TECH DOCS 3

O.C.I VALVE ISSUE 1 ©

1. INTRODUCTION

The O.C.I. valve is one of three different types of valves fitted to bubble stoves.

It can be supplied as a

BASIC VALVE FIG 1

NON-ELECTRIC CONTROLLED VALVE FIG 2

ELECTRIC CONTROLLED VALVE. FIG 13

Oil outlet can be either side or bottom; valves must be ordered accordingly.

Its primary job is to control the flow of oil into the appliance and it does this as follows.

When the valve is cocked by pressing the trip lever a Fig 3, oil is allowed to flow into the float chamber to a predetermined level. SEE FIG 4

When this level is reached the action of the rising float closes off the oil supply via a rubber tipped, mechanical lever actuated needle valve.

Oil is allowed to leave the valve through the metering stem, (FIG 8) which is a hollow piston in a cylinder, with a precise slot machined into its vertical side.

The hollow piston is normally called the **metering stem. FIG 5**

The cylinder in which the piston is housed has a hole drilled into the side of it and the oil level is set so as to allow oil to rise up and be exposed to the side of the cylinder via the cross drilled hole.

When the oil flow control knob (FIG 1) is rotated this rotational movement allows the piston to rise up in the cylinder and expose the slot to the oil.

The piston is sprung loaded against a rotary cam, as the knob is rotated the cam allows the sprung loaded piston to rise up in the cylinder allowing more of the machined slot to be exposed to the oil, this vertical movement of the piston allows more or less oil to flow through it depending upon its position.

The vertical movement of the piston is traced via the pin (FIG 1) which rise and fall in line with the movement of the piston / metering stem.

2. CONTROLS AND ADJUSTMENT

BASIC VALVES FIG 1

NON-ELECTRIC CONTROLLED VALVE FIG 2

ELECTRIC CONTROLLED VALVE. FIG 13

BASIC VALVES

Basic valves are as described in the introduction.

Controls are simple and comprise of the oil flow control knob and the oil trip lever. SEE FIG 1

BASIC VALVES WITH ELECTRIC CONTROLS

Basic valves can have an extra control called a flexatemp. SEE FIG 13.

The flexatemp is attached to the top of the valve and comprises of a bimetallic switch which when energised will raise or lower a actuating arm (FIG 14) pressing on or lifting off the tracer pin. Fig 3

The flexatemp can be wired to a variety of heat sensitive switching devices such as thermostats, oven stats and room stats. Fig 13

BASIC VALVES WITH NON-ELECTRIC CONTROLS FIG 3

These are the most interesting valves comprising as follows.

1. A manually operated oil flow control knob. FIG 1

2. A manually set, automatic running stat with capillary phial and bulb. FIG 3

3. A manually and automatically operated oil trip off lever. FIG 3

4. An automatically operated safety shut off thermostat with capillary phial and bulb, which trips the oil flow cut off lever. FIG 2

The valve operates as follows, it has flow control potential from mini to maxi via six graduations and so the appliance can be manually controlled from MINI to MAXI by simply turning the oil flow control knob.

In addition it also has a water sensing running stat and an automatic safety oil cut off device should the appliance water temperature exceed 85 degree C.

The water sensing running stat will automatically control the boiler water temperature at what ever setting is required up to a maximum of 70 degree C. and it is operated by a control knob situated alongside the oil flow control knob. SEE FIG 3

The flame then drops to it's low fire position, from there on it will automatically modulate from high to low in line with the heating load demand.

ADJUSTMENT OF THE RUNNING STAT

Set point of the operating stat can be adjusted as follows.

The thermostat drive knob has a cover, which slips over it and grips it acting as an adjustable driver.

SEE FIG 3

The driver has a dead stop (FIG 7) which acts against a small brass screw so restricting the rotational movement to one full turn, thus allowing adjustment of water temperature from mini to maxi through the single full turn.

If the water temperature settings are not as required remove the plastic push on cover and rotate the aluminium knob anticlockwise until the weight comes off, allow the stove to come up to the required temperature (say 65 deg c) and then rotate the aluminium knob until the fire starts to reduce, refit the plastic push on cover with the scale set as required.

On valves with permanently fixed drive covers the set point can be adjusted via the small screw in the centre of the stat cap. SEE FIG 8

(Note on later valves the plastic push on cover has been superseded by a permanently fixed aluminium cover)

ADJUSTMENT OF THE SAFETY STAT

To make this task as quick as possible for the commissioning engineer.

