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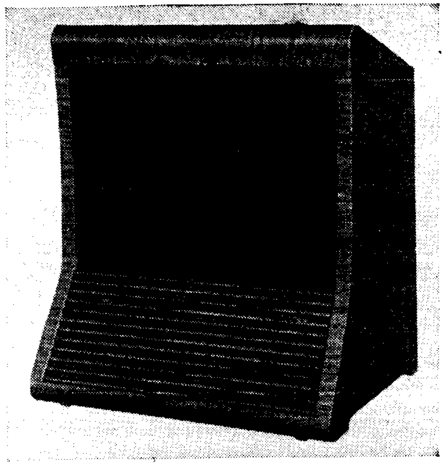
PYE

V4

Twenty valve receiver, plus nine metal and crystal rectifiers, covering five channels and fitted with 14in. rectangular black-screen CRT. Incorporates automatic picture control and "flywheel" synchronising. Walnut finished table cabinet. Suitable for 200-250V 50c/s AC and DC. Manufactured by Pye Limited, Cambridge.



THE receiver is a superhet operating on lower sideband of vision carrier. Aerial, RF, oscillator, and mixer circuits are tunable over a range covering all five BBC television channels. The circuit tuning cores, although individually adjustable for alignment purposes, are ganged and operated by a single station-tuner control knob located at rear of chassis and accessible without removal of rear cover panel.

VOLTAGE READINGS

V	Type	A	G_2	K
1	EF80	174	174	0–6.5
2	EF80	157	115	0–6.5
4	EF80	165	165	1.9
5	EF80	166	166	2
8	EF80	140	198	3.6
9 A	ECC82	198	—	144
9 B		194	—	
10	PY82	212 RMS	—	200
11	PY82	212 RMS	—	200
12 A	ECC82	84	—	0
12 B		104	—*	—
13 A	EB91	144	—	146
13 B		—	—	—
14	EF80	170	154	1.8
15	EF80	166	155	1.8
18 A	ECL80	97	—	6.5
18 B		188	175	
19	EF80	75	29	0
22 A	ECC82	56	—	3.5
22 B		No reading	—†	
23	PL82	185	126	9
26 A	ECL80	110	—	3.6
26 B		85	85	
27	PL81	No reading	153	4.8
28	PY81	198	—	No reading
29	EY51	—	—	14kV
30	MW36–24 or C36-24	14kV	452**	127

* G1 — 106–142V. † G1 — 0–6V. ** G1 — 0–125V.
HT1 Line Voltage — 198V. HT2 Line Voltage 175V.
Total HT Current — 260mA.

Vision interference and sound noise suppression circuits are incorporated, the former producing "black-spots" on the picture when interference pulses exceed peak white amplitude.

An "Automatic Picture Control" circuit eliminates picture fading when the receiver is installed where it has sufficient gain in reserve. Under these conditions, a reduction of signal to one-tenth produces no evident change in contrast or brightness. Allied with the Pye Auto-Sync or "flywheel" synchronising circuit, which prevents line displacement by noise, and with an effective grey-spotting interference limiter, this feature is designed to improve reception in fringe areas and districts of poor signal-noise ratio.

Mains consumption is approximately 140W.

Aerial input circuit is for use with 75ohm coaxial, the feeder being isolated from chassis by C1 C2 with static discharge provided by R1 R2. Input circuit incorporates built-in attenuator formed by R3 R4 R5 and "switched" by a transferable screw.

RF amplifier. Aerial signal is fed by C3 to tapping on aerial coupling coil L29. Gain of V1 is adjusted, with that of mixer V2, by variation of cathode bias by **Vision Sensitivity** control R13. Anode V1 is bandpass transformer coupled by L1 C6 L2 to grid of frequency-changer V2, bandwidth being maintained by damping resistors R6 R9.

Oscillator is triode V12A with tuned grid coil L33 tightly coupled to anode coil L32. C41 with R47 as leak bias the grid. Output is fed by C39 C7 to frequency-changer grid.

Frequency-changer. RF and oscillator signals are applied through C7 to grid V2 and produce in the anode circuit a vision IF of 16mc/s and a sound IF of 19.5mc/s.

Vision channel consists of two IF amplifiers V4 V5, signal rectifier V6, overload diode V7, video amplifier V8, cathode follower V9A, and interference suppressor V3.

Vision IF signal is bandpass-transformer coupled to first vision IF amplifier V4, the anode of which, in turn, is bandpass-transformer coupled to second vision IF amplifier V5. Anode V5 is single-peak transformer coupled to crystal rectifier V6.

Gain of V4 is controlled by a negative grid bias derived from automatic picture control circuit, the operating level of the bias being determined by setting of **Contrast** control R51.

Sound-on-vision rejection at 19.5mc/s is given by L4 C14 and L7 C21 in grid circuits of V4 V5, and by L8 C24 in rectifier circuit.

