



RADIO CORPORATION PTY. LTD.

DIVISION OF ELECTRONIC INDUSTRIES LTD.

126-130 GRANT STREET, SOUTH MELBOURNE, S.C.4.

TECHNICAL BULLETIN

BULLETIN LJ-1.

File: Receivers
Battery.

Date: 25/7/47.

Page 1.

SUBJECT-Mantel Model "LJ"

5 Tube Superheterodyne Dual Wave Receiver

Battery Operated-1.4 Volt Midget Tubes.

For operation from:

1.5 Volts "A" Battery }
and } Plug-in Type Batteries
90 Volts "B" Battery }

This Bulletin Contains:

1. Technical Specifications.
2. General Description.
3. Alignment Procedure.
4. Circuit Diagram.
5. Voltage Table.
6. Component Parts List.
7. Coil and IF. Transformer Connections.
8. Instructions for Replacing Batteries.
9. Instructions for Connecting External Batteries.



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SUBJECT-Technical Specifications-Model "LJ".

General Description:

The circuit consists of tuned aerial and oscillator stages using a type 1R5 converter tube followed by two IF. amplifier stages using type 1T4 tubes. A type 1S5 tube is used for diode detection, AVC. bias source, and 1st audio which is resistance capacity coupled to a pentode power output amplifier tube type 3V4.

The AVC. system employs approximately two thirds of the DC. voltage available from the diode circuit which after filtering is used to control the grids of the 1st IF. and converter tubes. No AVC. bias is applied to the converter on shortwave operation.

A grid leak and suitable bypass condenser are included in the grid return lead of the 2nd IF. transformer secondary to prevent the IF. amp. tube drawing grid current and thereby dampening the tuned circuit.

Back bias is used for the output tube which eliminates the necessity for a separate "C" battery and provides a decrease in bias as the "B" battery terminal voltage falls with use.

The number of manual controls has been kept to a minimum by using a four position switch as combined "ON/OFF" battery switch, tone switch and dial lamp switch. The function of this switch being that the first position is receiver switched "OFF", the second position is receiver switched "ON" and is the 1st position of the tone control which provides a tone condition of even balance between high and low frequencies. In the third position the treble response is reduced, providing a condition of maximum intelligibility when listening to long distant stations. In the fourth position of the switch dial illumination is provided to assist when tuning and selecting the required station.

Battery Economizer:

The fully anticlockwise position of the wave change switch brings into operation the battery economizer circuit which has the effect of reducing the current drain from the "B" batteries by approximately 30%. The undistorted power output is reduced by approximately 20% in this operating condition.

This is only noticeable when the receiver is being operated near the position of maximum tonal volume.

The reduction in current drain is accomplished by increasing the bias on the output tube.

SUBJECT-Technical Specifications-Model "LJ".

Tube Complement:

Type 1R5 Converter.
Type 1T4 IF. Amplifier.
Type 1T4 IF. Amplifier.
Type 1S5 Diode Detector, AVC. and 1st Audio.
Type 3V4 Power Output Amplifier.

Intermediate Frequency: 455Kc.

Tuning Range: Broadcast 535 Kc. (Kilocycles) to 1640 Kc.
560.7 M. (Meters) to 182.9 M.
Shortwave 5.85 Mc. (Megacycles) to 18.5 Mc.
50 M. (Meters) to 16 M.

Calibration: Straight Line Frequency.

Operating Voltages: "A" Battery 1.5 Volts.
"B" Battery 90 Volts (two 45 volt batteries
in series).

Battery Consumption:

"A" Battery drain 300 Milliamps (does not include dial lamps).
"B" Battery drain { Shortwave operation 11.5Ma. No signal.
Broadcast-normal operation 11.5Ma. No signal.
Broadcast-economises in operation 7.5Ma. No signal.

General Description:

The Model "LJ" is a 5 tube dual wave superheterodyne mantel receiver having a sensitivity of 5 microvolts on broadcast and 10 microvolts on shortwave for an output of 25 milliwatts with a load impedance of 10,000 ohms.

