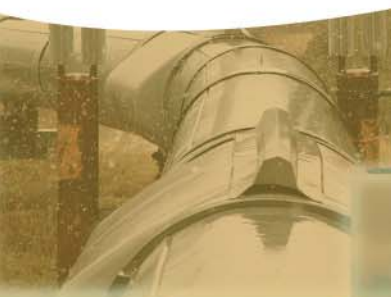




PACIFIC CREST

ADL Sentry

User Guide



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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Web 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, usually free of charge.

Legal notices

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Warranty

PACIFIC CREST MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Pacific Crest shall not be liable for errors contained herein or for incidental consequential damages in connection with the furnishing, performance, or use of this material.

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 radio 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.

Notices

Class B Statement – Notice to Users. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or Pacific Crest directly for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

Canada

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Europe

This product has been tested and found to comply with the requirements for a Class B device pursuant to European Council Directive 1999/5/EC on R&TTE, thereby satisfying the requirements for CE Marking and sale within the European Economic Area (EEA). These requirements are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential or commercial environment, and to ensure that the equipment is safe.

Australia and New Zealand

This product conforms with the regulatory requirements of the Australian Communications and Media Authority (ACMA) EMC framework, thus satisfying the requirements for C-Tick Marking and sale within Australia and New Zealand.

Notice to Our European Union Customers

For product recycling instructions and more information, please go to www.trimble.com/ev.shtml.

Recycling in Europe: To recycle Trimble WEEE (Waste Electrical and Electronic Equipment, products that run on electrical power), Call +31 497 53 24 30, and ask for the "WEEE Associate". Or, mail a request for recycling instructions to:

Trimble Europe BV
c/o Menlo Worldwide Logistics
Meerheide 45
5521 DZ Eersel, NL

March 2012

Safety Information

Before you use your radio, ensure that you have read and understood this publication, as well as safety requirements.

CAUTION – A license is required before operating radio communication equipment.

Warnings and cautions

An absence of specific alerts does not mean that there are no safety risks involved.

Always follow the instructions that accompany a Warning or Caution. The information they provide is intended to minimize the risk of personal injury and/or damage to the equipment. In particular, observe safety instructions that are presented in the following formats:

WARNING – A Warning alerts you to a likely risk of serious injury to your person and/or damage to the equipment. A warning identifies the nature of the risk and the extent of possible injury and/or damage. It also describes how to protect yourself and/or the equipment from this risk. Warnings that appear in the text are repeated at the front of the manual.

CAUTION – A Caution alerts you to a possible risk of damage to the equipment and/or loss of data. A Caution describes how to protect the equipment and/or data from this

Exposure to radio frequency energy

The radio 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
- RRC 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, observe the following operating procedures:

- Do not operate a transceiver when someone is within the distance noted below of the antenna (unity gain).
 - 30 cm (approximately 12 in) for the ADL Sentry radio @ 2 W
 - 60 cm (approximately 2 ft) for ADL Sentry @ 4 W
 - 15 cm (approximately 6 in) for the ADL Sentry radio @ 1 W
- 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.
- Antennas are excellent conductors of electricity, so use extreme caution when operating near power lines and other sources of electric current or during stormy weather.

CAUTION – Changes or modifications not expressly approved by the FCC could void the user's authority to operate the equipment.

Rechargeable batteries

The radio uses a 12 V, deep-discharge, lead-acid battery (portable power battery).

CAUTION – Storing batteries for an extended time in a discharged state damages them.

Note – For specific safety information, refer to the documentation included with your battery.

