"TRADER" SERVICE SHEET

1455

EKCO A355

A.M./F.M. Table Receiver for A.C. Mains Operation

DESIGNED to operate from A.C. mains of 200-250V, 50c/s, the Ekco A355 is a 5-valve A.M./F.M. table receiver housed in a wooden cabinet. Mains consumption is approximately 50W. The tuning ranges are 182—545m (M.W.); 1,200—2,000m (L.W.); and 86—100Mc/s (F.M.). It is fitted with two speakers, a tuning indicator, internal A.M. and F.M. aerials, and a contact-cooled rectifier. Sockets are provided for the connection of external aerials, a gramophone pick-up, a tape recorder, and a low impedance external speaker. Output is approximately 4W.

Release date and original price: August 1959, £25 8*s* 9*d. Purchase tax extra.*

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 2) are those derived from the manufacturers' information. Voltages were measured with a model 8 Avometer, chassis being the negative connection in each case. Smoothed H.T. voltage measured across **C54** was 255V on A.M., and 235V on F.M.

CIRCUIT DESCRIPTION

External A.M. aerial input is coupled via **R5**, bottom coupling capacitor **C14**, and R.F. tuned circuits **L6, C17, C18** (M.W.), and **L6, L7, C16-C18** (L.W.) to the triode-heptode frequency changer **V2. L6** and **L7** are mounted at opposite ends of a rotatable ferrite rod to form an internal aerial.

Heptode section **b** of **V2** operates as mixer, and triode section **a** as oscillator. Oscillator coil **L10** is tuned by **C24** and **C25** on M.W., additional capacitance being provided by **C26** and **C27** for L.W. reception.

The output from **V2** is coupled via a single-stage intermediate frequency amplifier comprising R.F. pentode **V3** and A.M. transformer couplings **L14, L15; L19, L20** to section **c** of triple-diode-triode valve **V4,** which operates as A.M. detector. The primary winding of the second F.M. I.F. transformer **L12, L13** is short-circuited by switch **S3x** during A.M. operation.

A.M. intermediate frequency 470kc/s.

The audio frequency output of **V4c** is developed across diode load resistor **R19** and is passed via switches **S3v, S2z,** A.F. coupling capacitor **C48,** volume control **R22,** and **C49** to the grid current biased A.F. amplifier **V4d.** R.F. filtering by **R15** and **C44.** Provision is made for the connection of a gramophone pick-up and tape recorder in the control grid circuit of **V4d.**

