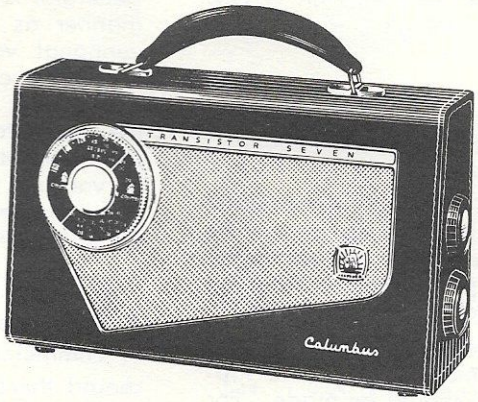
RADIO CORPORATION OF NEW ZEALAND LIMITED

TECHNICAL INFORMATION AND SERVICE DATA

Columbus Transistor Portable Model 117 P.Z.



GENERAL DESCRIPTION

Model 117 P.Z. is a Seven Transistor, battery operated Superheterodyne Portable receiver. This model is designed for Medium Wave band reception.

Features of the design include :—

Ferrite rod aerial with provision for external aerial; high gain I.F. Transformers; Autodyne converter; Volume and Tone controls; feedback on output stage; high sensitivity 7" x 5" elliptical speaker and economical battery operation.

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 276P

Battery Consumption ..... For zero output = 15 mA

Battery Consumption ..... For zero audio output = 15 mA
For full audio output = 80 mA

Transistor Complement:

R.C.A. 2N412 ..... Converter
R.C.A. 2N410 ..... 1st I.F. Amplifier
R.C.A. 2N410 ..... 2nd I.F. Amplifier
R.C.A. 2N408 ..... Voltage Amplifier
R.C.A. 2N408 ..... Driver
R.C.A. 2N270 ..... Output
R.C.A. 2N270 ..... Output

Three OA150 crystal diodes are also used as (1) Audio Detector and A.V.C. (2) Converter Clamp, and (3) Overload Diode.

Loudspeaker :

7 x 5" permanent magnet No. 21602.

V.C. Impedance, 15 ohms at 400 c.p.s.

Undistorted Power Output ..... 400 mW

Controls :

Tuning Control — front left-hand of cabinet.

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

Tone Control — bottom right-hand end of cabinet.

Dimensions :

Height, 7"; Width, 11½"; Depth, 4".

Weight, with battery, 7 pounds.

Chassis Removal :

Remove the tuning tone and volume control knobs. These knows are only a push on fit; however, in the case of the tuning control, forcing the knob past its normal travel with a twisting action is necessary to overcome friction between the knob and the gang spindle.

Remove the two screws from the top and one screw from the bottom of the cabinet.

The chassis is now free to lift from the cabinet.

Chassis replacement is the reverse of the above. After replacing the tuning knob check the calibration on some known station and correct for any tracking error by forcing the knob past its free travel in the appropriate direction.

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.

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) Signal Generator.

(2) 20,000 Ohm/Volt Multimeter.

(3) Output Meter : The output impedance from Collector to collector is 250 Ohms. If an indication only is required then an output meter presenting a load of not less than 5000 ohms connected across the output collectors should be adequate.

If an output meter with the correct loading (15 Ohms) is used, then the SPEAKER MUST BE DISCONNECTED, otherwise the maximum dissapation 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 *	1500 Kc/s.	1500 Kc/s.	H.F. Osc. Adj. (C5)
4	Inductively coupled to Rod Aerial *	1500 Kc/s.	1500 Kc/s.	H.F. Aerial Adj. (C3)

* 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 — 117-P.Z.

