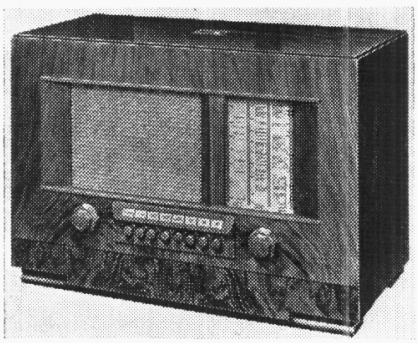
Supplement to The Wireless & Electrical Trader, June 22, 1940

"TRADER" SERVICE SHEET

472

H.M.V. 1351

MARCONIPHONE 893



The HMV model 1351. The Marconiphone 893 is electrically identical.

THE HMV 1351 receiver is a 4-valve (plus valve rectifier) table 3-band superhet receiver, for use on AC/DC mains of 200-255 V. There are five press-buttons for two LW and three MW pre-set stations, and three more for manual waveband selection. The SW range is 16-52 m.

The Marconiphone 893 is electrically identical.

Release date: April, 1940 (both models).

CIRCUIT DESCRIPTION

The switch numbering follows our usual practice, in which the switches associated with the press-button unit are numbered off in groups and each switch has a lettered suffix to indicate its action. The suffix **a** or **b** indicates that its switch *closes* when the control button is pressed, while an **x** indicates that its switch *opens*. When the button is released by the depression of another button, the position is reversed.

In this particular receiver, all the press-button switches are in groups of three. Two groups are controlled by each press-button, one in the aerial circuit and one in the oscillator circuit.

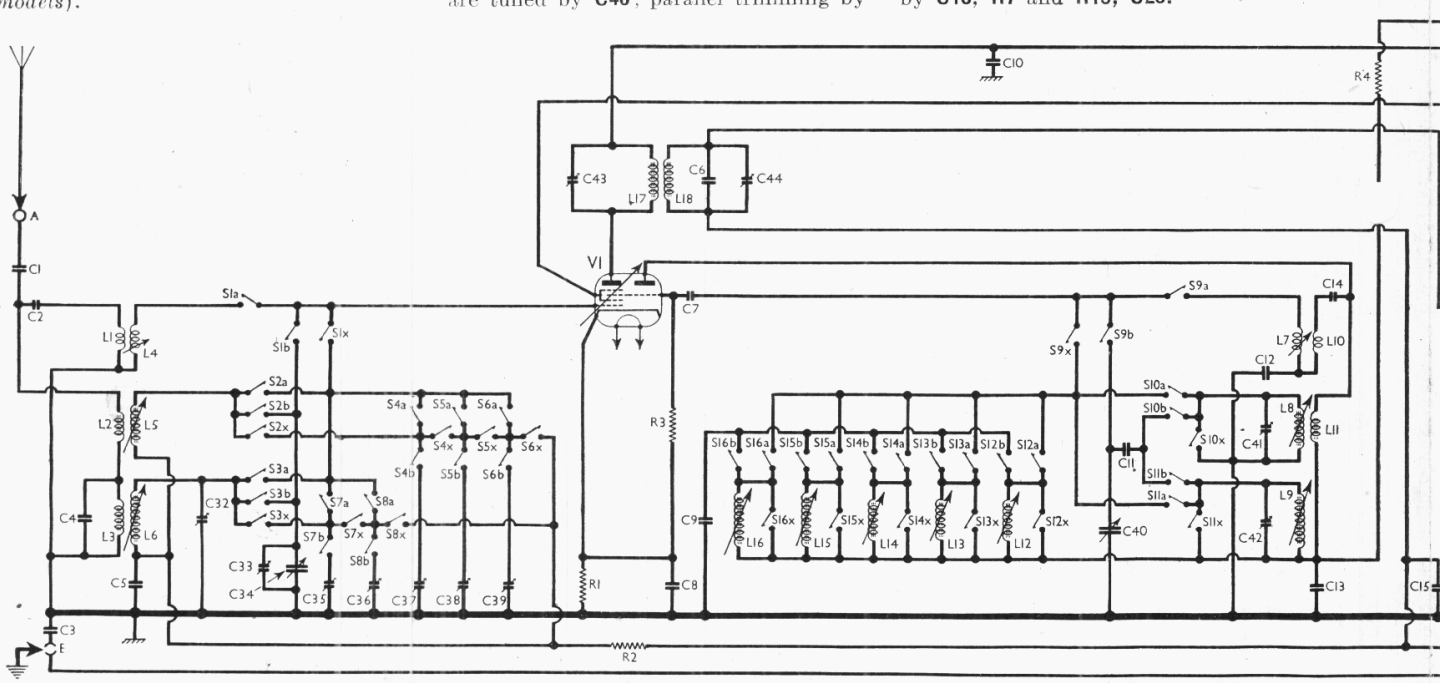
Aerial input is via isolating condenser **C1** and high impedance coupling coils **L1** (via **C2**, SW), **L2** (MW) and **L3** (LW) to single tuned circuits comprising coils **L4** (SW), **L5** (MW) and **L6** (LW) tuned manually by **C34** or automatically (MW and LW only) by pre-set condensers **C35** to **C39**, according to which button is pressed.

