Product Reviews

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BG2FX FX4CR Portable Transceiver

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Product Review

BG2FX FX-4CR Portable Transceiver

Reviewed by Phil Salas, AD5X
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I've used many QRP radios over the years. My favorite radios are the ones that provide up to 20 W of output power. While 5 W is adequate for CW (which, incidentally, is my favorite mode), 5 W is often inadequate for single sideband (SSB) operation. However, I've found that 20 W on SSB is a very effective power level, as the received signal at the other end is just a bit less than one S-unit below the typical 100 W transceiver output. Enter the FX-4CR 80 – 6-meter 20 W (5 W on 6 meters) SDR transceiver, designed and sold by Yu Hongbo, BG2FX. Table 1 lists the advertised specifications of the FX-4CR, along with the ARRL Lab measurements.

Overview

The FX-4CR transceiver is a compact and attractive transceiver that covers the 80 – 6-meter ham bands, along with a general-coverage receiver that tunes continuously from 3.5 to 54 MHz. The cast aluminum metal case has an excellent solid feel to it. And even though the FX-4CR can output up to 20 W of power, it literally fits in the palm of your hand. A tiny microphone rounds out the unit. The FX-4CR also includes a built-in microphone for portable operation. And besides normal AM, FM SSB, and CW modes, the FX-4CR is designed for digital modes. A USB cable provides computer interfacing for digital modes as well as for firmware updates. And besides displaying all normal operating parameters, the bright TFT 2-inch diagonal color display also provides spectrum and waterfall displays. A nice feature is that the FX-4CR package includes a padded plastic case with a perfectly cut foam insert for the radio and accessories (see Figure 1). Finally, while the FX-4CR does come with a manual, it is worth downloading the latest user manual from **www.bg2fx.com**, as features are being added through firmware updates and the online manual reflects the latest additions.

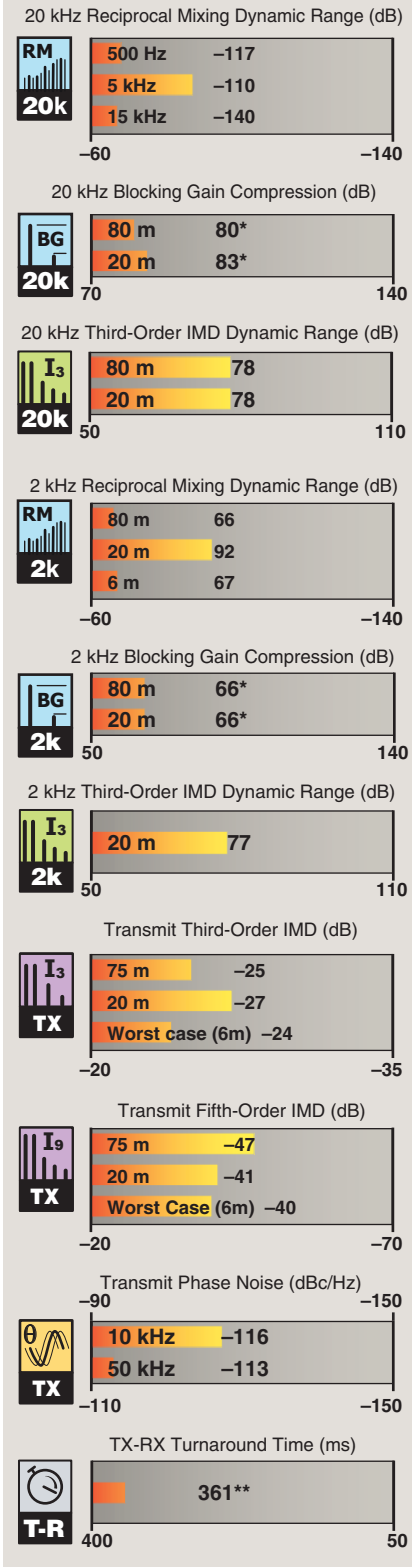
The FX-4CR operational features include split-frequency operation, RIT, receiver attenuator, noise blanker, digital noise reduction, and multiple fixed-bandwidth digital signal processing (DSP) filters tailored to each operating mode. It is externally powered only and does not include an internal automatic antenna tuner (ATU).

Figure 1 — The FX-4CR and accessories in the included padded case.

Bottom Line

The FX-4CR is an amazing radio, especially considering its size and power output. It's a rugged, compact, 20 W transceiver that should satisfy any portable operator.

BG2FX FX-4CR
Key Measurements Summary



KEY: QS2408-PR174
* Noise Limited
** Measurements with MGC set to 1.

