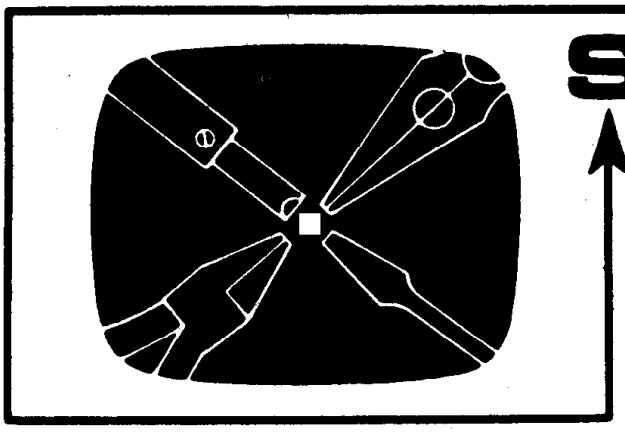


SERVICING television receivers

L. LAWRY-JOHNS

THORN 950/960 CHASSIS—continued

The original semiportables used a rather strange heater circuit which was later modified to a conventional dropper and diode series chain. However most of the models serviced by the writer have used the original circuit which, unless it is understood, can lead to a lot of time wasting.

The sequence of events from switching on is (or should be) as follows. Eight valves (including the c.r.t. heater) warm up quite quickly through a dropping capacitor C121 (Fig. 9) which has a value of 4·33μF. This means that the screen will light up in the normal time. However there will be no sound and no picture as four valves have their heaters in series with the h.t. return from the chassis to the on/off switch. Thus these valves cannot be heated until the others are drawing current. The high ripple current of the smoothing circuit does not contribute to this as the reservoir 100μF and the 200μF are returned direct to h.t. negative rather than chassis. A shunt circuit of R152 and R153 adjusts the heater current within fine limits and R153 is normally set for a current flow of 300mA when a meter is inserted into the circuit, conveniently at point 24A. on these receivers therefore sound and vision signals cannot be expected until about 45 seconds after the timebases are operative and this period is somewhat longer in some cases.

The awkward bit is when the circuit fails to function. Consider the following actual case. The complaint was small picture, no sound. The customer did not mention that there was no picture. The picture he saw was a small raster which vanished as the brilliance was advanced.

The h.t. voltage was low which accounted for the small raster. V3, V5, V6 and V7 did not light up. R152 and R153 were hot. An open-circuit

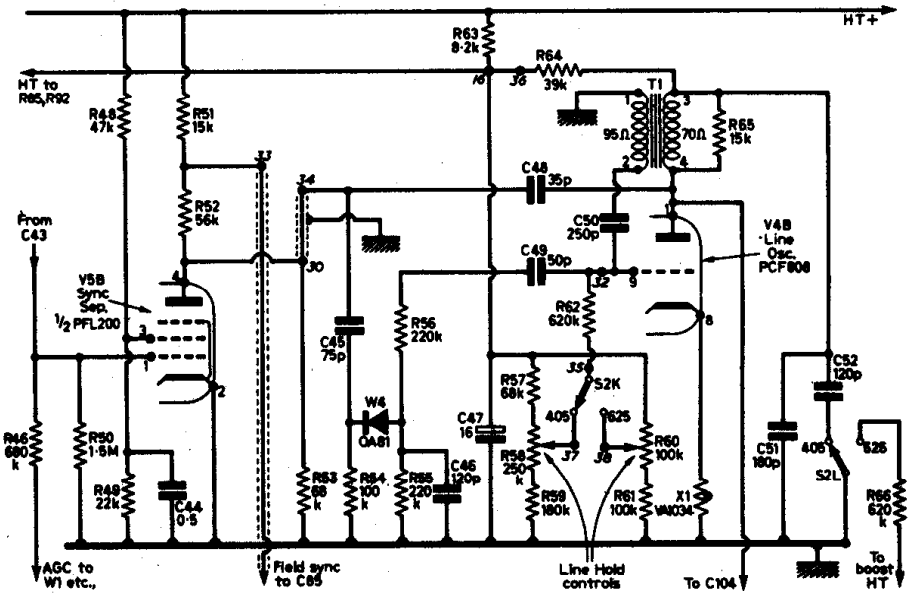


Fig. 5: Line oscillator with direct sync used in some chassis.

