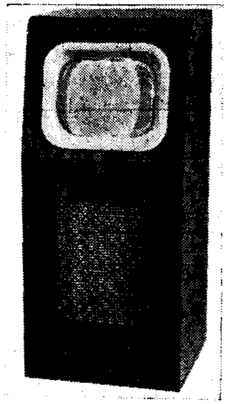
PYE D18T



Nineteen-valve AC-DC television receiver, fitted with 9-inch CRT, giving a 7½ by 6 inch picture. Suitable for 230 to 250 V AC or DC mains. Made by Pye, Ltd., Cambridge.

THE receiver uses a straight TRF circuit with permeability tuned inductances. RF amplifiers V1, V2 are common to both sound and vision signals. The receiver is assembled on a 15½ by 11½ in. chassis with the CRT and line transformer unit on a 10½ by 11½ in. sub-chassis. Mains consumption is approximately 125W.

Aerial.—Input circuit is designed for an 80 ohm balanced twin feeder. Signal is fed to high voltage insulated transformer RFT1 which, with RFT2, forms a balanced input to first RF amplifier V1.

Vision channel consists of four RF amplifiers V1 to V4 tuned to 45 mc/s, signal rectifier V5A, noise limiter V6A and video output valve V7. V1 is bandpass coupled by RFT3 and L7 to V2. Single peak transformer coupling is used between V2, V3 and V4. V4 is bandpass coupled by RFT6, L16, to vision rectifier V5A. Input to V1 is damped by R2 to provide a wide bandwidth to accept both sound and vision frequencies. Further damping to maintain bandwidth is provided by R15, R18 and by low diode load R21. Overall bandwidth is 6 mc/s.

Sound signal is tapped from L10 tuned to 41.5 mc/s in the cathode of V3. L13 in the anode, and L17 in the cathode of V4 are sound rejector circuits. The cathode filters L10-C16 and L17-L19 provide considerable negative feedback at 41.5 mc/s so reducing gain at this frequency.

Gain is manually controlled by Vision Sensitivity R6 in the cathode of V1, and by Contrast R14 in common cathode circuit of V2, V3. The effect of control grid and negative suppressor grid (connected to chassis) control is to maintain reasonably constant the input capacity and resistance of the valves to preserve the shape of the frequency response curve.

Vision rectifier V5A is provided with a small bias through R22, R71, R59 to prevent noise appearing on line sync. pulses which are fed from anode V7 to grid V11. Rectified signal from V5A is DC coupled to video output V7.

Grid L22 and anode L20 peaking coils improve high-frequency video response. L22 with circuit capacities resonates at around 3 mc/s and L20 damped by R24 resonates at 1.75 mc/s. Frequency response is level up to approximately 3 mc/s.

