



PACIFIC CREST

# ADL Vantage/ ADL Vantage Pro

Users Guide



## Notice

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License required prior to operation of radio communication equipment.



### Cautions and Warnings

Throughout this manual this symbol is used to indicate caution or warning. Please pay particular attention to these items to assure safe and reliable operation of your radio modem product.

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# Contents

# Introduction

## Welcome

Thank you for purchasing the Advanced Data Link (ADL) Vantage or Vantage Pro. The ADL Vantage™ and ADL Vantage Pro radios are advanced, high speed, wireless data links that are designed specifically for GNSS/RTK applications but are also appropriate for many other applications requiring digital data links. Your success in using the ADL Vantage/ADL Vantage Pro is Pacific Crest's primary goal. Pacific Crest stands behind its products by providing expert support and service. Your comments and questions are welcome.

## Scope

This guide provides information concerning the use of the ADL Vantage (Model Numbers ADLV-1 and ADLV-2) and the ADL Vantage Pro (Model Numbers ADLP-1 and ADLP-2).. This guide is written for the first-time user and gives details concerning system setup, operation and maintenance. We urge you to take the time to review this short manual completely prior to setting up your system.

## Note Concerning this Guide

We believe that the ADL Vantage/ADL Vantage Pro systems provide the best value and performance for the user. As such, we provide our equipment in complete turnkey systems, including all of the items necessary for operation with your GPS.

You may have purchased your ADL Vantage/ADL Vantage Pro from a third party. On occasion, the bundled product provided by these sources may differ from the kits provided directly from Pacific Crest. If this guide does not accurately reflect the equipment that you received, please contact your supplier for specific instructions concerning the setup of items that differ.

# Features and Benefits

## Compatible

- Facilitates radio equipment mix and match
- Interoperable with Pacific Crest (RFM, PDL and ADL), SATEL, and Trimble radio products
- All models support 12.5 and 25 kHz channel bandwidth communications
- 40 MHz-wide channel tables (390-430 and 430-470 MHz models)
- Provides upgrade path for existing installations

## Enhanced User Interface

- Backlit LCD display and five-button navigation interface
- View and change radio channel, modulation and protocol types
- Monitor signal levels, baud rates, and other parameters

## Fast Over-the-Air Data Rate

- 19,200 bits per second
- Reduced latency provides better GNSS position information
- Shorter transmit times reduces power consumption for longer battery life

## User-selectable RF output

ADL Vantage: Select between 0.1, 0.5, 1, 2 and 4 Watts

ADL Vantage Pro: Select between low power (2 Watts), three intermediate power settings and high power (as high as 35 Watts)

- Increase range by switching to a higher transmit power
- Increase battery life by reducing transmit power when you don't need the range

## Rugged Construction

Designed specifically for real-world working environments

- All metal construction and shock mounted electronics ensure highest reliability and EMI-resistance
- Watertight, corrosion-resistant connectors stand up to bad weather conditions

# Configuring ADL Vantage/ADL Vantage Pro

## ADLCONF Configuration Software

ADLCONF is a suite of software utilities for configuring and troubleshooting Pacific Crest's Advanced Data Link (ADL) line of digital communication radios and modems. Running ADLCONF on a PC attached via serial cable to an ADL radio allows you to check the status of the radio, input receive-only channel tables, and set radio parameters such as channel bandwidth and output power. Channel tables for transmission of data must be obtained from authorized Pacific Crest dealers. If your radio did not come with a channel table already installed, you can obtain one from your dealer and import it using ADLCONF.

ADLCONF is a software application for configuring all ADL radios. The latest version is available for free download from [www.PacificCrest.com](http://www.PacificCrest.com). A user guide that completely describes how to configure ADL radios is available by running ADLCONF and clicking Help > User Guide. The ADLCONF User's Guide is also available on the Pacific Crest website.

## Factory Default Settings

You can return your ADL Vantage/ADL Vantage Pro radio to its factory default configuration using ADLCONF software. Simply click the Restore Factory button to the right of the screen and then the Program button. The factory default settings are described in are described in Table 1 on pages 8-9.

# Setting Up the ADL Vantage/ADL Vantage Pro

## The ADL Vantage/ADL Vantage Pro Office Accessory Kits

The ADL Vantage/ADL Vantage Pro Office Accessory Kits consists of the following:

- Wall/mains power supply
- Wall plug with adaptor set
- Programming cable

To configure the radio with ADLCONF software:

- Connect the power supply to the wall/mains current
- Connect the programming cable to:
  - The power supply
  - The ADL Vantage/ADL Vantage Pro radio
  - Your PC (If your PC does not have a serial port, you may use a serial-to-USB adaptor)
- Turn on the radio
- Launch ADLCONF software and refer to the section of the ADLCONF User's Guide on connecting the program to your radio. In most cases, you just need to click ADLCONF's Connect button.

To operate your ADL Vantage/ADL Vantage Pro radio in the field you will need an antenna, a portable power supply and a cable to connect to a data source such as a GNSS receiver. Pacific Crest and its authorized dealers can provide you with everything you need including a tripod accessory kit and a battery/charger kit.

## Tripod Mounts

Each ADL Vantage includes a tripod clip on the rear of the radio (see Figure 1). Insert the clip into a slot on the tripod.



**Figure 1 – ADL Vantage Tripod Clip**

Each ADL Vantage Pro includes a high-impact polymer handle with built-in tripod clip (see Figure 2). Insert the clip into a slot on the tripod.



