

NUMBER 143

'TRADER' SERVICE SHEETS

MARCONIPHONE 234  
(AND 257) BATTERY SUPERHET

Of the battery-operated type, the Marconiphone 234 is a 4-valve superhet with a heptode frequency changer, a variable-mu tetrode I.F. amplifier, a double diode triode and a double pentode output valve. Provision is made for the use of a gramophone pick-up. Model 257 is a similar receiver, and the same service instructions apply.

CIRCUIT DESCRIPTION

Two alternative aerial connections (A2 via fixed series condenser C1) to coupling coil L2. Series resistance R1 works in conjunction with switch S1 to give local-distant sensitivity control. Tuned filter L1, C15 across aerial-earth circuit, forms an acceptor trap designed to by-pass interference of similar wavelength to the intermediate frequency. Image suppression by small pre-set condenser C16.

Single tuned circuit L3, L4, C17 precedes first valve, a heptode (V1, Marconi metallised X21) operating as frequency changer with electron coupling. Oscillator grid coils L5, L6 tuned by C19; tracking by shaped plates and condenser C4 (L.W.); anode reaction coils L7, L8.

Second valve, a variable-mu H.F. tetrode (V2, Marconi metallised VS24) operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings C22, L9, L10, C23 and C25, L11, L12, C26. Pre-set condenser C24 and small coupling X enable a degree of I.F. reaction to be applied.

Intermediate frequency 456 KC/S.

Diode second detector is part of a double diode triode valve (V3, Marconi

metallised HD21). Audio-frequency component in rectified output is developed across manual volume control R5 and passed via coupling condenser C8 and I.F. filter R7, C10 to C.G. of triode section which operates as L.F. amplifier. Provision for connection of gramophone pick-up across volume control by switch S5. On gramophone, switch S6 breaks V1 and V2 S.G.'s H.T. feed circuit, thus muting radio.

Second diode of V3, fed from tapping on primary of second I.F. transformer, provides D.C. potential which is developed across R10 and fed back through decoupling circuit as G.B. to F.C. and I.F. valves, giving automatic volume control.

Parallel fed transformer coupling by R9, C12 and T1 to quiescent push-pull output stage comprising a double pentode valve (V4, Marconi QP21). Resistance R11 prevents parasitic oscillations. Tone correction by fixed condenser C14. Provision for connection of low-impedance external speaker across secondary of internal speaker transformer T2.

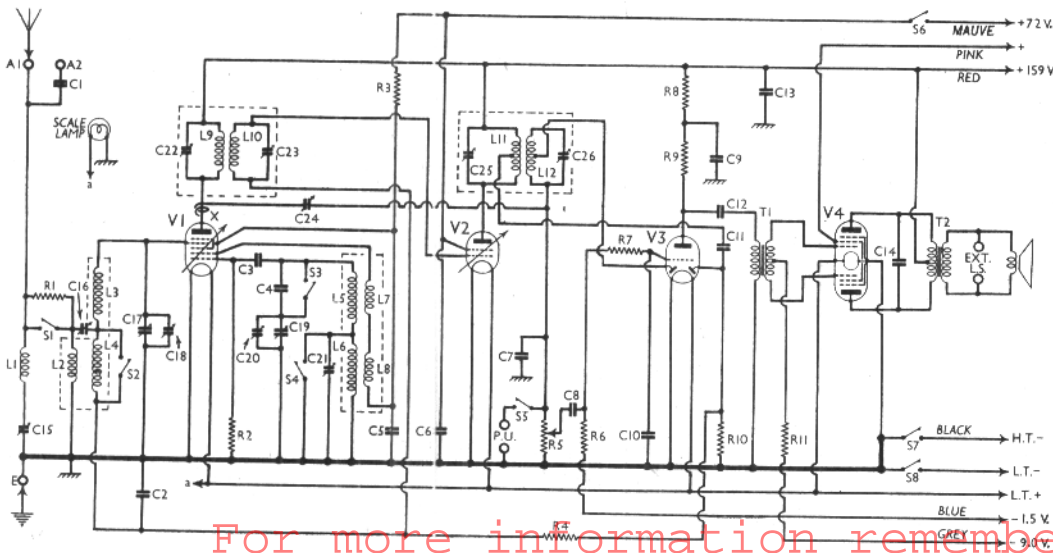
COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	Aerial series resistance	75,000
R2	V1 osc. C.G. resistance	50,000
R3	V1 S.G. and osc. anode H.T. feed	23,000
R4	V1, V2 A.V.C. line decoupling	500,000
R5	Manual volume control	500,000
R6	V3 triode C.G. resistance	1,000,000
R7	V3 triode C.G. I.F. stopper	23,000
R8	V3 triode anode decoupling	7,500
R9	V3 triode anode load	50,000
R10	V3 A.V.C. diode load	500,000
R11	V4 C.G.'s circuits stabiliser	230,000

