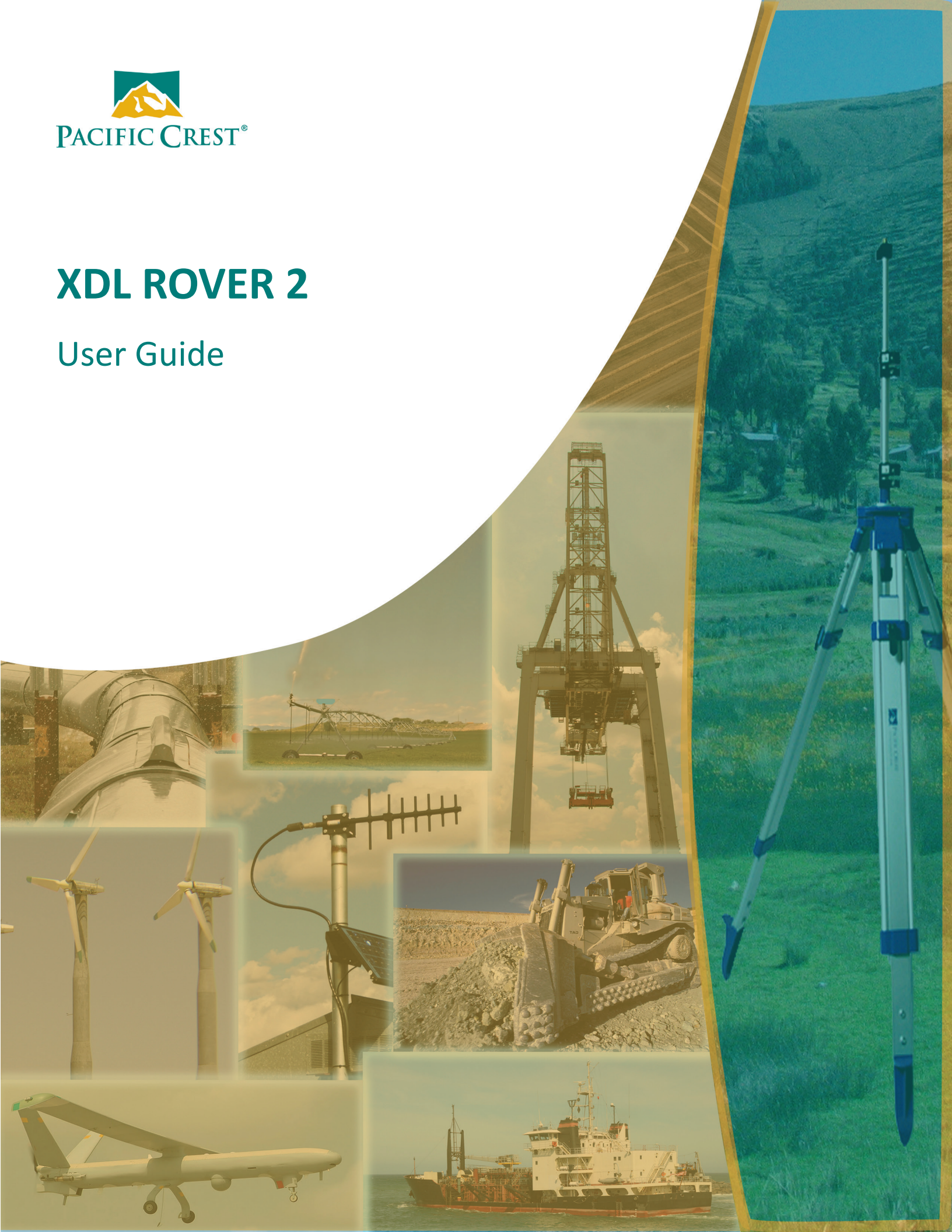
PACIFIC CREST®

XDL ROVER 2

User Guide



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

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

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Warranty

TRIMBLE 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.

Trimble 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.

Trimble warrants XDL 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 Trimble 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. Trimble 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 reseller or Trimble 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.

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Safety Information

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

C **CAUTION** – A license is required before transmitting with 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:

C **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.

C **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.

Antenna safety

C **WARNING** – 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.

Battery safety

C **WARNING** – The internal Lithium-Ion battery is NOT USER SERVICEABLE. Do not attempt to open the enclosure or replace the battery. Lithium-ion batteries can be dangerous if mishandled. All warranty will be void if the XDL ROVER 2 is opened by anyone except authorized service personnel.

C **CAUTION** – The internal battery must not be subject to operating temperatures below -20 °C. Subjecting the battery to conditions below -20 °C will produce permanent battery damage, and is not covered by the warranty.

