SoundAdvisor™
Model NMS045

Permanent Noise Monitoring System
Reference Manual

LARSON DAVIS
A PCB DIVISION

Larson Davis

SoundAdvisor™ Model NMS045
Permanent Noise
Monitoring System

Reference Manual

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For warranty information, refer to the **Larson Davis Product Warranty**.

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Chapter 1 System Overview

The SoundAdvisor™ Model NMS045 Permanent Noise Monitoring System includes coordinating instruments permanently mounted on a vertical, steel pole, which work together with the 831C sound level meter to provide long-term, outdoor, sound level monitoring.

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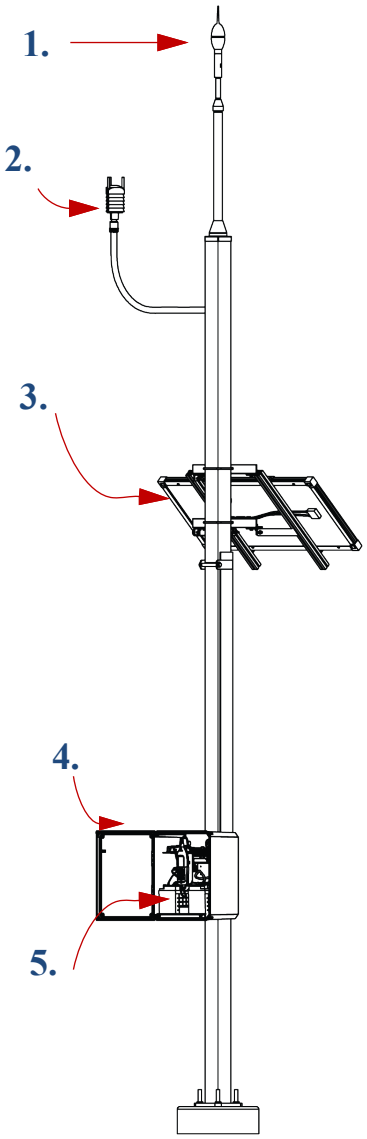
Figure 1-1 NMS045 System and Features

The foundation is poured, the pole mounted, and the protective outdoor case (EPS045) is installed by a local contractor according to specifications on the associated Larson Davis mechanical drawing.

1. **Reliable acoustic measurement** The SoundAdvisor Model 831C sound level meter measures area sound by using a prepolarized microphone and preamplifier that are environmentally-protected in a shroud.
2. **Data options** An accessory weather sensor (optional) can provide additional data on the site conditions and help you identify sources of noise.
3. **Power options** A solar panel (optional) effectively charges the 12 V battery as needed to power the system continuously without interruption. Alternatively, an AC power source keeps the battery charged.
4. **Secure instruments** A durable, lockable outdoor case (EPS045) protects the battery(ies), the charge controller, antennas, cellular gateway, and sound level meter. The case's anti-theft feature sends an email alert notification via the gateway whenever the door is opened.
5. **Connectivity** When included, the RV50X cellular gateway enables you to access the 831C to view and download data from a PC or mobile device any time. Ethernet or WiFi connections are also an option.



1.1 System Contents

In this section, review your system contents to identify items received.

NMS Systems: Outdoor Equipment for Environmental Noise Monitoring

Your permanent outdoor noise monitoring system may include any of the following kits. *Figure 1-2* and *Table 1.3* describe each kit.

Figure 1-2 Images of NMS045 System Contents

Table 1.3 Description of SoundAdvisor 831C Permanent NMS Kits (831C-045)

Contents	Kits to Order ----> 831C-045-AC	831C-045-S	TRP019-B TRP019-S
1. SoundAdvisor 831C Sound Level Meter (831C) with Firmware Options 831C-ELA, 831C-LOG, 831C-SW	X	X	
2. G4 LD Utility Software & Manual	X	X	
3. Preamplifier & microphone (PRM2103-FF)	X	X	
4. Outdoor microphone protection (EPS2116)	X	X	
5. Mounting plate for NMS equipment	X	X	

Table 1.3 (Continued)Description of SoundAdvisor 831C Permanent NMS Kits (831C-045)

Contents / Kits to Order ---->	831C-045-AC	831C-045-S	TRP019-B TRP019-S
6. Cables & Adapters: SLM cables Ethernet + USB Hub (DVX013) USB power cable for USB Hub (CBL235)	X	X	
7. Solar cables: Solar Charger (CBL226-03) Solar panel cable (CBL223-12)		X	
8. Outdoor Mic Adapter (ADP100)			X
9. Mounting pipe (426A12-NPT)			X
10. Tilt-down pole (TRP019)			X
11. MasterLock and key			X

Table 1.4 Description of Cellular Gateway Kits (COM-RV50X-045)

Contents / Kits to Order ---->	COM-RV50XNA/EU	COM-RV50XAPAC	EPS045-AC	EPS045-S
1. RV50X cellular gateway with GPS antenna (COM-RV50X)	X	X	X	X
2. High-gain antennae with cables (COM-ANT-HG)	X	X	X	X
USB cable (CBL218)	X	X		
3. RV50X power cable with intrusion detection (CBL231)	X	X		

Figure 1-5

Table 1.6 Description of Mountable Equipment Case Kits (EPS045)

Contents / Kits to Order ---->	EPS045-AC for AC power	EPS045-S for solar power	EPS045-AC-OPT1	EPS045-S-OPT1
1. Weather resistant, mountable case	X	X	X	X
Surge suppressor	X		X	
2. Durable mounting hardware (OPT1)			X	X
3. Adapter for EPS kits (1.5 to 0.75 pipe adapter)			X	X

Figure 1-7

Table 1.8 Description of Weather Sensor Kits

Contents / Kits to Order ---->	SEN031-045	SEN032-45	TRP019-W TRP019-WS
1. Weather sensor (SEN031)	X		
Anemometer (SEN032)		X	X
USB to serial adapter (DVX018)	X	X	
Weather sensor mounting adapter (ADP101)	X	X	
20-foot sensor power/connection cable (CBL229-20)	X	X	
2. Weather mount (TRP012)			X

Figure 1-9

Table 1.10 Description of Battery Kits

Contents / Kits to Order ---->	BAT019-45	BAT020-45
1. 45 Ah LiFePo battery (BAT019)	X	
2. 35 Ah SLA battery (BAT020)		X
Battery cable with fuse (CBL244)	X	X
Power extension cable (CBL232-02)	X	X

Figure 1-11

Table 1.12 Optional Accessories

Items to Order ----> / Contents	PSA040	PSA043	SLP003	TRP019-W TRP019-WS	PSA041	EPS043-BAND
1. Charger for SLA battery(PSA040)	X					
2. Charger for LiFePo battery (PSA043)		X				
3. Solar panel & support bracket (SLP003)			X			
4. Weather sensor mount (TRP012)				X		
5. AC power supply (PSA041)					X	
6. Security band for equipment box (EPS043-BAND)						X

1.2 Optional Accessories

Hardware

- 32 GB USB Flash Storage (831-MEM32G)
- Precision Acoustic Calibrator (CAL200)

Firmware

Sound Recording Firmware (831C-SR)

The optional Sound Recording firmware upgrade enables you to make event-based and manual sound recordings in WAV or OGG format. Recordings are stored in the measurement data and can be shared via email.

Scheduling Firmware (831C-SCH)

The optional Scheduling firmware upgrade (831C-SCH) enables you to conserve system power and data usage while conducting measurements based on a repeatable weekly schedule with schedule blocks for the following functions:

- Meter Run, Stop, Store
- Specific Measurement Trigger Levels
- Alert Notifications
- RV50X Modem Low Power

All features of the firmware option are accomplished by using G4 LD Utility software. For more information, contact your sales representative or see the *SoundAdvisor 831C Manual,* Module 6, which is available on the included Larson Davis USB drive.

Software

LD Atlas App for Mobile

With an established cellular connection, you can use the LD Atlas app to communicate with the SoundAdvisor™ 831C SLM. LD Atlas is available for Android® from the Google Play Store®, or for IOS® from the iTunes Store®[1]. To install the app: open the app store on your mobile device, search for “LD Atlas,” and follow the prompts.

1. See the inside front cover of this manual for trademark information.

1.3 Wiring Diagram

The following diagram shows the system with all available options, including both solar and AC power options. At least one battery is needed to run the system.

Figure 1-13 System Wiring Diagram

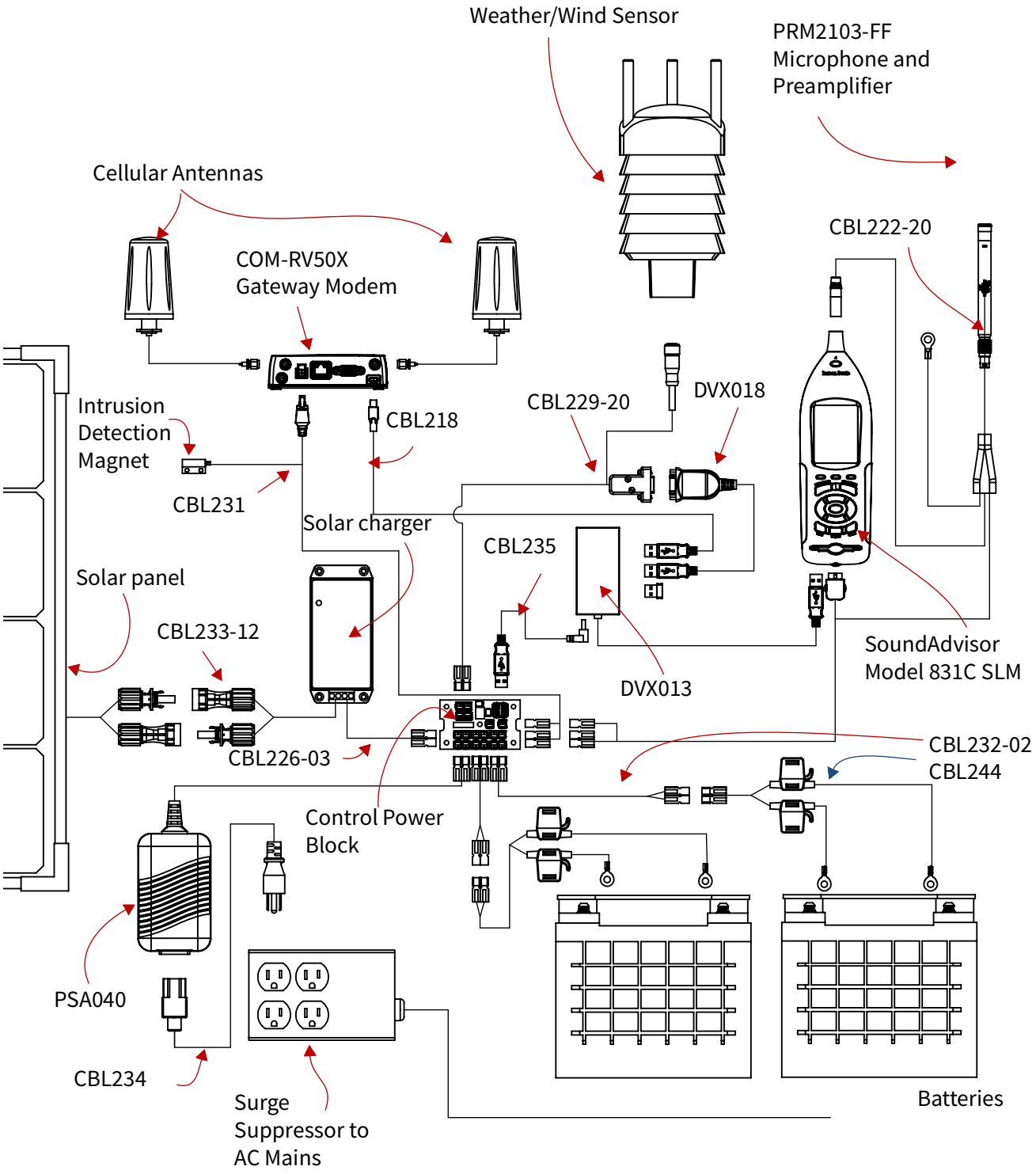
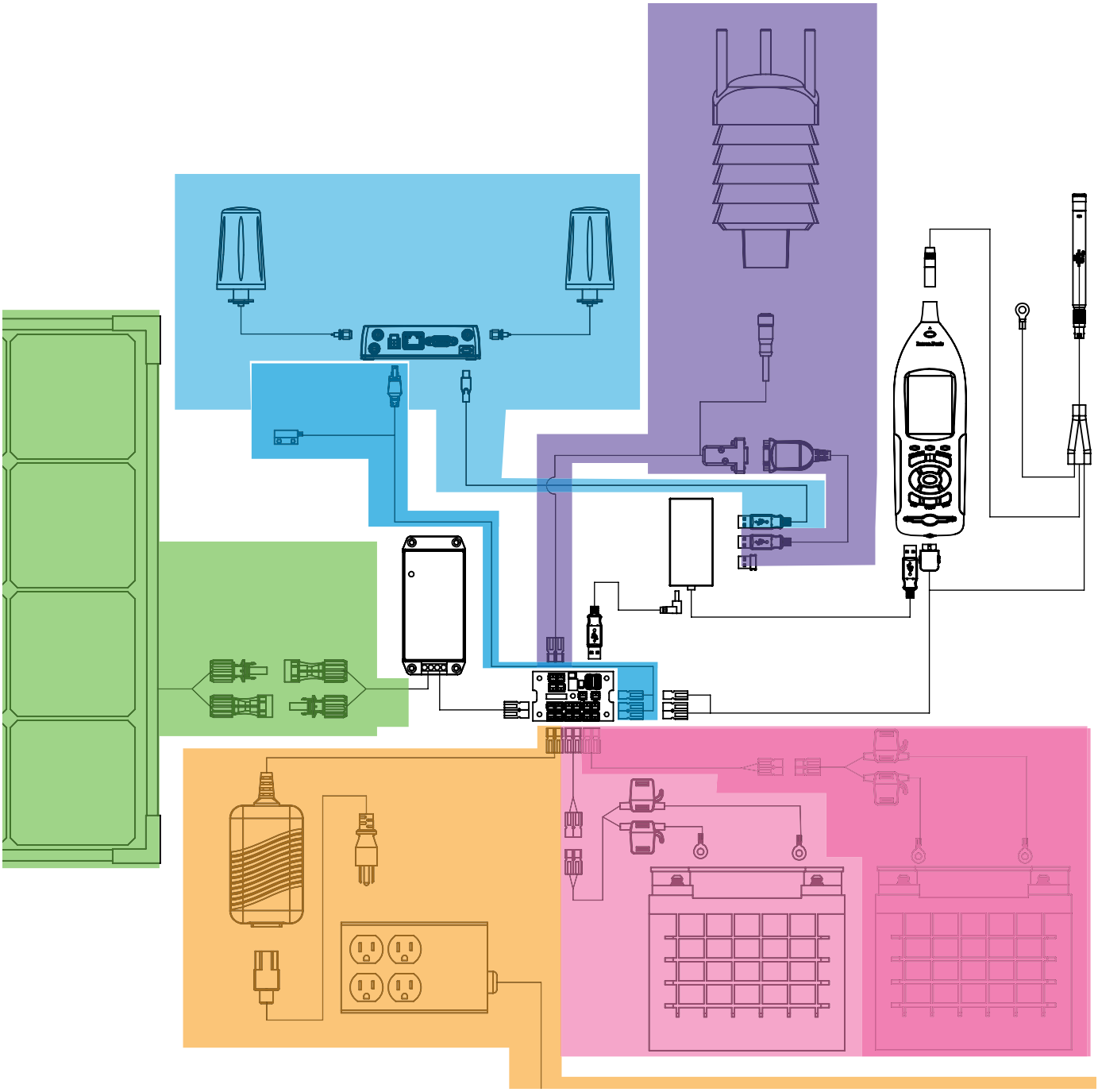


Figure 1-14 is color -coded to show each option with components.

- Blue - COM-RV50X-045NA/EU:APAC Cellular Gateway
- Purple - SEN031-045, SEN032-045 Weather/Wind System
- Green - Solar Powered System
- Orange - AC Powered System
- Pink - Batteries, one or two
- No color - 831C-045 base system for the NMS045

Figure 1-14 System Wiring Diagram - Options



1.4 Understanding NMS045 Power Consumption

The NMS045 system draws DC power from a connected battery when not powered via solar panel, wall outlet, etc.

Estimating Power Consumption

To estimate how much power your system requires per 24 hours, use the formula shown in *Figure 1-15*.

Figure 1-15 Formula for Average Watt-hours Used Per Day

$$P_{24hr} = 24\ (1.3\ W + \frac{t}{24}\ (2.05\ Watts))$$

t = time, in hours, that the modem is powered on

To estimate the system run time in days, based on the available battery power, calculate the following:

Figure 1-16 Formula for Days of Available Battery Power in Watt-hours

$$\text{Estimated Run Time (days)} = \frac{\text{Battery (Wh)}}{(P_{24hr} \times 2)}$$

Battery Capacity (Wh):
BAT020: 35 Ah SLA Battery = 420 Wh
BAT019: 45 Ah LiFPo Battery = 540 Wh

"2" = 50% safety factor to account for battery temperature effects and aging

Making the Most of Your Sunlight Hours

For best results, we encourage you to take advantage of the most daylight and direct sun for the area of deployment. The EU Science Hub's Solar Radiation Tool can provide an estimate of how your system performs in a particular location based on radiation data gathered for that location in the recent past.

Step 1. Visit the European Commission EU Science Hub's **Photovoltaic GIS (PVGIS)** website.

Step 2. Select the Solar Radiation Tool, then select a location on the map.

Step 3. Choose the **Off-Grid** tab, enter the following parameters, then click **Visualize Results**.

- **Installed Peak PV Power** (**100 W** or **60 W**, depending on your solar panel)

- **Battery Capacity** (BAT021, LiFePo battery = **540 Wh;** (BAT 019, SLA battery = **420 Wh**)
- **Discharge cutoff limit** is **10%**
- **Consumption per day** = 80 Wh (typical)
- Enter the **Slope** of the solar panel, and the **Azimuth**. To find the azimuth, do the following:

  a. Open this link for the **NOAA ESRL Solar Position Calculator**.

  b. Enter the **City** or the **coordinates** of the NMS system and click **Calculate Solar Position**.

  c. The **Solar Azimuth** value – 180 = **Azimuth**. Enter this value in the Solar Radiation Tool.

Step 4. Select the **Performance** view. The result should have no red bars (days with no battery power). Select the **Battery State** view. A desirable result shows the battery is not fully discharged at any time.

Step 5. To adjust for better results, adjust the **Slope** of the solar panel, or adjust the system location and **Azimuth**.

Recommended Next Step:

- **Chapter 2 Getting Started**

Chapter 2 Getting Started

Before installing the components of the NMS045 system, you will need to complete several “first use” procedures such as making cable connections, and configuring remote communication and the sound level meter as described in this module.

In this module:

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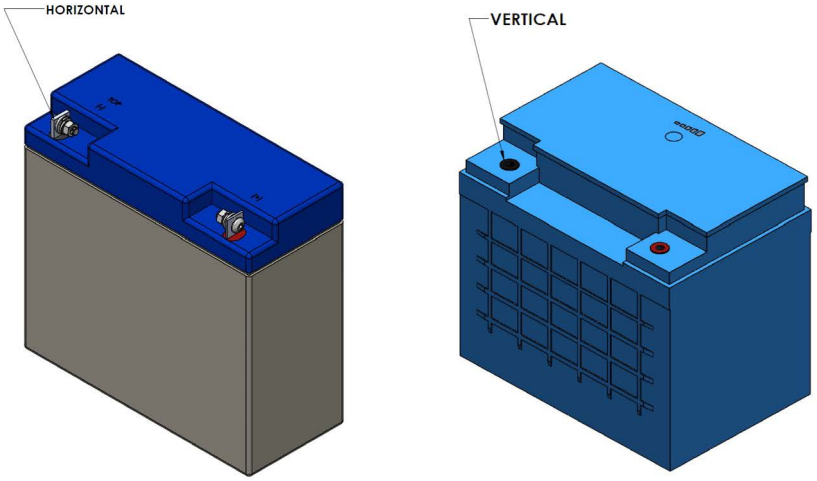
2.1 Preparing the Battery

The battery cables ship separately from the battery. Follow the appropriate section that matches your battery connections:

2.1.1 Preparing the Vertical Connection Battery

2.1.2 Preparing the Horizontal Connection Battery

Figure 2-1 Battery Connection Types



2.1.1 Preparing the Vertical Connection Battery

Step 1. First, verify the terminal insulator caps are placed over the CBL244 cable, red over the red cable, black over the black cable.

Figure 2-2 Insulator Caps

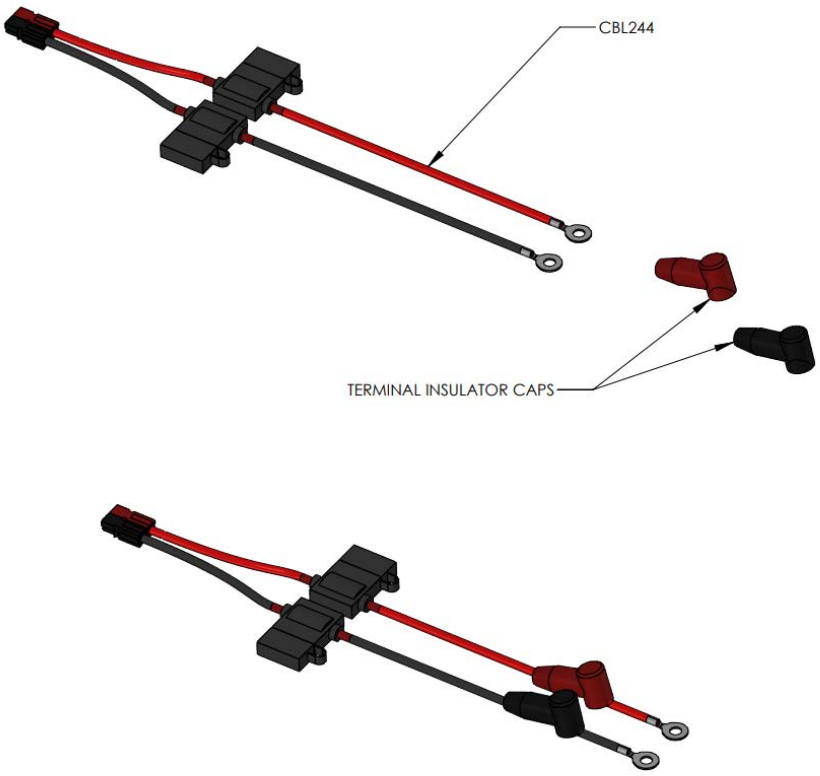
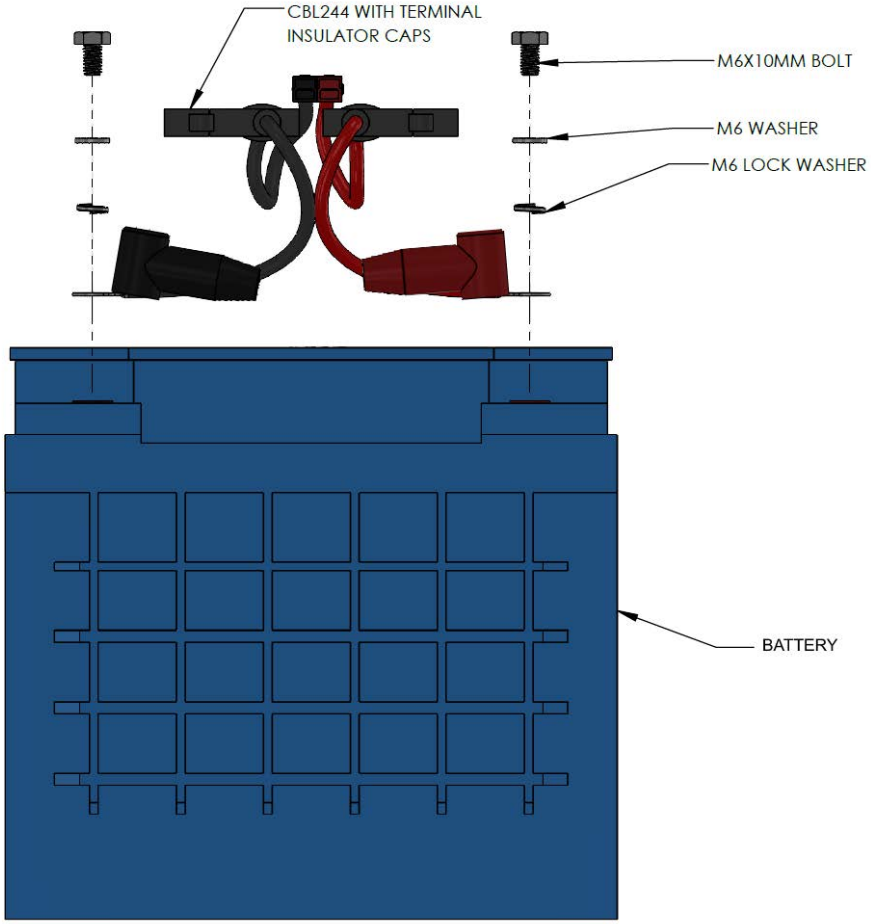


Figure 2-3 Vertical Connection Battery Cable Installation



Step 2. Using the included hardware, place the M6 washers on the M6 bolts

Step 3. Place the M6 lock washers on the M6 bolts

Step 4. Connect the positive (red) CBL244 cable to the positive battery terminal and the negative (black) cable to the negative battery terminal. Screw the bolts in hand tight.

Figure 2-4 Battery with Cables

Step 5. Charge the battery prior to installation by using the battery charger recommended for your battery type.

CAUTION If you are using two 12 V batteries, ensure both batteries are fully charged before installation. You risk blowing a fuse if one is depleted and one is

charged. The batteries cannot have more than 1 V difference in charge when connected.

2.1.2 Preparing the Horizontal Connection Battery

Step 1. Put the M5 bolts through the ring terminals on CBL244.

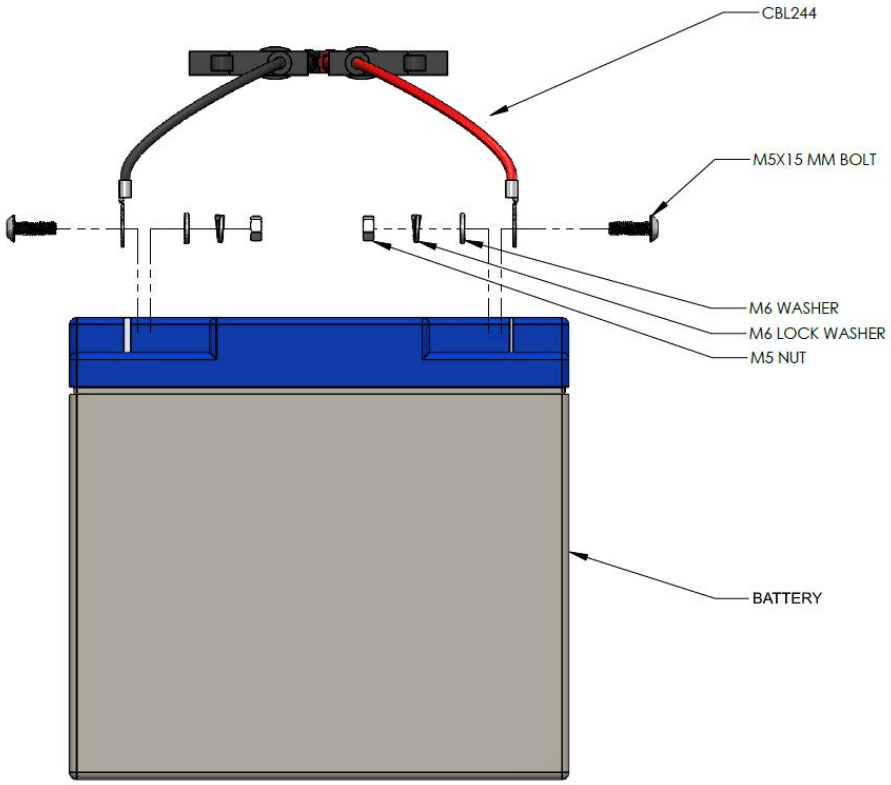
Step 2. Put the bolts through the appropriate terminal of the battery (red cable to positive, black cable to negative).

Step 3. Place the M6 washers on the bolts.

Step 4. Place the M6 lock washers on the bolts.

Step 5. Tighten the M5 nuts on the bolts.

Figure 2-5 Horizontal Connection Battery Cable Installation



Step 6. Charge the battery prior to installation by using the battery charger recommended for your battery type.

If you are using two 12 V batteries, ensure both batteries are fully charged before installation. You risk blowing a fuse if one is depleted and one is charged. The batteries cannot have more than 1 V difference in charge when connected

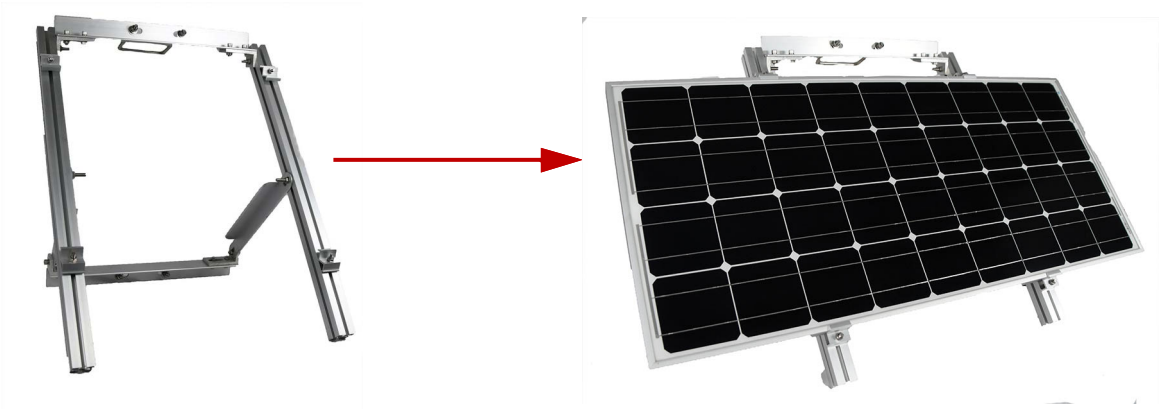
2.2 Assembling the Solar Bracket

If the solar panel is part of your system, complete this section.

