



Quarter 1 2024

Articles of Interest

Pg 2-5

Digital Mode Happenings!

By: Sholto Fisher, K7TMG

Pg 6-8

Testing Handheld Batteries

By: Craig Dominski, KC9VFA

Pg 9-11

Sodium Ion Batteries

By: Mark Siegesmund, W9WMR

Pg 12-13

**Important Firmware
Updates**



**Scientifically Analyze
Battery Performance**



**Works for All Battery
Chemistries**



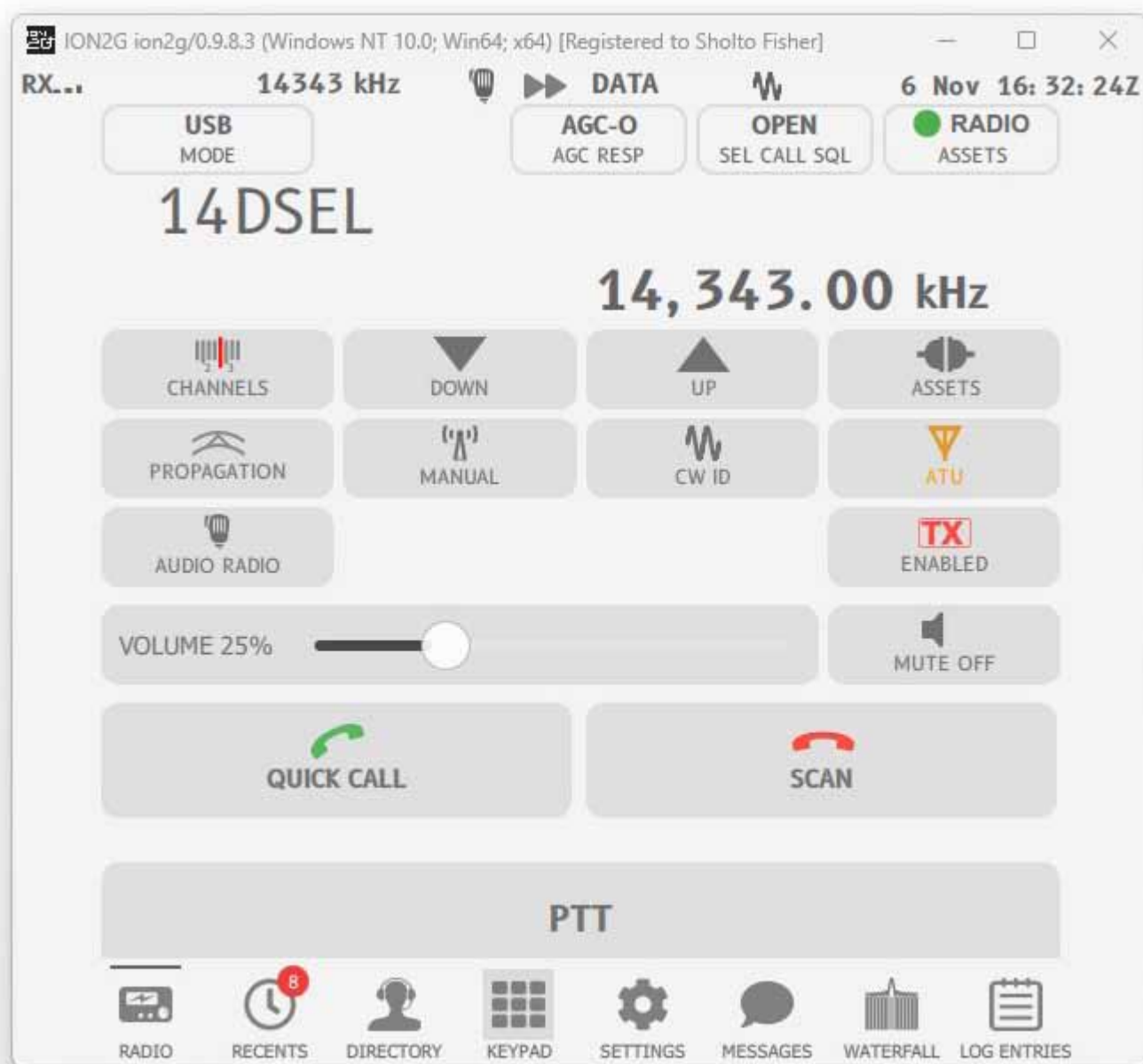
**Test at real world load
conditions, up to 150
watts or 40 amps max**

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.

