

LISSEN

SERVICE MANUAL FOR THREE-WAVE BAND AC/DC SUPERHET MAINS RECEIVER MODEL 8321.

TECHNICAL SPECIFICATION.

THE Model 8321 is a three-band superhet receiver for D.C. or A.C. mains operation (200-250 volts).

Valves are as follows:—

Frequency Changer
Ever Ready C36B (Triode-hexode).

I.F. Amplifier
Ever Ready C50N (Variable-mu H.F. Pentode).

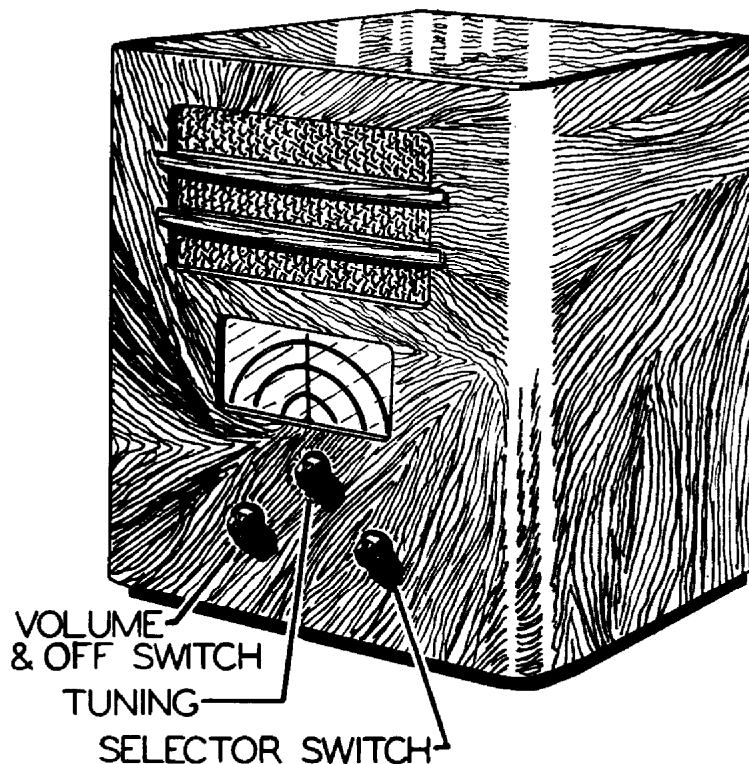
Detector and A.V.C.
Ever Ready C20C (Double diode).

Output
Ever Ready C70D (Pentode).

Rectifier
Ever Ready C10B (Diode).

Note.—On a number of receivers Mazda Pen 3520 and U4020 valves were used instead of Ever Ready C70D and C10B valves. These valves are not directly interchangeable, the power resistor being part No. 89,600 (677 ohms) when Ever Ready valves are used, and 89,601 (617 ohms) when the two Mazda valves are used.

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 signal frequency coil (L4) by a condenser (C3).



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 first 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 (V2) 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 (C30) 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 signal diode and the output pentode is by a resistance-capacitance combination (C28, R15).

H.T. smoothing is effected by an L.F. choke (L17) and electrolytic condensers (C33 and C34).

Maximum undistorted output two watts.

