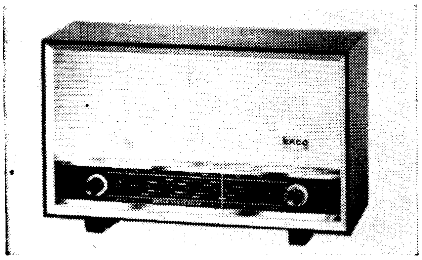
"TRADER" SERVICE SHEET

1448

EKCO U353

A.M./F.M. Table Receiver



Appearance of the Ekco U353.

THE Ekco U353 is a 5-valve, plus rectifier and tuning indicator, A.M./F.M. table receiver housed in a plastics cabinet and designed to operate from A.C. or D.C. mains of 200-250V, 50 c/s in the case of A.C. Mains consumption is 45W. It is fitted with internal A.M. and F.M. aerials; provision is made for the connection of external aerials and an external speaker. The tuning ranges are 183-555m (M.W.), 1,154-2,000m (L.W.), 85.5-101.5Mc/s (F.M.).

Release date and original price: August, 1959, £15 10s. Purchase tax extra.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information. Voltages were measured with a model 8 Avometer, chassis being the negative connection in every case. The receiver was operating from 240V A.C. mains and was tuned to 300m for A.M. readings, and to 94Mc/s for F.M. readings. Smoothed H.T. voltage measured at **C58** was 180V on A.M., and 170V on F.M.

Valve Table

Valve		Anode V	Anode mA	Screen V	Screen mA	Cath. V
V1a UCC85	*	—	—	—	—	—
	†	155[1]	—	—	—	—
V1b UCC85	*	—	—	—	—	—
	†	168[2]	—	—	—	—
V2a UCH81	*	70	3·1	—	—	—
	†	—	—	—	—	—
V2b UCH81	*	182	4·1	130	8·1	2·4
	†	168	8·7	134	5·6	2·2
V3 UF89	*	157	10·0	137	3·5	2·8
	†	145	9·0	125	3·3	2·5
V4d UABC80	*	65	0·4	—	—	—
	†	62	0·4	—	—	—
V5 UL84	*	192	53·0	156	2·6	10·5
	†	184	49·0	144	2·4	9·5
V6 UY85	*	240[3]	110·0	—	—	243·0[4]
	†	235[3]	118·0	—	—	235·0[5]
T.I. DM70	*	83	—	—	—	—
	†	78	—	—	—	—

