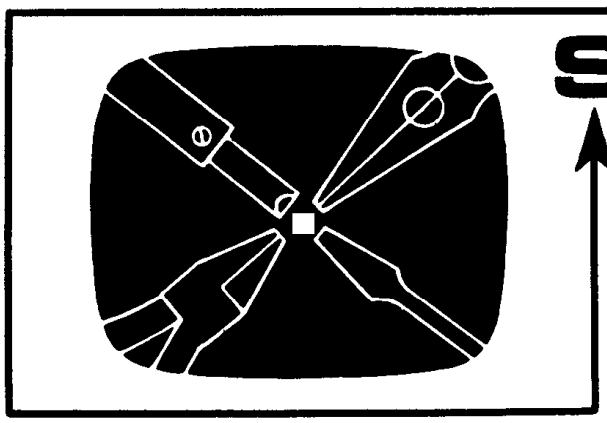


SERVICING television receivers

L. LAWRY-JOHNS

BRC 1500 CHASSIS

Ferguson Models 3800, 3801 3802 and 3803.
HMV Models 2800, 2801, 2802, 2803 and 2804.
Marconiphone Models 4800, 4801 and 4803.
Ultra Models 6800, 6801 and 6803.

THE above are some of the models which use the BRC 1500 chassis and give an idea of the coding employed. 17in., 20in. and 24in. models are included in the range. The differences are mainly in the e.h.t. supply, depending on the type of line output transformer and e.h.t. tray used. We show the 15kV unit in our main circuit—as coded with a pink or green dot. The basic arrangement used in the 1400 series—a single panel carrying all parts other than the tuner—is continued in this series. The line output section is now on the inside (hinged) edge of the panel. This is good in some ways and perhaps not so convenient (but safer) in others. All stages up to and including the video amplifier are transistorised.

Common Faults

The faults which we experience more than others seem to concern the tuner unit and the sync stage.

Since these are single-standard sets the i.f. stages are simple and uncluttered by switching. Few faults develop in the i.f. strip which cannot be tracked down by checking the transistor voltages against those shown on the circuit.

Where the sound is present but the picture is absent or very weak we have found C37 (feeding the base of VT9) faulty on several occasions. As it tends to become open-circuit, shunting a similar value capacitor across it immediately shows whether this is the trouble. For test purposes the value is not critical, anything between 20-100μF.

It is our experience that the majority of troubles on the 1500 chassis itself are due to capacitors becoming open-circuit or resistors changing value.

Tuner Troubles

As we are in an aerial group A area—channels 21-34—our tuner troubles may not be those experienced by others living in areas served by the higher channels. We say this because in order for example to receive channel 23 the push bar is almost at its maximum travel, extending the return spring fully and imposing a heavy load on the bar. The bar is soldered in a slot at either side and it appears that the constant pushing and shoving that goes on against the spring tension proves too much: the bar leaves the slot and the tuner no longer tunes. The obvious solution of resoldering the bar in the slots should be accompanied by a release of spring tension (stretch it a bit) so that the bar is not required to live quite so hard a life.

Apart from this the only other tuner troubles we have had have been resolved either by thoroughly cleaning out the grease around the spring washers on the tuner spindle or by changing the first stage r.f. transistor. This transistor is at the receiving end when there are storms about. When the complaint is weak and grainy reception it must be suspected. The type is a BRC TVT1 which is roughly equivalent to an AF139 or AF186. Replacement is not a job for the heavy handed.

Note the supply plug P1 at the lower part of the panel. Intermittent reception can be caused by a poor connection here. Clean and check. Also check the tuner unit gain control R74. The setting of this may require adjustment in areas of high signal strength to avoid cross-modulation. R74 can also be the cause of intermittent results due to poor wiper contact.

Poor Sync

Poor sync is one complaint which will be met on practically every set. The symptoms are that the contrast and sound are good but the picture cannot be held. In nine cases out of ten the trouble is due to R44 going high-resistance. It is a small 47kΩ resistor feeding the screen of the sync separator (30FL2): since it is in series with a 22kΩ resistor across the h.t.

