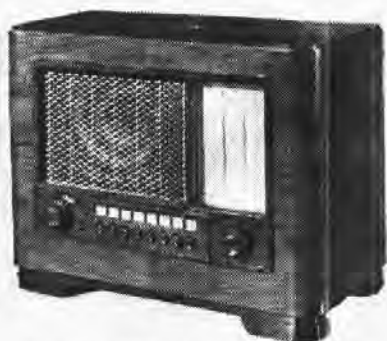


"TRADER" SERVICE SHEET

436

# H.M.V. 1104, 1301, 1501, 1601

## MARCONIPHONE 882, 884, 885



The H.M.V. 1104 Table Receiver.

**T**HIS *Service Sheet* covers a group of H.M.V. and Marconiphone models. All are 4-valve (plus valve rectifier), AC 3-band superhets with pre-set tuning for five stations, permeability tuning being used in the oscillator circuits.

The table and console models, which are identical except for the cabinets, are for 195-255 V., 50-100 C/S mains. The

radiograms are for 50 C/S mains only, and their differences are explained under "Radiogram Divergencies."

The models covered are: Table, H.M.V. 1104, Marconiphone 882; Console, H.M.V. 1301, Marconiphone 884; Radiogram, H.M.V. 1501, Marconiphone 885; Auto-Radiogram, H.M.V. 1601.

This *Service Sheet* was actually prepared on an H.M.V. 1104.

Release Dates: 1104, 882, July, 1939. Remainder, September, 1939.

### CIRCUIT DESCRIPTION

All the switches associated with the press-button unit, except those controlling the scale lamps, have been coded so as to indicate their action when a button is pressed.

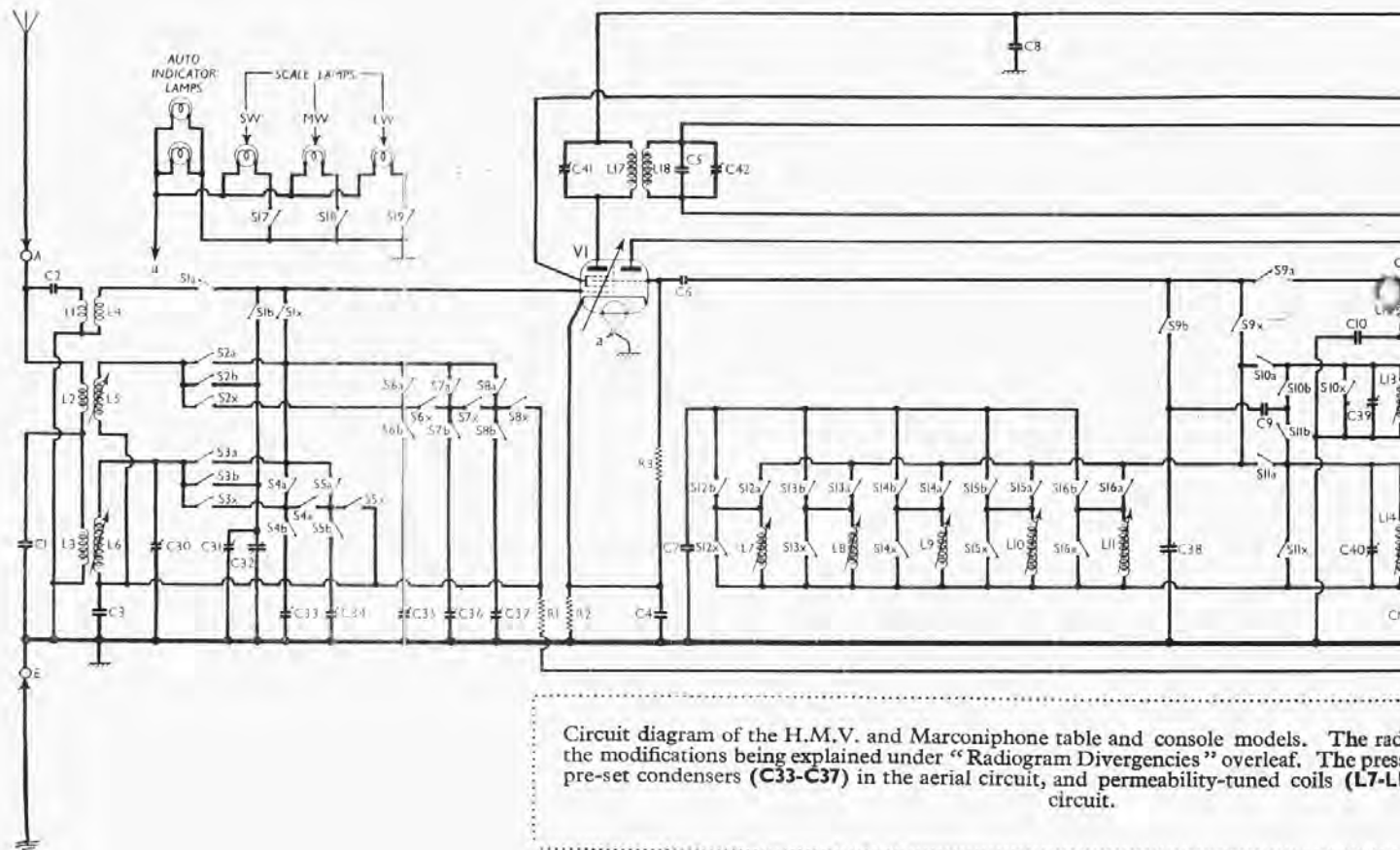
The switches are arranged in groups of three, and two groups, one in the aerial circuit and the corresponding one in the oscillator circuit, are operated by each press-button. Each group has its own number, and each arm of each group bears the group number together with a lettered suffix. If the suffix is *a* or *b*, the switch forming that arm *closes* when its button is pressed; while