Turn the pump off and the emersion heater on.

If possible, isolate the rest of the heat leak circuit to allow the boiler temperature to build up rapidly.

Fit a pipe thermometer to the hot flow and observe the temperature at which the safety stat cut off occurs.

Adjust as required to 85 degree C.

To adjust the set point on the safety stat the aluminium top cover of the oil valve has to be removed. SEE FIG 11

It is held in place by the three slotted screws and the base casting of the thermostat stand. FIG 9

Undo the three slotted screws and slacken the other two, lift the cover up and work it out from under the aluminium thermostat casting.

When the cover is removed it will reveal the operating bellows of the safety stat, on the left hand end of the bellows is a straight knurled nut, which if screwed in will decrease the temperature set point and if screwed out will increase the temperature set point. SEE FIG 11

The knurled adjuster screw is very sensitive needs only slight rotational movement

3. LOW FIRE DEADSTOP

If the flame falls over to dirty combustion, when the aquastat or flexatemp has put the valve onto low fire, it will be necessary to adjust the low fire dead stop screw shown in FIG 5.

The burner will run in blue flame combustion when the valve is set to minimum, but the thermostat has not acted upon the tracer button. As soon as the water circuit heats up, the thermostat will bear down upon the tracer pin. On valves with the non-electric thermostat, the thermostat can act with considerable force, the higher the temperature the greater the pressure, and in some cases the applied pressure can take the low fire down further than it was set when the thermostat was not acting. This screw stops the movement of the low fire setting due to the pressure applied by the flexatemp or thermostat.

This screw stops movement of the low fire setting, due to applied mechanical pressure, from the action of the flexatemp or thermostat.

4. SAFETY

The main safety issue is oil rising above the predetermined level.

If it does there is a safety mechanism.

The Oil Controls International oil control valve has a second safety float chamber designed as a safety back up to the first one.

If the first float fails oil will rise in the valve.

The rising oil floods over a purpose designed weir into another independent back up float chamber.

When the float in this chamber raises it trips the safety cut off lever and closes off the oil supply into the valve.

IF the valve is knocked or disturbed, it is possible to accidentally flood the second chamber, if this occurs it will be self evident, as it will not be possible to trip the safety cut off lever until the back up float chamber is deflooded.

5. PROBLEMS

The pressure of oil applied to the metering stem in these valves is miniscule as the head is only millimetres.

The precision machined slot (FIG 6) in the metering stem is extremely small and coupled with the fact that the pressure applied to it is so low, it is not hard to understand that sometimes oil is reluctant to flow through it because of the back pressure created by the meniscus effect on the slot.

It is sometimes necessary to turn the valve on to full flow and tap the tracer pin FIG 1 up and down to try and break the meniscus lock on the metering stem.

6. WATER CONTAMINATION.

If water contaminated fuel is used it will obviously build up in the float chamber of the valve and eventually cause a problem.

Drain the valve off via the filter.

7. DIRT IN OIL.

If dirt contaminated fuel is used it will obviously build up in the float chamber filter of the valve and eventually cause a problem.

Remove the filter and clean it out. FIG 3 – 4.

8. LET BY

All valves can suffer let by, it is caused by dirt becoming lodged under the rubber tipped needle valve item 25 FIG 16 and 17.

Let by will be evident by the burner not extinguishing when the valve is turned off.

The burner will hold a small dirty flame in the oil inlet pipe to the pot, which will not go out and cause a heavy carbon build up.

If the stove is not used for some time the oil will build up in the pot and may leak from it.

Remove the valve and strip it down. See FIG 16-17 item 25.

9. CALIBRATION

O.C.I. valves are calibrated at the factory.

They are set up to the requirement of the burner and measured by high fire flow rate and low fire flow rate.

The Low fire should be adjusted first and the high fire after.

On non electric thermostat or flexatemp valves always check the low fire setting when the water is up to maximum temperature.

Generally valves are calibrated for two types of fuel, which are normally kerosene or diesel, having different viscosity.

Kerosene is 1.8 cm3/min (Viscosity)

Diesel is 4.0 cm3/min. (Viscosity)

The rating badge FIG 7 on the valve will have details relevant to the type of oil and the flow rate in ccs per minute.

An example would be say 4 and 13 x 4.0.

