

MODEL A22 is a 4-valve superheterodyne receiver of circular construction with three control knobs and circular scale.

MAINS SUPPLY: 200/250v. 40/80 cycles.

CONSUMPTION: Approximately 40 watts.

WAVE RANGES: S.W. 16 metres— 53 metres.
M.W. 200 metres— 550 metres.
L.W. 1,000 metres—2,000 metres.

VALVES: V1.ECH35 Frequency changer. V2.EF39 I.F. Amplifier. V3.EBL31 Demodulator, AVC, Power Amplifier, V4.AZ31 Directly heated Rectifier. All are Mullard with International Octal bases.

PILOT LAMP: 6.3v. .3a. Approximately 5v. R.M.S. is tapped off the 6.3v. heater winding for lamp supply.

INTERMEDIATE FREQUENCY: 465 K/cs.

SPEECH COIL IMPEDANCE: 3 ohms at 400 c.p.s.

I.F. ALIGNMENT: (1) Switch to M.W. and fully mesh the gang. (2) Inject modulated signal 465 K/cs. via a .1 mfd. condenser to the grid of V1. Connect sig/gen earth to E Socket. (3) Connect output meter to EXT.LS sockets then adjust all four I.F. cores— working backwards from second I.F.—for maximum output.

FILTER ADJUSTMENT: Inject 465 K/cs via dummy aerial to A. and E. then adjust L1 core for lowest meter reading.

CALIBRATION: (1) Fully mesh the gang, and if indicator shadow does not cover the calibration spot (just under "L") loosen the two screws on small drive wheel, and adjust arm as necessary. (2) Trimming and tracking points are as follows:

Switch to S.W.

Adjust—

Osc. Trimmer (C14) at 16M., then adjust Osc. Core (L10,11) at 40M.
Aer. Trimmer (C3) 18M.,
Switch to M.W.

Adjust—

Osc. Trimmer (C16) at 200M. then adjust Osc. Core (L12,13) at 400M.
Aer. Trimmer (C4) 220M.
Switch to L.W.

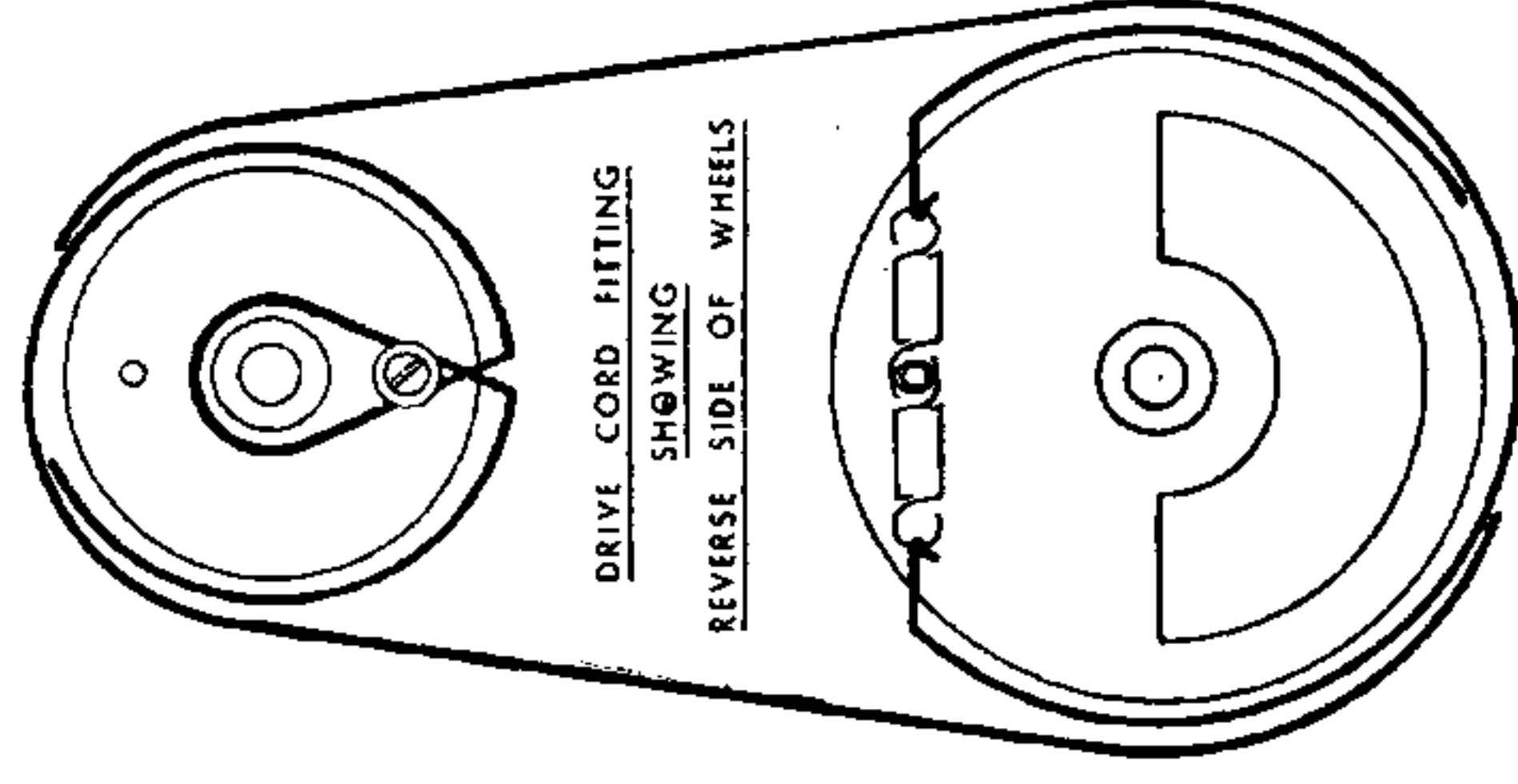
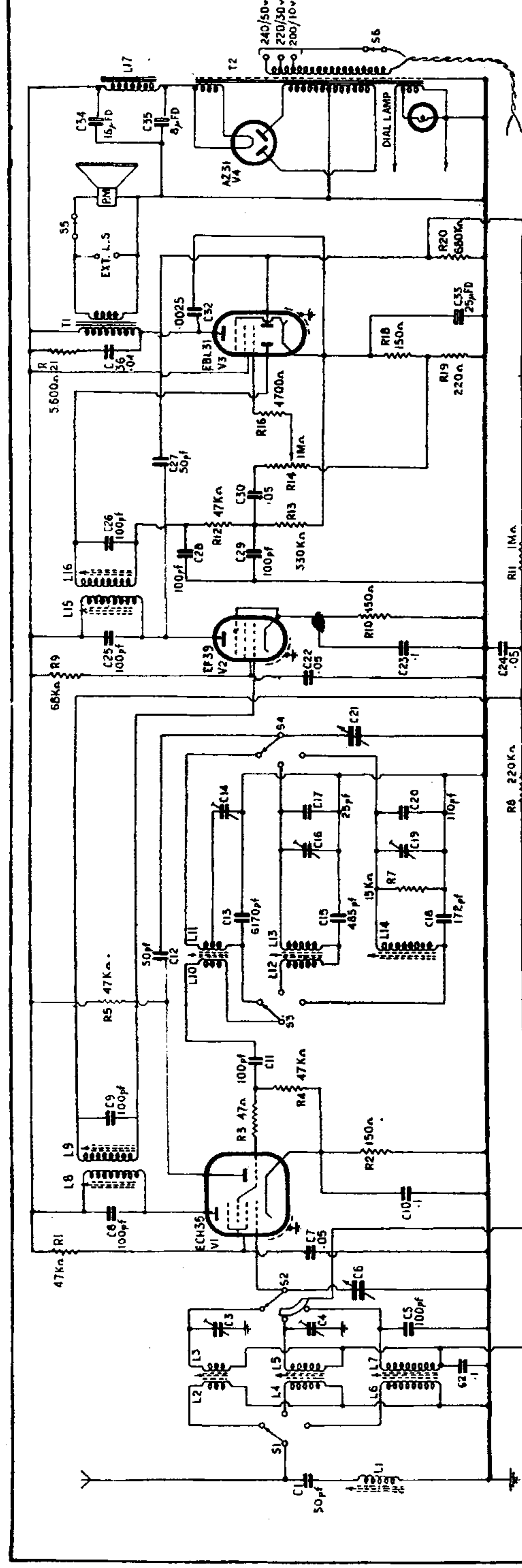
Adjust—

Osc. Trimmer (C19) at 1,000M, then adjust Osc. Core (L14) at 1500M.
Aer. Core (L6,7) 2000M.

CHASSIS REMOVAL: Remove the three control knobs. Un-screw four screws at back (on circumference) and one under trade-mark symbol and slide back cover along mains cord. Turn receiver

face down on suitable cushion and remove four 2BA perimeter screws, taking care not to disturb the components or wiring. Draw chassis clear. (A touch of beeswax in the slots of these 2BA screws will simplify their replacement.)
To remove scale, lay the chassis on its back on a suitable support. At 2 o'clock on the rim, a half-inch slot is located. Insert a LONG screwdriver in this hole and loosen the 2BA screw on central stem. Lift off scale complete. The locating flat on the central stem ensures correct replacement.

