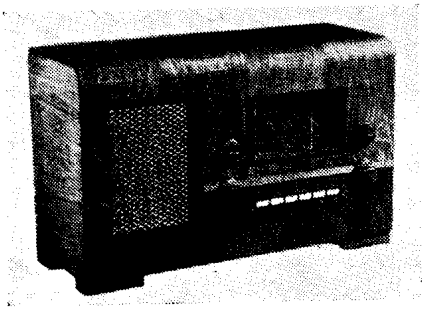
"TRADER" SERVICE SHEET

736

REVISED ISSUE OF SERVICE SHEET No. 384

MARCONIPHONE 855, 868, 869, 870 and HMV 658, 665, 666



The Marconiphone 855 superhet.

PRESS-BUTTON tuning of the permeability type is included in the Marconiphone 855 and caters for six stations. The receiver is a 4-valve (plus rectifier) AC 3-band superhet suitable for mains of 195-255 V, 50-100 c/s. The SW range is 16.5-50m.

An identical chassis is fitted in the HMV 658 table model receiver, and the Marconiphone 868 console, while the chassis of the Marconiphone 869 and HMV 665 radiograms and Marconiphone 870 and HMV 666 radiograms with record changers are very similar, the differences being explained under "Radiogram Modifications." This *Service Sheet* was prepared on an 855.

Release dates and original prices: 855 *and* 658, *August*, 1938, £14 3*s*. 6*d*.; 868, *September*, 1938, £18 7*s*. 6*d*.; 869, 665, *September*, 1938, £29 8*s*. (869 *reduced to* £25 4*s*., *July*, 1939); 870, *October*, 1938, £35 14*s*., *reduced to* £31 10*s*. *July*, 1939; 666, *September*, 1938, £35 14*s*.

CIRCUIT DESCRIPTION

The automatic tuning circuits in this receiver operate quite independently of the manual tuning circuits. A fourth position on the waveband switch effects the change-over from manual to auto tuning and when the switch control is turned from the auto position, any depressed button is automatically released.

Aerial input for manual operation is via switch **S19,** which is closed, and then via coupling capacitor **C1** (SW), **L1** and **L3** (MW) or **L1, L2** and **L4** (LW) to single tuned circuits **L5, C32** (SW), **L6, C32** (MW) or **L7, C32** (LW), which precede first valve **(V1, Marconi X63).** Capacitors **C2** and **C3,** and coils **L1** and **L2** provide IF and image rejection.

For automatic operation, when **S6** opens and **S7** closes, aerial input is via **S19** (MW) or **L19** (LW) and **C42** to one of the pre-set iron-cored tuning coils **L20** to **L25** via selector switches **S21** to **S26** according to which button is depressed. **C43** is a fixed tuning capacitor and **R24** prevents **V1** tetrode CG from becoming free. **L19** and **C41** form an image rejector when a LW button is depressed.

Manual oscillator tuning coils **L8** (SW), **L9** (MW) and **L10** (LW) are tuned by **C33;** parallel trimming by **C34** (SW), **C35** (MW) and **C36** (LW); series tracking by **C7** (SW), **C8** (MW) and **C9** (LW). Inductive reaction coupling from anode, via **C11,** by **L11** (SW) and by the lower sections of the tapped tuning coils **L9, L10** on MW and LW. Capacitative reaction coupling is obtained from the common impedance of trackers **C7, C8, C9** on SW, MW and LW respectively.

