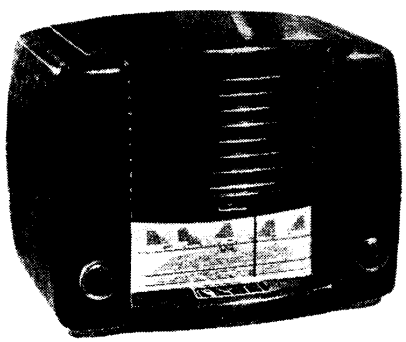
"TRADER" SERVICE SHEET

874

G.E.C. BC4850/55

A.C. and A.C./D.C. SUPERHETS



The G.E.C. BC4850 and BC4855 receivers, which are of similar appearance.

TWO 4-valve (plus rectifier) 3-band G.E.C. superhets are covered in this Service Sheet: the BC4850, which is designed to operate only from A.C. mains of 200-250v, 40-100 c/s; and the BC4855, which operates from A.C. or D.C. mains. A low-voltage version of the A.C. model, called the BC4850L, covers 115-220v mains. The waveband ranges are 16.5-50m, 192-550m, and 1,000-2,000m. Waveband switching is by press-buttons.

Except for the mains input and H.T. feed circuits, and several minor points elsewhere, the two models are identical. Our circuit diagram is based on the A.C. model, but the differences in the A.C./D.C. model are indicated in the circuit diagram by dotted lines. Except where it is obvious that these replace solid lines in the main circuit, the circuit drawn in solid lines is applicable to both models. Elsewhere, also, our information is based on the A.C. model, but unless we point out some difference it applies equally to the A.C./D.C. model.

Release date and original prices: October 1947; *BC*4850, £18 18*s*; *BC*4855, £19 19*s*, *plus purchase tax in each case.*

