THE BEACON

Articles of Interest

Scientifically Analyze Battery Performance

★

Works for All Battery Chemistries

★

Test at real world load conditions, up to 150 watts or 40 amps max

Digital Mode Happenings!

by: Sholto Fisher, K7TMG

With all the FT-8 activity these days you'd be forgiven for thinking that was the only data-mode people used especially if you're new to Amateur Radio.
Here's some info on other frequencies, modes and software which may have slipped under your radar but are well worth looking into.
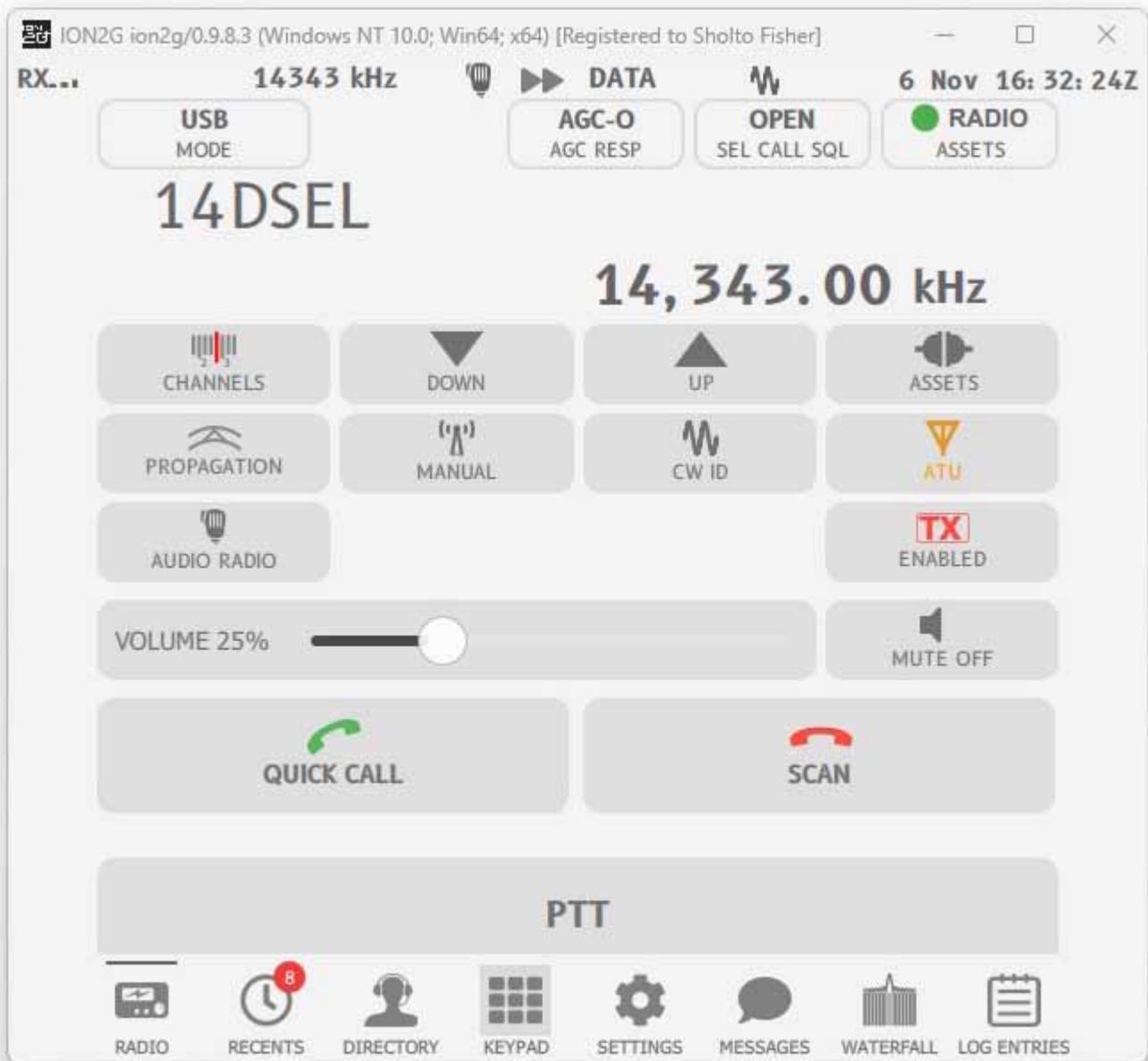
HF Automatic Link Establishment (MIL-STD-188-141B)
2G ALE controller for your radio with selective calling, data chat, channel analysis and scanning.
See https://ion2g.app/
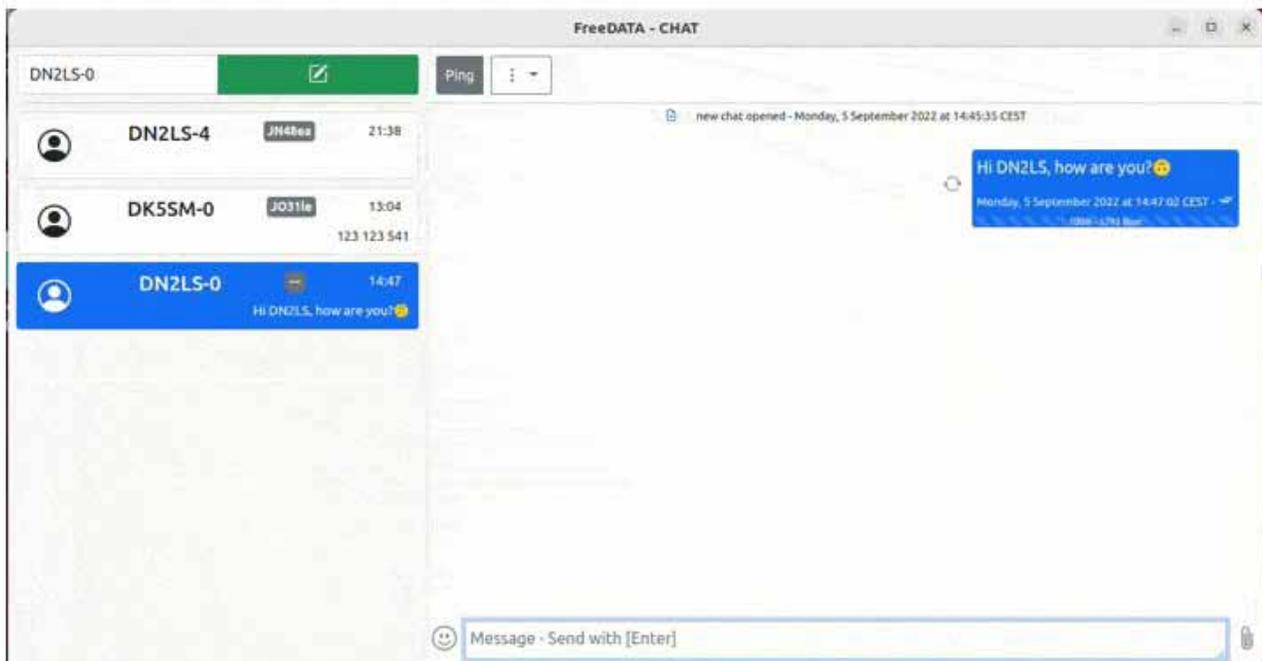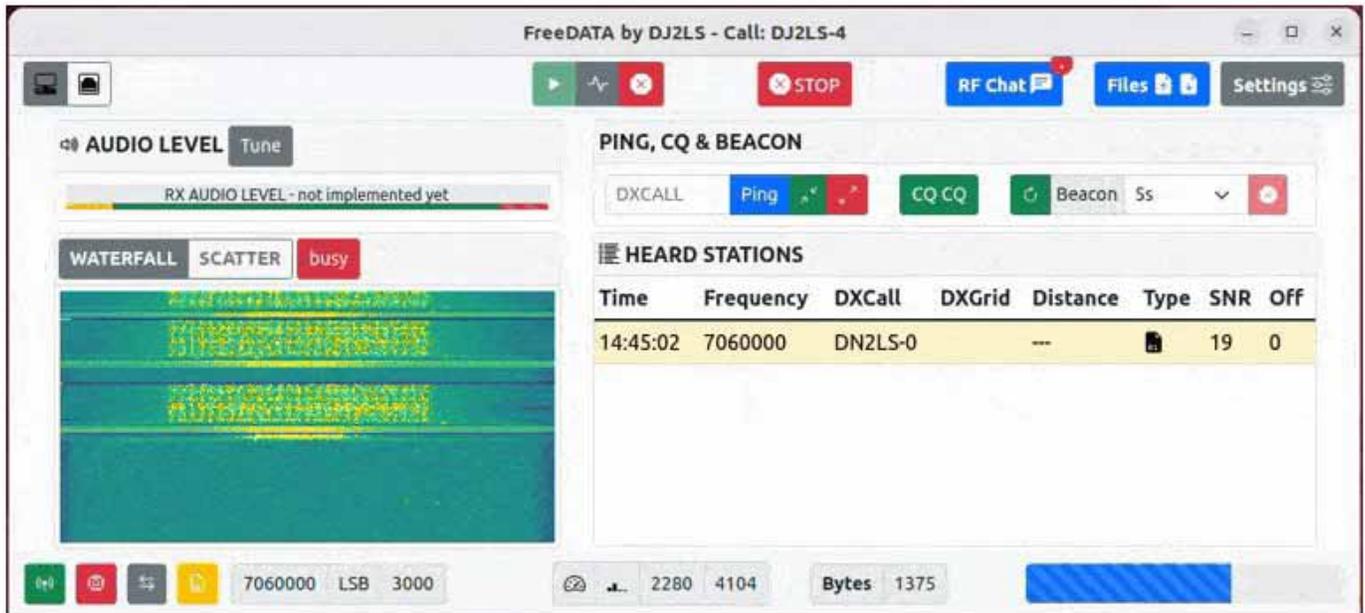
