

**HIGH SEAS AND OVERSEAS RADIO**  
**LD-R1 RADIO RECEIVER**  
**OPERATION**

The LD-R1 radio receiver is not fixed on a single frequency, nor is it an automatic device. It must be tuned to the proper frequency and adjusted by personnel who are experienced in the operation of the receiver. Practice tuning may be done when the receiver is out of service. WWV provides a good signal for practice tuning on both 10 MHz and 20 MHz (within the coverage of the LD-R1 receiver).

Standard speech is straight speech (not inverted) in the unspread portion (first 3 kHz next to the carrier) of the upper sideband (Channel A). The correct lineup of a signal containing standard speech results in undistorted audio speech in the Channel A audio output.

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**APPARATUS:**

- 1—Spectrum Analyzer, Singer Metrics Model SB-12b
- 1—Calibrated Signal Source, capable of delivering up to 5000 microvolts into a 75-ohm load
- 1—368A 75-ohm Termination Plug
- 1—372A 75-ohm Shorting Plug
- 1—Headset

**CHART 1**  
**INITIAL TUNING OF A SIGNAL**

STEP	PROCEDURE
1	Check the calibration card to see that settings for the frequency of operations are available. If the setup for the wanted frequency has not been made and recorded, refer to Chart 4 for calibration of a new frequency.
2	Check that the appropriate antenna is patched to the receiver at the external patching panel.
3	Check that the receiver output is connected to wire lines or terminated with appropriate 600-ohm plugs.
4	Terminate the REC INPUT with a 368A 75-ohm plug.
5	Set knobs and switches (in sequence) to the positions indicated in Table A.

**TABLE A**

SWITCH OR CONTROL	SWITCH POSITION WITH 1st BEAT OSCILLATOR SWITCH IN	
	CRYSTAL	VARIABLE
External alarm	OFF	OFF
PANEL SELECTOR	2	6 (+130V)
INPUT ATTENUATION DB	0	0
INPUT TUNING	5	5
HF AMPLIFIER TUNING	See calibration card	See calibration card
RANGE	See calibration card	See calibration card
AFC ZERO ADJ	0	0
1st BEAT OSCILLATOR TUNING	See calibration card	See calibration card
AFC REVERSE	See calibration card	See calibration card
CRYSTAL SELECTOR	See calibration card	0
2nd BEAT OSCILLATOR TUNING	Zero beat	0
AFC	SQUELCH	SQUELCH
CARRIER BRANCH GAIN	Set for anticipated received carrier suppression per calibration card	
CARRIER SUPPLY	LOCAL	LOCAL
MONITOR TRANSFER	A	A
VU METER TRANSFER	A	A
MONITOR jacks	Plug-in headset	Plug-in headset
VOLUME CONTROL	MAN	MAN
MAN VOL CONTROL	10	10

## CHART 1 (Cont)

STEP	PROCEDURE
6	Receiver set noise should be heard in the headset and indicated on the VU meter. If no noise is heard or indicated, recheck the items in Table A.
7	If the noise level exceeds $-3$ VU, reduce the MAN VOL CONTROL so that the average noise level is $-3$ VU.
8	Vary the HF AMPLIFIER TUNING control at least 10 divisions plus and minus to determine the maximum aural and VU indicated noise level.
9	Vary the INPUT TUNING through its full range to determine the maximum aural and VU indicated noise level.
10	Repeat Steps 8 and 9 until a final peak noise level is reached. The receiver RF stage is now adjusted for maximum gain at the desired frequency.
11	Adjust the 1st BEAT OSCILLATOR TUNING for a peak noise level.
12	Set VOLUME CONTROL to AUTO.
13	Remove the 368A 75-ohm plug from the REC INPUT jack and connect a 372A twin coaxial plug between the ANTENNA and REC INPUT jacks.
14	If the 1st beat oscillator is operated with crystal control, adjust the 2nd BEAT OSCILLATOR TUNING for a zero beat in the headset.
	If the 1st beat oscillator is operated manually (VARIABLE), make fine adjustments of the 1st BEAT OSCILLATOR TUNING for a zero beat in the headset.
15	Check the Channel A audio level. If the received signal carrier suppression matches the carrier suppression gain of the receiver, the speech peaks will reach 0 VU.
16	If the average indication of the CARRIER RECT CURRENT meter exceeds 150, cross-modulation products are probable. Reduce the current indication to 150 by adjusting INPUT ATTENUATION DB.
17	Set the VOLUME CONTROL to MAN and adjust the MAN VOL CONTROL for a midscale indication on the CARRIER RECT CURRENT meter. Make fine adjustments with INPUT TUNING and HF AMPLIFIER TUNING controls for a maximum indication on the CARRIER RECT CURRENT meter; then return the VOLUME CONTROL to the AUTO position.
18	Operate the external alarm switch (if one is provided) to ON. The green VF lamp lights, the amber CARRIER OFF—FAST lamp intermittently lights, the three meters show some indication, and the AFC scale is illuminated.
19	The receiver is ready for service.