if the suffix is *x*, the switch *opens*. When the button is released, by pressing another button, the position is reversed: the *a* and *b* switches open, and the *x*'s close.

Aerial input is via high impedance coupling circuits **C2**, **L1** (SW), **L2** (MW) and **L3** (LW) to single-tuned circuits comprising **L4** (SW), **L5** (MW), and **L6** (LW) tuned manually by **C32**, or automatically by pre-set trimmer condensers **C33**, **C34** (LW) and **C35**, **C36**, **C37** (MW). Image suppression by **C1**.

First valve (**V1**, Marconi **X65**) is a triode hexode operating as frequency changer with internal coupling. For manual tuning, triode oscillator grid coils **L12** (SW), **L13** (MW), and **L14** (LW) are tuned by **C38**; parallel trimming by **C39** (MW) and **C40** (LW); series trimming by **C10** (SW); **C9** (in high potential end of **L13** via **S10b**, MW) and **C9**, in high potential end of **L14** via **S11b**, together with **C12** in low potential end (LW). Reaction by **L15** via **C11** (SW), **L16** (MW), and common impedance of **C12** in anode and grid circuits (LW).

For automatic operation, one of the pre-set coils **L7** to **L11** is connected via **S9x**, between the oscillator control grid



Circuit diagram of the H.M.V. and Marconiphone table and console models. The modifications being explained under "Radiogram Divergencies" overleaf. The press-pre-set condensers (**C33-C37**) in the aerial circuit, and permeability-tuned coils (**L7-L11**) in the oscillator circuit.

