MARCONIPHONE

SERVICE MANUAL

PRIVATE AND CONFIDENTIAL TO THE TRADE ONLY

MODEL 284—3-VALVE BATTERY RECEIVER WITH M.C. SPEAKER

JUNE
1934
1935 SERIES
NUMBER ONE
PART NO. 17144

GENERAL DESCRIPTION.

WAVELENGTH RANGE.

Medium Waves.—200 to 550 metres (approximately).

Long Waves.—1,000 to 2,000 metres (approximately).

CURRENT CONSUMPTION.

L.T. 0·4 amperes (approximately). H.T. 8·5 mA (approximately).

VALVES AND EQUIPMENT.

The high frequency valve, Marconi S23 metallised (or S21) is followed by an HL2 metallised detector which is transformer coupled to a Marconi PT2.

The standard equipment comprises a Marconiphone 120-volt combined H.T. and G.B. battery, and a 2-volt 45 ampere-hour accumulator.

PHYSICAL SPECIFICATION.

Overall Height.	Overall Width.	Overall Depth.
19 inches.	$14\frac{3}{4}$ inches.	$10\frac{1}{4}$ inches.
48·3 cm.	37·5 cm.	26·0 cm.

Net weight, 35 lb. (16·0 kg.) with batteries. Weight packed, 48 lb. (21·75 kg.) with batteries.

CIRCUIT.

Model 284 is a 3-valve self-contained battery operated receiver with extremely selective tuning. The sensitivity of the H.F. valve is controlled by the resistance VR1 which regulates the filament current of that valve. This control serves to avoid overloading on powerful local transmissions.

The coupling between H.F. and detector valves is by H.F. transformer (L4, L5, L8 and L9), the secondary being tuned by VC2. Closely coupled to the H.F. transformer windings are the reaction windings L6 and L7, which are controlled by condenser VC3.

LOUDSPEAKER.

Type 16000B. See separate Service Manual.

EXTRA LOUDSPEAKERS.

Switch off the instrument before re-arranging speakers. An extra loudspeaker may be connected to this instrument without greatly weakening the output of the parent speaker, providing that impedance of extra speech coil is not less than 4·0 ohms.

Always use a heavy gauge wire for low resistance extra speaker leads.

WIRING (EXTRA LOW RESISTANCE LOUDSPEAKER).

Connect speech coil of extra loudspeaker to terminals numbered 1 and 2 on terminal panel of transformer mounted on parent speaker.

If a transformer is incorporated on the extra speaker the leads from receiver must be connected to the speech coil of the speaker and **not** to the primary (high resistance) winding of the transformer.

WIRING HIGH-RESISTANCE (MOVING IRON) TYPE.

Connect to terminals 3 and 5 (in parallel with transformer primary).
Connect the positive (RED) lead of speaker to terminal 3 of speaker transformer.
Speaker must have covered terminals and the extension wiring between receiver and speaker must be rubber-covered and of good quality.
Alternatively connection can be made through condensers of 0·2 microfarads, which will isolate speaker from H.T. current.

INSTALLATION.

OUTDOOR AERIAL.

The length of aerial should be between 40 and 100 feet including lead-in, and should be as high as possible, especially the end remote from the instrument.

For Reducing Interference.—If receiver is to be installed in the neighbourhood of a powerful station interference can be reduced by shortening the aerial to approximately 30 feet. Changing the direction of an aerial will often reduce noise from lighting, telephone and tramway trolley wires and also interference caused by a powerful local transmitter.

INDOOR AERIAL.

Due to the extreme sensitivity of this instrument an indoor aerial may be employed where circumstances do not permit the erection of an outdoor aerial. An insulated wire 20 to 50 feet long, stretched between hooks screwed into the picture rail will suffice to bring in local stations at adequate strength. Choose an inner wall which is not likely to be damp and keep the wire away from the wall.

THE SENSITIVITY CONTROL.

Mention to your customer that the slight delay in the action of the sensitivity control is a normal condition.
After moving this control, a second or two will lapse before the level of sensitivity becomes stable.

TO LOCATE TROUBLE

Before proceeding to make the cord end tests specified on page 7, check the installation in the following manner :—

(1) THE SPEAKER AND BATTERIES.

Turn the switch backwards and forwards between " M.W." and " L.W." positions.

Assuming that the dry battery and the accumulator are O.K. a rustling sound will be heard from the speaker, providing that the pentode valve (PT2) is functioning.

(2) THE PENTODE VALVE.

The Pentode Valve may also be assumed O.K. if this rustling sound is heard.

(3) THE S23 VALVE AND H.F. CIRCUIT.

Temporarily disconnect aerial whilst a powerful local station is being received.

If aerial makes little or no difference to signal strength, look for a fault in that part of the circuit preceding the detector valve.

A defective S23 valve or a faulty aerial or earth system will result in weak but undistorted signals.

If when aerial is connected to terminal 6 of coil L8 (see Fig. 2) the signal strength is commensurate with that of a 2-stage receiver, the trouble can be definitely associated with the S23 valve or the components preceding L8 and L9 in the circuit diagram (Fig. 1).