**Figure 2 – ADL Vantage Pro Handle with Tripod Clip**

## Antenna and Antenna Mount

If you have an antenna with a male TNC connector, you can attach it directly to the RF connector on the top of the ADL Vantage/ADL Vantage Pro. We highly recommend, however, that you elevate your RF antenna as much as possible. The most common set up is similar to that seen in Figure 3 where an antenna cable with male TNC connector is attached to the radio. The other end of this cable is attached to a tripod or elevated section of range pole. The RF antenna is then attached to the end of the cable. Pacific Crest offers an antenna cable that attaches to standard 5/8-inch threaded tripods and range poles and antennas with NMO connectors.

We recommend inspecting the antenna center push-pin contact to make sure that it makes good contact with the antenna mount. A good antenna connection is critical to system performance.



Always make sure an antenna is connected before transmitting with any radio. A good field practice is to attach the antenna before you turn on the radio and turn off the radio before you detach the antenna. Using a gained antenna will raise the Effective Isotropic Radiated Power of the ADL Vantage/Vantage Pro radio. Make sure the resultant Effective Isotropic Radiated Power

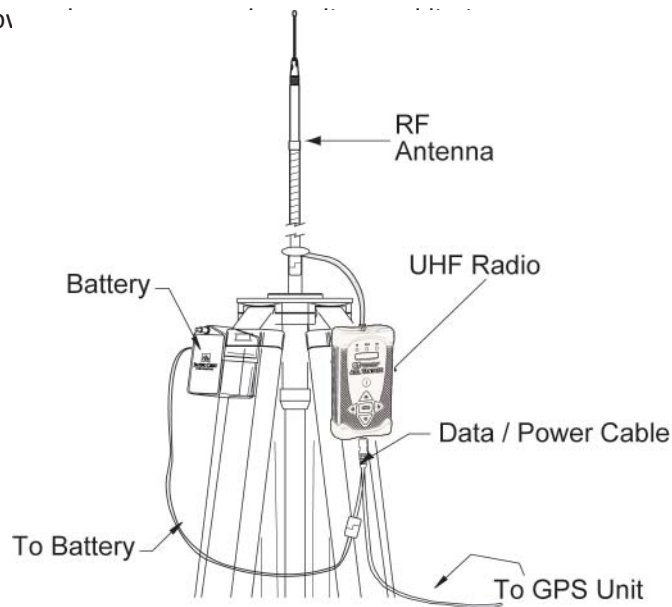
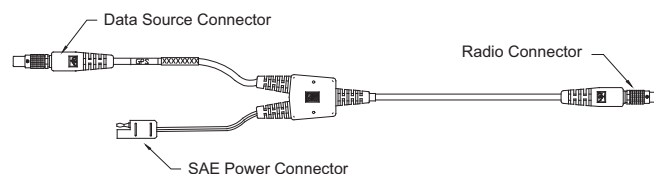


Figure 3 - ADL Vantage/ADL Vantage Pro Setup

## Data/Power Cable

The ADL Vantage/ADL Vantage Pro radios are connected to a data source, such as a GNSS receiver, using a data/power cable (see Figure 4). These cables are available with different connectors for attaching to a large variety of data sources. Contact your Pacific Crest sales representative for selecting the best cable to meet your needs.



Each ADL data/power cable also connects the radio (and in some cases the data source) to external power via an SAE-type connector. Pacific Crest strongly recommends you use the ADL Vantage external battery (PN A01742) or the ADL Vantage Pro external battery (PN A00399), both of which include an SAE connector. These are sold both separately and as part of the battery/charger kits (ADL Vantage, PN K01107; ADL Vantage Pro, PN tbd).



NOTE: Do NOT use any battery charger as a power supply for any Pacific Crest radio. This may damage the radio. Do NOT recharge any battery while it is connected to a radio.

## Operating the ADL Vantage/Vantage Pro

### Turning the Radio On and Off



**Warning:** *The ADL Vantage Pro enclosure and heat sink may become very hot during operation, depending on the air temperature, RF power selection and transmission duty cycle. Turn off the radio and allow it to cool prior to handling. Always use the heat-resistant handle to hold or move the ADL Vantage Pro.*

To turn on the ADL Vantage or ADL Vantage Pro, attach the radio to its battery via the SAE connector on either the programming cable or data/power cable. Once the radio detects power on its data connector, it will turn on automatically, test the antenna connection and battery status, and be ready for communication within 5 seconds. If wall/mains current is ever interrupted, the ADL Vantage/ADL Vantage Pro radio will automatically turn itself on and resume transmitting data within 5 seconds of power restoration. To turn off the radio, either detach its power cable or press the On/Off button in the center of the front panel. You may turn the radio on again either by pressing the On/Off button or by removing and reinserting the data/power cable.

### Indicator LEDs

The TX LED indicates that the ADL Vantage/ADL Vantage Pro is broadcasting. In most GPS RTK applications, the TX LED will flash approximately once per second.

The PWR LED is illuminated when power between 9 and 30 VDC is supplied to the radio. When more than 30 VDC are supplied, all three LEDs will flash indicating Error Code 01 for a high voltage condition. If less than 9 VDC are supplied, all three LEDs will flash twice, pause, flash twice, pause, etc., indicating Error Code 02 for a low voltage condition. o provides a low external voltage supply indicator. When lit, power is turned on. The PWR LED will blink when the external voltage drops to a level determined using ADLCONF software. (The default level is 10 VDC.) If the PWR LED does not turn on/off when pressing the On/Off button on the radio's front panel, inspect the external voltage supply. The minimum voltage required by the ADL Vantage/ADL Vantage Pro is 9 VDC.

