

# "HIS MASTER'S VOICE" SERVICE MANUAL

for

# 7-VALVE A.C. MAINS-OPERATED STEREOPHONIC RADIOGRAM CHASSIS TYPE LI

THE GRAMOPHONE COMPANY LIMITED
(Incorporated in England)
2 PARRAMATTA ROAD, HOMEBUSH

#### **TECHNICAL SPECIFICATION**

POWER SUPPLY:

200 to 250 volts at 40 to 50 c.p.s.

CONSUMPTION:

66 watts.

TUNING RANGE:

M.W.: 1600 - 540 Kc/s.

INTERMEDIATE FREQUENCY:

457.5 Kc/s.

VALVE COMPLEMENT:

6AN7 ..... Frequency Changer.

6N8 ...... I.F. Amp. — Demod. — A.V.C.

12AX7 ...... 1st A.F. Amp. — Tone Control.

2nd A.F. Amp.

6BO5 ...... Power.

6BÕ5 ...... Power.

6AC4 ...... Rectifier.

#### DIAL AND PILOT LAMPS:

6.3 volt, 0.3 amp. (Miniature screw cap base)

#### TONE CONTROL:

- 1: Bass boost or cut.
- 2: Treble boost or cut.

#### **FUNCTION SWITCH:**

Four positions—

- 1: Mains switched off.
- 2: Radio.
- 3: Monophonic records.
- 4: Stereophonic records.

#### CIRCUIT DESCRIPTION

This chassis type is a seven-valve A.C. mains-operated superheterodyne radio receiver covering the medium-wave broadcasting band 540-- $1600~{\rm Kc/s}$ , and has two separate audio amplifier channels suitable for reproduction of stereophonic records.

#### FREOUENCY CHANGER

A triode-hexode, V1, is employed as the frequency changer.

The aerial is coupled through a high gain transformer, L1-L2, to the hexode grid. The triode section of V1 is used as a grid tuned oscillator; tracking is obtained by means of a fixed padding capacitor in conjunction with an adjusable iron dust tuning bolt in oscillator coil L3-L4. The oscillator circuit tracks on the high frequency side of the signal frequency.

When the Function Switch is set to "Mono" or "Stereo," the converter and I.F. amplifier screen supply is disconnected.

#### I.F. AMPLIFIER - DEMOD. - A.V.C.

The frequency changer is transformer coupled to a duo-diode-pentode valve, V2, the output of which is coupled by means of a second transformer to the demodulator diode, where the signal is demodulated and appears across resistor R7.

The I.F. transformers employed have fixed tuning capacitors and are permeability tuned.

Neutralization of this stage is effected by capacitor C10. The plate circuit of this amplifier is capacity coupled to the remaining diode to provide A.V.C. Full A.V.C. voltage is applied to the frequency changer and I.F. amplifier; standing bias for these stages and A.V.C. diode delay voltage is supplied from the back bias resistor, R41, in the high tension negative circuit.

#### **FUNCTION SWITCH**

Input signals to each amplifier are fed via the function switch, the four positions of which provide for:

1. Set switched off.

A single pole switch "S2" switches the mains supply to amplifier and gramophone motor outlet.

2. "Radio."

Both amplifiers receive a common input. The demodulated radio signal is coupled to the "Right" section of the 2-gang volume control (RV2) which applies a common signal to both A.F. amplifiers via V3—L and V3—R.

3. "Mono" Pick-up.

Output from the monophonic pick-up head is applied to both A.F. amplifiers via V3—L and V3—R as in "Radio."

4. "Stereo."

Both amplifiers operate independently. Outputs corresponding to the "Left" and "Right" channels of the Stereophonic cartridge are coupled to their respective sections of the ganged volume control (RV1 and RV2) which independently feed V3—L and V3—R.

#### BALANCE CONTROL

The balance control which is connected between V3—L and V3—R cathodes and earth via C18, increases the gain of one valve and at the same time decreases the gain of the other by altering the effective cathode impedance to earth.

Note: It is only effective when the function switch is at "Sereo."

#### A.F. AMPLIFIERS

The A.F. amplifier section consists of two identical units, each of which comprises volume control, preamplifier, tone controls, driver and output stages. Controls for both amplifiers are mechanically coupled. The heater and H.T. supplies are both taken from a common power unit.

