Servicing ASA Hybrid CTVs

P. Cole

SETS fitted with the ASA hybrid colour chassis were imported by a Bristol firm during the early 70s colour boom period. There were two models, the 22in. CT5003 (A56-120X tube) and the 26in. CT5004 (A66-120X). They were manufactured in Finland, and the circuitry used is capable of giving above average performance.

The only i.c. in the set is the TAA550 (or ZTK33) tuning voltage stabiliser, discrete transistor circuitry being used throughout the i.f. strip and the decoder and RGB output stages. A PCL86 is used in the audio stages, a tertiary winding on the audio output transformer being used to provide negative feedback to the cathode of the triode section of the valve. This latter stage includes a.f. muting during the warm-up period, i.e. until the boost line has been established. There are three unusual aspects to the c.r.t. drive circuitry: the transistor R, G and B output stages drive the c.r.t.'s grids, while the common cathode circuit is used for beam limiting and switch-off spot suppression. We'll return to these latter features later.

The line timebase employs a PCF802, PL509 and PY500A (see the simplified circuit shown in Fig. 1), the tripler being either a TVK31 or a TM25-6W6. The only unusual feature of the line output stage is the use of an ECC81 triode in the width/e.h.t. stabilising circuit. The conventional VDR (see Fig. 1) is complemented by the ECC81 which conducts when the positive-going line flyback pulse appears at C307. The ECC81's cathode is held at a fixed voltage by the zener diode D45, its grid sensing the h.t. voltage via R384 and the boost voltage via R386. As a result, it produces at its anode a negative voltage, proportional to the h.t. and boost voltages, to bias the line output valve. P28 should be set for 23kV e.h.t. or 950-970V on the boost rail. The VDR is included to prevent the e.h.t. rising above 27kV in the event of failure of the ECC81 valve. The other section of the valve acts as the field flyback blanking pulse amplifier. The line and field flyback blanking pulses are mixed at the anode of this valve, clipped by diode D54 and then fed to the c.r.t.'s first anodes.

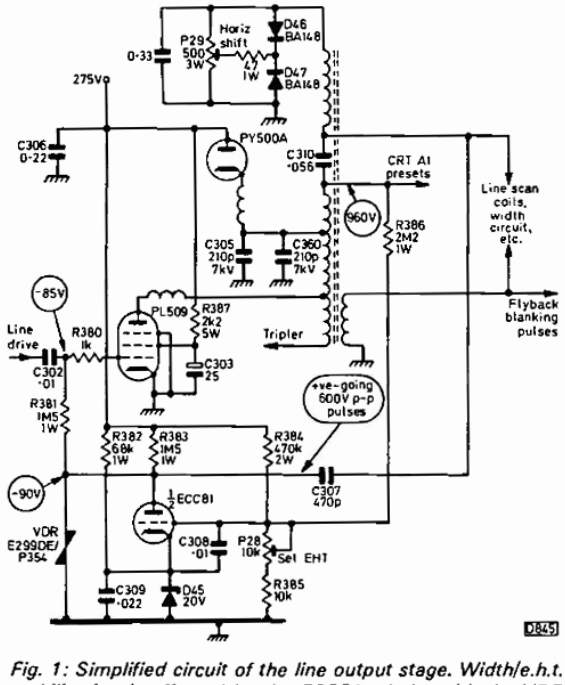

Fig. 1: Simplified circuit of the line output stage. Width/e.h.t. stabilisation is effected by the ECC81 triode, with the VDR providing protection in the event of failure of the triode. The negative control bias is developed by the pulse coupling capacitor C307 when the ECC81 conducts.

The sync circuitry is quite elaborate. The sync separator itself is T14 (BC158) on the signals panel. This is followed by the sync pulse clipper T43 (BC178) which feeds the field sync pulse amplifier T44 (BC147) and a small ringing transformer which couples the line sync pulses to the flywheel line sync discriminator circuit.

The final two valves in the set form the field timebase. First is another ECC81. One section of this acts as a blocking oscilator, the second section forming a waveform shaping/driver stage. As you'd expect, a PL508 is used in the field output stage.

