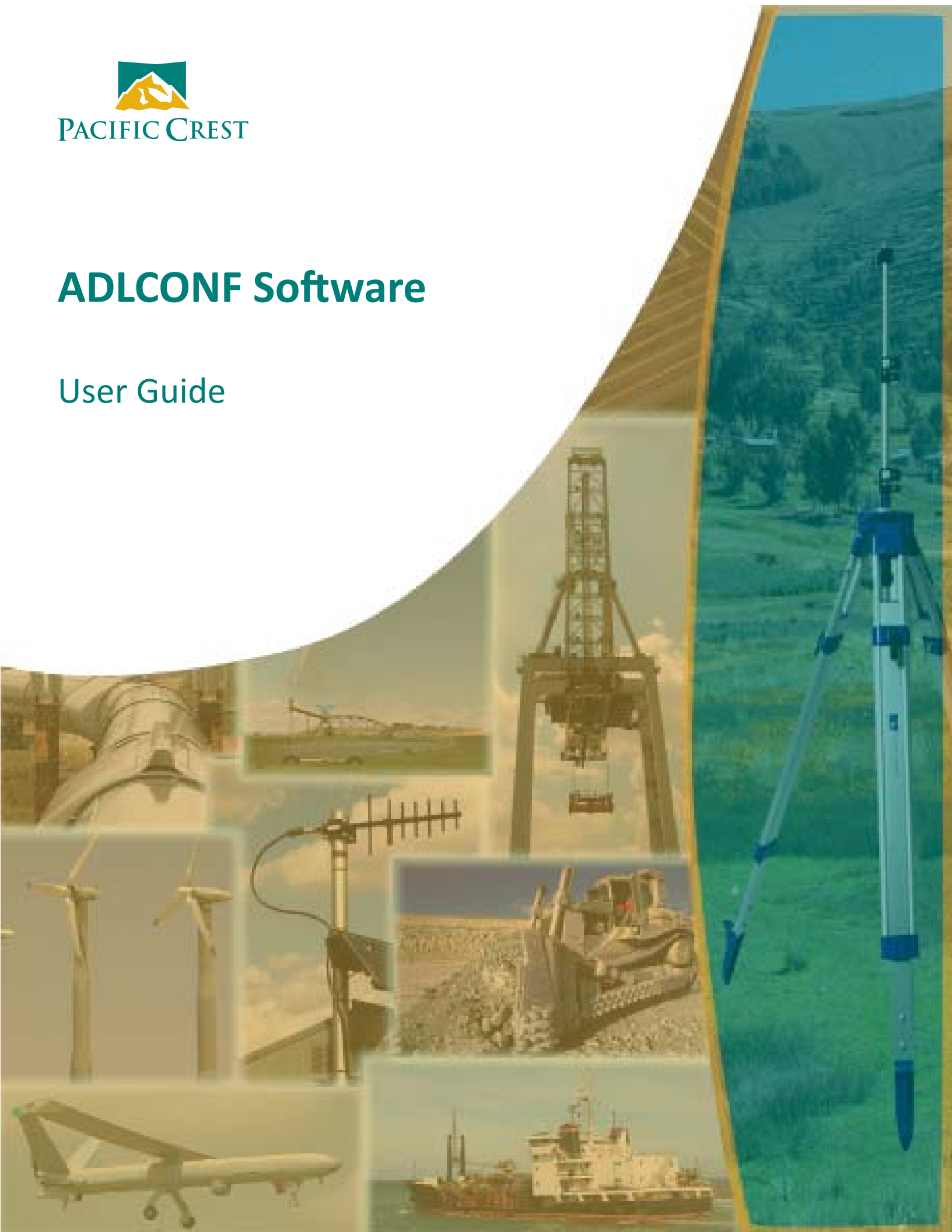


# ADLCONF Software

## User Guide



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## Contact Information

### Customer support and sales contacts

Quality, technology, and service are the hallmarks of Pacific Crest. We provide easy access to our customer service department to keep you running efficiently.

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Support hours are 8 am to 5 pm Pacific Time. Please visit our website for up-to-date news and product announcements. Firmware and software upgrades are available from our website, usually free of charge.

### Legal notices

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November 2015

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# Introduction

ADLCONF is a suite of software utilities for configuring and troubleshooting the Pacific Crest Advanced Data Link (ADL) line of digital communication radios and modems. It ships with all radio modems in the ADL family and is available for free download from the Pacific Crest website ([www.pacificcrest.com](http://www.pacificcrest.com)). Running the ADLCONF software on a computer attached using a serial cable to an ADL radio enables you to check the status of the radio, enter channel tables, and set radio parameters such as channel bandwidth and output power.

## Technical Support

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer or go to the Support area of the Pacific Crest website ([www.pacificcrest.com/support.php](http://www.pacificcrest.com/support.php)). Product updates, documentation, and any support issues are available for download.

If you need to contact technical support, email [support@pacificcrest.com](mailto:support@pacificcrest.com).

## Your Comments

Your feedback about the supporting documentation helps us to improve it with each revision. Email your comments to [info@pacificcrest.com](mailto:info@pacificcrest.com).

---

# Installing the Software

1. Download the latest version of ADLCONF software from [www.pacificcrest.com/support.php?page=updates](http://www.pacificcrest.com/support.php?page=updates), and save it to a folder on your compute.
2. Extract the contents of the zip file.
3. Some firewalls prevent the download of executable files, so the software installer is named ADLCONF\_setup.xxx. Right-click the file, select the Rename option and then change the “xxx” to “exe”.
4. Double-click the installer file to install the ADLCONF software.

*NOTE: Some versions of the Windows operating system require administrator rights to fully install software. If you do not have administrator rights, right click the installer file and select: Run as Administrator.*

## Running the Software

Do one of the following:

- Double-click the ADLCONF icon on the computer desktop.
- Click *Start / All Programs / Pacific Crest / ADLCONF / ADLCONF*.
- Click *Start / Run*, enter **C:\Program Files\Pacific Crest\ADLCONF\ADLCONF.exe** and then click **OK**.

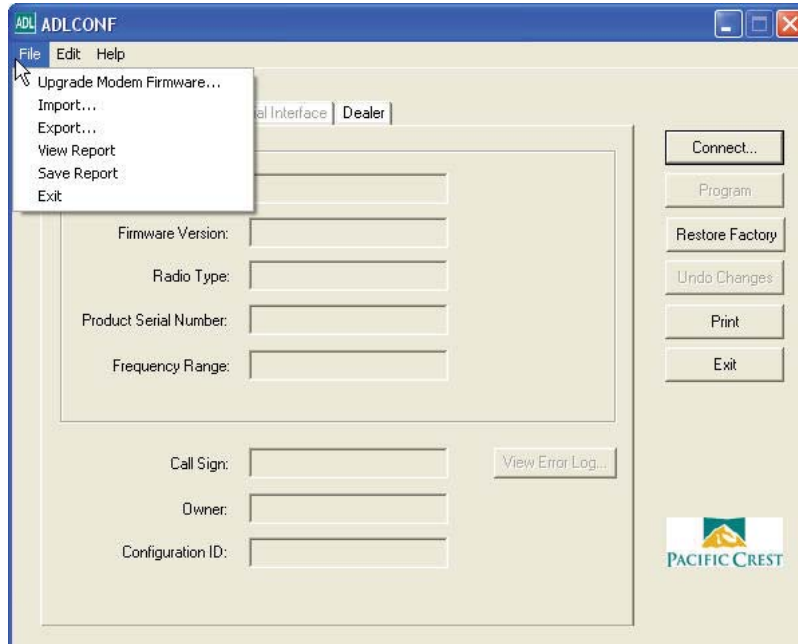
If you have problems running the ADLCONF software on Windows® 7 or a 64-bit computer with the Windows Vista® operating system, do the following:

1. Close the software.
2. Double-click **My Computer** or start Windows® Explorer.
3. Navigate to **C:/Program Files/Pacific Crest/ADLCONF/** and then right-click **ADLCONF.exe**.
4. Click **Properties**.
5. In the *Compatibility* tab, click **Run this program in compatibility mode for**.
6. Select *Windows XP, Vista 32, or Windows 7* and then click **OK**.
7. Restart the ADLCONF software.

# ADLCONF Menus

The main ADLCONF dialog contains three main menus: *File*, *Edit*, and *Help*.

