BUSH VHF81

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INCORPORATING a conventionally wired vertical chassis, Bush VHF81 is a three-waveband a.m./f.m. table radio receiver designed for mains operation. It employs six valves plus rectifier and is housed in wooden veneered cabinet.

Internal aerials are provided for a.m. and f.m. reception, and provision is made for the connection of an external f.m. aerial. A low impedance output from a separate winding on the output transformer is available for feeding a tape recorder.

Waveband ranges are 187-560m (m.w.), 1,050-1,935m (l.w.) and 87.5-100Mc/s (f.m.) with waveband selection by press-button switching. Audio power output is 2W and operating power consumption is 45W.

Release date and original price: July 1964 £22 12*s* 5*d*. *Purchase tax extra.*

VALVE ANALYSIS

Valve voltages given in the table in col. 1 were derived from information supplied by the manufacturers. They were measured on an Avometer model 8 and are positive with respect to chassis.

Valve Table

Valve		Anode (V)	Screen (V)	Cathode (V)
V1a UCC85	..*	152¶	—	0·9
V1b UCC85	..*	152¶	—	—
V2 UF89	*	75	68	—
	†	80	72	—
V3a UCH81	†	92	—	0·1
V3b UCH81	*	145	70	0·1
	†	158	70	0·1
V4 UF89	*	142	81	—
	†	158	88	—
V5d UABC80	*	55	—	—
	†	58	—	—
V6 UL84	*	188	104	6.9
	†	193	112	7·4
V7 UY85	*	—	—	206·0
	†	—	—	213·0

**Receiver switched to f.m*
†*Receiver switched to a m. (m.w.)*
¶*Measured at the junction* **R3, R5** *and* **S3g.**

CIRCUIT ALIGNMENT

The receiver and signal generator should be switched on for about 15 minutes before alignment. The receiver chassis should be removed from its cabinet for alignment; as described under "Dismantling."

Equipment Required.—An a.m. signal generator covering the a.m. and f.m. wavebands, modulated 30 per cent at 400c/s, and capable of being switched to c.w.; a 0-2W audio output meter to match an impedance of 3Ω; a length of insulated wire to be formed into an r.f. coupling loop; an Avometer model 8 for use as a d.c. output meter and balance meter; a 0.1μF isolating capacitor; a matched pair of 47kΩ resistors; a damping unit comprising a 1kΩ resistor, and two trimming tools, a non-metallic type 10in long for adjusting the f.m. i.f. cores and a special type for the a.m. i.f. cores.

A.M. CIRCUITS

In **IFT3** and **IFT6** the primary core is adjusted from the base and the secondary core from the top of the can.

1.—Switch receiver to m.w. and set the cursor to an unused frequency around 300m. Turn the volume control fully clockwise. Connect the audio output meter in place of the loudspeaker. During alignment adjust the input signal level to maintain an output of 50mW.

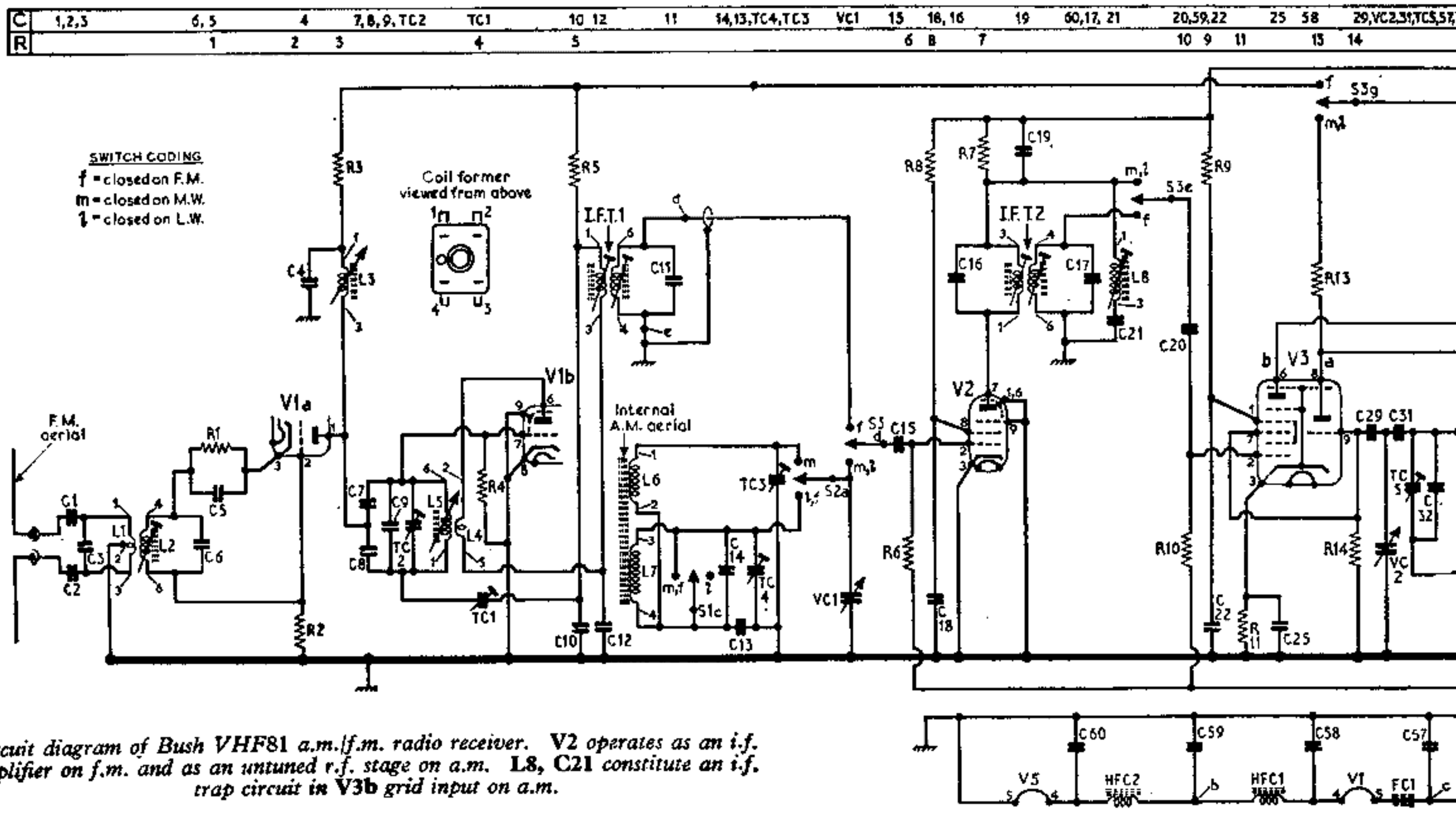
2.—Connect the signal generator via the 0.1μF isolating capacitor between **V4** pin 2 and chassis. Feed in a 470kc/s 30 per cent modulated signal and adjust the cores of **IFT6** for maximum output.