Table 1
FX-4CR QRP Transceiver, Firmware Version V1.5 23-08-25

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Receive: 0.465 – 50 MHz; Transmit: 3.5 – 4.0 MHz; 60 meters, five channels; 7 – 7.3 MHz; 10.1 – 10.15 MHz; 14 – 14.35 MHz; 18.068 – 18.168 MHz; 21 – 21.45 MHz; 24.89 – 24.99 MHz; 28 – 29.7 MHz; 50 – 54 MHz.	Receive: 0.5 — 54 MHz continuous. As specified.
Power requirement: 9 – 16 V dc; Transmit: ~2 A Receive: ~220 mA.	At 13.8 V dc: Transmit: 3.01 A Receive: 221 mA, (no signal, max. volume, max. lights); 218 mA (backlight off).
Modes of operation: SSB, CW, AM, FM.	As specified.

Receiver

SSB/CW sensitivity:
Noise floor (MDS): –120 dBm.

AM sensitivity: Not specified.

FM sensitivity: Not specified.

Blocking gain compression dynamic range: Not specified.

Reciprocal mixing dynamic range: Not specified.

Receiver Dynamic Testing[3]

Noise floor (MDS), 500 Hz bandwidth:

MGC[1] Level	1 — dBm/µV	32 — dBm/µV	63 — dBm/µV
3.520 MHz	–124/0.14	–131/0.06	–128/0.16
7.020 MHz	–122/0.19	–132/0.05	–132/0.05
14.02 MHz	–123/0.16	–133/0.05	–134/0.05
28.02 MHz	–120/0.22	–125/0.12	–126/0.11
50.02 MHz	–114/0.45	–115/0.41	–108/0.89

For 10 dB (S+N)/N, 1 kHz tone, 30% mod. 6 kHz BW:

MGC[1] Level	1 — dBm/µV	32 — dBm/µV	63 — dBm/µV
3.885 MHz	–97/3.20 µV	–102/1.80 µV	–104/1.50 µV
50.40 MHz	–76/34.40 µV	–84/14.60 µV	–84/14.60 µV

For 12 dB SINAD, 3 kHz deviation, 10 kHz BW:

MGC[1] Level	1 — dBm/µV	32 — dBm/µV	63 — dBm/µV
29 MHz	–95/4.0 µV	–96/3.40 µV	–96/3.40 µV
52 MHz	–91/6.10 µV	–90/7.40 µV	–90/7.40 µV

Blocking gain compression dynamic range: 500 Hz BW:

	20 kHz offset	*5/2 kHz offset*
MGC[1] Level	1/32/63	MGC — 1
3.5 MHz	$80^2/81^2/70^2$ dB	$62^2/66^2$ dB
14 MHz	$83^2/84^2/63^2$ dB	$64^2/66^2$ dB
50 MHz	$83^2/72^2/58^2$ dB	$64^2/68^2$ dB

3.5 MHz, 20/5/2 kHz offset: (MGC — 1) 68/64/66 dB;
14 MHz, 20/5/2 kHz offset: (MGC — 1) 87/91/92 dB;
50 MHz, 20/5/2 kHz offset: (MGC — 1) 67/64/67 dB.

Two-Tone Intermodulation Distortion (IMD) Testing (500 Hz Bandwidth)

Band/MGC Level	*Spacing*	*Measured IMD Level*	*Input Level*	*Measured IMD DR*
3.5 MHz/1	20 kHz	–124 dBm	–46 dBm	78 dB
14 MHz/1	20 kHz	–123 dBm	–45 dBm	78 dB
14 MHz/32	20 kHz	–133 dBm	–49 dBm	84 dB
14 MHz/63	20 kHz	–134 dBm	–67 dBm	67 dB
14 MHz/1	5 kHz	–123 dBm	–43 dBm	80 dB
14 MHz/1	2 kHz	–123 dBm	–46 dBm	77 dB
50 MHz/1	20 kHz	–114 dBm	–51 dBm	63 dB
50 MHz/32	20 kHz	–115 dBm	–53 dBm	62 dB
50 MHz/63	20 kHz	–108 dBm	–53 dBm	55 dB

