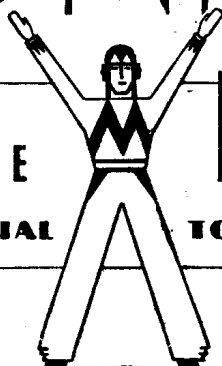


MARCONI PHONE

SERVICE MANUAL

PRIVATE AND CONFIDENTIAL TO THE TRADE ONLY



MODEL 223—4-VALVE A.C.—D.C. MAINS SUPERHETERODYNE

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Complete Spare Part Lists are issued separately, Part No. 21217.

JUNE
1935
223 SERIES
NUMBER TEN
PART NO. 21218

BRIEF SPECIFICATION.

VOLTAGE RANGE.

200 to 250 volts (A.C. or D.C.).

This instrument is designed to operate only on the voltages for which it is adjusted. Should any variation be noticed the supply company must be notified immediately.

FREQUENCY RANGE.

25-60 cycles A.C.

POWER CONSUMPTION.

90 watts (average).

FUSES.

This instrument may be connected to any A.C. or D.C. supply point, providing that the special fuses (Part No. 19850A) $\frac{3}{4}$ amp. rating are used.

SPEECH OUTPUT.

Approx. $1\frac{1}{2}$ watts (undistorted).

Anode dissipation of N. 30 output valve—approx. 5 watts.

WAVELENGTH RANGE.

Medium waves—200 to 550 metres.

Long Waves—1,000 to 2,000 metres.

DIMENSIONS.

Height.
 $17\frac{1}{4}$ inches.

Width.
 $14\frac{1}{2}$ inches.

Depth.
 $9\frac{1}{4}$ inches.

WEIGHT.

27 lb. net.

36 lb. gross (for home despatch).

LOUDSPEAKER.

Type No. 19800C.

This loudspeaker incorporates the output transformer T1 and smoothing choke CK1.

D.C. resistance of speech coil, 1.8 ohms.

Impedance at 800 cycles, 2.5 ohms.

D.C. resistance of field, 5,000 ohms approx.

CIRCUIT DESCRIPTION.

Aerial Coupling.

Two aerial sockets are provided, A2 (with condenser C22 coupling), for high capacity aerials. The input limiting resistance R16 is shunted by the sensitivity switch S2 and an acceptor trap (L1 TC6) is included to by-pass Morse interference of similar wavelength to the intermediate frequency (456 kc.). Constant sensitivity coupling to the first low loss tuned circuit is employed.

The Frequency Changer.

A Marconi X30 heptode operates as combined oscillator and first detector, the latter portion being A.V.C. controlled. Litz wound I.F. transformer IFT1 couples this valve to the I.F. amplifier.

The Amplifier and Detector.

The Marconi WD30 double diode pentode acts firstly as an I.F. amplifier, having the primary of the 2nd I.F. transformer in its anode circuit. The secondary of this transformer is connected to the diode of the WD30, which gives signal rectification and also supplies a D.C. voltage (across R13), which gives A.V.C. bias. The second diode is connected to cathode and acts as a screen. The L.F. signal now passes via R11 and L7 back to the grid of the WD30 for L.F. amplification. The resistance R9 acts as an L.F. load, and coupling to the output pentode is by C13 and the volume control VR1.

Output Pentode.

The Marconi N30 operates as a frequency correcting output stage, and feeds the moving coil loud-speaker.

The Rectifier.

On A.C. mains the Marconi U30 rectifies and supplies H.T. current to all valves. Smoothing is by CK1, C18 and C17. The loudspeaker field is shunted across the H.T. supply.

The Mains Filter and Fuse Unit.

The chokes CK2 and CK3 and C20, C21, C29, form an H.F. filter which, together with the fuses and main switch, are mounted in a separate unit at the side of the cabinet.

Heater Supply.

The filaments of all valves are in series, VR2 being the main voltage dropping resistance.

WARNING.

The chassis of this receiver is connected to one side of the mains, and therefore in certain conditions will be "live." Do not connect an "earth" to the chassis or touch it with the instrument connected to the mains.

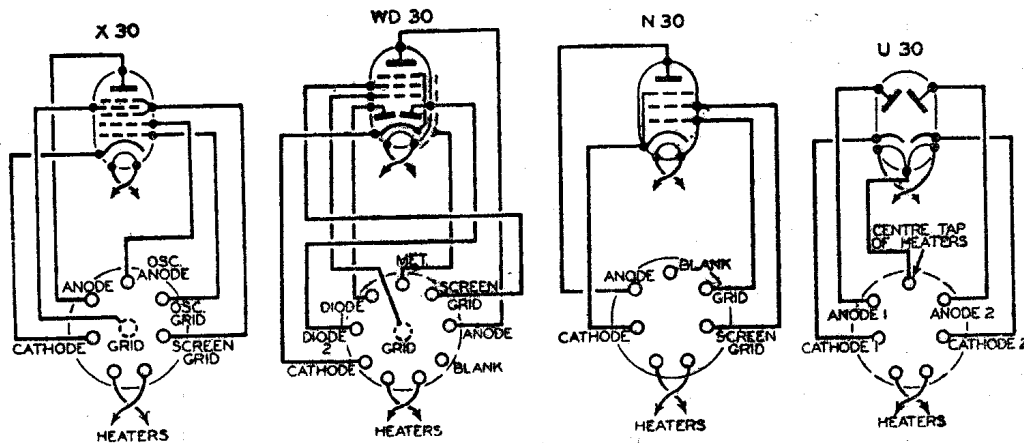
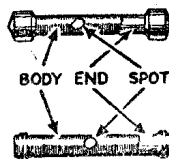


Fig. 1.

CONNECTIONS TO VALVES AS SEEN FROM UNDERSIDE OF CHASSIS.

NEW WIRE COLOUR CODE.

