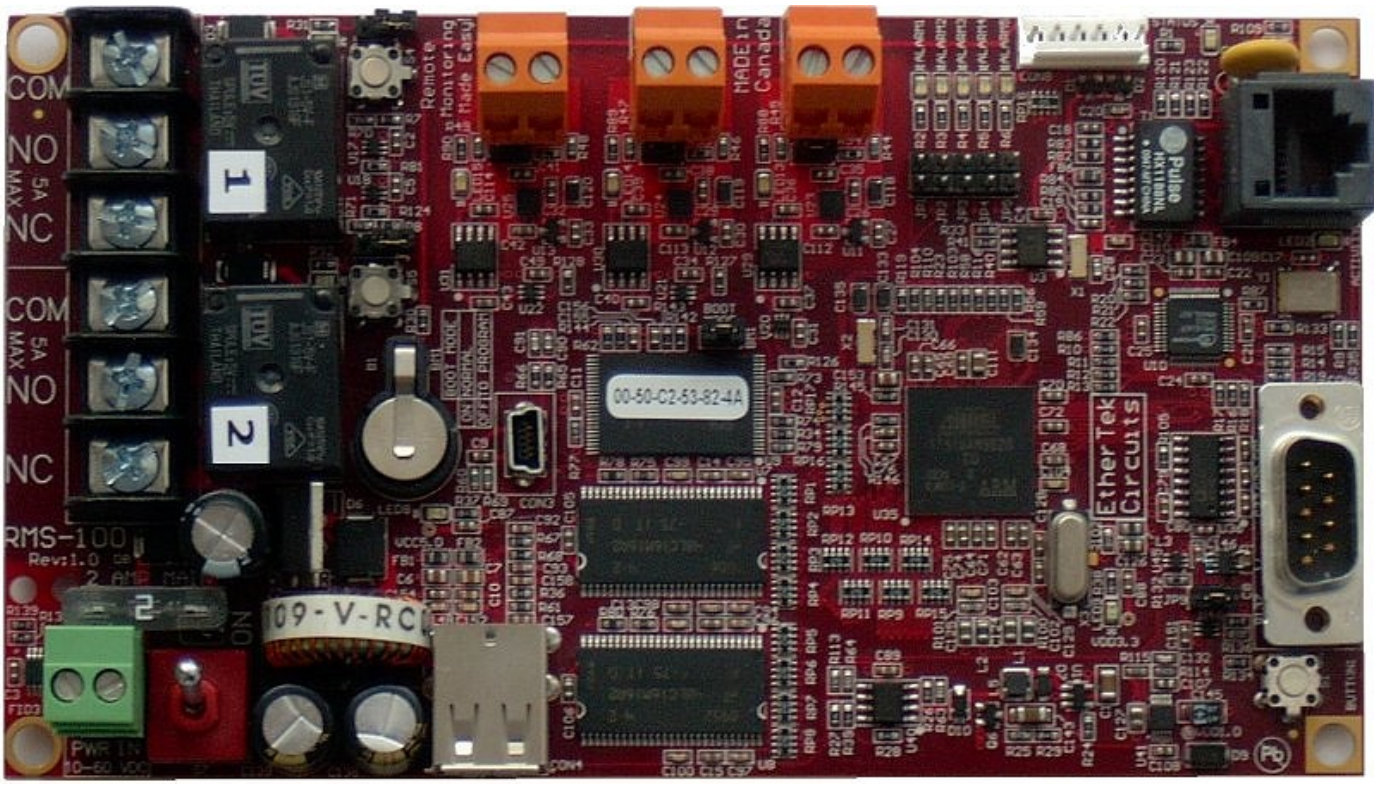
RMS-100



(C) EtherTek Circuits

Owners Manual

REMOTE MONITORING MADE EASY!

RMS-100 Owners Manual (Rev 1b)

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Introduction

RMS-100, the baby RMS; Is a unique remote monitoring, data acquisition, and control device specifically designed for use with Battery powered wireless internet repeater sites, or other AC & DC powered remote equipment

RMS-100 Has ultra low power consumption and won't put a drain on your power source. Uses only 1.2 watts!

RMS-100 Is powered by DC voltage from 10 to 60 volts.

RMS-100 Uses embedded Ethernet technology for internet data acquisition and remote voltage monitoring.

RMS-100 Uses the LINUX operating system for versatility, stability, and security.

RMS-100 Gives you the situational awareness you need to keep your equipment operational and reliable.

Possible Applications

A/C or Battery Powered Microwave, Telephony, Network Equipment

Use RMS-100 to monitor battery levels, room temperature, signal strength (RSSI) on radios and more. RMS-100 has 3 onboard isolated voltmeters giving it the ability to measure DC voltage from -100 to +100 volts with 24 bit accuracy. RMS-100 also has 2 power relays giving it the unique ability to turn on/off devices remotely using an Internet connection. Use the power relays to remote start a generator. RMS-100 has 5 dedicated input pins used for door alarms, motion sensors, or to monitor solar panel trip wires. RMS-100 has two USB 2.0 ports that support several USB devices concurrently using a USB hub. Control USB cameras, store data on USB flash drives, control USB speakers etc. RMS-100 has input and output pins used to control your own custom devices. RMS-100 can alert you via email or SMS messages when your battery bank is low. RMS-100 has ping monitor software that allows you to monitor network devices and alert you to failure and possibly power cycle the device. Monitor all this information remotely over an Internet connection using an ordinary web browser. RMS-100 gives you direct hardware control of fans, lights, computers, cameras, modems, radios, etc... No more guessing what your battery levels are. No more wondering if your signal strengths are at an acceptable level. No more long drives to reset a fussy radio. Let RMS-100 do this all remotely via the Internet.

Features

- Six layer PCB with Nickel Immersion Gold plating and red solder mask.
- 400 - MHz Arm Processor (500 Mips !).
- 256 - megs of Nand Flash. Create and store custom applications.
- 64 - megs of SD-Ram.
- Dual Low Noise Switching Power Supplies accepts 8 - 60 vdc input. Can be powered directly from 12, 24, or 48 volt battery banks.
- Battery backed-up, real time clock.
- One onboard temperature sensor –25c +100c.
- Three 24 bit isolated voltmeters (+/- 100 VDC). Each voltmeter has its own 24 bit Delta Sigma ADC.
- Each voltmeter can be put into low voltage shunt mode (+/- 2 VDC).
- Two Power Relays for devices using 1 – 240v -5 amps AC/DC current.
- One programmable push button.
- Four general purpose I/O pins.
- Five dedicated alarm pins.
- One console serial port.
- Two USB 2.0 ports for cameras, wireless clients, extra Ethernet, etc.
- Runs real Linux! 2.6.33 kernel.
- Send SMS messages, Email alerts, SNMP traps, Remote Syslog Messages.
- Ping watchdog, power cycle equipment after a set amount of ping timeouts.
- Command line utilities: ping, ftp, email, relays, etc.
- Flash new firmware over the internet.
- Duel Watchdog Reset circuits, processor integrated, and extra hardware.
- Control RMS-100 via web page, telnet, ssh, or snmp.
- Full SNMP v1, v2, v3 support (default v3).
- Supports external USB relays and voltmeters.
- Hardware is user accessible from files on the board.
- Make your own utilities and scripts to upload. (Bash, PHP, Python, Lua)

- Pluggable connectors for ease of use.

A partial list of programs and packages included:

SQLlite v3 database, Telnet ,Drop Bear SSH, Light Http and Https Server, Pro FTP, Cron scheduling agent, Busy Box, PPP, Net SNMP, NanoCom, Easy Edit, Nano, and Vi, Fping, SMTP email client, IPtables, Lrz and Lsz, Open SSL, Modbus Library, RRD Tool, USB Web Camera Support.

A programmers dream:

RMS-100 comes with PHP, Python, and Lua. Make your own custom monitoring programs and upload them to the RMS-100 board, or create your own branded interface!

Configuration

Setting up RMS-100

Connect 8 - 60 volts dc power (minimum 500 ma) to the green terminal block that is beside the on/off switch (See figure 1). Connect an Ethernet cable to the rj-45 jack on the **RMS-100** board. Turn the device on with the on/off switch. It takes the **RMS-100** board approximately 30 seconds to bring up the Linux operating system. The **RMS-100** will signal it is ready by first blinking the green status light in a continuous heartbeat sequence. After a few seconds the red alarm leds will display a light sequence. The board is now fully booted up and is ready for configuration.

Note1: **RMS-100** units should be mounted inside a steel enclosure that is grounded properly to prevent Electro Magnetic Interference.

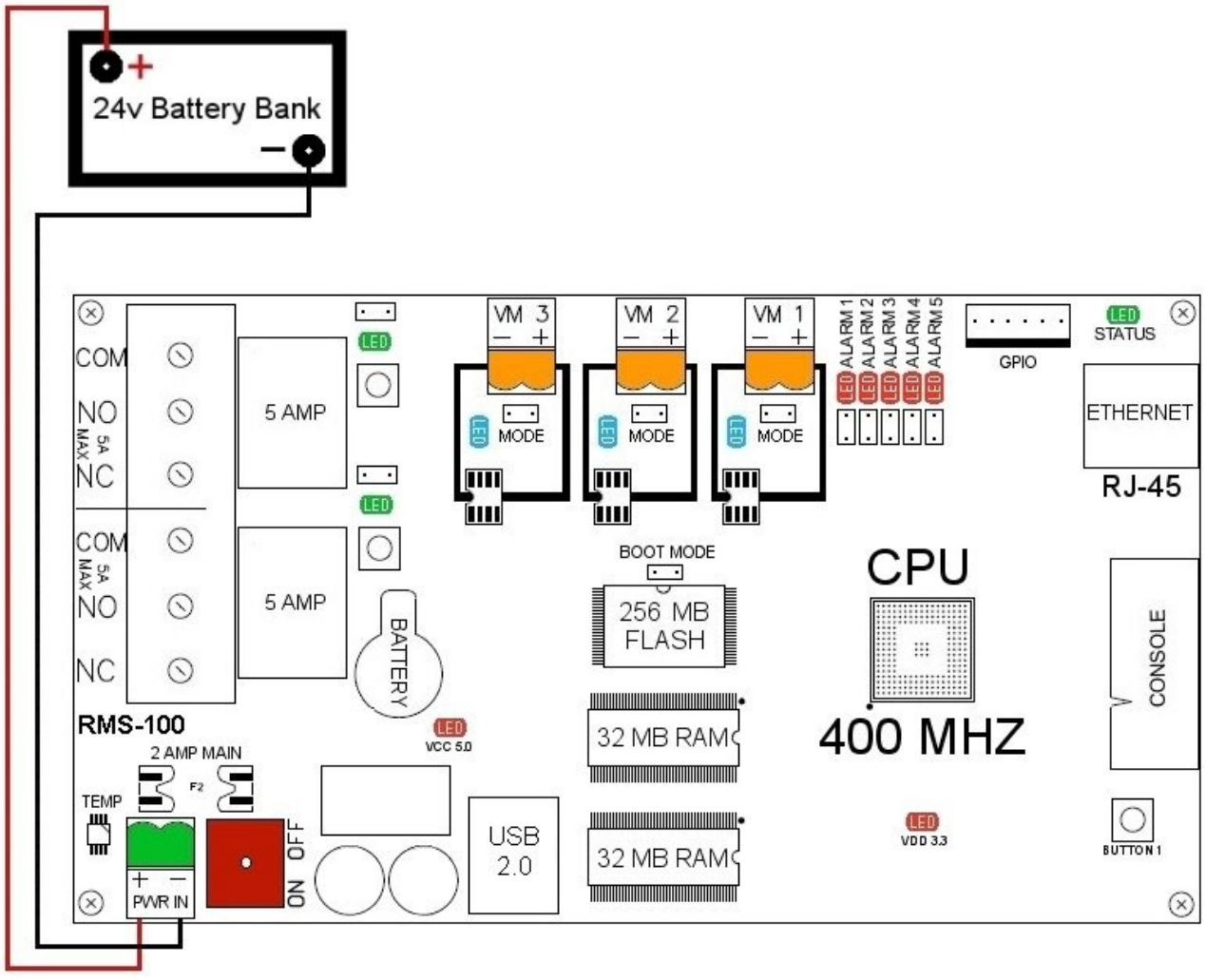
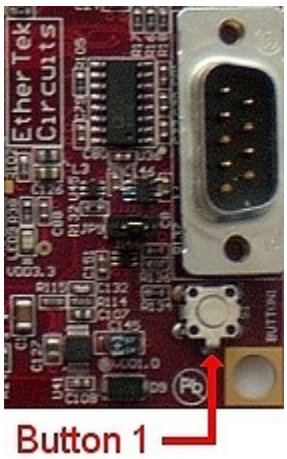


FIGURE 1

RMS-100 is powered up, Now What ?

We recommend configuring RMS-100 before deploying it in the field. Simply plug RMS-100 into your network or computer using an Ethernet cable (Straight or Cross).

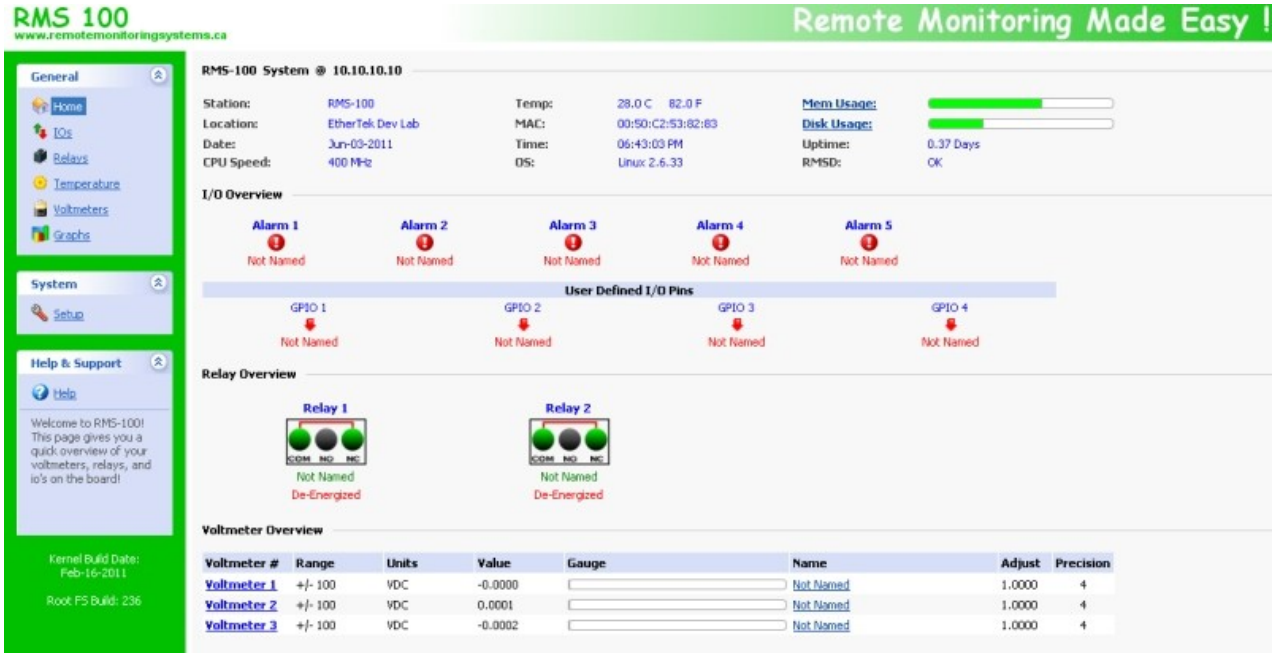
When RMS-100 is turned on it boots the Linux operating system and uses the values stored in its configuration files to bring up the system. The default values consist of an IP address, username, and password. The default IP address is 10.10.10.10. The default username is **root**. The default password is **pass**.



Note: You may at anytime restore the RMS-100 device to factory default values by pressing and holding down the micro push button #1 located near the console port and then turning the RMS-100 device on with the on/off switch. Release the button when the alarm leds start to flash. When the alarm leds stop flashing, the RMS-100 unit will be ready to configure.

Give your computer an ip address in the 10.10.10.X class. For instance use 10.10.10.1. Set your computers Netmask to 255.255.255.0 There is no need to set a Gateway at this time. Open your favorite web browser and enter 10.10.10.10 into the address bar, press enter or the go button. You should be presented with a password box like the one below.

Enter in the default username and password then press the OK button. You will be taken to the RMS-100 Home page. This page contains an overview of all of the functionality of the RMS-100 board.



In the left side panel, click on the Setup icon. This takes you to the System Setup area shown below.