Wavelengths covered by the Model 8321 are as follows:—

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

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

CONDENSERS			
Code	Description	Part No.	Values
C1	Aerial Isolating ..	66,520	.001 mfd.
C2	Earth Isolating ..	68,503	.01 mfd.
C3	S.W. Aerial Coupling	71,262	10 mmfd.
C4	L.W. B.P.1 Trimmer ..	82,501	40/100 mmfd.
C5	M.W. B.P.1 Trimmer ..	82,500	5/40 mmfd.
C6	S.W. Aerial Trimmer ..	82,500	5/40 mmfd.
C7	M.W. B.P.2 Trimmer ..	82,500	5/40 mmfd.
C8	L.W. B.P.2 Trimmer ..	82,501	40/100 mmfd.
C9	L.W. Oscillator Trimmer ..	82,501	40/100 mmfd.
C10	M.W. Oscillator Trimmer ..	82,500	5/40 mmfd.
C11	S.W. Oscillator Trimmer ..	82,500	5/40 mmfd.
C12	M.W. Padder { Double	82,502	300/600 mmfd.
C13	L.W. Padder { Padder		
C14			
C15	Triple Gang ..	80,503	540 mmfd. Max.
C16			
C17	Oscillator Grid ..	66,035	.0001 mfd.
C18	S.W. Aerial Tracking ..	68,005	.01 mfd.
C19	A.V.C. Decoupling ..	68,020	.1 mfd.
C20	Oscillator Anode Decoupling ..	68,020	.1 mfd.
C21	A.V.C. Decoupling ..	68,020	.1 mfd.
C22	V2 Screen By-pass ..	68,020	.1 mfd.
C23	V2 Bias By-pass ..	68,020	.1 mfd.
C24			
C25	I.F. Trimmers on I.F.T. Assembly		
C26			
C27			
C28	L.F. Coupling ..	68,014	.05 mfd.
C29	Signal Diode Load By-pass ..	66,038	.0002 mfd.
C30	A.V.C. Coupling ..	71,262	10 mmfd.
C31	Output Bias By-pass ..	67,005	50 mfd., P.V.12.
C32	Tone Control ..	68,503	.01 mfd.
C33	H.T. Smoothing ..	67,500	16 + 8 mfd., 540 Peak
C34			
C35	Mains Filter ..	68,503	.01 mfd.
C36	V1 Screen By-pass ..	68,020	.1 mfd.
C37	V1 Bias By-pass ..	68,020	.1 mfd.
C38	Tone Correction ..	66,969	.0005 mfd.

RESISTANCES			
Code	Description	Part No.	Values
R1	A2 Potentiometer ..	71,962	110,000 ohm, 1/2 watt
R2	A2 Potentiometer ..	71,963	11,000 ohm, 1/2 watt
R3	A.V.C. Decoupling ..	71,962	110,000 ohm, 1/2 watt
R4	A.V.C. Decoupling ..	71,962	110,000 ohm, 1/2 watt
R5	V1 Screen Potentiometer ..	71,928	20,000 ohm, 1/2 watt
R6	V1 Screen Potentiometer ..	71,935	5,000 ohm, 1/2 watt
R7	V1 Bias ..	71,969	150 ohm, 1/2 watt
R8	V1 Oscillator Grid Leak ..	71,974	26,000 ohm, 1/2 watt
R9	S.W. Oscillator Grid Stopper ..	71,943	200 ohm, 1/2 watt
R10	V1 Decoupling ..	72,011	10,000 ohm, 2 watt
R11	M.W. Oscillator Volts Modifier ..	71,914	1,000 ohm, 1/2 watt
R12	L.W. Oscillator Volts Modifier ..		
R13	V2 Screen Feed ..	71,982	2,100 ohm, 1/2 watt
R14	V2 Bias ..	24,756	25,000 ohm, 1/2 watt
R15	Volume Control ..	71,957	100 ohm, 1/2 watt
R16	A.V.C. Decoupling ..	81,501	500,000 ohm
R17	Signal Diode Load ..	71,962	110,000 ohm, 1/2 watt
R18	A.V.C. Diode Load ..	71,944	510,000 ohm, 1/2 watt
R19	Output Grid Stopper ..	71,944	510,000 ohm, 1/2 watt
R20	Output Bias ..	71,978	21,000 ohm, 1/2 watt
R21	Ballast Resistor ..	71,969	150 ohm, 1/2 watt
R22	Dial Lamp Voltage Dropping ..	89,600	677 ohm
		89,503	40 ohm, 1/2 watt

