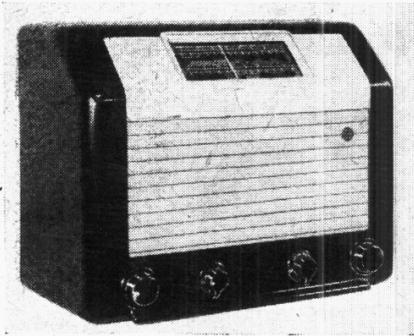


# EKCO B53

## FOUR-BAND BATTERY SUPERHET



The appearance of the Ekco B53 battery-operated superhet, which uses 2-volt valves.

QUIESCENT push-pull output is a feature of the Ekco B53 4-band superhet receiver, which operates from a 136.5 V H.T. battery and 2 V accumulator cell. Provision is made for the connection of a gramophone pick-up and low impedance external speaker,

and the wavebands covered are 18.5-56 m (S.W.1), 56-197 m (S.W.2), 197-560 m (M.W.), and 800-2,000 m (L.W.).

Release date and original price: September, 1947; £15 15s. plus purchase tax, without batteries.

### CIRCUIT DESCRIPTION

Aerial input is via coupling coils **L2** (S.W.1), **L3** (S.W.2) and **L4** (M.W. and L.W.) to single-tuned circuits **L5**, **C34** (S.W.1), **L6**, **C34** (S.W.2), **L7**, **C34** (M.W.) and **L8**, **C34** (L.W.). I.F. filtering by **C1**, **L1** across aerial-earth circuit.

First valve (**V1**, Mazda metallized **TP25**) is a triode pentode operating as frequency changer with internal coupling. Triode oscillator anode coils **L13** (S.W.1) **L14** (S.W.2), **L15** (M.W.) and **L16** (L.W.) are tuned by **C39**, with parallel trimming by **C35** (S.W.1), **C36** (S.W.2), **C37** (M.W.) and **C10**, **C38** (L.W.) and series tracking by **C8** (S.W.1), **C9** (S.W.2), **C11** (M.W.) and **C12** (L.W.). Inductive reaction coupling to C.G. is employed on all bands, with additional capacitive coupling, due to the common impedance

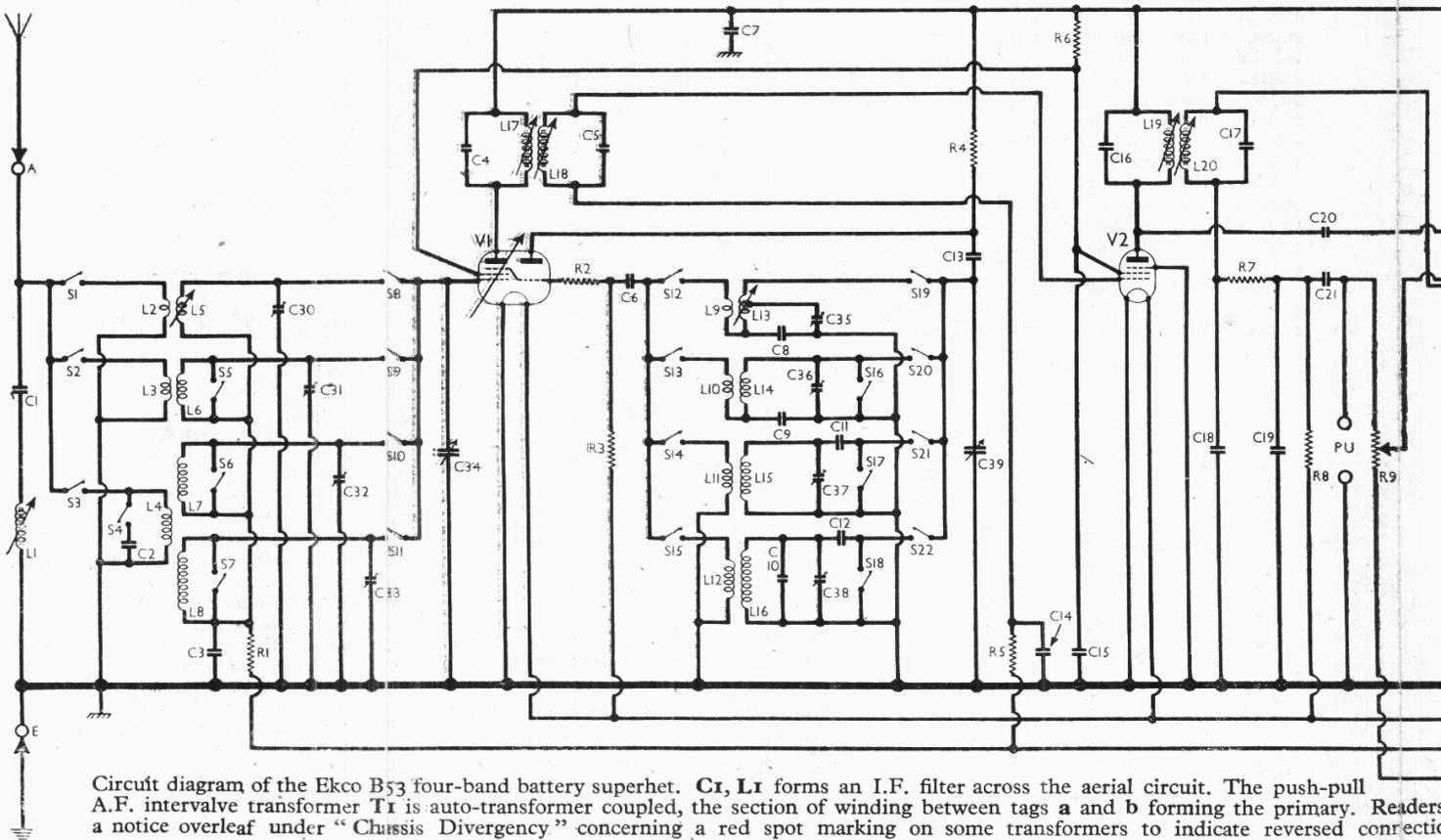
of the trackers **C8** and **C9**, on S.W.1 and S.W.2 bands.

