MARCH
1951

SERVICE ELECTRICAL and RADIO TRADING CHARTS

ALBA "ROVER"
BEETHOVEN TV50, TV50M
FALKS "ROBOT" TOASTER
SERVICE CASEBOOK

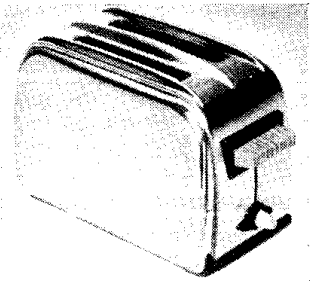

Fig. 1—The "Robot" automatic toaster is finished in highly polished chromium with plastic fittings

# FALKS "ROBOT" AUTOMATIC TOASTER

*Automatic toaster for two slices. Models available for* 100-120, 200-210, 220-230, 240-250 *AC-DC. Highly polished chromium-plated body with Bakelite fittings. Made by Falk, Stadelmann and Co., Ltd., 91, Farringdon Road, London, EC1.*

THE Robot toaster (Fig. 1) is designed to toast evenly and consistently to a predetermined degree of brownness. A variable control enables the degree of brownness to be adjusted; once set, each slice, whether the first or the last of batch, will be browned to the same extent.

When toasted the bread is automatically raised and the heating elements are switched off.

If at any time the setting of the Browning control is wrong, the toasting cycle can be stopped by rotating the control fully anti-clockwise. Toaster timing is primarily controlled by a clockwork mechanism but a thermostatic device compensates for the heating of toasting chambers.

## CONSTRUCTION

Main frame is a nickel-plated welded steel unit formed of two endplates, a baseplate and angle section cross members. A flat steel strip across centre between endplates is fitted for top support of inner elements and grids.

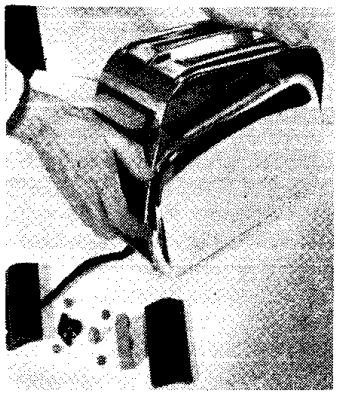

Fig. 2 — After removal of operating handle, control knob and base mouldings, centre arch of body can be lifted off as shown

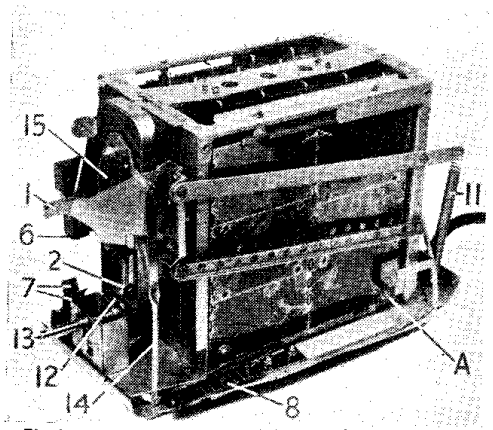


Fig. 3—With centre arch and side panels removed all the operating mechanism and the electrical wiring are accessible

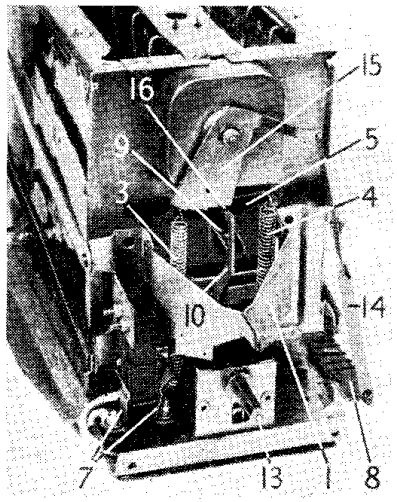


Fig. 4—Clockwork "timer" together with thermostatic compensating mechanism and manual browning control are assembled at one end of toaster

Fig. 5—Replacement of any faulty element is made easier if the pair of strapped elements is removed

The elements, held by small lugs fitting into holes, are protected by wires held by lugs at base and by holes at top.

Bread carriers between the heaters project through slots in endplate and are welded to the operating handle bracket which is pivoted on parallel levers at each side of the toaster. These levers are strongly sprung in an upward direction by springs.

A phosphor-bronze bridging blade of mains switch is carried on a Bakelite moulding bolted to lefthand side of operating handle bracket. The two fixed contacts are mounted on a moulding on the baseplate.

The clockwork timing device, consisting of a gear train operated by a rack-arm, is bolted to endplate. Rack-arm is fitted with a yoke to the ends of which are hooked springs attached to operating handle bracket. The yoke is also fitted with a roller that bears against inner edge of a trip lever.