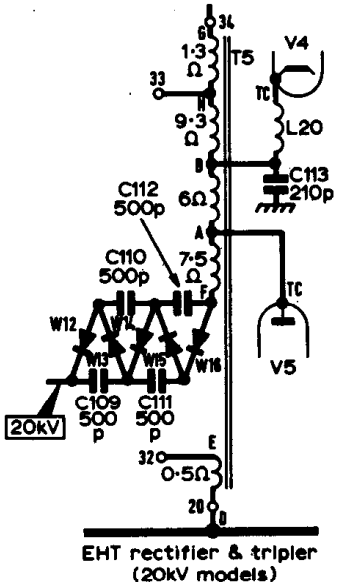


Fig. 1: E.H.T. circuit used in models operating with an e.h.t. of 20kV. The main circuit (Fig. 3) shows the e.h.t. doubler system used in models operating with an e.h.t. of 15·25kV. Voltages shown on the main circuit (Fig. 3) are given as a guide—variations between 10% and 20% do not necessarily indicate a fault. They were measured on a 15kV model with 240V a.c. mains input, no signal and all controls set for normal operation using (except for the e.h.t.) an Avo Model 8. T1 anode winding 70Ω, grid winding 95Ω d.c. resistance.

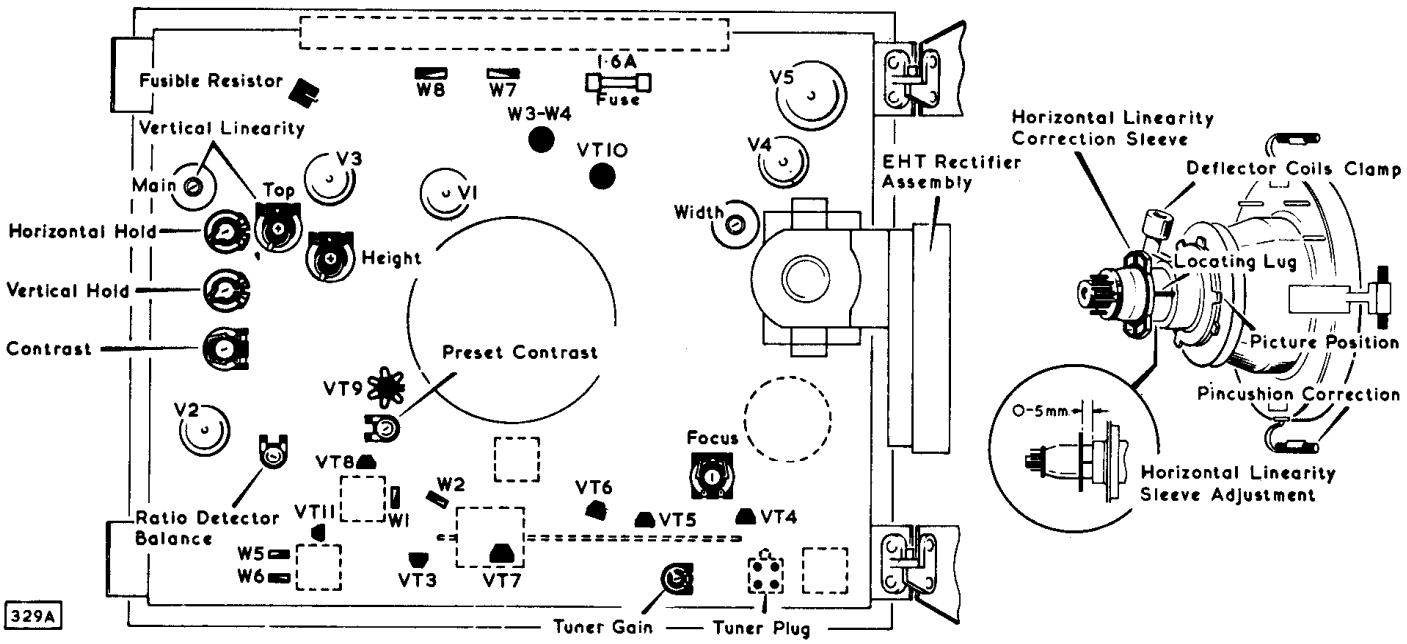


Fig. 2: Main chassis hinged open to show presets, valves and transistors.

line it is subject to a certain amount of load apart from the valve's screen current and a larger resistor (say 1W) is really needed in this position. The same could apply to the video stage base bias resistor R38 and this should be watched in the event of little or no picture: we haven't found this fault yet but it could well be the next one to show itself.

