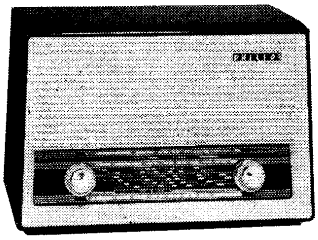
"TRADER" SERVICE SHEET

1342

PHILIPS B3G75U

A.C./D.C. A.M./F.M. Table Receiver



The Philips B3G75U A.M./F.M. receiver.

SIX Mullard A.C./D.C. valves, in addition to the mains rectifier, are employed in the Philips B3G75U receiver, an A.M./F.M. superhet covering 87.5-100 Mc/s and M.W. and L.W. bands of 187-569m and 1,128-2,000m. A short length of wire on the back cover acts as an internal aerial in areas of high signal strength for F.M., and a stout single-turn loop of metal, coupled via a low-impedance coil to the aerial tuning circuit, acts as an A.M. internal aerial, while the A.M. aerial socket is connected via a resistor to the earth socket.

Release date and original price: August 1957; £16 13*s* 6*d*. *Purchase tax extra.*

CIRCUIT DESCRIPTION

A.M. aerial circuits **L9, L10, L11, C21, C22** (M.W.) and **L11, L12, C21, C22, C23, C24** (L.W.) are permeability tuned by the sliding core of **L11.** On M.W. the internal aerial loop **L9** consists of a metal frame supported by the chassis. **L12** is mounted on a ferrite rod to form the L.W. internal aerial.

V3 (UCH81) is a triode-heptode employed as a frequency changer on A.M. Section **a** of **V3** is a shunt-connected Colpitts oscillator with D.C. coupling to the injector grid of the mixer valve **V3b.** Oscillator tuning by **L13, C31, C32,** on M.W., and in addition by **L14, C30, C33** on L.W. **C31** and **C33** are trimmer capacitors for M.W. and L.W. respectively. Permeability tuning on both bands is effected by the sliding core of **L13.**

V4 (UF89) is a variable-mu R.F. pentode valve operating as intermediate frequency amplifier with tuned A.M. transformer couplings **L17, L18** and **L19, L20.**

A.M. intermediate frequency 470 kc/s.

Diode A.M. detector is section **c** of the triple-diode-triode valve **V5 (UABC80).** The audio frequency component in the rectified output is filtered by **C48, R20, C49, R21, C50** and developed across the load resistor **R22,** and is then passed via **S14, C54,** volume control **R25** and **C55** to the control grid of **V5d,** which operates as triode A.F. amplifier.

The D.C. component of the rectified signal developed across **R22** is fed back as bias via the decoupling circuit **R19, C40** to the control grids of **V3** and **V4,** giving automatic gain control.

Resistance-capacitance coupling by **R28, C57, C58, R29** between **V5d** and the control grid of the pentode output valve **V6 (UL84).**

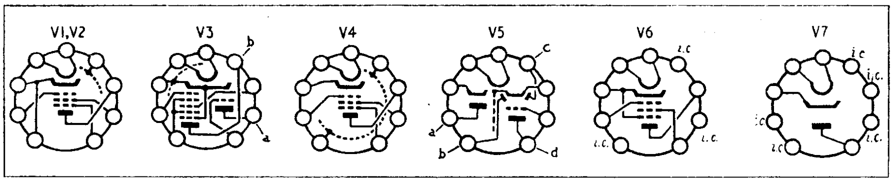
Fixed tone correction by **C61, R31,** and also by negative feedback via **R34, R35** to the control grid circuit of **V5d.**