The receiver operates from the new type plug-in layer built dry batteries which are held in position on a battery carrier inside the receiver cabinet by metal clips. Provision has been made for connecting heavy duty external batteries by including in the design of the chassis an eight pin socket and plug. Instructions for connecting external batteries are fully detailed in the following pages of this bulletin.

The tubes used in the design of the receiver are the new series miniature type which have no moulded bakelite bases and fit a special miniature 7 pin socket. The tubes have tubular envelopes and are single ended in all cases with an exhaust tip at the top of the bulb. The tube filaments operate from 1.4 volts including the type 3V4 output tube, the dual filaments of which are wired in parallel.

SUBJECT—Alignment Procedure—Model "LJ".

Equipment: Signal Generator.
 Output Meter.
 Alignment Tool: Part No. PM581.
 Dummy Antenna: .01MFD. Mica Capacitor.
 200MMFD. Mica Capacitor.
 400 Ohm Non-inductive Resistor.

Alignment Conditions:

Load Imped.: 10,000 Ohms.
 Output Level: 25 Milliwatts.
 Battery Supply: "A" 1.5 Volts, "B" 90 volts.
 Volume Control: Full on (clockwise).
 Tone Control: High Tone Position.

Alignment: Intermediate Frequency—455 Kc.

Oper. No.	Generator Connection	Generator Frequency	Dummy Antenna	Instructions
Turn wave change switch to normal B/cast position (centre position on switch)				
1.	To control grid pin No. 6 of 1T4 2nd IF. amp tube circuit No. 55	455 Kc.	.01MFD. mica capacitor in series with generator	Peak 3rd IF. trans. primary and secondary for maximum output.
2.	To control grid pin No. 6 of 1T4 1st. IF. amp tube circuit No. 54	455 Kc.	.01MFD. mica capacitor in series with generator	Peak 2nd IF. trans. primary and secondary for maximum output.
3.	To control grid pin No. 6 of 1R5 converter tube	455 Kc.	.01MFD. mica capacitor in series with generator	Gang plates full out. Peak 1st IF. trans. primary and secondary for max. output.
4.	To antenna terminal	600 Kc.	200MMFD. mica capacitor in series with generator	Turn gang and dial pointer to 600 Kc. & peak B/cast. oscl. coil inductance trimmer (iron core) for max. output. Rock the gang to and fro through the signal while adjusting.
5.	To antenna terminal	1400 Kc.	200MMFD. mica capacitor in series with generator	Turn gang and dial pointer to 1400 Kc. Adjust B/cast oscl. coil trimmer for logging and peak B/cast aerial coil trimmer for maximum output.
6.	Repeat operation Nos. 4 and 5.			



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SUBJECT—Alignment Procedure—Model "LJ".

Oper. No.	Generator Connection	Generator Frequency	Dummy Antenna	Instructious
<hr/>				
<u>Turn wave change switch to S/wave position.</u>				
7.	To antenna terminal	17 Mc.	400 Ohm non-inductive resistor in series with generator	Turn gang and dial pointer to 17 Mc. Adjust neutralizing trimmer for min. capacity. Adjust S/wave oscl. coil trimmer for logging and peak S/wave aerial coil trimmer for max. output. Peak neutralizing trimmer for max. output. Re-log S/wave oscl. coil trimmer and repeak S/wave aerial coil trimmer.
8.	To antenna terminal	7 Mc.	400 Ohm non-inductive resistor in series with generator.	Turn gang and dial pointer to 7 Mc. and check tracking.



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SUBJECT—Voltage Table—Model "LJ".

Equipment:

DC. Volt meter: 1,000 ohm per volt meter with 0-10 and
0-250 volt scales.
DC. Ma. meter: 0-10 and 0-500 milliamp scales.

Conditions of Test:

Receiver tuned to 1,000 Kcs.
Volume control full on (clockwise) no signal.
"A" battery 1.5 volts. "B" battery 90 volts.
Tone control on high tone position.
Wave change switch on normal broadcast operation
(centre position on switch).

