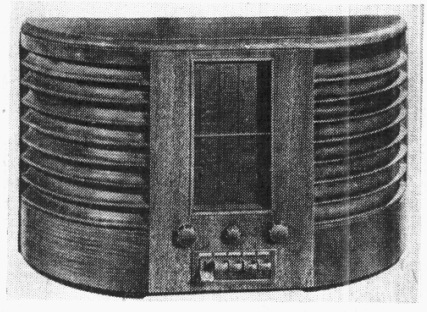
"TRADER" SERVICE SHEET

919

G.E.C. BC4750

Covering also BC4750L and the Radiograms BC4758 and BC4758R



The appearance of the G.E.C. BC4750

PRESS-BUTTON waveband switching is employed in the G.E.C. BC4750, a 4-valve (plus rectifier) 3-band superhet designed to operate from A.C. mains of 190-250v, 40-100 c/s. The waveband ranges are 16.5-50m, 192-550m, and 1,000-2,000m. Provision is made for the connection of a gramophone pick-up, with switching, and an external speaker.

The differences in the low-voltage model BC4750L, the radiogram BC4758 and the autoradiogram BC4758R, are described under "Associated Models" overleaf, but this *Service Sheet* was prepared from a BC4750 receiver.

Release dates and original prices: BC4750 and BC4750L, October, 1947, £23 12*s.* 6*d.*; *BC4758, December,* 1947, £49 7*s.*; *BC4758R, December,* 1947, £68 5*s. Purchase tax extra.*

CIRCUIT DESCRIPTION

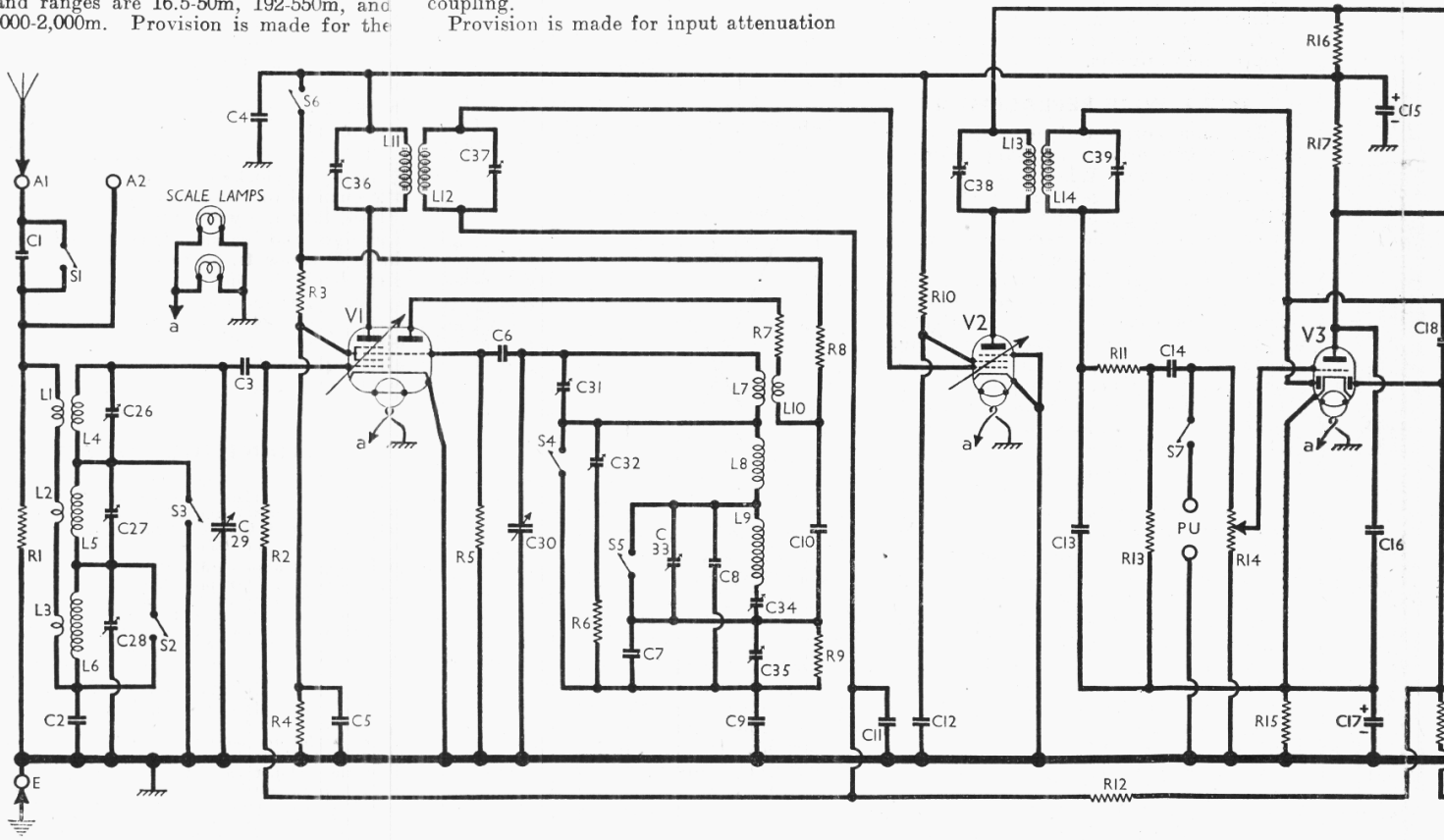
Aerial input from socket **A2** is inductively coupled by **L1** (S.W.), and capacitatively "bottom" coupled by **C2** (M.W. and L.W.), to single-tuned circuits **L4, C29** (S.W.), **L5, C29** (M.W.) and **L5, L6, C29** (L.W.), which precede a triode hexode valve **(V1, Osram metallized X61M)** operating as frequency changer with internal coupling.