FreeDATA is a free, open-source, and multi-platform application for sending files and
messages, using the codec2 HF modems
See https://freedata.app/
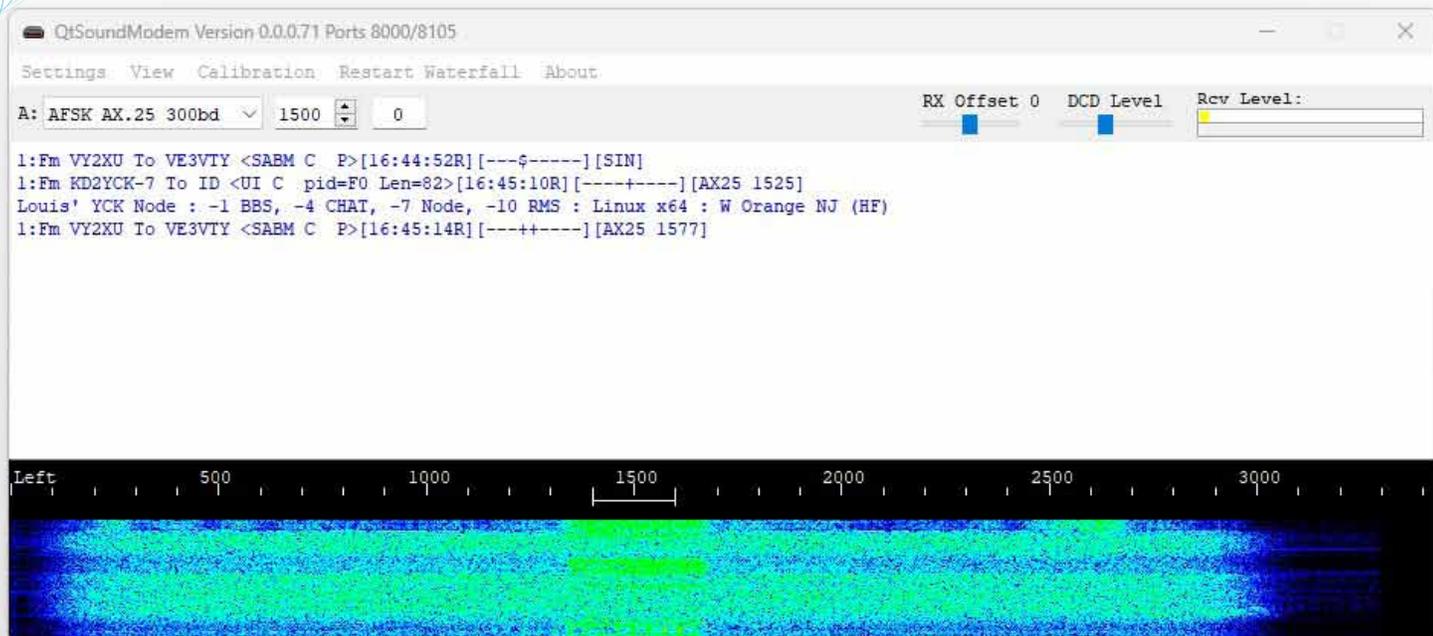
QtSoundModem is a port of UZ7HO's Sound Modem software written by G8BPQ.
The program also adds IL2P compatibility which is an experimental HF mode currently being tested on air. Multi-platform.
See https://www.cantab.net/users/john.wiseman/Documents/QtSoundModem.html

