TECHNICALLY speaking

THE SOLEX BI-STARTER CARBURETTOR

The Solex carburettor is well known for simplicity and accessibility. In common with other makes it has to perform two duties. One is to deliver the mixture in an atomised form. The other is to ensure that the two ingredients — petrol and air — are mixed in their correct proportions.

The first is not hard to understand when we realise a liquid can only burn when it is contact with the oxygen in the air. So the mixture when entering the cylinders must consist of very large numbers of exceedingly small drops carried in the air stream.

The second is the carburettor's ability to supply the correct ratio of fuel to air at variable engine speeds. In general, maximum power is secured from air fuel ratios of 14 to 1 [by weight] and maximum economy with ratios of about 15½ to 1. For cold morning starts this ratio is increased to something like 7 to 1.

To get this low ratio, the Solex carburettor employs what is known as a bi-starter. This is in effect a separate carburettor on its own, although attached to the main carburettor and is operative only during starting and the warming up period of the engine.

The starting device is brought into use by means of a dashboard control which is connected to the starter lever. [see Fig 1, #7] This lever has two adjustable positions. To start the engine when cold pull out fully the dashboard control. In this position it will give a very rich mixture which is essential for cold starting. The engine begins to warm up almost immediately after starting and the dash control can then be pushed in approximately half way to the 'bi-starter' position, when a resistance will be felt, determined by the location of the spring ball [#9] in a notch in the rotating valve disc [#5].

At this stage, the mixture strength is considerably reduced, but without risk of the engine stalling when the accelerator pedal is depressed.

As soon as the engine is warm enough, the dashboard control must be fully pushed home, thus putting the starting device out of action.

The bi-starter has two units for gauging the correct supply of petrol and air; the air jet [#2] metres the air supply and petrol jet [#8] metres the petrol.

IDLING

When the engine is idling, the mixture is provided by the pilot jet [#17], the air bleed [#16] and the volume control screw [#21], the mixture strength being weakened by turning the screw [#21] in a clockwise direction and vice versa.

IDLING SYSTEM

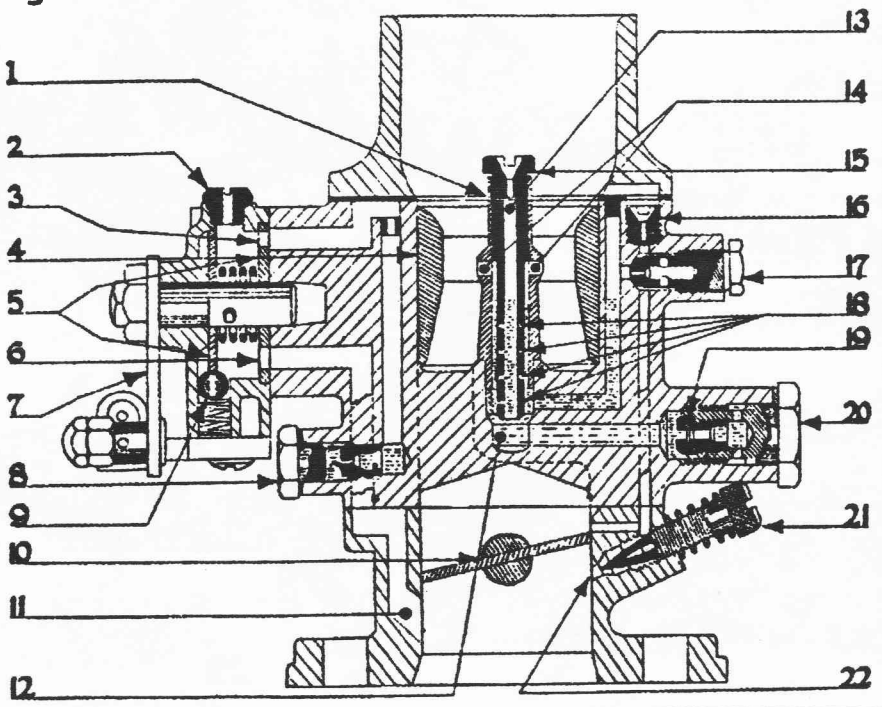
Petrol drawn from the reserve well [#12] is fed through a series of channels and eventually passes through the pilot jet [#17], then into the downward tract where it is partly broken up with a metered amount of air which has passed through the pilot jet air bleed [#16]. On reaching the idling orifice [#22], the flow is controlled by the tapering volume control screw [#21].