Step 1. Assemble the bracket and mount the solar panel following the manufacturer's instructions included with the SLP003 Solar Panel and Mount (MTS-SP100).

TAKE NOTE While round U-bolts come with the bracket, use the square U-bolts that come with the pole (TRP019) when mounting the solar bracket to the pole.

Figure 2-6 Solar Panel with Bracket



Step 2. Ensure that the angle of the panel on the bracket is close to the desired angle on the pole. To do this, you will need to calculate the solar tilt for the deployment location and adjust the bracket angle throughout the year to obtain optimal sunlight exposure.

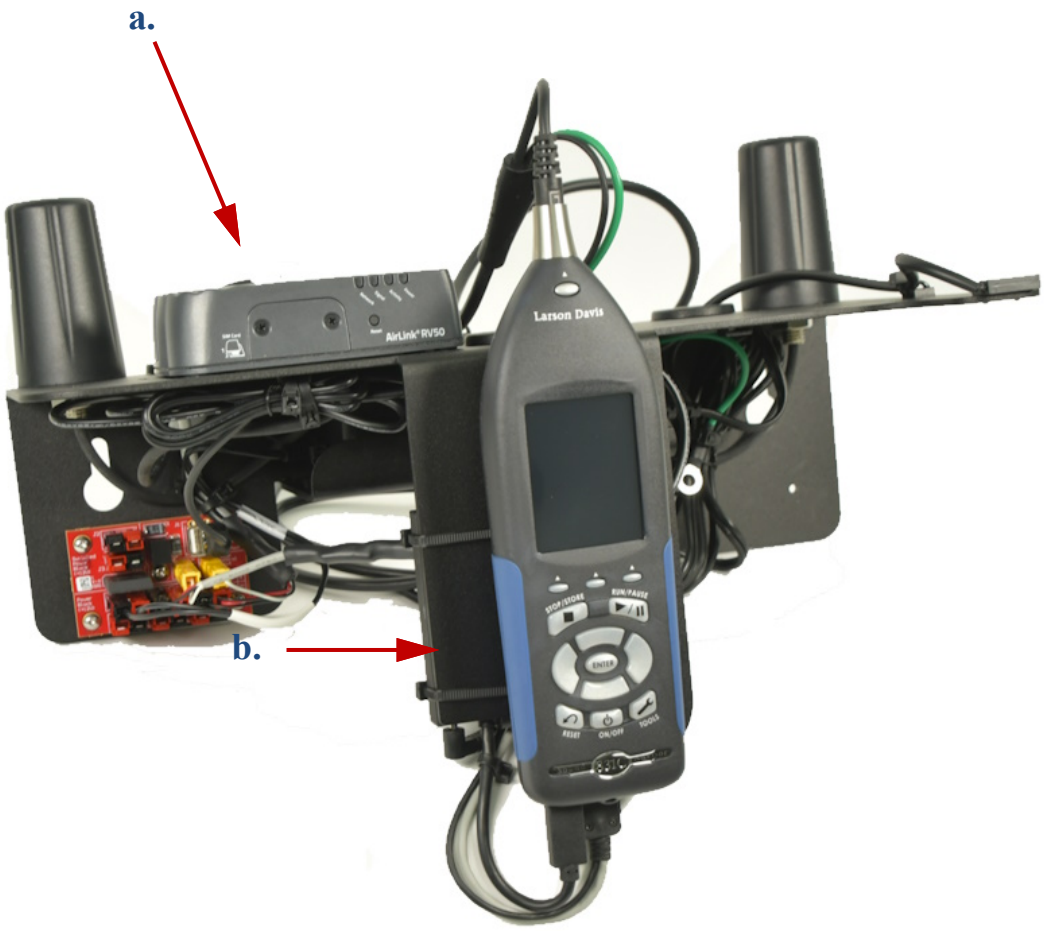
LEARN MORE To calculate solar tilt, etc., see **"Making the Most of Your Sunlight Hours" on page 9**.

2.3 Assembling Main Plate and Components

Your NMS045 system arrives partially assembled. This section describes the final assembly procedure.

Step 1. Mount the separate components of the system as shown in *Figure 2-7*.

Figure 2-7 831C-045 Assembly



a. Attach the gateway through the holes in the main plate by using the 2 included screws and lock nuts.

b. Mount the 831C SLM by using the 2 included front screws. Please note that setting the 831C cables on a horizontal surface may damage them.

c. The cables can be left bundled together as shown.

2.4 Establishing Service for the Gateway

Establishing cell service for the gateway includes purchasing a SIM card with cellular service and installing it. As indicated in this section, you can also opt to have Larson Davis install and activate the SIM when your system is prepared at the factory.

2.4.1 Purchasing Cellular Service

Review this section prior to purchasing cell service.

The NMS044 system requires a SIM card with a data plan. SIM cards should be configured with a static IP address or alternatively with a dynamic IP address used in conjunction with the optional SoundLink service, as described in this section. Where available at an affordable price, we recommend using a SIM card configured with a static IP address.

Step 1. When shopping for a cellular provider, verify that the service supports a public, static IP address and that incoming connection requests are not blocked.

If this type of SIM card and service is available, move to the next step; if not, we recommend the SoundLink online hosting service. This enables you to establish a secure connection to your gateway(s) using any IP address on a virtual private network (VPN). See **2.7 "Using SoundLink" on page 29**, or contact Larson Davis, or your representative, for more information about this subscription-based service.

Step 2. Purchase a SIM card with the following features:

- A data plan sufficient for the system's data usage

The amount of data your system requires is variable. For most applications, 4 GB per month is sufficient. While precautions have been taken to prevent high data use, the NMS system doesn't regulate data use. Significant charges may occur if the purchased data amount is exceeded.

- No messaging/voice is needed.

Step 3. If your SIM card is configured with a static IP, request the APN (Access Point Name) from your cellular provider. You will need it later in the process to configure your system for remote use.

TAKE NOTE If you would like Larson Davis to install the SIM and configure remote communication along with your equipment order, mail your SIM card, contact information, and APN (if applicable) to the following address:

NMS System Configuration
Larson Davis Manufacturing Center
1681 West 820 North
Provo, Utah 84601 USA

Recommended next step:

- If Larson Davis is configuring your system, move to **2.5.1 "Configuring Intrusion Detection" on page 23**. Otherwise, move to **2.4.2 "Installing the SIM Card" on page 18**.

2.4.2 Installing the SIM Card

With the system powered off, install the SIM card as shown here.

Step 1. Using the Phillips #0 screwdriver, unscrew the 2 screws holding the front SIM card door closed.

Step 2. Insert your card into the top slot (SIM Slot 1) until it clicks.

Step 3. Replace the screws and secure the door closed.

Figure 2-8 RV50X Sim Card Slot 1

2.5 Connecting the Gateway to Cellular Service

This section shows how to use your PC to connect the gateway to cellular service and verify that the service is working properly.

When you purchase a cellular gateway from Larson Davis, we modify its original configuration to conserve power, increase security, and provide additional services. The following list describes how the system is prepared for your use:

Enhanced Power Savings

- Ping response is disabled to prevent unauthorized traffic (hackers) from repeatedly accessing the gateway—a potential source of wasted power
- Ethernet and serial ports are disabled to conserve power

Security Enhancements

- SSH and DMZ Host are disabled, which increases system security by blocking potential sources of unauthorized access
- The gateway routes HTTPS communications through the secure HTTP socket to prevent unauthorized “listening”
- The gateway uses a unique port for local, and for remote access, to discourage unauthorized access

Additional Services

- With an installed GPS antenna, the gateway streams the GPS location (local time streams when at least 4 satellite signals are available)/

Part 1: Logging In

Step 1. Ensure the gateway is connected to the antennas. They should be connected to the ports marked **Cellular** and **Diversity** (see *Figure 2-9*).

Figure 2-9 RV50X Gateway Antennae Ports

Step 2. Connect the system to one of the following power sources:

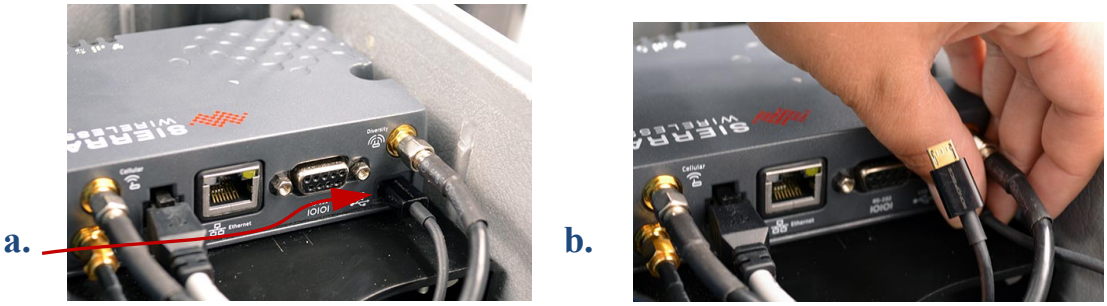
- Connect a 12 V battery to the power block on the connection line marked **Power Block** using the CBL231.
- Disconnect the **DC Power** cable on the gateway and connect to a power outlet using the included external power cable.

Step 3. Connect the gateway to your PC as shown in *Figure 2-10*.

Figure 2-10 Connecting to RV50X

a. On the back of the RV50X, unplug the mini-B USB.

b. Plug the included USB cable into the back of the RV50X, and connect the other end to your PC.

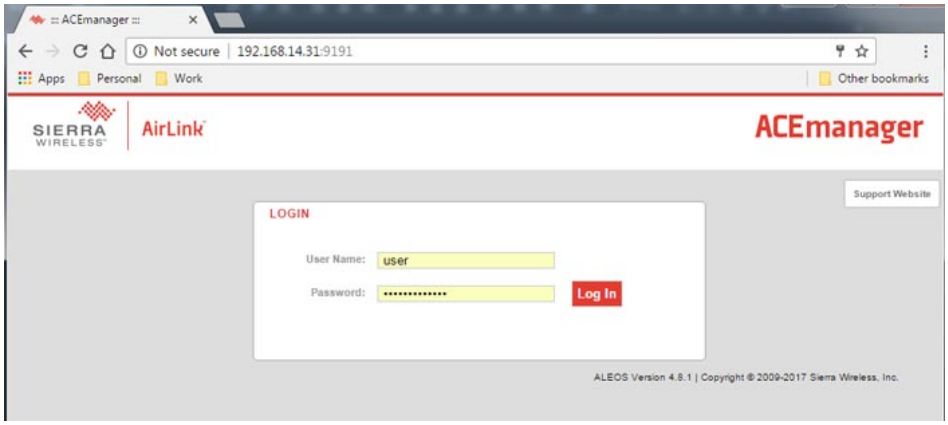


Step 4. Open a web browser on the connected PC, and navigate to **http://192.168.14.31:9191**. This is the ACEmanager configuration console.

Step 5. Log in to ACEmanager as "**user**" with the password "**LD_NMSystem16**".

TAKE NOTE If the login doesn't work, verify that the LD settings are loaded as shown in **2.8 "Configuring the Gateway for Larson Davis Instruments" on page 29**.

Figure 2-11 User Login

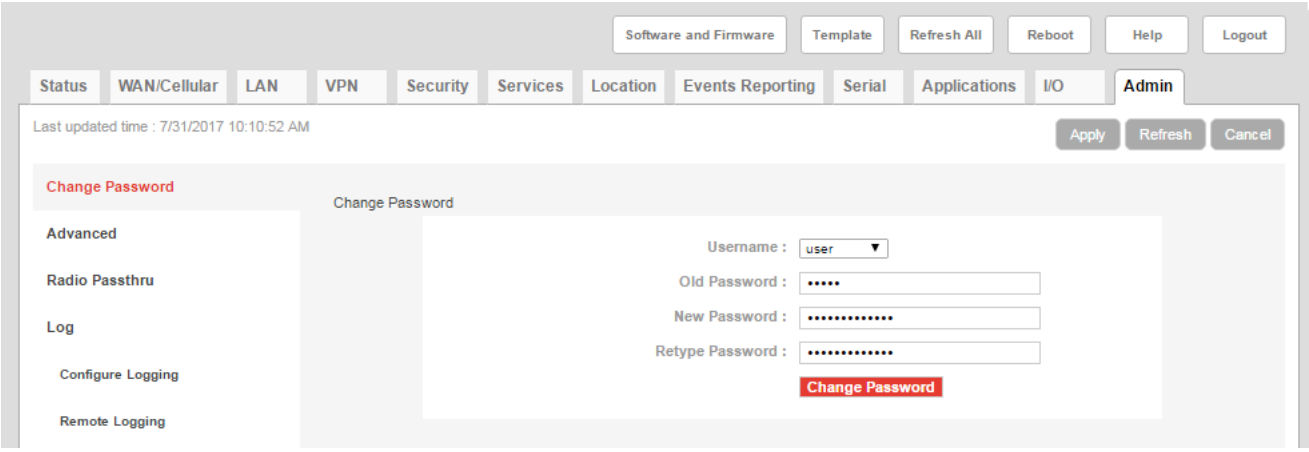


Step 6. Change the password as shown in steps 6a–d.

Changing Your Password

a. Navigate to the **Admin** tab, enter "**user**," and then "**LD_NMSystem16**" as the **Old Password** as shown in *Figure 2-12*.

Figure 2-12 Admin Tab



b. Enter a unique password in **New Password**, and again in **Retype Password**.

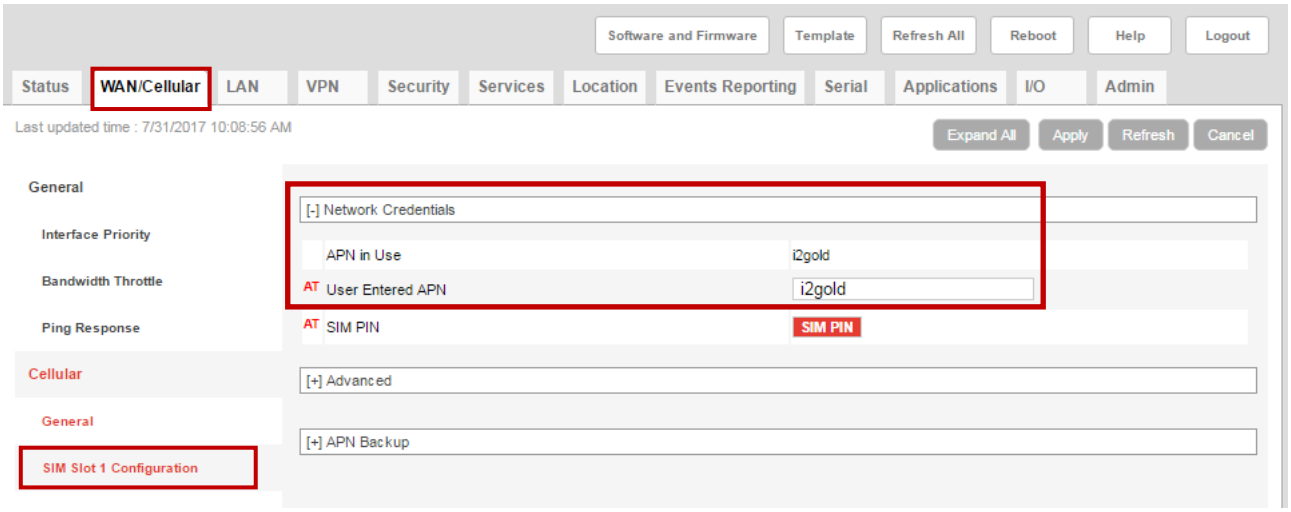
c. Record your password. If you forget it you will need to reset the gateway to factory settings and reconfigure.

d. Click **Change Password**, then click **Apply**.

Part 2: Editing Settings for Remote Communication

Step 1. Navigate to **WAN/Cellular** ⇢**SIM Slot 1 Configuration** and expand the **Network Credentials** menu by pressing the **+** icon.

Figure 2-13 WAN/Cellular



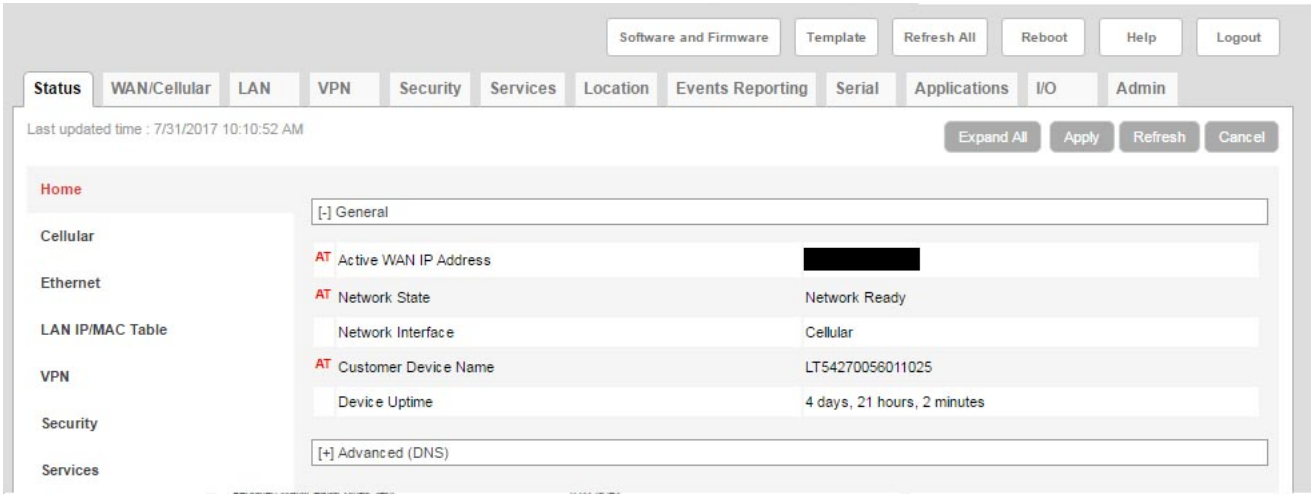
Step 2. Enter the APN provided by your cellular provider in the **User Entered APN**.

Step 3. Click **Apply**, then click the **Reboot** button.

Step 4. Login again, and choose the **Status** tab.

Step 5. In the **Home** section, the **Network State** field should say "Network Ready**.**"

Figure 2-14 Status



Step 6. If your system relies on a static IP address, verify that the **Active WAN IP Address** matches the static address given to you by your cellular provider, as shown in *Figure 2-14*. If you're using SoundLink, the **Active WAN IP** should match your SoundLink IP address.

Step 7. Set up a Trusted IP (Friends) list to promote system security. When this is enabled, only the IP addresses on this list can connect to the gateway. This prevents IP addresses not on the list from accessing your system and reduces

power consumption resulting from unauthorized users repeatedly attempting to connect.

Setting Up the Trusted IP List

a. Click on the **Security** tab, choose **Trusted IP - Inbound (Friends)** from the left pane.

b. Under **Inbound Trusted IP List** (**Inbound Trusted IP** Range) enter the public IP address given to you by your cellular provider, and any other IP address (or address ranges) that should have remote access to the gateway. Contact your local IT professional if you need more information.

c. Set **Inbound Trusted IP (Friends List) Mode** to **Enable**.

Step 8. Click **Apply**, and **Log out** of ACEmanager.

Step 9. **(Optional)** If you are planning to enable the system Intrusion Detection, complete section **2.5.1 Configuring Intrusion Detection** before disconnecting the USB cable and rebooting the system.

Step 10. Disconnect the USB cable from the PC and RV50X, and return the original mini-B USB connector to the RV50X.

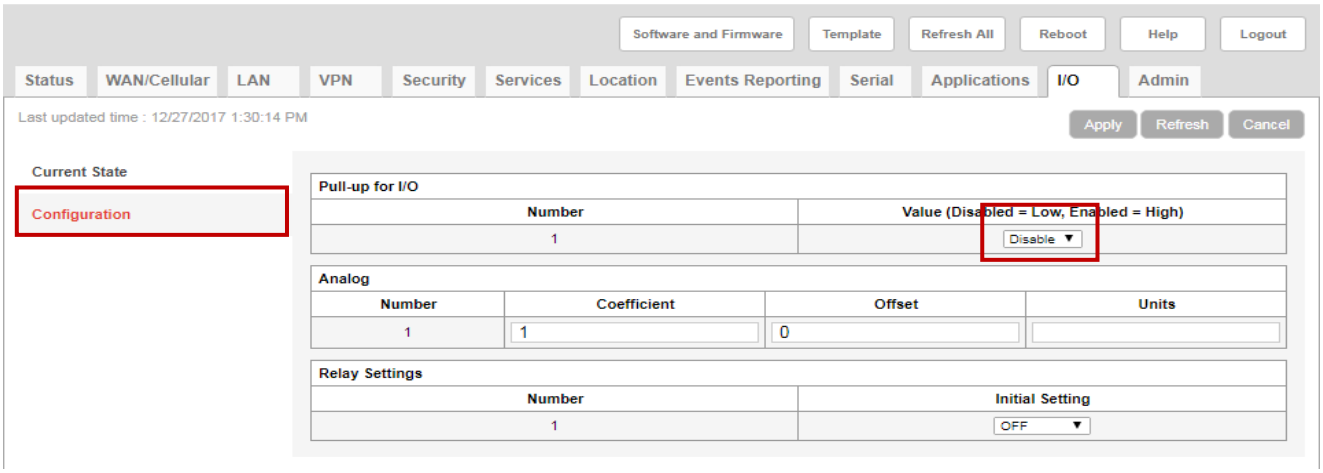
Step 11. Press the 831C ON/OFF button to reboot the system.

2.5.1 Configuring Intrusion Detection

For users of the COM-RV50X-045NA/EU:APAC Wireless Gateway only, the Intrusion Detection feature is available when configured as shown in this section.

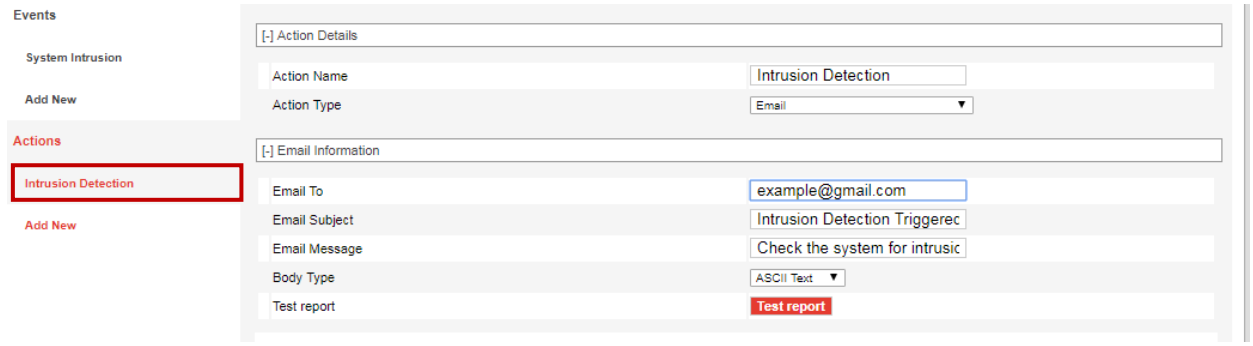
Step 1. On the **I/O** tab, choose the **Configuration** section, set **Pull-up for I/O** to **Disabled** and click **Apply**.

Figure 2-15 I/O Disabled



Step 2. Click the **Events Reporting** tab, and choose the **Intrusion Detection** section.

Figure 2-16 Intrusion Detection Settings



TAKE NOTE If there is no **Intrusion Detection** setting available, this may indicate that the gateway has not been prepared for use with Larson Davis instruments. if this is the case, see **2.8 Configuring the Gateway for Larson Davis Instruments**.

Step 3. Set the **Action Type** to **Email**.

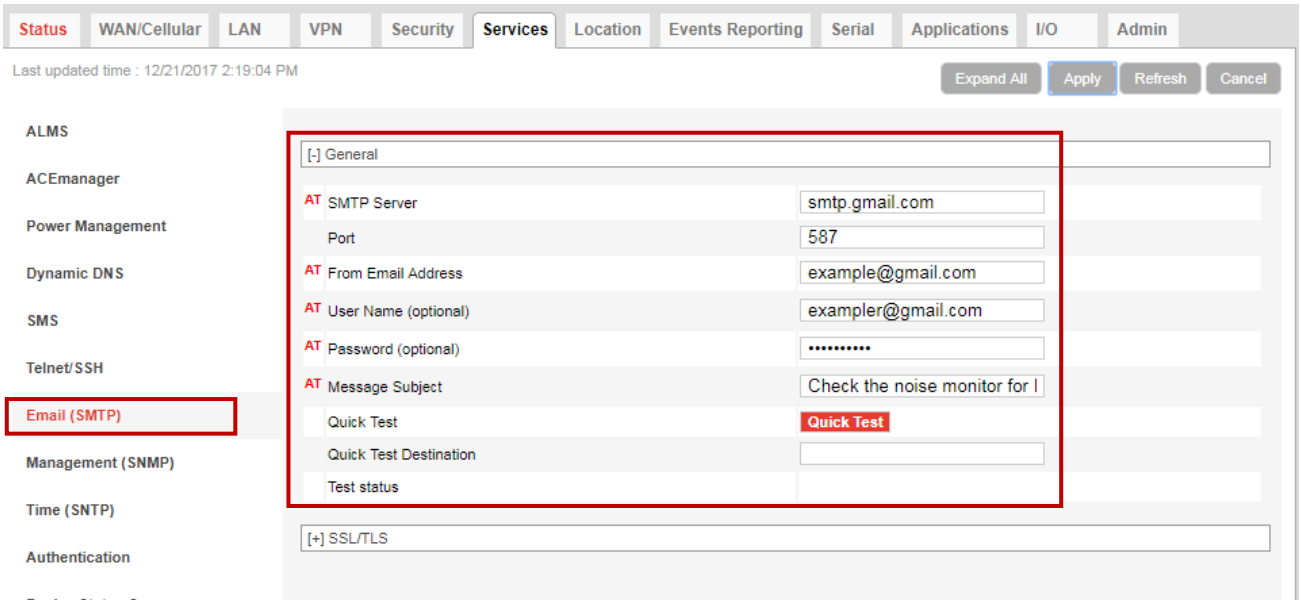
Step 4. Add an email address in the **Email To** field, then enter an **Email Subject** and **Email Message** for the alert notification.

Step 5. Click **Apply** when your alert notification is prepared.

Step 6. Click the **Services** tab, and choose the **Email (SMTP)** section. These settings are used to designate an email server for alert notifications.

TAKE NOTE Figures in this section show an unsecured account (Gmail™[1]) as an example. Contact your IT professional for more information on your specific security or communication needs.

Figure 2-17 Email Settings



1. Trademark and registered trademark information is located on the inside front cover of this manual.

Step 7. Complete all fields in the **General** menu, click **Apply**, then click **Reboot**.

Step 8. In your email client, review and configure any additional security settings. For more information, consult your email provider's documentation, or your IT professional.

Example Only: For the Gmail account shown in this section, the following security settings are required after logging in to Gmail:

a. Go to **My Account** ⇢**Sign-in & security**.

b. Enable the setting **Allow less secure apps**.

Step 9. To send a test email, log in to ACEmanager once again, navigate to **Events Reporting** ⇢**Intrusion Detection**, and click **Test Report**.

2.5.2 Verifying Remote Communications via a Mobile Device

Establishing a connection to the SoundAdvisor™ 831C SLM via WAN or LAN prior to deployment verifies that the service is working properly. This section show how to establish a remote connection using a mobile device. You can also establish this same connection to the 831C SLM using G4 LD Utility on your PC.

Step 1. Download the **LD Atlas** app from the Google Play Store™ (for Android®) or from the iTunes Store™ (for IOS®)[1]. AD Atlas is a mobile version of G4 LD Utility, which enables you to setup and monitor a measurement.

Step 2. Open the app, and tap the **plus icon** in-line with **Meters** in the top left. This opens the **Add New TCP/IP Meter** screen.

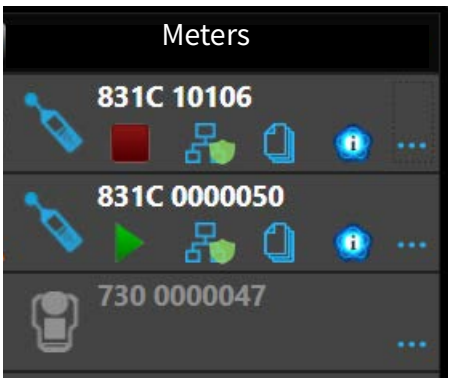
Step 3. Tap to enter a **Name** for the NMS system.

Step 4. Tap to enter the **IP Address/Host Name** from your cellular provider. If you are using the SoundLink IP Hosting service, enter the SoundLink IP address from your enrollment email.

Step 5. Leave the **Password** and **Port** fields blank unless instructed otherwise by your IT professional.

1. Trademark and registered trademark information is located on the inside front cover of this manual.

Step 6. Tap the **blue plus button** to connect. The Add Meter screen closes. If the NMS system and your mobile device have cellular service, the serial number of the 831C displays in the Meters list with a blue meter icon. The meter is connected on your device.



TAKE NOTE The connection may take up to 1 minute to display.

Step 7. Tap on the meter serial number to open the meter screen. From here, you can operate the 831C from the app.

2.6 Configuring SLM Settings On the 831C

Using G4 LD Utility (G4) or LD Atlas—which is G4 for mobile devices—are the fastest, easiest method of configuring your SLM for use in the NMS system. The G4 software enhances the features, flexibility, and ease-of-use of Larson Davis instruments by providing a dependable, intuitive interface for remote or local instrument operation, optional network security, file management, tabular or visual data analysis, and PDF reporting.

