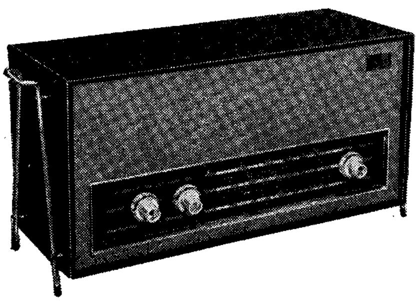
"TRADER" SERVICE SHEET

1649

PHILIPS B4G17U : STELL

Mains Operated A.M./F.M. Table Radio Recei



Appearance of the Philips B4G17U

COVERING reception on m.w., l.w. and Band II (v.h.f.), Philips B4G17U and Stella ST154U are mains operated a.m./f.m. receivers which employ the same chassis. The chassis is designed for operation from mains supplies of 200-250V and is fitted with five valves plus rectifier.

Waveband ranges are 188-569m (m.w.), 1,090-2,000m (l.w.) and 87.5-100Mc/s (f.m.).

A length of lead on the back cover is provided as an f.m. aerial for reception in high signal strength areas, and an internal loop forms an aerial for a.m. reception. Sockets are provided for the connection of external a.m. and f.m. aerials and an external loudspeaker.

Release date (both models): August, 1963. Original prices: Philips B4G17U £25 6s 8d, Stella ST154U £24 8s 7d. Purchase tax extra.

Valve Table

Valve		Anode (V)	Screen (V)	Cathode (V)
V1a UCC85	*	—	—	—
	†	180	—	1·9
V1b UCC85	*	—	—	—
	†	135	—	—
V2a UCH81	*	100	—	—
	†	—	—	—
V2b UCH81	*	220	54	—
	†	190	62	—
V3 UF89	*	180	90	—
	†	175	66	—
V4d UABC80	*	64	—	—
	†	60	—	—
V5 UL84	*	225	225	18·0
	†	220	205	16·5
V6 UY85	*	210§	—	250·0
	†	210§	—	245·0

*Receiver switched to a.m.
†Receiver switched to f.m.
§A.C. reading.

