EPS044 & NMS044

Noise Monitoring System
Reference Manual

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Larson Davis

SoundAdvisor

Model NMS044

Reference Manual

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Toll-free (in the US):888-258-3222
Phone:716-926-8243
USA fax:716-926-8215

E-mail: sales@larsondavis.com

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Module 1 System Overview

1.1 Overview

The SoundAdvisor Model NMS044 noise monitoring system (NMS044, system) is the practical solution to long-term or short-term, unattended sound level monitoring. Power is supplied by a 12 V battery, and the system is charged by a solar panel, chosen specifically for the area sunlight availability. It is lightweight, as little as 50 lbs, so one person can carry to a site and setup within a few minutes.

FIGURE 1-1 NMS044 Overview

1.2 EPS/NMS044 Features

Acoustic Measurement
The area sound is measured with a prepolarized microphone and preamplifier that are environmentally protected in a shroud on a telescoping pole, which is mounted to the case.

Portable
The NMS044 can be deployed, before, during, or after you setup the 831C to make your measurements.

Low Power Consumption
A 12 V battery powers the system, which is charged by a solar panel through a charge controller. The system can run, without recharging, for about a week. Sunlight needed to reboot the system after a power loss is minimal and full charge is reached in only a few hours.

LEARN MORE To learn more about power consumption, see "NMS044 Power Draw" on page A-2.

Continuous Sound Measurements
If the batteries are ever completely depleted, the system will shut off safely. When the battery is recharged sufficiently, it will power on and the measurement will continue. This feature runs without any prompting from the user.

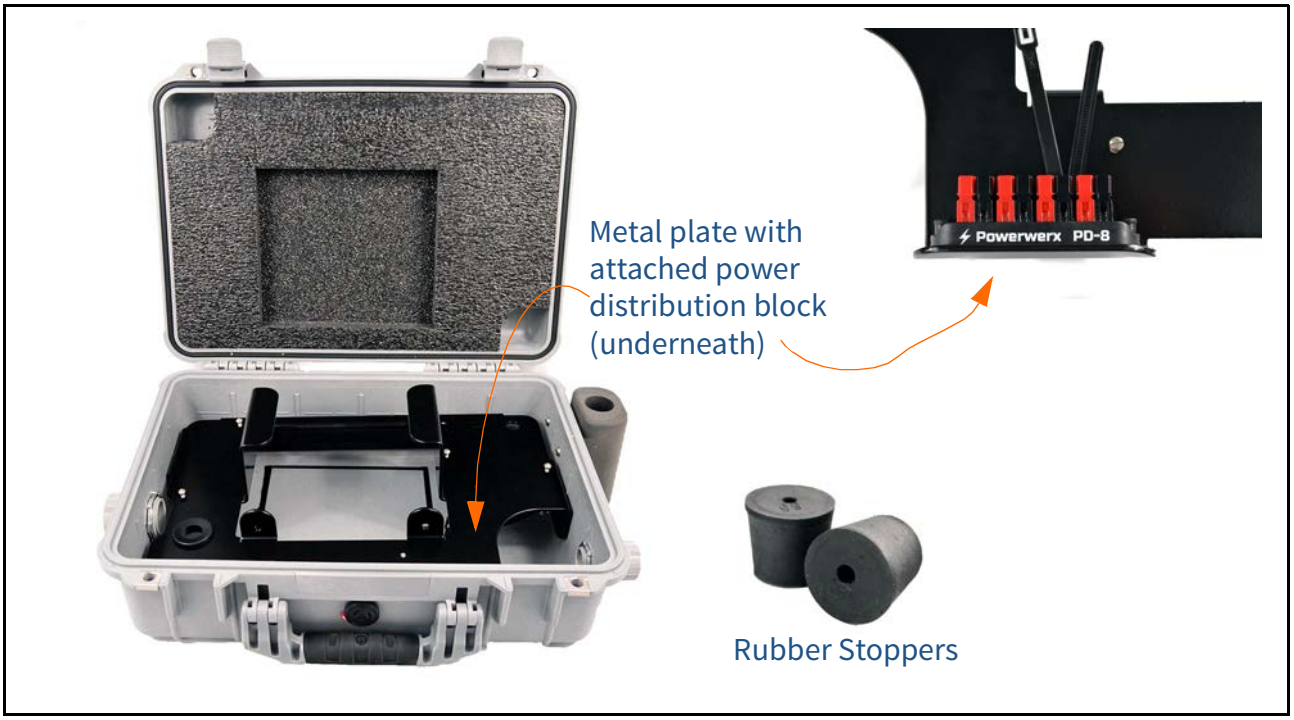
Connectivity
Connect to a cellular network using the RV50X and access the 831C to view/download data from a PC at anytime. Control the system from a web browser from wherever you are.

1.3 Components

CCS051

- Environmentally protected case with foam inserts, attachment bracket, and cable gaskets
- Metal Case Plate
- Power distribution block
- Rubber Stoppers - Depending on which preamplifier is used, one is used for CBL222-08 or CBL222-20, and one is used for EXC cables.
- Silicon grease for cable glands

FIGURE 1-2 CCS051



EPS044

- All that is included in the CCS051
- BAT019 45 Ah 12 V LiFePo Battery or BAT020 35 Ah 12 V SLA Battery
- Telescoping pole with guy wire ring
- PSA038 Genasun Solar Charge Controller
    - Controls the charge of the solar panel to the battery and indicates if the battery is charging or fully charged with the LED light. See A.5.3 "PSA038 Genasun Solar Charge Controller" on page A-5
    - Safe to use with BAT019 and BAT020
- CBL226-02 Charge controller to power block cable
- CBL225-01 Fused battery cable
- CBL228-03 Solar connectors to solar charger cable
- CBL224-02 831C to power block cable
- Canvas bag

FIGURE 1-3 EPS044 Hardware

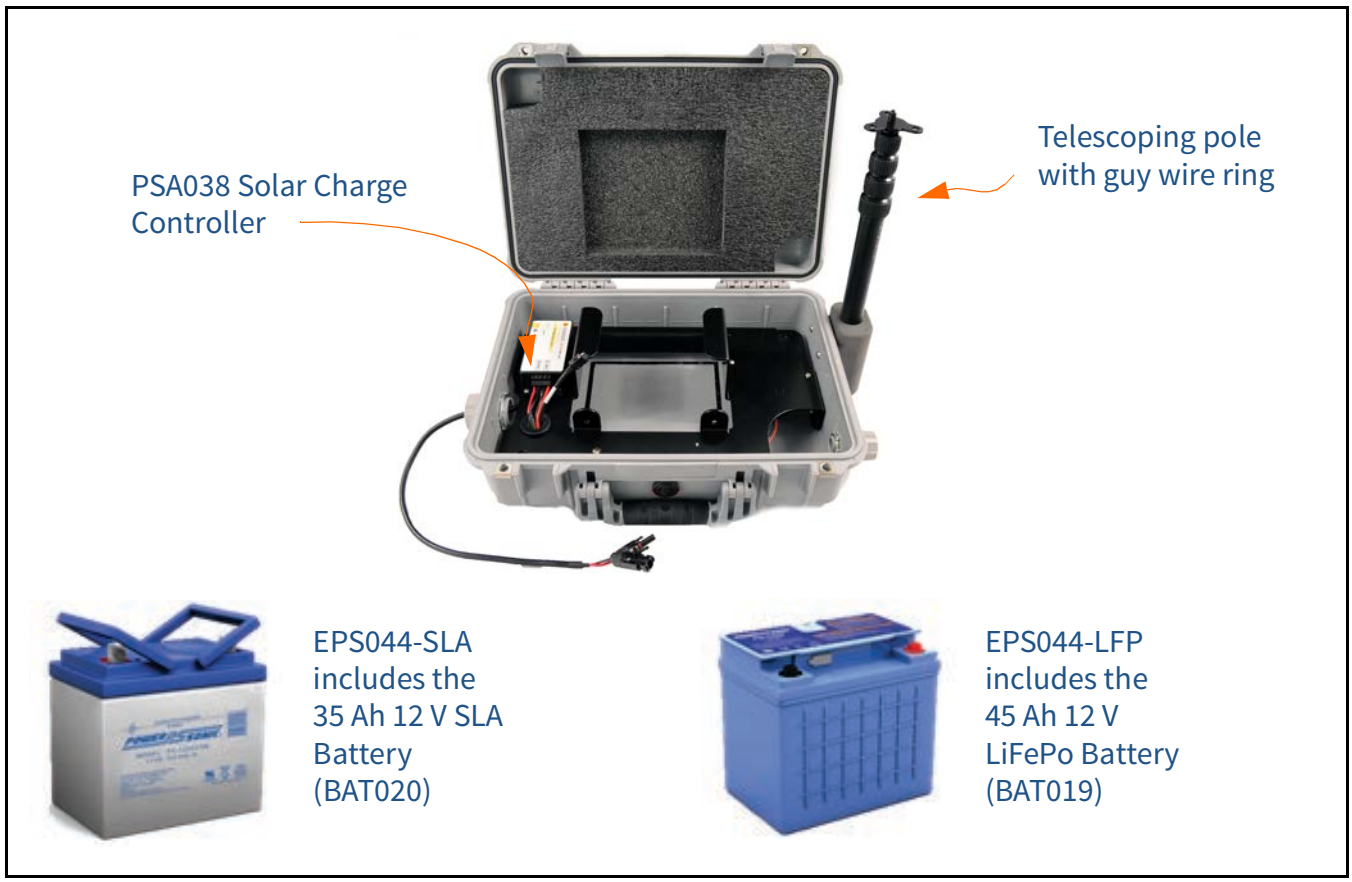
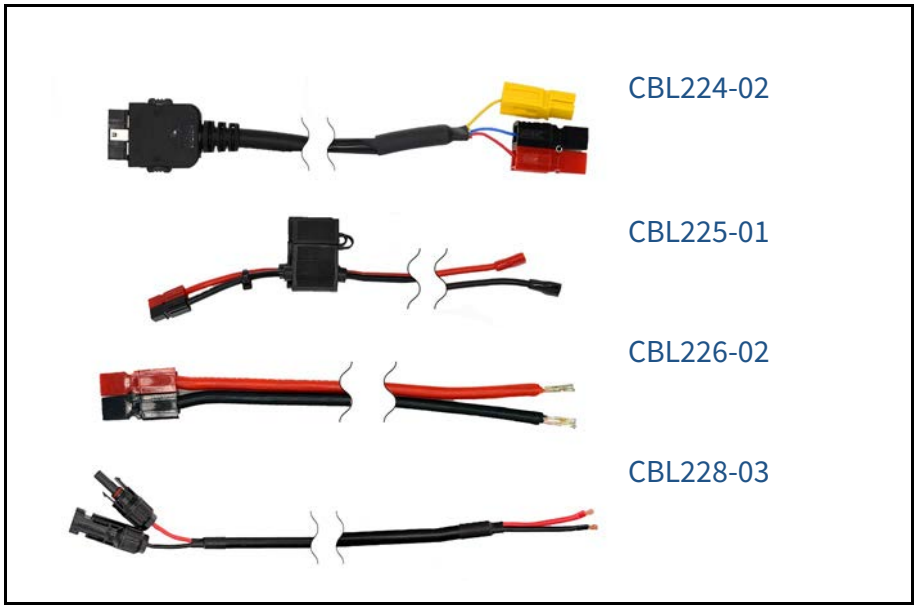


FIGURE 1-4 EPS044 Cables



NMS044

- All items listed above for CCS051 and EPS044 (either the EPS044-SLA or EPS044-LFP, see Figure 1-3 EPS044 Hardware).
- SoundAdvisor Model 831C Sound Level Meter (831C, SLM, meter)
    - Firmware options 831C-LOG, 831C-ELA and 831C-SW
    - Default NMS044 measurement setup
    - Four NiMH AA batteries
- COM-RV50X Cellular Gateway with dual antennas
- SLP001 60 W or SLP002 100 W Solar Panel
- EPS2116 Environmental protection system for microphone and preamplifier
- PRM2103-FF Preamplifier
    - 377B02 Microphone
- PSA039 120 AC Battery Charger Adapter
- CBL222-08 Cable from PRM2103 to 831C
- CBL223-02 RV50X to power block cable
- CBL138 USB to a Mini B used for system setup
- DVX015 2 port USB adapter
- Phillips #2 screwdriver
- Phillips #0 screw driver

TAKE NOTE A SIM card for the RV50X cellular gateway is not included and will need to be purchased through a cellular provider. See “Obtaining Cellular Service for the RV50X” on page 2-2.

FIGURE 1-5 NMS044 Hardware

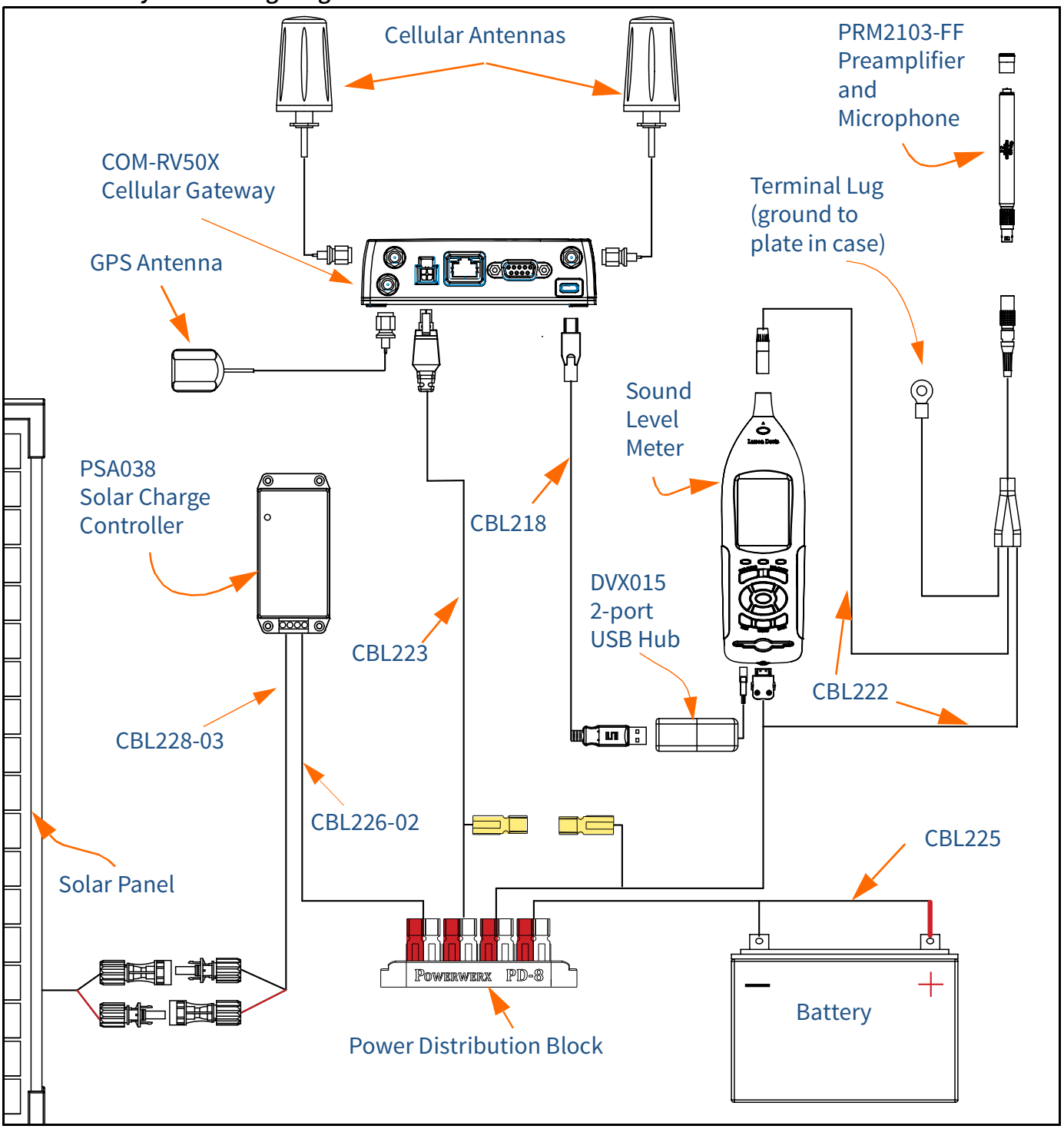
FIGURE 1-6 NMS044 Cables and Accessories

