INFORMATION SHEET

TOBY VALVE
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TOBY VALVES

The Toby valve is one of three different types of valves fitted to bubble stoves.
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 lifting the trip lever a Fig 4, oil is allowed to flow into the float chamber to a predetermined level.
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 8**
The cylinder (SEE IN FIG 5) 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 and lever (FIG 1) which rise and fall in line with the movement of the piston / metering stem.

SAFETY

The main safety issue is oil rising above the predetermined level.
If it does there is a safety mechanism, which is operated by a further lever set slightly higher than the float. FIG 5
If the float rises above its normal level the lever is tripped and the needle valve is closed down to stop the flow of oil.
To re set the valve lift the cocking lever FIG 4

PROBLEMS

1. 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 8) 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 lever FIG 1 up and down to try and break the meniscus lock on the metering stem.
2. We have also had problems with severe air locks in the outlet pipe leading from the valve to the vaporising pot, in some cases it has been found necessary to remove the top of the valve and the metering stem and insert a piece of wire down into the metering stem cylinder FIG 5 (which is the oil outlet from the valve) and work it round the bottom and down the pipe to tease the air lock out of the pipe. You will see one or several bubbles appear if successful.

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 screw. FIG 6

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.

LET BY

All valves can suffer let by and this 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.

CALIBRATION

Toby valves are calibrated at the Toby factory. They are set up to the requirement of the burner and measured by high fire flow rate and low fire flow rate.

Generally valves are calibrated for two types of fuel Which are normally kerosene or diesel, which have a different viscosity
Kerosene is 1.8 cm3/min (Viscosity)
Diesel is 4.0 cm3/min. (Viscosity)
The rating badge FIG 6 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.

ADJUSTMENT

The valve has been flow rated before leaving the factory and it should not need adjusting, if it does proceed as follows-:
Turn the appliance on and light it.
When the burner has established good blue flame combustion turn it up to half output. (Setting 3 on the fuel flow control knob) and let it stabilize.
Allow at least half an hour for the chimney to warm up thoroughly before making any adjustments to the high or low fire screws.
Turn the stove down onto minimum firing rate and let it stabilize.
After stabilization there should be a dull red glow in the bottom of the lower catalyser with wispy blue flames flicking in to the glowing edge of it.
If the flame falls into a dirty rolling yellow flame and the lower catalyser is not dull red then the low fire will need to be increased until it can support the required blue flame combustion.
To increase the low fire oil flow, screw the adjusting screw out by quarter turn increments. FIG2
When you are happy with the low fire, set the high fire. FIG 1
Turn the oil flow knob up to setting 4, (FIG 1) let the flame stabilize, and look at it, if it is stable and blue, turn it up slowly using the control knob, letting it stabilize after each movement, if the flame starts to go yellow with long flame combustion, it is running fuel rich and the high fire screw needs adjusting to reduce the flow of oil. (Screw the adjuster screw in to reduce the high fire oil flow.)
Before adjusting the high fire screw, (FIG 1) turn the flame down and let it stabilize in blue flame combustion, adjust the high fire screw by half a turn in and try turning the fuel flow up, if it is still fuel rich repeat the process until the hire fire flame is running blue with flicks of yellow in the tips.
If the burner does not run well check that the seals in the stove are good and that there is no ingress of air into the appliance flue ways.
Seals in stove mean:
The pot to closure plate seal
The door seal
Check that the correct fuel oil is being used.
Always refer to the oil stove makers notes on chimney vacuum.

THERMOSTATIC CONTROL

There are two types of thermostat to be used on Toby valves.
Non Electric (FIG 9) and Electric. (Fig 10)
Non-electric controls take the form of an Aqua stat or Oven stat. The aqua stat will control normal water temperatures >100C and the oven stat will control oven temperatures >300 C
The water stat can be seen in FIG 9 and is mounted onto the valve with two screws provided.
The water temperature can be set by means of the control detailed in FIG 9.
It has an oil filled capillary, which operates a lever, which in turn presses down on the tracer pin.
As the temperature of the water increases, the pin presses down on the metering stem and puts the valve on to low fire.
Note the pin has an adjustable dead stop screw FIG 12 which should be set up after the low fire has been adjusted, the dead stop screw must be set so as to stop the aqua stat actuating lever pressing the pin below the low fire setting.
To do this set the low fire and the press the pin down with your finger, if you can feel the pin drop; adjust the screw out until there is no additional movement.
The valve will then modulate from high to low fire in line with the demand of the heating system.
The aqua stat has a reset able safety device which shuts the valve off should the water go over temperature, to reset the safety device, lift the lever in FIG 9.

