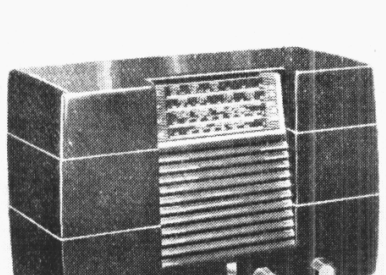
Supplement to The Wireless & Electrical Trader, December 11, 1948

"TRADER" SERVICE SHEET

890

PHILCO A547B

4-Band A.C. Superhet



The Philco A547B 4-band superhet.

FOUR wavebands are provided on the Philco A547B, giving semi band-spread coverage over the short wave range from 13.6 m to 50 m. The receiver is a 4-valve (plus rectifier) superhet for operation from A.C. mains of 200-250 V, 40-100 c/s.

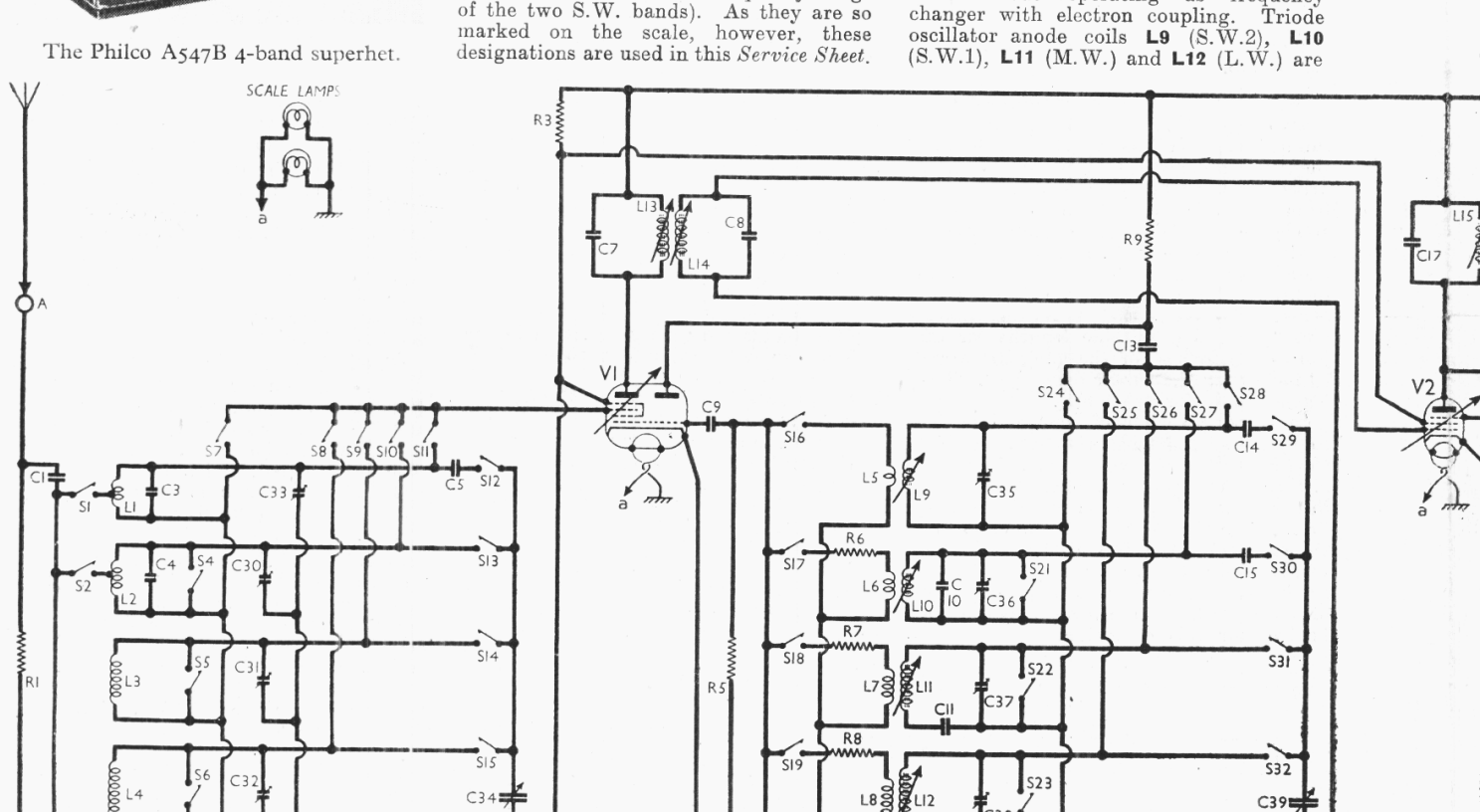
The actual waveband ranges are: S.W.1, 6-13 Mc/s (50-23.1 m); S.W.2, 13-22 Mc/s (23.1-13.6 m); M.W., 200-545.4 m; L.W., 810-2,000 m. It will be observed that the S.W. ranges are quoted in Mc/s, and the scale is so calibrated. Consequently the lowest wavelength band becomes S.W.2, instead of S.W.1 (which covers the lower frequency range of the two S.W. bands). As they are so marked on the scale, however, these designations are used in this *Service Sheet*.

