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"TRADER" SERVICE SHEET

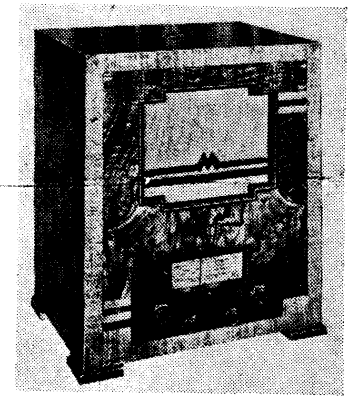
518

REVISED ISSUE OF SERVICE SHEET No. 8

MARCONIPHONE & H.M.V.

262, 272, 274, 286 & 288

438, 440, 512, 540 & 542



The Marconiphone 262 superhet.

THIS *Service Sheet* is a re-issue of our *Service Sheet* No. 8, which is now right out of print and for reprints of which a large demand is still experienced. In preparing this re-issue, the opportunity has been taken to revise and amplify the information in *Service Sheet* No. 8 and to arrange it in a manner which conforms to our standard method of presentation.

The Marconiphone model 262 is a 4-valve (plus rectifier) 2-band table superhet, designed to operate from AC mains of 200-250V, 40-100 C/S.

The circuit includes image suppression, bass compensation, and a dual volume control which, however, is not used on gramophone operation, for which provision is made. It was designed before the introduction of automatic volume control and multiple-type valve frequency changers. Provision is made for the connection of an external speaker.

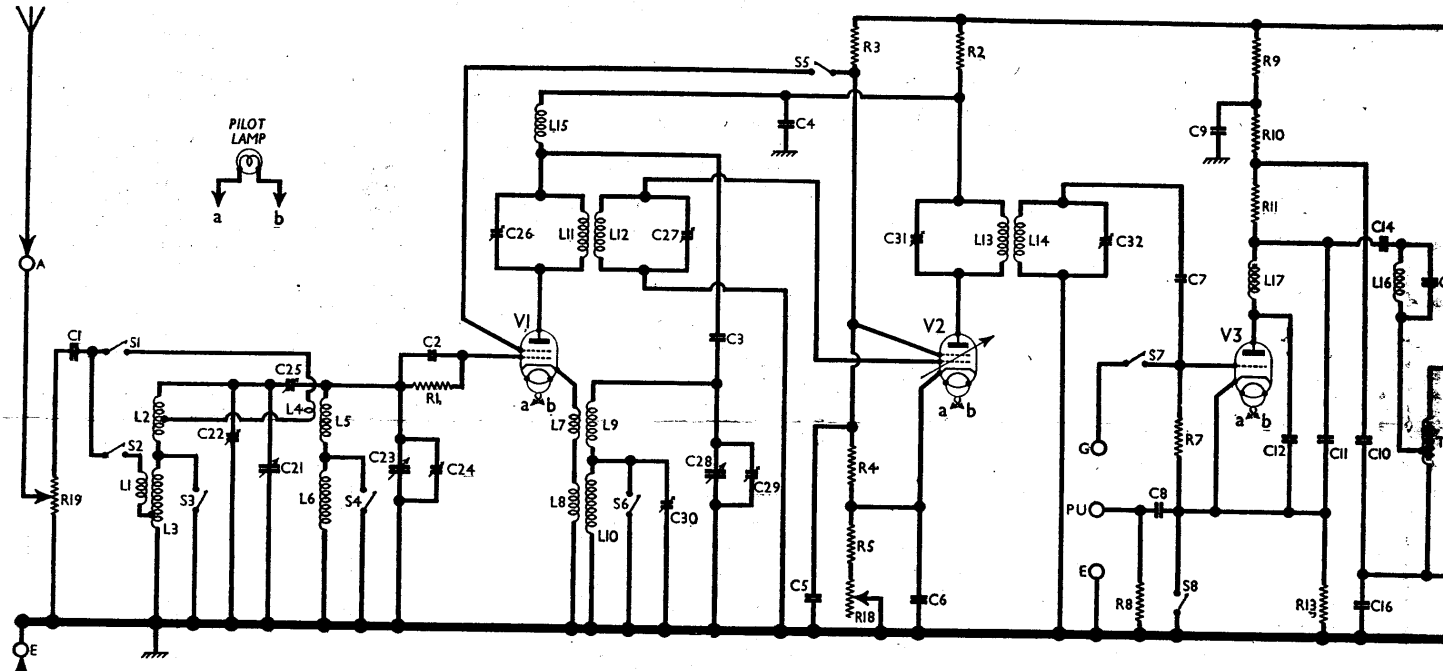
An identical chassis is employed in the 272 table model, in the 274 and 286 radiograms, and in 288 autoradiogram. It was also used in the equivalent HMV 438 and 440 table models, in the HMV 512 and 540 radiograms, and in the HMV 542 autoradiogram.