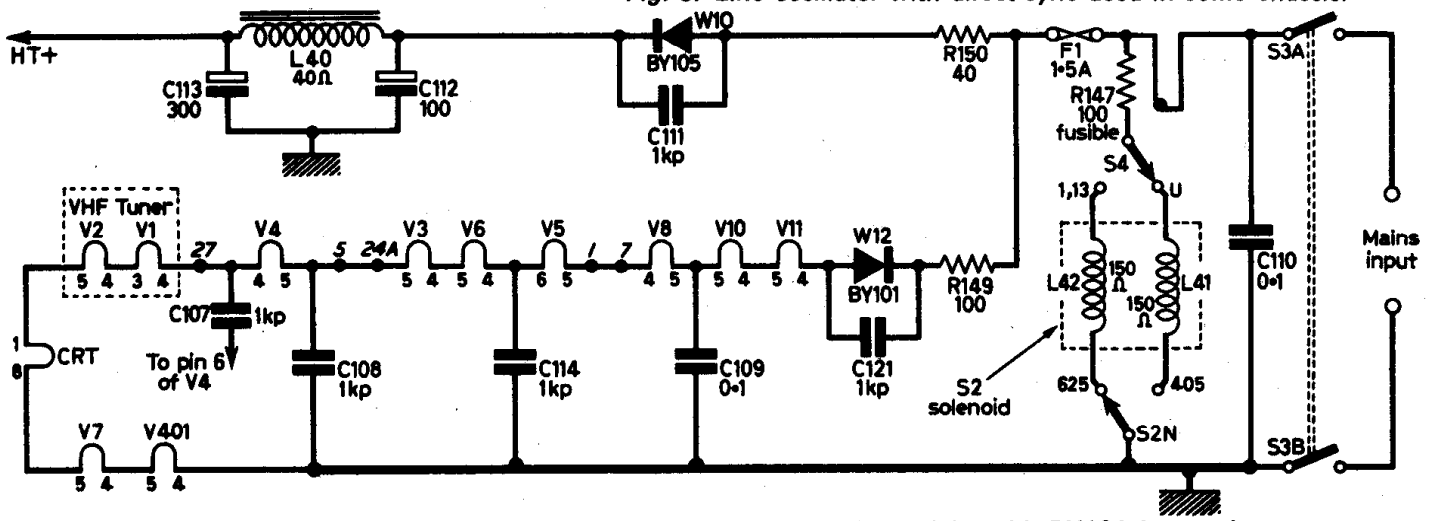
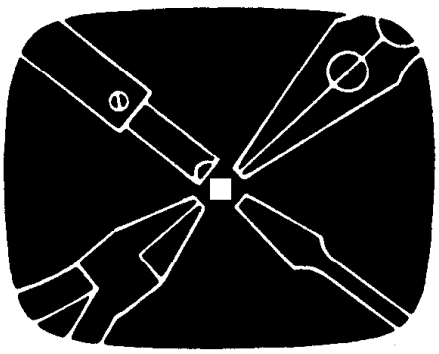


Fig. 6: Heater and power supply circuits of later semiportable models, with BY101 heater dropper.



SERVICING television receivers

L. LAWRY-JOHNS

THORN 950 AND 960 CHASSIS

THE 950 chassis employs a very similar circuit to the 900 chassis which was the subject of a previous article in this series (see August and September 1968). However, variations to the basic chassis and differences brought about by the introduction of the semiportable models warrant further discussion.

The main electrolytic capacitor unit seems to be failing more regularly now, giving rise to various symptoms from poor sync, curved verticals, pronounced hum etc. to more obsure troubles such as weak field lock on 625 only (check the video stage carefully before changing the block however).

The block itself is on the right-hand side and has five wrap-round tags. When fitting a new unit the leads should be soldered otherwise they will almost certainly fracture if an attempt is made to rewrap them. The correct replacement capacitor will have the colours clearly marked to coincide with the leads except the chassis tag which is plain. The screening division member which is across the chassis is secured by a screw on either side and removal of this and the PY800 makes access to the smoothing block easier.

Line output stage

C98, C99 and C106 have proved troublesome, the first two causing no line scan or excessive width depending upon which fails and on what standard, whilst C106 shorts when the receiver is switched to 625 causing the timebase to cease functioning with probable damage to the v.d.r. (Z3).

An annoying effect is sometimes encountered and takes the form of a ripple on the picture according to the setting of the brilliance control. This is usually due to a fault in one of the e.h.t. rectifiers. The complete tray should be replaced. This is of course the tray which carries the three X80/150 pencil-type rectifiers.

Field timebase

Uncontrollable field roll can usually be traced to C79 (0·003μF). The working voltage of this capacitor is very important and nothing under 1,000V should be fitted.

Striations

These are vertical rulings, mainly obvious on the left side. Check W9 (OA81), the lead to tag 51 and the winding H-J on the line output transformer.

Lack of contrast

This can be due to a large number of factors but in making checks do not omit to try a replacement 30FL14 (PCF808) in the V4 position. Quite often attention is concentrated on the tuner unit and video

PRINTED BOARD SERVICING AIDS

Printed wiring between components is shown by colour-coded lines printed on the component side of the board.

White—Heaters & AC
Blue—Earth
Blue & White—Cathodes
Green—Grids & AGC
Red & Green—Screen Grids
Red & White—Anodes
Red—HT
Broken Red—Decoupled HT
Red & Blue—Boost HT

External connections to wire-wrap tags numbered to correspond with circuit diagram are also shown.

