E.M.I SERVICE LTD.

TABLE MODELS. A.R-G's.
MARCONIPHONE 296, 298. 289, 289A.
HIS MASTER'S VOICE 442, 443. 570, 570A.

SERVICE MANUAL

5 valve A.C. Superhet with A.V.C. and Tuning Indicator

CONTENTS

Part No. 18842

AUG. 1934 Reprinted MARCH 1946

BRIEF SPECIFICATION. (TABLE MODELS)

VOLTAGE RANGE.

200 to 250 (A.C.).

FREQUENCY RANGE.

50 to 100 cycles.

This instrument is designed to operate only on the voltages for which it is adjusted.

Should any variation be noticed the supply company must be notified immediately.

POWER CONSUMPTION.

70 watts.

FUSES.

This instrument may be connected to any (A.C.) supply point, providing that 2½-amp. double-pole fuses are used for protection.

SPEECH OUTPUT.

Approx. 2½ watts (undistorted).

Anode dissipation of PX4 output valve, 12 watts approximately.

ACTUAL WAVELENGTH RANGE.

Medium waves—200 to 560 metres.

Long waves—850 to 2,000 metres.

DIMENSIONS.

Height.	Width.	Depth.
16 inches.	18¼ inches.	10⅞ inches.

WEIGHT.

37 lb. net.

45 lb. gross (for home dispatch).

LOUDSPEAKER.

Type No. 10971 W.

Electro-magnetic, the field being in the H.T.— feed. A Hum neutralising coil is fitted and the resistance R 17 in series with the field provides bias for the PX4 output valve. For electrical data, see Circuit diagram, Fig. 1, page 6.

CIRCUIT DESCRIPTION.

The aerial is coupled to the bandpass tuned circuit which feeds the heptode (or pentagrid) frequency changer valve, MX40.

This valve is A.V.C. controlled and is coupled to the I.F. amplifying valve VMS4B by the bandpass intermediate frequency transformer I.F.T.1.

The transformer I.F.T.2 couples the VMS4B valve to the double diode triode second detector valve MHD4 (Met), which rectifies the I.F. signal and supplies A.V.C. bias voltage and also functions as an L.F. amplifier. Intermediate frequency :—125 kc.

Transformer coupling (T1) is employed to the power output valve which feeds the moving coil speaker.

The output stage is also used as the tone correction stage, this function being switched out when the instrument is operating on "GRAM." TC7 is the tone corrector and VC4 the tone control.

A new design image suppressor circuit is incorporated in this instrument and consists of the two inductances L4 and L5, and the condenser C2.

CIRCUIT DESCRIPTION—*continued.*

This effectively prevents second channel interference over the whole of both the medium and long wave ranges.

The A.V.C. arrangement provides adequate delay (maintaining the high sensitivity of the receiver), and controls both the mixer and the I.F. stages, thus giving perfect control on local and distant stations and obviating the necessity for a " local-distant " switch.

In order to obtain between station noise suppression, a push-pull action on the volume control brings the variable static suppressor control (VR1) into action.

The suppressor functions only when volume control knob is pulled out. Push in for maximum sensitivity.

THE AERIAL TRIMMER.

The special trimming condenser TC1 enables the instrument to be aligned to suit the particular aerial in use. Trimming is greatly facilitated by the visual tuning device. Re-trimming is required only when installing the instrument or when the aerial is changed.

EXTRA LOUDSPEAKERS.

Switch off the instrument when re-arranging speakers. Two extra loudspeakers may be connected to this instrument without greatly weakening the output of the parent speaker, providing that impedance of extra speech coil is not less than that of the parent speaker (11 ohms).

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

WIRING.

Connect speech coil of extra loudspeaker to terminals marked " EXT. LS " 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.

HIGH-RESISTANCE (MOVING IRON) TYPE.

Connect to RED and YELLOW terminals, in parallel with transformer primary.

Connect the positive (RED) lead of speaker to the terminal to which the red lead of multiple speaker connector is attached.

Speaker must have covered terminals and the extension wiring between receiver and speaker must be rubber-covered and of good quality as the leads are at high potential.

Alternatively connection can be made through a condenser of not less than 2 microfarads, which will isolate speaker from H.T. voltage. Connect one side of condenser to yellow terminal, the other side of condenser to extra H.R. speaker and return other lead of extra speaker to earth.

It must be noted that the speaker field is in the negative H.T. lead and therefore the speaker field positive (+) terminal is connected to EARTH.

PICK-UP.

A high resistance pick-up may be permanently connected to the pick-up sockets ; the connecting lead must be metal screened and the screening connected to earth. The Marconiphone Model 25 pick-up is strongly recommended for use with this receiver.

The volume control is operative both on radio and gramophone.

PRELIMINARY TESTS.

Make sure that the loudspeaker magnet is being energised by applying a screwdriver near the pole-piece. Ascertain that speech circuit is correct by momentarily contacting a $1\frac{1}{2}$-volt battery across extra loudspeaker terminals while the field is energised. This should produce a definite sound in the speaker. 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	Top right-hand tag on coil L2. Switch to M.W. ...	Switch contacts A and B, C1, L4 and L5 ... Employ component tests—page 9.	Images present, otherwise performance will be fairly good.
2	Top tag of coil L1 ... Switch to L.W.	Switch contacts A and C, coil L1 ... ... Employ component tests—page 9.	Images present, otherwise performance will be fairly good.
3	Fixed vanes of VC1...	Switch contacts A, B and C, coils L1, L4 and L5, and L2 and L3 tappings. Employ component tests—page 9.	Images present. Selectivity will be impaired.
4	Fixed vanes of VC2...	Components mentioned in Tests 1, 2 and 3, plus coils L2 and L3. Employ component Tests—page 9.	Images present. Selectivity will be poor.

GENERAL FAULTS TABLE.

Employ the following tests in the order given :—

Symptoms.	Test No.	Action to be Taken.	Possible Cause.
NO SIGNALS, RADIO OR GRAM. Pilot lamps, visual tuner and valves do not light.	5	Test across mains input terminals (mains disconnected). See that mains are reaching the instrument.	Failure of primary of T3 mains transformer.
NO SIGNALS, RADIO OR GRAM. Pilot lamps light.	6	Check multiple cable connections on speaker transformer with circuit diagram—page 6.	Faulty connection or tags wrongly placed. Colour of lead must agree with marking of tag.
	7	Check voltage between RED and GREY TERMINALS on speaker transformer. Voltage (maximum H.T.) should be approx. 375. If C24 is short circuited voltage will be low or absent. A short on C23 will drop the voltage to 200. If voltage rises to 500 look for "dis" in speaker field or in R17.	Internal short on C24 would cause full H.T. to be applied across speaker field and R17. Burnt-out speaker field. Short to frame of C23 and/or C24, which would starve valves and speaker of energising current. Failure of U12 (V5).
	8	Check feed through speaker field—this should be approx. 56 mA.	Failure of speaker field or R17.
	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	Connect a pair of phones between tag 13 of C19 and frame (EARTH). Loud signals should be obtained.	Failure of T1—intervalve transformer or fault on C19.
	11	Test each valve individually as specified in valve table—page 7.	A voltage dropping resistance or a coil may have failed.