First valve **(V1, Marconi X65)** is a triode hexode operating as frequency changer with internal coupling. For manual operation, triode oscillator grid coils **L7** (SW), **L8** (MW), and **L9** (LW) are tuned by **C40**; parallel trimming by **C41** (MW), and **C42** (LW); series tracking by **C12** (SW), **C11** (MW and LW), and **C13** (LW). Tracking adjustments are carried out by adjustment of a loop at the end of **L7** (SW), and the iron cores of **L8, L9** (MW and LW). Reaction coupling by **L10** via **C14** (SW), **L11** (MW) and common impedance of **C13** (LW).

For automatic operation, one of the coils **L12** to **L16** is connected in the triode grid circuit, and returned to chassis via **C13** to establish reaction coupling. Fixed tuning capacity is provided by **C9,** and movable iron coil cores provide the tuning adjustment.

Second valve (**V2, Marconi KTW61**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary iron cored transformer couplings **C43, L17, L18, C6, C44** and **C45, L19, L20, C46.**

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 resistance **R9** and passed via AF coupling condenser **C19** and manual volume control **R8** to CG of triode section, which operates as AF amplifier. IF filtering by **C18, R7** and **R13, C23.**



Circuit diagram of the HMV 1351 and Marconiphone 893. The press-button system uses pre-set condensers in the aerial ci permeability tuned coils in the oscillator circuit. Note the earthing and voltage adjustment arrangements. A split socket can b by an unconnected plug to cut out **R24.** A diagram of the base of the ballast resistance is inset on the right.

Second diode of **V3**, fed from **V2** anode via **C20**, provides DC potential which is developed across load resistances **R14, R15.** That at their junction is then fed back through decoupling circuits as GB to FC (except on SW) and IF valves, giving automatic volume control. Delay voltage, together with GB for triode section, is obtained from drop along **R10** in cathode lead to chassis.