Introduction

Thank you for purchasing the XDL ROVER 2 for use with your survey system. The XDL ROVER 2 is an advanced, high speed, Bluetooth® enabled, wireless data link that is designed specifically for GNSS/RTK applications. Your success in using the XDL ROVER 2 is our primary goal. We stand behind our product with expert support and service and welcome your comments and questions.

We believe that the XDL ROVER 2 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 GNSS system.

About the user guide

This guide is written for the first-time user and describes how to set up, operate, and maintain the system. We urge you to take the time to review this user guide completely before you set up the system.

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 this user guide or in the ADLCONF Software User Guide, contact your local reseller 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.

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. Where possible, select a reference station location that takes advantage of terrain to get the receiving 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.

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 "Technical Specifications" on page 23.

Radio Modem

User interface

Power buttons

The Power button is used to:

- Turn on / turn off the XDL ROVER 2:
  - To turn on the unit, press and release the power button once. A green LED lights up to indicate that the unit has switched on.
  - To turn off the unit, press and hold the power button until all the LEDs switch off. The power button has a three second turn-off delay. This delay also prevents an inadvertent switch off.
- Turn on / turn off Bluetooth wireless technology:
  - To turn on Bluetooth, with the unit turned on, press and release the power button once more. The blue LED lights up, indicating that Bluetooth is being activated. After a few seconds to initialize, the blue LED blinks rapidly to show that it is ready to pair with a host device.
  - To turn off Bluetooth, press and release the power button again. The blue LED switches off to indicate Bluetooth is now disabled.

Indicator LEDs

Power LED - Green: The power LED indicates the power status and also serves as a battery status indicator. The different states of the power LED are as follows:

- Power LED constantly on:
  - The unit is switched on and operational.
  - The internal battery is at optimal voltage levels.
- Power LED blinks once every second:
  - Internal battery is low and requires a recharge.
- Power LED blinks once every two seconds:
  - Internal battery is being recharged. This state occurs only when the unit is powered from an external DC voltage source.

If the power LED does not respond to the power button, the internal battery may be fully discharged and must be charged prior to further operation.

Note: The XDL ROVER 2 operates with voltage levles between 10.5 V DC and 28 V DC.

Receive LED – Red: The red receiver LED blinks depending on which one of the following two options was programmed into the XDL ROVER 2 using the ADLCONF software:

- Signal Received: If this option is programmed into the radio and then selected, the receive LED will turn on whenever there is signal detected by the internal radio modem in the selected frequency..
- Data Packets received: If this option is programmed into the radio and then selected, the receive LED will turn on whenever valid data packets are received by the internal radio modem in the selected frequency.

Bluetooth LED – Blue: The blue LED indicates whether Bluetooth is enabled, unpaired, or paired. The various states are as follows:

- Unpaired state: The blue LED blinks rapidly, indicating that the unit is discoverable and ready to be paired with from a host device.
- Paired state: The blue LED blinks intermittently, indicating that the unit is successfully paired and communicating with a host device.

Note: When switching on Bluetooth on the XDL ROVER 2, the blue LED initially stays on for a few seconds indicating that the unit is initializing Bluetooth wireless communications. Wait for the LED to change from constantly on to the rapid blink mode described above before attempting to connect it to a host device.

Enclosure

The XDL ROVER 2 is housed in a tough, impact-resistant enclosure designed to withstand tough operating environments. The enclosure is dustproof and waterproof with an IP-67 rating.

Antenna

The XDL ROVER 2 provides an industry standard, waterproof, TNC female RF connector that is compatible with a wide range of mobile whip antennas.

Data port

The XDL ROVER 2 provides a robust, waterproof, locking data connector to relay RS232 data to a GNSS receiver or controller.

C

CAUTION – Pacific Crest data and programming cables are equipped with a locking mechanism on the connectors. When detaching a data/programming cable from the XDL ROVER 2, carefully pull back on the outer sleeve of the connector. If the connector on the cable is equipped with a lanyard cable, pull on the lanyard. This will release the locking mechanism allowing you to remove the connector from the radio. Pulling on the connector without first unlocking the outer sleeve can damage both the radio and the cable.

Configuring the XDL ROVER 2

Connecting the XDL ROVER 2 to the ADLCONF software

Cable connection

To configure the XDL ROVER 2 using a desktop or laptop computer, use the serial programming cable, P/N 100948-00. This cable is equipped with a standard DE9 connector that plugs into a computer's serial port. If your computer does not have a serial port, you may use a serial-to-USB adapter.

