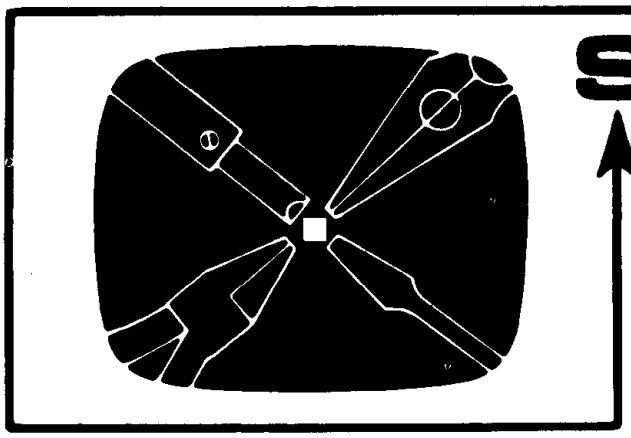


SERVICING television receivers

L. LAWRY-JOHNS

THORN 1400 CHASSIS

THIS is the latest and probably the last fully valved (except of course for the u.h.f. tuner) chassis from the Thorn group. It is employed in a large number of models under the Ferguson, Ultra, HMV and Marconiphone banners. Examples of commonly encountered models are the Ferguson 3646, Ultra 6649, HMV 2639 and Marconiphone 4621.

It is a very easy chassis to work on, presenting the print side to the rear and swinging open with the removal of two screws on the right side to allow access to valves and components. The chassis may be lifted off the left-hand hinges completely when swung open sufficiently. The v.h.f. tuner is of the valved type but the u.h.f. tuner is transistorised.

Points to Note

The top dropper has six sections. It should be remembered that only the two sections on the right (as viewed from the rear) carry a.c. The four sections on the left are the d.c. smoothing resistors. We will have a little more to say about these sections later.

The boost line smoothing capacitor C104 is usually shown on circuit diagrams as being 0·1μF. This was quite correct for early production runs but was later changed to 1μF in order to delay complete collapse of the field scan and thus provide a measure of protection against the possibility of a spot being burnt in the centre of the screen in the event of a line timebase failure. A 1μF capacitor should be fitted when C104 is found shorted (the makers say that this modification should be made to all chassis) and should be rated at 500V.

The series heater chain is fed through a silicon diode (W10) providing a negative-going, rippled d.c. current which cannot be accurately measured with a normal moving-coil meter. For example a d.c. voltmeter applied across pins 1 and 8 of the tube (heater) will show about 4V instead of 6·3V. Perhaps a more useful reading is at the d.c. side of W10. This will normally show a trifle over 80V (negative with respect to chassis). The reason for this suggestion will be explained later.

There is no cathode bias for the field output valve. The bias is obtained for the grid from the negative-going heater line. This is important to remember and ties in with the previous note.

Examination of the circuit and valve line up shows a marked similarity to the earlier 950 series. However the makers have introduced a 30FL1 and a 30PL1 in the circuit: the reason for this is not easy to see.

A five-unit electrolytic capacitor can is fitted, C120-124, forming the smoothing block. As this unit has the habit of leaking, the solenoid operating section of the system switch can suffer as it is immediately below (S2A).