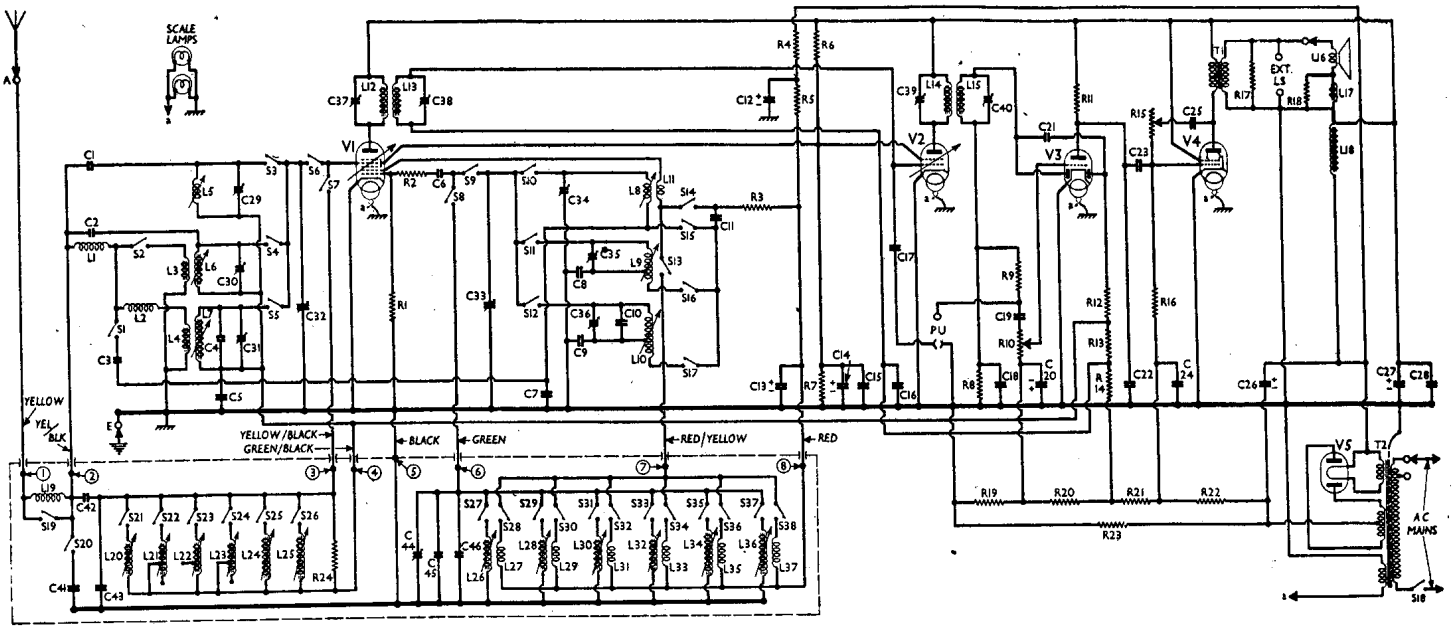
For automatic tuning in the oscillator circuit **S9** opens and **S8** closes so that any one of the evenly numbered coils **L26** to **L36** may be connected between **V1** oscillator control grid and chassis via the odd numbered switches **S27** to **S37** according to which button is pressed. These coils have pre-set iron-core adjustments and are tuned by capacitors **C44, C45** and **C46. S13** is now closed, and **S14** open, so that the reaction coils which bear odd numbers in the diagram **L27** to **L37,** are connected between **V1** oscillator anode and **R5, C13** via **L11, S13** and one of the evenly numbered switches **S28** to **S38.**

Second valve **(V2, Marconi KTW63)** is a variable-mu tetrode operating as intermediate frequency amplifier with tuned-primary tuned-secondary iron-cored transformer couplings **C37, L12, L13, C38** and **C39, L14, L15, C40.**

Intermediate frequency 465 kc/s.

Diode second detector is part of double diode triode valve **(V3, Marconi DH63).** Audio frequency component in rectified output is developed across load resistor **R8** and passed via IF stopper **R9,** AF coupling capacitor **C19** and manual volume control **R10** to CG of triode section, which operates as AF amplifier. Provision for connection of gramophone pick-up between **R9** and chassis, radio being muted by **C17** between **V2** CG and chassis via the split pick-up socket.

Second diode of **V3,** fed from **L15** via **C21,** provides DC potentials which are developed across load resistors **R12, R13, R14** and fed back through decoupling cir-



cuits as GB to FC and IF valves, giving automatic volume control.

Resistance-capacitance coupling by **R11, C23** and **R16** between **V3** triode and beam tetrode output valve **(V4, Marconi KT63).** Variable tone control by **R15** and **C25.**

Voltage for bias potentials is developed across **R23** in HT negative lead to chassis, the individual potentials being obtained at junctions of resistors **R19, R20, R21, R22,** which form a potential divider across **R23,** to provide fixed GB for **V1** and **V2,** AVC delay voltage, **V3** triode and **V4** GB.

