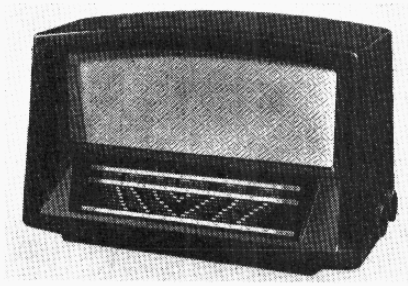


Appearance of models 85A, 85U.

RESISTORS		Values	Locations
R1	V1 G.B.	220Ω	F2
R2	V1 osc. C.G. ...	47kΩ	F2
R3	V1 osc. stabilizer...	100Ω	F2
R4	A.G.C. decoupling	100kΩ	G2
R5	Osc. anode feed ...	27kΩ	F3
R6	V2 .GB.	68Ω	E2
R7	I.F. stopper ...	47kΩ	E2
R8	Volume control ...	500kΩ	D2
R9	V3 C.G.	10MΩ	E2
R10	A.G.C. decoupling	1MΩ	F2
R11	A.G.C. diode load...	1MΩ	E2
R12	V3 anode load ...	470kΩ	E2
R13	Part tone control...	220kΩ	E3
R14	Tone control ...	500kΩ	D3
R15	Neg. feed-back ...	1·5MΩ	E3
R16*	H.T. potential divider	4·7kΩ	D2
R17		15kΩ	E2
R18	V4 C.G. stopper ...	4·7kΩ	E3
R19	V4 G.B.	180Ω	E3
R20	H.T. smoothing ...	1kΩ	D3
R21	V5 surge limiter ...	100Ω	D3
R22	Brimistor CZ2 ...	—	—
R23	Heater ballast ...	740Ω	—
R24		100Ω	—

* 6·8kΩ in Model 754.

