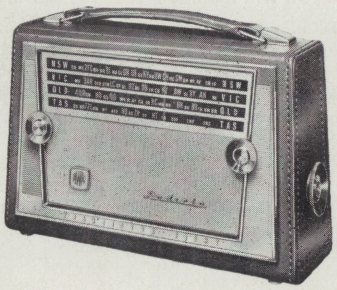
TECHNICAL INFORMATION AND SERVICE DATA

MANUFACTURERS AWA SUPERVISED SERVICE



Radiola

TRANSISTOR EIGHT

Model 208-P

ISSUED BY
AMALGAMATED WIRELESS (AUSTRALASIA) LTD.

GENERAL DESCRIPTION

Model 208-P is an eight transistor, battery-operated, superheterodyne portable 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. transformer; Autodyne converter; high-sensitivity, centre-tapped 80 ohms impedance speaker obviating the need of an output transformer.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

Frequency Range ..... 540-1,620 Kc/s
(555-185 metres)

Intermediate Frequency ..... 455 Kc/s

Battery Complement .. 9 volt battery type 276-P

Battery Consumption:

For zero audio output ..... 14 mA
For 50 mW audio output ..... 50 mA
For full audio output ..... 110 mA

Transistor Complement:

AWV 2N544 ..... R.F. Amplifier
AWV 2N412, 2N544 or 2N374 .... Converter
AWV 2N410 ..... 1st I.F. Amplifier
AWV 2N410 ..... 2nd I.F. Amplifier
AWV 2N410 ..... 1st Audio
AWV 2N408 ..... Driver
AWV 2N217 SP ..... Output
AWV 2N217 SP ..... Output

A diode (IN295) is also used as Audio Detector and A.V.C.

LOUDSPEAKER:

6" x 4" Permanent Magnet No. 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.

D.C. RESISTANCE OF WINDINGS

WINDING	RESISTANCE IN OHMS
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
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 slighty different reading is obtained.
* Less than one ohm.

MECHANICAL REPLACEMENT PARTS

ITEM	PART No.
Bracket, Aerial Mounting	39625
Cabinet	37792
Clamp	39348
Cover Link	39617
DIAL SCALES:	
All States	37943
Eastern	37932
Southern	37939
Drum, Tuning Assembly	39641
Fret	39603
Gear Case Assembly	39618
Knob Assembly, Tone, Volume	39631
Knob Assembly, Tuning	39626
Label, Component Layout	37743
Pointer	39627
Plug, Battery	
Spindle, Tuning	39629
Terminal, Spring Earthing	5458
Trim, Cabinet	39601

When ordering, always quote the above Part Numbers and in the case of coloured parts such as cabinet, knobs, fret, etc., the colour plus the Part Number.

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.

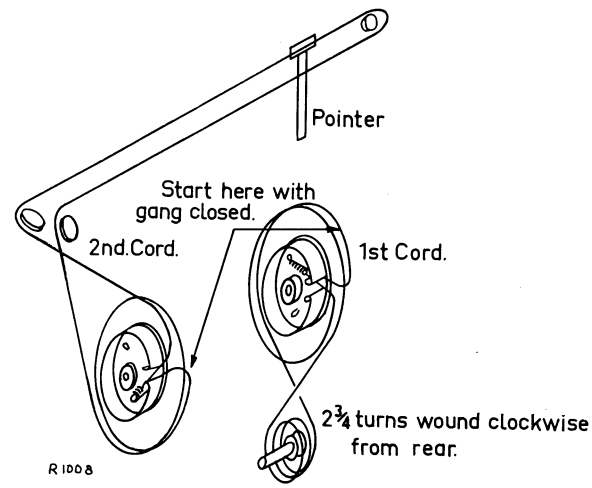
Remove the two Philip's head screws on the handle pivots.

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.

