Mullard

Radio

MODEL MUS 221

SERVICE MANUAL

THE MULLARD WIRELESS SERVICE CO., LTD.

SERVICE DEPT., WADDON FACTORY ESTATE, CROYDON, SURREY, ENGLAND

SERVICE MANUAL

FOR MULLARD RECEIVER TYPE MUS 221

FOR D.C. or A.C. SUPPLIES (200-250 Volts.)

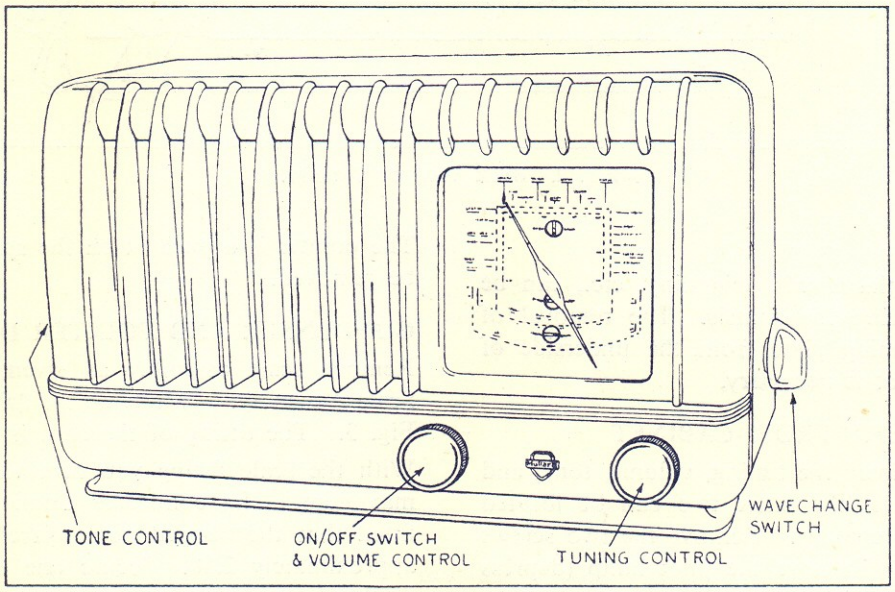


FIG. 1. FRONT VIEW OF CABINET.

VALVE COMBINATION

MULLARD	CCH35	Frequency Changer.
„	EF39	I.F. Amplifier.
„	EBC33	Detector and A.V.C.
„	CL33	Output
„	CY31	Rectifier.

PILOT LAMP

Type 8034D–00 (10 v.–0.2 Amp.)

WAVE RANGES

S.W. 16.3 – 51 Metres.
M.W. 192 – 560 „
L.W. 900 – 2,000 „

INTERMEDIATE FREQUENCY

470 Kc/s.

TRIMMING FREQUENCIES

S.W. 17.2 Mc/s and 6 Mc/s.
M.W. 1,500 Kc/s and 600 Kc/s.
L.W. 380 Kc/s and 175 Kc/s.

EXTENSION LOUDSPEAKER

5 – 7 Ohms.

CONSUMPTION

65 Watts at 240 Volts D.C.
69 Watts at 230 Volts A.C.

VOLTAGE RANGE

200 – 250 Volts D.C. or A.C. 50 – 100 cycles.

DIMENSIONS OF CABINET (including knobs)

Height $9\frac{3}{4}$". Width $16\frac{1}{4}$". Depth $7\frac{1}{2}$".

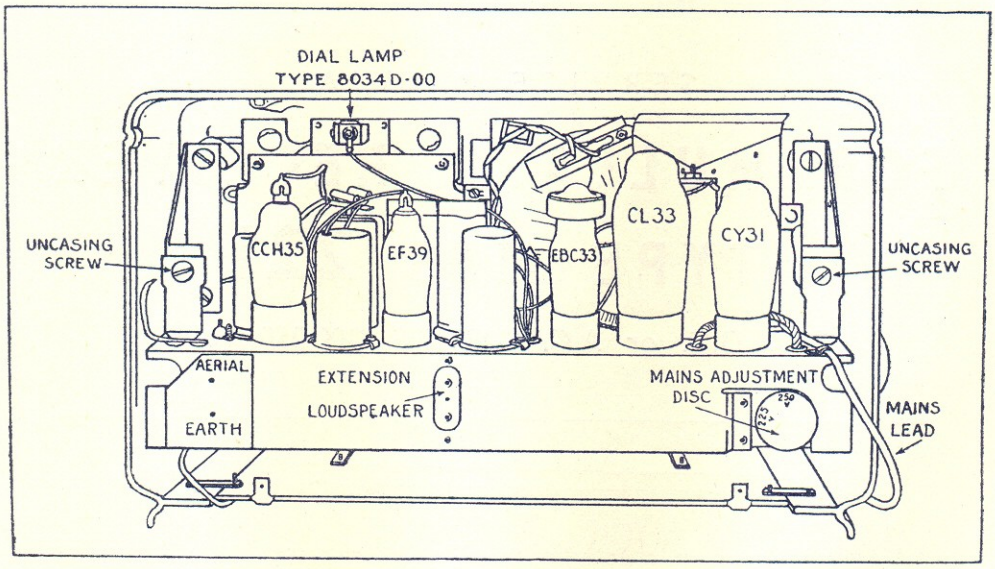


FIG. 2. BACK VIEW OF CABINET.

GENERAL NOTE

The majority of replacements, trimming, etc., can be done without removing the chassis. The removal of the metallised screening plate from the underside of the cabinet is all that is necessary.

REMOVING CHASSIS FROM CABINET

Remove the knobs from the tuning, volume, tone, and wave change controls (the latter two can be located through slots in the chassis). Remove the two screws indicated in Fig. 2. Remove the pilot lamp (depress both sides of holder), and unsolder loud speaker leads. Withdraw chassis.

When reassembling make sure that the threaded holes in the switch spindles are in line with the slots in the chassis so that the screws can be fitted without difficulty.

LOUDSPEAKER REPAIRS

Special attention must be paid to the following points. The bench must not be of iron and must be quite free from dust and filings. Never dismantle the magnet portion of the speaker. When repairs are completed replace the dust cover immediately. For recentring the speech coil, use non-magnetic feeler gauges of 0.010" thickness. The speech coil resistance is 2.2 Ohms approximately.

REPLACING THE SCALE ASSEMBLY

Remove the chassis from the cabinet. The scale assembly can be removed by unscrewing two screws. The pointer is a push fit on the spindle and can easily be removed.