Second valve (**V2**, Mazda metallized **VP23**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C4**, **L17**, **L18**, **C5** and **C16**, **L19**, **L20**, **C17** in which the tuning capacitors are fixed and alignment adjustments are carried out by varying the positions of the iron-dust cores.

### Intermediate frequency 460 kc/s.

Diode second detector is part of double diode triode valve (**V3**, Mazda metallized **HL23DD**). Audio frequency component in rectified output is developed across load resistor **R8** and passed via A.F. coupling capacitor **C21** and manual volume control **R9** to C.G. of triode section, which operates as A.F. amplifier. I.F. filtering by **C18**, **R7**, **C19** in diode circuit, and **C22** in triode anode circuit.

Second diode of **V3**, fed from **V2** anode via **C20**, provides D.C. potential which is developed across **R11**, **R12**, tapped off, and fed back via decoupling circuits as



Circuit diagram of the Ekco B53 four-band battery superhet. **C1**, **L1** forms an I.F. filter across the aerial circuit. The push-pull A.F. intervalve transformer **T1** is auto-transformer coupled, the section of winding between tags **a** and **b** forming the primary. Readers a notice overleaf under "Chassis Divergency" concerning a red spot marking on some transformers to indicate reversed connection.

G.B. to F.C. and I.F. valves, giving automatic volume control.

Parallel-fed auto-transformer coupling by C24 and T1 is employed between V3 triode and double pentode quiescent push-pull output valve (V4, Mazda QP25). Fixed tone correction in anode circuit by C28, C29 and variable tone control by R16, C27. Provision for the connection of a low impedance external speaker across T2 secondary winding, when the internal speaker may be silenced by opening S23.

Grid bias potentials for all valves, together with A.V.C. delay voltage, is obtained from the drop across R14, R15 in the H.T. negative lead to chassis. H.T. circuit R.F. filtering by C7 and C26.

**VALVE ANALYSIS**

Valve voltages and currents given in the table below are those quoted by the manufacturers. Their receiver was operating from a 136.5 V H.T. battery, and they give the total H.T. current as 10 mA, approximately.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TP25	98	0.3	40	0.6
	Oscillator			
V2 VP23	57	1.25	40	0.25
V3 HL23DD	98	0.75		
V4 QP25	67	0.5	126	1.2

\*Each anode.

