

# LISSEN

## SERVICE MANUAL FOR 5 VALVE (INCLUDING RECTIFIER) 3 BAND

## SUPERHET MAINS RADIOGRAM

## MODEL 8322

### TECHNICAL SPECIFICATION.

The Lissen Model 8322 is a three-band superhet receiver for A.C. mains operation (200-250 volts, 40-60 cycles).

Valves are as follows :—

Frequency Changer, E.R. A36B (Triode-hexode).

I.F. Amplifier, E.R. A50P (Variable-mu pentode).

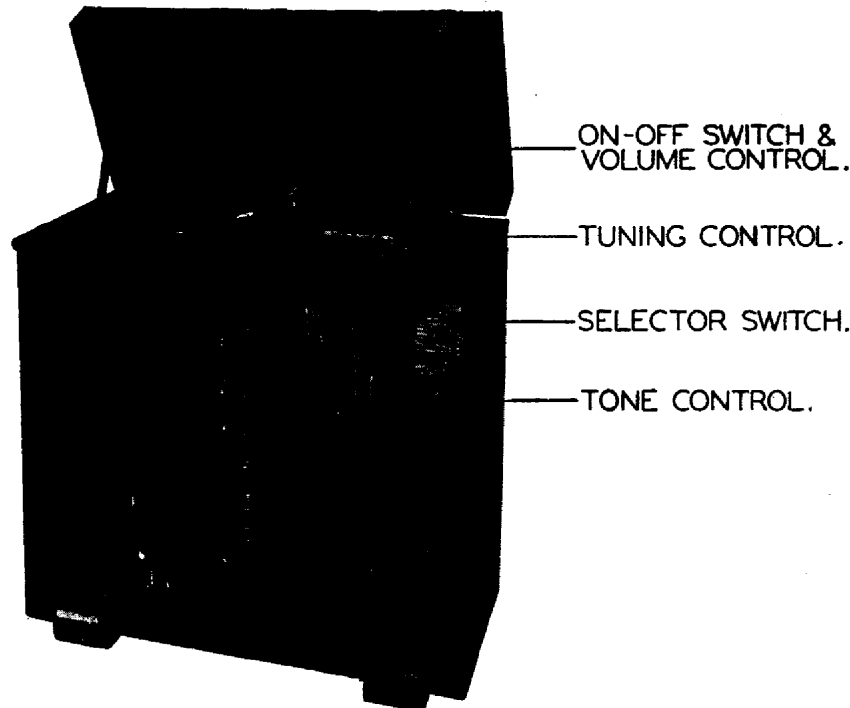
Detector A.V.C. and L.F. amplifier, E.R. A23A (Duo-diode-triode).

Output Valve, E.R. A70D (High slope L.F. pentode).

Rectifier, E.R. A11D (Double diode).

An inductively coupled band-pass filter precedes the frequency changer on long and medium waves; on short waves the aerial is coupled direct to the aerial coil through a condenser (C14).

The grid coils in the oscillator circuits are tuned, and the oscillator frequency is higher than the signal frequency on medium and long waves, and lower on short waves.



The primary of the 1st I.F. transformer forms the anode load of the frequency changer, and this winding, in common with the other I.F. coils, is tuned to 455 Kc/s. The anode circuit of the I.F. amplifier includes the primary of the second I.F. transformer, the secondary of which is connected direct to the signal diode and through a small condenser to the A.V.C. diode. The latter applies the A.V.C. potential via decoupled circuits to the grids of the frequency changer and I.F. amplifier valves. L.F. coupling between the triode amplifier in the duo-diode triode valve and the output pentode is by a high fidelity resistance-capacitance combination, and the output valve operates with negative feedback, enabling a large, undistorted output to be obtained. The maximum undistorted output is 2 watts.

The H.T. rectifier circuit is conventional, and the speaker field is used as a smoothing choke.

Wavelengths covered by the 8322 are as follows :—

Long waves	...	850—1,920 metres.
Medium waves	...	198—580 metres.
Short waves	...	19—50 metres.

The wavechange switches are in position "A" on short waves, "B" on medium waves, and "C" on long waves.

