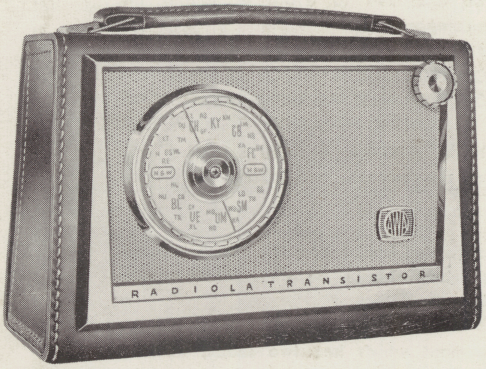
TECHNICAL INFORMATION AND SERVICE DATA

MANUFACTURERS AWA SUPERVISED SERVICE



Radiola Transistor Portable Model 694-P

ISSUED BY
AMALGAMATED WIRELESS (AUSTRALASIA) LTD.

GENERAL DESCRIPTION

Model 694-P is a compact, lightweight battery operated portable containing six transistors and three crystal diodes. It is a superheterdyne receiver designed for the reception of the Medium Wave Band.

Features of its design include:
Ferrite Rod Aerial; high gain I.F. transformers, Autodyne converter; feedback on the output stage; high sensitivity 4in. permanent magnet speaker; and printed circuit, giving compact size.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

Frequency Range ..... 540-1600 Kc/s. (555-187.5 Metres)

Intermediate Frequency ..... 455 Kc/s.

Battery Complement ..... 9 volt Battery Type 2364

Battery Consumption ..... For zero audio output = 11 mA

Transistor Complement:

A.W.V. 2N412 ..... Converter
A.W.V. 2N410 ..... 1st I.F. Amplifier
A.W.V. 2N410 ..... 2nd I.F. Amplifier
A.W.V. 2N408 ..... Driver
A.W.V. 2N270 ..... Output
A.W.V. 2N270 ..... Output

Three GEX34 crystal diodes are also used as (1) Audio Detector and A.V.C., (2) Converter Clamp, and (3) Overload Diode.

Loudspeaker:

4" permanent magnet No. 21594.

V.C. Impedance, 16 ohms at 400 c.p.s.

Undistorted Power Output ..... 300 mW

Controls:

Tuning Control — front left-hand of cabinet.
On/off Volume Control — right-hand end of cabinet.

Dimensions:

Height, 6¼"; Width, 8½"; Depth, 3".

Weight with battery, 3 pounds.

Chassis Removal:

Remove the volume and tuning control knobs. The former is a push on fit and the latter is attached to the gang spindle by a locking screw through the gold trim in the centre of the control.

Unscrew the two captive screws holding the back lid closed.

Remove the two screws at the base of the cabinet and the two screws at the handle pivots.

The chassis is now free to slide from the cabinet.

Chassis installation is the reverse of the above, making sure that the cardboard packer is correctly placed towards the front of the cabinet under the chassis before replacing the bottom screws.

When replacing the tuning control the following procedure should be adopted:

Make sure the gang is at its maximum clockwise position. Replace the tuning knob with the red line horizontal, then the small metal washer, taking care to locate the two small holes in the washer over the small pegs protruding from the nylon centre bush. Replace the gold trim and tighten up the locking screw. The position of the pointer may then be checked.

Switch the receiver on and tune to some known station. The pointer should fall across the centre of this station marking. If it does not, loosen the centre locking screw while holding the tuning knob firmly, then position the pointer correctly across the centre of the station marking and finally tighten the locking screw again holding the tuning knob firmly in position.

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 ohmeter. 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, applying heat for as short a time as possible.

It should be noted that all electrilytic capacitors have their positive terminal going to earth.

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 10,000 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 done 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.

Removal and Replacement of Components on a Printed Circuit:

Proper care must be exercised to avoid damaging the board when removing components.

1. ALWAYS USE A SOLDERING IRON WHICH IS BOTH HOT AND CLEAN. SOLDERING MUST BE DONE AS QUICKLY AS POSSIBLE. PROLONGING APPLICATION OF HEAT WILL DAMAGE THE PRINTED WIRING. A small soldering iron is recommended for convenience in working on printed circuit boards.