WARNING – Do not damage the battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage. To prevent injury or damage:

- Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
 - Do not expose the battery to fire, high temperature, or direct sunlight.
 - Do not immerse the battery in water.
 - Do not use or store the battery inside a vehicle during hot weather.
 - Do not drop or puncture the battery.
 - Do not open the battery or short-circuit its contacts.
-

WARNING – Avoid contact with the battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage. To prevent injury or damage:

- If the battery leaks, avoid contact with the battery fluid.
 - If battery fluid gets into your eyes, immediately rinse your eyes with clean water and seek medical attention. Do not rub your eyes!
 - If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.
-

WARNING – Charge and use the rechargeable battery only in strict accordance with the instructions. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage. To prevent injury or damage:

- Do not charge or use the battery if it appears to be damaged or leaking.
- Charge the battery only in a Trimble product that is specified to charge it. Ensure that you follow all instructions that are provided with the battery charger.
- Discontinue charging a battery that gives off extreme heat or a burning odor.
- Use the battery only in Trimble equipment that is specified to use it.
- Use the battery only for its intended use and according to the instructions in the product documentation.

CAUTION – *Do not* use any battery charger as a power supply for any radio. This may damage the radio. *Do not* recharge any battery while it is connected to a radio.

Transmission 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. The ADL Sentry transceiver uses extended frequencies and may contain functions that are not operational in the United States and its territories. Users should check with the radio authority of the country of operation for any restrictions that might apply.

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

The radios have been tested and found to comply with Parts 15 and 90 of Title 47 of the Code of Federal Regulations. They 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 customer support.

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, please be aware of the local regulations before using radio equipment.

Automatic station identification

For operation in the United States, the FCC requires that radio transmitters broadcast a station identifier every 15 minutes. The station identifier is the call sign assigned to you on the station license.

The radios support the broadcast of station identification in a manner that meets the requirements of the FCC. Upon receipt of equipment, use the ADLCONF software to program your FCC call sign into the configuration of the radio. This is only required for transmitters.

The call sign is transmitted every 15 minutes in Morse code. It is not included in any data packet and so is not processed 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 (on the ADLCONF's *Identification* screen), the radio programmed with this configuration file will not transmit any call sign.

WARNING: Failure to transmit your station identification is in violation of FCC regulations. If you are operating outside the United States, check with the local authorities if you need to transmit a call sign.

Carrier Sense Multiple Access (CSMA)

CSMA is a technology implemented in the 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 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 radio to transmit the required information. In areas of heavy co-channel usage, try changing channels to a less used frequency.

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Introduction

This manual describes how to set up and use the Advanced Data Link (ADL) Sentry radio, model numbers ADLS-1 (390-430 MHz) and ADLS-2 (430-470 MHz).

The ADL Sentry is an advanced, high speed, wireless data link that is designed specifically for environmental monitoring applications. Your success in using the radios is Pacific Crest's primary goal. Pacific Crest stands behind its products by providing expert support and service. Your comments and questions are welcome.

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 before you set up the system.

Note about this guide

We believe that the ADL Sentry system provides 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 this radio from a third-party supplier. 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.

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). Product updates, documentation, and any support issues are available for download.

If you need to contact technical support, email 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.

Overview

Features

Compatibility

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

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

- Select between 0.1 W, 0.5 W, 1 W, 2 W, and 4 W
- Increase range by switching to a higher output power
- Increase battery life by reducing output power when you do not 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.

Software compatibility

Current versions of the following software were tested and verified for compatibility with Windows[®] 7, Windows XP, and the Business Edition of the Windows Vista[®] operating systems:

- ADLCONF
- PCC Range Estimator

Configuring the Radios

ADLCONF configuration software

ADLCONF is the software application for configuring and troubleshooting all Advanced Data Link (ADL) radios. Running the ADLCONF software on a computer attached through a serial cable to an ADL radio enables you to check the status of the radio, enter 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 then import it using the ADLCONF software.

The latest version is available for free download from www.PacificCrest.com. The *ADLCONF User Guide* is also available on the Pacific Crest website. A user guide that describes how to configure the ADL Sentry radio is available by running the ADLCONF software and then selecting *Help / User Guide*.