Here you will want to visit the following areas: Company Setup, Network, System Time, and Change Password. Adjust the Station Name, Location, Domain Name, IP Address, Subnet Mask, Gateway, DNS, and password you want the **RMS-100** device to have. Caution must be taken when configuring the device, entering incorrect values may cause

you to lose connectivity with the device, forcing the need for a factory reset. Once you have RMS-100 configured properly, it is ready to deploy in the field. Below are some basic examples of how to install the RMS-100 unit.

Installation

Basic installation example 1

Monitoring your Battery Bank

To monitor your main battery power supply, run a wire from the positive side of the battery bank to one of the Voltmeter positive inputs. Run a second wire from the negative side of the battery bank to the corresponding Voltmeter negative input as shown in Figure 2. Connect **RMS-100** to the internet with a common Ethernet cable and monitor the voltage level of your battery bank with a web browser.

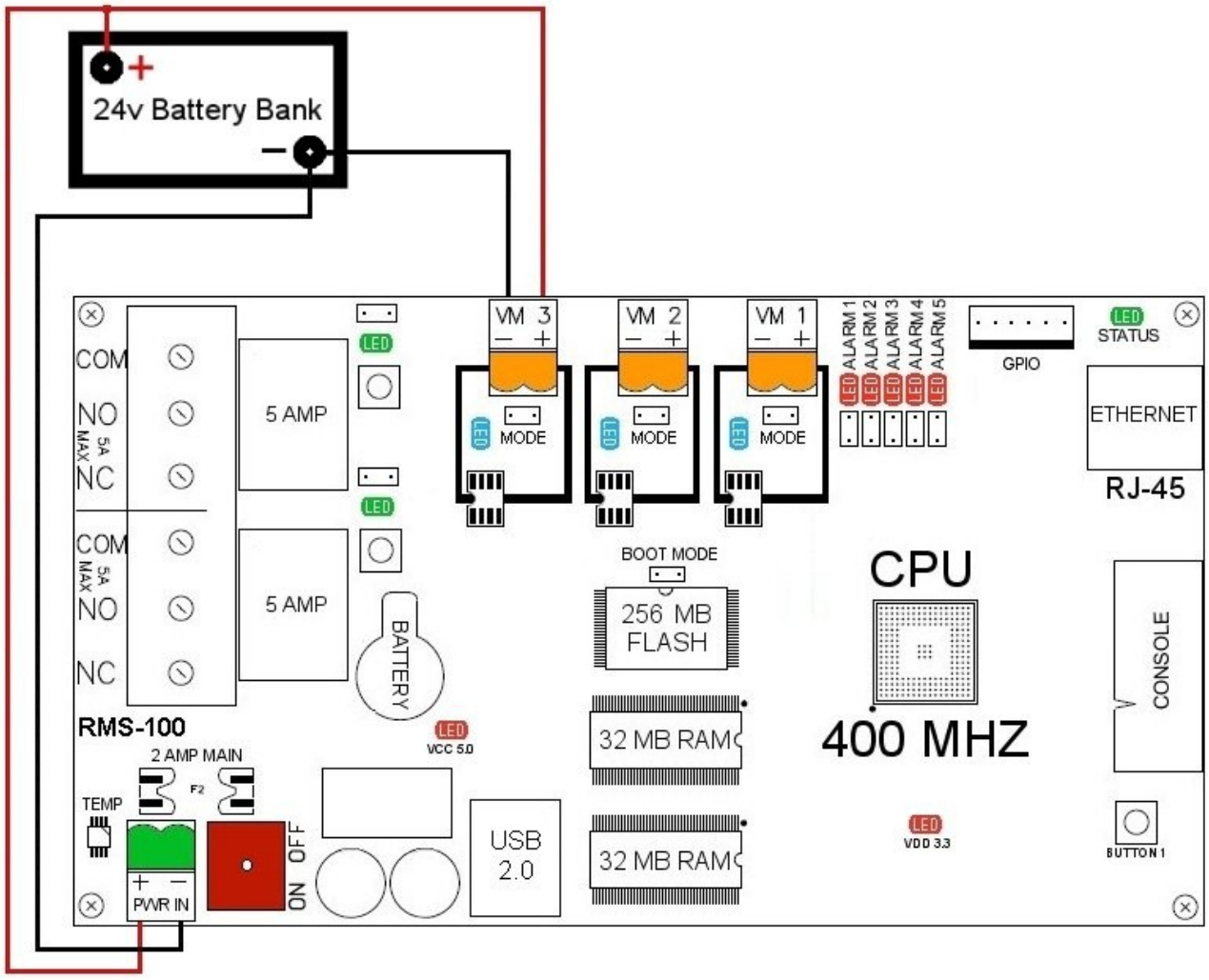


FIGURE 2

Basic installation example 2

Signal strength on Link CX Radios

Radios that have an external RSSI port for checking signal strength can be monitored with ease. Simply attach the RSSI output from the radio to one of the Voltmeter inputs on the RMS-100 board (see Figure 3). Monitor the signal strength of your radios with a web browser and/or have RMS-100 alert you by email if the signal falls below a certain threshold.

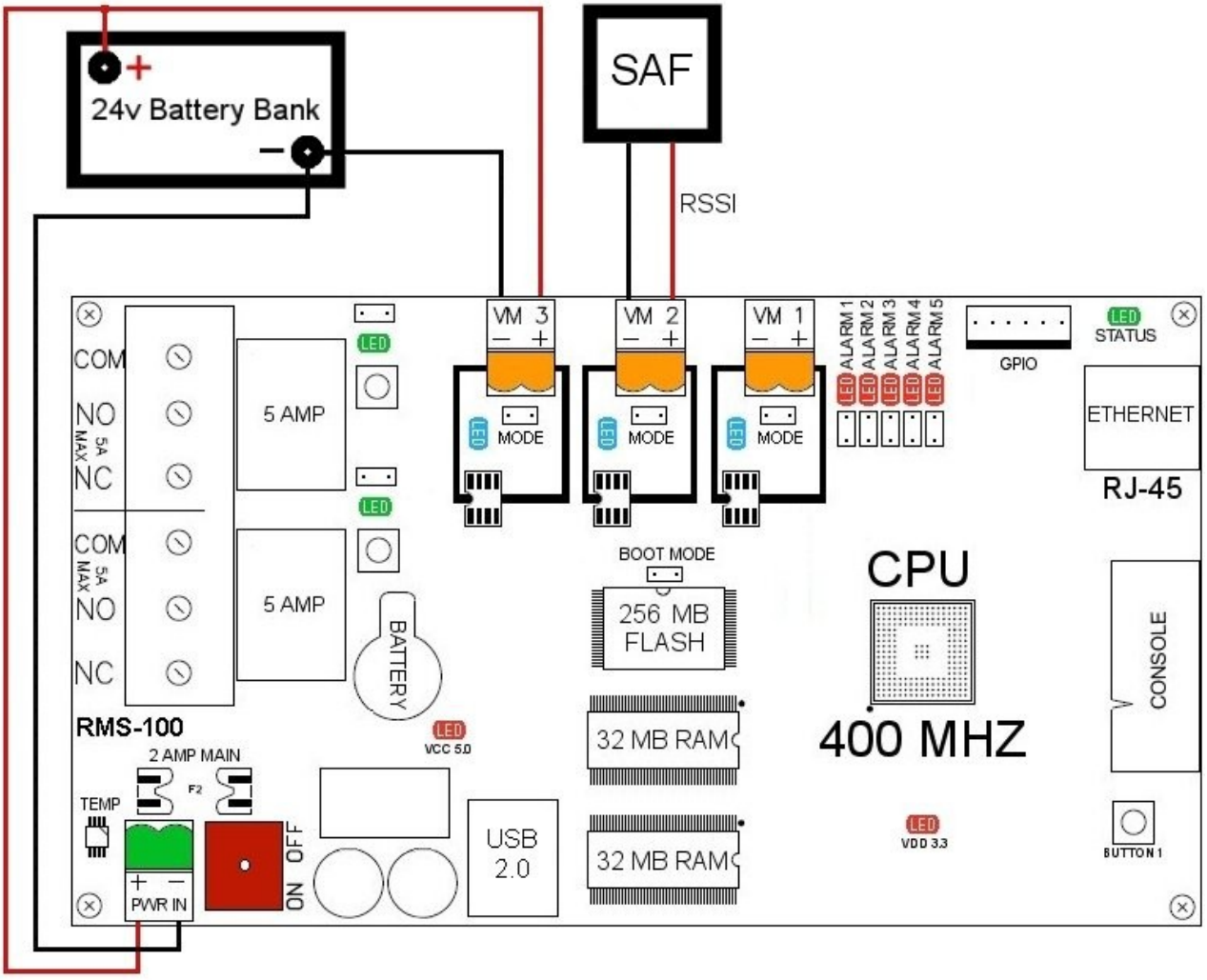


FIGURE 3

Basic installation example 3

Turning Devices ON/OFF

To make any device remotely reset able, simply cut one of the wires in the power cord of a device. Attach one side of the cut wire to the COM terminal on one of the Power Relays. Attach the other side of the cut wire to the NC (normally closed) terminal on the corresponding Power Relay. Reset your device at any time using **RMS-100**. Note: in the Normally Closed configuration, power still flows to your device even when the **RMS-100** device is turned off. Virtually any 1 to 240 volt AC or DC device can be turned ON/OFF remotely this way. The two small Power Relays can pass up to 5 amps each, the larger Power Relay up to 15 amps!. For devices that should be by default turned off, use the COM and NO (normally open) configuration. Figure 4 illustrates just one of the many ways you can set up devices for remote reset.

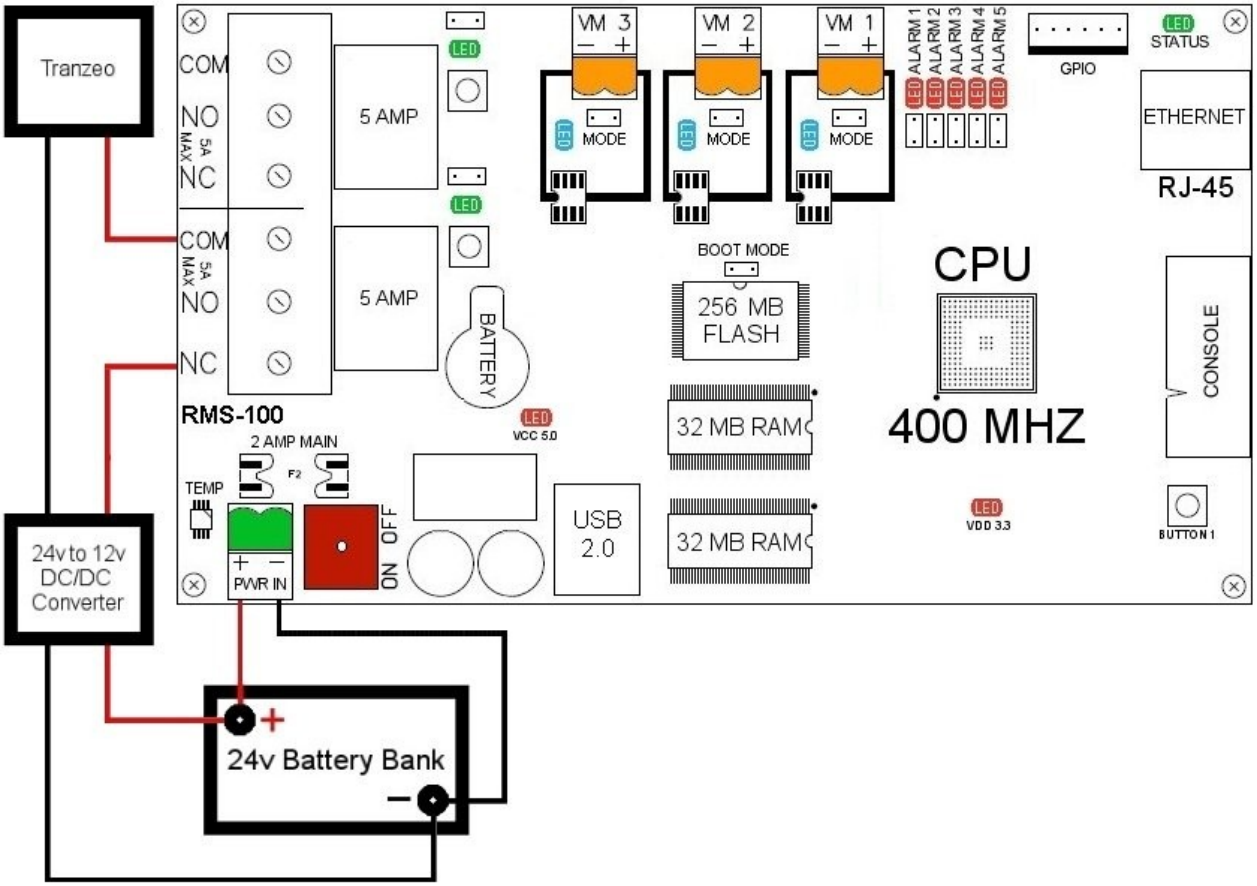


FIGURE 4

Basic installation example 4

Using the alarm pins to monitor door contacts

To give your equipment room some security you can use widely available common door contacts. These contacts allow current to flow through them when they are in close proximity with each other. **RMS-100** can sense when the contacts are together or apart. Program the alarm pins to send an email, run a custom file, and/or toggle a relay when the door gets opened. The diagram below (figure 5) shows how to use Alarm pin 5 to monitor door contacts.

Note1: the LED5 light is on when the contacts are together. This is the armed position.
Note2: each Alarm pin has a corresponding LED.

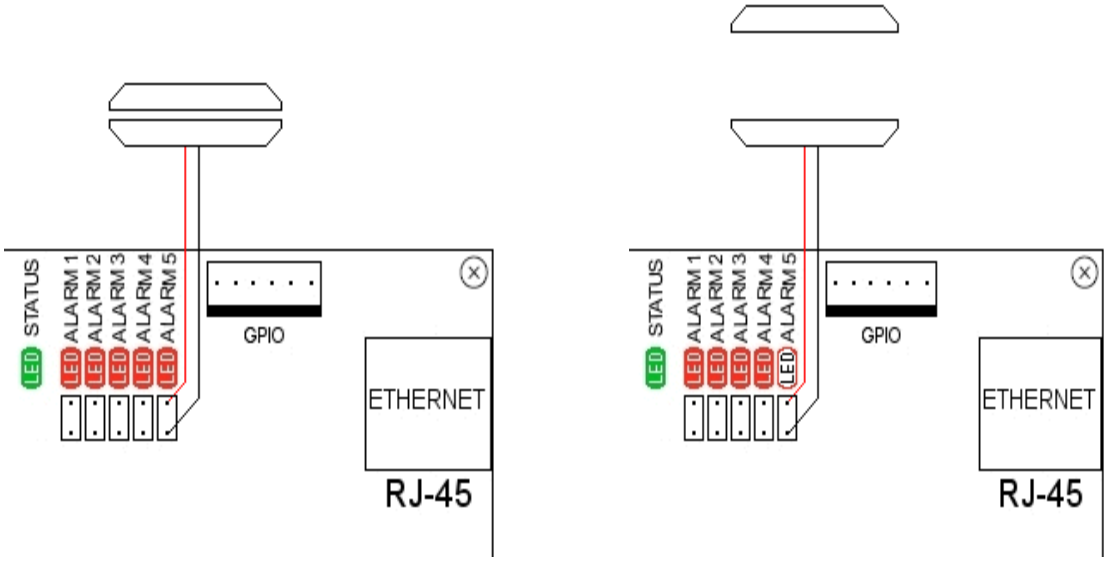


FIGURE 5

The Relays

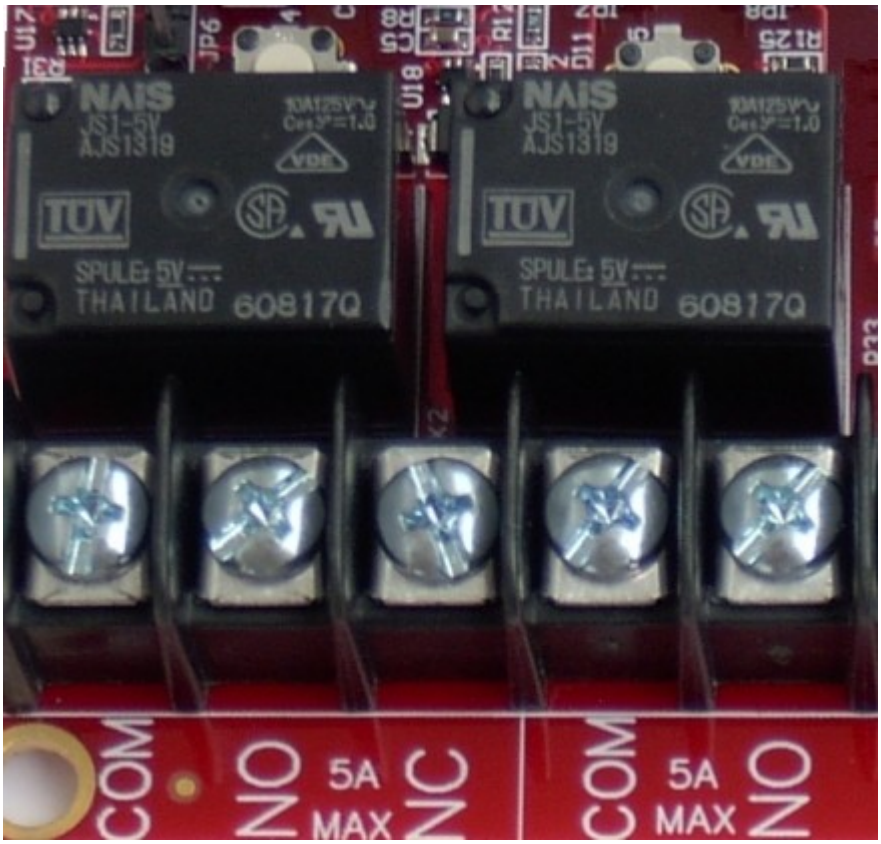
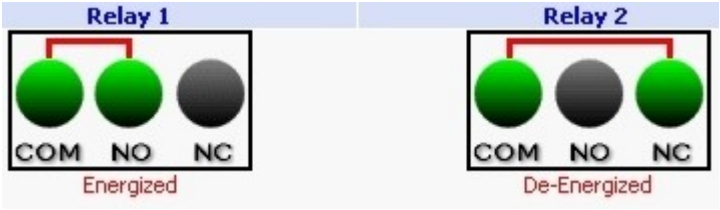


FIGURE 6

RMS-100 has two power relays for remote control of AC/DC powered equipment. Each relay has a manual override button that can toggle the relay; useful for on-site testing. Each relay also has a jumper shunt connector that allows the relay to be engaged manually for hands free testing.

