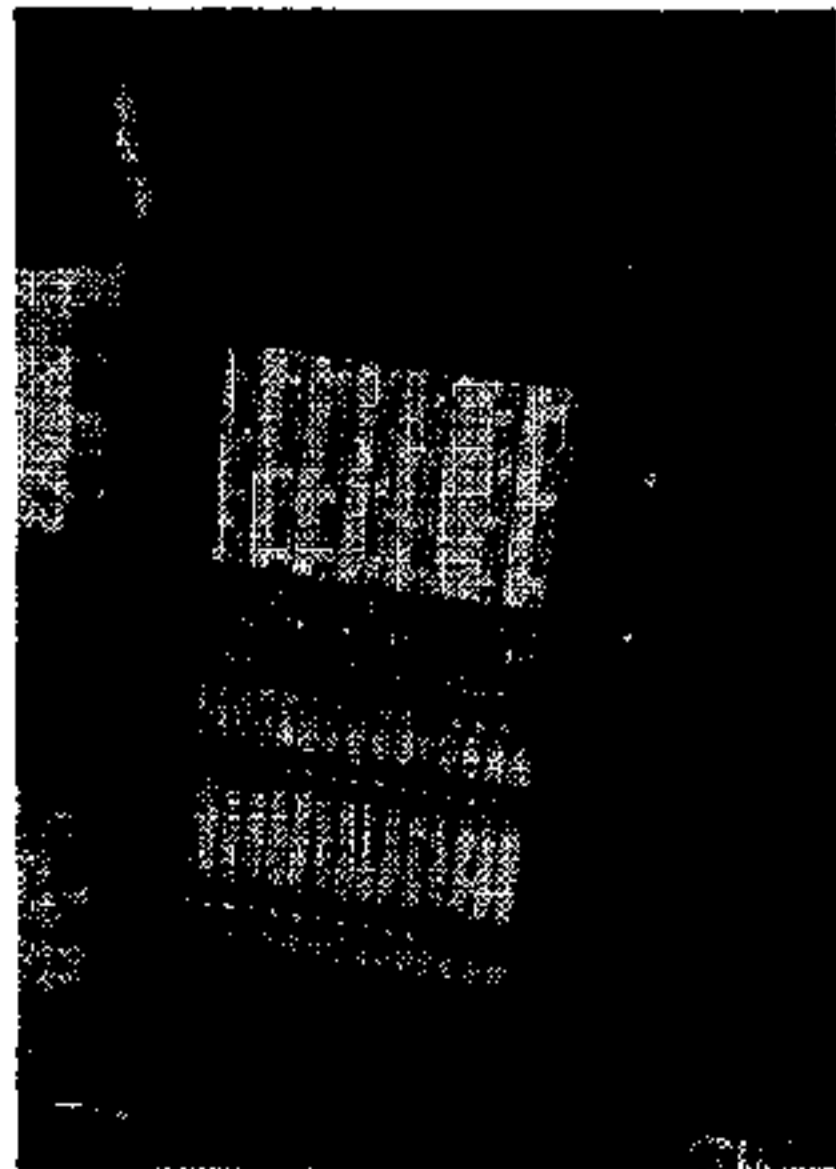
