

Toby Oil Control Valve Manual & Fault Finding

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Introduction

Almost a million TOBY oil controls are produced annually and are sold in over 20 countries throughout the world. The designing engineers at TOBY strive to ensure that all their products constantly achieve the optimum performance and the ultimate safety standards with the minimum of maintenance. The information in this document is to help the engineers responsible for the maintenance of heating appliances understand the operation of this TOBY valve and the operations necessary to set up and maintain the valve so that the appliance to which it is fitted operates safely and efficiently.

Diagram 1 shows a cutaway valve to illustrate the parts listed in the accompanying table.

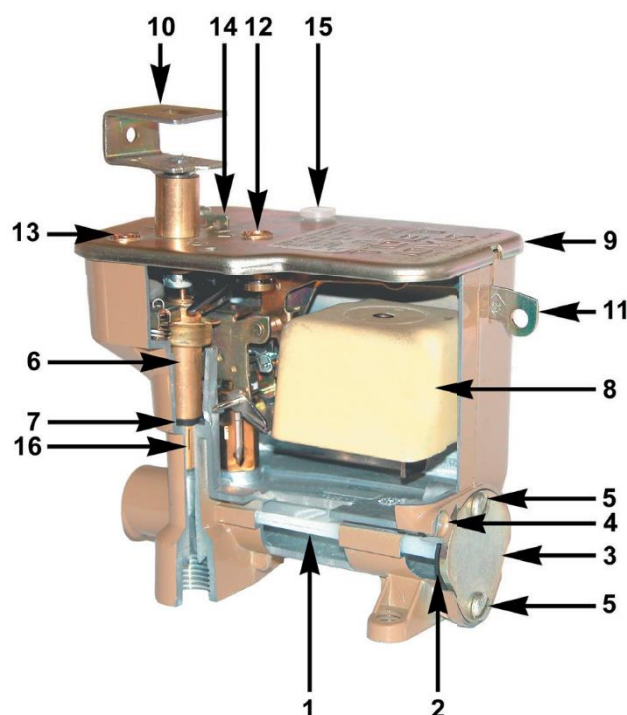
PRESSURE:

Maximum permissible: 6.4m oil column (Safety pressure over 10 atm.=> 120m oil column).

Principle of Operation of TOBY Oil Controls

The oil control serves to regulate the capacity of a heating device fire with liquid fuel. Apart from the task of having to supply oil to the burner with the controlled, pre-selected quantity of fuel per unit of time, the oil control also protects the burner against flooding and is therefore the safety device of the heating appliance.

Diagram 1



No	Description
1	Flat inlet oil filter
2	Filter access sealing washer
3	Filter cover
4	Valve chamber draining screw
5	Filter cover retaining screws
6	Metering stem
7	Metering stem "O" ring
8	Float
9	Lid Assembly
10	Control knob
11	Float arming lever
12	Low flow rate adjustment screw
13	High flow rate adjustment screw
14	Metering stem remote lever
15	Valve vent position
16	Metering stem slot



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The TOBY oil controls function according to the customary principle of level regulation. The fuel enters via the filter and the feed valve into the oil control itself. The rising oil level in the oil control lifts the float and, as soon as the oil has reached the level mark, the feed valve is closed to allow only as much oil to flow into the control as flows out of it to the burner. Should the feed valve become leaky as a result of accumulated dirt, the oil level in the control rises further, the operating float continues to rise releasing the spring previously stretched by hand across the float arming lever "11" Diagram 1; thus the feed valve is closed completely.

In order to recommence operations, the float arming lever "11" Diagram 1 must be lifted. If the safety device has been tripped, the heating device must first of all be started and only then may the control lever be actuated. The flow, i.e. the heating capacity, must be adjusted by hand, by means of the control knob.

