

LISSEN

SERVICE MANUAL FOR PORTABLE BATTERY OPERATED RECEIVER MODEL 8168

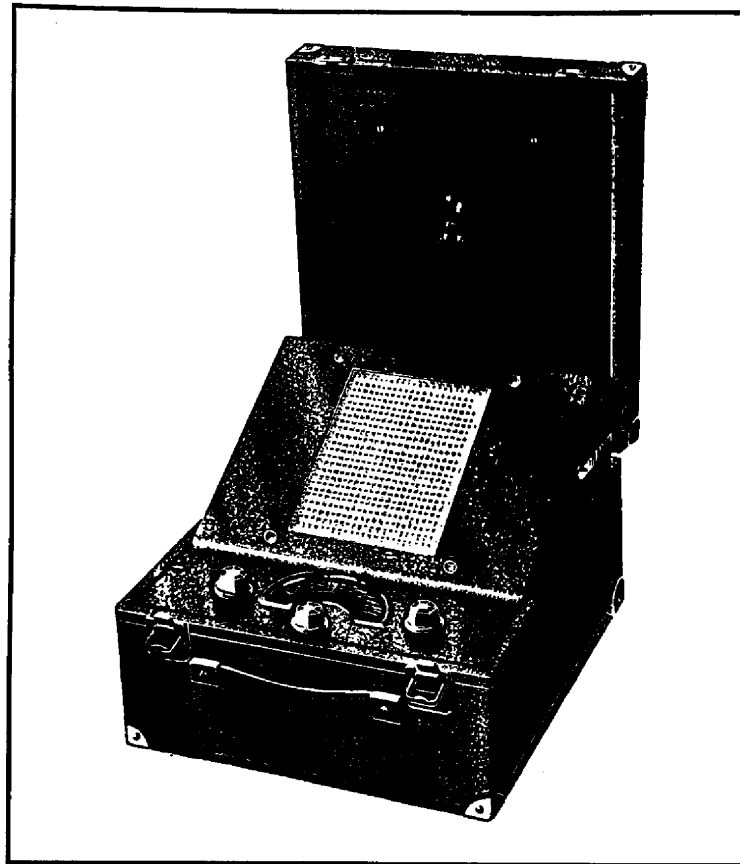
TECHNICAL SPECIFICATION

THE model 8168 is a battery operated receiver with self-contained frame aerials. The wavebands covered are 200-560 metres and 900-1,950 metres. Four valves are employed.

The first valve (V1) is a variable-mu R.F. pentode, which functions as a R.F. amplifier. It is preceded by a tuned frame aerial.

Volume control is effected by varying the bias on the control grid of this valve, thus changing the sensitivity.

The detector valve (V2) is a triode which functions as a grid rectifier. The coupling between this and the first valve is a choke fed tuned grid circuit.



Reaction is provided by the coil L7 on medium waves and by L8 on long waves, coupling to the tuned grid circuit. The coupling is controlled by the variable condenser C10. This condenser and the volume control are mechanically coupled so that the volume control is operated in the first half and the reaction condenser over the latter half of the rotation from minimum to maximum.

The detector valve is resistance-capacity coupled to the A.F. stage.

The A.F. amplifier (V3) is a triode which is also resistance-capacity coupled to the output valve (V4), a high slope A.F. pentode which in turn is transformer coupled to the permanent magnet moving coil speaker.

GENERAL REMARKS

In the event of trouble check the following details:—

- (1) Batteries: L.T. and H.T., and confirm that the leads are correctly connected.
- (2) Valves: (a) Check characteristics, or (b) substitute valves known to be good.
- (3) Locate trouble to a particular stage by (a) checking valve operating conditions, or (b) stage by stage test with an oscillator, i.e., A.F. stages, detector stage and R.F. stage.
- (4) Locate faulty components by testing with a suitable meter or by substitution as the case may be.
- (5) Check the alignment of the tuned circuits if not attended to under 3(b).

The following charts are given in the order they will usually be required.

Those readings given in columns X and Y are obtained with new (126 volts) and partially discharged (100 volts) H.T. batteries respectively.

