"TRADER" SERVICE SHEET

1362

BUSH VHF

F.M. Table Radio Receiver for Operation on

SIX Mullard A.C./D.C. valves and a half-wave metal rectifier are employed in the Bush VHF90A F.M. receiver, a superhet covering the frequency range 87.5-100Mc/s. It is designed to operate from A.C. or D.C. mains of 200-250V, 40-100c/s in the case of A.C. Total mains consumption is 60W.

An internal balanced dipole aerial is mounted on the back cover, and sockets are provided for the connection of an external aerial.

Release date and original price: May 1958; £12 17s. Purchase tax extra.

CIRCUIT DESCRIPTION

Balanced dipole internal aerial or 80Ω external aerial input is coupled via **C1, C2** and aerial coupling transformer **L1, L2** to the cathode of the earthed-grid R.F. amplifier **V1a.**

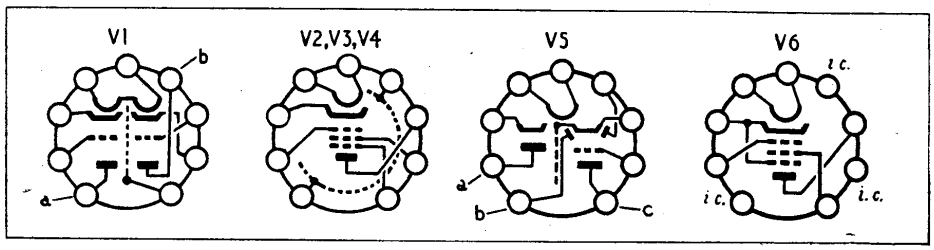
Section **b** of **V1** operates as a self-oscillating mixer valve with tuned oscillator grid circuit **L4, C6, C7, C8** and **C9.** Reaction coupling from oscillator anode via **L5.** To prevent oscillator voltages from passing into the R.F. and aerial circuits, a bridge neutralizing circuit is formed by **C6, C7, C10, C11** together with the input capacitance of **V1b,** and the R.F. output from **V1a** is connected to the point of zero potential at the junction of **C6, C7.** R.F. tuning is by the ganged cores of **L3** and **L4.**

V2, V3 and **V4** form a 3-valve intermediate frequency amplifier with tuned transformer couplings **C12, L6, L7, C13; R7, C17, L8, L9, C18; R11, C23, L10, L11, C24** and discriminator transformer **C27, L12, L13, C28, L14.** Bias for **V2, V3** and **V4** is obtained from the negative potential developed across **R12** due to grid current, and is fed back to **V2** and **V3** via decoupling circuits **C21, R10, C19, R8, C15.**

