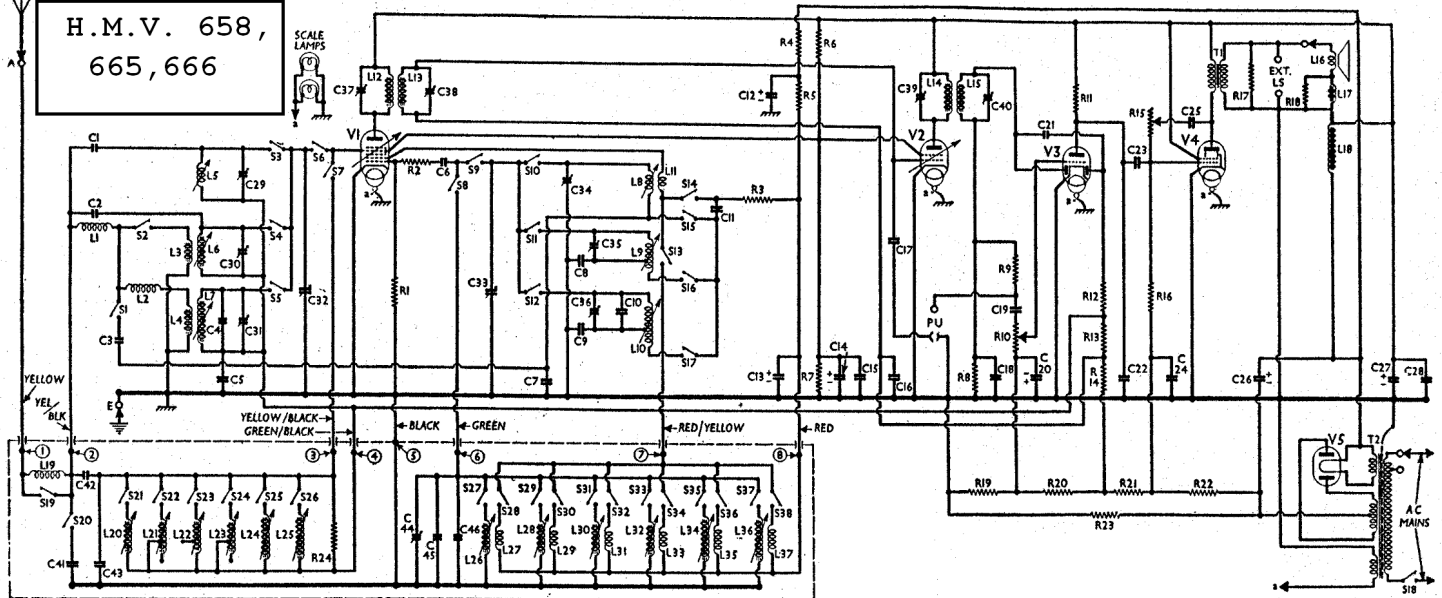


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COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	V1 osc. CG resistance	50,000
R2	V1 osc. CG stabiliser	75
R3	V1 osc. anode HT feed resistances	15,000
R4		5,000
R5		15,000
R6	V1, V2 SG's HT feed potential divider resistances	23,000
R7	V3 signal diode load	23,000
R8	IF stopper	500,000
R9	Manual volume control	230,000
R10	V3 triode anode load	2,000,000
R11		75,000
R12		1,000,000
R13	V3 AVC diode load resistances	500,000
R14		2,300,000
R15	Variable tone control	2,000,000
R16	V4 CG resistance	230,000
R17	T1 sec. artificial loading	50
R18	Hum neut. coil shunt	1.2
R19		100,000
R20	Automatic bias potential divider for V1, V2 fixed	100,000
R21	GB; V3 triode, V4 GB;	1,000,000
R22	AVC delay	100,000
R23		270
R24	V1 tetrode CG on auto.	2,300,000

VALVE ANALYSIS

Valve voltages and currents in the table overleaf are those measured in our receiver when it was operating on mains of 230 V, using the 224-255 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium 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 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X63	243	1.5	75	2.5
	178	4.0		
V2 KTW63	243	5.2	75	1.0
V3 DH63	105	1.3	—	—
V4 KT63	231	35.0	243	6.0
V5 U50	335†	—	—	—

† Each anode, AC.

