"TRADER" SERVICE SHEET

1374

PHILIPS B3G63A

Also Covering Models F5G62A and B5G64A

THE Philips B3G63A is a six-valve, plus rectifier, A.M./F.M. table model superhet, housed in a moulded cabinet. It is designed to operate from A.C. mains only of 200-250V, 50 c/s, using a double wound mains transformer. Waveband ranges are 87.5-100Mc/s (F.M.); 187-569m (M.W.); 1,177-2,000m (L.W.). Total mains consumption is 58W (A.M.); 63W (F.M.). It is fitted with a ferrite rod internal aerial for A.M. reception, and a short length of lead on the back cover forms an F.M. internal aerial for use in areas of high signal strength. Provision is made for the connection of external A.M. and F.M. aerials, and for the connection of a gramophone pick-up.

Model B5G64A employs an identical chassis, but is housed in a wooden cabinet.

Model F5G62A is a console radiogram employing an identical chassis and a Philips type AG1003 record changer.

Release dates and original prices: B3G63A, September 1956, £23 10*s; B5G64A, September* 1956, £27 5*s* 10*d; F5G62A, October* 1956, £52 6*s* 2*d. Purchase tax extra.*

CIRCUIT DESCRIPTION

Aerial coils **L10** and **L11** are connected in parallel for M.W. operation and are tuned by **C21, C22** and **C23.** For L.W. operation, **L11** only is in circuit, and is tuned by **C21, C22, C23, C24** and **C26. L.10** and **L11** are mounted at opposite ends of a ferrite rod to form an internal aerial. I.F. rejection by tuned circuits **L12, C25** and **C27, L13.** Provision for connection of external aerial via "bottom" impedance of **C21.**

Triode-heptode valve **V3** is employed as frequency changer on A.M. Triode section **a** operates as a tuned anode oscillator with reaction coil **L15** tuned by **C33, C34** (M.W.), and additionally by **C35** (L.W.). Oscillator circuit damping by **R13** on M.W. Tracking is achieved by adjustable reactance of **L15.**

Variable-mu R.F. amplifier **V4** is employed as intermediate frequency amplifier with tuned transformer couplings **C38, L18, L19, C39; C43, L20, L21, C44.**

A.M. Intermediate frequency 470kc/s.

Diode A.M. detector is section **c** of triple-diode-triode valve **V5.** The audio frequency component in the rectified output is filtered by **R20, C45** and developed across load resistor **R21,** and is then passed via **S5w, S2y, C53,** volume control **R27** and **C56** to the control grid of **V5d,** which operates as A.F. amplifier.

The D.C. component of the rectified signal developed across **R21** is fed back as bias via decoupling circuit **R24, C52** to the control grids of **V3** and **V4,** giving automatic gain control. Provision is made for the connection of a gramophone pick-up across volume control **R27** via **S2a** and **C53.**