GENERAL FAULTS TABLE—*continued.*

Symptoms.	Test No.	Action to be Taken.	Possible Cause.
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 T3 are not shorting to earth.	—
	14	Replace detector valve	This may be faulty.
	15	Test valves	"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.
HUM, GRAM ONLY	17	See that pick-up lead screening is earthed.	—
DISTORTION	18	Check bias of PX4	Faulty or wrongly connected tags on speaker transformer, or PX4 grid touching filament.
WEAK SIGNALS — LONG WAVE ONLY.	19	Test L1 for continuity	Break in winding L1.
CRACKLING	20	Test R14 ... ... 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.	—
SCALE POINTER DOES NOT REGISTER CORRECTLY.	21	See instructions under headings "CORD DRIVES" and "RE-GANGING OF H.F. CIRCUITS."	—
INSENSITIVITY ON "M.W." AND "L.W.," ACCOMPANIED BY "H.F." OSCILLATION AND IMAGES. Fault may be intermittent and cause crackling.	22	Examine each pair of contacts on S1, checking opening and closing with circuit diagram—Fig. 1.	Faulty wavechange switch.
POWERFUL "IMAGES," OSCILLATION AND INSENSITIVITY ON MEDIUM WAVES.	23	Check opening and closing of springs with circuit diagram—Fig. 1.	G and E contacts on wavechange switch S1 not making properly in "M.W." position.
FAULTY GRAMOPHONE REPRODUCTION.	24	Check contacts K and L and N and E on wavechange switch S1.	—
BREAK-THROUGH OF LOCAL STATION WHILST OPERATING ON "GRAM."	25	Check contacts H and J of wavechange switch S1. Springs should be open on "GRAM." and closed on radio.	Springs permanently shorted.
VISUAL TUNER LIGHT FLUTTERS RAPIDLY.	26	See that condenser C13 is connected ...	Failure of C13 due to VT not being in circuit.
VISUAL TUNER DOES NOT OPERATE.	27	Check for continuity ... ... *If VT is left disconnected an excessive strain will be imposed on C13 and this condenser will fail. Condenser connected the wrong way.*	—

