QST

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HYS TC-YG08UV Dual-Band VHF/UHF Yagi Antenna

iPortable Pro 2 Equipment Rack Systems 6UM

Product Review

MFJ-9219 QRP Tuner, Wattmeter, and Dummy Load

Reviewed by Phil Salas, AD5X
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The MFJ-9219 combines an antenna tuner, an SWR/wattmeter, and a dummy load into a compact package. It is designed for portable operation at power levels up to 20 W. Many QRP (low-power) transceivers and kits do not include an antenna tuner or SWR meter, and antenna installations in the field often require compromises, so the MFJ-9219 is a useful accessory.

Overview

The MFJ-9219's antenna tuner is a standard manual T-tuner (series-capacitance/shunt-inductance/series-capacitance). The two variable capacitors have values of 20 to 650 pF, and there are 12 selectable values of fixed inductance from 0.25 µH to 6.5 µH. The wattmeter is only functional when the internal dummy load is used. The dummy load consists of eight 2 W, surface-mount resistors. It will handle 5 W for several minutes at a time, but it is limited to no more than 10 seconds at 20 W, after which it must be permitted to cool for at least 2 minutes. The transceiver input (**RADIO**) is a BNC connector, and the output (**ANTENNA**) can either be coaxial (another BNC) or banana plugs for a random wire and ground. Figure 1 shows the interior of the unit.

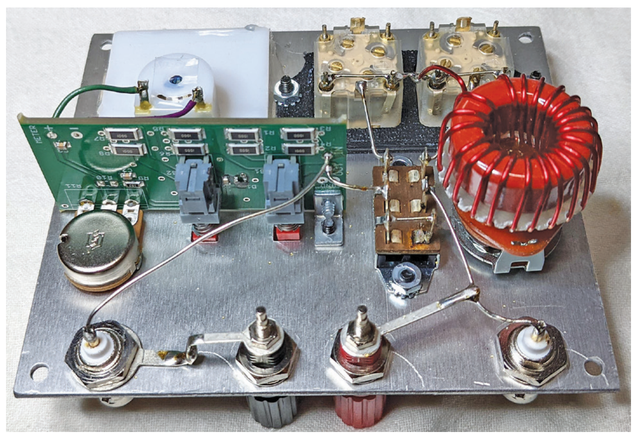

Figure 1 — The internal view of the MFJ-9219. The tuning capacitors and switched inductor are at the upper right. Surface-mounted resistors are located on the PC board.

The MFJ-9219 SWR circuit is based on the Wheatstone bridge, a simple circuit that can determine unknown impedances in RF circuits. (Theory of operation for the Wheatstone bridge is included in the MFJ-9219 manual, available from MFJ's website, or from **en.wikipedia.org/wiki/Wheatstone_bridge**.) Because it is a resistive bridge, some transmit power is dissipated in the bridge during the tuning process when measuring SWR. An advantage is that your transmitter is protected from high SWR conditions while tuning, because the worst SWR your transmitter can ever see is 2:1. The disadvantage is that during the tuning process, you can dissipate up to 100% of your tune-up power in two of the three bridge resistors during high SWR conditions, assuming your transmitter can deliver full power into a 2:1 SWR.

Operating the MFJ-9219

Operation of the MFJ-9219 can be a little confusing at first. There are three switches that need to be used in the proper manner. The **TUNE/BYPASS** slide switch puts the T-tuner in series with your transceiver's RF output. The **METER ENABLE/OPERATE** pushbutton switch places the Wheatstone bridge in series with the transceiver's RF output. The **SWR/PWR** pushbutton switch lets you measure SWR (used for tuning) or RF power, using the internal dummy load when the **METER ENABLE/OPERATE** switch is in the **METER ENABLE** position.

To measure power, place the **TUNE/BYPASS** switch in **BYPASS**, the **METER ENABLE/OPERATE** switch in the **METER ENABLE** position, and the **SWR/PWR** switch in the **PWR** position. Rotate the **METER SET** control to 20 W for a 20 W full-scale reading, 5 W for a 5 W full-scale reading, and 1 W for a 1 W full-scale reading. As the meter is only marked from 0 to 5, you need to multiply the meter reading by 4 for the 20 W setting, and divide by 5 for the 1 W setting.

To measure SWR, place the **TUNE/BYPASS** switch in **BYPASS**, the **METER ENABLE/OPERATE** switch in the **METER ENABLE** position, and the **SWR/PWR** switch in the **PWR** position. Apply RF power and adjust the **METER SET** control for a full-scale reading. Then set the **SWR/PWR** switch to **SWR** to read SWR. Note that the SWR scale is only marked up to a 3:1 SWR (about ⅔ of the scale).

