

SERVICE MANUAL

September, 1931.

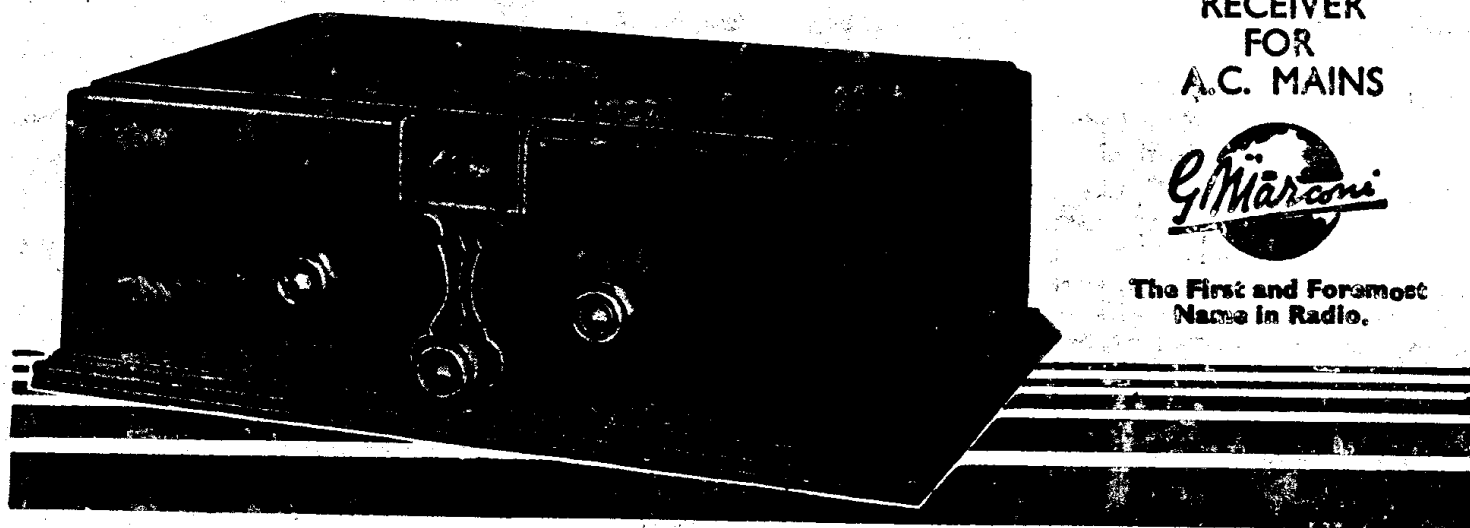
FOR Marconiphone

MODEL '246'

TWO-VALVE
RECEIVER
FOR
A.C. MAINS



The First and Foremost
Name in Radio.



PART I.

GENERAL INFORMATION.

Technical Description. See Theoretical Diagram, Fig. 1. Model 246 is an all mains A.C. Two-valve Receiver suitable for gramophone reproduction.

Tuning. (See Figs. 1 and 3). Separate coils for medium (L.1) and long (L.2) waves are used, the change over being accomplished by S1. The medium wave coil is tapped in alternative positions (C1* and C2^e). The aerial is joined directly to the coil from A1 via .0002 mfd. (C1) from A2; and via .0001 mfd. (C2) from A3. In parallel with the coils is a .0005 mfd. variable condenser (VC1).

Valves. MH4 valve acts as a detector (grid leak—R1—2 megohms and condenser—C3—.0001 mfd.) for radio reception and as a first stage low frequency amplifier for gramophone reproduction, and is of the indirectly heated cathode type. High tension is received from the smoothing choke (CK1) via R.2 (25,000 ohms) and the primary of the intervalve transformer (T1—1,000 ohms).

Reaction is applied via a .0005 mica dielectric variable condenser (V.C.2) to two coils (L3 and L4) superimposed on the aerial tuning coils, the long wave being shunted by a .0005 fixed condenser (C10).

When acting as an L.F. amplifier, automatic bias is applied to this valve by R3 (1,000 ohms), which is shunted by C4 (1 mfd.). The valves are coupled by an intervalve transformer (T1). The M.P.T.4 pentode valve is also indirectly heated and has automatic grid bias applied by R6 (400 ohms) R4 (6 ohms) and R5 (6 ohms) R6 is shunted by C6 (.1 mfd.).

The screen of this valve receives high tension from the smoothing choke (CK1). The plate receives high tension from CK1 via the loud-speaker.

Decoupling. The MH4 is decoupled by C5 (2 mfd.).

