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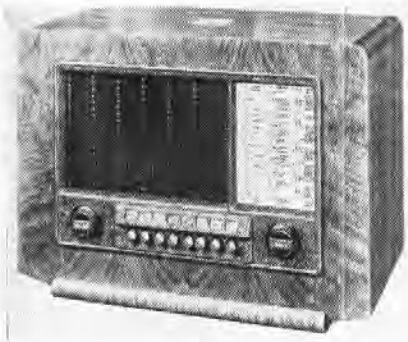
"TRADER" SERVICE SHEET

499

H.M.V. 1106

AC SUPERHET



PRESS-BUTTON waveband switching for manual tuning and five pre-set stations are provided in the HMV model 1106 receiver. It is a 4-valve (plus rectifier) 3-band AC superhet, designed to operate from mains of from 195 to 255 V 50-100 C/S.

Permeability-tuned coils are used for the automatic tuning in the oscillator circuit, while all the MW and LW manual tuning coils are iron-cored.

Provision is made for the connection of a gramophone pick-up and an external speaker.

Release date: May, 1940.

CIRCUIT DESCRIPTION

All the switches associated with the press-button unit have been coded so as to indicate their action when a button is pressed.

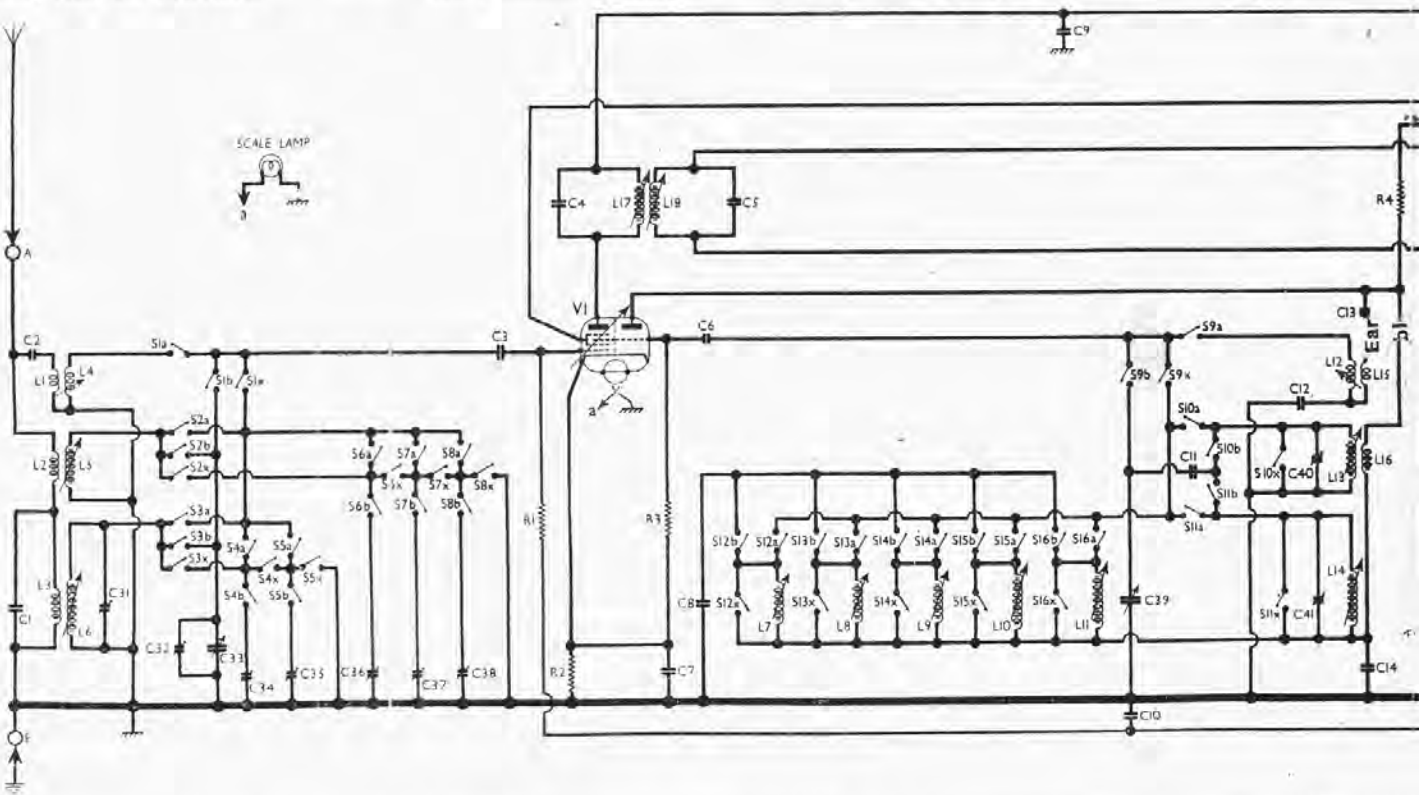
The switches are arranged in groups of three, and two groups, one in the aerial circuit and the corresponding one in the oscillator circuit, are operated by each press-button. Each group has its own number, and each arm of each group bears the group number together with a lettered suffix. If the suffix 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 **C33**, or automatically by pre-set trimmer condensers **C34, C35** (LW) and **C36, C37, C38** (MW). Image suppression by **C1** connected across **L3**. There are, of course, no automatic pre-set trimmers for the SW band.