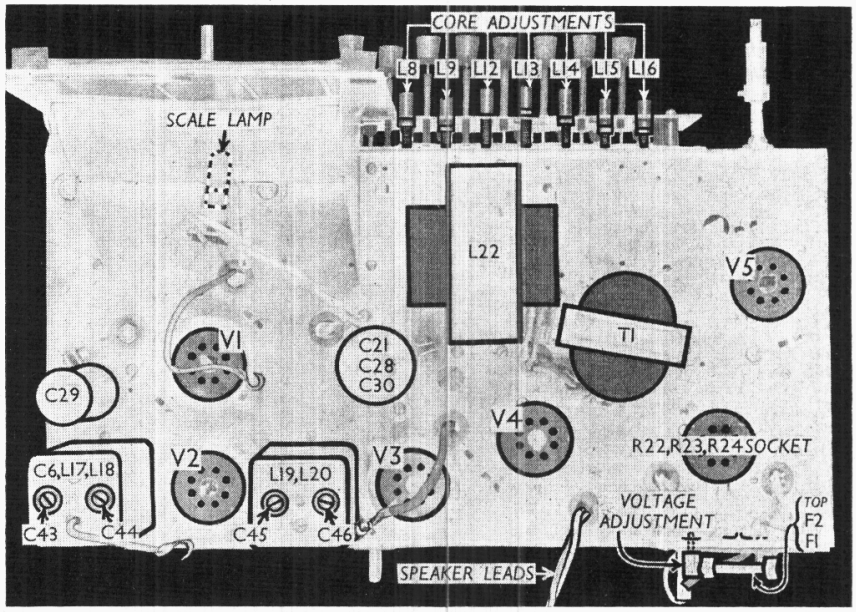
Resistance-capacity coupling by **R12, C24** and **R16,** via grid stopper **R18,** between **V3** triode and tetrode output valve **(V4, Marconi KT35).** Fixed tone correction by **C27** in anode circuit. Variable tone control by **R17, C25** also in anode circuit. Provision for connection of low impedance external speaker across secondary of output transformer **T1.**

Provision is also made to mute the internal speaker by means of a plug and socket device, and an artificial load resistance **R20** is connected across **T1** secondary to maintain a load should both speakers become disconnected. The secondary of **T1** is connected directly to one side of the split earth socket and is connected to chassis via **C3** only when the earth plug is inserted.

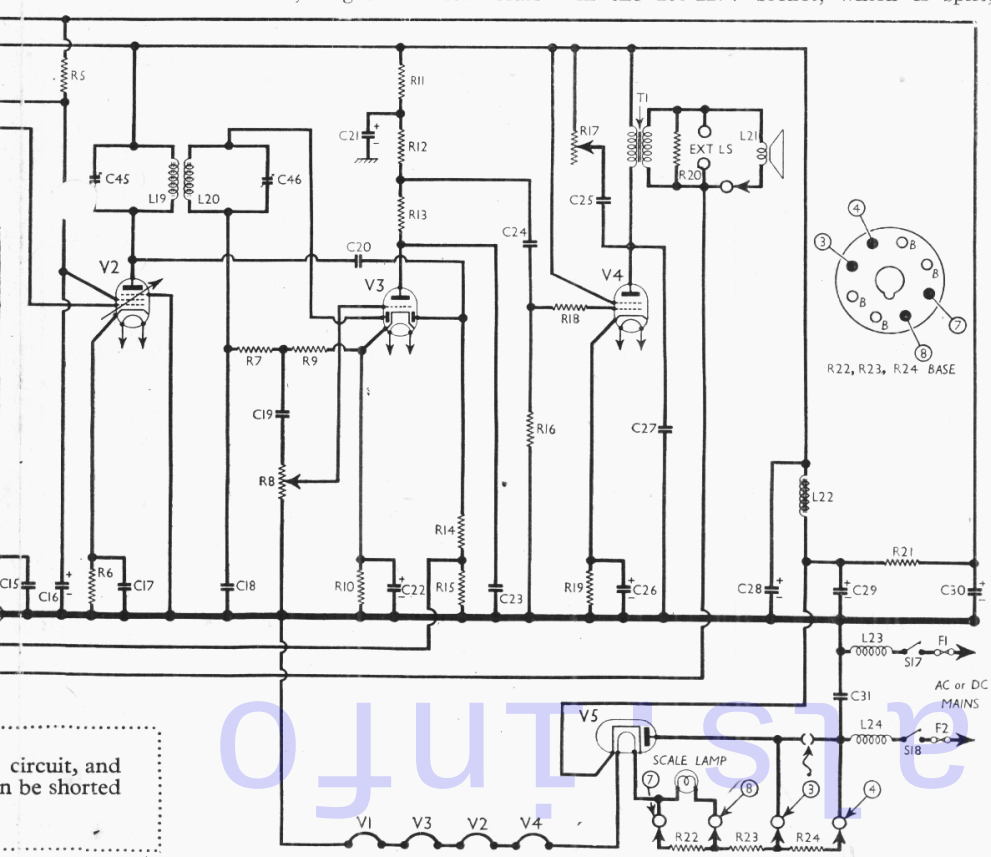
When the receiver is used with AC mains, HT current is supplied by IHC half-wave rectifying valve **(V5, Marconi U31),** which with DC mains behaves as a low resistance. Smoothing for the main HT line is effected by iron cored choke **L22** and electrolytic condensers **C28** and **C29.** The HT line to **V1** and **V2** screens and **V1** oscillator anode is fed via the smoothing circuit **C29, R21, C30.**

