



# Remote Monitoring and Control

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## **TVM3 MicroRTU™** **Outage and Line Voltage Monitoring**

### **Users' Guide**

9941 West Emerald Street  
Boise, ID 83704  
208-658-1292 FAX 208-323-5575  
support@telemetric.net

v. 1.1  
Part No: TVM3 REVB CBEMA MANUAL



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# Introduction

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Telemetric monitoring and control devices provide a low cost wireless system for remote monitoring, measurement, data collection, and control of equipment or machinery anywhere in the North American cellular coverage area.

The Telemetric system provides two-way communications using the non-voice or "control" channel of the public cellular network. The low cost of this proprietary method makes remote monitoring and control very affordable.

## Overview

The TVM3 reports power outages, under and over voltage conditions and the present or average line voltage. Using two-way communication, the device provides real-time notifications of both outages and the crossing of user programmed voltage thresholds. The TVM3 is accessible from a utility's SCADA system, outage management system, or from the secure Telemetric Web Server.

Operation is very simple:

- (1) Connect the TVM3 into 3-phase 120 VAC power (phase to Neutral). The MicroRTU will automatically establish two-way communications over the public cellular network to the **www.telemetric.net** Intelligent Web Server.
- (2) Log onto your private page on the Intelligent Web Server to view the status of the TVM3 – AC Voltage, Over and Under Voltages and Outages.
- (3) Send configuration commands from the web site to the TVM3 to set up under and over voltage triggers and time scheduled report frequency.
- (4) Configure selected events to trigger an immediate user notification by pager or e-mail.

The Telemetric Network Operations Center (NOC) records all incoming status messages and, depending on the customer's instructions, will:

- notify the customer of the reported event, and
- display the most current data on the web site

## How it works

When a Telemetric MicroRTU initiates a call from anywhere in North America, it is recognized locally as a roaming cell phone. As a part of the standard roaming protocol, the local cellular network automatically passes the device's identification numbers and data to the central cellular hub. The Telemetric device passes its data packet in the normally non-utilized data field. This technique allows the transmission of an identification number, the time, the date, and customer specific data, all at a very low cost. At the Telemetric NOC, the data is validated and processed for distribution to the end user. In addition, control and configuration information can be sent from the Telemetric NOC back out to the field device.

## Getting started

Setting up the Telemetric monitoring devices is a three-step process.

1. Install the TVM3 and connect it to 3-phase 120 VAC power (phase to Neutral).
2. Set up the device information on the Telemetric web site ([www.telemetric.net](http://www.telemetric.net)).
3. Program the TVM3 for your specific requirements by sending it programming commands from the Telemetric web site. This step is only required if you wish to change any of the factory default settings. Note that devices can also be ordered from the factory with the desired settings preprogrammed.

This manual provides the information you need to get started. It is divided into two sections:

- Installing the Telemetric device, and
- Using the Telemetric web site.

# Installing the TVM3 Telemetric MicroRTU

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The installation process for the TVM3 can be divided into four steps:

- Connect the battery.
- Select an installation location.
- Attach the device to 3-phase 120 VAC power and ground it
- Test the radio signal strength.

## Connecting the battery

When you receive the TVM3, the battery is disconnected. You must connect the battery (used for backup power) before installing the device.

### To connect the battery:

1. Open the door of the enclosure and locate the black and red wires.
2. Connect the black wire to the black battery terminal and connect the red wire to the red battery terminal.
3. Close the enclosure door.

## Selecting an installation location

The TVM3 enclosure is weather resistant, so it can be installed in any convenient location. The recommended operating temperature range is -40 to +158 degrees F (-40 to +70 C). The recommended relative humidity range is 5 - 95% non-condensing. It is recommended that it be mounted out of direct sunlight if possible.

A flexible, 1/2 Wave, 2.5dB antenna is included with the TVM3. Antennas are available to match the environment and signal conditions. An external SMA connector provides the connection to a direct-mount 50-ohm antenna. If desired, a remote antenna can be attached to the connector.

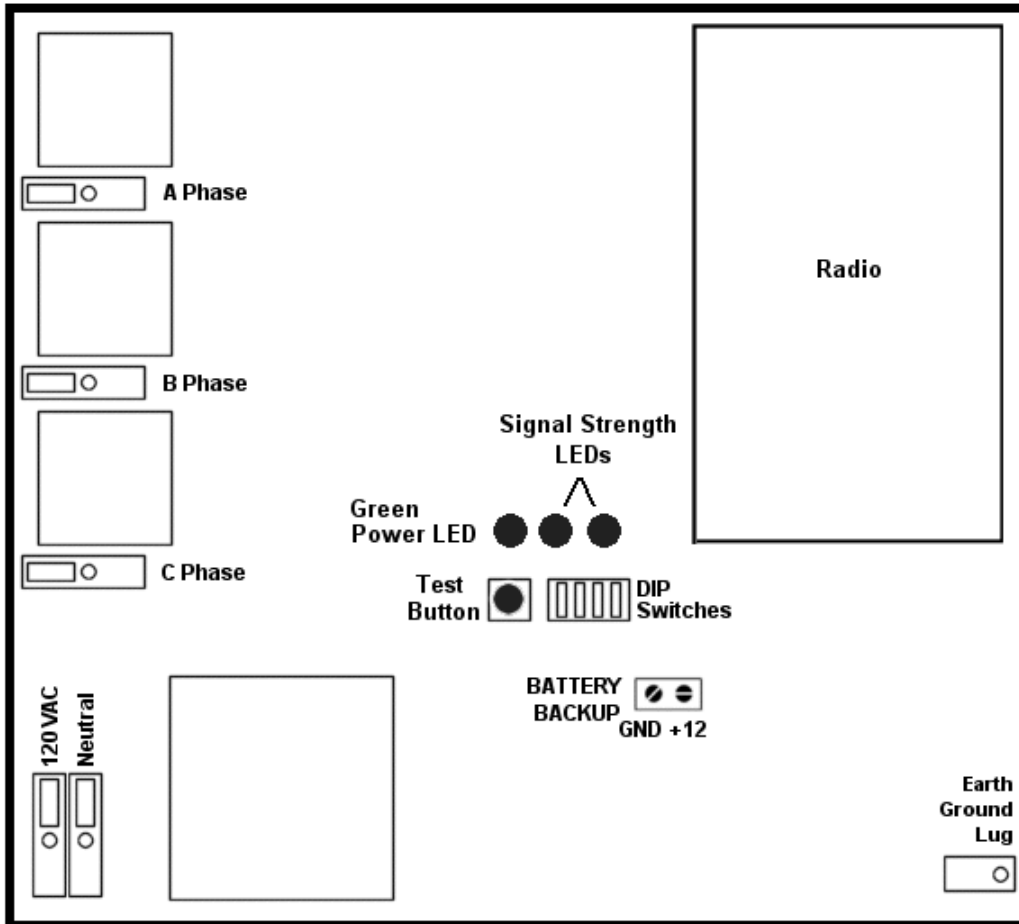
## Grounding the device

**It is important that the TVM3 be properly grounded.** A grounding lug is installed in the lower right corner of the TVM3 board. To ground the device, connect an earth ground wire to the lug. The ground helps with surge protection and improves the device's ability to communicate by making the radio less susceptible to transient noise. It is also important to the device's ability to accurately measure three-phase voltages.