RTTY GreenKeys
Yes, there are still ops using teletypes for RTTY in 2023 and why not?
Amateur Radio is an encompassing hobby and Harold W6IWI has some very interesting web pages on blending old technology with new DSP techniques.
See https://w6iwi.org/rtty/ and take a listen to 14.083,875 (Mark) during daylight hours, or 7.083,875 Mark at night for some interesting RTTY chat.

Simon's World Map
Some of you may remember Simon Brown as the original developer of Ham Radio Deluxe. Since those days he's been heavily involved with work on SDR radios and other projects. His World Map product is a very polished mapping program designed for the radio amateur. It's highly customizable and displays important data such as greyline terminators, live propagation data, zones and grids, and satellites. There is rotator control too.
The current version is 1.4.0 and available at https://www.sdr-radio.com/world-map

WEST MOUNTAIN RADIO
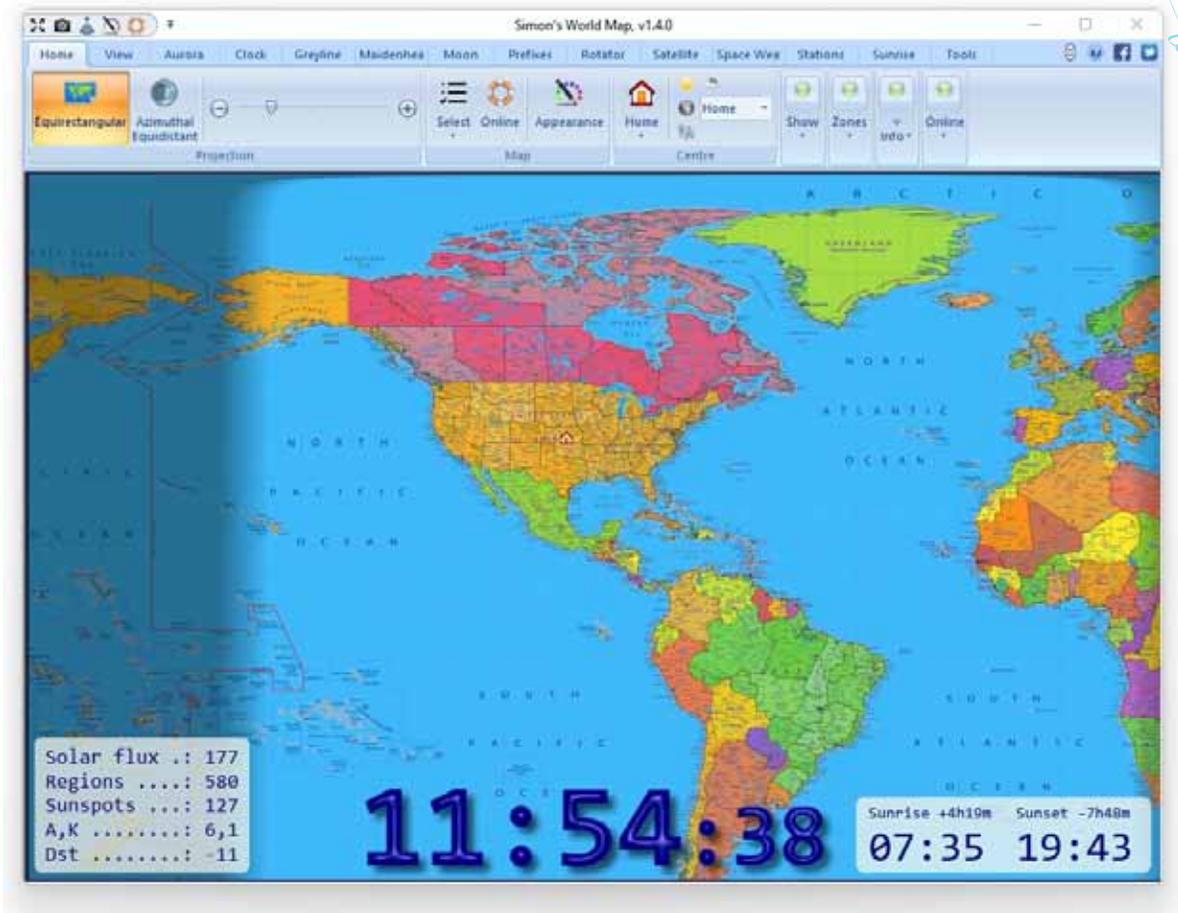
Sound Volume View

I stumbled across this quite by chance but it has proved a very useful utility for viewing and changing Windows audio levels quickly. You can also see if any channels are muted (often happens after an update) and which programs are using them. It also shows the default sound devices.