Normal Annual Servicing

Like all mechanical devices, it is necessary to clean the TOBY oil controls at certain intervals, as a rule every 1-2 years. If particularly dirty fuel oil is used, additional cleaning may prove necessary. The following sequence should be carried out during the annual overhaul:

1. Tap the thermostat pin, with the control knob set at the highest position (Diagram 3). In this way, any slight accumulation of dirt in the metering stem slit will be removed.
2. Remove the oil cock from the burner feed valve so that the fuel can flow unobstructed to the burner.
3. Remove and clean the filter (Diagram 4-5), and refit it.
4. Remove the draining screw and rinse the oil control through with fuel from the tank until clear oil emerges at the point of drainage.
5. If water should be found inside the oil control, it is advisable to remove the pipe between the oil control and the burner and to clean it. After the above-mentioned operations have been carried out, a trial run lasting at least 15 minutes must be made with the device set first at low and then at high (control knob positions 1 and 6).

Should this trial run not prove satisfactory for reasons of the oil flow or the proportions between the fuel and the combustion air, the oil flow is to be adjusted to the viscosity of the oil and/or the available flue draught or, if necessary, other more far-reaching adjustments made in the oil control itself. The measures to be taken in this case are described under "Oil Flow Adjustment" and in the table "List of Possible Maintenance Measures"

**DIAGRAM 3.**

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Oil Flow Adjustment

When the heating device is first put into operation, an adjustment of the oil control to the existing conditions, sometimes proves necessary. Such adjustments are necessary if the minimum flue draught required is not available or if the fuel oil used is not of the viscosity (cSt/25°C) specified on the name plate of the oil control valve. Adjustment of the flow is only to be done when the heating device is in operation.

After the flow has been corrected, 5 minutes must be allowed to elapse before the flame corresponds to the newly adjusted flow. As a rule, a quarter-turn of the flow adjustment screw suffices to make the necessary correction. Alongside the flow adjustment screws are arrows indicating + and - signs showing in which direction the screw must be turned to increase or decrease the flow. The high flame must first be controlled or adjusted with the stove running at maximum capacity, after which the low flame is controlled or adjusted at Position 1. If the flow is controlled by means of a built in or externally mounted thermostat or another regulating device, the low flame must be adjusted via the thermostat actuating pin (see Diagram 10).

Turning the pin to the right decreases, turning it to the left increases the flow. While checking the low flow via the thermostat actuating pin, the pin must be pressed down onto the hexagonal nipple.

DIAGRAM 8

Correction of the maximum flow

DIAGRAM 9

The flame must not cause soot or rumbling.

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DIAGRAM 10



Adjustment of the minimum flow via the thermostat pin. This adjustment is necessary only when the oil flow and consequently also the heating capacity is thermostatically controlled. Turning the stop nut anticlockwise increases, turning it clockwise decreases the minimum flow position. When the pin is pressed down, the low flame just burns all round i.e., in a closed circle. (See commissioning instructions supplied with the stove).

DIAGRAM 4.

Removal of the filter.



DIAGRAM 5

Cleaning the filter in fresh fuel oil or kerosene.



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Removal of the metering stem.

DIAGRAM 14.



DIAGRAM 15



Cleaning the metering stem slit. This must be done only with a soft, non-metallic instrument. The slit must not be enlarged and the washer not damaged.

DIAGRAM 16



Unscrewing of the float assembly. These screws are sealed with lacquer before the device leaves the factory in order to prevent unauthorized persons dismantling the oil control. Should these seals be broken, unauthorized tampering with the oil control has taken place.

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DIAGRAM 17



Lifting out the complete float assembly. When the attachment screw has been removed, the complete float assembly can be lifted out, upwards. If the float assembly must be replaced by a new one because of a defect, the flows must be checked and, if necessary, corrected (see Diagrams 8, 9 and 10).

If the heating device is supplied with the fuel by means of a TOBY OCV, and if the feed pressure at the oil control exceeds 3.5m oil column, a pressure-reducing valve must be fitted in the pipe leading to the oil control valve to ensure conditions are within the specified limits. When fitting the pressure-reducing valve, care should be taken that the pipe between the pressure reducing valve and the TOBY OCV lie on a constant upward slant in order that the air bubbles which unavoidably accumulate in this pipe can escape into the oil control. Within the framework of a TOBY OCV, the oil control is not the only decisive factor as far as the correct functioning of a heating device is concerned. The correct choice and expert installation of all the other components are also important. For this reason, in the case of an oil interruption which is believed to be attributable to the TOBY OCV, a calibration check to ascertain whether it does indeed deliver the required amount of fuel to the oil control should be undertaken.