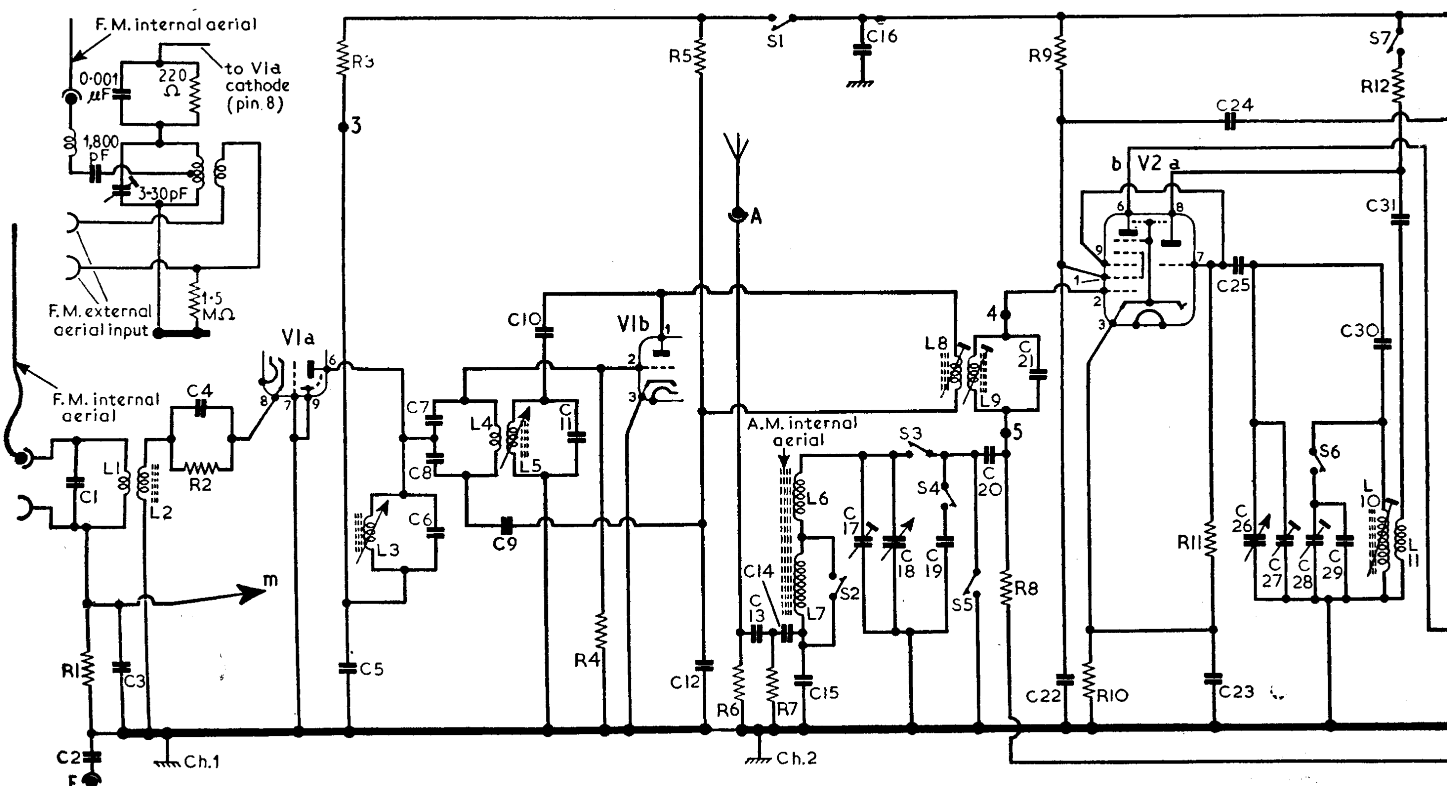
**Set switched to A.M.*
†Set switched to F.M.
[1] *Measured at the junction of* **R3, C5.**
[2] *Measured at the junction of* **R3, R5.**
[3] *A.C. reading.*
[4] *Cathode current 80mA.*
[5] *Cathode current 85mA.*

CIRCUIT DESCRIPTION

M.W. aerial coil **L6** is tuned by **C17** and **C18**; for L.W. reception, **L6** and **L7** are connected in series, additional tuning capacitance being provided by **C19**. **L6** and **L7** are mounted on a ferrite rod to form an internal aerial, while provision is made for the connection of an external aerial via **R6, C13, R7** and the capacitive potential divider **C14, C15.**

Heptode section, **b,** of **V2** operates as A.M. mixer, and triode section, **a,** as local oscillator. Oscillator grid coil **L10** is tuned by **C26** and **C27** on M.W., and, in addition, by **C28** and **C29** on L.W. Reaction coupling from **V2a** anode by **C31** and **L11.**

V3 is a variable-mu R.F. pentode operating as an intermediate frequency amplifier with A.M. transformer



Circuit diagram of the Ekco U353 and, inset, a section of circuit showing the differences in the F.M. input circuit incorporated in later versions. Where the later input circuit is used, the connection between the speech coil **L21** *and the junction of* **R1, C3** *(indicated at* **m** *in the diagram), is omitted.*

couplings **L14, L15** and **L19, L20.** The primary winding of the F.M. I.F. transformer **L12, L13** is short-circuited by **S8.**

A.M. intermediate frequency 470kc/s.

Diode section **c** of triple-diode-triode valve **V4** operates as A.M. detector. The audio frequency component in its rectified output is developed across diode load **R19** and **R21,** and fed via A.M. switch **S11,** volume control **R25,** and coupling capacitor **C50** to **V4d,** which operates as a grid-current biased A.F. amplifier. R.F. filtering by **C45, R19** and **C46.**

The D.C. component of the rectified signal developed across **R21** is fed to the grid of tuning indicator **T.I.** and also, via decoupling circuit **R18, C39,** to **V2b** and **V3** as A.G.C. bias.