Having said that nine times out of ten R44 is responsible for poor sync we will now mention the tenth time! This turned out to be C42, the 0·015μF sync coupling capacitor. We are finding more and more capacitors faulty due to a fracture inside the moulding. Moving them will sometimes reveal which is at fault. Whether the defect is due to manufacture or to stress imposed by mounting on the panel is a matter for others to decide but it is a fact that component failure is far more common now than of yesteryear (yes Grandad, remember factor R?).

Faulty Presets

If it isn't fixed resistors changing value it's the presets which are acting up. These tend to develop poor contact and faulty tracks, particularly in the height circuit in this chassis where the complaint of loss of height is more often due to a defective 2·2MΩ preset (R94) than to R93 going high-resistance or C89 leaking (check all three anyway, it could be a bit of each!). Cleaning the preset is no answer, it has got to be replaced.

The same could be said for the width control (R132-1MΩ) but this doesn't seem to happen nearly as much. If the width is reduced and a touch on the control varies it drastically replace the control and save yourself a load of trouble later.

Faulty Electrolytics

It is mainly the smaller electrolytics which are giving trouble. We have already mentioned C37 in the video circuit which tends to go open-circuit. Far more regularly however it is C79 which fails. This is the 160μF cathode decoupling capacitor of the field output valve (PCL85). It will go open-circuit suddenly to produce drastic loss of height with more compression at the bottom than the top. The value isn't too critical—between 100 and 250μF—but the size needs to be kept about the same if appearances are to be kept up. We feel this is important both from an appearance and a safety point of view: bits and pieces hanging all over the place are not only untidy but dangerous.

The same could be said for C89, the 1μF capacitor which decouples the boost feed to the height control. Because of its size some engineers tend to replace it with an 0·1μF type which although it functions just as well doesn't hold enough charge to maintain the field scan long enough in the event of line timebase failure. This means that instead of a fading line across the screen a bright spot will linger to damage the fluorescent screen coating in the centre and leave a permanent black spot.

These then are the usual trouble spots which will almost certainly be encountered with some degree of regularity. We must now discuss the more routine fault-finding procedures.

Set Dead

Check the mains supply to the on-off switch. If present check each side of the 1·6A fuse holder. If the fuse has failed observe its appearance. If it has blackened the chances are that one of two things has happened. Either the h.t. supply diode W8 has shorted or more likely the mains filter capacitor C84 has shorted. Now note this point. If the diode has shorted it will in most cases remain so and a meter check will therefore reveal the source of the trouble. If on the other hand the mains filter is the cause of the trouble the short may not show up on a cold meter test, i.e. C84 will not break down again until the full mains voltage is applied. If therefore no obvious faults show up on an ohmmeter check replace C84 using an 0·1μF 1kV type: the fuse can then be replaced with some degree of confidence. All right, so it blows again. Now you work it out. Electrolytics, arcing between tracks, Joe's meter clip shorting the h.t. to earth?

