Product Reviews

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WiMo PicoAPRS Version 4 APRS VHF Transceiver

AnyTone AT-D878UVII Plus DMR/FM Handheld Transceiver

The AlexLoop HamPack Portable Magnetic Loop Antenna

Metropwr FX775 Power/SWR Meter with FX3 kW Coupler

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Product Review

WiMo PicoAPRS Version 4 APRS VHF Transceiver

Reviewed by Steve Ford, WB8IMY
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WiMo's PicoAPRS, version 4, is the smallest, lightest handheld transceiver I've ever encountered. It is slightly larger than a box of wooden matches (see Table 1).

Its name can be misleading, as you may be tempted to regard the PicoAPRS as just another Automatic Packet Reporting System (APRS) tracking device. While it can certainly serve that purpose, the PicoAPRS is a 2-meter FM voice transceiver as well.

Developed by Taner Schenker, DB1NTO, the PicoAPRS packs an abundance of features into its tiny enclosure. For APRS applications, it includes a sensitive GPS receiver, a KISS terminal node controller (TNC), Wi-Fi and Bluetooth wireless control, and APRS IGate and digipeater functionality. For voice operating, you have 21 memory slots, receive-channel scanning, the usual side-mounted push-to-talk (**PTT**) button, and a minuscule, but surprisingly loud, speaker.

The PicoAPRS spans 144 to 148 MHz and offers either 0.5 or 1 W output. Everything is powered by an internal 850 mAh lithium-ion battery. Depending on how often (and how long) you are transmitting, the battery provides up to about 10 hours of operating time.

The transceiver sports a colorful 240 × 240-pixel display. While some of us must occasionally resort to eyeglasses to read the screen, I found it to be sharp and quite bright — so much so that my glasses usually remained in my pocket while I was using the PicoAPRS.

It is important to point out that the display is not a touchscreen. Instead, you must use the five-position joystick control below the screen to navigate the menus and make selections. Navigating in this fashion isn't intuitive, and it took a while for me to become accustomed to it.

Curiously, the PicoAPRS lacks two critical components that require additional purchases: an antenna and a USB-C cable. The radio is often depicted in advertisements with a flexible "rubber duck" antenna, but you won't find an antenna when you open the box. For this review, I purchased an antenna from Amazon for about $10. Any antenna will do if it has a male SMA connector. I also had an SMA-to-SO-239 pigtail adapter that I used to attach the PicoAPRS to my mobile and home antennas.

You'll need a USB-C cable to charge the battery and communicate with the built-in TNC (unless you use the wireless function). These cables are commonly available for just a few dollars.

FM Voice

A 3-second push on the **PTT** button powers up the PicoAPRS. To operate in voice mode, you must select **FM VOICE** via the menu system. You can program a frequency and operate simplex straightaway in this fashion. However, repeater operating requires you to first program the PicoAPRS memories to designate the transmit frequency, receive frequency, CTCSS tone frequency, etc. This can be done through the PicoAPRS display, but it is easier to accomplish via a wireless connection. For wireless access, you must configure the radio's built-in web server for the network you will be using, such as one in your home. Select your network, enter the network password, and PicoAPRS

Bottom Line

The WiMo PicoAPRS APRS VHF transceiver is a remarkable feat of technology, with functionalities that have been squeezed into an ultra-compact and ultra-lightweight radio.

will connect automatically and display its assigned IP address, such as 192.168.0.25 (see Figure 1). Alternatively, the PicoAPRS will provide a QR code that you can scan with your smartphone, which is even easier.

Once the web server is active, you can go to any computer on your network, open a web browser, and enter the IP address. From this screen you can program each memory slot. When you click **SAVE**, everything will be stored in the PicoAPRS memories.

With the memories programmed accordingly, it is easy to select the frequency combo for the repeater you desire. You can even scan through the memory channels. In voice mode, volume and squelch levels are shown on the screen and are adjustable via the joystick control.

Despite producing only 1 W maximum output, I was able to reliably reach any local repeater (see Figure 2) using just the flexible antenna. I received excellent reports with several comments on my clean transmit audio. Unfortunately, the PicoAPRS lacks ports for external earphones or microphones, which might be an issue when using the radio in situations where there is significant ambient noise.

Table 1
WiMo PicoAPRS Version 4 APRS VHF Transceiver, serial number 132582542771764

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: 144 – 148 MHz.	As specified.
Modes: FM voice, APRS.	As specified.
Power requirements: 3.7 V – 850 mAh lithium-ion battery.	As specified.
Transmitter	**Transmitter Dynamic Testing**
Power output: 1 W.	1 W at 3.7 V dc (full charge).
Spurious signal and harmonic suppression: Not specified.	> –60 dB. Meets FCC requirements.

Size (height, width, depth): 2.6 × 1.4 × 0.9 inch. Reviewed antenna, 6 inches.
Weight: 2 ounces.

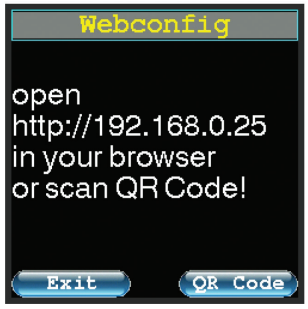

Figure 1 — The PicoAPRS offers a built-in web server that can connect to any Wi-Fi network.