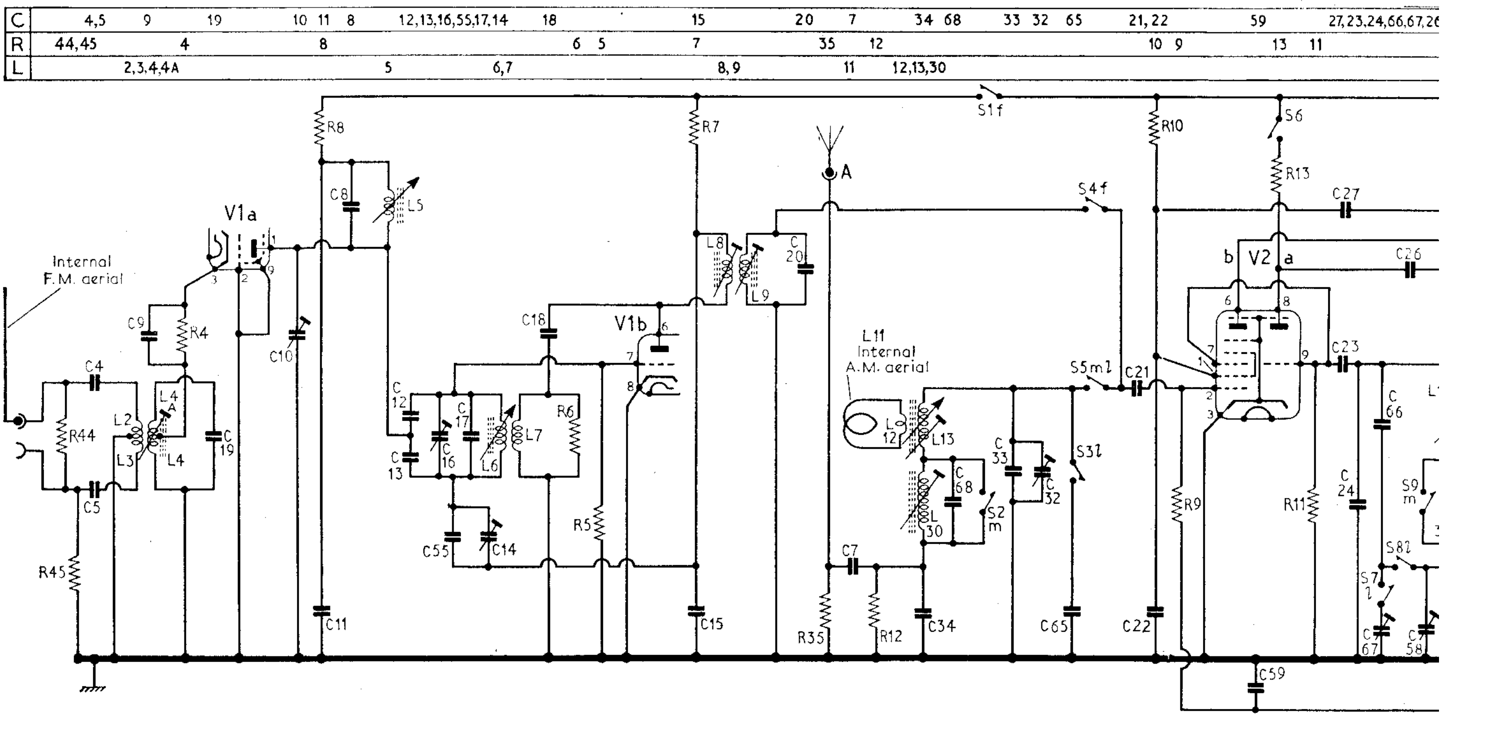
Resistors		
R4	180Ω	H4
R5	100kΩ	H4
R6	2·2kΩ	H4
R7	10kΩ	H4
R8	2·2kΩ	H4
R9	1MΩ	G5
R10	39kΩ	G5
R11	47kΩ	G5
R12	33kΩ	H5
R13	33kΩ	G5
R14	2·2kΩ	G5
R15	1MΩ	G4
R16	33kΩ	G5
R17	4·7kΩ	
R18	1·2MΩ	
R19	4·7kΩ	
R20	47kΩ	
R21	27kΩ	
R22	2MΩ	
R23	10MΩ	
R24	220kΩ	
R25	470kΩ	
R26	1kΩ	
R27	560Ω	
R27A	560Ω	
R28	68Ω	
R29	68kΩ	
R30	470Ω	

VALVE ANALYSIS

Valve voltages given in the table in col. 2 were derived from information from the manufacturers. They were measured on a valve voltmeter of approximately 10MΩ impedance with the receiver connected to 250V a.c. and the mains adjustment set at 226-250V.

CIRCUIT DESCRIPTION

Operation on A.M.—Loop aerial **L11** is coupled to the permeability-tuned aerial coil **L13** on both m.w. and l.w. and for m.w. reception the l.w. loading coil **L30** is short-circuited. An additional capacitor **C65** is shunted across the aerial tuning coils on l.w.

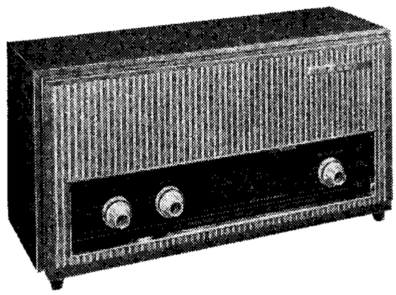


*Circuit diagram of the chassis incorporated in Philips B4G17U and Stella ST154U radio receivers. Permeability tuning is used on both a.m. and f.m. wavebands, the second arrows through **L10** and **L13** represent separate pre-set tracking adjustment screws. The internal a.m. aerial takes the form of a single rigid pick-up loop which encompasses the chassis, and the internal f.m. aerial comprises a length of lead wound on the back cover*

LLA ST154U

Receivers

4·7kΩ	G5	R31	2MΩ	D1
·2MΩ	F5	R35	4·7MΩ	H5
4·7kΩ	F4	R36	120Ω	F5
47kΩ	F5	R37	220kΩ	F4
27kΩ	F4	R38	2·7kΩ	F4
2MΩ	F4	R39	100kΩ	F5
10MΩ	F5	R40	27kΩ	C1
220kΩ	F5	R42	47kΩ	F5
470kΩ	F5	R44	10kΩ	H5
1kΩ	F4	R45	4·7MΩ	H5
560Ω	E4	R46	Varite	D1
560Ω	E5	R47	Varite	D1
68Ω	F4	R50	1kΩ	C2
68kΩ	F4	R51	140Ω	C2
470Ω	F4	R52	235Ω	D2



