7. OVERHAUL INSTRUCTIONS FOR CARBURETOR

Parts supplied may not always conform exactly to illustration.

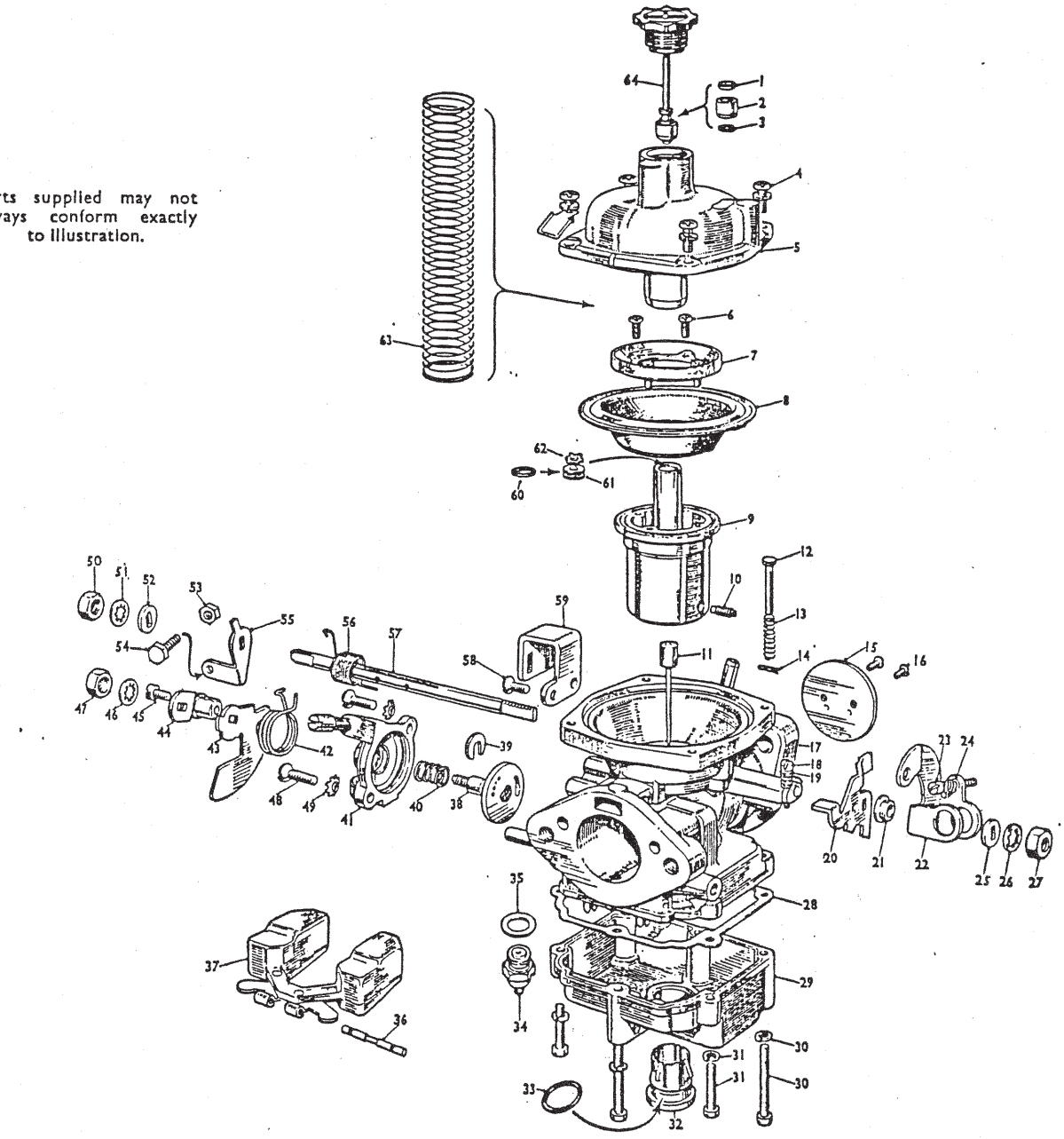

Fig. 7.1 Explosion view of 150 CD-3 carburetor

7. OVERHAUL INSTRUCTIONS FOR CARBURETOR

7.1 PRINCIPAL FEATURES

The Stromberg "CD" or constant depression instrument is different from carburetors of fixed choke tube design. It operates on the "constant vacuum" principle, the choke area and the jet orifice varying according to the degree of throttle opening and the speed of the engine which will alter according to the load.

