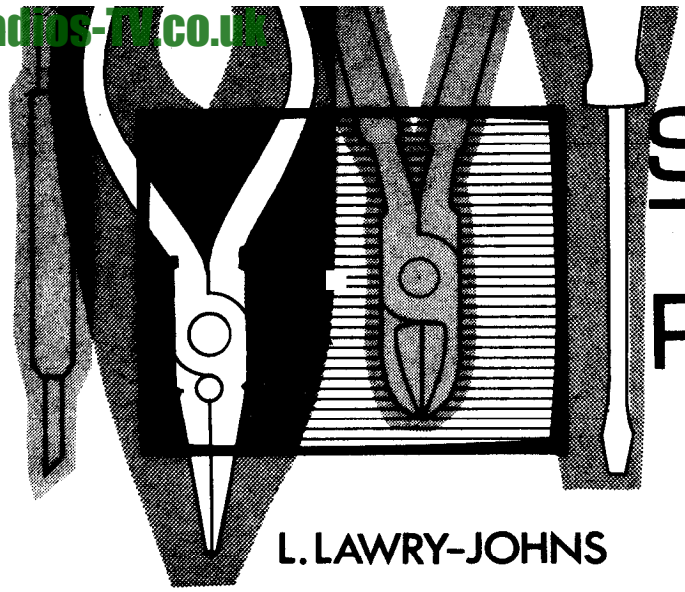


SERVICING TELEVISION RECEIVERS

THORN 1400 CHASSIS

L. LAWRY-JOHNS

IT'S getting on for seven years since we first covered the Thorn 1400 series. Since then the circuit has been changed quite a bit and lots of different fault conditions have shown up. In all there have been some fifty models with tube sizes from 16in. to 24in. and cabinet presentations from semi-portables to large wooden cabinets with or without legs. We will not list the models since there is little chance of confusion: they are all dual-standard sets with a single vertical swing out panel.

The v.h.f. tuner is a conventional turret type but the u.h.f. tuner can be either a continuously tuneable type with a dial numbered 21 to 65 or a four pushbutton unit (more than one type of these may be found).

There is no chance of confusing these sets with the later 1500 series since the latter has no v.h.f. tuner and no system switching, while the earlier 950 chassis used a horizontally mounted board rather than a vertical one.

Tube Condition

Now we usually start straight off with a discourse on the more common faults. Since we are dealing with a more elderly group of models however it would perhaps be better first to discuss the things which will determine whether a repair is going to be a worthwhile proposition. Doubtless many of these sets encountered will already have had a new tube fitted but even so this could be failing, particularly if the original make has been fitted as a replacement. As to the symptoms of a low emission tube, suffice it to say that if turning up the brilliance or contrast results in the whites turning pearly it is time to start thinking. Tapping the tube neck may liven things up for a while but not for long. A c.r.t. rejuvenator may also pulse up a new lease of life, but there is no substitute for a new tube from a long term point of view.

Open-Circuit Grid

There is another common tube fault which is mainly confined to the original make and which can happen at any time and quite suddenly. This is when its control grid becomes open-circuit internally. The result in no control of brightness, the screen merely being faintly illuminated with faint flyback lines displayed for the benefit of the close peerer. Again, it may be possible to apply a high pulse voltage between the grid and cathode in an attempt to weld the break, but this is not really the answer. One has to face up to the question as to whether the set warrants a new tube or not.

Panel Burn Up

The next big question mark is not caused by the failure of any particular item but by a burn up of the board around the right side of the system switch. This can be messy, and may wreck the system switch as well as damaging the panel. The obvious answer here is to do away with the switch and wire the contacts in whatever mode they normally work. Whilst this is usually 625, there are situations where the 1400 or other dual-standard receivers are retained purely for their 405-line capability. This type of repair requires little technical know-how but quite a bit of patience in cutting away the affected area, making good the tracks (not necessarily in the same place) and joining up the contacts in whichever switch position is required. There is of course no need for the solenoid, the switch or the switch contacts, wiring etc.: once this lot is removed the board takes on a more streamlined and neat appearance – except for the holes in the panel made by the original burn up.