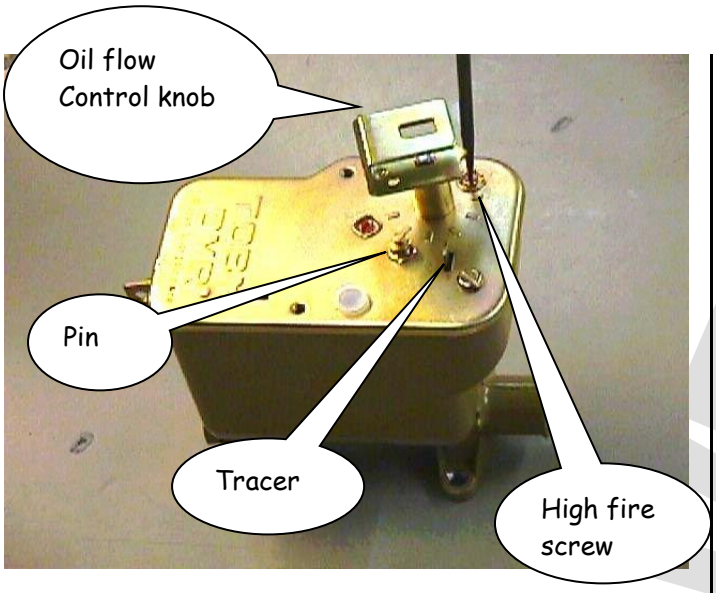

FIG 1 HIGH FIRE SCREW

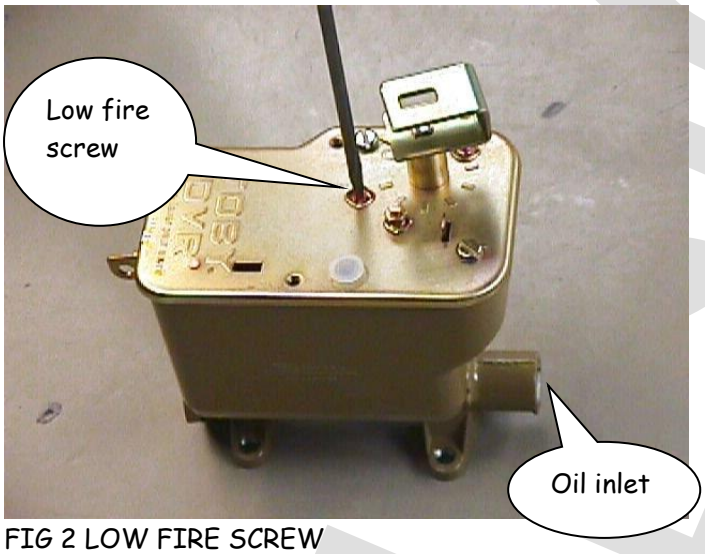

FIG 2 LOW FIRE SCREW

FIG 3 FILTER COVER

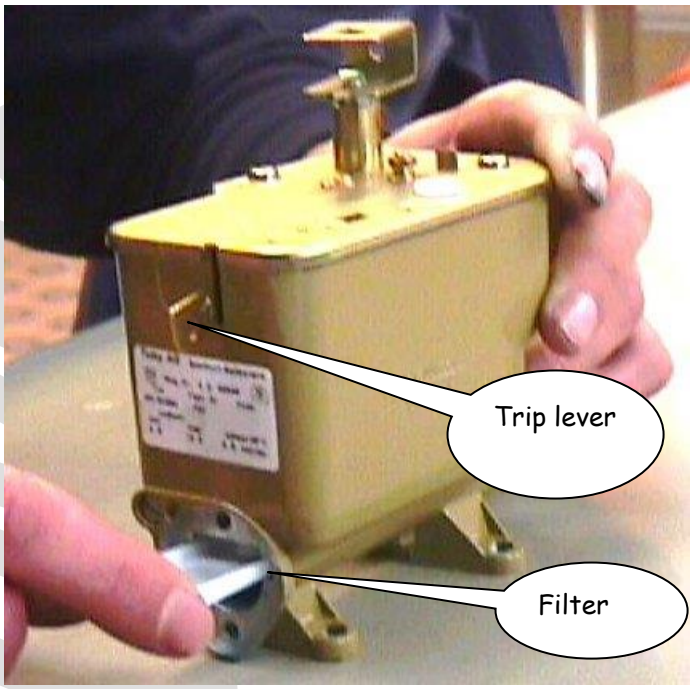