First valve **(V1, Marconi metallised X61M)** 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 **C39**; parallel trimming by **C40** (MW) and **C41** (LW); series tracking by **C12** (SW); **C11** (in high potential end of **L13** via **S10b**, MW) and **C11**, in high potential end of **L14** via **S11b**, together with **C14** in low potential end (LW). Reaction by **L15** via **C13** (SW), **L16** (MW), and common impedance of **C14** in anode and grid circuits (LW).

Tracking adjustments during alignment are made on the SW band by altering the positions of the end loops of the tuning coils **L4** and **L12**; and on MW and LW by adjusting the iron-dust cores of **L5, L13** (MW) and **L6, L14** (LW).

For automatic operation, one of the pre-set coils **L7** to **L11** is connected via **S9x** between the control grid and anode, and **C14** again provides a common coupling



Circuit diagram of the HMV 1106 press-button superhet receiver. Pre-set condensers across the manual tuning coils are u in the oscillator circuit, pre-set iron-cored coils are employed. Tracking adjustments are made on all wavebands in both aer values of the coils. In early models, as explained under "General Notes," no pick-up switc

path to chassis. Tuning capacity is provided by fixed condenser **C8.**

Second valve **(V2, Marconi metallised KTW61M)** is a variable-mu RF tetrode operating as pentode intermediate frequency amplifier with tuned-primary tuned-secondary iron-dust cored transformer couplings **C4, L17, L18, C5** and **C18, L19, L20, C19.**

Alignment tuning is carried out by adjusting the cores, and the tuning condensers are fixed.

Intermediate frequency 465KC/S.

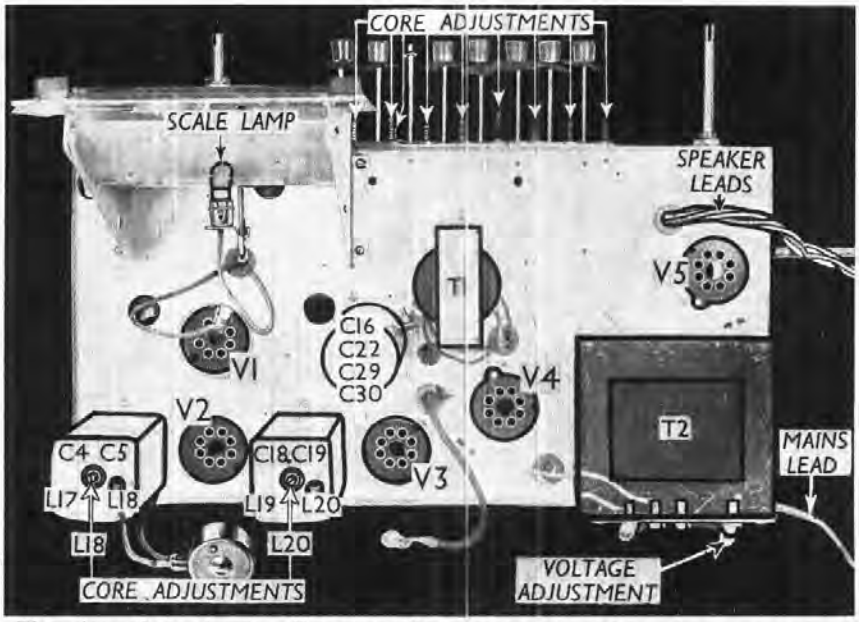
Diode second detector is part of double diode triode valve **(V3, Marconi metallised DH63M).** Audio frequency component in rectified output is developed across load resistances **R8, R9,** that across **R9** being passed via AF coupling condenser **C21,** switch **S19** and manual volume control **R10** to CG of triode section, which operates as AF amplifier.