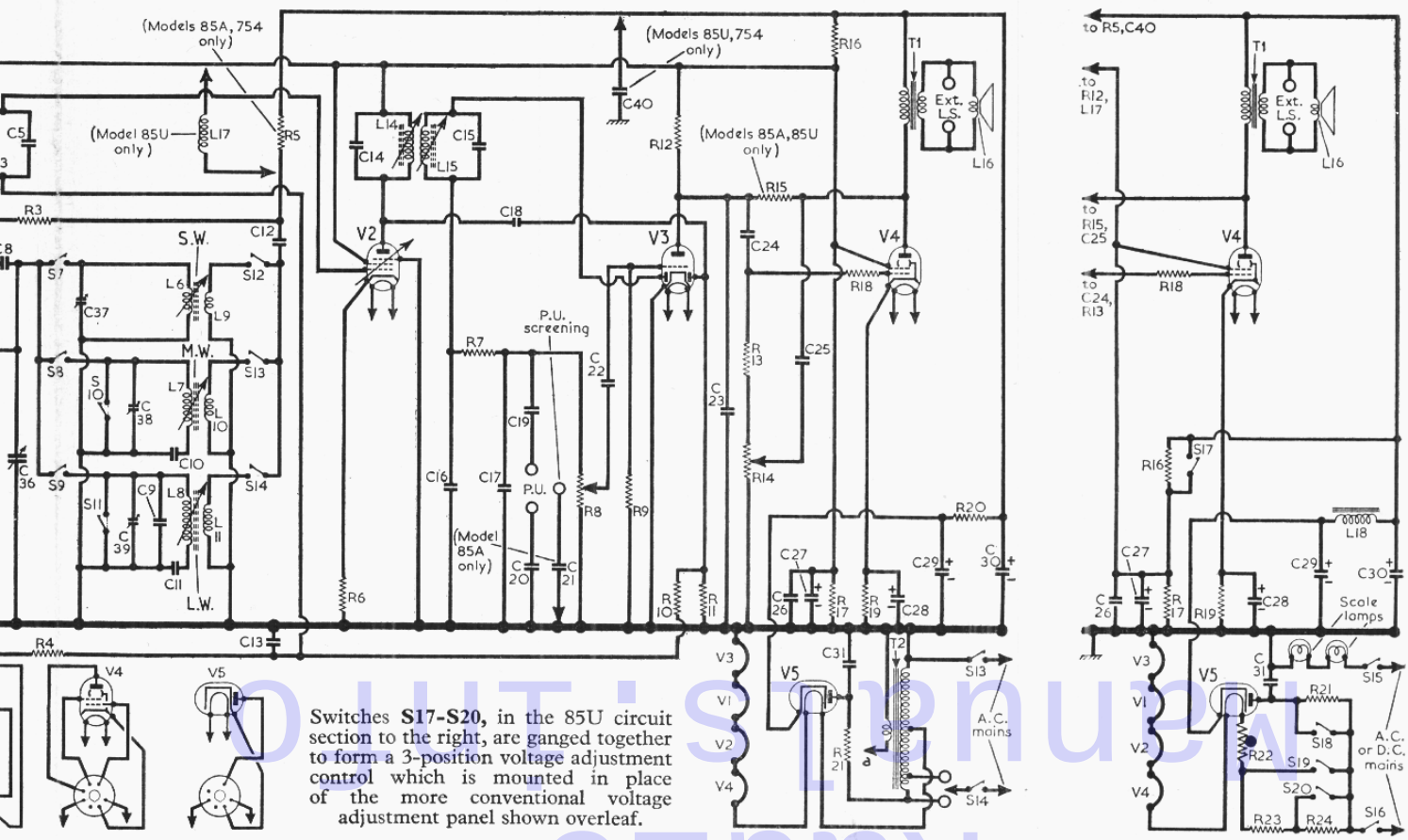
CAPACITORS		Values	Locations
C1	L.W. aerial trim. ...	230pF	A1
C2	Aerial series ...	500pF	G2
C3	A.G.C. decoupling	0·1μF	G2
C4	I.F. transformer	150pF	B1
C5	tuning	150pF	B1
C6	Osc. neutralizer ...	¶	A1
C7	V1 cath. by-pass ...	0·02μF	F2
C8	V1 osc. C.G. ...	100pF	F2
C9	L.W. osc. trim. ...	220pF	F2
C10	M.W. osc. tracker...	520pF	F3
C11	L.W. osc. tracker...	225pF	F3
C12	Osc. anode coupling	100pF	G2
C13	A.G.C. decoupling	0·1μF	F2
C14	I.F. transformer	150pF	B1
C15	tuning	150pF	B1
C16	I.F. by-passes ...	110pF	E2
C17		110pF	E2
C18	A.G.C. coupling ...	20pF	E2
C19	P.U. isolators ...	0·02μF	E3
C20		0·02μF	F3
C21		0·02μF	F3
C22	A.F. coupling ...	0·001μF	E2
C23	I.F. by-pass ...	300pF	E2
C24	A.F. coupling ...	0·04μF	E2
C25	Part tone control...	500pF	E3
C26	H.T. by-pass ...	0·1μF	D2
C27*	H.T. smoothing ...	8μF	C1
C28*	V4 cathode by-pass	50μF	E3
C29*	H.T. smoothing ...	32μF	C1
C30*		32μF	C1
C31	Mains R.F. by-pass	0·05μF	D3
C32‡	S.W. aerial trim ...	60pF	A1
C33‡	L.W. aerial trim ...	60pF	A1
C34‡	M.W. aerial trim ...	60pF	A1
C35†	Aerial tuning ...	§532pF	A1
C36†	Oscillator tuning ...	§532pF	A1
C37‡	S.W. osc. trim. ...	60pF	A1
C38‡	M.W. osc. trim. ...	60pF	A1
C39‡	L.W. osc. trim. ...	60pF	A1
C40	H.T. decoupling ...	0·1μF	—
C41	Chassis isolator ...	0·002μF	—
C42‡	S.W.1 aerial trim....	60pF	—
C43‡	S.W.2 aerial trim....	60pF	—
C44‡	M.W. aerial trim....	60pF	—
C45‡	L.W. aerial trim....	60pF	—
C46‡	S.W.1 aerial trim....	60pF	—
C47‡	S.W.2 aerial trim....	60pF	—

(continued next col.)

