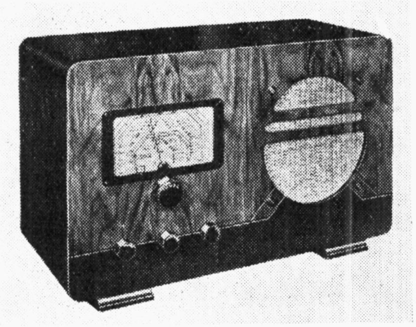
'TRADER' SERVICE SHEET

313

MARCONIPHONE 315

3-BAND BATTERY RECEIVER



A SHORT-WAVE range of 16.5-50 m is included in the Marconiphone 315 3-valve battery operated 3-band receiver. An alternative aerial socket brings a Droitwich rejector into circuit, and the receiver is housed in a horizontal cabinet.

CIRCUIT DESCRIPTION

Two alternative aerial input sockets, **A, AF.** Input from **A** is via **C1** and high impedance coupling coils **L1** (SW), plus **L2** (MW); plus **L3** (LW) to single tuned circuits **L4, C23** (SW), **L5, C23** (MW) and **L6, C23** (LW). Additional coupling on MW by **C3.** Condenser **C1** in aerial lead removes risk of short-circuiting GB supply, via coupling coils, between **A** and **E** sockets.

First valve (**V1, Marconi metallised W21** or **KTW21**) is a variable-mu tetrode operating as RF amplifier with gain control by potentiometer **R3** which varies GB applied, automatically reducing the damping imposed by **C7** across the aerial circuit as the GB potential becomes less negative, and so increasing the gain.

Tuned-anode coupling by **L11, L12, L13** and **C27** between **V1** and triode detector valve (**V2, Marconi HL2**) which operates on grid leak system with **C12** and **R7.** Reaction is applied from anode by coils **L8, L9** and **L10,** and controlled by variable condenser **C24.** RF filtering in anode circuit by **C11** (MW and LW) and **R9, R10, C13, C14, C15.**

Parallel-fed auto-transformer coupling by **R8, C16** and **T1** between **V2** and beam tetrode output valve (**V3, Marconi KT2** or **KT21**). Fixed tone correction in anode circuit by **C17.**

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the four knobs (recessed self-tapping screws) and the four bolts (with washers and spring washers) holding the chassis to the bottom of the cabinet. The chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

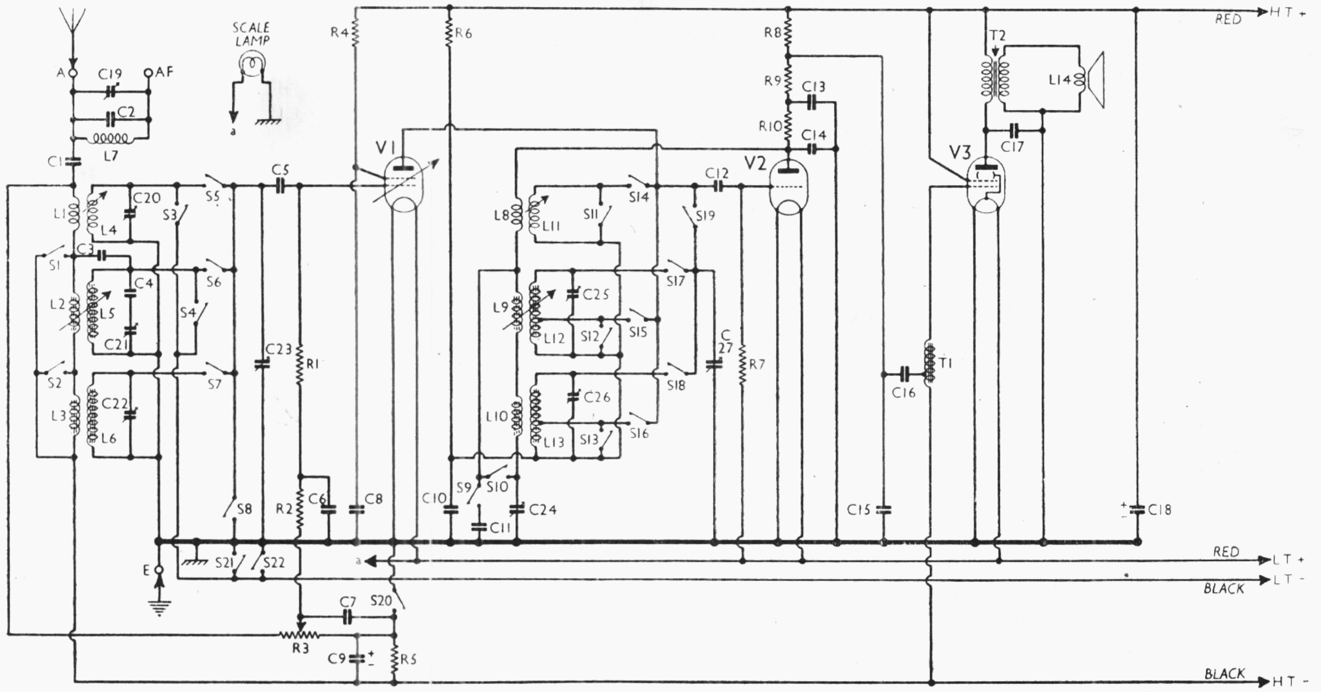
If it is desired to remove the chassis entirely, unsolder the speaker leads.