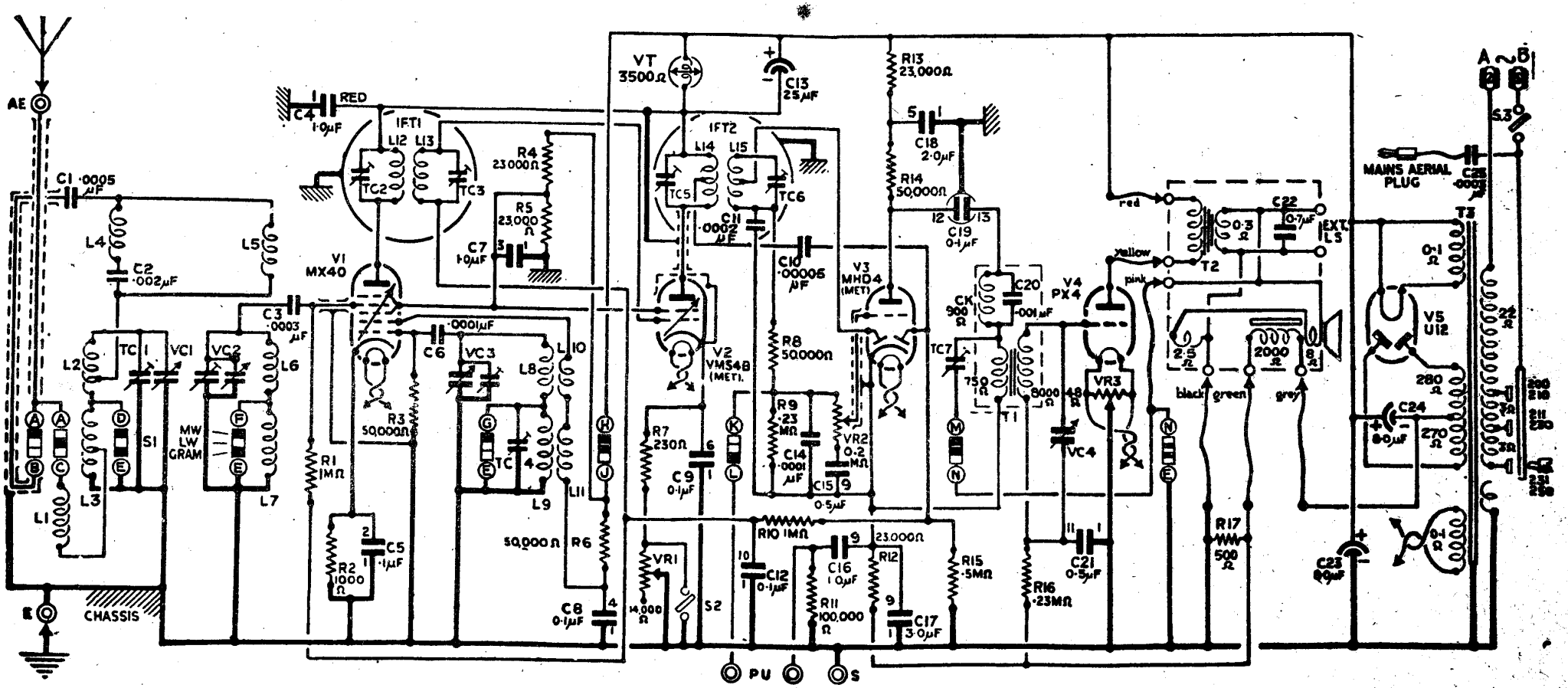

AE
E
CHASSIS
C1 ·0005 µF
L4
L5
C2 ·002µF
L2
TC
VC1
VC2
L6
L1
L3
S1
MW
LW
GRAM
L7
C3 ·0003 µF
V1 MX40
RED
C4 1·0µF
IFT1
L12
L13
TC2
TC3
R4 23,000Ω
R5 23,000 Ω
C7 1·0µF
·0001µF
C6
VC3
L8
L10
L9
L11
TC
R1 1MΩ
R2 1000 Ω
C5 ·1µF
R3 50,000Ω
C8 0·1µF
50,000 Ω R6
VT 3500Ω
C13 25µF
IFT2
L14
L15
TC5
TC6
C11 ·0002 µF
C10 ·00005 µF
V2 VMS4B (MET.)
V3 MHD4 (MET)
R8 50,000Ω
R9 ·23 MΩ
C14 ·0001 µF
VR2 0·2 MΩ
C15 0·5µF
R7 230Ω
C9 0·1µF
R10 1MΩ
VR1
14,000 Ω
S2
C12 0·1µF
C16 1·0µF
R11 100,000 Ω
R12 23,000Ω
C17 3·0µF
R15 ·5MΩ
R16 ·23MΩ
R13 23,000Ω
C18 2·0µF
R14 50,000Ω
C19 0·1µF
C20 ·001µF
CK 900 Ω
TC7
750 Ω
8000 Ω
T1
V4 PX4
VR3
48 Ω
VC4
C21 0·5µF
R17 500 Ω
red
yellow
pink
T2
0·3 Ω
C22 0·7µF
EXT. L.S.
2·5 Ω
2000 Ω
8 Ω
black
green
grey
A
B
S.3
MAINS AERIAL PLUG
C25 ·0005 µF
T3
0·1 Ω
V5 U12
280 Ω
270 Ω
C24 8·0µF
22 Ω
C23 8·0µF
0·1 Ω
200 210 211 230 231 250
PU
S

Fig. 1.

VALVE TABLE.

	MX40		VMS4B	MHD4	PX4	U12	Remarks.
TEST VOLTAGES	4·0 (3·8) Gram. : Nil		1·2 (0·3)* Gram. : Nil	6·0 positive (5·0 volts negative)* Gram. : 6·5	28·0	225	All voltage readings taken on a voltmeter having 200 ohms per volt resistance. Readings ± 10 per cent., but will also depend on type of meter used.
Measured between	Cathode and frame		Metallising and frame	Cathode and frame	Green wire (L.S. panel) and frame	Red wire (L.S. panel) and frame	
Parts which should be checked if TEST VOLTAGES are abnormal	U12 components, L10, L11, L12, R2, R4, R5, R6, C4, C7 and C8, VT, A.V.C.		U12 components, L14, R4, R5, R7, VR1, anode cap and screening, C4, C7, VT, A.V.C., S2	U12 components, R12, R13, R14, R17, C18, C19, A.V.C.	U12 components, T1, T2, R17, VR3	T3, R17, S.F., C23, C24	*To obtain these readings meter used must have a full-scale deflection of *at least* 10 *times* the indicated value.
ANODE/FRAME VOLTS ...	Osc. 90* Gram. : Nil	Mixer 200 (210) Gram. : 210	200 (210) Gram. : 210	70 (110) Gram. : 75	210 Gram. : 225	—	Voltage drop across S.F. (green wire to grey wire, L.S. panel), 110 volts.
SCREEN/FRAME VOLTS ...	—	70 Gram. : Nil	70 Gram. : Nil	—	—	—	Total H.T. feed (at grey wire, L.S. panel, 56 mA.
ANODE FEED mA.	2·0 Gram. : Nil	1·0 (0·2) Gram. : Nil	3·0 (0·4) Gram. : Nil	1·7 (0·9) Gram. (1·75)	43 (46) Gram. : 52	28 Each anode	
SCREEN FEED mA.	—	2·0 Gram. : Nil	0·7 (0·1) Gram. : Nil	—	—	—	

All values taken with static suppressor knob in. Where two values are given, the first is for no signal (carrier), the figure in brackets showing the variation due to the action of the A.V.C. on a strong station. If variation does not occur when tuned to a powerful station, check the following A.V.C. components :—C10, C12, R1, R10, R15.

IMPORTANT.—Do not remove valves whilst instrument is switched on. The absence of valves will cause the total H.T. voltage to rise and so impose a strain on the electrolytic condensers.

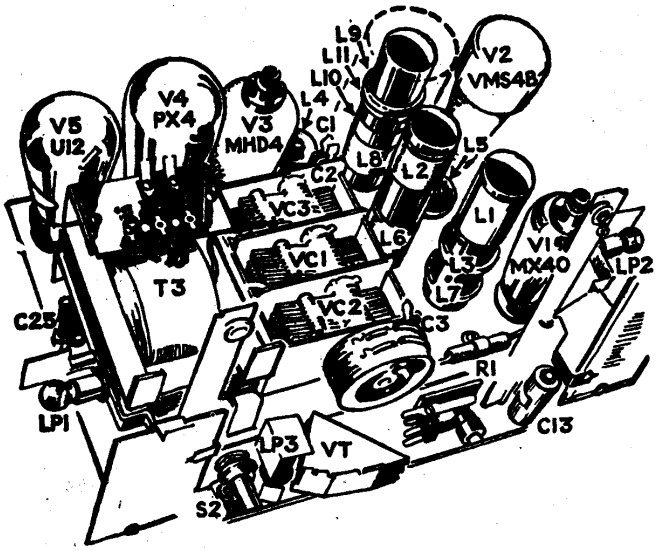


Fig. 2.

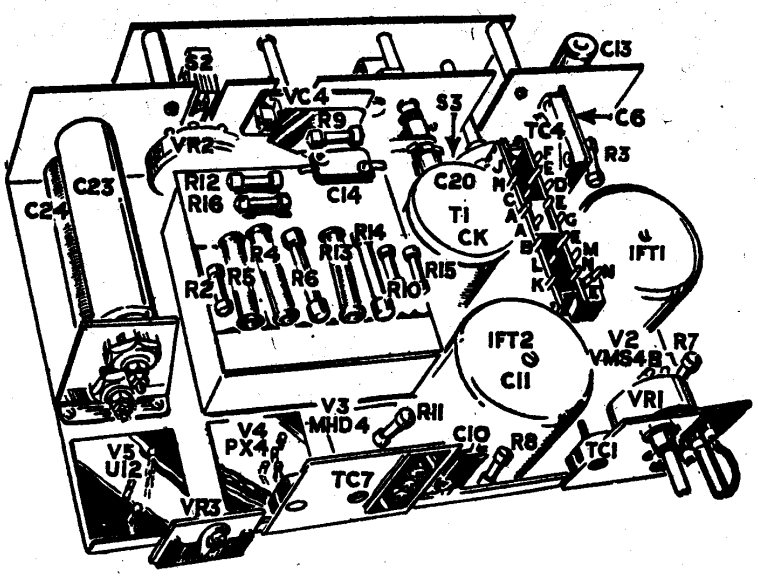


Fig. 3.