This section refers to G4. However, the same configuration capability is available when using LD Atlas on mobile.

In this section:

- **2.6.1 Installing G4 LD Utility**
- **2.6.2 Configuring Basic SLM Settings**
- **Step 5. On the Preferences tab, choose Store from the Auto-Store drop-down menu, then select Close to save your changes.**

2.6.1 Installing G4 LD Utility

G4 LD Utility (G4) software enhances the features, flexibility, and ease-of-use of Larson Davis instruments by providing a dependable, intuitive interface for remote or local instrument operation, optional network security options, file management, tabular or visual data analysis, and PDF reporting.

Step 1. Install G4 LD Utility.

Installing G4

a. On a PC, explore the included Larson Davis USB drive.

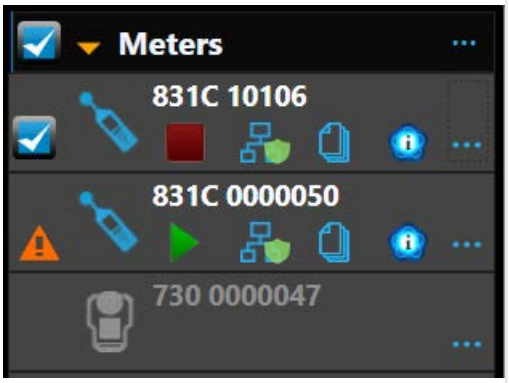
b. Locate and install “LDSetup.exe” in the **G4 LD Utility Software** folder. The program creates a PCB Piezotronics folder on the Start menu and a shortcut to G4 on the Desktop.

Step 2. Launch G4 on your PC.

Step 3. Connect the 831C to a PC via the included USB cable, and press power on the 831C.

Figure 2-18 Connected Meter in G4

A short time after the meter boots up, the serial number of the 831C and a blue meter icon display in the G4 Meters Panel on the left. This indicates that the meter is active and connected.



Recommended next step:

- **2.6.2 Configuring Basic SLM Settings**

2.6.2 Configuring Basic SLM Settings

These recommended settings for 831C help conserve battery power. Using G4 LD Utility — or LD Atlas on mobile— is the fastest, easiest method of configuring your SLM for use in the NMS system.

Step 1. In the G4 Meters Panel on the left, click on the name of your connected meter. This opens a meter tab on the right.

Step 2. Click **Live View icon** → **Tools** menu icon → **System Properties**.

Step 3. On the **Power** tab, we set **Auto-Off Time** to **Never**.

Step 4. Click **Prefer** on the bottom right to open the Preferences tab.

Step 5. On the Preferences tab, choose **Store** from the **Auto-Store** drop-down menu, then select **Close** to save your changes.

2.6.3 Verifying Remote Communications via a Mobile Device

Establishing a connection to the SoundAdvisor™ 831C SLM via WAN or LAN prior to deployment verifies that the service is working properly. This section show how to establish a remote connection using a mobile device. You can also establish this same connection to the 831C SLM using G4 LD Utility on your PC.

Step 1. Download the **LD Atlas** app from the Google Play Store™ (for Android®) or from the iTunes Store™ (for IOS®)[1]. AD Atlas is a mobile version of G4 LD Utility, which enables you to setup and monitor a measurement.

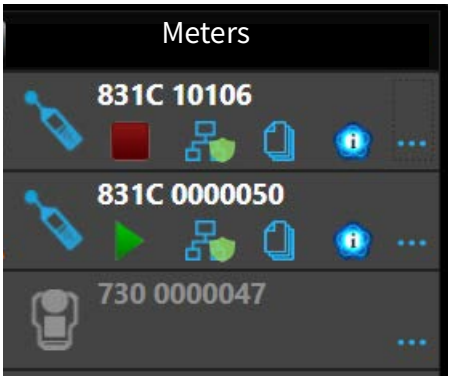
Step 2. Open the app, and tap the **plus icon** in-line with **Meters** in the top left. This opens the **Add New TCP/IP Meter** screen.

Step 3. Tap to enter a **Name** for the NMS system.

Step 4. Tap to enter the **IP Address/Host Name** from your cellular provider. If you are using the SoundLink IP Hosting service, enter the SoundLink IP address from your enrollment email.

Step 5. Leave the **Password** and **Port** fields blank unless instructed otherwise by your IT professional.

Step 6. Tap the **blue plus button** to connect. The Add Meter screen closes. If the NMS system and your mobile device have cellular service, the serial number of the 831C displays in the Meters list with a blue meter icon. The meter is connected on your device.



TAKE NOTE The connection may take up to 1 minute to display.

Step 7. Tap on the meter serial number to open the meter screen. From here, you can operate the 831C from the app.

1. Trademark and registered trademark information is located on the inside front cover of this manual.

2.7 Using SoundLink

SoundLink is an IP hosting service that provides secure communication with your remote noise monitoring systems using a dynamic IP address. This service from Larson Davis simplifies remote communication with your NMS system. It is an alternative to using a public, static IP address from your cellular provider, or a viable solution if one is not available. It works because G4 recognizes SoundLink as a static IP address even though the cell service connects via a dynamic IP address.

> **LEARN MORE** For more information, contact your Larson Davis representative or view the SoundLink manual at LarsonDavis.com.

Larson Davis provides complete gateway configuration plus SoundLink configuration service for new or previously deployed gateways. For previously deployed units without a public, static IP, the SoundLink configuration service requires that you ship the gateway to Larson Davis.

For new systems, if you prefer to configure the gateway for SoundLink service yourself, complete the following steps:

Step 1. Complete the initial gateway setup as shown section **2.5 Connecting the Gateway to Cellular Service**.

Step 2. Complete the SLM setup as shown in section **2.6 Configuring SLM Settings On the 831C**.

Step 3. Complete SoundLink setup as shown in the SoundLink manual. The manual is attached to your SoundLink Plan Details email from Larson Davis. When this process is complete, your new NMS system is ready for deployment.

2.8 Configuring the Gateway for Larson Davis Instruments

Complete this section only if you purchased a new RV50X from someone other than Larson Davis, or if it has been reset to factory defaults.

The RV50X Gateway can only be a functioning communication device if it is configured with the correct settings. Complete the following process to configure your system for use with Larson Davis instruments.

In this section:

- **2.8.1 Logging In to ACEmanager**
- **2.8.2 Configuring LD Settings Using the Template File**
- **2.8.3 Configuring LD Settings Without the Template File**

2.8.1 Logging In to ACEmanager

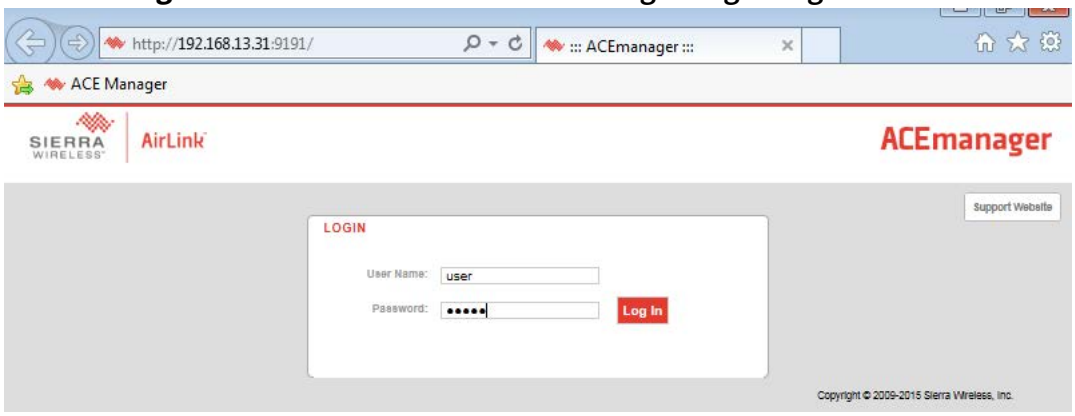
Step 1. Attach the USB to mini-B cable from the PC to the gateway.

Step 2. Open a web browser.

Step 3. Enter **http://192.168.14.31:9191** in the address field.

Step 4. Login as "**user**" with default password "**12345**".

Figure 2-19 Sierra Wireless ACEmanager Login Page



Step 5. Take note of the device's firmware version. If needed, update to the latest version.

Updating Firmware to the Latest Version (Optional)

a. Go to **http://source.sierrawireless.com/**.

b. Select the name of your device, then select **Firmware Package**.

c. If needed, download and update the firmware according to the manufacturer's instructions.

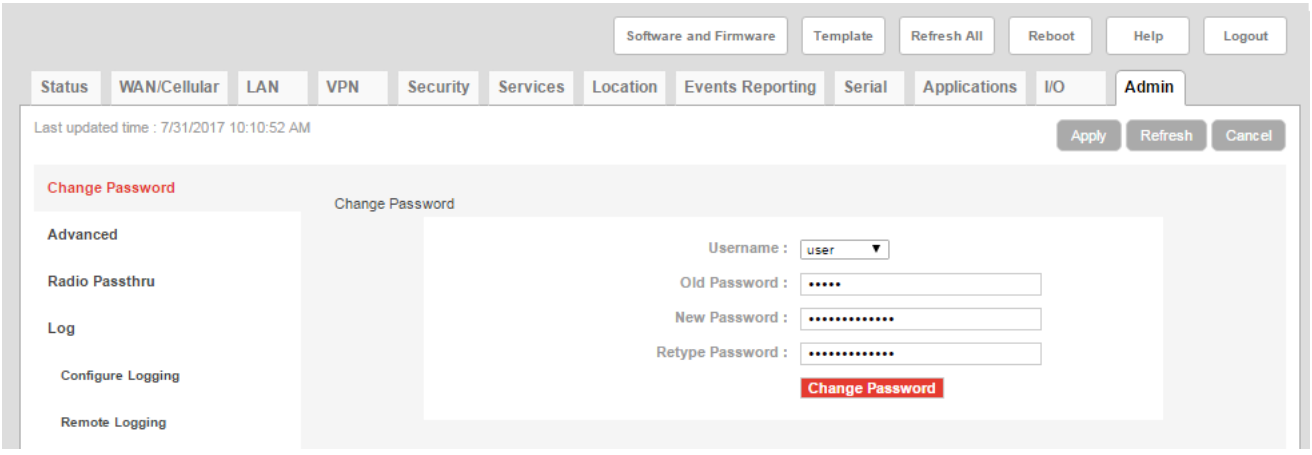
d. Log in again when the system is rebooted.

Step 6. Change your password.

Changing Your Password

a. Navigate to the **Admin** tab, and enter the default password ("12345") in **Old Password**.

Figure 2-20 Admin Page



b. Enter a unique password in **New Password**, and again in **Retype Password**.

c. Record your password. If you forget it you will need to reset the RV50X to factory settings and reconfigure.

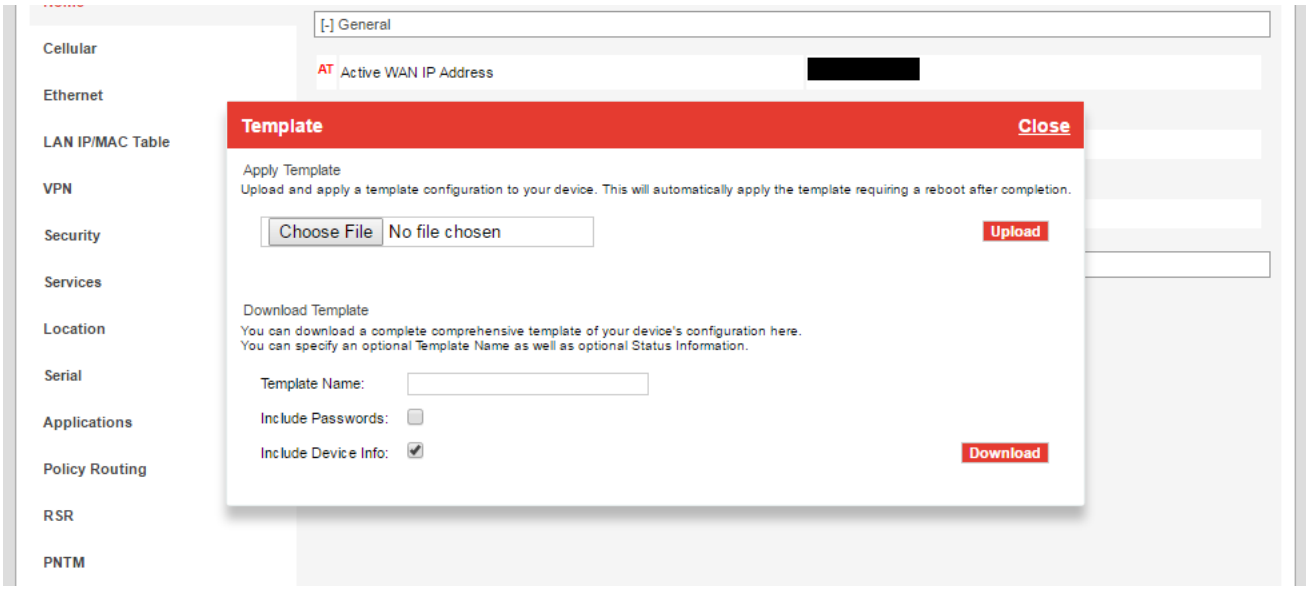
d. Click **Change Password**, then click **Apply**.

2.8.2 Configuring LD Settings Using the Template File

Using the LD Settings Template File is the quickest and easiest way to configure the gateway. However, if you would prefer to manually configure it, see **2.8.3 Configuring LD Settings Without the Template File**.

Step 1. Select **Template** in the top right. This opens the Template upload window.

Figure 2-21



Step 2. Click **Choose File**, select the template file "**RV50XTemplateFile.xml**" from the LD USB drive included with your system, then click **Upload**. If needed, you can also access the file from http://www.LarsonDavis.com.

Step 3. Select **Apply**. The gateway configuration is complete.

Recommended next step:

- **Chapter 3 Installing the NMS System**

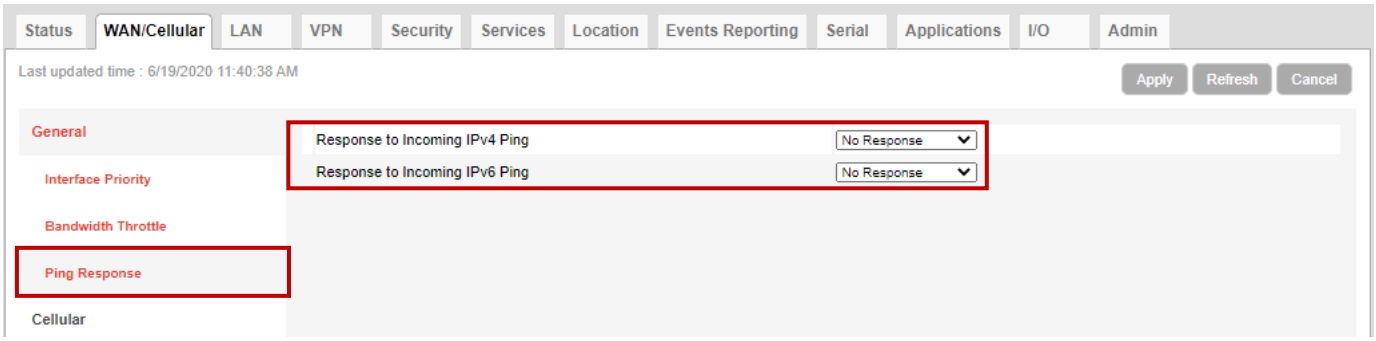
2.8.3 Configuring LD Settings Without the Template File

If you would prefer to manually configure the RV50X instead of uploading the template file, complete this section.

Step 1. Log in to ACEmanager as shown in **2.8.1 Logging In to ACEmanager**.

Step 2. Click the **WAN/Cellular** tab, select the **Ping Response** section in the left pane, and edit the values to match what is shown in *Figure 2-22* and click **Apply**.

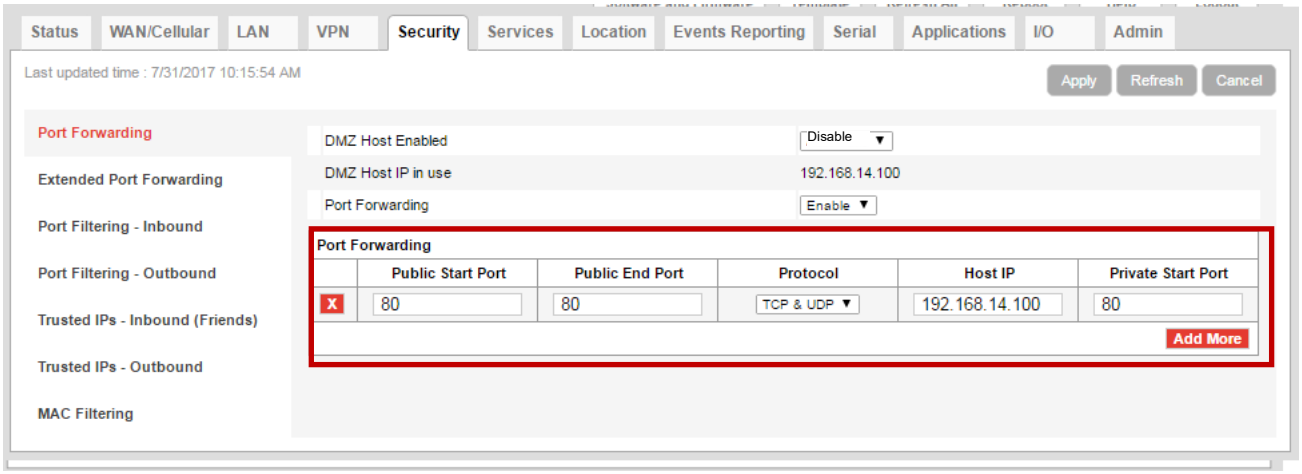
Figure 2-22 Edit the Ping Response



Step 3. Go to the **Security** tab, and select the **Port Forwarding** section in the left pane.

Step 4. Edit the values in the Port Forwarding section to match what is shown in *Figure 2-23*, and click **Apply**.

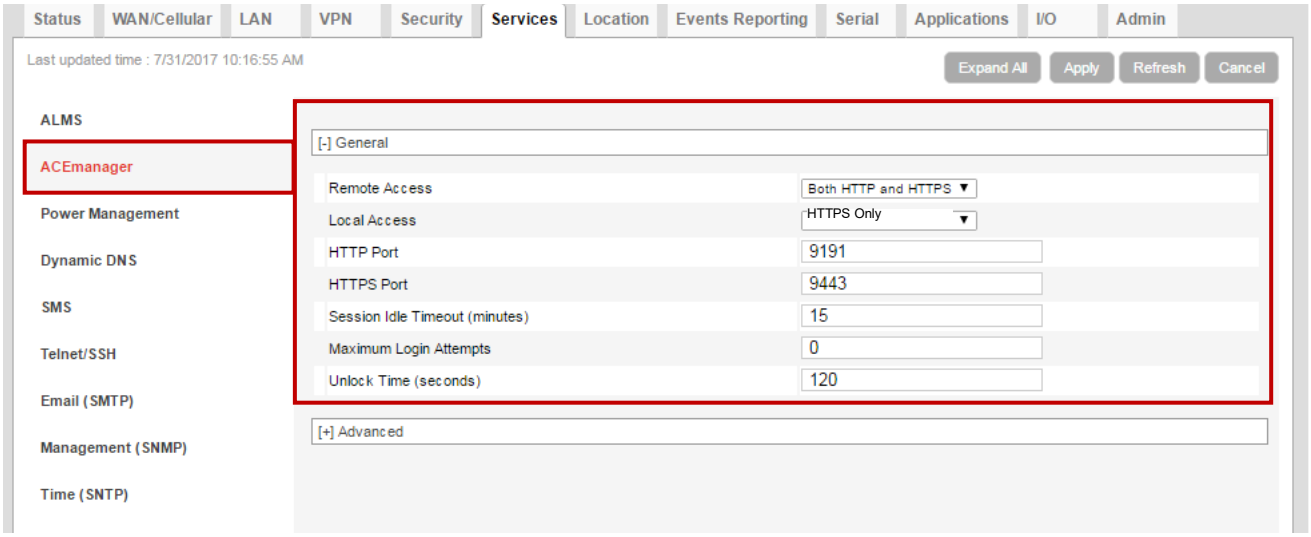
Figure 2-23 Edit Port Forwarding Settings



Step 5. Navigate to the **Services** tab, and in the left pane, select the **ACEmanager** section.

Step 6. Edit the values to match what is shown in *Figure 2-24* and click **Apply**.

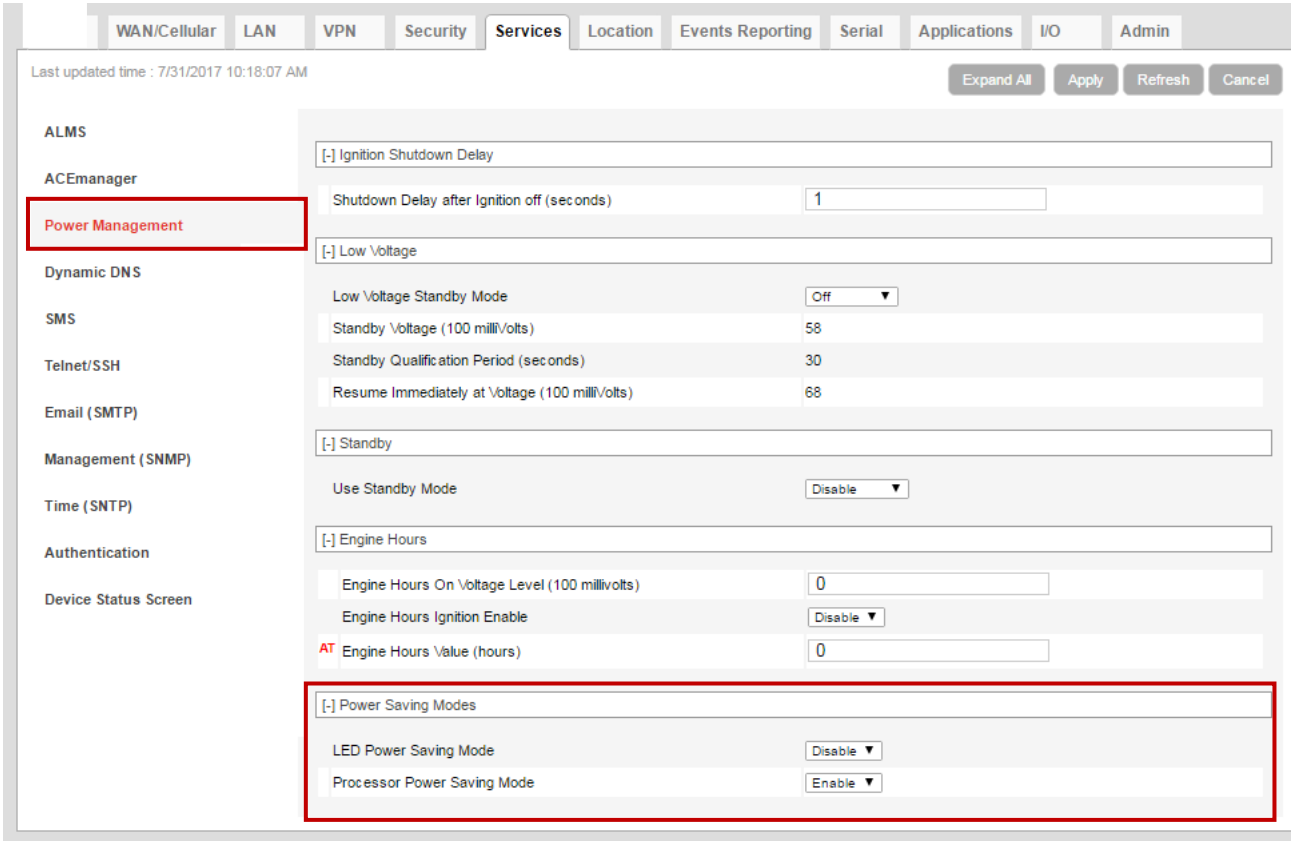
Figure 2-24 Services - ACEmanager



Step 7. In the left pane, click the **Power Management** section, and expand the **Power Saving Modes** menu.

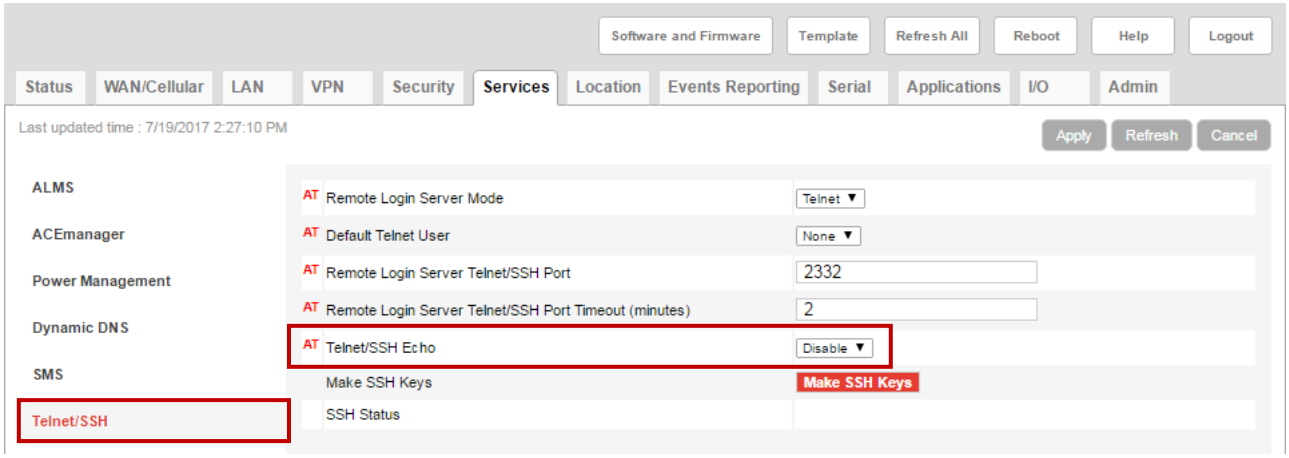
Step 8. From the **Processor Power Saving Mode** drop-down, select **Enable** and click **Apply**.

Figure 2-25 Services - Power Management



Step 9. In the left pane, select **Telnet/SSH**, then set **Telnet/SSH Echo** to **Disable** and click **Apply**.

Figure 2-26 Telnet/SSH

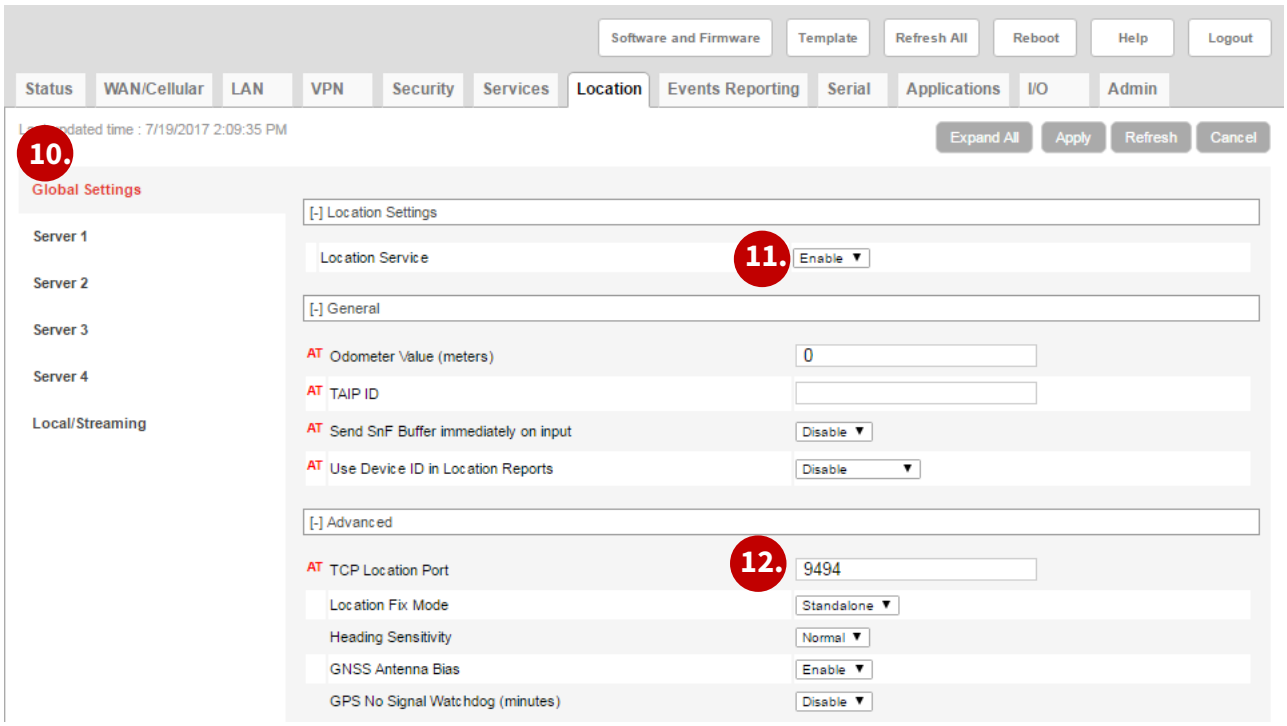


Step 10. Select the **Location** tab, then select **Global Settings** in the left pane.

Step 11. From the **Location Service** drop-down, choose **Enable**.