H.T. positive (+)	...	...	...	Red.
Anodes of valves when not direct to H.T. +	...	...	...	Red/Yellow.
Screening grids when not direct to H.T. +	...	...	...	Red/Black.
Grid circuits	...	...	...	Green.
Mains	...	...	...	Orange.
Heaters, filaments and cathodes	...	...	...	Brown.
General purpose colour	...	...	...	Yellow.



RESISTANCE COLOUR CODE.

BODY and END Colours.		SPOT Colours.	
(1st and 2nd figures.)		(Additional 0's.)	
0	Black.	0	Black.
1	Brown.	0.	Brown.
2	Red.	00.	Red.
3	Orange.	0000.	Orange.
4	Yellow.	0,000.	Yellow.
5	Green.	00,000.	Green.
6	Blue.		
7	Violet.		
8	Grey.		
9	White.		

Yellow will be used for leads not falling in the general code, and when stocks of any colour are temporarily exhausted in the factory.

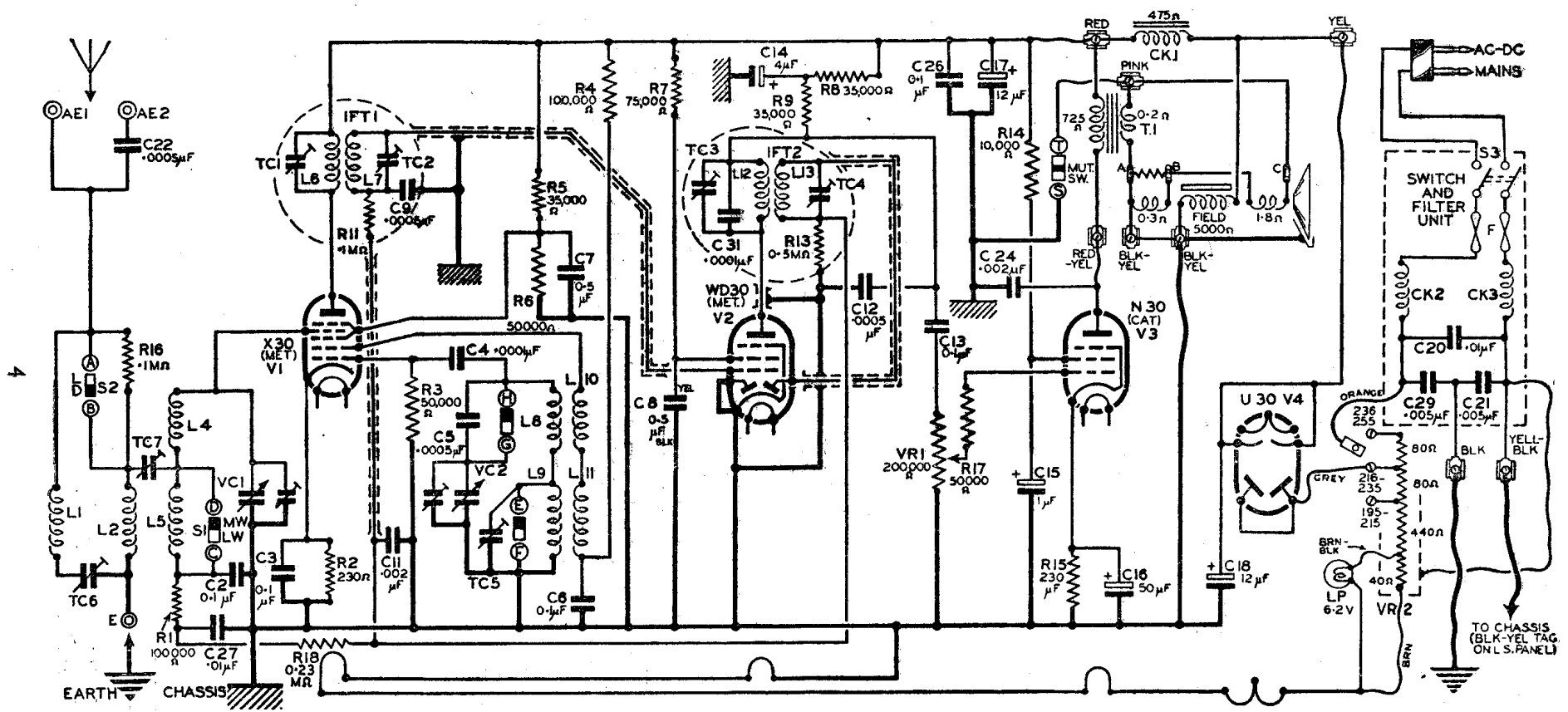


Fig. 2.

VALVE TESTS.

TOTAL H.T. FEED (including speaker field) 85 m/A. Measure at YEL. terminal on Loudspeaker Panel.
SPEAKER FIELD FEED 42 m/A. Measure at BLK.-YEL. terminal on Loudspeaker Panel.

VALVES	X30 (V1)	WD30 (V2)	N30 (V3)	U30 (V4)
Test voltages	0.9 v. (bias)	120 v.	17 v.	187 v.
Measure between	Valve metallising and chassis	Red terminal on speaker panel and anode pin of valve	Red and red-yel. terminals on speaker panel	Yel. terminal on speaker panel, and chassis.
Parts which should be checked if test voltages are abnormal	L6, TC1, R2, R4, R5, R6, L10, L11, C6, C7	R7, R8, R9, L12, TC3, C8 and C14	R14, T1 primary, C15, C16, R15	VR 2, C18.
		Also see Preliminary Tests.		
Anode/chassis volts	200 v.	65 v.	180 v.	187 v. (cathode to chassis).
Feed	0.5 to 1.3 m/A*	2.9 to 3.0 m/A	24.0 to 25.0 m/A	—
Oscillator anode/chassis volts ...	70 v.	—	—	—
Feed	1.3 m/A	—	—	—
Screen/chassis volts	56 v.	50 v.	145 v.	—
Feed	2.7 to 3.0 m/A	1.7 to 1.9 m/A	4.6 to 4.7 m/A	—
Bias volts	0.9 v.	—	5.9 v.	—

* Varies with signals and position of S2.

