

MULLARD MAS97

Four valve, plus rectifier, three waveband superhet with combined LF valve and visual tuning indicator. A mechanical push-button system allows the choice of three MW stations and three LW or MW stations with push-button wavechange and alternative manual tuning. Sockets are provided for a pickup and low impedance extra loudspeaker. Suitable for operation from AC mains (200-250V); marketed by Mullard Wireless Service Co., Ltd., Century House, Shaftesbury Avenue, London, WC2.

ON medium and long waves a band-pass filter is employed and signals are coupled by L2 (MW), L3 (LW) to the tuned primary coils L4, L5. An IF filter L1, T11 is in shunt with the coupling coils.

Coupling by C3, C4, L8, L9 transfers the signals to the secondary band-pass coils L6, L7 tuned by V2 and thence to the grid of the frequency changer V1.

When the receiver is switched to SW aerial input is to L10 and so to L11 which is the tuned grid coil. AVC is applied to the grid of V1 on MW and LW only.

The oscillator tuned anode circuits comprise L12 (SW), L14 (MW), and L16 (LW) tuned by VC3 with grid feed back coils L13, L15, L17.

The IF signal is transferred by L18, L19 to the grid of the pentode V2. The coupling between L18, L19 may be varied by bringing into circuit the additional windings L20, L21 by means of the

selectivity switch thereby altering the bandwidth of the transformer.

A second IF transformer L22/23, L24/25 couples V2 output to the signal diode of the double-diode pentode V4. R10 is the signal load and LF signals are fed to the tapped volume control, R12/R12a, via the limiter R11. IF filtering is effected by R9, C18 and tone compensation by R38, C19 and R13, R14, C22.

C21 is the LF coupling condenser to the grid of the pentode section of V3, the combined LF amplifier and visual tuning indicator.

The AVC diode of V4 is fed via C17 from the tapping on L22/23, the load resistances being

VALVE READINGS

V	Type	Electrode	Volts	mA
1	ECH3 Mullard	Anode	230	.95
		Osc. Anode	125	4
		Screen	70	1.5
2	EF9 Mullard	Cathode	2.8	—
		Anode	230	5.5
		Screen	73	1.6
3	EFM1 Mullard	Cathode	1.3	—
		Anode	105	.7
		Screen	35	.65
4	EBL1 Mullard	Target Anode	170	—
		Cathode	1.5	—
		Anode	250	34
5	AZI Mullard	Screen	235	4.5
		Grid	—	5.5
		Filament	280	—

Volts taken with a 2000 o.p.v. meter and receiver tuned to upper end of Long Wave Band on 225 volt mains.

R34, R23. Full control is applied to V1 and a smaller voltage to V2 via appropriate decoupling components.

Pickup sockets are connected so that the input is fed to the volume control when the pickup switch near the sockets is moved to gram. (up). In this position the pickup circuit is completed and the radio input to the volume control broken between R9 and R11.

The output from V3 is resistance-capacitance coupled by R18, C26, R19 and grid stopper R20 to the pentode grid of V4. The voltage across R22 in the HT negative line provides bias to the grid of V4 via R33, C27 decouplers.

Continued overleaf.

