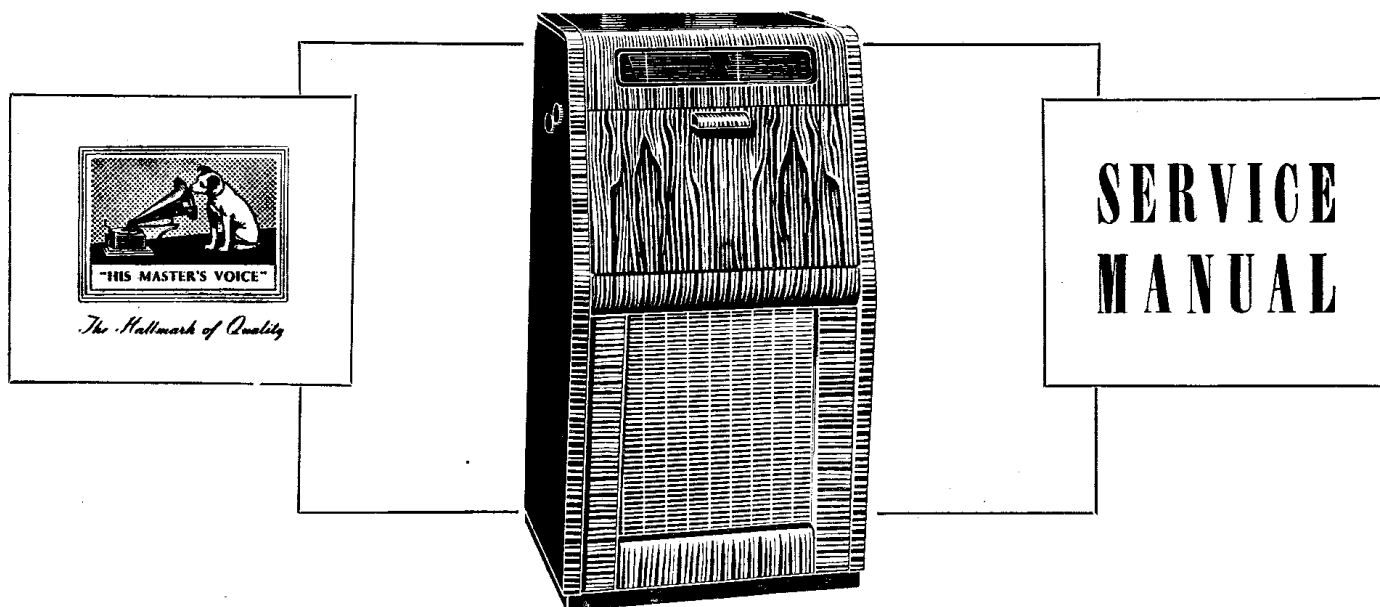


# "HIS MASTER'S VOICE"



## MODEL 1616 5-VALVE CONSOLE AUTO-RADIOGRAM FOR A.C. MAINS

	PAGE		PAGE
CALIBRATION ... ..	6	I.F. AND R.F. ALIGNMENT ...	3
CIRCUIT DIAGRAM ... ..	4	INSTALLING ... ..	2
COMPONENT DIAGRAMS ... ..	5	SPARE PARTS LIST ... ..	7
CAPACITOR & POINTER DRIVE	6	SPECIFICATION ... ..	2
DISMANTLING ... ..	2		

*COPYRIGHT AND REPRODUCTION OF DIAGRAMS STRICTLY RESERVED*

# MODEL 1616

## SPECIFICATION

### Physical.

Height—35 inches.  
Depth—17 $\frac{3}{4}$  inches.  
Width—20 $\frac{1}{2}$  inches.  
Weight—60 lbs.

### Mains Supply.

195—255 volts, 50 c.p.s. A.C.