Tube	Fil.	Plate	Screen	Grid	Oscil. Plate
1R5	1.4V.	85V.	65V.	—	65V.
1T4	1.4V.	85V.	5V.	—	—
1T4	1.4V.	85V.	5V.	—	—
1S5	1.4V.	7.5V.	2.5V.	—	—
3V4	1.4V.	85V.	85V.	5.15V.	—

"A" Current drain 300 Ma. (does not include dial lamps).

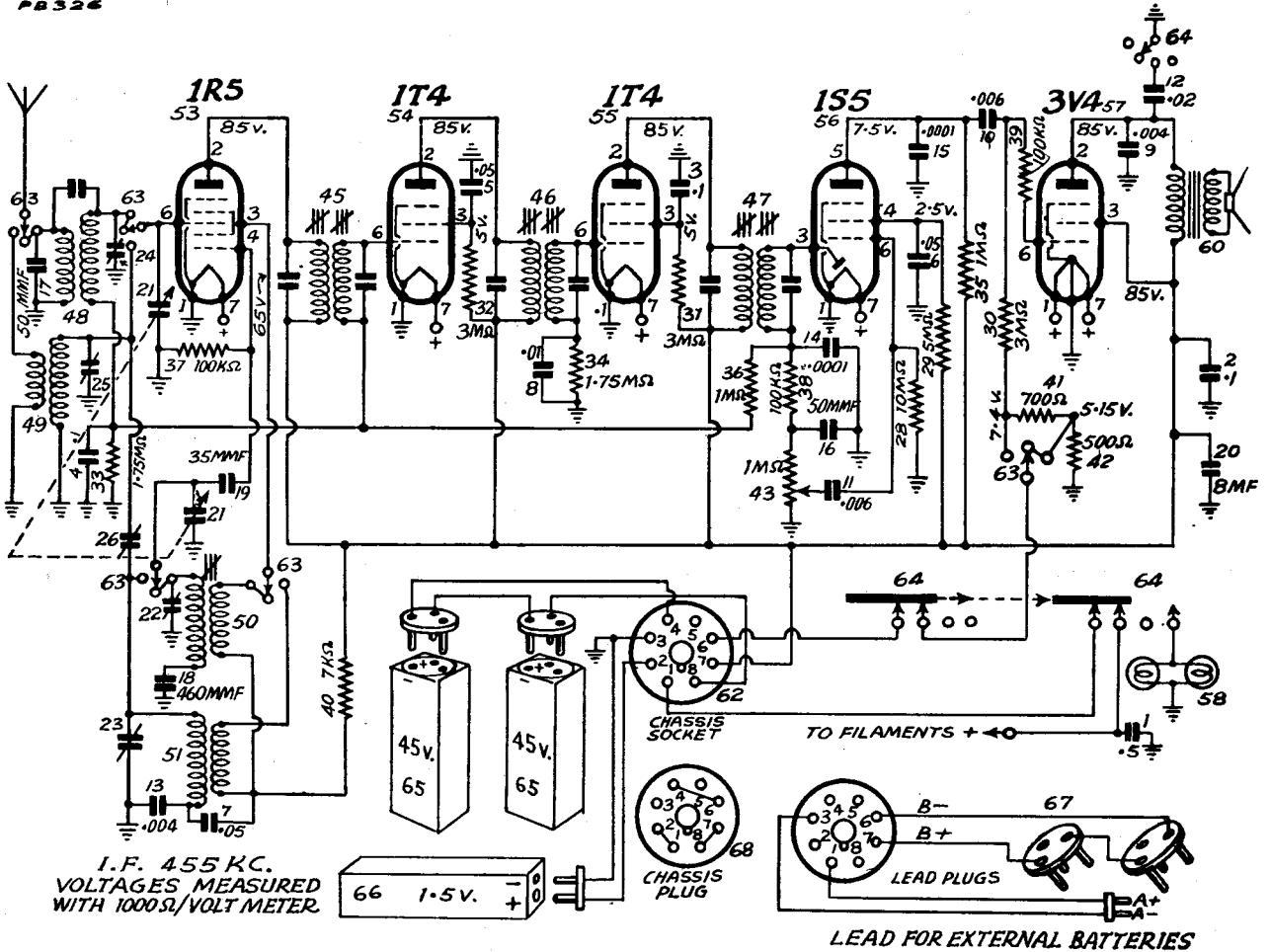
"B" Current drain { Normal B/cast and S/wave position: 11.5 Ma. (no signal).
Economise B/cast position: 7.5 Ma. (no signal).