Provision is made for input attenuation on M.W., via socket **A1** and series capacitor **C1,** but the latter is short-circuited by **S1** on L.W. Coils **L2, L3** provide anti-phase input for M.W. and L.W. image suppression purposes.

Triode oscillator grid coils **L7** (S.W.), **L8** (M.W.), **L9** (L.W.) are tuned by **C30,** with parallel trimming by **C31** (S.W.), **C32** (M.W.), **C8, C33** (L.W.) and series tracking by **C9** (S.W.), **C7, C35** (M.W.), **C34** (L.W.).

Inductive reaction coupling on S.W. is obtained from anode coil **L10,** with additional capacitative coupling, via **C10,** due to the common impedance of tracker **C9** in grid and anode circuits. On M.W. and L.W. coupling is capacitative only, due to trackers **C7, C35,** and resistors **R6, R7, R9** help to maintain a constant oscillator output over the range covered.

Second valve **(V2, Osram W61)** is a



Circuit diagram of the table models BC4750 and 4750L. The small differences in the radiograms BC4758 and 4758R are fully explained und overleaf. When the "Gram" button is depressed, **S6** opens to mute radio, **S7** closes to connect the pick-up, and **S8** closes to eliminate the tone co The tone correcting circuit is eliminated also when the S.W. button is depressed, when **S9** closes. The letter coding **b, c, d, e, f** is repeated in the pl leaf to identify the tags on **T1.** In some chassis, **R21** is omitted; there may be a 100 Ω "stopper" in the screen lead to **V4**; and **V2** may be an R.F. t

variable-mu R.F. pentode 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 **R13** and passed, via A.F. coupling capacitor **C14** and manual volume control **R14,** 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. Provision is made for the connection of a gramophone pick-up across **R14,** via isolating switch **S7.**

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 **R12, C11** as G.B. to F.C. and I.F. valves, giving automatic gain control.

