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Digital Mode Happenings!
By Sholto Fisher, K7TMG

MSHV

You might think that all digital mode activity these days is FT-8. Certainly the recent DXpeditions to the antipodes and rare DXCC entities got a lot of people excited to work ATNO with FT-8 (All-Time-New-Ones). I was interested in the software choice of FT8WW in that he was using MSHV which can multistream FT-8 replies. This means it was possible to work more than one station simultaneously which is very useful if you happen to be the DX station on the busy end of a pile-up. I had not come across it before and it appears to be a C++ rewrite of WSJT-X with lots of advanced features and a very different UI.

One thing I noticed is that it apparently works on Windows versions as far back as XP which could give new life to an old shack computer. I do not recommend ordinary users switching to this instead of WSJT-X or JTDX as it has a steep learning curve and you certainly wouldn't want to use multistreaming on the normal FT-8 frequencies.

You can check it out here: http://lz2hv.org/node/10 and there's a user group at https://groups.io/g/MSHV

VarAC

This program keeps getting better and better! The author Irad 4Z1AC is closely working with the author of the Vara modem José EA5HVK and implementing improvements and changes almost on a daily basis. I have had people ask what exactly is VarAC and the best way I would explain it is mostly an HF keyboard-to-keyboard chat application that uses Vara modulation at the 500Hz bandwidth. It is more than just chat however, it supports messaging (called 'vmails'), beaconing, something called 'broadcasting' which is basically group- (ALL) -or directed messaging (think unproto packets), pinging other stations for reception reports, calling CQ with an automatic QSY request (so you don't clutter up the calling channel) and SNR measurements with a nice graph so you can see how your QSO SNR varied.

The Vara modem is not free if you want to unlock its full speed potential (perhaps on a par with P3) but you don't necessarily need a license for VarAC as an unregistered copy of the Vara modem allows connections up to 177 bps which should be plenty fast enough for keyboard-to-keyboard chatting.

Frequencies are coded into the VarAC program so to get the most out of the program setup the CAT connection to your radio in the configuration. CAT is not essential but for the QSY feature to work it would be hard to do it manually. A recent update allowed interfacing to flrig so this should cover any radio that is not supported directly in VarAC.

The latest Vara modem can be obtained from https://rosmodem.wordpress.com/
VarAC is here https://www.varac-hamradio.com/
Some of the coded QSY frequencies (called 'slots') are usually in continuous use by packet networks (especially on 20m in the US and Canada) so to avoid QRM be careful with choosing a slot before calling CQ.

BPQ

John Wiseman has been hard at work porting UZ7HO's excellent Sound Modem software over to a BPQ native driver called QTSoundModem. This should especially appeal to those wanting to run superior HF packet on linux or mac based systems. You can read about it here:
https://www.cantab.net/users/john.wiseman/Documents/QtSoundModem.html
John is also working on ARDOPOFDM modems which look interesting. Read about them at https://www.cantab.net/users/john.wiseman/Downloads/Beta/ARDOP1OFDM.txt

TrueTTY 3.30

Sergei UA9OV has coded a couple of new modes into his excellent TrueTTY software. They are called PS2x5 and PS33x5. I've yet to make any QSO using these modes but they look interesting and his TrueTTY software is definitely worth checking out as it offers IMO the best PSK31 and RTTY decoding of any of the sound card based software programs.

You can download TrueTTY from https://www.truetty.com/en/products/truetty/

H.R. 9664

You may have read about the new bill from Rep. Debbie Lesko (AZ-08) which seeks to replace the digital mode symbol rate limit (currently 300 baud) with a bandwidth limit. It's called H.R.9664 – Amateur Radio Communications Improvement Act.   This will effectively allow Pactor 4 and other modes developed to use higher symbol rates and bring the US into harmony with other nations around the world.

I do not foresee this causing any more QRM issues than we currently have as the number of stations with P4 capabilities is small and will remain small due to the high cost of these modems.

You can follow the bill's progression through the house here: https://www.congress.gov/bill/117th-congress/house-bill/9664?s=1&r=1

Using the Elecraft K2 with RIGblaster Blue
By Bruce Grubbs, N7CEE

As the owner of an early Elecraft K2 kit, S/N 244, I messed around with digital modes using a computer sound-card back when I first put the radio on the air. But then my interest in QRP field contesting took over and I lost interest in digital until just recently.

