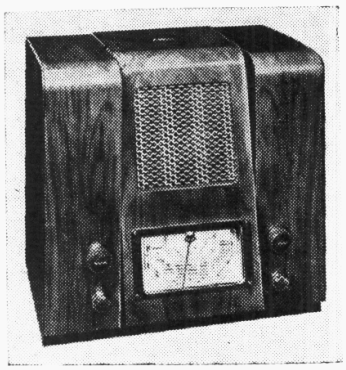
'TRADER' SERVICE SHEET

334

MARCONIPHONE 857 AND 861 RADIOGRAM



A SHORT-WAVE range of 13.5-50 m is covered by the Marconiphone 857 4-valve (plus rectifier) AC 3-band superhet, which is suitable for mains of 195-255 V, 50-100 C/S.

A very similar chassis is fitted in the 861 radio-gramophone, the differences being explained under "Radiogram Modifications," but this *Service Sheet* was prepared on an 857.

CIRCUIT DESCRIPTION

Aerial input via coupling condenser **C1** (SW), **L1, C2** and coupling coil **L3** (MW) or **L1, L2** and coupling coil **L4** (LW) to single tuned circuits **L5, C30** (SW), **L6, C30** (MW) and **L7, C30** (LW). **L1, L2, C2, C3** form a filter circuit to provide IF and image rejection.

First valve (**V1, Marconi X63**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L8** (SW), **L9** (MW) and **L10** (LW) are tuned by **C31**; parallel trimming by **C32** (MW) and **C33** (LW); series tracking by **C7** (SW), **C8** (MW) and **C9** (LW). Reaction by direct coupling to grid coils on all bands via coupling condenser **C12** assisted on SW by reaction coil **L11**.

Second valve (**V2, Marconi KTW63**) is a RF tetrode operating as intermediate frequency amplifier with tuned-primary tuned-secondary iron-cored transformer couplings **C34, L12, L13, C35** and **C36, L14, L15, C37**.

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 **R8** and passed via IF stopper **R9,** AF coupling condenser **C18** 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 **C15** between **V2** CG and chassis, the path to chassis being completed via the split PU socket upon insertion of plug.

Second diode of **V3,** fed from **L15** via **C20,** provides DC potentials which are developed across load resistances **R12, R13, R14** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control.

