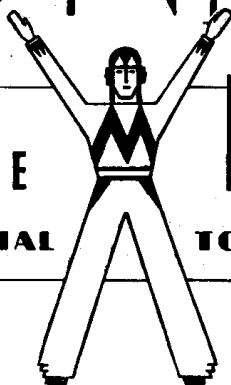


MARCONI PHONE

SERVICE MANUAL

PRIVATE AND CONFIDENTIAL

TO THE TRADE ONLY



MODEL 257—4-VALVE BATTERY SUPERHETERODYNE

	Page.		Page.
Brief Specification	2	Chassis Layout Diagrams	6
Circuit Description	2	Preliminary Tests	7
Installation	2	Dismantling	7
Extra Loudspeakers	3	Coil Continuity Tests	8
General Faults Table	3	H.F. Tests and Adjustments	8
Circuit Diagram	4	Electrical Interference	9
Valve Table	5		

For complete Spare Parts see separate List, Part No. 21207.

M A Y
1 9 3 5
1935. SERIES
NUMBER SEVEN
PART NO. 21208

BRIEF SPECIFICATION.

WAVELENGTH RANGE.

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

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

CURRENT CONSUMPTION.

L.T. 0.9 amperes (approximately).

H.T. 9.0 mA (approximately) on Radio. 5.0 mA (approximately) on Gram.

PHYSICAL SPECIFICATION.

Overall Height.

17 inches.

48.3 cm.

Overall Width.

14½ inches.

37.5 cm.

Overall Depth.

9 inches.

26.0 cm.

Net weight, 45 lb. with batteries. Weight packed, 61 lb. with batteries.

CIRCUIT.

Two aerial sockets are provided to allow for varying aerial conditions. A resistance is connected in series with the aerial, the local-distant switch being connected across it. For normal reception the switch is closed, whilst for reception of a powerful local station the switch is opened.

The Marconi X21 (Heptode) V1 acts as a mixer (frequency-changer), and is fed from a super-selective tuned circuit in which the medium wave coil is wound with Litz wire. Connected in the anode circuit of this valve is a Litz wound I.F. transformer. As the intermediate frequency is 456 kc, second channel interference is practically eliminated.

The (delayed) A.V.C. line from the second diode of the HD21 is connected through to the grid of this valve.

Reaction is capacitatively applied to the anode of V1 from the second I.F. transformer, and may be varied by the pre-set condenser TC6 at back of chassis.

The Marconi VS24, V2, and its transformer IFT2 (Litz wound) form the I.F. amplifier stage, the valve being controlled by the A.V.C. line as in the case of V1.

The Marconi HD21 (double diode triode) V3, serves three purposes :—

1. The first diode enables the output from tap of IFT2 to be rectified, after which the signal is passed via the volume control network to the grid of the triode portion of the valve.
2. The triode portion of the HD21 functions as an L.F. amplifier, signals being passed via C13 to the primary of the L.F. transformer T1.
3. The second diode of V3 supplies delayed A.V.C. voltage, which is passed via R4 to the grids of V1 and V2.

Marconi QP21 (Double Pentode) V4.—This valve, which is connected to the parallel fed transformer T1, gives an undistorted output of 1.2 watts into the speech coil of the moving coil speaker.

The Volume Control.—As the volume control network (VR1, C9, R6, R7) is in the grid circuit of V3 the volume of "gram" input is controlled by VR1, and only a shunt resistance will be required when fitting a pick-up.

INSTALLATION.

THE AERIAL.

Wherever possible an outdoor aerial should be used. Unless the instrument is installed within 10 miles of a transmitter, as long an aerial as possible, up to 100 feet including lead-in, should be erected. Within a radius of 10 miles from a transmitter about 40 to 60 feet should be used.

When using an aerial up to 60 feet in length, plug the aerial into socket AE1 ; if over 60 feet, plug into AE2.

HOW TO USE A PICK-UP.

This instrument may be used for the reproduction of gramophone records in conjunction with a Marconiphone pick-up. The Marconiphone Model 25 is particularly recommended. With this pick-up, a 50,000 ohms fixed resistance should be shunted across the pick-up leads for best results.

Do not forget to connect the pick-up lead screening to the socket marked "S." Reverse the pick-up plugs to ascertain that the best results are being obtained.

As the pick-up connections are switched the pick-up may be left permanently connected.

NO EXTRA VOLUME CONTROL IS REQUIRED.

EXTRA LOUDSPEAKERS.

Switch off the instrument before re-arranging speakers. Model 257 is capable of operating an extra speaker, the circuit arrangement being particularly suitable for moving coil (low resistance) types, providing that the 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 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.

GENERAL FAULTS TABLE.

Symptoms.	Possible Cause.	Action to be Taken.
No signals, radio or gram.	SI contacts L to P ... Faulty speaker connections. Faulty connection at H.T. plug. Manual volume control faulty ...	Examine opening and closing of these contacts. See preliminary tests. See faults under that heading.
Distortion on loud passages, radio or gram.	No bias on QP21 ... Speaker frame not earthed. Speech coil fouling ... Broken speech coil spider.	Check bias voltage with table on page 5. See Speaker Service Manual.
Manual volume control not operating.	Faulty joint on VR1, C9 or R7 ...	Check connections to these components.
Meter shows excessive H.T. consumption.	Incorrect bias on QP21... L.T. accumulator connected the wrong way.	—
Weak signals— M.W. only ... Below 240 metres ...	H.F. ganging incorrect ... VC1 and VC2 trimmers not correctly adjusted.	Regang as instructed on page 8.
Weak Signals— M.W and L.W. ...	Faulty wavechange switch S1 ... S2 faulty.	Check opening and closing of contacts with circuit diagram.
Sensitivity switch S2 has no effect on local station.	S2 mechanically faulty, or R1 disconnected ...	Check action of S2. See Preliminary test 1.
No results on long waves.	Fault in L4 or L8 circuits ...	Employ coil continuity tests, page 8.
A.V.C. not functioning	Faulty connection to A.V.C. components, or faulty HD21.	Check C2, C7, R4 and R5. Change HD21.
Good radio, no gram.	Contacts J and K on S1 faulty... Inefficient pick-up ...	Check action of contacts. See Pick-up Manual.
Severe crackling, radio or gram.	Loose connection at battery plug or tag ... Short between H.T. and chassis ... Faulty volume control.	Tighten accessible connections ; clean accumulator terminals. Look for H.T. short to chassis.