Second-order intercept point: Not specified.	MGC[1] Level 1/32/63: 14 MHz, +43/+43/+43 dBm 50 MHz, +3/+3/+3 dBm.
FM adjacent channel rejection: Not specified.	MGC[1] Level 32: 29 MHz, 59 dB 50 MHz, 58 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	MGC[1] Level 32: *20 kHz offset* 29 MHz, measurement noise limited to adjacent channel rejection value indicated; 52 MHz, measurement noise limited to adjacent channel rejection value indicated. *10 MHz offset* 29 MHz, measurement noise limited to adjacent channel rejection value indicated. 52 MHz, measurement noise limited to adjacent channel rejection value indicated.
S-meter sensitivity: Not specified.	For S-9 signal, MGC[1] Level 1/32/63: 14 MHz, 50.0/50.0/50.0 µV; 50 MHz, 115.0/115.0/115.0 µV.
Squelch sensitivity: Not specified.	At threshold: MGC[1] Level 32, FM: 29 MHz, 0.68 µV; 52 MHz, 0.97 µV. At threshold, MGC[1] Level 32, SSB: 14 MHz, 0.65 µV.
Receiver processing delay time: Not specified.	6 ms.
First IF rejection: Not specified. Image rejection; upper/lower: Not specified.	14 MHz, 121 dB; 14 MHz, 102/51 dB.
Audio output: 1 W.	0.85 W into 8 Ω at 2% T.H.D.
IF/audio response: CW: 50, 100, 200, 300, 500, 800 Hz; SSB: 1.5, 1.8, 2.1, 2.4, 2.7, 3.0 kHz; FM: 5, 10 kHz; AM: 6, 9 kHz.	As specified for all filters and modes.

Transmitter

Transmitter Dynamic Testing

Power output: 0 to 20 W continuously adjustable (54 MHz 5 W).	At 13.8,10 V dc: As specified.
Spurious and harmonic suppression: –43 dB (second and third harmonic).	HF: 30 meters (worst case), –45 dBc; 50.2 MHz: –50 dBc; meets the FCC limits for spurious emissions.
Third-order IMD products: Not specified.	3rd/5th order, 20 W PEP: 3.5 MHz; –25/–47 dBPEP; 14 MHz; –27/–41 dBPEP; 50 MHz, –24/–40 dBPEP (worse case); 10 W PEP: 14 MHz; –34/–41 dBPEP.
CW keyer range: Not specified.	Tested at 5 – 133 WPM, default = 45 WPM.
CW keying characteristics: Not specified.	See Figures A and B.
Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.	SSB and CW, CW DLY 10, AGC fast, 347 ms, AGC slow, 361 ms.
Receive-transmit turnaround time (TX delay): Not specified.	SSB, 200 ms; FM, 29 MHz, 200 ms.
Transmit phase noise: Not specified.	See Figure C.

Size (height, width, depth): 2.6 × 4.2 × 1.7 inches

Weight: 1.0 pound

[1]MGC stands for manual gain control and ranges from 1 to 63. No discrete pre-amps on the unit.
[2]Measurement is noise limited at values indicated.
[3]A and B receivers identical.

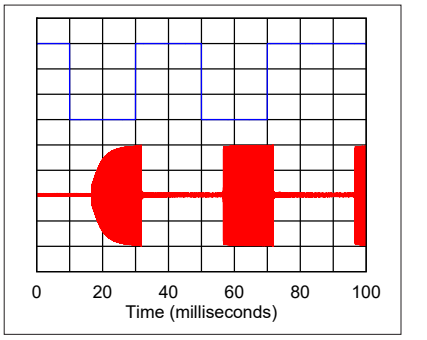


Figure A — CW keying waveform for the FX-4CR showing the first two dits using external keying. Equivalent keying speed is 60 WPM. The upper trace is the key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 20 W output on the 14 MHz band, using CW DLY set to 100 ms. The first-dit rise time is 7.1 ms; the fall time is 0.1 ms. The second-dit rise time is 0 ms; the fall time is 0 ms. The first-dit on delay is 8.5 ms; the off delay is 1.7 ms. The second-dit on delay is 6.7 ms; the off delay is 1.7 ms.

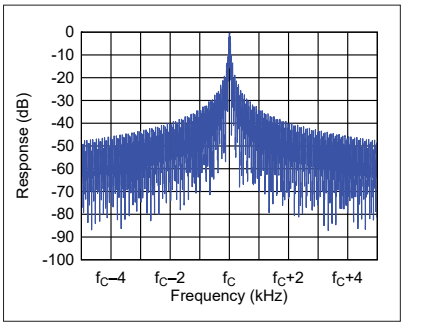


Figure B — The spectral display of the BG2FX FX-4CR transmitter during keying sideband testing. Equivalent keying speed is 60 WPM using external keying and the default rise time setting. Spectrum analyzer resolution bandwidth is 10 Hz, and the sweep time is 30 seconds. The transmitter was being operated at 20 W PEP output on the 14 MHz band, and this plot shows the transmitter output ±5 kHz from the carrier. The reference level is 0 dBc, and the vertical scale is in dB.