Appearance of the Stella ST154U

Capacitors

C1	50μF	A2
C2	100μF	A2
C3	4,700pF	E4
C4	470pF	H5
C5	470pF	H5
C7	1,800pF	H5
C8	6·8pF	H4
C9	1,000pF	H4
C10	5pF	A2
C11	1,000pF	H4
C12	8·2pF	H4
C13	8·2pF	H4
C14	10pF	B2
C15	130pF	H5
C16	10pF	B2
C17	15pF	H4
C18	33pF	H4
C19	6·8pF	H4
C20	15pF	A2
C21	100pF	G5
C22	1,200pF	G5
C23	56pF	G4
C24	290pF	G4
C25	120pF	G4
C26	470pF	G5
C27	4,700pF	G5
C28	15pF	B2
C29	15pF	B2
C30	110pF	B2
C31	195pF	B2
C32	18pF	B2
C33	33pF	G4
C34	3,000pF	G5
C35	100pF	G4
C36	4,700pF	F4
C37	4,700pF	G4
C38	22pF	C2
C39	47pF	C2
C40	4,700pF	F5
C41	330pF	F5
C42	330pF	F5
C43	195pF	C2
C44	195pF	C2
C45	100pF	F5
C46	2μF	F4
C47	330pF	F4
C48	0·01μF	F4
C49	0·01μF	F5
C50	25μF	E4
C51	1,000pF	C1
C52	1,000pF	H5
C53	1,000pF	H5
C54	1,000pF	F5
C55	5·6pF	H5
C56	1,000pF	G4
C57	0·22μF	F4
C58	18pF	B2
C59	0·022μF	F4
C63	100pF	F5
C65	742pF	G4
C66	15pF	G4
C67	50pF	B2
C68	56pF	G4
C69	390pF	E4
C70	1,000pF	F5

Coils and Transformers*

L2-L4A	—	A2
L5	—	A1
L6	—	A1
L7	—	A1
L8	1·8	A2
L9	1·9	B2
L10	23·0	B1
L11	—	G4
L12	—	B1
L13	7·0	B1
L14	—	B2
L15	1·7	B2
L16	7·5	B2
L17	4·5	B2
L18	1·4	C2
L19	—	C2
L19A	—	C2
L20	—	C2
L21	4·5	C2
L22	—	C2
L23	350·0	C2
L23A	12·0	C2
L24	1·0	B1
L30	—	B2
L31	3·5	—
L32	—	G4
L33	10·0	C1