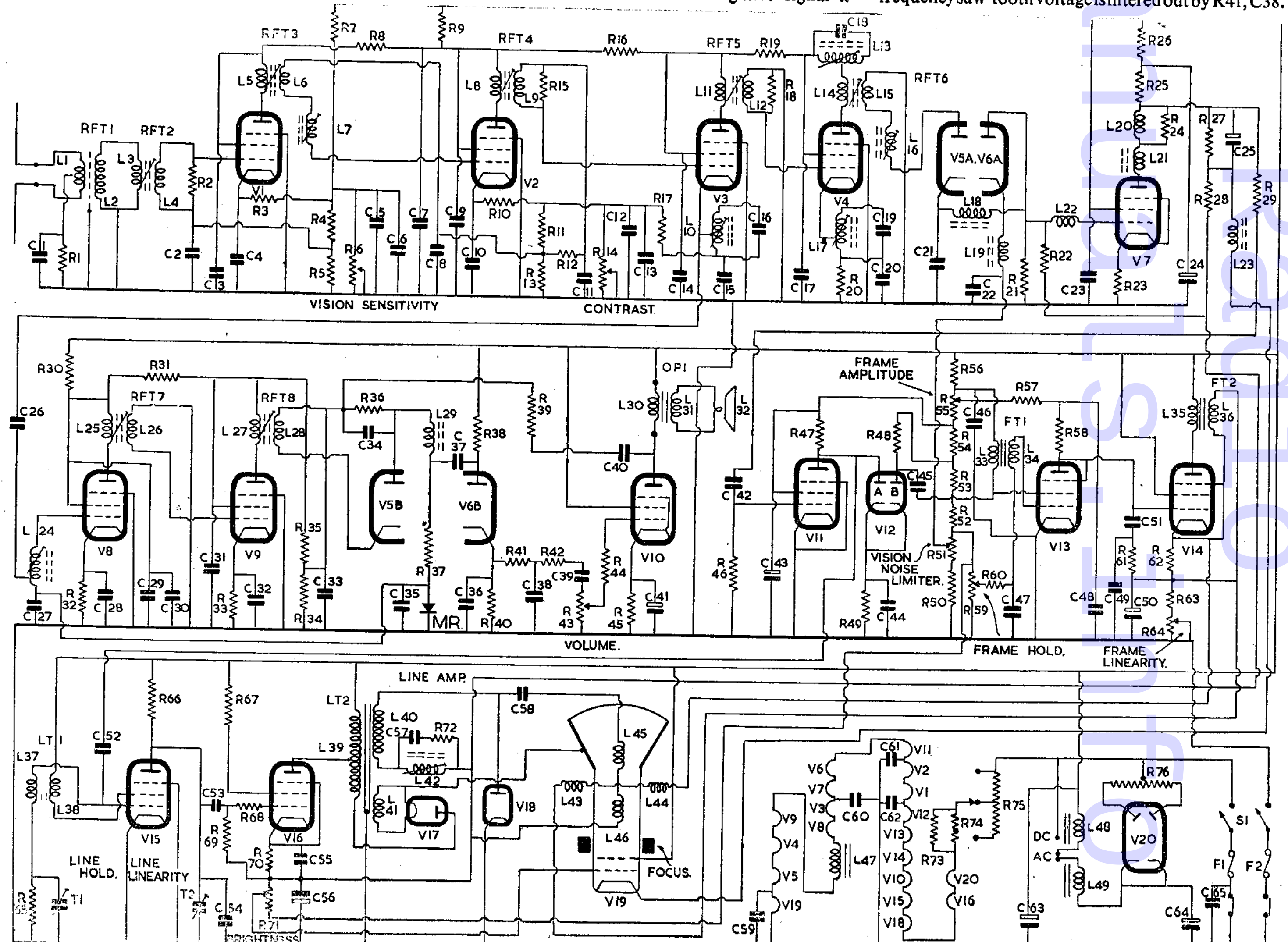
Output from V7 is DC-AC coupled to cathode of CRT by network R27, C25, R28, L23. At frequencies below 25 c/s anode voltage of V7 will increase in accordance with time constant of decoupling network R26, C24, until at DC or zero frequency V7 anode load is R25 plus R26. The increased gain, however, is neutralised by the effect of time constant element R27, C25 of the potential divider R27, R28.

Interference limiter.—V6A, which is shunted across signal rectifier V5A load, is biased by R51, Vision Noise Limiter, so that it will conduct on any pulse greater than peak white amplitude.

Sound channel.—The sound signal (41.5 mc/s) which is amplified with vision signal by V1, V2 is developed across tuned circuit L10, C16, in cathode of V3 and fed by C26 to grid coil of first sound signal amplifier V8. RFT7 couples V8 to second amplifier V9, and RFT8 feeds signal to diode rectifier V5B. Rectified signal is fed through interference limiter V6B to volume control R43, and thence to audio output valve V10, the output of which is fed to an 8 in. PM speaker. Negative feedback from anode V10 is fed by C40, R39 to signal rectifier diode V5B.