Mains Circuit. Mains enter the set via the 2 pin mains plug, passing through the switch (S.2) to the primary of the mains transformer T2, via voltage adjustment plugs and sockets.

This transformer has three secondaries (xyw.). The 4 volt secondary (y) feeds the heaters of the MH4, MPT4 and pilot lamp (connected in parallel); the second (x) heats the filament of the U.10 rectifier valve and the third (w) is applied to the two plates of the U10. This last is centre tapped to earth (and chassis frame). H.T. positive is led from the filament of the U.10 to the smoothing arrangements, consisting of CK1, C8 (3 mfd.), C7 (4 mfd.) and C9 (.05 mfd.), from where it passes to the valve anodes. C.11 (.001 mfd.) is connected from pentode plate to chassis frame to improve the tone (armoured cable).

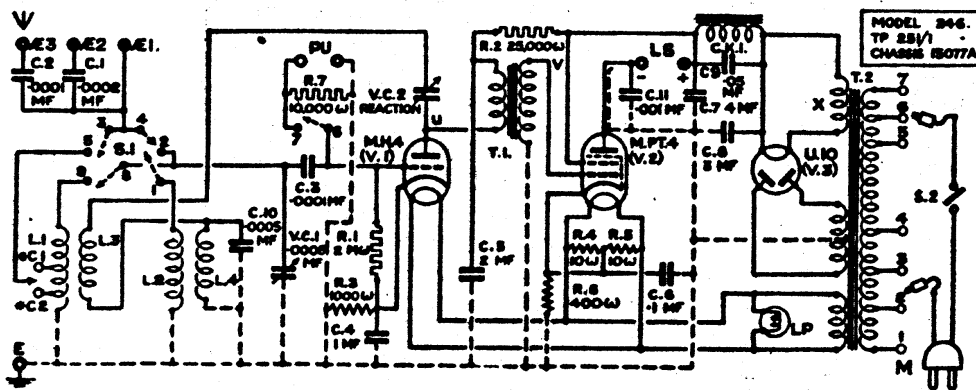
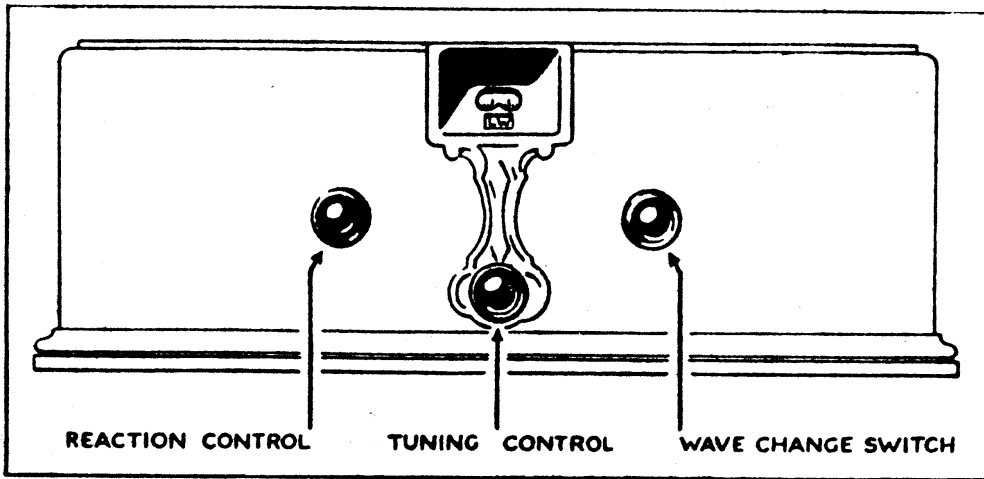