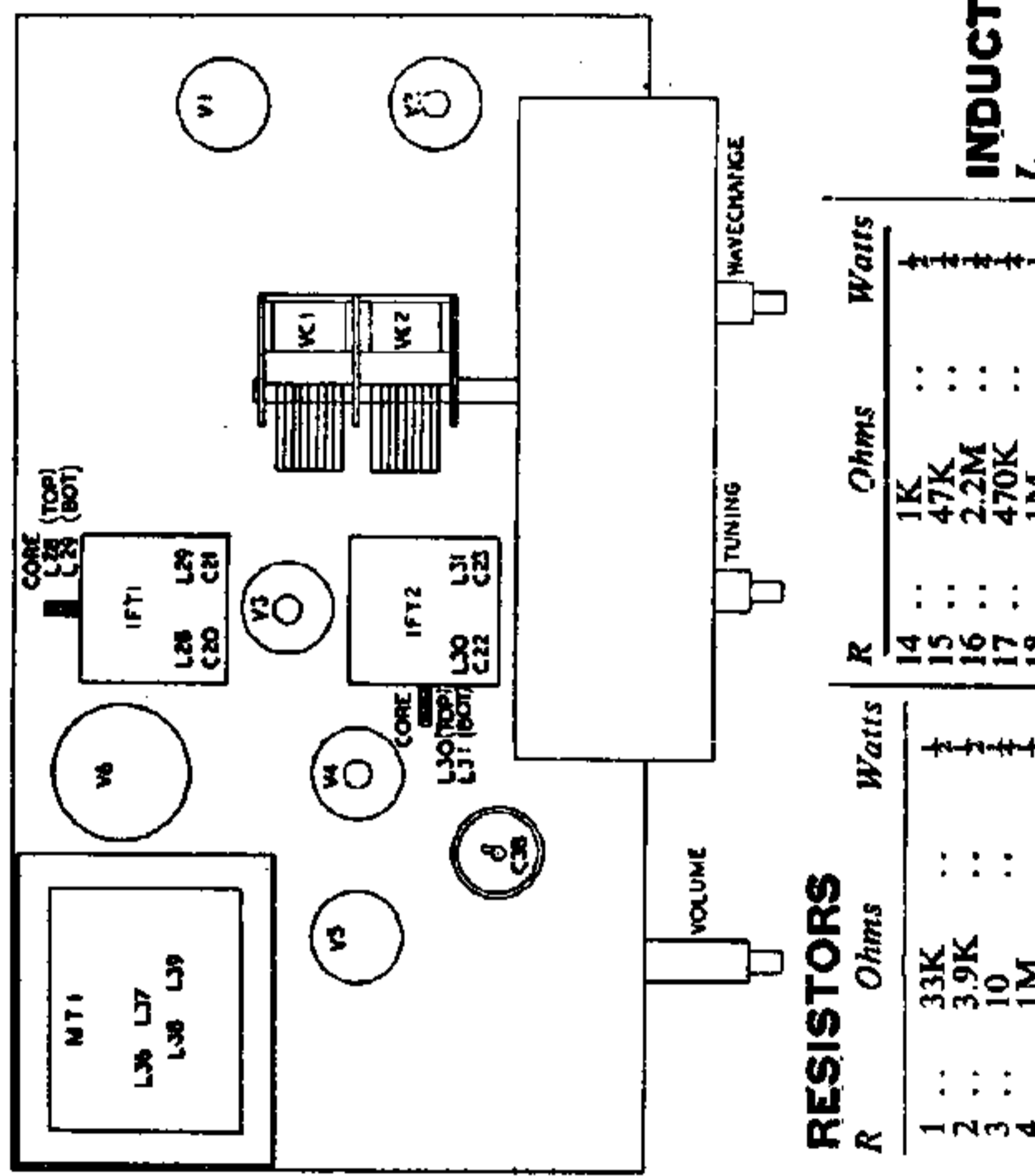