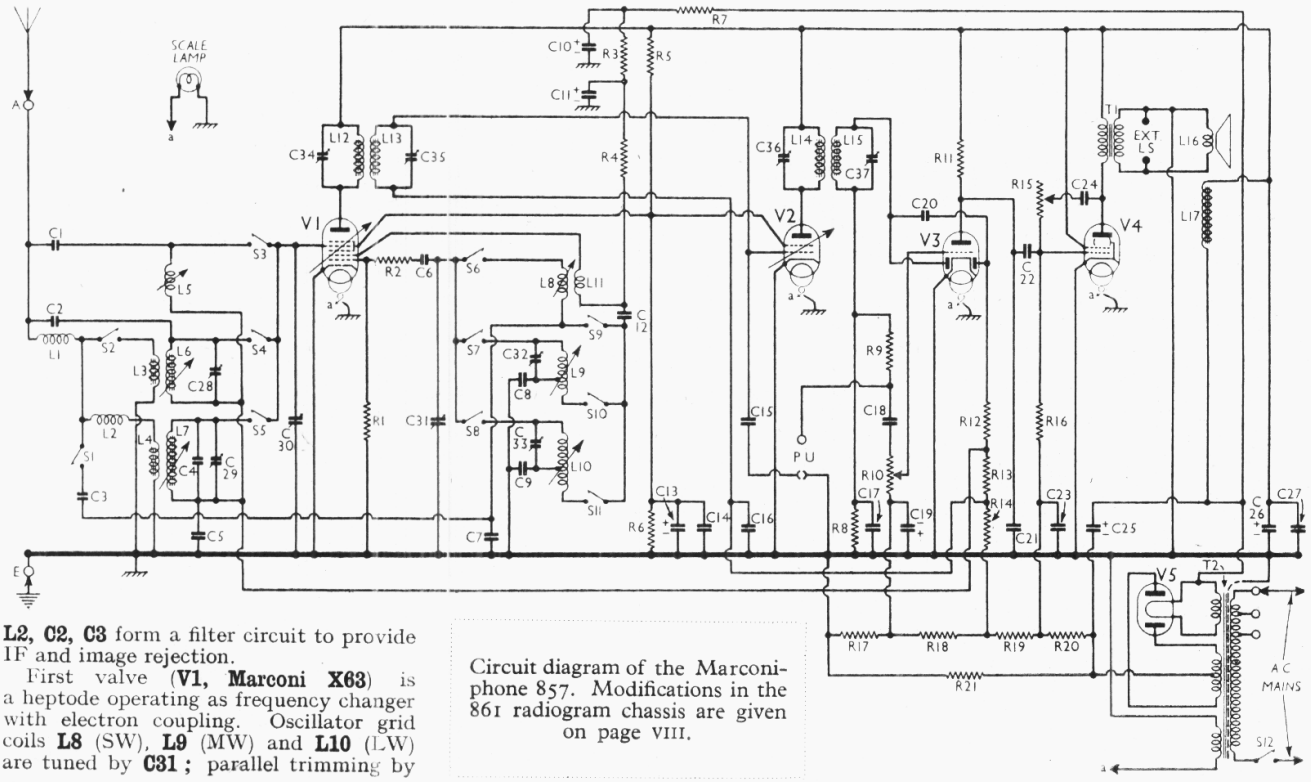
Resistance-capacity coupling by **R11, C22, R16** between **V3** triode and beam tetrode output valve (**V4, Marconi KT63**). Variable tone control by **R15** and **C24** between anode and grid circuits.

Voltage for bias potentials is developed across **R21** in HT negative lead to chassis, the individual potentials being obtained at junctions of resistances **R17, R18, R19, R20,** which form a potential divider across **R21,** to provide fixed GB for **V1** and **V2,** AVC delay voltage, **V3** triode GB and **V4** GB.

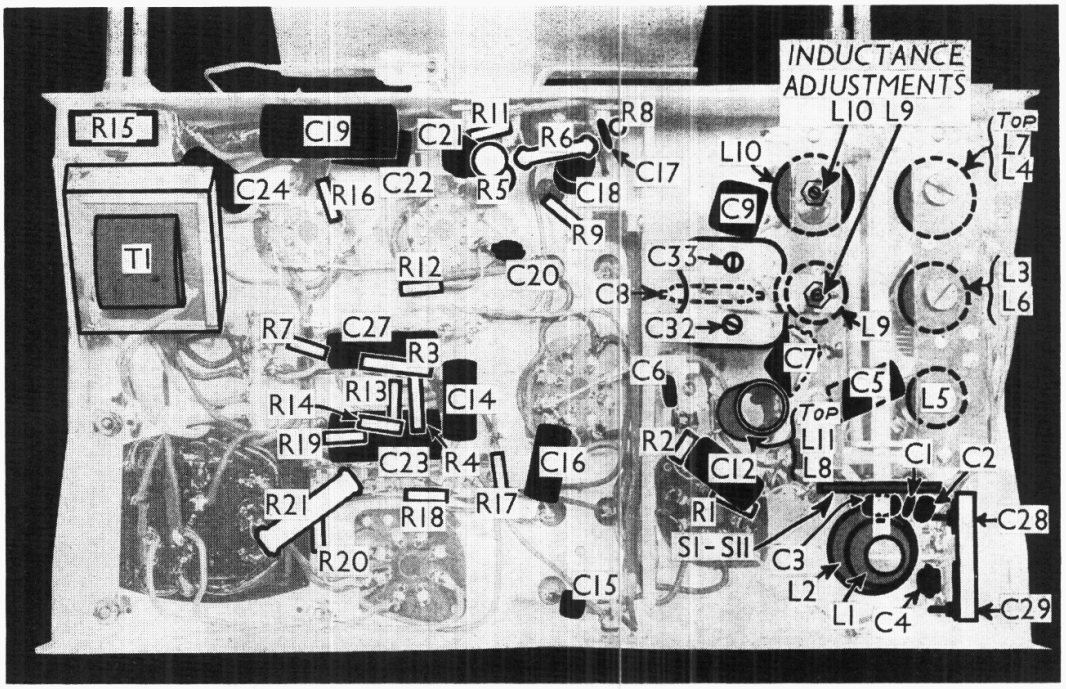
HT current is supplied by full-wave rectifying valve (**V5, Marconi U50**). Smoothing by speaker field **L17** and dry electrolytic condensers **C25, C26.**