(4) THE DETECTOR VALVE.

Connect a pick-up and try instrument on " gramophone " (a 15,000 ohm volume control is necessary).

If results are O.K. on " Gramophone " but unsatisfactory when aerial is connected to terminal 6, the fault will probably lie with coils L6, L7, L8, L9, or the variable condensers associated with those coils. (See Fig. 2.)

WARNING.—When operating this instrument on radio the pick-up must be disconnected from the pick-up terminals.

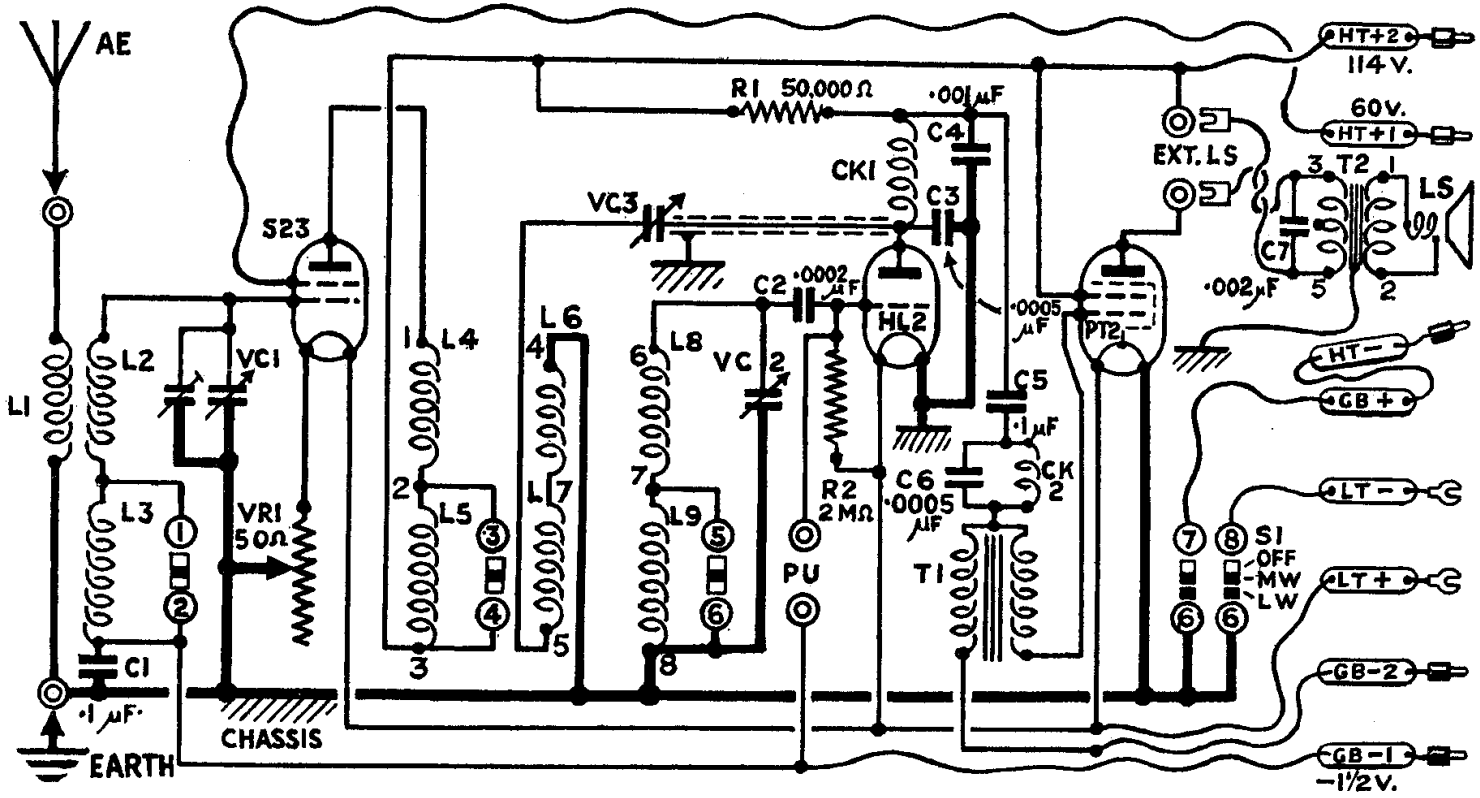
AE
EARTH
L1
L2
L3
C1
·1 μF
VC1
VR1
50Ω
CHASSIS
S23
L4
L5
L6
L7
L8
L9
VC
VC3
R1 50,000Ω
·001μF
C4
CK1
C3
C2 ·0002 μF
HL2
·0005 μF
R2 2MΩ
PU
C6 ·0005 μF
C5 ·1 μF
CK2
T1
PT2
EXT. LS
T2
C7
·002μF
LS
HT+2
114V.
60V.
HT+1
HT−
GB+
LT−
LT+
GB−2
GB−1
−1½V.
S1
OFF
MW
LW

Fig. 1.