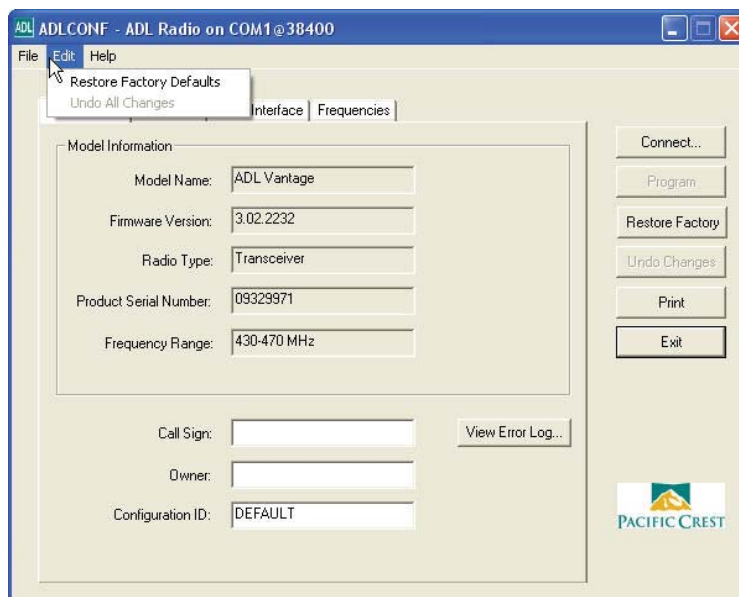
## File menu



Select...	to...
Upgrade Modem Firmware	<p>select a firmware file (*.bin format) to upload into the attached ADL radio modem. Pacific Crest recommends that you save the radio's current configuration to your computer before upgrading firmware. Use the <i>Export</i> option described below to save the configuration. Before upgrading the firmware, the software prompts you to connect or reconnect to the radio. See <a href="#">Connecting to the Radio, page 9</a>.</p> <p>Note: if you wish to upgrade the firmware of an ADL radio module embedded within another product, that product may restrict you to using only one baud rate. If so, you must select a special version of firmware made especially for your product. Please check with your dealer, your product's manufacturer or the Pacific Crest web site to obtain this special firmware.</p>
Import	<p>import radio configuration files (*.dat) from your computer to the ADLCONF software. These files contain the radio parameters displayed and edited on the Radio Link and Serial Interface screens. Click <b>Program</b> to upload the configuration to the attached radio.</p>
Export	<p>save the radio configuration (*.dat) to your computer. This enables you to create one configuration and copy it to multiple radios.</p> <p><b>Note</b> – When you export a configuration you only create a *.dat file. To configure a radio, you must view a configuration in the software (either by creating it or by importing an existing configuration) and then click <b>Program</b>.</p>
View Report	<p>view on a web browser all the configuration parameters of the attached radio. In addition, this HTML-formatted report shows firmware settings that may help Pacific Crest support technicians to diagnose problems if the radio requires service.</p>
Save Report	<p>save a *.txt copy of the configuration report to any location accessible to your computer.</p>

Select...	to...
Exit	exit the software.

## Edit menu



Select...	to...
-----------	-------

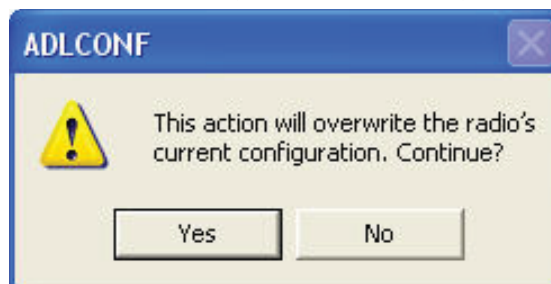
Restore Factory Defaults

view the radio factory defaults.

Different ADL radio products use different default configuration parameters. Regardless of how you reconfigure an ADL radio, it always remembers the original default settings. To view the defaults in the software, select *Edit / Restore Factory Defaults* or click **Restore Factory**.

The software must first connect (or reconnect) to the radio. For more information, see [Connecting to the Radio, page 9](#).

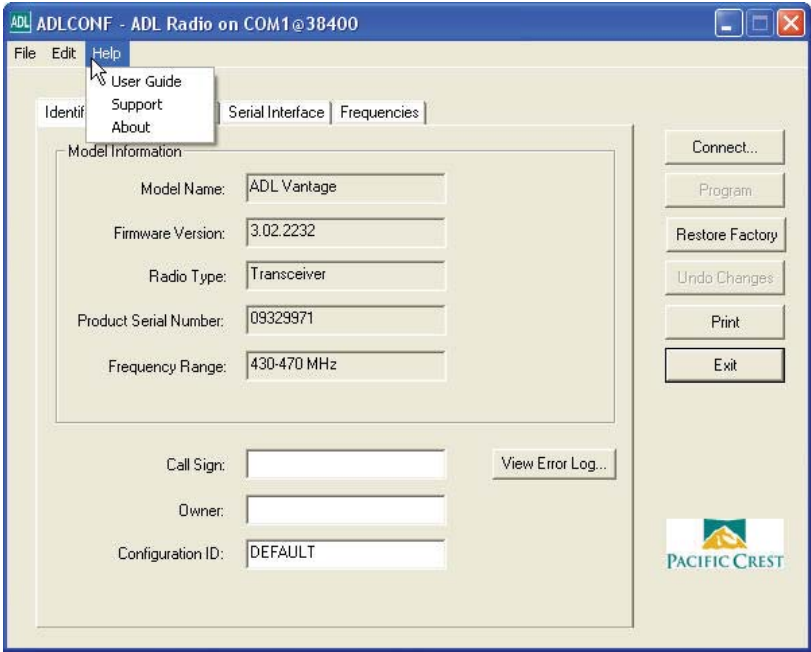
If the software already shows a radio configuration, a message appears.



Click **Yes** to copy the default settings from the radio's permanent memory to the computer RAM for review and editing. The radio does not use any changes until you click **Program** in the main dialog or in the *Exit* dialog. When restoring factory defaults, the ADLCONF current channel table is retained.

Select...	to...
Undo All Changes	discard all the configuration changes you made during this session. Settings on all the ADLCONF screens are reset to what was in effect when you started this session. Selecting <i>Undo All Changes</i> does not affect any settings in the radio or any configuration file on your computer. To change the radio configuration, you must make changes in the software and then click <b>Program</b> .

Help menu



Select...	to...
User Guide	view a copy of the ADLCONF User Guide (this document).
Support	access links to Pacific Crest <a href="#">Technical Support</a> and the Pacific Crest <a href="#">website</a> .
About	view which version of the software is installed on your computer.



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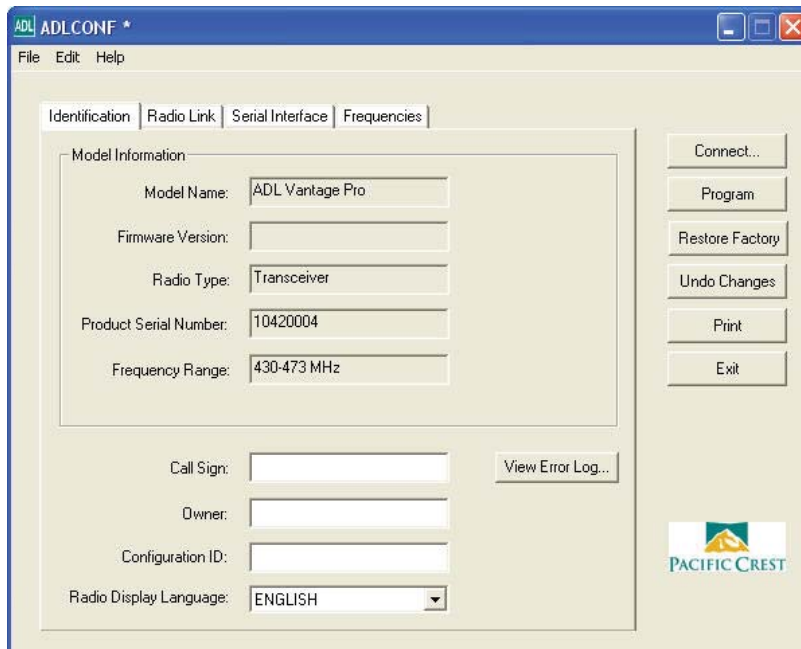
# Connecting to the Radio

To connect the software to an ADL radio:

1. Start the software.
2. Use the provided programming cable to connect the radio to the computer serial port.  
If your computer does not have a serial port, connect the programming cable to a serial-to-USB adaptor cable such as an IOGEAR® Model GUC232A or an FTDI Model UC232R.

The ADLCONF software program communicates only with Pacific Crest ADL radios. You must use XDLCONF software to communicate with XDL radios, the PDLCONF program to communicate with PDL radios and RFMCONF software to communication with RFM radios. All of these programs are available for free download from [www.PacificCrest.com](http://www.PacificCrest.com).