CAPACITORS		Values (μF)	Locations
C1	I.F. filter tuning ...	0.00015	L5
C2	Aerial L.W. shunt	0.00047	J3
C3	V1 pent. C.G. decoup. ...	0.05	I4
C4	1st I.F. transformer tuning ...	0.000068	A2
C5		0.000068	A2
C6	V1 osc. C.G.	0.0001	J4
C7	H.T. R.F. by-pass	0.1	K4
C8	S.W.1 tracker	0.0047	J5
C9	S.W.2 tracker	0.0015	K4
C10	L.W. fixed trim.	0.000082	J3
C11	M.W. tracker	0.0006	J4
C12	L.W. tracker	0.00024	J4
C13	Osc. anode coup.	0.0001	J5
C14	V2 C.G. decoup.	0.05	J5
C15	S.G.'s H.T. decoup.	0.1	K5
C16	2nd I.F. trans. former tuning ...	0.0001	B2
C17		0.0001	B2
C18	I.F. by-passes	0.0001	H5
C19		0.0001	H5
C20	A.V.C. coupling	0.000015	I6
C21	A.F. coupling	0.02	H6
C22	I.F. by-pass	0.0001	H5
C23*	H.T. decoupling	4.0	I5
C24	A.F. coupling	0.1	H5
C25*	G.B. by-pass	50.0	F4
C26	H.T. R.F. by-pass	0.1	H4
C27	Part tone control	0.01	G4
C28	Fixed tone correctors	0.0025	H5
C29		0.0025	H4
C30†	Aerial S.W.1 trim.	—	I4
C31†	Aerial S.W.2 trim.	—	I4
C32†	Aerial M.W. trim.	—	I4
C33†	Aerial L.W. trim.	—	I3
C34†	Aerial tuning	—	B1
C35†	Osc. S.W.1 trim.	—	K4
C36†	Osc. S.W.2 trim.	—	K4
C37†	Osc. M.W. trim.	—	K4
C38†	Osc. L.W. trim.	—	K4
C39†	Oscillator tuning	—	B1

\* Electrolytic. † Variable. ‡ Pre-set.

**COMPONENTS AND VALUES**

RESISTORS		Values (ohms)	Locations
R1	V1 pent. C.G. decoup. ...	1,500,000	I5
R2	Osc. C.G. stabilizer	100	K5
R3	V1 osc. C.G.	100,000	K5
R4	Osc. H.T. feed	22,000	K5
R5	V2 C.G. decoup.	1,500,000	J5
R6	S.G.'s H.T. feed	68,000	J6
R7	I.F. stopper	47,000	H5
R8	Signal diode load	470,000	H6
R9	Volume control	1,000,000	E3
R10	V3 triode load	47,000	H5
R11	A.V.C. diode load resistors ...	220,000	I5
R12		1,500,000	I5
R13	H.T. decoupling	6,800	H5
R14	Fixed G.B. and A.V.C. delay	82	E3
R15		820	E3
R16	Tone control	60,000	G3