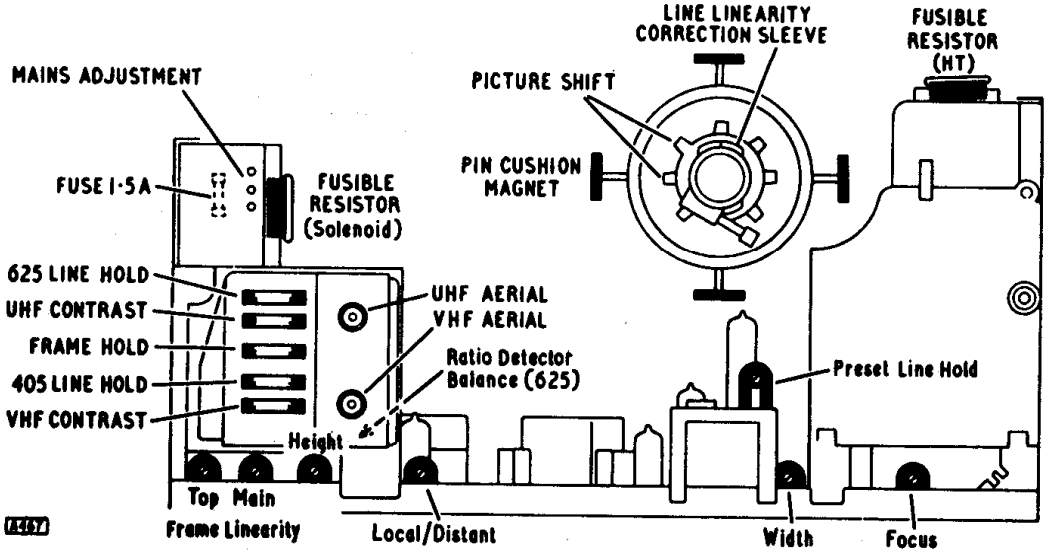


Fig. 1: Rear chassis view, showing preset adjustments.

