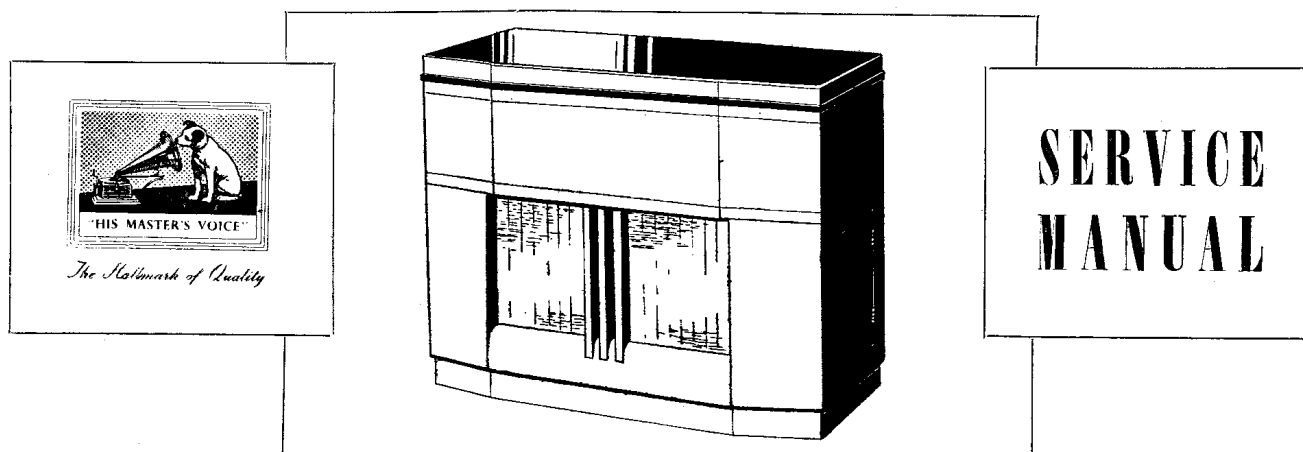


"HIS MASTER'S VOICE"



MODEL 1611 FOR A.C. MAINS 8-VALVE CONSOLE AUTO-RADIOGRAM

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MODEL 1611

SPECIFICATION

Physical.

Height	2 feet 6 inches	} Overall.
Width	3 feet 4 inches	
Depth	1 foot 9 inches	
Weight	142 lbs.	

Mains Supply.

195—255 volts, 50 cycles A.C. only.

Consumption.

Radio—100 watts.

Gram—114 watts.

Rated Output.

7 watts maximum.

Intermediate Frequency.

465 kc/s.

Wave Ranges.

S.W.3	..	15.6—21 metres (19.3—14.3 Mc/s).
S.W.2	..	20.8—33 metres (14.4—9.1 Mc/s).
S.W.1	..	32.6—100 metres (9.2—3.0 Mc/s).
M.W.	..	187—575 metres (1,605—522 kc/s).
L.W.	..	720—2,000 metres (417—150 kc/s).

Valves.

V1	W81	R.F. Amplifier.
V2	X81	Frequency Changer.
V3	W81	I.F. Amplifier.
V4	DH81 or DH149	Detector A.G.C. and A.F. Amplifier.
V5	Y61 or EM34	Tuning Indicator.
(See * on circuit diagram.)		
V6	DH81 or DH149	A.F. Amplifier.
V7	KT66	Output.
V8	U81	Rectifier.

Scale Lamps, Flood Lamp and Fuse.

Four scale lamps, 6.8 volt, 0.3 amp.
Flood lamp, 250 volt, 15 watt (bayonet fixing).
H.T. Fuse, 350 mA (cartridge type).

Loudspeaker.

This is a 13½-inch elliptical permanent magnet moving coil loudspeaker with aluminium cone centre. The speech coil has a D.C. resistance of 3 ohms and an impedance of 5 ohms at 1,000 cycles. Flux density, 10,000 lines sq./cm.

External Loudspeaker.

An additional low resistance loudspeaker may be connected to the "Ext. L.S." sockets at the back of the instrument. The loudspeaker should have an impedance of approximately 5 ohms. A loudspeaker switch is provided.

Motor.

Hysteresis type.

Pick-Up.

No. 15—D.C. resistance of pick-up and humbucking coils—2.4 ohms.

Auto-Mechanism.

New type auto-mechanism (Type 45000AL) plays one side of each of up to eight 10-inch or 12-inch records, unmixed.

Electric Clock.

The electric clock, incorporated in the instrument, may be set to switch on the receiver at the time of any previously selected station, and switch off at its conclusion. Advanced programmes up to 24 hours may be selected, the duration of the programme being no longer than 4 hours.

The clock operates continuously providing the mains supply to the instrument is switched on.

CIRCUIT DESCRIPTION

R.F. Amplifier.

The aerial is coupled to the grid of the R.F. Amplifier V1 (W81) by transformers with untuned high impedance primary coils and tuned secondary coils on all wavebands. On the 15.6—21 metre band a special grid winding is provided (L1) which increases the effective dynamic impedance of the tuned grid circuit. Each secondary winding is tuned by one section (VC1) of the three gang condenser. C1 and C6 are arranged in series with VC1 on wavebands S.W.3 and S.W.2 respectively in order to limit the capacity changes of VC1 on these bandsplit ranges. S.W.1 is a normal type continuous S.W. band and does not require a padding condenser in the aerial circuit.

The R.F. Amplifier is coupled to the signal grid of the triode-hexode frequency changer V2 (X81) by R.F. transformers with high impedance untuned primary coils and tuned secondary coils. These coils are identical with

those used for the aerial circuit. These circuits are tuned on all wavebands by the second section of the gang condenser (VC2); padding condensers C8 and C15 are used for S.W.3 and S.W.2 wavebands respectively.

Frequency Changer.

The triode portion of V2 (the local oscillator) has an anode circuit tuned by the third section (VC3) of the gang condenser. C24 and C25 are placed in series with VC3 and in conjunction with C23, limit the capacity change on S.W.3 and S.W.2 wavebands respectively. Separate grid and anode coils are provided on S.W.3, S.W.2, S.W.1 and M.W. bands, and coupling on the L.W. band is provided by condenser C20. Frequency stability is maintained by trimming condensers (TC11—TC15) and the relatively large value of C23. This latter condenser also tends to linearise the tuning scale on S.W.3 waveband. Resistances R4, R5 and R6 maintain the oscillator voltage fairly

constant at its optimum value over each of the short wavebands.

An iron-dust cored I.F. Transformer (IFT1), with variable inductances and fixed condensers, couples the hexode anode of V2 to the grid of the I.F. Amplifier V3 (W81). The I.F. transformer is arranged to give variable selectivity in conjunction with condensers C44 and C45 which are switched by S2.

I.F. Amplifier.

This valve V3, amplifies at the intermediate frequency of 465 kc/s and is coupled to the second detector by a further inductively tuned iron-dust cored I.F. transformer (IFT2), the H.T. being decoupled by R19 and C46.

Detector, A.G.C. and A.F. Amplifier.

The double-diode-triode V4 (DH81) has one diode which is used as a detector and operates the tuning indicator V5 (Y61), and the other, as an A.G.C. rectifier. The rectifier is fed via C55 from the I.F. Amplifier, and the voltage is applied via a filter R20, C47 to V1, V2 and V3.

L.F. signals are taken from VR1, Volume Control, and fed to the grid of the A.F. Amplifier. The anode of this valve is resistance-capacity coupled to the grid of the second A.F. Amplifier (V6).

Second A.F. Amplifier.

Switch S4 selects various values of grid coupling condensers to give varying degrees of bass attenuation. A negative feed-back circuit is provided by R43, R37,

R36 and C62. The anode of this valve is resistance-capacity coupled to the grid of the Output Valve (V7).

Output.

The output valve V7 (KT66) is auto biased by R42 and decoupled by C68. A measure of top-cut is provided by C64, C65, C66 and C67, the condensers being switched in circuit by S2. This valve feeds the loudspeaker through the output transformer (T1).

H.T. and L.T. Supplies.

The H.T. supply is taken from the mains transformer T4, and the full wave rectifier, V8 (U81). Smoothing is effected by the choke (CK1), reservoir condenser C70, R39 and electrolytic condensers C69 and C60.

The L.T. supply is taken from a separate winding of the mains transformer. Four scale lamps (LP1—LP4) are connected across this winding.

Gramophone.

For gramophone operation, S3 switches the output from the pick-up, via the matching transformers (T2 and T3) and the volume control (VR1) to the grid of the triode section of the A.F. Amplifier V4. Filtering is effected by CK2, R45 and C71.

Switch S3 also disconnects the H.T. supply from the local oscillator anode of V2.

In the "NORMAL" position of S6, top cut is applied to the pick-up circuit. When S6 is switched to the "EXTENDED" position, the top cut is removed, thus giving the pick-up an extended frequency range.

INSTALLING

The Aerial and Earth.

This receiver has been designed to give a high standard of reception on all wavebands. Unless it is connected to an adequate aerial and earth installation, however, the advantages of the design will be minimised or lost, and although the receiver will work on an inside aerial, a high outside aerial is essential for the best reception.