The program is freeware and you can obtain Sound Volume View
from https://www.nirsoft.net/utils/sound_volume_view.html
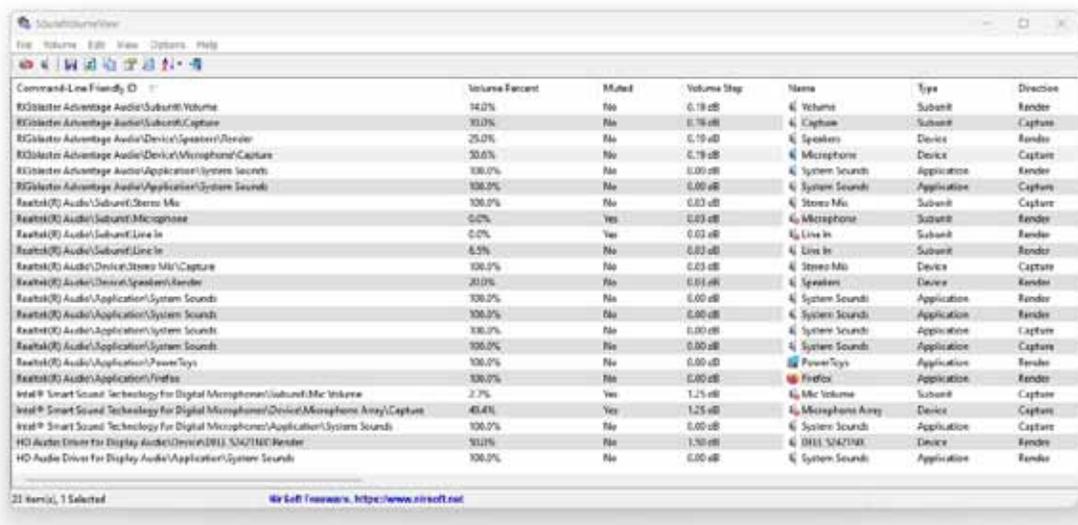
Please take note that prices are subject to change May 1, 2024

Testing Handheld Batteries

by: Craig Dominski, KC9VFA

Batteries, batteries and even more batteries everywhere and in almost everything! For years we have been testing for pass/fail and now even the complete health of the battery for its life expectancy. The West Mountain Radio Computerized Battery Analyzer (CBA) makes it easy to get significant amount of data on the battery health. However, there are many batteries that are difficult to connect to for such testing. This article will demonstrate how a charging stand can be converted to a battery holder, allowing the CBA to test any battery pack that fits into the charging stand. It will also allow the battery to power something other than the handheld radio using the Powerpole connectors.

A radio, battery, and charging stand were chosen for this project. It was discovered that the radio has an internal diode to prevent the battery from being discharged through the charging contacts. In general, this is good practice as it prevents the battery from getting shorted if metal comes into contact with the battery charging contacts. However, it prevents testing the battery while installed in the radio. The system does allow the battery to be charged when disconnected from the radio. This approach was utilized so the radio would not need to be modified.

The particular charging stand chosen, the enclosure snaps together, making disassembly not requiring any tools. To prevent the charging circuitry from affecting the results of the battery test, the battery contacts were disconnected from the charging circuitry by cutting circuit board traces. Be sure to neatly cut the traces. This will make it fairly easy to add jumper wires so the charging circuitry can be reconnected in the future if desired.

