WiMo PicoAPRS APRS Transmitter/Tracker

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Since I discovered the Automatic Packet Reporting System (APRS), a system for sending position reports and short messages via packet radio, I've been experimenting with ways of sending and monitoring APRS packets while on the go. Some fortuitous web surfing brought the WiMo PicoAPRS to my attention a few months ago. If you're not familiar with APRS, see the sidebar, "An APRS Primer," to learn more.

Introduction

Taner Schenker, DB1NTO, started development on the PicoAPRS in late 2014 and released the device as a commercial product in early 2016. A 2017 revision added a piezoelectric speaker to allow aural detection of packet reception. The unit reviewed here is known as V2. As we were wrapping up this review, a newer model, V3, was released. The new model uses the same firmware, but has been redesigned to be smaller and lighter. V3 receives GLONASS as well as GPS satellites, providing a quicker, more accurate position fix. It also uses a different battery and charger.

It's easy to imagine this product was the result of a personal challenge to make the smallest possible self-contained APRS transceiver. APRS trackers have been around for years, and several handheld transceivers include APRS capability, but this little device takes things to a new level. It can be taken literally anywhere.

Bottom Line

This tiny APRS transceiver gives you a rich range of capabilities for your positioning or packet radio projects.

Physical Description

The PicoAPRS comes with a well-written paper manual but no antenna. Without an antenna, the transceiver measures 1.3 × 2.28 × 0.95 inches and weighs just 1.83 ounces. To say that it fits in the hand is an understatement — I could hold four of them.

The PicoAPRS uses a standard SMA female antenna jack. For testing, I used the antenna from a dual-band handheld radio, which dwarfs the device, as seen in Figure 5. A small unity-gain 2-meter antenna is a tempting accessory to keep antenna size proportional to the device. Depending on your application, though, you may need an antenna with more gain.

A 128 × 64 pixel blue monochrome organic light-emitting diode (OLED) display is centered on the front of the transceiver. It's big enough and easy enough to read, even with my middle-aged eyes. There simply isn't room for a larger display in this tiny device, but usability does not suffer from it. Two control buttons, which I'll discuss shortly, are just below the display.

The bottom panel contains a micro-USB port to allow connection of a universal serial bus (USB) cable. This port is used to charge the internal 850 mAh lithium-polymer (LiPo) battery, which powers the device for several hours. The manufacturer advises that this battery is a standard 902540 model, commonly used in quadrocopters, and so should be readily available. The new V3 model uses an NP-48 battery commonly found in FujiFilm digital cameras.

The micro-USB port can also be used to update the device's firmware, or to connect to it as a KISS-mode terminal node controller (TNC). The manufacturer advises that approximately half of the computing engine's storage space is used with the stock firmware, leaving room for future features.

Figure 5 — The PicoAPRS has a standard SMA female antenna jack and can be used with any 2-meter antenna. Here it's shown with the flexible antenna from the author's dual-band handheld transceiver.

An APRS Primer

The Automatic Packet Reporting System (APRS) was devised in the late 1990s by Bob Bruninga, WB4APR. At its simplest, it's a telemetry system that allows the transmission of position packets from hams, either directly to other amateurs, or via a digipeater that repeats the packets (presumably with superior range and power). Modern digipeaters often relay the packets to the internet by serving as an IGate, or internet gateway. You can look up the position of hams transmitting APRS beacons online at **aprs.fi**.

APRS can be a lot more than this. It has a useful message feature that lets you send and receive messages. Digipeaters and IGates can get messages to hams far out of your VHF radio range. And while APRS is usually used on the 2-meter band (monitor 144.390 MHz for traffic near you), it can also be used on HF, which can be especially useful in isolated areas far from digipeaters.

Bob Bruninga has a comprehensive website at **www.aprs.org**, and some searching will reveal a wealth of other information sites. Many ham radio transceivers have built-in APRS capability, and radio gear dedicated to APRS activity is quite easy to find.