## Attaching the device to 120 VAC power

The figure below shows the TVM3 board.

**Figure 1: TVM3 board diagram**



This equipment contains components that can be damaged by electrostatic discharge. To prevent unexpected operation or permanent damage, be sure to connect the ground lug to an earth ground and always touch the ground lug before touching any components inside the enclosure.

### Power connections

The terminal blocks along the left side of the board provide the connections for 3-phase 120 VAC power (phase to Neutral). A jumper wire is pre-installed from A Phase to the 120 VAC terminal. Wire up the TVM3 in the same way as you would install three volt-meters with a common neutral.

### Alternate board power

By default, the board is powered off Phase A. If you would rather have it powered from one of the other two phases, simply reposition the jumper so that it runs from applicable phase's terminal

block to the 120 VAC terminal block. Note, however that board always assumes that it is powered by Phase A, so if Phase A permanently loses power the board will power itself down.

### **DIP Switches**

The four DIP switches on the board act as follows:

- **Switch 1 – Calibration**  
This switch is normally in the OFF position. It should only be turned on when performing voltage calibration (see instructions below).
- **Switch 2 – Model**  
This switch is in the ON position for a TVM3 board. If you would like the TVM to function as a TVM1 (measuring Phase A voltage only), power down the board and move this switch to the OFF position.
- **Switch 3 – VS1** – Reserved for future use
- **Switch 4 – VS2** – Reserved for future use

### **Testing the receiver strength**

After selecting an installation location, it is a good idea to test the device's ability to transmit and receive before performing the actual installation. (The device must be connected to AC power and an antenna attached in order to carry out this test.)

There are two LEDs on the device board that indicate RSSI (see Figure 1). To test the RSSI, wait until all LEDs have stopped blinking and then press the test button inside the device enclosure for less than 2 seconds. (See Figure 1 for the location of the test button.). After the button is released, the TVM3 reads the RSSI from the radio and a couple of seconds later it displays the signal strength using the red and the green LEDs.

The signal strength can be determined with the following table:

<b>LED Appearance</b>	<b>Meaning</b>
Solid red	Inadequate signal strength
Slow red blink	Marginal or weak signal strength
Slow green blink	Acceptable signal strength
Fast green blink	Good signal strength
Solid green	Excellent signal strength

If the signal is weak, try re-orienting the antenna or changing the mounting location. Note that it may be possible to improve inadequate signal strength with a directional or high gain antenna. High gain Yagi and omni-directional antennas are available from Telemetric.

After maximizing the signal strength, proceed with the installation.

### **Troubleshooting tips for testing with LEDs**

It is normal to receive occasional red blinks after transmitting. Sometimes the cell tower will simply be busy and will instruct the device to try again.

The two RSSI LED's are primarily used to display signal strength but also indicate key operating events, and can be useful in troubleshooting and system testing.

### **LED indicator guide**

- When the device receives a command from the web site, or successfully verifies that cellular service is available, the green LED will light for 0.2 seconds. After every successful transmit, the green LED will light for 1 second.

- After any failed transmit attempt (up to 4 tries), the red LED will light for 0.6 seconds
- After the 5<sup>th</sup> failed transmit attempt, the red LED will light for 1 second. At this point, the report will be abandoned. The next reportable event will restart the process.
- If the red LED keeps blinking slowly (on for 0.1 second every 3 seconds) this indicates that there is weak cellular service available or a weak radio signal strength. There will be a number of blinks at power up while the radio registers with the cell tower. This blinking will continue until service is available. Verify the antenna connection or relocate the device if it continues.
- The device is allowed to make one call per minute. During the one minute delay after every call, the green LED blinks on for 0.1 second every 3 seconds. During this time, it will record input changes but will not report them until the one minute has passed. If this blink continues after one minute, the device has reached its call limit. The device can still make time scheduled calls, user requested status calls and command acknowledgement calls, but it will not make any more triggered event calls until 24 hours have passed.
- If the red LED is blinking quickly, the device is waiting for registration acknowledgement (ACK) from the web site on the cellular A channel. If the green LED is blinking quickly, the device is waiting for registration acknowledgement (ACK) from the web site on the B channel. This cycle should normally only repeat once for one minute with each color. If it continues, the web site is not responding to the device's registration call.

## Using the Test button to trigger a call

During installation, or when doing maintenance in the field, it may be necessary to trigger a call from the device into the web site. You can use the test button to trigger two types of calls from the TVM3. Wait for the LEDs to stop blinking before pushing in the test button.

- To trigger a Maintenance call, hold in the test button for more than 2 seconds but less than 10 seconds.
- To trigger a Registration call, hold in the test button for at least 10 seconds but no more than 15 seconds. After 10 seconds, the red LED will start blinking. When you see this, release the button. The Registration call also resets the Cell Channel to Auto, so it is a way to reset the device if it has been programmed to call on the A or B channel.

**Note:** If you hold the button down for more than 15 seconds, the red LED will light and remain lit. This means the board has gone into factory programming mode. You will need to completely power down the board (including unplugging the battery) and power it back up again to get out of this mode.

## TVM3 Battery Test Routine

Every seven days the TVM3 tests the battery to see whether it has sufficient voltage to allow for outage reporting. Four levels of battery voltage are reported:

- Good – more than 1 hour of battery voltage remaining
- Low – 30 to 60 minutes of battery voltage remaining
- Weak – less than 30 minutes of battery voltage remaining
- Dead – less than 15 minutes of battery voltage remaining

The TVM3 will make a call to the web site after its battery test if the battery status is anything OTHER than Good. To find out the most recently reported battery status, request Report 13 or Report 20 (go to the History page to see the battery status).