NOTE.—In certain instruments the resistance R17 will be found in the position occupied by R12 (Fig. 3). Where this condition obtains the resistance R12 will be found on the inside of C14. If not mounted on the condenser block the resistance R17 will be wired to the underside of the speaker transformer panel.

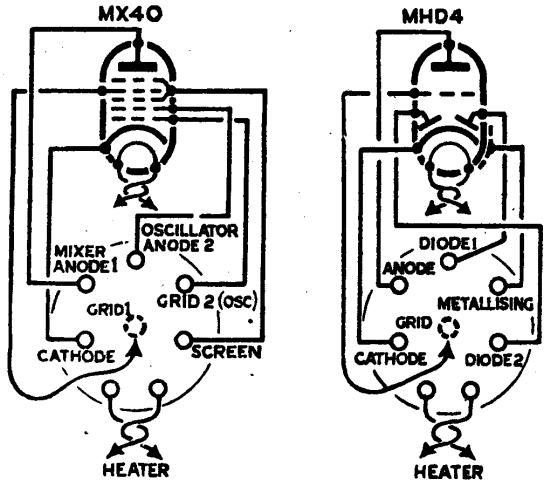


Fig. 4.

CONNECTIONS TO VALVES AS SEEN FROM UNDERSIDE OF CHASSIS.

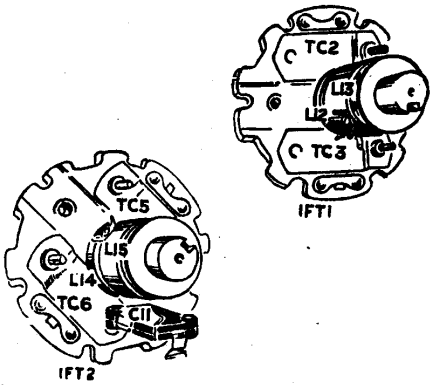


Fig. 5.

I.F. TRANSFORMERS.

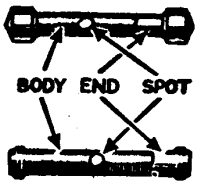
WIRING COLOUR CODE.

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

RESISTANCE COLOUR CODE.

BODY and END Colours.
(1st and 2nd figures.)

0 Black.
1 Brown.
2 Red.
3 Orange.
4 Yellow.
5 Green.
6 Blue.
7 Violet.
8 Grey.
9 White.



SPOT Colours.
(Additional 0's.)

·0 Black.
0· Brown.
00· Red.
000· Orange.
0,000· Yellow.
00,000· Green.

COIL CONTINUITY TESTS.

Do not measure resistances with instrument "live," or with valves in. Electrical values ± 10 per cent.

Test No.	Component.	Wavechange Switch setting.	D.C. Resistance.	Where to measure.	Wire size.
28	Coil L 1	M.W.	72 ohms ...	Across ends	44 S.W.G. (·0032 in. dia.) En. Cu.
29	Coil L 2	M.W.	3·5 ohms ...	Between earth and fixed vanes of VC1.	32 S.W.G. (·0108 in. dia.) D.S.C. Cu.
30	Coil L2 + L3 ...	L.W.	16·5 ohms ...	Between earth and fixed vanes of VC1.	L3, 36 S.W.G. (·0076 in. dia.) D.S.C. Cu.
31	Coil L4	M.W. or L.W. ...	0·3 ohm ...	Bottom tags of C1 and C2 ...	28 S.W.G., D.S.C. (·0148 in. dia.) Cu.
32	Coil L5	M.W. or L.W. ...	0·75 ohm ...	At tags of condensers C1 and C2.	28 S.W.G., D.S.C. (·0148 in. dia.) Cu.
33	Coil L6	M.W.	3·5 ohms ...	Between fixed and moving vanes of VC2.	32 S.W.G. (·0108 in. dia.) D.S.C. Cu.
34	Coil L6 + L7 ...	L.W.	16·5 ohms ...	Between fixed and moving vanes of VC2.	L7—36 S.W.G. (·0076 in. dia.) D.S.C. Cu.
35	Coil L8	M.W.	4 ohms ...	Between fixed and moving vanes of VC3.	34 S.W.G. (·0092 in. dia.) D.S.C. Cu.
36	Coil L8 + L9 ...	L.W.	10 ohms ...	Between fixed and moving vanes of VC3.	L9—36 S.W.G. (·0076 in. dia.) D.S.C. Cu.
37	Coil L10	M.W. or L.W. ...	4 ohms ...	Between centre tap and yellow wire.	38 S.W.G. (·006 in. dia.) D.S.C. Cu.
38	Coil L11	M.W. or L.W. ...	2·5 ohms ...	Between centre tap and red wire.	36 S.W.G. (·0076 in. dia.) D.S.C. Cu.
39	Coil L12 } I.F.T. 1	—	85 ohms ...	Across remote tags of TC2 ...	41 S.W.G. (·0044 in. dia.). S.S.C. Enam. Cu.
40	Coil L13 } I.F.T. 1	—	85 ohms ...	Across remote tags of TC3 ...	
41	Coil L14 } I.F.T. 2	—	85 ohms ...	Across remote tags of TC5 ...	
42	Coil L15 } I.F.T. 2	—	85 ohms ...	Across remote tags of TC6 ...	

DISMANTLING.

CHASSIS.

1. Release multiple speaker cord from spring clips on top and right of cabinet and disconnect tag ends of cords from transformer on speaker.

Refer to circuit diagram when re-connecting speaker cable.

2. Take out the two wood screws fixing wavelength scales to front of cabinet.

3. Remove four knobs from front of cabinet.

4. Take out the four screws fixing chassis to bottom of cabinet.

SPEAKER.

1. Disconnect tag ends of multiple cable from speaker transformer.

Refer to circuit diagram, Fig. 1, when reconnecting cable.

2. Remove four nuts holding speaker to baffle.

Do not forget to replace the plain washers and the locking washers when re-assembling. Do not interfere with the cross-headed screws on front of cabinet.

VISUAL TUNER ASSEMBLY.

1. Remove chassis from cabinet as described in the foregoing paragraph.

2. Detach the metal plate which serves as a guide for the control spindles and is secured by 2 countersunk screws

3. Remove the 2 screws fixing visual tuner assembly to chassis.

The whole assembly complete with lamp bracket is now free.

If the two wires to the visual tuner assembly are removed, make sure that these leads are correctly re-assembled, *i.e.*, the red wire to the positive (+) terminal.

Do not attempt to repair or adjust the visual tuner movement, as this work is highly specialised ; return the complete assembly to E.M.I. Service, Ltd.

The movement is carefully adjusted at the factory and the possibility of fault is very remote.