The power supply circuit is shown in Fig. 2. The only thing that might cause some confusion here is the use of three separate heater circuits. The ECC81 in parallel with the c.r.t.'s heaters is the e.h.t. regulator/pulse amplifier one.

To some common faults then. Valves and c.r.t. alight but no results will probably mean that R344 or R345 has gone open-circuit. The resistor concerned may simply have felt like doing so, or alternatively one of the BY127 diodes in the h.t. bridge rectifier citcuit may have gone short-circuit. A blown mains fuse probably means a short-circuit BY127 diode, although I did once find the protection capacitor C314 short-circuit.

When the l.t. bridge rectifier D41 goes short-circuit, either the 0·5A fuse blows or, if an incorrectly rated fuse has been fitted, the mains transformer burns out. I mention this latter point because I've come across quite a few of these sets with a 2·5AT fuse fitted in this position. This can result in the mains transformer burning away quite merrily for some time before the set is switched off.

The l.t. bridge also goes open-circuit. The result is an unmodulated white raster. The same result occurs when R353 goes open-circuit.

No sound or picture with the PL508, PL509 and PY500A glowing excessively means a heater-cathode short in one of these valves. It's best to replace all three. Why no sound? Remember the muting arrangement mentioned earlier.

No e.h.t. with cool valves in the line output stage probably means that either the PL509's screen grid feed resistor R387 is open-circuit or there's no h.t. supply to the line output stage due to R349 having sprung open.

No e.h.t. with the valves in the line output stage overheating is normally due to one of four things: (1) the boost capacitor C310 short-circuit; (2) the tripler short-circuit (it can be replaced with a Phab universal type); (3) the line output transformer shorting to the core; (4) lack of line drive. In the latter event check whether the PCF802's anode load resistor R374 (33kΩ) is open-circuit.

In the event of lack of width, first try new PL509 and PY500A valves and then check the following: the print behind the line output transformer burns out; dry-jointed

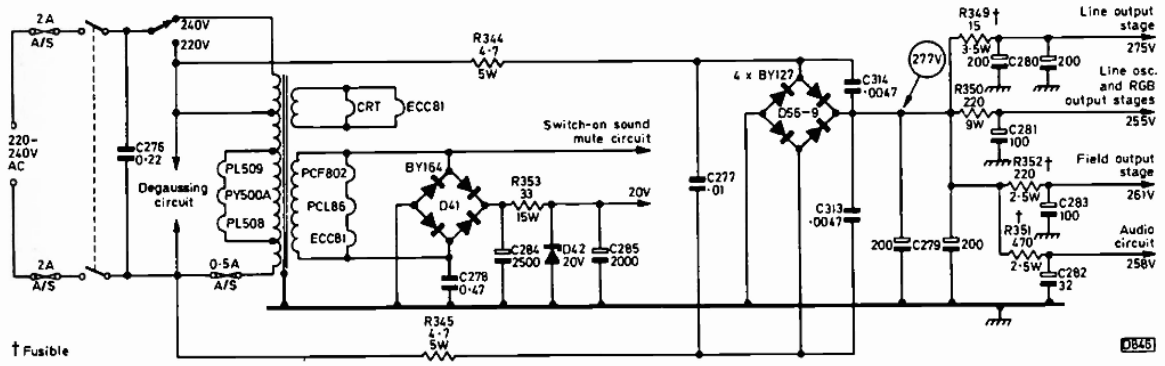

Fig. 2: Power supply circuitry. Note that the mains fuses are on the live side of the on/off switch.

connection(s) to the transformer; replace the transformer if it's burnt right up through the winding.

In the event of excessive width, check R386 and the ECC81 which may have lost emission.

Poor focus may be due to R421 (40MΩ) or R420 (30MΩ) changing value (they are in series with the focus control), a defective tripler, or sometimes the focus control (P31, 10MΩ) leaking to chassis. If the correct control is not available an Erie unit can be used with R420/1 left out of circuit.

