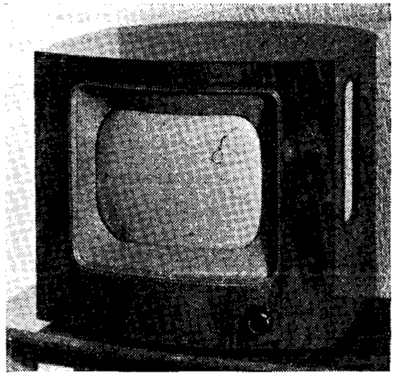
AMBASSADOR TV4, TV5

Sixteen-valve five-channel television receiver in walnut finished table cabinet. Model TV4 is fitted with a 12in. CRT and model TV5 with a 15in. tube. For 200-250V 50-100c/s. Made by Ambassador (R. N. Fitton Ltd.), Brighouse, Yorkshire



THE receiver is a superhet operating on lower sideband of vision carrier. Aerial, RF and oscillator coils have combination brass and iron dust, or iron dust cores, to enable them to be tuned to any of the five BBC television channels.

Aerial input circuit is for use with 80 ohm co-axial feeder which is connected to primary L1 of aerial coupling transformer RFT1. Earthy side of L1 and outer screening of co-axial are isolated from chassis by C57.

RF amplifier. Aerial signal is coupled by secondary L2 to grid of RF amplifier V1, gain of which is controlled by R11, the **Contrast** control, in its cathode. R11 maintains reasonably constant the input capacity and resistance of V1 and preserves the shape of the response curve.

Frequency-changer is pentode V2 operated as combined oscillator and mixer. Oscillatory tuned circuit L4 C6 is connected between screen and grid through C7, automatic bias for grid being developed on C7 with R7 as leak. Oscillator anode voltage is obtained from R5 and fed through tapping on L4 and stopper resistor R6 to screen.

RF signals at anode of V1 are fed by C5 to tap on L4, where they are mixed with oscillator signal, to produce across primary L5 of IFT1 a mean vision IF of 15.75 mc/s and sound IF of 19.25 mc/s.

Vision and sound IF signals at anode V2 are bandpass transformer coupled by IFT1 to common IF amplifier V3 the gain of which is controlled, with that of RF amplifier V1, by R11.

Vision channel consists of a further IF amplifier V4, followed by a signal rectifier V5A, interference limiter V5B and video amplifier V6.

Vision signal at anode V3 is fed by IFT2 to V4 which is bandpass transformer coupled by IFT3 to signal rectifier diode V5A. Bandwidth is maintained by damping resistors R17 R20.

Sound-on-vision rejection at 19.25 mc/s is given by L12 L13 C13 in grid of V4 and by L18 L17 C17 in signal rectifier diode anode circuit. Rectified video signal is developed across R21 and DC coupled to grid of video amplifier V6, the output of which is applied through frequency compensating network R47 C35 to cathode of CRT.

Interference limiter is diode V5B connected with cathode to anode of video amplifier V6 and its anode down to chassis through C19 R23 R25 R26/7 R28. The anode is biased positively through R23 from R25 the **Vision Noise Limiter** control so that normally at peak white signal, the diode just remains cut-off. When interference greater in amplitude than peak white appears V5B conducts to short circuit the pulse to chassis through C19.

Sound Channel consists of one further IF amplifier V7, signal rectifier V8A, noise suppressor V8B, and sound output valve V9.

Sound IF of 19.25 mc/s is taken from anode of common vision and sound IF amplifier by C22 and fed to L20 C62 in grid of sound IF amplifier V7, the gain of which is controlled by variation of its cathode bias by R37 the **Volume Control.**

Amplified signal at anode V7 is bandpass transformer coupled by IFT4 to signal rectifier diode V8A. Audio signal is developed on R38 C38 and fed by C29 through noise suppressor diode V8B and filter R41 C30 C31 and through C32 to grid of beam-tetrode output amplifier V9, the audio output of which is transformer fed by OP1 to a 6½in. PM speaker L28 (8" EN in console).