The battery plugs should be placed in the sockets indicated below:—

Battery Leads	Battery Sockets
Red lead (H.T.+)	126 volts
Yellow lead (H.T.+)	See notes below
Blue lead (H.T.+)	70 volts
Black lead (H.T.—)	9 volts
Brown lead (G.B.—)	0 volts

POSITION OF YELLOW BATTERY PLUG

The anode current of a pentode is controlled by the auxiliary grid voltage, which is applied in this case through the Yellow battery lead. The auxiliary grid voltage required for the correct anode current will vary with individual valves. For this reason the A.F. pentode valve is marked with a letter either A, B, C, or D, and this letter represents a certain H.T.+ tapping.

The letter A indicates 124½ volts.

B	117
C	108
D	99

The Yellow battery lead should be inserted into the appropriate socket as indicated by the above table.

If at any time it is necessary to replace the output valve by one that is not lettered, the correct position for the Yellow battery plug may be found as follows:—

Remove the first three valves from their sockets and insert a milliammeter in the Red H.T. lead. Now switch on the set and adjust the position of the Yellow plug until the milliammeter measures as nearly as possible to 4.5 milliamps. A new H.T. battery of 126 volts (including G.B.) should be used for this adjustment.

CIRCUIT ANALYSIS

Valve	Circuit	Associated Components
R.F. valve (V1), Ever Ready K50M (Metallized).	Anode circuit	L4, C6. Red H.T. lead and plug.
	Screen circuit	C4. Blue H.T. lead and plug.
	Grid circuit	L2, L3, C1, C3, C5, R1, R4, R10, R13, S1. Brown G.B. lead and plug.
Detector valve (V2), Ever Ready K30C (Metallized).	Anode circuit	L7, L8, C10, C11, C12, C13, C14, R5, R6, R7, Red H.T. lead and plug.
	Grid circuit	L5, L6, C9, C2, C7, C8, R2, R3, S5.
A.F. valve (V3), Ever Ready K30C (Metallized).	Anode circuit	R11, C15, C16. Red H.T. lead and plug.
	Grid circuit	R9, R8.
Output valve (V4), Ever Ready K70D (Clear).	Anode circuit	T1 primary, C17. Red H.T. lead and plug.
	Aux. grid circuit	Yellow H.T. lead and plug.
	Grid circuit	R12, R13, R10, R4. Brown G.B. lead and plug.

OPERATING CONDITIONS OF THE VALVES

All readings are taken with volume control at maximum and with no reaction. (All voltages are measured from the chassis.)

Valve	Circuit	Column X (New H.T.)	Column Y (Partially Discharged H.T.)
R.F. valve, Ever Ready K50M (Metallized).	Anode voltage	116 volts	93 volts
	Anode current	0.9 m.a.	0.7 m.a.
	Screen voltage	61 volts	49 volts
	Screen current	0.2 m.a.	0.16 m.a.
Det. valve, Ever Ready K30C (Metallized).	Anode voltage	39 volts	31 volts
	Anode current	1.0 m.a.	0.8 m.a.
A.F. valve, Ever Ready K30C (Metallized).	Anode voltage	47.5 volts	38 volts
	Anode current	0.95 m.a.	0.76 m.a.
Output valve, Ever Ready K70D (Clear).	Anode voltage	114 volts	91 volts
	Anode current	4.5 m.a.	3.6 m.a.
	Aux. grid voltage	Same as Yellow plug	
	Aux. grid current	0.65 m.a. (approx.)	0.52 m.a. (approx.)

If a particular reading should vary considerably from the above table, a systematic check of the circuits associated with the particular valve should be made.

The following tables will facilitate the testing of the components concerned.

NOTE.—All voltages are measured with a 1,000 ohms per volt meter.

INDUCTANCES AND TRANSFORMERS

Circuit Indication	Specification	Location	Component Number
L1 ..	Aerial coupling coil, 0.2 ohms	Fig. 1	75,122
L2 ..	Frame aerial medium wave winding, 1.8 ohms		
L2, L3	Frame aerial long wave winding, 18 ohms		
L4 ..	R.F. anode choke, 550 ohms	Fig. 6	79,008
L5 ..	Medium wave grid coil, 3 ohms		
L5, L6	Long wave grid coil, 22 ohms	Fig. 5	78,038
L7 ..	Medium wave reaction coil		
L7, L8	Long wave reaction coil	Fig. 1	85,016
L9 ..	Speaker speech coil, 2.4 ohms		
T1 ..	Output transformer: primary, 840 ohms; secondary, 0.3 ohms		
		Fig. 5	77,048

