MARCONIPHONE

SERVICE MANUAL

PRIVATE AND CONFIDENTIAL TO THE TRADE ONLY

MODELS 264, 287 AND 297 A.C. SUPERHETERODYNES

For Complete Spare Part List, see List Part No. 21213.

MAY
1935
1935 SERIES
NUMBER NINE
PART NO. 21215

BRIEF SPECIFICATION.

VOLTAGE RANGE.

200 to 250 volts (A.C.).

These instruments are designed to operate only on the voltages for which they are adjusted. Should any variation be noticed the supply company must be notified immediately.

FREQUENCY RANGE.

Model 287—50 to 60 cycles.

Models 264 and 297—50 to 100 cycles.

POWER CONSUMPTION.

On Radio 60 watts.

On Gram. Model 287, 90 watts.

FUSES.

These instruments may be connected to any (A.C.) supply point, providing that 2 amp. double-pole fuses are used for protection.

SPEECH OUTPUT.

Approx. 2 watts (undistorted).

Anode dissipation of MPT4 output valve—approx. 7 watts.

ACTUAL WAVELENGTH RANGE.

Medium waves—200 to 550 metres.

Long waves—800 to 2,000 metres.

DIMENSIONS.

	Height.	Width.	Depth.
Table Grand	17⅝ inches.	14⅝ inches.	11 inches.
Radiogram	31¼ ,,	27¼ ,,	16 ,,
Console	33¼ ,,	19⅞ ,,	11 1/16 ,,

WEIGHT.

Table Grand	38 lb. net.
	45 lb. gross (for home dispatch).
Radiogram	90 lb. net.
	160 lb. gross (for home dispatch).
Console	64 lb. net.
	113 lb. gross (for home dispatch).

LOUDSPEAKER.

Type No. 10971AB for Model 264.

,, 17461H or 10955T for Models 287 and 297.

These loudspeaker units include output transformers and filter units which consist of an 0·0005 mfd. condenser and 0·5 henry choke.

	Model 264.	Models 287 and 297.
D.C. resistance of speech coil	8 ohms	11 ohms
Impedance at 800 cycles	11 ,,	16 ,,

D.C. resistance of field—2,000 ohms in all models.

The field of these electro-magnetic speakers is connected in the H.T. negative lead. A hum neutralizing coil is fitted to the yoke of the speaker. For connections, see circuit diagram, Fig. 1, page 6.

PICK-UP.

17670J. D.C. resistance—8,000 ohms.

The volume and tone controls (VR2 and VR4 respectively) control the input to the grid of the MHD4 valve and are therefore operative on radio *and* gram.

MOTOR. (MODEL 287.)

Type 24H. For further particulars, see separate Service Manual (already issued).

AUTOMATIC BRAKE. (MODEL 287.)

Standard friction feed type. For complete details, see Manual for Model Q/286, Part No. 18850.

CIRCUIT DESCRIPTION.

Circuit diagram is on page 6.

THE AERIAL TRIMMER.

The special trimming condenser TC6 (across the first tuned circuit) enables the instrument to be aligned to suit individual aerials.

Re-trimming is required only when installing the instrument or when the aerial is changed.

MARCONI MX40 VALVE—V1.

This heptode (pentagrid) frequency changer is A.V.C. controlled and is coupled to the I.F. amplifying valve VMS4 (Met.) by the band pass intermediate frequency transformer I.F.T.1.

INTERMEDIATE FREQUENCY—125 K.C.

The image suppressor components L13 and L14, and the condenser C3 serve to prevent second channel interference, and are effective over the whole of both the medium and long wave ranges.

MARCONI VMS4 (MET.) VALVE—V2.

The transformer IFT2 couples this valve to the double diode triode second detector valve MHD4 (Met.) which rectifies the I.F. signal, supplies A.V.C. bias voltage, and also functions as an L.F. amplifier.

MARCONI MHD4 (MET.) VALVE—V3.

Resistance capacity coupled to the :—

MARCONI MPT4 VALVE—V4.

A high efficiency pentode output valve giving an undistorted output of approx. 2 watts.

THE Q.-A.V.C. ACTION.

When the receiver is switched for " quiet " operation the valve VMS4 is supplied with a slight positive bias, causing grid current to flow, thereby damping the circuit TC2, L10. The diode valve MHD4 has a paralysing negative bias on it, and the MX40 has a high negative bias.

When, however, a steady carrier reaches the diode of the MHD4 and the amplified A.V.C. system the condition of the valves is as follows :—

MX40.—The high negative bias on this valve is reduced.

VSM4.—A negative bias is applied to VMS4, thus neutralizing the existing positive bias, stopping the grid current and undamping TC2, L10.

MHD4.—The paralysing negative bias on the diode of this valve is removed, resulting in a rapid return to normal sensitivity.

By means of the Silent Tuning Adjustment at the rear of the instrument the threshold of operation of the " Q " circuit may be adjusted to suit local static conditions. In this way stations giving interference-free reception are admitted whilst the set remains quiescent to the static noises between stations.

When the Silent Tuning Switch (front end of wavelength scale) is pulled out, static suppression is in operation and at the same time the " Q " circuit is brought into action. When the switch is pushed in, the " Q " circuit is switched out, leaving the normal amplified A.V.C. in operation.

The practical effect of the " Q " arrangement on these models is quiet inter-station tuning, with at the same time, only a slight reduction in sensitivity, so that all stations except those completely ruined by static are receivable.

EXTRA SPEAKERS.

Two extra speakers may be connected to each of these instruments without greatly weakening the output of the parent speaker, providing that the " extras " are suitably wired and are adjusted to suit pentode output conditions.

If the extra speaker speech coils have a D.C. resistance of 8·0 ohms or more, their matching transformers will not be required. Connect the speech coils of the " extras " (in parallel) to the terminals marked " EXT. LS " on the terminal panel on the parent speaker transformer.

For " extras " having speech coils of less than 8·0 ohms D.C. resistance, the matching transformer primary winding must be connected to the " RED " and " YELLOW " terminals of the parent speaker panel (in parallel with the primary of the output transformer).