Release date and original price: October 1947, £19 19s., reduced June 1948 to £17 17s. Purchase tax extra.

CIRCUIT DESCRIPTION

On S.W., aerial input is directly coupled via **C1** to tappings on the coils of the single-tuned circuits **L1, C34** (S.W.2) and and **L2, C34** (S.W.1). On M.W. and L.W., aerial input is "bottom" coupled via the capacitative potential divider **C1, C2** to single-tuned circuits **L3, C34** (M.W.) and **L4, C34** (L.W.). **R1** shunts the aerial circuit to prevent modulation hum.

First valve **(V1, Ferranti 6K8G)** is a triode-hexode operating as frequency changer with electron coupling. Triode oscillator anode coils **L9** (S.W.2), **L10** (S.W.1), **L11** (M.W.) and **L12** (L.W.) are



Circuit diagram of the Philco A547B A.C. superhet. S in the R.F. and oscillator tuning circuits to connect the v and a third group is employed for muting unwanted circ (L1 and L9) belongs to the S.W.2 band, the longer wavelengt The numbered connections shown round the speaker

tuned by **C39,** with parallel trimming by **C35** (S.W.2), **C10, C36** (S.W.1), **C37** (M.W.) and **C38** (L.W). and series tracking by **C14** (S.W.2), **C15** (S.W.1), **C11** (M.W.) and **C12** (L.W.). Inductive reaction coupling by coils **L5-L8** to grid circuit is employed on all bands.

Second valve **(V2, Brimar 6K7GT)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-transformer couplings **C7, L13, L14, C8** and **C17, L15, L16, C18,** in which the tuning capacitors are fixed and alignment adjustments are effected by varying the positions of the iron-dust cores.

Intermediate frequency 465 kc/s.