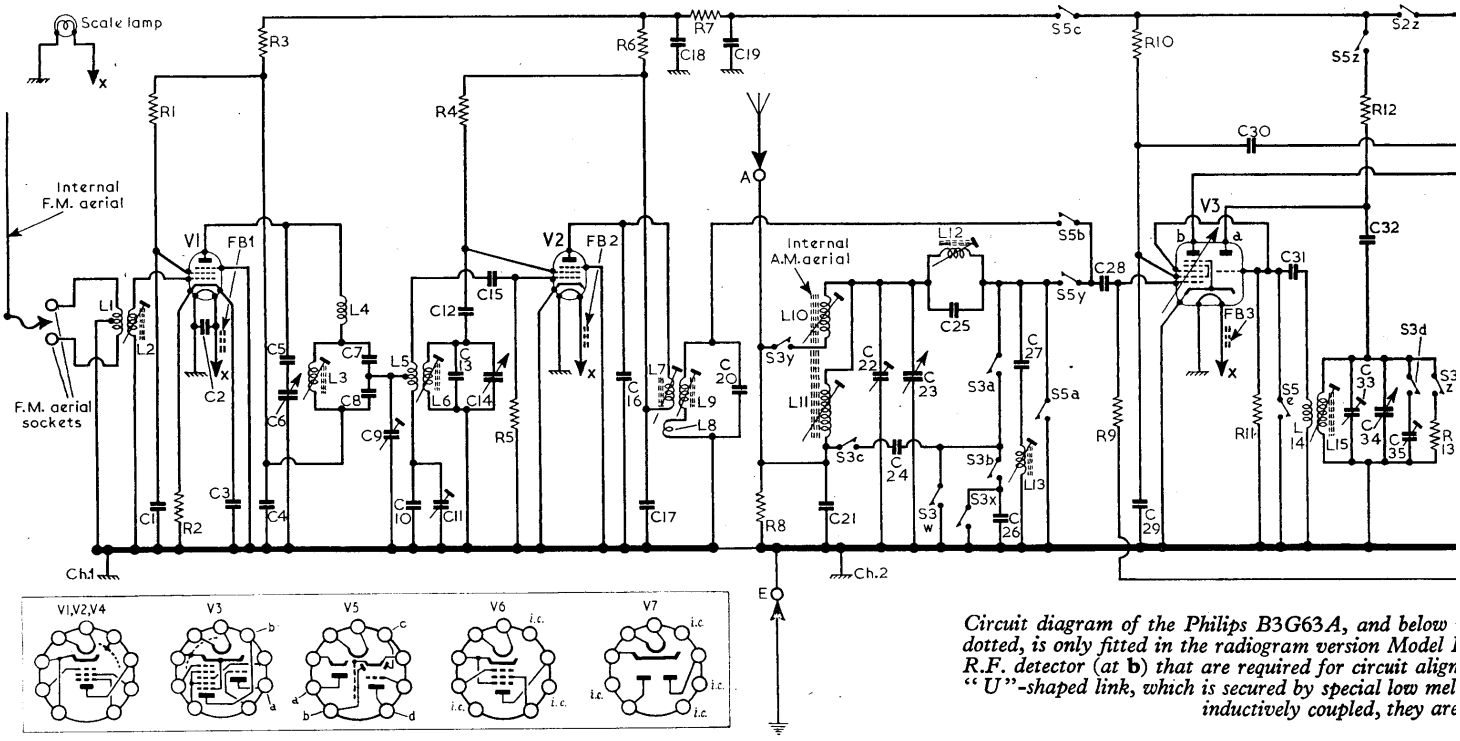
A.F. output of **V5d** is resistance-capacitance coupled by **R30, C60** and **R32** to the control grid of pentode output valve **V6.** Tone correction by the negative feed-back circuit **R35, R36, C55, R26, R27** and **C56.** Tone control by **C59, R31.**

H.T. current is supplied by full-wave rectifying valve **V7.**

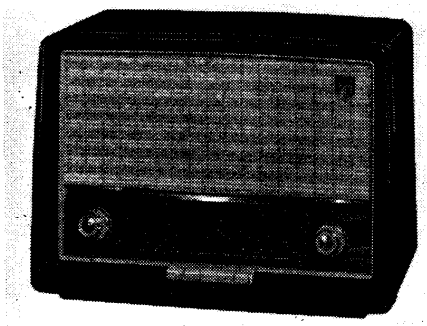
Operation on F.M.

75Ω balanced twin feeder input to the control grid of pentode R.F. amplifier **V1** via balanced aerial transformer **L1, L2. L2** is tuned by stray circuit capacitance and the inter-electrode capacitance of **V1.** Output of **V1** is developed across the tuned circuit **L3, L4, C5, C6, C7** and **C8,** and fed to the control grid of the self-oscillating frequency changer **V2.** To prevent oscillator voltages from passing into the R.F. and aerial circuits, a bridge neutralizing circuit is formed by **C11, L5** tapping, together with the input capacitance of **V2,** and the R.F. output from **V1** is connected to the point of zero oscillator potential at the tapping on **L5,** which divides **L5** into two sections.

Heptode section **b** of **V3** together with R.F. pentode **V4** form a 2-valve F.M. intermediate frequency amplifier with tuned transformer couplings **C16, L7,**



Circuit diagram of the Philips B3G63A, and below dotted, is only fitted in the radiogram version Model R.F. detector (at **b***) that are required for circuit align "U"-shaped link, which is secured by special low mel inductively coupled, they are*



Appearance of the B3G63A

L9, C20; C36, L16, L17, C37 and discriminator transformer **C46, L22, L23, L24** and **C47.** A.M. oscillator section **a** of **V3** is muted on F.M. by opening **S5z. V4** control grid circuit is connected by the closing of **S5f** to the potential divider **R15, R16, R17, S5x** opening on F.M. The positive bias induces grid current to flow, charging up **C52.** Rectification of the incoming signal drives the potential across **C52** negative to a degree depending upon signal strength, limiting the output of **V4.** The same potential is applied to **V3b** as A.G.C.

F.M. Intermediate frequency 10.7Mc/s.

Diode sections **a** and **b** or **V5** are employed in a ratio detector circuit. A.F. output is developed across the capacitive load **C48,** and fed via de-emphasis circuit **R22, C49,** and **S5d, S2y, C53** to volume control **R27.** From **R27** the audio signal route is the same as described for A.M. operation.

