Section K5 - Carburettors and Automatic Choke

Part 1 - Solex 4A1 Carburettor

Two different carburation systems are used dependent upon the specification of the vehicle. Either a Solex 4A1 or twin S.U. HIF7 carburetters are fitted, both have an automatic choke system.

For details of the carburetter(s) fault diagnosis, refer to Section K8.

Solex 4A1

Description

The Solex 4A1 carburetter (see Fig. K42) is a four barrel, two stage down draught carburetter. Two barrels combine to become the first or primary stage and the other two barrels form the secondary stage.

In the primary stage the throttle butterflies are operated directly whereas, the secondary stage butterflies depend upon the throttle lever of the primary stage after the lock of the automatic choke mechanism has disengaged.

The primary or first stage jet system is equipped with fixed fuel and air correction jets whereas, the secondary stage has variable (needle controlled) fuel jets.

There are three main parts to the carburetter, namely, the throttle body, the carburetter housing and the carburetter cover.

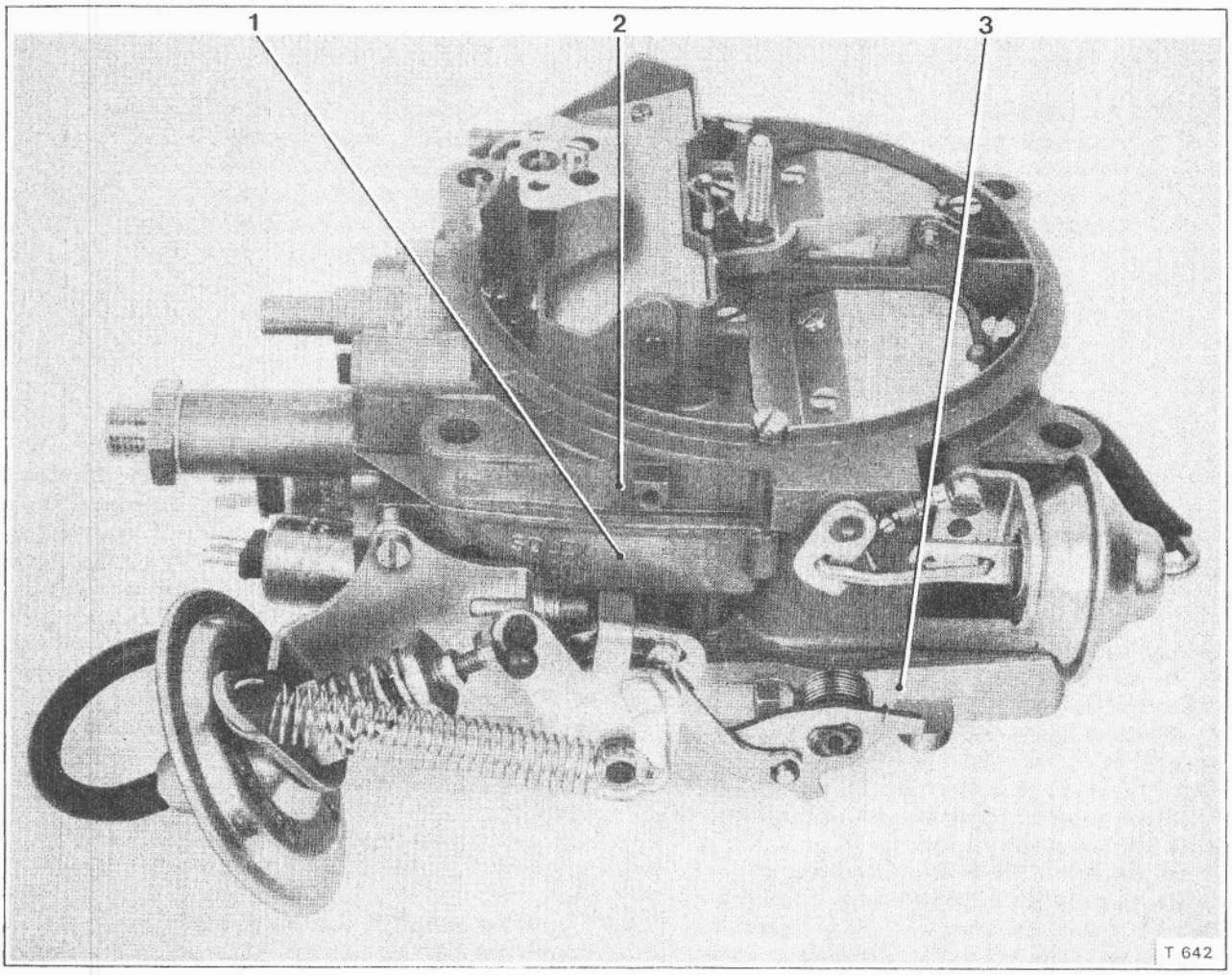

Fig. K42 Solex 4A1 carburetter

1 Carburetter housing 2 Carburetter cover 3 Throttle body

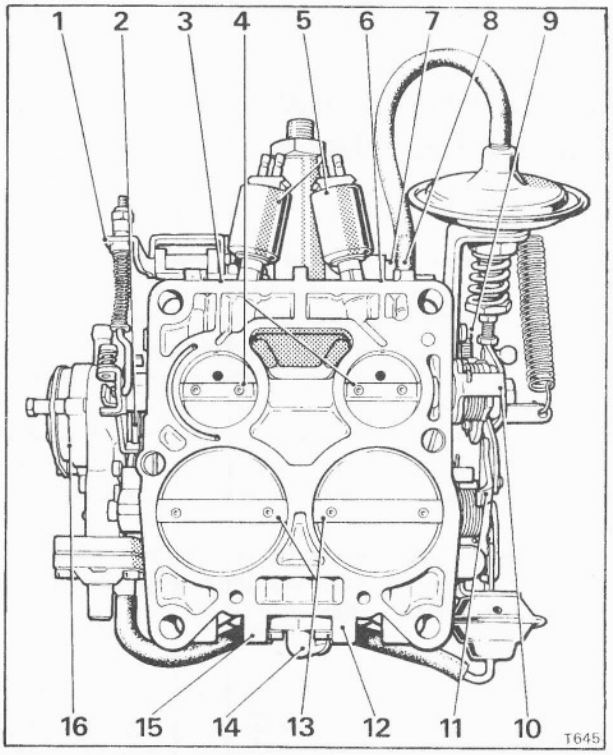

Fig. K43 Throttle body

1 Acceleration pump lever
2 Fast-idle lever
3 Location of idle mixture regulating screw
4 Primary stage throttle spindle
5 Anti 'run-on' solenoids
6 Location of idle mixture regulating screw
7 Vacuum advance capsule tapping (hidden)
8 Throttle damper/jack vacuum tapping
9 Idle stop screw
10 Primary stage throttle lever
11 Secondary stage throttle lever
12 Air flap damper vacuum tapping
13 Secondary stage throttle spindle
14 Speed control unit vacuum tapping
15 Choke pulldown vacuum tapping
16 Automatic choke assembly

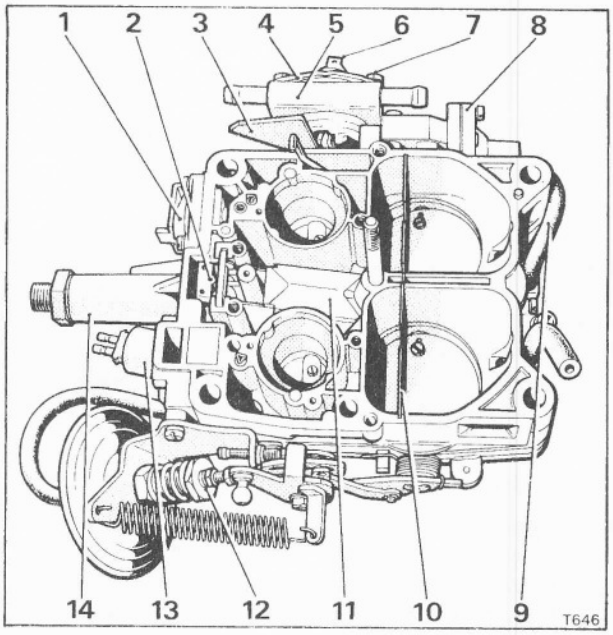

Fig. K44 Carburetter housing

1 Acceleration pump
2 Float needle valve
3 Fast-idle lever
4 Automatic choke bi-metal assembly
5 Engine coolant chamber
6 Bi-metal electrical terminal
7 Bi-metal retaining screws
8 Automatic choke pulldown unit
9 Choke pulldown vacuum hose
10 Deflector
11 Float
12 Throttle damper/jack
13 Anti 'run-on' solenoid
14 Fuel filter housing

Throttle body (see Fig. K43)

The throttle body is the lowest part of the carburetter assembly. Supported in this assembly are the two butterfly spindles, one for the primary stage (item 4) and one for the secondary stage (item 13). These spindles rotate in opposite directions and carry their respective butterfly valves which are retained by screws.

On one end of the primary stage butterfly spindle is located the throttle lever assembly (item 10) and on the other end of this spindle is situated the operating rod for the primary stage acceleration pump (item 1) and the lever (item 2) for the stepped disc of the automatic choke mechanism.

The secondary stage butterfly spindle carries its part of the throttle lever assembly (item 11) on one end and at the other end, a small pin which by means of a catch prevents the secondary butterflies opening under certain conditions of choke operation.

At the front of the throttle body and operating in conjunction with the primary stage, are two idling mixture regulating screws (items 3 and 6) and adjacent, are located two anti 'run-on' solenoid valves (item 5) which cut off the fuel supply in the idling gallery of the carburetter when the ignition is switched off. There are two tubes pressed into the front of the throttle body one above the other, these are used for tapping the depression; the upper connection (item 7) is for the ignition distributor vacuum advance capsule and the lower (item 8) for the diaphragm unit of the vacuum throttle damper/jack.

At the rear of the assembly there are three connections for tapping the inlet manifold depression, the large centre take-off (item 14) is the connection for the vehicle speed control system; of the other two smaller connections, one containing a restrictor is the vacuum signal for the choke pulldown

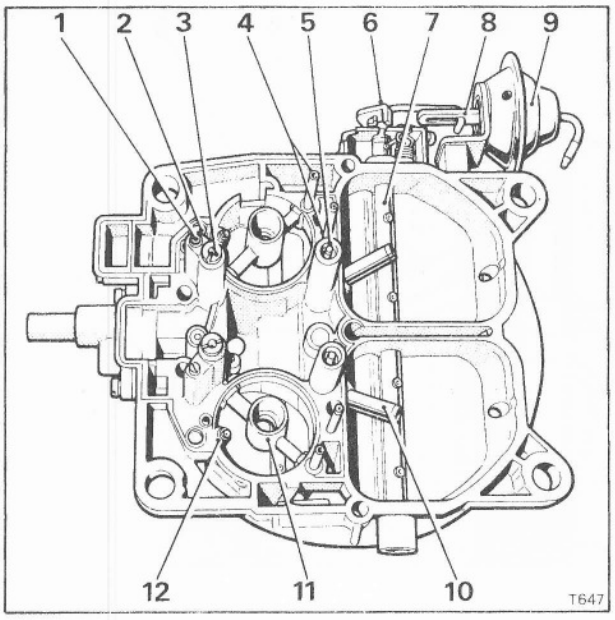

Fig. K45 Carburetter cover (inverted view)

1 Idling jet screw
2 Primary fuel jet housing
3 Primary main fuel jet
4 Riser tubes
5 Secondary main fuel jet
6 Damper lever
7 Secondary air flap spindle
8 Damper linkage
9 Damper unit
10 Secondary discharge tube
11 Primary discharge branches/diffuser
12 Acceleration pump discharge jet

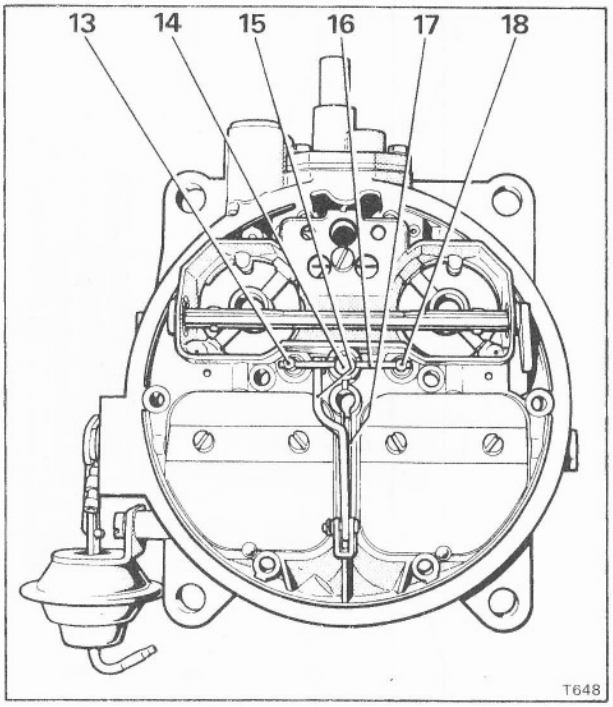

Fig. K46 Carburetter cover

13 Secondary jet needle
14 Guide pin
15 Transfer lever
16 Transverse rod
17 Cam disc (hidden)
18 Secondary jet needle

mechanism (item 15) and the other the vacuum signal for the secondary stage air flap damping device (item 12).

