

Servicing the Baird 700 Chassis

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THE Baird 700 series appeared almost at the start of colour in the UK (in days of old, when men were bold, and i.c.s not invented ...). They were like no other sets before or since. These large dual-standard receivers seem to owe something to American practice, with triode synchronous detectors and other miscellaneous oddities. There is no shortage of preset controls throughout the set, and any specimen one is likely to acquire will probably have been twiddled from black-level to breakfast time! These "adjustments" are commonly committed when the set develops a fault, whereupon a screwdriver is pressed into service rather than an oscilloscope or a test meter. One may find for example that the delay line matrix controls have been wound for maximum colour when the chroma level drops due to a fault elsewhere.

Although the sets look dated these days, with loving care they can be made to give a very good account of themselves, especially if treated to a new c.r.t. and a decoder overhaul. The chassis is quite reliable, and more to the point predictable, in that most faults encountered tend to fall into the "stock" category most of which, we hope, are described below. If we have missed any, no doubt our readers will fill us in!

Construction

The chassis is of peculiar shape, with four printed circuit panels mounted vertically in a metal frame on runners (à la Decca Bradford) which enable the chassis to be withdrawn. Accessibility is generally very good, with one or two notable exceptions. Some early hybrid receivers of other makes were notorious for the alarming deterioration of the printed circuit panels, which tended to carbonise and curl up until they resembled large black crisps: the 700 series fares quite well in this respect, but burn holes can and do occur, as will be described. The centre (decoder) panel can be swung out like a door, but the other panels must be dealt with in situ.

Tuners

The u.h.f. tuner is conventional and reliable from an electrical point of view. The mechanical arrangements often cause trouble however. The large rubber friction ring which

drives the tuner shaft tends to perish and develop a permanent dent, causing loss of drive – this situation is often precipitated by cleaning the customer controls above with lubricant or switch cleaner, which percolates down into the works. The large plastic drive drum contains a pin – the anchor for the cord tensioning spring – and this often snaps off. Finally, the brass bush tends to undo its securing nut, whereupon the whole assembly falls to pieces – misery indeed. These troubles usually involve restringing the drive cord – no mean task – as shown in Fig. 1.

The valved v.h.f. tuner is not now used on v.h.f., so the tendency of the biscuits to warp will not be noticed. The feedthrough capacitors on the v.h.f. tuner can leak or go short to the discomfiture of R607, the h.t. feed resistor. This is $2.2k\Omega$ (8W), mounted near the sound output transformer – it also feeds some of the PCL82 circuitry.