CAPACITORS (continued)		Values	Locations
C48‡	M.W. aerial trim....	60pF	—
C49‡	L.W. aerial trim....	60pF	—
C50	S.W.1 osc. tracker	0·005μF	—
C51	S.W.2 osc. tracker	0·0026μF	—

* Electrolytic. † Variable. ‡ Pre-set.
§ "Swing" value, minimum to maximum.
¶ Very low capacitance, formed by twisted wires

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	L.W. frame aerial	16·0	A1
L2	M.W. frame aerial	2·0	A1
L3	S.W. aerial coupling	—	G3
L4	S.W. aerial tuning	—	G3
L5	Loading coil ...	1·0	G2
L6	Oscillator tuning coils	—	F3
L7		3·0	F3
L8		7·5	F3
L9	Oscillator reaction coils	—	F3
L10		1·5	F3
L11		2·0	F3
L12	1st I.F. trans. Pri.	7·0	B1
L13	1st I.F. trans. Sec.	7·0	B1
L14	2nd I.F. trans. Pri.	7·0	B1
L15	2nd I.F. trans. Sec.	7·0	B1
L16	Speech coil ...	2·5	—
L17	Osc. anode choke	25·0	—
L18	Smoothing choke...	150·0	—
L19–L34	R.F. and oscillator coils (S.S.M.L.), Model 754 ...	—	—
T1	O.P. trans. Pri.	340·0	—
	O.P. trans. Sec.	—	
T2	Mains trans. Pri., total	76·0	C1
	Mains trans. Sec.	1·0	
S1–S14	Waveband switches	—	G3
S15, S16	Mains sw., g'd R14	—	D3
S17–S20	Voltage adj. sw. ...	—	—
S21–S42	Waveband switches	—	—



Switches **S17-S20,** in the 85U circuit section to the right, are ganged together to form a 3-position voltage adjustment control which is mounted in place of the more conventional voltage adjustment panel shown overleaf.

"TRADER" SERVICE SHEET

1126

PILOT 85 Series

Covering Models 754, 85A & 85U

HOUSED in a plastic cabinet, the Pilot 85A is a 4-valve (plus rectifier) 3-band transportable superhet, designed to operate from A.C. mains of 200-250 V, 40-100 c/s. The waveband ranges are 16-50 m, 185-550 m, 1,200-2,000 m.

Model 85U is an A.C./D.C. version of model 85A, on which this *Service Sheet* is based, and is covered as explained under "General Notes" by a separate section of circuit diagram to the right of the main diagram.

Model 754 is a 4-band version of model 85A, its R.F., oscillator and I.F. circuits being re-drawn to the left of the main circuit diagram. Further notes on this model appear under "General Notes" overleaf.

Release date, all models, September 1953. Original prices: 85A, £14 5s 10d; 85U, £15 1s 8d; 754, £18 5s 3d.

CIRCUIT DESCRIPTION

Tuned frame aerial input on M.W. by **L2,** loading coil **L5** and **C35,** and on L.W. by **L1, L2,** loading coil **L5** and **C35.** For S.W. reception an external aerial is necessary and is coupled via **L3** to single-tuned circuit **L4, C35.** An external aerial may also be used on M.W. and L.W., when it is connected either to the junction of **L2, L5** (M.W.) or to the junction of **L1, L2** (L.W.) by switches **S2, S3.**

Model 754 has four waveband ranges comprising S.W.1, S.W.2, M.W. and L.W. No frame aerials are fitted and the external aerial is fed via aerial coupling coils to the single-tuned grid circuits.

First valve **(V1, Brimar 12AH8)** is a triode heptode valve operating as frequency changer with internal coupling. Oscillator grid coils **L6** (S.W.), **L7** (M.W.) and **L8** (L.W.) are tuned by **C36.** Parallel trimming by **C37** (S.W.), **C38** (M.W.) and **C9, C39** (L.W.); series tracking by **C10** (M.W.) and **C11** (L.W.). Reaction coupling from anode circuit by **L9** (S.W.), **L10** (M.W.) and **L11** (L.W.). The oscillator circuit in model 754, but for the addition of a second S.W. band, is similar.

Second valve **(V2, Brimar 12BA6)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C4, L12, L13, C5** and **C14, L14, L15, C15.**

Diode signal detector is part of double diode triode valve **(V3, Brimar 12AT6).** Audio frequency component in rectified output is developed across volume control **R8,** which acts as diode load, and is passed via **C22** to grid of triode section.

