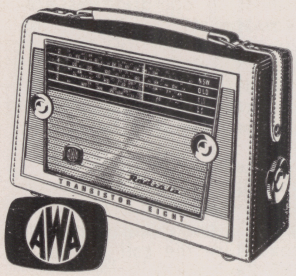
MANUFACTURERS AWA SUPERVISED SERVICE



RADIOLA TRANSISTOR EIGHT

MODELS 208-PY and B31

ISSUED BY
AMALGAMATED WIRELESS (AUSTRALASIA) LTD.

GENERAL DESCRIPTION

Model 208-PY is an eight transistor, battery operated, superheterodyne portable receiver designed for the reception of the Medium Wave Band.

Model B31 is similar to the 208-PY, but includes an external power supply socket, and uses a different leather case.

Features of design include:

Ferrite rod aerial with provision for car aerial or external aerial and earth system; high gain i.f. transformer; Autodyne convertor; high sensitivity; centre-tapped 80 ohms impedance speaker.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

Frequency Range .. 540-1620 Kc/s (555-185 metres)
Intermediate Frequency ..... 455 Kc/s
Battery Complement ..... 9 Volt battery
Eveready type 276-P

Battery Consumption:
For Zero audio output 14mA
For 50mW audio output 50mA
For full audio output 110mA

Loudspeaker:
6" x 4" 50043
V.C. Impedance ..... 80 ohms at 400 C.P.S.
Undistorted power output ..... 400 mW

Controls:
Tuning Control—right-hand side
On/off Volume Control—front left-hand
Tone Control—front right-hand

Dimensions:
Height .... 8"; Width .... 11"; Depth....4¼"
Weight with battery ..... 6 lbs. 3 ozs.

Transistor Complement:
A.W.V. 2N1637 ..... R.F. Amplifier
A.W.V. 2N1639 ..... Convertor
A.W.V. 2N410 ..... 1st I.F. Amplifier
A.W.V. 2N410 ..... 2nd I.F. Amplifier
A.W.V. 2N410 ..... 1st Audio
A.W.V. 2N408 ..... Driver
A.W.V. 2N217SP ..... Output
A.W.V. 2N217SP ..... Output
A diode IN295, OA90 or OA80 is also used as Audio Detector and A.G.C.

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.