Valve heaters, together with scale lamp and plug-in ballast resistance unit comprising **R22, R23** and **R24,** are connected in series across mains input. Filter circuit comprising **L23, L24** and **C31** suppresses mains-borne interference.

Two-position mains voltage adjustment is provided. When the plug is inserted in the 200-227V socket, which is split, the two halves are connected by the plug prongs and short-circuit **R24.** The 228-255V socket has no internal connection.



Plan view of the chassis. Note the extra condenser **C6** in the first IF unit. The core adjustments of **L8, L9** and **LI2-LI6** are indicated.



circuit, and
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DISMANTLING THE SET

Removing Chassis.—Remove the tuning control knob (self-threading screw), the tone control knob (recessed grub screw) and the volume control knob (pull-off). The last two are fitted concentrically.

Remove the two red-headed transit bolts (with lock-washers and claw washers), if still in position, from beneath the cabinet;

remove the two wooden blocks (four countersunk-head wood screws) covering the heads of the four chassis fixing bolts, and remove the bolts (with metal washers and rubber washers);

free the speaker leads from the cleat in the roof of the cabinet, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, unsolder the speaker leads from the tags on the speech coil panel.

When replacing, connect the black speaker lead to the tag marked —, and the yellow lead to the one marked +.

Note that two rubber washers are fitted to each chassis fixing bolt, one on either side of the floor of the cabinet. The bolts should be screwed up tightly.

Re-wax the heads of the control knob fixing screws.

Removing Speaker.—Unsolder the leads from the speech coil panel;

remove four round-head set screws (with washers) holding the speaker to the sub-baffle.

When replacing, the speech coil panel should go at the top, and the leads should be connected as indicated above.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial isolating condenser	0·0005
C2	Aerial SW coupling... ...	0·000035
C3	Earth isolating condenser...	0·01
C4	Image suppressor	0·0005
C5	V1 hexode CG decoupling...	0·05
C6	1st IF trans. sec. trimmer...	0·00025
C7	V1 osc. CG condenser ...	0·000075
C8	V1 cathode by-pass... ...	0·05
C9	Osc. circuit auto tuning ...	0·00023
C10	HT circuit RF by-pass ...	0·1
C11	Osc. circ. MW & LW tracker	0·0005
C12	Osc. circuit SW tracker ...	0·005
C13	Osc. LW and auto reaction coupling condenser ...	0·00035
C14	SW reaction coupling ...	0·00005
C15	V2 CG decoupling	0·05
C16*	V1, V2 SG's decoupling ...	2·0
C17	V2 cathode by-pass... ...	0·05
C18	IF by-pass	0·0001
C19	AF coupling to V3 triode ...	0·05
C20	Coupling to V3 AVC diode	0·0001
C21*	V3 triode anode decoupling	4·0
C22*	V3 cathode by-pass... ...	50·0
C23	IF by-pass	0·0005
C24	V3 triode to V4 AF coupling	0·05
C25	Part of variable tone control	0·15
C26*	V4 cathode by-pass... ...	25·0
C27	Fixed tone corrector ...	0·0023
C28*	HT smoothing condensers	32·0
C29*		16·0
C30*		4·0
C31	Mains RF by-pass	0·01
C32‡	Aerial (manual) LW trimmer	—
C33‡	Aerial (manual) MW trimmer	—
C34†	Aerial circ. manual tuning	—
C35‡	Aerial circuit LW auto tuning trimmers	—
C36‡		—
C37‡	Aerial circuit MW auto tuning trimmers	—
C38‡		—
C39‡		—
C40†	Osc. circ. manual tuning ...	—
C41‡	Osc. circuit MW trimmer...	—
C42‡	Osc. circuit LW trimmer ...	—
C43‡	1st IF trans. pri. tuning ...	—
C44‡	1st IF trans. sec. tuning ...	—
C45‡	2nd IF trans. pri. tuning ...	—
C46‡	2nd IF trans. sec tuning ...	—