Fixed tone correction is given by R53 C41 across primary of OP1. Bias for V9 grid is provided by negative voltage developed across focus coil L23 shunted by R54 R55 in HT negative return lead to chassis. Bias is smoothed by C36 and fed through decoupling network R43 C34 and grid load R42 to grid.

Noise Suppressor. Anode of diode V8B is biased positively from HT line through R39 and thus conducts, setting up a voltage across cathode load R40. Time constant of R39 C30 is such that voltage on C30 follows that of the audio signal fed by C29 to cathode of V8B.

When a large-amplitude high-frequency interference pulse is passed by C29 then, due to comparatively long time constant of R39 C30 the cathode is driven positive to the anode and the diode is cut off.

Sync separator. Signal at anode of video amplifier V6 is fed through R56 C43 to grid of sync separator valve V11. Positive sync pulses drive V11 into grid current and the resultant bias across R57 is sufficient to place video portion of waveform below cut-off; thus only the sync. pulses appear at anode and screen.

Frame sync pulses are taken from screen and applied through R60 C44 to cathode of frame scan oscillator V12. Line sync pulses are developed across anode load R58 and fed by C51 to screen of line scan oscillator and amplifier V14.

Frame scan oscillator is thyratron V12. Scan voltage is developed on C47 which charges from HT through R63 and is discharged rapidly by V12 when it is triggered by frame sync pulses. Adjustment of cathode bias by R65 gives **Vertical Hold.**

Frame amplifier. Scan voltage on C47 is fed by C48 through **Vert Form** control R67 and R69 to grid of beam-tetrode frame amplifier V13. Amplified scan voltage at anode is developed across choke L34, damped by R72, and directly coupled to frame deflector coils L24 on neck of CRT. C50 is DC isolating capacitor. **Height** is controlled by R71 which adjusts amount of cathode negative feedback.

Line scan current is generated by beam-tetrode V14 which is driven into self-oscillation by positive grid feedback obtained from secondary L37 of line output transformer LT1. Frequency of scan is adjusted by **Horizontal Hold** control R79 in grid circuit. Output waveform is fed by secondary L38 of LT1 through adjustable **Width** control inductances L40 L41 to line deflector coils L25 on neck of CRT.

Additional HT for anode of frame scan oscillator V12 and line oscillator and amplifier V14 is provided by voltage across C54 which is charged up by V15 when it rectifies and damps the shock oscillation set up in LT1 when V14 is cut off at end of line scan.

EHT for anode of CRT is provided by V16 which rectifies high surge voltage developed on primary L36 and its overwind of LT1 when V14 is cut off. EHT is smoothed by C55.

HT is provided by a halfwave metal rectifier MR fed from auto-transformer primary L32 of mains input transformer MT1. Choke-capacity smoothing is given by L29 C39 C40 with additional voltage dropping and resistance-capacity smoothing by R81 C42. RF decoupling is provided by C33. Reservoir smoothing capacitor C39 should be rated to handle 600mA of ripple.

Heaters of V1 - 9, 11 - 13 are in parallel and fed

ALIGNMENT INSTRUCTIONS

Apparatus required: sig-gen covering 10-70-mc/s, 1,000ohms-per-volt DC voltmeter, output meter or 100V AC range on Avometer, non-metallic screwdriver or trimming tool, and 470ohm damping resistor.

IF STAGES

Inject to grid of	Inject frequency (mc/s)	Procedure
(1) V4	17.5	Damp L15/L16, tune L14 for max. voltage across R29.
(2) V4	16.9	Damp L14, tune L15 for max. voltage.
(3) V4	19.25	Tune L17 for min. voltage across R29.
(4) Repeat 1 and 2.		
(5) V3	17.3	Damp L9, tune L8 for max.
(6) V3	18.6	Damp L8/L10, tune L9 for max.
(7) V3	19.25	Tune L13 for min. across R29.
(8) Repeat 5 and 6.		
(9) V2	17.5	Damp L6/L7, tune L5 for max.
(10) V2	17.8	Damp L5, tune L6 for max.
(11) V2	19.25	No damping. Tune L21 and L22 for max. sound output.
(12) V2	19.25	Tune L20 for min. volts across R29 with R37 set at 50 per cent. rotation.
(13) Repeat 9 and 10.		