1. Plug in the LEMO side of the cable into the XDL ROVER 2.
2. Plug the other end of the cable into its corresponding port on your desktop/laptop computer.
3. Press the power button on the XDL ROVER 2 to turn it on.
4. On the computer, open the ADLCONF software and then connect to the radio through the appropriate COM port.

For more information on how to use the ADLCONF software, refer to the ADLCONF Software User Guide. You can download the user guide from http://www.pacificcrest.com/resources.php?page=doc_library

Bluetooth connection

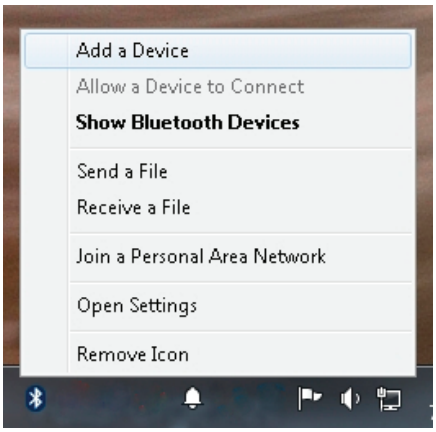
You can easily configure the XDL ROVER 2 using Bluetooth wireless technology from a computer enabled with Bluetooth that is running a Windows® operating system.

Do the following to set up a Bluetooth connection between your computer and the XDL ROVER 2 so that you can configure it using the ADLCONF software:

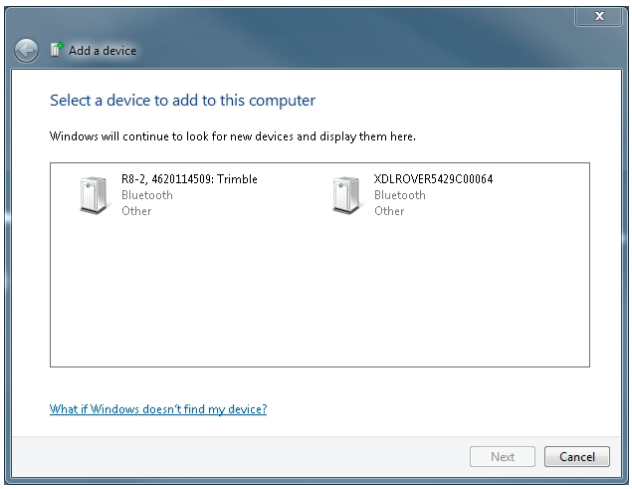
1. Press the power button on the XDL ROVER 2 to turn it on.
2. Press the power button again to turn on the XDL ROVER 2's Bluetooth connection. Wait until the Bluetooth LED blinks rapidly.
3. Ensure that your computer is enabled with Bluetooth. This is usually indicated by a Bluetooth icon on the right-hand side of your taskbar among the icons that list current running applications.

Note: If you are unable to find the icon, refer to your computer manual on how to enable Bluetooth technology.

4. Right-click the Bluetooth icon and then select Add a Device from the menu:



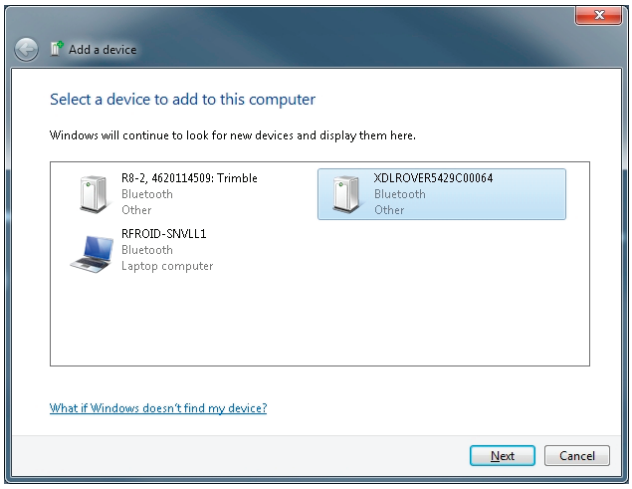
5. A screen appears on the desktop that automatically starts searching for Bluetooth devices within range:



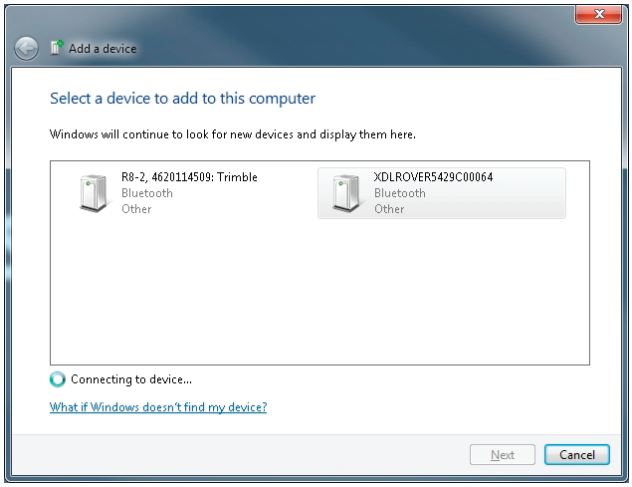
Note: If the Add a device screen does not populate with any devices or if the intended device does not appear, right-click and then select Refresh to rescan for all devices in range.