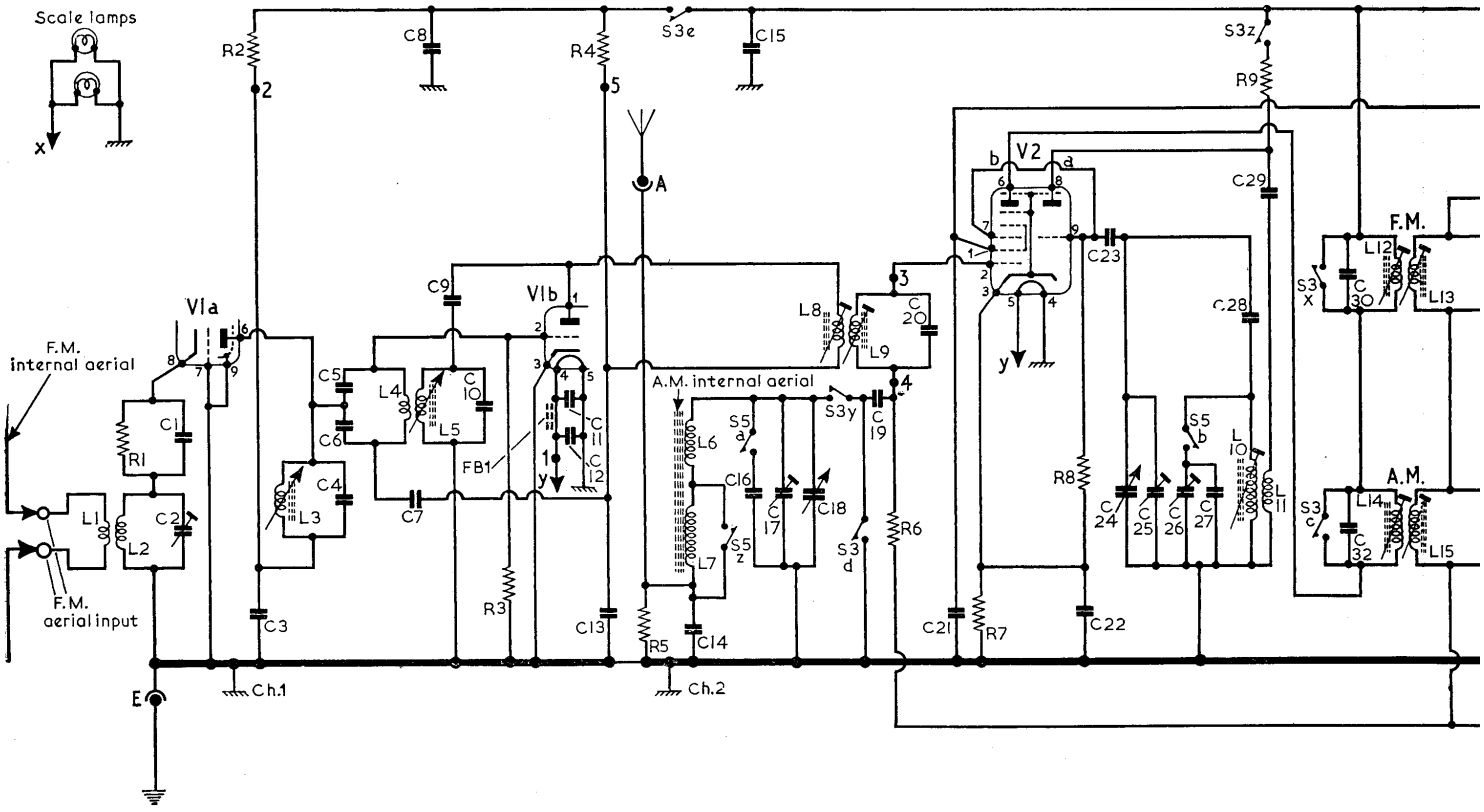
The D.C. component of the rectified signal developed across **R19** is fed back to the control grid circuit of **V2b** and **V3** as A.G.C. bias via decoupling components **R16, C42.** A.G.C. bias is also applied to the control grid of tuning indicator **T.I.** via **R17.**

The amplified output of **V4d** is resistance-capacitance coupled by **R24, R26, C51,** and tone control circuit **R27, C52** to pentode

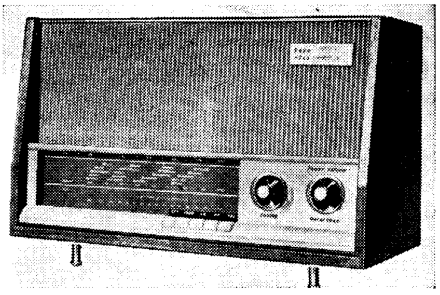
Valve Table

Valve		Anode V	Anode mA	Screen V	Screen mA	Cath. V
V1a ECC85	*	—	—	—	—	—
	†	227	8·2	—	—	1·9
V1b ECC85	*	—	—	—	—	—
	†	215	4·3	—	—	—
V2a ECH81	*	69	3·3	—	—	2·0
	†	—	—	—	—	—
V2b ECH81	*	250	6·0	100	6·0	2·0
	†	240	7·0	110	4·5	2·0
V3 EF89	*	240	6·9	100	2·6	1·8
	†	224	7·6	110	2·9	1·95
V4d EABC80	*	87	0·7	—	—	—
	†	85	0·64	—	—	—
V5 EL84	*	260	37·0	230	4·5	6·7
	†	265	40·0	215	4·1	6·2
T.I. EM84	*	55	0·48	—	—	—
	†	53	0·45	—	—	—

**Receiver switched to A.M.*
†Receiver switched to F.M.



Circuit diagram of the Ekco A355. The waveband switch operations are indicated in the table shown inset above **V4d.** *The F.M. tuner unit is permeabilit* **V2** *operates as a frequency changer on A.M. For F.M. reception, the heptode, section* **b,** *is used as an I.F. amplifier; triode A.M. oscillator, section* **a,** *l*



Appearance of the Ekco A355.

output valve **V5**. The output of **V5** is transformer coupled by **T1** to the speakers **L21** and **L22**. Negative feedback from the secondary winding of **T1** is applied to the input circuit of **V4d**, thus providing tone correction.