Fig 1

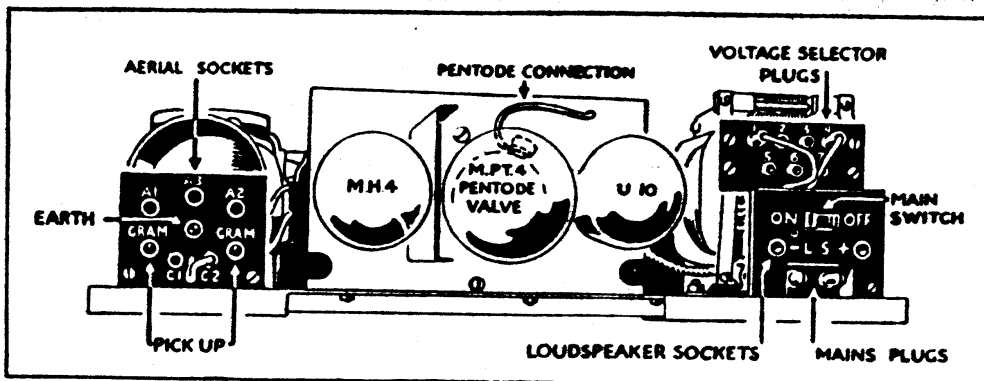


Fig. 2

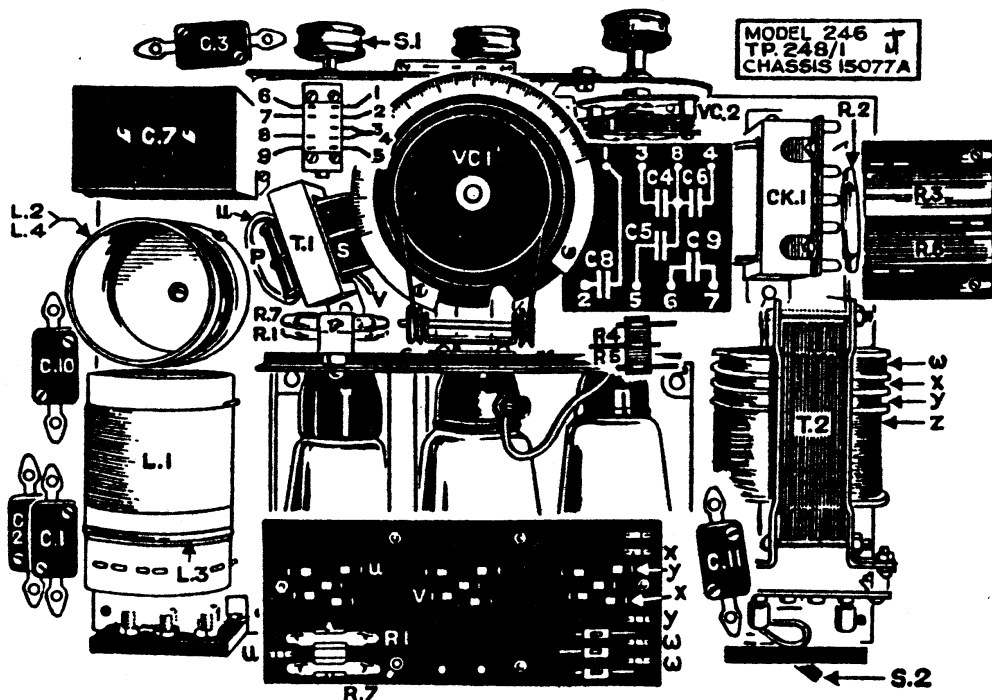


Fig. 3

PART 2.

INSTALLATION.

Aerials. Instal a well-insulated single inverted L type aerial about 60 ft. long in one continuous length without joints, with at least two good quality insulators at either end and short well-insulated earth lead wherever possible. Use nothing but either copper or phosphor bronze wire—enamelled for preference. Any other material will give trouble due to rusting, lack of efficiency, or difficulty in handling.

NOTE.—Where instruments are installed within 20 miles of a high-power transmitter the advisability of reducing the size of the aerial to as little as 25 ft. and using taps A.3 and C.2 may be considered in cases of severe jamming.

Earths. Earth wires should be as short and of as low resistance as possible. Extreme care must be taken if pipes of any kind are used. Avoid gas pipes at all costs. Not only are these dangerous, but the fact that they are frequently joined with non-conducting materials renders them still more unsatisfactory. A gas pipe earth does not comply with I.E.E. Regulations. Water pipes may be used. Wherever possible choose a rising main pipe. Make all connections to metal pipe on to clean metal, binding joints with insulating tape to protect from corrosion. Use a strong earth clip.

Bury earth pins or plates in moist ground. If ground tends to become dry pin or plate should be surrounded by a small amount of coke or porous material, which can be moistened, preferably by means of a short length of pipe such as is used to carry away rain water.