RF Stages

Align oscillator coil L4 at sound frequency for max. sound.

Align HF coil L3 0.75mc/s above sound frequency.

Align aerial coil L2 0.5mc/s below vision frequency.

Service Casebook

EARTH FOR SAFETY ?

A RECENT experience has magnified my doubt of the safety afforded by an earth connection. In a temporary workshop building containing no water pipes, two fuse boxes served different circuits described A and B, and a common earth bus-bar, with two earth rods, served the benches. A bench fitting included a steel post in the concrete floor, forming a convenient earth for checking a mains-connected chassis for " live " or " safe."

Let us call the earth bus-bar " ground " and the steel post " earth." A chassis was checked on circuit B and found to be safe by a meter test between earth and chassis. During work on the chassis, accidental contact was made with the case of a test instrument connected to ground. The A circuit fuse immediately blew.

While this fuse was being repaired, circuit B was used and a meter test was made between earth and chassis, and ground and chassis; both showed zero volts—chassis safe.

When fuse A had been repaired, another test was made—earth to chassis—safe; ground to chassis—chassis " live." Another test was made between earth and ground—full mains potential was indicated.

The loads on circuit A were then tested and a fault found in an electric fire where the earth lead had broken and was touching the live lead. Although considerable current must have been flowing in the earth bus-bar it was not sufficient to blow the A circuit fuses but it rendered the earth bus-bar " live."

Perhaps it would be safer if all electrical appliance cases were made of insulating material so that earth connections were not relied upon for safety?—F. R. Pettit, Herne Bay.

INTERMITTENT SYNC. PYE FV1

IN the Pye FV1 a chassis may develop a sync. fault which remains for hours or even days. Normal conditions may be restored by switching off and on, or even during continued operation of the receiver.

The fault shows up as loss of sync., both frame and line, although with careful adjustment either time-base may be locked if the other is set well off frequency. The sync. separator grid waveform appears normal, but, although voltages are normal, the anode waveform is very low in amplitude. A considerable improvement is made by connecting a quarter megohm from sync. separator grid to chassis but a complete cure is effected by increasing the sync. sep. grid limiter resistor from 10K to 80K ohms. It is thought that the fault really lies in the transmitted waveform causing overbias on the sync. sep. on some programmes.—F. R. Pettit, Herne Bay.

MARCONIPHONE T11DA

A MARCONIPHONE T11DA receiver was brought in with the complaint that it faded after about 30 mins.' use and would eventually work only on strong signal; if it was allowed to cool off it would perform correctly again for a short while.

It was found, by using the sig. gen., that the gain of the IF stage fell off after this interval and a positive voltage appeared on the grid of this valve, a W76. Replacing the valve, which appeared to have developed grid emission, cured the trouble.—K. D., Ramsgate.

from a 6.3V secondary L33 of MT1. Heater of booster-diode V15 is fed from a separate 28V secondary L30 and CRT heater from a 2V secondary L31.

Heater of line output valve V14 is fed from a 38V tapping on auto-transformer primary L32 of MT1. Primary L32 is tapped for inputs of 200, 220, 240V 50-100c/s.

Mains input is fed through 2A fuse and filter coil in each lead to S1 the on/off switch ganged to **Brilliance** control. C38 is mains bypass capacitor and C37 isolating capacitor between earth socket and earth wire of mains lead and chassis.

CRT. Model TV4 is fitted with a 12in. triode Mazda CRM123 and model TV5 with a 15in. triode type CRM151. Both are electro-magnetically focused—the focus coil being connected in negative HT return lead to chassis with current adjusted by **Focus** control R55.

R31, by varying grid voltage, gives **Brilliance** control. One side of heater is connected to junction of R44 R48 to prevent high voltage developing between cathode and heater.

MODIFICATIONS

The circuit diagram and information given above are for the latest issues of these receivers. Earlier models may differ in many ways but to assist servicing we give as many of the circuit differences as possible.