FIG 4 REMOVE FILTER

FIG 5 REMOVE FLOAT MECHANISM SCREW

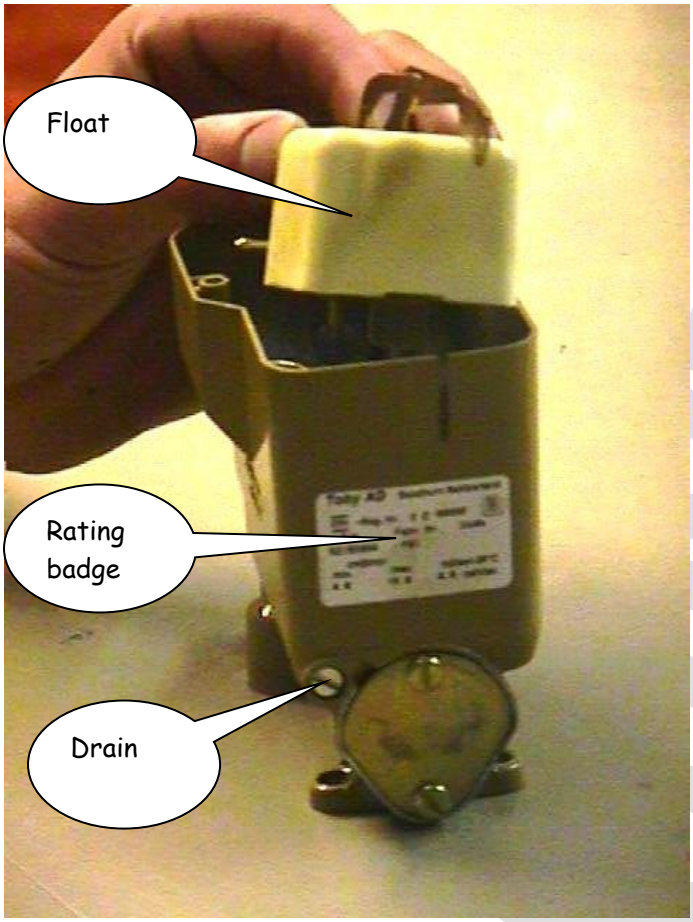

FIG 6 REMOVE FLOAT MECHANISM

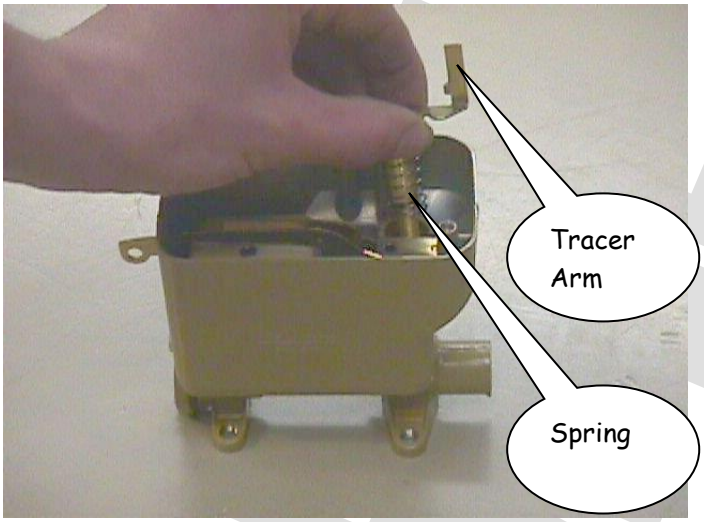