The throttle body is fixed to the carburetter housing by means of two cheesehead screws, with a gasket fitted between the two parts.

Carburetter housing (see Fig. K44)

The carburetter housing comprises four mixing chambers and the float chamber. The float chamber contains the float (item 11) with its linkage and a needle valve assembly (item 2).

In the mixing chambers of the primary/first stage are the choke tube inserts. Each of the two secondary stage mixing chambers is divided by a deflector (item 10).

At the side of the housing is situated the automatic choke and pulldown mechanism (item 8). Within the main part of the automatic choke is housed the bi-metal assembly (item 4) which is heated electrically and by hot engine coolant dependant upon the starting conditions. Within this bi-metal housing and riveted to the end of the spindle is the intermediate lever. Also on the spindle but located between the bi-metal housing and carburetter housing is located a bush which carries on its inner face a lever (item 3) that has the fast-idle notched segment cam at one end, whilst the other end is designed as a weight to release the fast-idle mechanism.

A rod situated within the body connects the choke pulldown unit to the intermediate lever. A hose (item 9) connects the depression in the throttle body with the choke pulldown unit.

In the upper part of the bi-metal housing there is an engine coolant chamber (item 5) with feed and return connections.

The bi-metal cover (item 4) is provided with a ceramic insert, which also carries the heating coil and the bi-metal spring; on the outside of the cover is the electrical terminal (item 6). The cap is retained in the bi-metal housing by means of a holding plate, three small screws (item 7) and three plastic spacer bushes.

The secondary throttle lock-out lever is supported on a pivot on the carburetter housing.

At the front of the carburetter housing is the fuel filter housing (item 14), the connection with the fuel feed pipe is by a threaded adapter, behind which is located a nylon mesh filter. Adjacent is located the primary stage acceleration pump (item 1), this consists of a pump lever with pivot spindle, pump cover, pump gasket/diaphragm with centre

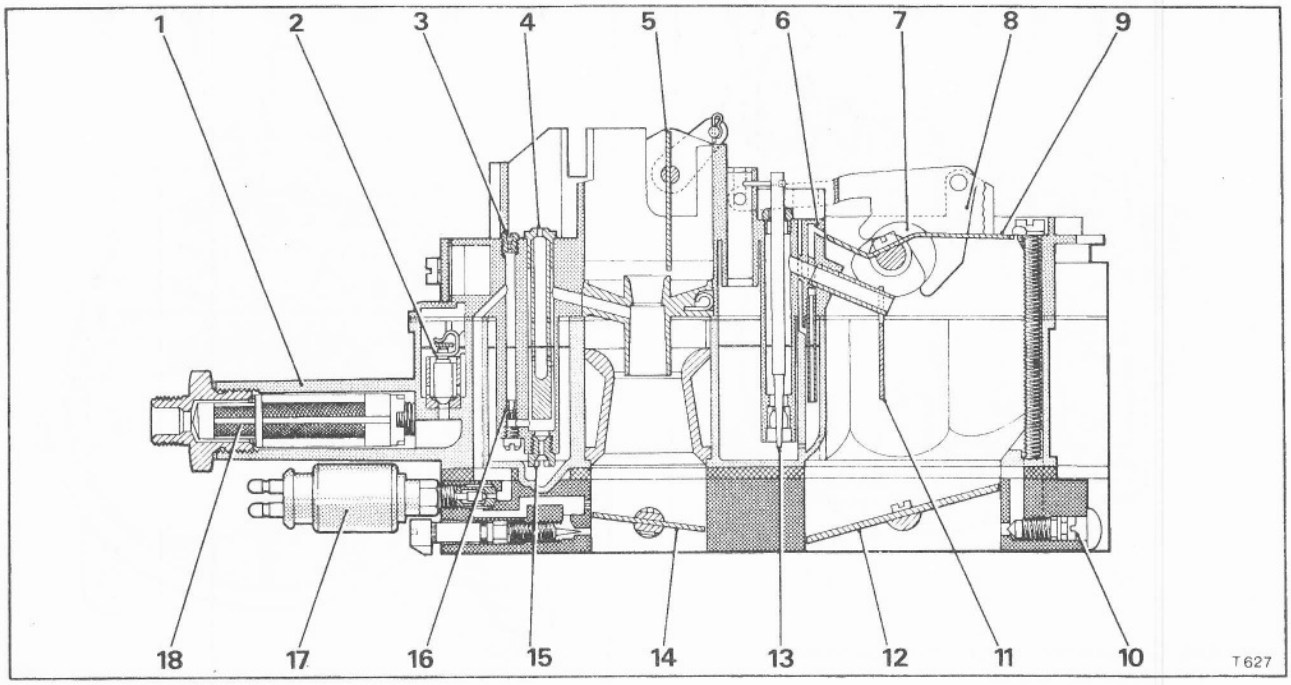

Fig. K47 Solex 4A1 (cross section)

1 Fuel filter housing
2 Needle valve
3 Idling air correction jet
4 Primary air correction jet
5 Choke strangler flap
6 Secondary riser passage
7 Cam
8 Cam lever
9 Secondary air flap
10 Secondary air balance screw
11 Deflector
12 Secondary throttle butterfly
13 Secondary needle
14 Primary throttle butterfly
15 Primary main fuel jet
16 Idling fuel jet
17 Anti 'run-on' solenoid
18 Fuel filter

disc and operating spindle, return spring and finally a plastic cap. A ball valve is fitted into the fuel supply to the acceleration pump chamber; other ball valves are fitted between the acceleration pump and each of the primary stage mixing chambers.

Three cheesehead screws retain the throttle damper/jack (item 12) via a mounting plate to the side of the carburetter housing. In addition, the mounting plate also carries the 'fixed' idle stop screw.

Carburetter cover (see Figs. K45 and K46)

The carburetter cover is fitted on top of the carburetter housing and secured by cheesehead screws of differing lengths. The fuel jet housings for the main jet system of the primary and secondary stages and of the idling system (primary stage) are cast as an integral part to the underside of the cover. Discharge branches with inner venturii for the primary stages are fitted into the mixing tube housings.

The two jet housings (item 2) of the idling system which are connected to the housings of the main primary system, have pressed-in jets enclosed by screws (item 1). The two housings (item 5) for the main jet system of the secondary stage have pressed-in inserts, their areas being governed by tapered needles.

The discharge tubes and branches (items 10 and 11) of the main jet systems of both primary and secondary stages, and the riser tubes (item 4) are pressed into position.

The choke strangler plate is carried by the spindle in the upper part of the primary stage; this spindle is connected by levers and a rod to the automatic choke spindle.

Across the two mixing chambers of the secondary stage is fitted a spindle (item 7) carrying the air flaps, to this spindle is secured a lever (item 6) and rod, the rod being suspended in the slot of the damper device rod. The damping device (item 9) is secured to the carburetter cover by means of a mounting plate and a cheesehead screw. A hose transmits the vacuum signal to the diaphragm unit from the connection in the throttle body. The air flaps spindle is closed by a return spring mechanism situated adjacent to the damping device.

The jet needles (item 18) of the secondary stage hang on a transverse rod (item 16) supported by a guide pin (item 14) that slides in a vertical bore, the assembly is operated by a transfer lever (item 15) which in turn is actuated by a cam (item 17) attached to the secondary stage spindle air flap.

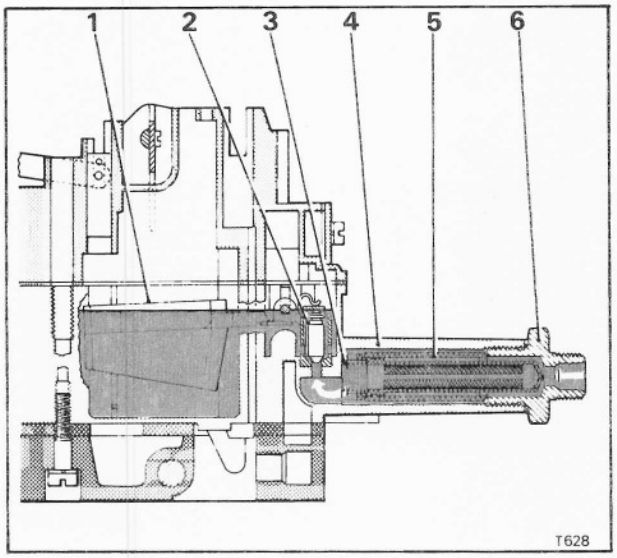

Fig. K48 Float system
1 Float assembly
2 Needle valve
3 Spring
4 Fuel filter housing
5 Fuel filter
6 Adapter

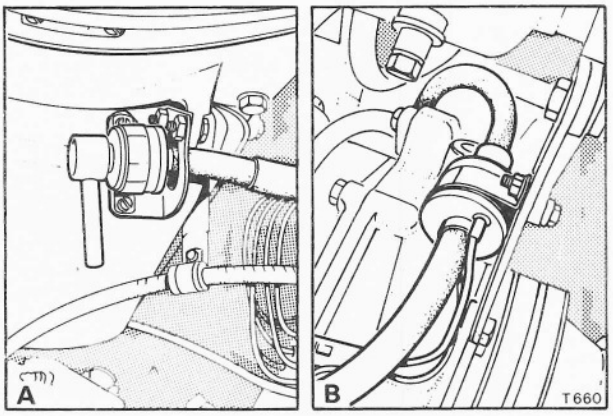

Fig. K49 Locations of the float chamber vent valve
A Bell housing bottom cover
B Refrigeration compressor

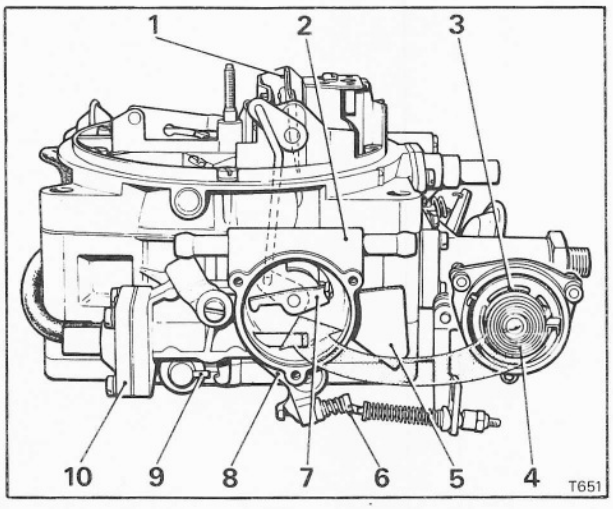

Fig. K50 Automatic choke mechanism
1 Choke strangler
2 Engine coolant chamber
3 Electrical heating element
4 Bi-metal spring
5 Fast-idle counterbalance lever
6 Fast-idle speed adjustment screw
7 Intermediate lever
8 Stop lever
9 Secondary stage lock-out pin
10 Choke pulldown

Operation

The float system

The float system (see Fig. K48) provides a constant level of fuel within the carburetter.

Fuel delivered by the fuel pump(s) assembly enters the float chamber via the filter (item 5) and the open float needle valve. As the fuel level within the float chamber rises, the float moves upwards and this movement is transmitted through the float linkage to the float needle. When the pre-set fuel level is reached the float linkage moves the float needle onto the valve seat and cuts off the flow of fuel. When fuel is drawn from the float chamber, the fuel level falls, the float moves in a downwards direction actuating the linkage and allows fuel under pressure from the pump(s) assembly to lift the needle valve from its seat and flow into the float chamber. Ventilation of the float chamber fuel vapour is either.