To use the antenna tuner, set the **TUNE/BYPASS** switch to **TUNE**, the **METER ENABLE/OPERATE** switch to **METER ENABLE**, and the **SWR/PWR** switch to **SWR**. Apply enough RF power to get a meter reading. If you use more than 5 W, you will need to minimize tuning time, as shown in the transmit-time-versus-power curve in the manual. You can adjust the **METER SET** control to increase the reading if needed. Now adjust the antenna tuner controls for minimum meter reading (a recommended tuning procedure is given in the manual).

Once this is accomplished, check the actual SWR as described above, making sure to leave the **BYPASS/TUNE** switch in the **TUNE** position. If the SWR is reasonable (typically less than 2:1 SWR), set the **METER ENABLE/OPERATE** switch to **OPERATE**, and you are ready to go.

Performance Tests

Next, I wanted to determine the meter reading accuracies, and how well the antenna tuner works. I found that the diode detector/dummy load combination was frequency insensitive (an advantage of surface-mounted components and construction), so SWR and RF power measurements were all made on 20 meters. The power meter is an analog, non-linear meter, so the readings were my best effort to interpolate the meter readings. Tables 1 and 2 detail the results of the SWR and RF power reading tests.

Table 1
MFJ-9219 SWR Meter Testing

High-Impedance SWR		Low-Impedance SWR	
Actual	**Measured**	**Actual**	**Measured**
1:1	1:1	1:1	1:1
2:1	1.6:1	2:1	1.5:1
3:1	3:1	3:1	2.2:1

Table 2
MFJ-9219 Power Display Accuracy*

1 W Setting		5 W Setting		20 W Setting	
Actual	**Measured**	**Actual**	**Measured**	**Actual**	**Measured**
1 W	0.9 W	5 W	5 W	20 W	20 W
0.5 W	0.5 W	4 W	4.2 W	15 W	16 W
0.2 W	0.2 W	3 W	3.4 W	10 W	10 W
		2 W	2.5 W	5 W	5.5 W

*Originally, the minimum sensitivity would only permit measuring power to 5 W maximum. I contacted MFJ, and they said that some units had been built with an incorrect potentiometer. MFJ promptly replaced the unit with one that was built correctly. Readings for the 1 W and 20 W settings were calculated from the meter scale (1 to 5).

Table 3
MFJ-9219 Resistive Load and Loss Testing

Untuned SWR	Load (Ω)	Power Loss (%) and Tuned SWR by Band (Meters) 160	80	40	20	10
10:1	5	—	26%	20%	12%	18%
		>2:1	1.7:1	1.1:1	1.3:1	1.4:1
8:1	6.25	—	22%	23%	2%	8%
		>2:1	1.25:1	1.3:1	1.2:1	1.2:1
4:1	12.5	17%	13%	18%	6%	5%
		1.8:1	1.2:1	1.2:1	1.2:1	1.3:1
3:1	16.7	9%	12%	16%	4%	4%
		1.5:1	1.2:1	1.3:1	1.2:1	1.3:1
2:1	25	2%	6%	12%	2%	4%
		1.2:1	1.1:1	1:1	1.2:1	1.3:1
1:1*	50	0	0	0	0	0
		1:1	1:1	1:1	1:1	1:1
2:1	100	12%	7%	4%	4%	4%
		1.9:1	1.1:1	1.2:1	1.1:1	1.4:1
3:1	150	—	6%	6%	4%	6%
		>2:1	1:1	1.2:1	1.1:1	1.1:1
4:1	200	—	6%	7%	6%	10%
		>2:1	1:1	1.1:1	1.3:1	1.3:1
8:1	400	—	7%	8%	9%	12%
		>2:1	1:1	1:1	1.3:1	1.5:1
10:1	500	—	10%	8%	8%	14%
		>2:1	1.4:1	1.1:1	1.1:1	1.4:1

— = no match
*Bypass

Bottom Line

The MFJ-9219 provides a QRP antenna tuner, wattmeter, and dummy load in one convenient package.

Tuner Matching and Loss Measurements

Next, I performed resistive matching range and loss testing. Tuning power was 5 W. All measured losses are subject to the ±3% accuracy of the National Institute of Standards and Technology (NIST) traceable test equipment used. Tuned SWR was recorded only if a tuned SWR of 2:1 or better could be achieved. The test results are given in Table 3.