**CHART 2****ATTENTION DURING SERVICE**

After a correct receiver lineup has been made, no adjustments are normally required. If the Overseas Control Office or the Traffic Operator criticizes the received signal, check the receiver for corrective steps to be taken.

<b>STEP</b>	<b>PROCEDURE</b>
1	Periodic checks of the CARRIER RECT CURRENT meter and VOLUME INDICATOR meter indicate the quality of the receiver operation. Refer to Chart 1, Steps 15 and 16.
2	<p>If an alarm is indicated, observe the alarm lamps on the meter panel and take the necessary action.</p> <p>If the red AFC lamp lights continuously, the AFC is out of control. Reset the AFC ZERO ADJ to 0 and zero beat the 1st and 2nd beat oscillators as required.</p> <p>If the red CARRIER OFF—SLOW lamp lights continuously and the AFC switch is in the OFF position, there is a failure of the 130V or a carrier failure.</p> <p>If the red CARRIER OFF—SLOW lamp lights intermittently, the carrier is fading for a period of more than 2 seconds. The transmitted signals are very weak.</p> <p>If the amber CARRIER OFF—FAST lamp lights continuously and the AFC switch is OFF, there is a failure of the 130V or a carrier failure.</p> <p>If the amber CARRIER OFF—FAST lamp lights intermittently, the carrier is fading for more than one-half second. The transmitter signals are weak.</p> <p>It is normal for the green VF lamp to light continuously. If the green lamp fails, check the 130V power supply, the carrier to the third demodulators, or check that the external alarm switch is not turned to OFF position.</p>

**CHART 3****REMOVAL FROM SERVICE**

<b>STEP</b>	<b>PROCEDURE</b>
1	<p><b>For Short Periods of Time</b></p> <p>At the receiver, set the following controls:</p> <p style="text-align: center;">VOLUME CONTROL to MAN</p>

CHART 3 (Cont)	
STEP	PROCEDURE
	<p style="text-align: center;">MAN VOL CONTROL to 0</p> <p style="text-align: center;">AFC to ON</p>
2	<p>Leave the external alarm switch in the ON position. See that the VF lamp remains lighted. If the receiver develops trouble while in a standby condition, the VF lamp will extinguish.</p> <p><b>For Long Periods of Time</b></p>
3	<p>Set the external alarm to the OFF position.</p>
4	<p>Set the following switches:</p> <p style="text-align: center;">MAIN POWER to OFF</p> <p style="text-align: center;">RECTIFIERS POWER to OFF</p> <p><i>Note:</i> The main power and rectifier power switches must be turned on at least one-half hour before the receiver is put back into service.</p>
5	<p>If it is necessary to keep the interior of the cabinet warm, insert a 100-watt lamp into the socket at the rear of the 250V rectifier panel.</p>
<p><b>CHART 4</b></p> <p><b>CALIBRATION FOR A NEW FREQUENCY</b></p>	
<p>This chart is divided into two parts. The first part applies to the selection of a crystal for reception of a fixed-frequency signal. The second part outlines the procedures for adjusting the beat oscillator for variable tuning reception.</p>	
STEP	PROCEDURE
1	<p><b>Crystal Control</b></p> <p>Select the proper crystal for the desired frequency. For frequencies between 4 MHz and 10 MHz, select the crystal that is 2.8 MHz above the received signal frequency. For frequencies between 10 MHz and 17.8 MHz, select a crystal that is 2.8 MHz below the received signal frequency. For frequencies between 17.8 MHz and 28 MHz, subtract 2.8 from the received signal frequency (in MHz) and divide by 2. <i>Example:</i> For a received signal of 20 MHz, 20 minus 2.8 equals 17.2; divided by 2 equals 8.6 MHz.</p>

CHART 4 (Cont)

STEP	PROCEDURE
2	Place the crystal in the crystal holder at the rear of the high-frequency panel.
3	Set the controls as indicated in Table B.
4	Patch the signal source to the REC INPUT jack. Adjust the output for approximately 5000 microvolts of input to the receiver.
5	Connect the headset to the MONITOR jacks.  <i>Note:</i> The signal should be heard in the headset. If no signal is heard, check the frequency of the signal and the settings indicated in Step 3.