H.T. current is supplied by the full-wave rectifying unit **MR1**. Smoothing by **R30** and electrolytic capacitors **C55, C54**.

Operation on F.M.

F.M. aerial input is coupled via **L1, L2** to the cathode of the earthed-grid R.F. amplifier **V1a**. The amplified signal is developed across the permeability tuned anode circuit **L3, C4**, and passed via **C5** and **C6** to the grid of the self-oscillating mixer **V1b**. The oscillator reaction circuit comprising **C9, C10** and **L5** is permeability tuned, the core of **L5** being ganged with that of the R.F. coil **L3**. To prevent oscillator radiation via the R.F. and aerial circuits, the output of **V1a** is connected to a point of minimum oscillator

(Continued overleaf col. 1)

Resistors

R1	220Ω	J5
R2	1·5kΩ	A1
R3	1MΩ	J5
R4	4·7kΩ	A1
R5	27kΩ	B1
R6	470kΩ	G4
R7	150Ω	H4
R8	47kΩ	H4
R9	56kΩ	G4
R10	18kΩ	G4
R11	180Ω	G4
R12	2·2kΩ	G4
R13	91Ω	G4
R14	47kΩ	G4
R15	47kΩ	G4
R16	2·2MΩ	G4
R17	1MΩ	G3
R18	1·8MΩ	G4
R19	220kΩ	G3
R20	5·6MΩ	G4
R21	47kΩ	G4
R22	820kΩ	A1
R23	10MΩ	F4
R24	220kΩ	F4
R25	470kΩ	A1
R26	150kΩ	F4
R27	820kΩ	A1
R28	4·7kΩ	F4
R29	150Ω	F4
R30	820Ω	F4
R31	220Ω	C1
R32	10Ω	C1

Capacitors

C1	0·001μF	J5
C2	30pF	A1
C3	0·001μF	J5
C4	3pF	J5
C5	8·2pF	J5
C6	6pF	J5
C7	12pF	J6
C8	0·01μF	A1
C9	10pF	J6
C10	17pF	J6
C11	0·001μF	J5
C12	0·01μF	J5
C13	44pF	J6
C14	4,700pF	B1
C15	0·01μF	G4
C16	130pF	G3
C17	30pF	B1
C18	—	B1
C19	0·001μF	H4
C20	8·2pF	J6
C21	0·01μF	H4
C22	0·03μF	H4
C23	82pF	G3
C24	—	B1
C25	30pF	B1
C26	80pF	C2
C27	435pF	G4
C28	495pF	G4
C29	200pF	H4
C30	10pF	B2
C31	15pF	B2
C32	100pF	B2
C33	100pF	B2
C34	0·1μF	G4
C35	0·03μF	G4
C36	0·01μF	G4
C37	15pF	B2
C38	22pF	B2
C39	220pF	G4
C40	350pF	B2
C41	350pF	B2
C42	0·03μF	G4
C43	220pF	G4
C44	220pF	G4
C45	220pF	F4
C46	2μF	G4
C47	500pF	G4
C48	0·01μF	A1
C49	0·01μF	F4
C50	220pF	G4
C51	0·01μF	F4
C52	0·003μF	A1
C53	8μF	F4
C54	50μF	C1
C55	50μF	C1
C56	50μF	F4
C57	0·5μF	—
C58	0·01μF	H4