1.4 Optional Accessories

- 831-MEM32G USB Flash Storage
- CAL200 Precision Acoustic Calibrator
- CAL250 Precision Acoustic Calibrator

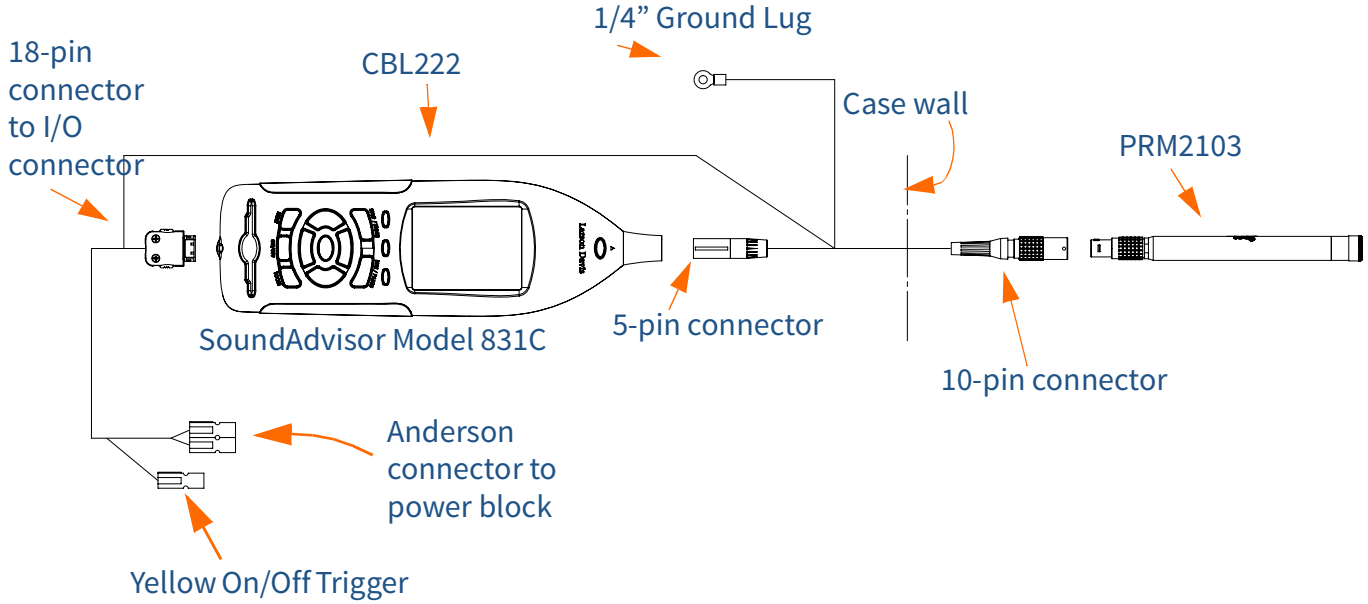
1.5 Wiring Diagrams

FIGURE 1-7 System Wiring Diagram



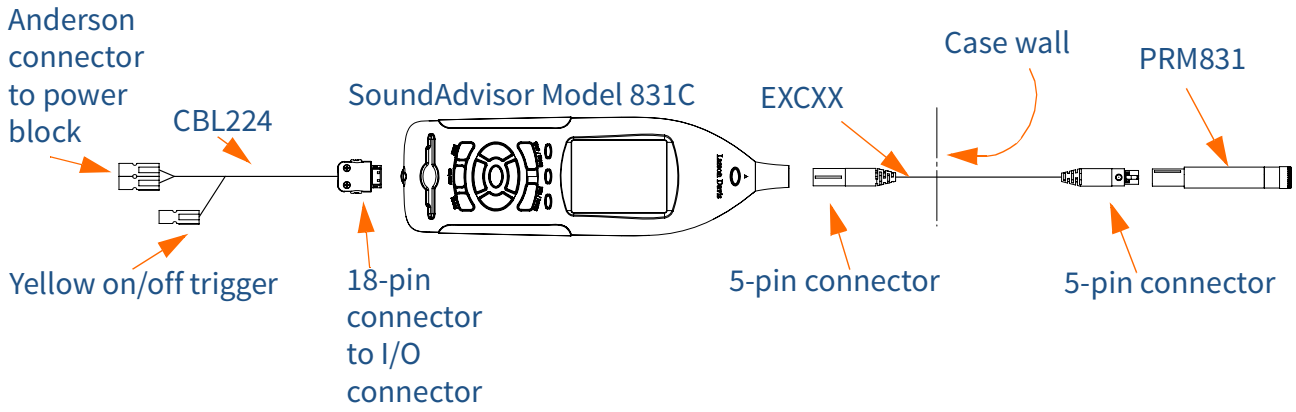
The following diagram shows the wiring details for the PRM2103 outdoor preamplifier, CBL222 cable, and the 831C.

FIGURE 1-8 Wiring Diagram for PRM2103



The following diagram shows the wiring details for the PRM831 preamplifier, EXCXXX cable, CBL2224and the 831C. This is an optional wiring setup for the case that a PRM831 preamplifier is used instead of the PRM2103 outdoor preamplifier.

FIGURE 1-9 Wiring Diagram for PRM831



Module 2 Getting Started

2.1 Overview

When you receive the NMS044 system you will need to perform several “first use” procedures. While most can be done in the field or after deployment, we highly recommended completing this section before deploying.

TAKE NOTE This module assumes that you have the complete NMS044 and all its components. The setup is similar for the EPS044, and the following modules apply to that system as well.

2.2 Preparing the Battery

In this section:

- **2.2.1 Installing the Battery**
- **2.2.2 Charging the Battery**

2.2.1 Installing the Battery

TAKE NOTE Connect all wires and devices prior to turning on the system.

Step 1 Open the case and lift out the plate being careful not to pull any wires loose. Set on an angle away from case.

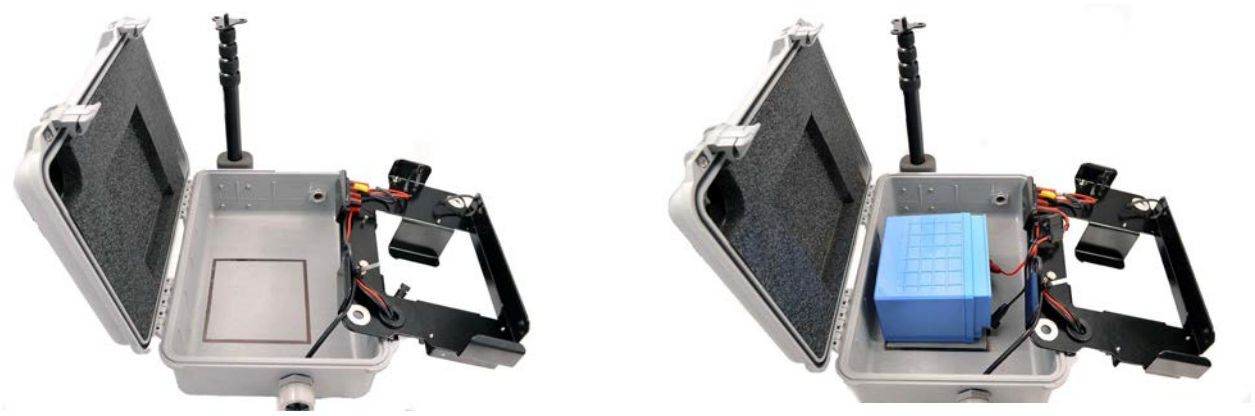
Step 1 If not already in place, insert the battery (BAT019 or BAT020) in the case inside the guide lines, with the terminal toward the power block. See *Figure 2-1 Battery Installation*.

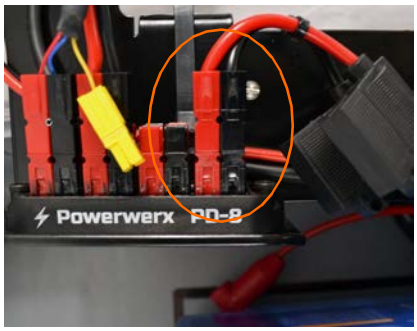
Step 2 Insert the connectors to the power distribution block—red to red and black to black—side by side in any available connector.

Step 3 Place the mounting plate back into the case, over the battery, until set all the way in.

Step 4 If installing a BAT020, insert foam block to fill empty space by the terminals.

FIGURE 2-1 Battery Installation





CAUTION The yellow connector does not connect in the power block. Do not attempt to connect the yellow connector to a red or black connector.

TAKE NOTE The 831C power button ⏻ controls the power in the whole system. It is used to turn off and on the NMS044. Additionally, connecting the battery will also turn the system on.

2.2.2 Charging the Battery

We recommended that you charge the battery prior to deployment using the included PSA039 AC Battery Charger.

Step 1 Connect the solar connectors together, and use the plug to connect to an external power source (wall outlet) until charged.

TAKE NOTE You will know it is fully charged when the PSA038 Genasun Solar Charge Controller LED is green (Blinking indicates charging, Solid green indicates charge is full). If there is no light, ensure the battery is properly installed and the system is turned on. For more information, see A.5.3 "PSA038 Genasun Solar Charge Controller" on page A-5.

2.3 Obtaining Cellular Service for the RV50X

The RV50X gateway requires a data plan, SIM card, public IP address, and an APN for access and service.

Step 1 Purchase a SIM card with the following features:

- A data plan sufficient to the NMS044 data usage. The NMS044 does not regulate data use. Significant charges may occur if the plan is exceeded.
- No messaging/voice data is needed.

Step 2 The cellular plan must support a public IP address so that you can access and control the system remotely. (Often cellular providers block incoming connection requests to a SIM with a dynamic IP address.) Check with the cellular provider to assure that incoming connection requests are allowed.

- If the plan does not have a public IP address you will not be able to access and control the system. However, you can still upload files to SFTP or Dropbox using a static IP address or alternative dynamic IP with Dynamic Domain Name Service (DDNS) as an alternative.

Step 3 Request the APN from your cellular provider. You will need this to configure your system for remote use.

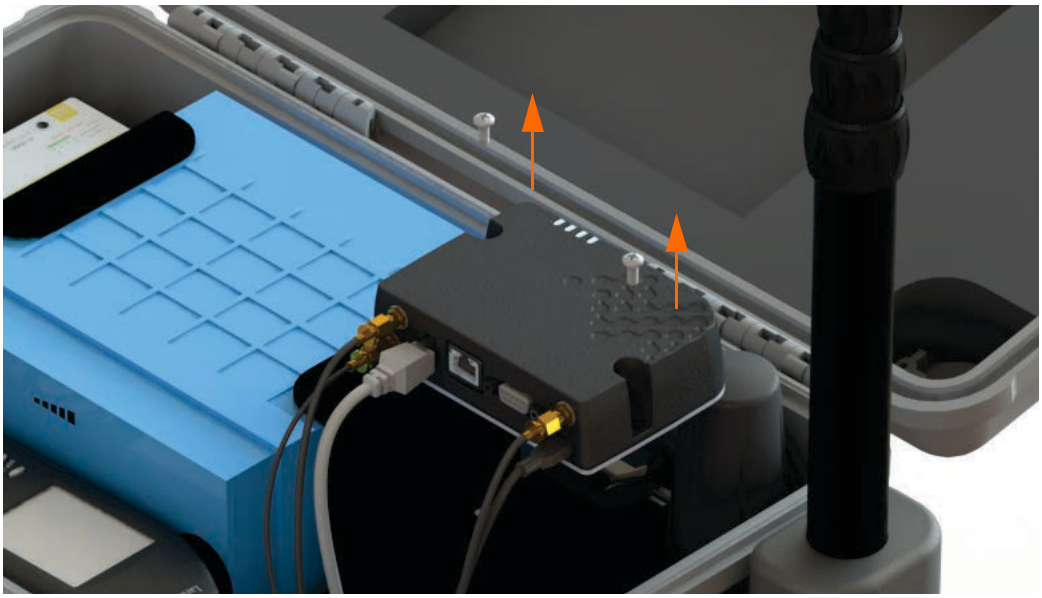
LEARN MORE To learn more about the RV50X gateway, refer to www.SierraWireless.com.

2.3.1 Installing the SIM Card

With the system powered off, install the SIM card by following these steps:

Step 1 Using the provided #2 Phillips head screw driver, remove the 2 screws located on the RV50X, disconnecting the gateway from the case plate.

FIGURE 2-2 Removing RV50X from Case Plate



Step 2 Using the #0 screwdriver, remove the 2 screws holding the front SIM card door.

FIGURE 2-3 RV50X Sim Card Slot

Step 3 Insert the SIM card into to the RV50X slot until it clicks.

Step 4 Replace the SIM card door and screws.

Step 5 Remount the RV50X in the case and hand-tighten the 2 case plate screws.

LEARN MORE To learn more about the RV50X gateway, refer to www.SierraWireless.com.

2.4 Configuring for Remote Communication

In this section:

This section shows you how to configure the gateway for remote communication and confirm the service is working properly, first, by using a USB connection, and second, by using a mobile device.

2.4.1 Configuring the Gateway for Remote Comms Using USB

Before you begin:

- If you've purchased the RV50X gateway separately or it has been reset to factory settings, complete the process shown in **A.7 Configuring LD Settings for the RV50X**.
- Prepare the battery as shown in **2.2 Preparing the Battery**
- Install the SIM card as shown in **2.3.1 Installing the SIM Card**

Step 1 The Ethernet port on the gateway has been disabled for power saving reasons and cannot be used to connect. Disconnect the USB cable which is connected to the gateway.

Step 2 Using a separate USB cable, connect the gateway directly to your computer as shown in *Figure 2-4 Connecting to RV50X*.