Figure 2 — The PicoAPRS in FM voice mode.

APRS

If you are unfamiliar with APRS, it is a digital mode that is commonly used for tracking moving objects, text messaging, and other types of data exchange (such as information from automated home weather stations). Object positions and information are typically displayed on software-generated maps.

In tracking applications, position data from GPS satellites is encoded into bursts of data that are transmitted on a regular basis, such as once every 60 seconds (transmit timing can be selected through the PicoAPRS menus). These are simplex transmissions usually occurring on 144.390 MHz.

If an APRS station, such as a digipeater, receives your transmission, it will relay the information to other stations in the area that may also pass it on to the internet.

For those already knowledgeable about APRS, I should mention that the relay path is fixed in the PicoAPRS at WIDE1-1, WIDE2-2, except when you select the International Space Station packet digipeater frequency of 145.8250 MHz. At that frequency, the path defaults to ARISS, WIDE2-1.

During this review, I found that the PicoAPRS could acquire signals from enough GPS satellites to determine my position within a minute or so after turning it on. The satellite antenna system icon flashes on and off in the display and then becomes steady once the receiver has a "fix."

The screen can display a surprising amount of APRS information, showing position messages, status messages, text messages, and more (see Figure 3). Through the menus you can see information for the last stations heard, including distance and compass direction. The PicoAPRS will also display your GPS coordinates and even your speed.

If you hope to have your APRS transmissions relayed throughout the network, I'd strongly recommend using a suitable antenna. If you rely on only a flexible antenna, you will likely discover that reports of your position will reach the network only occasionally. I had the best results with the PicoAPRS attached to my mobile antenna.

Another cool feature of the PicoAPRS is its ability to connect to a computer, smartphone, or tablet via a wireless Bluetooth link. If you have APRS software running on your device, you can access the PicoAPRS TNC and use it to send and receive APRS data. To test this function, I used the APRS.fi app on my Apple iPad. Once I had established the Bluetooth connection to the PicoAPRS, local APRS activity began appearing on the tablet in all its colorful glory (see Figure 4). With the PicoAPRS connected to my outside antenna at home, I had total access to the local network through my nearest APRS digipeater.

Figure 3 — Receiving weather station data via the local APRS network.

The PicoAPRS can operate while being powered through the USB-C cable. That being the case, you could use the radio as the core of a permanent home APRS station.

I should also mention that the PicoAPRS wireless connection capability allows you to update its firmware via the internet. This is easily done through the menu system. When the developer adds new features, you can update your radio within minutes.

WiMo offers a detailed user manual that explains all the functions of the PicoAPRS. You can download it as a PDF file at **www.wimo.com/en/picoaprs**.

The SOS Function

The PicoAPRS includes a clever emergency function. With luck, you'll never need to use it, but should you find yourself in a life-threatening situation, you need only press and hold the center button for about 5 seconds. This activates the SOS function, which will switch the PicoAPRS to APRS mode (if it isn't in that mode already). Transmit power will be set to maximum, and the PicoAPRS will send an APRS emergency message with your position. It will repeat this emergency message every 60 seconds.

A Remarkable Radio

While the PicoAPRS is a tiny transceiver, its hefty cost may raise some eyebrows. We tend to associate small size with small cost, but that isn't the case here. However, in my opinion, the value proposition justifies the price. In the PicoAPRS you get not only a full-featured APRS transceiver (that can also function as a digipeater, by the way), but you also have a capable 2-meter FM voice radio. The fact that all of this functionality has been squeezed into an ultra-compact, ultra-lightweight radio is a remarkable feat of technology.

Manufacturer: WiMo Antennen und Elektronik GmbH, Am Gäxwald 14, 76863 Herxheim, Germany, **www.wimo.com**. Price: $399.99.

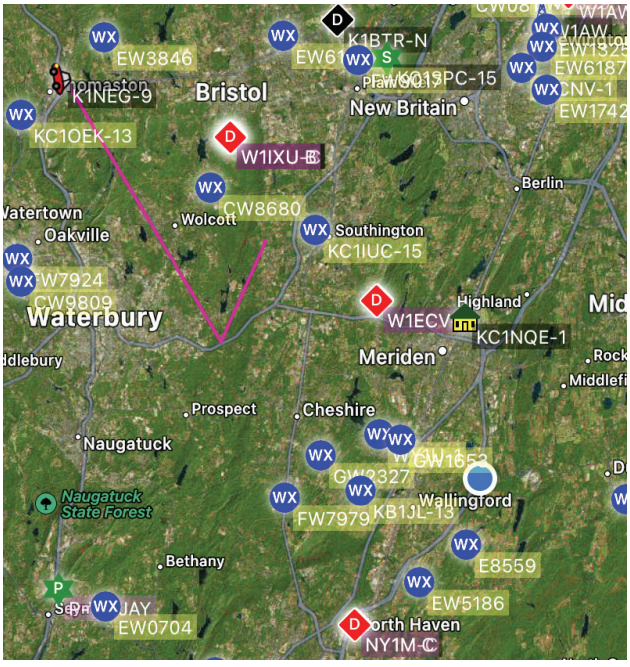

Figure 4 — Using the APRS.fi app on my tablet, I could connect to the PicoAPRS's internal KISS TNC via Bluetooth and monitor local APRS activity.

