Private and Confidential

For Trade Use Only

"His Master's Voice"

SERVICE MANUAL

for

FIVE-VALVE A.C. MAINS-OPERATED DUAL-WAVE CHASSIS

TYPE 33

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THE GRAMOPHONE COMPANY LIMITED
(*Incorporated in England*)
HOMEBUSH - - - - N.S.W.

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PART No. 6822771

TECHNICAL SPECIFICATION

POWER SUPPLY:
200 to 250 volts, 40 to 50 c.p.s.
(Receiver only).

CONSUMPTION:
36 watts.

FREQUENCY RANGE:
540 Kc/s to 1600 Kc/s.
5.9 Mc/s to 18.25 Mc/s.

I.F. FREQUENCY:
457.5 Kc/s.

VALVE COMPLEMENT:

6BE6	.....	Frequency Changer.
6BA6	.....	I.F. Amplifier.
6AV6	.....	A.V.C.-Demod.-Audio Amp.
6M5	.....	Power.
6X4	.....	Rectifier.

DIAL LAMPS:

6.3 volts, 0.3 amp.

CIRCUIT DESCRIPTION

This model incorporates a 5-valve A.C. mains-operated superheterodyne receiver for medium-wave and short-wave reception, and incorporates pick-up terminals for record player reproduction.

FREQUENCY CHANGER

The aerial, on the broadcast band, is coupled to the signal frequency circuit by means of the iron-dust cored aerial transformer, L3-L4. For short-wave reception, the short-wave aerial transformer, L1-L2, is switched into circuit.

The frequency changer valve is used as a pentagrid converter with a self-excited oscillator circuit.

Fixed padding capacities are used on both bands. On the short-wave the padding capacitor is switched in the aerial circuit, whilst on medium-wave padding is provided in the oscillator circuit with variable padding provided by an iron-dust bolt in coil L5.

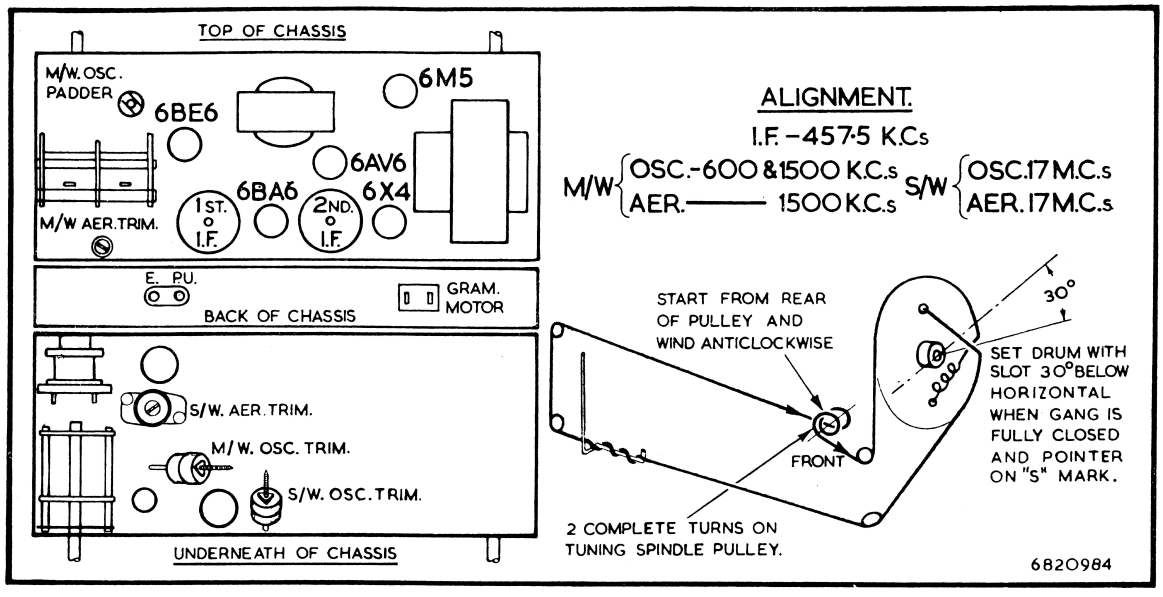
I.F. AMPLIFIER

The frequency changer valve is transformer-coupled to a remote cut-off pentode V2. This valve is, in turn, transformer - coupled to the demodulator diode section of the duo-diode triode valve V3. Both I.F. transformers have fixed tuning capacitors, and permeability tuning is provided by means of iron-dust tuning bolts.