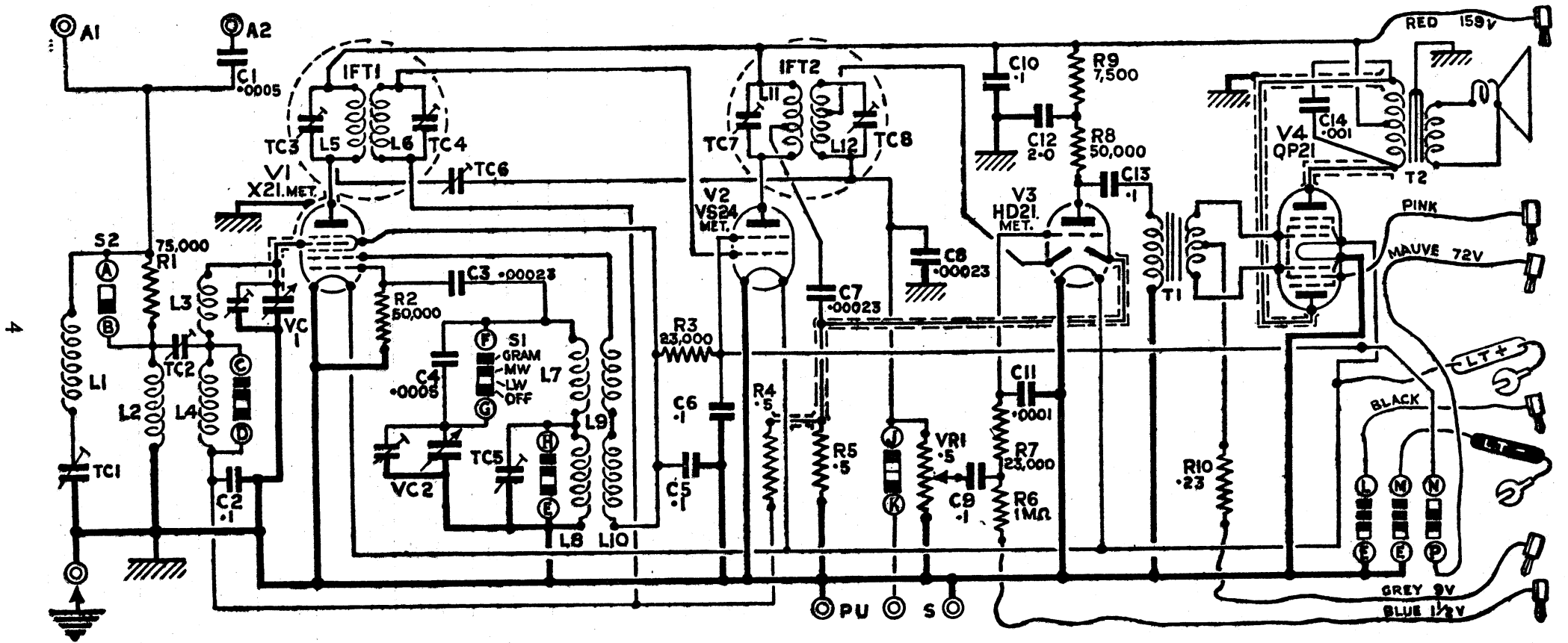


Fig. 1.