AVC.—Gain of V8 is automatically controlled by delayed AVC circuit consisting of metal rectifier MR, R34, R35, R37. Rectifier is positively biased from junction of R34, R35 and will accordingly conduct and offer a low resistance down to earth or chassis. When rectified audio signal-developed across R36 exceeds delay voltage then MR will cease to conduct and negative signal is applied through L24 to g1 of first sound amplifier V8.

Interference limiter.—Rectified audio signal across R36 is fed by C37 to series diode limiter V6B. This valve is provided with an anode voltage through R38 and will conduct and produce a cathode voltage across R40. The negative audio signal fed by C37, to V6B anode will be reproduced across R40 because of the short time constant of R40, C36. When, however, an interference pulse appears, then anode V6B is driven heavily negative, but due to short-time constant of R40, C36 cathode potential is maintained on C36 and V6B will cut off thus removing interference pulse from audio signal. Whilst V6B is cut off C36 will lose some of its charge through R40. The resultant high-frequency saw-tooth voltage is filtered out by R41, C38.



Sync. separator.—Signal from video output valve V7 is fed by R29, C42, to sync. separator V11. Positive sync. pulses of video signal drive V11 into grid current and so produce a steady bias across R46 such that negative picture signal is placed beyond cut off and only positive sync. pulses are passed to grid V11 for amplification. Anode and screen voltages of V11 are kept low in order to give a short grid base to ensure sync. separation on weak signals. Negative sync. pulses at anode V11 are fed to line scan oscillator V15 and via interlace filter V12, to frame scan oscillator V13.

Interlace filter is to ensure that only frame sync. pulses are fed to V13. In between line sync. pulses V11 is cut off and anode V11 and V12A are at HT potential. V12A conducts and C44 charges through R47 to HT voltage. During line pulses, when V11 is conducting, anode V12A falls negative to its cathode and ceases to conduct. Because time constant of R49, C44 is long compared with line sync. pulse the resultant pulse across R49 is attenuated.

During the longer frame sync. pulses, however, V12A is cut off for a much longer period and C44 discharges through R49 to a much lower potential and so produces a larger negative pulse. Because anode voltage of V12B is lower than that of V12A and their cathodes are strapped, then V12B only conducts on the larger frame sync. pulse. Frame sync. pulses across R48 are fed by C45 to frame scan oscillator V13.

Frame scan oscillator is pentode V13 operated as a grid blocking oscillator with screen to grid transformer back-coupling. Time constant of C47, R60 decides frequency of frame scan which is developed in anode of V13 by charge of C51 through R58. Time constant of C51, R58 is sufficiently long to ensure that linear portion of charge curve of C51 is used for scan. R61, C49 in series with C51 give wave-form shaping

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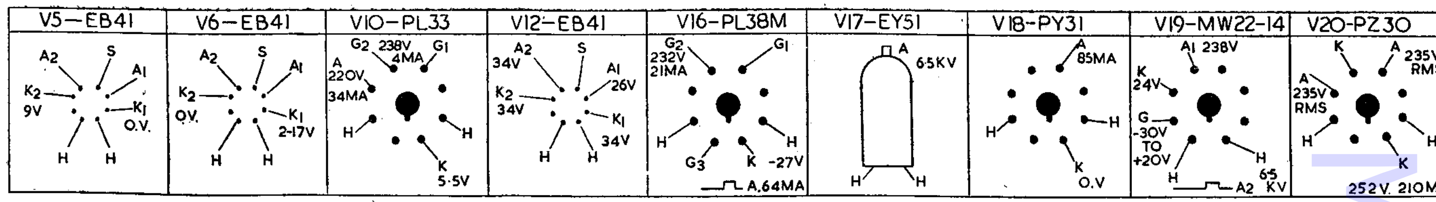