3.—Transfer the signal generator to **V3** pin 2 and adjust the cores of **IFT3** for maximum output.

4.—Transfer the signal generator to **V2** pin 2 and adjust the core of **L8** for *minimum* output.

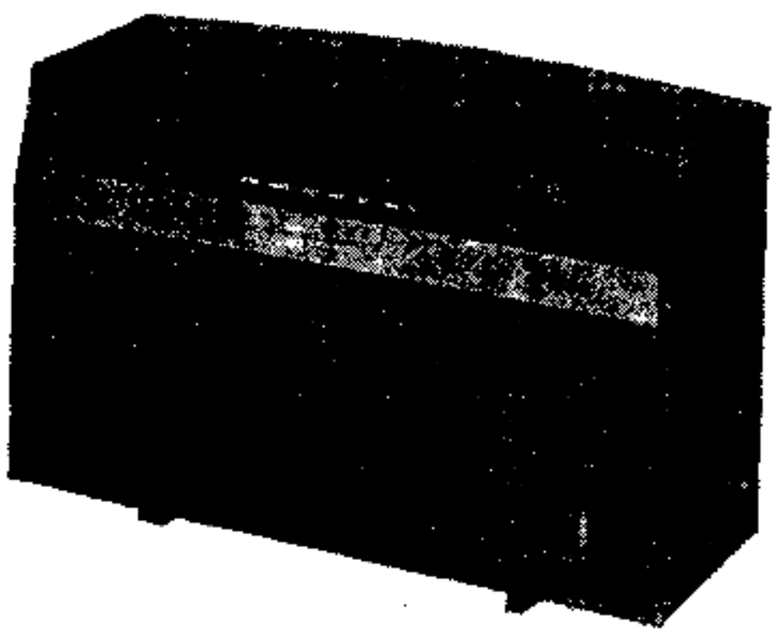
5.—Connect the signal generator to the r.f. coupling loop and loosely couple

(*Continued overleaf, col.* 1)



Circuit diagram of Bush VHF81 a.m./f.m. radio receiver. **V2** *operates as an i.f. amplifier on f.m. and as an untuned r.f. stage on a.m.* **L8, C21** *constitute an i.f. trap circuit in* **V3b** *grid input on a.m.*

ree-Waveband A.M./F.M. Table Radio Receiver



Appearance of the Bush VHF81

COMPONENT VALUES AND LOCATIONS

Resistors

R1	82Ω	H6
R2	27Ω	H6
R3	2·2kΩ	H6
R4	100kΩ	H6
R5	6·8kΩ	H5
R6	680kΩ	B2
R7	2·2kΩ	B2
R8	10kΩ	B2
R9	10kΩ	B2
R10	680kΩ	B2
R11	10Ω	B2
R12	1kΩ	B2
R13	15kΩ	E3
R14	47kΩ	B2
R15	2·2kΩ	B1
R16	22kΩ	B2
R17	1kΩ	A2
R18	100Ω	A2
R19	22kΩ	B2
R20	2·2MΩ	B2
R21	330kΩ	A2
R22	100kΩ	A2
R23	22kΩ	A2
R24	1·5kΩ	F3
R25	6·8MΩ	A2
R26	180kΩ	A2
R27	8.2kΩ	F3
R28	1MΩ	A2
R29	10kΩ	A1
R30	5·6kΩ	A1
R31	47kΩ	A2
R32	1·2kΩ	F4
R33	220Ω	A2
R34	2·7kΩ	F3
R35	150Ω	F3
R36	680Ω	E3
R37	47kΩ	A2
RV1	1MΩ	G3