(a) via a hose to a vent valve (see Fig. K49) and internally to the air filter/silencer assembly
or
(b) the internal means only.

The fuel level inside the float chamber is adjustable and if necessary should be set in accordance with the instructions given in the 'Service adjustments' section.

Automatic choke

(1) General operation

To bring the mechanism into operation the accelerator should be depressed once and then released before attempting to start the engine.

The bi-metal (item 4) of the automatic choke (see Fig. K50) is heated electrically (dependant upon the ignition being switched on) and by engine coolant (as the temperature of the engine coolant rises).

When the engine is cold, the choke strangler flap (item 1) above the primary stage is held closed

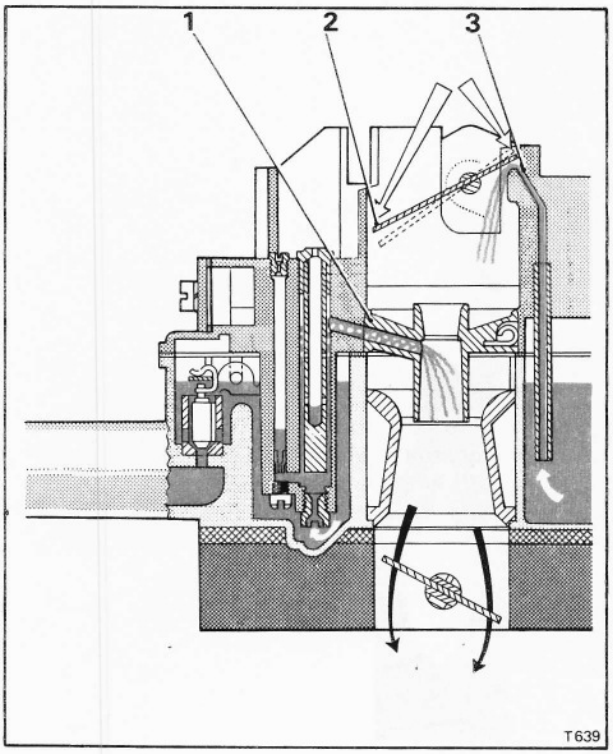

Fig. K51 Automatic choke - mixture flow
1 Primary discharge tube
2 Choke strangler flap
3 Primary riser discharge tube

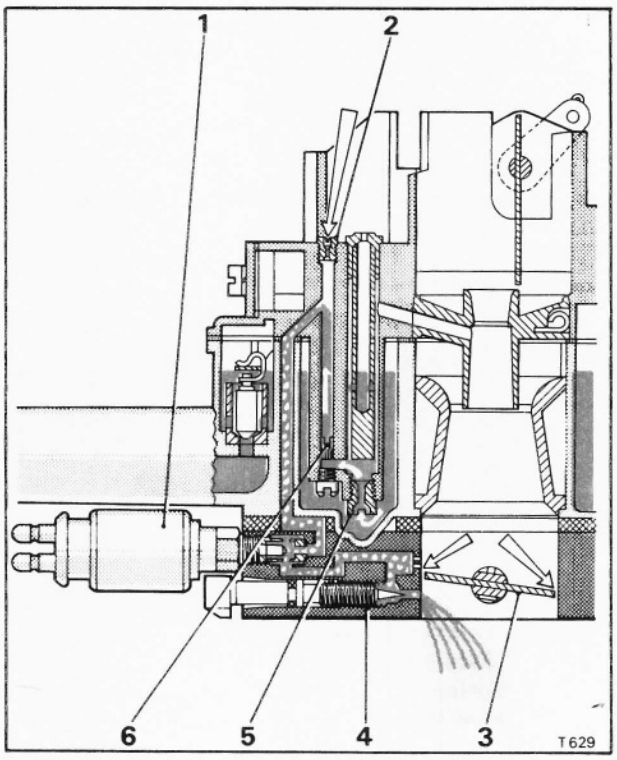

Fig. K52 Idling system
1 Anti 'run-on' solenoid valve
2 Air jet
3 Primary stage throttle butterfly
4 Idle mixture regulating screw
5 Main fuel jet (primary stage)
6 Idle fuel jet

via a mechanical linkage, the tension of the choke bi-metal spring (item 4) being applied to the intermediate lever (item 7).

As the cold engine starts (see Fig. K51), the depression created in the primary stage mixing chambers below the choke strangler flap will draw in fuel from the discharge branch tubes. Manifold depression acts upon the choke pulldown diaphragm and opens the choke strangler flap to the pulldown setting. This allows sufficient air required for the starting mixture to flow past the strangler into the mixing chambers; additional fuel is drawn into the mixing chambers through the primary riser discharge tubes for a limited period.

With the heating-up of the choke bi-metal spring, the choke strangler flap begins to open and the fuel mixture strength weakens until at normal engine operating temperature the choke strangler flap is fully opened.

(2) Pulldown unit

Working in conjunction with the automatic choke is the depression controlled choke pulldown.

Once the engine has started, this device which is arranged in a separate housing alongside the automatic choke bi-metal, tries to open the choke strangler flap against the closing force of the bi-metal spring. This prevents an excessive enrichment of the starting mixture. Under these conditions, the high inlet manifold depression that is evident below the almost closed throttle butterflies, is transmitted via a hose to the choke pulldown diaphragm (see Fig. K50, item 10). As the diaphragm flexes a rod is moved against the bi-metal spring pressure and pulls the automatic choke intermediate lever so that the choke strangler valve is opened by a pre-set amount.

The automatic choke pulldown gap is adjustable and if necessary should be set in accordance with the instructions given in the 'Service adjustments' section.

(3) Fast-idle mechanism

When the engine is started from cold, a rich mixture is necessary to avoid hesitation or stalling on driveaway. This is achieved by the relatively slow response of the choke bi-metal which controls the strangler plate to give a progressively weaker mixture as the engine warms-up. As this initially rich mixture would cause the engine to run unevenly at idle, a fast-idle mechanism is fitted to overcome the condition.

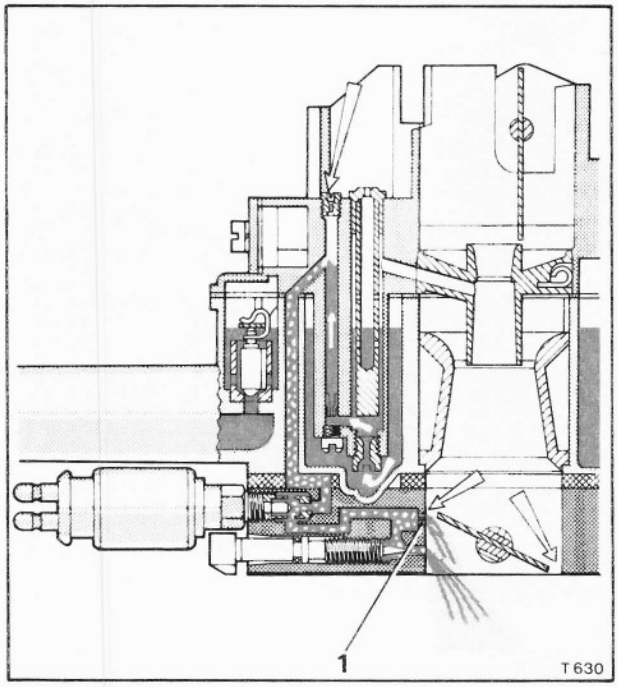

Fig. K53 Progression from idling system
1 Progression port

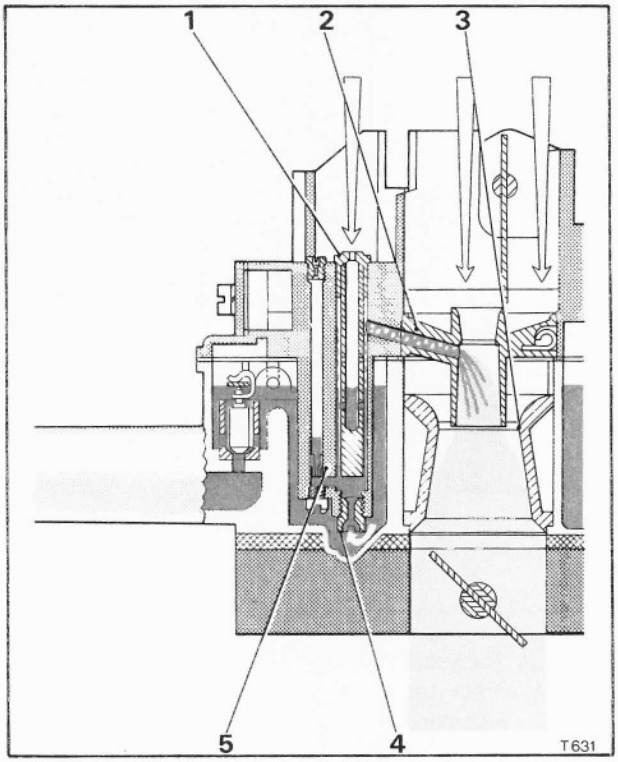

Fig. K54 Primary stage
1 Air correction jet
2 Discharge branch tube
3 Mixing chamber
4 Main jet
5 Mixing tube housing

When the accelerator pedal has been fully depressed prior to cold starting, the stop lever (see Fig. K50, item 8) attached to the primary throttle spindle is in contact with the high step of the fast-idle cam.

On starting therefore, the throttles will be opened beyond the normal idle position giving a higher idle speed. As the engine warms-up, opening the throttles beyond the fast-idle position will release the counterweight which in turn, will rotate the fast-idle cam as far as the bi-metal controlled intermediate lever will allow. The stop lever returns to progressively lower steps on the fast-idle cam (giving correspondingly lower idle speeds) until normal operating conditions are attained. However, if the throttles are not opened beyond the fast-idle position during the warm-up period, the stop lever will remain on the high step of the fast-idle cam and the idle speed will not decrease as the engine warms-up.

Idling system

For engine idling, fuel is drawn via the main and idle fuel jets through internal passages in the carburetter cover where it mixes with air drawn through the idle air correction jets. The emulsion (which is the initial blend of fuel and air) then passes through further internal passages in the housing and discharges through ports in the throttle body adjacent to the anti 'run-on' solenoid valves and below the throttle butterflies. This supply of the initial fuel/air mixture is cut-off by the anti 'run-on' solenoid valves when the ignition is switched off. The quantity of idle fuel/air mixture is determined by the idle mixture regulating screws (see Fig. K52, item 4).

The air, required to form the final combustible mixture in the inlet manifold is drawn past the almost closed throttle butterflies (item 3).

The ports situated above the almost closed throttle butterfly valves are progression ports. These discharge fuel emulsion only when the throttle butterflies are opened wider (see Fig. K53) and together with the acceleration pump, serve to improve the transition from the idling system to the main jet system of the primary stage.

The main jet systems

The carburetter has twin primary and secondary stages, however, only the operation of one from each of the stages is described for simplicity.

Fuel is drawn from the float chamber through the primary stage main jet into the mixing tube housing (see Fig. K54, item 5) up to the predetermined level. Air enters through the air correction jet and mixes with the fuel, the depression in the mixing chamber (item 3) then draws this mixture out through the discharge branch (item 2).