The respective outputs of V3—L and V3—R are fed to the ganged bass and ganged treble controls which comprise a frequency conscious voltage divider network. The separate outputs are then applied to the grids of V4—L and V4—R, which are R—C coupled to their respective power output valves, V5 and V6.

#### POWER OUTPUT STAGE

Transformers T1 and T2 provide correct matching, for the output stages, to 15 ohms loud-speaker loads. The split secondaries of each transformer are terminated to output socket SK2.

Speaker connections can be made in either one of the following ways:

(1) Single Channel Operation for radio and monophonic record reproduction.

A section of the secondary of one transformer is connected in series with the corresponding secondary section of the other transformer to feed a common "Single channel" 15 ohm loudspeaker.

(2) Two Speaker Operation for radio and stereophonic as well as monophonic record reproduction.

The whole secondary winding of each output transformer is connected to its own independent 15 ohm loudspeaker load.

For details of speaker connections pertaining to a particular model incorporating this chassis, reference should be made to the appropriate Model Data Sheet.

Portion of the voltage appearing across the secondary of each output transformer is applied to the cathode of the corresponding triode section of V4. This is fixed for all modes of operation on both amplifiers.

#### HIGH TENSION SUPPLY

The power supply employs an indirectly heated full wave rectifier which directly supplies the plate circuit of the power amplifiers. The remaining H.T. circuits of the receiver are fed through resistance-capacitance filters.

#### 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 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 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.

#### I.F. ALIGNMENT

Set receiver controls as follows:

Volume Control: Maximum.

Tone Control: Normal.

Function Selector to "Radio."

Tuning Control: Capacitor plates fully enmeshed.

(1) Connect the output of the signal generator through a 0.1 mF. capacitor to the stator plates of the front section of the ganged capacitor.

- (2) Tune the 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 the 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 the core into the coil until resonance is obtained.

#### R.F. ALIGNMENT

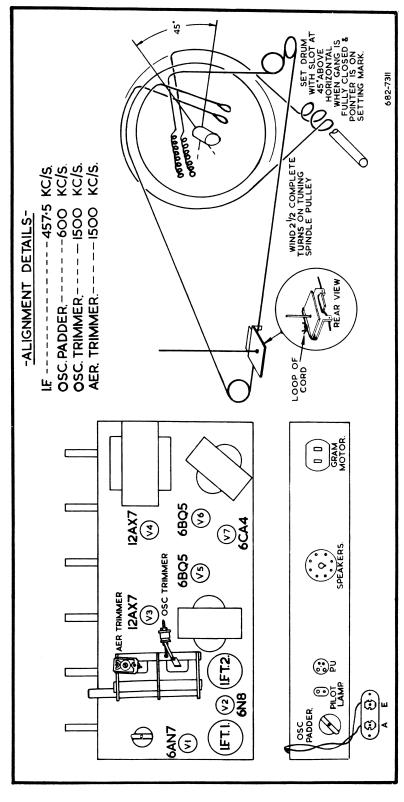
- (1) With the controls set as for I.F. alignment, connect the signal generator output leads in series with a 200 pF. capacitor to the aerial and earth terminals of the receiver.
- (2) Check that, when the ganged capacitor is fully closed, the pointer coincides with the setting marks at the extreme left-hand side of the dial scale.
- (3) Tune the signal generator and receiver to 600 kc/s. (The 600 kc/s calibration mark will be found above 4AT on the dial scale).
- (4) Whilst "rocking" the tuning control, adjust the medium - wave oscillator tuning bolt for maximum response.
- (5) Tune the signal generator to 1500 kc/s.

- (6) Adjust the tuning control until the pointer coincides with the 1500 kc/s calibration mark (near 3AK).
- (7) Adjust the oscillator and aerial trimmer capacitors in that order for maximum response.
- (8) Repeat operations (3) to (7) inclusive until correct alignment is obtained.

#### ADDITIONAL DATA

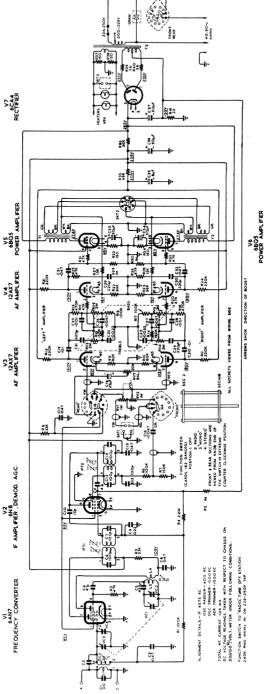
Any further service information may be obtained by addressing an enquiry to "The Service Division, E.M.I. (Australia) Limited, 575 - 577 Parramatta Road, Leichhardt" (phone LM0291).