OPERATING CONDITIONS OF VALVES			
Valve	Electrode	Voltage	Current (mA.)
Frequency Changer (Triode-hexode) Ever Ready C36B	Anode ..	221	1.2
	Oscillator anode	88	6.8
	Screen ..	61	2.6
	Cathode ..	1.5	10.6
I.F. Amplifier (H.F. Pentode) Ever Ready C50N	Heater ..	28	—
	Anode ..	221	7.5
	Screen ..	141	2.6
Detector and A.V.C. Valve (Double-diode) Ever Ready C20C	Cathode ..	1.0	10.3
	Heater ..	12.4	—
	Anode ..	7.9	—
Output (Pentode) Ever Ready C70D	Heater ..	12.1	—
	Anode ..	200	51.0
	Screen ..	221	7.2
Rectifier (Diode) Ever Ready C10B	Cathode ..	8.3	58.0
	Heater ..	32	—
	Anode ..	225	—
Voltage and current readings of Mazda Output Pentode and Rectifier used as alternatives to Ever Ready C70D and C10B.	Cathode ..	230	77.0
	Heater ..	20	—
	Anode ..	212	41.0
Output (Pentode) Mazda Pen 3520	Screen ..	221	9.0
	Cathode ..	7.9	50.0
	Heater ..	32	—
Rectifier (Diode) Mazda U4020	Anode ..	230	—
	Cathode ..	240	72.0
	Heater ..	35	—

INDUCTANCES			
Code	Description	Part No.	
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 ..		
L6	L.W. B.P.2 ..		
L7	S.W. Grid ..		
L8	M.W. Grid ..		
L9	L.W. Grid ..	78,509	Oscillator Frequency Coil
L10	S.W. Tickler ..		
L11	M.W. Tickler ..		
L12	L.W. Tickler ..		
L13	1st I.F. Primary Coil ..	77,501	1st 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	Smoothing Choke ..	79,501	—
L18	Mains Filter Choke ..	79,004	—
L19			
T1	Output Transformer on Speaker ..	—	—

SWITCHES			
Code	Description	Part No.	
S1	B.P.1 ..	83,502	Wave Range Switch
S2	B.P.2 ..		
S3	Oscillator Grid ..		
S4	Oscillator Anode ..		
S5	Mains Switch Ganged to Volume Control ..		