Field collapse with the sound o.k. can be due to several things: the valves – PL508 and ECC81; the vertical shift control P27 (22Ω) going open-circuit (thus open-circuiting the PL508's cathode); the blocking oscillator transformer M09 (low or varying ECC81 anode voltage); or R401 (1·5MΩ) in the blocking oscillator's timing circuit increasing in value – in this case applying the meter to the ECC81's grid (pin 2) will open out the field scan. Field collapse with no sound occurs when R404 (270kΩ, 2W) goes open-circuit – no sound because this removes the boost supply to the height control and the sound mute circuit.

Lack of height with cramping occurs when R404 goes high-resistance or the ECC81 looses emission.

The top folded over half way down the screen is due to a faulty field blocking oscillator transformer. Top foldover with cramping is caused by C332 (0·022μF) going short-circuit – this capacitor is mounted on the field output transformer, across the secondary winding (pins 7 and 9).

Since the ECC81 valve in the line output stage screening can amplifies the field flyback blanking pulses, lack of flyback blanking will be the result when this valve looses emission – or the relevant anode load resistor R423 (510kΩ, 1W) goes open-circuit.

Lack of brightness is generally caused by R336 (56kΩ, 1W) going high in value or open-circuit. This resistor links the high voltage end of the c.r.t.'s first anode presets to the boost rail.

If the picture goes negative at high brightness levels, check the blanking diode D9 in the luminance channel (goes open-circuit) and the setting of P3 (a.g.c. preset) and P45 (luminance amplifier bias). The former is set by connecting an oscilloscope to point 30 (junction of R256/R267/C250) and adjusting the potentiometer so that there's no clipping of the field sync pulses even when the contrast and brightness controls are at maximum. P45 is similarly adjusted for no white clipping. If the waveform at point 14 (pin 5 of vision detector can Ke 21-11) is not then at 2·5V ± 0·5V peak-to-peak, repeat the adjustment of P3.

Sound faults are usually due to the PCL86 valve. The man's a genius! Here's another one though. The sound output transformer sometimes shorts between its primary and feedback windings, with the result that the h.t. feed resistor R351 overheats. This can be misleading.

The signal and decoder stages are fairly trouble free apart from intermittent or complete loss or colour due to a fault in the colour-killer circuit. Replacing T21 and T22 (BC182) usually cures this.

For an intermittent bright red, blue or green raster, check for dry-joints at the appropriate output transistor or a dirty drive preset (P16/17/18).

Tuning drift or intermittent loss of signals is more often than not caused by the pushbutton unit. I've successfully refurbished some of these by applying electroconductive paint to the print connectors – a replacement unit is very costly (approximately £20 at the time of writing). The TAA550 tuning voltage stabiliser seems to be fairly reliable. The ELC1043 (ELC2000S in some sets) varicap tuner can be responsible for all kinds of faults from drift to a white unmodulated raster.

To summarise then. Most of the faults are straightforward, though the absence of sound due to a timebase fault could confuse someone not familiar with the chassis.

Finally the beam limiter/switch-off spot suppressor circuit (see Fig. 3). This operates as follows. −350V peak-peak pulses are fed via R332 to the cathode of D38, which produces a −264V supply across its reservoir capacitor C267. This biases D37 on, and with no beam current a bleed current of 1·3mA flows via R331 and D37 to chassis. The c.r.t.'s cathode currents also flow via D37, but in the opposite direction to the bleed current. When the beam current reaches 1·3mA, D37 cuts off to provide the beam limiting action. The inclusion of switch-off spot suppression is unusual in a colour set but is simple to arrange with this circuit. S1 is ganged to the mains on/off switch, so that when the latter is switched to off S1 disconnects D37 and instead shorts out R331. With −264V at its cathodes, the c.r.t. rapidly discharges the e.h.t. ■

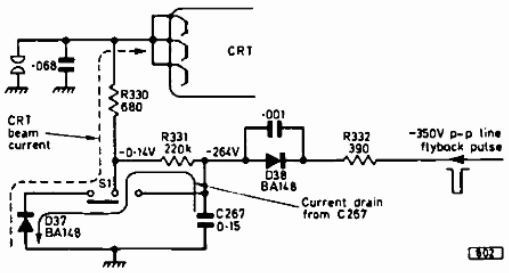

Fig. 3: The c.r.t.'s cathodes are strapped together and used for beam limiting and switch-off spot suppression.