DRIVE CORD: Knot one end of the cord to one spring then fix the other end to the second spring so that the total length (including springs) is 30 1/2 ins. Trim off surplus cord. Set the gang condenser at midway, then remove both drive wheels by loosening the set-screws, and the two 4BA screws under the lower wheel centrally above the spindle bush. Lay both wheels down, backs uppermost, to correspond with their normal positions. Fold the new prepared cord exactly in half and thread the centre loop through the lower hole in the small wheel rim. Open the loop to fall over the centre boss and clamp under the two springs on the Follow the given diagram, terminating the two springs on the central lug. Hold both wheels so that cord is taut, reverse them, and slip both on their respective spindles, then allow springs to take up slack cord. Replace screws and tighten grub screws.



Ned. Ver. v. Historie

ARCHIEF
DOCUMENTATIEDIENS
NVHR

SCOTTISH SERVICE DEPOT:

25, Cadogan Street,
Glasgow, C.2.

'Phone: Central 5357/8/9.

NORTHERN SERVICE DEPOT:

55, Whitworth Street,
Manchester.

'Phone: Central 6711/2.

WESTERN SERVICE DEPOT:

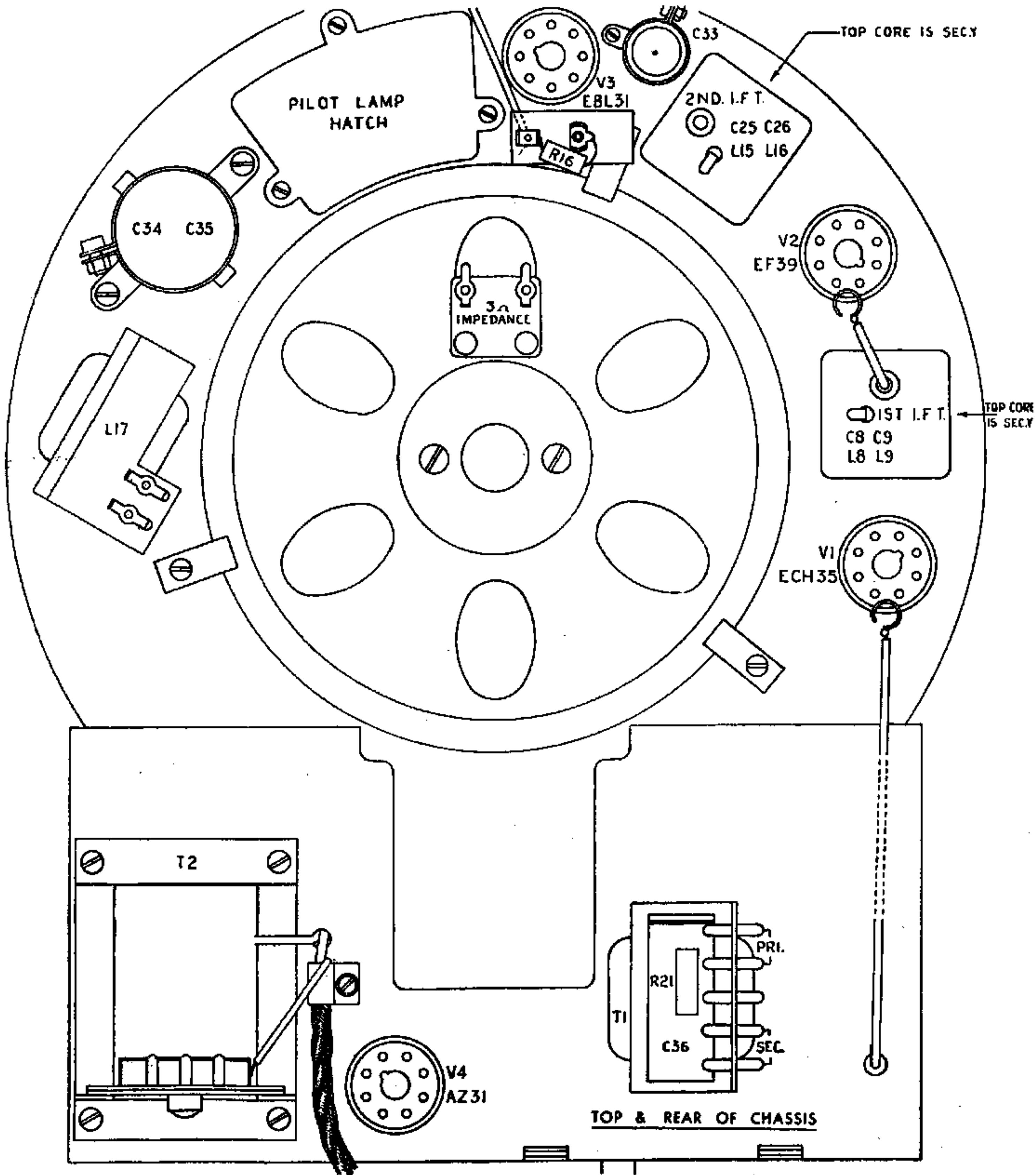
14, Redcross Street,
Bristol.

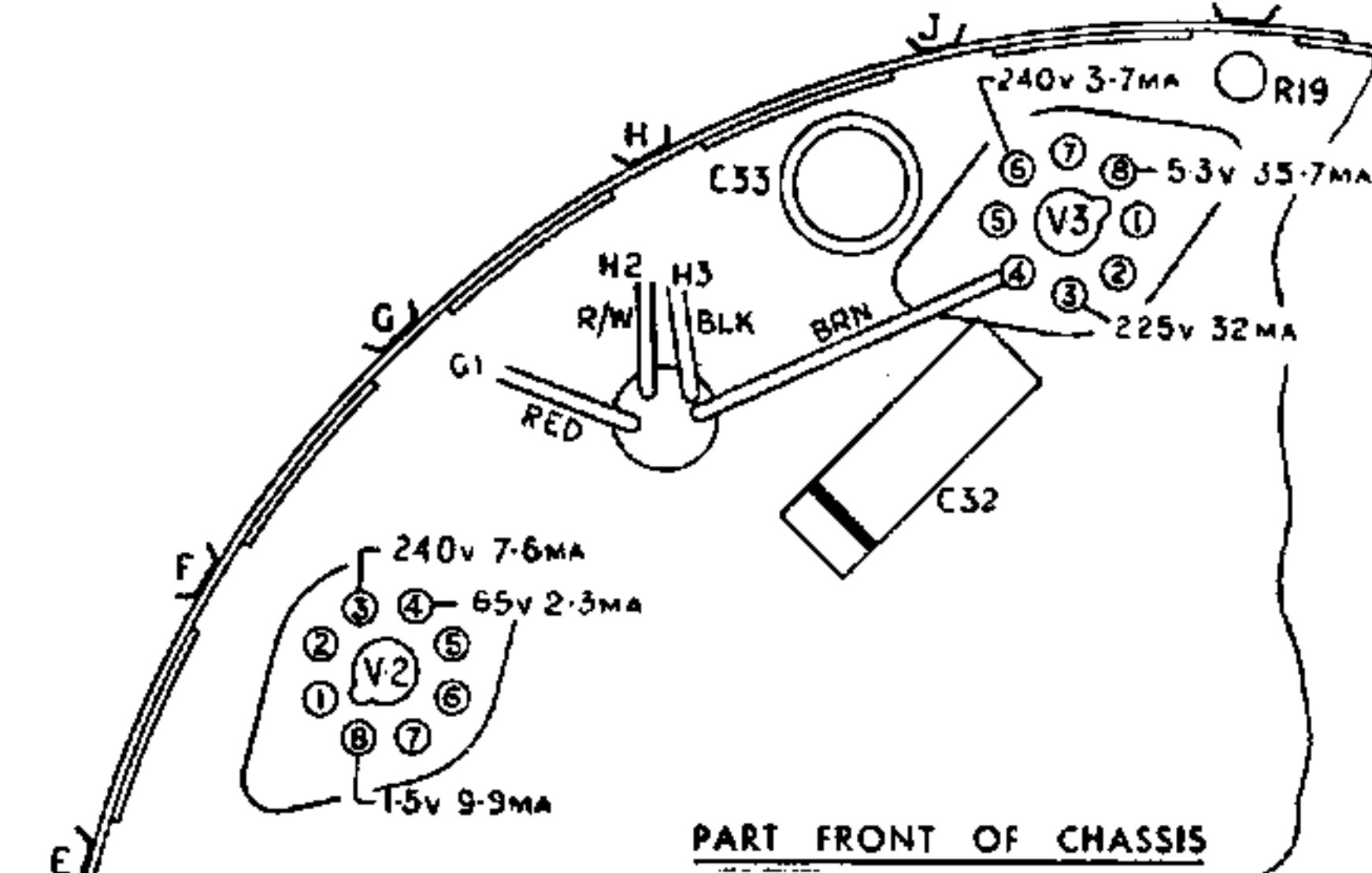
'Phone: Bristol 26311.

SERVICE DEPT., E. K. COLE Ltd.,

Somerton Works, Arterial Road,
Southend-on-Sea.