GENERAL NOTES

Switches.—S1-S17 are the waveband and auto/manual change switches, in three rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 6, where they are drawn as seen looking from the rear of the underside of the chassis. The table (col. 5), gives the switch positions for the four control settings, starting from fully anti-clockwise.

S18 is the QMB mains switch, ganged with the volume control R10.

S19, S20 are on a small unit fixed to the auto tuning unit, and shown in our underneath view of this unit. When any of the MW buttons is depressed, S19 remains closed, and S20 open. If either of the LW buttons is depressed, S20 closes, and S19 opens.

S21-S38 are the auto selector switches, operated by the six press-buttons, each button controlling three of the switches. They are all indicated in our view of the top of the auto unit. All the switches controlled by each button are open when the button is out, and closed when it is depressed.

Coils.—L1; L2; L3, L6; L4, L7; L5; L8, L11; L9; and L10 are in eight unscreened units beneath the main chassis. L3, L6 and L4, L7 are iron-cored, the cores of L6 and L7 being adjustable. The inductances of L5 and L8 are adjustable by wire loops inside the coil formers. L9 and L10 are also adjustable in inductance by metal "spade" trimmers.

L12, L13 and L14, L15 are the IF transformers, in two screened units on the chassis deck.

L19 is the image rejector coil, mounted on the S19, S20 unit, and shown in the top view of the auto-unit.

L20 to L37 are the auto tuning coils, shown in our underneath view of the auto unit. Note that L21-L23 are tapped for alternative ranges. Each of these coils is provided with a screw core adjustment.

Scale Lamps.—These are two Osram MES types, rated at 6.5 V, 0.3 A, and fitted with tubular bulbs.

MODELS 869, 870, 665 AND 666 MODIFICATIONS

The radiogram models employ a similar circuit, but with the following modifications. A radio-gram switch is fitted, which really consists of three single pole shorting switches. One section of the switch is fitted between the screens of V1 and V2 and the junction of R6, R7, and this switch closes on radio and opens on gram, thus muting radio. C17 and the split pick-up socket are therefore not used.

The top of R10 is disconnected from C19 and another section of the switch inserted between them, while the top of R10 also goes to the third section of the switch, the other side of which goes, via a 0.005 μ F condenser, to one of the pick-up sockets. On radio, C19 and R10 are joined, as in our diagram, while on gram C19 is disconnected, and the pick-up, via the extra condenser, is connected to the top of R10.

An extra 50 μ F condenser is connected from the slider of R10 to the bottom of C19. (This also applies to the console model 868).

There are three pick-up sockets altogether, that mentioned above, and two which go to chassis. One of these is for earthing the pick-up casing. Across the pick-up are connected a 0.001 μ F condenser and also a circuit consisting of a 0.01 μ F condenser and a 100,000 Ω resistance in series.

The pick-up is provided with a matching transformer (primary, 0.1 Ω , secondary 620 Ω) and its DC resistance is 6.0 Ω .

An induction motor working on the hysteresis principle is fitted. The speaker is different from that of the table model, and has a speech coil resistance of 4.0 Ω .

CONDENSERS		Values (μ F)
C1	Aerial circuit SW coupling	0.000015
C2	Image rejector condensers	0.0000023
C3		0.00005
C4	Aerial LW fixed trimmer	0.00005
C5	V1 tetrode CG decoupling	0.005
C6	V1 osc. CG condenser	0.00005
C7	Osc. circuit SW tracker	0.005
C8	Osc. circuit MW tracker	0.00055
C9	Osc. circuit LW tracker	0.0003
C10	Osc. circuit LW fixed trimmer	0.000175
C11	V1 osc. anode coupling	0.005
C12*	V1 osc. anode decoupling condensers	4.0
C13*		4.0
C14*	V1, V2 SG's decoupling	4.0
C15	V1, V2 SG's RF by-pass	0.05
C16	V2 CG decoupling	0.05
C17	Radio muting condenser	0.0001
C18	IF by-pass	0.0001
C19	AF coupling to V3 triode	0.001
C20*	V3 triode CG decoupling	50.0
C21	Coupling to V3 AVC diode	0.000075
C22	IF by-pass	0.00035
C23	V3 triode to V4 AF coupling	0.023
C24	V4 CG decoupling	0.23
C25	Part of variable tone control	0.001
C26*	HT smoothing condensers	16.0
C27*		8.0
C28	HT circuit RF by-pass	0.1
C29†	Aerial circuit SW trimmer	—
C30†	Aerial circuit MW trimmer	—
C31†	Aerial circuit LW trimmer	—
C32†	Aerial circuit tuning	—
C33†	Oscillator circuit tuning	—
C34†	Osc. circuit SW trimmer	—
C35†	Osc. circuit MW trimmer	—
C36†	Osc. circuit LW trimmer	—
C37†	1st IF trans. pri. tuning	—
C38†	1st IF trans. sec. tuning	—
C39†	2nd IF trans. pri. tuning	—
C40†	2nd IF trans. sec. tuning	—
C41	Aerial auto tuning MW image rejector	0.0001
C42	Aerial series (auto)	0.00001
C43	Aerial auto tuning fixed trimmer	0.00014
C44†	Osc. circuit auto trimmer	—
C45	Osc. circuit auto tuning fixed trimmers	0.00005
C46		0.000015