It is a simple, compact and dustproof instrument with a concentric floatchamber surrounding the jet orifice with its attendant advantages over the more orthodox out-rigged floatchamber some distance away from the jet.

Three principal die-cast aluminum castings are used in the construction:

The main body,
the suction chamber cover and
the floatchamber.

The 150 CD carburetor has a cold start device interconnected with the throttle to provide for a specific degree of throttle opening to ensure a suitable fast-idle as necessary when the engine is cold.

The 150 CD-3 carburetor has an additional disc valve to enrichen the mixture when starting from the cold. For the sake of simplicity it is called starter and may be operated independently from the throttle. The starter replaces the conventional choke.

7.2 PRINCIPLE OF OPERATION
(See fig. 7.2)

The fuel inlet 1, a fitting to accommodate a flexible hose is at the side of the main body. From here fuel passes into the floatchamber via the needle seating 5 where the flow is controlled by the needle 8 and the twin floats on a common arm 7. As the fuel level rises the float lifts and, by means of the float arm and tag, closes the needle on its seat when the correct level has been attained. With the engine running, fuel is drawn from the floatchamber, the float descends and more fuel is than admitted through the needle seating. In this manner, the correct level is automatically maintained the whole of the time the carburetor is in action. The fuel from the floatchamber will rise in the jet orfice 19 via hole 21 in the jet assembly, the fuel in the jet orfice being maintained at the same level as that in the floatchamber.