Resistance-capacitance coupling by **R17, C19, R22,** via tone correcting network **C20, R20, R19, C21** and stabilizing resistor **R21,** between **V3** triode and beam tetrode output valve **(V4, Osram KT61).** Fixed tone correction by **C23,** and variable tone control by **C22, R24,** in anode circuit.

The "base cut" circuit **C20, R20** is short-circuited by **S8** on gram and by **S9** on S.W.

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

Fixed G.B. for **V1, V2,** and part of the A.G.C. delay voltage, are obtained from the drop across **R26** in the H.T. negative lead to chassis.

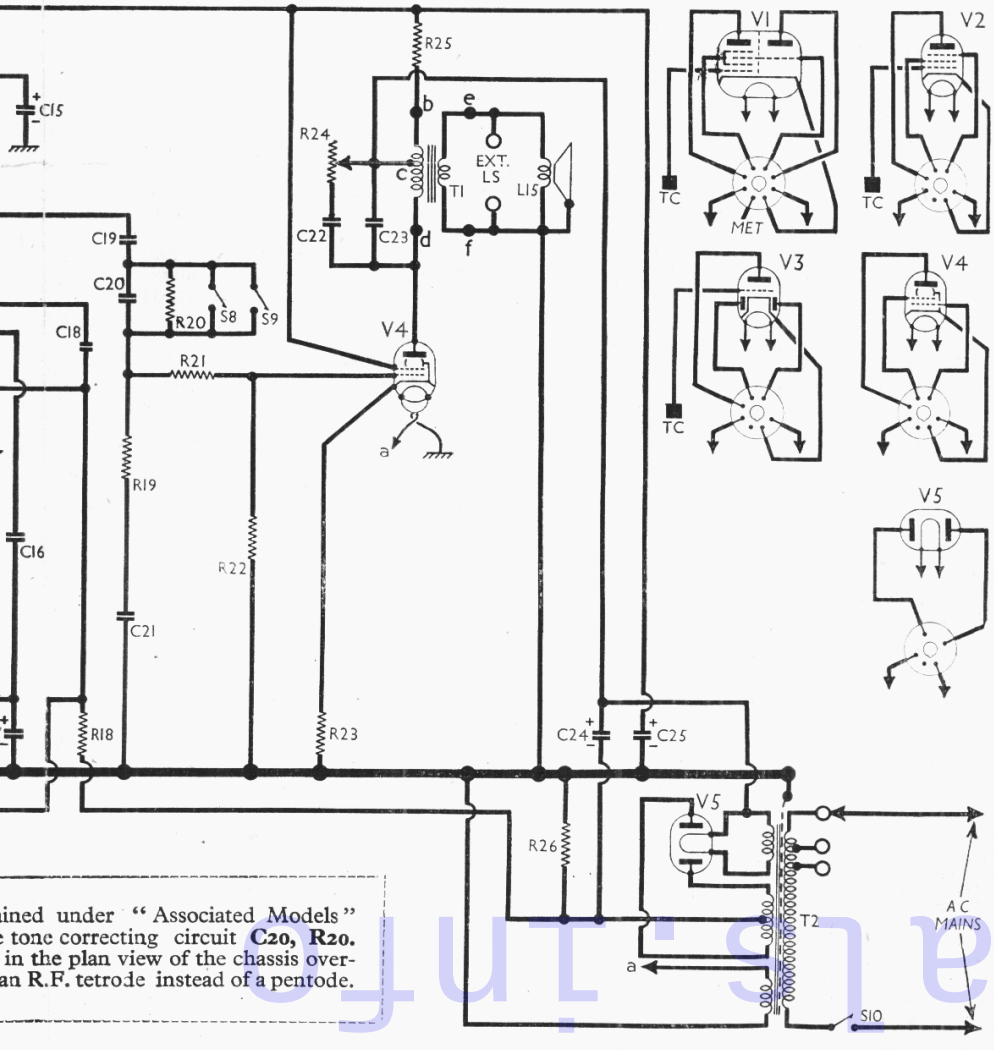
VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating from mains of 225 V, using the 215-240 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the M.W. band, and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Avometer, except where otherwise indicated, chassis being the negative connection.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 X61M	145	2·2	67	2·6	—
	Oscillator				
	73	3·1			
V2 W61	208	4·6	48	1·8	—
V3 DH63	70	0·5	—	—	1·0§
V4 KT61	262	32·0	208	5·1	3·1§
V5 U50	265†	—	—	—	277