Provision for connection of gramophone pick-up across **R10** via switch **S18.** When the radio/gram control is turned to the gram position, this switch closes, and **S17** and **S19** open to mute radio.

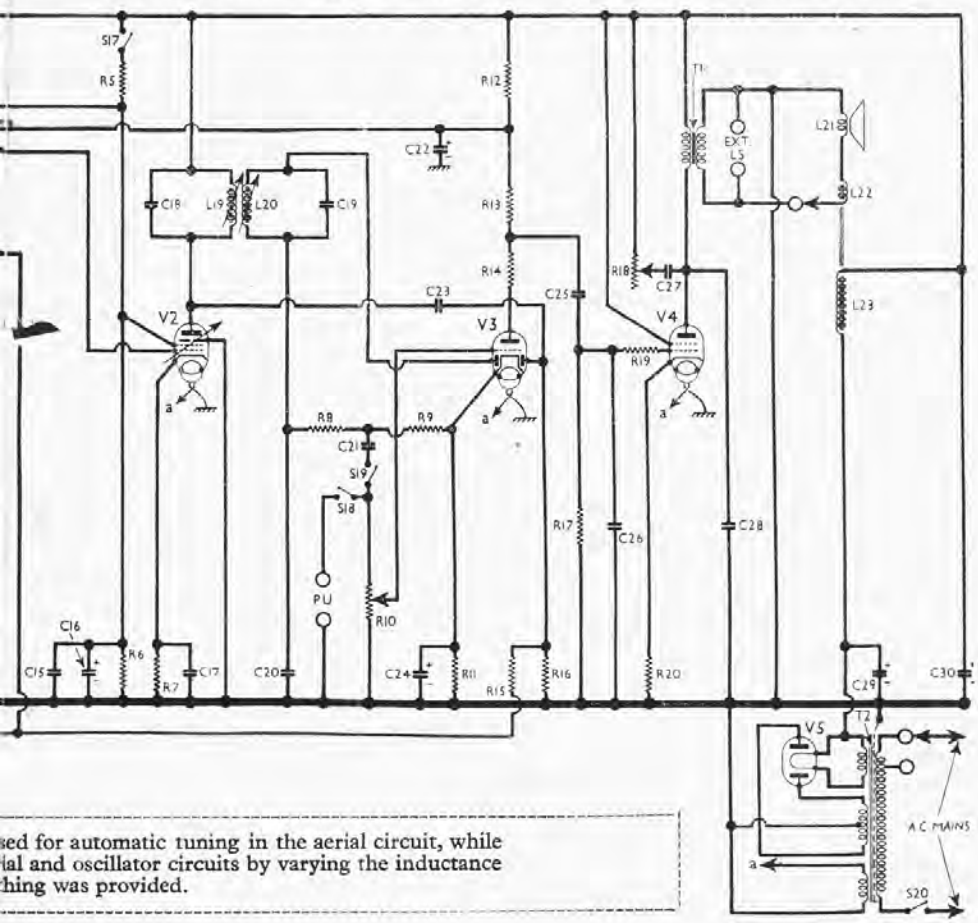
Second diode of **V3,** fed from **V2** anode via **C23,** provides DC potential which is developed across load resistance **R16,** fed back through decoupling circuit as GB to FC and IF valves, giving automatic volume control. Delay voltage, together with GB for triode section, is obtained from drop along **R11** in cathode lead to chassis.

Resistance-capacity coupling by **R13, R14** (which form a step-down coupling in **V3** triode anode circuit), **C25** and **R17,** via grid stopper **R19,** between **V3** trode and tetrode output valve **(V4, Marconi KT61).** Variable tone control by **R18, C27** in anode circuit. Fixed tone correction by **C28,** 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.

HT current is supplied by full-wave rectifying valve **(V5, Marconi U50).** Smoothing by speaker field **L23** and dry electrolytic condensers **C29, C30.**



Plan view of the chassis. The core adjustments of the IF transformer secondary coils are indicated; the primary adjustments are beneath the chassis.



sed for automatic tuning in the aerial circuit, while ial and oscillator circuits by varying the inductance hing was provided.