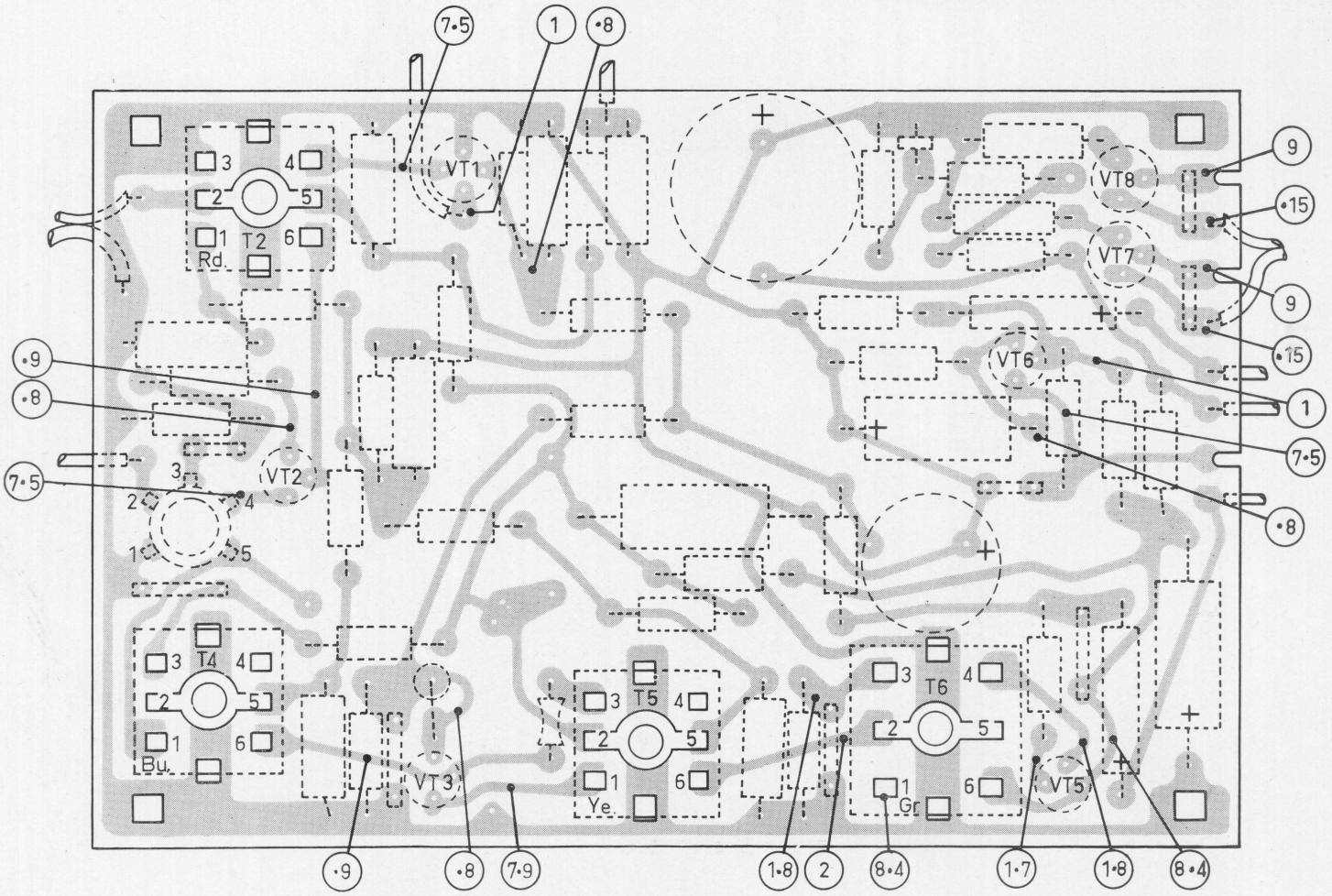
Dial Cord Replacement:

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.



