

Servicing the Philips G8 Chassis

Part 1

M. Phelan

THE Philips G8 chassis, the first all solid-state chassis to be introduced by this manufacturer, has been with us since 1970. In this time it has undergone many changes, although all the panels are interchangeable. On the whole it has proved very reliable and capable of excellent results.

The G8 uses a thyristor to supply the h.t., all other supplies except for the c.r.t. heaters being derived from the line output stage. It has a varicap tuner, and the i.f. strip consists of prealigned modules. The decoder uses transistors and either one or two i.c.s – or in later models is of the standard four i.c. type. All have primary colour output.

Power Supply Circuit

The power supply circuit follows the normal arrangement for a thyristor power supply, and is very similar to those used in other makes. The following description applies to the earliest version: modifications are discussed at the end.

The mains supply comes from the switch to the two-pin plug at the bottom of the panel, then to the anode of the thyristor SCR1379 via a 3.15A fuse, the 2.2Ω dropper section, and the filter circuit consisting of L1378 and C1366.

The mains waveform is also fed via R1386 and R1373 in parallel to C1376, the waveform across the latter lagging behind that of the mains. When the charge on C1376 reaches the breakover voltage of diac D1377 (approximately 33V) – this happens during the second quadrant of each mains cycle – the diac conducts and discharges C1376 across R1384. The positive spike thus produced across R1384 is limited by zener D1363 and applied to the gate of SCR1379 by C1383. As the gate is at cathode potential due to R1380, the pulse drives the gate positive with respect to the cathode and the thyristor conducts. On reversal of the mains polarity, it turns off again.

Control is achieved by putting a variable leak, in the form of a transistor, across C1376. The base of the transistor (T1374) is fed with forward bias via R1372 and D1371 from the h.t. rail. If the h.t. tends to rise therefore, the transistor conducts more, the charging of C1376 is delayed and SCR1379 is fired later – the converse applies of course if the h.t. falls. R1368 feeds a.c. to the base of T1374 to correct for variations in the mains voltage by the same method.

R1370 forms an adjustment for the h.t. voltage, and the zener diode D1371 in the base circuit is included to cancel out the temperature coefficient of the transistor's base-emitter junction.

A similar circuit, based around T1399, is also connected across C1376 and serves as an over-voltage protection system in the following way. T1399 is normally without forward bias, but if the h.t. rises, due to a fault, it starts to conduct – the h.t. voltage at which it does so depends on the setting of R1396. When T1399 conducts, D1398 is forward biased and the conduction angle of the thyristor becomes less, due to the extra "leak" across C1376. The h.t. then falls as C1385 is discharged, until T1399 cuts off again. The cycle repeats if the fault is still present, causing the picture to "flutter" rhythmically.

Most of the modifications to this panel concern the arrangement of the components in the stabilisation circuit. Very early panels did not have D1363 fitted. Later ones have D1371 in the emitter circuit of T1374. Also a diode D1357 is connected in parallel with C1376 to discharge it fully on the negative half cycles of the mains, otherwise the charge remaining depends on the point at which the diac stops conducting – any charge remaining can cause the circuit to trigger early on the next half cycle. This modification is worth carrying out on earlier panels, as is the reduction of R1384 to 4.7kΩ for the same reason.

The greatest difference between different versions of this panel has been the different types of thyristors and the amazing variety of different shaped heatsinks fitted. Earlier ones used a BT106 in a U-shaped heatsink. Then came a long alloy stem and a short alloy collar – both got very hot, as did the BT116 with a large alloy washer for cooling. Then came the BT106 with a disc type cooling fin mounted on the print side of the panel, with an extra nut on the thyristor. Latest panels use an OT112, which seems to be very reliable.

The degaussing circuit has been modified by omitting the v.d.r. R1361, and feeding in the c.r.t. heater supply to cancel out the small residual current in the degaussing coils when R1362 is hot. R1358, 1.5Ω or 1Ω, acts as a fuse.