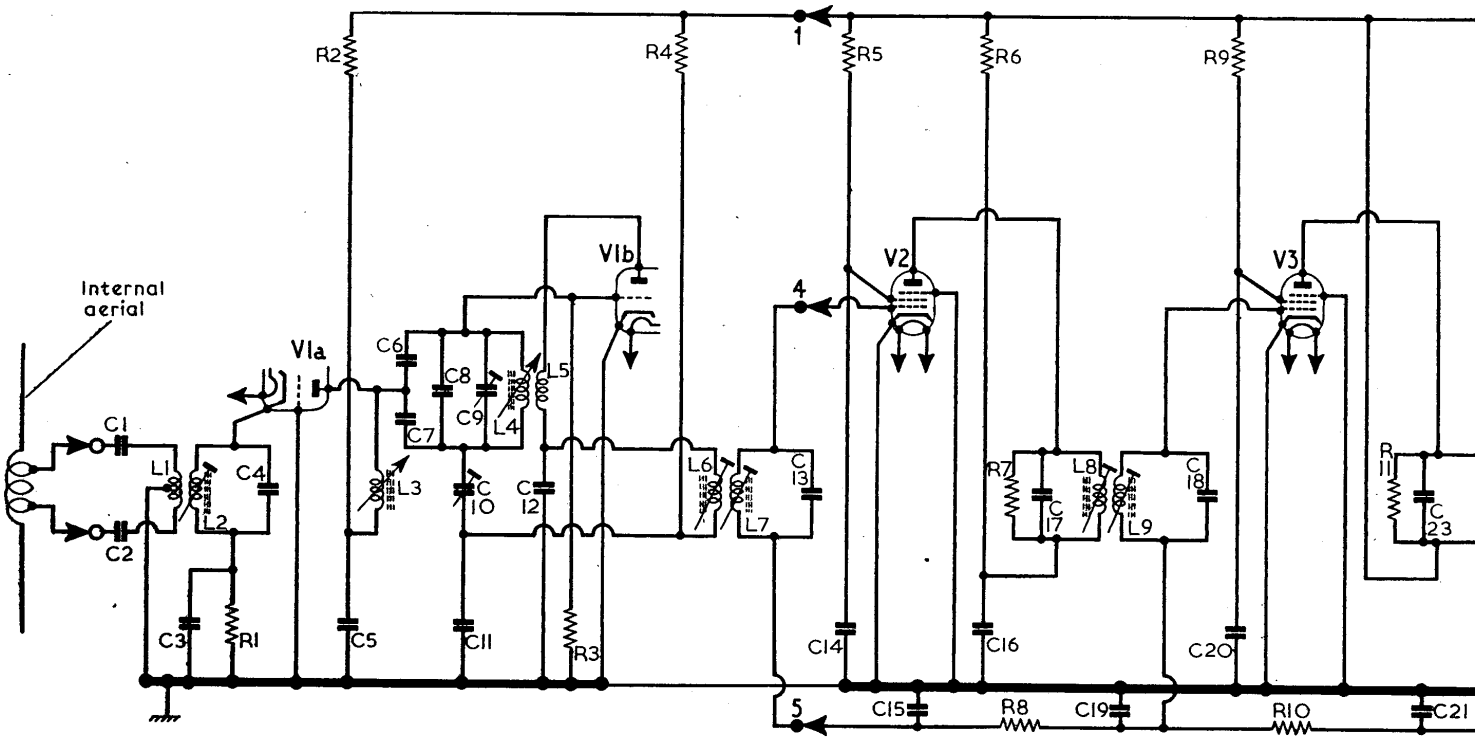
V4 also operates as A.M. limiter. The D.C. potential developed across **R16, C31** is fed back as bias to **V4** suppressor grid, supplementing the limiting action in the control grid circuit.

Intermediate frequency 10.7Mc/s.

Diode sections **a** and **b** of **V5** are employed in a ratio detector circuit. A.F. output is developed across **C29** and passed via **C30,** volume control **R17** and



Valve base diagrams for the six valves used in the receiver, drawn as seen from the free ends of the pins.



Circuit diagram of the Bush VHF90A. The overall frequency response of the A.F. amplifier section provides de-emphasis. An internal dipole aerial is provided for use in areas of high signal strength, but provision is made for the connection of an external aerial.

90A

ı A.C. or D.C. Mains

C32 to the control grid of A.F. amplifier **V5C.**

Resistance-capacitance coupling by **R19, C33, R20** between the anode of **V5c** and pentode output valve **V6.** Negative feed-back tone correction via **C39, R26, R27, R17** and **C32.**

H.T. current is supplied by half-wave metal rectifier **MR1.** Smoothing by **C36, R25** and **C35.** Hum neutralizing is achieved by passing H.T. current through winding a of output transformer **T1.**

CIRCUIT ALIGNMENT

Equipment Required.—An accurately calibrated signal generator covering the frequency range 10Mc/s-100Mc/s; a model 8 Avometer; a 50μA meter; two matched 47kΩ resistors; a 1kΩ damping resistor.

The receiver and signal generator should be switched on for 15 minutes before commencing alignment.

Remove the chassis from the cabinet. As the tuning scale remains fixed to the cabinet when the chassis is removed, it is necessary to use the indentation marks punched in the scale backing plate and shown in the sketch in col. 4 overleaf. A piece of wire may be fixed to the tuning spindle and used as a pointer. With the tuning spindle fully anti-clockwise the pointer should be lined up with the Datum mark on the tuning scale backing plate.