## **TVM3 Voltage Calibration**

The TVM voltage readings are calibrated before the board leaves the factory. It will normally not be necessary to recalibrate the TVM. However, if the voltage readings appear to be inaccurate, the board can be recalibrated.

To calibrate the TVM:

1. Connect all three phases to a controllable voltage source. Set the voltage source so that all three phases are reading exactly 117 VAC.
2. Set DIP switch #1 to the ON position (see Figure 1 and DIP switch explanation above). The green and red LEDs will blink on together briefly.
3. A few seconds later the green LED will blink. This indicates that the calibration is complete. If the red LED flashes, the calibration has failed. Call Customer Support for further instructions.
4. Set DIP switch #1 back to the OFF position when you are finished.

# Using the Telemetric web server

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The Telemetric Intelligent Web Server, [www.telemetric.net](http://www.telemetric.net), provides access to the data from Telemetric devices 24 hours a day, seven days a week, from any computer that has access to the Internet. You can use the site to set up all monitoring functions, to set up automatic event notifications, and to send remote configuration commands to your Telemetric device.

## Setting up Your Account on the Intelligent Web Server

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### Logging In

To log in to your secure account on the Intelligent Web Server, click on the **Client Login** link on the web site ([www.telemetric.net](http://www.telemetric.net)). On the login screen, enter the user name and password that were sent with your Telemetric device(s).

When you click the Enter button the customer **Welcome** screen will be displayed. This screen displays the most recent critical events for your devices, and the navigation panel on the left side has links to all of the device data and device configuration screens.

### Entering customer information

After logging in for the first time, click on the **Customer Information** link in the navigation panel. This will display the Customer Information page where you can fill in your name and address and change your password to one that is easier to remember.

While on the Customer Information page, take note of the following fields:

- **Time Zone Offset:** This needs to be set to the number of hours difference between your local time zone and Eastern Standard Time. For example, if you're on the east coast of the United States this would be set to zero, and if you're in California this would be set to -3. After setting the Time Zone Offset, all device report times will be displayed for your local time zone. If you have devices that are in a different time zone, you also have the ability to set device time zones individually on the **Device Info** page.
- **Status Call Interval:** This is the default interval in hours between status calls for your devices (a number between 1 and 240). The Status Call Interval allows the Missing Device Report to accurately list those devices that did not call in when they should have. The factory default is for Status Calls to be disabled, so if you have not programmed your device to make Status Calls, or if you do not plan to make use of the Missing Device Report, you do not need to fill in this field. If some devices are making status calls at different intervals, set up their call intervals individually in the Device Info screen (reached from the device Status page).
- **Additional Info field:** Use this text box to enter a custom name for the device "Additional Info" field. The Additional Info field is a customer specified data field. It appears as the name of a column on the Device List. It can be used to categorize any device-specific data. For example, it could be used to save GPS coordinates for the device, or to record the device's location on the power grid. This data can then be used to sort the devices in the Device List.

If you do not want to use this extra field, do not edit this box.

## Entering device-specific information

Each time a new Telemetric device is installed, you can enter that Device's location information and customize some display options. To do this, select the **Device List** link from the navigation panel. In the Device List table that is displayed, click on the Device ID of the device that was just installed. The **TVM3 Status** screen for that device is displayed.

History
Request Data
Change Settings
Edit Device Info
Refresh

### Status device: 5078 Three Phase TVM

**Last Reported Data**

**Recent Calls**

Date/Time	Call Type	Details
2/19/2003 8:44:35 AM	Line Voltage Status Report	A Phase =116.2 VAC; B Phase =116.2 VAC; C Phase =116.2 VAC; Transmission Attempts were 1; RSSI is -92 db: (good);
2/19/2003 4:44:36 AM	Line Voltage Status Report	A Phase =117.8 VAC; B Phase =117.7 VAC; C Phase =117.6 VAC; Transmission Attempts were 1; RSSI is -88 db: (good);
2/19/2003 12:44:37 AM	Line Voltage Status Report	A Phase =117.1 VAC; B Phase =117.2 VAC; C Phase =117.1 VAC; Transmission Attempts were 1; RSSI is -89 db: (good);

**Settings** [>modify](#)

VAC Report Frequency:	<b>4 hours</b>	Daily Call Limit:	<b>20</b>
High UV Set Point:	<b>117</b>	High UV Trigger Time:	<b>60 minutes</b>
Mid UV Set Point:	<b>96</b>	Mid UV Trigger Time:	<b>0.5 seconds</b>

At the top of the Status screen, click on the **Edit Device Info** link. This brings up a screen that allows you to enter a customized description for this device and the device's location information.

### Edit Device Information

Description:	<input type="text" value="TVM3 v.6 Test Unit"/>
Additional Info:	<input type="text" value="Mountain"/> <a href="#">more information</a>
Address:	<input type="text"/>
City:	<input type="text"/>
State:	<input type="text"/>
Zip:	<input type="text"/>
Time Zone Offset:	-2 (Mountain Time) <a href="#">more information</a>
Status Call Interval:	5 hours <a href="#">more information</a>

Fill in the appropriate information for this device. The **Additional Info** field can be used for any additional device data that may need to be saved for this device. For example, it could be used to save GPS coordinates for the device, or to record the device's location on the power grid. As explained previously, the title of this field can be changed by filling in the field on the Customer Information page. If this field has been named in the Customer Information page, the new name will be displayed here, in place of "Additional Info."

To set up the device for a specific time zone, set the **Time Zone Offset**. This is used if the device is reporting from a different time zone than the default setting on the Customer Information page (see above). If the device is not in a different time zone, this setting does not need to be changed.

The **Status Call Interval** field should be filled in only if this device has a different status call interval from the default interval entered on the Customer Information page. This is the device's programmed interval between status calls (a number of hours between 1 and 240). The Status Call Interval allows the Missing Device Report to accurately list those devices that did not call in when they should have. Click the **Save Changes** button when the Device Info information has been completed. You will return to the TVM3 Status screen.

## Remote Configuration Commands

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The Telemetric MicroRTU arrives from the factory programmed with the basic default settings shown in the "Steady State" column of the table below. To change those settings after installing the Telemetric device (or at any time in the future), you can send configuration commands from the web site (see instructions below).

