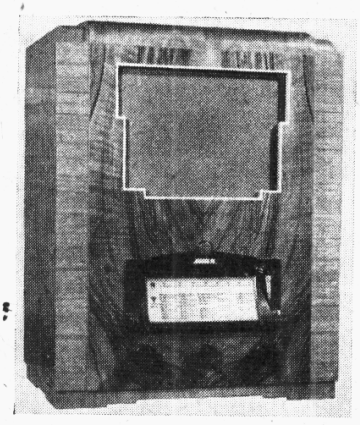
Supplement to The Wireless & Electrical Trader, January 27, 1945

"TRADER" SERVICE SHEET 707

PHILIPS 585U AND CONSOLE 587U



The Philips 585U (or HU) superhet.

EXTENSIVE precautions are taken to prevent accidental shock to the user in the Philips 585U (or HU) receiver, and a special noise-suppression system, assisted by the associated AVC action, is used. The receiver is a 5-valve (plus rectifier) 2-band superhet designed to operate from AC or DC mains of 200-250 V without the necessity of voltage adjustment.

The 587U (or HU) console chassis is similar in every respect to that in the 585.

Instructions for replacing **V5,** now obsolete, are given overleaf.

Release date and original prices: 1935 *(both models);* 585*U*, £14 14*s.*; 587*U*, £18 7*s.* 6*d.*

CIRCUIT DESCRIPTION

Aerial input via isolating capacitors **C1, C2** and coupling coils **L2, L3** to capacitance coupled band-pass filter. Primary coils **L4** (MW) and **L5** (LW) are tuned by **C40;** secondary coils **L6** (MW) and **L7** (LW) are tuned by **C42.** Top coupling by **C7,** and bottom coupling by **C6** (MW) and **C5** (LW).

C3 is a swamp capacitance, permitting the connection of various aerials without unbalancing the aerial circuit. **R1** maintains DC continuity between the **A** and **E** sockets, maintaining **C1** at the same DC potential as **C2.**

First valve **(V1, Mullard metallised FC13)** is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L8** (MW) and **L9** (LW) are tuned by **C43.** Parallel trimming by **C44** (MW) and **C45** (LW); series tracking by **C13** (MW) and **C12** (LW). Reaction coupling from anode by coils **L10** (MW) and **L11** (LW).

