

# RM4012

## *Installation and Configuration Guide*



# RM4012

## Bullhorn<sup>®</sup> Installation and Configuration Guide

Information in this document is subject to change without notice.

© 1999-2010 American Innovations, Ltd. All rights reserved.

Reproduction in any manner whatsoever without the written permission of American Innovations is strictly forbidden.

Trademarks used in this text: the American Innovations logo and icon are trademarks of American Innovations, Ltd. The Bullhorn logo and icon are registered trademarks of American Innovations, Ltd. Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. American Innovations, Ltd. disclaims any proprietary interest in trademarks and trade names other than its own.

# Contents

---

- CHAPTER 1**
- Getting Started . . . . . 1**
- ESD Precautions . . . . . 2
- Bullhorn System Overview . . . . . 2
- RM4012 Overview . . . . . 2
- AC Monitors . . . . . 3
- Required Tools and Equipment . . . . . 3
- Universal Configuration Toolkit Software . . . . . 4
  - Installing .NET Framework . . . . . 5
  - Installing the UCT Software . . . . . 5
  - Installing the USB Device Driver . . . . . 7
- Bullhorn Information Line . . . . . 10
- Contacting Technical Support . . . . . 10
  
- CHAPTER 2**
- Installation . . . . . 11**
- Installation Overview . . . . . 13
  - Preparing for the Installation . . . . . 14
  - Mounting Requirements . . . . . 15
- Installing the RM4012 . . . . . 16
  - Mounting the Enclosure . . . . . 16
  - Satellite Terminal Assembly . . . . . 17
  - Installing the Satellite Terminal . . . . . 21
  - Confirming Satellite Communication . . . . . 22
  - Installing the Solar Panel Battery Charger . . . . . 23
- Installing the Current Density Transducer . . . . . 26

<b>CHAPTER 3</b>	
<b>Configuration</b>	<b>31</b>
Disable Synchronization Software	32
Connect the Unit and Start UCT	32
Load a Template	33
Choose a Folder for Templates and Log Files	34
Set Up Battery Information	34
Set Up Controller Clock	35
Set Up Transmission Schedule	35
Set Up Input Channels and Alarms	36
Set Up an Input Channel for Millivolt Readings	36
Set Up an Input Channel for Analog Readings	39
Set Up an Input Channel for Digital Readings	41
Save Settings in the Event Log	43
Transmit a Test Packet	43
Save Settings in a Template	44
Exit UCT and Close the Enclosure	44
<b>APPENDIX A</b>	
<b>Optional Selectable Current Transducer Installation</b>	<b>45</b>
<b>APPENDIX B</b>	
<b>Regulatory Notices</b>	<b>49</b>
FCC Requirements	49
Export Control Classification Number	50
<b>APPENDIX C</b>	
<b>Glossary</b>	<b>51</b>

# Getting Started

---

This guide explains how to install Bullhorn® RM4012 units and then configure them for service using the Universal Configuration Toolkit (UCT) software. The RM4012 use the SkyWave-Inmarsat satellite network services for communication with the Bullhorn Asset Tracker (BAT) website.

This guide includes the following chapters and appendix for help in installing and configuring the RM4012:

- Chapter 1 - *Installation*
- Chapter 2 - *Configuration*
- Appendix A - *Optional Selectable Current Transducer Installation*

The CD provided in the installation kit includes a copy of this document in Adobe® PDF format. You can also download a copy from the BAT website through the **Help** menu. Use Adobe® Reader® version 5 or higher to view the PDF. If needed, visit the Adobe website at <http://www.adobe.com> to download a free copy of the software.

---

**NOTE:** For information about how to download files from the BAT website, see *Installing the UCT Software* on page 5.

---

## ESD Precautions

---

**WARNING:** To prevent electrostatic discharge (ESD) damage when handling electronic equipment, always wear an antistatic wrist strap attached to an unpainted, grounded metal object. Ensure the wrist strap has maximum contact with bare skin. If an antistatic wrist strap is unavailable, discharge static electricity from yourself and your clothing by touching a grounded metal object before handling electronic equipment.

---

## Bullhorn System Overview

Bullhorn is a wireless, telemetry system that provides scheduled and by-exception inbound reporting for field equipment typically located in remote areas. Data and alarm packets transmit from remote field locations to your account on the secure, Bullhorn Asset Tracker (BAT) website (<http://www.bullhornsys.com>) using digital cellular or satellite communication networks. You can quickly determine the status of field equipment anytime using information that posts to your BAT website account.

Bullhorn units provide remote monitoring with full coverage using GSM digital cellular, GEOS satellite (SkyWave-Inmarsat), or LEOS satellite (ORBCOMM) communication networks.

## RM4012 Overview

The RM4012 is a remote alarm point monitor and pulse count accumulator that features two AC monitors.

RM4012 units are designed to monitor various types of devices, such as cathodic protection rectifiers, test points, critical bonds, tanks, and meters. After installing an RM4012 unit, it is then configured for service using the Universal Configuration Toolkit (UCT) software. The UCT software allows you to set specific parameters that enable the unit to report measurements, alarm conditions, state changes, health check intervals, and accumulated counts.

RM4012 units transmit data (input channel measurements and alarms) using satellite communication networks. The RM4012 transmits data using the SkyWave-Inmarsat satellite network. Visit the following website to view satellite coverage maps:



- **SkyWave-Inmarsat coverage map:**  
<http://www.inmarsat.com>

## AC Monitors

The RM4012 includes two AC monitors. An AC monitor is a module that converts AC voltage to DC voltage. It supports an input voltage of 0–100 VAC from an AC connection on a test point, grounding mat, Kirk Cell®, or similar device. The module converts AC voltage to DC voltage in a range of 0–5V DC for output. The AC monitor is typically used to detect hazardous, AC voltage on a pipeline that shares the same right-of-way as high voltage power lines.

## Required Tools and Equipment

The following tools and equipment are required for installing and configuring the unit for service:

- Antistatic wrist strap
- Small slotted screwdriver
- Small Phillips head screwdriver
- Wire stripper
- Wire cutter
- Voltmeter
- Adjustable wrench (for solar panel battery charger installation)
- Socket or open end wrench set
- Compass
- Waterproof sealing tape
- silicone adhesive
- Mounting hardware (appropriate type for mounting surface; supplied by customer)
- Appropriate tools for preparing the mounting surface for installation (such as a hand drill and metal, masonry, or wood drilling bit)

- Installation drawing (provided in installation kit)
- Configuration cable (provided in installation kit; standard mini USB cable typically used with most digital cameras)

## Hardware

IBM-compatible computer with the following hardware and software specifications:

- Pentium<sup>®</sup> processor or equivalent
- 256 MB RAM (minimum)
- 70 MB free hard drive space
- Spare USB port

## Software

- Microsoft<sup>®</sup> Windows XP operating system with Service Pack 2 or 3; Vista<sup>®</sup> Home Premium, Business, or Ultimate with Service Pack 1 or higher; or Windows 7<sup>®</sup> Home Premium, Professional, or Ultimate
- Universal Configuration Toolkit Software (provided in the installation kit)
- Windows .NET Framework version 2.0 or higher (provided in installation kit)
- USB device driver (provided in the installation kit)
- Windows<sup>®</sup> Internet Explorer<sup>®</sup> version 8.0 or higher
- Adobe<sup>®</sup> Reader<sup>®</sup> version 5.0 or higher

# Universal Configuration Toolkit Software

Universal Configuration Toolkit (UCT) is a software program you use to set and read the adjustable parameters of the unit. After installing the unit, you then configure it for service using the UCT software.

The UCT software also provides diagnostic tools for checking input channel measurements, RSSI level, and transmitting a test packet to confirm communications with the BAT website.

Using the UCT software requires that your computer be installed with Microsoft® .NET Framework version 2.0 or higher. To use the USB configuration port on the RM4012, your computer must be installed with the appropriate USB device driver.

---

**NOTE:** You must log on as an administrator or your computer user name must be a member of the Administrators group in order to install the USB device driver. If needed, contact your network administrator or IT department to determine if your user name is setup with administrator rights or privileges.

---

The installation kit provides a CD that includes the UCT software, .NET Framework, and USB device driver. Installation procedures are provided in the next chapter.

---

**NOTE:** Before you begin the field installation, visit the BAT website ([www.bullhornsys.com](http://www.bullhornsys.com)) to verify you have the latest version of the UCT or .NET Framework software. Click **Help > Support Files > Support Files for Download** to view a list of files available for download.

---

## Installing .NET Framework

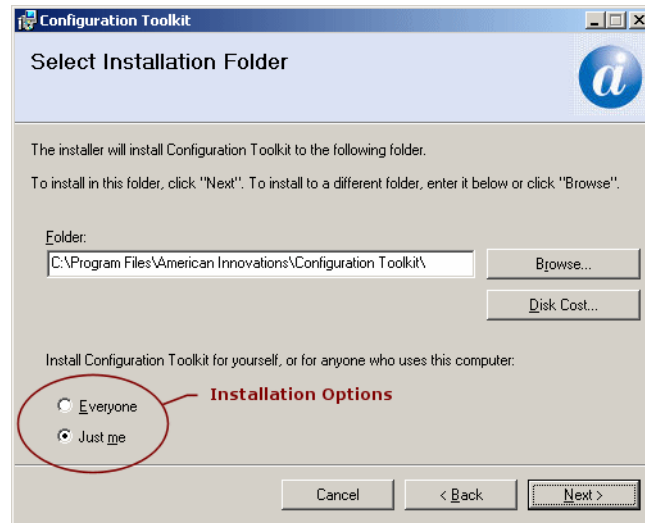
- 1 Using the CD provided in the installation kit, insert the CD in the CD-ROM drive of your computer.
- 2 Double-click the **dotnetfx.exe** file to begin installing .NET Framework on your computer.
- 3 Follow the prompts to complete the installation.

## Installing the UCT Software

If you have a previous version of the UCT software installed on your computer, review the following information prior to installing a new version of the software. Also see Figure 1-1 on page 6.

- **Everyone Installation Option:** If you installed a previous version of the UCT software using the **Everyone** option, the previous version must first be uninstalled prior to installing the new version.

- **Just Me Installation Option:** If you installed a previous version of the UCT software using the **Just Me** option, it is not necessary to uninstall the previous version prior to installing the new version.



**Figure 1-1. Configuration Toolkit Installation Options**

The following procedure explains how to install the UCT software using the CD included in the installation kit.

---

**NOTE:** If the installation CD is unavailable, visit the BAT website ([www.bullhornsys.com](http://www.bullhornsys.com)) to download a copy of the UCT installation file. Click **Help > Support Files > Support Files for Download > Universal Configuration Toolkit (UCT)**. Use the procedure in this section to install the UCT software.

---

Complete the following steps:

- 1 If a previous version of the software is installed using the installation option "Everyone", uninstall the software as follows:
  - a Click **Start** in the Windows Start menu and then select **Settings > Control Panel**.
  - b Click **Add or Remove Programs**.
  - c Click **Configuration Toolkit** and then click **Remove**.
  - d After the UCT software uninstalls, click the Windows close icon (X).