Setting	Steady State Defaults	Power Quality Defaults
Power Outage Trigger Time	5 minutes	32 mSec*
High Under Voltage Set Point	115 VAC	108 VAC
High Under Voltage Trigger Time	5 minutes	10 seconds
Middle Under Voltage Set Point	110 VAC	96 VAC
Middle Under Voltage Trigger Time	1 minute	0.5 seconds
Low Under Voltage Set Point	80 VAC	84 VAC
Low Under Voltage Trigger Time	30 seconds	32 mSec*
High Over Voltage Set Point	130 VAC	144 VAC
High Over Voltage Trigger Time	30 seconds	32 mSec*
Low Over Voltage Set Point	126 VAC	132 VAC
Low Over Voltage Trigger Time	5 minutes	0.5 seconds
Daily Call Limit	12 calls	12 calls
96-second Voltage Averaging	Disabled	Disabled
Power Outage Duration Reporting	Enabled	Enabled
Time Scheduled Report Frequency	Disabled	Disabled

\*Note that the 32 millisecond trigger times may trigger a large number of events, particularly in industrial locations. If you use these settings, watch the call volume of your TVM closely and adjust the trigger time upward if needed.

All of these settings can be remotely changed from the web site. To do so, go to the Device List and click on a TVM3, then click the **Change Settings** link at the top of the screen.

Refresh		Factory Default Settings	
<h2>Change TVM Settings</h2>			
Power Outage Trigger Time:	<input type="text" value="5 minutes"/>		<a href="#">▶ Change</a>
High Under Voltage Set Point:	<input type="text" value="115 VAC"/>	Trigger Time:	<input type="text" value="5 minutes"/> <a href="#">▶ Change</a>
Mid Under Voltage Set Point:	<input type="text" value="110 VAC"/>	Trigger Time:	<input type="text" value="1 minute"/> <a href="#">▶ Change</a>
Low Under Voltage Set Point:	<input type="text" value="80 VAC"/>	Trigger Time:	<input type="text" value="30 seconds"/> <a href="#">▶ Change</a>
High Over Voltage Set Point:	<input type="text" value="130 VAC"/>	Trigger Time:	<input type="text" value="30 seconds"/> <a href="#">▶ Change</a>
Low Over Voltage Set Point:	<input type="text" value="126 VAC"/>	Trigger Time:	<input type="text" value="5 minutes"/> <a href="#">▶ Change</a>
Daily Call Limit:	<input type="text" value="20"/>		<a href="#">▶ Change</a>
VAC Report Frequency:	<input type="text" value="Disabled"/>	Report:	<input type="text" value="20 as the time scheduled report"/> <a href="#">▶ Change</a>
96-Second Voltage Averaging:	<input type="text" value="Disabled"/>		<a href="#">▶ Change</a>
Power Outage Duration Reporting:	<input type="text" value="Enabled"/>		<a href="#">▶ Change</a>

The settings that are displayed in this form are the currently programmed settings for the TVM3. To change a setting, select a new value from the drop-down list and click **Change**. If you change more than one setting, a call will be sent out for each setting that is changed.



**Note:** Pay special attention to the power quality at the installation site when setting the Over and Under Voltage set points. If there are power fluctuations at the site, they can cause the TVM3 to call in with constant Over or Under Voltage calls – disrupting other communication. If this is the case, the Over or Under Voltage set point should be set very high or very low.

To change all of your settings to either Power Quality or Steady State defaults, click on the **Factory Default Settings** link at the top of this page. On the page that displays, you can click on either the **Set TVM to Steady State Defaults** or the **Set TVM to Power Quality Defaults** button. A single command is sent out to change all of the TVM settings at once. After it receives the command, the TVM will respond by sending three calls: a Programmable Voltage Set Points Report, a Programmable Configuration Settings Version Report, and a Registration Call. This confirms that all settings have been changed and it updates the web page with the new settings.

## Viewing monitoring data

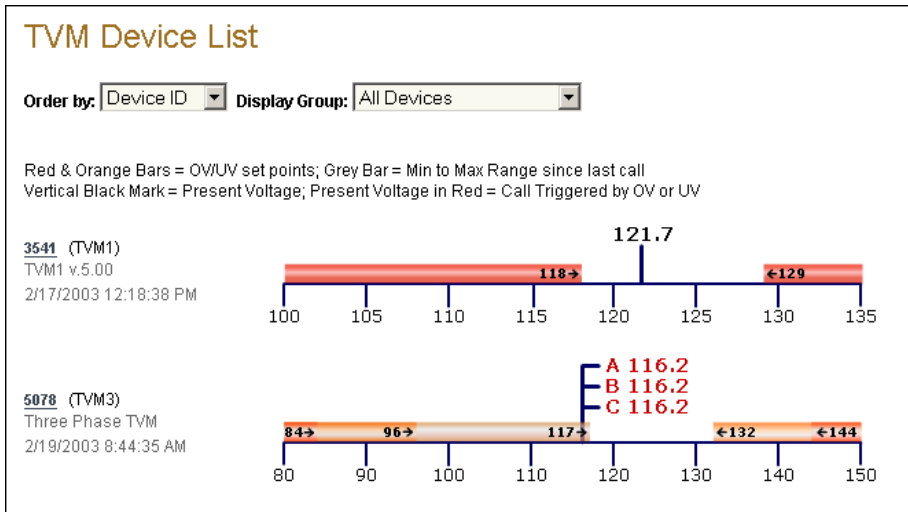
Once the Telemetric TVM3 is installed and turned on, it immediately begins to monitor voltage and outages. Within a few seconds after any change, the device makes a call over the cellular network and reports the change. This data is immediately available on the Telemetric web site.

## Device List

To view the current status of the device, log in on the customer login page and choose the **Device List** link from the navigation panel.

The Device List gives a quick overview of the status of each device. It shows the date and time of the last call, and what that call reported.

The format of the Device List page can be changed to display the data differently. If you click on the **TVM Format** link in the upper right corner, the Device List changes to the following format.



This Device List format displays TVMs only. It provides more data than the default Device List format, allowing you to quickly see the information collected by the TVM3s without having to drill down further.

## Status Page

If you want details on a specific device, click on the Device ID in the Device List to go to the Status page for that device.