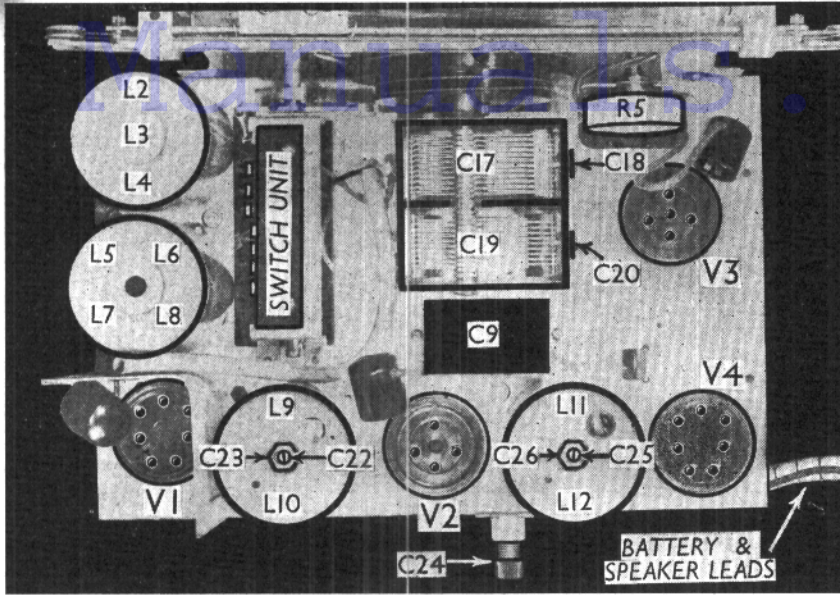
CONDENSERS		Values (µF)
C1	Aerial series condenser	0.0005
C2	V1, V2 A.V.C. line decoupling	0.1
C3	V1 osc. C.G. condenser	0.00023
C4	Osc. L.W. tracker	0.0005
C5	V1 S.G. and osc. anode decoupling	0.1
C6	V2 S.G. by-pass	0.1
C7	I.F. by-pass	0.00023
C8	L.F. coupling to V3 triode	0.1
C9	V3 triode anode decoupling	2.0
C10	V3 triode C.G. I.F. by-pass	0.0001
C11	Coupling to V3 A.V.C. diode	0.00023
C12	L.F. coupling to T1	0.1
C13	H.T. supply by-pass	0.1
C14	Tone corrector	0.001
C15†	I.F. filter tuning	—
C16†	Image suppressor	—
C17†	Aerial circuit tuning	—
C18†	Aerial circuit trimmer	—
C19†	Oscillator tuning	—
C20†	Oscillator trimmer	—
C21†	Oscillator L.W. trimmer	—
C22†	1st I.F. trans. pri. tuning	—
C23†	1st I.F. trans. sec. tuning	—
C24†	Pre-set I.F. reaction control	—
C25†	2nd I.F. trans. pri. tuning	—
C26†	2nd I.F. trans. sec. tuning	—

† Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial I.F. filter coil	47.0
L2	Aerial coupling coil	11.5
L3	Aerial tuning coils	3.2
L4		18.6
L5	Oscillator tuning coils	1.5
L6		3.5
L7	Oscillator anode coils, total	5.5
L8		—
L9	1st I.F. trans. (Pri. Sec.)	4.0
L10		4.0
L11	2nd I.F. trans. (Pri. Sec.)	4.0
L12		4.0
L13	Speaker speech coil	4.0
T1	Intervalve trans. (Pri. Sec. total)	425.0 7,500.0
T2	Speaker input trans. (Pri. total Sec.)	800.0 0.8
S1	Local-distant switch	—
S2-S4	Waveband switches	—
S5	Gram. pick-up switch	—
S6	Radio muting switch (gram.)	—
S7	H.T. circuit switch	—
S8	L.T. circuit switch	—
X	Small coupling (I.F. reaction)	—



Circuit diagram of the Marconiphone 234 battery superhet. The earlier Model 257 has a similar circuit. X is a small coupling, providing I.F. reaction, controlled by C24. The H.T. voltage of the pink lead depends on the letter marked on the bulb of V4. (See General Notes.)