AnyTone AT-D878UVII Plus DMR/FM Handheld Transceiver

Reviewed by Martin Arsenault, VE2BQA
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The AnyTone AT-D878UVII Plus is the evolution of the popular AT-D878UV, reviewed in the July 2019 issue of *QST*. Like its predecessor, its robust appearance is quite impressive. It's relatively small (see Table 2), weighs 11.2 ounces, and holds well in hand. The manufacturer has paid particular attention to the finish, which is very high quality.

This review will cover only the improvements made with this version II, like the APRS reception capability, Bluetooth operation with its external **PTT** button, and internal contact memory expansion. I will also cover the customer programming software (CPS). It's important to note that the firmware used for this review may not be the latest, as there are frequent updates, so the features and their location in the CPS menus may be different in the newest firmware versions.

Overview

The AnyTone AT-D878UVII Plus comes with many accessories in the box, as shown in Figure 5. It includes a 3100 mAh battery, a desk charger with its AC adaptor, a belt clip, a wrist strap, a dual-band antenna, a USB programming cable, a PTT Bluetooth button with an elastic strap, and a micro-USB charging cable. As for the documentation, you'll find two printed manuals — one for Bluetooth, and the operating manual.

Most of the AT-D878UVII Plus specifications are the same as those of its predecessor, the AT-D878UV Plus. The dual-band radio reception covers 136 – 174 MHz and 400 – 480 MHz. The RF power is programmable in four levels: 7, 5, 2.5, and 0.2 W for the VHF band, and 6, 5, 2.5, and 0.2 W for the UHF band. The display is the same as the previous model, with its customizable 1.77-inch color LCD. The radio is DMR Tier I and Tier II compatible and can hold 4,000 channels and 10,000 talk groups. It has 250 zones, with 250 channels per zone. This version can now handle up to 500,000 contacts in its internal memory. The DMR Radio ID database (**www.radioid.net/database/search**) contained more than 240,000 entries the last time I checked, and this radio can accommodate twice as much. You can upload the full DMR contact list into the radio, with spare room for years to come.

Connecting the Radio to a Computer

You don't need a computer to start using this radio. You can easily program a new channel and start using it in analog mode, but it's highly recommended to check the configuration with the CPS software. If you want to use the radio with digital mode or APRS, you should use the CPS. Personally, when I receive a new radio, I always pass through all of the parameters and functions in the programming software. It's a good way to be sure not to forget a setting.

Programming the radio using a Windows PC with the CPS software was easy. The USB programming cable supplied with the radio doesn't need a specific driver. You just plug the USB cable into your computer and wait for Windows to install the proper driver. You'll get a notification in the system tray that a new device has been found, and another notification when the device is ready to operate. Unfortunately, the CPS software is available for only the Windows operating system.

Working with Bluetooth

AnyTone's hands-free approach is interesting. The **PTT** button can strap on your finger or anywhere else in your car, and you simply push with your fingertips to start transmitting. Using Bluetooth, you can pair the radio with an external audio device, like your car's hands-free system or a Bluetooth headset, and with the remote Bluetooth PTT, you have a nice hands-free solution.

Bottom Line

The AnyTone AT-D878UVII Plus offers added value compared to the first version of this radio. It can now receive and transmit APRS, and can store up to 500,000 contacts in its internal memory. It's a high-quality dual-band radio that also supports Bluetooth audio operations.

Table 2

AnyTone AT-D878UVII Plus, serial number 1236213101130, FCC ID# T4KD878UVII, Firmware Version 3.01

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 136 – 174, 400 – 480 MHz.	Tested in the 2-meter and 70-centimeter amateur bands.
Modes: DMR, analog FM.	As specified.
Power requirements: 7.4 V dc, ±20%.	Receive, 340 mA (max volume, max backlight); (3100 mAh battery); 325 mA (max volume, min backlight); standby; 80 mA (standby, backlight off); transmit, 146 MHz, 1.85 A (turbo),1.46 A (high), 0.97 A (med), 0.38 A (low); 440 MHz, 1.86 A (turbo), 1.43 A (high), 0.96 A (med), 0.40 A (low), power off, <1 mA 3100 mAh battery at 8.3 V dc (full charge).
Receiver	**Receiver Dynamic Testing**
Sensitivity: For 12 dB SINAD, ≤0.25 μV (wide), ≤0.35 μV (narrow).	FM, for 12 dB SINAD, 0.16 μV (wide), 0.13 μV (narrow); 162.4 MHz, 0.15 μV; 440 MHz, 0.15 μV (wide), 0.15 μV (narrow); 100 MHz (WFM), 0.72 μV.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset, 146 MHz, 59 dB, 440 MHz, 58 dB; 10 MHz offset, 146 MHz, 70 dB, 440 MHz, 65 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	146 MHz, 85 dB; 440 MHz, 97 dB.
Adjacent-channel rejection: ≥65 dB (wide), ≥60 dB (narrow).	20 kHz offset, 146 MHz, 72 dB (wide), 75 dB (narrow); 440 MHz, 66 dB (wide), 70 dB (narrow).
Squelch sensitivity: Not specified.	At threshold, 146 MHz, 0.14 μV (min), 0.26 μV (max); 440 MHz, 0.13 μV (min), 0.30 μV (max).
S-meter sensitivity: Not specified.	For four bars, 146 MHz, 1.2 μV; 440 MHz, 0.30 μV.
Audio output: 1000 mW into 16 Ω.	507 mW at 10% THD into 16 Ω. THD at 1 V_{rms}, 3.1%.
Transmitter	**Transmitter Dynamic Testing**
Power output: VHF: 7/5/2.5/0.2 W, UHF: 6/5/2.5/0.2 W.	146 MHz, 8.7 W (turbo), 6.0 W (high), 2.6 W (med), 0.23 W (low); 440 MHz, 6.8 W (turbo), 4.9 W (high), 2.5 W (med), 0.25 W (low) at 8.3 V dc (full charge).
Spurious signal and harmonic suppression: ≥57 dB.	>70 dB; meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S-9 signal, 146 MHz, 415 ms; 440 MHz, 420 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	146 MHz and 440 MHz, 221 ms.

