SERVICE CASEBOOK

Surely every engineer should run his own casebook and exchange notes from time to time with this column? The value of a casebook is demonstrated by F. V. Carlshausen who has kept one for years and has here extracted tips on certain GEC and Philips receivers

GEC BT1091, BT1093, BT4640

FAULT: **Insufficient width.** If this persists after the line generator valve and line O/P valve have been replaced by known good ones, the fault is usually due to R77(47OK,$\frac{1}{2}$W,10 per cent.), anode feed for V18 (L63) line timebase generator having gone high resistance. Replacements should definitely be within the specified tolerance.

Bent and wobbly top. The verticals in the top part of the picture are bent to the left, or wobble, and the line sync. fails with increased Brightness or increased Contrast. This is caused by distortion of the sync. pulses and has been traced to the cathode by-pass condenser (C27,25mF,25V) of the video amplifier V7(Z77) having gone O/C or low capacity.

"Snow-storm" effect. Usually caused by the 10pF condensers (C23 and C24) in the IF filter going O/C. In one bad case of "snow" these condensers were measured on the bridge, and found to be perfect; we then tried 30pF and cleared the trouble.

Focus not sharp. Scanning lines indistinct even at optimum setting of focus control. Picture slowly drifts into focus in patches during the first 10 to 15 minutes after switching on and remains perfectly focused after that. After having measured the EHT during the warming up period, and found this to be perfectly stable, and having replaced the scanning coil assembly, it was discovered that the fault was caused by the tube, a type 6703A (12in.).

Picture badly out of focus. Focus control inoperative, fly-back lines prominent. The voltage across the focus coil should be 28 to 37, according to the position of the focus control, but was zero. A resistance measurement from the "live" side of the focus coil to chassis indicated zero ohms. It was assumed that C36 (16mF), the smoothing condenser across the coil was S/C. It was found to be OK but, on closer examination, it was seen that a minute drop of solder had become embedded in the empire cloth which insulates this condenser from its mounting cleat, thus shorting it out.

Horizontal non-linearity. Left-hand side of picture enormously extended, right-hand side very much contracted, with a brilliant $\frac{1}{4}$in. vertical line on left-hand side; line linearity control inoperative. This fault was caused by R73 and R74 (2500 ohms, wire wound, 7W) being O/C. Both are on top of the rear control panel and very accessible for inspection.

Unstable sync. Especially line sync. affected by changes of picture content, "bands" pulling out sideways. This is often caused by R44 (1meg1/4W) the grid leak of the sync. separator valve going high resistance. Replace with a $\frac{1}{2}$W type.

Edges of raster distorted. A few lines in the middle of the picture permanently displaced to the left. Gives the appearance of frame and line time base interaction. This was caused by C35(32mF, 450V) smoothing condenser having gone low capacity.

Insufficient width, coupled with low gain. The smoothed HT was measured and found to be low (250 instead of 350V). Caused by the reservoir condenser C36(16mF,500V) having lost capacity.

Loud hum coming from speaker with volume control turned fully anti-clockwise. Also lamination hum from mains transformer. Reduced picture width. All caused by V10(MU14) O/C heater, V11(MU14) acting as a half-wave rectifier.

Wedge-shaped raster. Full width at bottom of picture, becoming gradually narrower towards the top. This was obviously caused by one of the line deflection coils having S/C turns. This diagnosis was confirmed by measuring the AC volts across the two horizontal deflection coils. The AC potential across one coil was only half that across the other.

The deflector coil assembly was removed and generously brushed with insulating varnish, the varnish being allowed to run right into the windings. The coil was then placed in a gas oven with a very low flame, and baked for a few hours. It was subsequently removed and refitted, and has given trouble-free service ever since.

Astigmatism. This CRT fault was encountered several times with the 12in. tube (6703A). Most engineers, of course, are familiar with this fault, but for the benefit of Northern and Scottish engineers, who may not have had the opportunity of experiencing this relatively rare fault, I may be permitted to add that astigmatism is caused either by incorrect alignment of the focusing assembly or else a tube fault. The picture appears badly focused, but on closer inspection it is found that the horizontal lines can be focused quite sharply when all the verticals are badly out of focus and *vice versa*, in other words there are two positions of optimum focus; one position for verticals and another position for horizontals. This fault is best observed on the Test Card.

To determine whether the assembly or the tube is the cause of the trouble, it is recommended that initially the tube be changed. If it is found that the tube is at fault, the only cure is replacement of the tube, but some improvement may be effected by rotation of the tube.

PHILIPS 1800A AND 600A PROJECTION

FAULTS in a model 1800A were (*a*) contrast control inoperative and (*b*) raster could not be brought into focus by electrical focus control. Since this set had been working perfectly prior to sudden breakdown, it was assumed that these faults were caused by the same component.

Like most sets of this make, the 1800A derives various bias voltages from a chain in the negative HT return. The failure of one of the bias network components is likely to upset the operation of different parts of the circuit, and give the appearance of several apparently separate faults.

In this case an ohmmeter check of the various bias resistors showed R9 (2.2K) to be o/c. Replacement effected a complete cure. Two more sets have recently come into the workshop with identical faults, one of them a 600A.