Buzz on 625

The most common complaint with this chassis has always been vision buzz on sound when used on the 625-line standard. The first thing to do is to make sure that it is vision buzz (varies with picture content) and not buzz induced from the scan coils. This latter complaint is constant until the panel is swung open, when it stops as the sound ratio detector moves away from the coils. Generally this condition will not be met since most sets will have been fitted with the double screening can over the L27-28 etc. coil assembly (if one wonders why a second cover should have been fitted over the original, this is the reason: the original screen didn't screen enough!).

Now to get down to the annoying vision buzz. Generally no amount of tuning the coil cores (mainly L27-28) or setting the rejector potentiometer R87 will completely remove the buzz and one is left with the task of going through the whole of the vision i.f. alignment procedure or looking for an alternative. There is an alternative, and this consists of making some very small alterations to the circuitry.

The first job is easy and simply consists of changing the video stage screen grid feed resistor from 3kΩ to 8.2kΩ or thereabouts. The resistor is R36, connected to pin 8 of the 6F28. The next is a little more involved and requires the addition of two small resistors, one of 22kΩ, the other 180kΩ (both ½W). These are shown in our circuit diagram (Fig. 1, schedule E receivers) as R175 and R176 to the

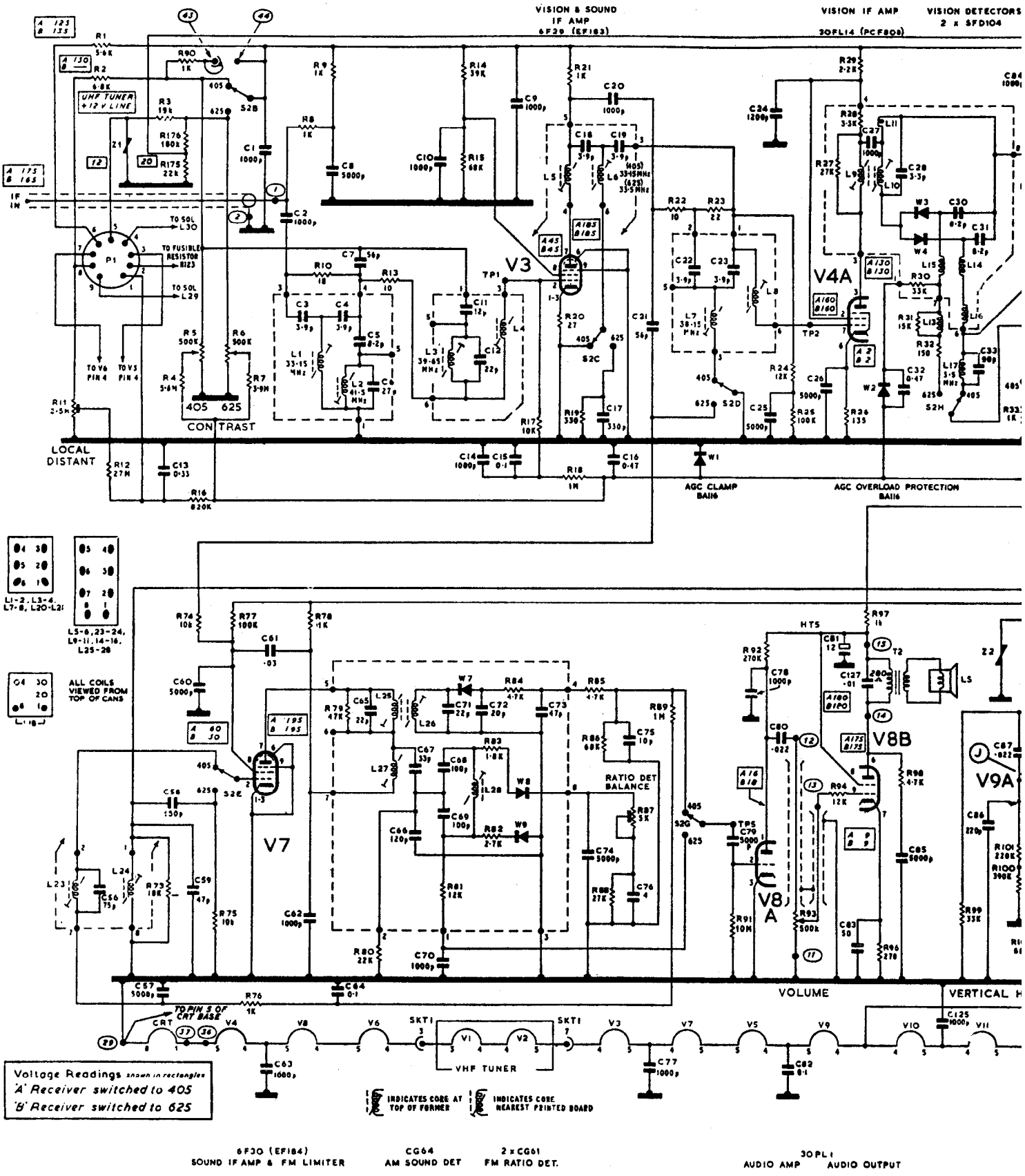


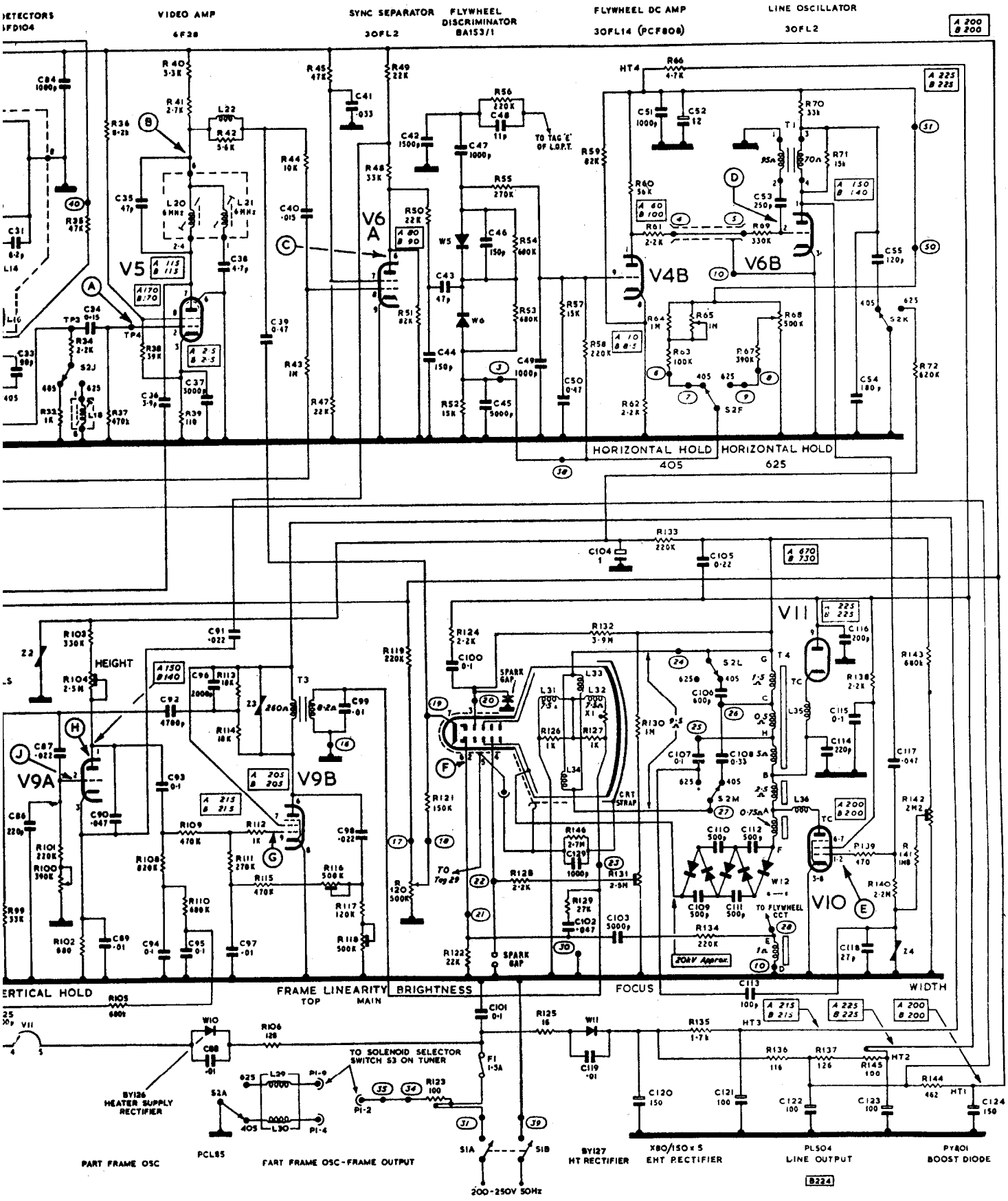
Fig. 1: Circuit diagram of the Thorn 1400 dual-standard chassis –

