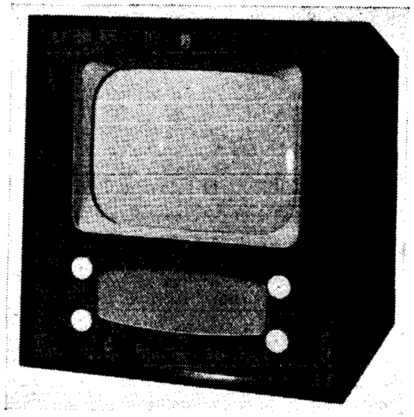
PHILIPS

1114UM

Nineteen-valve five-channel television receiver with 14in. tube giving a 11¼ by 8½in. picture. Housed in walnut finished, hood type cabinet. Suitable for 200-250V AC/DC. Manufactured by Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, WC2.



THE receiver employs a superheterodyne circuit which operates on the lower sideband of vision carrier, and in which the RF and frequency-changer stages are common to both vision and sound channels. Vision interference and sound noise suppression circuits are incorporated, and EHT is derived from line flyback. Channel selection is by means of plug-in aerial, RF and oscillator coils and adjustment of the oscillator trimmer.

Mains consumption, approximately 150W.

Aerial input is for use with screened 75-ohm balanced feeder, which is isolated from chassis by C1 C2 C3, but coupled to the earth terminal through static drain resistors R1 R2. Aerial signal is fed either direct or through a 10 to 1 attenuator made up of resistors R3 to R7, to L3, which is inductively coupled to tuned input transformer L1 L2 in grid of RF amplifier V1.

RF stage. Signal is amplified by RF amplifier V1, the gain of which is pre-set by R38, the **Sensitivity** control in its cathode. The output from V1 goes via parallel-fed bandpass transformer L4 L5 and C11 to frequency changer V2. Damping by R11 R17 provides bandwidth coverage both on vision and sound frequencies.

Oscillator. A Colpitt's type tuned circuit L6 C12 C13 C15 C14 is connected between screen and grid of V2 through L5 C11. Automatic bias for V2 is developed on C11 with R15 as leak. The circuit operates 12 mc/s lower than vision carrier.

Mixer. Aerial and oscillator signals are mixed in V2, at the anode of which, across L15 and L7 appear the intermediate frequencies of 12 mc/s (vision) and 8.5 mc/s (sound).

Vision channel. Vision IF is coupled by a double-tuned bandpass transformer L15 L16 to first vision IF amplifier V7, the gain of which is controlled by **Contrast** control R43 in the cathode. L17 and L22 are IF sound rejectors tuned to 8.5 mc/s. V7 is bandpass transformer coupled to V8, the second IF amplifier, by L21 L18, which are over-coupled to resonate at approximately 13.5 mc/s with 6dB response peaks at 9.6 mc/s (10.4 mc/s Fringe model) and 17 mc/s.

Coupling between V8 and the diode rectifier V9A is achieved by L19 L20 which resonate with the valve capacitance at about 30 mc/s to increase the rate of attenuation at high frequencies and to increase also the discrimination against various undesirable harmonics and beat frequencies.

Rectified vision signal at cathode of diode V9A is DC coupled through R160 to video amplifier V10, the output from which is DC coupled to cathode of CRT. L23 L67 are 3 mc/s peaking coils.

Interference limiter, diode V9B, has its cathode connected to V10 anode, while its anode goes to R46, **Picture interference limiter,** which forms part of potential dividing network R51 R118 R158 across boosted HT line. R46 should be set so that the diode remains cut-off up to, and just above, peak white. Pulses greater in amplitude than peak white cause V9B to conduct and are short-circuited to chassis through C41.

Sound channel. Sound IF signal at anode of V2 is fed via L7 L8 to V3, first sound IF amplifier. Coupling between V3 and the second IF amplifier V4A is by means of a shunt auto-transformer L9 L10, the output from this valve being single-peak transformer coupled by L11 L12 to detector diode V5A.

Audio signal across R28 is fed by C24 through series noise suppressor diode V5B, **Volume control** R25 and C23 to grid of triode amplifier V4B, the output from which goes to pentode amplifier V6, which is transformer coupled by OP1 to a 5in. PM speaker L76.

An anti-parasitic device, consisting of a Ferroxcube magnetic ring R52, through which grid lead to V6 passes, is fitted close to the valveholder tag. The magnetic field surrounding the grid lead couples directly with the magnetic field of the ring and the ring functions as a magnetic short circuit damping out any RF oscillation.

Negative feedback from anode to grid V6 is provided by C75 R104.

AVC. DC potential across R27 is divided by R29 R16 and applied through L8 to grid of first sound IF amplifier V3. AVC control characteristic is modified by connecting earthy end of R27 to cathode V4A.

Noise suppressor. Diode V5B is maintained conducting by negative cathode bias from R27 through R26 whilst signal is being received. With V5B conducting, rectified audio signal fed to its cathode by C24 is passed to volume control R25. When an interference pulse appears with audio signal, cathode of V5B is driven heavily positive, but owing to comparatively long time-constant of R154, in conjunction with screened lead capacity, the anode is unable to change as rapidly and the diode cuts off.

Sync separator. Video signal at anode V10 is fed through C48 to grid of sync separator V14A. The positive sync pulses drive valve into grid current and a negative charge is built up on C48 sufficient to place video signal below cut-off, thus only sync pulses appear at anode.

Frame sync pulses are integrated by R77 C60 and fed by C58 through R80 to grid of pentode frame-clipper V19A. This valve is operated with low anode and screen voltages to provide short grid base and its grid is positively biased from junction of R84 R85 to give sufficient grid clamping. Negative integrated frame sync pulses cut off V19A, and its anode voltage rises to half the full HT line voltage. The sudden increase in current through primary L33 of FT1 produces a positive triggering voltage at the grid of frame scan oscillator V19B.

Line sync pulses are fed by C49 R59 to grid of line-clipper triode V14B. The negative-going pulse cuts off the valve, and thus removes any noise which may occur during the synchronising pulse. The positive pulse at anode V14B is differentiated by C50 R63 and fed through C51 to grid of another triode line-clipper V15A. This valve has a short grid base and only the positive sync pulses will cause anode current to flow. Negative sync pulses developed at anode are fed by C52 to anode of line scan oscillator V15B.

Frame scan oscillator is triode V19B operated as a grid blocking oscillator with anode to grid back-coupling by transformer FT1. Scan voltage is developed on C62. Adjustment of R88 in grid provides **Frame hold** control.

Frame amplifier. Scan voltage on C62 is fed by C61 through R122 R121 to grid of pentode V20, the amplified output of which is transformer coupled to FT2 to frame deflector coils L38 L39 on neck of CRT. Negative feedback to improve linearity is provided through the feedback winding L73 and C68. **Frame linearity** is controlled by R95. R90, **Frame amplitude** control, operates by altering the zero point of feedback network.