- 2 To install the UCT software using the installation CD:
  - a Insert the CD in the CD-ROM drive of the computer.
  - b Double-click **setup.exe** and then follow the prompts to install the UCT software.
  - c Continue with the next section to install the USB device driver.
- 3 To install the UCT software using the file downloaded from the BAT website:
  - a Double-click **UniversalConfigToolkit.zip** to extract files in a folder on the computer.
  - b Double-click **setup.exe** and then follow the prompts to install the UCT software.
  - c Continue with the next section to install the USB device driver.

## Installing the USB Device Driver

If the unit includes a USB configuration port, use the procedure in this section to install the USB device driver. Installing the driver is a one-time process and does not need to be repeated if you have already installed it on the computer.

---

**IMPORTANT:** Installing the USB device driver requires that you log on the computer as an administrator. Or, your computer user name must be a member of the Administrators group. If needed, contact your network administrator or IT department to determine if your user name is set up with administrator rights or privileges.

---

Complete the following steps to install the USB device driver:

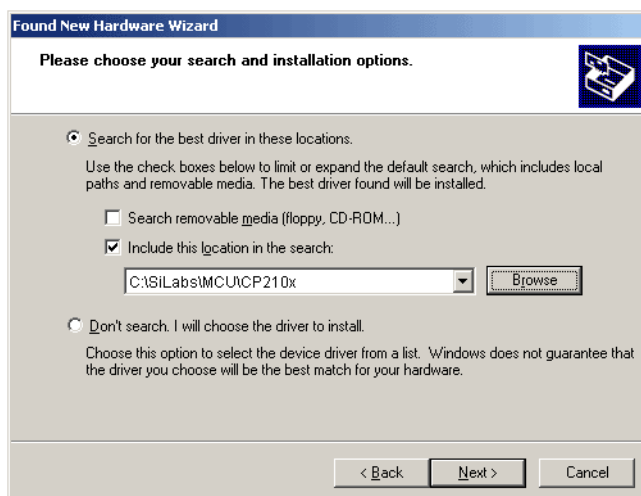
- 1 If you are installing the driver from the CD in the installation kit, insert the CD in the CD-ROM drive and then open Windows Explorer to view the contents of the CD.
- 2 Double-click the file labeled **CP210x\_VCP\_Win2K\_XP\_S2K3\_vista.exe** and then follow on-screen prompts to install the driver.

- 3 Connect the USB configuration cable (included in the installation kit) in an available USB port on the computer. Connect the other end of the cable in the USB configuration port on the unit.
- 4 If the driver does not automatically install, click **Install from a list or specific location (Advanced)** when Windows automatically displays the **Found New Hardware Wizard** (Figure 1-2).



**Figure 1-2. Found New Hardware Wizard (page 1)**

- 5 Click **Next** to display page 2 of **Found New Hardware Wizard** (Figure 1-3).



**Figure 1-3. Found New Hardware Wizard (page 2)**

- 6 Complete the following steps on page 2 of **Found New Hardware Wizard**:
  - a Click the option **Search for the best driver in these locations**.
  - b Click the option **Include this location in the search**.
  - c Click **Browse** and then navigate to the following computer directory:  
C:\SiLabs\MCU\CP210x
  - d Click **Next** to install the USB device driver.

---

**NOTE:** If Windows displays a message that states the USB device driver has not passed Windows Logo testing, click **Continue Anyway** to proceed with the installation. The USB device driver that AI supplies has passed “Windows Logo” testing by the USB chipset manufacturer. However, once it has been customized to identify the USB device as a Bullhorn unit, the USB device driver appears to Windows as “untested”.

---

- 7 Click **Next** to install the driver.
- 8 When the installation completes, page 3 of **Found New Hardware Wizard** displays (Figure 1-4). Click **Finish** to complete the installation and close the window.



**Figure 1-4. Found New Hardware Wizard (page 3)**

## Bullhorn Information Line

The Bullhorn Information Line is an automated attendant telephone system. It is typically used when installing units in the field. The system identifies when the last data transmission (or test packet) was received on your website account for a unit you specify.

Complete the following steps to use the Bullhorn Information Line:

- 1 Call the Bullhorn Information Line at **866-287-6739**.
- 2 Press **1** to access the packet log when prompted.
- 3 Use your telephone keypad to enter the unit serial number when prompted. The unit serial number is included on the bar code label on the side of the unit. It is also included on the label of the shipping carton. If required, repeat this step to check another unit.

## Contacting Technical Support

If you need assistance with the installation or configuration, contact American Innovations (AI) Technical Support in any of the following ways.

**Telephone:** 512-249-3400

**Email:** [bhtechservices@aiworldwide.com](mailto:bhtechservices@aiworldwide.com)

**Address:** American Innovations, Ltd.  
ATTN. FDD Technical Services  
12211 Technology Blvd.  
Austin, TX 78727

**Fax:** 512-249-3444



# Installation

---

The procedures in this chapter explain how to install the RM4012.

---

**NOTE:** Because of the variations in customers' installation and grounding methods, AI cannot warranty any damage to equipment caused by lightning strikes.

---

The RM4012 (Figure 2-1) is housed in an aluminum enclosure. It uses the SkyWave-Inmarsat satellite communication network and includes two AC monitors.

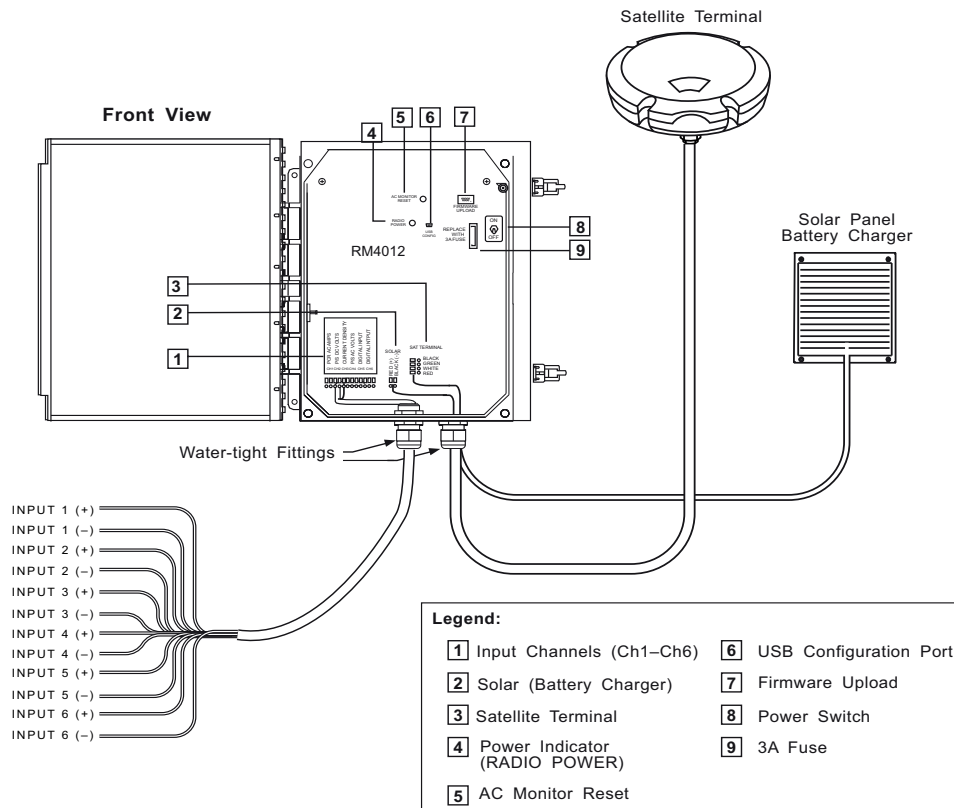
The RM4012 supports the following inputs:

- **PCR AC AMPS (CH1):** Selectable amp setting (30, 60 or 120A AC).
- **P/S DC Volts (CH2):**  $\pm 5V$  DC.
- **Current Density (CH3):** 0-200mA AC.
- **P/S AC Volts (CH4):** 0-100V AC.
- **Digital Input (CH5 and CH6):** Digital dry contact closure or active digital.

---

**NOTE:** PCR = Polarized Cell Replacement  
P/S = Pipe to Soil

---



**NOTES:**

**Radio Power:** LED turns red when satellite terminal is on or when unit is transmitting a data packet or has one or more data packets waiting to be transmitted.

**AC Monitor Reset:** Press pushbutton for 5 seconds to reset AC monitor.

**Input Channels (Ch1 - Ch6):**

- PCR AC AMPS (CH1): 0-30Aac, 0-60Aac, or 1-120 Aac (switch selectable) at sensor.
- P/S DC Volts (CH2): (Pipe to Soil) ±5VDC at faceplate input.
- Current Density (CH3): 0-200Aac at current transformer in which equates to 0-3VAC at faceplate input.
- P/S AC Volts (CH4): (Pipe to Soil) 0-100VAC at faceplate input.
- Channels 5 and 6: non-isolated input, supports digital dry contact closure, active digital, or accumulator.

**Figure 2-1. RM4012 Hardware Configuration**

**IMPORTANT:** The Bullhorn Asset Tracker (BAT) website includes a SkyWave coverage map. If you plan to install the RM4012 outside the United States, use the coverage map and the procedure in *Confirming Satellite Communication* on page 22 to correctly install the satellite terminal. To view the coverage map, visit the BAT website, then click **Help**, and then click **Coverage Maps**.

---

**IMPORTANT:** If you plan to install the RM4012 in the United States, install the satellite terminal so that it faces in a southeast direction. The satellite terminal is programmed at the factory for communications with the SkyWave-Inmarsat satellite positioned southeast of the United States.

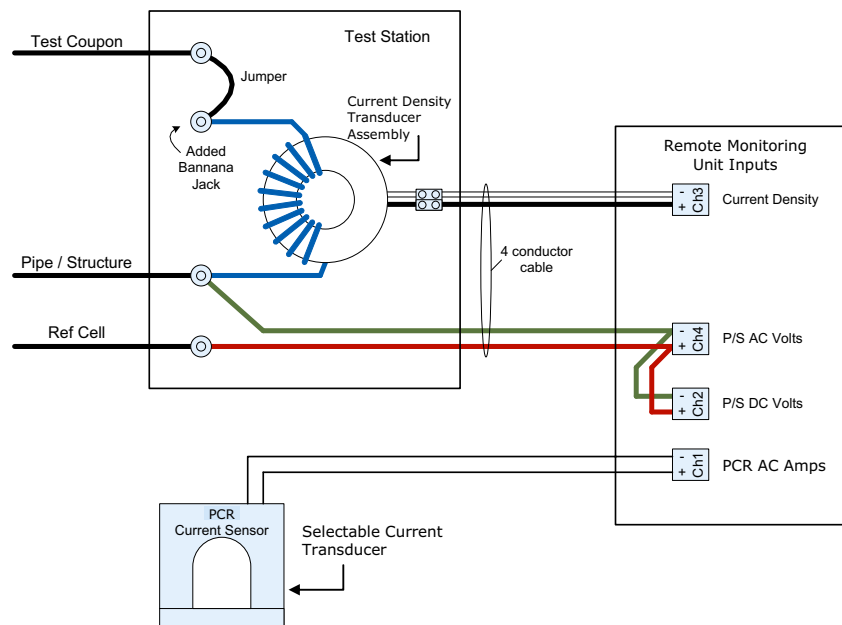
---

## Installation Overview

The following list provides an overview of a typical installation performed in the field:

- Determine where to install the unit, making sure objects or the terrain do not interfere with satellite communications.
- Confirm communications with the SkyWave-Inmarsat satellite network.
- Mount the enclosure; install the satellite terminal; install the solar panel battery charger.
- Install the Current Density Transducer.
- **OPTIONAL:** Install the Selectable Current Transducer (see *Appendix A* on page 45 for installation instructions).