DEMODULATOR, A.V.C. AND A.F. AMPLIFIER

Simple A.V.C. is used to obtain A.V.C. potentials for the frequency changer and I.F. amplifier.

The demodulated signal across the diode load VR1 is applied to the grid of the triode section of V3.



The audio amplifier is resistance capacity coupled to the grid of the power output valve V4.

Switching is provided for earthing the diode and A.V.C. line and for switching the P.U. terminals across the volume control.

AUDIO OUTPUT AMPLIFIER

The power pentode output valve V4 is transformer-coupled to the loudspeaker. Inverse feedback is provided by feeding voltage from the voice coil via C22 to the cathode of the 6M5 output valve.

H.T. SUPPLY

The power supply employs an indirectly heated type high-vacuum valve V5 as a full wave rectifier. Unfiltered high tension voltage is fed to the power output valve plate circuit, whilst the remaining receiver circuits are supplied with H.T. through a resistance capacity filter.

RECEIVER ALIGNMENT PROCEDURE

In any case where a component replacement has been made in either the tuned I.F. or R.F. circuits of a receiver, all circuits must be realigned. I.F. alignment should always precede R.F. alignment, and even if only one coil has been serviced, the whole of the realignment should be done in the order given. An output meter should be connected across the voice coil terminals of the speaker to indicate that the circuits are tuned to resonance. In carrying out the following operations, it is important that the input to the receiver from the signal generator 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 volt.

Note: Calibration marks are provided on the lower section of the dial glass. Beginning at the left, these marks correspond to:

(1) Pointer setting.
(2) 600 Kc/s.
(3) 980 Kc/s.
(4) 1500 Kc/s.

I.F. ALIGNMENT

(1) Rotate the volume control fully clockwise and fully enmesh the tuning condenser vanes, turn the tone control to minimum top cut position. Connect the output leads of the signal generator to the grid of the 6BE6 frequency changer valve through a 0.1 condenser, or the vacant lug on the top of the tuning condenser.
(2) Tune signal generator to exactly 457.5 Kc/s.
(3) Adjust the I.F. transformer trimmer screws for maximum reading on the output meter, commencing with the second I.F. transformer and following with the first.
(4) Continue this alignment on each transformer in turn until no greater output can be obtained. It is necessary to repeat this procedure twice to ensure correct 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 (Medium-Wave)

(1) With controls set as for I.F. alignment, connect signal generator output leads in series with a 200 mmF. condenser to the aerial tag on the short-wave aerial coil and the earth lead or chassis of the receiver.
(2) Check that, when the gang condenser is fully enmeshed, the pointer coincides with the setting line, on the extreme left of the dial scale. If necessary, the pointer must be adjusted at the point where the drive cord is attached to the pointer carrier.
(3) Tune signal generator to 600 Kc/s.
(4) Rotate tuning knob until the pointer is exactly over the 600 Kc/s calibration mark, and adjust the padder screw for maximum response.
(5) Tune signal generator to 1500 Kc/s.
(6) Rotate tuning knob until the pointer coincides with the 1500 Kc/s calibration mark, and adjust the oscillator trimmer and aerial trimmer in turn for maximum response.
(7) Repeat operations (3) to (6) inclusive for proper alignment.

R.F. ALIGNMENT (Short-Wave)

(1) Set wave-change switch to Short-Wave (extreme clockwise) position. Remove the 200 mmfd. condenser from the output lead of the signal generator and replace with a 400 ohm non-inductive resistor. It is desirable that the generator be connected straight to the aerial tag on the short-wave aerial coil former for the short-wave alignment and to the earth lead as before.

(2) Rotate the tuning knob until the pointer coincides with the 17 Mc/s calibration mark.