Erect a high outside aerial 60 to 80 feet total length, as far as possible from buildings and trees. Point the aerial towards any potential source of interference such as overhead power or trolley lines, or any roadway carrying heavy motor traffic. A lightning arrester or switch should be fitted and the aerial must be well insulated from all grounded objects.

A copper plate or rod buried about three feet deep in moist ground provides the best earth. Alternatively, connection can be made to a rising main water pipe. Do not use a telephone earth, or a hot water or gas pipe as an earth.

The aerial and earth leads should be fitted with the two plugs provided.

Transit Packing.

Before operating the instrument remove the four red-headed bolts from the corners of the gramophone mechanism plate and replace with the four bolts and washers contained in the cotton bag.

Remove the tapes securing the Record Retaining Arm and the Pick-up.

Valves and Fuse.

Remove the back panel and make certain that the valves and fuse are firmly inserted in their correct positions (see

illustration). Do not remove cradles securing valves.

WARNING.—When removing or refitting a valve, always use a vertical movement and on no account use force. As some of these valves have glass bases, any excessive sideways movement or rough handling may fracture the glass surrounding the pins and the valve will fail.

Mains Supply.

The instrument may be adjusted to operate on A.C. mains supplies of 195 to 255 volts, 50 cycles only.

IMPORTANT.—The mains supply point to which the instrument is connected must be fused for not more than 2 amperes. If the mains point is normally fused at a higher rating than this, a 2 amp. fuse plug may be satisfactorily employed.

Insert the "Mains Voltage Adjustment" lead under the terminal with the marking nearest to the mains voltage.

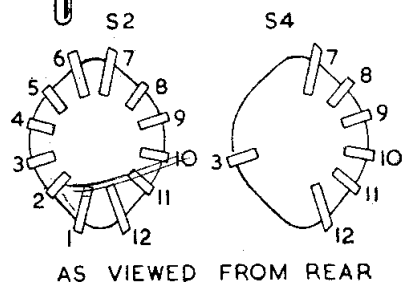
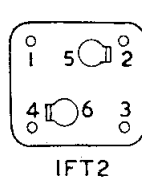
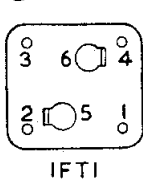
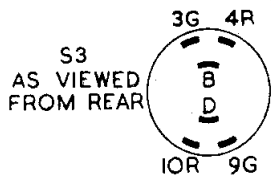
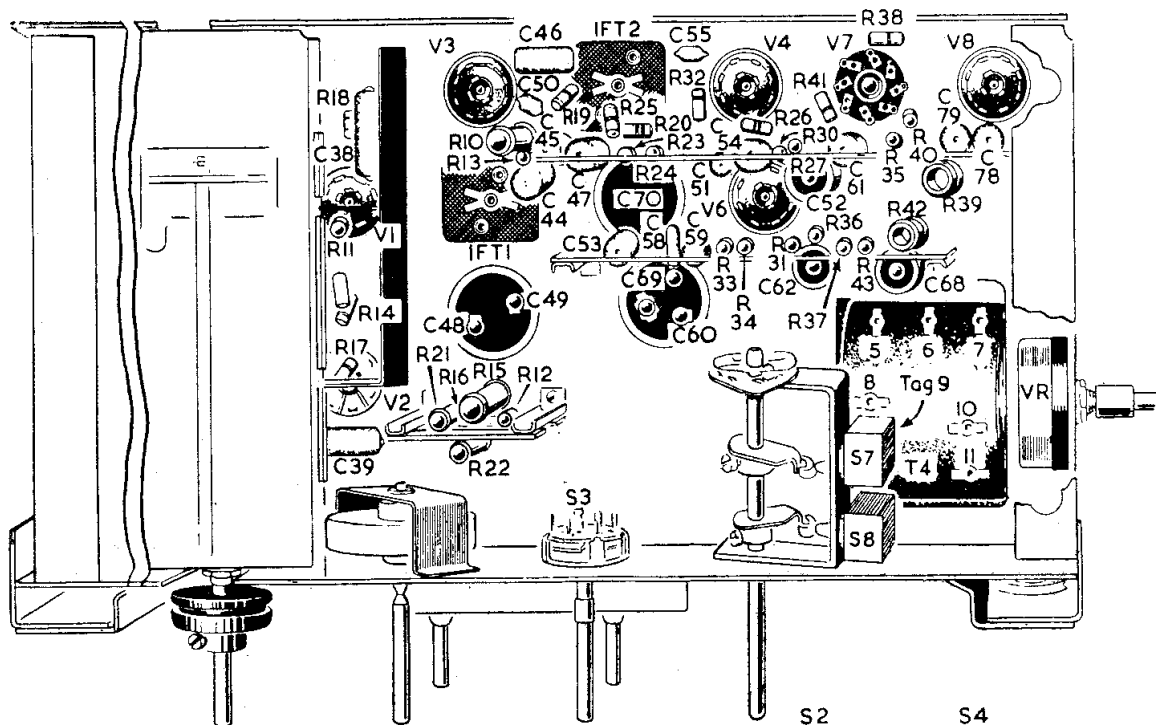
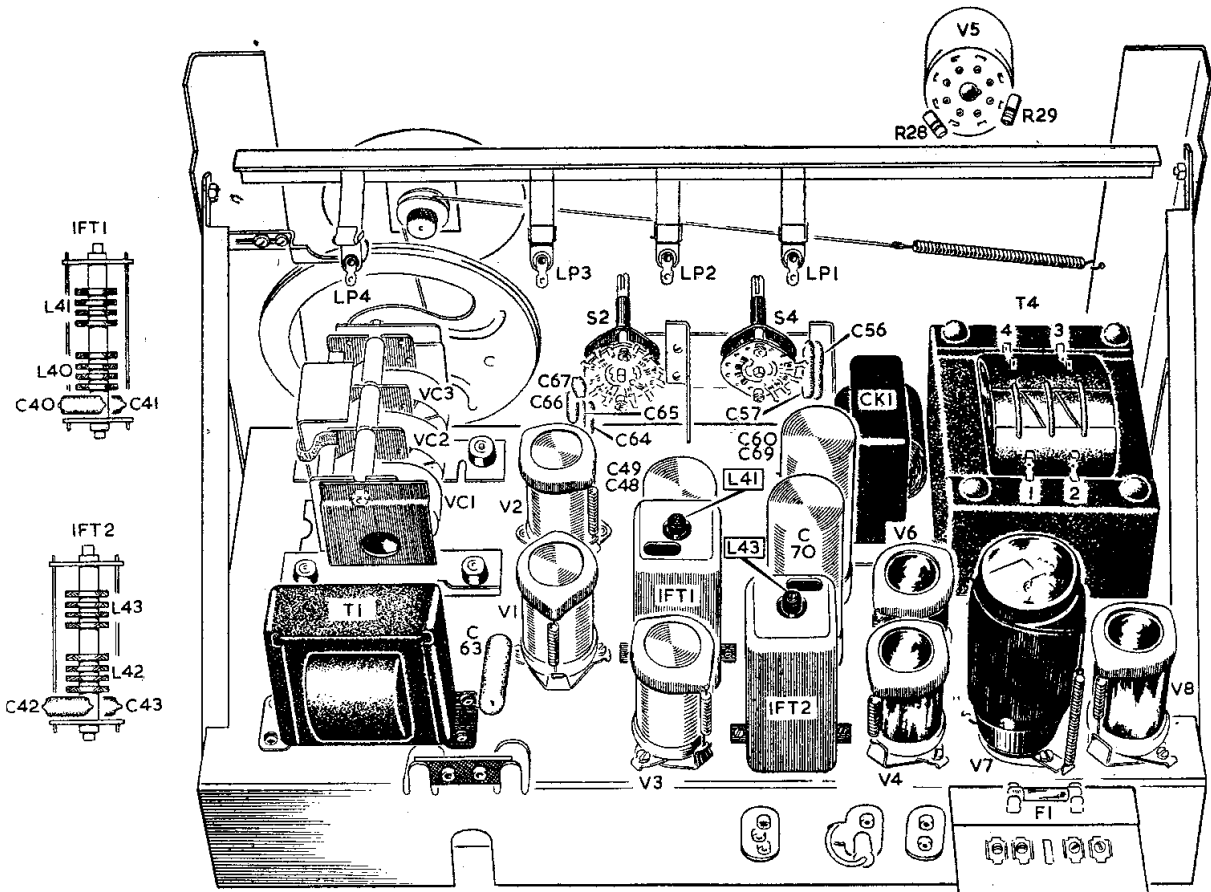
The voltages covered by the terminals are:—