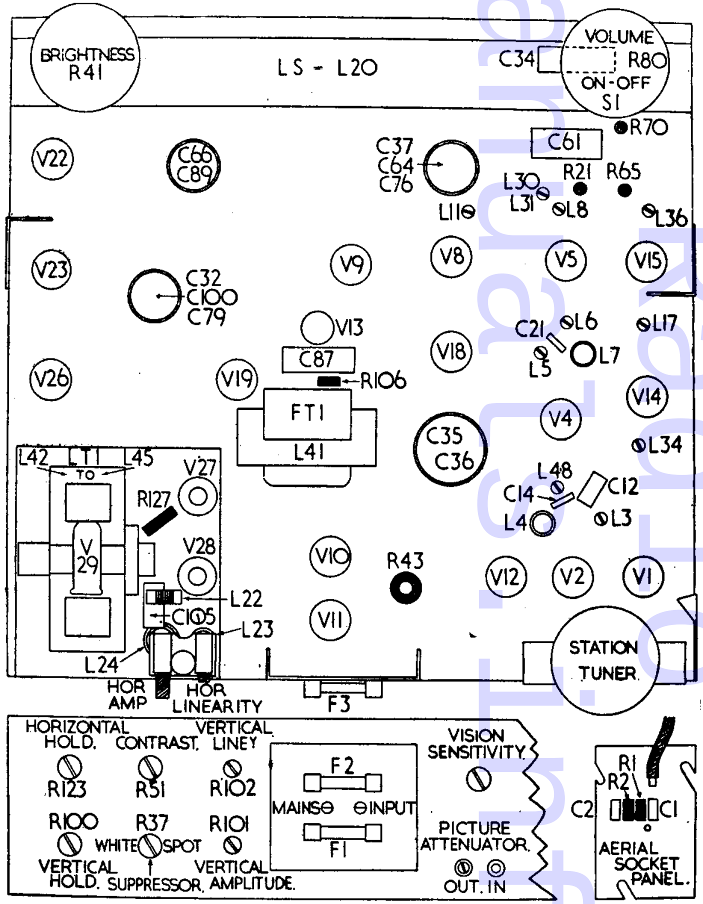
Video signal is developed across R27 C26 in grid of video amplifier V8. Anode V8 is directly coupled to cathode follower V9A and thence DC/AC coupled by R35 C29 R42 and fed through R133 C109 to cathode of CRT V30. L9 L10 are IF filter chokes whilst frequency compensation is provided by L12 in anode, and L11 C27 in cathode circuit V8.

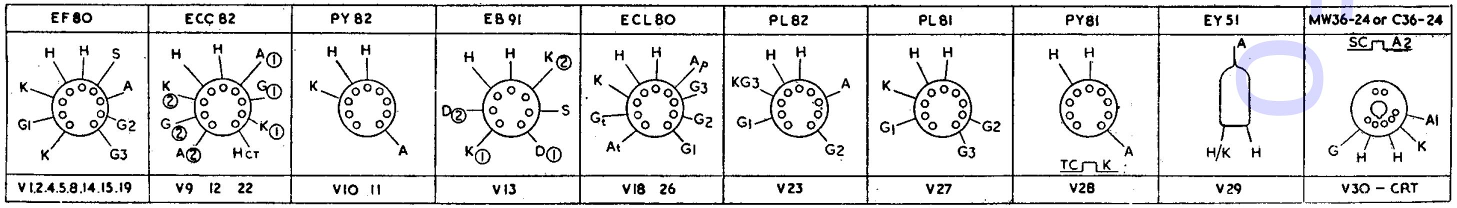
Interference suppression. Fixed degree of limiting is provided by crystal rectifier V3 in series with C15 across grid coil L48 of V4. The rectifier is connected to approximately .5V positive "bias" from cathode of amplifier V5. Signals do not attain this amplitude. Interference pulses are limited to this value and prevented from driving V4 into grid current.

Overload diode. V7 is necessary to prevent overloading of video amplifier during warming up period of receiver because no bias for first vision IF amplifier is developed by automatic picture control circuit until line oscillator and amplifier are functioning. The warming-up period is determined by the heavily-insulated cathode of efficiency diode V28 and is approximately three minutes.

Overload diode V7 is connected between grid V8 and cathode of line amplifier V27 and thus grid V8 is effectively earthed until V27 begins to draw current. When V27 reaches its normal operating condition, cathode bias across R128 exceeds the

Text continued on page 18: diagrams and component-values see pages 16 and 17.