[History](#)   [Request Data](#)   [Change Settings](#)   [Edit Device Info](#)   [Refresh](#)

## Status device: 5078 Three Phase TVM

**Last Reported Data**

**Recent Calls**

Date/Time	Call Type	Details
2/19/2003 8:44:35 AM	Line Voltage Status Report	A Phase =116.2 VAC; B Phase =116.2 VAC; C Phase =116.2 VAC; Transmission Attempts were 1; RSSI is -92 db: (good);
2/19/2003 4:44:36 AM	Line Voltage Status Report	A Phase =117.8 VAC; B Phase =117.7 VAC; C Phase =117.6 VAC; Transmission Attempts were 1; RSSI is -88 db: (good);
2/19/2003 12:44:37 AM	Line Voltage Status Report	A Phase =117.1 VAC; B Phase =117.2 VAC; C Phase =117.1 VAC; Transmission Attempts were 1; RSSI is -89 db: (good);

**Settings**   [>modify](#)

VAC Report Frequency:	<b>4 hours</b>	Daily Call Limit:	<b>20</b>
High UV Set Point:	<b>117</b>	High UV Trigger Time:	<b>60 minutes</b>
Mid UV Set Point:	<b>96</b>	Mid UV Trigger Time:	<b>0.5 seconds</b>

This page shows data from the most recent call, a history of the last three calls, and the TVM3's current programmed settings. If the TVM3 is currently reporting an outage, under voltage or over voltage condition, the phase(s) affected will be shown in red. Click the **Refresh** link at the top of the page to see the most recent data from the TVM3.

The **History** link at the top of this page displays the call history for this TVM3.

## History Device: 5120 Description: TVM3 v.6 Test Unit

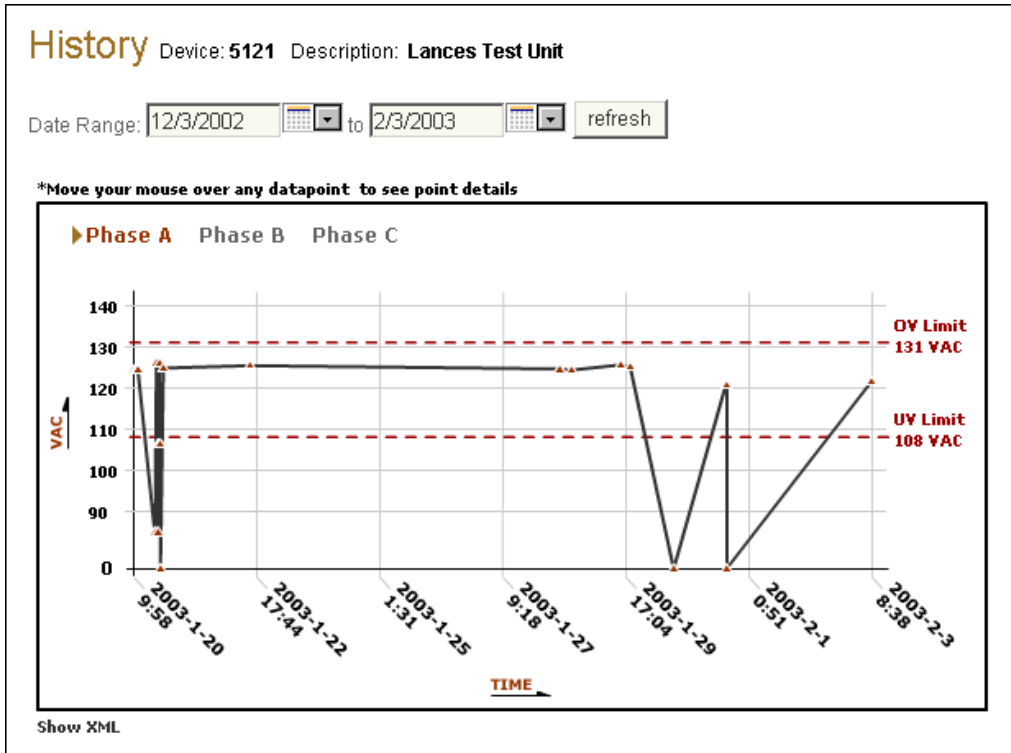
Display History for:

Date Range:

Date/Time	Call Description	Description
2/3/2003 11:45:31 AM	Three-Phase Voltage Report	A Phase - Min 111.7 VAC - Max 120.2 VAC; B Phase - Min 111.7 VAC - Max 117.7 VAC; C Phase - Min 111.7 VAC - Max 118 VAC; Transmission Attempts were 1;
2/3/2003 11:45:12 AM		Status Report #20 Requested - 3-Phase Min and Max Voltage
2/3/2003 11:41:26 AM	Programmable Configuration Settings and Version Report	Model is TVM3; Hardware version is 01; Firmware version is 06; A Phase AC Voltage is 119.6; Cellular Channel setting is Auto Select; 96 Second Voltage Averaging is Disabled; Report Frequency is 4 hours; Power Outage Duration Reporting is Disabled; Time scheduled report is 20; Transmission Attempts were 1; Daily Call Limit is 20
2/3/2003 11:41:08 AM		Command Sent: Send a line voltage report every 4 hours
2/3/2003 11:38:50 AM	Programmable Voltage Set Points Report	TVM3 - Phase A, B, & C reporting ; Under Voltage Low Set Point is 84 VAC - Trigger Time is 32 milliseconds; Under Voltage Mid Set Point is 96 VAC - Trigger Time is 0.5 seconds; Under Voltage High Set Point is 108 VAC - Trigger Time is 10 seconds; Over Voltage Low Set Point is 132 VAC - Trigger Time is 0.5 seconds; Over Voltage High Set Point is 144 VAC; Trigger Time is 32 milliseconds; Power Outage Trigger Time is 32 milliseconds
2/3/2003 11:38:04 AM	Programmable Voltage Set Points Report	TVM3 - Phase A, B, & C reporting ; Under Voltage Low Set Point is 84 VAC - Trigger Time is 32 milliseconds; Under Voltage Mid Set Point is 96 VAC - Trigger Time is 0.5 seconds; Under Voltage High Set Point is 108 VAC - Trigger Time is 10 seconds; Over Voltage Low Set Point is 132 VAC - Trigger Time is 0.5 seconds; Over Voltage High Set Point is 144 VAC; Trigger Time is 32 milliseconds; Power Outage Trigger Time is 32 milliseconds

This page displays a history of calls from this device. You can use the Date Range boxes to select a different History period. By default, the past two months of calls are displayed.

The format of the TVM3 Device History can be changed to view the voltage information in the form of a graph. To do so, click the **Display Graph** link in the top left corner.



If you hold your mouse over any of the points on the graph, the voltage information for that point will be displayed. If you would like to change the date range for the graph, use the **Date Range** boxes to select a different time period. By default, the graph displays the voltages for Phase A. If you would like to see a different phase, click on **Phase B** or **Phase C** in the top left corner of the graph.