(3) Tune the signal generator to 17 Mc/s.

(4) Adjust the short-wave oscillator trimmer for maximum output. Two settings may be found at which this trimmer will peak; care must be taken that the setting finally chosen is that which gives the larger capacity. Failure to select the correct position of the two will cause serious tracking errors and loss of sensitivity.

(5) Leaving the signal generator on 17 Mc/s., adjust the short-wave aerial trimmer for maximum output, whilst "rocking" the gang condenser slightly to obtain the true resonance point.

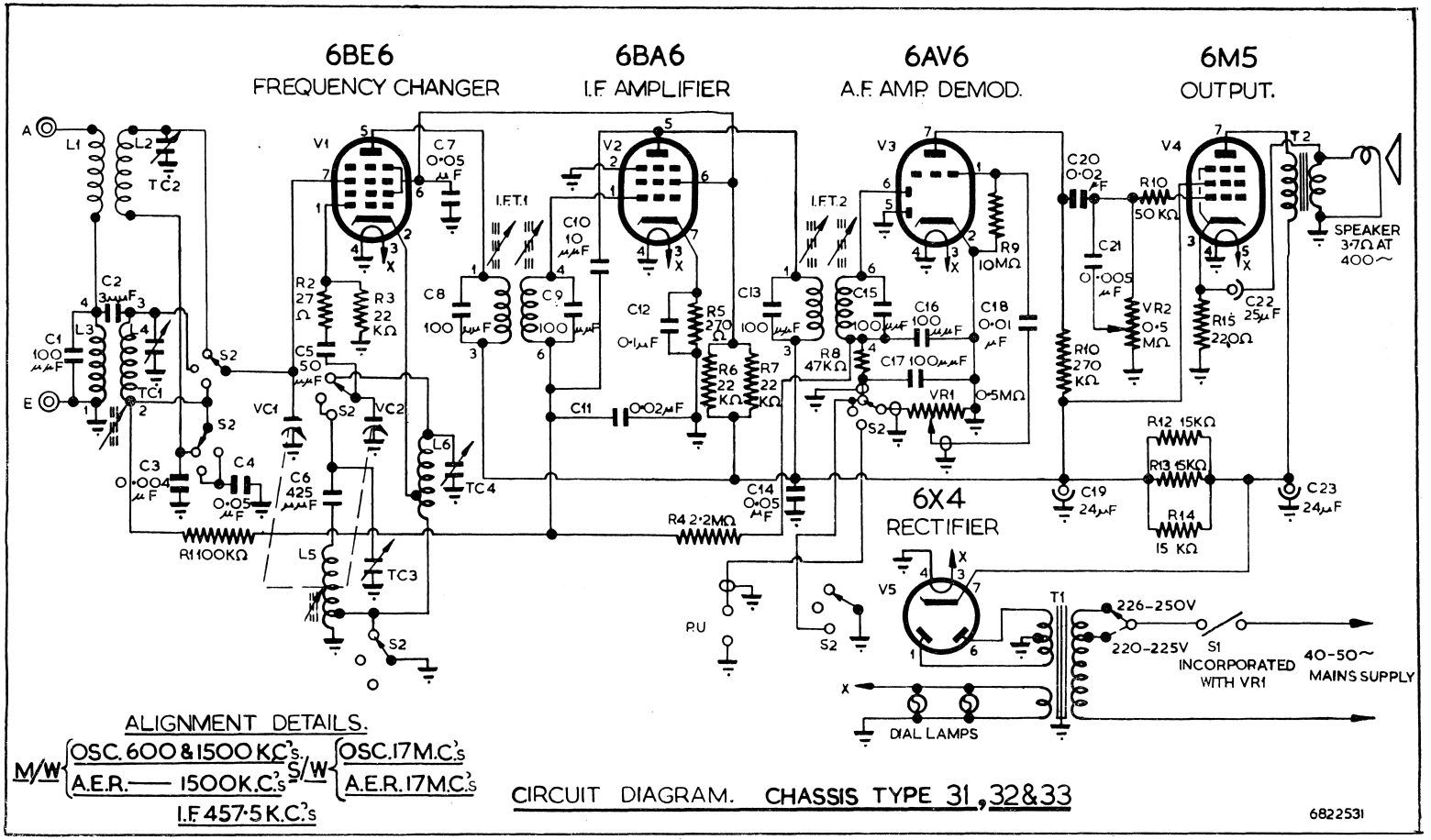
(6) Note that the signal is still tuned in correctly on the dial; if not, readjust the short-wave oscillator trimmer slightly until the dial reads correctly, and repeat operation (5).