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 osc. CG resistance	50,000
R2	V1 osc. CG stabiliser	75
R3	Part V1 osc. anode decoupling	15,000
R4	V1 osc. anode HT feed	15,000
R5	V1, V2 SG's HT potential divider resistances	23,000
R6		23,000
R7	Part V1 osc. anode decoupling	5,000
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 resistances	1,000,000
R13		500,000
R14		2,300,000
R15	Variable tone control	2,000,000
R16	V4 CG resistance	230,000
R17	Automatic bias potential divider for V1, V2 fixed GB; V3 triode, V4 GB; AVC delay	100,000
R18		100,000
R19		1,000,000
R20		100,000
R21		270



Circuit diagram of the Marconiphone 857. Modifications in the 861 radiogram chassis are given on page VIII.



Under-chassis view. Note the adjustments for the "spade" inductance trimmers of **L9** and **L10**. **L5** and **L8** are adjusted by loops of wire inside their formers. A diagram of the switch unit is given overleaf.

CONDENSERS		Values (μF)
C1	Aerial circuit SW coupling	0·000015
C2	Image rejector condensers	0·0000023
C3	Image rejector condensers	0·00005
C4	Aerial LW fixed trimmer	0·00005
C5	V1 tetrode CG decoupling	0·05
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*	V1 osc. anode decoupling	4·0
C11*	V1 osc. anode decoupling	4·0
C12	V1 osc. anode coupling	0·005
C13*	V1, V2 SG's decoupling	4·0
C14	V1, V2 SG's RF by-pass	0·05
C15	Radio muting condenser	0·0001
C16	V2 CG decoupling	0·05
C17	IF by-pass	0·0001
C18	AF coupling to V3 triode	0·001
C19*	V3 triode CG decoupling	50·0
C20	Coupling to V3 AVC diode	0·000075
C21	IF by-pass	0·00035
C22	V3 triode to V4 AF coupling	0·023
C23	V4 CG decoupling	0·23
C24	Part of variable tone control	0·001
C25*	HT smoothing	16·0
C26*	HT smoothing	8·0
C27	HT circuit RF by-pass	0·1
C28‡	Aerial circuit MW trimmer	—
C29‡	Aerial circuit LW trimmer	—
C30†	Aerial circuit tuning	—
C31†	Oscillator circuit tuning	—
C32‡	Osc. circuit MW trimmer	—
C33‡	Osc. circuit LW trimmer	—
C34‡	1st IF trans. pri. tuning	—
C35‡	1st IF trans. sec. tuning	—
C36‡	2nd IF trans. pri. tuning	—
C37‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set

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

OTHER COMPONENTS (*Continued*)		Approx. Values (ohms)
L16	Speaker speech coil	3·0
L17	Speaker field coil	1,660·0
T1	Output trans. Pri.	280·0
T1	Output trans. Sec.	0·5
T2	Mains trans. Pri., total	30·0
T2	Mains trans. Heater sec.	0·1
T2	Mains trans. Rect. heat. sec.	0·1
T2	Mains trans. HT sec., total	690·0
S1-S11	Waveband switches	—
S12	Mains switch, ganged R10	—

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the tuning knob (recessed grub screw) and the other three knobs (recessed self-tapping screws) and then remove the four bolts (with washers and spring washers) holding the chassis to the bottom of the cabinet.

