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For Trade Use Only

"His Master's Voice"

SERVICE MANUAL

for

FOUR - VALVE

BROADCAST BAND A.C. RECEIVER

MANTEL MODEL 46 (incorporating Chassis Type A436 BS)

TECHNICAL SPECIFICATION

POWER SUPPLY: 200 to 250 volts. 40 to 50 cycles.

CONSUMPTION: 29 watts.

FREQUENCY RANGE: 1600 to 540 Kc.

I.F. FREQUENCY: 457.5 Kc.

MAX. POWER OUTPUT: 1.5 watts.

VALVES: 6A8G Converter; 6G8G I.F., A.V.C., Demod.; 6V6GT Power; 6X5GT Rect.

DIAL LAMPS (2): 6.3 v 0.15 — 0.30 amp.

LOUDSPEAKER: 5-inch Permagnetic. 3.7 ohm voice coil impedance at 400 cycles.

RECEIVER DIMENSIONS: Length, 13 inches; depth, 7 inches; height, 9 inches.

WEIGHT: Nett, 12 lbs.; gross, 15 lbs.

CIRCUIT DESCRIPTION

This model is a four-valve mains operated broadcast superheterodyne. It normally operates from a self-contained loop aerial which is provided with primary coupling for connection of an aerial/earth system. The primary circuit incorporates a loading inductance and damping resistor in order to reduce signal frequency tracking error to a minimum when an external aerial earth system is connected.

The signal frequency tuned circuit is connected to a Pentagrid Converter; Oscillator voltage on the signal grid of this valve is neutralised by means of a small wire capacitor connected from oscillator plate to signal grid. The oscillator inductance is permeability tuned and has a fixed padder capacitance.

The converter valve is transformer coupled to the pentode section of a duo-diode pentode valve, the output of which is in turn transformer coupled to the demodulator diode, the other diode being capacity coupled to the plate circuit and functions as an A.V.C. rectifier. Both I.F. transformers are permeability tuned and have fixed capacitors. A resistive network across the H.T. filter choke and series resistor provides delay voltage for the A.V.C. diode and standing bias for the converter valve. A.V.C. voltage is applied to the converter valve whilst the I.F. valve is operated with fixed bias. The demodulator circuit is coupled to the potentiometer volume control, the output of which is taken to the grid of the beam power output valve.

The power output of this valve is limited by operating the screen at a reduced voltage. The output stage is transformer coupled to the voice coil of a permagnetic speaker. A tertiary winding on the output transformer provides inverse feedback voltage which is fed back to the input circuit of the output stage through a tap on the volume control.

High tension voltage is supplied by a full wave rectifier, the output of which is filtered by a choke in the negative side.

DISMANTLING

Removal of Chassis:

(1) Disconnect power plug from supply mains.
(2) Remove knobs.
(3) Remove four coloured fixing screws from back of cabinet.
(4) Withdraw chassis from cabinet.