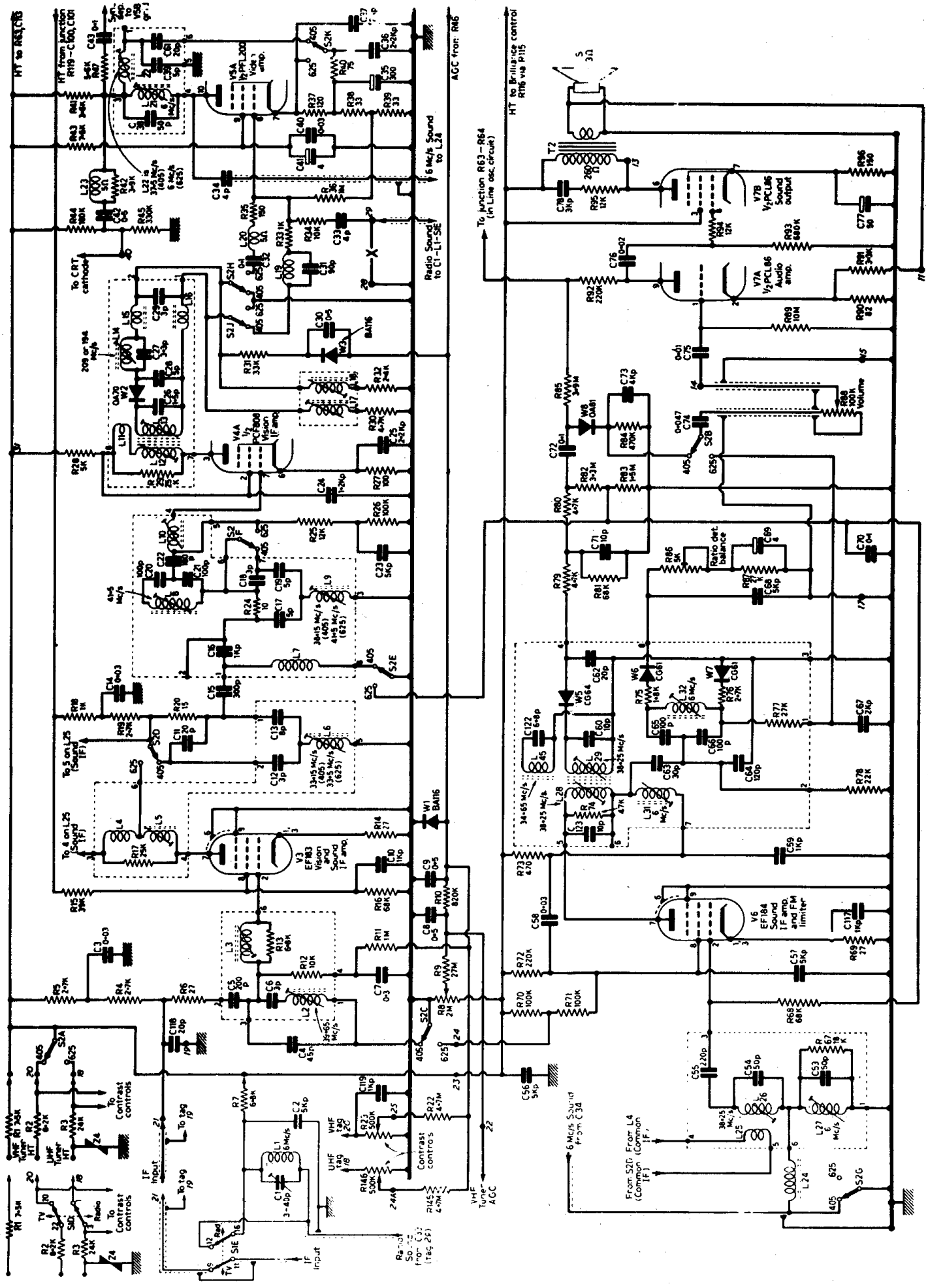


Fig. 2: Circuit diagram of the i.f., v.f. and a.f. sections of the Thorn 950 chassis. The physical layout is basically as shown in Fig. 2, page 511, in the August 1968 issue of PRACTICAL TELEVISION. *Parts of the circuit drawn in thinner lines apply to "plus radio" versions: points marked X are short-circuited on TV-only models.*

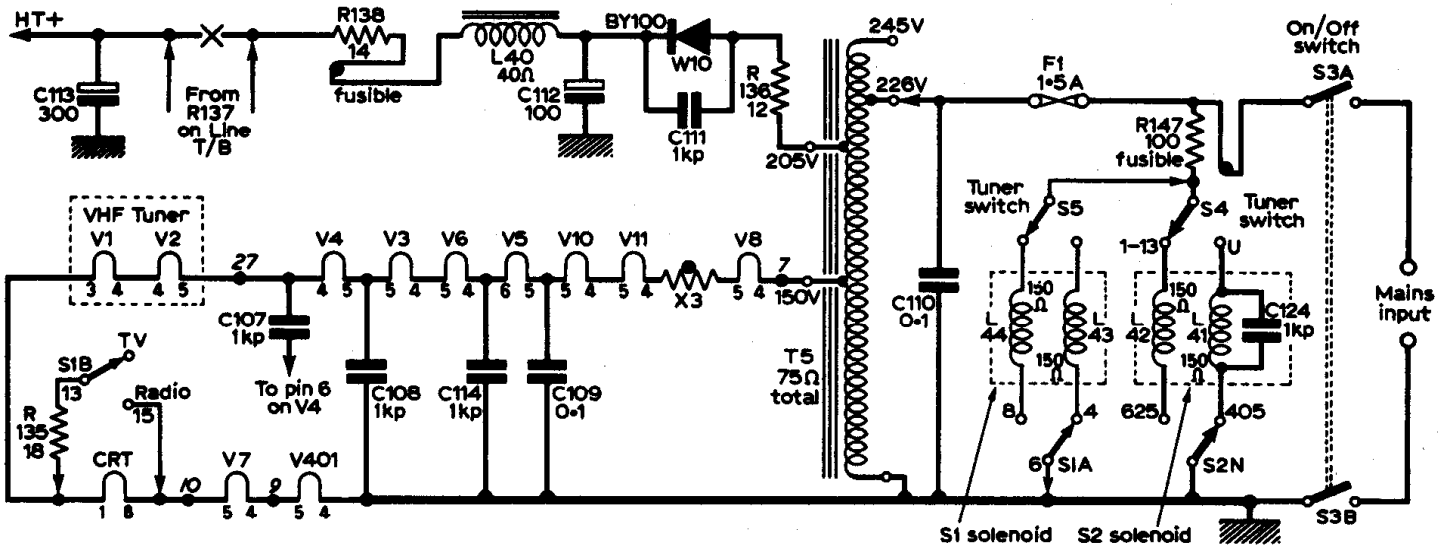


Fig. 3: Heater and h.t. circuits, Thorn 950 chassis. Note that different heater circuitry is used on the semiportable models. This will be shown next month. S1, L43 and L44 are on "plus radio" versions.

stage, the vision i.f. being neglected. So check V4 and also check R28 (5kΩ) which changes value quite regularly.

Tube faults

The majority of other common faults were outlined in the previous article including mention of low emission. We would however point out that many tubes have been condemned when in fact a check at pin 3 of the tube base would have revealed a low voltage. The supply resistor is R121 (3·9MΩ) and this is decoupled by C93 (0·1μF). C93 can become leaky or short completely, virtually shorting the tube first anode to the h.t. line.

It is far from unknown for the tubes to develop two other defects which would normally cause them to be discarded. The fact that a tube has an open-circuited heater is usually regarded with head shaking as "well, that's it." This is not necessarily so. Quite often the internal break in the heater can be welded by the application of a brief pulse from the top cap of the PL500.

We hasten to add that this operation must be very carefully carried out for several reasons. The first is the possibility of damage to the person doing the job, the second the possibility of damage to the line output transformer and the third the probability of destroying the tube heater completely.