After getting caught up on the various options and reading WB8IMY's review in QST, I decided to give the RIGblaster Blue a try. Avoiding the rat's nest of wires between computer and digital interface was very appealing.

Of course, to use the K2 on digital modes, you must have the KSB2 SSB adapter. If you want computer rig control, you also need the KIO2 serial interface.

On the computer end, I primarily run Kubuntu Linux, current 22.04 LTS, but also have to occasionally boot into Windows to use Adobe software for work. So first I'll explain how I set up the RIGblaster with Linux, and then talk about Windows 10/11 differences.

I used flrig and fldigi because they are both available for Linux and Windows.

To clarify how the RIGblaster Blue uses Bluetooth, TX and RX audio use the Bluetooth connection- the RIGblaster appears as a Bluetooth headset with mic to the computer. This has nothing to do with the instructions in the RIGblaster manual for pairing a Bluetooth headset directly to the RIGblaster in order to monitor receive audio. Most laptops have Bluetooth, but many desktop computers do not. To add Bluetooth, get a USB Bluetooth dongle. I used the ASUS USB-BT500 because it works with both Linux and Windows.

Rig control uses a virtual Bluetooth serial port, which shows up as an outgoing COM port in Windows and /dev/rfcomm0 in Linux.
Follow the instructions in the RIGblaster Blue manual to set up the RIGblaster. Use the Instant Setup Connector for Kenwood- the K2 uses the same mic wiring. For rig control, make sure you use the custom serial cable that came with the KIO2 kit to connect the K2 to the RIGblaster. DO NOT use a standard DB-9 cable- you will damage the K2 and possibly the RIGblaster. Follow the instructions in the KIO2 manual if you need to make up a new cable.

Linux
Radio audio
- Install Bluetooth Manager, fldigi, and flrig from the Kubuntu repositories in a terminal window line with the command sudo apt install blueman fldigi flrig
- Or you can install them from your graphical package manager (muon in Kubuntu)
- On the RIGblaster, put the Blue switch in the "config" position. The Status LED should be flashing green
- Open System Settings
- From the left panel, under Hardware, click on Bluetooth Settings
- Click on Add New Device
- When the RIGblaster appears in the select New Device window, click on it to connect
- On the RIGblaster, the Status LED should be solid green, indicating that Bluetooth is connected
- In System Settings, select Audio from the left panel

- The RIGblaster should show up under Playback and Recording Devices- set the RIGblaster to both. Leave the levels at 100%
- Put the Blue switch in the PC position
- Set the RIGblaster RCV LEVEL to the 12 o'clock position
- The RIGblaster may be disconnected at this point as shown by the Status LED flashing green- if so, reconnect it in the Bluetooth system settings
- Turn the K2 on, set the RF GAIN to max and the AF GAIN to about 9 o'clock, select USB, make sure all filters are off, and tune to one of the PSK31 frequencies, 7070, 14070, 21070 KHz, etc.
- Start fldigi- you should see noise and possibly some signals in the waterfall display. If not, open Configure in fldigi, then Soundcard, Devices, make sure PortAudio is checked and Capture and Playback are set to Pulse
- Adjust the K2 AF GAIN so that the diamond at the lower left corner of fldigi shows green
- On the RIGblaster, set the XMT level to minimum and the TX switch to VOX. On the K2, set the POWER to 5 watts or less
- In fldigi, click the T/R button. The red XMT LED should light on the RIGblaster. Adjust the XMT level to just below ALC indication on the K2, as outlined in the RIGblaster manual
- Click the T/R button to return to receive
- If you plan to use flrig for rig control, open Configure, Config Dialog, Rig Control, Rig, and check "Enable flrig scr control…", Leave "Shutdown flrig with fldigi" unchecked if you plan to use flrig with other software, such as WSJTX