FIGURE 2-4 Connecting to RV50X

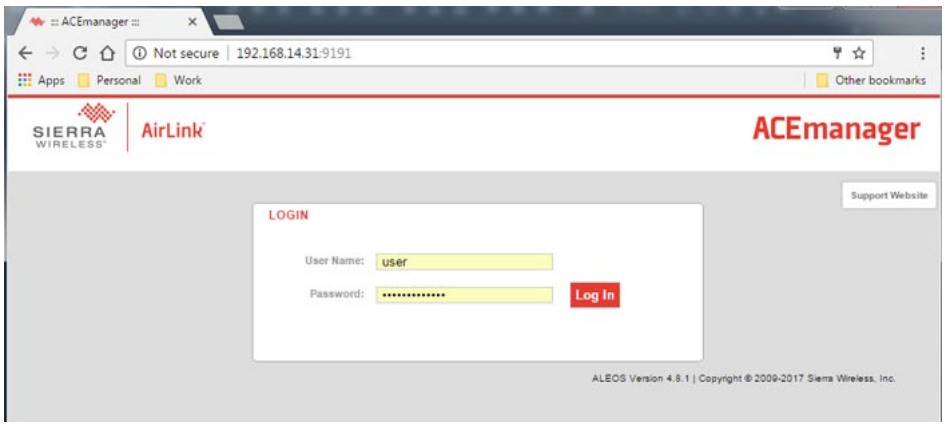
Step 3 Turn system ON by pressing the power button on the 831C (if not already on).

Step 4 Open a web browser on the connected PC and enter **http://192.168.14.31:9191** into the address bar.

Step 5 Log in as “user” with configured password “LD_NMSystem16”.

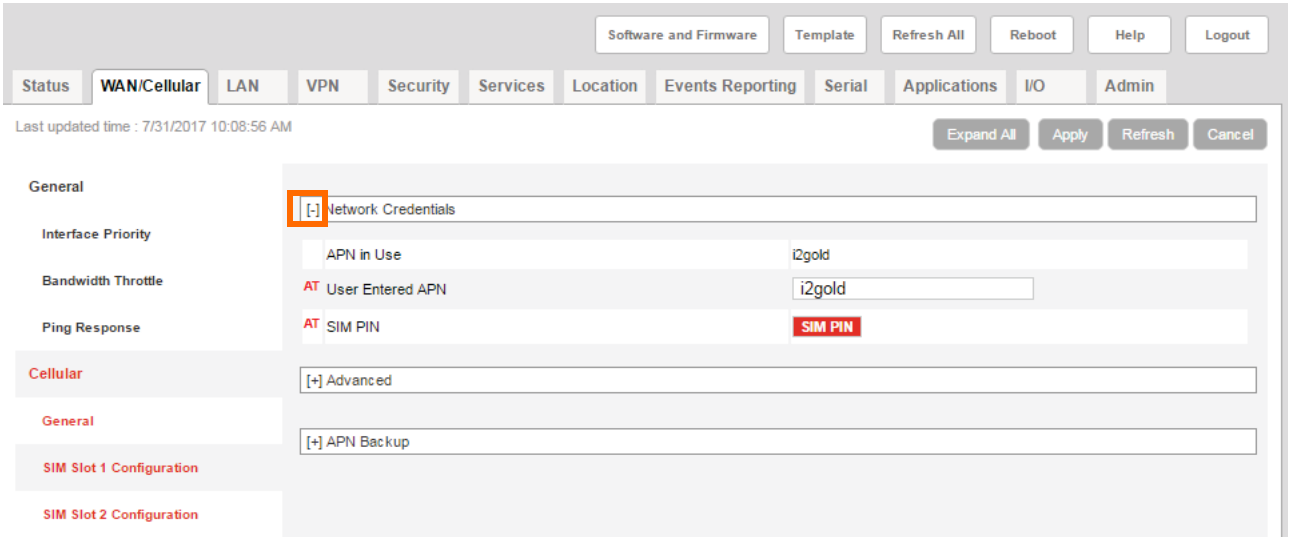
TAKE NOTE If the login is not working, this may be a sign that the gateway does not have LD settings loaded. See A.7 "Configuring LD Settings for the RV50X" on page A-8.

FIGURE 2-5 User Login



Step 6 Click the **WAN/Cellular** tab and expand the plus icon **+** in-line with **Network Credentials**.

FIGURE 2-6 WAN/Cellular



Step 7 Click the **SIM Slot 1 Configuration** sidetab, and enter the APN provided by your cellular provider in the **User Entered APN** field.

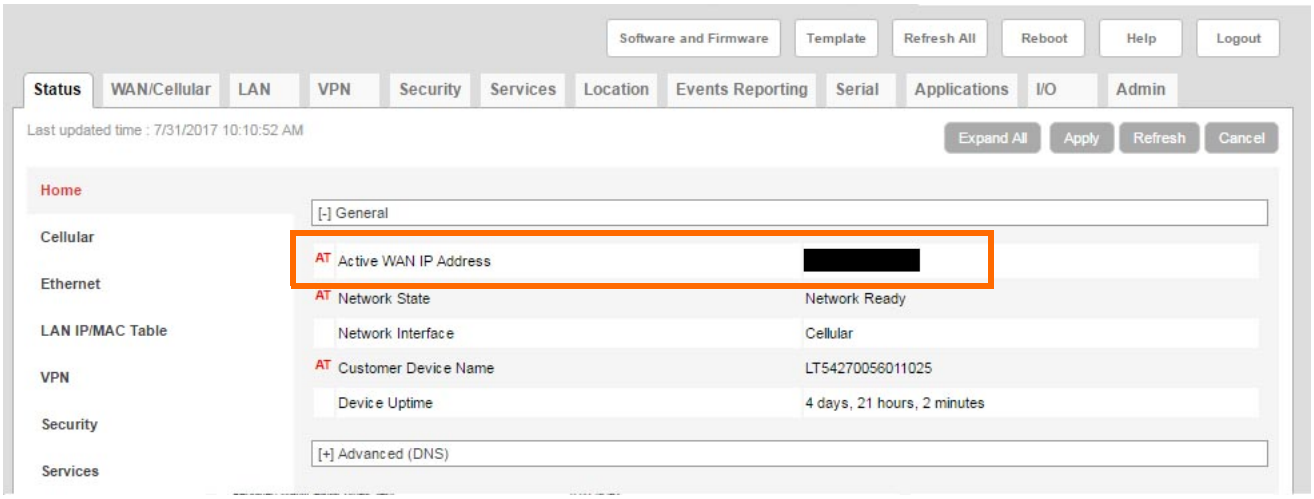
Step 8 Click **Apply** in the top left of the window, and reboot the RV50X.

Step 9 Login once again.

Step 10 Navigate to **Status** ⇢**Home** ⇢**Network State**. If the setup is complete, the status should be **Network Ready**.

Step 11 Verify the **Active WAN IP Address** matches the static address given to you by your cellular provider as shown in *Figure 2-7 Status*.

FIGURE 2-7 Status



Step 12 Disconnect the USB cable from the PC and RV50X. Return the mini USB to the RV50X.

FIGURE 2-8 Disconnecting USB/Reconnecting USB

Disconnect the USB from the PC and RV50X

Return the mini USB to the RV50X.

Step 13 Press the ON/OFF ⏻ button to reboot the 831C.

2.4.2 Configuring the Gateway for Remote Comms With a Mobile Device

Connecting via IP address to the 831C prior to deployment, confirms that the service is working properly. To connect to the 831C with a mobile device, follow these steps:

Step 1 On your mobile device, open a web browser. We recommend Chrome.

Step 2 In the URL field, type the IP address from your cellular provider followed by "**/SoundAdvisor**". Example: **126.120.130.65/SoundAdvisor**

Step 3 Press ENTER.

Step 4 The browser shows the meter's Live View tab. You can operate the 831C from this view.

2.4.3 Enabling the Trusted IP (Friends) List

We strongly recommend that you complete the following process to disable remote access from unknown IP addresses.

Step 1 Log in to ACEmanager or ALMS.

Step 2 Go to **Security → Trusted IP - Inbound (Friends)**.

Step 3 Under **Inbound Trusted IP List** (**Inbound Trusted IP** Range) enter the IP addresses or address ranges that should have remote gateway access.

Step 4 Set **Inbound Trusted IP (Friends List) Mode** to **Enable**.

Step 5 Click **Apply**, and reboot the gateway.

2.5 Configuring SLM Settings On the 831C

Step 1 On the 831C, go to **Tools → System Properties**, or using G4 while connected to your 831C, select your meter in the **Meters Panel→ Live View → Menu → System Properties**.

Step 2 We recommend selecting the following basic settings when using the NMS044 system:

- **Auto-Off**: **Never**
- **Backlights On**: **5 s - 10 s (power saving)**
- **Keypad Backlight**: **Off (power saving)**

Step 3 Enter a value in the **Ext Shutoff Voltage** field. This value should reflect the battery type that is installed in your NMS044 system. To determine the shutoff voltage, use *Table 2.1*:

Table 2.1 Shutoff Voltage

Battery	Shutoff Voltage
The LiFePo Battery (12V 45Ahr)	12.0 V
The SLA Battery (12V 35Ahr)	10.8 V

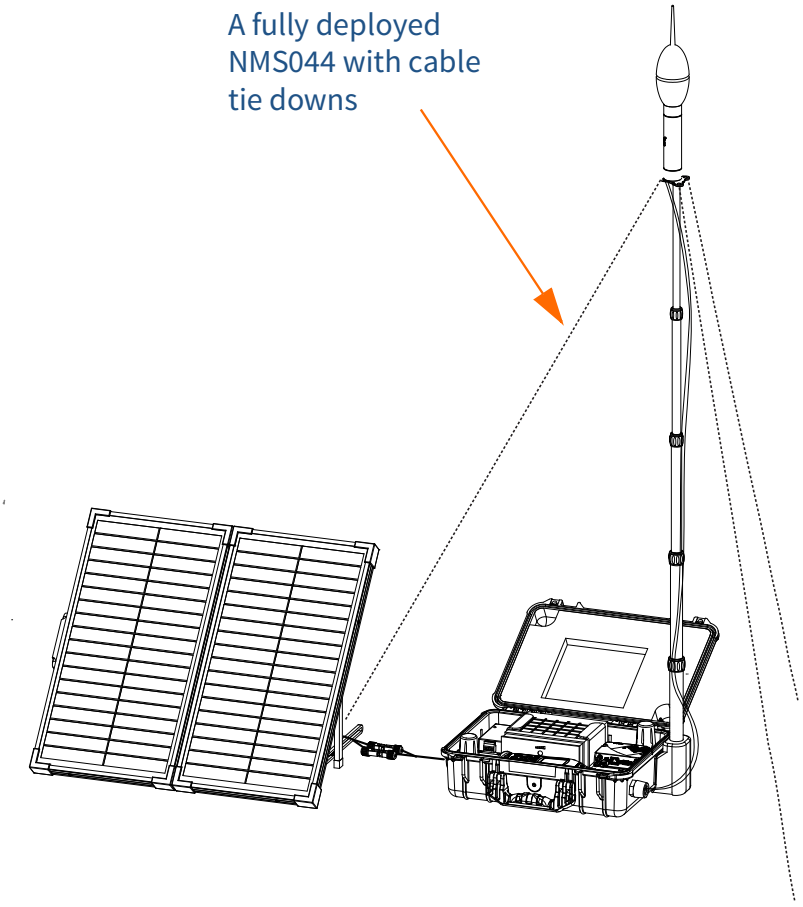
Step 4 Navigate to the Preferences tab, set **Auto-Store** to **Store**, and click **Close** and **Yes** to save your changes.

Module 3 Deployment

3.1 Overview

The following module will demonstrate the setup of the NMS044 in the field.

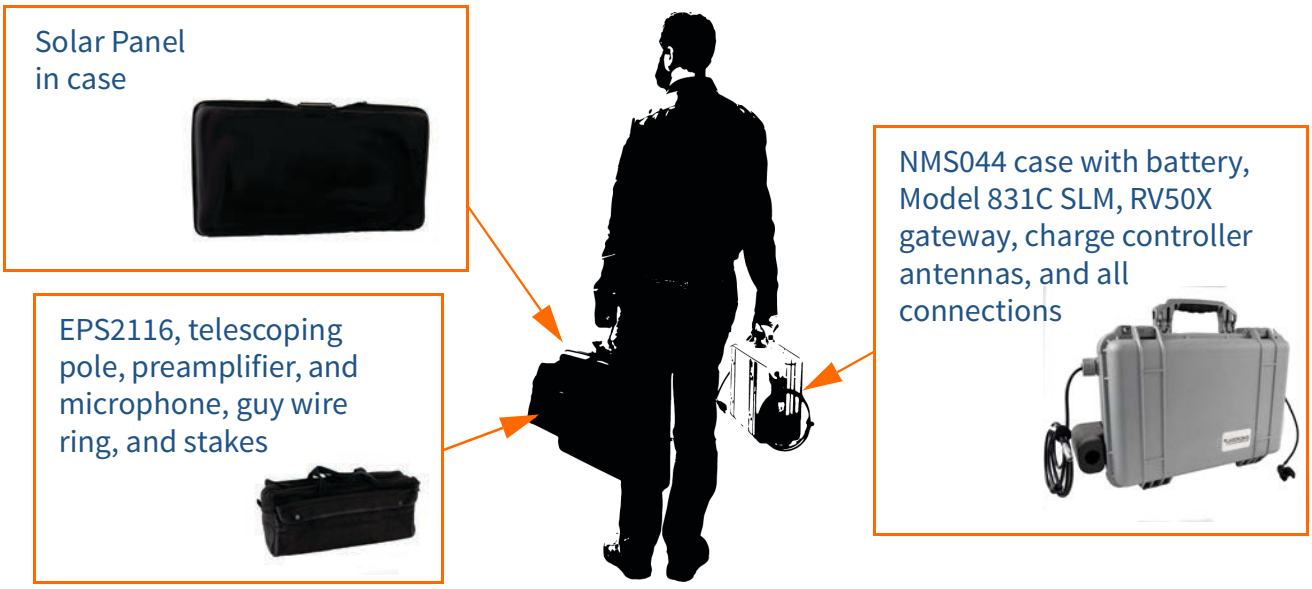
FIGURE 3-1 Deployment Overview



3.2 Travel Packs

Assemble all components in the recommended three travel packs. See Figure 3-2 NMS044 Deployment Travel Packs

FIGURE 3-2 NMS044 Deployment Travel Packs

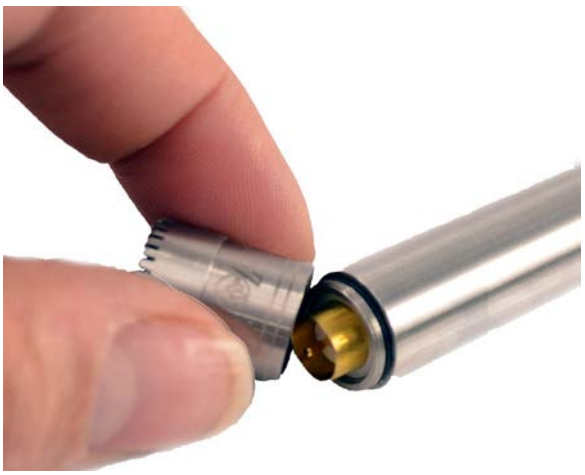


3.3 Assemble EPS2116 and Preamplifier

LEARN MORE To learn more about the assembly of the EPS2116 refer to the EPS2116 Reference Manual (IEPS2116.01)

Step 1 Remove rubber cap from top of preamplifier. Place microphone on preamplifier, then gently screw together until hand tight. Set aside (you can store these connected so you do not need to repeat this step with every deployment).