IMPORTANT.—Due to variations of current supply and the varying characteristics of valves, the values given will be subject to a variation of ± 20 per cent.

Marconi Valves have been selected for this instrument because of their high performance and special electrical characteristics. Inferior performance or actual damage may result if valves other than the specified Marconi Valves are employed.

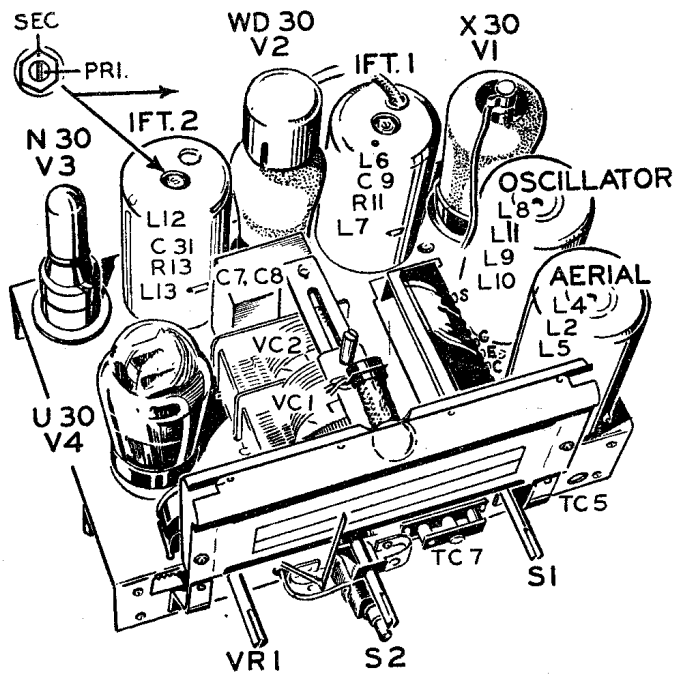


Fig. 4.

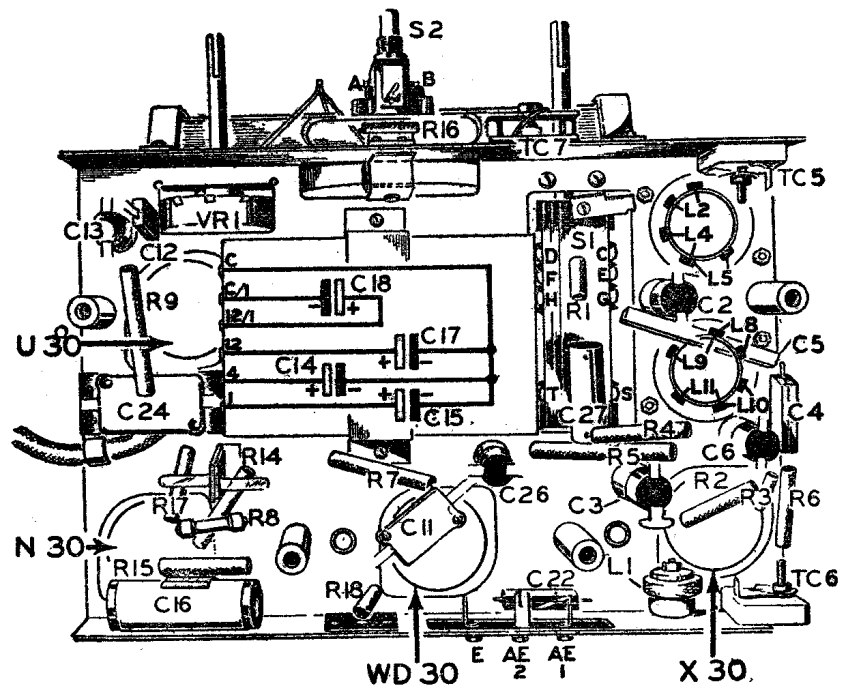


Fig. 3.

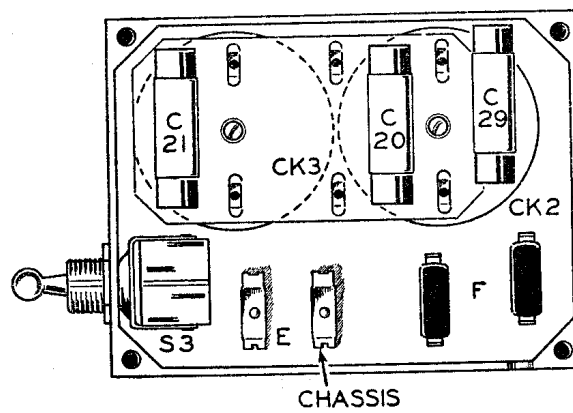


Fig. 5.

SERVICING DATA.

REMOVAL OF CHASSIS FROM CABINET.

- (1) Disconnect set from mains.
- (2) Remove knobs and knurled escutcheon from sensitivity switch. It is very important to replace the wax covering the grub screws when re-assembling knobs.
- (3) Remove mains plug, back and connections to mains voltage dropping resistance (there is no necessity to remove orange wire), and wires from terminals on filter unit and loudspeaker panel.
- (4) Loosen cable securing cleat on side of cabinet.
- (5) Remove from underside of cabinet the wooden battens which are each held by two wood screws. This gives access to the chassis fixing bolts.
- (6) Withdraw bolts, being careful not to lose the four washers which are INSIDE the cabinet. Chassis can now be withdrawn. When replacing see that the chassis edges rest firmly on the base of the cabinet.

REMOVAL OF LOUDSPEAKER AND MAINS UNIT.

- (1) Remove knurled escutcheon on mains switch.
- (2) Remove four wood screws fixing metal cowl. Mains unit can now be withdrawn.
- (3) The four roundhead screws holding the metal chassis should be removed to free the loudspeaker unit.

H.F. TESTS AND ADJUSTMENTS.