CIRCUIT ALIGNMENT

Equipment Required.—An accurately calibrated signal generator, 30 per cent modu-

(*Continued overleaf col.* 1)

Capacitors

C1	0·001μF	H4
C2	0·001μF	H4
C3	0·001μF	H4
C4	0·001μF	H4
C5	220pF	H4
C6	—	H4
C7	100pF	H4
C8	8·2pF	H4
C9	18pF	H4
C10	8·2pF	H3
C11	10pF	H3
C12	47pF	H3
C13	3·3pF	H3
C14	—	H4
C15	33pF	H4
C16	18pF	G3
C17	0·001μF	H3
C18	0·001μF	G4
C19	0·001μF	G4
C20	15pF	C2
C21	0·003μF	C1
C22	20pF	G4
C23	—	C1
C24	3·9pF	C2
C25	270pF	G4
C26	††100pF	F4
C27	12pF	G4
C28	100pF	G4
C29	3,900pF	G4
C30	1,500pF	G4
C31	56pF	G4
C32	470pF	G4
C33	—	C1
C34	—	C1
C35	‡400pF	B1
C36	33pF	C1
C37	33pF	C1
C38	110pF	C1
C39	195pF	C1
C40	3,900pF	F4
C41	1,500pF	F4
C42	0·1μF	F4
C43	195pF	B1
C44	195pF	B1
C45	100pF	F4
C46	22pF	B1
C47	47pF	B1
C48	2,200pF	F4
C49	2,200pF	F4
C50	4,700pF	F4
C51	5μF	F4
C52	0·01μF	F4
C53	0·1μF	F4
C54	33pF	B2
C55	1,500pF	E3
C56	0·018μF	F4
C57	0·1μF	E4
C58	4,700pF	F4
C59	·015μF	F3
C60	·015μF	F3
C61	470pF	E3
C62	50μF	A2
C63	50μF	A2
C64	6·8pF	F4
C65	100μF	F3
C66	0·001μF	E4
C67	500pF	A1
C68	500pF	A1

Resistors

R1	10kΩ	H4
R2	180Ω	H4
R3	2·2kΩ	G4
R4	22kΩ	H3
R5	100kΩ	H4
R6	2·2kΩ	H3
R7	1kΩ	G4
R8	33kΩ	C1
R9	1·2MΩ	G4
R10	39kΩ	G4
R11	47kΩ	G4
R12	33kΩ	G4
R13	33kΩ	G4
R14	2·2kΩ	F4
R15	56kΩ	F4
R16	10MΩ	F4
R17	100kΩ	F4
R18	220Ω	F4
R19	4·7kΩ	F4
R20	180kΩ	F4
R21	220kΩ	F4
R22	47kΩ	F4
R23	10kΩ	F4
R24	1·2MΩ	F4
R25	680kΩ	†
R26	220kΩ	A2
R27	2MΩ	A2
R28	10MΩ	F4
R29	100kΩ	F4
R30	220kΩ	E4
R31	500kΩ	A2
R32	1kΩ	F3
R33	150Ω	F4
R34	1·2kΩ	E4
R35	1·2kΩ	E4
R36	47Ω	F4
R37	18kΩ	E4

Coils*

L1	—	D1
L2	1·0	D1
L3	—	D1
L4	—	D1
L5	—	D2
L6	—	D2
L7	1.5	D2
L8	2·0	D2
L9	1·0	C2
L10	1·0	C1
L11	1·0	D2
L12	10·0	C2
L13	50·0	C2
L14	6·5	C2
L15	11·0	C2
L16	1·0	C1
L17	1·0	C1
L18	7·5	C1
L19	5·0	C1
L20	5·0	B1
L21	5·0	B1
L22	1·0	B1
L23	1·0	B1
L24	—	B1
L25	3·0	—