The XDL ROVER 2 appears in the Bluetooth device search identified by the following naming format: **XDLROVER1234567890**. The numbers in the device name represents the 10-digit product serial number of the XDL ROVER 2.

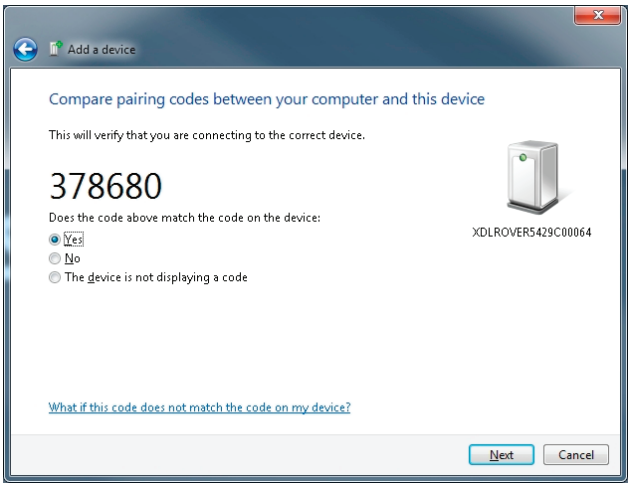
6. Select **XDLROVER1234567890** and then click **Next**:



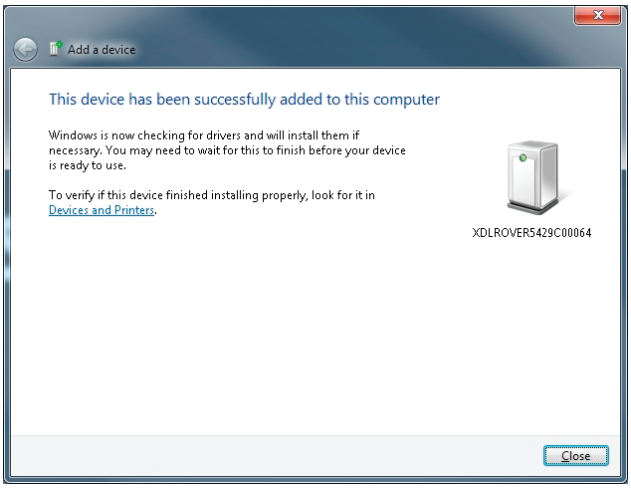
The Windows operating system starts connecting to the XDL ROVER 2:



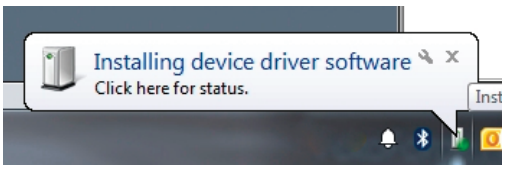
7. Once a connection has been established, a security screen appears that prompts you to compare pairing codes between the computer and the XDL ROVER 2. Click **Next** to continue the pairing process with the XDL ROVER 2:



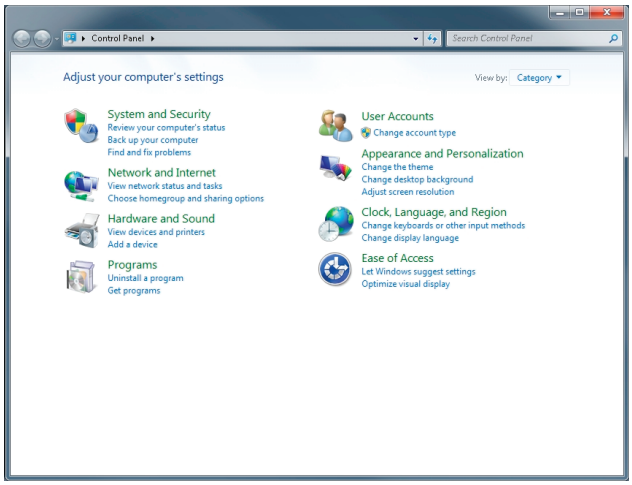
8. The connection between the XDL ROVER 2 and the Windows operating sytem continues. Once the process is complete, click **Close** to finish the pairing process with the XDL ROVER 2:



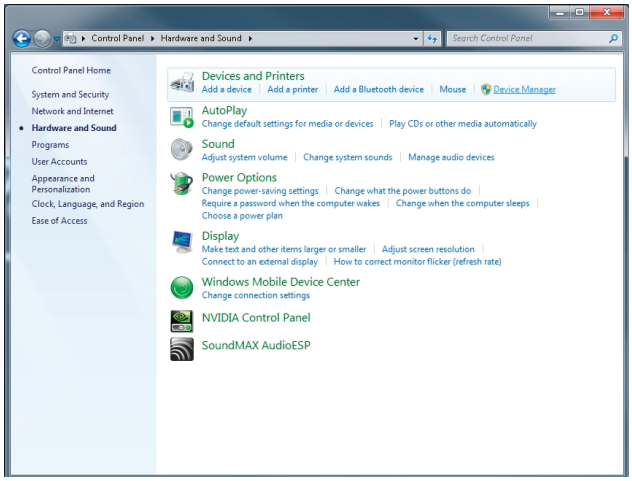
Wait for Windows to complete assigning a COM port to XDL ROVER 2. This process can be seen continuing in the background by an active icon that appears in the taskbar. Once complete, a message appears stating that the device is now ready for use:



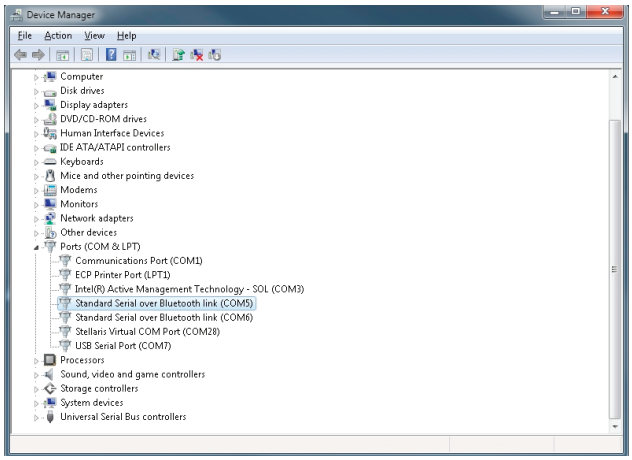
9. Once Windows has completed the device configuration, open the Control Panel and then select Hardware and Sound:



10. Under Devices and Printers, double-click Device Manager:

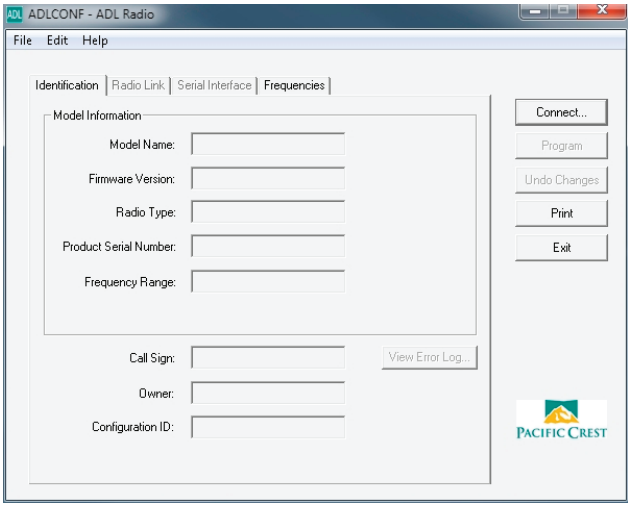


11. Once the Device Manager screen appears, expand the Ports (COM & LPT) list and then find the COM port assigned to the XDL ROVER 2, in this example, COM 5:

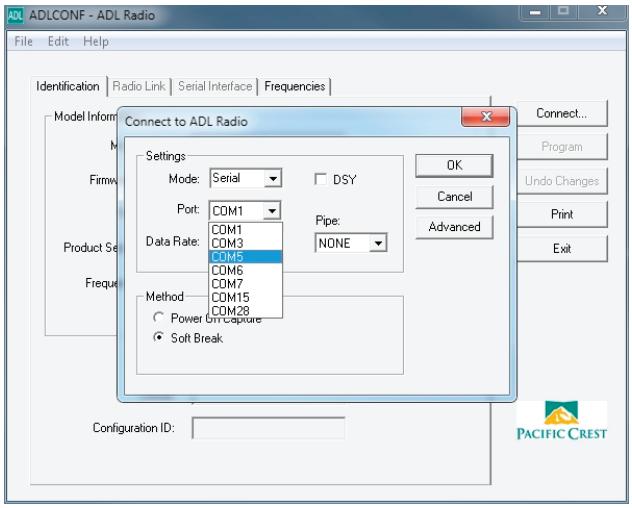


Note: Windows assigns two COM ports after completion of the XDL ROVER 2 pairing process. Always select the first COM port that was assigned. For example, if COM 5 and COM 6 were assigned after the pairing process, COM 5 is the correct port to use for connecting to the XDL ROVER 2.