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Possible Defects	Causes	Countermeasures
No oil flow to the oil burner or oil control	Oil tank empty. Fire valve closed Air lock	Fill up with oil. Open reset fire valve. Purge oil line.
Too little oil flows to the vaporising burner.	De-coke inlet coked. Stove is not level. Oil control is dirty. The fuel used is too viscous Air lock in oil valve.	Operate de-coker. Level stove Clean oil control as shown in Diagrams 3-7. Check oil type. Press float in oil valve downwards
Too much oil flows to the vaporising burner (the stove gets sooty and rumbles).	Too much oil in the burner prior to ignition. Flue draught is inadequate Flow too high.	Let less fuel into burner prior to ignition. Measure draught see draught chart. Decrease flow according to Diagrams 8-10
Oil flow to the vaporising burner fluctuates.	Dirty metering stem slit.	Tap the thermostat-actuating pin as shown in Diagram 3 or clean the oil control as shown in Diagrams 3-7
Safety device is constantly tripped.	Oil control very dirty.	Clean oil control as shown in Diagrams 3-7.
Stove is turned off and oil still flows to the vaporising burner.	Control knob of the oil control is pulled upwards by the driving element. O ring of the metering stem is defective. Dirty oil control.	Lengthen driving element or make it move more easily so that the stroke movement of the control knob is not hindered. Renew metering stem O ring. Clean oil control as shown in Diagrams 3-7



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In most cases the oil control valve is suspected to be at fault which is commonly an incorrect conclusion.

Firstly, you will need to identify that there is no oil entering the burner or you suspect an oil flow reduction

Section 1

No oil entering the burner.

- a) Check there is oil in the oil supply tank. Has the site gauge reset button been operated? If an oil lift pump is being utilized is it operating correctly.
- b) Check that the remote fire valve has not tripped or become damaged, Re-set if necessary
- c) Check that any isolation valves near the stove have not been switched off.
- d) Check any inline filters to ensure there is no contamination by water or debris. Clean or replace if necessary. When replacing filter bowls ensure they are filled with oil before refitting to prevent air entering the oil supply line. If there are bleed screws fitted bleed air from both screws (incoming first).
- e) Check that the de-coke lever has been operated regularly and there is not a buildup of carbon on the inlet port.

If all these checks do not reveal a problem, then it may be that there is an air bubble trapped in the oil control valve (OCV).

Section 2

You suspect an oil flow reduction or Section 1 has not solved your problem.

The Toby oil control valve (OCV) is a Swiss manufactured oil metering valve with very high tolerances. Small air bubbles can seriously prevent correct operation.

Air can enter the oil control for the following reasons.

- The oil line is not purged of air before installation.
- The oil line is purged AT TO HIGHER SPEED causing air to migrate into the oil. This air later separates. **Always flush oil supply lines slowly.**
- Inline oil filters bowls when removed must be refitted with the bowl filled with oil.
- A joint in the oil line is leaking allowing air to enter the supply.
- The user allows his oil tank to run low of oil allowing air to enter the oil supply system.

Important

Before undertaking any rectification work to remove an air lock an assessment of why the air has entered the valve must be made. Removing an air lock in the OCV for air to again arrive later is pointless.



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- Was the oil line flushed before original installation. Air bubbles can sometimes take years to migrate to the OCV. Unless you are sure to purge the oil supply line.
- Has the user allowed the oil tank to run low allowing air to enter the supply line? If yes, or not sure, purge the oil supply line.
- Has the oil filter or other supply line component been removed and been refitted without prevention taken to allow air to enter the oil supply line? Yes, or not sure purge the oil supply system.
- Is there a weeping oil connection in the oil supply line? Fix and purge the oil supply line.

Purging the oil supply system

Purging is the removal in this instance of products other than the required product oil. The aim is to clear all items other than oil as close as possible to the oil control valve. Firstly, isolate the oil supply at the isolation tap that should be fitted by your installer in the oil supply line close to the stove. (This is normally located behind the stove). At the OCV remove the oil supply connection. Allow at least two litres of oil to gently flow into a suitable container.

