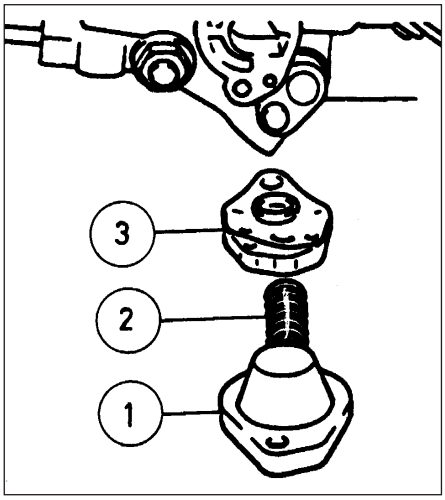
Removal

1 Disconnect the battery negative lead.

2 Remove the air cleaner, on early models. On later models, disconnect the air trunking from the air cleaner, then disconnect the vacuum pipe and breather hose from the air box. Extract the three securing screws and lift off the air box, complete with air trunking.

3 Thoroughly clean all external dirt from the area around the power valve housing.

4 Remove the two securing screws, and lift off the power valve cover, spring, and diaphragm assembly.



17.7 Carburettor power valve components

1 Cover
2 Spring
3 Diaphragm assembly

Refitting

5 Clean the mating faces of the cover and housing.

6 Locate the spring on the cover and diaphragm assembly, ensuring that it is correctly seated, then press the diaphragm assembly and cover together. Note that the vacuum hole in the diaphragm must align with the corresponding holes in the housing flange and cover.

7 Further refitting is a reversal of removal, but ensure that the diaphragm is correctly seated **(see illustration)**.

18 Accelerator pump - testing, removal and refitting

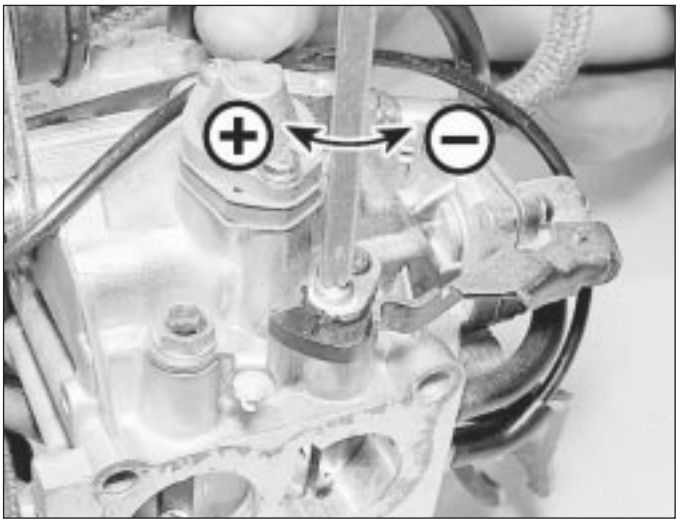
Note*: Refer to Section 2 before proceeding*

Testing

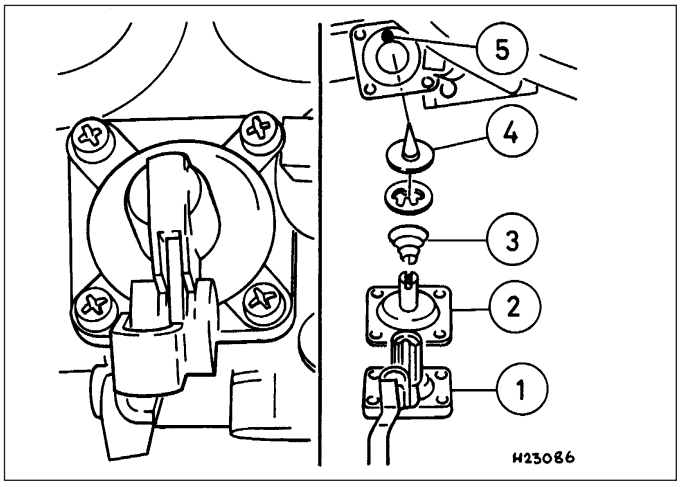
1 It will be necessary to feed the float chamber with fuel from a small reservoir during this test.

2 Position the primary barrel over an accurate measuring glass. Fully open and close the throttle ten times, taking approximately one second for each opening, and pausing for three seconds after each return stroke. Make sure that the fast idle cam is not restricting throttle travel at either end.