Capacitors

C1	470pF	B4
C2	470pF	D4
C3	15pF	H6
C4	560pF	H6
C5	560pF	H6
C6	10pF	D4
C7	22pF	H6
C8	22pF	H6
C9	5·6pF	H5
C10	47pF	H6
C11	47pF	C2
C12	10pF	H6
C13	7,500pF	E3
C14	120pF	F3
C15	270pF	B2
C16	47pF	E4
C17	47pF	E4
C18	4,700pF	B2
C19	33pF	B2
C20	270pF	B2
C21	47pF	C2
C22	4,700pF	B2
C23	47pF	F4
C24	150pF	E4
C25	4,700pF	B2
C26	4,700pF	B2
C27	47pF	F4
C28	150pF	F4
C29	100pF	B2
C30	0·01μF	B2
C31	515pF	B2
C32	450pF	B2
C33	1,000pF	B2
C34	4,700pF	B2
C35	150pF	G4
C36	10pF	G4
C37	0·04μF	B2
C38	4,700pF	A2
C39	560pF	B2
C40	2,200pF	B2
C41	150pF	G4
C42	47pF	G4
C43	100pF	A2
C44	0·01μF	G4
C45	270pF	A2
C46	5μF	G4
C47	3,000pF	G3
C48	20μF	F3
C49	0·01μF	A2
C50	0·01μF	A2
C51	3,000pF	A2
C52	40μF	F3
C53	0·04μF	F3
C54	40μF	F3
C55	2,200pF	B2
C56	2,200pF	B2
C57	560pF	H6
C58	560pF	H6
C59	560pF	H5
C60	2,200pF	A2
C61	0·02μF	G3
C62	100pF	A2
TC1	15pF	H6
TC2	15pF	H6
TC3	30pF	F3
TC4	30pF	F3
TC5	40pF	E4
TC6	40pF	E4
VC1	528pF	B3
VC2	528pF	E4

*Coils**

L1	—	D4
L2	—	D4
L3	—	H6
L4	—	H6
L5	—	H5
L6	—	E3
L7	—	D3
L8	18·0	C2
L9	1·5	E4
L10	4·8	E4
L11	—	—

*Transformers**

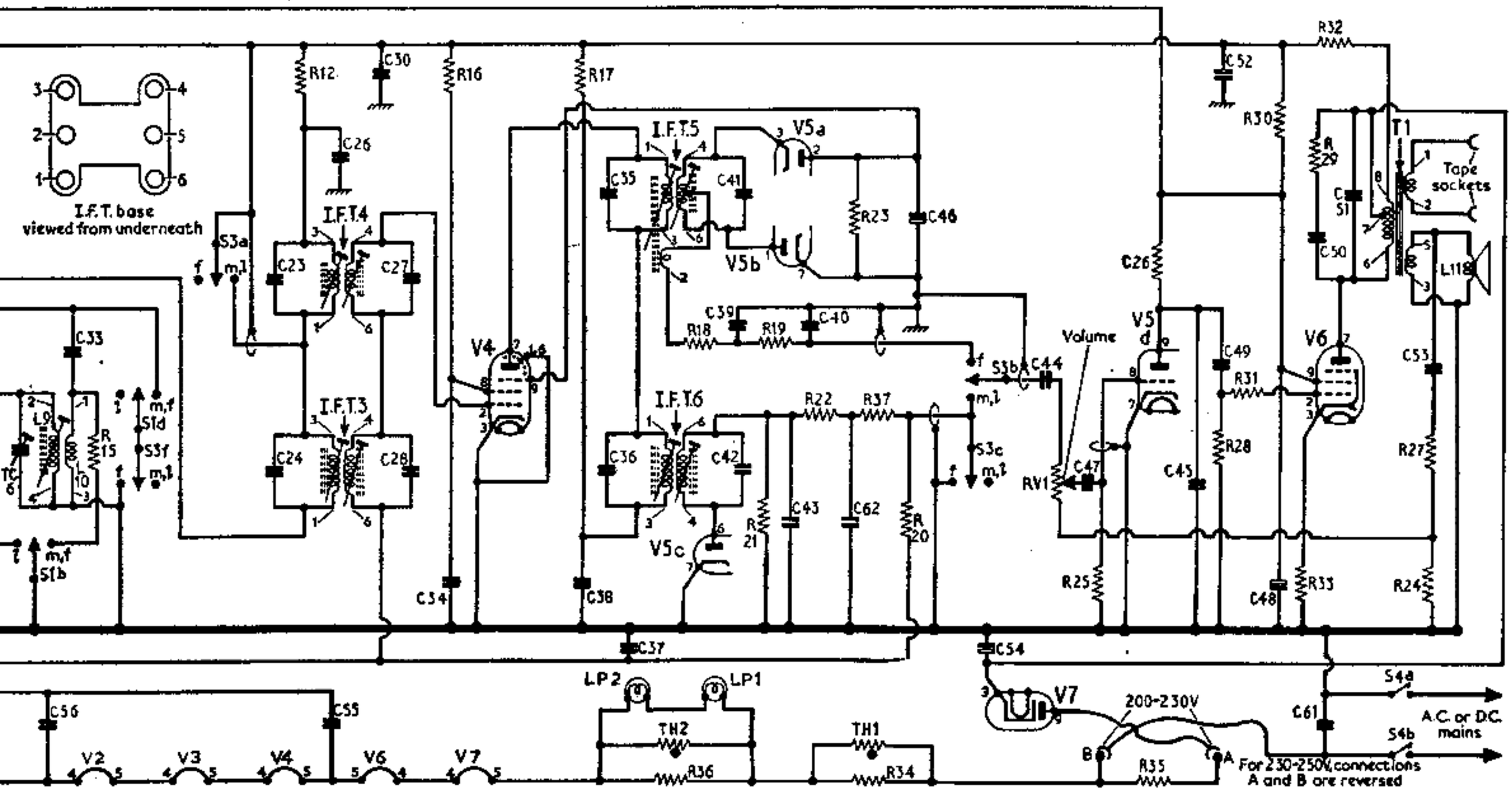
IFT1	—	C2
IFT2	—	E4
IFT3 pri.	14·0	F4
IFT3 sec.	14·0	F4
IFT4	—	F4
IFT5	—	G4
IFT6 pri.	14·0	G4
IFT6 sec	14·0	G4
T1 pri	600·0	F4
T1 sec.	—	F4