CONDENSER AND POINTER DRIVE

Remove scale assembly as given under "Replacing Scale Assembly." Make up the drive cord as shown in Fig. 3. The fitting of the cord is done as follows :—

With the scale facing you turn variable condenser to maximum. The condenser drum should then be so fitted that the flanged pin, adjacent to the slot, is at approximately 2.30. Secure one end of the cord on to the drum spring and pass over the flanged pin and round the left side of the drum (anti-clockwise). Wind 2½ turns around spindle winding towards you, and up and around right side of drum (anti-clockwise), and secure remaining end to spring.

"SPIRE" CLIPS

To remove clips holding scale glass and loudspeaker, twist the clips with a pair of pliers and pull off.

REPLACING FRONT GLASS OF SCALE

The glass front is secured by 4 "spire" clips fitted on bosses which are part of the plastic cabinet. Removal of the chassis and "spire" clips will enable the glass front to be withdrawn.

REPLACING VOLUME CONTROL AND SWITCH

Remove chassis from cabinet. Unsolder the leads to the volume control and switch. The assembly can be removed by unscrewing two screws and nuts.

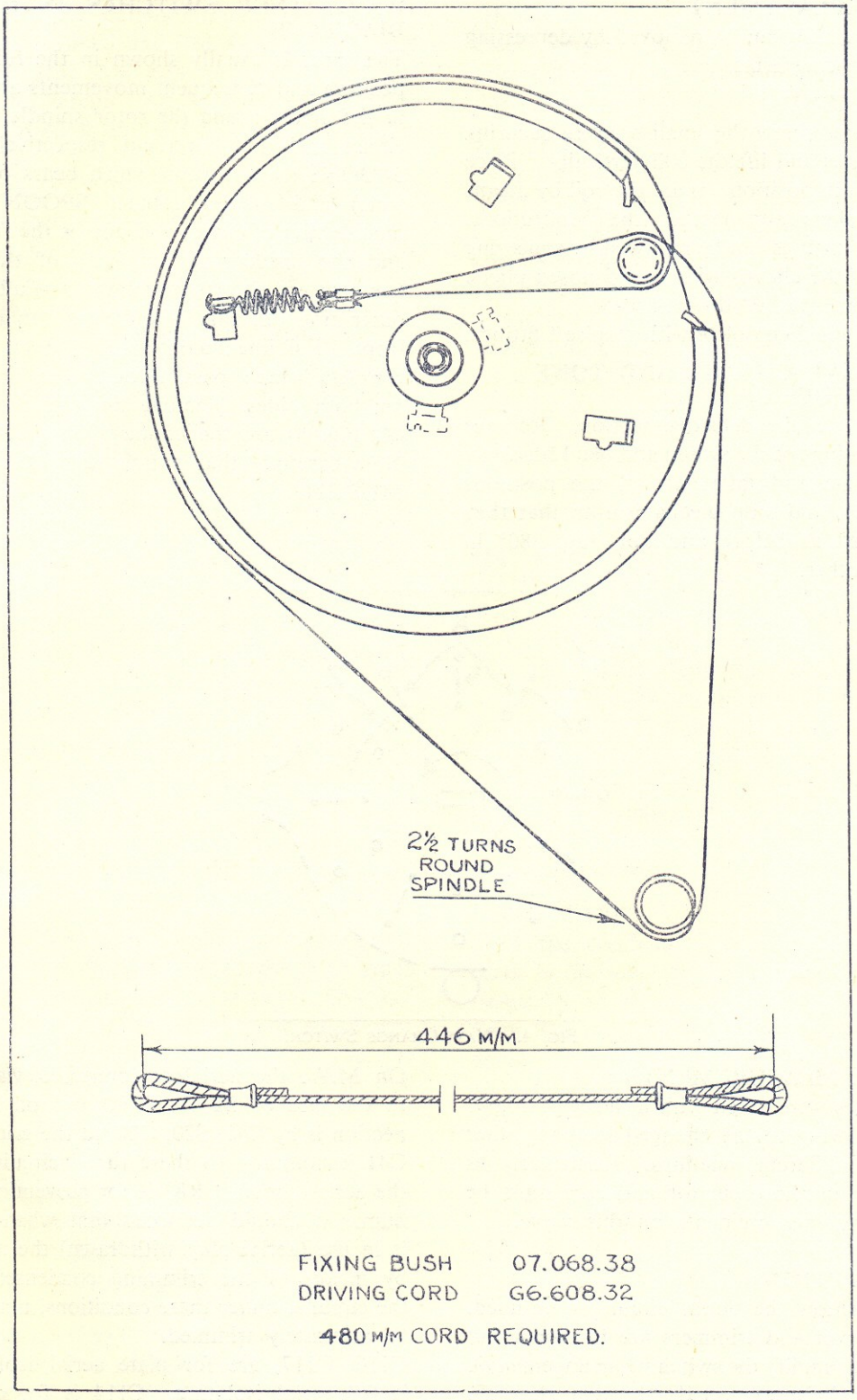


FIG. 3. POINTER DRIVE CABLE.

PILOT LAMP REPLACEMENT

The pilot lamp assembly can be removed by depressing both sides of the spring arms.

COIL REPLACEMENT

Unsolder the leads, unscrew the small brackets securing the coil to the chassis and lift the coil vertically. Place the new component in position, secure the coil by means of the small brackets and restore the connections. Coils with " spire " fittings can be removed by squeezing the clips on top of the chassis with round nosed pliers, and at the same time pushed downwards.

New coils are supplied complete with "spire" fittings.

REPAIRS TO WAVE CHANGE AND TONE CONTROL SWITCHES

Unsolder the leads to the defective section. Remove the flat strip and springs of the switch and bend brackets. Pull out the spindle and take care of the positions of the rotor, stator, and stop mechanism so that they can be reassembled as before and not, say, 180° in respect of one another.

WAVE-RANGE SWITCHES IN CIRCUIT DIAGRAMS

The rotor is usually shown in the fully anti-clockwise position and subsequent movements are in the direction of the arrow round the rotor spindle hole. The small circles and dots represent respectively stator contact SPOONS (that portion which bears on the rotor contacts) and unused contact SPOON positions. The outside ring of circles and dots is the front of the stator and the inside ring the back of the stator. Rotor contacts are shown as follows :—Full line against the outer ring (Y, Fig. 4) indicates contacts on the rotor front. Full line from inner ring to outer ring (X, Fig. 4) contacts which pass through the rotor and operate on both sides. Dotted line against the inner ring (Z, Fig. 4) are the contacts on the rotor rear.

Note carefully that switch turns 2 x 90° in the type MUS 221.