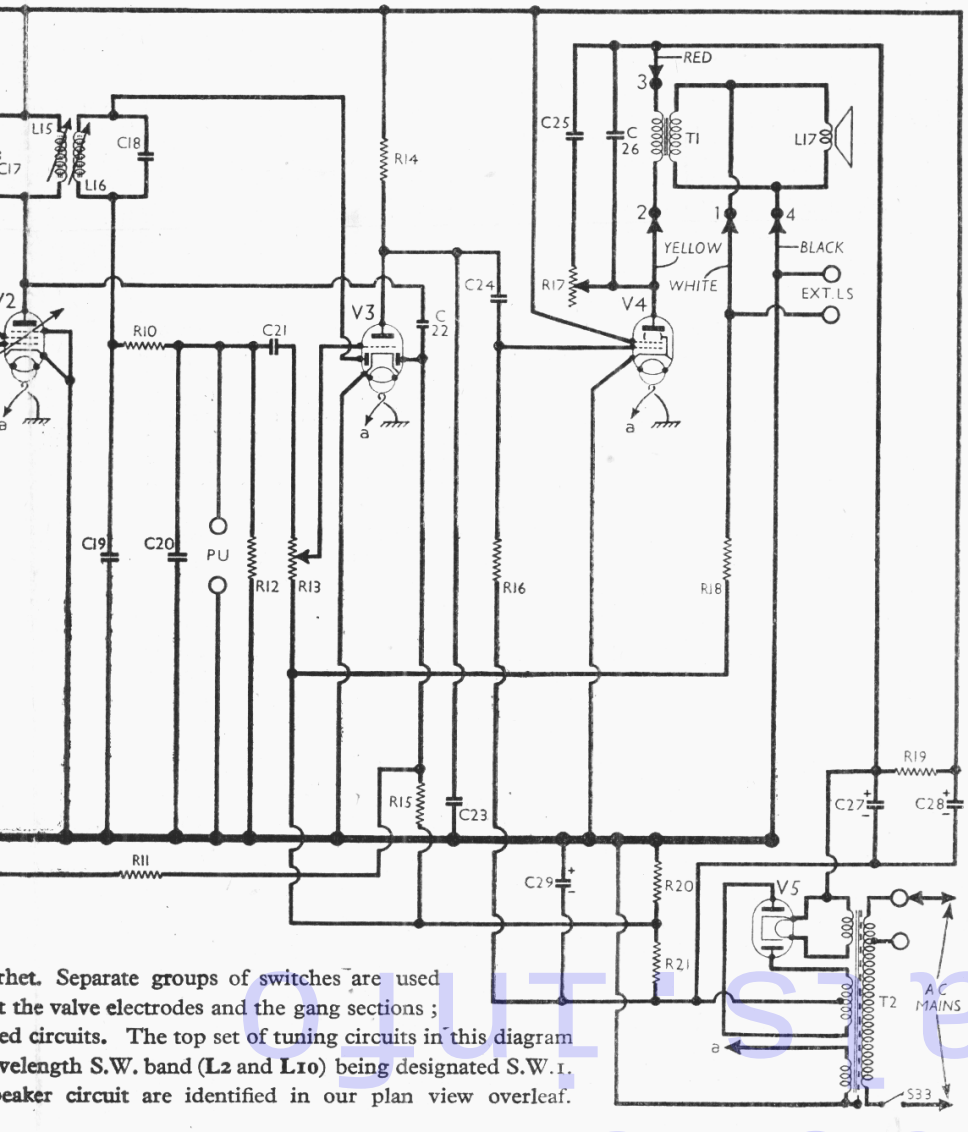
Diode second detector is part of double diode triode valve **(V3, Brimar 6Q7G).** Audio frequency component in rectified output is developed across load resistor **R12** and passed via A.F. coupling capacitor **C21** and manual volume control **R13** to C.G. of triode section, which operates as A.F. amplifier. I.F. filtering by **C19, R10, C20** and **C23** in diode and triode anode circuits respectively. Provision for the connection of a gramophone pick-up across **R12.**

Second diode of **V3,** fed from **V2** anode via **C22,** provides D.C. potential which is developed across load resistor **R15** and fed back through a decoupling circuit **R11, C16** as G.B. to F.C. and I.F. valves, giving automatic gain control.

Resistance-capacitance coupling by **R14, C24, R16** between **V3** triode and beam tetrode output valve **(V4, Ferranti 6V6G).** Fixed tone correction by **C26,** and variable tone control by **C25, R17.** The A.F. voltage developed across **T1** secondary winding is applied to a potential divider formed by **R18** and **R20** in series, tapped off and fed to **V3** grid circuit, via **R13,** giving negative feed back.

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Ferranti R52** or **Brimar 5Z4G).** Smoothing by resistor **R19** and electrolytic capacitors **C27, C28,** but the H.T. supply for **V4** anode is obtained directly from **V5** cathode.

Fixed G.B. for all valves, and A.G.C. delay voltage, is obtained from the drop across **R20, R21** in series with the negative H.T. lead to chassis.



…rhet. Separate groups of switches are used …t the valve electrodes and the gang sections; …ed circuits. The top set of tuning circuits in this diagram …velength S.W. band (L2 and L10) being designated S.W.1. …eaker circuit are identified in our plan view overleaf.