3 Measure the quantity of fuel delivered, and compare this with the specified value.



18.4 Accelerator pump delivery adjustment: "+" to increase, "-" to reduce



18.11 Carburettor accelerator pump components

1 Cover with operating lever
2 Diaphragm
3 Spring
4 Valve
5 Air passage

4 If adjustment is necessary, release the clamp screw and turn the cam plate in the desired direction. Tighten the clamp screw, and recheck the pump delivery **(see illustration)**.

Removal

5 Proceed as described in Section 17, paragraphs 1 and 2.
6 Thoroughly clean all external dirt from the area around the accelerator pump housing.
7 Remove the four securing screws and lift off the accelerator pump cover. Recover the diaphragm, spring, valve retainer and valve. Note the orientation of the valve retainer.

Refitting

8 Clean the mating faces of the cover and housing.
9 Check the condition of the valve, and renew if necessary.
10 Begin refitting by locating the valve, valve retainer and spring in the housing. Note that the valve retainer can only be fitted in one position. The larger diameter of the spring should rest against the valve retainer.
11 Locate the diaphragm on the housing, ensuring that the spring is correctly seated, and refit the cover. Tighten the cover securing screws progressively to avoid distorting the diaphragm **(see illustration)**.
12 Further refitting is a reversal of removal.

19 Automatic choke unit - removal, refitting and adjustment

Note: *Refer to Section 2 before proceeding. A tachometer and an exhaust gas analyser will be required to check the idle speed and mixture on completion. If the coolant housing is removed, new O-rings will be required for refitting*

Removal

1 Proceed as described in Section 17, paragraphs 1 and 2.
2 Note the position of the bi-metal housing alignment marks as an aid to refitting, if necessary making additional marks for clarity, then remove the three securing screws and lift off the bi-metal housing. Place the housing to one side, taking care not to strain the coolant hoses or electric choke heater wiring.
3 Remove the three screws securing the choke housing to the carburettor body, and withdraw the choke assembly, taking care not to bend the choke operating rod.
4 If it is necessary to remove the bi-metal housing for renewal, continue as follows; otherwise go on to paragraph 8.
5 Identify the automatic choke coolant hose locations as an aid to refitting, then disconnect the hoses. Be prepared for coolant spillage, and either plug the hoses, or secure them with their ends facing upwards, to prevent further loss of coolant.
6 Disconnect the wiring from the electric choke heater, and withdraw the bi-metal housing.
7 The coolant housing can be separated from the bi-metal housing by unscrewing the central securing bolt. Recover the O-rings from under the bolt head, and from the rim of the coolant housing.

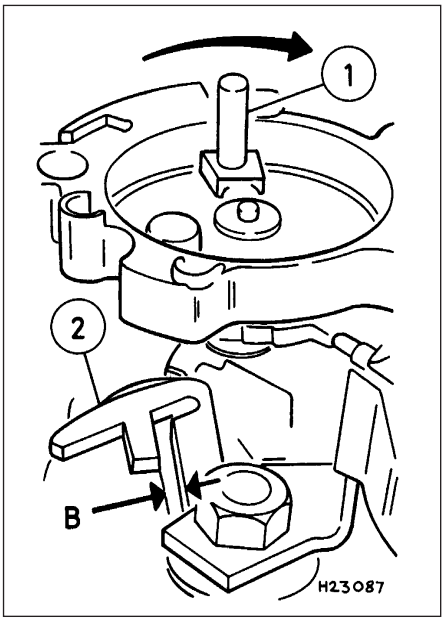
Refitting

8 Begin refitting by locating the choke assembly on the carburettor body, ensuring that the lever on the choke assembly engages with the choke operating rod. Tighten the three securing screws.
9 Check and if necessary adjust the choke valve gap and the fast idle cam position, as described in paragraphs 15 to 19, of this Section.
10 Connect the bi-metal spring to the choke lever, position the bi-metal housing on the choke housing, and loosely fit the securing screws. Align the marks on the bi-metal housing and the choke housing as noted during removal, then tighten the securing screws.
11 Where applicable, refit the coolant housing to the bi-metal housing, using new O-rings if necessary, and reconnect the coolant hoses and electric choke heater wiring.
12 Further refitting is a reversal of removal, remembering the following points.
13 If the coolant hoses have been disconnected, check the coolant level, as described in Chapter 3.
14 Check and if necessary adjust the fast idle speed, as described in paragraphs 25 to 34, of this Section.