MODIFICATION

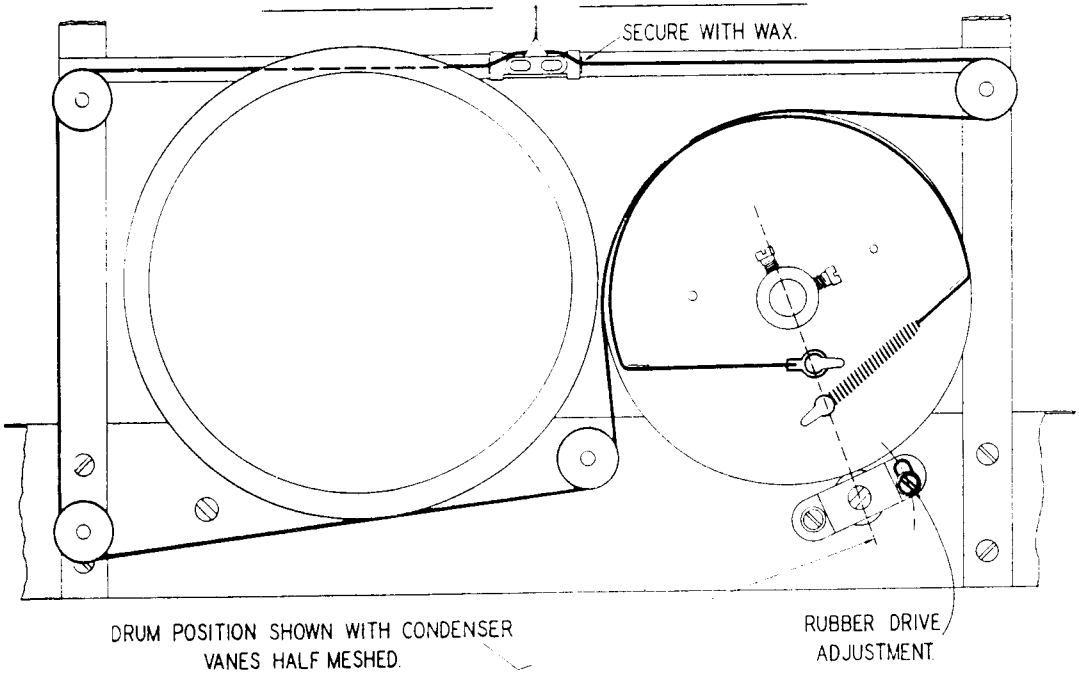
Due to material supply shortages it has been necessary to modify this receiver. Service information is amended as follows:—

1. I.F. valve type 6G8G replaced by Type EBF35.
2. 1st I.F. transformer replaced by Part No. D1985.
3. 25 mmfd. Osc. shunt Condenser (C6) deleted.
4. Osc. shunt trimmer condenser (TC2) replaced by Part No. D2383.
5. Voltage table for I.F. valve (EBF35) as under.

Valve Base Pin	Electrode	Volts to Chassis	Current ma	Resist. to Chassis
1	Heater	AC 6.3	0.2 amp.	—
2	Metal Coating	—	—	Nil.
3	Plate	242	4.5	Infin.
4	Screen Grid	96	1.4	Infin.

Valve Base Pin	Electrode	Volts to Chassis	Current ma	Resist. to Chassis
5	Diode	—	—	0.51 Megohm.
6	Diode (AVC)	—	—	2.6 Megohms.
7	Cathode	2.3	5.9	400 ohms.
8	Heater	—	—	Nil
9	Grid	-	—	11 ohms.