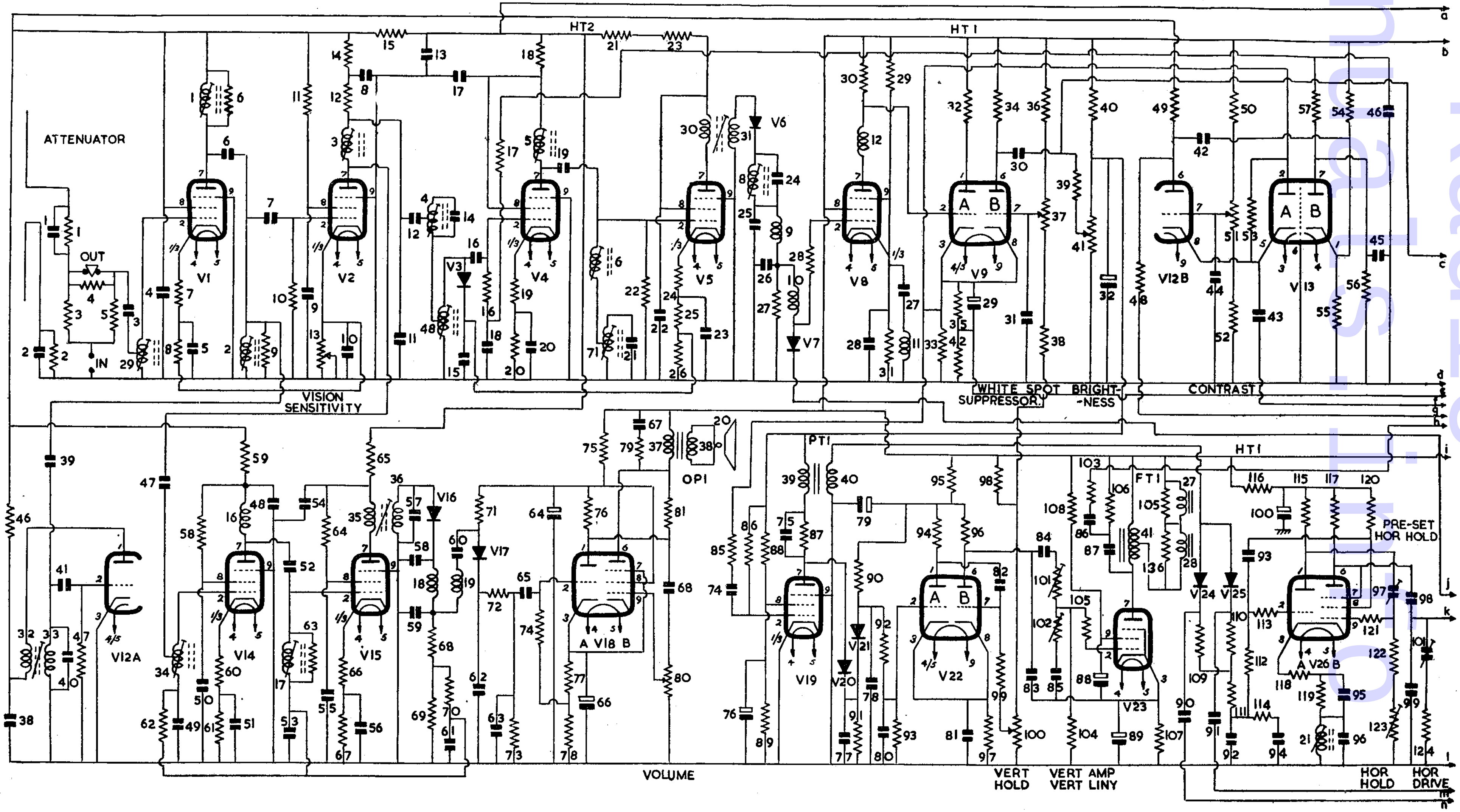
In addition, the receiver contains the following crystal and metal rectifiers: V3, V16, CG6E Germanium crystal, BTH; V6, V7, CG5E Germanium crystal, BTH; V17, V20, V21, WX6, metal, Westinghouse; V24, V25, M3, selenium, STC.

WINDINGS

L	Ohms
1	Very low
2	Very low
3	Very low
4	Very low
5	.3
6	.25
7	Very low
8	Very low
9	2.75
10	2.75
11	Very low
12	6
13	1
14	1
15	45
16	2.75
17	Very low
18	2.75
19	2.75
20	3
21	20
22	2
23	30
24	11
25	22
26	22
27	5
28	5
29	Very low
30	.25
31	.25
32	Very low
33	Very low
34	Very low
35	Very low
36	Very low
37	720
38	.35
39	9
40	10
41	480 tapped 2.5
42	455 (overwind 450)
43	17 tapped 2 and 13
44	.25
45	Very low
46	6
47	85
48	.3

