

MULTITONE Deaf-Aid Receiver

Combined all-wave radio and deaf-aid amplifier, with output limiter and tone control adapted for use by the deaf. Output to earphones, miniature earpiece or bone conductor. Made by Multitone Electric Co., Ltd., 223-7, St. John Street, London, E.C.1.

Circuit consists of a triode-hexode mixer and local oscillator V1, followed by a variable-mu HF pentode IF amplifier V2. A double-diode triode V3 is used for signal rectification and AVC and as first LF amplifier.

The grid of V3 can be switched from radio section of receiver to input from a hearing aid microphone amplifier V4.

Output from V3 is fed to phase-splitting valve V5, which in turn drives the push-pull pentode output valves V6 and V7. A full-wave indirectly heated rectifier V8 provides the HT supply. A magic-eye tuning indicator V9 is fitted to facilitate accurate tuning.

Aerial is fed via C1 to primary L1 of SW aerial coupling transformer. R1 connected between aerial input and earth is a static drain resistor.

On MW and LW aerial is fed via C1, L1 to bottom end of L3 and L4 respectively. C2 developing the input signal. S2 switches VC1, the tuning

capacitor, to secondary L2 of SW transformer and to L3 (MW) and L4 (LW) coils. S1 connects bottom end of L2 to earth on SW position only.

C3 is isolating capacitor, AVC being applied to the grid on all wavebands via R2. Screen voltage is obtained from junction R3 and R4, and C5 is the decoupling capacitor. L10, the primary of IFT1, the first intermediate frequency transformer, is in the hexode anode circuit.

Oscillator section of V1 is connected in a parallel-tuned grid circuit. S3 switches the grid and capacitor VC2 to the tuned primaries L6 (SW), L7 (MW) and L9 (LW). C8 (SW) padder is connected in the earth end of L6, while C9 (MW) and C10 (LW) padders are on the grid sides of L7 and L9. R9, C6 provide leak-condenser bias.

S4 switches the oscillator anode via C7, to feedback coils L5 (SW), L8 (MW) and L10A (LW). R10, in series with L5 (SW), is limiter resistor. R8 is oscillator anode load.

IF amplifier operates at 465 Kcs. L11, the secondary of IFT1, feeds the grid of V2, the IF amplifier. AVC is applied in series with L11 via R15 with C14 as AVC decoupler. Screen voltage is obtained from R11 and decoupled by C12. Cathode bias is obtained from R14, C13.

L12, the primary of IFT2, is in the anode circuit of V2.

Signal rectification, AVC and AF amplification. L13, secondary of IFT2, feeds a diode in V3. R13 is the load and R12, C15 an IF filter. AVC voltages are taken from top of R13 and fed to AVC line via R15.

The rectified signal is also taken from top R13, and fed, via PU plug switch S9 and via S6, to

volume control R16. C16 couples the triode section of V3, R17 being grid resistor.

R42 in the cathode circuit supplies a small standing bias and the AVC delay voltage. R18 is anode load, and C34 is HF bypass.

Phase splitter C17 transfers the amplified signal to grid of V5, the phase-splitting valve driving the push-pull output valves. R30 is the grid resistor, which is returned to cathode. R31 and R32 are the anode and cathode load resistors. C24 feeds the signal from the anode V5 to grid V6, and C25 feeds the cathode signal, 180 degrees out of phase with the anode signal, to grid of V7.

Output stage. 35R and R36 are grid resistors of V6 and V7 and R41 provides cathode bias. Screen voltages are obtained from HT line via stopper resistors R33, R34.

Anodes are taken to primary L15 of OPI, the output matching transformer. HT is drawn direct from reservoir condenser C31 and fed to centre tap of primary of OPI. C27 and C28 are fitted to prevent parasitic oscillation. R37 and C26 give variable top cut.