DISMANTLING THE SET

Removing Chassis.—Remove the two control knobs (recessed self-threading screws) from the front of the cabinet, and a third (pull-off) from the side;

remove the sixth (counting from left to right) press-button knob (pull-off);

remove the four fixing screws (with spring washers and square claw washers) holding the chassis to the bottom of the cabinet.

The chassis can now be withdrawn from the cabinet to the extent of the speaker leads, which is sufficient for normal purposes.

To free chassis entirely, unsolder from the tags of the speaker field bobbin the four leads connecting it to chassis.

When replacing, connect the speaker leads as follows:

yellow to middle tag of front row (near speech coil);

black to right-hand front tag (viewed from rear);

red/black to left-hand rear tag;

red to right-hand rear tag.

Fit a felt washer to the press-button plunger before replacing the knob;

Finally, tie a loop in the speaker leads, so that they shall not coil round the valves and become perished.

Removing Speaker.—Unsolder the four connecting leads, and remove the four round-head set-screws (with washers) holding the speaker to the sub-baffle.

When replacing, the connecting tags should be at the top, and the leads should be connected to them as indicated above.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 hexode CG resistance	500,000
R2	V1 fixed GB resistance	230
R3	V1 osc. CG resistance	50,000
R4	V1 osc. anode HT feed	23,000
R5	V1, V2 SG's HT feed potential divider	15,000*
R6		15,000
R7	V2 fixed GB resistance	350
R8	V3 signal diode load resistances	350,000
R9		350,000
R10	Manual volume control	2,000,000
R11	V3 triode GB; AVC delay	2,300
R12	V1 osc. and V3 anodes decoupling	10,000
R13	V3 triode anode load resistances	100,000
R14		75,000
R15	AVC line decoupling	750,000
R16	V3 AVC diode load	750,000
R17	V4 CG resistance	350,000
R18	Variable tone control	50,000
R19	V4 grid stopper	23,000
R20	V4 GB resistance	100

* Two 7,500 Ω resistances in series.

	CONDENSERS	Values (μF)
C1	Image suppressor	0·0005
C2	Aerial SW series	0·00005
C3	V1 hexode CG condenser	0·0001
C4	1st IF transformer tuning condensers	0·0002
C5		0·0002
C6	V1 osc. CG condenser	0·000075
C7	V1 cathode by-pass	0·05
C8	Osc. circuit auto fixed tuning capacity	0·00023
C9	HT circuit RF by-pass	0·05
C10	AVC line decoupling	0·05
C11	Osc. circuit MW tracker	0·0005
C12	Osc. circuit SW tracker	0·005
C13	V1 osc. anode SW coupling	0·00005
C14	Osc. circuit LW tracker	0·00035
C15	V1, V2 SG's RF by-pass	0·05
C16*	V1, V2 SG's decoupling	4·0
C17	V2 cathode by-pass	0·05
C18	2nd IF transformer tuning condensers	0·0002
C19		0·0002
C20	IF by-pass	0·0001
C21	AF coupling to V3 triode	0·05
C22*	V1 osc. and V3 anodes decoupling	4·0
C23	Coupling to V3 AVC diode	0·0001
C24*	V3 cathode by-pass	50·0
C25	V3 triode to V4 AF coupling	0·05
C26	IF by-pass	0·00023
C27	Part variable tone control	0·05
C28	Fixed tone corrector	0·0023
C29*	HT smoothing condensers	16·0
C30*		8·0
C31‡	Aerial circ. LW trimmer	—
C32‡	Aerial circ. MW trimmer	—
C33†	Aerial circ. manual tuning	—
C34‡	Aerial circuit LW auto tuning condensers	—
C35‡		—
C36‡	Aerial circuit MW auto tuning condensers	—
C37‡		—
C38‡		—
C39†	Osc. circ. manual tuning	—
C40‡	Osc. circ. MW trimmer	—
C41‡	Osc. circ. LW trimmer	—

* 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	Oscillator circuit MW auto tuning coils	5·5
L8		5·5
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	7·5
L15	Oscillator SW reaction	0·8
L16	Oscillator MW reaction	1·75
L17	1st IF trans. Pri.	5·0
L18	1st IF trans. Sec.	5·0
L19	2nd IF trans. Pri.	5·0
L20	2nd IF trans. Sec.	5·0
L21	Speaker speech coil	4·0
L22	Hum neutralising coil	0·3
L23	Speaker field coil	950·0
T1	Output trans. Pri.	370·0
	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	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	Radio/gram change switches	—
S20	Mains switch, ganged R10	—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 236 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.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X61M	260	3·3	85	3·7
	Oscillator 95	5·0		
V2 KTW61M	260	8·0	85	2·5
V3 DH63M	105	0·5	—	—
V4 KT61	245	42·0	260	8·0
V5 U50	345†	—	—	—