junction of which R35 is returned. In earlier models R35 was returned to the junction of R3, Z1. This modification divorces the detector from the 12V u.h.f. tuner supply. Finally, make sure that R74 and R75 are both 10kΩ. Then adjust L27 and R87 for optimum results.

Line Output Stage Faults

This chassis has its fair share of stock faults the majority of which affect the line timebase.

The e.h.t. for the tube is derived from the line output



assis – schedule E version incorporating production modifications.

transformer via a tripler (or doubler on small screen sets) unit which clips to the side of the transformer. Whilst a fault in this unit usually proclaims itself in no uncertain manner there are times when it neither smokes nor smells but still stops the line output stage working. So when one is faced with a no picture condition which is due to lack of e.h.t. it is prudent first to disconnect the tripler from the transformer and see whether this restores some life to the line output stage.

If it does one may find that the tripler is warm and a new

one is called for, preferably of the closed in variety. A nice solid block tripler is less likely to break down than the open type. The only advantage (which is dubious anyway) of the latter is that it can be opened up so that the pencil rectifiers can be replaced separately. Other tripler faults are picture ballooning or sizzling at high brightness levels (see later).

Assuming that the tripler is not at fault, lack of e.h.t. is usually due to valve or component failure, very rarely to the line output transformer which has a very good record. Where one has to be replaced it is usually due to hamfistedness when soldering (or unsoldering) connections to its tags which will come away if pulled when hot.

The item most often at fault is the 220pF high-voltage harmonic tuning capacitor C114 which is soldered to the transformer and which shorts the PY800 boost diode to chassis at the drop of a hat. Needless to say, the PY800 doesn't like this and is likely to blow itself before failure of the fuse can put an end to its misery. Later versions have a thermal cut-out (R145) in the supply line (HT2) and where this is present it will be found sprung open, the fuse remaining intact and the rest of the set continuing to function. So the drill is, if the cut-out is open on later models or the fuse blown on earlier ones check the resistance reading from the PY800 top cap to chassis and if a short is found check the capacitor – which may proclaim its guilt by looking a little off colour.

These remarks apply to several Thorn chassis, both earlier and later, and it is essential to use the proper type of capacitor for replacement. The tubular type of high-voltage ceramic capacitor is not suitable and will have a short life. The round disc type must be fitted for reliable operation. Cut the old one out with wire cutters (do not unsolder), then fit the new one with a couple of nice quick blobs of solder after twisting its wires round the relevant tags. This is to avoid sustained heat on the pegs and damage to the transformer.