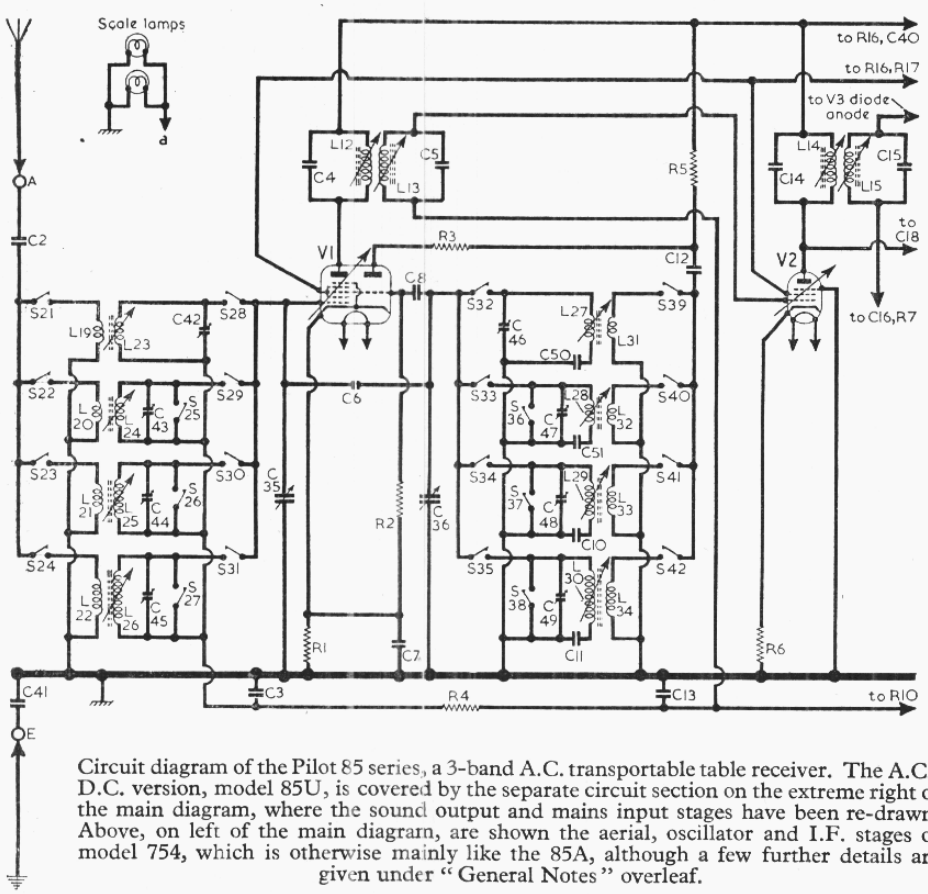
Intermediate frequency 471 kc/s.

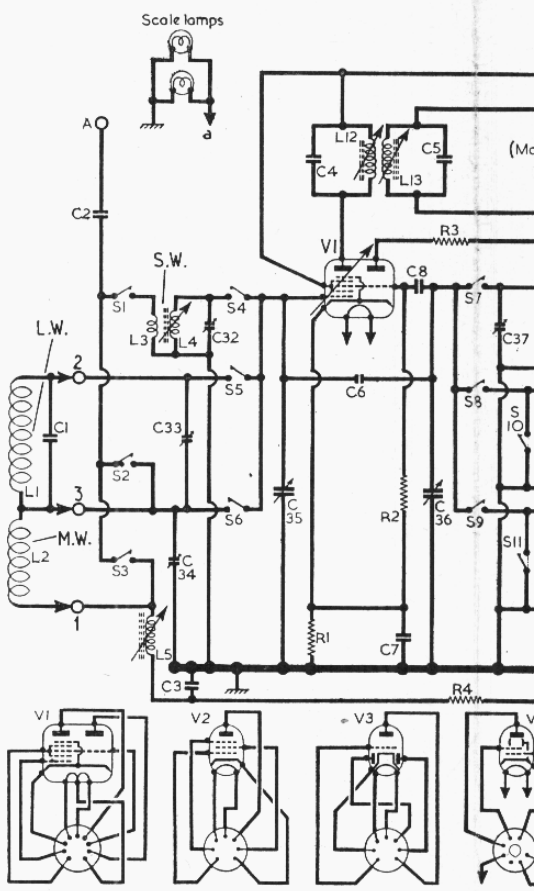
Second diode of **V3** is fed via **C18** from **V2** anode, and the resulting D.C. potential developed across load resistor **R11** is fed back as bias to **V1** and **V2,** giving automatic gain control.