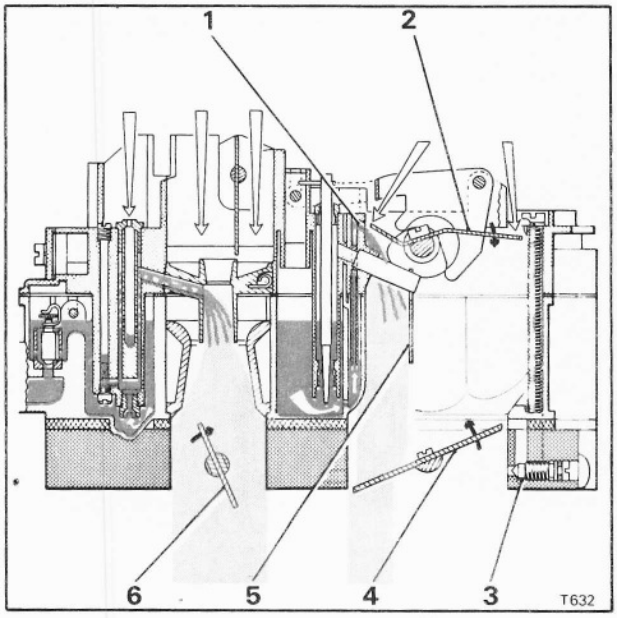

Fig. K55 Secondary stage commencing operation
1 Riser passage
2 Secondary air flap
3 Air balance screw
4 Secondary stage throttle butterfly
5 Deflector
6 Primary throttle butterfly

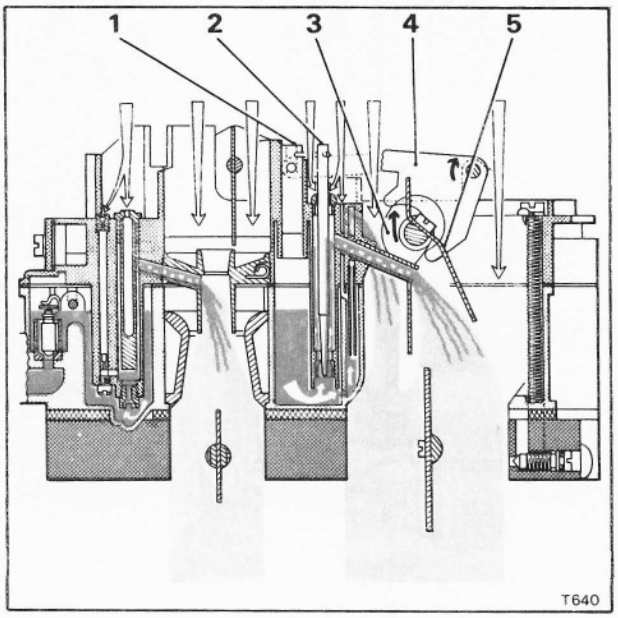

Fig. K56 Secondary stage full operation
1 Guide pin
2 Needle
3 Cam disc
4 Lever
5 Secondary air flap

The flow of air through the secondary stage throttle butterflies is balanced by means of the regulating screws (see Fig. K55, item 3). **These screws are set by the carburetter manufacturer using special equipment, therefore, they must not be adjusted.**

The opening of the secondary stage throttle butterfly is effected by a lever system, when the throttle butterfly of the primary stage has reached approximately three-quarters of its full open travel and the automatic choke mechanism (after opening the choke strangler valve) has released the lock arrangement on the secondary butterfly. A smooth introduction of the secondary stage is achieved by means of additional fuel discharge from the secondary riser passage into each mixing chamber. When the secondary butterfly valve is slightly opened, the mixing chamber depression acts upon the riser passage, drawing fuel from the reservoir connected to the float chamber. This fuel is mixed with air that is drawn past the slightly opened air valve and is deflected to the throttle butterfly gap.

Further progressive opening of the secondary stage throttle butterfly increases the depression in the mixing chamber (see Fig. K56) and opens the air flap which through a cam disc (item 3), a lever (item 4) and a guide pin (item 1) controls the height of the needle (item 2) of the main jet. The amount of fuel discharge depends upon the position of the needle. The correction air enters through the gap between the needle and the air correction jet, it mixes with the fuel which is then drawn through the discharge tube into the mixing chamber.

The secondary air flap is returned to its closed position by a spring (see Fig. K57, item 5), one end of which is attached to a pin pressed into the air flap spindle (item 2) and the other end to an adjustment screw (item 5). The tension of the spring, is set relative to the air flow in the mixing chamber of the secondary stage and is locked by a small screw (item 6). The tension of the spring is adjustable and if necessary should be set in accordance with the instructions given in the 'Service adjustments' section.

Adjacent is the depression controlled air flap damping device (item 3), this assembly damps the air flap movement at sudden openings of the secondary stage throttle butterfly.

Acceleration pump system

The acceleration pump (see Fig. K58) provides additional fuel when the primary throttle butterflies are suddenly opened, giving a smooth transition from the idle system to the main system.

The acceleration pump chamber is filled with fuel from the float chamber. In the rest position the pump spring (item 3) presses on the diaphragm (item 2) which in turn pushes the operating

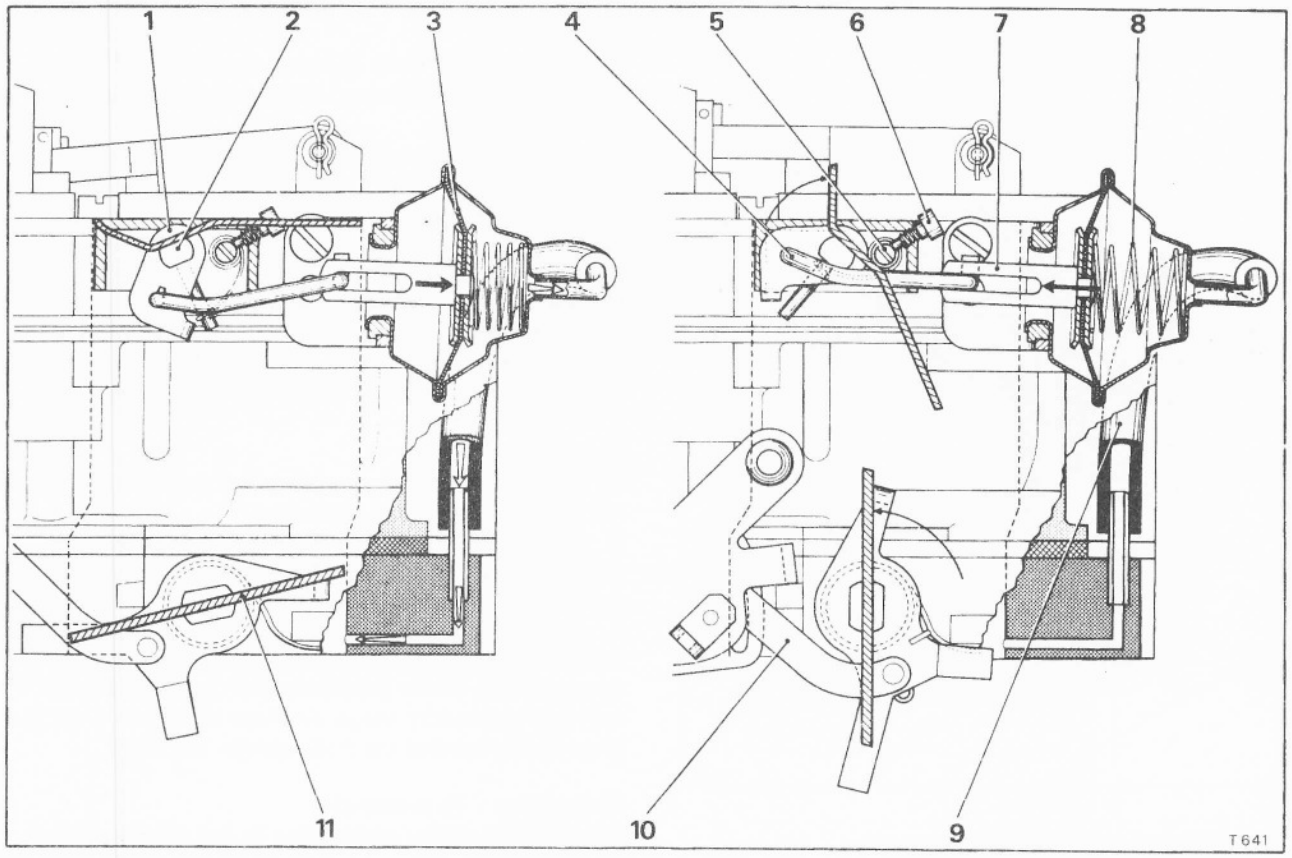

Fig. K57 Secondary stage air flaps damper

1 Lever
2 Air flaps spindle
3 Diaphragm
4 Rod
5 Spring and tension adjuster screw
6 Lock screw
7 Slotted lever
8 Diaphragm spring
9 Vacuum signal hose
10 Throttle lever
11 Secondary stage throttle butterfly

Vacuum signal
Lever movement

plunger (item 1) against the pump lever (item 4). When the primary stage throttle butterflies are opened the movement is also transmitted to the pump operating lever which then presses the plunger and hence the diaphragm inwards, this action injects fuel through the discharge openings into the mixing chamber of the primary stage.

The quantity of fuel added upon accelerating is determined by the pump stroke which is adjustable by means of the clamping screw (item 5) at the end of the pump rod and if necessary this should be set in accordance with the instructions given in the 'Service adjustments' section. The duration of the injection of fuel is determined by the spring and the size of the discharge openings. A ball valve is arranged in the fuel feed line from the float chamber to the pump chamber, this ball valve prevents the back flow of fuel during the discharge stroke of the pump. Ball valves are also fitted before the discharge openings and prevent air entering the system during the suction stroke of the pump.

Note
When the engine is not running, repeated movement of the accelerator linkage will operate the acceleration pump and inject fuel into the intake system.

Overhaul

Carburetter - To remove

1. Carry out the usual workshop safety precautions.
2. Remove the air cleaner/silencer assembly (see Section K6).
3. Drain the engine coolant (see Chapter L), until the level is below the automatic choke bi-metal housing.
4. Unscrew the worm drive clips and withdraw the coolant feed and return hoses from the bi-metal housing.
5. Disconnect the throttle linkage from the carburetter.

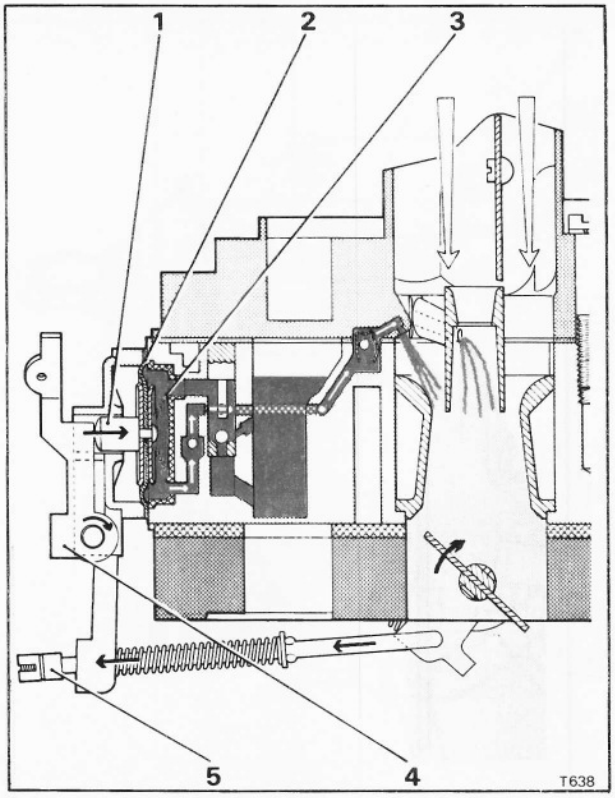

Fig. K58 Acceleration pump operation
1 Operating plunger
2 Diaphragm
3 Spring
4 Operating lever
5 Pump adjusting screw

6. Detach the fuel supply pipe and blank the open connections.
7. Withdraw the float chamber vent hose (if fitted).
8. Detach the following vacuum signal hoses from the carburetter.
(i) distributor vacuum advance capsule.
(ii) speed control unit.
9. Detach the following electrical leads from the carburetter.
(i) choke bi-metal cap.
(ii) anti 'run-on' solenoid valves.
10. Unscrew the four ½ in. A/F nuts retaining the carburetter to the inlet manifold, collect the washers and lift off the carburetter assembly.

Carburetter - To fit
Fit the carburetter by reversing the procedure given for removal noting the following.
1. Ensure that induction manifold and carburetter joint faces are clean and if necessary fit a new gasket/riser.
2. Ensure that the vacuum signal hoses for the distributor vacuum advance capsule, throttle damper/jack, choke pulldown unit, speed control unit and secondary stage air flaps damper are all in good condition and the hose joints 'air tight'.

Carburetter - To dismantle
Dismantling of the carburetter is not recommended as it has been set and balanced by accurate measuring techniques during manufacture.

In isolated instances however, it may be necessary to dismantle the carburetter and under these conditions adhere to the following procedure.

