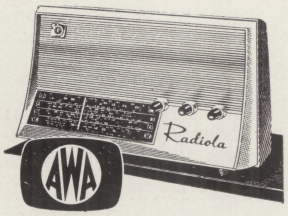
MANUFACTURERS AWA SUPERVISED SERVICE



RADIOLA
EIGHT TRANSISTOR
MANTEL MODEL
B23

ISSUED BY
AMALGAMATED WIRELESS (AUSTRALASIA) LTD.

GENERAL DESCRIPTION

Model B23 is an eight transistor, battery-operated, superheterodyne Mantel receiver designed for the reception of the Medium Wave Band.

FEATURES OF DESIGN include:—

Ferrite rod aerial with provision for external aerial; high-gain i.f. transformers; autodyne converter; high sensitivity; centre-tapped 80 ohms impedance speaker, obviating the need for an output transformer.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

Frequency Range ..... 530-1,600 Kc/s (576-187.5 metres)

Intermediate Frequency ..... 455 Kc/s

Battery Complement ..... 9 volt battery type 286

Battery Consumption:
- For zero audio output ..... 14 mA
- For 50 mW audio output ..... 50 mA
- For full audio output ..... 110 mA

Loudspeaker
- 6" x 4" Permanent Magnet No. 50119
- V.C. Impedance 80 ohms (centre tapped) at 400 c.p.s.
- Undistorted Power Output ..... 400 mW

Controls:

From left to right—
- On/Off Tone Control.
- Volume Control.
- Tuning Control.

Transistor Complement:
- AWV 2N374 or 2N1636 ..... Converter
- AWV 2N406 ..... Overload
- AWV 2N373 or 2N1634 ..... 1st I.F. Amplifier
- AWV 2N373 or 2N1634 ..... 2nd I.F. Amplifier
- AWV 2N406 ..... 1st Audio
- AWV 2N408 ..... Driver
- AWV 2N217S ..... Output
- AWV 2N217S ..... Output

A diode (1N295) is also used as Audio Detector and A.V.C.

Dimensions:
- Height .. .. $8\frac{3}{8}$"
- Width .. .. $13\frac{1}{4}$"
- Depth .. .. 6"
- Weight (with battery) .. .. .. 7 lb. 4 oz.

ALIGNMENT PROCEDURE

Manufacturer's Setting of Adjustments:

The receiver is tested by the manufacturer with precision instruments and all adjusting screws are sealed. Re-alignments should be necessary only when components in tuned circuits are repaired or replaced or when it is found that the seals over the adjusting screws have been broken. It is especially important that the adjustments should not be altered unless in association with the correct testing instruments listed below.

Under no circumstances should the plates of the ganged tuning capacitor be bent, as the unit is accurately aligned during manufacture and can only be re-adjusted by skilled operators using special equipment.

For all alignment operations, keep the generator output as low as possible to avoid A.V.C. action and set the volume control in the maximum clockwise position.

Testing Instruments:

(1) A.W.A. Junior Signal Generator, type 2R7003; or

(2) A.W.A. Modulated Oscillator, series J6726.

If the modulated oscillator is used, connect a .22 megohms non-inductive resistor across the output terminals.

(3) No output transformer is used in this receiver since the speaker has a centre tapped 80 ohm voice coil and is connected directly to the collectors on the output transistors. For output measurement, if an indication only is required, Output Meter type 2M8832, switched to 5000 ohms and connected across the output collectors, should be adequate. For correct reading of power output an A.C. meter, with neither probe earthed, connected across the output collectors will measure the voltage across the 80 ohms load. The normal alignment level of 50mw occurs when 1.4 volts is indicated on the A.C. voltmeter.