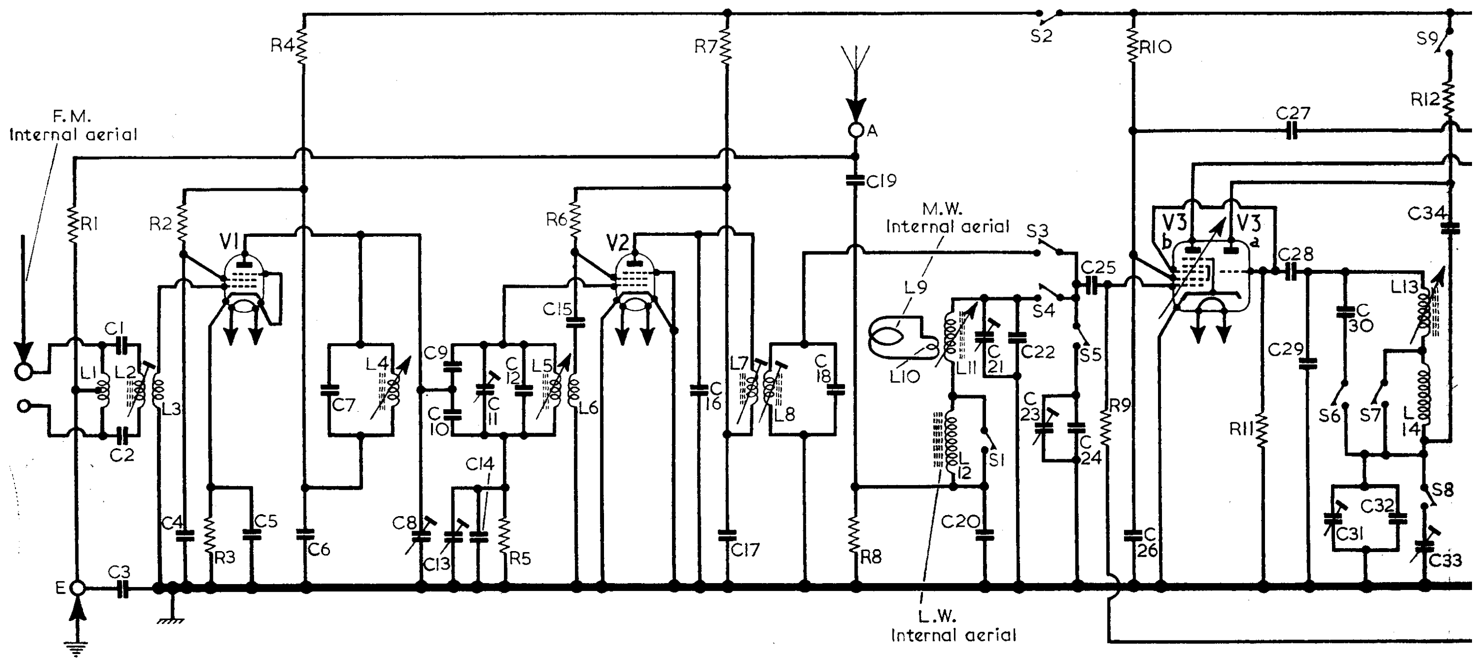
H.T. current is supplied by half-wave rectifying valve **V7 (UY85).** Smoothing by **C60, R33, C59.** Residual hum is neutralized by passing H.T. current through section **a** of the output transformer **T1.**

Operation on F.M.

75 ohm balanced twin feeder input to the control grid of the pentode R.F. amplifier valve **V1 (UF80)** via the balanced aerial transformer **L1, L2, L3.** The grid circuit of **V1** is tuned by **L3** and the stray and valve capacitances. The output from **V1** is developed across the permeability-tuned circuit **L4, C7** and fed to the control grid of the self-oscillating frequency changer valve **V2 (UF80)** via **C9, C10** which form part of a balanced bridge circuit. The grid circuit of the oscillator valve **V2** is permeability-tuned by the sliding core of **L5.** Reaction coupling via **C15, L6.**

The output from **V2** is fed to the intermediate frequency amplifier comprising the heptode section of **V3,** which operates as an R.F. amplifier, and **V4** which operate with





Circuit diagram of the Philips B3G75U receiver. **L9** is a stout loop of metal which acts as the M.W. aerial, matched to the tuning circuit by coupli
are ferrite bead R.F. stoppers, each with two wires threaded through separate holes. Above the circuit (left) are the valve base diagrams; and (ri
balun network (at **a**) and the R.F. detector (at **b**) that are required for circuit alignment. **L2** should actually be shown centre-tapped

tuned transformer couplings **L7, L8, C18; L15, L16, C35, C36** and discriminator transformer **L21, L22, L23, C45, C46** and to the ratio detector circuit employing sections **a** and **b** of **V5**. The oscillator section **a** of **V3** is muted on F.M. by opening **S9.**

F.M. intermediate frequency 10.7 Mc/s.

On F.M. the A.G.C. line from the A.M. detector circuit is short-circuited to chassis by **S11,** and bias for **V3** is obtained by grid current, which charges **C25** and develops a negative voltage across **R9. S12** and **S13** are also closed on F.M., and **V4** bias is derived from grid current developing a negative voltage across **R14,** which is ensured even in the absence of a signal by connecting **R15** to **R17.** At the same time the switched potential divider **R17, R16** reduces the screen voltage and hence the grid base of **V4,** thus ensuring positive A.M. limiting.