Plan view of the chassis. The switches are indicated in the under-chassis view. C24 controls the I.F. reaction.

**DISMANTLING THE SET**

**Removing Chassis.**—If it is desired to remove the chassis from the cabinet, first remove the three control knobs (taking care not to lose the recessed grub screws), and the switch escutcheon.

Next remove the four bolts (with spring washers and washers) holding the chassis to the bottom of the cabinet and free the speaker and battery leads from the cleat on the cabinet bottom.

The chassis can now be withdrawn by tilting the back upwards and taking the left end (when viewed from the back) out first, so that the tuning scale clears the bolt holding the bracket at the rear of the speaker.

**NOTE.**—Some models may have two screws passing through the shelf and securing the frame of the tuning scale.

When replacing, do not forget the large washers between the chassis and the cabinet bottom, and note that the small knob should be placed on the tuning spindle.

To free the chassis entirely, free the accumulator leads from the cleat at the top of the cabinet and the speaker leads from the cleat on the sub-baffle. Next disconnect the leads from the speaker (screw terminals) and the black earthing lead, which is secured by one of the screws holding the terminal panel to the transformer. When replacing, note that the terminals are numbered and connect the leads as follows:—3, red/yellow; 4, red; 5, red/yellow. Do not forget the black earthing lead.

**Removing Speaker.**—To remove the speaker from the cabinet, first remove the two round-head screws holding the clamps at the top of the speaker and remove the bolt (with nut, lock washer and metal plate) holding the support at the rear of the speaker to the shelf.

**VALVE ANALYSIS**

Valve voltages and currents given in the table (Col. 2) are those measured in our receiver when it was operating from a new battery reading 175 V. The volume control was at maximum, as was the

sensitivity control and the receiver was tuned to the lowest wavelength on the medium band. There was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 X21*	165	0.1	30	0.7
V2 VS24	170	2.8	60	0.9
V3 HD21	88	1.4	—	—
V4 QP21	165†	0.9†	140	0.6

\* Osc. anode (G2) 30 V, 0.6 mA. † Each anode.

**GENERAL NOTES**

**Switches.**—S1 is the local-distant switch, of the push-push type, situated at the front of the chassis. S2-S6 are the waveband, pick-up and muting switches, and

S7, S8 are the battery switches. S2-S8 are ganged together in a single unit mounted in a gap in the deck of the chassis. The table below gives the switch positions for the various control settings.

Switch	Off	M.W.	L.W.	Gram.
S2	C	C	O	C
S3	C	C	O	C
S4	C	C	O	C
S5	O	C	O	C
S6	O	C	C	O
S7	O	C	C	C
S8	O	C	C	C

**Coils.**—L1 is beneath the chassis. L2-L4 and L5-L8 are in two screened units on the chassis deck. The I.F. transformers L9, L10 and L11, L12, are in two further screened units.

**Scale Lamp.**—This is an Osram M.E.S. type rated at 2.0 V, 0.1 A.

**External Speaker.**—Provision is made for the connection of a low impedance speaker (4.0 Ω) to the terminals 1 and 2 on the panel of the internal speaker.

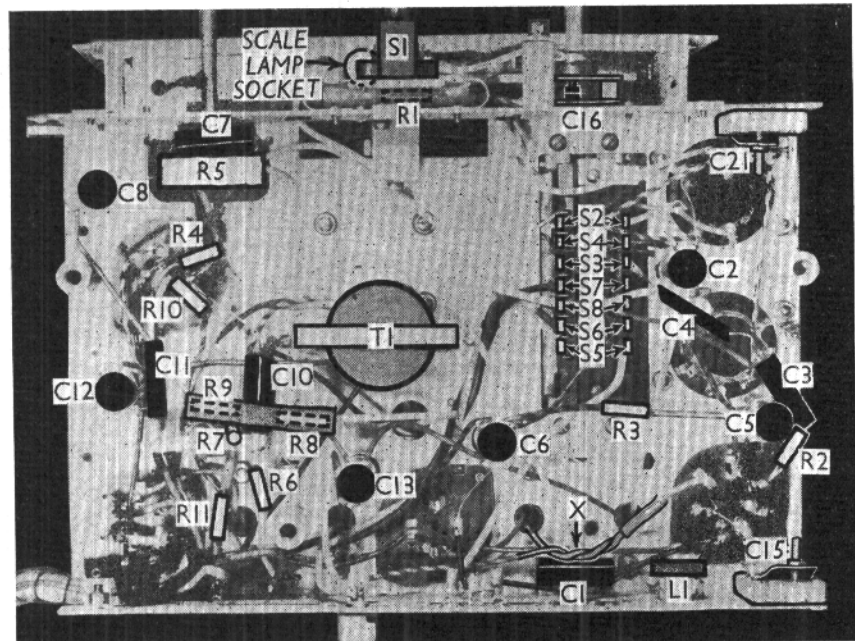
**Condenser C16.**—This is a very small air dielectric pre-set type, mounted at the front of the chassis.