Code No.	Description	Part No.
	RESISTORS	
	All Resistors ± 10% unless otherwise stated	
R1	10K ohms ½ watt	
R2	56K ohms ½ watt	
R3	470 ohms ½ watt	
R4	1.5K ohms ½ watt	
R5	4.7K ohms ± 5% ½ watt	
R6	27K ohms ± 5% ½ watt	
R7	2.2K ohms ½ watt	
	560 ohms ± 5% ½ watt	
R9	4.7K ohms ½ watt	
R10	47K ohms ½ watt	
R11	470 ohms ½ watt	
312	470 ohms ½ watt	
R13	1K ohms ± 5% ½ watt	
R14	4.7K ohms ± 5% ½ watt	
R15	22K ohms ± 5% ½ watt	
	1.2K ohms ½ watt	
R17	1.8K ohms ½ watt	
R18	2.5K ohms Log Carbon. Volume W/S	37218
R19	4.7K ohms ½ watt	
R20	100 ohms ½ watt	
R21	27K ohms ½ watt	
	220 ohms ½ watt	
R23	100 ohms ½ watt	
R24	6.8K ohms ½ watt	
325	22 ohms ½ watt	
R26	1K ohms ½ watt	
R27	20K ohms Log Carbon. Tone	37219
R28	10 ohms ½ watt	
	CAPACITORS	
C1	0.1 mfd. 200 volt working paper	
C2	11-385 pfd. tuning (Aerial)	21209
C3	6-50 pfd. trimmer (Aerial)	31954
C4	11-385 pfd. tuning (Osc.)	21209
C5	8-40 pfd. trimmer (Osc.)	231185
C6	420 pfd. ± 2½% padder	
C7	0.1 mfd. 200 volt working paper	
C8	0.01 mfd. 200 volt working paper	
C9	330 pfd. ± 5% silvered mica (in 1st I.F.)	
C10	330 pfd. ± 5% silvered mica (in 1st I.F.)	
C11	0.047 mfd. 200 volt working paper	
C12	6.8 pfd. ± .5 pfd. N.P.O. tubular	
C13	0.047 mfd. 200 volt working paper (117-PZ)	
C14	330 pfd. ± 5% silvered mica (in 2nd I.F.)	

Code No.	Description	Part No.
	CAPACITORS (Cont.)	
	500 mfd. 3 volt working Electrolytic	
C16	0.047 mfd. 200 volt working paper	
C17	6.8 pfd. ± .5 pfd. N.P.O. tubular	
C18	0.047 mfd. 200 volt working paper	
C19	330 pfd. ± 5% silvered mica (in 3rd I.F.)	
C20	330 pfd. ± 5% silvered mica (in 3rd I.F.)	
C21	0.047 mfd. 200 volt working paper	
	470 pfd. ± 10% 500 volt working mica.	
C23	25 mfd. 3 volt working Electrolytic	
C24	25 mfd. 3 volt working Electrolytic	
C25	100 mfd. 10 volt working Electrolytic	
C26	100 mfd. 10 volt working Electrolytic	
C27	100 mfd. 10 volt working Electrolytic	
C28	0.047 mfd. 200 volt working paper	
C30	0.022 mfd. 200 volt working paper	
C31	0.01 mfd. 200 volt working paper	
C32	0.22 mfd. 200 volt working paper	
C33	400 mfd. 12 volt working Electrolytic	
C34	0.047 mfd. 200 volt working paper	
	TRANSFORMERS	
T1	Ferrite Rod Aerial	38076
T2	Oscillator Coil	38074
T3	1st I.F. Transformer	36911
T4	2nd I.F. Transformer	38072
T5	3rd I.F. Transformer	36921
T6	Audio Driver Transformer	21447A
T7	Audio Output Transformer	38118
	TRANSISTORS	
VT1	R.C.A. 2N412	
VT2	R.C.A. 2N410	
VT3	R.C.A. 2N410	
VT4	R.C.A. 2N408	
VT5	R.C.A. 2N408	
VT6	R.C.A. 2N270	
VT7	R.C.A. 2N270	
	MISCELLANEOUS	
MR1	Germanium Diode OA150	
MR2	Germanium Diode O19150	
MR3	Germanium Diode OA150	
TH1	Thermistor 130 ohms at 25° C. N.T.C.	893703
PLA	Battery Plug	
SWA	ON/OFF Switch (On R18)	
LS1	7" x 5" P.M. Speaker	36457