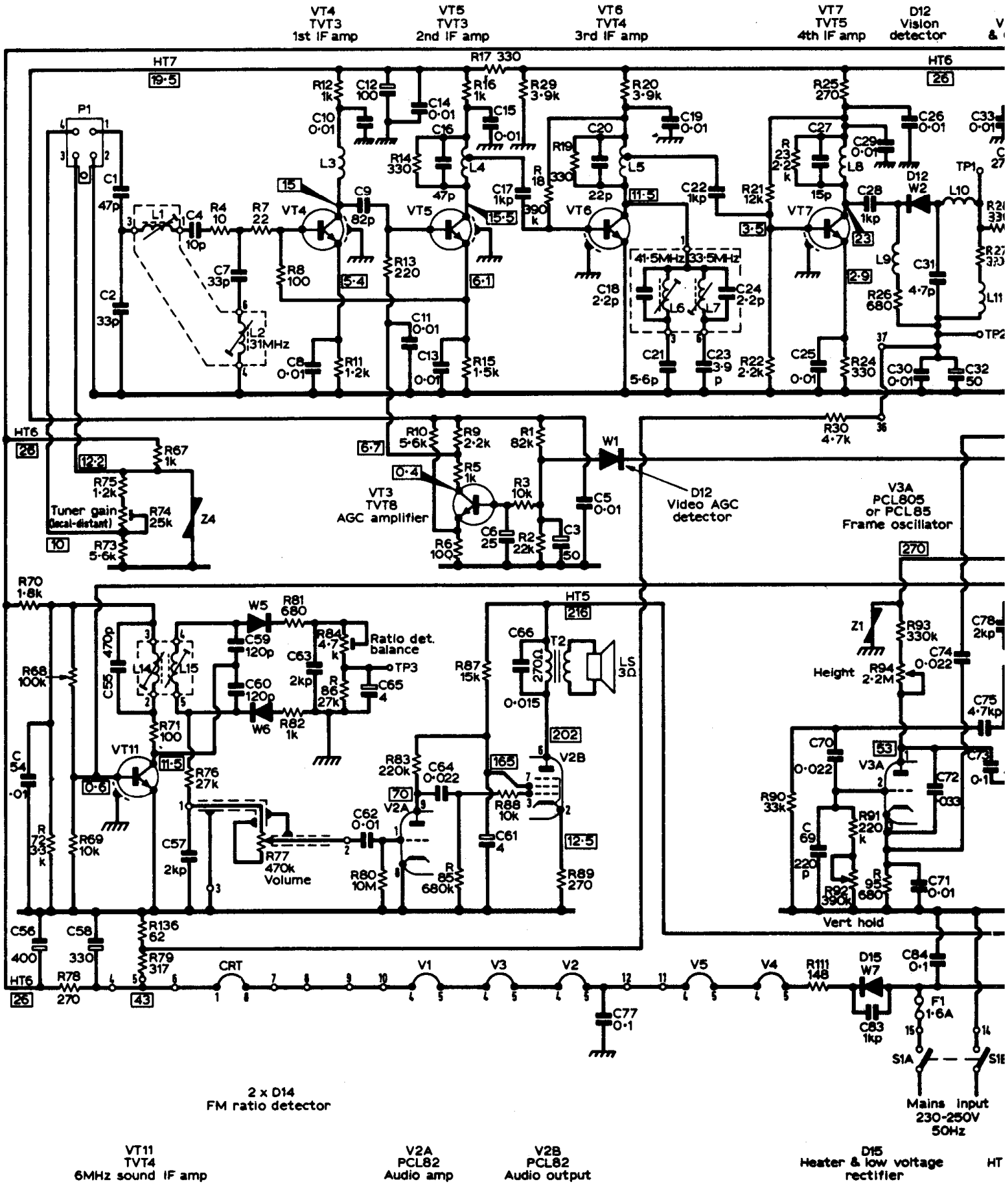
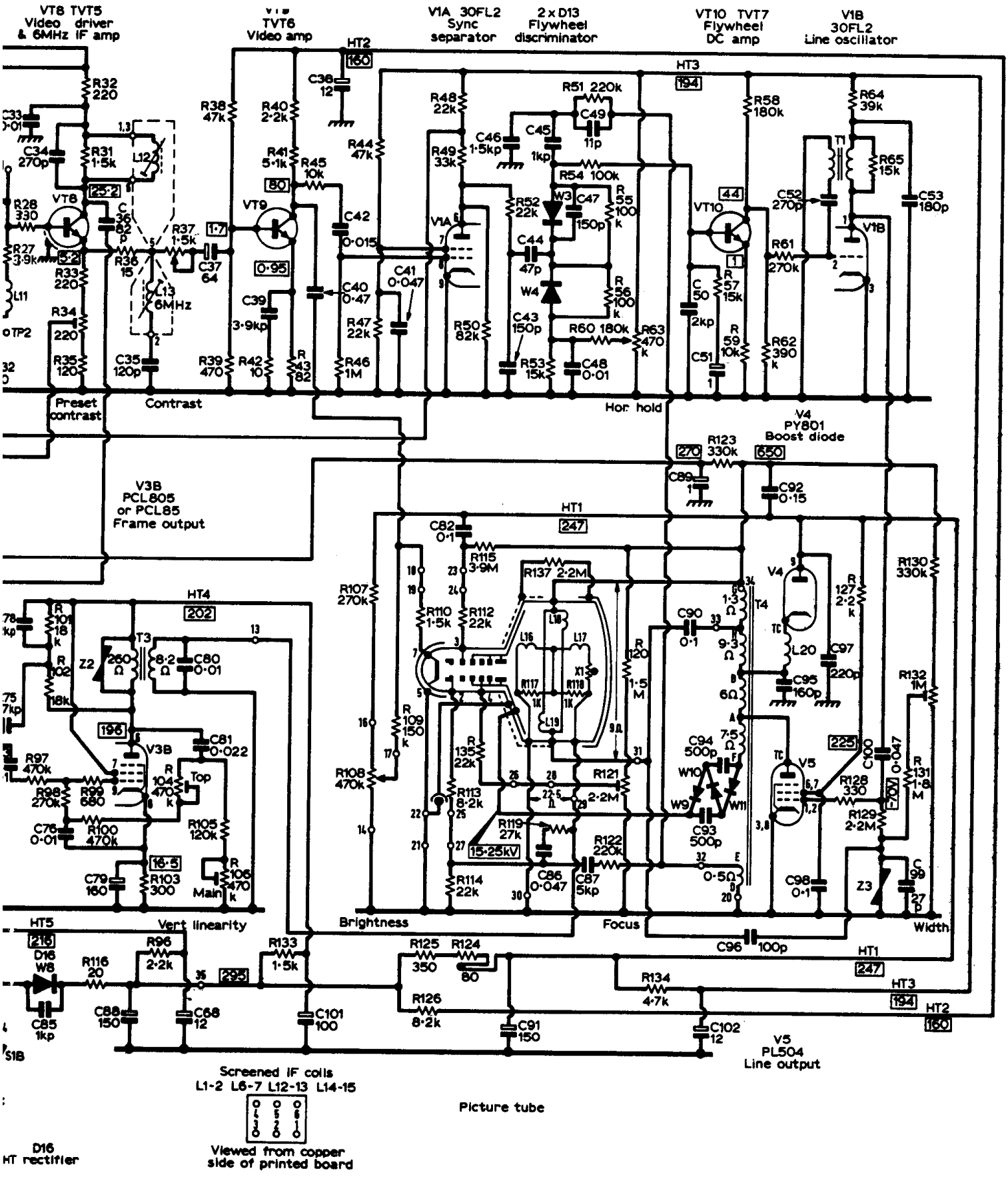