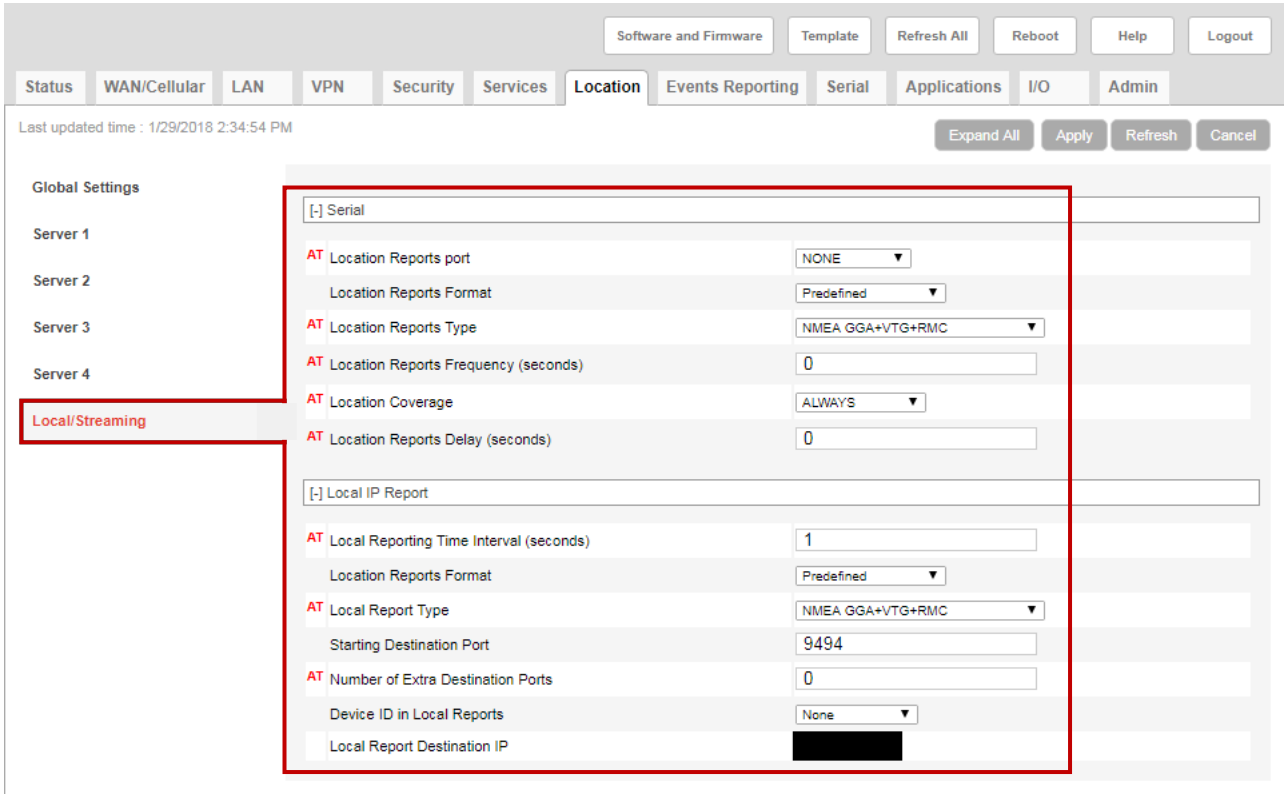
Step 12. Set the **TCP Location Port** to **9494**, and click **Apply**.

Figure 2-27 Location Settings



Step 13. In the left pane, select **Local/Streaming**, modify the values to match *Figure 2-28*, and click **Apply**.

Figure 2-28 Local/Streaming Configuration Values

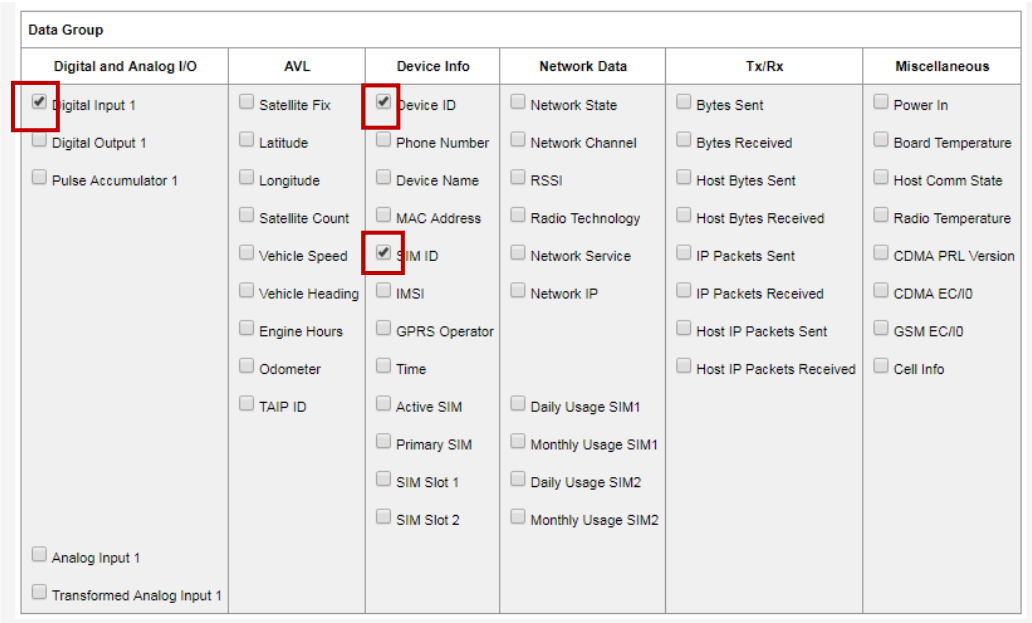


Step 14. Navigate to the **Events Reporting** tab.

Step 15. Change the **Action Name** to be **Intrusion Detection**, and the **Action Type** to be **Email**.

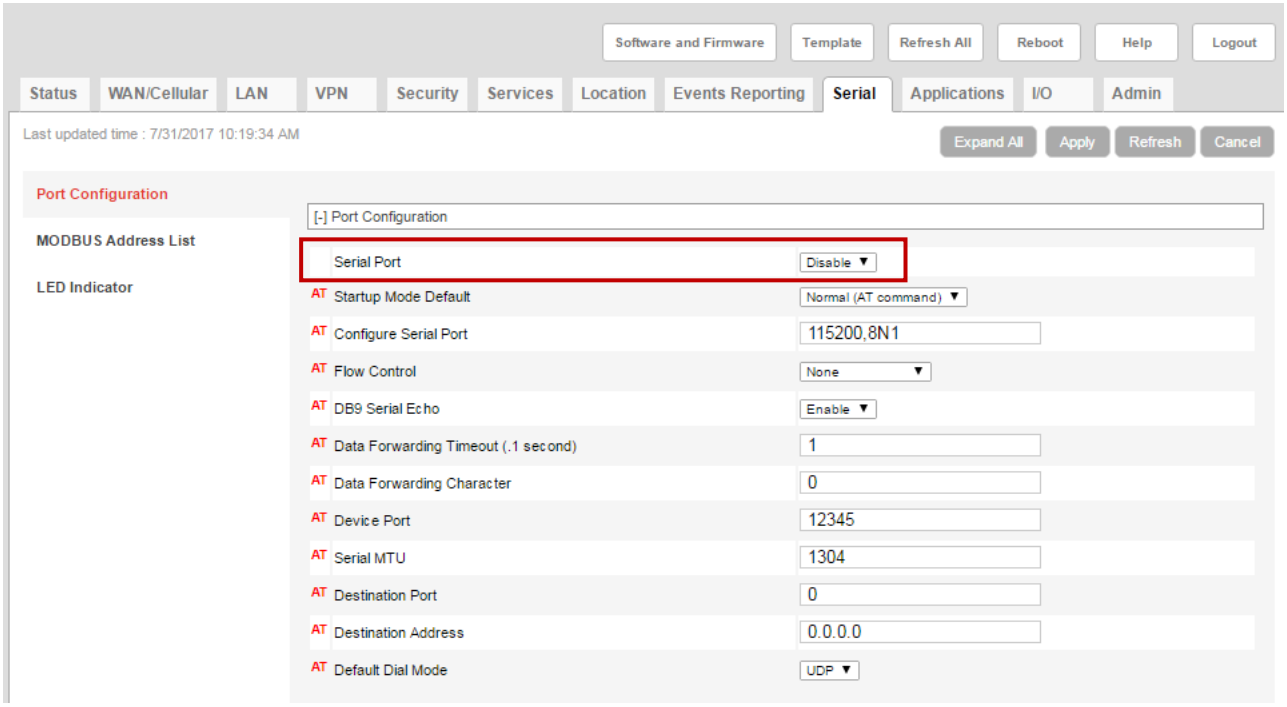
Step 16. In the **Data Group** section on the same page, set the values to match *Figure 2-29*.

Figure 2-29 Data Group Settings



Step 17. Navigate to the **Serial** tab, select **Disable** from the **Serial Port** drop-down menu, and click **Apply**.

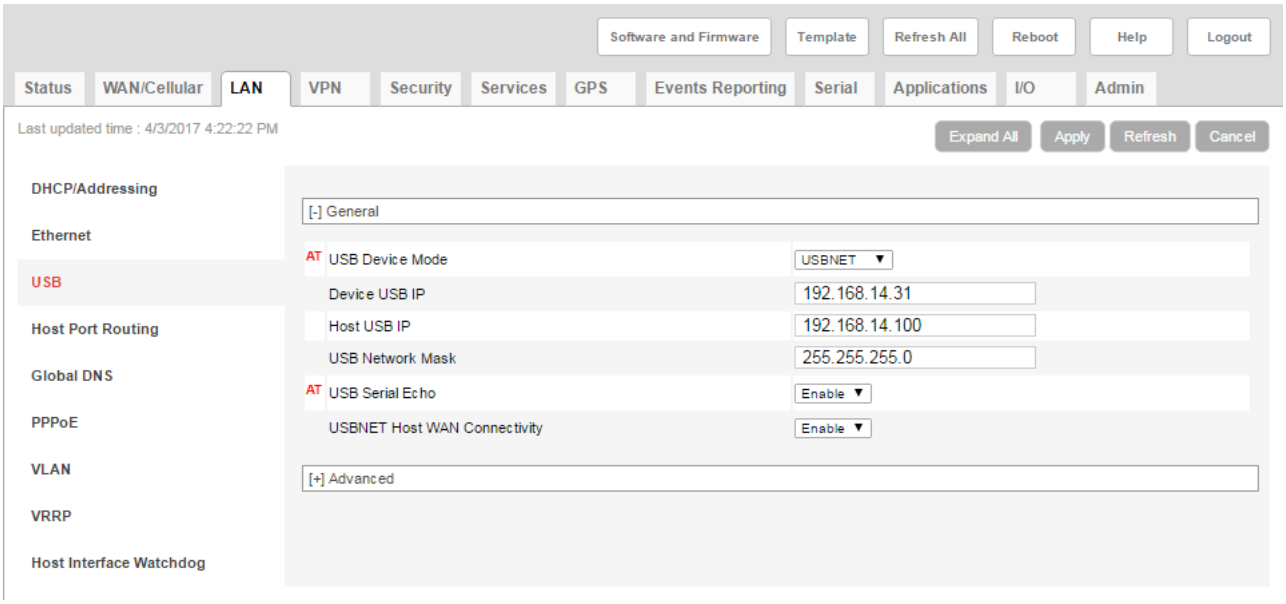
Figure 2-30 Serial Port Settings



Step 18. Navigate to the LAN tab, and select the **USB** section in the left pane.

Step 19. Verify that the settings are as shown in *Figure 2-31*, and click **Apply**.

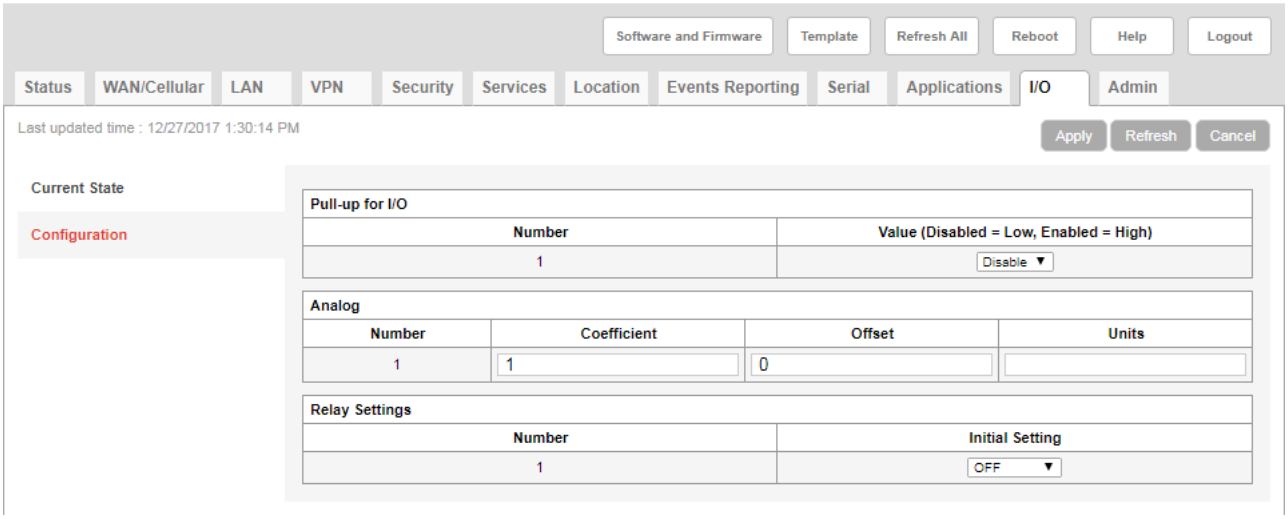
Figure 2-31 USB Port Settings



Step 20. Navigate to the **I/O** tab, and select the **Configuration** section in the left pane.

Step 21. Verify that the settings are as shown in *Figure 2-32*, and click **Apply**.

Figure 2-32 I/O

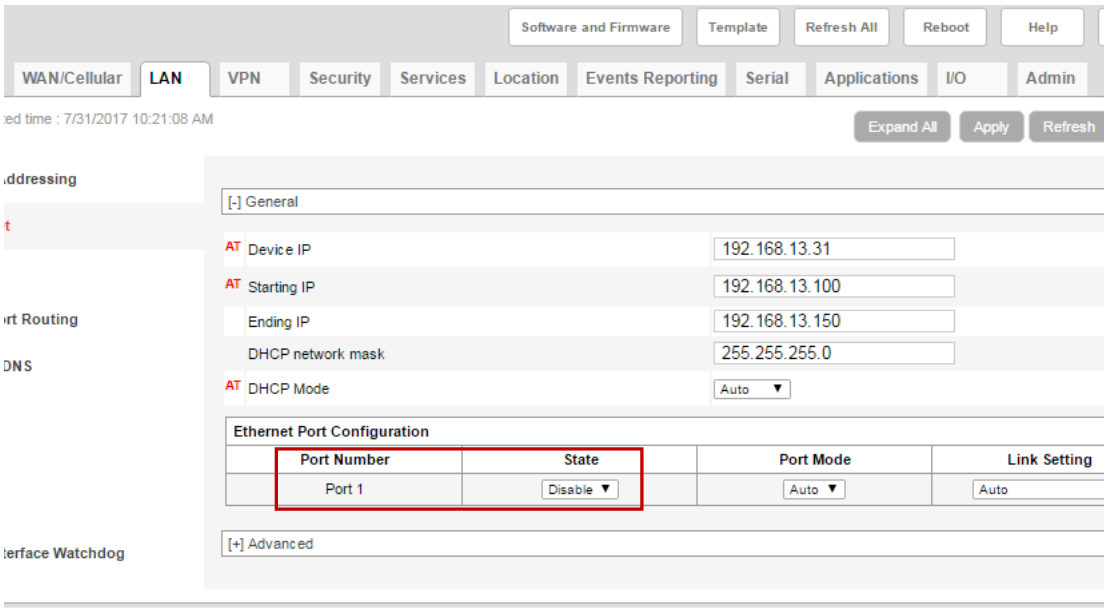


TAKE NOTE After this change you will not be able to connect to the gateway with a wired Ethernet connection. If you need to restore the wired connection without connecting to the gateway through the cellular connection, do a hard reset on the gateway. This resets all items to the factory defaults. If you want to use a cellular connection once again, you will need to repeat this process from step 1.

Step 22. Navigate to the **LAN** tab, and select the **Ethernet** section in the left pane.

Step 23. In the **Ethernet Port Configuration** section, change the **Port 1 State** to **Disable**, and click **Apply**.

Figure 2-33 LAN Settings



Step 24. In the top right of the screen, click the **Reboot** button. The gateway saves your settings and reboots.

Recommended next step:

- **Chapter 3 Installing the NMS System**

Chapter 3 Installing the NMS System

Before installing the NMS system components, you will need to arrange for the pole and box to be installed by a professional contractor. If needed, Larson Davis can provide your contractor with mechanical drawings detailing our recommendations. Contact information is found on the back cover of this manual.

This module describes installing the basic 831C-045 components. For information about installing optional components (weather, solar, etc), see **Chapter 4 Installing Optional Components**. We recommend reading this module before beginning the installation. Complete each section in the order it's presented.

In this module:

3.1 Gathering Required Tools 3-34

3.2 Installing the NMS045 on the Pole 3-34

3.3 Performing a Field Operational Check 3-51

3.4 Securing the Pole 3-52

3.5 Calibrating the 831C 3-52

3.1 Gathering Required Tools

You will need the following tools for installation:

- Ladder for each installer
- 3/4-inch Ratchet or box wrench to open pole (TRP019)
- Electrical wire fish tape
- Tape to help feed cables with fish tape

This list is not comprehensive. Make substitutions as needed.

3.2 Installing the NMS045 on the Pole

In this section:

- **3.2.1 Mounting the Fiberglass Enclosure**
- **3.2.3 Installing the Battery and Main Plate**
- **3.2.4 Routing Cables in the Pole**
- **3.2.5 Connecting the Preamplifier, Microphone, and Mic Protection**
- **3.2.6 Installing Components In the Box**

3.2.1 Mounting the Fiberglass Enclosure

Before you begin:

- Ensure you have tools ready for mounting the enclosure
- Recommend to not install alone
- Choose the appropriate mounting instructions for your system from the following sections:

3.2.1.1 Mounting the Enclosure with an AC System

3.2.1.2 Mounting the Enclosure with a Solar Option

3.2.1.3 Mounting the Fiberglass Enclosure OPT1 (non standard pole)

3.2.1.1 Mounting the Enclosure with an AC System

Step 1. Place the bushings into the support plate

Step 2. Push bushings through enclosure wall and add sealing washers between enclosure wall and pole

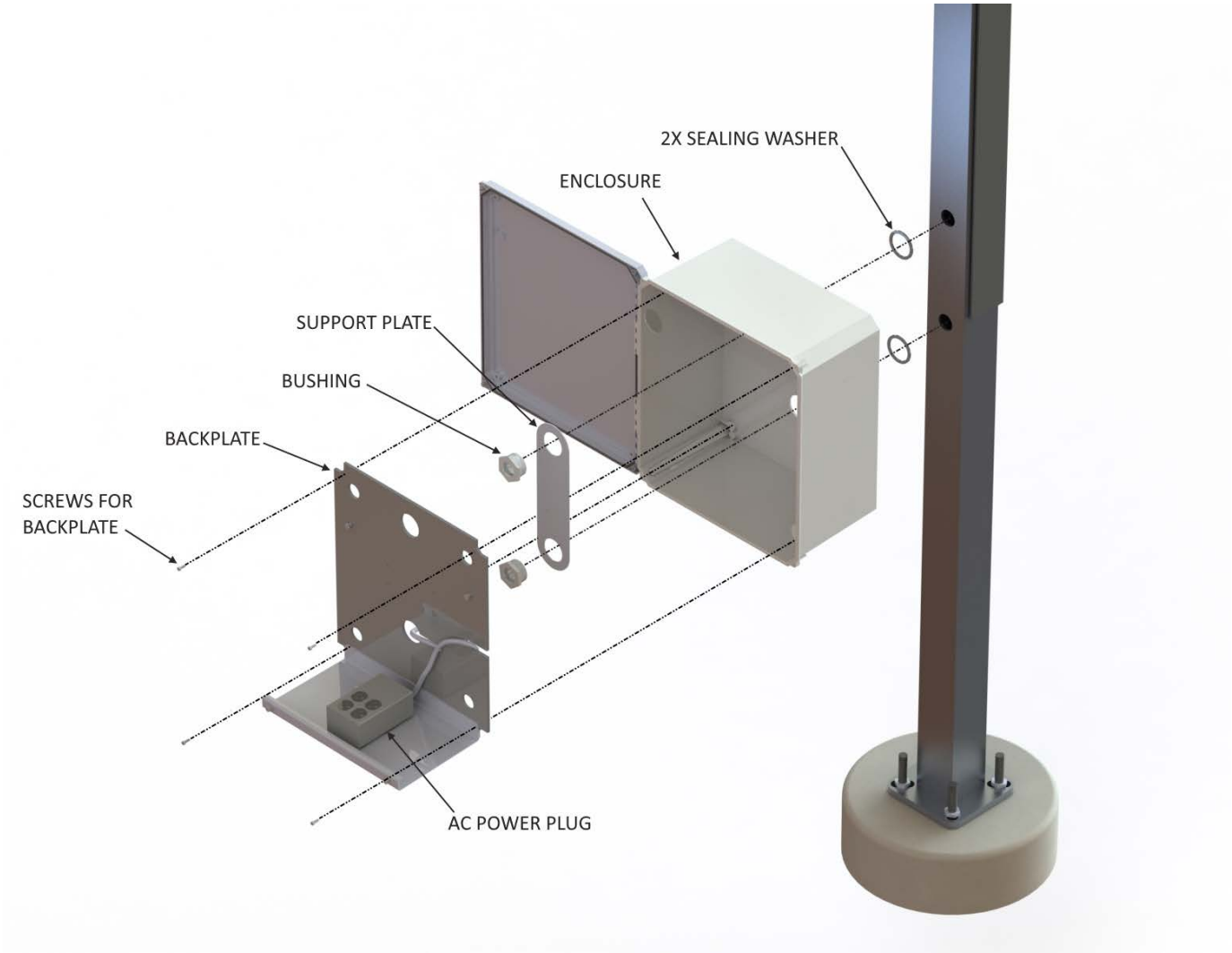
Step 3. Attach bushings to pole and tighten down to secure enclosure to the pole

Step 4. Have a licensed electrician help route the AC power through the pole into the enclosure. Route AC Power wires up and around right side of backplate, and then through bottom bushing into the pole, with some of the cable in the slot next to the bushing hold in the backplate as shown in *Figure 3-1 AC Power Cable Backplate Routing*

Figure 3-1 AC Power Cable Backplate Routing

Step 5. Use the 4 10/32 screws to attach the backplate to the enclosure

Figure 3-2 NMS045 AC Enclosure Installation



3.2.1.2 Mounting the Enclosure with a Solar Option

Before you begin:

Step 1. Place the bushings into the Support plate

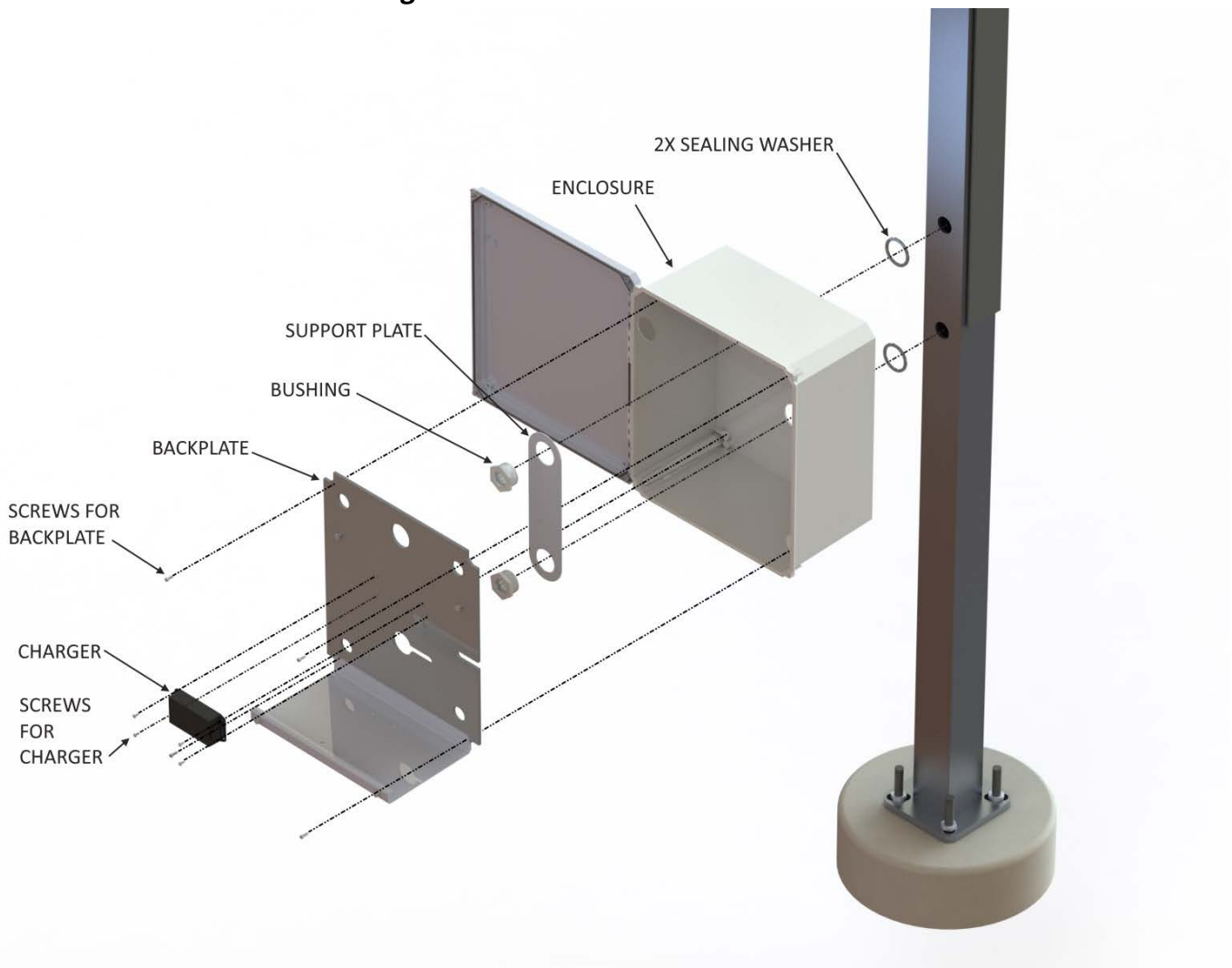
Step 2. Push bushings through enclosure wall and add sealing washers between enclosure wall and pole

Step 3. Attach bushings to pole and tighten down to secure enclosure to the pole

Step 4. Use the 4 10/32 screws to attach the backplate to the enclosure

Step 5. Attach solar charger to the backplate

Figure 3-3 NMS045 Solar Enclosure Installation



3.2.1.3 Mounting the Fiberglass Enclosure OPT1 (non standard pole)

TAKE NOTE This option can be used to mount the enclosure to objects other than the Larson Davis TRP019, i.e. Power pole, wall, etc.

TAKE NOTE Avoid putting holes in the top or bottom of the box. Any holes toward the bottom of the case need to be above the battery height in the side. Use silicone to seal up around any opening made in the side of the box

Figure 3-4

Step 1. Verify mounting and enclosure components

Figure 3-5 OPT1 Mounting Components

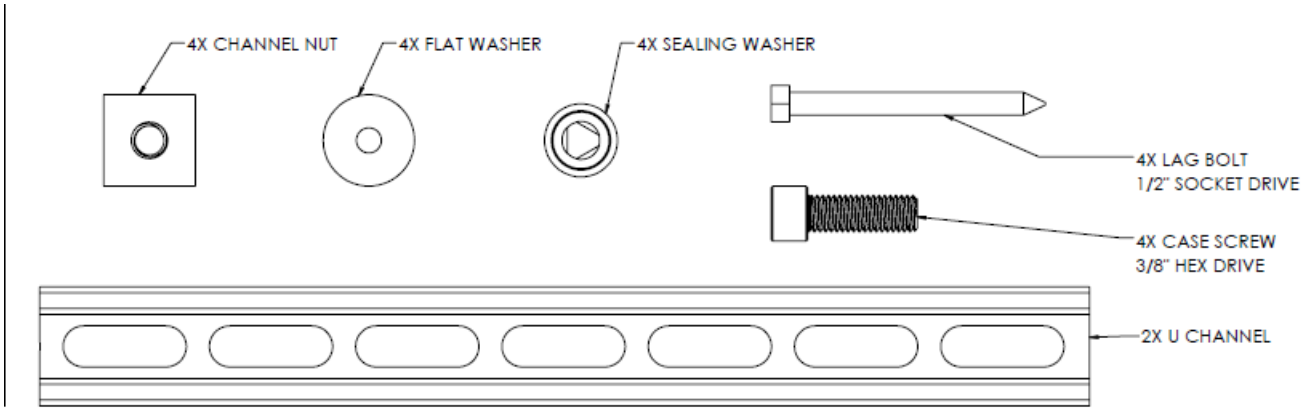
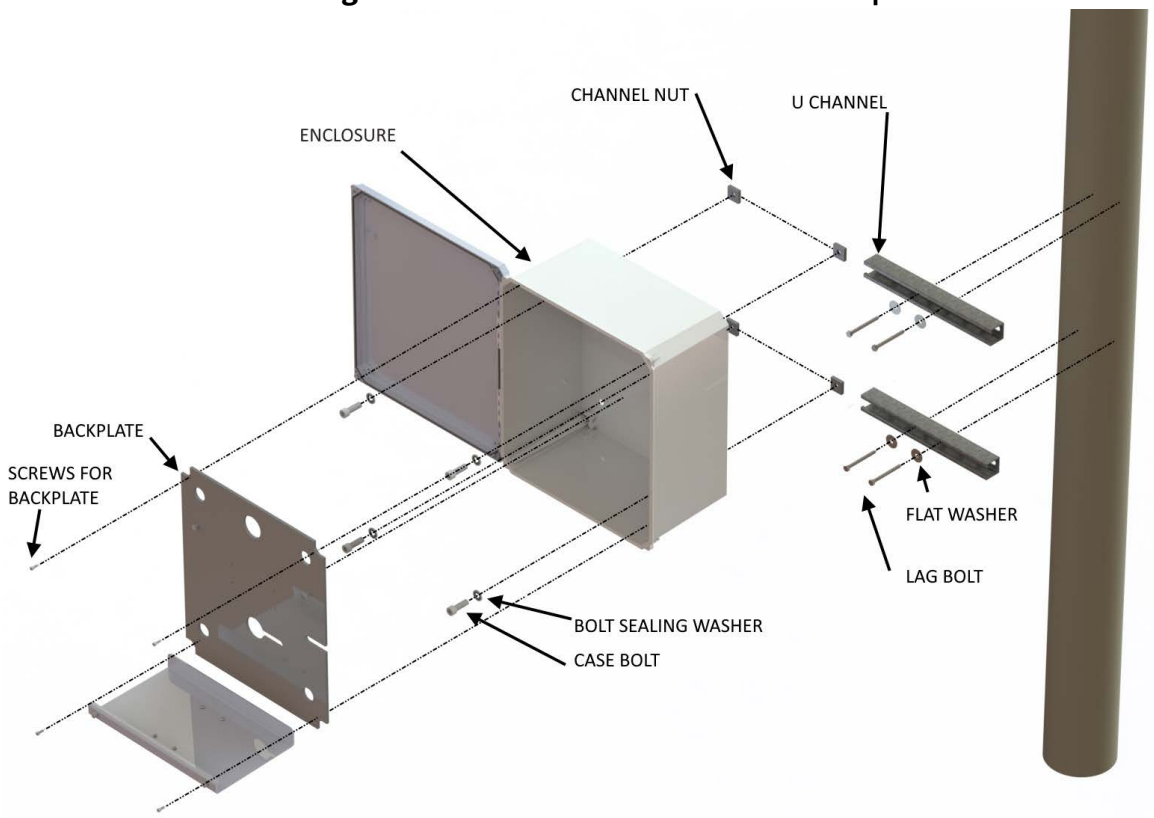
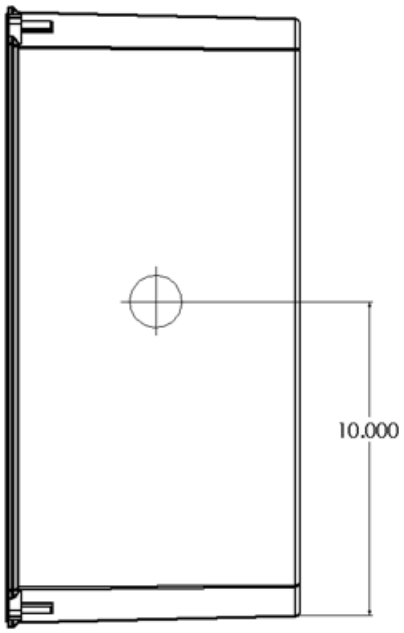


Figure 3-6 OPT1 NMS045 Enclosure Components



Step 2. (Optional) For electrical connection porting, we recommend adding a hole to the case on the side opposite the door hinges, approximately 10” from the bottom, centered on the case. Any port hole must be sealed using a gland or sealant.

