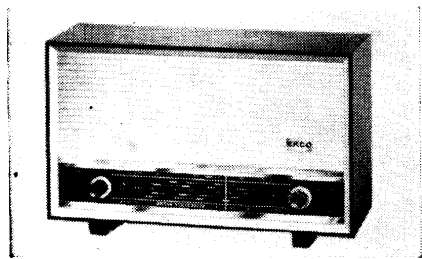


EKCO U353

A.M./F.M. Table Receiver

"TRADER" SERVICE SHEET
1448



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. aeriels; provision is made for the connection of external aeriels 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

Valve Table

Valve	Anode		Screen		Cath. V
	V	mA	V	mA	
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
V4d	145	9.0	125	3.3	2.5
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 ⁴
T.I. DM70	83	—	—	—	—
	78	—	—	—	—

*Set switched to A.M.

†Set switched to F.M.

¹Measured at the junction of R3, C5.

²Measured at the junction of R3, R5.

³A.C. reading.

⁴Cathode current 80mA.

⁵Cathode current 85mA.

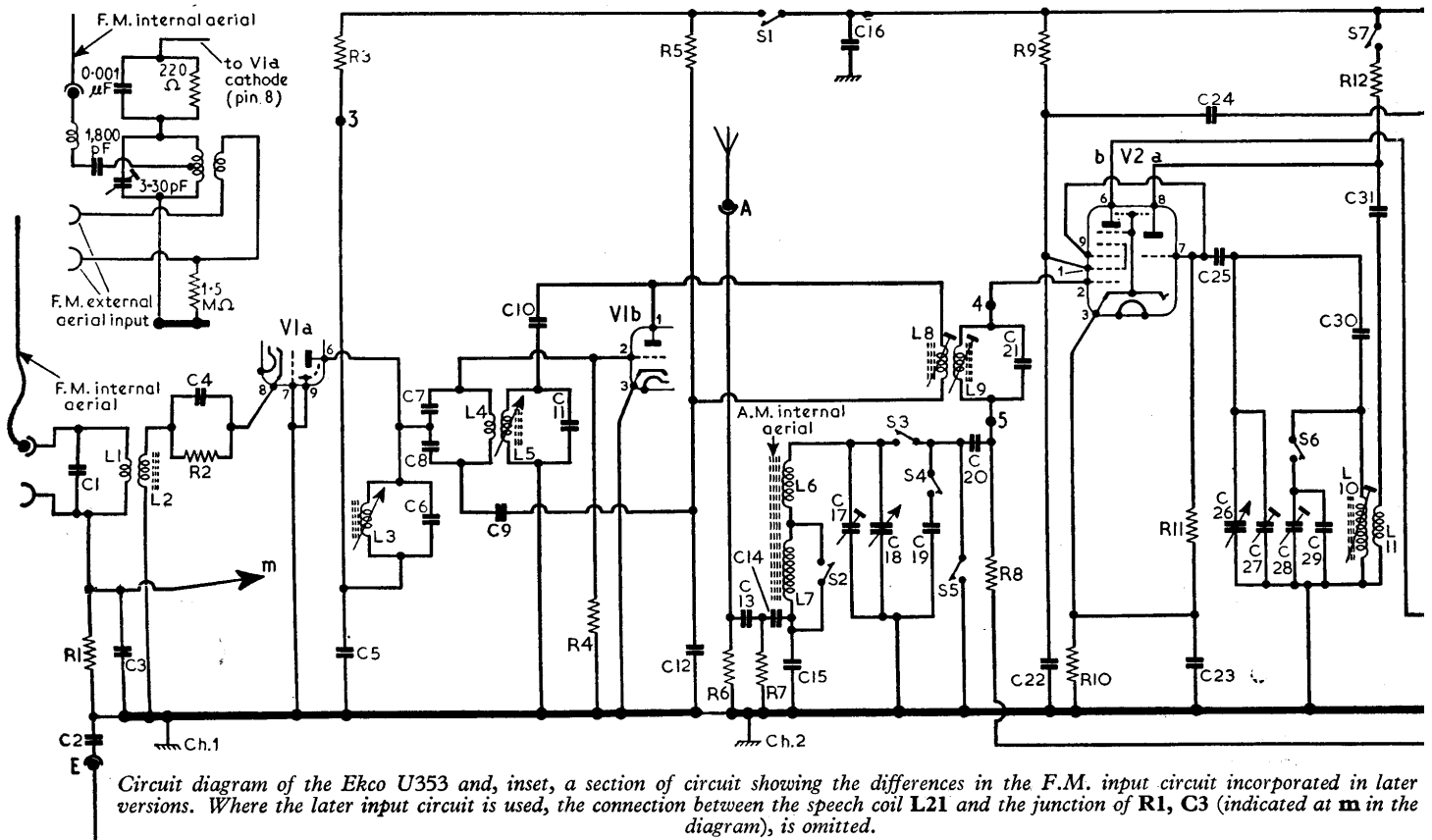
the manufacturers' information. Voltages were measured with a model 8 Avometer, chassis being the negative connection in every case. The receiver was operating from 240V A.C. mains and was tuned to 300m for A.M. readings, and to 94Mc/s for F.M. readings. Smoothed H.T. voltage measured at C58 was 180V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