CAPACITORS

C	Capacity	Type
1	.001	Tubular 300V AC
2	.001	Tubular 300V AC
3	22pF	Silver Mica
4	.001	Tubular 350V
5	.001	Tubular 350V
6	1.5pF	Twin Feeder
7	100pF	Silver Mica
8	.003	Tubular 350V
9	.003	Tubular 350V
10	.003	Tubular 350V
11	47pF	Silver Mica
12	47pF	Silver Mica
13	.003	Tubular 380V
14	100pF	Silver Mica
15	.003	Tubular 350V
16	220pF	Silver Mica
17	.003	Tubular 350V
18	.003	Tubular 350V
19	3pF	Twin Feeder
20	.003	Tubular 350V
21	100pF	Silver Mica
22	.003	Tubular 350V
23	.003	Tubular 350V
24	100pF	Silver Mica
25	4.7pF	Ceramic
26	4.7pF	Ceramic
27	680pF	Tubular 350V
28	470pF	Tubular 600V
29	2	Electrolytic 150V
30	.1	Tubular 350V
31	.04	Tubular 150V
32	12	Electrolytic 275V
33	.02	Tubular 300V AC
34	.05	Tubular 300V AC
35	100	Electrolytic 275V
36	200	Electrolytic 275V
37	12	Electrolytic 275V
38	.001	Tubular 350V
39	2pF	Ceramic
40	22pF	Silver Mica
41	10pF	Silver Mica
42	.01	Tubular 350V
43	.01	Tubular 350V
44	.1	Tubular 350V
45	.002	Tubular 350V
46	.25	Tubular 150V
47	2pF	Ceramic
48	.003	Tubular 350V
49	.003	Tubular 350V
50	.003	Tubular 350V
51	.003	Tubular 350V
52	220pF	Silver Mica
53	.003	Tubular 350V
54	.003	Tubular 350V
55	.003	Tubular 350V
56	.003	Tubular 350V
57	8.2pF	Ceramic
58	10pF	Ceramic
59	10pF	Ceramic
60	.04	Tubular 150V
61	1	Tubular 150V
62	.001	Tubular 350V
63	.001	Tubular 350V
64	12	Electrolytic 275V
65	.02	Tubular 150V
66	200	Electrolytic 25V
67	.01	Tubular 300V AC
68	.003	Tubular 350V
69	.003	Tubular 350V
70	.003	Tubular 350V
71	.003	Tubular 350V
72	.003	Tubular 350V
73	.003	Tubular 350V
74	.1	Tubular 350V
75	100pF	Silver Mica
76	12	Electrolytic 275V
77	220pF	Silver Mica
78	470pF	Tubular 600V