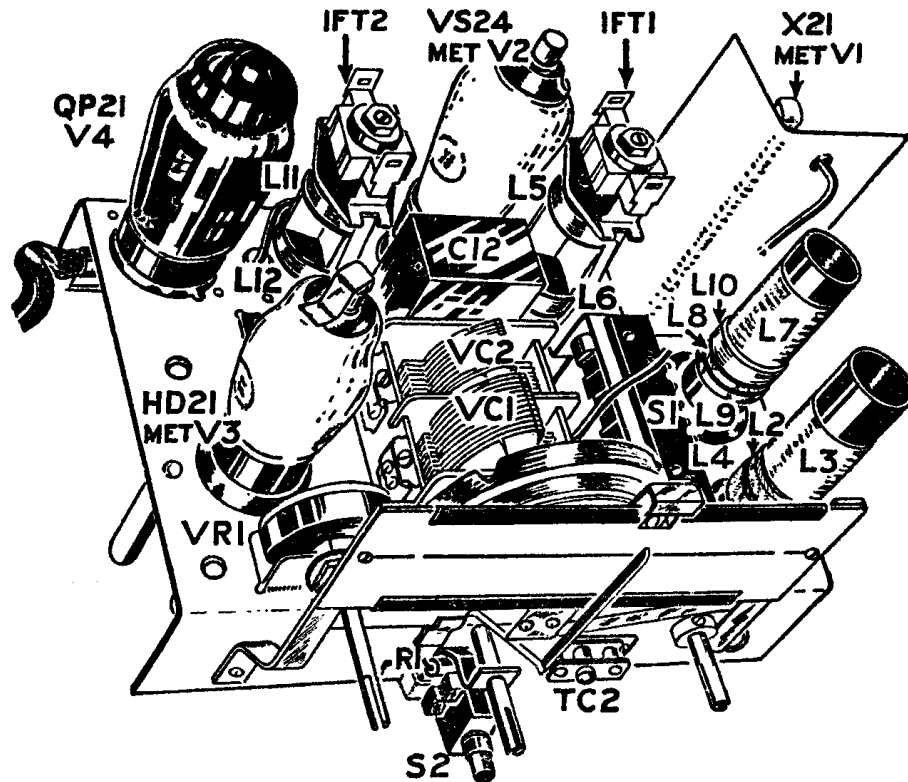


Fig. 2

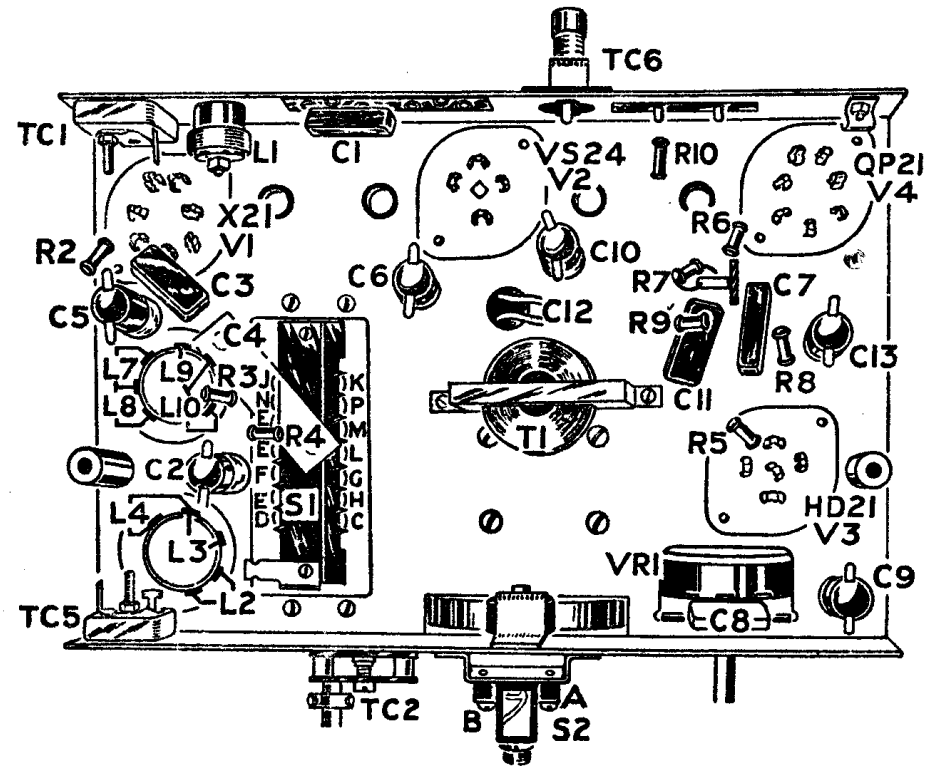


Fig. 3

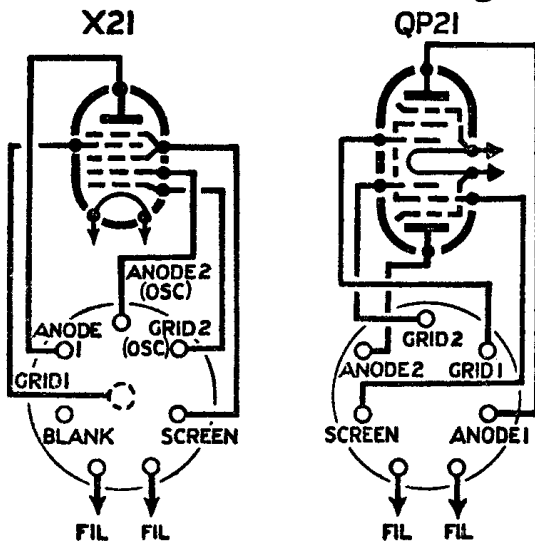


Fig. 4

CONNECTIONS TO VALVES AS SEEN FROM UNDERSIDE OF CHASSIS.

FOR COMPLETE SPARE PARTS see Separate List, Part No. 21207.

CHASSIS WIRING COLOUR CODE.

- Black Earth.
- Red H.T. positive.
- Green Grid.
- Blue Pick-up.
- Brown Filaments.
- Purple Aerial,

I.F. TRIMMING CONDENSERS

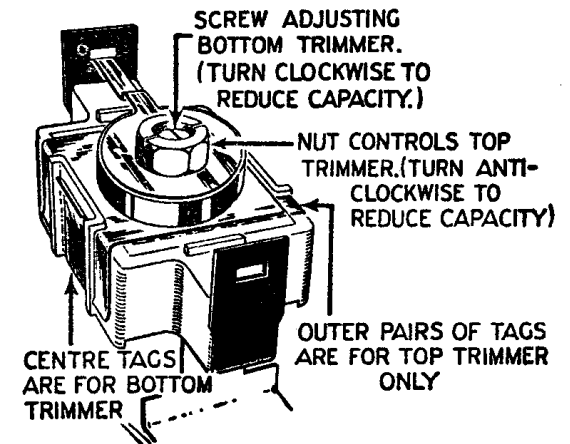


Fig. 5

PRELIMINARY TESTS.

Before proceeding to make the coil continuity tests specified on page 8, check the installation in the following manner :—

TEST 1.—The Speaker, Batteries, Pentode, and Triode portion of HD21.

When the control switch (S1) is rotated, a "plop" will be heard. Set the switch knob to "Gram" position, and with a moistened finger, touch the pick-up socket (grid side) adjacent to TC6. If battery voltages are adequate and the speaker, pentode and triode portion of HD 21 valve are O.K., a loud "plonk" will be heard when the finger touches the socket. The volume control must be turned to maximum.

Whilst the finger is making contact with the grid socket a breathing sound will be heard from the speaker. Testing with a pick-up will determine whether the batteries are good enough to give satisfactory results on "Radio."

TEST 2.—The Sensitivity Switch S2 and the Associated Coils, Condensers and Wiring.

Test sensitivity switch for "make and break" by connecting an ohmmeter across tags A and B. If the switch is functioning correctly the resistance R1 will be shorted when the contacts are closed. To test R1 and coils L1 and L2 connect ohmmeter between junction of L1 and TC1 and earth socket. With the switch closed the reading will be 58 ohms (L1 + L2). A push of the sensitivity switch S2 will put R1 in circuit (75,000 ohms).

TEST 3.—Valve Emissions.

(a) Test the total H.T. feed by measuring at the H.T.-plug :—

Total H.T. feed (Radio) should be	9.0 to 9.75 mA.
Total H.T. feed (Gram) should be	3.25 to 5.0 mA.

(b) Remove the QP21 valve and measure again at the H.T.-plug :—

H.T. feed of X21, VS24 and HD21	6.75 mA. (Radio).
---------------------------------	-----	-----	-----	-------------------

(c) Remove the QP21 and HD21 valves and measure at HT-plug :—

H.T. feed of X21 and VS24 only	5.75 mA. (Radio).
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(d) Remove the QP21, HD21 and VS24 valves and measure at H.T.-plug :—

H.T. feed of X21 only	2.0 mA. (Radio).
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IMPORTANT
The instrument must be switched off before removing valves.

From the foregoing preliminary measurements the individual emissions of each valve may be obtained and comparison made with the valve table on page 5.

DISMANTLING.

Proceed as follows :—

- (1) Unscrew knobs and switch escutcheon on front of cabinet.
- (2) Disconnect L.T. leads and remove accumulator from recess.
- (3) Withdraw four securing screws and take off back cover.
- (4) Disconnect battery leads and remove black lead clamped between terminal strip and speaker frame.
- (5) Withdraw the chassis fixing screws—heads are on underside of cabinet.
The chassis is now free.

SPEAKER.

Disconnect the three coloured leads from the speaker, also the black lead clamped between terminal strip and speaker frame. Remove the four nuts securing the clamps and carefully extract speaker.

COIL CONTINUITY TESTS.

Component.	Wave-change Switch Setting.	D.C. Resistance.	Where to Measure.	Wire.
Coil L1 ...	M.W. ...	47 ohms ...	Across ends	41 S.W.G. .0044 En. and S.S.C. Cu.
Coil L2 ...	M.W. ...	11.5 ohms	Across ends	38 S.W.G. .006 D.S.C. Cu.
Coil L3 ...	M.W. ...	3.2 ohms ...	Across ends	27/47 Litz. En D.S.C.
Coil L3+L4	L.W. ...	21.8 ohms	Across extreme ends of L3, L4	L3 as above. 38 S.W.G. .006 D.S.C. Cu.
Coil L5 ...	} I.F.T. 1 {	4 ohms ...	Across tags of TC3	27/47 Litz. En. Cu.
Coil L6 ...		4 ohms ...	Across tags of TC4	
Coil L7 ...	M.W. ...	1.5 ohms ...	Across ends	30 S.W.G. .0124 En. Cu.
Coil L7+L8	L.W. ...	5.0 ohms ...	Across extreme ends of L7, L8	L7 as above. 38 S.W.G. .006 D.S.C. Cu.
Coil L9 ...	L.W. ...	3.3 ohms ...	Across ends	38 S.W.G. .006 D.S.C. Cu.
Coil L10 ...	L.W. ...	2.2 ohms ...	Across ends	38 S.W.G. .006 En. Cu.
Coil L11 ...	} I.F.T. 2 {	4 ohms ...	Across tags of TC7	27/47 Litz. En. Cu.
Coil L12 ...		4 ohms ...	Across tags of TC8	

H.F. TESTS AND ADJUSTMENTS.