† Each anode, A.C. §10V meter range.



ined under "Associated Models" tone correcting circuit **C20, R20.** in the plan view of the chassis over- an R.F. tetrode instead of a pentode.

COMPONENTS AND VALUES

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

	CAPACITORS	Values (μF)	Locations
C1	Aerial series ...	0·000022	K6
C2	Aerial coupling ...	0·003	F3
C3	V1 hex. C.G. ...	0·0001	B1
C4	H.T. R.F. by-pass	0·05	J6
C5	V1 S.G. decoupling	0·05	H5
C6	V1 osc. C.G. ...	0·0001	H5
C7	Osc. M.W. tracker	0·0001	H4
C8	Osc. L.W. trim. ...	0·000039	H4
C9	Osc. S.W. tracker...	0·00395	J4
C10	Osc. anode coup. ...	0·005	H5
C11	A.G.C. decoup. ...	0·05	J6
C12	V2 S.G. decoupling	0·05	H6
C13	I.F. by-pass ...	0·0003	G6
C14	A.F. coupling ...	0·02	G6
C15*	H.T. feed decoup.	4·0	B1
C16	I.F. by-pass ...	0·0005	F5
C17*	V3 cath. by-pass ...	25·0	F6
C18	A.G.C. coupling ...	0·000022	G5
C19	A.F. coupling ...	0·02	F5
C20	Bass cut	0·0002	F5
C21	Bass boost... ...	0·0015	G5
C22	Part tone control...	0·05	C1
C23	Tone corrector ...	0·005	C1
C24*	H.T. smoothing ...	16·0	A2
C25*		20·0	B1
C26‡	Aerial S.W. trim....	0·00003	J3
C27‡	Aerial M.W. trim.	0·00003	J4
C28‡	Aerial L.W. trim....	0·00008	J4
C29†	Aerial tuning ...	0·0005	K4
C30†	Oscillator tuning ...	0·0005	K5
C31‡	Osc. S.W. trim. ...	0·00003	F3
C32‡	Osc. M.W. trim. ...	0·00003	F4
C33‡	Osc. L.W. trim. ...	0·00008	F4
C34‡	Osc. L.W. tracker	0·000425	G5
C35‡	Osc. M.W. tracker	0·000425	H5
C36‡	1st I.F. transformer	0·00013	J5
C37‡	tuning	0·00013	J6
C38‡	2nd I.F. transformer	0·000425	G6
C39‡	tuning	0·000425	G5

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)	Locations
R1	Aerial shunt ...	10,000	K6
R2	V1 hex. C.G. ...	1,000,000	B2
R3	V1 S.G. H.T. po-	15,000	J5
R4	tential divider ...	22,000	H5
R5	V1 osc. C.G. ...	100,000	H5
R6	Osc. M.W. stabilizer	68	F4
R7	Osc. stabilizer ...	470	H5
R8	Osc. anode load ...	22,000	H5
R9	Osc. M.W. stabilizer	10,000	H4
R10	V2 S.G. H.T. feed...	56,000	H6
R11	I.F. stopper ...	56,000	G6
R12	A.G.C. decoup. ...	1,000,000	G6
R13	Sig. diode load ...	470,000	F6
R14	Volume control ...	1,000,000	C1
R15	V3 G.B., part A.G.C. delay	2,200	F6
R16	H.T. feed decoup.	4,700	J5
R17	V3 triode load ...	100,000	F5
R18	A.G.C. diode load...	470,000	F5
R19	Parts of tone cor-	150,000	F5
R20	rection network	680,000	F5
R21	V4 C.G. stabilizer...	10,000	F5
R22	V4 C.G. resistor ...	330,000	G5
R23	V4 G.B. resistor ...	91	F4
R24	Tone control ...	55,000	C1
R25	H.T. smoothing ...	3,300	C1
R26	V1, V2 fixed G.B., part A.G.C. delay	39	F5