'Phone: Southend 2296
Head Office: Ekco Works, Southend-on-Sea

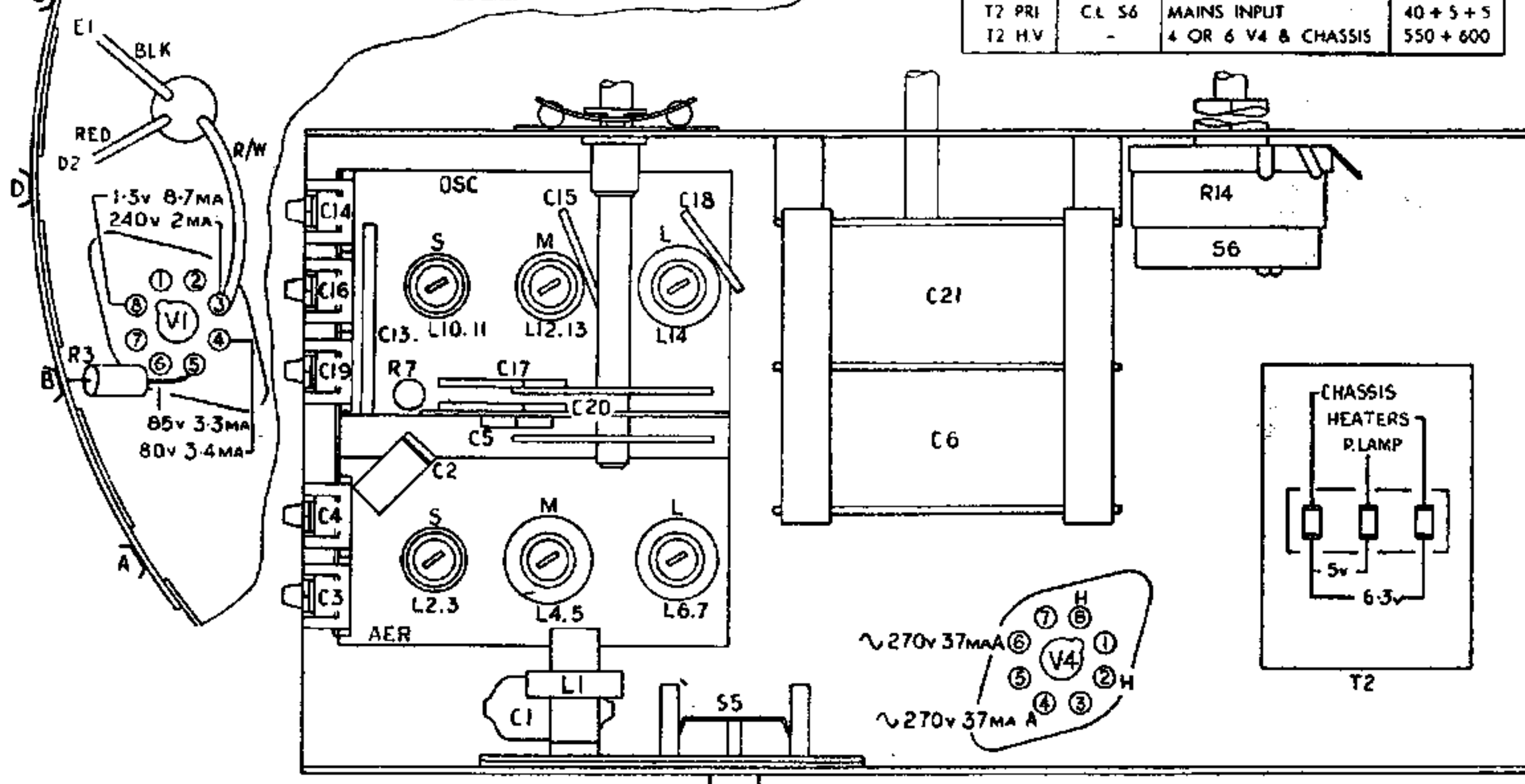




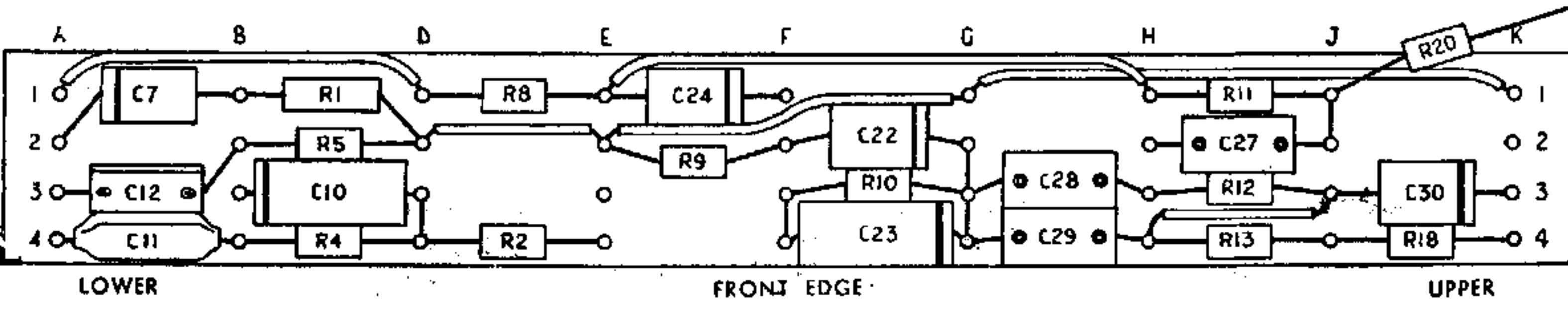
PART FRONT OF CHASSIS

D.C. RESISTANCE OF COILS & TRANSFORMERS

L. No	SWITCH	MEASURE ACROSS	RES
1	-	COIL ENDS	20
2	S.W.	AER & CHASSIS	.2
3	S.W.	GRID V1 & R8 (D1)	.1
4	M.W.	AER & CHASSIS	44
5	M.W.	GRID V1 & R8 (D1)	3
6	L.W.	AER & CHASSIS	30
7	L.W.	GRID V1 & R8 (D1)	30
8	-	PIN 3 V1 & D2	10
9	-	GRID V2 & E1	10
10	S.W.	A4 & C13	10.5
11	S.W.	C21 (GANG) & C13	.2
12 + 10	M.W.	A4 & C15	11
13	M.W.	C21 (GANG) & C15	3.2
14	L.W.	C21 (GANG) & C18	6
15	-	PIN 3 V2 & H2	10
16	-	PIN 4 V3 & H3	10
17	-	L17 TAGS	310
T1 PRI	-	PRI TAGS	450
T1 SEC	OPEN SS	SEC TAGS	.17
T2 PRI	C.L. S6	MAINS INPUT	40 + 5 + 5
T2 HV	-	4 OR 6 V4 & CHASSIS	550 + 600