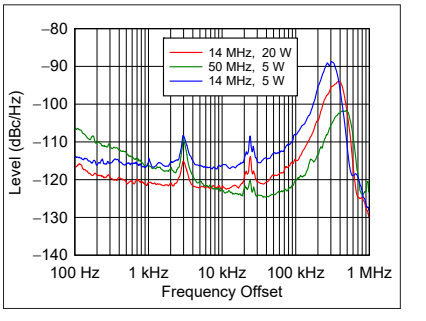


Figure C — The spectral display of the BG2FX FX-4CR transmitter output during phase-noise testing. Power output is 20 W on the 14 MHz band (red trace), 5 W on the 14 MHz band (blue trace), and 5 W on the 50 MHz band (green trace). The carrier, off the left edge of the plot, is not shown. This plot shows phase noise 100 Hz to 1 MHz from the carrier. The reference level is –80 dBc/Hz, and the vertical scale is 10 dB per division.

Figure 2 — The FX-4CR left-side interfaces.

Figure 3 — The FX-4CR right-side interfaces.

Interfaces and Controls

The I/O connectors are located on the left and right sides of the FX-4CR. On the left side (see Figure 2), you'll find the BNC RF connector, a separate external speaker jack, separate headphone jacks, and a microphone jack. On the right side (see Figure 3), you'll find jacks for a USB interface, a CW key jack, a push-to-talk (PTT) output for controlling an external amplifier, and a dc power jack. A fused dc power cable and an extra fuse are included.

At the time of this review, the PTT output is active only for voice modes. It is not active upon CW keying, though pressing the microphone PTT button when in the CW mode does operate the PTT output. I contacted BG2FX, and he said he would be implementing this for CW in an upcoming firmware update. He also said he will probably include two PTT-to-RF output delays — one for QSK amplifiers, and one for non-QSK amplifiers — to preclude hot switching. To interface the PTT output to an amplifier, I've made a "Keying an Amplifier DIY Interface." For more information, visit **www.arrl.org/qst-in-depth**.

As you can see in the lead photo, two variable controls provide audio frequency (AF) gain and tuning. These two controls are multi-function, based on selected parameters. Besides volume, the AF control is also used for selecting the different parameters, most of which are easily accessed without having to enter the menu. The menu is used for some of the less-used parameters, such as transmit filter bandwidth, break-in delay, transmit compression level, side tone frequency, and AGC settings. Within the menu, you can also enable Bluetooth for interfacing your Android phone with Android-based FT8 software. The tune control adjusts the tuning step when tapped, and band selection when the **F** key is tapped. All the buttons are backlit for about 10 seconds when any button is pushed, though they can be set to be on at all times. All of the buttons are large and easy to push, and they have an excellent tactile feel. The two knobs feel solid and are wobble-free.

A Bit More Testing

Because the specified voltage range is 9 – 18 V dc, I wanted to check the maximum output power at 9, 13.8, and 16 V dc. Table 2 shows the results of these tests. Note that the output power doesn't suffer much, even at 9 V dc.

Next, because the FX-4CR doesn't have an internal auto tuner, I wanted to see how it would do with some reasonable mismatches. Table 3 shows the output power when transmitting into high-impedance and low-impedance 2:1, 3:1, and 4:1 standing wave ratio (SWR) resistive loads.

As you can see in Table 3, the FX-4CR can put out pretty substantial power even into a moderately high SWR. However, the manual cautions you to avoid high power with high SWR at high dc input voltage, espe-

Table 2 — Output Power and Current Draw vs Input Voltage
Tested by Phil Salas, AD5X

Band	V dc	Max Pwr	Current	V dc	Max Pwr	Current	V dc	Max Pwr	Current
80 m	9	15.1 W	4.2 A	13.8	20.3 W	3.1 A	16	20.9 W	3.3 A
40 m	9	18.6 W	3.8 A	13.8	20.9 W	3.4 A	16	21.5 W	3.6 A
20 m	9	14.3 W	2.5 A	13.8	20.6 W	3.2 A	16	20.6 W	3.4 A
10 m	9	16.3 W	3.2 A	13.8	20.2 W	3.5 A	16	20.5 W	3.7 A
6 m	9	5.6 W	3.2 A	13.8	6.1 W	3.1 A	16	6.2 W	3.3 A

Table 3 — SWR Impact on FX-4CR Transmit Power

Measurements made on 20 meters at 13.8 V dc Tested by Phil Salas, AD5X

SWR	Forward TX Power
1:1	20 W
2:1 Hi-Z	17.5 W
3:1 Hi-Z	14.5 W
4:1 Hi-Z	12.4 W
2:1 Lo-Z	18.8 W
3:1 Lo-Z	16.0 W
4:1 Lo-Z	13.6 W

Table 4 — FX-4CR S-Meter Measurements

Band	tinySA	FX-4CR	tinySA	FX-4CR	tinySA	FX-4CR
20M	–73 dBm	–73 dBm/S9	–85 dBm	–84 dBm/S7	–97 dBm	–95 dBm/S5
6M	–73 dBm	–73 dBm/S9	–85 dBm	–86 dBm/S7	–97 dBm	–97 dBm/S5

cially when running high duty cycle digital modes.