The amplified A.F. output of **V4d** is developed across **R27** and coupled via **R28, C53,** and tone control **R31** to pentode output valve **V5.** Tertiary winding **c** on output transformer **T1** provides negative feedback to the input circuit of **V4d.**

H.T. current is supplied by half-wave rectifying valve **V6.** Smoothing by **R36** and electrolytic capacitors **C57** and **C58.**

Operation on F.M.

F.M. aerial input is coupled via **L1, L2** to the earthed-grid R.F. amplifier **V1a.** Amplified output of **V1a** is developed across permeability tuned circuit **L3, C6,**

(*Continued overleaf, col.* 1)

If component numbers in these tables are used when ordering spares, the fact should be mentioned, as these numbers may differ from those used by the manufacturer.

COMPONENT VALUES AND LOCATIONS

Resistors

R1	1·5MΩ	B2
R2	220Ω	H5
R3	1·5kΩ	A1
R4	1MΩ	H5
R5	4·7kΩ	H6
R6	1·5MΩ	B1
R7	3·3kΩ	B1
R8	470kΩ	G4
R9	5·6kΩ	G4
R10	150Ω	G4
R11	47kΩ	G4
R12	33kΩ	F4
R13	2·2kΩ	G4
R14	12kΩ	F4
R15	180Ω	F4
R16	2·2kΩ	E4
R17	82Ω	F4
R18	2·2MΩ	G4
R19	47kΩ	E4
R20	47kΩ	F3
R21	220kΩ	E3
R22	1·8kΩ	E4
R23	1MΩ	E4
R24	47kΩ	E4
R25	820kΩ	D3
R26	10MΩ	E4
R27	220kΩ	E4
R28	47kΩ	E4
R29	68kΩ	E3
R30	68kΩ	E3
R31	820kΩ	D3
R32	10kΩ	E4
R33	820Ω	D4
R34	150Ω	E4
R35	56Ω	D3
R36	330Ω	D4
R37	100Ω	C2
R38	414Ω	C2
R39	300Ω	C2

Capacitors

C1	8·2pF	H5
C2	0·01μF	G4
C3	1,800pF	A1
C4	0·001μF	H5
C5	0·001μF	H5
C6	3pF	H5
C7	8·2pF	H5
C8	6pF	H5
C9	12pF	H6
C10	10pF	H6
C11	17pF	H6
C12	44pF	H6
C13	470pF	B1
C14	0·01μF	B1
C15	4,700pF	B1
C16	0·01μF	F4
C17	30pF	B2
C18	—	A2
C19	150pF	G3
C20	0·001μF	G4
C21	8·2pF	H6
C22	0·005μF	G4
C23	0·03μF	G4
C24	0·01μF	G4
C25	82pF	G4
C26	—	A1
C27	30pF	B1
C28	30pF	B1
C29	435pF	F3
C30	495pF	F3
C31	200pF	F4
C32	10pF	A2
C33	15pF	A2
C34	100pF	A2
C35	100pF	A2
C36	0·005μF	F4
C37	0·03μF	F4
C38	0·01μF	F4
C39	0·03μF	F4
C40	15pF	B2
C41	22pF	B2
C42	220pF	E3
C43	350pF	B2
C44	350pF	B2
C45	220pF	F4
C46	220pF	F4
C47	220pF	E4
C48	2μF	F4
C49	500pF	F3
C50	0·01μF	E3
C51	220pF	E4
C52	32μF	E3
C53	0·01μF	L4
C54	0·003μF	D3
C55	2μF	E4
C56	25μF	E4
C57	40μF	E4
C58	40μF	E4
C59	470pF	D4
C60	0·01μF	E3
C61	0·03μF	E4
C62	0·01μF	A1
C63	0·001μF	H5
C64	0·01μF	H5