— DIAL CORD ARRANGEMENT AND TUNING DRIVE ADJUSTMENT —



PARTS LIST

RESISTORS

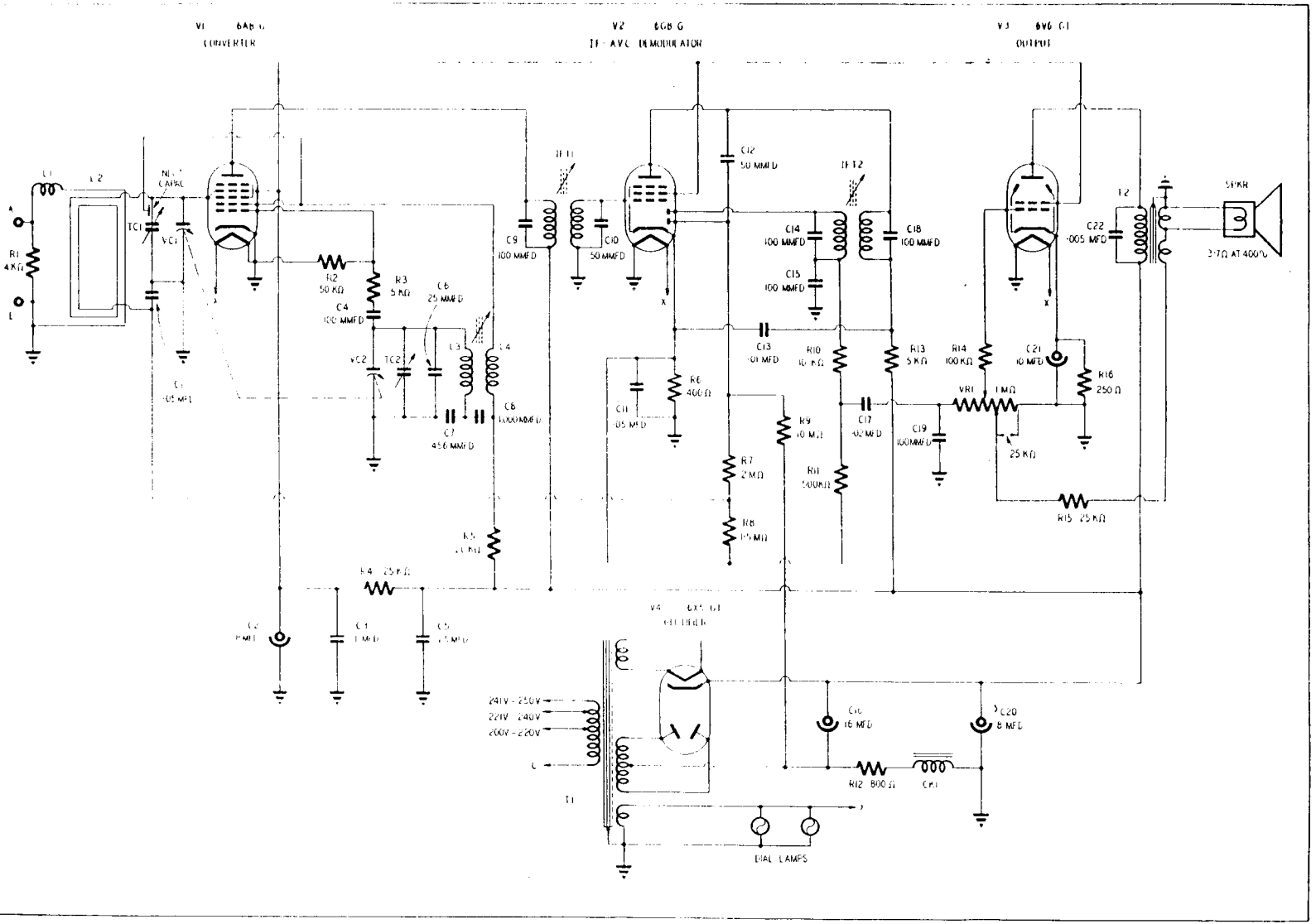
Ref.	Part No.	DESCRIPTION
R1	E1X	4,000 Ohms ½ Watt ± 10%
R2	H1X	50,000 Ohms ½ Watt ± 10%
R3	X1X	5,000 Ohms ½ Watt ± 10%
R4	AE4X	25,000 Ohms 2 Watt ± 10%
R5	V3X	20,000 Ohms 1 Watt ± 10%
R6	U1X	400 Ohms ½ Watt ± 10%
R7	AA1X	2 Meg. ½ Watt ± 10%
R8	Q1X	1.5 Meg. ½ Watt ± 10%
R9	AB3X	10 Meg. 1 Watt ± 10%
R10	F1X	10,000 Ohms ½ Watt ± 10%
R11	O1X	500,000 Ohms ½ Watt ± 10%
R12	I.R.C. "AA"	800 Ohms 3 Watt ± 10%
R13	X1X	5,000 Ohms ½ Watt ± 10%
R14	J1X	100,000 Ohms ½ Watt ± 10%
R15	AE1X	25,000 Ohms ½ Watt ± 10%
R16	I.R.C. "BW"	250 Ohms 1 Watt ± 10%