Factory default settings

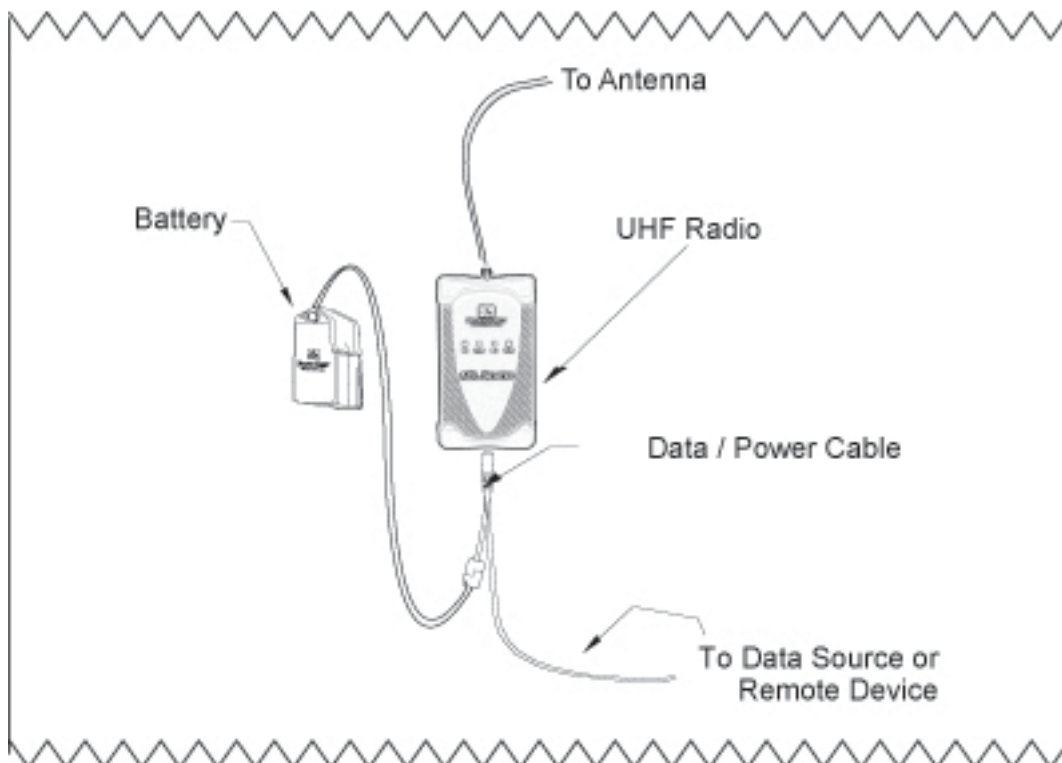
To return the radio to its factory default configuration, use the ADLCONF software. Click **Restore Factory** to the right of the screen and then click **Program**. The following table shows the factory default settings:

| Description | Default Setting |
|-----------------------------------|---------------------------------------|
| Device Status | Battery status |
| Channel/Frequency | Channel No. and frequency (MHz) |
| Channel Tx Frequency | Channel No. and frequency (MHz) |
| Data Protocol | Transparent EOT (End of Transmission) |
| Radio Link Rate | 9600 |
| Operation Mode (Trimble protocol) | Base/Rover |
| Sensitivity | High (Rover) |
| Rx LED Meaning | Signal Received |
| Serial Baud | 38000 |
| Advanced Menus | Hide |
| CSMA | On |
| Security Code | Off |
| Edit Configuration | Enabled |
| Scrambling | On |
| Forward Error Correction | On |