RESISTORS

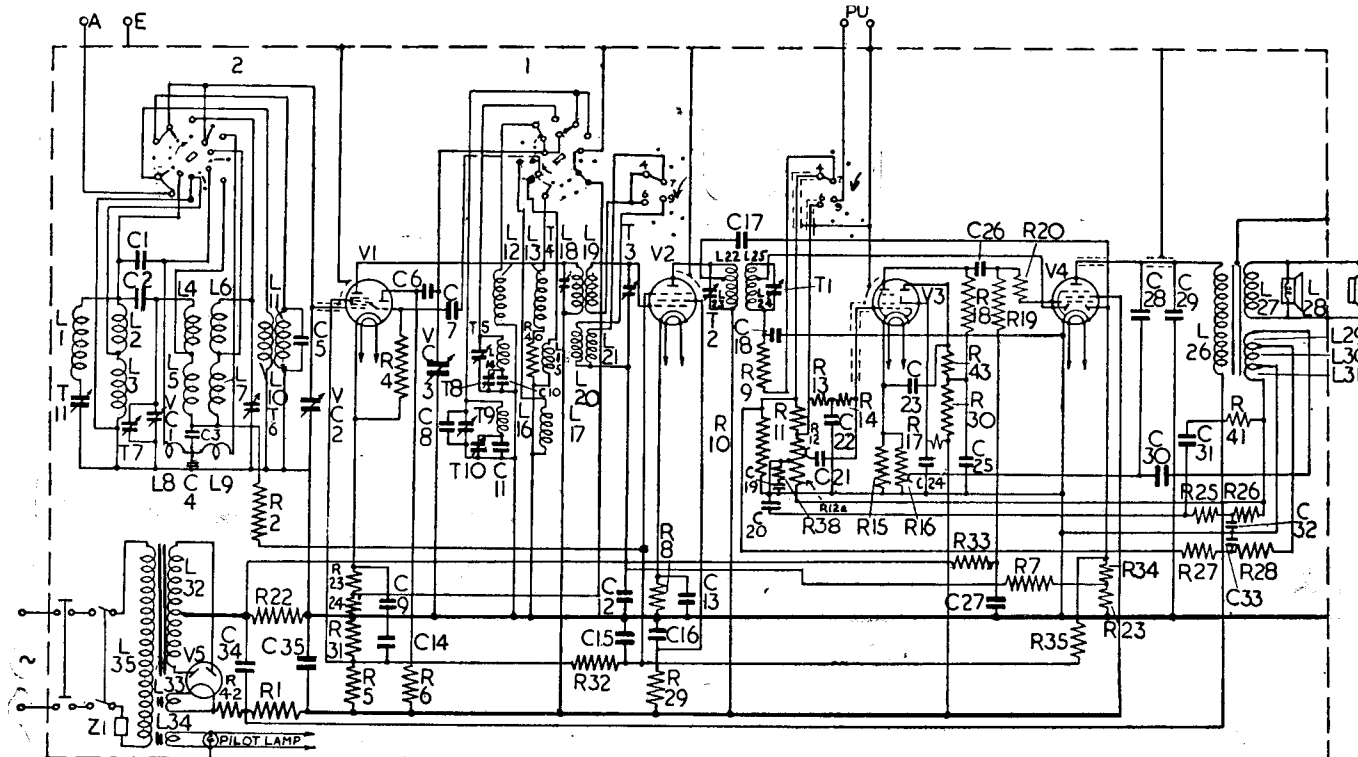
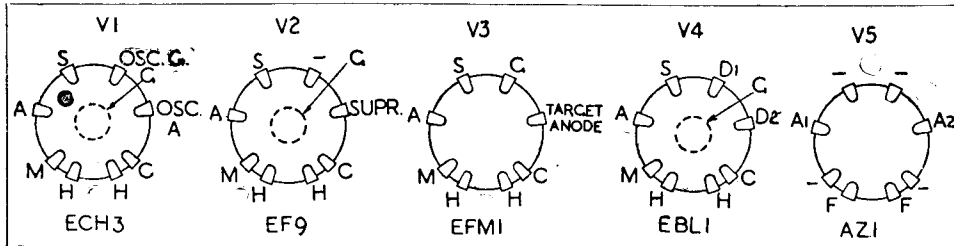
R	Ohms	R	Ohms
1	1,500	20	1,000
2	100,000	22	100
3	330	23	470,000
4	47,000	24	150
5	47,000	25	4,700
6	27,000	26	1,500
7	1.8 meg	27	820,000
8	120	28	10,000
9	220,000	29	100,000
10	680,000	30	39,000
11	180,000	31	33,000
12	650,000	32	4.7† 4.7 meg
12a	50,000	33	180,000
13	1.5 meg	34	470,000
14	1 meg	35	1 meg
15	1,000	38	22,000
16	50,000	40	15
17	330,000	41	3,300
18	120,000	42	100
19	470,000	43	47,000

WINDINGS

L	Ohms	L	Ohms
1	110	19	125
2	26	20	23
3	90	21	23
4	4.5	22	40
5	48	23	90
6	4.4	24	45
7	45	25	90
8	.7	26	800
9	.7	27	1.5
10	2	28	3.5
11	very low	29	800
12	very low	30	28
13	1	31	28
14	8	32	300
15	2	33	very low
16	32	34	very low
17	8.5	35	
18	125		

CONDENSERS

C	Mfd	C	Mfd
1	39 mmfd	19	.18
2	.00001 mfd	20	.056
3	.012	21	.033
4	.039	22	.068
5	2.2 mmfd	23	.18
6	.06047 mfd	24	.056
7	47 mmfd	25	.18
8	12 mmfd	26	.047
9	.047	27	.22
10	1362 mmfd	28	.00033
11	325 mmfd	29	.0047
12	.068	30	.0039
13	.047	31	.0022
14	.047	32	.022
15	.1	33	.01
16	.047	34	50
17	18 mmfd	35	32
18	56 mmfd		



MULLARD MAS97—Continued

V4 is coupled to the low impedance permanent magnet loudspeaker by a matching transformer L26, L27 which has additional windings L29-L31. These are for providing negative feed back via C20 to the volume control and positive feed back to the input side of the volume control at the junction of R10, R11. By this arrangement the positive feed-back cancels the negative feed back when the volume control is at maximum so giving maximum gain.

Fixed tone correction is effected by C29 and variable tone control by C28 and R16.