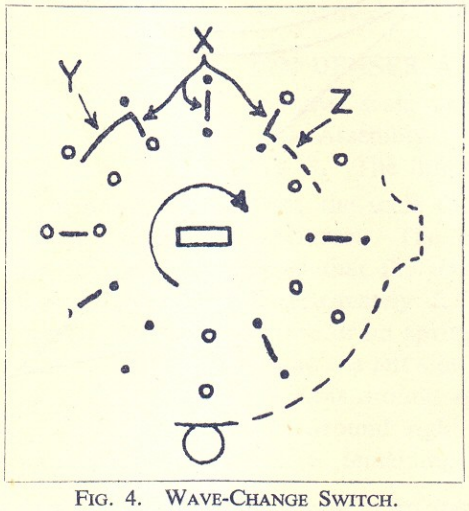


FIG. 4. WAVE-CHANGE SWITCH.

VOLTAGE, ETC., MEASUREMENTS

The various voltages were taken with a meter of 20,000 Ohms per volt. Owing to the changed loading, other meters may give different readings. Particularly is this so in the case of the oscillator and care must be taken when making measurements on this valve.

CIRCUIT DESCRIPTION

On the S.W.2 position the aerial circuit is untuned. (The M.W. aerial coil and trimmers are in circuit but they are included to simplify the switching arrangements). Therefore the aerial is connected (through the I.F. filter) by C13 and C100 to the grid of Valve B2 (CCH35).

On M.W. the aerial is connected via C41, S18, C18 to the grid of B2 via C100 and on L.W. aerial connection is by C41, S20, C20, to the grid of B2 via C100. C41 is common to these tuned circuits and completes the aerial circuit. R83 is for prevention of modulation hum. It should be noted that when the plate aerial is in use (aerial plug withdrawn) the aerial coupling is by means of the trimming condensers and therefore the circuits, under these conditions, may not necessarily be accurately trimmed.

C116, C117, are for plate aerial isolating and C113 is for aerial isolating. C114 is for chassis isolation. The oscillator section is resistance (R39) capacity

(C102) coupled to the common coupling coil S33. The grid circuits are tuned and S34, C34 are for short waves. On M.W. the coil S38 and the condensers C38, C42, form the circuit. On L.W. S40, C40, C45, together with C47, C42, form the circuit. C7 is common to all circuits.

R40 is for limiting grid current. The anode of B2 (CCH35) is connected to the I.F. transformer primary winding S51 and the secondary S52, and is followed by a similar circuit which is connected to the signal diode of B4 (EBC33). A.V.C. is applied via R47 to the grids of the two preceding valves. After detection the signal is passed via the volume control R11, R42, C84, R44, to the grid of B4 ; the anode of which is Resistance R46, capacity C83, coupled to the grid of the output valve (CL33). R44 is to prevent tone control from being inoperative at low volume control settings. Finally the anode of the output valve is connected to the output transformer and loudspeaker. A portion of the A.F. voltage is fed back to the M.W. and L.W. circuits only via R52, R53, C109 and R55, C110, to the grid of B4 to ensure satisfactory reproduction. Note on S.W. C110 is earthed via the switch. Tone control is by fixed condensers and switch.

The I.F. filter comprises S91, C91. In some sets an H.F. choke coil may be fitted between switch contact 20 and junction of R38, etc.

TRIMMING INSTRUCTIONS

The oscillator is higher than the H.F. tuning on all ranges.

Connect an output meter across the external speaker sockets for trimming indication. Keep the R.F. input as low as possible to prevent A.V.C. action. The wax on air trimmers can be broken off with tweezers. For dust iron cores insert a warm screwdriver into the slot of the core and rotate backward and forward to free the wax.

WIRE TRIMMERS

Capacity is reduced by removing the turns of wire and in trimming, wire is removed until the deflection of the meter, having reached maximum, commences to fall back. Turns are then replaced, the surplus is cut off, and the windings fixed with a small quantity of wax. Do not attempt to increase capacity by adding more turns as extra turns cannot be wound tightly enough and would cause varying capacity.

GENERAL

Place variable condenser to minimum and adjust pointer to the two marks opposite one another. Keep input low.

I.F. CIRCUITS

Switch receiver to M.W. and adjust condenser to mid-position. Volume control at maximum. Apply a signal of 470 Kc/s to the grid (G1) of valve B2 via a condenser of 47,000 pF. Damp the circuits with a 100 pF condenser by connecting it across the windings as instructed.

Damp S61. Trim S62 (top).
„ S52. „ S61, S51 (bottom).
„ S51. „ S52 (top).

I.F. FILTER

Switch to M.W. Variable condenser to maximum. Trim S91 for minimum output.

H.F. AND OSCILLATOR TRIMMING
MEDIUM WAVE

Turn the condenser to 500 Metres and feed a signal of this frequency into the aerial socket via a suitable dummy aerial. Trim S38 (bottom) for maximum output. Turn the condenser to 200 Metres (the trimming mark is opposite this point) and feed a signal of this frequency into the aerial socket via a dummy aerial. Trim C38 for maximum output. Re-adjust the condenser to 500 Metres and trim S18 (bottom) for maximum output. Return condenser to 200 Metres and trim C18 for maximum output. Repeat adjustments if necessary.

LONG WAVE

Turn the condenser to 1,720 Metres (the trimming mark is opposite this point) and feed a signal of this frequency to the aerial socket via a dummy aerial. Trim S40 (top) for maximum output. Turn the condenser to 790 Metres (the trimming mark is opposite) and trim C40 for maximum output. Re-adjust condenser to 1,720 Metres and trim S20 (top) for maximum output. Return the condenser to 790 Metres and trim C20 for maximum output. Repeat adjustments if necessary.

SHORT WAVE

Turn the condenser to 50 Metres and feed a signal of 6 Mc/s to the aerial socket via a suitable dummy aerial. Trim S34 for maximum output. Adjust the condenser to 17.3 Mc/s (the trimming mark is opposite this point) and trim C34 for maximum output.

Repeat adjustments if necessary.

SPARE PARTS LIST FOR TYPE MUS 221

CABINET ASSEMBLY

CABINET less fittings	MK.950.47
Mullard Emblem	MK.700.23
Knobs—Tuning and Vol. control	MK.852.95/258
Grubscrew for above	07.863.10
Knob—waveband	MK.853.02/Brown 2
Knob—Tone control	MK.260.72
Screws for above	07.803.10
BAFFLE and SILK ASSEMBLY	MK.823.71
Spire fix for above	MK.926.45
WINDOW GLASS	MK.335.71
Spire fix for above	MK.926.46
BASE PLATE	MK.868.68
Holding strips	A3.324.77
BACK PLATE	MK.868.84
Valve position label	M.573
Limited licence label	MK.700.34
Top holding clip	MK.076.11

CHASSIS ASSEMBLY

MAIN SUPPORT, Scale side	MK.823.54
Main support, Speaker side	MK.823.81
Screws for main support	07.805.10
" L " bracket	MK.076.37
Rubber bush for above	25.655.95
Tube for above	25.437.87
Washer	MK.446.12
Screw	07.805.15
SPEAKER Complete (Type 5052–050)	MK.860.58
Cone and Coil	MK.950.28
Metal Service Ring	25.873.41
Paper ring	28.452.69
Dust bag	49.957.16