Rig Control
- Open Bluetooth Manager
- Right-click on the RIGblaster to get the pop-up menu
- Click on serial port. Serial port rfcomm0 should appear. If not, repeat this procedure
- Under the rfcomm0 port, under Autoconnect, check the Serial port box- this enables rfcomm0 to communicate with the K2
- Open a terminal window
- To set the serial port to communicate with the K2, issue the following command: stty -F /dev/rfcomm0 4800 (If you don't have stty, install it with: sudo apt install coreutils)
- On the K2, press MENU then DISPLAY to get the secondary menu. Turn the main knob to the PORT item
- Press and hold EDIT, then turn the main knob to change PORT OFF to PORT ON
- In the terminal window, type minicom -s (if you don't have minicom, install it: sudo apt install minicom)
- In minicom, select Serial port setup
- Type A, then change /dev/modem to /dev/rfcomm0
- Type E, then type B until the speed is 4800
- Type X to set 2 stop bits
- Current should read 4800 8N2. Press <ENTER><ENTER>, then select Exit to return to the minicom main window
- On the K2, press DISPLAY. The K2 will display "test" and should send a string to minicom, "FA000xxxxxxxx", where the "xxx"s are the display frequency in Hz. If not refer to the KIO2 manual for troubleshooting
- On the K2, press MENU twice to exit the menus
- Open flrig, click Config, then Setup, then Transceiver
- Under Rig, select K2

- Click Update, then select /dev/rfcomm0 (probably toward the bottom of the long scroll list)
- Set Baud to 4800 and check 2 StopBits. Leave everything else unchecked
- Click Init. The Connected light should turn green
- If not, recheck your settings

Windows 10/11
Radio audio
- On the RIGblaster, put the Blue switch in the CONFIG position. The Status LED should be flashing green
- On the right end of the Taskbar, click on the Bluetooth icon, then on show Bluetooth devices (if it's hidden, click the up arrow to reveal it)
- Click the Add Device button, then Bluetooth
- When the RIGblaster appears, click it to connect
- On the RIGblaster, the Status LED should be solid green. Put the BLUE switch in the PC position
- The RIGblaster may be disconnected at this point as shown by the Status LED flashing green- if so, reconnect it in the Bluetooth settings
- Set the RIGblaster RCV LEVEL to the 12 o'clock position
- On the Taskbar, right-click on the speaker icon and open Sound Settings
- Under Output, select the RIGblaster, which will show as a headset
- Under Input, select the RIGblaster, which will show as a headset
- Turn the K2 on, set the RF GAIN to max and the AF GAIN to about 9 o'clock, select USB, make sure all filters are off, and tune to one of the PSK31 frequencies, 7035, 14070, 21070 KHz, etc.
- Start fldigi- you should see noise and possibly some signals in the waterfall display. If not, open Configure in fldigi, then open Soundcard, Devices, make sure PortAudio is checked and Capture and Playback are set to to the RIGblaster
- Adjust the AFGAIN and RCV LEVEL
- On the RIGblaster, set the XMT level to minimum and the TX switch to VOX. On the K2, set the POWER to 5 watts or less
- In fldigi, click the T/R button. The red XMT LED should light on the RIGblaster. Adjust the XMT level to just below ALC indication on the K2, as outlined in the RIGblaster manual
- Click the T/R button to return to receive

Rig Control
- Open WMR Device Diagnostic Utility
- There should be two Com ports labeled "COMx" Standard Serial over Bluetooth link- usually COM5 and COM6
- Right-click on COM5, then click on Configure RIGblaster Blue. IF COM5 doesn't work try COM6
- Set the port to 4800 and 2 stop bits
- On the K2, press MENU then DISPLAY to get the secondary menu. Turn the main knob to the PORT item
- Press and hold EDIT, then turn the main knob to change PORT OFF to PORT ON
- Open flrig, click Config, then Setup, then Transceiver
- Under Rig, select K2
- Click Update, then select /dev/rfcomm0 (probably toward the bottom of the long scroll list)

- Set Baud to 4800 and check 2 StopBits. Leave everything else unchecked
- Click Init. The Connected light should turn green
- If not, recheck your settings. You can also follow the troubleshooting procedure above under Linux
- If you plan to use flrig for rig control, open Configure, Config Dialog, Rig Control, Rig, and check "Enable flrig scr control…", Leave "Shutdown flrig with fldigi" unchecked if you plan to use flrig with other software, such as WSJTX

Note: If you switch computers or operating systems, the RIGblaster won't connect, even you previously connected it. To reconnect, you must "forget" the RIGblaster on the computer and then pair it again.