B+ voltage on broadcast economise position is 83.7 volts.

3V4 back bias voltage on broadcast economise position is 7.4 volts.

SUBJECT—Schematic Circuit Diagram—Model "LJ".

PR326



SUBJECT-Component Parts List-Model "LJ".

Circuit No.	Part Name	Tol.±	Rating	Part No.
1.	.5MFD. Paper Condenser	20%	200V.DCW	PC121
2.	.1MFD. Paper Condenser	20%	400V.DCW	PC103
3.	.1MFD. Paper Condenser	20%	400V.DCW	PC103
4.	.1MFD. Paper Condenser	20%	200V.DCW.	PC218
5.	.05MFD. Paper Condenser	20%	400V.DCW	PC109
6.	.05MFD. Paper Condenser	20%	400V.DCW	PC109
7.	.05MFD. Paper Condenser	20%	200V.DCW	PC102
8.	.01MFD. Paper Condenser	20%	600V.DCW	PC140
9.	.004MFD. Paper Condenser	20%	600V.DCW	PC221
10.	.006MFD. Paper Condenser	20%	600V.DCW	PC217
11.	.006MFD. Paper Condenser	20%	600V.DCW	PC217
12.	.02MFD. Paper Condenser	20%	400V.DCW	PC111
13.	.004MFD. Mica Condenser	5%	1000VT.	PC299
14.	.0001MFD. Mica Condenser	10%	1000VT.	PC110
15.	.0001MFD. Mica Condenser	10%	1000VT.	PC110
16.	.00005MFD. Mica Condenser	10%	1000VT.	PC141
17.	.00005MFD. Mica Condenser	10%	1000VT.	PC141
18.	460MMFD. Silvered Mica Condenser	2½%	1000VT.	PC684
19.	35MMFD. Silvered Mica Condenser	+0 -5%	1000VT.	PC721
20.	8MFD. E'lytic. Condenser	20%	525PV.	PC313
21.	2 Gang Varb. Condenser			PC636
22.	0-30MMFD. Trimmer Cond. Wire Wound			PC663
23.	0-30MMFD. Trimmer Cond. Wire Wound			PC663
24.	1.5-18MMFD. Trimmer	} Double Trimmer } Cond. Assembly		PC658
25.	3-55MMFD. Trimmer			
26.	1.5-18MMFD. Trimmer Condenser			PC250
27.				
28.	10 Megohm Carbon Resistor	10%	1 Watt	PR236
29.	5 Megohm Carbon Resistor	10%	1 Watt	PR355
30.	3 Megohm Carbon Resistor	10%	½ Watt	PR282
31.	3 Megohm Carbon Resistor	10%	½ Watt	PR282
32.	3 Megohm Carbon Resistor	10%	½ Watt	PR282
33.	1.75 Megohm Carbon Resistor	10%	½ Watt	PR248
34.	1.75 Megohm Carbon Resistor	10%	½ Watt	PR248
35.	1 Megohm Carbon Resistor	10%	½ Watt	PR246
36.	1 Megohm Carbon Resistor	10%	½ Watt	PR246
37.	100,000 Ohm Carbon Resistor	10%	½ Watt	PR103
38.	100,000 Ohm Carbon Resistor	10%	½ Watt	PR103
39.	100,000 Ohm Carbon Resistor	10%	½ Watt	PR103
40.	7,000 Ohm Carbon Resistor	10%	½ Watt	PR247
41.	700 Ohm Carbon Resistor	10%	½ Watt	PR261
42.	500 Ohm Carbon Resistor	10%	½ Watt	PR274
43.	1 Megohm Carbon Potentiometer	20%		PR383
44.				
45.	Transformer 1st IF.			PT387
46.	Transformer 2nd IF.			PT387
47.	Transformer 3rd IF.			PT387
48.	Transformer-Antenna-B/cast.			PT381



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SUBJECT—Component Parts List—Model "LJ".