ALIGNMENT TABLE

ORDER	CONNECT "HIGH" SIDE OF GENERATOR TO:	TUNE GENERATOR TO:	TUNE RECEIVER TO:	ADJUST FOR MAX. PEAK OUTPUT
1	Aerial section of Gang	455 Kc/s	Gang fully closed	Cores in TR5, TR4 and TR3
		Repeat adjustment until maximum output is obtained		
2	Inductively coupled to Rod Aerial*	600 Kc/s	600 Kc/s	L.F. Osc. Core Adj. (TR2)†
		Remove shunt resistor on R.F. section		
3	Inductively coupled to Rod Aerial*	1,650 Kc/s	Gang fully open	H.F. Osc. Adj. (C4)
4	Inductively coupled to Rod Aerial*	1,500 Kc/s	1,500 Kc/s	H.F. Aerial Adj. (C3)
		Repeat steps 2, 3 and 4.		

* A coil comprising 3 turns of 16 gauge D.C.C. wire and about 12 inches in diameter should be connected between the output terminals of the test instrument, placed concentric with the rod aerial and distant not less than 1 foot from it.

† Rock the tuning control back and forth through the signal.

Service Notes for Transistor Receivers:

Whilst transistors, when used within the manufacturer's ratings, should give considerably longer life in service than vacuum tubes, the following precautions should be observed when servicing receivers to prevent damage to transistors.

Transistors can be damaged when checking circuit continuity by the D.C. voltage present in an ohmmeter. To avoid damaging a transistor or getting a misleading resistance reading the transistors must be disconnected from the circuit.

The use of screwdrivers as a means of checking high tension, as is commonly done in mains operated receivers, is not only a waste of time but can permanently damage the transistors. Similarly, the indiscriminate shorting out of bias resistors as a means of checking whether certain stages are operating will almost certainly have drastic results, particularly in the output stages.

Transistors are extremely sensitive to heat, temperatures in excess of 90° C. can cause permanent damage. Great care should therefore be exercised when soldering transistor leads, keeping the soldering iron as far away from the transistor body as practicable and applying heat for as short a time as possible.

It should be noted that all electrolytic capacitors have their positive terminal going to earth or to the earthy part of the circuit.

Fault Finding:

The first thing to check when the receiver is inoperative is the battery. With the receiver switched on a new battery should measure 9 volts, although a receiver will still operate satisfactorily at 6 volts.

Voltmeters used for test purposes must be at least 20,000 ohms per volt. The use of low impedance meters will only give misleading results as serious shunting effects will occur.

If the receiver is inoperative to R.F. and the converter is suspect, the oscillator can be checked by measuring the voltage between base and emitter of the converter. If the base is negative with respect to the emitter by more than 0.12 volts then the converter is not oscillating.

When checking for a circuit fault causing excessive battery drain, an overall current measurement and supplementary voltage measurements should be made. For reasons stated above continuity measurements can be misleading.

Signal tracing by injection of a signal from a signal generator is carried out on transistor radios in exactly the same manner as has been done for many years with conventional vacuum tube radios. The signal generator should be connected (as in past practice) in series with a capacitor to avoid shorting out bias voltages. With the transistors used in this receiver, the BASE is the signal input terminal (corresponding to the signal grid of vacuum tubes), the COLLECTOR is the signal output terminal (corresponding to plate), and the EMITTER is the common terminal (corresponding to the cathode).

The output circuit used in this receiver is of the "Class B" type; this type of output circuit has seldom been used in commercial radios for the past several years. It should therefore be noted that in "Class B" output the battery current increases greatly with increased signal input to the base.

Component Removal and Replacement:

Always use a soldering iron which is very clean and just hot enough to achieve a quick soldering operation as prolonged application of heat will damage the printed wiring.

Before installing a replacement component, it is advisable to clear the contact hole by heating the contact area and pushing a tapered stainless steel wire into the hole. Small screwdriver kits are available on the market containing a suitable spiked bit.

To remove an I.F. transformer or oscillator coil it is desirable to have a suitable tip on the soldering iron as shown in Fig. 1. All seven connections on the transformer may be freed simultaneously and the transformer pulled from the board. This is the only satisfactory method: any other method using smaller irons will generally result in damage to either the board or the transformer or to both.

Transistors may be removed in a similar manner to the I.F. transformers using the $\frac{3}{16}$" bit on the ORYX iron.