Introduction

Periodically we release new versions of Epic PWRgate firmware and it is important to keep your device up-to-date to take advantage of the improvements we make. You can update the firmware at home with a Windows PC and the USB micro cable supplied with your Epic. The USB micro cable can also be used to program various parameters into the Epic if you need to fine tune for your particular application.

Updating the Firmware

Updating the firmware is relatively easy, but please read this section entirely before starting to familiarize yourself with the procedure.

Required Hardware

A computer running a recent version of Windows. Preferably Windows 10 or 11, but the procedure should work for older versions too. A Windows VM could also be used if USB support is enabled and the hid/pid of the Epic is passed through to the VM.

A fully connected USB micro cable. A 'phone charger' USB cable may not have data lines connected so if possible use the USB micro cable which came with your Epic. A DC supply or fully charged battery.

Required Software

The latest WMR Diagnostic Program
The latest Epic firmware installer

Procedure (first steps)

1. Remove all cables from the Epic PWRgate before starting.

2. Download and install the latest WMR Diagnostic Software from
    https://www.westmountainradio.com/exe/setup_wmrdiagnostics.exe
    You may get a warning from Windows Defender SmartScreen regarding a potential risk. This just means that the program isn't commonly downloaded but all software from WMR is free of malware, adware and viruses. Click on the "More Info" link and choose "Run Anyway" from the next screen.

3. Download and install the latest Epic firmware from
    https://www.westmountainradio.com/exe/setup_epic_firmware.exe
    You may get a warning from Windows Defender SmartScreen regarding a potential risk. This just means that the program isn't commonly downloaded but all software from WMR is free of malware, adware and viruses. Click on the "More Info" link and choose "Run Anyway" from the next screen.

4. Connect the USB micro cable from the Epic PWRgate to a free USB port on your PC.

5. Connect DC power to the Power Supply terminal. The Battery terminal can be used instead if necessary.

Procedure (updating the firmware)

The West Mountain Diagnostic software normally starts automatically with Windows and minimizes itself to the Windows System Tray (figure 1). Click the System Tray up arrow then click on the little red antenna icon which should open the main diagnostic window in the foreground.

Examine the display and ensure you see the Epic PWRgate device and a corresponding COM port number (figure 2)
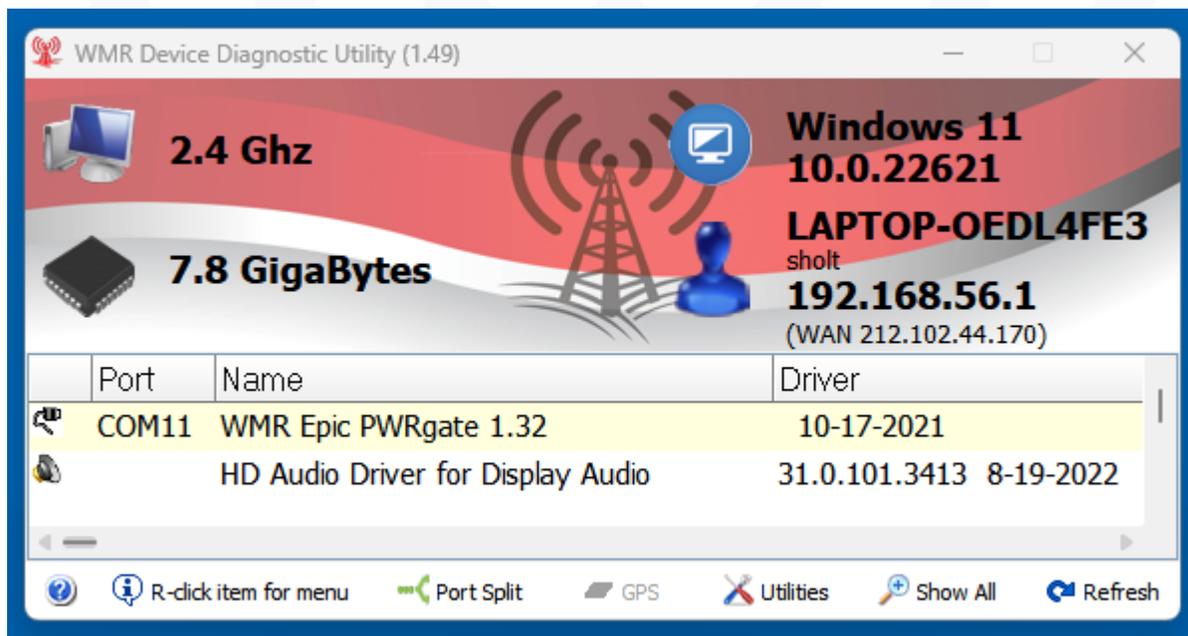
Figure 1