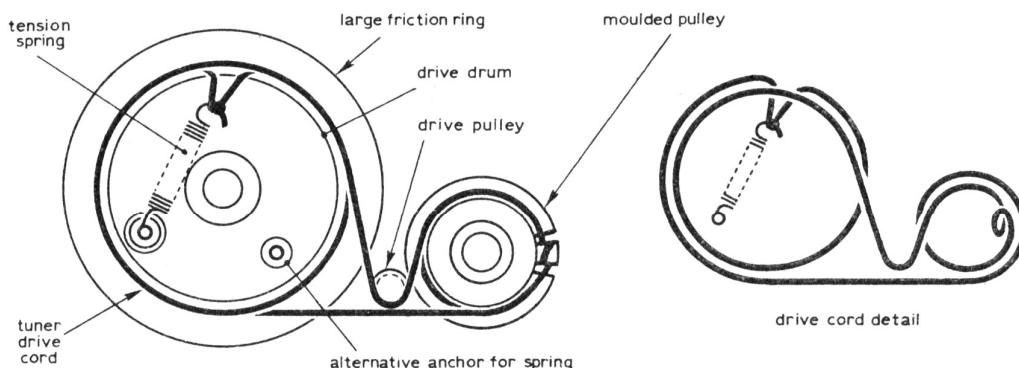
IF Strip

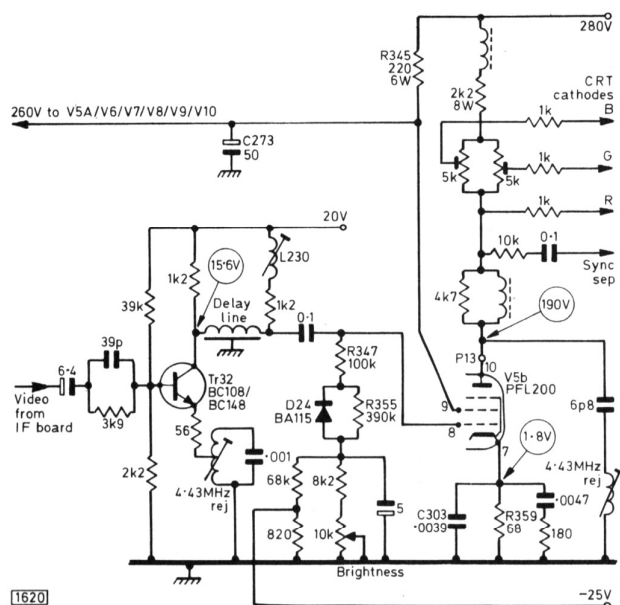
The i.f. strip is similar to that used on the monochrome 660 series. It is quite trouble-free so long as it hasn't been twiddled. Occasional cases of picture flutter can be resolved by reducing C144 in the a.g.c. circuit to $0.01\mu F$ (if not this value already). There is a tendency for components in the sound discriminator can L28-30 to touch the can itself, causing intermittent buzz and lack of sound. Replacement of C122 ($10\mu F$), D2 and D3 (OA90), followed by careful trimming of L28 and L30, will resolve most sound problems if the PCL82 and its pentode cathode bias components (560Ω plus $25\mu F$) are in order.

Luminance

When servicing this set dismay may arise due to odd faults which are unconnected with the main complaint appearing. The answer usually lies with either the system switch, which can become half-cocked if it has not been secured, or wires becoming detached from the panels. The most common examples of the latter trouble are on the decoder panel, where the white video input lead to P8 can break or become disconnected, causing a blank raster, or the white lead from the c.r.t. base comes adrift from P13 on the panel. A disconnection at P13 robs the PFL200

Fig. 1: The u.h.f. tuning drive cord system.





(luminance output section) of anode potential, and the brightly-glowing screen grid will destroy the valve after a very short time.

The PFL200 is the *bête noir* of this chassis, both halves contributing their quota of troubles. At this point we are concerned with the "b" (luminance) half of the valve, whose internal electrodes seem to have a magnetic attraction for each other. The first victim of this is usually the 68 Ω cathode bias resistor R359 (see Fig. 2) which goes out in a blaze of glory, often followed by C303 developing a leak or short. R345 is next in line, and can almost disintegrate. The PFL200 is thus the instigator of burn holes in the printed circuit panel in the area of its associated resistors.

The d.c. restorer diode D24 is sometimes the cause of incorrect d.c. conditions in the luminance output stage, and the two associated resistors R355 and R347 are also worth checking. The effects of these faults are often masked by the repairer changing the setting of the d.c. restorer taps X, Y and Z (see Fig. 4), leading to brightness problems and the burn ups referred to earlier.

L230 is a wee retractor coil associated with the luminance delay line. It is physically fragile and often goes open-circuit, leaving the luminance delay line unterminated. The result is an over contrasted picture with reflections or ghosting.

Finally the luminance delay line driver transistor Tr32 tends to be unreliable. The symptoms of failure are weak or no luminance, or a "halo" effect and a higher voltage on the delay line than the usual 15.6V.

Decoder

There is only a single chrominance amplifier stage (Tr27) up to the chroma delay line, and a few faults are encountered here. A convenient killer over-ride switch will be found at the bottom of the decoder panel. In cases of no colour, operating this will usually confirm that the problem lies in the reference chain rather than the chroma amplifier. A block diagram of the decoder is shown in Fig. 3.

A change in saturation from left to right, accompanied by a change in background colour (magenta on the left fading to green on the right), should lead to a check of C232

(640 μ F), C312 (32 μ F) and C273 (50 μ F) which decouple the supplies within the decoder.

In the post-delay line circuitry the inverter transformers L214/5 and L217/8 often develop shorts between their lead-out wires. This leads to weak colour or imbalance between the B-Y and R-Y signal levels. The cure is obvious on inspection. After properly setting up the delay line circuit adjustments L213 and R275, any Hanover bars remaining are usually traceable to imbalance of the OA90 PAL switching diodes D26 and D27. Hanover bars due to this cause are easily distinguished by the fact that they are most noticeable on saturated reds.