HT current is supplied by full-wave rectifying valve **(V5, Marconi U50).** Smoothing by speaker field **L18** and dry electrolytic capacitors **C26, C27.**

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (four round-head wood screws) gives access to some of the components beneath the chassis.

Removing Chassis.—Remove the tuning knob (recessed screw) and the three remaining knobs (recessed self-tapping screws); remove the four bolts (with claw washers and spring washers) holding chassis to cabinet. If the speaker leads are now freed from the cleat, the chassis may be withdrawn to a sufficient extent for most purposes.

To free the chassis entirely from the speaker, unsolder the speaker leads.

Before access can be gained to those components beneath the chassis which are grouped round **V1** it is necessary to remove the screen (three self-tapping screws), while before access can be gained to the components in the front centre of the under-side of the chassis, the press-button unit must be removed.

To do this, remove the bracket holding the unit to the rear member of the chassis (two self-tapping screws) and the four self-tapping screws holding the two brackets to the front member of the chassis.

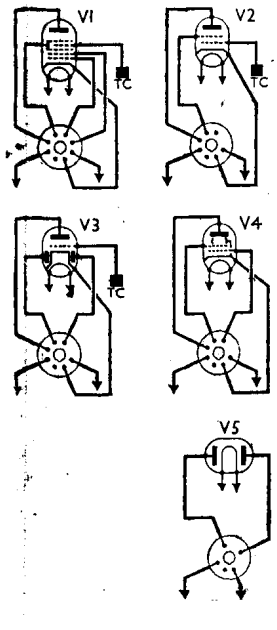
To free the press-button unit entirely, unsolder the connecting leads to the main chassis.

When replacing, the connections between the press-button unit and the chassis can be seen in our under-chassis, press-button unit and circuit illustrations.

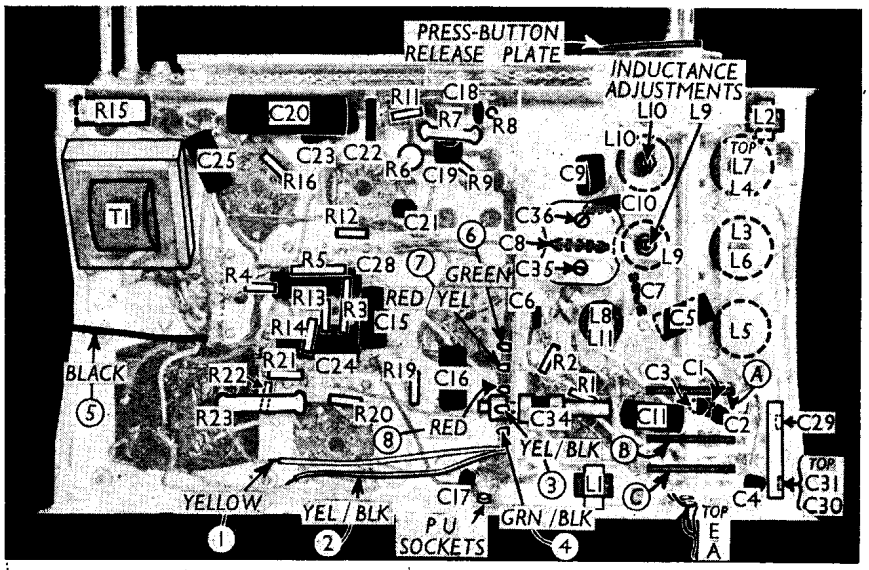
The speaker leads should be connected as follows, using the numbers marked on the connecting panel; 3, black; 6, red; 7, red/black; 8, yellow.

Removing Speaker.—Unsolder the leads and remove the four bolts (with washers) holding it to the sub-baffle.

When replacing, tags 1 to 4 should be on the right, and the leads should be connected as follows: 2, yellow to external speaker panel; 3, black to chassis and black to external speaker panel; 5, red; 7, red/black; 8, yellow and yellow/black.



