Product Reviews

July 2023

National RF High-Frequency Direction-Finding System

ATS-25 Si4732 General Coverage SDR Receiver

Pascal Villeneuve, VA2PV, va2pv@arrl.org

Product Review

ATS-25 Si4732 General Coverage SDR Receiver

Reviewed by Steve Ford, WB8IMY
wb8imy@arrl.net

The ATS-25 is a radio with interesting architecture. At its heart is a Silicon Laboratories Si4732-A10 chip (5.2a MAX version) that functions as a complete receiver in a 16-pin package. The manufacturer built the ATS-25 around the chip, adding a large tuning knob, a touchscreen display, a lithium-ion battery, and several input/output connections. The result is a multi-mode receiver with coverage in the long-wave, medium-wave, high-frequency, and FM broadcast bands.

The Si4732-A10 has been showing up in several small receiver designs. In the ATS-25 it is controlled through open-source firmware via an Arduino processor using the Inter-Integrated Circuit (I2C) serial communications protocol. This means that it's possible to design custom firmware, upload it to the radio, and dramatically change how the ATS-25 functions.

Of course, the vast majority of customers will have no interest in playing with firmware; they will simply use the ATS-25 as is. The radio purchased for this review contained version 3.4 firmware. However, I have a feeling many amateurs won't be able to resist trying other firmware creations or writing firmware of their own.

The ATS-25 doesn't include instructions on how to access or modify the firmware. This is understandable, as an unfortunate mistake can turn a customer's ATS-25 into a proverbial brick. But if you feel confident in your abilities and don't mind taking the risk, you can chase down this information online. There is also a small ATS-25 group on Facebook, as well as a few YouTube videos.

The ATS-25 Package

The model I acquired for this review is compact, at only 1.88 × 4.44 × 6.13 inches. Because the radio sports its own internal lithium-ion battery, it has a somewhat dense feel, but it weighs only 0.9 pound. See the complete specifications in Table 1.

There is a sizable tuning knob on the front of the cabinet and a bright, colorful 2.5-inch touchscreen display. Even with my fleshy fingers, I didn't have a problem making selections on the touchscreen. A stylus is included to make it easier, though. Using either method, I sometimes noticed a slight lag (about 1 second) between a button contact and a response.

On the rear panel you'll find a USB-C port for battery charging, and the USB cable is included. You can charge the ATS-25 from just about any USB-equipped power source, including the types used to recharge smartphones and other devices. An adjacent LED lights up when charging, and turns off when the battery is fully replenished. My ATS-25 required about 4 hours to go from fully discharged to 100% charged.

On the rear panel there is also a **POWER OFF/ON** slide switch, a ⅛-inch headphone jack, a female BNC antenna jack, and another slide switch to select the front-end configuration for either FM broadcast or HF, MW, or LW.

The radio includes a telescoping antenna with a male BNC connector, but this is only useful for FM listening. The antenna that came with our ATS-25 had a difficult time staying vertical, falling to the right or left if even only slightly disturbed.

Bottom Line

The ATS-25 receiver has an attractive look. It is compact and includes an internal battery. It's not the best receiver on the market, but with a price less than $150, it represents an excellent option to attract newcomers who have an interest in radio.

As the instruction manual states, you must connect a different antenna for use on other bands. Otherwise, the ATS-25 is as deaf as a post. For this review, I used an outdoor multiband dipole.

The radio comes with a double-sided instruction sheet that briefly describes the primary features. It was apparently written by a non-native English speaker, and I found myself having to occasionally untangle what the author was attempting to say.

Listening with the ATS-25

When you slide the **POWER ON/OFF** switch to the **ON** position, the radio responds by first displaying a screen that shows the firmware version, among other things. Seconds later, the colorful touchscreen comes to life, and you're greeted with a few loud pops from the internal top-firing speaker.

Table 1
ATS-25 Si4732 General Coverage SDR Receiver (5.2a MAX version)

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: 0.153 to 0.500 kHz, 0.520 to 1.71 MHz, 1.73 to 30 MHz, 64 to 108 MHz (broadcast).	As specified.
Power requirement: USB power and internal battery.	As specified.
Modes of operation: SSB, AM. FM is available on the broadcast band only.	As specified.
Receiver	**Receiver Dynamic Testing**
Sensitivity (MDS): Not specified.	0.475 MHz, –120 dBm; 3.5 MHz, –124 dBm; 14 MHz, –125 dBm; 28 MHz, –124 dBm.
AM sensitivity: Not specified.	For 10 dB (S+N/N), 6 kHz BW: 1.020 MHz, 5.49 µV; 3.885 MHz, 4.16 µV; 28.0 MHz, 5.30 µV.
Blocking gain compression dynamic range: Not specified.	500 Hz BW, 20 kHz offset: 3.5 MHz, 75 dB; 14 MHz, 76 dB; 28.5 MHz, 74 dB.
Two-tone, third-order IMD dynamic range: Not specified.	Measurements noise limited at the blocking gain compression dynamic range values
S-meter sensitivity: Not specified.	S-9 signal: 1 MHz, 65 µV; 14 MHz, 76 µV.
Size (height, width, depth): 1.88 × 4.44 × 6.13 inches, including front knob and rear connectors.	
Weight: 0.9 pound.	