# SERVICE DATA FOR MODEL No. 8322.

## CONDENSERS.

Code	Description	Part No.	Values
C1	M.W. B.P.1 Trimmer	82,500	5/40 mmfd.
C2	L.W. B.P.1 Trimmer	82,501	40/100 mmfd.
C3	M.W. B.P.2 Trimmer	82,500	5/40 mmfd.
C4	L.W. B.P.2 Trimmer	82,501	40/100 mmfd.
C5	S.W. Aerial Trimmer	82,500	5/40 mmfd.
C6	S.W. Oscillator Trimmer	82,500	5/40 mmfd.
C7	M.W. Oscillator Trimmer	82,500	5/40 mmfd.
C8	L.W. Oscillator Trimmer	82,501	40/100 mmfd.
C9	M.W. Padder } Double	82,502	300/600 mmfd.
C10	L.W. Padder } Padder		
C11	Triple Gang	80,502	540 mmfd. Max.
C12			
C13			
C14	S.W. Aerial Coupling	71,262	10 mmfd.
C15	S.W. Tracking	68,005	.01 mfd.
C16	A.V.C. Decoupling	68,020	.1 mfd.
C17	V1 Screen Decoupling	68,020	.1 mfd.
C18	V1 Cathode By-pass	68,020	.1 mfd.
C19	V1 Oscillator Grid	66,035	.0001 mfd.
C20	V1 Oscillator Anode	68,020	.1 mfd.
C21	Decoupling		
C22	A.V.C. Decoupling	68,020	.1 mfd.
C23	I.F. Trimmers on L.F.T. Assembly	—	—
C24			
C25			
C26	V2 Screen By-pass	68,020	.1 mfd.
C27	V2 Cathode By-pass	68,020	.1 mfd.
C28	I.F. Filter	66,038	.0002 mfd.
C29	L.F. Coupling	68,008	.05 mfd.
C30	Signal Diode Load By-pass	66,038	.0002 mfd.
C31	V3 Cathode By-pass	67,005	50 mfd.
C32	A.V.C. Coupling	71,262	10 mmfd.
C33	L.F. Coupling	68,008	.05 mfd.
C34	Tone Control	68,008	.05 mfd.
C35	V4 Screen Cathode By-pass	67,500	8 + 8, 8 mfd., 540 Peak.
C36	H.T. Smoothing		
C37	Rectifier Reservoir		

## RESISTANCES.

Code	Description	Part No.	Values
R1	A.V.C. Decoupling	71,962	110,000 ohm, 1/2 watt
R2	A.V.C. Decoupling	71,962	110,000 ohm, 1/2 watt
R3	V1 Screen Potentiometer	71,928	20,000 ohm, 1 watt
R4	V1 Screen Potentiometer	71,935	5,000 ohm, 1/2 watt
R5	V1 Oscillator Grid Leak	71,974	26,000 ohm, 1/2 watt
R6	V1 Bias	71,969	150 ohm, 1/2 watt
R7	M.W. Oscillator Volta Modifier	71,914	1,000 ohm, 1/2 watt
R8	L.W. Oscillator Volta Modifier	71,907	2,000 ohm, 1/2 watt
R9	V1 Decoupling	72,011	10,000 ohm, 2 watt
R10	A.V.C. Decoupling	71,962	110,000 ohm, 1/2 watt
R11	V2 Bias	71,957	100 ohm, 1/2 watt
R12	V2 Screen Feed	24,756	25,000 ohm, 1/2 watt
R13	I.F. Stopper	71,962	110,000 ohm, 1/2 watt
R14	Signal Diode Load	71,944	510,000 ohm, 1/2 watt
R15	Volume Control	81,502	500,000 ohm
R16	V3 Bias	71,942	300 ohm, 1/2 watt
R17	A.V.C. Diode Load	71,944	510,000 ohm, 1/2 watt
R18	V3 Anode Load	71,928	20,000 ohm, 1 watt
R19	V4 Grid Leak	71,945	260,000 ohm, 1/2 watt
R20	V4 Grid Stopper	71,978	21,000 ohm, 1/2 watt
R21	V4 Screen Feed	71,936	2,500 ohm, 1/2 watt
R22	Tone Control	81,500	50,000 ohm
R23	V4 Bias and Negative Feed Back	71,969	150 ohm, 1/2 watt
R24	V4 Negative Feed Back	71,803	250 ohm, 1/2 watt
R25	A2 Potentiometer	71,963	11,000 ohm, 1/2 watt
R26	A2 Potentiometer	71,962	110,000 ohm, 1/2 watt
R27	Oscillator Grid Modifier	71,943	200 ohm, 1/2 watt