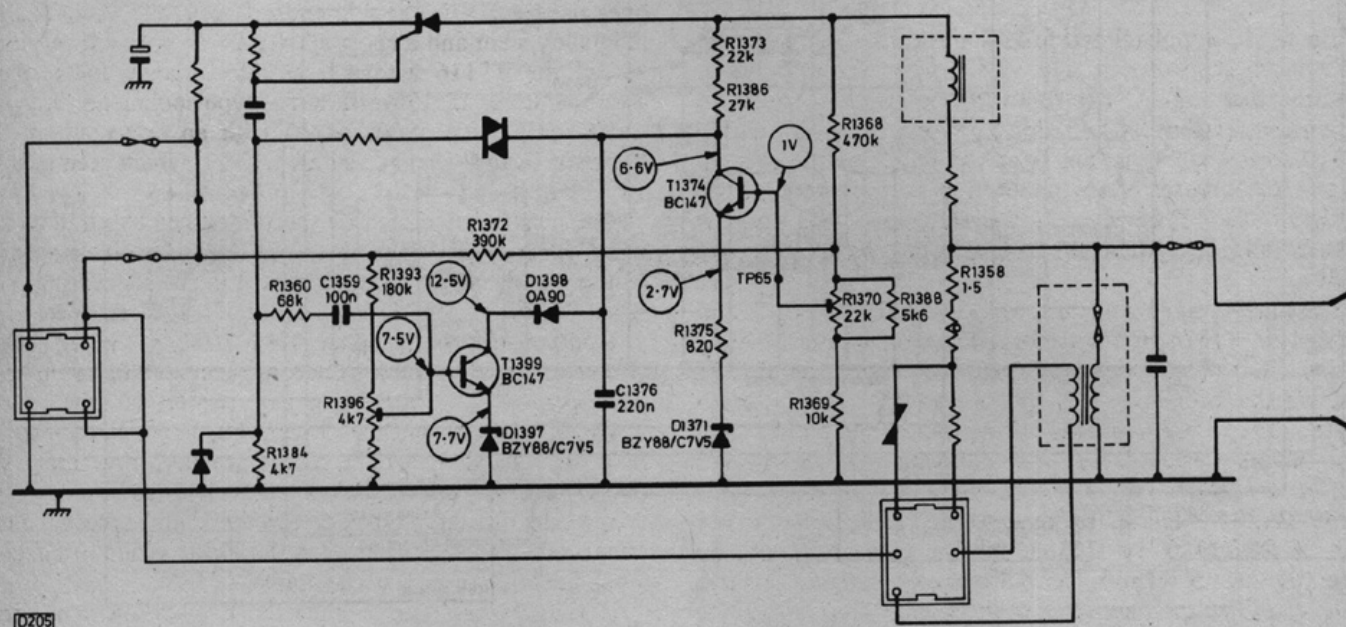
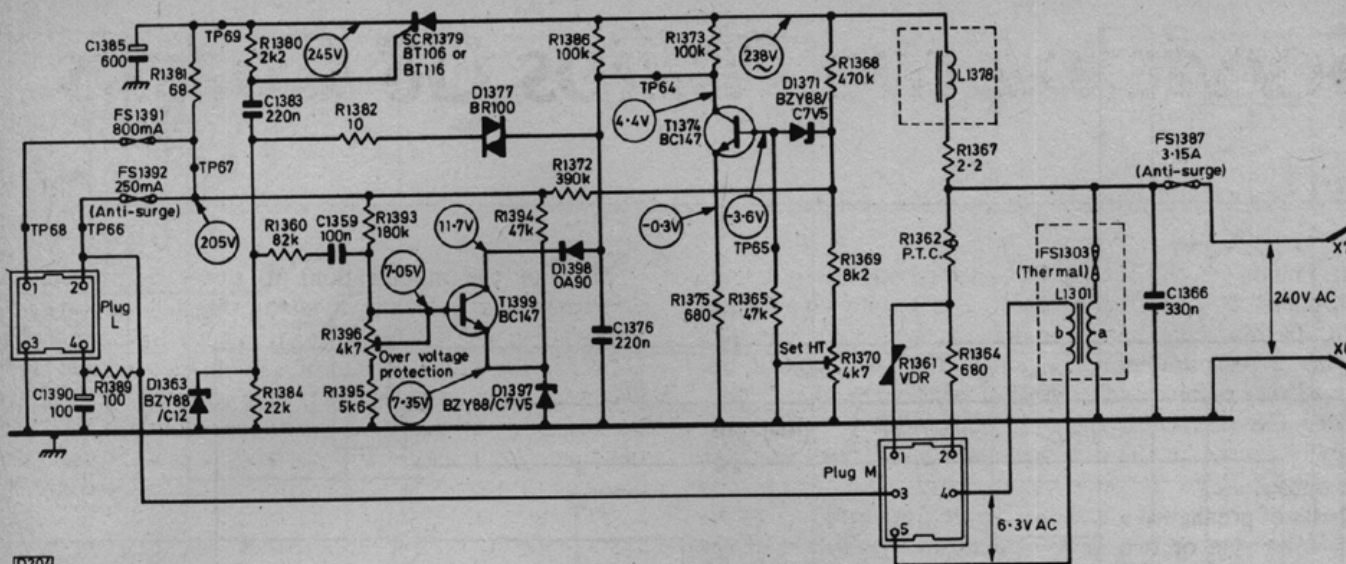
Apart from the dropper R1367/R1381 going open-circuit, most faults on this panel are semiconductor failures. The mains fuse often shatters at switch on due to the absence of a slow-start circuit, but sometimes due to SCR1379 or C1366 being short-circuit. More rarely the 600μF reservoir capacitor C1385 goes short-circuit, or the dropper resistor develops a conductive path between the top connection and the holding lug. L1378 is prone to buzzing (soak in epoxy resin) and dry-joints.

If C1385 loses capacitance the h.t. falls, with a slight hum bar. Sometimes after the BT106 has been replaced no results are forthcoming when the set is switched on. If you are lucky you will see that the piece of print along the bottom of the panel has disappeared. It forms the main earth between the chassis and the power supply. If you are unlucky, you will find you have 240V a.c. at the anode of the thyristor but nothing at its cathode – here fault-finding begins in earnest!

First check that the thyristor hasn't gone open-circuit by applying your meter prods on the lowest resistance range to the cathode and gate terminals, with the set switched on. If the set comes on, remove the prods *immediately* – or the h.t. will rise to some 300V. If nothing then happens, the thyristor is sound and the fault lies in the control circuitry.

If so, disconnect D1398 to isolate the overvoltage circuit. If the set then works, probably D1398, T1399 or D1397 is faulty. If it doesn't, remove T1374, switch on momentarily and if the set works T1374 is faulty or D1371 is short-circuit. If the set is still dead, the diac is probably short-circuit or D1363 if fitted is short-circuit. The passive components in this circuit give very little trouble.

Apart from a "dead" set (which can be caused by a line timebase failure) most of the other power supply faults cause a fluttering picture, due to the fluctuating h.t. The main culprit is the thyristor whose leakage increases, causing the



h.t. to rise and fluctuate. Under these conditions the overvoltage protection circuit doesn't operate as the thyristor is fired by its own internal leakage, not by the gate pulse.

The thyristor should show no measurable leakage between its anode and cathode either way when out of circuit. Even a leakage of $15\text{M}\Omega$, measured on an Avo 8, will cause fluttering when the set gets really hot. The diac can also cause flutter, but of a more irregular nature. A clue to this is that the h.t. voltage will *fall* if the diac is leaky and *rise* if the thyristor is.

In an emergency the diac can be reversed and will work providing one junction only is leaky. The earlier panels used green BR100s which were moderately reliable, then came large glass ones which weren't, then small orange glass ones which are fairly good. A diac should measure open-circuit both ways.

D1363 if open-circuit produces no noticeable difference: if leaky it can give rise to fluttering and reduced h.t. Don't forget to check the setting of R1396 however before becoming involved.

To adjust the power supply, turn R1396 fully anti-

clockwise to disable the overvoltage circuit, set R1370 for 220V, then turn R1396 clockwise until the picture starts to flutter, finally adjusting R1370 for 205V or for greater reliability 200V. Voltages are measured on either fuse.

The degaussing circuit does not cause many problems. The 680Ω resistor R1364 sometimes goes open-circuit so that the degaussing remains on all the time. Replace with a wirewound component. R1358 on later panels goes open-circuit for no apparent reason. Replace with the same type of resistor as it's a safety component with no other circuit function.

There is a thermal fuse in the mains transformer. This rarely fails, no c.r.t. heaters being alight usually being due to the base itself or badly crimped pins in the plug or on the power supply.