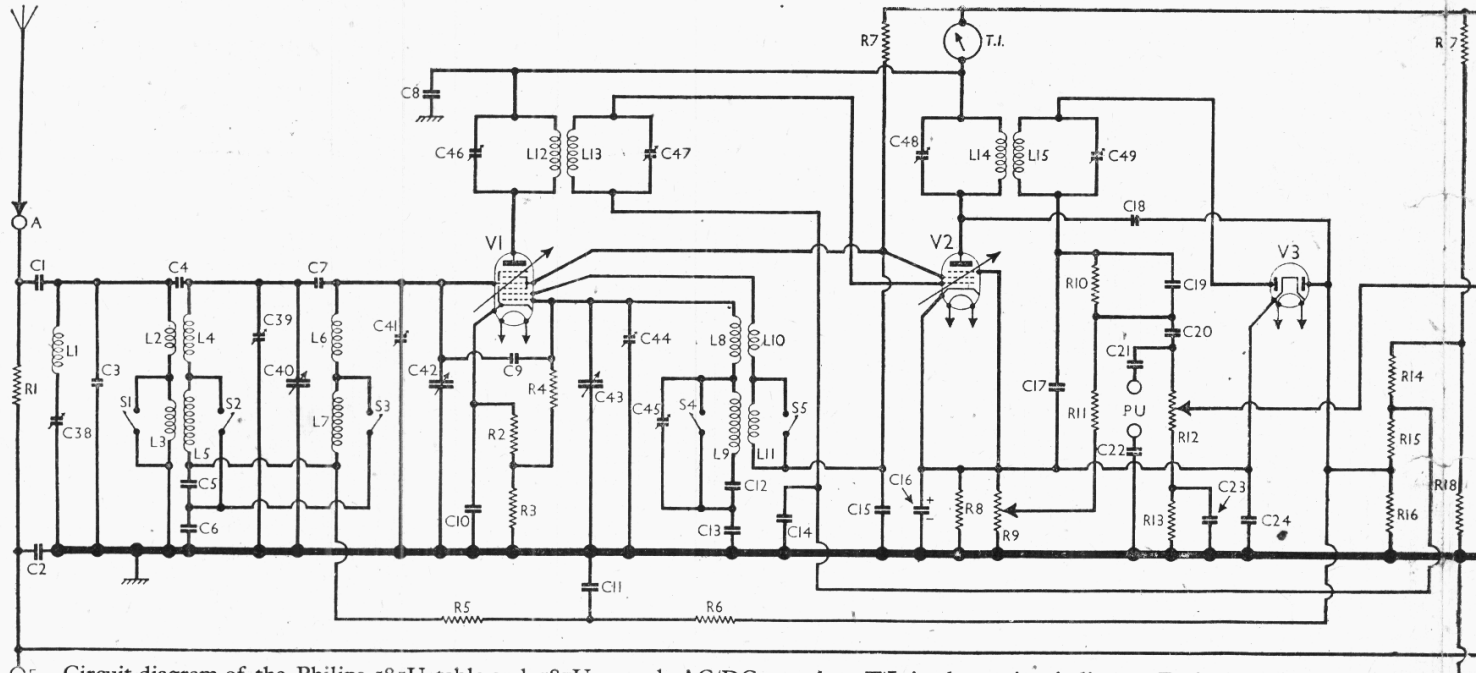
Second valve **(V2, Mullard metallised VP13A)** is a variable-mu RF pentode operating as intermediate-frequency amplifier with tuned-primary, tuned-secondary transformer coupling **C46, L12, L13, C47** and **C48, L14, L15, C49.**

Intermediate frequency 115 kc/s.

Diode second detector is part of separate double diode valve **(V3, Mullard metallised 2D13A).** Audio frequency component in rectified output is developed across load resistors **R10, R11,** that across **R11** being passed via AF coupling capacitor **C20** and manual volume control **R12** to CG of triode valve **(V4, Mullard metallised HL13)** which operates as AF amplifier.

High-note compensation by **C19** and **R10,** and bass boost by **C23, R13.** IF filtering by **C17** in diode circuit and **C26** in **V4** anode circuit. Provision for connection of gramophone pick-up via isolating capacitors **C21, C22** across **R12, R13.**

Second diode of **V3,** fed from **V2** anode via **C18,** provides DC potential which is developed across load resistor **R16** and fed back via decoupling circuits **R5, C11, R6** to **V1,** and **R15, C14** to **V2,** giving automatic volume control. Delay potential is obtained from the drop along **R8** in the common return lead from **V2** and **V3** cathodes but it is slightly off-set by a positive potential at the top of **R16,** obtained



Circuit diagram of the Philips 585U table and 587U console AC/DC superhet. **T.I.** is the tuning indicator. **R9** is the noise suppressor. **C19** provides high-note emphasis, and **C23** compensates for loss of bass at low volume levels. **C28, L16** form a resonant circuit resonating at about 60 c/s. In some versions **L16** is included in **V4** cathode circuit, while in others it is omitted altogether.

from the potential divider formed by **R14, R15, R16** which is in turn shunted across the lower limb of an HT potential divider **R17, R18.** A moving-iron meter movement **T.I.**, actuated by the anode current of **V1** and **V2**, operates as a tuning meter