It will be noted that the idle orifice [#22] is on the engine side of the throttle and therefore open to depression when the throttle butterfly [#10] is at the closed position. When the throttle is opened it will be seen that the orifice is just above the throttle plate and will come into action. This is a by-pass or progression outlet and is used to provide an easy move over from idling to general running.

Figure 1:The various parts are identified in the key below. For an explanation of how they work, see the text.

1. Spraying well
2. Starter air jet
3. Starter valve
4. Choke tube [venturi]
5. Spring loaded disc valves
6. Starter valve exit duct
7. Starter lever
8. Starter petrol jet
9. Spring ball [Bi-starter position]
10. Throttle butterfly
11. Starter mixture delivery duct
12. Reserve well
13. Emulsion tube
14. Spraying orifices
15. Air correction jet
16. Pilot jet air bleed
17. Pilot jet
18. Emulsion holes
19. Main jet
20. Main jet holder
21. Volume control screw
22. Idling mixture delivery duct

Fig 1.



Important parts are drawn separately [left].
External view of carburettor [right] shows where to look for them.

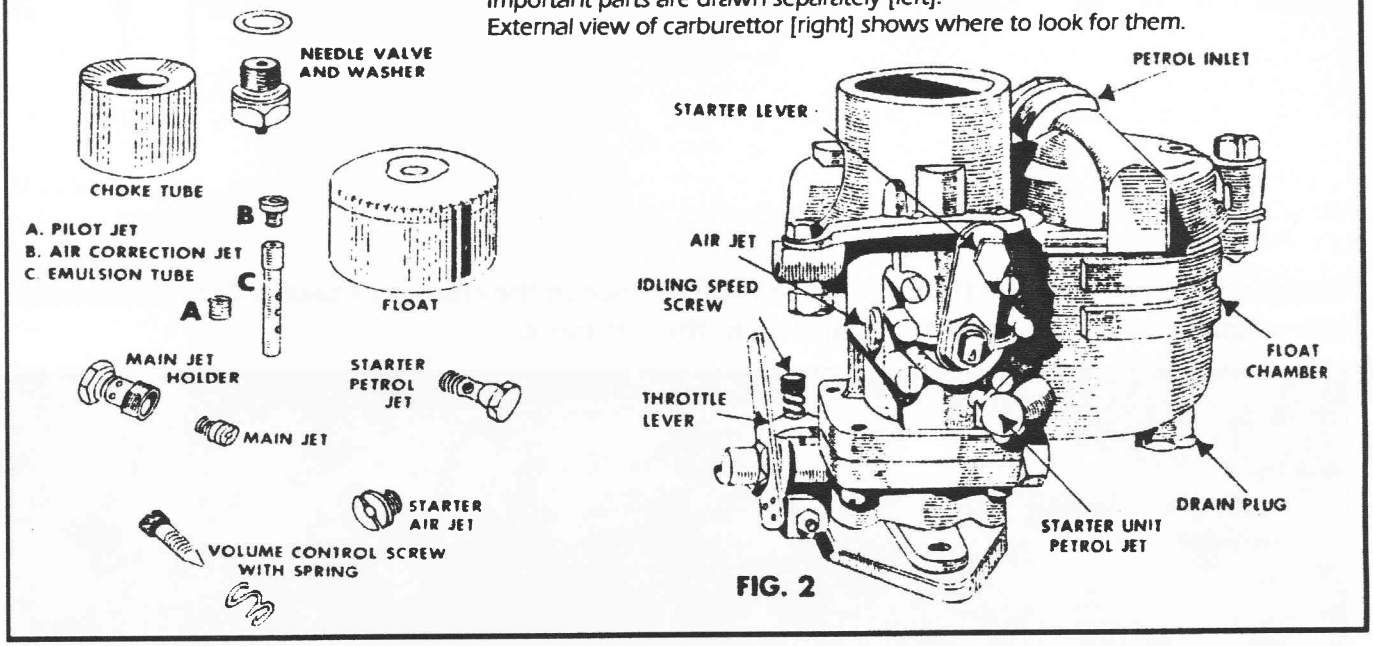


FIG. 2

GENERAL RUNNING

For general running above idling speed, the fuel is drawn from the float chamber [not illustrated, but it is of conventional design carrying a float which closes off a needle valve when petrol in the float chamber has reached the right level] through the main jet [#19], which is housed in the main jet holder [#20], then into the spraying well [#1] via the reserve well [#12], where it meets air drawn down via the air correction jet [#15]. This air passes out through the emulsion holes [#18] where an emulsion is formed with the petrol. The resultant mixture rises and is drawn out of the spraying orifices [#14] by a vacuum created by air rushing through the choke tube [#4]. The mixture is then carried past the throttle butterfly and on into the firing chamber of the engine.

DISMANTLING THE CARBURETTOR

The main construction of the carburettor illustrated comprises three die castings, namely [A] the throttle body, [B] the float chamber and the main carburettor body to which is attached the bi-starter unit, [C] the float chamber cover and the air intake. [On some smaller Solex models there are only two die castings. On these the throttle body and main carburettor are cast as one piece.]

A study of figure 1 will show that the main jet [#19], the pilot jet [#17] and the starter air jet [#2] are all accessible from the exterior without dismantling the carburettor. With removal of the air cleaner, if fitted, access to the interior of the carburettor is quite easy. To get to the float chamber it is necessary to remove screws holding the cover in position, together with the petrol pipe union, when the cover may then be lifted off, exposing the float chamber, float, air correction jet [#15] and pilot jet air bleed [#16].