*Electrolytic. †Variable. ‡Pre-set.

	OTHER COMPONENTS	Approx Values (ohms)
L1	Aerial SW coupling coil	0·7
L2	Aerial MW coupling coil	24·0
L3	Aerial LW coupling coil	59·0
L4	Aerial SW tuning coil...	0·1
L5	Aerial MW tuning coil...	2·25
L6	Aerial LW tuning coil...	17·5
L7	Osc. circ. SW tuning coil	0·1
L8	Osc. circ. MW manual tuning	3·0
L9	Osc. circ. LW manual tuning	7·5
L10	Oscillator SW reaction	0·8
L11	Oscillator MW reaction	1·75
L12	Oscillator circuit automatic MW tuning coils	3·5
L13		3·5
L14		5·5
L15	Oscillator circuit automatic LW tuning coils	10·0
L16		10·0
L17	1st IF trans. Pri. ...	6·5
L18	Sec. ...	2·75
L19	2nd IF trans. Pri. ...	4·0
L20	Sec. ...	4·0
L21	Speaker speech coil ...	4·0
L22	HT smoothing choke ...	150·0
L23	Mains filter chokes ...	3·0
L24		3·0
T1	Output trans. Pri. ...	230·0
	Sec. ...	0·8
S1a, b, x to S3a, b, x	Aerial circuit waveband switches	—
S4a, b, x to S8a, b, x	Aerial circuit automatic selector switches ...	—
S9a, b, x to S11a, b, x	Oscillator circuit waveband switches ...	—
S12a, b, x to S16a, b, x	Oscillator circuit automatic selector switches	—
S17, S18	Mains switches, ganged R17	—
F1, F2	Mains circuit fuses ...	—

	RESISTANCES	Values (ohms)
R1	V1 fixed GB resistance ...	350
R2	V1 hexode CG decoupling...	230,000
R3	V1 osc. CG resistance ...	50,000
R4	V1 osc. anode HT feed ...	5,000
R5	V1, V2 SG's HT feed ...	5,000
R6	V2 fixed GB resistance ...	350
R7	IF stopper	100,000
R8	Manual volume control ...	2,000,000
R9	V3 signal diode load ...	500,000
R10	V3 triode GB; AVC delay	2,300
R11	V3 triode anode decoupling	10,000
R12	V3 triode anode load ...	50,000
R13	IF stopper	50,000
R14	V3 AVC diode load resistances	500,000
R15		1,500,000
R16	V4 CG resistance	230,000
R17	Variable tone control ...	50,000
R18	V4 grid stopper	23,000
R19	V4 GB resistance	200
R20	T1 sec. artificial loading ...	50
R21	HT feed resistance	10,000
R22	Heater circuit ballast resistances	20·7
R23		400
R24		48·5

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on AC mains of 236V, using the 228-255V mains tapping. The receiver was tuned to the lowest wavelength on the MW 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	X65	205	2·0	80	3·2
		Oscillator			
		95	3·5		
V2	KTW61	205	6·7	80	2·0
V3	DH63	120	0·7	—	—
V4	KT35	190	52·0	205	10·0
V5	U31	215†	—	—	—

† Cathode to chassis, DC.