## Request data

From the TVM3 Status screen, an updated status report can be requested from the device at any time. To request a report, click the **Request Data** link at the top of the Status screen. On the Request Data screen, select a Status Report from the drop down box. If you want to receive the status report immediately, click the **Send Request** button. If you would like the report to be sent at a later time, select a time and a date and click **Send Request**. The request will be sent to the device either immediately or at the time you selected, and it will respond by sending back the requested report. After approximately 30 seconds, you can click the **Refresh** link on the Status screen to see the new data. You can also look at the History screen to see a record of the Status Report. See Appendix A of this document for a detailed list of all of the Status Reports.

To start or stop time scheduled status reports, click the **Time Scheduled Reports** link at the top of the Request Data screen. The Time Scheduled Reports page that displays allows you to start or stop receiving regular status reports from this device. This also allows you to start time scheduled reports at a certain time. For example, if you want a voltage report to come in every morning at 5:00 AM, you can select "Send a line voltage report every 1 day" and then select 5:00 AM tomorrow morning. At 5:00 AM the first day you will get the confirmation report indicating that

the device has been programmed (the “Programmable Configuration Settings” report), and then at 5:00 AM every day thereafter you will get the line voltage report.

## Event-based actions

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The Telemetric web software allows the user to create scenarios that will automatically send out a notification. For example, a rule might be created to specify that “If Voltage reports ‘high’ then send a page to George.”

To create these rules, the Telemetric Intelligent Web Server has a step-by-step interface that walks through the process. After logging in to the web site, select the **Event Based Actions** link from the navigation panel.

On the **Event Based Actions** screen there will be a list of any User Notifications that have already been created. These can be edited at any time by clicking on the Description.

### Event-based user notifications

To create a User Notification, you will first select the condition(s) that will trigger the notification, and then select the recipient and message for the notification.

Before creating the first User Notification, at least one Message and one Recipient must be created for use in the notification.

To set up new Recipients and Messages, select the **Messages & Recipients** link from the navigation panel. On the screen that displays, select the **Messages** link to create a new message, the **Recipients** link to create a new recipient, or the **Recipient Distribution List** link to add a new Recipient list (you must create some recipients first).



**Note:** All notification messages are sent using email addresses. An Internet email address can be used to send someone a regular email message, which will appear in their email inbox, or a pager email address can be used to send a text page directly to a pager or PDA. Most modern pagers have the ability to receive emailed pages. Check with your pager company if you have questions.

### Create a message

When you click the **Messages** link the Messages screen is displayed.

### Add/Modify Messages

To add a new Message, click the **Add New Message** button.  
To edit an existing message, select the message to modify and click the **Modify Current Message** button.

A1 out of range high

Modify Current message    Add New message    Delete message

To create a new message, select the **Add New Message** button.

## Add Message

Note: Messages are limited to 80 characters in length

**Message Name:** \*

**Message Subject:** \*

**Message Text:** \* **Variables:**

It is required that all three fields in this screen be filled in to create a message. Type in a name for the new message in the **Message Name** field. This is the name that will appear in the list of previously created messages. Fill in the **Message Subject**. This will appear in the Subject line if the message is sent via Internet email. Type a message of less than 80 characters into the **Message Text** field. You can also insert a variable into the message by putting your cursor in the appropriate spot and selecting a variable from the drop-down box. The variable is a place holder that tells the software to insert the appropriate data from the database into the message before it is sent. Using variables, one message can be created and used for a number of different devices, instead of having to make a separate message for each device. The variables currently available are:

- Device Description
- Device Address
- Additional Information field
- Present Voltage

When finished with the new message, click the **Add Message** button to save it.

## Add a recipient

To add a new message recipient, click on the **Recipients** link on the Messages and Recipients page.

## Add/Modify Recipient

To add a new Recipient, click the **Add New Recipient** button.  
To edit an existing Recipient, select the name and click the **Modify Current Recipient** button.

The drop-down box on this page lists any previously created recipients. Click the **Add New Recipient** button to add a new recipient to the list.

**Add Recipient**

Recipient Name: \*

Email Address: \*

Enter the recipient's name and their email address. As mentioned before, this email address can be either an Internet email address or a text pager email address.

After entering the recipient information, click the **Add Recipient** button. You will be returned to the Recipients page.

### Add a recipient list

If you would like to send email out to a group of recipients instead of just one, you can create a recipient list. Before creating the list, you must first add all of the recipients for the list using the Recipient screen. Then, on the Messages and Recipients page, select the **Recipient Distribution List** link. You will see a list of all of the recipients you have created, with a check box next to each one. Check the boxes for the recipients you want to include in the list, give the list a name, and then save it. The list will show up as a recipient option when you are creating the user notification.

### Setting up a user notification

To create an event-based User Notification, select the **Event Based Actions** link from the navigation panel.

On the Event Based Actions page click the **Create New User Notification** link to create a new event-based user notification rule.

1. The first step in the process is to select the Telemetric device ID number for the device that will trigger the User Notification.

**Select Device ID**

Please select a device ID to create a new User Notification.

After selecting the device, click **Proceed** to display the User Notifications setup page.

## Setup User Notification

Set up a user notification to be carried out by the selected MicroRTU. You can create up to five triggers for the user notification.

**Triggering Device:** 5120

Select the first trigger for the user notification:

### Additional Triggers

2nd Trigger	<input type="radio"/> And <input type="radio"/> Or <input checked="" type="radio"/> None	<input type="text" value="No option Available"/>
3rd Trigger	<input type="radio"/> And <input type="radio"/> Or <input checked="" type="radio"/> None	<input type="text" value="No option Available"/>
4th Trigger	<input type="radio"/> And <input type="radio"/> Or <input checked="" type="radio"/> None	<input type="text" value="No option Available"/>
5th Trigger	<input type="radio"/> And <input type="radio"/> Or <input checked="" type="radio"/> None	<input type="text" value="No option Available"/>

### Select a message and a recipient:

Select the message that should be sent to the recipient:

Select the recipient:

User Notification Name\*:

2. Select the event that will trigger a User Notification.



**Note:** Only one voltage event can be used to trigger a User Notification. Therefore, a combination of events cannot be used to trigger a TVM notification and no selection can be made in the **Additional Triggers** table.

3. Select the message that will be sent to the selected recipient. The messages in this drop down list box are those that were created on the Create Messages page.
4. Next, select the recipient or recipient list. The names that appear in this drop-down box are the Recipient names that were assigned on the New Recipient page (or the Recipient Distribution List page). Each Recipient is associated with an email address – either for Internet email or a text pager.
5. In the final step, give the User Notification action a name and click the **Save User Notification** button to save it.

