



“His Master’s Voice”

SERVICE MANUAL

for

FOUR-VALVE MANTEL RECEIVERS

Broadcast Battery Operated Model 71

Broadcast Vibrator Operated Model 81

Dual-Wave Battery Operated Model 72

Dual-Wave Vibrator Operated Model 82

TECHNICAL SPECIFICATION

BATTERIES

Model	"A" Supply	"B" Supply
71	2-volt 110 amp. hr. Accumulator.	1 x 45-volt & 1 x 60-volt Superdyne Battery.
72	do.	do.
81	2-volt 190 amp. hr. Accumulator.	Vibrator.
82	do.	do.

The accumulator, where supplied with the receiver, is already fully charged.

This battery should be recharged at least every two months, or, alternatively, whenever the specific gravity as measured with a hydrometer falls below 1.140, or the voltage, with the receiver in operation, falls below 1.8 volts.

CONSUMPTION

Model	"A" Supply	"B" Supply
71 and 72	0.37 amp.	11.4 ma.
81 and 82	2.2 amp.	

INTERMEDIATE FREQUENCY

457.5 kc.

SPEECH OUTPUT

135 milliwatts into voice coil.

WAVE-LENGTH RANGE

Models 71, 81: 187.5-545 metres (1600-550 kc.).
 .. 72, 82: 187.5-545 metres (1600-550 kc.).
 16.5-52 metres (18.17-5.77 mc.).

DIMENSIONS

Height, 15in.; width, 11in.; depth, 8in.

WEIGHT

Model	Net	Gross
71	17 lbs.	21 lbs.
.. .. with Batteries ..	60 lbs.	68 lbs.
.. 72	18 ..	22 ..
.. .. with Batteries ..	61 ..	69 ..
.. 81	25 ..	29 ..
.. .. with Battery ..	50 ..	58 ..
.. 82	26 ..	30 ..
.. .. with Battery ..	51 ..	59 ..

VALVES

1C7G Converter.

1D5GP I.F.

1F7G Demodulator, A.V.C. and 1st A.F.

KL4G Power.

LOUDSPEAKER

The speaker used is of the permanent magnet dynamic type. It is a 6-inch model with a voice coil impedance at 400 cycles of 3.35 ohms.

CIRCUIT DESCRIPTION

These models employ a 4-valve superheterodyne chassis comprising a Pentagrid converter followed by an I.F. amplifier. Demodulation is effected and A.V.C. voltage is obtained in the diode circuits of the

following valve, which is a duo-diode-pentode; the pentode section of this valve functions as an audio amplifier and is resistance-capacity coupled to the output valve, which is of the pentode type.

Coupling to the aerial on the broadcast band is effected through an iron-cored transformer having the normal tuned secondary and added capacity between the high potential ends of primary and secondary.

The I.F. transformers are permeability tuned and employ Litz-wound coils with sliding iron cores.

Full A.V.C. voltage is applied to the converter and I.F. valve whilst partial A.V.C. is taken to the audio valve; no A.V.C. voltage is applied to the S.W. converter grid.

Padding on the broadcast band is effected by adjustment of the oscillator secondary inductance, by means of an adjustable iron core, in conjunction with a fixed padding condenser. On the short-wave band no padding adjustment is required.

All R.F. trimmers are of the air dielectric type, using a robust plunger type construction, which is entirely immune to change of capacity by atmospheric influences.

When the chassis is operated with a vibrator unit, the bias on the power valve grid is obtained from the voltage drop across the smoothing choke in the H.T. negative lead.

When operated with battery H.T., this bias is derived from a voltage drop across a resistor in the H.T. negative lead.

This change of circuit connections is automatically accomplished by plugging the appropriate cable into the proper battery socket on the chassis.

By this means it is possible to convert Models 71 and 72 into Models 81 and 82 respectively by merely plugging in a vibrator unit cable in place of the battery cable.

CAUTION

It is not advisable to alter the length of any of the battery connection cables, because their resistance forms part of the total series resistance introduced to obtain correct filament voltages.

WAVE-BAND SWITCHING (Models 72 and 82)

This is carried out by means of a two-position switch. The oscillator primary coils are connected in series, as are the aerial primaries, and are not switched; however, a little feed-back is applied across the padding condenser on the S.W. band, and this is switched in and out by contacts on the wave-change switch.

In the first position of the switch (anti-clockwise) the receiver is adjusted for short-wave reception, and in the second position for broadcast reception.

TONE MONITOR (Combined with Battery Switch)

The tone is controlled by a four-position switch, the first position on which switches the receiver off; the second position switches the receiver on and gives normal reproduction, while the third and fourth positions introduce an increasing degree of

high-frequency cut by means of a condenser resistor combination shunted across the speaker transformer primary.