FIGURE 3-3 Connecting Microphone and Preamplifier



Step 2 Hold EPS2116 windscreen and birdspike together and unscrew from top. Screw together top and base. The EPS2116 should now appear in two components, see Figure 3-4 EPS2116 Separated.

FIGURE 3-4 EPS2116 Separated

Step 3 Thread the CBL222-08 cable up through the base and top. Align red dots on bottom of preamplifier to top of CBL222-08, gently push together until mounted. Gently ease the cable back down until the microphone is seated at the top of the EPS2116. As illustrated in Figure 3-5.

FIGURE 3-5 EPS2116 Threading

Step 4 Holding windscreen and birdspike over the top, screw the assemblies together (this can wait until after calibration, see “Calibrate” on page 3-8.

TAKE NOTE Step 4 can be done after calibration, see “Calibrate” on page 3-8.

CAUTION If you need to remove the windscreen, do not pull it off the birdspike with an upward motion. First, unscrew the birdspike by twisting its top and then pull the windscreen down over the bottom of the unscrewed birdspike.

3.4 Install Pole and EPS2116 to System

Step 1 Remove the protective cap from the top and the bottom of the telescoping pole. Place guy wire ring on the top of the pole. Place the EPS2116 on top and hold it still, twist the pole only, making sure to have the signal cable between two of the tie downs of the ring to not over strain the cable.

FIGURE 3-6 EPS2116 to Telescoping Pole

Step 2 Wrap the cable around the pole (2) two times in a counter clockwise orientation. Place into the bracket and twist clockwise to tighten.

FIGURE 3-7 Telescoping Pole with EPS2116 to system

Step 3 Extend the sections of the pole by loosening the telescoping pole clamp and then tighten.

Step 4 Use hook and loop cable straps (already on the cable) to fix the signal cable to the pole.

Step 5 Use the guy wires and stakes to steady the pole by attaching them to the guy wire ring and then to the ground.

3.5 Connect Solar Panel

Step 1 Unlatch solar panel to open.

Step 2 Loosen thumb screws to extend legs. Match angle on either side.

Step 3 Connect the solar connectors together.

Step 4 Place solar panel in a secure, unobstructed flat spot facing toward the sky with optimal sunlight.

FIGURE 3-8 Solar Connection

Procedures for Disconnecting Solar Connectors

To disconnect the solar connectors, a solar connector tool is provided. Insert the tool in the middle of the connection, to pinch the locking mechanism, then pull apart.

FIGURE 3-9 Solar Connector Removal

3.6 Turn System ON

Press the power button ⏻ on the 831C to turn the whole system on.

The Model 831C SLM power button ⏻ controls the power in the whole system. It is used to turn off and on the NMS044.

FIGURE 3-10 NMS044 Case Components

3.7 Calibrate

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 in performing the acoustic calibration.

TAKE NOTE It is recommended to perform a calibration after the system is deployed.

Step 1 Holding windscreen and birdspike together, unscrew the assemblies until they come apart.

Step 2 Place the calibrator over the microphone. Apply it carefully to avoid sudden large pressure changes to the diaphragm.

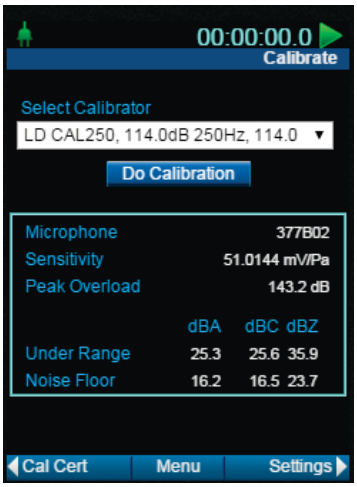
Step 3 Navigate **Tools** ⇢**Calibrate** on the meter.

Step 4 Select the calibrator and click the **Edit Settings** button if the calibrator settings need to be modified. Ensure that the settings correspond to those described in the manual for the selected calibrator.

Step 5 Turn calibrator on.

Step 6 Click the **Do Calibration** button on the meter.

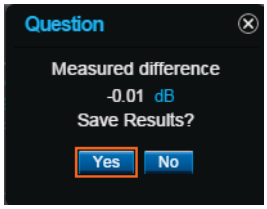
FIGURE 3-11 Acoustic Calibration



Step 7 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.

Step 8 Carefully remove the calibrator from the microphone.

FIGURE 3-12 Calibration Results



Click the Calibration History tab to view either acoustic calibration or calibration check summaries.

Step 9 When calibration process is complete, assemble windscreen and birdspike back on to the microphone.

3.8 Due Diligence

Follow these steps prior to leaving the system:

FIGURE 3-13 Due Diligence

3.8.1 Verify Battery is Charged/Charging

You will know the is battery fully charged when the PSA038 Solar Charge Controller is green. A blinking LED indicates it is charging, constantly on indicates charge is full. See A.5.3 "PSA038 Genasun Solar Charge Controller" on page A-5.

3.8.2 Check Cellular Service

By connecting to the 831C while in the field, you can determine if the service is working properly. To connect to the 831C via a mobile device (with active cellular service), follow these steps:

TRY THIS Check the service lights, see A.5.2 "COM-RV50X-APAC/US:EMEA Cellular Gateway" on page A-3.

Step 1 Open a web browser (Chrome is recommended)

Step 2 In the URL, type the IP address provided to you from your cellular provider, then /SoundAdvisor. Press enter.

- Ex: 126.120.130.65/SoundAdvisor

Step 3 If you have cellular service, then the browser should show the current state of the meter, the same screen as the meter. You can operate the 831C from this view.

3.8.3 Secure case with lock

This step is optional but recommended. The NMS044 case latches tight, and a lock can be used to secure it. You can chain the system to a fixed object as well, to deter theft.

Module 4 Making Measurements

4.1 Overview

Setting up the Model 831C Sound Level Meter can be done prior, during, or after deployment. You have complete accessibility to make settings changes, check the measurement, or download the file at any step of the process.

4.2 Connecting to G4 LD Utility

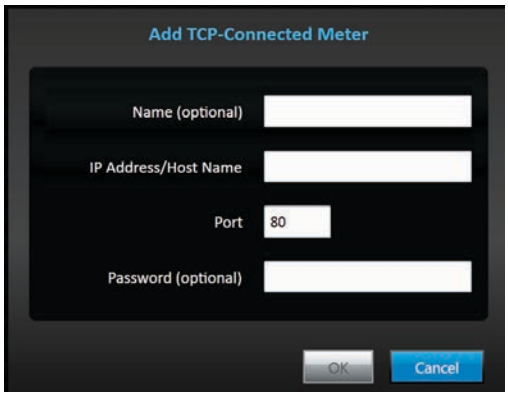
While you can always connect directly to a PC from the 831C using the included USB cable, this section describes connecting via TCP/IP.

Step 1 In G4 in the Meters Panel, click the blue plus icon  in-line with **Meters**.
This opens the Add TCP Connected Meter window

Step 2. Enter information in the following fields, then click **OK**.

- **Name**
- **IP Address/Host Name:** Enter the IP Address given by your cellular provider for the RV50X modem SIM card.
- **Port**: Unless you receive specific instructions, this will usually be **Port 80**.
- **Password**

FIGURE 4-1 Adding a TCP/IP Connected Meter



4.3 Default NMS044 Setup File

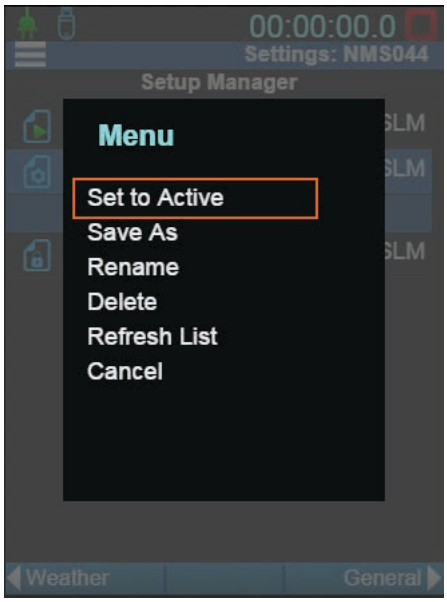
For convenience, there is a default setup file for the NMS044 on the meter that can be set to Active. If you make any changes to this setup, you can save it as a custom setup file for multiple use, even transferring it to a PC to be transfered to any number of meters. To do this, follow these steps:

Step 1 Using G4, mobile device, or the meter itself navigate to the Setup Manager for the meter. (**Tools** ⇢**Setup Manager**)

Step 2. Select the setup “NMS044”, press **Enter**.

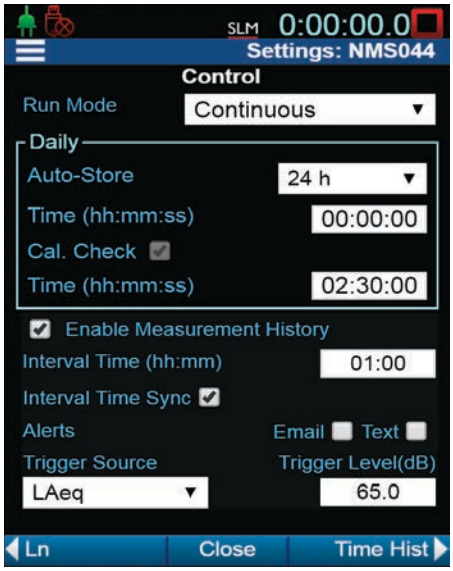
Step 3. Select Set to **Active**.

FIGURE 4-2 Set to Active



The NMS044 setup file contains metrics that are commonly measured when measuring outdoor noise. These default settings will log one hour intervals, daily results, and one second time histories to view noise levels as a function of time. Triggers SPL 2 (set to 65 dB) and/or PEAK 3 (set to 140 dB) will send email alerts any time there is an event detected. This default setup is described below.

FIGURE 4-3 NMS044 Settings: Control

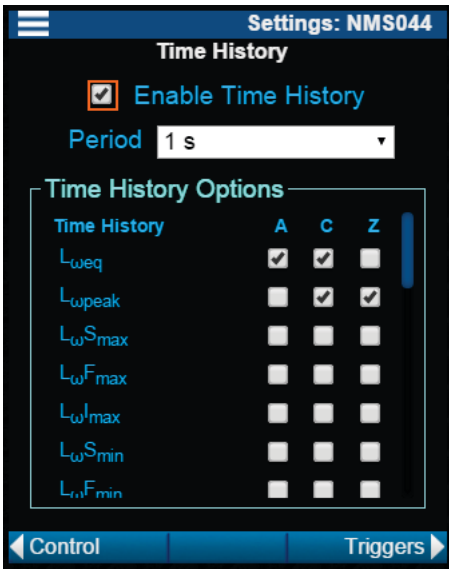


TAKE NOTE Measurement history is only available with the 831C-ELA or 831C-MRS option purchased and installed on the Model 831C SLM. For more information, see “Contact Larson Davis” on page i-2.

It is recommended to set Continuous as the Run Mode for the NMS044. This mode will begin a run every time the meter is powered on and will continue to run until a manual Stop or the meter is powered off. If the system loses power and then is recharged sufficiently, the system will power on and a measurement will start on its own. The Daily Auto Store is set to store once a day, so you will have 24 hour measurement files.

The PRM2103 preamplifier can do a daily automatic calibration check to ensure that the measurements are accurate. A recommended time for the calibration check is 2:30:00.

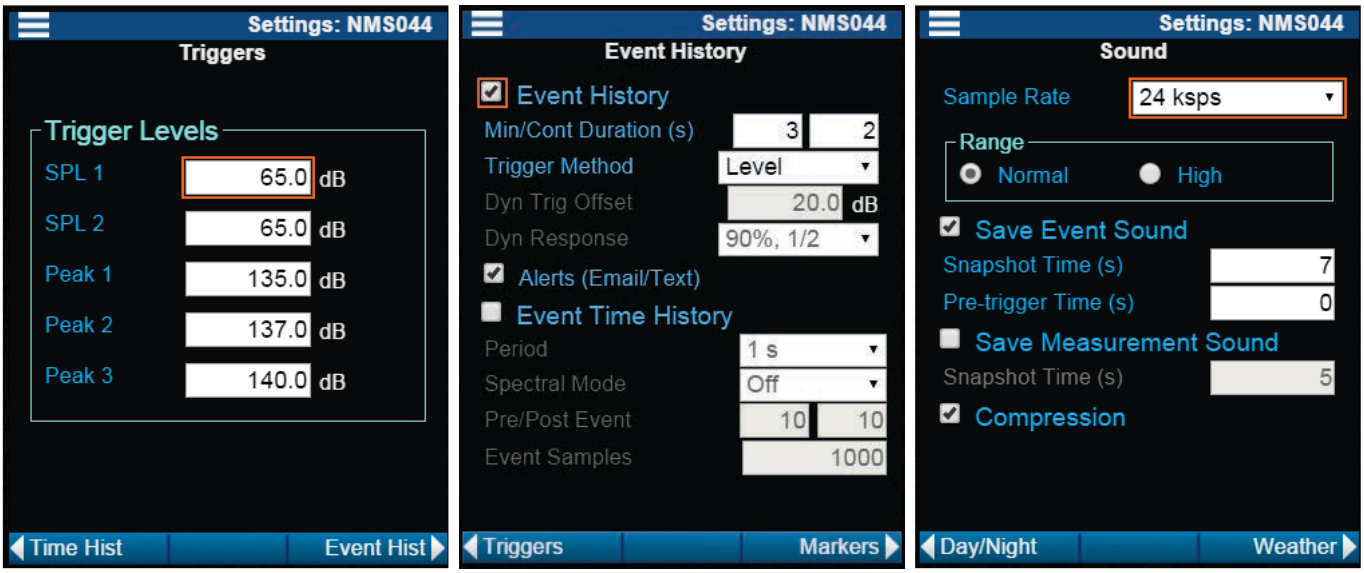
FIGURE 4-4 NMS044 Settings: Time History



TAKE NOTE Time History is only available with the 831C-LOG or 831C-MRS option purchased and installed on the Model 831C SLM. For more information, see “Contact Larson Davis” on page i-2.

Time History at one second period will create one second records in each measurement. For each record, the selected metrics will be logged. The NMS044 setup enables the default metrics.

FIGURE 4-5 NMS044 Settings: Triggers, Events, and Sound



TAKE NOTE Options 831C-SR, 831C-MSR, 831C-ELA enable this feature and must be purchased and installed on the Model 831C SLM. For more information, see “Contact Larson Davis” on page i-2.

Make event-based sound recordings that can be sent via email or SMS and stored in the measurement data with these settings. When the area sound exceeds the SPL 2 or Peak 3 triggers, a sound recording will begin and record 7 seconds of sound, which will immediately be sent as an email or text message. To assign the recipients, see “Setting Up Alert Notifications” on page 4-5.