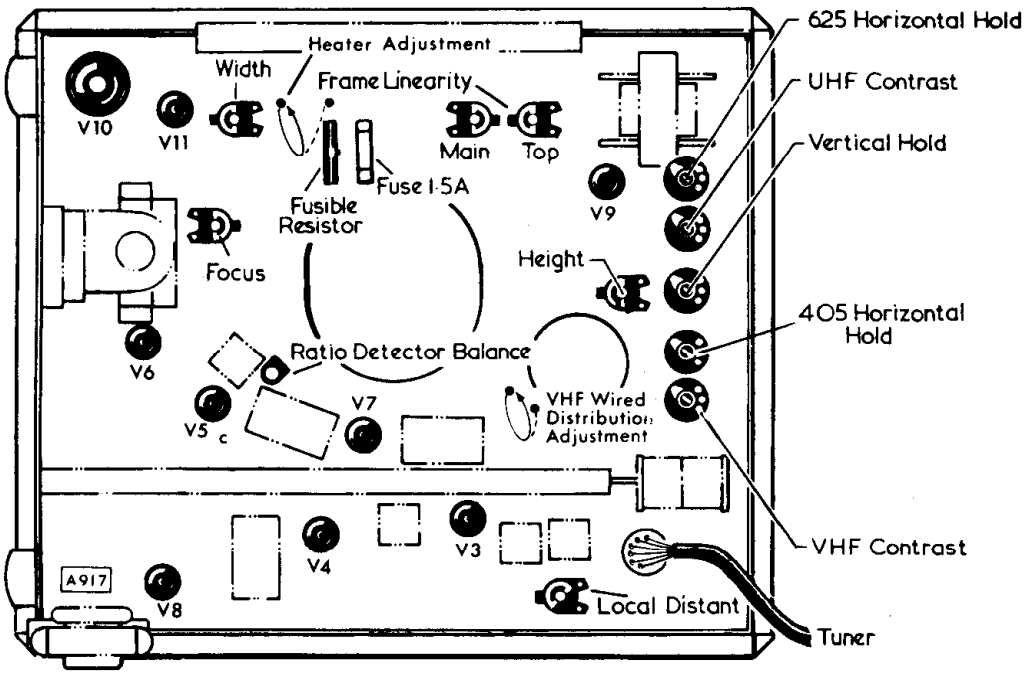


Fig. 1: Main chassis hinged open to show valve positions and preset adjustments.

It should also be noted that there is no voltage adjustment provision in the usual sense. Instead there is a shorting link provided for connection across tags 32 and 33 for use where the applied mains voltage is consistently less than 220V.

Line Timebase

Perhaps the most common fault the writer has experienced is collapse of the line scan on 405 only, the 625 picture remaining normal. The cause of this has been C108 (0·3μF) in every case. This capacitor is located on the lower right edge as viewed from the rear, in the closed position. Sometimes this capacitor gives up quietly, sometimes it blows up!