Early sets had two 7.8kHz tuned circuits, L216A and L216B. In aligning these coils, L216A is set for maximum ident amplitude, followed by L216B for correct phasing of the PAL switching point – this receiver uses the ident signal to drive the PAL switch directly instead of via the usual (for those days) triggered bistable. Troubles are occasionally experienced in this department, with the emitter decoupling capacitors (both 25 μ F) drying up to give low ident signal amplitude. Later chassis used a modified circuit which omits L216B. In these versions L216A is adjusted for correct phasing of course, any error showing as a vertical band of incorrect colour on the right or left of the picture.

Reference Chain

The burst gate transistor Tr20 is not reliable, and can be responsible for unlocked colours (killer over-ridden) due to no gated burst being present, or erratic locking of the reference oscillator, the net result being intermittent colour due to colour-killer action. The same symptoms are often attributable to the OA90 gating pulse clipper D20, although if this is responsible the symptoms can usually be varied by altering the contrast control setting. The burst discriminator driver stage Tr21 is reliable in our experience, but the BA115 phase detector diodes are not. The usual effect here is inability to lock the subcarrier oscillator or get a sensible ident signal. The fault can be intermittent. We use 1N4148s in this position for replacement purposes.

If the reference oscillator (Tr23) stops, the picture background goes green, with no other colour of course. This is a useful clue, confirmed by the colour-killer switch having no effect on the fault. A stalled oscillator is sometimes caused by faulty polystyrene capacitors around Tr23, these being C221, C222, C223 or C119 (see Fig. 4). It is wise to replace the lot, especially where, as is often the case, the oscillator fails intermittently.

Synchronous Demodulator Driver

We now come to the villain of the piece, our old friend the PFL200. The "a" section takes the oscillator output and amplifies it to a level suitable for driving the cathodes of the triode synchronous detectors. Whenever reference drive problems are encountered and the oscillator is still running, the PFL200 should be checked by substitution. Interelectrode shorts tend to burn the screen grid feed resistor R238 and the control grid leak resistor R236. R239 (cathode) often succumbs too. In severe cases R345 in the h.t. line is also affected.

Turning now to the secondary windings on the subcarrier drive transformer L207/10, we find the earthy ends decoupled by a $25\mu\text{F}$ capacitor (C229). This component can be responsible for weak drive, imbalance of B–Y and R–Y, low G–Y and so on. In later modifications this troublesome component was removed altogether, the