4.4 Setting Up Alert Notifications

The 831C can be set up to send email and text alerts for a variety of system events, as well as measurement and sound events by using the System Properties email preferences. When an event (setting change, exceedance trigger, sound event, etc) occurs and the meter has an active network connection, the meter sends the alert notification after the event has concluded.

To set up alert notifications for system-, event-, and measurement history-triggered events, follow these steps:

Before you begin:

- Create an email account on an email server that supports secure email.
- We recommend that you use 2-Step Verification when using Google. If you choose this option, see **section 9.15 in the *831C SLM Reference Manual***.
- To avoid spam filters, add the host email addresses to your contact list.
- When the meter is configured with a static IP address, you will need to configure your network settings as shown in **section 13.3** of the ***831C SLM Reference Manual***.

Step 1 Connect the 831C to a router with Internet access via WiFi or Ethernet.

Step 2. Navigate to **Tools →System Properties → Email**.

Step 3. Enter a **Hostname** for your mail server and a **Username** and **Password** for your mail account.

FIGURE 4-6 Email Preferences Screen

To (Text) field sends a plain text email, or text message (when configured for the following mobile carriers:

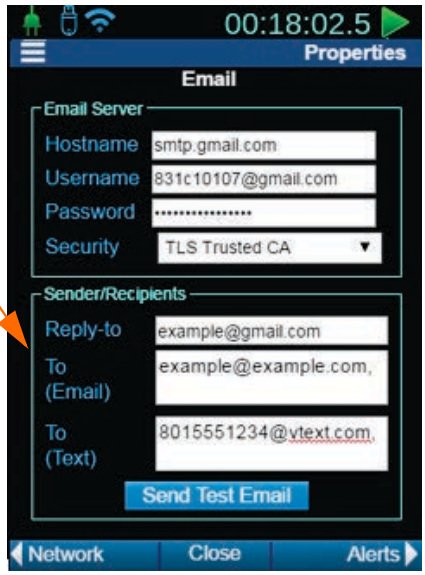
AT&T: phonenumber@txt.att.net

T-Mobile: phonenumber@tmomail.net

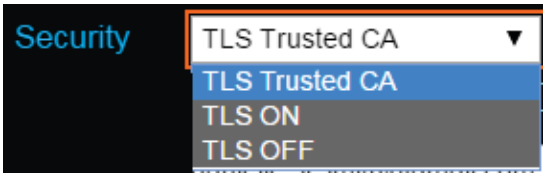
Sprint: phonenumber@messaging.sprintpcs.com

Verizon: phonenumber@vzwpix.com

Virgin Mobile: phonenumber@vmobl.com



Step 4. Select the **Security** level for the account.



TLS Trusted CA (preferred)

The 831C matches responding server with a provided certificate to verify that the responding server is known. If the responding server can't be verified, the email will not send. Most email providers (such as Gmail) use this type of security.

TLS On

Certain configurations use their own method for validating that an email server is the correct server—such as the US military. Use this setting when instructed by your IT department.

TLS Off

This is option uses only a login name and password to access an email server. This method is not secure, and we don't recommend it.

Step 5. If desired, enter a **Reply-to** email address. This is displays as the "From" address in the alert notifications. If someone replies to an email from 831C, this is where the email will send.

Step 6. Indicate the **To (Email)** where you want to receive HTML-based email notifications.

Step 7. In the **To (Text)** field, enter an email address or SMS-enabled phone number where you want to receive text notifications. See Figure 4-6.

Step 8. Click **Send a Test Email**.

If you don't receive a notification within a few minutes of initiating a test, check to see if your meter is connected to the Internet. Also, make sure a proxy is not filtering your email.

For additional questions or troubleshooting, contact your local IT support.

Step 9. Click **Close** (⬭⬬⬭) to save your settings and exit the menu.

4.4.1 Enabling Alert Notifications for Sound Events

Step 1 Create an Event History-enabled measurement Setup as shown **section 17.1** of the ***831C SLM Reference Manual.***

Step 2 Enable notification alerts in the Setup, and make it the Active setup.

TRY THIS With firmware option 831C-MSR, or 831C-SR installed, you can also choose sound recording settings in your measurement setup file. To

send a sound recording of the exceedance (in WAV or OGG format), go to **Tools → Setup Manager → Sound** and select **Save Event Sound**. For the full process, see section 18.3 of the ***831C SLM Reference Manual***.

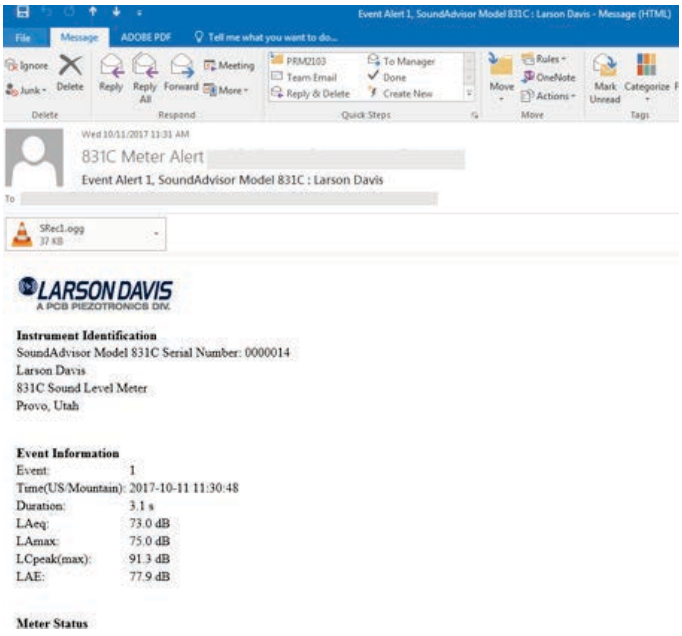
Step 3 Run a measurement and trigger an event.

TAKE NOTE The alert notification sends after the event and any continuation period passes. The arrival time of the notification may also be impacted by Internet performance.

FIGURE 4-7 Example Sound Event Alert Notification Email

HTML alert notification emails send with the event sound recording as an attachment, unless one of the following conditions applies:

- Event sound recording is disabled.
- The current sound recording is still being captured when the event ends.
- The event sound recording is too large to attach to the email.



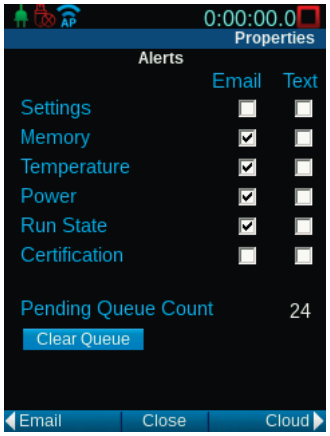
4.5 Setting System Alert Notification Details

In this section, select which details you want to include in the alert notification.

Before you begin:

- Complete the process shown in **4.4 Setting Up Alert Notifications**.

Step 1 On your 831C, go to **Tools →System Properties → Alerts** and select from the following options:



Settings

When you change any setting or preference on the meter, the 831C sends an alert notification.

Memory

The 831C sends an alert notification when the primary memory storage (free space) is 25%, 10%, and 0%. Primary memory storage can be internal or USB. For information about setting the primary memory storage location, see **section 9.5** in the ***831C SLM Reference Manual***.

Temperature

An alert notification will be sent when the internal temperature of the meter is outside of 70°C and -40°C.

Power

There are 4 available alert notifications:

- Low external power: sent when power reaches External Shutoff Voltage + 0.6 V
- Meter is shutting down due to low external battery: sent 4 seconds prior to shut down
- Power from mains (AC or solar power) is lost, and meter is running on external battery for more than 30 minutes
- If power lost alert is sent, then power is restored to mains for at least 3 minutes, an alert will be sent

Run State

This alert replaces the SLM State alert. It sends a notification for each Run, Stop, Pause, or Reset on the meter.

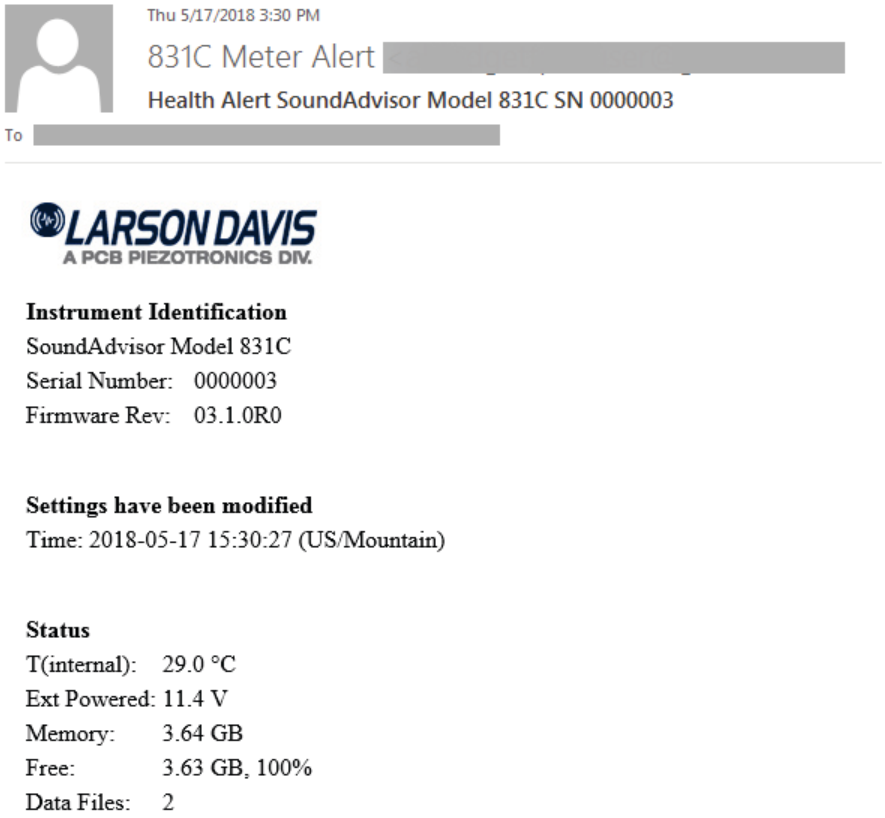
Certification

You can send an alert notification during the meter's startup if the calibration date is expired, or if the reminder for calibration is due. This alert occurs once every 24 hours, when enabled.

Clear Queue

The 831C often queues alert notifications to send at a later time if the network connection is lost, etc. If you don't want these older notifications to send, click the **Clear Queue** button to delete them.

FIGURE 4-8 Alert Notification Email Example



Thu 5/17/2018 3:30 PM

831C Meter Alert [redacted]

Health Alert SoundAdvisor Model 831C SN 0000003

To [redacted]

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Instrument Identification
SoundAdvisor Model 831C
Serial Number: 0000003
Firmware Rev: 03.1.0R0

Settings have been modified
Time: 2018-05-17 15:30:27 (US/Mountain)

Status
T(internal): 29.0 °C
Ext Powered: 11.4 V
Memory: 3.64 GB
Free: 3.63 GB, 100%
Data Files: 2

Spam and Duplicate Alerts

To protect recipients from receiving duplicate alert notifications for the same trigger when the state of the meter fluctuates around that trigger, the 831C has a hysteresis, or threshold, for multiple notifications that concern these specific alert details:

- Memory: If a notification is sent, free memory space can raise up to 5% of the trigger level before another alert can be sent.
- Temperature: If a notification is sent, the temperature can rise above the trigger (-40°C) or fall below the trigger (70°C) multiple times until the temperature rises/falls at least 5°C. If the same conditions are met again, after that, another alert notification is sent.
- Low external power: After an alert is sent, the voltage can rise up to 0.5 V before another alert can be sent if the conditions are met.

The 831C supports interfacing with the meter using a browser. This function is in beta testing, and the functionality is not complete. Support for browsers and audio playback is summarized below:

Table 4.1 Audio Playback

Platform	Browser	Audio File (.OGG)
Windows	Internet Explorer - Not recommended	No Supported
	Chrome - Recommended	Supported
	Firefox	Not Tested
	Microsoft Edge	Not Tested
Mobile (Apple & Android)	Chrome - Recommended	Supported
	Safari	Requires CODEC download and installation
	Opera	Not Tested
	Symbian	Not Tested

Appendix A Additional Features

A.1 Physical Characteristics

Weight

- NMS044 with SLP001 & BAT019, cases: 23 kg (50 lbs)

NMS044 without battery or solar panel: 8.18 kg (18 lbs)

- SLP001 60 Watt solar panel: 9 kg (19.85 lbs)
- SLP002 100 Watt solar panel: 12.27 kg (27.05 lbs)
- Telescoping pole, EPS21116, and PRM026 in bag: 1.92 kg (4.2 lbs)
- BAT019: 5.8 kg (12.8 lbs)
- BAT020: 11.2 kg (24.7 lbs)

Dimensions

- NMS044 Case: 61 cm x 35.5 cm x 18 cm (24” x 14” x 7”)
- SLP001: 66 cm x 35.5 cm x 8 cm (26” x 14” x 3”)
- SLP002: 50 cm x 68.5 cm x 8 cm (20” x 27” x3”)
- Canvas Bag: 48 cm x 23 cm x 15 cm (19” x 9” x 6”)

Deployment Dimension

3 m (10’) diameter on the ground with a 2 m (6.5’) overhead clearance minimum. Though sound reflections are possible with objects that could be nearby, so more clearance is recommended.

A.2 NMS044 Power Draw

The NMS044 system draws power from the connected battery. It cannot be powered any other way (ex. wall outlet).

The following table was generated from the recommended setup for the RV50X, see “Preparing the Battery” on page 2-1. Other options are available that will change the power consumption of the system and any deviation from the recommended setup. Setting up scheduled run-time(s) on the 831C meter will cause the meter to turn off when not running which will extend the number of days of backup.

All of these values are given with the assumption that no external power is attached (solar, outlet, etc.).

Table A.1 Draw and days of battery backup

System continuously running	3.1 W
The LiFePo Battery (12V 45 Ahr)	>7.5 days
The SLA Battery (12V 35 Ahr)	>6 days
System continuously running and streaming	3.6 W
The LiFePo Battery (12V 45 Ahr)	>6 days
The SLA Battery (12V 35 Ahr)	>4.5 days

A.2.1 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.2.2 Alternative Solar Panel

The NMS044 system can support solar panels that are <140 W.

A.3 Long Term Storage

If your system is to be stored for more than one week, unplug and/or remove the battery from the case and store separately.

A.4 Shipping Information

CAUTION Do not transport with lid open.

Prior to shipping the system, always disconnect the battery from the power block terminal, as to not drain the battery while in transit. The

battery can be shipped in the case, with the correct shipping labels on the outside of the box.

A.4.1 Lithium Iron Phosphate Battery (LiFePo)

The BAT019 LiFePo is considered Class 9 Hazardous Material, and additional requirements will need to be met when shipping. A company and/or individual will need to be 49 CFR and IATA certified to be able to ship the BAT019 (which is a lithium battery over 100 W Hr). Additionally, recertification is required every two years.