A.F. output from the detector circuit is developed across the load capacitor **C47** and fed from the de-emphasis network **R24, C53** via **S15, C54,** to **R25,** after which it follows the same path as has already been described for A.M. operation.

GENERAL NOTES

Switches.—**S1-S15** are the band switches ganged in a single rotary unit beneath the chassis. The unit is indicated in the under-chassis illustration and the switch contacts are identified in the diagrams in col. 3 overleaf.

The associated switch table indicates the switch operation in the three control settings, starting with the control knob turned fully anti-clockwise. A dash indicates open, and **C** closed.

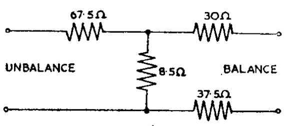
To change the switch wafers it is necessary to remove the scale, scale backplate, scale lamp reflector plate and the two screws holding the centering plate of the operating spindle. The brass strip holding the end of the switch operating bar must also be removed together with the six screws which hold the gear bracket. The bracket may then be swung upwards and away from the switch wafers which can then be removed.

Scale Lamp.—This is a special Philips lamp, type 8097D. It has a frosted tubular bulb and an M.E.S. base, and is rated at

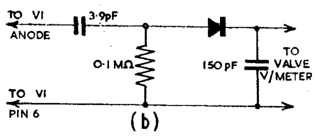
(*Continued Col.* 1 *overleaf*)

Resistors

R1	1MΩ	H4
R2	10kΩ	H3
R3	180Ω	H4
R4	2·2kΩ	H3
R5	1MΩ	H3
R6	22kΩ	H4
R7	2·2kΩ	H4
R8	33kΩ	B1
R9	1MΩ	G4
R10	39kΩ	G4
R11	47kΩ	G4
R12	33kΩ	G4
R13	2·2kΩ	G4
R14	1MΩ	G4
R15	10MΩ	G4
R16	47kΩ	G4
R17	33kΩ	F4
R18	4·7kΩ	F3
R19	1·2MΩ	F4
R20	27kΩ	F4
R21	27kΩ	F4
R22	220kΩ	F4
R23	10kΩ	F3
R24	47kΩ	F4
R25	2MΩ	E3
R26	10MΩ	E4
R27	100kΩ	E4
R28	220kΩ	E4
R29	470kΩ	E3
R30	1kΩ	E4
R31	27kΩ	C1
R32†	280Ω	E4
R33	1kΩ	D1
R34	3·3kΩ	E3
R35	68Ω	E3
R36	235Ω	D1
R37	119Ω	D1
R38§	30Ω	E4
R39	146Ω	D1



(a)



(b)

Coils*

L1	1·1	H4
L2	—	A2
L3	—	A2
L4	—	A1
L5	—	A1
L6	—	A1
L7	1·7	A2
L8	1·9	A2
L9	—	—
L10	—	B1
L11	7·0	B1
L12	1·6	B1
L13	18·0	B1
L14	23·0	G3
L15	—	B2
L16	—	B2
L17	9·2	B2
L18	5·2	B2
L19	4·5	C2
L20	4·5	C2
L21	1·3	C2
L22	0·5	C2
L23	—	C2
L24	3·2	—

Capacitors

C1	0·001μF	H4
C2	0·001μF	H4
C3	4,700pF	H4
C4	0·001μF	H3
C5	220pF	H4
C6	0·001μF	H3
C7	5·6pF	H3
C8	5pF	H3
C9	8·2pF	H3
C10	8·2pF	H3
C11	5pF	H3
C12	18pF	H3
C13	10pF	H3
C14	8·2pF	H3
C15	47pF	H3
C16	18pF	H3
C17	0·001μF	H4
C18	15pF	A2
C19	1,800pF	G4
C20	0·003μF	B1
C21	18pF	H4
C22	33pF	G4
C23‡	400pF	B1
C24	390pF	B2
C25	100pF	G4
C26	3,900pF	G4
C27	4,700pF	G4
C28	56pF	G3
C29	290pF	G3
C30	15pF	G3
C31	18pF	G3
C32	120pF	G3
C33‡	25pF	G3
C34	470pF	G3
C35	33pF	B2
C36	33pF	B2
C37	110pF	B2
C38	195pF	B2
C39	100pF	G4
C40	0·047μF	F3
C41	6,800pF	F4
C42	4,700pF	F4
C43	195pF	C2
C44	195pF	C2
C45	22pF	C2
C46	47pF	C2
C47	390pF	F4
C48	82pF	F4
C49	47pF	F4
C50	47pF	F4
C51	390pF	F4
C52	10μF	F3
C53	820pF	F4
C54	4,700pF	F3
C55	0·01μF	F4
C56	0·1μF	E3
C57	0·022μF	E4
C58	1,500pF	E4
C59	100μF	B1
C60	50μF	B1
C61	0·001μF	C1
C62	25μF	D1
C63	0·033μF	E3
C64	0·001μF	F4
C65	0·001μF	H4
C66	0·001μF	H4
C67	0·001μF	H3
C68	0·001μF	H4