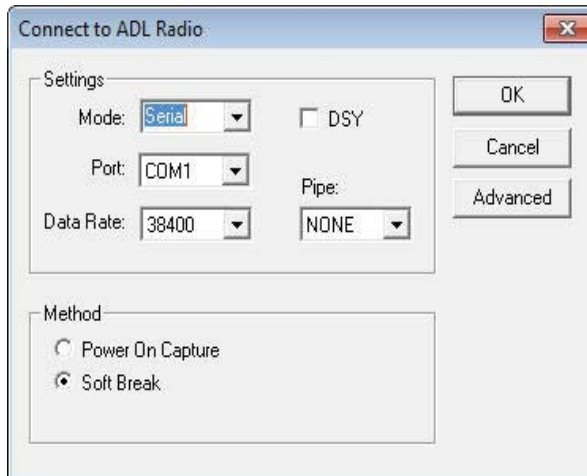
The radio turns on when it is connected to power:



3. Click the **Connect** button on the right of the main ADLCONF screen.

**Note** – When the ADLCONF software connects to a radio, it copies the radio settings to the computer's memory and overwrites any other settings that may be currently displayed. If you had made any edits to the copy of the file in the computer memory and then click **Connect**, the ADLCONF software does not ask you if you want to save the settings from the memory to a file on your hard drive.

The following dialog appears:



4. To connect to an ADL radio that is connected to the PC via a serial cable, select Serial in the Mode box. Then select the COM port that the radio is connected to (from the *Port* list) and then select a baud rate (from the *Data Rate* list).
5. To connect to an ADL radio that is connected to the PC via the Internet, select TCP in the Mode box and type in the IP address of the radio.
6. To connect to an ADL radio embedded in an Ashtech GNSS receiver, check the DSY box and select the number of pipes.
7. When done, click OK on the Connect to ADL Radio window and click **Yes** to overwrite the current configuration.

8. To establish a connection, select one of the following:

- Power On Capture. Turn off the radio. Select the *Power On Capture* option and then click **OK**. **Within 10 seconds**, turn on the radio.

The radio accepts a packet switch command (at the selected baud rate) that puts the radio into command mode.

- Soft Break (the default method). Ensure that the radio has been turned on for at least four seconds and then click **OK**.

This sends a soft break, (ASCII string “+++”) to the radio at the selected baud rate, which puts the radio into a mode to accept commands from the ADLCONF software (“command mode”).

**Note** – If the ADL radio was previously connected to any external device (for example, a computer, a GNSS receiver, or a measurement device) while using a data rate other than that shown, the software detects non-communication at the displayed rate and cycles through the other rates to establish a connection. Some versions of the Windows operating system, and some serial communications drivers, can prevent this connection; if communication fails, do the following:

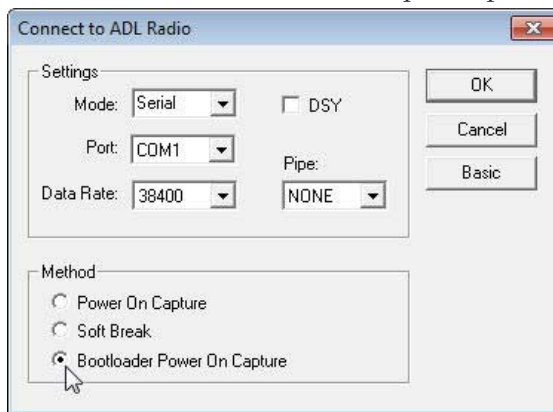
- a. Turn off the radio.
- b. Disconnect it from the computer.
- c. Reconnect the radio, but do not turn it back on.

---

d. Use the *Power On Capture* method for connection (see above).

If neither of these methods establishes a connection:

1. Turn off the radio and then click **Advanced**:
2. Select the *Bootloader Power On Capture* option and then click **OK**:



3. **Within 10 seconds**, turn on the radio. The bootloader firmware puts the radio into monitor mode that will accept commands.

## Demo mode

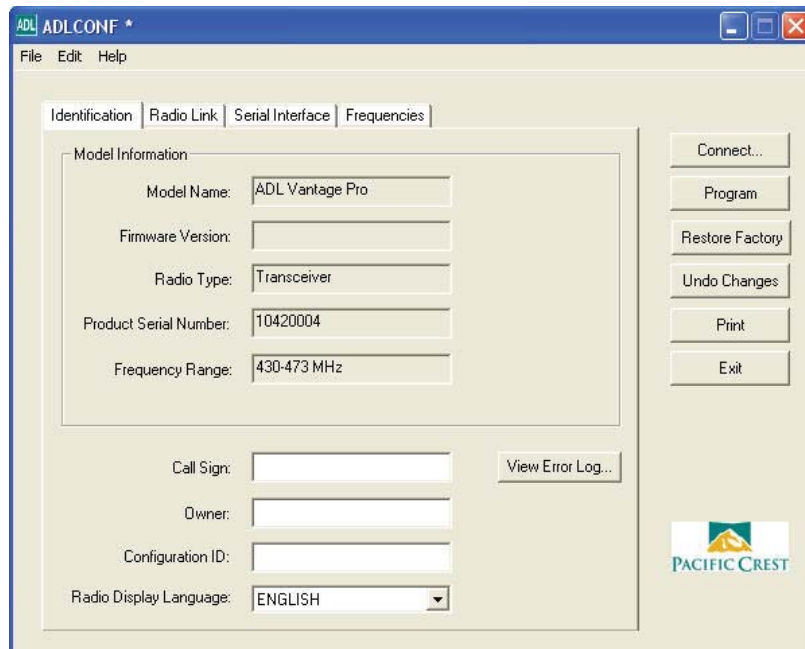
To simulate connection to an ADL Foundation modem, you can run the software in Demo mode:

1. Start the software.
2. Press [Alt]+[D] and then click **OK** on the *Demo Mode* dialog.
3. Click **Connect** in the main dialog and then follow the steps in [Connecting to the Radio](#), page 9.
4. The software uses a pre-set demonstration radio configuration, so you can view the software features and settings as though you were connected to a radio.
5. You can load an existing radio configuration file (\*.dat) to simulate being connected to that radio; select *File / Import*. You cannot export configuration files in this mode.

---

# Identification Tab

Connecting to the radio displays the ADLCONF *Identification* screen:



This screen shows the current configuration of the attached radio:

- Model Name
- Firmware Version
- Radio Type (“Transceiver” or “Receiver Only”)
- Product Serial Number (an 8-digit number where the first two digits are the year of manufacture, the next two digits are the week of manufacture and the last four digits are incremented from 0001)
- Frequency Range

You cannot edit these fields.

The *Identification* screen also enables you to enter a call sign, owner name, and configuration ID.

For operating in the USA, the FCC requires that radio transmitters periodically broadcast a station identifier every 15 minutes. The station identifier is the call sign assigned to USA operators on their station license. The call sign is transmitted in Morse code. It is not included in any data packet and so is ignored by the receiving radio. However, data transmission is interrupted for a few seconds while the call sign is being transmitted. If you leave the call sign field blank, a radio programmed with this configuration file will not transmit any call sign. If you are operating outside the USA, ask your local authority if you need to transmit a call sign.

The *Configuration ID* field is a user-friendly way to identify which configuration has been loaded into the radio. It can be different from the \*.dat filename used when exporting (saving) the configuration using the *File / Export* function.

---

When configuring an ADL Vantage Pro or ADL Vantage 35 radio, you can select the language that will be used on the radio's front panel. The options are English, Chinese, and Russian. When configuring an ADL Vantage radio, only English is supported.

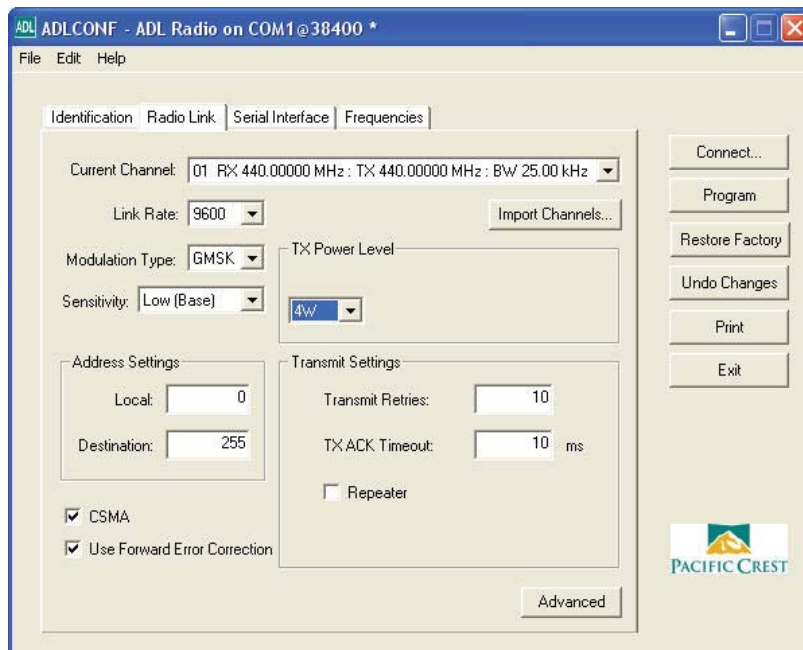
To save the call sign, owner name, and configuration ID to the radio, click **Program**. To save any configuration changes to a file on your computer, select *File / Export*.