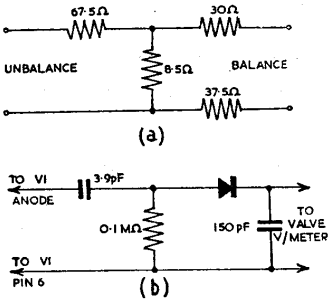
Transformers*

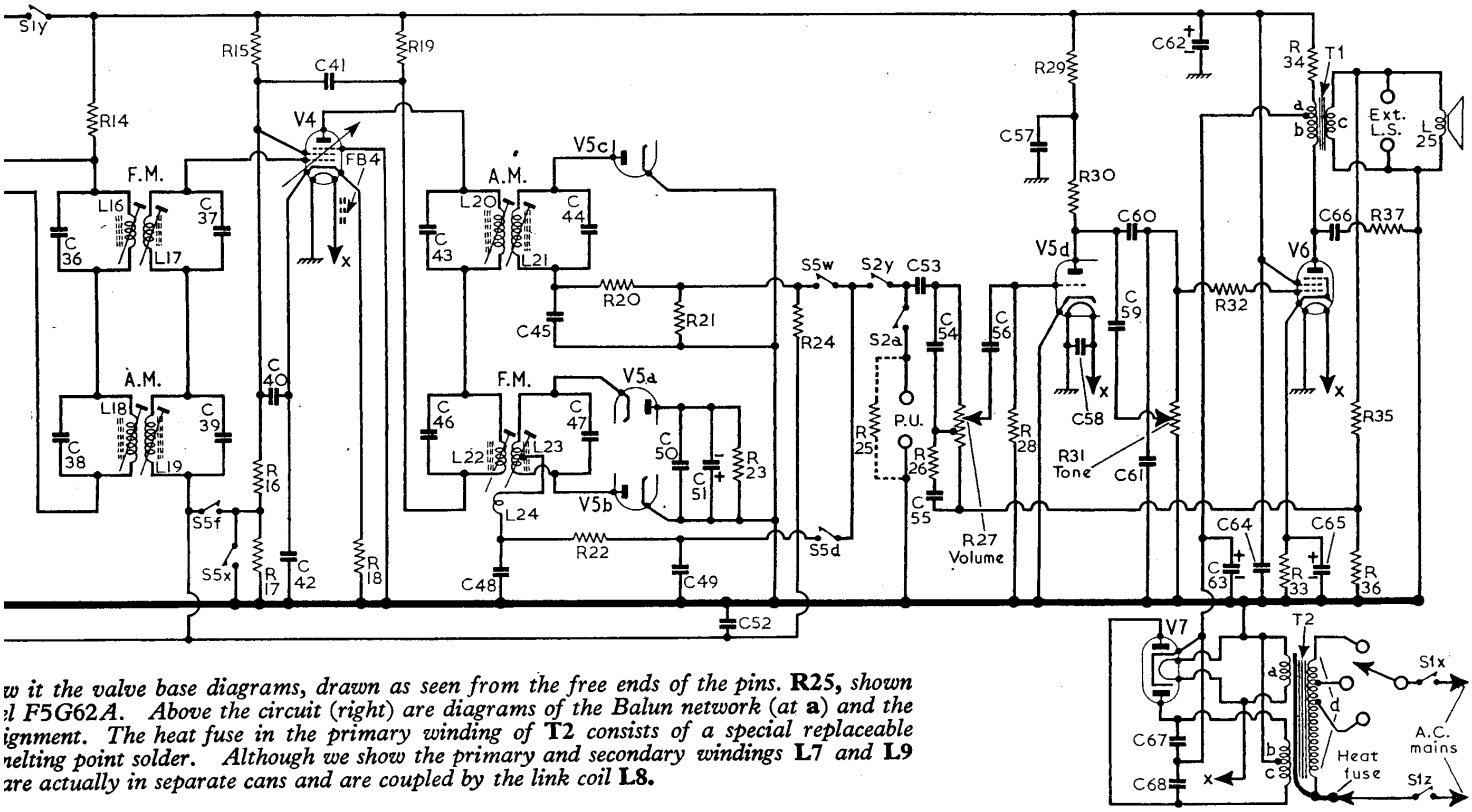
T1	a	10·0	E4
	b	600·0	
	c	—	
T2	a	1·0	A1
	b	142·0	
	c	142·0	
	d	51·5	