There are three areas at which air can be trapped within the valve

1. Metering stem slot (see figure 6)

The metering stem has a slot, no thicker than a hair, through which the oil is allowed to pass from the valve to the burner. The more of this slot exposed to the oil the more oil flows to the burner. If an air bubble or debris becomes trapped against this slot it can act as a dam or weir, stopping or reducing the oil flow or giving the impression that the stove is running on a low flame setting, however high the oil control knob is turned.

This can be shaken loose by turning the control knob to its highest position and tapping the metering stem remote lever (see figure 6). This will appear through the top of the OCV, tapping this firmly with a finger about 6 times will clear most blockages.

2. Oil level control needle (see figure 4)

The second place is on the end of the needle allowing oil into the OCV (see figure 4). This needle is part of the float assembly. As the float falls as oil is used the needle is lifted up from its seat allowing more oil to enter. This movement is only very small. If an air bubble is trapped on the end of the needle it can act as an extension to the needle. This results in the oil level in the valve being lower than required. If the oil level is low the amount the metering stem slot is less exposed to the oil is reduced. This results in reduced oil flow similar to an incorrectly calibrated oil valve.



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Symptoms of an air bubble on the metering stem

- a. No oil enters the burner pot, even though oil is found to flow freely when the filter lid is loosened, indicating there is sufficient flow from the tank.
- b. The stove will light normally however after a few minutes it fails and dies. If then left for a short period of time will light again but again fails and dies. (Please note lack of flue draught can also produce these symptoms see technical document IN1088 Spring and Autumn syndrome)
- c. The stove will light normally however it continually "candles" using the igniter as a wick and fails to vaporize producing soot. Turning the oil control knob to a higher setting has little or no effect. (Please note that too great a flue draught can also produce similar symptoms)
- d. The stove will light normally and vaporize but any increase in the oil flow has no effect on the flame pattern.
- e. The stove operates correctly for some time then on low fire setting produces soot. (Note this symptom can also occur with excess chimney draught at a low setting).

The Three different ways to clear this type of air lock.

- a) Tapping the side of the OCV can free the air bubble. Turn the oil control knob to its maximum setting and then with a blunt instrument, such as a handle of a screwdriver, tap the side of the OCV firmly several times.
- b) Using a paper clip, or similar soft metal object, fashion a tool about 30mm long. Remove the breather tube from the hole in the top of the OCV, (see figure 1) and insert this tool pointing it back towards the arming lever under the top of the OCV's lid. Depress this tool and you will feel it pushing down onto the float, hold the float down for about 5 seconds. This will push the float further down than it would normally move, so lifting the needle higher than would occur during normal operation, and so allowing a greater space for the trapped air bubble to move up and out.
- c) If the above has not removed the air bubble i.e. the symptom continues, then the float assembly will need removing from the OCV, (see figure 2). Remove OCV top cover (see figure 1). The float is held in place by one screw, (see figure 2). Remove the screw and then lift up the whole float assembly. Oil will then purge past the needle clearing any trapped air bubbles. **Caution with the float removed oil will enter the OCV very quickly, be prepared to isolate the oil supply.** Replace the assembly ensuring that the needle locates back into the correct position. Replace the retaining screw and the top of the OCV.

If air continually becomes trapped within the OCV there could be a leak in the oil line to the valve and all joints should be checked to ensure that they are sealed.



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3. Metering stem chamber

The metering stem is a rod-shaped item with a slot in the side (as previously discussed). This rod is located in a circular tube (metering stem chamber) and sealed with an O ring. The oil which passes through the metering slot, then exits the oil control valve along a copper tube and enters the burner through the decoking assembly.

An air lock can occur if the stove owner runs their oil supply out allowing the oil level in the OCV to drop. Instead of oil passing through the metering stem slot air replaces it. The stove will extinguish from lack of oil. However not all the oil in the oil line from the OCV to the burner is used. When the oil supply is replenished oil should again pass through the metering stem slot. However, the inside of the metering stem is now full of air. Unlike oil the air will not naturally fall towards the burner. This air acts as a plug preventing the oil passing through the metering stem slot.