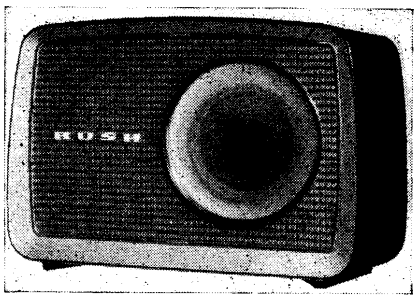
With the exception of **L12** the correct peak associated with the iron-dust tuning cores is the first one reached from the adjusting end of the coil former.

During the alignment procedure adjust the signal generator output to maintain a 4V reading on the output meter.

The iron-dust cores of **L3** and **L4** are adjusted simultaneously by adjusting the special nut shown in location reference G3.

C9 and **C10** (location reference F4)

(Continued overleaf col. 1)



Appearance of the Bush VHF90A. The circular scale has a cream surround which is illuminated with a soft glow when the set is switched on.

COMPONENT VALUES AND LOCATIONS

Resistors

R1	150Ω	G4
R2	2·2kΩ	G4
R3	100kΩ	G4
R4	6·8kΩ	F3
R5	33kΩ	F4
R6	1kΩ	F4
R7	22kΩ	B2
R8	2·2MΩ	F4
R9	33kΩ	E4
R10	2·2MΩ	E4
R11	22kΩ	B2
R12	2·2MΩ	E4
R13	33kΩ	E4
R14	2·2kΩ	E4
R15	100Ω	E4
R16	22kΩ	E4
R17	500kΩ	D4
R18	15MΩ	D4
R19	220kΩ	D4
R20	1MΩ	D3
R21	33kΩ	E3
R22	10kΩ	C1
R23	47kΩ	D3
R24	220Ω	D3
R25	2·2kΩ	E3
R26	8·2kΩ	D3
R27	1·5kΩ	D4
R28	27Ω	E3
R29	550Ω	C1
R30	125Ω	D3
R31	125Ω	D3

Capacitors

C1	470pF	A2
C2	470pF	A2
C3	560pF	G4
C4	10pF	A2
C5	560pF	G4
C6	22pF	G4
C7	22pF	F4
C8	5·6pF	F3
C9	15pF	F4
C10	15pF	F4
C11	47pF	F4
C12	10pF	F4
C13	47pF	A2
C14	0·001μF	F3
C15	0·001μF	F4
C16	0·001μF	F4
C17	47pF	B2
C18	47pF	B2
C19	0·001μF	F4
C20	0·001μF	E4
C21	0·001μF	E4
C22	0·01μF	E4
C23	47pF	B2
C24	47pF	B2
C25	0·001μF	E4
C26	0·001μF	E4
C27	10pF	C2
C28	47pF	C2
C29	560pF	E4
C30	0·01μF	D4
C31	5μF	E4
C32	0·01μF	D4
C33	0·01μF	D4
C34	20μF	B1
C35	40μF	B1
C36	40μF	B1
C37	0·01μF	C1
C38	0·02μF	C1
C39	0·04μF	D3
C40	0·002μF	D4
C41	0·002μF	D4
C42	560pF	F4
C43	560pF	G4
C44	560pF	F4
C45	0·001μF	F3
C46	0·001μF	E4