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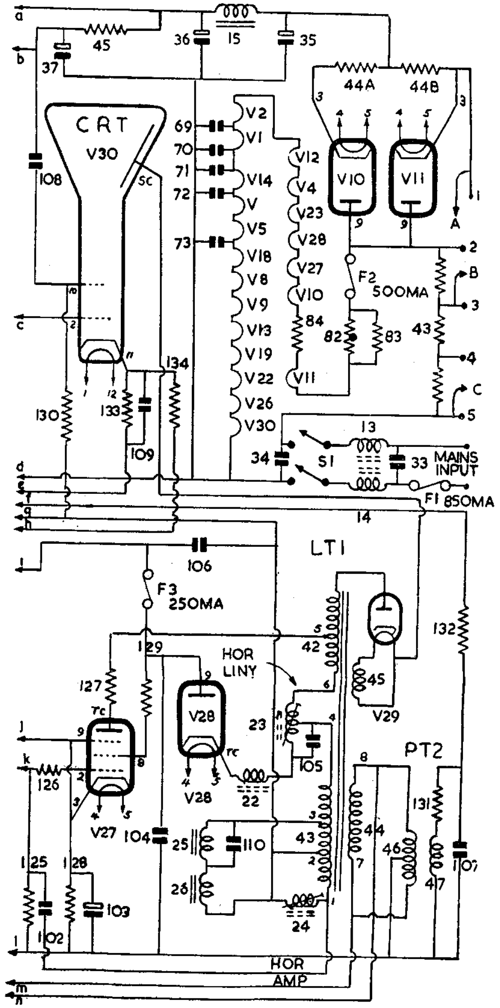
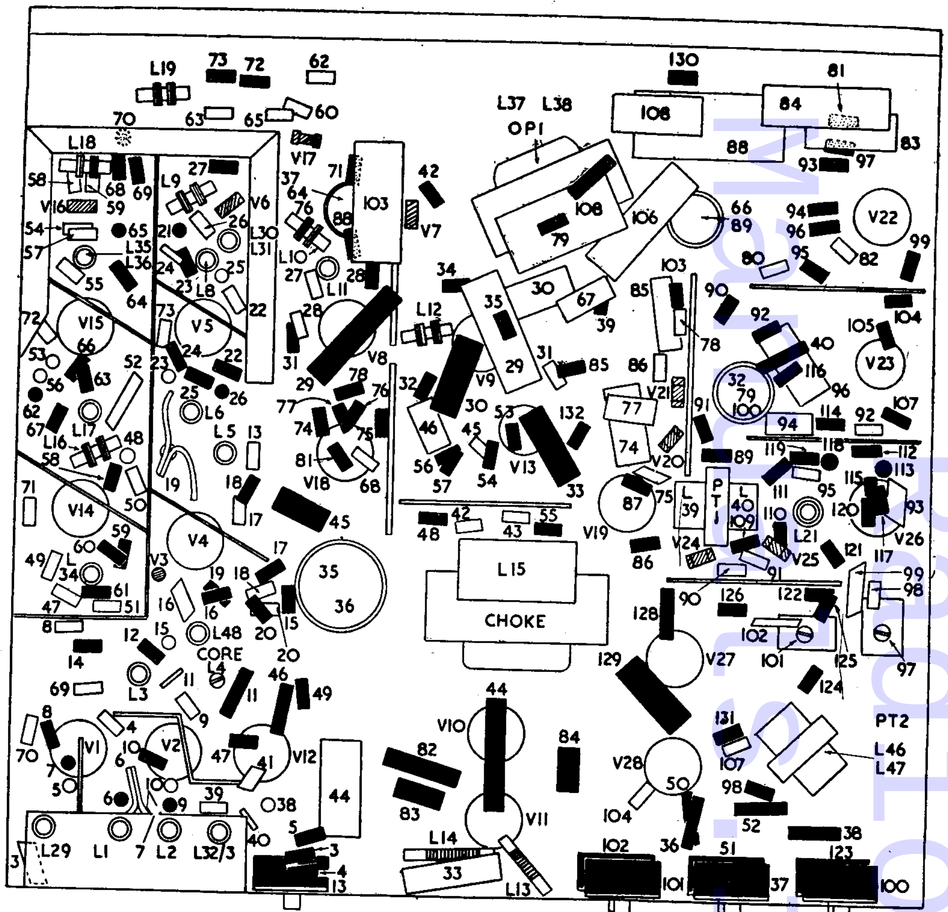
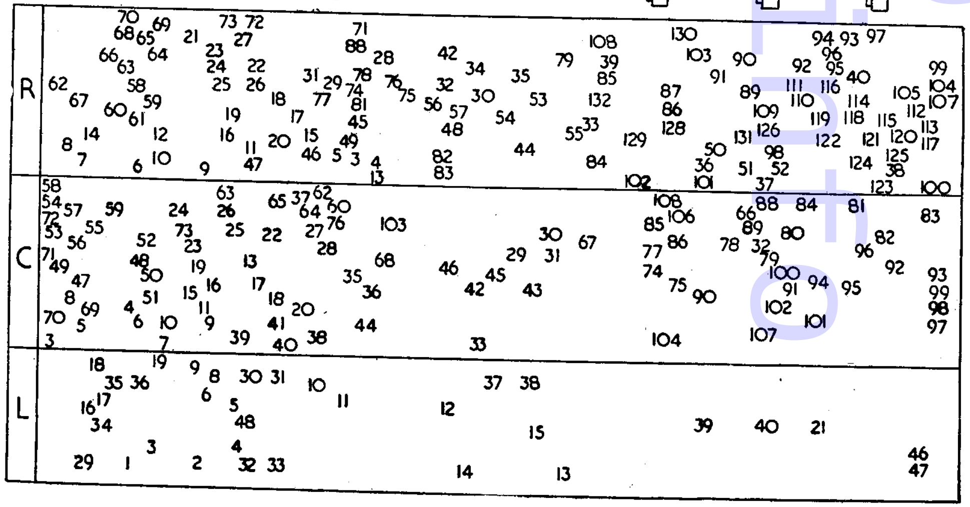
C	Capacity	Type
79	12	Electrolytic 275V
80	.04	Tubular 150V
81	.02	Tubular 150V
82	.01	Tubular 350V
83	.1	Tubular 350V
84	.5	Tubular 350V
85	.04	Tubular 150V
86	.002	Tubular 300V AC
87	.05	Tubular 300V AC
88	32	Electrolytic 250V
89	100	Electrolytic 25V
90	.001	Tubular 350V
91	.001	Tubular 350V
92	.01	Tubular 350V
93	100pF	Silver Mica
94	.1	Tubular 150V
95	.04	Tubular 150V
96	.1	Tubular 350V
97	Trimmer 10-100pF	
98	.01	Tubular 350V
99	220pF	Silver Mica
100	12	Electrolytic 275V
101	Trimmer 50-450pF	
102	27pF	Silver Mica
103	25	Electrolytic 12V
104	.002	Tubular 350V
105	.1	Tubular 150V
106	.5	Tubular 350V
107	.001	Tubular 350V
108	.1	Tubular 350V
109	100pF	Silver Mica
110	68pF	Silver Mica