**Condenser C24.**—This is a very small mica dielectric pre-set type for controlling I.F. reaction. It is mounted at the back of the chassis, and a knob is provided.

**Batteries.**—L.T., Exide CZS3, 2 V 30 AH cell. H.T. and G.B., Marconiphone B552 166 V H.T. plus 9 V G.B.

**Battery Leads and Voltages.**—Black lead, spade tag, L.T. negative; Black lead, spade tag, with red indicator, L.T. positive 2 V; Black lead and plug, H.T. negative (and G.B. positive); Red lead and plug, H.T. positive 166 V; Mauve lead and plug, H.T. positive 72 V; Pink lead and plug, H.T. positive, voltage depending on marking on V4: V, 132 V; W, 140 V; X, 147 V; Y, 155 V; Z, 162 V. Blue lead and plug, G.B. negative 1.5 V; grey lead and plug, G.B. negative 9 V.

**Circuit Alignment.**—Alignment instructions are given on page VIII.



Under-chassis view. S1 is the local-distant switch. X is a coupling formed of twisted wires.

## ALBA 540 (Continued)

tracker is adjusted through a hole in the chassis deck between the V1 and V2 valveholders.

**Condensers C13, C14.**—These are two 6  $\mu$ F dry electrolytics with a common negative (black) lead. The red lead going to the mains transformer T2 is the positive of C13, while the red lead going to the valveholder of V4 is the positive of C14.

## CIRCUIT ALIGNMENT

Circuit alignment follows normal practice. The I.F. transformers are first aligned at 117.5 KC/S, feeding the signal generator output between the top cap of V1 and chassis, and adjusting the trimmers C23, C24, C25 and C26 in turn for maximum output.

A signal of about 220 m. is now fed into the aerial and earth sockets, the scale pointer set to the same wavelength, and C21 is adjusted.

If there are two peaks, the correct one is the second reached when unscrewing C21 from maximum capacity. C19 and C17 are then adjusted for maximum output.

The set is then switched to the L.W. band, a signal of about 1400 m. is injected, and tuned in. C22 is then adjusted for maximum output, rocking the gang slightly if necessary to obtain the optimum setting.

## RADIOGRAM MODIFICATIONS

Basically the 740 radiogram has a circuit similar to the 540 table and 640 console models. There are, however, certain additions and modifications.

In the first place, instead of the pick-up sockets being across R11 as in our diagram (which, incidentally, necessitates the use of a pick-up with a fairly large output), one of them is connected to chassis and the other to one of the outer contacts of an extra single-pole changeover switch. The lead from L14 to the junction of C3 and R6 is broken, and taken to the centre contact of the switch, the junction going to the third contact of the switch.

The lead from L15 to the H.T. line is broken, and a 5,000  $\Omega$  resistance inserted. A 0.002  $\mu$ F condenser is connected between chassis and the junction of this resistance and L15.

The lead from C10 to R7 is broken and taken to the centre contact of another S.P.C.O. switch. The junction of R7 and C7 is taken to one outer contact of this switch, while from the remaining outer contact a lead goes to the junction of L15 and the extra resistance and condenser.

A tone control circuit, consisting of a 0.05  $\mu$ F fixed condenser and a 50,000  $\Omega$  variable resistance in series is connected across the primary of T1.

C13 and C14, instead of being two 6  $\mu$ F condensers, have values of 8  $\mu$ F and 12  $\mu$ F respectively.

It will be seen that on radio the circuit is the same as in the table model, except for the extra resistance and condenser in the anode circuit of V2, which provides a certain amount of decoupling, and the variable tone control.

On gramophone, V2 is used as an R.C. amplifier, and the radio circuit is fully muted.