The RX LED flashes to indicate that the ADL Vantage/ADL Vantage Pro is receiving signals from another radio or from a source of interference. The default is Signal received, but you can reset the radio so that when its RX LED flashes it means Data packets received. You can reset the meaning either through the user interface or with ADLCONF configuration software. During normal operation, the RX LED will flash at a once-per-second rate indicating the reception of transmissions from the transmitting radio. If the RX LED is on continuously, then a source of interference may be impacting the ability of the ADL Vantage to receive data. Try repositioning the antenna, or changing to another channel at both the transmitter and receiver to reduce or eliminate the interference.

### Enclosure

The ADL Vantage enclosure is made from a tough, impact-resistant aluminum alloy. The enclosure receives an anti-corrosion treatment and is further protected with a chemical- and scratch-resistant polyurethane coating. Elastomer end caps



provide the first level of shock protection for the internal components. An internal isolation system reduces the effect of vibration on the radio receiver board.

## Antenna Connector

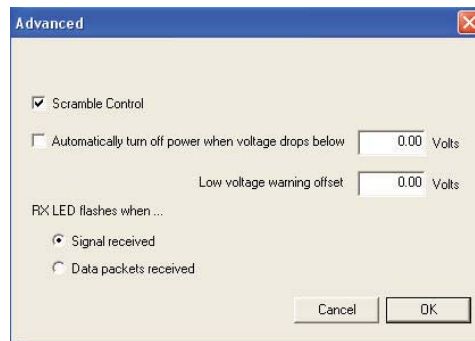
The ADL Vantage/ADL Vantage Pro radios use an industry standard TNC-female RF connector that is compatible with a wide range of mobile whip antennas. Pacific Crest also sells cables that connect the ADL Vantage to remote antennas.

## Battery Care

The ADL Vantage Battery/Charger kit (PN K01107) includes a 12-Volt, 12-AHr, deep-discharge, lead-acid battery. The ADL Vantage Pro Battery/Charger kit (PN 81818) includes a 12-Volt, 33-AHr, deep-discharge, lead-acid battery. Both batteries provide all-day operation for the respective radios and may be recharged approximately 300 times over a period of 5 years.

To power the ADL Vantage with a user-supplied battery, select a deep-discharge battery with a minimum capacity of 8 AHr. Batteries designed for automotive use can be used if necessary but will be damaged by repetitive discharge/charge cycles and are therefore not recommended.

By default, the ADL Vantage/ADL Vantage Pro user interface displays battery status on the bottom row of the **Device Status** screen. The screen displays “Normal” until the voltage on the battery falls below a level input on ADLCONF by clicking the **Advanced** button on the **Radio Link** screen.



**Figure 7 - ADLCONF’s Radio Link/Advanced Screen**

To prevent battery damage, the ADL Vantage automatically shuts itself off when the input voltage drops below 9 Volts (see Figure 7). The ADL Vantage Pro radio shuts itself off automatically when the input voltage drops below 9.5 Volts. You can input a different value on the Radio Link/Advanced screen, but inputting a value less than 9 V (ADL Vantage) and 9.5 V (ADL Vantage Pro) is not recommended. To configure the radio to warn you when you are within a number of volts of this minimum voltage, input a value into the Low voltage warning off set field. For example, with the radio programmed with 9.5 and 1.00 in the voltage fields, the PWR LED on the front of the radio will begin flashing when the input voltage drops to 10.5 Volts (9.5 + 1.00).

ADLCONF and its user guide are available for free download at [www.PacificCrest.com](http://www.PacificCrest.com).

You can turn this battery protection feature off, but the ADL Vantage/ADL Vantage Pro radios will not transmit with an input voltage lower than 9 VDC. To run your radio as a receiver at voltages as low as 5 VDC, uncheck the box illustrated in Figure 7 and program the radio.

## Charging

The charger supplied with the ADL Vantage Battery/Charger kit (PN K01107) provides two-stage charging and should be connected to the battery following every full day of operation to assure good battery life and performance. The first stage quickly charges the battery to capacity and the second stage trickle charges the battery to maintain a full charge.

It is important to periodically charge any battery that is stored for an extended length of time. Storing batteries for an extended time in a discharged state will damage them. To recharge a user-supplied battery, select a charger of appropriate type. You should never recharge any battery while it is connected to a radio. This may damage the radio and/or the battery.

## ADL Vantage/ADL Vantage Pro User Interface

The ADL Vantage/ADL Vantage Pro user interface includes three LEDs, an On/Off button, a two-row LCD display, four scrolling buttons marked with arrows and a central Enter button.

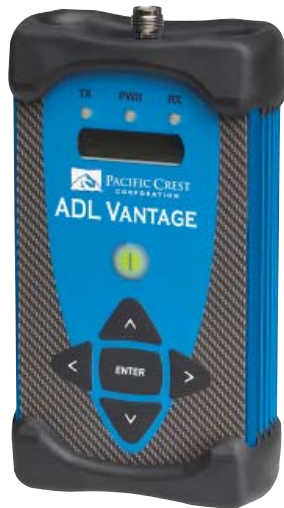


Figure 5 - ADL Vantage



Figure 6 - ADL Vantage Pro

Each radio's LCD has a backlight that stays on for 20 seconds. The backlight must be on for the **Enter** or arrow buttons to function. If the backlight is off, pressing any button turns it on. You can opt to have the backlight stay on by clicking the **Advanced** button on ADLCONF's **Serial Interface** screen and unchecking the box to "Turn off radio LCD backlight after 20 seconds." Then click ADLCONF's **Program** button to program the radio with this change.

The top row of the LCD display the name of the currently selected radio configuration function. The bottom LCD rows displays the various parameters you can choose for the displayed function. Press the left or right arrows to scroll to different functions. Press the up or down arrows to scroll to different choices for the displayed function.