COMPONENTS AND VALUES

	CAPACITORS	Values (μF)	Locations
C1	Aerial coupling capacitors	0·001	K6
C2		0·0025	L4
C3	Aerial S.W.2 trim.	0·000022	L6
C4	Aerial S.W.1 trim.	0·000022	L4
C5	Aerial S.W.2 track.	0·00033	K4
C6	S.G.'s decoupling ...	0·1	L6
C7	1st I.F. transformer tuning ...	0·0001	A3
C8		0·0001	A3
C9	V1 osc. C.G. ...	0·0001	K6
C10	Osc. S.W.1 trim....	0·000022	J6
C11	Osc. M.W. track. ...	0·000374	J4
C12	Osc. L.W. track. ...	0·000104	J5
C13	Osc. anode coup. ...	0·0001	L5
C14	Osc. S.W.2 track....	0·000293	K4
C15	Osc. S.W.1 track....	0·0018	K4
C16	A.G.C. decoupling	0·1	H6
C17	2nd I.F. transformer tuning ...	0·0001	B3
C18		0·0001	B3
C19	I.F. by-pass capacitors ...	0·0001	B3
C20		0·0001	B3
C21	A.F. coupling ...	0·01	G5
C22	A.G.C. coupling ...	0·000047	H6
C23	I.F. by-pass ...	0·0001	H5
C24	A.F. coupling ...	0·001	G5
C25	Part tone control...	0·05	F4
C26	Tone corrector ...	0·005	F5
C27*	H.T. smoothing capacitors ...	30·0	D1
C28*		30·0	D1
C29*	G.B. by-pass ...	25·0	F4
C30‡	Aerial S.W.1 trim.	0·00005	L4
C31‡	Aerial M.W. trim....	0·00005	L5
C32‡	Aerial L.W. trim....	0·00005	L5
C33‡	Aerial S.W.2 trim.	0·00005	L5
C34†	Aerial tuning ...	0·000443§	A2
C35‡	Osc. S.W.2 trim. ...	0·00005	J4
C36‡	Osc. S.W.1 trim. ...	0·00005	J5
C37‡	Osc. M.W. trim. ...	0·00005	J5
C38‡	Osc. L.W. trim ...	0·00005	J5
C39†	Oscillator tuning ...	0·000443§	A1

* Electrolytic. † Variable. ‡ Pre-set.
§ "Swing" value, min. to max.

	RESISTORS	Values (ohms)	Locations
R1	Aerial shunt ...	10,000	K6
R2	V1 A.G.C. decoup.	33,000	K6
R3	V1, V2 S.G.'s H.T. potential divider	12,000	H4
R4		68,000	J6
R5	V1 osc. C.G. ...	47,000	L6
R6	Oscillator stabilizing resistors ...	68	K5
R7		2,200	K5
R8		8,200	K5
R9	Osc. anode load ...	33,000	K6
R10	I.F. stopper ...	47,000	B3
R11	A.G.C. decoupling	1,000,000	H6
R12	Sig. diode load ...	220,000	G6
R13	Volume control ...	1,000,000	G4
R14	V3 triode load ...	220,000	H5
R15	A.G.C. diode load...	1,000,000	H5
R16	V4 C.G. resistor ...	470,000	G5
R17	Tone control ...	50,000	E4
R18	F.-B. series ...	220	G6
R19	H.T. smoothing ...	4,300	G4
R20	V1-V4 G.B., and A.G.C. delay resistors ...	33	H5
R21		180	G4

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Aerial tuning coils	Very low	L5
L2		Very low	L5
L3		3·3	L4
L4		45·0	L4
L5	Oscillator reaction coils	Very low	J4
L6		0·4	J5
L7		2·5	J4
L8		5·5	J5
L9	Oscillator tuning coils	Very low	J4
L10		Very low	J5
L11		6·6	J4
L12		16·0	J5
L13	1st I.F. trans. Pri. ... Sec. ...	8·0	A3
L14		8·0	A3
L15	2nd I.F. trans. Pri. ... Sec. ...	8·0	B3
L16		8·0	B3
L17	Speech coil ...	2·0	B1
T1	Speaker trans. Pri. ... Sec. ...	620·0	B2
		0·1	B2

(*Continued col. 1 overleaf*)

OTHER COMPONENTS (*continued*)			Approx. Values (ohms)	Locations
T2	Mains trans.	Pri., total	31·0	D2
		Rect. heat. sec. ...	Very low	D2
		H.T. sec., total	720·0	D2
		Heat. sec.	Very low	D2
S1-S32	W/band and gram. switches ...		—	—
S33	Mains sw., g'd R17		—	E4

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers. Their receiver was switched to M.W. and the volume control was at maximum. The receiver was operating on A.C. mains of 230 V, and voltages were measured with a 500 ohms per volt meter, chassis being the negative connection. The total H.T. current was given as 51 mA.