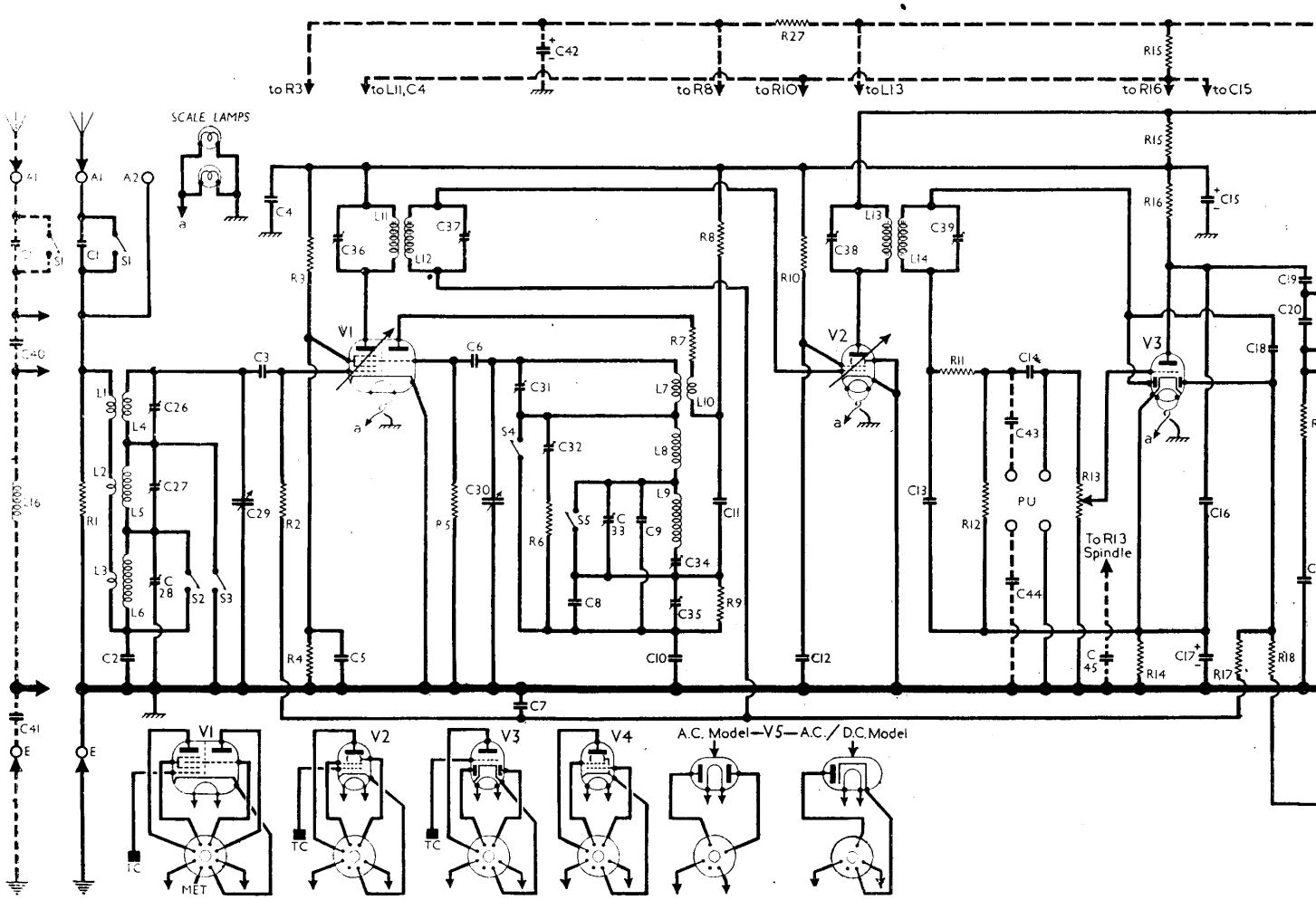
CIRCUIT DESCRIPTION

Alternative aerial input sockets **A1** and **A2** are provided, and the coupling circuit is shunted by **R1** (or **L16** in the A.C./D.C. model) to prevent modulation hum.

Input from socket **A2** is inductively coupled by **L1** to single-tuned circuit **L4, C29** (S.W.), and capacitatively "bottom" coupled by **C2** to single-tuned circuits **L5, C29** (M.W.) and **L6, C29** (L.W.).

Provision is made for input attenuation on M.W. via socket **A1** and series capacitor **C1,** which is short-circuited on L.W., while coils **L2** and **L3** provide anti-phase input for M.W. and L.W. image suppression purposes.

First valve **(V1, Osram metallized**



X61M) is a triode-hexode operating as frequency changer with internal coupling. Oscillator grid coils **L7** (S.W.), **L8** (M.W.) and **L9** (L.W.) are tuned by **C30,** with parallel trimming by **C31** (S.W.), **C32** (M.W.) and **C9, C33** (L.W.), and series tracking by **C10** (S.W.), **C8, C35** (M.W.) and **C34** (L.W.).

On S.W., inductive reaction coupling is obtained from anode coil **L10,** with additional coupling, via **C11,** due to the common impedance of tracker **C10** in grid and anode circuits. On M.W. and L.W. reaction coupling is capacitative only, being developed across the common impedance of trackers **C8, C35** in grid and anode circuits. Resistors **R7** and **R9** help to maintain a constant oscillator output over the range of frequencies covered.

Second valve **(V2, Osram KTW61)** is a variable-mu R.F. tetrode operating as intermediate frequency amplifier with tuned transformer couplings **C36, L11, L12, C37** and **C38, L13, L14, C39.**

Intermediate frequency 456 kc/s.