Coils*

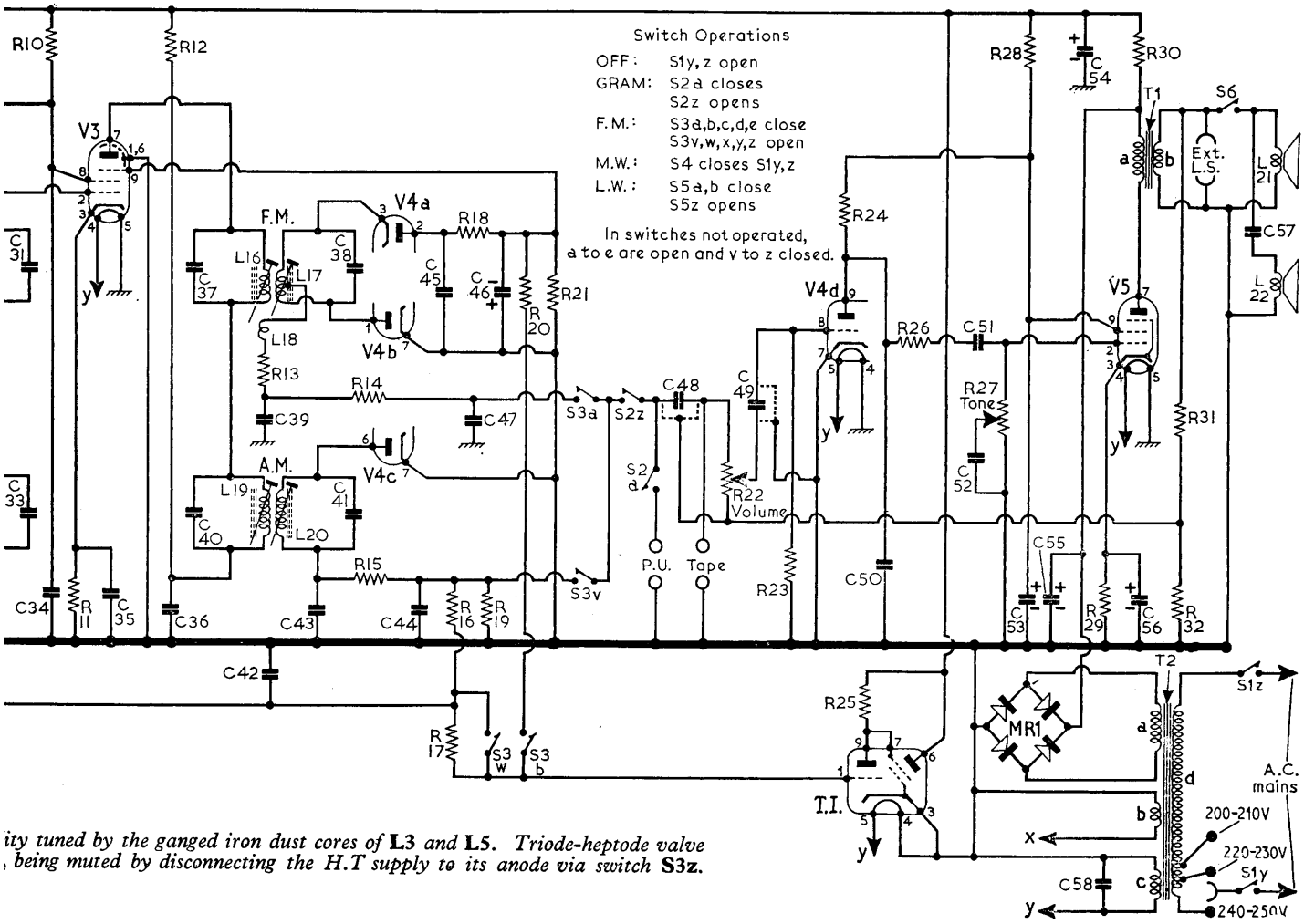
L1	—	A1
L2	—	A1
L3	—	J5
L4	—	J6
L5	—	J6
L6	—	B1
L7	7·0	C1
L8	—	J6
L9	—	J6
L10	2·0	H4
L11	1·0	H4
L12	—	B2
L13	—	B2
L14	10·0	B2
L15	10·0	B2
L16	—	B2
L17	—	B2
L18	—	B2
L19	5·0	B2
L20	6·0	B2
L21	3·0	—
L22	3·0	—