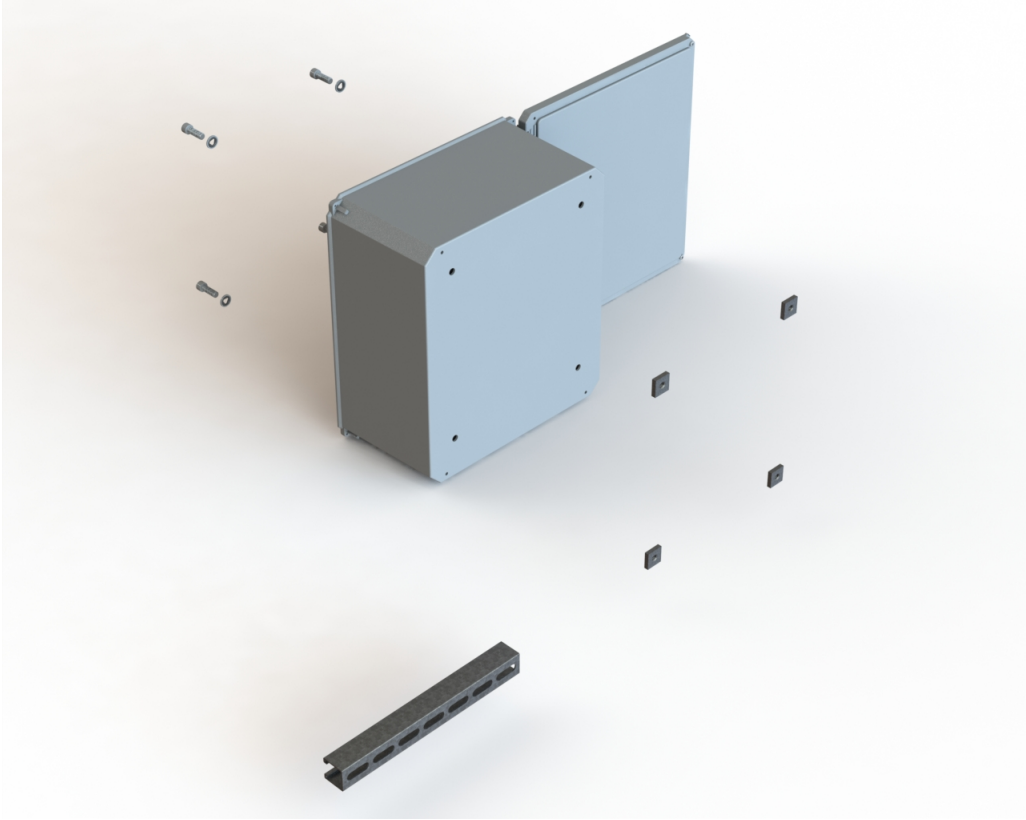
Figure 3-7 OPT1 Recommended Electrical Port Position



Step 3. Prepare the box by placing the sealing washers on the channel bolt. Install from the inside of the case and mount the channel nut on the outside of the case.

Slide the bottom rail into position and lightly tighten the bolts using the 3/8” Hex wrench.

Figure 3-8 OPT1 Box Preparation

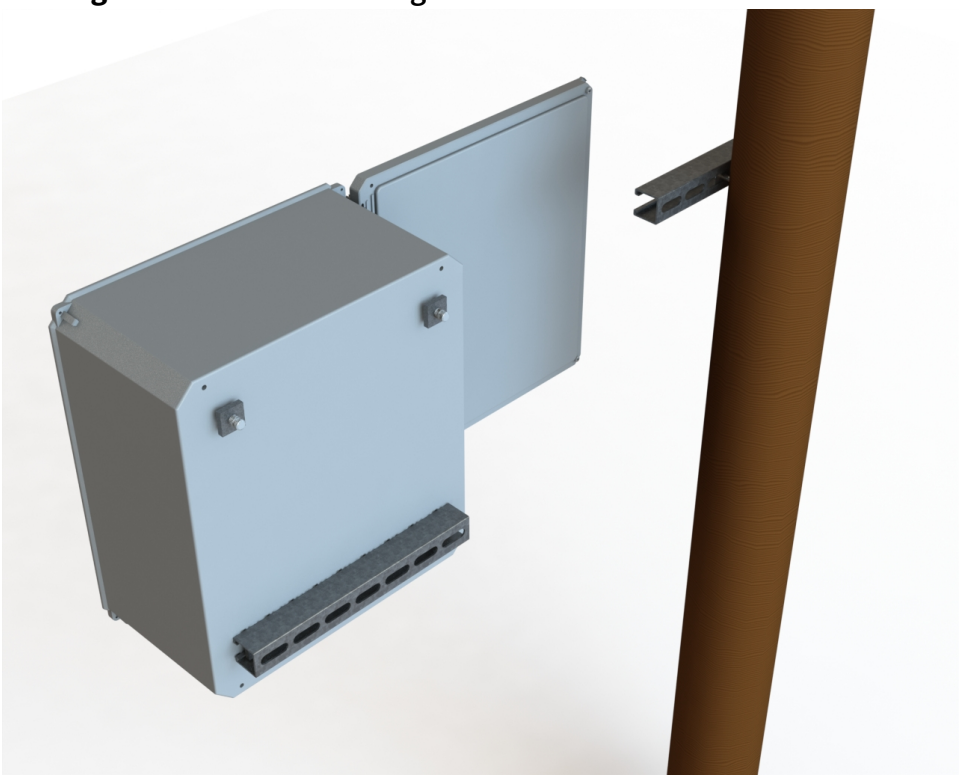


Step 4. Level and mount the top rail to the wooden pole or wall using the lag bolts and the fender washers from the inside of the channel.

Figure 3-9 Top Rail Mount to Pole or Wall

Step 5. Slide the box with bottom rail onto the top mounted rail. Mark the location of the bottom rail. Remove the box assembly from the top rail, and remove the rail from the bottom of the box leaving the channel nut and screw loosely attached.

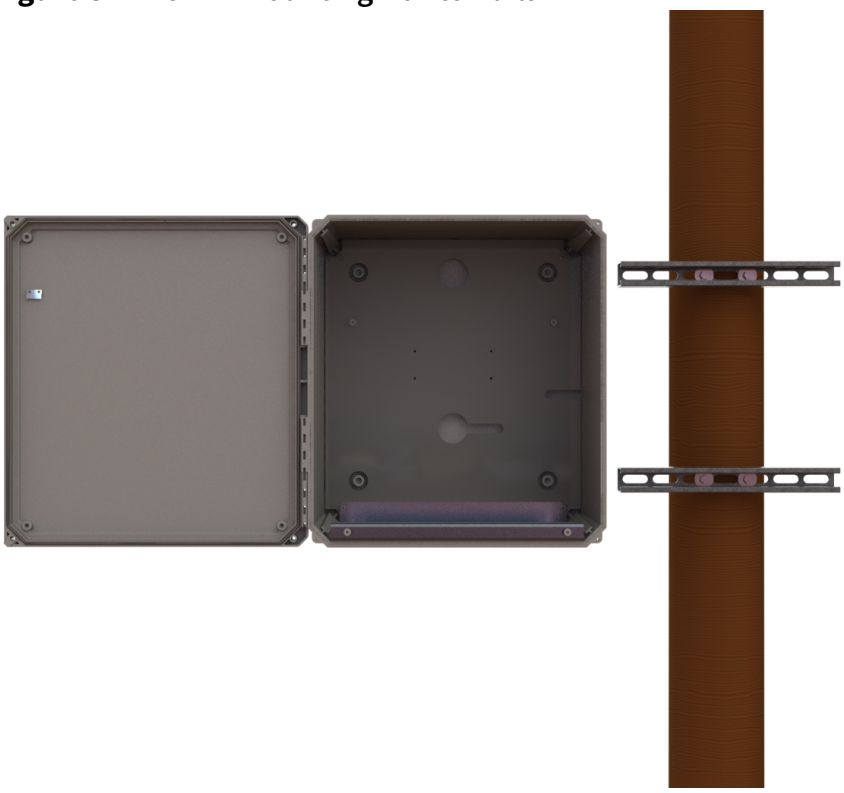
Figure 3-10 OPT1 Marking Bottom Rail Location



Step 6. Level and mount the bottom rail to the wooden pole or wall making sure the spacing is 13.5” between centers.

Step 7. Slide the box onto the top and bottom rail, and tighten using the 3/8” Hex wrench to engage the sealing washers that are installed on the inside of the case.

Figure 3-11 OPT1 Mounting Box to Rails



3.2.2 Positioning the Pole Tip Down

Step 1. Attach the 2 carabiners to either side of the rope. The length of the rope between the 2 carabiners should be 11 feet (3.3 meters). Cut or tie the rope to modify the length.

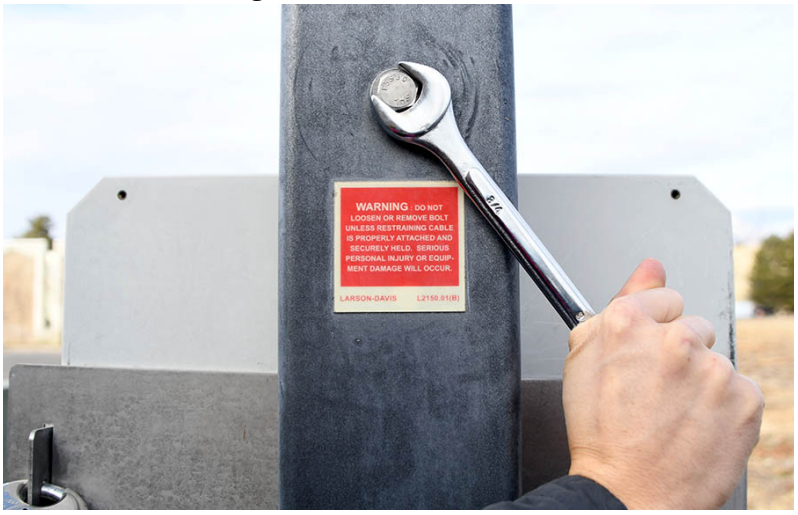
Step 2. Remove the lock, and attach the carabiners on the rope to the top and bottom loops on the pole.

Figure 3-12 Carabiners on Pole

Step 3. Remove the bolt on the pole using a 3/4-inch wrench or socket.

CAUTION Do not stand underneath the pole.

Figure 3-13 Removing Bolt from Pole



Step 4. Using the rope attached to the top ring, pull gently until the top half of the pole tips down. The rope prevents the pole from hitting the ground. Ensure you create adequate clearance for the pole to tip down so that it does not contact electrical wires or surfaces. For more information on clearance distance, refer to *Figure B-3 Steel Pole (TRP019) Dimensions*.

Figure 3-14 Pole in tip-down position

3.2.3 Installing the Battery and Main Plate

Before you begin:

- If the system includes a solar panel or weather station, do not install the battery until you've mounted each of these components. See **Chapter 4 Installing Optional Components** for installation procedures.
- If the battery cables are not yet installed, see section **2.1 Preparing the Battery**.

Step 1. Open the box using the supplied driver, and place the battery on the bottom battery plate.

Figure 3-15 Battery Placement

One Battery: place on the left side with the connectors on the outside.

Two Batteries: place on either side with connectors on the outside.

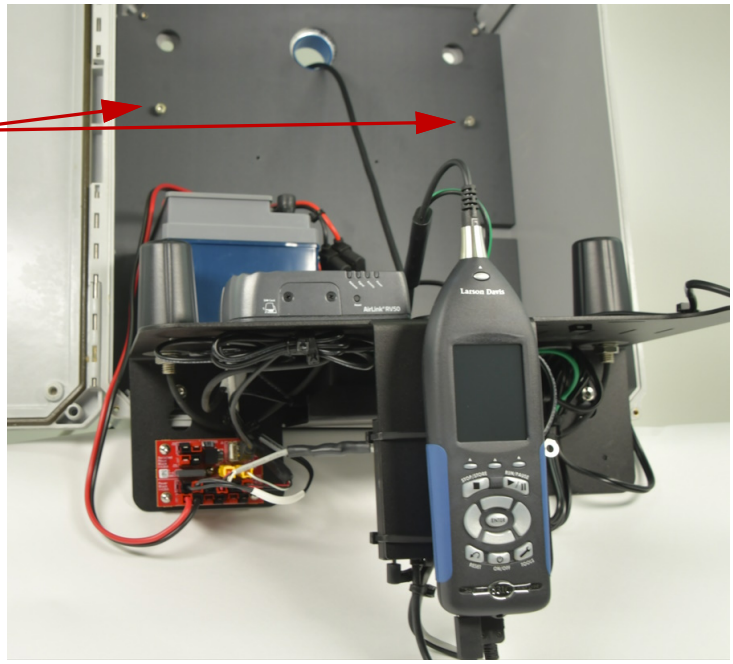
One Battery

Two Batteries

Step 2. Place the main plate on the outside of the box, on the battery plate shoulder screws as shown in *Figure 3-16*.

Figure 3-16 831C-045 on Shoulder Screws.

Battery plate shoulder screws are designed to hold the main plate as you work on it.



TAKE NOTE At this point in the installation, the main plate should have all components installed, and the gateway should be operating.

3.2.4 Routing Cables in the Pole

Before you begin:

- If desired, feed the cables through the included flexible tubing for protection before pulling them through the pole as shown in *Figure 3-17*.

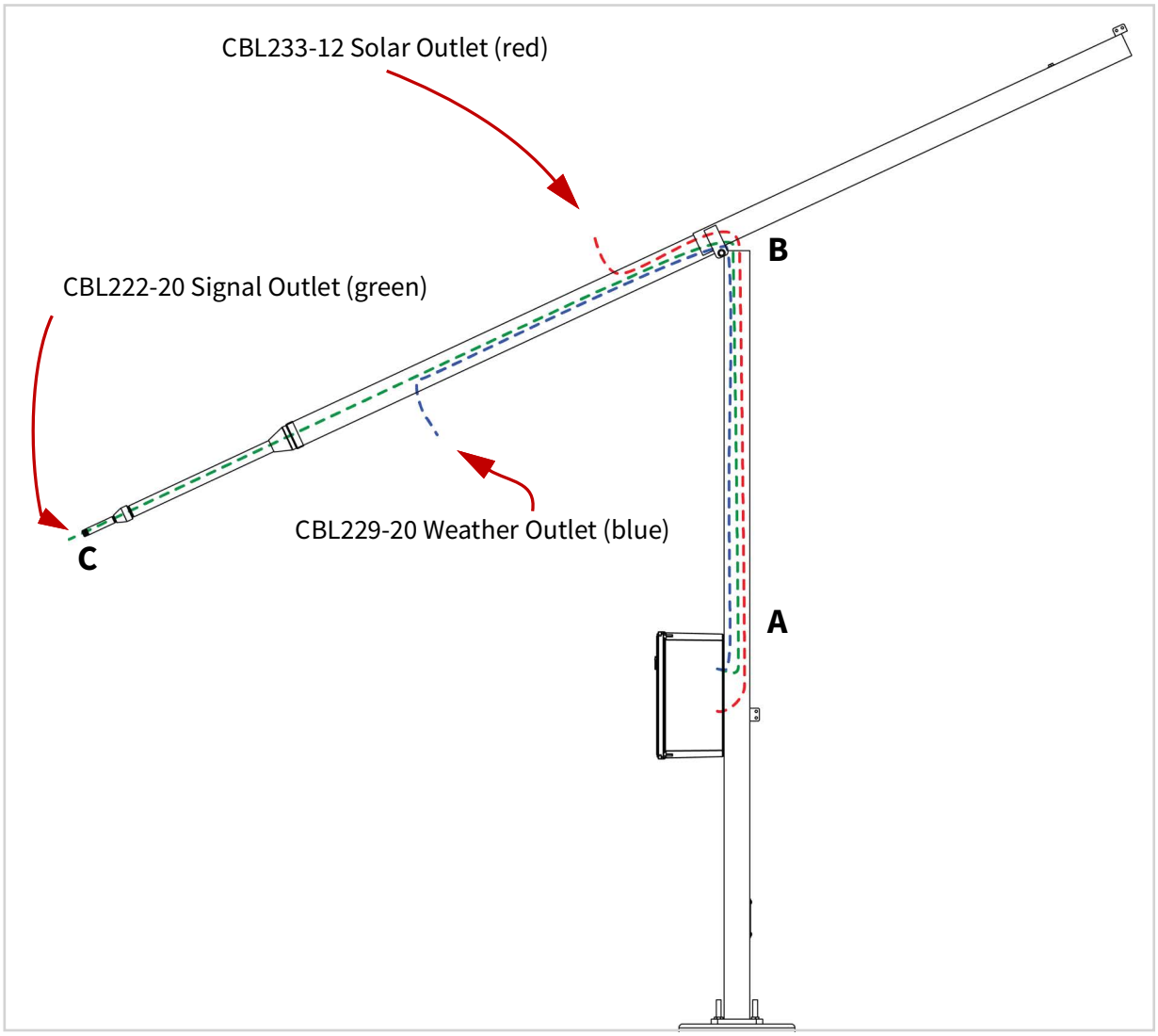
Figure 3-17 (Optional) Using the included cable protection tubing

Step 1. Open the back of the pole as shown in *Figure 3-18*.

Figure 3-18 Back side of Pole

Step 2. Feed the CBL222-20 (and solar, weather, or other cables) through the top hole in the back of the pole at point **A** until you see it exit the pole at point **B**. (Refer to *Figure 3-19*.)

Figure 3-19 Cable Routing in TRP019 Pole



Step 3. To feed the cable down the second half of the pole, we recommend using fish tape. See *Figure 3-20*.

TAKE NOTE If the end of the cable gets stuck at the weather cable outlet, recoil and try again until it clears the opening.

Figure 3-20 CBL222-20 Routing with Fish Tape

1. Attach fish tape to CBL222-20.
2. Insert fish tape into signal outlet, and route to the back of the pole.
3. Recoil fish tape until the CBL222-20 is out.

Step 4. From the back of the pole, route the end of the solar cable through the bottom hole and into the box. Route the ends of the other cables through the top hole and into the box.

3.2.5 Connecting the Preamplifier, Microphone, and Mic Protection

Step 1. Remove the rubber cap from the top of the preamplifier.

Step 2. Place microphone on preamplifier, and gently screw together until hand tight.

Step 3. Hold the EPS2116 windscreen and bird spike together, and unscrew from the top.

Step 4. Screw the top and base together. The EPS2116 should now be in two parts, see *Figure 3-21*.

Figure 3-21 EPS2116 Separated

Step 5. Follow the steps shown in *Figure 3-22* to thread the mic through the EPS2116 mic protection. If desired, you can calibrate the mic first, then install mic protection.

Figure 3-22 EPS2116 Threading

1. Thread the CBL222-20 cable up through the base and top of the EPS2116.

2. Align red dots on bottom of preamplifier to top of CBL222-20, gently push together until mounted. (This step can be done after the EPS2116 is mounted to the pole, but attaching it now prevents the CBL222-20 from slipping into the pole).

3. With the preamp on the outside of the assembly, carefully screw the base of the EPS2116 on the pole. Do not twist the CBL222-20 or the PRM2103-FF. Hold steady as you mount the EPS2116 on the pole.

4. Gently ease the cable into the EPS2116 until the microphone is seated at the top.

Step 6. Holding the windscreen and birdspike over the top, screw the assemblies together.

CAUTION If you need to remove the windscreen, do not pull it off the birdspike with an upward motion. This will damage the weather protection. First, unscrew the birdspike by twisting its top. Then pull the windscreen down over the bottom of the unscrewed birdspike.

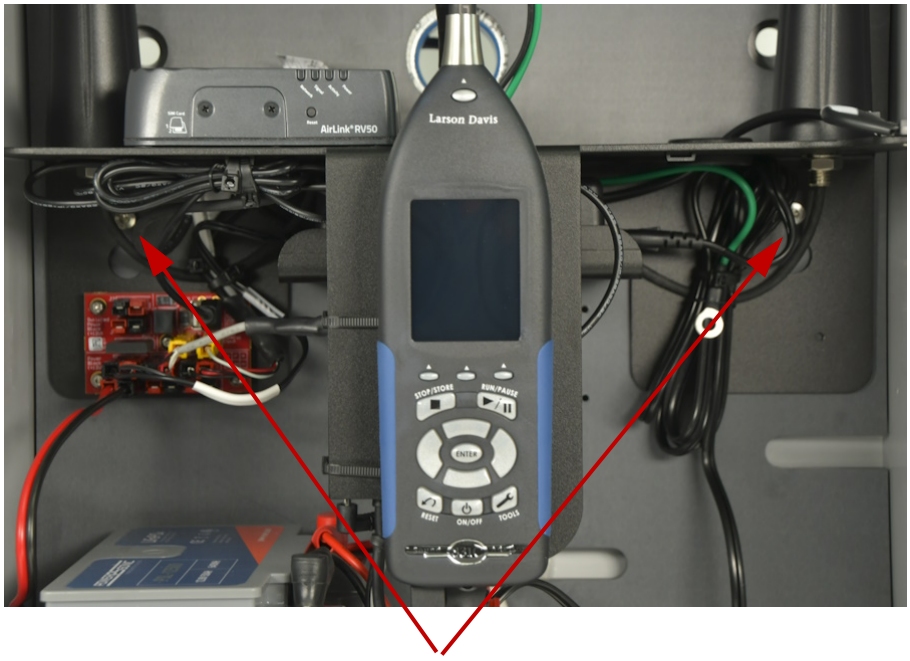
3.2.6 Installing Components In the Box

Step 1. From the front of the box, connect the CBL222-20 to the top of the 831C.

Figure 3-23 CBL222-20 Connection

Step 2. Lift the mounting plate off the shoulder screws, then mount the back plate on the shoulder screws.

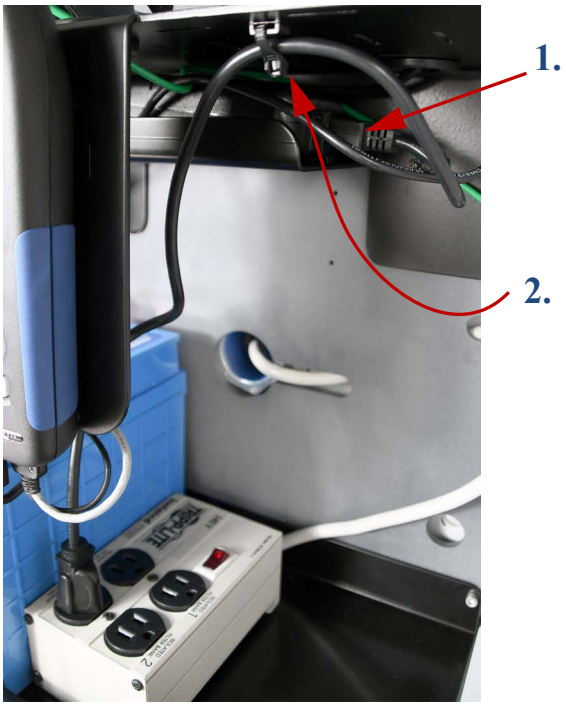
Figure 3-24 Back Plate On Shoulder Screws



Step 3. **When using AC power**: connect PSA040 to the surge suppressor (as shown in *Figure 3-25*)
When using solar power: connect the solar charger to the control power block on the line called **Power Block**.

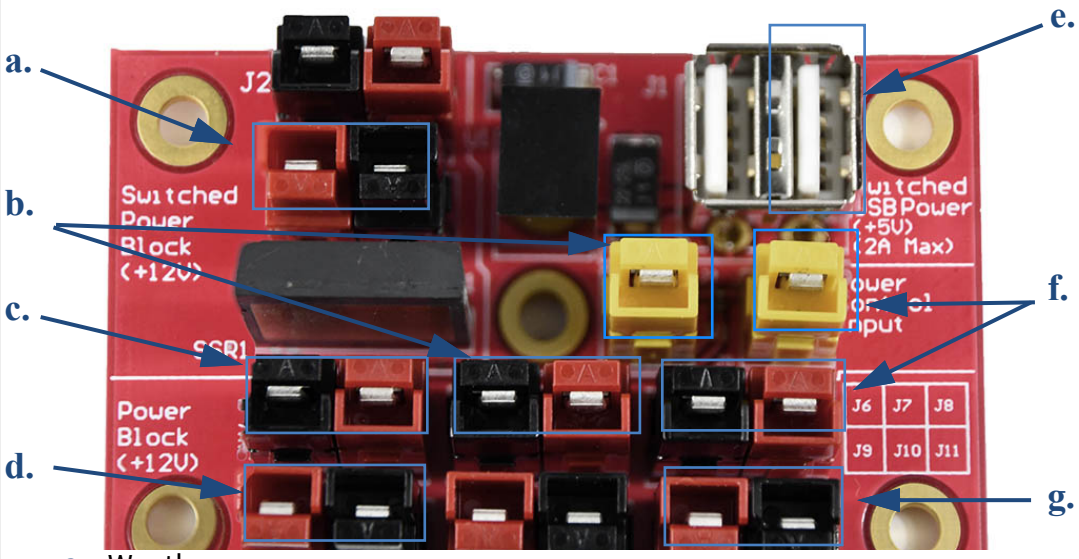
Figure 3-25 For AC Power: PSA040 to Surge Suppressor

1. PSA040 (AC only) to surge protector
2. After connection, tie the cord out of the way with provided zip tie as shown.



Step 4. Connect the battery to the power block on the line called **Power Block**.

Figure 3-26 Suggested Setup for Control Power Block



a. Weather
b. 831C SLM
c. PSA040 or CBL226-03
d. Battery
e. USB Hub
f. RV50X Gateway
g. Second battery

Figure 3-27 Components Installed

Step 5. When the battery is connected, the system powers on. The 831C power button ⏻ controls the power in the whole system. It is used to turn off and on the NMS045.

3.3 Performing a Field Operational Check

Follow these steps prior to leaving the installed system.

Step 1. Verify the battery is charged or charging.

AC Power Charging

The battery is fully charged when the LED on the PSA040 power charger is green. An orange LED indicates the battery is charging.

Solar Charging

The battery is fully charged when the PSA038 Solar Charger is green. A blinking LED indicates charging. See **A.2.3 "LED Indicators for Solar Charge Controllers" on page 5**.

Step 2. Connect to the 831C using the LD Atlas app on a mobile device to verify cellular service is functioning. For details, see **2.6.3 "Verifying Remote Communications via a Mobile Device" on page 28**.

3.4 Securing the Pole

Step 1. Gently pull the rope until the pole tips back into place.

Step 2. Secure the bolt using a 3/4-inch wrench.

Step 3. Remove carabiners and secure with padlock.

Step 4. (Optional) Wrap a security band around case and secure with lock.

3.5 Calibrating the 831C

TAKE NOTE For best results, use Larson Davis Precision Acoustic Calibrators and Larson Davis Microphone-Preamplifiers.

Refer to your calibrator and microphone-preamplifier product manuals for specific requirements on performing the acoustic calibration.

Tools Needed

- Keys for removing locks, and tools for opening box and putting the pole in the tip down position.
- Calibrator, such as the Larson Davis CAL200 or CAL250.
- A mobile device with LD Atlas app installed and Internet access.

Step 1. The pole should be in the tip down position. See **3.2.1 "Mounting the Fiberglass Enclosure" on page 35**.