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	Aerial S.W. coup....	0·36	H3
L2	M.W., L.W. image rejection ...	Very low	H3
L3		Very low	G3
L4	Aerial tuning coils	Very low	H3
L5		2·8	H3
L6		19·5	G3
L7	Oscillator tuning coils	Very low	H4
L8		3·4	G4
L9		7·7	G4
L10	S.W. react. coil ...	0·32	H4
L11	1st I.F. trans. Pri. ...	7·0	B2
L12	1st I.F. trans. Sec. ...	7·0	B2
L13	2nd I.F. trans. Pri. ...	4·0	C2
L14	2nd I.F. trans. Sec. ...	4·0	C2
L15	Speech coil ...	2·3	—
T1	Output trans Pri., b-c	12·0	
	Output trans Pri., c-d	430·0	C1
	Output trans Sec. ...	0·6	
T2	Mains trans. Pri., total	34·0	
	Mains trans. Heat. sec.	0·16	D2
	Mains trans. Rect. heat sec. ...	0·14	
	Mains trans. H.T. sec., total...	310·0	
S1-S9	W/band and gram switches ...	—	H4
S10	Mains switch ...	—	F5

GENERAL NOTES

Switches.—S1-S5 and **S9** are the waveband switches, and **S6. S7** and **S8** are the radio/gram change-over switches, in a five-section press-button unit beneath the chassis. Four sections actually contain all the switching for gram, L.W., M.W. and S.W., the fifth being provided to accommodate the "Off" button, whose Q.M.B. switch unit **S10** is mounted as an adjunct to the unit proper.

The position of the press-button unit is indicated in our under-chassis view, where the sections are identified by markings on their plungers, but the unit is shown in more detail in the diagram in col. 3, where the switch tags are indicated as they appear when viewed from the rear of an inverted chassis. The table in col. 3 shows the positions of the various switches when any given button is depressed.

Scale Lamps.—These are two Osram M.E.S.-type lamps, with small, clear, spherical bulbs, rated at 6.5 V, 0.3 A. The correct type of replacement lamp is designated Cat. No. O.S.75.

External Speaker.—Two terminals are provided at the rear of the chassis for the connection of a low-impedance (2-4 Ω) external speaker.

Chassis Divergencies.—In some chassis **C25** and **C15,** which in our chassis comprised a 20 μF section and a 4 μF section of a single unit, may be instead a 4 μF + 4 μF + 8 μF + 8 μF unit in which one 4 μF and the two 8 μF sections are connected in parallel to form the 20 μF capacitor **C25.** The remaining 4 μF section is then **C15.**

In some chassis, too, **R21** is omitted, the tops of **R19** and **R22** being joined together directly. Further, a 100 Ω stopper may be included in the screen grid lead to **V4,** and **V2** may be a KTW61 (tetrode) instead of a W61 (pentode).

ASSOCIATED MODELS

BC4750L.—This is a low-voltage version of the B4750, employing a mains transformer whose primary is tapped at 115 V, 125 V and 220 V. The overall D.C. resistance of the primary is 26 Ω; from the fixed end to the 115 V tapping the resistance is 10.5 Ω; and from the fixed end to the 125 V tapping the resistance is 11.5 Ω. Otherwise the receiver is like the BC4750.