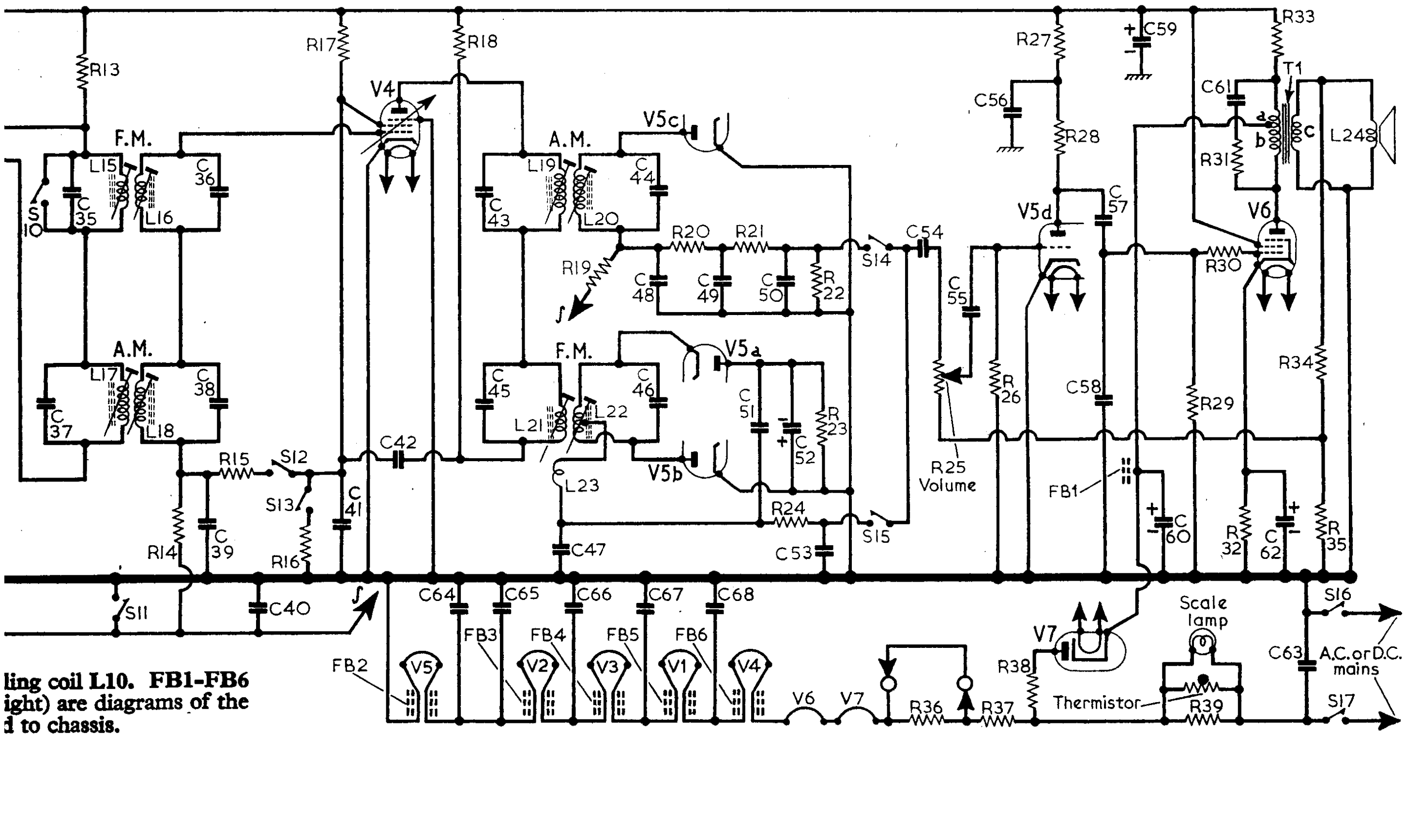
Transformers*

T1	a	17·0	C1
	b	360·0	
	c	—	

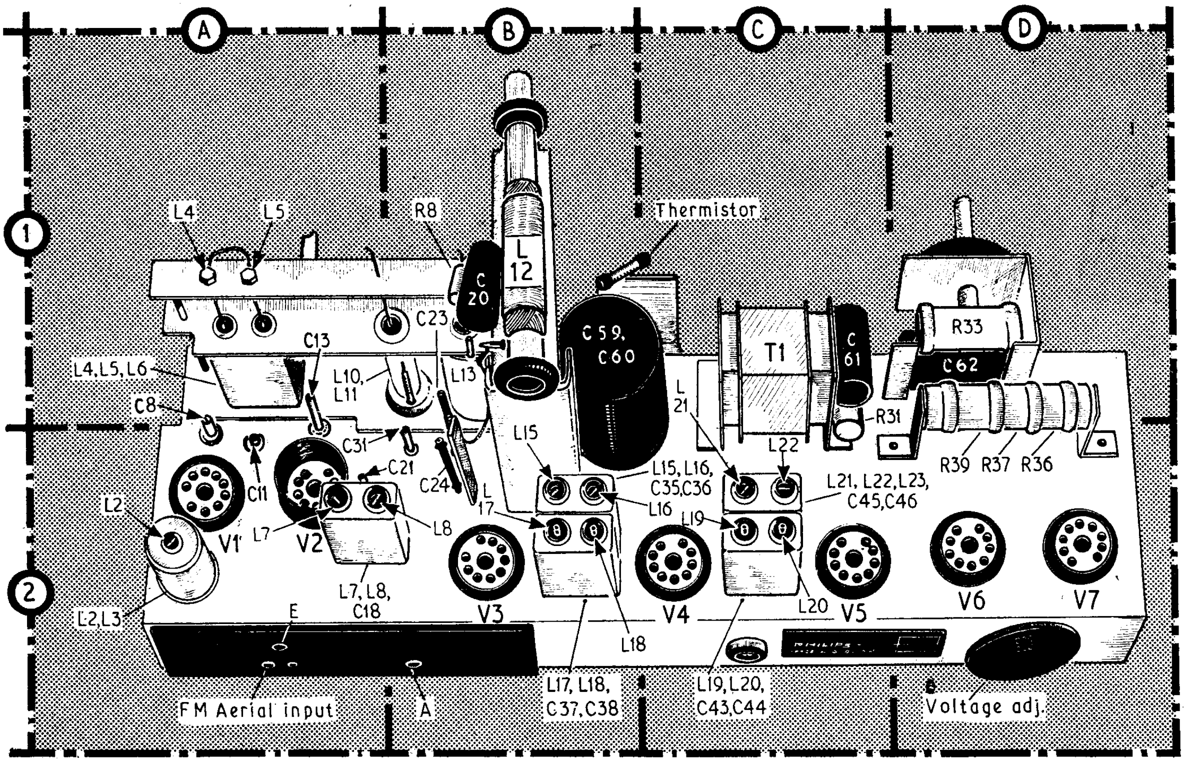
Miscellaneous

FB1	Ferrite beads	E4
FB2		F4
FB3		H4
FB4		G4
FB5		H4
FB6		F4
Thermistor[1]	—	B1
S1-S15	—	G4
S16, S17	—	E3

**Approximate D.C. resistance in ohms.*
†*Two 560Ω in parallel.*
§*Two 60Ω in parallel.*
‡*One "plate" is a single-layer coil of wire pre-set by removing turns.*
[1] *Varite VA1010.*



ling coil L10. FB1-FB6
ight) are diagrams of the
d to chassis.



Plan view of the chassis. The loop between the adjustment heads of **L4** and **L5** is a spring to provide tension and hold the threaded rods firm. Ganged with them are the A.M. tuning cores belonging to **L11** and **L13**, which are critically adjusted at the factory and should not be disturbed. **C23** is one of two of a special type of pre-set capacitor that is adjusted by removing a turn or two of wire.

General Notes—*continued*

19V, 0.1A. It is shunted by a thermistor.

Tuner Adjustments.—A slender pre-set rod painted red, is fitted alongside **L11**. Another is located inside the can of **L13**. These have been finally set by the manufacturer and should not be disturbed. Nor should the wires by which the cores inside the coils **L11, L13** are ganged be unsoldered. In the event of tuner faults or maladjustment, the unit should be replaced as a whole, a new one being obtained from the manufacturers.

Capacitors.—In our chassis **C32** was 120pF, but in a small number of early chassis it was 125pF. Two capacitors shown as pre-set comprise a metal-cored ceramic tube overwound with fine wire, and their adjustment consists of removing a turn or two of wire until a peak is reached. If the peak is passed, the capacitor must be replaced, as turns cannot be added. Their numbers are **C23** and **C33**.