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

A.5 LED Indicators

A.5.1 SoundAdvisor Model 831C Sound Level Meter

Table A.2 Measurement Status LED Indicators

Measurement State	Red LED		Green LED	
Stopped with Reset	Winking	***-	Off	
Stopped	Blinking	**-*-*	Off	
Paused	Flashing	*-*-	Flashing	-*-*
Running	Off		Blinking	**-*-*
Waiting for valid data to begin running	Delayed wink	----*	Off	

Charge Status LED

The charge status indicated by an LED on ⏻ are as follows:

- LED ⏻ continuously lit: Charging
- LED ⏻ not lit: Not charging
- LED ⏻ winking: Charging stopped (battery fault)
- LED ⏻ fast blinking: meter is powering up or shutting down

A.5.2 COM-RV50X-APAC/US:EMEA Cellular Gateway

When installed and running, the state of the RV50X is indicated in the four LED indicators on the side and bottom of the device. Refer to the following table for the LED behavior:

Table A.3 RV50X LED Indicators

LED	Color/Pattern	Description	LED Power Saving Mode
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)	Off
	Solid Amber	Fair signal (equivalent to 2-3 bars)	Off
	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	Off
	Solid Amber	Connected to a 3G or 2G network	Off
	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.	

FIGURE A-1 Gateway LED Indications

A.5.3 PSA038 Genasun Solar Charge Controller

The solar charger has one bicolor status LED. When you first connect your charger to the battery, the LED should blink red then green. The LED blinks green to indicate that your charger is powered and charging, and the LED may blink red to indicate errors. Refer to the following list for more specific indications:

Green LED

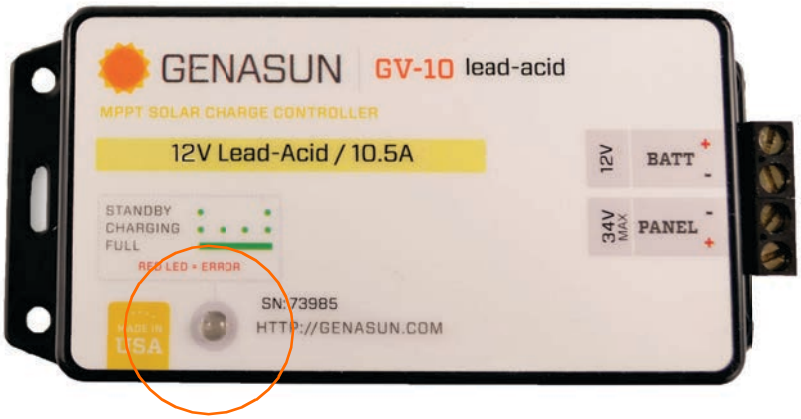
- Short blinks every 4-5 seconds
  Battery connected, no panel voltage
- Short blinks every 1 second
  Panel detected, but not providing power
- Fast short blinks
  Charging with low current
- Slower long blinks
  Charging with high current
- Long Blink, Short Blink
  Charging at internal current limit
- Constant on
  Battery is Fully Charged

Red LED

- Two Blinks
  Temperature Too High
- Three Blinks
  Power Too High
- Four Blinks
  Battery Too Low
- Five Blinks
  Battery Too High

- Six Blinks
  Panel Too High
- Two Long Blinks followed by short blinks
  Contact Technical Support

FIGURE A-2 Genasun Solar Charge Controller LED

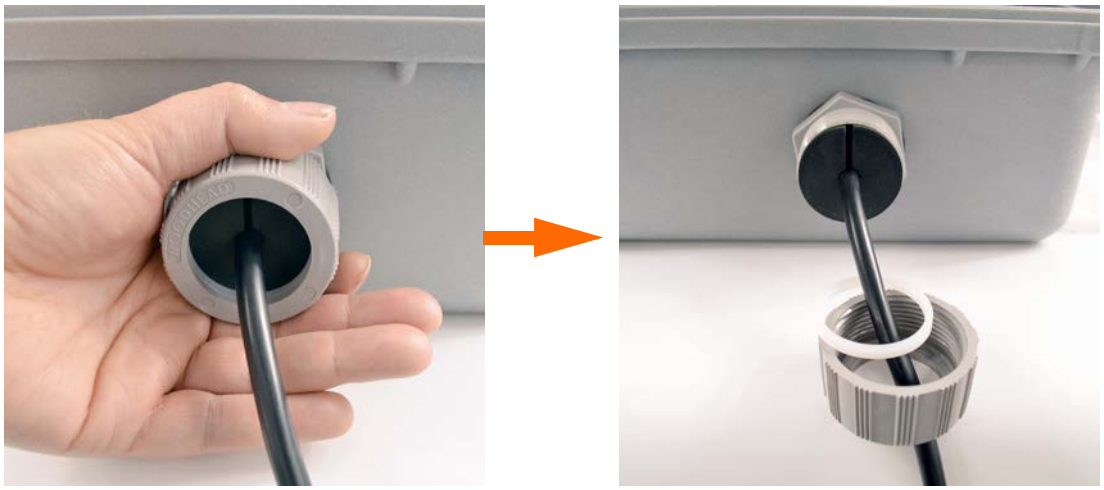


A.6 Removing Cables From the Case

In the event that the cables need to be removed from the case, follow these steps.

Step 1 Remove the CBL228-03 from the charge controller by unscrewing the terminals and gently pulling the cable out. Remove the CBL222-08 from the top of the 831C by pressing the release button and pulling out.

Step 2 Unscrew the gasket by turning counterclockwise.



Step 3 Using your hands on either side of the case wall, gently push the rubber stopper out. The cable can be removed through the slit in the stopper.

Step 4 if needed, follow the steps in reverse order to reinstall the cables in the case.

A.7 Configuring LD Settings for the RV50X

The RV50X Gateway can only be a functioning communication device if it is configured with the correct settings. If you purchased a new RV50X from someone other than Larson Davis—or if it has been reset to factory defaults—complete the following sections to configure your system for use with Larson Davis instruments.

In this section:

A.7.1 Logging In to ACEmanager

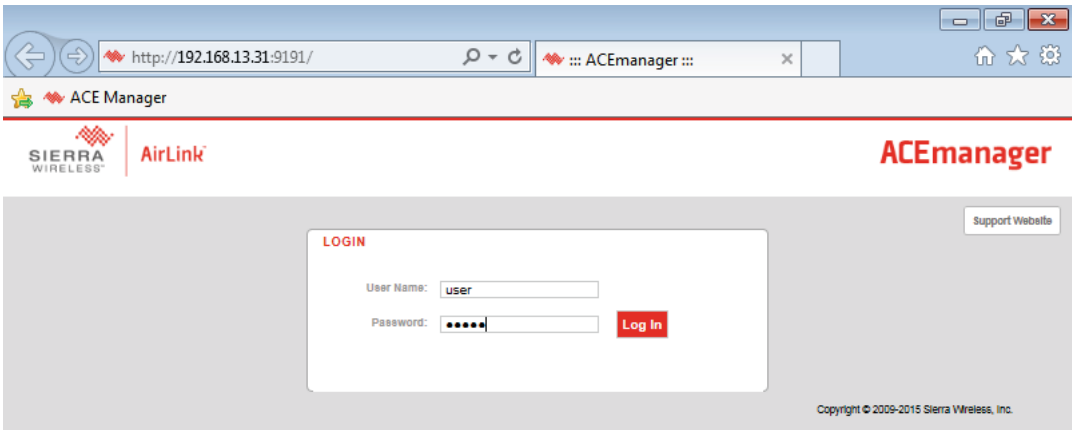
Step 1 Attach the USB to mini cable from the PC to the gateway. See *Figure 2-4 Connecting to RV50X*.

Step 2 Open a web browser.

Step 3 Enter **http://192.168.14.31:9191** into the address bar.

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

FIGURE A-3 Sierra Wireless Login



Step 5 Take note of the device's firmware version. Update to the latest version if needed.

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.

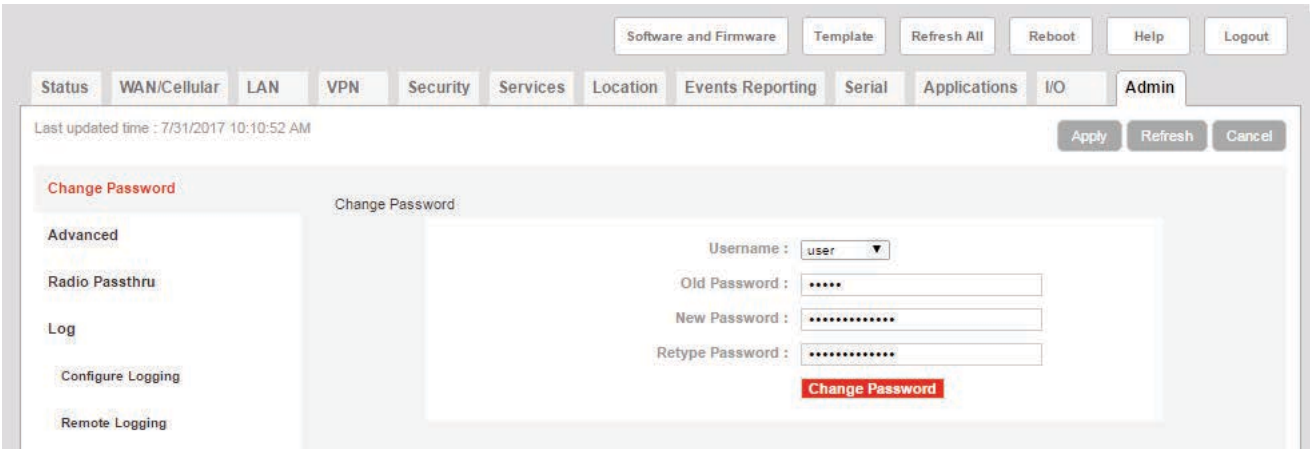
d. Log in again when the system is rebooted.

Step 5 Change your password.

Changing Your Password

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

FIGURE A-4 Admin Tab



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

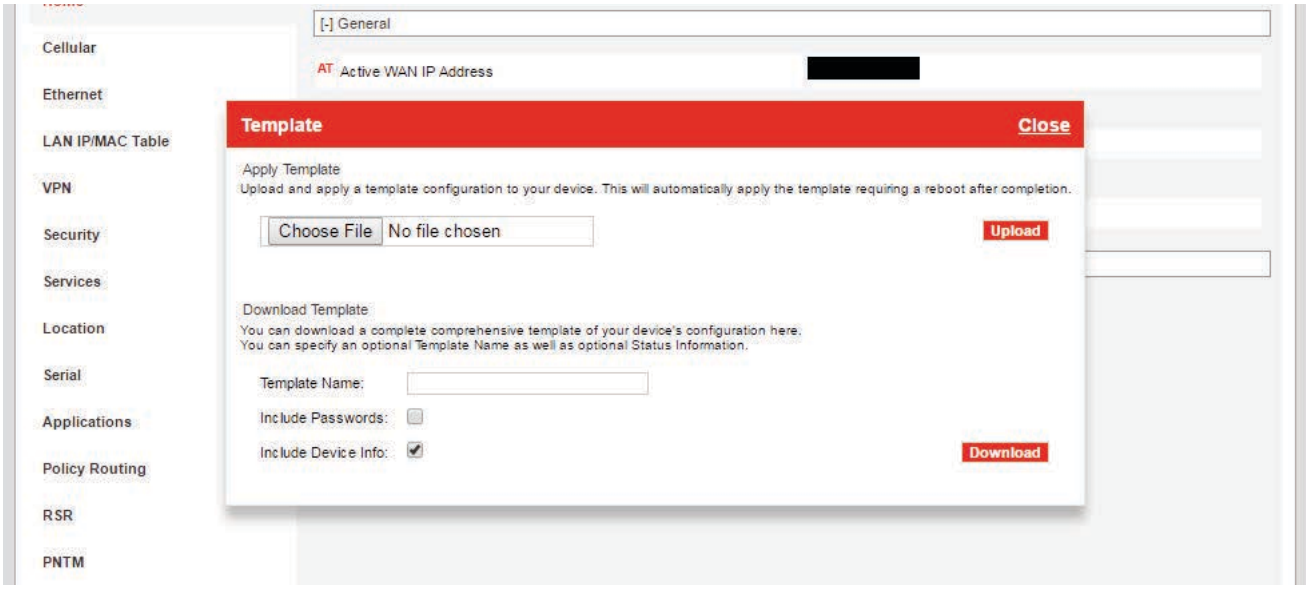
c. Record your password. If you forget it you will need to reset the RV50X to factory settings and reconfigure.

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

A.7.2 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 **A.7.3 Configuring LD Settings Without the Template File**.

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



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.

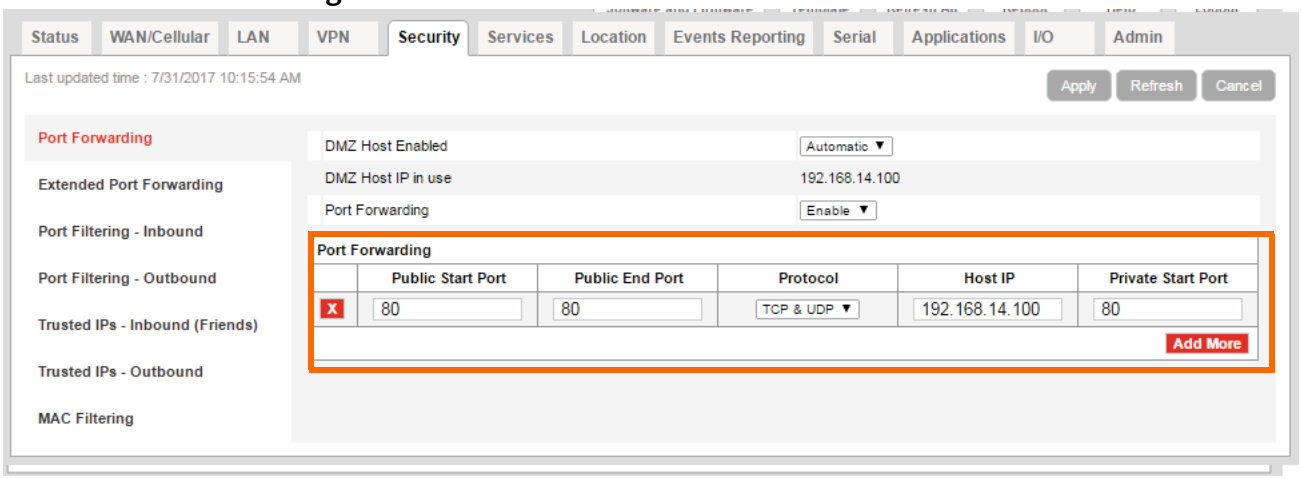
A.7.3 Configuring LD Settings Without the Template File

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

Step 1 Go to the **Security** tab, and in the left pane, select the **Port Forwarding** section.

Step 2 Edit the values in the Port Forwarding section to match what is shown in *Figure A-5 Port Forwarding*, and click **Apply**.