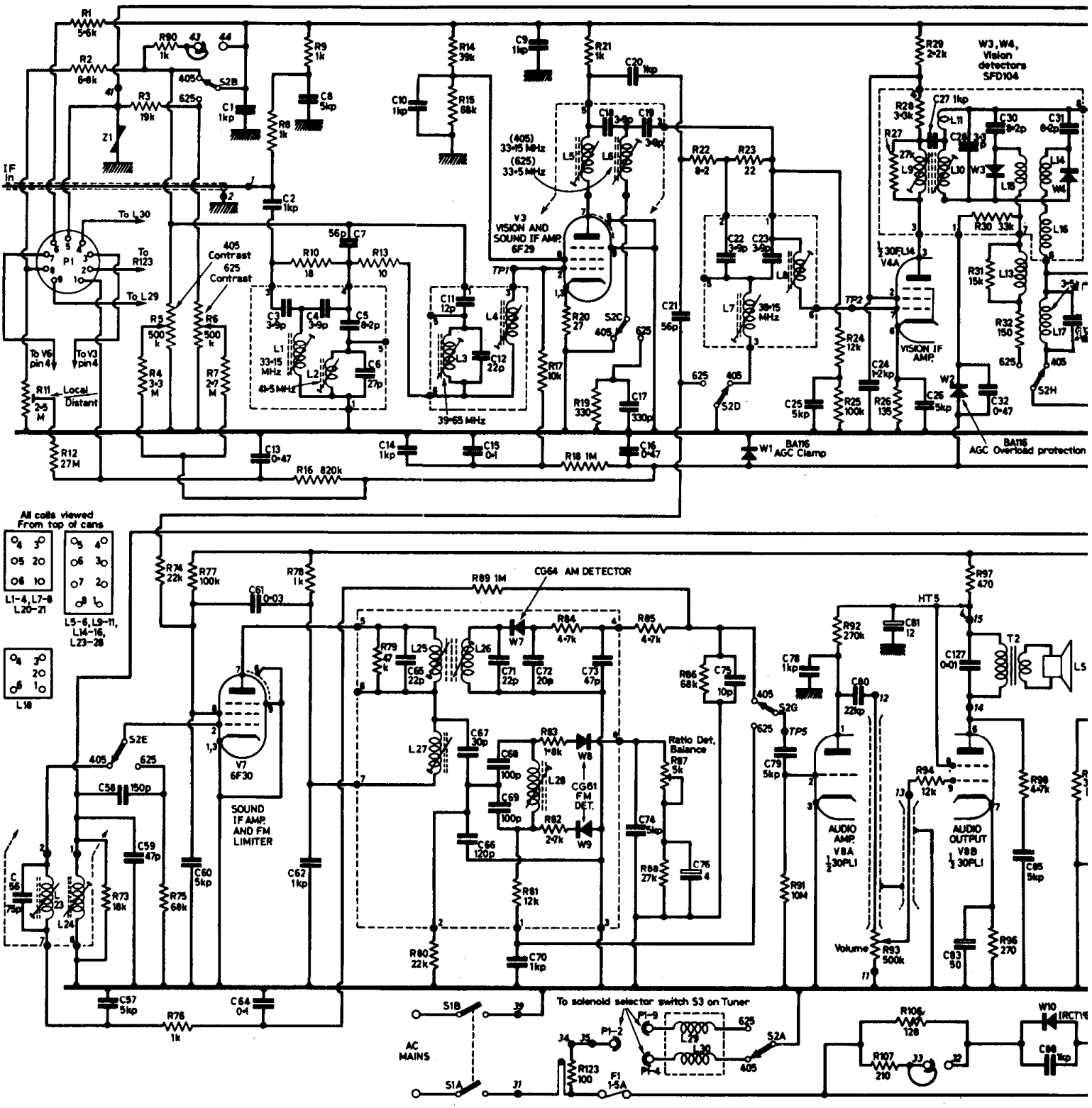


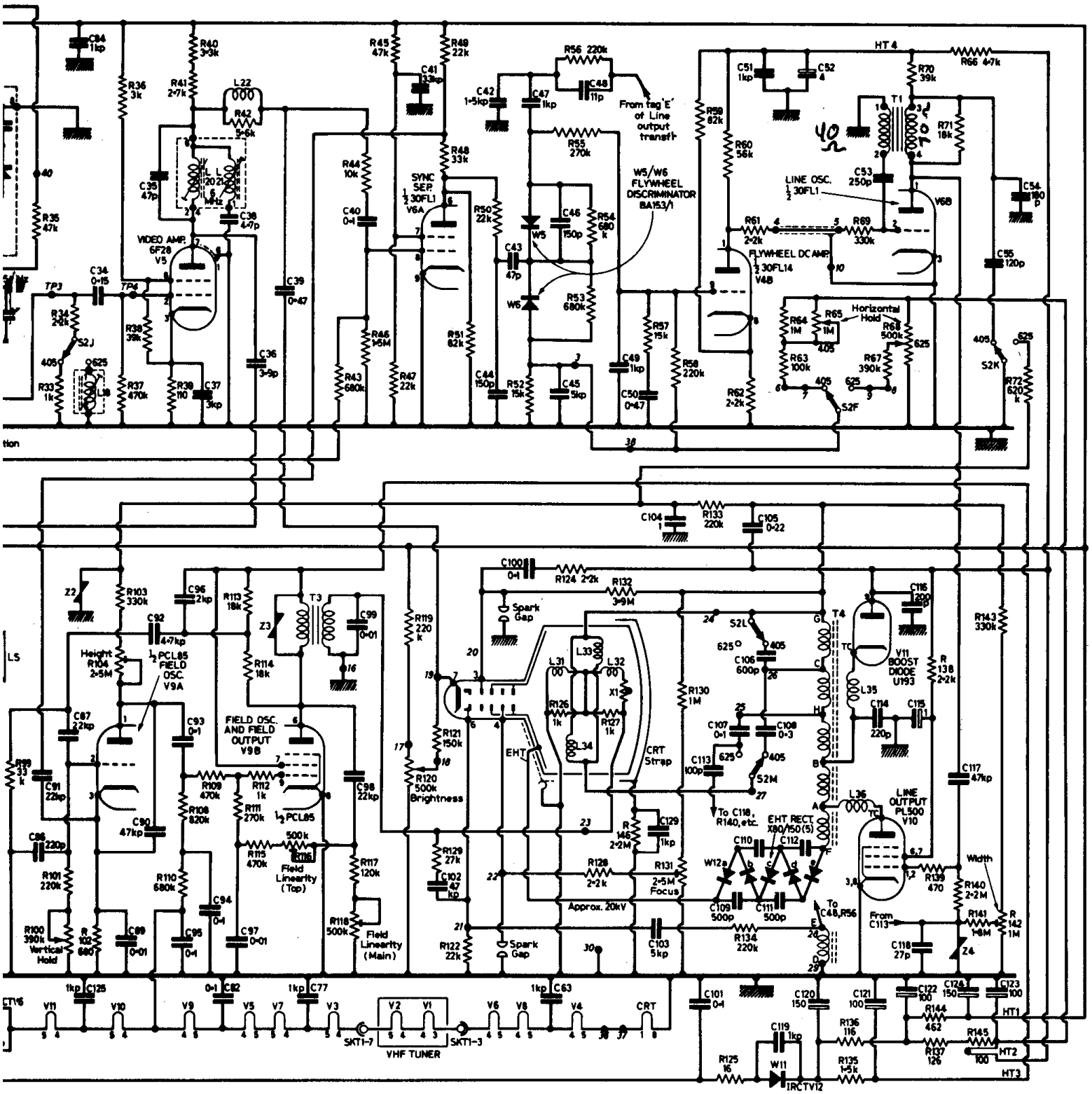
Fig. 2: Circuit diagram of the Thorn 1400 chassis used on many HMV, Ferguso