CONDENSERS

Circuit Indication	Specification	Location	Component Number
C1 ..	Aerial tuning condenser	Fig. 6	80,041
C2 ..	Grid tuning condenser		
C3 ..	0.1 mfd. tubular, 350 volt D.C.	Fig. 6	68,020
C4 ..	0.1 mfd. tubular, 350 volts D.C.		
C5 ..	Aerial tuning condenser trimmer	Fig. 1	80,039
C6 ..	.00005 mfd. mica	Fig. 5	66,036
C7 ..	Grid tuning condenser trimmer	Fig. 5	80,000
C8 ..	.000005 mfd. disc type	Fig. 6	71,261
C9 ..	.00005 mfd. mica	Fig. 5	66,036
C10	Reaction condenser	Fig. 6	75,123
C11	2 mfd. dry electrolytic, 300 volt D.C.	Fig. 6	67,009
C12	.0002 mfd. mica	Fig. 6	66,967
C13	.001 mfd. tubular, 450 volt D.C.	Fig. 6	68,000
C14	.025 mfd. tubular, 350 volt D.C.	Fig. 6	68,013
C15	.001 mfd. tubular, 450 volt D.C.	Fig. 6	68,000
C16	.025 mfd. tubular, 350 volt D.C.	Fig. 6	68,013
C17	.001 mfd. tubular, 450 volt D.C.	Fig. 5	68,000

RESISTANCES

Circuit Indication	Specification	Colour Code			Location	Component Number
		Body	Tip	Dot		
R1	110,000 ohms ½ watt	Brn.	Brn.	Yel.	Fig. 6	71,962
R2	2.1 megohms, ½ watt	Red	Brn.	Grn.	Fig. 6	71,902
R3	2.1 megohms, ½ watt	Red	Brn.	Grn.	Fig. 6	71,902
R4	Volume control, 3,000 ohms	—	—	—	Fig. 6	75,123
R5	30,000 ohms, ½ watt	Org.	Blk.	Org.	Fig. 6	71,949
R6	30,000 ohms ½ watt	Org.	Blk.	Org.	Fig. 6	71,949

RESISTANCES continued

Circuit Indication	Specification	Colour Code			Location	Component Number
		Body	Tip	Dot		
R7	50,000 ohms ½ watt	Grn.	Blk.	Org.	Fig. 6	71,909
R8	0.51 megohm, ½ watt	Grn.	Brn.	Yel.	Fig. 6	71,944
R9	50,000 ohms ½ watt	Grn.	Blk.	Org.	Fig. 6	71,909
R10	300 ohms ½ watt	Org.	Blk.	Brn.	Fig. 6	71,800
R11	50,000 ohms ½ watt	Grn.	Blk.	Org.	Fig. 6	71,909
R12	260,000 ohms ½ watt	Red	Blue	Yel.	Fig. 6	71,945
R13	1,400 ohms ½ watt	Brn.	Yel.	Red	Fig. 6	71,906

SWITCH POSITIONS

Circuit Indication	Medium Waves	Long Waves
S1	Closed	Open
S3	Closed	Open
S2, S4, S5 ..	Closed when set is on Open when set is off	

REMOVING THE CHASSIS FROM THE CABINET

First disconnect all battery leads and remove the accumulator. Disconnect the frame aerial leads by loosening the screws on the connecting strip. The four wood screws holding the main panel are now taken out. Withdraw the chassis slightly towards the back of the case, when it may now be lifted clear of the case.