## INDUCTANCES.

Code	Description	Part No.	Values
L1	M. and L.W. Primary	78,505	Signal Frequency Coil
L2	M.W. B.P.1		
L3	L.W. B.P.1		
L4	S.W. Aerial		
L5	M.W. B.P.2	78,509	Oscillator Frequency Coil
L6	L.W. B.P.2		
L7	S.W. Grid		
L8	M.W. Grid		
L9	L.W. Grid	77,501	1st I.F. Transformer
L10	S.W. Tickler		
L11	M.W. Tickler		
L12	L.W. Tickler		
L13	1st I.F. Primary Coil	77,503	2nd I.F. Transformer
L14	1st I.F. Secondary Coil		
L15	2nd I.F. Primary Coil	77,503	2nd I.F. Transformer
L16	2nd I.F. Secondary Coil		
L17	Speaker Field, 2,000 ohm cold	85,504	Output Transformer on Speaker
T1	Output Transformer on Speaker		
T2	Mains Transformer	77,054	

## GRAMOPHONE UNIT.

Code	Description	Part No.
Motor Pick-up	Motor Unit Complete	73,651

## OPERATING CONDITIONS OF VALVES IN TYPE A22 RECEIVER.

Valve	Electrode	Voltage	Current
Frequency changer	Anode ..	245-260	1.0- 2.0 mA.
Ever Ready A36B (Triode-hexode)	Screen ..	55- 75	5.0- 7.0 mA.
	Oscillator Anode ..	85-105	—
	Cathode ..	1.5-2.0	12.0-14.0 mA.
I.F. Amplifier	Anode ..	245-260	8.5-10.5 mA.
Ever Ready A50P (H.F. Pentode)	Screen ..	155-175	3.0- 4.0 mA.
	Cathode ..	1.0-1.5	11.5-14.5 mA.
Detector, A.V.C. and L.F. Amplifier. Ever Ready A23A. (Duo-diode-triode)	Anode ..	105-125	5.5- 7.0 mA.
	Cathode ..	1.5-2.0	—
Output Pentode	Anode ..	235-255	28.0-38.0 mA.
Ever Ready A70D (L.F. Pentode)	Screen ..	235-255	4.0- 6.0 mA.
	Cathode ..	12.0-16.0	32.0-44.0 mA.
Rectifier Ever Ready A11D	Anode to Anode ..	650-750	—
	Cathode to Chassis	375-420	—
	Total H.T. current ..	—	65.0-75.0 mA.
	Mains current (A.C.)	—	0.25-0.35 amp.

## SWITCHES.

Code	Description	Part No.	Values
S1	Band Pass 1	83,507	Wave Range Switch
S2	Band Pass 2		
S3	Oscillator Grid		
S4	Oscillator Anode		
S5	Radio Cut-out	—	—
S6	Pick-up	—	—
S7	Mains Switch Gauged to Volume Control	—	—
S8	Gramophone Motor	—	—

## VALVES.

Code	Description	Part No.	Values
V1	Frequency Changer	4,093	Ever Ready A36B
V2	Pentode I.F. Amplifier	4,083	Ever Ready A50P
V3	Doubt Diode Triode	4,067	Ever Ready A23A
V4	Output Pentode	4,085	Ever Ready A70D
V5	Rectifier	4,084	Ever Ready A11D