UNDERNEATH OF CHASSIS



LOWER

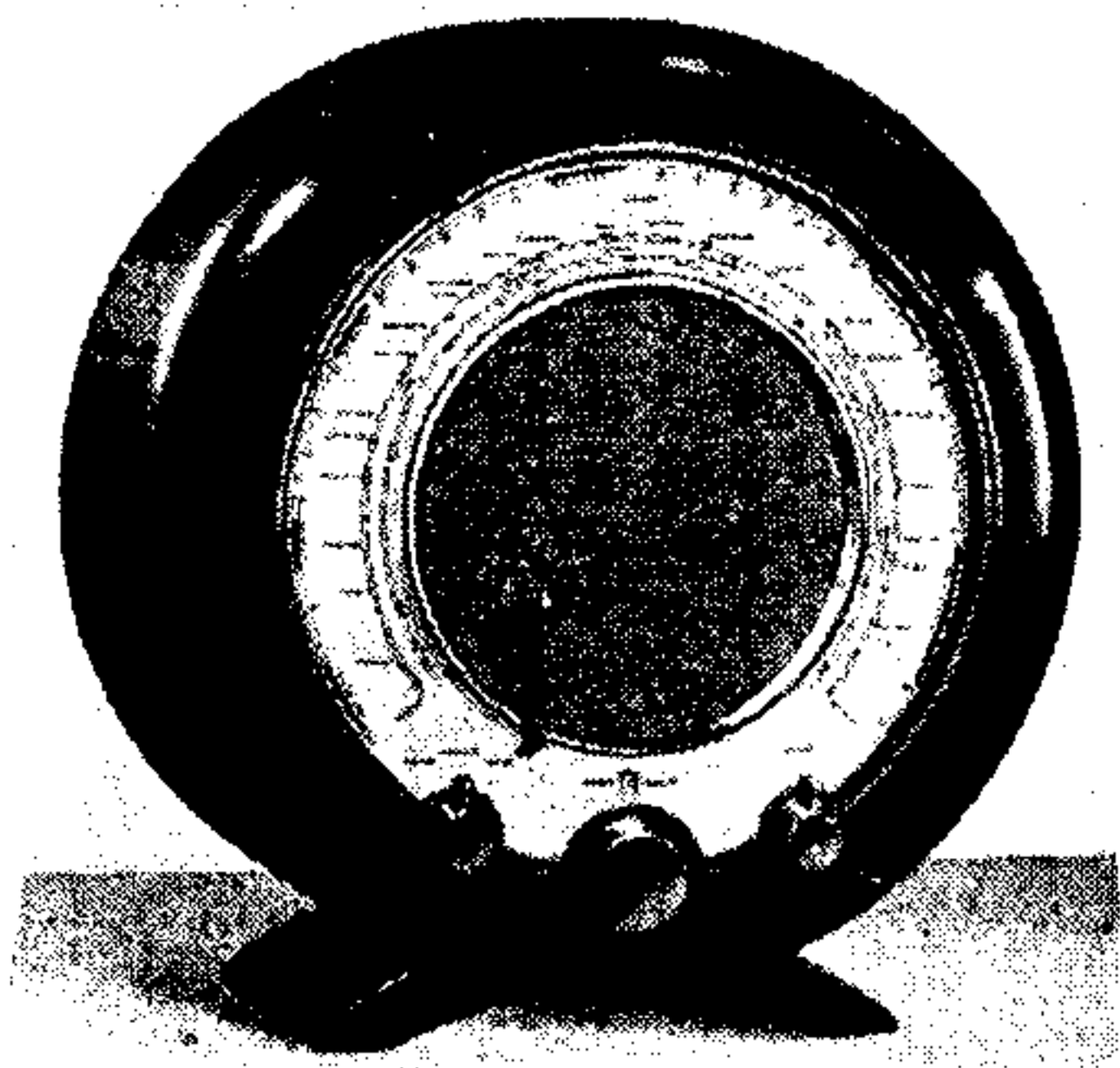
FRONT EDGE

UPPER

"TRADER" SERVICE SHEET
768

EKCO A22

3-BAND A.C. SUPERHET



The Ekco A22 post-war superhet. The cabinet shown is finished in black and chromium, but a walnut finish is available also.

OF entirely new circular chassis construction, the Ekco A22 is a 3-valve (plus rectifier), 3-band superhet designed to operate from A.C. mains of 200-250 V, 40-80 c/s. The S.W. range is 16-50 m.

The chassis comprises a vertical circular member and a small horizontal compartment. Our chassis illustrations show front and rear elevation and the underside of the chassis.

The circular plastic cabinet is available in walnut or black and chromium finish. There is provision for connecting an external speaker, but none for a gramophone pick-up. Modifications in early models are described overleaf.

Release date: November, 1945.

Original price: £14 14s., plus £3 3s 3d purchase tax, in walnut or black and chromium finish.

CIRCUIT DESCRIPTION

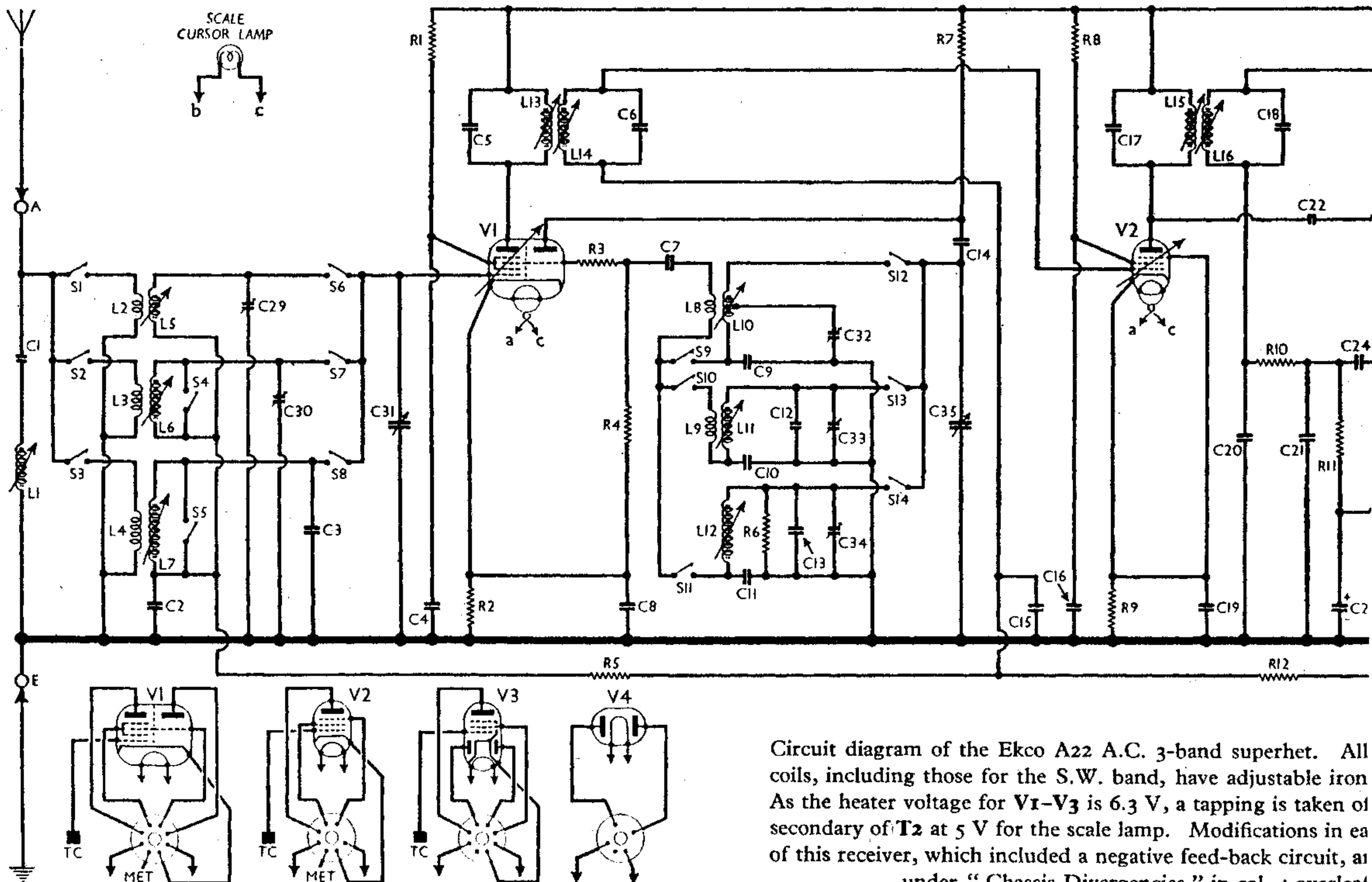
Aerial input via coupling coils L2 (S.W.), L3 (M.W.), and L4 (L.W.) to single-tuned circuits L5, C31 (S.W.), L6,

C31 (M.W.) and L7, C31 (L.W.). I.F. filtering by L1, C1 across the aerial circuit.

First valve (V1, Mullard metallised ECH35) is a triode-hexode operating as frequency changer with internal coupling. Triode oscillator anode coils L10 (S.W.), L11 (M.W.) and L12 (L.W.) are tuned by C35. Parallel trimming by C32 (S.W.), tapped down the tuning coil, C12, C33 (M.W.) and C13, C34 (L.W.); series tracking by fixed capacitors C9 (S.W.), C10 (M.W.) and C11 (L.W.), adjustments being effected by variable iron-dust cores on all three wavebands, as is the case also in the aerial circuit.

Reaction coupling to grid circuit via the common impedance of the trackers on all three wavebands with additional inductive coupling on S.W. and M.W. by coils L8 and L9 respectively.

Second valve (V2, Mullard metallised EF39) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings C5, L13, L14, C6 and L15, L16, C18, in which the



Circuit diagram of the Ekco A22 A.C. 3-band superhet. All coils, including those for the S.W. band, have adjustable iron. As the heater voltage for V1-V3 is 6.3 V, a tapping is taken of secondary of T2 at 5 V for the scale lamp. Modifications in early models of this receiver, which included a negative feed-back circuit, are under "Chassis Divergencies" in col. 4 overleaf.

tuning capacitors are fixed and adjustments are again carried out by varying the positions of the iron-dust cores.