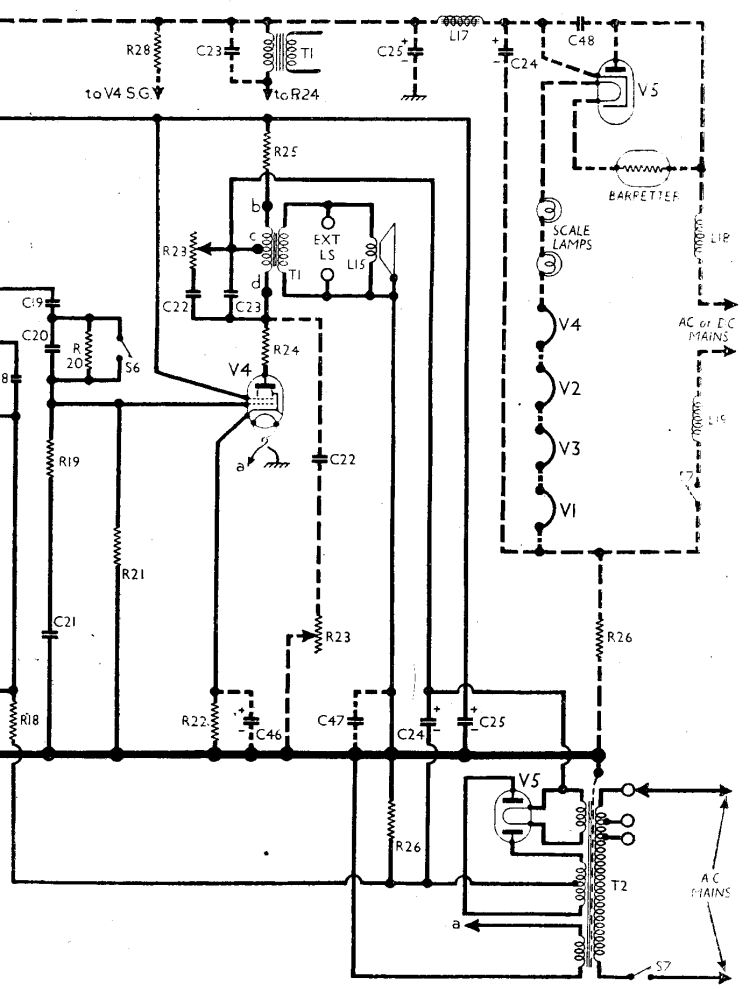
Diode second detector is part of double diode triode valve **(V3, Osram DH63).** Audio frequency component in rectified output is developed across load resistor **R12** and passed via A.F. coupling capacitor **C14** and manual volume control **R13** to grid of triode section, which operates as A.F. amplifier. I.F. filtering by **C13, R11** in diode circuit and **C16** in triode anode circuit, and provision for the connection of a gramophone pick-up across **R13** (via isolating capacitors **C43, C44** in A.C./D.C. model).

Second diode of **V3,** fed from **L14** via **C18,** provides D.C. potential which is developed across load resistor **R18** and fed back through a decoupling circuit as G.B. to F.C. and I.F. valves, giving automatic volume control.

Resistance-capacitance coupling by **R16, C19, R21,** via tone correcting network **C20, R20, R19, C21,** between **V3** triode and beam tetrode output valve **(V4, Osram KT61)** (or **KT33C** in the A.C./D.C. model). Fixed tone correction in anode circuit by **C23,** and variable tone control by **R23, C22.** The tone correcting circuit **C20, R20** in the intervalve coupling is short-circuited on S.W. and gramophone operation by **S6.**

H.T. current is supplied in the A.C. model by full-wave rectifying valve **(V5, Osram U50).** Smoothing by resistor **R25** and electrolytic capacitors **C24, C25,** residual hum being neutralized by passing the receiver H.T. current through a portion of the output transformer primary winding.

(Continued col. 1 overleaf)



Circuit diagram of the G.E.C. 4850/55 series. The complete circuit of the A.C. model is drawn in solid lines. Where differences occur in the A.C./D.C. model, these are indicated by broken line connections. In some cases, like **R27, R28, C45, C46,** etc., these are additional to the A.C. circuit; in others, like the aerial circuit and the H.T. circuit, they replace parts of the A.C. circuit. Cases of replacement are obvious, because the component numbers are duplicated, like **R15, C22, R23,** and the P.U. connections (which incidentally move to the opposite side of **C14**). **C45** "earths" **R13** spindle while isolating it from the mains.