EF50 VOLTAGE READINGS

Valve	G2	A	G3	S	K	G1	S
V1	233	233	—	—	1.9	—	—
V2	236	236	—	—	1.9	—	—
V3	235	235	—	—	1.9	—	—
V4	237	237	—	—	2.2	—	—
V7	238	145	—	—	2.5	—	—
V8	237	237	—	—	2.0	—	—
V9	235	235	—	—	2.3	—	—
V11	73	25	—	—	—	—	—
V13	209	—	—	—	—	−42	—
V14	238	230	—	—	−12	—	—
V15	238	17	—	—	—	−32	—

RESISTORS

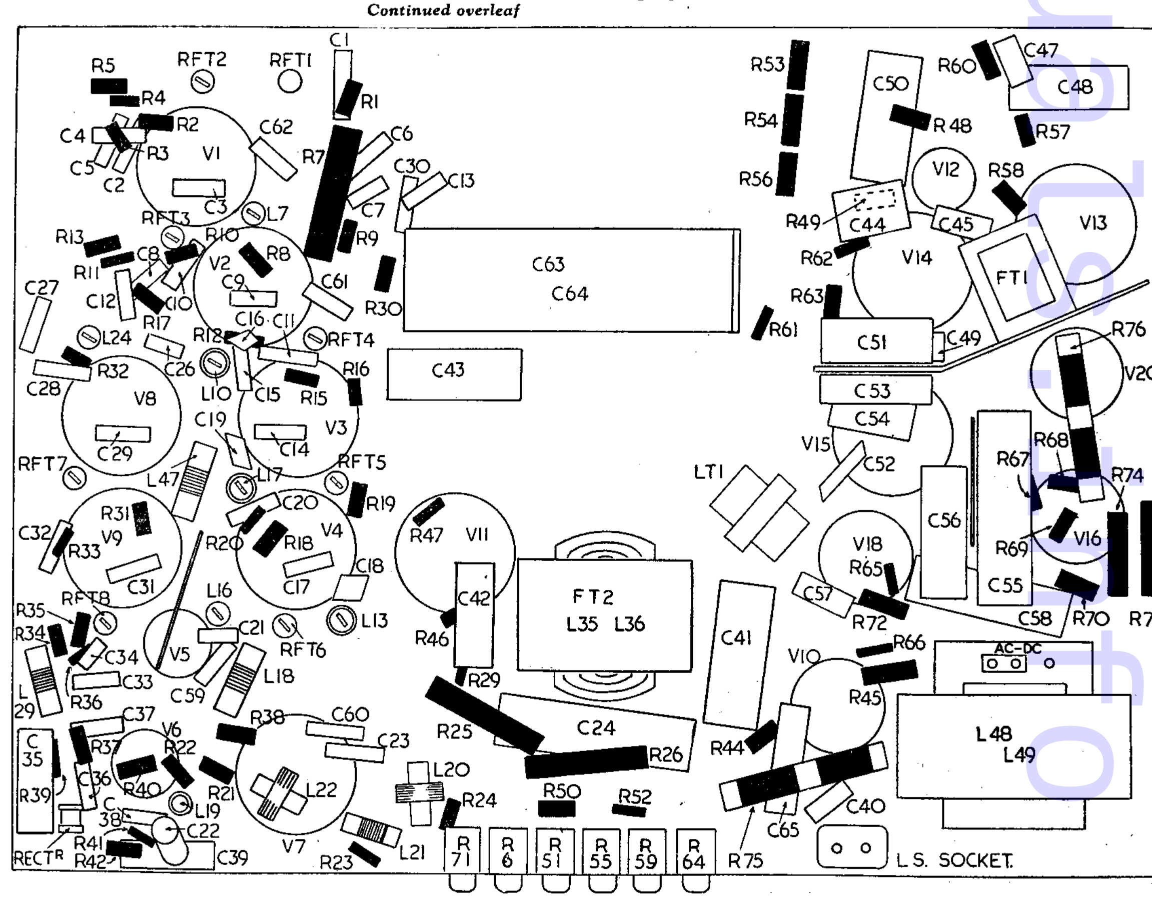
R	Ohms	Watts
1	2.7M	¼
2	4.7K	¼
3	150	¼
4	3.3K	¼
5	47K	¼
6	10K	W.W. Potr.
7	56K	2
8	330	¼
9	33	¼
10	150	¼
11	2.2K	¼
12	330	¼
13	47K	¼
14	3K	Potr. 1.5
15	2.2K	¼
16	33	¼
17	150	¼
18	2K	¼
19	33	¼
20	220	¼
21	4.7K	¼
22	56K	¼
23	390	¼
24	4.7K	¼
25	5.6K	1
26	7.5K	1
27	68K	¼
28	33K	¼
29	10K	¼
30	33	¼
31	330	¼
32	150	¼
33	220	¼
34	10K	¼
35	220K	¼
36	33K	¼
37	1.5M	¼
38	1M	¼
39	330K	¼
40	2.2M	¼
41	33K	¼
42	330	¼
43	250K	Potr. 1.5
44	330	¼
45	150	½
46	2.7M	¼
47	27K	¼
48	47K	¼
49	220K	¼
50	1K	¼
51	5K	W.W. Potr.
52	3.9K	¼
53	2.7K	½
54	2.7K	½
55	10K	W.W. Potr.
56	2.2K	¼
57	1.2M	¼
58	1.5M	¼
59	5K	W.W. Potr.
60	470K	¼
61	2.2K	¼
62	100	¼
63	330	¼
64	2K	W.W. Potr.
65	180K	¼
66	820K	¼
67	330	¼
68	300	¼
69	680K	¼
70	33	¼
71	10K	W.W. Potr.
72	500	W.W. 4
73	390	W.W. 6
74	Thermistor	
75	57	W.W. 8 (tapped 23)
76	94	W.W. 8 (centre tapped)