### Consumption.

Radio—40 watts } approximately.  
Gram—55 watts }

### Wave Ranges.

L.W. .. 900—2,000 metres (333·4—150 kc/s).  
M.W. .. 187—575 metres (1,604—521·7 kc/s).  
S.W. .. 16·3—51·7 metres (18·4—5·8 Mc/s).

### Intermediate Frequency.

470 kc/s.

### Rated Output.

4 watts maximum.

### Valves.

V1	X78	Frequency Changer.
V2	W77	I.F. Amplifier.
V3	DH77	Detector A.G.C. and A.F. Amplifier.

V4 N78 Output.  
V5 U78 Rectifier.

### Scale Lamps and Fuses.

Two Scale Lamps, 6·8 volts, 0·3 amp.  
Two Fuses, 1·0 amp., Cartridge Type.

### Loudspeaker.

The loudspeaker is a dustproof 10 $\frac{1}{2}$ -inch elliptical cone permanent magnet moving coil type.  
D.C. resistance of loudspeaker speech coil, 3 ohms.  
Impedance at 1,000 c.p.s., 5 ohms.  
Flux density, 8,000 lines sq./cm.

### External Loudspeaker.

An additional low resistance loudspeaker may be connected to the EXT. L/S. sockets at the rear of the receiver. The loudspeaker plug provided allows either loudspeaker to be operated singly or both together.

### Automatic Record Player.

The Automatic Record Player Type 45000AS plays one side of each of up to ten 10-inch or 12-inch records.

### Pick-Up.

No. 13 lightweight pick-up.  
D.C. resistance of the coil, 1·3 ohms.

### Motor.

Hysteresis Type 26200P.

## INSTALLING

### Transit Packing.

It is essential that all transit packing is removed before connecting the instrument to the mains supply.

1. Remove the four red-headed transit screws from the corners of the mechanism plate and replace with the chromium screws and leather washers contained in the cotton bag.
2. Remove the packing and tapes securing the record retaining arm and the pick-up.
3. Fit the four control knobs (spring loaded).

*NOTE.—The transit packing should be kept in case the instrument is to be transported at some future occasion.*

### Aerial and Earth.

Although the receiver will operate on an inside aerial, a high outside aerial is essential for the best reception.

It is essential that an efficient earth is provided. Never 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 supplied.

### Mains Supply.

The receiver may be adjusted to operate on A.C. mains supplies of 195—255 volts, 50 c.p.s.

To adjust the mains input ensure that the instrument is completely disconnected from the supply and proceed as follows:—

- (a) Remove the top panel (two screws).
- (b) Insert the Mains Voltage Adjustment Plug into the socket with the markings nearer to that of the supply. Do not connect the mains supply until the remaining adjustments have been completed.

### Final Connections.

Make sure that the valves are firmly inserted in their correct positions and the fuses firmly held in their clips.

*NOTE.—When removing or refitting a valve, always use a vertical movement and on no account use force. As these valves have glass bases, any excessive sideways movement or rough handling may fracture the glass surrounding the pins and the valve will fail. Replace the back panel and insert the Aerial and Earth plugs. Ensure that the loudspeaker plug is in the "INT" socket.*

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

## DISMANTLING

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

### Removal of Chassis.

1. Remove the four control knobs (spring loaded).

2. Remove the aerial and earth plugs.
3. Remove the two back panels.
4. Remove panel underneath radio chassis (four screws at the front).
5. Remove Pick-up, Aerial and Earth plugs from the radio chassis.
6. Unsolder the two motor mains leads (orange) from the Transformer.
7. Unsolder internal loudspeaker leads from small tag panel on cabinet.
8. Remove the two earthing leads on the L.H.S. of chassis.

9. Unscrew the two hexagonal screws from the back of the radio chassis; care should be taken that the chassis does not slide out. Open flap and withdraw chassis.

