PRIVATE AND CONFIDENTIAL

FOR TRADE USE ONLY

"His Master's Voice"

SERVICE MANUAL

for

FOUR-VALVE BROADCAST BAND A.C. RECEIVER

MANTEL MODEL 449

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TECHNICAL SPECIFICATION

VOLTAGE RANGE

200 to 250 volts, 40 to 50 cycles.
It is important that the receiver be operated at the correct voltage; the voltage taps on the mains transformer should be utilized as follows:

Voltage of A.C. Supply:	Use Tap Designated:
200–230 volts	230
231–250 ,,	250

CONSUMPTION

56 watts.

WAVE-LENGTH RANGE

200 to 550 metres, or 1500 to 545 kilocycles.

MAX. UNDISTORTED POWER OUTPUT

2.0 watts.

DIMENSIONS

Height	Width	Depth
15″	11″	8″

WEIGHT

Net	Gross
18¾ lbs.	23 lbs.

LOUDSPEAKER

Model 449 uses a 6″ cone speaker.

DC resistance of field, cold ..	1500 ohms
DC resistance of voice coil ..	2.3 ,,
400 cycle impedance of voice coil	2.7 ,,

VALVES

6A8G, 6G8G, EL3(N)G, 5Y3G.

CIRCUIT DESCRIPTION

The 6A8G pentagrid converter is coupled to the aerial by means of an iron-cored Litz wire transformer, which gives improved gain and selectivity. The converter is followed by a single stage high gain intermediate frequency amplifier utilising a 6G8G type amplifier tube.
The intermediate transformers are also of ironcored-Litz wire construction.
The primary and secondary of the first transformer are specially designed to give the order of gain and selectivity required.
The 6G8G tube, by means of its two diodes, also provides AVC bias both for itself and the converter as well as the demodulation of the IF signal.
The audio output of this tube is resistance capacity coupled to a high power sensitivity output pentode type EL3(N)G, which directly feeds the output transformer.
Power is supplied to the main circuits from a directly heated rectifier (Type 5Y3G), through the usual field coil filter employing 8 uf wet electrolytic condensers.
The oscillator plate and 6G8G screen grid are fed through a separate resistance capacity filter to further improve stability.
Padding of the oscillator tuned circuit is obtained by means of a variable inductance secondary and fixed padder condenser which minimises calibration drift due to variable padder shunts.

A.V.C.

Referring to the circuit diagram on page 3, it may be seen that the AVC diode of the 6G8G is delayed by an amount corresponding to its cathode voltage above ground. This delay is thus governed by the sensitivity requirements of the amplifier, and is about 2¾ volts negative with respect to cathode.
Only one half the total developed voltage is utilised for control purposes in order not to seriously limit the power output on weak signals.

TONE CONTROL

The tone is controlled by a series resistor-condenser combination across the output transformer primary; the various values being selected by a 4-position switch.

PRELIMINARY TESTS

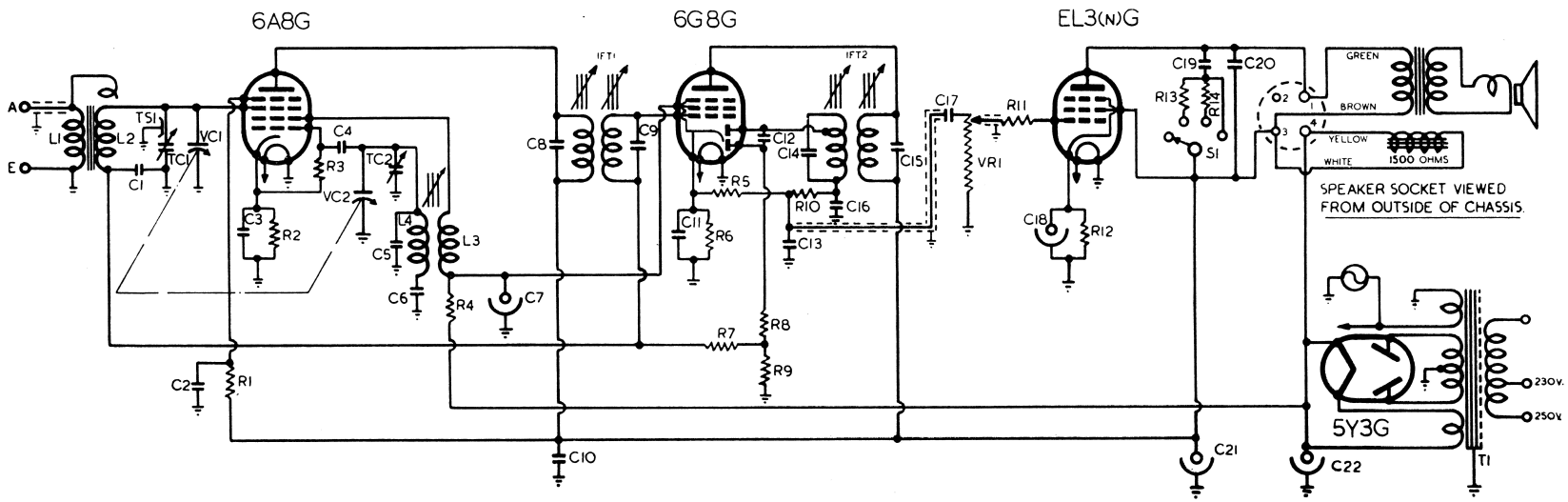
The following tests should be made:

1. Unfiltered HT + (terminal 4 on speaker socket) to chassis 327 volts.
   If voltage is low, check line voltage to see that transformer is working from correct prinary tap, also try replacing 5Y3G.
   Also test filter condensers for leakages. Do tests 2 and 3.
2. Filtered HT (terminal 3 on speaker socket) to chassis 235 volts.
   If voltage is low, check output filter condenser. Do test 3.
3. EL3(N)G plate current. Check voltage drop across output transformer primary (terminals 1 and 3 on speaker socket). This should be 15 volts. If high or low and voltages on tests 1 and 2 are O.K., try replacing the EL3(N)G.
4. Check all valves for filament continuity and freedom from inter-electrode short circuits.
5. If fault still persists, compare voltages with table on page 3.

NOTE.—The foregoing tests can only be carried out after removal of chassis from cabinet. The speaker socket numbering will be found by consulting the diagram on page 3 and noting that the numbers given for the speaker plug are correct only when viewing socket from **outside of chassis.**

IMPORTANT

All the above voltage tests should be made with a voltmeter having not less than 1000 ohms per volt of the full scale reading, and should then be within ± 10% of the specified values.



REF.	PART No.	DESCRIPTION
R1	AE3X	25000 OHMS 1 WATT
R2	AH1X	200 OHMS ¼ WATT
R3	H1X	50000 OHMS ¼ WATT
R4	W3X	30000 OHMS 2 WATT
R5	O1X	500000 OHMS ¼ WATT
R6	Z1X	250 OHMS ¼ WATT
R7	AA1X	2 MEGOHMS ¼ WATT
R8	O1X	500000 OHMS ¼ WATT
R9	O1X	500000 OHMS ¼ WATT
R10	H1X	50000 OHMS ¼ WATT
R11	H1X	50000 OHMS ¼ WATT
R12	AZW	130 OHMS 3 WATT
R13	F1X	10000 OHMS ¼ WATT
R14	E1X	4000 OHMS ¼ WATT

REF.	PART No.	DESCRIPTION
C1	0013/M	0.05 MFD 200V.
C2	0013/E	0.1 MFD 400V.
C3	0013/Q	0.1 MFD 200V.
C4	0243/BE	25 MMFD
C5	0243/BA	20 MMFD
C6	0243/AM	400 MMFD
C7	0014/AF	8 MFD 515 P.V. ELECTRO. CONDENSER
C8	0243/BL	100 MMFD
C9	0243/AZ	50 MMFD
C10	0013/C	0.25 MFD 400V.
C11	0013/Q	0.1 MFD 200V.
C12	0243/Q	50 MMFD
C13	0243/AE	100 MMFD
C14	0243/BL	100 MMFD
C15	0243/BL	100 MMFD
C16	0243/C	250 MMFD
C17	0013/N	0.01 MFD 600V.
C18	0014/F	25 MFD 25V.
C19	0013/G	0.05 MFD 400V.
C20	0013/O	0.002 MFD 600V.
C21	0014/AF	8 MFD 515 P.V. ELECTROLYTIC COND.
C22	0014/AF	8 MFD 515 P.V. ELECTROLYTIC COND.

REF.	DESCRIPTION	PART No.
VC1 & VC2	380 MMFD 2 GANG CONDENSER	APC0057/A
VR1	1 MEGOHM POTENTIOMETER	APD0877
	DIAL LAMP 6.3V. .3 AMP.	
IFT1	1st IF TRANSFORMER	APD1442
IFT1	2nd IF TRANSFORMER	APD1443
	6″ SPEAKER	APC0202
T1	MAINS TRANSFORMER	APD1432
S1	TONE MONITOR SWITCH	APD1238
L1 & L2	B/C AERIAL COIL	APD0896
L3 & L4	B/C OSCILLATOR COIL	APC0085/A
TC1 & TC2	AIR TRIMMER 1.5—18 MMFD	APD0786
TS1	FIXED TRIMMER SHUNT 7.0 MMFD	APD0910

DISMANTLING

REMOVAL OF CHASSIS

1. Remove knobs.
2. Disconnect power plug and speaker plug.
3. Remove four fixing screws from underside of cabinet; the chassis is now free.

REMOVAL OF LOUDSPEAKER

1. Remove 4-pin plug from back of chassis.
2. Remove four screws holding speaker chassis and two screws from support bracket to cabinet.

IMPORTANT

It is extremely important, when servicing, to make sure that the speaker is plugged into the chassis before switching on, otherwise serious damage may result.

VOLTAGE TABLE

Values given may vary ± 10% and are taken on 240-volt mains (250-volt primary tap). Receiver tuned to no signal point unless otherwise stated.