The MFJ-9219 was able to tune up to 10:1 resistive SWR on 80 – 10 meters. The ability to tune mismatches on 160 meters was limited. As with all tuners, losses increase as SWR increases. Incidentally, because the tuning capacitors are isolated from ground, I experienced some RF bites (just enough to get my attention) from the capacitor knob set screws while tuning some of the high-impedance loads.

Reactive Testing

Resistive matching tests are fine for antenna tuner comparisons, but tuners experience the highest RF current and maximum inductance with short antennas. Higher values of matching inductance can result in higher loss due to the typically lower Q (quality factor) of a physically small, higher-value inductor. To determine tuner losses in a few real-world conditions, I built antenna simulator circuits based on two different antenna lengths — a 43-foot vertical on 80 meters, and an 8-foot vertical on 40 meters. As expected, I found that higher losses do occur when matching a short antenna.

Conclusion

The MFJ-9219 is an interesting device that can be useful for the portable QRP operator. It provides the ability to tune an antenna, and measure power and SWR in a package not much larger than your hand.

Manufacturer: MFJ Enterprises, 300 Industrial Park Rd., Starkville, MS 39759; **www.mfjenterprises.com**. Price: $119.95.

HYS TC-YG08UV Dual-Band VHF/UHF Yagi Antenna

Reviewed by Steve Ford, WB8IMY
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The HYS TC-YG08UV is a dual-band Yagi antenna designed for 2 meters and 70 centimeters. It offers five elements on 70 centimeters and three on 2 meters, so the tradeoff is reduced gain in return for lighter weight and a smaller footprint (the boom is only 36 inches in length). There are two driven elements with individual gamma-matching sections, but they combine to a single SO-239 coaxial connection (see Figure 2). With its all-aluminum construction, the TC-YG08UV weighs about 2 pounds and is rated for 100 W, although I suspect it could tolerate more power.

Bottom Line

The HYS TC-YG08UV is a sturdy dual-band VHF/UHF Yagi antenna that will increase your effective range on 2 meters and 70 centimeters. It could be used for portable operation if you can transport it fully assembled.

Assembly

The antenna arrives in a rather small box, but that's because the 36-inch boom and the 2-meter elements are split into several sections. The elements are inscribed with numbers that correspond to their matching holes in the boom (see Figure 3).

The 2-meter elements include extensions that must be attached to each end after you slide the elements through the boom holes. The instructions seem to imply that the extensions are numerically inscribed as well, but this is not the case. Fortunately, all extensions are the same lengths, so it doesn't matter which elements you attach them to.

The two boom pieces are joined at the driven-element section. Depending on how you position the boom pieces when attaching to the driven-element section, the TC-YG08UV will end up in a horizontally or vertically polarized orientation for attachment to a support mast via a single **U**-bolt. The supplied **U**-bolt and saddle will fit masts up to 1.57 inches in diameter.

Figure 2 — The TC-YG08UV driven elements use individual gamma-matching sections for each band. A single feed line runs to the transceiver.

The elements, extensions, and boom sections are all held together by stainless-steel screws. The instructions caution against repeatedly assembling and disassembling the antenna because this can ultimately weaken the screw connections. This is a point well taken. The TC-YG08UV is intended for permanent installation rather than portable use where it would be reassembled over and over. Of course, it will work well as a portable antenna if you are willing to transport it fully assembled. The longest element (the 2-meter reflector) is about 43 inches in length.

To assemble the antenna, I needed only a Phillips screwdriver. Forty minutes after unpacking the parts, the antenna was ready for use.

Testing

I attached the TC-YG08UV to a temporary wood mast and swept it on 2 meters and 70 centimeters with an antenna analyzer. The low-SWR points (less than 1.5:1) were at the bottom ends of both bands. Using a small Allen wrench, I loosened the nuts on the gamma-match shorting bars and slid each one about ½ inch. That was sufficient to bring the lowest SWR to 146 MHz on 2 meters and 440 MHz on 70 centimeters. In this configuration, the 2:1 SWR bandwidths ranged from 144 to 148 MHz and 435 to 445 MHz.

Figure 3 — Each element is inscribed with a number that corresponds to a matching number on the boom.

Taking the TC-YG08UV to my favorite antenna test site atop a 300-foot ridge in Connecticut, I wasn't surprised to find that I could hear (and access) 2-meter and 70-centimeter repeaters as far north as New Hampshire and as far south as New Jersey. I was also lucky enough to contact a mobile station on 146.52 MHz simplex at a distance of about 20 miles. My output power during this test session was only 5 W.