Terminal.	Voltages.
205	195—215
225	216—235
245	236—255

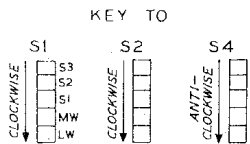
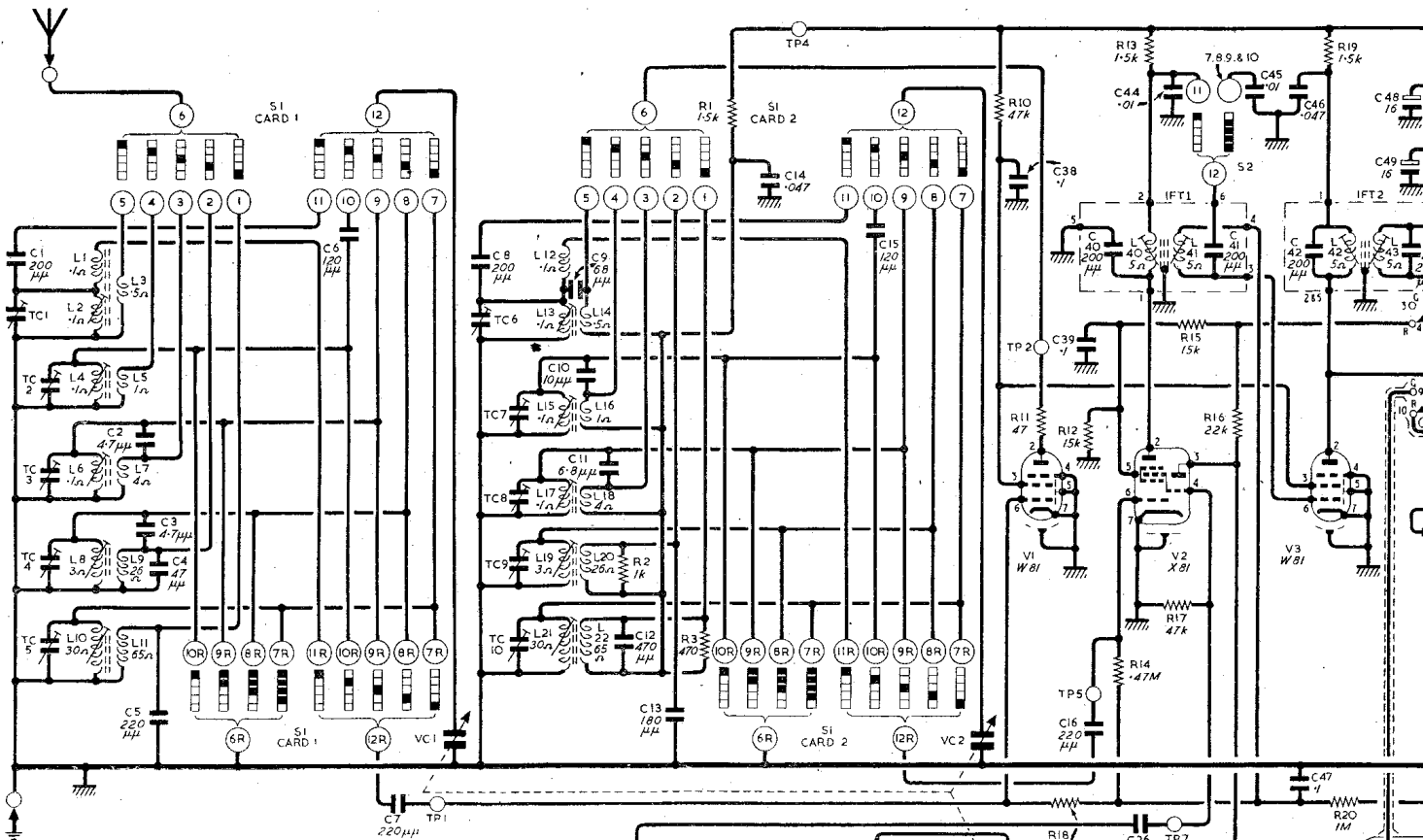
Final Connections.

Replace the back panel. Insert the Aerial and Earth plugs into their appropriate sockets. Fit the External Loudspeaker Switch knob by pushing it on its spindle and see that it is switched to "INT".

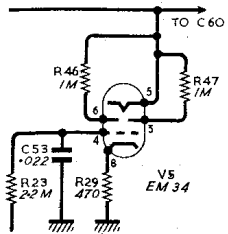
Connect a suitable plug to the mains lead and insert it in the supply socket.



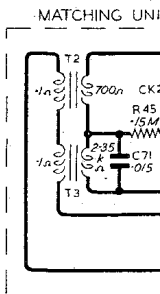
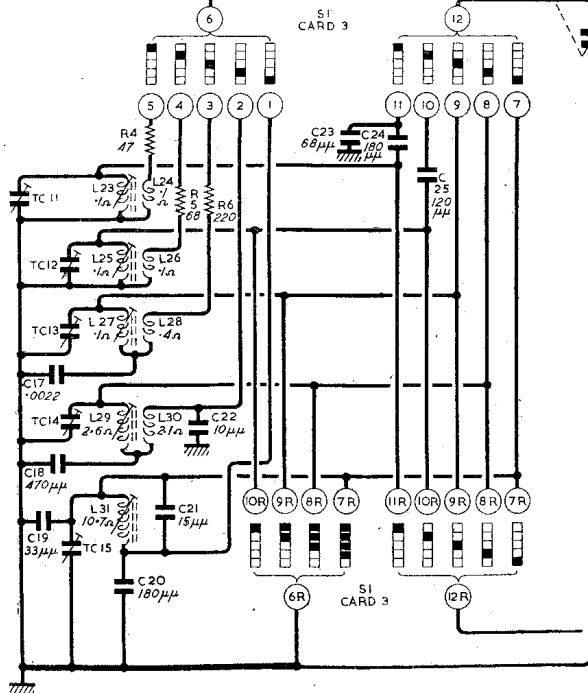
C	1	2,5	3,4	6	7	8	10,11,9	12,13	14	15	38,39,16,40	44	26	41	45,42,46	47	48,49	71						
R							17,18,19	20	21	22	23	24	25	11,0	18,12	13,14	17,15	16	19,20	41				
L																								
V																								
MISC.	TC1 TO 5					VC1, TP1	TC 6 TO 15				TP4			VC 2	TP 2	VC 3	TP 5			IFT1, TP 7	S 2, TP 6	T 2, T 3	IFT 2	CK



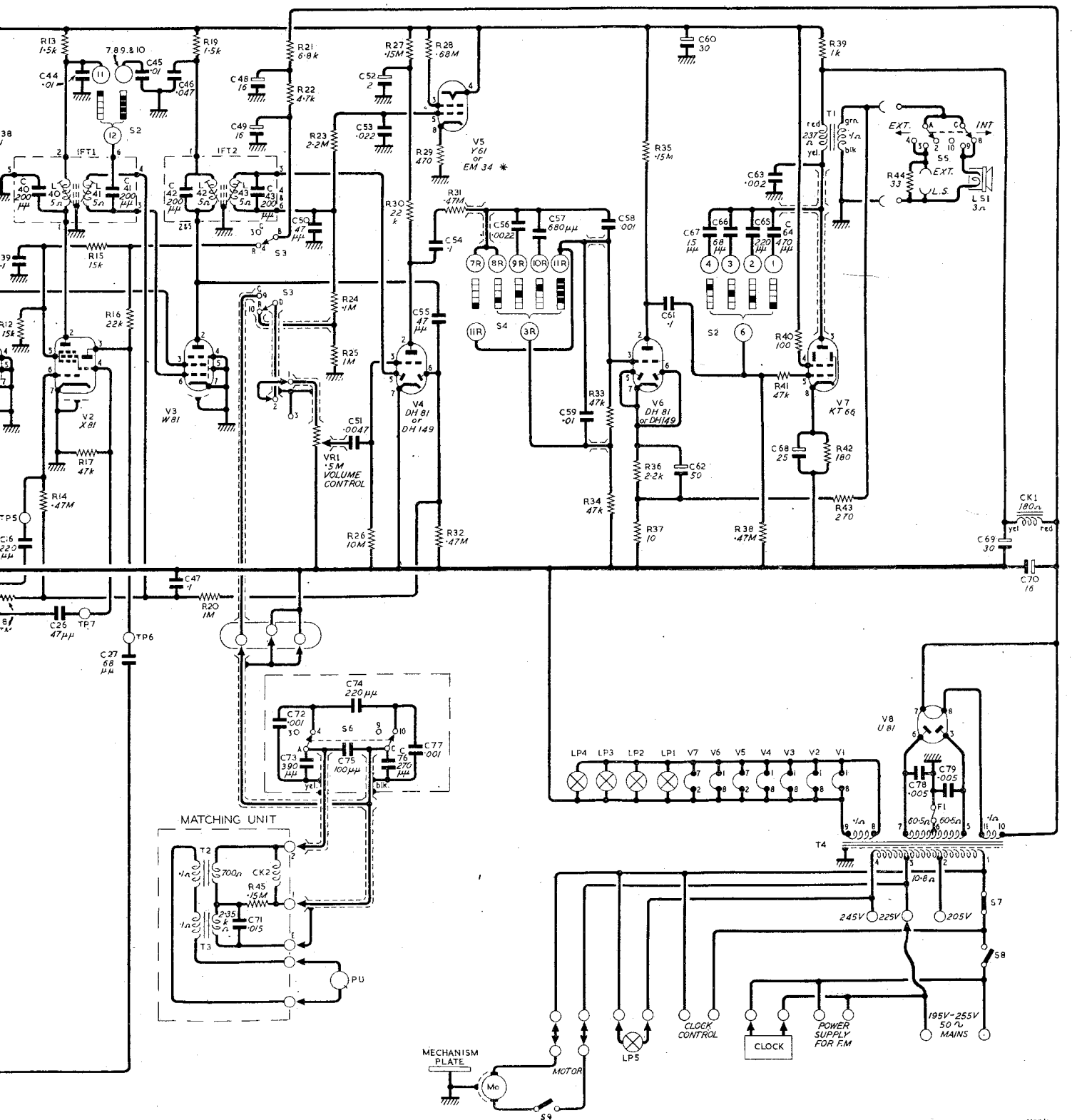
NOTE - A BLACK SQUARE INDICATES CONTACTS CLOSED.
 A WHITE SQUARE - CONTACTS OPEN
 POTENTIOMETER SHOWN IN MAX ANTI-CLOCKWISE POSITION
 ALL METALLISED SCREENING CONNECTED TO CHASSIS.
 ALL SPIGOT GUIDES TO BE CONNECTED TO CHASSIS
 NUMBERS ADJACENT TO VALVE ELECTRODE CONNECTIONS REFER TO VALVE BASE PINS (KEY GIVEN ON UNDERSIDE CHASSIS ILLUSTRATION)