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.

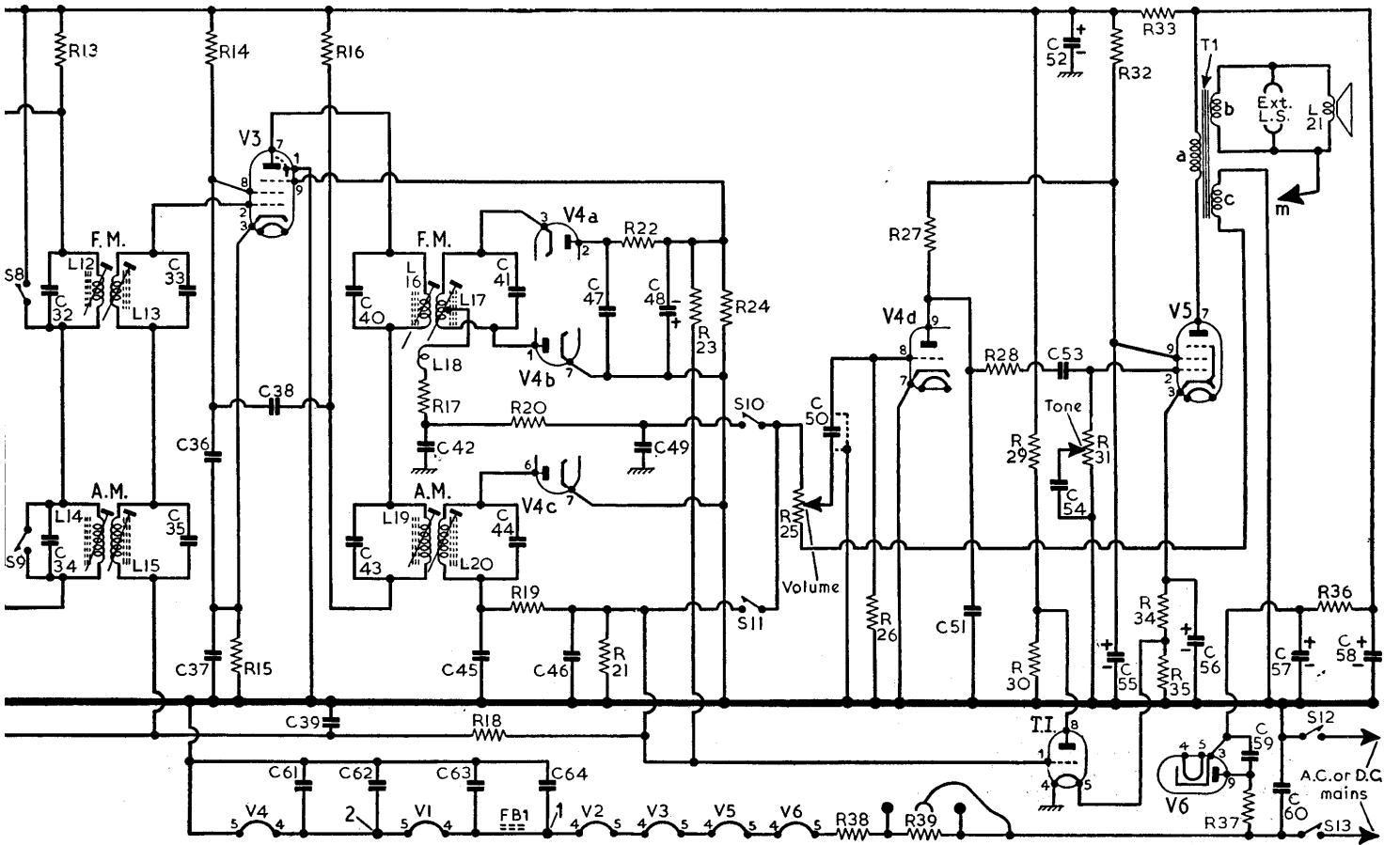
Operation on F.M.