Setup in the Office

1. Plug the radio's desktop power supply into the wall. You may alternatively use an approved 12 Volt battery for power. But you must never power a radio with a battery while it is being recharged. This will damage the battery.
2. Attach the desktop power supply's (or battery's) SAE connector to the radio programming cable's SAE connector.
3. Attach the programming cable's DE-9 connector into a serial port on your PC. If your PC does not have a serial port, you should use a serial-to-USB adaptor.
4. Attach the programming cable's Turck plug (with the red dot facing up) into the bottom of the radio. This will turn the radio on.
5. Install ADLCONF, available for free download from <http://www.pacificcrest.com/support.php?page=updates>.
6. Launch ADLCONF and refer to its user guide for instructions on connecting to ADL radios. The user guide is displayed when you click Help > User Guide on ADLCONF's main menu. In most cases, you simply click the Connect button on the right of the ADLCONF main screen.
7. After connecting to the radio for the first time you should click File > Export and save a copy of the radio's original configuration to your PC. You also can return the radio to its factory configuration by clicking File > Import and selecting this file. You will not lose any channel tables or personalized configurations such as Owner Name or Call Sign by importing a configuration file.

ADL Sentry Setup



Setting up in the Field

1. Attach the antenna to the radio, either directly to the top of the radio or to an antenna cable.
2. Attach the radio to your tripod using the tripod clip on the back of the radio. See the figure below for setup suggestions.
3. Connect the radio to the source of the data you will transmit, for example, a GPS receiver, using the data/power cable. The ADL Sentry radio uses the same data connector – with the same pin outs - found on the PDL HPB radio. This makes the radios compatible with existing HPB data cables.
4. Join the data/power cable's SAE connector to the 12 Volt battery's SAE connector. This will turn the radio on. If the radio had previously been powered on and then off, turn it on again by pressing the On/Off button in the center of the front panel.

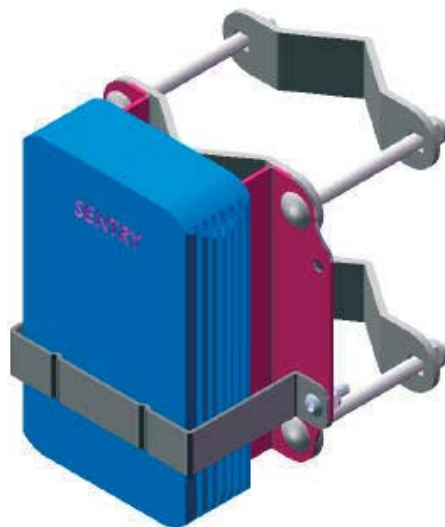
Wall Mounting Kit (PN K01134)

Before connecting any cables, attach the ADL Sentry wall mount onto the back of the radio and then attach the wall mount to the wall



Mast Mounting Kit (PN K01135)

Alternatively attach the ADL Sentry mast mount onto the back of the radio and then attach the mast mount to the antenna mast.



Tripod mount

Each ADL Sentry radio includes a tripod clip on the rear of the radio. Insert the clip into a slot on the tripod:



Antenna and antenna mount

The most important activity in setting up a radio transmitter is determining the placement and type of the antenna. Where flexibility permits, always place the antenna on the highest point available and always select an antenna with a gain pattern (more on this later) which optimizes the coverage. In general, use a directional gained antenna such as a Yagi for a point-to-point fixed location application and a gained omnidirectional antenna for mobile point-to-point or point-to-multipoint communication systems.

Note –Safety Concerns

- Be aware of power lines or other obstacles that can inadvertently come in contact with the antenna and cause potentially lethal conditions.
- Guy-wire antenna masts higher than 10 feet.
- Use lightning arrestors for equipment and personal protection if erecting an antenna in areas prone to lightning.
- Installation of antennas on buildings or other structures (towers, etc.) must be done in accordance with local building regulations. Contact a local antenna installer who is familiar with building codes and proper antenna installation for any permanent installation.

If you have an antenna with a male TNC connector, you can attach it directly to the RF connector on the top of the radio. We highly recommend, however, that you elevate the RF antenna as much as possible. The most common set up is similar to that shown in the following illustration 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-in threaded tripods and range poles and antennas with NMO connectors.