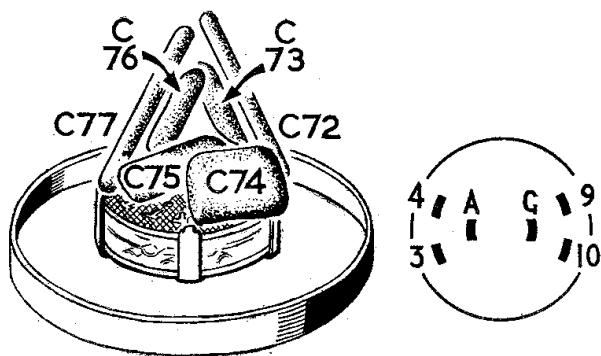


* ALTERNATIVE CIRCUIT USING EM 34

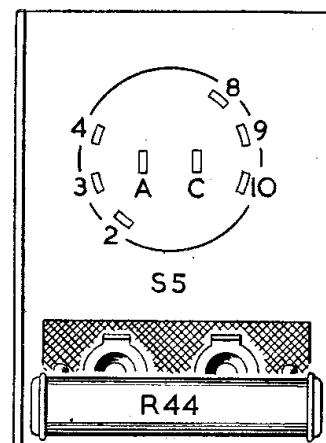


33,10,40,44	26	41	45,42,46	48,49,43	50	51	52,53	55	54	56	57,59	58	61	67,62,60,66,63,65,68,64	78	79	69	70
8,12	13,14	17,15	16	19,20	45	21,22,23	24,25,26	27,30,29	28,31,32		34,33	36,37,35		38	40,41	39	42,43	44
	40	41		42	43													
TP5	IFT1,TP7	S2,TP6	T2,T3	IFT2	CK2,S3	VRI,S6,PU		Mo,S4	S9	LP1,TP5	S2		T4,TP1		F1,S5	L51,S7,S8	CK1	MISC

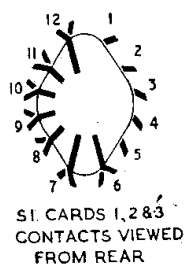
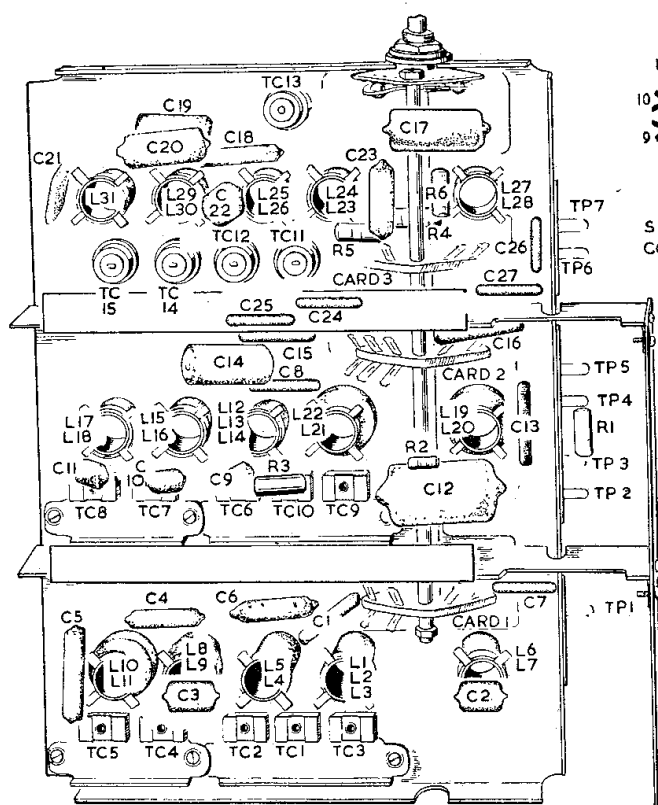




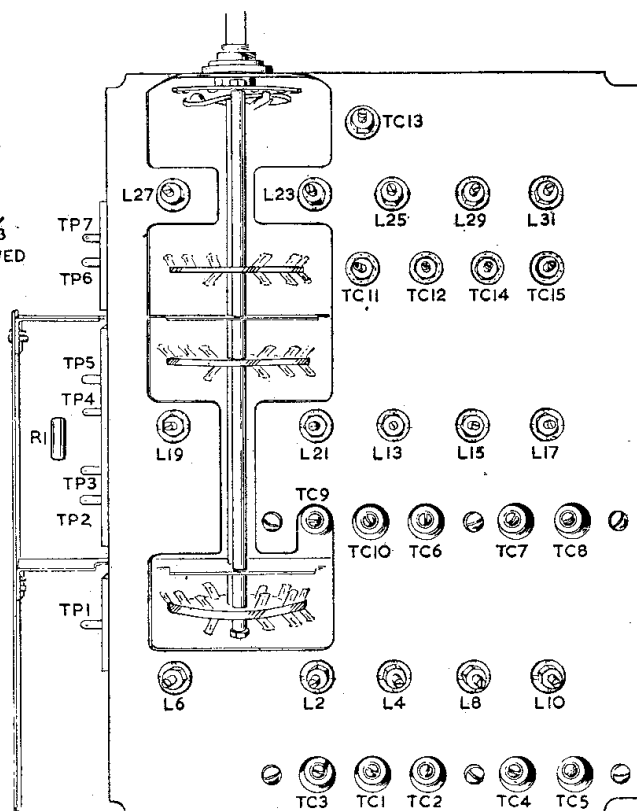
S6 DETAILS
VIEWED FROM REAR



EXTERNAL LOUDSPEAKER
SWITCH VIEWED FROM
REAR



S1 CARDS 1, 2 & 3
CONTACTS VIEWED
FROM REAR



ADVANCED PROGRAMMES

The electric clock, incorporated in this instrument, may be set to switch on the receiver at the time of any previously selected station, and switch off at its conclusion. Advanced programmes up to 24 hours may be selected, the duration of the programme being no longer than four hours.

The procedure for setting the clock is as follows:—

1. Switch on the receiver and tune in the desired station, adjust Volume and Tone Controls to suit.
2. Using the right-hand knob, set the green pointer to the required time of switching ON, taking care that the small indicator to the right of the dial is correctly set. If this is incorrect, advance the pointer a further 12 hours.

3. Using the left-hand knob, set the red pointer to the time of switching OFF (this must not be more than four hours after switching on), noting that the indicator to the left of the dial is correctly set.
4. Set the Master Switch to TIME.

NOTE.—The instrument may be used for normal operation at any time previous to that selected, providing that at the conclusion of such an operation, the receiver is tuned to the selected station and the Master Switch reset to "TIME".

If it is necessary to reset the hands of the clock, simply press in and rotate the right-hand knob until the hands and the indicator beneath the clock face are correctly set. The clock operates continuously providing the mains supply point to the instrument is switched on.

DISMANTLING

Before attempting any dismantling, ensure that the instrument is completely disconnected from the supply.

Removal of Chassis.

1. Remove the "EXT. L.S." knob and back panel.
2. Remove the four scale lamps from their supports and unclip the tuning indicator and screening can.
3. Loosen screw clamping drive cord to the cursor and slip cord free.
4. Remove the following connections from the mains transformer panel: Lamp; Motor; Clock; Control and Mains.
5. Unclear the Clock and Control leads from cabinet.
6. Remove the Motor and loudspeaker earthing leads from the chassis.
7. Remove the "EXT. L.S." plugs; Aerial and earth plugs, and Pick-up plugs from chassis.
8. Open lid and remove control knobs, unscrew the woodscrews securing the control panel and lift out panel.
9. Remove the volume control knob and extension spindle (two screws).
10. Unscrew the four nuts and washers securing the chassis and lift out chassis.

Removal of Auto Mechanism.

1. Remove the "EXT. L.S." knob and back panel.
2. Remove motor leads from mains transformer panel and unclear from cabinet.
3. Remove Pick-Up leads from matching unit, and remove motor earth lead.
4. Open lid and remove the four screws from the corners of the mechanism plate.
5. Lift out mechanism.

Removal of Extended Frequency Range Unit.