Adjustment

Choke valve gap

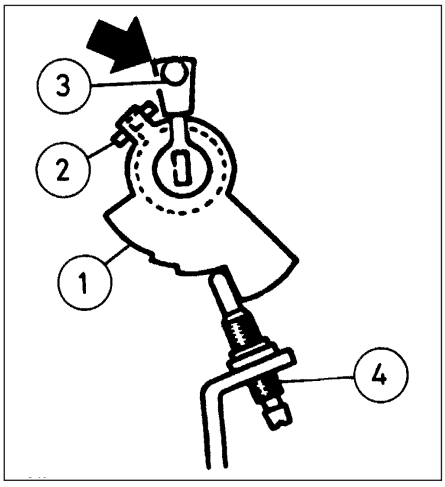
15 With the bi-metal housing removed as described in paragraphs 2 to 4, of this Section, continue as follows.
16 Press the choke operating lever fully clockwise, and retain it in position with a rubber band.
17 Move the throttle lever to the fully open position, and measure the choke valve gap between the lower side of the choke plate and the wall of the primary barrel. Check that the gap is as given in the Specifications.
18 If necessary, adjust the choke valve gap by bending the "adjuster segment (2)" If the gap is too small, enlarge gap "B", by levering with a screwdriver. If the gap is too large, decrease gap "B" using a pair of pliers **(see illustration)**.
19 If no further adjustments are to be carried out, refit the bi-metal housing, as described in paragraphs 10 to 14, of this Section.



19.18 Choke valve gap adjustment
1 Choke operating lever
2 Adjuster segment
B Choke valve gap

Fast idle cam position

20 With the bi-metal housing removed, and the choke valve gap "B", correctly set, continue as follows.
21 Open the throttle valve, then close the choke valve using light finger pressure on the choke drive lever **(see illustration)**. Close the throttle valve.
22 Check that the fast idle speed adjustment screw is resting against the stop on the second highest step of the fast idle cam.
23 If adjustment is required, first check that the choke return spring is correctly positioned, then adjust by bending the adjustment lever.
24 Refit the bi-metal housing, as described in paragraphs 10 to 14 of this Section.



19.21 Fast idle cam adjustment
1 Fast idle cam
2 Adjustment lever
3 Choke drive lever
4 Fast idle speed adjustment screw

Fast idle speed

Note: *To carry out the adjustment, an accurate tachometer and an exhaust gas analyser (CO meter) will be required*
25 Check the idle speed and mixture, as described in Section 14. The idle speed must be correct before attempting to check or adjust the fast idle speed.
26 With the engine at normal operating temperature, and a tachometer connected according to the equipment manufacturer's instructions, continue as follows.
27 Position the fast idle speed adjustment screw on the second highest step of the fast idle cam **(see illustration)**.
28 Start the engine without touching the throttle pedal, and check that the fast idle speed is as specified. If adjustment is required, stop the engine and continue as follows.
29 Remove the tamperproof cap from the fast idle speed adjustment screw, ensure that no local or national laws are being broken by doing so **(see illustration)**.
30 Ensure that the adjustment screw is still resting on the second highest step of the fast idle cam, then start the engine, again without touching the throttle pedal.
31 Turn the adjustment screw using a screwdriver, until the specified fast idle speed is obtained.
32 If the cooling fan cuts in during the adjustment procedure, stop the adjustments, and continue when the cooling fan stops.
33 On completion of adjustment, stop the engine and disconnect the tachometer.
34 Fit a new tamperproof cap to the fast idle speed adjustment screw, where this is required by law.

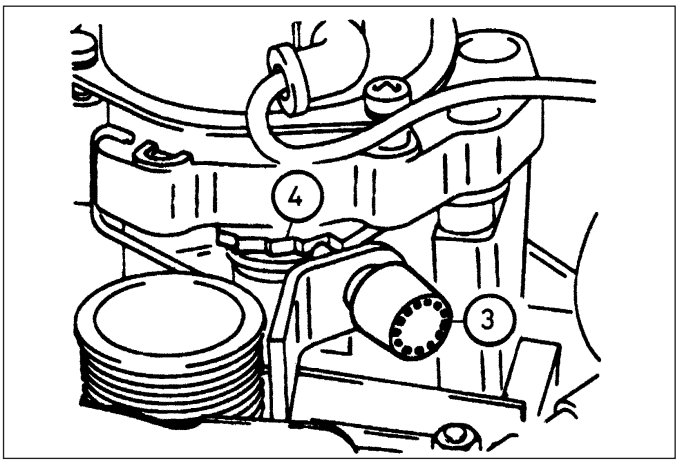
20 Automatic choke vacuum pull-down units - removal, refitting and adjustment