2. When removing the printed board from the support frame, all interconnecting leads should be unsoldered at the support frame end.

3. To remove a component which has two leads, exert a slight pull or pry on one lead while heating the joint where it is soldered to the board. When the component is to be discarded it may be advisable to either cut the component in two or cut one of its leads if it is long enough. The two pieces may then be removed separately. Before installing a replacement component, clear the contact hole by heating the contact area with a soldering iron while pushing a wire through the hole.

4. For the removal of transistors, special care should be taken to prevent them being damaged due to heat. One lead at the time is removed by gripping that lead with a pair of pliers or tweezers, applying the soldering iron to the appropriate junction and pulling the lead clear, the pliers or tweezers acting as a heat sink.

5. To remove the oscillator, I.F. or Audio Transformers, (a) hold the board horizontal with the printed wiring side down. (b) Apply a hot, clean soldering iron, which has no solder on its tip, to one terminal. (c) As soon as the solder melts most will run onto the hot iron. (d) Remove the iron and immediately bump your hand holding the board onto your table or bench to help remove any excess molten solder. (c) and (d) to be repeated until the amount of solder in contact with the lugs is at a minimum. (e) When all lugs have been thus treated, the individual lug can be easily broken free from the contact area with a small pair of pliers, by pushing the lug along the slotted hole provided on the printed board. (f) The component can now be lifted free.

Critical Lead Dress:

1. Dress C7 and C10 clear of gang plates.

2. Dress the gang frame earthing lead to clear gang plates.

3. Dress the lead from the oscillator section of gang to clear gang plates.

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) The output impedance from collector to collector is 250 ohms. If an indication only is required then Output Meter, type 2M8832, switched to 5,000 ohms and connected across the output collectors, should be adequate. If other types of meters are used with the correct loading, the speaker MUST BE DISCONNECTED, otherwise the maximum dissipation of the transistors will be exceeded at full audio output.

ALIGNMENT TABLE

Alignment Order	Connect "high" side of Generator to:	Tune Generator to:	Tune Receiver to:	Adjust for Maximum Peak Output:
1	Aerial Section of Gang	455 Kc/s.	Gang fully closed	Cores in T5, T4 and T3
Repeat adjustment until maximum output is obtained.				
2	Inductively coupled to Rod Aerial°	600 Kc/s.	600 Kc/s.	L.F. Osc. Core Adj. (T2) †
3	Inductively coupled to Rod Aerial°	1650 Kc/s.	Gang fully open	H.F. Osc. Adj. (C6)
4	Inductively coupled to Rod Aerial°	1500 Kc/s.	1500 Kc/s.	H.F. Aerial Adj. (C4)

° A coil comprising 3 turns of 16 gauge D.C.C. wire 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.