Removing Speaker.—To remove the speaker from the cabinet, unsolder the leads and remove the nuts and washers from the four ornamentally-headed bolts holding it to the front of the cabinet. *When replacing*, see that the terminal panel is on the right.

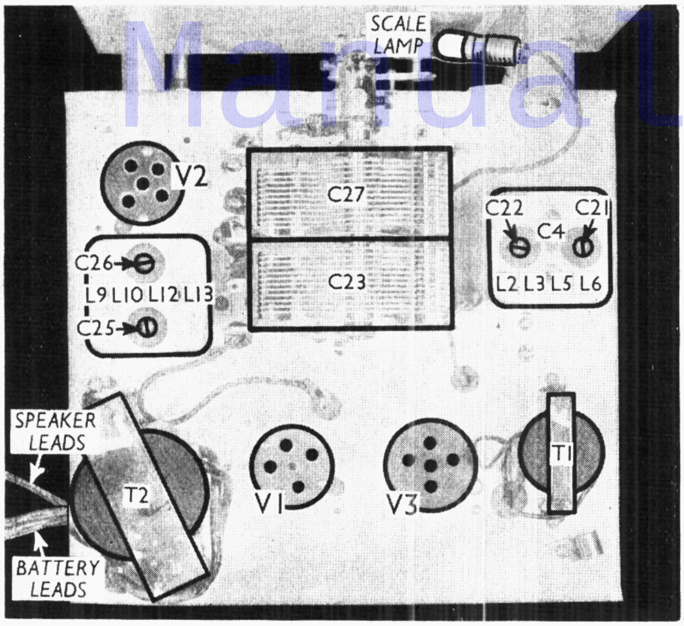
COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial isolating condenser ..	0·0005
C2	Droitwich rejector fixed tuning	0·00035
C3	Aerial MW coupling ..	0·0000023
C4	Aerial MW fixed trimmer ..	0·000015
C5	V1 CG condenser	0·0001
C6	V1 CG decoupling	0·1
C7	Part of aerial shunt control ..	0·1
C8	V1 SG decoupling	0·1
C9*	Automatic GB by-pass ..	25·0
C10	V1 anode decoupling ..	0·1
C11	MW and LW RF by-pass ..	0·00023
C12	V2 CG condenser	0·00005
C13	V1 anode RF by-pass condensers	0·0005
C14		0·00005
C15		0·0005
C16	AF coupling to T1	0·1
C17	Fixed tone corrector	0·001
C18*	HT circuit reservoir	4·0
C19‡	Droitwich rejector trimmer ..	—
C20‡	Aerial circuit SW trimmer ..	—
C21‡	Aerial circuit MW trimmer ..	—
C22‡	Aerial circuit LW trimmer ..	—
C23†	Aerial circuit tuning	—
C24†	Reaction control	0·0005
C25‡	V1 anode MW trimmer ..	—
C26‡	V1 anode LW trimmer ..	—
C27†	V1 anode circuit tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Marconiphone 315 battery receiver. **L5** and **L12** have inductive as well as capacitative trimmers.