Although the TC-YG08UV isn't intended for amateur satellite use, I decided to give it a try. Holding the boom at the rear, just in front of the 2-meter reflector, I managed to make a few contacts through AMSAT-OSCAR 27 as it zipped overhead. The satellite's signal was full quieting at peaks and, according to reports, so was I.

Overall, the TC-YG08UV is easy to assemble and seems durable enough to survive all but the worst conditions. If you're looking for an antenna to expand your VHF/UHF range, especially if you are using low power, this may be a model to consider.

Manufacturer: Quanzhou Truest Communication, Fujian, China. Available from **www.amazon.com** and **www.newegg.com**. Price: $100.

iPortable Pro2 Equipment Rack System 6UM

Reviewed by Rick Palm, K1CE
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Figure 4 — The iPortable Pro2 Equipment Rack System 6UM prior to installing equipment.

The iPortable Pro2 Equipment Rack System model 6UM is a portable, medium-duty hard shell case that includes two 12-inch-wide shelves for mounting transceivers, power supplies, digital mode interfaces, or other gear. It includes panels on each side of the shelves for speakers and external power and antenna connections. The outer dimensions of the box are 12 × 22 × 18 inches (height, width, depth), and it weighs about 19 pounds. The iPortable Pro2 case comes with covers for the back and front that are deep enough to provide some extra room for radio knobs, fans, or connectors. A zippered nylon mesh pocket attached to the inside of the back cover holds extra cables and radio manuals. The covers are secured with sturdy latches. The package is designed for use as a complete solution for an emergency go-kit or portable station. Figures 4, 5, and 6 show several views of the iPortable Pro2 rack system

Bottom Line

The iPortable Pro2 Equipment Rack System 6UM offers a flexible way to build a portable station that's quick to set up and well-protected when in storage or in transit.

More Details

The box has molded, integrated feet on both sides for placement on the ground, and there are pull-out handles on each side of the case. An adjustable bright-

Figure 5 — Front and back covers offer protection for equipment in storage or in transit. The covers are deep enough to clear equipment knobs and connectors.

Figure 6 — A look into the rack case from the rear. The speakers and power wiring are visible on the right side.

ness LED light bar along the top of the front opening illuminates the front panels of installed equipment.

The panel on the left side has two 3.5-inch front-firing speakers and two ¼-inch headphone jacks. Below the speakers are four standard ATC-type fuses (see Figure 7). I used the fuses and power cables marked Circuit 1 and Circuit 2 for supplying power to my two installed radios. Below those fuses is a 10 A fuse to protect the 12 V dc cigarette lighter power socket.

The Anderson Powerpole connector on the front panel is for providing dc input power to the iPortable rack (for example, from your dc power supply or battery), or it can be used as another output to a radio or accessories. It is protected by a 30 A fuse. The setup also includes a separate power cable that can be run out of the back of the box to your power source. Finally, there are two USB power ports — one rated for 0.5 A, and the other for 2.4 A.

On the right-side panel are three plastic plugs that can be removed with a screwdriver. These holes fit bulkhead-style SO-239 coax connectors for easy antenna feed line connections. Inside the case, short jumper cables connect the bulkhead connectors to the radio rear-panel antenna jacks. The bulkhead connectors and coaxial jumpers are not included.

Below the antenna connectors are two slide switches. One is to power an accessory or fan (not included). The other switch and dimmer are for the LED light bar.

Installation

Upon arrival, I opened the shipping container, removed the box, removed the covers, and found loose screws. The screws are for securing the radio trays to the rack mount frame, four screws for each tray. All screws were there, but I would have liked to see them taped to the cabinet, or otherwise secured.

The only included documentation was a one-sheet wiring diagram. Upon closer examination, I decided that a manual must not be necessary; mounting and operation looked simple and straightforward. I drilled mounting holes through the two trays, and mounted my two radios — an Icom IC-7300 transceiver for 160 – 6 meters, and an Icom IC-9700 VHF/UHF multimode transceiver.

I then mounted the trays inside the box with the screws supplied, but I mounted them backward at first (with radios' front panels looking out the back of the box). I removed the radios/trays and re-rigged them to the proper configuration. Later, I discovered more documentation and photos showing equipment installation on the DX Engineering web page for this rack.

With everything mounted and wired, I thought that the combined weight and size of my IC-7300 and IC-9700 radios was just a bit too much to stuff into the iPortable

Figure 7 — The iPortable Pro2 fuses and power connections.