Drive Cord Replacement

About 39in of twine is required for a new drive cord. As shown in the sketch of the tuning drive system below, two brass collars are pinched on the cord to form a loop at each end. Another collar divides the cord into two lengths of given dimensions.

Turn the tuning unit drive wheel to its maximum clockwise position and insert the middle collar on the cord into the hole in the side of the small drum on the drive wheel, bringing out the shorter end of the cord, on the inside, through the slot provided. Pass this end in a clockwise direction from the drum and round the rear section of the brass pulley on the control spindle below. Wind two turns from back to front in a clockwise direction round this pulley and then pass the cord round the bottom right-hand pulley, fixing the tension spring in the end loop and hooking it somewhere temporarily.

Now bring the longer end of the cord through the slot in the drum and wind two and a half turns, front to back, on the drum in an anti-clockwise direction. Then pass it two and a half times, back to front, round the front section of the brass pulley in an anti-clockwise direction. Finally, take it over the top right-hand pulley and the top and bottom left-hand pulleys, and attach it to the free end of the tension spring.

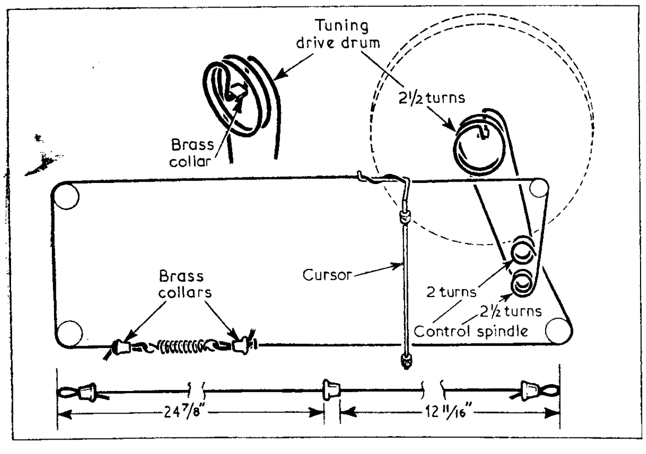
CIRCUIT ALIGNMENT

Equipment required.—A.M. signal generator with an output impedance of 75 ohms, 30 per cent modulated for A.M., preferably with a balanced output; a sound output meter; a valve-voltmeter or 20,000Ω/V meter; a 47kΩ damping resistor and an insulated trimming tool. Unless the voltmeter has an R.F. probe the detector circuit shown in col. 5 overleaf must be made up; and if the signal generator output is co-axial, the balun network must be made up also.

Alignment points are indicated on the tuning scale by small white arrow heads along the lower edge of the tuning scale apertures on each band. Check that when the tuning gang is fully closed (i.e., maximum inductance) that the tuning cursor coincides with the arrow head at the high wave-length end of the M.W. band.

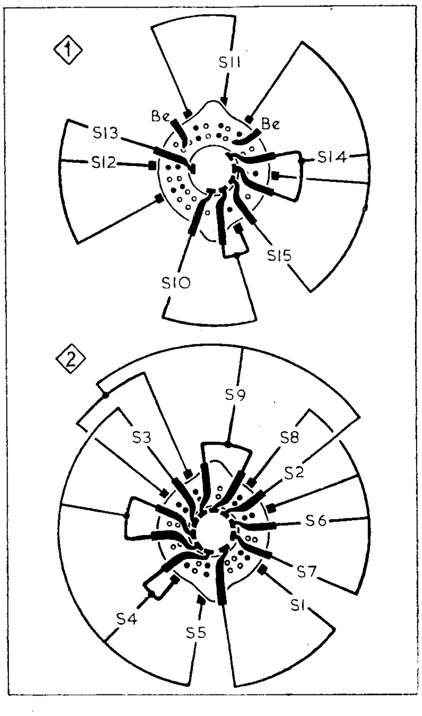
A.M. Alignment

1. Connect sound output meter to the speaker connections.
2. Switch receiver to M.W. and fully open the tuning gang (i.e., tuning knob fully



The sketch on the left shows the tuning drive cord system, drawn as seen from the front of the chassis with the gang at maximum wavelength. Cord lengths are indicated beneath the sketch. Inset is sketch showing the method of anchoring the cord.

On the right are shown diagrams of the two switch units, drawn as seen in the direction of the arrows in the underside view of the chassis.