C114 can also cause lack of width – before it finally goes short-circuit.

Still on the subject of no e.h.t., but where there is no short across the PY800 (PY801), overheating is usually caused by the PL500 (PL504) passing too much current. If this valve is red hot when the h.t. is reconnected (if it has been disconnected by the thermal cut out that is) there can be several causes. The usual one is failure of line drive from the oscillator stage. Whilst the 30FL1 (30FL2) line oscillator valve is the most frequent offender, it is by no means the only one.

If there is no voltage at pin one – there should be around 145V – check the value of R70 – assuming that there is h.t. on the other side of this resistor. It can go high. There are times when it's of correct value and C54 or C55 may be found shorted. If not it could well be that the stage is simply not oscillating. This could be due to several factors, from C53 back to the d.c. amplifier stage V4B and the discriminator diodes W5/W6. The source of the trouble in this case depends on which voltages are right and which are wrong.

If there is no voltage at pin 1 of the 30FL1 and also no voltage at the other end of R70 the HT4 smoothing resistor R66 is suspect, also C52 which may be leaky.

If the PL504 is not cherry red but only dully red (not really a Marxist, just a left-wing socialist perhaps) it is probably being driven from the oscillator but damped in the output stage. The PY800 is often overlooked in this connection but in fact is often responsible. If the valves are not at fault it becomes necessary to disconnect a few items, the tripler of course (which should have been removed first), the scan coils, and C113 checked. Remove the top cap of the PY800 and if the stage comes to life suspect the boost capacitor C105 which will be shorting to the h.t. line. Check the value of R133 (220kΩ): if this is low and discoloured check R72 which may have "gone to ground", or C104 may be shorted.

If the PL504 is quite cool it could well be that its screen grid feed resistor R138 is open-circuit. This could well be due to C115 shorting but is not often the case. An open-circuit C115 may give rise to striations.

A frequent complaint is that while there is a picture the width is insufficient and the picture expands and contracts. The PL504 and the PY800 could be responsible but are often not. A general check on the width stabilising circuitry is called for. Start with the width control itself, R142. Check it for correct value and smooth action. Then check the value of R143 which can lose as well as gain value. If it falls in value it can mess up the width control while if it increases in value the width control is ineffective. If these are in order check R141 and R140, both of which can go high.

These are not rare faults, they happen regularly and often and must be expected. The v.d.r. Z4 is very rarely at fault and should not be suspected even after it has suffered at the hands of a shorted C113. For those interested, it is a type E298ZZ/05.

If C113 has to be replaced it is prudent to check C107 (assuming the set is used on 625) which can also short to spoil the scanning waveform. The result is compression on the left side with a white line down the edge.

C108 and C106 can be responsible for no picture on 405 lines.