Now free the speaker leads from the cleat on the sub-baffle, when the chassis can be withdrawn to the extent of the speaker leads. Before access can be gained to the coil and switch compartment it will be necessary to remove the screen (three round-head self-tapping screws).

When replacing, see that there is a metal washer on each of the chassis fixing bolts, between the chassis and the cabinet bottom, and note that the cap for the valve screen goes on **V1.**

To free the chassis entirely, unsolder the speaker leads and *when replacing*, connect them as follows, noting that the tags are numbered :—7, red; 6, red/black; 4, yellow; 3, no external connection; 1 and 2 joined, black.

Removing Speaker.—If it is necessary to remove the speaker from the cabinet, unsolder the leads, and remove the nuts and washers from the three screws holding the speaker to the sub-baffle. *When replacing*, see that tags 1 and 4 are at the top and connect the leads as above.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 228 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	238	1·9	76	2·8
	Oscillator			
	185	4·0		
V2 KTW63	238	5·3	76	1·0
V3 DH63	120	1·2	—	—
V4 KT63	227	34·0	238	5·3
V5 U50	335†	—	—	—

† Each anode, AC.

GENERAL NOTES

Switches.—**S1-S11** are the waveband switches, in a single rotary unit beneath the chassis, indicated in our under-chassis view, and shown in detail in the diagram on page VIII. The table (p. VIII) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

S12 is the QMB mains switch, ganged with the volume control **R10.**

Coils.—**L1, L2; L3, L6; L4, L7; L5; L8, L11; L9;** and **L10** are in seven unscreened units beneath the 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, whose positions are varied by means of

Continued overleaf

MARCONIPHONE 857—*Continued*

screw adjusters, indicated in our under-chassis view.

L12, L13 and **L14, L15** are the IF transformers, in two screened units on the chassis deck, with their associated trimmers.

Scale Lamp.—This is an Osram MES type, rated at 6·5 V, 0·3 A, and fitted with a frosted bulb.

External Speaker.—No sockets are provided for this, but a low impedance (5 O) type can be connected to tags 1 and 5 on the internal speaker panel.

Internal Speaker.—It will be noted that our diagram shows no hum neutralising coil in series with **L16** and **T1** secondary. Actually, the speaker in our receiver was fitted with such a coil, connected to tags 3 and 4, but it was short-circuited by a wire between these two tags, and hence is not shown in the diagram. It is understood that in later models the coil will be omitted entirely.

Pick-up.—Sockets are provided for this, a Marconi model 25 being recommended. It should have a 7,500 O resistor wired in parallel with it.

Note that the lower pick-up socket is split, and when the plug is inserted **C15** is connected to chassis, and so mutes radio. To revert to radio reception, *both* pick-up plugs should be removed.

Condenser 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 condensers **C10, C11, C13, C25** and **C26**. The coding of the leads is: Brown, negative of **C25** (16 μF); red, positive of **C25**; black, negative of all the other condensers; yellow, positive of **C26** (8 μF); blue, positive of **C13** (4 μF); green lead to junction of **R3, R7,** positive of **C10** (4 μF); green lead to junction of **R3, R4,** positive of **C11** (4 μF). The unit is a Dubilier type 3231.

Condenser C19.—Note that the positive of this electrolytic goes to chassis.

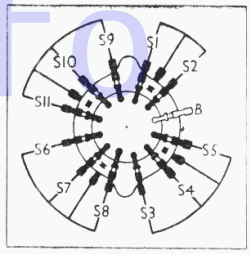
Bearer Tag.—One end of **R9** is connected to an insulated bearer tag, which looks like a small moulded condenser, but is not one.

Valve Connections.—Base connections for the octal valves used were given on page 1 of *Radio Maintenance* for November 13, 1937.

TABLE AND DIAGRAM OF THE SWITCH UNIT

Switch	SW	MW	LW
S1	—	—	C
S2	—	C	—
S3	C	—	—
S4	—	C	—
S5	—	—	C
S6	C	—	—
S7	—	C	—
S8	—	—	C
S9	C	—	—
S10	—	C	—
S11	—	—	C

Switch diagram, looking from the rear of the underside of the chassis.