Switch Table

Switch	F.M.	M.W.	L.W.
S1	—	C	—
S2	C	—	—
S3	C	—	—
S4	—	C	C
S5	—	—	C
S6	—	—	C
S7	—	C	—
S8	—	—	C
S9	—	C	C
S10	—	C	C
S11	C	—	—
S12	C	—	—
S13	C	—	—
S14	—	C	C
S15	C	—	—

anti-clockwise). Turn volume control to maximum and connect signal generator output via a 47pF capacitor to the control grid (pin 2) of **V3b** and chassis. Feed in a 470 kc/s signal and adjust the cores of **L20** (C2), **L19** (C2), **L18** (B2), **L17** (B2) in that order for maximum output. Repeat these adjustments until no improvement can be obtained.

3. Tune the receiver to the alignment mark at 185m on the M.W. scale and connect signal generator via a standard dummy aerial to the A.M. aerial socket and chassis. Feed in a 1,620kc/s signal and adjust **C31** (B2) and **C21** (A2) for maximum output.
4. Switch receiver to L.W. and tune to the 1,665m alignment mark on the L.W. scale. Feed in a 180kc/s signal, and adjust **C33** (G3) and **C23** (B1) for maximum output.

F.M. Alignment

1. Switch receiver to F.M. and turn volume control to minimum. Fully close the tuning gang (i.e., maximum inductance). Remove the output meter from the speaker connections. Connect valve-voltmeter via a 100kΩ resistor across **C52** (F3), positive lead to chassis, and set it to the 10V range. During the alignment adjustments the input should be such that the voltage across **C52** does not exceed 8V.
2. Connect signal generator output via a 1,500pF ceramic capacitor to the control grid (pin 2) of **V3b** and chassis. Feed in a 10.7 Mc/s unmodulated signal. Damp **L15** (B2) with a 47kΩ resistor and adjust **L16** (B2) for maximum output.
3. Damp **L16** (B2) and adjust **L15** (B2) for maximum output.
4. Remove damping from **L16** (B2) and adjust **L21** (C2) for maximum output, reducing the signal generator output to maintain a reading of 8V across **C52.**
5. Remove valve-voltmeter from **C52** and connect it across **C47** (F4). Adjust **L22** (C2) to give a 4V reading across **C47.**
6. Connect signal generator output to the control grid (pin 2) of **V2** and reconnect the valve-voltmeter across **C52,** positive lead to chassis. Damp **L7** (A2) with a 47kΩ resistor and adjust **L8** (A2) for maximum output.
7. Damp **L8** (A2) and adjust **L7** (A2) for maximum output.
8. Tune the receiver to the top right-hand alignment arrow, above the F.M. scale, and set **C8** (A1), **C13** (A1) and **C11** (A2) to their mid-positions. Connect balanced signal generator output (via an unbalance-to-balance pad made up as shown overleaf if co-axial) to the F.M. aerial socket. Feed in an unmodulated 87.5Mc/s signal and adjust **L5** (A1) and **L4** (A1) for maximum output, reducing the signal generator output so that the voltage across **C52** does not exceed 8V.
9. Tune the receiver to 100Mc/s. Feed in an unmodulated 100Mc/s signal and adjust **C11** (A2) and **C8** (A1) for maximum output.
10. Disconnect signal generator. Connect the valve-voltmeter (via a detector circuit made up as shown overleaf or an R.F. probe) between the anode (pin 7) of **V1** and the earth connection on **V1** valve-holder. Adjust **C13** (A1) for minimum oscillator voltage as indicated on the valve-voltmeter.
11. Repeat adjustments 8 and 9 until no improvement can be obtained.
12. Remove the detector and valve-voltmeter from **V1** anode and reconnect the valve-voltmeter via a 100kΩ resistor across **C52** (F3), positive lead to chassis. Reconnect signal generator to the F.M. aerial socket. With the receiver tuned to 94Mc/s, feed in a 94Mc/s unmodulated signal and adjust **L2** (A2) for maximum output.