Line Scan Unit

The line scan unit contains the line driver and output stages, i.t. and boost supplies and the beam current limiter. The following description applies to the earliest version: modifications will be discussed later. Each section of this

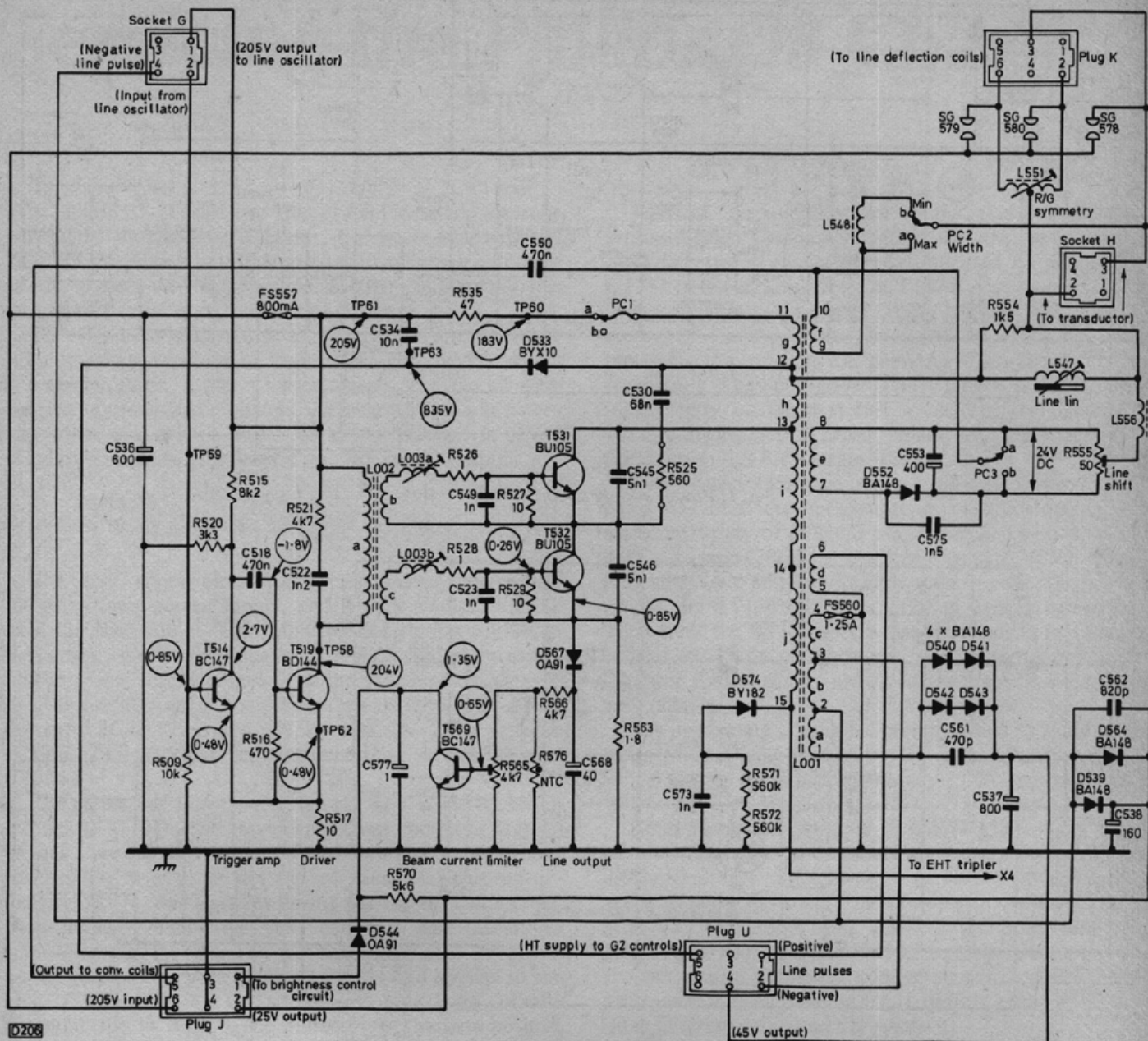


Fig. 3: Line driver and output stages with beam limiter – early version.

article will be thus given to make reference easier.

T5514 and T5519 form a Schmitt trigger, which converts the incoming waveform from the line oscillator to a squarewave with a fast rise time. The sine wave input is applied to the base of T5514, whose emitter is connected, together with that of T5519, to earth via R5517. When T5514 is "off" and T5519 "on", the emitters are at a higher potential than when T5514 is "on", due to the much larger emitter current of T5519. With T5519 "on" and T5514 "off", the rising sine wave turns T5514 on slightly and its falling collector voltage is fed via C5518 to the base of the driver, turning it off. The emitter voltages fall, increasing the base current of T5514, which turns on harder. This regenerative action results in T5514 being saturated and T5519 biased off (due to the large value of C5518, the charge on it remains fairly constant, so it can be imagined to act as a resistor).

When the negative-going part of the sine wave starts to turn T5514 off, the collector voltage rises, T5519 starts to conduct, and the rising emitter voltage switches T5514 rapidly off. Thus the current flowing through the driver transformer L5002 is a squarewave. R5521 and C5522

across the primary damp out any rings.

This chassis has two line output transistors in series and these have to be driven on simultaneously and switched off likewise. It is the switching off that presents the problem, as these large transistors have fairly low gain and high hole storage times. This means that not only has the base current to be cut off, but also stored charges have to be extracted from the base-emitter junction. The two coils L5003A and B on the same former provide an adjustment for simultaneous switch-off. R5526 and R5528 limit the base current, R5527 and R5529 provide a low-impedance path for stored charges. The tuning of the line flyback time is done by C5545 and C5546 in series. They are of equal value to give the same flyback pulse amplitude across each transistor.