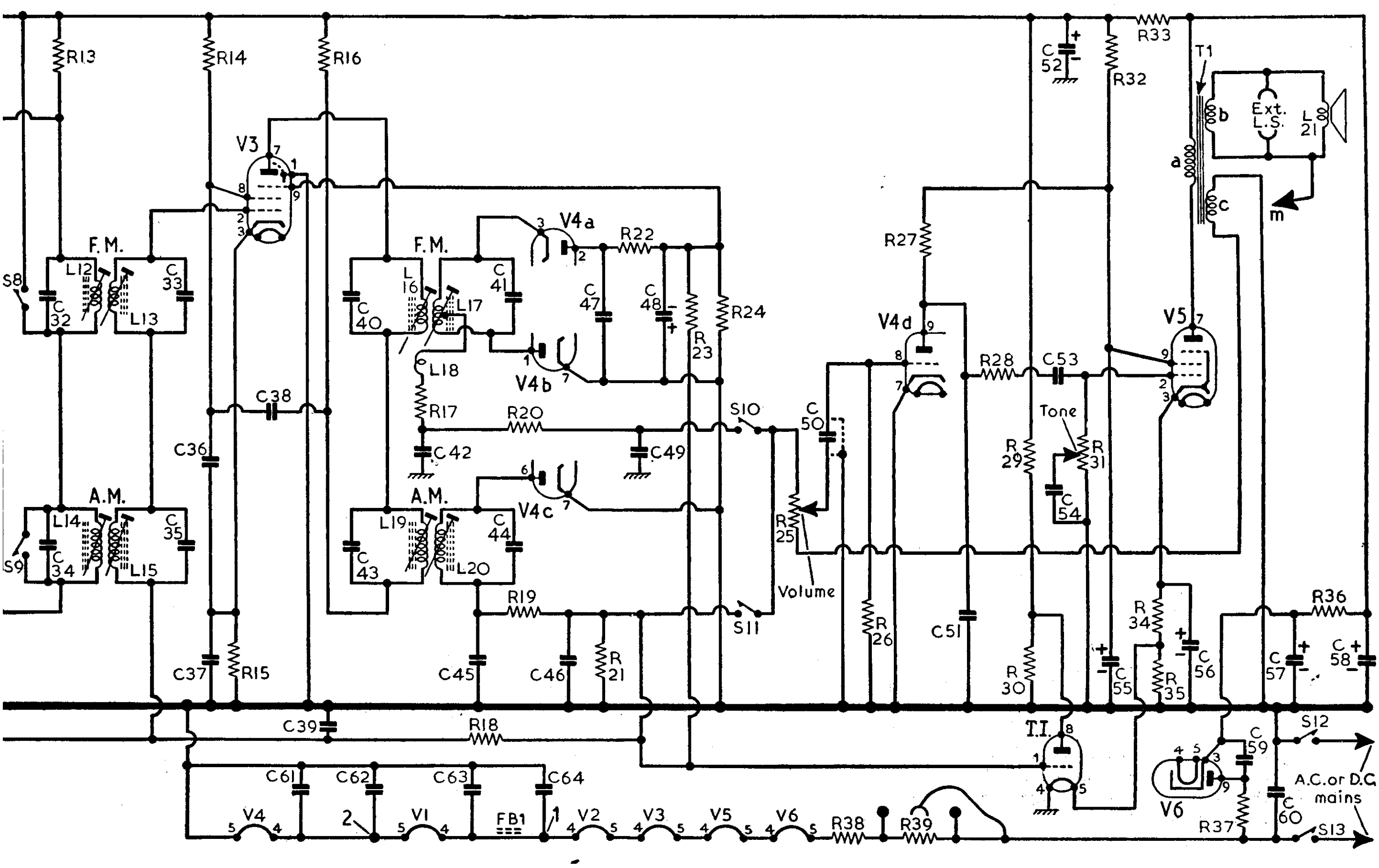
Coils*

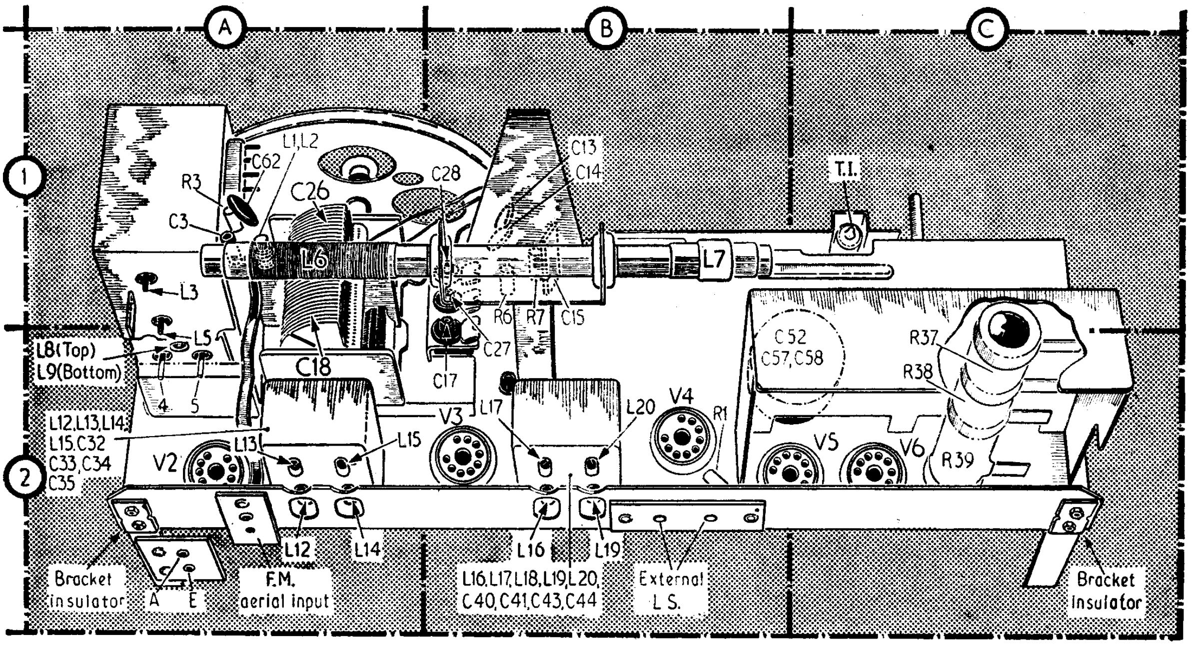
L1	—	A1
L2	—	A1
L3	—	H5
L4	—	H6
L5	—	H6
L6	—	A1
L7	8·0	E1
L8	—	H6
L9	—	H6
L10	2·0	F3
L11	1·0	F3
L12	—	A2
L13	—	A2
L14	10·0	A2
L15	10·0	A2
L16	—	B2
L17	—	B2
L18	—	B2
L19	6·0	B2
L20	6·0	B2
L21	3·0	—

Miscellaneous*

T1	a	330·0	D4
	b	0·4	
	c	—	
FB1		—	H5
S1-S11		—	G3
S12, S13		—	D3

*Approximate D.C. resistance in ohms.





Plan view of the chassis. Components which are hidden by the ferrite rod aerial assembly and the metal screen of **V5, V6** *are shown dotted. The screen is shown cut away to reveal* **R37** *and* **R38.