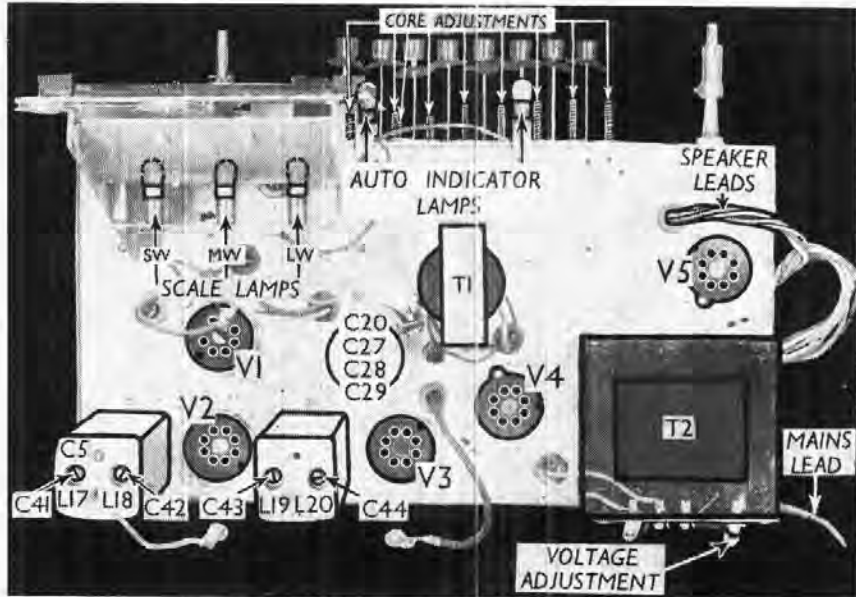
and anode, and C12 again provides a common coupling path to chassis. Tuning capacity is provided by fixed condenser C7.

Second valve (V2, Marconi KTW61) is a variable-mu RF tetrode operating as intermediate frequency amplifier with tuned-primary tuned-secondary iron-cored transformer couplings C41, L17, L18, C5, C42, and C43, L19, L20, C44.

Intermediate frequency 465KC/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 C16, R7. Provision for connection of gramophone pick-up across R8 via C19, while the insertion of pick-up plug in the split socket short-circuits the two halves and connects C17 between V2 anode and chassis, to mute radio automatically.

Second diode of V3, fed from V2 anode via C18, provides DC potential which is developed across tapped load comprising resistances R14 and R15, that R15 being 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, R13 (which form a step-down coupling in V3 triode anode circuit), C22 and R16, via grid stopper R18, between V3



Plan view of the chassis. Note the extra condenser C5 in the first IF unit. C20, C27, C28, C29 are four dry electrolytics.

triode and tetrode output valve (V4, Marconi KT61). Variable tone control by R17, C24 in anode circuit. Fixed tone correction by C26, also in anode circuit. Provision for connection of low impedance external speaker across secondary of output transformer T1. Provision by means of a plug and socket

device for muting internal speaker.

IFT current is supplied by full-wave rectifying valve (V5, Marconi U50). Smoothing by speaker field L23 and dry electrolytic condensers C27, C28, C29.

**DISMANTLING THE SET**

**Removing Chassis.**— Remove tone control knob by first turning the volume control knob until the slot at its side is visible, then turning the tone control knob until the recessed grub-screw head registers with the slot, and then loosening the screw. Now remove the volume control knob (pull-off), the double-headed tuning control knob (self-tapping screw), the MW press-button knob (pull-off) and the four bolts (with spring and claw washers) holding the chassis to the bottom of the cabinet, when the chassis can be withdrawn to the extent of the speaker leads.