Figure 2

If you do not see a COM port showing for the Epic PWRgate then first try clicking on the "Refresh" button. If that fails to show the device then suspect you may be using a USB micro cable that does not have the data lines connected. Locate the USB cable which came with the Epic and continue the procedure using this cable instead.

1. Using the mouse, right-click over the COM port number and choose the menu option "Update Firmware" (figure 3)

2. You should see an information Window telling you to power off the Epic device and the procedure to enter software update mode (figure 4).

3. Remove the DC power from the Epic.
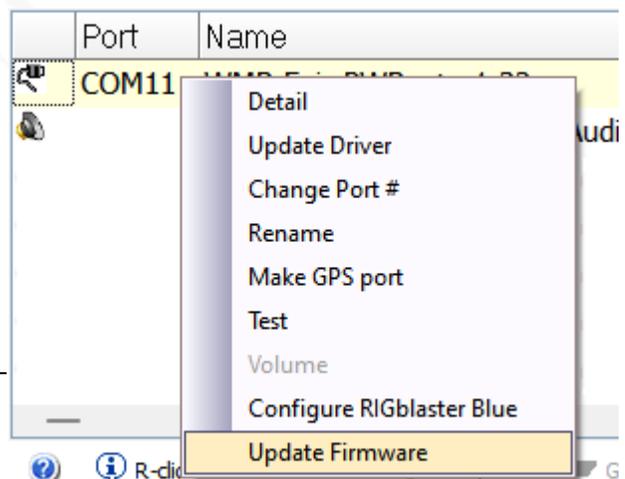
Figure 3

4. Hold down the Suspend button on the Epic.

5. While still holding down the Suspend button, reconnect DC power to the Power Supply or Battery terminal.

6. Release the Suspend button.

7. Click on OK in the information window to continue. You should see the USB Loader window appear on the screen (figure 5). The current version of firmware loaded on your Epic is shown and below that, the new version of the firmware to replace it. If for some reason you do not see your Epic you can try the "Scan for device" button. If that still fails to show your Epic then you may have made a misstep in the updating procedure. Try starting the whole procedure again.
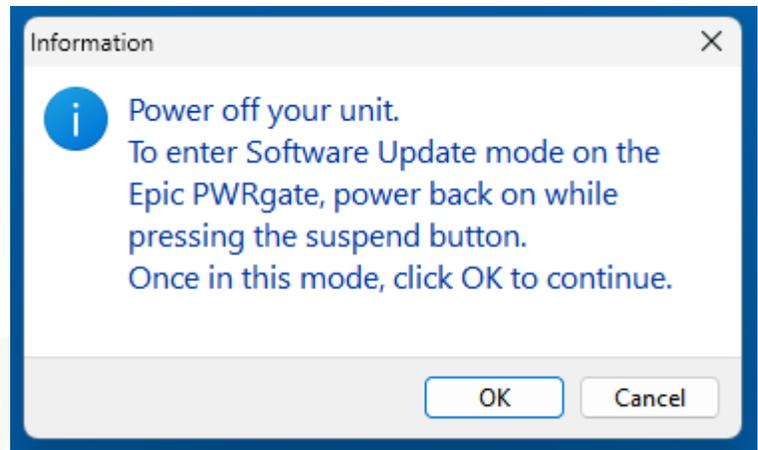
Figure 4
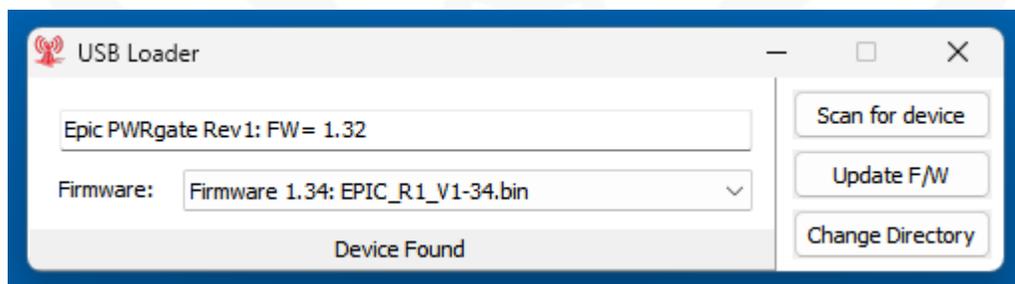
Figure 5