BC4758.—This is a radio-gram employing a slightly modified BC4750 chassis. The modifications consist of changing **C23** to 0.01 μF, adding a 33,000 Ω resistor across the pick-up leads, moving **R24** to the position we show for **R14** and fitting **R14** on the front of the cabinet. The motor unit in the BC4758 is a Garrard type V. The mains frequency range is limited to 40-60 c/s.

BC4758R.—This is an autoradiogram version of the BC4758 employing a Garrard type RC60 record changer unit. The mains frequency range here is limited to 40-60 c/s. In the table models, BC4750 and 4750L the speaker is an 8-inch permanent magnet type. In the radiograms a 10-inch speaker is used.

CIRCUIT ALIGNMENT

Access may be gained to the components involved in the following adjustments upon removal of the cabinet 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 G5) and **C38** (G6) for maximum output.

Transfer "live" signal generator lead and series capacitor to control grid (top cap) of **V1,** feed in a 456 kc/s signal, and adjust **C37** (J6) and **C36** (J5) for maximum output. Do not readjust **C39** or **C38** without repeating the complete I.F. alignment procedure.

R.F. and Oscillator Stages.—With the gang at maximum capacitance the cursor should coincide with the dots at the high wavelength ends of M.W. and S.W. scales. It may be adjusted in position by rotating the drive drum on its spindle, after slackening the two grub screws. Transfer "live" signal generator lead to **A2** socket, via a suitable dummy aerial.

S.W.—Switch set to S.W., tune to 16.7 m (spot on scale), feed in a 16.7 m (18 Mc/s) signal, and adjust **C31** (F3) for maximum output, choosing the peak involving the lesser trimmer capacitance. Then adjust **C26** (J3), while rocking the gang slightly, 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 **C32** (F4) and **C27** (J4) for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust **C35** (H5), 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** (F4) and **C28** (J4) for maximum output. Tune to 1,818 m (spot on scale), feed in an 1,818 m

Switch Table and Diagram

Switch	Off	Gram	L.W.	M.W.	S.W.
S1	—	—	C	—	—
S2	C	C	—	C	C
S3	—	—	—	—	C
S4	—	—	—	—	C
S5	C	C	—	C	C
S6	C	—	C	C	C
S7	—	C	—	—	—
S8	—	C	—	—	—
S9	—	—	—	—	C
S10	—	C	C	C	C