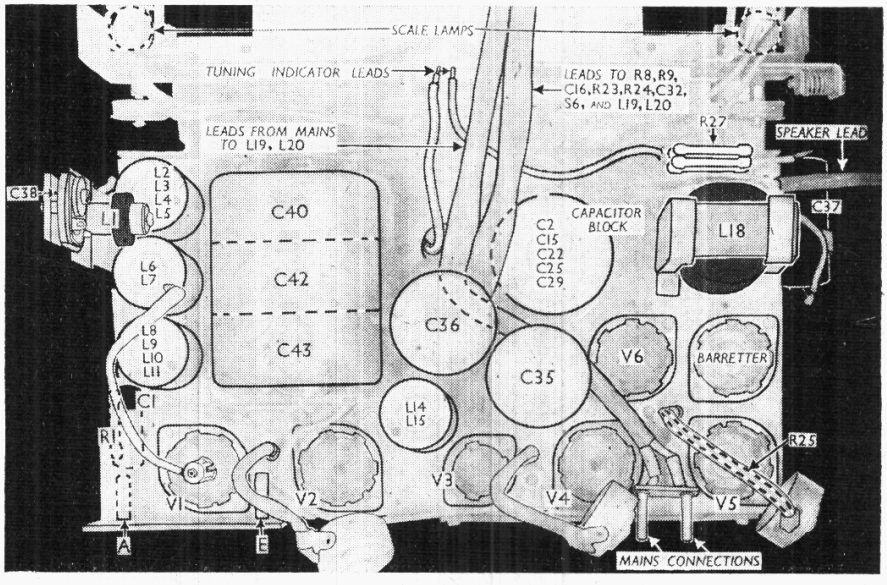
Fixed GB potentials for **V1** and **V2** are obtained from the usual cathode resistors also, but these too are partly off-set by positive potentials from the potential divider **R14, R15, R16,** applied via the two AVC lines to the respective control grid circuits. For this reason **R4** is returned to the junction of **R2, R3.**

Noise suppression by variable potentiometer **R9,** to the slider of which **R11** is returned. The signal diode can thus be biased from the potential along **R8** to a point at which all signals, including interference noise, up to a given level, are muted, giving silent tuning between strong transmissions. This system favours strong signals, as the cathode potential falls (due to falling current) as the signal strength increases. It is because **V2** cathode works at a fairly high voltage that the potential divider **R7, R8** is necessary.

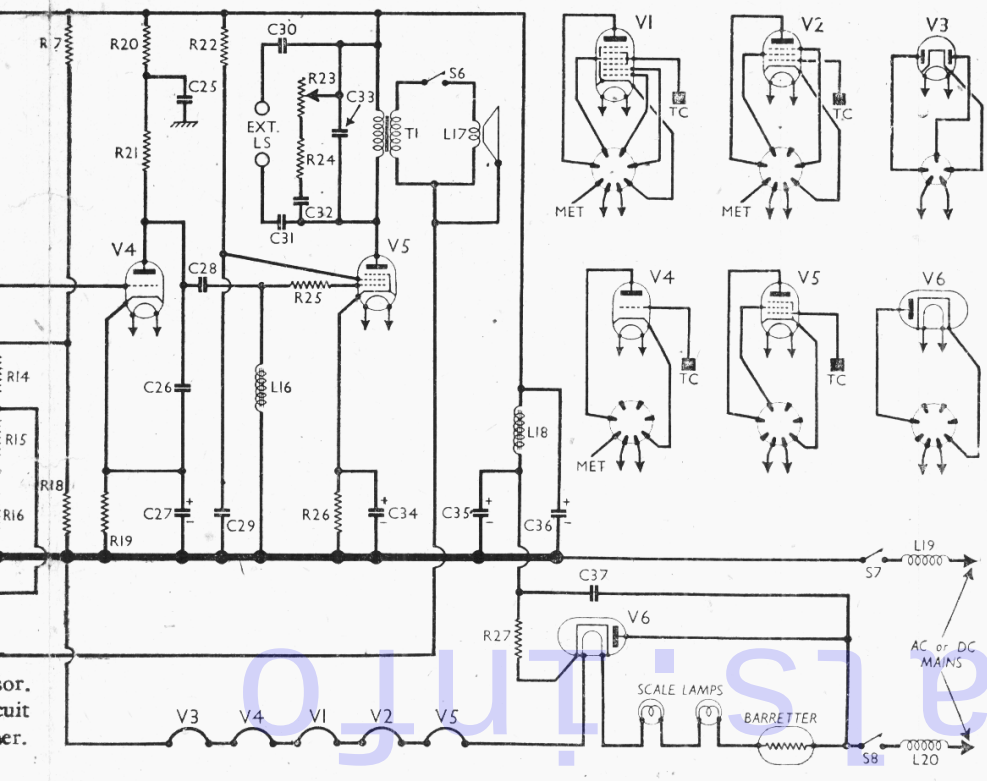
Resistance-capacitance coupling by **R21, C28** and choke **L16,** via grid stopper **R25,** between **V4** and pentode output valve **(V5, Mullard Pen 26).** Fixed tone correction by **C28, L16,** which for tone-correction purposes form a potential divider, in the control grid circuit, and variable tone control by **R23, R24, C32** and **C33** in anode circuit. Provision for connection of high impedance external speaker via isolating capacitors **C30, C31,** also in anode circuit. Switch **S6** permits the internal speaker to be muted if desired.