The coupling transformer may be removed by first disconnecting the five leads and then moving each mounting lug by approximately $\frac{1}{32}$" at a time until both lugs are free.

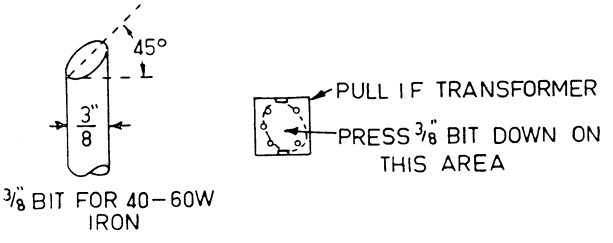


Fig 1—Soldering Bit and I.F. Removal.

CHASSIS REMOVAL

Remove the two cabinet retaining screws in the back of the cabinet.

Remove the rear pair of screws underneath the cabinet and lift off the cabinet back.

Unsolder the speaker leads.

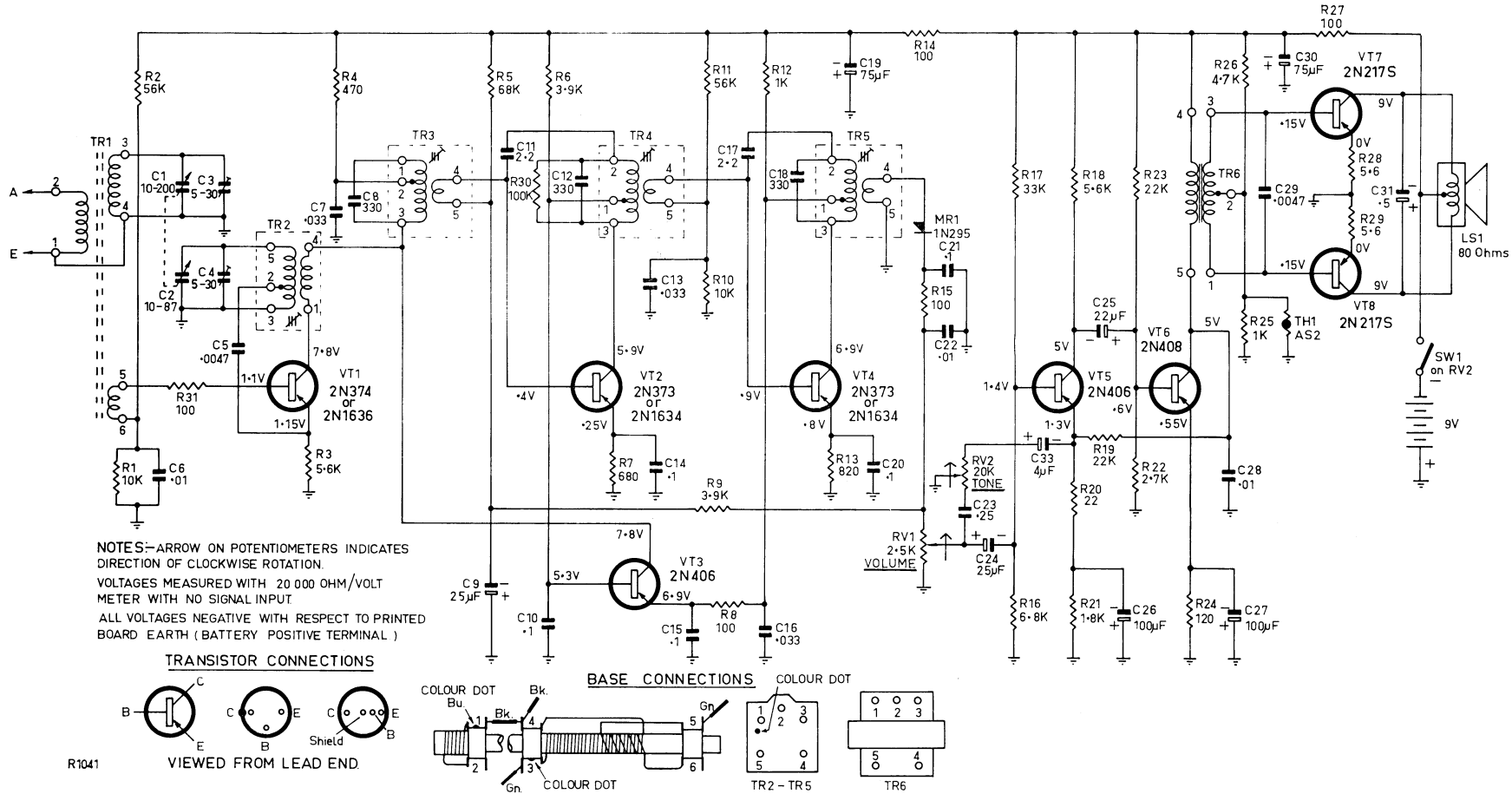
Remove the three control knobs, these being a push-on fit.