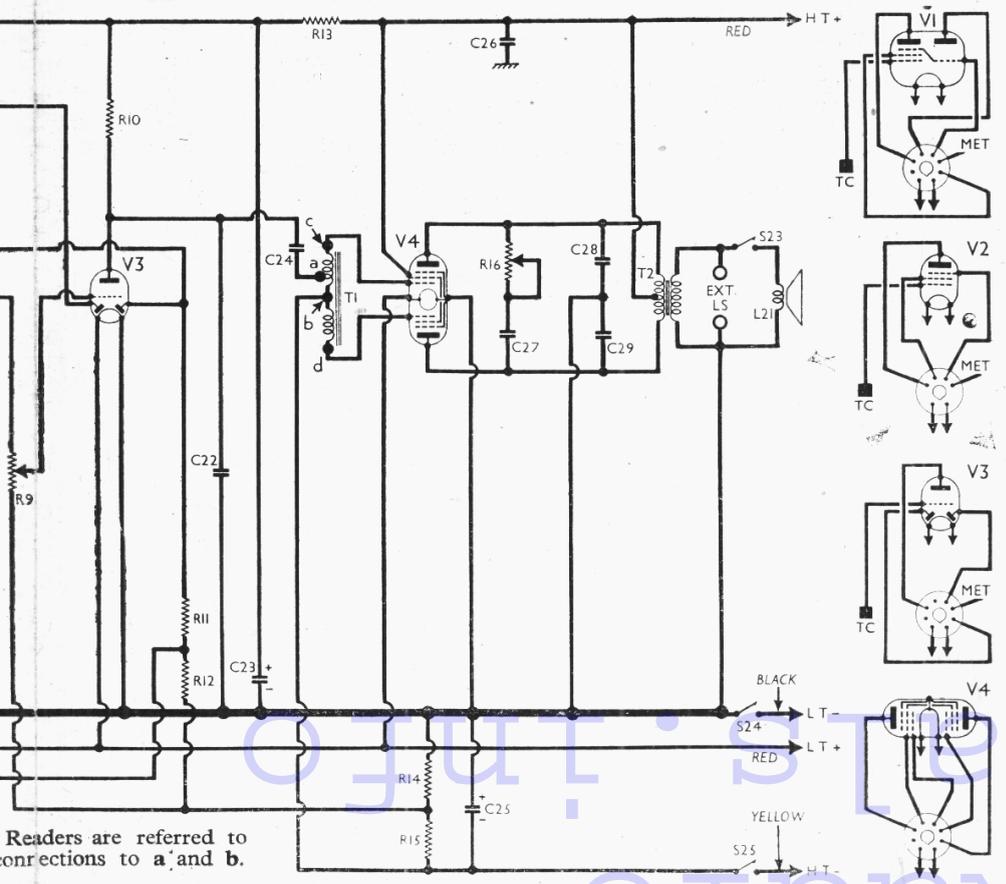
OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	I.F. filter coil	9.5	L5
L2	Aerial coupling coils	0.2	I4
L3		0.7	I4
L4		38.0	I3
L5	Aerial tuning coils ...	Very low	I4
L6		0.5	I4
L7		6.5	I4
L8		33.0	I3
L9		0.4	J5
L10	Oscillator reaction coils	0.8	J4
L11		1.5	J4
L12		4.5	J4
L13	Oscillator tuning coils	Very low	J5
L14		0.3	J4
L15	4.0	J4	
L16	9.0	J4	
L17	1st I.F. trans.	Pri. 18.0	A2
L18		Sec. 18.0	A2
L19	2nd I.F. trans.	Pri. 15.0	B2
L20		Sec. 15.0	B2
L21	Speech Coil ...	2.5	—
T1	Intervalve trans.	Pri. a-b 350.0	G6
T2		Sec. c-d 3,000.0	G5
	Output trans.	Pri., total 1,300.0	G4
		Sec. 0.4	G4
S1-22	Waveband switches	—	J4
S23	Int. speaker switch	—	I6
S24	Battery switches	—	E3
S25		ganged R9	—

If the component numbers given in the above tables are used when ordering replacements, dealers should mention the fact, as these numbers may differ from those in the manufacturers' diagram.

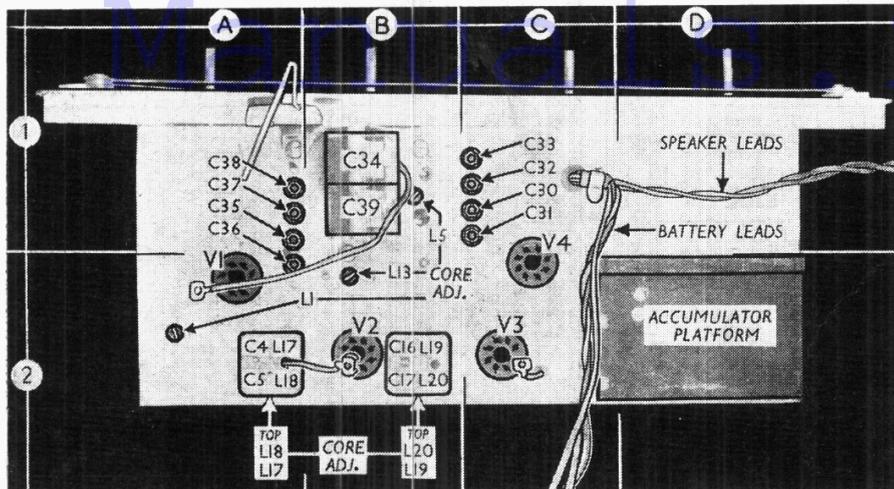
**DISMANTLING THE SET**

**Removing Chassis.**—Slide out the battery shelves and remove the four control knobs (recessed grub screws). Remove the scale backing plate (four 4BA cheese-head screws). Remove the long 4BA cheese-head screws (with washers) at either end of the cursor guide rail. Withdraw the four 2BA cheese-head screws (with large metal washers) securing the chassis to the base of the cabinet, and slide out the chassis to the extent of the speaker leads, which is sufficient for most purposes.