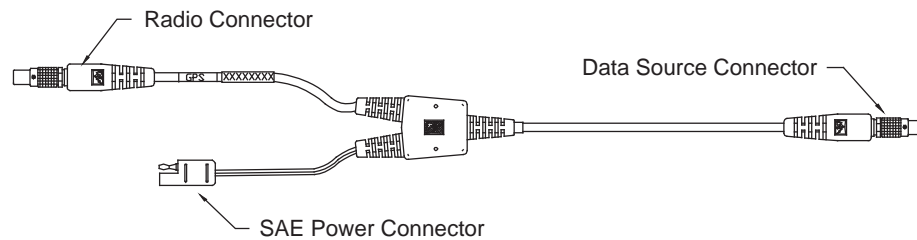
Inspect the antenna center push-pin contact to ensure that it makes good contact with the antenna mount. A good antenna connection is critical to system performance.

***Note** – Always ensure that 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 then turn off the radio before you detach the antenna. Using a gained antenna raises the Effective Isotropic Radiated Power (EIRP) of the radio. Ensure that the resultant EIRP does not exceed your licensed limit.*

Data/Power cable

The radio is connected to a data source using a data/power cable (see below). This cable is available with different connectors for attaching to a large variety of data sources. Contact your sales representative for selecting the best cable to meet your needs:

Each data/power cable also connects the radio (and in some cases, the data source) to external power through an SAE-type connector. Pacific Crest strongly recommends you use the external battery, which includes an SAE connector. It is sold both separately and as part of the battery/charger kits.



Serial Port

The ADL Sentry supports one full RS-232 data port on an 8-pin I/O port. This port is used to receive or transmit data in “data mode.” Attaching the ADL Sentry to a source of power and a source of data is all you need to do to put Port 1 into “data mode.” Port 1 may also be used in “command mode” to configure or troubleshoot the radio. To put Port 1 in “command mode” apply power to the radio and connect it to a PC running ADLCONF configuration software. Contact Pacific Crest Sales for information on incorporating into your own software application a set of RS-232 commands for communication with the ADL Sentry.

Enclosure

The radio 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 effects of vibration on the radio receiver board.

Antenna connector

The integrated antenna connector provides 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 radio to remote antennas.

Battery care

The ADL Sentry Battery/Charger kit includes a 12 V, 12-AHr, battery. The battery is deep-cycle, deep-discharge, sealed lead-acid battery, also known as portable power batteries. The battery provide all-day operation for the respective radio and can be recharged approximately 300 times over a period of three years if proper care is maintained.

A deep-discharge battery will last longer if it is never fully discharged during use and always fully charged before storage. If the battery is discharged entirely, the capacity will diminish. Transmitting at a high power level for a long period of time may cause the battery to reach the automatic shut off level before eight hours of use and will need to be recharged.

If you use your own battery, select a deep-discharge battery with a minimum capacity of 30 AHr. If necessary, you can use an automotive battery, but it will be damaged by repetitive discharge/charge cycles. An automotive battery will lose capacity in just a few cycles. Pacific Crest does not recommend this practice.

To protect the battery from over-discharge, an ADL Sentry will flash a low voltage warning when the input voltage declines to 10 V DC. If the voltage continues to decline, the radio will shut itself off at 9 V DC. At 10 V DC, the LEDs on the front of the radio will flash twice, pause, flash twice again, pause, etc. indicating low input voltage. If a radio has shut itself off because of low input voltage, it will automatically turn itself back on when the voltage returns to 9 V DC or higher.

The 10 V warning and 9 V shut-off levels are the factory defaults. If you wish, you can use ADLCONF software (Radio Link - Advanced screen) to configure other power levels. You can input a lower value for the ADL Sentry, but please be advised that values lower than 9 V might permanently damage your battery.

Charging

The charger supplied with the radio Battery/Charger kit provides two-stage charging and must be connected to the battery following every full day of operation to ensure 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 recharge your battery every time it is used. Do not allow a battery to remain in a discharged state any longer than necessary.