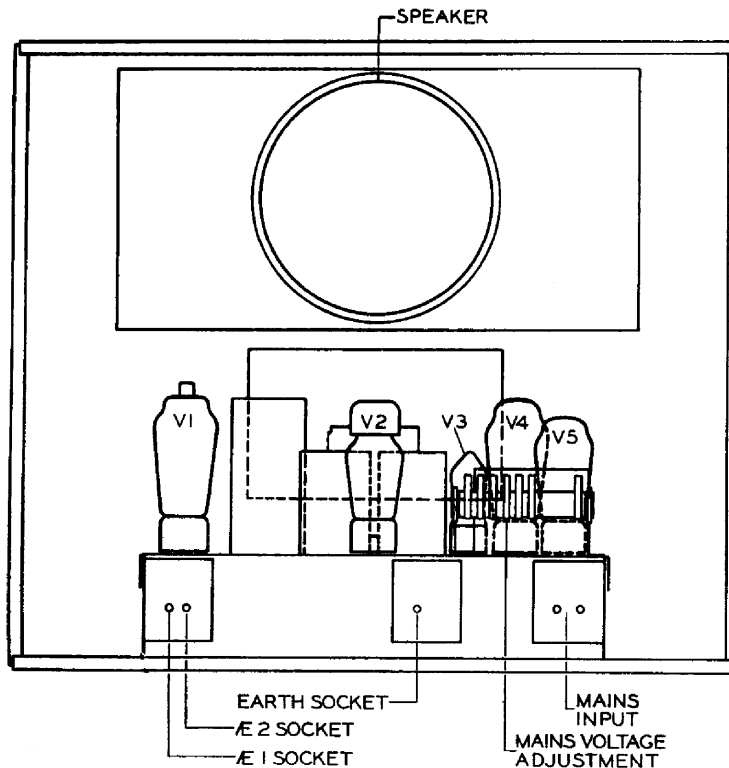


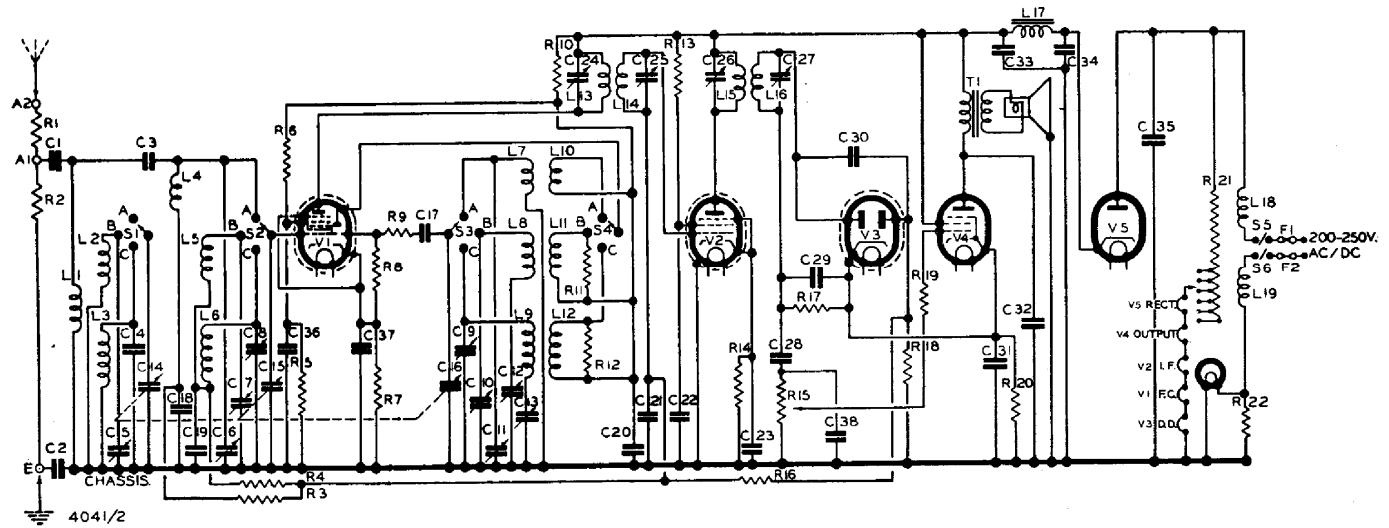
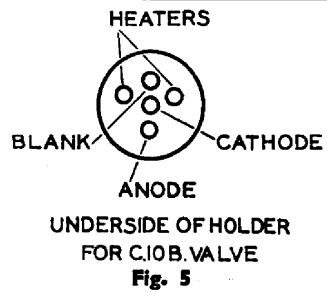
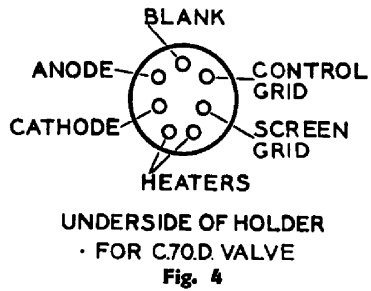
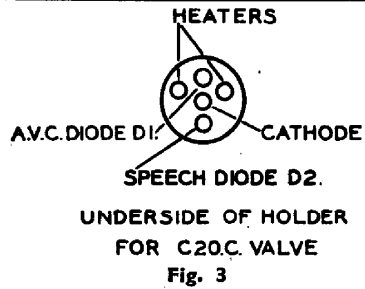