Remove the two remaining screws under the cabinet and slide the chassis free.

To replace the chassis, reverse the above procedure making sure that all control spindles are centrally located in the cabinet holes.

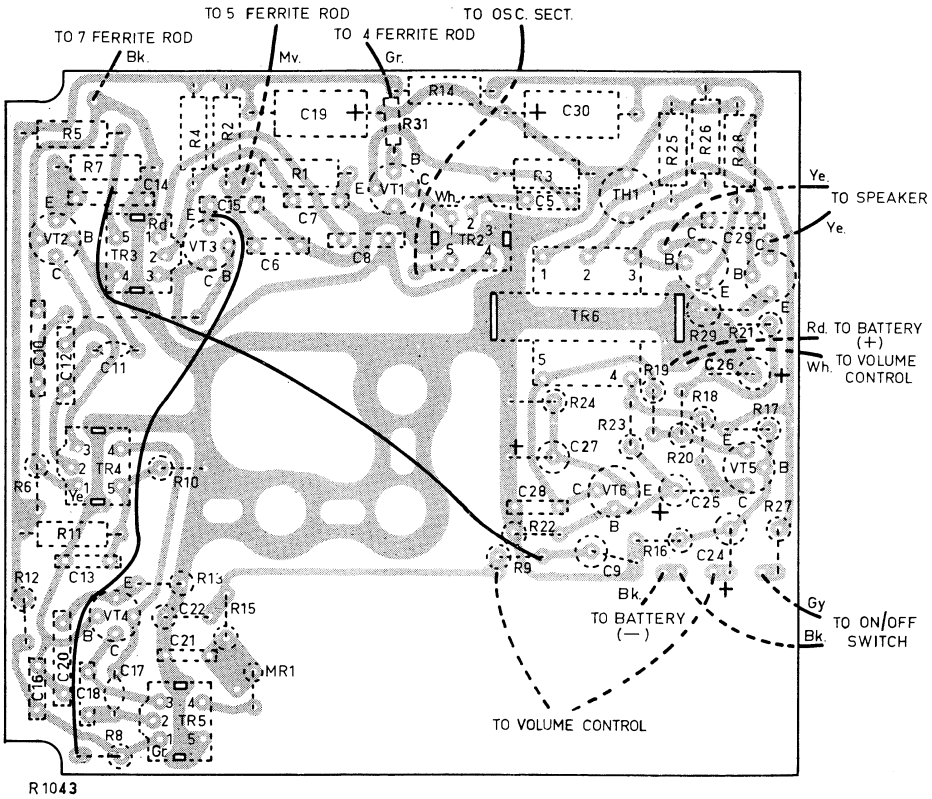
CIRCUIT CODE—RADIOLA—MANTEL B23

CODE No.	DESCRIPTION	PART No.
	RESISTORS	
	All Resistors ±10% carbon unless otherwise stated.	
R1	10K ohms ½ watt	612025
R2	56K ohms ½ watt	615161
R3	5.6K ohms ½ watt	611293
R4	470 ohms ½ watt	606588
R5	68K ohms ½ watt	615494
R6	3.9K ohms ½ watt	610556
R7	680 ohms ½ watt	607281
R8	100 ohms ½ watt	604031
R9	3.9K ohms ½ watt	610556
R10	10K ohms ½ watt	612025
R11	56K ohms ½ watt	615161
R12	1K ohm ½ watt	608025
R13	820 ohms ½ watt	607665
R14	100 ohms ½ watt	604031
R15	100 ohms ½ watt	604031
R16	6.8K ohms ½ watt	611526
R17	33K ohms ½ watt	614460
R18	5.6K ohms ½ watt	611293
R19	22K ohms ½ watt	613653
R20	22 ohms ½ watt	602320
R21	1.8K ohms ½ watt	609077
R22	2.7K ohms ½ watt	609862
R23	22K ohms ½ watt	613653
R24	120 ohms ½ watt	601077
R25	1K ohms ½ watt	608025
R26	4.7K ohms ½ watt	610932
R27	100 ohms ½ watt	604031
R28	5.6 ohms ½ watt	600724
R29	5.6 ohms ½ watt	600724
R30	100K ohms ½ watt	616017
R31	100 ohms ½ watt	604031
RV1	2.5K ohms log carbon, Volume	620033
RV2	20K ohms log carbon, Tone W/S	620096
	CAPACITORS	
C1	10—200pf tuning Aerial	62217
C2	10—87pf tuning Osc.	
C3	5—30pf trimmer Aerial	231136
C4	5—30pf trimmer Osc.	231136
C5	0.0047uf ±20% K1000 rect.	225964