ADL radio modems record error logs in the field if the modem experiences a problem. To view this log, click **View Error Log**:



## Radio Link Tab

This settings available vary according to the radio protocol selected in the *Serial Interface* tab. The following example shows the settings available when the Transparent EOT protocol is selected:



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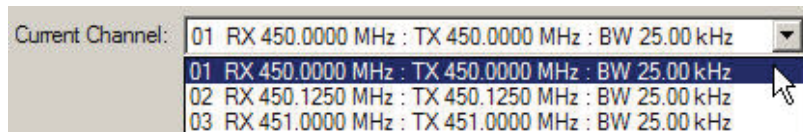
## Current Channel

Channel tables are lists of radio settings comprising:

- Channel numbers (from 1 through 32)
- Frequencies at which the radio receives data on each channel
- Frequencies at which the radio transmits data on each channel (this may be different from the receive frequencies)
- One channel bandwidth (25 kHz or 12.5 kHz) for all channels in the table
- An optional list of radio serial numbers that can read the channel table

Your dealer should have created a channel table based on your radio license and loaded it into your ADL radio(s) before delivery. If you did not receive a channel table with your ADL radio, contact your dealer or Pacific Crest Support.

The radio channel table can contain more than one channel, but the radio can be set to only one channel at a time. The *Current Channel* field indicates the current setting. The list to the right of the field shows all the channels in your channel table. To select another channel, click it:



**Note** – The radio is not set to this new channel until you click **Program**. While all ADL radios can be reconfigured using the ADLCONF software, some models have user interfaces that enable you to select other channels on the front of the radio, and others must be reconfigured using the ADLCONF software.

## Import Channels

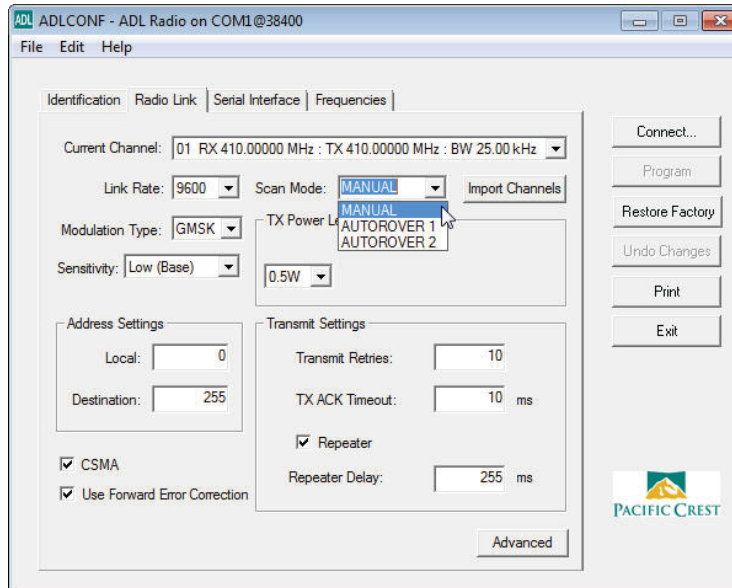
Click **Import Channels** to select any other channel table created for your radio by an authorized Pacific Crest dealer. Channel tables are files with the \*.frq file extension. Other channel table files, such as \*.upg files created by the PDLCONF software for PDL-generation radios, are not compatible with ADL radios.

**Note** – Government regulations may require you to possess a valid license to transmit data on certain radio frequencies. This version of the ADLCONF software does not let you create channel tables. You must check with your dealer about obtaining frequency channel tables, which meet your licensed authorized frequencies or other government regulations.

## Scan Mode

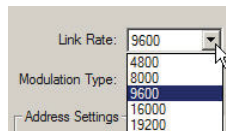
Select the MANUAL option when you wish to select the channel manually. Select the AUTOROVER 1 option when you want the radio to automatically scan the entire channel table and select the one with the strongest decodable signal. The AUTOROVER 1 option will perform one scan when the radio is turned on and will then reset the radio to MANUAL mode. The AUTOROVER 2 option will perform a scan for the strongest decodable signal when the radio is turned on and will perform a subsequent scan if the

percentage of received data packets drops under 90%.



## Link Rate

This is the rate at which data bits are transmitted or received by the radio modem. The radio must both receive and transmit at the same rate. The default link rate for all ADL radios is 9600. You can select a different rate from the list:



## Modulation Type

This enables you to configure your radio for either Gaussian Minimum-Shift Keying (GMSK) modulation or 4-Level Frequency-Shift Keying (4FSK) modulation. The default is GMSK because GMSK is generally less sensitive to interference from environmental noise. However, 4FSK modulation supports approximately twice the data throughput of GMSK. When you are using a link rate above 9600, the general recommendation is to use 4FSK modulation. To switch to 4FSK modulation, select it from the list:



Not all data protocols support 4FSK modulation. If you try to program the radio after selecting a protocol type on the *Serial Interface* tab that is incompatible with the selected modulation type, the following message appears:





For more information, see [Supported combinations of radio settings](#), page 32.

## Sensitivity

To optimize your radio for operation in different signal or noise environments, select a sensitivity level from the list (the PDL radios used the term *Digisquelch*):



In general, have the Sensitivity level of the radio low enough to reject noise, but high enough to accept signal. **Signal** is defined here as the radio energy you want to receive; **noise** is defined as everything else. Suitable sensitivity levels to select depending on both the noise level and the signal level are:

		Signal	
		Strong	Weak
Noise	Loud	Low	Medium
	Quiet	Medium	High

Signal levels decrease with distance between the transmitter and the receiver. To extend the range, set Sensitivity to Medium or High, although this can increase the amount of noise passed through the radio. At times, it may not be easy to determine the noise level without using a scanner or other RF energy monitor. If you are not sure about the noise level in your work environment, you can use the following guidelines to set Sensitivity:

GNSS Surveying and similar applications	Set Sensitivity to
GNSS base station radio	Low
GNSS rover radio	High
Environmental Monitoring and Similar Applications	
Remote sensor radio	Low
Local office radio	High

Environmental noise levels may change throughout a work day and you may need to adjust the Sensitivity setting. Most ADL radios include a user interface that enables you to adjust the Sensitivity in the field without running the ADLCONF software.



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## TX Power Level

If you purchased an ADL radio as a transceiver, you can configure it for various output power levels. To adjust the transmit power, select it from the list:

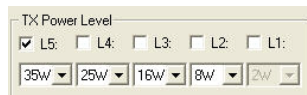


If the radio is a receiver-only, this field is grayed out.

The *Radio Type* field on the *Identification* screen (see above) indicates if the radio is a transceiver or receiver only.

If you are configuring an ADL Vantage Pro or ADL Vantage 35 radio, this option lets you select four power levels in addition to a low power setting of 2 Watts. You cannot edit the 2 Watt setting. The other four settings can be in any order, but not higher than the Max TX Power set by your dealer.

Select the box above the power level at which the ADL Vantage Pro or ADL Vantage 35 radio will initially transmit:



## Address Settings

Use these fields to set Local and Destination addresses for any two Pacific Crest ADL transceivers to communicate exclusively with each other.

The main advantage of addressing is the ability to restrict the usage of transmitted data to a specified receiver. Any receiving rover radio with a Local address different from the transmitting base radio's Destination address will delete the data without repeating it over the air to other radios or sending it serially to an external device such as a GNSS receiver. Addressing allows multiple transceiver pairs to operate on the same channel without "seeing" each other's data. To do this, the addressed radios need Tx/Rx capability.

The addressing feature only works between two radios. In addition, both radios must be configured for the Transparent FST/EOT/EOC protocols (from the *Serial Interface* tab). The Local address of one radio must be the same as the Destination address of the other radio, and vice versa. For example, a radio with Local=X and Destination=Y can only communicate with another radio with Local=Y and Destination=X.

**Note** – *There is no standard in the radio community that defines addressing. Each manufacturer does things slightly differently. Therefore, when using radios of different brands in a communication system, addressing should be turned off on all of them.*

To select a Local or Destination address, click the appropriate field and enter a number between 0 and 254. You can enter only one Local and only one Destination address into any one radio:

Address Settings

Local:

Destination:

Selecting 255 for the Destination address is a special case designated as ***broadcast mode***. If you enter **255** as a radio's Destination address, all Pacific Crest radios sharing the channel—regardless of their Local address—can receive the data transmissions and either repeat them over the air to other radios or send them serially to an external device.