Miscellaneous

FB55	—	E5
FB56	—	F5
FB57	—	G5
FB58	—	H5
FB59	—	F5
PL1	19V 0·1A	B1
S1-S4	—	G4
S15, S16	—	E4

**Approximate d.c. resistance in ohms.*

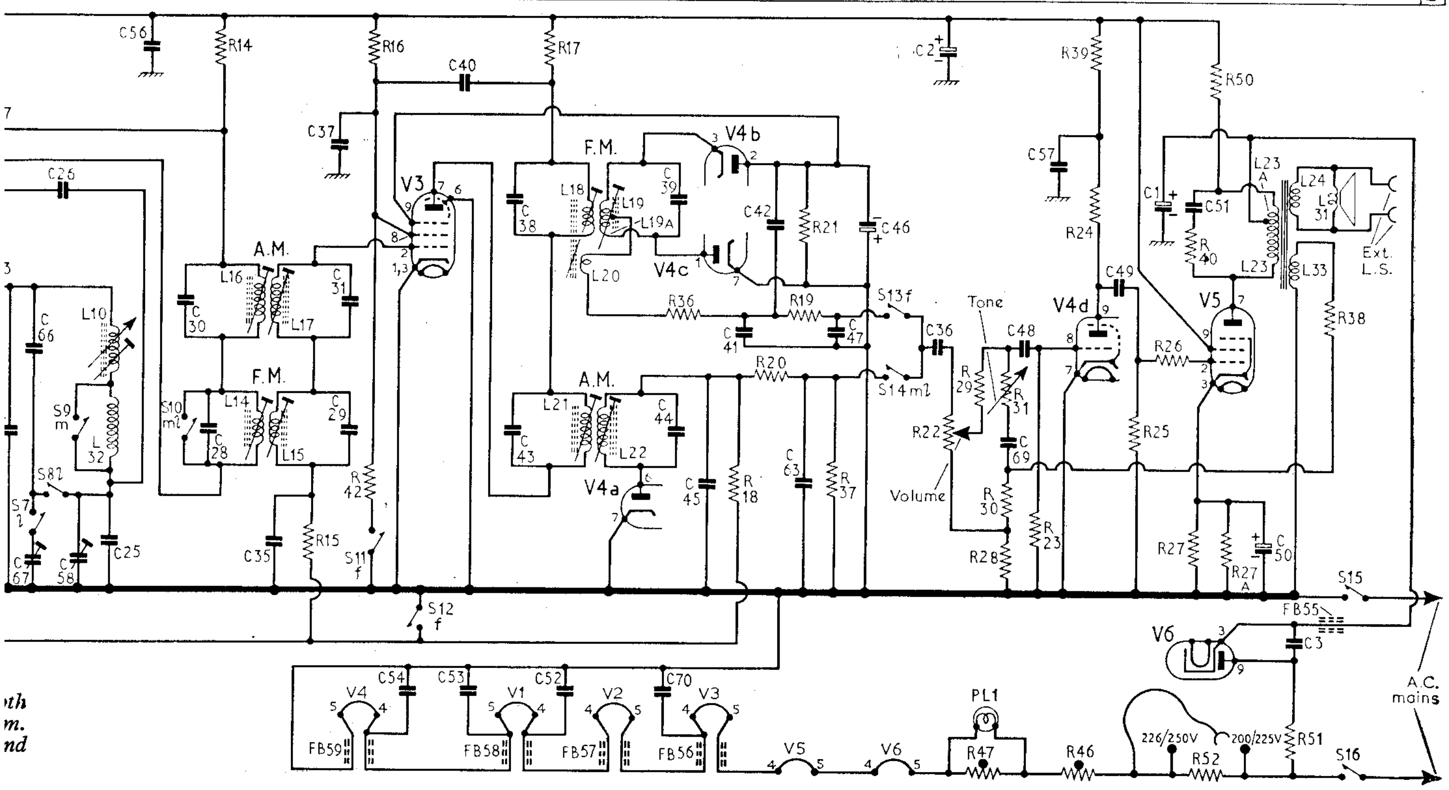
The external aerial socket is bottom-coupled via **R12** and **C34** to the aerial tuned circuit.

V2 operates as a triode-heptode frequency changer with the triode oscillator section tuned by a parallel-fed oscillator circuit comprising **L10** and l.w. loading coil **L32** wired in series. On m.w. **L32** is short-circuited and on l.w. trimming and tracking is adjusted by the additional circuit **C66** and **C67.** The heterodyne signal is injected in the mixer section **V2b** via grid 3, and the resultant i.f. component in **V2b** anode is coupled via the tuned transformer **L16, C30, L17, C31** to the grid of the i.f. amplifier **V3.**

A.M. Intermediate Frequency 470 kc/s. Output from **V3** is applied via the coupling transformer **L21, C43, L22, C44** to the a.m.

(*Continued overleaf, col.* 1)

3,24,66,67,26,58,25, 56 30,28 35 37,31,29 54 40,53 38,43 52 70,39,44,45,41, 42 63 47 46 36,2 69,48,57 49 1 51 50 3	C
14 15 16, 42 17 36 18 20 21, 19, 37 22 29,47,31,30,28,23,46,39,24,25,26,40,27,52,50,27A,51 38	R
10,32 14,15,16,17 18,19,19A,20,21,22 23,23A,24,33,31	L