I began with the FM broadcast band using the telescoping antenna. The ATS-25 seemed reasonably sensitive as I tuned through the band. Even with the antenna being inside my home, I had no difficulty receiving weaker stations. The radio provides stereo reception, but you'll need to wear headphones to hear the benefit. Otherwise, the internal speaker did a decent job in mono with plenty of audio power.

The ATS-25 includes the ability to decode and display Radio Data System (RDS) information from FM broadcasts that provide it. You must activate the RDS function through the menu system. When it is operating, you see blue characters marching across the center of the display with artist names, song titles, and so on. Space is limited, so words tend to "break" at unusual intervals, requiring you to interpret the text as best you can.

On the main screen, you'll see a button labeled **PRESET**, which certainly looks promising. You'd assume it would allow you to store favorite stations and other frequencies in memory. Well, yes and no. Mostly no.

To start, the preset function works only for FM broadcast stations. That was disappointing, but then I discovered that the presets were pre-programmed to the frequencies of FM stations that I assume are popular wherever the firmware author is located. By sheer luck, a few of them happened to correspond to stations in my area. Unfortunately, the ATS-25 does not provide a way to modify preset memories. I did a little research and determined that the only way to change the presets is to modify the firmware, a task that will likely be beyond many users.

Figure 1 — The ATS-25 rear panel.

The ATS-25 offers other presets in the form of designated frequency bands. If you tap the **HAM** button, you see a list of band choices from 630 through 10 meters. In addition, you can select a band button labeled **BACON** — seriously. Perhaps the intention was "beacon," as in nondirectional beacons used for navigation. At any rate, selecting this band will allow you to tune from 280 through 470 kHz, so your guess is as good as mine. Curiously, the 40-meter ham preset spans 7000 to 7200 kHz, stopping 100 kHz short of the top end of the US amateur allocation. It is probably safe to assume that all these presets could be modified in firmware.

Tap the button labeled **BROAD** and you'll see 17 preset buttons ranging from **LW** to **CB**. The last button is labeled **SW**, and it seems to send you back to whatever shortwave frequency you chose last. Pressing the **FREQ** button allows you to enter specific frequencies manually.

There are handy buttons for selecting bandwidth, tuning steps, and modes (LSB, USB, AM, and CW). FM broadcast automatically defaults to FM, but FM is not available for any other band. They even threw in a **MUTE** button, which is convenient.

The **AGC** (automatic gain control) button is a bit of a mystery. Enabling AGC at some frequencies seemed to have no effect whatsoever, while at other frequencies the effect was quite noticeable. In fact, when browsing shortwave broadcast signals, the AGC function made the difference between listening to a clear or badly distorted signal.

Tuning through several amateur bands was an interesting exercise. On both SSB and CW, the ATS-25 was more sensitive than I expected — sometimes too sensitive. Combined with meager selectivity, this occasionally made listening a challenge. While listening to CW, I had to select the tightest bandwidth available (500 Hz) to reduce the cacophony. There is a selectable RF attenuator, but it was often helpless to mitigate gross overload and its subsequent effects. One of the most egregious examples was hearing 20-meter CW while listening to WWV at 15 MHz.

If the bands were not crowded, I'd describe ham reception as mediocre at best. That said, I liked the inclusion of a receiver incremental tuning function, labeled **BFO** in the array of buttons.

For shortwave broadcast listening, the ATS-25 seemed to perform somewhat better. The receiver was sensitive enough to pick up not only the most powerful stations, but many weaker signals as well. The ATS-25's signal-strength meter is way too generous, though. Almost every signal was S9 and then some.

Disconnecting the antenna resulted in an S4 reading. There was a significant amount of internally generated noise, so the S meter may have been responding to it.

Conclusion

The ATS-25 that was purchased for this review would be adequate for casual listening, but it has several shortcomings that limit its usability.

Getting improved performance and features requires upgrading the firmware. You can buy more advanced firmware online for a low cost; just ensure it won't brick your unit. However, as I mentioned earlier, loading new firmware is not a task to take lightly.

If you shop for an ATS-25, be sure to check which firmware version is being offered. By the time this review is published, there may be a new hardware version available online. Also, there are many different brand names out there for this unit. The brand we bought for this review is DmgicPro, and it can only be found on Amazon, as this brand doesn't seem to have its own website. I have seen several units available on sites such as eBay, with versions as low as 2.0, and some of these earlier versions can be problematic. My recommendation is to stick with the latest firmware (3.4 and higher) and hardware version.

Manufacturer: DmgicPro (the unit shows only the international amateur radio symbol), **www.amazon.com**. Price: $135.