Plan view of the chassis. The inductive trimmers of **L5** and **L12** are beneath the chassis, as are also the S W coil units.

RESISTANCES		Values (ohms)
R1	V1 CG resistance	2,300,000
R2	V1 CG decoupling	500,000
R3	V1 gain and aerial shunt control	125,000
R4	V1 SG HT feed	50,000
R5	Automatic GB resistance ..	320
R6	V1 anode HT feed	23,000
R7	V2 CG resistance	2,300,000
R8	V2 anode load	50,000
R9	RF stopper resistances	10,000
R10	RF stopper resistances	10,000

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial SW coupling coil ..	0·2
L2	Aerial MW coupling coil ..	15·0
L3	Aerial LW coupling coil ..	125·0
L4	Aerial SW tuning coil.. ..	0·1
L5	Aerial MW tuning coil ..	1·3
L6	Aerial LW tuning coil ..	12·0
L7	Droitwitch rejector coil ..	7·0
L8	SW reaction coil	0·3
L9	MW reaction coil	1·2
L10	LW reaction coil	4·0
L11	V1 anode SW tuning coil ..	0·1
L12	V1 anode MW tuning coil, total	1·3
L13	V1 anode LW tuning coil, total	12·0
L14	Speaker speech coil	4·0
T1	Intervalve auto-trans., total..	3,310·0
T2	Output trans. Pri... ..	1,000·0
	Output trans. Sec... ..	0·6
S1-S19	Waveband switches	—
S20	HT circuit switch	—
S21	SW LT circuit switch ..	—
S22	MW and LW LT circuit switch	—

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 W21	71	2·0	68	0·9
V2 HL2	46	1·0	—	—
V3 KT2	118	3·8	122	0·8

Valve voltages and currents given in the table above are those measured in our receiver when it was operating with a new HT battery reading 125 V, on load. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but the reaction control was at minimum. There was no signal input.

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

GENERAL NOTES

Switches.—**S1-S19** are the waveband switches, and **S20-S22** the battery circuit switches, in two ganged rotary units beneath the chassis. The units are indicated in our under-chassis view, and shown in detail in the diagrams on page IV.

The table (page IV) give the switch positions for the four control settings, starting from fully anti-clockwise. A dash indicates *open*, and **C** *closed*.

Coils.—**L1, L4; L7** and **L8, L11** are in three unscreened units beneath the chassis, while **L2, L3, L5, L6** and **L9, L10, L12, L13** are in two screened units on the chassis deck. The first of the screened units also contains **C4,** while each contains a pair of trimmers adjustable from the tops of the cans, and a core adjustment (for **L5** and **L12** respectively) reached from beneath the chassis.

Scale Lamp.—This is an Osram MES type, rated at 2 V, 0.1 A, fitted on a bracket behind the waveband indicating window.

External Speaker.—There is no provision for this, but a low impedance (about 5 O) type could be wired across the internal speaker speech coil.

Bearer Tags.—In several places in this chassis, special bearer tags are used. These comprise a metal bracket and a tag, moulded into a small rectangular plate of paxolin, and insulated from each other. The metal bracket is screwed to the chassis, and the tag is used to support components or wiring. The units look like small moulded condensers, and may confuse those who have not encountered them before.

Batteries.—LT, Exide DFG 2 V 45AH glass cased LT cell; HT, 120 V dry battery, Marconiphone Cat. No. B 408 or B 600.