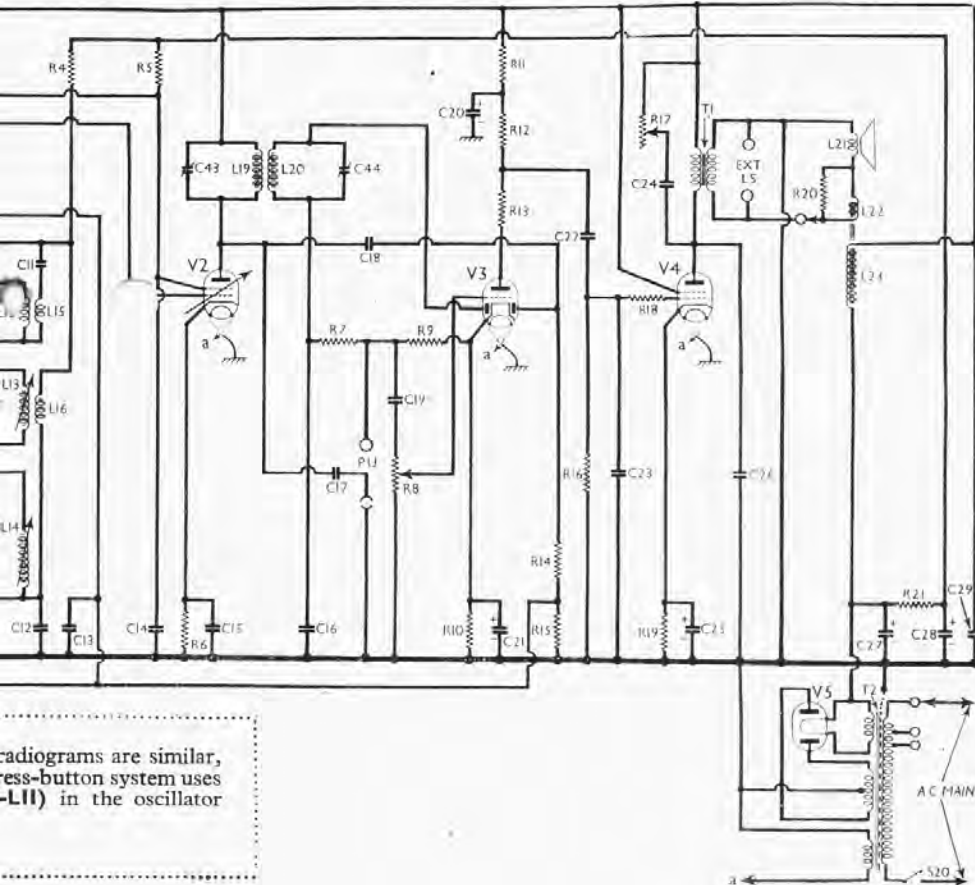
To free the chassis entirely, unsolder the four leads from the tags on the field coil bobbin on the speaker.

When replacing, note that the volume control knob goes on to its slotted sleeve spindle before the tone control knob is fitted, and see that it engages well in the slots. Note also that a second sleeve is fitted, between the tone control spindle and its knob; and that the fixing screw must pass through the hole provided for it in this sleeve.

Before the MW press-button knob is replaced, a felt washer must be slipped over its plunger and tucked through the hole in the escutcheon. The speaker leads are connected as follows, numbering the tags from left to right as seen from the rear of the cabinet. Front row: 1, no external connection; 2, yellow; 3, black. Back row: 1, red/black; 2, red.

**Removing the Speaker.**—Unsolder the leads from the tags on the field coil bobbin and remove the four round-head screws (with washers) holding the speaker to the sub-baffle.

When replacing, the leads should be connected as indicated above.



Diagrams are similar, press-button system uses (L11) in the oscillator

COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	V1 hexode CG decoupling ...	230,000
R2	V1 fixed GB resistance ...	350
R3	V1 osc. CG resistance ...	50,000
R4	V1 osc. anode HT feed ...	23,000
R5	V1, V2 SG's HT feed ...	23,000
R6	V2 fixed GB resistance ...	350
R7	1F 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 ...	100,000
R12	V3 triode anode load resistances ...	23,000
R13	V3 AVC diode load resistances ...	75,000
R14	V3 AVC diode load resistances ...	500,000
R15	V3 CG decoupling ...	1,500,000
R16	V4 CG resistance ...	150,000
R17	Variable tone control ...	50,000
R18	V4 grid stopper ...	23,000
R19	V4 GB resistance ...	100
R20	Hum neut. coil shunt ...	0.5
R21	V1 osc. anode and V1, V2 SG's HT feed resistance	23,000