DIAL LAMP (2.5-volt, 0.3-amp.)

The dial lighting is controlled by a push-button mounted on the side of the cabinet, which should be pressed during the process of tuning-in a station. When released, this button will extinguish the dial lighting, thus saving unnecessary drain on the battery.

VIBRATOR CIRCUIT DESCRIPTION (Models 81 and 82)

The circuit of the vibrator unit is indicated on page 6. This unit includes the vibrator cartridge,

which is enclosed in a separate metal container arranged so that it can be plugged into or removed from a socket located in the vibrator unit in a manner similar to a valve. The vibrator socket is arranged with a sponge rubber mounting, to ensure a minimum of mechanical noise being transmitted to the cabinet.

The remainder of the unit consists of the necessary transformers and filters.

Important Note.—It is essential that the resistance of the 5-amp. fuse in the vibrator positive L.T. circuit should not exceed 0.01 ohm, otherwise the performance and battery life will suffer. Use only Australux 5-amp. fuse, type IAG.

PRELIMINARY TESTS

1. Check over battery connections in accordance with the diagram on page 6.
2. Check over battery voltages as specified in paragraph headed "Batteries."
3. Remove fuse from A+ vibrator lead and check for continuity in the fuse (Models 81 and 82).
4. Switch the receiver on by means of the combined Battery and Tone Monitor Switch, and, having removed the earth wire and turned the Volume Control to the maximum position, touch the finger to the grid of the 1F7G valve (1st AF). A loud hum should be heard; this denotes that the audio frequency side of the receiver is functioning and the fault probably lies in the valves or associate circuits ahead of this position. Should no hum be heard, the fault will have developed between the first audio and output stage.
5. Check all valves for filament continuity and freedom from internal short circuits.
6. To determine if the fault lies in the loudspeaker, connect a high-impedance A.C. voltmeter or output meter, with a range of approximately 2 volts, across the voice coil terminals on the speaker. With the receiver switched on and adjusted for the broadcast band, turn the Volume Control fully on and rotate the Tuning Control. If no deflection is given by the meter, the fault lies either in the receiver chassis or the output transformer. If a deflection is obtained, but no audible sound, the loudspeaker is at fault.
7. If the fault is still undiscovered, remove the chassis from the cabinet and compare voltages with the voltage table given on page 7.

DISMANTLING

REMOVAL OF CHASSIS

1. Turn tuning control so that gang condenser plates are fully meshed.
2. Remove knobs.
3. Disconnect loudspeaker and battery plug.
4. Remove rear cabinet support bar.
5. Loosen nut on dial lamp switch and remove.
6. Remove four fixing screws from underside of cabinet; the chassis is now free.

REMOVAL OF VIBRATOR UNIT (Models 81 and 82)

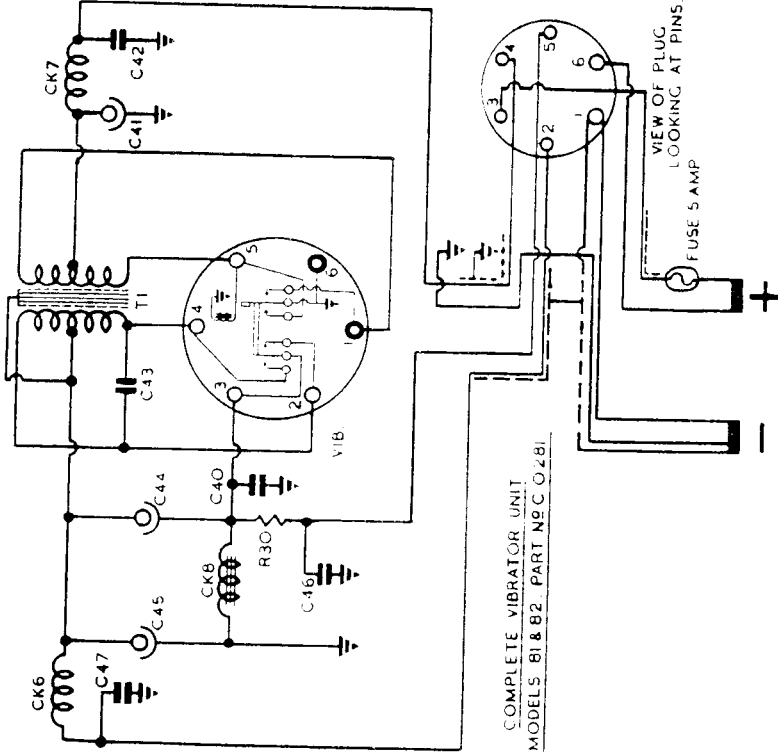
(**Note.**—Replacement of the vibrator cartridge may be effected at any time without removal of the entire unit from the cabinet. This may be accomplished by removing the nine screws which hold the

vibrator unit cover in place; on lifting this cover plate all vibrator components will be accessible.)