VALVE TABLE

—	S21 or S23.	HL2.	PT2	Remarks.
TEST VOLTAGES... ...	114 volts	50 volts*	2·3 (voltage drop across speaker terminals 3 and 5)	Values marked * must be taken with a voltmeter having a full scale deflection of at least 10 times the reading shown. A voltmeter having a resistance of 200 ohms per volt was used to obtain all readings given. † These readings taken with sensitivity control fully advanced.
Measured between ...	Anode and chassis ...	Anode and chassis ...	Extra L.S. terminals	
Check components ...	L2, L3, L4, L5, VR1...	R1, CK1 ...	T1, T2	
Anode/Frame VOLTS ...	114	50*	106	**Warning.**—Stress the importance to your customer of always connecting the accumulator the right way round, *i.e.*, the L.T.+ tag to the Red terminal. A wrongly connected terminal will cause the H.T. battery consumption to be increased by approximately 100 per cent.
Screen/Frame VOLTS ...	60	—	—	
Anode feed mA	1·5†	1·25 (remove V1 and V3 and measure at H.T.+ 2 plug	3·75	**Recommend the fitting of a new H.T. battery when total H.T. voltage has fallen to 70 volts.**
Screen feed mA	0·75† (measure between H.T. + 1 plug and batt. socket	—	1·25	

Total H.T. feed measured H.T.— ... ... 8·5 mA.
Total L.T. feed measured L.T.— ... ... 0·4 amp.

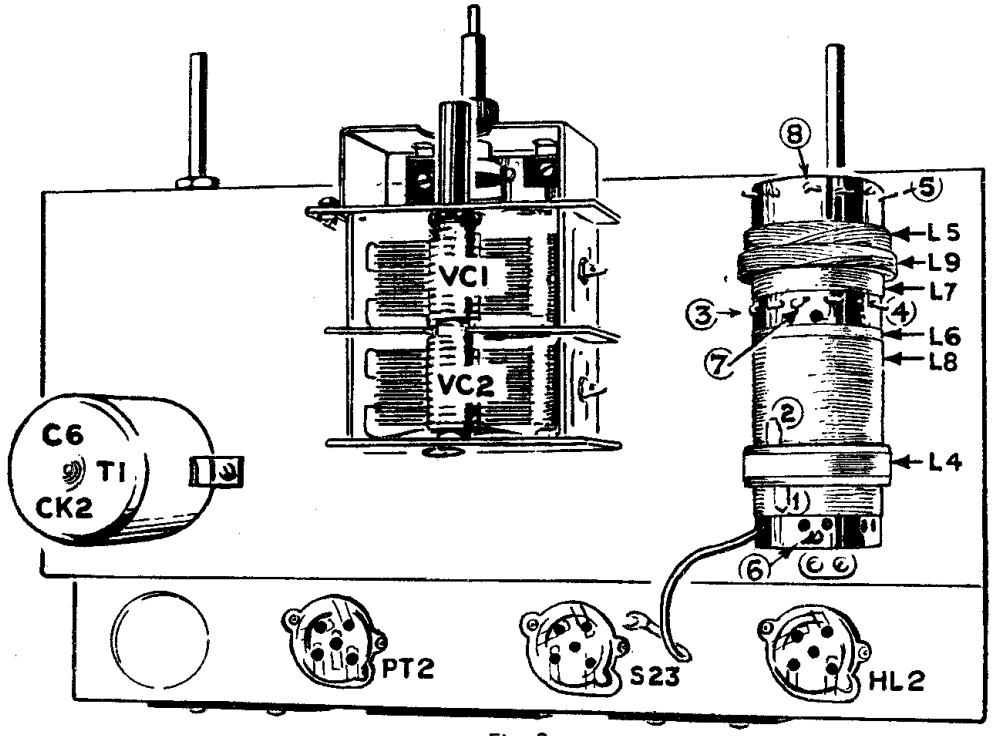

Fig. 2.