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 damages them and will reduce the capacity of the battery. To recharge a user-supplied battery, select a charger of appropriate type. A battery charge designed for use with a deep-cycle, deep-discharge, sealed lead acid battery may damage an automotive battery. An automotive battery charger may not fully charge a deep-cycle, deed-discharge, sealed lead acid battery. Never recharge any battery while it is connected to a radio as it could damage the radio and/or the battery.

Operating the Radio

Turning the radio on and off

To turn on the radio, attach the radio to power using either the programming cable (attached to wall/mains current) or the data/power cable (attached to the external battery of the radio). Once the radio detects power on its data connector, it automatically turns on and is ready for communication within 5 seconds. If the wall/mains current is interrupted, the radio automatically turns itself on and resumes transmitting data within 5 seconds of power restoration. If the radio is attached to an antenna when the radio is turned on, it automatically runs an antenna test before it will communicate. Wait until this test is complete before transmitting any data.

To turn off the radio, either detach its power cable or depress the On/Off button in the center of the front panel for 5 seconds..

To turn the radio on again, either press the On/Off button or remove and reinsert the data/power cable.



Indicator LEDs

| LED | Description |
|-----|--|
| Tx | Shows that the radio is broadcasting. In most GPS RTK applications, the Tx LED flashes approximately once per second. |
| Pwr | Shows the power status and also provides a high and low external voltage supply indicator. When lit, power is turned on. If the power is too high or too low, the LEDs will flash the number of the Error Code (see page 20). The PWR LED blinks 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 radio is 9 VDC. |
| Rx | Shows that the radio is receiving signals from another radio or from a source of interference. The default is <i>Signal received</i> , but you can reset the radio so that when its Rx LED flashes it means <i>Data packets received</i> . You can reset the meaning either through the radio or with the ADLCONF software. During normal operation, the Rx LED flashes at once per second to show reception of transmissions from the transmitting radio. If the Rx LED is on continuously, a source of interference may be affecting the radio's ability to receive data. To reduce or eliminate the interference, reposition the antenna, or change to another channel at both the transmitter and receiver. |
| PGM | Can be programmed to behave in user-definable ways. For more on programming contact your Pacific Crest dealer. |

Serial Port

The ADL Sentry supports one full RS-232 data port on an 8-pin I/O port. This port is used to receive or transmit data in “data mode.” Attaching the ADL Sentry to a source of power and a source of data is all you need to do to put Port 1 into “data mode.” Port 1 may also be used in “command mode” to configure or troubleshoot the radio. To put Port 1 in “command mode” apply power to the radio and connect it to a PC running ADLCONF configuration software. Contact Pacific Crest Sales for information on incorporating into your own software application a set of RS-232 commands for communication with the ADL Sentry.

Security code

You can use the ADLCONF software to configure ADL radios to send and receive encrypted data via the Transparent EOT/EOC or Packet Switched protocols. When an ADL Sentry radio is programmed for encryption and is set to one of these three supporting protocols, only similarly configured radios will be able to communicate with it.

***Note** – With the Security Code feature on, the radio will be unable to communicate with other radios that are not set to use the same code. When you enable this feature for one radio, therefore, you should enable it for all the radios in the same communication network. ADL radios with button/LCD interfaces can turn the Security Code feature on or off in the field, but all other Pacific Crest radios, such as the ADL Sentry, must be attached to a computer running the appropriate configuration software to disable the Security Code feature.*

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 is expecting this, it can 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. However, if some of the radios in your system are not Pacific Crest or Trimble radios, you may need to turn Scrambling off.

Note - Trimble protocols require Scrambling. With a Trimble protocol selected, you are unable 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.

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.

Antennas are excellent conductors of electricity, so use extreme caution when operating near power lines and other sources of electric current or during stormy weather.

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) decreases 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 is 2 W. Every 6 dB of loss reduces the radio's effective range by 50%.