Where extensions are connected to the RED and YELLOW terminals (high resistance output) the extension must be kept as short as possible in order to avoid attenuation of the high frequencies.

If a speaker is to be installed at a distant point choose a low resistance speaker (having a D.C. resistance of at least 8·0 ohms), as low resistance extensions are generally more satisfactory.

IMPORTANT.

DON'T attempt to derive energizing current from Models 264, 287 and 297 for the field of an extra electro-magnetic Speaker.

DON'T leave the instrument switched on when re-arranging speakers.

DON'T connect the speech coil of a speaker to the primary (high resistance) winding of the output transformer.

DON'T use poor quality wire for speaker extensions. For high resistance extensions use a well insulated wire as the leads are at high potential. For low resistance extensions employ a heavy gauge wire in order to keep down the resistance to only a fraction of an ohm.

PRELIMINARY TESTS.

For " Dismantling," see page 13.

Ascertain that speech circuit is correct by momentarily contacting a 1½-volt battery across extra loudspeaker terminals while the field is energised. If the field is not energised only a faint click will be heard. See that all connecting leads are securely connected and are continuous.

First test the instrument on gramophone. If " gram." results are good but radio poor, the fault will be found in that part of the circuit preceding V3 or in an A.V.C. component. A progressive contacting of the aerial plug on to the following points will assist in locating a fault associated with the tuning coils and connections thereto.

PROGRESSIVE AERIAL TESTS.

Test No.	Test Point.	Components Eliminated and Tests to Make.	Results which should be Obtained.
1	Tap of L1. Remote tag (purple) at top of L1 former. Switch to M.W.	S1 contacts C and D, C2, C3, L14, L13 and connection at L1. Employ component tests, page 13.	Images present, otherwise performance will be fairly good.
2	Tap of L2. Top tag of coil L15. Switch to L.W.	S1, contacts N and O, L5, and connection at L2. Employ component tests, page 13.	Images present, otherwise performance will be fairly good.
3	Fixed vanes of VC1 Switch to M.W. or L.W.	Switch contacts N, O, C and D ... ... Coils L15, L14, L13 and tappings of L1 and L2. Employ component tests, page 13.	Images present.
4	Fixed vanes of VC2 Switch to M.W. or L.W.	Components mentioned in Tests 1, 2 and 3, plus coils L1, L2, L3 and L4. Employ component tests, page 13.	Images present. Selectivity will be poor.

VALVE TABLE.

VALVES	V1 MX40 } No Feed on Gram.	V2 VMS4 Met.	V3 MHD4 Met.	V4 MPT4	V5 MU12	Remarks.
TEST VOLTAGES	3·0 to 6·0 v‡†*, Negative bias.	0·6 to 1·0 v. bias.*	*‡1·0 v. positive to 2·5 v. negative (Off signal)	25·0 volts (drop across pri. of output transformer)	—	All voltage readings taken on a voltmeter having a resistance of 200 ohms per volt.
Measured between	Cathode and frame (bias).	Metallising and frame (bias).	Cathode and frame	Red and yellow terminals on speaker transformer	Red terminal (speaker transformer and frame)	**Readings are ± 25 per cent.**, but will depend on type of meter used.
Parts which should be checked if TEST VOLTAGES are abnormal.	S1 Contacts A and B, L9, L7 and L8, TC1. Transformer T1, R2, R3, R4, R6, C5, C6, C8, C26 and C27.	TC3, L11, VR1, R6, R7, R8 and R13, C8, C9, C10, C26 and C27. Transformer T1, S3 Contacts 2, 5 and 6.	C13, C24, C25, R9, R28, R12, R30, R32, R29 and R24, C15, C26 and C27. Transformer T1 and Speaker Field.	R18, R19, R21 and R29, C16, C17, C26 and C27. Transformers T1 and T2.	Speaker Field, C26 and C27, and T1.	
ANODE-FRAME VOLTS ...	OSC. 120* / MIXER 220	220	90-100*	215	—	KEY TESTS.
SCREEN-FRAME VOLTS ...	— / 80*	*75 volts	—	170	—	Voltage drop across speaker field (GREEN to GREY terminals—L.S. Panel), 115 volts.
ANODE FEED (mA's.) ...	2·0 to 1·5 / 1·4 ("Q") to 3·3 (Maximum sensitivity)	‡† 3·0 / 8·0	1·3 to 1·7	25	Measure at GREY TERMINAL—L.S. Panel—55 mA's.	Total H.T. Feed (GREY terminals—L.S. Panel) should be approximately 55 mA.'s.
SCREEN FEED (mA's.) ...	— / 2·3 to 1·9	1·7	—	4·0 to 7·0	—	
BIAS	SEE TEST VOLTAGES			10 Volts Measure across R29	—	Maximum H.T. voltage measured between RED terminal on Speaker Panel, and chassis should be 240 volts (approximately).

NOTES.—A.V.C. components and the parts which would affect the working of the A.V.C. are :—R33, R17, C1 and contacts 1, 3 and 4 of S3.

‡ Highest figure will be obtained when "Q" knob is out (Silent position). † Varies with signals.

* To obtain these readings the meter used must have a full scale deflection of about ten times the indicated value.

When the instrument is installed in an area where the field strength of the local station is high, or in a place where static is particularly severe, the choice of valves is an important factor.

(1) To ensure the highest quality being maintained on the local station in areas of high field strength the valves should have the following characteristics :—
VMS4 (Met.) V2 should have a *high* anode current limit.
MHD4 (Met.) V3 should have a *low* anode current limit.
MPT4 V4 should have a *high* anode current limit.

(2) In areas where static is severe and "Q" circuit is ineffective, choose the following types of valves :—
VMS4 (Met.) V2 should have a *low* anode current limit.
MHD4 (Met.) V3 should have a *high* anode current limit.
MPT4 V4 should have a *low* anode current limit.