National RF High-Frequency Direction-Finding System

Reviewed by Steve Anderson, W1EMI
sanderson@arrl.org

This direction-finding tool from National RF is a directional antenna system that allows the operator to locate noise sources in the HF and lower portions of the VHF spectrum. National RF states that the system has been used by power companies, professional noise hunters, and other communications specialists to find noise sources that emanated from pole power transformers, arcing electric fences, CATV in-line amplifiers, plasma TV screens, and grow lights.

Loop antennas have long been a go-to resource for RFI direction finding, mostly due to their simplicity and effectiveness in locating noise sources. They are bidirectional and can easily be rotated to locate signals that peak when the loop is edgewise to the noise source. Further, a deep

Bottom Line

The National RF High-Frequency Direction-Finding System works well to locate HF noise, and a good noise loop is a tool that every ham will eventually need.

Table 2
Technical Specifications
(as listed on the National RF website)

Antenna type	Amplified Faraday shielded loop with bidirectional, cardioid pattern response
Dynamic response	Approximately +6 dB compared to a dipole, amplified response
Frequency range	Loop BB — 1.8 to 3.5 MHz Loop AA — 3.5 to 8 MHz Loop A — 8 to 16 MHz Loop B — 15 to 30 MHz Loop C — 30 to 55 MHz
Output impedance	50 Ω, nominal
Output connector	Female, BNC
Controllable gain output	High- and low-gain positions
Enclosure size (height, width, depth)	1.5 × 2 × 6.5 inches
Overall height	8 inches from bottom of handle to compass top, loops not installed
Power input	Single 9 V battery, alkaline recommended

null occurs when the loop is turned 90 degrees from the peak, such that you are looking through the loop toward the source. This sharp null is extremely useful for determining the direction of a noise source.

Description

The National RF system uses a high-gain frequency amplifier coupled to tunable Faraday shielded loop sensors. They are using their own design for the AA and BB loops, allowing them to be smaller to be physically manageable on the unit. The loops cover a broad spectrum of frequencies, between 1.8 and 55 MHz. For the manufacturer's specifications, see Table 2. The unit is packaged in a handheld, lightweight metallic enclosure, with a pistol grip and a magnetic compass mounted on top. The compass can be used to get magnetic bearings to the noise source, which may be plotted on a map to triangulate, and ultimately pinpoint, the location of a noise source. National RF states that "in certain cases, our customers tell us that they have been able to walk right up to the interfering noise source and correct the situation on the spot!"

We purchased and tested the entire High-Frequency Direction-Finding (HFDF) Noise Location Package, which includes the HFDF Noise Gun (see Figure 2), five loop sensors (loop BB for 1.8 – 3.5 MHz, AA for 3.5 – 8 MHz, A for 8 – 16 MHz, B for 15 – 30 MHz, and C for 30 – 55 MHz; see examples in Figure 3), the AT-65N in-line attenuator (see Figure 4), and a 3-foot interfacing cable with BNC connectors on either end (see Figure 5). National RF states that the user should have a portable HF receiver, such as the Sony ICF-SW7600GR, or a Sangean portable shortwave receiver or similar model that contains an external antenna connection that would allow interfacing to the noise gun. National RF also recommends that the receiver has a signal strength indicator to facilitate determination of a null when the noise gun is pointed in the line of sight of the incoming signal.

While the **HI / LO** switch on the unit drops the output level to the receiver by about 12 dB, the AT-65N step attenuator can be installed on the output side of the HFDF gun, and is capable of adding up to 65 dB of attenuation in various combinations of 35, 20, and 10 dB attenuation steps.

Figure 2 — The National RF HFDF Noise Gun.

Figure 3 — Four of the five National RF loops, showing loops BB, AA, A, and part of C.

▲**Figure 4** — The National RF AT-65N in-line attenuator.

▶**Figure 5** — The National RF 3-foot interfacing cable with BNC connectors, a coax jumper, and three HF loops.

Taken together, the HFDF noise gun, tuned loops, and attenuators allow the location of a wide range of noise sources, through the ability to tune to a range of frequencies, and amplify and/or attenuate incoming signals as necessary during direction finding.

Testing and Using the Unit

First, I tested the loop using a known noisy device that we had no trouble finding in the ARRL Lab. I brought home a particularly noisy set of holiday lights, provided to us by Mark Persons, WØMH, for conducted emissions testing. As it turns out, these lights barely complied with FCC Part 15B conducted emissions limits, but they were noisy enough to serve my purpose of trying out the noise loop. As many hams may already know, the lights aren't usually the cause of the noise; it's the tiny switch mode power supplies used to power newer, energy-efficient devices, which can lack adequate filtering. This noise, coupled with 50 feet (+/-) of wiring for the lights, makes for a great transmitter and antenna.