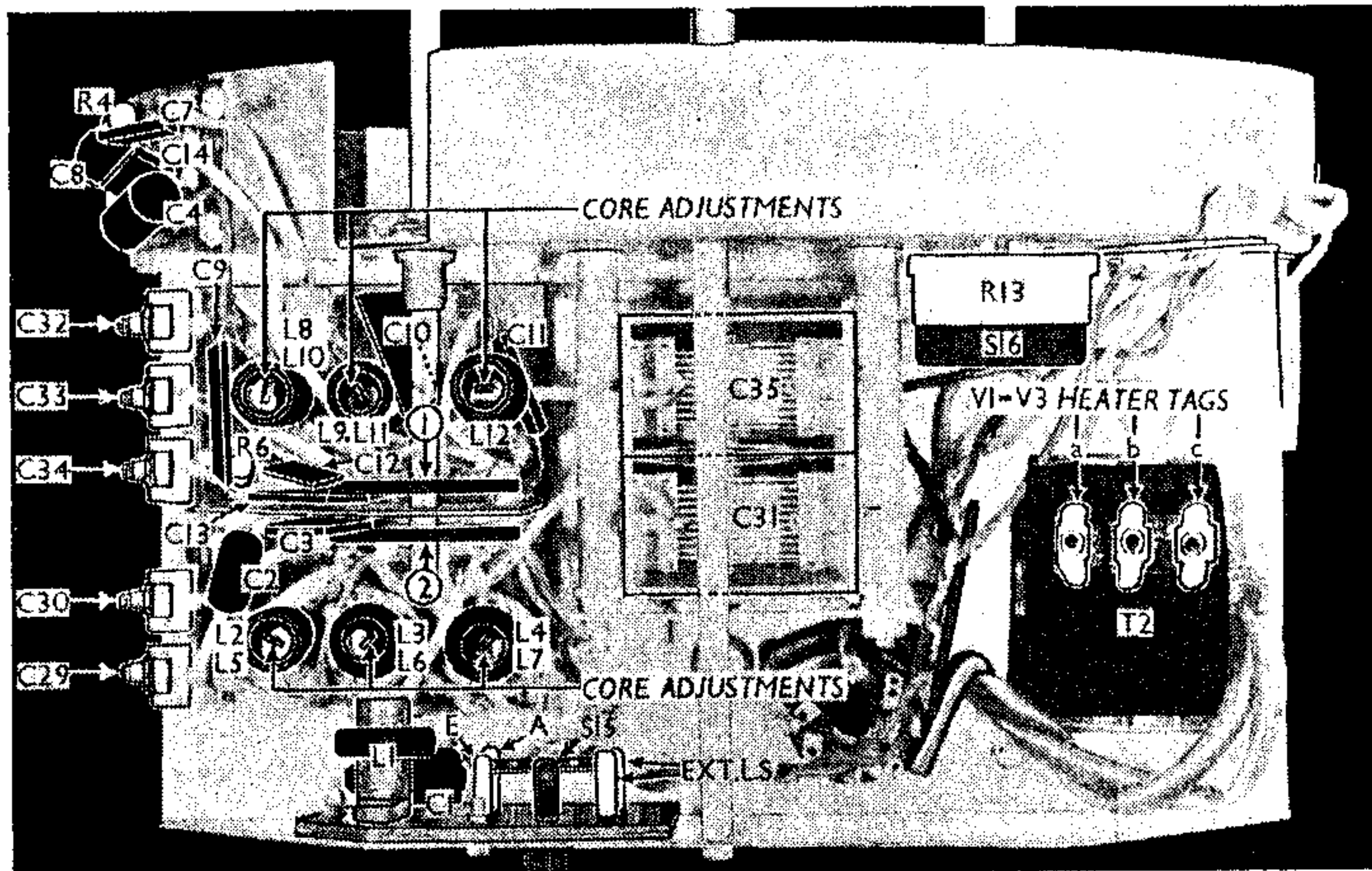
Intermediate frequency 465 k/cs.

Diode second detector is part of double-diode output pentode valve (V3, Mullard EBL31). Audio frequency component in rectified output is developed across load resistor R11 and passed via A.F. coupling capacitor C24, manual volume control R13 and grid stopper R14 to control grid of pentode section.

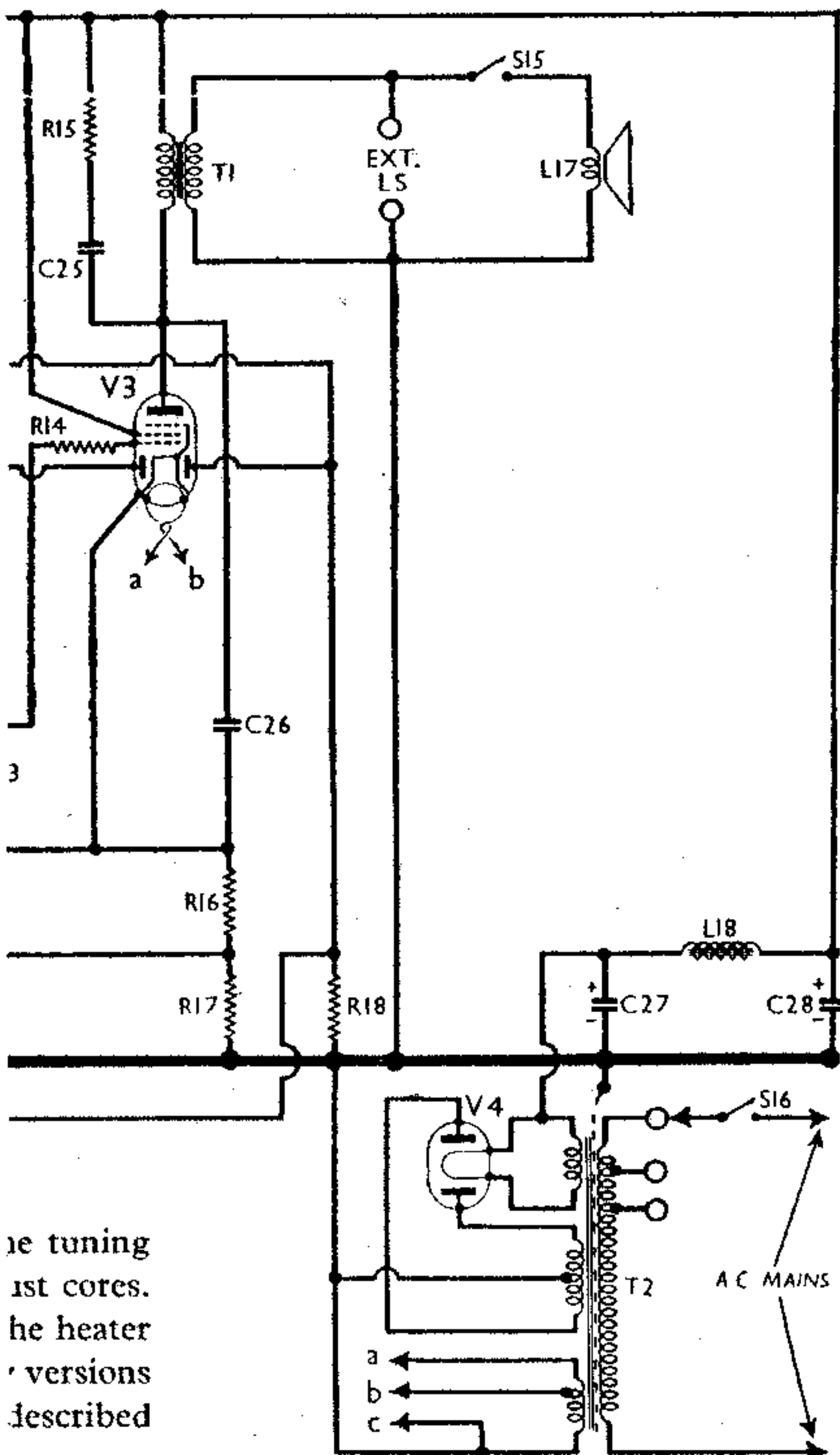
I.F. filtering by C20, R10 and C21 in diode circuit. Fixed tone correction by C26 and R15, C25 in pentode anode circuit. Provision for connection of low impedance external speaker across secondary winding of output transformer T1.

Second diode of V3, fed from V2 anode via C22, provides D.C. potential which is developed across load resistor R18 and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage, together with G.B. for pentode section, is obtained from the drop along resistors R16, R17 in cathode lead to chassis.

H.T. current is supplied by full-wave rectifying valve (V4, Mullard AZ31). Smoothing by iron-cored choke L18 and electrolytic capacitors C27, C28. Valve heaters of V1-V3 are supplied from the ends a, c of the heater secondary winding on the mains transformer T2 at 6.3 V R.M.S., but the scale lamp is supplied from c and a tapping b at about 5 V R.M.S.



Under-chassis view. The R.F. and oscillator tuning assembly is seen on the left of the tuning gang, the trimmers conveniently facing outwards. Arrows show the directions in which the waveband switch units (1 and 2) are viewed in the diagrams in col. 2 overleaf.



ie tuning
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he heater
versions
described

COMPONENTS AND VALUES

CAPACITORS		Values (μF)
C1	Aerial I.F. filter tuning...	0.00005
C2	V1 hex C.G. decoupling...	0.1
C3	Aerial circ. L.W. trimmer	0.0001
C4	V1 S.G. decoupling ...	0.05
C5	1st I.F. transformer tuning capacitors ...	0.0001
C6		0.0001
C7	V1 osc. C.G. capacitor ...	0.0001
C8	V1 cathode by-pass ...	0.1
C9	Osc. circ. S.W. tracker ...	0.00617
C10	Osc. circ. M.W. tracker ...	0.000485
C11	Osc. circ. L.W. tracker ...	0.000172
C12	Osc. M.W. fixed trimmer	0.000025
C13	Osc. L.W. fixed trimmer...	0.00011
C14	V1 osc. anode coupling ...	0.00005
C15	A.V.C. line decoupling ...	0.05
C16	V2 S.G. decoupling ...	0.05
C17	2nd I.F. transformer tuning capacitors ...	0.0001
C18		0.0001
C19	V2 cathode by-pass ...	0.1
C20	I.F. by-pass capacitors ...	0.0001
C21		0.0001
C22	V3 A.V.C. diode coupling	0.00005
C23*	V3 cathode by-pass ...	25.0
C24	A.F. coupling to V3 pent.	0.05
C25	Fixed tone correctors ...	0.04
C26		0.0025
C27*	H.T. smoothing capacitors	8.0
C28*		16.0
C29†	Aerial circ. S.W. trimmer	—
C30†	Aerial circ. M.W. trimmer	—
C31†	Aerial circuit tuning ...	—
C32†	Osc. circ. S.W. trimmer...	—
C33†	Osc. circ. M.W. trimmer...	—
C34†	Osc. circ. L.W. trimmer...	—
C35†	Oscillator circuit tuning...	—

* Electrolytic. † Variable. ‡ Pre-set.