Figure 8 — The author's final configuration with an IC-7300 and an FT-2980R VHF FM radio in place.

box. I ended up removing the IC-9700 and replacing it with my Yaesu FT-2980R VHF FM transceiver (see Figure 8). The combination of the smaller VHF FM radio and HF radio was a winner, and that's how I have kept it. By moving the IC-7300's tray up a hole on the mounting bracket, I was able to fit my external automatic antenna tuner under the radio and tray by using zip ties — a perfect solution. That exercise demonstrates the flexibility of this equipment case, which can be configured many different ways to suit your equipment lineup and operating needs.

Using the iPortable

I grabbed the box with radios mounted inside and set it up in the hatchback of my 2016 Honda Fit in an adjustable wooden frame I constructed to secure it (with flexible ties) on top of the spare tire compartment. The Powerpoles make battery connections easy, and my magnet-mount roof antenna feed lines ran easily down a groove in the roof and into the back of the car for easy connection to the bulkhead connectors.

The iPortable rack's built-in speakers (connected to each radio's external speaker jack by supplied cables) offered good audio output, and it was nice to be able to adjust the light bar to illuminate the front panels of the radios as necessary. With the rack's covers removed, it seemed to me that there was sufficient convection cooling, considering that the FT-2980R has huge heatsinks for its 80 W RF output, and the IC-7300 has an integrated cooling fan. The iPortable rack system is lightweight, easy to tote, and well-engineered and sturdy. An interlocking feature allows for stacking additional boxes (not tested for this review).

Conclusion

With many years of experience taking delicate radios into the field, it seems to me that the iPortable Pro2 Equipment Rack System 6UM box is a good solution for any field application where grab-and-go and equipment protection is involved. The built-in speakers, power wiring, and antenna connections eliminate hunting for cables and make it a breeze to get a station up and running in the field. The gasket-sealed case covers help protect gear from the elements.

I recommend setting aside plenty of time for planning and setting up your portable station, and experimenting with placement of the various pieces before locking it all down. Once installed, you'll find that you won't want to remove and replace your radios regularly.

I operated Field Day this year from an Emergency Operations Center (EOC) and noticed emergency management staffers using the iPortable rack system boxes with radios for deployment to area Red Cross shelters. That's a good indication of their quality and usefulness. A 9-inch-high version, the 4UM, is available for single-radio applications.

Manufacturer: iPortable, **www.iportableus.com**. Available from DX Engineering, **www.dxengineering.com**. Price: $375.

SIGLENT SDG1062X Waveform Signal Generator

(Photo courtesy of SIGLENT Technologies North America)

Reviewed by Phil Salas, AD5X
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When it comes to test equipment in my home lab, I've always skimped on a good waveform generator. However, as I've been spending more time making receiver and transmitter tests, I thought the time was right to purchase a quality signal generator and invested in a SIGLENT SDG1062X.

Overview

The SIGLENT SDG1062X is a dual-channel function/waveform generator capable of generating signals up to 60 MHz with very low jitter (variation in the waveform) and very low total harmonic distortion (THD). It generates sine, square, pulse, ramp, noise, and arbitrary waveforms. A library of 196 waveforms is included in the SDG1062X's internal memory, or you can create and store your own arbitrary waveform. The SDG1062X will also sweep the selected waveform,

Bottom Line

The SIGLENT SDG1062X is a high-quality, useful waveform signal generator with many uses in the amateur workshop.

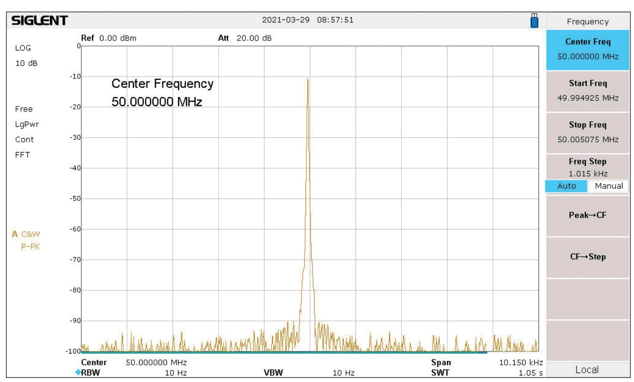

Figure 9 — The close-in noise on the 50 MHz output from the SDG1062X observed on a SIGLENT SSA3021X spectrum analyzer.

Table 4
SDG1062X Specifications

Bandwidth: 1 µHz resolution, max. frequency 60 MHz.

Amplitude: 1 mVpp to 20 Vpp.

Sampling rate: 150 MSa/s (mega samples per second).

Vertical resolution: 14 bit.

Waveform length: 16,000 points.

Jitter: less than 300 picoseconds +0.05 ppm of the period.

Total harmonic distortion: <60 dBc up to10 MHz, <40 dBc up to 60 MHz.