Rather than using the recommended shortwave radios, which I'm sure would work just fine, I opted to test the loop using my Yaesu FT-818ND, as it not only covers the bands covered by the loop, but also has aircraft, VHF, and UHF, which are good to have (with other antennas) for hunting something like a power line source. An Icom IC-705 might be another good option; like the FT-818ND, it covers aircraft, VHF, and UHF bands, in addition to HF. Keep in mind that this is a receive loop, so *never* transmit into this antenna, as you will be out whatever you spent on it! If you use a transceiver for this task, I strongly recommend doing a TX inhibit, if possible.

Figure 6 — The noisy holiday lights strung up outside for direction-finding testing.

Overall, the loop performed as expected. For example, the holiday lights were found to be noisy in the 80-meter amateur band. Starting with the 1.8 – 3.5 MHz loop, I was easily able to pick up the noise from the lights (which I had strung up outside my home; see Figure 6) and determine the direction from which it was coming.

I found the process simple. Just install the loop covering the range where you want to look for the noise, and tune for maximum signal on the frequency of interest. With that, and knowing where the noise was coming from (in this case anyway), I was able to get far enough away to look for the sharp null described at the beginning of this review, and look at the overall performance of the loop. I found that even with the built-in preamp on low, I was able to pick up the noise from the lights from about 50 to 75 feet away. As I moved farther away, more amplification was helpful, especially at the edges of my property. I was also able to quickly test the attenuator and see that it functioned as expected when moving closer to the noise source.

It's worth noting at this point that when actually hunting for a noise, you will see a null not just in the direction of the noise source, but also in a direction 180 degrees opposite from the noise source. You will need to determine, through observations in the field, which is the correct direction. Once you know the direction, the compass on the loop can be used to get a line of sight to the noise.

I also tested the loop around the house, where I managed to uncover a few noisy devices, most notably my Keurig coffee maker, which I later found adds two S units to my noise floor just from having it plugged in. I have yet to troubleshoot this or try a choke on the coffee maker; instead I just unplug it if it becomes a bother.

The Results

Lastly, it was off to see how the loop performs when looking for a power line source. As luck would have it (or not), W1AW Station Manager Joe Carcia, NJ1Q, asked if I could help him locate a noise source to the north of W1AW. While we used other equipment to find the source a while back, the noise was still present, so it provided an excellent test bed to see how the National RF loop performed.

Starting at W1AW, I began by confirming the noise was still present on W1AW receivers. Once I confirmed it was still there, I proceeded outside with the National RF loop. I used the 8 – 16 MHz loop, and the FT-818 tuned to about 14.200 MHz, AM mode, where we heard the noise — though the noise was observed at higher frequencies, too. I turned on the loop from the W1AW parking lot, started with the amplifier on high, and was able to hear the noise loud and clear. I was also able to get a null on the source, which I knew to be about a half mile away. Walking along the road in the direction of the source, I found I could quickly turn the amplifier to low and still see S8 to S9 noise on my receiver. I stopped in several locations along the way to check the source direction and to add attenuation sufficient to keep my receiver from being overloaded. I confirmed the source by going past it (a single power pole, possibly with a faulty insulator atop it) and getting a null from two other directions.

Conclusion

A couple of tips, should you decide to get one of these: First, there is a power (**PWR**) button, and on at least one occasion I left it on for an extended period (at least a couple of weeks) and drained the battery, so I recommend keeping a spare handy in case you do the same. My other tip is to keep checking your tuning setting. I found that from time to time, re-peaking for maximum noise where your receiver is tuned helps with your direction-finding observations, by ensuring the knob didn't get moved while you were walking.

Figure 7 — The SDRplay SDR receiver attached to the National RF noise gun handle.

I also experimented with coupling an SDR to the loop, and would like to do more with this when I have some time. However, I was easily able to tie-wrap (you may find a better approach) an SDRplay receiver to the handle of the noise gun (see Figure 7), making it possible to use a Windows tablet computer with SDR software along with the antenna. I'm certain this is not necessarily what National RF had in mind, but this gives an additional benefit of being able to produce recordings or screenshots of an entire band (or region of a band), a valuable thing to have when searching for and/or analyzing a noise source.

Whether it's this loop antenna or another one, whether you build one or buy one, a good noise loop is a tool every ham will eventually need. Both *The ARRL Handbook* and our RFI web page (**www.arrl.org/radio-frequency-interference-rfi**) have plenty of tips on hunting down RFI.

Manufacturer: National RF, Inc., 7969 Engineer Road Ste. 102, San Diego, CA 92111, **www.nationalrf.com**. Price: Noise Location Package, including the HFDF handheld electronics package, five individual loops covering the 1.8 – 55 MHz range, a 3-foot interfacing cable, and the AT-65N step attenuator, $399.95; HFDF Noise Gun with One Customer Specified Loop, $174.95; AT-65N Step Attenuator (sold separately), $94.50; additional individual loops, $34.50 each.