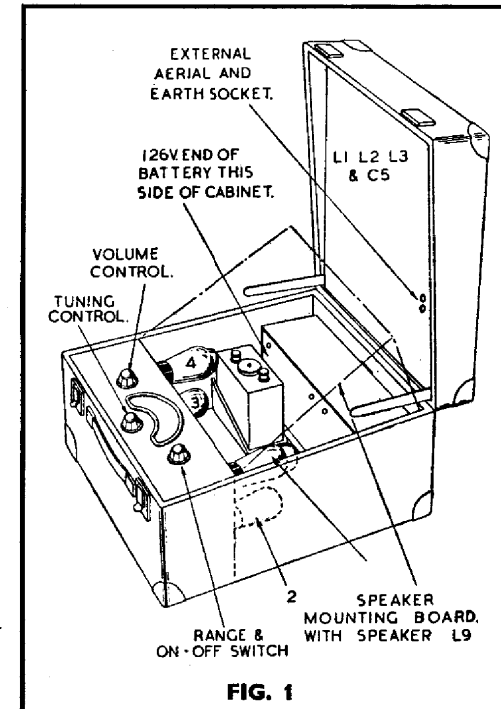


FIG. 1

LEADS FROM
FRAME
AERIAL

WHITE
RED
GREEN
BLACK

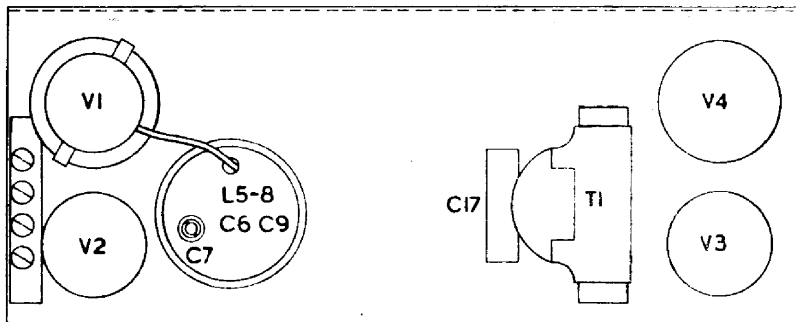


FIG. 5

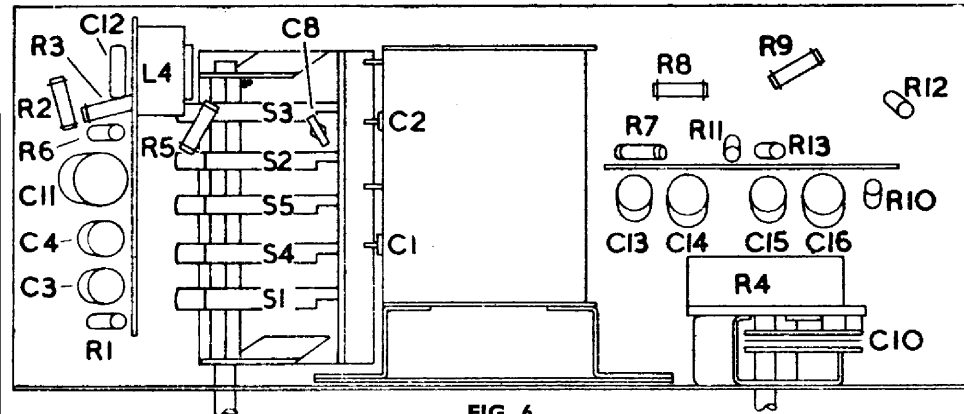
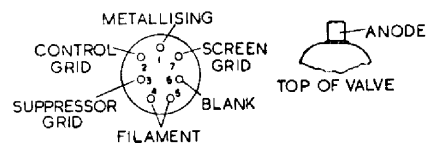
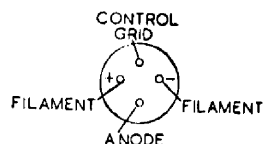


FIG. 6



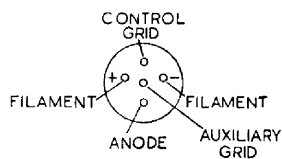
V1
TOP SIDE OF VALVE HOLDER
BATTERY R.F. PENTODE