Two 600A sets were recently brought into the

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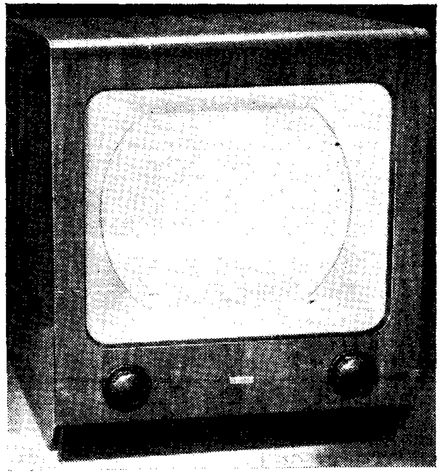

COSSOR 926

Seventeen-valve five-channel television receiver with 12in. CRT giving a 10½in. by 8in. picture. Walnut veneered table cabinet. For 195-250V 50 c/s AC mains. Manufactured by A. C. Cossor, Ltd., Cossor House, Highbury Grove, London, N5

THE receiver is a superhet operating on lower sideband of vision carrier. Aerial, RF and frequency-changer stages, which are common to vision and sound channels, have permeability-adjusted inductances with special cores enabling them to tune over 40-65 mc/s, covering all five BBC television channels.

Vision interference and sound noise suppression circuits are incorporated, and EHT is obtained from line flyback pulses. Mains consumption is 150W.

Aerial input circuit is for use with 80-ohm coaxial feeder. Aerial connecting socket is isolated from receiver chassis by C2 C64 with R1 R33 as static drain resistors.

RF amplifier. Signal is fed through C2 to primary L1 of RFT1, the secondary L2 of which couples signal to grid of RF amplifier V1. Gain of V1 is controlled, with that of first vision IF amplifier V3, by **Contrast** control R43 in the common cathode circuit. Input capacity of V1 is maintained reasonably constant with variation of gain by negative feedback across R3. Amplified signal is developed across tuned coil L3 in the anode.

Frequency-changer is pentode V2, a combined oscillator and mixer. Oscillatory tuned circuit L4 C6 C65 is between screen and grid through C5, the screen (oscillator anode) voltage being obtained through tap on L3.

Bias for oscillator grid is developed on C5 with R5 as leak. RF signals at anode V1 are mixed with oscillator signal by the link between tappings on L3 L4 and produce across L5 L6, in anode V2, a vision IF of 16 mc/s and a sound IF of 19.5 mc/s.

Wide bandwidth to cover both sound and vision frequencies is maintained by damping resistor R8.

Vision channel consists of two IF amplifiers V3 V4, signal rectifier V5A, noise suppressor V5B and video amplifier V6. Bandpass transformer coupling is employed, wide bandwidth being maintained by damping resistors R9 R12 R14 R15.

Sound-on-vision rejection is given by L6 L8 C9 in anode V2, by L10 L12 C11 in anode V3, and by L15 C15 in cathode V4.

Rectified video signal is developed across R17 C16 in cathode V5A and DC coupled through IF filter coil L17 to grid of video amplifier V6, the output of which is applied direct to cathode of CRT.

Interference limiter is diode V5B connected with its cathode to anode of video amplifier V6 and its anode up to HT through R50, **Spotter Control** R48, and R47. R48 is normally adjusted so that with peak white signal the diode is just cut off. When an interference pulse greater in amplitude than peak white appears V5B conducts the pulse to chassis through C43 and V6 cathode decoupling capacitor C41. Bottom end of **Spotter** R48 is connected to slider of **Brightness** control R45 to prevent V5B anode becoming negative to CRT grid.

Sound channel consists of two IF amplifiers V7 V8, signal rectifier V9A, noise suppressor V9B and combined AF amplifier and sound output valve V16.

Sound IF of 19.5 mc/s is taken from anode of frequency-changer V2 by inductively-coupled circuit L8 C9 and fed to grid of first sound IF amplifier V7.

Continued overleaf

The anode of this is bandpass transformer coupled by L23 L24 to final sound IF amplifier V8, which is in turn bandpass transformer coupled by L25 L26 to cathode of signal rectifier V9A.

Rectified audio signal across R28 C28 is fed by C29 through noise suppressor diode V9B and R41 C40 to **Volume Control** R40 in grid of triode AF amplifier V16A. Amplified signal is fed by C42 to pentode sound output valve V16B and transformer fed by OP1 to a 6½in. PM speaker.

AVC voltage, derived from rectified audio signal on R28 C28 and from rectifier W1 shunted by C20, are fed through decoupling network R25 C25 and L8 to grid of first sound IF amplifier V7.

Noise suppressor. Diode V9B anode is positively biased from HT through R30 and decoupling network R82 C54 and therefore conducts, setting up a potential across cathode load R31 C30. The time-constant of R31 C30 is such that the voltage across the network follows that of the audio signal fed by C29 to anode V9B. When a large amplitude high-frequency interference pulse is passed by C29, then anode V9B is driven negative, but due to comparatively long time-constant of R31 C30, the cathode is unable to follow and the diode cuts off.