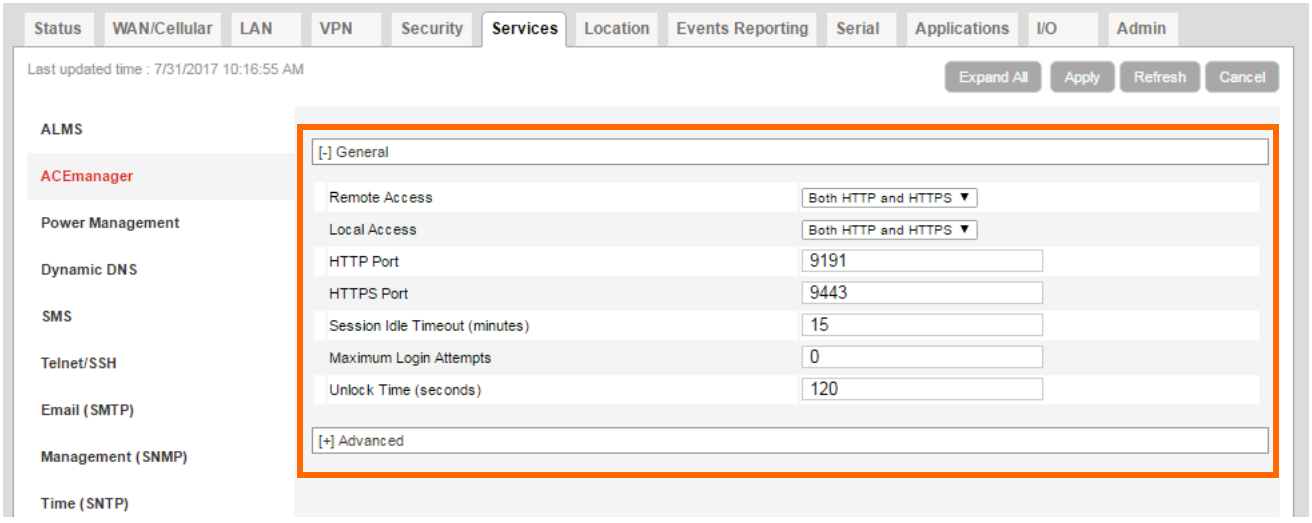
FIGURE A-5 Port Forwarding



Step 3 Navigate to the **Services** tab, and in the left pane, select the **ACEmanager** section.

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

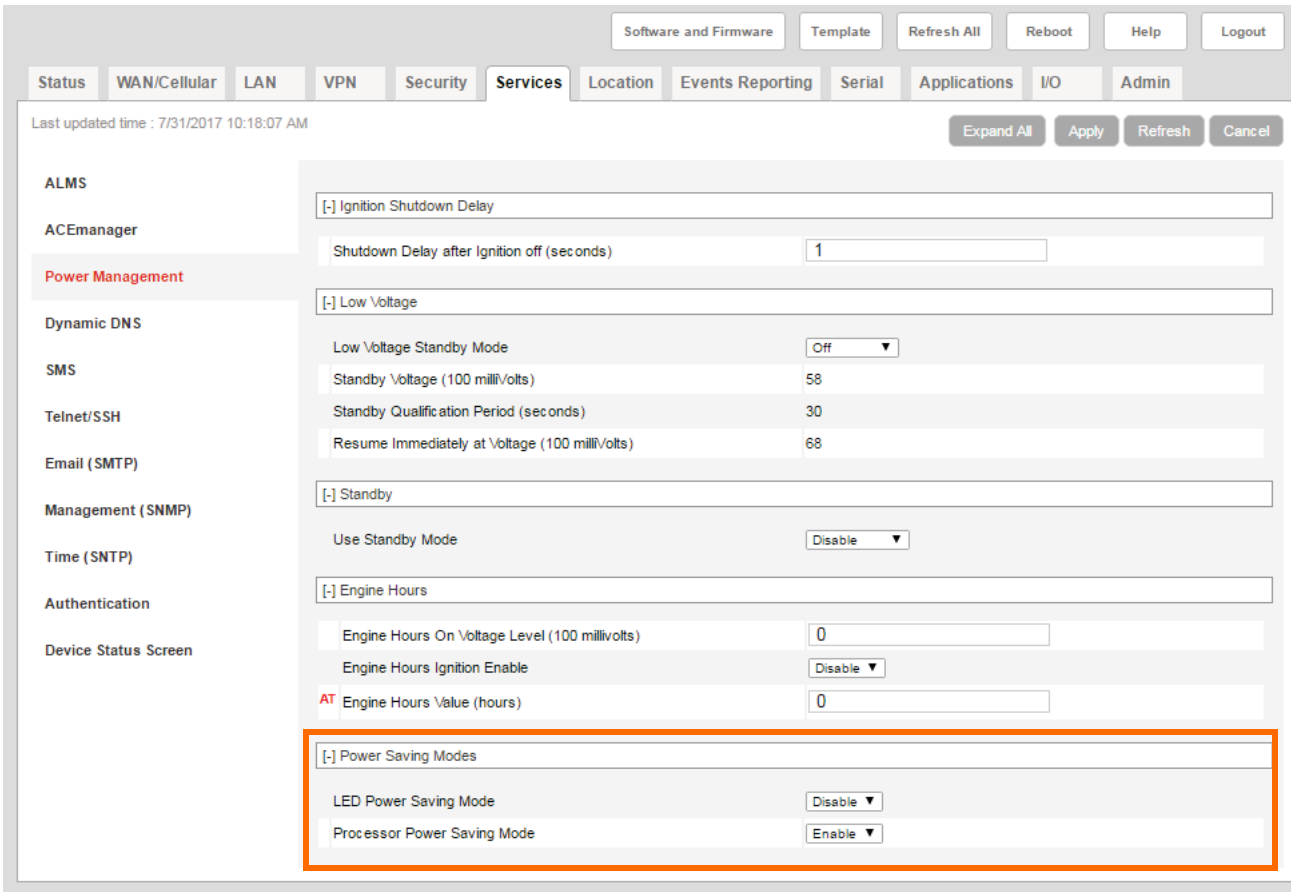
FIGURE A-6 Services - ACEmanager



Step 5 In the left pane, click the **Power Management** section, and select **Power Saving Mode**.

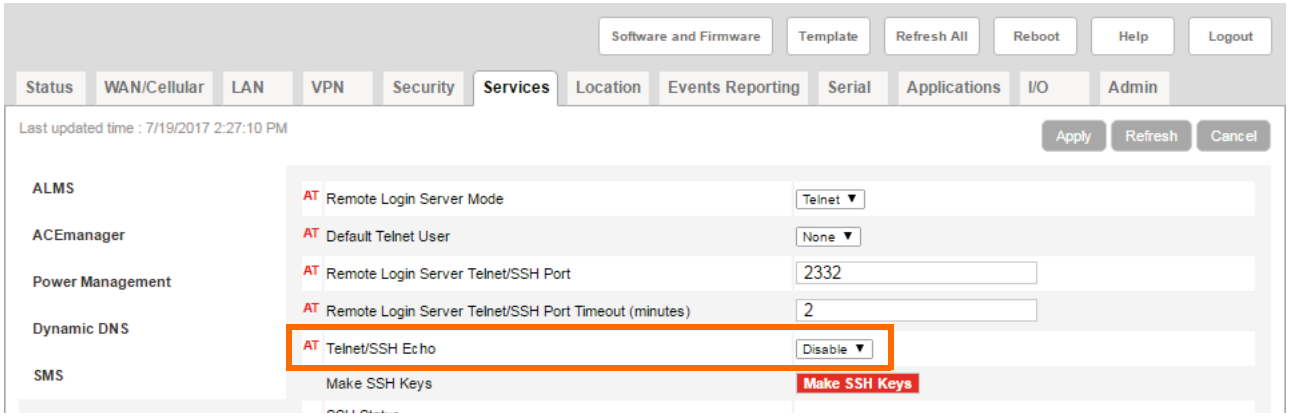
Step 6 From the **Processor Power Saving Mode** drop-down, select **Enable** and click **Apply**.

FIGURE A-7 Services - Power Management



Step 7 In the left pane, select **Telnet/SSH Echo**, set the value to **Disable** and click **Apply**.

FIGURE A-8 Telnet/SSH

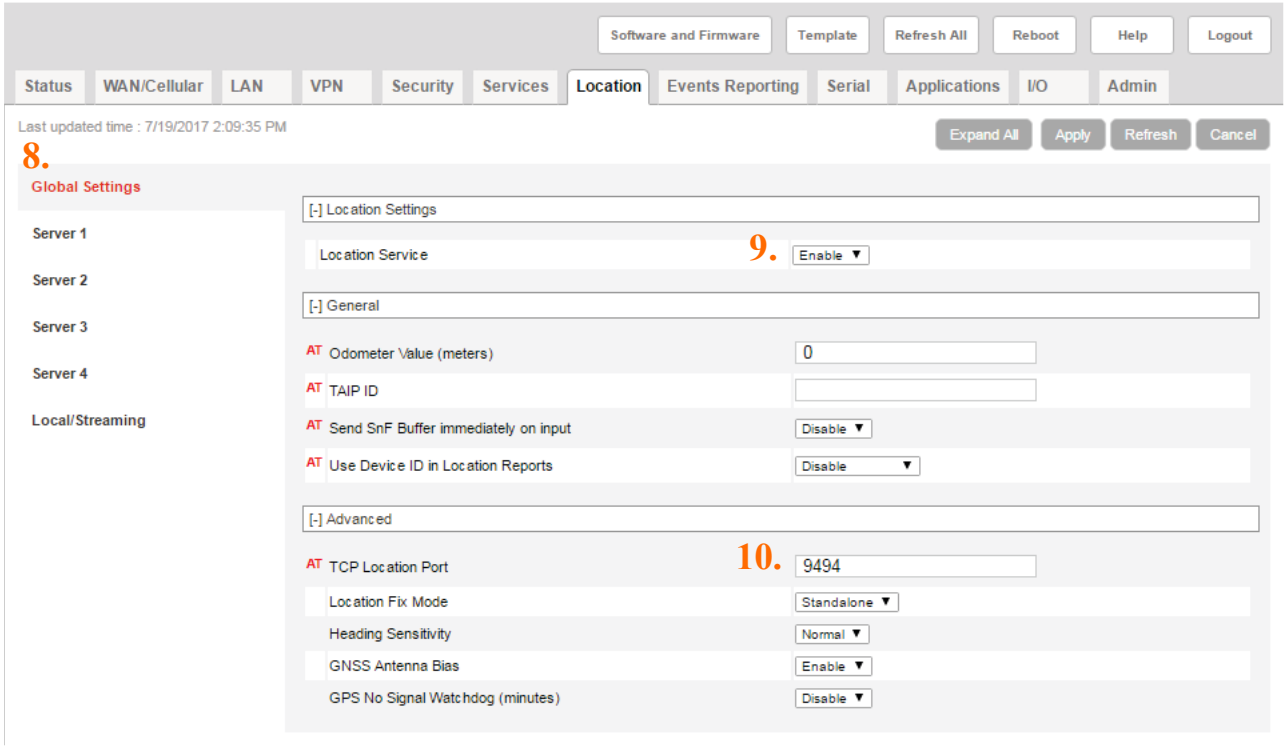


Step 8 Select the **Location** tab, then in the left pane, select **Global Settings**.

Step 9 From the **Location Service** drop-down, choose **Enable**.

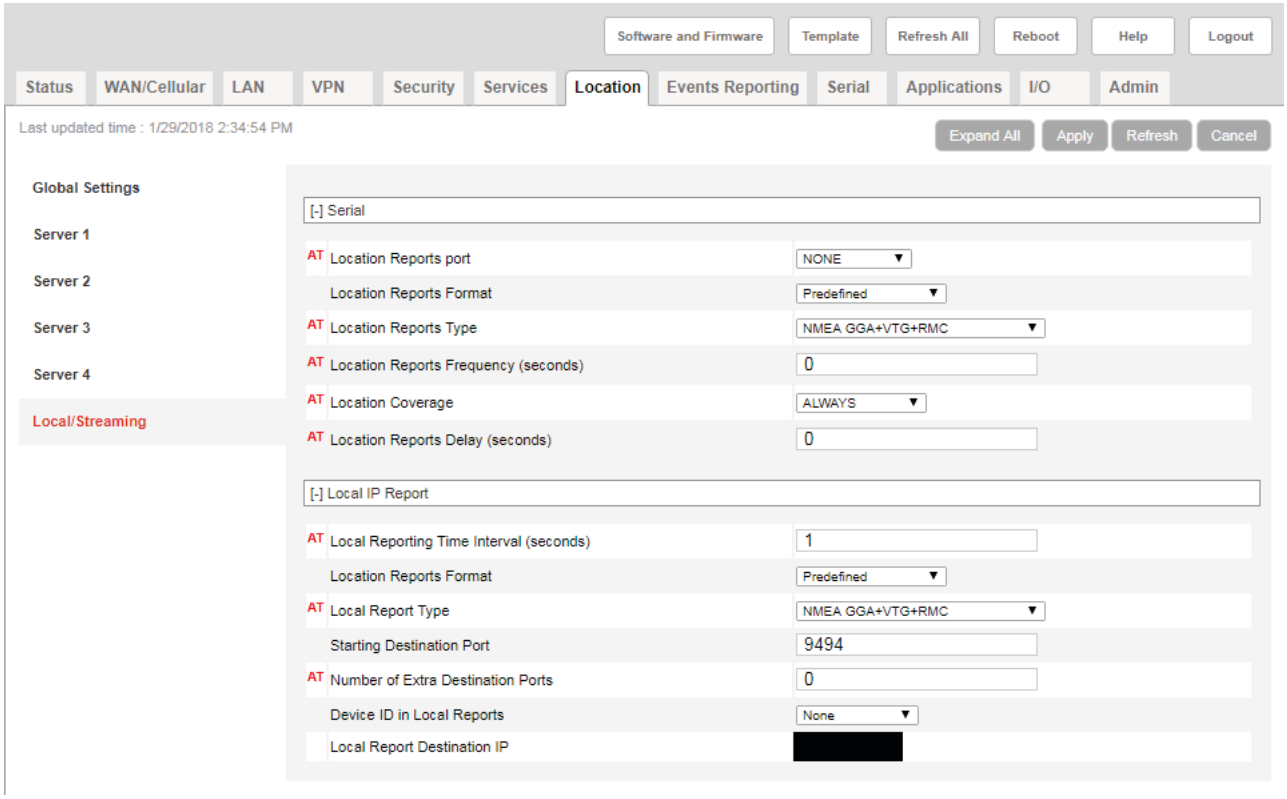
Step 10 Set the **TCP Location Port** to **9494**, and click **Apply**.

FIGURE A-9 Location Settings



Step 11 In the left pane, select **Local/Streaming**, modify the values to match *Figure A-10*, and click **Apply**.