D.C. RESISTANCE WINDINGS

Winding	D.C. Resistance in ohms
Ferrite Rod Assembly T1 :	
Primary	1
Secondary	*
Oscillator Transformer T2 :	
Primary	4.2
Secondary	*
I.F. Transformer Windings T3, T4 and T5 :	
Primary	10
Secondary	*
Driver Transformer T6 :	
Primary	380
Secondary	160
Audio Output Transformer T7 :	
Primary	20
Secondary	1.7

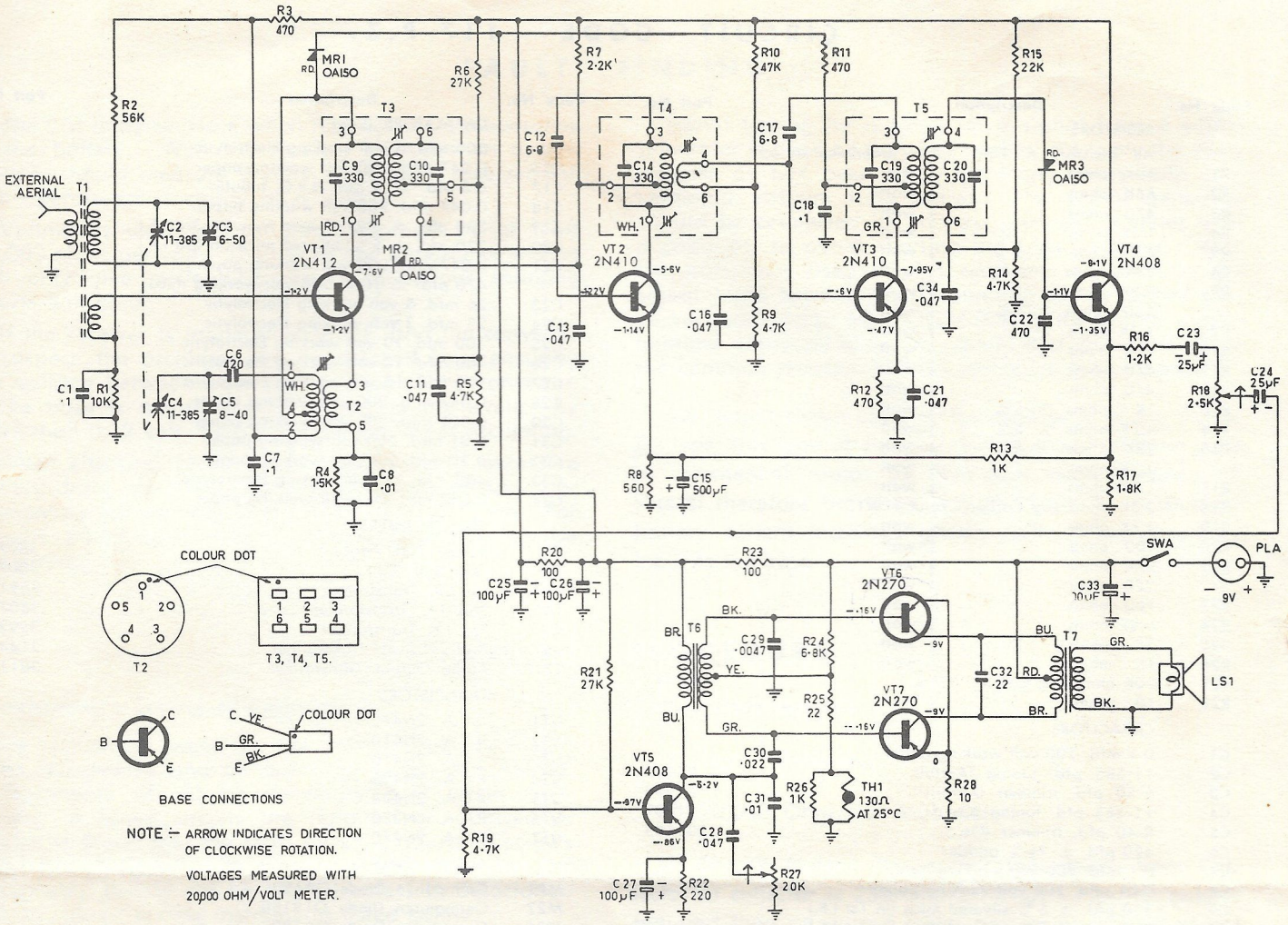
The above readings were taken on a standard chassis, but substitution of materials during manufacture may cause variations and it should not be assumed that a component is faulty if a slightly different reading is obtained.