Line scan oscillator is pentode V15B operated as a grid blocking oscillator with anode to grid back-coupled by transformer LT1. Scan voltage is developed on C54. Variation of series charging resistor R70 gives **Line Hold** control.

Line amplifier. Scan voltage is taken from screen of V15B and applied through C55 R73 to grid of pentode line amplifier V16, the output from which is transformer fed by LT2 to the line deflector coils L40 L41 on neck of CRT. **Line amplitude** is controlled by variation of inductance of series coil L42. R67 C80 damp out ringing in L42 during flyback and also assist linearity. The **Linearity** correction coil L69 is provided so that the rate of change of inductance with current can be adjusted for optimum linearity.

Booster diode is V18. High peak voltage occurring during flyback is applied, scaled down in proportion, to the cathode, and the boosted HT voltage is fed to the first anode of CRT via the smoothing circuit C72 R47. It also supplies frame oscillator, **Brightness** and **Interference limiter** controls.

EHT of approximately 12kV is obtained by rectification by V17 of the high surge voltage set up across primary L28 and its over-wind L27 when V16 is cut-off. Smoothing is affected by the capacitance between the inner and outer graphite coatings of the CRT.

HT is derived from a pair of half-wave indirectly-heated rectifiers V12 V13 connected in parallel and fed from the mains through surge limiters R105 R106 and droppers R107 R108. On 217-235V mains R108 is shorted; on 200-217V, R107 and R108 are short circuited.

Choke-capacity smoothing is by L44 C71 C32. HT line is RF decoupled by C47. C71 should be rated to handle 500mA ripple.

Heaters of all valves except EHT rectifier V17 are connected in series and obtain their current from the mains through thermal surge limiter R112 shunted by R111 and R109 R110. On 217-235V, R110 is shorted; on 200-217V, R109 and R110 are short circuited. Heater line is RF decoupled by C43 C44 C45 C78 C81 C82 C109. S1, the on/off switch, is ganged to volume control R25. Mains input incorporates a 1A fuse in each lead.

CRT is a 14in. tetrode with electro-magnetic focusing. Video signal is fed to its cathode, and picture **Brightness** is controlled by variation of grid voltage by R51.

Focusing of CRT is accomplished by electro-magnetic coil L36 L37. L37 is connected from HT line to cathode of V6, the sound output valve. The cathode bias of V6 is variable from 4 to 10.5V by means of **Focus** control R34 and the anode plus screen current of V6, which is drawn through L36 of focus coil, is varied accordingly from 65-40mA.

ADJUSTMENT

Removing cabinet hood. The cabinet hood and backplate are held in position by four (4mm.) bolts, two through top rear of cabinet, and two through the cabinet cross strut. Removing and replacing hood may be more easily carried out if set is placed front downwards on bench.

Removing baseplate. The baseplate is held by six screws. When replacing, check to see that earthing lead is connected under one of the screws.

Removing CRT assembly. Remove cabinet hood. Unplug tube base, and deflector assembly leads. Unscrew two hexagonal-headed bolts which hold deflector coil assembly to main chassis bracket. Slacken clamping band round CRT. The CRT and deflector coil assembly may now be removed by passing it through the right-hand side of chassis frame (viewed from the rear).

Removing CRT. Remove CRT assembly. Remove ion trap magnet (one screw). Slacken four clamping bolts (the four inner bolts on the back-plate of deflector unit).

Replacing CRT, and deflector unit adjustment. Slide deflector unit over the neck of the tube, pushing it as far as it will go. Do not completely tighten four clamp bolts. Place deflector coil and CRT assembly in position in receiver, and replace the clamping band, making sure that the earthing strip makes contact with the CRT outer graphite coating. Bolt deflector assembly to chassis bracket. Plug in leads from the deflector unit, replace ion trap magnet, fit tube base and switch on. Adjust ion trap magnet for maximum brightness. (*Danger.* The deflector coil frame and chassis may be live if an isolating transformer is not in use.) Slacken two bolts which clamp front deflector unit bracket and turn unit until picture is square with mask. Tighten the two bolts, centre picture by adjusting the three knurled nuts. Tighten tube clamping bolts.

Diagrams overleaf; text continued p. 24

CAPACITORS

C	Capacity	Type
1	3300pF	Tubular 800V
2	1000pF	Silver Mica
3	1000pF	Silver Mica
4	2—8pF	Trimmer
5	2—8pF	Trimmer
6	470pF	Ceramic
7	100pF	Ceramic
8	560pF	Ceramic
9	2—8pF	Trimmer
10	2—8pF	Trimmer
11	100pF	Ceramic
12	390pF	Ceramic
13	39pF	Silver Mica
14	31—30pF	Trimmer
15	56pF	Silver Mica
16	4760pF	Tubular 400V
17	.047	Tubular ... 125V
18	4700pF	Tubular 400V
19	100pF	Ceramic
20	4700pF	Tubular 400V
21	4700pF	Tubular 400V
22	4700pF	Tubular 400V
23	.022	Tubular 125V
24	.068	Tubular 125V
25	47pF	Ceramic
26	47pF	Ceramic
27	.01	Tubular ... 400V
28	220pF	Ceramic
29	.015	Tubular ... 400V
30	50	Electrolytic 25V
31	65	Electrolytic 275V
32	100	Electrolytic 275V

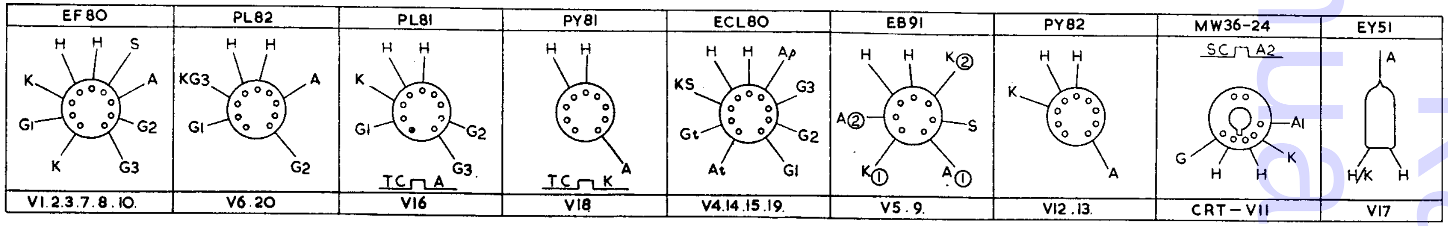
C	Capacity	Type
33	4700pF	Tubular 400V
34	4700pF	Tubular 400V
35	1000pF	Tubular 600V
36	330pF	Silver Mica
37	.068	Tubular ... 125V
38	4700pF	Tubular 400V
39	330pF	Silver Mica
40	8.2pF	Ceramic
41	.22	Tubular ...400V
42	100	Electrolytic 12V
43	4700pF	Tubular 400V
44	4700pF	Tubular 400V
45	4700pF	Tubular 400V
46	.022	Tubular ... 800V
47	4700pF	Tubular 400V
48	.056	Tubular ... 400V
49	100pF	Ceramic
50	33pF	Ceramic
51	4700pF	Tubular 400V
52	2200pF	Tubular 400V
53	1000pF	Tubular 400V
54	1000pF	Tubular 400V
55	.047	Tubular ... 400V
56	No Component	
57	.056	Tubular ... 400V
58	1000pF	Tubular 400V
59	1000pF	Tubular 400V
60	470pF	Ceramic
61	.1	Tubular ... 400V
62	.056	Tubular 400V
63	.47	Tubular ... 400V
64	330pF	Ceramic
65	No Component	
66	100	Electrolytic 25V