Sockets for the low impedance extra loudspeaker are provided across L27.

HT supply is from a full wave rectifier V5 with smoothing by C34, R1, C35.

GANGING

IF Circuits.—Tune receiver to 180m adjust volume control to maximum and bandwidth to minimum. Connect an 80 mmfd condenser in parallel with T2.

Inject a modulated 128 KC signal to the first strid (top) of V1 and adjust T1 for maximum output.

Disconnect 80 mmfd condenser and connect it in parallel with L25. Adjust T2 for maximum output.

Disconnect condenser from L25; adjust T3 and T4 for maximum output.

Seal T4, T3, T2, T1.

MW Band.—Depress button for MW band. Set pointer to 180m by means of manual control.

Fit trimming jig to rear of the tuning condenser spindle and rotate the manual control until the condenser rests against the jig.

Inject a 1,600 KC signal to the aerial socket via a standard dummy aerial. Trim T5, T6, T7, T6, T5 carefully in that order for maximum output.

Remove trimming jig and inject a 546 KC signal into the aerial socket. Connect the aerial socket to an auxiliary receiver via a 25 mmfd condenser to the anode of the

hexode part of V1. Connect output indicator to the auxiliary receiver output.

Tune the two receivers to about 550m and then carefully tune the MAS 97 for the maximum output from the auxiliary receiver.

Disconnect auxiliary receiver and reconnect the output indicator to the MAS 97 output. Do not turn the tuning knob.

Adjust T8 for maximum output.

Retrim T5 in the manner already described.

LW Band.—Press LW button. Connect aerial socket of auxiliary receiver via a 25 mmfd condenser to the hexode anode of V1, and output indicator to the auxiliary receiver output.

Inject a modulated 400 KC signal via a standard dummy aerial to the aerial socket of the receiver to be trimmed, and tune both receivers to about 750m.

Carefully tune the MAS 97 for maximum output from the auxiliary receiver.

Disconnect auxiliary receiver and connect output indicator to the MAS 97 under repair. Do not turn the tuning knob.

Adjust T9 for maximum output.

Connect hexode anode of V1 via a 25 mmfd condenser to the aerial socket of the auxiliary receiver and output indicator to the latter.

Inject a 160 KC signal to the aerial socket of the set on test via a standard dummy aerial.

Tune both receivers to about 1,875m and tune the set being repaired to give maximum output as indicated by the meter.

Disconnect auxiliary receiver and reconnect output meter to the receiver on test. Do not turn the tuning knob.

Trim T10 for maximum output.

Retrim T9 as previously described.

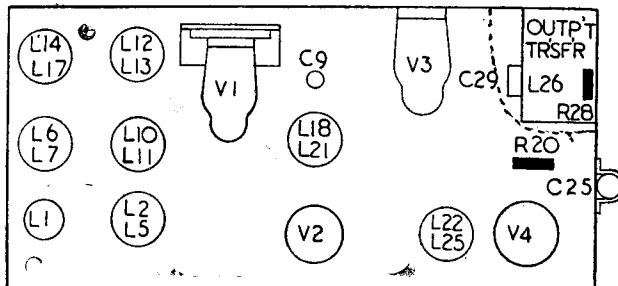
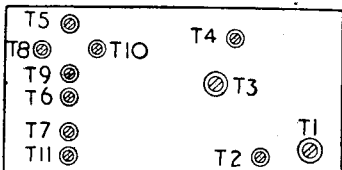
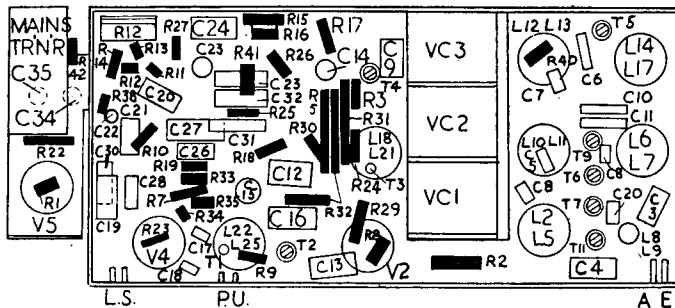
I.F. Filter Circuit.—Inject a 128 KC signal to the aerial socket. Adjust T11 for minimum output; seal T11.

Calibration.—Inject a 566 KC signal and carefully tune the receiver by means of the manual control. The pointer should read 530m. If it does not, adjust the horizontal screw at end of link to pointer arm until the pointer lies on the 530m mark.

Inject a signal of 1,250 KC (240m) and carefully tune the receiver to it. Adjust vertical screw on link until the pointer lies on the 240m mark.

Repeat the adjustments until the pointer indicates correctly at both 530m and 240m.

Underside (top) and top-of-chassis layouts of Mullard MAS97. The small diagram below identifies trimmers.



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