COMPONENTS AND VALUES

The following tables include components that are in both A.C. and A.C./D.C. chassis. In the resistor and capacitor tables, two values and two locations (which may be similar) are quoted for components which are common to both chassis.

Resistors	A.C. Values (ohms)	A.C. Locations	A.C./D.C. Values (ohms)	A.C./D.C. Locations
R1	10,000	H8	—	—
R2	1,000,000	H4	1,000,000	H4
R3	15,000	H6	8,200	H6
R4	22,000	I6	22,000	H6
R5	100,000	H6	100,000	H6
R6	68	F5	68	E5
R7	470	G6	470	G6
R8	22,000	G6	6,800	G6
R9	10,000	G5	—	—
R10	56,000	F7	47,000	F7
R11	56,000	E7	56,000	E7
R12	470,000	E7	470,000	E7
R13	1,000,000	C3	1,000,000	C3
R14	2,200	E8	2,200	D7
R15	4,700	E7	10,000	F7
R16	100,000	E7	100,000	E7
R17	1,000,000	E8	1,000,000	E8
R18	470,000	E7	470,000	E7
R19	150,000	E6	150,000	E6
R20	680,000	E6	680,000	E6
R21	330,000	E5	330,000	E5
R22	91	D6	220	C6
R23	55,000	A1	55,000	A1
R24	100	D5	100	D5
R25	3,300	D4	—	—
R26	39	D7	39	D7
R27	—	—	6,800	E7
R28	—	—	100	D5

Capacitors	A.C. Values (μF)	A.C. Locations	A.C./D.C. Values (μF)	A.C./D.C. Locations
C1	0·000022	I8	0·000022	I8
C2	0·003	E4	0·003	E4
C3	0·0001	H3	0·0001	H3
C4	0·05	H8	0·05	H8
C5	0·05	I6	0·05	I6
C6	0·0001	G6	0·0001	G6
C7	0·05	G8	0·05	G8
C8	0·0001	G5	0·0001	G5
C9	0·000039	G5	0·000039	G5
C10	0·00395	G5	0·00395	G5
C11	0·005	G7	0·005	G7
C12	0·05	F8	0·05	F8
C13	0·0003	E8	0·0003	E8
C14	0·02	E8	0·02	E8
C15*	4·0	J5	4·0	J5
C16	0·0005	D7	0·0005	D7
C17*	25·0	D8	25·0	D8
C18	0·000022	E7	0·000022	E7
C19	0·02	E6	0·02	E6
C20	0·0002	E6	0·0002	E6
C21	0·0015	F7	0·0015	F7
C22	0·05	E4	0·1	D5
C23	0·005	C5	0·01	D4
C24*	16·0	A2	16·0	A2
C25*	20·0	J4	32·0	J4
C26‡	—	H5	—	H5
C27‡	—	H5	—	H5
C28‡	—	H6	—	H6
C29†	—	I4	—	I4
C30†	—	I5	—	I5
C31‡	—	E5	—	E5
C32‡	—	E5	—	E5
C33‡	—	E6	—	E6
C34‡	—	G6	—	G6
C35‡	—	G6	—	G6
C36‡	—	A2	—	A2
C37‡	—	A2	—	A2
C38‡	—	B2	—	B2
C39‡	—	B2	—	B2
C40	—	—	0·001	I8
C41	—	—	0·04§	I8
C42*	—	—	8·0	J5
C43	—	—	0·01	E8
C44	—	—	0·01	E8
C45	—	—	0·001	C3
C46*	—	—	25·0	C6
C47	—	—	0·001	E8
C48	—	—	0·01	C5

* Electrolytic. † Variable. ‡ Pre-set.
§ Two 0·02 μF in parallel.