The new User Notification will now appear on the Event Based Actions list. As soon as it has been created it is active. The notification message will be sent to the recipient whenever the trigger event takes place.

## Using Groups

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Another advanced feature of the Telemetric Intelligent Web Server is its ability to assign a number of units to a group and then order an action or request a report for all units in that group, instead of one unit at a time. This is carried out on the **Device Groups** page, which you can reach by selecting the **Device Groups** link in the navigation panel.

### Create or maintain a group

Follow the instructions below to create or edit a group.

1. Select the **Create New Group** link at the top of the Device Groups page, or click on the **Modify Group** link next to the group you want to edit.
2. If you are creating a new group, select the Telemetric model that will be part of this group (e.g. TVM3). Click **Continue** to proceed to the next screen, where all of the devices of this model type are listed.
3. To create a group, select the check box next to each device you want to include. To edit a group, select or un-select the check boxes to add or remove devices from the group.
4. After selecting the devices, type the group name into the **Group Name** text box at the top of the screen.
5. Click the **Save Changes** button to save the group.

After creating a new group, the group name will appear in the drop-down list at the top of the Device Groups screen.

### Request a report

After creating a group, you can request any report from all units in that group. Follow the instructions below to request a report.

1. Click the **Request Data** link next to the group on the Device Groups page.
2. Select the report that you want to request from the **Request a Report** drop-down list.
3. Click the **Request Report** button. You will see a web page verifying that your report request has been sent.

After requesting a report, you can go to the Status screen for any of the units in your group in order to see what was reported for that unit.

### Send a command

Once you have created a group, you can send a command to all members of the group at once. Follow the instructions below to send a command.



**Note:** The only commands that can be sent to TVM3s are programming commands.

1. Click on the **Send Command** link next to the group on the Device Groups page.
2. Select the command that you want to send from the **Send a Command** drop-down list.

3. Click the **Send Command** button. You will see a web page verifying that your command has been sent.

The command will immediately be sent out to all units in the group. You can go to the Device History page for any of the units and see that they have called in to acknowledge that the command has been carried out.

## Setting up data export

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To export the data from one or more Telemetric devices for use in another data management program, set up the automated data export function. Currently the data export takes place in the form of machine-readable e-mail messages or CSV files. Other data export methods will be available in the future.

To set up one or more devices for data export, select the **Data Export Setup** link on the navigation panel.

Choose **Global Export via E-Mail**, **Device-Specific Export via E-Mail** or **Export to CSV File**. Global exporting exports all data for all devices that call in. Device Specific data exporting specifies one or more devices for data export. Export to CSV File exports selected history data from a specific device, or group of devices, into a CSV file, which can be downloaded onto your computer.

### Global data exporting

To use Global exporting, check the **Enable Global Exporting** check box and enter an email address into the **Recipient Address** text box. Click the **Update Global Settings** button to save the changes. Once Global exporting has been enabled, each call from each device will generate an email message, which will be sent to the assigned email address. See the Email Data Export Format section, below, for details on how the data is formatted within the email.

### Device specific exporting

To export data only for specific devices, select **Device Specific Export via E-mail** and click the **Add Devices** button. On the Add Devices screen, select a device from the drop down list, and then select an email recipient. The recipients in the drop down list are the recipients that have been added on the Recipients web page (reached by following the "Messages & Recipients" link on the navigation panel).

After selecting a device and an email address, click the **Save Selection** button. A confirmation page will confirm the addition of the device, and the selected device and the e-mail address will be displayed in the Device Specific Exporting table. Follow this procedure for each device to be added. As soon as the device has been added to the table, each call from that device will generate an email containing the data from that call. See the Email Data Export Format section, below, for details on how the data is formatted within the email.

### Email data export format

The export data within each email message is in a specific comma-delimited format, so that it can be imported directly into a database. An example email format for a voltage event call is shown below, with the actual export data represented in brackets. The email for each different call type is different, but they all follow the same type of comma separated format.

The Min and Max readings (for Voltages) are always the minimum and maximum readings since the previous call.

Unit, [Device ID]  
Datetime, [date and time – mm/dd/yy hh:mm:ss]  
Call Reason, [event or report type that triggered the call]  
Duration-A, [Duration of voltage event – if any on this phase]  
Duration-B, [Duration of voltage event – if any on this phase]  
Duration-C, [Duration of voltage event – if any on this phase]  
A Phase AC Voltage, [Voltage reading]  
B Phase AC Voltage, [Voltage reading]  
C Phase AC Voltage, [Voltage reading]  
Report triggered by, [Phase that triggered the event – A, B or C]  
Description, [Device description]  
AdditionalInfo, [Contents of “Additional Info” field]  
Address,  
City,  
State,  
ZipCode,

## Data export to a CSV File

To export TVM3 data to a CSV file, select Export to CSV File from the Data Export menu. On the page that displays, select the device or group of devices for which you want to export data (a group can be created using the Device Groups tool on the navigation panel). Then select the start date and end date for the history that you want to export. You can click on **Pick Date** to select a date from a calendar. Click **Continue**. The CSV file is created. On the next screen, click on **Download** to download the CSV file onto your computer. Click **Continue** when the download is complete to return to the Date Export menu.

## CSV data export format

The CSV is saved in the format shown below. The Device ID and the time/date stamp of the call is recorded for each piece of data.

```
3608,9/16/2002 12:46:49 PM,Call Type,Over Voltage
3608,9/16/2002 12:46:49 PM,AC Voltage,127.9
3608,9/16/2002 12:46:49 PM,AC Voltage - Min,119.1
3608,9/16/2002 12:46:49 PM,AC Voltage - Max,127.8
3608,9/16/2002 12:49:08 PM,Call Type,Voltage Condition Cleared
3608,9/16/2002 12:49:08 PM,AC Voltage,120.3
3608,9/16/2002 12:49:08 PM,AC Voltage - Min,120.3
3608,9/16/2002 12:49:08 PM,AC Voltage - Max,128
3608,9/16/2002 12:57:11 PM,Call Type,Registration Call
3608,9/16/2002 12:57:11 PM,Model,TVM3
3608,9/16/2002 12:57:11 PM,ACVoltage,119.7
3608,9/16/2002 12:57:11 PM,Hardware version,50
3608,9/16/2002 12:57:11 PM,Firmware version Version,05
3608,9/16/2002 12:57:11 PM,RSSI,-94 db: (weak)
```

## Advanced programming

---

The Telemetric Intelligent Web Server has an Advanced Programming section that provides access to some of the more advanced features of the Telemetric device. Follow the **Advanced Programming** link on the navigation panel to find these tools.