8. Click on "Update F/W" and you should see an update window similar to figure 6 with a green progress bar. This normally only takes a few seconds to complete.

9. When the update has finished you will get a message on the screen that the update is complete (figure 7). Click on OK.
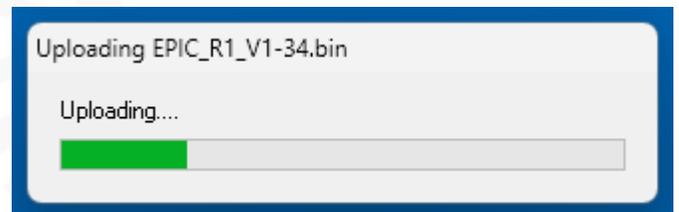
Figure 6
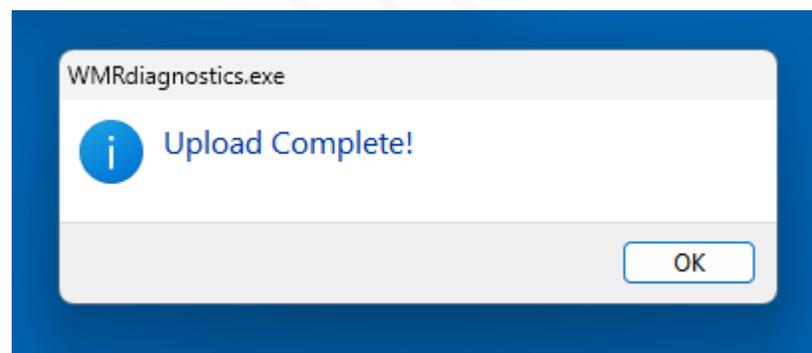
Figure 7
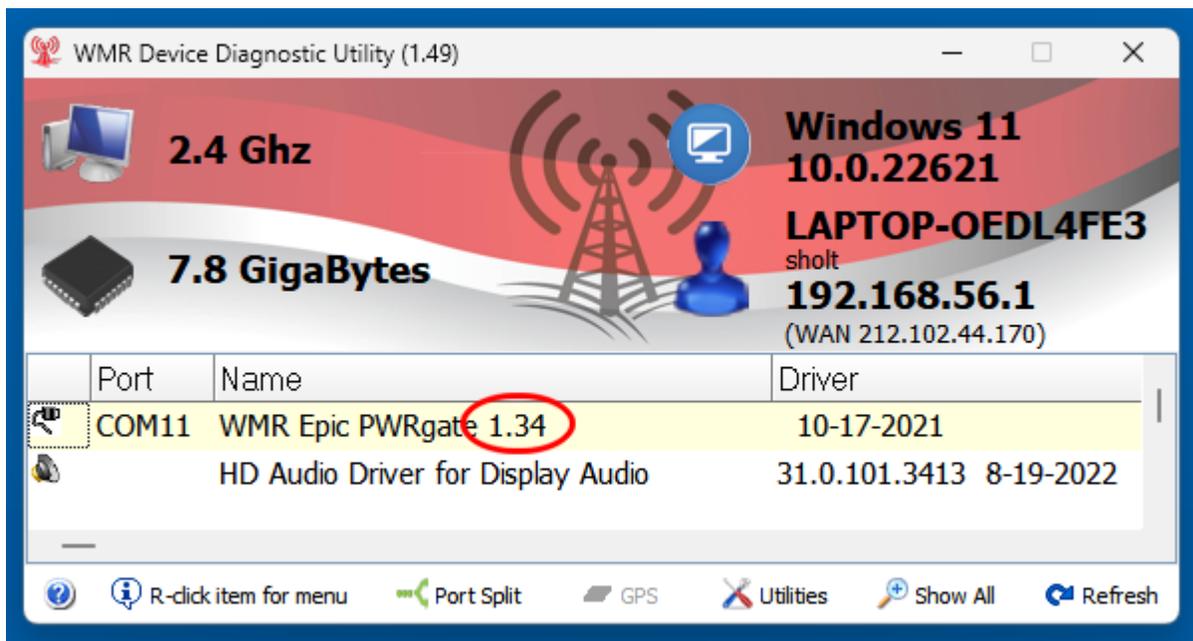
Figure 8