** *The resister shown as* **R38** *is actually* **R39,** *and* **R39** *is* **R38.**

Circuit Description—*continued*

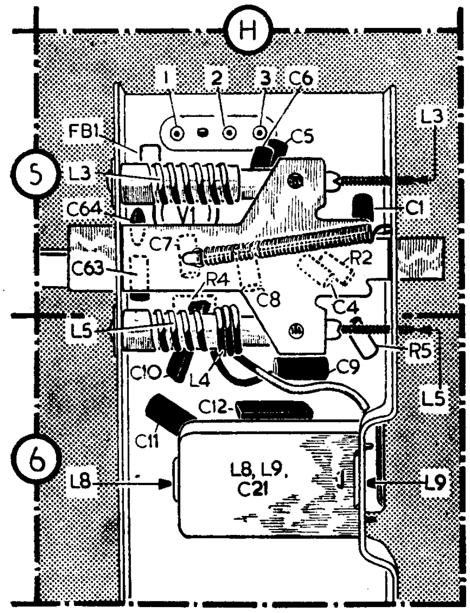
and coupled via **C7, C8** to **V1b,** which operates as a self-oscillating mixer.

V2b and **V3** are employed as F.M. intermediate frequency amplifiers with transformer couplings **L8, L9; L12, L13;** and **L16, L17, L18.** Triode section **a** of **V2** is muted on F.M. by **S7,** which disconnects the H.T. supply to its anode.

F.M. intermediate frequency 10.7Mc/s.