RADIOGRAM MODIFICATIONS

The radiogram model 861 employs 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 **R5, R6,** and this switch closes on radio and opens on gram., thus muting radio. **C15** and the split pick-up socket is therefore not used.

The top of **R10** is disconnected from **C18** 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 condenser, to one of the pick-up sockets. On radio, **C18** and **R10** are joined, as in our diagram, while on gram. **C18** is disconnected, and the pick-up, via the extra condenser, is connected to the top of **R10.**

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 0·015 μF condenser and 10,000 O resistance in parallel. The pick-up has a DC resistance of 850 O.

The radiogram model includes external speaker sockets, and a plug and socket arrangement for muting the internal speaker. 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 O.

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 condenser to fixed vane tag of **C30** and chassis, leaving top cap connection of **V1** in place. Feed in a 465 KC/S signal, and adjust **C34, C35, C36** and **C37** in that order for maximum output. Check these adjustments.

RF and Oscillator Stages.—The scale must be positioned so that the pointer spindle hole is exactly concentric with the spindle, and the scale is square in its frame. With gang at maximum, pointer must coincide exactly with the small black spot at the top 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 (black spot). Feed in a 225 m (1,333 KC/S) signal and adjust **C32** for maximum output. Tune to 530 m on scale (black 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 **C28** 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 coil mounting strip, and the rubber bush bearing on the core. The core may now be rotated by turning the tool.

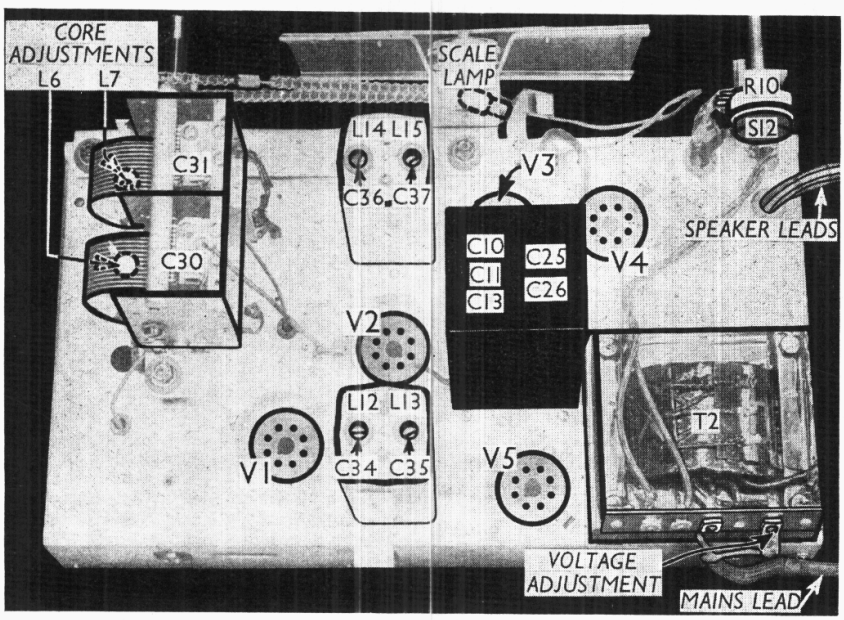
Repeat the adjustments of **C28** and **L6.**

LW.—Switch set to LW, tune to 1,100 m on scale, and feed in a 1,100 m (272·7 KC/S) signal. Adjust **C33** for maximum output. Tune to 1,900 m on scale, 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 **C29** 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 **C29** 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 **C29** if necessary.

SW.—Switch set to SW, 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.

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



Plan view of the chassis. Note the holes through which **L6** and **L7** can be adjusted.

Printed in Great Britain as a supplement to *The Wireless & Electrical Trader* by Sanders Phillips & Co., Ltd., The Baynard Press, Chryssell Road, London, S.W.9