Lack of width can be due to a low-emission PL500 (PL504) and usually is. However the U193 (PY801) and the width circuit resistors R143, R141 and R140 should be checked in stubborn cases and it should be remembered that leakage through C113 (100pF) can damage the v.d.r. (Z4, MU01) leaving lack of width after C113 has been replaced.

The PL500 screen feed resistor is R138. A faulty PL500 can cause this to overheat and although the resistor may survive the solder on the panel may be impaired and the resultant improper connection may lead to intermittent line output and sparking at the point of poor connection.

Line Hold

It is quite common for the line hold to be suddenly lost with an abrupt change of line speed. Before checking the valves (30FL1 and 30FL14) and components check the screened cable between R61 and R69. The inner may be found shorted to the outer if the cable is pinched or has been subjected to heat. Apart from this R69 can often change



Marconiphone, Ultra and Baird models (a complete list will follow next month).

value (going high), C53 can leak and the discriminator diodes W5 and W6 (double unit BA153/1) can become unbalanced.

The EHT Tray

The e.h.t. for the tube is derived from a voltage multiplier fed from the jelly-pot line output transformer. This multiplier consists of five pencil-type rectifiers set in a tray with their voltage doubling capacitors. The tray is clipped to the transformer and is easily detachable. A faulty rectifier can cause some unusual effects quite apart from the more common symptoms of "blowing up", etc. For example the picture may be quite acceptable at low brilliance but as the brightness is increased—either by operating the control or by the picture content—the line structure is "sizzled" horizontally, the degree of disturbance depending upon the brightness level. Whilst it is possible to replace individual "pencils" the writer (being of a lazy disposition) replaces the tray for a complete cure.

—continued column two overpage

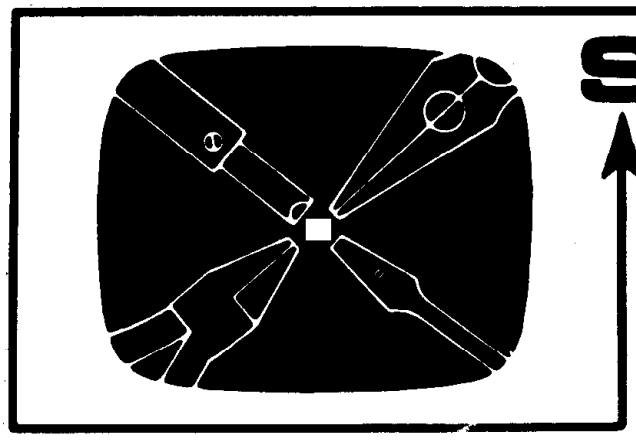
Shorted Heater Circuit Diode

This is probably the most commonly encountered fault of all. The original type of diode fitted in the W10 position was a very small one which seemed to short at the slightest provocation and the writer usually fits a BY100 or BY126 in this position.