Miscellaneous

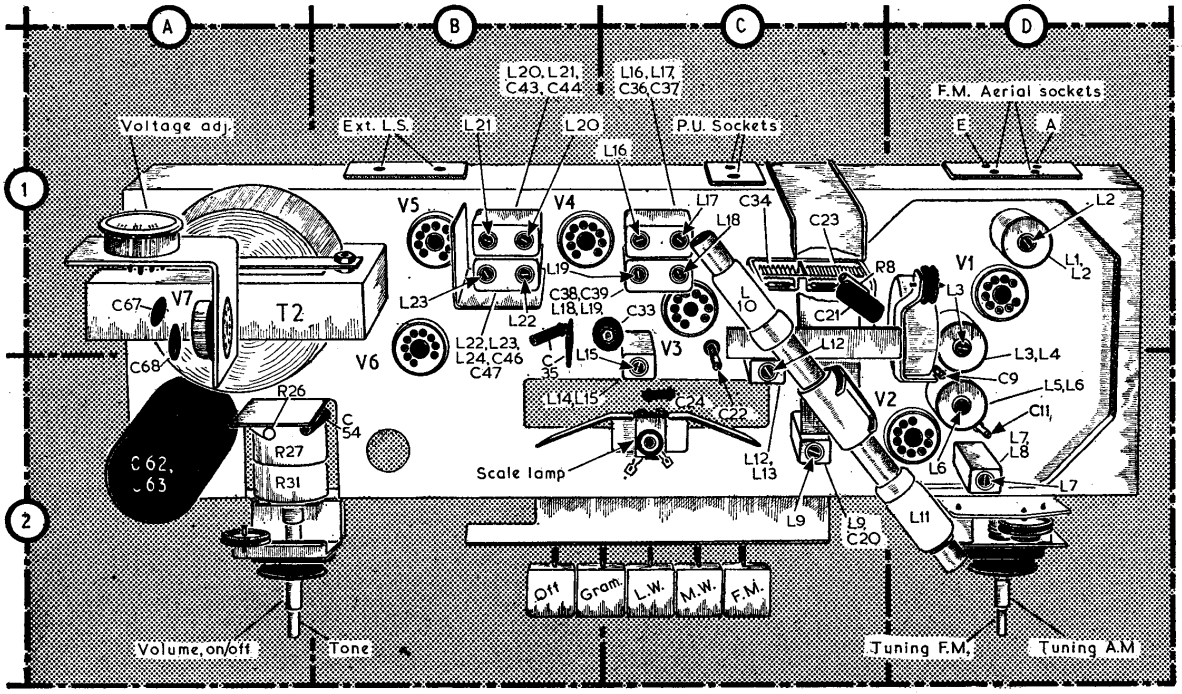
FB1	Ferrite beads	H4
FB2		G3
FB3		G4
FB4		F4
S1, S2	—	F3
S3-S5	—	G3

**Approximate D.C. resistance in ohms.*
†In model F5G62A only.
‡270pF plus wire-wound 130pF.
††Wire-wound.





w it the valve base diagrams, drawn as seen from the free ends of the pins. **R25,** *shown l F5G62A. Above the circuit (right) are diagrams of the Balun network (at* **a**) *and the ignment. The heat fuse in the primary winding of* **T2** *consists of a special replaceable nelting point solder. Although we show the primary and secondary windings* **L7** *and* **L9** *are actually in separate cans and are coupled by the link coil* **L8.**



Plan view of the chassis, not including the A.M. and F.M. tuning drive systems. These are shown in the diagram at the foot of this page. For details of the "piano-key" switches see "General Notes" and the diagram at the top of cols. 5 and 6. The heat fuse will be found fitted across the front of the windings of **T2**, *the fusible link being at the top.*

Circuit Alignment—*continued*

lated for A.M., and covering the frequency range 100kc/s-100Mc/s; an output meter; a valve-voltmeter or a 20,000 ohms-per-volt meter; a 4.7kΩ damping resistor and a non-metallic trimming tool. A detector circuit must be made up as shown in col. 5 overleaf and is used in conjunction with the valve-voltmeter. For signal generators employing co-axial output, the Balun network must also be made up.

Check that when the A.M. tuning gang is at minimum the A.M. cursor coincides with the middle of the "M" in "Metre." With the F.M. gang at maximum the F.M. cursor should coincide with the gold arrowhead mark situated on the lower edge of the V.H.F. tuning scale.

A.M. Alignment

1.—Connect output meter to the external speaker sockets.

2.—Switch the receiver to M.W. and set the gang at about mid-position. Turn the volume control to maximum and tone control to "brilliant." Set the I.F. coil cores about ⅛in from the screwed out position.

3.—Connect signal generator output between the control grid (pin 2) of **V3** and chassis. Feed in a 470kc/s signal and adjust the cores of **L21** (B1), **L20** (B1), **L19** (C1), **L18** (C1) and **L20** again for maximum output. After **L20** has been finally adjusted do not alter the positions of the other cores.

4.—Connect signal generator to the A.M. aerial and earth sockets via a dummy aerial. Feed in a 470kc/s signal and adjust **L13** (G4) and **L21** (C2) for minimum output.

5.—Switch the receiver to M.W. and turn the gang to maximum. Short circuit **L11** (D2). Feed in a 525kc/s signal and adjust **L15** (C2) for maximum output.

6.—Turn gang to minimum. Feed in a 1,610kc/s signal and adjust **C33** (C1) for maximum output.

7.—Repeat operations 5 and 6 until no improvement in calibration can be obtained.

8.—Switch receiver to L.W. and tune it to 1,744m. Feed in a 172kc/s signal and adjust **C35** (B1) for maximum output. Remove the short circuit from **L11** and adjust its former along the ferrite rod for maximum output.