Diode sections **a** and **b** of **V4** are employed in a conventional ratio detector circuit. The A.F. output is developed across **C42,** and is fed via de-emphasis circuit **R20, C49,** F.M. switch **S10,** to volume control **R25.**

The D.C. voltage developed across stabilizing capacitor **C48** varies with signal amplitude, and is fed to the suppressor grid of **V3** and, via decoupling circuit **R23, R18, C39,** to the control grid circuits of **V2b, V3** as A.G.C. bias.



A side view of the F.M. tuner unit with its screening cover removed. Components which are hidden by the tuning core carriage are shown dotted.

CIRCUIT ALIGNMENT

Equipment Required.—An A.M. signal generator, modulated 30 per cent at 400c/s; an F.M. signal generator, deviated by ±25kc/s; an A.C. voltmeter for use as an audio output meter; a 0-50μA meter for use as a D.C. output meter; a matched pair of 220kΩ resistors; a damping unit comprising a 4.7kΩ resistor and a 0.001μF capacitor connected in series; a 0.1μF capacitor; and a screwdriver-type trimming tool.

A.M. Alignment

1.—Connect the audio output meter across the external speaker sockets, and the A.M. signal generator to the control grid (pin 2) of **V2b** via the 0.1μF capacitor.

2.—Switch the receiver to M.W. and turn the tuning and volume controls fully clockwise. Set the tone control for maximum top response.

3.—Feed in a modulated 470kc/s signal and adjust the cores of **L20, L19** (B2) and **L15, L14** (A2), in that order, for maximum output.

4.—Transfer the signal generator output to the A.M. aerial socket and tune the receiver to 500m. Feed in a 600kc/s signal and adjust the core of **L10** (F3) for maximum output.

5.—Tune the receiver to 200m. Feed in a 1,500kc/s signal and adjust **C27** (B1) for maximum output.

6.—Tune the receiver to 500m. Feed in a 600kc/s signal and slide the former of **L6** (A1) along the ferrite rod for maximum output.

7.—Tune the receiver to 214m. Feed in a 1,400kc/s signal and adjust **C17** (B2) for maximum output.

8.—Check the calibration at 550m (545.4kc/s), 350m (857kc/s) and 200m (1,500kc/s).

9.—Switch the receiver to L.W. and tune it to 1,400m. Feed in a 214.3kc/s signal and adjust **C28** (B1) for maximum output. Then slide the former of **L7** (B1) along the ferrite rod for maximum output.

10.—Check the calibration at 1,800m (166.7kc/s) and 1,200m (250kc/s).

F.M. Alignment

1.—Connect the matched pair of 220kΩ resistors in series across **C48** (location reference F4). Connect the 0-50μA meter between chassis and the junction of the two 220kΩ resistors, and the F.M. signal generator to the control grid (pin 2) of **V3.**

2.—Switch the receiver to V.H.F. and tune it to the low frequency end of the band. Feed in an unmodulated 10.7Mc/s signal and adjust the core of **L16** (B2) for maximum reading on the meter.

3.—Transfer the micro-ammeter chassis connection to the junction of **R17, R20** (location reference F3). Feed in an unmodulated 10.7Mc/s signal and adjust the core of **L17** (B2) for a zero reading on the meter. This will occur mid-way between a positive and negative peak.