SCALE ASSEMBLY

Scale housing	MK.886.03
Rubber bushes	28.725.52
Station scale	MK.700.35
Press studs for scale	MK.615.29
Pointer	MK.930.48
Clip for above	MK.905.09
Pilot lampholder	MK.860.55

TUNING DRIVE ASSEMBLY

Drive drum	MK.832.46
Cord only	06.606.29
Cord loop grips	28.078.61
Cord tension spring	A1.975.10
Tuning spindle	MK.001.34
Lock washer for above	07.891.01
Triangular washer for above	07.043.05

SWITCHES

Mains switch for **NON-DETACHABLE SPINDLE VOL. CONTROLS**	MK.885.26
Mains switch for **DETACHABLE SPINDLE VOL. CONTROLS**	08.529.38
Waveband switch wafer	MK.885.65
Tone switch wafer	MK.885.64
Square spindles for waveband and tone control switches	MK.001.19
Paxolin stop plates on above	A1.638.78
Locating springs	A3.648.30
Retaining clips for springs	A3.514.13
COMPONENT RACK for mounting resistances, etc.	28.682.08
Solder strip, Single way	28.032.86
Solder strip, Two way	28.032.84
Solder strip, Three way	28.032.83
Solder strip, Four way	28.032.82
Spacer for rack on gang	07.005.22

NON-DETACHABLE SPINDLE VOLUME CONTROL

Volume control only	MK.809.44
Mains switch	MK.885.26
Mounting plate	MK.306.14
Lever with pin for switch	MK.823.19

DETACHABLE SPINDLE VOLUME CONTROL

Volume control and mains switch	49.500.11
Spindle	MK.001.35

CHASSIS LEAD-THROUGH INSULATOR

Large washer	A1.757.67
Small internal washer	07.034.03
Tag eyelet	07.068.25

MISCELLANEOUS

Valveholders for CL33 and CY31	49.231.73
Valveholder (wafer type)	MK.225.05
Grid clip	MK.250.53
Grid clip in cap	MK.831.93
Socket plate—**AERIAL**	MK.885.66
Socket plate—**SPEAKER**	28.875.32
Coil holding clips	28.084.83
Screwed rod for vitrious resistance	MK.645.27
Pertinax washer for above	MK.446.49
Metal washer for above	MK.446.50
Heat deflector screen	MK.881.08
Long strip for mounting trimmers	MK.885.42
Short strip for mounting trimmers	MK.885.49
Spacer tube for above	07.005.26
Fixing nut for electrolytic	07.093.02
Insulator washer for above	07.028.77
Voltage adjuster	MK.885.88
Type plate	28.698.71
Single pin plugs	08.281.72
Mains flex only	33.981.08
Wall plug	08.280.35

SPARE PARTS LIST FOR TYPE MUS 221 (Continued).

GENERAL, SCREWS, NUTS, ETC.

CHEESE HEAD SCREWS

3 x 5 mm.	07.803.05
3 x 6 mm.	07.803.06
3 x 8 mm.	07.803.08
3 x 10 mm.	07.803.10
3 x 15 mm.	07.803.15
4 x 5 mm.	07.804.05
4 x 6 mm.	07.804.06
4 x 8 mm.	07.804.08
4 x 10 mm.	07.804.10

NUTS

3 mm.	07.104.30
4 mm.	07.104.40
5 mm.	07.104.50

WASHERS

3 mm.	07.035.30
4 mm.	07.035.40
5 mm.	07.035.50
Yellow wax for air capacity trimmers	02.771.69
Red wax for dust iron core trimmers	02.851.36

VALVES AND PILOT LAMPS

B2	Mullard	CCH35
B3	,,	EF39
B4	,,	EBC33
B5	,,	CL33
B6	,,	CY31
L1	Philips	8034D–00

COILS

S18, S20	Aerial Coil, M.W. & L.W.	MK.561.19
S33, S34	Osc. : Coil S.W.2.	MK.561.18
S38, S40	Osc. : Coil M.W. & L.W.	MK.561.20
S51, S52	1st I.F. Coil	MK.561.15
S61, S62	2nd I.F. Coil	MK.561.16
S81, S84	Speaker transformer	MK.511.22
S91	I.F. Filter Coil	MK.561.17
	H.F. Choke Coil	MK.550.04

CONDENSERS

C1	32 uF	28.182.40
C2	32 uF	28.182.40
C3	8 uF	MK.180.06
C6, C7	Variable Gang	MK.210.87
C13	1,500 pF	49.128.04
C18	3–12 pF	MK.210.54
C20	3–30 pF	28.212.36
C34	3–30 pF	28.212.36
C38	32 pF	28.212.06
C40	32 pF	28.212.06
C41	3,300 pF	49.128.08
C42	360 pF	48.429.02/360E
C45	10 pF	49.055.16
C47	150 pF	48.429.02/150E
C51		In coil
C52		In coil
C61		In coil
C62		In coil
C81	47 pF	49.055.24
C82	100 pF	49.055.28
C83	4,700 pF	49.128.10
C84	10,000 pF	49.127.14
C85	1,000 pF	49.129.80
C91	560 pF	49.055.37
C100	100 pF	49.055.28
C101	150 pF	49.055.30
C102	100 pF	49,055.28
C103	47,000 pF	49.128.22
C104	47,000 pF	49.128.22
C105	0.1 uF	49.128.26
C106	150 pF	49.055.30
C107	0.1 uF	49.128.26
C108	0.1 uF	49.128.26
C109	.12 uF	49.128.27
C110	47,000 pF	49.127.22
C111	33 pF	49.055.22
C112	0.1 uF	49.128.26
C113	1,000 pF	48.752.20/1K
C114	10,000 pF	49.129.14
C115	22,000 pF	49.129.18
C116	1,000 pF	48.752.20/1K
C117	1,000 pF	48.752.20/1K