9.—Switch receiver to M.W. Feed in a 640kc/s signal and tune the receiver to it. Adjust **L10** (C1) for maximum output.

10.—Turn gang to minimum. Feed in a 1,610kc/s signal and adjust **C22** (C2) for maximum output.

F.M. Alignment

1.—Switch receiver to F.M., turn volume control to minimum and gang to maximum. Remove output meter from external speaker connections. Connect valve-voltmeter or 20,000 ohms-per-volt meter via a 100kΩ resistor across **C51** (F4), positive lead to chassis, and set it to the 10V range. During the alignment adjustments the signal input should be adjusted so that the voltage across **C51** does not exceed 8V.

2.—Connect signal generator output via a 1,500pF ceramic capacitor to **V3b** control grid (pin 2) and chassis. Feed in a 10.7Mc/s unmodulated signal. Damp **L16** (C1) with a 4.7kΩ resistor and adjust **L17** (C1) for maximum output.

3.—Damp **L17** and adjust **L16** for maximum output.

4.—Remove damping from **L17** and adjust **L22** (B1) for maximum output, and reset the generator output to obtain exactly a reading of 8V across **C51.**

5.—Connect valve-voltmeter across **C49** (F4). Adjust **L23** (B1) to give a 4V reading across **C49.**

6.—Connect signal generator output to the control grid (pin 2) of **V2,** and reconnect the valve-voltmeter across **C51,** positive lead to chassis. Damp **L9** (C2) and adjust **L7** (D2) for maximum output.

7.—Remove damping and adjust **L9** for maximum output. Adjust input to give an 8V reading across **C51.**

8.—Tune generator to find the maximum output on the meter; this should not exceed 8.5V and should occur within the frequency range 10.67Mc/s-10.73Mc/s. If these conditions are not met, the I.F. circuits should be re-adjusted.

9.—Tune the receiver to 87Mc/s. Connect valve-voltmeter across **C51,** and connect the signal generator to the F.M. aerial sockets (via an unbalance-to-balance pad made up as shown overleaf). Feed in an unmodulated 87Mc/s signal and adjust **L6** (D2) and **L3** (D1) for maximum output.

10.—Disconnect signal generator. Connect the valve-voltmeter (via a detector circuit made up as shown overleaf) between the anode (pin 7) of **V1** and chassis. Tune the receiver to the middle of the band and adjust **C11** (D2) for minimum output.

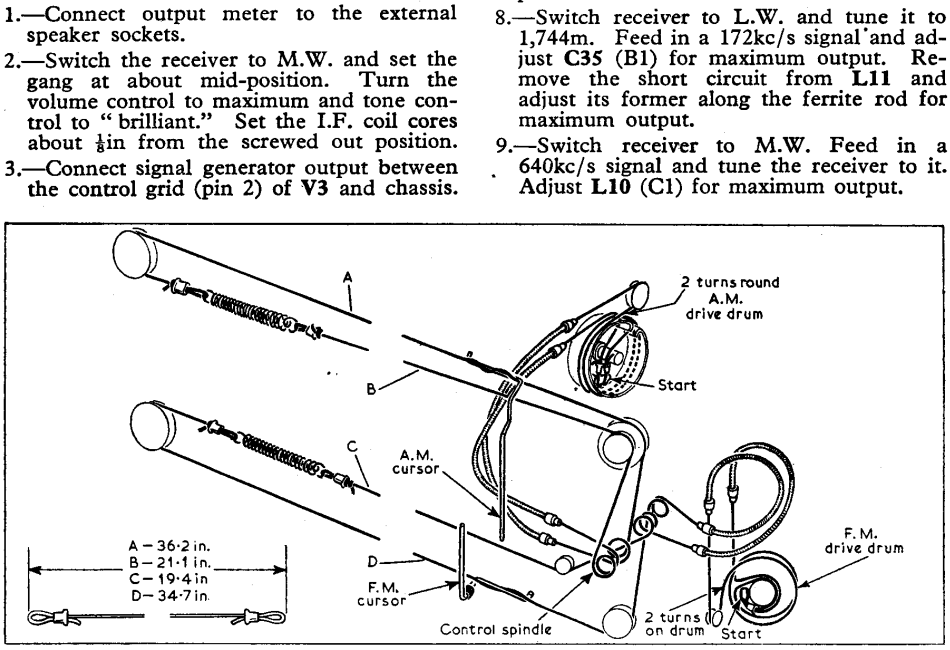


Diagram of the A.M. and F.M. tuning drive systems. In each drive two lengths of cord are used. These are joined by a tension spring and have their free ends anchored together in the appropriate drum. Specified cord lengths over the loops are given but only one loop is made before fitting; the springs allow for small variations.