Power supplies

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

Equipment care

Routine equipment care prolongs the life and reliability of your radio. Radio communication equipment is susceptible to damage from shock or environmental extremes. Never operate the radio outside the operating specifications contained in “[Safety Information](#)” on page 3.

Use with Machinery and Vehicles

Vibration damping

ADL Sentry radio meet or exceed the MIL-STD 810F standard for vibration (up to 2.6 g). It is always recommended to mount the radio with rubber dampers. Avoid introducing vibration and tension into the data/power connector at bottom of radio. Consider supporting the data/power cable with a rubber-padded clamp.

Mounting inside/outside vehicle cabin

The radios are rated IP67 and can be mounted outside a cabin. However, the radios automatically turn off if the temperature inside the radio exceeds 80 °C (140 °F), so it is best to avoid direct sunlight in very hot environments. Installing all electronic devices inside an air-conditioned cabin is always better.

DC power supply with power conditioner

The radios require 9 to 30 V DC at all times. Voltage spikes over 30 volts can damage the radio and voltage transients can affect performance. The ideal power supply is 13.5 V DC and 3 to 5 amps for ADL Sentry radio. Vehicle installations must always include a suitable power conditioner.

Protection from electromagnetic interference

Always position the radio as far as possible away from:

- Other antennas, particularly transmitting antennas
- Electrical generators/alternators
- Regulated power supplies
- Rotating beacons, strobe lights

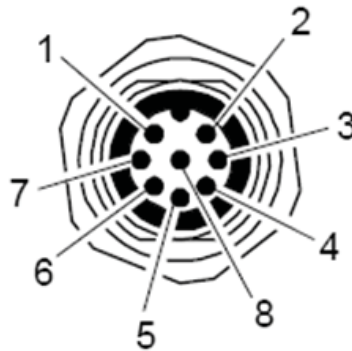
Pinouts and Connectors

The radio uses a Turck 8-pin circular data/power connector. For a mating connector, Pacific Crest recommends using a Turck RSS 8T, or equivalent.

The following table shows the radio's pin assignments:

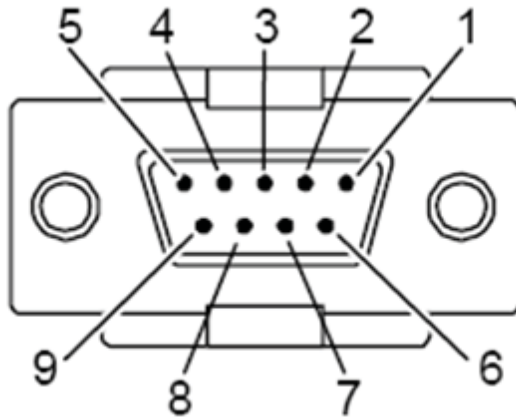
| Pin No. | Description |
|---------|---|
| 1 | Signal Ground |
| 2 | Power Ground |
| 3 | Tx (Connects to the external device's Rx pin) |
| 4 | RX (Connects to the external device's Tx pin) |
| 5 | RTS |
| 6 | N/C |
| 7 | CTS |
| 8 | 9-30 VOLTS, 2 AMP Max |

The following figure shows the orientation of the pins in the radio's female data/power connector. It shows a rear view of the pin-outs (looking from behind the connector).



ADL Sentry Data Cable DE9 Connector

The ADL Sentry offers cables to connect to external devices via a DE9 connector.