RESISTANCES

R11	**Non Detachable Spindle Potentiometer** 0.5 M.Ohm	49.500.11
R11	**Detachable Spindle Potentiometer**	MK.809.44
R32	5,600 Ohms	49.375.33
R33	33 Ohms	49.375.06
R34	82 Ohms	49.375.11
R35	1,500 Ohms	48.468.10/1K5
R36	1 Meg	49.376.60
R37	27,000 Ohms	49.377.41
R38	22,000 Ohms	49.377.40
R39	22,000 Ohms	49.377.40
R40	5,600 Ohms	49.375.33
R41	0.1 Meg	49.376.48
R42	47,000 Ohms	49.375.44
R43	470 Ohms	49.375.20
R44	0.1 Meg	49.375.48
R45	1 Meg	49.376.60
R46	0.22 Meg	49.376.52
R47	0.68 Meg	49.375.58
R48	0.68 Meg	49.375.58
R49	1.0 Meg	49.376.60
R50	0.47 Meg	49.375.56
R51	0.1 Meg	49.375.48
R52	4,700 Ohms	49.375.32
R53	2,700 Ohms	49.375.29
R54	47 Ohms	49.375.08
R55	220 Ohms	49.375.16
R56	100 Ohms	49.375.12
R81	47,000 Ohms	49.375.44
R82	0.47 Meg	49.375.56
R83	10,000 Ohms	49.375.36
R84	100 Ohms	48.468.10/100E
R85, R86	110 Ohms, 607 Ohms	MK.790.86 or
R85, R86	110 Ohms, 607 Ohms	MK.790.89

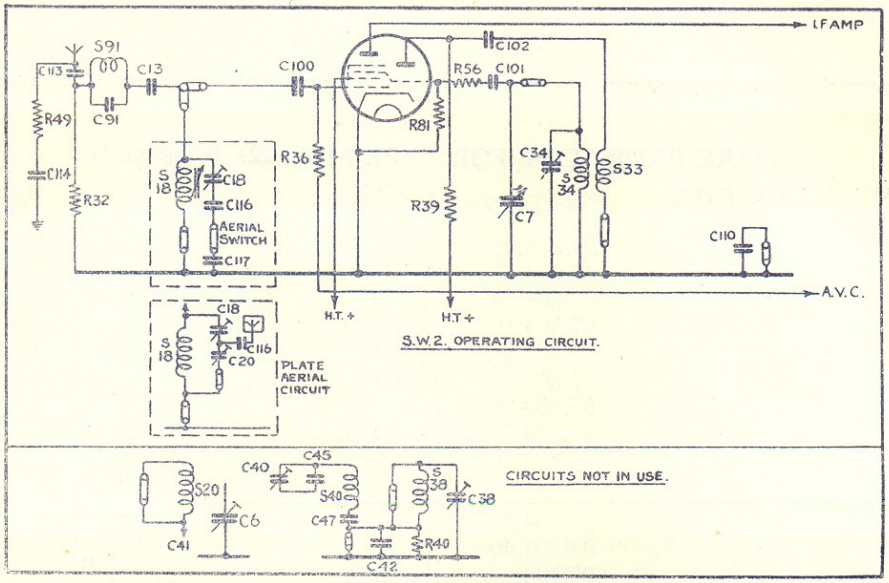


FIG. 5. S.W. SECTION OF CIRCUIT.

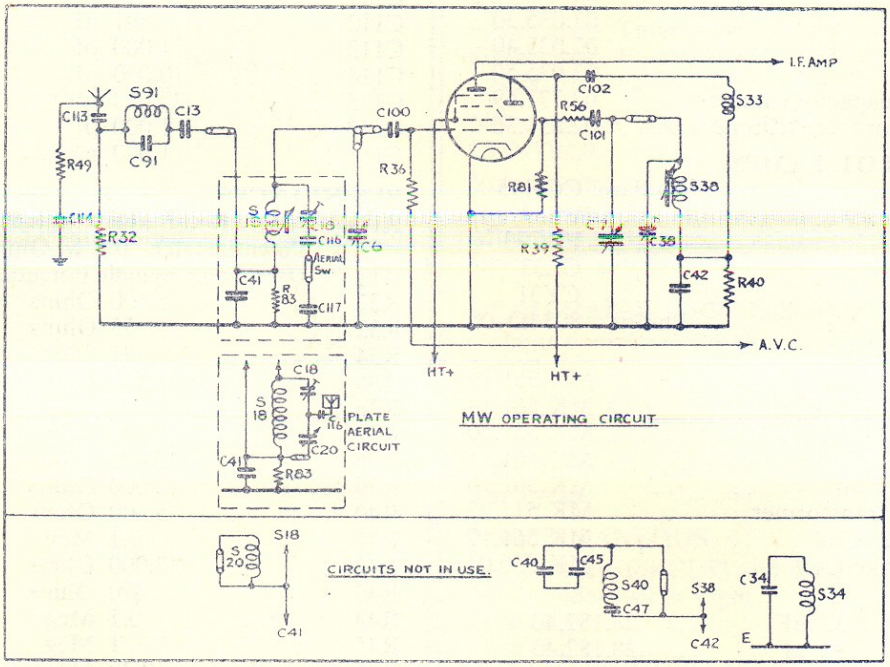


FIG. 6. M.W. SECTION OF CIRCUIT.

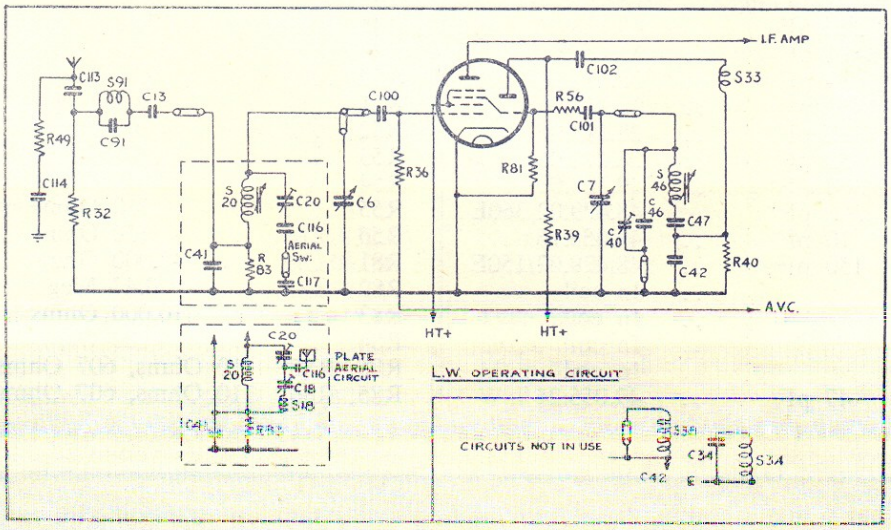


FIG. 7. L.W. SECTION OF CIRCUIT.

In some Receivers an additional R.F. choke S19 (Code No. MK.550.04) is connected between contacts 11 and 20 of the waveband switch. The inter-switch wires joining contacts 11, 17, 19 are deleted.

