Supplement to The Wireless & Electrical Trader, April 17, 1948

"TRADER" SERVICE SHEET

857

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-valve 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.

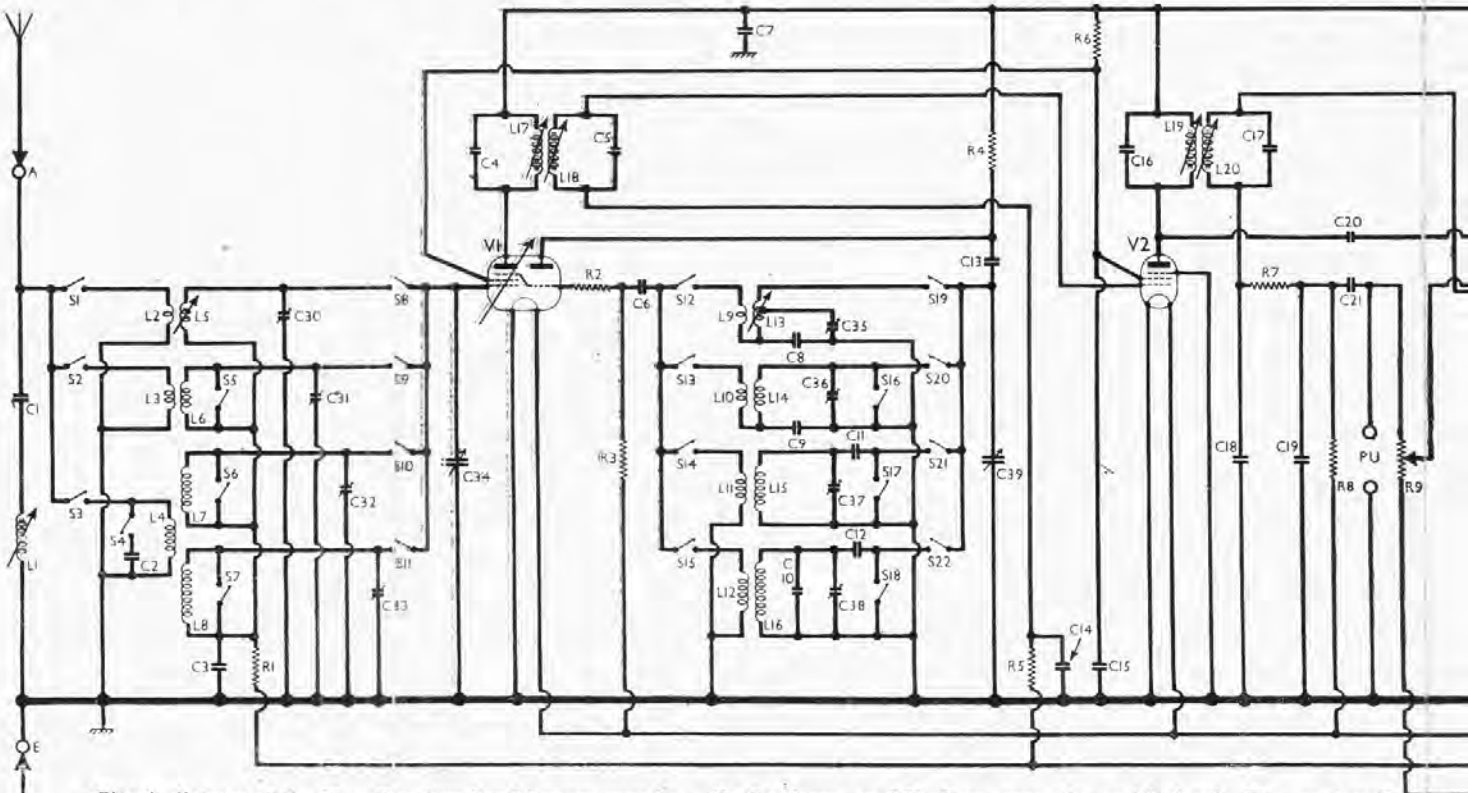
First valve **(V1, Mazda metallized TP25)** is a triode pentode operating as frequency changer with internal coupling. Triode oscillator anode coils **L13** (S.W.1) **L14** (S.W.2), **L15** (M.W.) and **L16** (L.W.) are tuned by **C39,** with parallel trimming by **C35** (S.W.1), **C36** (S.W.2), **C37** (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 capacitative 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 connecti

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			
	57	1.25		
V2 VP23	98	0.75	40	0.25
V3 HL23DD	67	0.5	—	—
V4 QP25	125 *	2.5*	126	1.2

*Each anode.