REPLACEMENT OF VISUAL TUNER LAMP.

1. Remove the perforated metal plate from the bottom of cabinet.

2. Slack off the two round-head screws holding the lamp bracket assembly and slide the bracket to one side and lift over screw-heads.

Replacement lamps, which must be of the 6·2-volt screw-in type, must be screwed in firmly. A spot of wax or a slip of paper should be employed if lamp is slack in the holder.

REPLACEMENT OF PILOT LAMPS.

Access may be obtained by removing the back cover.

Replacement lamps, which must be of the 6·2-volt screw-in type, must be firmly screwed in.

A spot of wax or a slip of paper may be employed if lamp is slack in the holder.

H.F. TESTS AND ADJUSTMENTS.

TRIMMING OF I.F. TRANSFORMERS.

If a new coil or other component has been fitted to an I.F. transformer, or if wiring has been seriously disarranged, the circuits must be re-trimmed.

An accurately calibrated, modulated oscillator is required for this work, which should not be attempted unless instruments are available. Inject the signal across the I.F. circuits by connecting the oscillator output between the grid of the 1st valve (MX40) and earth (chassis).

Note.—The grid of this valve is connected to the screw terminal on the top of this valve. Adequate coupling may be obtained by attaching the clip of oscillator lead to the insulated portion of cap. As an output meter an 0-5 D.C. milliammeter may be employed in the anode circuit of the second detector valve V3, or alternatively an 0-3 A.C. voltmeter may be connected across the extra L.S. terminals.

TRIMMING OF I.F. TRANSFORMERS—*continued.*

If a D.C. milliammeter is used the deflection will be downwards, and 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.

Push in the volume control knob to ensure maximum sensitivity.

Trim in the following order, adjusting oscillator to the frequencies indicated :—

1. Adjust oscillator to 127 kc.
2. Trim TC6.
3. Trim TC3.
4. Adjust oscillator to 123 kc.
5. Trim TC5.
6. Trim TC2.

It is advisable to check adjustments, **always working in the above order.**

The adjustments cannot be made on broadcast signals. Always re-gang H.F. circuits after trimming I.F. transformers.

RE-GANGING OF H.F. CIRCUITS.

If a new tuning coil is 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 essential. Employ output meter as instructed under heading " TRIMMING OF I.F. TRANSFORMERS."

Loosely couple the oscillator to the aerial lead-in wire. **It is important that an aerial be connected to the instrument in order to ensure a normal operating condition.**

Proceed as follows :—

1. Unscrew trimmer TC1 to minimum capacity.
2. Switch on the oscillator and set to 200 metres.
3. Set moving vanes of variable condensers to the position where there is exactly $\frac{1}{4}$ inch between the edges of moving vanes and the trimmer side of frame. With the vanes in this position (at almost minimum capacity) unscrew trimmer on VC3 until maximum deflection of output meter needle is obtained.

   It is possible to obtain signals at two positions of VC3 trimmer. Adjust to the position nearest minimum capacity.

   Check the medium wave pointer on the wavelength scale.
4. Switch on the oscillator and set to 250 metres.
5. Rotate ganged condenser until signals are at maximum strength and then adjust trimmer on VC2, to further increase response to oscillator signal. Rock the ganged condenser to ascertain that the correct position has been obtained.
6. Adjust trimmer TC1 for maximum signals.
7. Switch receiver to L.W. position.
8. Set oscillator (or receive station) on 1,000 metres. Adjust TC4 for maximum deflection of output meter needle, at the same time rocking the ganged condenser.
9. Repeat operations 1 to 8.

CORD DRIVES.

Use a superior flax fishing line having a breaking strain of approximately 42 lbs.

Supplies of cord may be had from :—

E.M.I. SERVICE, LTD.,

SHERATON WORKS, HAYES, MIDDLESEX.

Approximate length of both cords (one instrument), 83 inches. In cases where both cords require replacing, the condenser drive cord should be assembled first. Proceed as follows :—

1. Cut off approximately 24 inches of cord and splice on to closed end of " S " hook. Draw the cord several times through a piece of hard wax to ensure freedom from slip.

CORD DRIVES—*continued.*

2. Fully engage the vanes of variable condensers and turn the drive spindle to its clockwise stop position.

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 screw A, Fig. 7, is in the centre of its radial slot.

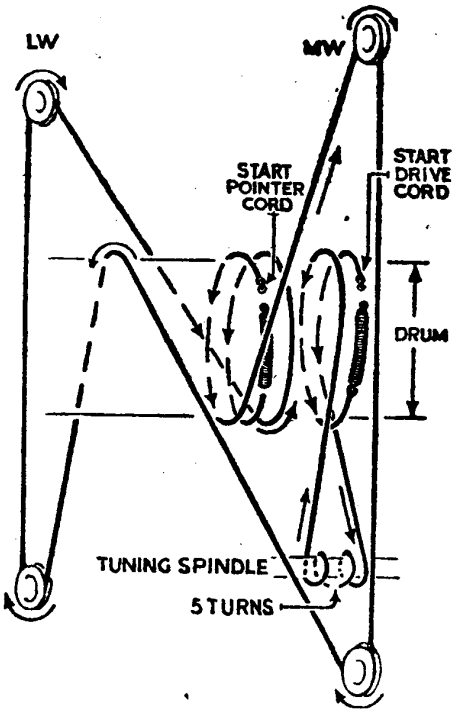


Fig. 6.

3. Start the condenser drive cord on the back left-hand anchor point, and proceed (as Fig. 6) to wind five complete turns around drive spindle, being careful to keep spindle in its clockwise stop position.
4. Bring cord up to drum and wind as shown, hooking spring between the loop end of cord and the remaining hook on the anchor plate.

It is most important that the cord lies in the grooves provided on the drum (see Fig. 7).

5. Should the cord require tightening (but not warranting a new spring), the cord may be tensioned by slightly pulling up shorter the plaited end (at the coil spring end only).

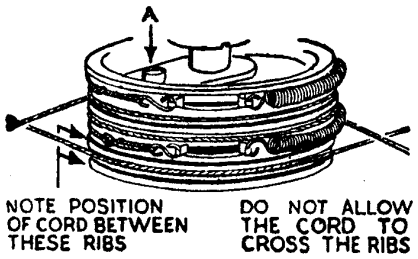


Fig. 7.

REPLACING THE POINTER CORD (Fig. 6).