† Each anode, AC.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

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 radio/gram change switches, in a single rotary unit fitted on the rear member of the chassis. The unit is indicated in our under-chassis view and shown in detail in the diagram in column 5. In the anti-clockwise position of the control knob, viewed from the rear, **S17** and **S19** are closed and **S18** is open; in the clockwise position the conditions are reversed.

S20 is the QMB mains switch, ganged with the volume control **R10.**

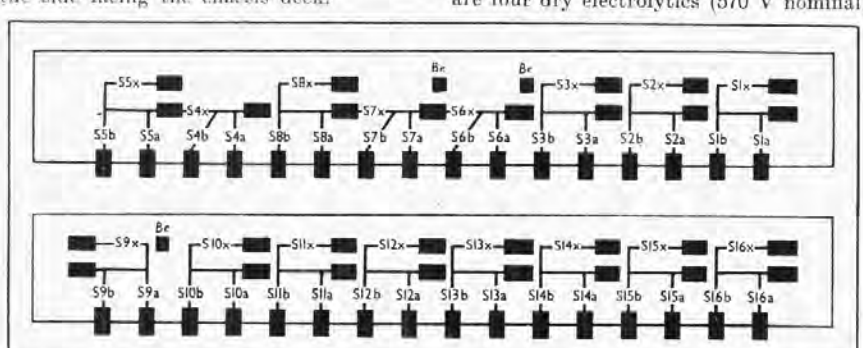
Coils.—All the coils except those forming the IF transformers are in a number of unscreened units beneath the chassis. Six of these units are the manual aerial and oscillator coils, these being **L1, L4; L2, L5; L3, L6; L12, L15; L13, L16** and **L14.** The remaining coils, **L7-L11,** are the oscillator 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, and are indicated in the diagram and the under-chassis view.

L17, L18 and **L19, L20** form the IF transformers, in two screened units on the chassis deck, with their associated fixed trimmer condensers. The coils have adjustable iron-dust cores, the adjusting screws of which project from each end of the cans, as indicated in our chassis illustrations.

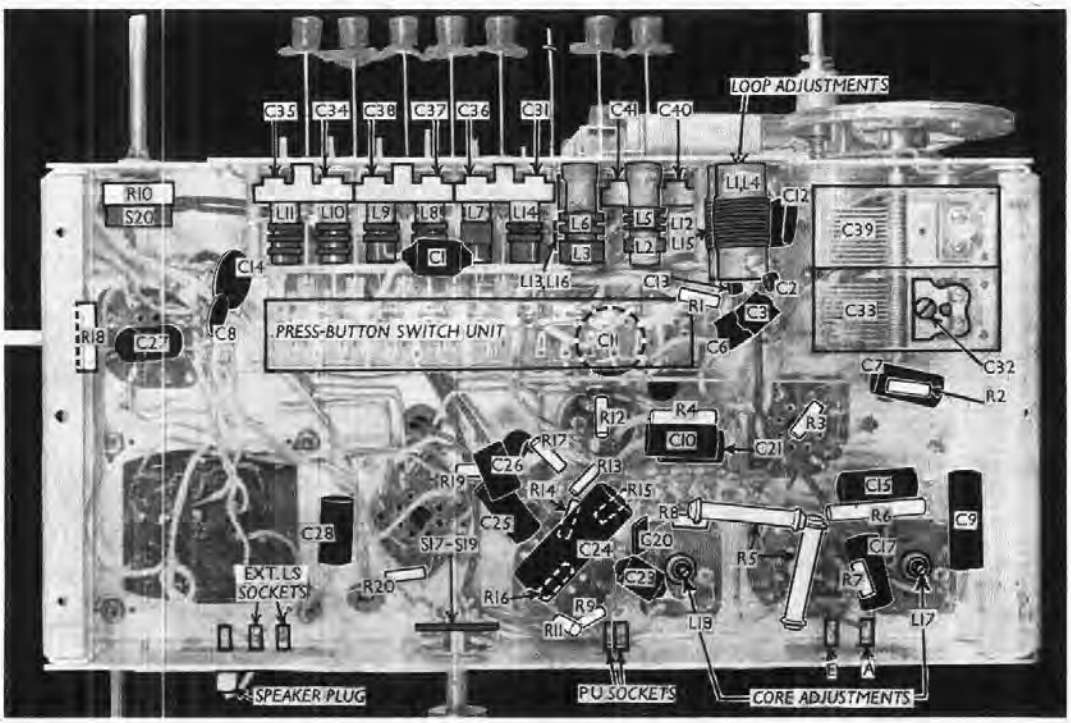
Scale Lamp.—This is an Osram MES type, rated at 6.5 V, 0.3 A, with a tubular bulb.