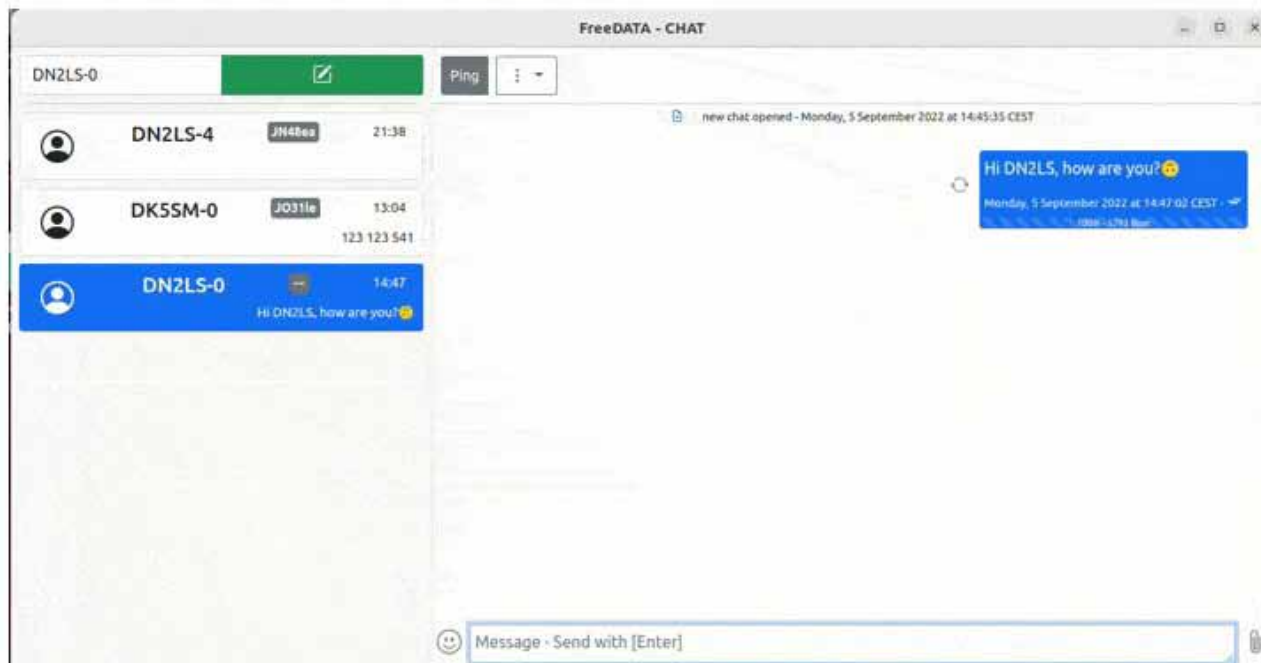
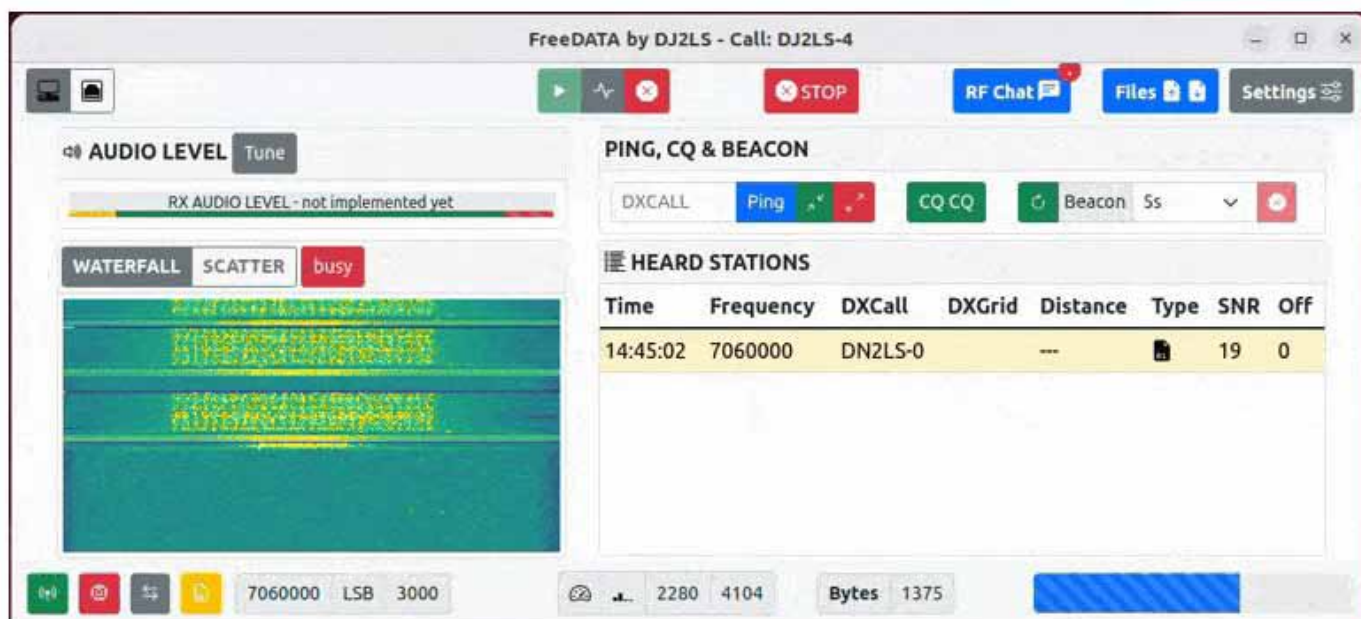
Here's some info on other frequencies, modes and software which may have slipped under your radar but are well worth looking into.