* Electrolytic.

† Variable.

‡ Pre-set.

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CIRCUIT ALIGNMENT

IF Stages.—Switch set to LW, turn gang to maximum, volume control to maximum and tone control fully anti-clockwise. Connect signal generator via a $0.1 \mu\text{F}$ condenser to fixed vane tag of **C32** and chassis, leaving top cap connection of **V1** in place. Feed in a 465 KC/S signal, and adjust **C37**, **C38**, **C39** and **C40** in that order for maximum output. Check these adjustments.

RF and Oscillator Stages.—With gang at maximum, pointer must coincide exactly with the small mark at the bottom right-hand corner of the scale.

Turn volume control to maximum, and tone control fully anti-clockwise, and connect signal generator to **A** and **E** sockets.

MW.—Switch set to MW, and tune to 225 m on scale (yellow spot). Feed in 225 m (1,333 KC/S) signal and adjust **C35** for maximum output. Tune to 530 m on scale (yellow spot) and feed in a 530 m (566 KC/S) signal. Adjust inductance ("spade" trimmer) of **L9** (screw on paxolin coil mounting strip) for maximum output. Repeat these operations until no further improvement results. Return to 225 m, and adjust **C30** for maximum output.

Return to 530 m, and rotate upper core of **L8** for maximum output. This is reached through a hole in the chassis deck by means of a special tool (EMI Service, Part No. 20730A) which consists of a pointed rod of insulating material with a rubber bush. It should be inserted through the hole in the chassis, the point located in the hole in the paxolin coil mounting strip, and the rubber bush bearing on the core. The core may now be rotated by turning the tool.

Repeat the adjustments of **C30** and **L8**.

LW.—Switch set to LW, tune to 1,100 m on scale (white spot), and feed in a 1,100 m (272.7 KC/S) signal. Adjust **C36** for maximum output. Tune to 1,900 m on scale (white spot), feed in a 1,900 m (158 KC/S) signal, and adjust inductance ("spade" trimmer) of **L10** (screw on paxolin coil mounting strip) for maximum output. Repeat these adjustments.

TABLE AND DIAGRAMS OF THE SWITCH UNITS

Switch	SW	MW	LW	Auto
S1	—	—	C	—
S2	—	C	—	—
S3	C	—	—	C
S4	—	C	—	—
S5	—	—	C	—
S6	C	C	C	—
S7	—	—	—	C
S8	—	—	—	C
S9	C	C	C	—
S10	C	—	—	C
S11	—	C	—	—
S12	—	—	C	—
S13	—	—	—	C
S14	C	C	C	—
S15	C	—	—	C
S16	—	C	—	—
S17	—	—	C	—

Return to 1,100 m and adjust **C31** for maximum output. Return to 1,900 m and adjust hexagonal-headed screw core of **L7** (through hole in chassis deck) for maximum output. Re-adjust **C31** at 1,100 m, then tune to 1,400 m on scale, feed in a 1,400 m (214 KC/S) signal, and re-adjust **C31** if necessary.

SW.—Switch set to SW, tune to 16.5 m on scale, feed in a 16.5 m (18.2 MC/S) signal, and adjust **C34** (by slackening locknut and sliding plunger) and **C29** for maximum output.