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

Condensers C16, C22, C29, C30.—These are four dry electrolytics (570 V nominal)



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. A detailed diagram showing both sides of the press-button switch unit appears at the foot of cols. 2 and 3 opposite, while a diagram of the **S17-S19** switch unit is shown in col. 5 below. The **L4** and **L12** loop adjustments are reached through holes in the front member of the chassis, as also are most of the pre-set trimmer condensers.

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 **C22** (4 μF); the green tag is the positive of **C16** (4 μF); the red tag is the positive of **C29** (16 μF), and the yellow tag is the positive of **C30** (8 μF).

Pick-up Sockets.—Two further sockets at the rear of the chassis are provided for connection of a gramophone pick-up. The radio/gram change switch unit is fitted between these and the speaker sockets.

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. Instructions for setting the pre-set station trimmers are given under "Staton Setting."

Chassis Divergencies.—In early models of this receiver, the radio/gram change switch unit was not incorporated. Instead, the lower socket was split; one half was connected to chassis, while the other half was connected via a 0.05 μF condenser to **V2** anode, so that when the plug was inserted, connecting the two halves, radio was muted.

In the makers' diagram a resistance of very low value (about 0.5 Ω) is shown connected in parallel with **L22.** Also, the switch **S17,** which was present in our chassis, is absent. **R5** consisted in our chassis of two 7,500 Ω resistances connected in series.

A 2.3 μμF (0.0000023 μF) condenser is shown in the makers' diagram, connected across the contacts of the switch **S2x.** It would act as a MW manual fixed trimmer, and would be returned to chassis via **S6x, S7x** and **S8x.** When the MW manual button was released, the condenser would be short-circuited by **S2x.**

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 **V2,** and chassis. Leave existing top cap connector in place.

Connect a damping shunt, consisting of a 35,000 Ω resistance and a 0.05 μF condenser in series, between **V2** anode and chassis, feed in a 465 KC/S signal, and adjust the core of **L20** (at top of can) for maximum output. Transfer damping shunt to connections of **L20,** and adjust **L19** (beneath chassis) for maximum output.

Transfer signal generator lead to **V1** top cap, leaving existing connector in place, and transfer damping shunt to **V1** anode and chassis. Adjust **L18** (at top of can) at the same frequency for maximum output. Transfer damping shunt to connections of **L18,** and adjust **L17** (beneath chassis) for maximum output. Repeat if necessary in same order.

RF and Oscillator Stages.—Check that the pointer covers the 192 m 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.

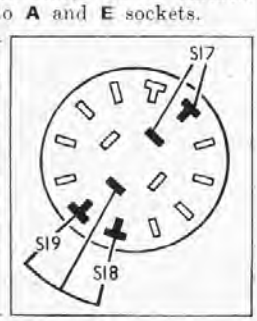


Diagram of the radio/gram change switch unit, as seen when viewed from the front of the underside of the chassis.

SW.—Switch set to SW, tune to 50 m on scale, and feed in a 50 m (6 MC/S) signal. Adjust loops of **L4** and **L12** for maximum output. Repeat until no further improvement results. Check sensitivity at 16.8 m (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 **C40** for maximum output. Tune to 210 m on scale, feed in a 210 m (1,429 KC/S) signal, and adjust **C32** for maximum output. Tune to 510 m on scale, feed in a 510 m (588 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 1,000 m on scale, feed in a 1,000 m (300 KC/S) signal, and adjust **C41,** then **C31,** for maximum output. Tune to 1,850 m on scale, feed in a 1,850 m (162.2 KC/S) signal, and adjust cores of **L14** and **L6** for maximum output. Repeat the 1,000 m 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 and 2, 1,250 to 2,000 m; 3 and 4, 310 to 540 m; 5, 200 to 350 m.

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.

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