If a new component associated with the tuned circuits has been fitted, or if wiring has been disarranged, the circuits must be re-aligned. An accurately calibrated modulated oscillator and an output meter are necessary for this work. As an output meter a 0-1.5 A.C. voltmeter may be used, connected across the speech coil of the speaker, or, alternatively, a 0-1.5 D.C. voltmeter between the metallising of VI (X30) and chassis. If a D.C. voltmeter is used the deflection will be towards zero, and the oscillator need not be modulated. There should be a resistance of at least 10 ohms between the oscillator output leads.

I.F. CIRCUITS.

- (1) Couple oscillator to control (top) grid of VI, having first removed the lead already connected to this terminal.
- (2) Set receiver to medium waves (about 220 metres), volume control at maximum and oscillator to 456 kc.
- (3) Adjust trimmers in the following order for maximum deflection of meter needle :—

TC1 (IFT1 primary)	...	...	Inner screw.
TC2 (IFT1 secondary)	...	...	Outer nut.
TC3 (IFT2 primary)	...	...	Inner screw.
TC4 (IFT2 secondary)	...	...	Outer nut.
- (4) Check over the adjustments in the same order, progressively reducing the input from the oscillator to prevent overloading.
- (5) Re-align H.F. circuits as under.

I.F. TRIMMING CONDENSERS

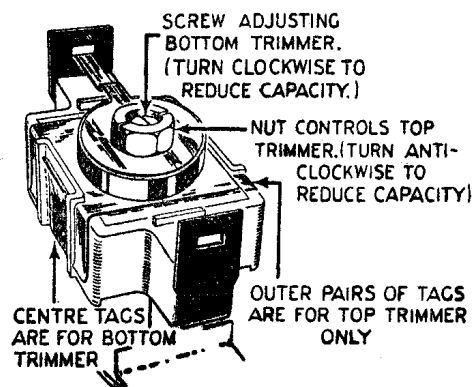


Fig. 6.

H.F. CIRCUITS AND IMAGE REJECTION.

- (1) Connect aerial and earth to receiver (AE1 socket) and couple oscillator to aerial lead.
- (2) Set receiver and oscillator to 200 metres (sensitivity switch in). The receiver volume control should be kept at maximum and the oscillator input reduced to avoid overloading.
- (3) Adjust trimmer on VC1 for maximum meter deflection.
- (4) Set oscillator and receiver to 230 metres and adjust VC2 trimmer.
- (5) Check setting of trimmers on 500 metres. If either trimmer has to be appreciably re-adjusted "tracking" is inaccurate, and the chassis should be returned for factory matching.
- (6) Repeat Nos. 2 and 3.
- (7) Set oscillator to 456 kc. and increase input until a reading is obtained on the output meter.
- (8) Adjust TC6 for **minimum** deflection.
- (9) Set oscillator and receiver to 1,400 metres.
- (10) Adjust TC5 and the gang condenser one after the other for maximum deflection.
- (11) Set oscillator to 261 metres and tune receiver to the image on approximately 1,260 metres.
- (12) Adjust TC7 for **minimum** deflection.

THE CONDENSER DRIVE.

ADJUSTMENT OF RUBBER DRIVE.

If slip occurs due to wear of the rubber drive, an adjustment can be made. First detach the sensitivity switch complete with bracket (it is not necessary to unsolder the connecting wires). Now slacken the two screws fixing the drive spindle brackets, push the brackets upwards to increase the pressure of the rubber drive and tighten screws.

ADJUSTMENT OF POINTER.

Although no fine adjustment of the pointer is provided, adjustments of the pitch of the rack and pinion—i.e., approximately $\frac{3}{32}$ inch or more—may be made by slipping the rack. If finer adjustment is required it may be done by slacking off screws fixing the scale and sliding scale to the correct setting.

PROGRESSIVE TESTING.

Fault finding can be greatly simplified by a systematic process of elimination. Follow through the progressive tests given below and consult the General Faults Table on page 10.

- (1) First check up fuses, all valves for heater continuity and freedom from inter-electrode short circuits, and measure with ohmmeter across the mains input to the receiver. The reading should be approximately 550 ohms, valves in and switch ON. If reading is infinity suspect CK2, CK3, VR2, S3 connecting leads or heater wiring. If reading is less than value given suspect C20, C21 or C29.
- (2) Check L.F. side of the receiver by connecting a pick-up (via an 0.1 mfd. condenser in each lead) to the top grid terminal of V2 (WD30) and chassis, or by touching top grid of WD30 with the finger, when a loud hum should be heard. If results are O.K. the fault lies somewhere in V1 or its associated circuits.
- (3) The aerial coupling circuits including R16, S2, L1, L2 and TC7, can be roughly checked by contacting the aerial on to the top grid of V1 (X30). Results should now be obtainable, but with some instability and hum.
- (4) Should none of the above tests point to or locate the fault, make the following continuity checks and check valve readings with the valve table on page 5.

CONTINUITY CHECKING.

Disconnect instrument from mains, remove valves and pilot lamp. Readings ± 20 per cent.

Component.	Wavechange Switch.	Where to Measure.	D.C. Resistance.
L1	M.W. ...	AEI and TC6	50 ohms.
L2	M.W. ...	AEI and E—sensitivity switch "IN"	15 ohms.
L4	M.W. ...	Top grid V1 and switch contact "C"	4 ohms.
L4 + L5	L.W. ...	As for L4	30 ohms.
L6	—	—	5 ohms.
L7 + R11	—	Top grid V2 and one side of C11	100,000 ohms (L7—5 ohms).
L8	M.W. ...	Switch contact "H" and chassis	1.5 ohms.
L8 + L9	L.W. ...	As for L8	6.5 ohms.
L10 + L11	—	—	6.5 ohms.
L12	—	—	3.5 ohms.
L13 + R13	—	Diode V2 and chassis	0.5 megohm (L13—5 ohms).
R1 + R18	—	One side C11 and top grid V1	330,000 ohms.
VRI + R17	—	Measure only by resistance bridge or damage may be done to the graphite track volume control	50,000 to 250,000 ohms, according to position of volume control.

GENERAL FAULTS TABLE.