A LOW-RESISTANCE EARTH ASSISTS BOTH SELECTIVITY AND SENSITIVITY. If doubt is entertained as to efficiency of earth, more than one earthing point may be employed with advantage; for instance, a water pipe and earth plate. Fit an adequate weather-proof lightning switch. If porcelain type of switch installed outside window, provide protecting cowl. When lightning is about, earth aerial in such a manner that no portion of it enters house. Satisfactory combined leading-in tubes and earthing switches are obtainable which, while operating outside, can be manipulated from inside. **THEY MUST, HOWEVER, BE OF FIRST-CLASS QUALITY.**

Earthing Switch. The earthing switch most recommended is a double pole double throw, so that both aerial and earth are disconnected from the receiver when not in use. This is particularly important on receivers working from the mains—any metal cover or part of a mains receiver requiring to be earthed in accordance with I.E.E. or other lighting regulations can be connected to the "earth" on the lighting circuit or to a separate earth connection other than that which earths the aerial outside the premises. See Fig. (2) (i.e. Pictorial view of back).

Voltage Adjustment. Above the main switch (S.2) there is a panel with seven sockets and two plugs.

When the mains voltage is between	Put the red plug into the socket numbered	Put the black plug into the socket numbered
95 and 102	4	5
103 .. 110	4	6
111 .. 118	3	5
119 .. 127	3	6
128 .. 136	2	5
137 .. 145	2	6
146 .. 155	1	5
156 .. 164	1	6
190 .. 205	4	7
206 .. 222	3	7
223 .. 240	2	7
241 .. 260	1	7

PICK-UP ATTACHMENT FOR GRAMOPHONE.

Reproduction. The most suitable pick-up to use with this instrument is the Marconiphone Pick-up K.10 which, due to its large output and balanced response will convert this Radio receiver into a first-class reproducer of gramophone records.

The pick-up must be attached to the two sockets on the left-hand back panel marked "Gram." It is essential that a volume control is fitted between the pick-up and the receiver. If the pick-up is over 6 feet from the instrument the connecting wire must be metal sheathed—the sheathing being earthed.

LOUD SPEAKERS.

Model 131 No. 64.

This instrument is designed to operate a high resistance loud speaker such as the Marconiphone Model 132, etc., which should be plugged into the sockets by the main switch marked L.S.

Warning. IN NO CIRCUMSTANCES MUST THE LOUD SPEAKER BE DETACHED WHEN THE SET IS SWITCHED ON AS THIS WILL DAMAGE YOUR VALVES.

WORKING ON MAINS AERIAL.

While this instrument is designed for operation on an efficient external aerial it is pointed out that in areas in close proximity to powerful transmitters the Model 246 may operate at Small Room volume on a mains aerial condenser. It is thought that the knowledge of this may assist in effecting sales in certain cases.

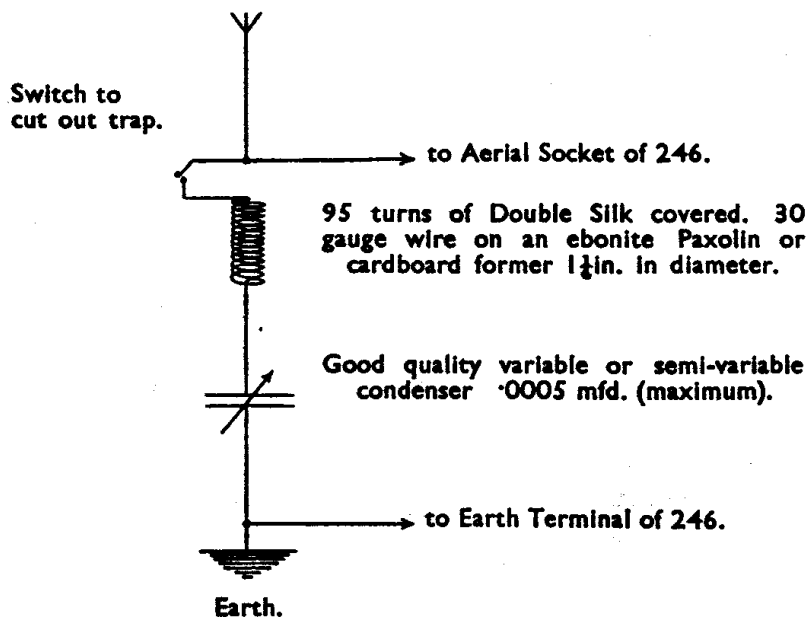
Connect a lead from one mains wire to a high class mica fixed condenser of about .0003 mfd. capacity and from the other side of the condenser connect a lead to aerial socket A.1.

If an installation of this kind is made the greatest precautions should be taken to see that any such arrangement complies with Local Regulations and that no wires or terminals are exposed.

An efficient earth is essential and it is recommended that experiments along the the lines indicated above should be made before the instrument is offered for sale as localities differ.

TREATMENT OF SHOCK EXCITATION OF AERIAL BY POWERFUL NEARBY TRANSMITTER.