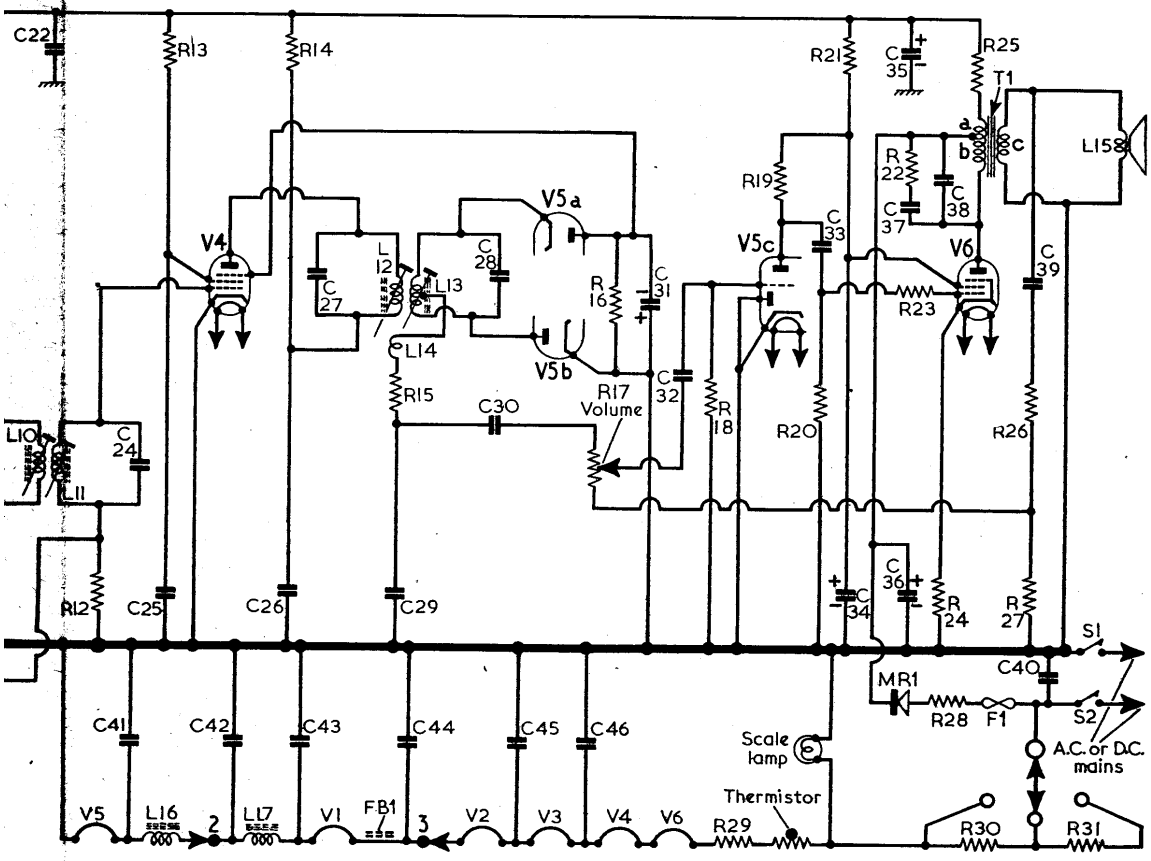
Coils*

L1	—	A2
L2	—	A2
L3	—	G4
L4	—	F4
L5	—	F4
L6	—	A2
L7	—	A2
L8	—	B2
L9	—	B2
L10	—	B2
L11	—	B2
L12	—	C2
L13	—	C2
L14	—	C2
L15	2·0	—
L16	—	F4
L17	—	F4

Other Components*

T1 a	16·5	C1
T1 b	600·0	C1
T1 c	0·46	C1
F1 M.E.S. lamp		B1
FB1 FX1098/A4		F4
Thermistor CZ1		C1
MR1 S.T.C. C3D		E3
S1, S2	—	D4