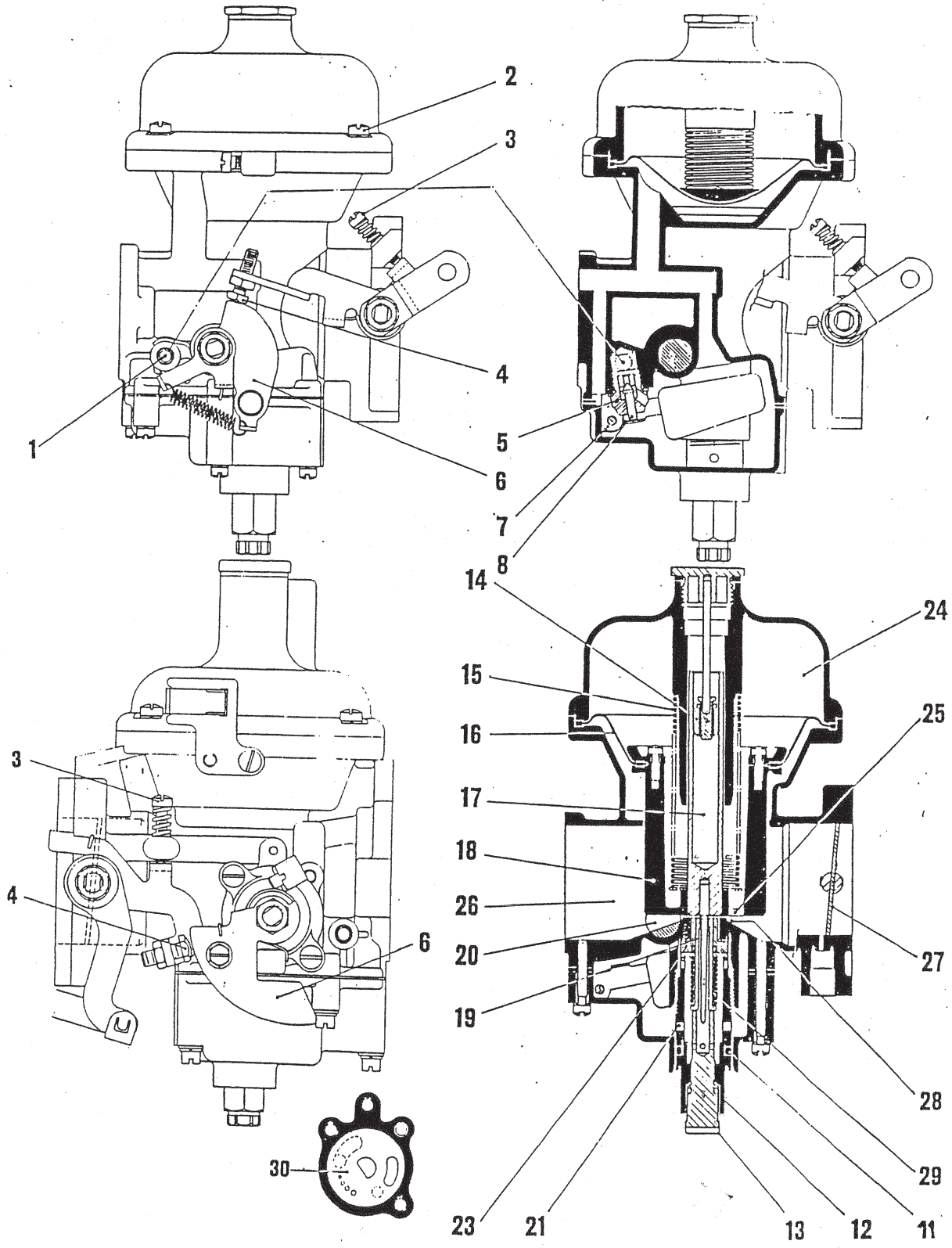

Fig. 7.2 Sectional drawing of 150CD carburetor

7.2.1 Starting from Cold

a) Carburetor Type 150 CD

When the choke control on the instrument panel is pulled out it operates the lever 6 at the side of the carburetor; this rotates the starter bar 20 to lift the air valve 18 in which is fitted the metering needle 29 from the jet orifice 19 to increase the area of the annulus between needle and orifice. In this manner the enriched mixture necessary to ensure cold starting is provided. Simultaneously, the cam on the lever 6 will open the throttle beyond the normal idle position according to the setting of the fast-idle stop screw 4 to provide the fast-idle speed when the engine is cold. When the engine fires the increased depression will lift the air valve 18 to lean the initial starting mixture and prevent the engine stalling through over-richness. While the chok remains in action the control knob should be released or pushed in gradually as the engine attains normal working temperature. It will be appreciated that movement of the choke lever 6 will decrease progressively the extent of enrichment and degree of throttle opening for fast-idle to the point where the screw 4 is out of contact with the cam on the choke lever and the throttle is permitted to return to the normal idle position as determined by the setting of the throttle stop screw 3.

b) Carburetor types 150 CD-3

When the choke control on the instrument panel is pulled out, it operates lever 6 at the side of the device in which a series of holes of different diameters are drilled. In the full rich position the largest hole will be in communication with the starter circuit and provide the richest mixture. Fuel is drawn from the floatchamber via a vertical drilling adjacent to the central main feed channels, throu the starting device and into throttle body on the atmospheric side of the throttle plate. Simultaneously, the cam on the starter lever will open the throttle beyond the normal idle position, according to the setting of the fast-idle stop screw 4, to provide the fast-idle speed when the engine is cold. As the dash-board control on the instrument panel is gradually released, smaller holes will provide the fuel feed from the floatchamber, there by progressively leaning the mixture strength to the point where the control is pushed fully home and mixture strength will be governed by the setting of the orifice adjusting screw and the idle speed determined by the setting of the throttle stop screw.

NOTE

The throttle should not be opened when starting from cold on either type.

7.2.2 Idling

There is no separate idling circuit in the Stromberg "CD" carburetor. The fuel is provided by the jet orfice 19, the amount being controlled by the setting of the orfice adjusting screw 13 and the speed of idle by adjustment to the throttle stop screw 3 which limits the closure of the throttle when the throttle lever is pushed all the way in. Turning the orifice adjusting screw, when looking on this clockwise leans the mixture, counter-clockwise will enrichen it.