Various tappings on the output transformer give outputs required for various parts of the set. There are two l.t. supplies, 45V for the field timebase and sound output stage, rectified by D5540, D5541, D5542 and D5543 in series-parallel and smoothed by C5537, and 25V for the tuner, line oscillator, i.f. strip and decoder, rectified by D5539 and D5564 and smoothed by C5538. A fuse is fitted in the

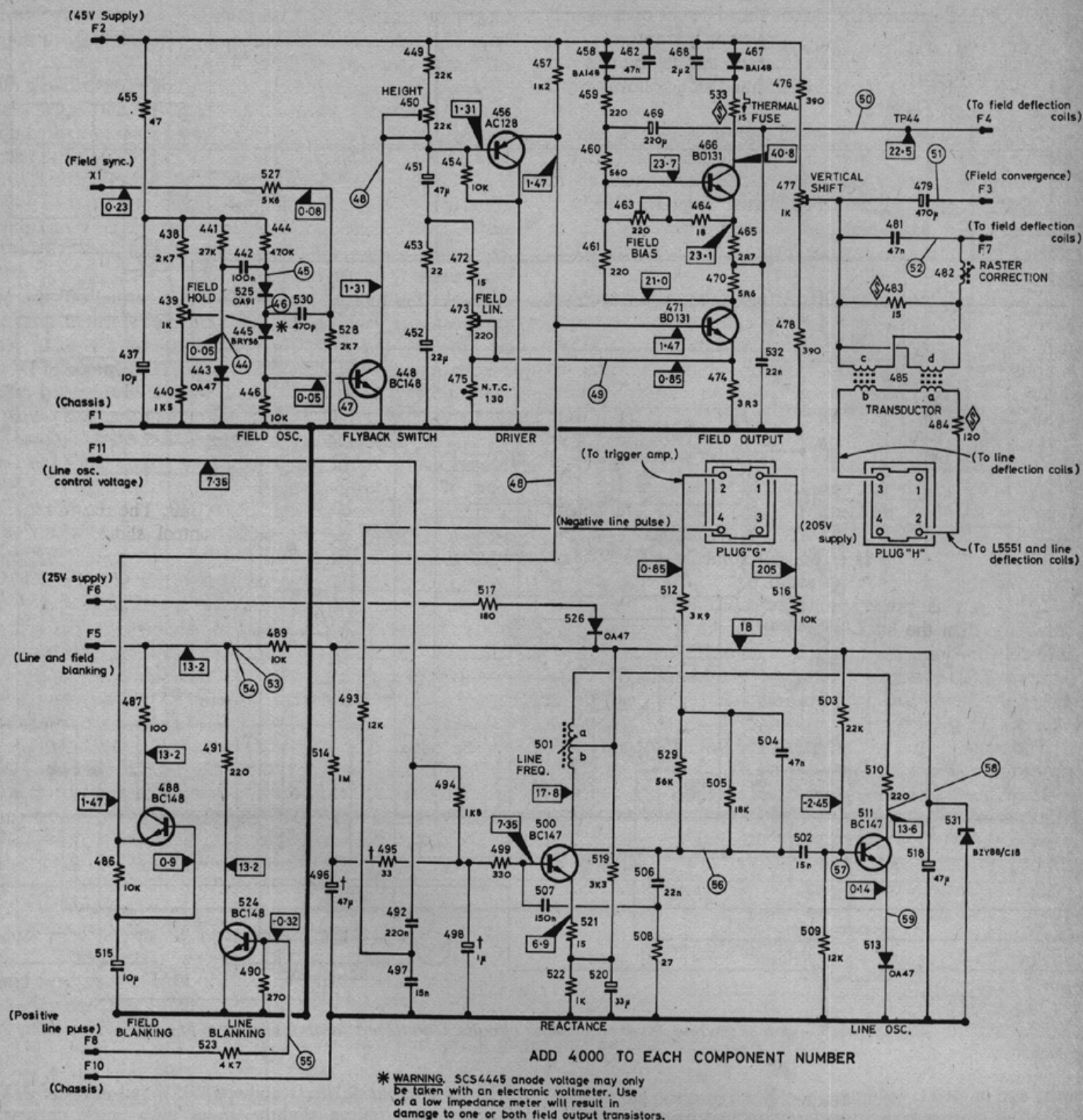


Fig. 5: Later version of the timebase panel. In early versions type BD124 field output transistors were used. Components marked with a dagger can be altered to obtain VCR compatible operation – see text.

capacitors, the l.t. rectifiers are single diodes, there is an extra fuse in the 45V rail and one in the shift circuit.

This panel is responsible for a number of faults, but is very easy to service. A blown 800mA fuse (F5557) should be replaced and PC1 disconnected to remove the supply to the output stage. Switch on: if the fuse blows the fault is in the driver stage – it is sometimes fairly obvious, as R5517, R5559 and sometimes R5516 are burnt up and C5558 has melted. If this is the case, the driver transistor will be found to be short-circuit and probably the transformer as well. The primary should measure 28Ω. If this sort of thing happens fairly often, check the value of R5520 (3.3kΩ).

If the fuse remains intact with PC1 off, reconnect it and remove the tripler input lead. If the fuse blows, then either both line output transistors or both tuning capacitors are leaky (the green type of capacitor is more reliable than the

earlier blue ones) or the transformer is faulty – not very common. The mica washer under the output pair sometimes develops a hole. D5574 will blow the fuse if short-circuit, but it's usually obviously burnt, as sometimes are R5571 and R5572. Discard D5574 if fitted.

If the fuse has still not blown again, then of course the tripler is faulty.

If the pincushion correction transducer has shorted turns (it's not on this panel) then the fuse will blow, usually accompanied by large volumes of smoke from the said component (check by removing plug H).

When replacing this, the tripler or the field or line output pairs, check the h.t. voltage and check the thyristor in the power supply for leakage (see power supply) as quite often this is the original cause of the trouble.

A blown l.t. fuse gives no field scan and no sound – the

cause will be elsewhere. If C5538 (160 μ F) goes open-circuit it gives rise to some really perplexing symptoms. The brightness and colour controls interact, and the picture has a band of no chroma down the left-hand side, followed by a band of Hanover blinds.

C5536 (600 μ F) if open-circuit gives rise to a similar fluttering effect to a power supply fault. Lack of c.r.t. first anode voltages should lead one to D5533 or more likely to the charred blob where D5533 was! Replace C5534 if necessary, and check that no one has dropped any nuts or screws into the convergence panel if it is of the front mounted type.

If h.t. is present on the 800mA fuse, the fuse is intact, yet the set is dead, check for h.t. at the collectors of the output pair. No h.t., and the 47 Ω wirewound resistor R5535 is probably open-circuit. H.T. on one transistor and no voltage on the other indicates no drive to one or both transistors. First check at TP59 to see if there is input from the oscillator (should be less than 2V and more than 0.6V). If this is o.k., which it probably will be, check for negative voltage at the base of the driver transistor and 0.5V or so at its emitter. If these voltages are absent T5514 is probably faulty, or R5515 open-circuit.