TRIMMING OF I.F. TRANSFORMERS.

If a new unit has been fitted to an I.F. transformer, the circuits must be retrimmed. For these adjustments a modulated oscillator capable of being adjusted to 456 kc. will be required. Measurement of signal may be obtained from an 0-3 A.C. voltmeter across secondary of T2. If the necessary oscillator is not available return the receiver to E.M.I. Service, Ltd.

Proceed as follows :—

- (1) Connect the battery leads to their respective points and insert valves.
- (2) Connect oscillator output to grid of V1 (top of valve), and earth oscillator to chassis of the receiver.
- (3) Switch receiver to M.W. and turn tuning condenser to minimum.
- (4) Set oscillator to 456 kc. and adjust primary and secondary of I.F.T.1 (TC3 and TC4) for maximum deflection of output meter needle. An enlarged view of the trimmers is shown in Fig. 5.
- (5) Now adjust I.F.T.2 (TC 7 and TC8) for maximum deflection, and then finally check trimmers TC3 and TC4 (I.F.T.1).

The I.F. cans must be in place when making adjustments.

RE-GANGING OF H.F. CIRCUITS.

If tuning or oscillator coils have been replaced or the associated wiring disarranged, the trimmers of VCI and VC2 must be readjusted. The retrimming of I.F. transformers will also call for the re-adjustment of the ganged condensers.

Employ an 0-3 A.C. voltmeter (connected across the output side of T2) as an output meter.

Check the position of the scale and pointer when vanes of VCI and VC2 are at minimum capacity. The pointer should then register 185 metres.

NOTE.—It is important that an aerial and earth be connected to Model 257 in order to obtain a normal operating condition. Loosely couple the oscillator to the aerial lead.

MEDIUM WAVES.

Switch receiver to M.W. and set ganged condenser to minimum capacity. The pointer should now be $\frac{1}{4}$ inch below the 200-metre line of the scale. Set the oscillator and Model 257 scale pointer to 200 metres and adjust VC2 for maximum deflection of output meter needle. Now set the oscillator to 230 metres, tune in signal, and adjust VC1 for maximum deflection on meter. Check instrument on a 550-metre signal to ensure that it will tune to that wavelength. Finally tune in London Regional and if necessary adjust the scale.

LONG WAVES.

Switch receiver to L.W. and set pointer to 1,500 metres. Adjust TC5 for maximum deflection of output meter needle.

IMAGES.

1. Adjust oscillator to frequency of any strong transmission that occurs between 250 and 285 metres. With switch of Model 257 in L.W. position tune the receiver to receive oscillator signal and adjust TC2 for minimum deflection of output meter needle.
2. Adjust oscillator to 456 kc. and couple output to the aerial terminal of the receiver. Adjust TC1 for minimum deflection of meter needle.

ELECTRICAL INTERFERENCE.

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 H.M. Post Office and the British Broadcasting Corporation in investigating this type of interference.

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 the make and model number of your receiver.
4. Send the questionnaire back as directed, together with brief notes as to possible source of interference which your local knowledge may suggest.
5. The P.O./B.B.C. organisation is one for investigating the cause of complaint to ascertain whether the trouble can be cured. Such investigations may be both delicate and lengthy, and require both goodwill and tact to bring to a successful conclusion. Your customer should not be assured that a cure will be effected and it should not be suggested to the owner (if known) of the interfering apparatus that your application is in any way a measure of retaliation.
6. It is 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.

ANTI-STATIC AERIAL EQUIPMENT.

Attention is drawn to the Anti-Static Aerial Equipment marketed by E.M.I. Service, Ltd. This equipment has been designed on the principle described under "Matched Impedance Aerial Coupling System" in the Marconiphone Interference Manual, and eliminates static interference picked up by the down lead. The equipment is now available as a separate unit to secure efficient static-free reception on both medium and long waves in the worst areas. Full particulars may be obtained from E.M.I. Service, Ltd.

SPARE PART LIST

For complete priced list of spare parts, see separate publication, Part No. 21207. When ordering spare parts please quote spare part number and description as given in this list.

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 257 SALES POINTS

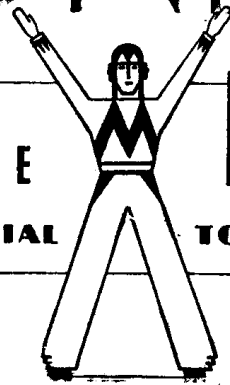
1. 8-stage super-selective circuit with high-efficiency delayed A.V.C.
2. Constant-slope double-pentode output giving $1\frac{1}{2}$ Watts undistorted volume.
3. Sensitivity switch for perfect local-station reception.
4. Pre-set reaction control for higher I.F. amplification.
5. Very low current consumption from double-capacity batteries.
6. Selected Walnut and Macassar Ebony cabinet.



MARCONI PHONE

SERVICE MANUAL

PRIVATE AND CONFIDENTIAL TO THE TRADE ONLY



MODEL 234 4-VALVE BATTERY SUPERHET

	Page		Page
Brief Specification	2	Cord Drives	3
Service Data	2	Spare Part List	4

MAR.

1 9 3 6
1936 SERIES
NUMBER EIGHT
PART No. 22380

BRIEF SPECIFICATION

BATTERY SPECIFICATION

L.T.—Exide type CZS3, 2 volt 30AH.

H.T.—Marconiphone No. B552, 175 volt (including grid bias).

CONSUMPTION

L.T.—0.9 amps. (approximately).

H.T.—9.0 mA (approximately) on radio.

5.0 mA („) on gram.

SPEECH OUTPUT

1.2 watts (undistorted).

WAVELENGTH RANGE

Medium Waves 200 to 550 metres.

Long Waves 1,000 to 2,000 metres.

DIMENSIONS

Height, 18 inches ; width, 17 $\frac{1}{4}$ inches ; depth, 9 $\frac{3}{8}$ inches.

WEIGHT

44 lbs. net.

58 lbs. gross.

LOUDSPEAKER

Type 16000AM.

This loudspeaker incorporates the output transformer T2.

The permanent magnet is of the latest aluminium-nickel type.

D.C. resistance of speech coil, 4 ohms.

Impedance at 800 cycles, 5 ohms.

VALVES

Marconi X41 (met.), Frequency changer.

„ VS24 (met.), I.F. Amplifier.

„ HD21 (met.), Second detector, A.V.C. and L.F. Amplifier.

„ QP21, Output double pentode.

SERVICE DATA

For instructions for connecting pick-up and extra loudspeakers, General Faults Table, Preliminary Tests, Coil Continuity Tests, and H.F. Tests and Adjustments, see Service Manual for Model No. 257.