Shock excitation of an aerial may result in the intrusion on the long waveband of a medium wave program. The attached sketch and particulars give details of an 'acceptor trap' which has been proved efficient in cases of shock excitation.



NOTE.—It is important that the coil be carefully made.

The tuning of this trap is sharp and the condenser dial should be slowly turned. Normally the trap should be out of circuit when listening on the medium waveband.

PART 3.

SERVICE ADJUSTMENTS.

Removal of Chassis from Cabinet. See Fig 2.

1. Remove back panel.

NOTE.—The red plug may have to be taken out of socket in order to ease panel up after two retaining screws have been withdrawn.

2. Remove valves and place in safe place.
3. Remove six chassis retaining screws on under side of cabinet (do not lose nuts, plain washers or steel lock washers under nuts). This operation is best performed with instrument lying on its side. When large retaining screws are being unscrewed or screwed up, a finger inserted through ventilating hole in base of cabinet will keep nut and lock washer steady.
4. Gently lever off control knobs on front of panel, care being taken not to damage the escutcheon.
5. Remove small wood stop on under-side of top of cabinet by passing screw-driver through centre ventilation hole in bottom of cabinet.
6. Withdraw chassis by pulling gently on metal screen between MH4 and pentode valve-holders.

Description of Wave Change Switch (S.1) at Indicator. Switch is of the continuously rotatable type operating moving plate by roller cam secured to shaft of switch, transparent indicator plate being moved by moving plate. To remove rotating cam operate switch so that cam is horizontal, and lift out.

To remove switch or mica reaction condenser VC2 proceed as follows :—

1. Gently press forward tensioning pulleys and remove gut from dial. Rotate dial until " O " faces front of instrument, and by inserting screw driver in slot provided, slack away dial grub screw. Lever off dial by placing screwdriver between lower end of dial bush and top of main condenser bush, and rotating screwdriver blade.
2. Remove two nuts and bolts securing condenser bridge to valve platform. (Do not lose steel lock washers under nuts).
3. Remove front panel retaining bolts under front edge of chassis platform.
4. Remove pilot lamp holder and pilot lamp by slacking away slotted milled nut below base of chassis.
5. Ease out front metal panel as far as it will go without breaking soldered joints, particular watch being kept on glass resistance contacts.
6. Remove right-hand round-slotted bolt securing sliding plate and condenser. (Do not lose spring lock washer).
7. Remove left hand round slotted bolt securing sliding plate and condenser. (Do not lose spring lock washer).
8. Remove sliding metal plate.
9. Remove two nuts and bolts securing switch to front metal plate.
10. Unsolder contacts having attached to each wire suitable indicating labels for replacement. See Fig. 3 (i.e. pictorial view of top).

Examination of Valve Platform Contacts. (See Fig. 3.) If valve platform and holder contacts prove inaccessible, proceed as for removal of switch, if necessary slightly bending back valve platform to obtain access to contacts.

Special Note. The greatest possible care should be taken when removing components, to see no strain whatever is put upon glass grid leak type resistances, especially Nos. R7 and R1.

General Note re Removal of Leads from Components. Whenever it is necessary to remove leads from components see that adequate labels are attached to wires. Small pieces of card are better than paper. In cases such as wires connected to smoothing choke CK1 card may be pierced to correspond with all lugs on choke. Wires to lugs may then be threaded through holes, the whole wiring system, therefore, dropping into correct position when new choke is installed.

When re-assembling front metal platform :—

1. Attach condenser bridge to valve panel.
2. Insert left-hand panel of chassis retaining bolt first to locate conveniently right-hand retaining bolt.

Re-insertion of these two bolts may be most conveniently carried out by tipping chassis up on back edge. (Do not forget steel lock washers).

PART 4.

SERVICE TABLES.