R5559 (27 Ω – on later panels) sometimes goes open-circuit or high, giving lack of width.

If no h.t. is present on the collector of the driver transistor then the hank bushes to which it's screwed are probably dry-jointed – a large iron is needed here.

Both T5514 and T5519 can go intermittently open-circuit – “the picture went into a vertical line, then the set went off”.

The panel at the top, carrying the tuning capacitors, is prone to dry-joints, causing no drive.

Excessive width should lead one to check the collector voltages on the output pair (some meters object to this – I use an Avo 8). One should be exactly half the other. If the lower transistor has either full h.t. or nothing on its collector, then one of the transistors or tuning capacitors is short-circuit. Adjust the equalising coil L5003 (if the core isn't stuck) for minimum width. Usually the core has to be soaked in oil or the coil replaced before adjustment is possible.

The earlier beam limiter circuit is fairly reliable, but R5563 sometimes burns up, the line output stage current then flowing through the beam limiter stage, obliterating it. The later beam limiter circuit gives trouble with intermittent low brightness, usually caused by the 12V zener diode D5582 going open-circuit. Replace with a BZX61 type and check that R5570 is 680 Ω , not 68 Ω as it was on some panels. Both the beam limiter transistors can be intermittent too. For other causes of brightness variations, see the decoder section later.

Panels coded BY25 or later sometimes give a single striation down the left-hand side of the raster. This can be eliminated by fitting a 3.3 Ω 3W resistor in series with FS5511, the fuse in the shift circuit.

Timebase Panel

The timebase panel contains the entire field timebase, the line oscillator, raster-correction and blanking circuits. The operation of the s.c.s. field oscillator will not be explained in detail as there have been several excellent articles in this magazine in the past describing it fully. Suffice it to say that positive-going pulses are produced across R4446. These pulses turn on T4448, which discharges C4451 and C4452 to give the flyback period. During the scan, these two capacitors charge towards 45V through R4449 and the

height control R4450. The sawtooth voltage is fed to the base of the emitter-follower T4456, progressively turning it off during scan and on during flyback.

The output stage, which at first glance looks like a class B one, is actually class A. T4471 is the output transistor proper, with T4466 acting as its load. It can be looked upon as a constant-current source. At the beginning of the scan, T4471 is off and T4466 is saturated due to the bias from R4459, R4460 and D4458. As the scan progresses, T4471's conduction increases, the midpoint voltage falls, and due to the potential developed across R4465 and R4470 T4466 is progressively turned off.

When the flyback occurs, T4471 is turned off, the midpoint voltage rises, and T4466, which is saturated, conducts in reverse. Due to the inductance of the scan coils resonating with C4468, the voltage at the cathode of D4467 rises above h.t. biasing it off. D4458 is also biased off, so the scanning circuit is free to undergo a half cycle of oscillation until D4467 is forward biased again and the stored energy is returned to the h.t. supply. C4469 feeds part of the scan waveform back to the base of T4466, increasing the gain of the output pair. The return from the scan coils goes to the shift control slider which is at approximately half the supply voltage. The field convergence circuits are fed through C4479 which blocks d.c. but acts as a very low-impedance at field frequency.

The transducer has one set of windings in series with the field scan circuit, L4482 and C4481 forming a tuned circuit resonant at line frequency. L4482 is adjustable to alter the phase of the correction waveform. R4483 damps the transducer to prevent it ringing. The other set of windings on the transducer is fed with line pulses through R4484.

T4500 and T4511 form the line oscillator circuit. T4511 is a Hartley oscillator, the coil being connected between its collector and base. T4500 functions as a reactance stage, the feedback from its collector to base being phase-shifted through C4506, C4507 and R4508. C4496, R4495 and C4498 form the time-constant filter.

As the line oscillator is supplied from the 25V rail from the line output stage, means must be provided to start it. This is carried out by R4516 which supplies a reduced voltage to the oscillator to start it. D4526 is reverse biased until the 25V rail is established, so that R4516 supplies only the line oscillator and not everything else fed by the 25V rail.

The sinewave at the collector of T4500 is fed to the line scan panel via the network C4504, R4505, R4529 and R4512.

Line pulses are fed back to the i.f. panel on the same lead that carries the control voltage to the reactance stage. T4488 and T4524 amplify the field and line frequency pulses respectively to give a composite blanking waveform.

Not many modifications have been made to this panel. A 15 Ω wirewound resistor, R4453, was added between the junction of C4468/D4467 and T4466's collector. On later panels this is a fusible resistor, and the output devices are type BD131.

The latest panels have the flywheel sync time-constant altered as follows to make them VCR compatible. This modification can be carried out on all panels. R4495 changed from 33 Ω to 47 Ω ; C4496 from 47 μ F to 10 μ F; and C4498 deleted. Another component addition is necessary on the i.f. panel, and will be mentioned in that section.

If a panel thus modified gives poor line sync under very noisy signal conditions on off-air transmissions, it will be necessary to restore it to the original circuit.

The latest panels have a three-position switch in place of the field shift potentiometer.

This panel gives rise to a fair proportion of the faults on this chassis. Apart from the usual adjustments the only extra one is the output stage bias adjustment R4463, which should be set for 23.5V at TP44, or 22.5V on panels with R4533 fitted. The line hold set-up will be covered under the i.f. panel adjustments.

The most common fault is failure of the field output pair, blowing the 1.25A fuse on the line scan unit. Before replacing them, check that the oscillator is running by measuring the voltage at TP52 (T4448 collector) – if more than 1.5V, the oscillator has stopped, usually because of dry-joints around the field hold control. Be careful when replacing the back cover on these sets, as it can easily press on the contrast and field hold controls and crack the print around them. Also check the thyristor in the power supply for leakage.

Other causes of repeated failure of the output transistors are c.r.t. flashovers and a noisy or dry-jointed bias potentiometer. Replace R4465, R4470 and R4474 if they are visibly burnt. With the earlier BD124 type transistors the hank bushes to which they are screwed are often dry-jointed. On later panels the collector connections are made by separate leads.

Lack of height when warm is usually either a faulty transducer or a leaky AC128 driver transistor. For greater reliability replace with a silicon device (BC143, BC126, BFX88 etc.) and insert a silicon diode (1N914, BA148, BY127 etc.) between the emitter of T4471 and R4474/R4475 (anode to the transistor's emitter of course).