The obvious symptom of this rectifier failing is uncontrollable field roll as the negative bias for the PCL85 is replaced by an alternating voltage. The less obvious sign of a shorted rectifier is that the tube and valve heaters are being over-run. The negative voltage output of the rectifier (about an indicated 80V) becomes something under 200V a.c.

Fortunately the rectifier is in an easy position for replacement and there is plenty of room. Carefully observe the polarity of the replacement as a positive output will play havoc with the PCL85.

Next month: Field timebase—quick fault-finding guide—modifications—printed panel layout—voltage data—tuner circuit—complete list of models.



SERVICING television receivers

L. LAWRY-JOHNS

THORN 1400 CHASSIS—continued

Field Timebase

The PCL85, used as the field oscillator-output valve, can contribute its own quota of troubles with no help from any other source. These include loss of height, bottom compression, bottom fold-up and loss of field hold. The bottom fold-up occurs when the PCL85 develops grid-cathode leakage which cancels the standing grid bias from the heater line. A collapsed field scan (just a white line across the screen) should direct attention to the PCL85 valve and then to the boost line where C104 usually shorts to chassis (see points to note at the beginning of this epic). Lack of voltage at C104 would of course direct attention to the capacitor before the valve if voltage readings are taken as they should be.

There are occasions when the boost voltage is present at the height control (or C104) and the PCL85 is not at fault. It is then that the voltmeter is to be used in a logical manner. First take a reading at pin 7 of the PCL85 valvebase: this should be a little over 200V. If there is no voltage here there will not be any at pin 6 and the fault is in the supply from R135, 1·5kΩ, which is the centre section of the dropper. This section can become open circuit with no other component failure to cause it.

If however there is a voltage of well over 200V at pin 7 but not at pin 6 it is fair to suspect that the field output transformer T3 has an open-circuit primary winding.

If there is voltage at both pins 6 and 7 check the bias voltage at pin 9 and apply a hum test here to see if the scan opens up. If it does the fault is earlier, probably in the triode section. If it doesn't check C99 and the continuity of the deflection coils, X1 etc.

If the fault appears to be in the triode section it is worthwhile to note the effect of shorting the vertical hold control to chassis as this can become open-circuit. Capacitors to check here are C92, C87 and C90. C93 is more likely to become leaky and