Earliest models employed an indirectly heated twin fullwave HT rectifier, type U801, the heater of which was connected in series with heater V14 and fed from 118V tapping on auto-transformer. The anodes were fitted with 47 ohm surge limiters and fed from top of L32.

Later models employed two U31 rectifiers in place of U801 and were fitted with 68 ohm anode current limiters. Heaters were series connected and fed from a 52V tapping on L32.

Sync separator V11 circuit differed in that suppressor grid was earthed and line sync pulse taken from screen through a 50pF capacitor whereas frame sync pulse was obtained from anode circuit and fed through R60 C44 (.05mF) to cathode of frame oscillator V12, the grid resistor R61 being connected direct down to chassis.

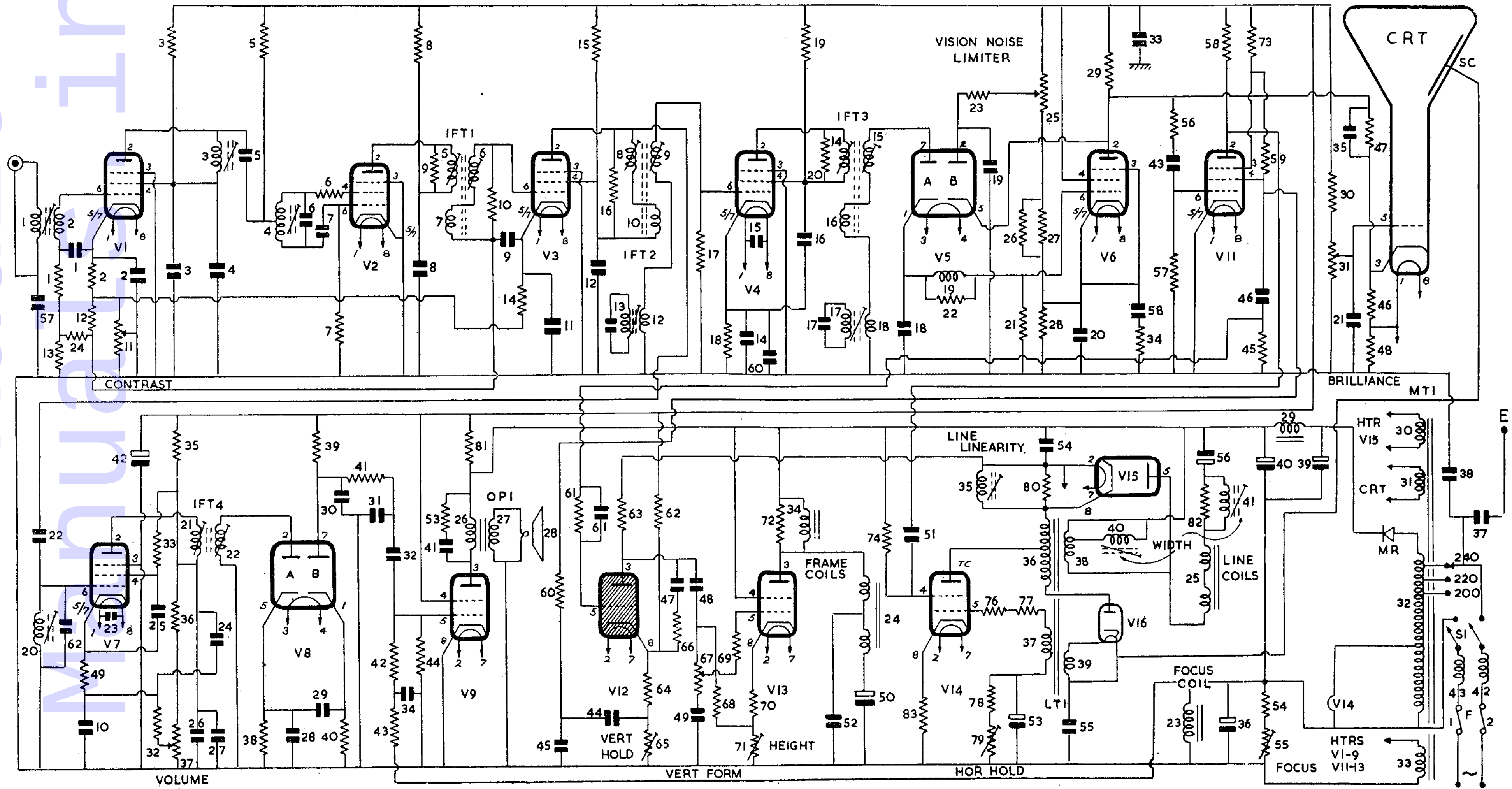
Sound channel signal was obtained from a loop inductively coupled to L8/10 of IFT2 and then fed by C22 to L20. The bottom end of L20, instead of going direct to chassis, was connected to junction of 3.3K and 100K resistors in cathode of V7, this point being decoupled by C10. R32 was connected from cathode V7 in series with the 3.3K and 100K and the whole cathode network was decoupled by C24.