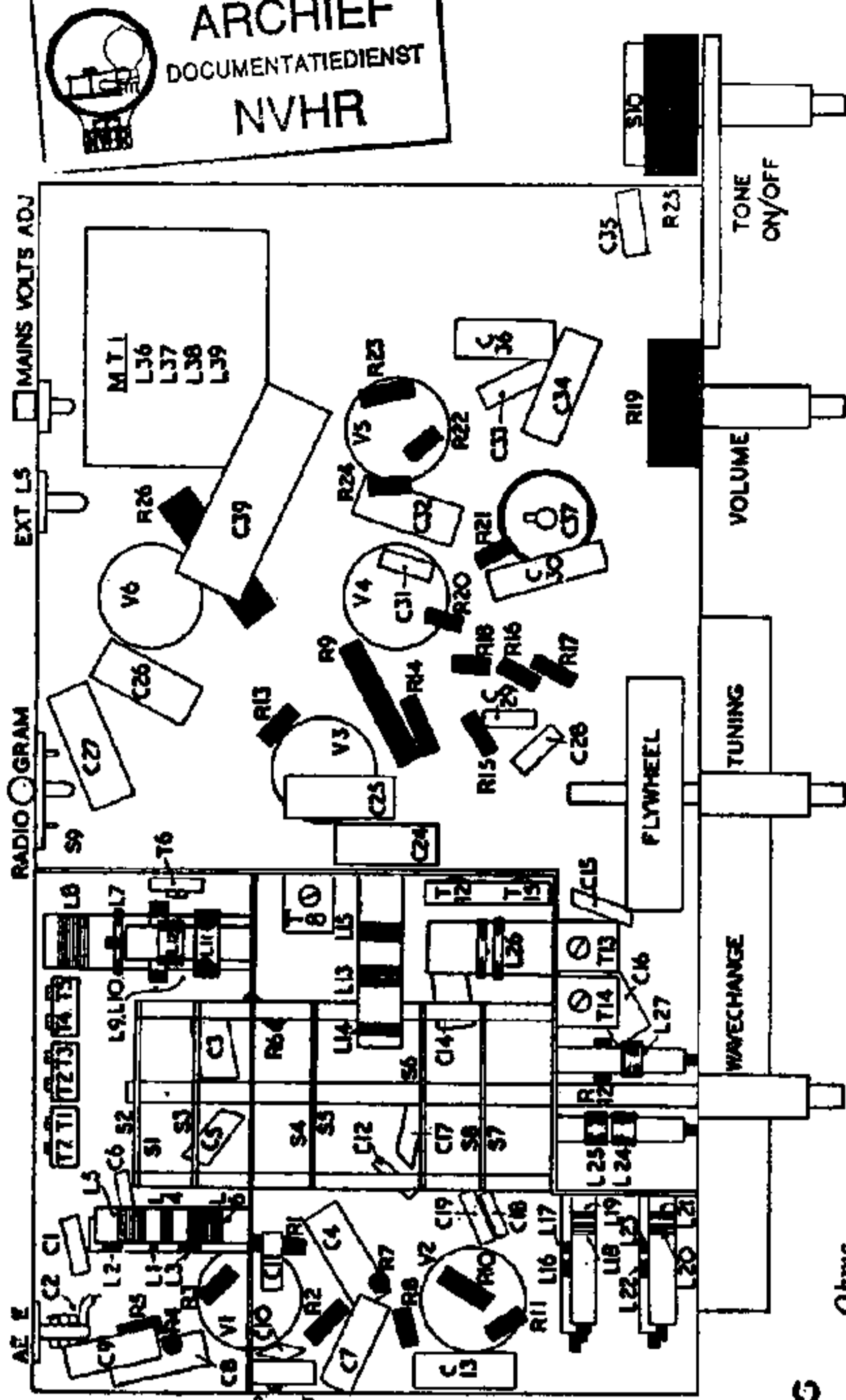