Sync separator. Signal at anode of video amplifier V6 is fed through R21 C44 to grid of sync separator V10. Positive sync pulses drive the valve into grid current and resultant bias on C44 places video portion of waveform beyond cut-off, thus only sync pulses appear at anode. Frame sync pulses are integrated on R56 C47 and applied through C45 R81 to anode of frame scan oscillator V11B.

Line sync pulses are taken from junction of R78 R55, connected between anode and screen V10, and are fed by C46 to anode line scan oscillator V11A.

Suppressor grid V10 is connected through R49 to frame timebase charging capacitor C50 so that at end of frame scan V10 is held cut off, thus preventing noise triggering the frame scan oscillator.

Frame scan oscillator is triode V11B operated as a grid-blocking oscillator with anode-grid back coupling by transformer FT1. Scan waveform is developed on C51. Variation of grid voltage by R67 gives **Vertical Hold.** Variation of oscillator HT by R69 gives control of **Height.**

Top end of R67, the vertical hold control, is connected to slider of height control. Adjustment of height therefore affects the vertical hold control voltage to maintain oscillator frequency.

Frame amplifier. Scan voltage on C51 is fed, with a parabolic correcting waveform developed on tertiary winding L31 of frame output transformer FT2, through C53 C52 R65 to grid of beam-tetrode frame amplifier V12.

R80 by varying amount of correction applied to input waveform gives **Vertical Linearity** control. Amplified scanning voltage at anode V12 is transformer fed by FT2 to frame deflector coils L33 on neck of CRT. Screen of V10 is connected to a tapping on primary L30 of FT2 to reduce non-linearity at end of scanning stroke. Further correction is provided by negative feedback into cathode circuit from high potential side of deflector coils via C56 R88.

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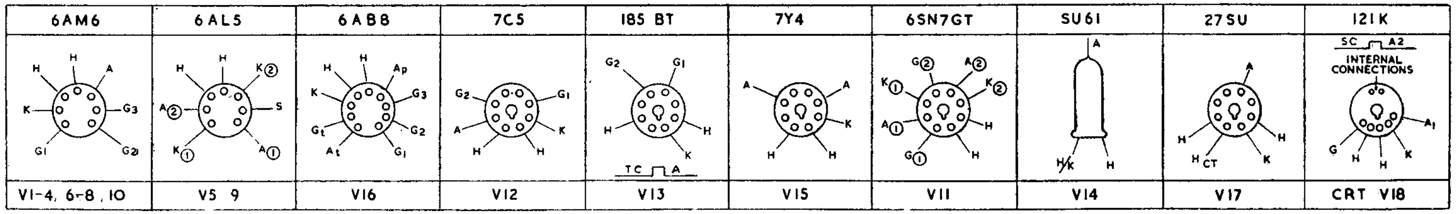
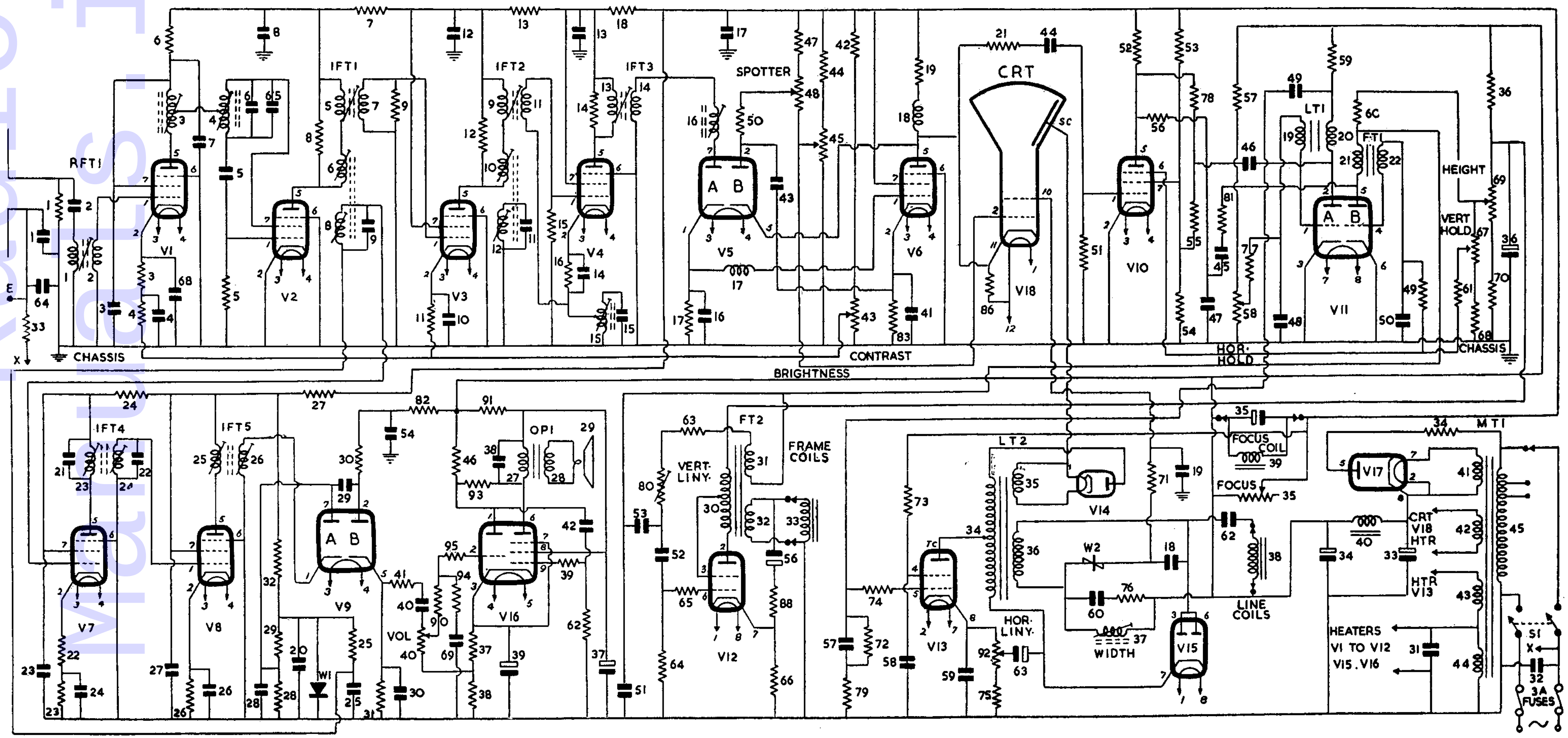