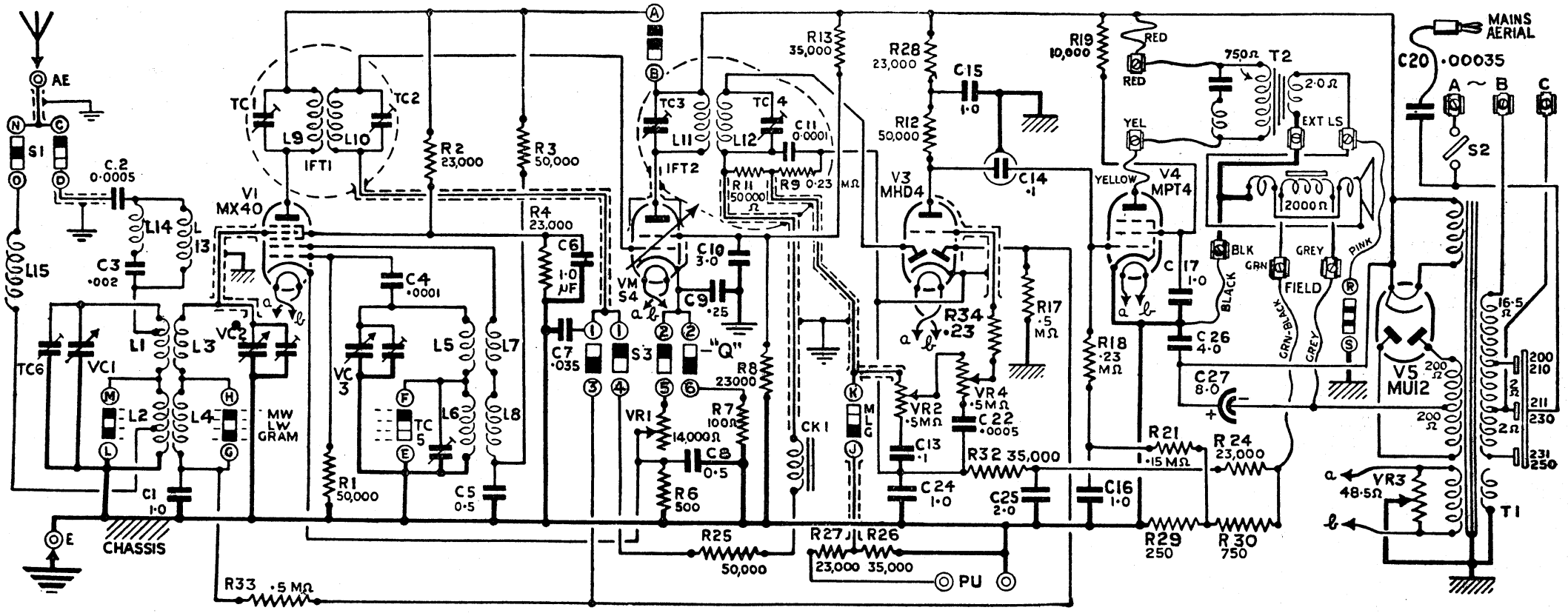


Fig. 1.

Certain instruments will be found in which the choke CK1 is not fitted.

Where this condition prevails the resistance R25 will be 500,000 ohms (Part No. 5787C) instead of 50,000 ohms.

List of Electrical Components will be found on page 8.

Marconi valves have been selected for these instruments 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.

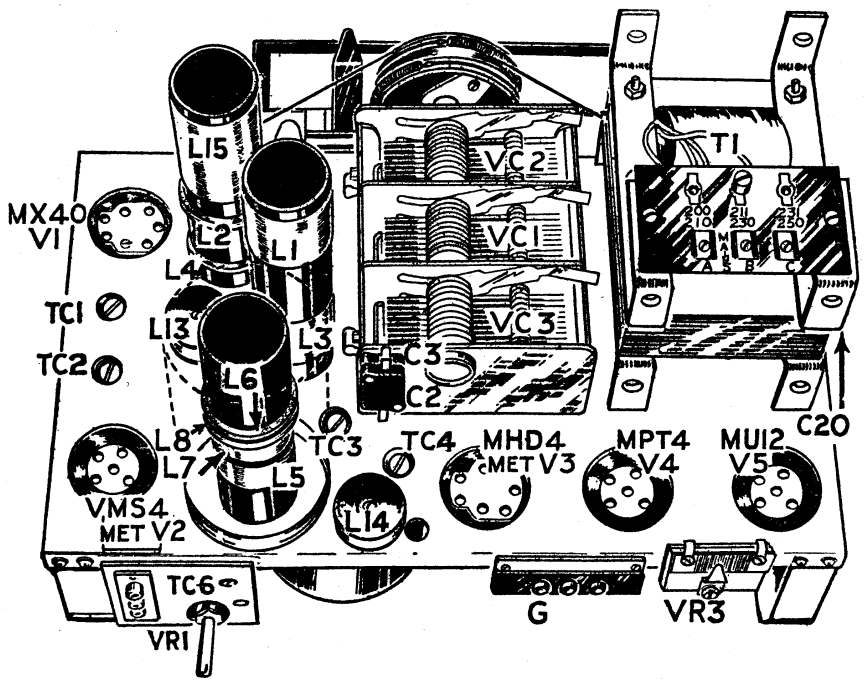


Fig. 2.