Main diaphragm unit

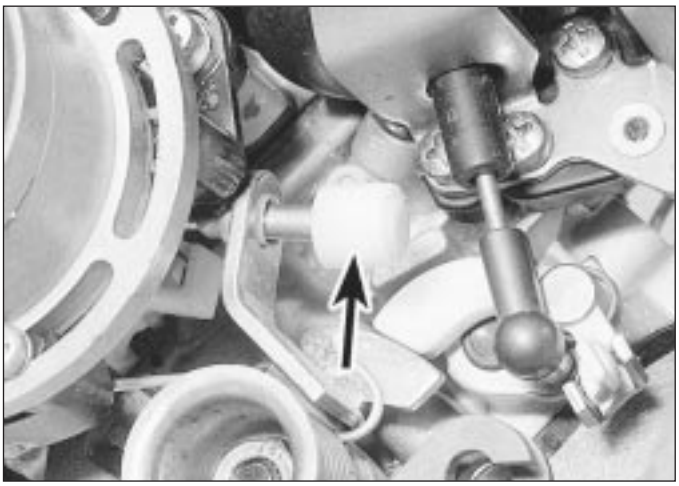
Note: *Refer to Section 2 before proceeding. A new star clip must be used when refitting the diaphragm unit. Test vacuum units as described in Section 16, paragraph 1.*

Removal

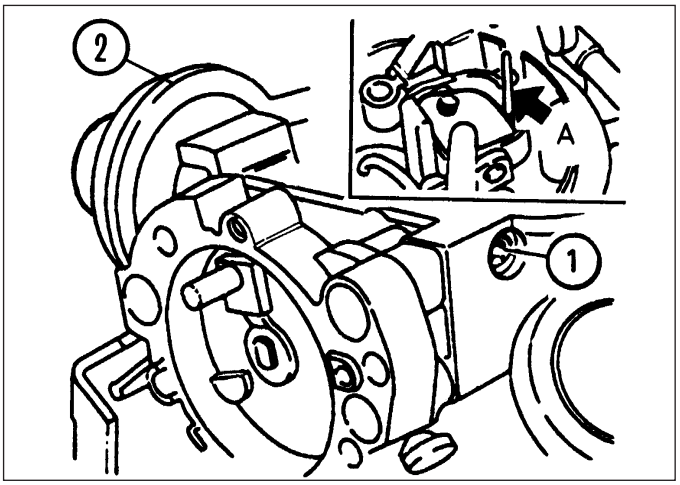
1 Proceed as described in Section 17, paragraphs 1 and 2.
2 Disconnect the diaphragm unit vacuum pipes.
3 Using a pin punch, tap out the roll pin securing the diaphragm unit to the carburettor top cover.
4 Note the position of the bi-metal housing alignment marks as an aid to refitting, if necessary making additional marks for clarity, then remove the three securing screws, and lift off the bi-metal housing. Place the housing to one side, taking care not to strain the coolant hoses or electric choke heater wiring.



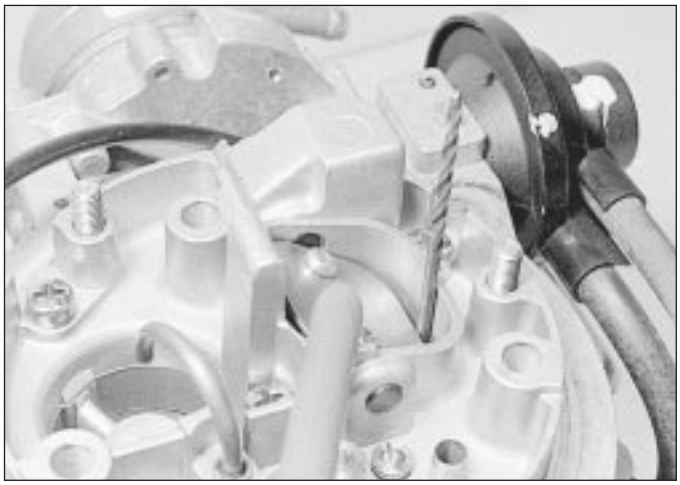
19.27 Fast idle speed adjustment
3 Fast idle speed adjustment screw
4 Screw positioned on second highest step of cam