The default Local address number is 0 and the default Destination address number is 255. If you are not using Transparent EOT, Transparent EOC, or Packet Switched protocol, do not change these defaults.

**Note** – *The Local=0/Destination=255 combination is the only selection that works with receive-only radios.*

## Transmit Settings

When configuring the radio with the Transparent EOT/EOC or Packet Switched protocols, the *Transmit Settings* section of the *Radio Link* screen enables you to configure three aspects of the radio's transmitter:

- Transmitter Retries
- TX ACK Timeout
- Repeater

Transmit Settings

Transmit Retries:

TX ACK Timeout:  ms

☐ Repeater

**Note** – *Only Transparent EOT/EOC and Packet Switched protocols support transmit retries. So when you select any other protocol (on the Serial Interface screen described on page 21), the Transmit Settings section of the Radio Link screen displays only the Repeater check box.*

As a general rule, the number of Transmit Retries should be less than the transmission rate (in seconds) times the link rate (in bits per second) divided by the packet size (in bits):

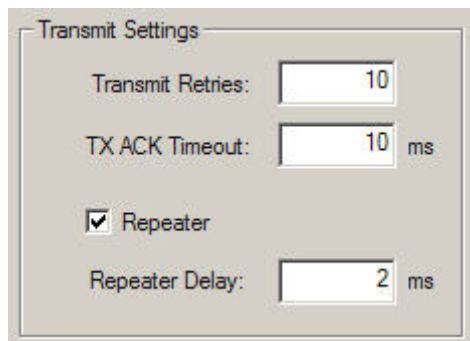
$$(\text{TX Retries}) < (\text{Transmission rate}) \times (\text{Link Rate}) \div (\text{Packet Size})$$

For example, if you transmit 3300-bit corrections every second at a 9600 bps radio link rate, set the Transmit Retries to less than three because it would take more than one second to transmit 3300 bits three times at 9600 bps, and after one second there will be newer, more accurate corrections to transmit.

Check the *Repeater* check box to configure the radio as a repeater, i.e., to automatically

---

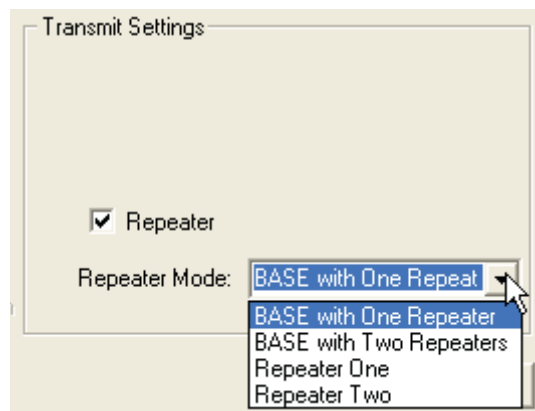
retransmit each data packet it receives. Checking this option displays different fields depending on the selected protocol. If you selected a non-Trimble protocol and then check the *Repeater* check box, the *Repeater Delay* field appears.



The image shows a 'Transmit Settings' dialog box. It contains four fields: 'Transmit Retries' with a value of 10, 'TX ACK Timeout' with a value of 10 ms, a checked 'Repeater' checkbox, and 'Repeater Delay' with a value of 2 ms.

Enter the amount of time you want to elapse between receipt of a data packet and its retransmission. You may enter any value between 0 and 255.

If you selected the TRIMTALK 450S, TRIMMARK II/Ile, TT450S (HW), or TRIMMARK 3 protocol and then select the *Repeater* check box, the following repeater modes become available:



The image shows the 'Transmit Settings' dialog box with the 'Repeater' checkbox checked. The 'Repeater Mode' dropdown menu is open, displaying four options: 'BASE with One Repeater' (highlighted), 'BASE with Two Repeaters', 'Repeater One', and 'Repeater Two'.

- Select the *BASE with One Repeater* option to configure the attached radio as a base station transmitting RTK corrections to one repeater radio
- Select the *BASE with Two Repeaters* option to configure the attached radio as a base station transmitting RTK corrections to two repeater radios
- Select the *Repeater One* option to configure the attached radio as a single repeater or the first of two repeaters
- Select the *Repeater Two* option to configure the attached radio as the second of two repeaters

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## CSMA

ADL radios are configured in the factory to have the CSMA feature (Carrier Sense Multiple Access) set to ON. It is illegal to transmit in the United States while CSMA is turned off. When CSMA is activated, the radio will “listen” on the selected transmission frequency for any broadcasts. (The selected transmission frequency is indicated in the *Radio Link* screen’s *Current Channel* field.) If no broadcasts are detected, the radio will transmit any data received on its serial interface. If a radio signal is detected on the selected frequency, the radio will not transmit but waits 3.3 milliseconds before checking again if it is clear to transmit. It continues checking until the frequency is clear.

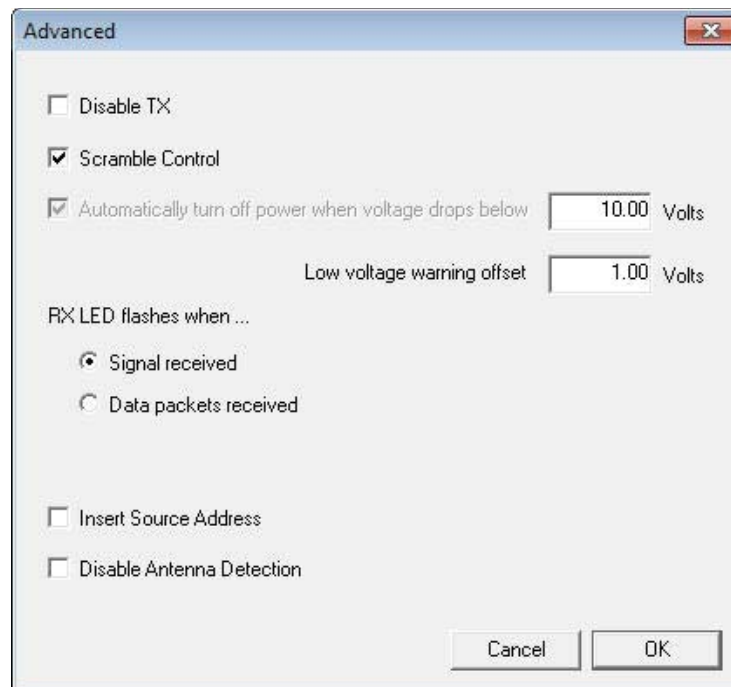
## Use Forward Error Correction

Select this check box to place extra bits in the transmitted data, so that other ADL radios receiving the data can check for transmission errors. Although data throughput is adversely affected, using forward error correction can greatly improve range; Pacific Crest strongly recommends that you use this feature.

The check box is unavailable (grayed out) if you use Trimble protocols, which do not support forward error correction. Select the protocol type from the *Serial Interface* tab.

## Advanced settings

Click **Advanced** to access the following controls:



The screenshot shows a dialog box titled "Advanced" with a close button (X) in the top right corner. The dialog contains several settings:

- ☐ Disable TX
- ☒ Scramble Control
- ☒ Automatically turn off power when voltage drops below  Volts
- Low voltage warning offset  Volts
- RX LED flashes when ...
  - ☒ Signal received
  - ☐ Data packets received
- ☐ Insert Source Address
- ☐ Disable Antenna Detection

At the bottom right, there are "Cancel" and "OK" buttons.

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## Disable TX

Select this check box to disable the transmitter when you need to conduct certain tests of a radio system where you need to ensure that the radio will not transmit. If you select this check box, remember to clear it or the radio will not transmit data.

## Scramble Control

Scramble control or “scrambling” makes the transmitted data look more random. This improves range. While “scrambled” data looks more random, it is actually “scrambled” according to a set code understood by both the transmitter and the receiver. This allows the receiver to reverse the scrambling and output the same data that was input into the transmitter. Of course the receiver must know whether or not the transmitter has scrambled the data.

We recommend you leave Scramble Control on for all radios. However, if some of the radios in your system are non-Pacific Crest radios, you may need to turn Scramble Control off. Other brands of radios may use another term, such as “whitening,” instead of Scramble Control.

**Note** – Trimble protocols require Scramble Control. With a Trimble protocol selected, you are unable to turn off Scramble Control.

## Automatic turn off

The default for the ADL Vantage is 9 volts; for the ADL Vantage Pro and ADL Vantage 35 it's 10 volts.

You can also select a low voltage warning offset. This is the number of volts above the automatic turn off level at which the radio interface, if it has one, warns you that the radio battery charge is low. With a radio shut off value of 9 V and a low voltage warning offset of 1 V, the radio warns you when the battery reaches 10 V. The radio turns off when the battery reaches 9 V.