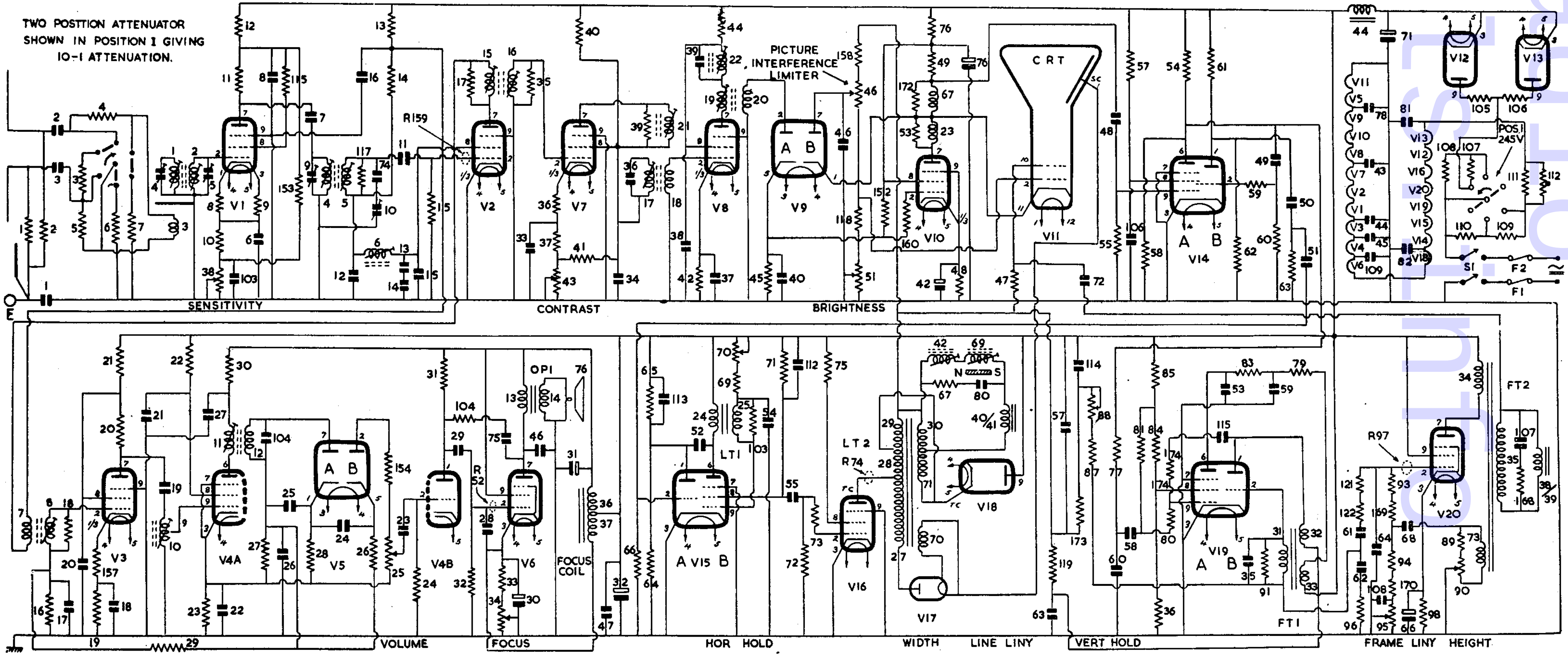
C	Capacity	Type
67	No Component	
68	.068	Tubular ... 400V
69, 70	No Components	
71	100	Electrolytic 270V
72	.022	Tubular ... 400V
73	No Component	
74	22pF	Ceramic
75	2200pF	Tubular 400V
76	10	Electrolytic 200V
77	No Component	
78	390pF	Ceramic
79	No Component	
80	390pF	Ceramic
81	.022	Tubular 1000V
82	.1	Tubular ... 600V
103	470pF	Ceramic
104	22pF	
105	No Component	
106	.047	Tubular ... 400V

C	Capacity	Type
107	.082	Tubular ... 125V
108	.022	Tubular ... 400V
109	470pF	Ceramic
110, 111	No Components	
112	12pF	Ceramic
113	150pF	Ceramic
114	Not fitted to this Chassis	
115	4700pF	Tubular 400V

RESISTORS

R	Ohms	Watts
1	1M	1/4
2	1M	1/4
3	100	1/8
4	220	1/8
5	220	1/8
6	47	1/8
7	47	1/8
8	82	1/8
9	82	1/8
10	150	1/4
11	3.9K	1
12	1K	1/8
13	1K	1/8
14	22K	1/4
15	220K	1/4
16	680K	1/8
17	8.2K	1/8
18	100K	1/8
19	330	1/8
20	3.3K	1/8
21	1K	1/8
22	18K	1/8
23	150	1/8
24	2.2M	1/8
25	1M Log. Potr.	
26	470K	1/8
27	68K	1/8
28	68K	1/8
29	1.5M	1/8
30	680	1/8
31	220K	1/4
32	820K	1/8
33	47	1/8
34	200 WW Potr.	3 W
35	8.2K	1/8
36	47	1/4
37	150	1/8
38	3K WW Potr.	3 W
39	12K	1/8
40	1K	1/8
41	120K	1/8
42	180	1/8
43	3K WW Potr.	3 W
44	1K	1/8
45	4.7K	1/8
46	20K WW Potr.	3 W
47	22K	1/8
48	390	1/8
49	4.7K	1
50	No Component	
51	50K Linear Potr.	
52	Ferrox Cube Ring	
53	47K	1/8
54	180K	1/8
55	1M	1/8
56	No Component	
57	1M	1/8
58	100K	1/8
59	100K	1/8
60	1M	1/4
61	47K	1/8
62	47K	1/8
63	22K	1/4
64	47K	1/8
65	220K	1/8
66	1M	1/8
67	6.8K	1 W
68	No Component	
69	270K	1/8
70	500K Linear Potr.	
71	100K	1/8
72	470K	1/8
73	1K	1/8
74	Ferrox Cube Ring	
75	3.9K WW	3
76	3.3K	1
77	100K	1/8
78	No Component	
79	22K	1/8
80	470K	1/8
81	2.2M	1/8
82	No Component	
83	22K	1/8