### Analog Lookup Data

The TVM3 does not have Analog inputs, so the Analog Lookup Data link does not apply to this device.

### Acknowledgement retries

The Advanced Programming menu also allows you to set the number of retries used by the Telemetric software when a command is sent to a device. Whenever the device is sent a configuration command it always sends back an acknowledgement so that the user knows that the command was successfully completed. By default, the Telemetric software does not re-send the command, even if it does not receive an acknowledgement from the device. Some users place a higher priority on receiving this acknowledgement so that they can be certain that the command was carried out. By setting up retries, the user is able to make certain that the device receives and responds to the command.

To set Acknowledgement Retries:

1. Select **Acknowledgement Retries** from the Advanced Programming screen.
2. Select the device from the **Device ID** drop down list and click **Continue**.
3. Select the number of retries to use (from 1 to 5) from the **Number of times to Retry** drop down list.
4. Click the **Continue** button to save the new Acknowledgement Retries setting. A confirmation screen will verify that the change has been made. From this point forward, the software will use the specified number of retries whenever it does not receive a command acknowledgement from the device.

**Note:** With the use of retries, a very high level of reliability can be achieved for carrying out commands. There are factors inherent in cellular communications, however, which prevent the system from being 100% reliable. If the device is having problems receiving messages, it will obviously be unable to receive the command, no matter how many times it is retried. If the device receives and carries out the command, it may then have problems communicating the acknowledgement back to the web software. In this case, retries will cause the web site to send the command again. For TVM3 configuration commands, resending the command will have no effect. Bear in mind, however, that increasing the number of retries will increase the overall call volume.

## Create/edit user IDs

This option allows a “master user” to create new user IDs that allow access to the Telemetric Intelligent Web Server without the ability to make edits or control the Telemetric devices. The “master user” is the initial user ID and password that is sent from Telemetric. Only the master user will see this item in the Advanced Programming menu.

### Creating a new user ID

1. Select **Create/Edit User ID** from the Advanced Programming menu.
2. Click the **Add User ID** button.
3. Fill in the User ID and Password for the new user. For the User ID, use alphanumeric characters only with no spaces or punctuation. The Password must be eight or more alphanumeric characters.
4. Select either the **View and Report** or **View Only** radio button. A View and Report user can view all device data and request reports from devices. They cannot send configuration commands to devices. A View Only user can only view device data. They cannot request reports or send configuration commands.
5. Click **Save Changes** to save the new User ID. This User ID and password can now be used to access the web site.

User IDs can be edited or deleted by using the **Edit** and **Delete** buttons on the Create/Edit User IDs page.

## Appendix A: Status reports

---

The Telemetric TVM3 has a few different reports that can be requested from the web site. The amount of data that can be sent in one call is limited, so these report types have been set up to focus on different types of data.

### **Status report #13 – 120VAC Report**

This report reports line voltage data.

This report contains the following information:

- The number of transmission attempts
- The present AC line voltage for phases A, B and C
- The battery status
- The radio signal strength

### **Standard report #20**

This report contains the minimum and maximum measured line voltage for each of the three phases.

The report contains the following information:

- The maximum voltage measurement for phases A, B and C (since the last 20 call)
- The minimum voltage measurement for phases A, B and C (since the last 20 call)
- The battery status

### **Standard report #21**

This report contains voltage data for Phase A only.

The report contains the following information:

- The present phase A voltage
- The maximum phase A voltage (since the last 20 or 21 call)
- The minimum phase A voltage (since the last 20 or 21 call)
- The number of transmission attempts
- The radio signal strength
- The battery status

### **Standard report # 50 – Programmable Parameters**

This report contains the value for each of the remotely programmable voltage parameters for the TVM3.

The report contains the following information:

- The Low Under Voltage set point
- The Middle Under Voltage set point

- The High Under Voltage set point
- The Low Over Voltage set point
- The High Over Voltage set point
- The Low Under Voltage trigger time
- The Middle Under Voltage trigger time
- The High Under Voltage trigger time
- The Low Over Voltage trigger time
- The High Over Voltage trigger time
- The Power Outage trigger time

### **Standard report # 98 – Device Version/Configuration Report**

This report contains TVM version information and also contains the “non-voltage” programmable parameter settings.

The report contains the following information:

- The model number
- The hardware version
- The firmware version
- The cellular channel settings
- The 96-second voltage averaging setting (enabled or disabled)
- The time scheduled report frequency
- The time scheduled report selection (Report 13 or Report 20)
- The power outage duration reporting setting (enabled or disabled)
- The daily call limit
- The present Phase A line voltage
- Transmission attempts
- The radio signal strength

### **Standard Report # 99 – Maintenance Report**

This is a general purpose report that gives device version information and voltage readings.

The report contains the following information:

- The present phase A line voltage
- The present phase B line voltage
- The present phase C line voltage
- The hardware version
- The firmware version
- Today’s call count
- The number of transmission attempts
- The radio signal strength

## Appendix B: Hardware specifications

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### Battery

A built-in battery provides operating power for power outage reporting, data storage and orderly shutdown during AC power outages. An on-board circuit charges the battery.

### Antenna

The included antenna is a “rubber duck” style, 1/2 Wave, 2.5dB antenna. An external SMA connector provides the connection to this antenna or to a remote antenna if desired. Larger (50-ohm cellular frequency) antennas including Yagi or higher gain omni-directional models can be used to improve performance in fringe areas. Telemetric also sells Phantom Low-Profile antennas for the TVM3.

### On-Board radio signal strength indicator

A pushbutton switch initiates a test in which LEDs are used to indicate the Radio Signal Strength (RSSI) being received by the radio. This is used to facilitate installation, antenna selection and orientation, and troubleshooting. The same LEDs provide a momentary pass / fail indication after each transmission as well as other troubleshooting indications.

### Cellular radio operating specifications

The CMM8700 cellular modem module has the following specifications:

- 0.6, 1.2, and 3 Watt transmit power at 824-849 MHz.
- Receive frequency: 869-894 MHz,
- Compatible with the AMPS analog cellular system

### Internal AC power supply

The power supply operates from 100-135 VAC, 60 Hz.

### CPU / memory

The CPU is a Microchip PIC product. Non-volatile (EEPROM) memory is used to store configuration and operational data.

### Environmental specifications

- The recommended operating temperature range is -40 to +158 degrees F (-40 to +70 C). The recommended relative humidity range is 5 - 95% non-condensing.
- Electrical Transient Immunity per ANSI/IEEE C37.90.1-2002