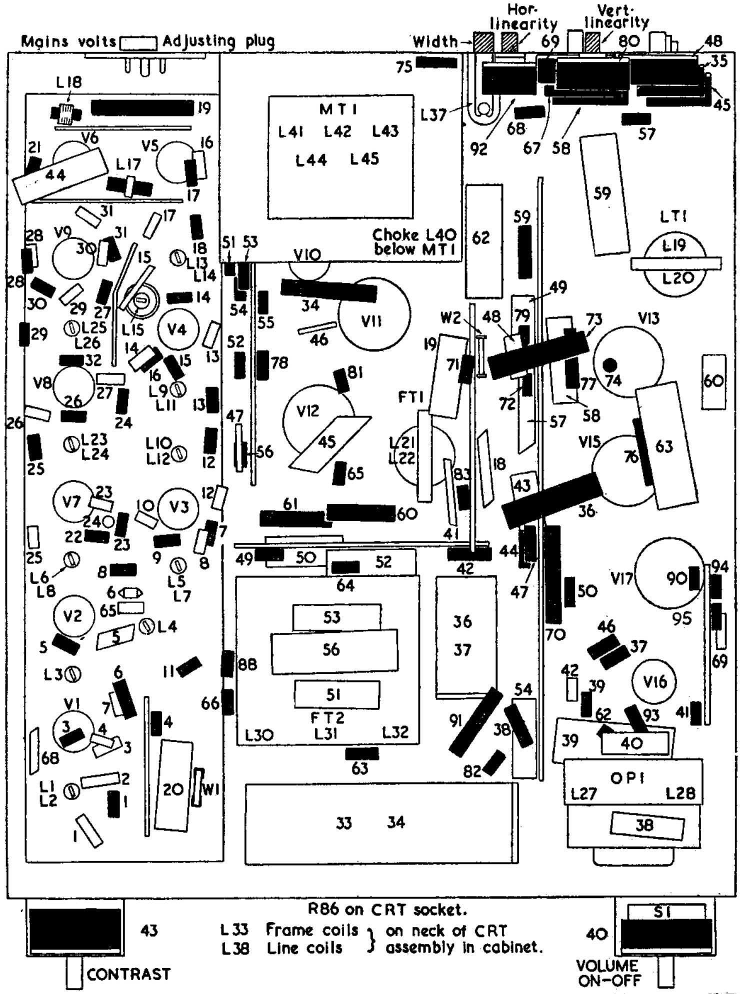


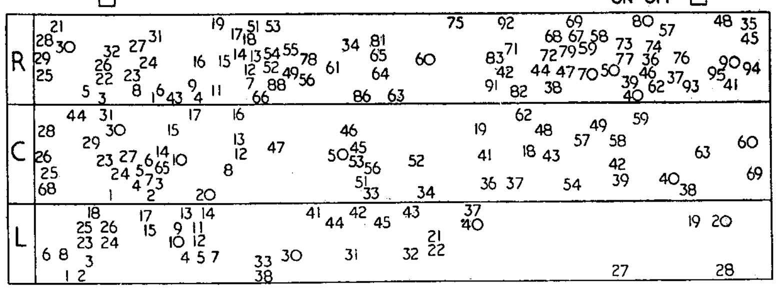
RESISTORS

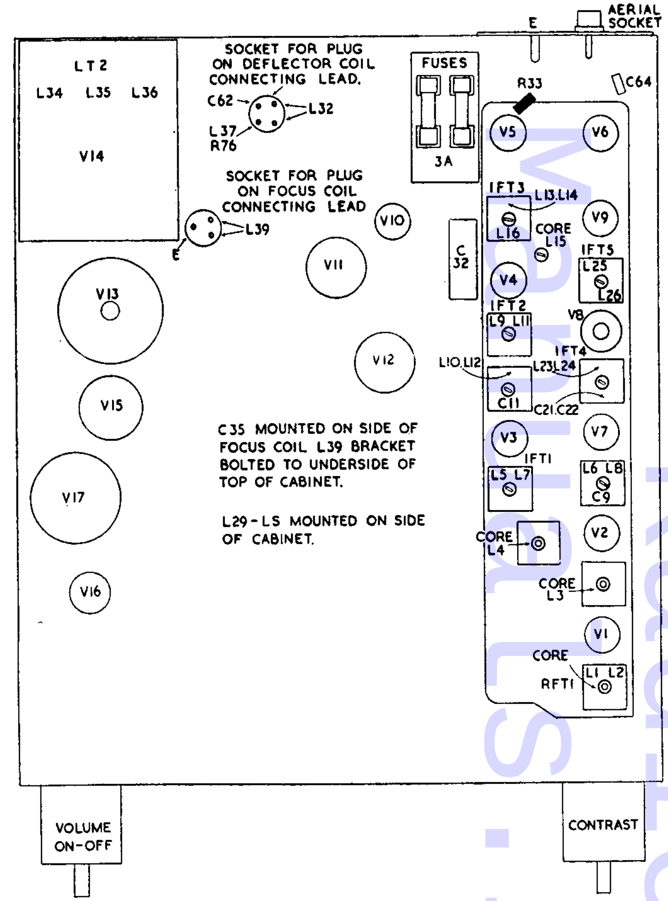
R		Ohms	Watts
1	...	4.7M	¼
2	...	No Component	
3	...	68	¼
4	...	100	¼
5	...	15K	¼
6	...	1K	½
7	...	270	¼
8	...	15K	¼
9	...	8.2K	¼
10	...	No Component	
11	...	150	¼
12	...	22K	¼
13	...	270	¼
14	...	47K	¼
15	...	2.2K	¼
16	...	180	¼
17	...	5.6K	¼
18	...	270	¼
19	...	12K	1
20	...	No Component	
21	...	10K	¼
22	...	33	¼
23	...	150	¼
24	...	2.7K	¼
25	...	27K	¼
26	...	180	¼
27	...	270	¼
28	...	100K	¼
29	...	470K	¼
30	...	1M	¼
31	...	2.2M	¼
32	...	4.7M	¼
33	...	1M	¼
34	...	21	5
35	...	500	WW Potr
36	...	1K	2
37	...	180	¼
38	...	220	½
39	...	10K	¼
40	...	500K	Potr. with DP Switch
41	...	33K	¼
42	...	150K	½
43	...	2K	WW Potr.