4. Removing metering stem chamber air lock

a) Turn the control knob to its highest position and tap the metering stem remote lever (see figure 6). This will appear through the top of the OCV, tapping this firmly with a finger about 6 times may clear any blockage.

b) This method requires the removal of the oil valve top cover. The cover is retained in place by two retaining screws (see figure 1). Gently lift the OCV cover and place to one side. With two fingers carefully lift the metering stem clear of the main body (see figure 3). If in a quiet environment a sucking noise will be heard as the air bubble is released. Replace the metering stem and OCV lid.

Oil pipe volume per meter

The following is an example of the minimum quantity of fuel that should be purged through an oil line for each meter of pipe.

Pipe diameter

8mm contains 28.27 cc per meter

10mm contains 50.26 cc per meter

15mm contains 132.7 cc per meter



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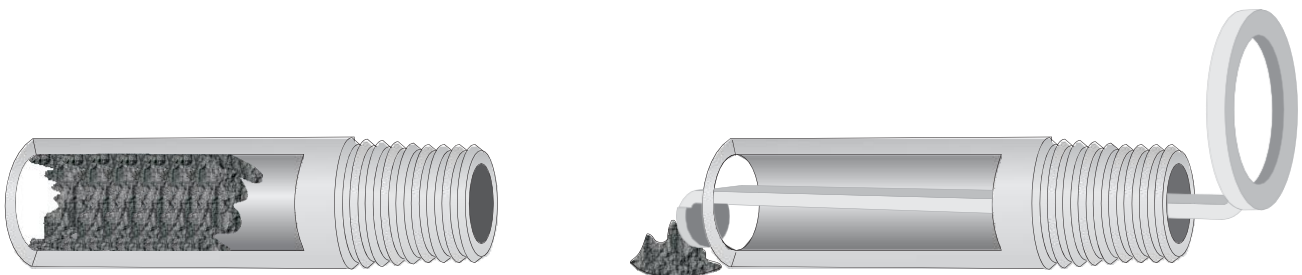
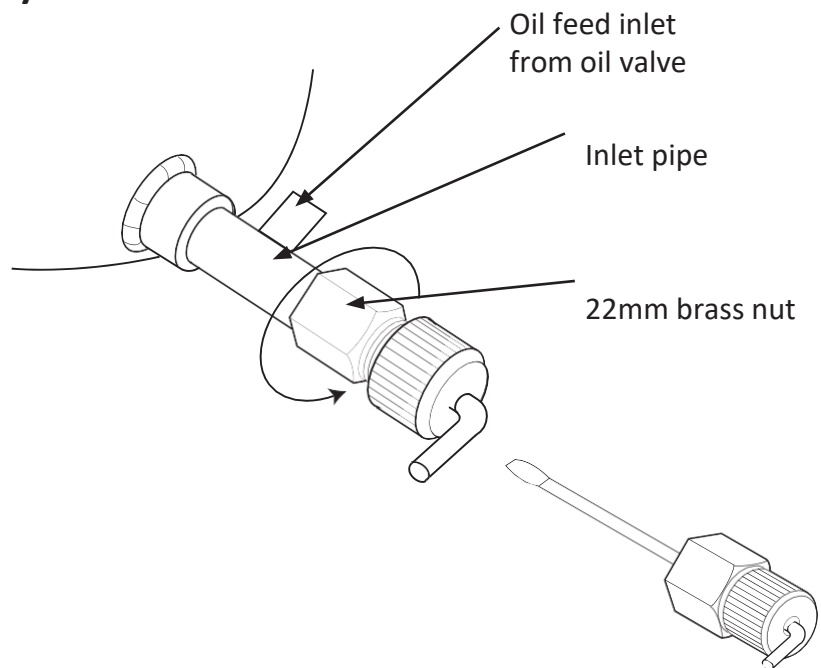
Reduced oil flow due to carbon in the inlet pipe

Another reason for a reduced oil flow rate is a buildup of carbon in the inlet pipe to the burner and NOT the Toby oil valve being at fault. Stoves that have been used for over 4 to 5 years may need the de-coke assembly removing, this carbon cannot be reached by the de-coke blade, and the hard carbon that has formed in the inlet pipe and the oil feed inlet from the valve removing.