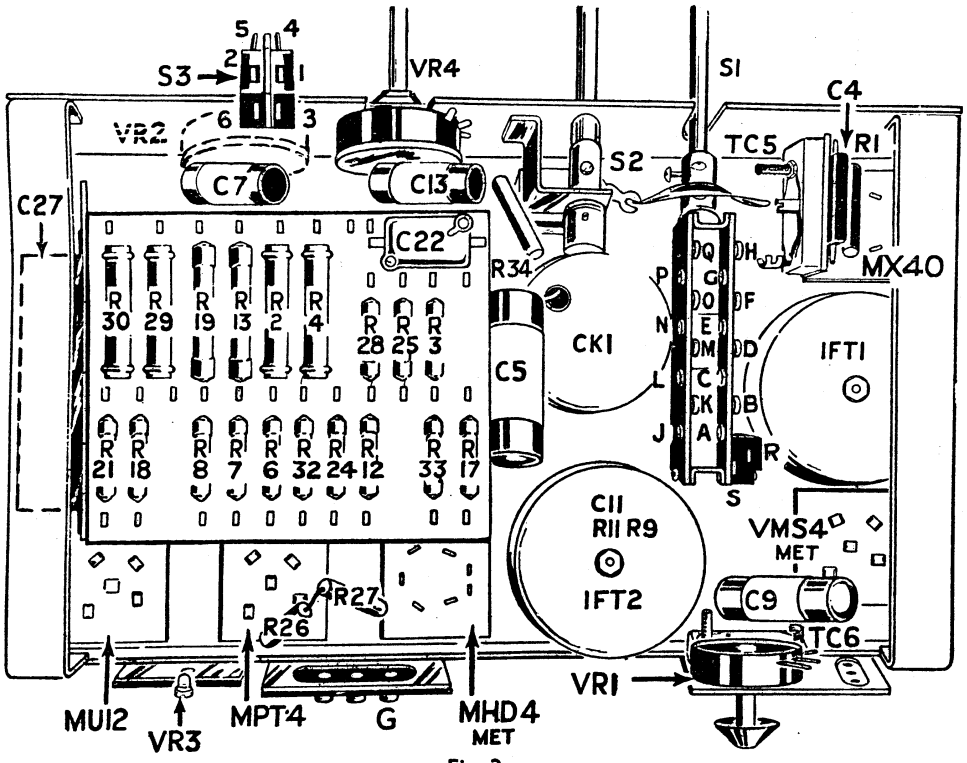
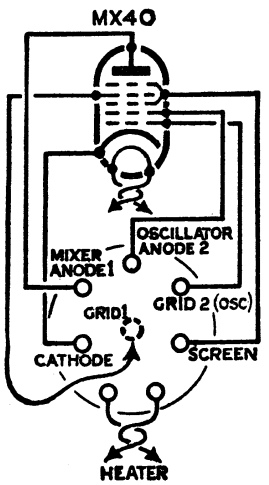


Fig. 3.



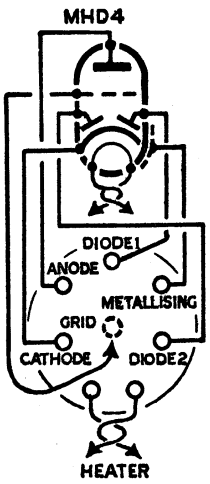


Fig. 4.

CONNECTIONS TO VALVES AS SEEN FROM UNDERSIDE OF CHASSIS.

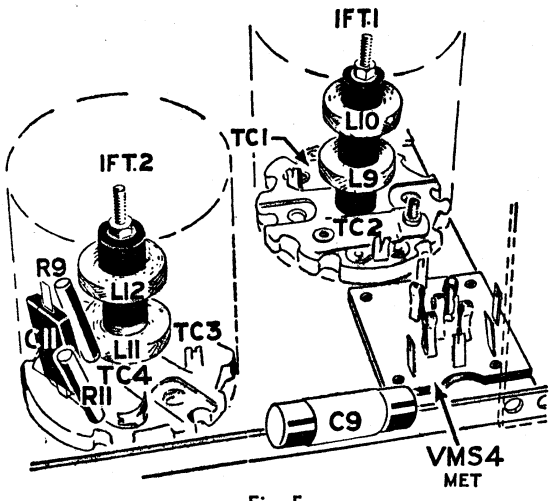


Fig. 5.

ELECTRICAL COMPONENTS SPARE PARTS LIST.

Ref. No.	Description.	Part No.
L 1	M.W. band pass coil	14561B
L 2	L.W. „ „	14563C
L 3	M.W. „ „	14561B
L 4	L.W. „ „	14563C
L 5	M.W. oscillator coil	17416C
L 6	L.W. „ „	
L 7	M.W. reaction coil	
L 8	L.W. „ „	
L 9	1st I.F. transformer	14550D
L 10	„ „	14550D
L 11	2nd „ „	14550K
L 12	„ „ „	14550K
L 13	Image suppressor coil	14508F
L 14	Suppressor coil	14508D
L 15	Filter coil	14563C
VC 1	Ganged condenser	13638E
VC 2	„ „	
VC 3	„ „	
	Trimming condensers—	
TC 1	30-140 mmfd.	14550A
TC 2	30-140 „	
TC 3	30-140 „	
TC 4	30-140 „	
TC 5	70-140 „	16240D
TC 6	5- 70 „	16240C
	Fixed condensers—	
C 1	1·0 mfd.	19544D
C 6	1·0 „	
C 8	0·5 „	
C 10	3·0 „	
C 14	0·1 „	
C 15	1·0 „	
C 16	1·0 „	
C 17	1·0 „	
C 24	1·0 „	
C 25	2·0 „	
C 26	4·0 „	
C 2	0·0005 mfd.	15719E
C 3	0·002 „	15719X
C 4	0·0001 „	15719B
C 5	0·5 „	16316G
C 7	0·035 „	16316P
C 9	0·25 „	16316F
C 11	0·0001 „	15719B

Ref. No.	Description.	Part No.
C 13	0·1 mfd.	16316D
C 20	0·00035 „	15719AE
C 22	0·0005 „	15719E
C 27	8·0 mfd. (electrolytic)	19545A
VR 1	Suppressor resistance	6000AH
VR 2	½ megohm volume control	6000BJ
VR 3	Hum dinger	14567B
VR 4	Tone control, ½ megohm	6000BP
	Resistance—	
R 1	50,000 ohms	17541P
R 2	23,000 „	10451R
R 3	50,000 „	5787P
R 4	23,000 „	10451R
R 6	500 „	5787N
R 7	100 „	5787AC
R 8	23,000 „	5787AA
R 9	230,000 „	18530M
R 11	50,000 „	18530J
R 12	50,000 „	5787P
R 13	35,000 „	5786G
R 17	500,000 „	5787C
R 18	230,000 „	5787Z
R 19	10,000 „	5786B
R 21	150,000 „	5787AN
R 24	23,000 „ (± 5 per cent.)	5787CD
R 25	50,000 „	5787P
R 26	35,000 „	18530H
R 27	23,000 „	18530G
R 28	23,000 „	5787AA
R 29	250 „ (± 5 per cent.)	5786EC
R 30	750 „ (± 5 per cent.)	10451AY
R 32	35,000 „ (± 5 per cent.)	5787AT
R 33	500,000 „	5787C
R 34	230,000 „	18530M
CK 1	Choke, 1,500 h.	18964B
T 1	Mains transformer	14584U
S 1	Wave change switch	14520F
S 2	Mains switch	
S 3	D.P.D.T. switch	18817A
V 1	Valve MX40 plain	
V 2	„ VMS4 metallised	
V 3	„ MHD4 metallised	
V 4	„ MPT4 plain	
V 5	„ MU12 plain	

REMOVAL OF COMPONENTS.