Circuit diagram of the Marconiphone 855 and HMV 658 table press-button superhets. It also applies to the Marconiphone 868 console, while the differences in the radiograms are explained in col. 4 overleaf. The lead colours between the chassis and the press-button unit are shown here and in the chassis illustrations, and the connections are numbered.



Under-chassis view, with press-button unit removed. All the connecting points for it are shown. The waveband switch units indicated by **A, B, C,** are shown in detail in diagrams in col. 2 overleaf.

VALVE ANALYSIS

Valve voltages and currents in the table below 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
	Oscillator			
	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.

COMPONENTS AND VALUES

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

	CAPACITORS	Values (μF)
C1	Aerial circuit SW coupling	0·000015
C2	Image rejector capacitors	0·0000023
C3		0·00005
C4	Aerial LW fixed trimmer...	0·00005
C5	V1 tetrode CG decoupling	0·05
C6	V1 osc. CG capacitor ...	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. LW fixed trimmer ...	0·000175
C11	V1 osc. anode coupling ...	0·005
C12*	V1 osc. anode decoupling capacitors	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 capacitor	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 to V4 AF coupling ...	0·023
C24	V4 CG decoupling ...	0·23
C25	Part variable tone control	0·001
C26*	HT smoothing capacitors	16·0
C27*		8·0
C28	HT circuit RF by-pass ...	0·1
C29‡	Aerial circ. SW trimmer...	—
C30‡	Aerial circ. MW trimmer...	—
C31‡	Aerial circ. L.W. trimmer	—
C32†	Aerial circuit tuning ...	—
C33†	Oscillator circuit tuning...	—
C34‡	Osc. circ. SW trimmer ...	—
C35‡	Osc. circ. MW trimmer ...	—
C36‡	Osc. circ. 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

* Electrolyte. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Parts of IF and image rejector circuit	9·5
L2		33·0
L3	Aerial MW coupling coil ...	0·4
L4	Aerial LW coupling coil ...	1·6
L5	Aerial SW tuning coil ...	0·1
L6	Aerial MW tuning coil ...	2·0
L7	Aerial LW tuning coil ...	9·0
L8	Osc. circuit SW tuning coil	0·1
L9	Osc. circuit MW coil, total	2·8

(*Continued overleaf*)

	OTHER COMPONENTS (continued)	Approx. Values (ohms)
L10	Osc. circuit LW coil, total	3·6
L11	Oscillator SW reaction ...	1·2
L12	1st IF trans. Pri. ...	4·5
L13	1st IF trans. Sec. ...	4·5
L14	2nd IF trans. Pri. ...	4·5
L15	2nd IF trans. Sec. ...	4·5
L16	Speaker speech coil ...	4·0
L17	Hum neutralising coil ...	0·7
L18	Speaker field coil	1,660·0
L19	Auto LW image rejector ...	78·0
L20		0·8
L21	Aerial circuit MW automatic tuning coils, totals ...	1·4
L22		1·4
L23		2·3
L24	Aerial circuit LW automatic tuning coils ...	11·5
L25		14·0
L26		1·5
L27		1·25
L28		1·9
L29	Oscillator circuit MW automatic tuning and reaction coils	1·3
L30		1·9
L31		1·3
L32		2·6
L33		1·6
L34		4·5
L35	Oscillator circuit LW automatic tuning and reaction coils	2·5
L36		4·5
L37		2·5
T1	Output trans. Pri. ...	280·0
	Output trans. Sec. ...	0·5
T2	Mains trans. Pri., total ...	30·0
	Mains trans. Heater, sec. ...	0·1
	Mains trans. Rect. heat. sec.	0·1
	Mains trans. HT sec., total ...	690·0
S1-S17	Waveband and auto/manual change switches... ...	—
S18	Mains switch, ganged R10	—
S19, 20	Automatic circuit image rejector switches	—
S21-26	Aerial auto. selector switches	—
S27-38	Oscillator automatic selector switches	—