Step 2. If the windscreen is on the microphone, remove it by holding the windscreen and birdspike together, and unscrewing the assemblies until they come apart.

Step 3. Gently place the calibrator over the microphone. Apply it carefully to avoid sudden large pressure changes to the microphone diaphragm.

Figure 3-28 CAL200 Calibrator

Step 4. In LD Atlas on a mobile device, connect to the 831C as shown in **2.6.3 "Verifying Remote Communications via a Mobile Device" on page 28**.

Step 5. Navigate to **Tools** ⇢**Calibrate**.

Step 6. Select a **Calibrator** from the drop-down menu.

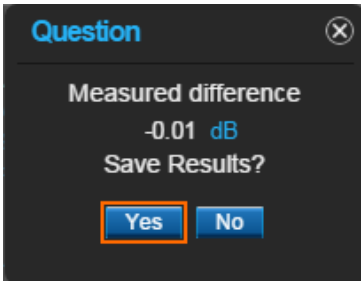
TAKE NOTE If you need to edit calibration settings, tap the bottom right tab to display the Settings page, and tap **Edit Settings**. Ensure that the settings correspond to those described in the manual for the selected calibrator.

Step 7. Turn the calibrator on by pressing the power button, then select **Do Calibration** in the app.

Figure 3-29 Acoustic Calibration

Step 8. After a few seconds, a message appears indicating the measured difference and a prompt to save the results. Click **Yes** to save the calibration or **No** to reject it.

Figure 3-30 Calibration Results



Step 9. Gently remove calibrator from microphone.

TRY THIS Click **Calibration History** to view either acoustic calibration or calibration check summaries.

Step 10. Reassemble the windscreen and bird spike back on to microphone.

Chapter 4 Installing Optional Components

The following components can be installed in conjunction with the field installation described in Module 3.

IN THIS MODULE:

4.1 Required Tools (not supplied) 4-55

4.2 Solar Installation to TRP019 4-55

4.3 Solar Installation to Wall or Wood Pole 4-61

4.4 Weather Installation 4-67

4.1 Required Tools (not supplied)

The tools listed are a recommended to have available for installation. It is not a comprehensive list, and comparable substitutions can be made at your discretion.

TAKE NOTE It is recommended to have two installers for the solar panel install.

- Ladder for each installer
- Ratchet or box wrench
  - Open pole (TRP019): 3/4”
  - Solar panel install: 9/16”
  - Weather arm install: 9/16”
- Hex wrench (TRP019): 3/4”
- Electrical wire fish tape
- Tape to help with feeding cables with fish tape
- #2 or #3 flat head screwdriver
- For install to wood pole or wall (Non-TRP019):
  - 4 - 3/8” hex head screws with 9/16” head
  - 4 - 3/8” fender washers

4.2 Solar Installation to TRP019

Step 1 The pole should be in the tip down position. See **3.2.1 "Mounting the Fiberglass Enclosure" on page 35**.

Step 2 Locate solar outlet hole in TRP019. See **Step 1. Open the back of the pole as shown in Figure 3-18.**

Step 3 Install the bracket and mount it to the solar panel following the manufacturer's instructions included with the SLP003 solar panel and mount. See **2.2 "Assembling the Solar Bracket" on page 16**.

Step 4 Establish which side of the pole is best for the solar panel to face. It should face an unobstructed view of the sun's main trajectory in the sky.

- Southern hemisphere: facing the north.
- Northern hemisphere: facing the south.

TAKE NOTE Mount panel so the solar outlet is close the to the solar cables on the panel. Do not strain the cables.

Step 5 Using the included u-bolts install the top and bottom of the solar panel to the pole. Tighten with 9/16" wrench. Do not over-tighten u-bolts.

FIGURE 4-1 Solar Panel Install

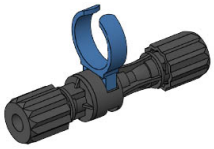
Step 6 The solar cable CBL233-12 connecst the panel with the charge controller. Feed the cable down the pole, out the bend, then out the bottom hole and into the box.

FIGURE 4-2 Feed Cable Down Pole

Step 7 To get the solar cable through the gland bend the connectors so they are in-line, one pointing up and one pointing down. Then feed through the cable gland pieces to be fitted into the hole on the pole. Grease the plug. Secure down into place, leaving enough slack to connect the cable to solar panel.

FIGURE 4-3 Gland Install

TAKE NOTE To disconnect the solar connectors, use the included ring tool.



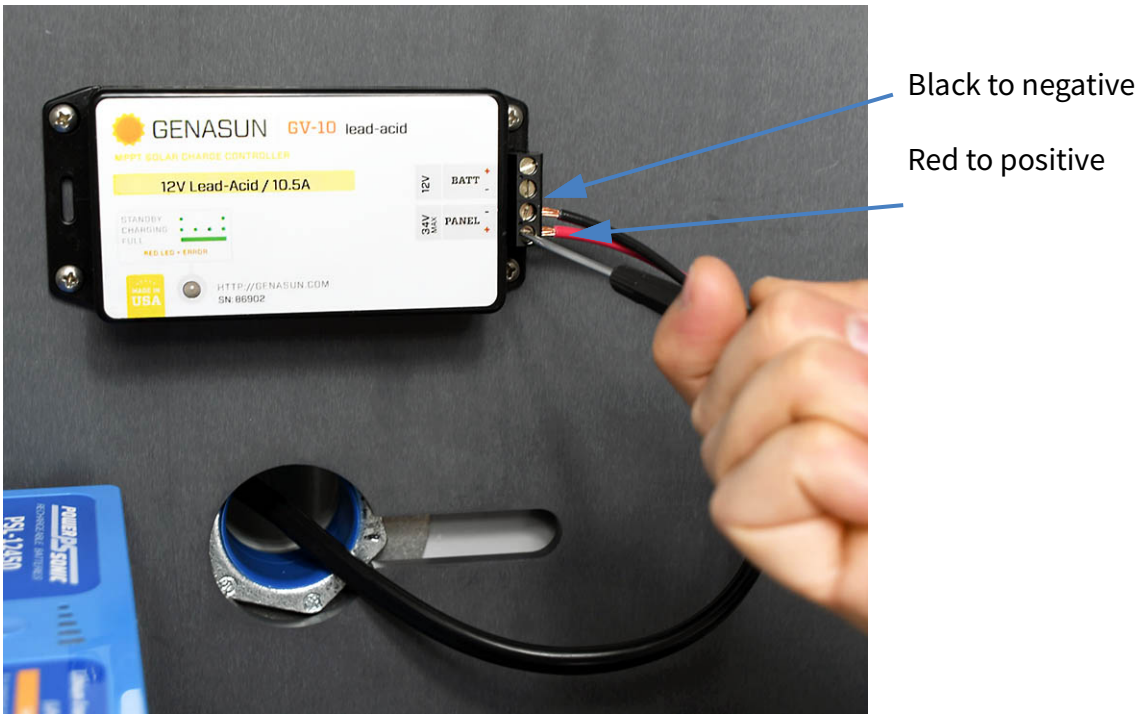
Step 8 Connect cables, ensuring they are completely seated. You will hear a small snap when they are connected.

FIGURE 4-4 Connect Solar Cable to Panel

Step 9 Feed CBL233-12 into the box through the bottom hole. Connect to solar charger on the area marked **Panel**. Loosen the screws with a flat head

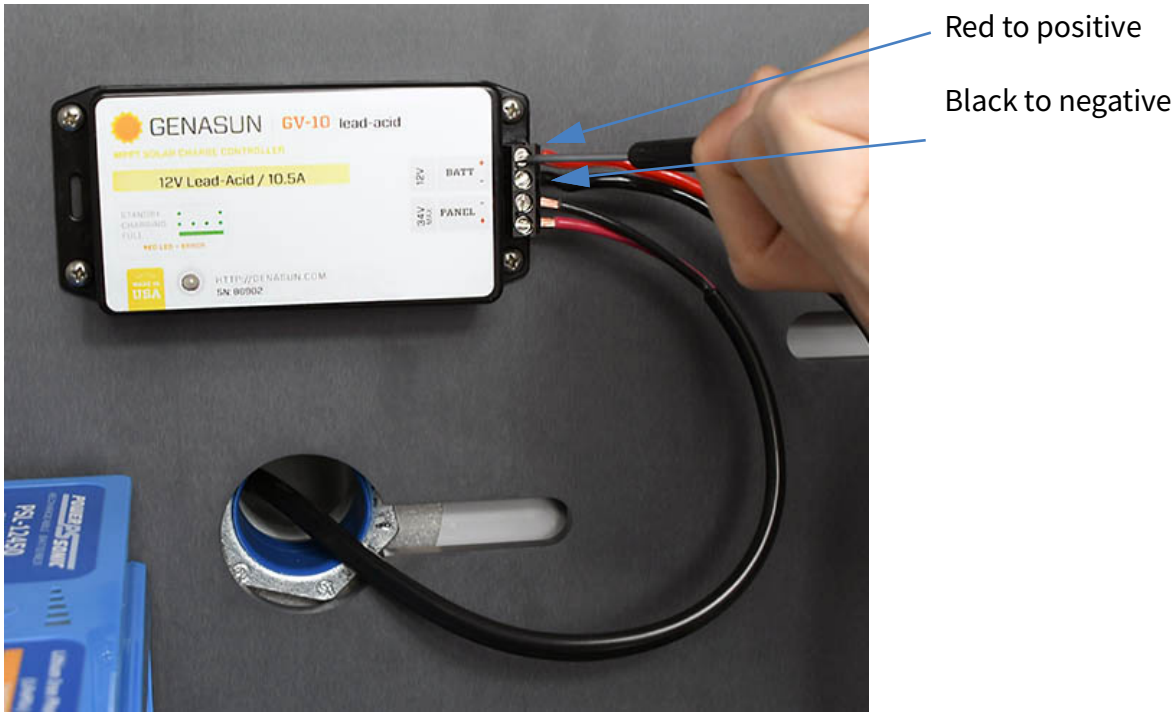
screwdriver, insert the correct cable ends, then tighten down. Black to negative, red to positive.

FIGURE 4-5 CBL233-12 to Solar Charger



Step 10 Connect CBL226-03 to the solar charger in the space marked **Battery**. Loosen the screws, insert the correct cable ends, then tighten down. Black to negative, red to positive.

FIGURE 4-6 CBL226-03 to Solar Charger



Step 11 After the plate has been placed into the box (see **"Step 2." on page 45**), connect CBL226-03 to the control power block on the line marked

Power Block. After everything else is connected to the control power block, connect the battery to the line marked **Power Block**.

Step 12 Check that the panel is charging the battery, see **"LED Indicators for Solar Charge Controllers" on page A-5**.

FIGURE 4-7 Solar Panel on Tip-Down Pole

4.3 Solar Installation to Wall or Wood Pole

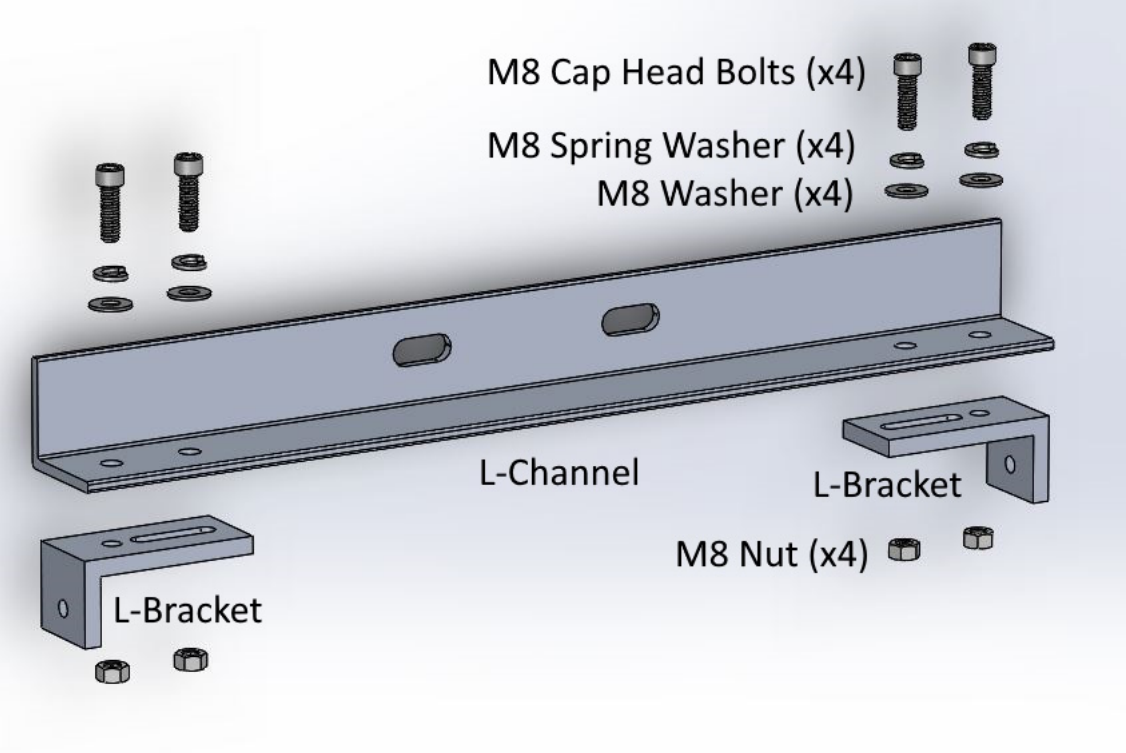
Step 1 Establish which direction is best for the solar panel to face. It should face an unobstructed view of the sun's main trajectory in the sky.

- Southern hemisphere: facing the north.
- Northern hemisphere: facing the south.

TAKE NOTE Mount panel so the solar outlet is close the to the solar cables on the panel. Do not strain the cables

Step 2 Fasten 2 L-Channels to each L-Bracket as shown in *Figure 4-8 Fasten L-Channels to L-Bracketsl*

FIGURE 4-8 Fasten L-Channels to L-Bracketsl

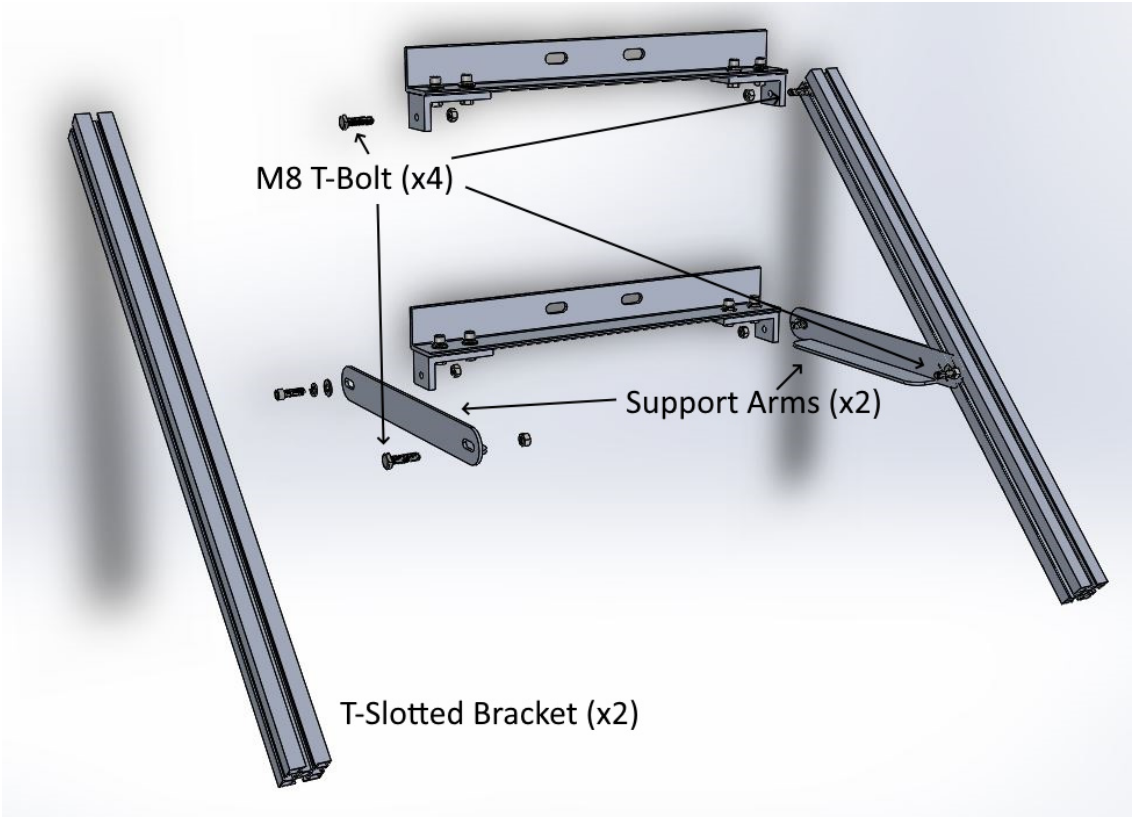


Step 3 Fasten top L-Channel to wall or pole using 2 hex head screws. The screws needed are not provided. Recommended to use 3/8” hex head screws appropriate for wall or pole material type with 3/8” fender washers.

Step 4 Attach Support Arms to bottom L-Brackets. Depending on the angle the T-Slotted brackets are fastened to the top L-Channel, you may need to adjust the bottom L-Channel location on the wall or pole.

Step 5 Slide the M8 T-bolts into the T-Slotted brackets, and then fasten T-Slotted Brackets to the top L-Channel using the L-Brackets. Fasten the bottom of the T-Slotted Brackets to Support Arms.

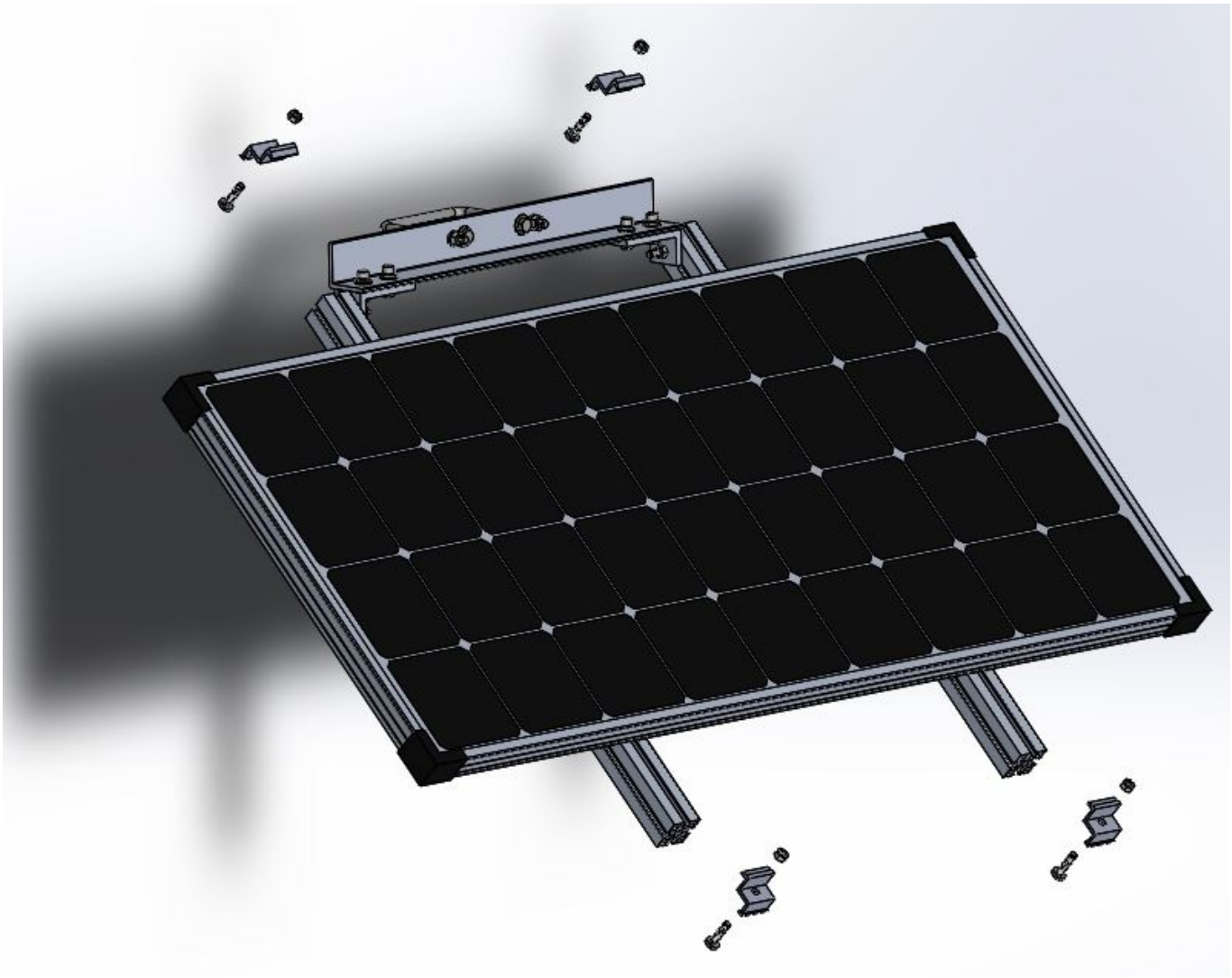
FIGURE 4-9 Mounting Support Arms and T-Slotted Brackets



Step 6 Mount bottom L-Bracket to the wall or wooden pole. using 2 hex head screws. The screws needed are not provided. Recommended to use 3/8” hex head screws appropriate for wall or pole material type with 3/8” fender washers.

Step 7 Mount the solar panel to the bracket following the manufacturer's instructions included with the SLP003 solar panel and mount. See **2.2 "Assembling the Solar Bracket" on page 16**.

FIGURE 4-10 Mounting Solar Panel to Bracket



Step 8 Connect cables, ensuring they are completely seated. You will hear a small snap when they are connected.

TAKE NOTE To disconnect the solar connectors, use the included ring tool.

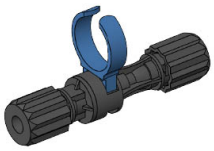
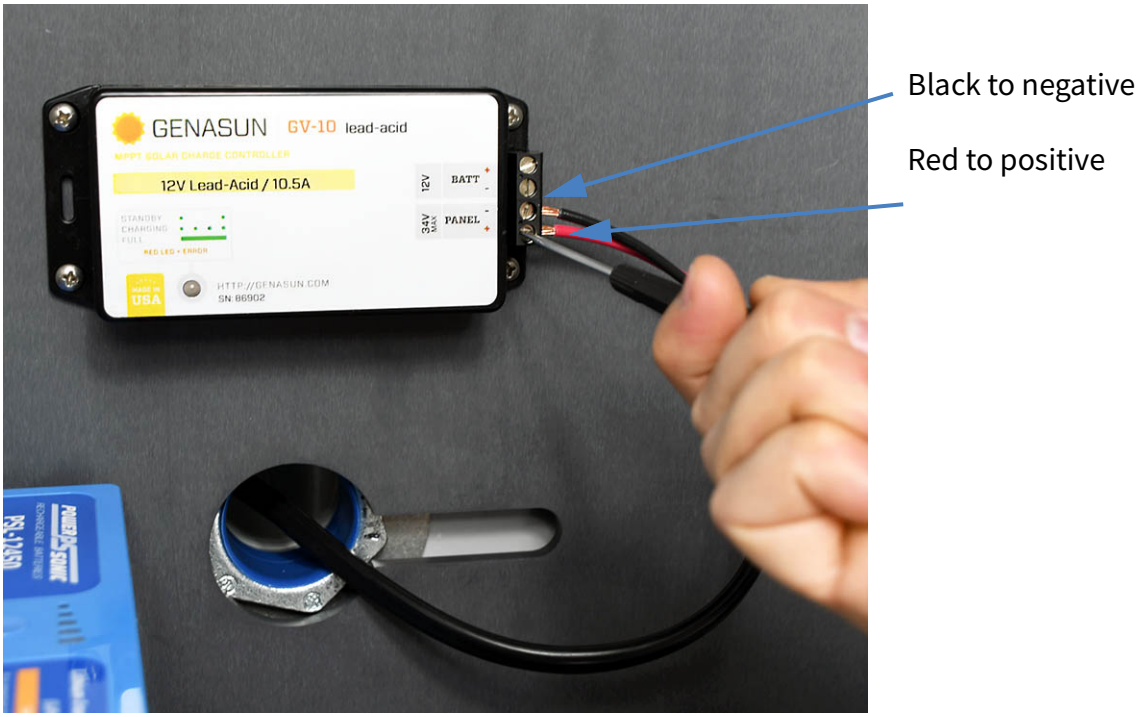


FIGURE 4-11 Connect Solar Cable to Panel

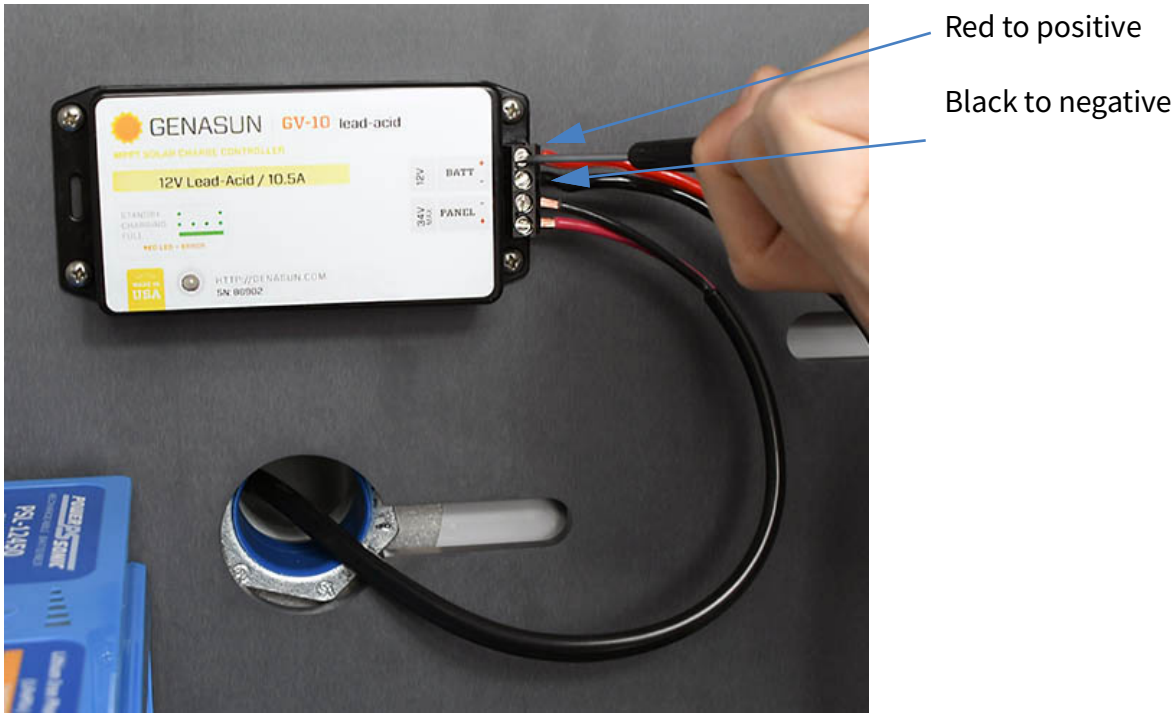
Step 9 Feed CBL233-12 into the box through the bottom hole. Connect to solar charger on the area marked **Panel**. Loosen the screws with a flat head screwdriver, insert the correct cable ends, then tighten down. Black to negative, red to positive.

FIGURE 4-12 CBL233-12 to Solar Charger



Step 10 Connect CBL226-03 to the solar charger in the space marked **Battery**. Loosen the screws, insert the correct cable ends, then tighten down. Black to negative, red to positive.

FIGURE 4-13 CBL226-03 to Solar Charger



Step 11 After the plate has been placed into the box (see **"Step 2." on page 45**), connect CBL226-03 to the control power block on the line marked **Power Block**. After everything else is connected to the control power block, connect the battery to the line marked **Power Block**.

Step 12 Check that the panel is charging the battery, see **“LED Indicators for Solar Charge Controllers” on page A-5**.

4.4 Weather Installation

Step 1 The pole should be in the tip down position. See **3.2.1 "Mounting the Fiberglass Enclosure" on page 35**.

Step 2 Using fish tape, feed CBL229-20 out the top hole in the box, up the pole and out at the bend. Then feed the cable down the second half of the pole and out the weather outlet hole. We recommend using fish tape for this process. Be careful not to twist up the cables inside the pole. *Figure 4-14* shows feeding the fish tape through the weather hole to retrieve CBL229-20.

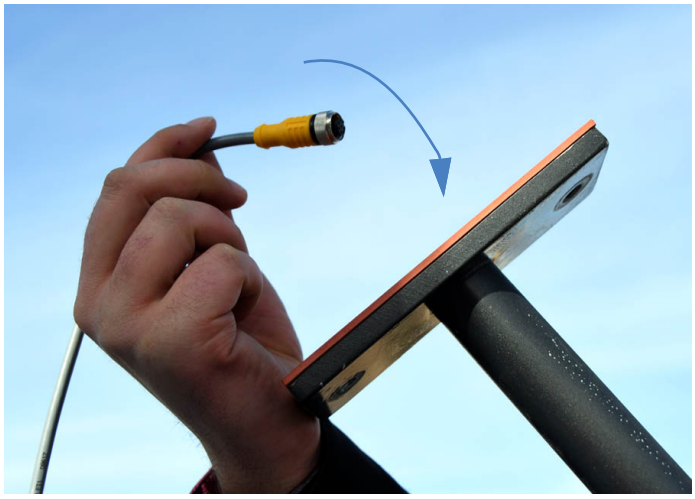
FIGURE 4-14 Feed CBL229-20 with fish tape

a. Route fish tape from weather hole to the back of the pole by the box.
b. Secure cable to fish tape.
c. Feed cable back through pole and out through weather hole, giving enough slack to go through the weather arm.

Step 3 Install the ADP101 on top of the weather arm.