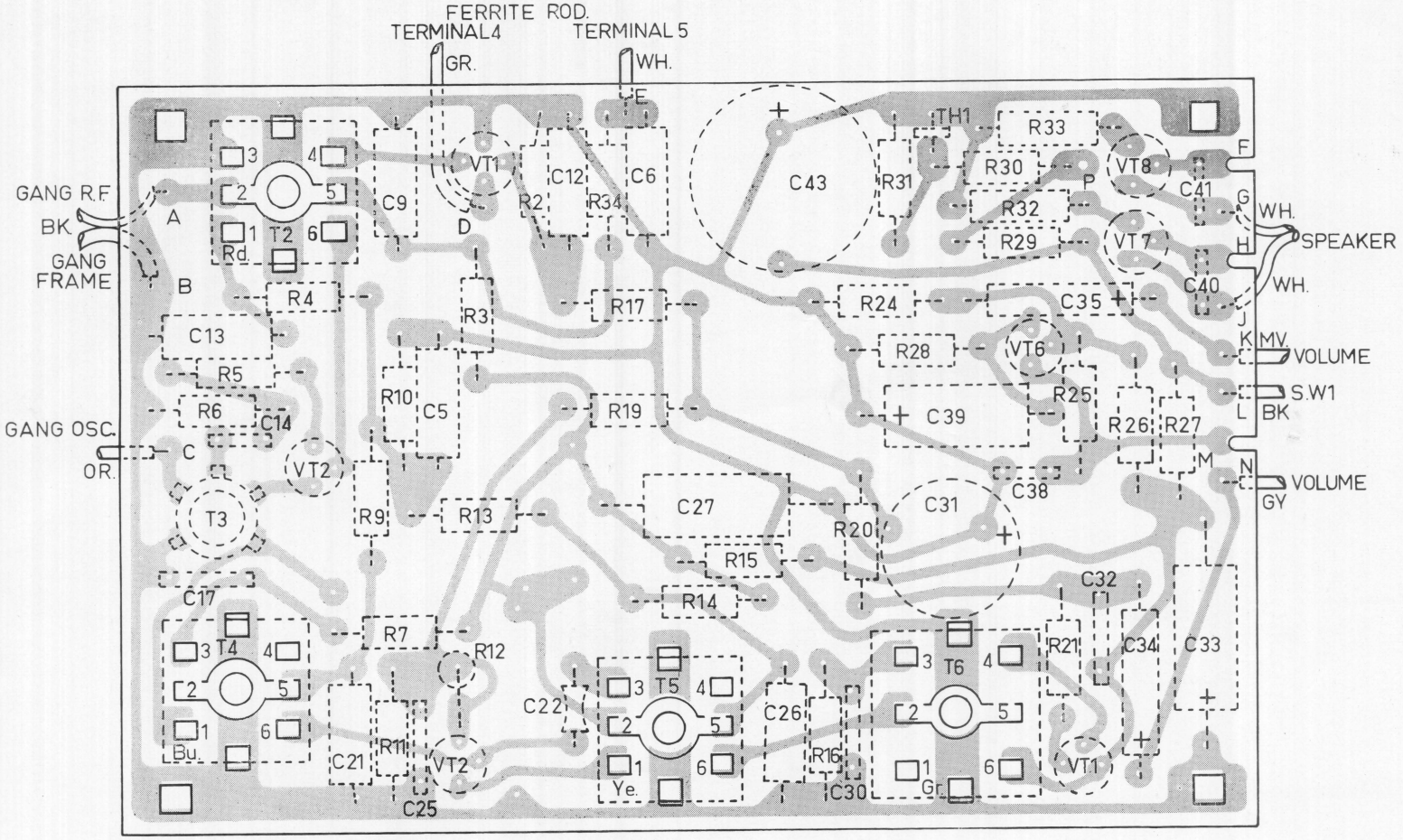
VOLTAGE CHART

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



The assemblies represented above are viewed from the wiring side of the board.