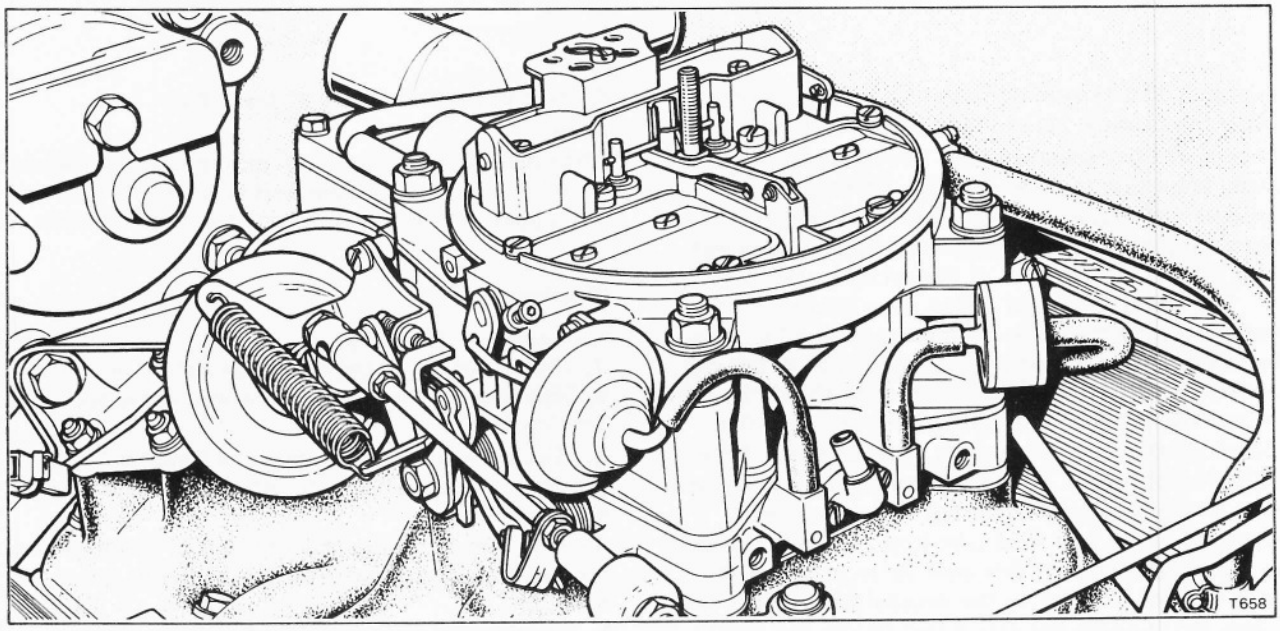

Fig. K59 Carburetter in position

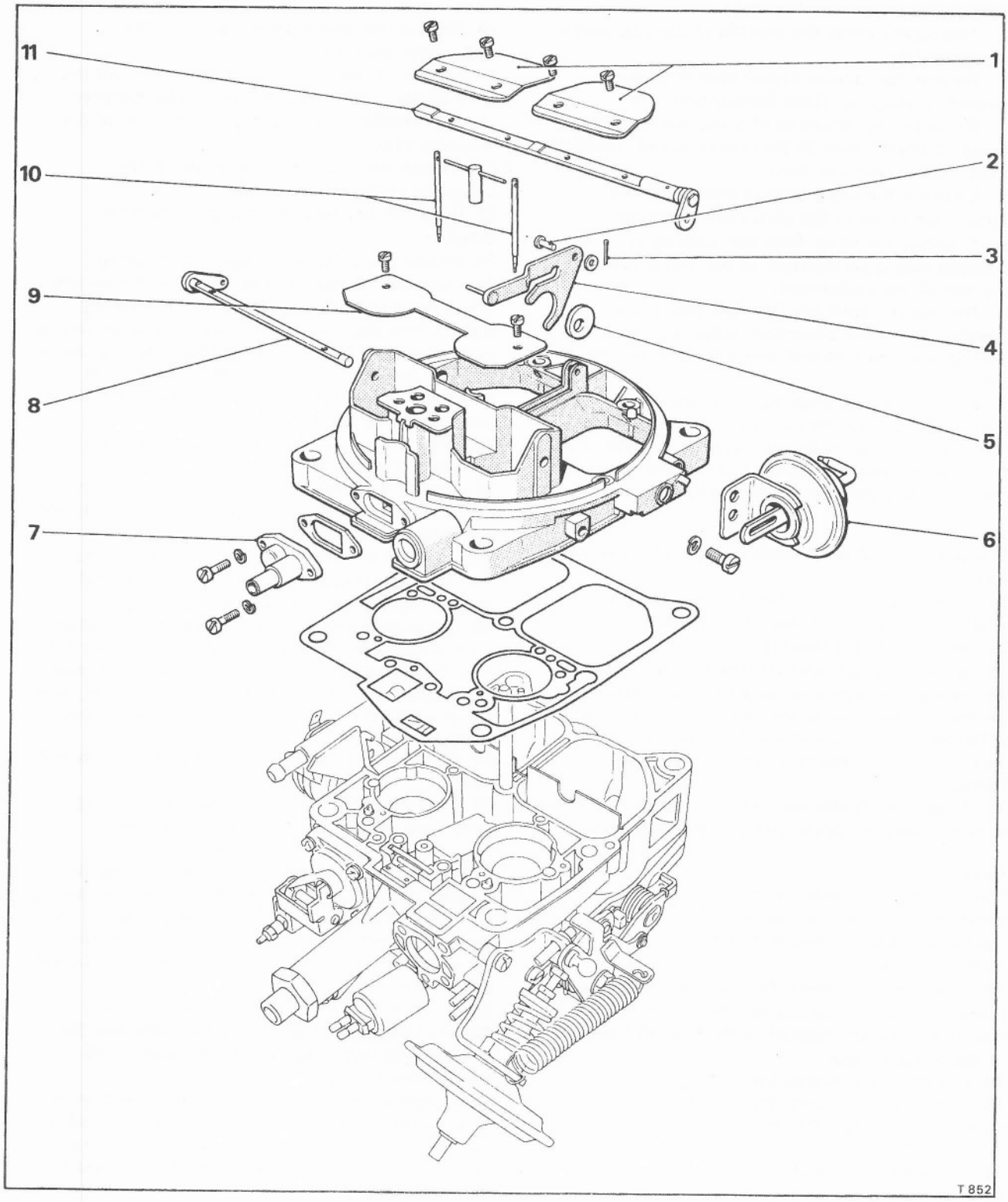

Fig. K60 Dismantling the carburetter (carburetter cover)

1 Secondary stage air flaps
2 Clevis pin
3 Split pin
4 Secondary stage needles operating lever
5 Nylon cam
6 Secondary stage air flaps damper unit
7 Float chamber vent connection (if fitted)
8 Choke strangler spindle
9 Choke strangler valve
10 Secondary stage needles
11 Secondary stage air flaps operating spindle

Carburetter cover (see Fig. K60)

1. Thoroughly clean the outside of the carburetter using paraffin.

2. Detach the vacuum signal hose from the secondary stage air flaps damper unit.

3. Withdraw the retaining clip that secures the choke strangler lever to the operating rod. Carefully prise the rod from the lever.

4. Unscrew the eight screws that retain the carburetter cover to the carburetter housing.

5. Separate the cover from the housing by levering with a screwdriver in the slot provided at the rear of the carburetter.

6. Remove the split pin from the clevis pin situated above the secondary stage air flaps. Collect the small washer and withdraw the clevis pin.

7. Lift up and withdraw the secondary stage needle operating lever assembly. Slide the two needles from the traverse. Slide the traverse from the lever.

8. Unscrew and remove the four screws retaining the secondary stage air flaps to the spindle.

Note

The underside of each screw is 'spread' to prevent turning.

9. Carefully overtravel the spindle to release the small nylon bush (if fitted) from the damper tensioning spring assembly.

10. Slide the nylon bush (if fitted) from the pin.

11. Remove the screw securing the secondary stage air flap damper unit to the carburetter cover and withdraw the unit, carefully disengaging its slotted operating rod from the air flaps spindle linkage.

12. Align the spindle tensioning pin with the cut-out in the carburetter cover and pull the spindle out.

Note

Collect the nylon cam located between the secondary chambers as the spindle is withdrawn, noting which way round it is fitted on the spindle, to facilitate assembly.

13. Unscrew and remove the main fuel jets of the primary stage and the blanks that mask the idle fuel jets, they are located in the fuel jet housings of the primary stage.

14. Unscrew and remove the primary stage air jets.

15. Unscrew the screws retaining the choke strangler to its spindle, above the primary stage of the carburetter.

16. Withdraw the spindle.

17. From above the carburetter cover, tap out the primary stage discharge branch tubes in a downwards direction, using a soft wooden drift; collect the spring clip.

18. Remove the two screws and spring washers securing the float chamber vent connecting plate (if fitted) or the blanking plate. Withdraw the plate and gasket.

Carburetter housing (see Fig. K61)

19. Remove the gasket from the top of the carburetter housing.

20. From the float chamber, carefully lift out the pivot spring, float assembly (withdraw the pivot pin) and needle valve, noting the position of the retaining clip.

21. Detach the vacuum signal hose for the automatic choke pulldown unit.

22. Drain off any fuel remaining in the float chamber.

23. Detach the throttle linkage return spring.

24. Unscrew the four screws retaining the acceleration pump in position and collect the spring washer from each screw. Withdraw the acceleration pump assembly from the carburetter housing, taking care not to lose the spring fitted between the diaphragm and plastic insert, the small end of the spring is fitted towards the diaphragm.

25. Detach the diaphragm and operating plunger assembly from the cover.

26. Carefully remove the plastic insert from the carburetter housing, ensuring that the insert is not damaged.

27. Unscrew the acceleration pump adjusting clamp nut, free the linkage and collect the small nylon adapter, spring and spring seating washer.

28. Unscrew the two screws retaining the carburetter housing to the throttle body. The screws are situated on either side of the carburetter between the primary and secondary throttle butterflies, they are also fitted into counterbores and have spring washers.

29. Detach the carburetter housing from the throttle body.

30. From the bottom of the carburetter housing gently tap out the deflector plate from the secondary stage mixing chambers.

31. Unscrew and remove the screw securing the throttle damper/jack in position; collect the spring washer from each screw. The upper screw is longer than the others and has a distance piece fitted between the throttle damper/jack mounting bracket and the carburetter housing.

32. Unscrew the setscrew from the end of the throttle damper/jack operating rod. Unscrew the large spring retaining nut situated underneath. Collect the spring.

33. Unscrew the nut securing the throttle damper/jack diaphragm assembly to the mounting bracket.

34. Unscrew the fuel inlet adapter, collect the sealing washer and withdraw the filter assembly from its housing.

35. Unscrew and remove the screw securing the automatic choke mechanism to the carburetter housing; collect the spring washer, plain washer and part number identification tag from under the head of the screw.

36. Before withdrawing the choke mechanism note the position of the operating tag on the counter-

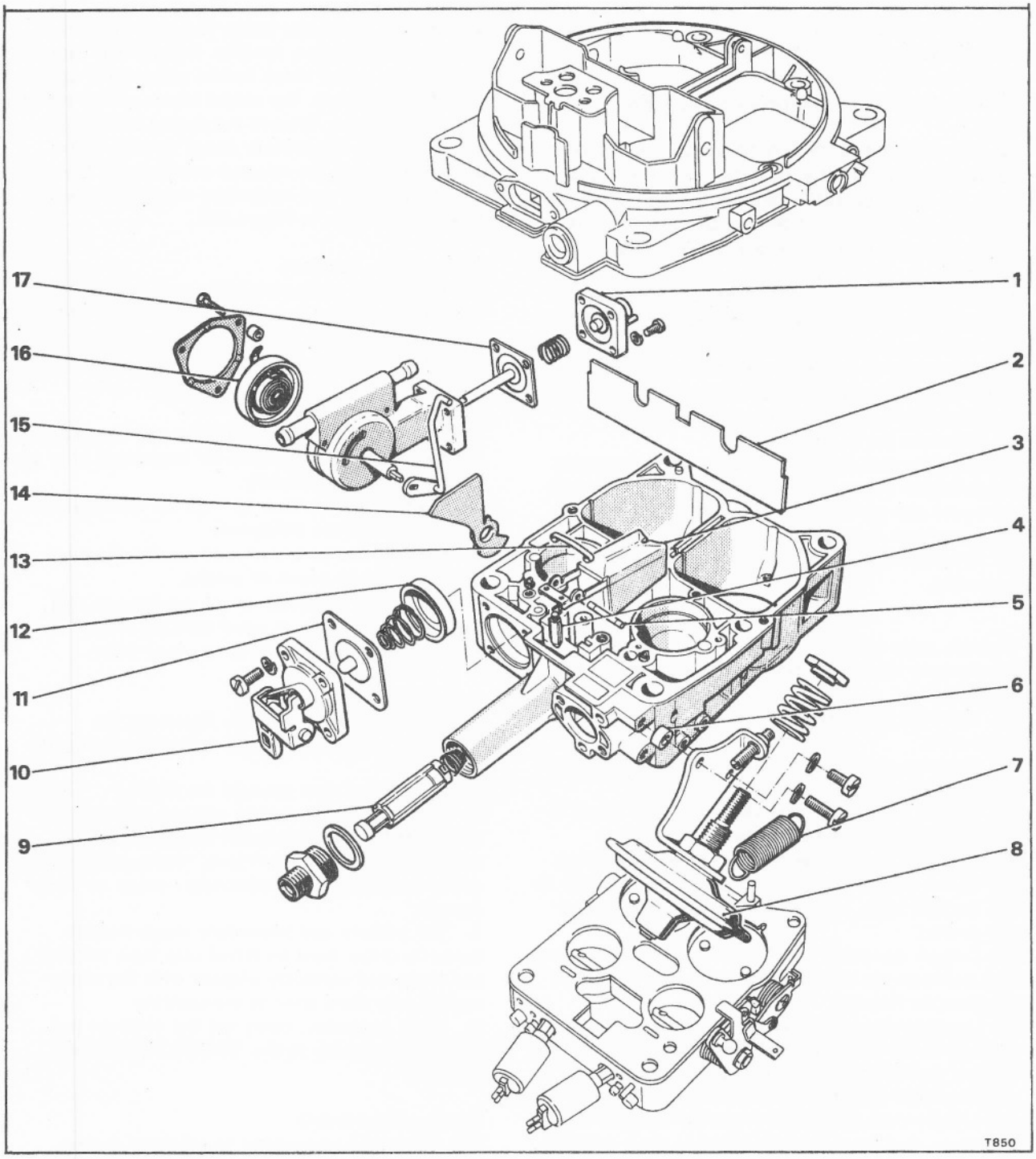

Fig. K61 Dismantling the carburetter (carburetter housing)