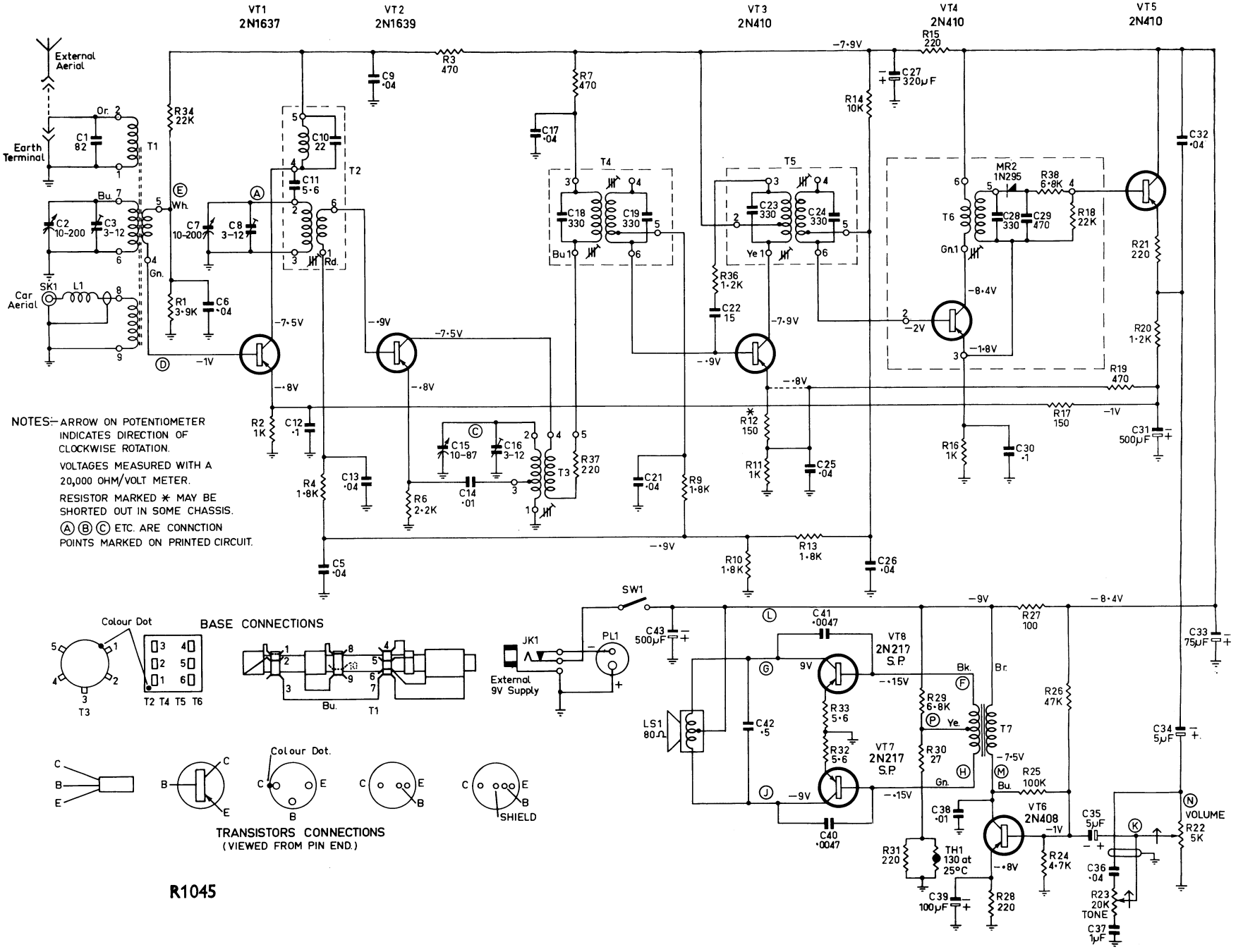
(3) No output transformer is used in this receiver since the speaker has a centre tapped 80 ohm voice coil and is connected directly to the collectors on the output transistors. For output measurement, if an indication only is required, Output Meter type 2M8832, switched to 5000 ohms and connected across 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 2 volts is indicated on the A.C. voltmeter.