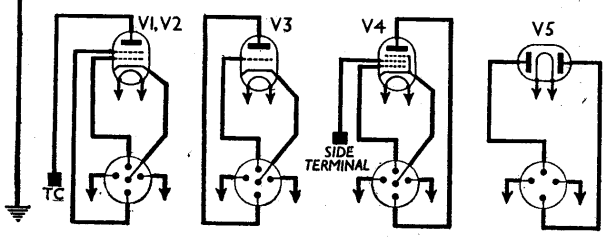
The Marconiphone 272 and HMV 438 were originally released in 1933.

CIRCUIT DESCRIPTION

Aerial input via one section **(R19)** of dual volume control, **C1** and image suppressor coil **L4** (MW) or coil **L1** (LW), to inductively coupled band-pass filter. Primary coils **L2** (MW), and **L3** (LW) are tuned by **C21**; secondaries **L5, L6** by **C23.** Image suppression by **L4** and preset condenser **C25.**

First valve **(V1, Marconi MS4B)** is an RF tetrode operating as frequency changer with cathode injector coupling. Oscillator circuit tuning coils **L9** (MW) and **L10** (LW), coupled to the anode by **C3** and **L15,** are tuned by **C28.** Parallel trimming by **C29** (MW) and **C30** (LW); tracking by specially shaped vanes of **C28.** Reaction by injector coils **L7, L8** in cathode circuit.





Circuit diagram of the Marconiphone 262 superhet. **R18** and **R19** are ganged to form the volume control. The lettering round the speaker circuit agrees with that on the speaker connecting panel. There is no **R6, R12** or **R15** in the diagram. The pick-up sockets are marked **G** and **PU,** while the third socket **E** is for the pick-up screening lead. In some chassis, **L17** may be replaced by a 10,000 O resistance, and another coil and a condenser may be connected across **L4.**

Second valve **(V2, Marconi metallised VMS4)** is a variable-mu RF tetrode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C26, L11, L12, C27** and **C31, L13, L14, C32.**

Intermediate frequency 125 KC/S.

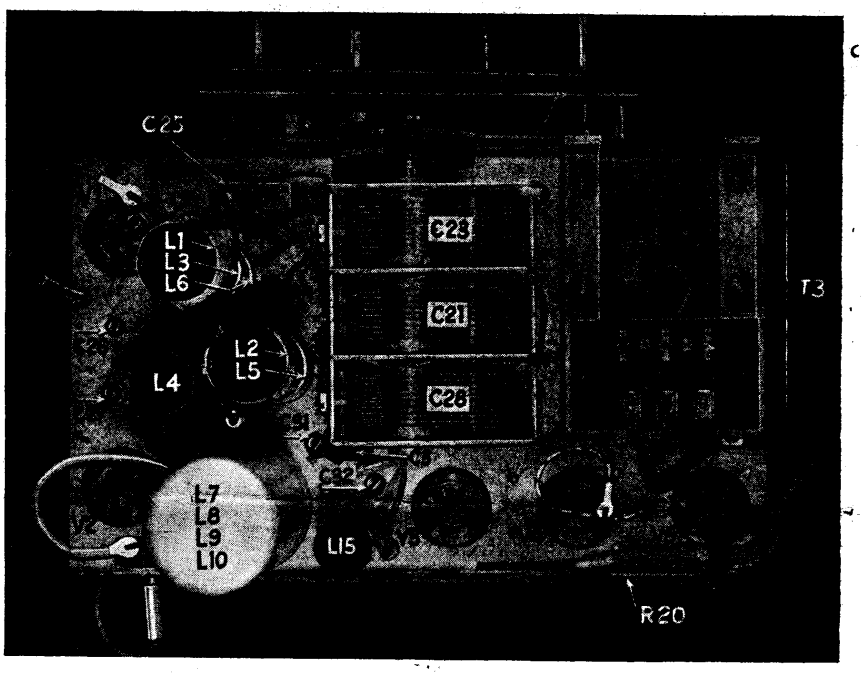
Gain control by variable resistance **R18,** which is ganged with **R19,** in cathode circuit.