Line Tear and Sync Problems

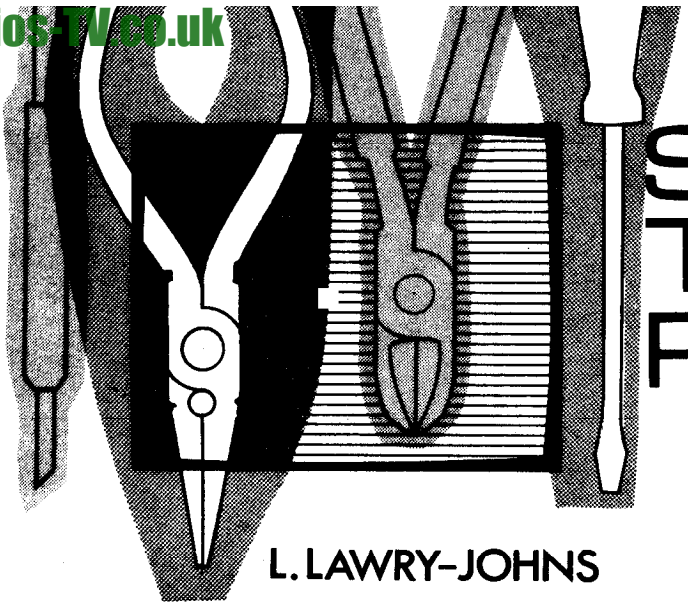
Intermittent horizontal displacement of lines which is not affected by the brightness of the picture directs suspicion to C54 (180pF) which can become leaky to give rise to these symptoms. If the brightness does have an effect however, i.e. the condition gets worse as the picture gets brighter (tube draws more current) then the tripler is at fault with one of the pencil rectifier sticks breaking down. When the tray is removed from the transformer a sniff is enough to confirm the diagnosis, the smell being enough to penetrate the most insensitive of noses. A similar effect can arise if the outer coating of the tube is not effectively earthed to chassis, but this is very rarely the case.

If the line hold takes a time to sort itself out when the set is first switched on but settles down after a period to give no more trouble, suspect a lazy 30FL1 line oscillator valve. The valve can also play about after a period to give loss of line hold – or it may fail completely to cause picture collapse to the centre with consequent line output stage overheating.

Variation of line hold need not be due to this valve however and one or two other points may need to be checked before the real cause is tracked down. Among the causes found have been the 30FL14, R59, R60, R62, R66, R69, C50 and the discriminator diodes W5 and W6. Weak sync can be due to these components (the 30FL1 is also the sync separator) plus the resistors associated with pins 6 and 7 of this valve (check R45 and R48). If necessary go back to the video stage where R38 may have decreased in value thus increasing the video cathode bias and upsetting the sync pulses.

In difficult cases of no line sync do not omit to check the reference pulse feed from the line output transformer (tag E) via R56/C48 and C42/C47 to W5. A short in the screened lead between R61 and R69 is another possibility.

Wavy verticals should direct attention to the main smoothing block, then C52.



SERVICING TELEVISION RECEIVERS

THORN 1400 CHASSIS

– continued –

L. LAWRY-JOHNS

Field Timebase Faults

The field timebase consists of the familiar PCL85 (PCL805) in a not so familiar circuit. There is no cathode bias, no cathode resistor to change value, no cathode capacitor to dry up.

Instead, the bias is applied to the grid of the output pentode and is derived from the heater circuit at the junction of V9 and V10, the potential being negative (due to W10) and at this point unsmoothed. It's smoothed by the high-value resistors R105/R110/R108 and capacitors C94 and C95, and divided by these resistors and the linearity network.

Now this is quite nice and the basic idea is to call attention to the heater circuit if W10 should short (we could say when W10 shorts, as this is a common occurrence). When W10 shorts, the heater current increases dramatically and the valves and tube would have a very gay (albeit short) life if left in this state. With the field output stage bias derived from the heater line however attention is called to this condition as the field scan then acts in a most peculiar way, the bottom of the picture folding up and there being no proper hold. Thus a normal picture cannot be restored until the heater circuit diode is replaced, thereby saving the tube and valves. After all nobody wants to watch a crazy picture like that, do they? Well the sad fact is that they do! We have often been called to attend to a set with this fault only to find it still operating even with no one watching it. You see they must have their favourite serial(s) on to keep up with what is happening to this or that character. They may not be able to watch properly, but to listen is apparently enough.

One look at the valve (and tube) heaters is sufficient to confirm the diagnosis, and it is only minutes' work to cut out the faulty diode and fit another and hope that the overload hasn't proved too much for the valves and the perhaps already ailing tube.

The fault was much more common before W10 was changed to a BY126. It may also be present in less exaggerated form due to the diode being leaky.

Insufficient height can be due to a failing PCL85 but is more often due to the height control itself or its 330kΩ series resistor (R103). If the height control has a dud spot it should be replaced, not merely reset to a different part of the track. The condition of R133 (boost feed) should also be checked.