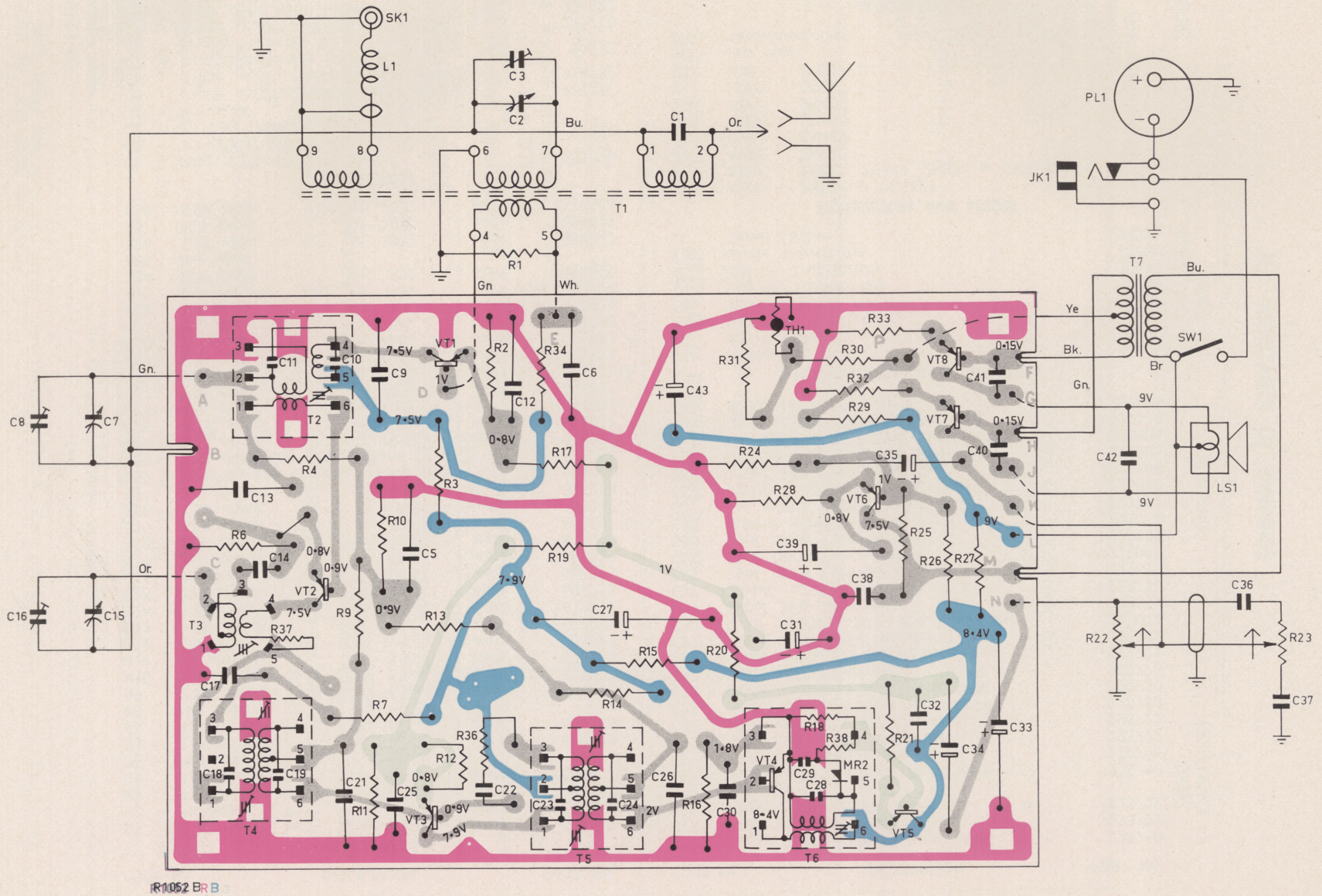
ALIGNMENT TABLE

ORDER	CONNECT "HIGH" SIDE OF GENERATOR TO:	TUNE GENERATOR TO:	TUNE RECEIVER TO:	ADJUST FOR MAX. PEAK OUTPUT
1	R.F. Section of Gang	455 Kc/s	Gang fully closed	Cores in T6, T5 and T4
	Repeat adjustment until maximum output is obtained Shunt R.F. section of gang (rear section) with a 3K ohm resistor			
2	Inductively coupled to Rod Aerial*	600 Kc/s	600 Kc/s	L.F. Osc. Core Adj. (T3)†
	Remove shunt resistor on R.F. section			
3	Inductively coupled to Rod Aerial*	600 Kc/s	600 Kc/s	L.F. R.F. Core Adj. (T2)
4	Inductively coupled to Rod Aerial*	1,620 Kc/s	Gang fully open	H.F. Osc. Adj. (C16)
5	Inductively coupled to Rod Aerial*	1,500 Kc/s	1,500 Kc/s	H.F. Aerial Adj. (C3)
6	Inductively coupled to Rod Aerial*	1,500 Kc/s	1,500 Kc/s	H.F. R.F. Adj. (C8)

* 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.