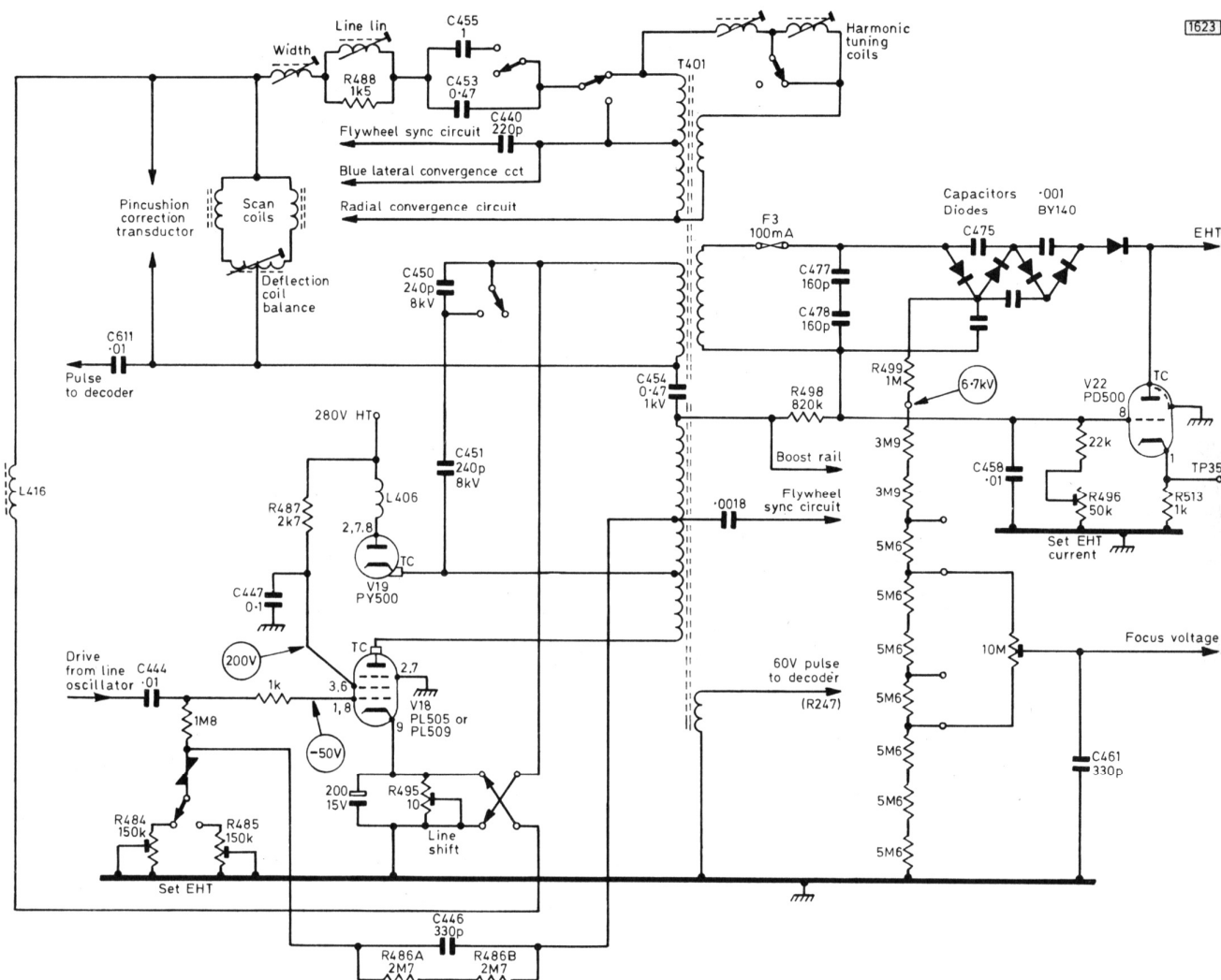


Fig. 5: Circuit of the line output stage.

of the colour-difference amplifier triodes from the slider of R330, which is squeezed in between the valholders for V8 (PCC88) and V10 (EB91). The track very often parts company with the rest of the potentiometer, and commonly goes open-circuit into the bargain. This causes either insufficient or excessive brightness, depending on which side of the break the slider is. Replacement is difficult due to the limited space available, and if a respectable skeleton potentiometer is fitted it is necessary to brave the tangle of wires at the back of the panel and fit it there. Adjustment of this potentiometer is made for correct amplitude (100V) of the line blanking pulses on the B-Y feed to the c.r.t. at P14. Assuming that R331 is intact, adjustment of this for 100V blanking pulses on the G-Y feed at P16 completes adjustments in this area.

Before we leave the decoder panel, if you have invested in a new c.r.t. it's possible that flashover might damage one or more of the EB91 d.c. restorer diodes: the picture will then take on a coloured tint, depending on which diode has succumbed.

Field Timebase

The field timebase occupies the top section of the timebase panel. Field collapse accompanied by smoke from amidships is usually due to the h.t. supply resistor R606 touching the metal case of C607 on the bottom rear

member of the chassis. Open the door/coder and all will be revealed! Similar symptoms (but the smoke smells different) are caused by a short in C402 cooking R403 (see Fig. 6). These components decouple the boost feed to the field charging circuit and sit on the left side of the timebase panel. The cathode capacitor (C420, 500 μ F) for the PL508 output pentode lives on the convergence board. This component is often dry-jointed to its panel, leading to field jitter at the bottom of the picture. Jitter of the whole picture should lead to a check of the M3 sync filter diode D30. This can also be the cause of complete loss of field sync. The triode section of a PCF80 acts as field oscillator (with the PL508), the pentode section of this valve being the sync separator.

Line Generator

The flywheel line sync discriminator uses a pair of BA144 diodes, D31/32. Any set encountered with OA81 diodes in this position should be fitted with BA144 or 1N4148 types regardless. Intermittent line sync problems can usually be resolved by replacing the diodes and checking R461 (12k Ω), part of the reference pulse integrating circuit. Much more often frequency drift, line pulling and difficulty in setting up the ECC82 multivibrator line oscillator is due to its anode load resistors R469 (18k Ω) and R475 (27k Ω) ageing. If the thing stops altogether, or

sometimes fails to perk up from cold, the 680pF coupler C442 should be checked by substitution – as well as the above resistors.