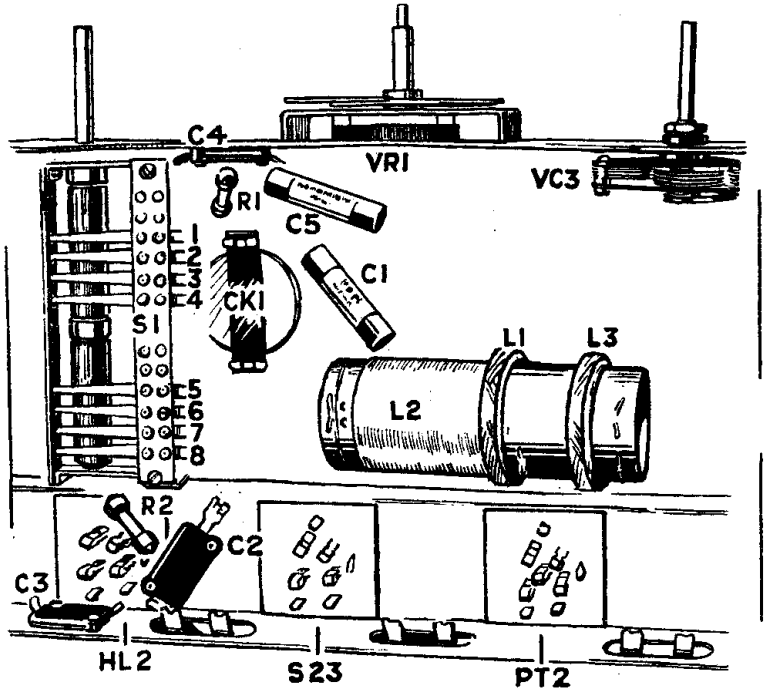

Fig. 3.

WIRING COLOUR CODE.

Purple	Aerial.
Yellow	Anode.
Yellow with Black Tracer	Pentode screen.
Green with White Tracer	Mid position of tuning coil.
Black	Earth.
Red	H.T. positive.
Green	Grid.
Blue	Pick-up.
Brown	Filaments.

GENERAL FAULTS TABLE.

Symptom.	Possible Cause.	Suggested Remedy.
Set will not operate ...	Damaged valves	Try new valves.
	Plugs incorrectly placed or not making electrical contact with H.T. battery sockets.	Check up with instructions given, widening points of plugs slightly and ascertaining that wire is connected to metal part of plugs.
	Loudspeaker leads disconnected.	
	Flexible lead not attached to terminal on top of H.F. valve.	
	S23 valve receiving no filament supply ...	Test for voltage at sockets. This fault may be caused by a damaged VR 1. NEVER LAY THE INSTRUMENT DOWN ON ITS FACE, VR 1 MAY BE DAMAGED IN THIS WAY.
WEAK SIGNALS accompanied by low pitched hum, or LOW PITCHED " BLURRED " SIGNALS	H.T. battery partially run down	If H.T. battery is not badly run down, the H.T. + 1 plug should be tried in higher voltage socket. Replace H.T. Battery when voltage has fallen below 70 volts.
WEAK SIGNALS UNDISTORTED).	Pick-up connected	Disconnect both lead from pick-up terminals.
	Damaged S23 valve	Try new valve.
	Lead not attached to terminal top of S23 valve.	
Crackling or "frying" noises.	Valves not making proper contact in sockets	See that valve pins are clean.
	Loose plugs	Open points.
	Dirty contacts on accumulator	Scrape clean, and apply small quantity of vaseline.
High pitched whistle (continuous).	Valves in wrong positions	—
Distorted signals	L.T. battery connected the wrong way round.	Reverse polarity.
	In the neighbourhood of powerful stations signals may overload instrument.	Retard sensitivity control.

CONTINUITY TESTS.

DISCONNECT THE BATTERIES AND REMOVE THE VALVES BEFORE TESTING.
SEE THAT THE SWITCH IS SET TO THE POSITION GIVEN IN TABLE.

Test No.	Part to be Tested.	Test between	Switch Position	Resistance in Ohms.	Gauge of Wire.
1	L1	Aerial and earth sockets	—	10·0	36 S.W.G.-D.C.C
2	L2 ... ... L2 + L3	Fixed vanes of VC1 and G.B.-1-plug ... Fixed vanes of VC1 and G.B.-1 plug ...	M.W. ... L.W. ...	2·5 18·0	30 S.W.G.-D.C.C. L.3.-36 S.W.G.-D.C.C.
3	L4 ... ... L4 + L5	Anode lead of S23 and H.T. + 2 plug... Anode lead of S23 and H.T. + 2 plug...	M.W. ... L.W. ...	6·0 15·0	38 S.W.G.-D.S.C. L5-36 S.W.G.-D.C.C.
4	L6 + L7	Tags 4 and 5 on coil former	—	4·0	} 38 S.W.G.-D.S.C.
5	L8 ... ... L8 + L9	Fixed vanes of VC2 and chassis ... Fixed vanes of VC2 and chassis ...	M.W. ... L.W. ...	2·5 16·0	30 S.W.G.-D.C.C. L9-36 S.W.G.-D.C.C.
6	VR1	Inside (—) filament socket of S23 valve socket and chassis	—	0·5 to 48·0 according to position of VR1 (Sensitivity control)	—
7	R1 + CK1	Anode socket of HL2 and H.T. + 2 plug	—	50,000	—
8	R2	L.T. + and grid socket of HL2 with phones	—	2·0 M Faint click in phones	—
9	CK1	Across ends	—	95·0	—
10	T1— Primary+CK2 Secondary+CK2	 C5 and G.B.—2 plug ... ... C5 and grid socket of PT2	 — —	 1,500 4.250	 — —
11	T2— Primary ... ... Secondary... ...	 Extra L.S. sockets or terminals 3 and 5 on speaker transformer Speech coil must be disconnected to measure this value	 — —	 825 1·0	 — —
12	Speaker speech coil plus secondary of T2	Terminals 1 and 2 on transformer ...	—	0·8	—
13	Speech coil only ...	If on applying a small battery, a rustle is heard, the speech coil may be assumed O.K.	—	4·0	—

REMOVAL OF CHASSIS.