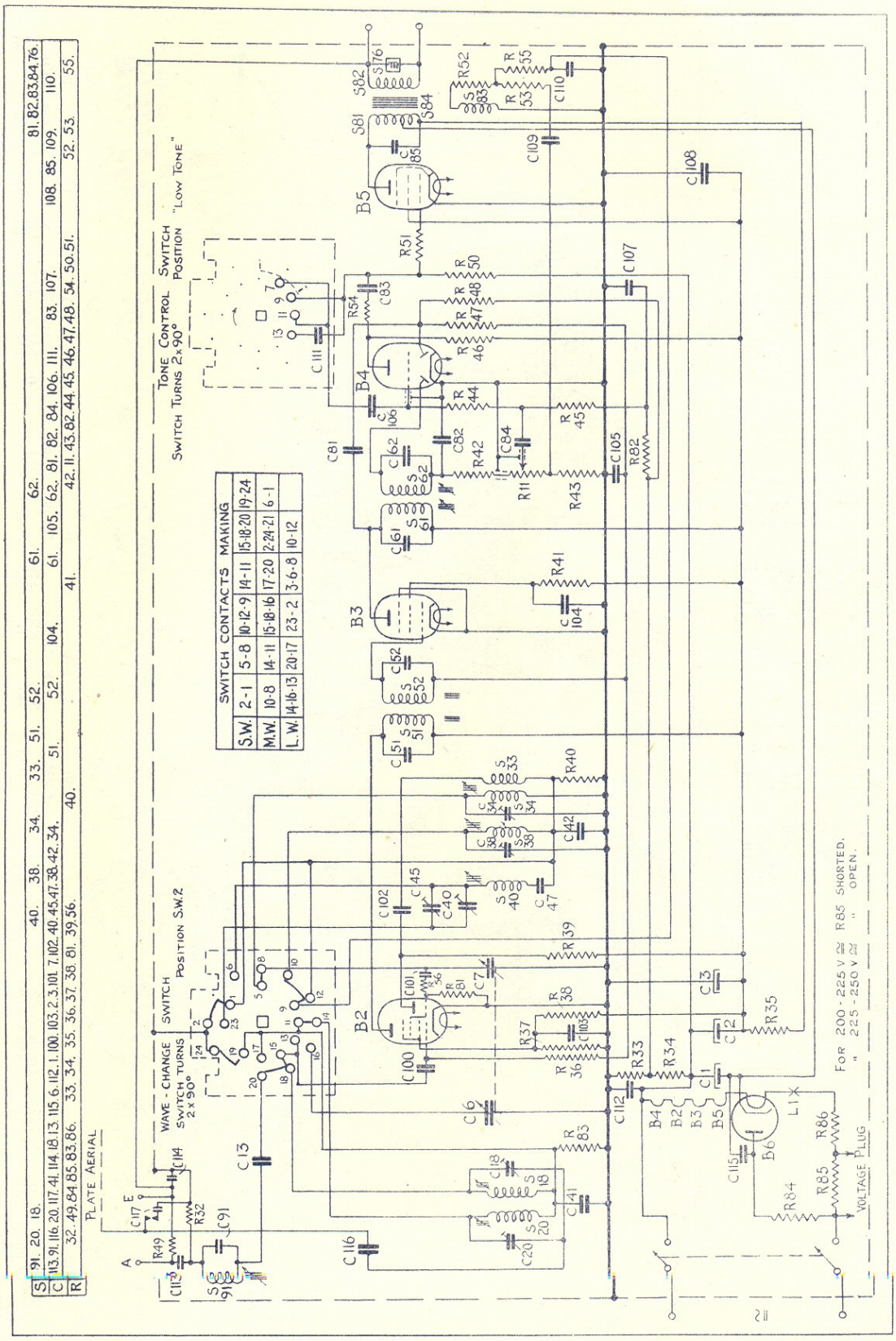
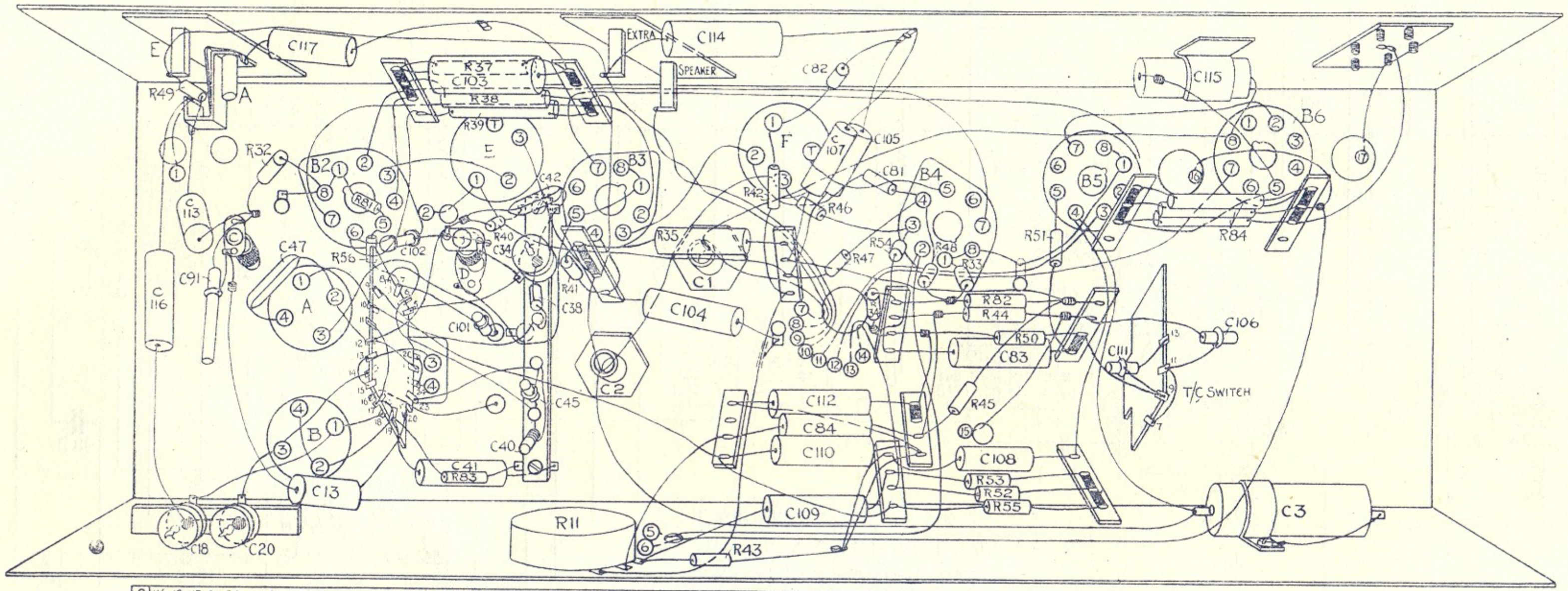


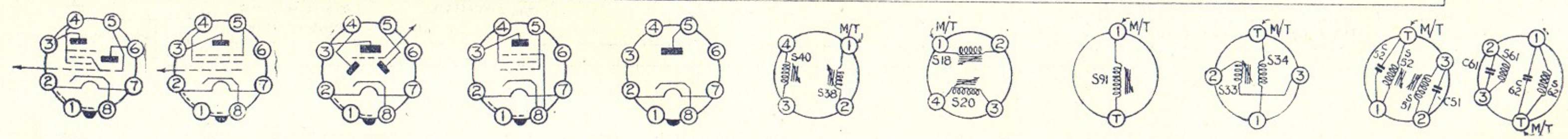
FIG. 8. THEORETICAL CIRCUIT.