Circuit No.	Part Name	Tol.±	Rating	Part No.
49.	Transformer—Antenna—S/wave.			PT463
50.	Coil—Oscillator—B/cast.			PT793
51.	Coil—Oscillator—S/wave.			PT464
52.				
53.	Type 1R5 Tube			
54.	Type 1T4 Tube			
55.	Type 1T4 Tube			
56.	Type 1S5 Tube			
57.	Type 3V4 Tube			
58.	Dial Lamp, Min. Screw Base, G3½ Bulb 2.5V. 3A.			PM477
59.				
60.	Speaker—Permag, 6 inch 10,000 Ohm Imped. Input Trans.			K129
61.	Terminal—Press down type			PM306
62.	Socket—8 pin			PM532
63.	Switch—Wave Change			S130
64.	Switch—Battery "ON/OFF" and tone			S131
65.	Battery, 45 volt plug-in type			M130
66.	Battery 1.5 volt plug-in type			M129
	Above batteries are for fitting into cabinet.			
67.	Battery lead for external batteries			PA407
68.	Plug 8 pin			6/646
	Plug Cover			216/224
	Battery Cradle Assembly			A102/646
	Bush—Cond. and Spkr. Mt. (7)			93/53-1
	Terminal Strip Ass'y. (3)			A103/509
	Washers—speaker Mt. (3)			67/30C
	Single Pin Socket—Bottom Plate			18/96
	Single Pin Socket—Top Plate			19/96
	Single Pin Socket—Contact			15/58-2
	Valve Shield			38/635
	Midget Valve Socket (5)			A104/58
	Spring — Socket Mount			32/635
	Pea Lamp Socket Assembly (2)			A128/30C
	Tuning Spindle Assembly			A103/646
	Dial Back Assembly			A110/407-2
	Diffuser Glass			27/407
	Dial Pointer Assembly			A111/407
	Dial Idler Pulley			17/87
	Dial Pulley Mount Stud			18/87
	Dial Drum Assembly			A102/617
	Cord Tension Springs			27/87
	"A" Battery Plug—2 pin			336/30C
	"B" Battery Plug—3 pin (2)			335/30C
	Control Knobs (4)			61/81
	Knob Springs			17/81
	Bakelite Cabinet Type M2			59/81
	Dial Glass			5/646
	Baffle			4/612
	Cabinet Feet (4)			96/47
	Speed Nuts			227/250



TECHNICAL BULLETIN

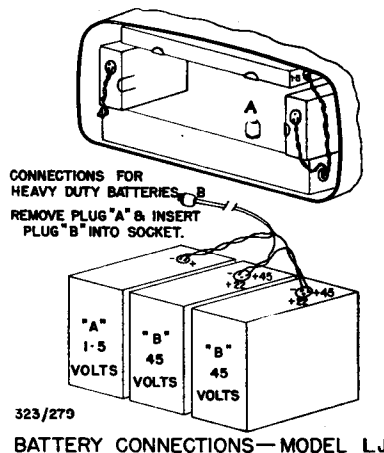
SUBJECT—Instructions forRemoving and Refitting Batteries inside the Cabinet.

To remove the batteries:

The receiver chassis does not have to be removed from the cabinet to remove the batteries. Switch the receiver "Off", remove plug "A" from its socket (refer diagram), withdraw the lead plugs from the battery sockets and then withdraw the batteries from under the spring clips on the battery carrier.