When the receiver is operating on AC mains, HT current is supplied by IHC half-wave rectifying valve **(V6, Mullard UR1** or **CY1),** which with DC mains behaves as a low resistance. Smoothing is effected by iron-cored choke **L18** and electrolytic capacitors **C35, C36.**

Valve heaters, together with current regulating resistance lamp **(Barretter, Philips C1)** and scale lamps, are connected in series across mains input. Mains RF filter chokes **L19, L20** suppress mains-borne interference.



Plan view of the chassis. The three bunches of leads in large-diameter sleeving (two in the centre and one on the right) go to the components at the top of the cabinet, shown overleaf. **R27** may consist of a vertical wire-wound tubular unit.



COMPONENTS AND VALUES

	CAPACITORS	Values (μF)
C1	Aerial isolator	0·001
C2§	Earth isolator	0·1
C3	Aerial capacitance swamp	0·00008
C4	Aerial top coupling ...	0·00001
C5	Band-pass coupling capacitors	0·025
C6		0·025
C7		Very low
C8	V1, V2 anodes decoupling	0·1
C9	Neutralising coupling ...	0·000002
C10	V1 cathode by-pass ...	0·05
C11	AVC line decoupling ...	0·1
C12	Osc. circ. LW tracker ...	0·00093
C13	Osc. circ. MW tracker ...	0·00181
C14	V2 CG decoupling ...	0·1
C15§	V1, V2 HT decoupling ...	0·5
C16*	V2, V3 cathodes AF by-pass	25·0
C17	IF by-pass	0·0001
C18	Coupling to AVC diode ...	0·000064
C19	High-note boost ...	0·0002
C20	AF coupling to V4 ...	0·05
C21	PU isolators	0·05
C22§		0·05
C23	Base boost	0·2
C24	V2, V3 cathodes RF by-pass	0·1
C25§	V4 anode decoupling ...	0·5
C26	IF by-pass	0·00025
C27*	V4 cathode by-pass ...	25·0
C28	V4 to V5 AF coupling ...	0·032
C29§	V5 screen decoupling ...	1·0
C30	Ext. LS isolators ...	0·2
C31		0·2
C32	Parts of tone variable control	0·05
C33		0·002
C34*	V5 cathode by-pass ...	25·0
C35*	HT smoothing capacitors	32·0
C36*		32·0
C37	V6 RF by-pass ...	0·1
C38‡	Aerial IF filter tuning ...	0·000145
C39‡	B-P pri. MW trimmer ...	0·000055
C40†	Band-pass pri. tuning ...	0·00043
C41‡	B-P sec. MW trimmer ...	0·000055
C42†	Band-pass sec. tuning ...	0·00043
C43†	Oscillator circuit tuning	0·00043
C44‡	Osc. circ. MW trimmer ...	0·000055
C45‡	Osc. circ. LW trimmer ...	0·000055
C46‡	1st IF trans. pri. tuning	0·000145
C47‡	1st IF trans. sec. tuning	0·000145
C48‡	2nd IF trans. pri. tuning	0·000145
C49‡	2nd IF trans. sec. tuning	0·000145

*Electrolytic. † Variable. ‡ Pre-set.
§ In capacitor block.