CAPACITORS

C	Capacity	Type
1	3300pF	Tubular 800V
2	1000pF	Silver Mica
3	1000pF	Silver Mica
4	2—8pF	Trimmer
5	2—8pF	Trimmer
6	470pF	Ceramic
7	100pF	Ceramic
8	560pF	Ceramic
9	2—8pF	Trimmer
10	2—8pF	Trimmer
11	100pF	Ceramic
12	390pF	Ceramic
13	39pF	Silver Mica
14	31—30pF	Trimmer
15	56pF	Silver Mica
16	4760pF	Tubular 400V
17	.047	Tubular ... 125V
18	4700pF	Tubular 400V
19	100pF	Ceramic
20	4700pF	Tubular 400V
21	4700pF	Tubular 400V
22	4700pF	Tubular 400V
23	.022	Tubular 125V
24	.068	Tubular 125V
25	47pF	Ceramic
26	47pF	Ceramic
27	.01	Tubular ... 400V
28	220pF	Ceramic
29	.015	Tubular ... 400V
30	50	Electrolytic 25V
31	65	Electrolytic 275V
32	100	Electrolytic 275V

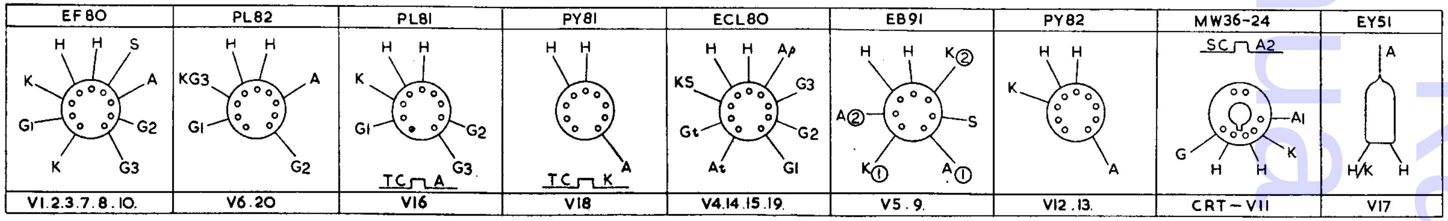
C	Capacity	Type
33	4700pF	Tubular 400V
34	4700pF	Tubular 400V
35	1000pF	Tubular 600V
36	330pF	Silver Mica
37	.068	Tubular ... 125V
38	4700pF	Tubular 400V
39	330pF	Silver Mica
40	8.2pF	Ceramic
41	.22	Tubular ... 400V
42	100	Electrolytic 12V
43	4700pF	Tubular 400V
44	4700pF	Tubular 400V
45	4700pF	Tubular 400V
46	.022	Tubular ... 800V
47	4700pF	Tubular 400V
48	.056	Tubular ... 400V
49	100pF	Ceramic
50	33pF	Ceramic
51	4700pF	Tubular 400V
52	2200pF	Tubular 400V
53	1000pF	Tubular 400V
54	1000pF	Tubular 400V
55	.047	Tubular ... 400V
56	No Component	
57	.056	Tubular ... 400V
58	1000pF	Tubular 400V
59	1000pF	Tubular 400V
60	470pF	Ceramic
61	.1	Tubular ... 400V
62	.056	Tubular 400V
63	.47	Tubular ... 400V
64	330pF	Ceramic
65	No Component	
66	100	Electrolytic 25V

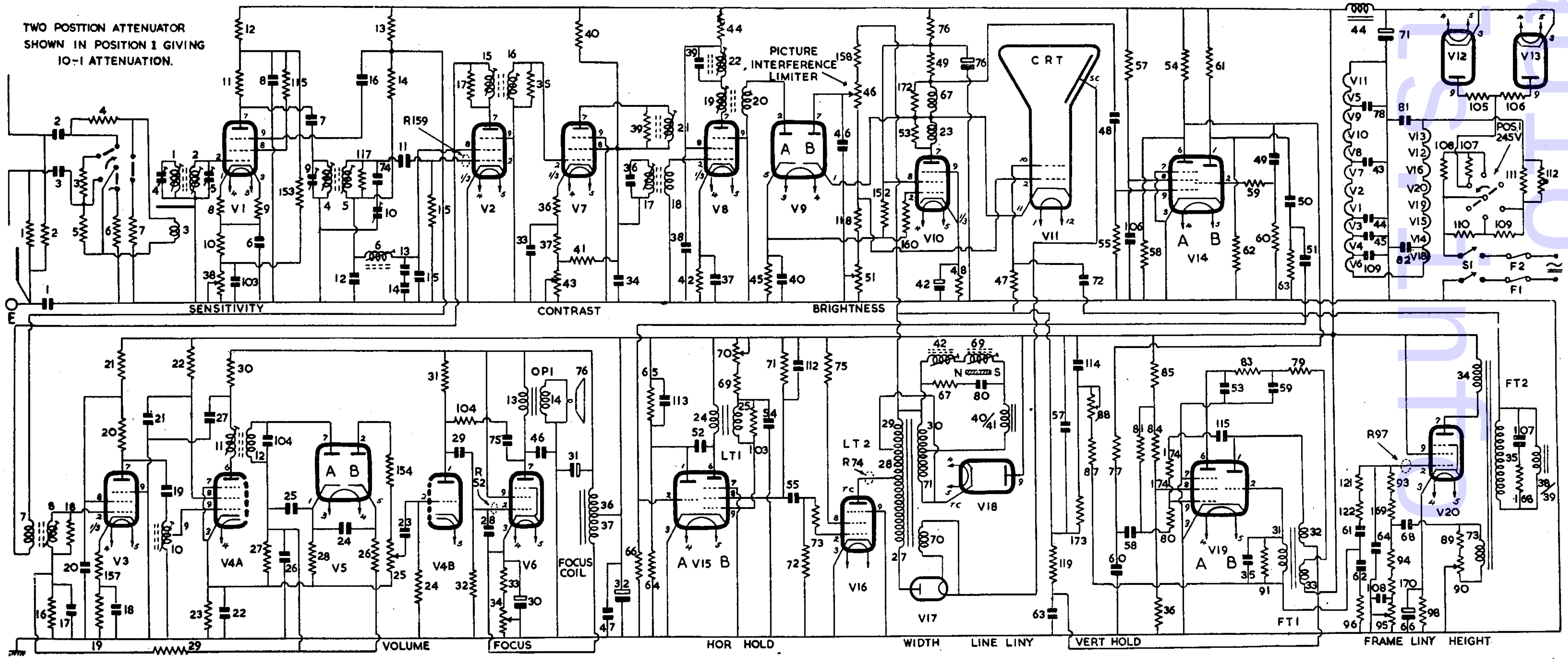
C	Capacity	Type
67	No Component	
68	.068	Tubular ... 400V
69, 70	No Components	
71	100	Electrolytic 270V
72	.022	Tubular ... 400V
73	No Component	
74	22pF	Ceramic
75	2200pF	Tubular 400V
76	10	Electrolytic 200V
77	No Component	
78	390pF	Ceramic
79	No Component	
80	390pF	Ceramic
81	.022	Tubular 1000V
82	.1	Tubular ... 600V
103	470pF	Ceramic
104	22pF	
105	No Component	
106	.047	Tubular ... 400V