Chameleon Antenna MPAS 2.0 Portable Antenna System

Reviewed by John Leonardelli, VE3IPS
ve3ips@gmail.com

I enjoy operating outdoors, whether it's for Parks on the Air (POTA), Summits on the Air (SOTA), Field Day, or just "playing radio." I have various low- and regular-power radios to use, and of course, an antenna or two. I usually pack a wire-based antenna, like a dipole, doublet, or long wire, with a 9:1 balun. I also use mobile antennas, verticals, and telescopic masts to hold up wires. Many times, the dipole or long-wire antenna cannot be used due to a lack of a nearby supporting structure.

Every outing has its challenges with how to place the antenna for the best performance. I bring out a box and bagful of antenna bits and pieces, as every radio site has different antenna requirements. I always look to deploy antennas quickly, because no one wants to spend an hour fiddling and untangling wires to get their communications out.

I always wanted an antenna go-kit that included a well-thought-out, versatile antenna system that covers all types of configurations. I have seen various Special Operations Group antenna kits for HF radios that are out of my price range. So, I tried to build my own backpack full of antennas that can be used as needed. The challenge was that everything would be ad hoc and needed to be designed so it could work together with the ⅜ inch × 24 threaded stud common with amateur radio, CB antennas, and mounts. I wanted versatility. Why? Well, I may show up at a beach and can use only a vertical antenna. A picnic table operation usually has nearby trees into which to throw a paracord for the antenna. A roadside rest stop with an operating window of only 20 minutes calls for an antenna that can be rapidly deployed.

Description

The Chameleon Antenna Modular Portable Antenna System (MPAS) 2.0 kit has various antenna components packed into a military-style backpack. I could buy what the military signals teams were using for HF communications in an affordable package. This is an MPAS that allows for quick and easy deployment of various types of antennas in the field. It comes with a range of components, including a proprietary balun, wire and whip radiators, a counterpoise, and different mounting options, allowing you to set up a vertical whip, horizontal whip, sloper wire, inverted **V** or **L** wire, near vertical incidence skywave (NVIS) configuration, or balcony rail mount. The system covers a frequency range of 1.8 to 54 MHz. Additionally, the system is available in two power levels — the Micro (100 W PEP, reviewed unit) and the Mini (500 W PEP) — so you can choose the one that best fits your power needs (see the specifications in Table 3). The system is designed for use in portable and mobile operations, and is not recommended for fixed outdoor locations, although you can use it in a stationary vehicle

[Photo courtesy of Chameleon Antenna]

Bottom Line

The Chameleon MPAS 2.0 gives the operator all the necessary versatility of configurations, allowing the antenna to be installed almost anywhere. This makes it an ideal antenna for portable and emergency operations.

Table 3
Chameleon MPAS 2.0 Antenna System

Manufacturer's Advertised Specifications (not tested by the ARRL Lab)	
Frequency coverage	6 to 160 meters (all configurations require a wide-range antenna tuner)
Maximum power rating (Micro version, reviewed unit)	100 W SSB, 50 W CW, and 25 W high duty cycle digital modes
Maximum power rating (Mini version, not reviewed)	500 W SSB, 250 W CW, and 100 W high duty cycle digital modes
Connector	UHF female, SO-239
Antenna type	Vertical whip configuration using one or both whips
	Horizontal whip configuration for NVIS operations
	Sloper wire configuration; inverted V wire configuration; inverted L wire configuration
	NVIS wire configuration; balcony rail mount using one or both whips
	Vehicle mounted (stationary use only)
	Manpack vertical whip configuration
Antenna length	Radiator wire, 73 feet
	Counterpoise wire, 25 feet
	CHA MIL 2.0 whip: 9.40 feet extended; 17 inches collapsed
	CHA MIL EXT 2.0: 8.75 feet extended; 28.75 inches collapsed
	Total CHA MIL 2.0 whip with CHA MIL EXT 2.0: 18.15 feet extended
Antenna package weight	Not specified
Mounting configuration	⅜ – 24 thread

mount. An antenna tuner may be required, depending on the frequency and the antenna configuration deployed. Chameleon took customers' feedback on the original MPAS and made improvements in the new version. I now have a solution to my problem and can bring the backpack out to the field to deploy whatever antenna I need.

I chose the Micro Balun, as I typically run between 5 and 50 W out in the field. I strongly recommend that those who plan to use this antenna system in a fixed outdoor location use an antioxidant compound on the joints to aid in waterproofing. I have operated the antenna in rain and snow and always wipe and dry all components before putting them away for their next use.