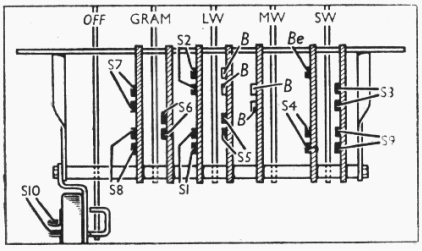
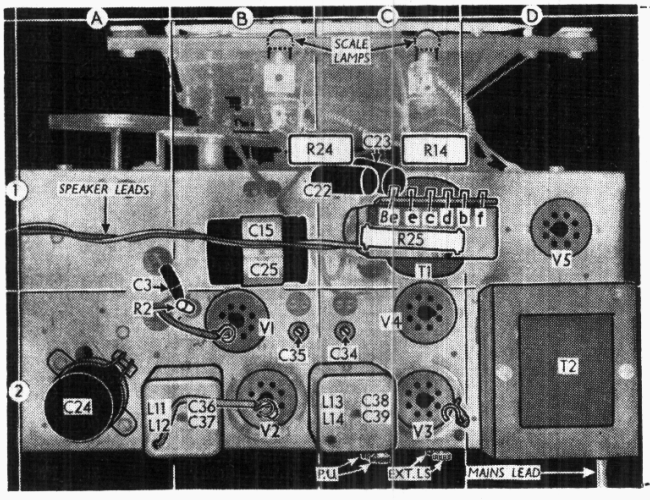
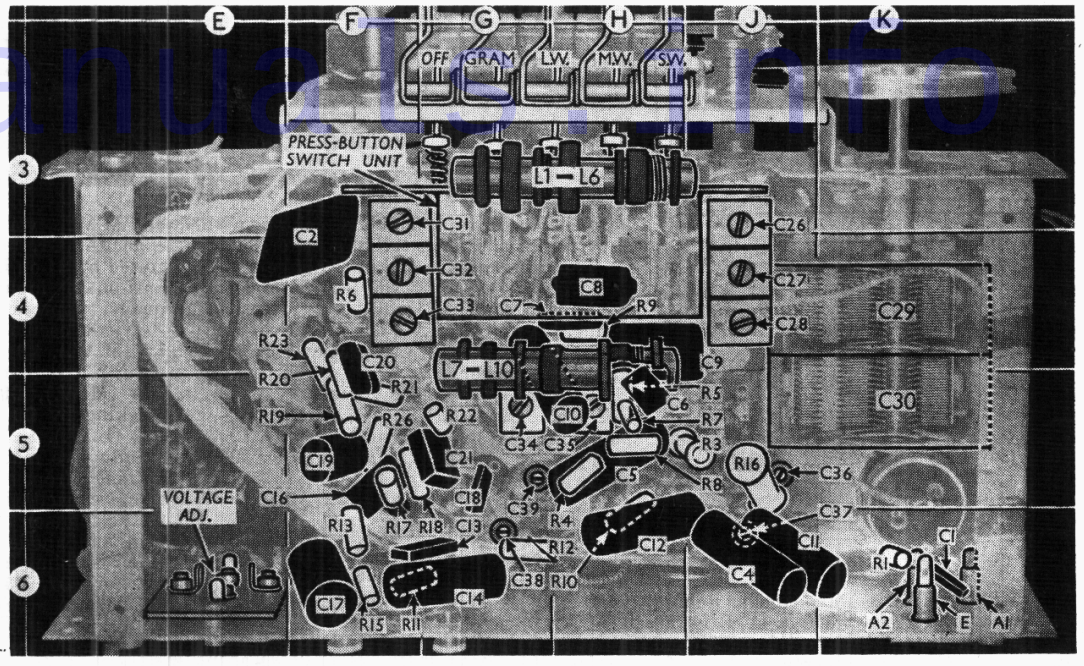


Diagram of the press-button waveband switch unit, drawn as seen from the rear of an inverted chassis. When the "off" button is depressed, **S10** in the attached unit opens. The action of the switches when any button is pressed is shown in the table above the diagram.



Plan view of the chassis, of the table model. In the radiograms, **R24** takes the place of **R14,** and **R14** is mounted on the front of the cabinet. The tags of **T1** are lettered to agree with the circuit diagram overleaf. **V2** and **V3** are provided with screening cans.



Underside view of the chassis, in which position all alignment adjustments can be made. The position of the press-button switch unit is indicated between the two coil units, but it is shown in detail in the diagram in col. 3. The identity of the press-button plungers is shown at the top of the illustration.

(165 kc/s) signal and adjust **C34** (G5), while rocking the gang, for maximum output. Repeat these operations until no improvement results.

DRIVE WIRE REPLACEMENT

The tuning drive system consists of two separate wire drives : the gang drive and the cursor drive. Where the two are to be replaced, the gang drive should be fitted first. Suitable wire can be obtained from G.E.C. Radio Service Depot, 9, Greycoat Street, London, S.W.1.