44	...	18K	½
45	...	30K	WW Potr.
46	...	220K	¼
47	...	27K	½
48	...	30K	WW Potr.
49	...	100K	¼
50	...	270K	¼
51	...	470K	¼
52	...	10K	¼
53	...	68K	¼
54	...	39K	¼
55	...	100K	¼
56	...	100K	¼
57	...	180K	¼
58	...	30K	Potr.
59	...	270K HS	1
60	...	1M HS	1
61	...	2.2M HS	1
62	...	680K	¼
63	...	68K	¼
64	...	2.2M	¼
65	...	220K	¼
66	...	1.5K	¼
67	...	30K	WW Potr.
68	...	33K	¼
69	...	10K	WW Potr.
70	...	4.7K	1
71	...	470K	¼
72	...	1M	¼
73	...	2.2K	2
74	...	1K	¼
75	...	33	½
76	...	1K	3
77	...	270K HS	1
78	...	220K	¼
79	...	3.3K	¼
80	...	250K	Potr.
81	...	220K	¼
82	...	220K	¼
83	...	330	¼
84, 85	}	No Component	
86	...	100K	¼
87	...	No Component	
88	...	180	¼
89	...	No Component	
90	...	100K	¼
91	...	1.5K	5
92	...	50	WW Potr.
93	...	560K	½
94	...	470K	¼
95	...	10K	¼