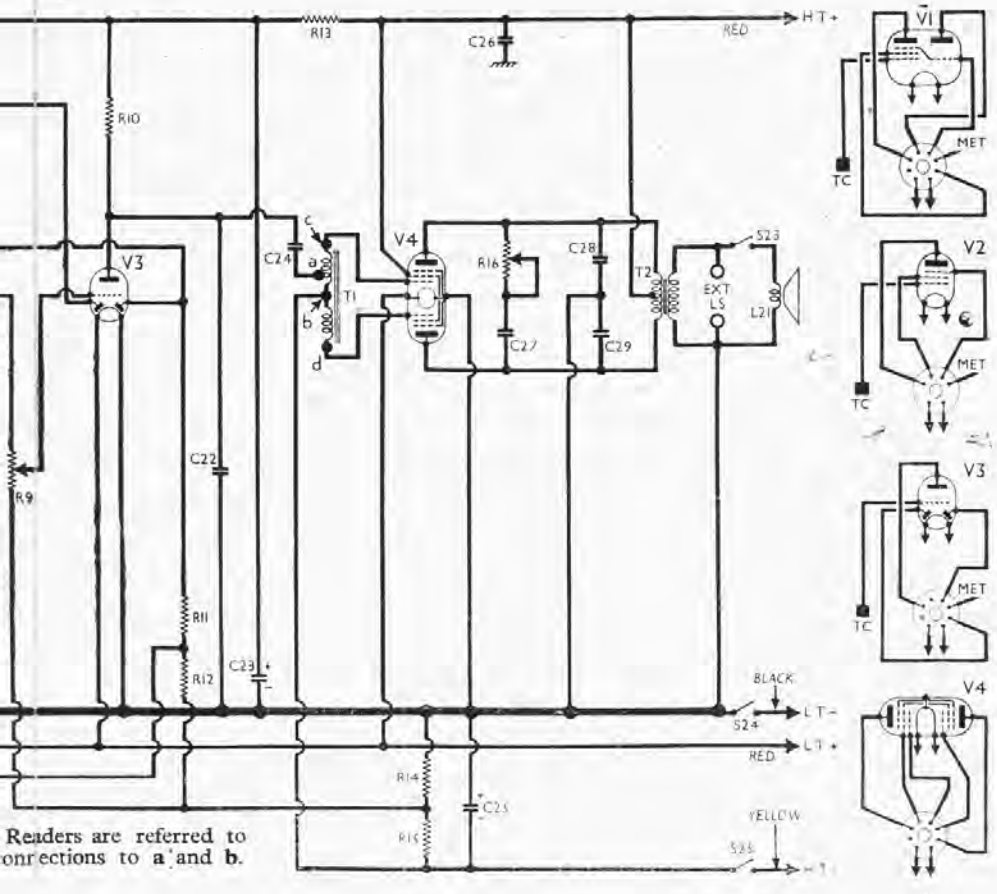
COMPONENTS AND VALUES

	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	1st I.F. transformer tuning	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. transformer tuning	0·0001	B2
C17	2nd I.F. transformer tuning	0·0001	B2
C18	I.F. by-passes	0·0001	H5
C19	I.F. by-passes	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	0·00025	H5
C29	Fixed tone correctors	0·00025	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