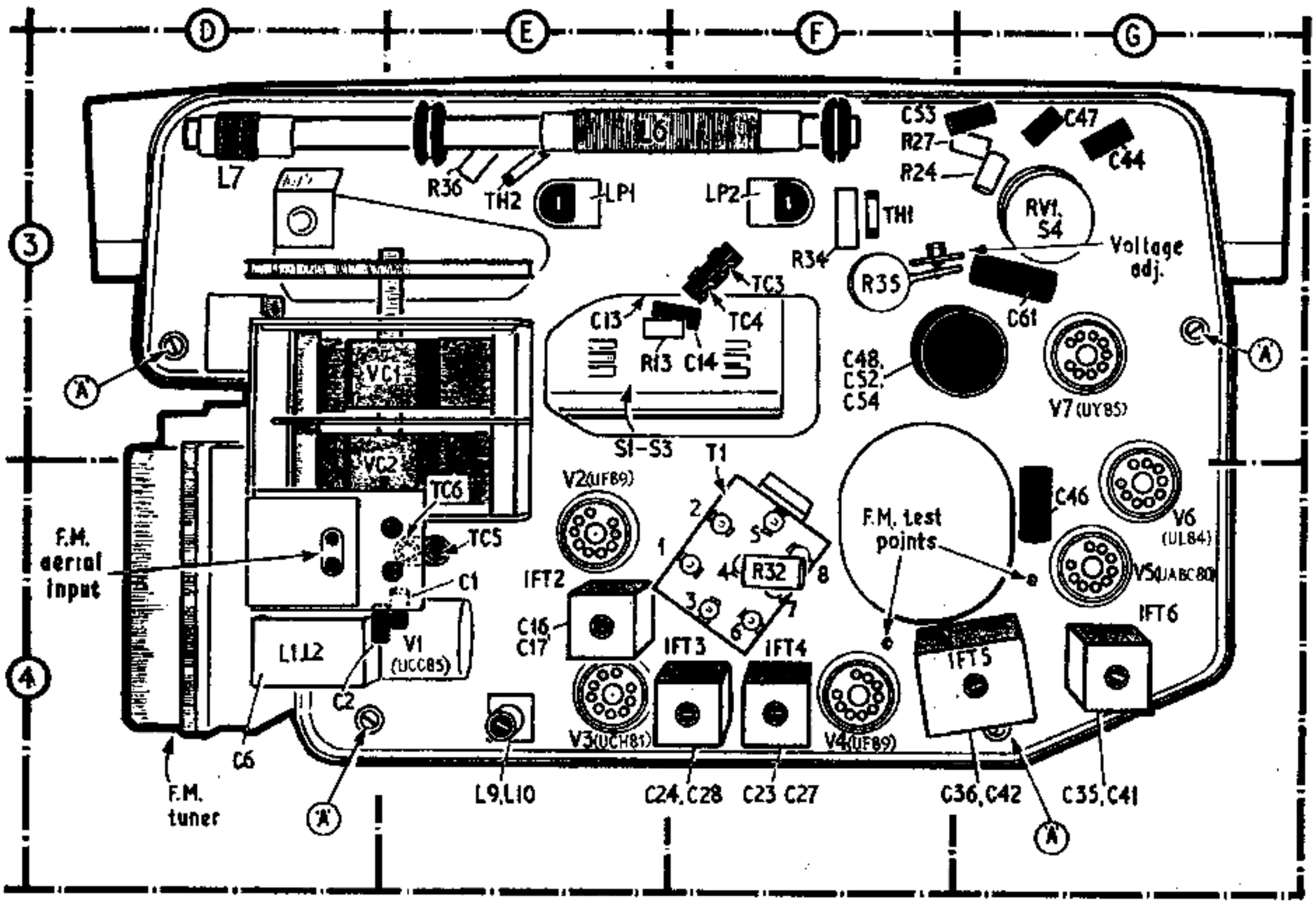
Miscellaneous

FC1	—	H6
LP1	6·3V 115mA M.E.S.	F3
LP2	6·3V 115mA M.E.S.	F3
S1-S3	—	B2
S4	—	G3
TH1	VA1010	F3
TH2	VA1010	E3
HFC1	—	H6
HFC2	—	A2

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

57,52,TC6,56,33	23,24	55,26	30, 27,28, 34	38, 35,36,37	39,41,42,43,40	62	46	54	44	47	45,52,49	48	50, 61,51	53	C
15	12	16	17	TH2,36,18	21,19	22	23,37,TH1,34,20	RV1	25	26,35	28,31	30,33,29,32	27,24	R





Left: The metal chassis as seen from the rear showing valve positions and alignment adjustment locations

Right: Front view of the chassis giving component locations. Tags a-e on the f.m. tuner (location reference C2) identify the tuner connections with the main chassis

Continued—

the loop to the receiver by placing it about three feet from the receiver with its plane at right-angles to the ferrite rod aerial. Check that with the tuning gang at maximum capacitance, the cursor is in line with the datum marks at the l.f. end of the scale.

6.—Switch receiver to m.w. and set the cursor at 500m. Feed in a 600kc/s signal and adjust **L9** for maximum output.

7.—Set the cursor to 200m, feed in a 1,500kc/s signal and adjust **TC6** for maximum output.

8.—Repeat operations 6 and 7 and check calibration.

9.—Set the cursor to 200m, feed in a 1,500kc/s signal and adjust **TC3** for maximum output.