DISMANTLING

To remove the chassis proceed as follows :—

1. Remove knobs and switch escutcheon.
2. Remove L.T. accumulator and back and disconnect and remove H.T. battery.
3. Disconnect leads from loudspeaker panel (including earthing lead).
4. Remove two screws (holding scale frame) which pass through the battery shelf.
5. Remove the four screws fixing the chassis.

To remove loudspeaker.

1. Disconnect the leads to the panel.
2. Slacken two wood screws holding clamps at edge of loudspeaker chassis, and remove single bolt fixing loudspeaker support bracket.

CORD DRIVES

Use a superior flax fishing line having a breaking strain of approximately 42 lbs. Supplies of cord may be obtained from E.M.I. Service, Ltd. Approximate length of cords, 37 inches pointer cord, 24 inches drive cord.

To gain access to the cords it is first necessary to remove the tuning scale, etc.

1. Loosen the P.K. screws securing glass clamps, and remove scale and two pieces of glass.
2. Remove P.K. screws behind ends of scale frame and remove gold sprayed reflector and waveband indicator.

In cases where both cords require replacing assemble condenser drive cord first.

Replacement of Condenser Drive Cord.

1. Turn the condenser vanes fully out, and having made quite sure that there is no trace of oil on the inside surfaces of the split tube, or on the portion of the tuning spindle on which it fits, temporarily assemble the tube on to the spindle by twisting a turn of copper wire round the two halves.
2. Take 24 inches of cord, form a loop in one end and pass it over the anchoring pillar on the drive drum.
3. Take the cord out through the hole in the smaller diameter cord channel and round the drum one and a half turns anti-clockwise, being sure to keep the condenser in its minimum position
4. Take cord down on right-hand side of split tube and wind three and a half turns on the tube as shown.
5. Bring cord up through the aperture in the drum and splice on to the coil spring so that a suitable tension will be put on the cord when the spring is assembled on to the anchoring pillar.
6. Remove temporary wire round the split tube.

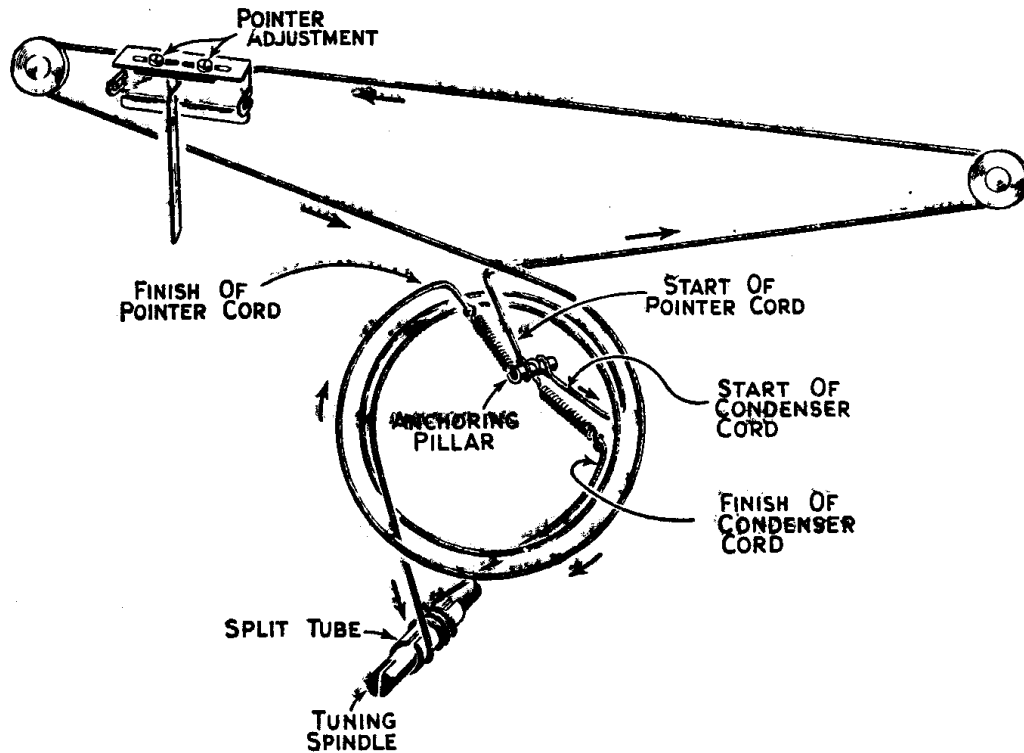
Replacing Pointer Cord.

1. Remove cursor guide bar and slide cursor off.
2. Take 37 inches of cord and having formed a loop in one end, thread on to the cursor so that the distance from the extreme right-hand end of the cursor to the end of the loop is exactly $14\frac{3}{4}$ inches.
3. Reassemble guide bar with cursor and hook the loop on to the anchoring pillar as shown.
4. Take the other end of the cord and, passing it over the left pulley, wind one complete turn clockwise round the larger diameter cord channel on the drum.
5. Assemble the coil spring on to the anchoring pillar so that a suitable tension is put on the cord.
6. Reassemble the scale and reflector, etc., and adjust pointer by tuning in a station at about the centre of the medium waveband and positioning the pointer to read the correct wavelength.

NOTE.—Further adjustment of wavelength indication may be obtained by positioning the scale in its mounting.

SLIPPING DRIVE

If there is a tendency for the drive to slip, particularly if the tuning control has not been turned for some time, it is due to oil between the split tube and the drive spindle. To cure this it is necessary to remove the drive cord, and wash the relevant parts in petrol to remove all traces of oil.



SPARE PART LIST

Part No.	Description.	Parts per Inst.	Finish.	Retail List Price.	Per
23061	Instructions.	1	—	£ s. d.	Each.
23062	Instruction book	1	—	0 0 6	..
	Warning and valve position label... ..			0 0 1	..
CABINET PARTS AND FITTINGS.					
22886C	Cabinet	1	—	3 2 0	Each.
22898A	Metal plinth	1	AnBr	0 4 6	..
22886B	Metal frame	1	Spec AnBr	0 12 6	..
11224	Screw } securing frame to plinth	4	WN	0 0 3	Doz.
11628	Nut }	4	WN	0 0 4	..
23049	Bottom corner, R.H.	2	Pol	0 0 9	Each.
23050	Bottom corner, L.H.	2	Pol	0 0 9	..
11226	Screw } securing bottom corners to plinth	8	WN	0 0 7	Doz.
6314	Washer }	8	WN	0 0 2	..
11628	Nut }	8	WN	0 0 4	..
8195	Rubber feet	4	—	0 0 8	..
22909	Bottom panel	1	BSp	0 1 3	Each.
23051	Bottom strip	2	BSp	0 0 3	..
15830	Screw, securing bottom strips to bottom panel	4	—	0 0 2	Doz.
9545	Screw } securing bottom panel to plinth	2	—	0 0 3	..
13377	Washer }	2	WN	0 0 1	..
22908A	Shelf, with filter and speaker block	1	BSp	0 1 9	Each.
11419	Screw } securing shelf to frame	4	WN	0 0 4	Doz.
6314	Washer }	4	WN	0 0 2	..
11628	Nut }	4	WN	0 0 4	..