CONDENSERS

Ref.	Part No.	DESCRIPTION	
C1	C0013/M	0.05 mfd.	200V wkg.
C2	C0014/CA	8 mfd.	525 P.V.
C3	C0013/E	0.1 mfd.	400V wkg.
C4	D4405/B	100 pf.	± 10%
C5	C0013/C	0.25 mfd.	400V wkg.
C6	D4405/AB	25 pf.	± 5%
C7	D0243/CR	456 pf.	± 5 mmfd.
C8	D4405/A	1000 pf.	± 10%
C9	D4405/W	100 pf.	± 5%
C10	D4405/X	50 pf.	± 5%
C11	C0013/M	0.05 mfd.	200V wkg.
C12	D0243/Q	50 pf.	± 10%
C13	C0013/N	0.01 mfd.	600V
C14	D4405/W	100 pf.	± 5%
C15	D0243/P	100 pf.	± 10%
C16	C0014/BZ	16 mfd.	525 P.V.
C17	C0013/S	0.02 mfd.	600V wkg.
C18	D4405/W	100 pf.	± 5%
C19	D0243/P	100 pf.	± 10%
C20	C0014/CA	8 mfd.	525 P.V.
C21	C0014/BY	10 mfd.	40 P.V.
C22	C0013/AK	0.005 mfd.	600V ± 10%

MISCELLANEOUS

Ref.	Part No.	DESCRIPTION
L1	D2225	Aerial Loading Coil
L2	C0317	Loop Aerial Coil
L3 & L4	D2224	B/C Oscillator Coil
VC1 & VC2	D1993	2 Gang Condenser
TC1 & TC2	D0786A	Air Trimmer (1.5 — 12.0 pf.)
VR1	D1944A	1 Meg. Potentiometer (Tapped 25,000 ohms)
IFT1	D2019	1st I.F. Transformer
IFT2	D2020	2nd I.F. Transformer
T1	D2226	Mains Transformer
T2	D2227	Output Transformer
CK1	D2228	H.T. Filter Choke
Speaker	C0315	5-inch Speaker
	A0035	Cabinet
	B0108	Grille (Cabinet)
	D2008	Handle (Carrying)
	D2009	Knob (Control)
	D2233	Dial Glass
	D1536A	Rubber Drive Bush
	D2011A	Dial Pointer
	B0112	Loop Aerial Assembly
	D2229A	Dial Cord
	D1554	Spring



CIRCUIT DIAGRAM OF MODEL 46, INCORPORATING CHASSIS A436BS.

RECEIVER ALIGNMENT PROCEDURE

In any case where a component replacement has been made in either the tuned I.F. or R.F. circuits of the receiver, all circuits must be re-aligned.

I.F. alignment should always precede R.F. alignment, and even if only one coil has been serviced, the whole of the re-alignment should be done in the order given.

An output meter should always be connected across the voice coil terminals of the speaker to indicate when the circuits are tuned to resonance. In carrying out the following operations, it is important that the input to the receiver from the oscillator should be kept low and progressively reduced as the circuits are brought into line, so that the output meter reading does not exceed about 1.0 volt.

I.F. ALIGNMENT

Rotate volume control fully clockwise and fully enmesh the tuning condenser vanes.

Connect output leads of signal generator to the grid cap of the 6A8G converter through a 0.1 mfd. condenser and to the receiver chassis. Do not remove grid lead of converter valve.

(1) Tune signal generator to exactly 457.5 Kc.

(2) Adjust the I.F. transformer trimmer screws for resonance, commencing with the second I.F. transformer and following with the first.

(3) Continue this alignment carefully on each transformer in turn until no greater output can be obtained. It is necessary to repeat this procedure at least twice to ensure good alignment.

NOTE: If trimmer screws are screwed too far in, it may be possible to obtain a false peak due to coupling effects between the iron cores. Start alignment of each individual transformer by first screwing its core well out and then advancing core into the coil until resonance is obtained.

R.F. ALIGNMENT

With controls set as for I.F. alignment, connect signal generator output leads in series with a 200 mmfd. condenser to the aerial and earth terminals.

Check that when the ganged condenser is fully meshed the pointer coincides with the setting line at the extreme left of the dial scale. If necessary, the pointer may be adjusted to this position by first softening the wax securing the drive cord to the pointer carriage.