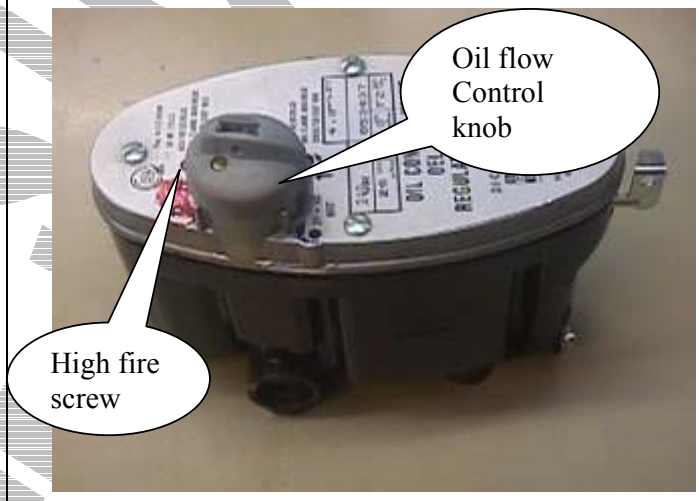

FIG 1 HIGH FIRE SCREW

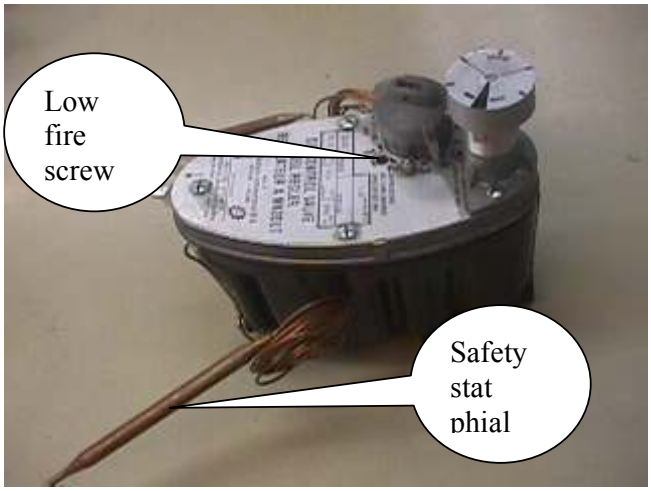

FIG 2 LOW FIRE SCREW

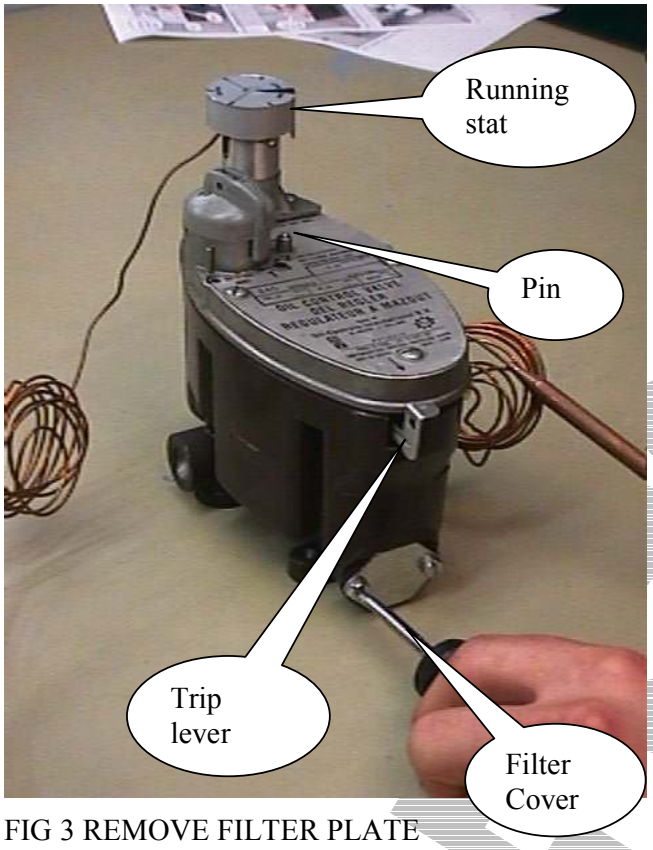

FIG 3 REMOVE FILTER PLATE

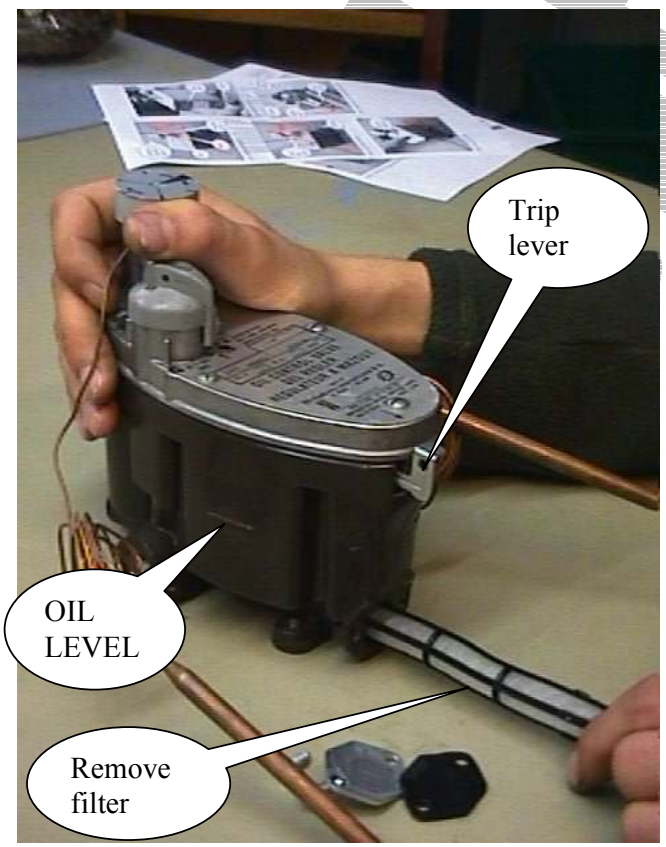

FIG 4 REMOVE FILTER

FIG 5 REMOVE METERING STEM

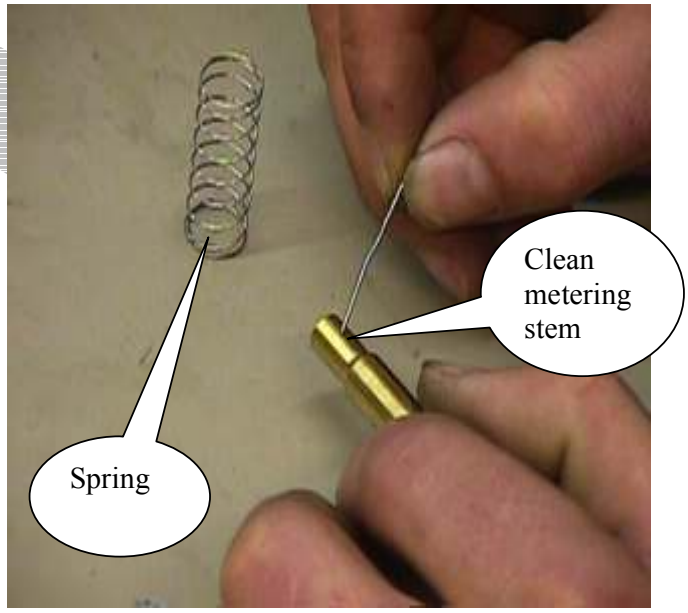

FIG 6 CLEAN METERING STEM

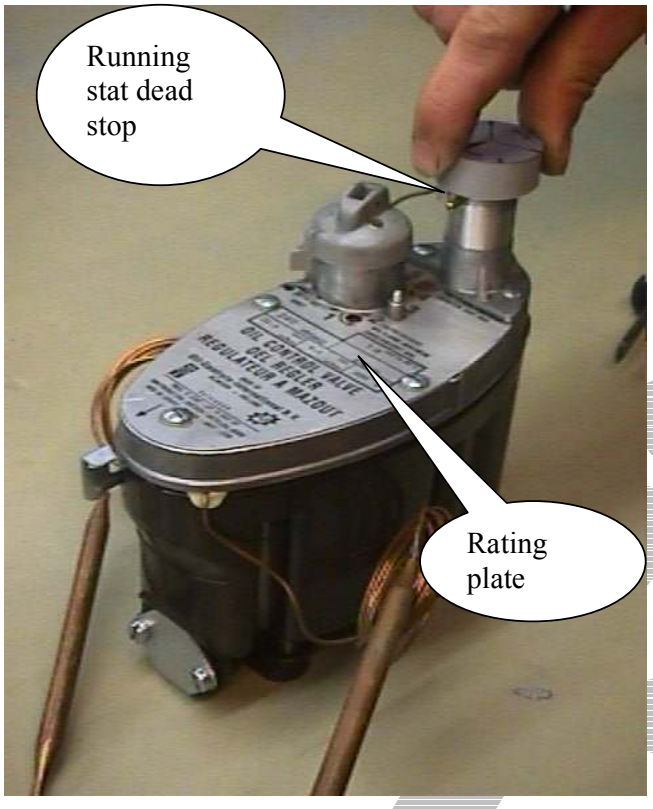

FIG 7 RUNNING STAT DEAD STOP

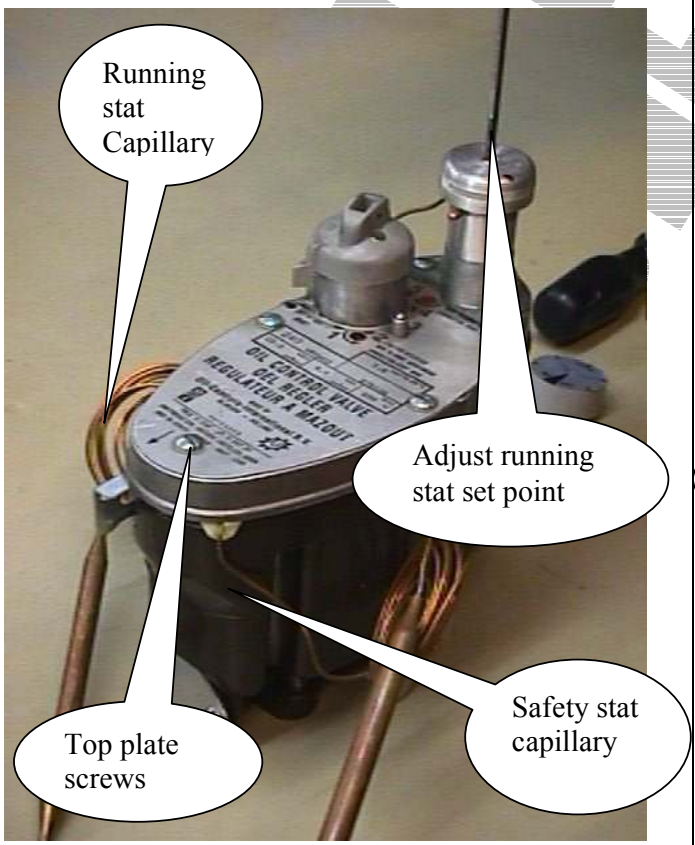