	RESISTORS	Values (ohms)
R1	Aerial circuit shunt ...	200,000
R2, R3	V1 fixed GB resistors ...	250, 160
R4	V1 osc. CG resistor ...	50,000
R5, R6	AVC line decoupling ...	500,000, 500,000
R7	V1, V2 HT feed resistor	20,000*
R8	V2 fixed GB resistor ...	5,000
R9	Noise suppressor ...	50,000
R10, R11	V3 signal diode load resistors	500,000, 320,000
R12	Manual volume control...	500,000
R13	Part tone corrector ...	1,250,000
R14, R15	Parts of V2 GB pot divider and AVC feed	10,000,000†, 2,500,000
R16	V3 AVC diode load ...	320,000
R17, R18	HT potential divider ...	400,000, 80,000
R19	V4 GB resistor	5,000
R20	V4 anode decoupling ...	20,000
R21	V4 anode load ...	50,000
R22	V5 SG HT feed	16,000
R23, R24	Parts of variable tone control	50,000, 100
R25	V5 grid stopper ...	1,000
R26	V5 GB resistor	3·0
R27	V6 surge limiter ...	200

*Made up of two 40,000 Ω resistors in parallel.
† Made up of two 5,000,000 Ω resistors in series

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial IF filter coil ...	135·0
L2, L3	Aerial coupling coils ...	30·0, 100·0
L4, L5	Band-pass primary coils	4·2, 42·0
L6, L7	Band-pass secondary coils	4·2, 42·0
L8	Osc. MW tuning coil ...	10·0
L9	Osc. LW tuning coil ...	35·0
L10, L11	Oscillator reaction coils...	4·0, 10·5
L12, L13	1st IF trans. Pri. ... Sec. ...	140·0, 140·0
L14, L15	2nd IF trans. Pri. ... Sec. ...	140·0, 140·0
L16	Tone corrector choke ...	9,450·0
L17	Speaker speech coil ...	4·5
L18	HT smoothing choke ...	300·0
L19, L20	Mains RF filter chokes ...	2·0, 2·0
T1	Speaker input trans. Pri. ... Sec. ...	300·0, 0·6
T.1.	Tuning meter winding ...	2,400·0
S1-S5	Waveband switches ...	—
S6	Int. speaker switch ...	—
S7,S8	Mains switches	—

VALVE ANALYSIS

Valve voltages and currents in the table (next col.) are those quoted in the makers' manual. They represent conditions in an average chassis when the noise suppressor control is turned fully clockwise and there is no signal input.

Voltages were measured with a high resistance meter whose negative lead was connected to cathode for **V2** readings but to chassis for the remainder.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 FC13	191 Oscillator 67	0·72 1·5	67	4·1
V2 VP13A	182	1·53	60	0·44
V3 2D13A	—	—	—	—
V4 HL13	143	0·74	—	—
V5 Pen26	167	40·0	92	5·5
V6 UR1†	—	—	—	—

† Cathode to chassis, 212V DC.

DISMANTLING THE SET

Removing Chassis.—Remove the control knobs (recessed grub screws) from the front of the cabinet;
remove the two set screws holding the noise suppressor control **R9** to its bracket at the top (rear) of the cabinet;
slacken the wood screw of the clip holding **C16** and **R8** to the side of the cabinet, releasing these components;
unsolder the four leads from the mains RF filter chokes **L19, L20,** and the earth lead;
unsolder from the speaker transformer the two leads to the outside pair of studs, further unsoldering one of these leads from **C32,** and the other from **R23,** freeing the cable from its cleat;
remove the four cheese-head bolts (with metal washers, rubber washers and distance pieces) holding the chassis to the bottom of the cabinet;
unsolder the two leads from the tuning indicator, just above the scale assembly.
When replacing, connect the two screened leads in the sleeved cable from the mains connections to the two studs on the right (one to each coil) of the **L19, L20** unit, and take their earthing lead to the bracket of the coil unit.
Fit **R9** to its bracket (left rear at top of cabinet) with tags to the left, and fit **C16, R8** (still connected to tags of **R9**) into their cleat on the side of the cabinet. Do not omit to slip the earthing tag under the head of the lower screw holding **R9**;
solder the two free leads, with large gauge yellow sleeving, emerging from the **R9** cable to the two remaining studs on the **L19, L20** unit (again one to each coil).
Connect the screened lead emerging from the speaker cable to the front stud on the speaker transformer and to **C32**;
connect the plain yellow sleeved lead to the rear stud on the transformer and the bottom tag of **R23.**
Finally, check that all metal parts are connected to the earthing wire from the transformer frame, and note that it is returned, via the cable to the mains connectors, to the earth socket, not to chassis.
Removing Speaker.—Unsolder the chassis leads from the transformer, the two leads from **S6,** and the lead to the earthing tag on the transformer, and slacken the nuts (with locknuts and washers) on the three clamps.
When replacing, the transformer should be on the **right.**