Then tune to 50 m on scale, feed in a 50 m (6 MC/S) signal and adjust loop of **L8** (inside its coil former) for maximum output. This can be reached through a hole in the shield. A strip of insulating material with a slot in it should be used to move the wire up or down. Then adjust loop of **L5** (through hole in chassis deck) for maximum output in the same way. Repeat the 16.5 m and 50 m adjustments until no further improvement results.

Do not alter the position of the pointer, after ganging, or rock the gang, while aligning.

PRESS-BUTTON ADJUSTMENT

To change a station, turn the receiver on to its left side, and remove the card panel from the aperture in the underside of the cabinet. Tune the desired station manually and note the programme. Switch to Auto, and adjust the screw of the oscillator coil associated with the button it is desired to change, until the same programme is heard.

Next adjust the screw of the corresponding aerial coil. If the tuning is very flat, use a 2 ft. length of wire in place of the normal aerial.

Screwing in the coil adjustments increases the wavelength, and vice versa.

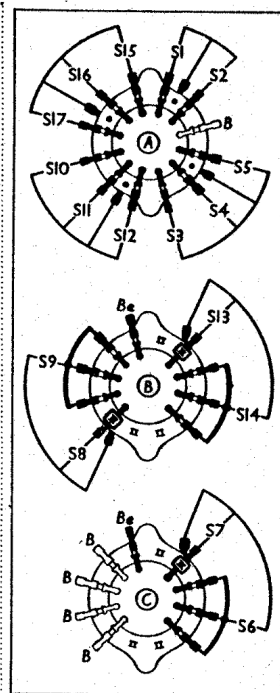
Finally, replace the card cover, and stick the new station name over the previous one.

The tables in the next column give the wavelength ranges of the various buttons.

AERIAL COIL		
Button	Range (metres)	Colour Spot
1	195-262	Yellow
2	258-345 (300-395)	Green
3	300-395 (258-345)	Green
4	366-475 (400-580)	White
5	1,200-1,500	Blue
6	1,442-1,700	Slate

OSCILLATOR COIL		
Button	Range (metres)	Colour Spot
1	195-262	Yell./Wh.
2	258-395	Green/Wh.
3	258-395	Green/Wh.
4	366-580	Brown/Wh.
5	1,200-2,000	Blue/Wh.
6	1,200-2,000	Blue/Wh.

Diagrams of the rotary switch units, as seen from the rear of the under-side of the chassis.



It will be noted that two ranges for the aerial coils of buttons 2, 3 and 4 are given. Reference to the circuit diagram will show that these coils (**L21**, **L22** and **L23**) are tapped, and normally part of **L21**, the whole of **L22** and part of **L23** are used. By using the whole of **L21** part of **L22** and the whole of **L23**, the ranges in brackets are obtainable on these three buttons.

To alter the coils, remove the existing lead from the appropriate looped wire tag nearest the press-button side of the auto unit, and in its place solder the lead which will be found secured to the coil former by a piece of white tape or a rubber band.

The discarded lead should then be taped to the coil former.

The entire MW band (195-580 m) and the LW band from 1,200-1,700 m can be covered with the coils fitted. A special aerial coil (Part No. 28728 L) covering the ranges of 1,648-1,895 m (tapping) and 1,744-2,050 m (whole coil) can be supplied by E.M.I. Service Ltd. The standard LW oscillator coil already covers this range. To fit the coil, unsolder the existing coil leads from their tags, grasp the coil former firmly and twist anti-clockwise, when the whole coil can be withdrawn. Reverse the operations to fit the new coil, ensuring that the paper washer is in place. The connections are: Inner end of coil to the straight wire tag; outer end, or tapping, to the looped wire tag. Note that buttons 5 and 6 must be retained for the LW coils, since they are the only ones which operate **S19**, **S20**.

If the correct wave ranges are not obtainable, or if the **C44** setting has been accidentally altered, it may be re-set as follows.

Connect a signal generator to **A** and **E** sockets, and an output meter, and fully unscrew the inductance trimmer of **L26**. Feed in a 180 m (1,667 KC/S) signal, switch set to Auto, and press button 1. Adjust **C44** by loosening locking nut and sliding the plunger until maximum output is obtained. Lock the adjustment.

Now re-set **L26** to the required station in the usual way, and also check the settings of all the other auto coils.