19.29 Tamperproof cap (arrowed) fast idle speed adjustment screw



20.12A Choke vacuum pull-down adjustment
1 Adjustment screw 2 Diaphragm unit A Twist drill



20.12B Checking the vacuum pull-down gap using a twist drill

5 Remove the three screws securing the choke assembly to the carburettor body. Allow the choke assembly to drop down, but do not disconnect the choke linkage.
6 Remove the star clip that secures the diaphragm unit to the carburettor top cover, and withdraw the diaphragm unit.

Refitting

7 Refitting is a reversal of removal, but use a new star clip to secure the diaphragm unit to the carburettor top cover. Before refitting the air box to the top of the carburettor, check and if necessary adjust the choke pull-down, as follows.

Vacuum pull-down

Adjustment

8 With the air cleaner or air box removed from the top of the carburettor, as described in Section 17, paragraph 2, continue as follows.
9 Note the position of the bi-metal housing alignment marks as an aid to refitting, if necessary making additional marks for clarity, then remove the three securing screws, and lift off the bi-metal housing. Place the housing to one side, taking care not to strain the coolant hoses or electric choke heater wiring.
10 Position the fast idle speed adjustment screw on the highest step of the fast idle cam, and check that the choke valve is closed.
11 Move the pull-down arm towards the diaphragm unit by pushing on the adjustment screw until resistance is felt. Hold the arm in this position.
12 Using a drill shank of appropriate diameter, or a similar item, measure the clearance between the lower side of the choke plate and the wall of the primary barrel **(see illustrations)**. Check that the clearance is as given for the "small" choke pull-down gap in the Specifications.
13 If adjustment is necessary, turn the adjustment screw in the appropriate direction, using an Allen key, until the clearance is correct.
14 Now push the pull-down arm towards the diaphragm unit as far as its stop, and hold the arm in this position.
15 As before measure the clearance between the lower side of the choke plate and the wall of the primary barrel. Check that the clearance is as given for the "large" choke pull-down gap in the Specifications.
16 If adjustment is necessary, turn the adjustment screw in the appropriate direction until the clearance is correct.
17 Connect the bi-metal spring to the choke lever, position the bi-metal housing on the choke housing and loosely fit the securing screws. Align the marks on the bi-metal housing and the choke housing as noted during removal, then tighten the securing screws.
18 Refit the air box to the top of the carburettor on completion.

Secondary pull-down solenoid

Removal

19 This unit operates in conjunction with the main diaphragm unit.
20 To remove the solenoid unit, first continue as described in Section 17, paragraphs 1 and 2.
21 Disconnect the diaphragm unit vacuum pipe.

20.22 Secondary choke pull-down solenoid securing screw and earth lead

22 Disconnect the wiring plug, then unscrew the securing screw, and withdraw the solenoid unit and its mounting bracket from the carburettor. Note that the securing screw also secures the wiring plug earth lead **(see illustration)**.

Refitting

23 Refitting is a reversal of removal, but ensure that the wiring plug earth lead is in place under the solenoid bracket securing screw.

21 Carburettor filter - removal and refitting

Removal

1 A small tubular filter gauze is fitted into the carburettor top cover's fuel inlet union to remove any particles of dirt from the fuel.
2 To ensure a clean fuel supply and to prevent the risk of misfiring, poor starting or other problems due to a restricted fuel supply, this filter must be cleaned and/or renewed at the interval specified in Chapter 1.
3 To reach the filter, remove the air cleaner or air box, as applicable, then disconnect and plug the hose from the fuel pump or vapour separator to the top cover union.
4 Remove the filter by hooking it out with a small screwdriver, or by snaring it with a long thin screw (3 mm thread size, screwed approximately 5 mm into the filter).
5 If the filter is blocked or heavily fouled, or if it is torn, distorted or damaged in any way, it must be renewed. If it is fit for further use, clean it using a jet of compressed air or by brushing away particles of dirt with an old soft toothbrush. Then flushing it in clean solvent, taking care not to allow any overspray to get into your eyes; if petrol is used, take care to prevent the risk of fire.