1. Remove mechanism plate as given above.
2. Remove flood lamp and remove two screws securing floodlamp compartment.
3. Withdraw floodlamp compartment.
4. Unclear extended frequency range and lamp leads from cabinet.
5. Remove knob from Extended Frequency Range unit.
6. Remove unit.

Removal of H.F. Unit.

1. Withdraw chassis as given above.
2. Remove shield from VC2 (2 screws) and unsolder the following connections:—
 - (a) Three leads from stator plates of VC1, 2 and 3.
 - (b) Two (sleeved) earthing braids.
 - (c) Lead from aerial socket.
3. Unsolder the following connections from the tag panel on the H.F. Unit.
 - (a) TP1—green lead to pin 6 V1.
 - (b) TP2—resistance R8 (47 ohms) to pin 2 V1.
 - (c) TP4—red H.T. lead.
 - (d) TP5—green lead to pin 6 V2.
 - (e) TP6—white lead to pin 3 V2.
 - (f) TP7—yellow lead to pin 4 V2.
4. Remove two P.K. screws from each end of the H.F. Unit and the four P.K. screws from top of unit.
5. Withdraw H.F. Unit.

NOTE.—It is essential that care is taken to return the gang earthing braids to exact positions from which they were removed, on re-assembly of H.F. Unit to chassis.

I.F. & R.F. ALIGNMENT

General.

If the I.F. circuits have been disturbed complete I.F. and R.F. alignment must follow. Either S.W., M.W. or L.W. bands can be reganged without affecting other bands. The S.W. bands can also be reganged independently. The oscillator tracks at a higher frequency than the signal on all wavebands.

Whilst ganging, the input to the receiver must be progressively reduced as the circuits are brought into line so

that the output does not exceed 500 mW (1.4 v. across the speech coil).

An A.C. voltmeter (rectifier type) connected across the loudspeaker speech coil may be used as an output meter.

Intermediate Frequency.

Set the Waveband switch to M.W., the Volume control to maximum, the Bass control to maximum clockwise less one position and the Treble control to maximum anti-

clockwise less one position. Turn the gang condenser to maximum capacity (plates fully interleaved).

1. Inject a modulated signal at 465 kc/s, via a 0.05 mfd. condenser into the grid of V2, leaving the grid connection made. Adjust cores of L43, L42, L41 and L40 in that order for maximum output. Repeat for optimum results.

Radio Frequency—Setting Up Calibration Scale.

As the wavescale is not assembled to the chassis, a calibration scale is printed on the back of the condenser drum. This scale is calibrated in inches and sixteenths of an inch which correspond to frequencies given in the ganging tables, and is read against a red datum line, printed on a bracket, which is mounted beside the condenser drum.

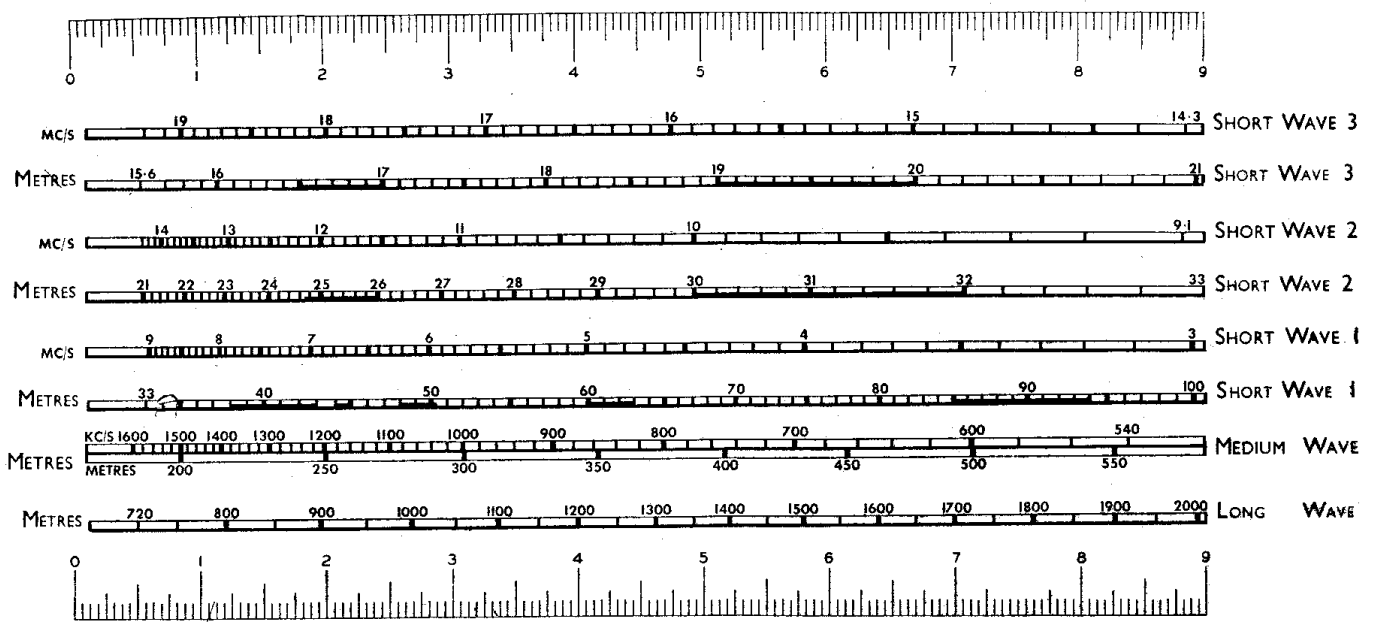
Before commencing R.F. ganging operations, it is essential

to check the alignment of the calibration scale and datum line in relation to the gang condenser, as follows:—

1. Turn gang condenser to maximum.
2. See that the datum line coincides with 9 inches on the calibration scale.
3. If adjustment is necessary, slacken the two screws securing the bracket and adjust. Then tighten the screws securely.

Bandspread.

Unless the signal generator to be used for alignment is known to have an extremely high order of accuracy, it is essential to check the calibration of those ranges on a transmission of known frequency, either during or after ganging. A reproduction of the scales relative to the inch calibrating scale is given so that the wavelength can be interpreted as calibration scale readings for this purpose.



Short Waves.

Set Volume Control to maximum, Bass control to maximum clockwise less one position; Treble to maximum anti-clockwise less one position; Waveband switch as required. Inject test signal into aerial and earth sockets via a S.W. dummy aerial.

NOTE.—Whilst carrying out the following adjustment procedure, care should be taken to avoid tuning on image frequencies.

Waveband Switch Position.	Op. No.	Calibration Scale Setting.	Tune Test Oscillator to m. Mc/s.		Operation.
S.W.3	1	$8\frac{1}{8}$	20.68	14.5	Adjust L23 for maximum output.
	2	Rock Gang	20.68	14.5	Adjust L2 and L13 for maximum output.
	3	$8\frac{1}{8}$	20.68	14.5	Adjust L23 for maximum output.
	4	$1\frac{7}{16}$	16.21	18.5	Adjust TC11 for maximum output.
	5	Rock Gang	16.21	18.5	Adjust TC1 and TC6 for maximum output.
	6	$1\frac{7}{16}$	16.21	18.5	Adjust TC11 for maximum output.
	7	—	—	—	Repeat operations 1 to 6.

Waveband Switch Position.	Op. No.	Calibration Scale Setting.	Tune Test Oscillator to m. Mc/s.		Operation.
S.W.2	1	$6\frac{31}{32}$	31.9	9.4	Adjust L25 for maximum output.
	2	Rock Gang	31.9	9.4	Adjust L4 and L15 for maximum output.
	3	$6\frac{31}{32}$	31.9	9.4	Adjust L25 for maximum output.
	4	$\frac{31}{32}$	22.2	13.5	Adjust TC12 for maximum output.
	5	Rock Gang	22.2	13.5	Adjust TC2 and TC7 for maximum output.
	6	$\frac{31}{32}$	22.2	13.5	Adjust TC12 for maximum output.
	7	—	—	—	Repeat operations 1 to 6.

Waveband Switch Position.	Op. No.	Calibration Scale Setting.	Tune Test Oscillator to m. Mc/s.		Operation.
S.W.1	1	$7\frac{1}{16}$	85.66	3.5	Adjust L27 for maximum output.
	2	Rock Gang	85.66	3.5	Adjust L6 and L17 for maximum output.
	3	$7\frac{1}{16}$	85.66	3.5	Adjust L27 for maximum output.
	4	1	36.12	8.3	Adjust TC13 for maximum output.
	5	Rock Gang	36.12	8.3	Adjust TC3 and TC8 for maximum output.
	6	1	36.12	8.3	Adjust TC13 for maximum output.
	7	—	—	—	Repeat operations 1 to 6.

Medium Waves.

Controls as before, but with Waveband switch set to M.W. M.W. dummy aerial to be used.

Waveband Switch Position.	Op. No.	Calibration Scale Setting.	Tune Test Oscillator to m. kc/s.		Operation.
M.W.	1	$7\frac{3}{8}$	510	588	Adjust L29 for maximum output.
	2	Rock Gang	510	588	Adjust L8 and L19 for maximum output.
	3	$7\frac{3}{8}$	510	588	Adjust L29 for maximum output.
	4	$\frac{15}{32}$	186.9	1,605	Adjust TC14 for maximum output.
	5	Rock Gang	210	1,427	Adjust TC4 and TC9 for maximum output.
	6	$\frac{15}{32}$	186.9	1,605	Adjust TC14 for maximum output.
	7	—	—	—	Repeat operations 1 to 6.