1 Choke pulldown cover (including adjusting screw and vacuum connection)
2 Deflector
3 Float assembly
4 Float needle valve
5 Float pivot pin
6 Distance piece
7 Throttle linkage return spring
8 Throttle damper/jack
9 Fuel filter
10 Acceleration pump cover and lever assembly
11 Acceleration pump diaphragm
12 Acceleration pump plastic insert
13 Float pivot spring
14 Counterbalance/fast-idle cam lever
15 Choke strangler operating rod and lever
16 Automatic choke bi-metal assembly
17 Choke pulldown diaphragm

balance/fast-idle cam lever in relationship to the bi-metal tag protruding from the rear of the bi-metal housing.
37. Withdraw the counterbalance/fast-idle cam lever.
38. Withdraw the secondary stage lock-out lever.
39. Withdraw the choke strangler operating rod and lever as the automatic choke mechanism is removed.
40. Note the position of the scribed alignment marks on the bi-metal coil and housing to facilitate correct assembly.
41. Unscrew the three setscrews retaining the automatic choke bi-metal in its housing. Withdraw the retaining ring, noting that the lowest setscrew is the longest of the three. In addition, each set-screw has a plastic distance piece fitted between the retaining ring and the bi-metal housing.
42. Withdraw the bi-metal cap.
43. Unscrew and remove the four screws retaining the pulldown cover in position. Carefully withdraw the cover and collect the spring located between the cover and diaphragm.
44. Withdraw the diaphragm and operating rod assembly.

Throttle body (see Fig. K62)
45. Remove the gasket from the upper face of the throttle body.
46. Unscrew and remove the two anti 'run-on' solenoids.
47. Unscrew and remove the two idle speed mixture regulating screws.
48. Detach any of the five vacuum signal hoses if they are still connected to the throttle body.
49. Unscrew and remove the two screws securing the speed control unit vacuum signal hose elbow to the throttle body, withdraw the elbow and collect the gasket.
50. Detach the small 'cee' clip from the connecting link between the primary and secondary stages of the throttle linkage.
51. Unscrew the nut securing the primary throttle linkage to the primary butterfly spindle. Collect the washer and withdraw the linkage; collect the small washer from the secondary throttle lever.
52. Lightly mark the primary throttle butterflies, to ensure that they are assembled in their original positions noting that the small hole in each butterfly valve is fitted towards the anti 'run-on' solenoid valves end of the body.
53. Unscrew the butterfly valve retaining screws and carefully remove the butterfly valves.
54. Tap the spindle out of the housing and collect the cover from the linkage end of the spindle.
55. Lightly mark the secondary stage butterfly valves to facilitate assembly in their original positions.
56. Unscrew the screws securing the butterfly valves, remove the valves.
57. Tap the automatic choke lock-pin from the end of the secondary spindle. Remove any burrs from the spindle screw holes before tapping the spindle out of the housing. The slight return spring tension will be released. Remove the spring and ferrule.
58. Dismantle the primary stage throttle lever assembly noting the relative positions of the parts.

The primary and secondary stage throttle linkage is shown in Figure K62.

Carburetter - To clean
All **light alloy** parts should be well soaked in methylated spirits and then cleaned. This does not apply to parts such as diaphragms, rubber hoses, gaskets, plastic parts, etc.

Carburetter - To inspect
1. Examine the throttle spindles and bearings in the carburetter body; check for excessive play and fit new parts if necessary.
2. Examine the various springs for breakage and renew any that are defective.
3. Examine the carburetter cover, housing and throttle body for signs of cracks.
4. Check the condition of all diaphragms and ensure that they are in good working order.
5. Inspect the condition of the fuel filter.

Carburetter - To assemble
Assemble the carburetter by reversing the procedure given for removal noting the following points.
1. Ensure that new gaskets are fitted.
2. Ensure that new rubber vacuum signal hoses are fitted for the distributor vacuum advance capsule, throttle damper/jack, choke pulldown unit, speed control unit and secondary stage air flaps damper.
3. The primary and secondary stage throttle butterfly discs must be fitted into their original positions and correctly aligned with the marks etched onto them prior to dismantling.
4. After assembly, carry out the settings and adjustments given in the 'Service adjustments' section.

Service adjustments
The Solex 4A1 carburetter is adjusted during manufacture to the correct settings in order to comply with various exhaust gas emission regulations and therefore, alterations to any of the settings should not be necessary.

If however, special circumstances do arise (e.g. settings are inadvertertly disturbed) where adjustment becomes necessary the following procedures must be adhered to.

The following screws must not be adjusted under any circumstances.
1. Secondary stage air balance control screws (see Fig. K63) in the throttle body.

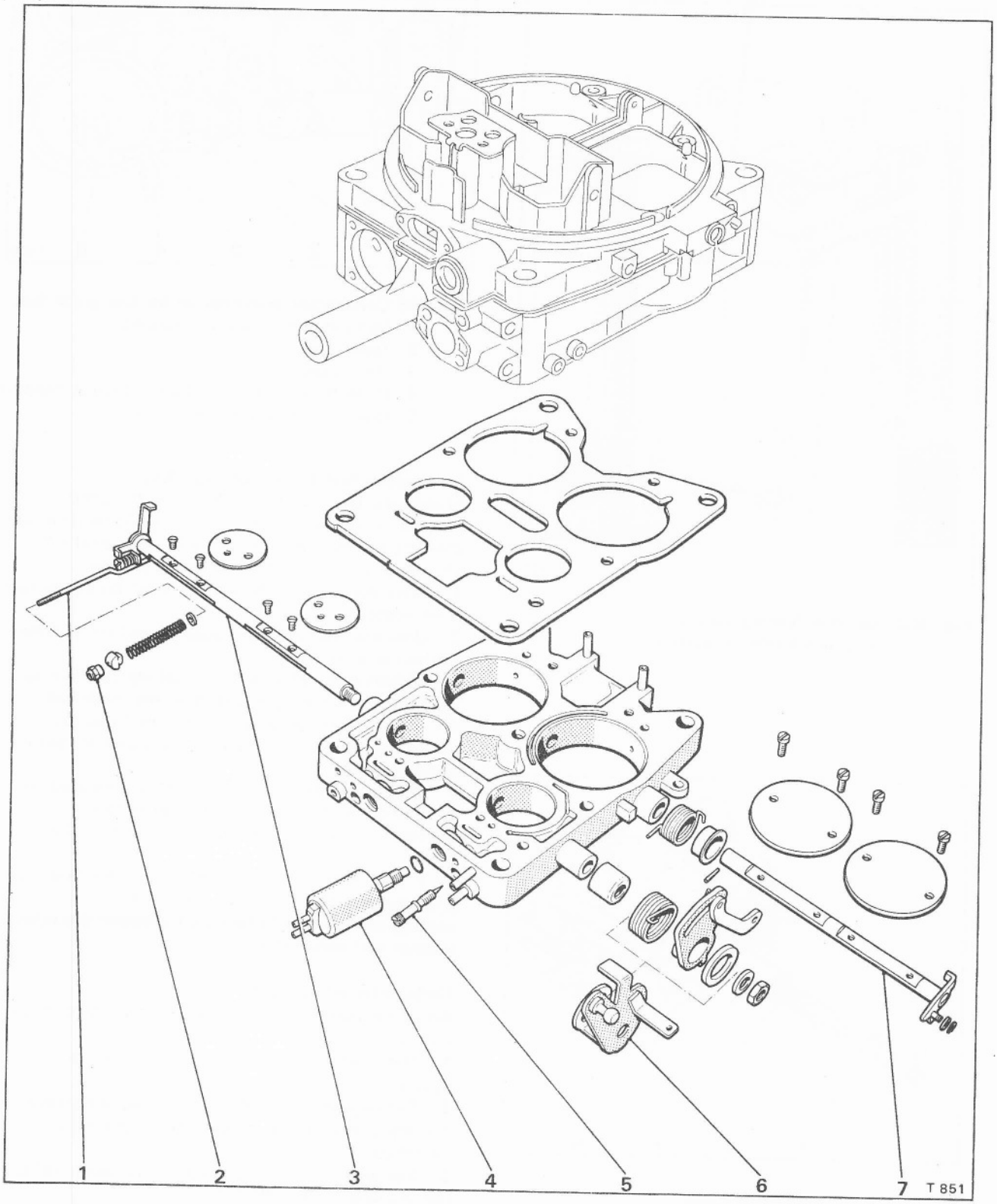

Fig. K62 Dismantling the carburetter (throttle body)

1 Acceleration pump operating rod
2 Acceleration pump adjustment nut
3 Primary stage throttle butterfly spindle
4 Anti 'run-on' solenoid valve
5 Idle speed mixture regulating screw
6 Carburetter throttle linkage
7 Secondary stage throttle butterfly spindle

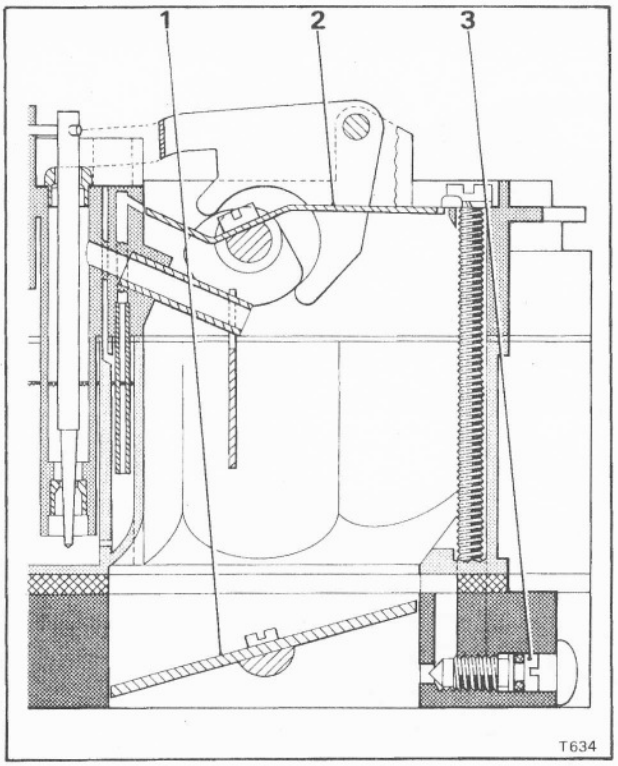

Fig. K63 Sealed adjusting screws
1 Air balance control screws

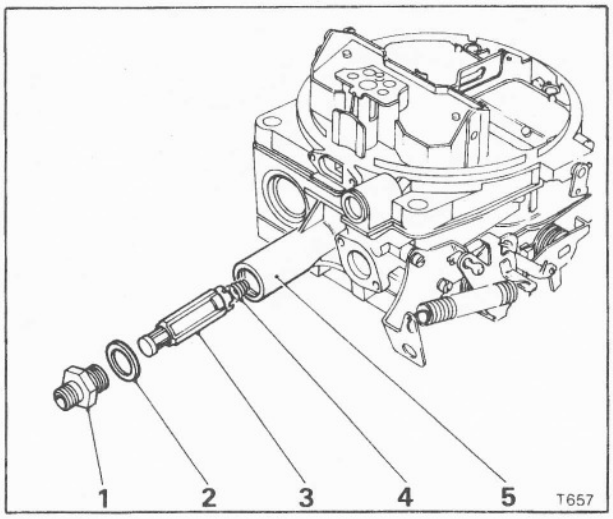

Fig. K64 Carburetter fuel filter
1 Inlet adapter
2 Sealing washer
3 Fuel filter
4 Spring
5 Filter housing