The antenna system consists of the following components:

- CHA Hybrid-Micro (reviewed version) or Hybrid-Mini balun unit
- 73 feet wire tinned copper Kevlar PTFE radiator
- 25 feet wire tinned copper Kevlar PTFE counterpoise
- CHA line winder (two units)
- CHA MIL 2.0 (113 inches long) telescopic whip
- CHA MIL EXT 2.0 (105.5 inches long) collapsible base extension
- CHA spike mount
- CHA 50 feet coax with RFI choke
- CHA military backpack
- ⅜ – 24 stainless-steel hardware

There is an optional CHA Jaw Mount clamp and a stainless-steel telescopic whip (SS17, 17 feet) that, to me, are mandatory items to complete the versatility of the kit. Chameleon is offering several variations of the MPAS kit, allowing you to choose the one that best serves your needs. Let's look at each component:

The proprietary balun serves as a mounting base as well as impedance-matching device. It uses standard ⅜ – 24 threads, so it's usable with other antenna systems and CB mounting brackets. It is used with a wire element or the telescopic whip. The antenna shackle is used with the wire elements to reduce stress with an included carabiner. An SO-239 connector is included. Chameleon plans to introduce a BNC connector version later this year.

The tinned copper wire is in a rugged Kevlar jacket; the longer wire is the radiator, and the shorter wire is the counterpoise. The included line winders are brilliant and make for easy unwinding of the wire. I used the loop configurations (186 feet; see figure 8 in the antenna manual). You can download the manual from the manufacturer's website (see **www.chameleonantenna.com**).

The military-style main telescopic whip (CHA MIL whip) is 9.4 feet and collapses to a compact 17 inches in length. You can add length if you use the CHA MIL EXT whip for another 8.8 feet. The total length of both is just slightly more than 18 feet.

With the balun mounted to the spike mount, you can deploy a vertical in the grassy field or beach, or use that as a starting point for a sloper. A knurled lug allows the counterpoise wire to be neatly connected to the spike. You can tie-wrap to a backpack or pole if needed.

Coax with an included RFI choke helps keep common mode currents out of the radio and is a thoughtful addition to the kit.

Everything is neat and organized in a true grab-and-go backpack. There is ample room for additional items to ensure you have whatever is needed in your deployment.

I added BNC coax adapters, 2 x 50-foot lengths of paracord with tent spikes, a tripod, the optional Jaws clamp, and the optional SS17 stainless-steel whip to complete the system and meet my needs. I also use a tripod and telescopic mast to round out how I can mount the balun. This is based on hundreds of exercises out in the field. As

a Canadian, I found hockey pucks make a good throw weight, but paracord wrapped around a water bottle also works.

Different Antenna Configurations

Let's explore the different use cases for this antenna system and how it can be deployed in the field quickly and efficiently.

Vertical Whip

This omnidirectional configuration is used with the spike mount or the optional Jaws clamp. I use the whip for any contacts from 20 meters and up, and add the base to increase radiated power on 20 meters and for use on the lower bands. You can also use standard mobile antenna mounts. This worked out well for a recent park picnic table operation (see Figure 8).

Horizontal Whip for NVIS Operations

This typical mobile setup should have the radiating element at a 30- to 45-degree angle for the correct NVIS angle of radiation. The Jaws clamp allows this; however, a Hustler-style ball mount or various CB antenna mounts will also work. I have made solid contacts into Michigan, Sudbury, Ottawa, and Rochester on 60 meters. See Figure 9.

Sloper Wire

I have used this with the spike, the Jaws clamp, and even the balun mounted on a tripod. Usually, the balun is at ground level, and the long wire gets tossed into a tree with the counterpoise laid out on the ground. This is also deployed with the balun up in the tree or on a military mast, and the wire slope is down. I find there tends to be a bit of directivity this way. This is my most-used POTA configuration, and in many cases I can use the Jaws clamp on a picnic table, a fence, or even a guardrail.

Inverted V and L Wire

This is no different from the sloper, except this classic antenna is deployed as the name implies. You can cover 160 meters and up in this configuration. I use this setup for the 80-meter net check-ins with the longer 73-foot radiating element. If you have space constraints, you can coil the antenna up to whatever length you require, but I find a length longer than 25 feet is the minimum to cover 40 meters.

NVIS Wire

The important part is that this antenna has the balun and the radiating wire at a height of 9 to 12 feet for proper NVIS radiation. A short military mast, or even a painter pole, solves this problem, or you can look for a suitable tree. Remember, NVIS works best on 80, 60, and 40 meters. Keep in mind that an antenna tuner is needed to get the SWR below 2:1.

Balcony Rail Mount Using One or Both Whips

A balcony rail mount is perfect for apartment/condo operators, and any antenna mount can be used against a railing. I suggest attaching lightweight paracord to all components and securing them to prevent them from crashing down to the street. I have used the MIL whip by itself with great success, making contacts in Europe on 20 meters. Personally, the use of the SS17 whip or addition of the MIL EXT is physically too cumbersome at nine floors above ground, but a MIL whip set up is ideal for bands from 20 meters and up. Now think about how easy

◀**Figure 8** — The Chameleon Antenna MPAS 2.0 attached to a picnic table.

▼**Figure 9** — The Chameleon Antenna MPAS 2.0 attached to a boardwalk.

it is to deploy an antenna on a park boardwalk using the Jaw clamp out in the field.