Symptom.	Action.	Possible Causes.
No results—Pilot lamp and valves light	Check connections of leads to loud-speaker panel with circuit diagram, page 4	Loudspeaker field or transformer primary not connected.
	Check muting contacts T and S	These contacts may have become distorted.
	Check that grey lead is connected to the centre (216-235) of the voltage tapings on VR2	—
	Check C24 for short circuit	—
	Check C13 for open circuit or disconnection.	—
Hum	If on A.C. try reversing the mains plug...	—
	Try replacing WD30 valve	—
	Check condensers C14, C13, C15, C17, C18, C29	—
	Check C7, C8	Modulation hum.
Crackles	Give each valve a slight knock to locate possible fault	Loose valve electrode.
	Screw pilot lamp in tightly	—
	Check C20, C29 and C21, and CK2 and CK3 (3 ohms each)	H.F. interference coming in through mains (see below).
	Examine soldered joints	—
	If a "scratchy" noise, examine gap of speech coil for dirt or badly centred coil	Loudspeaker dirty or out of adjustment.

ELECTRICAL INTERFERENCE.

Before attributing disturbing noises to a fault within the instrument the following simple tests should be made :—

Switch on the receiver and, having tuned to a point where signals are not being received, make and break the aerial lead. If the aerial is picking up disturbances a decrease in noise will be noticed when aerial is disconnected. On the other hand, the interference may be due to high frequency (H.F.) brought to the instrument via the current supply, or to a fault in the receiver. Carefully check the whole receiver for loose or dirty contacts or joints.

in districts where severe interference is experienced, due to man-made static being picked up by the aerial downlead, the fitting of ANTI-STATIC AERIAL EQUIPMENT may be of great benefit. This equipment is obtainable from :—

E.M.I. SERVICE, LTD.,
SHERATON WORKS,
HAYES, MIDDLESEX.

Electrical machinery or flashing signs will invariably give rise to the type of interference known as "H.F." and will cause crackling or "frying" noises in the speaker. Attention is drawn to the activities of the Post Office and the British Broadcasting Corporation in investigating this type of interference.

If it is quite certain after the tests previously described that the interference is not within the instrument, obtain from a Post Office (or the B.B.C.) a copy of the special questionnaire form issued on Electrical Interference, fill this up accurately and return it as directed.

The P.O./B.B.C. organisation is one for investigating the **cause** of complaint to ascertain whether a cure can be effected. Such investigations may be delicate and lengthy, and require both goodwill and tact to bring to a successful conclusion. On no account should it be suggested to the owner (if known) of the interfering apparatus that your application to the B.B.C. is in any way a measure of retaliation.

It is of the utmost importance that this valuable channel of co-operation with the 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 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.

A complete List of Spare Parts is issued separately, Part No. 21217.
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.

Unless full particulars are quoted, delay in the execution of orders must inevitably result.

Order spare parts from :—

E.M.I. SERVICE, LTD.,
SHERATON WORKS,
HAYES, MIDDLESEX.

Telephone : Southall 2468.

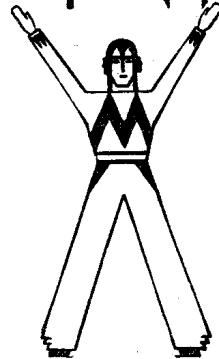
Telegraphic Address: Service, Hayes, Middlesex.

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MARCONI PHONE

MODEL 223



4-VALVE AC-DC
MAINS SUPERHET

Spare Part List

PRIVATE AND CONFIDENTIAL

TO THE TRADE ONLY

Part No.	Description.	Retail List Price.	Per
19823	Instructions. Instruction Book	£ s. d. 0 0 6	Each.
19830	Model, Warning and Patents label	0 0 6	Doz.
13874	Label " Use Marconi Valves "	0 0 2	Each.
19864A	Voltage label (tie-on)	0 0 6	Doz.
CABINET PARTS AND FITTINGS.			
—	Cabinet, complete	2 15 0	Each.
8195	Rubber feet	0 0 8	Doz.
18709	Pin, securing feet	0 0 3	Gross.
19838A	Back for cabinet	0 1 9	Each.
19896	Screw } securing back to brackets	0 0 1	"
19895	Spring washer }	0 0 4	Doz.
13268	Bracket for back	0 0 1	Each.
8602	Screw securing brackets	0 0 2	Doz.
19875	Escutcheon for mains switch (S. 3)	0 0 6	Each.
18928	Escutcheon for L.D. switch (S. 2)	0 0 2	"
18940	Tuning escutcheon	0 0 8	"
8695	Screw securing escutcheon	0 0 2	Doz.
18939	Window	0 0 1	Each.
12106	Clip, R.H. } securing window to escutcheon	0 0 1½	"
12108	Clip, L.H. }	0 0 1½	"
11248	Screw	0 0 7	Doz.
17627	Loudspeaker fret	0 2 6	Each.
15817	Button } securing fret	0 0 1	"
9548	Screw }	0 0 3	Doz.
—	Baffle board, with silk and insert nuts	0 3 3	Each.
19865	Silk	0 0 9	"
14922	Insert nut	0 1 4	Doz.
8681	Wood screw	0 0 4	"
16020	Ornamental screw } securing baffle board	0 0 1	Each.
14761	Ornamental washer }	0 0 7	Doz.
1021	Washer }	0 0 3	"
3167	Washer, S.P. }	0 0 2	"
11627	Nut }	0 0 6	"