Third valve **(V3, Marconi metallised MH4)** is a triode operating as power grid detector with **C7, R7. R7** is returned directly to cathode and, on radio, **S8** short-circuits **R13.** Provision, however, is made for connection of a gramophone pick-up between the control grid and, via **R8,** chassis, and during gramophone operation **S8** opens, so that **R7,** the pick-up and **R8** form a potential divider across **R13** to provide the necessary GB to operate **V3** as an AF amplifier. At the same time **S5** opens, disconnecting **V1** SG from the HT supply and muting radio. IF filtering by **L17, C11** and **C12** in anode circuit.

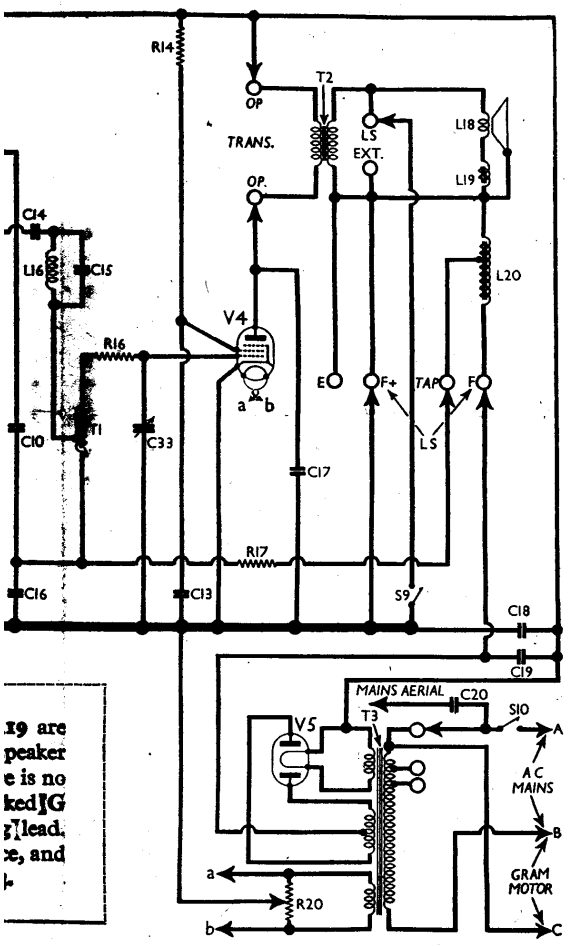
Parallel-fed auto-transformer coupling by **R10, R11, C14** and **T1,** via tone compensating filter **L16, C15,** between **V3** and pentode output valve **(V4, Marconi MPT4).** Variable tone control by **R16** and variable condenser **C33** in control grid circuit. A small percentage of the signal in this circuit, predominantly low-frequency, appears across **C16** and is coupled back via **C10** and **R10** to **V3** anode circuit to produce a bass-boosting effect. Fixed tone correction by **C17** in **V4** anode circuit. Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T2.**

HT current is supplied by full-wave rectifying valve **(V5, Marconi U12).** Smoothing by speaker field **L20,** in negative HT lead to chassis, and condensers **C18, C19.** Provision for use of mains aerial via **C20.**

Potential at tapping on **L20** is fed back via decoupling resistance **R17** as GB to **V4** CG circuit. Switch **S9** closes between rest positions of the wavechange switch control and mutes the receiver by short-circuiting the speech coil circuit during the process of wave-changing. The low resistance potentiometer **R20** is connected across the heater circuit to balance out any hum voltages that may be present.



Plan view of the chassis. **L4** is mounted on a slotted bracket near the chassis deck. On some models another coil and a condenser may be mounted with it on a vertical slotted bracket.



COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 CG resistance	2,000,000
R2	V1, V2 anodes decoupling	5,000
R3	V1, V2 SG's potential divider	35,000
R4		23,000
R5	V2 fixed GB resistance ...	350
R6*		—
R7	V3 grid leak	1,000,000
R8	V3 CG decoupling ...	1,000,000
R9	V3 anode decoupling ...	10,000
R10	V3 anode load resistances	10,000
R11		23,000
R12*		—
R13	V3 (gram) GB resistance	500
R14	V4 SG HT feed	10,000
R15*		—
R16	Part variable tone control	250,000
R17	V4 CG decoupling ...	250,000
R18	Volume control, ganged ...	18,000
R19		25,200
R20	Hum neutralising control	50

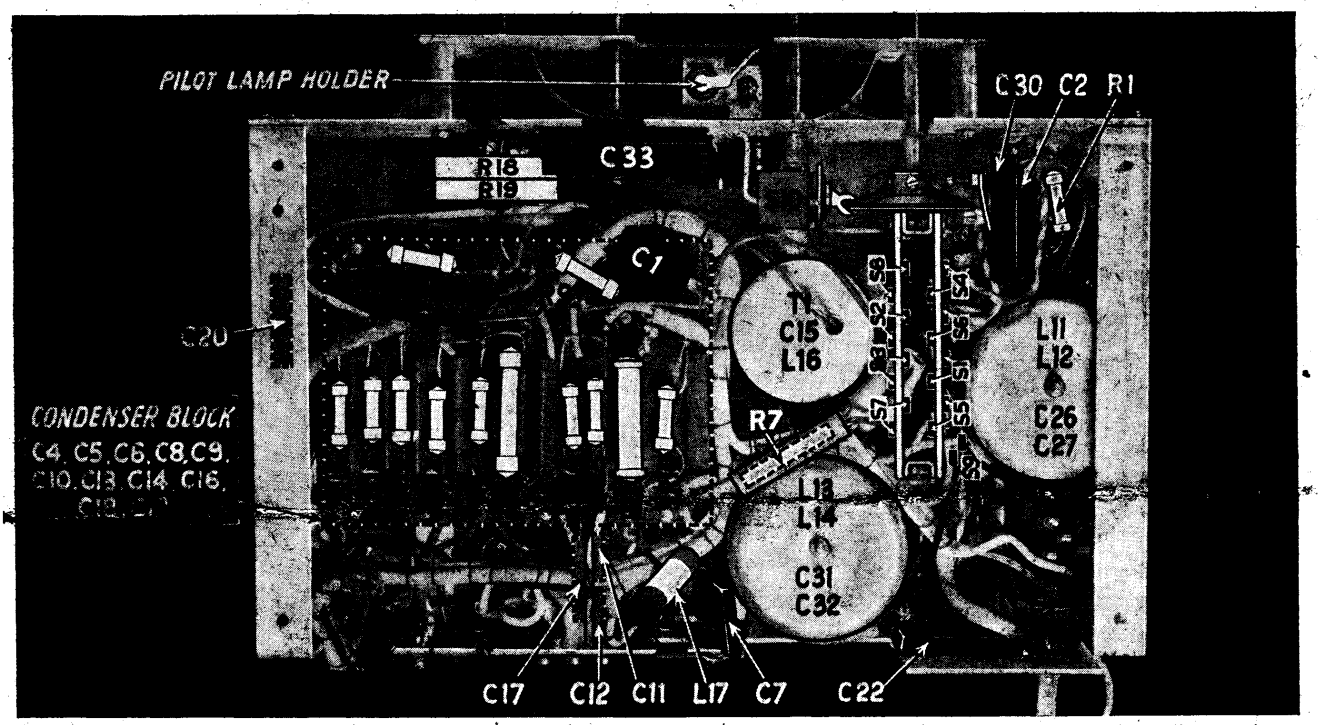
* Not in circuit diagram.

	CONDENSERS	Values (μF)
C1	Aerial coupling condenser	0·0005
C2	V1 CG condenser... ...	0·00005
C3	V1 osc. anode coupling ...	0·0001
C4*	V1, V2 anodes decoupling	1·0
C5*	V1, V2 SG's decoupling ...	1·0
C6*	V2 cathode by-pass ...	0·1
C7	V3 CG condenser... ...	0·00005
C8*	V3 CG decoupling ...	1·0
C9*	V3 anode decoupling ...	1·0
C10*	Part feed-back coupling...	2·0
C11	V3 anode RF filter condensers	0·002
C12		0·002
C13*	V4 SG decoupling ...	1·0
C14*	AF coupling to T1 ...	0·1
C15	Part of tone filter	0·0003
C16*	Part feed-back coupling...	2·0
C17	Fixed tone corrector ...	0·002
C18*	HT smoothing condensers	2·0
C19*		5·0
C20	Mains aerial coupling ...	0·0003
C21†	Band-pass pri. tuning ...	—
C22‡	Band-pass pri. MW trimmer	—
C23†	Band-pass sec. tuning ...	—
C24‡	Band-pass sec. MW trimmer	—
C25‡	Image suppressor ...	0·000005
C26‡	1st IF trans. pri. tuning...	—
C27‡	1st IF trans. sec. tuning...	—
C28†	Oscillator circuit tuning...	—
C29‡	Osc. circ. MW trimmer ...	—
C30‡	Osc. circ. LW trimmer ...	—
C31‡	2nd IF trans. pri. tuning .	—
C32‡	2nd IF trans. sec. tuning...	—
C33†	Variable tone control ...	0·00065