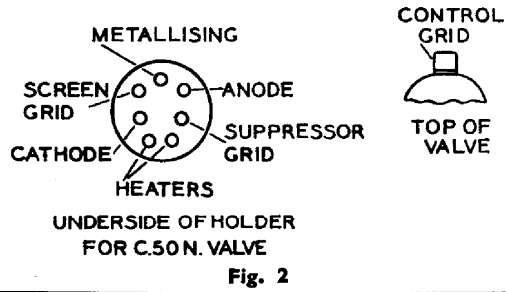
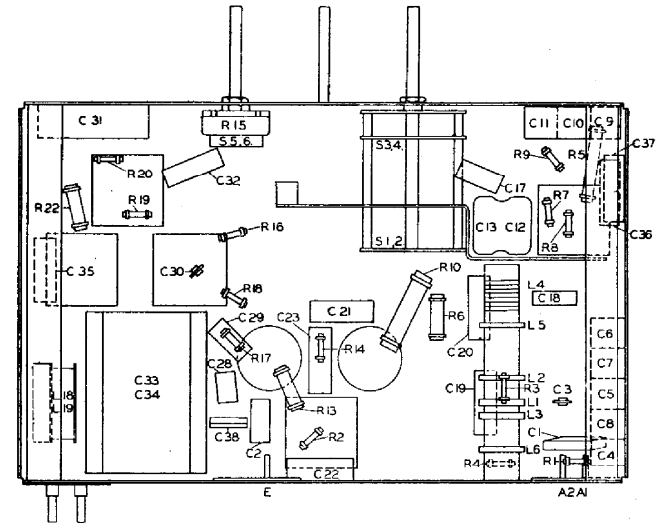
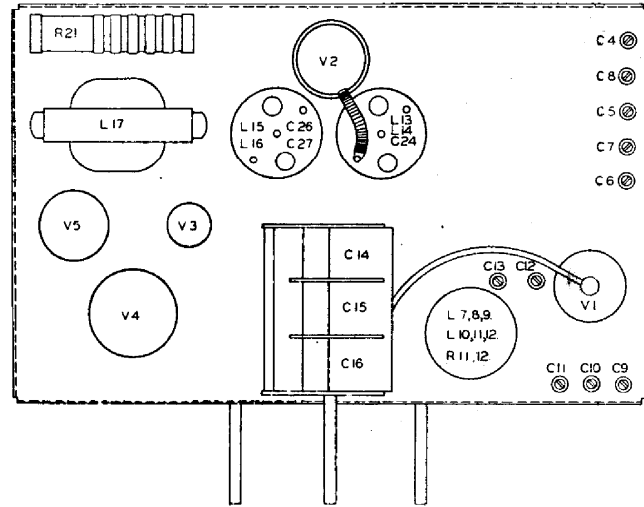
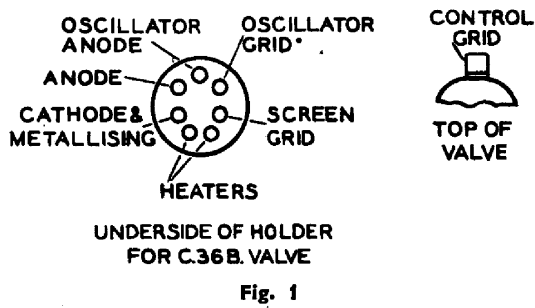
Fig. 9