* Indicates — Less than 1 ohm.

MECHANICAL REPLACEMENT PARTS

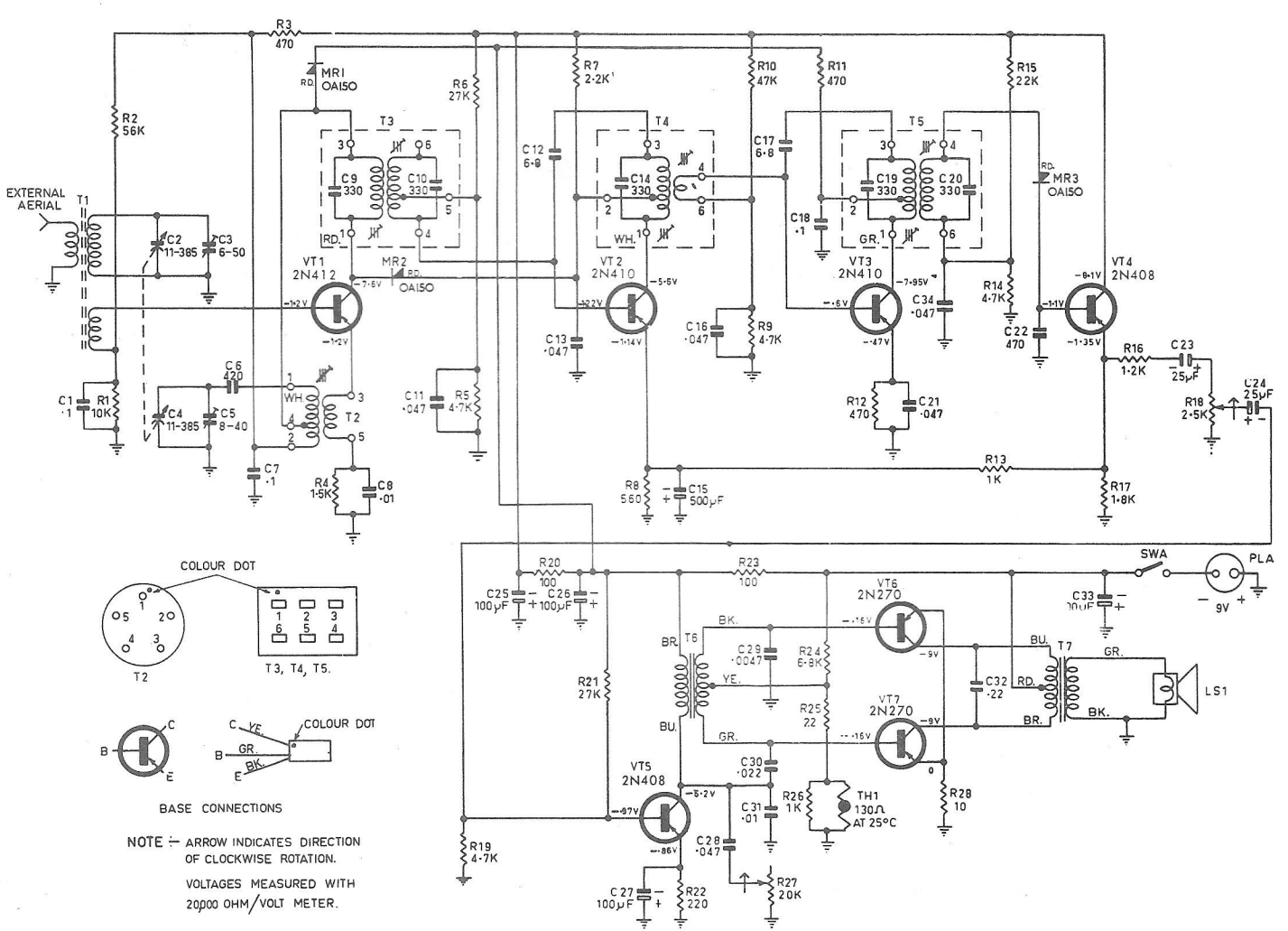
Item	Part Number
Chassis Assembly :	
Bracket Assembly, Ferrite Rod Mounting	38427
Bracket, Gang Mounting	36477
Clip, I. F. Mounting	27780
Coupling, Gang Spindle	36468
Nut, Top Chassis Mounting	36447
Screw Oscillator Coil Mounting	31373
Cabinet Fitting :	
Cabinet	37775
Dial Scale	OE309R
Fret, Speaker	36437A
Knob Assembly, Tone	38432
Knob Assembly, Tuning	35290A
Knob Assembly, Volume	38431
Label, Component Layout	37686
Retainer, Dial Scale	36472
Trim Frame	36436