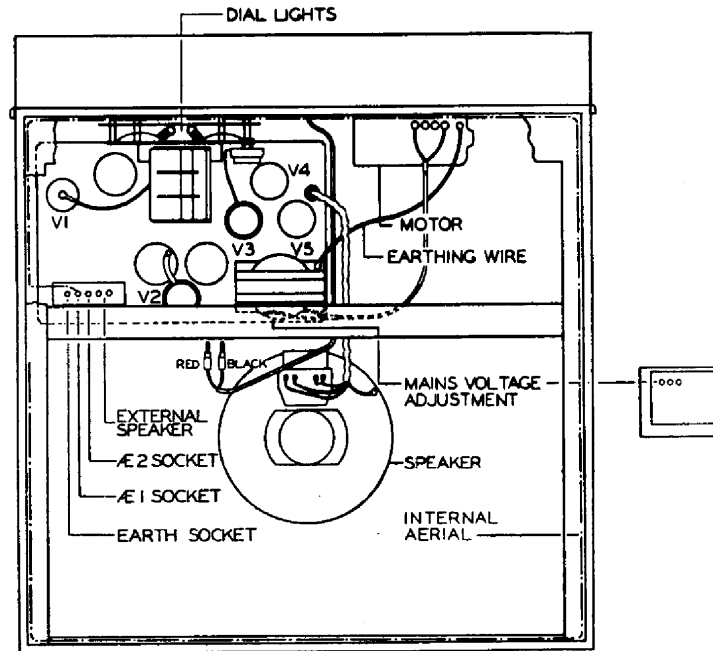
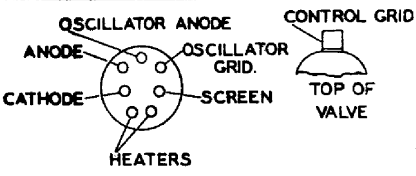
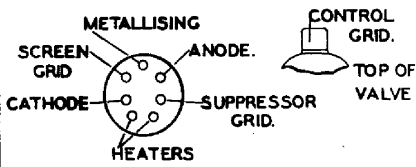


Fig. 9.

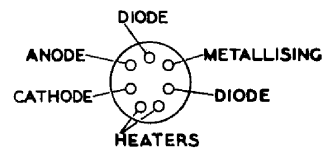
All voltage measurements made with a Universal Avometer (on 1,200 volts range for voltages above 50-volts) are to CHASSIS. Switch in M.W. position for all measurements.



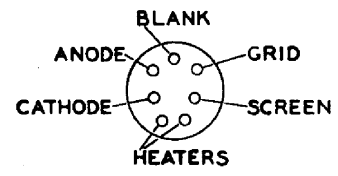
UNDERSIDE OF HOLDER  
FOR A36B VALVE  
**Fig. 1.**



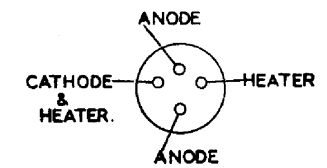
UNDERSIDE OF HOLDER  
FOR A50P VALVE  
**Fig. 2.**



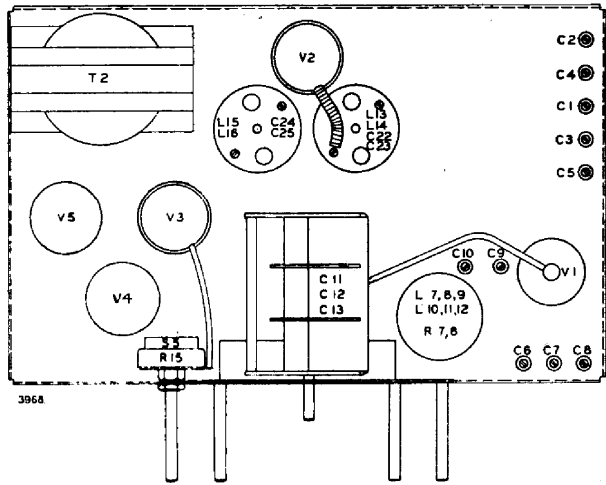
UNDERSIDE OF HOLDER  
FOR A23A VALVE.  
**Fig. 3.**