CONDENSERS		Values (μF)
C1	Image suppressor ...	0.0005
C2	Aerial SW series condenser ...	0.00035
C3	V1 hexode CG decoupling ...	0.05
C4	V1 cathode by-pass ...	0.05
C5	1st IF trans. sec. trimmer ...	0.00025
C6	V1 osc. CG condenser ...	0.000075
C7	Osc. circuit auto fixed tuning capacity ...	0.00023
C8	HT circuit RF by-pass ...	0.1
C9	Osc. circuit MW tracker ...	0.0005
C10	Osc. circuit SW tracker ...	0.005
C11	V1 osc. anode SW coupling ...	0.00005
C12	Osc. circuit LW tracker ...	0.00035
C13	V2 CG decoupling ...	0.05
C14	V1, V2 SG's decoupling ...	0.05
C15	V2 cathode by-pass ...	0.05
C16	1F by-pass ...	0.0001
C17	Radio muting condenser ...	0.05
C18	Coupling to V3 AVC diode ...	0.0001
C19	AF coupling to V3 triode ...	0.05
C20*	V3 triode anode decoupling ...	4.0
C21*	V3 cathode by-pass ...	50.0
C22	V3 triode to V4 AF coupling ...	0.05
C23	1F by-pass ...	0.00005
C24	Part of variable tone control ...	0.05
C25*	V4 cathode by-pass ...	50.0
C26	Fixed tone corrector ...	0.0023
C27*	—	10.0
C28*	HT smoothing condensers	4.0
C29*	—	3.0
C30†	Aerial circuit LW trimmer	—
C31†	Aerial circuit MW trimmer	—
C32†	Aerial circuit manual tuning	—
C33†	Aerial circuit LW auto tuning condensers	—
C34†	—	—
C35†	—	—
C36†	Aerial circuit MW auto tuning condensers	—
C37†	—	—
C38†	Osc. circuit manual tuning	—
C39†	Osc. circuit MW trimmer ...	—
C40†	Osc. circuit LW trimmer ...	—
C41†	1st IF trans. pri. tuning ...	—
C42†	1st IF trans. sec. tuning ...	—
C43†	2nd IF trans. pri. tuning ...	—
C44†	2nd IF trans. sec. tuning ...	—

\* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Ap'rox 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	Oscillator circuit MW auto tuning coils	3.5
L8	—	3.5
L9	—	5.5
L10	Oscillator circuit LW auto tuning coils	10.0
L11	—	10.0
L12	Osc. circuit SW tuning coil	0.1
L13	Osc. circuit MW manual tuning	3.0
L14	Osc. circuit LW manual tuning	7.6

OTHER COMPONENTS (Continued)

L15	Oscillator SW reaction	0.8
L16	Oscillator MW reaction	1.75
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	Hum neutralising coil	0.3
L23	Speaker field coil	1,680.0
T1	Output trans. (Pri. ...)	370.0
	— (Sec. ...)	0.5
	Pri. total	30.0
T2	Mains Reactor sec. ...	4.0
	Trans. Rect. heat sec. ...	0.1
	— HT sec., total	0.1
	—	630.0
S1a, b, x to S3a, b, x	Aerial circuit wave-band switches	—
S4a, b, x to S8a, b, x	Aerial circ. auto station selector switches	—
S9a, b, x to S11a, b, x	Oscillator circuit wave-band switches	—
S12a, b, x to S16a, b, x	Osc. circ. auto station selector switches	—
S17-S19	Scale lamps switches	—
S20	Mains switch, ganged R17	—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 229 V, using the 224-255 V tap 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.

If the valve screens are removed to accommodate valve adaptors for current readings, it is advisable to slip the screen over the valve and to earth it while the reading is being taken.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X65	244	1.25	65	2.6
	Oscillator	—		
V2 KTW61	103	3.4	—	—
V3 DH63	244	6.1	65	1.9
V4 KT61	88	0.7	—	—
V5 U50	230	38.0	244	7.2
	334†	—	—	—

† Each anode, AC.

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.