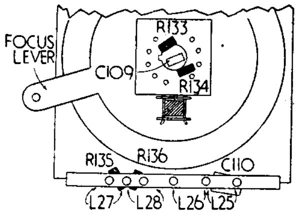
RESISTORS

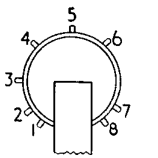
R	Ohms	Watts
1	2.2M	¼
2	2.2M	¼
3	82	¼
4	750	¼
5	82	¼
6	15K	¼
7	47	¼
8	150	¼
9	5.6K	¼
10	100K	¼
11	33K	½
12	2.7K	¼
13	3K WW Potr.	
14	150	¼
15	47	¼
16	4.7K HS	¼
17	100	¼
18	150	¼
19	47	¼
20	150	¼
21	150	¼
22	5.6K HS	
23	150	¼
24	47	¼
25	100	¼
26	47	¼
27	5.6K	¼
28	330	¼
29	22K	2
30	15K	1
31	330	¼
32	100	¼
33	15K	1
34	4.7K	¼
35	47K	¼
36	33K	½
37	25K WW Potr.	
38	22K	½
39	100K	¼
40	6.8K	½
41	25K Potr.	
42	150K	¼
43	20 x 20 x 10 Dropper	
44	30 x 30 WW	6W
45	470 WW	6W
46	10K	½
47	33K	¼
48	1M	¼
49	470K	¼
50	15K	½
51	10K WW Potr.	
52	33K	½
53	2.2M	¼
54	1M	¼
55	39K	¼
56	1M	¼
57	330K	¼
58	6.8K	¼
59	150	¼
60	47	¼
61	150	¼
62	1K	¼
63	27K HS	¼
64	6.8K	¼
65	150	¼
66	47	¼
67	150	¼
68	4.7K	¼
69	4.7K	¼
70	47K	¼
71	2.2M	¼
72	33K	¼
73	2.2M	¼
74	1M	¼
75	4.7K	¼
76	47K	¼
77	220	¼
78	150	¼
79	2.7K	¼
80	500K Potr. with DP switch	
81	680K	¼
82	Varistor	
83	350 WW	5
84	32 WW	6
85	10K	¼
86	4.7M	¼
87	22K	¼
88	47K	¼
89	22K	¼
90	150K	¼
91	220K	¼
92	150K	¼
93	5.6K	¼
94	47K	¼
95	4.7K	¼
96	1M	¼
97	1.5K or 2.2K	¼
98	330K	¼
99	820K	¼
100	3K WW Potr.	
101	500K Potr.	
102	250K Potr.	
103	220K	¼
104	2.2M	¼
105	1K	¼
106	68K	¼
107	330	¼
108	12K	½
109	100K	¼
110	100K	¼
111	270K	¼
112	1K	¼
113	100	¼
114	39K	¼
115	47K	¼
116	4.7K	¼
117	110K	¼
118	470	¼
119	1.5	¼
120	150K	¼
121	100	¼
122	1M	¼
123	1M Potr.	
124	15K	¼
125	470K	¼
126	1K	¼
127	47	½
128	47	½
129	3.3K	1
130	10M	¼
131	2.2K	¼
132	47K	¼
133	10K	½
134	220K	¼
135	150	¼
136	150	¼










LT1 TAG CONNECTIONS

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video signal appearing on grid V8 and diode V7 is cut off.

White spot suppressor. Video signal at cathode of cathode follower V9A is directly coupled to cathode of triode interference suppressor V9B. Grid voltage of V9B is varied by **White Spot Suppressor** control R37, and is normally adjusted so that only peaks of interference pulses fed to cathode V9B cause the valve to conduct. Amplified negative going pulses across anode load R34 are applied through C30 R37 to grid of CRT. As these are in same phase but of greater amplitude than interference pulses appearing with video signal at cathode of CRT the electron beam is reduced and the interference appears as black or grey spots.

Automatic Picture Control. This new feature ensures that a stable picture of consistent contrast and brilliance is reproduced despite input signal fluctuations as great as ten to one. The circuit relies for its operation on the fact that, following each line synchronising pulse, there is a brief signal of constant amplitude representing black level. Normally, this will only vary in value at the receiver when signal fading is experienced. This black-level signal can be used for automatic gain control while the picture modulation is not suitable and, in fact, must be excluded from the control circuits.

The APC circuit consists of signal-measuring diode V13A, pulse amplifier V12B and rectifier diode V13B. The circuit is held inoperative during the picture content of waveform because cathode of amplifier V12B is biased through R33 to a potential more positive than its grid, the potential of which is determined by setting of **Contrast** control R51.

The circuit is brought into operation during each "black-level" signal, by feeding to cathode of signal measuring diode V13A a negative-going flyback pulse derived from secondary L47 of pulse transformer PT2, the primary L46 of which is coupled to auxiliary winding L44 of line output transformer LT1. The pulse is delayed a few microseconds by C107 R131 R132 so that it reaches V13A during the black-level following each synchronising pulse.

The negative pulse causes V13A to conduct thereby connecting cathode of cathode follower V9A to cathode of APC amplifier V12B during black level period. The peaks of the delayed pulses are therefore set at the potential of the cathode follower output, this potential varying with variation of input signal amplitude.

Setting of **Contrast** control R51 determines the amount of pulse which is amplified by V12B and therefore functions as a manual gain control irrespective of whether signal is present or not. Amplified pulse at anode V12B is rectified by V13B and resulting DC voltage is smoothed by R57 C45 C46 and applied through R16 R17 to grid of first vision IF amplifier V4.

Sound channel consists of two IF amplifiers V14 V15, signal rectifier V16, interference suppressor V17, triode AF amplifier V18A, and pentode sound output amplifier V18B.

Sound signal of 19.5mc/s at anode V2 is fed by C47 to tapping on L34 in grid of first sound IF amplifier V14. Anode V14 is choke-capacity coupled by L16 C52 to tuned coil L17 in grid second IF amplifier V15, the anode of which is single-peak transformer coupled to crystal signal rectifier V16. DC component of rectified audio signal is potentially divided by R68 R69 and applied through decoupling networks R70 C61 and R62 C49 to grids of IF amplifiers V15 V14 as AVC voltage.