Do not lay the instrument down on its face—VR1 may be damaged in this way.

(1) Remove 4 knobs from front of cabinet. (When re-assembling make sure that ends of screws locate in grooves in spindles.)

(2) Detach loudspeaker leads from terminal strip on chassis and release cords from clips on side and base of cabinet.

(3) Remove 4 hexagon-headed screws fixing chassis to bottom of cabinet. DO NOT FORGET TO REPLACE THE WASHERS WHEN RE-ASSEMBLING.

REMOVAL OF SPEAKER.

To gain access to the Speaker or to remove it does not entail the removal of chassis.

(1) Release speaker leads from clips on side and base of cabinet.

(2) Remove the 3 cross-head screws from front of cabinet.

Do not forget to re-connect the lead which joins the speaker frame to chassis (earth).

PICK-UP.

A high resistance pick-up may be connected to the sockets provided—the screening of lead should be connected to EARTH.

THE MARCONIPHONE MODEL 19 PICK-UP IS PARTICULARLY SUITABLE, and when used with this instrument should be fitted with a 5,000 ohm volume control and a series voltage dropping resistance of 10,000 ohms.

RE-GANGING.

Where new coils have been fitted or wiring of the tuning circuits altered in any way the trimmer on the ganged condenser VC1 must be adjusted. A local modulated oscillator is most useful for this work, as it supplies a signal of constant power, wavelength, and note. In the absence of an " oscillator," ganging can be accomplished on a broadcast signal.

GANGING WITH AN OSCILLATOR.

The instrument to be re-ganged must be operated on the **medium wave band** and the aerial lead-in wire coupled to the oscillator.

Note.—It is important that some form of aerial and earth be coupled to the radio instrument in order to preserve correct operating conditions.

Set the oscillator to 220 metres and tune radio receiver to receive oscillator signal.

The reaction control must be turned to the point where the receiver is on the verge of oscillation.

The slotted hexagon head on trimmer VC1 should be turned to the point where signals are strongest.

The strength of the signal may be judged aurally, but greater accuracy can be attained by the use of an output meter. If an 0·2 D.C. milliammeter is available connect this in the anode circuit of the detector valve (V2-HL2). Alternatively an 0·3 (A.C.) voltmeter connected across terminals 1 and 2 will function as an output meter.

GANGING ON BROADCAST SIGNALS.

Tune in a weak station of approx. 300 metres. Choose a station which does not fade and (if possible) re-gang during the daytime when fading is not severe.

Proceed to adjust trimmer as specified for " oscillator " ganging.

Remember that when the signal overloads the radio instrument the volume of sound **falls.**

IMPORTANT.

DON'T use an A.C. voltmeter connected to the low resistance output to measure broadcast signals.

INVESTIGATION OF ELECTRICAL INTERFERENCE.

Attention is drawn to the activities of H.M. Post Office and the British Broadcasting Corporation in investigating the sources of interference in the reception of broadcast programmes from electrical sources exterior to radio receivers, such as tramways, electric signs, motors, &c., X-ray apparatus and similar installations.

WHAT TO DO.

1. Make absolutely certain that the interference is not within the instrument.

2. Obtain from a post office (or the B.B.C.) a copy of the special questionnaire form issued by them.

3. Fill in the form accurately, giving, in addition to the answers required :—

   (a) Name of manufacturer of the receiver.

   (b) The manufacturer's Cat. No. of the receiver.

4. Send the questionnaire back as directed, together with **brief** notes as to possible source or interference which your local knowledge may suggest.

5. **Do not** assure your customer that a cure will be effected.

6. The P.O./B.B.C. organisation is one for investigating the **cause** of complaint with a view to ascertaining whether or not a cure can be effected. Such investigations may be both delicate and lengthy, and require both goodwill and tact to bring to a successful conclusion. **Do not** suggest to the owner (if known) of the interfering apparatus that your application is in any way a measure of retaliation.

7. It is of the utmost important that this valuable channel of co-operation with H.M. Post Office and the B.B.C. should not be employed until every possible test has been made to ensure that the interference complained of comes definitely from a source **exterior** to the instrument.

THE INTERFERENCE MANUAL.

You are advised, in your own interests, to obtain the new Marconiphone Manual "Electrical Interference with Broadcast Reception." This is a most comprehensive treatment of the subject, extending over 32 pages and dealing fully with the symptoms, cause and remedy of all types of interference. In conjunction with the manual, four special 12-inch Records have been made of the various interference noises, each fully cross-indexed for rapid identification.

The nett price of the Manual and Records in an album is 7s. 6d. Orders should be sent to The Marconiphone Co., Ltd., Radio House, Tottenham Court Road, London, W.1.