If the midpoint voltage (TP44) is correct, then field collapse will probably be due to a fault on the convergence panel. This can be checked by earthing pin 3 on the edge connector, and also checking for continuity of the scanning circuit between pins 4 and 7, with the panel removed (should read approximately 15Ω).

On later panels, failure of the 15Ω fusible resistor after prolonged operation is usually due to excessive h.t. or occasionally leaky BD131s which can also give intermittent field collapse.

The s.c.s. rarely fails but can be responsible for poor interlace or gradual closing up of the field scan. Do not try to measure any voltages on the s.c.s. – this will stop the oscillator and destroy the output transistors.

The transducer often goes up in smoke, taking R4483 and R4484 with it. These resistors must be replaced with the same types, and mounted clear of the panel. If a transducer is not to hand, plug "H" (the red one behind it) can be temporarily left out. Again, *check the power supply*.

Severely reduced field scan occurs when C4479 goes open-circuit.

The line oscillator is extremely trouble-free, the only components giving trouble being C4520, the emitter decoupler in the reactance stage – it goes open-circuit to give no line sync – and the 18V zener D4531 which goes open-circuit to give line drift. Like most of the faults caused by zener diodes on this chassis, it usually clears when the set is warm. Also, for each fault symptom there are usually two zeners which can be responsible on different panels! For the other line drift one, see the i.f. panel section.

A rather puzzling fault occurs if the start-up resistor R4516 becomes dry-jointed, as it often does. The set is dead until the cabinet is tapped, then no amount of tapping will make it go off again as once the line oscillator has started R4516 is no longer required.

The blanking circuit is also very reliable, but on the later G8 chassis with the combined i.f. and chroma panel blanking failure will give a bright raster with no information on it.

CONTINUED NEXT MONTH

Servicing the Philips G8 Chassis

Part 2

M. Phelan

THERE are two basic types of convergence panel, the earlier type which was mounted on the front of the cabinet and the later one with revised circuitry which was mounted on the top chassis rail. Both types are quite reliable compared to some makes – major burn-ups are rare, but no doubt in time the diode-connected AC128s will become leaky and the electrolytics dry up. As in all sets using low-value convergence potentiometers, the controls become noisy, but this fault is usually cleared by rotating the spindle to and fro rapidly. Indeed, it's a good idea to do this to all the convergence potentiometers before attempting adjustment. The G8 usually converges extremely well.

A fault peculiar to this chassis is that after having the chassis frame in the raised position the blue convergence is found to be severely out: before twiddling all the controls, look at the plug on the blue radial coil – you will find it has been pulled partly off due to the leads not being quite long enough!

One control not located on the convergence panel is the R-G symmetry coil L5551, which is on the line scan panel. This tilts the red and green horizontal lines in opposite directions. Use an insulated trimming tool, preferably all plastic.

The first anode controls and switches are mounted on the convergence panel. On the cabinet mounting type the switches can leak and the controls can develop shorts between the wiper and one end of the track; the offending potentiometer then acts as a preset brightness control.

The R/G balance control R1937 (5 Ω) can be responsible for field collapse, as can the plugs and sockets on the convergence panel.

With the front mounting panel, the horizontal printed board acts as an excellent collector of dropped nuts and screws from the front control or convergence panel, with the accompaniment of much smoke and the demise of D5533 on the line scan unit.

Front Controls

The potentiometers used for the front controls tend to lose their wipers, which are held on with a plastic rivet. In an emergency these are repairable by sinking the wiper into the plastic with a hot iron.

The earlier type of tuner push-button unit with a separate tuning potentiometer assembly is almost trouble-free, but not so the type with the potentiometers behind the push-buttons. The potentiometers become noisy, but it's possible to clean the tracks by careful dismantling (do not use switch cleaner). The printed contacts can be cleaned with metal polish, then given a smear of silicone grease. On reassembly, be careful with the location of the plastic peg which operates the a.f.c. switch.

Remote Control

Some later models have a remote control facility with a touch-tuning head. This is operated by a MOSFET i.c. (ETT6016) which fails, giving various fault symptoms. On

changing channels, the a.f.c. is momentarily disabled by a reed switch driven by a monostable. Sticking on one channel can be caused by an accumulation of grime on the front of the unit, or the springs on the 10M Ω resistors not making contact with the touch contacts.

The remote control system is operated by a mechanical ultrasonic transmitter (a metal bar struck by a hammer). The receiver is a tuned audio amplifier/limiter, followed by a complementary switch which supplies a pulse to pin 9 of the ETT6016 which changes channel sequentially. Up to now we have had no faults at all with the amplifier, but if replacing the tuning head check for the presence of R59 (100k Ω). If this is not fitted, CES will supply a resistor and NTC to be fitted between pins 1 and 5 of socket CC on the remote control amplifier.

The IF Strip

As well as the tuner on its sub-panel and all the i.f. circuitry, the i.f. panel contains the a.f.c. circuit, the audio output stage and the video/sync/a.g.c. i.c. (either TAA700 or TBA550Q). The i.f. circuits are contained in five separate modules, which are easier to replace than repair, particularly as the cans are so close together that accessibility is difficult unless one removes the offending module and temporarily resolders it on the back of the print.

The input from the tuner goes via a very short lead into the first module (vision selectivity). L2805 forms half of a bandpass pair, the other half being in the tuner. L2807 and C2806 are the 33.5MHz trap. The input tuned circuits are coupled to the first i.f. stage T2828 via a capacitive divider C2803 and C2802 to prevent the varying base current due to the a.g.c. damping the tuned circuits. Forward a.g.c. is applied to the base of T2828. Following this stage are two rejectors, L2819/C2818 (41.5MHz), and L2826/C2827 (31.5MHz).

The second module (vision gain) provides most of the i.f. gain (26dB). The direct coupled pair T2306, T2308 have negative feedback to stabilise the operating point. T2329 drives the vision detector D2340, L2333 being very broadly tuned. L2346 and L2345 are the i.f. rejector chokes, and C2334 feeds part of the signal to the a.f.c. circuit. The video signal from the detector is fed into the sound module, through the tuned circuit L2501/C2502, and back out to the video i.c. IC2001. T2505 in the sound can separates the sound and chroma signals, the sound being fed through the bandpass pair L2510/L2511 into IC2002 (TAA570), which incorporates a limiting amplifier followed by a coincidence detector. L2601a and C2601b form the quadrature tuned circuit.