VALVE ANALYSIS

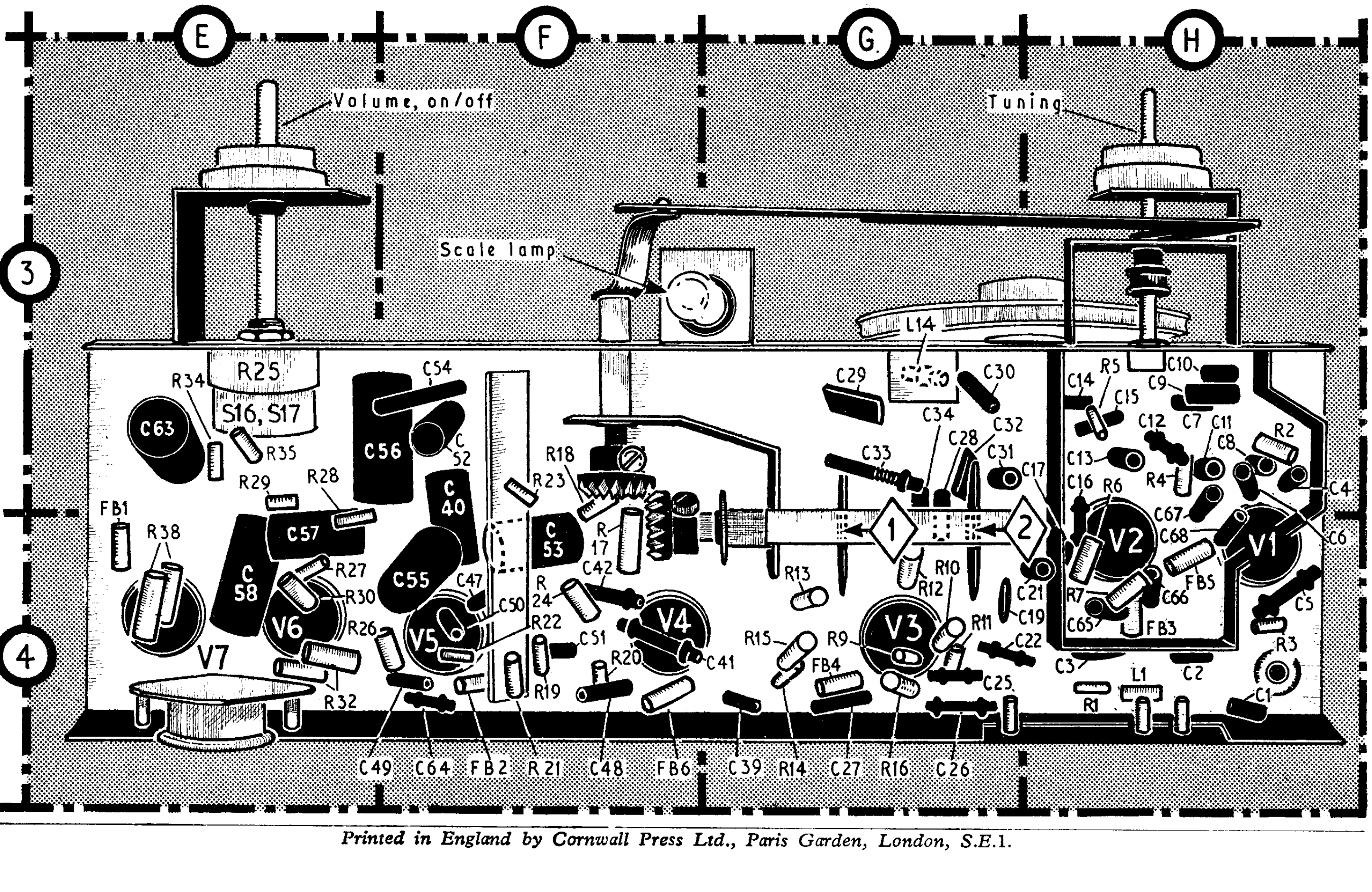
Valve voltages given in the table below are those derived from the makers' service manual, where separate readings are given for A.M. and F.M. operation. They were measured with a high resistance voltmeter (total resistance quoted as 10MΩ) with the negative lead connected to chassis. The receiver was connected to mains of 220V, using the 220-250V voltage adjustment tapping.

Valve		Anode (V)	Screen (V)	Cath. (V)
V1 UF80 ..	*	—	—	—
	†	160	140	1·6
V2 UF80 ..	*	—	—	—
	†	160	100	—
V3a UCH81	*	100	—	—
	†	—	—	—
V3b UCH81	*	165	50	—
	†	190	55	—
V4 UF89 ..	*	150	75	—
	†	140	55	—
V5d UABC80	*	64	—	—
	†	60	—	—
V6 UL84	*	200	190	15·0
	†	200	175	14·0
V7 UY85	*	—	—	215·0
	†	—	—	214·0

***Measured with receiver switched to A.M.*
†Measured with receiver switched to F.M.

Underside view of the chassis, showing the geared drive to the waveband switch units.

These diagrams are shown in col. 3.



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Model B3G97U: The chassis fitted to this model is similar to that of Model G75U