Refitting

6 On refitting the filter, press it into the union until it catches **(see illustration)**. The remainder of the reassembly procedure is the reverse of removal.

22 Throttle valve dashpot (automatic models) - adjustment

1 Remove the air cleaner or air box, refer to Section 3.
2 Ensure that the lever **(see illustration)** is in the idling position.
3 Slacken the locknut and unscrew the dashpot until a gap of 0.05 mm (0.002 in) exists between the lever and the dashpot tip. Then screw the dashpot downwards 2.5 full turns and tighten the locknut.
4 Refit all removed components.

23 Throttle position sensor (automatic transmission models) - removal and refitting

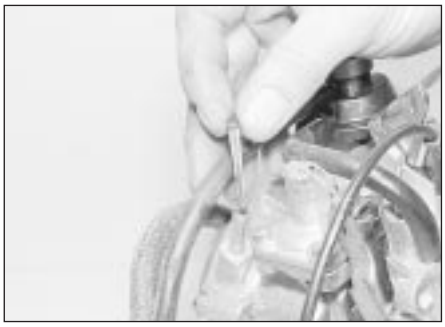
Removal

1 Disconnect the battery earth lead.
2 Disconnect the wiring plug from the sensor.
3 Either unscrew the two securing screws and withdraw the sensor from its bracket, or unbolt the bracket.

Refitting

4 Refitting is the reverse of the removal procedure, noting the following points.

*a) Install the sensor when the throttle valve is fully closed and ensure that the adapter, "1" **(see illustration),** seats correctly on the throttle valve spindle.*
b) Tighten the screws carefully.



21.6 Refitting the carburettor fuel filter

24 Idle speed increase valve - testing

1 Certain models are fitted with an idle speed increase valve that is attached to the side of the carburettor.
2 To test the operation of this valve first remove the air filter and vacuum hose.
3 With the valve's plug connected, have someone turn the ignition on (but do not start the engine). A mechanical shifting noise should be heard. If not replace the unit.
4 After refitting replace the vacuum hose and air filter.

25 Idle cut-off solenoid (1.8 litre models) - description and testing

Note: *Refer to Section 2 before proceeding*

Description

1 On 1.8 litre models, the carburettor is fitted with an idle cut-off solenoid. This is an electrically operated valve, which interrupts the idle mixture circuit when the ignition is switched off, thus preventing the engine from running-on **(see illustration)**.
2 The idle cut-off solenoid is energised all the time that the ignition is switched on. A defective solenoid, or a break in its power supply, will cause the engine to stall or idle roughly, although it will run normally at speed.

Testing

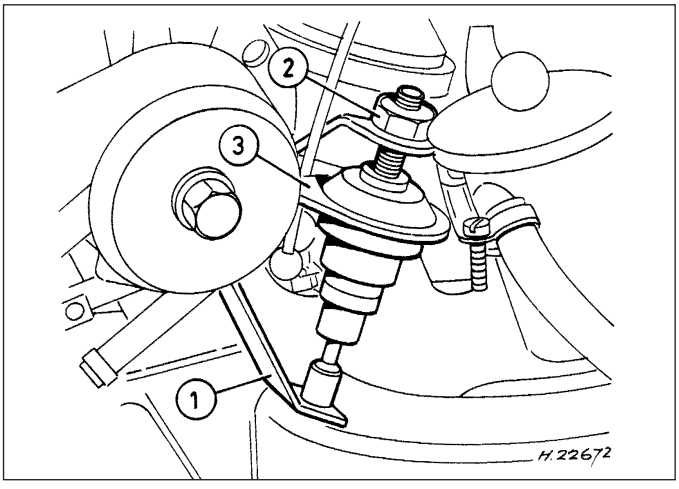
3 If the operation of the solenoid is suspect, first check that battery voltage is present at the solenoid terminal when the ignition is switched on. Use a 12 volt test lamp or similar test device.
4 If no voltage is present, then the fault lies in the wiring to the solenoid. If voltage is present, the solenoid can be tested as follows.
5 With the solenoid unscrewed from the carburettor, connect the body of the solenoid to the negative terminal of a 12 volt battery. When the battery positive terminal is connected to the solenoid centre terminal, there should be an audible click, and the needle at the tip of the solenoid should retract.
6 A defective idle cut-off solenoid must be renewed.