Battery Leads and Voltages.—Black lead, spade tag, LT negative; red lead,

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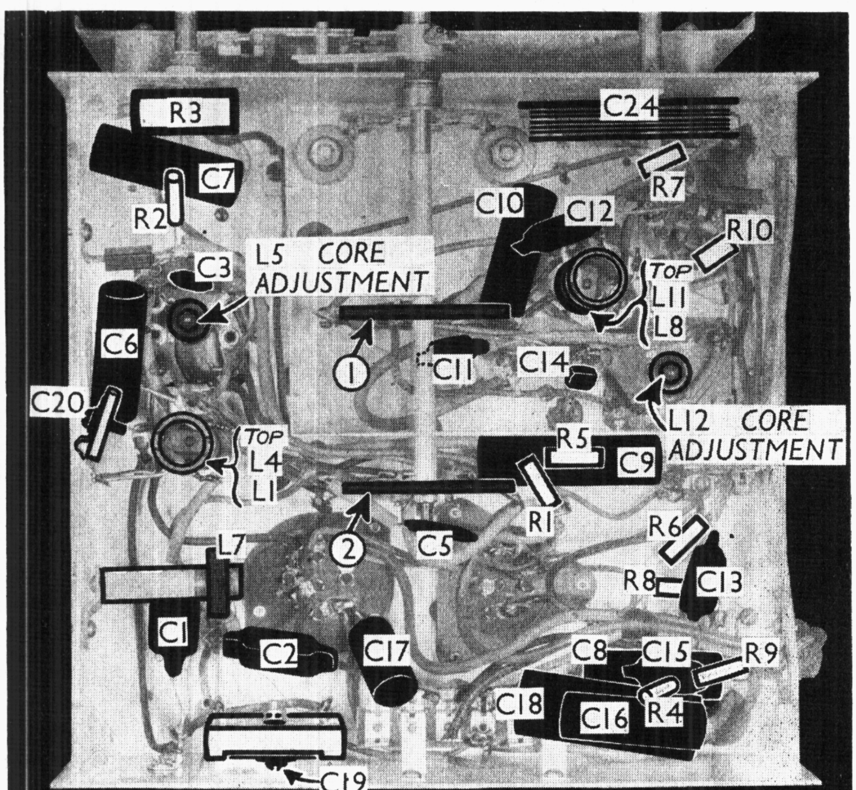


Under-chassis view. Diagrams of the switch units are overleaf.

MARCONIPHONE 315—*Continued*

spade tag, LT positive 2V; black lead, yellow plug, HT negative; red lead, yellow plug, HT positive 120 V.

CIRCUIT ALIGNMENT

The pointer should be positioned so that it stops about ⅛ in. below the horizontal position at each end of the scale. The reaction control must be kept advanced to a point just short of oscillation, and the volume control must be at maximum. Connect a signal generator to the **A** and **E** sockets.

MW.—Switch set to MW, and set gang to minimum. Feed in a 195 m (1,538 KC/S) signal, and adjust **C25,** then **C21,** for maximum output. Do not adjust the inductive trimmers unless a coil or coils have been replaced.

LW.—Switch set to LW, tune to 725 m on scale, feed in a 725 m (414 KC/S) signal, and adjust **C26,** then **C22,** for maximum output.

SW.—Switch set to SW, tune to 50 m on scale, feed in a 50 m (6 MC/S) signal, and adjust the inductances of **L4** and **L11,** in that order, for maximum output, by moving the loop of wire inside each coil former up or down by means of a strip of insulating material with a nick in it.

Feed in a 16.5 m (18.2 MC/S) signal, tune it in, and adjust **C20** for maximum output, while rocking the gang for optimum results. Feed in a 50 m (6 MC/S) signal, tune it in, and readjust loop inside **L4** former for maximum output. Repeat the adjustment of **C20** at 16.5 m.

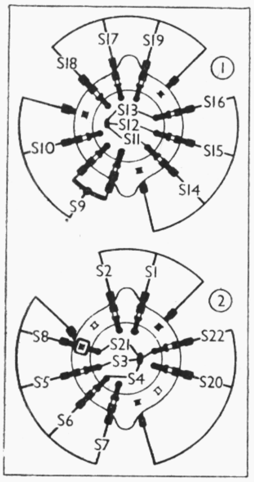
After each waveband has been aligned, check that oscillation is obtainable and controllable throughout the band. The pointer should be adjusted to give the best possible compromise on all bands.

Droitwich Rejector.—This must be adjusted on the aerial on which the receiver is used, using the Droitwich signal. Connect aerial to **AF** socket, tune in to Droitwich, with reaction control just short of the oscillation point, and adjust **C19** for *minimum* output.

MW Inductive Trimming.—This is only necessary if a coil or coils have been replaced. First adjust **C25** and **C21** as described under "**MW**" above. Feed in a 530 m (566 KC/S) signal, tune it in, and adjust core of **L5,** by means of the hexagonal headed screw beneath the chassis, for maximum output. If the calibration is out, adjust **L12** core in a similar manner, afterwards re-adjusting **L5** core. Repeat the **C25** and **C21** adjustments.