1. Possible Faults.

Possible Faults.	Probable Cause and Suggested Remedy.
<p>Pilot lamp beneath wave length tuning scale does not light when instrument is turned on. NOTE.—If valves glow when gramophone switch is turned to gramophone, mains are reaching the instrument.</p> <p>Hum. Microphonic howl when playing gramophone. " Motor-boating." Uncontrollable reaction and oscillation on radio. Instrument insensitive—no reaction. Lack of selectivity, or double tuning points on powerful nearby transmitter.</p> <p>No Radio Gramophone O.K. No gramophone Radio O.K. No Radio No gramophone Faint Reproduction.</p>	<p>Make sure that supply is reaching the instrument, test by means of a lamp connected across the two sockets at the end of the mains connecting flex. If mains reaching instrument all right, possibly pilot lamp bulb is loose in holder. Check these points and renew bulb if faulty (6 volt bulb). N.B.—To obtain access to the pilot lamp it is only necessary to remove the metal plate underneath the cabinet when a milled and slotted screw will be revealed which secures the lamp holder. Check up earth, reverse mains plug, change U10 rectifier valve. Change MH4 detector valve. Change detector valve or pad with cotton wool or soft cloth. Examine bias Resistors R6 and R3. Examine leads to reaction control for disconnection, and to both reaction coils—test for continuity. Check L3 and L4 for continuity. Use A2 or A3. Try red plug in C2. If necessary shorten aerial to about 25 feet. Aerial and earth O.K.? Check S.1 aerial tuning coil (L.1 and L.2) V.C.1, C.3 and R.1. Check wiring of pick-up and Volume control ; see that contacts 6 and 7 are closing. Valves functioning correctly? See valve table. Loud speaker and adjacent wiring O.K.? Check with " speech table " and theoretical diagram. Suspect all valves or partial short circuit. Possibly components shorted to chassis. Check with diagram.</p>

2. Speech Values.

Unit.	Strength.	Remarks.
MH4 valve between grid (green wire) and cathode (white wire) On GRAM. ONLY.	With pick-up on revolving record, approximately crystal set strength.	If no signals check pick-up circuit and see the switch contacts 6 and 7 are closing.
Across primary of T1, intervalve transformer (Tag W on valve deck).	Slightly louder under above conditions. Crystal set strength when on radio.	If no signal check the performance of the valve and anode circuit.
Across secondary of T1. intervalve Transformer (Lug V on valve deck).	Slightly louder than above.	If no signal check up transformer (see resistance table and grid circuit of MPT4).
MPT4 valve between grid (green wire) and cathode (white wire).	As one valve set.	If no signal check wiring in grid circuit of valve.
MPT4. valve anode circuit (Loud speaker sockets).	Very loud.	Check wiring in anode circuit of valve.

3. Valve Table.

NOTE A.—Grid bias readings from cathode to chassis (earth) must be taken with valve in and alight.

NOTE B.—When taking grid bias readings the anode supply to the valve must be correct as grid bias readings cannot be obtained unless H.T. supply is O.K.

Valve.	Position.	Anode feed.	Avo. Scale.	Anode volts.	Avo. Scale.	Screen feed.	Avo. Scale.	Screen volts.	Avo. Scale.	Cathode to Earth (Chassis). Grid Bias	Avo. Scale.	Remarks.
MH4	Left hand from the back.	3.4 gram. 3.8 radio.	.012 amps.	190 gram.	1200v.					2½v. Chassis to Cathode valve Leg (White Wire).	12v. 120v.	If voltage on plate but no current, suspect R2 of disconnection. If no voltage trace back via primary T1, R2, to HT+ and check that VC2 not broken down or shorted to earth. See that C5 has not broken down. If no signals through valve see that no part of the grid circuit is shorted to earth, and that valve is working under normal conditions. Check tuning cond. VC1 for short.
MPT4	Centre	30	.12 amps.	240	1200v.	ap- prox.7	.012 amps.	250	1200v.	13v.		No feed but voltage on plate (probably high) suspect R4, R5, R6. If no plate voltage suspect smoothing circuit and C11 also L.S. shorting to earth. For no signals on to this valve trace back grid circuit suspecting secondary of T1.
U10	Right hand from back.	20 per side.	.12									If no output yet valve known to be efficient suspect secondary of mains transformer (see resistance table).

4. Tuning Coils.

	Ohms.	Where Measured.	Remarks.
Medium wave coil ..	.3	A1 to frame socket	Apply same test across VC1 which will test cond. and cont. up to C3. Plug in C1 position Tests L1 and wave change switch contacts. Do. do. Tests L3 do. do.
Long wave coil	14	Do. do.	
V reaction coil. Medium wave	4.25	Top lug VC2 to lug A reaction coil.	
Long wave reaction coil	17	From lug M to E.	

NOTE.—Top of VC2 to earth will measure resistance of, and check, both long and short wave reaction coils in series. Total resistance of 2 coils in series approx. 22 ohms.