RESISTORS		Values (ohms)
R1	V1 S.G. H.T. feed ...	47,000
R2	V1 fixed G.B. resistor ...	150
R3	V1 osc. C.G. stabiliser ...	47
R4	V1 osc. C.G. resistor ...	47,000
R5	A.V.C. line decoupling ...	220,000
R6	Osc. circ. L.W. damping...	15,000
R7	V1 osc. anode H.T. feed...	47,000
R8	V2 S.G. H.T. feed ...	68,000
R9	V2 fixed G.B. resistor ...	150
R10	I.F. stopper ...	47,000
R11	V3 signal diode load ...	330,000
R12	A.V.C. line decoupling ...	1,000,000
R13	Manual volume control ...	1,000,000
R14	V3 pent. grid stopper ...	4,700
R15	Part of tone corrector ...	6,600
R16	V3 pent. G.B. and A.V.C. delay resistors ...	150
R17		220
R18	V3 A.V.C. diode load ...	680,000

OTHER COMPONENTS		Approx. Values (ohms)	
L1	Aerial I.F. filter tuning ...	20.0	
L2	Aerial coupling coils ...	0.2	
L3		44.0	
L4		30.0	
L5	Aerial S.W. tuning coil ...	0.1	
L6	Aerial M.W. tuning coil ...	3.0	
L7	Aerial L.W. tuning coil ...	30.0	
L8	Osc. S.W. reaction coil ...	10.5	
L9	Osc. M.W. reaction coil ...	0.5	
L10	Osc. S.W. tuning coil, total	0.2	
L11	Osc. M.W. tuning coil ...	3.2	
L12	Osc. L.W. tuning coil ...	6.0	
L13	1st I.F. trans. { Pri. ...	10.0	
L14		Sec. ...	10.0
L15	2nd I.F. trans. { Pri. ...	10.0	
L16		Sec. ...	10.0
L17	Speaker speech coil ...	2.6	
L18	H.T. smoothing choke ...	310.0	
T1	Output trans. { Pri. ...	450.0	
		Sec. ...	0.17
	Mains trans. { Pri., total ...	50.0	
		Heater sec. ...	0.15
		Recr. heat. sec. ...	0.15
	IL.T. sec., total...	1,150.0	
S1-S14	Waveband switches ...	—	
S15	Int. speaker switch ...	—	
S16	Mains switch, ganged R11	—	

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted in the makers' manual. They represent conditions to be expected in an average receiver when the mains voltage adjustment is appropriately set.

When readings were taken the receiver was tuned to the highest wavelength on the M.W. band, and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 1,200 V scale of a Universal Avometer, chassis being the negative connection in all cases.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 ECH35	{ 240 Oscillators 85 }	{ 2.0 3.3 }	80	3.4
V2 EF39	240	7.6	65	2.3
V3 EBL31	225	32.0	240	3.7
V4 AZ31	270†	—	—	—

† Each anode, A.C.

DISMANTLING THE SET

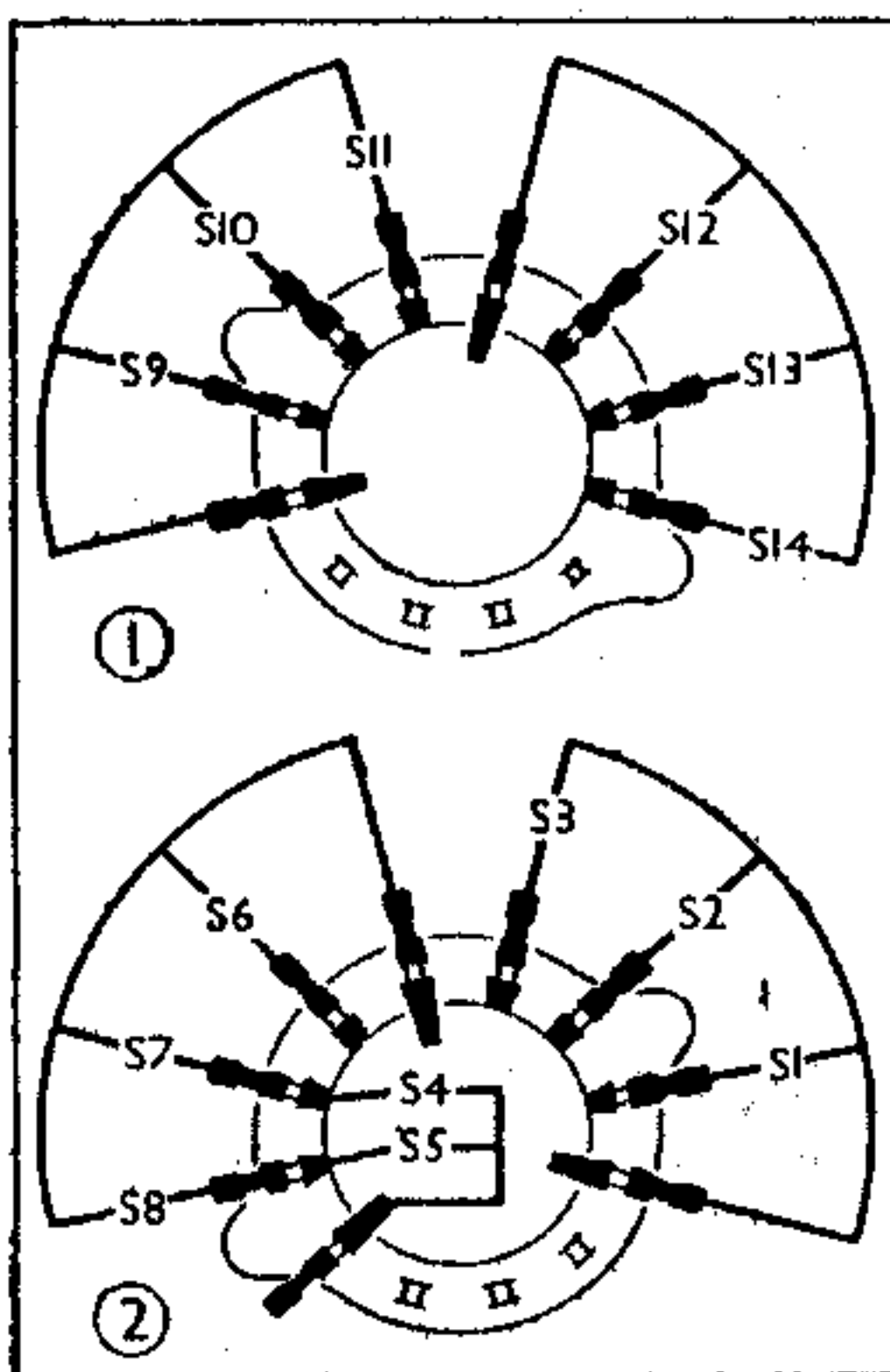
Removing Chassis.—Remove the three control knobs (large recessed grub screws);

laying the receiver face-down on a baize pad or soft duster, with the control spindles overhanging the bench, remove the back cover (five cheese-head screws) and slide it down the mains lead; remove from the four lugs round the periphery of the chassis the four set screws holding it to the front of the cabinet, when the chassis, complete with speaker, may be lifted out.

When replacing, insertion of the four fixing screws is facilitated by the use of beeswax or Plasticine to hold the screws to the end of the screwdriver.

Removing Scale Disc.—To obtain access to the front compartment of the vertical

chassis section, insert a long screw-driver into the slot across the flat rim of the periphery of this section, opposite the 41 m band mark on the scale, and slacken the largest fixing screw at the



Diagrams of the waveband switch units. Arrows in the under-chassis view overleaf show the directions in which they are viewed.

centre of the section, in front of the speaker, when the scale disc can be withdrawn.

This operation is simplified if the scale lamp inspection cover is first removed (three small cheese-head screws) permitting a clear view of the screw-head. The bottom edge of the scale disc should just overhang the edge of the bench.

When replacing, the flat on the central stem locates the scale accurately, so that calibration is not upset, but it is advisable to swing the scale either way slightly, to assist correct location on the flat as the screw is tightened.

Removing Speaker.—Turn the gang to minimum to protect the vanes from risk of damage, and slacken the nuts on the

three clamps holding the speaker to the vertical chassis member.

If the clamps are swivelled, the speaker may now be lifted out, but as the leads are not very long it is advisable to unsolder them.

When replacing, the connecting panel should go at the top. Note that the fixing clamps have on their bases locating pegs which rest in holes drilled in the vertical member.

GENERAL NOTES

Switches.—S1-S14 are the waveband switches, ganged in two rotary units within the tuning assembly beneath the chassis, the aerial (S1-S8) and oscillator (S9-S14) units being separated into their appropriate compartments by a metal screen. The units are indicated in our under-chassis view, and shown in detail in the diagrams in col. 2, where they are drawn as seen when viewed in opposite directions, as indicated by arrows in the chassis illustration.