Audio from pin 3 of the i.c. goes to the volume control, C2210 providing de-emphasis. The class A output stage delivers 2W into the 70 Ω speaker, and operates in the same way as the field output stage. T2207 is the driver, and there is extensive frequency-dependent negative feedback.

The signal developed across R2507 in the sound can is fed into the chroma module. The bandpass pair L2403/L2406 are broadly tuned to 4.43MHz, and followed by L2420, C2419, C2422, R2421, a bridged-T notch filter

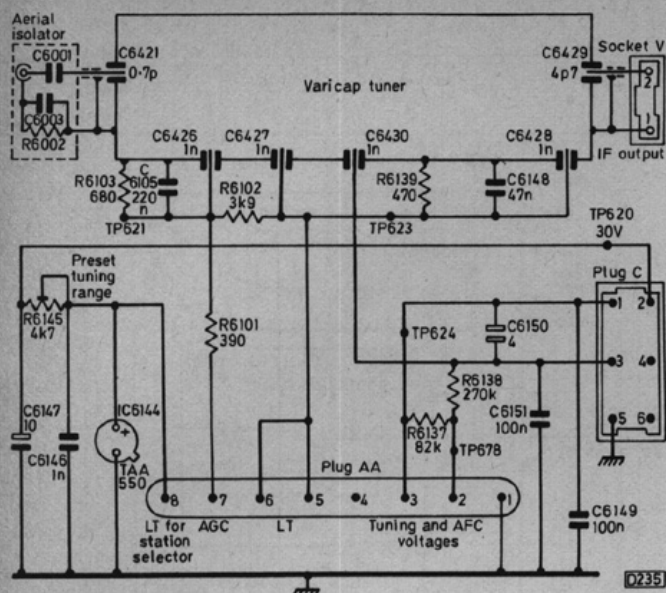


Fig. 6: The tuner unit's peripheral circuitry.

tuned to 6MHz. Before the bandpass pair comes another bridged-T filter, L2410, C2408, C2411, R2409, tuned to 2·2MHz, to notch out video signals at this frequency whose second harmonic would produce a visible pattern. The output is taken from emitter-follower T2417, which gives a low-impedance output to the decoder and isolates the tuned circuits by providing them with a high-impedance load.

Tuning and AFC

The a.f.c. module contains one stage of amplification followed by a bandpass pair which is tuned to the vision carrier (39.5MHz). The secondary capacitance is centre-tapped, and feeds the diodes D2724 and D2725. The voltage across the diodes is zero when the frequency of the input to the stage is 39.5MHz. L2733, L2734, L2738 and L2739 remove the carrier from the output.

The supply for the varicap diodes in the tuner is derived from the 205V rail through R2143, and stabilised by IC6144 (TAA550). The 33V thus obtained is fed through R6145, which gives a coarse adjustment of tuning voltage, to the box of tuning potentiometers, then to the push-button unit and back to the i.f. panel, where the voltage selected by the push-buttons is fed to one end of the a.f.c. discriminator diodes, the output from the other end being fed to the varicap diodes in the tuner.

The a.f.c. discriminator adds the error voltage (if any) to the tuning voltage in the correct sense to provide correction. When the push-buttons are fully depressed, a switch operated by the latch plate shorts out the input and output of the a.f.c. discriminator, removing the a.f.c. On later units, the tuning controls are behind the push-button units, and opening the flap to gain access operates the a.f.c. switch.

Jungle IC

IC2001 provides amplification of the video signal, sync separation, gated a.g.c. and line flywheel sync action. The sync separator is noise-gated, and provides 10V p-p field sync pulses at pin 15. The external integrating capacitor is C2165, connected to pin 14. The line sync pulses are fed to an integrated phase detector which also receives a sawtooth waveform at pin 2, fed back up the control voltage line. The line sync is gated by pulses fed in at pin 3. The gated a.g.c. system is also noise-gated. After a predetermined signal

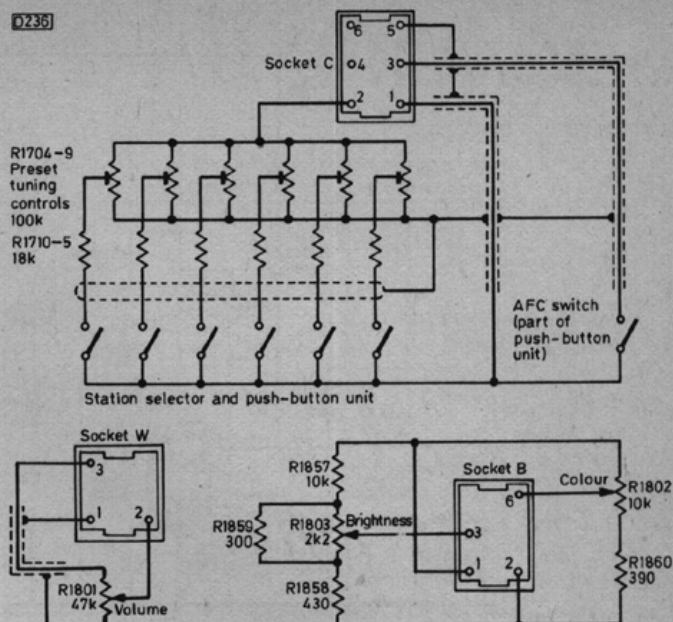
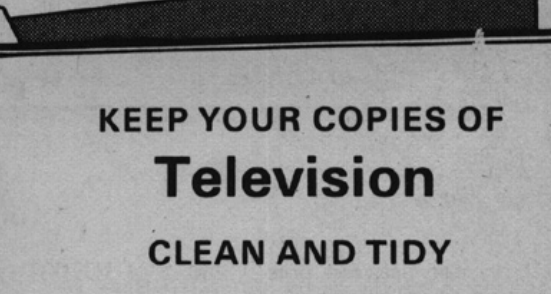


Fig. 7: Front panel controls and connections.

level, control is switched to the tuner. The crossover point is set by R2169.

IF Strip Modifications

Very few modifications to the i.f. panel have taken place, other than small differences in component values and layout. To make earlier panels VCR compatible, connect a



KEEP YOUR COPIES OF

Television

CLEAN AND TIDY

IN THE TV EASI-BINDER

The Easi-Binder holds twelve issues and is attractively bound in black with the title blocked in gold on the spine together with the current (or last) volume number and year. For any previous volume a set of gold transfer figures will be supplied.