On this particular circuit board, there were unused solder pads near the positive and negative battery contacts. These solder pads are convenient points to solder wires to. To minimize voltage drop in the wiring, be sure to use the shortest length, largest diameter wire that is practical. This example uses twelve inches of 18AWG red / black zip cord.
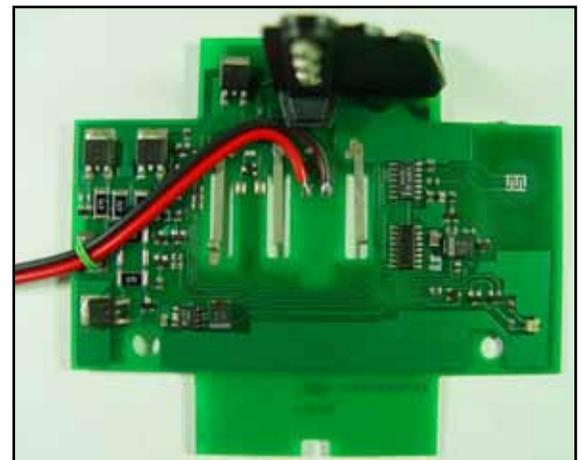
The original power connector was carefully desoldered from the circuit board. In case we would like to reinstall the connector in the future, the connector was kept and put into a bag. After the power connector is removed, the existing power connector opening can be used to route the 18AWG red / black zip cord through the enclosure wall.

Be sure to route the wires away from the battery contacts and anything that might pinch the wires when the enclosure is reassembled. To prevent the wires from breaking off at the solder joints, it is important to secure the wires to the circuit board. This was done by wrapping a piece of solid, insulated wire around the red / black wires and the circuit board. The solid wire was threaded through the circuit board openings that were previously used for the power connector. The wire ends were twisted together underneath the board. This is a good time to check the wiring for opens or shorts. The Powerpole connector can be installed if that has not been done yet.

Carefully reassemble the charging stand. Place the battery into the charging stand and use a volt meter to check for proper voltage and polarity at the Powerpole connector. If this test passes, the modified charging stand is ready for use!

If the CBA is new to you, watch this video for a good introduction to running a battery test:
https://www.youtube.com/watch?v=Sb2ZtEmF4fc

+If following this procedure, note that it is at your own risk. West Mountain Radio is not liable for personal injury or property damage that may result from the use or misuse of the information in this article.

Sodium Ion Batteries

by: Mark Siegesmund, W9WMR

There is increased chatter about the new rage for battery technology....Sodium Ion (Na-Ion) batteries are the next level up! We recently bought a Sodium Ion battery and ran it through a series of tests to determine how suitable it would be for amateur radio. This was a test of just one battery and it is still early in the development for Sodium ion batteries. It is being promoted as having a life span in the range of a Lithium battery without the concerns of spontaneous thermal events. Note that the Lead Acid battery data in this article are for sealed type that are not AGM.

The charge voltage is higher than we are accustomed to, and more importantly, the discharge voltage is considerably lower than the competitive technologies.

	Charge Voltage	Discharge Min Voltage
Lead Acid	13.8V	10.5V
LiFePO4	14.5V	10V
Na-Ion	15.4V	6V

Most radios need 11.5V to transmit, meaning about half the Amp Hours in the battery are not usable just as it is. A battery booster will help this situation. The West Mountain Radio N8XJK Super Booster works down to 9V, thus providing 82% of the Amp Hours.

Na-Ion batteries require a 15.4 charge voltage, so most radios will need to be disconnected during charging. The radio can stay connected while charging the battery is charged to 15V, however, there is a small reduction in AH. Note that even when charged to 15.4V after charging the battery settles down to 14.8V.

In our tests we were only able to get 96% of the rated AH even when charging as instructed.