The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and C, closed.

S15 is the thumb-screw operated internal speaker switch, situated on the connecting panel at the rear of the chassis. It closes when screwed in (clockwise).

S16 is the Q.M.B. mains switch, ganged with the volume control R13.

Coils.—The aerial circuit coils L2, L5; L3, L6; L4, L7; and the oscillator coils L8, L10; L9, L11; L12, are in six un-screened tubular units in the tuning assembly beneath the chassis, the aerial and oscillator compartments being separated by a metal screen. All six units have adjustable iron-dust cores. The aerial I.F. filter coil L1, also iron-cored, is mounted on the rear chassis member, in the aerial compartment.

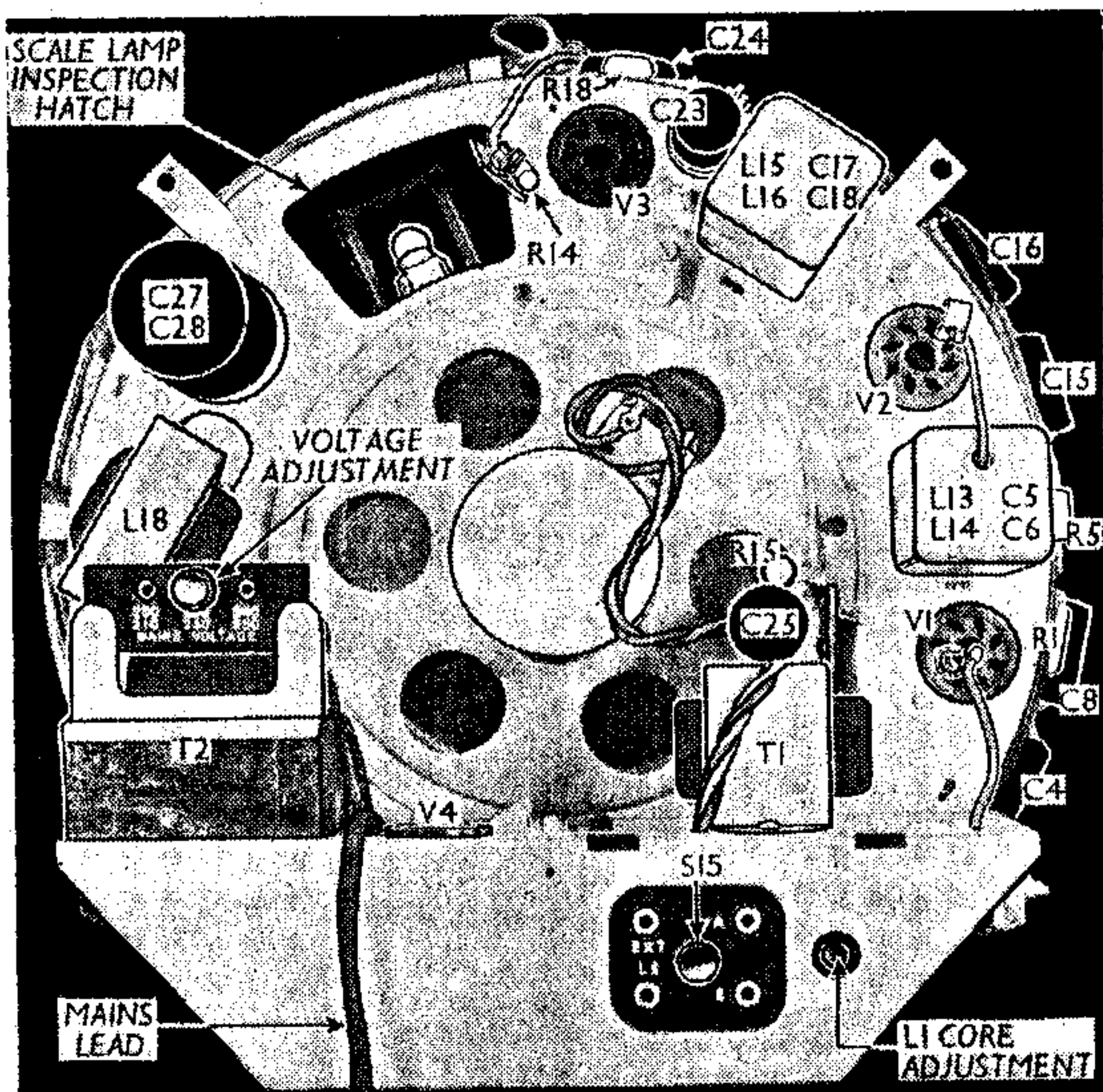
Scale Cursor Lamp.—This is a lamp with a spherical bulb and an M.E.S. base, rated at 6.3 V, 0.3 A. It is energised from the heater secondary of T2, being tapped off at b and c at about 5 V R.M.S.

The lamp is mounted in a small box carried on the end of the cursor arm, and throws a shadow which forms the cursor line through the translucent scale. It is connected by a pair of flexible leads which make a complete turn round the central stem on which the cursor drive pulley is mounted.

Access to the lamp is obtained easily from the rear of the receiver by removing

Switch Table

Switch	S.W.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	C	—	—
S5	C	C	—
S6	C	—	—
S7	—	C	—
S8	—	—	C
S9	C	—	—
S10	—	C	—
S11	—	—	C
S12	C	—	—
S13	—	C	—
S14	—	—	C



Rear view of the chassis, showing all the valve positions, V4 being on the horizontal deck. The cover has been removed from the scale lamp inspection hatch, and the lamp and cursor are seen through the aperture

the cover (three cheese-head set screws) from the scale lamp inspection hatch, indicated in our rear view of the chassis, and turning the cursor to the appropriate position.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (about 3 Ω) external speaker. With these sockets is switch **S15**, which can be used if desired to mute the internal speaker.

Capacitors C27, C28.—These are two dry electrolytics in a single tubular metal container mounted on the vertical chassis member, rated at 500 V D.C. working. The red spotted tag is the positive of **C27** (8 μF), and the yellow spotted tag is that of **C28** (16 μF). The case forms the common negative connection.

Chassis Divergencies.—In the first few models produced, negative feed-back was used in the output stage, involving two additional resistors and one capacitor.

The lead connecting the speech coil circuit in our diagrams to chassis then went to the junction of **R16** and **R17** instead of to chassis, and a 22,000 Ω and a 33,000 Ω resistor went in series across **T1** secondary, the 33,000 Ω resistor being at the earthy end with a 0.1 μF capacitor shunted across it to modify the response. Feed-back was introduced into **V3** pentode control grid circuit by connecting the earthy end of **R13** (shown connected in our diagram to the junction of **R16** and **R17**) to the junction of the two additional resistors. The three additional components were mounted on a small connecting panel just beside **T2** in the under-chassis compartment.

In some chassis, also, a 33,000 Ω damping resistor may be shunted across the M.W. oscillator coil **L11**, in the manner in which **R6** is shunted across **L12**. This may be further extended in a few cases to adding a damping resistor across **L10**.

CIRCUIT ALIGNMENT

I.F. Stages.—Switch set to M.W. and tune to 550 m on scale. Turn the volume control to maximum and keep the input low to avoid A.V.C. action. Connect signal generator leads to control grid (top cap) of **V1** and chassis, via a 0.1 μF capacitor, feed in a 465 kc/s (645.16 m) signal, and adjust the cores of **L16**, **L15**, **L14** and **L13**, in that order, for maximum output.

I.F. Filter.—Transfer signal generator leads via a M.W. dummy aerial to **A** and **E** sockets, feed in a strong 465 kc/s signal and adjust the core of **L1** for minimum output.

R.F. and Oscillator Stages.—With the gang at maximum, the cursor shadow should cover the red spot just beyond the "L" at the high wavelength end of the L.W. scale. If it does not, the cursor arm may be adjusted within the limits of the slotted screw-holes in its carrier arm if the two screws holding it to the smaller (central) drive wheel are slackened. To do this, the scale disc must first be removed, as described under "Dismantling the Set." The signal generator leads remain connected to **A** and **E** sockets, via a suitable dummy aerial.