Fig. 3: Circuit diagram, BRC 1500 single-standard chassis.

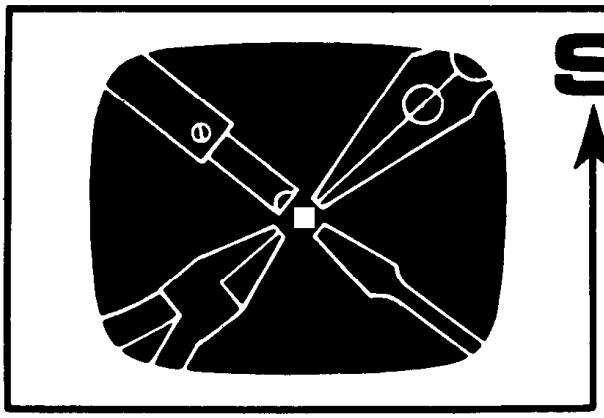
If the fuse has not failed the cause of the no results condition could be a breakdown in the heater supply or in the h.t. supply. If the valves are glowing normally it's obvious that the heater supply is not at fault. Thus the h.t. supply requires attention. This is where the layout of the top centre dropper demands close attention. From the circuit it will be seen that R116 is the surge limiter, connecting directly from



See also Fig. 1 and notes alongside.

the rectifier D8 to the various h.t. smoothing elements —R96, R125, R126 and R133. It is R116 (20Ω) which is most likely to be found at fault. It is well worthwhile studying the make up of the dropper in order to know which section is which from an h.t. and heater point of view.

CONTINUED NEXT MONTH



SERVICING television receivers

L. LAWRY-JOHNS

BRC 1500 CHASSIS—cont.

Sound, No Picture

There is a thermal cut out (R124) in the HT1/HT3 supply line. Quite often this will be found open, usually denoting that there has been a heavy current demand from the line output stage. Closing the wires together will often cause the PY801 to overheat grossly so it pays to check first for shorts from the top cap of the PY801 to chassis. Practically a dead short may be found here and this could well be due to a shorted capacitor on the side of the line output transformer (C95 or C113 depending on the e.h.t. system used). The types fitted in this position on the 1400 chassis seem of late to be popping off like flies and it is fair to expect the same to happen on the 1500 chassis. The value depends upon whether the model is a 20kV or 15kV version (210pF or 160pF respectively). The voltage rating is most important. We have found that an 8kV ceramic doesn't seem to survive very long and we now make a point of fitting a 12kV type—even when this means putting two in parallel to make up the required value (a few pF one way or the other is not out of order, for example two 100pF 12kV in parallel suffice in the 20kV version).