Specified receiver bandwidth, 25 kHz (wide), 12.5 kHz (narrow).

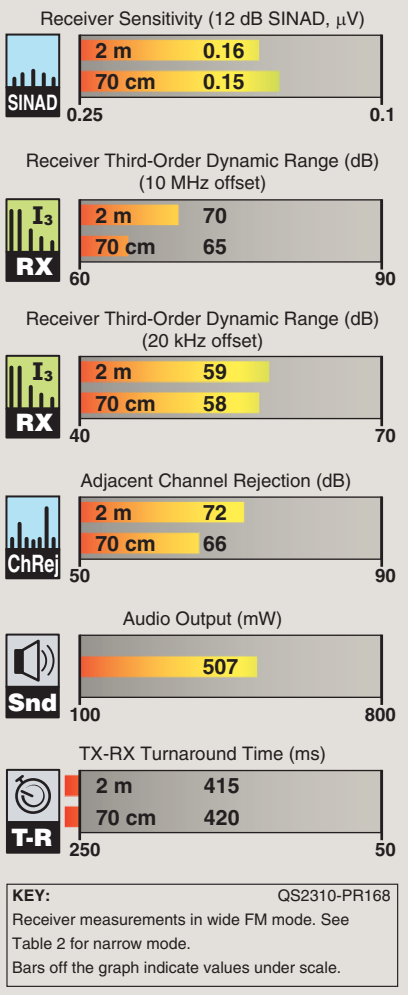
Size (height, width, depth): 5.1 × 2.4 × 1.6 inches (including protrusions).

Belt clips, add 0.2 inches to depth.

Antenna length: 7.1 inches.

Weight: 11.2 ounces (including battery and antenna).

AnyTone AT-D878UVII Plus Key Measurements Summary



KEY: QS2310-PR168

Receiver measurements in wide FM mode. See Table 2 for narrow mode.

Bars off the graph indicate values under scale.

You'll hear the audio received by the radio the same way it's received by a cellular phone. By default, when activating a Bluetooth audio device, the speaker and microphone inside the radio are deactivated.

Pairing a Bluetooth device was straightforward. The radio can connect only one Bluetooth audio device at a time, so if your earbud is in your pocket and connected to your radio, this could cause conflict when trying to connect your Bluetooth to the car's audio system.

I tried two different setups during my tests. The first one was a PlayStation Bluetooth headset borrowed from my

Figure 5 — The AnyTone AT-D878UVII Plus with the included accessories.

son. Pairing the PlayStation Bluetooth headset worked like a charm, and audio was good both ways (RX/TX). I also gave my GMC Canyon pickup IntelliLink System a try. The pairing was a little bit more complex but relatively fast. This kind of pairing uses a PIN code that you have to program in your radio. After setting the same PIN code, pairing was easy. When using a Bluetooth device, you can see which audio device is connected to the radio directly in its menu. I strapped the **PTT** button on the transmission lever to facilitate the operation from the driver's seat. I was thinking about strapping the **PTT** button directly to the steering wheel, but I found that it was not the best location while driving.

I made some contacts using the car's hands-free system, and the comments were relatively good, but the quality was not as good as if I was operating with the internal microphone and speaker. Using the hands-free system, you get the same quality as a phone call, meaning the other end will hear all the noise in the cabin mixed with your voice.

Using APRS

The radio can transmit and receive APRS analog signals, which is another improvement from its predecessor that was only able to transmit. You can set the radio to automatically send your position at fixed intervals of time and monitor other stations. Using the incorporated GPS, when you're on the move your loved ones will be able to follow you from **www.APRS.fi**, assuming your signal can be received by an APRS internet gateway. You should use the CPS software to configure the radio with the proper APRS parameters. Using the CPS in the **APRS COMMON SETTING** section, you will find all parameters to set your radio. These parameters are standard.

To receive APRS data, you should program a specific channel on the radio with APRS parameters activated. I programmed channel 42 on my radio for APRS receiving using the national APRS frequency. I set the channel in analog mode and activated the function **APRS RX**. You can set the function **ANA APRS MUTE** to mute the sound of APRS signals, and activate **PTT PROHIBIT** to prevent causing interference on the channel in case you push the **PTT** button accidentally.

The last thing to do before using the radio in APRS mode is to activate **ANALOG APRS** in the radio. You'll have to go to **APRS MENU** and enter the first setting (**UPLOAD TYPE**) to select the second option (**SEL A APRS**). This will activate the analog APRS.