If a wavechange switch, volume control, condenser block or other component is removed in the course of servicing, care must be taken to restore wiring to its original position when re-assembling. The correct replacement of the wavechange switch wiring is particularly important. It is advisable to label wires before removing from contacts to ensure that they are returned to their correct points.

Fig. 6 shows internal connections of condenser block.

If switch is removed from chassis, check wiring by Fig. 1 and re-gang the instrument as detailed on page 10.

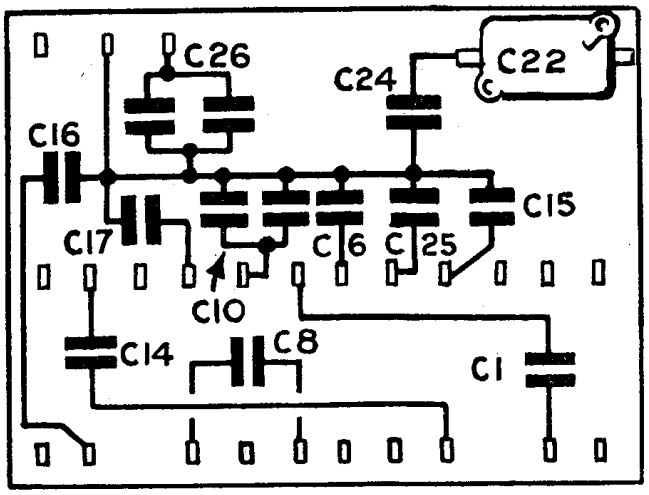


DIAGRAM OF CONDENSER BLOCK CONNECTIONS.

Fig. 6.

H.F. TESTS AND ADJUSTMENTS.

When using a modulated oscillator and L.F. output meter the oscillator signal is sufficient to bring the A.V.C. into operation. To avoid this, keep the volume control at maximum and reduce input from oscillator otherwise H.F. ganging and trimming of I.F.'s becomes almost impossible.

TRIMMING OF I.F. TRANSFORMERS.

If a new coil or other component associated with the I.F.'s has been fitted, or if wiring has been disarranged, the circuits must be re-trimmed. An accurately calibrated oscillator must be used for this work, which should not be attempted unless instruments are available.

A modulated signal (125 kc.) is injected into the I.F. circuit by connecting output of oscillator between grid of first valve (MX40) and earth.

NOTE.—The grid of the MX40 is connected to the terminal on **top** of this valve. Adequate coupling may be obtained by twisting an insulated lead from oscillator around this terminal. As an output meter a 0–5 D.C. milliammeter may be employed in the anode circuit of the second detector valve V3, or alternatively a 0–3 A.C. voltmeter connected across the extra speaker windings. If a D.C. milliammeter is used, the deflection will be downwards, in which case the oscillator need not be modulated. When using an A.C. voltmeter a modulated signal must be employed, when the deflection will be towards maximum.

With mains connected, switch receiver to M.W. position and push **in** the silent tuning knob. All valves must be in position. Adjust I.F. trimmers in the following order :—

TC3. TC4. TC1. TC2.

Re-check all trimmers for maximum deflection of meter needle in the following order :—

TC1. TC2. TC3. TC4.

In order to check for peak deflection, the trimmer screw must be rotated first slightly clockwise and then anti-clockwise—the reading should fall in each case. Leave trimmers set for peak deflection.

IMPORTANT NOTES.

1. I.F. ADJUSTMENTS CANNOT BE MADE ON BROADCAST SIGNALS.
2. ALWAYS RE-GANG H.F. CIRCUITS AFTER TRIMMING I.F. CIRCUITS.

RE-GANGING OF H.F. CIRCUITS.

If a new tuning coil has been fitted or the wiring thereto has been disturbed, the circuits must be carefully re-ganged. To ensure accurate re-ganging a modulated oscillator and an output meter are required. Employ output meter as instructed under heading :—" Trimming of I.F. Transformers."

Connect aerial and earth to the instrument in order to ensure a normal operating condition.

Proceed as follows :—

MEDIUM WAVES.

1. Loosely couple oscillator to the aerial lead-in wire.
2. Set wavechange switch to M.W. position.
3. Switch on the oscillator and adjust to 200 metres.
4. Set moving vanes of variable condensers to a position nearly full out (approximately $\frac{9}{32}$ inch between edge of vanes and frame of condenser).

   The pointer on scale should now be adjusted to 200 metres.
5. Screw up VC3 trimmer to its fullest extent and then unscrew until maximum deflection of output meter needle is obtained.

   It is possible to obtain signals at two positions of VC3 Trimmer. Trimmer must be adjusted for minimum capacity.
6. Now set oscillator to 250 metres and move vanes of ganged condenser until maximum deflection of output meter needle is obtained.
7. Adjust trimmer of VC2 to obtain a further increase in signal strength.
   Rock the ganged condenser to ascertain that correct position has been obtained.
8. Adjust TC6 trimmer until maximum response is obtained.

LONG WAVES.

9. Switch receiver to L.W. position and set oscillator to 1,000 metres. Check the adjustment of pointer on the scale.
10. Turn ganged condenser to a point where maximum response is obtained and adjust TC5. After each small adjustment of TC5 the ganged condenser must be reset to give maximum output. Repeat this operation until setting which gives maximum output is obtained.

IMAGE RECEPTION.

Powerful local stations may cause " image " reception at some other part of the scale. This image will have a frequency equal to that of the original signal, minus twice the I.F. frequency—which in the case of this instrument is 125 kc., e.g., the " image " of London Regional (352 metres or 877 kc.) is 877—250 = 627 kc. or 480 metres.