The extra switches are accommodated on the wave-change switch assembly, and a gramophone position is provided.

## MARCONIPHONE 234

## CIRCUIT ALIGNMENT

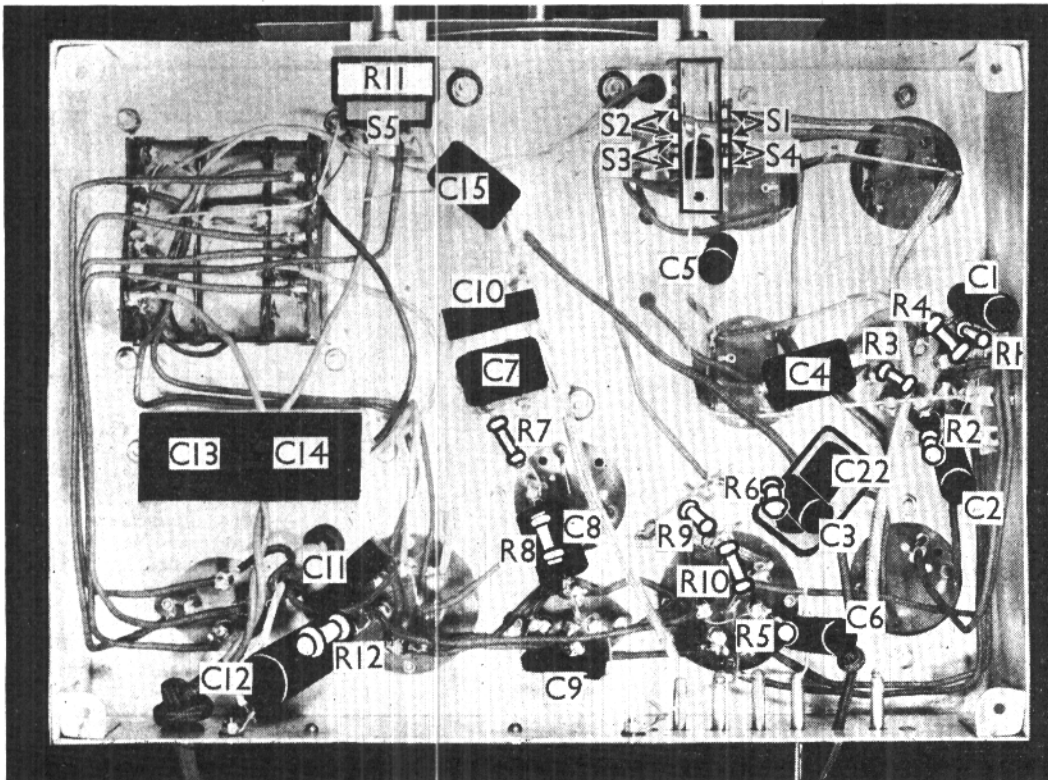
(See pages II and III for circuit diagram and chassis illustrations.)

**I.F. Stages.**—Connect a signal generator to grid (top cap) of V1 and chassis. Switch set to M.W., and turn tuning condenser to minimum. Set generator to 456 KC/S, and adjust C22 (screw), C23 (nut), C25 (screw) and C26 (nut) for maximum output. Re-check these settings.

**H.F. and Oscillator Stages.**—When tuning condenser is at minimum, scale pointer should read 185 m. ( $\frac{1}{4}$  in. to left of 200 m. mark). Connect an aerial and earth to the set, and loosely couple the signal generator to the aerial lead. Switch set to M.W., and turn gang to minimum. Set generator and receiver scale pointer to 200 m. and adjust C20 for maximum output. Set generator to 230 m., tune in signal, and adjust C18 for maximum output. Check on 550 m., then tune in London Regional, and, if necessary, adjust scale.

Switch to L.W., set pointer to 1,500 m. Feed in 1,500 m. signal and adjust C21 (hole in front of chassis) for maximum output.

For image suppression, adjust generator to frequency of any strong transmission occurring between 250 and 285 m. With switch of set in L.W. position, tune set to receive oscillator signal, and adjust C16 (front of chassis) for minimum output. Adjust generator to 456 KC/S, and couple to aerial terminal of receiver. Adjust C15 (hole in back of chassis) for minimum output.



Under - chassis view. Note the simple wave-change switch arrangement. S2, S3 and S1, S4 each have one common connection. C22 is the oscillator, L.W. tracker adjustable through a hole in the chassis deck.