7.2.3 Normal Running

With the opening of the butterfly throttle manifold depression is transferred (via a drilling 25 in the air valve) to the chamber 24 which is sealed from the main body by the diaphragm 16. The pressure difference between chamber 24 and that existing in the bore 26 causes the air valve to lift, thus any increase in engine speed or load will enlarge the effective choke area since the air valve lift is proportional to the weight of air passing the throttle 27. By this means air velocity and pressure drop across the jet orifice remain approximately constant, ensuring good fuel atomization at all speeds. As the air valve 18 rises it withdraws a tapered metering needle 29 held in the base of the air valve by a screw from the jet orifice 19 so that fuel flow is increased relative to the greater air flow. The metering needle is a variable and is machined to very close limits to provide a mixture ratio for all speeds and loads in line with engine requirements.

7.2.4 Acceleration

At any point in the throttle range a temporarily richer mixture is needed at the moment the throttle is suddenly opened. To provide this, a dashpot or hydraulic damper is arranged inside the hollow guide rod 17 of the air valve. The rod itself is filled with suitable oil to within a 6 mm of the end of the rod in which the damper 14 operates. When the throttle is opened, the immediate upward motion of the air valve is resisted by this plunger.

For that short time the suction or depression at the jet orifice is increased and the mixture is enriched. For all normal requirements Zenith lube oil is suitable. The downward movement of the air valve 18 is assisted by the coil spring 15 and/or weighted air valve.

7.3 ADJUSTMENTS

7.3.1 Base Adjustments

7.3.1.1 150 CD:

The 150 CD type carburetor must be pre-set before installing on the engine. The procedure is as follows:

- Remove airfilter (pre-heating of carburetor) from the carburetor. Remove securing wire from the idle mixture screw no.13.
- Screw the idle mixture screw clockwise, till it contacts the piston no.18.(Look into the carburetor).
- Unscrew the idle mixture screw from this position 3.5 rotations.

Caution
****

Don't loosen the tightening screw no.12, the idle mixture screw may be misaligned, which will cause sticking of the carburetor needle no.29. Check if the piston no.18 is easily movable.It must be liftable with little resistance (against the oil-pressure piston no.14)and glide without sticking back into it's initial position.

7.3.1.2 150 CD-3

The 150 CD-3 carburetor must be pre-set according to table 1 before installing on the aircraft.

Caution
****

Some engines require a richer mixture for testing on the engine test-stand. (See table 1)
Be sure to readjust the normal setting before installing on aircraft.

Adjusting metering needle
(see fig. 7.3)

150 CD-3 carburetors are fitted with metering needle assemblies which are adjustable. This fine adjustment is intended to be used to give an optimum mixture setting for a particular engine. The jet orifice height is set during manufacture and no attempt should be made to alter this in service. The needle adjusting screw (1) is located in the base of the air valve guide rod (2) and is secured by a spring steel retaining clip (3). Removal of the clip or adjusting screw is not recommended, as serious damage to the guide rod can result rendering the air valve assembly useless. The biased metering needle assembly (4) engages with the adjusting screw through the base of the air valve and is retained by a spring loaded screw (5).