HF Automatic Link Establishment (MIL-STD-188-141B)

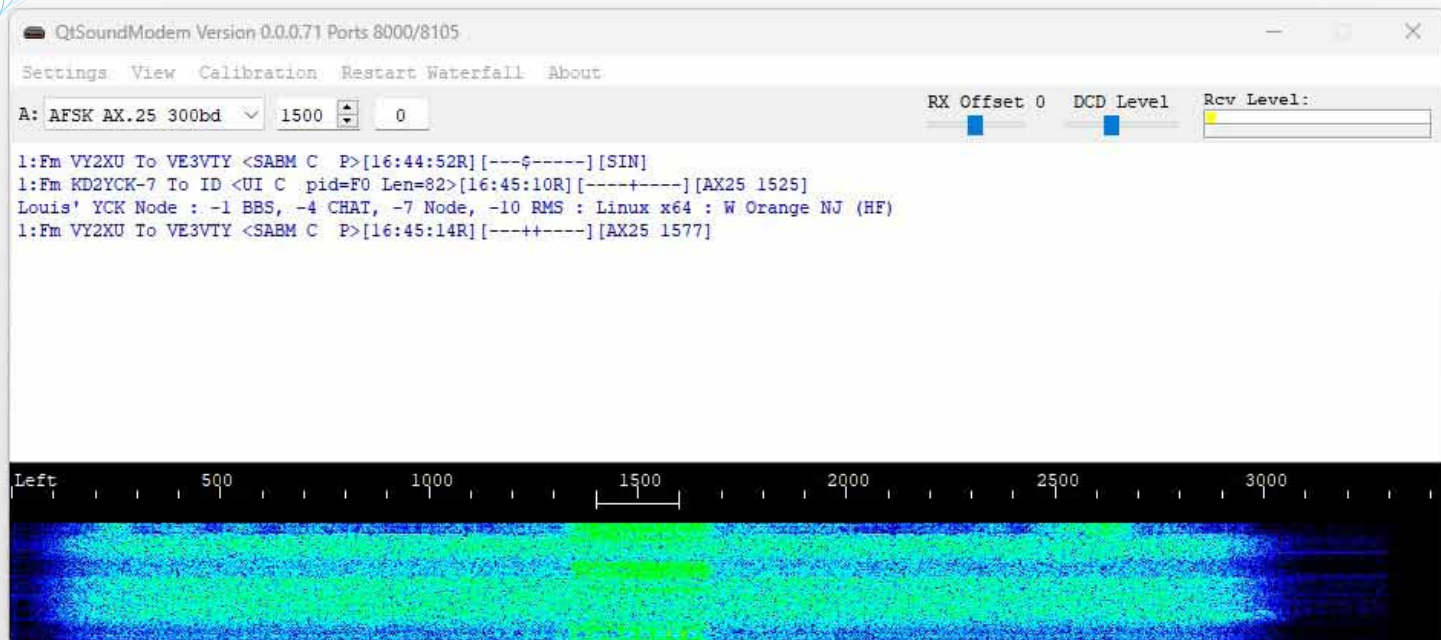
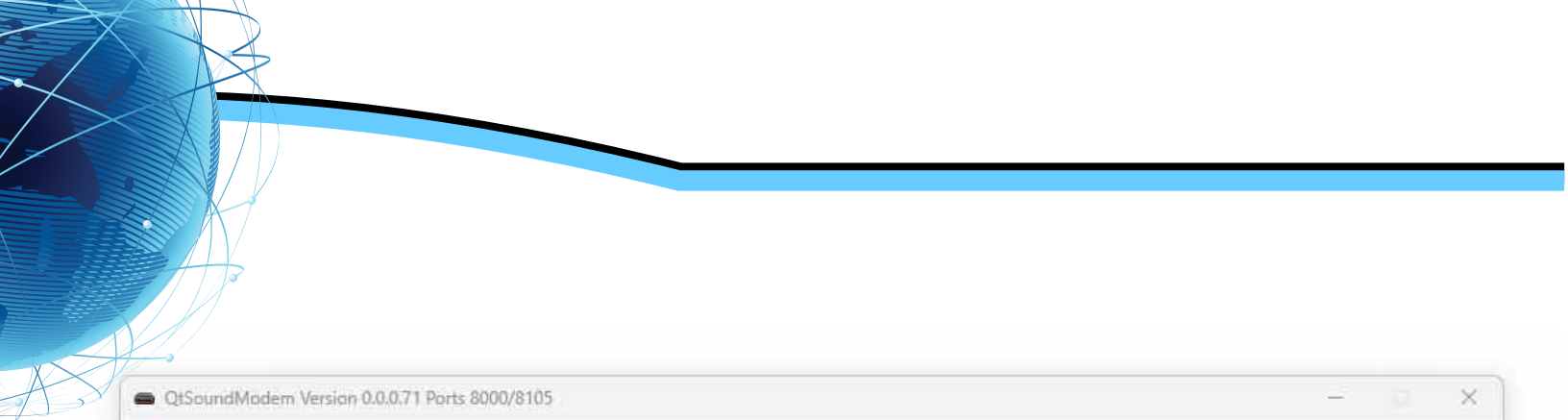
2G ALE controller for your radio with selective calling, data chat, channel analysis and scanning.