CAPACITORS

C		Capacity	Type
1	...	1000pF	Tub. Ceramic
2	...	1000pF	Tub. Ceramic
3	...	.003	Tub. 350V
4	...	1000pF	Tub. Ceramic
5	...	100pF	Silver Mica
6	...	5pF	Ceramic
7	...	1000pF	Tub. Ceramic
8	...	1000pF	Tub. Ceramic
9	...	22pF	Silver Mica
10	...	1000pF	Tub. Ceramic
11	...	33pF	Silver Mica
12	...	1000pF	Tub. Ceramic
13	...	1000pF	Tub. Ceramic
14	...	1000pF	Tub. Ceramic
15	...	150pF	Silver Mica
16	...	5pF	Ceramic
17	...	1000pF	Tub. Ceramic
18	...	120pF	Silver Mica
19	...	.1	Tubular 350V
20	...	.1	Tubular 350V
21	...	12pF	Silver Mica
22	...	5.6pF	Silver Mica
23	...	.003	Tubular 350V
24	...	1000pF	Tub. Ceramic
25	...	1000pF	Tub. Ceramic
26	...	.01	Tubular 150V
27	...	1000pF	Tub. Ceramic
28	...	33pF	Tub. Ceramic
29	...	.01	Tubular 150V
30	...	1000pF	Tub. Ceramic
31	...	1000pF	Tub. Ceramic
32	...	.01	Tubular 600V
33	...	60	Electrolytic 350V
34	...	100	Electrolytic 350V
35	...	100	Electrolytic 50V
36	...	16	Electrolytic 350V
37	...	16	Electrolytic 350V
38	...	.005	Tubular 1000V
39	...	100	Electrolytic 25V
40	...	.02	Tubular 500V
41	...	1500pF	Silver Mica
42	...	.003	Tubular 350V
43	...	.1	Tubular 350V
44	...	.1	Tubular 350V
45	...	2000pF	Silver Mica
46	...	47pF	Silver Mica
47	...	100pF	Silver Mica
48	...	180pF	Silver Mica
49	...	.01	Tubular 500V
50	...	.02	Tubular 500V
51	...	.05	Tubular 350V
52	...	.1	Tubular 350V
53	...	.1	Tubular 350V
54	...	.1	Tubular 350V
55	...	No Component	
56	...	100	Electrolytic 25V
57	...	1000pF	Silver Mica
58	...	.1	Tubular 350V
59	...	.2	Tubular 350V
60	...	.01	Tubular 500V
61	...	No Component	
62	...	.5	Tubular 350V
63	...	8	Electrolytic 350V
64	...	1000pF	Silver Mica
65	...	10pF	Ceramic
66, 67	}	No Component	
68	...	15pF	Silver Mica
69	...	300pF	Silver Mica







INDUCTORS

L			Ohms
1	...	...	Very Low
2	...	...	Very Low
3	...	...	Very Low
4	...	...	Very Low
5	...	...	.5
6	...	...	1
7	...	...	.5
8	...	...	.2
9	...	...	.5
10	...	...	1
11	...	...	.5
12	...	...	.2
13	...	...	1
14	...	...	1
15	...	...	Very Low
16	...	...	1
17	...	...	8
18	...	...	9.5
19	...	...	45
20	...	...	65
21	...	...	275
22	...	...	450
23	...	...	.2
24	...	...	.2
25	...	...	.4
26	...	...	.4
27	...	...	650
28	...	...	Very Low
29	...	...	3
30	...	...	1500
31	...	...	360
32	...	...	2.2
33	...	...	7.5
34	...	...	360
35	...	...	Very Low
36	...	...	7.5
37	...	...	5
38	...	...	7.5
39	...	...	525
40	...	...	65
41, 42, 43, 44	}	...	Very Low
45	...	...	15

VALVES and VOLTAGES

V	Type	A	G_2	K
1	6AM6	155	155	1.2—3.2
2	6AM6	170	150	0
3	6AM6	175	175	1.2—3.2
4	6AM6	180	180	1.6
5A	6AL5	—	—	—
5B	6AL5	15—50	—	125
6	6AM6	125	190	2
7	6AM6	160	160	.1
8	6AM6	185	185	1.4
9A	6AL5	—	—	—
9B	6AL5	25	—	25
10	6AM6	165	70	0
11A	6SN7GT	40	—	0
11B	6SN7GT	15	—	0
12	7C5	170	175	15
13	185BT	—	145	9.5
14	SU61	—	—	10kV
15	7Y4	—	—	—
16A	6AB8	60	—	7
16B	6AB8	170	180	7
17	27SU	220 RMS	—	225
18	121K	10kV	400V	125

Total rectifier current = 225mA. Mains current = .25A.

COSSOR 926

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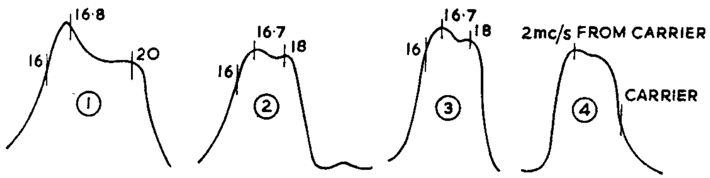

Line scan oscillator is triode V11A operated as grid-blocking oscillator with anode-grid back coupling by transformer LT1. Scan waveform is developed on C57 which charges through C49 and R59. Variation of grid voltage by R58 gives **Horizontal Hold.**

Line amplifier. Scan voltage across C57 is fed through R74 to grid of beam-tetrode line amplifier V13. R72 across C57 provides DC return path for grid. Output waveform at anode is transformer fed by LT2 to line deflector coils L38 on neck of CRT.

Efficiency diode. First portion of line scanning stroke is produced by conduction of V15 when its anode is swung about 700V positive on second half-cycle of surge oscillation set up in LT2 when V13 is cut off at end of previous line scan.

Linearity at commencement of line scan is controlled by R92 **Horizontal Linearity. Width** is controlled by adjustment of inductance L37, damped by R76 C60, connected in series with output secondary L36 of LT2 and line deflector coils L38.