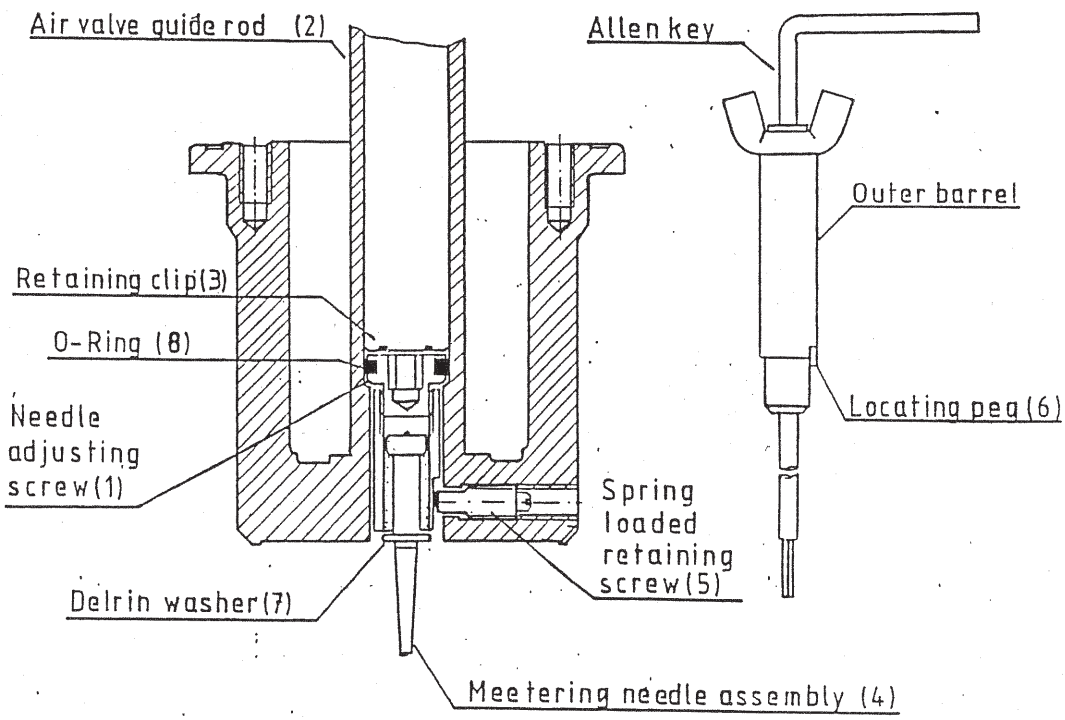

Fig. 7.3 Sectional drawing of air valve assy. 150CD-3 and adjustment tool

Method of Adjustment

Adjustment is effected with the use of a special adjusting tool Limbach part No. 803.001.020. which consists of an outer barrel with an allen key running through its center. With the damper removed from the carburetor the outer barrel of the tool can be inserted in the air valve guide rod and the small peg (6) positioned in the machined slot. This prevents the air valve from twisting and consequently damaging the diaphragm when adjustment is being made. The allen key can then be pushed down and gently turned to locate with a corresponding hexagon in the needle adjusting screw (1).

Procedure

The datum position for the metering needle in the air valv is with its shoulder or where fitted, the underside of the washer (7) flush with the bottom of the guide rod. It is essential that the needle is set in this position before adjustment is made. Generally it will be found necessary to remove the air valve assembly from the carburetor to set the needle in its datum position. After setting the needle as described above, the engine should be fully warmed up and the idle mixture quality assessed. The mixture can be adjusted by up to one turn of the needle adjusting screw either side of the datum position. Raising the needle RICHENS (Turn Clockwise), Lowering the needle LEANS (Turn Counter-Clockwise). While making adjustment it may be found that the engine has a tendency to "stall". If this is so the engine should be allowed to recover its idle between each fractional movement of the adjusting screw. To do this hold engine at say 2000 rpm for 10 seconds to clear manifold.

Warning
****

OBSERVE APPROPRIATE SAFTEY PRECAUTIONS WHILE MAKING ADJUSTMENTS WHILE THE ENGINE IS RUNNING!

Warning
****

It is possible to turn the needle adjusting screw so far in an anti-clockwise direction that the needle assembly disengages from the screw, leading to an unsafe operating condition. This can be rectified be lightly lifting the needle assembly upwards whilst turning the adjusting screw in a clockwise direction. Care should be taken not to clean the air valve assembly with a degreasing agent that will harm the rubber sealing ring (8).

Caution
****

When running the engines L 2000 EB 1, EB 1A and EA 1B on the test stand, the metering needle must be adjusted in full rich position. (+2.5 rotations)

After engine test reset metering needle in the position outlined in table 1.

SL1700

	E	EI	EA	EA I	EB	EB1	EC	EC1
carburetor needle valve	all 1.5							
meetering needle	all 6A							
float level	all 16.5mm, measured without gasket							
adjustment of meetering needle	+2	+2	±0	±0	±0	±0	+2	+2

L 2000

	E 01	EA	EA 1	EB 1	EB 1.A	EC 1	EA.1 B	DD 1
carburetor needle valve	2.0	2.0	2.0	1.5	1.5	2.0	1.5	2.0
meetering needle	6A	6A	6A	B5 CK	B5 CK	6A	B5 CK	6A
float level	all 16.5 mm, measured without gasket							
adjustment of meetering needle relative to datum position. (+ =richer, - =poorer +1=1 rotation richer	±0	±0	±0	+1.5	+1.5	±0	+1.5	±0

L2400

	EB 1.A	EB1.B	EB 1.C
carburetor needle valve	2.0	2.0	2.0
meetering needle	B5 CK	B5 CK	B5 CK
float level	all 16.5mm, measured without gasket		
adjustment of meetering needle	+1.5	+1.5	+1.5

Table1: Standard Settings of the Stromberg Zenith CD-3

7.3.1.3 Adjusting throttle (both types of carburetor)

Before installing carburetor on the engine ensure that the throttle is in horizontal position at full throttle and completely closed when throttle stop screw is unscrewed. If one of these conditions are not fulfilled, the stopping faces must be bent.