10.—Switch receiver to l.w. and set the cursor to 1,400m. Feed in a 214kc/s signal and adjust **TC5** and **TC4** for maximum output. Seal trimmers.

F.M. CIRCUITS

In **IFT1, IFT2** and **IFT4** the primary core is adjusted from the base, and the secondary core from the top of the can. In **IFT5** (discriminator) the primary core is adjusted from the top, and the secondary core from the base of the can. With the exception of **IFT5** primary the correct peak is that which occurs with the core in the outer position. The primary of **IFT5** should be peaked with the core in the inner position.

1.—Switch receiver to f.m. and set **IFT2** and **IFT4** primary and secondary cores to be $\frac{1}{8}$in inside the coil former. Set the primary core of **IFT5** to be $\frac{3}{4}$in inside the former and the secondary core to $\frac{1}{8}$in inside the former. Turn the volume control fully anti-clockwise.

2.—Connect the Avometer switched to a suitable d.c. voltage range between the negative end of **C46** and chassis (positive terminal to chassis). Connect the signal generator via the 0.1μF capacitor to **V3** pin 2.

3.—Feed in a 10.7Mc/s signal and adjust the input level to produce an output of 4V on the d.c. meter. (Maintain this output level throughout alignment by reducing the signal input as necessary.)

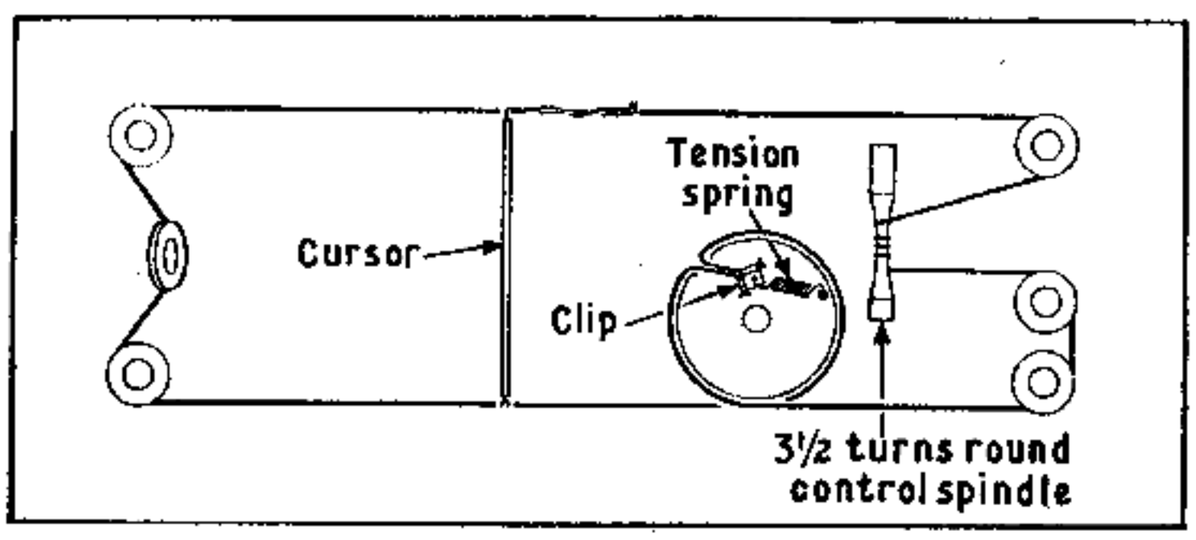
4.—Adjust **IFT5** primary for maximum reading on the d.c. meter.