Proceed as follows :—

1. Take approximately 59 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.
2. Remove the cursor guide bars.
3. Thread the cursors on the cord as shown ; the distance between the end of hook and the first hole in cursor should be exactly $15\frac{1}{2}$ inches. Adjust the second cursor on the cord so that the distance between the inside holes of the pair of cursors is exactly $18\frac{1}{4}$ inches. The free end of cord will be approximately 18 inches long.
4. Set condenser vanes fully in, and hook end of cord on to " S " hook and " S " hook on to anchor plate as shown.
5. Pass cord round drum and up over top of M.W. pulley.
6. Take cord round lower M.W. pulley, over top of drum, and under lower L.W. pulley.
7. Take cord over top L.W. pulley and around drum—one complete turn.
8. Assemble coil spring in position as shown.
9. Replace pointer guide bars by threading them through the cursors and securing at top and bottom.

ADJUSTING THE POINTER.

This adjustment may be made without removing chassis from the cabinet.

Proceed as follows :—

1. Accurately tune in a known station at the end of the medium waveband, between 200 and 230 metres.

ADJUSTING THE POINTER—*continued.*

2. Having switched off again, remove MHD4 valve, slacken off the screw A, Fig. 7, and whilst holding the moving vanes of variable condenser turn the tuner knob until the station being received is accurately indicated.
3. Re-tighten screw A and check the adjustment.

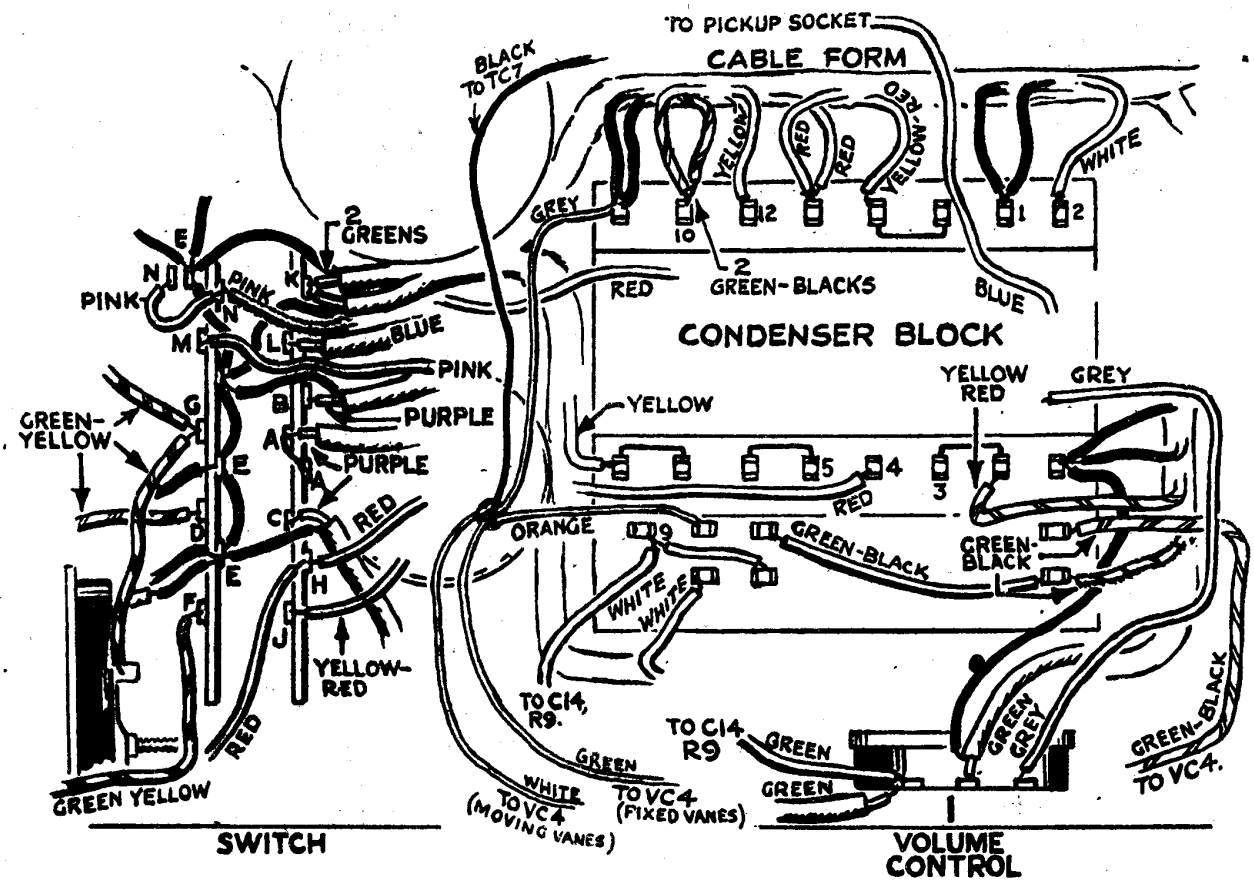


Fig. 8.

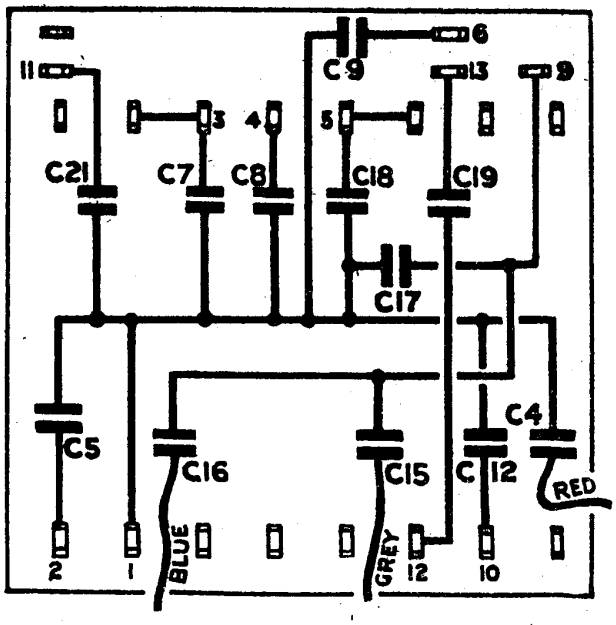


Fig. 9.

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.

If switch is removed from chassis, re-wire according to Fig. 8 and re-gang the instrument as detailed on page 11.

AUTO RADIOGRAM MODELS

BRIEF SPECIFICATION

VOLTAGE RANGE.

200 to 250 (A.C.).

FREQUENCY RANGE.

50 to 60 cycles.

This instrument is designed to operate only on the voltages for which it is adjusted.

Should any variation be noticed the supply company must be notified immediately.

POWER CONSUMPTION.

Radio, 70 watts (approx.).

Gram., 105 watts (approx.).

FUSES.

This instrument may be connected to any (A.C.) supply point, providing that 2½-amp. double-pole fuses are used for protection.

SPEECH OUTPUT.