- Screw the throttle stop screw to the point, where the end of the screw just contacts the casting.
- Rotate the stop screw two full turns, to provide a basis from which final speed of idle can be set.

7.3.2 Adjusting and Synchronizing Twin Carburetor Installation

7.3.2.1 Prerequisites

Following conditions must be met before carburetors can be synchronized,

1- Both carburetors must be eqully preset as detailed in 7.3.1.1 for the 150 CD carburetor and 7.3.1.2 for the 150 CD-3 carburetor.

2- Both carburetor throttles must have been checked and adjusted as detailed in chapter 7.3.1.3.

3- Correct float level and, carburetors are in the required good condition.

7.3.2.2 Mounting Twin Carburetor Installation

- mount both carburetors and tighten nuts to the prescribed torque.
- loosen nuts for exhaust pipe flanges on cylinderhead
- loosen hose clamps for intake pipes
- engage linkage for twin carburetor
- push both carburators inward as far as possible yet permitting the linkage to operate smoothly and without excessive force.
- retighten the nuts for the exhaust pipe flanges holding the carburetors in the position describes above.
- check the intake pipes for correct alignment. (pipe

joints underneath the hoses must not be offset!)

- tighten hose clamps for intake pipes.

7.3.2.3 Synchronising Twin Carburetor Installation

- Check that both cold-start levers are fully resting in the off position. Ensure that fast idle screws are clear of the cam for correct synchronization (150CD carburetor only). Adjust coupling and/or control wires as necessary.

- Ensure that both throttle levers are in the same position at full throttle (both come into contact with the stopping faces on the carburetor body) **adjust linkage if necessary .**

- Set the throttle stop screws to give required idle speed, turning each screw an equal amount.

Warning:
****

It is not reccomended to set the idle speed with the engine running because of possible injury by the propeller. Stop the engine before making an adjustment.

7.3.3 Float Level:

When correctly set and with the carburetor inverted measure to the highest point of the floats above the face of the main body with the fuel inlet needle on its seat. The correct measurement is indicated in figure 7.4.

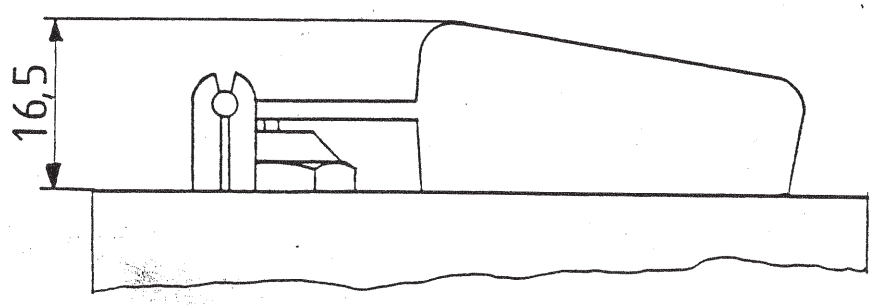

Fig. 7.4 Checking float level

Great care must be taken not to twist or distort the float arms, to ensure a constant fuel level. Should it be necessary to reset the float level, this can be carried out by bending the tag which contacts the end of the needle 8. Care should be taken to maintain the tag at right angles to the needle in the closed position.

7.3.4 Jet Centralization(150 CD carburetors only)

The efficient operation of the carburetor depends on free movement of the air valve and needle in the jet orifice. In the150 CD carburetor there is annular clearance around the orifice bushing 23 which permits the lateral positioning of the bushing and jet. Thus it may be clamped up in such a position that the metering needle 29 moves freely in the orifice 19. When the carburetor leaves the factory the orifice bushing is in the correct position and this can be checked by lifting the air valve by means of the spring loaded pin and noting that the valve falls freely. If for any reason, the jet assembly is removed, it must be re-centered.