Control of each relay can be done with a web browser. The picture below shows a portion of the **RMS-100** relays web interface. In the picture below all relays are in the default "Normally Closed" position. By clicking on the relay 1 icon…

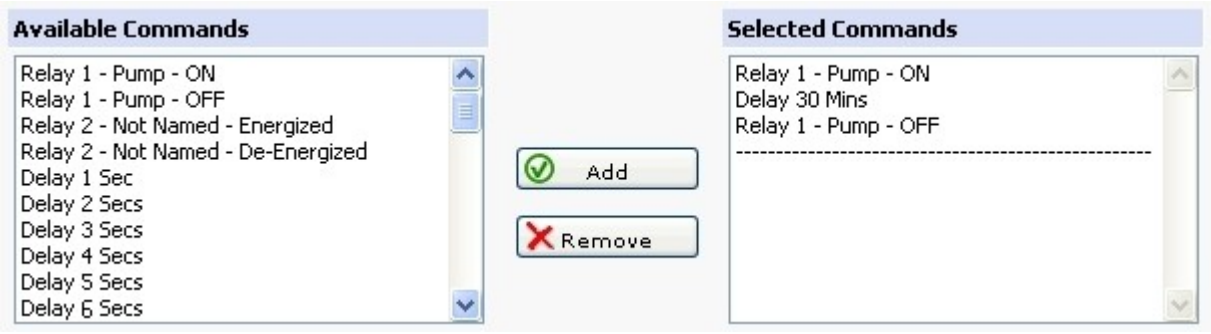
The relay will be toggled to the "Normally Open" position as shown below.



The relays can also be toggled with **RMS-100** relay Scripts. Relay scripts are made up of simple commands that control the relays. Complex relay actions can be performed to control your equipment. For example; starting a generator.

Below is a screen shot of making a relay script to toggle relay 1 on, wait 2 seconds, then toggle relay 1 off again.

Each relay can have a name and its actions defined. Below is a screenshot of a relay script that turns a pump on for 30 minutes and then turns it off again.



Control of the **RMS-100** relays can also be done by using telnet or ssh. Below is an example of using the **rmsrelay** command to toggle relay 1 on and off.

```
# rmsrelay


**************************************
*                                    *
*     RMS-100 Relay Control Program  *
*                                    *
* Example Usage for Built in Relays: *
*                                    *
* rmsrelay # on                      *
* rmsrelay # off                     *
* # can be from 1 to 2               *
*                                    *
* Example Usage for the Relays on a  *
* USB Relay Daughter Board:          *
*                                    *
* rmsrelay rdb device rly# on        *
* rmsrelay rdb device rly# off       *
*                                    *
* rdb means use external relays.     *
* device is usually:                 *
* /dev/usb/hiddev0 to /dev/usb/hiddev15 *
* rly# can be from 1 to 5            *
*                                    *
**********************************SirDan

# rmsrelay 1 on
Relay 1 On
# rmsrelay 1 off
Relay 1 Off
#
```

Below is an example of reading the status of Relay 1 using the command line interface. Note the relay1, relay2, and relay3 file will contain a "0" when the relay is in the "Normally Open" position, and will contain a "1" when in the "Normally Closed" position.

```
#
# cat /var/rmsdata/relay1
1
#
```

An example of running a relay script on the command line using the **rmsscript** program. The example below runs relay Script 1.

```
# rmsscript

**************************************
*                                    *
* Usage Example:                     *
* rmsscript 1,2,                     *
* would execute script number 1,     *
* and then script number 2           *
*                                    *
* rmsscript 1,                       *
* would only execute script number 1 *
* Dont forget the ending dot,        *
*                                    *
*********************************SirDan
# rmsscript 1,
# Executing relay Script ID 1 Name: Relay Test
Relay 1 On
Relay 2 On
Relay 1 Off
Relay 2 Off
relay Script ID 1 has been executed!
#
#
#
```

PHP programmers may want to write their own programs to control the relays. Below are two example PHP functions that use the PHP system command to turn relay 1 on and off.

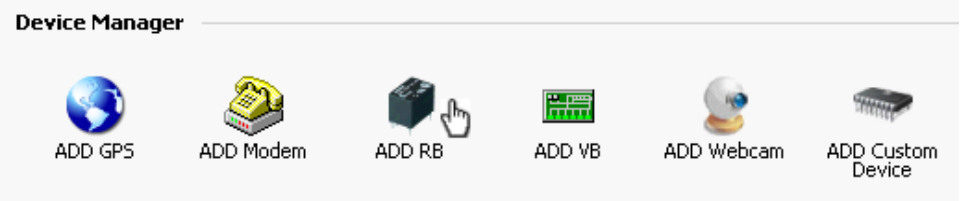
```
<?php
# EtherTek Circuits 2001 - 2010

#************************
#* Relay 1 ON Function       *
#************************
function relay1on()
{
system("/bin/rmsrelay 1 on");
}

#************************
#* Relay 1 OFF Function        *
#************************
function relay1off()
{
system("/bin/rmsrelay 1 off");
}
?>
```

Need More Relays?

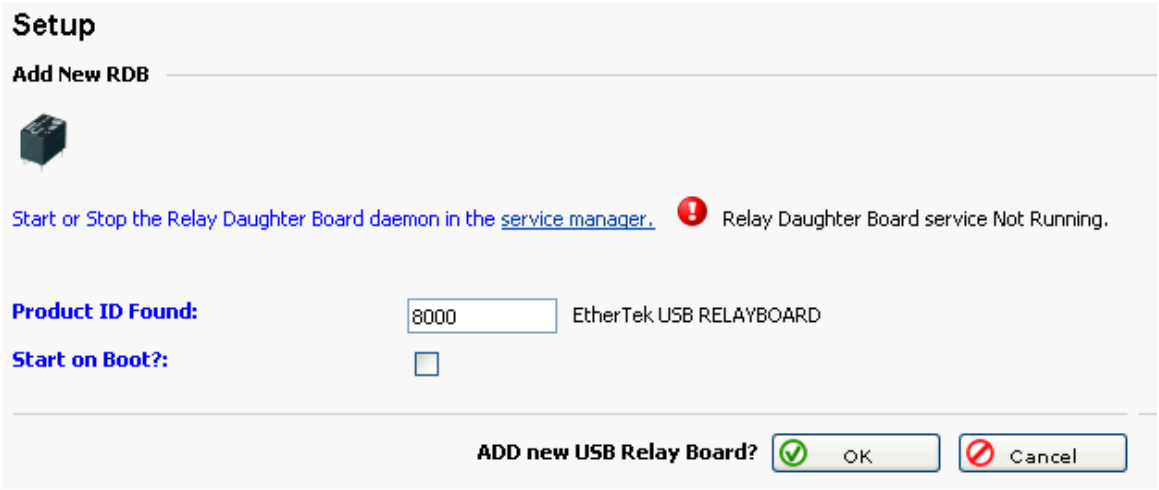
If the two on board relays on the **RMS-100** board are not enough for your needs, you can add five additional relays by adding a USB relay board.

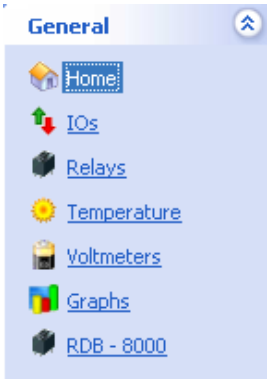
The USB Relay Board gives you control of 5 SPDT relays for general purpose use via the standard USB Bus. See the USB Relay Board user manual for additional information on how to hook up the USB Relay Board to your **RMS-100**, **RMS-200** or **RMS-300** unit.

To access the Relay Daughter Board interface, go to the Device Manager and click on the USB Relay Board Icon shown below.

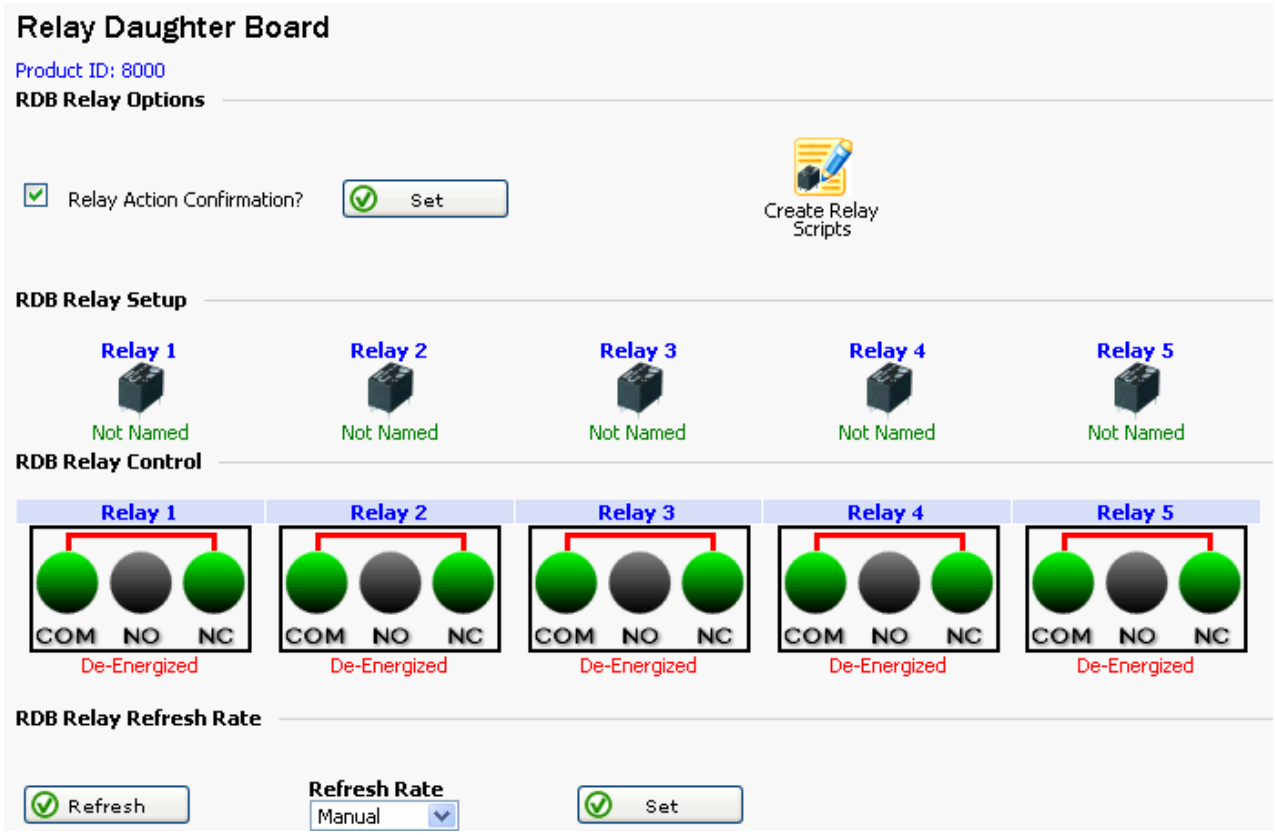


Below is the USB Relay Board setup interface. The **RMS-100** will automatically detect any USB Relay Boards found. Here you can select which Relay Daughter Board you want to work with. Decide if you want the USB Relay Board to start when the **RMS-100** system is booted, then click OK.



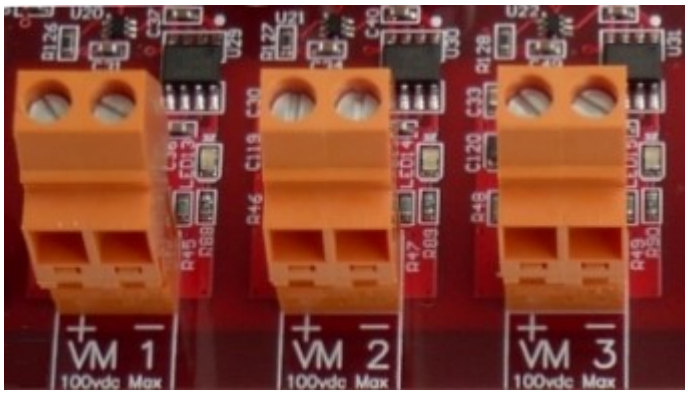


When a USB Relay board has been selected, an icon in the left navigation bar will appear. Clicking on the USB Relay Board icon will take you to the setup page for the selected USB Relay Board.



This page shows at a glance the status of each relay and provides a gateway for more relay options. To refresh the web page you can press the Refresh button. To have the web page automatically refresh, set the refresh rate.

The Voltmeters



Each voltmeter is capable of measuring up to ±100 VDC with 24-bit accuracy. Each voltmeter has its own 24 bit Delta Sigma ADC. The data and power lines for each voltmeter are isolated with a chip-scale air core transformer. This enables each voltmeter to measure different DC voltage sources without any effect on the main board or other voltages.