Secondary L16 of OPI feeds the primary L17 of OP2, the phone matching transformer. In series

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INDUCTORS

L	Ohms
1	.25
2	very low
3	2.5
4	.16
5	7.5
6	very low
7	.3
8	.5
9	7.75
10A	.4
10	5.2
11	5.2
12	5.2
13	5.2
14	400
15	400
16	.5
17	.5
18	.380
19	.2
20	very low
21	500
22	very low
23	.26

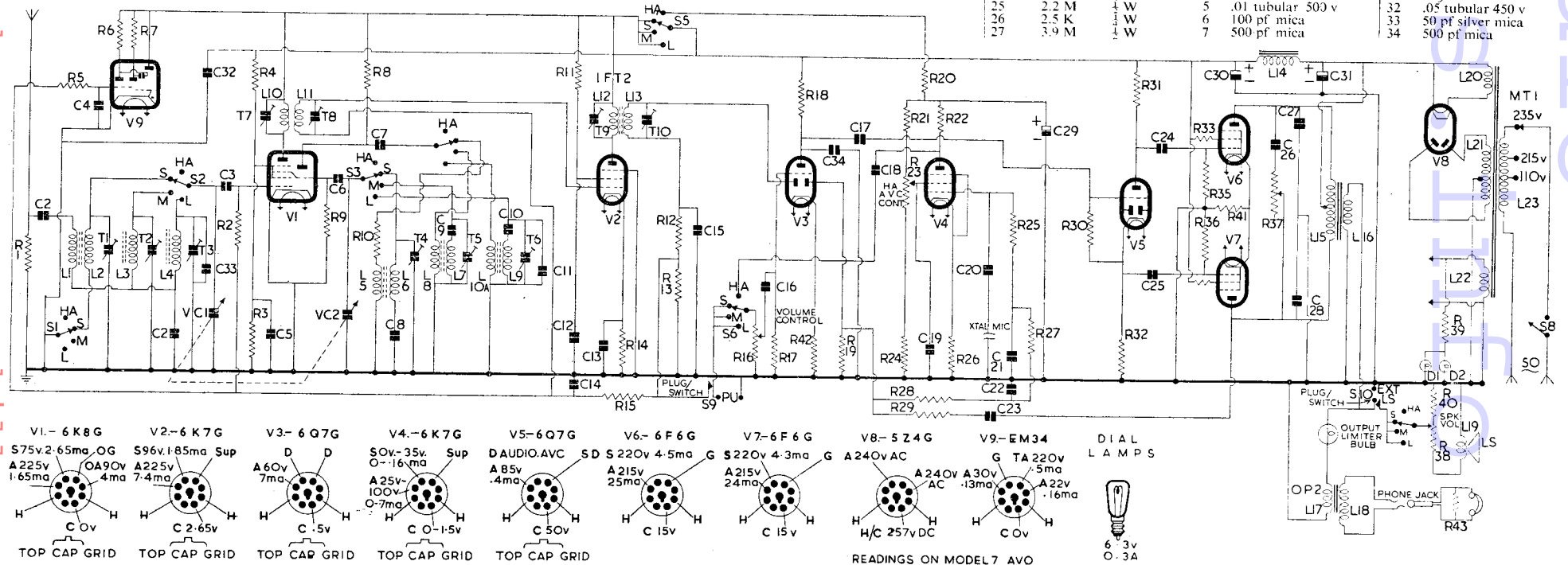
RESISTORS

R	Ohms	Watts
1	100 K	W
2	470 K	W
3	10 K	W
4	15 K	2 W
5	2.2 M	W
6	1.2 M	W
7	1.2 M	W
8	33 K	W
9	39 K	W
10	.33	W
11	68 K	W
12	12 K	W
13	1.2 M	W
14	330	W
15	1.2 M	W
16	1 M	Potr.
17	10 M	W
18	220 K	W
19	100 K	W
20	27 K	W
21	680 K	W
22	220 K	W
23	.5 M	Potr.
24	12 K	W
25	2.2 M	W
26	2.5 K	W
27	3.9 M	W

R	Ohms	Watts	C	Mfils
28	220 K	W	8	5700 pf silver mica
29	680 K	W	9	350 pf silver mica
30	10 M	W	10	150 pf silver mica
31	220 K	W	11	50 pf silver mica
32	220 K	W	12	.02 tubular 500 v
33	100	W	13	.02 tubular 500 v
34	100	W	14	.02 tubular 500 v
35	470 K	W	15	300 pf mica
36	470 K	W	16	.002 tubular 500 v
37	50 K Potr. (with Switch)	W	17	.002 tubular 1,000 v
38	20	Potr.	18	.01 tubular 500 v
39	2.5	Vitrous	19	.5 tubular 350 v
40	2.5	Vitrous	20	.005 mica
41	250	W	21	.2 tubular 350 v
42	1 K	W	22	.2 tubular 350 v
43	10 K	W	23	.001 mica
			24	.015 tubular 350 v
			25	.015 tubular 350 v
			26	.02 tubular 450 v
			27	.002 tubular 1,000 v
			28	.002 tubular 1,000 v
			29	12 electrolytic 250 v
			30	16 electrolytic 440 v
			31	.01 tubular 500 v
			32	.05 tubular 450 v
			33	50 pf silver mica
			34	500 pf mica