TABLE B

SWITCH OR CONTROL	POSITION
External alarm	OFF
PANEL SELECTOR	5
INPUT ATTENUATION DB	0
INPUT TUNING	5
HF AMPLIFIER TUNING	See calibration curve, Fig. 1
RANGE	See calibration curve, Fig. 1
AFC ZERO ADJ	0
PANEL 5 VT CURRENTS	AFC RECT V507 40MA
1st BEAT OSCILLATOR	CRYSTAL
1st BEAT OSCILLATOR TUNING	See calibration curve, Fig. 1
AFC REVERSE	2
CRYSTAL SELECTOR	Steps 1 and 2, Chart 4
2nd BEAT OSCILLATOR TUNING	0
MAN VOL CONTROL	7
VOLUME CONTROL	AUTO
CARRIER BRANCH GAIN	20 dB suppression
MONITOR TRANSFER	A

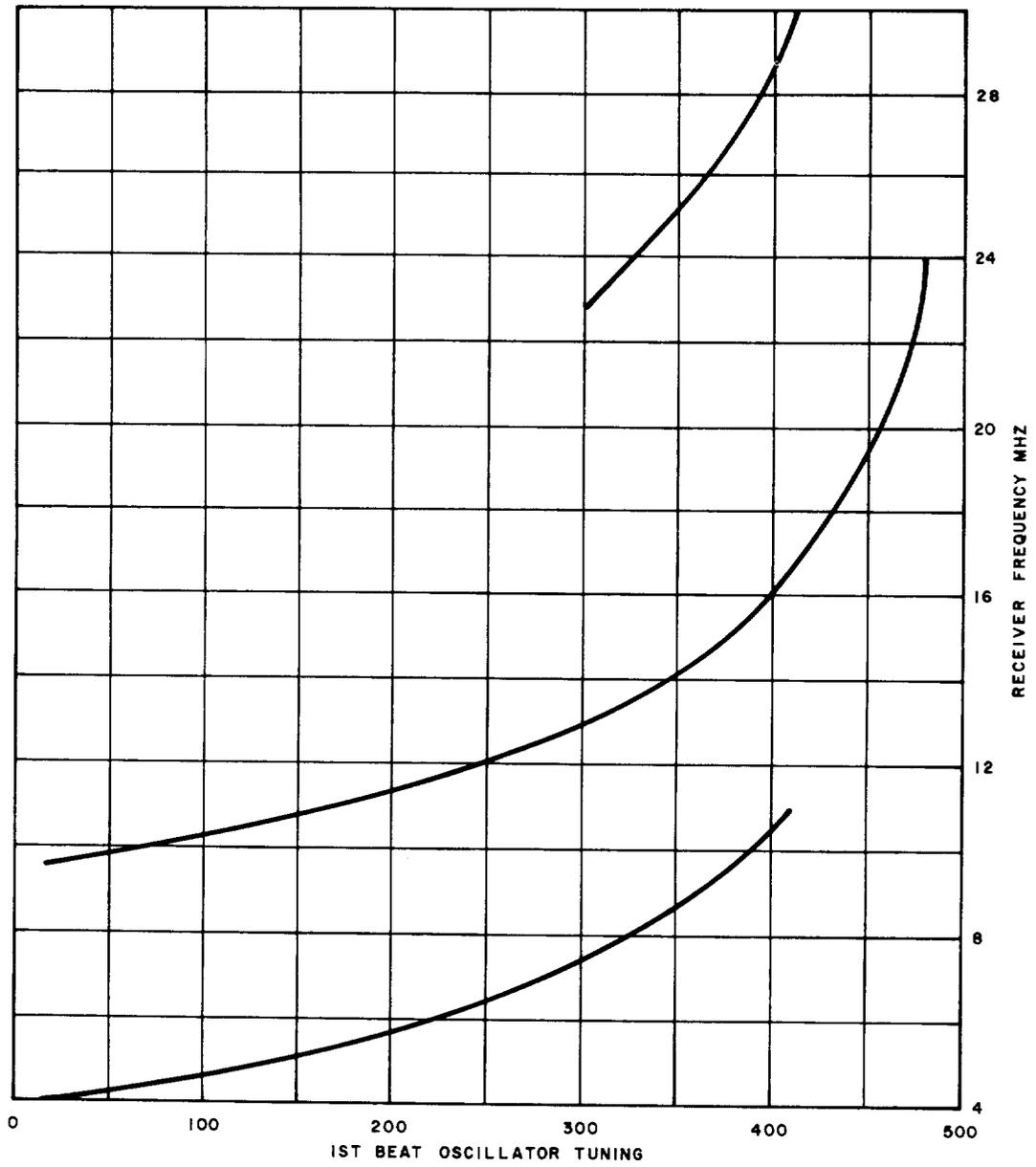


Fig. 1—Crystal Control Calibration Curve

## CHART 4 (Cont)

STEP	PROCEDURE
6	Adjust the 2nd BEAT OSCILLATOR TUNING for a 0 beat.
7	Set VOLUME CONTROL to MAN.
8	Adjust MAN VOL CONTROL for a midscale indication on the CARRIER RECT CURRENT meter.
9	Adjust INPUT TUNING, HF AMPLIFIER TUNING, and 1st BEAT OSCILLATOR TUNING for a maximum indication on the CARRIER RECT CURRENT meter. Continue adjusting the MAN VOL CONTROL for midscale indication as required.
10	Adjust the signal source output for approximately 1 microvolt.
11	Adjust the MAN VOL CONTROL for midscale indication on the CARRIER RECT CURRENT meter.
	<i>Note:</i> If no signal is heard in the headset with 1-microvolt input, repeat Step 3 through 11.