Table 1 displays the various functions available in the ADL Vantage/ADL Vantage Pro user interface. It also describes these functions and lists the parameter choices for each function. The default parameters, where applicable, are in bold face. A more detailed description of some of the functions follows.

## Figure 4 - A Typical Data/Power Cable

Function	Description	Parameter Choices
<b>Device Status</b>	Displays radio status and identification information	<b>Battery status</b>
		Owner name
		Call sign
		Modulation type
		Channel bandwidth
		Transmitter status
		Firmware version
<b>Channel / Freq</b>	Displays/selects channel number & receive frequency	<b>Channel 01 and frequency (MHz)</b>
		Channel 02 and frequency (MHz)
		Etc.
<b>Ch TX Freq</b>	Displays TX freq (if different from the channel's RX freq)	<b>Channel No. &amp; frequency (MHz)</b>
<b>Data Protocol</b>	Displays/selects data protocol type	<b>Trans EOT (End of Transmission)</b>
		Trans EOC (End of Character)
		Packet Switched
		TRIMTALK 450S
		TRIMMARK II/IIIE
		TT450S (HW)
		TRIMMARK 3
		SATEL®
		Trans FST
<b>Radio Link Rate</b>	Displays/selects bit rate for radio transmission/reception	4800
		8000
		<b>9600</b>
		16000
		19200
<b>Repeater Mode</b>	Sets the radio to be a repeater (non-Trimble) protocols)	<b>Off (Not a repeater)</b>
		On (Is a repeater)
<b>Operation Mode</b>	Sets the radio to be a repeater (Trimble protocols)	<b>Base/Rover</b>
		Base w/ One Rpt
		Base w/Two Rpt
		Repeater1
		Repeater2
<b>Sensitivity</b>	Displays/selects radio squelch level	<b>High (Rover)</b>
		Moderate
		Low (Base)
<b>Transmit Power</b>	Displays/selects transmitter power level (in Watts)	Low Power

		Low intermediate power
		Intermediate power
		High intermediate power
		High power
<b>RX LED Meaning</b>	Displays/selects what it means when the RX LED flashes	<b>Signal Received</b>
		Data Received
<b>Serial Baud</b>	Displays/selects serial baud rate of the radio's data port	2400
		4800
		9600
		19200
		38400
		115200
<b>Signal Strength</b>	Displays strength of the received signal (RSSI) in dBm	Press Enter
<b>Advanced Menus</b>	Displays or Conceals rarely used functions	<b>Hide</b>
		Show
<b>CSMA</b>	Displays/selects Carrier Sense Multiple Access setting	<b>On</b>
		Off
<b>Security Code</b>	Encrypts/Decrypts transmitted data	<b>Off</b>
		On
<b>Edit Configuration</b>	Enables/Disables configuration using the radio interface	<b>Enabled</b>
		Disabled
<b>Scrambling</b>	Fills dead air with non-zero bits	<b>On</b>
		Off
<b>FEC</b>	Turns Forward Error Corrections on/off	<b>On</b>
		Off
<b>Error Code</b>	Displays current error status	<b>Error (if any)</b>
<b>Language Select (ADL Vantage Pro Only)</b>	Selects the display language	<b>English</b>
		Chinese
		Russian

**Table 1- ADL Vantage/ADL Vantage Pro User Interface Display**

The ADL Vantage and ADL Vantage Pro LCDs display radio parameters that are determined:

- In the factory: serial number, firmware version, transmitter status (enabled/disabled)
- By the radio: battery status, signal strength and error codes
- By your dealer: channel tables (including frequency and bandwidth) and maximum transmit power
- In the office using the ADLCONF program (everything else)

In addition, you may configure the following parameters in the field using the ADL Vantage/Vantage Pro user interface:

- Channel number
- Data protocol
- Radio link rate
- Repeater Mode (called “Operation Mode” when using a Trimble protocol)
- Sensitivity
- Transmit power
- RX LED meaning
- Serial baud rate
- CSMA (Note: It is illegal to transmit in the United States while CSMA is turned off. CSMA should be turned off within the European Union.)
- Security Code
- Edit Configuration
- Scrambling
- Forward Error Correction
- Language of display (with ADL Vantage Pro only)

For the field-configurable functions, the available choices are displayed on the bottom row of the LCD. The currently selected parameter is marked with an asterisk. To select a different choice for the displayed function, scroll up or down with the arrow buttons and press the Enter button when the desired choice is displayed.

There are two ways to move to a different function screen. When viewing a display-only function such as **Device Status** or **Signal Strength**, simply press the left or right arrow. When viewing a display-and-select function such as **Channel/Freq** or **Data Protocol**, first press the up/down arrows to display the currently selected parameter (marked with an asterisk) in the second row. Then press either the left or right arrow to move to a new function screen.

**Note:** if the currently selected parameter (shown with an asterisk) is not currently displayed on the LCD, and the backlight is off, you have not pressed a button for more than 20 seconds), you can scroll directly to the selected parameter by pressing the left or right arrow once. To move to a new function screen, press the left or right arrow a second time.

To speed field configuration and to prevent the selection of unsupported radio configurations, the ADL Vantage/ADL Vantage Pro user interface displays only those function parameters that make sense based on the parameters chosen for previously displayed functions. What you choose for the data protocol determines your options for radio link rate and repeater mode. For example, if your channel table is set to 12.5 kHz channel spacing, and you select **TT450S (HW)** on the **Data Protocol** screen, you cannot select a radio link rate – in fact the Radio Link Rate screen does not even appear - because the TT450S (HW) protocol works with 12.5 kHz channel spacing only at 4800 bps. And because TT450S (HW) is a Trimble protocol, Trimble-specific “Operation Modes” (instead of “Repeater Modes”) are available for selection. The ADL Vantage/ADL Vantage Pro user interface remembers things like this so you don’t have to! If you decide to undo any of these selections, simply press the left arrow to return to the **Data Protocol** screen and select a different protocol.