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



CHASSIS DIAGRAM — VALVE LAYOUT AND DIAL CORDING





# PARTS LIST

# RESISTORS

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
R1	740-0142	$100,000 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$	R21	742-0452	$220,000 \text{ ohms} \pm 20\% 1 \text{ watt}$
R2	740-0582	$47,000 \text{ ohms } \pm 20\% \frac{1}{2} \text{ watt}$	R22	740-0052	$3,300 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$
R3	742-0382	$33,000 \text{ ohms } \pm 20\%  \tilde{1} \text{ watt}$	R23	740-0052	$3,300 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$
R4	740-0552	2.2 megohms $\pm 20\% \frac{1}{2}$ watt	R24	742-0452	$220,000 \text{ ohms } \pm 20\%  \bar{1} \text{ watt}$
R5	740-0532	1.0 megohm $\pm 20\% \frac{1}{2}$ watt	R25	740-0582	$47,000 \text{ ohms } \pm 20\% \frac{1}{2} \text{ watt}$
R6	740-0142	$100,000 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$	R26	740-0582	$47,000 \text{ ohms } \pm 20\% \frac{1}{2} \text{ watt}$
R7	740-0152	$150,000 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$	R27	740-0092	$15,000 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$
R8	742-0382	$33,000 \text{ ohms } \pm 20\%  1 \text{ watt}$	R28	<b>74</b> 0-0092	$15,000 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$
R9	740-0792	$8,200 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$	R29	740-0532	1.0 megohm $\pm 20\% \frac{1}{2}$ watt
R10	740-0792	$8,200 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$	R30	740-0532	1.0 megohm $\pm 20\% \frac{1}{2}$ watt
R11	742-0452	$220,000 \text{ ohms } \pm 20\%  \text{1 watt}$	R31	740-0582	$47,000 \text{ ohms } \pm 20\% \frac{1}{2} \text{ watt}$
R12	742-0452	$220,000 \text{ ohms } \pm 20\% 1 \text{ watt}$	R32	740-0582	$47,000 \text{ ohms } \pm 20\% \frac{1}{2} \text{ watt}$
R13	740-0152	$150,000 \text{ ohms } \pm 10\% \frac{1}{2} \text{ watt}$	R33	746-0261	150 ohms $\pm 10\% \frac{1}{2}$ watt
R14	740-0152	$150,000 \text{ ohms} \pm 10\% \frac{1}{2} \text{ watt}$	R34	746-0261	150 ohms $\pm 10\% \frac{1}{2}$ watt
R15	740-0182	$470,000 \text{ ohms} \pm 10\% \frac{1}{2} \text{ watt}$	R35	740-0562	$68,000 \text{ ohms } \pm 20\% \frac{1}{2} \text{ watt}$
R16	740-0142	$100,000 \text{ ohms} \pm 10\% \frac{1}{2} \text{ watt}$	R36	749-0202	$2,200 \text{ ohms } \pm 20\% 2 \text{ watt}$
R17	740-0142	$100,000 \text{ ohms} \pm 10\% \frac{2}{2} \text{ watt}$	R37	746-0261	150 ohms $\pm 10\% \frac{1}{2}$ watt
R18	740-0142		R38	746-0261	150 ohms $\pm 10\% \frac{1}{2}$ watt
R19	740-0182	$470,000 \text{ ohms} \pm 10\% \frac{1}{2} \text{ watt}$	R39	748-0131	$56 \text{ ohms } \pm 20\% \text{ 1 watt}$
		$47,000 \text{ ohms} \pm 20\% \frac{1}{2} \text{ watt}$	<b>R4</b> 0	748-0131	56 ohms $\pm 20\%$ 1 watt
R20	740-0582	$47,000 \text{ ohms } \pm 20\% \frac{1}{2} \text{ watt}$	R41	746-0002	22 ohms $\pm 10\% \frac{1}{2}$ watt