ADDITIONAL DATA

Any further service information may be obtained by addressing an inquiry to the "Service Division, E.M.I. (Aust.) Pty. Ltd., 575-577 Parramatta Rd., Leichhardt (telephone LM1491).

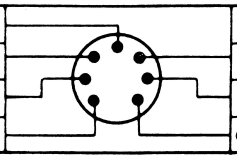
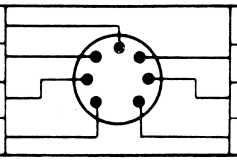
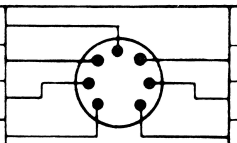
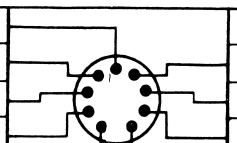
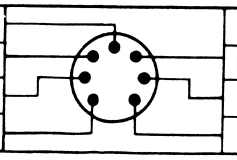
During the course of production of this receiver, the Company reserves the right, without notice, to make any modification or improvements in design which may be necessary to meet prevailing conditions.

Information concerning changes, which is likely to be of benefit to retailers and servicemen, will be notified as far as possible by issuing a Technical Data Sheet.


6BE6
FREQUENCY CHANGER
6BA6
I.F. AMPLIFIER
6AV6
A.F. AMP. DEMOD.
6M5
OUTPUT.
6X4
RECTIFIER
SPEAKER 3·7Ω AT 400~
DIAL LAMPS
226-250V
220-225V
S1
INCORPORATED WITH VR1
40-50~
MAINS SUPPLY
P.U
ALIGNMENT DETAILS.
M/W
OSC. 600 & 1500 KC's.
A.E.R. — 1500 K.C's
S/W
OSC. 17 M.C's
A.E.R. 17 M.C's
I.F. 457·5 K.C's
CIRCUIT DIAGRAM. CHASSIS TYPE 31, 32 & 33
6822531

— VOLTAGE TABLE. —

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

VOLTS TO CHASSIS	CURRENT M.A.	RESISTANCE TO CHASSIS	VALVE ELECTRODE	BOTTOM VIEW OF VALVE SOCKET	VALVE ELECTRODE	VOLTS TO CHASSIS	CURRENT M.A.	RESISTANCE TO CHASSIS
			V1	6BE6	FREQUENCY CHANGER.			
—	—	0	HEATER					
6·3A.C.	300	—	HEATER		PLATE	185	2·0	INFIN
—	11	0·5Ω	CATHODE		SCREEN	95	8·0	INFIN.
—	0·31	20KΩ	OSC.GRID		CONTROL GRID	—	—	2·6MΩ
			V2	6BA6	I.F. AMPLIFIER.			
—	—	0	HEATER					
6·3A.C.	300	—	HEATER		PLATE	185	3·6	INFIN.
—	—	0	SUPPRESSOR		SCREEN	95	2·0	INFIN.
—	—	2·5 MΩ	CONTROL GRID		CATHODE	1·5	5·6	250Ω
			V3	6AV6	AUDIO AMPLIFIER–DEMODULATOR.			
—	—	—	HEATER					
6·3A.C.	300	—	HEATER		DIODE N° 2	0	0	0·5MΩ
0	0·4	0	CATHODE		DIODE N° 1	—	—	—
0	0	10MΩ	CONTROL GRID		PLATE	70	0·4	INFIN.
			V4	6M5	OUTPUT			
6·3 A.C.	710	—	HEATER					
—	—	—	HEATER		NO CONN.	—	—	—
5V	26	200Ω	CATHODE		PLATE	280	23	INFIN.
0	0	0·5MΩ	CONTROLGRID		NO CONN.	—	—	—
185	3	INFIN.	SCREEN		NO CONN	—	—	—
			V5	6X4	RECTIFIER.			
—	—	—	HEATER					
6·3A.C.	600	—	HEATER		NO CONN.	—	—	—
—	—	—	NO CONN.		PLATE N°2	240A.C.	—	360Ω
240A.C	—	360Ω	PLATE N°1		CATHODE	260	—	INFIN.