Although the ADL Vantage/ADL Vantage Pro radio modem supports both GMSK and 4FSK modulation, you cannot select the modulation type with the user interface. The radio automatically selects the appropriate modulation based on the channel bandwidth of the radio’s channel table (displayed on the Device Status screen as “BW: 12.5 or 25 kHz”), the data

protocol and the radio link rate. If you want to select a modulation type first and then an appropriate channel bandwidth, protocol and link rate, please use ADLCONF to configure the radio.

## Tips and Techniques for Best Performance

### Antenna

Antenna placement is critical for good performance. Range and coverage is directly proportional to the height of the transmitting and receiving antennas in addition to antenna gain. Where possible, select a reference station location that takes advantage of terrain to get the transmitting antenna as high as possible.

Always use the telescoping antenna mast and raise the antenna as high as is practical and safe given terrain and wind conditions.

Do not use a gained antenna if doing so increases the radio's Effective Isotropic Radiated Power beyond the limit of your license.

### Line Loss

Line loss from connectors and cables between the radio and antenna decreases the output power transmitted by the antenna, thereby decreasing the signal's range. To minimize line loss, please check the loss-per-length of cable to be used. For every 3 dB of line loss, the ERP (Effective Radiated Power) will decrease by half. For example, if you have a 4 W radio and a line loss of 3 dB in your cable and antenna, the power effectively radiating from the antenna will be 2 W. Every 6 dB of loss will reduce the radio's effective range by 50%.

### Power Supplies

Maintain batteries in a fully charged state. They will last longer if they are not allowed to become completely discharged. We recommend routinely connecting the battery to its charger after every working day and for 24 hours every 3 months during period of non-use. This will assure optimal performance and long battery life.

### Equipment Care

Routine equipment care will prolong the life and reliability of your ADL Vantage. Radio communication equipment is susceptible to damage from shock or environmental extremes. Never operate the ADL Vantage outside the operating-specifications contained in Appendix C.

### CSMA (Carrier Sense Multiple Access)

CSMA is a technology implemented in ADL Vantage/ADL Vantage Pro radios to meet the United States Federal Communication Commission (FCC) transmitter requirements. It is illegal to transmit on any UHF radio within the United States without CSMA enabled. CSMA holds off the radio transmission if the frequency is currently being used by a co-channel user. On occasion, you may note that the radio broadcasts stop for short periods of time. Most often, this is a case of co-channel interference and the ADL Vantage/ADL Vantage Pro radio is holding off broadcasts due to the FCC-mandated CSMA.

**Note:** You should turn CSMA off when transmitting within the European Union.

GPS RTK equipment is designed to function with intermittent gaps in the data. Heavy co-channel use may limit the ability of the ADL Vantage/ADL Vantage Pro radio to transmit the required information. In areas of heavy co-channel usage, try changing channels to a less used frequency.

## Security Code

You can use the ADLCONF software program to configure your ADL Vantage/ADL Vantage Pro to send and receive encrypted data. When the radio is programmed for encryption, the second line of its Security Code screen will say On (with an asterisk). Only radios that support Pacific Crest protocols (Transparent EOT, Transparent EOC, Packet Switched) and are programmed with this code will be able to interpret data sent by any of the radios. To turn the security code feature off, press the Up or Down arrow to display the Off option and press Enter. To turn the security feature back on, select the On option. If the radio has not been programmed by ADLCONF for data security, you will not be able to select the On option.

**Note:** If you program a radio to use the Data Security feature, it will not be able to communicate with any radio that is not set to use the same code. So 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. ADL 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.

## Edit Configuration

The ADL Vantage/ADL Vantage Pro LCD display includes 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 press the Enter button. You are now instructed to input a passcode, which is 369369 for all ADL radios. To input 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. You can also use ADLCONF to enable/disable the Edit Config function in the ADL Vantage/ADL Vantage Pro by checking/unchecking the Enable field configuration box on the Serial Interface screen's Advanced menu. The RX LED flashes to indicate that the ADL Vantage/ADL Vantage Pro is receiving signals from another radio or from a source of interference. The default is Signal received, but you can reset the radio so that when its RX LED flashes it means Data packets received. You can reset the meaning either through the user interface or with ADLCONF configuration software. During normal operation, the RX LED will flash at a once-per-second rate indicating the reception of transmissions from the transmitting radio. If the RX LED is on continuously, then a source of interference may be impacting the ability of the ADL Vantage to receive data. Try repositioning the antenna, or changing to another channel at both the transmitter and receiver to reduce or eliminate the interference, another radio or from a source of interference. The default is Signal received, but you can reset the radio so that when its RX LED flashes it means Data packets received. You can reset the meaning either through the user interface or with ADLCONF configuration software. During normal operation, the RX LED will flash at a once-per-second rate indicating the reception of transmissions from the transmitting radio. If the RX LED is on continuously, then a source of interference may be impacting the ability of the ADL Vantage to receive data. Try repositioning the antenna, or changing to another channel at both the transmitter and receiver to reduce or eliminate the interference.