The transceiver is truly self-contained. A 1 W radio for the 2-meter band provides transmission and reception capability for APRS packets (and packet radio in general; more on this later). The radio can also be set to 0.5 W if battery life is a consideration, or if you don't need full-power output. Most of my testing was done at the 0.5 W setting. According to the manual, the transceiver has a seven-pole harmonic filter to suppress unwanted emissions. ARRL Lab testing confirmed that the PicoAPRS has 1 W RF output and complies with FCC spectral purity requirements.

The computing engine runs on an ATmega1284p chip, popularly used in Arduino applications. A global positioning satellite (GPS) receiver completes the package. You can even use the transceiver as a simple GPS mouse for your computer through its USB port.

Operation

This device may look like a toy, but it packs quite a punch. Once you add an antenna, it literally has everything needed to act as a mobile or portable APRS transceiver. The internal GPS receiver picks up signals quickly. Even in my dining room at home, it locks onto the signal within just a few seconds of powerup — much more quickly than an amateur handheld transceiver I used for some of the APRS testing. Once you configure your call sign and APRS suffix, you're ready to go.

You may first want to check to see if there is new firmware available for the device (**www.picoaprs.de/downloads.html**). I updated my device twice after receiving it, first to version 006 and later to version 007. Updating requires a little bit of computing experience, but it's not too difficult, and can be done on Windows, macOS, and Linux systems. As a Linux user, I appreciate this flexibility.

To turn on the device, press and hold either of the two control buttons. The display will run through a few startup screens, but this takes only a few seconds. The PicoAPRS menus are quite obvious. I had to figure out some of the tricks of navigating the menus, but was able to do this without the manual. (Of course, I read the manual shortly after because I didn't want to miss anything, and I recommend that you do the same — it's quite well-written.)

The most important initial settings are your call sign, time zone (set as a UTC offset; don't forget to adjust this if your area observes daylight saving time), transmit power, measurement system (miles or kilometers), and the APRS frequency you wish to use. In Canada and the US, we use 144.390 MHz — be sure to set this parameter, as the device uses the European frequency as a default.

Menu options allow you to review a log of previously received packets, which is quite convenient. By default, incoming packets display until dismissed, so you won't miss seeing one.

There is an interesting messaging feature built into the device. APRS supports sending short text messages to other APRS stations. This feature works well with one major caveat — entering messages on a two-button keypad is very tedious. I would not recommend it for anything but very brief messages. On the other hand, you can have a received message and call sign of the sending station played in Morse code on the PicoAPRS's piezoelectric speaker. I can see this being useful in situations where looking at the display would be difficult, for example, in a car or when cycling.

A similar feature will allow you to send email to the internet via the **aprs.fi** internet email gateway. Again, this is a tedious procedure, but considering that you only need to be in APRS IGate (internet gateway) range to make use of it, I can see it having some potential useful application.

The micro-USB port on the device is used primarily for charging the built-in battery, but via the menus, you can configure the PicoAPRS to act as a GPS receiver for your computer or as a KISS-mode terminal node controller. The former is probably better done by a dedicated device, but again, if you need this capability and have the PicoAPRS handy, it's nice to have the option. Conversely, I think the TNC capability is very useful. You could easily use this capability to set up a temporary digipeater and IGate (or even a permanent one, if low power is sufficient) in a region without proper

coverage. I gave this a try at the International Hamfest at the International Peace Garden on the North Dakota-Manitoba border last July.

To cap everything off, there are a couple of built-in applets that let you display your speed in knots, miles per hour, or kilometers per hour, as well as a compass feature that also shows your forward speed in a smaller font.

Final Thoughts

I picked up the PicoAPRS thinking that it might be interesting to play with, but now my mind is swimming with possibilities about how to use it. You can use APRS while cycling, walking, driving in a rental car, or operating from a hotel room while traveling. Setting up a short-range digipeater or IGate when you're visiting a rural area is easy with APRS, as is setting up packet reporting on your drone or high-altitude balloon. You could even use it to set up a packet radio bulletin board system on a budget, thanks to its TNC feature. While this isn't the least expensive APRS device out there, it gives you a lot in an incredibly small package.

Manufacturer: WiMo Antennen & Elektronik GmbH, **www.wimo.com**; developed by Taner Schenker, DB1NTO; **www.db1nto.de**. Available from Ham Radio Outlet, **www.hamradio.com**. Price: $229.95.