ADL Sentry Data Cable's DE9 Pin Assignments

| Pin No. | Description |
|---------|---------------|
| 1 | N/C |
| 2 | RX |
| 3 | TX |
| 4 | N/C |
| 5 | Signal Ground |
| 6 | N/C |
| 7 | RTS |
| 8 | CTS |
| 9 | Data Cable |

ADL Sentry SAE Power Connector Polarity

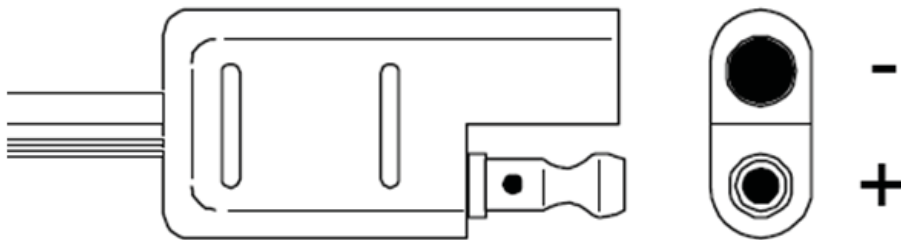
The ADL Sentry uses an SAE-type power connector. The following figure shows the polarity of the SAE-type connector.

Antenna

All Pacific Crest ADL radios use a TNC female antenna connector. While you may attach an antenna directly to the radio, range will be greatly improved if you elevate the antenna as high as possible. Pacific Crest makes antenna cables in a variety of lengths. These terminate in industry-standard NMO or N-type connectors. If you wish to use your own antenna cable, we recommend Amphenol-brand connectors. You should also use only high-quality, 50-Ohm impedance cabling.

Connector manufacturer contacts

- Contact Turck at www.turck.com
- Contact Amphenol at www.amphenol.com



Technical Specifications

| General Specifications | |
|--|---|
| Communication | 1 RS-232 port, 115.2 kbps maximum |
| User Interface | 2-row, 16-character LCD display with five navigation buttons |
| Power | |
| Input Power | 9.0 V DC – 30.0 V DC, 2 amp maximum At 9 V DC, the current must not exceed 15 amps at any time. Warning – Supplying 30.0 V DC or more than the specified current can damage the radio. |
| Power Consumption (Rx) | 0.6 W nominal @ 12.0 V DC |
| Power Consumption (Tx) | 7 W nominal @ 12.0 V DC, 1 W RF output 13.4 W nominal @ 12.0 V DC, 4 W RF output |
| Modem Specifications | |
| Modulation/Link Rates | GMSK: 4800, 8000, 9600, 16000, 19,200 bps 4FSK: 9600, 19,200 bps |
| Link Protocols | Transparent FST/EOT/EOC, Packet-switched, TRIMTALK™, TRIMMARK™, TT450S (HW), SATEL® |
| Forward Error Correction | Yes |
| Radio Specifications | |
| Frequency Bands | 390 to 430 MHz and 430 to 470 MHz |
| Frequency Control | Synthesized 6.25 kHz tuning resolution Frequency stability: ±1 PPM -40 °C to +85 °C |
| Channel Bandwidth | 12.5 kHz and 25 kHz, software derived |
| RF Transmitter Output | Programmable to 0.1 – 4 Watts (where permitted) |
| Sensitivity | -110 dBm BER 10 ⁵ |
| Type Certification | Type accepted and certified for operation in the U.S., Europe, Australia, Russia, New Zealand, and Canada. |
| Environmental Specifications | |
| Enclosure | IP67 (Dustproof and watertight to depth of 1 m for 30 minutes) |
| Operating Temperature (Receiver) | -40 °C to +85 °C (-40 °F to +185 °F) |
| Operating Temperature (Transmitter) | -40 °C to +65 °C (-40 °F to +149 °F) |
| Storage Temperature (Receiver/Transmitter) | -55 °C to +85 °C (-67 °F to +185 °F) |
| Vibration Spec | MIL-STD-810F |
| Mechanical Specifications | |
| Dimensions | 8.89 cm L x 4.6 cm W x 16.0 cm H (3.5 in L x 1.809 in W x 6.3 in H) |
| Weight | 690 grams (1.52 lbs.) |
| Data/Power Connector | 8-pin Turck RSS 8T |
| RF Connector | 50 Ohm, TNC-female |