Part No.	Description.	Retail List Price.	Per
LOUDSPEAKER.			
		£ s. d.	
19800C	Loudspeaker, complete with CK1 and T1	1 13 0	Each.
11213	Screw	0 0 2	Doz.
1021	Washer } securing loudspeaker	0 0 3	"
3167	Washer, S.P. }	0 0 2	"
19460A	Speech coil and cone	0 3 0	Each.
19457	Felt ring	0 0 1	"
19585	Cardboard washer	0 0 1	Doz.
17476	" D " washer } securing spider to studs on cone chassis	0 0 1	"
1092	Washer }	0 0 2	"
19687	Nut }	0 0 2	"
19455C	Cone chassis	0 2 9	Each.
11635	Nut securing electro-magnet to studs on cone chassis	0 0 6	Doz.
19459C	Field coil	0 6 3	Each.
19458	Large presspahn washer	0 0 6	Doz.
19821A	Hum coil	0 0 9	Each.
19800A	Magnet yoke and core	0 3 6	"
19822	Top plate	0 1 6	"
11311	Screw securing top plate	0 0 2	Doz.
13455C	Panel with three tags	0 0 2	Each.
7237	Tag	0 0 4	Doz.
8777	Screw, P.K., securing panel to cone chassis	0 0 6	"
311701320	Eureka wire (32 S.W.G.)	0 0 1	5 yds.
223702440	Varnished cotton sleeving, $\frac{3}{4}$ mm.	0 0 2	Yard.
CONTROLS.			
17051A	Knob—Volume	0 0 7	Each.
17054B	Knob—Tuner	0 0 7	"
17051G	Knob—Wave-change switch	0 0 7	"
16564	Screw, P.K., securing knobs	0 0 7	Doz.
—	Wax for screws	—	—
MAINS INPUT UNIT.			
19804B	Mains Input Unit, complete with S. 3, CK2, CK3, C20, C21, C29 and fuses	1 3 6	Each.
9526	Screw } securing mains input unit	0 0 3	Doz.
6461	Washer }	0 0 1	"
19804A	Screen plate	0 1 0	Each.
16757	Insulating bush	0 0 1	"
19803	Transfer—Warning	0 0 8	Doz.
19811	Transfer—Voltage tapping	0 0 4	"
19852A	Mains resistance—VR2	0 7 0	Each.
or 21429A	or 19852A } Mains resistance—VR2	0 7 0	Each.
11219	Screw } securing mains resistance to screen plate	0 0 3	Doz.
3166	Washer, S.P. }	0 0 2	"
11228	Terminal screw for connections to VR2	0 0 4	"
12179	Voltage adjusting screw	0 0 1	Each.
19869A	Switch and filter unit	0 14 0	"
19876	Insulation	0 0 6	Doz.
11228	Screw } securing switch and filter unit to screen plate	0 0 4	"
3165	Washer, S.P. }	0 0 2	"
19869	Moulded case	0 2 0	Each.
11228	Terminal screw	0 0 4	Doz.
14512	Tag	0 0 5	"
14511	Nut	0 0 4	"
19872	Mains connecting pin	0 0 1 $\frac{1}{2}$	Each.
11284	Screw } securing mains connecting pin	0 0 6	Doz.
15159	Tag }	0 0 3	"
3820	Washer }	0 0 2	"
19818	Fuse panel	0 0 1	Each.
19877	Fuse clip	0 0 1	"
19878	Fuse clip (for spare fuse)	0 0 8	Doz.
19850A	Fuse (yellow spot)	0 0 6	Each.

Part No.	Description.	Retail List Price.	Per
RADIO UNIT.			
		£ s. d.	
18900F	Radio Unit ...	5 17 6	Each.
13859	Bolt, 0 B.A., hex. hd. ...	0 0 1	"
19802	Washer ...	0 0 6	Doz.
3460	Spring washer ...	0 0 3	"
—	Wood cover for bolts, long ...	0 0 9	Each.
—	Wood cover for bolts, short ...	0 0 7	"
9552	Screw securing wood covers ...	0 0 2	Doz.
VALVES.			
—	V1—Marconi X30 Met. ...	—	—
—	V2—Marconi WD30 Met. ...	—	—
—	V3—Marconi N30 Catkin—Output ...	—	—
—	V4—Marconi U30—Rectifier ...	—	—
19835A	Valve cap for V2 ...	0 0 6	Each.
19881	Insulation ...	0 0 4	Doz.
COILS.			
12362A	L1—filter coil ...	0 1 0	Each.
10996	Screw ...	0 0 6	Doz.
3166	Washer, S.P. } securing L1 ...	0 0 2	"
11636	Nut ...	0 0 4	"
18925C	L2—Aerial coil } aerial coil assembly with screen ...	0 4 3	Each.
	L4—M.W. grid coil ...		
	L5—L.W. grid coil ...		
21345A	L6—Primary coil } in 1st I.F.T. ...	0 3 6	"
	L7—Secondary coil ...		
18925D	L8—M.W. Oscillator coil } oscillator coil assembly wire screen ...	0 4 0	"
	L9—L.W. Oscillator coil ...		
	L10—M.W. Reaction coil ...		
	L11—L.W. Reaction coil ...		
18432A	Screen for aerial coil and oscillator coil assemblies ...	0 0 9	"
18431	Spacer ...	0 0 2	"
11272	Screw ...	0 0 5	Doz.
3166	Washer, S.P. } securing coil screen to coil former ...	0 0 2	"
11636	Nut ...	0 0 4	"
11628	Nut ...	0 0 4	"
3166	Washer, S.P. } securing screen to chassis ...	0 0 2	"
21345D	L12—Primary coil } in 2nd I.F.T. ...	0 3 6	Each.
	L13—Secondary coil ...		
CHOKES.			
12040X	CK1—Smoothing choke ...	0 5 0	Each.
10606	Screw, P.K., securing CK1 to loudspeaker ...	0 0 7	Doz.
16840B	CK2—H.F. choke ...	0 1 3	Each.
16840B	CK3—H.F. choke ...	0 1 3	"
11223	Screw ...	0 0 3	Doz.
8361	Washer ...	0 0 7	"
3166	Washer, S.P. } securing CK2 and CK3 to filter unit in mains input mains ...	0 0 2	"
TRANSFORMERS.			
21345C	1st I.F. transformer, complete with R11 and C9 ...	0 8 6	Each.
21345C	2nd I.F. transformer, complete with R13 and C31 ...	0 8 6	"
19323C	Screen on 1st I.F.T. ...	0 0 9	"
19323B	Screen on 2nd I.F.T. ...	0 0 9	"
19308	Adjusting screw ...	0 0 1	"
19306	Adjusting nut ...	0 0 4	Doz.
18462	Washer, brass ...	0 0 1½	"