C6	0.01uf +80% —20% K6000 rect.	226352
C7	0.033uf +80% —20% 25VW disc	226741
C8	330pf ±5% N750 disc	223715
C9	25uf 3VW Electrolytic	229428
C10	0.1uf +80% —20% 25VW disc	227074
C11	2.2pf ±10% NPO disc	221494
C12	330pf ±5% N750 disc	223715
C13	0.033uf +80% —20% 25VW disc	226741
C14	0.1uf +80% —20% 25VW disc	227074
C15	0.1uf +80% —20% 25VW disc	227074
C16	0.033uf +80% —20% 25VW disc	226741
C17	2.2pf ±10% NPO disc	221494
C18	330pf ±5% N750 disc	223715
C19	75uf 10VW Electrolytic	229676
C20	0.1uf +80% —20% 25VW disc	227074
C21	0.1uf +80% —20% 25VW disc	227074
C22	0.01uf ±20% 200VW Hunts W99	228609
C23	0.25uf ±20% 200VW Hunts W48	227391
C24	25uf 3VW Electrolytic	229428
C25	22uf 10VW Electrolytic	229307
C26	100uf 3VW Electrolytic	229706
C27	100uf 3VW Electrolytic	229706
C28	0.01uf +80% —20% K6000 rect.	226352
C29	0.0047uf ±20% K2000 rect.	225964
C30	75uf 10VW Electrolytic	229676
C31	0.5uf ±20% 200VW Hunts W48	229116
C32	Not used	
C33	4uf 4VW Electrolytic	228189
	TRANSFORMERS	
TR1	Ferrite Rod	51242
TR2	Oscillator Coil	51206
TR3	1st I.F. Transformer	51204
TR4	2nd I.F. Transformer	51202
TR5	3rd I.F. Transformer	51200
TR6	Coupling Transformer	51145
	TRANSISTORS AND DIODES	
VT1	AWV 2N374 or 2N1636	
VT2	AWV 2N373 or 2N1634	
VT3	AWV 2N406	
VT4	AWV 2N373 or 2N1634	
VT5	AWV 2N406	
VT6	AWV 2N408	
VT7	AWV 2N217S	
VT8	AWV 2N217S	
MR1	Anodeon 1N295	
	MISCELLANEOUS	
LS1	6" x 4" Speaker	50119
TH1	AWV AS2	
SW1	ON-OFF Switch (on RV2)	