S.W.—Switch set to S.W., tune to 16 m on scale (middle of 16 m band area), feed in a 16 m (18.75 Mc/s) signal, and adjust

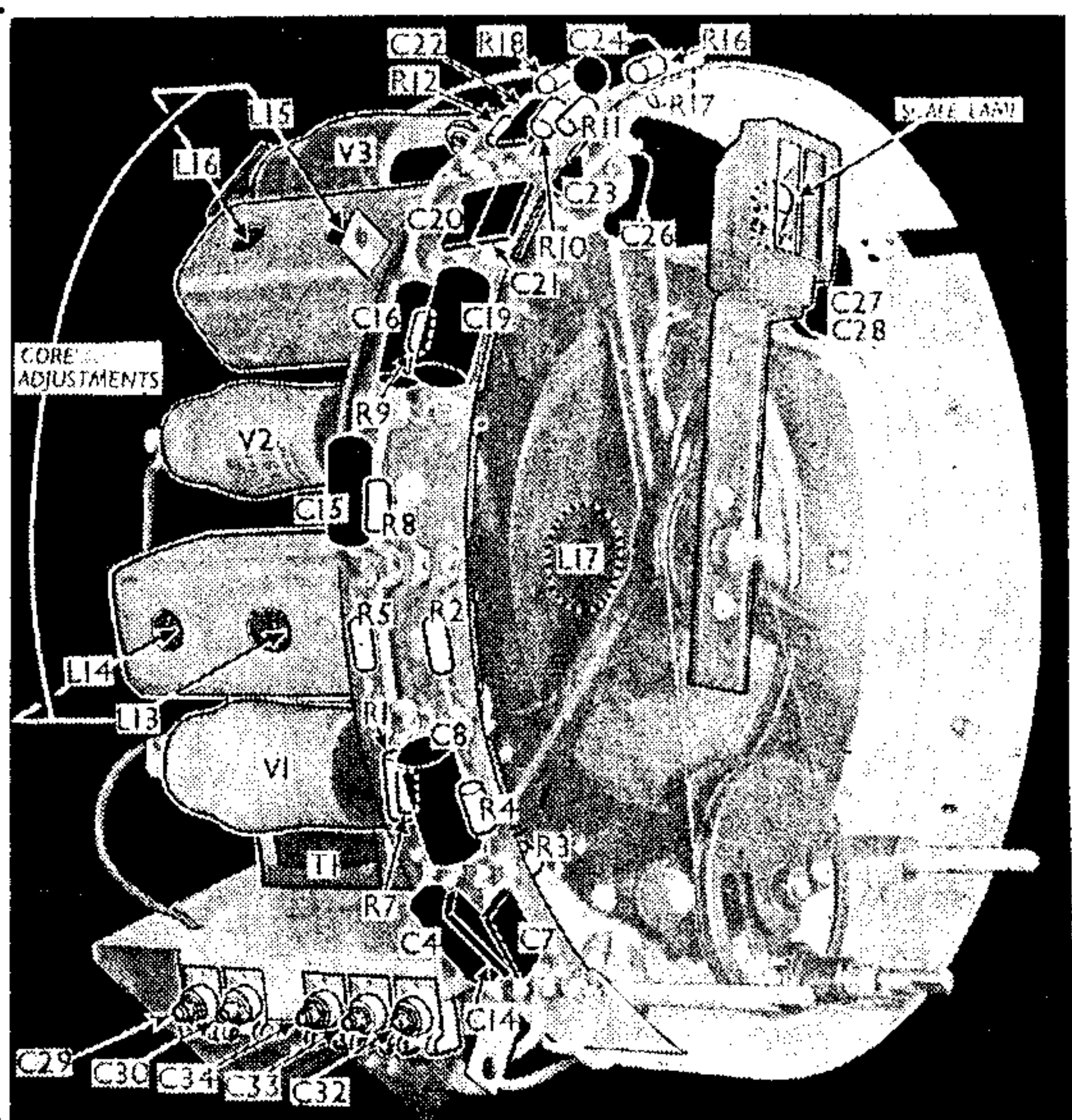
C32 for maximum output. Tune to 40 m on scale, feed in a 40 m (7.5 Mc/s) signal, and adjust the core of **L10** for maximum output. Tune to 18 m on scale, feed in an 18 m (16.67 Mc/s) signal, and adjust **C29** for maximum output. Tune to 48 m on scale, feed in a 48 m (6.25 Mc/s)

put. Tune to 2,000 m on scale, feed in a 2,000 m (150 kc/s) signal, and adjust the core of **L7** for maximum output.

DRIVE CORD REPLACEMENT

Turn the gang to minimum, and remove the collar (set screw) and cupped washer

Three-quarter front view of the chassis, with the scale disc removed, showing the speaker cone. Most of the components are fitted to a flexible band which is bolted round the rim of the chassis. The valves are shown in position, and the I.F. core adjustments are indicated.



signal, and adjust the core of **L5** for maximum output.

M.W.—Switch set to M.W., tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C33** for maximum output. Tune to 400 m on scale, feed in a 400 m (750 kc/s) signal, and adjust the core of **L11** for maximum output. Tune to 220 m on scale, feed in a 220 m (1,364 kc/s) signal, and adjust **C30** for maximum output. Tune to 520 m on scale, feed in a 520 m (576.9 kc/s) signal, and adjust the core of **L6** for maximum output.

L.W.—Switch set to L.W., tune to 1,000 m on scale, feed in a 1,000 m (300 kc/s) signal, and adjust **C34** for maximum output. Tune to 1,500 m on scale, feed in a 1,500 m (200 kc/s) signal, and adjust the core of **L12** for maximum out-

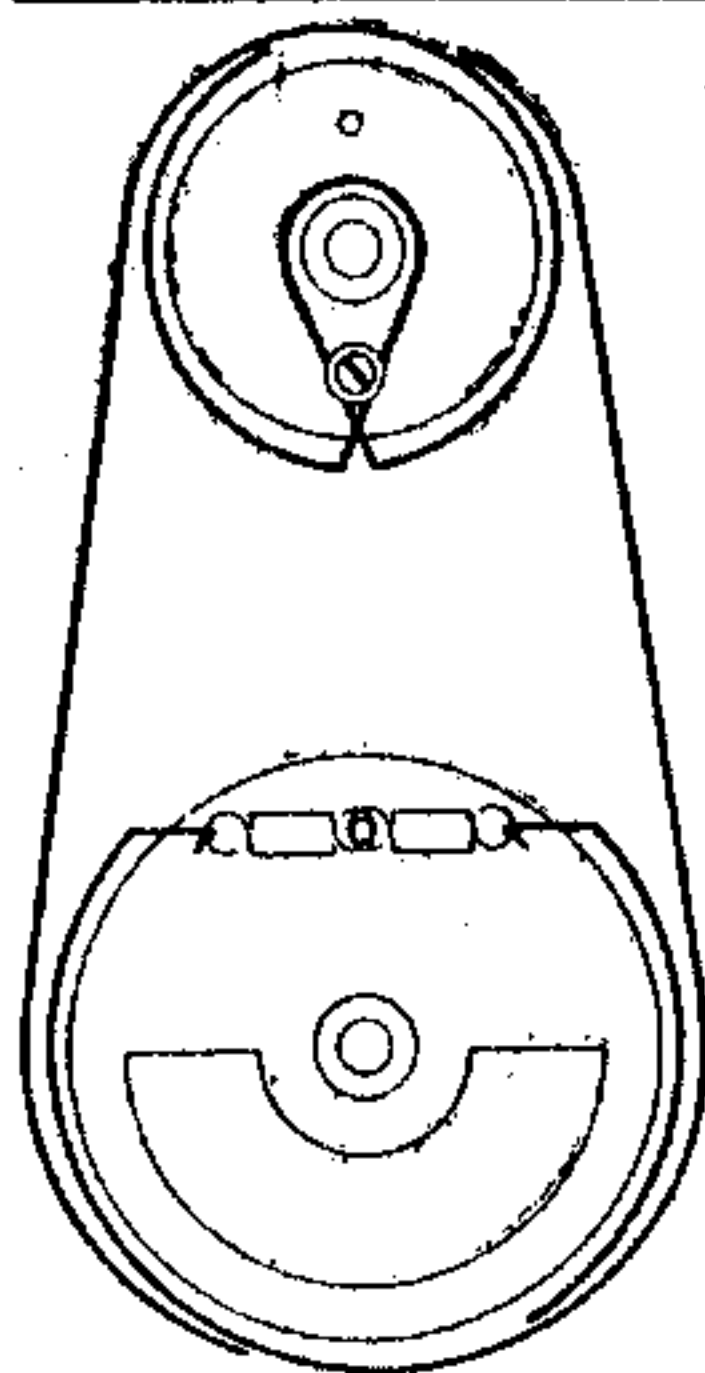
holding the upper wheel in place on the central stem; then dismount the cursor arm (one screw, one nut, with washers) from the upper wheel, and withdraw the wheel.

Slacken the two grub screws holding the lower wheel boss to the gang spindle, and remove the two set screws, behind the wheel, holding the friction drive bracket to its mounting (the screwdriver is applied through the drive wheel). The lower wheel may now be withdrawn, complete with tuning spindle and friction drive. Lay both wheels face-down on the bench, the spindle on the lower wheel overhanging the edge of the bench.

Removing the two tension springs from their anchor, knot one end of the new cord to one spring, then knot the other end to the second spring, so that the overall length, including the two springs relaxed, is 30 3/4 in, then cut off the surplus cord.

Fold the new cord exactly in half, and thread the centre loop so formed through the lower hole in the rim of the smaller wheel. Open the loop, slip it over the centre boss, pull it taut, and secure it under the clamping screw between the hole and boss.

The cord must now be run round the two drive wheels, which still lie face-down on the bench, in the manner shown in the diagram in col. 5, terminating with the springs at the anchor pin in the larger wheel. Then, holding the wheels to keep the cord taut, lift them and slip them on to their spindles, upper side first, and allow springs to take up slack. Finally, tighten up the fixing screws.



Reverse, or "inside" view of the cursor drive wheels, seen as they lie on the bench, showing the course taken by the drive cord, whose replacement is described in the next column.