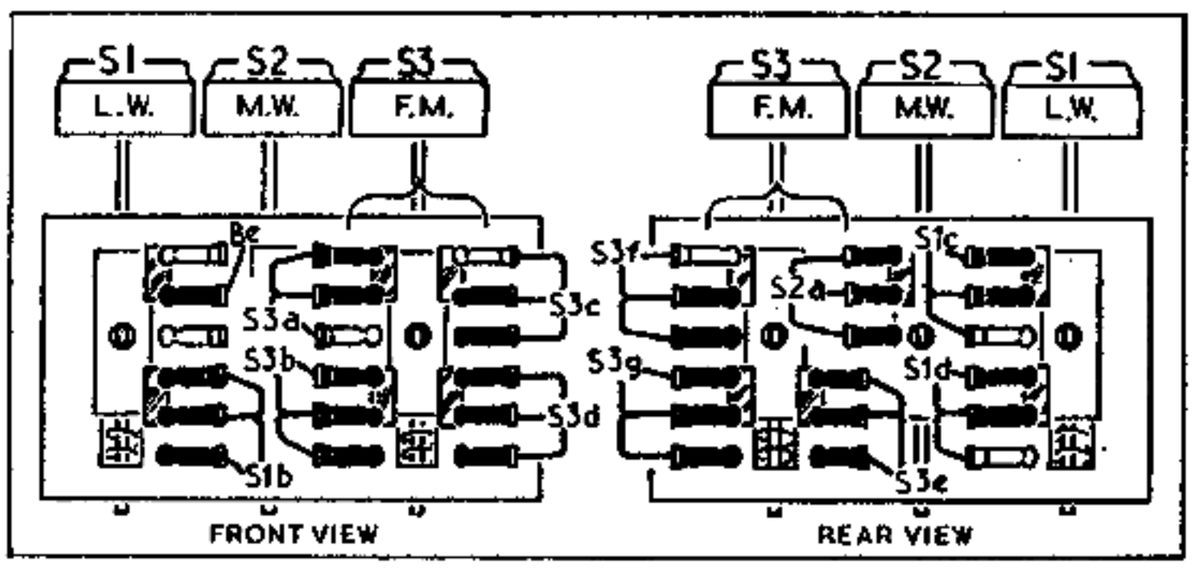
5.—Connect the two matched 47kΩ resistors in series across **C46**, and connect the Avometer (switched to a suitable μA range) between their junction and the junction **R18, R19, C39.** Adjust **IFT5** secondary for zero reading on the meter.