## Scrambling

To demodulate a digital transmission, a receiver must synchronize itself with the transmitter. This can be hard to do when the transmitter sends a long series of one's or a long series of zeroes. But if every nth character in the transmission were switched, a one to a zero or a zero to a one, and if the receiver was expecting this, it could more quickly synchronize itself with the transmission. This is essentially what Scramble Control does and why we recommend you leave it on for all radios. If you select a protocol type other than Transparent (EOT and EOC) or Packet Switched, Scrambling will auto-

matically be disabled (though the box will remain checked). However, if some of the radios in your system are non-Pacific Crest radios, you may need to turn Scrambling off.

## Forward Error Correction

**Forward Error Correction** places extra bits in the transmitted data so receivers can check for transmission errors. Although data throughput is adversely affected, using Forward Error Correction can greatly improve range and so is strongly recommended.

**Note:** The **Forward Error Correction** screen is not displayed when using Trimble protocols, which do not support forward error correction.

## Error Codes

The ADL Vantage/ADL Vantage Pro performs a variety of power-up and run-time tests to assure optimal operation. Tests include environmental as well as electrical measurements designed to avoid damage to the unit while maintaining adequate operation. In the event of an error condition, an error code is displayed on the LCD screen and the PWR LED flashes the number of the error code (two flashes for Error Code 02, followed by a pause, two more flashes, etc.). Table 3 lists the possible error conditions.

Code	Description
01	Input voltage is too high
02	Input voltage is too low
08	Internal temperature exceeds limit for operation
11	Memory error
12	RAM error during initialization
15	Transmit frequency lock error
16	Receive frequency lock error
17	Serial buffer overflow

**Table 3 - ADL Vantage Error Codes**

### What to do

- **Error Code 01-02:** Check battery or power supply voltage level; check power cables; recharge or replace the battery; check the charger.
- **Error Code 08:** Place the radio in the shade; check the antenna and antenna cables for damage or disconnection; set radio link rate to 19200 to reduce the duty cycle.
- **Error Codes 11-12:** Turn the radio off and wait a full second before turning it back on. If the radio still reports Error Code 11 or 12, the SRAM memory may be corrupted and you should contact Customer Service (see Page 20).



- **Error Codes 15-16:** If you are using the radio as a repeater, make sure that the transmit and receive frequencies are less than 10 MHz apart. Otherwise, you should return the radio for service. If the radio displays Error Code 15 (Transmit frequency lock error), it is important to stop using it because the crystal oscillator might be unstable and you might be transmitting at an unprogrammed frequency for which you are not licensed.
- **Error Code 17:** If data comes into the radio faster than it can be transmitted, the serial buffer can overflow. If the radio displays Error Code 17, you should adjust the serial baud rate and radio link rate so the radio has enough time to transmit each data packet before the next packet is sent to the radio.

If the radio continues to display the error code after you have fixed the situation, you may clear the error code from the radio's display by pressing the On/Off button for 3 seconds (turning off the radio), waiting one full second and pressing the On/Off button a second time. If an error warning persists, contact a Pacific Crest authorized dealer or [Pacific Crest Customer Support](#).

## RF Output Power Regulation

Excessive heat is the enemy of all electronic equipment. For this reason ADL radios are equipped with RF (Radio Frequency) output power regulation firmware. Both the ADL Vantage and ADL Vantage Pro radios can operate safely with an ambient temperature as high as 65 degrees [use the degree symbol] centigrade (150 degrees Fahrenheit). But if the radio detects an internal temperature rising close to the maximum, it will reduce its RF output power automatically. While this reduces range temporarily, it also prevents damage to the radio that might cause a permanent loss of range.

If the ADL Vantage senses its internal temperature approaching the limit while it is set to transmit at its maximum 4 Watts, the radio will reduce its output power to 2 Watts. If the temperature continues to rise at the 2 Watt setting, the radio will turn off its transmitter completely. The radio will stay on and will display a "High Temp" message on its LCD screen. When the internal temperature decreases sufficiently, the RF output power will automatically increase. Any automatic change in the power setting - either a decrease or an increase - is preceded by a message sent to the receiver radio(s) informing them of the change. Other ADL Vantage or ADL Vantage Pro radios will display this message to the user on their LCD displays and by flashing all three LEDs for 5 seconds.

If the ADL Vantage Pro senses the internal temperature approaches the limit while it is set to transmit at its **High** transmit power (as programmed into the radio with ADLCONF configuration software), the radio will reduce its output power by 5 Watts. If the temperature continues to rise, the radio will reduce its output power by another 5-Watts and so on until the **Medium** transmit power level is met. The radio may then reset itself to output at the 2 Watt **Low** power setting or shut off the transmitter. As with the ADL Vantage, RF power output will automatically increase as the radio's internal temperature decreases.

If for some reason the ADL Vantage/ADL Vantage Pro radio's internal temperature is ever exceeded, it will automatically shut off the transmitter and display the Error 08 (excessive internal temperature). Shut the radio off, let it cool and turn it back on. If the storage temperature maximum has been exceeded, the radio will continue to display the Error 08 and may require repair.

# FCC Rules and Regulations

## Licensing Requirements

It is the responsibility of the owner to comply with applicable rules and regulations concerning the operation of a radio transmitter. In the United States, the FCC regulates the licensing of this equipment.

Application for a license is made by submitting FCC Form 600 along with evidence of frequency coordination (if required) and applicable fees. Similar licensing requirements exist worldwide. Penalties for broadcasting without a license can be severe, and may include the confiscation of your radio.

For more information, contact our customer service department.



**Warning:** Always obey local licensing requirements and restrictions. It is illegal to transmit in the United States while CSMA is turned off. CSMA is not required within the European Union and should be turned off.