SPARE PARTS LIST.

Part No.	Description.	Retail List Price. £ s. d.	Per
	CABINET PARTS AND FITTINGS.		
—	Cabinet, polished	1 13 0	Each.
—	Battery platform	0 2 6	,,
9525	Screw securing platform	0 0 2	Doz.
10475	Felt feet	0 0 6	,,
16775	Back for cabinet	0 1 3	Each.
12754	Screw securing back	0 0 1	,,
14922	Insert nuts for screws	0 1 4	Doz.
14755	Clip for back, R.H.	0 0 2	Each.
14756	Clip for back, L.H.	0 0 2	,,
8692	Screw securing clips	0 0 3	Doz.
—	Baffle, with silk	0 2 6	Each.
17507	Silk	0 1 6	,,
9545	Screw securing baffle	0 0 3	Doz.
11135	Tuning escutcheon, mottled	0 1 0	Each.
or 17593	Tuning escutcheon, brown	0 1 0	,,
10716	Screw securing escutcheon	0 0 4	Doz.
16000B	**Loudspeaker** complete with T2 output transformer	2 0 0	Each.
16020	Ornamental screw } securing loudspeaker	0 0 1	,,
14761	Ornamental washer } securing loudspeaker	0 0 7	Doz.
16000A	Cone chassis, with three fixing lugs, transformer base plate, four studs for magnet and two studs for cone spider	0 3 2	Each.
16005A	Magnet	0 10 0	,,
11627	Nut } securing magnet to studs on cone chassis	0 0 6	Doz.
3167	Washer, S.P. } securing magnet to studs on cone chassis	0 0 2	,,
16401B	Speech coil and cone	0 5 0	Each.
11636	Nut } securing spider of cone to studs on cone chassis	0 0 4½	Doz.
6314	Washer } securing spider of cone to studs on cone chassis	0 0 2	,,
1883	Spring washer } securing spider of cone to studs on cone chassis	0 0 3	,,
16007	Cardboard washer } securing spider of cone to studs on cone chassis	0 0 1	,,
16012	Felt	0 0 2	Each.
10616D	T2—Output transformer, complete with C7	0 10 6	,,
16013A	Terminal panel, on T2, with five tags and terminal screws	0 1 6	,,
11228	Terminal screw	0 0 4	Doz.
15159	Earthing tag	0 0 3	,,
8777	Screw, PK, securing terminal panel	0 0 6	,,
15719G	C7—0·002 mfd.	0 1 1	Each.
12619	Screw, PK, securing T2	0 0 6	Doz.
16024	Dust bag	0 1 0	Each.
	RADIO UNIT.		
16300E	**Radio Unit**	3 8 6	,,
11313	Screw } securing radio unit	0 0 2	Doz.
3531	Washer } securing radio unit	0 0 2	,,
3167	Washer, S.P. } securing radio unit	0 0 2	,,
	Marconi Valves.		
—	V1—S21 or S23 Met.	—	—
—	V2—HL2 Met.	—	—
—	V3—PT2	—	—
17446	Nut for V1	0 0 6	Doz.
	Inductances.		
17280A	L1—Aerial coil L2—M.W. grid coil L3—L.W. grid coil } aerial coil assembly complete with fixing brackets	0 3 6	Each.
12619	Screw, P.K. } securing aerial coil assembly	0 0 6	Doz.
3166	Washer, S.P. } securing aerial coil assembly	0 0 2	,,
16576	Earthing tag } securing aerial coil assembly	0 0 3	,,
16033B	L4—M.W. anode coil L5—L.W. anode coil L6—M.W. reaction coil L7—L.W. reaction coil L8—M.W. grid coil L9—L.W. grid coil } H.F. transformer with reaction coils, complete with fixing brackets	0 5 6	Each.
12619	Screw, PK, securing H.F. transformer	0 0 6	Doz.
11045	Bracket on above coils	0 0 1	Each.
12619	Screw, PK, securing brackets to coil former	0 0 6	Doz.