D.C. RESISTANCE WINDINGS

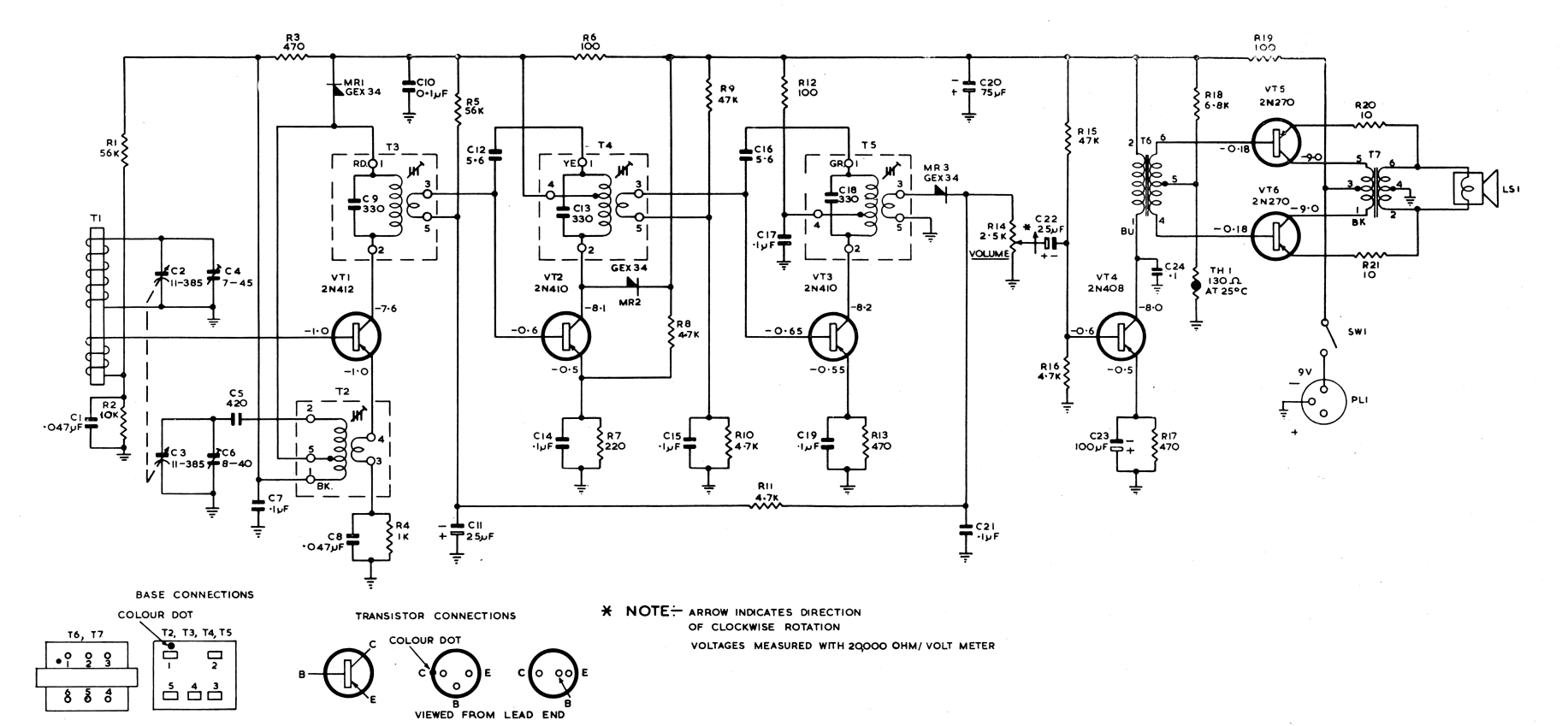
Winding	D.C. Resistance in ohms
Ferrite Rod Assembly T1:	
Primary	1
Secondary	*
Oscillator Transformer T2:	
Primary	4
Secondary	*
I.F. Transformer Windings T3, T4 and T5:	
Primary	9
Secondary	*
Driver Transformer T6:	
Primary	450
Secondary	500
Audio Output Transformer T7:	
Primary	17
Secondary	1.5