#### Removal of Auto-Mechanism.

1. Tie the Pick-up arm to its rest position.
2. Disconnect the four leads from the Matching Unit.
3. Disconnect the motor leads from the Mains Panel underneath mechanism plate.
4. Remove the motor earth lead from mechanism plate.
5. Remove the four screws from the corners of the mechanism plate and lift out mechanism.

## I.F. AND 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 the others.

The oscillator tracks at a higher frequency 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 m.W. (1.58 v. across the speech coil).

### Radio Frequency.

#### Short Waves.

Set the Volume and Tone controls to maximum position and Waveband switch as required. Inject test signal into aerial and earth sockets, via a S.W. dummy aerial.

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.; Volume control to maximum; Tone control as required; turn the Gang capacitor to minimum capacity.

1. Inject a modulated signal at 470 kc/s into the grid of V1 and chassis.
2. Adjust cores of L16, L15, L14 and L13 in that order for maximum output.

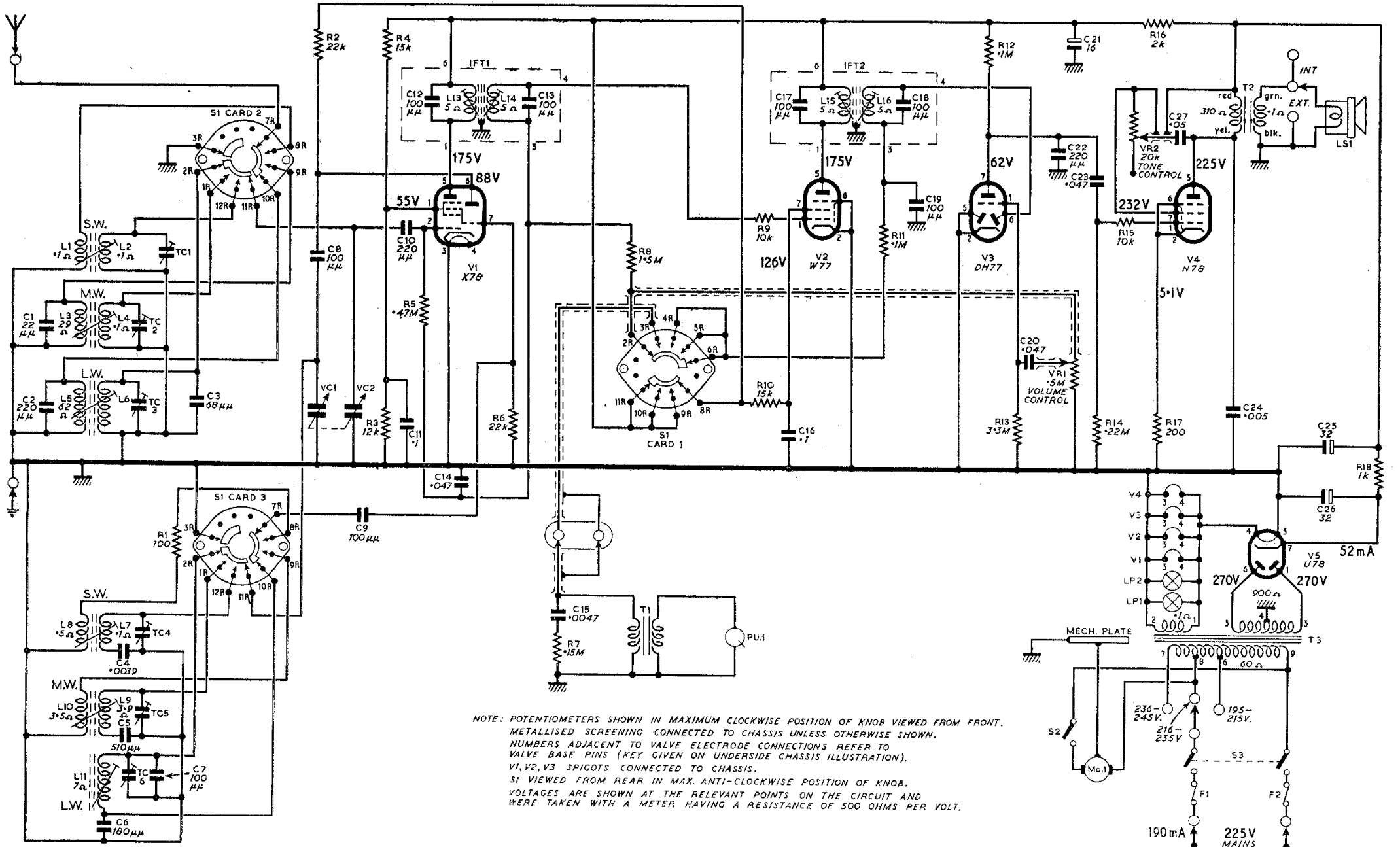
Waveband Switch.	Op. No.	Set Gang.	Tune Signal Generator to		Operation.
			m.	Mc/s.	
S.W. . . . .	1	Maximum	51.7	5.8	Adjust L7 for maximum output. Adjust TC4 for maximum output. Adjust L2 for maximum output. Adjust TC1 for maximum output. Repeat operations 1 to 4.
	2	Minimum	16.3	18.4	
	3	Tune in	50	6	
	4	Tune in	16.8	17.8	
	5	—	—	—	