This technology enables the ability to measure (but not limited to):

- positive and negative voltages
- separate power sources
- individual batteries in a battery bank
- shunt voltages for equipment that may be drawing or generating power.
- solar panel voltage and amperage
- wind turbine voltage and amperage
- battery charger voltage and amperage

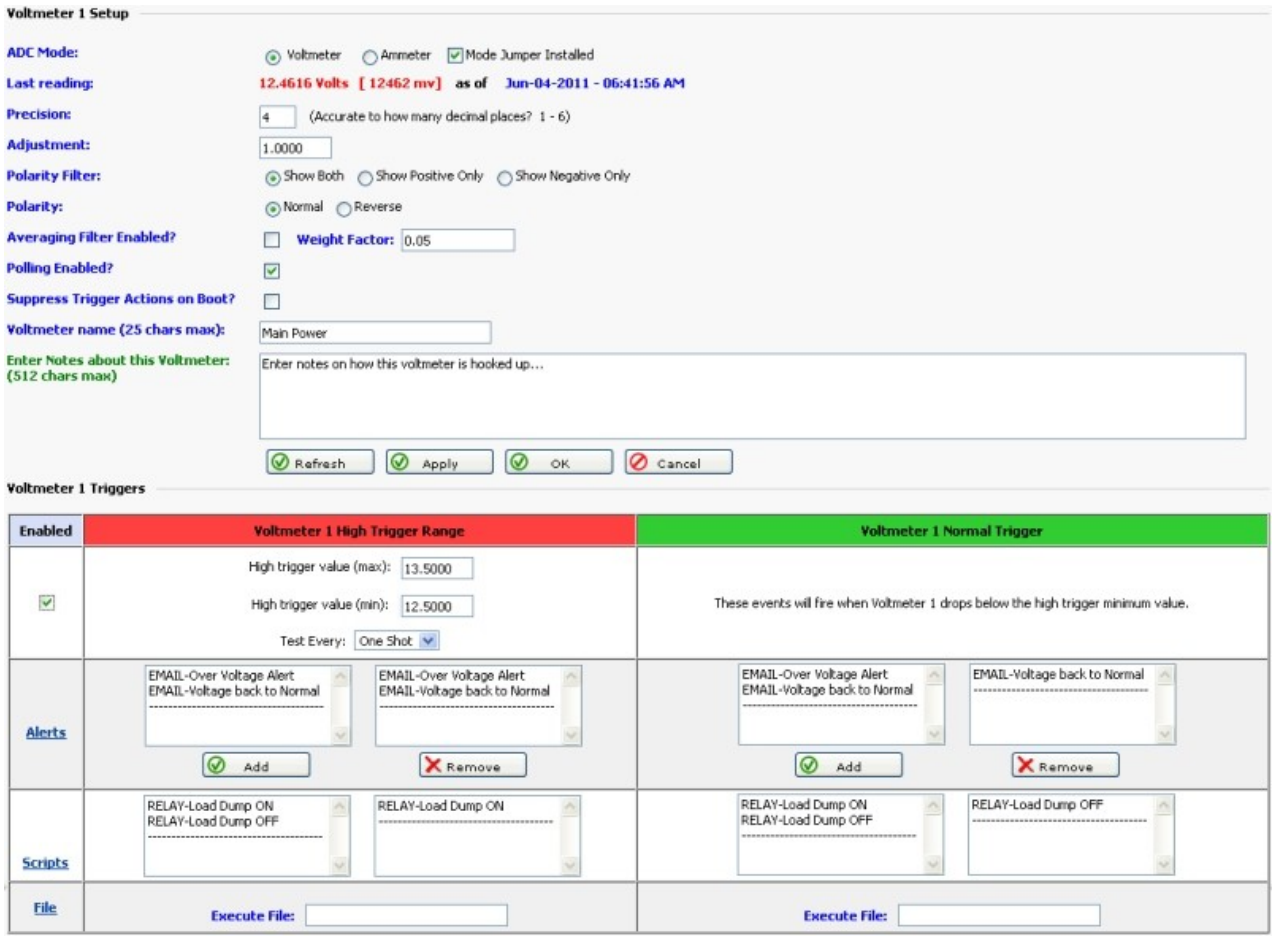
Each voltmeter has a Mode Jumper that when removed puts the voltmeter into low voltage mode. In this mode, the volmeter has a range of ± 2.0 VDC and has over 4 million steps. This is perfect for calculating amperage by measuring voltage drop across a current shunt.

Note 1: Voltmeters that have nothing hooked up to them so that the positive and negative inputs are floating may read spurious positive and negative voltage readings, this is normal. You may dampen the voltage reading by sacrificing accuracy using the precision box. Use a number between 2 and 6 to increase or decrease the decimal place.

Note 2: Due to variations in components and the manufacturing process, voltmeter readings may differ slightly from each other and from your hand held DVM. Use the adjustment box to fine tune the voltmeter to display the expected value.

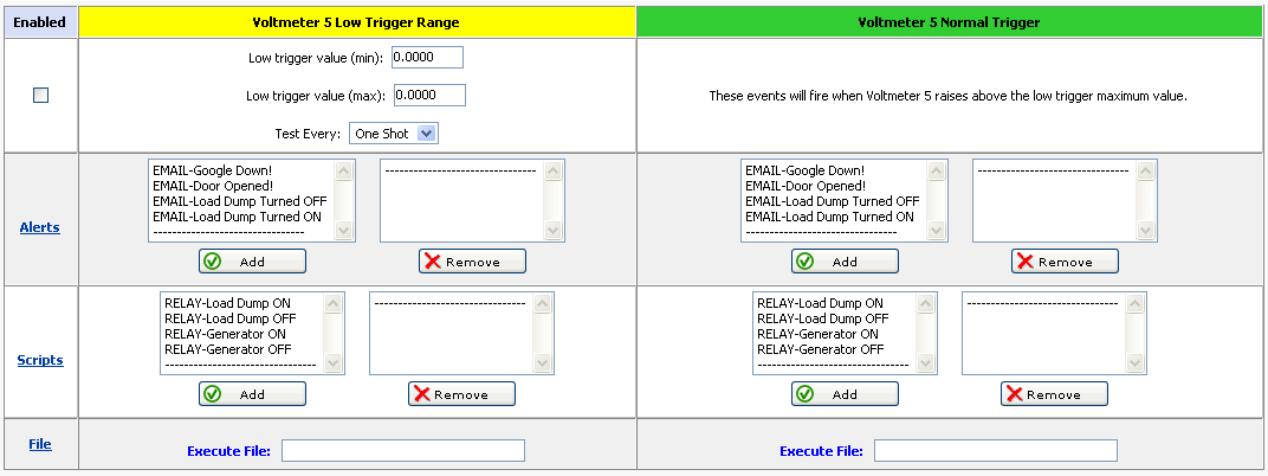
Below is a screen shot of the **RMS-100** voltmeter overview page. This page shows at a glance all voltmeter readings and provides a gateway for more voltmeter options. In the screen shot below voltmeter 1 is displaying a positive reading of a 12v battery bank. Voltmeter 2 is in ammeter mode, it is measuring the charge going into the battery bank via a 50 millivolt / 50 amp current shunt (more on using shunts below). Voltmeter 3 is measuring the output of a negative 24 volt power supply. Note: A green bar graph indicates positive voltage, a red bar graph indicates negative voltage. To refresh the web page you can press the Refresh button. To have the web page automatically refresh, set the refresh rate. The graphs button takes you to a page displaying voltage or amperage readings.

Clicking on one of the voltmeter icons will bring you to the setup page for that particular voltmeter.



Here you can enter setup information like a name and notes for this voltmeter. The precision box is used to set how many decimal places to display, valid choices are between 2 and 6. The adjustment box is used to fine tune the voltmeter to match your DVM reading. The Polarity Filter will allow both positive and negative, positive only, or negative only readings. The Averaging Filter is used to smooth out the voltage readings. The “Suppress Trigger Actions on Boot” check box is used to stop actions from happening when the RMS-100 board is warm or cold started. Each voltmeter has a High, Normal, and Low trigger range. Each High and Low trigger range has a maximum and minimum value. The range in between the maximum and minimum value acts like a dead band area. Triggers can be set to fire alerts or scripts when the voltage is either too high or too low. The High Trigger is used when the voltage rises above the High Trigger maximum value. The Normal Trigger is used when the voltage falls below the High Trigger minimum value. The “Test Every” box is used to select how often the condition should be tested and acted upon. Each voltmeter trigger can also execute a custom file stored on the RMS-100 board.

Below is the Low Trigger interface. The Low Trigger is used when the voltage falls below the Low Trigger maximum value. The Normal Trigger is used when the voltage rises above the Low Trigger minimum value.

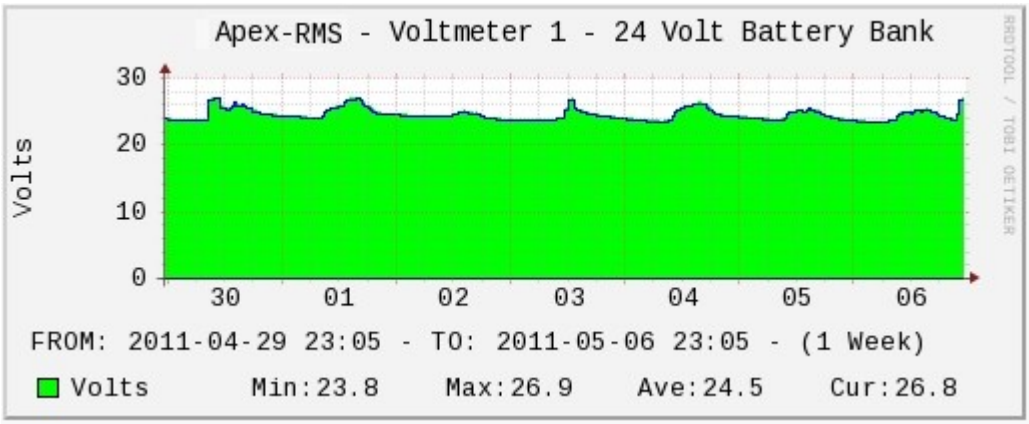


Below is an example of reading the voltmeters on the command line. The voltmeter data files can be found in the /var/rmsdata/ directory. Note: the voltmeter readings are stored in files. Voltmeter 1's storage file is called vm1. Voltmeter 2's storage file is called vm2 etc.

```
# cat /var/rmsdata/vm1
12.829453
#
# cat /var/rmsdata/vm*
12.829380
0.000019
-25.241156
#
#
#
```

Voltmeter Graphs

Each voltmeter has corresponding graphs associated with it. Below is a graph showing volts over a 1 week period. Day, week, month, and year graphs are available.

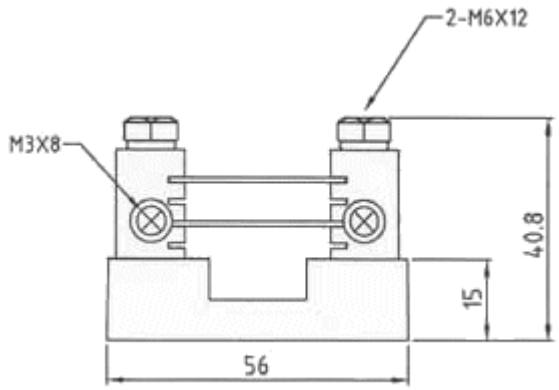


If you are managing a remote battery powered site, knowing your battery voltage is vital. It is also a key thing to know how much charging you are putting back into your batteries, and how much power is being consumed by your equipment. It is also a key thing to know how much charging you are putting back into your batteries. Using a common shunt, it is possible to obtain a millivolt reading that relates to an amperage reading. The voltmeters on the **RMS-100** board are perfect for this as they are very sensitive and can easily read millivolt readings. For greater accuracy, put the **RMS-100** voltmeters in to low voltage mode by removing the mode jumper for a particular voltmeter. Removing the mode jumper decreases the voltage range to +/- 2.0 volts and increases the granularity for increased accuracy when measuring millivolt values.

A word on shunts.

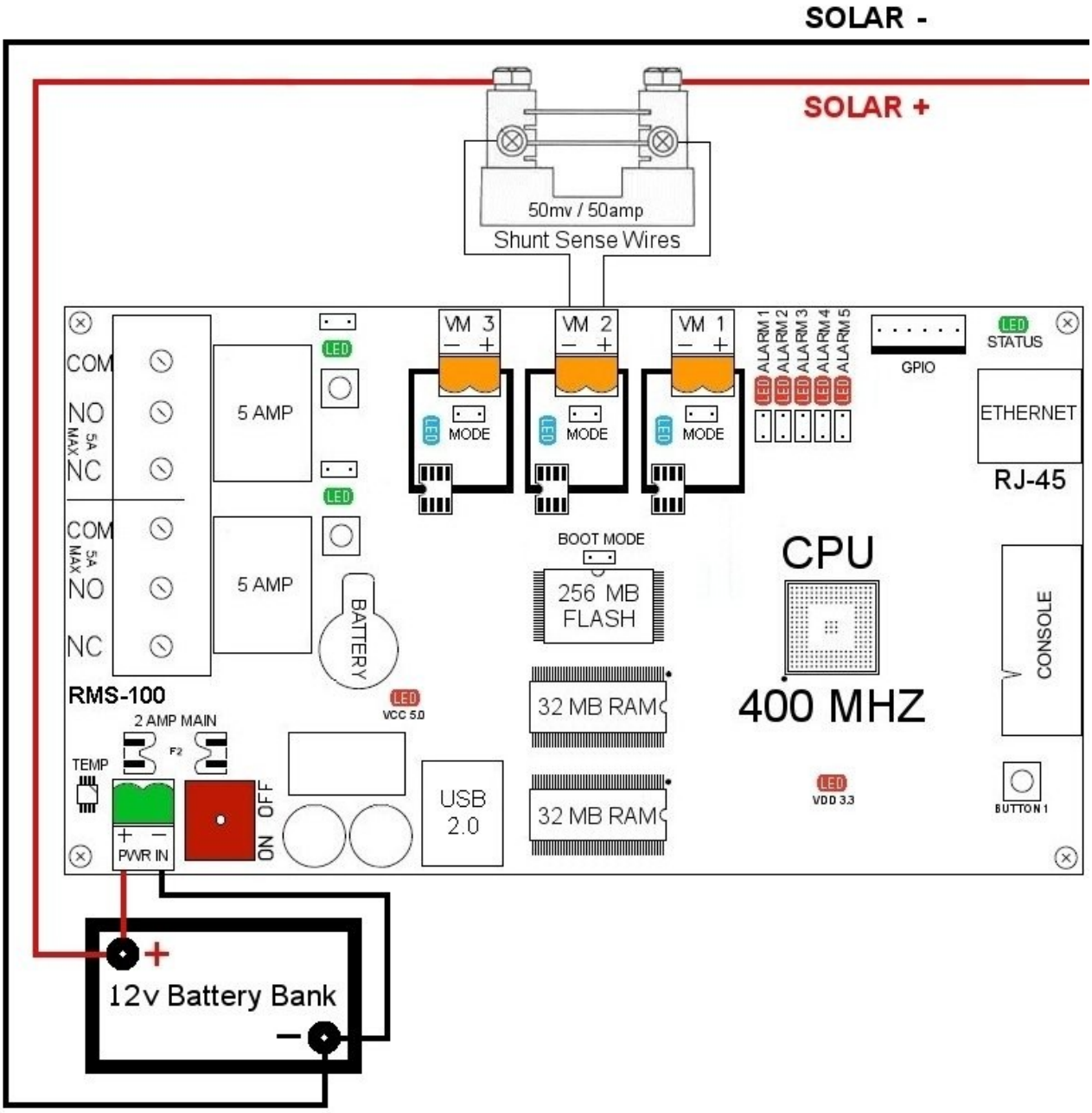
Shunts are defined as a resistive load through which electricity is diverted. Often the resistance of a shunt is known precisely and is used to determine amperage by measuring the voltage across it and using Ohm's law (I = V/R). It also allows high current measurements with low-current equipment. Some popular shunts are 50mv/50amp and 100mv/100amp. The relationship between the millivolt reading and the current going through the shunt makes figuring out the amperage easy. For example, in the case of the 50mv/50amp shunt: if you had 50 amps of charging going through the shunt then the millivolt reading would be 50mv. If you had 25 amps of charging going through the shunt then the millivolt reading would be 25mv etc etc. When measuring current over 100 amps, continuous operating current should not exceed 2/3 ammeter shunt rating. To ensure proper operation, the shunt temperature is in no way to exceed 145°C, as a permanent change in resistance will occur. For example, if continuous current for an application is 500 amps, the ammeter shunt rating should be no less than 750 amps. This applies to both 50 and 100 millivolt current drop shunts.

Below is a drawing of a 50mv/50amp shunt.



Below is an example diagram of how to use **RMS-100** with a shunt to measure charging from a solar panel array. The negative solar panel lead is connected to the battery negative terminal. The positive solar panel lead is routed to the positive battery terminal by way of a 50 millivolt 50 amp current shunt. From one side of the shunt there is a sense wire run to the negative input on VM3. From the other side of the shunt there is a sense wire run to the positive input on VM3.

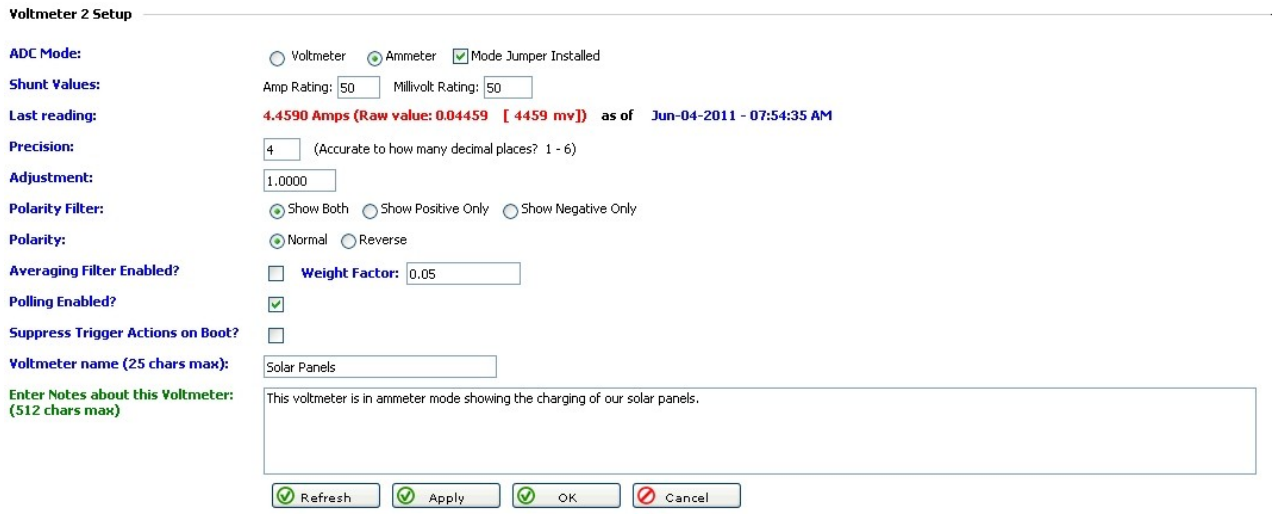
NOTE: Consult the Owners Manual or the Manufacturer of the equipment you are measuring to determine if there is any preference on which power wire the shunt should be hooked up to.