If you are configuring an ADL Vantage Pro or ADL Vantage 35 radio, the Automatic turn off feature is on and grayed out. Because of the higher transmit power of the ADL Vantage Pro or ADL Vantage 35 radio, the battery can be damaged by overdischarge. To prevent this, the radio always warns you of a low battery condition at 11 V and shuts off when the battery discharges to 10 V.

## RX LED Definition

If you have a radio with an Rx LED, you can switch the meanings of the LED to one of the following:

- Signal received (RF energy above squelch level is detected) – the default
- Data packets received

If the Signal Received option is selected and the RX LED flashes, this means two things:

- A radio within range is transmitting at the selected frequency
- The received signal may or may not be decipherable data, and so you cannot know

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from the RX LED flashing if the transmitter and receiver are configured in the same way

If the Signal Received option is selected and the RX LED doesn't flash, this means:

- No radio within range is transmitting at the selected frequency

If the Data Packet Received option is selected and the RX LED flashes, this means:

- A radio within range is transmitting at the selected frequency
- Data packets are deciphered, which means the transmitter and receiver are configured in the same way

If the Data Packet Received option is selected and the RX LED doesn't flash:

- Either no radio within range is transmitting at the selected frequency and/or
- No data packets are deciphered

How to use the RX LED Meaning feature:

1. Set the RX LED Meaning feature to Data Packets Received
2. If the RX LED flashes, you have a good connection between the transmitter and receiver
3. If the RX LED doesn't flash, check that the receiver sensitivity is set to High (Rover)
4. Switch the RX LED meaning on the receiver to Signal Received
5. If the RX LED now flashes, you know that a radio within range is transmitting at the same frequency but that it is not configured the same way as the receiver. It is possible that it is being operated by someone else, but it is more likely that it is your transmitter but it was not configured in the same way as the receiver. To reconfigure the receiver, do the following:
6. Set the RX LED Meaning feature back to Data Packets Received
7. Check that the receiver is set to use the protocol you typically use and then change the link rate
8. If the RX LED still doesn't flash with any link rate, check that Scrambling is on
9. If the RX LED still doesn't flash, you will need to compare the receiver's and transmitter's configurations

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## Insert source address

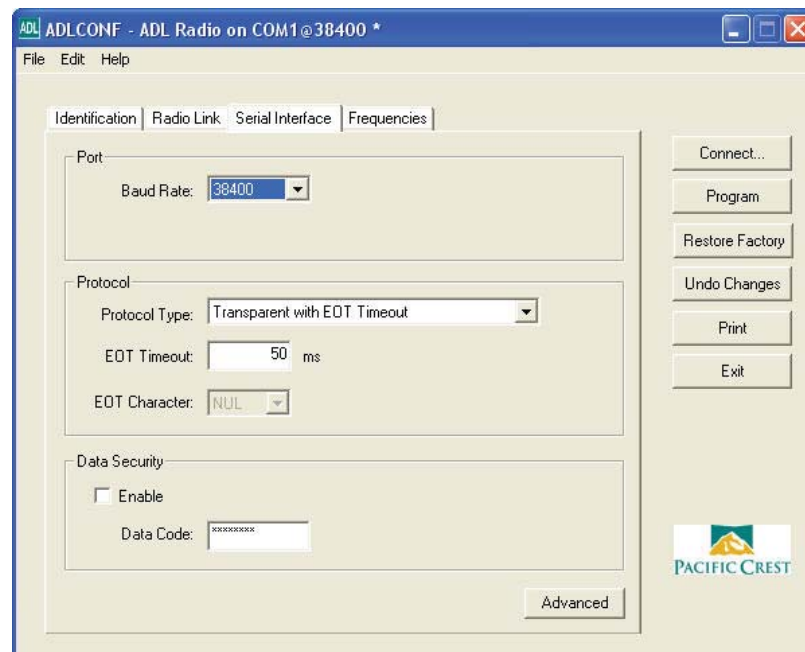
If you check this box, and program the radio with a local address and a destination address, both addresses will be added to each transmitted data packet.

## Disable Antenna Detection

If you are connected to an ADL Vantage Pro you will see a check box for disabling the antenna detection function, a feature found only in the ADL Vantage Pro. This feature protects the radio from transmitting at high power without an antenna, with a damaged cable or with an antenna that doesn't support the radio's transmit frequency (antenna mismatch). If you disable this feature you must ensure that you never transmit without first manually checking the antenna and cable.

# Serial Interface Tab

This tab has the following controls:



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In this tab, you can configure the serial interface between the radio and external devices such as a computer running the ADLCONF software, a GNSS receiver, or monitoring equipment.

The way you set up the radio to communicate to your computer is how it will communicate to all external devices (unless your radio is a model with a user interface on its front panel that enables radio configuration in the field). First, determine which parameters the GNSS receiver or external equipment requires in the field for serial communications and then enter these same settings in the *Serial Interface* tab.

Serial communications require a serial port consisting of a software driver running in conjunction with the operating system and a physical port—usually a DE9 connector. If your computer, GNSS receiver, or other external device does not have a serial port, you can use a serial-to-USB adaptor cable to connect the radio serial cable to the external device.

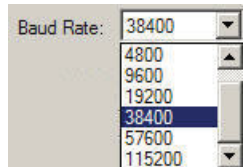


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## Port

### Baud Rate

The default baud rate between the computer and the radio is 38400. Select other rates (between 4800 and 115200) from the *Baud Rate* list:



## Protocol

### Protocol Type

You must select a protocol—a set of rules governing the order, syntax, and so on—of the data communicated between the external device and your radio. All radios communicating with one another must be set to use the same protocol.

Select the required protocol from the *Protocol Type* list:

- Transparent with EOT Timeout
- Transparent with EOT Character
- Packet Switched
- TRIMTALK™ 450S
- TRIMTALK II/III
- TT450S (HW)
- TRIMMARK™ 3
- SATEL
- Transparent FST
- South
- Stonex Type 1
- U-Link

Protocol	Description
Transparent	<p>There are three types of “Transparent” protocols, in which the data has no address or frame characters and are thus “transparent.” Radios using transparent protocols, however, must know when the transmission has ended (known as <i>End of Transmission</i> or <i>EOT</i>). There are two ways to do this:</p> <ul style="list-style-type: none"> <li>• With a length of time during which there is no transmission (EOT Timeout)</li> <li>• With a special character (EOT Character)</li> </ul> <p>For systems using Pacific Crest radio modems exclusively, the default setting is Transparent with EOT Timeout. When you select this, enter the time (between 10 and 2560 milliseconds) that signifies the End of Transmission. The default is 50 milliseconds.</p> <p>If you select Transparent with EOT Character, select the ASCII character you want your radios to use. The default is the “NUL” ASCII character. To select another character, select an option from the <i>EOT Character</i> list: NUL, SOU, STX, ETX, EOT, ENQ, ACK, BEL, BS, HT, LF, VT, FF, CR, SO, SI, DLE, DC1, DC2, DC3, DC4, NAK, SYN, ETB, CAN, EM, SUB, ESC, FS, GS, RS, US, SP, QWERTY keyboard characters, and so on.</p> <p>Transparent FST is a Pacific Crest protocol optimized for long distance, high speed/ volume data communication. It supports only 4FSK modulation.</p> <p><b>Note</b> – <i>Not all data protocols support 4FSK modulation. A message appears if you try to program the radio after selecting a protocol type that is incompatible with the modulation type you selected on the Radio Link tab:</i></p>
Packet Switched	<p>This protocol is unique in that it is a “command” mode. In all other protocols, incoming serial port data is formatted into packets and automatically transmitted. With Packet Switched protocol, external equipment must provide the packet formatting, scrambling, error correction, and housekeeping functions, and send commands to the radio to perform the actual transmission and reception of data. This may be useful in specialized applications where settings, such as channel selection, must be changed “on-the-fly” and the controlling serial port equipment can be programmed to perform these functions.</p>
TRIMBLE	<p>The ADL radios support the following variations of the Trimble wireless protocol:</p> <ul style="list-style-type: none"> <li>• TRIMTALK 450S</li> <li>• TRIMMARK II/IIe</li> <li>• TT450S (HW)</li> <li>• TRIMMARK 3</li> </ul> <p>Use the ADLCONF software to select the same protocol used on the Trimble radios in your network. To communicate with radios configured to use any other Trimble protocol, set your ADL radio to TRIMTALK 450S protocol.</p>
SATEL	<p>SATEL is a protocol used by SATEL radios. ADL radios are fully compatible with SATEL radios, but only when set to the SATEL protocol. If SATEL does not appear in the <i>Protocol Type</i> list, select the <i>Radio Link</i> tab and ensure that you have selected 4FSK in the <i>Modulation Type</i> field. (SATEL protocol supports only 4FSK modulation.)</p>

## Data Security

To send encrypted messages, enter any combination of 8 alpha-numeric characters into the *Data Code* field, select the *Enable* check box and then program the radio. Only Pacific Crest XDL, ADL or PDL radios programmed with this code can interpret data sent by any of the radios—and only when configured to use a Pacific Crest protocol. Although each generation of Pacific Crest radios (XDL, ADL and PDL) must be programmed using the

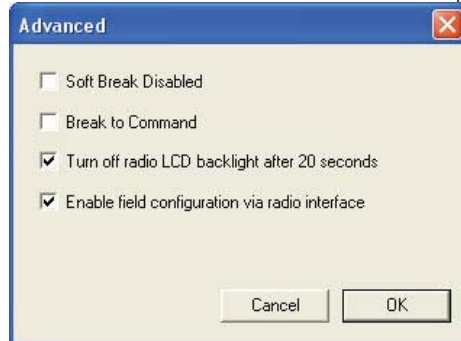
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respective generation of configuration software, the data security feature is the same for all products and all types of Pacific Crest radios can be set to use the same code.