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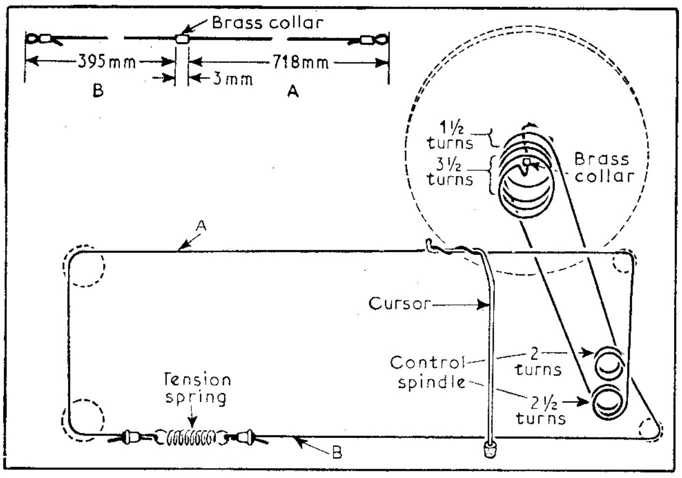


Tuning drive system drawn as seen from the front of the chassis. The length of cord required is indicated at the top of the diagram but in some cases length B may require to be slightly longer than the 395mm quoted

Circuit Description—*continued.*

detector diode **V4a** and after filtering by **R20** and **C63** the rectified audio signal is developed across the load resistor **R37**. The negative d.c. potential present across **R20** and **R37** due to diode current is fed via **R18** to the control grids of **V2** mixer and **V3** as a.g.c. bias.

Variable audio signals from the volume control **R22** slider, are fed via **R29** and **C48** to the grid of the pre-amplifier **V4d** and amplified audio signals in its anode are r/c coupled via **R24** and **C49** to the output stage **V5**. A hum-bucking arrangement is provided in the output stage by feeding receiver h.t. current through a section of the output transformer primary winding. A negative feedback loop covering the audio amplifier is fed from tertiary winding **L33** via **R38** to the grid of **V4d**, and selective variation of feedback magnitude by **R31** provides variable tone control.

Operation on F.M.—Signal input via the aerial isolating network **R44, R45, C4** and **C5** is coupled by the wideband transformer **L2-L4A** to the cathode of **V1a** which operates as an earthed-grid r.f. amplifier. R.f. signals developed across its tuned anode impedance **L5** are coupled via a bridge network, which reduces oscillator back coupling, to the grid of the self-oscillating mixer **V1b**. The circuit associated with **L6** is tuned at oscillator frequency and regenerative feedback is provided via coupling winding **L7**. **L5** and **L6** are ganged, and are permeability-tuned.

F.M. Intermediate Frequency 10.7 Mc/s.

I.f. signals in **V2b** anode are coupled by the tuned i.f. transformer **L8, L9** to the grid of **V2b** which operates on f.m. as the first i.f. amplifier. **S6** is open removing h.t. supply from the anode of the a.m. oscillator **V2a** and the short-circuit across **L14** in the form of **S10** is removed, allowing coupling of the i.f. signal via **L14** and **L15** to the grid of the second f.m. i.f. amplifier **V3**.

V2b grid resistor **R9** is taken to chassis by **S12**, and **V2b** is self-biased by the potential resulting from grid current. Due to the action of **S11, V3** screen grid potential is reduced and the valve operates with a short grid base providing a.m. limiting action. **V3** suppressor grid is fed from the negative potential which appears across the ratio detector stabilizing capacitor **C46**.

The f.m. detector circuit comprises the discriminator transformer **L18-L20** and the two diodes **V4b** and **c**. Audio output from the detector is given suitable de-emphasis by the network **R19, C47** and applied via **S13** and **C36** to the volume control **R22**. Operation of the audio amplifier is the same as for a.m.

CIRCUIT ALIGNMENT

A.M. Circuits

Equipment Required.—An a.m. signal generator; an audio output meter; a 0.05μF capacitor and a 5 Ω resistor.

1.—Connect the signal generator via the 0.05μF capacitor to **V2** pin 2. Shunt the audio output meter terminals with the 5Ω resistor and connect the meter in place of the loudspeaker.

2.—Switch receiver to m.w. and turn the tuning control to minimum inductance (h.f. end of scale). Turn the volume control to maximum and the tone control to maximum top response.