HOW TO ADJUST THE SUPPRESSOR.

Having ascertained that the offending transmitter is in operation, tune the receiver to the image of that signal. Slack off the screws fixing the bracket of L13 and move this coil to a point where the image signal is as faint as possible.

AERIAL TRIMMING.

The aerial trimmer screw adjusts the instrument for the size of aerial to which it is connected and is situated in the lower hole (marked A.T.) at left of aerial-earth panel at back of cabinet.

1. Tune in carefully a weak station having a wavelength of about 240 metres.
2. Insert the small insulated screwdriver provided, and turn the screw-head until the station is loudest. If on turning in one direction the station gets weaker, turn in the other direction until a maximum point is reached.

This adjustment need only be made once—unless the aerial is changed or mains aerial substituted.

CORD DRIVES.

Use a superior flax fishing line having a breaking strain of approximately 42 lb.
Supplies of cord may be had from :—

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

Approximate length of both cords (one instrument), 58 inches. In cases where both cords require replacing assemble condenser drive cord first.

REPLACEMENT OF CONDENSER DRIVE CORD (all three Models).

Refer to Fig. 7 and proceed as follows :—

1. Remove station scale from its frame.
2. Cut off approximately 24 inches of cord and splice on to closed end of " S " hook. The cord must now be drawn through a piece of hard wax to ensure freedom from slip.
3. Fully engage the vanes of variable condensers and (looking at the front of chassis) turn the condenser drive spindle fully clockwise. See that the spring anchor plates on the cord drum are at the top of drum when vanes are fully engaged. The hexagon head screw fixes position of drum. Also see that the cheesehead screw on the back of the cord drum is in the centre of its radial slot.
4. Hook the cord on to the rear left-hand anchor point of drum and bring the cord once round the wide rear channel of drum, in an anti-clockwise direction, down through aperture in chassis, and on to the right side of drive spindle.
5. Make four complete turns around the undercut portion of " tune " spindle in a clockwise direction.

Make sure that the spindle is kept in its fully clockwise position, and that the condenser vanes are fully engaged.

6. Bring the cord round as for a fifth turn and return the cord through aperture in chassis.
7. The cord must now be passed along the centre (narrow) groove of condenser drum in an anti-clockwise direction—only one turn being necessary.
   Splice the end of cord on to the spiral spring so that coils of spring will be slightly opened when spring is hooked on to right-hand (rear) anchor point.

The cord will cross from centre to rear groove before completing one revolution of drum.

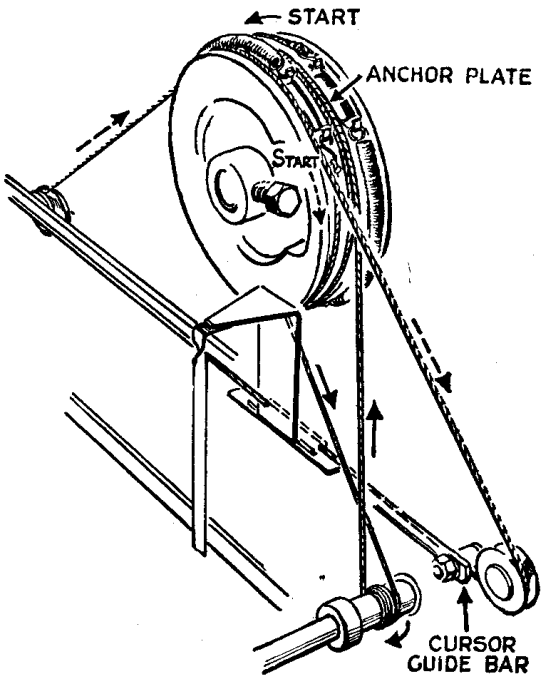


Fig. 7.

REPLACEMENT OF POINTER CORD.

Model 264.

Proceed as follows :—

1. Remove station scale from frame, and remove the cursor guide rod and pointer.
2. Take approximately 34 inches of cord and splice on to the closed end of " S " hook. Draw the cord several times through a piece of hard wax to ensure freedom from slip.
3. Pass the cord through the two small holes in the cursor so that hook end of cord is on the right side of pointer and the distance between end of hook and nearest cursor hole is exactly $13\frac{1}{8}$ inches.
4. Replace pointer on guide bar and replace guide bar.
5. Slide pointer fully to the right and fully engage condenser vanes.
6. Slip hook end of cord over front right-hand anchor point and pass the cord clockwise once round the cord drum (front channel), and over the right-hand pulley.
7. Now take the free end of cord under left-hand pulley and pass cord clockwise along the centre (narrow) channel of cord drum—only one turn is necessary.
8. Splice the end of cord on to the spiral spring so that coils of spring will be slightly opened when spring is hooked on to left-hand (nearest) anchor.

   The cord will cross from centre to front groove before completing one revolution of drum.

Models 287 and 297.

Refer to Fig. 8.

1. Remove cursor guide rod and pointer carrier.
2. Take approximately 34 inches of cord and splice on to the closed end of " S " hook. Draw cord several times through a piece of hard wax to ensure freedom from slip.
3. Pass the cord through the two small holes in the cursor so that hook end of cord is on the left side of pointer, and the distance between end of hook and nearest cursor hole is exactly $15\frac{5}{8}$ inches (Model 297), $16\frac{1}{2}$ inches (Model 287).
4. Replace pointer carrier and guide bar.
5. Slide pointer fully to right and fully engage condenser vanes.
6. Slip hook end of cord over front left-hand anchor point, pass round drum in an anti-clockwise direction and over left-hand pulley.
7. Now take free end of cord over right-hand pulley and round the drum, keeping cord towards the front of the drum.
8. Splice the end of the cord on to the spiral spring so that a suitable tension is put on the cord when the spring is assembled on to the right-hand anchor point.
9. Adjust pointer on station of known wavelength.