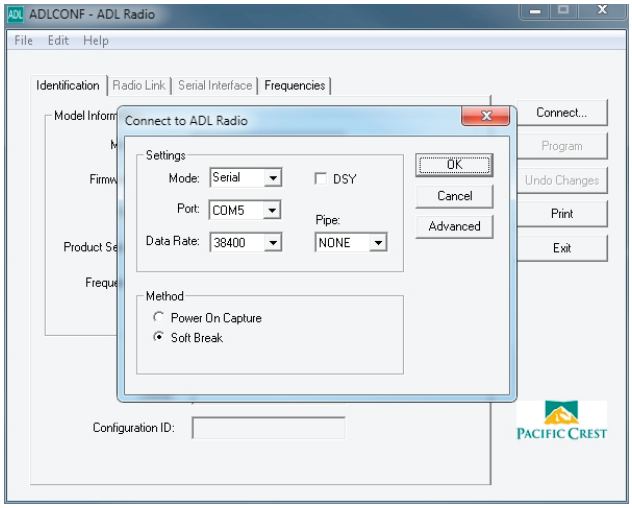
12. Open the ADLCONF software and then click **Connect**:



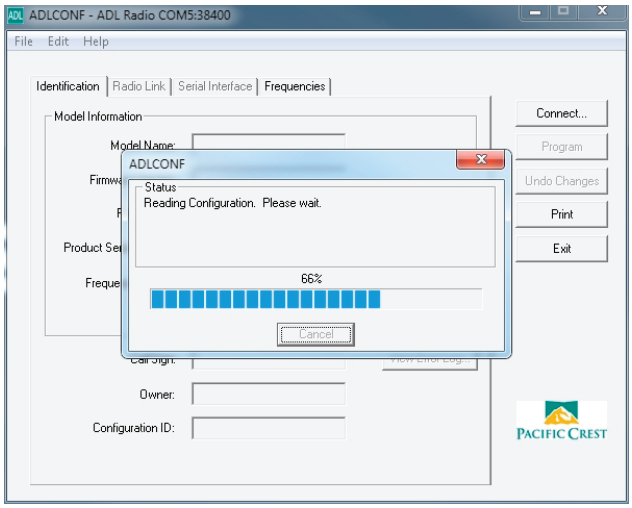
13. From the Port drop-down list, select COM 5:



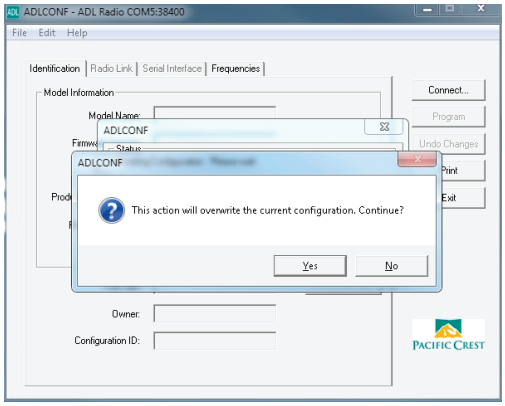
14. Make sure that the correct serial Data Rate (baud rate) is entered and then click **OK**:

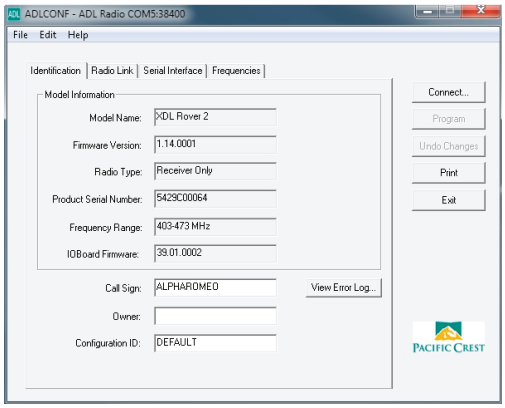


15.If prompted, click **Yes** to overwrite current configurations for the XDL ROVER 2:



The ADLCONF software has now successfully connected to the XDL ROVER 2 using Bluetooth wireless technology:





For more information on how to use the ADLCONF software, refer to the ADLCONF Software User Guide by selecting Help / User Guide. Alternatively, you can download the user guide from http://www.pacificcrest.com/resources.php?page=doc_library.