The discharge curve is also unique. The following shows the typical discharge curves for Lead Acid
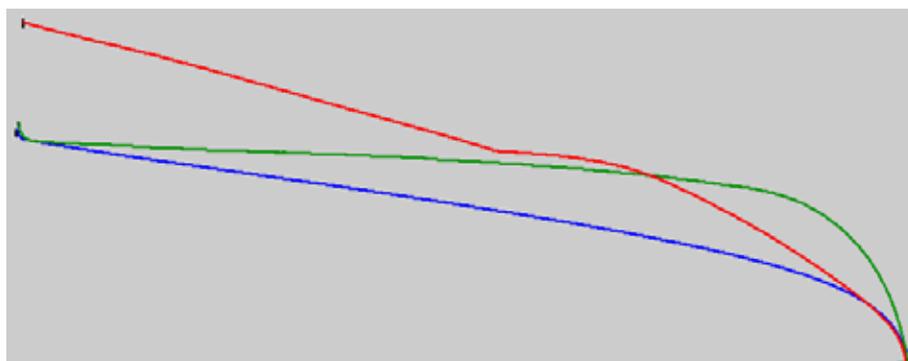
(Blue), LiFePO4 (Green) and the Sodium Ion (Red).
In order to simulate normal operating conditions we do a test that alternates between a 2A discharge (receive) and a 20A discharge (transmit), each for 30 seconds. The three technologies are shown below.
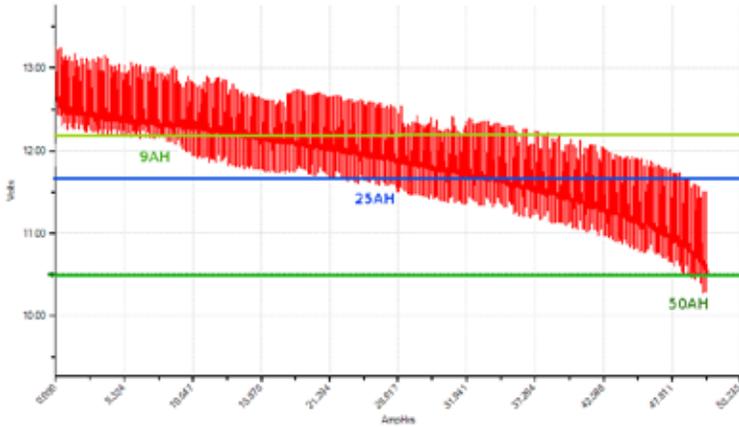
Lead Acid
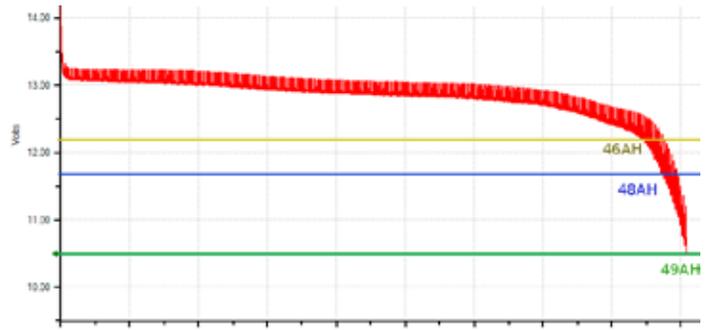
LiFePO4
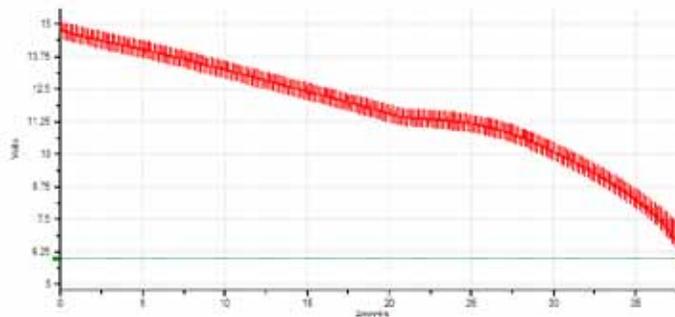
Sodium Ion

The internal resistance on this battery comes out to 0.003 ohms ignoring the spikes. It is impressive how there is not a lot of voltage drop when you transmit.

Perhaps the most attractive feature of this battery was the price. The retail price was $85 for a 40AH battery and the weight was 11.75 lbs. It did cost us twice that due to overseas shipping. Here is a rough comparison chart.

	Dollars per AH	Pounds per AH	Deep Cycles
Lead Acid	$4.80	0.7 lbs	600
LiFePO4	$7	0.28 lbs	3000

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Na-Ion	$2.13	0.29 lbs	3000

In summary this battery will take some getting used to. The battery can be used as-is using a Li charger set to 14.8V (the Epic can do this) to get 46% of the rated capacity (down to 11.5V). The WMR Super booster will bring this to 81%. Still a lower cost than a LiFePO4 but then there is a hassle of actually buying one. The characteristics will likely change as these batteries are available from more manufactures and are in mass production. If you want to find the battery we tested google YC-NA-1240S.

Important Firmware Updates

Many of the West Mountain Radio products now have microprocessors that have re-loadable firmware. It is important to keep the firmware up to date on the more complex products. Many can be updated by the user after downloading the newest firmware from the website. In the cases where units need to come back to us, we only charge for shipping to update your unit.