GENERAL NOTES

On warm days, if the engine is not stone cold, it is usually possible to start up with the dashboard control pulled out only to the half-way position. If an instant start is not forthcoming and the carburettor is suspect, remove and clean the starter petrol jet [#8]. Blow through it with compressed air. Do not probe with a pin or wire.

Before adjusting the carburettor it is important that the ignition system must be in good condition and that the compression is equal in all cylinders. It is also important that there are no leaks in the intake manifold and that the engine is at operating temperature. The carburettor must be clean internally, in good mechanical condition and the float level must be correctly set. The float level can be adjusted if necessary by using different thicknesses of washers under the needle and seat. An extra or thicker washer will reduce the petrol level. A high float level can generally be determined by looking down through the throat of the carburettor with a flashlight while the engine is idling. If the spraying holes flush alternately wet and dry, it is a true indication of a high fuel level in the float bowl which must be corrected before the engine will idle smoothly.

Normal adjustment is carried out as follows:
Wait until the engine is hot and set the idling speed screw [Fig. 2] so the idling speed is running a little on the high side. Next slacken the volume control screw [#21] until the engine begins to hunt, then screw it in until the hunting just disappears. If the engine speed is still too high, set the idling speed screw until a nice even idle is obtained. Should this cause a resumption of hunting, turn the volume control screw in a clockwise direction until the idling is perfect. When removing the volume control screw for cleaning, care should be taken to see that the tapered point is not bent or worn. If this is the case, then a new screw should be obtained immediately.

AIR FILTERS

An air filter with too small an area of filtering medium will raise fuel consumption owing to the increased vacuum imposed upon the jets. If this is suspected, make a comparative test with the air filter removed. Should the cause be located here, first clean carefully the filtering medium then try again. If after this the consumption is still bad, it is probably the result of the filter itself being too small.

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