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/>



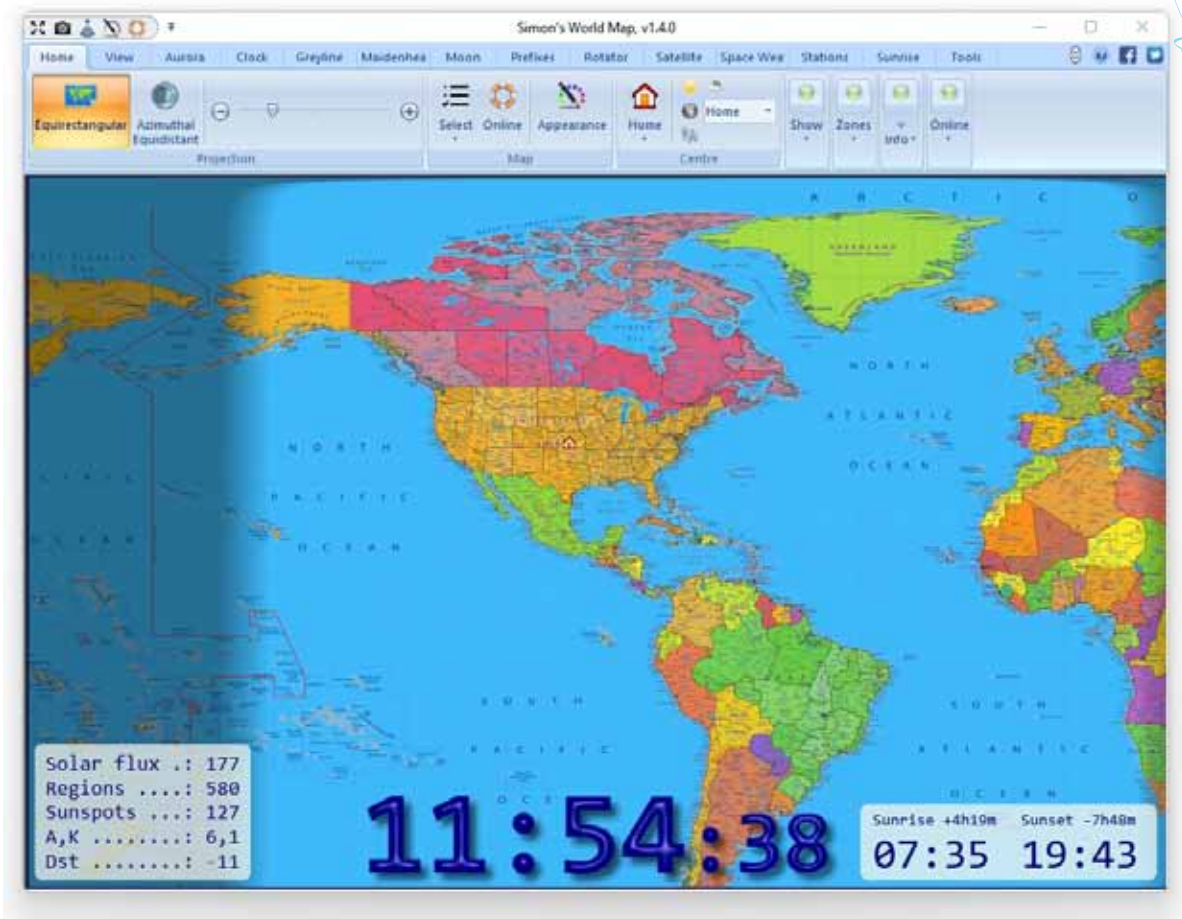
QtSoundModem is a port of UZ7HO's Sound Modem software written by G8BPQ. The program also adds IL2P compatibility which is an experimental HF mode currently being tested on air. Multi-platform.
See <https://www.cantab.net/users/john.wiseman/Documents/QtSoundModem.html>

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>



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

Command-Line Friendly ID	Volume Percent	Muted	Volume Step	Name	Type	Direction
Realtek Advantage Audio\Subunit\Volume	14.0%	No	0.18 dB	4\ Volume	Subunit	Render
Realtek Advantage Audio\Subunit\Capture	90.0%	No	0.18 dB	4\ Capture	Subunit	Capture
Realtek Advantage Audio\Device\Speaker\Render	25.0%	No	0.18 dB	4\ Speakers	Device	Render
Realtek Advantage Audio\Device\Microphone\Capture	50.0%	No	0.18 dB	4\ Microphone	Device	Capture
Realtek Advantage Audio\Application\System Sounds	100.0%	No	0.00 dB	4\ System Sounds	Application	Render
Realtek Advantage Audio\Application\System Sounds	100.0%	No	0.00 dB	4\ System Sounds	Application	Capture
Realtek Audio\Subunit\Stereo Mix	100.0%	No	0.03 dB	4\ Stereo Mix	Subunit	Capture
Realtek Audio\Subunit\Microphone	0.0%	Yes	0.03 dB	4\ Microphone	Subunit	Render
Realtek Audio\Subunit\Line In	0.0%	Yes	0.03 dB	4\ Line In	Subunit	Render