PILOT BS648



Six-valve, seven-waveband superhet with electrical bandspread on the five short wave ranges. Sockets provided for gramophone pickup and a low impedance type extension loudspeaker. Designed to operate on 110-130, 200-250 volt, 40 to 100 cycle AC mains. Housed in walnut veneered cabinet. Made by Pilot Radio Ltd., 31-37, Park Royal Road, London, NW10.



CAPACITORS

C	Capacity	Type
1	500 pF Mica	
2	Formed with wire around A1 sockets	
3	310pF Silver Mica	
4	1 Tubular 350V	
5	120 pF Silver Mica	
6	100 pF Tubular Cer.	
7	1 Tubular 350V	
8	1 Tubular 350V	
9	1 Tubular 350V	
10	60 pF Silver Mica	
11	500pF Mica	
12	100pF Tubular Cer.	
13	1 Tubular 350V	
14	310 pF Silver Mica	
15	150 pF Silver Mica	
16	260 pF Silver Mica	
17	120 pF Silver Mica	
18	60 pF Tubular Cer.	
19	300 pF Mica	
20	100 pF Silver Mica	
21	100 pF Silver Mica	
22	100 pF Silver Mica	
23	100 pF Silver Mica	
24	1 Tubular 350V	
25	1 Tubular 350V	
26	1 Tubular 350V	
27	1 Tubular 350V	
28	100pF Tubular Cer.	
29	100pF Tubular Cer.	
30	005 Tubular 500V	
31	100pF Tubular Cer.	
32	05 Tubular 500V	
33	05 Tubular 500V	
34	1 Tubular 500V	
35	01 Tubular 500V	
36	1 Tubular 500V	
37	16 Electrolytic 450V	
38	16 Electrolytic 450V	
39	8 Electrolytic 500V	

INDUCTORS

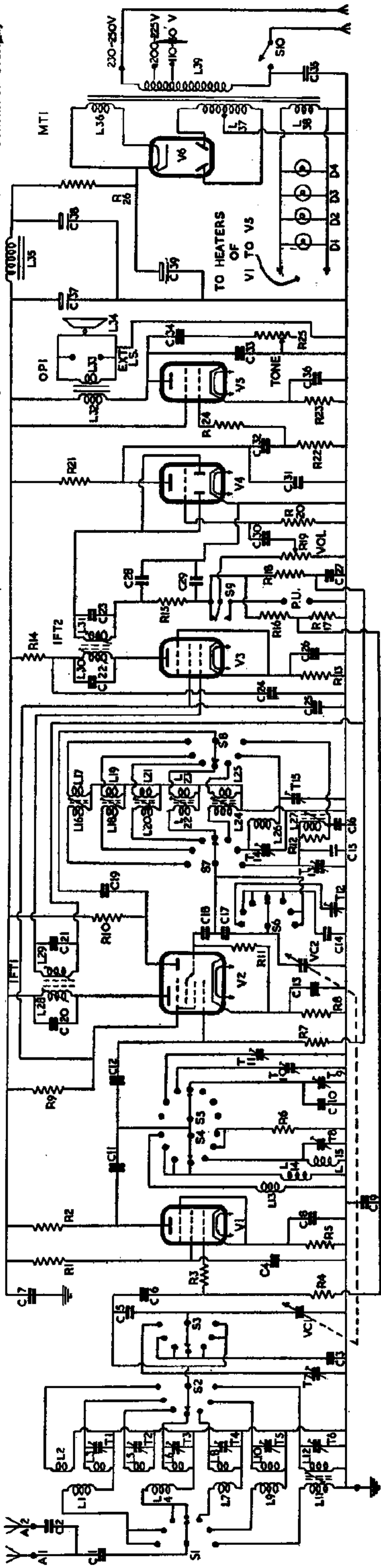
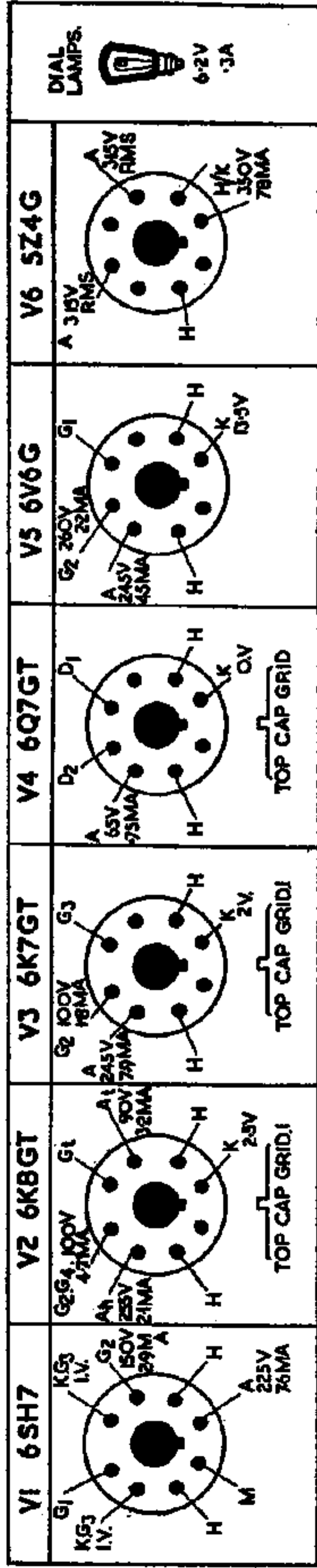
L	Ohms	Type
1	.15	
2	.15	
3	1.75	
4	16.5	
5	2.2	
6	150	
7	26.5	
8	.5	
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40	10 (Shunted by R12)	
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RESISTORS