### Medium Waves.

Controls as before, but with M.W. dummy aerial.

Waveband Switch.	Op. No.	Set Gang.	Tune Signal Generator to		Operation.
			m.	kc/s.	
M.W. . . . .	1	Maximum	575	522	Adjust L9 for maximum output. Adjust TC5 for maximum output. Adjust L4 for maximum output. Adjust TC2 for maximum output. Repeat operations 1 to 4.
	2	Minimum	186.9	1,605	
	3	Tune in	510	588	
	4	Tune in	210	1,427	
	5	—	—	—	

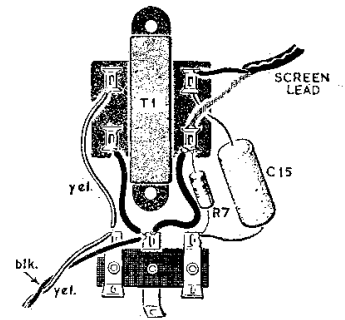
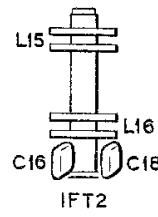
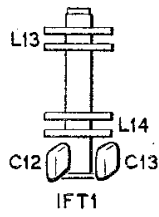
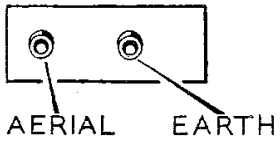
R	1			2			3			4,5			6			7			8			9,10			11			12,13			14,15			16,17			18		
C	1,2	4,5,6		7,3		8		9		10,11,12,14		13		15		17		16		18,19		20		22,23,21		27		24		25,26									
MISC.	L1	TO	L11	TC1	TO	TC6	VC1	VC2	L13	V1,IFT1	L14	T1	PU1	V2,L15	IFT2	L16	V3	VR1,S2	Mo.1	VR2	V4,F1	S3,T2	F2	V5,T3	LS1	MISC.													