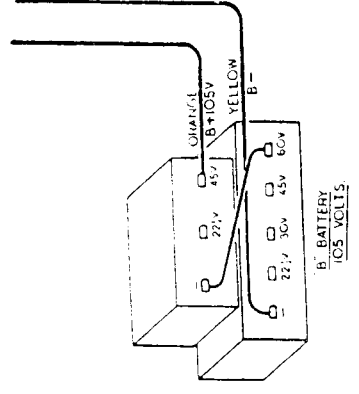
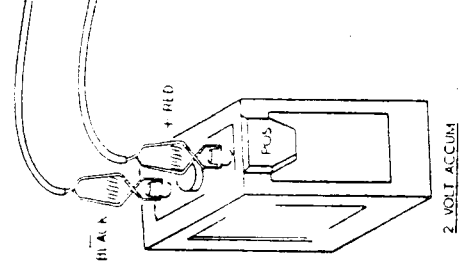
1. Remove rear cabinet support bar.
2. Disconnect cable plug from chassis.
3. Remove the two screws at the top rear of cabinet.
4. Remove the two screws holding unit to speaker support bar; the unit is now free and may be withdrawn from the cabinet.

REMOVAL OF LOUDSPEAKER

1. Remove vibrator unit (Models 81 and 82 only).
2. Disconnect speaker leads from jacks.
3. Remove screws at each end of speaker support bar.
4. Remove four nuts holding speaker chassis and remove speaker.



REF.	DESCRIPTION	PART NO
T1	VIBRATOR TRANSFORMER	D 1421 A
CK6	R.F. CHOKE HT	D 1425
CK7	R.F. CHOKE LT	D 1438
CK8	HT. CHOKE 265Ω ±5%	D 1423 A
C40	0.1MFD 400V	C 0013 E
C41	400MFD 12PV ELECTROLYTIC	C 0014 AE
C42	0.1MFD 200V	C 0013 Q
C43	0.007MFD 1000V	C 0013 AF
C44	8MFD 525PV ELECTROLYTIC	C 0014 AC
C45	24MFD 150PV ELECTROLYTIC	C 0014 AD
C46	0.1MFD 200V	C 0013 Q
C47	7000 MMFD	D 0243 B
VIB	FERROCART 2V VIBRATOR	D 1894
R30	250,000 OHMS 1/4 W	DO243NIX
	VIBRATOR PLUG & LEAD	D 1433



BATTERY CONNECTIONS FOR ACCUMULATOR OPERATION.

VOLTAGE TABLE

The receiver should be tuned to a point of no reception on the B.C. band. Values given are $\pm 10\%$ with the exception of filament voltages which are $\pm 5\%$. All voltage readings above 10 volts are taken on the 250-volt scale of a 1000 ohms per volt voltmeter. If a voltmeter with an internal resistance of less than 1000 ohms is utilised, allowance must be made for the voltage drop caused by the voltmeter. Note that, with vibrator H.T. supply it will not be possible to measure the power valve grid bias at the chassis, due to the presence of a 0.25 megohm decoupling resistor in the vibrator unit; however, this voltage may be measured at the vibrator unit.

Models 71, 72, 81 and 82

	1C7G	1D5GP	1F7G	KL4G
Plate to chassis volts	83	83	18	100
Plate current (ma)	0.87	1.75	0.2	4.5
Osc. plate to chassis volts	B.C. 73 S.W. 80	—	—	—
Osc. plate current (ma)	1.7 2.0	—	—	—
Screen to chassis volts	37	37	20	101
Screen current (ma)	1.1	0.63	0.1	0.82
Bias voltages	0	0	0	-3.0
Filament voltages—With accumulator ≈ 2.0 volts	1.84	1.84	1.84	1.85

RADIO FREQUENCY TESTS AND ADJUSTMENTS

Instability, insensitivity or poor selectivity may indicate that the alignment of the tuned circuits is not correct. If a coil or other component associated with the R.F. or I.F. side of the receiver has been replaced or repaired, or if the wiring has been disarranged, all circuits must be realigned.

To do this, the following apparatus is required:

1. An oscillator or signal generator capable of tuning to 1500 kc., 600 kc., 457.5 kc., 16.5 metres and 17 metres, suitably screened and with an attenuator.
2. An output meter having a range of 0-2 volts A.C. approximately.