	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	A.V.C. diode load resistors	1,500,000	I5
R13	H.T. decoupling	6,800	H5
R14	Fixed G.B. and A.V.C. delay	82	E3
R15	Fixed G.B. and A.V.C. delay	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	Aerial coupling coils	0.7	I4
L4	Aerial coupling coils	38.0	I3
L5	Aerial tuning coils	Very low	I4
L6	Aerial tuning coils	0.5	I4
L7	Aerial tuning coils	6.5	I4
L8	Aerial tuning coils	33.0	I3
L9	Oscillator reaction coils	0.4	J5
L10	Oscillator reaction coils	0.8	J4
L11	Oscillator reaction coils	1.5	J4
L12	Oscillator reaction coils	4.5	J4
L13	Oscillator tuning coils	Very low	J5
L14	Oscillator tuning coils	0.3	J4
L15	Oscillator tuning coils	4.0	J4
L16	Oscillator tuning coils	9.0	J4
L17	1st I.F. trans. Pri.	18.0	A2
L18	1st I.F. trans. Sec.	18.0	A2
L19	2nd I.F. trans Pri.	15.0	B2
L20	2nd I.F. trans Sec.	15.0	B2
L21	Speech Coil	2.5	—
T1	Intervalve trans. Pri. a-b	350.0	G6
	Intervalve trans. Sec. c-d	3,000.0	G5
T2	Output trans. Pri., total	1,300.0	G4
	Output trans. Sec.	0.4	G4
S1-22	Waveband switches	—	J4
S23	Int. speaker switch	—	I6
S24	Battery switches ganged R9	—	E3
S25	Battery switches ganged R9	—	E3

* Electrolytic. † Variable. ‡ Pre-set.



Readers are referred to connections to **a** and **b**.

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).

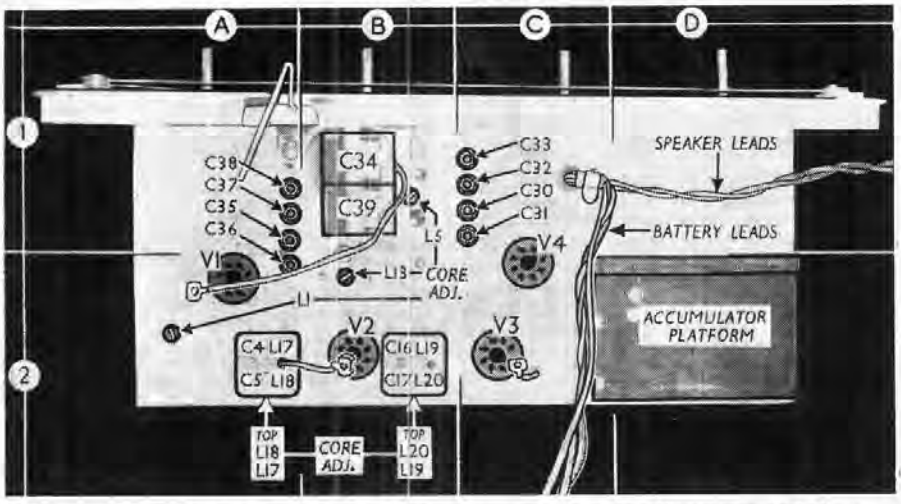
Remove the scale backing plate (four 4BA cheese-head screws).

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.



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 × 3⅛ 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.

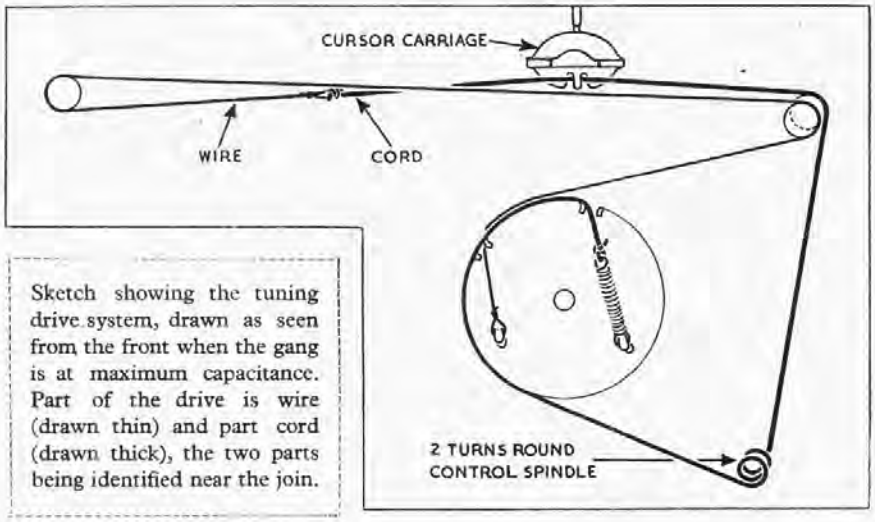
In order to ensure that the transformer is fitted in the correct position, one foot is slotted, and this foot should face the rear member of the chassis.