11.—Repeat operation 9 until no further improvement can be obtained.

12.—Remove the detector and valve-voltmeter from **V1** anode and reconnect the valve-voltmeter across **C51**. Reconnect signal generator to the F.M. aerial sockets. Feed in a 100Mc/s unmodulated signal, tune it in on the receiver, and adjust **C9** (D2) for maximum output.

13.—Feed in an 87Mc/s signal, tune it in on the receiver, and adjust **L3** (D1) for maximum output.

14.—Feed in a 94Mc/s signal, tune it in on the receiver, and adjust **L2** (D1) for maximum output.

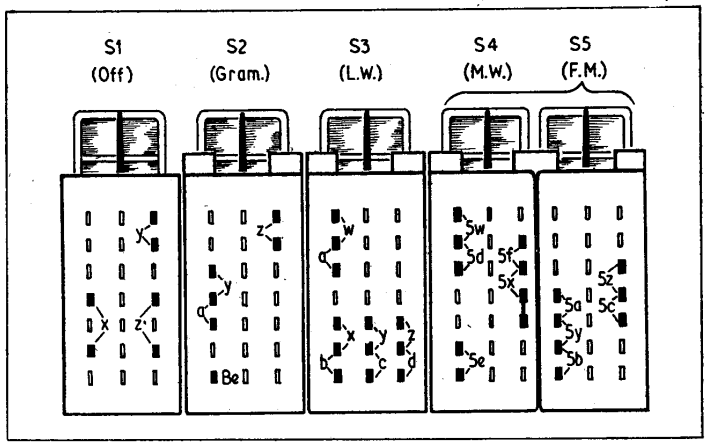
GENERAL NOTES

Switches.—All waveband and A.M./F.M. change-over switches are ganged in a five-way slide-type switch unit actuated by "piano-key" press-buttons designated **S1-S5**. Switches associated with each press-button bear a suffix letter to indicate its function when the appropriate button is pressed. When a given button is pressed, those with letters **a-f** close, and those with **w-z** open. There are no contacts directly associated with the M.W. press-button (No. 4), but it is mechanically linked to the other switches in so far that when it is pressed for M.W. operation, any closed buttons are released. There are, however, no **S4** switches. What would be the wafer carrying the **S4** switches is actually operated by the F.M. press-button (No. 5), wafers 4 and 5 being locked together and both carrying **S5** switches.

The mains "off" switch **S1** is coupled with the other press-button switches by means of a trigger mechanism. On pressing any button **S2-S5** the mains switches close, and on pressing button **S1** they open, and the mains circuit is broken and the receiver is switched off. Individual switch groups are identified in the diagram of the unit shown in cols. 5 and 6.

Scale Lamp.—This is a special Philips lamp, type 8028D-00. It has a clear tubular bulb and an M.E.S. base, and is rated at 6.5V, 0.3A.

Diagram of switches **S1-S5**. *The coding and operation are described under "General Notes." Observe particularly that* **S5** *uses one double-width wafer extending over the* **S4** *position; it switches on both groups of switches for F.M.* **S4** *switches off* **S5**, *or any other switch, for M.W.*



Heat Fuse.—Philips code number 08.100.99.

Drive Cord Replacement.—See diagram, col. 1. Loop one end of B and hook in A.M. drum with gang at maximum. Pass: through gap and turn anticlockwise; through sheath; twice, clockwise, rear to front, round first (front) groove of control spindle; over smaller pulley above to spring.

Hook A in drum. Pass: through gap; twice, clockwise, 1ound drum; over pulley above and through sheath; 1¼ turns anticlockwise, front to rear, round second groove of spindle; over top pulleys to spring.

Hook C in F.M. drum with gang at minimum. Pass: anticlockwise round inner drum; through gap and rear hole in chassis above; through sheath; twice, clockwise, front to rear, round third groove of spindle; under small pulley to spring.