SPARE PARTS LIST—*continued.*

Part No.	Description.	Retail List Price. £ s. d.	Per
	Chokes.		
1940C	CK1—H.F. choke	0 2 1	Each.
8602	Screw securing CK1	0 0 2	Doz.
—	CK2—inside T1	—	—
	Transformers.		
14542H	T1—Intervalve transformer, together with CK2 and C6	0 10 0	Each.
12619	Screw, PK, securing T1	0 0 6	Doz.
10616D	T2—Output transformer, on loudspeaker	0 10 6	Each.
	Resistances.		
5787P or 17140P	R1—50,000 ohms	0 0 9	,,
5787T or 17140T	R2—2 megohms	0 0 9	,,
11031B	VR1—50-ohm resistance	0 1 0	,,
211	Screw, PK, securing VR1	0 0 6	Doz.
	Condensers.		
16316D	C1—0·1 mfd.	0 0 9	Each.
15719C or 10012A	C2—0·0002 mfd.	0 0 9 0 0 8	,,
11017	Distance-piece securing C2	0 0 3	Doz.
13809	Rivet securing C2	0 0 2	,,
15719E or 15193A	C3—0·0005 mfd.	0 1 3 0 0 9	Each. ,,
13806	Rivet, securing C3	0 0 4	Doz.
10610	Insulation	0 0 1	Each.
15719F or 10010A	C4—0·001 mfd.	0 0 9	,,
10610	Insulation	0 0 1	,,
13806	Rivet	0 0 4	Doz.
16316D	C5—0·1 mfd.	0 0 9	Each.
—	C6—Inside T1	—	—
15719G	C7—0·002, on T2	0 1 1	Each.
17285A	**VC1 and VC2**—Two-gang variable condenser with one trimmer	0 8 0	,,
17284	Distance collar securing two-gang condenser	0 0 4½	Doz.
17192	Screw securing two-gang condenser	0 0 2	,,
12442	Washer, S.P. securing two-gang condenser	0 0 2	,,
16286D	Condenser drive assembly	0 2 9	Each.
16286A	Condenser drive bracket and bush	0 0 9	Each.
11012A	Condenser drive spindle with rubber drive	0 0 8	,,
11041	Split ring	0 0 6	Doz.
16274B	Spindle with spring contact for VR1	0 0 5	Each.
16280	Thrust bracket	0 0 2	,,
11227	Screw securing thrust bracket to bush on drive bracket (16286A)	0 0 6	Doz.
3165	Washer, S.P. securing thrust bracket to bush on drive bracket (16286A)	0 0 2	,,
17282	Bracket, L.H.	0 0 4½	Each.
17283	Bracket, R.H.	0 0 4½	,,
3166	Washer, S.P. securing condenser drive bracket to R. and L.H. brackets and latter to two-gang condenser	0 0 2	Doz.
11219	Screw securing condenser drive bracket to R. and L.H. brackets and latter to two-gang condenser	0 0 3	,,
11034F	Scale support and scale	0 1 0	Each.
11034A	Scale support	0 0 5	,,
10664D	Scale	0 0 6	,,
1551	Rivet securing scale to scale support	0 0 4	Doz.
11025	Grub screw, securing scale support to spindle of two-gang condenser	0 0 6	,,
10611G	**VC3**—0·0005 variable condenser	0 4 9	Each.
10660	Insulation bush securing VC3	0 0 1	,,
10661	Insulation washer securing VC3	0 0 1	,,
1060	Washer securing VC3	0 0 3	Doz.
12441	Nut securing VC3	0 0 1	Each.
	Switch.		
11056F	S1—Wave-change and On/off switch	0 6 6	,,
15159	Earthing tag	0 0 3	Doz.
3166	Washer, S.P.	0 0 2	,,

Part No.	Description.	Retail List Price. £ s. d.	Per
	Switch—*continued.*		
12619	Screw, securing S1	0 0 6	Doz.
11057	Spindle	0 0 3	Each.
11051L	Rotor, with two short contacts, front end of switch	0 0 9	,,
11051K	Rotor, with one long and one medium contact, at rear end of switch	0 0 9	,,
11059	Locating cam	0 0 3	,,
11063	Collar, between rotors	0 0 2	,,
10674	Grub screw securing locating cam and collar	0 0 4	Doz.
12567	Spring } at rear end of spindle	0 0 6	,,
1039	Washer } at rear end of spindle	0 0 2	,,
9016	Spring, on locating arm	0 0 1	Each.
11054B	Strip with eight spring contacts	0 2 6	,,
211	Screw, PK, securing strip	0 0 6	Doz.
11062	Guard strip, holding ends of contacts	0 0 2	Each.
211	Screw, PK, securing guard strip	0 0 6	Doz.
	Valve Holders and Panels.		
10545	Valve panel	0 0 2	Each.
10546	Valve leg clip	0 0 7	Doz.
13703	Valve panel cover	0 0 2	Each.
10547	Valve panel cover, with red spot	0 0 2	,,
13804	Rivet securing valve holders	0 0 3	Doz.
16550A	A. and E. terminal panel, with two sockets and tags	0 0 4	Each.
16073A	P.U. terminal panel, with two sockets and tags	0 0 4	,,
11692A	Ex L.S. terminal panel, with two tags and terminal screws	0 0 7	,,
11228	Terminal screw	0 0 4	Doz.
13803	Rivet, securing terminal panels	0 0 3	,,
	Bushes, Cleats, Leads and Wiring.		
16755	Insulation bush—Small	0 0 1	Each.
16756	Insulation bush—Large	0 0 1	,,
12613	Cleat for battery lead (H.T.)	0 0 1	,,
3047	Cleat for battery lead (L.T.)	0 0 6	Doz.
11228	Screw } securing cleats to radio unit	0 0 4	,,
3165	Washer, S.P. } securing cleats to radio unit	0 0 2	,,
11629	Nut } securing cleats to radio unit	0 0 6	,,
4681	Cleat, small	0 0 1	Each.
12613	Cleat, large	0 0 1	,,
8718	Screw } securing cleats to cabinet	0 0 4	Doz.
1058	Washer } securing cleats to cabinet	0 0 3	,,
16553A	Loudspeaker lead with five tags	0 1 8	Each.
15159	Tag, connecting leads to T2	0 0 3	Doz.
11802	Tag, connecting leads to radio unit	0 0 3	,,
15161	Tag, connecting earthing lead to radio unit	0 0 6	,,
3083	Rubber sleeve, small	0 0 6	,,
3084	Rubber sleeve, large	0 0 6	,,
16552A	Battery leads (H.T. and G.B.), with plugs and labels	0 3 10	Per Set.
16288A	Plug, red	0 0 2	Each.
16288B	Plug, black	0 0 2	,,
15453C	Lead label, H.T. negative	0 0 1	,,
15453D	Lead label, H.T. positive 1	0 0 1	,,
15453E	Lead label, H.T. positive 2	0 0 1	,,
15453G	Lead label, G.B. positive	0 0 1	,,
15453H	Lead label, G.B. negative 1	0 0 1	,,
15453J	Lead label, G.B. negative 2	0 0 1	,,
3084	Rubber sleeve	0 0 6	Doz.
14925A	Battery lead (L.T.), with tags and labels	0 1 4	Set.
8519	Tag	0 0 1	Each.
15453A	Lead label, L.T. positive	0 0 1	,,
15453B	Lead label, L.T. negative	0 0 1	,,
	Systoflex—		
223/03000	Black, 1 mm.	0 0 2½	Per yard.
223/03110	Brown, 1 mm.	0 0 2½	,,
223/03220	Red, 1 mm.	0 0 2½	,,
223/03440	Yellow 1 mm.	0 0 2½	,,
223/03550	Green, 1 mm.	0 0 2½	,,
223/03660	Blue, 1 mm.	0 0 2½	,,