GENERAL NOTES

Switches.—S1a, b, x to S16a, b, x are the press-button switches in a single unit beneath the chassis. They are actually situated on both sides of the unit, and diagrams of the switches on each side are given in cols. 2 and 3. The upper diagram shows the unit as seen from beneath the chassis, while the lower diagram shows the side facing the chassis deck.

The action of the switches is explained at the beginning of the Circuit Description, and it should be noted that when a button is pressed, its associated switches with suffixes **a** and **b** *close*, while those with the suffix **x** *open*.

S17, S18 are the QMB mains switches, ganged with the tone control **R17.**

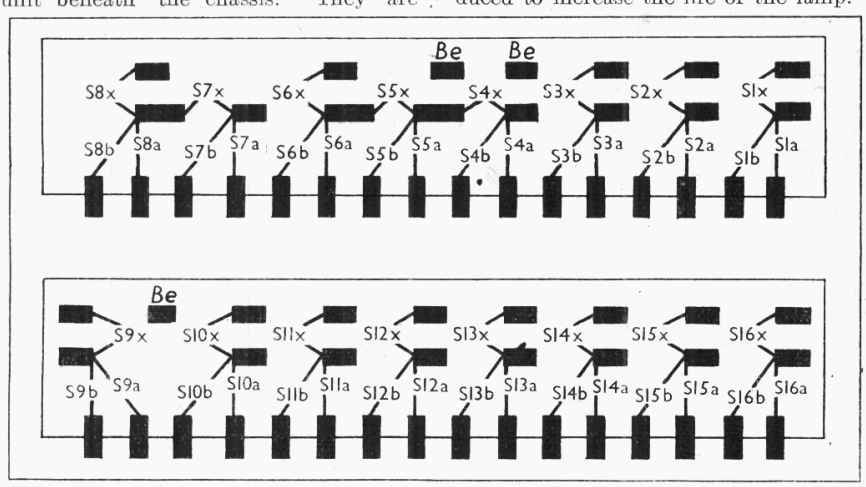
Coils.—All the coils except those forming the IF transformers are in a number of unscreened units beneath the chassis. Six of these units are the manual aerial and oscillator coils, these being **L1, L4; L2, L5; L3, L6; L7, L10; L8, L11** and **L9.** The remaining coils, **L12-L16,** are the oscillator auto-tuning coils, in five separate units, each with a core adjustment projecting through the front of the chassis. **L5, L6, L8,** and **L9** also have core adjustments projecting through the front of the chassis. **L4** and **L7** are the thick wire windings of their respective units, and have loops inside their tubular formers for inductance adjustment. These are reached through holes in the front of the chassis, and are shown in the circuit diagram by arrows through the bottom turns of the coils.

L17, L18 and **L19, L20** form the IF transformers, in two screened units on the chassis deck, with their associated trimmers. Note that the first of these units also contains **C6.**