GENERAL NOTES

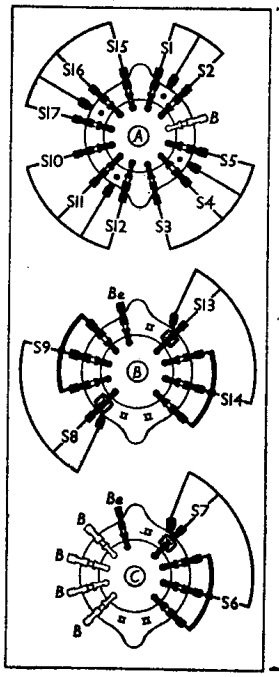
Switches.—S1-S17 are the waveband and auto/manual change switches, in three rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 2, where they are drawn as seen from the rear of the underside of the chassis. The table (col. 2), gives 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

Switch Diagrams and Table



Diagrams of the waveband switch units, as seen when viewed from the rear of the underside of the chassis. ***Be*** indicates tags used only as bearers, and ***B*** indicates blank tags.

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	—

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 to **L5** and **L8** are adjustable by wire loops inside the coil formers. **L9** and **L10** are also adjustable in inductance by metal "spade" trimmers.

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.

External Speaker.—Two sockets are provided on a panel at the rear of the cabinet for a low impedance (5 Ω) external speaker. The internal speaker can be muted by a plug and socket device, and **R17** is a safety load resistor connected behind the Ext. LS panel.

Pick-up.—Sockets are provided for this, a high resistance type being recommended. It should have a 7,500 Ω resistor wired in parallel with it.

Note that the lower pick-up socket is split, and when the plug is inserted **C17** is connected to chassis, and so mutes radio. To revert to radio reception, *both* pick-up plugs should be removed.

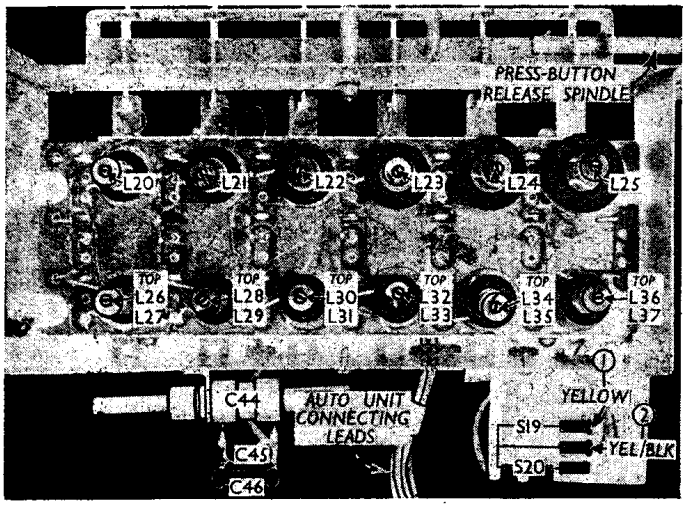
Capacitor Block.—This is in a rectangular metal case, on the chassis deck, with the connecting leads emerging beneath the chassis. It includes the dry electrolytic capacitors **C12, C13, C14, C26** and **C27.** The coding of the leads is : Brown, negative of **C26** (16 μF); red, positive of **C26;** black, negative of all the other capacitors; yellow, positive of **C27** (8 μF); blue, positive of **C14** (4 μF); green lead to junction of **R4, R5,** positive of **C12** (4 μF); green lead to junction of **R3, R5,** positive of **C13** (4 μF). The unit is a Dubilier 3231.

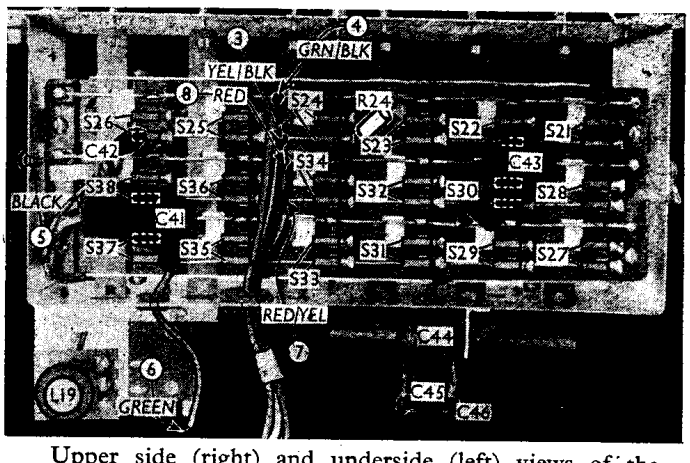
Capacitors C34, C44.—These are two special air dielectric tubular trimmers, adjusted by sliding plungers, which can be fixed in position by locknuts.