The entire installation of both current transducers is shown in the following wiring diagram (Figure 2-2).



**Figure 2-2. Transducer Wiring Diagram**

**IMPORTANT:** Electrostatic Discharge (ESD) can damage electronic components. Provide ESD protection by wearing an antistatic wrist strap attached to any unpainted metal surface before opening the enclosure door of the unit or handling electronic parts. If an antistatic wrist strap is unavailable, discharge static electricity from yourself and your clothing by touching a nearby metal surface before opening the enclosure door of the unit or handling electronic components.

## Preparing for the Installation

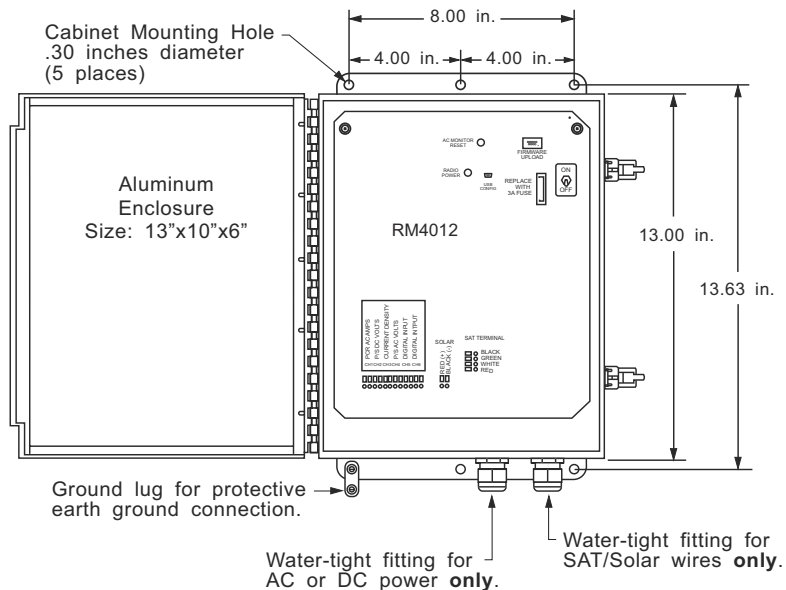
Use the following items as a checklist prior to installing an RM4012:

- 1 Does the installation area provide enough room to easily open the enclosure? When you finish the installation, you'll need to open the enclosure to connect input wires and to configure the unit for service using the UCT software.
- 2 Is the latest version of the UCT software installed on the computer you plan to use during the installation? For more information, see *Universal Configuration Toolkit Software* on page 4.

- 3 To ensure uninterrupted service, the location you plan to install the satellite terminal must meet the following qualifications:
- The area must be clear of all obstructions such as buildings, trees, and hills.
  - The satellite terminal should be located at least 6-½ feet from objects taller than 1-¾ feet in the direction of the satellite.
  - The satellite terminal must have a clear line-of-sight facing in a southeast direction so that it faces the satellite located southeast of the U.S.
  - The satellite terminal should not be installed in an area where standing water may occur. The drain holes in the slots on the bottom of the terminal should not be blocked.

## Mounting Requirements

The RM4012 enclosure (Figure 2-3) can be mounted anywhere with a few precautions. The list below identifies conditions to consider when choosing a location. Mounting hardware suitable for the type of mounting surface is provided by the customer.



**Figure 2-3. Enclosure Dimensions**

- Mount the enclosure in a clear, unobstructed area.

- The installation area should provide enough working space to easily open the enclosure when performing routine maintenance or configuring the RM4012 for service.

## Installing the RM4012

For quicker communication with the satellite, install the enclosure and satellite terminal first, and then complete the remainder of the installation while the RM4012 acquires a communications link with the SkyWave-Inmarsat satellite.

## Mounting the Enclosure

The enclosure comes with two (2) metal mounting brackets installed on the back for easy mounting to either a flat surface or pole.

The enclosure comes with a pole mounting kit that includes the following items:

- U-bolts, 2 each (for top and bottom metal bracket).
- Pipe brackets, 2 each (for top and bottom metal bracket).
- Mounting hardware, 4 each (nuts and washers for the u-bolts).

To mount the enclosure, use the procedure in any of the following sections.

### *Mounting the Enclosure on a Flat Surface or Telephone Pole*

To install the enclosure against a telephone pole using the factory-installed metal brackets, complete the following steps:

- 1 Place the enclosure against the surface in the location you plan to mount it.
- 2 Mark the hole locations of the top and bottom center holes. Set the enclosure aside. Use a hand drill and a metal, masonry, or wood drilling bit to drill two holes in the mounting surface where you marked their locations in step 2, one for the top bracket and one for the bottom bracket.
- 3 Place the enclosure back in place where the holes line up and drive in lag bolts or other appropriate fasteners to hold the enclosure in place.
- 4 Continue with *Satellite Terminal Assembly* on page 17.

## Mounting the Enclosure on a Pole or Pipe

To install the enclosure on a pole or pipe (the typical method), complete the following steps:

- 1 Install one u-bolt around the pole, through the pipe bracket, and then through the top mounting bracket.
- 2 Secure the u-bolt using washers and nuts provided in the installation kit. Tighten nuts.
- 3 Repeat steps 1 and 2 for the bottom mounting bracket.
- 4 Continue with *Satellite Terminal Assembly*.

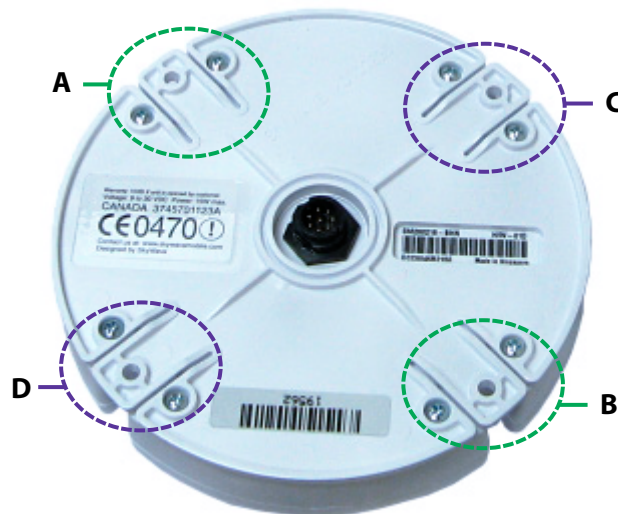
## Satellite Terminal Assembly

Before installing the satellite terminal, assemble the terminal for use in either a non-hazardous installation site (see below) or a hazardous installation site (see page 19).

### *Satellite Terminal Assembly for a Non-Hazardous Installation Site*

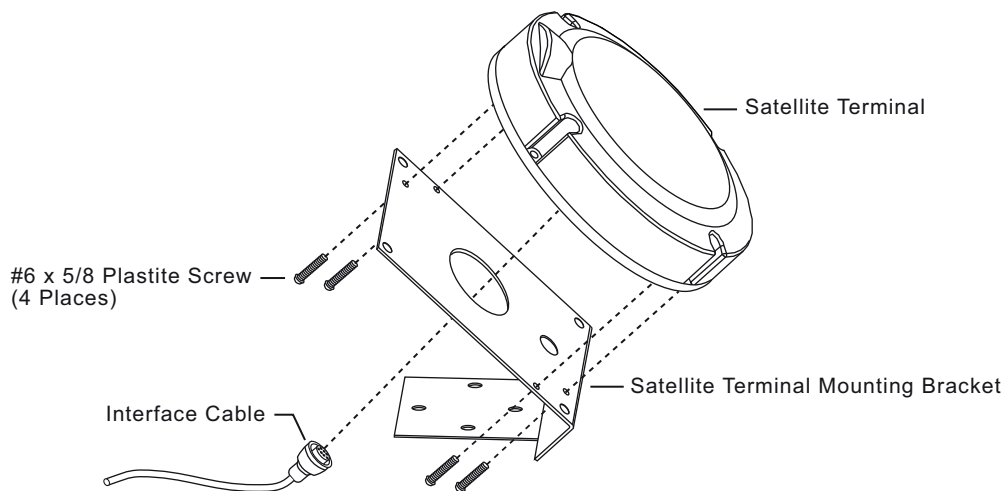
Complete the following steps to assemble the satellite terminal, mounting bracket, and u-bolt:

- 1 Remove four (4) screws labeled **A** and **B** or **C** and **D** in the next figure (Figure 2-4).



**Figure 2-4. Removing Satellite Terminal Screws**

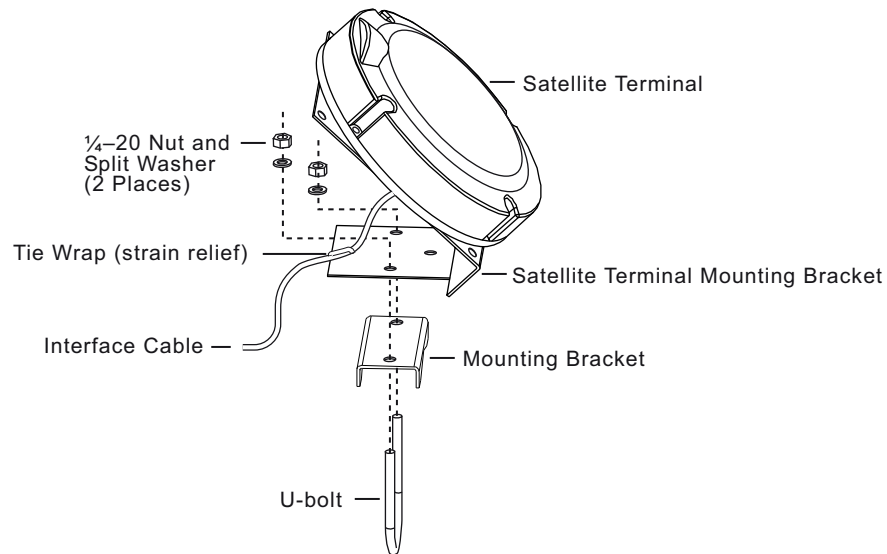
- 2 Install the satellite terminal on the mounting bracket (Figure 2-5) using four #6 x 5/8 Plastite screws provided in the installation kit.