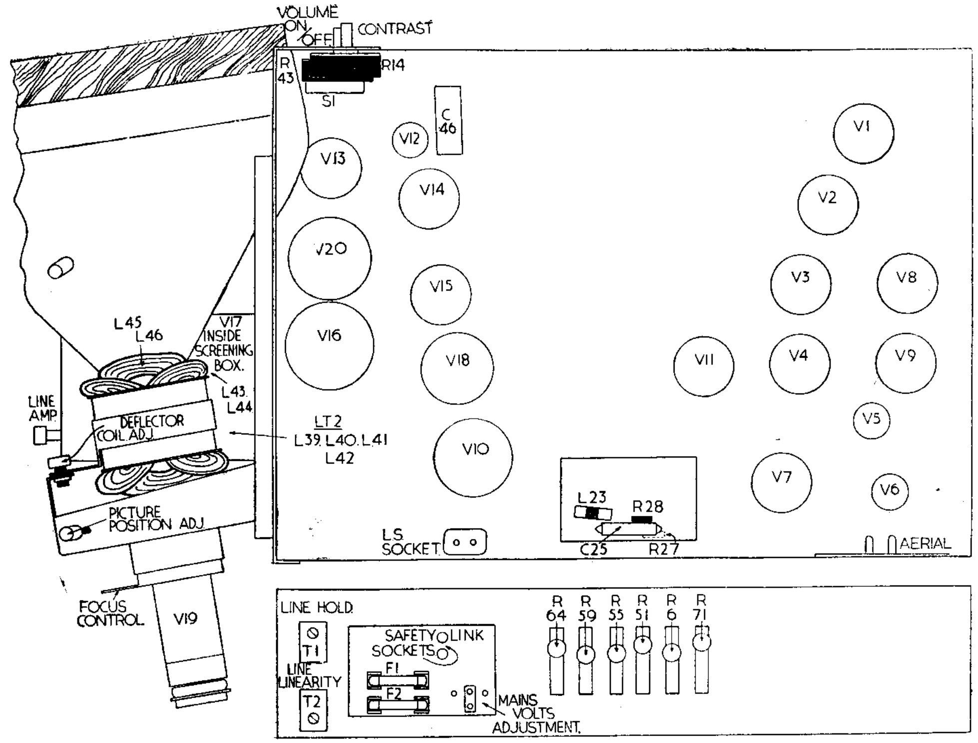
CAPACITORS

C	Capacity	Type
1	.001	Tubular 1000V
2	.0015	Tub. Ceramic
3	.0015	Tub. Ceramic
4	.0015	Tub. Ceramic
5	.0015	Tub. Ceramic
6	.0015	Tub. Ceramic
7	.0015	Tub. Ceramic
8	.0015	Tub. Ceramic
9	.0015	Tub. Ceramic
10	.0015	Tub. Ceramic
11	.0015	Tub. Ceramic
12	.0015	Tub. Ceramic
13	.0015	Tub. Ceramic
14	.0015	Tub. Ceramic
15	.0015	Tub. Ceramic
16	50pF	Silver Mica
17	.0015	Tub. Ceramic
18	50pF	Silver Mica
19	50pF	Silver Mica
20	.0015	Tub. Ceramic
21	5pF	Ceramic
22	.1	Tubular 350V
23	.0015	Tub. Ceramic
24	12	Electrolytic 275V
25	2	Electrolytic 150V
26	5pF	Ceramic
27	.002	Tubular 500V
28	.002	Tubular 500V
29	.002	Tubular 500V
30	.0015	Tub. Ceramic
31	.002	Tubular 500V
32	.002	Tubular 500V
33	.002	Tubular 500V
34	5pF	Ceramic
35	.05	Tubular 500V
36	.0015	Tub. Ceramic
37	.01	Tubular 350V
38	.0015	Tub. Ceramic
39	.1	Tubular 350V
40	.002	Tubular 500V
41	50	Electrolytic 12V
42	.05	Tubular 500V
43	8	Electrolytic 125V
44	250pF	Silver Mica
45	.01	Tubular 500V
46	.1	Tubular 350V
47	.02	Tubular 350V
48	.1	Tubular 350V
49	.1	Tubular 350V
50	25	Electrolytic 25V
51	.1	Tubular 350V
52	100pF	Silver Mica
53	.01	Tubular 1000V
54	300pF	Silver Mica
55	.25	Tubular 500V
56	25	Electrolytic 50V
57	.01	Tubular 500V
58	.5	Tubular 350V
59	.0015	Tub. Ceramic
60	.0015	Tub. Ceramic
61	.0015	Tub. Ceramic