Auto Unit Connections.—Eight leads connect the auto unit to the main chassis, and these are indicated by numbers in circles and arrows in the circuit diagram and other illustrations, the lead colours also being indicated.

RADIOGRAM MODIFICATIONS

The radiogram models employ a similar circuit, but with the following





Upper side (right) and underside (left) views of the press-button unit when removed from the chassis.

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 sockets 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 μF capacitor, 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 capacitor, is connected to the top of **R10.**

An extra 50 $\mu\mu$F capacitor 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 μF capacitor and also a circuit consisting of a 0.01 μF capacitor and a 100,000 Ω resistor 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.

CIRCUIT ALIGNMENT

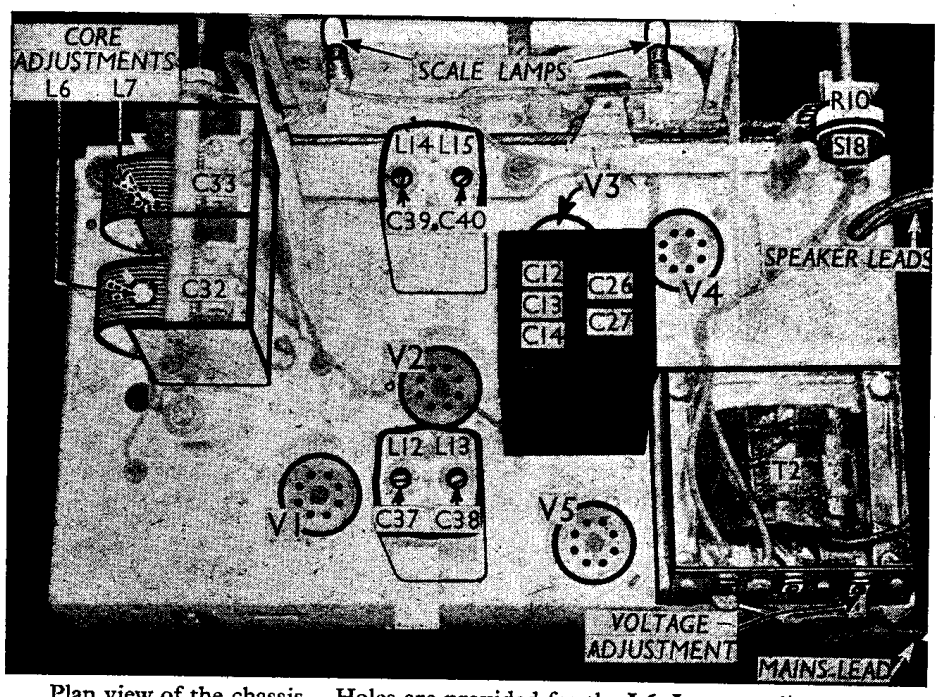
IF Stages.—Switch set to LW, turn gang to maximum, volume control to maximum and tone control fully anti-clockwise. Connect signal generator via a 0.1 μF capacitor to fixed vane tag of **C32** and chassis, leaving top cap connection of **V1** in place. Feed in a 465 kc/s (645.16 m) signal, and adjust **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 **L6** 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 mounting strip, and the rubber bush bearing on the core. The core may now be rotated by turning the tool.



Plan view of the chassis. Holes are provided for the **L6, L7** core adjustments.

Repeat the adjustments of **C30** and **L6.**

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.

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 2ft. 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 (next col.) give the wavelength ranges of the various buttons.

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 EMI 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.**

AERIAL COIL

Button	Range (metres)	Colour Spot
1	195-162	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.

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.

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