## Equipment Compliances

ADL Vantage/ADL Vantage Pro have been tested and found to comply with Parts 15 and 90 of Title 47 of the Code of Federal Regulations. ADL Vantage/ADL Vantage Pro radios have also been tested and found compliant for type certification and approval in many other countries worldwide.

For more information concerning our worldwide compliances, contact Pacific Crest Customer Service.

## Being Part of the RF Community

Operation of a licensed radio product makes you a member of the RF community. Be aware that virtually all frequencies licensed are provided on a shared basis with other users. Each frequency dedicated specifically to RTK surveying activities has certain restrictions and limitations. For complete information, refer to the appropriate documentation from the licensing agency in your country of operation, e.g., Part 90, Title 47, of the Code of Federal Regulations.

Most frequencies sharing data transmissions and voice transmissions give priority to voice users. Be mindful of the persistent nature of a GPS RTK data transmission and always limit your RF transmission output power when performing close-in survey situations to avoid interference with co-channel users. Pacific Crest recommends using the low RF power setting for construction site and other line-of-site surveys with baselines less than two miles (depending on terrain).



**Warning:** If you are in conflict with a co-channel user, select another frequency to avoid formal actions by government agencies. In most cases you are required to vacate a frequency upon complaint by a shared channel voice user.

Most survey operations are itinerant in that the system is moved on a frequent basis. For fixed system installations, you should not use frequencies set aside for itinerant operations, but should coordinate a frequency based on the fixed area operation.

Regulations differ from country to country, so please be aware of the local regulations prior to using radio equipment.

## Automatic Station Identification

For operation in the United States, the FCC requires that radio transmitters used for GPS RTK applications periodically broadcast a station identifier. The station identifier is the call sign assigned to you on the station license.

The ADL Vantage/ADL Vantage Pro support the broadcast of station identification in a manner that meets the requirements of the FCC. Upon receipt of equipment, program your FCC call sign into the configuration of your ADL Vantage/ADL Vantage using ADLCONF software. This is only required for transmitters.



**Warning:** Failure to transmit your station identification is in violation of FCC regulations. Use ADLCONF software to enter your FCC call sign.

# Contact Information

## Customer Support

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

### Headquarters

Pacific Crest  
510 DeGuigne Drive  
Sunnyvale, CA 94085  
USA  
Tel: 1-800-795-1001 (U.S. & Canada toll free)  
1-408-481-8070 (outside the U.S.)  
Fax: 1-408-481-8984

E-mail: [Support@PacificCrest.com](mailto:Support@PacificCrest.com)  
Repair info: [RMA Request](#)  
Web: [www.PacificCrest.com](http://www.PacificCrest.com)

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, in most cases free of charge.

## Sales Contact

### Headquarters

Pacific Crest  
510 DeGuigne Drive  
Sunnyvale, CA 94085  
USA  
Tel: 1-800-795-1001 (U.S. & Canada toll free)  
1-408-481-8070 (outside the U.S.)  
Fax: 1-408-481-8984

E-mail: [Sales@PacificCrest.com](mailto:Sales@PacificCrest.com)  
Web: [www.PacificCrest.com](http://www.PacificCrest.com)

### EMEA Office

HAL Trade Center  
Bevelandseweg 150  
1703 AX Heerhugowaard  
The Netherlands  
Tel: +31-72-5348408  
Fax: +31-72-5348288

### EMEA Office

HAL Trade Center  
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Tel: + 31-72-5348408  
Fax: + 31-72-5348288

# Warranty

## One-Year Limited Warranty

This warranty gives you specific legal rights. You may also have other rights which vary from state to state or area to area.

Pacific Crest warrants ADL family products, inclusive of cables and batteries, against defects in materials and workmanship for a period of one year from receipt by the end-user.

## Exclusions

Should Pacific Crest be unable to repair or replace the product within a reasonable amount of time, a refund of the purchase price may be given upon return of the product.

The warranty on your ADL Vantage/ADL Vantage Pro shall not apply to defects resulting from:

- Improper or inadequate maintenance by the customer
- Unauthorized modification, negligence or misuse
- Operation outside of the environment specifications

## Warranty Limitations

*This warranty set forth above is exclusive and no other warranty, whether written or oral, is expressed or implied. Pacific Crest specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.*

# Appendix A - Safety Information

## Exposure to Radio Frequency Energy

The ADL Vantage/ADL Vantage Pro is designed to comply with the following national and international standards and guidelines regarding exposure of human beings to radio frequency electromagnetic energy, in addition to protection against harmful interference of neighboring electrical equipment:

- FCC Report and Order FCC 96-326 (August, 1996)
- American National Standards Institute (C95.3-1992)
- National Council on Radiation Protection and Measurement (NCRP - 1986)
- International Commission on Non-ionizing Radiation Protection (ICNRP - 1986)
- European Committee for Electrotechnical Standardization (CENELEC)
- FCC CFR47 Part 15
- FCC CFR47 Part 90
- Industry Canada RSS 119
- ETSI EN 300 113-2
- ETSI EN 300 489
- ACA AS/NZS 4295
- iDA Spec 111
- OFTA STD-1E
- SRRC CMII

Contact your sales representative for model specific country approval.

To assure optimal radio performance and to ensure that exposure to RF energy is within the guidelines in the above standards, the following operating procedures should be observed:

- Do not operate a transceiver when someone is within the distance noted below of the antenna (unity gain).
  - 120 cm (approx. 4 feet) for ADL Vantage Pro @ 35 Watts
  - 30 cm (approx. 12 inches) for ADL Vantage/ADL Vantage Pro @ 2 Watts - 60 cm (approx. 2 feet) for ADL Vantage/ADL Vantage Pro @ 4 Watts
  - 15 cm (approx. 6 inches) for ADL Vantage @ 1 Watt
- Do not operate the transceiver unless all RF connectors are secure and any open connectors are properly terminated.
- Avoid contact with the antenna while operating the transceiver.
- Do not operate the transceiver with a damaged antenna. If a damaged antenna comes in contact with the skin, a minor burn may result.
- Do not operate the equipment near electrical blasting caps or in an explosive atmosphere.