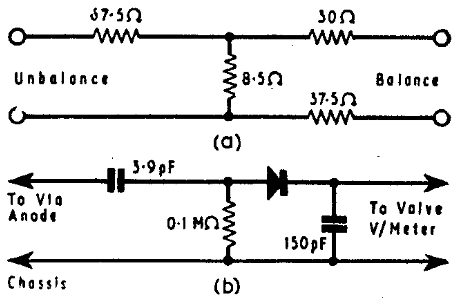
3.—Feed in a 470kc/s 30 per cent modulated signal and adjust **L22** (location reference C2), **L21** (C2), **L17** (B2) and **L16** (B2) in that order for maximum output.

4.—Connect the signal generator via a dummy aerial to the a.m. aerial socket. Set cursor to the 185m calibration mark on scale. Feed in a 1,620kc/s signal and adjust **C58** (B2) and **C32** (B2) for maximum output.

5.—Switch receiver to l.w. and set cursor to the 1,580m calibration mark on scale. Feed in a 190kc/s signal and adjust **C67** (B2) and **L30** (B2) for maximum output.

F.M. Circuits

Equipment Required.—An f.m. signal generator; an a.m. signal generator to provide marker pips; a valve-voltmeter; an oscilloscope if the f.m. signal generator does not incorporate a display device; a 100kΩ resistor and a 4,700pF capacitor. Also required, a diode detector circuit and an unbalance-to-



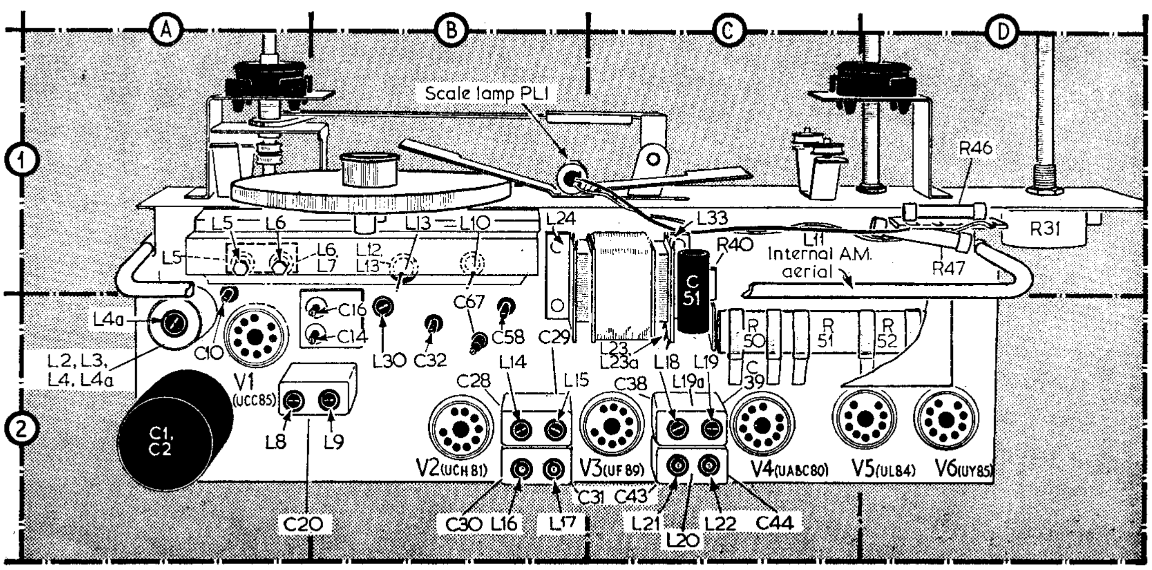
Input matching network (a) and detector circuit (b) referred to in the alignment instructions