Step 4 Place the gasket on the bottom of the weather arm. Feed CBL229-20 through the weather arm and adapter.

FIGURE 4-15 Feed CBL229-20 Through Weather Arm



Step 5 Bolt the weather arm to the pole with the gasket in place using a 9/16-inch wrench.

FIGURE 4-16 Weather Arm Bolted to the Pole

Step 6 Connect the weather or wind sensor to the cable, push the slack back through the arm, and connect the sensor to the arm.

FIGURE 4-17 Feed CBL229-20 Through Weather Arm

Step 7 Adjust the sensor, so that north on the sensor aligns with north on a compass once the pole is brought back into place.

Step 8 Tighten the sensor set screw with hex driver that comes with the sensor. Do not over-tighten.

FIGURE 4-18 Weather/wind station

Step 9 Inside the box, route CBL229-20 through the top hole, and connect it to the DVX018, which should be routed through the top of the plate and into the USB hub.

Step 10 Route the Anderson connectors of the CBL229-20 through the top plate and into the control power block on the line marked **Switched Power Block**.

Appendix A Additional System Information

IN THIS MODULE:

A.1 NMS045 Power Information ---------- A-1
- A.1.1 Power Draw A-1
- A.1.2 Sunlight Hours A-2
- A.1.3 Alternative Solar Panel A-2
- A.1.4 Two Battery System A-2

A.2 System LED Indications ---------- A-2
- A.2.1 LED Indicators for SoundAdvisor™ Model 831C SLM A-2
- A.2.2 LED Indicators for RV50X Cellular Gateway A-4
- A.2.3 LED Indicators for Solar Charge Controllers A-5

A.3 Shipping the System ---------- A-6

A.4 Configuring the Gateway for Larson Davis Instruments ---------- A-7
- A.4.1 Logging In to ACEmanager A-7
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- A.4.3 Configuring LD Settings Without the Template File A-9

A.1 NMS045 Power Information

The NMS045 System draws power from the connected battery that is charged by a solar panel or AC connection.

A.1.1 Power Draw

The power draw for the system depends on your settings, mode, and component options installed. These estimates are for the 831C-045 with COM-RV50X-045NA/EU:APAC:

- Minimum Current (Standby Mode): ~5mA
- Average Current (Setting Dependent): ~280mA
- Maximum Current (Setting Dependent): ~500mA

Typical Runtime

The NMS045 system is powered by a 12 V battery that is charged by either AC or solar panel. The typical runtime for the system, on battery power only, is given below.

Table A.1 Typical Runtime

Configuration	One 45 Ah LiFePo Battery (BAT019-045)	One 35 Ah SLA Battery (BAT020-045)
NMS045 with Ethernet	8 days*	6 days*

Table A.1 Typical Runtime

Configuration	One 45 Ah LiFePo Battery (BAT019-045)	One 35 Ah SLA Battery (BAT020-045)
NMS045 with cellular gateway	6 days*	4 days*
These are average numbers and should be used only as reference. For example, as batteries age or operate at low temperatures the runtime may be reduced.		

A.1.2 Sunlight Hours

You are encouraged to take advantage of the most daylight, direct sun for your area. To better understand your sunlight, refer to
http://rredc.nrel.gov/solar/old_data/nsrdb/1961-1990/redbook/atlas/
http://re.jrc.ec.europa.eu/pvgis/countries/countries-europe.htm

A.1.3 Alternative Solar Panel

The NMS045 system can support a solar panel that is <140 W.

A.1.4 Two Battery System

The NMS045 can support two 12 V batteries of the same chemistry. Before installation ensure both batteries are charged equally. You risk blowing a fuse if the one is depleted and one is charged, once connected to the system.

A.2 System LED Indications

This section is a reference for LED indicators on the 831C, the cellular gateway, and the solar charge controller.

IN THIS SECTION:

- **A.2.1 LED Indicators for SoundAdvisor™ Model 831C SLM**
- **A.2.2 LED Indicators for RV50X Cellular Gateway**
- **A.2.3 LED Indicators for Solar Charge Controllers**

A.2.1 LED Indicators for SoundAdvisor™ Model 831C SLM

The SoundAdvisor™ 831C has a multi-color back-lighted keypad, which provides the following colored indications for power and measurement statuses.

System Power Indicators

The system power status is indicated by the green LED behind the SLM **power button** .

Table A.2 Power Status LED Indicator

Status	Green LED
System is powering up or shutting down	FAST, SHORT GREEN BLINK

Measurement Status Indicators

SLM measurement status is indicated by the LEDs behind the **Stop button** and the **Play/Pause button** as shown in *Table A.3*.

Table A.3 Measurement Status LED Indicators

Measurement State	Red LED	Green LED
Stopped with Reset	LONG, QUICK RED BLINK	OFF
Stopped	LONG THEN SHORT RED BLINK	OFF
Paused	SHORT RED BLINK	SHORT GREEN BLINK
Running	OFF	LONG THEN SHORT GREEN BLINK
Waiting for valid data to begin running	SHORT DELAYED BLINK	OFF

A.2.2 LED Indicators for RV50X Cellular Gateway

When installed and running, the state of the gateway is indicated by the 4 LEDs on the side and bottom of the device. Individual lighted LEDs and combination lighted LED indications are listed in *Table A.4*:

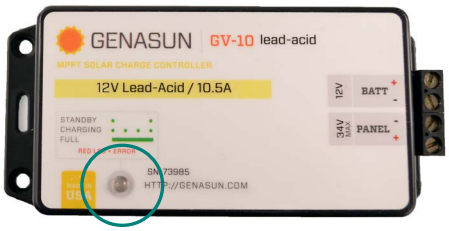
Table A.4 Gateway LED Indications

LED	Color/Pattern	Description
Power	Off	No power or input voltage > 36 Vdc or < 7 Vdc
	Solid Green	Power is present
	Green with Amber Flash	Power is present and the gateway has a GPS fix
	Solid Red	Standby mode
	Flashing Green	When you press the reset button, flashing green indicates when to release the reset button to reboot the gateway.
	Flashing Red	When you press the reset button, flashing red indicates when to release the reset button to reset the gateway to the factory default settings.
Signal	Solid Green	Good signal (equivalent to 4-5 bars)
	Solid Amber	Fair signal (equivalent to 2-3 bars)
	Flashing Amber	Poor signal (equivalent to 1 bar) If possible, move the gateway to a location with a better signal.
	Flashing Red	Inadequate (equivalent to 0 bars) If possible, move the gateway to a location with a better signal
Network	Solid Green	Connected to an LTE network
	Solid Amber	Connected to a 3G or 2G network
	Flashing Green	Connecting to a network
	Flashing Red	No network available
	Flashing Red/Amber	Network Operator Switching is enabled, but the gateway is unable to locate the required firmware. For more information, contact Sierra Wireless®.
Activity	Flashing Green	Traffic is being transmitted or received over the WAN interface.
	Flashing Red	Traffic is being transmitted or received over the serial port. This behavior only appears if the RV50X is configured to display it. For more information, contact Sierra Wireless®.
	Flashing Amber	Traffic is being transmitted or received over both the WAN interface and the serial port. This behavior only appears if the RV50X is configured to display it. For more information, contact Sierra Wireless®.
ALL	Green LED chase	Radio module reconfiguration/firmware update or Network Operator Switching is in progress.
	Amber LED chase	ALEOS software update is in progress.

A.2.3 LED Indicators for Solar Charge Controllers

The NMS044 solar charge controller has 1 multi-color LED which indicates unit status as shown in this section. The Genasun Lead Acid solar charge controller (*Figure A-1*) is one example; your model may differ slightly.

Figure A-1 Example: Genasun Solar Charge Controller



LEARN MORE For LED indication details, see *Table A.5*.

.

Table A.5 Genasun Solar Charge Controller LED Indication Patterns

• LED STATUS INDICATIONS:

Standby: The battery is connected properly and ready to charge when solar panel power is available.

2 SEC BETWEEN GREEN BLINKS

Charging (low current, less than -3.7A)

FAST, SHORT GREEN BLINKS

Charging (high current, more than -3.7A)

LONGER, SLOWER GREEN BLINKS

Charging (at current limit, 10.5A)

LONG THEN SHORT GREEN BLINKS

• LED ERROR INDICATIONS:

Overheat The controller's internal temperature is too high.

SETS OF 2 RED BLINKS

Overload This could be caused by changing the solar panel connections while the charge controller is powered.

SETS OF 3 RED BLINKS

Battery Voltage Too Low The controller cannot begin charging due to low battery voltage. If the nominal battery voltage is correct (12V), charge the battery by some other means before use.

SETS OF 4 RED BLINKS

Battery Voltage Too High If the battery voltage is correct (12V), check the functioning of other chargers that may be connected to the system.

SETS OF 5 RED BLINKS

Table A.4 *(Cont) Genasun Solar Charge Controller LED Indication Patterns*

...LED STATUS INDICATIONS

Battery Charged The battery is in the absorption or float charging stage.

SOLID GREEN LED

...LED ERROR INDICATIONS

Panel Voltage Too High Only 12V nominal solar panels may be used with this controller.

SETS OF 6 RED BLINKS

Internal Error Contact your dealer

2 LONG BLINKS, THEN ANY NUMBER OF SHORT BLINKS

A.3 Shipping the System

If you need to ship your system, be aware that the LiFePo Battery (BAT019) is considered Class 9 Hazardous Material. The shipping vendor and you are required by law to follow specific protocol when shipping. One requirement is that a company and/or individual must be 49 CFR and IATA certified to ship a lithium battery with over 100 Watt-hour capacity. Recertification is required every 2 years.

LEARN MORE Licensing can be obtained through a training course, such as the Lion Technology online training course - code #HMT 254 “Shipping Lithium Batteries”.

A.4 Configuring the Gateway for Larson Davis Instruments

CAUTION Complete this section ONLY if you purchased a new RV50X cellular gateway from someone other than Larson Davis, or if it has been reset to factory default settings.

Larson Davis modifies the Sierra Wireless RV50X gateway configuration to conserve power, increase security, and provide additional services. If you purchased an RV50X gateway from someone other than Larson Davis, or if it has been reset to factory defaults, you will need to reenter these important modifications before using it in the NMS system.

To do this you may request a Settings Template file from Larson Davis, or you may choose to manually configure the settings as outlined in this section. The following list describes how the gateway is prepared for your use:

- Power Savings
  - Ping response is disabled to prevent unauthorized traffic (hackers) from repeatedly accessing the gateway—a potential source of wasted power
  - Ethernet and serial ports are disabled to conserve power
- Security Enhancements
  - SSH and DMZ Host are disabled, which increases system security by blocking potential sources of unauthorized access
  - The gateway routes HTTPS communications through the secure HTTP socket to prevent unauthorized "listening"
  - The gateway uses a unique port for local, and for remote access, to discourage unauthorized access
- Additional Services
  - With an installed GPS antenna, the gateway streams the location (and time in local time when at least 4 satellite signals are available).

IN THIS SECTION:

- **A.4.1 Logging In to ACEmanager**
- **A.4.2 Configuring LD Settings Utilizing the Template File**
- **A.4.3 Configuring LD Settings Without the Template File**

A.4.1 Logging In to ACEmanager

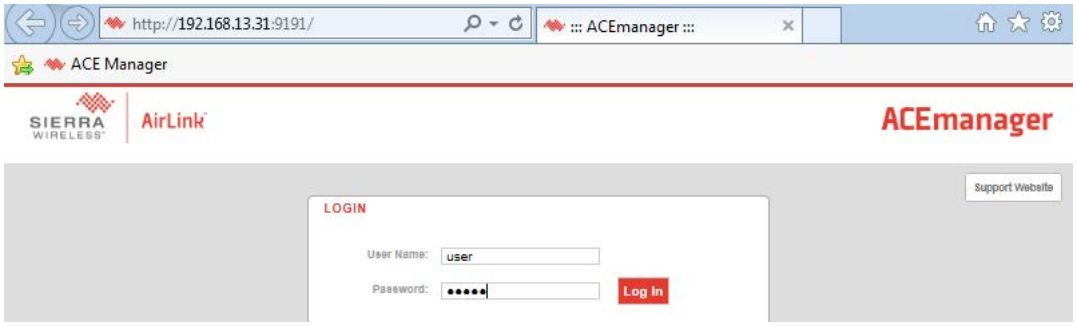
Step 1. Attach the included USB to mini-B cable from the PC to the gateway. See **Figure 2-10 "Connecting to RV50X" on page 20**.

Step 2. Open a web browser.

Step 3. Enter "**http://192.168.14.31:9191"** in the address field.

Step 4. Login as "**user**" with default password "**12345**".

Figure A-2 Sierra Wireless Login



Step 5. Take note of the device's firmware version. If needed, update to the latest version.

Updating Firmware to the Latest Version (Recommended)

a. Go to **http://source.sierrawireless.com/**.

b. Select the name of your device, then select **Firmware Package**.

c. If needed, download and update the firmware according to the manufacturer's instructions.

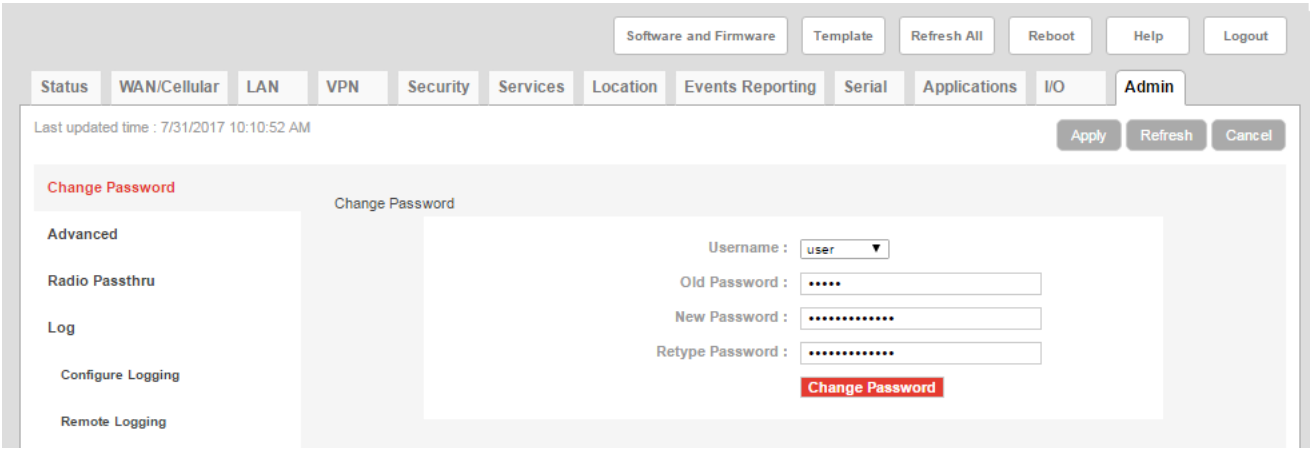
Step 6. Log in again when the system is rebooted as shown in step 3–4.

Step 7. Change your password as shown in the following process.

Changing Your Password:

a. Navigate to the **Admin** tab, and enter the default password ("12345") in **Old Password**.

Figure A-3 Admin Tab



b. Enter a unique password in **New Password**, and again in **Retype Password**.

c. Record your password. If you forget it you will need to reset the RV50X to factory settings and complete this process again.

d. Click **Change Password**, then click **Apply**.

RECOMMENDED NEXT STEP:

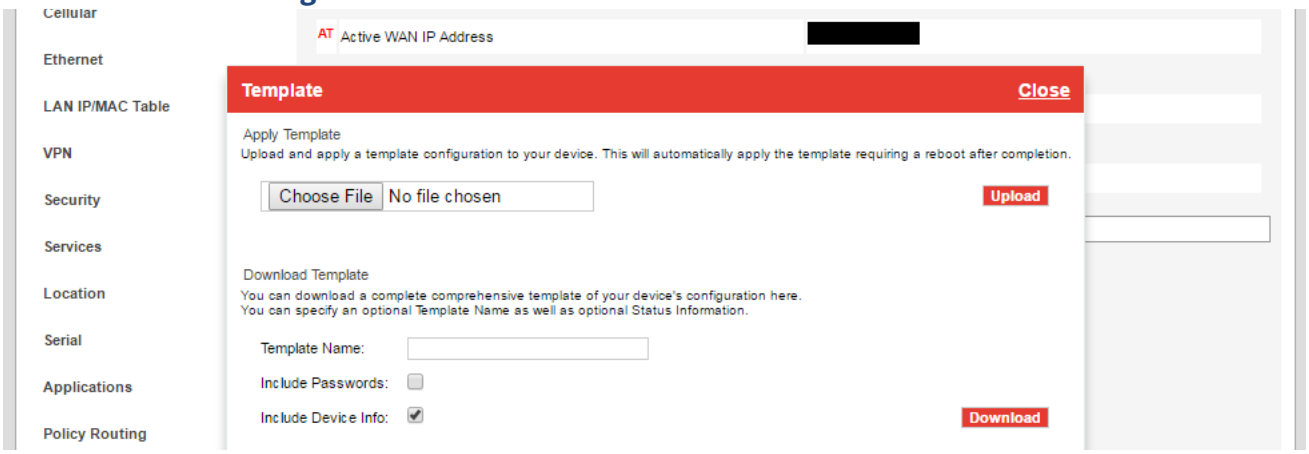
- Choose one of the following sections:
  - **A.4.2 Configuring LD Settings Utilizing the Template File**
  - **A.4.3 Configuring LD Settings Without the Template File**

A.4.2 Configuring LD Settings Utilizing the Template File

Utilizing the LD settings template file is the fastest and simplest method of configuring the gateway.

Step 1. Select **Template** in the top right. This opens the Template upload window.

Figure A-4



Step 2. Click **Choose File**, select the template file "**RV50XTemplateFile.xml**" from the LD USB drive included with your system, then click **Upload**.

Step 3. Select **Apply**. The gateway configuration is complete.

A.4.3 Configuring LD Settings Without the Template File

If you purchased your RV50X gateway from someone other than Larson Davis, or if your gateway has been restored to factory default settings, you need to configure it for use with Larson Davis instruments.

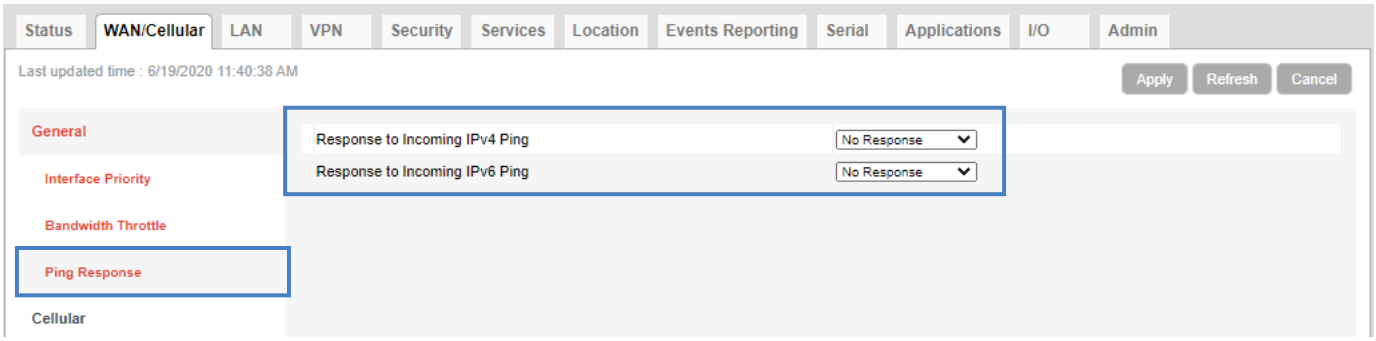
There are 2 methods for accomplishing this:

- Request a template file from Larson Davis. This is the fastest way to prepare the gateway. (This method is shown in **"Configuring LD Settings Utilizing the Template File" on page A-9**.
- Manually configure the RV50X for use with Larson Davis instruments as shown in this section.

Step 1. Log in to ACEmanager as shown in **A.4.1 Logging In to ACEmanager**.

Step 2. Click the **WAN/Cellular** tab, select the **Ping Response** section in the left pane, and edit the values to match what is shown in *Figure A-5* and click **Apply**.

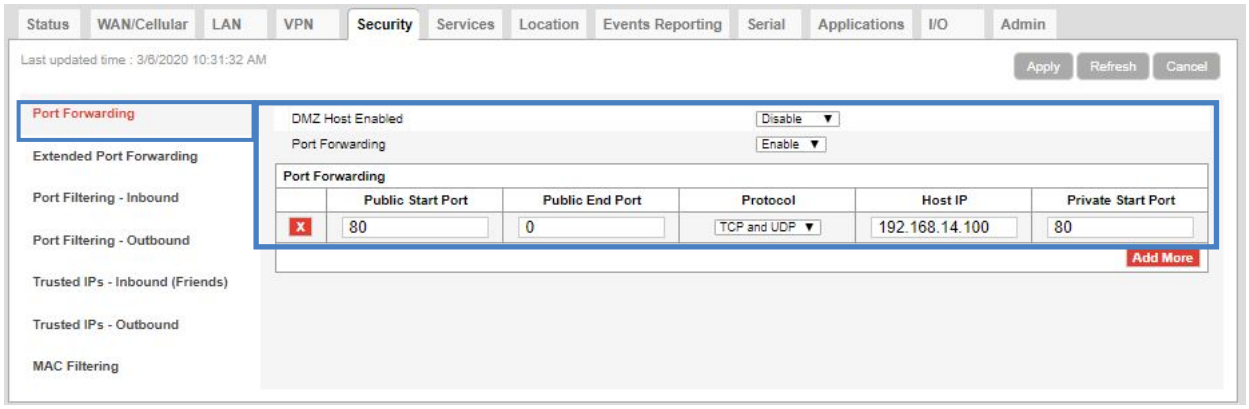
Figure A-5 Edit the Ping Response



Step 3. Go to the **Security** tab, and select the **Port Forwarding** section in the left pane.

Step 4. Edit the values in the Port Forwarding section to match what is shown in *Figure A-6*, and click **Apply**.

Figure A-6 Edit Port Forwarding Settings



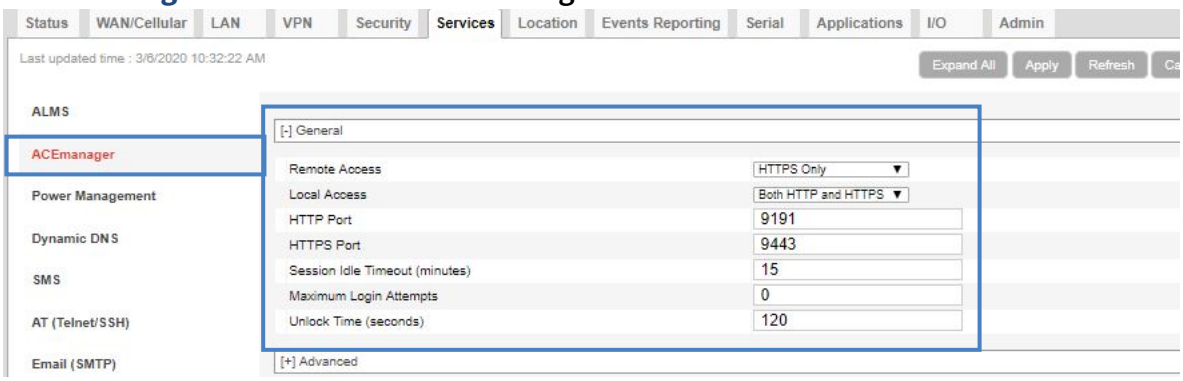
Step 5. To provide gateway security, complete the following process.

a. Navigate to the **Services** tab, and in the left pane, select the **ACEmanager** section.

b. Edit the values to match what is shown in *Figure A-7* and click **Apply**.

TAKE NOTE This step assigns a unique local and remote port. The remote access port must be set to 9443. Do not customize this.

Figure A-7 Services - ACEmanager



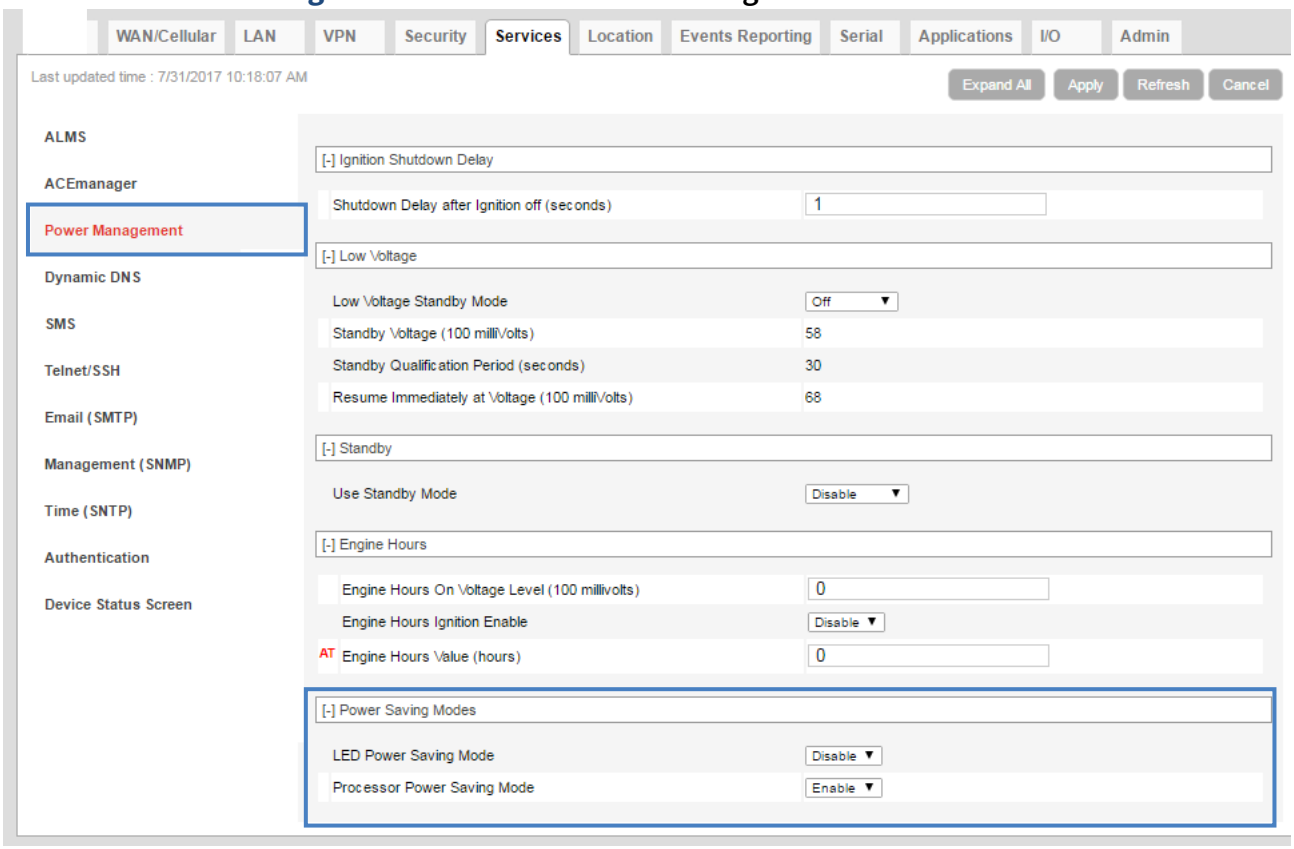
Step 6. To configure the gateway to make the best use of available power, complete the following process.

Configuring Power Management

a. In the left pane, click the **Power Management** section, and expand the **Power Saving Modes** menu.

b. From the **Processor Power Saving Mode** drop-down, select **Enable** and click **Apply**.

Figure A-8 Services - Power Management

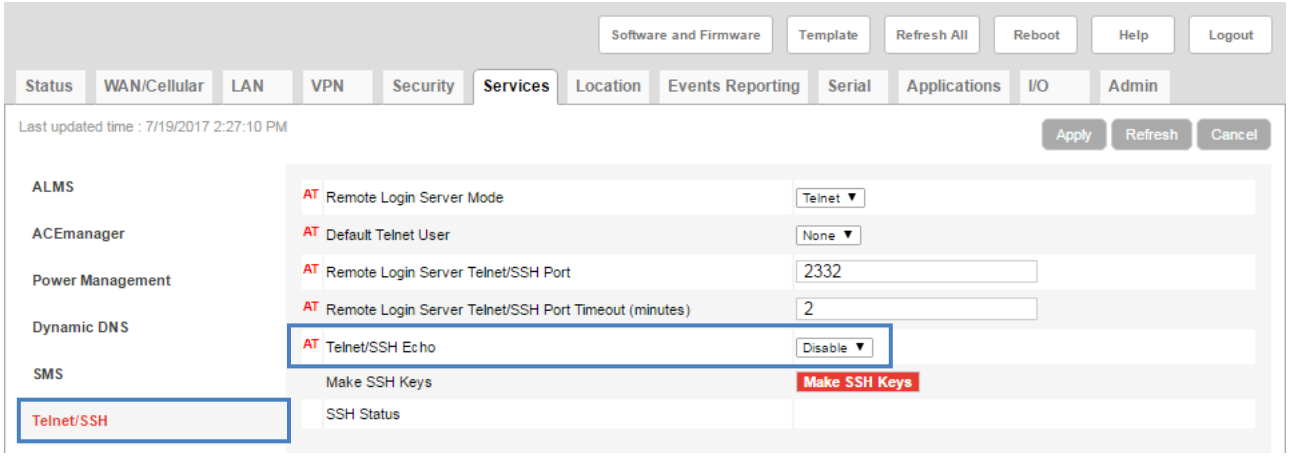


Step 7. To promote gateway security, complete the following process.

a. In the left pane, select **Telnet/SSH**, then set **Telnet/SSH Echo** to **Disable** and click **Apply**.

TAKE NOTE This setting increases system security by blocking a potential source of unauthorized access.