5. Mains Transformer (at supply pins with mains switched on).

A. Primary.

When adjusted thus :

Red Plug.	Black Plug.	For	To Volts.	Approximate resistance across mains pins.
				Ohms.
4	5	95	102	14
4	6	103	110	14.5
3	5	111	118	15
3	6	119	127	16.5
2	5	128	136	17
2	6	137	145	18.5
1	5	146	155	19
1	6	156	164	20.5
4	7	190	205	56
3	7	206	222	59
2	7	223	240	61
1	7	241	260	63

B. Secondaries.

4 volt filament winding (Y) valves and pilot lamp out
 4 volt filament winding (X) for U.10
 High Tension winding (W)

.2 ohms.
 .2 ohms
 1,200 ohms

Measure across Fil. lugs of valve holder.
 as above.
 Measure between anode and grid socket of U.10.

6. Resistance Table.

										Ohms.
Intervalve transformer T.1.										
Primary.										
(Taken from lug 4 of choke to lug on valve deck)										1,000
Secondary.										
(Taken from grid socket pentode to earth)										
CK1	(Smoothing choke)	..	..	..	..	..	..	..	..	10,000
	(lugs 2 and 3)	..	..	..	..	..	..	..	..	750
R3 } R6 }	Biasing resistances	..	..	..	..	..	..	..	..	1,000
	i.e. "cathode droppers"	..	..	..	..	..	..	..	..	400
R4	(across filament of pentode 6 each side)	..	..	..	..	..	..	..	..
R5	" " " " 6 " "	..	..	..	..	..	..	..	..	20
R1	Grid leak " " " "	..	..	..	..	..	..	..	..	2 meg.
R7	Across Pick-up	..	..	..	..	..	..	..	..	10,000
R2	MHL4 decoupling	..	..	..	..	..	..	..	..	25,000

PART 5.

SPARE PARTS LIST.

Description.	Part No.	Description.	Part No.
VALVES.		CABINET FITTINGS—continued.	
Detector valve MH4		Bracket with corner cut away	15197
Power valve MPT4		Back securing screws 3 BA x $\frac{1}{4}$ " inst. hd. screws	
Rectifier valve U10		Screw cups	2809
Dial illuminating lamp	1575-A	Felt feet	15207
CABINET FITTINGS.		Tuning escutcheon	15218
Cabinet complete with back panel	15210-A	" " securing screw 6 BA x $\frac{7}{16}$ " Rd. Hd. screw	
Valve deck steady button	15206	" " clamping plate	15194
Back	15211-A	Knob for reaction (left hand)	4485-A
Bracket	15196		

SPARE PARTS LIST—continued.