REMARKS:- TOTAL H.T. CURRENT 42 M.A.

6820742

PARTS LIST

RESISTORS

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
R1	7400142	100,000 ohms ± 10% ½ watt	R9	7420232	10 megohms ± 10% 1 watt
R2	7460112	27 ohms ± 10% ½ watt	R10	7400172	270,000 ohms ± 10% ½ watt
R3	7400102	22,000 ohms ± 10% ½ watt	R11	7400122	47,000 ohms ± 10% ½ watt
R4	7400202	2.2 megohm ± 10% ½ watt	R12	7420042	15,000 ohms ± 10% 1 watt
R5	7400292	270 ohms ± 10% ½ watt	R13	7420042	15,000 ohms ± 10% 1 watt
R6	7420052	22,000 ohms ± 10% 1 watt	R14	7420042	15,000 ohms ± 10% 1 watt
R7	7420052	22,000 ohms ± 10% 1 watt	R15	7400282	220 ohms ± 10% ½ watt
R8	7400122	47,000 ohms ± 10% ½ watt			

CAPACITORS

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
C1	2730051	100 pF. ± 10%	C12	2790151	.1 mF. ± 20% 200V. wkg.
C2	2730001	3 pF. ± 10%	C13	2750041	100 pF. ± 5%
C3	2730201	.004 mF. ± 100 pF.	C14	2790131	.05 mF. ± 20% 400V. wkg.
C4	2790121	.05 mF. ± 20% 200V. wkg.	C15	2750041	100 pF. ± 5%
C5	2730041	50 pF. ± 10%	C16	2730051	100 pF. ± 10%
C6	2730111	425 pF. ± 5 pF.	C17	2730051	100 pF. ± 10%
C7	2790131	.05 mF. ± 20% 400V. wkg.	C18	2790071	.01 mF. ± 20% 600V. wkg.
C8	2750041	100 pF. ± 5%	C19-C23	2690271	24 mF. + 24 mF. 350 P.V.
C9	2750041	100 pF. ± 5%	C20	2790101	.02 mF. ± 20% 600V. wkg.
C10	2730011	10 pF. ± 10%	C21	2790031	.005 mF. ± 20% 600V. wkg.
C11	2790091	.02 mF. ± 20% 400V. wkg.	C22	2690221	25 mF. 40 P.V.

MISCELLANEOUS

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
T1	9040004	Transformer, Mains	L6	2570112	Coil, S/W Oscillator
T2	9050023	Transformer, Output	TC1 & TC2	2810071	Capacitor, Trimmer Aerial—S.W. & M.W.
VC1-VC2	2810062	Capacitor, 2-Gang	TC3 & TC4	2810031	Capacitor, Trimmer Osc.—S.W. & M.W.
VR1/S1	6770004	Potentiometer, ½ meg., with 2-pole switch	IFT1	9050024	Transformer, 1st I.F.
VR2	6770023	Potentiometer, ½ megohm	IFT2	9060024	Transformer, 2nd I.F.
S2	8550025	Switch, Wave-Change		3810033	Drum
	9320301	Valve 6X4		2970011	Cord, Drive: 4' 5" length
	9320291	Valve 6M5		8400111	Spring, Drum
	9320321	Valve 6AV6		8370055	Drive Spindle
	9320331	Valve 6BA6		6710281	Pointer Assembly
	9320341	Valve 6BE6		7940331	Dial Scale
L1-L2	2530122	Coil S/W Aerial		9320391	Lamps, 6.3V., 0.3 amp., M.E.S.
L3-L4	2530101	Coil, Medium-Wave Aerial			
L5	2570104	Coil, Medium-Wave Osc.			