**Removing Speaker.**—Remove the chassis as previously described, loosen the nuts of the four speaker retaining clamps, and lift out the speaker. When replacing, the connecting panel should be on the left.



Readers are referred to connections to a and b.



Plan view of the chassis, showing the two rows of trimmer adjustments and three core adjustments on the chassis deck, the I.F. core adjustments being indicated at the rear of their cans. The scale cursor, which can be seen on the left, runs along a rail at the top of the scale assembly.

**GENERAL NOTES**

**Switches.**—S1-S22 are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis view and shown in detail in the diagrams in col. 5, where they are drawn as seen from the rear of an inverted chassis.

The table (col. 4) gives the switch positions for the four settings of the control, starting from the fully anti-clockwise position of the knob. A dash indicates "open," and C, "closed."

S23 is the screw-type internal speaker switch, mounted on the Ext. L.S. and P.U. panel at the rear of the chassis.

S24, S25 are the Q.M.B. battery circuit switches, ganged with the manual volume control R9.

**Coils.**—L1 is a small tubular unscreened unit beneath the chassis near the aerial panel. A hole above it in the chassis deck gives access to its core adjustment, as indicated in our plan view of the chassis.

The S.W. coil assemblies L2, L5 and L9, L13 are in two units of similar appearance to the L1 unit, and they also have core adjustments which are indicated in our plan view.

The remaining R.F. and oscillator coils L3, L4, L6, L7, L8 and L10, L11, L12, L14, L15, L16 are in two large air-cored tubular units mounted horizontally on either side of the wave-band switch assembly on pillars supporting their associated trimmers, which again are reached through holes in the chassis deck.

The I.F. transformers L17, L18 and L19, L20 are in two screened units on the chassis deck with their associated trimmers. Their respective core adjustment positions are indicated approximately in our plan view.

**Gramophone Pick-up.**—Two sockets (the lower pair) are provided at the rear of the chassis for the connection of a gramophone pick-up, the left-hand socket being "earthy."

As two stages of A.F. amplification follow the pick-up, it is unimportant whether the type used is sensitive or not. As there

is no radio muting device, the receiver should be tuned to a quiet spot on one of the wavebands when using a pick-up. When it is desired to revert to radio reception, the pick-up connections must be withdrawn.

**External Speaker.**—Two sockets are provided at the rear of the chassis for the connection of a low impedance (2.6 Ω) external speaker, and S23 is provided to mute the internal speaker when desired.

**Transformer T1.**—This component operates on the auto-transformer principle, the section between tags a and b constituting the primary winding, and the whole winding c, d forms the secondary. The tags are lettered in our circuit diagram and under-chassis view, and the slotted mounting bracket should be nearest to the rear edge of the chassis. (See also under Chassis Divergency.)

**Batteries.**—L.T., 2 V accumulator cell; H.T., 136.5 V. No intermediate tappings are required since grid bias is automatic, and the lead colours are indicated in the

circuit diagram. The recommended H.T. battery is an Ever Ready Portable 56, or Drydex type H1142.

The maximum dimensions of the accumulator compartment are 5 inches × 3½ inches on the base, and 10 inches in height, which should be sufficient for any normal 2 V accumulator. The accumulator is not supplied with the receiver.

**Chassis Divergency**

A small number of chassis have been produced with the connections to tags a and b on T1 reversed, in which case T1 is coded with a red spot.

If it is necessary to replace this component in these chassis, the new transformer should be wired in accordance with the information given in this Service Sheet, and not necessarily as was the original transformer.

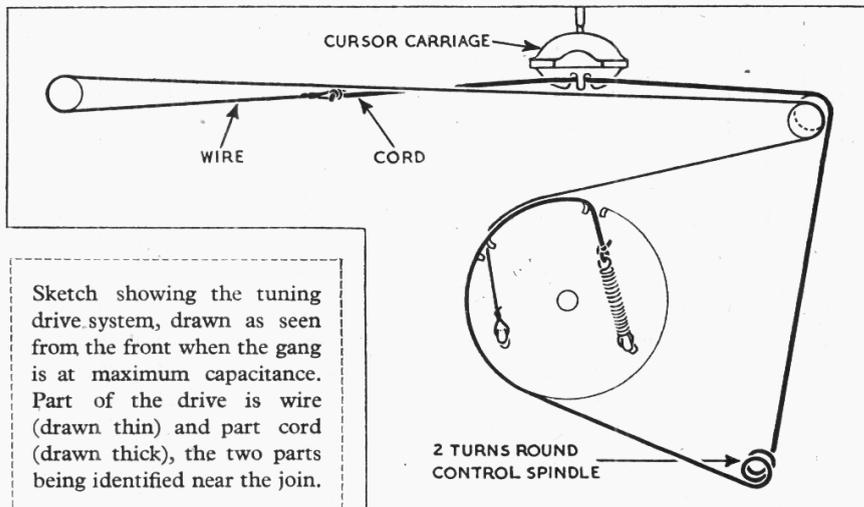
In order to ensure that the transformer is fitted in the correct position, one foot is slotted, and this foot should face the rear member of the chassis.