Realtek Audio\Subunit\Line In	6.5%	No	0.03 dB	4\ Line In	Subunit	Render
Realtek Audio\Device\Stereo Mix\Capture	100.0%	No	0.03 dB	4\ Stereo Mix	Device	Capture
Realtek Audio\Device\Speaker\Render	30.0%	No	0.01 dB	4\ Speakers	Device	Render
Realtek Audio\Application\System Sounds	100.0%	No	0.00 dB	4\ System Sounds	Application	Render
Realtek Audio\Application\System Sounds	100.0%	No	0.00 dB	4\ System Sounds	Application	Render
Realtek Audio\Application\System Sounds	100.0%	No	0.00 dB	4\ System Sounds	Application	Capture
Realtek Audio\Application\System Sounds	100.0%	No	0.00 dB	4\ System Sounds	Application	Capture
Realtek Audio\Application\PowerToys	100.0%	No	0.00 dB	4\ PowerToys	Application	Render
Realtek Audio\Application\Firefox	100.0%	No	0.00 dB	4\ Firefox	Application	Render
Intel® Smart Sound Technology for Digital Microphones\Subunit\Mic Volume	2.3%	Yes	1.25 dB	4\ Mic Volume	Subunit	Capture
Intel® Smart Sound Technology for Digital Microphones\Device\Microphone Array\Capture	40.0%	Yes	1.25 dB	4\ Microphone Array	Device	Capture
Intel® Smart Sound Technology for Digital Microphones\Application\System Sounds	100.0%	No	0.00 dB	4\ System Sounds	Application	Capture
HD Audio Driver for Display Audio\Device\HDMI S/PDIF\Render	100.0%	No	1.30 dB	4\ HDMI S/PDIF	Device	Render
HD Audio Driver for Display Audio\Application\System Sounds	100.0%	No	0.00 dB	4\ System Sounds	Application	Render