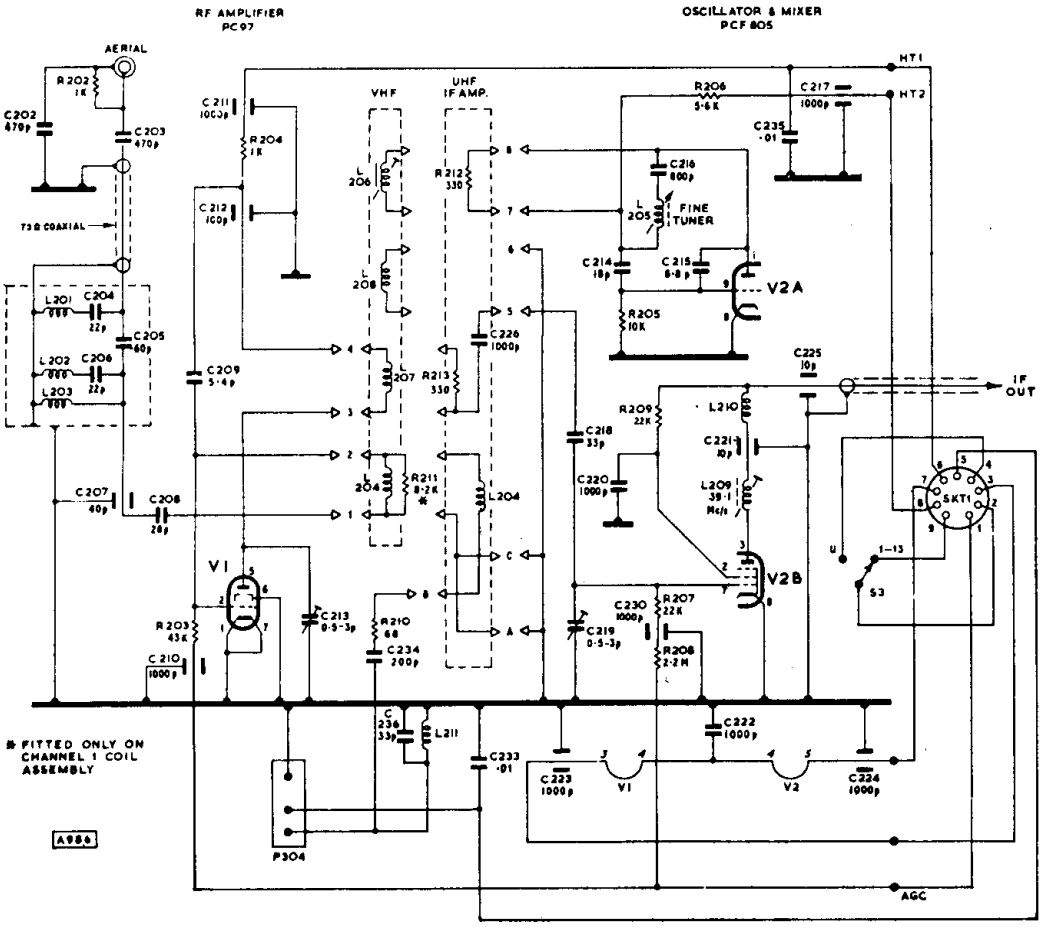


Fig. 3 (left): Circuit of the Type 1516 v.h.f. tuner unit used with the Thorn/BRC 1400 chassis.

MODELS FITTED WITH THE THORN/BRC 1400 CHASSIS

Baird
8691 and 8693

Ferguson
3645, 3646 3647, 3652, 3653, 3654, 3655, 3658, 3659, 3660 and 3661

HMV
2639, 2645, 2646, 2647, 2648, 2649, 2650, 2659, 2660, 2661 and 2662

Marconiphone
4623, 4624, 4626, 4649, 4659 and 4661

Ultra
6648, 6649, 6652, 6654, 6656, 6657, 6658, 6659 and 6661

VOLTAGE DATA

The voltages given in the table below were measured with 240V a.c. mains input, no signal, contrast controls and local/distant control (R11) at maximum, using an Avo Model 8 (20,000 Ω/V). HT1 is 200V, HT2 225V and HT3 215V (both systems). E.H.T. measured with an electrostatic meter approximately 20kV. Voltage at P1 pin 5 12V (u.h.f. tuner line), pin 6 125V (405) and 135V (625), pin 8 130V (405) and 0V (625).

Valve		*Anode volts*		*Screen volts*		*Cathode volts*	
		405	625	405	625	405	625
V3	6F29 (EF183)	185	185	45	45	—	—
V4A	30FL14 (PCF808)	130	130	160	160	2	2
V4B	30FL14 (PCF808)	60	100	—	—	10	8·5
V5	6F28	115	115	170	170	2·5	2·5
V6A	30FL1	80	90	—	—	—	—
V6B	30FL1	150	140	—	—	—	—
V7	6F30 (EF184)	195	195	60	30	—	—
V8A	30PL1	16	18	—	—	—	—
V8B	30PL1	175	175	180	180	9	9
V9A	PCL85	150	140	—	—	—	—
V9B	PCL85	205	205	215	215	—	—
V10	PL500	—	—	200	200	—	—

cause the picture to fold up at the bottom as the bias is cancelled.

No sound, picture in order

Apply hum test to pin 2 of V8, 30PL1. If there is no response—with the volume fully up of course—apply test to pin 9. If no response check the valve and the valvebase voltages. If there is a hum from pin 9 but not pin 2 check R92 and C78.

If the sound is distorted on strong signals check R91 or bridge it with a resistor of near value. Distortion under all conditions can be due to a faulty 30PL1 or a leaky coupling capacitor (C80).