This fault should not be confused with overheating in the line timebase which may also open the cut out. With this fault the PY801 does not react so violently although it and the PL504 may overheat. In this event the 30FL2 may be at fault, failing to drive the output stage. Where there is adequate line drive however and there is still a degree of overheating taking place it is quite likely that the line output transformer is at fault with shorted turns.

The EHT Tray

This is the flat grey tray which clips on to the line output transformer. Its purpose is to multiply the pulse voltage from the transformer and rectify it at the same time. The smaller 15kV models use a three-rectifier (sticks as they are called) tray, the 20kV models a five-stick tray. A lead from the final stick is taken to the tube cavity connector on the side of the bulb.

The load imposed on the rectifiers depends of course on the brightness of the picture. As the brilliance is increased so the current passing through the rectifiers increases. If one of the rectifier sticks is defective therefore the voltage dropped across it will increase with the brightness of the picture. This can have two effects. One is that the picture will expand and fade out. This is common to all sets with a low-emission or an undersupplied rectifier. The less common effect is of a picture which "sizzles" horizontally as the brightness is turned up, the expansion and defocusing being less marked. In most cases where these troubles are experienced it will be found that the final stick in the tray is marked due to the overheating occurring as a result of its resistance increasing and the voltage across it rising. The remedy is to replace the rectifier or the tray. The writer replaces the tray because he is a lazy coward (and so would you be if you'd just seen the static convergence varying by more than an inch before your very eyes on a set which had only required a green colour-difference amplifier . . . a free copy of *Babes in the Wood* for the first correct solution!).

Width Circuit Resistors

Whilst it is fairly obvious that a defective resistor in the R131 position will cause lack of width with the control having little effect, the symptoms caused by R129 going high-resistance are a little more hair raising. When it is open-circuit, perhaps because of faulty contact with the panel, the picture becomes like ripples on a stream together with a pulsating action which is difficult to describe. If a 1MΩ resistor from pin 1 or 2 of the PL504 valve base to chassis (pin 3 or 8) restores a more rational appearance this is where the trouble is most likely to be located (check resistors and tracks).

Faulty Main Smoothing

A picture which slowly undulates like a tired belly dancer (hips swinging and bottom rising and falling) should call attention to the main smoothing block. This is C101, C88 and C91. An exact replacement is far more pleasing than four leads going to some taped up can somewhere inside the cabinet.

Separate HT Feeds

When a particular section of the receiver fails, for example the sound output or the field timebase, our instinct is to note that the other stages are working and therefore to assume that the h.t. supply is in order. Over the last few years however it has become necessary for the h.t. supply to be more elaborately smoothed and decoupled. Each section of a set tends therefore to have its own supply line and thus smoothing resistor which can fail or be made to fail. In this chassis for example overheating in the line output stage could well be caused by R134 failing, a white line across the screen by R133, no sound by R96 and