DRIVE CORD REPLACEMENT

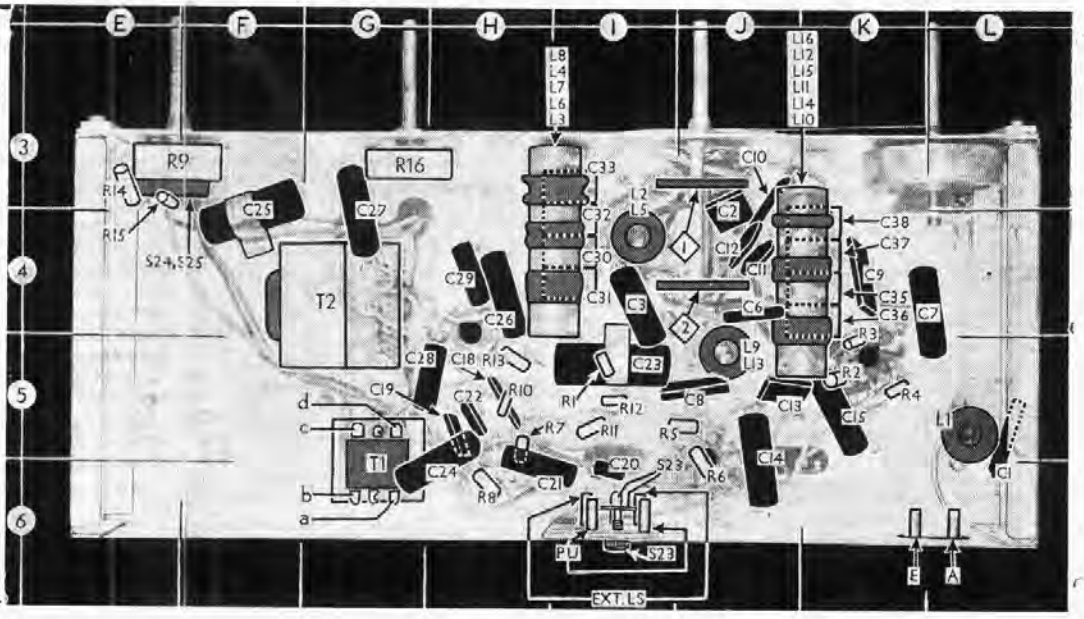
The drive cord consists of 33 in of stranded steel wire (obtainable, ready looped, from the manufacturers under Part No. B33563), and approximately 36 ins. of cord. The sketch below shows the course taken by the cord, as seen when viewing the chassis from the front with the gang at maximum.

Tie 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.

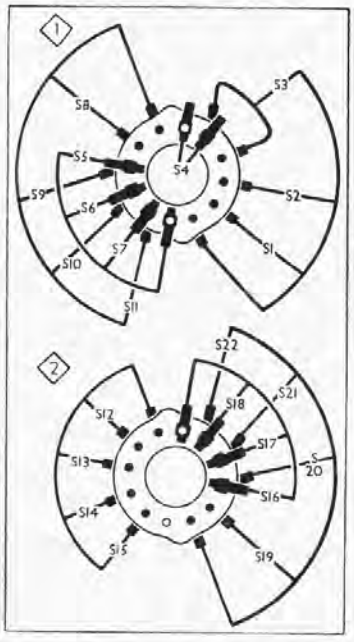
S.W.2.—Switch set to S.W.2, tune to 60 m on scale, feed in a 60 m (5 Mc/s) signal, and adjust **C36** (A2) for maximum output. Tune to 75 m on scale, feed in a 75 m (4 Mc/s) signal, and adjust **C31** (C1) for maximum output.

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.

Switch Table

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



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.

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.

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