Finally, I checked the signal level reading against my tinySA Ultra using its signal generator mode at levels of –73 dBm (S9), –85 dBm (S7), and –97 dBm (S5) on 20 and 6 meters. Besides an S-meter bar graph display, the FX-4CR also gives a level measurement in dBm. The FX-4CR S-meter and level measurement results are shown in Table 4. As you can see, the FX-4CR S-meter levels drop 6 dB per S-unit as it should, and the level measurements track within 1 – 2 dB of the tinySA Ultra.

General Operation

The first thing you'll need to do is add your connector of choice to the included power cable. This will connect to a 9 – 18 V dc battery pack or power supply capable of sourcing up to 4 A. This input voltage range is nice in that the radio can be powered from an RC 4S LiPo battery, which has a fully charged voltage of 16.8 V dc. However, as mentioned earlier, it is best to keep the voltage below 16 V dc, especially when operating high duty cycle modes into less-than-perfect loads.

I found the FX-4CR's controls and buttons to be mostly self-explanatory and well thought out. Reading through the manual once was all I needed to operate the radio. Tapping the **POWER** button turns on the radio, and pressing and holding the **POWER** button turns off the radio. Tapping the **POWER** button when the radio is on permits you to adjust the transmit power with the **AF** gain control. I particularly liked the ease with which you can change some parameters without having to go into the menu. For example, press and hold **SSB** to turn DSP noise reduction on or off. When DSP noise reduction is on, press and hold the **AF** gain knob until DSP is highlighted on the display, and then adjust the DSP level with the **AF** gain control. In the CW mode, you can change from straight key to iambic-A and to iambic-B by tapping the CW mode key, making it easy to put out a carrier if you have an external antenna tuner. And you can easily change your CW speed by tapping the **AF** gain knob and then changing speed with that knob (the CW speed is displayed on the screen). And in all modes, you can easily cycle through the available filters by tapping the **FILTER** key.

On the Air

I operated CW and SSB on 40, 20, and 17 meters, and CW on 30 meters, using my 43-foot vertical. I did not test the FX-4CR on digital modes as I am primarily a CW and SSB operator. But for those interested, the FX-4CR can be operated with a computer for RTTY, PSK, JT65, or any of the other popular digital modes. Select **USB-DIG** or **LSB-DIG** modes for digital mode operation. This mutes the speaker and sets the filter bandwidth to 3.0 kHz. The manual recommends keeping the maximum output at 5 W for high duty cycle modes.

CW Operation

The FX-4CR internal keyer speed range is 5 – 50 WPM. CW pitch is adjustable from 500 to 1000 Hz (750 Hz default). You can select either **CWL** (lower) or **CWU** (upper) depending on interference conditions. The available CW filter bandwidths are 800, 500, 300, 200, 100, and 50 Hz. The break-in delay setting varies from 5 to 500 ms in 5 ms steps (readings of 1 – 99 in the menu are multiplied by 5). Transmit/receive switching uses an internal relay, but it is very quiet. As expected (based on my experience), CW contacts were always easy, even at the 5 W level. However, operating at 20 W was a real pleasure. I did notice that after about 30 minutes of CW operation at 20 W, the radio was noticeably warm — but not hot.

Voice Operation

I found SSB operation to be very satisfying at 20 W. I could normally make contacts with minimal problems, especially on 20 and 17 meters. The audio reports were all quite good. The microphone gain and compression level adjustments are in the menu; however, the default settings work fine with the supplied microphone. You may need to change these settings if you change to a different microphone. The available SSB filter bandwidths are 3, 2.7, 2.4, 2.1, 1.8, and 1.5 kHz. You can adjust the transmit filter bandwidth from 1.5 to 3 kHz (default is 2.4 kHz). For AM and FM operation, receive bandwidth settings are 6 and 9 kHz, and 5 and 10 kHz, respectively.

Firmware Updates

Firmware updates via the supplied USB cable are easily performed as new features and bug fixes become available. The latest firmware can be found on the manufacturer's website. The firmware version shows on the screen for a few seconds when you turn on the unit. As this particular FX-4CR's firmware was out-of-date, I went through the update procedure, which is detailed in the user manual. I found the firmware update procedure to be easy. However, you must first download and install the free *STM32Cube Programmer* (see **www.st.com**). Once you have this on your computer, the firmware update process will take less than 30 seconds. So future updates will go quickly.