Analog and digital modulation types: AM, DSB-AM, FM, PM, FSK, ASK, PSK, and PWM. Waveform combining function.

Frequency counter: 10 Hz – 200 MHz (200 mV RMS minimum, 5 Vpp max).

Internal storage: 20 MB.

Standard interface: USB; GPIB optional.

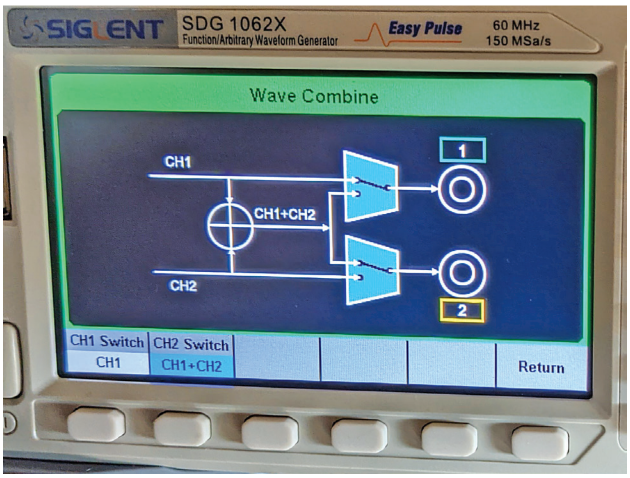

Figure 10 — The A and B outputs can be internally combined.

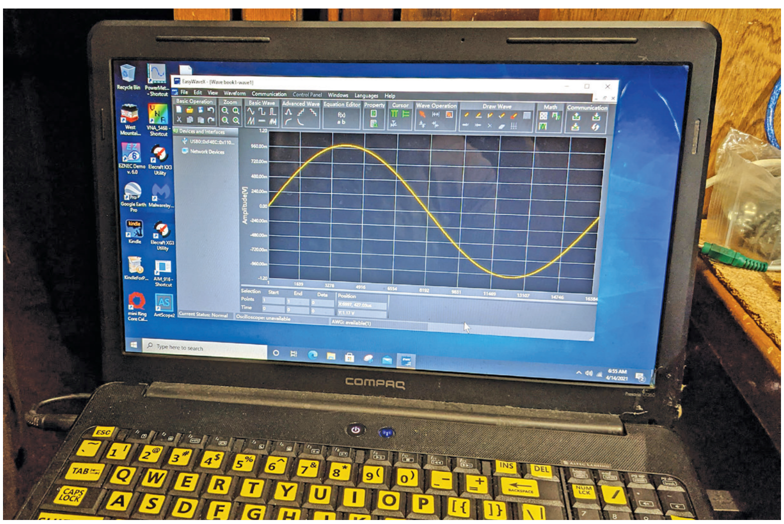

Figure 11 — *EasyWaveX* provides PC control of the SDG1062X.

either linearly or logarithmically. Table 4 lists the basic specifications.

Using the SDG1062X

A detailed manual is available for download from the SIGLENT website. The basic functions are pretty much self-explanatory. If you're familiar with using test equipment, you'll probably be able to do many things without having to refer to the manual.

The 4.3-inch TFT-LCD screen provides all the information you need, and the display changes based on what you want to do. The soft keys below the display also change functions based on what you want to change. The display does not show the output waveform in real time, instead showing one cycle of the waveform that is being output. A USB interface on the left side of the front panel permits using additional memory for data storage, and it is also used for updating the firmware. There is also internal nonvolatile storage for saving configuration settings and custom waveforms.

The output signal is very clean, as you can see in the 50 MHz signal in Figure 9. Therefore, the SDG1062X should provide little or no degradation to any connected equipment under test.

The two channels are completely independent. Further, the two channels can be combined internally (see Figure 10). And the combined signals can be connected to either or both outputs.

The ability to output a dual-tone signal of any separation provides a lot of flexibility for measuring the performance of receivers, preamps, transmitters, and amplifiers up to 60 MHz. One popular test is the two-tone intermodulation distortion (IMD) testing of transmitters. This test is performed by injecting two tones (typically 700 Hz and 1,900 Hz) into the transmitter's microphone jack and monitoring the resulting output with a spectrum analyzer. The combined 700 Hz and 1,900 Hz output signals from the SDG1062X are quite clean (see the sidebar, "Two-Tone Test Transmitter Interface" for more information).