After all settings are established, you can use the programmed channel to receive others and transmit your position according to the programmed interval time.

Conclusion

This radio offers a lot of high-end features. APRS transmit and receive make the AT-D878UVII Plus a great portable radio for hiking and expeditions. The included Bluetooth features make the radio even more portable-friendly. You can leave the radio anywhere nearby in your house and use only a headset and the **PTT** button to operate without having to hold the radio. Its internal memory for digital contacts lets you add the complete list of worldwide DMR users.

Although it is best to first program the radio using the CPS software, keep in mind that you can edit or add a new channel and change a parameter very easily from the keypad.

Manufacturer: Qixiang Electron Science & Technology Co., Ltd., Fujian, China, **www.anytone.net**. Available from several US dealers. Price: $314.99.

The AlexLoop HamPack Portable Magnetic Loop Antenna

Reviewed by John Leonardelli, VE3IPS
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There has been a recent surge in discussions regarding the utilization of magnetic loop antennas for low-power portable operations. These antennas present numerous advantages, including their compact size, enhanced reception with lower noise levels, and quick and effortless deployment and operation. Their small physical footprint makes them exceptionally suitable for use in apartments, RVs, HOA communities, and other constrained locations. Furthermore, magnetic loop antennas can be conveniently rotated to optimize reception and eliminate sources of noise. Typically, these antennas are mounted on camera or lighting tripods. In my case, I have previously used heavier and bulkier magnetic loop antennas, which is why I was particularly intrigued to try out the new lightweight version designed for portability, allowing for versatile usage in a variety of situations. I can now conveniently carry all the necessary equipment for my portable operations during Parks on the Air (POTA), Summits on the Air (SOTA), camping, hiking, or even while on vacation, with the loop antenna easily mounted in a window or on a balcony.

The AlexLoop antenna, skillfully designed by Alexandre Grimberg, PY1AHD, has been on the market for more than 12 years, specifically developed to meet the demand for a portable antenna compatible with the Yaesu FT-817. Over time, the antenna has undergone multiple iterations, and in my opinion, the HamPack model stands out as the pinnacle of Alex's designs. Every antenna is meticulously handcrafted by Alex himself and undergoes thorough testing prior to being shipped to customers.

Description

The AlexLoop HamPack is a remarkable magnetic loop antenna system designed to be compact, portable, and lightweight, specifically catering to amateur radio operations on the high frequency bands. Alex Grimberg has implemented several noteworthy improvements to his loop antenna, such as enhancing tuning precision, introducing a smooth geared tuning mechanism (see Figure 6), incorporating knob protection rails and an LED-based standing wave ratio (SWR) indicator, and developing a full-sized backpack capable of not just storing the antenna itself but also featuring two padded pouches for a radio and accessories. The backpack

has undergone multiple prototypes, as Alex diligently sought to discover the ideal solution (see Figure 7). It includes side pockets for convenient storage of a water bottle and snacks, making it an excellent grab-and-go option for outdoor activities. Additionally, the internal pockets are designed to securely hold the loop antenna and can even accommodate an iPad, tablet, or cell phone. The backpack features hook-and-loop straps for

Bottom Line

This AlexLoop HamPack is a great solution for operating from locations where antennas are prohibited, difficult to deploy, or temporarily placed. Radio amateurs who enjoy low-power CW and FT8 operations will also have great results with this magnetic loop.

Figure 6 — The HamPack version provides a smooth gearing tuning system with a big knob and an LED SWR indicator for fast and easy adjustment of the "sweet spot."

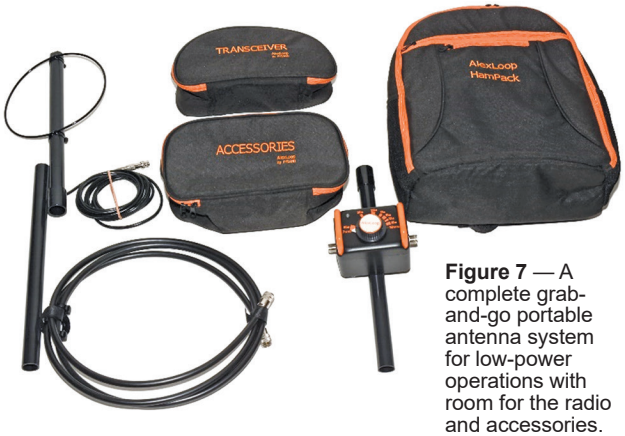

Figure 7 — A complete grab-and-go portable antenna system for low-power operations with room for the radio and accessories.

attaching the antenna and mast, robust zippers, and water-repellent fabric. Personally, I would appreciate a backpack version with MOLLE system straps that would allow for attaching a camera tripod.

Setting Up the Antenna

Assembling and disassembling the antenna are a breeze, taking just 2 minutes, and the AlexLoop HamPack offers a simple tuning method that ensures a low SWR, thereby maximizing the time available for radio operations. I have successfully used it with popular low-power radios such as the Icom IC-705 and Yaesu FT-817/818, both of which lack a built-in antenna tuner. I have also tested it with an IC-7300 in a fixed location.