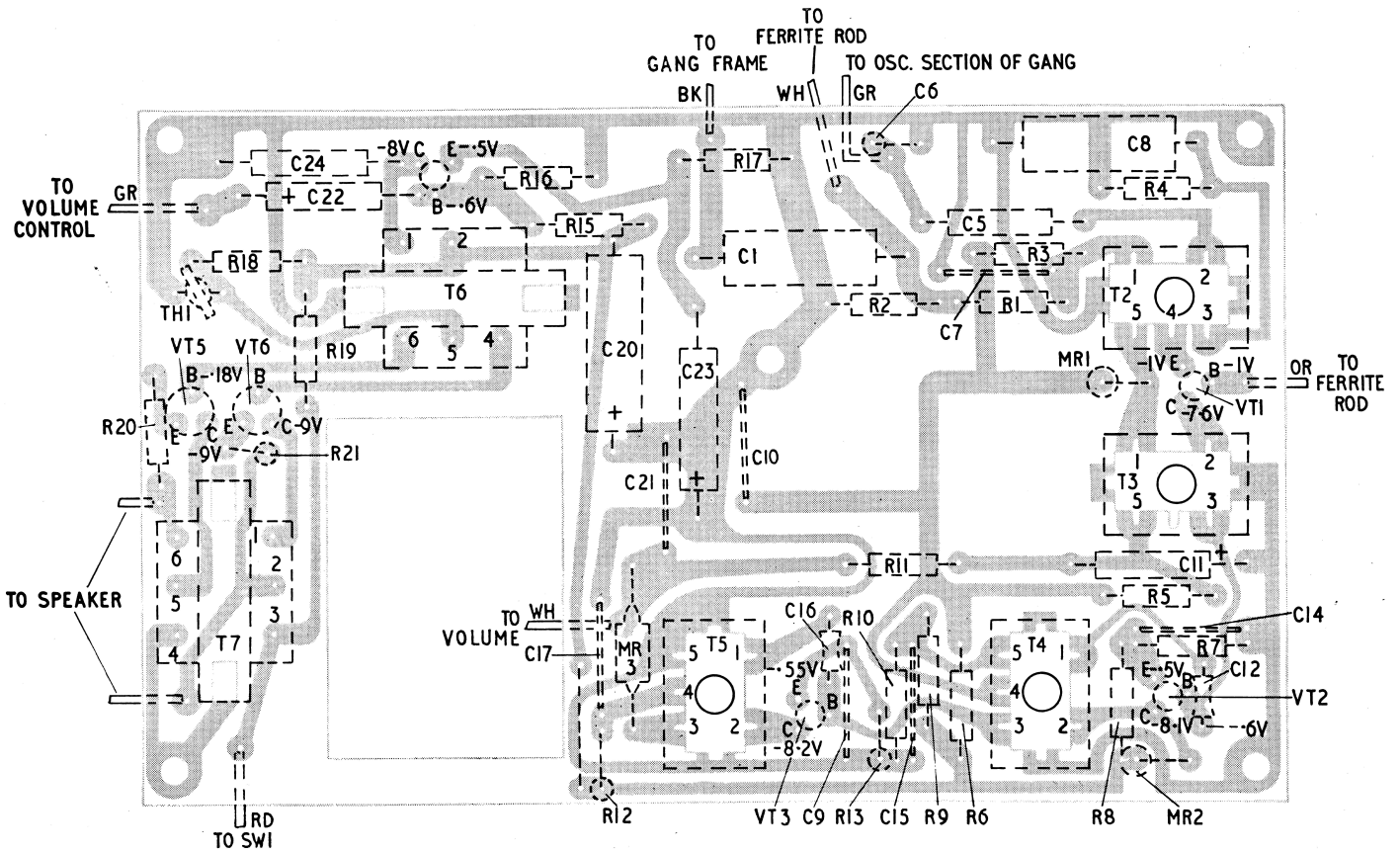
The above readings were taken on a standard chassis, but substitution of materials during manufacture may cause variations and it should not be assumed that a component is faulty if a slightly different reading is obtained.

* Indicates — Less than 1 ohm.

MECHANICAL REPLACEMENT PARTS

Item	Part Number
Chassis Assembly:	
Battery Cable Assembly	38019
Cabinet Fitting:	
Case	37765
Clip, Back Retaining	211014
Dial Scales:	
N.S.W.	37906
VIC.	37907
QLD.	37908
S.A.	37909
W.A.	37910
TAS.	37911
Dial Trim	37506
Fret, Speaker	37507
Fret, Trim	37505
Handle Link	37504
Handle Link Cover	37503
Knob Assembly, Tuning	37538
Knob Assembly, Volume	37537
Knob Trim, Tuning	37509
Label, Component Layout	37681
Retainer, Dial Scale	36425
Screw, Back Retaining	37536
Washer, Clutch	37534