CONDENSERS		
C1	Electrolytic (320 v)	32 uF
C2	,, (320 v)	32 uF
C3	Dry ,, (350 v)	8 uF
C6 } C7 }	Gang	
C13	(400 v) Tubular ..	1,500 pF
C18	Air Trimmer ..	3–12 pF
C20	Air Trimmer ..	3–30 pF
C34	Air Trimmer	3–30 pF
C38	Wire Trimmer ..	32 pF
C40	,, ,, ..	32 pF
C41	(400 v) Tubular ..	3,300 pF
C42	Mica	360 pF
C45	Ceramic	10 pF
C47	Mica	150 pF
C51	See Coils	—
C52	,, ,,	—
C61	See Coils	—
C62	,, ,,	—
C81	Ceramic	47 pF
C82	,, ...	100 pF
C83	Tubular (400 v) ..	4,700 pF
C84	,, (100 v) ..	10,000 pF
C85	,, (100 v) ..	1,000 pF
C91	Ceramic	560 pF
C100	,, ...	100 pF
C101	Ceramic	150 pF
C102	,, ...	100 pF
C103	Tubular (400 v) ..	47,000 pF
C104	,, (400 v) ..	47,000 pF
C105	,, (100 v) ..	0.1 uF
C106	Ceramic	150 pF
C107	Tubular (100 v) ..	0.1 pF
C108	,, (400 v) ..	0.1 pF
C109	,, (100 v) ..	0.12 uF
C110	Tubular (100 v) ..	47,000 pF
C111	Ceramic	33 pF
C112	Tubular (400 v) ..	0.1 uF
C113	,, (400 v) ..	1,000 pF
C114	,, (600 v) ..	10,000 pF
C115	,, (600 v) ..	22,000 pF
C116	,, (600 v) ..	1,000 pF
C117	,, (600 v) ..	1,000 pF

RESISTANCES		
R11	Pot. ..	0.5 Meg.
R32	¼ watt ..	5,600 Ohms
R33	¼ ,, ..	33 Ohms
R34	¼ ,, ..	82 Ohms
R35	3 ,, ..	1,500 Ohms
R36	½ ,, ..	1.0 Meg.
R37	1 ,, ..	27,000 Ohms
R38	1 ,, ..	22,000 Ohms
R39	1 ,, ..	22,000 Ohms
R40	¼ ,, ..	5,600 Ohms
R41	½ watt ..	0.1 Meg.
R42	¼ ,, ..	47,000 Ohms
R43	¼ ,, ..	470 Ohms
R44	¼ ,, ..	0.1 Meg.
R45	½ ,, ..	1.0 Meg.
R46	½ ,, ..	0.22 Meg.
R47	¼ ,, ..	0.68 Meg.
R48	¼ ,, ..	0.68 Meg.
R49	½ ,, ..	1.0 Meg.
R50	¼ ,, ..	0.47 Meg.
R51	¼ ,, ..	0.1 Meg.
R52	¼ watt ..	4,700 Ohms
R53	¼ ,, ..	2,700 Ohms
R54	¼ ,, ..	47 Ohms
R55	¼ ,, ..	220 Ohms
R56	¼ ,, ..	100 Ohms
R81	¼ ,, ..	47,000 Ohms
R82	¼ ,, ..	0.47 Meg.
R83	¼ ,, ..	10,000 Ohms
R84	3 ,, ..	100 Ohms
R85	35 ,, ..	110 Ohms
R86	35 ,, ..	607 Ohms



C	116. 18. 113. 91. 20. 47. 117. 13. 102. 103. 101. 41. 34. 40. 42. 38. 45 2. 114. 104. 1 112 84. 110. 109. 82. 107. 105. 81. 108. 83. 111. 115. 106 3.
R	49. 32. 56. 81. 37. 38. 39. 40. 83. 41. 11. 35. 43. 42. 46 47 34 54 48. 33. 45. 82. 44. 53. 52. 55. 50. 51. 84.
S	(C) 91 (A) 38. 40. (B) 20. 18. (D) 33. 34. (E) 52. 51. (F) 61-62.



B2	B3	B4	B5	B6
CCH35	EF39	EBC33	CL33	CY31
Anode V. 215 v	Anode V. 215 v	Triode V. 75v	Anode V. 235 v	Anode V. '218 v ~
Anode Current 1.4 mA	Anode Current 4.3 mA	Triode Current 0.6 mA	Anode Current 50 mA	Volts Across—
Screen V. 85 v	Screen V. 80 v	Neg. V.G.1 — 2 v	Screen V. 215 v	C1 .. 245
Screen Current 1.8 mA	Screen Current 1.2 mA		Screen Current 5.5 mA	C2 .. 220
Triode V. 95 v	Neg. V.G.1 — 2 v		Neg. V.G.1 — 7 v	C3 .. 215
Triode Current 5.6 mA				C112 .. 8
Neg. V.G.1 —2 v				

A	B	C	D	E	F
MK.561.20	MK.561.19	MK.561.17	MK.561.18	MK.561.15	MK.561.16
S38 .. 8.5Ω	S20 .. 27Ω	S91 .. 4.0Ω	S33 .. <1.0Ω	S52 .. 9Ω	S61 .. 9Ω
S40 .. 13Ω	S18 .. 4.5Ω		S34 .. <1.0Ω	S51 .. 9Ω	S62 .. 9Ω

In some Receivers the junction of C41, R83, Tag 2 of Coil B and one end of S19 are joined to switch contact 11. The other end of S19 is joined to switch contact 20. The inter-switch wires joining contacts 11, 17, 19 are removed.

NOTE :—C18 and C20 may be reversed.

FIG. 9. UNDERSIDE VIEW OF CHASSIS.