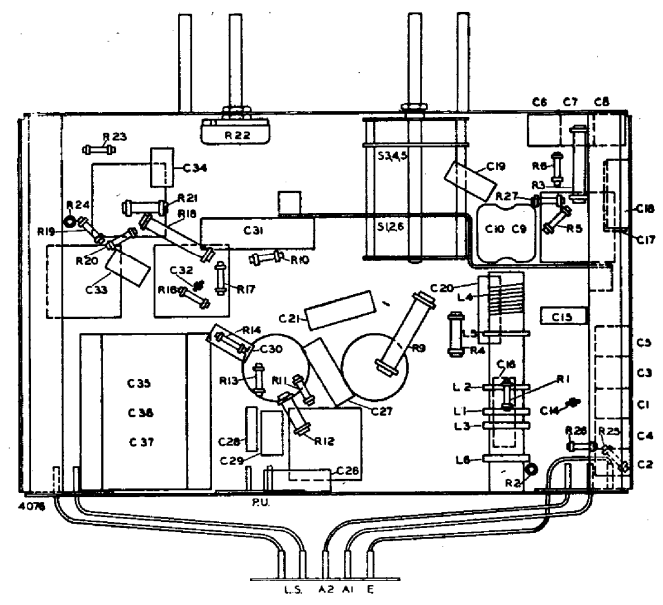
UNDERSIDE OF HOLDER  
FOR A70D VALVE  
**Fig. 4.**



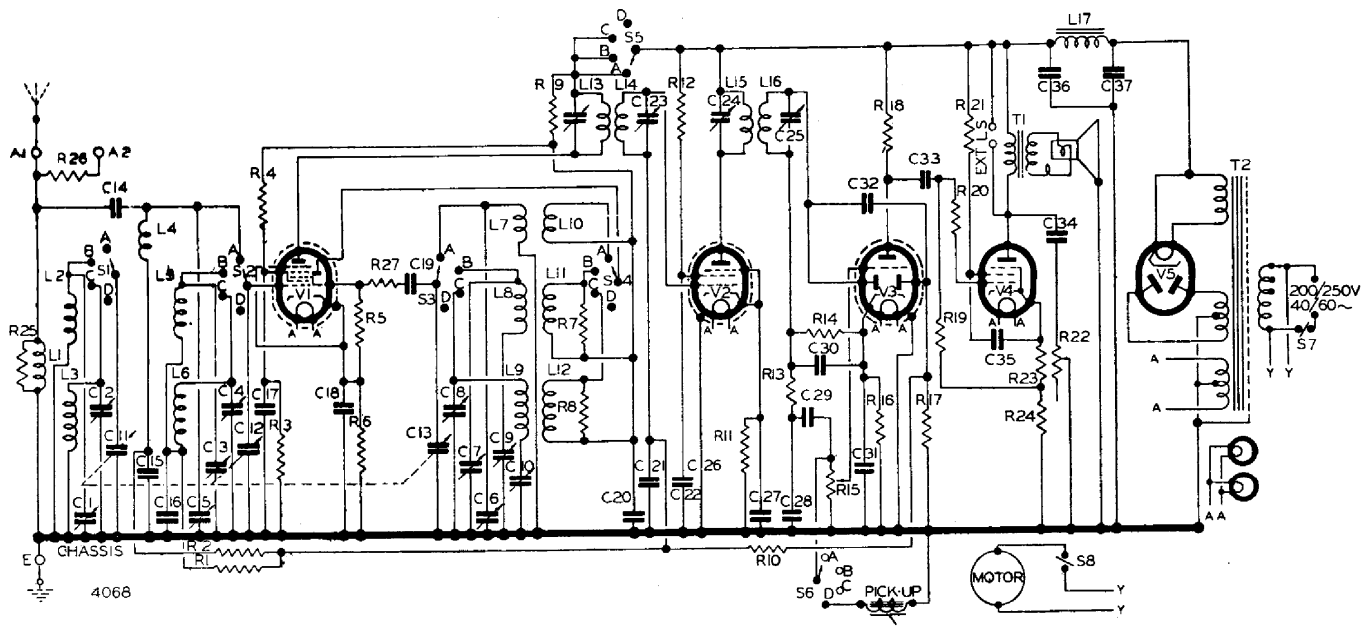
UNDERSIDE OF HOLDER  
FOR A11D VALVE.  
**Fig. 5.**



**Fig. 6.**



**Fig. 7.**



**CIRCUIT DIAGRAM.**

**Fig. 8.**

## SPARE PARTS PRICE LIST FOR MODEL 8322.

Prices are subject to alteration without notice. Postage and Packing extra.