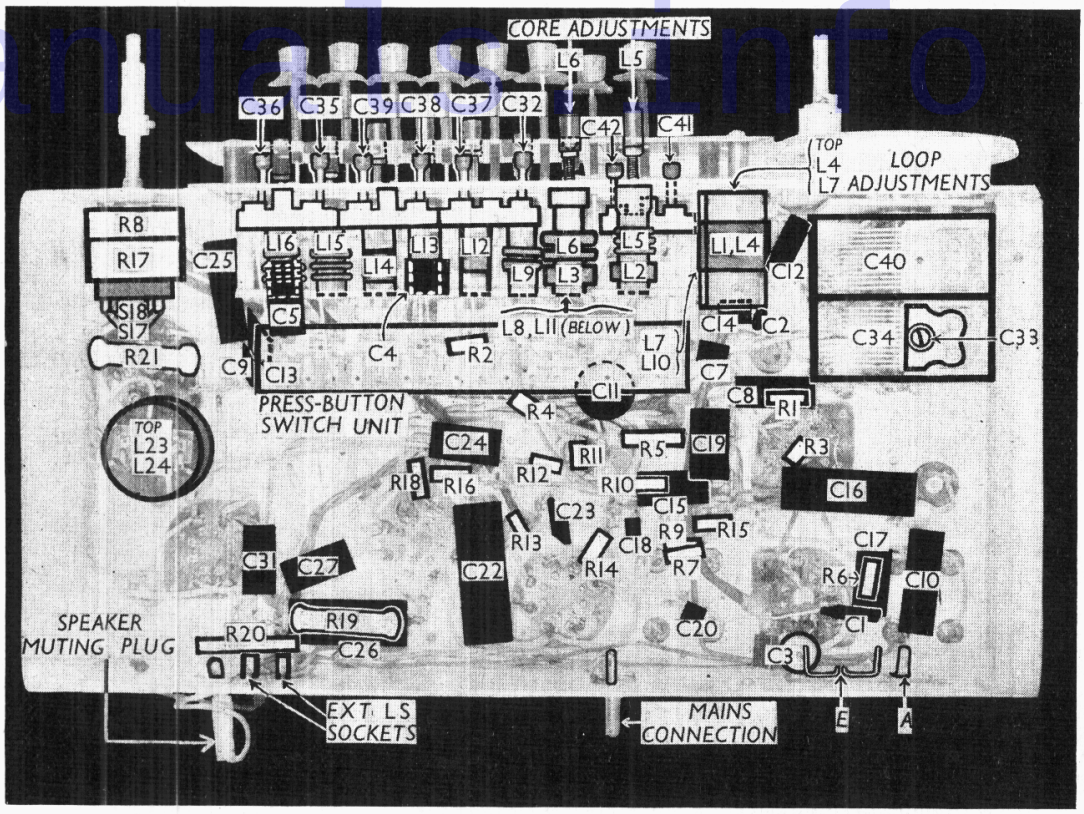
L22 is the HT smoothing choke, mounted on the chassis deck, while **L23, L24** are the mains filter chokes, bolted together in a unit beneath the chassis.

Scale Lamp.—This is a Bulgin MES type, with a tubular bulb, and is rated at 8V, 0.15A. The metal part of the bulb and holder is covered with rubber sleeving to prevent contact with the metal scale backing plate, and hence with chassis.

NOTE.—Should the scale lamp show a tendency to fail early on in its life when the set is used on high voltage mains, the following modification may be introduced to increase the life of the lamp.



Diagrams of the press-button switch unit. The upper one is the view looking at the underside of the chassis, while the lower one shows the switches on the side of the unit facing the chassis deck.



Under-chassis view. Many of the alignment and station setting adjustments are indicated.

The modification consists in fitting a 250 ohm resistance in parallel with **R22** and a 10 ohm resistance in series with the scale lamp. To do this, remove the scale lamp lead from tag 8 of the ballast resistance socket, and solder it to the blank tag 1. Next connect a short length of insulated wire from tag 8 to the blank tag 2. Connect the 10 ohm resistance between tags 1 and 8, and the 250 ohm resistance between tags 2 and 7.

The 10 ohm resistance should have a ½W rating (E.M.I. Part No. 2,415 OR) and the 250 ohm resistance a 1 W rating (E.M.I. Part No. 5786 CE).

The effect of this modification is to reduce the illumination and to increase the life of the scale lamp.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (5O) external speaker. A plug and socket device, adjacent to the external speaker sockets, permits the internal speaker to be muted.