10. To check the firmware was successfully updated, click the refresh button in the West Mountain Radio diagnostic program and the current version of the Epic will be displayed (figure 8).

11. Remove the DC power from the Epic.

12. Remove the USB micro cable from the Epic PWRgate if you wish. Leave it connected if you plan to access the programming feature or normally have it connected to the computer.

13. You have successfully updated your Epic PWRgate and you can now restore DC power, battery, load & solar panel connections as before.

Programming the Epic PWRgate

For fine tuning the Epic PWRgate you can use the serial based programming interface. This is an entirely optional step and doesn't need to be done in most situations. Programming is done via a serial terminal program such as PuTTY, Tera Term or the one provided in the WMR Diagnostic Software.

For changes to survive power-cycling of the Epic PWRgate, both internal hardware jumpers (battery, charge rate) should be removed before programming. We suggest hanging the jumpers on a single pin to prevent losing them as shown in figure 9.

Figure 9

Connect the USB micro cable to the Epic PWRgate and your computer (if not already connected) and launch the West Mountain Radio diagnostic software as before (figure 1).

To use the serial terminal in the West Mountain Diagnostic program, right-click over the Epic PWRgate COM port and choose "Test".

This will open the serial terminal and you should start to see a display similar to figure 11. The information line will be updated every second.

Port	Name
COM11	WMR Epic PWRgate 1.34

Detail
Update Driver
Change Port #
Rename
Make GPS port
Test
Volume
Configure RIGblaster Blue
Update Firmware
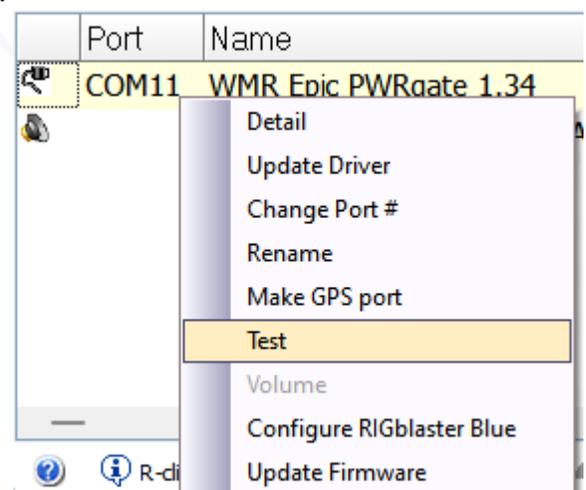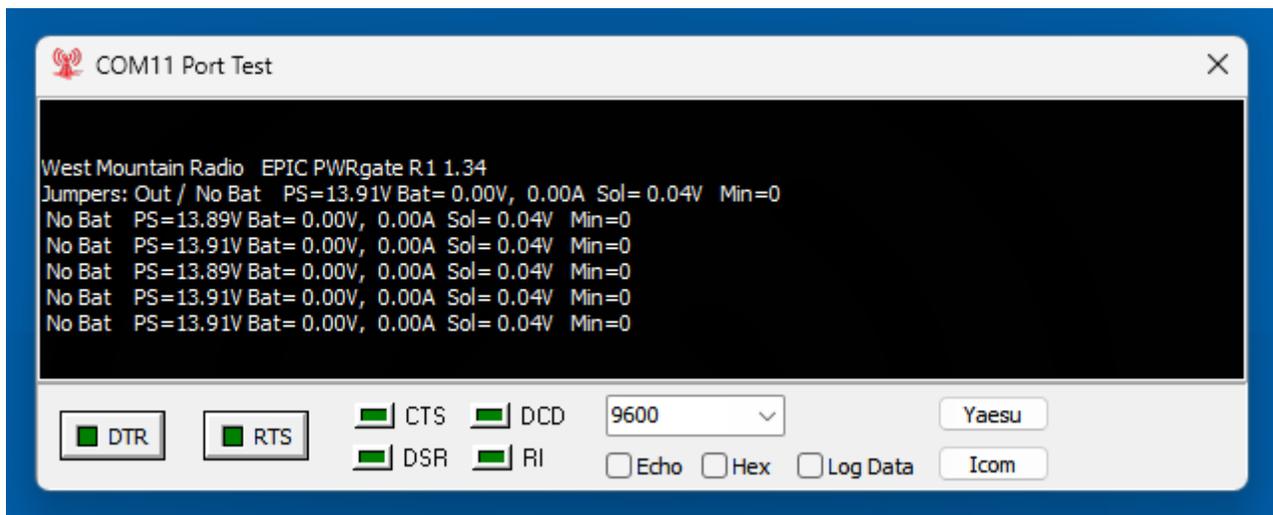
Figure 10