SPARE PARTS LIST—*continued.*

Part No.	Description.	Retail List Price. £ s. d.	Per
	Bushes, Cleates Leads and Wiring—*continued.*		
223/03770	Violet, 1 mm.	0 0 2½	Per yd.
223/03401	Yellow/black, 1 mm.	0 0 2½	,,
223/03501	Green/black, 1 mm.	0 0 2½	,,
223/03541	Green/white, 1 mm.	0 0 2½	,,
223/07440	Yellow, 3 mm.	0 0 3½	,,
223/08440	Yellow, 4 mm.	0 0 4	,,
223/10440	Yellow, 6 mm.	0 0 6	,,
223/12440	Yellow, 8 mm.	0 0 10	,,
301/02240	Tinned copper wire, 24 S.W.G.	0 2 9	Per lb.
301/02220	Tinned copper wire, 22 S.W.G.	0 2 6	,,
398/20336	Metal braid	0 0 4	Per yd.
	Knobs, Valves, Batteries, Plugs and Labels.		
16554A	Knob-Switch, mottled	0 0 7	Each.
or 16554B	Knob-Switch, brown	0 0 7	,,
16555A	Knob-Volume, mottled	0 0 7	,,
or 16555B	Knob-Volume, brown	0 0 7	,,
17286A	Knob-Tune, mottled or brown	0 0 7	,,
10674	Grub screw for knobs	0 0 4	Doz.
16276	Knob-Filament, mottled	0 0 5	Each.
or 17594	Knob-Filament, brown	0 0 5	,,
11038	Washer } securing filament knob	0 0 2	Doz.
16277	Nut }	0 0 8	,,
—	H.T. battery, 120-v. (Cat No. B498)	—	—
—	L.T. accumulator, 2-v. 45 A.H., Type DFG	—	—
16289E	Aerial plug, mauve	0 0 2	Each.
16289B	Earth plug, black	0 0 2	,,
16289D	Pick-up plug, blue	0 0 2	,,
13874	Label—Use Marconi Valves	0 0 2	,,
17322	Model, Warning and Patents label	0 0 6	Doz.
17320	Instruction book	0 0 3	Each.

In order to expedite delivery of spare part orders, please quote :—

1. Model number and unit type number.
2. Spare part number and description as given in the above list.
3. Quantity required.

Failure to give full particulars inevitably causes delay in the execution of orders.

Order spare parts from :—

E.M.I. SERVICE, LTD.,

SHERATON WORKS, HAYES, MIDDLESEX.

Telephone : Southall 2468. Telegraphic Address : Service, Hayes, Middlesex.

The Company reserves the right to make any modifications without notice.

Marconi 284
Sales Points

1. Remarkable range and power for a very small cost.
2. High and constant selectivity.
3. Very fine reproduction from matched moving coil speaker—
4. Very economical operation—only 8 mA. H.T. current consumption.
5. Sensitivity control eliminates over-load on strong transmissions.
6. Very simple to operate—three main controls and clear wave-length scale.
7. Automatic tone-balancer.
8. Provision for pick-up and extra speaker.

G Marconi