Valve		Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1	6K8G	195	2·8	93	4·9
		Oscillator			
		80	2·6		
V2	6K7GT	195	8·6	93	2·0
V3	6Q7G	78	0·4	—	—
V4	6V6G	265	26·0	195	1·3
V5	R52	250†	—	—	—

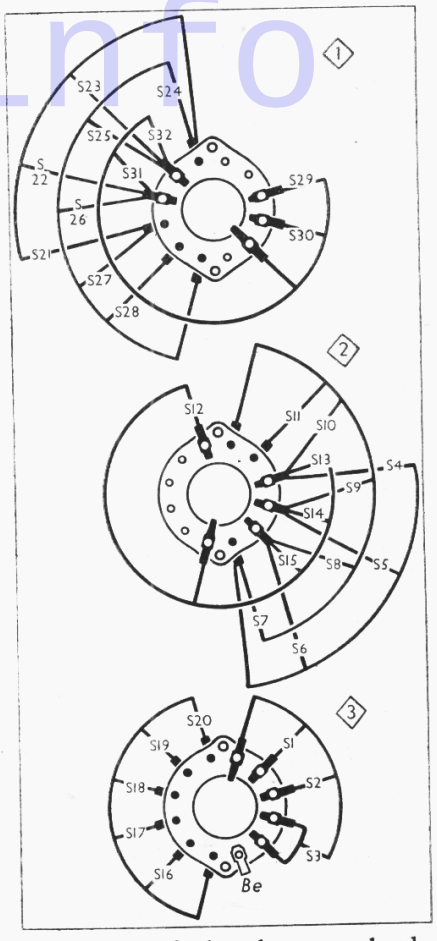
† Each anode, A.C.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (pull-off);
from the rear of the cabinet remove the hexagon-head machine screw (with thick and thin metal washers) located directly beneath each of the scale lamps;
withdraw the two cheese-head screws (with washers) securing the plywood chassis support to the rear of the cabinet, and slide out the chassis and speaker as a single unit.
When replacing, ensure that the metal projections on the front chassis edge engage in the rubber bushes provided for them inside the cabinet before attempting to fit the rear plywood chassis support. It should also be noted that a thin metal washer is fitted between the head of each of the machine screws, located beneath the scale lamps, and their rubber grommets, and that a thick metal washer goes between the other side of each grommet and the cabinet.

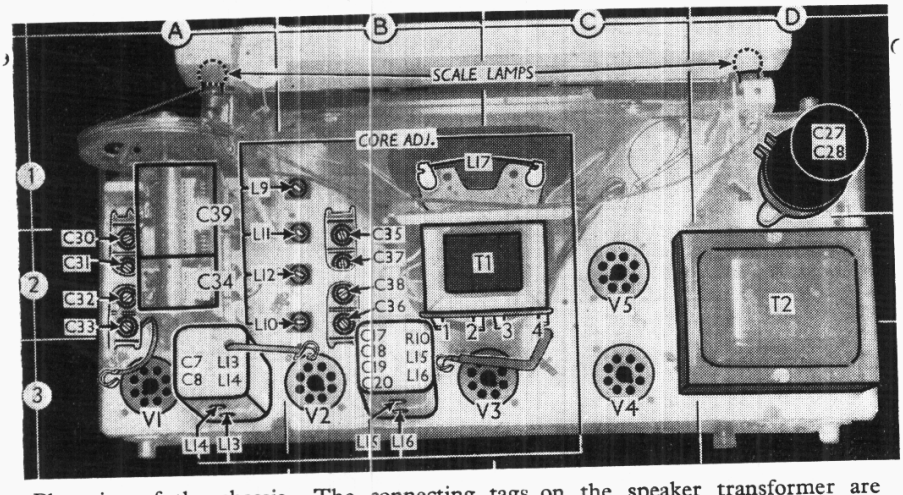
Removing Speaker.—Turn the waveband switch fully clockwise and, from the front of the chassis, remove the four hexagon-head machine screws securing the metal sub-baffle to its vertical support members;
lift out the speaker very carefully, taking care not to foul the drive or waveband indicator cords in the process.
When replacing, the transformer should be at the top, and if the leads have been unsoldered they should be reconnected as follows, numbering the tags on the transformer from left to right when viewed from the rear: 1, white; 2, yellow; 3, red; 4, black.