If the no-sound condition is not due to a faulty audio stage check that all channels are affected and check V7 and associated components, particularly C60 and R77.

No vision signal, sound in order

This assumes that a raster of normal size can be resolved when the brilliance is advanced but that no picture can be displayed. The fact that the sound is in order means that the tuner and the V3 stages are functioning and that the fault is therefore almost certainly in the V4 (30FL14-PCF808) or V5 (6F28) stages. A check on the valves, valvebase voltages, continuity of coils etc. should quickly reveal the cause of the trouble.

Poor sync, particularly on 625

Check R38 (39kΩ) also C34 (0·15μF). If these are in order check R45 (47kΩ) and C40 (0·1μF). In most cases the field timebase will be mainly affected making the setting of the vertical hold control very critical.

No signals, raster in order

If there are no sound or vision signals on either standard, 405 or 625, the fault should be looked for in the V3 (EF183-6F29) or the v.h.f. tuner unit stages. We could include in this the symptom of weak signals if both standards are affected. Check the EF183 valve and the voltages to pins 7 and 8. It may well be found that R14 has risen in value: this 39kΩ resistor is liable to do this or it can be damaged if C10 shorts to chassis.

If the V3 stage appears to be functioning properly attention should be directed to the tuner unit. The i.f. output cable of the v.h.f. tuner is inclined to bend at an acute angle at the point of connection to the tuner and can give trouble either by shorting to core, which upsets R8 and R9, or by becoming open-circuit—perhaps intermittently. Check the PCF805 and the resistors and coils associated with this valve. Trouble in the PC97 stage will affect v.h.f. only and trouble in the u.h.f. tuner will affect u.h.f. only. The three-pin plug at its connection to the three-pin socket on the rear of the v.h.f. tuner can give intermittent reception on u.h.f.

Variation of tuning on VHF

This implies that the tuning is continuously varying each time the channel selector is operated, the fine tuner appearing to operate at times and at others to be ineffective. The usual cause of this trouble is either that the fine tuner lever is not operating the wire which goes through to the core or that the metal sleeve on the core is loose and is not following the movement of the core.

Removal of VHF tuner

Whilst the mounting may vary in different models the fixing is the same. The front knobs pull off to expose a single screw. When this screw is removed the tuner can be unlatched from the mounting flange on the opposite side to the screw.

UHF tuner

This may be of the rotary type or push-button. Servicing should be restricted to the bare minimum. Check resistors if necessary but leave the inside alone. The tuner should be returned to the nearest makers servicing depot should any trouble develop inside it.