Virtually all receiver tests performed in the ARRL Lab can be accomplished with this instrument. (See the ARRL Lab Test Procedures Manual, available from **www.arrl.org/how-equipment-is-tested**.) However, a step attenuator will be necessary for most receiver tests as the minimum output level of the SDG1062X is 1 millivolt peak-to-peak

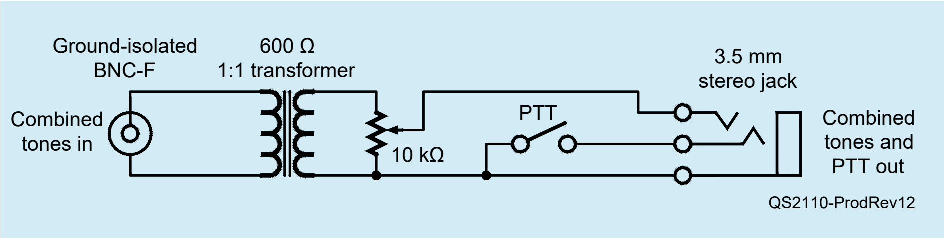

Figure 12 — Two-tone test interface schematic. The ground-isolated BNC connector is TE Connectivity part number 5227726-1, and the audio transformer is Walfront item number 8541759415, both found on Amazon.

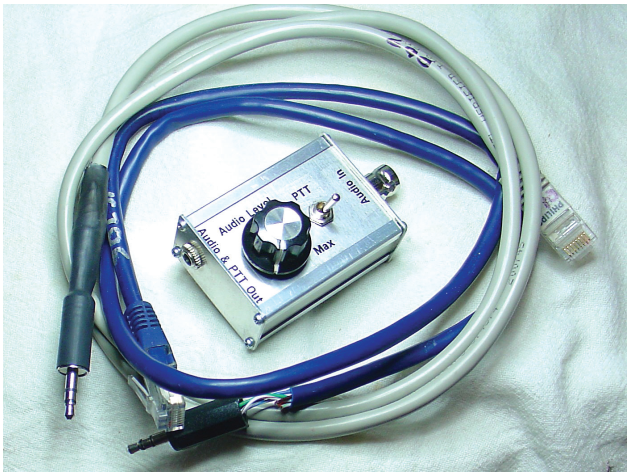

Figure 13 — The assembled two-tone test interface with micro-phone interface cables.

Two-Tone Test Transmitter Interface

The combined A/B channel output for two-tone testing is a nice feature of the SDG1062X. However, the audio levels can only be adjusted independently. This is inconvenient, and it would be nice if the combined output could be adjusted easily once the levels are properly set. Further, isolation of the dc power supply, radio, and signal generator ground connections is often necessary. This led me to build an interface that both isolates the ground and permits adjusting the composite output level from the SDG1062X. I also added a PTT switch, so the radio under test can be controlled by the PTT switch during two-tone testing. Figure 12 is a schematic of this interface, which required a ground-isolated BNC-F connector and a 1:1 audio isolation transformer. Figure 13 shows the assembled unit with cables that I built for testing my Icom IC-706MKIIG and Xiegu G90 transceivers.

(–56 dBm, or S-9+17 dB). Inexpensive step attenuators can be found on the popular auction sites.

Because the SDG1062X can also output broadband noise, you can pair this signal generator with a spectrum analyzer, such as the tinySA (reviewed in the March 2021 "Product Review" column in *QST*) and display a filter passband. You can also add an inexpensive directional coupler and look at return loss. Both of these methods are described in the tinySA review.

Finally, SIGLENT provides *EasyWaveX* software for Windows (see Figure 11). It is an arbitrary waveform software platform that supports waveform creation and editing. It provides 11 types of standard waveforms, equation drawings, hand drawings, points drawings, as well as horizontal, vertical, and oblique drawings. And you can add, subtract, or multiply any two waveforms under edit. You can also export or import waveforms from the SDG1062X arbitrary waveform generator, and analyze or modify an imported waveform.

Final Thoughts

The SIGLENT SDG1062X is a powerful, full-featured, dual-channel arbitrary waveform generator that can satisfy a variety of testing applications for amateurs and professionals alike. If you don't need the 60 MHz range of the SDG1062X, the SDG1032X (30 MHz maximum frequency) is available at a lower cost.

Manufacturer: SIGLENT Technologies North America, 6557 Cochran Rd., Solon, OH 44139; **www.siglentna.com**. The SDG1062X is available from multiple sources, including TEquipment, Amazon, Digi-Key, and other vendors. Price: SDG1062X $459, SDG1032X $319.