R	Ohms	Watts
1	33K	
2	3.9K	
3	10	
4	1M	
5	100	
6	1K	
7	220K	
8	220	
9	22K	
10	47K	
11	47K	
12	22K	
13	220	
14	1K	
15	47K	
16	2.2M	
17	470K	
18	1M	
19	500K	
20	10M	
21	270K	
22	470K	
23	270	
24	4.7K	
25	25K	
26	390	

INDUCTORS

L	Ohms
1	.15
2	.15
3	1.75
4	16.5
5	2.2
6	150
7	26.5
8	.5
9	
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40	10 (Shunted by R12)
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AERIAL is connected through C1 to S1, when using A1 socket or through C2, C1 to S1, when A2 socket is used. S1 switches the aerial to coupling coils L1, L4, L7 (SW), L9 (MW), L11 (LW).

L2, L3, L5, L6, L8 (SW), L10 (MW), L12 (LW) are the grid coils which are switched by S2, through C6 and grid stopper resistor R3, to g1 of RF amplifier V1, and through C5 to tuning capacitor VC1. S3 is used to bring in trimmer T7 across VC1 on the lowest SW range (13 to 16 metres) and to place C3 across VC1 on the remaining four SW ranges. On MW and LW ranges C5, which is in series with VC1 on the SW ranges, is short circuited by S3. T1 to T7 are the aerial trimmers. AVC is applied to g1 of V1 through grid resistor R4 and is decoupled by C9.

Cathode bias is provided by R5 decoupled by C8. Screen voltage is obtained from R1 and decoupled by C4 and suppressor grid is connected to cathode. R2 is anode load resistor.

C11 feeds signal at anode V1 to S4, S5, which are used to switch in circuit the intervalve coupling coils L13, L14, L15 and associated trimmers T8, T9, T10, T11, which are used on the SW ranges, and resistor R6 for the MW and LW ranges. The signal developed across these circuits is then fed by C12 to g1 of frequency-changer V2. AVC is applied to g1 through grid resistor R7 and is decoupled by C27. Cathode bias is provided by R8, decoupled by C13.

Screen (g2, g4) voltage is obtained from R9 and decoupled by C25. L28, C20, which form the primary of IFT1, are in the hexode anode circuit.

Oscillator is connected in a tuned-grid parallel-fed HT circuit. L16, L18, L20, L22, L24 (SW) and L26 (MW), L27 (LW) are the grid coils and these are switched by S7, through C18, to grid of triode oscillator section of V2, and through C17 to tuning capacitor VC2. S6 is used to switch in trimmer T12 across VC2 on the lowest SW range (13 to 16 metres), and C14 on the remaining four SW ranges. On MW and LW ranges C17, which is in series with VC2, is short circuited by S6.

The SW oscillator circuits are trimmed by their adjustable iron dust cores and no padding capacitors are incorporated. On MW, however, T14 is trimmer and T15 is padder. The LW coil L27, although of the permeability tuned type, is provided with T13, C15 as trimmers and C16 as fixed padder. Padding adjustments are made by means of its iron dust core. L27 has a damping resistor R12 connected across it. Bias for oscillator grid is developed on C18 with R11 as leak resistor.