Vehicle Mounted or Tripod Mounted

This has been used with a stationary mount on a trailer hitch, as well as on a Hustler ball mount. I tried using the large three-magnet mount on the roof of the stationary vehicle, but it needs guying to be safe. I still add the counterpoise wire to improve grounding. Warning: do not drive around with this antenna set up, as you will hit power lines. I also use this with a Manfrotto lighting tripod. You can add additional counterpoise wires as needed. A recent example of my use of this setup involved going out on a snowmobile to an ice hut in the middle of a lake, and then realizing that there were no nearby trees or poles for hanging my antenna. No problem — a tripod and the whip got me up and running quickly (see Figure 10).

Manpack Vertical Whip

This allows the antenna to be attached to a backpack. Just thread the antenna through the MOLLE straps. I have also deployed this on Alice and Icom backpacks in stationary mode (being careful of power lines), or you can simply have the backpack on a picnic table. I have tried this with a CB mirror mount on a Pelican go-box for a simple setup. See Figure 11 for a sloper setup.

Figure 10 — The Chameleon Antenna MPAS 2.0 attached to an ice hut installation.

Dipole or Loop

Using the broadband balun, you can make your own wire elements or adapt with what's included. I could add another 73-foot wire element to make a dipole that would serve the 80- and 160-meter bands nicely. I have tried this with two MIL 2.0 element whips up 16 feet on a mast, with great results. The balun does its job of providing a suitable load impedance across a wide frequency range. Chameleon has indicated that two 60-foot wires can also be used for a broadband dipole. These items can be purchased as accessories.

On-the-Air Results

This is the most versatile antenna system I've ever used, and its components allow basically any antenna configuration you desire. You may not need to use an antenna tuner, as the SWR is typically less than 2:1 across the bands. However, depending on what you are doing, the antenna tuner may be required.

Build quality can be referred to as MIL-SPEC — to me, that means rugged components built to last, and not so flimsy that they break as you use them. I have stepped on the balun many times and thrown it into the trunk after a rainfall, and the Kevlar wire is strong and rust-free. Chameleon ensures that everything is built to be handled roughly and last for a long time. Stainless-steel nuts round out the build quality.

I have used this antenna in all its configurations, from deployment to experimentation, and have always been happy with the results. This is not necessarily a short com-

Figure 11 — The Chameleon Antenna MPAS 2.0 backpack setup.

Figure 12 — The Chameleon Antenna MPAS 2.0 9-foot SWR sweep.

Figure 13 — The Chameleon Antenna MPAS 2.0 73-foot SWR sweep.

promise antenna that will be several S units down from the standard dipole. Compared to a regular dipole or 20-meter vertical, the signal reports show comparable signal strengths. The prime advantage is that I can arrive at a site and see that there are no trees and use the vertical components. If there are trees, then I choose the sloper. If I want to do NVIS, then I can do that with a mast/pole to keep the antenna at the right height. For POTA, Field Day, or EmComm use cases, the MPAS 2.0 is a perfect grab-and-go approach. The antenna deploys very rapidly, and I can be on the air within 5 to 10 minutes — no fiddling around. Just deploy, hit **TUNE**, and make contacts. The Jaws clamp option is a powerful component that allows the clamp to be used in many ways. I heard on the local repeaters on the way to a park that 6 meters was open. When I got there, I mounted the clamp to a fence, added the telescopic element, and made contacts 5 minutes later. When I decided to switch to 20 meters, I added the counterpoise, and no additional effort was needed.

I also use the balun mount on my trailer hitch for a sloper, and can throw the wire into a tree using my hockey puck throwing aid.

Product Support

Product support has been fantastic, and with years of use, I have never had any issues with other Chameleon Antenna products. Not only does the supplied handbook provide propagation information and best-suited antenna types, but detailed configuration diagrams aid in deployment. The handbook also provides SWR and far-field antenna plots. See Figure 12 for a 9-foot SWR sweep, and Figure 13 for a 73-foot SWR sweep.

Conclusion

Now, I can grab my radio, battery box, and Chameleon MPAS 2.0 backpack, and be on my way to the radio site, knowing that no matter what I encounter, I have everything I need to get on the air quickly. Overall, the Chameleon MPAS 2.0 is a useful tool for maintaining communications in the field, providing a convenient, rugged, and portable solution for any antenna deployment scenario.

Manufacturer: Chameleon Antenna, 155 Glendale Ave. S-17B, Sparks, NV 89431, **www.chameleonantenna.com**. Price: Hybrid Micro, $600; Hybrid Mini, $625; CHA-Jaws mount clamp, $66; SS17 stainless-steel telescopic whip, $70.

MFJ-1146 RF Filtered DC Outlets

Reviewed by Pascal Villeneuve, VA2PV
va2pv@arrl.org

The MFJ-1146 is a new product from MFJ Enterprises that was announced at the 2022 Dayton Hamvention and released later that year.