A small pawl, pivoted at baseplate, is fitted with a stud at its upper end and this moves in a slot cut in the trip lever. The inner edge of the pawl forms a catch which engages with lip on lower edge of operating handle bracket. The Browning control, consisting of spindle with cam together with trip lever pawl, is mounted on a rectangular box riveted to baseplate.

A bi-metal strip, part of the thermostatic compensating mechanism, is mounted alongside baseplate. It is fitted with a heater insulated from frame by mica gaskets. The free end is coupled by tie-bar to a cam having a stepped edge—the steps engage with small roller associated with the yoke of the timer rack-arm.

Toaster housing consists of two pressed steel side panels with a pressed steel centre arch and is mounted on two Bakelite feet fitted with cork heat insulating studs. Operating handle, fixed handle, Browning control knob and their escutcheons are moulded Bakelite. A combined ventilator and crumb tray is fitted on underside.

Exterior is finished in highly polished chromium with red and grey Bakelite fittings.

## ELECTRICAL

Elements, tapewound on high grade mica supports, are closely matched for even heating and it is essential to replace a faulty element with one of the correct voltage range. In the three models covering 200-250V, the elements are series-parallel connected but in the 100-120V model they are in parallel. Total loading of all models is 1,250W.

The bi-metal heater, wired in series with live lead to one side of circuit switch, consists of six turns of nickel-chrome tape wound over mica insulating gaskets.

Toaster is supplied with approximately 5 ft. heavy three-core fabric covered flex, the earth lead being connected to terminal on baseplate.

## OPERATION

With toaster plugged to mains and Browning knob in mid-position, two slices of bread are dropped through slots on to carriers and operating handle 1 is lowered until it is locked in down position by engagement of lip (Fig. 5) on bottom edge of operating handle bracket with the catch on pawl 2.

Lowering of handle 1 expands springs 3 and 4 attached to yoke 5 on timer rack-arm, and the yoke is pulled slowly downwards being retarded by timer gear train. Bridge blade 6 shorts contacts 7 and power is switched through bi-metal heater 8 to toaster elements.

As yoke 5 travels downward roller 9 follows shaped edge of spring-loaded trip lever 10 and when it reaches the slope pushes the lever outward. This movement is imparted, by stud in slot in trip lever 10, to pawl 2, which in turn commences to move outwards. With continued downward travel catch on pawl 2 disengages from lip (Fig. 5) on operating handle 1. Handle is pulled upwards by its springs, raising bread carriers.

The rack-arm is returned to its start position by two projecting lugs on face of operating handle bracket which strike on underside of yoke as handle rises.

Adjustment of timing is obtained by altering the vertical position of trip lever 10 so that roller 9 on yoke 5 has a longer or shorter distance to travel downward before it runs onto slope of trip lever. Position of lever is adjusted by raising or lowering the pawl on which it is pivoted and this is done by rotation of a shaped cam 12 attached to end of Browning control spindle 13. Pawl pivot is spring loaded to maintain contact with cam in all positions.

Automatic reduction in length of subsequent toasting cycle, to allow for heating of toaster, is obtained by bi-metal strip 8 which is coupled by tie-bar 14 to cam 15 pivoted on timer fixing bolt.

At commencement of first toasting when toaster is cold, bi-metal 8 is unflexed and cam 15 is positioned so that first step is immediately above projecting roller 16 on yoke 5. During toasting,

when power is switched through bi-metal heater to toasting elements, the bi-metal strip flexes in an upwards direction and cam 15 is moved inwards, and a further step on it sets the timer rack-arm to an advanced position so that, on a second toasting, the arm has a shorter distance to travel to operate trip lever.

Cam 12 on Browning control spindle is so shaped that by rotating control fully anti-clockwise pawl 2 is moved outwards sufficiently to allow lip of operating handle bracket to disengage from catch. Thus, should setting of Browning control have been misjudged, toasting can be stopped.

### MAINTENANCE

**Renewal of Element.** Remove Browning knob and operating handle by undoing grub screws and withdraw calibrated escutcheon behind control knob.

Invert toaster on protected surface to avoid scratching chrome and pull out four cork studs in raised bosses on base mouldings. Undo four screws in bosses and remove mouldings. Remove four self-tapping screws located two at each end of centre arch.

Place toaster right way up and carefully remove centre arch by lifting end opposite to operating handle first to give clearance to control lever and spindle (Fig. 2).