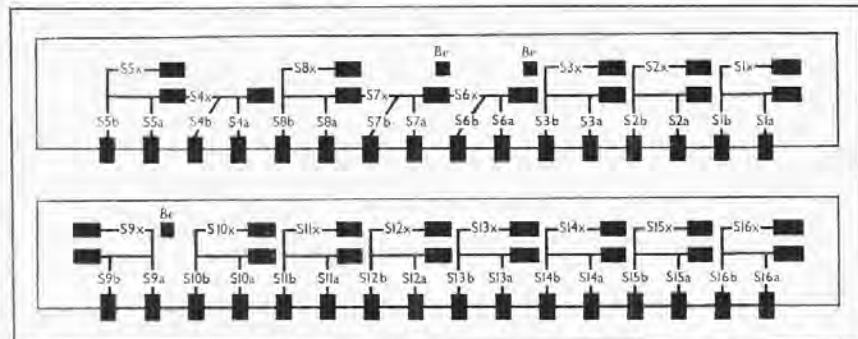
S17-S19 are the scale lamps switches, which control the lamps illuminating each of the three wave-bands on the scale. The switches are mounted on a paxolin panel behind the wave-band press buttons, and each is formed of a spring contact and the end of the associated press-button plunger. When the SW button is pressed, S17 closes; when the MW button is pressed, S18 closes; and when the LW button is pressed S19 closes.

S20 is the QMB mains switch, 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; L12, L15; L13, L16 and L14. The remaining coils, L7-L11, are the oscillator auto-tuning coils, in five separate units, each with a core adjustment projecting through the front of the chassis. L5, L6, L13 and L14 also have core adjustments projecting through the front of the chassis. L4 and L12 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, but are not shown in our diagrams.

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 C5.

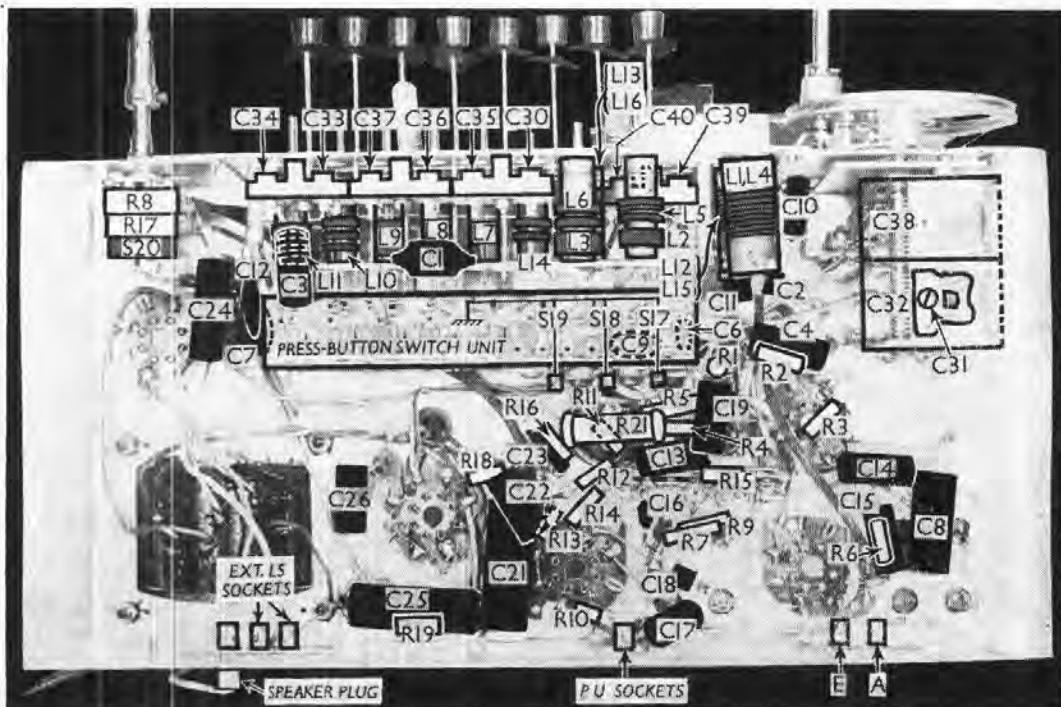
Scale and Indicator Lamps.—There are two auto indicator lamps and three scale lamps, the latter being switched by S17-S19. All the lamps are Osram MRS types, rated at 6.5V, 0.3A, and having tubular bulbs. The scale lamps holder plugs into two pillars behind the tuning scale.