The hard carbon builds up within the pipe acts as a dam or weir so that the oil flow has to be increased to overcome this. The principle symptom of this is that the stove does not run on low fire and the temptation is to increase the oil flow using the low fire adjustment screw.

Remove the de-coke assembly

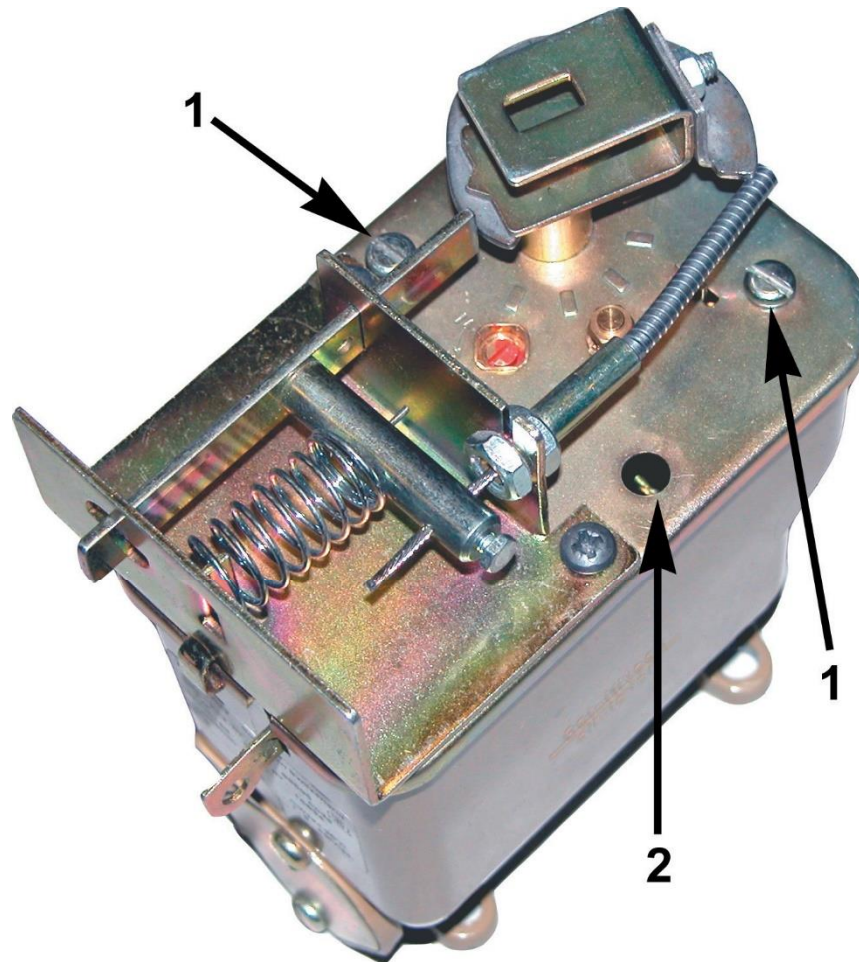
To remove the de-coke assembly, you will have to unscrew the 22mm brass nut. Grip the inlet pipe with an adjustable spanner at the point where the oil feed from the oil valve enters. Then using a 22mm spanner unscrew the brass nut which will allow the complete assembly to be removed from the inlet pipe.