Miscellaneous*

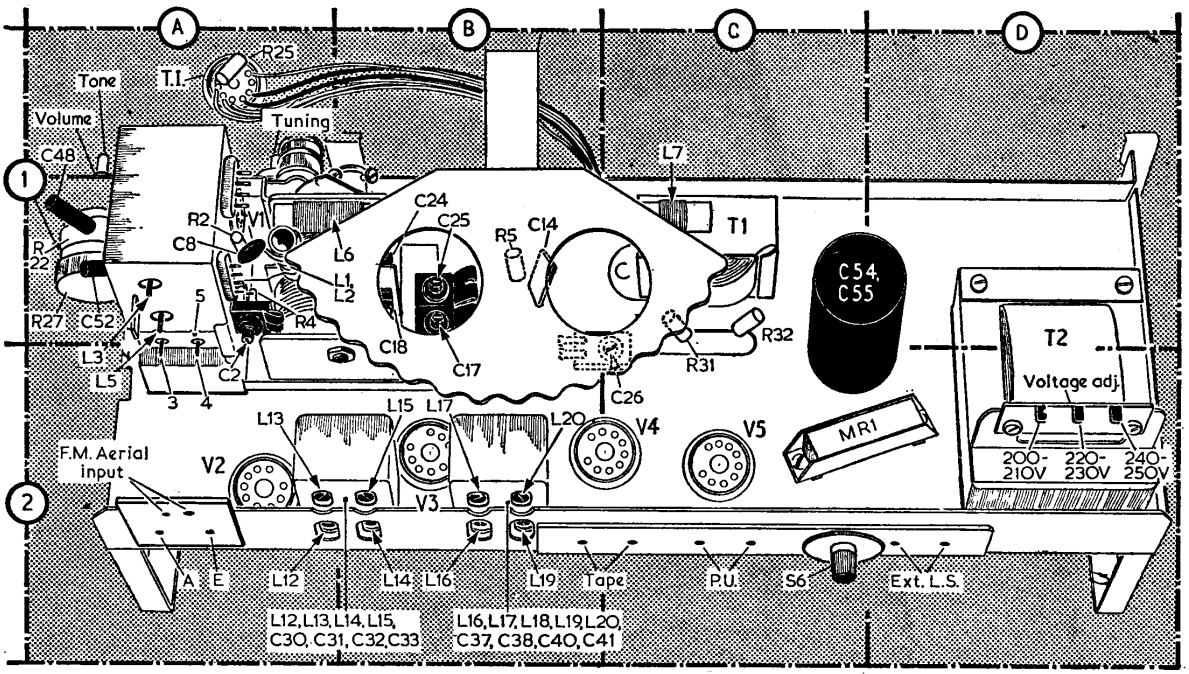
T1 a	400·0	C1
T1 b	—	
T2 a	85·0	D1
T2 b	—	
T2 c		
T2 d	40·0	
MR1	EC1/U567	C2
S1-S5	—	G3
S6	—	F4

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

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



ity tuned by the ganged iron dust cores of **L3** *and* **L5**. *Triode-heptode valve , being muted by disconnecting the H.T supply to its anode via switch* **S3z**.



Plan view of the chassis. Components which are hidden by the ferrite rod assembly are shown dotted. Mains voltage adjustment is effected by means of a flying lead which is terminated with a spring clip, the latter being connected to the appropriate tag on the mains transformer **T2**.

Circuit Description—*continued*

potential on the bridge circuit formed by **C5, C6, C7, C13,** and the input capacitance of **V1b.**

The output from **V1b** is transformer coupled by **L8, L9** to the heptode section **b** of **V2,** which for F.M. operation is employed as an I.F. amplifier. The triode A.M. oscillator, section **a** of **V2,** is muted by disconnecting the H.T. supply to its anode via switch **S3z.** The I.F. signal is passed via a second I.F. amplifier comprising **V3,** F.M. transformer couplings **L12, L13,** and discriminator transformer **L16, L17, L18** to diode sections **a** and **b** of **V4,** which operate in a ratio detector circuit.

F.M. intermediate frequency 10.7Mc/s.