The operation should be carried out as follows. Remove the tube base socket. Short pins 1 and 8 of the socket to preserve heater continuity. Connect a lead from pin 1 of the tube base to chassis. Allow the set to warm up. Using a very well insulated lead, touch one end to the PL500 top cap and the other to pin 8. An arc will be seen inside the tube neck. Do not repeat unless it can be proved that the heater is still open-circuit. Only the briefest of brief touches is required. By this means tube replacement may in some cases be postponed for a considerable period. In others the operation may be quite unsuccessful. This pulse application is often recommended for clearing shorts but not so often for internal welding of open-circuit electrodes.

The other common defect causes a very very dim raster to be displayed which is completely unaffected by operation of the brilliance control. This indicates an open-circuit grid. Proceed as before but join pin 7 (cathode) to chassis instead of pin 1. The pulse should now be applied to pin 2 or 6 (both grid). If successful this may not only restore full control of brilliance but also a marked increase of emission due to the disturbance of the cathode coating. Considering the alternative of discarding the tube completely, this is indeed a bonus!

Solenoid switching

The foregoing notes apply equally to the 900 and the 950 chassis. The main differences concern the system switching and in the case of the 960 semiportables the heater supply. The mechanical operation of the system switching in the 900 chassis was replaced by solenoids. In the 950 models these are mounted on the right side so that they push or pull the bar along. They are energised by the supply switch S4 on the rear of the v.h.f. tuner and de-energised by S2N on the system switch.

S4 is fed from the on/off switch via R147 (100Ω) which is there not only to limit the current through the solenoids but also to operate the cut-out in the event of a short or failure of switching in the solenoids. The cut-out is reset by joining the two wires and applying a soldering iron. Do not wrap a wire round the join as this could cause quite serious damage.

The writer has on more than one occasion found that the receiver functions perfectly well on 405 but that R147 becomes overheated and opens the cut-out when switched to 625. This has been found to be due to the orange lead to the actual solenoid being pinched under the chassis with the insulation

—continued on page 311

SERVICING TV RECEIVERS

—continued from page 303

punctured. Other causes of non-operation are an open-circuited blue lead and a split solenoid, or merely that the moulded cam on the rear of the switch spindle is loose and is not rotating with the spindle to operate the S4 switch.

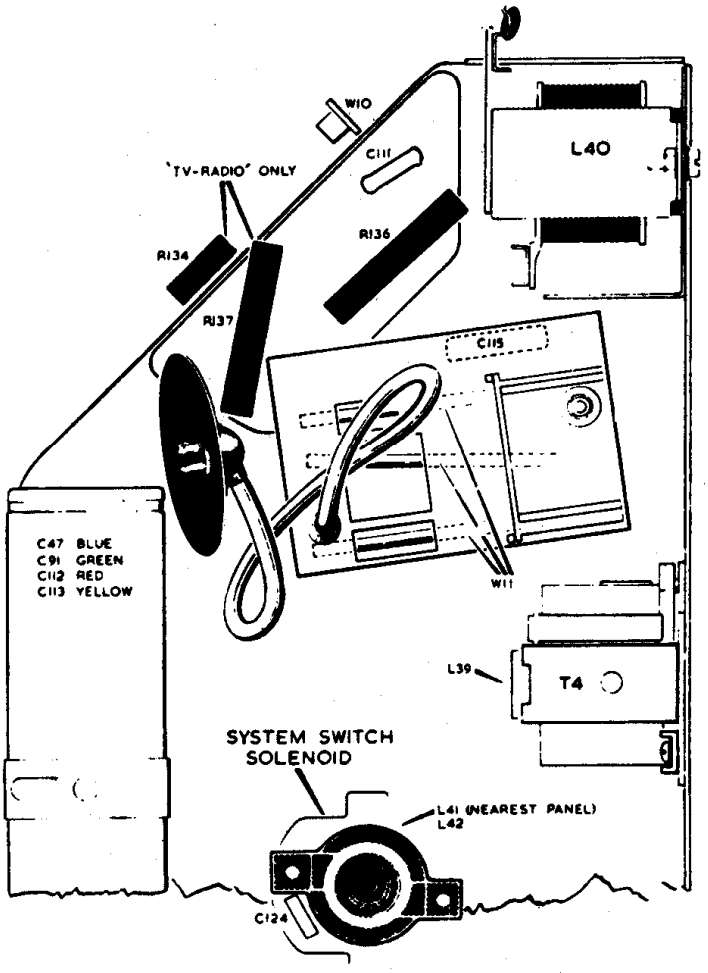


Fig. 4: Right-hand side panel, 950 chassis, showing the position of the system switch solenoid.

In the case of the semiportables, which use the "960" chassis, the solenoid is on the left side and operates the push bar at an angle. With this system the solenoid may chatter continuously if the side lever is not engaging. A visual inspection will show this immediately although a description of the operation may not clarify what happens so easily.

Checks for inoperative solenoids

In short therefore if the solenoids are not working check the supply to the tuner switch and make sure these contacts are being operated by the plastic cam. If there is no supply to this point, check R147 which may be open. Note: if the cut-out is open (not the resistor), the set will not operate at all. If the supply is going through S4 correctly, check the leads to the solenoid and check the solenoids to make sure they are intact.