This magnetic loop antenna provides coverage for the 40- through 10-meter bands and boasts a 3-foot-diameter loop, making it an excellent choice for individuals operating in restricted locations where larger antennas may not be permitted. Like many magnetic loops, it is specifically designed for low-power operations and has a power rating of 10 W on CW/digital/FM and 25 W on SSB. The included coaxial cable comes with a BNC connector, though a mounting bracket for the antenna mast is not included. Personally, I utilized a camera tripod and experimented with various other mounting arrangements. I even created a simple tripod mount for the antenna mast using PVC tubing and a ¼-inch threaded coupler. It is worth noting that this antenna exhibits a high Q factor, meaning that antenna adjustments need to be made as the frequency changes, emphasizing the importance of having the controls within easy reach. It is not intended for placement on an 18-foot mast or in the attic.

Operation on the Air

I conducted a series of tests with the antenna in various typical scenarios, using different radios that align with my operating preferences.

Equipped with the grab-and-go backpack, the Yaesu FT-818, and a flask filled with espresso, I embarked on an urban hike toward a nearby park. Upon finding a suitable picnic table, I effortlessly mounted the antenna on a lightweight camera tripod and assembled it within minutes (see the lead photo). Adjusting the antenna to the optimal position is a straightforward process. By referring to the printed faceplate frequency guide, I fine-tuned it for 20-meter operation and sought to achieve maximum noise reception. When I engaged CW mode on my radio and pressed my Morse key, I adjusted the tuning for maximum LED brightness. I was pleasantly surprised to find that, with the radio's power set to 5 W, I could successfully make a CQ call from Maple, Ontario, that reached Pennsylvania with an SWR of 1.5. I also checked the performance on 10 meters and made the necessary adjustments to maximize noise reception, which allowed me to hear several CW beacons. Rotating the loop proved to have the desired effect in terms of directionality.

These types of antennas exhibit reduced efficiency, as expected due to their small and compact design compared to full-sized antennas. However, I found that the magnetic loop antenna provided a quieter reception compared to an end-fed antenna, despite the weaker signal strength of 1 or 2 S-units. At low-power levels, one should not expect to receive signal reports of 59+20, as operators employing 1000 W setups with beams and dipoles may achieve. Considering this, the initial test results were quite positive.

During a recent POTA activation, I had a highly successful experience using the loop antenna on 20 meters while running 10 W on SSB. I effortlessly made 10 contacts for the activation, thanks to the antenna's performance. The ability to rotate the loop greatly improved reception and allowed me to null out noise originating

from a nearby dirty power transformer. What I particularly enjoyed was the convenience of driving up to the park, setting up the antenna within minutes, completing the activation, and swiftly packing up to continue on my way. This efficiency enabled me to consecutively activate several parks without the need to spend time attempting to hoist a 66-foot wire into a tree.

For my third operating scenario, I opted to operate at a friend's townhouse located in an HOA neighborhood. This time, I brought along the IC-705, running at 10 W. We set up the antenna on the patio table, and the results were impressive. By rotating the loop, we were able to establish contact with Europe on 15 meters, receiving signal reports ranging from 5-6 to 5-7 while providing a solid 5-9 signal in return. Subsequently, we spent an hour engaging in conversation about portable operations while tuning in to the East Coast Amateur Radio Service net on 7.255 MHz. Most check-ins were received within the 5-8 to 5-9 range. As snowflakes began to fall, we efficiently packed the antenna, radio, and accessories into the reinforced padded cases.

For my fourth operating scenario, I decided to simulate using the antenna in a hotel/motel room or an apartment, where electrical noise is often a challenge for SSB operations. However, with CW and digital modes, this issue is less of a problem. To replicate this environment, I utilized my IC-7300 and placed the antenna near the sliding patio doors in our kitchen. The results were satisfying, as I could easily decode FT8 signals using the Android app. I also had the pleasure of monitoring the shortwave bands one evening, setting up at the kitchen table. The antenna's smooth gearing and large tuning knob made it effortless to maintain optimal tuning. After a few hours of listening on 40 meters to the Old Man International Sideband Society net, maritime traffic, and some SW broadcasters, I packed everything up within 2 minutes. I noticed that my wife was pleased, as her kitchen was restored to its normal state following the deployment. Moreover, I am confident that I can pack the antenna in a midsize suitcase without its backpack and utilize it at various travel destinations, such as on a balcony or even on the beach.

Lately, I've noticed some interesting activity on 10 meters, so I've been monitoring 29.600 MHz FM and 29.250 MHz C4FM using my Yaesu FT-991 in my home office with my attic antenna. During my monitoring, I heard some activity and set up the AlexLoop antenna within minutes. After swapping the antenna cable, I was able to work a station in Seattle on FM. It's important to remember to ensure your power is set to a maximum of 10 W to be within the operating range for CW and FM modes.

AlexLoop HamPack Backpack Dimensions and Information

Overall dimensions (W × H × D): 13.39 × 16.54 × 10.24 inches (34 × 42 × 26 centimeters)

Transceiver pocket: 11.81 × 4.33 × 6.70 inches (30 × 11 × 17 centimeters)

Accessory pocket: 11.81 × 5.11 × 5.90 inches (30 × 13 × 15 centimeters)

Weight: 5 pounds, 7 ounces

Backpack: Additional pockets included for cell phone/tablet and two water bottles.