SPARE PART LIST—continued.

Part No.	Description.	Parts per Inst.	Finish.	Retail List Price.	Per
22906	Side panel	2		£ s. d.	
22907	Top panel	1	LocalPol	0 4 3	Each.
9545	Screw	1	LocalPol	0 4 6	"
13377	Washer } securing top panel	12	—	0 0 3	Doz.
22905D	Front panel	12	WN	0 0 1	"
23056	Tuning escutcheon	1	LocalPol	0 15 6	Each.
23065	Clip	1	LocalFSp	0 1 3	"
8692	Screw } securing tuning escutcheon	2	—	0 0 9	Doz.
23052	Wire mesh	4	—	0 0 3	"
23054	Felt for mesh (7½-in. × ⅝-in. × ⅛-in.)	1	AnBrSpec	0 3 0	Each.
23055	Felt for mesh (12⅝-in. × ⅝-in. × ⅛-in.)	2	—	0 0 9	Doz.
23053	Baffle	2	—	0 0 1	Each.
9954	Screw, securing baffle	1	BSp	0 1 6	"
23057B	Cabinet back with battery shield	12	—	0 0 3	Doz.
19050	Screw	1	—	0 2 6	Each.
22511	Washer } securing back	6	ParB	0 0 3	Doz.
18934	Battery strap	6	ParB	0 0 1	"
18907	Screw	1	BnEn	0 0 2	Each.
14997	Washer } securing battery strap to cabinet back	2	BnEn	0 0 8	Doz.
11627	Nut	4	ParB	0 0 2	"
18928	Escutcheon for L.D. switch	2	WN	0 0 6	"
5820	Cleat, for L.T. leads	1	SynBEn	0 0 2	Each.
12613	Cleat, for H.T. leads	1	WN	0 0 1	"
7155	Cleat, for L.S. leads	1	WN	0 0 1	"
8692	Screw, securing cleats	3	WN	0 0 1	Doz.
16289E	Aerial plug	1	—	0 0 2	Each.
16289B	Earth and P.U. screen plugs	2	—	0 0 2	"
16289D	P.U. plugs	2	—	0 0 2	"
VALVES AND BATTERIES.					
VI—X21 Met.		—	—	—	—
V2—VS24 Met.		—	—	—	—
V3—HD21 Met.		—	—	—	—
V4—QP21 Plain		—	—	—	—
L.T. accumulator, 2 v. 30 a.h.		—	—	—	—
H.T. battery, 166 and 9 v., B552		—	—	—	—
LOUDSPEAKER.					
16000AM	Loudspeaker	1	—	1 10 0	Each.
16000AL	Cone chassis, with transformer base plate and six studs	1	—	0 2 6	"
22480A	Magnet	1	—	0 12 6	"
11627	Nut, securing magnet to studs on cone chassis	4	WN	0 0 6	Doz.
16401B	Speech coil and cone	1	—	0 5 0	Each.
11636	Nut	2	WN	0 0 4	Doz.
6314	Washer } securing spider of cone to studs on cone chassis	2	WN	0 0 2	"
16007	Cardboard washer	2	WN	0 0 1	"
16012	Felt	1	—	0 0 2	Each.
10616G	T2—Output transformer	1	—	0 8 0	"
16013A	Terminal panel with 5 screws	1	—	0 1 6	"
11228	Terminal screw	5	WN	0 0 4	Doz.
15159	Tag	1	CdP	0 0 3	"
8777	Screw, P.K., securing panel	2	—	0 0 6	"
15719V	C14, 0.001 mfd. condenser	1	—	0 0 9	Each.
12619	Screw, P.K., securing transformer	2	—	0 0 6	Doz.
22016	Dust bag	1	—	0 0 3	Each.
23059	Bracket, for loudspeaker	1	—	0 0 3	"
22760	Square washer plate	1	CdP	0 0 3	"
23060	Screw	1	CdP	0 0 9	Doz.
21018	Washer } securing loudspeaker to bracket	1	WN	0 0 1	Each.
3910	Washer, S.P.	1	AcD	0 0 6	Doz.
11504	Screw	1	—	0 0 2	"
			WN	0 0 1	Each.

SPARE PART LIST—continued.

Part No.	Description.	Parts per Inst.	Finish.	Retail List Price.	Per
10173	Spring washer	1	—	£ 0 0 2	Doz.
21768	Washer	1	WN	0 0 4	Each.
24103	Tapped plate	1	AISp	0 0 4½	Each.
17219	Bracket	2	AISp	0 0 1	Doz.
9547	Screw	2	WN	0 0 4	Doz.
	securing bracket to shelf				
	securing loudspeaker to baffle board				
CONTROLS.					
17053K	Knob—Volume and switch	2	—	0 0 7	Each.
17049P	Knob—Tuning	1	—	0 0 7	Doz.
16564	Screw, P.K., securing knobs	3	—	0 0 7	Doz.
RADIO UNIT					
18900Q	Radio unit	1	—	6 5 0	Each.
11504	Screw	4	WN	0 0 1	Doz.
19802	Washer	4	CdP	0 0 6	Doz.
21768	Washer (thinner)	4	CdP	0 0 4	Doz.
3460	Spring washer	4	—	0 0 3	Doz.
11214	Screw	2	WN	0 0 2	Doz.
14120	Washer	2	WN	0 0 2	Doz.
3167	Washer, S.P.	2	WN	0 0 2	Doz.
12362B	L1—Filter coil	1	Std	0 1 0	Each.
10996	Screw	1	WN	0 0 6	Doz.
3166	Washer, S.P.	1	—	0 0 2	Doz.
11628	Nut	1	WN	0 0 4	Doz.
18925C	L2—Aerial coil	1	—	0 4 3	Each.
	L3—M.W. grid coil				
	L4—L.W. grid coil				
	aerial coil assembly with screen				
18790A	L5—Primary coil in 1st I.F.T.	1	—	0 3 0	Doz.
	L6—Secondary coil in 1st I.F.T.				
18925D	L7—M.W. oscillator coil	1	—	0 4 0	Doz.
	L8—L.W. oscillator coil				
	L9—M.W. reaction coil				
	L10—L.W. reaction coil				
	oscillator coil assembly with screen				
18432A	Screen for aerial coil and oscillator coil assemblies	2	—	0 0 9	Doz.
18431	Spacer	2	WN	0 0 2	Doz.
11272	Screw	2	WN	0 0 5	Doz.
3166	Washer, S.P.	2	—	0 0 2	Doz.
11636	Nut	2	WN	0 0 4	Doz.
11628	Nut	4	WN	0 0 4	Doz.
3166	Washer, S.P.	4	—	0 0 2	Doz.
	securing coil screen to coil former				
	securing screen to chassis				
19301A	L11—Primary coil in 2nd I.F.T.	1	—	0 3 6	Each.
	L12—Secondary coil in 2nd I.F.T.				
18790C	1st I.F. transformer complete	1	—	0 6 6	Doz.
19323B	Screen	1	WN	0 0 9	Doz.
19308	Adjusting screw for trimmer	1	—	0 0 1	Doz.
18462	Washer, brass	1	—	0 0 1½	Doz.
21027	Insulating washer	1	—	0 0 9	Doz.
21037	Insulating washer (thicker)	1	—	0 0 4½	Doz.
18452	Washer with tag	1	—	0 0 5	Doz.
19306	Adjusting nut for trimmer	1	—	0 0 4	Doz.
18447	Mica for trimmers	6	—	0 0 7	Doz.
19301B	2nd I.F. transformer, complete	1	—	0 7 0	Each.
19323C	Screen	1	—	0 0 9	Doz.
11628	Nut	4	WN	0 0 4	Doz.
3166	Washer, S.P.	4	—	0 0 2	Doz.
	securing I.F. transformers				