IF rejector circuit L12 L13 C13 was connected in grid end not earthy end of secondary L9 of IFT2. Frame coils L24 were connected through a 150K resistor to HT line and C52 not used. HT for V12 was obtained from HT, not from booster-diode capacitor C54.

Line sync pulse was fed by C51 (50pF) to junction of R76 R77 in grid of V14.

CAPACITORS

C	Capacity	Type
1	... 3000pF	Mica
2	... 1000pF	Tubular
3	... 1000pF	Tubular
4	... 1000pF	Tubular
5	... 5pF	Silver Mica
6	... 15pF	Silver Mica
7	... 100pF	Silver Mica
8	... 1000pF	Tubular
9	... 2200pF	Tubular
10	... 1000pF	Tubular
11	... 2200pF	Tubular
12	... 1000pF	Tubular
13	... 30pF	Silver Mica
14	... 1000pF	Tubular
15	... 2200pF	Tubular
16	... 1000pF	Tubular
17	... 30pF	Silver Mica
18	... 6pF	Ceramic
19	1	Tubular 350V
20	... 200pF	Silver Mica
21	1	Tubular 350V
22	... 3pF	Silver Mica
23	... 2200pF	Tubular
24	... 2200pF	Tubular
25	... 2200pF	Tubular
26	... 2200pF	Tubular
27	... 2200pF	Tubular
28	... 25pF	Silver Mica
29	... .02	Tubular 350V
30	... 120pF	Mica
31	... 300pF	Mica
32	... .05	Tubular 350V
33	... 2200pF	Tubular
34	... .25	Tubular 150V
35	... .25	Tubular 150V
36	... 25	Electrolytic 50V
37	... .05	Tubular 500V
38	... .05	Tubular 500V
39	... 100	Electrolytic 350V
40	... 200	Electrolytic 350V
41	... .005	Tubular 1000V
42	... [illegible]	Electrolytic 350V



C	Capacity	Type
43	.1	Tubular 350V
44	.02	Tubular 350V
45	.01	Tubular 1000V
46	.05	Tubular 350V
47	2 x .1	Tubular 350V
48	.5	Tubular 350V
49	.02	Tubular 350V
50	32	Electrolytic 350V
51	300pF	Mica
52	1000pF	Mica
53	2	Electrolytic 150V
54	2	Tubular 200V
55	.001—10kV or 12.5kV	
56	25	Electrolytic 25V
57	1000pF	Tubular
58	1000pF	Mica
59	25	Electrolytic 25V*
60	2200pF	Tubular
61	1pF	Ceramic
62	35pF	Silver Mica

*C59 fitted on some chassis.