Includes 8.5 feet of low-loss coaxial cable with a BNC connector for radio connection.

Conclusion

The AlexLoop HamPack antenna solution is a good choice for portable operators seeking a convenient and efficient grab-and-go antenna system. The customized backpack provided with the antenna makes it incredibly easy to transport and deploy the equipment quickly. The recent enhancements made to the original design greatly enhanced its performance.

The magnetic loop antenna is specifically designed for low-power operations and is well suited for CW and FT8 digital modes, where low power can still yield excellent readability and signal quality. This makes it a valuable tool for making contacts in situations where SSB may not be as effective.

While the antenna is primarily geared toward portable operations, it also performs admirably in fixed locations. Shortwave listeners will also appreciate its broadband coverage. It's worth noting, however, that the antenna is not waterproof, so it should not be left outdoors.

One improvement that could be made is the inclusion of a mounting bracket for the antenna. This would provide users with more options for mounting and positioning the antenna in various scenarios.

Overall, the AlexLoop HamPack antenna offers a versatile solution that can be used anywhere within the frequency range of 7 – 30 MHz, without the need to rely on trees or masts commonly required for end-fed-style antennas.

Manufacturer: AlexLoop, **http://alexloop.com**.
Price: $599.

Metropwr FX775 Power/SWR Meter with FX3 3 kW Coupler

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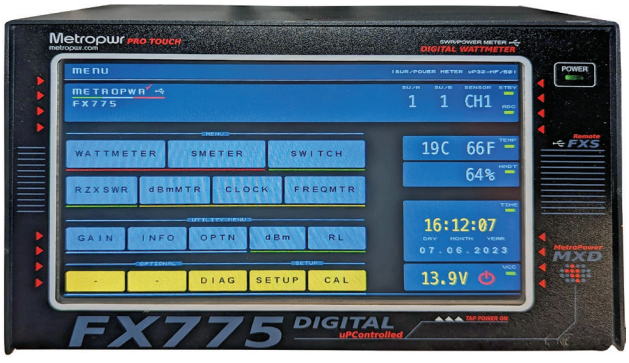
The new Metropwr FX775 measures SWR and power from 0.5 to 3000 W with the FX3 coupler (included), and 0.5 to 5000 W with the FX5 coupler, from 160 to 6 meters. A 7-inch diagonal color touchscreen displays all performance measurements and provides setup customizations. Besides measuring SWR and average power, the FX775 also measures peak power, power level in dBm, frequency, impedance (R, Z, and [X]), temperature, and humidity. And it displays power in a digital format or a simulated analog meter format. The FX775 also includes a real-time clock and a European-format perpetual calendar (day/month/year). The rear SMA connectors (see Figure 8) provide interfaces for up to two couplers, and the rear RJ-45 jacks can support up to two FX4 four-way radio/antenna remote switches. The less expensive FX773 has the same specifications but has a smaller 5-inch diagonal color touchscreen. Table 3 lists the FX775 specifications.

Using the Metropwr FX775

The FX775 arrived with the 3 kW coupler, three SMA cables (should have been two), no USB cable (should have been one), and a 5.5 × 2.1-millimeter dc connector that is easily attached to a power cable. The manual is not provided but is available online from DX Engineering. The manual notes that the dc power connection is 2.5 millimeters, but it is 2.1 millimeters. The FX775 is reverse voltage protected.

The manual states that there is an on/off switch located on the left side of the FX775, but there is no switch. The FX775 powers up automatically when dc voltage is applied. The operating current is not specified, but I measured 250 mA at +13.8 V dc when the display is fully illuminated. So, if your transceiver has a 12 V accessory port with this capability, this can provide power to the FX775 when you turn on your transceiver. If desired, you can set a time-out from 1 to 60 minutes whereby the FX775 drops to standby (screen off and minimal current drain). The unit will fully turn on when RF power is sensed. The RF coupler (3 kW and/or 5 kW) interfaces to the display with a pair of supplied SMA cables. As mentioned earlier, two couplers can be supported. The coupler's SO-239 RF input and output ports are marked on the coupler label. While the SMA



forward and reverse cable connections are not marked, the connection diagram in the manual is accurate (see Figures 9 and 10).

When dc power is applied, the FX775 powers up in the **MENU** mode (as shown in the lead photo). From the menu, you can select the display type, and wattmeter and SWR calibration menus. You can also set the clock, calendar, time-out for standby, PEP hold time, and SWR alarm threshold. As soon as you transmit, the FX775 changes the display to show power and SWR,

Figure 8 — The Metropwr FX775 rear panel view.

Bottom Line

The Metropwr FX775 provides accurate SWR and peak and average power measurements for the 160- to 6-meter bands on a bright 7-inch color touchscreen.