Side panels are removed by undoing self-tapping screws which pass through lugs projecting from top edge of panels. Hexagonal packing nuts are inserted between lugs on side panels and toprails of frame and when re-assembling these must be replaced to prevent distortion of panels, etc., when screws are tightened. Invert toaster again, remove crumb tray by undoing the two self-tapping screws. Locate faulty element. As each outer element is connected by a metal strap to the adjacent inner element it is recommended that the appropriate pair of strapped elements be removed for renewal of the faulty element.

Remove four self-tapping screws holding centre element support in position and carefully lift away support complete with guide wires and in likewise manner remove outer element support.

Disconnect mains neutral terminal strip from outer element of pair by undoing screw "A" (Fig. 3) and remove nut, bolt and spacer which connects eyelets of inner elements to the live mains terminal strip (through the circuit switch and bi-metal heater). The pair of elements is now free to be withdrawn through base of toaster (Fig. 5).

Replace faulty element with one of correct voltage range. Insert pair of elements into frame, ensuring lugs are in correct holes in top support strips. Reconnect terminal strips to element eyelets and make sure all connecting screws are really tight and that spacer has been placed between two centre elements. Replace in position the bottom supports, allowing guide wires to hang free, and before inserting and tightening up fixing screws check that element lugs are in correct holes in base supports.

With base support screws tightened see that elements are not bowed and that at least 1/32 in. of vertical movement is provided. Guide wires are sprung into their respective holes by placing finger of left hand through inverted frame and pressing on ends of wires. Before replacing housing, etc., check that terminal strips are well clear of frame and that guide wires are not touching elements.

**Replacement of bi-metal strip.** Remove housing as described above. Disconnect tie-bar from free end of bi-metal strip by opening up slotted hole

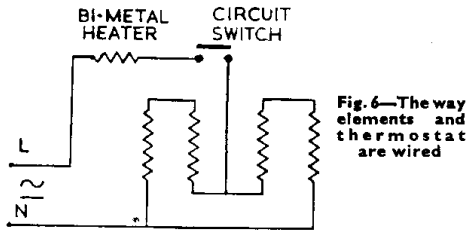


**Fig. 6—The way elements and thermostat are wired**

in end of tie-bar with pliers. Remove two terminal bolts which pass through bi-metal and baseplate and carefully remove porcelain insulating bushes. Bi-metal is spot welded to baseplate at a point approximately midway between the terminal bolt-holes—the weld can be broken by twisting bi-metal laterally.

Before placing new bi-metal in position the residue of the spot weld should be filed off. Place new bi-metal strip in position, insert porcelain insulating bushes in holes and replace terminal screws and reconnect bi-metal heater wires and mains wires.

The terminal screws are used to hold the new bi-metal strip in position but they should not be over-tightened or insulating bushes and mica gaskets may be damaged. Reconnect tie-bar to free end of bi-metal strip.

**Adjustment of bi-metal strip.** With a pair of pointed pliers adjust bi-metal strip (at fixing screw end on bend) so that roller 16 is positioned on first step of cam 15. There should be at least $\frac{1}{8}$th in. clearance between bi-metal and baseplate.

Connect toaster to mains and with Browning control set fully clockwise operate toaster and then allow it to cool for at least half an hour.

Re-adjust bi-metal so that roller 16 is on first step of cam 15.

**Replacement of clockwork timer.** Remove housing. Disengage springs 3 and 4 from ends of yoke 5. Undo nut on centre of timer cover screw and remove cam 15. Unscrew and remove the four timer fixing bolts accessible on back of endplate and withdraw faulty timer. Replace with new timer.

**To check new timer.** Place Browning control in fully anti-clockwise position and lower operating handle 1 until lip (Fig. 5) on handle bracket is level with tip of catch on small pawl 2. There should be a clearance of .015 to .03 in. If not, adjust position of lip to give this clearance.

Place Browning control knob in fully clockwise position and again lower operating handle until it locks down. There should be a clearance of .005 to .062 in. between roller 9 and straight portion of trip lever 10. If not, adjustment of clearance between small pawl 2 and lip on operating handle bracket has not been carried out correctly.

Trip mechanism by rotating Browning control fully anti-clockwise and check that roller 16 is engaged with first step on cam 15. If it is not, adjust bi-metal as described.

Without connecting toaster to mains but with Browning control set fully clockwise operate toaster and check length of timing cycle—this should be within plus or minus 15 secs. of 3 minutes 35 seconds. If timing is too short, slightly lessen tension of either spring 3 or 4 by stretching it. If timing is too long, increase tension of either spring by removing one or two turns.

Finally, test trip by rotating Browning knob to extreme anti-clockwise position.