Please take note that prices
are subject to change
May 1, 2024

**Take Control
of the DC Power
Universe**



The image displays three Ridge Runner DC power distribution units against a dark, starry space background. The top unit is a Ridge Runner 4004U, a compact black box with four red fuses and two USB ports. The middle unit is a Ridge Runner 4008H, a larger black box with eight fuses and a row of red and black terminals. The bottom unit is a Ridge Runner 400S, a compact black box with four fuses and two USB ports. Red and black cables are connected to the units.

- Easy-Mount Boxes
- Fuse Safety Features
- Optional USB Ports
- Clean Cable Organization

**WEST MOUNTAIN
RADIO**  **262-522-6503**
westmountainradio.com

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.

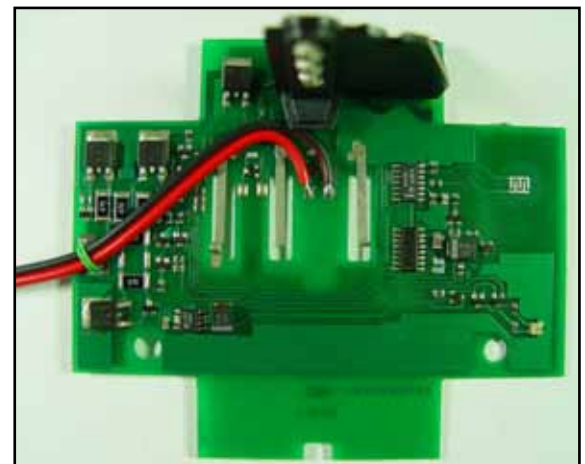


A radio, battery, and charging stand were chosen for this project. It was discovered that the radio has an internal diode to prevent the battery from being discharged through the charging contacts. In general, this is good practice as it prevents the battery from getting shorted if metal comes into contact 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.

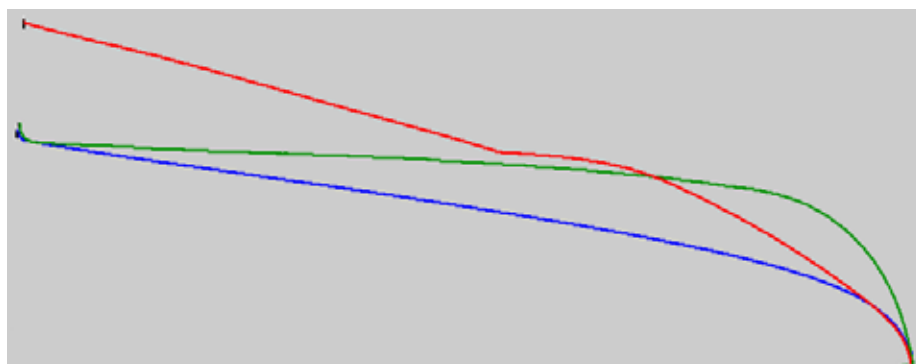
	Charge Voltage	Discharge Min Voltage
Lead Acid	13.8V	10.5V
LiFePO4	14.5V	10V
Na-Ion	15.4V	6V

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.