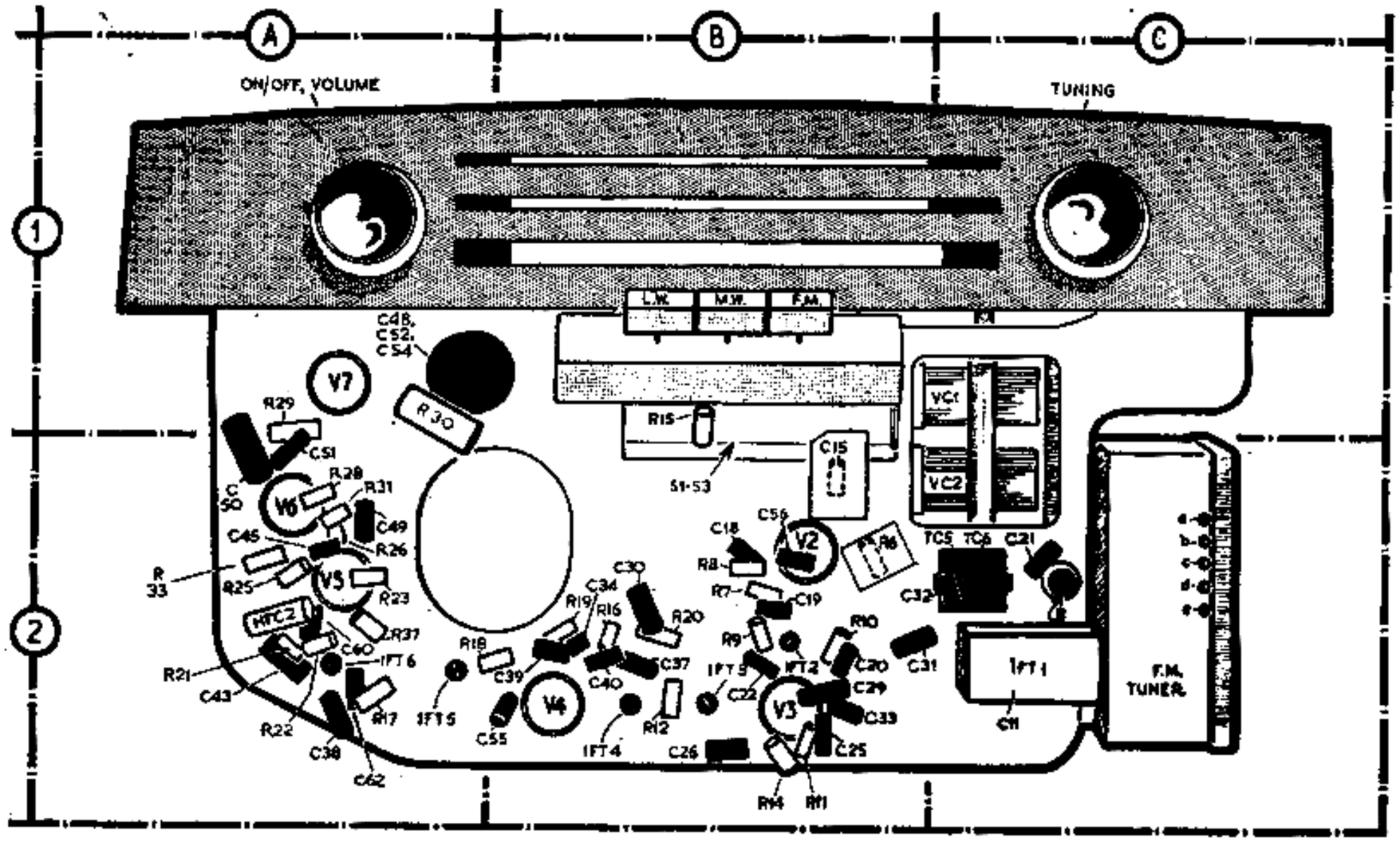
6.—Reconnect the Avometer as in operation 2. Connect the 1kΩ damping resistor across **IFT4** secondary and adjust the primary core for maximum meter reading. Then transfer the damping resistor to **IFT4** primary and adjust the secondary core for maximum meter reading.

7.—Transfer the signal generator to **V2** pin 2. Connect the damping resistor across **IFT2** secondary and adjust the primary core for maximum meter reading. Then transfer the damping resistor to **IFT2** primary and adjust the secondary for maximum meter reading. Remove the 1kΩ damping resistor.

The drive cord assembly (below left) seen from the front, and (below) front and rear views of the waveband switch assembly







8.—Readjust the primary of **IFT5** for maximum meter reading, then connect the meter as in operation 5 and readjust the secondary of **IFT5** for zero meter reading.

9.—Reconnect the Avometer as in operation 2. Transfer the signal generator to the f.m. aerial sockets. Connect the 1kΩ damping resistor across **IFT2** primary and adjust **IFT1** secondary for maximum meter reading. Remove the damping resistor.

10.—Tune receiver to 87.5Mc/s and feed in an 87.5Mc/s unmodulated signal. Slacken the f.m. tuning pivoted adjuster locking screw (see sketch) and rotate the adjusting arm (thus moving the cores of **L3** and **L5**), for maximum meter reading.

11.—Tune receiver to 94Mc/s. Feed in a 94Mc/s signal and adjust **L2** for maximum meter reading.

Note: The setting of **TC2** and mechanical adjustment of **L3** coil former have been carefully carried out at the factory for minimum oscillator radiation, and are unlikely to require further attention.

DISMANTLING

Chassis Removal.—To remove the chassis from the cabinet, it is best to place the receiver in a face-downwards position.

Remove the back cover by taking out four Phillips-head screws.

Slide out the heat deflector from inside the top of the cabinet.

Unscrew five screws securing the chassis to the cabinet brackets (screws "A" on main chassis diagram).

Withdraw the chassis complete with control knobs and tuning scale, tilting slightly to allow the glass scale to clear the cabinet brackets. Unplug the loudspeaker leads from the output transformer if required.

V.H.F. Tuner Unit Removal.—To remove the v.h.f. tuner unit, first remove the chassis as just described.

Disconnect the five soldered connections "a-e" (see f.m. tuner diagram).

Remove the locking screw and washer securing the pivoted calibration adjuster, located in the curved slot of the tuning drum.

Remove the cord loop from the boss on the pivoted adjuster.

Remove two 6BA screws which retain the v.h.f. unit and aerial socket assembly to the tuning capacitor bracket.

Remove the 6BA screw retaining the v.h.f. tuner to the tuning capacitor bracket (top centre of unit) and two 6BA screws retaining the unit to the lower chassis fixing bracket. Lift the unit clear of the chassis.