Resistance-capacitance coupling by **R12, C24, R13** and **R14** between **V3** and pentode output valve **(V4, Brimar 35L6).** Fixed tone correction by negative feedback via **R15** between the anodes of **V4** and **V3.** Tone control **R14** is part of the negative feed-back chain **C25, R13, R14** between the anode and control grid circuits of **V4.**

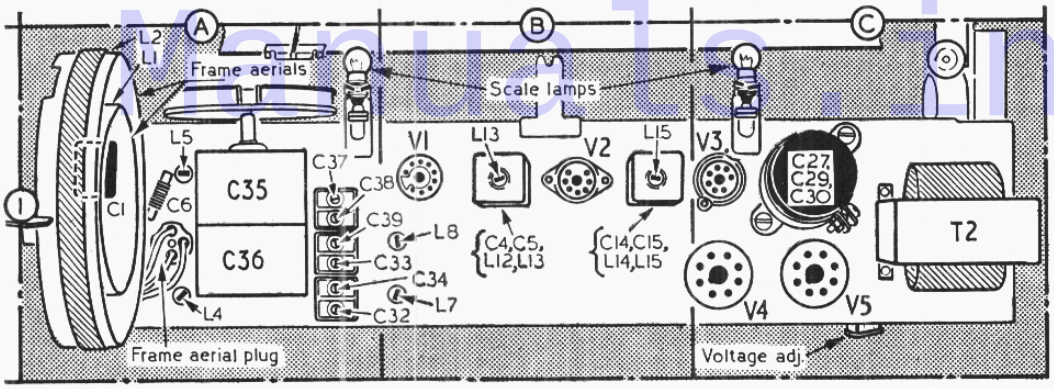
H.T. current in models 85A and 754 is supplied by I.H.C. half-wave rectifying valve **(V5, Brimar 35Z4).** Smoothing by **R16, R20** and electrolytic capacitors **C27, C29, C30.** The valve filaments are connected in series across a section of the primary winding of mains transformer

(Continued col. 1 overleaf)





Circuit diagram of the Pilot 85 series, a 3-band A.C. transportable table receiver. The A.C./D.C. version, model 85U, is covered by the separate circuit section on the extreme right of the main diagram, where the sound output and mains input stages have been re-drawn. Above, on left of the main diagram, are shown the aerial, oscillator and I.F. stages of model 754, which is otherwise mainly like the 85A, although a few further details are given under "General Notes" overleaf.



Plan view of the 85A chassis. The frame aerials **L1, L2** shown in location reference A1 are normally mounted in the cabinet, chassis connections being made by a 3-pin plug and socket, but they are shown here for the purpose of identification.

Circuit Description—*continued.*

T2, which acts as an auto-transformer. An isolated secondary winding is provided on **T2** for the scale lamps.

H.T. current in model 85U is supplied by I.H.C. half-wave rectifying valve **(V5, Brimar 35Z4).** Smoothing by **R16,** choke **L18** and electrolytic capacitors **C27, C29, C30.** Valve heaters, together with scale lamps, thermistor **R22** and ballast resistors **R23, R24,** are connected in series across the mains input. Voltage adjustment is by means of a three-position switch unit **S17-S20.**

GENERAL NOTES

Switches.—**S1-S14** are the waveband switches in models 85A and 85U, and are ganged in a single rotary unit beneath the chassis. The unit is indicated in our under-chassis illustration and shown in detail in the diagram in column 2 where it is drawn as seen from the volume control end of an inverted chassis. The associated table (above) shows the three control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C** closed.