* In condenser block. † Variable. ‡ Pre-set

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial LW coupling coil	72·0
L2	Band-pass primary coils	3·5
L3		13·0
L4	Image suppressor coil ...	0·1
L5	Band-pass secondary coils	3·5
L6		13·0
L7	Oscillator reaction coils...	0·25
L8		0·5
L9	Osc. circ. MW tuning coil	5·0
L10	Osc. circ. LW tuning coil	5·0

(*Continued overleaf*)



Under-chassis view. The position of the condenser block is indicated by an arrow and dotted lines. The diagram in cols. 5 and 6 opposite shows the internal connections. All the switches are indicated here. The connections of the **S1-S9** unit switches are shown, and their action is seen from the table in col. 3 below.

OTHER COMPONENTS (*continued*)		Approx. Values (ohms)
L11	1st IF trans. Pri.	100·0
L12	1st IF trans. Sec.	100·0
L13	2nd IF trans. Pri.	100·0
L14	2nd IF trans. Sec.	100·0
L15	V1 osc. coupling coil	95·0
L16	Part of tone filter	—
L17	V1 anode RF filter coil	240·0
L18	Speaker speech coil	—
L19	Hum neutralising coil	—
L20	Speaker field coil, total	2,250·0*
T1	Intervalve auto-transformer, total	4,000·0
T2	Speaker input trans. Pri.	750·0
	Speaker input trans. Sec.	2·0
T3	Mains trans. Pri., total	29·2
	Mains trans. Heater sec.	0·1
	Mains trans. Rect. heat sec.	0·15
	Mains trans. HT sec., total	720·0
S1-S4	Waveband switches	—
S6		—
S5	Radio muting switch	—
S7, S8	Radio/gram change switches	—
S9	Wave-change muting switch	—
S10	Mains switch	—

* Tapped at 250 Ω from chassis.

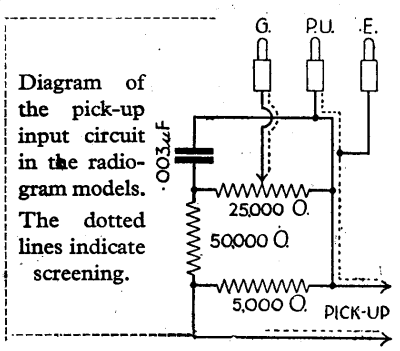


Diagram of the pick-up input circuit in the radio-gram models. The dotted lines indicate screening.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those to be found in the average receiver when the mains voltage tapping is properly adjusted and the receiver is switched to medium waves. Where two values are given, the first is taken with the volume control at minimum and the second with the control at maximum.

Voltages were measured on the 1,200 V scale of a Universal Avometer; the same readings will be obtained using the 400 V scale of the model 7 Universal Avometer.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 MS4B	200–180	4·0–2·0	120–70	1·0–0·1
V2 VMS4	220–190	0·1–5·5	120–70	0·1–2·4
V3 MH4	75	2·8	—	—
V4 MPT4	220	30·0	175	6·0
V5 U12†	—	—	—	—

† Heater to chassis, 240 V, DC; heater to HT negative (HT secondary CT on T3), 355.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed screws);
remove the millboard back cover (three large slotted screws) and the wooden strip below (two large slotted screws);
remove the four bolts holding the chassis to the bottom of the cabinet.
If the speaker leads are now freed from the clips on the walls of the cabinet, the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.
To free chassis entirely, free the speaker leads from the terminals on the speaker connecting panel.

When replacing, connect the speaker leads as indicated in the diagram in column 5, or, if the connecting panel is so marked, according to the colours marked on it.

Removing Speaker.—Remove the four hexagon nuts holding the speaker to the sub-baffle, but do not disturb the cross-headed ornamental screws.