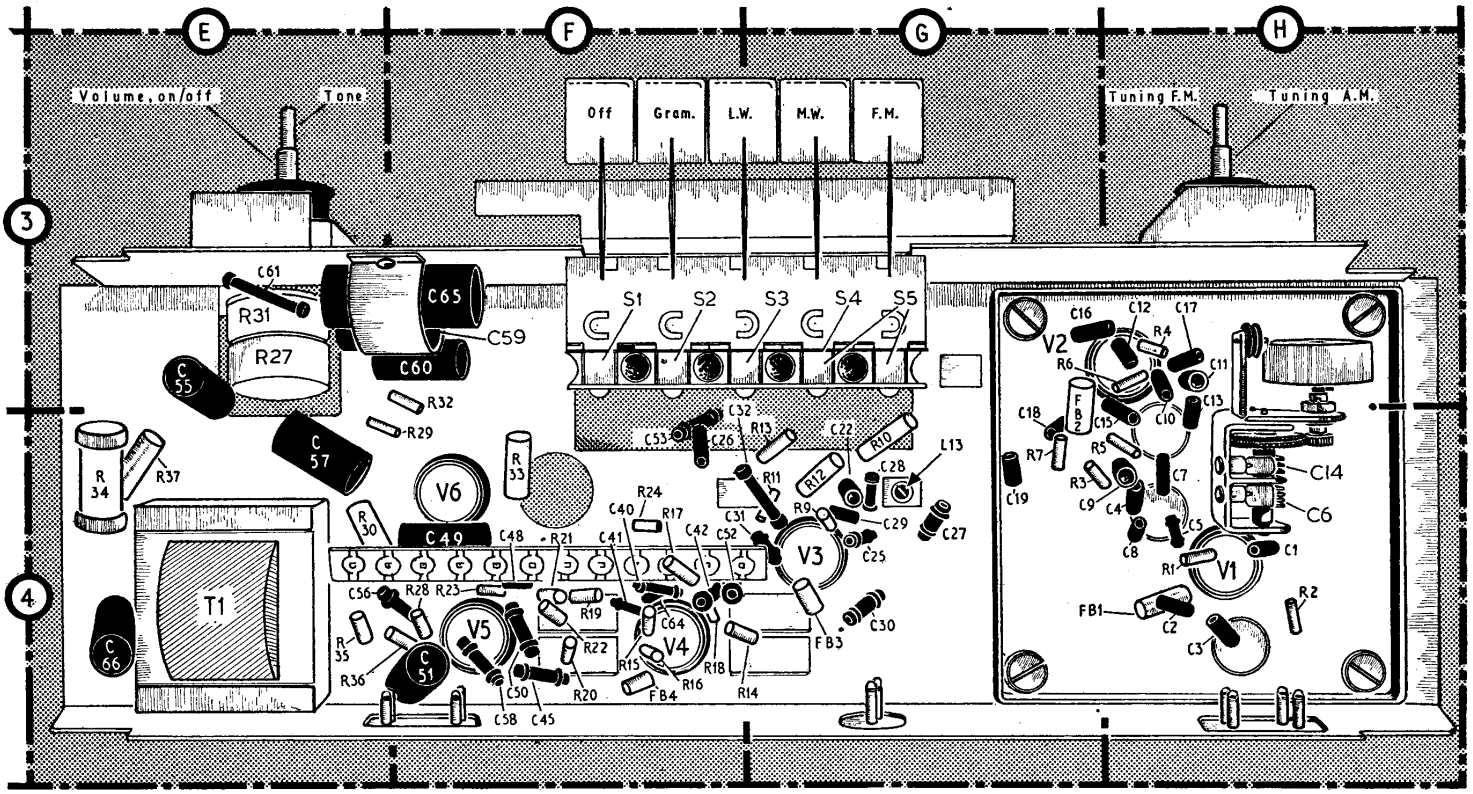
Hook D to drum. Pass: anticlockwise round inner drum; through gap; twice, anticlockwise round outer drum; clockwise round pulley below; through front hole in chassis and remaining sheath; 1¼ times, anticlockwise, front to rear, round rear groove of control spindle; under lower pulleys to spring.

VALVE ANALYSIS

Valve voltages given in the table, col. 6, are those derived from the manufacturers' information, where separate readings are given for A.M. and F.M. operation. They were measured with a valve-voltmeter having an input impedance of 10MΩ, chassis being the negative connection in every case. The receiver was connected to mains of 245V with the voltage adjustment correctly set.

Valve		Anode (V)	Screen (V)	Cath. (V)
V1 EF80	*	—	—	—
	†	180	160	1·9
V2 EF80	*	—	—	—
	†	180	100	—
V3a ECH81	*	115	—	—
	†	—	—	—
V3b ECH81	*	230	65	—
	†	200	75	—
V4 EF85	*	180	65	2·3
	†	210	90	2·35
V5d EABC80	*	70	—	—
	†	65	—	—
V6 EL84	*	235	230	6·7
	†	230	240	5·8
V7 EZ80	..	225[2]	—	240·0[1]

**Measured with receiver switched to A.M.*
†*Measured with receiver switched to F.M.*
[1]*Cathode current, A.M. 60 mA.; F.M. 75 mA.*
[2]*A.C. reading.*



Underview of the chassis. The tuner unit chassis is seen at the right-hand end.

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