62	.0015	Tub. Ceramic
63	100	Electrolytic 350V
64	60	Electrolytic 350V
65	.02	Tubular 1000V

INDUCTORS

L	Ohms
1–17	very low
18	.5
19	.5
20	3.5
21	.5
22	3.25
23	.5
24–28	very low
29	.5
30	450
31	.25
32	2.5
33	140
34	600
35	1400
36	2.5
37	90
38	9.5
39	300 Total (Tap 260)
40	3.5
41	very low
42	4
43, 44	9
45, 46	7
47	very low
48	29
49	34





PYE D18T—*Continued*

necessary due to nature of impedance presented by frame scanning coils to output valve V14. Adjustment of V13 HT voltage by R55 gives Frame Amplitude control, and variation of positive grid bias by R59 give Frame Hold control.

Frame amplifier is V14.—Oscillator output is direct coupled to V14. Secondary of frame output transformer is coupled in series with cathode to give negative feedback to lengthen grid swing and improve linearity. Manual control of linearity is given by R64 which adjusts cathode bias of V14. L43, L44 are CRT frame scanning coils.

Line scan oscillator is pentode V15 operated as a grid blocking oscillator with screen to grid transformer back-coupling. R65, T1 decide line frequency—adjustment of T1 giving Line Hold control. Line scan is developed in anode of V15 by C54, T2 and R66. Adjustment of T2 gives Linearity control. Sync. pulses are differentiated by C52, the coupling capacitor, before being fed to grid of V15.