Figure 11

To start programming press the S key on your keyboard and the display will show a series of parameters and prompts one line at a time. The values shown in < > are default values and pressing Enter on your keyboard will select it and move on to the next parameter. All the current programming parameters are show in figure 12.
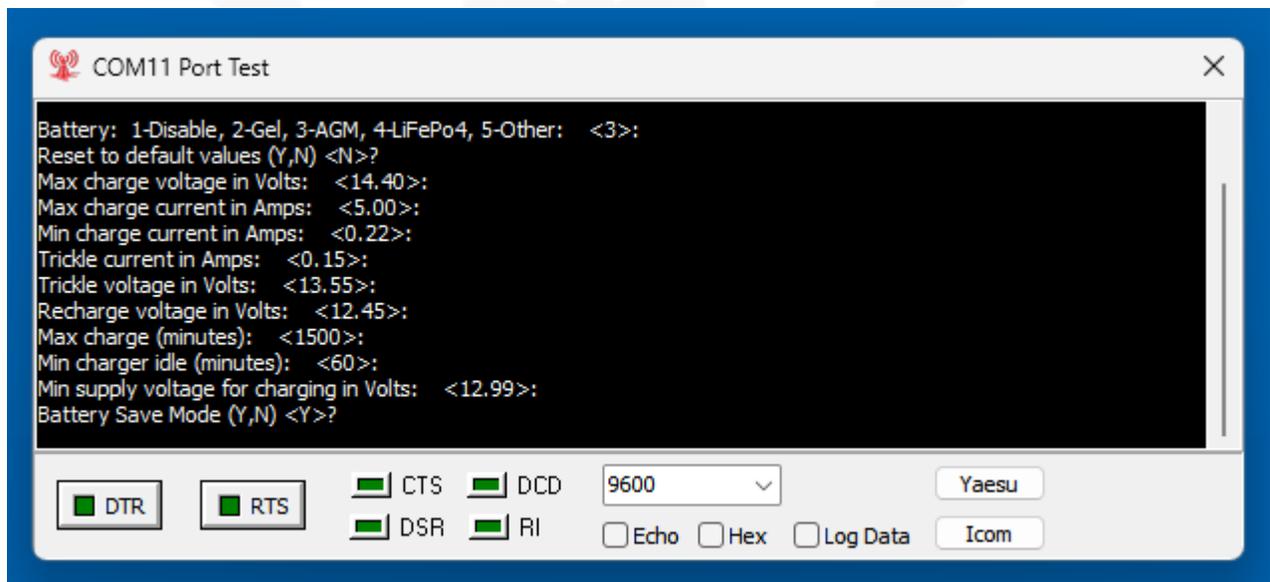
Figure 12

Refer to the Epic PWRgate manual for details of the parameters shown here.

When finished programming, close this window and remove the USB cable from the Epic PWRgate and computer if desired.

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Due to COVID-19, production has been delayed. West Mountain Radio encourages all the hams to keep communication going through these hard times over radio! Stay healthy!

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