R3 470
R6 100
R19 100
MR1 GEX 34
C10 0·1μF
R5 56K
R9 47K
R12 100
C20 75μF
R18 6·8K
VT5 2N270
R20 10
R1 56K
T3
C12 5·6
T4
C16 5·6
T5
MR3 GEX34
R15 47K
T6
T7
LS1
C9 330
C13 330
C18 330
C17 ·1μF
R14 2·5K VOLUME
C22 25μF
VT6 2N270
R21 10
T1
C2 11-385
C4 7-45
VT1 2N412
VT2 2N410
GEX 34
MR2
VT3 2N410
VT4 2N408
C24 ·1
TH1 130Ω AT 25°C
SW1
9V
PL1
R8 4·7K
C5 420
T2
C3 11-385
C6 8-40
C7 ·1μF
C8 ·047μF
R4 1K
C11 25μF
R11 4·7K
C21 ·1μF
R2 10K
C1 ·047μF
C14 ·1μF
R7 220
C15 ·1μF
R10 4·7K
C19 ·1μF
R13 470
R16 4·7K
C23 100μF
R17 470
BASE CONNECTIONS
COLOUR DOT
T6, T7
T2, T3, T4, T5
TRANSISTOR CONNECTIONS
COLOUR DOT
VIEWED FROM LEAD END
* NOTE:- ARROW INDICATES DIRECTION OF CLOCKWISE ROTATION
VOLTAGES MEASURED WITH 20000 OHM/ VOLT METER



CIRCUIT CODE

Code No.	Description	Part No.
	TRANSFORMERS	
T1	Ferrite Rod Aerial	38013
T2	Oscillator Coil	38015
T3	1st I.F. Transformer	38007
T4	2nd I.F. Transformer	38009
T5	3rd I.F. Transformer	38011
T6	Audio Driver Transformer	38022
T7	Audio Output Transformer	38050
	RESISTORS	
	ALL RESISTORS ± 10% UNLESS OTHERWISE STATED	
R1	56K ohms ½ watt	
R2	10K ohms ½ watt	
R3	470 ohms ½ watt	
R4	1K ohms ½ watt	
R5	56K ohms ± 5% ½ watt	
R6	100 ohms ½ watt	
R7	220 ohms ± 5% ½ watt	
R8	4.7K ohms ± 5% ½ watt	
R9	47K ohms ½ watt	
R10	4.7K ohms ½ watt	
R11	4.7K ohms ± 5% ½ watt	
R12	100 ohms ½ watt	
R13	470 ohms ½ watt	
R14	2.5K ohms Volume Control	37210
R15	47K ohms ½ watt	
R16	4.7K ohms ½ watt	
R17	470 ohms ½ watt	
R18	6.8K ohms ½ watt	
R19	100 ohms ½ watt	
R20	10 ohms ½ watt	
R21	10 ohms ½ watt	
	CAPACITORS	
C1	0.047 μF 200 volt working paper	
C2	11-385 pF tuning (Aerial)	36466
C3	11-385 pF tuning (Oscillator)	36466
C4	7-45 pF trimmer (Aerial)	31954

Code No.	Description	Part No.
C5	420 pF ± 2½% padder	
C6	8-40 pF spiral trimmer (Oscillator)	231185
C7	0.1 μF 100 volt working Ceramic	
C8	0.047 μF 200 volt working paper	
C9	330 pF ± 5% (in 1st I.F.)	
C10	0.1 μF 100 volt working Ceramic	
C11	25 μF 3 volt working Electrolytic	
C12	5.6 pF ± 10% Ceramic	
C13	330 pF ± 5% (in 2nd I.F.)	
C14	0.1 μF 100 volt working Ceramic	
C15	0.1 μF 100 volt working Ceramic	
C16	5.6 pF ± 10% Ceramic	
C17	0.1 μF 100 volt working Ceramic	
C18	330 pF ± 5% (in 3rd I.F.)	
C19	0.1 μF 100 volt working Ceramic	
C20	75 μF 12 volt working Electrolytic	
C21	0.1 μF 100 volt working Ceramic	
C22	25 μF 3 volt working Electrolytic	
C23	100 μF 3 volt working Electrolytic	
C24	0.01 μF 200 volt working paper	
	MISCELLANEOUS	
MR1	Germanium Diode	GEX34
MR2	Germanium Diode	GEX34
MR3	Germanium Diode	GEX34
TH1	Thermistor 130 ohms at 25° C.	893703
PL1	Battery Plug	
SW1	ON/OFF Switch (on R14)	
LS1	4" Loudspeaker	21594
	TRANSISTORS	
VT1	A.W.V. 2N412	
VT2	A.W.V. 2N410	
VT3	A.W.V. 2N410	
VT4	A.W.V. 2N408	
VT5	A.W.V. 2N270	
VT6	A.W.V. 2N270	