Part No.	Description and Circuit Indication.	List Price.
63550	Cabinet, complete with Baffle, etc. ....	—
73650	Card Back for Cabinet ....	—
78505	Coil, Aerial .... (L1, L2, L3, L4, L5, L6)	6/6
78509	" Anode .... (L7, L8, L9, L10, L11, L12, R7, R8)	6/-
81500	Tone Control .... (R22)	4/6
67005	Condenser, Tubular 50 mfd. .... (C31)	2/3
68020	" " .1 mfd. .... (C16), (C17), (C18) (C20), (C21), (C26), (C27)	1/4
68005	" " .01 mfd. .... (C15)	1/-
68008	" " .05 mfd. .... (C33), (C29)	1/-
71262	Condenser, Mica 10 mmfd. .... (C14), (C32)	1/6
66035	" " .0001 mfd. .... (C19)	8d.
66038	" " .0002 mfd. .... (C28), (C30)	8d.
67500	" " Block 8 + 8,8 mfd. .... (C35), (C36), (C37)	8/-
80502	Gang Condenser, 3-Stage .... (C11, C12, C13)	18/9
55005	Knob, Tuning ....	3d.
55001	" Tone ....	3d.
55022	" Volume and Off ....	3d.
57056	" G.L.M.S. ....	3d.
60057	Mains Lead ....	1/6
71012	Plug for Earth ....	3d.
71013	Plug for Aerial ....	3d.
77054	Transformer, Mains .... (T2)	15/-
4093	Valve (V1) Ever Ready A36B ....	15/-
4083	" (V2) Ever Ready A50P ....	12/6
4067	" (V3) Ever Ready A23A ....	15/6
4085	" (V4) Ever Ready A70D ....	13/6
4084	" (V5) Ever Ready A11D ....	10/6
82500	Trimmer 5-40 mmfd. .... (C1), (C3), (C5), (C6), (C7)	8d.
82501	" 40-100 mmfd. .... (C2), (C4), (C8)	1/-
82502	Double Padder .... (C9), (C10)	3/-
77501	1st I.F. Transformer .... (L13, L14)	7/-
77503	2nd I.F. Transformer .... (L15, L16)	7/-
71945	Resistor, 260,000 ohms 1/2 watt .... (R19)	1/-
71935	" 5,000 ohms 1/2 watt .... (R4)	1/-
71974	" 26,000 ohms 1/2 watt .... (R5)	1/-
71967	" 1,100 ohms 1/2 watt .... (R7)	1/-
71982	" 2,100 ohms 1/2 watt .... (R8)	1/-
71957	" 100 ohms 1/2 watt .... (R11)	1/-
71944	" 510,000 ohms 1/2 watt .... (R14) (R17)	1/-
71942	" 300 ohms 1/2 watt .... (R16)	1/-
71978	" 21,000 ohms 1/2 watt .... (R20)	1/-
71936	" 2,500 ohms 1/2 watt .... (R21)	1/-
71803	" 250 ohms 1/2 watt .... (R24)	1/-
71963	" 11,000 ohms 1/2 watt .... (R25)	1/-
71962	" 110,000 ohms 1/2 watt .... (R1) (R2) (R10) (R13) (R26)	1/-
71928	" 20,000 ohms 1 watt .... (R3) (R18)	1/-
24756	" 25,000 ohms 1/2 watt .... (R12)	1/-
72011	" 10,000 ohms 2 watt .... (R9)	1/-
71969	" 150 ohms 1/2 watt .... (R6) (R23)	1/-
71943	" 200 ohms 1/2 watt .... (R27)	1/-
50060	Scale Pointer ....	6d.
73657	Scale Lamp 12 m/m, 5.5v., 3a ....	—
71245	Scale Lamp Holder ....	6d.
71347	Scale Window (Glass) ....	3d.
90006	Socket Plate, P.U. ....	3d.
90002	" " L.S. ....	3d.
75516	" " Aerial ....	3d.
85504	Speaker, including Transformer ....	35/-
83507	Switch, Wave-change ....	—
75505	Valve Holder, 4-pin ....	3d.
75507	Valve Holder, 7-pin ....	3d.
81502	Volume Control and Switch, On-Off ....	6d.
74006	Instruction Booklet ....	5/-
73655	Socket Plate ....	1/-
73651	Motor Unit Complete ....	—
63552	Crate ....	—