CONTINUES NEXT MONTH

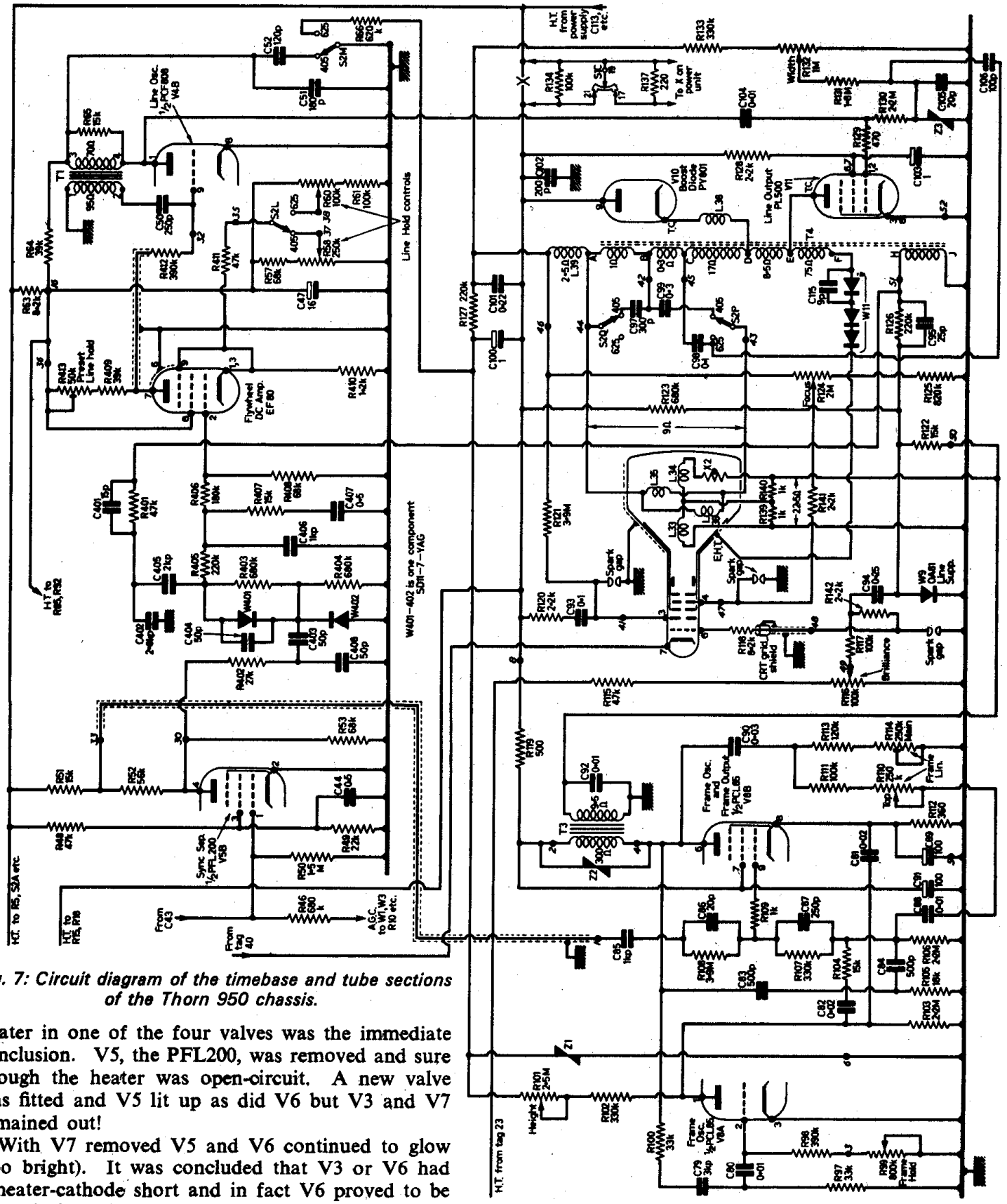


Fig. 7: Circuit diagram of the timebase and tube sections of the Thorn 950 chassis.

heater in one of the four valves was the immediate conclusion. V5, the PFL200, was removed and sure enough the heater was open-circuit. A new valve was fitted and V5 lit up as did V6 but V3 and V7 remained out!

With V7 removed V5 and V6 continued to glow (too bright). It was concluded that V3 or V6 had a heater-cathode short and in fact V6 proved to be the culprit. The heater circuit had in fact become, from chassis, through R69 to the V6 heater. Thus R69 was in fact across the V3 and V7 heaters and having a low value (27Ω) was shunting the current away from them thus causing V5 to fail.

The modified heater circuit (Fig. 6) consists of a BY101 diode in series with a 100Ω dropper. All valve heaters are in a single chain and little trouble is experienced although the diode can short and in so doing will over-run the valve heaters with a heavily shaded raster to call attention to the fault (0·001μF to pin 6 of V4). Unlike the BY130 used in the later 1400 series, which regularly shorts and produces frantic field roll to call attention to it, the BY101 is not so liable to give trouble.