Table 3
Metropwr FX775 Manufacturer's Specifications

Coverage	1.8 – 55 MHz (160 – 6 meters)
Measurements	AVG and PEP W, dBm, R, Z, |X|, SWR, frequency (X is absolute value)
Power range (autoranging)	500 mW – 5 kW
HF/50 MHz couplers	500 mW – 3 kW (FX3), 500 mW – 5 kW (FX5)
SWR accuracy	<5%
Power reading accuracy	<5%
R/X/Z accuracy	<10%
ADC resolution	16 bit
Coupler directivity	30 dB minimum
Display	7 inches diagonal TFT 16 K color touchscreen
Internal menus	16
Internal clock/calendar	Analog and digital displays of time; date in European format
USB port	For firmware updates
Operating voltage	+9 to 13.8 V dc (5.5 × 2.1-millimeter dc jack)
Dimensions	8.1 × 4.7 × 4.3 inches (205 × 120 × 109 millimeters)
Weight	1.1 pounds (500 grams)

Figure 9 — The FX3 coupler RF label.

Figure 10 — The SMA F/R ports are not labeled on the FX3 coupler.

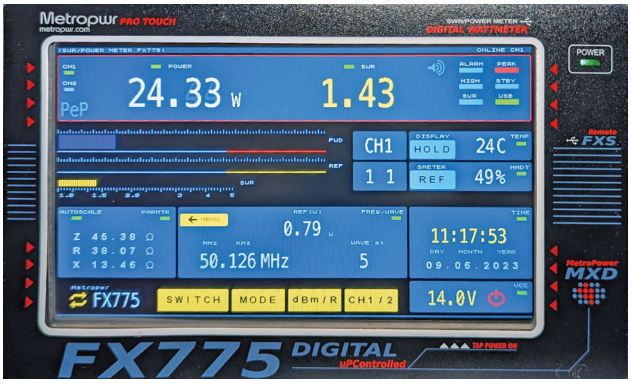


Figure 11 — The FX775 default monitoring screen.

Figure 12 — The FX775 analog power meter display.

both digitally and on bar graphs (see Figure 11). If you select **SMETER** on the main menu, the display will change to show an analog power meter display (not an analog S-meter display; see Figure 12). The FX775 does keep all settings in non-volatile memory, so the settings are not lost when power is interrupted. Incidentally, I found the touchscreen to be quite responsive to pushes with my fingernail or a stylus. It didn't respond well to a finger push.

Performance Testing

I first checked the power meter readings at several different bands and power levels. On the 160- through 6-meter bands, I used both an Array Solutions PowerMaster and a Mini-Circuits PWR-6+ power meter with calibrated attenuators for power levels up to 100 W. At the 500 W level (the maximum power available with my KPA500), I used the Array Solutions PowerMaster. My

test equipment is all NIST-calibrated, so accuracy should be within ±3%.

The minimum measured power is closer to 1 W, so it does not meet the 0.5 W specification. Other than that, the FX775 easily meets its 5% accuracy specification (see *QST* in Depth for details).

I did find that the peak power readings of the FX775 were very close to the PowerMaster peak power readings. However, the FX775 doesn't always catch the first "dit." But certainly, by the second "dit" the peak power is displayed. The FX775 can be set to hold the peak power reading from 1.5 to 6 seconds. For SWR testing, I checked the FX775 against my precision SWR test box.

For my final tests, I built two low-impedance complex loads with an SWR of approximately 3:1 at 21 MHz, and 2:1 at 50 MHz. The FX775 provided almost identical SWR measurements to the VNA2180, but the actual component measurements were not accurate.

Firmware Updates

The FX775 firmware is updatable. Currently, the updated software is for Windows PC only; however, a Mac version will be available shortly. The current installed firmware version can be found in the **INFO** menu. You can find the latest firmware at **www.metropwr.com/firmware**. The update procedure seems simple. My unit was up to date, so I didn't update the firmware. Metropwr has informed us that the PC software is available on their website, and it allows full PC control of the FX775.

A Problem Occurred

As I was finishing up the review, I spent some time experimenting with changing some of the parameters (time-out, beep on/off, meter scaling, etc.). When I exited the setup menu, I wound up with a partial main menu display with no menu items shown, and I could not get the FX775 to respond to input RF signals. I contacted Metropwr in Italy on a Saturday afternoon and almost instantly received a response from Antonio Ferrulli, IZ7LDG, the owner of Metropwr. He told me this was the first time he encountered this issue, but he was able to guide me to perform a master reset and had me access the service menu, where I was able to load the default data into the EEPROM. After that, however, I had to recalibrate the power and SWR on each band. The procedure is simple, but you need an accurate external power meter for this. Fortunately, I have the equipment to do this. According to Metropwr, they have more than 1,000 units in the field, and this is the first time this has occurred. However, it is good to know that there is a solution should this happen.

Conclusion

The Metropwr FX775 power and SWR meter is an accurate instrument that integrates nicely into any station. The large color touchscreen display is easy to see and provides a variety of measurement parameters. The only issue I had was the complex load measurements. Metropwr is looking into this and will provide a firmware update when this is resolved. For additional information, you can download the manual from the manufacturer's website.

Manufacturer: Metropwr, Italy, **www.metropwr.com**. Price: FX775 including one FX3 coupler: $729.99; FX773 including one FX3 coupler: $559.99; additional coupler (FX3 3 kW): $249.99; additional coupler (FX5 5 kW): $299.99.

See *QST* in Depth for More!

Visit www.arrl.org/qst-in-depth for the following supplementary materials and updates:

- ✓ PicoAPRS memory list
- ✓ The AnyTone AT-D878UVII Plus APRS and channel settings in the CPS
- ✓ FX775 power measuring tests
- ✓ High-power comparison with external attenuators measured SWR