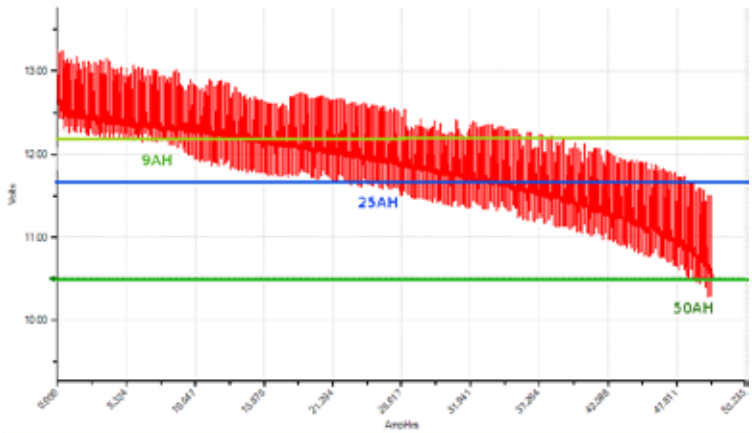
In our tests we were only able to get 96% of the rated AH even when charging as instructed.

The discharge curve is also unique. The following shows the typical discharge curves for Lead Acid

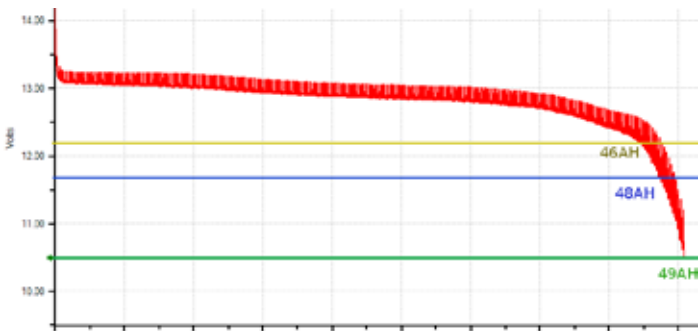




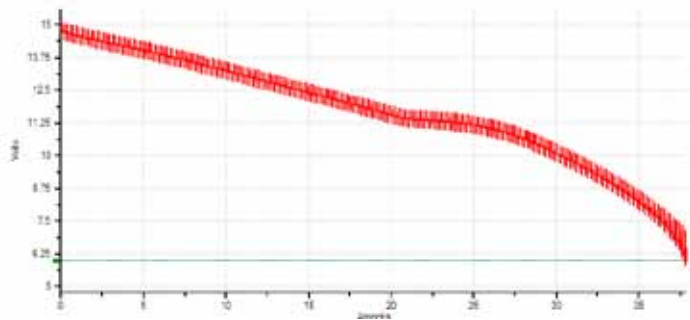
(Blue), LiFePO4 (Green) and the Sodium Ion (Red).
In order to simulate normal operating conditions we do a test that alternates between a 2A discharge (receive) and a 20A discharge (transmit), each for 30 seconds. The three technologies are shown below.



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

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.



Get the MOST LIFE out of your BATTERY!

Maintains up to 15VDC to your radio regardless of battery voltage

N8XJK Super Booster

HIGH POWER

- Draws up to 40A from the Battery
- Connect units in parallel for 80A and 120A!

QUIET, THERMALLY CONTROLLED FAN

- Operates at max current continuously

ADJUSTABLE RF ENABLE DELAY

- Provides smoother transmissions

OTHER GREAT FEATURES INCLUDE...

- Low voltage shut-off with LED indicator
- Extremely low RFI
- Switch for Boost/No Boost
- Optional remote monitor/control unit