Figure A-9 Telnet/SSH

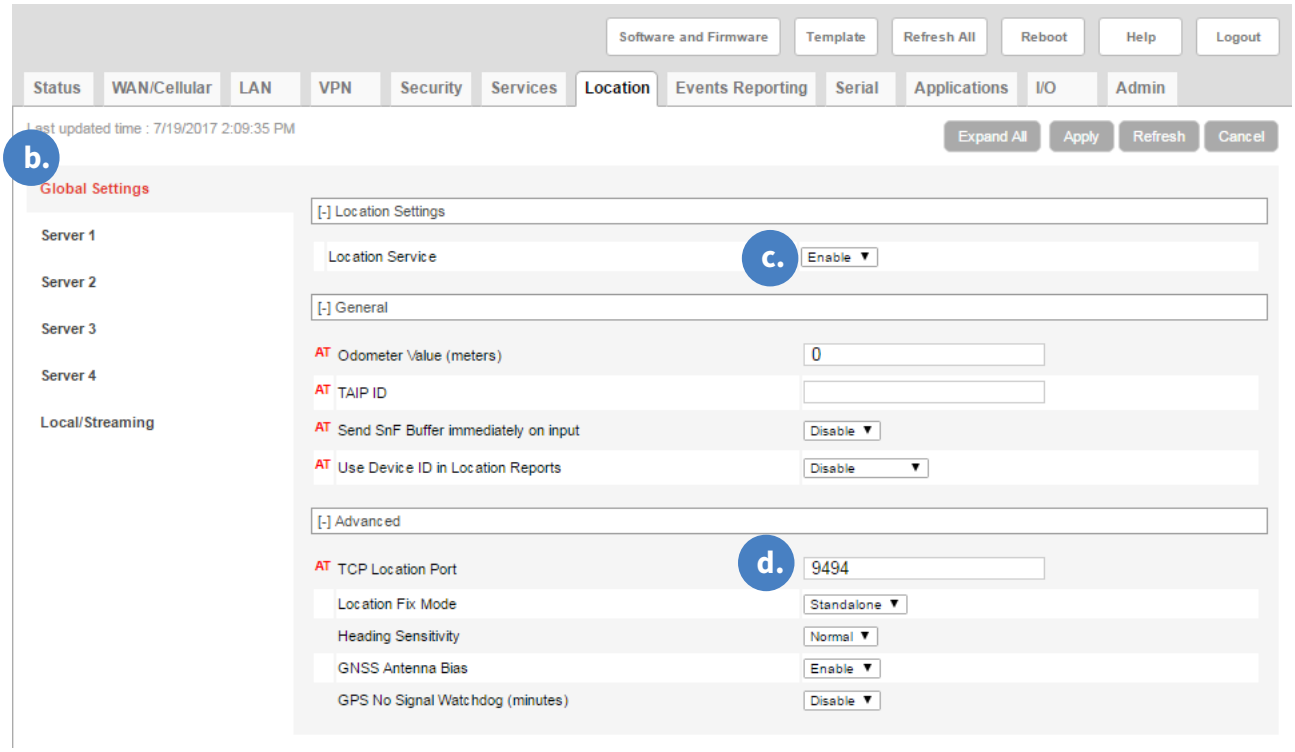


b. Select the **Location** tab, then select **Global Settings** in the left pane as shown in *Figure A-10*.

c. From the **Location Service** drop-down, choose **Enable**.

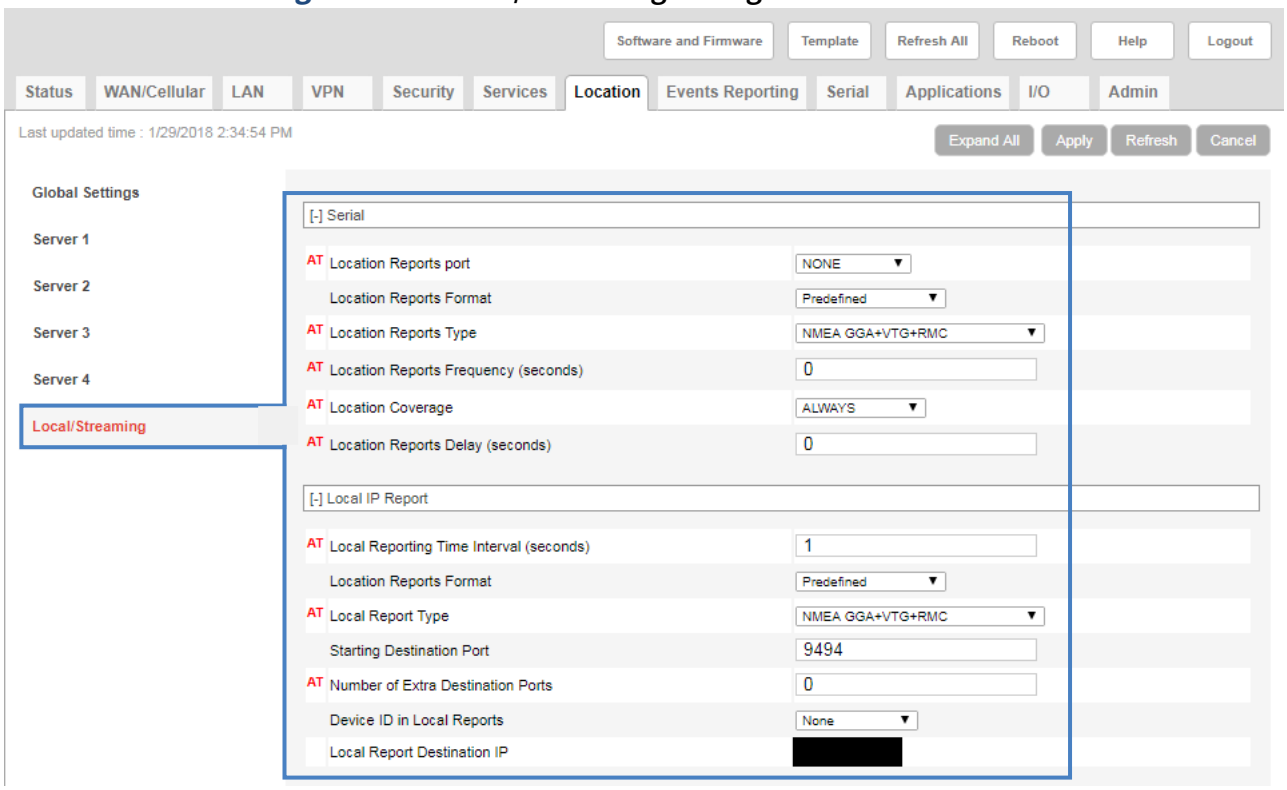
d. Set the **TCP Location Port** to **9494**, and click **Apply**.

Figure A-10 Location Settings



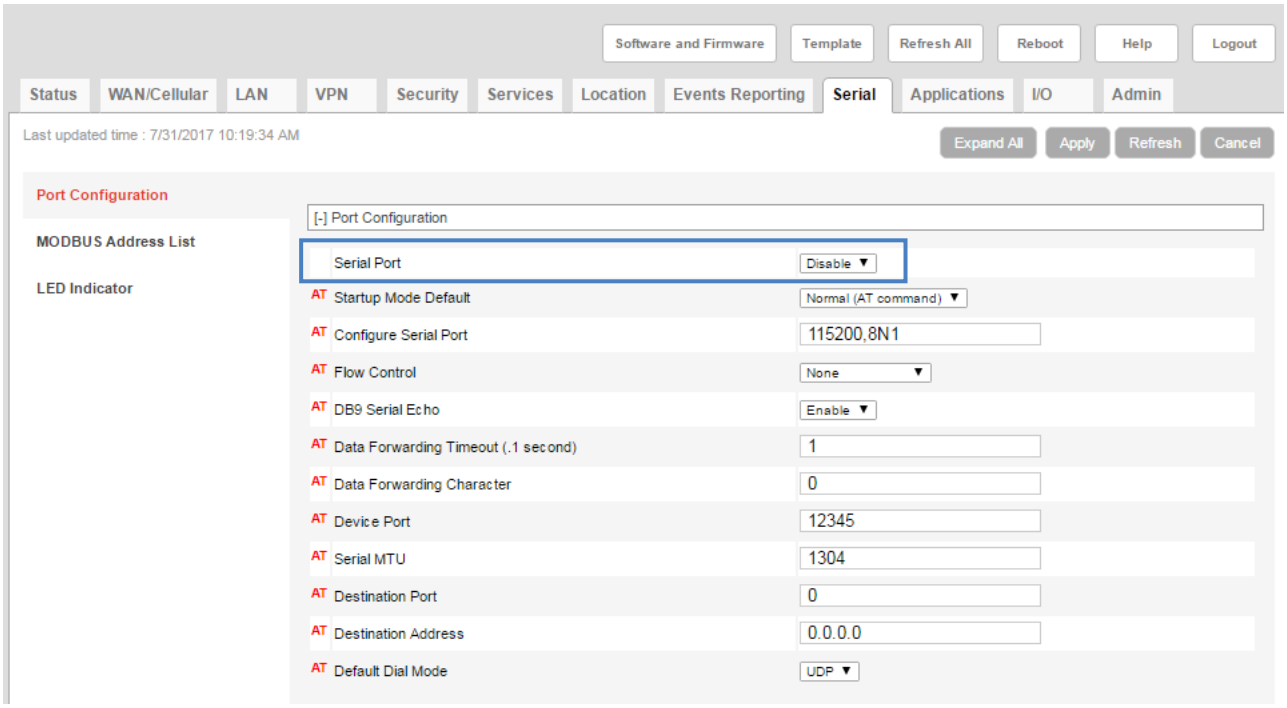
Step 8. In the left pane, select **Local/Streaming**, modify the values to match *Figure A-11*, and click **Apply**.

Figure A-11 Local/Streaming Configuration Values



Step 9. Navigate to the **Serial** tab, select **Disable** from the **Serial Port** drop-down menu, and click **Apply**.

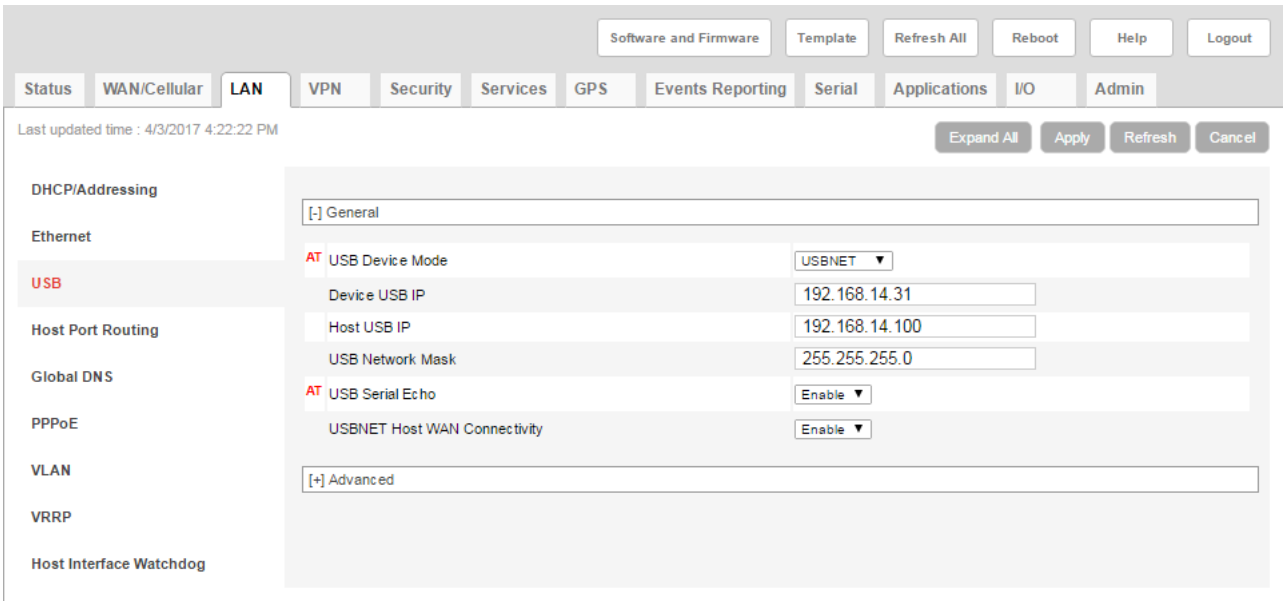
Figure A-12 Serial Port Settings



Step 10. Navigate to the LAN tab, and select the **USB** section in the left pane.

Step 11. Verify that the settings are as shown in *Figure A-13*, and click **Apply**.

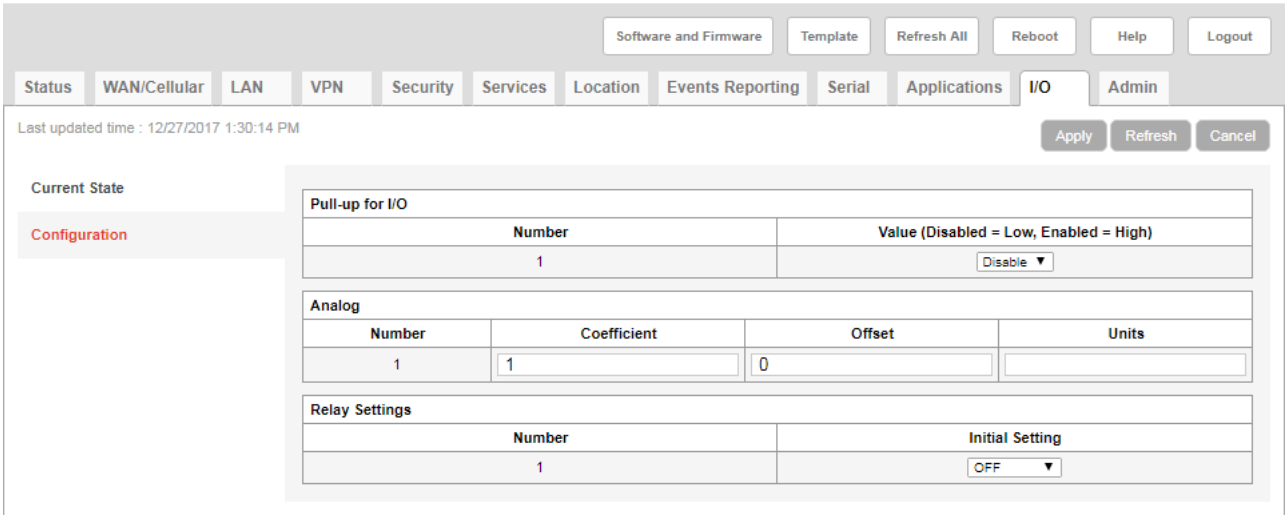
Figure A-13 USB Port Settings



Step 12. Navigate to the **I/O** tab, and select the **Configuration** section in the left pane.

Step 13. Verify that the settings are as shown in *Figure A-14*, and click **Apply**.

Figure A-14 Settings on the I/O Tab

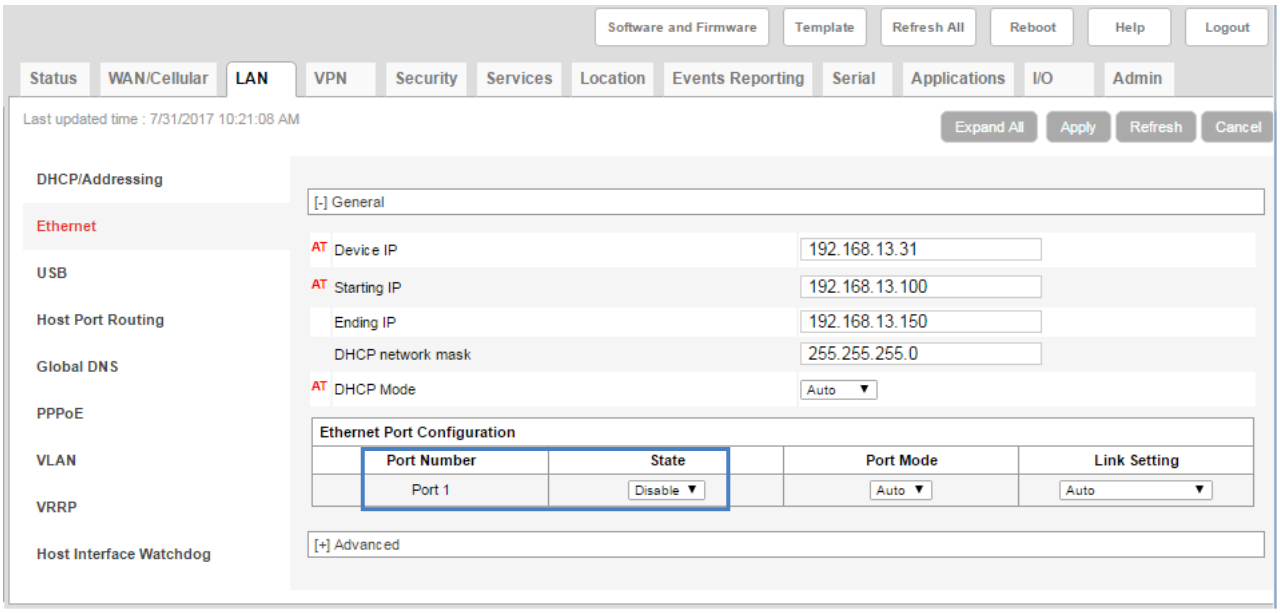


Step 14. Navigate to the **LAN** tab, and select the **Ethernet** section in the left pane.

TAKE NOTE After this change you will not be able to connect to the gateway with a wired Ethernet connection. If you need to restore the wired connection without connecting to the gateway through the cellular connection, do a hard reset on the gateway. This resets all items to the factory defaults. If you want to use a cellular connection once again, you will need to repeat the process in this section from step 1.

Step 15. In the **Ethernet Port Configuration** section, change the **Port 1 State** to **Disable**, and click **Apply**.

Figure A-15 LAN Settings



Step 16. In the top right of the screen, click the **Reboot** button. The gateway saves your settings and reboots.

Appendix B Technical Specifications

IN THIS MODULE:

B.1 Physical Characteristics B-1
Main Plate Dimensions
EPS045 Case Dimensions
Steel Pole (TRP019) Dimensions

B.1 Physical Characteristics

OPERATING TEMPERATURE

- -40 °C to 50 °C ambient temperature

TAKE NOTE Weights are approximate and for reference only.

WEIGHT

- EPS045: 24 lbs (11 kg)
- 831C-045: 7 lbs (3 kg)
- COM-RV50X-045NA/EU:APAC 1 lbs (22 oz)
- BAT019-05: 13 lbs (6 kg)
- BAT020-045: 23 lbs (11 kg)
- SLP003: 26 lbs (12 kg)
- SEN031-045: 10 lbs (4.5 kg)

FIGURE B-1 Main Plate Dimensions

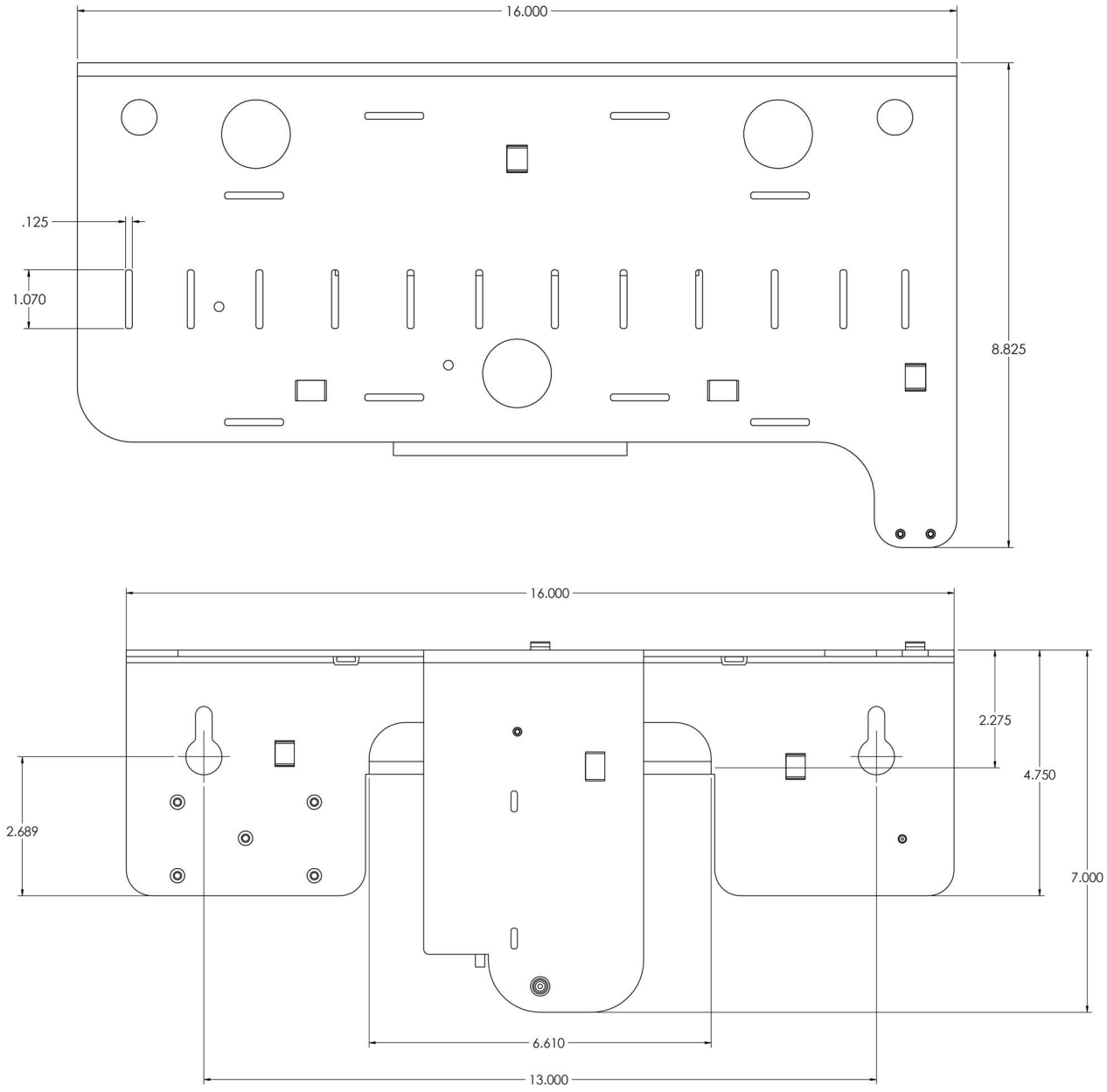


FIGURE B-2 EPS045 Case Dimensions

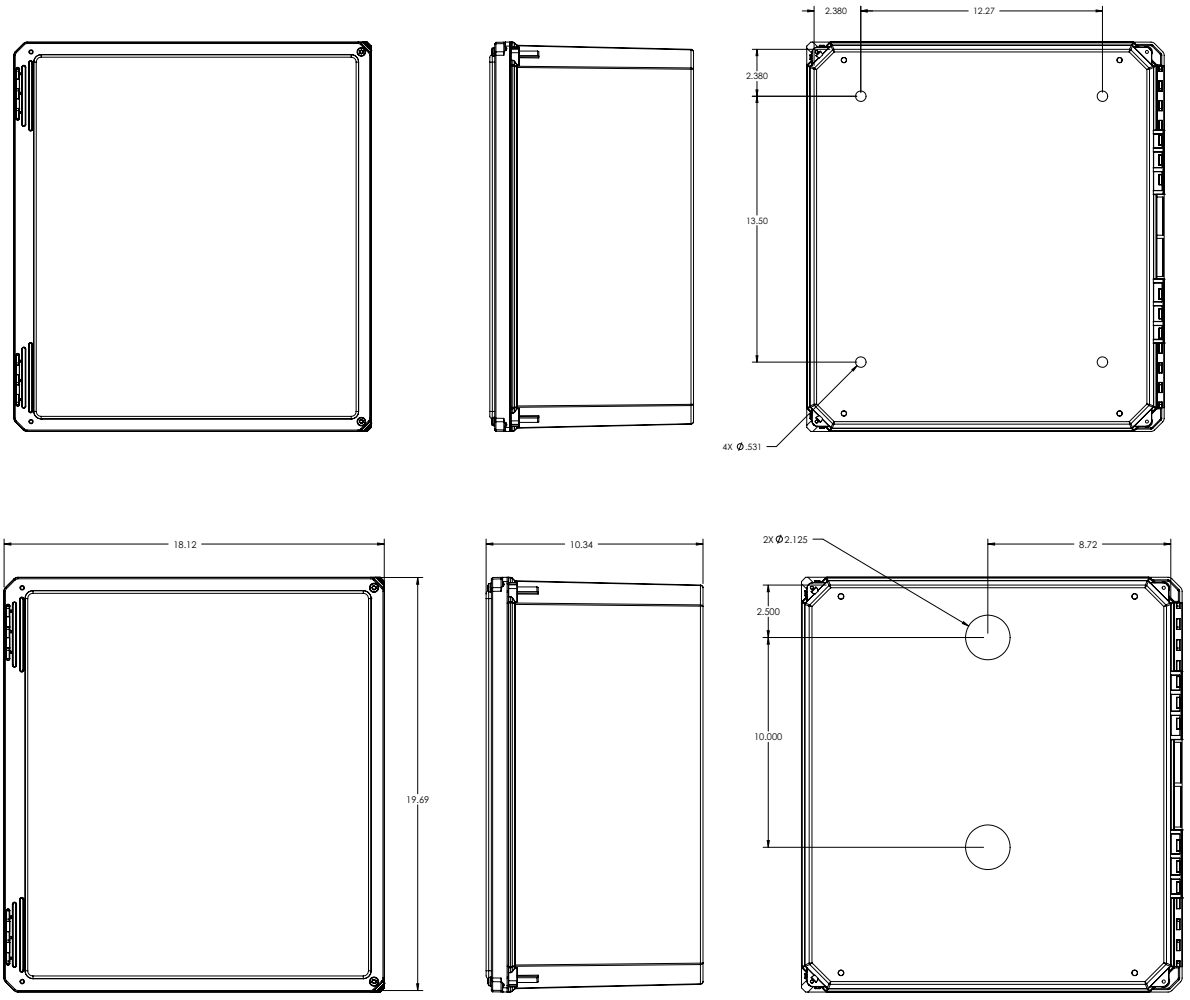
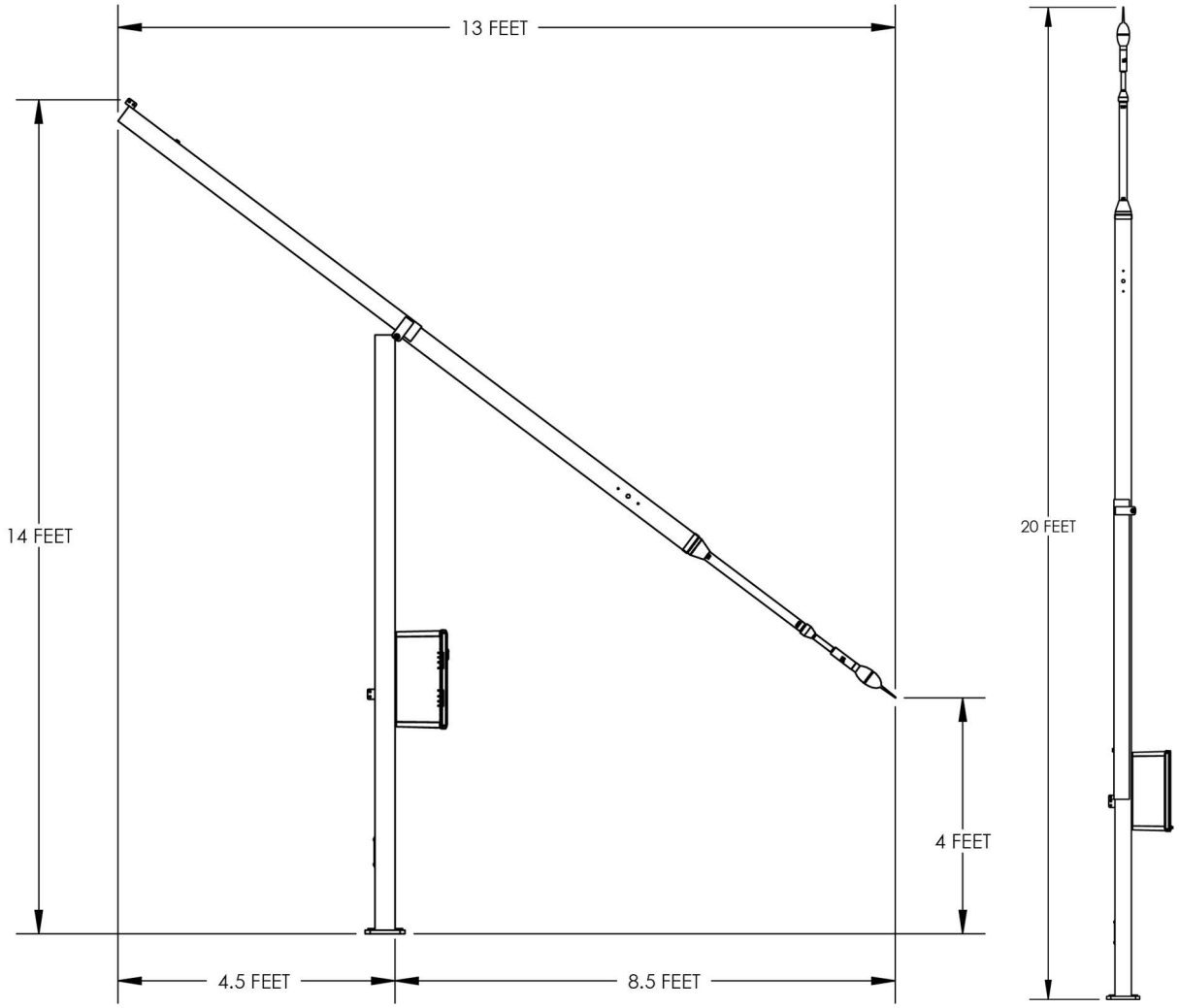


FIGURE B-3 Steel Pole (TRP019) Dimensions



Larson Davis - a PCB Piezotronics division LarsonDavis.com

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