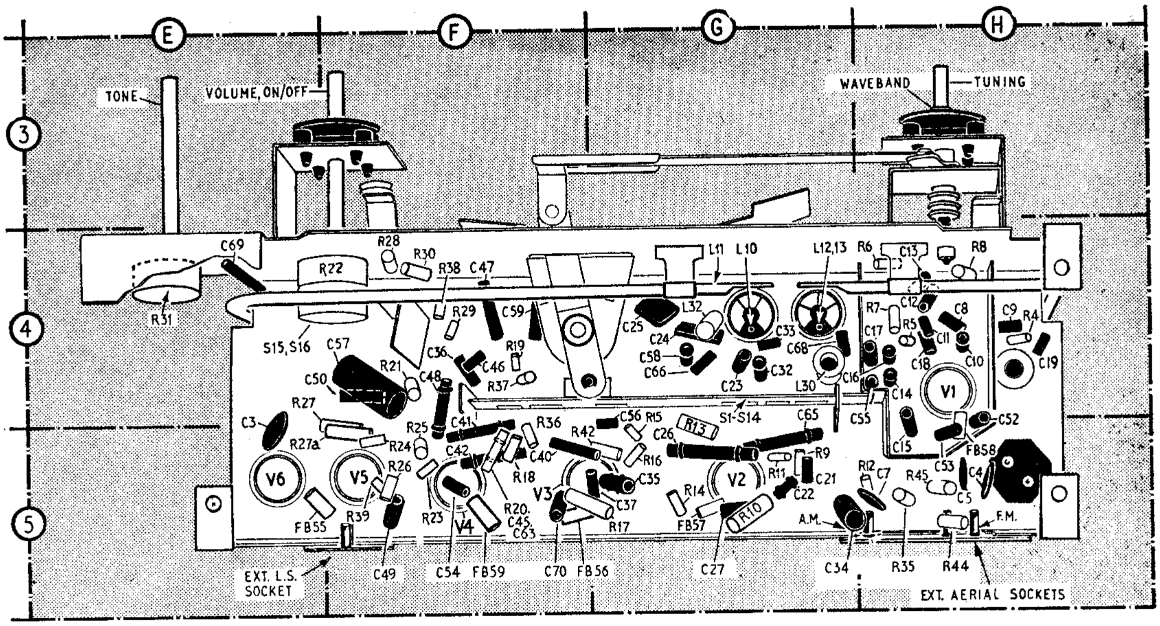
balance matching pad, both made up as shown above.

1.—Switch receiver to f.m. and disconnect one end of **C46** (F4). Connect the oscilloscope via the 100kΩ resistor across **R21.** Connect the f.m. signal generator to **V3** pin 2.

2.—Feed in a 10.7Mc/s f.m. signal with a deviation of 500kc/s at 50c/s, and adjust **L18** (C2) for best response with a 10.7Mc/s marker at the centre of the curve. Adjust

Plan view of the chassis showing alignment adjustment positions. The ballast resistor **R50, R51, R52** *would normally be obscured from this angle by by the heat deflecting screen*





Underside view of the chassis. The screws associated with coils ***L10*** *and* ***L13*** *shown in location reference G4, are the pre-set adjustments mounted alongside the coils themselves*

L19/L19A for maximum curve width and symmetry.

3.—Re-connect **C46** and connect the oscilloscope across **C41.** Check that the response is straight over approximately 200kc/s. Switch to a.m. (30 per cent at 400c/s) when the straight portion of the curve should remain unchanged.

4.—Disconnect **C46** and connect the oscilloscope across **R21.** Connect the f.m. signal generator to **V2** pin 2. Feed in a 10.7Mc/s f.m. signal with a deviation of 500kc/s at 50c/s and adjust **L14** (B2) for maximum response with a 10.7Mc/s marker at the centre of the curve. Adjust **L15** (B2) for maximum response and symmetry consistent with marker position.

5.—Connect the f.m. signal generator via the 4,700pF capacitor to **V1a** pin 1. Adjust **L8** (A2) for maximum response with a 10.7Mc/s marker at the centre of the curve, then adjust **L9** (B2) for maximum response and symmetry consistent with marker position. **L14** may require slight readjustment.

6.—Re-connect **C46** and feed in an unmodulated 10.7Mc/s signal at **V1a** pin 1. Adjust the input signal level to give a reading of 8V across **C46.** Swing the signal generator frequency either side of 10.7Mc/s until the output drops to 5V and note that the total frequency change should be greater than 200kc/s.

7.—Turn the tuning control to maximum inductance position (maximum clockwise) and check that the cursor coincides with the right-hand end of the scale windows. Set **C10** (A2), **C14** (B2) and **C16** (B2) to their mid-positions. Connect the valve voltmeter via the 100kΩ resistor across **C46.**

8.—During this operation the output voltage across **C46** should not exceed 8V. Adjust the tuning knob so that the cursor lines up with the first "E" of R. Eireann. Feed in an 87.5Mc/s unmodulated signal at the f.m. aerial sockets. This is a balanced input and if the signal generator output is unbalanced, a matching pad should be used made up as shown in col. 3. Adjust **L6** and **L5** (A1) for maximum output.