# SERVICE CASEBOOK

*What's yours? In response to this invitation you cannot "Knock one back" but you can jot one down. Each Casebook item earns a bonus on a repair well done.*

## MODULATION HUM

A Universal KB receiver suffered from violent modulation hum and poor sensitivity. It was found that the combined detector-amplifier had very low heater voltage. The next valve in the heater chain is the frequency changer. Heater-cathode insulation failure in the frequency-changer introduced the hum, and also shunted the heater of the detector stage causing the poor sensitivity. A. C. Trotter, Downham Market Norfolk.

## MURPHY SA102R

A Murphy SA102R had severe distortion and low gain. Testmeter check revealed slight positive voltage on grid cap of HL133DD. Also the load of the meter considerably reduced the distortion.

Uncased, the chassis operated OK and the positive voltage on the cap of HL133DD had disappeared. The set was left on soak for several hours and behaved perfectly.

Consideration was given to the extra ventilation afforded the chassis whilst uncased. A bowl fire was then placed a few feet from the chassis. Within the next half-an-hour the fault re-appeared.

It was found that, only above a given temperature, the positive voltage appearing on the grid cap of HL133DD, was due to a leak across the insulation of gram/radio switch. This switch is a DPDT toggle switch and on Gram serves to disconnect the SG HT feed to preceding valves, besides changing over the grid circuit of the HL133DD.—C. A. Heeley, Bognor Regis.

## ERRATIC LINE SYNC

SYMPTOMS: Very erratic line sync. With line sync condenser disconnected the following observations were made: The raster could be held steady by careful line hold adjustment; test card C was reproduced almost to perfection, the response being good. All components in the sync circuit and all potentials were in good order.

With a "cross" pattern applied to the receiver, short bursts of line sync pulses were observed on an oscilloscope connected to the sync separator anode. The grid waveform of this valve was seen to consist of a train of line pulses with a small amount of picture content superimposed so that the tips of the sync pulses did not lie on a straight line—hence the absence of some pulses at the anode.

With a "BBC cross" or similar pattern it was seen that the waveform at the sync separator grid (with oscilloscope time-base set at 50c/s) showed that the level of the line sync pulses immediately following the horizontal bar was a few volts higher than all the others.

The waveform at the VF anode was next examined and it was seen that while each "line" viewed singly was of good form with well shaped sync pulses, the Frame waveform exhibited a marked overshoot on the horizontal picture bar.

Attention was thus turned to decoupling and the VF anode decoupling condenser was found to be low in value, about .1mF instead of 4mF. Replacement of this component effected a cure.

I submit this account of what, without the use of a 'scope, would be a rather difficult fault to trace in the hope that it may prove to be of value to others. Although the model B18T is quoted it is possible for these symptoms to develop in any TV set with the same type of VF—sync circuit.—F. R. Pettit, Herne Bay.

## PYE P27UBQ

A Pye 27UBQ was silent on both wavebands. The fault was localised to the frequency changer stage, but replacement of the DK91 did not produce results. Voltage and current tests were made on the valve circuit and all proved to be normal. Shorting of oscillator grid produced the normal change in anode current.

It was decided to inject signals into the mixer grid of the DK91 and it was found that the only signal to be passed was the IF of 465kc/s. The M and L wave oscillator coil was then suspected, so resistance tests were made which proved that the "earthy" side of the coil was in order, but that the HT side had either a dead short or was of extremely low resistance.

Reference was made to the Service Notes but resistance of the coils was not shown. To prove our diagnosis, the coil was saturated in amyl-acetate and so made movable on the former and it was found that sure enough there was a short in the HT side of this tapped coil. In a suitable position to clear the short, the set functioned.

The coil was therefore replaced to make sure of the sets continued performance.—H. L. Mitchell, Portsmouth.

## VIEWMASTER

THE home constructor will usually only bring in his television receiver for troubleshooting and/or alignment if the job has got beyond him. This usually means that all the remedies suggested in the instruction book have been tried without avail. The following information gleaned by us from a number of Birmingham "Viewmaster" receivers may be of assistance to other engineers.

*Weak Sound.* On three receivers this was cured by taking the suppressor connection (pin 4) on V6 from the solder tag and soldering direct to the side screen.

Two other receivers had this fault cured after finding that the first sound rejector was operating at maximum efficiency around 54mc/s. Removal of one turn from this coil (L110) greatly improved both sound volume and rejection from picture.

*Sound Pickup from Frame Timebase.* On all console type receivers it was found necessary to fit a screened top cap connector to the EBC 33.

*Bright band at top of frame due to cramping.* Whilst the handbook specifies either a 6P25 or KT61 as frame output valves, replacing the 6P25 with a KT61 cured this fault.

*Vision interference on sound.* Caused by poor earth connection to C29 on pin 1 of V3 giving the impression that L115 had a very low "Q".—E. A. Griffiths, Radford, Coventry.