12	Readjust INPUT TUNING, HF AMPLIFIER TUNING, and 1st BEAT OSCILLATOR TUNING.
13	Push in and turn AFC ZERO ADJ knob until the scale indicates 0. Readjust 2nd BEAT OSCILLATOR TUNING for a 0 beat. Note that the fluctuations of the DC METERING meter become slower indicating that the receiver is being controlled. The receiver is now lined up on the specified frequency.
14	When a signal from the distant transmitter is received, readjust the receiver controls according to Chart 1.
15	<p>Record the following receiver control settings:</p> <p style="padding-left: 40px;">HF AMPLIFIER TUNING</p> <p style="padding-left: 40px;">RANGE</p> <p style="padding-left: 40px;">1st BEAT OSCILLATOR TUNING</p> <p style="padding-left: 40px;">AFC REVERSE</p> <p style="padding-left: 40px;">CRYSTAL SELECTOR</p> <p><b>Variable Control</b></p>
16	Set the controls as indicated in Table C.

TABLE C

SWITCH OR CONTROL	POSITION
External alarm PANEL SELECTOR INPUT ATTENUATION DB INPUT TUNING HF AMPLIFIER TUNING RANGE AFC ZERO ADJ 1st BEAT OSCILLATOR 1st BEAT OSCILLATOR TUNING AFC REVERSE  2nd BEAT OSCILLATOR TUNING MAN VOL CONTROL VOLUME CONTROL CARRIER BRANCH GAIN MONITOR TRANSFER	OFF 5 0 5 See calibration curve, Fig. 2 See calibration curve, Fig. 2 0 VARIABLE See calibration curve, Fig. 2 1 (4-10.3 MC) 2 (10.3-28 MC) 0 7 AUTO 20 dB suppression A