We are going to couple field collapse with field hold troubles since the latter are often the forerunner of a horizontal white line. For example resistors R113 and R114 often change value. Depending upon the severity of the change, the result could be loss of field hold or complete field collapse. C92 can do the same, depending upon whether it leaks slightly or fails completely. This capacitor must be of high voltage rating. C87 is a similar instance and can cause hold troubles as well as collapse but here the voltage rating is not critical.

Other causes of field collapse are C104 and R135.

C93 has a tendency to leak. This reduces the bias on the output stage with the result of fold up at the bottom.

Video Output Stage

The video output stage consists of a 6F28. If the picture lacks contrast it is often because this valve is losing emission. Since this is not the most widely used of valves, one may not be to hand for a quick swop and it pays therefore to check associated components. The suspects are R40 and R41 in the anode circuit and the 39kΩ bias stabilising resistor R38 between the screen grid and cathode. As this goes low it loads up the cathode bias to cause a weak picture with loss of sync. It may also result in R39 changing value.

If R36 is changed to 8·2kΩ (as it should be) an EF184 can be fitted to see what the difference is. This will not give the same performance as the 6F28 but is all right for a check or as a stopgap until the proper valve can be fitted.

Other Contrast Faults

Lack of contrast is often due not to the video stage but to loss of emission in either the 30FL14 (PCF808), which is the vision i.f. amplifier and line oscillator, or the 6F29 (EF183) first i.f. amplifier. When one has to replace V4 because of a line hold fault it is often surprising what a difference this makes to the contrast. A voltage check at pin 6 can save time. If this is about 2V the valve is probably not at fault and it is better to concentrate on the EF183, its screen grid feed resistor R14 and the a.g.c. components. The common troubles here are the contrast controls and the high-value resistors R4 and R7 in series with the sliders.