Adjust the tuning control so that the cursor lines up with the 100Mc/s mark. Feed in a 100Mc/s signal and adjust **C16** (B2) and **C10** (A2) for maximum output. Disconnect the signal generator.

9.—Adjust the tuning control so that the cursor lines up with 94Mc/s mark. Connect the detector circuit shown in col. 3 between **V1a** pin 1 and the earth connection of **V1** valve holder. Connect the valve voltmeter to the detector output. Adjust **C14** (B2) for minimum oscillator voltage. Disconnect the detector and repeat operation 8 as necessary.

10.—Connect the valve voltmeter via the 100kΩ resistor across **C46.** Feed in a 94Mc/s unmodulated signal at the f.m. aerial sockets and adjust **L4/L4A** (A2) for maximum output.

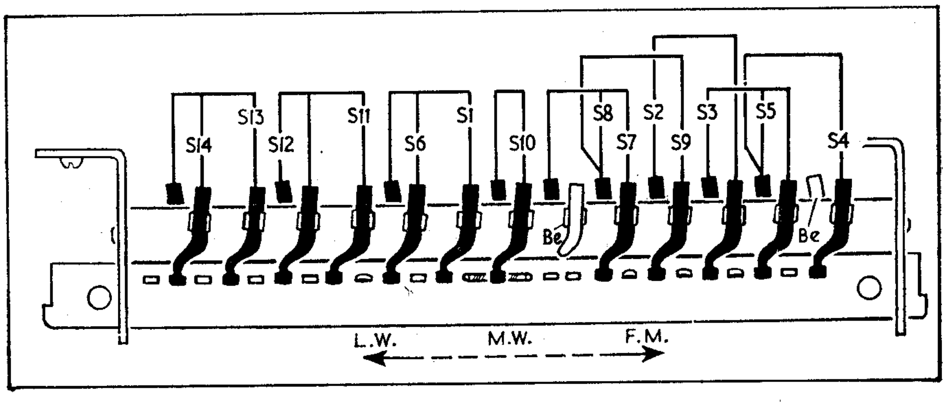
GENERAL NOTES

Dismantling.—To remove the chassis from the cabinet, remove the five chassis fixing screws from the base of the cabinet and withdraw the chassis complete with station scale and control knobs. To detach the chassis completely from the cabinet, unsolder the speaker leads.

Drive Cord Replacement.—Make up the cord to the dimensions shown in the diagram opposite. Turn the tuner drum to its maximum clockwise position and insert the knot on the cord into the slot on the tuner drum, the shorter end towards the back. Pass the short end of the cord one turn clockwise around the drum, winding from back to front, and down to the rear pulley on the drive spindle. Wind two turns from back to front in a clockwise direction, and then pass the cord around the bottom right-hand pulley. Fit the tension spring to the cord and anchor it to a convenient point. Take the longer end of the cord and wind $3\frac{1}{2}$ turns anti-clockwise around the drum, winding from front to back. Pass the cord around the front pulley on the drive spindle and wind on $2\frac{1}{2}$ turns in an anti-clockwise direction winding from back to front. Lead the cord over the top right-hand pulley, around the top left hand pulley, and attach it to the tension spring. Finally stretch the cord over the bottom left-hand pulley.

Tuner Unit Coil Replacement.—The tuner unit, tuning drum and a.m. coils (**L10, L12/L13**) are pre-trimmed as a complete item. If either of the a.m. coils are defective, it is necessary to replace the complete unit. To remove the unit, disconnect the pointer cord, unsolder the coil wiring connections, and remove the three unit fixing screws. When wiring the replacement unit, care must be taken to replace the components in their original positions.

NOTE.—The tie wires attached to the cores in the a.m. coils must not be unsoldered from their anchoring points, and the position of the sealed ferrox-cube rods must not be altered. When the replacement unit has been fitted, it will be necessary to re-trim both a.m. and f.m./r.f. circuits.



The waveband switch assembly drawn as seen from the front of an inverted chassis

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