Line Output Stage

Low width is a common trouble on this chassis and predictably the fault is generally due to the high-value resistors in the width stabilising circuit. R486A and R486B are each 2.7M Ω and tend to go high. Accessibility in the area of these components is poor, and we find it easier to remove the chassis from the cabinet for this and similar operations. The set e.h.t. potentiometer R484 sometimes curls up, making adjustment difficult. The line output stage circuit is shown in Fig. 5.

On the other side of the line output transformer, which itself is quite dependable, several weak spots exist. We'll kick off at the e.h.t. tripler, a strange device built up of separate rectifiers and capacitors. The 100mA e.h.t. feed fuse F3 will often be found open-circuit when problems develop in the tripler department, and the presence of this fuse probably accounts for the longevity of the transformer itself. Just out of sight under the paxolin lip of the tripler assembly lurk two tubular pulse capacitors, C477 and C478, both 160pF. These are wont to burn to a crisp, and are the most common cause of fuse failure. The value of these capacitors is quite critical for correct transformer tuning and width/e.h.t. ratio, and 160pF capacitors can be hard to come by. We suggest as a replacement 150pF and 180pF in series, both of the 12kV disc type.

The first capacitor of the tripler proper, C475 (0.001 μ F), is also prone to trouble, the snag here being that in spite of violent internal arcing and overheating it usually looks quite innocent! If F3 is blown and C477/478 are ok, most often this capacitor is responsible. When working on these high-voltage components, make the solder joints nicely rounded to avoid corona discharge.

The focus chain is fed from the first stage of the e.h.t. tripler, and these high-value resistors very commonly go high. In cases of poor focus check and replace them as necessary, using 2W types for reliability. Don't overlook R499 on the tripler as it is if anything more fault prone than its comrades on the convergence/focus panel. The focus control itself and its decoupler C461 occasionally fail, and when this removes the focus voltage from the c.r.t. altogether the misleading result is no raster.

C458 ties the grid of the PD500 shunt stabiliser valve to earth pulsewise, and has a habit of failing. This turns on the PD500, which then mops up most of the e.h.t., running very warm. This state of affairs is often accompanied by a "squegging" noise from the distressed timebase, and when this fault is first encountered one tends to suspect that the line oscillator has come unhinged! The other symptom of this fault is burning and arcing at the set e.h.t. current potentiometer R496, which can culminate in a burnt printed circuit panel if the set is left running long in the faulty state. Whenever C458 is replaced, the condition of R496, the PD500 valve, and the printed panel should be checked. A more rare cause of burnt components in the PD500 grid circuit is a soft valve. Inability to set up R496 correctly accompanied by poor e.h.t. regulation can be due to a change in the value of R513, the 1k Ω cathode resistor. When repairs have been made in the shunt stabiliser circuit, adjust the set e.h.t. current control R496 for 1.2V at TP35 (cathode of V22, PD500) with the c.r.t. screen blacked out.

The c.r.t. first anodes are fed from 2M Ω potentiometers which are connected between the boost and the h.t. lines (see Fig. 6). No picture (or sometimes a very dim one) is the

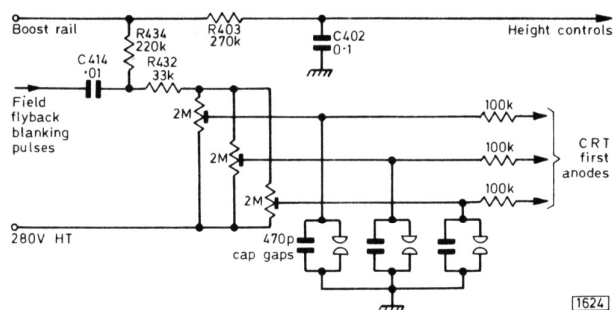


Fig. 6: The c.r.t. first anode circuit.