GENERAL NOTES

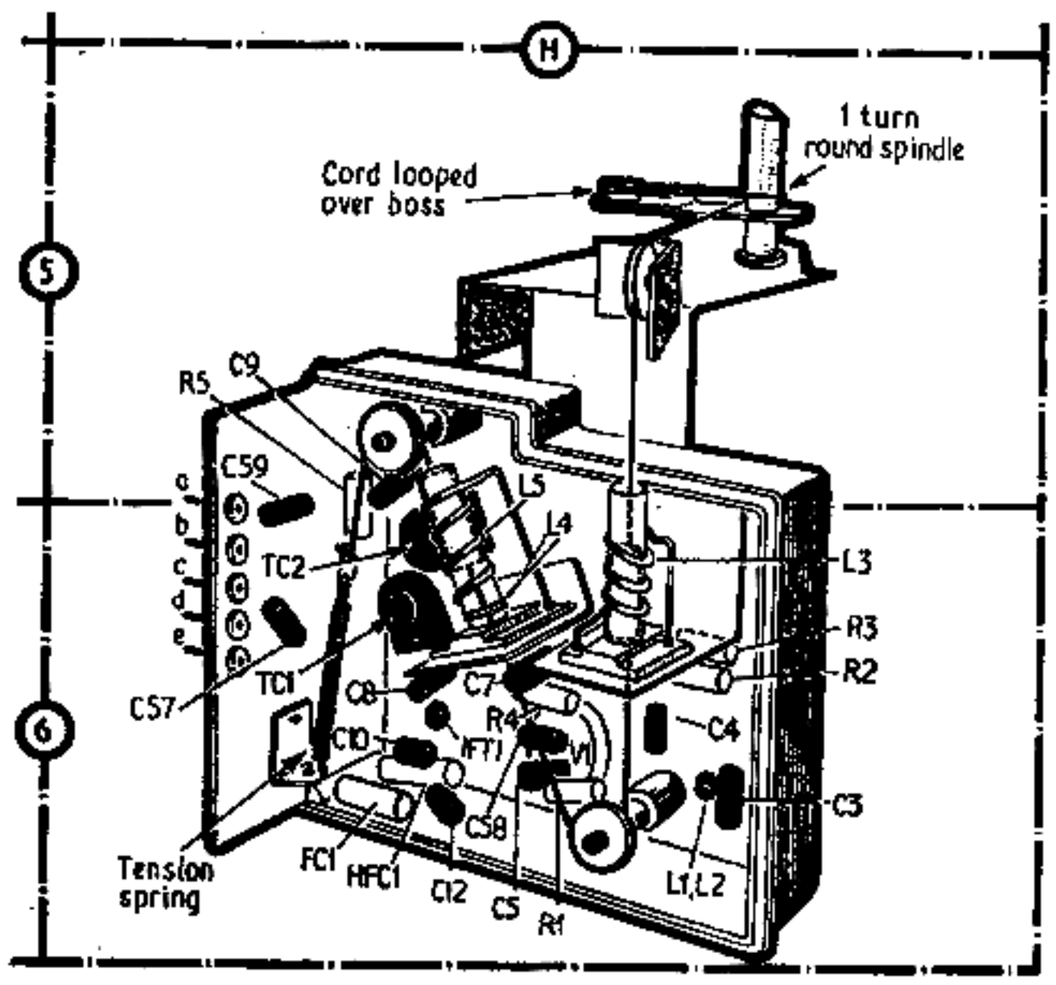
Main Drive Cord Replacement.—To fit a replacement main tuning drive cord, remove the chassis from the cabinet as described under "Dismantling." Loosen two 6BA screws securing the scale lamps at each side of the chassis. Slacken the 4BA screws securing the control knobs but do not attempt to withdraw the knobs through the holes in the tuning scale. Lift the tuning scale with the control knobs clear of the chassis. Remove the old cord and route the replacement as shown in the sketch in col. 1.

F.M. Tuning Cord Replacement.—If a breakage occurs in either the tuning cord or the cores, the complete assembly should be replaced.

Remove the chassis from the cabinet as described under "Dismantling." Remove the die-cast cover from the f.m. unit. Set the a.m. tuning capacitor to minimum and remove the locking screw and washer of the pivoted adjuster, located in the curved slot of the tuning drum. Unhook and remove the cord assembly from the return spring, and from the pivoted adjuster and fit the new assembly as shown in the f.m. tuner unit illustration.

When reassembling, check that with the tuning gang at maximum capacitance, the cursor is in line with the datum marks at the right-hand end of the scale. Set the pivoted adjuster as described in operation 10 of "Circuit Alignment" (F.M. Circuits).

Switches.—**S1-S3** are the waveband switches comprising a press-button unit shown on the chassis diagram in location reference B1, with details drawn separately in col. 3. On the circuit diagram the switch contacts are lettered in accordance with a coding key indicating their closed position. **S4** is a double-pole mains on/off switch which is ganged with the volume control.



View of the f.m. tuner unit with the screening cover removed showing component locations and the tuning drive assembly. To fit a new tuning drive (which should be replaced as a complete assembly) see "F.M. Tuning Cord Replacement" in col. 6

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