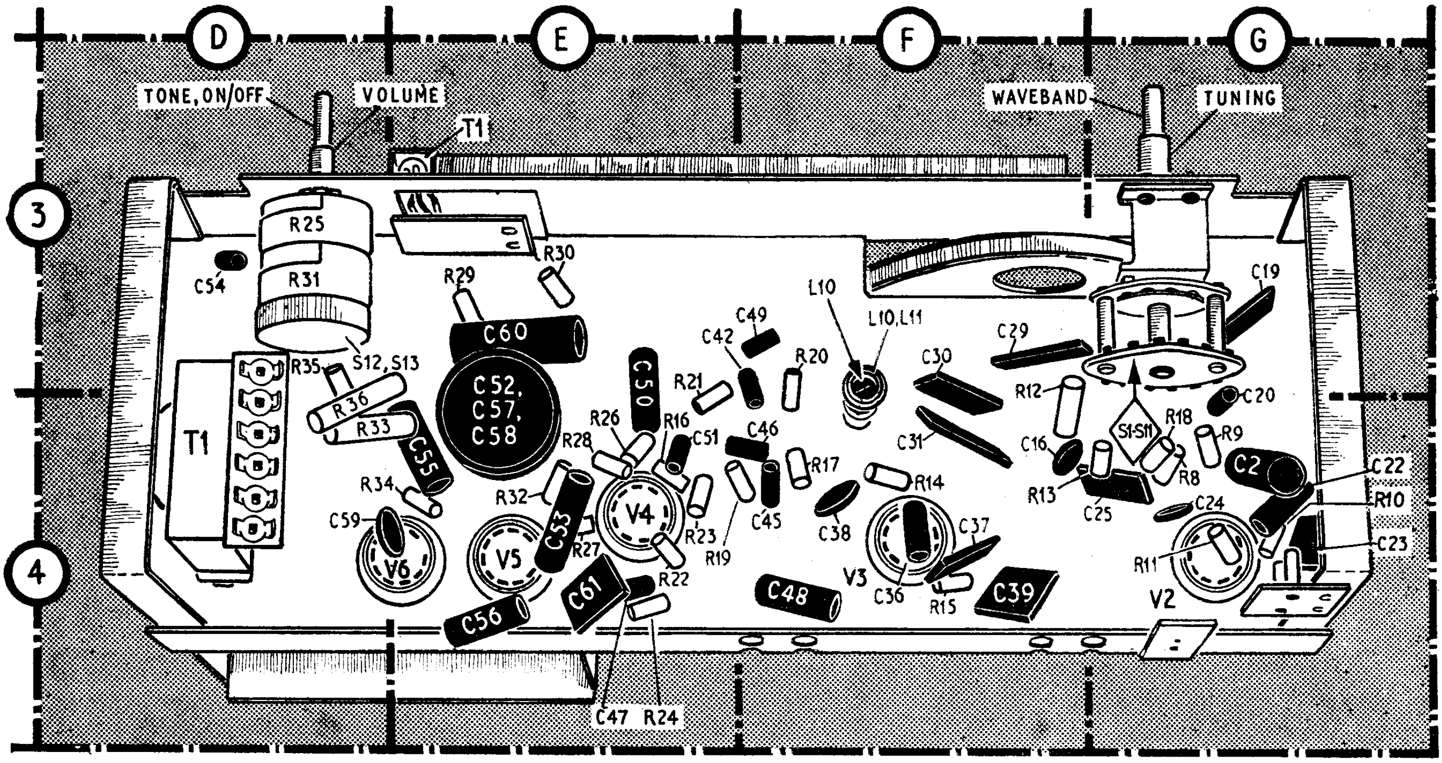
4.—Connect the micro-ammeter between chassis and the junction of the two 220kΩ resistors. Transfer the signal generator output to the control grid (pin 2) of **V2.**

5.—Connect the damping unit across **L12.** Feed in a 10.7Mc/s signal, deviated by ±25kc/s, and adjust the core of **L13** (A2) for maximum output, keeping the generator output as low as practicable. Transfer the damping unit to **L13** and adjust the core of **L12** (A2) for maximum output.

6.—Transfer the signal generator output to the junction of **R3, C5** (location reference A1), taking care to use a blocking capacitor as this point is at H.T. potential. Transfer the damping unit to **L9.** Feed in a 10.7Mc/s signal, deviated by ±25kc/s, and

Switch Table

Switches	F.M.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	C	C
S4	—	—	C
S5	C	—	—
S6	—	—	C
S7	—	C	C
S8	—	C	C
S9	C	—	—
S10	C	—	—
S11	—	C	C



Underside view of the chassis. The tags on the output transformer **T1**, *considered from the top in our illustration, are connected as follows (see also circuit overleaf): 1, chassis; 2, volume control* **R25**; 3, **V5** *anode; 4, H.T.; 5, speaker; 6, speaker and* **R1**.

adjust the core of **L8** (H6) for maximum output. Then damp **L8** and adjust **L9** (H6) for maximum output. Remove the damping resistor.

7.—Check that with the tuning control turned fully clockwise the carriage of **L3, L5** tuning cores is 1/32in from its fully open position, and that the cursor coincides with the datum marks at the right-hand end of the tuning scale. If necessary, the position of the core carriage may be adjusted by loosening the two screws on the drive drum and rotating it on its spindle.