**Figure 2-5. Mounting Bracket and Satellite Terminal (Non-Hazardous Installation Site)**

- 3 Plug the mating connector on the interface cable in the connector on the bottom of the satellite terminal. Apply non-conductive silicone grease on the mating connector and then wrap with waterproof sealing tape.
- 4 Create a strain relief for the interface cable using a tie wrap and one of the mounting holes on the mounting bracket as shown in the next figure (Figure 2-6).
- 5 Fasten the u-bolt and mounting bracket to the satellite terminal mounting bracket using two  $\frac{1}{4}$ -20 nuts and split washers (Figure 2-6). Tighten hardware using an adjustable wrench.





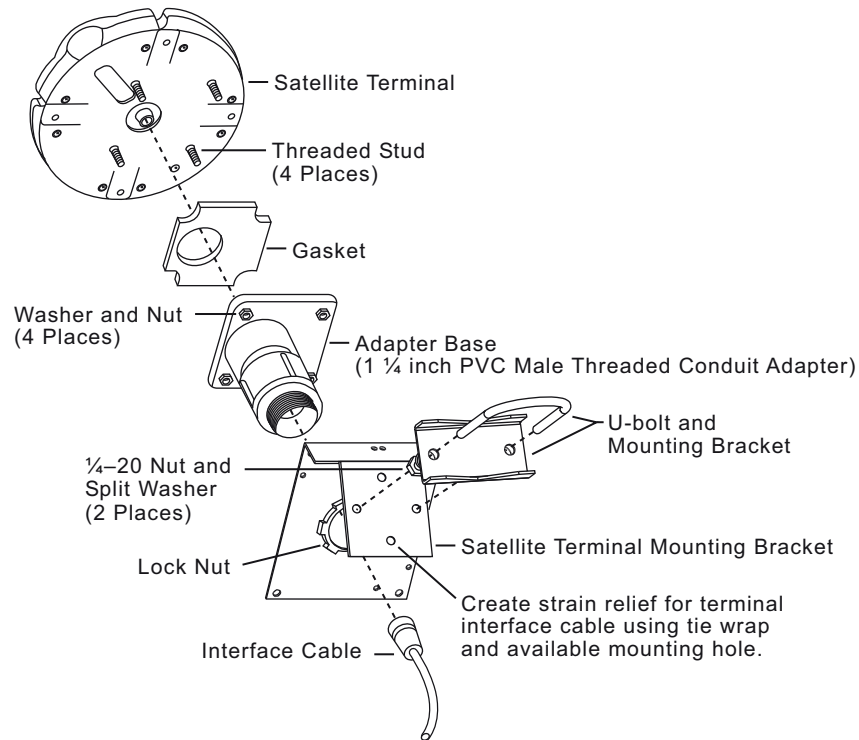
**Figure 2-6. U-bolt and Mounting Bracket Installation (Non-Hazardous Installation Site)**

- 6 Continue with *Installing the Satellite Terminal* on page 21.

### *Satellite Terminal Assembly for a Hazardous Installation Site*

Complete the following steps to assemble the satellite terminal, gasket, adapter base, and interface cable:

- 1 Remove the lock nut from the adapter base (1-1/4 inch PVC male threaded conduit adapter). Set aside for re-installation later.
- 2 Place the gasket in the space on the top of the adapter (Figure 2-7).



**Figure 2-7. Satellite Terminal Assembly for Hazardous Installation Site**

- 3 Route the mating connector on the interface cable through the adapter base and gasket.
- 4 Plug the mating connector on the interface cable in the connector on the bottom of the satellite terminal. Apply non-conductive silicone grease on the mating connector and then wrap with waterproof sealing tape.
- 5 Install the adapter base on the satellite terminal using four (4) threaded studs, washers and nuts.
- 6 Fasten the u-bolt and mounting bracket to the satellite terminal mounting bracket using two  $\frac{1}{4}$ -20 nuts and split washers as shown in the previous figure. Tighten hardware using an adjustable wrench.
- 7 Install the adapter base on the satellite terminal mounting bracket by routing the interface cable through the mounting hole on the bracket and then using the lock nut to secure the terminal.
- 8 Continue with *Installing the Satellite Terminal* on page 21.

---

## Installing the Satellite Terminal

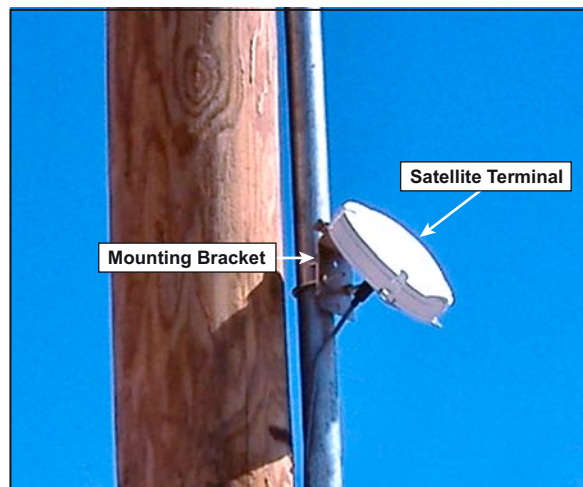
Complete the following steps:

- 1 Install the satellite terminal on the mounting surface using the u-bolt (Figure 2-8). The satellite terminal must face in the direction of the SkyWave-Inmarsat satellite located southeast of the United States.

---

**WARNING:** The satellite terminal should not be installed in an area where standing water may occur. The drain holes in the slots on the bottom of the terminal should not be blocked. The installation area should provide a clear line of sight to the satellite with no obstructions such as building, trees, or hills. The satellite terminal should be facing in the direction of the Inmarsat satellite located southeast of the United States.

---



**Figure 2-8. Example of Typical Satellite Terminal Installation**

- 2 Route the satellite terminal interface cable through the water-tight fitting on the bottom of the enclosure. Connect the interface cable in the **SAT TERMINAL** connector on the faceplate of the RM4012 (Figure 2-1). The **RADIO POWER** LED will turn red when the satellite terminal is on or when the unit is transmitting a data packet.

---

**NOTE:** The RM4012 makes a clicking sound after applying power. This is a normal function and indicates the unit is polling the input channels.

---

- 3 Connect the configuration cable in an available USB port on your computer. Connect the other end of the cable in the **USB CONFIG** port on the faceplate of the RM4012 (Figure 2-1).
- 4 Start the UCT software. When the **Find Devices** window displays, select your unit.
- 5 When the main configuration window displays, click **Auto Update** in the Communications group box.

## Confirming Satellite Communication

Use the following procedure at the location you plan to install the satellite terminal. The procedure will help confirm communication with the satellite before you install the equipment.

Complete the following steps:

- 1 Open the RM4012 unit enclosure.
- 2 If you are installing the RM4012 outside the United States, use the BAT website **Help>Coverage Maps** (<http://www.bullhornsys.com>) to locate the satellite that covers the area where you plan to install the satellite terminal.
- 3 Connect one end of the satellite terminal interface cable in the connector on the bottom of the satellite terminal. Route cable through bottom of unit enclosure, through the smaller water-tight fitting.
- 4 Connect the other end of the cable to the **SAT TERMINAL** connector on the faceplate of the RM4012.
- 5 Point the satellite terminal to the southwest - making sure it has a clear line-of-sight and the path is clear of all obstructions. If you are unsure of the nearest satellite, please contact Technical Support.
- 6 The **RADIO POWER** LED turns on only when the satellite terminal is transmitting data to the satellite.

---

**IMPORTANT:** Footprint anomalies and intermittent obstacles on the horizon can cause satellite communications failure. Low look angles (less than 15 degrees elevation) may also be subject to fading due to rain, snow, clouds, and other weather conditions. Every attempt has been made to ensure the highest level of system availability and reliability. However, the previously mentioned conditions may have an impact on the provided service.

---

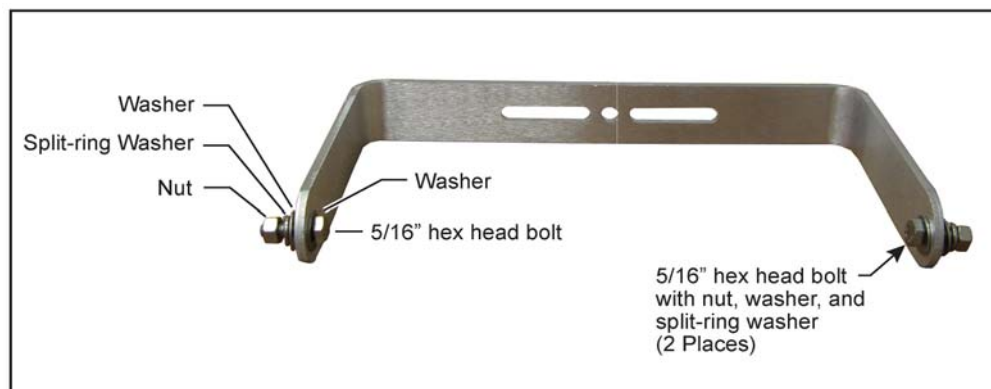
## Installing the Solar Panel Battery Charger

The procedure in this section explains how to assemble and install the 5 watt solar panel battery charger.

Complete the following steps:

- 1 Prepare the mounting surface for the solar panel installation. Depending on the type of mounting surface, use a hand drill and a metal, masonry, or wood drilling bit.
- 2 Assemble the solar panel mounting bracket and solar panel in the following manner:
  - a Install the provided hardware in the mounting holes on the solar panel mounting bracket (Figure 2-9).

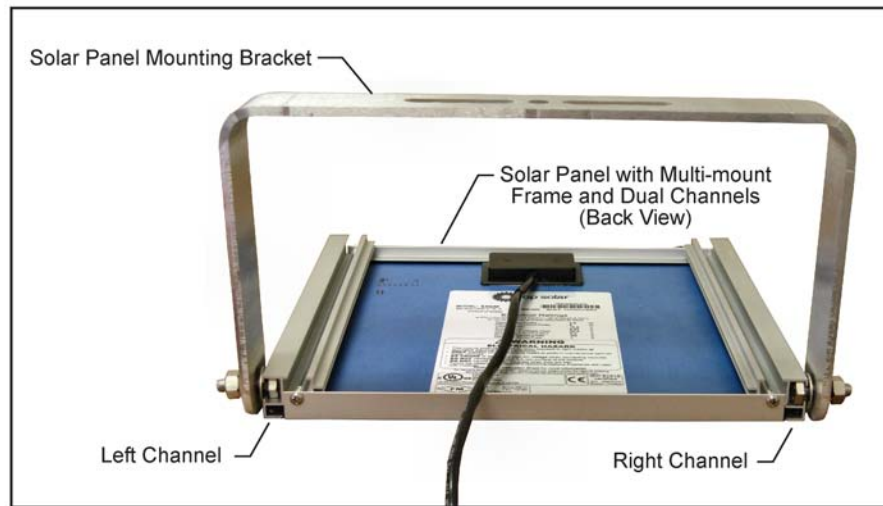
Hardware includes (2) 5/16" hex head bolts with nuts and (4) washers and split-ring washers.