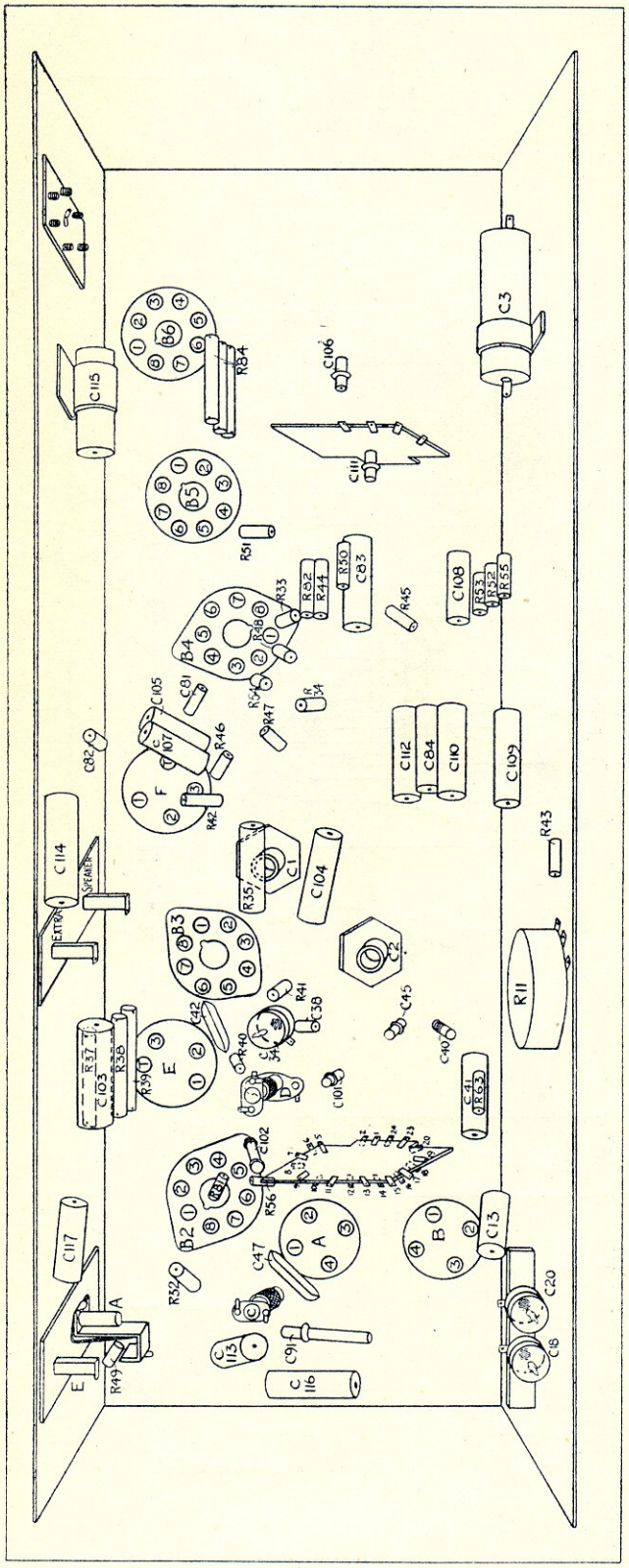


FIG. 10. VIEW OF COMPONENTS. UNDERSIDE OF CHASSIS.

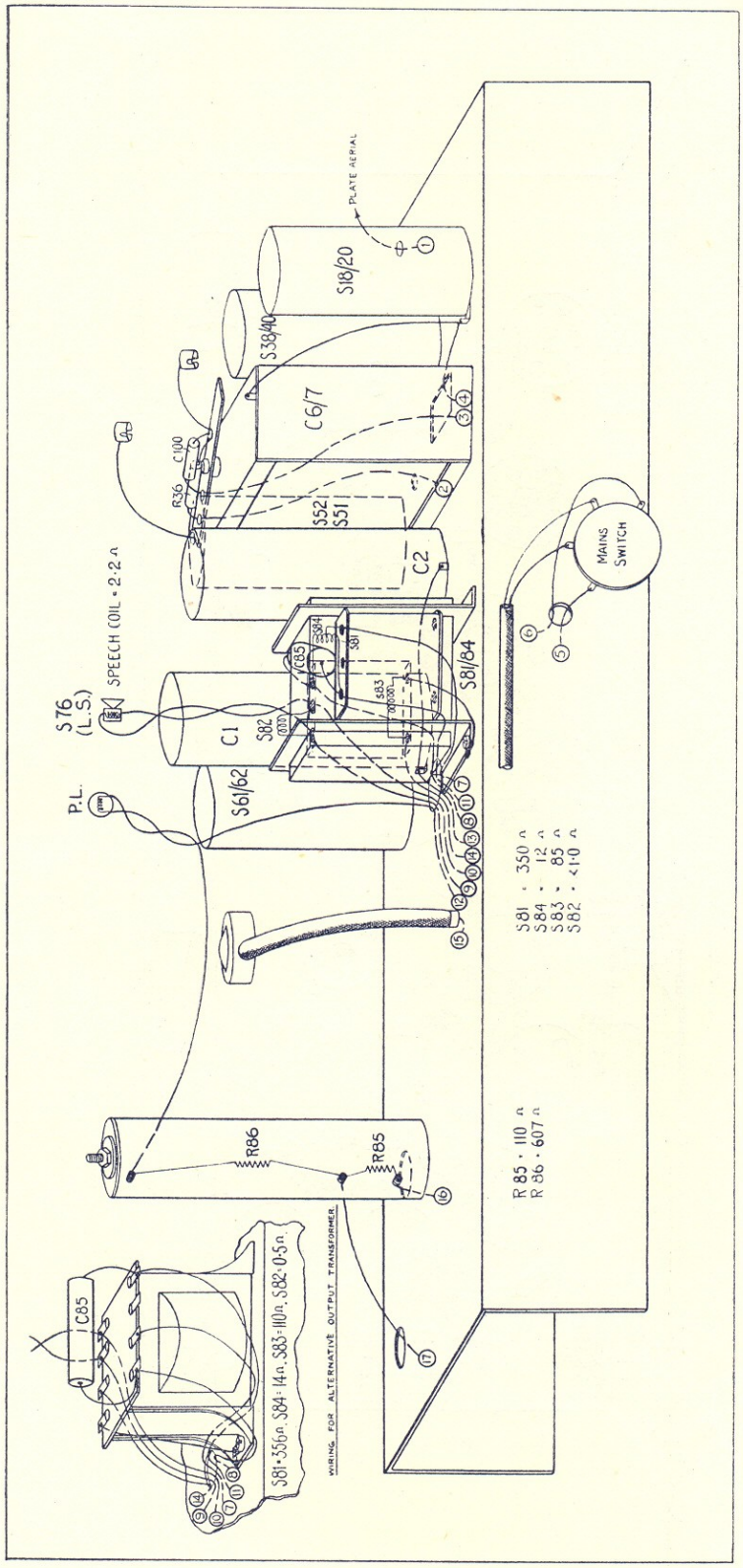


FIG. 11. TOP VIEW OF CHASSIS.