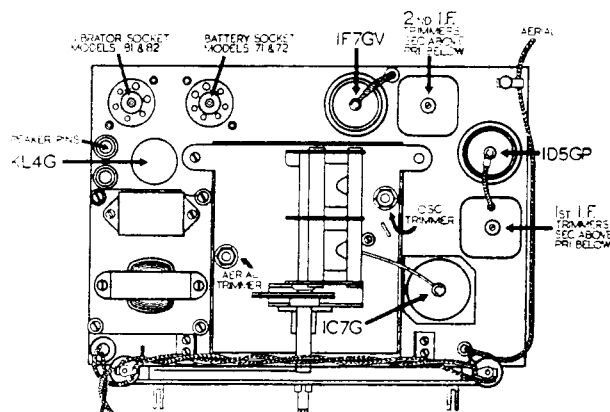
I.F. alignment should always precede R.F. alignment, and even if only one coil or one range of coils has been serviced, the whole of the realignment should be done in the order given, i.e., broadcast band first followed by short-wave band.

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 0.5 volt.

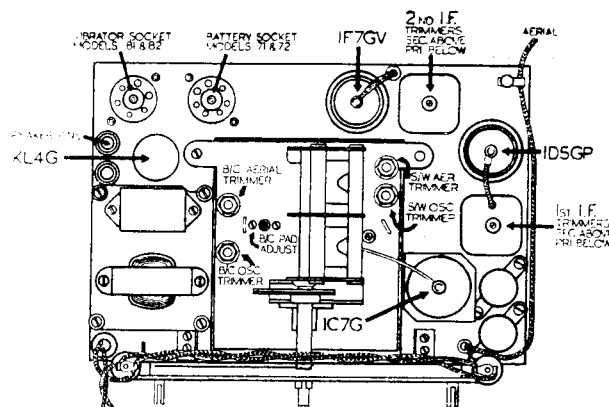
For all alignment operations, the output meter should be connected across the loudspeaker voice coil.

I.F. ALIGNMENT

The following sketches show the layout of all principal components and adjustments referred to in the procedure following.



Models 71 and 81



Models 72 and 82

Before commencing alignment, the Tone Monitor should be set to its second position, i.e., "Normal."

Rotate the Volume Control fully clockwise and set Wave-change Switch to broadcast band position; make sure that the vanes of the tuning condenser are fully meshed; connect one of the output leads of the signal generator to the grid cap of the IC7G valve through a 0.1 mfd. condenser and the other to the chassis.

(Note.—Do not disconnect the grid lead from the IC7G grid.)

1. Tune signal generator to exactly 457.5 kc.
2. Adjust the trimmer screws on the I.F. transformers (the top screw is the secondary and the bottom screw 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.

(Note.—If trimmer screws are screwed in too far, it may be possible to obtain a false peak due to coupling effects between the movable 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 I.F. alignment, connect the signal generator output leads through a standard dummy antenna of 200 mfd. capacity to the aerial connection and chassis.

Check that when the ganged condenser is fully meshed the pointer falls directly over the setting line marked "S" at the extreme bottom right of the scale; the pointer is a friction fit on the condenser spindle, and can be rotated to bring it to the correct setting.

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 side of gang condenser) align receiver so that 600 kc. signal is tuned-in exactly on line.
3. Tune signal generator to 1500 kc.
4. Set pointer exactly over 1500 kc. point on scale and adjust B.C. oscillator trimmer until signal is correctly tuned-in with the pointer on the 1500 kc. line.
5. Adjust B.C. aerial trimmer for maximum output as shown on the output meter.
6. Repeat operations 1 to 5 inclusive. THIS IS IMPORTANT. Note that any broadcast stations receivable are tuned-in correctly on calibration.

SHORT WAVE ALIGNMENT (Models 72 and 82)

Note.—The S.W. trimmers may be distinguished by the red washers under their locknuts.

1. Set Wave-change Switch to S.W. range (fully anti-clockwise). Remove the standard dummy antenna from the output lead of the signal generator and substitute a 400-ohm non-inductive resistor; connect to aerial connection as previously.
2. Tune signal generator to 16.5 metres (18.17 mc.).
3. Rotate tuning knob until pointer is over 16.5 metres, and adjust S.W. oscillator trimmer until maximum output is obtained with pointer exactly on the 16.5 metre mark. Two settings will be found at which trimmer will peak; care should be taken to see that the setting finally selected is that which gives the **lower** capacity in the trimmer (plunger further out). Failure to select the correct position will cause serious tracking error and loss of sensitivity.
4. Tune receiver and signal generator to 17 metres (17.64 mc.).
5. Adjust the S.W. aerial trimmer for maximum output while "rocking" the ganged condenser to obtain the correct resonant point.
6. Check the foregoing adjustments to ensure that the correct settings have been obtained in all trimmers.

Note.—The R.F. trimmers on this model 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 locknut and adjusting hook for the plunger. After loosening the large locknut 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 locknut 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.