Conclusion and Final Thoughts

The FX-4CR is an amazing radio, especially considering its size and power output. While I see this as being used most often in portable operations, fixed station use is certainly in the picture. BG2FX now has a cooling assembly available, which includes a small internal fan and new side plates — one of which has vents for the warm air exhaust. The new side plates extend past the knobs on the front panel, thus providing some front panel protection. The cooling assembly is probably a good idea for those who operate digital modes. For more information, you can download the FX-4CR user manual on the manufacturer's website.

Manufacturer: BG2FX, **www.bg2fx.com**. Price: FX-4CR, $550; cooling package for existing units, $55; FX-4CR with cooling package installed, $585. All prices include shipping.

Xiegu VG4 Four-Band HF Vertical Antenna

Reviewed by Richard Lawn, W2JAZ
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I have been enjoying the amateur radio hobby for 58 years, and while I've built various pieces of gear, including kits and scratch builds, my real interest lies in building and testing new antennas, both homebrew and commercially manufactured. Recently I tried a new four-band HF vertical antenna by Xiegu, the VG4, available in the US from Radioddity. It caught my eye because of its relatively affordable price and the fact that it requires no ground radials. While I have lots of real estate at my QTH, ground radials are a challenge because of trees and roots, and I know that many other hams are starved for space and might find this antenna of interest.

Unpacking

The antenna came well packaged in a 47-inch box, each part clearly labeled with a number corresponding to a diagram on a one-page instruction sheet. You

Bottom Line

The Xiegu VG4 is an affordable and well-built four-band vertical HF antenna. The fact that it does not require any ground radials provides an alternative for locations where this constitutes a challenge.

will also find on the Radioddity website an improved manual with color photos (see **https://radioddity.s3.amazonaws.com/Xiegu_VG4_Manual_EN_20220111.pdf**).

I was impressed with the quality of workmanship of all components. The antenna is made out of aluminum alloy, and all hardware is stainless steel. After a quick parts inventory, I found that all the parts were present and accounted for. Most of the tools necessary for assembly are also included, making the build process a snap.

Some components such as traps and connecting tubes are preassembled, but be careful to measure everything and compare it to the bill of materials, as the shorter joining tube between two traps was actually the wrong size in my antenna. Radioddity and Xiegu were quick to send me a replacement part once I informed them of the error.

Assembling the Antenna

Using the diagram provided in the instructions, which are pretty minimal (unless you download the improved manual from the Radioddity website), I found the build went very quickly and easily following the numbered parts and the diagram. It took about 55 minutes working slowly with a friend to assemble the antenna to its full height. We used sawhorses to support the long antenna horizontally (see Figure 4). All parts except the drooping radials fit perfectly; however, the instructions did not specify any measurements in terms of assembling the various aluminum tubes to achieve approximate desired frequency resonant points for each band. We decided to make measurements as long as possible, tightening the hose clamps after inserting the inner tube to the length of the slot on the matching tube. We found the need to rotate the aluminum collar on the base insulator slightly in order to align the counterpoise radials with the threaded holes while not interfering with the matching box. There is no Allen wrench provided to loosen these two set screws. It is recommended that the six counterpoise radials be assembled after the antenna is moved to an upright position.

Figure 4 — The Xiegu VG4 base section with balun box.

Tuning the Antenna

At this point, things became more complicated and time-consuming than we expected. The SWR readings were taken with a RigExpert AA-600 when the antenna was about 3 feet off the ground, supported on sawhorses and attached to a 10-foot galvanized pipe and tilt-over bracket. The tilt-over bracket was attached to a chain-link fence post. Even with the aid of the bracket we found that hoisting the antenna was a two-man job, at least for two “older” men! After making several adjustments with the antenna horizontal to the ground, we raised the antenna to a height suggested as a minimum height above ground by Xiegu (about 10 feet). I then took new SWR readings, expecting to see a slight rise in resonant frequencies compared to the readings when the antenna was horizontal to the ground. The new SWR readings were unfortunately horrible, showing no usable frequency dips on any band. Could it be a bad coax line, or perhaps we were located too close to the chain-link fence? We then tested the coax line with a dummy load and a RigExpert, and it was perfectly flat, so that wasn’t the problem. After several additional attempts at tuning the antenna without any positive result, we gave up and I sent an email to Radioddity support. They responded very quickly, suggesting that I follow the tuning measurements provided in a user review found on their website. Several days later we followed the reviewer’s suggestions to no avail. Once again we could only conclude that the proximity of the chain-link fence was a problem, but that didn’t make sense either.