***Note** – If you program a radio to use the Data Security feature, it cannot communicate with any radio that does not use the same code. When you enable this feature for one radio, it is a good idea to enable it for all the radios you will use in the same communication network. Pacific Crest radios with button/LCD interfaces can turn the Data Security feature on or off in the field, but all other Pacific Crest radios must be returned to the office to disable the Data Security feature using the appropriate configuration software.*

## Advanced settings

Click **Advanced** to access the following functions:



### Soft Break Disabled

The ADLCONF software normally connects to a radio using a technique called Soft Break whereby you attach a radio, turn it on and then click **Connect**. Selecting this check box enables you to reconnect to the radio without using the Soft Break technique. This is normally done under the guidance of a service technician to troubleshoot connection problems.

### Break to Command

The Break to Command function configures the radio to accept a hard break signal that puts the radio into command mode. Clear this check box for the radio to go into command mode if it detects a hard break.

### Turn off radio LCD backlight after 20 seconds

If the attached radio is equipped with an LCD, this check box configures the LCD backlight to turn off 20 seconds after the last button on the radio interface is clicked. Clear this check box for the radio to leave its LCD backlight on as long as the radio is turned on.

### Enable/Disable Radio Configuration via radio interface

Some radio models include a keypad for configuring the radio in the field. To prevent field configuration, clear this check box and then click **OK** to return to the main screen. Click **Program**. To re-enable a radio, clear this check box and then program the radio.

Radios with an LCD display include an *Edit Config* screen that indicates if configuring the radio with the keypad is Enabled or Disabled. The current selection is displayed with an asterisk on the second row of the *Edit Config* screen. To switch the selection, press the down arrow to display the other option and click **Enter**. You are now prompted to enter a passcode, which is 369369 for all ADL radios. To enter this code, press the right arrow to display a 3 on the second row. Then press the down arrow to display a 6 and the left arrow to display a 9. Press the right, down, and left buttons a second time in sequence. When you see 369369 displayed on the second row of the LCD, press **Enter** and the keypad's ability to configure the radio is changed.

## Frequencies Tab

This tab has the following controls:

The screenshot shows the 'Frequencies' tab of the ADLCONF software. At the top, there are four tabs: 'Identification', 'Radio Link', 'Serial Interface', and 'Frequencies'. Below the tabs, there are three main sections. The first section, labeled 'Channel', contains a text field for 'RX' with the value '410.57500' and a dropdown menu for 'Bandwidth' set to '25k'. To the right of these fields are three buttons: 'Apply', 'Clear', and 'Clear All'. The second section is a table with three columns: 'CHANNEL', 'RX (MHz)', and 'TX (MHz)'. The table contains eight rows. The first three rows have numerical values, while the remaining five rows have '-unused-' in both the RX and TX columns. To the right of the table are two buttons: 'Export...' and 'Import...'. The third section, labeled 'Country', has a dropdown menu set to 'US/Canada'.

CHANNEL	RX (MHz)	TX (MHz)
01	410.57500	410.57500
02	400.00000	400.00000
03	410.00000	410.00000
04	-unused-	-unused-
05	-unused-	-unused-
06	-unused-	-unused-
07	-unused-	-unused-
08	-unused-	-unused-

In the tab you can configure the radio for receive-only channels. When you first select the *Frequencies* tab, the current channel table shows the Rx frequency of Channel 01 in the *RX* field.

To add a receive-only channel, click on an “unused” channel, select the *RX* field, enter the frequency on which you wish to receive data and then click **Apply**.

To clear a receive-only channel, select it and then click **Clear**.

To clear all receive-only channels, click **Clear All**.

To move a channel up or down in the channel table, click on the channel you want to

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move and then either click the up or down arrow next the channel table, or “drag and drop” the channel into its new position.

This configures the channel table that is displayed in the ADLCONF software. To program the attached radio to receive on this frequency, you must click **Program** (see below). In addition, select *File / Export* to save any new radio configurations to your computer.

## Importing a channel table

To display a channel table created by the ADLCONF software, click **Import** and then select the required .frq file.

***Note** – Only a dealer can program a radio with a channel table containing transmit frequencies unless the channel table was tagged with the serial number of the radio. Please check with your dealer for an Rx/Tx channel table created for your radio's serial number.*

Pacific Crest radio modems use an 18 MHz digitally compensated crystal reference oscillator. The modems are designed to emit a minimum of energy at harmonic frequencies, hence minimizing the effect of harmonic interference to other radio users. However, harmonics of the unit's reference crystal at 18 MHz can internally interfere with received signals at frequencies that are exact multiples of 18 MHz: 396, 414, 432, 450, and 468 MHz. To minimize the potential of harmonic interference, avoid using frequencies that are multiples of 18 MHz.

## Exporting a channel table

After you build a receive-only channel table, click **Export** to save it to your computer.

***Note** – Only your dealer can create or edit a channel table that allows data transmission.*

## Region Codes

Different countries and regions require radios to be configured in slightly different ways. to configure your ADL radio to meet your country's or region's regulations. Only authorized Pacific Crest dealers are able to edit the region code. If you feel the selected code is not appropriate, please contact your dealer.

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## High Heat Configurations

The amount of heat generated by any transmitter is highly dependent on its configuration. Some configurations cause the radio's transmitter to stay on longer, and the longer the radio is actually transmitting, the more heat it generates. Because this is more of an issue with the 35-Watt ADL Vantage Pro than with the 4-Watt ADL Vantage, if you try to program an ADL Vantage Pro radio with a high heat configuration, you will see a warning message with three choices: Cancel, Continue and OK.

If you click the Cancel button you are returned to the ADLCONF software without programming the radio. This will allow you to change the configuration to one that will generate less heat. For example, you can raise the radio link rate or switch to a more efficient protocol such as TRIMMARK 3 or Transparent FST. Both actions halve the time it takes the radio to transmit the data and so halve the amount of heat generated.

If you click Continue, your settings are programmed into the radio. The ADL Vantage Pro's Automatic Power Management feature will maintain a safe temperature in the radio.

If you click OK, the ADLCONF program will automatically set the maximum transmit power to 25 Watts and program the radio. You will not be able to select a higher transmit power using the radio interface, but you will be able to re-configure the radio for higher power with the ADLCONF program.

There are other ways you can reduce the temperature of your ADL radio besides reducing the transmit power. Using a compressed data format such as CMRx can reduce the data packet size by as much as 60% allowing the radio to generate 60% less heat. On hot days, keeping the radio above the ground and out of direct sunlight can lower the temperature as much as 20°.

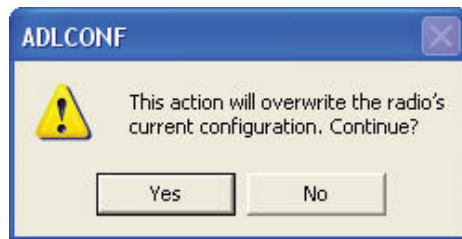
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# Programming the radio

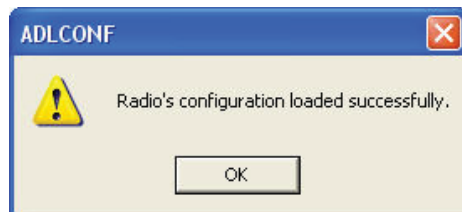
When you start the ADLCONF software, it displays a blank file. Click **Connect** to connect to a radio, and to open a file containing the radio settings. If you edit any settings, an asterisk appears in the title bar. Before you exit the software, click **Program** to save changes to the radio or you will lose them.

To save changes to an ADLCONF file to your hard drive, select *File / Export*.