OTHER COMPONENTS			Approx. Values (ohms)	Locations
L1	Aerial coup. coils		Very low	G4
L2			Very low	F4
L3			Very low	F4
L4	Aerial tun. coils ...		Very low	G4
L5			2·2	F4
L6			18·5	F4
L7	Osc. tuning coils ...		Very low	G6
L8			2·7	F6
L9			6·8	F6
L10	S.W. react. coil ...		0·1	G6
L11	1st I.F. trans.	Pri.	6·8	A2
L12		Sec.	6·8	A2
L13	2nd I.F. trans.	Pri.	3·6	B2
L14		Sec.	3·6	B2
L15	Speech coil ...		2·25	—
T1	Output trans. (A.C. model)	Pri., b-c	13·0	D4
		Pri., c-d	450·0	D4
		Sec. ...	0·1	D4
T2	Mains trans.	Pri., total	33·0	B2
		Heat. sec., Rect. heat. sec.,	0·1	B2
		H.T. sec.total	Very low	B2
			310·0	B2
S1-S6	W/band switches...		—	—
S7	Mains switch ...		—	
	In A.C./D.C. Model Only.			
L16	Aerial shunt ...		47·0	J6
L17	Smoothing choke...		410·0	A2
L18	Mains R.F. filter chokes		2.5	C8
L19			2.5	C8
T1	Output trans.	Pri.	220·0	D4
		Sec.	0·4	D4

Circuit Description—*continued*

In the A.C./D.C. model, H.T. current is supplied by a half-wave rectifier **(V5, Osram U31).** A smoothing choke **L17** replaces **R25,** but a different output transformer **T1** is used without the hum neutralizing facility. The modified mains input circuit and H.T. feeds to various parts of the receiver can be seen in the dotted circuit running round the top and right-hand side of the A.C. circuit diagram.

Further, in the A.C./D.C. model, the spindle of the volume control is isolated from the mains, but it is "earthed" via **C45.** Similarly in the A.C./D.C. model an isolating capacitor is inserted in the earthing lead from the internal speaker speech coil circuit, which includes the external speaker terminals. The tone control circuit **C22, R23** is returned to chassis, and **V4** G.B. resistor **R22** is by-passed by **C46.**

Fixed G.B. for **V1** and **V2,** and part of the A.V.C. delay voltage, is obtained from the drop across **R26** in the H.T. negative lead to chassis, and the remainder of the A.V.C. delay voltage, and G.B. for the triode section, is obtained from the drop across **R14** in **V3** cathode lead to chassis. H.T. circuit R.F. filtering by **C4.**

Switch Table and Diagram

Button Pressed	Switches closed	Switches open
OFF ...	S2, S5	S1, S3, S4, S6
L.W. ...	S1	S2, S3, S4, S5, S6
M.W. ...	S2, S5	S1, S3, S4, S6
S.W. & P.U.	S3, S4, S6	S1, S2, S5

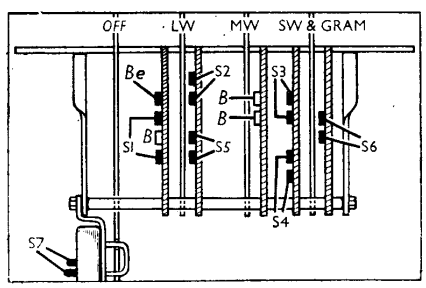


Diagram of the press-button waveband switch unit, drawn as seen between the two coil units in our under-chassis view. The "OFF" plunger operates **S7.** This diagram applies equally to the A.C. and A.C./D.C. models.

GENERAL NOTES

Switches.—S1-S6 are the waveband switches, in a 4-section press-button unit beneath the chassis, all the actual switches being carried by two of the sections (L.W. and S.W.) only. The other two sections peform the function of releasing other plungers when theirs is depressed. **S7** is the Q.M.B. mains switch, mounted on the press-button assembly and operated by the "OFF" button, opening when that button is depressed.