**DRIVE CORD REPLACEMENT**

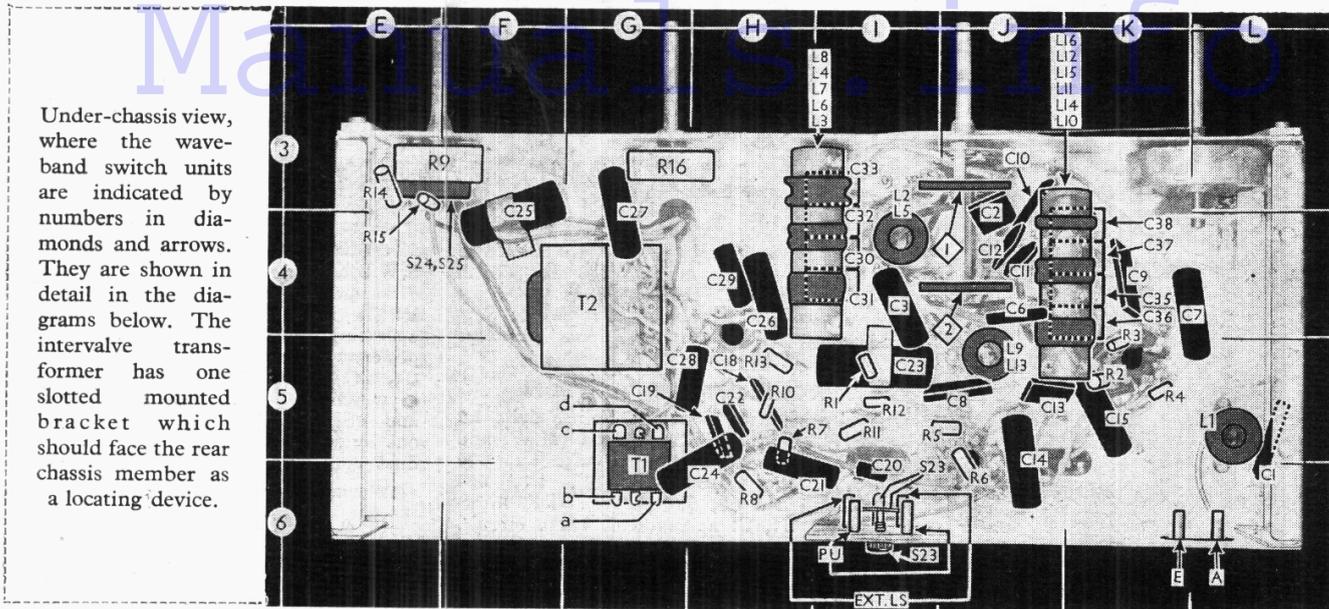
The drive cord consists of 33 in of stranded steel wire (obtainable, ready looped, from the manufacturers under Part No. B33563), and approximately 36 ins. of cord. The sketch below shows the course taken by the cord, as seen when viewing the chassis from the front with the gang at maximum.

The one end of the cord to one of the looped ends of the steel wire, pass the free wire loop through the left-hand slot in the gang drive drum flange, and hook it to the anchor on the drum. The drive wire should then be fitted as indicated, passing in an anti-clockwise direction over the front right-hand pulley and over the left-hand pulley, and the cord section should pass clockwise over the rear right-hand pulley, down to the control spindle and twice round it clockwise.

Finally, the cord must pass in a clockwise direction round the drive drum, and its free end should be fed through the right-hand slot in the drum and tied to the tension spring, so that the latter is expanded by about half an inch. The cursor carriage is clipped to the drive cord



Sketch showing the tuning drive system, drawn as seen from the front when the gang is at maximum capacitance. Part of the drive is wire (drawn thin) and part cord (drawn thick), the two parts being identified near the join.