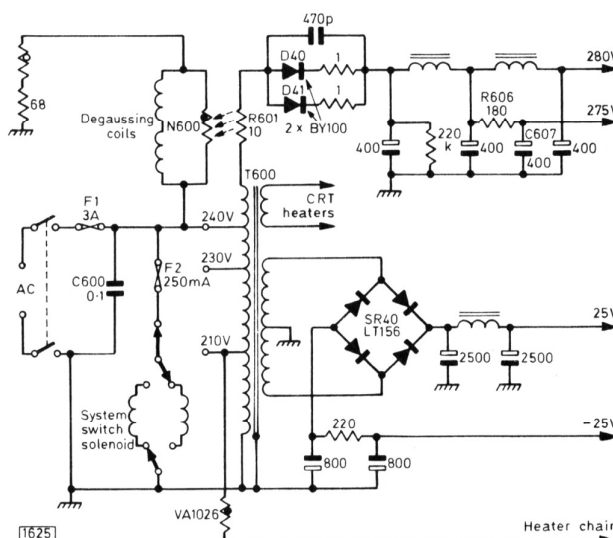


Fig. 7: The power supply circuit.

result when C414, which feeds field flyback blanking pulses to the A1 control network, goes leaky or short-circuit – R434 often burns as a result. In a few early receivers R432 was not present and a slight shading effect occurred, the left side of the screen being brighter than the right side.

The boost capacitor C454 sometimes shorts, overheating the PY500 boost diode and culminating in the mains fuse blowing. The same effect, but on an intermittent basis and with no overheating of V19, is often due to the suppressor choke L406 shorting to chassis beneath the boost diode valveholder.

In cases of a dead line output stage with the PL509 running cool, thrash round the base pins with a voltmeter. Zero on pins 3 and 6 means that R487 is open-circuit while full h.t. on pin 9 (cathode) is due to the line shift control R495 opening.

Convergence

The 700 series has the doubtful distinction of being probably the only set sold in the UK with the red and green convergence circuits not matrixed for vertical correction. This is no problem so long as the function and effect of each control is understood. Some early models had four OA10 diodes on the convergence panel in place of the more common clamp transistors. These diodes will be found wired in parallel pairs. Where problems are experienced, each pair of diodes can be replaced by an AC128 with its

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base and emitter strapped together. The transistor's collector then corresponds to the diodes' anode.

Junky convergence controls are not as common on this chassis as on most of its contemporaries, the only real offender being R524, the R/G line amplitude control. A suitable replacement will be found in R517, the corresponding 405-line control.

Intermittent horizontal convergence change is often the effect of a noisy system switch. This should be cleaned and firmly fixed in the 625 position, or soldered up once and for all.

Power Supply

The power supply circuitry (Fig. 7) is nothing if not robust – no Syclops nonsense here! No results and a shattered fuse is often due to a faulty mains buffer/filter capacitor C600 or, less commonly, a short-circuit h.t. rectifier diode D40 or D41. No results and an intact fuse usually means that the rotary mains on-off switch has failed. A picture which gradually decays away with defocussing and white clipping should lead to a check of the c.r.t. heater connections on the mains transformer, where dry-joints can occur.

The pincushion correction transducer is mounted on the power supply panel and can fail quite spectacularly with fireworks and a burnt board. A more subtle effect caused by a faulty transducer is ringing, which causes wrinkles or

corrugations in the corners and edges of the picture. Check the associated damping resistor R442 (22k Ω) before condemning the transducer on this one. Some sets may be encountered on which the early type of transducer AT4041/03 was fitted. This can result in the top of the picture bending to the right: the device should be replaced by the later AT4041/05, and R442 fitted (across pins 5 and 6) if it is not already there. Transducers are easily identified by the type number stamped on the side.

Occasional purity problems, in which coloured patterns often drift gently over the screen for ten minutes or more after switch on, can usually be resolved by moving the VA1103 degaussing thermistor N600 nearer to R601 to increase its working temperature.

710 Series

The 710 series was an updated version of the earlier models, and many of the bugs we have described were ironed out in this later chassis. All the 19in models were of the 710 type and on the 19in sets the degaussing coils tend to develop short-circuit turns, leading to burning of the degauss control components or mains fuse blowing. Many models in the 710 range were fitted with a push-button tuner which eliminated the maladies associated with the rotary tuning system, but had mechanical problems of its own with the actuating bar becoming dislocated. The cure is obvious on inspection, and usually involves removing the tuner cover to check and lubricate the bearings. Modifications include the addition of a.f.c. – an RCA CA3034V1 i.c. is used for this purpose – and the use of a later type of tripler with the PD500 omitted and a v.d.r. type focus control. ■