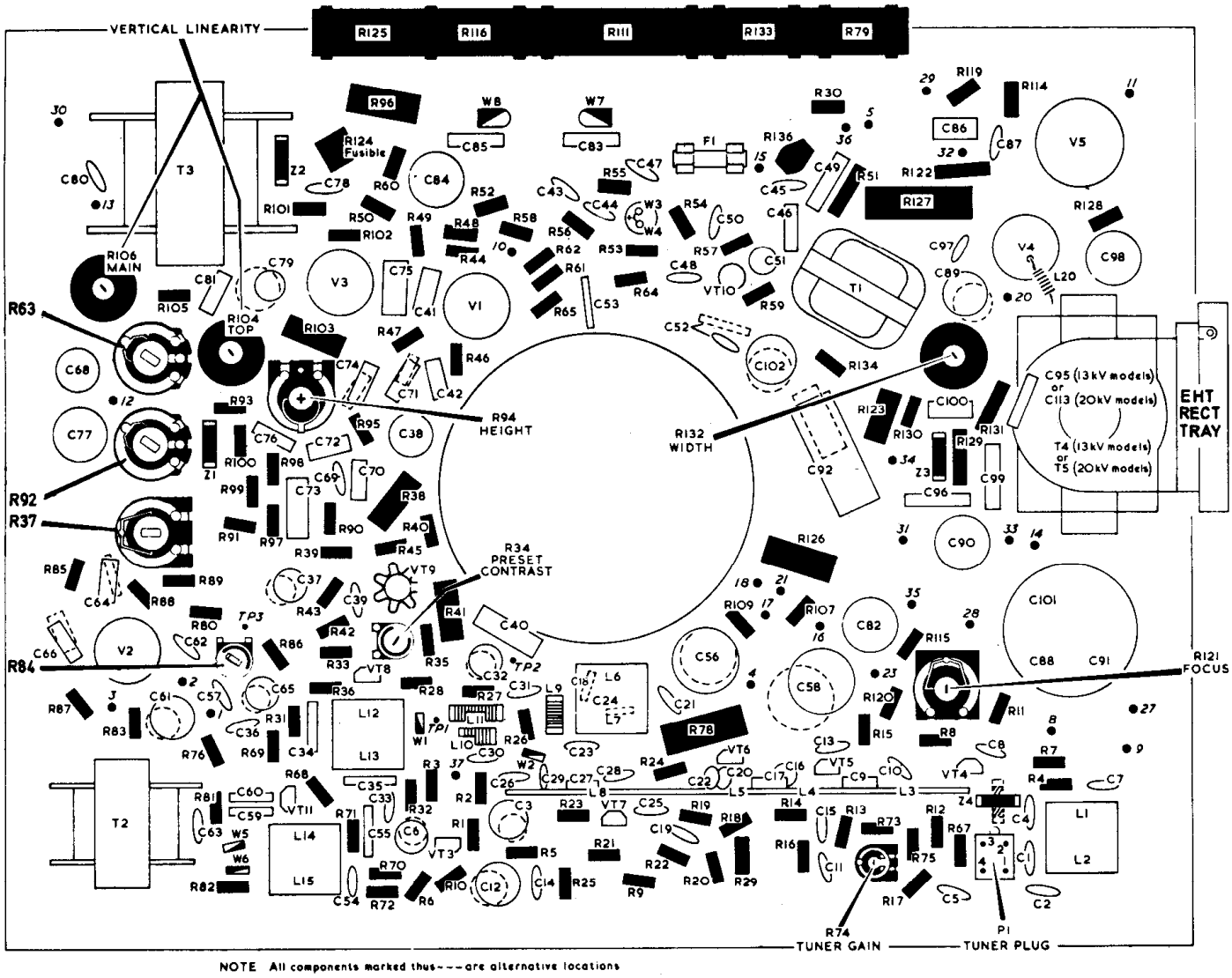


Fig. 4: Component layout on the main chassis assembly.

so on. Each h.t. feed line should be checked first therefore if the relevant section suddenly becomes inoperative. Kids' stuff? Of course it is, but who hasn't been red faced at some time or the other by not following simple basic routines.

Field Timebase

A PCL85 with conventional cathode bias is used and as mentioned last month it is the cathode bias capacitor C79 which is most likely to be at fault, producing severe loss of height with greater compression at the bottom. The valve itself is not so "accident prone" as were earlier versions of the PCL85 but it should still be the first suspect in the event of total loss of scan, inadequate scan or vertical hold troubles. Check the value of R103 if the valve has had to be replaced.

The Transistor Stages

It is fair to say that we have not had much trouble with the transistor vision and sound amplifier stages. If the preset contrast control is properly set (and this should not be disturbed unless really necessary) together with the tuner gain (Local-Distant) control then absence of sound and vision signals can normally be tracked down to the stage which shows incorrect voltage readings: the readings to be expected are clearly shown on the circuit diagram.

All the transistors outside the tuner unit are npn types. This means that a cold test with an ohmmeter should be made with the negative probe to the base of the transistor and the positive probe to its emitter or collector to give a low reading (20Ω or so) and a higher reading when the meter leads are reversed. With the transistor left in circuit the associated components must be taken into account: the result will generally be a reading some four or five times higher. This is a rough check but seems to hold good for transistors used as amplifiers (not necessarily when used as oscillators).

Sound Faults

The sound ratio detector circuit doesn't give much trouble unless the diodes are unbalanced, the balance preset R84 is defective or C65 is faulty. In the event of distortion and severe vision buzz check these points.

Distortion without a buzz may be due to the PCL82 audio output valve and if this is so don't forget to check the value of R89 which may be damaged.