Booster circuit for HT supply to first anode of CRT is provided by Metrosil W2 with capacitor C18 which on first half-cycle of flyback surge oscillation charges up through W2. During following half-cycle when V15 is conducting and during remainder of scan, voltage across L36 is low, but effective resistance of W2 is extremely high, hence very little of charge on C18 is lost. Voltage on C18 is fed through filter R71 C19 to first anode of CRT.

EHT of approximately 10kV for final anode of CRT is provided by V14, which rectifies the high surge voltage across primary and overwind L34 of LT2 when line amplifier V13 is cut off. Heater current for rectifier V14 is obtained from an auxiliary winding L35 on LT2. EHT is fed direct to anode of CRT, the capacity between inner and outer coatings of which provide smoothing.

HT is provided by indirectly-heated halfwave rectifier V17 fed through limiter R34 from 240-250V tapping on primary L45 of valve heater transformer MT1, the LT secondary L41 of which supplies rectifier heater current. Choke-capacity smoothing is by L40 C33 C34. Further smoothing is provided by focus coil L39 C35 and by R36 C36. Reservoir smoothing capacitor C33 should be rated to handle 500 mA ripple current.

Heaters of V1 to V12, V15, V16 are parallel-connected and fed from secondary L44 of MT1. Heater V13 is fed from series connected secondaries L43 L44. CRT heater current is obtained from a separate secondary L42. S1, ganged to sound volume control spindle, is ON/OFF switch.

CRT is a 12in. Cossor 121K tetrode with electro-magnetic focusing, the focus coil L39, shunted by **Focus** control R35, being connected in series with positive HT line.

Video signal is applied to tube cathode, and grid is used with variable bias from R45 to control **Brightness.** R86 prevents high voltage developing between heater and cathode.

ALIGNMENT INSTRUCTIONS

Apparatus required : Cossor Tele-Check, model 1320, or a suitable " wobbulator " ; a standard oscilloscope, a modulated signal generator, high-resistance voltmeter ; output meter of 3 ohms impedance ; and a non-metallic trimming tool.

Tele-Check output leads should terminate in 82 ohm resistors except when connection is made to aerial socket.

A 47K ¼W resistor should be fitted in series with " live " lead of oscilloscope near receiver connection end to act as an RF stopper.

Modulated sig-gen, which is used as a marker, can either be connected to terminals provided on Tele-Check or fed, via a 470-ohm resistor, to output terminals of instrument.

As receiver chassis is connected to one side of the AC mains supply, care should be taken to ensure that mains is connected correctly.

Wax sealing iron dust cores can be softened with a warmed grub screwdriver.

IF STAGES

(1) Connect oscilloscope to anode V6 ; short tapping on L15 to chassis, using a minimum length of wire ; inject 17 mc/s (approx.) signal from wobbulator into grid of V4. Adjust L13 L14 and L16 until curve in Fig. 1 is obtained. Peak at 16.8 mc/s is obtained mainly by adjustment of bottom core : beginning of steep fall at 20 mc/s is mainly brought about by adjustment of top core.

(2) Remove shorting connection on L15 ; advance Contrast control about one-third of its travel clockwise and inject a 19.5 mc/s modulated signal to grid V3. Adjust L15 and L12 (top) for minimum response. Remove signal generator ; connect wobbulator to grid of V3 and adjust L10 (bottom) and L9/11 for curve of Fig. 2. Retrim above alternately until the greatest curve amplitude is obtained.

(3) Disconnect wobbulator ; short oscillator coil L4, inject a 19.5 mc/s 30 per cent. modulated signal to grid of V1. Adjust L8 (top core) for minimum, advancing Contrast control setting if necessary to obtain sufficient response.

Connect oscilloscope to cathode V9B (pin 5). Adjust L23 L24 and L25/26 for maximum, reducing signal input so that amplitude of response is 4V peak to peak or less.

(4) Remove sig-gen ; disconnect shorting link on L4 ; advance Contrast control setting to about one-third of its travel clockwise and inject output from wobbulator into grid of V2. Reconnect oscilloscope to anode of V6 and adjust L6 (bottom) and L5/7 until curve Fig. 3 is obtained. Retrim L6 L8 and L5/7 for maximum amplitude.

RF STAGES

Connect wobbulator to aerial input socket (remove the 82 ohm resistors from leads) ; set frequency to about mean of required channel and adjust L1/2 L3 and L4 (in step) until a response curve appears in centre of oscilloscope. Adjust L1/2 and L3 for maximum response. Remove wobbulator, inject a 30 per cent. modulated signal of sound channel frequency into aerial input socket ; connect oscilloscope to cathode V9B (pin 5). Adjust L4 for maximum response, controlling input level so that response amplitude is 4V peak to peak or less.

Reconnect wobbulator in place of sig. gen. and connect oscilloscope to V6 anode. Adjust L1/2 and L3 for curve of Fig. 4. Retrim L4 and then lock the three trimmers.

SENSITIVITY

Vision : connect a suitable high-resistance voltmeter across video anode load resistor R19 and decouple by 0.1 mF. If an unmodulated signal at appropriate frequency is fed via aerial socket, signal required to produce a change of 20V should be less than 80 micro-volts for London and 100 microvolts for Birmingham.

Sound : the output level should be better than half the figure obtained on vision—i.e., at 80 microvolts on vision, sound sensitivity should be better than 40 microvolts.