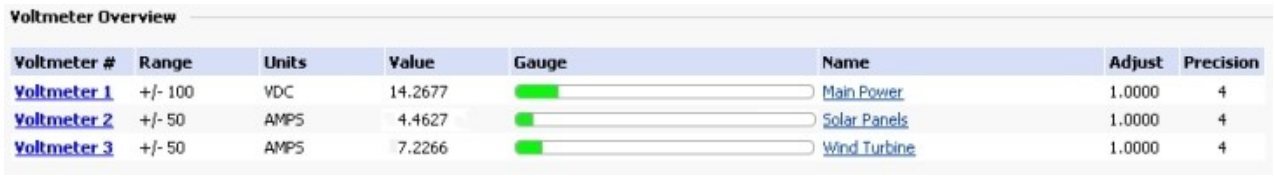
Below is a screen shot of how to setup Voltmeter 2 to act as an ammeter to show how much charging is going into the batteries from solar panels. First, put Voltmeter 3 into ammeter mode and click Apply. Next, enter valid shunt values (amperage rating, millivolt value), enter name and notes and then click Apply or click Ok.

Note: For increased accuracy, remove the mode jumper on the corresponding voltmeter. This

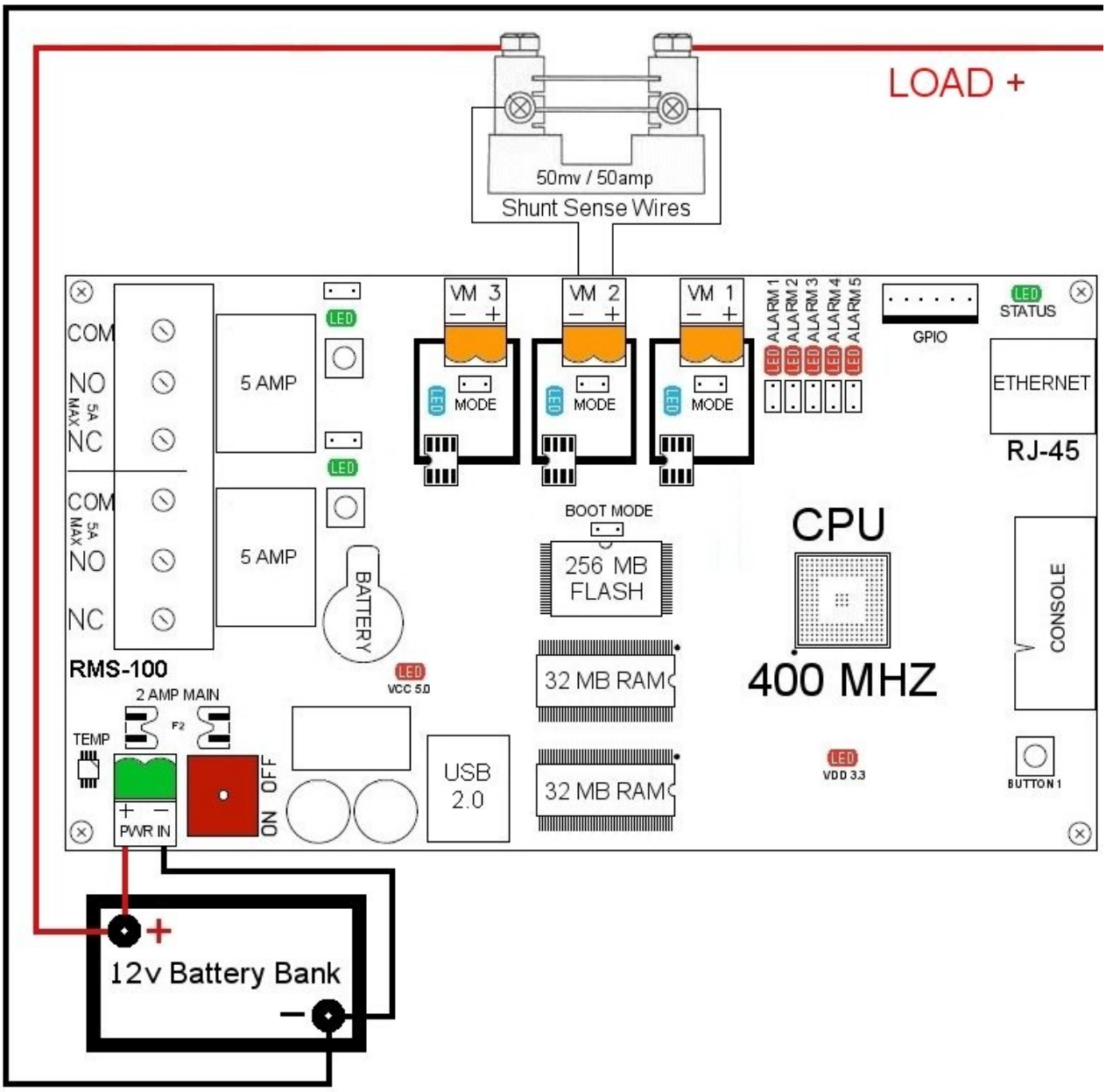
puts the voltmeter in low voltage mode, in this mode the maximum voltage must not exceed -2.0v to +2.0v.



If everything is hooked up correctly you should be able to see how much amperage is being put into your batteries. In the screenshot below the 12 volt main battery bank is being charged by both solar and wind. This technique can be used to measure DC current being put into your batteries by solar panels, a wind generator, or a battery charger. **RMS-100** can monitor your voltage and amperage remotely and alert you to dangerous battery conditions.



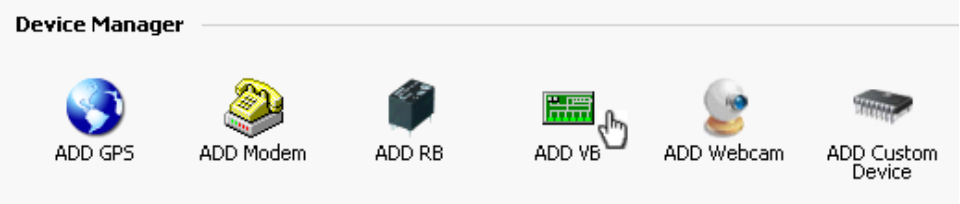
Below is an example of how to use **RMS-100** with a shunt to measure current draw from your equipment. The negative load wire is connected to the battery negative terminal. The positive wire is routed to the positive battery terminal by way of a 50 millivolt 25 amp current shunt. From one side of the shunt there is a sense wire run to the negative input on VM3. From the other side of the shunt there is a sense wire run to the positive input on VM3.**NOTE:** Consult the Owners Manual or the Manufacturer of the equipment you are measuring to determine if there is any preference on which power wire the shunt should be hooked up to.


LOAD -
LOAD +
50mv / 50amp
Shunt Sense Wires
COM
NO
NC
5A MAX
5 AMP
5 AMP
LED
VM 3
VM 2
VM 1
MODE
ALARM 1
ALARM 2
ALARM 3
ALARM 4
ALARM 5
GPIO
STATUS
ETHERNET
RJ-45
BOOT MODE
256 MB FLASH
CPU
400 MHZ
CONSOLE
BATTERY
RMS-100
VCC 5.0
2 AMP MAIN
F2
TEMP
PWR IN
ON OFF
USB 2.0
32 MB RAM
32 MB RAM
VDD 3.3
BUTTON 1
12v Battery Bank

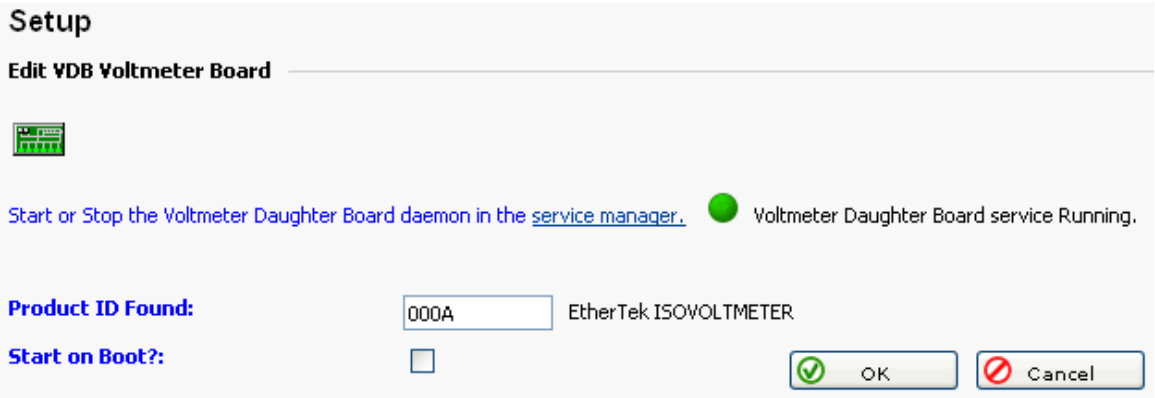
Need More Voltmeters?

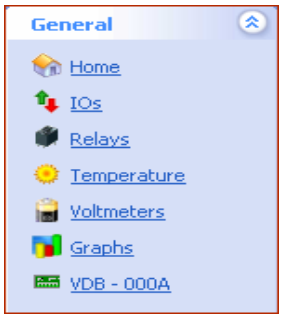
If the six on board voltmeters on the **RMS-100** board are not enough for your needs, you can add six additional isolated voltmeters by adding a USB isolated voltmeter board.

The USB Isolated Voltmeter Board gives you control of six +/- 100vdc isolated voltmeters via the standard USB Bus. See the USB Isolated Voltmeter user manual for additional information on how to hook up the USB Isolated Voltmeter Board to your **RMS-100**, **RMS-200** or **RMS-300** unit. To access the USB Isolated Voltmeter Board interface, go to the Device Manager and click on the USB Isolated Voltmeter Board Icon shown below.

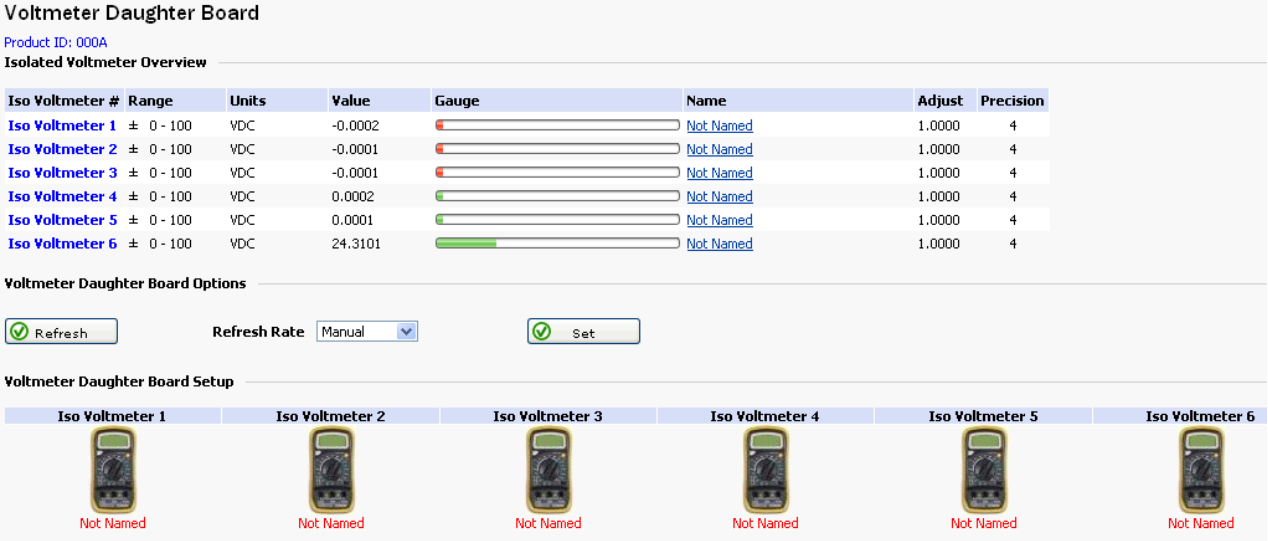


If a USB Isolated Voltmeter Board gets detected by the RMS-100 system, it will show up in the product ID box shown below. Decide if the USB Isolated Voltmeter board should be active when the RMS-100 board boots, then press the OK button to add an icon to the main left navigation bar



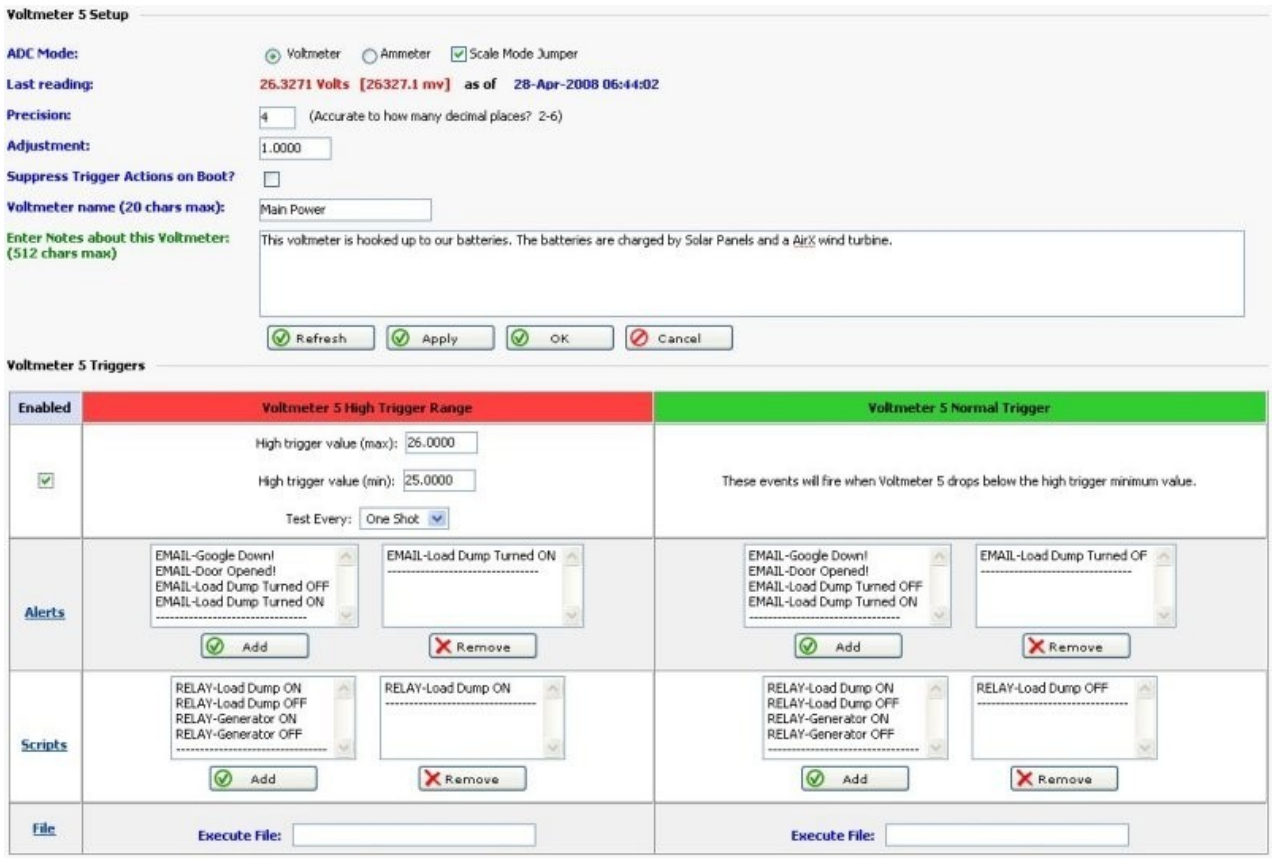


Clicking on the VDB icon in the left navigation bar takes you to the main setup page of the USB Isolated Voltmeter board. Below is a screen shot of the familiar voltmeter setup page.