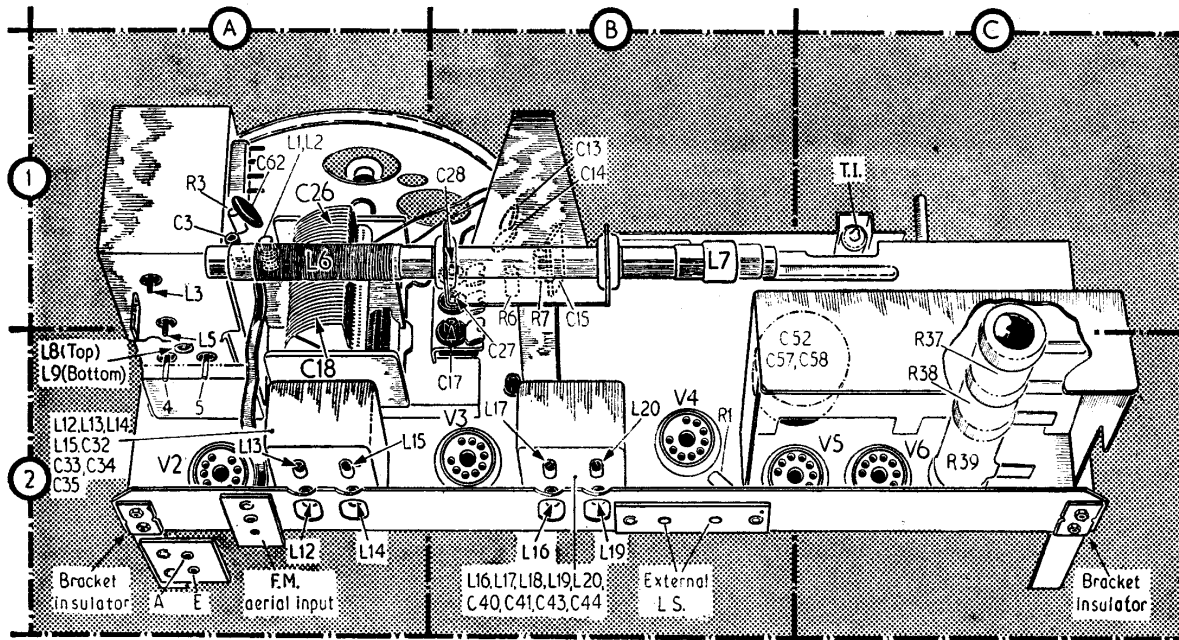
F.M. aerial input is coupled via L1, L2 to the earthed-grid R.F. amplifier V1a. Amplified output of V1a is developed across permeability tuned circuit L3, C6, (Continued overleaf, col. 1)