The audio frequency output of the ratio detector is developed across **C39** and passed via de-emphasis circuit **R14, C47,** switches **S3a, S2z** to the input circuit of **V4d.**

The D.C. voltage developed across stabilizing capacitor **C46** varies with the signal amplitude, and is fed to the suppressor grid of **V3** and, via the filter circuit **R20, R17, C42,** to the control grid circuits of **V2b** and **V3** as A.G.C. bias.

GENERAL NOTES

Cursor Drive Cord Replacement.—A length of nylon cord of approximately 47 inches is required for a new cursor drive cord. To replace the cord, turn the tuning gang so that the vanes are fully meshed and check that the three slots in the rims of the drive drum are at the top. Tie a small loop at one end of the cord and attach it to one end of the tension spring. Temporarily anchor the free end of the spring to a convenient point, such as a tag on the output transformer **T1.** Then, following the sketch of the drive cord system shown below, pass the cord anti-clockwise round pulley A, and clockwise over pulley B; then 1½ turns clockwise round the control spindle. Pass the cord clockwise round pulley C and then anti-clockwise round pulley D. Wind 4 turns anti-clockwise round the rear half of the tuning drum and pass the cord through the middle slot in the drum. Release the tension spring from its temporary anchor position and tie the cord to its free end so that the spring is under slight tension. Attach the cursor to the cord between pulleys A and B so that, with the tuning gang fully meshed, it coincides with the datum marks at the right-hand end of the tuning scale.

F.M. Drive Cord Replacement.—A length of nylon cord of approximtely 8½ inches is required. Attach one end of the cord to the end of **L3, L5** core carriage and run it as indicated in the sketch of the tuning drive system illustrated below. With the tuning control turned fully clockwise the core carriage should be 3/32in from its fully returned position. The position of the carriage may be adjusted by loosening the two screws which secure the collar to the shaft of the tuning gang.

F.M. Switch Drive Cord Replacement.—A length of nylon cord approximately 6 inches long is required. Attach one end of the cord to the top of the actuating lever on the F.M. push-button. Then run the free end of the cord anti-clockwise round the pulley as indicated in the underside illustration of the chassis (location reference G4), and also shown in the sketch of the switch unit in column 1. Tie the free end of the cord to the tension spring on the slide-type switch unit **S3** so that, with the F.M. button released, the cord is taut and the slide-type switch unit is released.

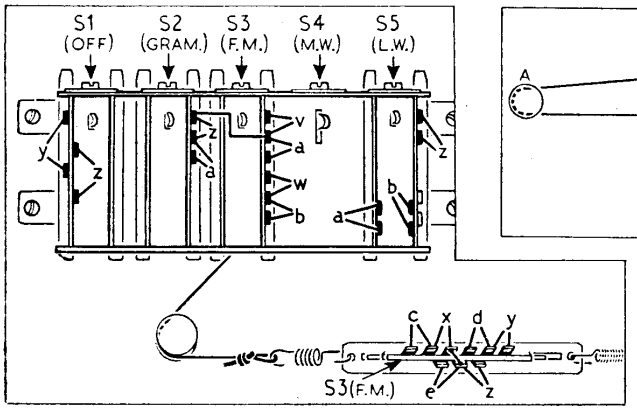
Scale Lamps.—These are two 6.5V, 0.3A lamps with clear spherical bulbs and M.E.S. bases.