VT1
2N1637
VT2
2N1639
VT3
2N410
VT4
2N410
VT5
2N410
External Aerial
Earth Terminal
Car Aerial
SK1
L1
T1
T2
T3
T4
T5
T6
MR2
1N295
VT7
2N217
S.P.
VT8
2N217
S.P.
VT6
2N408
SW1
JK1
PL1
LS1
80Ω
TH1
130 at 25°C
TONE
VOLUME
External 9V Supply
-7·9V
-7·5V
-9V
-8·4V
-8V
-1V
-2V
-1·8V
-15V
NOTES:— ARROW ON POTENTIOMETER INDICATES DIRECTION OF CLOCKWISE ROTATION.
VOLTAGES MEASURED WITH A 20,000 OHM/VOLT METER.
RESISTOR MARKED * MAY BE SHORTED OUT IN SOME CHASSIS.
Ⓐ Ⓑ Ⓒ ETC. ARE CONNCTION POINTS MARKED ON PRINTED CIRCUIT.
Colour Dot
BASE CONNECTIONS
T2 T4 T5 T6
T3
Bu.
T1
TRANSISTORS CONNECTIONS
(VIEWED FROM PIN END.)
SHIELD
R1045


SK1
L1
C3
C2
Bu.
C1
Or.
T1
R1
Gn
Wh.
PL1
JK1
T7
Bu.
Ye
Bk.
Br
Gn.
SW1
9V
C42
LS1
C8
C7
Gn.
Or.
C16
C15
C11
C10
T2
C9
VT1
1V
R2
C12
R34
C6
C43
TH1
R33
R31
R30
VT8
C41
0·15V
R32
R29
VT7
C40
R24
C35
R28
VT6
0·8V
7·5V
R25
R26
R27
9V
C39
C38
R4
C13
R3
R17
R10
C5
R6
C14
R19
1V
7·9V
VT2
0·9V
R9
R13
C27
C31
R15
R20
8·4V
C36
R22
R23
C37
T3
R37
C17
R14
R7
T4
C18
C19
R36
R12
C22
C21
R11
C25
VT3
0·9V
T5
C23
C24
2V
C26
R16
C30
1·8V
R18
R38
VT4
C29
C28
MR2
8·4V
VT5
T6
R21
C32
C34
C33