Part No.	Description.	Retail List Price.	Per
		£ s. d.	
	2nd I.F. Transformer— <i>contd.</i>		
18452	Washer with tag	0 0 5	Doz.
21027	Insulating washer (0.176 dia. hole)	0 0 9	"
21037	Insulating washer (0.242 dia. hole)	0 0 4½	Each.
18447	Mica for trimmers	0 0 7	Doz.
11628	Nut	0 0 4	"
3166	Washer, S.P. } securing I.F. transformers	0 0 2	"
12040W	T1—Output transformer	0 7 6	Each.
10606	Screw, P.K., securing T1 to loudspeaker	0 0 7	Doz.
19825A	Terminal panel of T1, with six terminal screws	0 0 9	Each.
12619	Screw, P.K., securing terminal panel to T1	0 0 6	Doz.
11228	Terminal screw, on panel	0 0 4	"
RESISTANCES.			
19202L	R1—100,000 ohms	0 0 9	Each.
17541AJ	R2—230 ohms	0 0 9	"
19202J	R3—50,000 ohms	0 0 9	"
17541Q	R4—100,000 ohms	0 0 9	"
17141G	R5—35,000 ohms	0 1 1	"
17541P	R6—50,000 ohms	0 0 9	"
17541CF	R7—75,000 ohms, S.L.	0 1 0	"
5787F	R8—5,000 ohms	0 0 9	"
17141BS	R9—35,000 ohms, S.L.	0 1 3	"
19202L	R11—100,000 ohms	0 0 9	"
19202N	R13—500,000 ohms	0 0 9	"
17541B	R14—10,000 ohms	0 0 9	"
17541AJ	R15—230 ohms	0 0 9	"
19202L	R16—100,000 ohms	0 0 9	"
19202J	R17—50,000 ohms	0 0 9	"
19202AK	R18—350,000 ohms, ¼ watt	0 0 9	"
6000BG	VR1—Volume control—200,000 ohms	0 5 0	"
16574	Washer } securing VR1	0 0 2	Doz.
4400	Nut }	0 0 2	Each.
19852A	VR2—Mains resistance	0 7 0	"
or 21429A			
11219	Screw } securing VR2 to screen plate of mains input unit	0 0 3	Doz.
3166	Washer, S.P. }	0 0 2	"
CONDENSERS.			
18318C	C2—0.1 mfd.—tubular	0 0 9	Each.
18318C	C3—0.1 mfd.—tubular	0 0 9	"
18580C	C4—0.0001 mfd....	0 0 9	"
18105B	C5—0.0005 mfd., S.L.	0 3 0	"
18318C	C6—0.1 mfd.—tubular	0 0 9	"
18920D	C7—0.5 mfd. } small condenser block	0 2 6	"
	C8—0.5 mfd. }		
12619	Screw, P.K., securing small condenser block and cleat for valve packing	0 0 6	Doz.
18580F	C9—0.0005 mfd....	0 0 9	Each.
15719G	C11—0.002 mfd....	0 1 1	"
18580F	C12—0.0005 mfd.	0 0 9	"
18318C	C13—0.1 mfd.—tubular	0 0 9	"
	C14—4.0 mfd. } electrolytic condenser block	0 9 0	"
19851A	C15—1.0 mfd. }		
	C17—12.0 mfd. }		
	C18—12.0 mfd. }		
19807	Strap } securing electrolytic condenser block	0 0 2	"
8777	Screw, P.K. }	0 0 6	Doz.
16764A	C16—50.0 mfd., electrolytic	0 2 2	Each.
19810	Spring clip } securing C16	0 0 8	Doz.
16360	Rivet }	0 0 2	"
—	Insulation }	—	"

Part No.	Description.	Retail List Price.			Per
		£	s.	d.	
16316A	C20—0.01 mfd. ...	0	0	9	Each.
16316H	C21—0.005 mfd....	0	0	9	"
18580F	C22—0.0005 mfd.	0	0	9	"
15754C	C24—0.002 mfd....	0	1	7	"
19894	Insulation ...	0	0	3	Doz.
13517	Screw, P.K., securing C23	0	0	1	Each.
18318C	C26—0.1 mfd., tubular	0	0	9	"
18381	Holder for tubular condensers...	0	0	3	"
18480	Eyelet securing holders	0	0	6	Doz.
16316A	C27—0.01 mfd. ...	0	0	9	Each.
16316H	C29—0.005 mfd....	0	0	9	"
18580C	C31—0.0001 mfd.	0	0	9	"
—	TC1 and TC2—Part of 1st I.F. transformer	—	—	—	—
—	TC3 and TC4—Part of 2nd I.F. transformer	—	—	—	—
16240A	TC5—L.V. trimmer	0	1	2	Each.
16240C	TC6—Filter trimmer	0	1	2	"
11229	Screw	0	0	3	Doz.
3165	Washer, S.P. } securing TC5 and TC6	0	0	2	"
11629	Nut	0	0	6	"
14575B	TC7—Image suppressor...	0	0	9	Each.
12619	Screw, P.K., securing TC7	0	0	6	Doz.
18712F	VC1—Tuning condenser	0	8	6	Each.
or 18708A	VC2—Oscillator condenser } two-gang condenser				
18944	Screw	0	8	6	"
12442	Washer, S.P. } securing two-gang condenser	0	0	4	Doz.
21424	Spring at back of condenser gang	0	0	2	"
		0	0	1	Each.
	Parts of 18712F—				
17356	Trimmer plate	0	0	6	Doz.
17357	Mica for trimmer	0	0	9	"
17362	Insulating washer	0	0	1	"
11366	Adjusting screw	0	0	3	"
17359	Earth spring	0	0	6	"
CONDENSER DRIVE AND TUNING DETAILS.					
18926A	Drive wheel	0	1	3	Each.
18943	Gear plate	0	0	1	"
11424	Screw securing gear plate to drive wheel	0	0	5	Doz.
18904	Screw securing drive wheel to condenser spindle	0	0	3	"
18929B	Drive spindle with rubber drive	0	1	0	Each.
18923	Bracket supporting rear end of drive spindle	0	0	2	"
18924	Bracket supporting front end of drive spindle	0	0	1	"
21501	Screw	0	0	3	Doz.
3165	Washer, S.P. } securing brackets	0	0	2	"
18917A	Pointer, complete with rack	0	0	9	Each.
18942	Rack support	0	0	1 $\frac{1}{2}$	"
18908	Rivet securing rack support	0	0	3	Doz.
12400	Spring for rack support	0	0	1	Each.
19808A	Scale frame and reflector assembly	0	2	0	"
8777	Screw, P.K., securing scale frame	0	0	6	Doz.
19815B	Tuning scale	0	2	6	Each.
12619	Screw, P.K. } securing scale	0	0	6	Doz.
1062	Washer, S.P. }	0	0	3	"
19887A	Lamp holder and bracket assembly	0	1	0	Each.
19886	Lamp adjusting bar	0	0	3	"
19882	Tapped plate for screw	0	0	1	"
19842	Knurled screw for adjusting lamp	0	0	1	"
8777	Screw, P.K., securing adjusting bar to bracket	0	0	6	Doz.
12619	Screw, P.K., securing adjusting bar to reflector	0	0	6	"
1575A	Pilot lamp...	0	0	9	Each.