Rectified audio signal is fed through series interference suppressor V17 to grid of triode AF amplifier V18A. Signal at anode is fed by C68 to **Volume** control R80 in grid of pentode sound amplifier V18B, the output of which is transformer coupled by OP1 to a PM speaker L20.

Sync separator. Video signal at cathode of cathode follower V9A is applied through R85 C74 to grid of sync separator V19. Positive sync pulses drive the valve into grid current and resultant bias on C74 is sufficient to place video portion of waveform below cut-off, thus only sync pulses appear at anode. Grid resistor R86 is returned to HT line to increase grid current flow and reduce noise on base of sync pulses.

Line sync pulses are differentiated and phase inverted by phasing transformer PT1 and applied to line sync discriminating rectifiers V24 V25.

Sampling pulses derived from secondary L44 of LT1 are also applied by C90 C91 to V24 V25. The sampling pulses are balanced about earth potential by virtue of centre tap of primary L46 of PT2 being connected down to earth. At junction of R109 R110 and R111 a controlling voltage is produced, the amplitude of which is dependent on relative phases of sync pulses and sampling pulses. Resultant voltage is delayed by R114 C92 C94 and fed through R112 R113 to grid of triode section V26A of line scan oscillator.

Frame sync pulses are developed across R87 C75 and fed through interlace filter V20 V21 and R92 to grid of first triode V22A of frame-scan oscillator.

Between sync pulses V19 is cut off and anodes V19 V20 rise to HT line potential. V20 conducts and C77 charges through R87 and primary of PT1 to HT potential. During line sync pulses V19 conducts and anode V20 is driven negative; its cathode remains unchanged due to long time constant of R91 C77—hence V20 is cut off. During longer frame pulses C77 discharges to a lower potential. Anode V21 is biased through R90 to a lower potential than anode V20. Hence when strapped cathodes of V20 V21 fall negatively during frame pulse period V21 conducts thus passing frame pulse developed across R91 C77 on to grid of V22A.

Frame scan sawtooth is generated by a multi-vibrator type oscillator using twin triodes V22A V22B with common cathode coupling and anode V22A to grid V22B coupling by C82. Frequency of scan voltage, which is developed on C83, is controlled by adjustment of V22B grid voltage by **Vertical Hold** control R100.

Frame amplifier. Scan voltage on C83 is fed through **Vertical Amplitude** control R101 to grid of frame amplifier V23. **Vertical Linearity** is controlled by R102 in series with C85 between grid and cathode. Output waveform at anode is transformer fed by FT1 to frame deflector coils L27 L28. Flyback pulse at anode V23 is fed by C86 through R103 R134 to cathode of CRT to black out tube during vertical flyback period.

Line scan voltage is generated by a multivibrator oscillator using triode V26A and grid and screen of pentode V26B as a second triode with common cathode coupling by R118 and anode to grid cross coupling by C93 C97. Frequency of scan voltage, which is developed on C99, is controlled by preset trimmer C97 and by variation of V26B grid circuit resistance by R123, the **Horizontal Hold** control. L21 shunted by C96 in cathode circuit is a stabilising circuit tuned to 8500c/s and is incorporated to eliminate a watery appearance of picture verticals under low signal conditions.

Line amplifier. Scan voltage on C99 is fed through R126 to grid of pentode line output amplifier V27. Amplitude of input waveform to grid is controlled by shunt capacitor C101 the **Horizontal Drive** control. Amplified output waveform at anode V27 is transformer fed by LT1 to line deflector coils L25 L26. Amplitude of scan is controlled by **Horizontal Amplitude** control L24, which is a variable inductance connected in parallel with section of output secondary L43 of LT1. **Horizontal Linearity** is controlled by adjustment of inductance L23 in series with efficiency diode V28. Interaction between frame and line deflector coils is prevented by C110.

Efficiency diode. Additional HT for line amplifier V27 and first anode of CRT is provided by charge built up on C106 by V28 when it rectifies and damps out shock oscillations set up in LT1 when V27 is cut-off at end of each line scan.

EHT of approximately 14kV for final anode of CRT is provided by V29 which rectifies the high surge voltages set up across primary and overwind L42 of LT1 when V27 is cut off. EHT is fed direct to final anode of CRT smoothing being provided by capacity between inner and outer coatings of tube.

HT is provided by parellel connected indirectly heated halfwave rectifiers V10 V11 fed from the input mains either direct on 200V or through sections of tapped dropper R43 on high voltage supplies. On DC supplies up to 230V rectifiers are short circuited to reduce voltage drop. Choke-capacity smoothing is given by L15 C35 C36 and further voltage dropping and resistance-capacity smoothing for HT2 feed is provided by R45 C37. Reservoir smoothing capacitor C35 should be rated to handle 600mA ripple current.

Heaters of all valves excepting EHT rectifier V29 are series connected and fed, via thermal surge limiter R82 shunted by R83 and protective 500mA fuse F2, from mains direct on 200V AC and DC, and through tapped dropper R43 on the higher ranges. C69 to C73 are heater RF decoupling capacitors. S1 which is ganged to sound volume control spindle is on/off switch. Mains input is fitted with 850mA anti-surge type fuse F1 in neutral lead to chassis and has filter coils L13 L14 one in each lead together with filter capacitors C33 C34.