Under-chassis view, where the waveband switch units are indicated by numbers in diamonds and arrows. They are shown in detail in the diagrams below. The intervalve transformer has one slotted mounted bracket which should face the rear chassis member as a locating device.

above the gang spindle, and should be positioned in accordance with the instructions given under "Circuit Alignment."

**CIRCUIT ALIGNMENT**

These operations may be carried out with the chassis in position in the cabinet if the H.T. battery shelf is removed and the battery is placed on the bench.

**I.F. Stages.**—Switch set to M.W., turn the 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 V1 and the E socket. Feed in a 460 kc/s (652.1 m) signal and adjust the cores of L19, L20 (location reference B2) and L17, L18 (A2), in that order, for maximum output.

**I.F. Filter.**—Transfer "live" signal generator lead via an 0.002 μF capacitor, to A socket, feed in a 460 kc/s signal, and adjust the core of L1 (A2) for minimum output.

**R.F. and Oscillator Stages.**—With the gang at maximum capacitance the cursor should coincide with the vertical lines at

the high wavelength ends of the four scales. It may be adjusted in position by sliding the carriage along the drive cord.

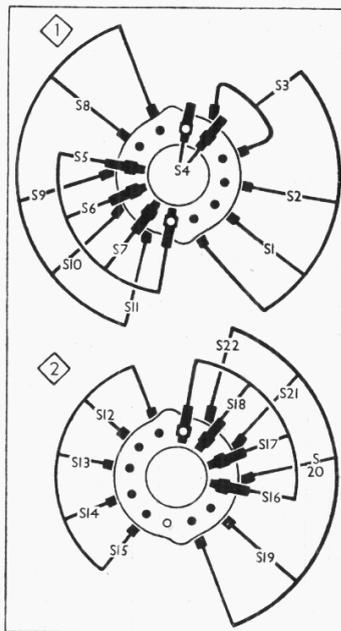
**S.W.1.**—Switch set to S.W.1, tune to 20 m on scale, feed in a 20 m (15 Mc/s) signal, and adjust C35 (A1) and C30 (C1) for maximum output. Tune to 50 m on

scale, feed in a 50 m (6 Mc/s) signal, and adjust the cores of L13 (B2) and L5 (B1) for maximum output. Repeat these adjustments until optimum results are obtained.

**S.W.2.**—Switch set to S.W.2, tune to 60 m on scale, feed in a 60 m (5 Mc/s) signal, and adjust C36 (A2) for maximum output. Tune to 75 m on scale, feed in a 75 m (4 Mc/s) signal, and adjust C31 (C1) 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 C37 (A1) for maximum output. Tune to 231 m on scale, feed in a 231 m (1,300 kc/s) signal, and adjust C32 (C1) 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 C38 (A1) and C33 (C1) for maximum output.



Diagrams of the two waveband switch units, drawn as seen when viewed from the rear of an inverted chassis as indicated by the arrows in the chassis illustration above. The associated table on the left in col. 4 shows the action of the switches.

**Switch Table**

Switch	S.W.1	S.W.2	M.W.	L.W.
S1	o	o	o	o
S2	o	o	o	o
S3	o	o	o	o
S4	o	o	o	o
S5	o	o	o	o
S6	o	o	o	o
S7	o	o	o	o
S8	o	o	o	o
S9	o	o	o	o
S10	o	o	o	o
S11	o	o	o	o
S12	o	o	o	o
S13	o	o	o	o
S14	o	o	o	o
S15	o	o	o	o
S16	o	o	o	o
S17	o	o	o	o
S18	o	o	o	o
S19	o	o	o	o
S20	o	o	o	o
S21	o	o	o	o
S22	o	o	o	o

**Handy P.A. Manual**

A HANDY little booklet entitled "The Partridge Manual" packs into 60 pages a great deal of information useful to radio dealers who handle P.A. gear. The successor to two booklets, "The P.A. Manual" and "The Partridge Amplifier Circuits" published before the war, it combines the two and brings them into line with modern development.

It begins with the theory of sound, hearing and acoustics, followed by the electrical requirements in various parts of amplifiers and a chapter on sound distribution methods. The rest of the matter is of a practical nature, comprising a number of P.A. circuits and several pages of formulæ, tables and charts.

The booklet, which is well illustrated with diagrams, is available from Partridge Transformers, Ltd., 76-78 Petty France, London, S.W.1, at 5s net.