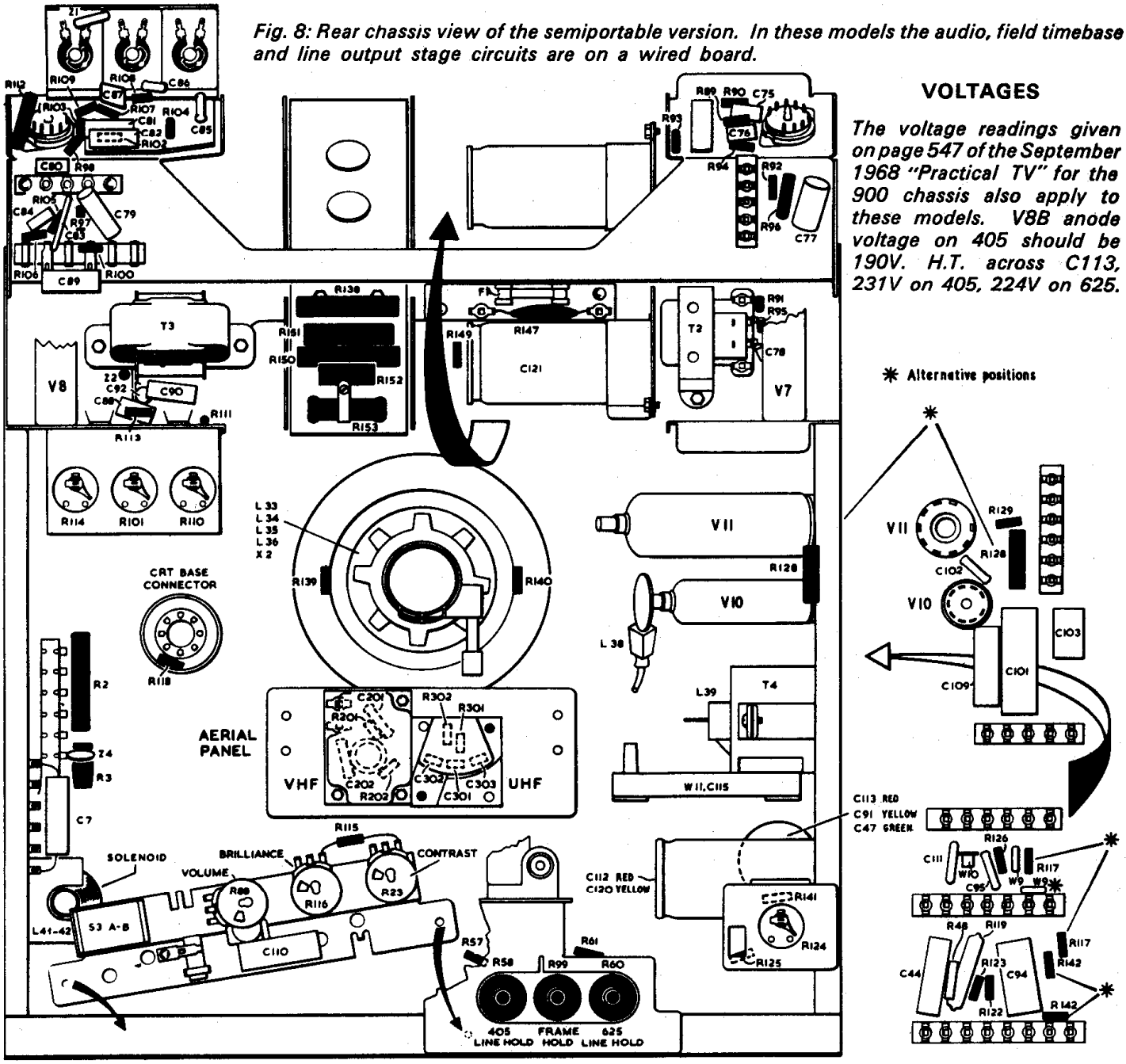


Fig. 8: Rear chassis view of the semiportable version. In these models the audio, field timebase and line output stage circuits are on a wired board.

VOLTAGES

The voltage readings given on page 547 of the September 1968 "Practical TV" for the 900 chassis also apply to these models. V8B anode voltage on 405 should be 190V. H.T. across C113, 231V on 405, 224V on 625.