R1052 BR B

CIRCUIT CODE

CODE No.	DESCRIPTION	PART No.
	RESISTORS	
R1	3.9K ohms ± 5% ½ watt	610560
R2	1K ohms ± 5% ½ watt	608022
R3	470 ohms ± 10% ½ watt	606588
R4	1.8K ohms ± 10% ½ watt	609077
R5	Not used	
R6	2.2K ohms ± 10% ½ watt	609442
R7	470 ohms ± 10% ½ watt	606588
R8	Not used	
R9	1.8K ohms ± 10% ½ watt	609077
R10	1.8K ohms ± 5% ½ watt	609080
R11	1K ohms ± 5% ½ watt	608022
R12	150 ohms ± 10% ½ watt	604677
R13	1.8K ohms ± 5% ½ watt	609080
R14	10K ohms ± 5% ½ watt	612019
R15	220 ohms ± 10% ½ watt	605253
R16	1K ohms ± 10% ½ watt	608025
R17	150 ohms ± 5% ½ watt	604679
R18	22K ohms ± 10% ½ watt	613653
R19	470 ohms ± 5% ½ watt	606591
R20	1.2K ohms ± 10% ½ watt	608312
R21	220 ohms ± 10% ½ watt	605253
R22	5K ohms Log Carbon, Volume W/S	620060
R23	2.5K ohms Log Carbon, Tone	620256
R24	4.7K ohms ± 10% ½ watt	610932
R25	100K ohms ± 10% ½ watt	616017
R26	47K ohms ± 10% ½ watt	614961
R27	100 ohms ± 10% ½ watt	604031
R28	220 ohms ± 10% ½ watt	605253
R29	6.8K ohms ± 10% ½ watt	611526
R30	27 ohms ± 10% ½ watt	602593
R31	220 ohms ± 10% ½ watt	605253
R32	5.6 ohms ± 5% ½ watt W.W.	600714
R33	5.6 ohms ± 5% ½ watt W.W.	600714
R34	22K ohms ± 5% ½ watt	613656
R35	Not used	
R36	1.2K ohms ± 10% ½ watt	608312
R37	220 ohms ± 10% ½ watt	605253
R38	6.8K ohms ± 10% ½ watt	611526
	CAPACITORS	
C1	82pf ±5% N750 tubular	222128
C2	10—200pf tuning Aerial	21370
C2	3—12pf trimmer Aerial	
C4	Not used	
C5	0.04uf ±20% 200VW Hunts W99	228750
C6	0.04uf ±20% 200VW Hunts W99	228750
C7	10—200pf tuning R.F.	21370
C8	3—12pf trimmer R.F.	
C9	0.04uf ±20% 200VW Hunts W99	228750
C10	22pf ±5% N750 tubular	221523
C11	5.6pf ±5% NPO tubular	220268
C12	0.1uf ±20% 25VW disc	227074
C13	0.04uf ±20% 200VW Hunts W99	228750
C14	0.01uf ±20% 200VW Hunts W99	226363
C15	10—87pf tuning Osc.	21370
C16	3—12pf trimmer Osc.	
C17	0.04uf ±20% 200VW Hunts W99	228750
C18	330pf ±5% 125VW Styroseal	223722
C19	330pf ±5% 125VW Styroseal	223722
C20	Not used	
C21	0.04uf ±20% 200VW Hunts W99	228750
C22	15pf ±5% NPO tubular	220706
C23	330pf ±5% 125VW Styroseal	223722
C24	330pf ±5% 125VW Styroseal	223722
C25	0.04uf ±20% 200VW Hunts W99	228750
C26	0.04uf ±20% 200VW Hunts W99	228750
C27	320uf 10VW Electrolytic	229776
C28	330pf ±5% 125VW Styroseal	223722
C29	470pf ±20% Hi-K tubular	221972
C30	0.1uf ±80% —20% Hi-K 33VW disc	227074
C31	500uf 3VW Electrolytic	229854
C32	0.04uf ±20% 200VW Hunts W99	228750
C33	75uf 10VW Electrolytic	229675
C34	20uf 10VW Electrolytic	229309
C35	20uf 10VW Electrolytic	229309
C36	0.04 μf ±20% 200VW Hunts W99	228750
C37	1uf ±20% 200VW Hunts W48	227731
C38	0.01uf ±10% 200VW Hunts W99	226363
C39	100uf 3VW Electrolytic	229706
C40	0.005uf ±20% 200VW Hunts W99	226005
C41	0.005uf ±20% 200VW Hunts W99	226005
C42	0.5uf ±20% 200VW Hunts W48	229116
C43	500uf 10VW Electrolytic	229856
	TRANSFORMERS AND INDUCTORS	
T1	Ferrite Rod Ass'y	51065
T2	R.F. Transformer	50620
T3	Oscillator Transformer	50622
T4	1st I.F. Transformer	50637
T5	2nd I.F. Transformer	50639
T6	3rd I.F. Transformer	50641
T7	Driver Transformer	50459
L1	Aerial Choke	34336
	TRANSISTORS AND DIODES	
VT1	AWV 2N544 or 2N1637	
VT2	AWV 2N412, 2N544, 2N374 or 2N1639	
VT3	AWV 2N410	
VT4	AWV 2N410	
VT5	AWV 2N410	
VT6	AWV 2N408	
VT7	AWV 2N217 SP	
VT8	AWV 2N217 SP	
MR1	Not used	
MR2	Germanium Diode IN295, OA90 or OA80	
	MISCELLANEOUS	
SW1	On/Off Switch on R22	
LS1	6" x 4" Permanent Magnet Speaker	50043
TH1	130 ohms at 25° C. NTC Thermister	893703
JK1	Jack	63629
PL1	Battery Plug	34623
SK1	Aerial Socket	49051

D.C. RESISTANCE OF WINDINGS

WINDING	OHMS RESISTANCE IN
Ferrite Rod Assembly T1:	
Primary 1-2	20
Secondary 6-7	1.5
Tertiary 4-5	*
R.F. Transformer T2:	
Primary 4-5	78
Secondary 2-3	10.6
Tertiary 1-6	*
Oscillator Transformer T3:	
Primary 1-2	5.5
Secondary 4-5	1

WINDING	RESISTANCE IN OHMS
1st and 2nd I.F. Transformers Windings T4, T5	10
3rd I.F. Transformer T6:	
Primary 1-6	6
Secondary 3-5	10
Coupling Transformer T7:	
Primary Bu-Br	70
Secondary Bk-Gr	230

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.
* Less than one ohm.