C	Capacity	Type
107	.082	Tubular ... 125V
108	.022	Tubular ... 400V
109	470pF	Ceramic
110, 111	No Components	
112	12pF	Ceramic
113	150pF	Ceramic
114	Not fitted to this Chassis	
115	4700pF	Tubular 400V

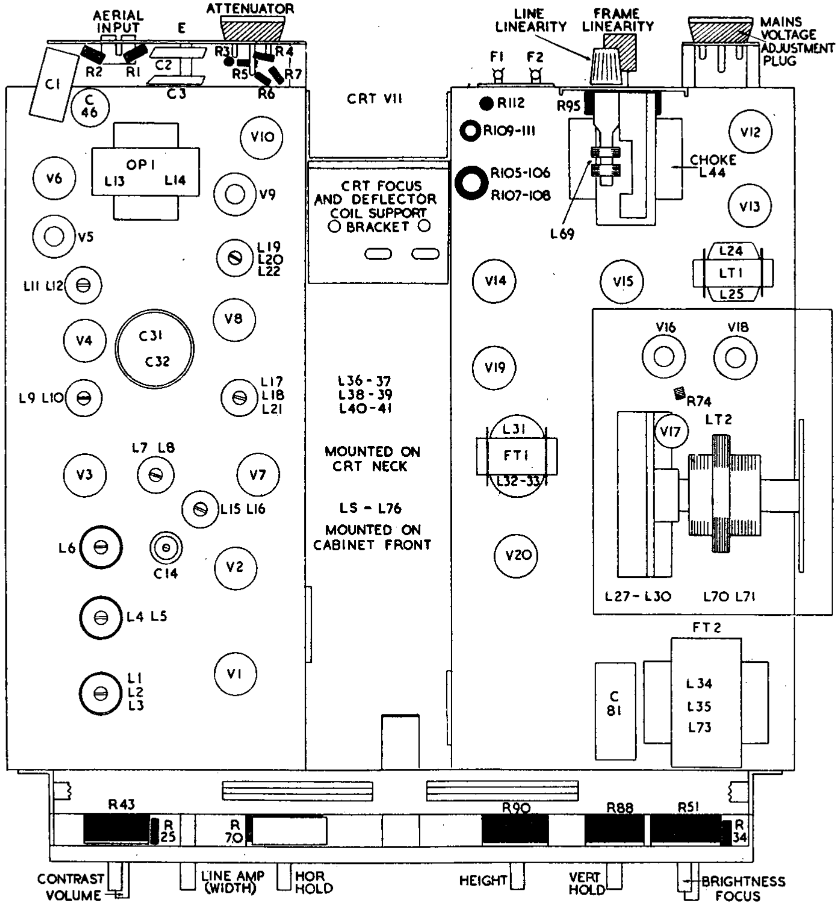
RESISTORS

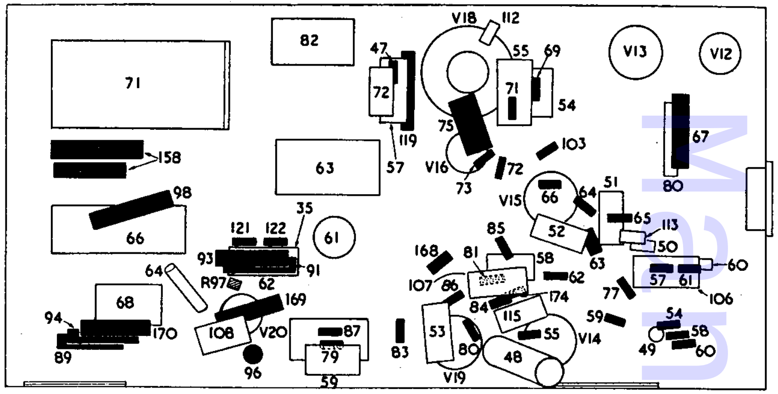
R	Ohms	Watts
1	1M	¼
2	1M	¼
3	100	⅛
4	220	⅛
5	220	⅛
6	47	⅛
7	47	⅛
8	82	⅛
9	82	⅛
10	150	¼
11	3.9K	1
12	1K	⅛
13	1K	⅛
14	22K	¼
15	220K	¼
16	680K	⅛
17	8.2K	⅛
18	100K	⅛
19	330	⅛
20	3.3K	⅛
21	1K	⅛
22	18K	⅛
23	150	⅛
24	2.2M	⅛
25	1M Log. Potr.	
26	470K	⅛
27	68K	⅛
28	68K	⅛
29	1.5M	⅛
30	680	⅛
31	220K	¼
32	820K	⅛
33	47	⅛
34	200 WW Potr.	3 W
35	8.2K	⅛
36	47	¼
37	150	⅛
38	3K WW Potr.	3 W
39	12K	⅛
40	1K	⅛
41	120K	⅛
42	180	⅛
43	3K WW Potr.	3 W
44	1K	⅛
45	4.7K	⅛
46	20K WW Potr.	3 W
47	22K	⅛
48	390	⅛
49	4.7K	1
50	No Component	
51	50K Linear Potr.	
52	Ferrox Cube Ring	
53	47K	⅛
54	180K	⅛
55	1M	⅛
56	No Component	
57	1M	⅛
58	100K	⅛
59	100K	⅛
60	1M	¼
61	47K	⅛
62	47K	⅛
63	22K	¼
64	47K	⅛
65	220K	⅛
66	1M	⅛
67	6.8K	1 W
68	No Component	
69	270K	⅛
70	500K Linear Potr.	
71	100K	⅛
72	470K	⅛
73	1K	⅛
74	Ferrox Cube Ring	
75	3.9K WW	3
76	3.3K	1
77	100K	⅛
78	No Component	
79	22K	⅛
80	470K	⅛
81	2.2M	⅛
82	No Component	
83	22K	⅛