**Figure 2-9. Solar Panel Mounting Bracket**

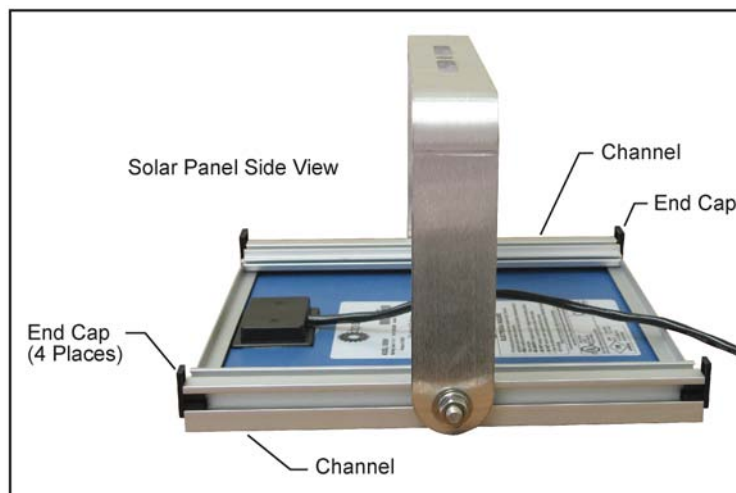
- b Place the solar panel face down on a flat surface.

- c Install the solar panel mounting bracket in the left and right channels of the multi-mount frame (Figure 2-10).



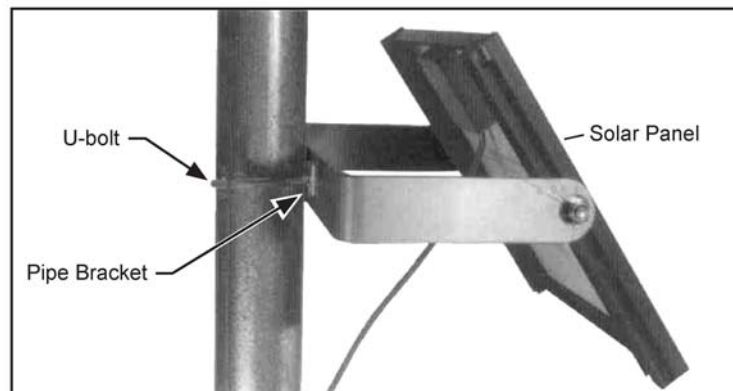
**Figure 2-10. Solar Panel Multi-Mount Frame**

- d Position the solar panel mounting bracket in the center of each channel. Use an adjustable wrench to loosely tighten hardware to prevent the bracket from moving.
- e Using four (4) end caps provided in the installation kit, insert an end cap in both ends of each channel (Figure 2-11).



**Figure 2-11. Installing End Caps**

- f Install the solar panel on the mounting surface using the following guidelines:
- To prevent signal interference during data transmissions, install the solar panel at least two (2) feet above the RM4012.
  - Install the solar panel using the solar panel mounting bracket and mounting hardware appropriate for the type of mounting surface. Mounting hardware is provided by the customer.
  - Position the solar panel 10 degrees above horizontal and facing south for full sun exposure.
  - If you plan to install the solar panel on a pipe, use the provided u-bolt and pipe bracket with the solar panel mounting bracket (Figure 2-12).
  - Use an adjustable wrench to tighten mounting hardware.



**Figure 2-12. U-bolt and Pipe Bracket Option**

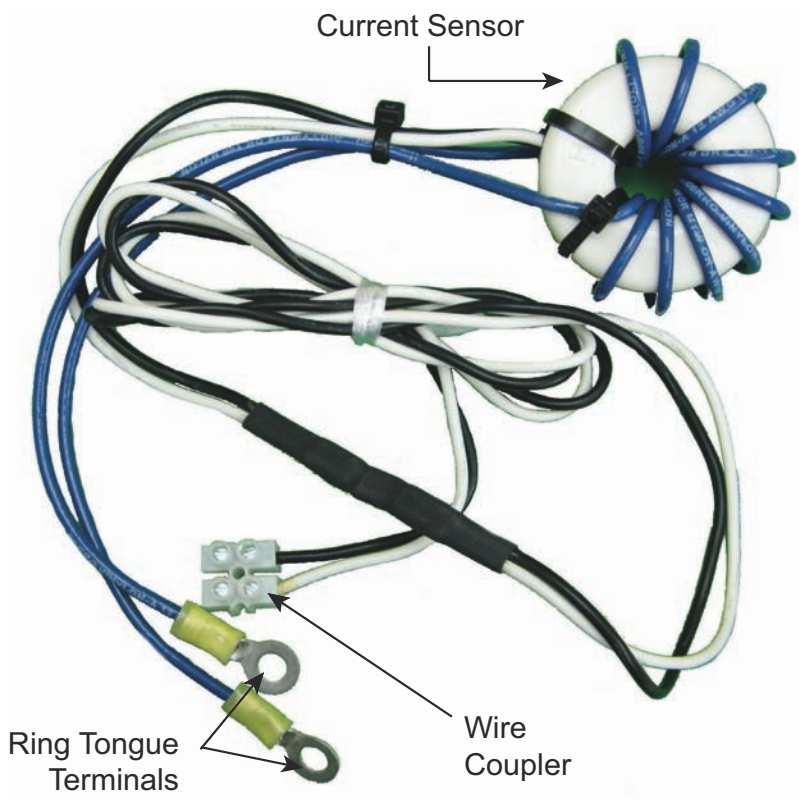
- 3 Route the solar panel cable through the water-tight fitting on the bottom of the RM4012 enclosure.
- 4 Connect the solar panel cable in the positive (+) and negative (-) terminals of the **SOLAR** terminal block (Figure 2-1). Red wire connects to the positive (+) terminal; black wire connects to negative (-) terminal.

## Installing the Current Density Transducer

---

**WARNING:** If wires are to be buried or covered, conduit must be used to protect the wires.

---

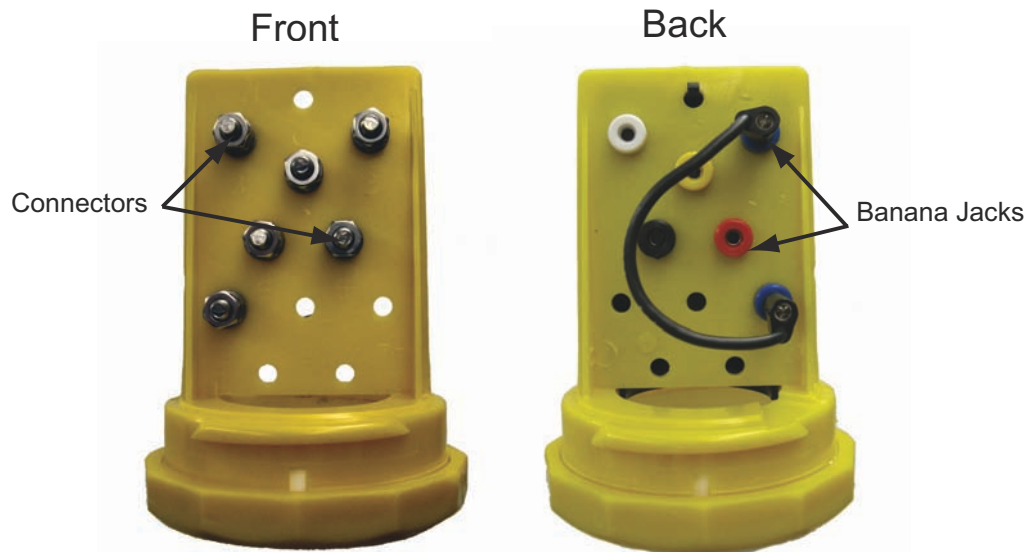


**Figure 2-13. Current Density Transducer Assembly**

Complete the following steps to connect the Current Density Transducer assembly to the RM4012:

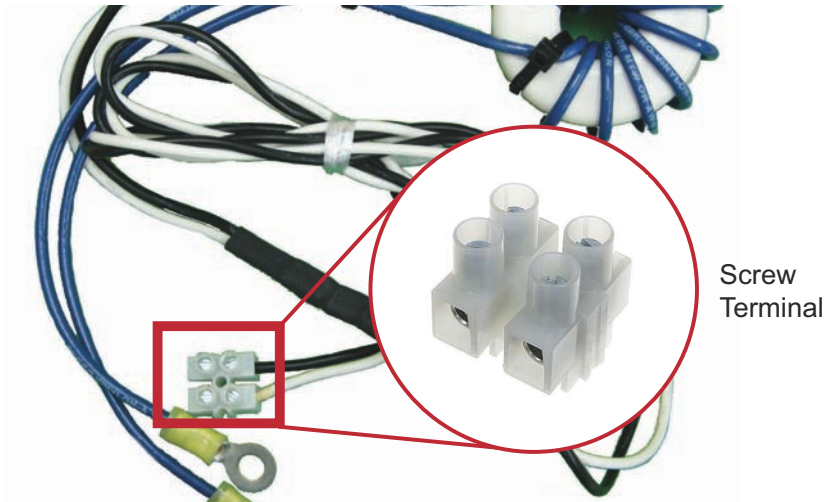
- 1 Ensure that the RM4012 unit is powered off.
- 2 Drill a hole in the test station pipe that is large enough to fit the included .492" water-tight fitting.
- 3 Remove the cap from the test station.
- 4 Install the included blue banana jack lug to the terminal board (Figure 2-14).





**Figure 2-14. Test Station Terminal Board - Before Installation**

- 5 Route all input wires of the Current Density Transducer assembly through the opening of the test station so that the current sensor is on the back side (Figure 2-14) and the assembly wires are on the connector side (Front, Figure 2-14). See Figure 2-17 on page 29 for an example of a completed transducer installation.
- 6 Attach the Current Density Transducer assembly ring tongue terminals (blue wires, see Figure 2-13) to test station terminal board connectors, one to P/S and the other to the CP Coupon connectors.
- 7 Route the four-conductor cable (included) through water-tight fitting in test station pipe to terminal board.
- 8 Connect the black and white wires of the four-conductor cable to the screw terminal on the Current Density Transducer assembly (Figure 2-15), matching white to white and black to black.



**Figure 2-15. Current Density Transducer Assembly Screw Terminal**

- 9 If a reference cell is installed, connect ring tongue terminals (included, Figure 2-16) to the ends of the red and green wires and then to the reference cell connector on the test station terminal board.