Switch Table, Models 85A & 85U

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

S15, S16 are the Q.M.B. mains switches, ganged with the tone control **R14.**

S17-S20 are the voltage adjustment switches in model 85U, and are ganged in a single rotary unit which takes the place of the voltage adjustment panel in our plan view of the chassis. In the 110 V position of the switch **S17, S18** and **S19** close, and **S20** opens; in the 200-225 V position **S20** closes and **S17, S18, S19** open; in the 225-250 V position all switches open.

S21-S42 are the waveband switches in model 754, and are ganged in two rotary units beneath the chassis deck in place of the single rotary unit shown in our under chassis illustration. The switch table in column 3 gives the switch operations for the four control settings, a dash indicating open, and **C** closed.

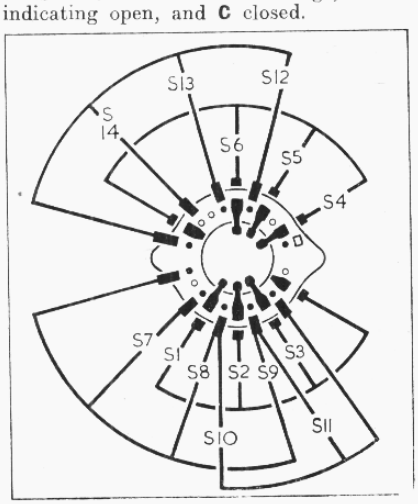


Diagram of the waveband switch unit for the 85A and 85U, drawn as seen from the volume control end of an inverted chassis.

Model 85U.—This is an A.C./D.C. version of the model 85A on which this *Service Sheet* was based. It differs from the 85A mainly in the power input stage, and this section has been re-drawn to the right of the main circuit diagram overleaf.

The receiver is designed to operate from A.C. or D.C. mains of 110 V and 200-250 V, 40-100 c/s in the case of A.C. Apart from other small differences, which are indicated in the main circuit diagram and in the valve voltage table, the remaining information applies equally to both receivers.

Model 754.—This is a 4-band version of model 85A, an extra S.W. band covering the range 50-180 m being added. No frame aerials are fitted to this model and the full H.T. voltage is applied to the anodes of **V1** and **V2.** The complete R.F., oscillator and I.F. section of this receiver has been re-drawn to the left of the main circuit diagram. The remainder of the 754 circuit, except where otherwise indicated, is the same as that for the 85A.

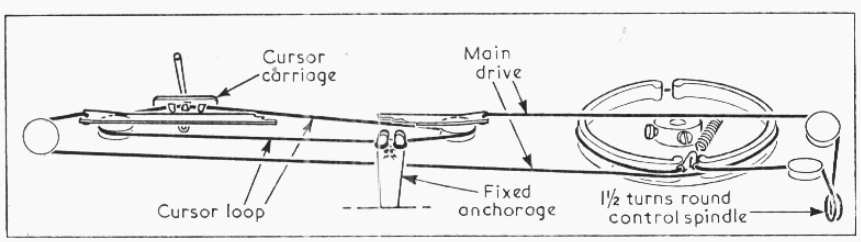
Scale Lamps.—These are 6.5 V, 0.3 A lamps with small clear spherical bulbs and M.E.S. bases.