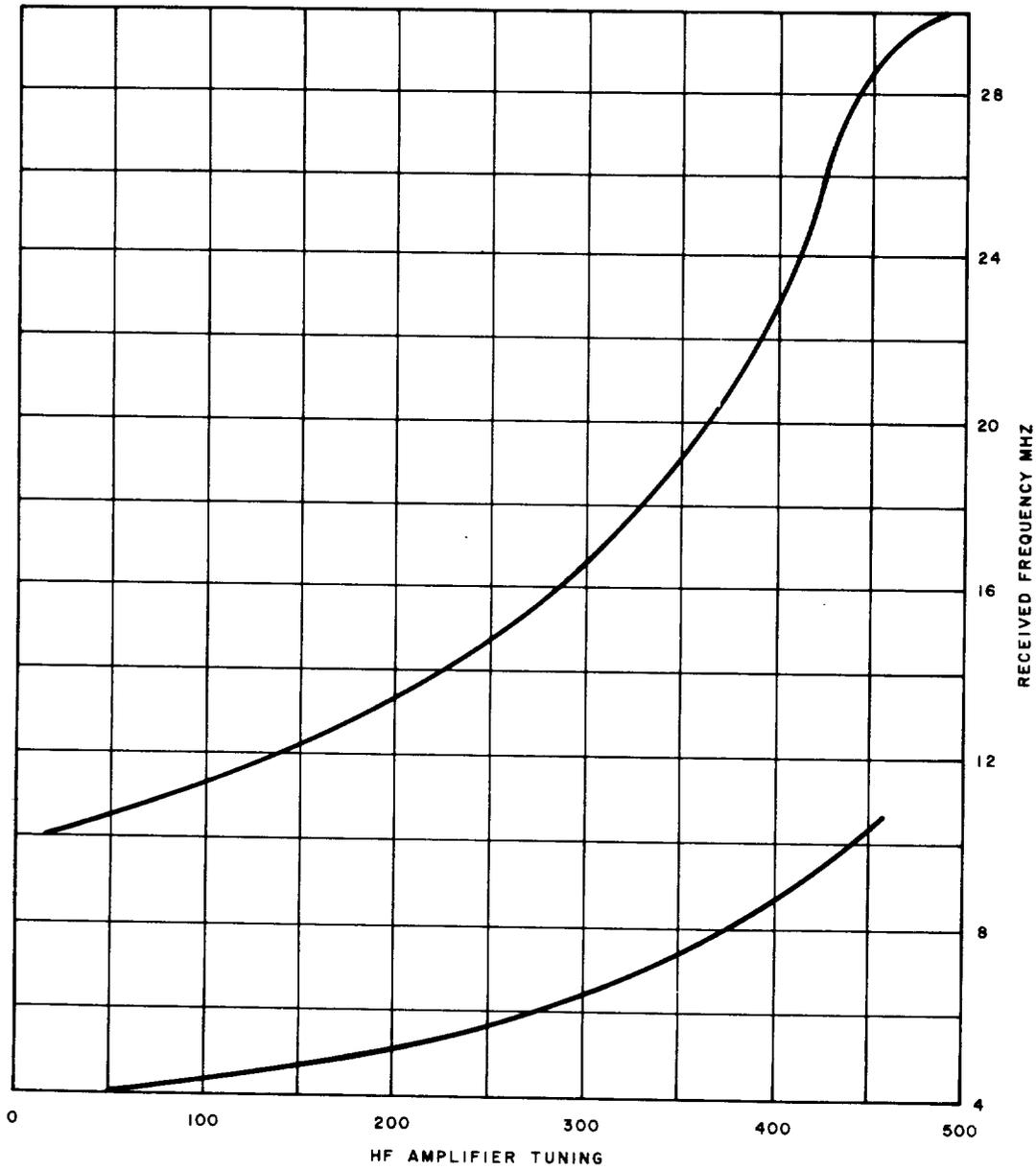


Fig. 2—Variable Control Calibration Curve

CHART 4 (Cont)

STEP	PROCEDURE
17	Patch the signal source to the REC INPUT jack. Adjust the output for approximately 5000 microvolts input to the receiver.
18	Connect the headset to the MONITOR jacks.  <i>Note:</i> The signal should be heard in the headset. If no signal is heard, check the frequency of the signal and the control settings indicated in Step 16.
19	Adjust the 1st BEAT OSCILLATOR TUNING for a 0 beat.
20	Set VOLUME CONTROL to MAN.
21	Adjust the MAN VOL CONTROL for a midscale indication on the CARRIER RECT CURRENT meter.
22	Adjust INPUT TUNING and HF AMPLIFIER TUNING for a maximum indication on the CARRIER RECT CURRENT meter. Continue adjusting MAN VOL CONTROL for a midscale indication as required.
23	Adjust the signal source output for approximately 1 microvolt.
24	Advance MAN VOL CONTROL for a midscale indication on the CARRIER RECT CURRENT meter.  <i>Note:</i> If no signal is heard in the headset with a 1-microvolt input, repeat Steps 16 through 24.
25	Readjust INPUT TUNING and HF AMPLIFIER TUNING.
26	Push in and turn AFC ZERO ADJ knob until the scale indicates 0. Readjust 1st BEAT OSCILLATOR TUNING for a 0 beat. Note that the fluctuations on DC METERING meter become slower indicating that the receiver is being controlled. The receiver is now lined up on the specified frequency.
27	When a signal from the distant transmitter is received, readjust the receiver controls according to Chart 1.
28	Record the following receiver control settings:  HF AMPLIFIER TUNING  RANGE  1st BEAT OSCILLATOR TUNING  AFC REVERSE  CRYSTAL SELECTOR