Line amplifier.—Scan voltage developed across C54, T2 is coupled by C53 to grid of line output valve V16. Amplitude of input voltage is sufficient to drive V16 into grid current, which gives a steady negative bias on C53. This cuts off approximately 30 per cent. of first part of scan waveform to grid of V16, but cut portion is restored later by action of V18. Line output transformer secondary L40 feeds scanning waveform through C58 to CRT deflector coils L45, L46.

Booster damper stage is V18 and converts shock oscillation in LT2 into additional deflection power, and also supplies additional negative HT to line amplifier V16.

Anode return circuit of V18 is through L40, L42, R71, R59 to chassis. During line scan, anode end of L40 has a mean potential of 30V positive with respect to cathode end, V18 conducts and develops approximately 30V bias across C56. Junction of R70 and R71 is therefore negative to chassis and this boosts the effective HT supply of V16.

The flyback shock oscillations, which drive anode V18 more positive than the mean potential of 30V, cause V18 to conduct heavily, so damping out the oscillations and at the same time increasing negative charge on C56. When shock oscillations cease C56 loses its extra charge in the form of a linear saw-tooth current waveform through L40, thus restoring the 30 per cent. cut in the waveform at grid of line amplifier V16. L42, R72, C57 damp out any residual shock oscillations which are not removed by V18. C58 isolates DC component of V18 from deflector coils L45, L46.

EHT of 6.5kV is obtained by rectifying the high voltage surge developed across primary L39 of line scan transformer LT2 when line amplifier V16 is cut off. Filament current of rectifier V17 is provided by an auxiliary winding L41. EHT is fed to final anode of CRT, the capacity between inner and outer "Aquadag" coatings of which forms the smoothing capacitor.

HT is provided by a half-wave rectifier V20 fed direct from mains. Choke-capacity smoothing is

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given by L48, L49, C63, C64. To reduce voltage drop on DC operation rectifier V20 and half of smoothing choke (L49) can be by-passed by alteration of a link coupler.

Heaters of V1 to V16, V18, to V20, are series connected and obtain their current from the mains, through tapped dropper resistor R75 and thermal surge limiter R74. S1 which is ganged to volume control is the ON/OFF switch. Mains input is fused and a filter capacitor C65 is fitted.

CRT is a 9 inch tetrode Mullard MW22-14. Focusing is by an adjustable permanent magnet ring. Picture brightness is controlled by varying the bias applied to grid by R71.

ALIGNMENT INSTRUCTIONS

(1) Remove screening can from RF section. Disconnect R22 from V6A tag. Set R6 to minimum and R14 to maximum. Fit damping condenser of 20 pF between anode V4 and chassis. Inject 45 m/cs to g1 of V3 and with 100 mV input adjust L16 for maximum output.

(2) Damp anode V5A and with 20mV input adjust RFT6 for maximum output.

(3) With 5mV input adjust RFT5 or maximum output.

(4) With volume control at minimum inject 41.5 mc/s. With 100 mV input adjust L10, L13, L17 for minimum.

(5) With VC at maximum and 3mV input adjust L24, RTF7, RFT8, for maximum sound output.

(6) Replace screening can on RF section. Inject 45 mc/s to g1 of V1. Damp anode V1 with 20 pF capacitor. Set R6 to maximum. With 2mV input adjust L7 for maximum output.

(7) Damp g1 of V2 with 20 pF capacitor. With 1mV input adjust RFT3 for maximum output. Remove damping.

(8) With 350 μV input, adjust RFT4 for maximum.

(9) Inject signal to aerial sockets. With 70μV input adjust RFT2 for maximum.

(10) With R43 set at maximum inject 41.5 mc/s. With 25μV input re-adjust L24, RFT7, RFT8 for maximum output (20 mW on AF power output meter).