Long Waves.

Controls as before, but with Waveband switch set to L.W. L.W. dummy aerial to be used.

Waveband Switch Position.	Op. No.	Calibration Scale Setting.	Tune Test Oscillator to		Operation.
			m.	kc/s.	
L.W.	1	7 $\frac{29}{32}$	1,850	162	Adjust L31 for maximum output.
	2	Rock Gang	1,850	162	Adjust L10 and L21 for maximum output.
	3	7 $\frac{19}{32}$	1,850	162	Adjust L31 for maximum output.
	4	1 $\frac{19}{32}$	850	353	Adjust TC15 for maximum output.
	5	Rock Gang	850	353	Adjust TC5 and TC10 for maximum output.
	6	1 $\frac{19}{32}$	850	353	Adjust TC15 for maximum output.
	7	—	—	—	Repeat operations 1 to 6.

CALIBRATION

Replace chassis in cabinet and check calibration at about the middle of the tuning scale on a station of known

wavelength. Adjust pointer to give best compromise on all stations if necessary.

VALVE TABLE

The following table indicates the approximate voltage readings obtained on each valve when the receiver is connected to a 220 volt, 50 cycle mains supply, and operating with the Volume Control at maximum, at a point of no reception on the M.W. band. Variations of $\pm 15\%$ may be anticipated between models. Higher or lower mains voltage will produce a corresponding variation in meter readings in approximate proportion to the change in mains supply. A high resistance voltmeter should be used to measure voltages. Values stated below were obtained using a meter with a resistance of 500 ohms per volt.

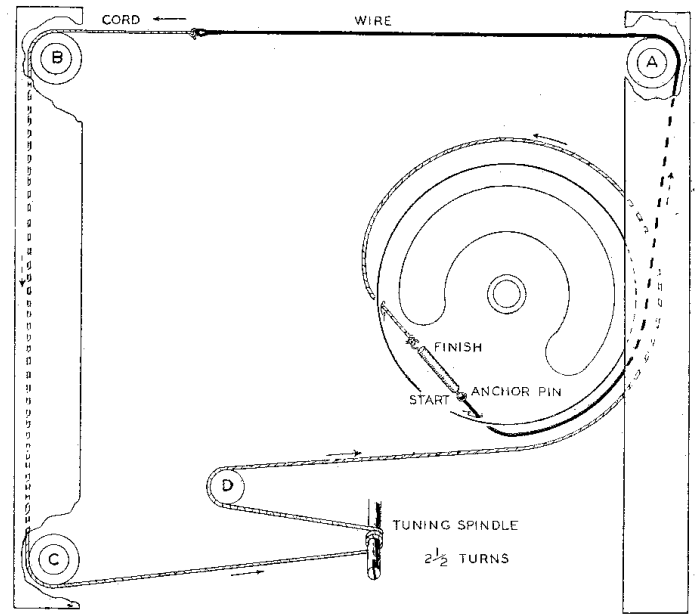
Valve.	Anode.		Screen.	Cathode.
V1 (W81)	233		45	—
V2 (X81)	Mx. 240	Osc. 90	60	—
V3 (W81)	233		45	—
V4 (DH81)	90		—	—
V5 (Y61)	245		35	1·0
V6 (DH81)	110		—	1·0
V7 (KT66)	260		246	13·0
V8 (U81)	265 A.C.		—	—

Total A.C. Current, 0·42 amps. Total H.T. Voltage (smoothed), 276 v. Total H.T. Current, 108 mA.

CONDENSER AND POINTER DRIVE

Use only correct wire (4851 × 9033) and high grade fishing line (6301 × 0335). Approximately 25 inches of wire and 60 inches of cord are used.

1. Form a loop with an opening of about $\frac{1}{8}$ -inch in diameter at one end of the wire. It will be found that the twisted part of the wire can be readily soldered.
2. Pass loop end of wire through hole in periphery of drum and assemble on anchor pin as shown in diagram.
3. Wind wire partly round drum and take it over pulley "A". Arrows show direction.
4. Form a loop in end of wire and solder; secure cord to wire.
5. Take cord round pulleys marked "B" and "C".
6. Wind two and a half turns round tuning spindle.
7. Take cord round pulley "D" and then round drum and in through hole in periphery of drum. Assemble tension spring as shown and secure cord to spring.



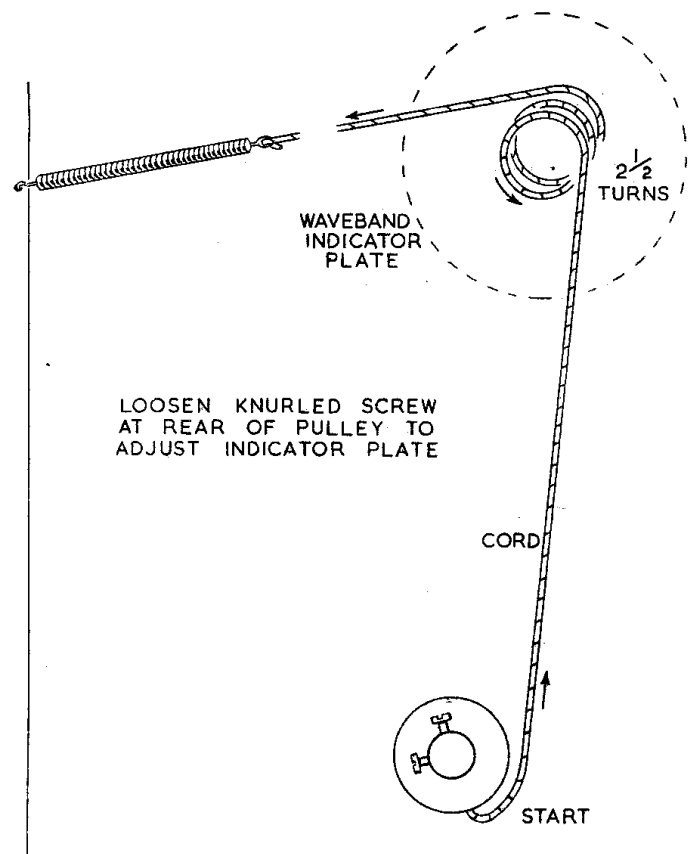
WAVEBAND DRIVE

Approximately 25 inches of cord (6301 × 0335) is used.

1. Tie a knot in end of cord and pass cord through hole in bakelite pulley. Fit pulley to spindle of S1 and adjust pulley and switch to position shown in diagram (S1 should be turned fully clockwise).
2. Take cord partly round the bakelite pulley and then wind $2\frac{1}{2}$ turns round pulley at rear of indicator plate.
3. Allow approximately $7\frac{1}{2}$ inches of cord to extend beyond the pulley, and secure to spring. Clip spring to end support.
4. Slacken knurled screw at rear of indicator pulley and adjust indicator plate to give desired reading.

NOTE.—On certain models, both the Waveband and Condenser and Pointer drive are fitted with nylon cord (no wire is used); the method of fitting the cord is as shown above.

The knots, to prevent slipping, should be tied as Reef Knots and secured with shellac.



PICK-UP

IMPORTANT.—Dealers should appreciate, and advise owners, that the new lightweight pick-up is a component of precision, which should be handled accordingly. No other needles but the Permanent Sapphire or Silent Stylus type must be used, and it is normal for these to feel loose when correctly inserted. Damage will result if force is used or a larger needle inserted. The needle should not be disturbed until it has to be changed. If any fault should occur in the pick-up head, the complete head should be replaced.

To Remove the Pick-Up Head.

1. Turn the head over in a clockwise direction.
2. Loosen the grub screw securing the head to the arm.
3. Remove the head.

To Remove the Pick-Up Arm and Gimbal Mounting.

1. Unsolder the pick-up leads from the tag panel on the mechanism plate.

2. Remove the Pick-Up Lift Lever.
3. Remove Collar and spring from Pick-Up Lift Rod.
4. Loosen screw in fixed clutch plate.
5. Remove screws securing pick-up base.
6. Remove Pick-up and Gimbal.

HYSTERESIS MOTOR

Electrical Data.

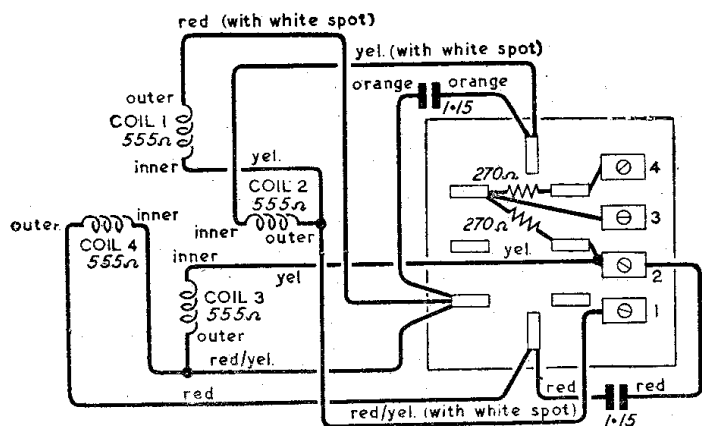
Frequency Range 50 cycles only.
 Current, maximum 0.07 amps. at 200 volts.
 Wattage, maximum 14 watts at 200 volts.
 Condensers 1.15 mfd. each section.
 Insulation not less than 50 megohms at 500 v. D.C.
 On 50 cycle mains, the speed of the motor is constantly maintained giving a turntable speed of 78 r.p.m.