GENERAL NOTES

Switches.—S1-S5 are the waveband switches, ganged in two rotary units beneath the chassis. The individual pairs of switch tags are indicated in our underchassis view, but only one unit can be seen there; the other is obscured by it, although its tags are visible. All five switches close on MW, and open on LW.

S6 is the internal speaker muting switch, fitted at the top of the cabinet. It is closed in the anti-clockwise position of the control knob.

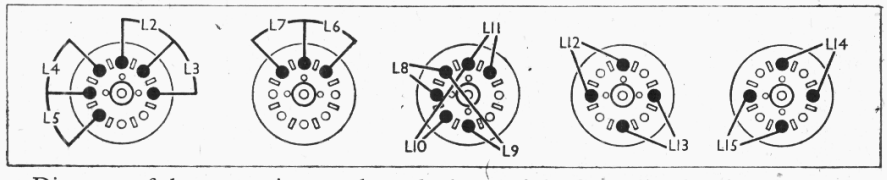
S7, S8 are the mains switches, ganged in a single rotary unit, with a QMB action, beneath the chassis. This unit and the **S1-S5** unit are operated by a link which is controlled by the main switch spindle. The switching sequence, starting from the fully anti-clockwise position of the control, is : OFF; MW; LW.

Coils.—L1 is the aerial IF filter coil, mounted with **C38** on a vertical bracket at one end of the chassis. The band-pass and oscillator coils **L2-L7** and **L8-L11** are in three screened units on the chassis deck. The two IF units **L12, L13** and **L14, L15** are in two further screened units, the latter on the chassis deck, and former below the deck.

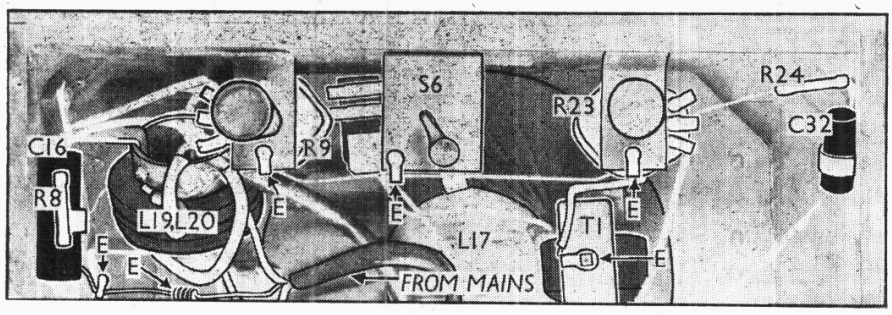
The connecting tags of all five units are beneath the chassis, and the actual connections as seen there are identified in the diagrams above in columns 2 and 3. The directions in which these are viewed are indicated by three locating holes around the central rivet.

L16 is beneath the chassis, **L18** is on the chassis deck, and **L19, L20** are on the side of the cabinet, near the top.