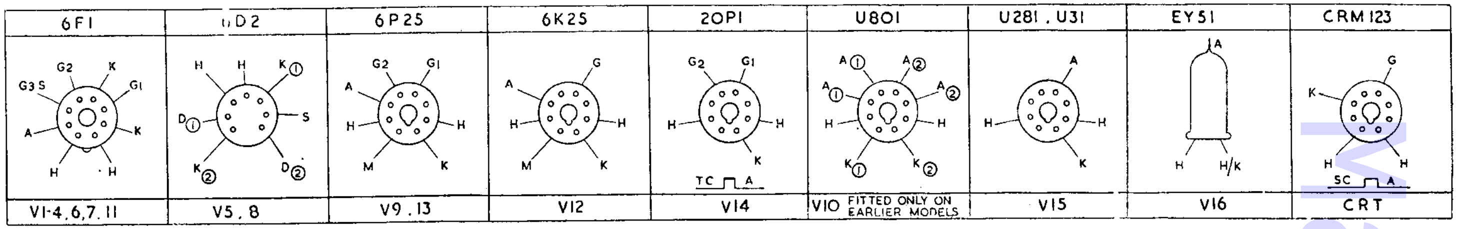
INDUCTORS

L	Ohms
1-4	Very low
5	1
6, 7	.3
8, 10	.75
9	.5
11	No coil
12	Very low
13	.3
14	.75
15, 16	.75
17	Very low
18	.3
19	3.5
20	.25
21	.75
22	.75
23	135
24	1400
25	14
26	300
27	Very low
28	2.5
29	68
30	Very low
31	Very low
32	27
33	Very low
34	1000
35	12
36	70
37	10
38	2.5
39	Very low
40	1.5
41	1.5
42	1
43	1

RESISTORS

R	Ohms	Watts
1	1K	¼
2	180	⅛
3	3.3K	½
4	15K	¼*
5	22K	1
6	22	¼
7	100K	⅛
8	5.6K	⅛
9	5.6K	⅛
10	10K	⅛
11	10K	WW Potr.
12	4.7K	¼
13	100K	¼
14	180	⅛
15	3.3K	½
16	10K	½
17	10K	¼
18	180	⅛
19	1K	¼
20	22K	⅛
21	5.6K	¼
22	47K	¼
23	2.2M	¼
24	15K	¼
25	30K	WW Potr.
26	33K	⅛
27	33K	⅛
28	270	½
29	6.8K	1
30	100K	⅛
31	100K	Potr. with DPSN
32	180	⅛
33	3.3K	⅛
34	100	⅛
35	2.2K	¼
36	270K	¼
37	15K	WW Potr.
38	100K	¼
39	3.9M	¼
40	1M	¼
41	33K	¼
42	1M	¼
43	470K	¼
44	680K	¼
45	100	¼
46	100K	¼
47	150K	¼
48	470K	¼
49	47	¼
50	No component	
51	68	3*
52	68	3*
53	4.7K	¼
54	220	2
55	1.5K	WW Potr.
56	10K	¼
57	470K	¼
58	68K	¼
59	100K	1
60	47K	¼
61	47K	¼
62	220K	¼
63	560K	½
64	2.2K	¼
65	2.5K	WW Potr.
66	68	¼
67	500K	Potr.
68	1M	¼
69	47K	¼
70	180	½
71	1K	WW Potr.
72	10K	¼
73	150K	¼
74	4K	WW
75	No component	
76	270	¼
77	1K	1
78	680	1
79	5K	WW Potr.
80	2.8K	WW
81	220	1
82	2.2K	½
83	33	¼

* Fitted on some earlier receivers.



VALVES and VOLTAGES

Total HT current 260mA

Mains current at 230V, 630mA

V	Type	A	G_2	K
1	6F1	230	230	45
2	6F1	170	130	0
3	6F1	220	220	45
4	6F1	230	230	2.4
5 A	6D2	—		—
5 B	6D2	—		180
6	6F1	180	245	4.6
7	6F1	225	215	2-60
8 A	6D2	—		—
8 B	6D2	5		5
9	6P25	250	245	—
10	U801	250V RMS on all four anodes	—	260
11	6F1	100	50	0
12	6K25	60	—	18-25
13	6P25	215	260	8-40
14	20P1	—	100	0
CRT	CRM123	10kV	—	165
	CRM 121B	12.5kV	—	165
15	U281	—	—	320
16	EY51	—	—	10 or 12.5kV