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Removing the oil valve top cover

Figure 1



Number	Description
1	Oil valve cover retaining screws
2	Oil valve vent position



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Figure 2

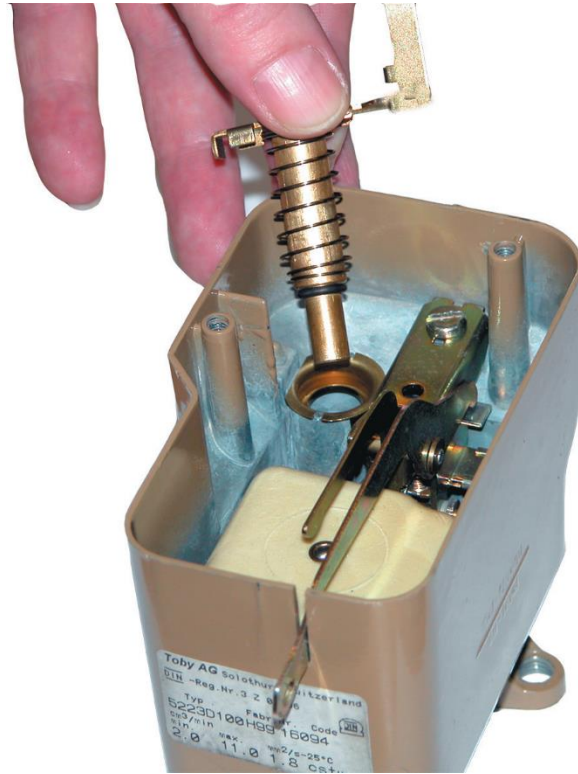


Figure 3



Figure 4

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Toby oil controller with progressive draught controller operating mechanism fitted.

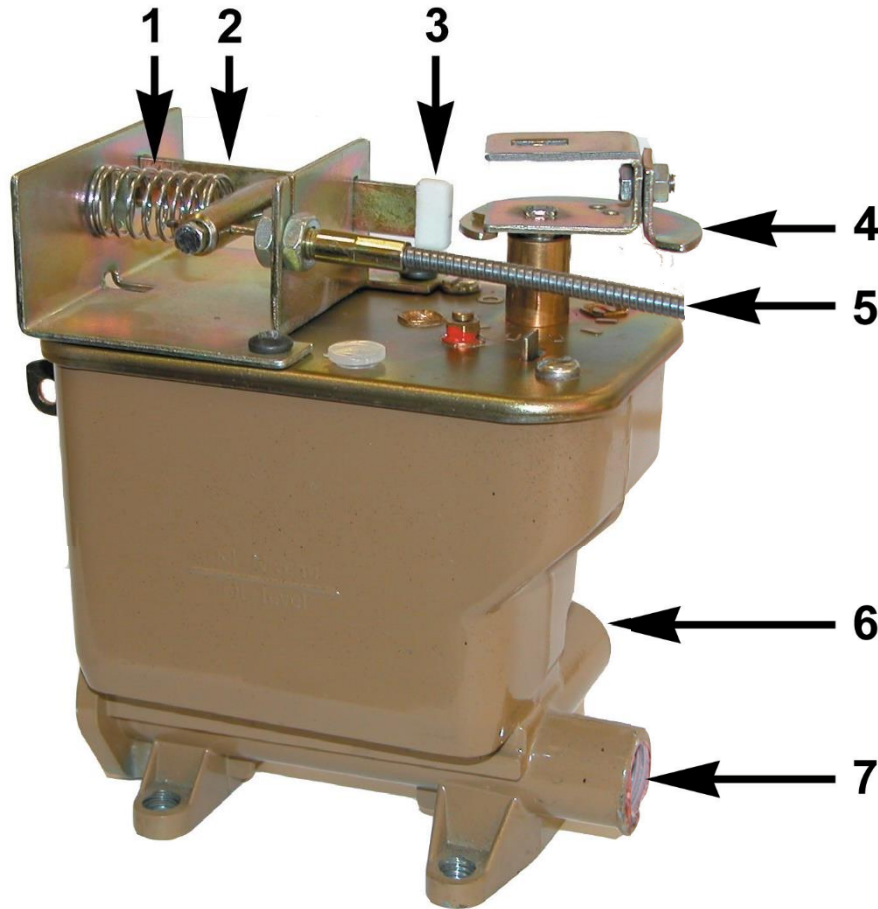


Figure 5

Number	Description
1	Draught controller return spring
2	Draught controller slide bar
3	Draught controller slide bar end cap
4	Draught controller cam
5	Draught controller control cable
6	Oil outlet position
7	Oil inlet position