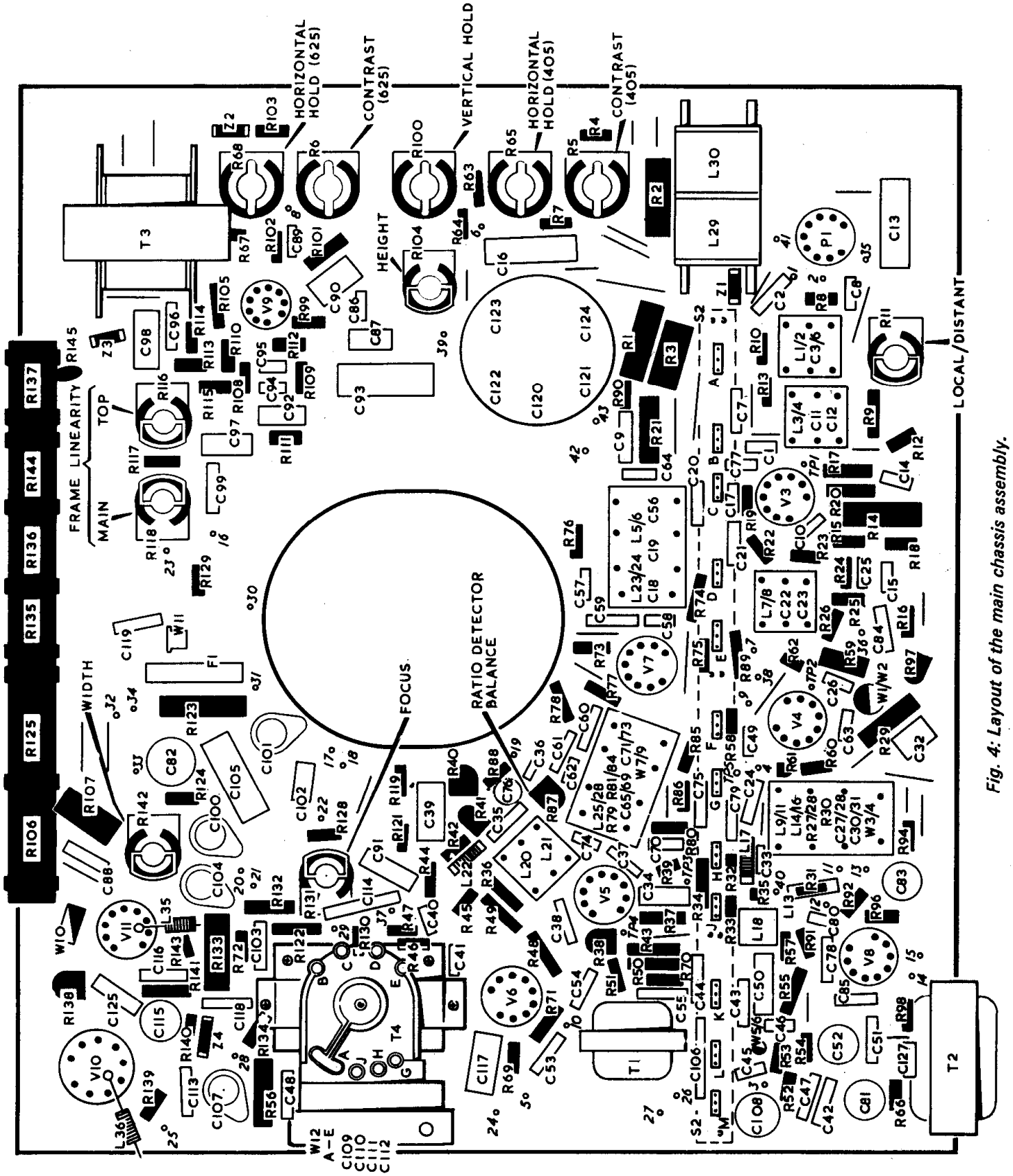


Fig. 4: Layout of the main chassis assembly.

The printed panel

Almost all printed panels can be subject to fractured tracks, which can usually be traced with a meter, and dry-joints, which can sometimes be seen to be dry, both defects being more quickly located by movement of the panel or suspect components. The appearance of these defects does not follow any regular pattern on the 1400 chassis; not so far!

Modifications

The circuit diagram shown last month is for schedule C chassis. In some schedule A chassis a 1,000pF capacitor is fitted across the mains input and also across the brightness control. R90 and tags 43 and 44 were added on schedule B chassis to provide for 625-line v.h.f. working. Fusible resistor

—continued on page 170

SERVICING TV RECEIVERS

—continued from page 167

R145 was added with the schedule C chassis, R137 at the same time being changed from 226Ω to 126Ω. In later schedule C production R107 and the associated shorting link are not fitted.

The following component differences from Fig. 2 may be found: C48 3pF; C89 0·1μF; R4 3·9MΩ; R69 360kΩ; R71 15kΩ; R102 1kΩ; L36 not fitted; V10 PL504; V11 PY800. Note that Sparkguard tube bases are used and may be of two types, S or R, the tube type numbers bearing these suffixes. A tube with an S Sparkguard may be fitted in an R chassis if the flat side tag is bonded to tag 5 of the base connector. If replacing an S type with an R type connect tag 5 of the c.r.t. base connector direct to printed board tag 29 and disconnect the c.r.t. aquadag earthing lead from the chassis frame and connect direct to tag 5 of the c.r.t. base connector.

Late modifications released to us are: C114 210pF, R141 3·3MΩ and V6 30FL2 on some chassis and in later production the h.t. feed to the line hold controls taken from the junction R66, C51 with C52 raised to 12μF.

NEXT MONTH: PHILIPS 210 CHASSIS