FIG. 2



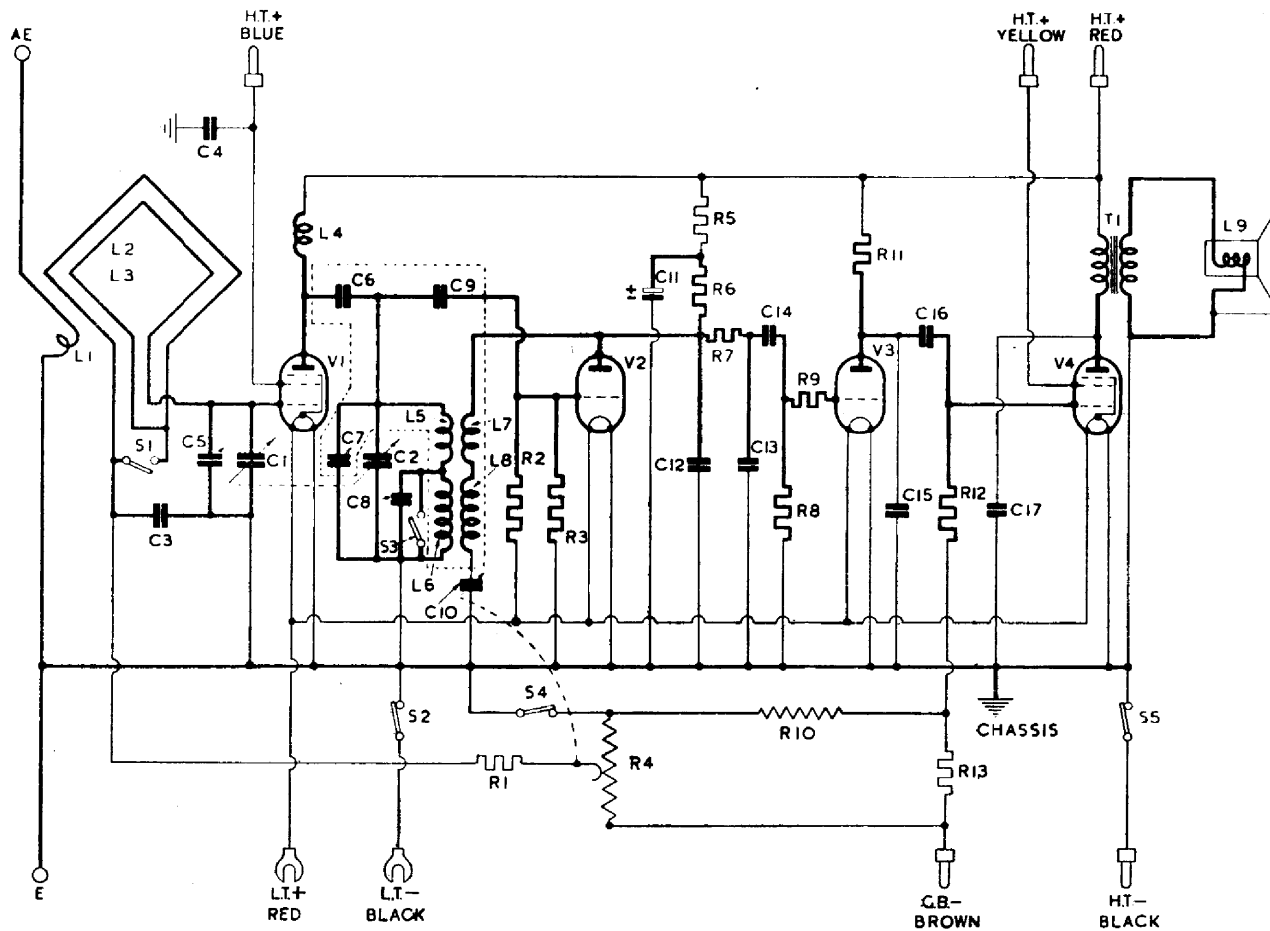
V2 & 3
TOP SIDE OF VALVE HOLDER
BATTERY TRIODE

FIG. 3



V4
TOP SIDE OF VALVE HOLDER
BATTERY OUTPUT PENTODE

FIG. 4



WIRE WOUND RESISTANCE
COMPOSITE RESISTANCE

METALLIZING OF VALVES EARTHED TO CHASSIS

CIRCUIT DIAGRAM

REMOVING THE FRAME AERIAL ,

Remove the four screws holding the fibre cover to the lid. Unsolder the four flexible leads from the frame. Four wood screws located at the corners of the frame should be taken out and the frame can be removed.

ADJUSTING THE GANGED CONDENSER AND DIAL POINTER

First remove the chassis from the cabinet. Rotate the gang till the pointer is at the higher wavelength end of the scale. The rotor vanes should now be fully in mesh with the stators. If they are not, release the two grub screws behind the scale, which fix the drive to the condenser spindle, and adjust the condenser till the vanes are fully in mesh. Now, with the pointer still at the

stop at the higher wavelength end of the scale, tighten the grub screws.

ADJUSTING THE RADIO FREQUENCY CIRCUITS

First remove the fibre cover in the lid to obtain access to the frame aerial trimmer. Rotate the gang till the pointer indicates 200 metres, and switch the receiver to the medium waveband. The volume control should be turned to maximum with no reaction. Apply a modulated signal of 200 metres to the external aerial socket and adjust the trimmers C5 and C7 to obtain maximum output. It is not necessary to remove the chassis for this operation, as the trimmer C7 may be adjusted by lifting the speaker slightly.

There is no additional adjustment for the long waveband.

NOTES

This space is reserved for recording any further information you may find useful. If advice is required at any time the Lissen Service Dept. will be pleased to help you.