Because of part availability issues we have been substituting parts to try to keep production moving. Recently we discovered an alternate analog to digital converter had a small amount of cross talk between channels not seen on the original part. This affects the CBA and RR4005i. We have made a update to the firmware to eliminate any error due to cross talk, so we are advising the firmware be updated on those products right away.

For the CBA the firmware is included in the software download. Download and install the newest CBA software. Then use TOOLS > CBA DEVICES to bring up the list of CBA's. Select the CBA you want to update and then click UPDATE FIRMWARE.

A box will come up to allow you to select the version of firmware to load and then you need only click UPDATE.
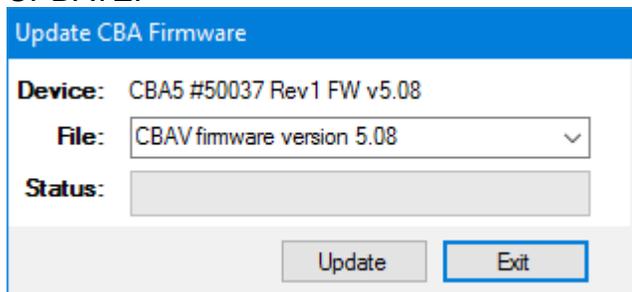
Give it a few minutes and then you are updated and ready to go.

For the RIGrunner 4005i the update is done through your TCP/IP internet connection. It uses the Trivial FTP protocol. In the past we had a procedure for enabling TFTP on your PC, then enabling it on the RR4005i and finally uploading from a command prompt the two images. There is one image for the web pages and another for the program.

We recently created a simple utility that does all this from a simple GUI. Download and run the firmware update from our web site and you will get the following window.

First click CONNECT and that will show you the versions available on your PC that match your hardware. If you have a WiFi module select an image for the last drop down list that has WiFi in the name if you want to use WiFi. Select the other one for Ethernet. If you do not have a WiFi module do not select an image with WiFi as in that case you will not be able to update again.
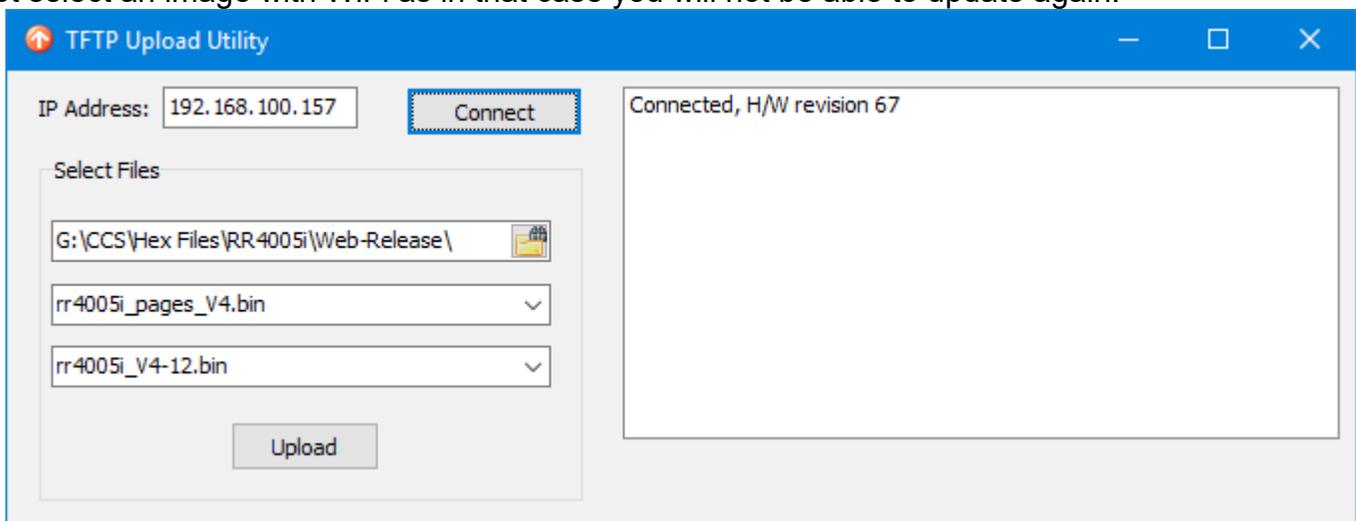
Contact support if you have any problems updating.

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