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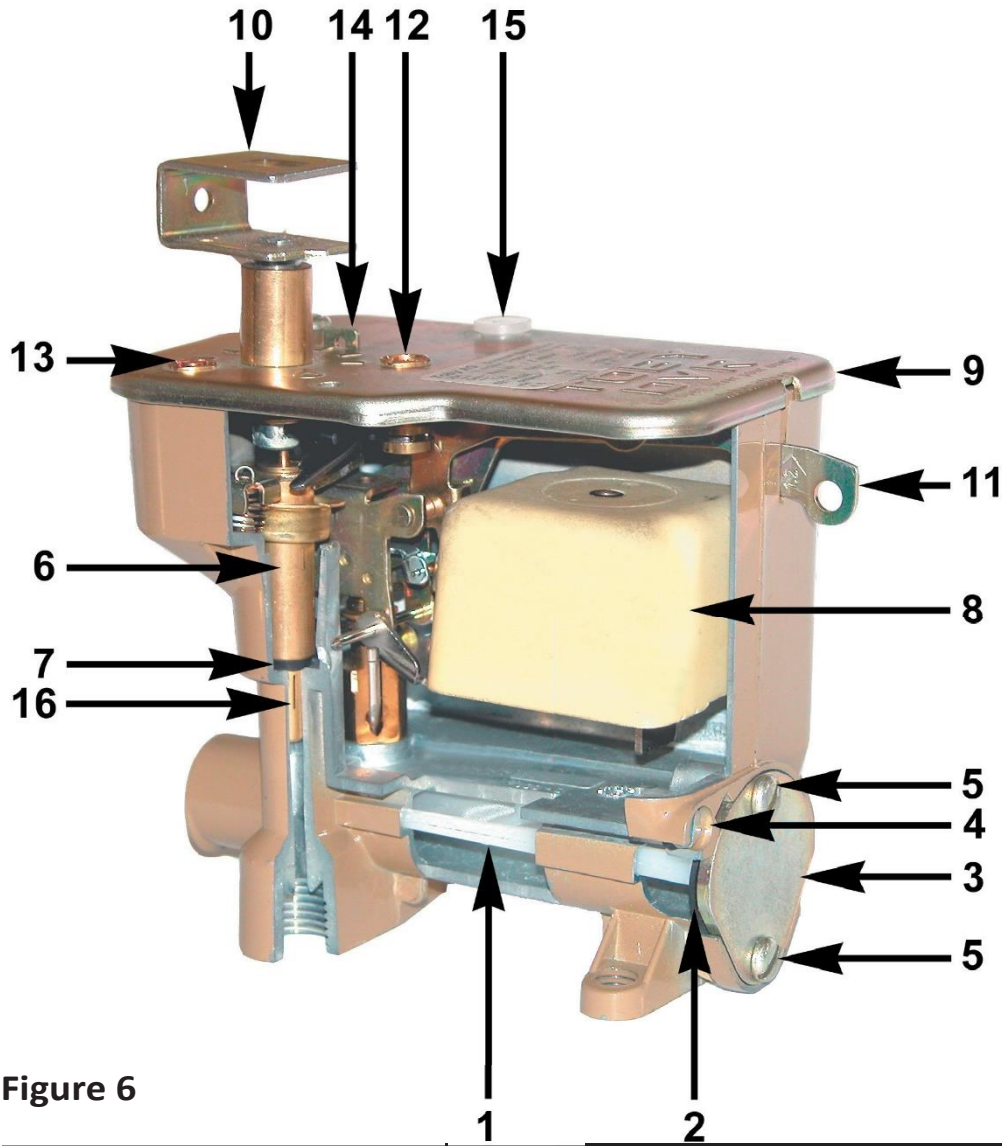


Figure 6

Number	Description	Number	Description
1	Flat inlet oil filter	9	Lid Assembly
2	Filter access sealing washer	10	Control knob
3	Filter cover	11	Float arming lever
4	Valve chamber draining screw	12	Low flow rate adjustment screw
5	Filter cover retaining screws	13	High flow rate adjustment screw
6	Metering stem	14	Metering stem remote lever
7	Metering stem "o" ring	15	Valve vent position
8	Float	16	Metering stem slot