MECHANICAL REPLACEMENT PARTS

ITEM	PART No.
Badge, AWA	39636/1
Badge, Radiola (on 208-PY)	35278
(on B31)	64002
Bracket, Moulded, Aerial Mounting	39625
Cabinet (on 208-PY)	37792
(on B31)	60246
Dial Scale (on 208-PY)	37943
(on B31)	37978
Drive Cord, B184 Glass Fibre Nylon Covered 21" and 39"	250007
Drive Drum Assembly	39641
Fret (on 208-PY)	39603
(on B31)	64001
Gang Mounting:	
Grommet	36826/2
Screw, 4BA x 5/16" Ch. hd.	714010
Spacer	39624
Washer, Flat	13156
Washer, 4BA, ITL	921204

ITEM	PART No.
Gear Case Assembly	39618
Grommet,	38429
Jack, Earphone	417409
Jack, Power Supply	63629
Knob Assembly, On-Off/Volume (on 208-PY)	60093
(on B31)	64004
Knob Assembly, Tone (on 208-PY)	39631
(on B31)	64003
Knob Assembly, Tuning (on 208-PY)	39626
(on B31)	64005
Label, Component Layout (on 208-PY)	60350
(on B31)	62952
Pointer	39627
Spindle, Tuning	60096
Spring, Dial Cord Tension	1741
Terminal, Spring Earthing	5458

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

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 exception to the above is in the 1st audio stage (VT5) where the output is taken from the EMITTER instead of the COLLECTOR.

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:

It is not necessary to disconnect the printed board from the chassis to gain access to components on top of the board as the speaker may be readily removed from chassis.

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.

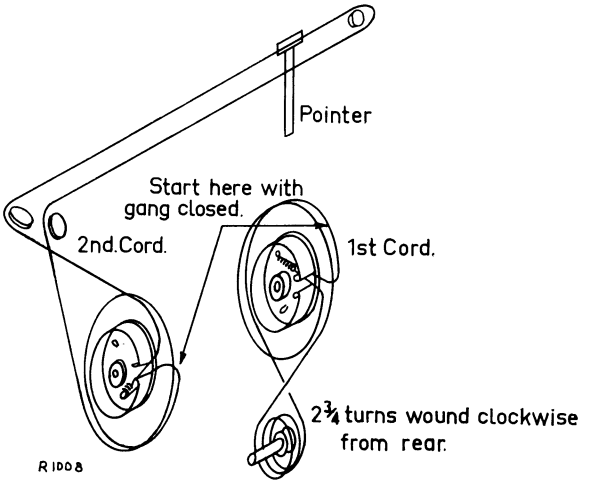
The cans on all coils except the 3rd IF transformer may be removed without disturbing the coil formers. This is done by unsoldering the can lugs only and pulling the can free. When replacing the cans make sure the coil former is concentric with the hole on top of the can.

Chassis Removal:

Remove all control knobs, these being a push-on fit.
Remove the two Philip's head screws on the handle pivots.
Open the cabinet back and remove the battery.
The chassis assembly is now held by two screws on the outer edge of the chassis near the two front controls. Remove these screws and the chassis may be lifted out of the cabinet.

Dial Cord Replacement:

Two dial cords are used on this model; one connects the tuning spindle to the dial drum and the other connecting the dial drum to the pointer. The former is put on first starting with a looped end of the cord, following the path shown and terminating with the tension spring at the original anchor point. All successive turns around the drum progress outward from the gang.



CIRCUIT — RADIOLA MODELS B31 and 208-PY