Description.	Part No.	Description.	Part No.
CABINET FITTINGS—continued.		CHASSIS—continued.	
Knob for tuning condenser (centre) ..	4616-A	L.W. Tuning and Reaction Coil L2 & L4	15170-B
Knob for wave change switch (right hand)	4615-A	Secured by : 4 BA $\frac{1}{16}$ " rd. hd. screw	
Cover plate on under side of cabinet ..	15176	4 BA Std. Hex. Nut S.C.	
CHASSIS.		Shakeproof Washer ..	3166
Valve deck with R1, R4 and R5 complete ..	15136-B	Front, top support and pulley assembly complete ..	15078-B
Metal screen between valves ..	15080	Securing screws : 2-4 BA $\frac{1}{8}$ " rd. hd. screw	
Secured by : 6 BA x $\frac{1}{8}$ " Rd. Hd. Screw		2-4 BA x $\frac{1}{2}$ " rd. hd. screw	
6 BA Std. Hex. Nuts D.C.		4-4 BA Std. Hex. Nut S.C.	
Mains transformer T2 ..	15201-B	2 Shakeproof Washer	3166
Secured by : 4-4 BA x $\frac{1}{16}$ " Rd. Hd. Screws		Pilot Lamp bracket and holder ..	15156-B
4-4 BA Std. Hex. Nut S.C.		Special knurled screw ..	15158
Shakeproof washer ..	3166	Plugs, Leads, etc.	
1 Intervalve Transformer T1 ..	15098-B	Mains transformer adjusting plug (red) ..	15203-A
Secured by : 2-6 BA x $\frac{1}{2}$ " rd. hd. screw		" " " (black) ..	15203-B
2-6 BA Std. Hex. nut		Mains plug (on set) and socket (on lead) ..	15199-A
Shakeproof washer ..	3165	Plugs : White ..	15190-A
H.T. Smoothing choke CK1 ..	3705-J	Black ..	15190-B
Secured by : 2-6 BA x $\frac{1}{2}$ " rd. hd. screw		Red ..	15190-C
2-6 BA std. hex. nut S.C.		Green ..	15190-D
2-Shakeproof washers ..	3165	Grey ..	15190-E
Resistances :		Blue ..	15190-F
R1 glass vacuum type 2 megohms ..	15141-H	Mains lead 12 ft. maroon flex Std. Bayonet plug ..	
R2 " " " 25,000 ohms. ..	15232-A	Socket for mains lead (half of) ..	15199-A
R3 and R6 wire wound 1,000 ohms and 400 ohms on T2 ..	15120-B	Mains Plug on set (half of) ..	15199-A
R4 } ..		Plug secured to set by :	
R5 } centre tapped 10 ohms each ..	15122-B	2-6 BA x $\frac{1}{2}$ " rd. hd. screw	
R7 glass vacuum type 10,000 ohms ..	15141-A	2-6 BA std. hex. Nut D.C.	
Condensers :		Mains Switch complete ..	15145-B
C1 fixed condenser .0002 mfd. ..	15192-A	Secured by : 2-6 BA x $\frac{1}{16}$ " Inst. hd. screw	
C2 " " .0001 mfd. ..	2308-A	2 Shakeproof Washer ..	3165
C3 " " .0001 mfd. ..	2308-A	2-6 BA Std. Hex. Nut ..	
C4 " " 1 mfd. ..		Aerial Plug Board complete with sockets ..	15127-A
C5 " " 2 mfd. ..		Secured by : 2-6 BA x $\frac{1}{16}$ " Inst. Hd. ..	
C6 " " .1 mfd. ..	15086-B	2-6 BA Std. Hex. Nut	
C8 " " 3 mfd. ..		Securing Screws, Nuts, Washers, etc.	
C9 " " .05 mfd. ..		Screw for condenser blocks CK1, T1, 6BA x $\frac{1}{2}$ " Rd. Hd.	
C7 " " 4 mfd. ..	15081-B	Nuts for condenser blocks CK1, T1, 6BA Std. Hex. Nut	
C10 " " .0005 mfd. ..	15193-A	Screw securing T2 :	
C11 " " .001 mfd. ..	10010-A	4BA x $\frac{1}{16}$ " Rd. Hd. screw	
VC1 Variable Condenser .0005 mfd. ..	15198-A	4BA Std. Hex. Nut S.C.	
Dial for VC1 ..	15164-A	Shakeproof washer for 2 BA screw ..	3167
Locking screw for dial 4BA x $\frac{1}{2}$ " rd. hd. screw MS ..		Shakeproof washer for 4 BA screw ..	3166
Scale on dial ..	15166	Shakeproof washer for 6 BA screw ..	3165
Scale securing screw 6 BA x $\frac{1}{16}$ " rd. hd. screw ..		Screws securing valve deck and valve screen	
Cat-gut string 20" (.020" dia.) ..		6 BA x $\frac{1}{16}$ " rd. hd. screw	
Spindle ..	15195	6 BA Std. Hex. Nut D.C.	
Pulley for end of spindle ..	15132	Screws securing condenser bridge :	
Grub screw for pulley ..	15133	4 BA x $\frac{1}{2}$ " Rd. Hd. Screw	
VC2 Variable condenser (small) .0005 mfd. ..	15036-C	4 BA Std. Hex. Nuts S.C.	
Wave Change Switch Unit ..	15109-B	Screws securing former contg. R3 and R6 to T2	
Secured by : 2-6 BA x $\frac{1}{16}$ " c/sk hd. screw		8 BA x $\frac{1}{16}$ " Rd. Hd. Screws	
2-6 BA x $\frac{1}{16}$ " x $\frac{1}{4}$ " hex. nut S.C.		8 BA Std. Hex. Nut	
Wave Change Panel ..	15097	8 BA Std. Washer	
Wave Change Panel holding screws ..	15174	Screws securing C3 :	
Nut for holding screw (6 BA Std. hex. nut)		6 BA x $\frac{1}{2}$ " rd. hd. screw	
Wave Change Indicator Label ..	15167	6 BA Std. Hex. Nut S.C.	
" " " securing screw ..	15231	2 Shakeproof Washer ..	3165
Wave Change Switch Crankarm ..	15117-A	Chassis-to-cabinet securing screw :	
" " " grub screw ..	15119	4 BA x $1\frac{1}{2}$ " rd. hd. screw	
M.W. Tuning Reaction Coil L1 and L3 ..	15168-B	4 BA Std. Hex. Nut S.C.	
Coil Support Sleeve ..	15134	4 BA Std. Washer	
Coil secured by : 2-4 BA x 1" rd. hd. screw		Shakeproof Washer ..	3166
2-4 BA Std. Hex. Nuts			
2-4 BA Washer			
2 Shakeproof Washer ..	3166		