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Transforming a Base Radio into a Repeater

Q: Can I setup a radio to be a repeater?

A: Yes. Repeater setup seems to be a big topic these days and many questions about how to set one up have recently come into the Technical Support Center, so allow me to take some time to explain the process.

Radios

First, you need to have a transceiver—a radio that can transmit as well as receive. So, which Pacific Crest radios can be used as a repeater? Read below to find out:

1. PDL HPB: the base radio normally transmits one way to rovers or repeaters, although it can receive and thus become a repeater. But it must be setup as either a base or a repeater and cannot serve both functions simultaneously due to major conflicts in configuration parameters.

Verdict: Yes, the PDL HPB makes an excellent repeater that is recommended for both long-distance and short-distance repeater applications.

2. PDL LPB: if you use this base radio, your range will be a lot less than if you use a base-style, 35 watt radio (i.e. the PDL HPB).

Verdict: Yes, the PDL LPB can be used as a repeater for short-distance repeater applications. For repeater applications requiring a long range greater than 12 miles, the 35 watt PDL HPB is recommended.

3. PDL Rover: this is a zero watt, receive-only radio and cannot be a repeater since it is unable to transmit radio signals. Remember, a repeater is a transceiver, which can both receive and transmit radio signals.

Verdict: No, the PDL Rover is a receive-only radio and cannot transmit, which a repeater must be able to do.

Digisquelch

The term “Digisquelch” refers to the sensitivity of the radio to effectively receive signals. Choose this setting to adjust the “listening” sensitivity of the radio.

The radios have three settings: high, moderate, and low. For those who need to know or may be interested, the exact Digisquelch specifications are:

High: –114 dBm

Moderate: –110 dBm

Low: –102 dBm

Base radios need to be set to “low” because the FCC requires U.S. residents to listen on the same frequency that they are using. If anyone else is active on that frequency, the CSMA (Carrier Sense Multiple Access) feature will stop the radio from transmitting voice or data signals. That is why we want to listen with the lowest (but legal) sensitivity.

Since the base radio’s “Digisquelch” setting needs to be set to “low”, the rover radio needs to be set to “high”, so it can hear the signal over long distances. This is due to the Inverse Square Law: the further you go from the base, the faster the signal falls off.

Humor me for a minute and picture throwing a rock into a pond, causing several series of waves to ripple from the center of the impact. The waves furthest away from the center cover much more water, but they are much weaker since they must spread themselves out to cover that much water. On the other hand, the waves closest to the center are the strongest since they have to cover much less water. A radio wave from an omni-directional antenna acts much the same and becomes weaker the more distance it is required to cover.

RFM96W / PDL Repeater Setup

Setting up a Pacific Crest radio to be used as a repeater is actually very simple to do. The following differences in the radio setup will allow a system to be setup using either a base radio (A), a repeater (B), or a rover (C). These instructions assume that all radios are in factory default settings or those settings specific to a certain manufacturer.

Type	Setting
A. BASE	1. Digisquelch = Low
B. REPEATER	1. Digisquelch = High
	2. Local Node = Repeating
C. ROVER	1. Digisquelch = High

Follow these instructions and your repeater should be up and ready to go in no time at all.

Notes

1) Do not select “Digipeater” in the “DCE-DTE Protocol” interface.

2) Do not select the “Digipeater Delay” setting for three or fewer repeaters. For instructions about more complicated repeater setups, please contact Pacific Crest.