

QRP Amateur Radio & Power Delivery

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The Article's History

- First appeared in QRPARCI QRP Quarterly, July, 2020
- Also available on NG3P.COM
- I check the comments there at intervals
- If I don't answer right away, email me ng3p@arrl.net



Field Operations: What do you need?

At a minimum:

- A radio.
- An antenna, rigging, and feedline
- A keying device (straight key, paddle)
- Logging materials
- *A power source!*

For the sake of discussion, let's assume a 5w CW QRP rig, and a POTA activation in a local park. This gives us some parameters.

QRP in the Park

- Everything needs to be lightweight
- Everything needs to be compact
- Only take essentials where possible
- Unnecessary redundancy should be avoided.
- Where possible, use multitaskers to save weight and space.

The log can be on your cell phone, and that's a multitasker. You can check weather, make phone calls, and translate code to text on it.

Power Sources

The biggest and potentially heaviest or bulkiest item is not your radio. It is your source of power FOR your radio. There are literally tons of options, but you don't want to lug a 300-pound generator to a POTA activation in the woods. Nor do you want a 10-pound lead-acid battery, nor a 6-pound, 24 Ah LiFePO4 battery.

But you could use a 2.5-pound, 12Ah LiFePO4 battery, that's much smaller!

But what about your phone? If you run down the battery in it, you can't log, can't call, can't check weather, can't decode, can't use it for digital modes...you also need a power bank for the phone!

The Power Delivery (PD) Standard

This is what I thought about this same problem: I don't want to carry a separate battery for my phone and my radio. Can't I combine them somehow? Power banks are so ubiquitous these days, it seems a shame not to be able to use one for a QRP rig.

With recent technology, Power Delivery power banks are a new option. This was my discovery.

- PD can deliver up to 20v at 3A, or 12V at 1.5-3A. If your radio can handle 15V, some PD banks can deliver 3A.
- With the right hardware, a PD power bank will power a QRP rig.

Powering a 12v QRP Transceiver

Power Delivery isn't as straightforward as a bench supply, or just plugging the power bank into your radio...yet. Right now, your radio can't talk to the power bank to tell it what voltage, current, or power it wants. You need a device in between to tell the power bank what to provide to the radio. This device is called a "PD Sink".

A sink has circuitry to specify the right power to be sent from the battery bank down the cable to the radio. Most USB-C power banks can provide 12v if asked to, but they can also supply 5v, 9v, 15v, and 20v at varying current levels.

Using a PD Sink

A PD sink is a very small PC board with input and output connections, and some way to toggle it through the power options it can supply. This can be a small button, some jumpers, or terminal communications. The one I chose uses the third option. You can talk to it with your computer to set the levels you want. I prefer this so you don't wind up sending the wrong power to the radio and damaging it.

The one I chose is the PD Buddy Sink by Clara Hobbs, from Tindie:

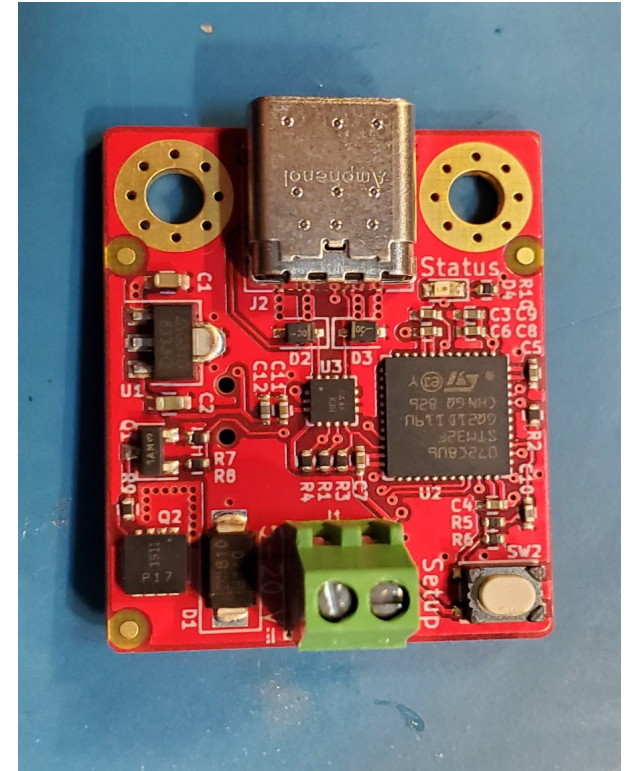
<https://www.tindie.com/products/clarahobbs/pd-buddy-sink/>

A PD/QRP Power Cable

To the right is shown the PD Buddy Sink board. At the top middle is a USB-C input connector, and at the bottom is a terminal block for the output cable. The holes at the top can be used to secure it in a case. A button at the lower right is used to reboot the board into terminal mode. Communications is done from your computer into the board via a USB-C cable.

Attach a coaxial plug, or whatever plug your QRP rig needs for 12v input, to the screw terminals. Then plug a USB-C—USB-C jumper cable between the power bank and the board, and plug the output plug into your radio.

But there are even more options!



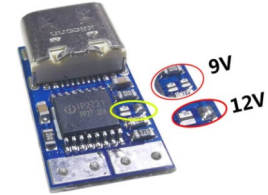
There Are Other Sink Boards Available!

The PD Buddy Sink is currently out of stock, but that's OK! There are a lot of these devices out there, small and flexible. You can easily make a 12v/5A cable with these, or even mount the board inside your QRP radio kit when you build it!

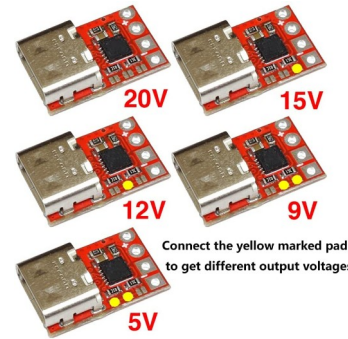
If you do other projects with different voltages, there are options for that, as well, from 5v to 20v with a jumper.