The position of the switch unit is indicated in our under-chassis view, and the positions of the actual switch tags are shown in the diagrams of the unit in col. 2, where it is drawn as seen from the rear of an inverted chassis. The table (col. 2) shows the action of the switches when any button is depressed.

There are no connections to the "OFF" and "M.W." sections, except those to the mains switch on the "OFF" section. The result of depressing the M.W. button is merely to release any other button.

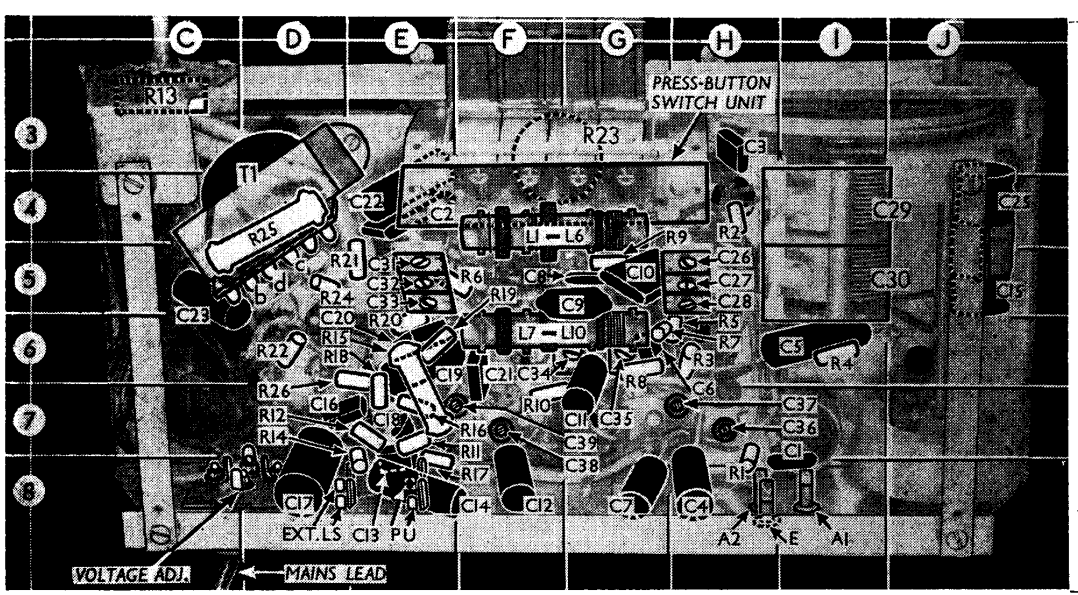
Scale Lamps.—These are two Osram M.E.S. type lamps, with small, clear, spherical bulbs, rated at 6.5 V, 0.3 A. They are the same in the A.C. and A.C./D.C. models.

External Speaker.—The A.C. model is provided with two terminals and the A.C./D.C. model with two sockets, on a panel at the rear of the chassis, for the connection of an external speaker. In either case the impedance should be about 2-4 Ω.

Gramophone Pick-up.—Two terminals are provided at the rear of the chassis in the A.C. model, and two sockets in the A.C./D.C. model, for the connection of a gramophone pick-up.

In the case of the A.C./D.C. model, any screening should be connected to the **E** socket which, like the P.U. sockets, is isolated from chassis by capacitors. The pick-up input is applied on the opposite sides of the A.F. coupling capacitor **C14** in the alternative models. The makers advise the user to depress the appropriate button and tune to maximum wavelength for pick-up operation.

Low-voltage Model.—The BC4850L is a special version of the A.C. model BC4850 employing a mains transformer whose primary is tapped at 115 V, 125 V and 220 V. The overall D.C. resistance of the winding is 26 Ω; from the fixed end to the 115 V tapping it is 10.5 Ω, and to the



Under - chassis view of the A.C. chassis. The top of the press-button switch unit is indicated here, but the side shown in our diagram of the unit lies between the two coil units, where it is obscured here by other components. In the A.C./D.C. chassis there are additional components not shown here, but their positions are indicated by the grid locations in the tables.