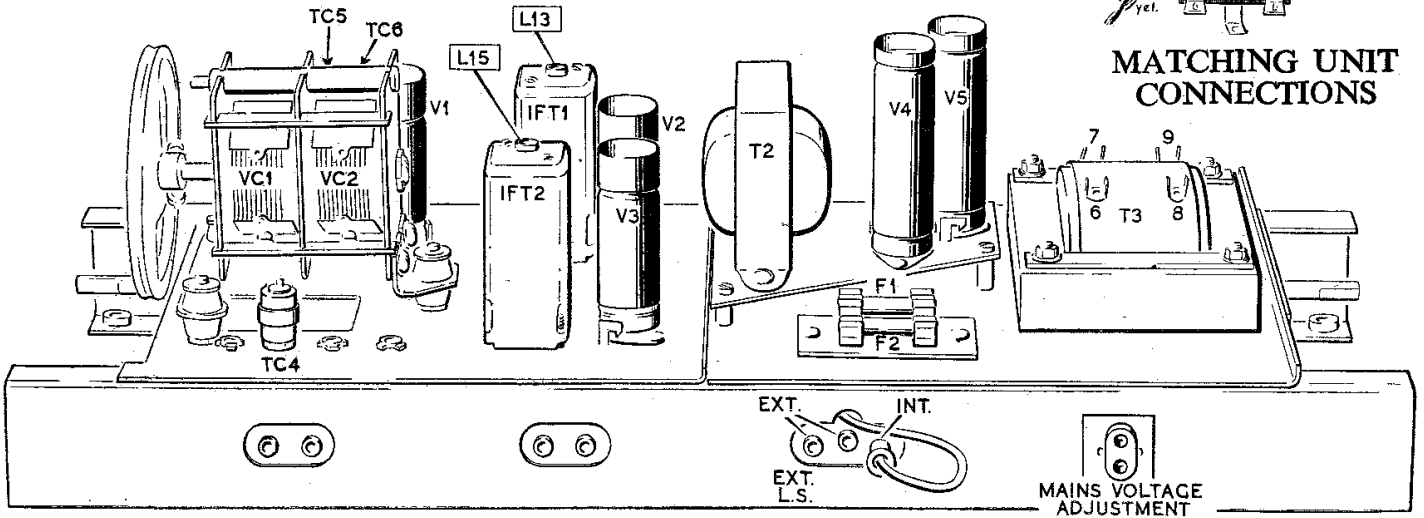
NOTE: POTENTIOMETERS SHOWN IN MAXIMUM CLOCKWISE POSITION OF KNOB VIEWED FROM FRONT. METALLISED SCREENING CONNECTED TO CHASSIS UNLESS OTHERWISE SHOWN. NUMBERS ADJACENT TO VALVE ELECTRODE CONNECTIONS REFER TO VALVE BASE PINS (KEY GIVEN ON UNDERSIDE CHASSIS ILLUSTRATION). V1, V2, V3 SPIGOTS CONNECTED TO CHASSIS. S1 VIEWED FROM REAR IN MAX. ANTI-CLOCKWISE POSITION OF KNOB. VOLTAGES ARE SHOWN AT THE RELEVANT POINTS ON THE CIRCUIT AND WERE TAKEN WITH A METER HAVING A RESISTANCE OF 500 OHMS PER VOLT.

D.C. resistance of L6 25 ohms. Never attempt to measure the D.C. resistance of T1.