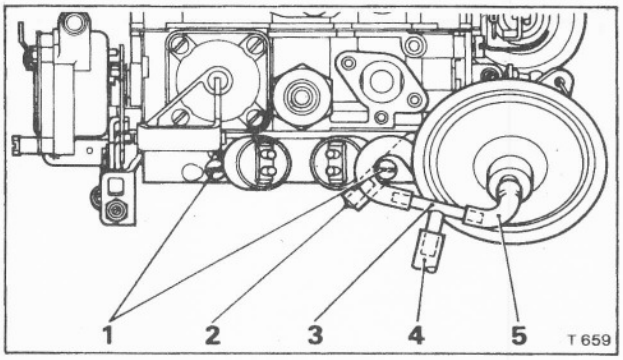

Fig. K65 Carburetter modification for low grade fuel
1 Idle mixture regulating screws
2 Taper pin
3 'Tee' piece
4 Hose to distributor vacuum advance capsule
5 Hose to throttle damper/jack

Carburetter fuel filter (see Fig. K64)
Fitted into the fuel inlet behind the threaded adapter is a plastic filter assembly. At the intervals specified in the service schedules the inlet filter should be cleaned in the following manner.

1. Unscrew the fuel delivery pipe union at the fuel inlet adapter.

2. Unscrew the fuel inlet adapter and collect the sealing washer.

3. Withdraw the plastic filter, taking care not to lose the small spring situated on the inner end.

4. Clean the filter by washing it in clean fuel, shake any excess fuel from the unit and dry with compressed air.

5. Ensure that the spring is correctly located on the end of the filter unit, the slightly larger diameter of the spring should be seated in the filter.

6. Fit the filter to the carburetter by reversing the procedure given for removal, noting that a new sealing washer should be fitted between the inlet adapter and carburetter.

Carburetter adjustment
Before commencing any adjustments to the carburetter ensure that

1. There are no air leaks into the induction system.

2. The engine is at normal operating temperature and the automatic air conditioning system is switched off.

3. The ambient air temperature is between 16° C. (60° F.) and 27° C. (80° F.).

4. The ignition timing is correct and the ignition system is in good working order (refer to Chapter M - Electrical system).

If the ignition timing is to be set using low grade fuel (refer to Chapter M, Section M3), the distributor

	(†)	(††) (†††)
Slow idle speed	600 r.p.m.	650 r.p.m.
Ignition timing	Refer to Chapter M, Section M3	
Throttle damper/ jack setting	(a) 1 300 r.p.m. - 1 400 r.p.m. vacuum signal pipe disconnected (b) 0,127 mm.-0,254 mm. (0.005 in. - 0.010 in.) clearance between the plunger and throttle lever with the vacuum signal pipe connected and the engine running at slow idle.	
Fast-idle speed	1 750 r.p.m. - 1 850 r.p.m.	1 750 r.p.m. - 1 850 r.p.m.
	Set with engine at normal working temperature and the distributor vacuum advance signal disconnected and blanked off.	
Slow idle CO setting 97 to 94 R.O.N. (Min.) fuel 91 R.O.N. (Min.) fuel	0.8% – 1.2% @ 600 r.p.m. 2.5% – 3.0% @ 600 r.p.m.	0.2% – 0.5% @ 650 r.p.m. 2.5% – 3.0% @ 650 r.p.m.
	In Neutral, with the automatic air conditioning system switched off and the air cleaner/silencer fitted.	
Choke pulldown setting	3,0 mm. - 3,4 mm. (0.118 in. - 0.134 in.)	3,8 mm. - 4,2 mm. (0.150 in. - 0.165 in.)
Modification	If either the ignition timing or the slow idle CO is to be set using low grade fuel [i.e. 91 R.O.N. (Min.)] a modification is necessary to the distributor vacuum advance signal. Details of this change are given in Carburetter adjustment - item 4 (Page K5-18).	
Identification (see Fig. K67)	(†) These cars have a float chamber vent connection on the carburetter cover and short air intakes. (††) These cars have extended air intakes and float chamber vent connection on the carburetter cover blanked. The automatic choke pulldown has a delay valve fitted into the vacuum signal hose. (†††) These cars are similar to cars identified with (††), however, an engine modification package alters the ignition setting. These engines have the suffix letter B stamped on the crankcase immediately after the engine number.	

Fig. K66 Basic tuning settings

vacuum advance signal and throttle damper/jack hoses require the following modification (see Fig. K65).

Cut the throttle damper/jack vacuum signal hose in half and insert a small 'tee' piece. Cut the distributor vacuum advance signal hose into two pieces at a point 3,17 cm. (1.250 in.) from the carburetter. Connect the hose from the distributor vacuum advance capsule to the remaining connection of the 'tee' piece and seal the short rubber hose from the carburetter with either a taper pin or by other suitable means.

Idle mixture setting

Later models of the Solex 4A1 carburetter may have tamperproof plugs fitted over the idle mixture adjustment screws and a tamperproof cap over the idle speed adjustment screw. Non-tamperproofed carburetters may be adjusted as follows.

1. Connect an impulse tachometer to the engine in accordance with the manufacturer's instructions.
2. Ensure that the automatic air conditioning system is switched off.
3. Start and run the engine. Check to ensure that the conditions given in 'Carburetter adjustment' prevail.
4. Stop the engine.
5. Remove the air cleaner/silencer assembly and the rubber sealing ring (see Section K6).
6. A basic setting can be obtained by completely screwing in (turning clockwise) both idle mixture regulating screws and then, unscrewing each screw four complete turns.
7. Fit the probe of a suitable exhaust gas analyser (e.g. Horiba Mexa 200) into the exhaust tailpipe in accordance with the manufacturer's instructions.
8. Start the engine and ensure that the slow idle speed is correctly set (see Fig. K66).
9. Allow the engine to run at the slow idle speed for at least 5 minutes after normal operating temperature has been reached.

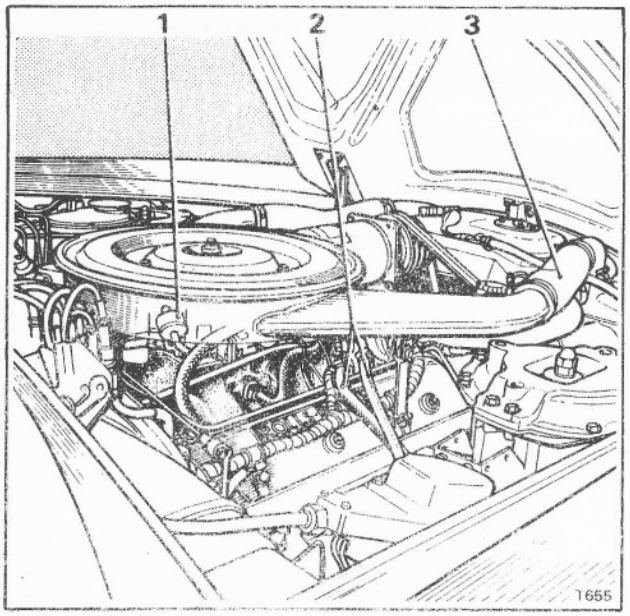

Fig. K67 Identification of cars
1 Choke delay valve
2 Fuel lines
3 Extended air intakes

10. Check that the exhaust gas analyser carbon monoxide content (CO) reading is steady and note the reading, this should be as stated in Figure K66.
11. If the CO reading is not correct, adjustments can be carried out by turning the idle mixture regulating screws by equal amounts either clockwise to reduce the CO reading or anti-clockwise to increase the reading. Allow conditions to stabilise and ensure that the idle speed is correct before the CO reading is again taken.
12. Stop the engine.
13. Fit the air cleaner/silencer assembly and the rubber sealing washer (see Section K6).
14. Start the engine and ensure normal operating temperature is attained.
15. Finally, again check that the CO reading at the slow idle speed is as quoted in Figure K66. In countries where only low octane fuel is available changes to the ignition timing and a higher idle CO reading are allowed, as shown in Figure K66.
16. Stop the engine and remove the test equipment.

Fast - idle setting
1. Ensure that the engine is not running but has attained normal operating temperature.
2. Open the throttles and raise the fast-idle cam counterbalance lever to the vertical position (see Fig. K68), release the throttle linkage whilst holding the lever vertical. The throttle linkage will now be engaged on the highest step of the fast-idle cam and the throttles will be in the cold start position.
3. Connect an impulse tachometer to the engine in accordance with the manufacturer's instructions.

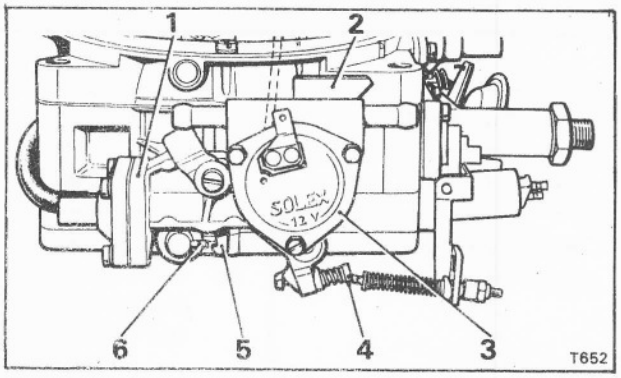

Fig. K68 Choke fast-idle
1 Choke pulldown
2 Cam counterbalance lever
3 Bi-metal cap
4 Fast-idle speed adjustment screw
5 Secondary stage lock-out lever
6 Secondary stage lock-out pin

4. Disconnect the vacuum signal hose from the distributor advance capsule; suitably blank the signal hose.
5. Start the engine and check the fast-idle speed is as specified in Figure K66.
6. Alterations to the speed can be made by adjusting the fast-idle screw (see Fig. K68).
7. When the fast-idle speed is correct, open the throttles to release the cam and return the engine to the slow idle speed.
8. Stop the engine.
9. Remove the blank from the distributor vacuum advance signal hose and fit the hose to the distributor capsule.
10. Remove the impulse tachometer.

Throttle jack/damper setting
1. Remove the air cleaner/silencer (see Section K6).
2. Start and run the engine until normal operating temperature is attained.
3. Ensure that the fast-idle cam is not in operation and that the engine slow idle speed is correct (see Fig. K66).
4. Disconnect the vacuum signal hose from the throttle jack/damper (see Fig. K69) and suitably blank the hose; the engine speed will increase.
5. Slacken the lock-nut (see Fig. K69, item 3) on the throttle jack/damper and adjust the bolt (item 4) to obtain the engine speed quoted in Figure K66.
6. Tighten the lock-nut and check to ensure that the engine speed is still correct.
7. Remove the blank from the vacuum signal hose and fit the hose to the throttle jack/damper.
8. Adjust the gap between the throttle lever (item 6) and bolt (item 4) to the setting quoted in Figure K66 by turning the nut (item 2).
Turning the nut anti-clockwise increases the gap.
9. Stop the engine.