**Warning:** Changes or modifications not expressly approved by the FCC could void the user's authority to operate the equipment.

## Exposure to Hot Surfaces

The ADL Vantage Pro enclosure and heat sink may become very hot during operation, depending on the air temperature, transmit power and transmission duty cycle. Turn off the unit and allow it to cool prior to handling. Always use the heat-resistant handle to hold or move the ADL Vantage Pro.

## Appendix B - Pin-outs and Connectors

The ADL Vantage/ADL Vantage Pro uses a #1-shell, 5-pin circular data/power connector. For a mating connector, Pacific Crest recommends using a LEMO P/N FGG.1B.305.CLAD.72Z, or equivalent. Refer to Table 3 and Figure 8 for pin assignments and orientation. Figure 8 shows a rear view of the pin-outs (looking from behind the connector).

Pin No.	Description
1	Power: 9-30 VDC Input
2	Ground for Power
3	RX (DTE)
4	Signal Ground
5	TX (DTE)

Table3 - ADL Vantage/Vantage Pro Pin Assignments

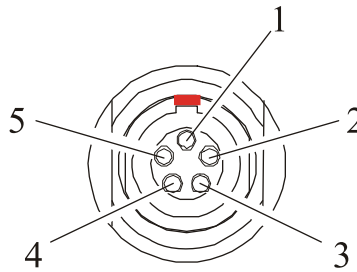


Figure 8 – ADL Vantage/Vantage Pro Data/Power Connector

### Antenna

The ADL Vantage/ADL Vantage Pro antenna connector is a TNC female. For a mating plug, we recommend Amphenol-brand connectors. Use only high quality 50  $\Omega$  impedance cable for the antenna connection.

Most ADL Vantage/ADL Vantage Pro antennas use industry-standard NMO connectors. The impedance of all ADL Vantage/ADL Vantage Pro antennas is 50  $\Omega$ .

- Connector Manufacturer Contacts
- Contact LEMO at <http://www.lemo.com>
- Contact Amphenol at <http://www.amphenol.com>

## Appendix C - Technical Specifications

General Specifications	
Communication	1 RS-232 port, 115.2 kbps maximum
User Interface	2-row, 16-character LCD display with 5 navigation buttons
Power	
External	ADL Vantage: 9.0 – 30.0 VDC, 2 Amp maximum ADL Vantage Pro: 9.0 – 30.0 VDC, 15 Amp maximum <sup>1</sup>
During RX	0.6 Watts nominal @ 12.0 VDC
During TX	ADL Vantage: 7 Watts nominal @ 12.0 VDC, 1 W RF output 13.4 Watts nominal @ 12.0 VDC, 4 W RF output
	ADL Vantage Pro:
Modem Specifications	
Link Rate/Modulation	19,200 bps/4FSK
	9600 bps/4FSK
	19,200 bps/GMSK
	16,000 bps/GMSK
	9600 bps/GMSK
	8000 bps/GMSK
	4800 bps/GMSK
Link Protocols	Transparent FST/EOT/EOC, Packet-switched, TRIMTALK™, TRIMMARK™, TT450S (HW), SATEL®
Forward Error Correction	Yes
Radio Specifications	
Frequency Bands	390-430, 430-470 MHz
Frequency Control	Synthesized 12.5 kHz tuning resolution
Frequency stability +/- 1 PPM	
RF Transmitter Output	ADL Vantage: Programmable to 0.1 – 4 Watts (where permitted)
	ADL Vantage Pro: 2 Watts, 3 user-defined intermediate power levels and 35 Watts
Sensitivity	-110 dBm BER 10-5
Type Certification	All models are type accepted and certified for operation in the U.S., Europe, Australia, New Zealand, and Canada
Environmental Specifications	
Enclosure	IP67 (Dust proof and watertight to depth of 1 meter for 30 minutes)



Operating Temperature (Receiver)	-40° to +85° C (-40° to +185° F)
Operating Temperature (Transmitter)	-40° to +65° C (-40° to +149° F)
Storage Temperature (Receiver/Transmitter)	-55° to +85° C (-67° to +185° F)
Vibration Spec:	MIL-STD-810F
<b>Mechanical Specifications</b>	
Dimensions	ADL Vantage: 8.89 cm L x 4.6 cm W x 16.0 cm H (3.5" L x 1.809" W x 6.3" H)
	ADL Vantage Pro: 11.9 cm L x 8.6 cm W x 21.3 cm H (with handle) (4.7" L x 3.4" W x 8.37" H)
Weight	ADL Vantage: 705 grams (1.55 lbs.) ADL Vantage Pro: 1950 grams (4.35 lbs)
Data/Power Connector	5-pin, #1-shell LEMO-type
RF Connector	50 Ohm, TNC-female

<sup>1</sup> ADL Vantage Pro will not operate below 9.0 VDC or above 30.0 VDC. The radio is protected from input voltage that is below 9.0 VDC or above 30.0 VDC.

## Appendix D – Software

### Software Compatibility

Current versions of the following software were tested and verified for compatibility with Windows XP and the Microsoft Business Edition of the Windows Vista operating systems:

- ADLCONF
- PCC Range Estimator



510 DeGuigne Drive . . . Sunnyvale, CA 94085