Part No.	Description.	Retail List Price.	Per
SWITCHES			
		£ s. d.	
18781F	S1—Wavechange switch	0 7 6	Each.
11248	Screw } securing S1	0 0 7	Doz.
3165	Washer, S.P. }	0 0 2	"
18783B	Contact block complete with 8 spring contacts	0 2 6	Each.
18787	Top insulating plate	0 0 3	"
8777	Screw, P.K., securing insulator to switch frame	0 0 6	Doz.
11805	Screw, P.K., securing contact block to switch frame	0 0 6	"
18784	Cam—Front	0 0 6	Each.
18785	Cam—Rear	0 0 6	"
12457	Collar } securing cams to spindle	0 0 3	"
14812	Screw }	0 0 2	Doz.
18788	Spindle	0 0 4	Each.
19834A	Locating collar with 3 pins	0 0 4	"
10674	Screw—Pointed } securing locating collar	0 0 4	Doz.
11773	Screw—Cupped }	0 0 5	"
18638	Spring	0 0 1 $\frac{1}{2}$	Each.
18786	Spring, bracket	0 0 4	Doz.
18946A	S2—Local distant or sensitivity switch	0 3 3	Each.
19827	Plate for S2	0 0 1	"
19832	Spring bracket for S2	0 0 1	"
11229	Screw } securing S2 to bracket	0 0 3	Doz.
3165	Washer, S.P. }	0 0 2	"
12619	Screw, P.K. } securing bracket to chassis	0 0 6	"
15059	Washer }	0 0 1 $\frac{1}{2}$	"
19214D	S3—Mains on/off switch	0 2 9	Each.
14697	Nut securing S3 to mains input unit	0 0 11	Doz.
PANELS, LEADS, PLUGS, ETC.			
16289J	Aerial plug, yellow	0 0 2	Each.
16289B	Earth plug, black	0 0 2	"
19874A	Mains lead	0 1 6	"
19867B	Mains socket	0 2 6	"
19867	Base moulding	0 1 3	"
19870A	Spring contact	0 0 1	"
11228	Screw	0 0 4	Doz.
15159	Tag	0 0 3	"
3165	Washer, S.P.	0 0 2	"
19868	Cap moulding	0 1 0	Each.
11430	Screw, securing cap moulding to base moulding	0 0 4	Doz.
18889A	Carton for mains lead, etc.	0 0 1	Each.
12613	Cleat for leads	0 0 1	"
8692	Screw securing cleat	0 0 3	Doz.
18900E	Chassis with four securing pillars	0 3 0	Each.
19860	Valve panel, 9-pin	0 0 1	"
19861	Valve panel cover, 9-pin	0 0 2	"
18182	Valve panel, 7-pin	0 0 1	"
18183	Valve panel cover, 7-pin	0 0 4	"
17503	Valve leg socket	0 0 1	"
16357	Rivet securing valve holders	0 0 2	Doz.
19816A	Aerial and earth connection panel with three sockets	0 0 4	Each.
13802	Rivet securing panel	0 0 2	Doz.
19859A	Lead anchor panel with three tags	0 0 3	Each.
13803	Rivet securing panel	0 0 3	Doz.
18902B	Terminal strip with three long tags	0 0 3	Each.
16357	Rivet } securing strip	0 0 2	Doz.
19880	Washer }	0 0 1	"
19839A	Output and power cable, less tags	0 3 0	Each.
11802	Tag for cable (slotted)	0 0 3	Doz.

Part No.	Description.	Retail List Price.			Per
		£	s.	d.	
19829	Tag for cable (with hole)	0	0	2	Doz.
12619	Cleat for cable	0	0	6	"
7155	Cleat for valve packing	0	0	1	Each.
11220	Screw	0	0	2	Doz.
11628	Nut } securing cleat for power cable and one cleat for valve packing...	0	0	4	"
3166	Washer, S.P. }	0	0	2	"
8777	Screw, P.K., securing cleat for valve packing	0	0	6	"
16576	Earthing tags at ends of chassis	0	0	3	"
11219	Screw	0	0	3	"
11628	Nut } securing tags to underside of top of chassis	0	0	4	"
3166	Washer, S.P. }	0	0	2	"
16576	Earthing tag at back of chassis	0	0	3	"
11228	Screw	0	0	4	"
11629	Nut } securing tag	0	0	6	"
3165	Washer, S.P. }	0	0	2	"
16755	Insulating bush (small)	0	0	1	Each.
16756	Insulating bush	0	0	1	"
19897	Spring clip for valve top	0	0	1	"
19898	Screw for spring clip	0	0	3	Doz.

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