125 V tapping it is 11.5 Ω. There is no low-voltage A.C./D.C. version.

CIRCUIT ALIGNMENT

Access may be gained to all components involved in the following operations upon removal of the detachable bottom cover.

I.F. Stages.—Switch set to L.W., turn gang and volume control to maximum, connect signal generator (via an 0.1 μF capacitor in the "live" lead) to control grid (top cap) of **V2** and the **E** socket, feed in a 456 kc/s (657.8 m) signal, and adjust **C39** (location reference E7) and **C38** (F7) for maximum output.

Transfer "live" signal generator lead and isolating capacitor to control grid (top cap) of **V1**, feed in a 456 kc/s signal, and adjust **C37** (H7) and **C36** (H7) for maximum output.

R.F. and Oscillator Stages.—With the gang at minimum capacitance the cursor should be coincident with the vertical lines at the left-hand ends of the three scales. It may be adjusted in position by sliding the cursor carriage along the drive cord, after opening its clamping tongues. Transfer "live" signal generator lead to **A2** socket, via a suitable dummy aerial.

S.W.—Switch set to S.W., tune to 16.67 m (spot on scale), feed in a 16.67 m (18 Mc/s) signal, and adjust **C31** (E5) for maximum output, choosing the peak involving the least trimmer capacitance. Then adjust **C26** (H5) for maximum output whilst rocking the gang slightly. Repeat these operations.

M.W.—Switch set to M.W., tune to 214 m (spot on scale), feed in a 214 m (1,400 kc/s) signal, and adjust **C32** (E5), then **C27** (H5) for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust **C35** (G6 or A2) while rocking the gang, for maximum output. Repeat these operations until no improvement results.

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 **C33** (E6), then **C28** (H6) for maximum output. Tune to 1,818 m on scale, feed in a 1,818 m (165 kc/s) signal, and adjust **C34** (G6 or A2) while rocking the gang, for maximum output. Repeat these operations until no improvement results.

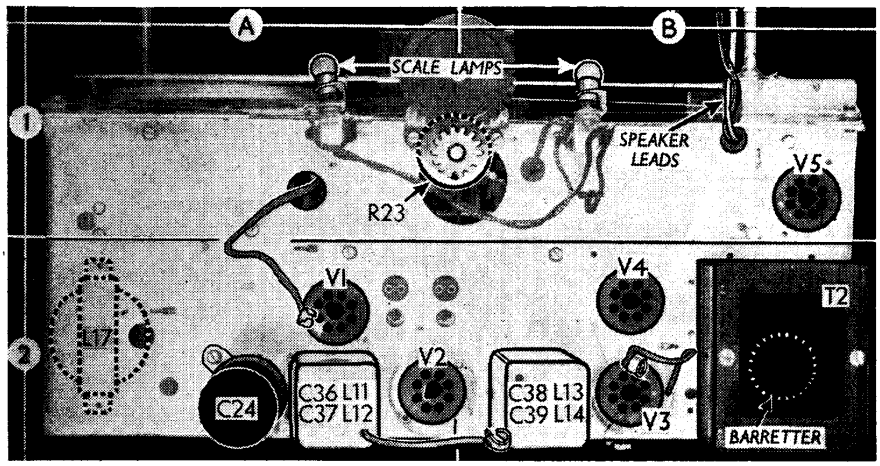
DRIVE CORD REPLACEMENT

To obtain access to the drive drum, run the cursor to the low wavelength end of the scale, remove the four cheese-head screws (with lock-washers) from the ends of the scale, and draw off the scale over the tuning control spindle.

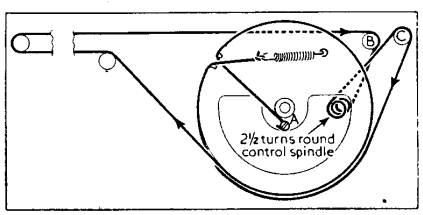
Take 66 inches of drive cord, and thread one end of it into the drive drum, through the hole in its rim, and clamp the end under the screw. This is marked **A** in our sketch (col. 5) which shows the complete cord drive system as it should appear when viewed from the front when the gang is at maximum.