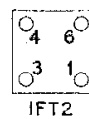
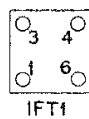
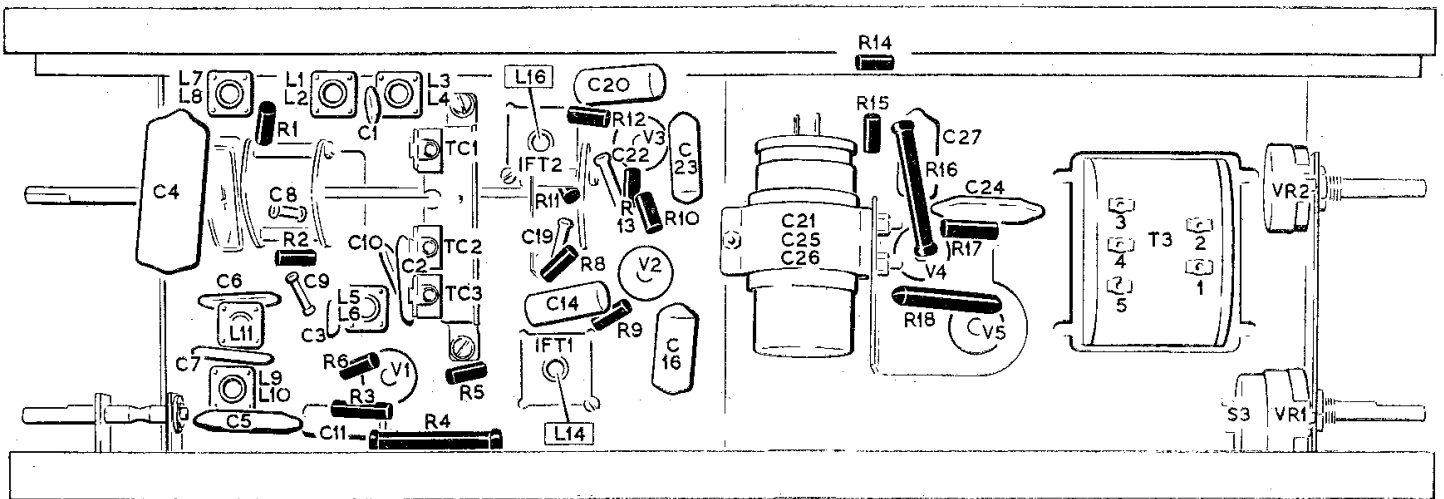
**MODEL 1616**



**MATCHING UNIT CONNECTIONS**



**CHASSIS TOP-SIDE VIEW**



**CHASSIS UNDER-SIDE VIEW**

## Long Waves.

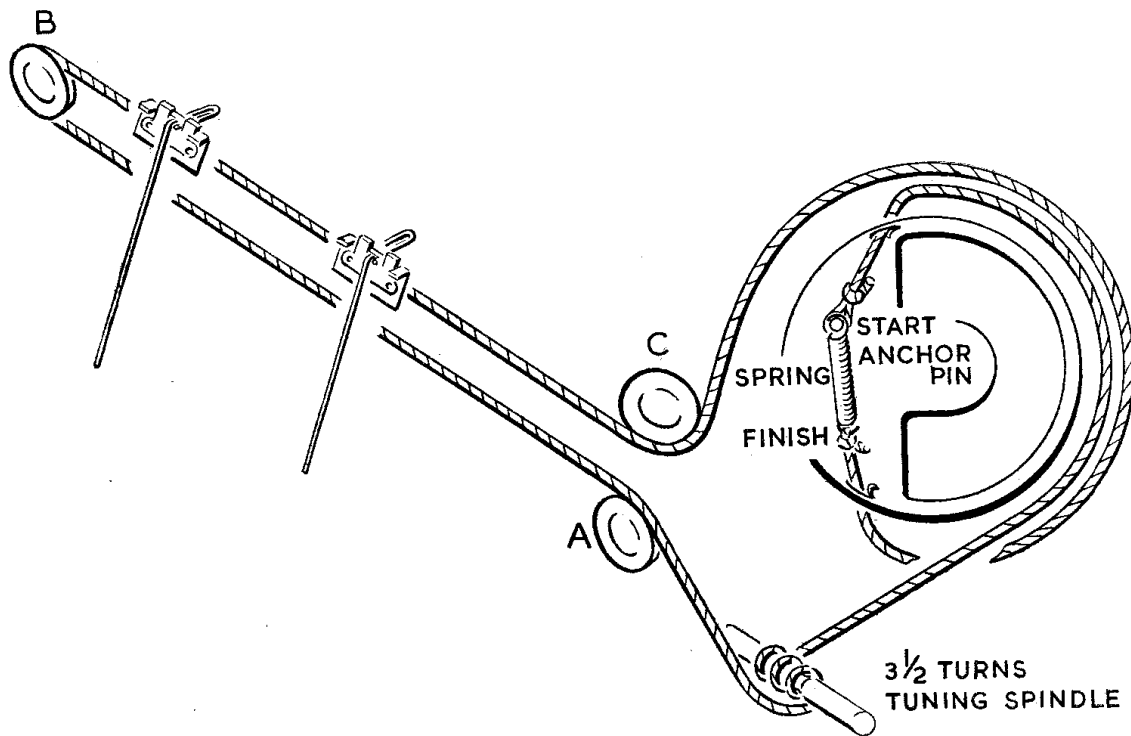
Controls as before, but with L.W. dummy aerial.