FIG 7 REMOVE METERING STEM

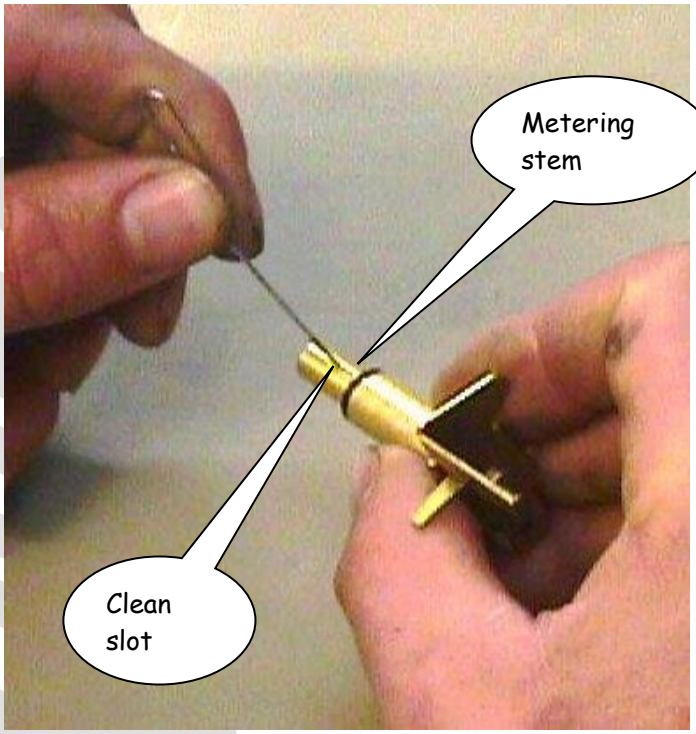

FIG 8 CLEAN METERING STEM

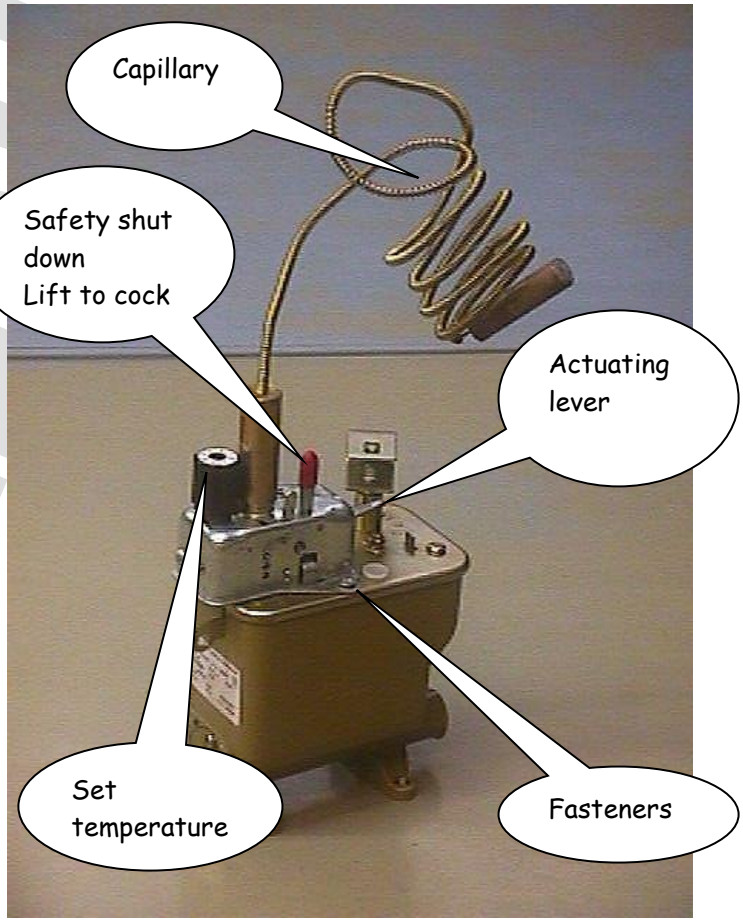

FIG 9 AQUASTAT FITTED