## CAPACITORS

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
C1	273-0931	$100P \pm 10\%$	C20	280-1371	$0.01 \pm 20\% 400V$ .
C2	526-1233	3P Lead—Capacitor	C21	273-0691	220P ± 10%
C3	279-1081	$0.047 \pm 20\%^{2}200V$ .	G22	280-0291	$0.0022 \pm 10\% 200V$ .
C4	273-0541	$47P \pm 10\%$	G23	280-0291	$0.0022 \pm 10\% 200V$ .
C5	273-0111	$425P \pm 5P$	G24	273-0691	220P ± 10%
C6	273-0331	$100P \pm 5\%$	G25	280-0251	$0.001 \pm 10\% 200$ V.
C7	273-0331	$100P \pm 5\%$	G26	280-0231	$0.001 \pm 10\% 200V$ . $0.0047 \pm 10\% 200V$ .
C8	279-1701	$0.047 \pm 20\% 400V$	G27	280-0331	$0.0047 \pm 10\% 200V$ . $0.0047 \pm 10\% 200V$ .
C9	279-4661	$0.022 \pm 10\% 400V$ .	C28		$0.0047 \pm 10\% 200V$ . $0.001 \pm 10\% 200V$ .
C10	273-0011	$10P \pm 10\%$		280-0251	
C11	273-0541	$47P \pm 10\%$	C29	273-0691	$220P \pm 10\%$
C12	273-0331	$100P \pm 5\%$	C30	273-0691	$220P \pm 10\%$
C13	273-0931	$100P \pm 10\%$	C31	279-1701	$0.047 \pm 20\% 400V$ .
C14	273-0331	100P ± 5%	C32	279-1701	$0.047 \pm 20\% 400V$ .
C15	279-1701	$0.047 \pm 20\% 400$ V.	C33	269-0171	50 mF 25 P.V.
C16	279-1581	$0.0047 \pm 20\% 400$ V.	C34	269-0171	50 mF 25 P.V.
C17	279-1701	$0.047 \pm 20\% 400$ V.	C35	269-0211	8 mF 350 P.V.
C18	269-0221	25 mF 40 P.V.	C36	269-0471	50 mF 400 P.V.
C19	280-1371	$0.01 \pm 20\% 400V.$	C37	269-0471	50 mF 400 P.V.

# MISCELLANEOUS

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
L1-L2 L3-L4 VC2- VC3 VC1 VC4 IFT1- IFT2 T1-T2 T3 RV1- RV2 RV3- RV4 RV5- RV6 RV7	253-0103 257-0085 281-0022 281-0031 281-0111 906-0062 905-0271 904-0231 677-0531 677-0531 677-0551	Coil M/W Aerial Coil M/W Oscillator Capacitors, 2-gang, Variable Capacitor, Trimmer Capacitor, Trimmer Transformer, I.F. (1st and 2nd) Transformer, Output Transformer, Power Volume Control, 2-gang, 1 Meg. Treble Control, 2-gang, 2 Meg  Bass Control, 2-gang, 2 Meg. Balance Control, 20,000 ohms	S1-S2 V1 V2 V3 V4 V5 V6 V7	855-0341 932-0151 932-0201 932-0401 932-1051 932-1051 932-1041 932-0391 792-8011 279-0011 381-0073 671-0341 840-0182 840-0251	Switch, Function Valve, 6AN7 Valve, 6N8 Valve, 12AX7 Valve, 12AX7 Valve, 6BQ5 Valve, 6BQ5 Valve, 6CA4 Lamp, 6.3 volt, 0.25 amp., M.E.S. Scale, Dial Cord, Dial Drive Drum Pointer Assembly Spring—Pointer Drive Spring—Pointer Drive



# TECHNICAL DATA SHEET

Date NO. 63

17th March, 1960.

Australia) Ltd., 2 Parranatta Rd., Homebush...N.S.W.

### MODEL L1

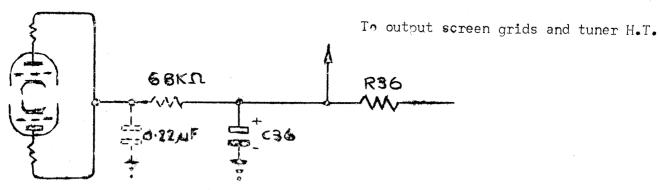
A circuit change has been made in the above model to reduce hum.

The change commenced with S/NO2698 and consists of adding a filter section to the anodes of V4 as shown in the circuit below:

Modified Circuit

(Additions shown dotted)

V4-12AX7



Components added are:-

740-0562 resistor, 68K 1 ± 20% W.

279-1781 condenser,  $0.22 \text{ uF} \pm 20\% 400 \text{ V.W.}$