Matt, N2IDW, joined me for a third attempt at finding resonant points, and when we arrived at the same results, he began to suspect the coax jumper was the culprit. We tried three more jumper cables only to find the same results — when the antenna was tilted to its vertical position, the reasonably good SWR readings at the horizontal position went haywire! It was then that we discovered that no matter how tightly the outer threaded shell of the PL-259 was tightened on the SO-239 at the bottom of the matching box, there was play where the inner shield (ground portion) of the PL-259 connected to the mating toothed section of the SO-239. On closer examination we found that the teeth on the female connector provided by Xiegu were unusually widely spaced and therefore did not mesh

Figure 5 — Close view of a Xiegu VG4 trap.

Performance on the Air

The antenna performs very well on all bands, offering, of course, the smallest usable bandwidth on 40 meters, though that can be extended with a good antenna tuner and trial and error in adjusting the bottom- and topmost section of the antenna. The antenna is fairly broad across all of 10 meters and most of 15 and 20 meters. The surprising finding was that, with a tuner, the antenna can be used effectively on other

properly for a tight connection with the PL-259 on the jumper cables. When the coax hung perpendicularly to the connector on the match box, the SWR was fine as a good connection was made, but when the antenna was mounted vertically, the coax hung straight down. The loose play was just enough to break the connection of the shield part of the coax connector!

Surgery was required to correct this problem. We removed the matching box from the antenna and disassembled it by removing the screws that hold the black box together. We found it was well sealed from weather, as are the traps incidentally (see Figure 5 for a close look at one of the traps). The faulty SO-239 was removed and a substitute made with one I found in my shop. After reassembling the matching box and mounting it on the antenna again, we hoisted it to its vertical position, crossing our fingers that the SWR curves would be at least close to proper resonant points on each of the four bands of operations. While they were initially not perfect, they were very close to the operating frequencies I frequent. The mystery was finally solved, and Radioddity seemed grateful to learn of my finding, which they passed on to Xiegu! Apparently, based on the few user reviews I've seen, not all customers have experienced the SO-239 problem, so I suspect that the manufacturer at some point changed suppliers and was unaware of the problem.

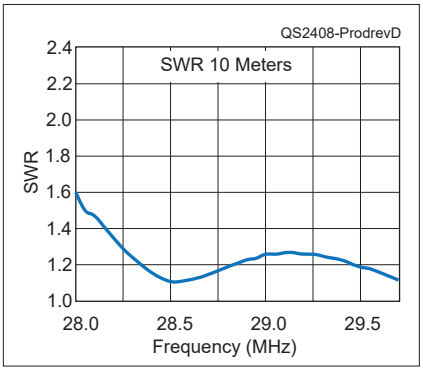

Figure D — SWR chart for the 10-meter band.

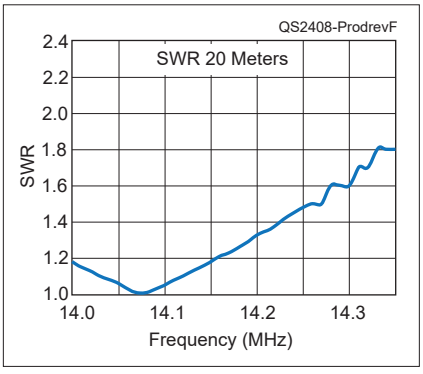

Figure F — SWR chart for the 20-meter band.

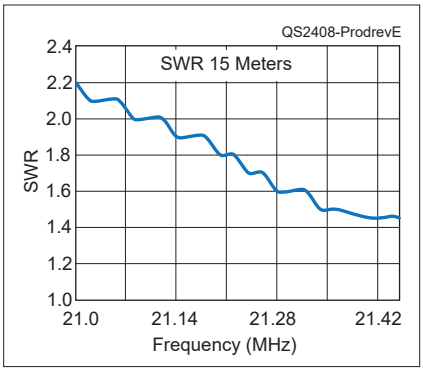

Figure E — SWR chart for the 15-meter band.

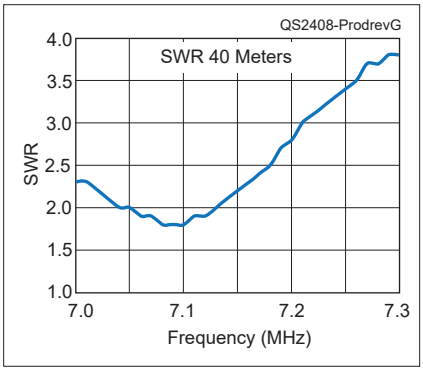

Figure G — SWR chart for the 40-meter band.