26 Inlet manifold - removal and refitting

Note*: Refer to Section 2 before proceeding. A new manifold gasket must be used on refitting*

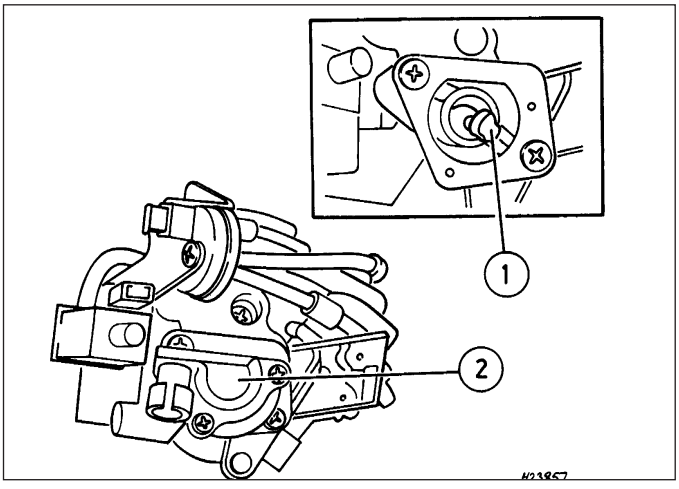
Removal

1 Disconnect the battery negative lead.
2 Drain the cooling system, as described in Chapter 3.
3 Proceed as described in Section 13, paragraphs 2 to 7 inclusive, ignoring the reference to coolant spillage in paragraph 5.



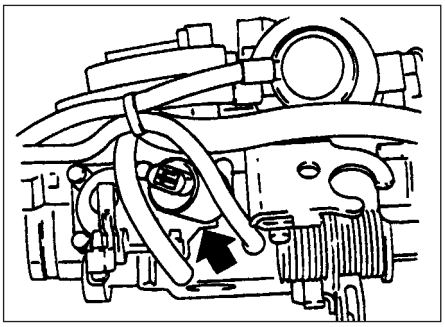
22.2 Adjusting the throttle valve dashpot - models with automatic transmission

1 Lever 2 Locknut 3 Dashpot



23.4 Throttle position sensor - models with automatic transmission

1 Adapter 2 Sensor



25.1 Carburettor idle cut-off solenoid (arrowed) - 1.8 litre models

26.4 Disconnecting the coolant hose . . .

26.5 . . .and the camshaft cover breather hose (arrowed) from the inlet manifold - 1.6 litre model

4 Disconnect the coolant hose from the rear of the manifold **(see illustration)**.
5 Where applicable, disconnect the camshaft cover breather hose from the rear of the manifold **(see illustration)**.
6 Unscrew the union and disconnect the brake servo vacuum hose from the manifold.
7 On 1.4 and 1.6 litre models, disconnect the wiring from the temperature gauge sender.
8 Unscrew and remove the top alternator mounting nut and bolt.
9 On 1.4 and 1.6 litre models, disconnect and remove the stub hose that connects the crankcase breather tube to the rear of the camshaft housing.
10 Make a final check to ensure that all relevant hoses, pipes and wires have been disconnected.
11 Unscrew the securing nuts, and withdraw the manifold from the cylinder head **(see illustration)**. Note the position of the rear engine lifting bracket, which is secured by one of the manifold nuts, and recover the manifold gasket.
12 It is possible that some of the manifold studs may be unscrewed from the cylinder head when the manifold securing nuts are unscrewed. In this event, the studs should be screwed back into the cylinder head once the manifold has been removed, using two manifold nuts locked together.
13 If desired, the carburettor can be removed from the manifold, referring to Section 13, if necessary.

Refitting

14 Refitting is a reversal of removal, remembering the following points.
15 If the carburettor has been removed from the manifold, refit it, using a new gasket.
16 If the alternator mounting bracket has been unbolted from the manifold, refit it before refitting the manifold, as access to the securing bolt is extremely limited once the manifold is in place.
17 Refit the manifold using a new gasket, and ensure that the engine lifting bracket is in place under the relevant manifold nut. Tighten the nuts to the specified torque.
18 Ensure that all relevant hoses, pipes and wires are correctly reconnected.
19 Refill the cooling system, as described in Chapter 3.
20 Check the throttle cable free play and adjust if necessary, as described in Section 11.
21 If the carburettor has been disturbed, check and if necessary adjust the idle speed and mixture, as described in Section 14.

26.11 Withdrawing the inlet manifold - 1.6 litre model