CRT is a 14in. tetrode Mullard MW36-24 or Cathodeon C36-24 with rectangular screen and employing PM focusing. **Brightness** is controlled by variation of grid voltage by R41.

ADJUSTMENTS

Chassis removal. First loosen two wood screws securing aerial socket plate to rear of case, slide plate sideways and withdraw. Remove two bolts on rear flange of chassis—chassis can then be withdrawn. When replacing chassis ensure that front flange fits under the chassis retaining bar on floor of cabinet.

Removal of CRT. Unsolder the two LS leads from tag plate on tube clamp. Remove ion trap magnet, tube base connector, and unplug EHT lead from CRT. Remove two screws securing deflector coil tag strip support brackets to CRT clamp, the screw fixing LS tag strip, and finally the four deflector coil housing fixing nuts.

Withdraw deflector coil and focus magnet assembly from neck of tube. Lay cabinet face downwards on suitably protected surface then undo and remove the four CRT clamp fixing screws. Tube is now free to be withdrawn from cabinet.

When replacing CRT check to see that two earthing springs attached to tube-clamp make good contact with side coating of CRT and that neck is central in deflector coil assembly.

Alignment of picture and ion-trap magnet. Removal or replacement of CRT will necessitate the adjustment of ion-trap magnet and repositioning of picture. Ion-trap magnet should be pushed over base of tube with arrow pointing towards screen and over line marked on tube neck.

Switch on receiver and adjust **Brightness** control to just show raster. Move magnet towards screen until focused raster is at its brightest. Slightly rotate magnet to obtain position of maximum brilliance at same time ensuring verticals of picture are straight. Final adjustment should be carried out with a fairly bright picture. Lock magnet in position by tightening thumb screw.

Loosen picture rotation screw and rotate coils until picture is square with tube mask. Rotate two picture centering magnets until picture is central.

Horizontal Drive. Connect voltmeter between cathode V27 and chassis and adjust C101 for minimum reading on meter.

ALIGNMENT INSTRUCTIONS

Apparatus required. Crystal voltmeter to measure vision channel output (see Fig. below). Connect meter between cathode CRT and chassis. AF power output meter with 2.5ohms impedance and 100-200mW range. Connect meter across LS speech coil. Signal-generator covering 14-20, 40-70mc/s and with 30 per cent. modulation.

A damping unit consisting of a 220ohm resistor in series with 1000pF capacitor. When signal is fed "directly" to a valve grid a resistor of 75ohms must be connected across output leads and signal from "live" lead applied to appropriate valve pin through 1000pF capacitor. Earth lead of signal generator output should be fitted with crocodile-clip, the clip being attached to same point as end of 75ohm resistor.

Vision IF. Connect anode (pin 7) of V13B to chassis. Switch crystal voltmeter to 25V range. Place Vision Sensitivity R13 and White Spot Suppressor R37 fully anti-clockwise. Inject 19.5mc/s "directly" to junction L48 V3 C16 and tune L7 L8 for minimum output.

Change sig-gen to 16.9mc/s and tune L30/31 for maximum output. Connect damper between grid V5 (pin 2) and chassis and tune L5 for maximum output. Connect damper between anode V4 (pin 7) and tune L6 for maximum output. Remove damper. Inject 19.75mc/s, directly to junction L2 R9 C7. Place station pointer to channel 2, Holme Moss, and advance Sensitivity Control R13 to approximately three quarters maximum. Tune L4 for minimum output.

Connect damper between junction L48 V3 C16 and chassis. Change sig-gen to 16.9mc/s and tune L3 for maximum output. Connect damper between anode V2 (pin 7) and chassis and tune L48 for maximum output.

Sound IF. Place sound Volume control R80 to approximately mid-position and Sensitivity control R13 to three quarters maximum. Place station pointer to channel 2 Holme Moss. Inject 19.5mc/s directly to junction L3 R9 C7 and tune L34 L17 L35/36 for maximum AF output.

RF Stages. Place station pointer to channel 2, Holme Moss, and place Sensitivity control R13 to three quarters maximum. Inject 48.25mc/s directly to grid V1 (pin 2) and tune L32/33 for maximum AF output.

Connect damper across L2. Change sig-gen to 50.5mc/s and tune L1 for maximum output. Connect damper between anode V1 (pin 7) and chassis and tune L2 for maximum output. Remove damper and also remove resistor and capacitor termination from sig-gen output lead. Inject 50.5mc/s to aerial input socket and tune L29 for maximum output.

Vision Sensitivity. Connect anode V13B down to chassis. With Sensitivity control R13 placed fully clockwise the sensitivity of receiver will vary from 12 microvolts for channel 1 to 25 microvolts for channel 5 for an output of 15V on crystal voltmeter.

Sound Sensitivity. With Sensitivity and Volume controls at maximum, sensitivity will vary from four microvolts for channel 1 to 9 microvolts channel 5 for an output of 20mW on AF output meter.