(11) Set R43 to minimum. With 5mV input re-adjust L10, L13, L17 for minimum output on diode voltmeter.

SOBELLETTE—*from opposite page*

decoupling capacitor. Primary L9, C8 of IFT1 is in the heptode anode circuit.

Oscillator is connected in a tuned grid series fed HT circuit. The grid coils L5 (MW), L7 (LW) which are series connected and tuned by VC2, are coupled by C5 to oscillator grid (gt, g3) of V1. T2 is MW trimmer and C6 (MW), C7 (LW) padders. S3 shorts out L7, C7 when receiver is switched to MW band.

Automatic bias for oscillator grid is developed on C5 with R4 as leak resistor. Anode reaction voltages are obtained inductively from L6 (MW), L8 (LW), which are in series with oscillator HT circuit.

IF amplification.—No separate IF amplifier is used. The am lification given by V1 at 465 kc/s, together wi th positive feedback from anode to grid of V2, wh ch is introduced by secondary winding L11 incorporat ed in IFT1, being sufficient.

Signal rectifier and AF amplifier.—Secondary L10, C9 o. IFT1 feeds signal to g1 of V2 which is operated as a leaky-grid detector. Rectified signal is developed on C10 with R5 as leak resistor. Cathode and suppressor grid are connected down to chassis. Screen voltage is obtained from R6 and decoupled by C11.

R7 is anode load and R8, C12 form an RF filter. Reaction voltages from anode are fed by T3, L11 to the grid input. T3 gives control over the amount of feedback.

Output stage.—C13 feeds signal at anode V2, through R9 to beam tetrode output valve V3. R10 is its grid resistor and C14 a filter capacitor. Cathode bias is provided by R11 and decoupled by C15.

Screen voltage is obtained direct from HT line to V1, V2. Primary L12, of output matching transformer OP1 is in the anode circuit, the HT for which is obtained direct from reservoir capacitor C17. Secondary L13 of OP1 feeds signal to a 5 in. PM speaker L14.

High tension is provided by an indirectly heated half-wave rectifier V4 with anode voltage is obtained from the mains through limiter resistor R13. Smoothing is given by R12, C16, C17, together with a portion of primary L12 of OP1 connected in a hum backing circuit. C15 is a mains filter capacitor.

Heaters of V1 to V4 and dial light are series connected and obtain their current from the mains through dropper resistor R14. Thermal surge limiter R15 is fitted to protect valve heaters from excessive current when switching on. S4, S5 which are ganged to the volume control spindle switch the receiver ON/OFF.

Chassis removal.—Remove the push on volume control knob.

Unscrew the four bolts securing fibre base cover panel to bottom of cabinet.

Undo and remove the two screws at each side of chassis. Tilt chassis so as to give clearance for tuning dial and lift chassis out of cabinet.

TRIMMING INSTRUCTIONS

Apply signal as stated below	Tune receiver to	Trim in order stated for max. output
(1) 465 kc/s to g1 of V1 via 1mF.	MW band	Core L9, L10.
(2) Test for instability by LW bands.	tuning over w	hole of MW and
(3) 465 kc/s as in (1)	550 metres	T3.
(4) Retest as in (2) for an point reduce capacity o	y instability. I f T3 very slig	f unstable at any htly.
(5) 1.450 mc/s to AE via dummy aerial.	200 metres	T2, T1.
(6) 600 kc/s as above.	500 metres	Core L5, L2.
(7) Repeat operation (5) metres.	and then ch	eck 300 and 550
(8) 334 kc/s as in (6).	900 metres	Core L7, L4.
(9) 150 kc/s as above.	2,000 metres	Check and adjust if necessary.
(10) Repeat (8) and (9) obtained over scale fro least attenuation below	until a satisfa m 1,000 to 2 1,000 metres.	ctory balance is ,000 metres with

NOTE:—Operations (1) to (4) should be carefully carried out as receiver sensitivity depends on correct IF and feedback alignment.