**Approximate D.C. resistance in ohms.*



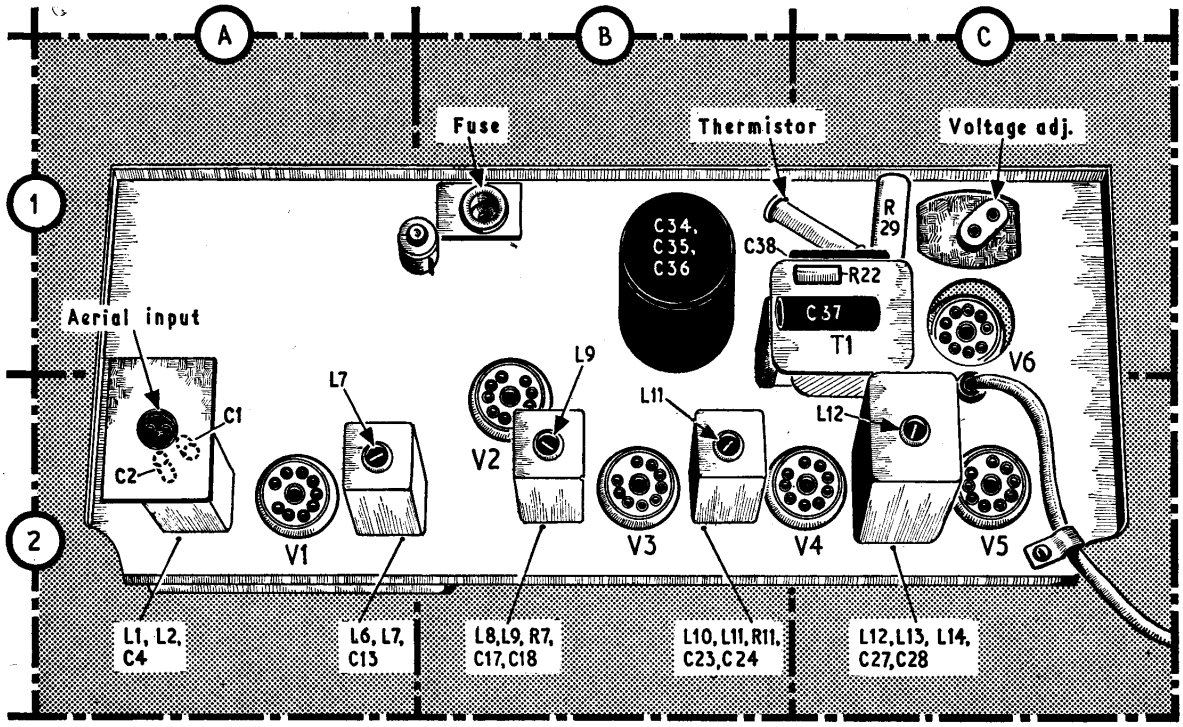


Illustration of the rear side of the chassis. The fuse (F1) is a 6V, 0.5A lamp with an M.E.S. cap and it should not be confused with the scale lamp (see circuit overleaf). Our picture shows the fuse holder.

Circuit Alignment—*continued*

are pre-set by the manufacturers, and should not be disturbed.

I.F. Alignment

1.—Connect the two matched 47kΩ resistors in series across **C31** (E4). Connect the model 8 Avometer across **C31** (E4), with the positive meter lead connected to chassis. Connect the signal generator output between the control grid (pin 2) of **V2** and chassis.

2.—Feed in a 10.7Mc/s unmodulated signal and adjust the core of **L12** (C2) for maximum reading on the meter.

3.—Connect the 50μA meter between the junction of the two 47kΩ resistors and the junction of **R15, C29** (location reference E4). Feed in a 10.7Mc/s unmodulated signal and carefully adjust the core of **L13** (E4) for a zero reading on the 50μA meter. This will occur midway between a positive-going and negative-going peak. Remove the 50μA meter.

4.—Connect the 1kΩ damping resistor across the secondary winding **L11** and adjust the core of **L10** (E4, where it is indicated in error as C46) for maximum output on the Avometer.

5.—Transfer the damping resistor to the primary winding **L10** and adjust the core of **L11** (B2) for maximum output.

6.—Transfer the damping resistor across the secondary winding **L9** and adjust the core of **L8** (F4) for maximum output.

7.—Transfer the damping resistor to the primary winding **L8** and adjust **L9** (B2) for maximum output. Remove the damping resistor.

8.—Repeat operations 2 and 3.

9.—Connect the signal generator output to the aerial sockets. Feed in a 10.7 Mc/s signal and adjust the cores of **L6** (F4) and L7 (A2) for maximum output.

R.F. Alignment

1.—Connect the signal generator output to the aerial sockets. Tune the receiver to the 87.5Mc/s calibration point on the scale backing plate. Feed in a 87.5Mc/s signal and adjust the cores of **L3** and **L4** (adjustment location reference G3) for maximum output.

2.—Tune the receiver to the 94Mc/s calibration point. Feed in a 94Mc/s signal and adjust the core of **L2** (G4) for maximum output.

3.—Check calibration.