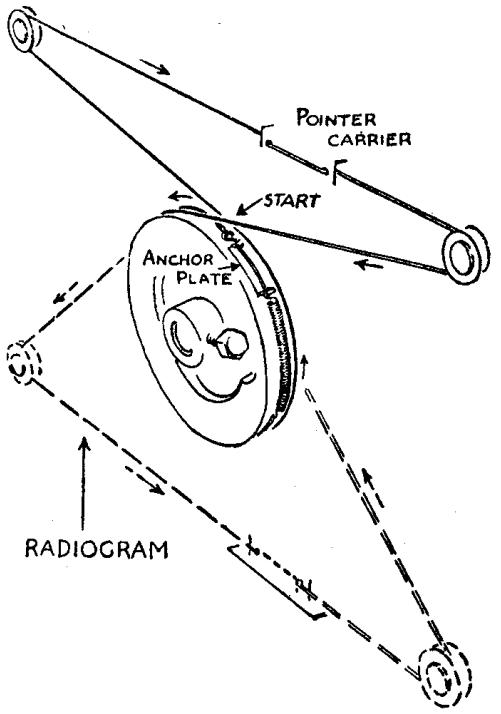


Fig. 8.

ADJUSTING THE POINTER.

Models 264, 287 and 297.

This adjustment may be made without removing chassis from the cabinet :—

Proceed as follows :—

1. Accurately tune in a known station at the **top** end of the medium waveband.
2. Having switched off again slacken off the cheesehead screw on the back of the cord drive drum.
3. Carefully hold the moving vanes of variable condensers and move the tuner knob until the station being received is accurately indicated.
4. Retighten the cheesehead screw and check over the pointer reading.

COIL CONTINUITY TESTS.

Do not measure resistances with instrument "live" or with valves in. Electrical values ± 20 per cent.

Test No.	Component.	Wave-change Switch Setting.	D.C. Resistance.	Where to Measure.	Wire Sizes.
28	Coil L15	M.W.	72·0 ohms	Across ends	44 S.W.G. (0·0032 inch) En. Cu.
29	Coil L14	M.W.	1·3 ohms	Across ends	28 S.W.G. (0·0148 inch) D.S.C. Cu.
30	Coil L1	M.W.	3·3 ohms	Between fixed and moving vanes of VC1.	32 S.W.G. (0·0108 inch) D.S.C. Cu.
31	Coils L1 + L2 ...	L.W.	17·0 ohms	Between fixed and moving vanes of VC1.	L1 as above. L2, 36 S.W.G. (0·0076 inch) D.S.C. Cu.
32	Coil L13	L.W.	1·2 ohms	Across ends	28 S.W.G. (0·0148 inch) D.S.C. Cu.
33	Coil L3	M.W.	3·7 ohms.	Across ends	32 S.W.G. (0·0108 inch) D.S.C. Cu.
34	Coils L3 + L4 ...	L.W.	16·0 ohms	Across ends	L3 as above. L4, 36 S.W.G. (0·0076 inch) D.S.C.
35	Coil L 9 } IFT1	—	95·0 ohms	Across trimmer TC1 ...	41 S.W.G. (0·0044 inch) S.S.C. En. Cu.
	Coil L10 } IFT1	—	95·0 ohms	Across trimmer TC2 ...	41 S.W.G. (0·0044 inch) S.S.C. En. Cu.
36	Coil L5	M.W.	4·7 ohms	Between fixed and moving vanes of VC3.	34 S.W.G. (0·0092 inch) D.S.C. Cu.
37	Coils L5 + L6 ...	L.W.	11·5 ohms	Between fixed and moving vanes of VC3.	L5 as above. L6, 36 S.W.G. (0·0076 inch) D.S.C. Cu.
38	Coils L7 + L8 ...	L.W.	6·6 ohms	Across ends	L7, 38 S.W.G. (0·006 inch) D.S.C. Cu. L8, 36 S.W.G. (0·0076 inch) D.S.C. Cu.
39	Coil L11 } IFT2	L.W.	95·0 ohms	Across trimmer TC3 ...	41 S.W.G. (0·0044 inch) S.S.C. En. Cu.
	Coil L12 } IFT2	L.W.	95·0 ohms	Across trimmer TC4 ...	41 S.W.G. (0·0044 inch) S.S.C. En. Cu.
40	L.S. Filter Coil ...	L.W.	160·0 ohms	Across ends	37 S.W.G. (0·0068 inch) En. Cu.

DISMANTLING.

MODEL 287 (RADIOGRAM).

Access to Components (underside of Chassis).

Remove the two wood screws on right of radio control panel (top of instrument).

The side panel of cabinet against which the radio chassis is mounted may now be removed.

To Remove Chassis.

1. Remove R.H. side panel as detailed in the preceding paragraph.
2. Remove P.U. plugs from bottom of chassis and disconnect the motor and speaker leads.
3. Remove the four knobs from the radio control panel and also the volume control knob from the front of cabinet.
4. Take out the two remaining screws in the top of radio control panel and remove the panel.
5. Remove the volume control from inside front of cabinet—two wood screws.
6. Whilst holding radio unit remove the four screws holding the chassis to the side bearers of cabinet. The unit is now free.

DISMANTLING (cont.)

MODEL 264 (TABLE GRAND).

To remove chassis :—

1. Remove the four control knobs on front of cabinet.
2. Withdraw the four bolts securing chassis to cabinet base.
3. Disconnect the six lead cable to speaker panel. The chassis is now free.

MODEL 297 (CONSOLE).

To remove chassis :—

1. Remove the four control knobs on front of cabinet.
2. Withdraw the four bolts securing chassis to shelf.
3. Disconnect the six lead cable to speaker panel and release cable from securing staples. The chassis is now free.

GENERAL FAULTS TABLE.