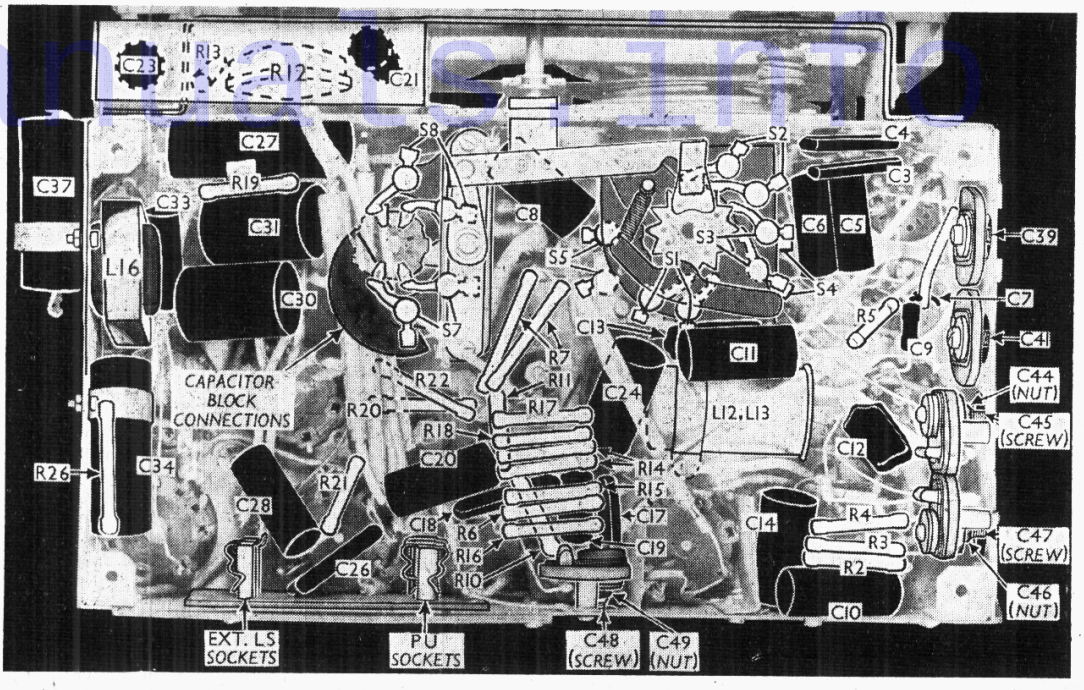
Scale Lamps.—These are two Philips lamps, with centre-contact SBC bases, type 8066, rated at 9 V, 0.2 A. Type 8070 lamps, which are rated at 10 V, 0.2 A, can also be used.



Diagrams of the connecting panels at the bases of the five coil units, drawn as seen from beneath the chassis with their internal connections indicated. In each case, three locating holes around the central rivet serve to show from what direction they are viewed.



Rear view of the top of the cabinet, showing the various components mounted there. All the tags marked E are bonded together and connected via an earthing wire in the mains input cable directly to the earth socket, not to chassis.



Under-chassis view. Where **R13, C23** are omitted, **C19** is mounted inside the screening box with **R12**. In this photograph, **C19** is almost hidden, with **R10** and **C17**, beneath the bunch of resistors in the centre foreground. The internal connections of the capacitor block are shown in the diagram in col. 5 below, drawn as seen in this view. **S4, S5** are on a second switch unit, practically hidden here by the **S1–S3** unit. All the tags are, however, identified here.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (about 5,000 Ω) external speaker. The sockets are isolated from the HT circuit by capacitors **C30, C31,** and a switch **S6** in the speech coil circuit of the internal speaker permits the latter to be muted.

Capacitor C7.—This has a very low capacitance, and consists of a piece of wire, covered with sleeving and connected to **C39,** hooked into a loop in the connecting lead of **C9.** Its value is given as 0.5 $\mu\mu$F.

Capacitors C35, C36.—These are two tubular wet electrolytics, mounted on the chassis deck. Both are rated at 32 μF, 320 V.

Resistor R25.—This is a stabilising resistor in the control grid (top cap) lead to **V5.** It consists of resistance wire wound round an insulating core inside the sleeving to the cap, and actually forms the conductor in the lead.

External Components.—V2, V3 cathode circuit components **R8, C16** and the noise suppressor control **R9;** the tone control components **R23, R24, C32;** the mains filter chokes **L19, L20;** and the internal speaker switch **S6** are all mounted on or near the top of the cabinet, external to the chassis, to which they are connected by leads indicated in our plan view of the chassis.