**Figure 2-16. Ring Tongue Terminal**

The following examples show a typical installation of the Current Density Transducer to the test station:

Front

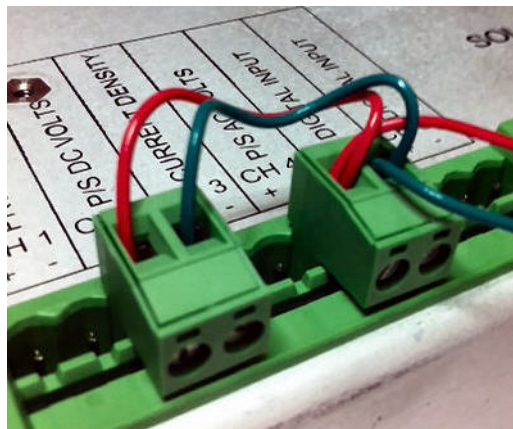


Back



**Figure 2-17. Test Station Terminal Board - After Installation**

- 10 Route the four-conductor cable through the water-tight fitting on the bottom of the RM4012 enclosure and toward the terminal block labeled **CURRENT DENSITY (CH1)**.
- 11 Attach the black and white wires of the four-conductor cable to the **CURRENT DENSITY (CH1)** terminal block.
- 12 Attach the green and red wires of the four-conductor cable to the **P/S AC VOLTS (CH4)** terminal block.
- 13 To measure for DC volts, jump the red and green wires to the **P/S DC VOLTS (CH4)** terminal block (Figure 2-18).



**Figure 2-18. Wire Jumping from P/S AC VOLTS to P/S DC VOLTS**

- 14 If needed, dress input wires inside the RM4012 enclosure using provided tie-wraps and adhesive tie-wrap holders.
- 15 Replace the cap on the test station.
- 16 Turn **ON** the RM4012.

---

**NOTE:** The RM4012 makes a clicking sound after turning on the power switch. This is a normal function and indicates the unit is polling the input channels.

---

- 17 Push and hold the **AC Monitor Reset** button for at least 5 seconds.
- 18 Continue with Chapter 3, *Configuration* on page 31 to configure the RM4012 for service.

# Configuration

---

This chapter explains how to configure the RM4012 for service using the UCT software.

The configuration process includes the following tasks:

- 1 If present, disable any synchronization software (page 32).
- 2 Connect the unit to your computer. Start UCT and select a unit to configure (page 32).
- 3 Load a template (page 33).
- 4 Choose a folder on your computer to store templates and log files (page 34).
- 5 Set up battery information, controller clock, and a transmission schedule (page 34-35).
- 6 Set up input channels and alarms (page 36).
- 7 Save settings in the Event Log (page 43).
- 8 Transmit a test packet (page 43).
- 9 Save settings in a template (page 44).
- 10 Exit UCT and close the enclosure (page 44).

## Disable Synchronization Software

If you use a synchronization software to synchronize a mobile device with your computer, temporarily disable the software before starting UCT.

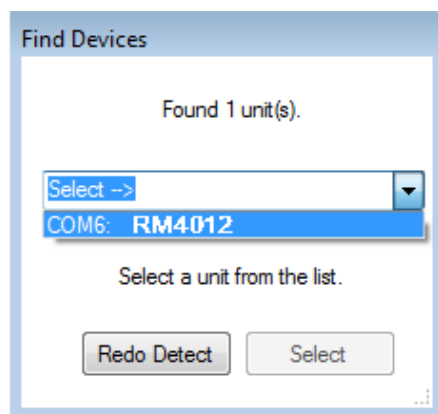
If you use Microsoft ActiveSync to synchronize the Allegro field computer with your computer, complete the following steps to temporarily disable the software:

- 1 Click **Start > Programs > Microsoft ActiveSync**.
- 2 Click **File > Connection Settings**. If enabled, click to remove the check mark and disable COM port, USB, and network options.
- 3 Click **OK** to close Connection Settings.
- 4 Click **File > Close** to exit ActiveSync.

## Connect the Unit and Start UCT

Complete the following steps:

- 1 Connect the configuration cable in the USB port of your computer. Connect the other end of the cable in the configuration port of the unit.
- 2 Double-click the Bullhorn icon on the desktop to start the UCT software. Or click **Start > Programs > American Innovations > Configuration Toolkit**.
- 3 Select your unit in the drop-down list of the Find Devices window (Figure 3-1) and then click **Select**.



**Figure 3-1. Find Devices**

- 4 The main configuration window displays after selecting a unit (Figure 3-2). Press **F2** or click **Tools > Read Unit Settings** to verify UCT and the unit are communicating.

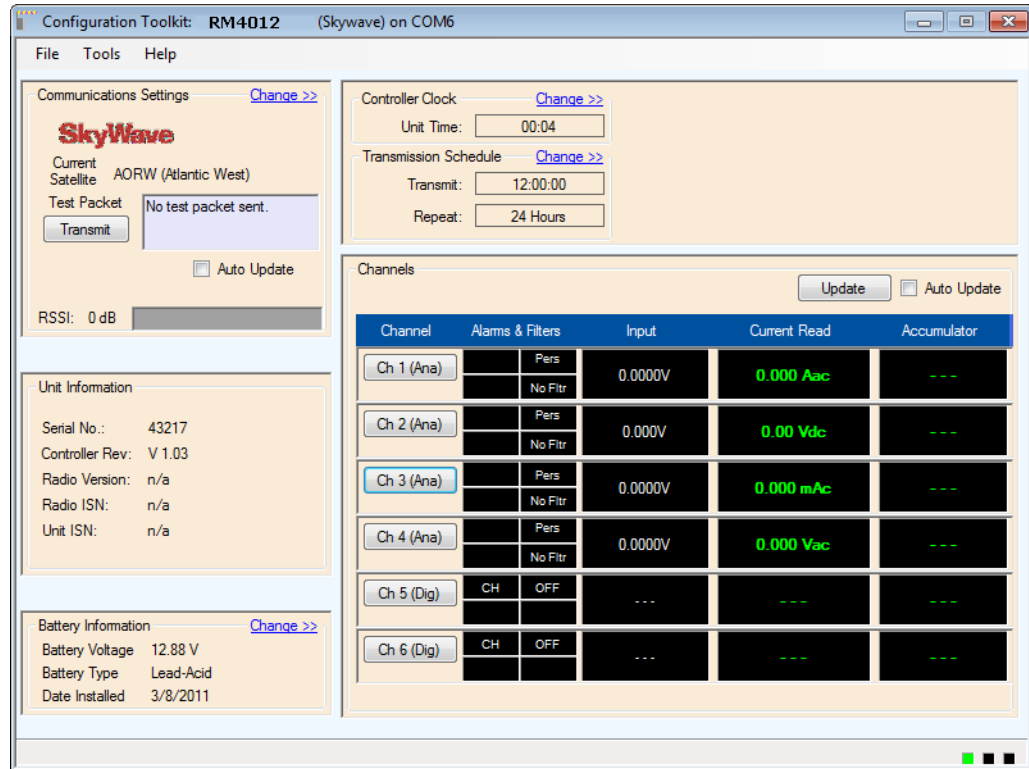


Figure 3-2. Main Configuration Window

## Load a Template

Load a template (if available) using the following steps:

- 1 Click **Tools > Advanced > Template > Load from Template** (Figure 3-3).

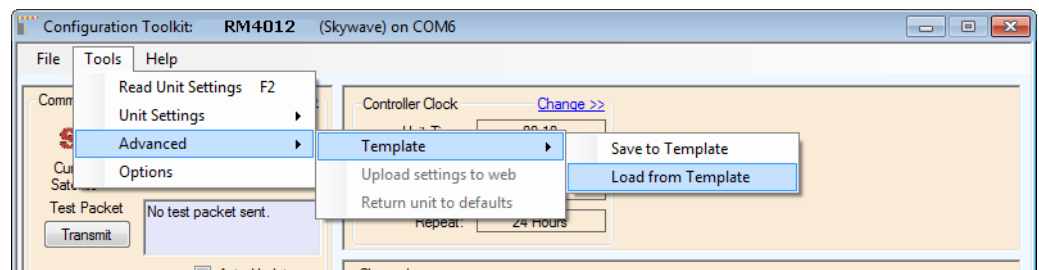


Figure 3-3. Load From Template

- 2 When the **Open Template** window displays, locate the template. Double-click on the template (do not select **OPEN**).
- 3 After UCT applies the template, press **F2** to read settings or click **Tools > Read Unit Settings**.
- 4 Click **File > Save Current Setup in Event Log** to save settings.

## Choose a Folder for Templates and Log Files

Templates and log files are stored in My Documents by default. If you want to store these files in a different folder on your computer, complete the following steps:

- 1 Click **Tools > Options** to display the Options window.
- 2 Click **Folder for Log files** to display the Browse for folder window.
- 3 Select an existing folder or click **Make New Folder** to create a new folder.
- 4 Click **Ok** and then click **Done** to close the window.

## Set Up Battery Information

Complete the following steps to identify the type of battery installed in the unit and the battery installation date:

- 1 Click **Change** in Battery Information to display the Power/Battery window.
- 2 Select an option in the **Battery Type** drop-down list.
- 3 Click **Installed Today** if the battery was installed today. Or, click **Installed Date** and use the calendar to choose an installation date.
- 4 Click **Save**.



## Set Up Controller Clock

The controller clock is a time-of-day clock running inside the unit. It does not keep track of the month or year and also does not correct itself for daylight savings time. The unit uses the controller clock as a basis for all time-related operations.

Complete the following steps to set up the controller clock:

- 1 Click **Change** in Controller Clock.
- 2 Select **Set to PC Time**.
- 3 Click **Save**.

## Set Up Transmission Schedule

Transmission schedule determines when and how often input channel readings transmit to your website account.

Complete the following steps:

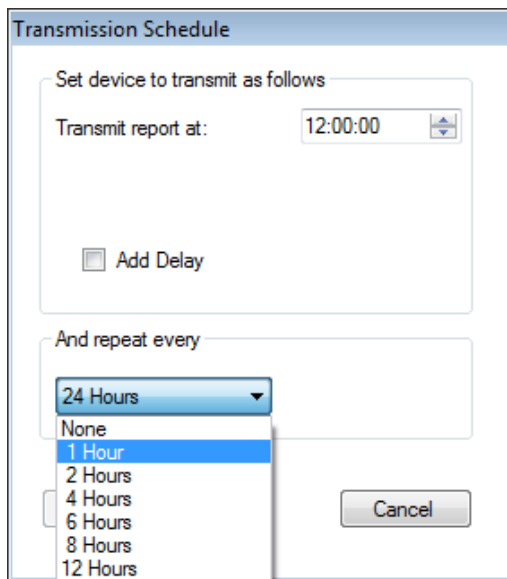
- 1 Click **Change** in Transmission Schedule to display the Transmission Schedule window.
- 2 Select a field in the **Transmit report at** field. Use the up and down arrows to adjust the time. Repeat this step for remaining time fields as needed.
- 3 If you want to include a delay in the transmission schedule, click **Add Delay** to place a check mark in the check box.

---

**NOTE:** **Add Delay** is based on the unit serial number. The unit serial number is equivalent to the number of seconds added to the reporting time. This feature is typically used to offset the transmission schedule for several units set up with the same reporting time.