FIGURE A-10 Local/Streaming Configuration Values

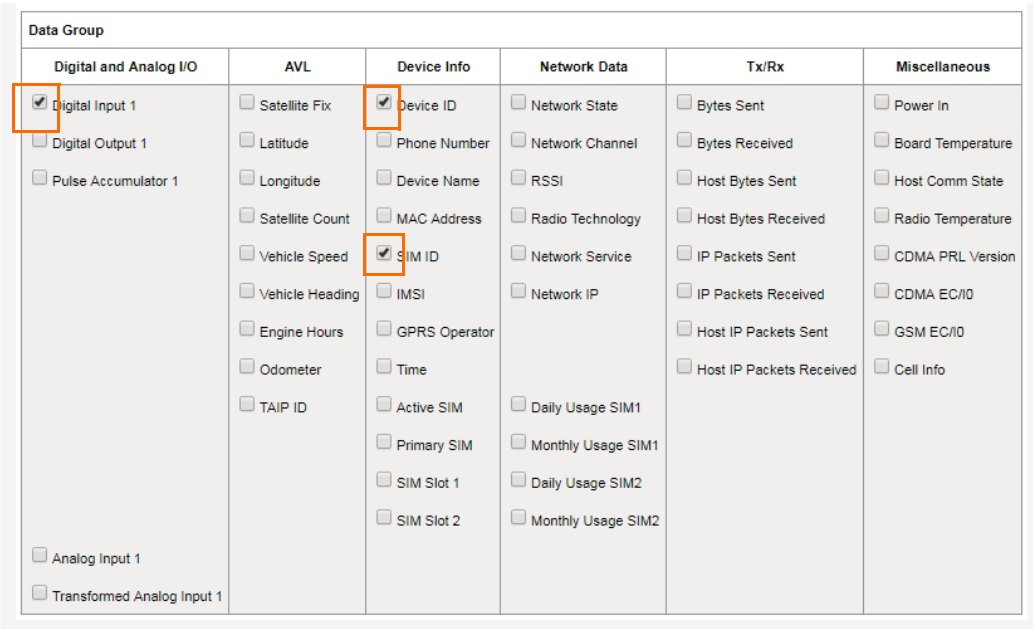


Step 12 Navigate to the **Events Reporting** tab.

Step 13 Change the **Action Name** to be **Intrusion Detection**, and the **Action Type** to be **Email**.

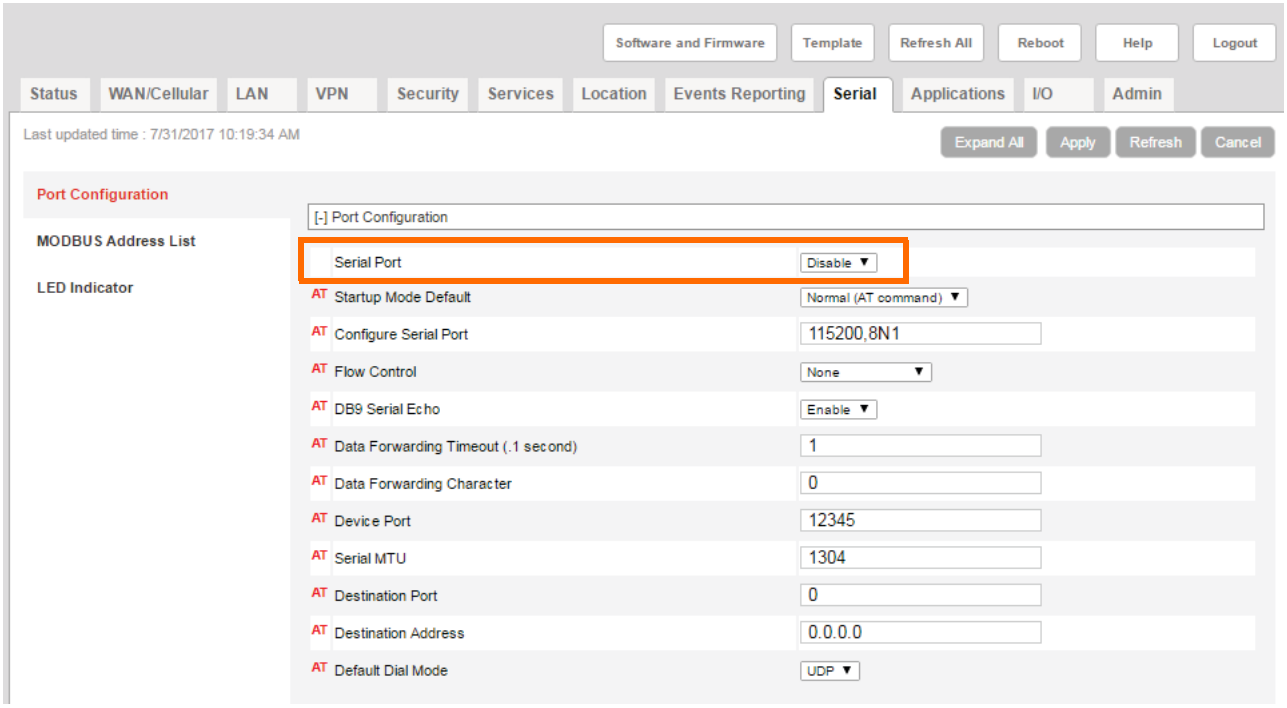
Step 14 In the Data Group section on the same page, set the values to match *Figure A-11*.

FIGURE A-11 Data Group Settings



Step 15 Navigate to the **Serial** tab, select **Disable** from the **Serial Port** drop-down menu, and click **Apply**.

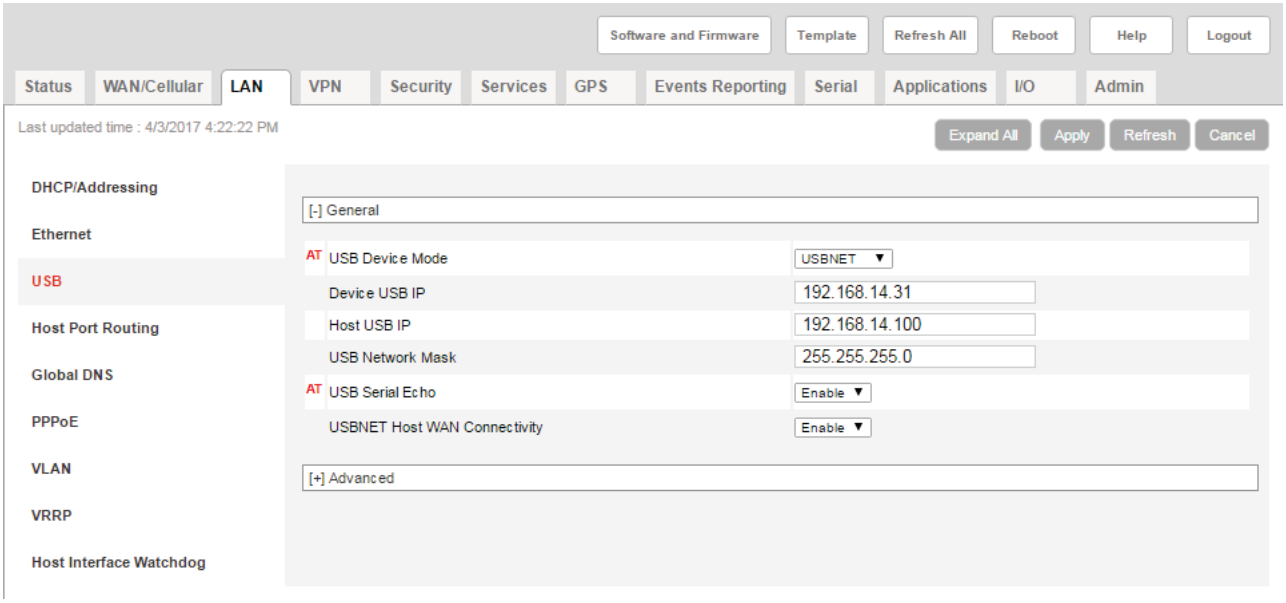
FIGURE A-12 Serial Port Settings



Step 16 Navigate to the LAN tab, and in the left pane, select the **USB** section.

Step 17 Verify that the settings are as shown in *Figure A-13*, and click **Apply**.

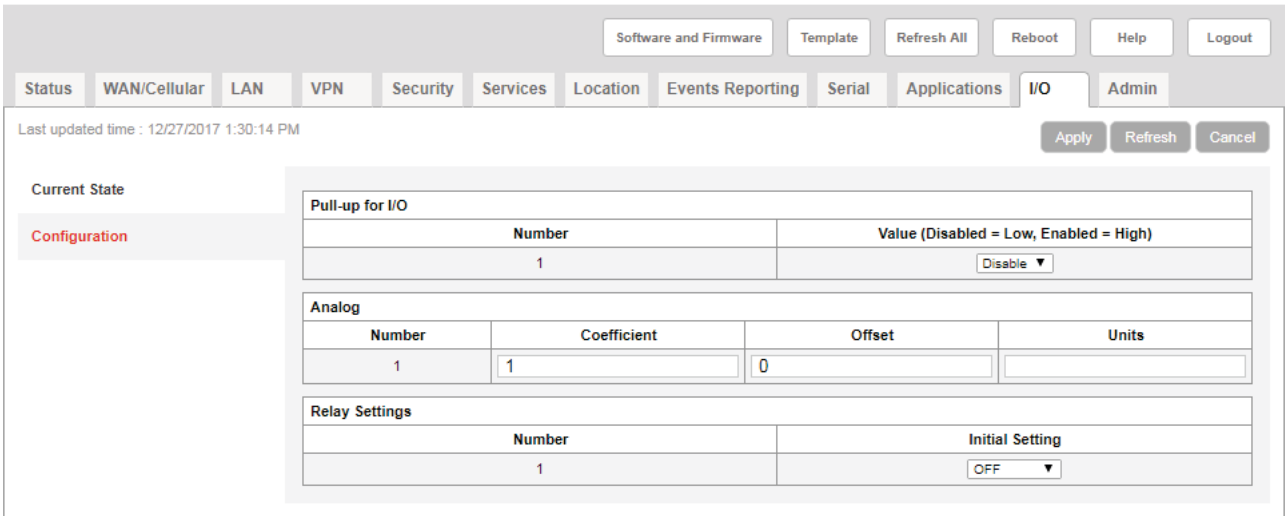
FIGURE A-13 USB Port Settings



Step 18 Navigate to the **I/O** tab, and select the **Configuration** section in the left pane.

Step 19 Verify that the settings are as shown in *Figure A-14*, and click **Apply**.

FIGURE A-14 I/O

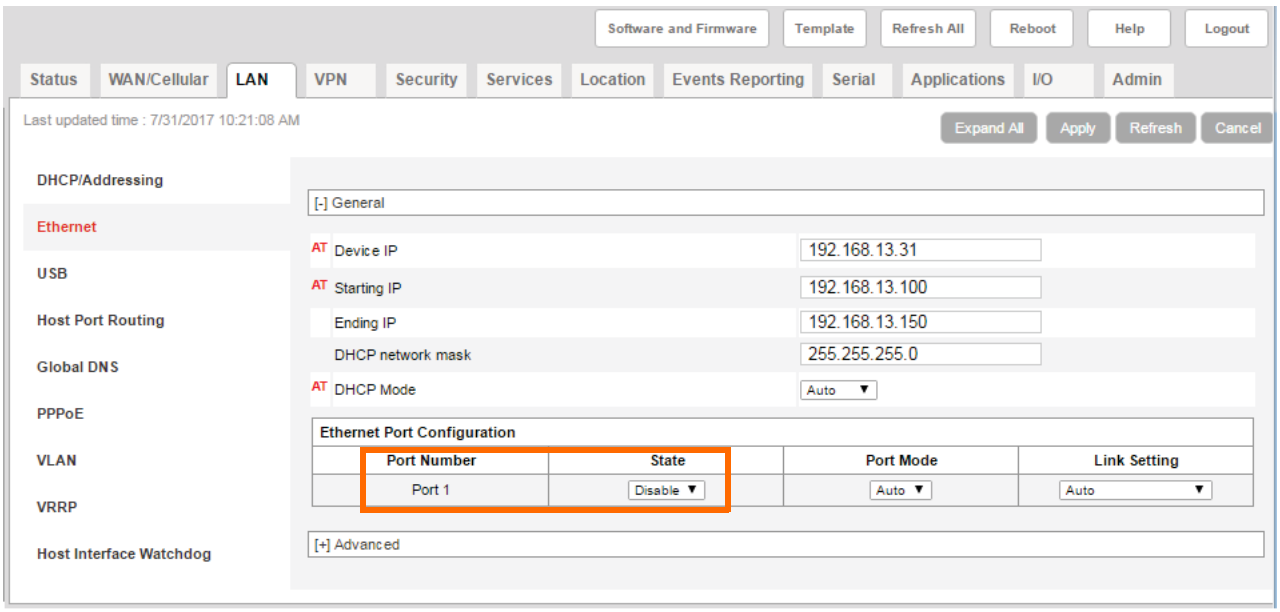


TAKE NOTE After this change you will not be able to connect to the gateway with a wired Ethernet connection. If you need to restore the wired connection without connecting to the gateway through the cellular connection, do a hard reset on the gateway. This resets all items to the factory defaults. As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

Step 20 Navigate to the **LAN** tab, and select the **Ethernet** section in the left pane.

Step 21 In the **Ethernet Port Configuration** section, change the **Ethernet Port 1 State** to **Disable**, and click **Apply**.

FIGURE A-15 LAN Settings



Step 22 In the top right of the screen, click the **Reboot** button. The gateway saves your settings and reboots.

A.8 Declaration of Conformity

PCB PIEZOTRONICS Inc.

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

EU Declaration of Conformity PS144
In Accordance with ISO/IEC 17050

Manufacturer: Larson Davis, a Division of PCB Piezotronics 1681 West 820 North Provo, Utah, USA 84601	**Authorized European Representative:** PCB Piezotronics Europe GmbH Porschestrasse 20-30 41836 Hückelhoven,Germany

Certifies that type of equipment: Sound Level Meter

Whose Product Models Include: 831C and derived kits, including NMS044 configurations

This declaration is applicable to all 831 Series models which have the CE mark on their data sheets and where those data sheets refer to this Declaration of Conformity. The data sheets for all model numbers referenced above which include the CE mark on such data sheets and refer to this Declaration of Conformity are hereby incorporated by reference into this Declaration.

Conform to the following EU Directive(s) when installed per product documentation:	2014/30/EU 2014/35/EU 2011/65/EU	EMC Directive Low Voltage Directive RoHS Directive

Standards to which Conformity is Declared:

Harmonized Standards	EN 61010-1:2001 EN 50581:2012	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
Immunity Test Standard	EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
Emissions Test Standard	EN 55011:2009	Industrial, scientific and medical equipment. Radio-frequency disturbance characteristics. Limits and methods of measurement
Industry Standards	EN 61672-1:2002	Sound level meters – Part 1: Specifications
Test Reports	EMC and Safety Report	D1247.0024(A) – Model 831C EMC and Safety Test Report

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) Standard(s)

Place: Provo, UT **Date:** 08/01/2017

Signature: Carrie Termin

Name: Carrie Termin

Title: Regulatory Affairs and Product Certification Specialist

- ISO 9001 Certified PCB Piezotronics, Inc. Phone: 716-684-0001 FAX: 716-684-0987

PS144 Rev. A 08/01/2017

Larson Davis - a PCB Piezotronics division LarsonDavis.com

P/N INMS044.01 Rev E, Firmware version 4.0.5

Worldwide Corporate Headquarters
3425 Walden Avenue
Depew, NY 14043-2495 USA

Toll-free (in the US): 888-258-3222
Phone: 716-926-8243
USA fax: 716-926-8215
E-mail: sales@larsondavis.com