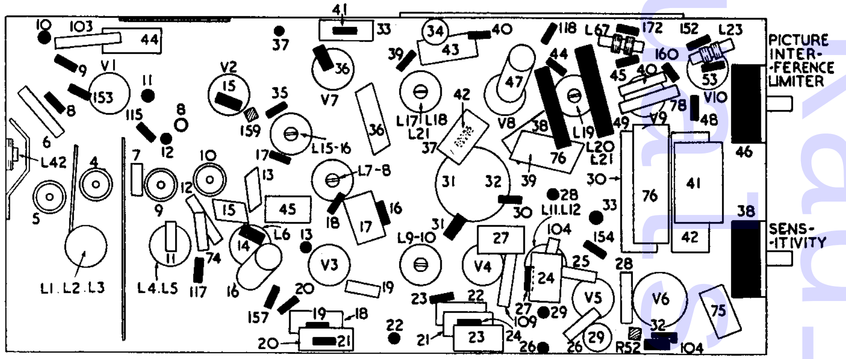


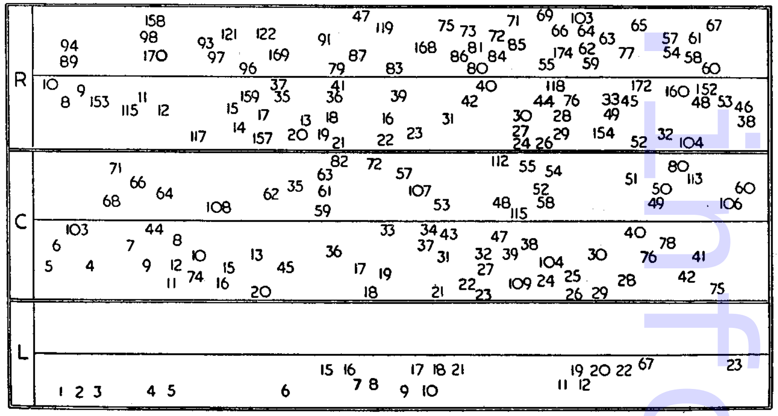


R	Ohms	Watts
84	22K	$\frac{1}{8}$
85	39K	$\frac{1}{8}$
86	10K	$\frac{1}{8}$
87	1.2M	$\frac{1}{8}$
88	1M Linear Potr.	
89	68K	1
90	100K Potr.	
91	47K	1
92	No Component	
93	680K	1
94	68K	1
95	500K Log. Potr.	
96	12K	1
97	Ferrox Cube Ring	
98	270	1
99–102	No Components	
103	10K	$\frac{1}{8}$
104	680K	$\frac{1}{4}$
105	40	5
106	40	5
107	27	12 W
108	24	10 W
109	60	6 W
110	53	5 W
111	500	7 W
112	CZ1 Brimistor	
113–114	No Component	
115	27	$\frac{1}{8}$
116	No Component	
117	4.7K	$\frac{1}{8}$
118	10K	$\frac{1}{8}$
119	33K	1
120	No Component	
121	1M	$\frac{1}{8}$
122	1M	$\frac{1}{8}$
123–151	No Components	
152	4.7M	$\frac{1}{8}$
153	100K	$\frac{1}{8}$
154	4.7K	$\frac{1}{8}$
155–156	No Components	
157	47	$\frac{1}{8}$
158	220K shunted by 180K	1 W
159	Ferrox Cube Ring	
160	3.3K	$\frac{1}{8}$
161–167	No Components	
168	68	$\frac{1}{4}$
169	560K	1
170	68K	1
171	No Component	
172	22K	$\frac{1}{8}$
173	Not fitted on this chassis	
174	2.2M	$\frac{1}{8}$









VOLTAGE READINGS

V	Type	A	G_2	K	Remarks
1	EF80	120-165	155-170	1.9-4.3	R38 Max—Min
2	EF80	160	95	0	
3	EF80	145	161	2.9	
4 A	ECL80	126	110	3	
4 B	ECL80	47	—		
6	PL82	100-143	123-150	4.5-10.5	R34 Max—Min
7	EF80	160-170	160-170	1.6-3.9	R43 Max—Min
8	EF80	161	161	1.6	
9 A	EB91	—	—	—	R46 Max—Min
9 B	EB91	80-30	—	125	
10	EF80	125	115	2.1	
11	MW36—24	12.5kV	360	125	R51 Max—Min 30—105V
12	PY82	201	—	180	
13	PY82	201	—		
14 A	ECL80	30	25	0	No Signal Input
14 B	ECL80	45	—		
15 A	ECL80	20	—	0	
15 B	ECL80	170	100		
16	PL81	—	95	0	
17	EY51	—	—	12.5kV	
18	PY81	172	—	—	
19 A	ECL80	49	20	0	
19 B	ECL80	290	—		
20	PL82	154	172	12	

Total rectifier current = 240mA. Mains consumption = 530mA. Readings taken with 230V 50c/s input

INDUCTORS

L	Ohms
1—7	Very Low
8	2
9	2.5
10	2.5
11	1.5
12	1.5
13	250
14	.5
15	3
16	2.5
17	Very Low
18	2
19	2.5
20	2
21	2.5
22	Very Low
23	16
24	140
25	40
26	No Component
27	300
28	7.25
29	6
30	2.8
31	400
32	240
33	270
34	430
35	2
36	600
37	8000
38	10 (38, 39)
39	
40	6 (40, 41)
41	
42	3
43	No Component
44	40
67	17
68	No Component
69	2.5
70	Very Low
71	12
72	No Component
73	1600
74—75	No Components
76	2.5

Removing timebase chassis. Remove cabinet hood. Remove rectangular back frame, which is fixed to the baseboard by two bolts, and to the top girders by one bolt in each girder. Unplug inter-connecting leads.

Chassis is held at six points, one at rear, bolting into baseboard, one at top front of chassis bolting into the angle bracket projecting from front plate, two which bolt from flange on the front plate into front of the chassis, and two which bolt into deflector coil support bracket.

Removing RF chassis. Chassis fixing method is same as that used for timebase. When removing chassis care should be taken not to damage line amplitude choke, which is fixed to front panel.

Removing the knobs. Remove cabinet hood. The knobs are held by set screws which are accessible from behind the cabinet front.

Removing cabinet front. Remove cabinet hood and knobs. Remove four bolts holding cabinet front to baseboard (accessible from the bottom) and the two bolts holding the cabinet front to front plate. Disconnect speaker. Release two top girders from rear rectangular frame.