VALVES			
Code	Description	Part No.	
V1	Frequency Changer ..	4,098	E.R. C36B (Met.)
V2	Pentode I.F. Amplifier ..	4,076	E.R. C50N (Met.)
V3	Double Diode Triode ..	4,099	E.R. C20C (Met.)
V4	Output Pentode ..	4,078	E.R. C70D
V5	Rectifier ..	4,079	E.R. C10B

Total heater current 0.2 amp. A.C.; Total mains current, 0.28 amp.

The above measurements were made with a Universal Avometer and mains voltage of 230 volts A.C.

All voltage measurements are to CHASSIS unless otherwise stated.



CIRCUIT DIAGRAM

Fig. 8.

SPARE PARTS PRICE LIST FOR MODEL 8321.

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

Part No.	Description and Circuit Indication	List Price
63541	Cabinet, complete with Baffle, etc.	35/-
73637	Card Back for Cabinet	1/3
78505	Coil, Aerial (L1, L2, L3, L4, L5, L6)	6/6
78509	" Anode (L7, L8, L9, L10, L11, L12, R11, R12)	6/-
67005	Condenser, Tubular 50 mfd. (C31)	2/3
68020	" " 1 mfd. (C19) (C20) (C21) (C22) (C23) (C36) (C37)	1/4
68005	Condenser, Tubular .01 mfd. (C18)	1/-
68503	" " .01 mfd. (C2) (C32) (C35)	1/-
68014	" " .05 mfd. (C28)	1/-
66035	" " .0001 mfd. (C17)	8d.
66038	" " .0002 mfd. (C29)	8d.
67500	" " Block 16+8 mfd. (C33, C34)	8/-
71262	" Mica 10 mmfd. (C3) (C30)	1/6
66520	" .001 mfd. (C1)	6d.
5408	Fuse, 1 amp.	8d.
66969	Condenser Mica .0005 mfd. (C38)	18/9
80503	Gang Condenser, 3-stage (C14, C15, C16)	3d.
55006	Knob, Tuning	3d.
57040	" L.M.S.	3d.
55023	" Volume and Off	3d.
60510	Mains Lead	4/-
71012	Plug for Earth	3d.
71013	" " Aerial	3d.
4098	Valve (V1) Ever Ready C36B	15/-
4076	" (V2) " " C50N	12/6
4099	" (V3) " " C20C	5/6
4078	" (V4) " " C70D	13/6
4079	" (V5) " " C10B	10/6
82500	Trimmer 5—40 mmfd. (C5) (C6) (C7) (C10) (C11)	8d.
82501	" 40—100 mmfd. (C4) (C8) (C9)	1/-
82502	Padder 300—600 and 200—400 mmfd. (C12, C13)	3/-
77501	1st I.F. Transformer (L13, L14)	7/-
77503	2nd I.F. Transformer (L15, L16)	7/-
71935	Resistor, 5,000 ohms 1/2 watt (R6)	1/-
71974	" 26,000 ohms 1/2 watt (R8)	1/-
71957	" 100 ohms 1/2 watt (R14)	1/-
71944	" 510,000 ohms 1/2 watt (R17) (R18)	1/-
71978	" 21,000 ohms 1/2 watt (R19)	1/-
71963	" 11,000 ohms 1/2 watt (R2)	1/-
71962	" 110,000 ohms 1/2 watt (R1) (R3) (R4) (R16)	1/-
71928	" 20,000 ohms 1 watt (R5)	1/-
24756	" 25,000 ohms 1/2 watt (R13)	1/-
72011	" 10,000 ohms 2 watt (R10)	1/-
71969	" 150 ohms 1/2 watt (R7) (R20)	1/-
71943	" 200 ohms 1/2 watt (R9)	1/-
50060	Scale Pointer	3d.
71206	" Lamp 12 m/m., 6.2 volt, .3 amp.	4d.
71246	" Lampholder	6d.
73603	" Window (Glass)	3d.
75516	Socket Plate Aerial	3d.
85512	Speaker, including Transformer	27/6
83502	Switch, Wavechange	6/-
75506	Valve Holder, 5-pin	4d.
75507	" " 7-pin	6d.
81501	Volume Control and Switch, On-Off	5/6
69517/33	Carton and Liner	5/6
74005	Instruction Booklet	1/-
89600	Ballast Resistor, 677 ohms	4/6
89503	Resistor, 40 ohm 1/2 watt	1/-
79501	Smoothing Choke	7/6
79004	Mains Filter Choke	2/6

CIRCUIT ALIGNMENT PROCEDURE FOR LISSEN 8321.

Note.—C4 and C5, etc., refer to trimmers as indicated in Service Manual, Fig. Nos. 6, 7 and 8.

I.F. Circuit Alignment.

(1) Short circuit the oscillator by clip leads across front section of gang condenser, C16.

(2) Apply a signal of 455 Kc/s. to control grid of frequency changer (V1). Trim each I.F. circuit to peak in the following order:—
C27, C26, C25, C24.

(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 the scale pointer registers with the 180° line on the scale with the gang at maximum capacity.

(2) Set condenser C12 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 C10 to receive the signal; adjust condenser C7 to give maximum output, then adjust condenser C5 to give maximum output.

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

(6) Apply a signal of 500 metres and adjust condenser C12 to give maximum output on that signal.

(7) Re-set pointer against 214 metres mark and readjust condensers C10, C7, C5 to give maximum output on the 214 metres signal.

(8) Check again at 500 metres and see that the pointer is at the 500-metre mark when receiving the 500 metres signal. If it is not, make a slight adjustment to condenser C12.

(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 condenser at maximum capacity.

(2) Set condenser C13 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 C9 to receive the signal; adjust condenser C8 to give maximum output, then adjust condenser C4 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 C13 to give maximum output on that signal.

(7) Re-set pointer against 1,200-metre mark and readjust condenser C9, C8, C4 to give maximum output on the 1,200 metres 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 metres signal. If it is not, make slight adjustment to condenser C13.

(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 condenser at maximum capacity.

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

(3) Screw condenser C11 right in and then apply a signal of 15 Mc/s. Slowly unscrew C11 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 that with C11 at the higher capacity, in other words, it is the first peak found when unscrewing C11. Having selected the right peak adjust condenser C6 to give maximum output.

(4) Apply a signal of 7.5 Mc/s. and tune the receiver to this signal. 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 readjust condensers C11 and C6 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 C11 when aligning at 15 Mc/s.