SPARE PART LIST—continued

Part No.	Description.	Parts per Inst.	Finish.	Retail List Price.	Per
18792A	T1—Intervalve transformer	1	—	£ s. d. 0 9 3	Each.
12619	Screw, P.K., securing T1	2	—	0 0 6	Doz.
10616G	T2—Output transformer	1	—	0 8 0	Each.
12619	Screw, P.K, securing T.2 to bracket on L.S.	2	—	0 0 6	Doz.
19202K	R1—75,000 ohms	1	—	0 0 9	Each.
19202J	R2—50,000 ohms	1	—	0 0 9	"
19202G	R3—23,000 ohms	1	—	0 0 9	"
19202N	R4—500,000 ohms	1	—	0 0 9	"
19202N	R5—500,000 ohms	1	—	0 0 9	"
19202P	R6—1,000,000 ohms	1	—	0 0 9	"
19202G	R7—23,000 ohms	1	—	0 0 9	"
19202J	R8—50,000 ohms	1	—	0 0 9	"
19202S	R9—7,500 ohms	1	—	0 0 9	"
19202M	R10—230,000 ohms	1	—	0 0 9	"
10300BN	VR1—500,000 ohms volume control, complete with fixing nut and S.P. washer	1	—	0 5 0	"
18980F	C1—0.0005 mfd.	1	—	0 0 9	"
18318G	C2—0.1 mfd.	1	—	0 0 9	"
18580B	C3—0.00023 mfd.	1	—	0 0 9	"
21767E	C4—0.0005 mfd. (S.L.)	1	—	0 1 6	"
18318C	C5—0.1 mfd.	1	—	0 0 9	"
18318C	C6—0.1 mfd.	1	—	0 0 9	"
18580B	C7—0.00023 mfd.	1	—	0 0 9	"
18580B	C8—0.00023 mfd.	1	—	0 0 9	"
18318C	C9—0.1 mfd.	1	—	0 0 9	"
18318C	C10—0.1 mfd.	1	—	0 0 9	"
18980C	C11—0.0001 mfd.	1	—	0 0 9	"
18920B	C12—2 mfd....	1	—	0 2 6	"
12519	Screw, P.K., securing C13	2	—	0 0 6	Doz.
18318C	C13—0.1 mfd.	1	—	0 0 9	Each.
15719Y	C14—0.001 mfd. (on T2)	1	—	0 0 9	"
18381	Holder for tubular condensers	6	CdP	0 0 3	"
16240C	TC1	1	—	0 1 2	—
14229	Screw	2	WN	0 0 3	Doz.
14629	Nut	2	—	0 0 6	"
3165	Washer, S.P.	2	—	0 0 2	"
14743	Adjusting screw on TC1	1	—	0 0 8	"
44575A	TC2	1	—	0 0 9	Each.
12619	Screw, P.K., securing TC2	2	—	0 0 6	Doz.
—	TC3 and TC4—in first I.F. transformer	—	—	—	—
16240D	TC5	1	—	0 1 2	Each.
14229	Screw	2	WN	0 0 3	Doz.
14629	Nut	2	WN	0 0 6	"
3165	Washer, S.P.	2	—	0 0 2	"
14743	Adjusting screw on TC5	1	—	0 0 8	"
18795A	TC6—Reaction condenser...	1	—	0 0 8	Each.
18797A	Adjusting screw	1	—	0 0 3	"
18798	Spring	1	—	0 0 7	Doz.
19298	Spring ring	1	—	0 0 6	"
18799	Mica	1	—	0 0 1	Each.
13803	Rivet securing TC6...	4	—	0 0 3	Doz.
—	TC7 and TC8 in 2nd I.F. transformer	—	—	—	—
18712K	VC1—Tuning condenser	1	—	0 8 6	Each.
21765	VC2—Oscillator condenser	1	—	0 0 1½	Doz.
42442	Screw	3	WN	0 0 2	"
	Washer, S.P. } securing two-gang condenser	3	—		

SPARE PART LIST—continued.