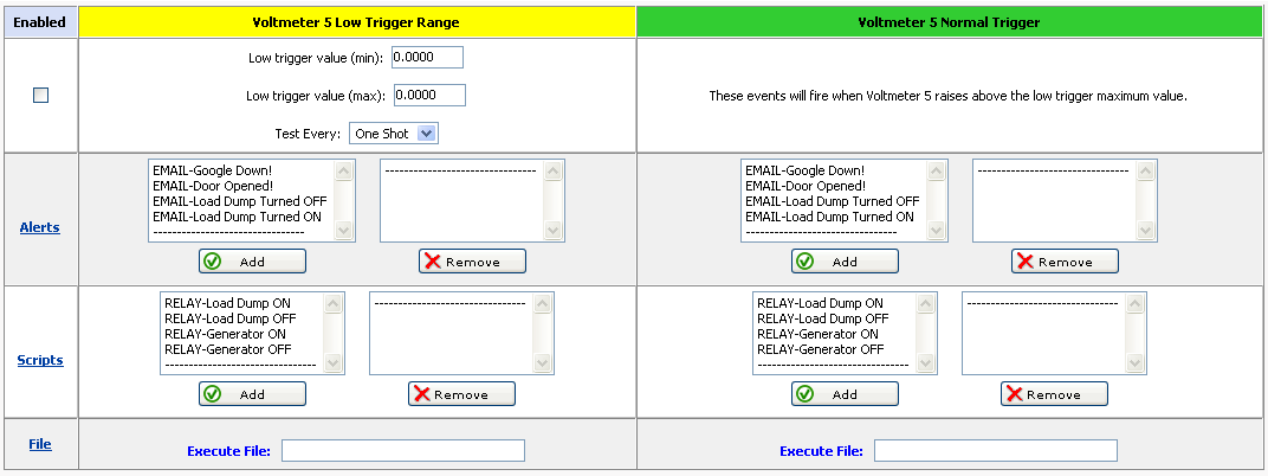
This page shows at a glance all voltmeter readings and provides a gateway for more voltmeter options. In the screen shot above voltmeter 6 is displaying a positive reading of a 24v battery bank. Note: A green bar graph indicates positive voltage, a red bar graph indicates negative voltage. To refresh the web page you can press the Refresh button. To have the web page automatically refresh, set the refresh rate.

Clicking on one of the voltmeter icons will bring you to the setup page for that particular voltmeter.



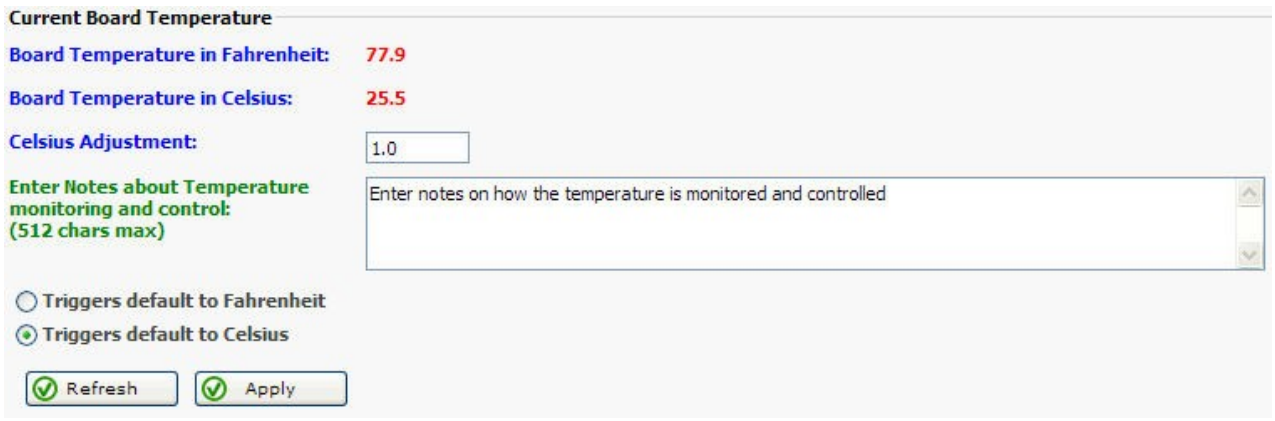
Here you can enter setup information like a name and notes for this voltmeter. The precision box is used to set how many decimal places to display, valid choices are between 2 and 6. The adjustment box is used to fine tune the voltmeter to coincide with your DVM. The “Suppress Trigger Actions on Boot” check box is used to stop actions from happening when the RMS-100 board is warm or cold started. Each voltmeter has a High, Normal, and Low trigger range. Each High and Low trigger range has a maximum and minimum value. The range in between the maximum and minimum value acts like a dead band area. Triggers can be set to fire alerts or scripts when the voltage is either too high or too low. The High Trigger is used when the voltage rises above the High Trigger maximum value. The Normal Trigger is used when the voltage falls below the High Trigger minimum value. The “Test Every” box is used to select how often the condition should be tested and acted upon. Each voltmeter trigger can also execute a custom file stored on the RMS-100 board.

Below is the Low Trigger interface. The Low Trigger is used when the voltage falls below the Low Trigger maximum value. The Normal Trigger is used when the voltage rises above the Low Trigger minimum value.

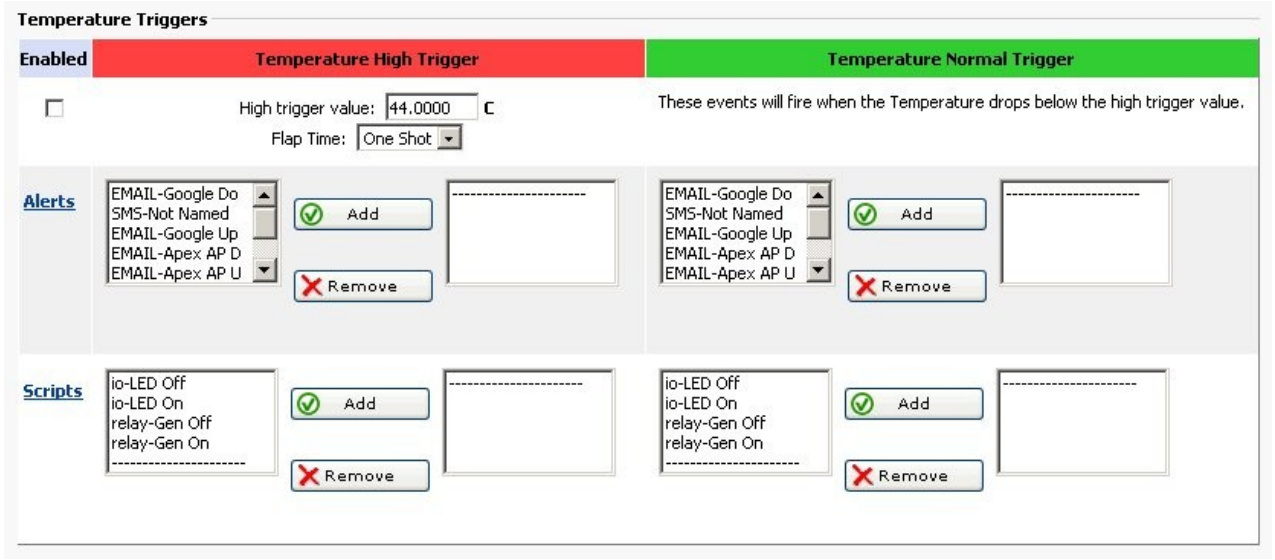


The Temperature

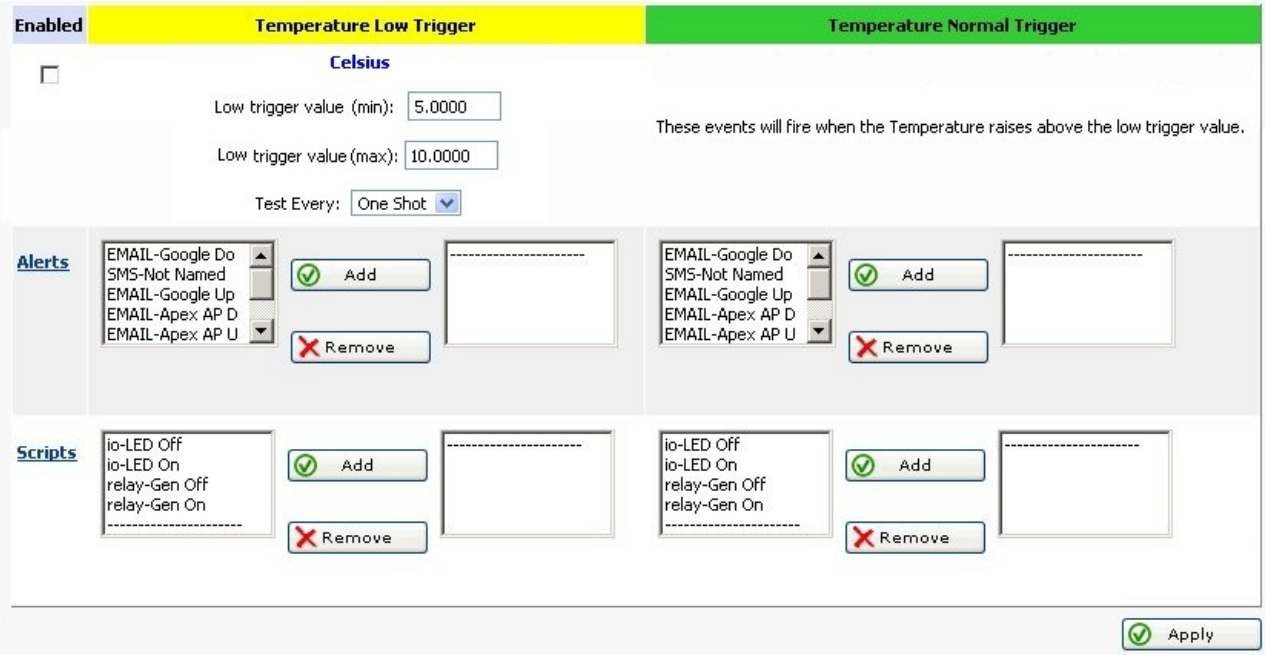
Below is a screen shot of the **RMS-100** temperature setup page. Preliminary setup steps are done in this area like entering notes and choosing the temperature format.



The **RMS-100** web interface has High and Low triggers that can be set to fire alerts or scripts when the temperature is either too high or too low. Use the relay scripts to turn on a cooling fan for example. The High Trigger is used when the temperature rises above the High Trigger value. The Normal Trigger is used when the temperature falls below the High Trigger value.



Below is the Low Trigger interface. The Low Trigger is used when the temperature falls below the Low Trigger value. The Normal Trigger is used when the temperature raises above the Low Trigger value.



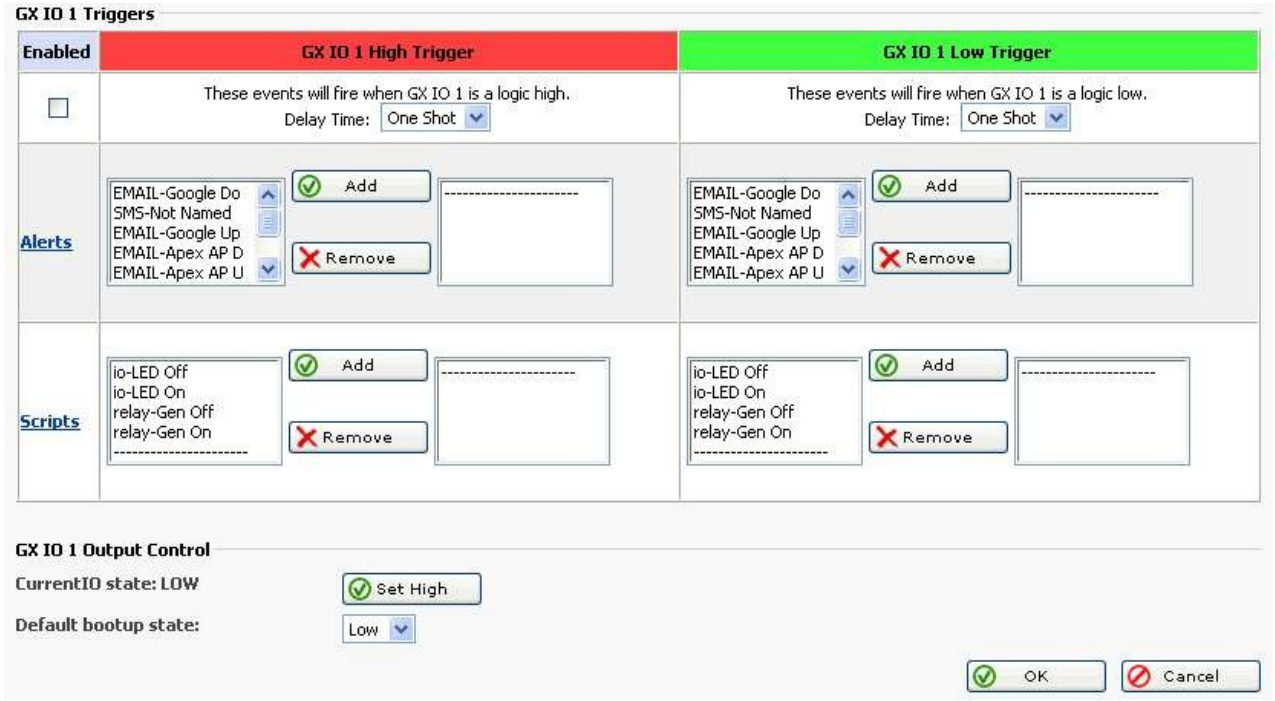
Below is an example of reading the temperature on the command line. **Note:** the file tempf contains the board temperature in Fahrenheit. The file tempc contains the board temperature in Celsius.

```
# cat /var/rmsdata/tempf
82.4
# cat /var/rmsdata/tempc
28.0
#
```

The I/O Pins and Push Buttons

Below is a screen shot of the **RMS-100** I/O overview page. Here you can choose which of the boards Alarm or I/O pins to control. **RMS-100** has 5 dedicated Alarm Pins that have a corresponding LED. Use them with common door contacts to monitor entry points. **RMS-100** also has 4 general purpose pins that can be set as Inputs or Outputs. These multi purpose I/O pins can be controlled or read from either the web page interface or a command shell. **RMS-100** also has 1 micro push button that has special attributes when the **RMS-100** board is booting. After the **RMS-100** board is finished booting the button is free for you to use for controlling your devices.

Below is a screen shot of the **RMS-100** I/O setup page for GPIO 1. GPIO pins can be configured to be 3.3 volt Inputs or Outputs. Use these pins to control any manner of devices, or sense condition changes and react with alerts or scripts.



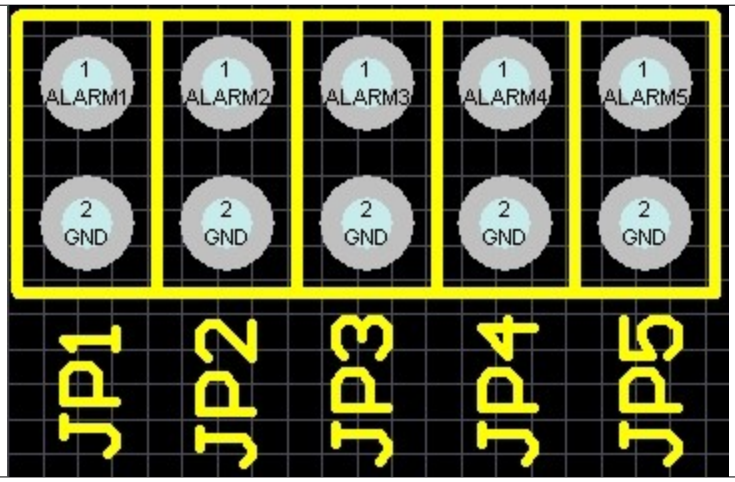
GPIO

Below is a pinout diagram of Con 8 on the **RMS-100** board. These are 3.3 volt general purpose I/O pins.

Note: Pin 1 is VDD (3.3 volts). Pin 2 is General Purpose I/O pin 1. Pin 3 is General Purpose I/O pin 2. Pin 4 is General Purpose I/O pin 3. Pin 5 is General Purpose I/O pin 4. Pin 6 is GND.	