Principle of Operation.

The hysteresis motor is an induction type operating by virtue of the rotating magnetic field produced by the four-pole stator in conjunction with condensers. The rotor consists of a plain ring of magnet steel, which, during starting is magnetised by the eddy currents produced by the rotating field in such a way that torque is developed between the stator and the rotor field. As the motor reaches synchronous speed, the rotor becomes polarised in a simple two-pole manner and consequently follows the rotating field set up by the stator.

To Remove Motor from Mechanism Plate.

1. Remove the turntable (3 screws).
2. Detach connections from motor.



PART No. 26200 P

3. Slacken off the grub screw on the motor pulley.
4. Take out the three screws on top of the mechanism plate, at the same time supporting the bottom of the motor to prevent it from dropping.
5. Withdraw the motor.

To Remove Stator.

1. Remove large bronze rotor bearing, and withdraw rotor carefully.
 2. Unsolder leads from condenser block.
 3. Remove stator assembly by unscrewing the four securing screws.
- When re-assembling, care must be exercised to ensure that the end of the rotor spindle is located in the spring loaded bearing (at the worm end) before pushing the large bronze bearing home. Before finally tightening the stator securing screws, assemble the rotor in position and ensure that an equal gap is obtained all round the magnet steel ring. A diagram of the coil connections is given.

To Remove the Main Spindle.

Remove three screws securing the bottom plate of the motor. The spindle can now be withdrawn.

Adjustments.

End play is catered for by the spring loaded bearing. Ball thrust bearings should be present at both ends of the rotor and at the lower end of the main spindle.

Lubrication.

The motor should be oiled periodically with "His Master's Voice" oil. There are three lubrication points:—two holes at extreme ends of motor, and the spindle bearing.

AUTOMATIC RECORD CHANGER

Although the mechanism is robust and non-critical in adjustment, it must be handled with care. The record changer must be installed in such a manner that the turntable is level (test on turntable). Force is not necessary when operating the mechanism, and warped or damaged records should not be used. The operating instructions below are in sequence and should be performed in the order given.

Any salient points are shown in heavy type and the most important of these, which should be emphasised to the customer when the instrument is installed, are listed separately.

OPERATING INSTRUCTIONS

To Play a Programme of Records.

The record changing mechanism will play one side of each of up to eight 10-inch or 12-inch records, with a finishing groove of not more than $3\frac{5}{8}$ inches diameter. Only records of one size, 10-inch or 12-inch, may be played at one loading. Not more than eight records may be loaded at a time. If fewer than eight records have been loaded, others may be added whilst a record is being played. **The total of eight records must not be exceeded.**

1. Lift the record retaining arm, and adjust the position of the 10-inch record support plate to suit the size of records, i.e., **for 10-inch records, the record support plate must be down ; for 12-inch records the plate must be fully raised. The 10-inch record support plate must not be lowered whilst 12-inch records are being played.**

2. Fit the cranked spindle into the pusher tube, rotate until it locates and drops into position. Place the records on the spindle so that they are supported by the "shelf" in the spindle and by the appropriate record support plate at one side.

3. Gently lower the record retaining arm on the top record.

4. Turn the pick-up head over in a clockwise direction, insert a "His Master's Voice" Silent Stylus or Permanent Sapphire Needle, pushing the needle fully home. (See IMPORTANT note on page 12.)

5. Turn the pick-up head back to its normal position.

6. Turn the "START-REJECT" switch control as far as it will go in a clockwise direction and then release it; the control will automatically return to its normal position.

7. The mechanism will now play the full programme of records, and then come to rest. It is advisable to keep the lid closed whilst playing.

To Unload the Mechanism.

1. Lift the record retaining arm and remove the cranked spindle.
2. Lift the records straight off the turntable.
3. Replace the cranked spindle.
4. Lower the record retaining arm.

To Reject a Record.

A record can only be rejected after it has started to be played. To reject, simply turn the "START-REJECT" switch in a clockwise direction and release. The pick-up will automatically lift from the record and move aside while the next record is dropped.

To Stop the Mechanism.

If it is required to stop during playing before all records have been played, lift the record retaining arm and take off all unplayed records, lower the record retaining arm and turn the "START-REJECT" switch control clockwise. The pick-up will now return to its rest and the mechanism will stop.

To Play a Single Record.

Place a record on the turntable. Lower the record retaining arm, **lift the pick-up and gently feed needle into record groove.** At the end of the record the pick-up is returned to its rest and the mechanism stops.

Important Operating Points.

All movements of the pick-up arm during record changing are entirely automatic and must not be interfered with.

The 10-inch record support plate must not be down when playing 12-inch records.

Ensure that the cranked spindle is in position before starting mechanism.

Do not rotate turntable by hand.

For further information regarding the auto-mechanism, see separate Service Manual.

SPARE PARTS LIST

Part No.	Description	No. per Inst.	Fin.	Part No.	Description	No. per Inst.	Fin.
CABINET AND FITTINGS.							
410101	Cabinet	1	—	40172H	Knob—Treble	1	—
44723	Back Panel	1	—	40172G	Knob—Bass	1	—
40171N	Knob — Master (OFF-ON- TIME)	1	—	36060AA	Knob— Ext. L.S.	1	—
40171W	Knob—Radio-Gram	1	—	40172J	Knob—Extended Range	1	—
40171G	Knob—Tuning	1	—	40171Y	Knob—Volume	1	—
40171AU	Knob—Waveband	1	—	44076E	Wavescale	1	—
				37133G	Pointer and Cursor	1	56/42 Loc.

Part No.	Description of Part.	No. per Inst.	Fin.	Part No.	Description of Part.	No. per Inst.	Fin.
INDUCTANCES.							
27389DF	L1 } 15.5—21 metres Aerial	1	—	38000E	C26—47 mmfd., ± 5%	1	—
	L2 } Coil			38000F	C27—68 mmfd., ± 5%	1	—
	L3 }			38211EA	C38—0.1 mfd.	1	—
27389DH	L4 } 21—33 metres Aerial Coil	1	—	38211EA	C39—0.1 mfd.	1	—
	L5 }	1	—	See IFT1	C40—200 mmfd., ± 2%	1	—
27389DD	L6 } 33—100 metres Aerial Coil			See IFT2	C41—200 mmfd., ± 2%		
	L7 }	1	—	36355U	C42—200 mmfd., ± 2%	1	—
27389DU	L8 } M.W. Aerial Coil ..			36355U	C43—200 mmfd., ± 2%		
	L9 }	1	—	36355U	C44—0.01 mfd., ± 10%, 1,000 V.	1	—
27389DT	L10 } L.W. Aerial Coil ..			36355U	C45—0.01 mfd., ± 10%, 1,000 V.		
	L11 }	1	—	38211DY	C46—0.047 mfd.	1	—
27389DF	L12 } 15.5—21 metres H.F. Coil			38210EA	C47—0.1 mfd.		
	L13 }	1	—	See C49	C48—16 mfd., Electrolytic, 350 V.	1	—
27389DH	L14 } 21—33 metres H.F. Coil			38150C	C49—16 mfd., Electrolytic (with C48), 350 V.		
	L15 }	1	—	38050DE	C50—47 mmfd.	1	—
27389DD	L16 } 33—100 metres H.F. Coil			38212DS	C51—0.0047 mfd.		
	L17 }	1	—	38151B	C52—2 mfd., Electrolytic, 400 V.	1	—
27389DU	L18 } M.W. H.F. Coil ..			38211DW	C53—0.022 mfd.		
	L19 }	1	—	38255A	C54—0.1 mfd.	1	—
27389DT	L20 } L.W. H.F. Coil			38050DE	C55—47 mmfd.		
	L21 }	1	—	38051DQ	C56—0.0022 mmfd., 500 V. ..	1	—
27389DE	L22 } 15.5—21 metres Oscilla- tor Coil			38051DM	C57—680 mmfd., 500 V. ..		
	L23 }	1	—	38051DN	C58—0.001 mfd., 500 V. ..	1	—
27389CX	L24 } 21—33 metres Oscillator Coil			38212DU	C59—0.01 mfd.		
	L25 }	1	—	38150D	C60—30 mfd., Electrolytic, 350 V. (with C69)	1	—
27389DG	L26 } 33—100 metres Oscillator Coil			38255A	C61—0.1 mfd.		
	L27 }	1	—	38151F	C62—50 mfd., 12 V., Electro- lytic	1	—
27389BX	L28 } M.W. Oscillator Coil ..			31840E	C63—0.002 mfd., 1,000 V. ..		
	L29 }	1	—	38051DL	C64—470 mmfd., 500 V. ..	1	—
27389BZ	L30 } L.W. Oscillator Coil ..			38000VF	C65—220 mmfd., ± 2% ..		
See IFT1	L40—IFT1 Primary	1	—	38000YC	C66—68 mmfd., ± 2% ..	1	—
	L41—IFT1 Secondary	1	—	38050DB	C67—15 mmfd.	1	—
See IFT2	L42—IFT2 Primary			38151E	C68—25 mfd., 25 V., Electro- lytic		
	L43—IFT2 Secondary	1	—	See C60	C69—30 mfd., 350 V., Electro- lytic	1	—
CONDENSERS.							
38004TK	C1—200 mmfd., ± 2%	1	—	38150B	C70—16 mfd., 500 V., Electro- lytic	1	—
38050NL	C2—4.7 mmfd.	1	—	38211DV	C71—0.015 mfd.	1	—
38050NL	C3—4.7 mmfd.	1	—	38004N	C72—0.001 mmfd., ± 5% ..	1	—
38000E	C4—47 mmfd., ± 5% ..	1	—	38000PD	C73—390 mmfd., ± 5% ..	1	—
38001J	C5—220 mmfd., ± 5% ..	1	—	38000J	C74—220 mmfd., ± 5% ..	1	—
38001TH	C6—120 mmfd., ± 2% ..	1	—	38004G	C75—100 mmfd., ± 5% ..	1	—
38001J	C7—220 mmfd., ± 5% ..	1	—	38000CX	C76—270 mmfd., ± 5% ..	1	—
38004TK	C8—200 mmfd., ± 2% ..	1	—	38004N	C77—0.001 mfd., ± 5% ..	1	—
38050DF	C9—68 mmfd.	1	—	31840J	C78—0.005 mfd., 1,000 V. ..	1	—
38050DA	C10—10 mmfd.	1	—	31840J	C79—0.005 mfd., 1,000 V. ..	1	—
38050XZ	C11—6.8 mmfd.	1	—	44085A	{ VC1 } Gang Condenser ..	1	—
38001L	C12—470 mmfd., ± 5% ..	1	—		{ VC2 }	1	—
38004CV	C13—180 mmfd., ± 5% ..	1	—		{ VC3 }		
38211DY	C14—0.047 mfd.	1	—	31486A	{ TC1 } 4—30 mmfd.		
38001TH	C15—120 mmfd., ± 2% ..	1	—		{ TC2 }	1	—
38001J	C16—220 mmfd., ± 5% ..	1	—		{ TC3 }		
38002WA	C17—0.002 mfd., ± 2% ..	1	—	32668A	{ TC4 } 4—30 mmfd.	1	—
38001VP	C18—470 mmfd., ± 2% ..	1	—		{ TC5 }	1	—
38000D	C19—33 mmfd., ± 5% ..	1	—	31486A	{ TC6 } 4—30 mmfd. (with TC9 and TC10)		
38001VE	C20—180 mmfd., ± 2% ..	1	—			1	—
38004B	C21—15 mmfd., ± 5% ..	1	—			1	—
38050DA	C22—10 mmfd.	1	—			1	—
38000YC	C23—68 mmfd., ± 2% ..	1	—			1	—
38004VE	C24—180 mmfd., ± 2% ..	1	—			1	—
38001TH	C25—120 mmfd., ± 2% ..	1	—			1	—