---

- 4 Select **1 Hour** from the **And repeat every** drop-down list (Figure 3-4) to have the unit call in every hour.



**Figure 3-4. Transmission Schedule - Repeat Transmission**

- 5 Click **Save**.

## Set Up Input Channels and Alarms

Based on the type of input device connected to the input channels of the unit, use the procedure in the following sections to set up channels and alarms:

- *Set Up an Input Channel for Millivolt Readings* (page 36)
- *Set Up an Input Channel for Analog Readings* (page 39)
- *Set Up an Input Channel for Digital Readings* (page 41)

### Set Up an Input Channel for Millivolt Readings

Complete the following steps to set up channels 1, 3, or 4 for millivolt readings. Refer to the *Glossary* on page 51 for UCT field descriptions.

- 1 Based on the input channel the input device is connected to, click **Ch1**, **Ch3**, or **Ch4** to display the channel configuration window (Figure 3-5).

**Settings for Channel 1**

Channel Setting

**Channel 1**  Analog  
 Enable  Digital Dry Contact  
 Active Digital

Analog Scaling Settings

+/- 50mV  +/- 5 Volts

Raw voltage values (on unit input)	translates from	Engineering Units (on transducer)	amps
0	mV = Transducer Value:	0	amps
50	mV = Transducer Value:	75	amps

Response Filter Time (to settle within 1%)

Alarm Settings

Transmit Low Alarm  Transmit High Alarm  
 Repeat Low Alarm  Repeat High Alarm

Repeat delay in minutes

Low Alarm  amps High Alarm  amps  
Deadband  amps Deadband  amps  
Persistence

[Validate / Check Entries](#)

Save   Cancel

**Figure 3-5. Example of Channel 1 (Ch1) Millivolt Settings**

- 2 Click **Enable**, **Analog**, and **+/- 50mV** to enable the channel for service and millivolt readings.
- 3 Type the unit of measurement used by the input device in the **Engineering Units (on transducer)** field.
- 4 Based on shunt size, scale the input channel and input device as follows:
  - a Type the minimum and maximum voltage level supported by the input channel in the top and bottom fields of **Raw voltage values (on unit input)**, respectively.
  - b Type the minimum and maximum voltage level supported by the input device in the top and bottom fields of **Engineering Units (on transducer)**, respectively.
- 5 If you want to apply an optional response filter to the input channel, click the **Response Filter Time** button and select a time option.
- 6 If you want the unit to transmit an alarm packet when a low alarm condition occurs, click **Transmit Low Alarm** and then type a value in the **Low Alarm** field.

The unit transmits an alarm packet when the input channel reading is lower than the value entered in the Low Alarm field.

- 7 If you want the unit to continue transmitting low alarms until the alarm condition is removed in the field, click **Repeat Low Alarm** and then type a value in the **Repeat delay in minutes** field.

The **Repeat delay in minutes** value is the number of minutes between repeated alarm transmissions for both low and high alarm conditions.

- 8 If you want the unit to transmit an alarm packet when a high alarm condition occurs, click **Transmit High Alarm** and then type a value in the **High Alarm** field.

The unit transmits an alarm packet when the input channel reading is higher than the value entered in the High Alarm field.

- 9 If you want to include deadband in low and/or high alarms, type a value in the low and/or high alarm **Deadband** fields.

Valid entries are any positive scaled value that does not cause the alarm point to be lower than the minimum scale value or higher than the maximum scale value in Engineering Units (on transducer). Entering zero disables deadband.

- 10 If you want to apply a persistence filter to low and/or high alarms, type a value in the **Persistence** field. Valid entries are any number from 1 to 65535. Entering zero (0) disables persistence.

- 11 Click **Validate/Check Entries** to verify configuration settings are correct and then click **Save**.

Text boxes display green or red to indicate whether or not an entered value is correct. If a text box is red, enter a different value and then validate again. If all text boxes are green, settings are correct.

## Set Up an Input Channel for Analog Readings

Complete the following steps to set up channels 1, 2, 3, or 4 in analog mode. Refer to the *Glossary* on page 51 for UCT field descriptions.

- 1 Based on the input channel the input device is connected to, click **Ch1**, **Ch2**, **Ch3**, or **Ch4** to display the channel configuration window (Figure 3-6).

**Figure 3-6. Example of Channel 2 (Ch2) Analog Settings**

- 2 Click **Enable** and **Analog** to enable the channel for service and analog mode.
- 3 Click **+/- 5V** or **+/- 100V** if the input device has a voltage output of  $\pm 5\text{VDC}$  or  $\pm 100\text{VDC}$ , respectively.
- 4 Type the unit of measurement used by the input device in the **Engineering Units (on transducer)** field.
- 5 Scale the input channel and input device as follows:
  - a Type the minimum and maximum voltage level supported by the input channel in the top and bottom fields of **Raw voltage values (on unit input)**, respectively.

For example, to set up the input channel for AC amps, type **0** in the top text box and **5** in the bottom text box.

- b Type the minimum and maximum voltage levels supported by the input device in the top and bottom fields of **Engineering Units (on transducer)**, respectively.

For example, to set up the input channel for pipe-to-soil readings, type **0** in the top text box and the maximum amps from the transducer to CT in the bottom text box.

- 6 If you want to apply an optional response filter to the input channel, click the **Response Filter Time** button and select a time option.
- 7 If you want the unit to transmit an alarm packet when a low alarm condition occurs, click **Transmit Low Alarm** and then type a value in the **Low Alarm** field.

The unit transmits an alarm packet when the input channel reading is lower than the value entered in the Low Alarm field.

- 8 If you want the unit to continue transmitting low alarms until the alarm condition is removed in the field, click **Repeat Low Alarm** and then type a value in the **Repeat delay in minutes** field.

The **Repeat delay in minutes** value is the number of minutes between repeated alarm transmissions for both low and high alarm conditions.

- 9 If you want the unit to transmit an alarm packet when a high alarm condition occurs, click **Transmit High Alarm** and then type a value in the **High Alarm** field.

The unit transmits an alarm packet when the input channel reading is higher than the value entered in the High Alarm field.

- 10 If you want to include deadband in low and/or high alarms, type a value in the low and/or high alarm **Deadband** fields.

Valid entries are any positive scaled value that does not cause the alarm point to be lower than the minimum scale value or higher than the maximum scale value in Engineering Units (on transducer). Entering zero disables deadband.

- 11 If you want to apply a persistence filter to low and/or high alarms, type a value in the **Persistence** field. Valid entries are any number from 1 to 65535. Entering zero (0) disables persistence.

- 12 Click **Validate/Check Entries** to verify configuration settings are correct and then click **Save**.

Text boxes display green or red to indicate whether or not an entered value is correct. If a text box is red, enter a different value and then validate again. If all text boxes are green, settings are correct.

## Set Up an Input Channel for Digital Readings

Complete the following steps to set up channel 5 or 6 in either Digital Dry Contact or Active Digital mode. Refer to the *Glossary* on page 51 for UCT field descriptions.

**NOTE:** For the RM4012 units, digital channels are not typically used for the AC application.

- 1 Based on the input channel the input device is connected to, click **Ch5** or **Ch6** to display the channel configuration window (Figure 3-7).

The screenshot shows the 'Settings for Channel 5' window. It is divided into several sections:

- Channel Setting:** 'Channel 5' is selected. The 'Enable' checkbox is checked. Radio buttons are set to 'Digital Dry Contact'.
- Digital Settings:** 'Debounce filter' is set to 15 (Number of Seconds).
- Accumulator:** 'Current Accumulator Value' is 459, 'Accumulator Reset Value' is 12345, 'Accumulator Alarm Value' is 9999, and 'Repeat Alarm frequency (minutes)' is 65. 'Reset on High Alt Channel' is unchecked, and 'Reset on Low Alt Channel' is checked.
- Alarm Settings:** 'Transmit Low Alarm', 'Repeat Low Alarm', 'Transmit High Alarm', and 'Repeat High Alarm' are all checked. 'Repeat delay in minutes' is 60.

At the bottom, there are 'Save', 'Validate / Check Entries', and 'Close' buttons.

**Figure 3-7. Example of Channel 5 (Ch5) Digital Settings**

- 2 Click **Enable** to enable the channel for service.
- 3 Click **Active Digital** or **Digital Dry Contact**.

- 4 If you want to include an optional **Debounce filter** in alarm settings, type the number of seconds the input channel must remain in an alarm state before the unit transmits an alarm packet. If you want alarm states recognized immediately, enter zero (0) in the field.
- 5 If the channel is set up in **Active Digital mode**, complete the following steps to set up channel alarms:
  - a Click **Transmit Low Alarm** to have an alarm transmitted when the input voltage is lower than the threshold value.
  - b Click **Transmit High Alarm** to have an alarm transmitted when the input voltage is higher than the threshold value.
  - c Click **Repeat Low Alarm** and/or **Repeat High Alarm** if you want the unit to continue transmitting alarms until the alarm condition is removed in the field.

Type a value in the **Repeat delay in minutes** field that indicates the number of minutes between repeated alarm transmissions.

- 6 If the channel is set up in **Digital Dry Contact mode**, complete the following steps to set up channel alarms:
  - a Click **Transmit Closed Alarm** to have an alarm transmitted when the input device is in a closed state.
  - b Click **Transmit Open Alarm** to have an alarm transmitted when the input device is in an open state.
  - c Click **Repeat Closed Alarm** and/or **Repeat Open Alarm** if you want the unit to continue transmitting alarms until the alarm condition is removed in the field.

Type a value in the **Repeat delay in minutes** field that indicates the number of minutes between repeated alarm transmissions.

- 7 Click **Validate/Check Entries** to verify configuration settings are correct and then click **Save**.

Text boxes display green or red to indicate whether or not an entered value is correct. If a text box is red, enter a different value and then validate again. If all text boxes are green, settings are correct.



## Save Settings in the Event Log

To save configuration settings, click **File > Save Current Setup in Event Log**.

---

**NOTE:** The Event Log is used later when setting up the unit on the BAT website. The file saves on your hard drive in the same folder as the UCT software. The UCT software automatically assigns a file name using the unit serial number with a **.bhs** extension.

---

## Transmit a Test Packet

To transmit a test packet, click **Transmit** in Communication Settings.

Status messages display in the window beside the Transmit button. When the status message **Acknowledgement received from server** appears, communication has been established.

---

**IMPORTANT:** If the status message **Test Packet Return Transmission Failed** appears, communication has not been established with the server. Click **Transmit** again to send another test packet. If communication cannot be established after several attempts, please call Technical Support for assistance.

---

## Save Settings in a Template

Settings can be saved as a template that can be used to set up another unit of the same type.

Complete the following steps to save the settings to a template:

- 1 Click **Tools > Advanced > Template > Save to Template** to display the Save Template window.
- 2 Open an existing folder or create a new folder to store the template.
- 3 If you want to change the default file name of the template, type a name for the template in the **File name** field making sure to use the **.bht** file extension.
- 4 Click **Save** when you finish.