Employ the following tests in the order given :—

Symptoms.	Test No.	Action to be Taken.	Possible Causes.
NO SIGNALS, RADIO OR GRAM. Pilot lamps and valves do not light.	5	Test across mains input terminals (mains disconnected). Faulty mains switch. See that mains are reaching the instrument.	Failure of T1 mains transformer primary.
NO SIGNALS, RADIO OR GRAM. Pilot lamps light.	6	Check multiple cable connections on speaker transformer with colour markings on the panel.	Faulty connection or tags wrongly placed. Colour of lead must agree with marking of terminal.
	7	Check voltage between RED and GREY terminals on speaker transformer. Voltage (maximum H.T.) should be approx. 390. If C27 is short-circuited voltage will be low or absent. A short on C26 will drop H.T. voltage to 200. If voltage rises to 500 look for " dis " in speaker field or in R29 or R30. — — Check screen feed of MPT4	Internal short on C26 would cause full H.T. to be applied across speaker field and R29 and R30. Burnt out speaker field. Failure of MU12 valve. Short to frame of C26 and/or C27 will starve valves and speaker of energising current. Faulty MPT4. Faulty MHD4. Failure of R19.
	8	Check feed through speaker field—this should be approx. 55 mA.	Failure of speaker field or R29 or R30.
	9	Test primary and secondary of T2. On connecting an ohmmeter to secondary a " plonk " will be heard if speech coil is continuous.	" DIS " in primary of T2 (speaker transformer) or damaged speech coil. If primary of T2 is " dis " the voltage at red terminal will rise to 450.
	10	Test each valve individually as specified in valve table—page 5.	A voltage dropping resistance or a coil may have failed.
NO RADIO—Good Gram. ...	11	Connect a pair of phones between contact K of S1 and chassis—Loud signals should be heard.	If signals are not heard fault is definitely due to stages preceding MHD4. *As the volume and tone controls function on GRAM. VR2 and VR4 can be assumed O.K. if Gram. results are satisfactory.* Faulty MX40 or VMS4 valve.

GENERAL FAULTS TABLE—continued.

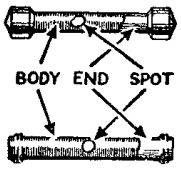
Symptoms.	Test No.	Action to be Taken.	Possible Causes.
LOUD HUM, RADIO AND GRAM.	12	See that arm of VR3 (hum adjuster) is making good contact and that wire is continuous. Disconnect one filament lead before measuring D.C. resistance as filaments are in parallel.	—
	13	See that secondaries of T1 are not shorting to earth.	—
	14	Replace detector valve (MHD4) ...	—
	15	Test valves MHD4 and MX40	"Short" between cathode and heater of a valve.
	16	See that speaker frame is connected to earth.	Frame of speaker should be connected to black terminal (BLK) on speaker transformer.
	17	Look for loose laminations in T1 transformer.	—
HUM, GRAM. ONLY	18	See that pick-up lead screening is earthed. See that frame of motor is connected to BLK (earth) terminal of speaker transformer.	— —
DISTORTION	19	Check bias of MPT4	Faulty or wrongly connected tags on speaker transformer, or faulty valve.
WEAK SIGNALS—LONG WAVE ONLY.	20	Test L15 for continuity	Break in winding L15.
CRACKLING	21	Test R12 ... ... See that screening and transformer winding in I.F.T.2 can are not shorting. Test H.T. points for short to earth. Faulty joint	— Faulty MX40 or MHD4.
SCALE POINTER DOES NOT REGISTER CORRECTLY.	22	See instructions under headings "CORD DRIVES" and "RE-GANGING OF H.F. CIRCUITS."	Incorrect setting of stops on tuning spindle or pointer incorrectly placed.
INSENSITIVITY ON "M.W." AND "L.W.", ACCOMPANIED BY "H.F." OSCILLATION AND IMAGES. Fault may be intermittent and cause crackling.	23	Examine each pair of contacts on S1, checking opening and closing with circuit diagram—Fig. 1.	Faulty wavechange switch. Faulty MX40.
POWERFUL "IMAGES," OSCILLATION AND INSENSITIVITY ON MEDIUM WAVES.	24	Check opening and closing of springs with circuit diagram—Fig. 1.	F and E contacts on wavechange switch S1 not making properly in "M.W." position.
FAULTY GRAMOPHONE REPRODUCTION.	25	Check contacts K, J, R and S on wavechange switch S1.	—
BREAK-THROUGH OF LOCAL STATION WHILST OPERATING ON "GRAM."	26	Check contacts A and B of wavechange switch S1. Springs should be open on "GRAM." and closed on radio.	Springs permanently shorted.
INSTABILITY IN "Q" POSITION.	27	— See that "Q" switch contacts are opening and closing according to circuit diagram.	Faulty MX40.

WIRING COLOUR CODE.

Black	Earth.
White	Cathode.
Red	H.T. positive.
Green	Grid.
Blue	Pick-up.
Brown	Heaters.
Pink	Loudspeaker.
Purple	Aerial.
Orange	Mains.
Yellow	Anode.
Yellow with red tracer.	Screen of screen grid valve.
Green with black tracer.	Bottom of grid circuit not direct to earth.
Green with white tracer.	Mid position of tuning coil.

RESISTANCE COLOUR CODE.

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



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, if no difference is noticed in noise level whether aerial is connected or not, the interference may be due to high frequency (H.F.) brought to the instrument via the power supply, or to a fault in the receiver.

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

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

If interfering noises are due to a bad connection in the receiver, a jar will sometimes aggravate the fault and so assist in defining the source of trouble—see Faults Table.

Loose or faulty pilot lamps will give rise to severe crackling. If a flickering lamp is noticed and a renewal does not improve matters, suspect a bad connection in the heater circuits of the valves. See that valves are fully inserted and that pilot lamps are tightly screwed in.

H.F. 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 by employing the tests previously described.

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

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

4. 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 both delicate and lengthy, and require both goodwill and tact to bring to a successful conclusion. **Do not** suggest to the owner (if known) of the interfering apparatus that your application 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 H.M. Post Office and the B.B.C. should not be employed until every possible test has been made to ensure that the interference complained of comes definitely from a source **exterior** to the instrument.

THE INTERFERENCE MANUAL.

You are advised, in your own interests, to obtain the 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.

For complete list of Spare Parts, see Separate List, Part No. 21213.

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 spare part 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.

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

MARCONI 264
SALES POINTS

1. Exceptional all-round performance at a price within reach of almost every household.

2. Silent tuning and adjustable sensitivity—normally found only in much more expensive instruments.

3. Beautiful cabinet-work in a modern but harmonious style.

4. 25 sales-compelling technical features.

5. Selectivity adequate for future as well as present requirements.

6. Outstandingly efficient Automatic Volume Control.

7. Superb quality and volume of reproduction.