When you click **Program**, you are prompted to confirm you want to overwrite the radio's current configuration:



The following message appears if programming the radio is successful:



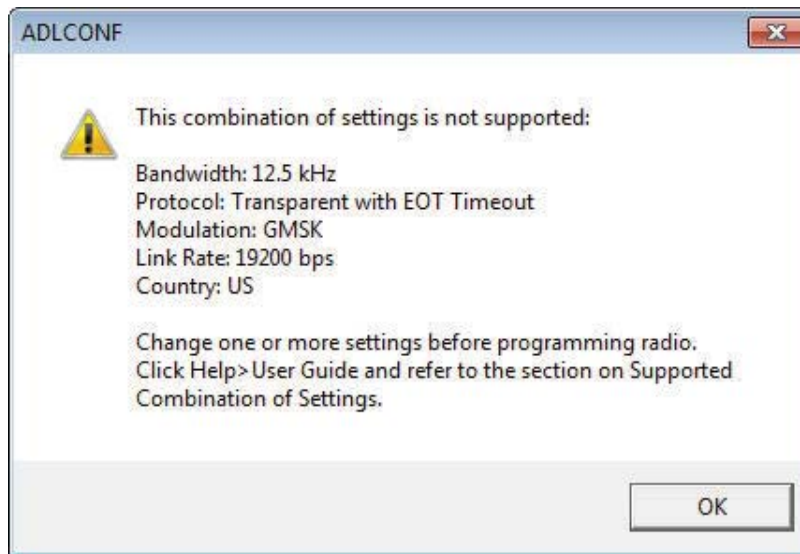
After you click **OK** the software will allow you to save the new configuration as a TXT file on your computer. To save the configuration as a DAT file that you can import into other ADL radios, select *File / Export*.

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## Supported combinations of radio settings

Different combinations of radio settings – channel bandwidth and protocol - support different radio link rates. Not all combinations support all link rates, which can be confusing until you get used to it. Because the user interface on some ADL radios shows a sequence of screens, it is possible after the user selects the first setting to display only those options on the subsequent screens that are supported. But with ADLCONF, users often move from one screen to another selecting or confirming the correct configuration. For this reason, selecting one parameter in ADLCONF does not restrict your choices for the next parameters.

If you try to program a radio with an unsupported combination of settings, ADLCONF returns the following error message:



The following tables show the supported combinations. To use the tables, first select the channel bandwidth for the channel table you will use. On the *Radio Link* screen, look on the far right of the *Current Channel* field. If you see BW 12.50 kHz, you are transmitting and receiving on a channel that is 12.5 kHz wide. Use the first table appearing below to see what combinations of protocol, modulation, and radio link rates are possible. If you see BW 25 kHz you are transmitting and receiving on a channel that is 25 kHz wide. Use the second table to see what combinations are supported.



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## 12.5 kHz Channel Bandwidth

Protocol Type	Modulation Type	Radio Link Rates (bps)
Transparent EOT/EOC and Packet Switched	GMSK	4800
Transparent EOT/EOC and Packet Switched	4FSK	9600
Transparent FST	4FSK	9600
TRIMTALK 450s	GMSK	4800, 8000
TRIMMARK II/IIe	GMSK	4800
TT450S (HW)	GMSK	4800
TRIMMARK 3	GMSK	9600 (USA)
SATEL	4FSK	9600
U-Link	GMSK	4800

## 25 kHz Channel Bandwidth

Protocol Type	Modulation Type	Radio Link Rates (bps)
Transparent EOT/EOC and Packet Switched	GMSK	4800*, 9600*
Transparent EOT/EOC and Packet Switched	4FSK	19200
Transparent FST	4FSK	19200
TRIMTALK 450s	GMSK	4800*, 9600*, 16000*
TRIMMARK II/IIe	GMSK	4800*
TT450S (HW)	GMSK	4800*, 9600*
TRIMMARK 3	GMSK	19200 (USA)
SATEL	4FSK	19200
South	GMSK	9600*
Stonex Type 1	GMSK	9600*
U-Link	GMSK	n/a

\* According to the latest FCC regulations all transmissions in 25 kHz channels must use a radio link rate of at least 19200 bps. See the next section on US narrowbanding regulations.

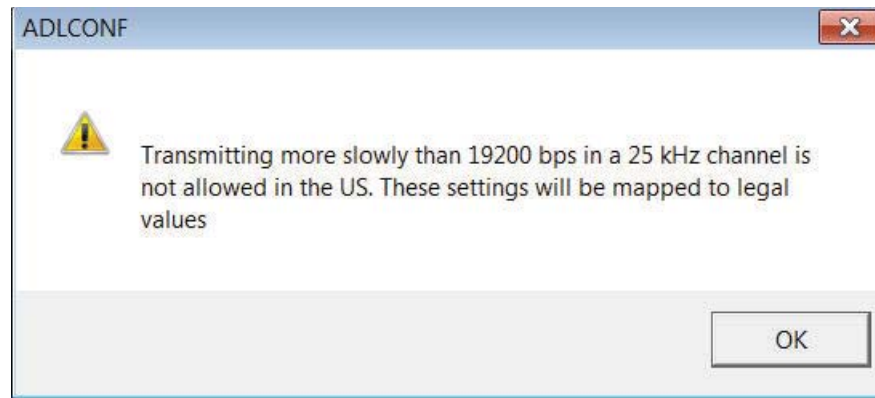
## US Narrowbanding Regulations

FCC narrowbanding regulations restrict the speed of UHF transmissions within the United States. Data transmission made in 25 kHz-wide channels are restricted to radio link rates  $\geq 19200$  bps.

All Pacific Crest radios are programmed by authorized dealers with region codes that ensure the radios adhere to local radio regulations. ADLCONF displays error messages if you attempt to program a radio with an illegal setting. If you attempt to program an ADL radio set to the US region code for operation in 25 kHz channels and at a link rate lower

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than 19200 in 25 kHz channels, ADLCONF returns the following warning message:



The expression “map settings to legal values” seen in this warning message means ADLCONF will automatically change the settings in such a way that the radio remains both legal in the US and compatible with other brands and models of radios configured in the same way. When you click the OK button on this warning message, you will program the radio with all your selected settings but ADLCONF will automatically reset the channel spacing to 12.5 kHz. If you later increase the link rate to 19200 bps, ADLCONF will automatically set the radio’s channel bandwidth back to 25 kHz.

### What does this mean for radio network compatibility?

In order for two radios to communicate they must be configured for the same protocol, frequency, modulation type, forward error correction and scrambling. In general, you also want both radios to be set to the same channel bandwidth, but a radio set up for 25 kHz channels will receive data from a radio transmitting in 12.5 kHz channels as long as no nearby radio is simultaneously transmitting in an adjacent 12.5 kHz channel. (You can catch all the water from a faucet with a glass, but not with a thimble.) This ensures that ADL radios configured with the US region code will remain compatible with legacy radios.

## Undoing Changes to Radio Settings

To undo all configuration changes entered in the current session of the ADLCONF software, click **Undo Changes** or select *Edit / Undo All Changes*.

This action cancels all the configuration changes you have made during the session. All settings on the ADLCONF screens are reset to those that were in effect when you started this session.

Click **Undo Changes** does not affect any settings in the radio or any configuration file on your computer. The only way to change the configuration of the radio is to first make

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them in the ADLCONF software and then click **Program**.

## Printing Radio Settings

To create a file describing the current configuration of the attached radio, select *File / Save Report*. To print the configuration without creating a file, click **Print** on the right of the ADLCONF screen:

On the subsequent *Print* screen, select the printer you want to use and then click **OK**.

**Note** – *The configuration displayed on the ADLCONF software may not be the same as the configuration in the attached radio. The ADLCONF software displays a radio's configuration as soon as you connect to the radio. However, you can import a configuration file from your computer by selecting File / Import. You can also use the ADLCONF software to edit parts of the displayed configuration. The imported or edited configuration displayed on the ADLCONF software is not written to the radio until you click **Program**. If you click **Print** before clicking **Program**, the configuration that is printed is of the radio, not what appears in the ADLCONF software.*

An asterisk in the ADLCONF title bar indicates that the displayed configuration has changed:



## Closing the ADLCONF Program

There are three ways to close the ADLCONF software:

- Click **Exit**
- Click the **X** at the top right corner
- Select *File / Exit*

Closing the ADLCONF software puts an attached radio back into data mode.

When you close the ADLCONF software after changing any setting without programming the change(s) to a radio, the following message appears:



*Click **Export** to write a configuration file to a selected location on your computer and close the ADLCONF software.*

- Click **Program** to write the new configuration to the attached radio and then close the ADLCONF software.
- Click **Continue** to discard the changes and close the ADLCONF software.
- Click **Cancel** to return you to the ADLCONF software without making any changes to the radio.

You must save changes before closing the program or you will lose them:

- You save the changes ***to a file on your computer*** by closing the ADLCONF software and then selecting the *Export* option or by selecting *File / Export*.
- You save the changes ***to a connected radio*** by closing the ADLCONF software and then selecting the *Program* option or by clicking the **Program** button.