The anode reaction voltages are developed inductively on L17, L19, L21, L23, and L25 on the SW ranges, but capacitively across T15 and C16 on the MW and LW ranges. S8 switches the reaction voltages through C19 to oscillator anode of V2. R10 is the anode load resistor.

IF amplifier operates at a frequency of 451 kc/s. L29, C21, the secondary of IFT1, feeds signal and AVC voltages to grid of IF amplifier V3. R18, C27 decouple the AVC line. Cathode bias is provided by R13, decoupled by C26. Screen voltage is obtained from R9 and decoupled by C25. Suppressor grid is connected to cathode. L30, C22, which form the primary of the IFT2, are in the anode circuit, the HT for which is decoupled by R14, C24.

Signal rectifier. L31, C23, the secondary of IFT2, feeds signal to the strapped diodes of V4.

R19, the volume control, shunted by R16, R17, forms the diode load resistor and R15, C28, C29 a filter circuit.

Pickup. Sockets are fitted to allow a high impedance gramophone pickup to be used.

When S9 is in the gram. position, then pickup is connected across the volume control R19 and the radio signal is disconnected. Similarly when S9 is switched to radio, then the pickup is disconnected from across R19. This enables the pickup to be left permanently plugged in.

AVC is provided by the DC component of the rectified signal. Full AVC voltage is fed by R18 to grids of V2 and V3 and approximately one fifth, from potential divider formed by R16, R17 to grid of V1. C9, C27 are decoupling capacitors.

AF amplifier. C30 feeds signal from volume control R19 to grid of triode section of V4. Negative bias for grid is developed on C30 with R20 as leak resistor. Cathode is connected down to earth. R21 is the anode load resistor and C31 anode RF bypass capacitor.

Output stage. C32 feeds signal from anode V4 through grid stopper R24 to grid of output tetrode V5. R22 is grid resistor. Cathode bias is provided by R23, decoupled by C36. C36 is a fairly low value capacitor and consequently negative feedback is introduced in the cathode circuit to a greater degree at the lower than at the higher frequencies.

Screen voltage is obtained direct from HT line. L32, the primary of OP1, the output matching transformer, is in the anode circuit of V5. C33 provides fixed, and C34, R25 variable tone control. L33, the secondary of OP1, feeds into an 8 inch energised loudspeaker, L34. Sockets are fitted on L33 for connection of a low impedance type extension loudspeaker.

High tension is provided by an indirectly heated full-wave rectifier V6. L37, the HT secondary of the mains input transformer MT1, supplies its anode voltages and L36 its heater current.

Continued on page 15

TRIMMING INSTRUCTIONS

Apply signal as stated below	Tune receiver to	Trim in order stated for maximum output
(1) 451 kc/s to g1 of V2 via .01 capacitor	—	Core L31, L30, L29, L28
(2) 22 mc/s to AE socket via dummy aerial	22 mc/s calibration mark on dial plate	T12, T7
(3) 18 mc/s as above	18 mc/s mark	Core L16, repeat (2) and (3)
(4) 15.4 mc/s as above	15.4 mc/s mark	Core L18, T11, T1
(5) 12 mc/s as above	12 mc/s mark	Core L20, T10, T2
(6) 9.7 mc/s as above	9.7 mc/s mark	Core L22, T9, T3
(7) 6.1 mc/s as above	6.1 mc/s mark	Core L24, T8, T4
(8) 1.4 mc/s as above	1.4 mc/s mark	T14, T5
(9) 600 kc/s as above	600 kc/s mark	T15, repeat (8) and (9)
(10) 300 kc/s as above	300 kc/s mark	T13, T6
(11) 200 kc/s as above	200 kc/s mark	Core L27, L12 and repeat (10) and (11)