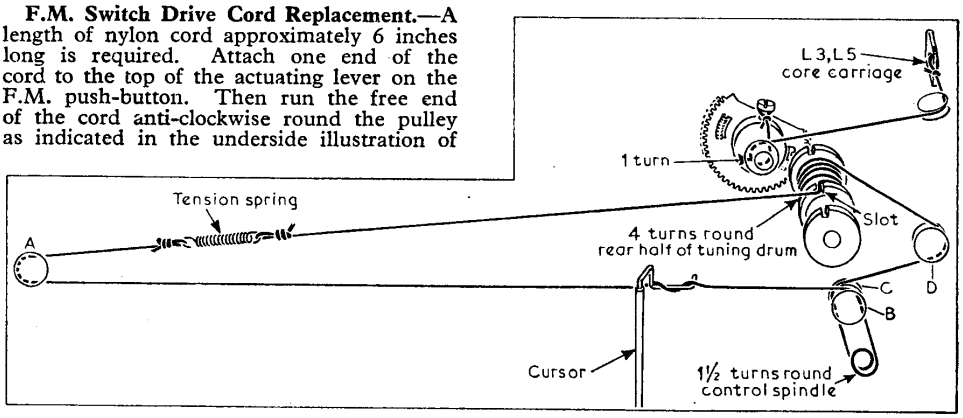
CIRCUIT ALIGNMENT

Equipment Required.—An A.M. signal generator, modulated 30 per cent at 400c/s; an F.M. signal generator capable of being 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

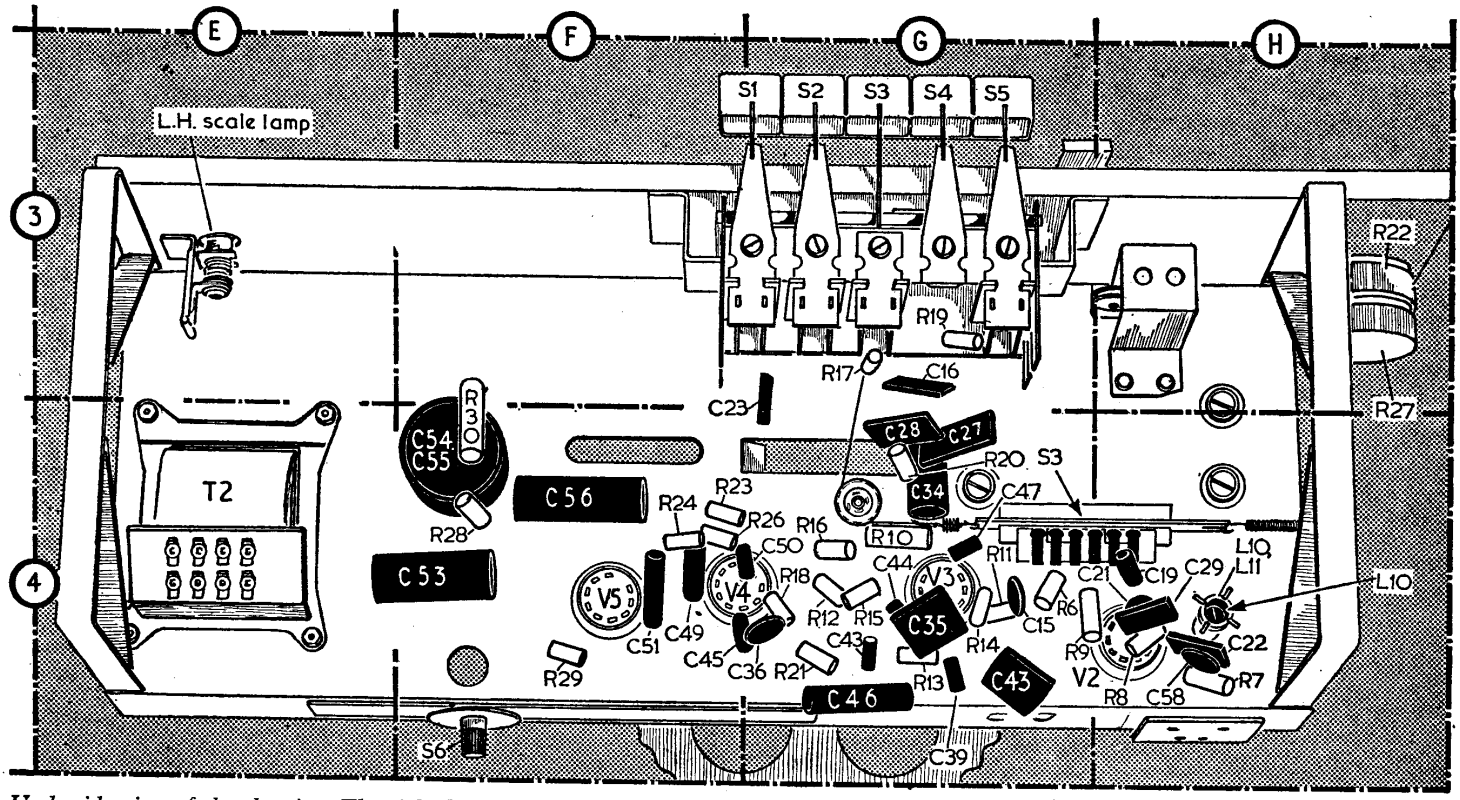
1.—Connect the audio output meter across the external speaker sockets, and the A.M. signal generator to the control grid (pin 2) of **V2b** via the 0.1μF capacitor.