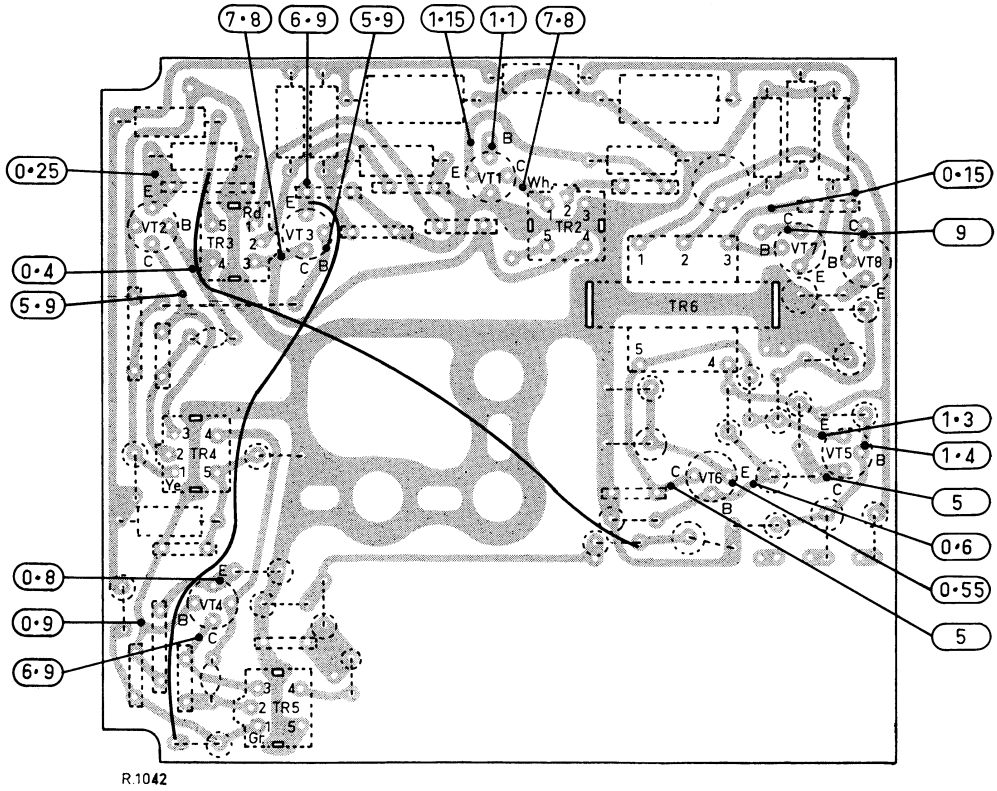
NOTE: On later chassis a 680pf ±20% type CTR-AY tubular capacitor 224775 has been added across the aerial winding of the Ferrite Rod.

COMPONENT LOCATION



VOLTAGE CHART

All voltages negative with respect to printed circuit earth (positive terminal of battery).



The assemblies represented above are viewed from the wiring side of the board.
The printed wiring, on the near side of the board, is presented in phantom view superimposed on the component layout of the reverse side.

MECHANICAL REPLACEMENT PARTS

Item	Part No.	Item	Part No.
Cabinet, Back	62207	Drive Spring	798033
Cabinet, Front	60085/1	Knob Assembly	42644
Dial Scale	62220	Pointer Assembly	60069
Drive Cord Assembly	9576/25	Support, Aerial	36403
Drive Drum Assembly	62219		

NOTE: When ordering, always quote the above Part Numbers. In the case of coloured parts, such as knobs, also quote the colour.

D.C. RESISTANCE OF WINDINGS

Winding	D.C. Resistance	Winding	D.C. Resistance
Ferrite Rod Assembly TR1:		1st, 2nd and 3rd I.F. Transformers:	
Primary 1-2	1.5	Primary	1.5
Secondary 3-4	*	Secondary	*
Tertiary 5-6	*		
Oscillator Transformer TR2:		Coupling Transformer:	
Primary 3-5	1.2	Primary	540
Secondary 1-4	*	Secondary	540

* Less than 1 ohm.

The above readings were taken on a standard chassis, but substitution of materials during manufacture may cause variations and it should not be assumed that a component is faulty if a slightly different reading is obtained.