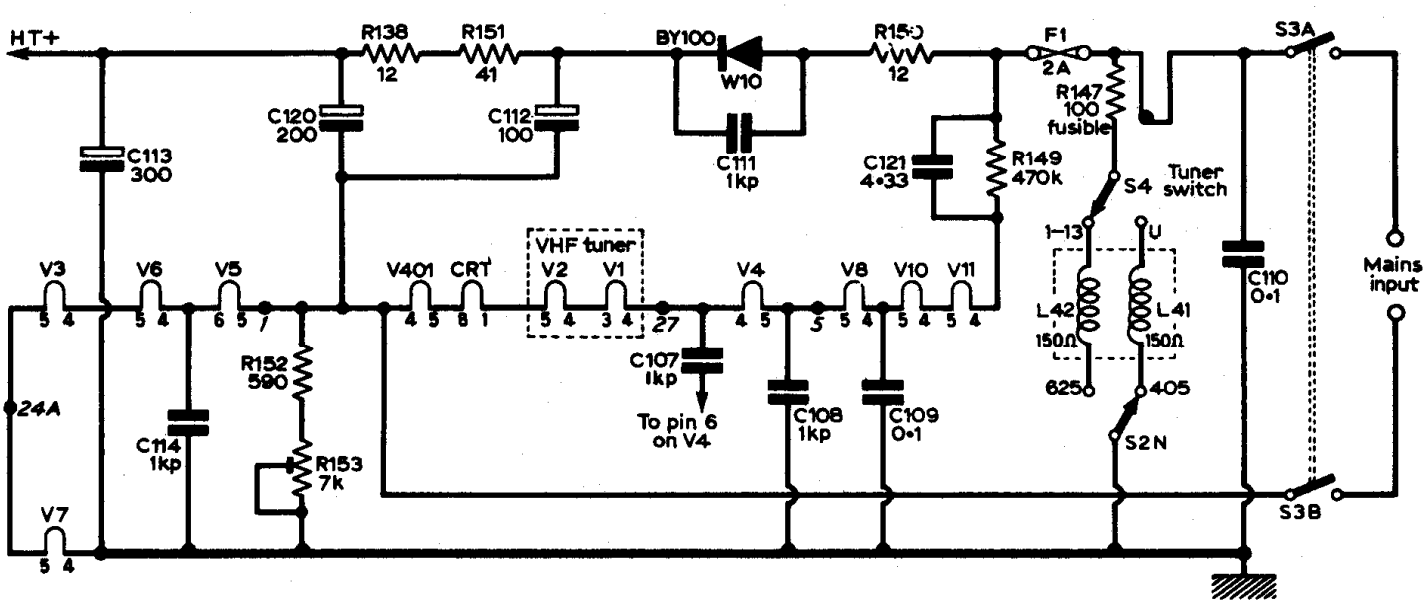


Fig. 9: Heater and power supply circuits used on early semiportable versions. Note heater line dropper C121.

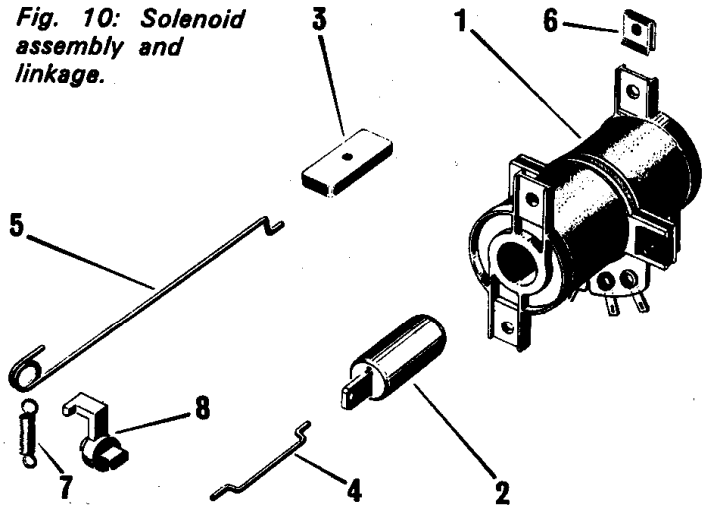


Fig. 10: Solenoid assembly and linkage.

1 Solenoid; 2 slug; 3 TV-radio switch solenoid slug; 4 system switch link; 5 TV-radio switch link; 6 solenoid fixing clip; 7 TV-radio switch spring; 8 TV-radio switch operating arm.

Note that all 16in. models use only one fusible resistor (R147), not two as in the 950 series (R138 in the h.t. line as well as R147).

Additional Versions

To avoid confusion we would point out that there are 16in. versions of the 405-only 11in. portable, e.g. HMV 2643 etc., which have no relation to the 950 or 960 series. For information on these models we would refer readers to the December 1967 and January 1968 issues which dealt with the 980 chassis (Imp, Cub etc.). However, there is a 950 Mk. II with 20kV voltage trebler e.h.t. system etc. and even a 950 Mk. III (36409) which uses a dropper resistor in place of the autotransformer and a slightly different e.h.t. circuit, but we only mention these to avoid confusion.

Tuner Mounting

The standard 950 series models have a v.h.f. tuner which is readily accessible for cleaning. With the channel selector and fine tuner knobs removed a single screw is visible. With this removed, the tuner can be unlatched and moved far enough to remove the cover so that the studs can be cleaned.

The 960 semiportables have no such facility. The chassis must be removed far enough to enable the tuner to be unshipped. This is a matter of releasing screws which secure the tuner knobs, the chassis and the tuner, with a couple in the tuner cover for luck! The channel selector is secured by a screw reached from the inside with the fine tuner rotated to reveal it.

For details of the fine tuner mechanism and slug replacement see the January Philips Servicing Article for diagram and the December 1968 article for description.

NEXT MONTH: THE BUSH-MURPHY TV125/V879 Series.