Switch	Gram.	L.W.	M.W.	S.W.1	S.W.2
S1	—	—	—	—	C
S2	—	—	—	C	—
S3	—	C	C	—	C
S4	—	—	—	C	—
S5	—	—	C	—	—
S6	—	—	—	—	—
S7	C	—	C	—	—
S8	—	C	—	—	—
S9	—	—	C	—	—
S10	—	—	—	C	—
S11	—	—	—	—	C
S12	—	—	—	C	—
S13	—	—	C	—	—
S14	—	—	—	—	—
S15	—	C	—	—	C
S16	—	—	—	C	—
S17	—	—	C	—	—
S18	—	—	—	—	—
S19	—	C	—	—	—
S20	C	—	—	—	C
S21	—	—	—	C	—
S22	—	—	C	—	—
S23	—	—	—	—	—
S24	C	—	—	—	—
S25	—	C	—	—	—
S26	—	—	C	—	—
S27	—	—	—	C	—
S28	—	—	—	—	C
S29	—	—	—	—	C
S30	—	—	—	C	—
S31	—	—	C	—	—
S32	—	C	—	—	—



Diagrams of the three waveband switch units, drawn as seen from the rear of an inverted chassis. In some cases tags are connected to their opposite numbers on the reverse side of the unit, the pair being used as one side of three separate switches. The associated table appears on the left, in col. 2.

A felt washer should be fitted between the sub-baffle and the vertical support when inserting each of the securing screws.



Plan view of the chassis. The connecting tags on the speaker transformer are numbered to agree with connecting points indicated in the circuit diagram overleaf. All the alignment adjustments are indicated here.

GENERAL NOTES

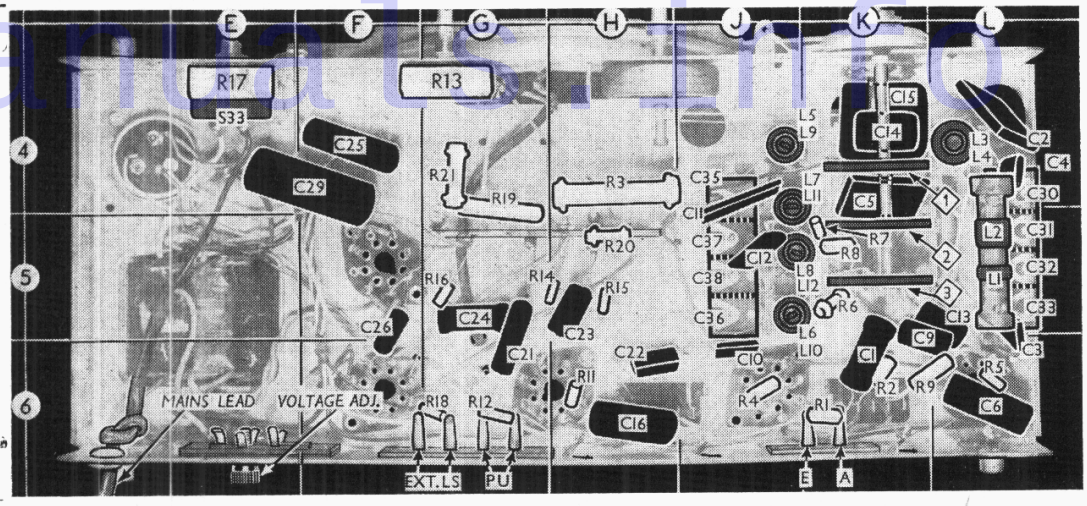
Switches.—S1-S32 are the waveband and radio muting switches, ganged in three rotary units beneath the chassis. The units are indicated in our under-chassis illustration, and shown in detail in the diagrams above, where they are drawn as seen when viewed from the rear of an inverted chassis.

The table (col. 2) gives the switch positions for the five control settings, starting from the fully anti-clockwise of the control knob. A dash indicates open, and **C**, closed.

S33 is the Q.M.B. mains switch, ganged with the tone control **R17.**

Scale Lamps.—These are two Ever Ready M.E.S. types, rated at 6.5 V, 0.3 A, with small clear spherical bulbs.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (about 2-3 Ω) external speaker.



Under-chassis view, in which the positions of the three switch units shown in col. 3 are indicated by numbers in diamonds, with arrows to show the direction in which they are viewed.

Resistor R19.—This is a wire wound cement coated unit rated at 4,300 Ω, 5 W dissipation.

DRIVE CORD REPLACEMENT

Two separate cords are used in the tuning drive on this receiver: one from the tuning control spindle to the gang drive drum (gang drive cord), and one from the gang drive drum to the cursor above the speaker (cursor drive cord).

The two cords are shown in our sketch below, the gang drive cord being drawn in broken line to distinguish it from the other. The cord used is Nylon braided glass yarn, and suitable lengths for the job are 24 inches for the gang drive and 50 inches for the cursor drive cord. This leaves ample for tying off.