Poor Sync

We have mentioned the tendency for R38 to change

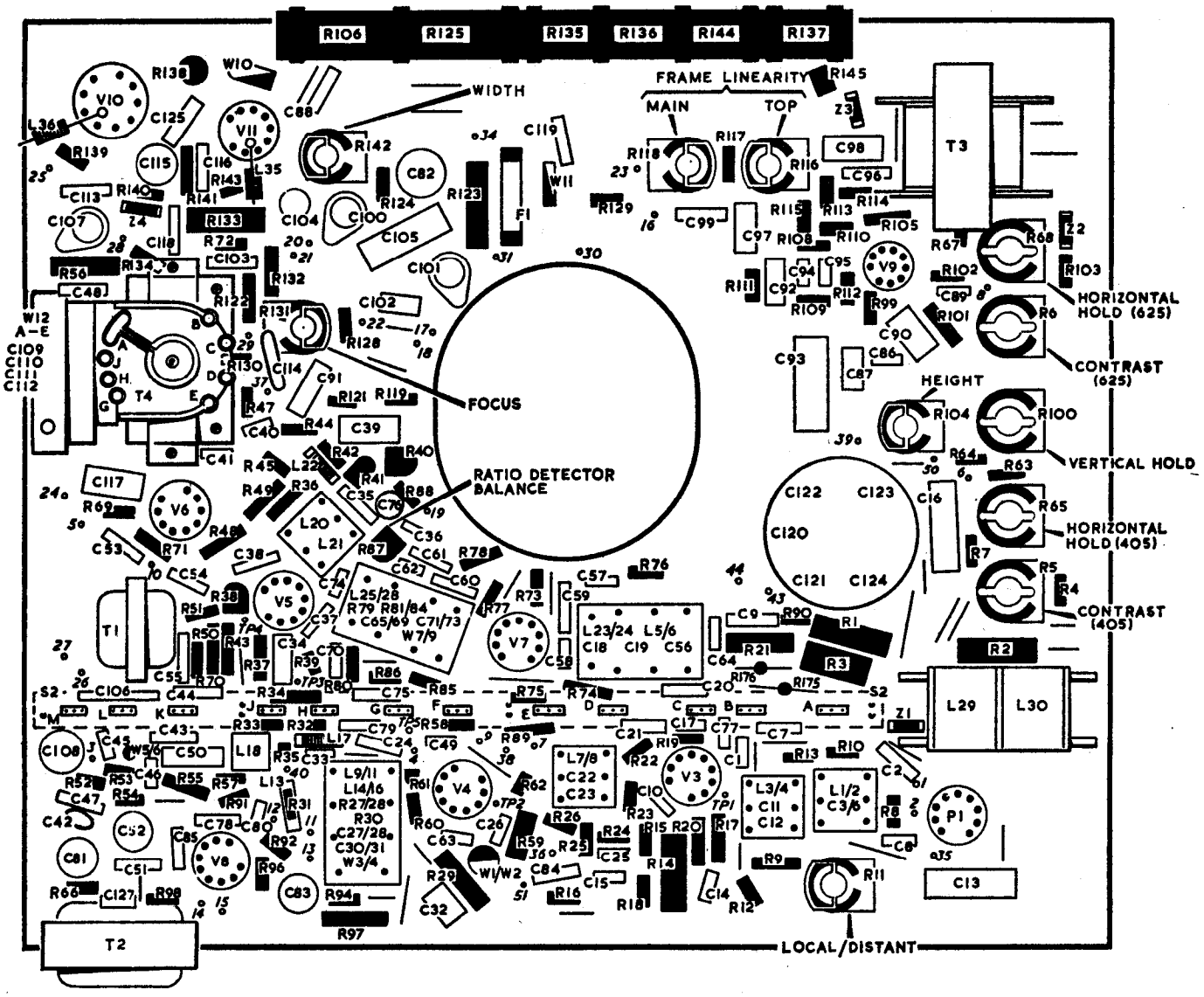


Fig. 2: Main chassis component layout.

value and upset the sync performance. Other suspects are C34, R45 and C40.

Tuner Units

In the majority of cases the v.h.f. tuner is not used for v.h.f. reception but where it is the tendency for R206 to change value should be kept in mind. This puts paid to v.h.f. reception as it is the oscillator load resistor. Its position up in the side wall makes the job of replacement a little tedious and precludes the possibility of using a larger and more reliable resistor.

The PCF805 mixer/oscillator often requires replacement and this affects u.h.f. reception as well since it is also used as an i.f. amplifier on 625-lines. The coil biscuit studs may also require cleaning from time to time and perhaps the switch bank carrier eased down with a screwdriver blade to improve the contact surface. The PC97 hardly ever needs replacement.

One of several types of u.h.f. tuner may be encountered so we can't go on too much about this. Probably the most common trouble is variation of the tuning setting due to poor contact between the spindle earthing springs and the tuner body. Cleaning out the grease with a solvent (not switch cleaner-lubricant) such as meths will often clear the fault, but it's sometimes necessary to remove the oscillator section springs with a large iron in order to clean and retension thoroughly. Other troubles are mainly of a mechanical nature and can be immediately spotted and rectified.

Aerial Input Panel

The aerial input panel itself is a prime source of weak signals. Resoldering the tracks etc. can produce a marked improvement.

Sound Circuits

The sound output stage uses a 30PL1 (nearest equivalent PCL83) which is fairly reliable but can give rise to trouble. When it has to be replaced it is essential to check not only its cathode bias resistor (R96) but also the h.t. feed resistor R97 (which should be 1kΩ). Other causes of weak output can be C81 and C83, both of which can dry up. R92 may go high but this doesn't happen very often.

We have already outlined the main sound trouble which is background buzz. If L27-L28 are set correctly, together with R87, the other remedies must be tried.

Distortion can be due to C80 leaking or R91 going high.