Above: *Diagram of the tuning drive system drawn as seen from the front of the chassis with the tuning gang at maximum capacitance.*

Left: *Diagram of the press-button and slide-type waveband switch units as seen from the rear of an inverted chassis.*



Underside view of the chassis. The right-hand scale lamp is hidden by the press-button switch unit. Details of the switches are shown in the sketch at the foot of col. 1.

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** (B2), 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** (H4) for maximum output.

5.—Tune the receiver to 200m. Feed in a 1,500kc/s signal and adjust **C25** (B1) for maximum output.

6.—Tune the receiver to 450m. Feed in a 666.6kc/s and slide the former of **L6** (B1) along the ferrite rod for maximum output.

7.—Tune the receiver to 214m. Feed in a 1,400kc/s signal and adjust **C17** (B1) 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 **C26** (C2) for maximum output. Then slide the former of **L7** (C1) along the ferrite rod for maximum output. Seal the formers of **L6** and **L7** to the ferrite rod to prevent them from moving.

F.M. Alignment

1.—Connect the matched pair of 220kΩ resistors in series across **C46** (G4). Connect the 0-50μA meter between chassis and the junction of the two 220kΩ resistors. Connect 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 **R13, C39** (G4). 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 **R2, C3** (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 adjust the core of **L8** (J6) for maximum output. Then damp **L8** and adjust **L9** (J6) for maximum output. Remove the damping unit.

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 ends of the tuning scale. If necessary, the position of the core carriage may be adjusted by loosening the two screws in the collar on the gang spindle and turning the collar.

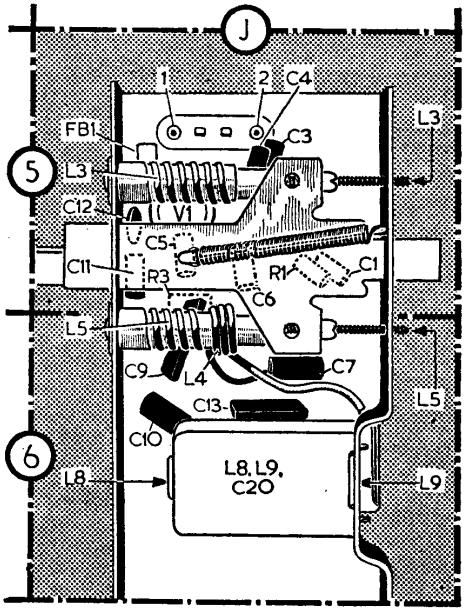
8.—Transfer the signal generator to the V.H.F. aerial sockets. Tune the receiver to 92Mc/s. Feed in a 92Mc/s signal and adjust the cores of **L5** and **L3** (location reference A1) for maximum output.

9.—Check the 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 **C2** (A1) for maximum output.

DISMANTLING

Removing Chassis.—Remove the back cover (five screws) and pull off the control knobs;
remove four chassis retaining screws and washers from the base of the cabinet;
remove the woodscrew which secures the chassis bracing bracket to the lower centre of the speaker baffle;
slacken the woodscrew securing the ferrite rod assembly to the baffle and spring the slot over the screwhead;
remove the valve holder from the tuning indicator **T.I.**
The chassis may now be withdrawn to the extent of the speaker leads.



A side view of the tuner unit with the screening cover removed. Components which are hidden by **L3, L5** *core carriage are shown dotted.*

Printed in England by Cornwall Press Ltd., Paris Garden, London, S.E.1.