Connecting the XDL ROVER 2 to an Android device using XDLCONF-BT

XDL Rover 2 is equipped with a Bluetooth® transceiver for cable-free communications with external devices. A serial API via the Bluetooth SPP is available for OEM developers wishing to create configuration applications for handheld computers such as Android™ devices. An example configuration app, XDLCONF-BT, is available for select Android devices. Serial communications is also supported by the XDL Rover 2's standard LEMO port.

To download XDLCONF-BT, go to https://play.google.com/store/apps and search for "XDLCONF-BT". Install the app on your Android device and then do the following:

1. Press the power button on the XDL ROVER 2 to turn it on.
2. Press the power button again to turn on the XDL ROVER 2's Bluetooth. Wait for the Bluetooth LED to blink rapidly.
3. On your Android device, open the System Settings menu.

Note: Every Android device has a different way of accessing system settings. Refer to device manual/user guide to find out how to access system settings. In 4.3 and later versions of Android, the option to enable Bluetooth may be shown in the Networks tab.

4. Enable Bluetooth.
5. Tap the Bluetooth icon to open the paired device list.
6. Tap **Scan** to scan for all nearby devices. The XDL ROVER 2 appears in the Bluetooth device search identified by the following naming format: **XDLROVER1234567890**. The numbers in the device name represents the 10-digit product serial number of the XDL ROVER 2.
7. Tap **XDLROVER1234567890**,

   The Android device starts the pairing process with the XDL ROVER 2 . Once this is complete, XDL ROVER 2 appears in the paired device list.

Note: Some devices may ask for pairing code. Enter "1234" and continue the pairing process. Some devices may ask to verify a pairing code. Tap Yes/Accept to continue the pairing process

8. Open XDLCONF-BT and select XDL ROVER 2 from the paired device list.

   XDLCONF-BT will connect to the app and show configurable settings.

For more information on how to configure the XDL ROVER 2 using XDLCONF-BT, refer to the Android Apps Software User Guide. You can download the user guide from http://www.pacificcrest.com/resources.php?page=doc_library.

Factory default settings

The XDL ROVER 2 comes from the factory with the following settings pre-configured:

Settings	XDL ROVER 2
Frequency	-
Protocol	Transparent EOT (End of Transmission) timeout
Timeout	10
Retries	0
GPS port data rate	38400 bps
Link rate	9600 kbps
Channel bandwidth	12.5 KHz
Modulation	4FLSK
Forward error correction	On
Data srambling	Enabled
Sensitivity	High

Note: Should you need to change any of these settings, connect the XDL ROVER 2 to a computer via Bluetooth or using its programming cable and run the ADLCONF program. Both the program and its manual are available for free download from www.pacificcrest.com.

Battery

Battery care

The XDL ROVER 2 has an internal power supply that allows all-day operation without taking power from the GNSS receiver. The light-weight Lithium-ion single-cell battery can be recharged more than 1,000 times, providing 3+ years of normal use.

For best battery life and performance always recharge the battery after every use. If the XDL ROVER 2 is stored, you must recharge the battery every 3 - 6 months.

WARNING – The internal Lithium-Ion battery is NOT USER SERVICEABLE. Do not attempt to open the enclosure or replace the battery. Lithium-ion batteries can be dangerous if mishandled. All warranty will be void if the XDL ROVER 2 is opened by anyone except authorized service personnel.

Charging the Internal Battery

It is important to recharge the battery after every use, or every 3 months during periods of non-use.

The XDL ROVER 2 has built-in circuitry that monitors and controls the charging of the internal battery. The internal battery quickly charges in less than 4 hours with the supplied charger. We recommend charging the internal battery at room temperature.

Charging is inhibited if the ambient temperature is below 0 °C or above 25 °C.

- To charge the XDL ROVER 2 use the provided charger (C03155) and cable (P/N 100948-00).
- The XDL ROVER 2 can also charge its internal battery from any data cable that provides power to the radio.
- The green LED will begin to blink once every two seconds to indicate that the unit is charging its internal battery.
- The XDL ROVER 2 will continue to operate while charging.

Note: The XDL ROVER 2 is designed to ignore external power inputs that are less than 11 VDC. If the unit is connected to a system running from a 12 VDC external battery pack, when the voltage drops below 11 VDC, the XDL ROVER 2 will switch to its internal battery. This allows the overall system to last longer as XDL ROVER 2 is now operating from its own internal battery.