Part No.	Description.	Parts per Inst.	Finish.	Retail List Price.	Per
				£ s. d.	
CONDENSER DRIVE AND TUNING DETAILS.					
22913A	Frame assembly	1	CdP	0 2 0	Each.
24105	Front bracket	2	CdP	0 0 1	"
11805	Screw, P.K., securing support brackets of frame assembly and front brackets to chassis	4	—	0 0 6	Doz.
22915	Condenser drive pulley	1	—	0 1 0	Each.
23048	Screw, securing pulley to spindle of two-gang condenser	2	WN	0 0 4½	Doz.
23034	Spring anchor	1	WN	0 0 1	Each.
3166	Washer, S.P. } securing spring anchor to drive pulley	1	—	0 0 2	Doz.
11628	Nut }	1	WN	0 0 4	"
24112	Spring, for cords	2	—	0 0 1	Each.
5515	Cord for drive and pointer	—	—	0 0 1	Yard.
23038	Condenser drive spindle	1	WN	0 0 3	Each.
23037	Half sleeve (for cord)	2	WN	0 0 6	Doz.
23041	Collar	1	WN	0 0 2	Each.
11805	Screw, P.K., securing collar to spindle	1	—	0 0 6	Doz.
18924	Bracket, supporting spindle	2	CdP	0 0 1	Each.
21501	Screw } securing brackets to chassis	2	WN	0 0 3	Doz.
3165	Washer, S.P. }	2	—	0 0 2	"
14649A	Cursor guide plate with two pulleys and two studs	2	WN	0 0 8	Each.
8777	Screw, P.K., securing cursor guide plate to frame assembly	2	—	0 0 6	Doz.
14650	Cursor guide rod	1	WN	0 0 3	Each.
3165	Washer, S.P. } securing cursor guide rod to studs	2	—	0 0 2	Doz.
11629	Nut }	2	WN	0 0 6	"
14617A	Cursor, with spring	1	—	0 0 7	Each.
23040A	Pointer	1	Local BnEn	0 0 6	"
11325	Screw } securing pointer to cursor	2	WN	0 0 3	Doz.
3165	Washer, S.P. }	2	—	0 0 2	"
23036	Screen }	1	MGS local	0 0 9	Each.
12619	Screw, P.K., securing screen	4	—	0 0 6	Doz.
23046B	Change-over indicator lever and indicator	1	—	0 0 4½	Each.
23068A	Indicator	1	Printed	0 0 1	"
21422	Eyelet, securing indicator	2	—	0 0 1	Doz.
23079	Indicator mask	1	—	0 0 3	"
23031	Glass	1	—	0 0 3	Each.
23047A	Scale	2	Printed	0 2 6	"
23039	Clamp	2	CdP	0 0 6	Doz.
24111	Rubber packing } securing glass and scale	8	—	0 0 2	"
11219	Screw }	2	WN	0 0 3	"
23045	Cam lever, operating indicator lever	1	CdP	0 0 1	Each.
11628	Nut } securing cam lever	1	WN	0 0 4	Doz.
1088	Washer }	1	WN	0 0 3	"
3166	Washer, S.P. }	1	—	0 0 2	"
9054	Indicator spring	1	—	0 0 1	Each.
22914A	Indicator cam	1	—	0 0 3	"
21050	Screw, pointed } securing cam to spindle of S1	1	WN	0 0 4	Doz.
13387	Screw, cupped }	1	WN	0 0 3	"
23076B	Lampholder and bracket	1	—	0 1 0	Each.
24110	Screw, securing lampholder	1	WN	0 0 4	Doz.
23252A	Lamp wiring	1	—	0 0 2	Each.
22704B	Lamp	1	—	0 0 9	"
SWITCHES.					
18781C	S1—Wave change and on/off switch	1	—	0 7 9	Each.
11248	Screw } securing S1	4	WN	0 0 7	Doz.
3165	Washer, S.P. }	4	—	0 0 2	"
18781B	Switch frame, complete with locating lever and roller	1	—	0 0 8	Each.
18783A	Contact block, complete with 14 spring contacts	1	—	0 3 9	"
18787	Top insulator	1	—	0 0 3	"
11805	Screw, P.K., securing contact block	2	—	0 0 6	Doz.
8777	Screw, P.K., securing insulator	2	—	0 0 6	"

SPARE PART LIST—continued

Part No.	Description.	Parts per Inst.	Finish.	Retail List Price.	Per
18784	Cam, front	1	—	£ 0 0 6	Each.
18785	Cam, rear	1	—	0 0 6	"
12457	Collar	2	WN	0 0 3	"
14812	Screw } securing cams to spindle	2	WN	0 0 2	Doz.
18788	Spindle	1	CdP	0 0 4	Each.
12541A	Locating collar with four pins	1	CdP	0 0 4	"
10674	Screw, pointed } securing locating collar	1	WN	0 0 4	Doz.
11773	Screw, cupped }	1	WN	0 0 5	"
22698	Spring	1	WN	0 0 1½	Each.
18786	Bracket for spring	1	CdP	0 0 4	Doz.
NOTE.—For change-over indicator, see under Condenser Drive and tuning details.					
18946B	S2—Local distant or sensitivity switch	1	BzSp	0 3 3	Each.
19832	Bracket for S2	1	CdP	0 0 1	"
19827	Tapped plate	1	CdP	0 0 1	"
11229	Screw } securing S2 to bracket	2	WN	0 0 3	Doz.
15059	Washer }	2	WN	0 0 1½	"
3165	Washer, S.P. }	2	—	0 0 2	"
12619	Screw, P.K., securing bracket to chassis	2	—	0 0 6	"
PANELS, LEADS, ETC.					
18180	Valve panel, 5-pin	2	—	0 0 1	Each.
18181	Valve panel cover, 5-pin	2	—	0 0 4	"
18182	Valve panel, 7-pin	2	—	0 0 1	"
18183	Valve panel cover, 7-pin	2	—	0 0 4	"
17503	Valve leg socket	23	Tnd	0 0 1	"
16358	Rivet securing valve-holders	8	—	0 0 1	Doz.
18918B	Valve screen	1	CdP	0 0 6	Each.
8777	Screw, P.K., securing valve screen	2	Std	0 0 6	Doz.
or 19835A	Valve screen (for top of valve)	1	—	0 0 6	Each.
18903A	Aerial, etc., connection panel	1	—	0 0 6	"
13803	Rivet securing panel	2	—	0 0 3	Doz.
21346A	Lead anchor panel, with two tags	1	—	0 0' 1½	Each.
13810	Rivet securing panel	2	—	0 0 3	Doz.
18902B	Terminal strip with three long tags	1	—	0 0 3	Each.
16357	Rivet } securing strip	1	—	0 0 2	Doz.
19880	Washer }	1	CdP	0 0 1	"
23253A	Set of battery and L.S. leads, with tags and plugs	1	—	0 9 0	Each.
8519	L.T. tag	2	—	0 0 1	"
15159	L.S. tag	3	—	0 0 3	Doz.
15453A	Label, LT +	—	—	0 0 1	Each.
15453B	Label, LT —	—	—	0 0 1	"
16288A	Plug, red	—	—	0 0 2	"
16288B	Plug, black	—	—	0 0 2	"
16288C	Plug, pink	—	—	0 0 2	"
16288D	Plug, blue	—	—	0 0 2	"
16288E	Plug, mauve	—	—	0 0 2	"
16288F	Plug, grey	—	—	0 0 2	"
12613	Cleat	—	—	0 0 1	"
11220	Screw } securing leads	—	WN	0 0 2	Doz.
3166	Washer, S.P. }	—	WN	0 0 2	"
11628	Nut }	—	WN	0 0 4	"
16576	Earthing tag	4	—	0 0 3	"
15140	Earthing tag	1	—	0 0 3	"
21404A	Insulated clip for valve top	3	—	0 0 4	Each.
19897	Valve clip } for VI when 19835A valve top screen is fitted	1	—	0 0 1	"
19898	Screw }	1	WN	0 0 3	Doz.

" FINISH " CODE.

AcD	Acid Dip.	MGSp	Matt Gold Spray
AlSp	Aluminium Spray	Pol	Polished.
AnBrSpec	Antique Bronze Special.	ParB	Parkerised Black.
BnEn	Brown Enamel.	Std	Standard.
BMEn	Black Matt Enamel.	SynBEn	Synthetic Black Enamel.
BSp	Black Spray.	Tnd	Tinned.
CdP	Cadmium Plate.	WN	White Nickel.
FSp	Felt Spray.		



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

1. Model number and serial number.
2. Spare part number, description, and " finish " as given in the above list.
3. Quantity required.

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