An important shack accessory is the power supply (PSU) and the distribution of 13.8 V dc. The most flexible way to achieve this is by using Anderson Powerpoles for every connection. Most of today's available dc outlets, like the MFJ-1146, will provide this type of connection.

Description

The MFJ-1146 is an RFI filtered dc power strip for the 13.8 V distribution. It is capable of supplying 40 A (master fuse), and it has four fuses (30 A, 20 A, 10 A, and 5 A) associated with the Anderson Powerpole connections, and two fuses (15 A each) associated with the binding posts. In the case of a blown fuse, there's an LED indicator for each connection, letting you know which one is out. On the side of the unit, you will find a grounding connection. A good ground is mandatory to take advantage of

Bottom Line

The MFJ-1146 helps attenuate noise getting into the dc line, and it also serves its main purpose as a dc fuse distribution power outlet.

Table 4
MFJ-1146 RF Filtered DC Outlets

Manufacturer's Measurements of the RFI Suppression by Band (from the product manual)	
Band	**Peak Suppression**
160 meters	–60 dBm
80 meters	–51 dBm
60 meters	–46 dBm
40 meters	–48 dBm
30 meters	–24 dBm
20 meters	–30 dBm
17 meters	–20 dBm
15 meters	–29 dBm
12 meters	–15 dBm
10 meters	–24 dBm
6 meters	–25 dBm

the integrated RFI filter. The dc outlet measures 8 × 1.25 × 2.75 inches. The PSU connection wire is included with the unit. It's a 6-foot-long 8-gauge wire with ring terminals already installed at the end.

Does It Work?

Prior to 2005, I was living in the countryside, with no noise from the surroundings. But in 2005, I moved to the city and had power lines directly in my backyard. The noise was terrible, but the kids were younger at that time, and being closer to schools was our top priority. A few years later, my friend Claude Bouchard, VE2BUB, and I identified a few noise sources coming from the power line, so I called my local utility company and filed a complaint. They cleaned up about 50% of the noises — the worst one could go up to +30 dB on my HF S meter on 80 meters. A few years ago, I invested in my first dc power outlet. I removed all of the wall adapters that could be replaced by connecting the devices directly to my shack's 13.8 V dc power supply, and this removed many spurious responses (birdies) on the HF bands. In the September 2022 issue of *QST*, I wrote a review about an Ethernet filter that I installed on my main equipment that has a network connection in my station. This also helped to reduce some of the birdies on the bands.

I added the MFJ-1146 to my PSU that feeds two of my HF radios (one at a time). Because my location is less noisy now, I ran a simple test on my noisiest band, 80 meters, with and without it. Although the propagation variation (QSB) can be tricky, in general the noise floor seemed to be 1 S unit less. But this is not a scientific test; it's more of an impression, as it's hard to switch quickly to bypass the unit. Don't take my word for it — you can look at Figure A and see the attenuation measured in the ARRL Lab. The MFJ-1146 manual also shows the maximum RFI suppression by band (see Table 4). We can see that the band attenuation pattern is similar to the ARRL Lab measurements.

Lab Notes: MFJ-1146 RF Filtered DC Outlets

The ARRL Lab measured the attenuation of the unit across HF and VHF (see Figure A). The manufacturer specifies "up to –60 dB attenuation," but not on all bands; the unit has significantly less attenuation. On the 12-meter band, for example, the suppression is only about 8 dB. Because noise is generally stronger at lower filters, the filtering is still useful. If noise is coupling into your 13.8 V radio from a noisy power supply or motor vehicle, even an 8 dB reduction can make a difference. On the lower bands, the ~40 dB reduction will suppress most noise adequately. — *The ARRL Lab*

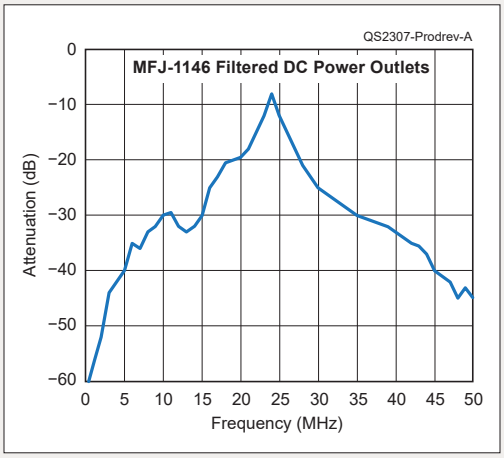

Figure A — This graph shows the ARRL Lab attenuation measurements for the MFJ-1146 across HF and VHF bands.

Conclusion

If you are concerned about noise, and you need a dc power outlet, the MFJ-1146 can help reduce the unwanted noise getting into your transceiver/receiver. It won't solve everything, but it can certainly help.

Manufacturer: MFJ Enterprises, Inc., 300 Industrial Park Rd., Starkville, MS 39759, **www.mfjenterprises.com**. Price $225.