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			Capacitors			Coils*			Miscellaneous*			
R1	1.5MΩ	B2	C1	8.2pF	H5	L1	—	A1	T1	{ a 330.0	D4	
R2	220Ω	H5	C2	0.01μF	G4	L2	—	A1	FB1	{ b 0.4		H5
R3	1.5kΩ	A1	C3	1,800pF	A1	L3	—	H5	S1-S11	{ c —		G3
R4	1MΩ	H5	C4	0.001μF	H5	L4	—	H6	S12, S13	{ —	D3	
R5	4.7kΩ	H6	C5	0.001μF	H5	L5	—	H6				
R6	1.5MΩ	B1	C6	3pF	H5	L6	—	A1				
R7	3.3kΩ	B1	C7	8.2pF	H5	L7	8.0	E1				
R8	470kΩ	G4	C8	6pF	H5	L8	—	H6				
R9	5.6kΩ	G4	C9	12pF	H6	L9	—	H6				
R10	150Ω	G4	C10	10pF	H6	L10	2.0	F3				
R11	47kΩ	G4	C11	17pF	H6	L11	1.0	F3				
R12	33kΩ	F4	C12	44pF	H6	L12	—	A2				
R13	2.2kΩ	G4	C13	470pF	B1	L13	—	A2				
R14	12kΩ	F4	C14	0.01μF	B1	L14	10.0	A2				
R15	180Ω	F4	C15	4,700pF	B1	L15	10.0	A2				
R16	2.2kΩ	E4	C16	0.01μF	F4	L16	—	B2				
R17	82Ω	F4	C17	30pF	B2	L17	—	B2				
R18	2.2MΩ	G4	C18	—	A2	L18	—	B2				
R19	47kΩ	E4	C19	150pF	G3	L19	6.0	B2				
R20	47kΩ	F3	C20	0.001μF	G4	L20	6.0	B2				
R21	220kΩ	E3	C21	8.2pF	H6	L21	3.0	—				
R22	1.8kΩ	E4	C22	0.005μF	G4							
R23	1MΩ	E4	C23	0.03μF	G4							
R24	47kΩ	E4	C24	0.01μF	G4							
R25	820kΩ	D3	C25	82pF	G4							
R26	10MΩ	E4	C26	—	A1							
R27	220kΩ	E4	C27	30pF	B1							
R28	47kΩ	E4	C28	30pF	B1							
R29	68kΩ	E3	C29	435pF	F3							
R30	68kΩ	E3	C30	495pF	F3							
R31	820kΩ	D3	C31	200pF	F4							
R32	10kΩ	E4	C32	10pF	A2							
R33	820Ω	D4	C33	15pF	A2							
R34	150Ω	E4	C34	100pF	A2							
R35	56Ω	D3	C35	100pF	A2							
R36	330Ω	D4	C36	0.005μF	F4							
R37	100Ω	C2	C37	0.03μF	F4							
R38	414Ω	C2	C38	0.01μF	F4							
R39	300Ω	C2	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							





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 resistor shown as R38 is actually R39, and R39 is R38.

Circuit Description—continued

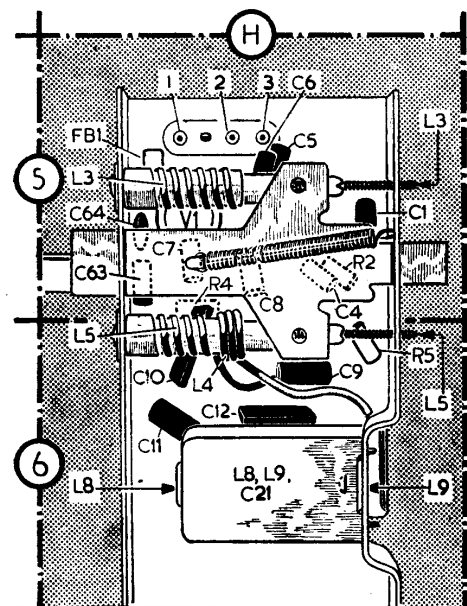
and coupled via C7, C8 to V1b, which operates as a self-oscillating mixer.

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 ± 25 kc/s; an A.C. voltmeter for use as an audio output meter; a 0-50 μ A meter for use as a D.C. output meter; a matched pair of 220k Ω resistors; a damping unit comprising a 4.7k Ω resistor and a 0.001 μ F capacitor connected in series; a 0.1 μ F 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 0.1 μ F 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.