	V1 Amplr. Sect.	Osc. Sect.	V2 (6G8G)	V3 (EL3(N)G)	V4 5Y3G
Plate to chassis volts	235	125	235	218	—
Screen to chassis volts	100* / 95	— / —	135* / 125	235 / 262	— / —
Heaters	—	6.3	6.3	6.3	5.0
Cathode to chassis volts	-2.3	—	-2.6	-5.3	—

*Tuned to strong local station.

Total HT current measured at terminal 4 of speaker socket	55 ma.
V1 oscillator anode current measured at + side of primary	4.2 ma.
V1 screen current measured at dropping resistor	4.7 ma.
V2 screen current measured at V2 socket	2.2 ma.
V3 screen current measured at screen terminal of V3 socket	3.9 ma.
V3 plate current measured at terminal 4 of speaker socket	34 ma.

RADIO FREQUENCY TESTS AND ADJUSTMENTS

Insensitivity or poor selectivity generally indicate mis-alignment of the tuned circuits.

In any case, where a component replacement has been made in either the IF or RF circuits, of the receiver, or if the wiring has been disarranged, all circuits must be re-aligned.

To do this, the following equipment is required:

An oscillator or signal generator capable of tuning to 460 kc., 1400 kc., and 600 kc. An output meter should be used to indicate when the circuits are tuned to resonance.

IF alignment should always precede RF alignment, and even if only one coil has been serviced, the whole of the realignment should be done in the order given.

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 reading on the output meter does not exceed about 1.0 volt.

For all alignment operations the output meter should be connected directly across the voice coil terminals on the speaker.

I.F. ALIGNMENT

Rotate volume control fully clockwise and tone control fully anti-clockwise and fully engage the vanes of the ganged condenser. Connect the output leads of the signal generator to the grid of the 6A8G through a 0.1 mf. condenser and to the chassis. (Note: Do not disconnect the clip and lead from 6A8G grid).

1. Tune signal generator to exactly 460 kc.
2. Adjust the trimmer screws on the IF transformers (the top screw is the secondary and the bottom the primary in both transformers) for maximum deflection of the output meter.

Continue this alignment on each transformer in turn until no greater output can be obtained.

IMPORTANT

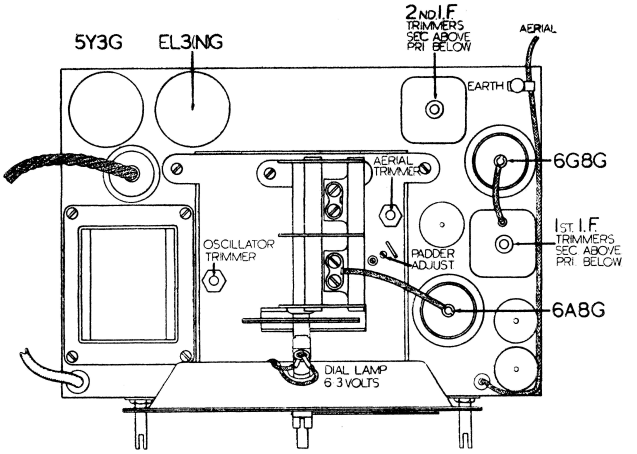
Do not use metal blade screwdriver for this purpose.

(**Note.**—If trimmer screws are screwed too far in, it is possible to obtain a false peak due to coupling effects between the moveable iron cores. Any trimmer which appears to require screwing too far in should be screwed out considerably, and the true peak will then be found.)

R.F. ALIGNMENT

With controls set as for IF alignment, connect the signal generator output leads through a standard dummy antenna of 200 MMF capacity to the aerial terminal (nearest front of chassis) on the 5 terminal strip in RF tuning compartment, and to chassis. Check that when the gang condenser is fully meshed the pointer falls directly over the thin horizontal line (marked "S") at the extreme lower right of the scale.

1. Tune signal generator to 600 kc.
2. Rotate tuning knob until pointer is exactly over 600 kc. mark on scale, and by means of padding adjustment (brass screw to right of ganged condenser) align receiver so that the 600 kc. signal is tuned exactly on line.
3. Tune signal generator to 1400 kc.
4. Set pointer exactly over 1400 kc. point on scale and adjust oscillator trimmer (on **left-hand side** of ganged condenser) until signal is correctly tuned in with the pointer on the 1400 kc. line.
5. Adjust aerial trimmer (on **right-hand side** of ganged condenser) for maximum output meter reading.
6. Repeat operations 1 to 5 (inclusive). **This is important.** Note that any broadcast stations receivable are tuned in correctly on calibration.



Note.—The R.F. trimmers on these models are of plunger type with air dielectric, and possess exceptionally high stability and efficiency. A special adjusting tool can be obtained from the factory incorporating a box spanner for the condenser lock nut, and an adjusting hook for the plunger. After loosening the large lock nut at the top of the condenser, the adjusting hook is inserted in the hole which will be found in the top of the plunger, which can then be easily adjusted by moving up or down as required with a **slight** rotary movement. When adjustment is completed, tighten the lock nut securely.

ADDITIONAL DATA

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

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

THE GRAMOPHONE COMPANY LTD.

(Incorporated in England)

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