COMPONENT LOCATION



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

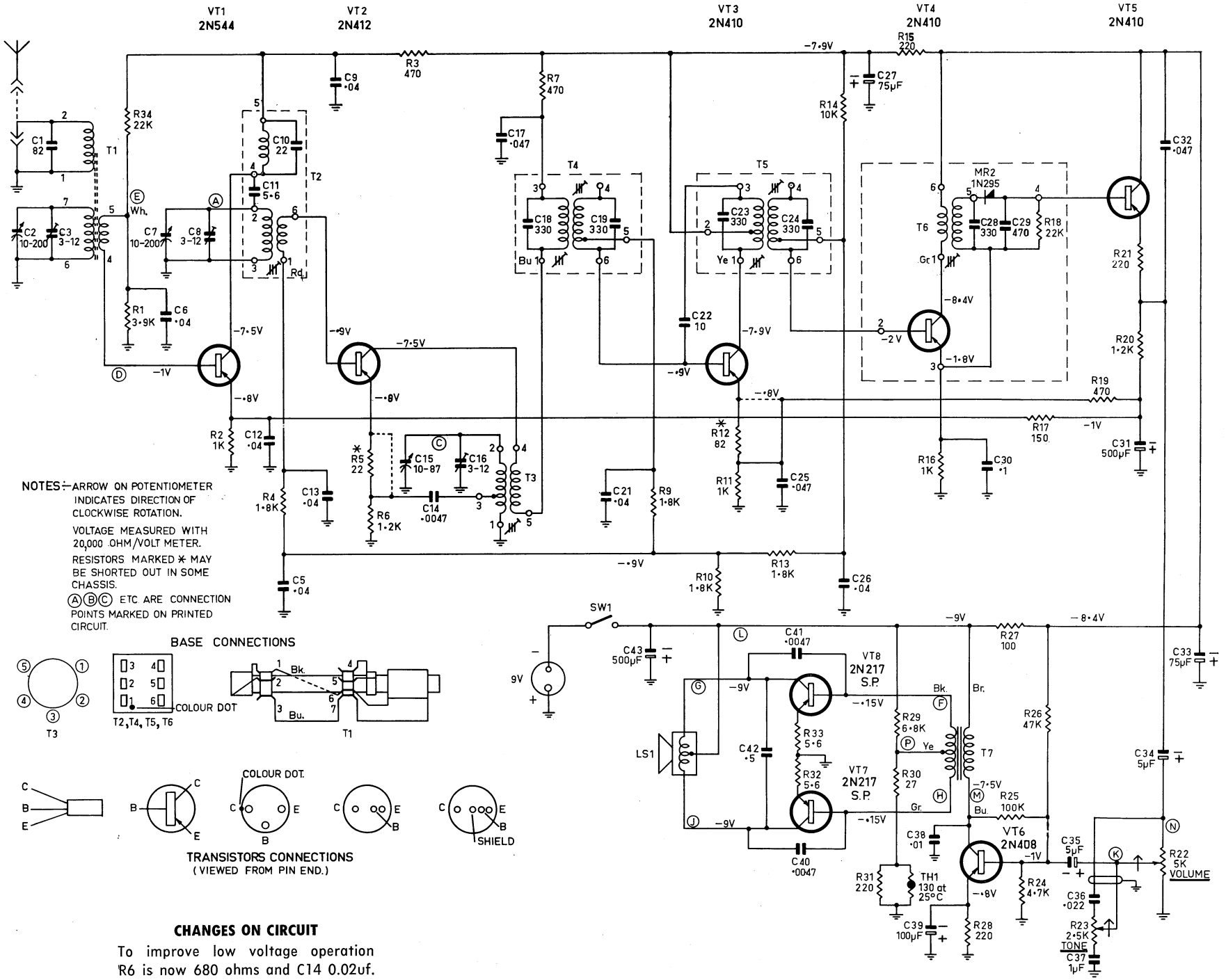
ORDER	CONNECT "HIGH" SIDE OF GENERATOR TO:	TUNE GENERATOR TO:	TUNE RECEIVER TO:	ADJUST FOR MAX. PEAK OUTPUT
1	R.F. Section of Gang	455 Kc/s	Gang fully closed	Cores in T6, T5 and T4
	Repeat adjustment until maximum output is obtained			
	Shunt R.F. section of gang (rear section) with a 3K ohm resistor			
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.