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



RADIO CORPORATION OF NEW ZEALAND LIMITED

80 COURTENAY PLACE
WELLINGTON, C.3.


R3 470
MR1 OA150
R6 27K
R7 2·2K
R10 47K
R11 470
R15 22K
R2 56K
T3
T4
T5
C12 6·8
C17 6·8
C18 ·1
MR3 OA150
EXTERNAL AERIAL
T1
C2 11-385
C3 6-50
C9 330
C10 330
C14 330
C19 330
C20 330
VT1 2N412
MR2 OA150
VT2 2N410
VT3 2N410
VT4 2N408
R14 4·7K
C22 470
R16 1·2K
C23 25µF
C24 25µF
R18 2·5K
C1 ·1
R1 10K
C6 420
C4 11-385
C5 8-40
T2
C7 ·1
R4 1·5K
C8 ·01
C11 ·047
R5 4·7K
C13 ·047
C16 ·047
R9 4·7K
C34 ·047
R12 470
C21 ·047
R13 1K
R8 560
C15 500µF
R17 1·8K
COLOUR DOT
T2
T3, T4, T5.
R20 100
R23 100
SWA
PLA
9V
C25 100µF
C26 100µF
C33 100µF
VT6 2N270
VT7 2N270
T6
T7
LS1
C29 ·0047
R24 6·8K
R25 22
C32 ·22
R21 27K
C30 ·022
C31 ·01
R26 1K
TH1 130Ω AT 25°C
R28 10
VT5 2N408
C28 ·047
R27 20K
R19 4·7K
C27 100µF
R22 220
BASE CONNECTIONS
NOTE :– ARROW INDICATES DIRECTION OF CLOCKWISE ROTATION.
VOLTAGES MEASURED WITH 20p00 OHM/VOLT METER.

RADIO CORPORATION OF NEW ZEALAND LIMITED

Cables: "MARKSLIM"
Telegrams: "RADICENTRE"

RADIO MANUFACTURERS
80 COURTENAY PLACE, WELLINGTON, C3, N.Z.

Telephone 55-020
G.P.O. Box 696

CIRCULAR TO CENTRE MANAGERS
AND DEALERS

Circular Number 2774

9th October, 1959.

MODEL 117PZ 500 MFD 3 VOLT EMITTER BY-PASS CONDENSER

Owing to faults in a batch of 500 mfd 3 volt Ducon electrolytic condensers, a small number of 117PZ transistor portables left the factory with condensers which might give trouble in service.

This condenser which is connected to the emitter of the 2N410 1st IF is the by-pass for the 560ohm bias resistor, and it has been found to exhibit an intermittent circuit. The symptoms are very hissy reception and slight tendancy to instability. The fitting of a new 500 mfd condenser will eliminate the trouble.

Condensers which are removed from sets should be returned to the factory as we can claim a credit for these from the supplier.

L.W. HURRELL,
WORKS MANAGER

LWH/ERS.