(1) Tune signal generator to 600 Kc.

(2) Rotate tuning knob until dial pointer is exactly over 600 Kc. calibration mark (third mark from the left on upper dial scale) and adjust the oscillator padder screw for maximum response.

(3) Rotate tuning knob to 1500 Kc. calibration mark (second mark from the right on upper dial scale) and adjust the oscillator trimmer and aerial trimmer in turn for maximum response.

(4) Repeat all the foregoing operations for proper alignment.

CONVERTER VALVE REPLACEMENT

If the 6A8G converter valve has been replaced, it may be necessary to alter the value of neutralizing capacitance used. This capacitance is in the form of a Nylex insulated wire coiled around the barrel of the aerial trimmer; its value may be adjusted by altering the length of wire used. Its value should be such as to result in approximately the same overall sensitivity at 1500 and 1000 Kcs. Too much capacitance may result in low sensitivity at the high frequency end of the band, whilst too low a value may give rise to instability.

Complete re-alignment of the oscillator and signal frequency circuits must be carried out if any adjustment of the neutralizing capacitance has been made.

ADDITIONAL DATA

Any further service information desired may be obtained by addressing an inquiry to The Service Department, The Gramophone Co. Ltd., 2 Parramatta Road, Homebush, N.S.W.

— VOLTAGE TABLE —

VALUES GIVEN ARE WITH RECEIVER OPERATING ON AVERAGE MAINS VOLTAGE AND TUNED TO POINT OF NO RECEPTION ON THE BROADCAST BAND.
VOLTAGE READINGS MEASURED WITH METER RESISTANCE OF 1,000 OHMS PER VOLT.
VOLTAGE AND CURRENT READINGS WITHIN ± 15 %.
RESISTANCE READINGS ARE APPROXIMATE.

VOLTS TO CHASSIS	CURRENT MA.	RESISTANCE TO CHASSIS	VALVE BASE	VOLTS TO CHASSIS	CURRENT MA.	RESISTANCE TO CHASSIS
		V 1	6A8-G CONVERTER			
			GRID	—	—	1·5 MΩ
96	4·9	INFIN.	SCREEN GRID / OSC. GRID	—	—	50,000 Ω
270	2·7	INFIN.	PLATE / OSC. PLATE	175	4·2	INFIN.
A.C. 6·3	0·3 AMP	—	HEATER / HEATER	NIL	—	NIL
			NO CONN. / CATHODE	NIL	11·8	NIL
		V 2	6G8-G I.F. A.V.C. DEMODULATOR			
			GRID	—	—	6·3 Ω
—	—	0·51 MΩ	DIODE / DIODE (A.V.C.)	—	—	2·6 MΩ
235	6·0	INFIN.	PLATE / SCREEN GRID	96	1·6	INFIN.
A.C. 6·3	0·3 AMP	—	HEATER / HEATER	NIL	—	NIL
			NO CONN. / CATHODE	3·1	7·6	400 Ω
		V 3	6V6-GT OUTPUT			
96	0·7	INFIN.	SCREEN GRID / GRID	—	—	1·0 MΩ
265	15·5	INFIN.	PLATE			
A.C. 6·3	0·45 AMP	—	HEATER / HEATER	NIL	—	NIL
			NO CONN. / CATHODE	3·9	16	250 Ω
		V 4	6X5-GT RECTIFIER			
			PLATE # 1	A.C. 280	—	1,700 Ω
A.C. 280	—	1,700 Ω	PLATE # 2			
—	A.C. 0·6 AMP	INFIN.	HEATER / HEATER	—	—	INFIN.
			NO CONN. / CATHODE	270	36	INFIN.

REMARKS -

H.T. TRANSFORMER C.T. TO CHASSIS — — — VOLTAGE = 50 VOLTS.

H.T. TRANSFORMER C.T. TO CHASSIS — — RESISTANCE = 1,400 OHMS

TOTAL H.T. CURRENT = 36 MA.

FILTERED H.T. VOLTAGE = 270 VOLTS.