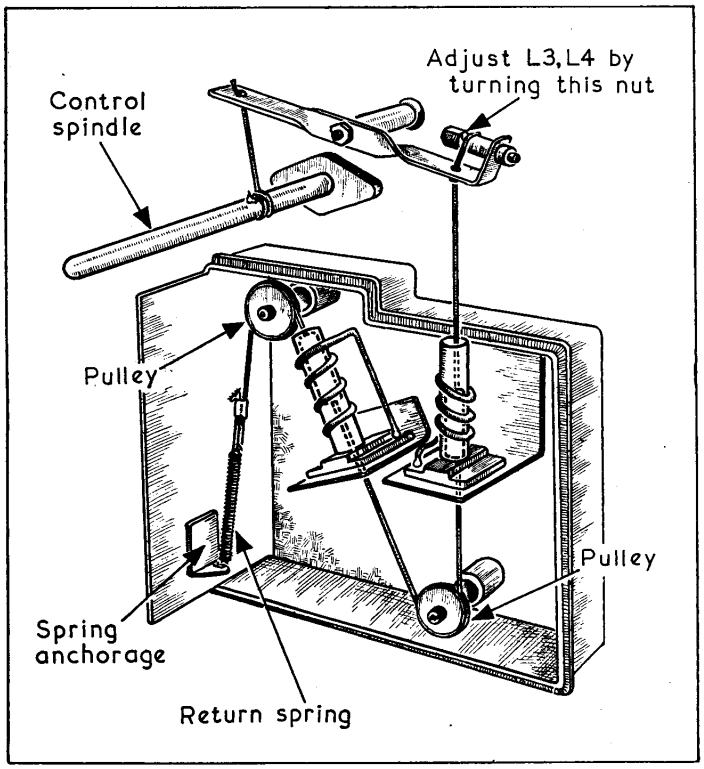


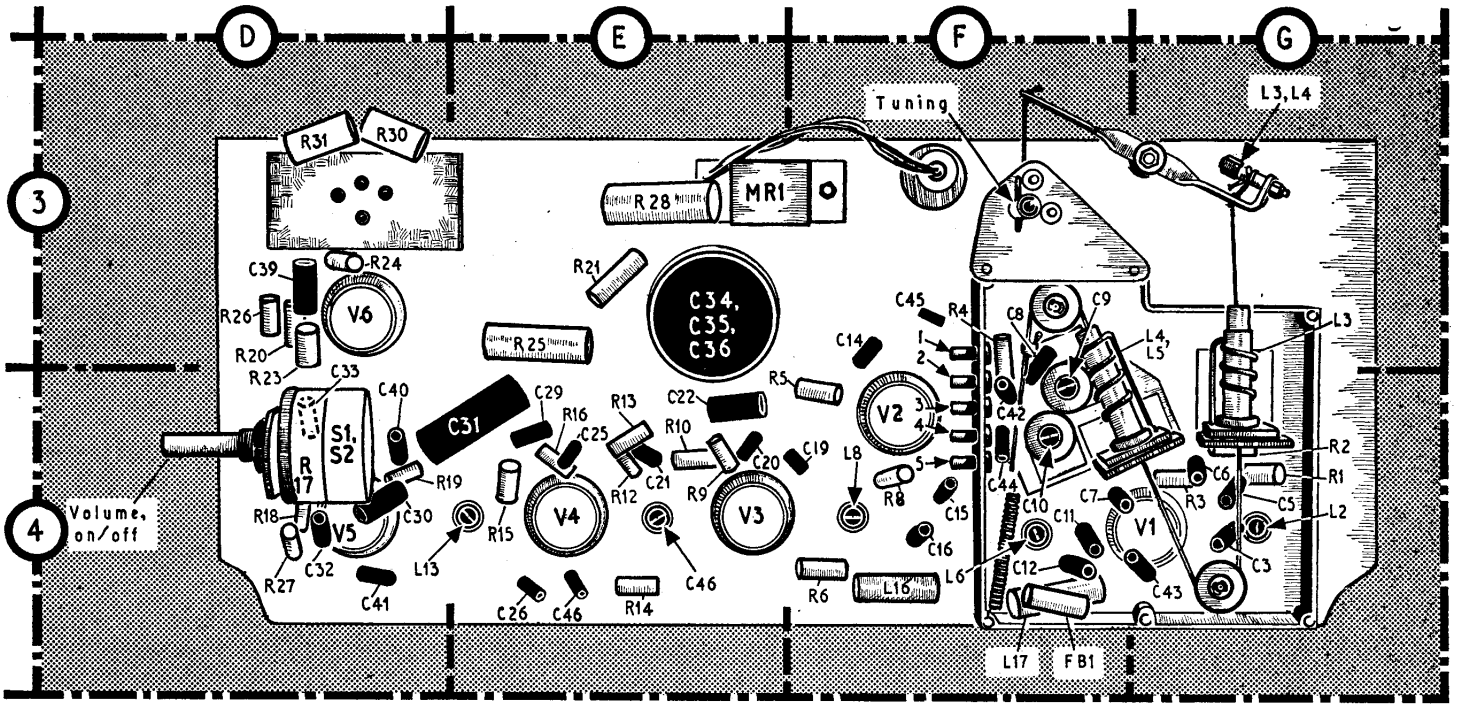
Diagram of the tuning drive cord. For the sake of clarity no components are shown except the coils directly affected by the drive. The turning of the control spindle operates the lever located above it and moves the cores up or down inside the coils.