Pacific Antenna 20/40-Meter Trap Dipole Kit

Reviewed by Mark Wilson, K1RO
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The Pacific Antenna 20/40-meter trap dipole kit offers a lightweight, inexpensive solution to adding those bands to a portable station. The antenna is rated for up to 100 W, and the finished length is 51 feet. (In addition to isolating the center section of the antenna for 20 meters, the traps provide some loading, which shortens the overall length from the typical 66 feet for a half-wave 40-meter dipole. Traps are discussed in detail in the "Multiband HF Antennas" chapter of the *ARRL Antenna Book*.) Pacific Antenna offers another version of this antenna for 17 and 30 meters.

Building the Kit

The kit includes everything needed to build the antenna — 75 feet of #24 AWG stranded wire, a center insulator and BNC jack, end insulators, and materials to make the traps. You just add some small-diameter rope to hang the finished antenna and a feed line. You'll need a tape measure, something to cut and strip wire, and a small soldering iron. It only took me an hour to put it all together.

Following the detailed and well-illustrated instructions, the first step is to cut the wire into six pieces (two of these will be used to wind coils for the traps). Then build the traps and do the final assembly.

Bottom Line

The Pacific Antenna 20/40-Meter Trap Dipole Kit is easy to build and results in a lightweight, portable antenna with good coverage of the 20- and 40-meter bands.

Each trap is made with a narrow PC board and a plastic coil form. Solder two small capacitors to the PC board, then wind the coil on the plastic form. I found that the number of turns on the coil worked out perfectly if you cut the wire to the specified length and wind the turns tightly. With the capacitors soldered to the PC board, slide the board inside the coil form, and solder the coil wires and antenna wires.

Once you've tested the finished antenna and it's working as expected, the traps will be covered with supplied heat-shrink tubing. The tubing is fairly thick, so I borrowed a heat gun to shrink it. Figure 14 shows a finished trap.

The center insulator is a piece of PC board material with holes and solder pads for securing a BNC connector and the antenna wires, as well as a hole at the top for a support rope (see Figure 15). The end insulators are just short pieces of the same plastic material used for the coil forms. According to my postal scale, the assembled antenna weighs just 4.5 ounces.

In the Field

I tried the trap dipole as an inverted V during portable operations at several local parks. I hung the center insulator from a 20-foot collapsible mast secured to the trailer hitch on my vehicle and fed the antenna with 50 feet of RG-58 coaxial cable. Rather than drive stakes into the ground, I added lightweight rope to the end insulators and tied the rope to 1-gallon beverage containers filled with water. The antenna is so light that it doesn't take much to hold it in place.

I swept the antenna system with an antenna analyzer. On 40 meters, the minimum SWR was 1.1:1 at 7.110 MHz, and it covered 7.015 to 7.210 MHz with SWR of 2:1 or less. On 20 meters, the low SWR point (1.1:1) occurred at the bottom of the band, with SWR rising to about 2.6:1 at the top of the band. Although I could have shortened the 20-meter section to move the low-SWR point higher in the band, I left it alone. The SWR curve would likely change somewhat in other portable installations, and the antenna tuner in my transceiver allowed operation throughout the bands.

In previous portable operations, I typically used short-loaded vertical antennas on my vehicle. In addition to having to change antennas to change bands, those antennas have a narrow SWR bandwidth and usually require adjustment of the whip on top when switching between the CW, digital, and phone segments of the bands. I enjoyed the wide SWR bandwidth of the trap dipole and the convenience of changing bands or band segments without adjusting the antenna. I had no trouble making plenty of contacts on both bands from several local parks.

Figure 14 — A finished trap covered with heat-shrink tubing.

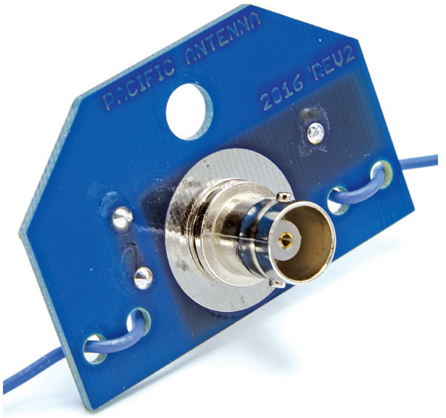

Figure 15 — The feed line connects to a BNC connector on the center insulator. The PC boards used for the center insulator and traps have additional holes for routing the antenna wires to avoid stressing the soldered connections.

Although I didn't have much difficulty packing and unpacking the antenna when switching parks, I ended up using a couple of plastic rope winders to store the antenna when not in use.

Manufacturer: Pacific Antenna, P.O. Box 10301, Fayetteville, AR 72703; **www.qrpkits.com**. Price: $25 plus shipping.