Approx. 2½ watts (undistorted).

Anode dissipation of PX4 output valve, 12 watts approximately.

ACTUAL WAVELENGTH RANGE.

Medium waves—200 to 560 metres.

Long waves—850 to 2,000 metres.

DIMENSIONS.

Height.	Width.	Depth.
33 inches.	27⅜ inches.	17¼ inches.

WEIGHT.

129 lb. net.

202 lb. gross (for home dispatch).

LOUDSPEAKER.

TYPE No. 17461c.

Electro-magnetic, the field being in the H.T. feed. A Hum neutralising coil is fitted and the resistance R17 in series with the field provides bias for the PX4 output valve. For electrical data, see Circuit diagram.

TO GAIN ACCESS TO MECHANISM.

Proceed as follows:—

1. Remove the four sections of beading from edges of mechanism panel. Note the position of each strip as these parts are not interchangeable.

2. Remove the turntable, the jaw operating knob and the " HAND-AUTO-REPEAT " switch lever.

3. Press the starting button and rotate the turntable spindle by hand until the record separator and rest plates occupy a minimum of space. This will facilitate the removal of mechanism board.

4. Remove the seven flat head screws which fix the mechanism board.

5. If record supports are set to 12-inch position and pick-up arm is lifted to its needle changing position (nearly vertical), the mechanism board may be lifted free.

The position of speed regulator knob need not be disturbed.

REMOVAL OF MECHANISM.

1. Remove mechanism board as detailed above.

2. Disconnect instrument from mains and detach all leads from mechanism terminal panel.

3. Using a large screwdriver, remove the three round-head screws (42A, Fig. 2—Auto Mechanism Manual) which lock the three special circular nuts (42).

4. The three circular nuts may now be removed.

DO NOT LIFT THE MECHANISM BY THE RECORD JAWS.

5. Having removed volume control knob the reject plunger should also be removed in order to avoid damage to end.

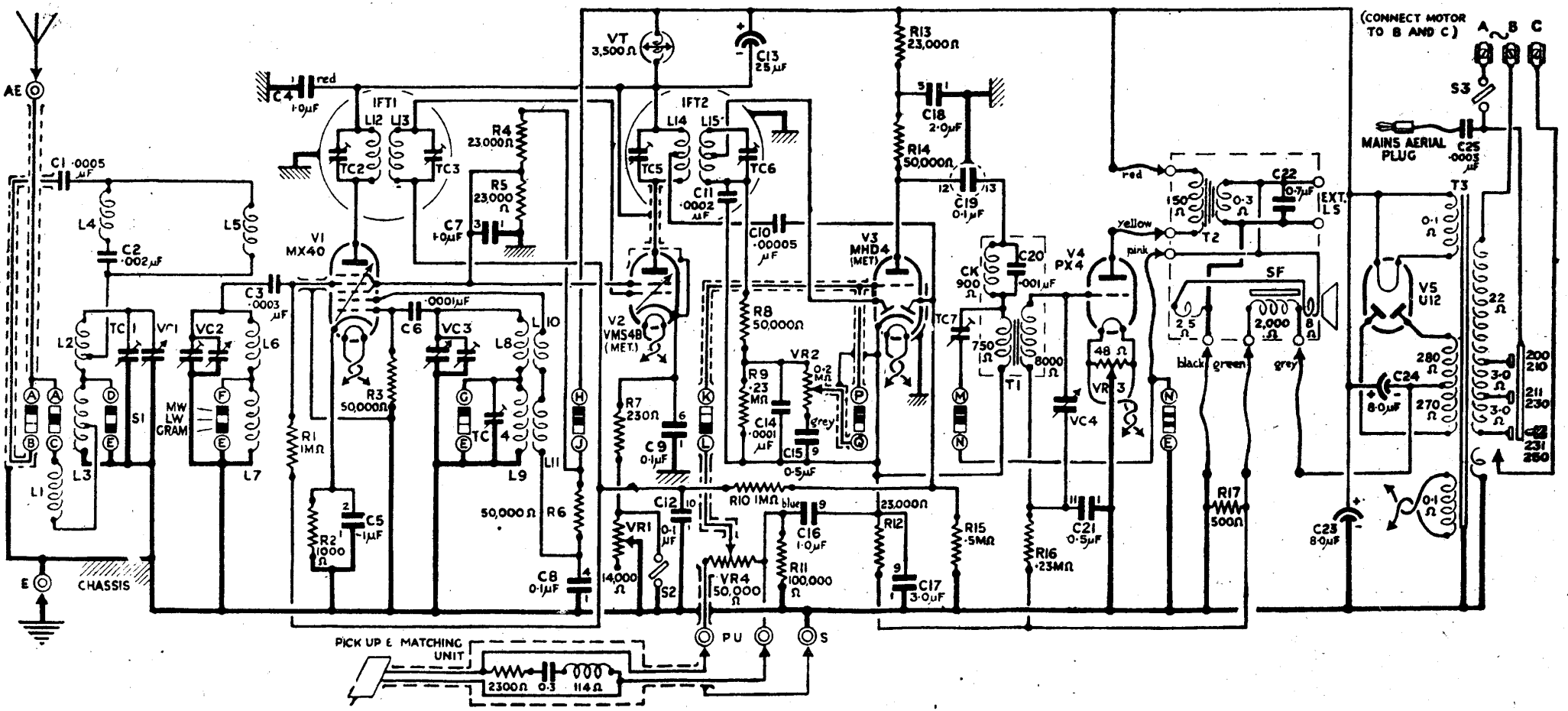
The mechanism, which is now free, must be lifted back first.

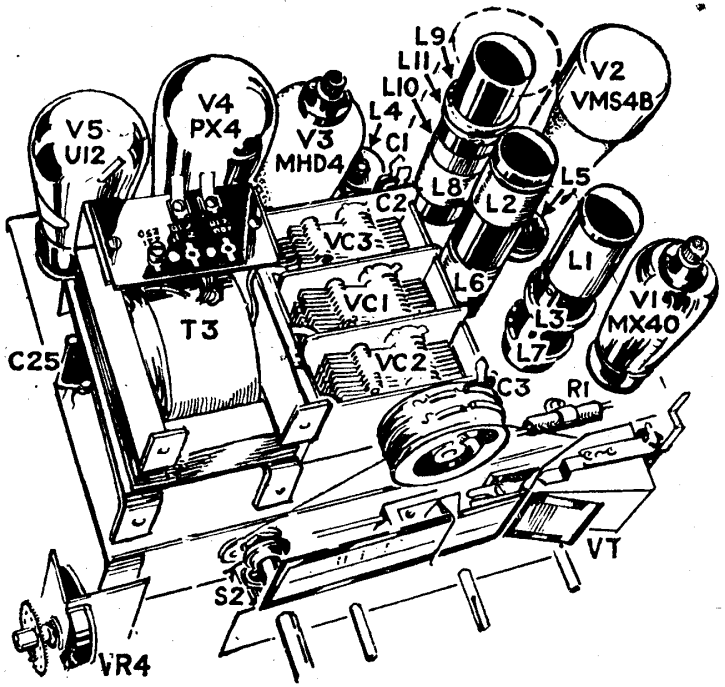
THE PICK-UP MUTING CONTACTS.