## Exit UCT and Close the Enclosure

Complete the following steps to:

- 1 Click **File > Exit** or press **Alt+F4**.
- 2 Disconnect the configuration cable from the unit and your computer.
- 3 Close and latch the enclosure door.
- 4 Tighten water-tight fittings on the bottom of the enclosure.
- 5 Re-enable any synchronization software disabled earlier in this chapter.

The installation and configuration are now complete.



# Optional Selectable Current Transducer Installation

---

The information in this section explains how to install the optional Selectable Current Transducer on an existing Polarized Cell Replacement (PCR) and how to connect the transducer to an installed RM4012. Refer to the previous chapters for the procedures for installing and configuring the RM4012.



**Figure A-1. Selectable Current Transducer**

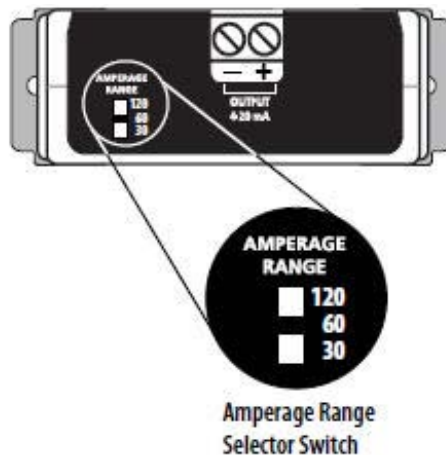
Complete the following steps:

- 1 Clamp the Selectable Current Transducer (SCT) to the wires running from the PCR (an example installation is shown in Figure A-2).



**Figure A-2. Selectable Current Transducer - Installed**

- 2 Select the setting on the SCT selector switch (Figure A-3) to **above** the current maximum output on the PCR. For example, if the maximum PCR current is 55 amps, set the SCT selector switch to 60.



**Figure A-3. Selectable Current Transducer - Selector Switch**

- 3 Run the SCT wires to the RM4012 and through the larger of the two water-tight fittings towards the terminal block marked **PCR AC AMPS** (CH1) (refer to Figure 2-1 on page 12 for location of fitting and terminal block location).
- 4 Connect wires to the terminal block marked **PCR AC AMPS** (CH1).
- 5 If needed, refer to Chapter 3 - *Configuration* on page 31 for information on using the Universal Configuration Toolkit to configure the RM4012 unit.



# B

## Regulatory Notices

---

### FCC Requirements

The following FCC requirements are met by the products described in this guide.

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 communications. 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 receiver.
- Connect the equipment in an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## Export Control Classification Number

The Export Control Classification Number (ECCN) assigned to the Bullhorn Universal Configuration Toolkit (UCT) software by the U.S. Bureau of Industry and Security (BIS) is as follows:

- **ECCN Classification:** No Classification
- **ECCN Code:** EAR99 or NLR



# Glossary

---

The following information is an alphabetical list of technical terms and UCT software fields identified in this manual.

**Table C-1. Glossary**

Term	Definition
Controller Clock	Time-of-day clock running inside the unit. The clock is used for all time-related operations such as transmission schedules.
Controller Rev	Firmware version of the controller board installed in the unit.
Current Density	The measure of the density of flow of a conserved charge.
Deadband	Deadband applies hysteresis to low and high alarm values; it is an area of equal value above and below the alarm values. When the input voltage passes below the deadband area, this is the alarm point that triggers a low alarm transmission. Likewise, when the input voltage passes above the deadband area, this is the alarm point that triggers a high alarm transmission.
Debounce filter	Debounce is an optional filter that applies to alarms. The filter uses the entered value as the number of seconds an input channel must remain in an alarm state before the unit transmits an alarm. The purpose of the filter is to prevent short spurious noise pulses from triggering an alarm. If the input channel goes out of alarm during the polling cycle, the unit resets and does not transmit an alarm. When Debounce is set to zero (0), no filter is applied and the alarm state is recognized immediately.
HI, HI Rpt, LO, LO Rpt	Abbreviations for alarm labels high, high repeat, low, and low repeat respectively.
IMEI	International Mobile Equipment Identity. Unique number assigned to the digital cellular radio by the manufacturer for identification purposes.

**Table C-1. Glossary (continued)**

Term	Definition
LED	Light Emitting Diode. Status indicator.
Persistence	<p>Persistence is the number of samples an input channel must complete while in a particular state before that state is recognized as an alarm.</p> <p>For example, if an input channel is set up with a high alarm and a persistence value of 5, the input channel must complete 6 samples in a high state before it is recognized as a high alarm.</p>
PCR	Polarization Cell Replacement. A solid-state device designed to simultaneously provide DC decoupling and AC continuity/grounding when used with cathodically protected structures, such as pipelines, tanks, grounding systems, and cable casings.
P/S	Pipe to Soil (or Pipe to Structure).
Radio ISN	Radio Identification Serial Number. The SkyWave satellite terminal and Bullhorn unit ship from the factory as a matching pair. Both are assigned the same ISN by AI for identification purposes. Also see <i>Unit ISN</i> .
Radio Version	Version number assigned to an analog cellular radio by the manufacturer. The UCT software displays "n/a" (not applicable, not available) for digital cellular and satellite unit types.
Response Filter Time	<p>Optional filter for input channels set up in analog mode. The response filter slows the unit's response to sudden changes in the input signal. The purpose of the filter is to help eliminate false alarm transmissions in unstable environments that have a tendency to produce temporary noise</p> <p>Input channels include hardware filters suitable for rectifier outputs such as those used in line-powered CP systems. Response Filter Time applies a response time to the input channel in addition to a hardware filter response. Actual response time may vary based on variables such as the current input voltage level and position of the unit's polling cycle.</p>

Table C-1. Glossary (continued)

Term	Definition
RSSI	<p>Receive Signal Strength Indicator. RSSI value and green or red status bar are static indicators of the last RSSI reading. Clicking <b>Auto Update</b> forces the UCT to display a “live” RSSI reading. The RSSI value should meet the following qualifications:</p> <p>RM4012 units use an RSSI scale of 0.00dB to 50.00dB. RSSI of 14dB and higher indicates a strong signal; levels below 14dB indicate no satellite communication.</p>
Serial No.	Unique serial number assigned to the unit at the factory for identification purposes.
SIM	Subscriber Identity Module. Unique identification number assigned to the digital cellular radio by the service provider.
Status Indicators, UCT	<p>UCT software includes the following three (3) status indicators in the bottom, right hand side of the main configuration screen:</p> <ul style="list-style-type: none"> <li>■ Green/red indicator: Green indicator remains lit when running UCT. After transmitting a test packet, green indicator begins flashing. Green indicator changes to a flashing red indicator when communication cannot be established with the network.</li> <li>■ Yellow indicator: Flashes when unit transmits data.</li> <li>■ Black indicator: Not currently used.</li> </ul>
Transmission Schedule	Scheduled data transmission at regular time intervals.
Transmit	Click the Transmit button to force the unit to send a test packet for communications testing. Status messages display beside the button to describe the process, such as Test Packet Status, Preparing, and Sending test packet.
Transmit Retries	Number of times the unit resends a data or alarm packet when an acknowledgment is not received from the communication network.
UCT	Universal Configuration Toolkit. Software program used to configure a unit for service and view status information such as channel measurements, battery voltage level, and RSSI.
Unit ISN	Unit Identification Serial Number. The Bullhorn unit and SkyWave satellite terminal ship from the factory as a matching pair. Both are assigned the same ISN by AI for identification purposes. Also see <i>Radio ISN</i> .

**Table C-1. Glossary (continued)**

<b>Term</b>	<b>Definition</b>
Update/Auto Update	Click Update to display a current reading for all input channels. Click Auto Update to automatically display a current reading every 16 seconds.
USB	Universal Serial Bus. Communication protocol used by a computer for communications with an externally connected device.

# Index

---

## **Symbols**

.NET framework  
installing 5

## **A**

AC Monitor Reset LED 12, 15  
AC monitors 3  
ActiveSync 32  
Alarms 36  
Analog readings 39  
Antistatic wrist strap 2  
Auto Update 22, 53

## **B**

Banana jack 26, 27, 29  
Battery installation date 34  
Battery type 34  
Bullhorn information line 10

## **C**

Channel setup 36  
Clicking 21  
Controller clock 35, 51  
CP Coupon connector 27  
Current Density Transducer 26  
    channel configuration (analog)  
        39  
    channel configuration (millivolt)  
        36

input specifications 11  
installing 26  
wiring diagram 14

Current Transducer  
    Selectable 45

## **D**

Deadband 38, 40, 51  
    disabling 40  
Debounce filter 42, 51  
Digital Input  
    channel configuration 41  
    input specifications 11  
Digital readings 41

## **E**

Enclosure  
    dimensions 15  
    mounting 15  
Equipment warranty 11  
ESD precautions 2  
Event log 43

## **F**

Find devices 32  
Fuse  
    replaceable 15

## **I**

IMEI 51  
Input channels 11

Installation site qualifications 14

## L

LED 12

AC Monitor Reset 12, 15

Radio Power 12, 15, 21, 22

Lightning strikes 11

## M

Main configuration window (UCT)  
33

Millivolt readings 36

Mounting

enclosure 16

pipe bracket 16

u-bolt 16

## P

P/S

channel configuration for AC  
volts 36

see Pipe to Soil 11

Packet

transmit 35

PCR 45

channel configuration (analog)  
39

channel configuration (millivolt)  
36

input specifications 11

Persistence 38, 40, 52

disabling 40

Pipe bracket 16

Pipe to Soil 11, 52

channel configuration for DC or  
AC volts 39

input specifications 11

test station connector 27

## R

Radio ISN 52

Radio Power LED 12, 15, 21, 22

Read unit settings 33

Response filter 52

RSSI 53

## S

Satellite terminal 22

direction 15, 22

location 15

Scale 37, 38, 39, 40

Selectable Current Transducer 45

wiring diagram 14

Serial number

unit 53

SIM 53

Site survey 14

Solar panel 23

Status indicator 52

See also LED

Status indicator, UCT 53

## T

Technical support 10

Template

folder 34

loading 33

saving 44

Test packet 53

transmit 43

Test station 26

terminal board 27, 29

Transducer

See also Current Transducer or  
Current Density Transducer

Transmission schedule 35, 53

Add Delay 35

repeat 35

Transmit packet 35, 53

Transmit retries 53

## U

U-bolt 16

UCT software 4, 53

installation 5

installing 6

starting 32

Status Indicators 53

Universal Configuration Toolkit. See  
UCT software  
Update  
    auto update 53  
USB 54  
USB Config port 12

USB driver  
    installing 7

## W

Wiring diagram  
    transducers 14









<http://www.aiworldwide.com/>  
12211 Technology Blvd. • Austin, TX 78727  
Phone: 512-249-3400 • Fax: 512-249-3444  
Part No. 122180-000, Rev. 0 • September 16, 2011