Their positions are shown in the photograph in cols. 2 and 3, and the various lead connections can be identified by reference to this illustration, the description under "Dismantling the Set" and the plan view illustration.

Chassis Divergencies.—In the early stages of production several modifications were made to the original design, chiefly concerned with the tone correction choke **L16.** This *Service Sheet* represents the final and most numerous type.

In some cases the choke may be included in **V4** cathode circuit, when it would be mounted on the cabinet, external to the chassis. In such cases its DC resistance is comparatively small, and it is shunted by a capacitor and resistor in series, the whole being enclosed in a metal box and connected between **V4** cathode and **R19. R13** and **C23** are then omitted, **R12** going down to chassis, and the position we show for **L16** is taken by a 640,000 Ω resistor.

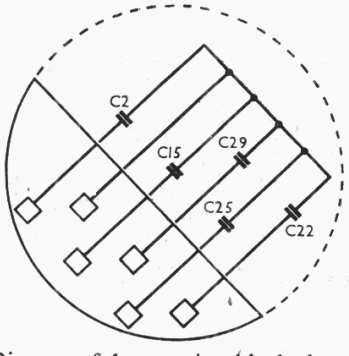


Diagram of the capacitor block, drawn as seen from beneath the chassis as indicated in the photograph above, where only the lower segment, containing the connecting tags, is visible. The broken line completing the circle represents the outline of the container on the chassis deck.

R24 and **C32** may be located inside the chassis, and **C19** may be mounted on the volume control, connected between slider and chassis, but this would be when **R13, C23** were omitted. **C37** may be mounted close to **V6** holder. **R27** may consist of four small 800 Ω resistors connected in parallel or a large wire-wound tubular unit mounted vertically in their place on the chassis deck. The value of **R23** may be 64,000 Ω or 80,000 Ω instead of 50,000 Ω.

Replacing V5.—The Pen26 originally used in this position is now obsolete, but it is superseded by the Mullard CL4, which gives a superior performance.

The base and top cap connections of the two valves are the same, and the load impedance differs only slightly, but as the grid bias is very different, **R26** must be changed from 320 Ω to 170 Ω when using a CL4. The screen voltage may be raised to 200 V, so that **R22** and **C29** may be discarded.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator via a 0.1μF capacitor to control grid (top cap) of **V1** and **E** socket, connecting an earth lead also to the socket. Turn gang to minimum, volume control to maximum, the noise suppressor fully clockwise, switch set to LW, and short-circuit **R4.** Connect a 10,000 Ω damping resistor across **L13,** feed in a 115 kc/s (2,608.7m) signal, and adjust **C46, C48** and **C49** for maximum output. Transfer damping resistor to **L12** and adjust **C47** for maximum output, then repeat the **C46, C48, C49** adjustments with damping across **L13.**

RF and Oscillator Stages.—Leave the signal generator connected as for IF stages until instructed otherwise, and leave the damping resistor across **L12** throughout the MW and LW adjustments. Remove short-circuit from **R4.**

MW.—Switch set to MW, and slacken off **C44** to minimum. Turn gang to minimum, feed in a weak 199m (1,550 kc/s) signal, and screw up **C44** slowly until two peaks are found; then adjust **C44** for maximum output on the peak involving the lesser trimmer capacitance. Feed in a weak 225m (1,330 kc/s) signal, tune it in, and check calibration; if necessary, readjust **C44,** taking care that the correct peak is still being used.

Transfer signal generator leads, via a dummy aerial, to **A** and **E** sockets, feed in a 225m signal, and adjust **C39** and **C41** for maximum output. Check calibration at 500m (600 kc/s), and if incorrect adjust pointer; then return to 225m adjustments.

LW.—Switch set to LW, tune to 900m on scale, feed in a 900m (333.3 kc/s) signal, and adjust **C45** for maximum output.

Finally, remove the damping resistor from **L12.**

IF Filter.—Switch set to LW, tune to 1,900m on scale, and short circuit **R4.** Feed in a strong 115 kc/s signal, and adjust **C38** for minimum output. Remove short-circuit.

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