FIG 8 SET RUNNING STAT SET POINT

FIG 9 RUNNING STAT HOUSING REMOVED

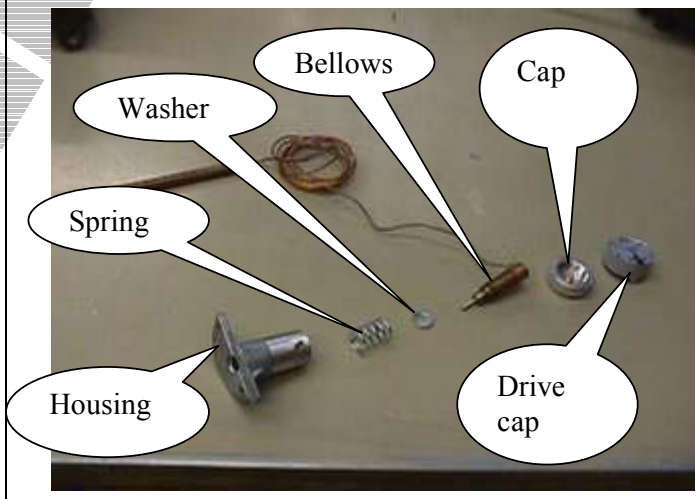

FIG 10 RUNNING STAT COMPONENTS

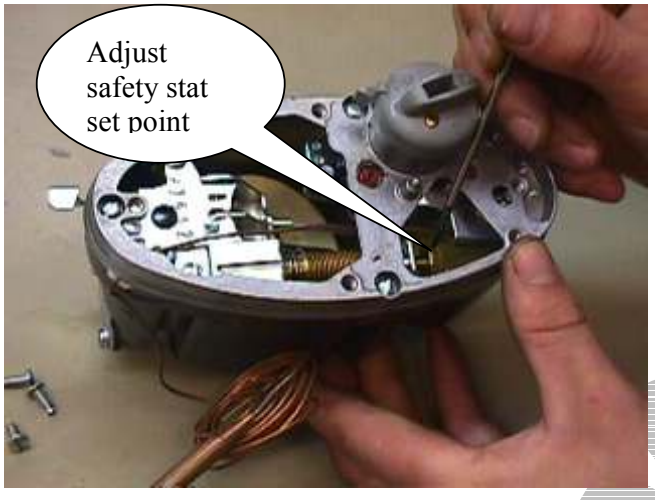

FIG 11 ADJUST SAFETY STAT SET POINT

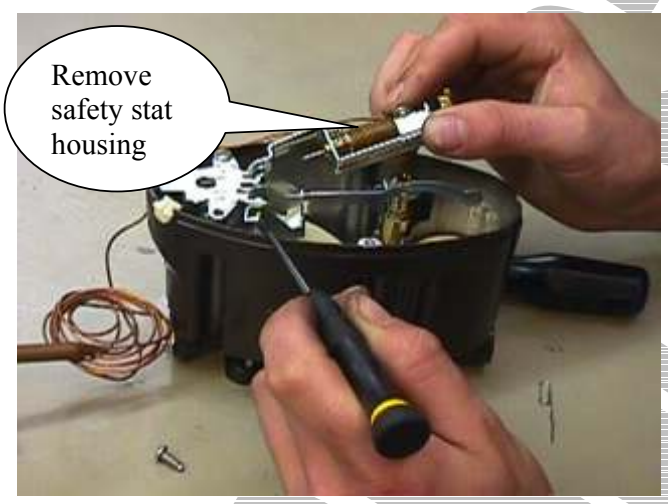

FIG12 REMOVE SAFETY STAT

FIG 13 FLEXATEMP FITTED

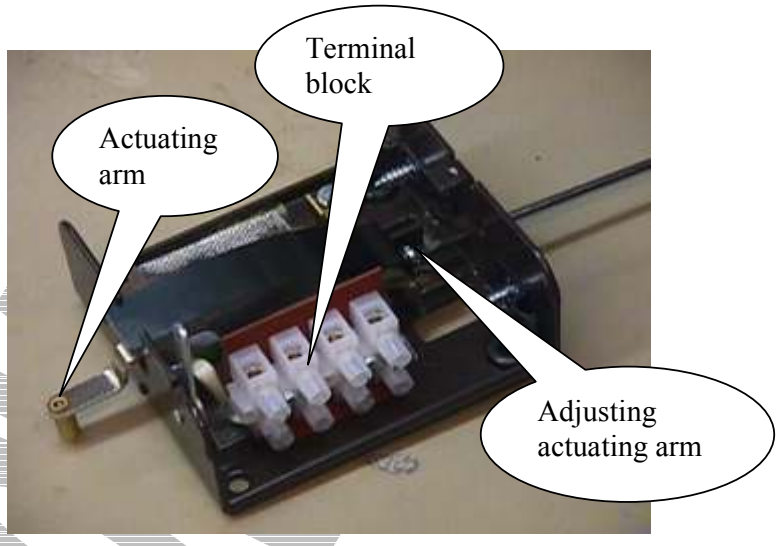

FIG 14 ADJUST ACTUATING ARM

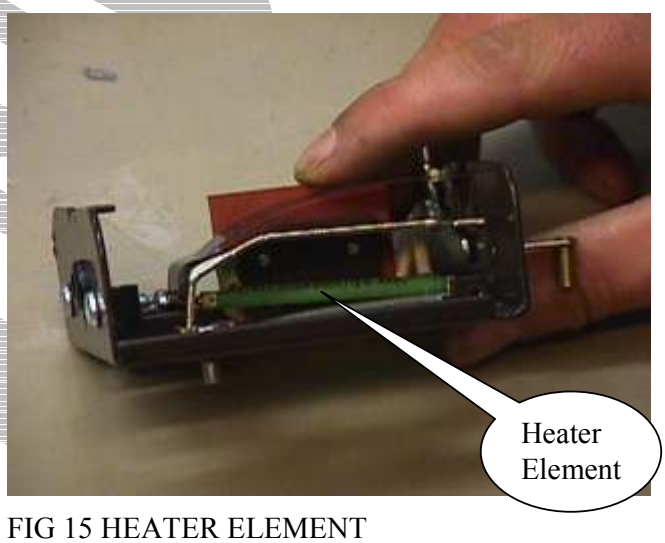

FIG 15 HEATER ELEMENT

FIG 16