CIRCUIT CODE — RADIOLA PORTABLE 208-P

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	22 ohms ± 10% ½ watt	602320
R6	1.2K ohms ± 10% ½ watt	608312
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	601263
R11	1K ohms ± 5% ½ watt	608022
R12	82 ohms ± 10% ½ watt	603810
R13	1.8K ohms ± 5% ½ watt	601263
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	601490
R19	470 ohms ± 5% ½ watt	606575
R20	1.2K ohms ± 10% ½ watt	608312
R21	220 ohms ± 10% ½ watt	605253
R22	5K ohms Log Carbon, Volume W/S	37253
R23	2.5K ohms Log Carbon, Tone	37254
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
	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	0.04uf ±20% 200VW Hunts W99	228750
C13	0.04uf ±20% 200VW Hunts W99	228750
C14	0.0047uf ±20% Hi-K 33VW disc	225964
C15	10—87pf tuning Osc.	21370
C16	3—12pf trimmer Osc.	
C17	0.047uf ±100% —0% Hi-K 33VW disc	226824
C18	330pf ±5% N750 33VW tubular	223717
C19	330pf ±5% N750 33VW tubular	223717
C20	Not used	
C21	0.04uf ±20% 200VW Hunts W99	228750
C22	10pf ±5% NPO tubular	220451
C23	330pf ±5% N750 33VW tubular	223717
C24	330pf ±5% N750 33VW tubular	223717
C25	0.047uf ±100% —0% Hi-K 33VW disc	226824
C26	0.04uf ±20% 200VW Hunts W99	228750
C27	75uf 10VW Electrolytic	229675
C28	330pf ±5% N750 33VW tubular	223717
C29	470pf ±20% Hi-K tubular	221972
C30	0.1uf ±100% —0% Hi-K 33VW disc	227059
C31	500uf 3VW Electrolytic	229854
C32	0.047uf ±100% —0% Hi-K 33VW disc	226824
C33	75uf 10VW Electrolytic	229675
C34	5uf 6VW Electrolytic	228253
C35	5uf 6VW Electrolytic	228253
C36	0.022uf ±10% 200VW paper	226641
C37	1uf ±20% 200VW Hunts W48	227731
C38	0.01uf ±20% Hi-K 33VW disc	226352
C39	100uf 3VW Electrolytic	229706
C40	0.0047uf ±20% Hi-K 33VW disc	225964
C41	0.0047uf ±20% Hi-K 33VW disc	225964
C42	0.5uf ±20% 200VW Hunts W48	229116
C43	500uf 10VW Electrolytic	229856
	TRANSFORMERS	
T1	Ferrite Rod Ass'y	50624
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
	TRANSISTORS AND DIODES	
VT1	AWV 2N544	
VT2	AWV 2N412, 2N544 or 2N374	
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	
	MISCELLANEOUS	
SW1	On/Off Switch on R22	
LS1	6" x 4" Permanent Magnet Speaker	50043
TH1	130 ohms at 25° C. NTC Thermister	893703



NOTES:- ARROW ON POTENTIOMETER INDICATES DIRECTION OF CLOCKWISE ROTATION.

VOLTAGE MEASURED WITH 20,000 OHM/VOLT METER.

RESISTORS MARKED * MAY BE SHORTED OUT IN SOME CHASSIS.

(A)(B)(C) ETC ARE CONNECTION POINTS MARKED ON PRINTED CIRCUIT.

BASE CONNECTIONS

TRANSISTORS CONNECTIONS
(VIEWED FROM PIN END.)

CHANGES ON CIRCUIT

To improve low voltage operation R6 is now 680 ohms and C14 0.02uf.