SWITCH TABLE AND DIAGRAMS

Switch	Off	SW	MW	LW
S1	—	C	—	—
S2	—	—	C	—
S3	—	—	C	—
S4	—	—	—	C
S5	—	C	—	—
S6	—	—	C	—
S7	—	—	—	C
S8	C	—	—	—
S9	—	—	C	C
S10	—	C	—	—
S11	C	—	—	—
S12	—	C	—	—
S13	—	—	C	—
S14	—	C	—	—
S15	—	—	C	—
S16	—	—	—	C
S17	—	—	C	—
S18	—	—	—	C
S19	—	C	—	—
S20	—	C	C	C
S21	—	C	—	—
S22	—	—	C	C



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

MAINTENANCE PROBLEMS

Elusive Intermittent Fault

A PYE T/20 mains transportable had an intermittent fault of such an elusive nature that nearly three months elapsed before the fault was located. The customer complained that without any warning the neon tuning indicator would flash the whole length of the tube, and signals could not be heard for the oscillation taking place.

Upon investigation it was found that the triode-pentode had an intermittent S/C which caused the neon indicator to glow the whole length of the tube, but no instability was present, and results were normal upon replacing the valve.

Three weeks later another complaint was lodged, symptoms being exactly as before; the set was collected again and sure enough was violently unstable.

The electrolytic smoothing condensers were suspect, and upon connecting another condenser in parallel, the instability vanished and remained so when the test condenser was disconnected. Evidently a surge had been created which cleared the fault. However, the electrolytics were thoroughly tested, but were OK in every respect, and as a lengthy "soak" test revealed nothing, the set was again returned.

A month elapsed, this time no results whatever were complained of, which turned out to be due to a dead short in one of the HT smoothing condensers, with a complete demise of the rectifier valve. A new valve and electrolytic was fitted and all was well again.

Five weeks after this the customer—now *very* irate—complained that the oscillation had started up again and that she would not have the set in the house until it *was* right. On test the set was exactly as stated, but the fitting of parallel test condensers was deemed inadvisable in view of the previous experience, accordingly each condenser was probed and worked about with the set switched on, in the hope of locating an intermittent O/C.

Each condenser was also disconnected and individually tested for capacity, but all tested OK.

To make matters worse, the set functioned perfectly after this procedure, but obviously it could not be returned until some guarantee of satisfaction was forthcoming.

After some thought it was decided to disconnect each condenser in turn, with the set switched on, to find which condenser produced a similar symptom of instability to that previously experienced. Eventually it was found that the condenser decoupling the AVC feed to the IF stage caused an exact repetition of the trouble when it was disconnected.

A new condenser was therefore fitted and after a very lengthy "soak" the set was returned. Some months have now elapsed without further repetition of the trouble, so evidently the fault was satisfactorily cleared. Strange to say, careful examination of the suspected condenser revealed no trace of O/C or varying capacity—such are the trials of service work!—R. A. C.

IF Transformer Trouble

AN Ultra 101 was brought in for service, with the complaint of no signals. Valves were OK. A 456 KC/S signal was fed to the IF, and the trimming tool turned gently. A sudden burst of sound, with immediate disappearance when the core was turned the other way, made me take the IF transformer down. The whole coil revolved with the core, and a soldered connection had broken.

The core was very stiff and the "locking" nut, which should hold the whole coil on the fibre panel, was loose. A shakeproof washer will do the trick; or if there is plenty of time, liquid glue run in and the nut tightened will cure the slipping.

This fault has occurred in several receivers, and is common to all the coils of this type.—G. C. Oxley, Tibshelf.

Heater Centre Tap O/C

WE had in for repair a Bush AC23 in which the symptom was a very pronounced hum. The hum stopped only when the detector valve was withdrawn.

The components in the grid and cathode circuits of the detector valve were checked and proved OK. It was found, however, that by shorting one side of the valve heaters to chassis the hum ceased entirely, and the set worked normally.

Inspection and testing of the mains transformer showed a disconnection in the lead to the heater centre tap. The fault was cured by disconnecting the centre tap entirely, and fitting a hum-dinger.—E. Evans, Exmouth.