CASEBOOK—*Continued from p. 21*

workshop, one with sound OK, raster OK but no vision, the other with sound OK, raster OK, very weak vision and weak sync. A voltage check of all the valves in the vision receiver revealed the same cause in both cases—the anode load resistor of V18 (PL83), the video valve (R67 3.3K 3W WW), had gone o/c.

With another 600A the fault was : no sync, line frequency affected by setting of interference limiter. A voltmeter check of V19 (UF42) sync separator showed high positive volts on g1. C61 (.068mF) sync feed condenser was suspected and, on test, proved to be a dead short.

A fault which has been encountered several times with the 600A is incorrect frame timebase frequency. The frame timebase runs too slow and cannot be adjusted to correct frequency by the framehold pot. The speed can be varied and the raster locked but with two pictures of half the normal height one above the other.

This condition is usually caused by R106 (470K 1/4W) going high resistance, sometimes up to several megohms. Replacement with a 1/2W resistor effects a lasting cure.

Another 600A was normal upon switching on but raster suddenly disappeared after 10-15 minutes. Examination revealed EHT had disappeared too and so had the 1,000c/s whistle generated by EHT oscillator V3(UAF 42).

Voltage check of V3 electrodes revealed anode volts to be low (150V instead of 400V). V3 derives its high anode potential from V1 (PZ30) acting as a voltage doubler. After this PZ30 had become thoroughly heated up, it broke down and caused the fault.

In a similar set frame amplitude was insufficient to fill screen. Frame hold control was right at the end of range, instead of nicely in the middle. A voltage check of V23 (UCH42) frame generator electrodes revealed anode volts to be low ; R88, the anode feed, had gone high to above 20K, instead of the 6.8K specified. Another set with the same fault was found to have a 33K resistor wired in this position.

With these sets, failure to focus with an enormously extended scan indicates low EHT. This is usually caused by R14 (390K, 3W, 2 per cent.) feed to V3 (UAF42) EHT generator going high resistance.—F. V. CARLSHAUSEN.

ENGLISH ELECTRIC 1550

ONE of these receivers had a fault which caused the picture to slip down the screen when the equipment was thoroughly warm. With the back left off the performance was normal.

After a series of fruitless checks for time-base interaction, etc., the deflection coil unit was changed—when the fault cleared. The picture, with the fault on, was correctly proportioned, but left a band about 3in. deep across the mask top and missed an equivalent band at the bottom.

A fault which frequently occurs in these receivers is arc-over from the 185 BT/A EHT generator anode to the EHT box. When this occurs with the valve correctly placed in the box the cause of the flashover is usually an excessively high voltage, caused by a high screen voltage on the 185 BT/A. The variation of this screen voltage adjusts focus.

The basic cause is wrong positioning of the PM focus magnet along the tube neck. This should be adjusted for optimum focus with EHT running at 9½-10kV and the focus control towards the bottom end (i.e., beginning) of its travel.

This is a recommended drill by EC, but is often ignored or is not noticed, and mild corona can bring some queer effects on the picture (erratic line trigger due to interference, etc.) without actual flashover.—T.H.

ENGLISH ELECTRIC 1651

QUITE often we have been called to this combined radio-TV to find no scan and no EHT. The cause is usually the breaking of a wire on the width control. This control is on a tip-over small panel and it is easy for the connecting wire to break. A simple fault, but the first time we went through the drill for no EHT before noticing this.—T.H.

GEC Conversions for Scotland and Wales

CONVERSION of existing GEC television receivers for the reception of Kirk o' Shotts and Wenvoe transmissions are dealt with in the following notes.

SUPERHET MODELS

For receivers BT3443, BT3839 and BT9144M, conversion kits are available with full instructions to GEC dealers at a net price of 7s. 6d. each. The modification consists of substituting aerial and oscillator coils, realignment, etc., and this can be done in the dealer's workshop. The kit for converting the receivers to the Scottish frequency is BT42C, and to the Western frequency BT42E.

To convert models BT1091B, BT1093 and BT4640 a conversion kit (also 7s. 6d. to the trade) BT42D will be needed to change to the Scottish frequency, and kit BT42F to change to the Western.

Models BT1091A, BT7092, BT7094 and BT9144L cannot be converted for use on single-sideband transmissions.

TRF MODELS

With receivers which use the tuned radio frequency technique modification is extremely simple and can be carried out on site. It consists of the replacement of the existing RF sub-chassis with another, which can be obtained by GEC dealers at a nominal cost of £7 each, less valves. Then, providing that the old sub-chassis is returned to the GEC supplier within three weeks and in good condition, a credit of £5 will be passed, which will thus make the cost to the dealer £2 net.

The identification codes for the various sub-chassis are as follows:—

Models BT2147, BT5144 and BT4541 : to convert these for the Scottish frequency use sub-chassis R806204, assembly 5, and for the Western frequency use R806204, assembly 6.

To convert models BT5145 and BT4542 to the Western frequency use sub-chassis R807025, assembly 7. It is not considered that there will be any call for conversion of these last two models to the Scottish frequency because sets of this frequency have been available for a long period.