DISMANTLING

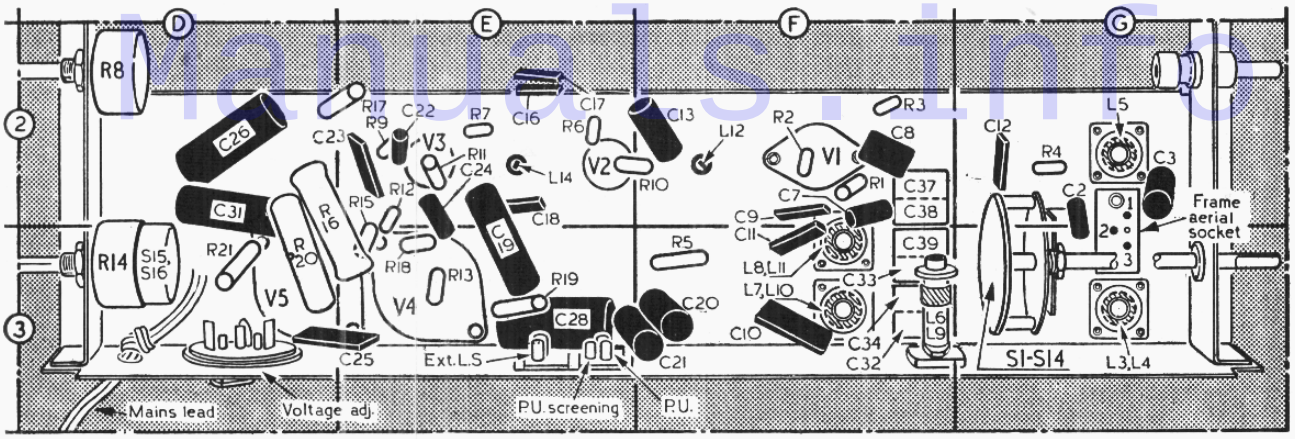
Removing Chassis.—Remove four control knobs from sides of cabinet (pull-off);
unsolder four leads from speech coil and output transformer tags on speaker;
remove two 2BA nuts (with washers) from rear lower edges of chassis;
release two 2BA captive bolts securing lower front edges of chassis to cabinet, and withdraw chassis.
When replacing, the brown and black speaker leads should go to the speech coil tags, and the red and blue leads to the tags on the output transformer.

Switch Table, Model 754

Switch	S.W.1	S.W.2	M.W.	L.W.
S21 ...	C	—	—	—
S22 ...	—	C	—	—
S23 ...	—	—	C	—
S24 ...	—	—	—	C
S25 ...	C	—	—	—
S26 ...	C	C	—	—
S27 ...	C	C	C	—
S28 ...	C	—	—	—
S29 ...	—	C	—	—
S30 ...	—	—	C	—
S31 ...	—	—	—	C
S32 ...	C	—	—	—
S33 ...	—	C	—	—
S34 ...	—	—	C	—
S35 ...	—	—	—	C
S36 ...	C	—	—	—
S37 ...	C	C	—	—
S38 ...	C	C	C	—
S39 ...	C	C	—	—
S40 ...	—	C	—	—
S41 ...	—	—	C	—
S42 ...	—	—	—	C



Drive cord as seen from beneath the chassis with the gang at minimum capacitance.



Under-chassis view of the 85A. In the 754 a two-wafer 4-position switch unit is fitted in place of the single-wafer unit **S1-S14** in location G3. The core adjustment for **L6** (F3) is reached from the rear of the chassis.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information and were measured on a model 85A receiver when it was operating from 225 V A.C. mains, the voltage adjustment being set to the 200-225 V tapping. Readings taken on a model 85U and a model 754, except where otherwise indicated in the table, were approximately the same.

Voltages were measured with an electronic meter, and as these instruments have a high internal resistance, allowance should be made for the current drawn by other types of meter. Chassis was the negative connection. The voltage measured across **C30** was 190 V.

Valve		Anode		Screen		Cath.
		V	mA	V	mA	V
V1	12AH8	90¶ Oscillator 85§	2·0 4·0	90	3·0	2·0
V2	12BA6	90¶	7·5	90	3·0	0·7
V3	12AT6	50	0·1	—	—	—
V4	35L6 ...	180	26·0	90	3·0	5·0
V5	35Z4 ...	240*	—	—	—	240·0†

* A.C. reading. † Cathode current, 49 mA.
§ 90V in Model 85U. ¶ 185V in Model 754.

DRIVE CORD REPLACEMENT

The tuning drive system is unusual in that there is a two-to-one step-up drive on the cursor section, devised by means of an anchored loop to which the cursor is attached. Altogether, about 4½ feet of nylon-braided glass yarn is required, and it should be divided into two lengths of 3ft and 1½ft.

First, with the shorter length, make the cursor loop. The ends of this loop should be passed through a metal collet and knotted together, the loop, when stretched out flat measuring 7⅞in overall. Attach the loop to the fixed anchorage behind the scale backing plate, as shown in the sketch at foot of cols. 1 and 2, and positioning the loop round the two pulleys on the "floating" pulley plate, attach the cursor to the uppermost run of the loop.