GENERAL NOTES

Drive Cord Replacement.—Should a breakage occur in the tuning drive cord or should one of the tuning cores break, the manufacturers recommend that the complete drive cord assembly (Part Number AP24888) should be replaced.

Access to the drive cord and tuning cores can be obtained by removing the tuning scale backing plate (two 4BA screws) and the cover of the tuning unit (seven 6BA $1\frac{5}{8}$in screws and nuts).

Thread the new cord assembly through the formers of **L3** and **L4**, and with the tuning control spindle turned to its maximum clockwise position, attach the



Front view of the chassis with the light reflector and screening box cover removed. The reflector, shown in the illustration at the foot of column 4, fits over the tuning or control spindle and behind the circular scale. The core adjustment in location reference E4, labelled " **C46** *" in error, is actually the core of* **L10.**

cord to the return spring. The spring should then be hooked to its anchorage and the free end of the cord run as indicated in the sketch at the foot of cols. 1 and 2.

Attach the cord to the adjusting screw and carry out operation 1 in the R.F. alignment instructions.

The short primary tuning drive cord which links the tuning control spindle with the lever is a separate piece of cord. To replace this cord, take a length of about six inches and fix it as shown in the sketch. Adjust it so that the lever swings equally above and below the horizontal for the full tuning range. A final adjustment can be made by means of the adjusting nut at the opposite end of the lever. Finally, carry out operation 1 in the R.F. alignment instructions.

Scale Lamp.—This is a 15W, 230V lamp with a large clear bulb and an S.B.C. base.

Fuse Lamp F1.—This is an ordinary scale lamp, with an M.E.S. base, rated at 6V, 0.5A.

VALVE ANALYSIS

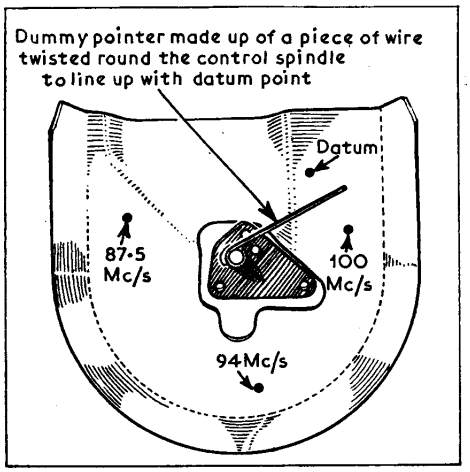
Valve voltages given in the table below are those derived from the manufacturers' information. They were measured on the 10V and 1,000V ranges of a model 8 Avometer, chassis being the negative connection in every case.

The receiver was connected to A.C. mains of 230V with the voltage adjustment correctly set. There was no signal input.

H.T. voltage measured at **C36** was 258V and at **C35** 158V.

Valve Table

Valve		Anode (V)	Screen (V)	Cath. (V)
V1 UCC85	a	145	—	1·2
	b	130	—	—
V2 UF89		150	75	—
V3 UF89		158	75	—
V4 UF89		138	70	—
V5c UABC80		60	—	—
V6 UL84		230	115	9·2



Scale lamp reflector, finished white to reflect and distribute the light, and having points marked as shown for the purpose of alignment. The marks are in the form of small indentations made with a centre-punch.

ADDITIONAL NOTES

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