In running each cord, one end is tied to its associated tension spring, which is then hooked to its anchor hole. The cord is then run round its course, commencing in the clockwise direction round the drive drum, with the gang at maximum so that the stop takes the pull of the cord, then finally tied off again at the same place as it started, making a complete loop of each cord. The spring may be unhooked for this operation.

The only points worthy of note are that the gang drive cord should run on the rear side of the flat groove round the gang drive drum, with the cursor cord in front of it, so that the gang drive should be fitted first; and that when slipping the cord into the grip on the cursor, take care to use the truly horizontal (upper) run of cord for it, and note that this runs over the front pulley on the right of the scale. This is clearly shown in our sketch. The cursor may be adjusted as explained under "Circuit Alignment."

CIRCUIT ALIGNMENT

The chassis must be in position in the cabinet when carrying out these operations.

I.F. Stages.—Switch set to M.W., tune to 200 m on scale, turn volume control to maximum, and 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 465 kc/s (645.16 m) signal, and adjust the cores of **L16, L15, L14** and **L13** (location references B3, A3) for maximum output. Repeat these operations until no improvement results.

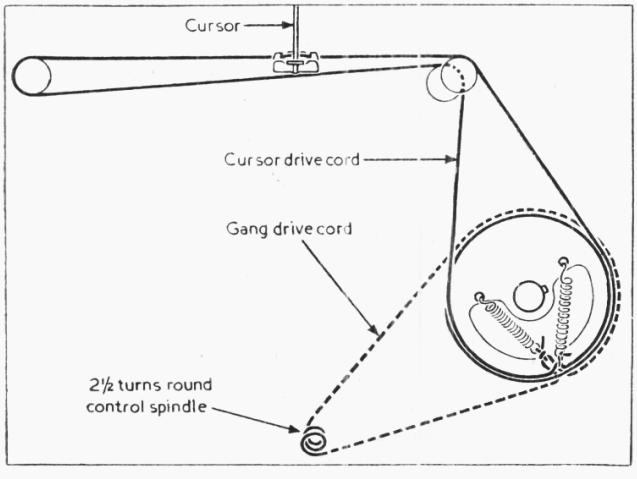
R.F. and Oscillator Stages.—With the gang at maximum capacitance, the cursor should be coincident with the high wavelength ends of the three scales. It may be adjusted in position by sliding the cursor carriage along the drive cord in the required direction. Transfer "live" signal generator lead, via a suitable dummy aerial, to **A** socket.

L.W.—Switch set to L.W., tune to 857 m (spot on scale), feed in an 857 m (350 kc/s) signal, and adjust **C38** (B2) and **C32** (A2) for maximum output. Tune to 1,875 m (spot on scale), feed in a 1,875 m (160 kc/s) signal, and adjust the core of **L12** (B2) for maximum output. Repeat these operations until no improvement results.

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 **C37** (B2) and **C31** (A2) for maximum output. Tune to 500 m (spot on scale), feed in a 500 m (600 kc/s) signal, and adjust the core of **L11** (B2) for maximum output. Repeat these operations until no improvement results.

S.W.1.—Switch set to S.W.1 as marked on waveband indicator, tune to 13 Mc/s (spot on scale), feed in a 13 Mc/s (23.08 m) signal, and adjust **C36** (B2) for maximum output. Tune to 12.07 Mc/s on scale and check that the image signal appears and then re-tune to 13 Mc/s on scale and adjust **C30** (A2), while rocking the gang, for maximum output. Tune to 6 Mc/s (spot on scale), feed in a 6 Mc/s (50 m) signal, and adjust the core of **L10** (B2) for maximum output. Repeat these operations until no improvement results.

S.W.2.—Switch set to S.W.2 as marked on waveband indicator, tune to 21 Mc/s (spot on scale), feed in a 21 Mc/s (14.29 m) signal, and adjust **C35** (B2) for maximum output. Tune to 20.07 Mc/s on scale and check that the image signal appears and then re-tune to 21 Mc/s on scale and adjust **C33** (A2), while rocking the gang, for maximum output. Tune to 13 Mc/s (spot on scale), feed in a 13 Mc/s (23.08 m) signal, and adjust the core of **L9** (B1) for maximum output. Repeat these operations until no improvement results.



Sketch showing the tuning drive system, involving two separate cords. The main drive cord is shown in broken line to distinguish it from the cursor drive cord, which is drawn in solid line. The drive is viewed from the front.

Printed in England by The Cornwall Press Ltd., Paris Garden, London, S.E.1.

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