GENERAL NOTES

Switches.—S1-S9 are the waveband, radio/gram and speaker muting switches in a leaf-type unit beneath the chassis. **S1-S4** and **S6** are the waveband switches, and **S5, S7, S8** the radio/gram change switches. **S9** closes during the process of waveband-switching and produces a silent wave-change operation.

The unit is indicated in our under-chassis view, where the tags of the individual switches are identified. The table below gives the switch positions for three of the four control settings, starting from the "off" position and turning clockwise. The fourth position is "Off." A dash indicates open, and **C**, closed.

S10 is the QMB mains switch, which is operated by a cam disc on the **S1-S9** control spindle.

Coils.—L1, L3, L6; L2, L5; and **L4** are

Switch Table

Switch	Gram	MW	LW
S1	—	C	—
S2	—	—	C
S3	C	C	—
S4	C	C	—
S5	—	C	C
S6	C	C	—
S7	C	—	—
S8	—	C	C
S9*	—	—	—

* Closed between settings only.

in three unscreened tubular units on the chassis deck, while the oscillator coils **L7-L10** are in a screened unit, also on the chassis deck, with the small choke **L15** beside it. The IF transformers **L11, L12** and **L13, L14** are in two screened units beneath the chassis with their associated tuning condensers, whose adjustments are reached through holes in the chassis deck. **L17** is a small tubular unit in the middle at the rear beneath the chassis, while the tone compensating filter coil **L16,** with its condenser **C15,** is in the same container as **T1** beneath the chassis.

Pilot Lamp.—This is a 6.2V, 0.3A MES type lamp. It may be replaced without disturbing the chassis if the perforated metal plate in the bottom of the cabinet is removed. Its bracket, which has a key-hole slot, may then be removed if the thumb-screw holding it is loosened.

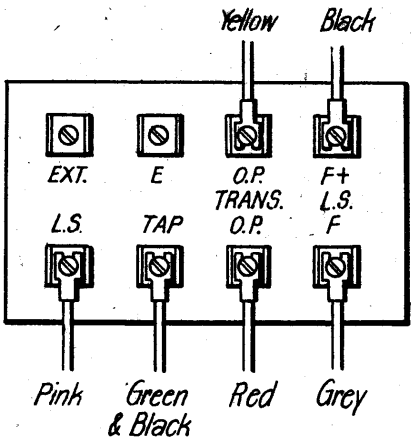
Pick-up Connections.—Three sockets are provided at the rear of the chassis for a gramophone pick-up. The socket marked **G** is at the high-potential end of the circuit; **PU** is at the low-potential end, but is isolated from chassis. The third socket, marked **E,** is connected to chassis to provide an earthing connection for the screening and other free metal parts of the pick-up unit.

Since the volume control in the receiver does not operate on gram, an external volume control should be fitted with the pick-up. A circuit somewhat after the style of that shown for the radiogram model in column 1 should be used, although the 5,000 Ω resistance and the 0.003 μF condenser may be omitted. If the pick-up is a Marconiphone model 19, the volume control should be 1,000-1,500 Ω instead of 25,000 Ω, and the series resistance 2,000 Ω instead of 50,000 Ω. No other components are then necessary. For a model 25 pick-up, the volume control should be about 100,000 Ω with a series resistance of 500,000 Ω.

External Speaker.—A low impedance (6-12 Ω) speaker may be connected to the two terminals marked **Ext.** and **LS** on the panel on the speaker assembly (see diagram in next column), or a high impedance speaker may be connected to those marked **OP.** It should be borne in mind that the latter pair are "live" to the HT circuit.

Condenser Block.—This is mounted beneath the chassis deck, and is concealed from view in our under-chassis illustration by its connecting panel and an assembly of resistances, but its position is indicated by an arrow. It contains eleven condensers, whose connections are shown in the diagram in cols. 5 and 6, where the numbers of the tags to which they are connected are seen. The diagram is drawn as seen when viewed from the rear of the underside of the chassis. In some chassis it may be found that **C19** is connected between tag 4 and the horizontal tag immediately above tag 13 in our diagram, instead of between tags 4 and 3. These arrangements may be identified by two white leads connecting **R5** with **R18.**

Chassis Divergencies.—Apart from the alteration to the condenser block connection mentioned above, other divergencies may be found. The place of **L17** in **V3** anode circuit may be taken by a 10,000 Ω resistance. **L4** may be mounted on a vertical bracket, which is mounted on the deck. Where this is so, a second coil and a fixed condenser will also be found with it. The second coil and condenser are then connected in series across **L4,** and the image suppressor condenser **C25** will not be present.