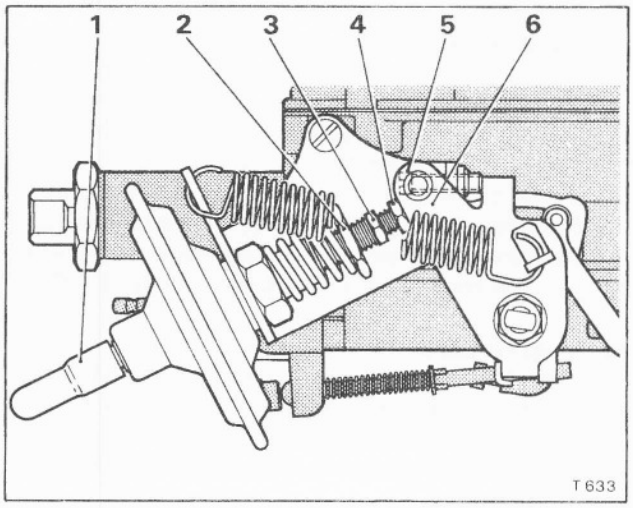

Fig. K69 Throttle jack/damper
1 Vacuum signal hose
2 Adjustment nut
3 Lock-nut
4 Adjustment bolt
5 Throttle stop screw
6 Throttle lever

10. Fit the air cleaner/silencer and rubber sealing ring.

Float chamber fuel level
Preliminary setting
If new parts have been fitted to the float assembly a **preliminary fuel level setting** can be achieved as follows.
1. Install the float assembly in the float chamber.
2. Using light pressure on the extreme end of the float toggle press the needle valve onto its seat.
3. Ensure that the top face of the float is between 3,0 mm. and 4,0 mm. (0.118 in. and 0.157 in.) below the joint face of the float chamber when measured at point A in Figure K70.
4. This setting can be adjusted by carefully bending the float lever at the point shown in Figure K71.
5. After completion of the preliminary setting the fuel level should always be tested as described in Operations 6 to 9 inclusive.

Testing the fuel level
The level of fuel in the float chamber should be as shown in Figure K71. The measurement should be taken with the float chamber cover removed and the float toggle spindle prevented from becoming buoyant.
6. Ensure that the carburetter is horizontal and fill the float chamber with fuel through the normal fuel inlet connection.
7. Connect the test equipment shown in Figure K72 to the fuel inlet. Apply pressure with the hand operated pump until the column of water in the test

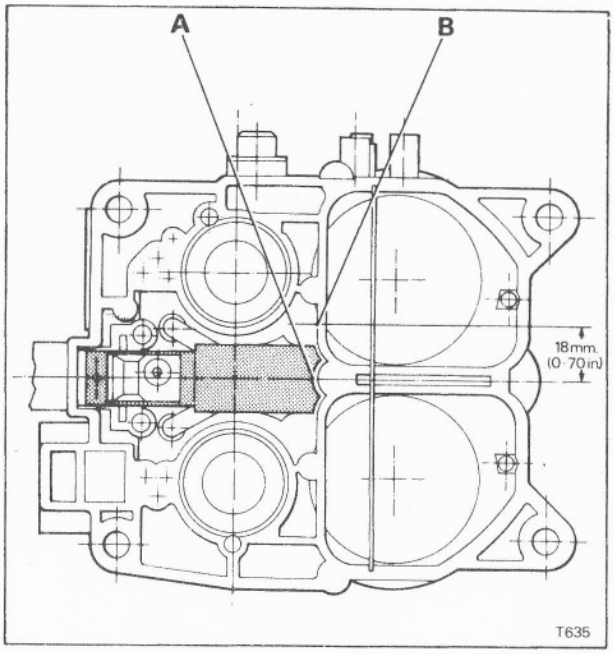

Fig. K70 Checking the float position
A Preliminary float checking point
B Fuel level checking point

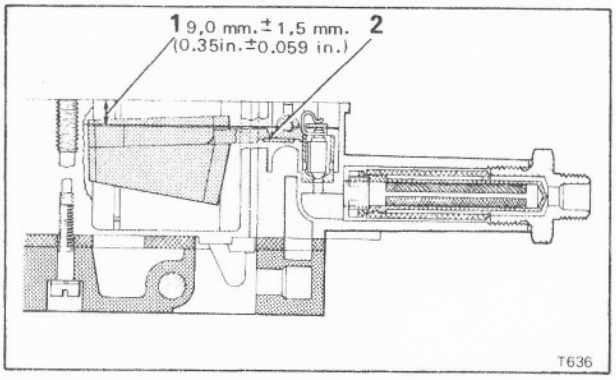

Fig. K71 Checking the float chamber fuel level
1 Fuel level measurement
2 Bending point for float adjustment

equipment reaches 2,0 m. (6ft. 6¾ in.) which is equivalent to a pressure of 0,20 kgf/sq.cm. (2.86 lbf/sq.in.).
8. Check that the fuel level is 9,0 mm. ± 1,5 mm. (0.35 in.± 0.059 in.) below the joint face (see Fig. K71) when measured at a distance of 18 mm. (0.70 in.) from the centre line of the float (see Fig. K70).
9. To correct the fuel level it is permissible to carefully bend the float lever at the point shown in Figure K71.

Automatic choke pulldown

1. The choke pulldown gap must be set with the carburetter at room temperature and the choke strangler fully closed.

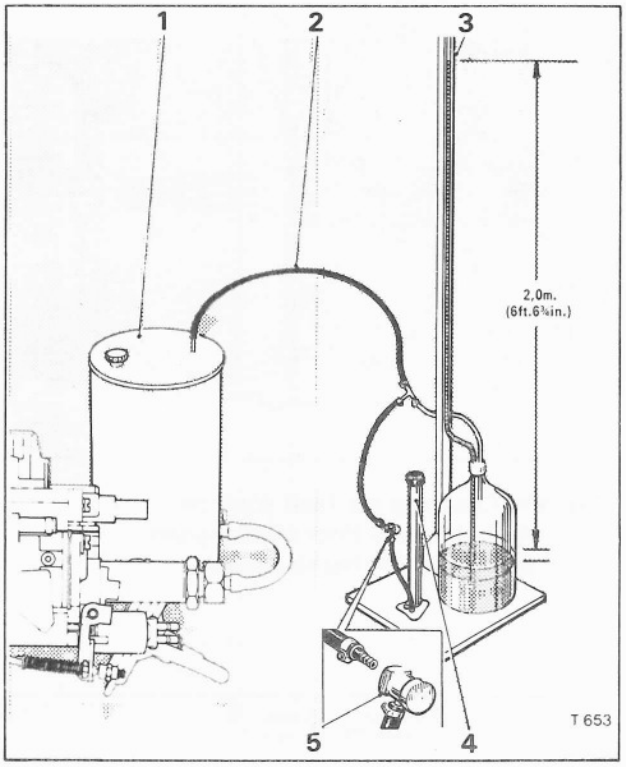

Fig. K72 Test equipment

1 Fuel supply reservoir
2 Connection pipe (air pressure)
3 Test equipment
4 Pump
5 One-way pressure valve

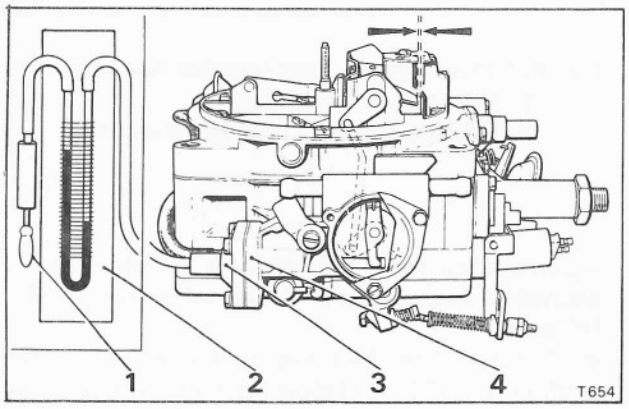

Fig. K73 Automatic choke pulldown setting

1 Vacuum pump
2 Manometer
3 Adjustment screw
4 Pulldown unit

2. Operate the pulldown unit by applying a vacuum of between 38 cm. Hg. and 50 cm. Hg. (15 in. Hg. and 20 in. Hg.) to the tapping adjacent to the adjustment screw.
3. Turn the adjustment screw to set the gap between the leading edge of the choke strangler and the carburetter cover (see Fig. K73). Bias the strangler lightly in the opening direction as the measurement is made.Turning the adjustment clockwise decreases the gap. The correct setting is given in Figure K66.

Acceleration pump

When the throttles are opened from the slow idle position fuel should be immediately discharged from the acceleration pump jets. To check the quantity of the acceleration pump discharge, proceed as follows.

1. Remove the carburetter from the engine (see Carburetter - To remove).
2. Position the carburetter horizontally over two suitable measuring containers (see Fig. K74).
3. Ensure that an adequate supply of fuel is connected to the fuel inlet union of the carburetter. Connect the test equipment illustrated in Figure K72 to the fuel supply and apply pressure using the hand pump until the water column reading is 2,0 m. (6ft. 6¾in.) which is equivalent to a pressure of 0,20 kgf/sq.cm. (2.86 lbf/sq. in.).

   This is to ensure that the float chamber is always full throughout the test.
4. Open and close the throttle butterflies of the primary stage in a uniform manner, starting from the slow idle position (i.e. throttle linkage resting on

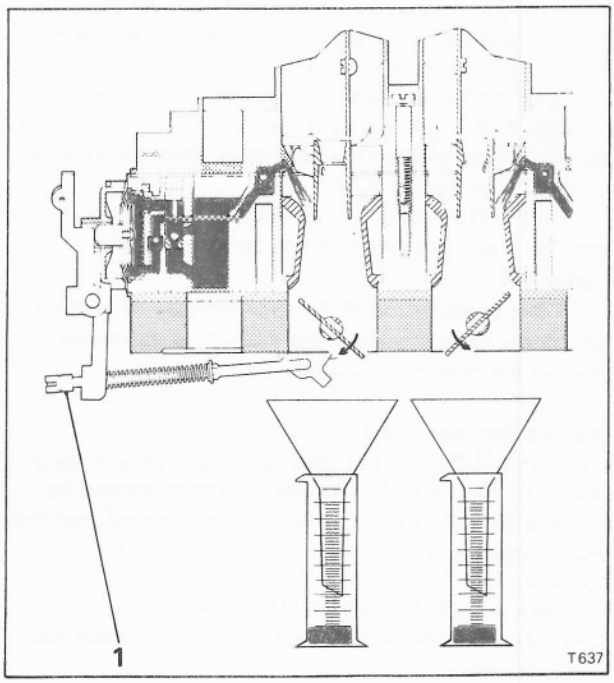

Fig. K74 Acceleration pump setting

1 Adjustment clamp screw

the slow idle stop and not being 'jacked' open by the throttle jack/damper unit).

5. Determine the amount of fuel injected, this should be 1,0 cc ± 0,1 cc for each stroke from each side. To reach a more precise reading carry out 10 pumping strokes in approximately 25 to 35 seconds and collect the fuel seperately from each side of the carburetter, a more accurate reading for each stroke can then be calculated.

6. The amount of fuel injected can be regulated by adjusting the clamping screw (see Fig. K74).

Automatic choke bi-metal

If the choke bi-metal cover has been removed or replaced the corelation mark on the cap and housing should always be aligned when the cover is again fitted. However, if this is not possible for any reason the tension of the bi-metal coil can be set as follows.

1. Remove the air cleaner/silencer assembly (see Section K6).

2. Ensure that the temperature of the bi-metal element is between 20° C. and 25° C. (68° F. and 77° F.).

3. Ensure that the bi-metal cap is loosely assembled into the housing and can be rotated.

4. Ensure that all tension is removed from the bi-metal coil by turning the bi-metal cap clockwise; the choke strangler will lose its return tension at this time.

5. Slightly open the choke strangler.

6. Slowly rotate the bi-metal cap anti-clockwise until the choke strangler is fully closed.

7. Scribe a line on the bi-metal cap to coincide with the mark on the bi-metal housing.

8. Tighten the three retaining setscrews.

Secondary stage air flaps return spring

Details of this return spring are given on Page K5 - 10, however, it can be replaced and/or adjusted as follows.

1. Unscrew the spring spindle locking screw (see Fig. K57, item 6).

2. Remove the spindle and withdraw the spring.

3. Fit a new spring by reversing the procedure but do not tighten the locking screw until the spring tension has been set by carrying out Operations 4 to 6 inclusive.

4. Ensure that the locking screw has been unscrewed and the air flaps are open.

5. Turn the spring spindle slowly anti-clockwise until the air flaps just close. Continue to turn the spring spindle a further five-eighths of a turn.

6. Tighten the locking screw using a 2,5 mm. (0.098 in.) allen key.

Secondary stage throttle return spring

If a malfunction occurs resulting in poor idle quality which is diagnosed as a faulty secondary stage throttle return spring (see Section K8, Fault diagnosis), the return spring can be replaced without dismantling the carburetter assembly. Remove and fit the return spring by unwinding it over the throttle lever.

After fitting the new spring, open the secondary stage throttle butterflies. Release the throttle lever and ensure that the throttle butterflies return to their fully closed position assisted by the pressure of the new spring.