Due to the change in size during Vol. 25 a large capacity binder is available to take 16 copies from July 1975 to October 1976 (Vols. 25 and 26) and a separate binder is required for the eight smaller copies of Vol. 25. Later volumes revert to 12 magazines per binder.

When ordering please state the year and volume required, and your name and address in **BLOCK LETTERS**.

Priced at £2.85 including UK post and VAT, **TELEVISION Easi-Binders** are available from the Post Sales Dept., **IPC MAGAZINES LIMITED**, Lavington House, 25 Lavington Street, London SE1 0PF. Overseas post 60p extra.

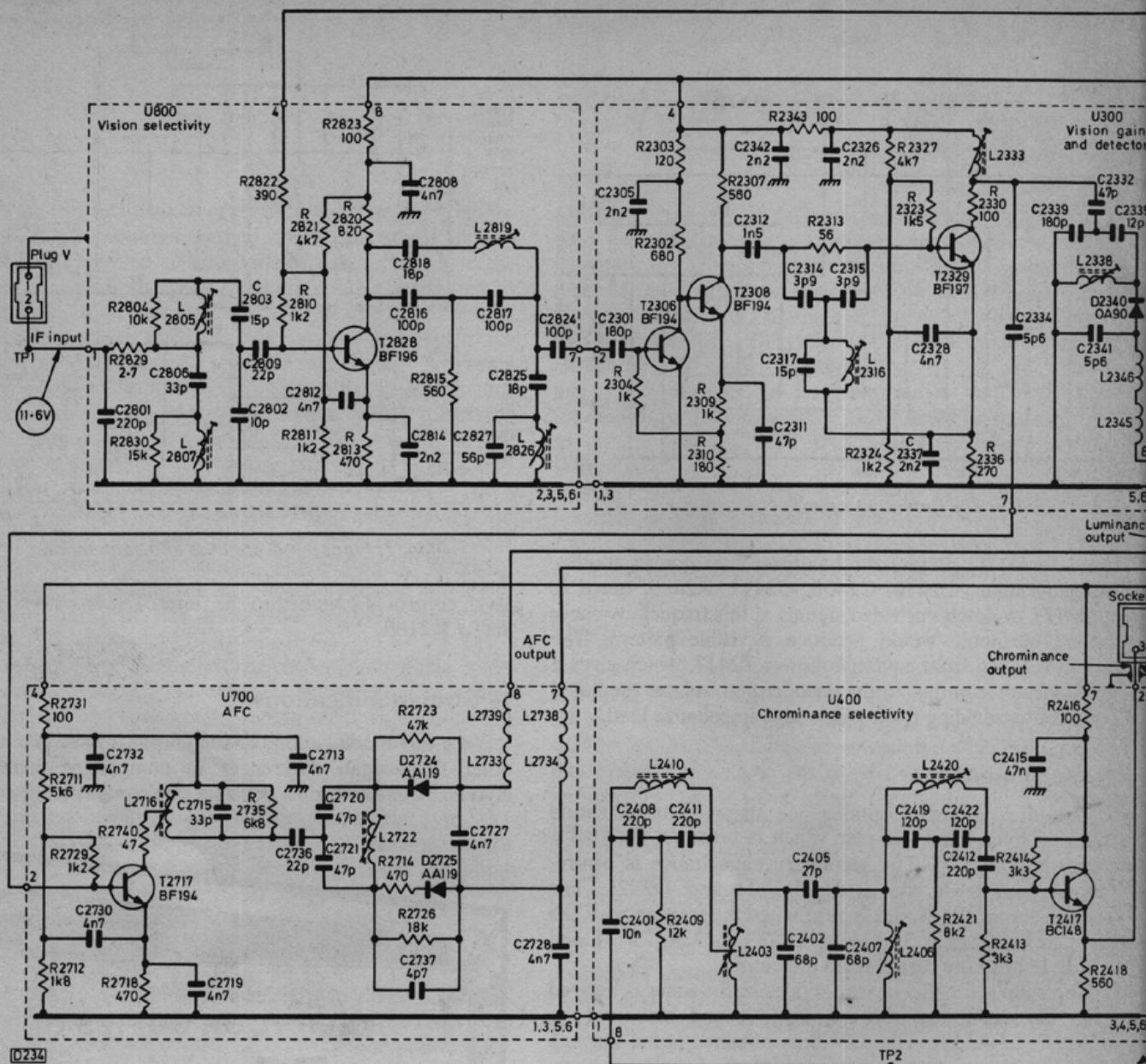


Fig. 8: Circuit

10k Ω resistor between pins 3 and 5 of IC2001 (see also timebase panel).

Tuning Faults

The tuner is a fairly reliable unit. Tuner drift is usually due to a faulty TAA550 or R2143 having altered in value – this component tends to become dry-jointed. Check also the pins of plug C on the tuner sub-panel. If pin 1 is open-circuit, the set will change channels normally due to the a.f.c. switch providing a temporary tuning supply, but will drift off when C6150 has discharged. C6150 has been known to cause erratic tuning, with the programme suddenly disappearing after staying tuned in for a while.

On depressing one of the push-buttons slightly so that all the buttons come out, the set should remain on channel for at least 10 seconds. Failure to do so normally means that one of the varicap diodes in the tuner is leaky. This usually also gives rise to slight noise, due to the tuner being in effect misaligned.

No a.f.c., or a hum bar which varies with tuning, is due to one of the small chokes in the a.f.c. can being open-circuit.

A quick check of this is to remove the tuner panel and measure the resistance between pins 7 and 8 of the a.f.c. can. You should find about 20k Ω one way and 50k Ω the other.

IF Strip Faults

A very noisy picture can be due to failure of T2828 or the r.f. amplifier transistor in the tuner. Faults in either the vision gain or selectivity cans can give rise to flashing on the picture, and are rather difficult to find. C2337 in the gain can goes open-circuit and causes weak field sync! – rather misleading, until you also notice the lack of contrast and slight smearing.

The filter chokes in the vision detector circuit can go open-circuit to give no sound or vision. Check the output of the vision detector at pin 8: if this is present (negative voltage), check at TP6. If video is absent here, L2501 in the sound can is probably dry-jointed.

Another fairly common fault here is a dry-joint in the sound can at pin 8. This causes intermittent chroma, as do dry-joints in the chroma can. T2417 open-circuit causes no