### Circuit Alignment for Lissen 8322.

**NOTE.**—C1 and C2, etc., refer to trimmers as indicated in Service Manual, Figs. No. 6, 7 and 8.

#### I.F. Circuit Alignment.

(1) Short circuit the oscillator by clip leads across front section of gang condenser C13.

(2) Apply a signal of 455 Kc/s. between frequency changer (V1) control grid and chassis. Trim each I.F. circuit to peak in the following order:—  
C25, C24, C23, C22.

(3) Check each circuit by going over the trimmers in the same order again.

(4) Remove shorting clip from gang condenser.

#### R.F. Circuit Alignment.

The three wavebands short, medium and long waves are quite independent of each other and any adjustment to trimmers or padders on any one band affects only that particular band.

#### Medium Waveband Alignment.

(1) See that scale pointer registers with the 180° line on the scale with the gang at maximum capacity.

(2) Set condenser C9 approximately two-thirds in.

(3) Set the pointer against the 214-metre mark on scale.

(4) Apply a signal of 214 metres to the A1 and E sockets of the receiver and adjust condenser C7 to receive the signal, then adjust condenser C3 to give maximum output and adjust condenser C1 to give maximum output.

(5) Set pointer against 500-metre mark on the scale.

(6) Apply a signal of 500 metres and adjust condenser C9 to give maximum output on that signal.

(7) Re-set pointer against 214-metre mark and re-adjust condensers C7, C3, C1 to give maximum output on the 214-metre signal.

(8) Check again at 500 metres and see that the pointer is at the 500-metre mark when receiving the 500-metre signal. If it is not, make slight adjustment to condenser C9.

(9) Check calibration at 214 metres, 300 metres and 500 metres.

#### Long Waveband Alignment.

(1) See that the pointer registers with the 180° line on the scale with the gang at maximum capacity.

(2) Set condenser C10 approximately one-third in.

(3) Set pointer against 1,200-metre mark on scale.

(4) Apply a signal of 1,200 metres to the A1 and E sockets of the receiver and adjust condenser C8 to receive the signal, then adjust condenser C4 to give maximum output and adjust condenser C2 to give maximum output.

(5) Set pointer against 1,700-metre mark on scale.

(6) Apply a signal of 1,700 metres and adjust condenser C10 to give maximum output on that signal.

(7) Re-set pointer against 1,200-metre mark and re-adjust condensers C8, C4, C2 to give maximum output on the 1,200-metre signal.

(8) Check again at 1,700 metres and see that the pointer is at the 1,700-metre mark when receiving the 1,700-metre signal. If it is not, make slight adjustment to condenser C10.

(9) Check calibration at 1,200 metres and 1,700 metres.

#### Short Waveband Alignment.

(1) See that the scale pointer registers with the 180° line on scale with the gang at maximum capacity.

(2) Set the pointer against 15 Mc/s. mark on the scale.

(3) Screw condenser C6 right in and then apply a signal of 15 Mc/s. Slowly unscrew C6 until this signal is heard. Care should be taken that the right peak is selected. Two peaks will be found with this trimmer. The correct one is the one with C6 at the higher capacity, in other words, it is the first peak found when unscrewing C6. Having selected the right peak adjust condenser C5 to give maximum output.

(4) Apply a signal of 7.5 Mc/s. and tune the receiver to this signal and adjust the end turn of inductance L4 (on signal frequency coil) to give maximum output on this signal.

(5) Re-set pointer to 15 Mc/s. mark and re-adjust condenser C6 and C5 to give maximum output on the 15 Mc/s. signal.

(6) Check calibration at 15 Mc/s.

**NOTE.**—On the short waveband the oscillator runs at the lower frequency and performance on this band depends upon the selection of the right peak of trimmer C6 when aligning at 15 Mc/s.