Removing controls. Remove front of cabinet as described above. All controls are then accessible but care must be exercised in withdrawing the leads through the chassis holes.

Removing line transformer screening can. The can is held by two wing nuts at the top. The CRT anode cap will pass through hole in can if the rubber grommet is removed.

Replacement of V17 (EY51). Remove line transformer screening can. Remove three transformer fixing bolts, but do not disconnect any leads. Gently lay transformer on its side on a block placed at the side of the chassis. **Note**—Anode and filament leads of EY51 are soldered into wax filled bushes in moulded former together with fine lead-out wires from transformer.

ALIGNMENT INSTRUCTIONS

Preliminary adjustments: set R46 (Interference limiter) fully anti-clockwise, and R38 (Sensitivity), R43 (Contrast), R25 (Volume) fully clockwise. Set attenuator plug in Direct position. Connect high-impedance 10V FSD valve voltmeter between cathode of CRT and chassis.

Rough IF. Feed sig/gen output, 37.5 ohms impedance, to gl V2, in series with a capacitance of 5,000pF, connected between grid and chassis. Apply 11.5 mc/s and trim core L19 (top); 9.6 mc/s and trim core L21 (top); 10.6 mc/s, core L16 (bottom); 10.6 mc/s, core L15 (top). Fringe model: 11.8 mc/s, trim L19 (top); 10.4 mc/s, L21 (top); 11 mc/s, core L16 (bottom); 11 mc/s, L15 (top).

Sound IF. Feed 8.5 mc/s to gl V2. Trim L11 L9 L8 for maximum on sound output meter, taking peak where the core is nearest chassis underside.

Sound rejectors. Inject 8.5 mc/s to gl V2. Short circuit L17 and trim L22 (bottom core) for minimum video output. Short L22 and trim L17 (bottom) for minimum.

Vision IF. Feed sig/gen output to gl V2. Inject 11.5 mc/s and trim L19 (top); 9.6 mc/s, trim L21 (top); 10.6mc/s, connect 680 ohm resistor in series with 1,000pF between anode V2 and chassis, and trim L16 (bottom). Finally connect damper between gl V7 and chassis, and trim L15 (top). Fringe model: 11.8 mc/s, L19 (top); 10.4 mc/s, L21 (top); 11 mc/s, L16 (bottom); 11 mc/s, L15 (top).

Oscillator. Inject sound frequency of required channel to aerial socket and trim C14 for maximum sound output, using a low input with volume control at maximum.

RF circuits. Connections to aerial socket to be from a source of 37.5 ohms impedance, connected between earth blade of aerial plug and right-hand pin (viewed from back of chassis), the left-hand pin being connected to the earth blade through 37.5 ohms. These connections must be shorter than 3cms. With input to aerial socket inject a frequency 1.5 mc/s lower than vision carrier frequency. Damp and trim for maximum video output as follows: damp to chassis at junction of L4 C7 and trim C10; damp to chassis gl V2 and trim C9; damp to chassis at junction of L1 C4 (that is not earthed to chassis) and trim C5; damp to chassis gl V1 and trim C4.

CHAMPION 781—*Continued*

CIRCUIT DESCRIPTION

AERIAL. On MW band aerial signal is obtained from frame L1 in series with loading coil L2. On SW bands aerial signal, from either the telescopic or external aerial, is fed through isolating capacitor C1 and switched by S1 to SW aerial coupling coils L3 (SW1) L5 (SW2) L7 (SW3). Earth socket is isolated from chassis by C2.

RF amplifier. Grid coils L1 L2 (MW) L4 (SW1) L6 (SW2) L8 (SW3), which are trimmed by T1 to T4 respectively, are switched by S2 across SW aerial tuning capacitor VC2 and connected to gl of RF amplifier V1. To tune over the required range the MW circuit is provided with an additional tuning capacitor VC1 which is permanently connected across L1 L2 and ganged to VC2.

AVC, decoupled by R13 C3, is fed through the tuned coils to V1. Screen voltage is obtained from anode circuit decoupling network R1 C6. Amplified signal at anode V1 is developed across L9 L11 L13 L15, the appropriate coupling coil being switched into the anode circuit by S3.

Frequency-changer is heptode V2. The inductively-coupled grid coils L10(MW) L12(SW1) L14(SW2) L16(SW3) which are trimmed by T5 to T8 respectively, are switched by S4 to SW tuning capacitor VC4 and connected to V2. Additional capacity to tune MW coil L10 is provided by VC3 permanently connected across the coil and ganged to VC4. AVC decoupled by R3 C5 is fed to g3 of V2 on MW band only. On the SW bands earthy ends of tuned coils are connected to V2 filament negative to maintain correct bias conditions. Primary L25 C10 of IFT1 is in the anode circuit.

Oscillator employs tuned-grid shunt-fed circuit. Grid coils L17 (MW) L19 (SW1) L21 (SW2) L23 (SW3), which are trimmed by T9 to T12 respectively and padded by C14 (MW) C15 (SW1) C16 (SW2), are switched by S5 to SW oscillator tuning capacitor VC6, and coupled by C12 to oscillator grid (gl) of V2. Automatic bias for grid is developed on C12 with R7 as leak. Additional capacity to tune MW coil L17 is provided by VC5 ganged to VC6.

Anode reaction voltages are developed from L18 (MW) L20 (SW1) L22 (SW2) L24 (SW3) which are switched by S6 in series with HT to oscillator anode (g2) of V2. Oscillator HT is voltage dropped and RF decoupled by R9 C17.

IF amplifier operates at 465kc/s. Secondary L26 C11 of IFT1 feeds signal, and AVC voltage decoupled by R4 C13, is fed to grid of IF amplifier V3. Screen voltage is obtained from R10 decoupling being given by C18. Primary L27 C19 of IFT2 is in the anode circuit.

Signal rectifier. Secondary L28 C20 of IFT2 feeds signal to diode anode V4. R14 is diode load and R12 C21 C22 form an IF filter.

AVC. The DC component of the rectified signal across R14 is fed through decoupling network R13 C3 to grid V1, through R3 C5 to grid V2 and through R4 C13 to grid V3. R8 R4 R3 R13 with diode load R14 form a potential dividing network across series connected filament V1 to V4. The AVC feeds to grids of V1 V2 and V3 are tapped from the potential divider at points which give voltages approximately equal to the voltages between their filaments and chassis.

AF amplifier. Rectified signal across R14 is fed by C23 to volume control R15 and thence by C24 to pentode AF amplifier section of V4. Automatic bias for grid is developed on C24 with R16 as leak. R20 is anode load.

Tone Control. A fixed degree of top cut is provided by S7 which in its Bass position connects C27 in series with C36 between anode V4 and chassis.