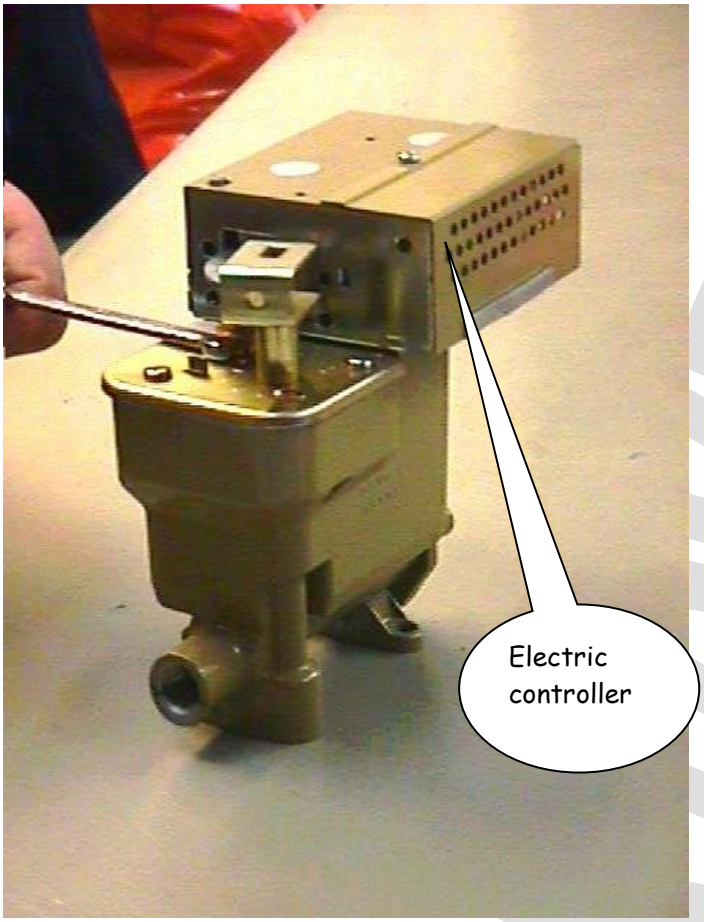

FIG 10 FLEXATEMP FITTED

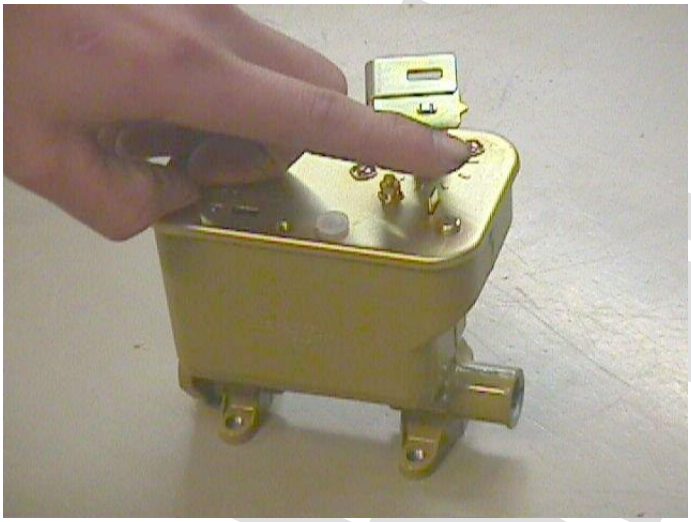

FIG 11 DEPRESS THE METERING STEM

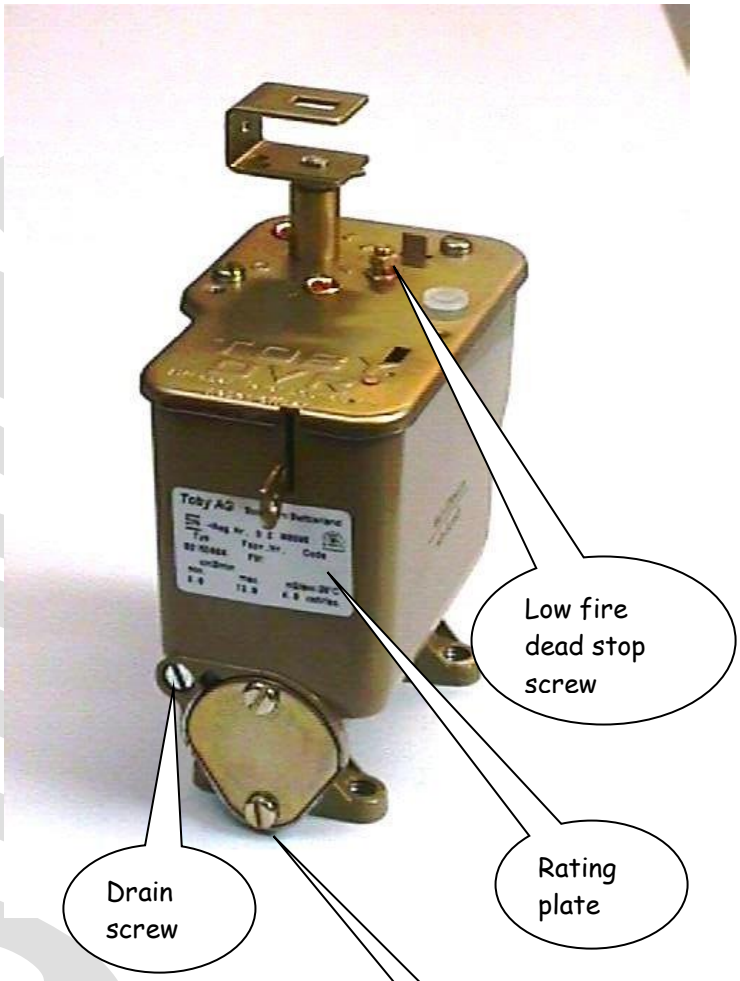

FIG 12