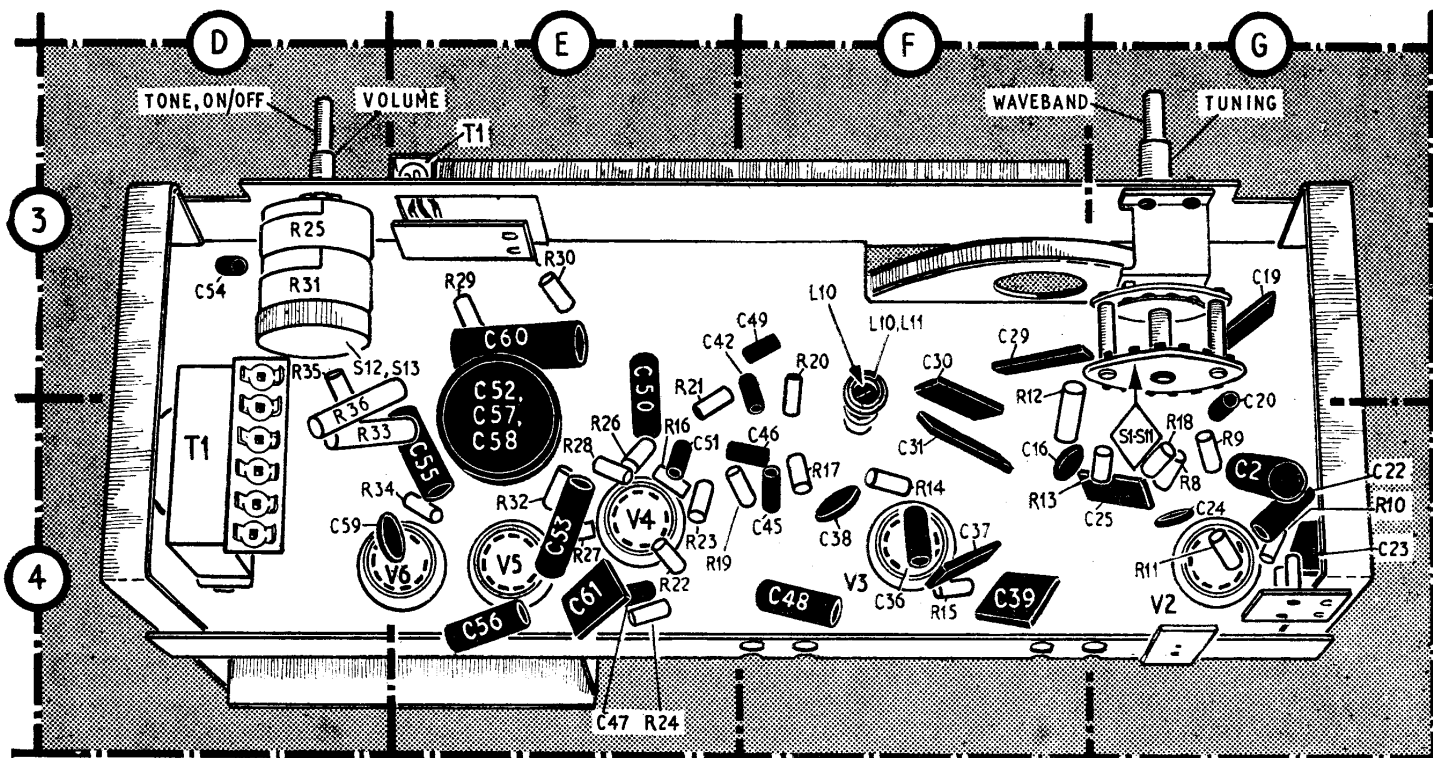
- 10.—Check the calibration at 1,800m (166.7kc/s) and 1,200m (250kc/s).

F.M. Alignment

- 1.—Connect the matched pair of 220k Ω resistors in series across C48 (location reference F4). Connect the 0-50 μ A meter between chassis and the junction of the two 220k Ω 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 220k Ω 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 ± 25 kc/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 ± 25 kc/s, and

Switch Table

Switches	F.M.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	—	—	—
S5	C	—	—
S6	—	—	C
S7	—	C	—
S8	—	—	C
S9	—	C	—
S10	C	—	—
S11	—	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 $\frac{1}{2}$ in 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 ± 0.3 Mc/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 220k Ω resistors. Connect the internal aerial and tune the receiver to a transmission. Adjust the aerial trimmer, if fitted, for maximum output.

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 $\frac{1}{2}$ in 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.

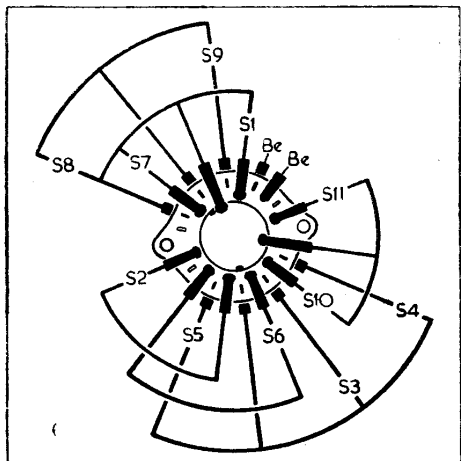


Diagram of the switch unit drawn as seen from the rear of an inverted chassis as indicated by the arrow in the chassis illustration at the top of this page.

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