Condensers C21, C28, C30.—These are three dry electrolytics (350v working) in a single metal can on the chassis deck. The can forms the common negative connection. The red spotted tag beneath the chassis is the positive of **C28** (32μF); the plain tag is the positive of **C21** (4μF); and the yellow spotted tag is the positive of **C30** (4μF).

Trimmers.—Apart from the core adjustments and inductance trimmers already mentioned, there are eight capacity trimmers reached through holes in the front of the chassis (of which five are associated with the aerial auto-tuning coils), and one on the rear section of the gang. In addition, there are, of course, the four IF trimmers at the tops of the IF cans.

Ballast Resistance Unit.—The ballast resistance unit contains **R22, R23** and **R24,** and is housed in a tubular perforated metal case, fitted with an octal base, four of the eight pins being blank. An underneath view of the base is inset at the right of the circuit diagram, and the connections in the circuit are indicated by numbered arrows and circles.

Voltage Adjustment.—Tappings are provided for mains of 200-227V and 228-255V. For the 200-227V setting a plug (anchored to the chassis, but not connected electrically) is inserted into a split socket connected across the **R24** section of the ballast resistance, thereby shorting out this resistance. For the 228-255V setting the plug is inserted into an unconnected socket, and **R24** is in circuit.

Fuses F1, F2.—These are two 1¼ in. glass tubular types, held in clips on the voltage adjustment panel at the rear of the chassis. The fuses are rated at 1.25A each. Two spares are provided inside the cabinet, on the right.

Earthing Arrangements.—Note that the earth socket, which is split, has one side isolated from chassis by **C3**. The other side goes to the secondary of **T1** and the speaker circuit. When the earth plug is inserted, the speaker is connected to true earth, and the chassis to earth via **C3.** The aerial is isolated from the receiver by **C1.**

STATION SETTING

The wavelength ranges of the press-buttons, numbering from left to right, looking at the front of the set are: 1, 1,250 to 2,000m; 2, 1,250 to 2,000m; 3, 300 to 550m; 4, 300 to 550m; 5, 200 to 345m.

When setting up a new station, adjust the associated oscillator coil core (above the press-button) first of all. Screwing up clockwise increases the wavelength. Then adjust the associated aerial trimmer (beneath the press-button). Check by tuning manually to the station, and changing over from manual to auto, and vice-versa.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to MW, turn tone control fully clockwise, and gang condenser and volume control to maximum. Connect signal generator via a 0·1 μF condenser to grid (top cap) of **V1,** and **E** socket. Leave existing top cap connector in place. Feed in a 465 KC/S signal, and adjust **C46, C45, C44** and **C43** in turn for maximum output.

RF and Oscillator Stages.—Check that the pointer covers the 192m mark on the MW scale, when the gang is at minimum. If adjustment is necessary, slide the pointer up or down the drive wire. Connect signal generator, via a suitable dummy aerial, to **A** and **E** sockets.

SW.—Switch set to SW, tune to 50m on scale, and feed in a 50m (6 MC/S) signal. Adjust loops of **L4** and **L7** for maximum output. Repeat until no further improvement results. Check sensitivity at 16·8m (17.86 MC/S).

MW.—Switch set to MW, turn gang to minimum, and feed in a 192m (1,562·5 KC/S) signal. Adjust **C41** for maximum output. Tune to 220m on scale, feed in a 220m. (1,363.6 KC/S) signal, and adjust **C33** for maximum output. Tune to 530 m on scale, feed in a 530m (566 KC/S) signal, and adjust cores of **L8** and **L5** for maximum output.

LW.—Switch set to LW, tune to 1,000m on scale, feed in a 1,000m (300 KC/S) signal, and adjust **C42,** then **C32,** for maximum output. Tune to 1,750m on scale, feed in a 1,750m (171·4 KC/S) signal and adjust cores of **L9** and **L6** for maximum output.

Finally, check adjustments of all press-button trimmers.

Printed in Great Britain by ST. CLEMENTS PRESS, LTD., Portugal Street, Kingsway, London, W.C.2.