CAPACITORS

C	Mfils
1	500 pf mica
2	2,000 pf silver mica
3	50 pf mica
4	.01 tubular 500 v
5	.01 tubular 500 v
6	100 pf mica
7	500 pf mica



- V1-6K8G S75v.2.65ma OG A225v 1.65ma C 0v
 - V2-6K7G S96v.1.85ma Sup OA90v 4ma A225v 7.4ma C 2.65v
 - V3-6Q7G D A60v 7ma C .5v
 - V4-6K7G SOv.35v Sup O-.16ma A25v 100v O-.7ma C O-1.5v
 - V5-6Q7G DAUDIO.AVC SD S220v 4.5ma G S220v 4.3ma C 15v
 - V6-6F6G A215v 25ma C 15v
 - V7-6F6G A215v 24ma C 15v
 - V8-5Z4G A240v AC A240v A30v AC A22v .5ma C 0v
 - V9-EM34 G TA 220v .5ma A22v .16ma C 0v
- READINGS ON MODEL 7 AVO

MULTITONE—Contd.

with L17 is a 6.3V 0.3 or 0.6A bulb which has the effect of compressing or limiting the headphone volume. L18, the secondary of OP2, is connected to a phone jack.

Output from L16 of OPI is also taken via Ext. LS plug/switch S10 socket to S7, and thence to R38 the speaker volume control. R40 is in series with R38 to chassis. R38 and R40 are in parallel with the LS speech coil L19. It will be seen that when an extension speaker is plugged in, the speaker volume control R38 is inoperative and volume must be controlled by R16. When S7 is in Hearing-Aid position the interior speaker is switched off.

Hearing aid. V4 is a microphone amplifier. Output from crystal microphone is fed to grid via capacitor C20. Cathode bias is derived from R26.

An interesting feature is that an audio AVC voltage is fed to the grid V4. This voltage is obtained from the second diode of V3, and is fed to V4 via filter network R25, R27, R28, C21, C22.

The diode of V3 is driven by AF drawn from anode of output valve V7 via C23, R29.

R19 is diode load resistor. Screen of V4 is fed from R23, which is part of bleeder network R21, R23, R24.

R23 controls the gain of V4 and, to some extent, the amount of audio AVC. The short-time constant circuit in the screen voltage supply formed by R23,



C19 is very effective in reducing large amplitude variations of signal. HT and screen voltage for V4 are only applied when S5 is in the Hearing-Aid position and is fed via R20, a decoupling resistor. C29 is associated decoupling capacitor. R22 is anode load, and C18 feeds the signal to R16, the receiver volume control, via S6.

When in Hearing-Aid position, S5 disconnects the HT supply to V1, V2 and V9, the tuning indicator. V9 is fed from the AVC line.

HT supply is provided by a full-wave rectifier V8. L21, the HT secondary of MT1, the mains input transformer, supplies the anode voltages for V8, and L20 supplies the heater voltage. L14, C30 and C31 are smoothing components. C32 is HF bypass. L22 supplies heater voltages for V1-V9 and also the two dial lamps. R39 is a series voltage-dropper to lengthen the life of dial lamp.

L23, the primary of MT1, is tapped at 110, 215 and 235V. S8, which is ganged with R37, the tone control, is the mains on/off switch.

TRIMMING INSTRUCTIONS

Apply Signal as Stated Below.	Tune to (metres).	Trim in Order stated for Max. Output.
(1) 470 Kc to top cap V1 via .01 cap.	550 metres	T10, T9, T8, and T7
(2) 15Mc to Aerial socket via dummy aerial	20 metres	T4, T1
(3) 7.5 Mc as above	40 metres	Core of L5-6 and L1-2. Recheck (2)
(4) 1.2 Mc as above	250 metres	T5, T2
(5) 600 Kc as above	500 metres	Core of L7-8 and L3. Recheck (4)
(6) 300 Kc as above	1,000 metres	T6, T3
(7) 167 Kc as above	1,800 metres	Core of L9-10A and L4. Recheck (6)