Thread half an inch of Systoflex sleeving on the longer length of drive cord, and attach one end of the cord to one end of the "floating" pulley plate. Run the cord as indicated in the sketch, finally tying of the cord to the other end of the pulley plate. The Systoflex on the cord should be positioned over the gap in drive drum rim and the tension spring should be anchored to it.

CIRCUIT ALIGNMENT

Although all the R.F. and oscillator adjustments are accessible with the chassis in its cabinet, the chassis must be withdrawn when making the I.F. adjustments.

I.F. Stages.—Switch receiver to M.W. and turn gang to maximum capacitance. Connect signal generator output, via an 0.1 μF capacitor in each lead, to control grid (pin 2) of **V1** and chassis. Feed in a 471 kc/s (637 m) signal and adjust the cores of **L15** (location reference B1), **L14** (E2), **L13** (B1) and **L12** (F2) for maximum output. Repeat these adjustments until no further improvement results.

R.F. and Oscillator Stages.—Transfer signal generator leads to **A** and **E** sockets. Replace chassis in cabinet and check that with the gang at maximum capacitance the cursor coincides with the 100 mark on the 0-100 tuning log scale.

Models 85A, 85U.

S.W.—Switch receiver to S.W., tune to 17.65 m, feed in a 17.65 m (17 Mc/s) signal and adjust **C37** (A1) and **C32** (A1) for maximum output. Tune receiver to 46.16 m, feed in a 46.16 m (6.5 Mc/s) signal and adjust the cores of **L6** (F3) and **L4** (A1) for maximum output. Repeat these adjustments until no further improvement results.

M.W.—Switch receiver to M.W., tune to 200 m, feed in a 200 m (1,500 kc/s) signal and adjust **C38** (A1) and **C34** (A1) for maximum output. Tune receiver to 500 m, feed in a 500 m (600 kc/s) signal and adjust the cores of **L7** (B1) and **L5** (A1) for maximum output. Repeat these adjustments until no further improvement results.

L.W.—Switch receiver to L.W., tune to 1,200 m, feed in a 1,200 m (250 kc/s) signal and adjust **C39** (A1) and **C33** (A1) for maximum output. Tune receiver to 1,667 m, feed in a 1,667 m (180 kc/s) signal and adjust the core of **L8** (B1) for maximum output. Repeat these adjustments until no further improvement results.

Model 754.

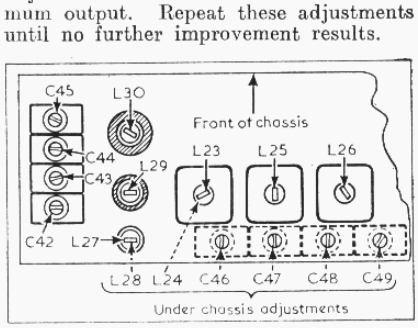
The positions of the core and trimmer adjustments used in the following alignment instructions are shown in a separate sketch at the foot of this column.

S.W.1.—Switch receiver to S.W.1, tune to 20 m, feed in a 20 m (15 Mc/s) signal and adjust **C46** and **C42** for maximum output. Tune receiver to 50 m, feed in a 50 m (6 Mc/s) signal and adjust the cores of **L27** and **L23** for maximum output. Repeat these adjustments until no further improvement results.

S.W.2.—Switch receiver to S.W.2, tune to 60 m, feed in a 60 m (5 Mc/s) signal and adjust **C47** and **C43** for maximum output. Tune receiver to 180 m, feed in a 180 m (1,667 kc/s) signal and adjust the cores of **L28** and **L24** for maximum output. Repeat these adjustments until no further improvement results.

M.W.—Switch receiver to M.W., tune to 200 m, feed in a 200 m (1,500 kc/s) signal and adjust **C48** and **C44** for maximum output. Tune receiver to 500 m, feed in a 500 m (600 kc/s) signal and adjust the cores of **L29** and **L25** for maximum output. Repeat these adjustments until no further improvement results.

L.W.—Switch receiver to L.W., tune to 1,304 m, feed in a 1,304 m (230 kc/s) signal and adjust **C49** and **C45** for maximum output. Tune receiver to 1,800 m, feed in a 1,800 m (166.7 kc/s) signal and adjust the cores of **L30** and **L26** for maximum output. Repeat these adjustments until no further improvement results.



Model 754 trimmer and core positions.

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