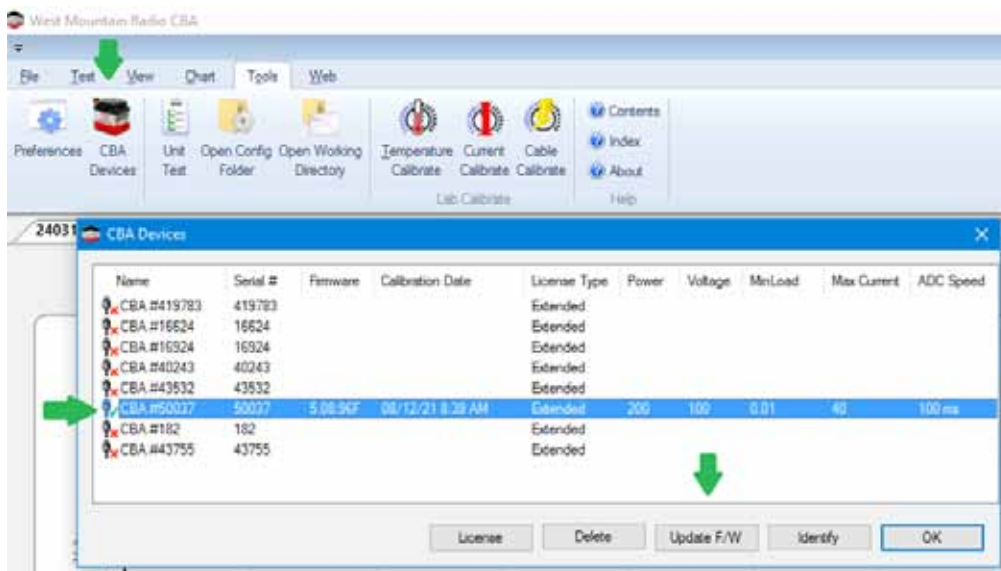
NEW FEATURES & A MORE MODERN DESIGN

Important Firmware Updates

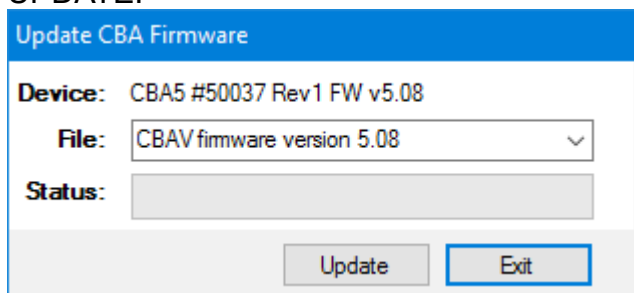
Many of the West Mountain Radio products now have microprocessors that have re-loadable firmware. It is important to keep the firmware up to date on the more complex products. Many can be updated by the user after downloading the newest firmware from the website. In the cases where units need to come 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**.

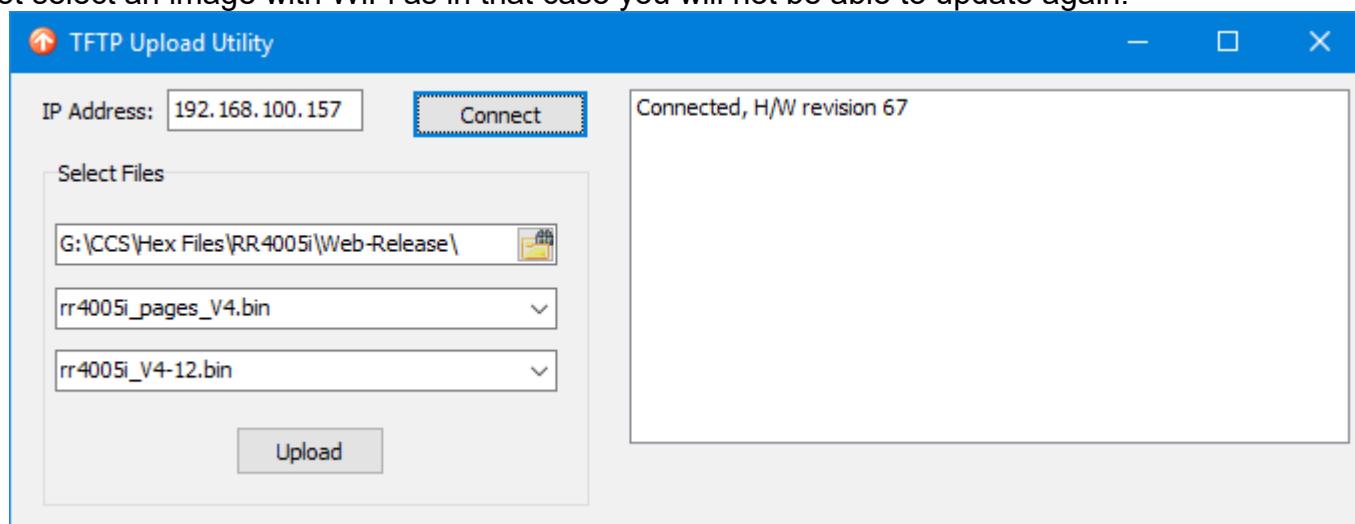


Give it a few minutes and then you are updated and ready to go.

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 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.

Visit Our Booth!

**Hamvention
May 17-19, 2024
Xenia, OH**

**EAA Airventure
July 22-28, 2024
Oshkosh, WI**

Follow Us!



**West Mountain Radio
1020 Spring City Dr.
Waukesha, WI 53186
www.westmountainradio.com**