Part No.	Description of Part.	No. per Inst.	Fin.	Part No.	Description of Part.	No. per Inst.	Fin.
32668A	{ TC7 } 4—30 mmfd. 1 —			V2	X81 Frequency Changer	1	—
	{ TC8 } 1 —			V3	W81 I.F. Amplifier .. 1 —		
See TC6	{ TC9 } 4—30 mmfd. 1 —			V4	DH81 Detector, A.G.C. or and A.F. Amplifier .. 1 —		
35480B	TC10} 1 —				DH149 1 —		
35480B	TC11 3—30 mmfd. 1 —			V5	Y61 Tuning Indicator .. 1 —		
35480B	TC12 3—30 mmfd. 1 —				or EM34 (See * on circuit diagram.)		
35480B	TC13 3—30 mmfd. 1 —			V6	DH81 2nd A.F. Amplifier or DH149 .. 1 —		
35480B	TC14 3—30 mmfd. 1 —			V7	KT66 Output 1 —		
35480B	TC15 3—30 mmfd. 1 —			V8	U81 Rectifier 1 —		

RESISTANCES.

33360DP	R1—1,500 ohms 1 —
33360DN	R2—1,000 ohms 1 —
33360DL	R3—470 ohms 1 —
33360DE	R4—47 ohms 1 —
33360DF	R5—68 ohms 1 —
33360J	R6—220 ohms, ± 5% .. 1 —
33377Y	R10—47,000 ohms, ± 5% .. 1 —
33360DE	R11—47 ohms 1 —
33363V	R12—15,000 ohms, ± 5% .. 1 —
33360DP	R13—1,500 ohms 1 —
33360EE	R14—0.47 megohms 1 —
33373V	R15—15,000 ohms, ± 5% .. 1 —
33363W	R16—22,000 ohms, ± 5% .. 1 —
33360DY	R17—47,000 ohms 1 —
33360EE	R18—0.47 megohms 1 —
33360DP	R19—1,500 ohms 1 —
33360EG	R20—1 megohm 1 —
33373T	R21—6,800 ohms, ± 5% .. 1 —
33373S	R22—4,700 ohms, ± 5% .. 1 —
33360EJ	R23—2.2 megohms 1 —
33360EA	R24—0.1 megohms 1 —
33360EG	R25—1 megohm 1 —
33360EN	R26—10 megohms 1 —
33360EB	R27—0.15 megohms 1 —
33360EF	R28—0.68 megohms 1 —
33360DL	R29—470 ohms 1 —
33360W	R30—22,000 ohms, ± 5% .. 1 —
33360AE	R31—0.47 megohms, ± 5% .. 1 —
33360EE	R32—0.47 megohms 1 —
33360DY	R33—47,000 ohms 1 —
33360Y	R34—47,000 ohms, ± 5% .. 1 —
33360EB	R35—0.15 megohms 1 —
33360DQ	R36—2,200 ohms 1 —
33334A	R37—10 ohms, ± 5% 1 —
33360EE	R38—0.47 megohms 1 —
33381N	R39—1,000 ohms, ± 5% .. 1 —
33360DG	R40—100 ohms 1 —
33360DY	R41—47,000 ohms 1 —
33379CV	R42—180 ohms, ± 5% .. 1 —
33334CX	R43—270 ohms, ± 5% .. 1 —
33377DD	R44—33 ohms 1 —
See MU	R45—0.15 megohms, ± 5% .. 1 —
33360EG	R46—1.0 megohms 1 —
33360EG	R47—1.0 megohms 1 —
37903DD	VR1—0.5 megohms, Volume Control 1 —

VALVES.

V1	W81 R.F. Amplifier	1	—
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V2	X81 Frequency Changer	1	—
V3	W81 I.F. Amplifier ..	1	—
V4	DH81 Detector, A.G.C. or and A.F. Amplifier ..	1	—
V5	Y61 Tuning Indicator ..	1	—
V6	DH81 2nd A.F. Amplifier or DH149	1	—
V7	KT66 Output	1	—
V8	U81 Rectifier	1	—

TRANSFORMERS AND CHOKES.

39000B	IFT1—1st I.F. Transformer ..	1	—
39000B	IFT2—2nd I.F. Transformer ..	1	—
41500C	T1—Output Transformer ..	1	—
See MU	T2—Pick-Up Transformer ..	1	—
See MU	T3—Pick-Up Transformer ..	1	—
42780C	T4—Mains Transformer ..	1	—
34715G	CK1—Choke	1	—
See MU	CK2—Choke	1	—

MISCELLANEOUS.

35421D	LP1—Scale Lamp, 6.8 V., 0.3 amp.	1	—
35421D	LP2—Scale Lamp, 6.8 V., 0.3 amp.	1	—
35421D	LP3—Scale Lamp, 6.8 V., 0.3 amp.	1	—
35421D	LP4—Scale Lamp, 6.8 V., 0.3 amp.	1	—
35834B	LP5—Floodlamp, 250 V., 15 watt	1	—
31806J	LS1—Loudspeaker	1	—
44075A	S1—Waveband Switch	1	—
44689A	S2—Treble Control	1	—
44680A	S3—Radio-Gram Switch	1	—
44690A	S4—Bass Control	1	—
35419B	S5—"EXT. L.S." Switch	1	—
32498W	S6—Extended Range Switch ..	1	—
44696A	S7—Switch	1	—
44696A	S8—Switch	1	—
On Auto-Mechanism	S9—Gram Motor Switch	1	—
38825A	F1—Fuse, 350 mA, Cartridge Type	1	—
26200P	Mo—Motor	1	—
40777R	P.U.—No. 15 Pick-Up	1	—
34720Z	MU—Matching Unit, complete with CK2, T2, T3, R45 and C71	1	—
45000AL	Auto-Mechanism Complete ..	1	—
41663A	Electric Clock	1	—
44987G	Extended Frequency Range Unit Complete	1	—

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

1. Model number and serial number.
2. Spare part number and description, as given above.
3. Quantity required.

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

Order spare parts from—

**E.M.I. SALES AND SERVICE, LTD., SPARE PARTS DIVISION,
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Telegraphic Address : Emiservice, Greenford, Middlesex

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