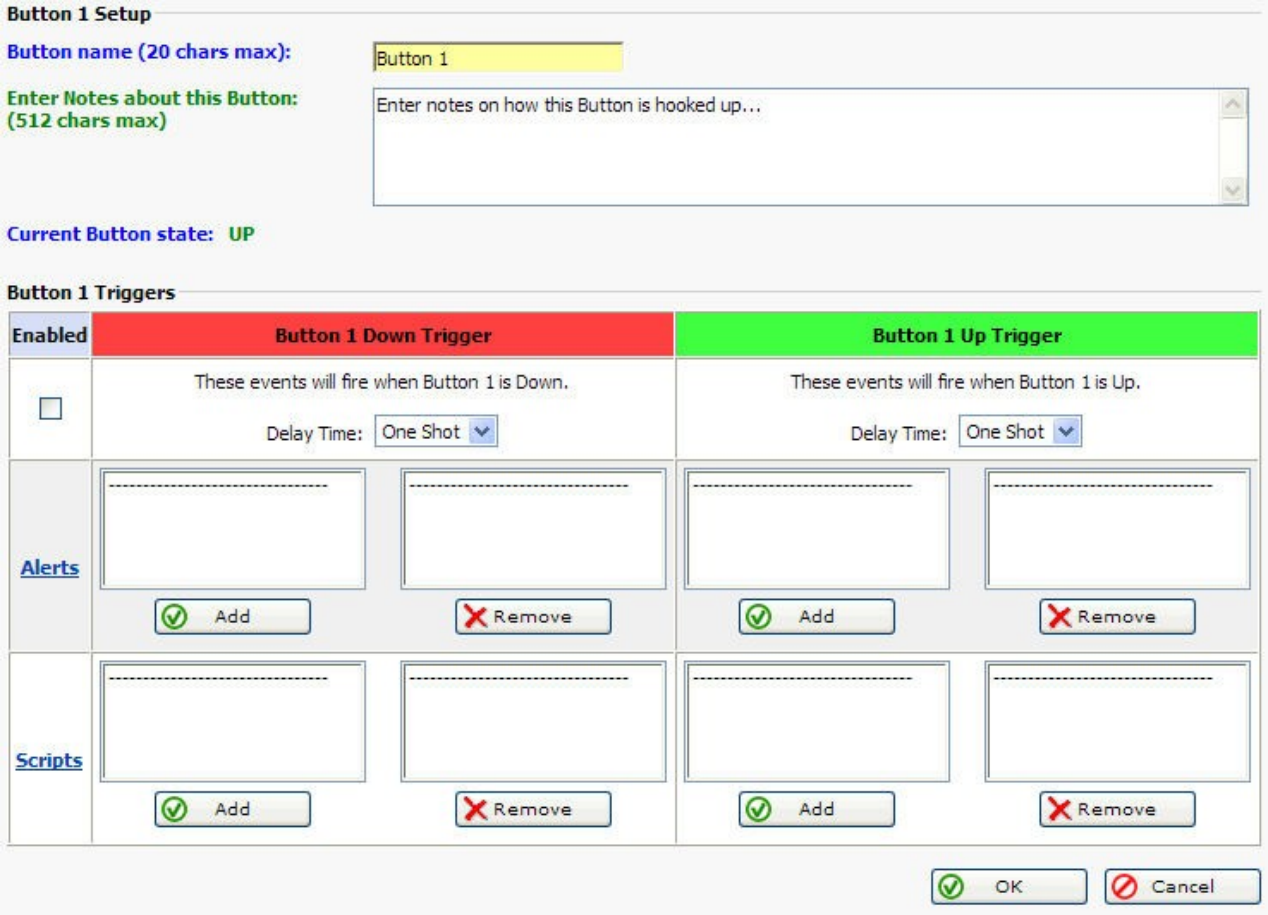
ALARMS

Below is a pinout diagram of the Alarm pins on the RMS-100 board. These input pins are pulled up to 3.3 volts.

Note: JP1 - Pin 1 is Alarm input 1. Pin 2 is GND. JP2 - Pin 1 is Alarm input 2. Pin 2 is GND. JP3 - Pin 1 is Alarm input 3. Pin 2 is GND. JP4 - Pin 1 is Alarm input 4. Pin 2 is GND. JP5 - Pin 1 is Alarm input 5. Pin 2 is GND.	

PUSH BUTTON

Below is a screen shot of the **RMS-100** Push Button 1 setup page. Use these buttons to manually control devices, or use them for onsite testing of alerts or scripts.



Button 3 Note:

When the **RMS-100** is booting up it first checks to see if Button 1 is being held down. If Button 1 is held down then all of the configuration files in /etc are re-written bringing the **RMS-100** unit to a factory default condition.

Button General Note:

When the **ALARM LEDS** on the **RMS-100** board perform a flashing sequence, the Linux OS has fully booted and normal button operation can commence.

USB Support

CAMERAS

RMS-100 uses the UVC driver that supports a wide variety of USB web cameras. These inexpensive cameras come in handy to passively monitor things like door ways, fuel gauges, LCD displays, etc.

USB to SERIAL

RMS-100 has built in USB to Serial converter drivers. Support for “generic type” and USB to Serial converters that use the “Prolific” chipset.

USB WIRELESS

RMS-100 uses the RayLink wireless device driver. Some USB wireless devices such as the Dlink USB stick have been tested giving RMS-100 an alternative path to the internet.

GENERAL USB SUPPORT

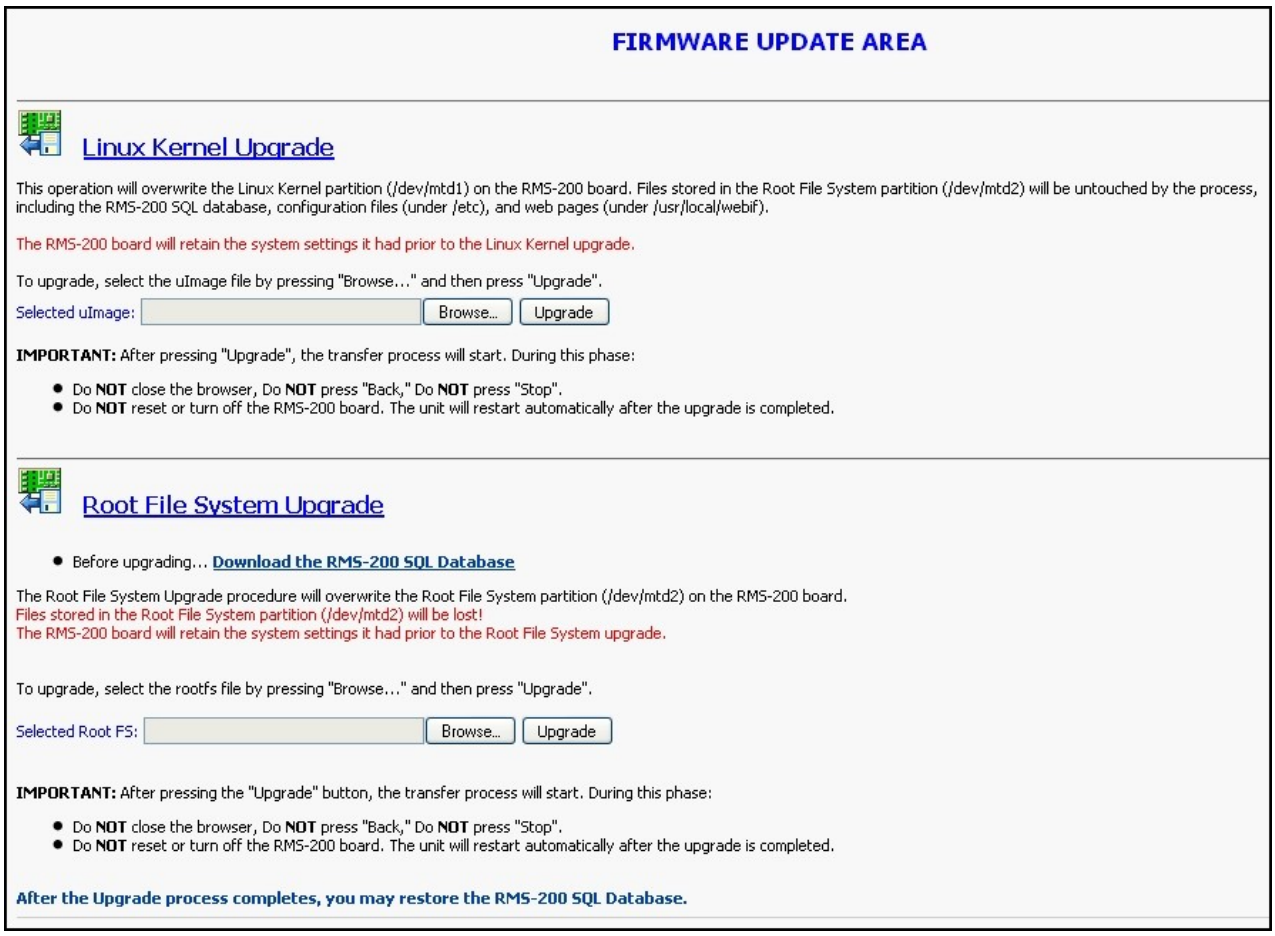
RMS-100 supports a wide variety of USB devices. Check with us to find out if your USB device can be made compatible with RMS-100.

Firmware Upgrades

Please visit http://www.remotemonitoringsystems.ca/rms200/firmware.php for the newest firmware revisions for your **RMS-100** board. There are two easy ways to upgrade the firmware on the **RMS-100** board. You may either choose the Web Browser based method or the FTP based method.

Web Based Upgrade

To perform a web browser based firmware upgrade, first download the latest Kernel or RootFS file from the firmware download area to your computer. Connect to the **RMS-100** board with your favorite web browser and click on the setup icon. When the setup page loads, click on the Firmware Upgrade icon to be taken to the screen below.



Decide which type of upgrade that goes with the firmware you downloaded and click on the appropriate browse button to locate the firmware image. When the firmware image is selected, click on the Upgrade button. After a time you should see similar output as below.

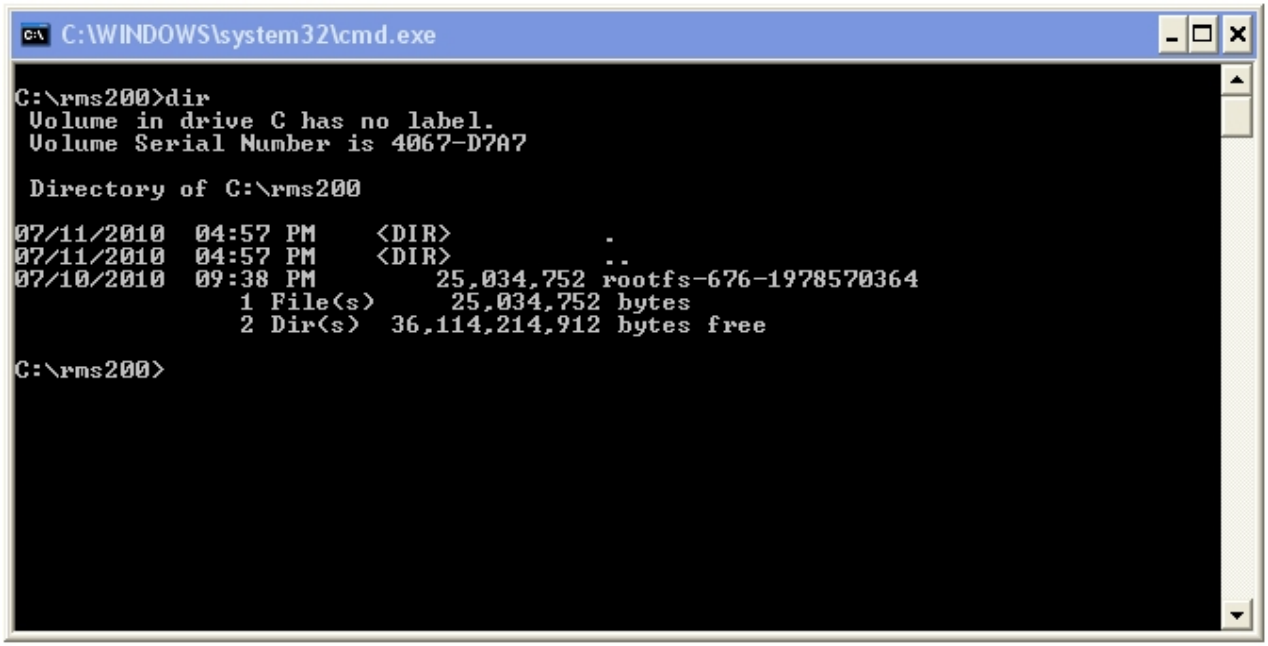
```
The file rootfs-RMS100-675-1182185503 has been uploaded

Starting Root File System Upgrade...

Stopping processes ...
Sending TERM signal ...
Most processes stopped.

Erasing 128 Kibyte @ 0 --  0 % complete. Cleanmarker written at 0.
Erasing 128 Kibyte @ 20000 --  0 % complete. Cleanmarker written at 20000.
Writing data to block 0
Writing data to block 20000
Checksum = 2020866943
File Stamp = 2020866943

Root File System upgrade complete....

The unit will now reboot.
To continue, please connect to the unit again.
There may be a short delay before the new connection is accepted.
This connection will now close.
```

When the firmware programming is complete, the **RMS-100** board will reboot with the new firmware image. Wait 45 seconds and then reconnect. When connection is reestablished you may configure the **RMS-100** board, upload your data base, add scripts etc.

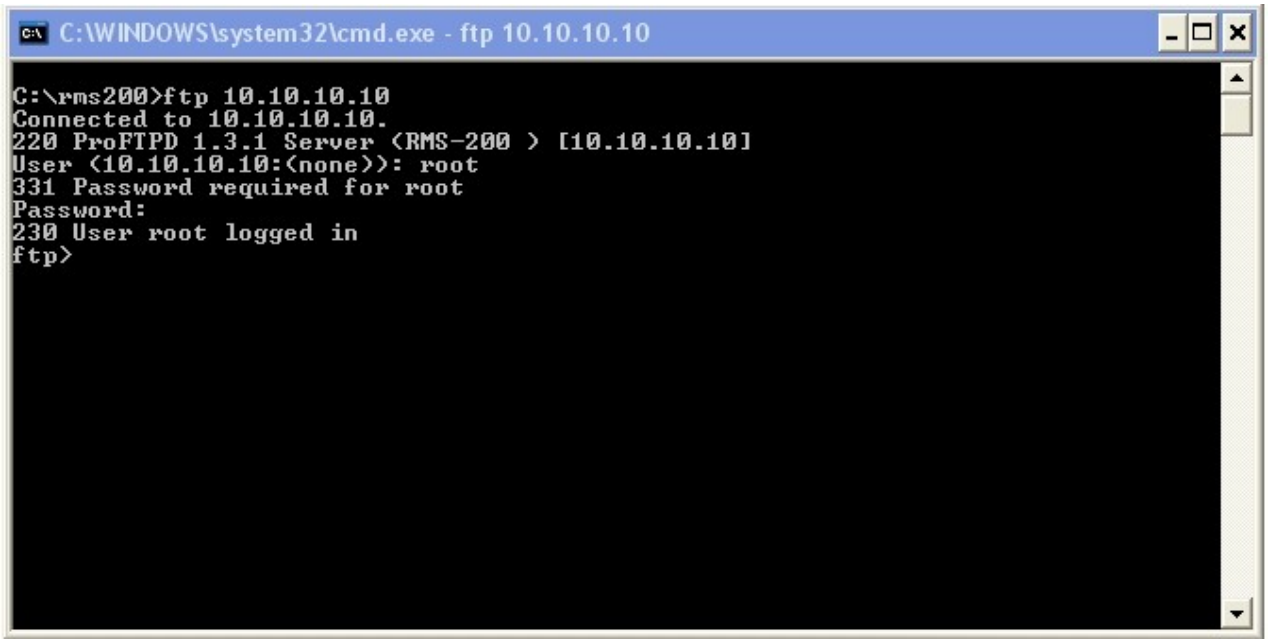
FTP Based Upgrade

To perform an ftp based firmware upgrade, first download the latest Kernel or RootFS file from the firmware download area to your computer. The examples below assume a computer running Windows, but the commands will be similar on any OS. The examples below assume a folder on the C:\ drive called RMS200 that contains the firmware that you would like to upload to your RMS-100 board. The example below assumes that the Telnet Server has been enabled on the RMS-100 board. In the example below a rootfs firmware upgrade is used.