Waveband Switch.	Op. No.	Set Gang.	Tune Signal Generator to		Operation.
			m.	kc/s.	
L.W. .. ..	1	Maximum	2,000	150	Adjust L11 for maximum output. Adjust TC6 for maximum output. Adjust L6 for maximum output. Adjust TC3 for maximum output. Repeat operations 1 to 4.
	2	Minimum	901	333	
	3	Tune in	1,850	162	
	4	Tune in	1,000	300	
	5	Tune in	1,000	300	

## CALIBRATION

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

length. Adjust pointers to give best compromise on all wavebands, if necessary.



CAPACITOR AND POINTER DRIVE

## CAPACITOR AND POINTER DRIVE

Use only correct nylon cord 6370  $\times$  0012; approximately 72 inches of cord is used.

1. Form a loop in one end of cord with an opening of approximately  $\frac{1}{8}$ -inch in diameter and assemble on anchor pin.

2. Wind cord round pulleys as shown in diagram.
3. Secure cord to tension spring and assemble spring.

*NOTE.*—The knots, to prevent slipping, should be tied as reef knots and secured with shellac.

*NOTE.*—For Technical Information relating to the Pick-up, Motor and Automechanism, apply for separate Service Manual.

## SPARE PARTS LIST

Ref.	Description.	Part No.	Ref.	Description.	Part No.	
<b>RESISTORS</b>			TC5	3-30 mmf. Trimmer .. ..	35480B	
R1	100 ohms, $\pm 5\%$ .. ..	33360G	TC6	3-30 mmf. Trimmer .. ..	35480B	
R2	22,000 ohms .. ..	33363DW	VC1	} Gang Capacitor .. ..	37101H	
R3	12,000 ohms .. ..	33363PM	VC2			
R4	15,000 ohms, $\pm 5\%$ .. ..	33373V	<b>INDUCTANCES</b>			
R5	0.47 megohm .. ..	33360EE	L1	} S.W. Aerial Coil .. ..	40970G	
R6	22,000 ohms .. ..	33360DW	L2			
R7	0.15 megohm .. ..	33360EB	L3			} M.W. Aerial Coil .. ..
R8	1.5 megohms .. ..	33360EM	L4			
R9	10,000 ohms .. ..	33360DU	L5	} L.W. Aerial Coil .. ..	40970J	
R10	15,000 ohms, $\pm 5\%$ .. ..	33360V	L6			
R11	0.1 megohm .. ..	33360EA	L7	} S.W. Oscillator Coil .. ..	40970A	
R12	0.1 megohm .. ..	33360EA	L8			
R13	3.3 megohms .. ..	33360EK	L9			
R14	0.22 megohm .. ..	33360EC	L10	} M.W. Oscillator Coil .. ..	40970B	
R15	10,000 ohms .. ..	33360DU	L11			L.W. Oscillator Coil .. ..
R16	2,000 ohms, $\pm 5\%$ .. ..	37870FP	L13	IFT1 Primary Coil .. ..	} See IFT1	
R17	200 ohms, $\pm 5\%$ .. ..	33363AW	L14	IFT1 Secondary Coil .. ..		
R18	1,000 ohms, $\pm 5\%$ .. ..	37870N	L15	IFT2 Primary Coil .. ..	} See IFT2	
VR1	0.5 megohm, Volume Control ..	37941FJ	L16	IFT2 Secondary Coil .. ..		