Output Stage (Battery operation). C26 feeds signal at anode V4 to grid of pentode output amplifier V5. The valve is biased by approximately 6V, this being the potential difference between centre tap of its filament, which is at high potential side of LT supply, and the earthy end of its grid resistor R21. Suppressor is internally connected to centre tap of filament. Primary L29 of output matching transformer OP1 is in the anode circuit. Fixed tone correction is by C28.

Output Stage (Mains Operation). Signal at anode V4 is fed by C26 to grid of beam-tetrode output amplifier V6, the grid load being R21 as in the case of V5. Cathode bias is obtained from voltage set up across filaments V1 to V4 which are connected in series with R23 between cathode V6 and chassis. Bias and filament voltage is decoupled by C32.

Section of primary L29 of output matching transformer OP1 is in the anode circuit with C37 giving fixed degree of tone correction. Secondary L30 of OP1 feeds signal from either V5 or V6 to a 5in. PM speaker L31.

HT of 90V is provided by two 45V Berec Batrymax type B104 batteries connected in series or, alternatively, from the mains. HT line of receiver is switched by S10 to either source of supply. In the Battery-Economy position of S10 a dropper resistor R25 is placed in series with HT feed to reduce slightly the current consumption to conserve the life of the HT batteries.

Mains HT is provided by indirectly-heated half-wave rectifier V7. Anode voltage is obtained from the mains direct on 100-120V supplies and through droppers R29 to R31 on 200-250V mains. Choke-capacity smoothing is by L32 C35 C34. R26 is current limiter and C29 prevents modulation hum. HT feed to V1 to V3 is further resistance-capacity smoothed by R18 C33.

Reservoir smoothing capacitor C35 should be rated to handle 150mA ripple current.

Heaters of V6 V7 are series connected with dial lights and thermal surge limiter R28 and fed from the input mains through dropper resistor R27. On 100-120V supplies R27 is shorted out by mains voltage adjusting plug. Dial lights are protected by shunt thermal surge limiter R24.

Dial lights. When the receiver is operated from batteries, provision is made to run dial lights from an entirely separate 4.5V Berec No. 28 battery. In the Dial Light position of tone control switch the series connected 2.5V lamps are switched by S9 through to S7 which connects them across the battery.

LT of 9V for the series-connected filaments of V1 to V5 is provided by two 4.5V Berec No. 28 batteries coupled in series. Battery is decoupled by C32 and filament current is fed through dropper R23 and switched by S8 to positive side of V5 filament. Negative side of battery is switched by S11 in either of its two battery positions, through the on/off switch S12 to chassis. R2 R5 R11 R17 and R22 are current bypass resistors to maintain correct voltage across each valve filament, whilst C30 C31 C4 provide smoothing and decoupling.

On mains operation V5 filament is switched out of circuit by S8 leaving filament of V1 to V4 connected in series with R23 and cathode V6, the total cathode current of which, being 50mA, ensures correct filament voltage.

S12 which is ganged to volume control spindle is on/off switch breaking both LT and HT battery negative leads to chassis when S11 is in either of its battery positions, and breaking HT battery negative lead and mains lead to chassis when S11 is in mains position.

Chassis Removal. Unfasten catch on front of cabinet and pull front flap forward and downward. It will then be free and the back will spring open. Lift back up slightly, this will release bottom retaining studs. Then ease back down, thus releasing two top retaining studs.

Unplug and remove HT and LT batteries. Remove aerial/earth socket panel from side of case (secured by two wood screws) and unsolder from aerial socket the SW telescopic aerial connecting lead. Remove slide-in battery compartment divisions and undo and remove the four screws securing LS baffle to front of case. Shelf with receiver chassis and LS baffle attached is now free to be withdrawn out of back of case. Finally unsolder LS leads from output transformer on chassis. Remove the four chassis-fixing bolts on underside of shelf.

TRIMMING INSTRUCTIONS

Apply signal as stated below	Tune receiver to	Trim in order stated for maximum output
(1) 465k/cs to g3 of V2 via dummy aerial	Set gang fully open	Cores L28, L27, L26 and L25
(2) 600kc/s to g3 of V2 via dummy aerial 2.5pF capacitor	MW Band 600kc/s	Cores L17/18, L9/10
(3) 1.5Mc/s as above	1.5Mc/s	T9, T5 and repeat 2 and 3
(4) 600kc/s to aerial socket	600kc/s	Cores L9/10, L2
(5) 1.5Mc/s as above	1.5Mc/s	T5, T1 and repeat 4 and 5
(6) 3Mc/s to g3 of V2 via dummy aerial and 2.5pF capacitor	SW1 Band 3Mc/s	Cores L19/20 L11/12
(7) 5Mc/s as above	5Mc/s	T10, T6 and repeat 6 and 7
(8) 3Mc/s to earial socket	3Mc/s	Cores L11/12, L3/4
(9) 5Mc/s as above	5Mc/s	T6, T2 and repeat 8 and 9
(10) 6Mc/s to g3 of V2 via dummy aerial and 2.5pF capacitor	SW2 Band 6Mc/s	Cores L21/22, L13/14
(11) 9.5Mc/s as above	9.5Mc/s	T11, T7 and repeat 10 and 11
(12) 6Mc/s to aerial socket	6Mc/s	Cores L13/14, L5/6
(13) 9.5Mc/s as above	9.5Mc/s	T7, T3 and repeat 12 and 13
(14) 11.5Mc/s to g3 of V2 via dummy aerial and 2.5pF capacitor	SW3 Band 11.5Mc/s	Cores L23/24, L15/16
(15) 18Mc/s as above	18Mc/s	T12, T8 and repeat 14 and 15
(16) 11.5Mc/s to aerial socket	11.5Mc/s	Cores L15/16, L7/8
(17) 18Mc/s as above	18Mc/s	T8, T4 and repeat 16 and 17

Model 781B

On this receiver SW1 band is replaced by a LW band covering 1000 to 2000 Metres. Operation 6 and 8 are carried out using 150kc/s and 7 and 9 using 300kc/s.

Notes

When carrying out operations 11, 13, 15 and 17, make quite sure that correct signal, not the image, is peaked when adjusting trimmers. This can easily be checked by tuning Sig/Gen. first to fundamental frequency, then to a higher frequency than fundamental by 930kc/s, and ensuring that the former gives the greater response.

INDUCTORS—*Continued*

L	*Ohms*	*L*	*Ohms*
4	1	19	.75
5	.3	20	.25
6, 8, 14-16	Very Low	21, 23, 24	Very Low
7	.2	22	.2
9	1.5	25-28	10.5
10	3.5	29	500 Tapped 150
11, 13	.25	30	.4
12	.75	31	2.75
17	2	32	250
18	1		