CAUTION – The internal battery must not be subject to operating temperatures below -20 °C. Subjecting the battery to conditions below -20 °C will produce permanent battery damage, and is not covered by the warranty.

Error Codes

The XDL ROVER 2 performs a variety of power-up and run-time tests to ensure 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, the red and blue LED will flash in unison. The LEDs will flash a code indicating the type of error the unit is experiencing. The table below shows the different error codes and their corresponding LED flash codes.

LED Blink Rate (short bursts)	Error Type	What to Do
RX LED on continuously	External source of interference inhibiting the XDL ROVER 2 to receive data	Power cycle the radio to clear error codes. If an error code persist after power cycling the radio, contact customer service.
2	Internal battery charge current too high.	Check battery, cables, charger, power supply voltage level, or recharge battery
3	Internal battery charge taking too long.	Check battery, cables, charger, power supply voltage level, or recharge battery
4	Unit temperature too high / low.	Operating temperature is above / below rated levels.
5	Charging temperature too high.	Check battery, cables, charger, power supply voltage level, or recharge battery
6	Charging temperature too low.	Check battery, cables, charger, power supply voltage level, or recharge battery

Note: If any problem persists, contact your reseller or Pacific Crest customer support.

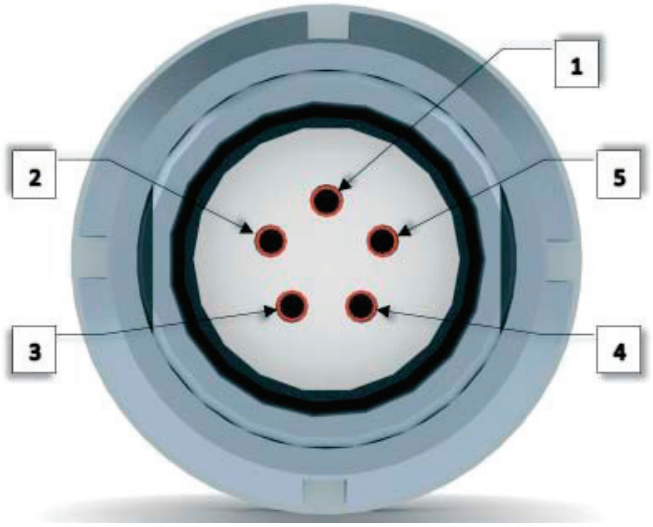
Pinouts and Connectors

The radio uses a size 0, 5-pin circular data/power connector.

The following table shows the radio's pin assignments:

Pin	Description
1	Power: 11 V DC to 28 V DC input
2	Ground for power
3	RS232 RX (Connects to the external device's Rx pin)
4	RS232 signal ground
5	RS232 TX (Connects to the external device's Tx pin)

The following figure shows the orientation of the pins in the radio's female data/power connector. It shows a front view of the pin-outs.



Antenna

All Pacific Crest radios use a TNC male antenna connector. You should also use only a high-quality, 50 Ω impedance cable, similar to that found on all Pacific Crest antenna cables.

Technical Specifications

General Specifications	
Communication	1 RS232 port, 115.2 kbps maximum
Power	
Charging	11 - 28 V DC
Power consumption (Rx)	0.55 W nominal at 3.7 V DC
Radio Specifications	
Frequency bands	403-473 MHz
Channel spacing	Channel spacing 12.5/25 KHz (user-selectable)
Type certification	All models are type accepted and certified for operation in the U.S.A. and Canada FCC CFR47 Part 15, IC, EU, NZ, Australia ETS300-113-2
Modem Specifications	
Modulation/Link Rates	GMSK: 4800, 8000, 9600, 16000, 19200 bps 4FSK: 9600, 19200 bps
Link Protocols	Transparent EOT/EOC/FST, SATEL, South, Stonex Type 1, TRIMMARK™ 3, TRIMTALK™ 450S, TRIMTALK II/IIe
Forward Error Correction	Yes
Environmental Specifications	
Operating temperature	–20 ˚C to +60 ˚C (–4 ˚F to +140 ˚F)
Charging temperature	0 °C to +25 °C (+32 °F to +77 °F)
Storage temperature	–20 ˚C to +60 ˚C (–4 ˚F to +140 ˚F)
Vibration specification	MIL-STD-810F
Mechanical Specifications	
Dimensions	14.2 cm x 8.4 cm x 2.8 cm (5.60 in x 3.30 in x 1.10in)
Weight	270 g (0.60 lb)