VR2	20,000 ohms, Tone Control ..	37941GJ	<b>TRANSFORMERS</b>			
<b>CAPACITORS</b>			T1	Pick-up Matching Transformer ..	34720E	
C1	22 mmf. .. ..	38050DC	T2	Output Transformer .. ..	22628BS	
C2	220 mmf., $\pm 5\%$ .. ..	38001J	T3	Mains Transformer .. ..	44490C	
C3	68 mmf., $\pm 2\%$ .. ..	38004YC	IFT1	1st I.F. Transformer .. ..	46551J	
C4	0.0039 mmf., $\pm 2\%$ .. ..	38001WF	IFT2	2nd I.F. Transformer .. ..	46551J	
C5	510 mmf., $\pm 2\%$ .. ..	38001VQ	<b>MISCELLANEOUS</b>			
C6	180 mmf., $\pm 2\%$ .. ..	38000VE	S1	Waveband and Radio-Gram Switch .. ..	47002A	
C7	100 mmf., $\pm 2\%$ .. ..	38004TF	S2	Gram Motor Switch .. ..	See Auto.Mech.	
C8	100 mmf., 750 v. .. ..	38100A	S3	Mains On/Off Switch .. ..	See VR1	
C9	100 mmf., 750 v. .. ..	38100A	LP1	Scale Lamp, 6.8 v., 0.3 amp. ..	35421D	
C10	220 mmf., 750 v. .. ..	38100M	LP2	Scale Lamp, 6.8 v., 0.3 amp. ..	35421D	
C11	0.1 mf. .. ..	38210EA	LS1	Loudspeaker .. ..	46570B	
C12	100 mmf., $\pm 2\%$ .. ..	38006TF	F1	Fuse, 1.0 amp. .. ..	38825D	
C13	100 mmf., $\pm 2\%$ .. ..	38006TF	F2	Fuse, 1.0 amp. .. ..	38825D	
C14	0.047 mf. .. ..	38210DY	<b>VALVES</b>			
C15	0.0047 mf. .. ..	38212DS	V1	X78—Frequency Changer		
C16	0.1 mf. .. ..	38210EA	V2	W77—I.F. Amplifier		
C17	100 mmf., $\pm 2\%$ .. ..	38006TF	V3	DH77—Detector, A.G.C. and A.F. Amplifier		
C18	100 mmf., $\pm 2\%$ .. ..	38006TF	V4	N78—Output		
C19	100 mmf., 750 v. .. ..	38100A	V5	U78—Rectifier		
C20	0.047 mf. .. ..	38210DY	<b>AUTO-MECHANISM</b>			
C21	16 mf., 350 v., Electrolytic ..	38150N	Automatic Record Player Com- plete .. ..			45000AS
C22	220 mmf., 750 v. .. ..	38100M	Mo1	Hysteresis Motor .. ..	26200P	
C23	0.047 mf. .. ..	38210DY	PU1	No. 13 Pick-up .. ..	35215D	
C24	0.005 mf., 1,000 v. .. ..	38214E	(For further details, see Auto. Mech. Manual)			
C25	32 mf., 350 v., Electrolytic ..	} See C21				
C26	32 mf., 350 v., Electrolytic ..					
C27	0.05 mf., $\pm 2\%$ , 1,000 v. ...	38214H				
TC1	4-30 mmf. Trimmer .. ..	} 39653A				
TC2	4-30 mmf. Trimmer .. ..					
TC3	4-30 mmf. Trimmer .. ..					
TC4	3-30 mmf. Trimmer .. ..	35480B				

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,

SHERATON WORKS,

WADSWORTH ROAD,

GREENFORD, MIDDLESEX.

*Telephone* : PEKivale 6666.

*Telegraphic Address* : Emiservice, Greenford, Middlesex.

**The Company reserves the right to make any modification without notice.**