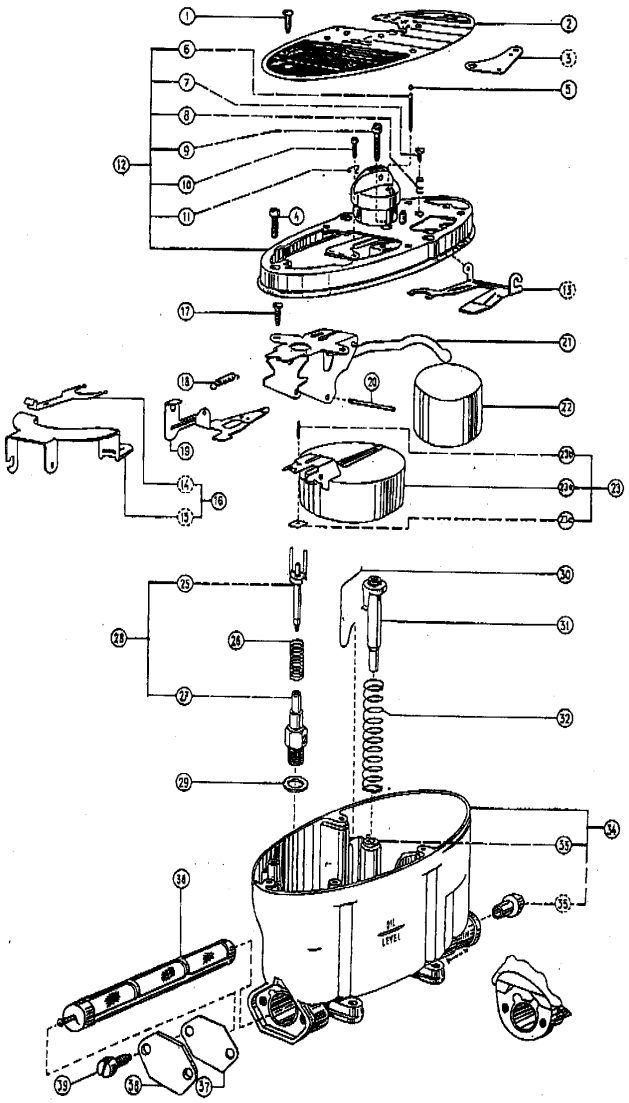

FIG 17

Pos.no.	Part no.	Description
1	0010-1016	Screw nameplate
2	0990-1162	Printed nameplate standard (0990-3001 blank)
3	0090-1002	Mounting plate
4	0674-1000	Screw cover
5	22727	Cap
6	912-30-180	Adjusting screw
7	0001-1025	High fire adjusting screw
8	28497	Friction spring
9	33700	External adjusting screw
10	26814	Fill head screw
11	28911	Friction clip
12	0664-6003	Cover assy (0664-2000 without nose)
13	0442-1000	Action plate
14	0117-1001	Metering stem shut off lever spring
15	0117-1000	Metering stem shut off lever
16	0117-2000	Metering stem shut lever assy
17	0010-1016	Screw
18	38275	Shut off spring
19	0203-3000	Shut off plate
20	0001-1024	Float lever pin
21	0061-2002	Bracket & trip lever assy
22	0061-1014	Safety float
23	0061-2003	Complete oillever float assy
23 a	0061-1013	Main float
23 b	0705-1024	Adjusting screw
23 c	0061-1012	Friction washer
25	0081-2005	Inlet valve stem assy
26	0001-3030	Needle valve spring
27	0081-3000	Valve seat
28	0081-2000	Inlet valve assy
29	24419	Valve seat gasket
30	28563	Spring cup guide stop
31	0060-2000	Metering stem cup assy not punched
32	0664-3002	Metering stem spring
33	0664-3003	Metering stem guide (0664-3004 met. stem guide VRB)
34	0664-0002	Body machined 240 VRU
35	0664-1005	Flare seat
36	0674-3002	Strainer
37	0705-1001	Strainer gasket
38	0705-1002	Strainer cap
39	0705-1023	Screw strainer