To refit batteries:

Place batteries in position (refer diagram) under the spring clips on the battery carrier. Fit the receiver battery lead plugs into the battery sockets. Make sure the lead plugs are pushed well into the battery sockets. Refit plug "A".

Instructions for Connecting Heavy Duty External Batteries.

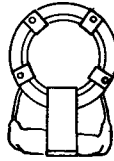
An extension lead part No. PA407 for connecting external batteries is supplied with each receiver.

1. Switch receiver "Off".
2. Remove plug "A" (refer diagram) from the 8 pin socket on the receiver chassis and insert plug "B" (8 pin plug) on extension lead into the 8 pin socket from which plug "A" was withdrawn. An inspection of plug "B" will reveal a centre guide pin for correctly locating this plug into the receiver chassis socket.
3. Plug the small plugs on the extension lead into the sockets of the heavy duty external batteries.

The batteries fitted on the battery carrier in the cabinet do not have to be removed from their positions when operating from external batteries as removing plug "A" automatically disconnects them from the receiver. When operating from the batteries fitted into the cabinet plug "A" must be inserted into its socket.

SUBJECT—Coil and IF. Transformer Connections—Model "LJ".

AVC.



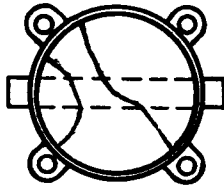
Earth

(Outside secondary) Grid

Antenna (Inside primary)

Ant. Trans. B/cast.

Earth



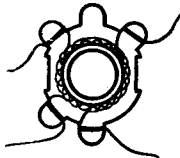
Antenna

Earth

Grid

Ant. Trans. S/wave.

Grid



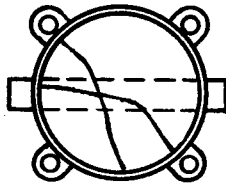
Plate

Junction of Circuit
Nos. 7 and 40

Series Padder

Osc. Coil B/cast.

Osc. Grid Cond.



Junction of circuit
Nos. 40 and 7

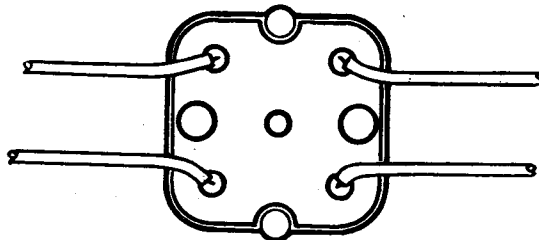
Osc. Plate

Series Pad

Osc. Coil S/wave.

(Grid Return) Black

Green (Grid)



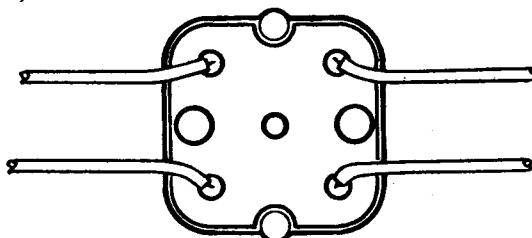
(Plate) Blue

Red (B+)

1st & 2nd IF. Trans.

(Diode Return) Black

Green (Diode)



(Plate) Blue

Red (B+)

3rd. IF. Trans.



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BULLETIN LJ-2.

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SUBJECT—Substitute Output Tube—Model "LJ".

The first production run of the 5 tube battery receiver Model "LJ" has been modified to use a type 3Q4 tube in place of the 3V4 tube.

The modification is due to the shortage of type 3V4 tubes.

Should it be required to change the 3Q4 tube to a type 3V4 tube, no circuit alterations are necessary except for the wiring of the tube socket which is as below.

Socket Connections

3Q4 Tube	3V4 Tube
Pin No. 1. Filament +	Pin No. 1. Filament +
2. Plate	2. Plate
3. Grid	3. Screen
4. Screen	4. No connection
5. Filament—(Mid-tap)	5. Filament—(Mid-tap)
6. Plate	6. Grid
7. Filament +	7. Filament +