Sketch of the speaker connecting panel, showing the lead colours.

In some cases, also, the three mains terminals on **T3** will not be marked **A, B** and **C,** but in such cases the connections will be clearly indicated by the markings "Mains" and "Motor" between the respective terminals. Where the original purchaser required it, the primary winding of **T3** was specially wound and tapped for mains of 100-260V.

RADIOGRAM MODIFICATIONS

Marconiphone models 274 and 286, and HMV models 512 and 540 are radiograms; Marconiphone 288 and HMV 542 are auto-radiograms.

Their chassis are identical with those of the table models but their mains frequency range is restricted to 50-60 C/S. Their motor leads are connected to the terminals marked **B** and **C** on **T3,** where the panel is so lettered, or to the terminals marked "motor" in other cases. These terminals are connected directly across **T3** primary winding, so that a single voltage adjustment automatically suffices for receiver and motor.

The pick-up plugs are inserted in the three sockets on the panel at the rear of the chassis, the black plug going into the socket marked **E.** The diagram in col. 1 shows the pick-up network in the radiogram models.

CIRCUIT ALIGNMENT

IF Stages.—Short-circuit **L7, L8** by connecting **V1** cathode (centre pin) to chassis, and loosely couple the signal generator output to **V1** control grid circuit via the leads associated with **C25.** Feed in a 128 KC/S (2,340 m) signal, and adjust **C26** and **C31** for maximum output. Feed in a 123 KC/S (2,440 m) signal, and adjust **C27** for maximum output. Feed in a 125.5 KC/S (2,390 m) signal, and adjust **C32** for maximum output. Repeat these adjustments, always in the same order.

RF and Oscillator Stages.—Transfer signal generator leads to **A** and **E** sockets via a suitable dummy aerial. If the scale pointer does not register correctly, it may be adjusted after freeing its drive drum (cheese-head screw).

MW.—Switch set to MW, tune to 210 m on scale. Unscrew **C25** several turns, and screw up **C24** fully. Feed in a 210 m (1,430 KC/S) signal, and adjust **C29,** then **C22** (near aerial socket), for maximum output. Now adjust **C24** for maximum output, and check whether receiver is "lively" below 240 m. If it is not, **C24** has been unscrewed too far, and must be tightened up a little.

LW.—Switch set to LW, tune to 1,000 m on scale, feed in a 1,000 m (300 KC/S) signal, and adjust **C30** for maximum output.

Any subsequent disturbance of the wiring is liable to throw the receiver out of alignment.

Image Suppressor.—Switch set to MW, tune to 315 m on scale, feed in a strong 250 m (1,200 KC/S) signal. Find the image point by slight adjustment of the tuning control if necessary, and adjust **C25,** with a non-metallic screwdriver, for *minimum* output. Feed in a 350 m (860 KC/S) signal, tune in its image at about 496 m, and adjust **L4** on its slotted bracket for minimum output.

Care should be exercised with the wiring of **C25,** as its capacity is very small, and disturbance may carry the adjustment beyond the range of the condenser.

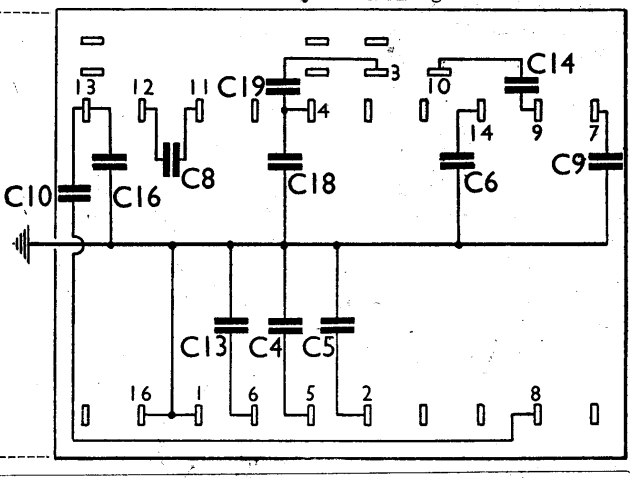


Diagram of the internal connections of the condenser block, drawn as seen when viewed from the rear of the underside of the chassis. The lead to tag 3 may in some cases be taken instead to the tag just above tag 13.

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