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 facing the chassis deck.

**Under-chassis view.**

The press-button switch unit is indicated. Note the extra switches **S17-S19** formed by the ends of the wave-change press-button plungers and three fixed contacts. Most of the trimmers are reached through the front plate of the chassis.



**External Speaker.**—Two sockets are provided at the rear of the chassis for a low impedance (50) external speaker. A plug and socket device, adjacent to the external speaker sockets, permits the internal speaker to be muted when desired.

**Condensers C20, C27, C28, C29.**—These are four dry electrolytics (570V nominal) in a single metal can on the chassis deck. The can forms the common negative connection. The plain tag beneath the chassis is the positive of **C20** (4 $\mu$ F); the red tag is the positive of **C27** (16 $\mu$ F); the green tag is the positive of **C28** (4 $\mu$ F), and the yellow tag is the positive of **C29** (8 $\mu$ F).

**Resistance R20.**—This, being connected across the hum neutralising coil in the loudspeaker unit, is not shown in our chassis illustrations.

**Pick-up Sockets.**—Note that the lower one of these is split, and when its plug is inserted, the two halves of the socket are connected together, thus connecting **C17** to chassis, and so muting radio on gram.

**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.

**RADIOGRAM DIVERGENCIES**

The H.M.V. 1501 radiogram and 1601 auto-radiogram, and the Marconiphone 885 radiogram, are very similar to the table and console models, the differences being explained below. They are suitable for use on 50C/S mains only.

The pick-up used has a resistance of

7,500  $\Omega$ , while the motor is of the usual E.M.I. hysteresis type, connected, via its auto-switch, across the whole of **T2** primary.

A 2-pole change-over radio/gram switch is fitted. One side of the pick-up is connected to chassis; the other side goes to one pole of the switch, which is arranged so that on radio the pick-up is disconnected, and **C19** is connected to the top of **R8**, as in our diagram. On gram, **C19** is disconnected, and the switched side of the pick-up is connected to the top of **R8**.

The other pole of the radio/gram switch is arranged to break the connection between **R5** and the screens of **V1** and **V2** when switched to gram, and to make the connection on radio. Condenser **C17** is not used in the radiograms.

Across the pick-up are connected a 0.05 $\mu$ F condenser and a 15,000  $\Omega$  resistance, in series.

**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  $\mu$ F condenser to grid (top cap) of **V1**, and chassis. Leave existing top cap connector in place. Feed in a 465 KC/S signal, and adjust **C44**, **C43**, **C42** and **C41** in turn for maximum output. Repeat these adjustments.

**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 **L12** 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 192 m (1,562.5 KC/S) signal. Adjust **C39** for maximum output. Tune to 220m on scale, feed in a 220m (1,363.6 KC/S) signal, and adjust **C31** for maximum output. Tune to 530 m on scale, feed in a 530m (566 KC/S) signal, and adjust cores of **L13** and **L5** for maximum output. Only slight adjustments should be necessary. Repeat the MW adjustments.

**LW.**—Switch set to LW, tune to 1,000m on scale, feed in a 1,000m (300 KC/S) signal, and adjust **C40**, then **C30**, for maximum output. Tune to 1,750m on scale, feed in a 1,750m (171.4 KC/S) signal, and adjust cores of **L14** and **L6** for maximum output. Repeat the 1,000m adjustments.

Finally, check adjustments of all press-button trimmers.

**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, 200 to 345m; 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.

Final adjustments should always be carried out on the mains supply and aerial on which the set will normally be used.