Procedure

1. Lift the air valve 18 and tighten the jet assembly 12 fully.
2. Screw up the orifice adjuster until the top of the orifice 19 is just above the bridge 28.
3. Slacken off the whole jet assembly 12 approximately halfa-turn to release the orifice bushing 23.
4. Allow the air valve 18 to fall; the needle will then enter the orifice and thus automatically centralise it. If necessary, assist the air valve drop by inserting a soft metal rod in the dashpot after unscrewing the damper.
5. Tighten the assembly 12 slowly, checking frequently that the needle remains free in the orifice. Check by raising the air valve approximately 6 mm and allowing it to fall freely. The piston should then stop firmly on the brigde.
6. Reset idle as outlined earlier.

Sticking of the air valve can be explained by dirt or carbon on the outside diameter of the bore in which the air valve moves or if the metering needle is bent. To remove the air valve assembly take off the top cover by undoing the screws 2. The assembly with diaphragm can then be lifted out of the main body. The outside of the air valve and the bore can be wiped clean with a rag that is moistened with paraffin or fuel, but if the diaphragm has expanded, allow it to dry for a few minutes, then it will fit on the bead and re-

cess for the locating tab. If it is necessary to clean the diaphragm, use only a clean rag. In common with other products made from rubber compounds any contact of the diaphragm with volatile cleaners such as trichlorethylene should be avoided. If examination of the needle indicates it is bent it should be replaced with a new one bearing the specified marking as detailed in the specification for the particular make and model of engine. In replacing or fitting a new metering needle, the shoulder must line up with the lower face of the air valve and the locking screw tightened fully.

The needle is machined to very close limits and should be handled with care.

7.4 Air Valve/Diaphragm Assembly

A bead and locating tab is moulded into both the inner and outer radii of the diaphragm to ensure correct positioning of this item. The diaphragm is secured to the air valve by a ring and screws with lockwashers and it is very necessary to ensure that the bead is correctly located and the screws are fully tightened. Location for the bead and tab on the outer radii of the diaphragm is provided by a location channel at the top of the main body. It is important that location beads and tabs be accurately positioned. When refitting the suction chamber cover, place it accurately so that the screw holes line up with those in the main body. This will prevent any disturbance of the installed diaphragm.

7.5 Air Valve Rod and Guide

The air valve rod and guide must be kept clean and should not be handled unduly to avoid corrosion. A few drops of light oil should be applied to the rod before refitting.

7.6 Floatchamber Removal

To prevent a leakage of fuel from the floatchamber, a rubber "O" ring 11 is situated between the jet assembly and the floatchamber spigot boss. Care should be taken when removing the floatchamber to avoid damage to the faces and floats.

7.7 INSTALLING CARBURETOR.

Warning:
****

ALWAYS replace the gaskets when remounting the carburetor!

An air leak will cause a faulty mixture ratio and consequently a bad engine running. It may even cause engine overheating with subsequent permanent damage and an unsafe operating condition. Be careful to mount the gasket between carburetor and air cleaner or carb heating box in such manner, that all openings in the gasket align with the corresponding bores in the flange of the carburetor.

7.8 Fuel Pump

The fuel pump is located at the right side of the crankcase.

The pump pressure and delivery capacity can be checked with suitable appliances. Experience has shown that the values normally vary very little and that even if the pump presure is slightly higher than it should be, it has no influence on the running of the engine or on fuel consumption.

Test values:

Pump pressure	Delivery capacity	rpm
0.25 bar (3.5 lbs./sq.in.)	400 cm 3 / min	3400

If large variations are observed, the stroke of the pump rod must be checked and if necessary corrected by inserting the appropriate number of flange gaskets.

The fuel pump is driven by a push rod, that is acutated by an excentric shaft. The shaft is driven by a worm drive mounted on the crankshaft. To check and adjust axial clearance of the eccentric shaft see chapter 11.4.

Caution
****

During assembling and disassembling fuel pump, the operating lever must be pressed into the pump housing, to ensure proper placement of the diaphragm.