8.—Transfer the signal generator output to the V.H.F. aerial socket. Tune the receiver to 92Mc/s. Feed in a 92Mc/s signal and adjust the cores of **L5** (A2) and **L3** (A1) for maximum output.

9.—Check that calibration at 87Mc/s, 94Mc/s and 99Mc/s is within ±0.3Mc/s. Check that the oscillator is operating below the carrier frequency by tuning the receiver to 100Mc/s and identifying the image at 78.6Mc/s.

10.—Disconnect the signal generator, the micro-ammeter, and the 220kΩ resistors. Connect the internal aerial and tune the receiver to a transmission. Adjust the aerial trimmer, if fitted, for maximum output.

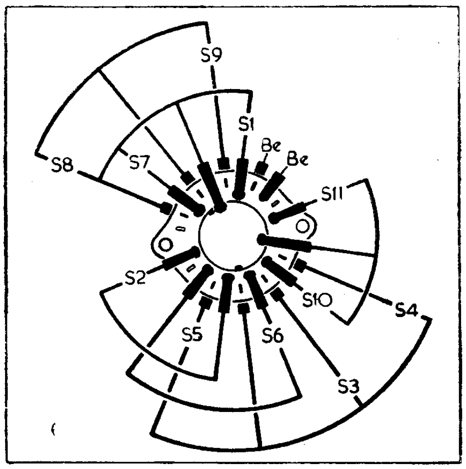


Diagram of the switch unit drawn as seen from the rear of an inverted chassis as indicated by the arrow in the chassis illustration at the top of this page.

GENERAL NOTES

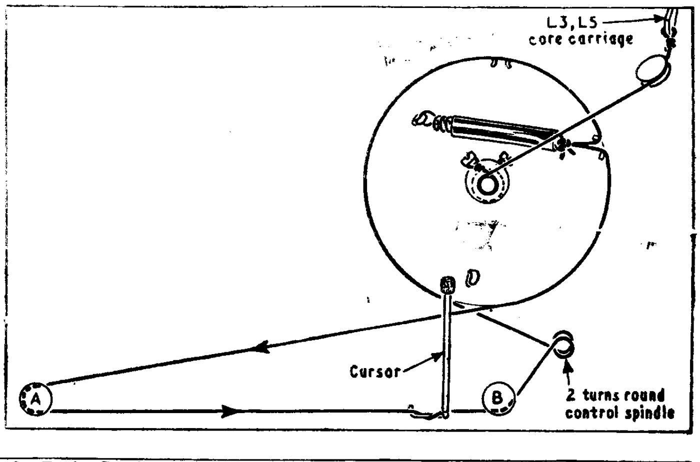
Switches.—S1-S11 are the waveband and A.M./F.M. change-over switches ganged in a single rotary unit beneath the chassis. The unit is shown in our underside view of the chassis (location reference G3) and a detailed sketch is shown in col. 4, where the contacts are drawn as seen when viewed in the direction of the arrow in the chassis illustration. The table in col. 3 shows the switch positions for the three control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates that the switch is open, and **C** that it is closed.

Cursor Drive Cord Replacement.—A length of nylon cord of approximately 36 inches is required for a new cursor drive cord. With the tuning gang fully meshed, pass the cord through the hole in the edge of the drive drum and secure it to the free end of the tension spring. Pass the free end of the cord clock-wise round the drum and anti-clockwise round pulley A as indicated in the sketch of the tuning drive system below. Pass the cord under pulley B, then two turns clockwise round the control spindle. Finally, pass the cord clockwise round the drive drum and through the hole in its edge, tying the end to the spring so that the latter is under slight tension. Secure the knots with an adhesive.

Attach the cursor to the cord between pulleys A and B so that, with the gang fully meshed, it coincides with the datum marks at the right-hand end of the tuning scale.

Tuner Drive Cord Replacement.—A length of nylon cord of approximately 8½ inches is required for a new tuner drive cord. Attach the cord to the end of **L3, L5** core carriage and run it as indicated in the sketch of the tuning drive system shown below. With the tuning control turned fully clockwise the core carriage should be 1/32in from its fully returned position. The position of the carriage may be adjusted by loosening the two screws on the drive drum and rotating the drum on its spindle.

Right: *Diagram of the tuning drive system drawn as seen from the front of the chassis with the tuning control turned fully clockwise.*



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