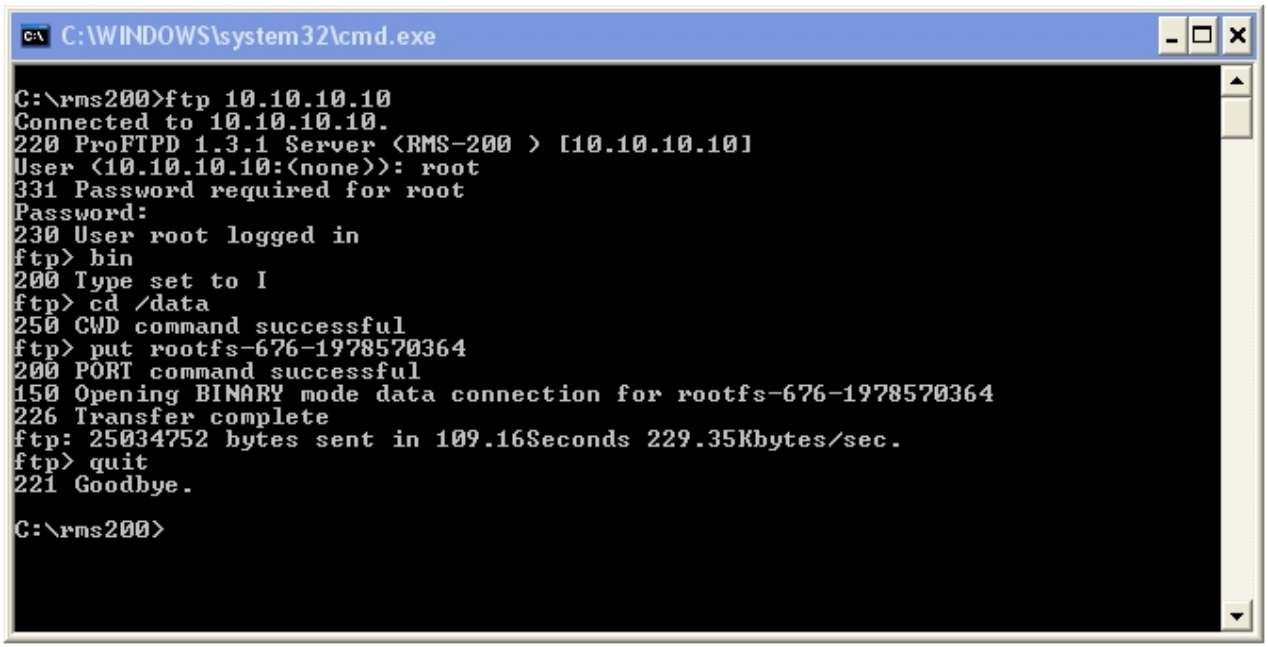
Open a Dos Box or Command Prompt box and change to the RMS200 directory, then type out ***dir*** and then press ***Enter***.



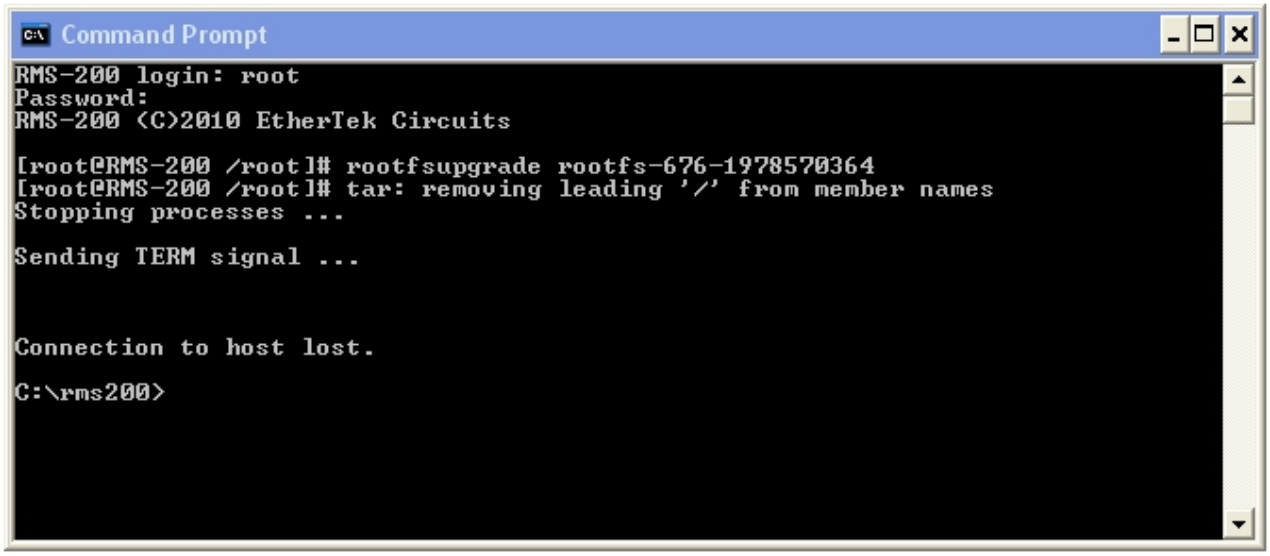
Log into your **RMS-100** board with the ftp command. The example below uses the default **RMS-100** ip address 10.10.10.10.



Once logged in, as shown below, type out ***bin*** and press ***Enter***. Next type out ***cd /data*** and press ***Enter***. Then type out ***put rootfs-RMS100-XXX-xxxxxxxxxx*** (where XXX is the firmware build number, and xxxxxxxxxx is the checksum), and press ***Enter***. The firmware will be uploaded to the RMS-100 board. When the upload is complete, type out ***quit*** and press ***Enter***.



Open a Dos Box or Command Prompt box and telnet to the RMS200 board, then type out ***rootfsupgrade rootfs-RMS100-XXX-xxxxxxxxxx*** (where XXX is the firmware build number, and xxxxxxxxxx is the checksum) and then press ***Enter:*** You should see similar output to what is shown below.



When the firmware programming is complete, the **RMS-100** board will reboot with the new firmware image. After 45 seconds you may reconnect to the **RMS-100** board and upload your data base, add scripts etc.

Downloads

Please visit http://www.remotemonitoringsystems.ca/rms200/downloads.php for current downloads such as SNMP mib file.

Specs

Base System 256Mb Flash / 64 Mb Ram

98ma @ 12.2v = 1.195 Watts

Relay power consumption:
relay1 add 42ma
relay2 add 42ma
Relay Total for all relays energized: 84ma @ 12.2v = 1.024 Watts

Bare Board = 98ma + 84ma for all relays = 182ma.

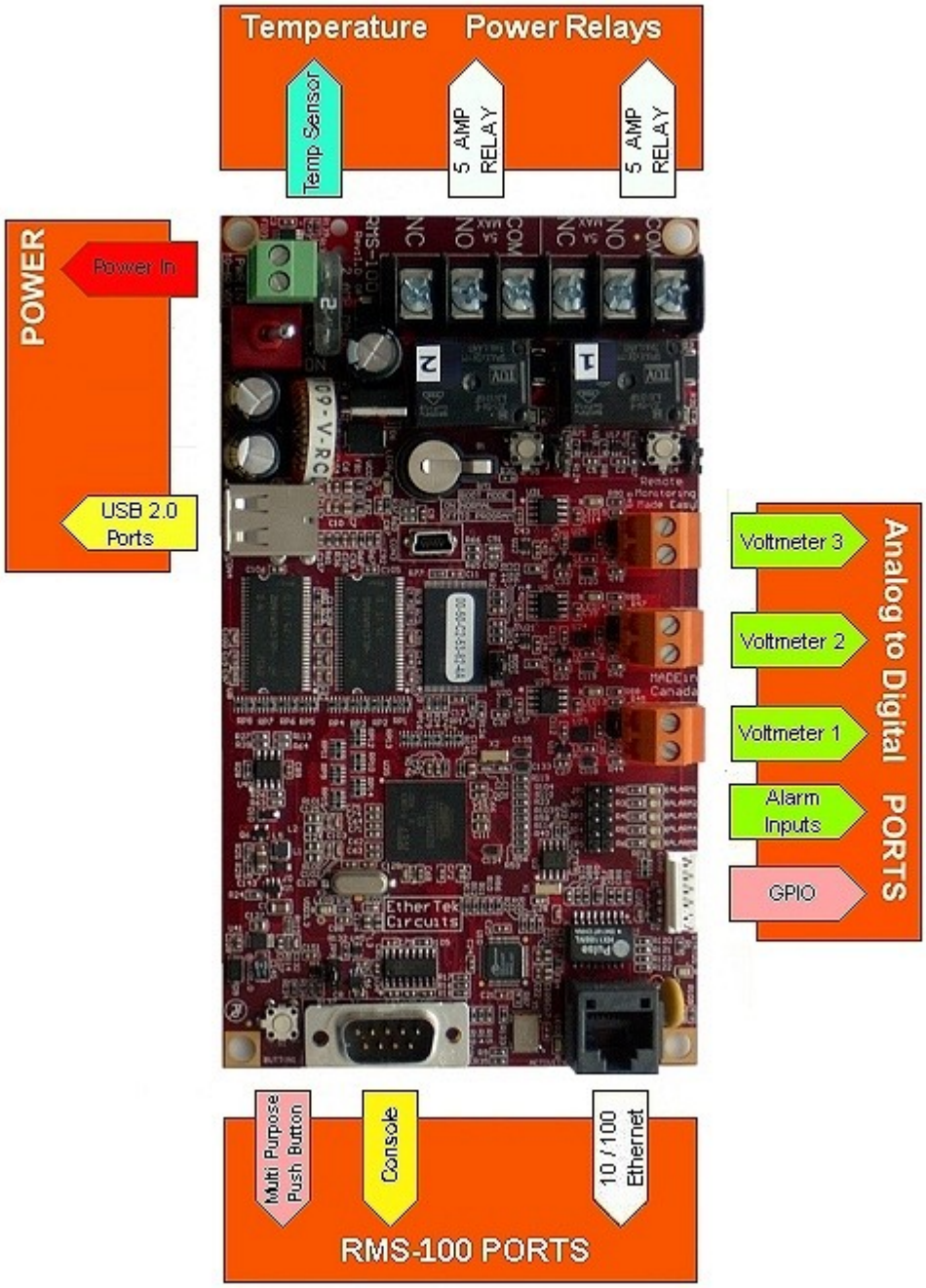
182ma @ 12.2v = 2.220 Watts. For board and all relays energized.

General Board Information

Software Features	
Linux:	Kernel 2.6.33
Services:	HTTP Server, FTP server, SSH, SNMP Agent, TELNET Server PPP
Drivers:	USB to Ethernet USB to Serial USB flash stick USB Web Cameras Relays LM75 More...
SDK:	Open source SDK for Linux Systems
Language:	C, PHP, Python

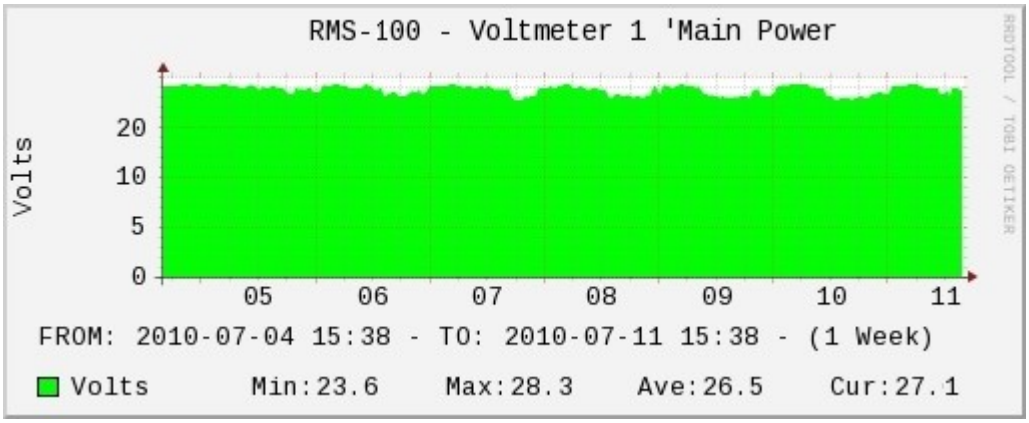
Hardware Features	
Size: Weight:	6.363 x 3.575 inches. 160 grams (5.64 oz.)
MIPS	500 Million Instructions /sec.
Power	98 ma @ 12.2 vdc **(with all relays off and no USB devices plugged in)
Cpu	Arm AT91SAM9G20 32 bit, RISC, 400MHz
Memory	64MB of SD-RAM 256MB of FLASH
Ports	1 Ethernet (10/100 Mb/s) 2 USB 2.0
Others	1 Serial console, I/O lines, Single power source twin onboard power supplies (5 Volt 2A and 3.3 Volt 1A)

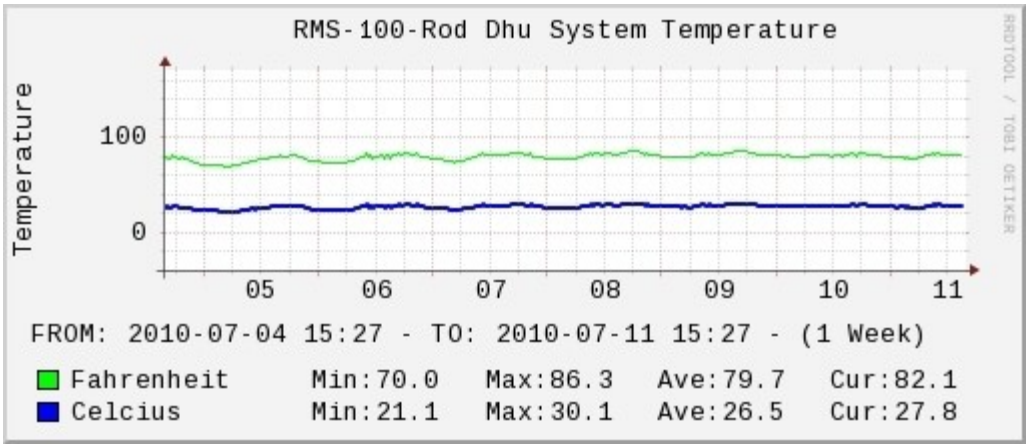
Block Diagram

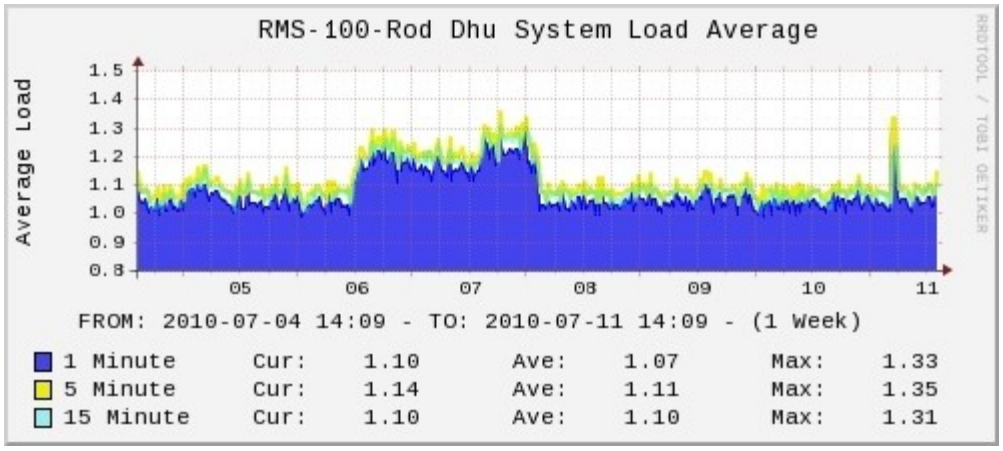


Graphs

The graphs below were created by the RMS-100 board using RRD Tool. Graphs are available for each voltmeter, temperature, and system load.







RMS-100 One (1) Year Limited Warranty

WARRANTY COVERAGE

EtherTek Circuits warranty obligations are limited to the terms set forth below:

EtherTek Circuits warrants their hardware products against defects in materials and workmanship for a period of ONE (1) YEAR from the date of original retail purchase. If a defect exists, at its option EtherTek Circuits will (1) repair the product at no charge, using new or refurbished replacement parts, (2) exchange the product with a product that is new or which has been manufactured from new or serviceable used parts and is at least functionally equivalent to the original product, or (3) refund the purchase price of the product. A replacement product/part assumes the remaining warranty of the original product or ninety (90) days from the date of replacement or repair, whichever provides longer coverage for you. When a product or part is exchanged, any replacement item becomes your property and the replaced item becomes EtherTek Circuits property. When a refund is given, your product becomes the property of EtherTek Circuits. Contact your RMS-100 retailer for warranty instructions.

EXCLUSIONS AND LIMITATIONS

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The RMS-100 circuit boards are supplied as OEM-type equipment and not in retail form. It is imperative that the user/purchaser understands the correct installation, configuration and operation of this equipment. Operation and configuration information is available via the website and is updated regularly. We recommend reviewing the website materials before powering the boards. The manufacturer and distributor cannot be held responsible for improper installation and configuration of this equipment and/or any damage caused by its improper use.

Interfacing external components or equipment to the RMS-100 boards is not intended for the novice electronics hobbyist, medium to advanced knowledge of electronic circuit design is necessary. The manufacturer and distributor cannot be held responsible for improper interfacing of custom circuits or equipment that damage the RMS-100 circuit boards or other equipment or property.

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