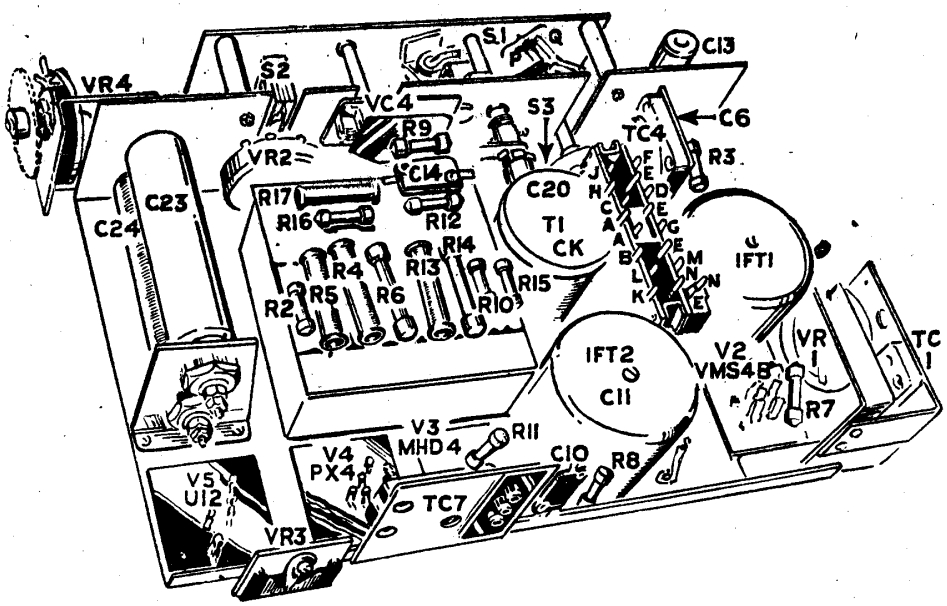
These contacts, which are a new feature of the auto mechanism, are situated at the base of pick-up arm and serve to short circuit the pick-up during the changing cycle.

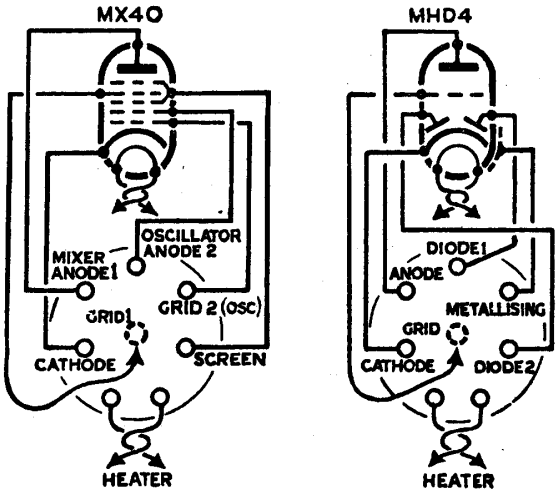
A flexible lead connects the muting springs with the pick-up terminals on the mechanism terminal strip.

NOTE:— **Models 289A and 570A have only slight mechanical differences from Models 289 and 570. Electrically they are similar.**


AE
E
CHASSIS
C1 ·0005 µF
C2 ·002 µF
C3 ·0003 µF
C4 1·0µF red
C5 ·1µF
C6 ·0001µF
C7 1·0µF
C8 0·1µF
C9 0·1µF
C10 ·00005 µF
C11 ·0002 µF
C12 0·1 µF
C13 25µF
C14 ·0001 µF
C15 0·5µF
C16 1·0µF
C17 3·0µF
C18 2·0µF
C19 0·1µF
C20 ·001µF
C21 0·5µF
C22 0·7µF
C23 8·0µF
C24 8·0µF
C25 ·0003 µF
L1
L2
L3
L4
L5
L6
L7
L8
L9
L10
L11
TC1
VC1
VC2
VC3
TC4
S1
MW LW GRAM
R1 1MΩ
R2 1000 Ω
R3 50,000Ω
R4 23,000Ω
R5 23,000 Ω
R6 50,000 Ω
R7 230Ω
R8 50,000Ω
R9 ·23 MΩ
R10 1MΩ blue
R11 100,000 Ω
R12 23,000Ω
R13 23,000Ω
R14 50,000Ω
R15 ·5MΩ
R16 ·23MΩ
R17 500Ω
VR1 14,000 Ω
VR2 0·2 MΩ grey
VR3 48 Ω
VR4 50,000 Ω
S2
S3
IFT1
IFT2
LI2 LI3
LI4 LI5
TC2 TC3
TC5 TC6
V1 MX40
V2 VMS4B (MET.)
V3 MHD4 (MET)
V4 PX4
V5 U12
VT 3,500 Ω
T1
T2
T3
CK 900 Ω
750 Ω
8000 Ω
150 Ω
0·3 Ω
2·5 Ω
2,000 Ω
8 Ω
48 Ω
0·1 Ω
22 Ω
280 Ω
270 Ω
3·0 Ω
3·0 Ω
200 210
211 230
231 250
SF
EXT. LS
red
yellow
pink
black
green
grey
(CONNECT MOTOR TO B AND C)
A B C
MAINS AERIAL PLUG
PICK UP & MATCHING UNIT
2300Ω 0·3 114Ω
PU
S



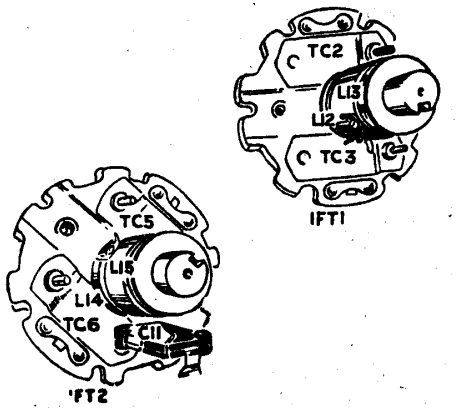




CONNECTIONS TO VALVES AS SEEN FROM UNDERSIDE OF CHASSIS.

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.



I.F. TRANSFORMERS.