12V 5A Only



9v/12v Jumpered



5/9/12/15/20v Jumpered

All of these boards supply 5A with proper USB-C cable!

What Does It Look Like?

Here's what my test rig looked like.

I didn't have the paddles plugged in when I took this picture. A small powered speaker is at the bottom. The antenna is a QRP Guys 40m end-fed going to a tree out front.

- On the left, you see a tan box that contains the PD Buddy Sink I used.
- A coaxial lead goes to the QCX.
- A USB-C jumper goes to the RAVPower PD 3.0 Power Bank.
- You can see the radio is decoding CW in the display.



Aha! But how do I charge it?

However you'd go about charging a USB power bank! You can use a solar panel, or your automobile cigar lighter charger, or if you'll have access to mains power at some point, you can use that to charge it.

Oh, that reminds me...

PD 3.0 mains chargers have the same circuitry in them to adjust voltage, current, and power to what the sink or trigger board says to provide! Bring a tiny PD mains charger with you, and while you have AC available, use THAT to power the radio! Switch to the battery bank when you no longer have AC available, and extend your operating time!

They're also very small and lightweight!



<https://www.amazon.com/dp/B07T7M2799/>

Operating Tips

This is a very viable method for powering QRP radios up to 5A input current. But there are some things to remember when buying your gear:

- Make sure your PD power bank supports 12V output. Usually, PD 3.0 supports it, but PD 1.0 only does 5/9/15/20V. Not 12V. Check the documentation for the output voltages the bank supports!
- Buy a popular brand. RAVPower, Anker, Monoprice, are known to work properly if they specify 12V PD output. Beware cheap banks – they lie!
- Use a high-quality, high-amperage USB-C jumper meant for power rather than a lightweight data cable! Use a cable only as long as it needs to be. Short is good, especially at high amperages!

Technical Specifications:

Battery Capacity: 10000mAh

Total Output: PD 20W + iSmart 5V/2.1A (Each Port), Total 20W Max.

PD 3.0 Input: 5V/3A, 9V/2A, 12V/1.5A, 20W max.

PD 3.0 Output: 5V/3A, 9V/3A, 12V/2A, 14.5V/2A

iSmart Output: QC3.0/2.0, 5V/3A, 9V/2A, 12V/1.5A

Dimensions: 11.2 x 5.1 x 2.5cm/4.4 x 2.0 x 1.0in

Net Weight: 190.6g/6.7oz



But does it WORK?

- Others have replicated this technique, and it does work, and works well. You're going to be receiving a lot more than you'll be transmitting, and QRP transceiver manufacturers and kitters have worked hard to make the receive drain as low as possible, and only demanding greater current for really involved activity, like transmitting.
- I used a 10Ah PD power bank to operate a QRP-Labs QCX 40m transceiver for 10 hours on my bench. 90% of the time was listening, with sporadic transmitting: "NG3P TESTING...NG3P TESTING...NG3P TESTING" at intervals for 3 minutes every half hour. When the test was done, the LED indicator on the power bank showed only one increment down from full power. I've operated all of my QRP radios on this power system, just to make sure it works.
- I discovered the PD 1.0 problem of not supporting 12V out by testing various radios. Some could fall back to 9V or handle 15V so I didn't see it until I tried a radio that really wanted 12V, then checked and the power bank I was using didn't support 12V. I switched to a PD 3.0 power bank and that radio worked flawlessly.

But Why Can't I...?

- Q: “Why mess around like this? Why shouldn't I just bring my big LiFePO4 12v battery?”
A: There's no reason not to, if you are willing to carry that weight and bulk. Most people do already. But they also carry a power bank for their phone, and an LED light, and their laptop, and so on...if you're already going to carry both, why not carry a 200 gram cable and a PD power bank, then leave the big battery at home?

If you're already going to carry everything with you in the back of your car, and drive right up to your operating position, there's no real incentive to reduce the weight of what you bring. In that case, bring whatever you like to work with. This is for the ham who wants to carry a station in a fanny pack instead of a duffel bag. An EFHW tossed up into a tree, a tiny radio and an even tinier key or paddle...this is the backpacker's edition of field operation. If you want a generator, a tent, a solar array, essentially your whole Field Day setup, to activate a park, then you do you. But I want to see how small I can get it and still operate.

I usually use more gear when I go to the park, but because I'm old and disabled and want to take it easy, I like to minimize what I have to haul as much as I can.

But What About...?

- Q: “What about RF noise? Buck/Boost converters make RF noise!” A: This isn’t a Buck/Boost converter. All it does is tell the power bank what parameters to use when providing power. It isn’t a power supply board, so it doesn’t produce “birdies” like a power supply would.
- Q: “My XYZ brand power bank says it’s QC compliant. Will it work?” A: No, not with this setup. QC is Qualcomm Quick-Charge, a different standard from the Texas Instruments PD standard.
- Q: “I tried this, and it would show 12v for just a second, then switch to 9v/15v...” A: The power bank you’re using is not up to date. It’s probably PD 1.0, which for some reason skipped 12v as a valid voltage. Read the specs for the bank and make sure it provides 12V output voltage. If it says it’s PD 3.0, it probably does, but double-check.

Thank You For Listening!

That's all for now. If I discover anything new to report, I'll add it to my personal ham blog page, <https://NG3P.com>

Now get out there and do some radio! It's nice out, and we can actually leave home!

(Picture is from 2019, before all the craziness! Setup does not use the PD system because it wasn't a thing yet. Location at Norristown Farm Park.)