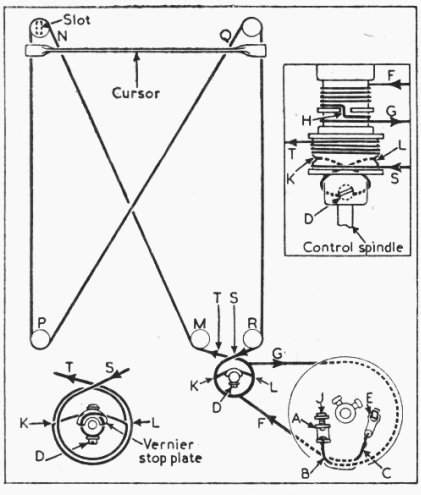
The drawing (col. 5) includes a sketch of the complete system, as seen from the front, with code letters to identify the significant points; an inset at top right showing a plan view of the drive wheels and control spindle, the appropriate code letters being repeated to identify the disposition of the various turns of wire in the three channels; and an inset at bottom left showing the inside of the front (larger) drive wheel as seen from the front, and the method of terminating the cursor drive wire. Throughout the drawing the various items are shown in the positions they adopt when the gang is at maximum capacitance.

Gang Drive.—Turn the gang to maximum, the gang drum to the position shown in the sketch, with **B** and **C** at the bottom, and the control spindle so that screw **D** is at the bottom and the slow-motion stop plate is on top. If the cursor drive is in order, the cursor should be at the top of the scale.

Taking a suitable length of wire, solder to one end of it a 4BA solder tag, as shown at **E,** and to the other end the adjustment bracket **A,** so that the distance between the two soldered joints is 21 inches. Hook the tag to the anchor at **E,** and run the wire as shown in the sketch, making 4½ turns clockwise in the rear drive wheel channel between **F** and **H,** crossing the gap at **H,** making one further turn in the next channel, and running off at **G** on the way back to the gang drum.

Pass into the drum again at the opening **B,** and fit the adjusting screw **J** to the bracket **A,** tightening it up as required.

Cursor Drive.—Take a 62-inch length of wire and solder the ends to keep them



Sketch showing the complete tuning drive system as seen from the front with the gange at maximum. Inset are shown details of the drive wheel sections as seen from above (top right) and inside the front (bottom left) from which the number of turns and course of the wire can be followed.

solid. Pass one end into the drive wheel through the hole **K,** make a small loop in it, wind it clockwise round the fixing boss inside and fix the loop to the screw **D.** Drop pulley **N** (at top left-hand corner of scale) to the bottom of its slot.

With the free wire, wind 3¾ turns anti-clockwise in the large outer channel, winding towards the rear of the channel, running off at **T** to the pulley **M.** Then follow the course shown in the sketch, **N, P, Q, R,** passing run **P, Q** in front of run **M, N.**

Return to the drive wheel at **S,** make ¾ turn anti-clockwise round the front of the channel to the hole **L,** pass inside the wheel, take the wire anti-clockwise round the boss and clamp it firmly under the head of screw **D.** Adjust pulley **N** in its slot to obtain the required tension.

Finally, solder the cursor to the vertical runs of wire **N, P** and **Q, R** so that it is exactly level with the two white dots at the high wavelength ends of the scales when the gang is at maximum capacitance.

DISMANTLING THE SET

A detachable bottom cover is fitted to the cabinet, upon removal of which (four round-head wood screws and plain washers) access may be gained to the alignment adjustments and many of the under-chassis components.

Removing Chassis—Pull off the three control knobs and the five press-button knobs; unsolder the speaker leads at the speech coil connecting tags and withdraw the four round-head wood screws securing the top of the scale assembly to the cabinet; from the underside of the cabinet remove the four cheese-head chassis retaining screws (with one metal and two rubber washers each), and slide the chassis out of the cabinet.

When replacing, note that one rubber washer is fitted between the chassis and the base of the cabinet, and the other beneath the large metal washer, on each chassis retaining screw. The black speaker lead should be re-soldered to the lower speech coil tag, together with the lead which earths the speaker frame, and the white lead should be soldered to the upper tag.

Removing Speaker.—Withdraw the four cheese-head screws (with washers) securing the speaker to the sub-baffle and lift it out.

When replacing, the connecting panel should be on the left, and the leads should be connected as previously described.

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