Pass the cord clockwise round the drum groove, and follow the direction indicated by the arrows in the sketch, making 2½ turns clockwise round the control spindle winding away from the chassis. The cord running down from pulley **B** to the control spindle should thus pass behind the length running up to pulley **C**, and the final half-turn round the drum should lie in the groove behind the former turn, as indicated in our sketch.

While running the upper horizontal length, upon which the cursor is clamped, a 1 in length of 2 mm sleeving should be threaded on to the cord. This is used in the cursor clamp to protect the cord from chafing.



Plan view of the chassis of the A.C. receiver, with dotted outlines to indicate the positions of the H.T. smoothing choke **L17** and the barretter in the A.C./D.C. model. The tone control resistor **R23** is mounted beneath the chassis deck, but is driven by the toothed wheel seen above it. **C35** (left) and **C34** adjustments are just above **V2** holder.



Sketch showing the drive cord system as seen from the front, with the gang at maximum, after removal of the scale. Part of the horizontal run on the left has been cut out to shorten it.

Finally, slacken screw **A**, and pull up cord until the tension spring is extended to 1⅛ ins, and tighten screw. Then replace scale, and clamp up cursor to cord while it is in line with the two marker dots at the long wavelength ends of the M.W. and L.W. scales.

DISMANTLING THE SET

The cabinet is fitted with a detachable bottom cover, upon removal of which (slide out) access may be gained to most of the under-chassis components.

Removing Chassis.—Remove the two control knobs (pull off);
unsolder the two leads joining the chassis to the speaker;
remove the four cheese-head screws (two with plain washers and two with lock washers) securing the chassis to the bottom flanges of the cabinet, and slide out the chassis.

When replacing, note that lock washers are fitted beneath the heads of the two screws securing the front of the chassis to the bottom flanges of the cabinet, and that plain metal washers are used beneath the heads of the rear chassis securing screws.

Removing Speaker.—Remove chassis as previously described, and then extract the four 4BA cheese-head screws (with spring and plain metal washers) securing the speaker to the sub-baffle.

When replacing, the connecting panel should point towards the right-hand side of the cabinet, and the black speaker lead should be resoldered to the lower connecting tag, together with a black lead which earths the speaker frame. The white lead goes to the upper tag on the connecting panel.

VALVE ANALYSIS

Valve voltages and currents given in the tables below are those measured in our receivers when they were operating on A.C. mains of 232 V. The receivers were tuned to the lowest wavelength on the M.W. band and the volume controls were at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Avonmeter, chassis being the negative connection.

Valve		Anode Voltage (V)	Anode Current (mA)	*Screen Voltage (V)	Screen Current (mA)
		A.C. Model			
V1	X61M	140 Oscillator 65	2·2 2·9	65	2·2
V2	KTW61	200	6·2	54	1·6
V3	DH63	65	0·5	—	—
V4	KT61	260	32·0	200	7·2
V5	U50	270†	—	—	—
		A.C./D.C. Model			
V1	X61M	160 Oscillator 103	2·2 4·0	84	2·3
V2	KWT61	212	7·0	62	2·1
V3	DH63	80	0·6	—	—
V4	KT33C	198	47·0	212	7·5
V5	U31*	*	—	—	—

* Cathode to chassis 247 V, D.C.
† Each anode, A.C.

MARCONIPHONE "PERSONAL"

In *Service Sheet 869*, on the Marconiphone P17B "Personal" receiver, we stated that the battery should be fitted with the label side showing.

Ever Ready advise us, however, that the battery may have a label on each side, but if the instruction is followed that the plug should face the top of **V4** no mistake will occur. The label showing then will be the one with the price and voltage panels on it.

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