Table 5 — Xiegu VG4 Four-Band HF Vertical Antenna

Manufacturer's Specifications (not tested in the ARRL Lab)

Operating frequencies	40, 20, 15, and 10 meters
Usable bandwidth	40 meters, 150 kHz; 20 meters, 450 kHz; 15 meters, 800 kHz; 10 meters, 1000 kHz
Height	Approximately 7.8 meters (25.6 feet)
Widest point	2.69 meters (8.8 feet)
Weight	7 kg (15.4 pounds)
Power handling	1000 W PEP (500 W CW, 300 W RTTY)
Rated wind speed	35 meters/second, approximately 78 mph
Minimum height	3 meters (10 feet)
Package size	13 × 13 × 120 centimeters (0.4 × 0.4 × 3.9 feet)

bands — 30, 17, and 12 meters, giving users a seven-band antenna for a modest investment! I enjoyed a number of SSB, CW, and FT8 QSOs on all of these additional bands. The antenna does not seem to accept power well on 6 meters, however. I used only 100 W output, but the matching coils appeared robust enough to handle the higher power as advertised.

You will find the manufacturer's specifications in Table 5 and my SWR measurements for 10, 15, 20, and 40 meters in Figures D to G. I did notice that the point of resonance changed in wet weather.

In terms of gain, of course, it doesn't match my hex beam, but at times it hears better than a Carolina Windom at 40 feet. And surprisingly, the antenna is extremely quiet, by comparison, to either of these other antennas. With an improved signal-to-noise ratio, signals often seem louder on the VG4.

The good news is that I also seem to be heard as well, with QSOs from my New Jersey QTH as distant as Australia on a day when conditions were labeled as "disturbed" on 20 meters!

Conclusion

If you are looking for an easy-to-build antenna (as long as the SO-239 doesn't need replacing) that takes up very little space and requires no ground radials, then the Xiegu VG4 deserves some consideration. Just be aware that you will need to spend some time adjusting lengths of the first and last few sections of the antenna to achieve desired resonance.

I could not have accomplished this review without the help of South Jersey Radio Association members Tony Canuso, N2ATB; Brian Gross, KD2FJX, and Matt Grohgans, N2IDW.

Manufacturer: Xiegu Technology Co. Ltd., **www.cqxiegu.com**. Available online via **www.radioddity.com**. Price: $299.

JNCRadio Chelegance MC-750 HF 40 – 6-Meter Antenna

Reviewed by John Leonardelli, VE3IPS
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As a dedicated portable field operator, I am always interested in antennas that seamlessly balance ease of setup with high-performance signal propagation. Most portable antenna designs are center-loaded vertical antennas usually about 7 – 8 feet in length. While these antennas may be labeled as "compromise" solutions due to their radiating length falling short of a quarter wave, they offer operational convenience in outdoor scenarios. I have made hundreds of contacts with no concern, but when operating low power at 5 W, every gain in efficiency by using a better antenna will be rewarded with more contact possibilities.

Bottom Line

The JNCRadio Chelegance MC-750 is a great choice for amateur radio enthusiasts seeking a multiband antenna that is easy to deploy and provides good performance in a relatively compact size.

Table 6 — JNCRadio Chelegance MC-750

Manufacturer's Specifications (not tested in the ARRL Lab)

Frequency range	7 – 50 MHz
Power handling	100 W PEP
Counterpoise	4 × 3.5 meters (11.5 feet)
Weight	1.8 kg (4 pounds)
Carry case dimensions	65 × 9 × 7 centimeters (25.5 × 3.5 × 2.8 inches)

I decided to get the JNCRadio Chelegance MC-750 antenna, and it has exceeded my expectations. Designed by JNCRadio in collaboration with Chelegance, this antenna offers versatility, performance, and convenience for amateur radio enthusiasts. In this review, I will delve into its features, construction, and performance to give you a comprehensive overview of its capabilities.

Description

The Chelegance MC-750 antenna is a lightweight, solidly built, compact multiband antenna tailored for portable operations (see the manufacturer's specifications in Table 6). Its foundation is based on a quarter-wave design using a telescopic whip for 20 to 6 meters and a base coil for operation on 40 and 30 meters. The antenna kit is safely stashed in a rugged carrying case with pockets to keep everything secure. It includes a base unit with an SO-239 connector and counterpoise hub, a hefty stainless-steel spike rod that screws into the base unit, a base rod (with a red knurled hand grip) that also screws into the base unit, a 5.2-meter (17-foot) telescopic whip, and the four (11.5-foot) counterpoise wires securely held on a plastic nylon line winder. There is also the 40-meter coil packaged in a protective pouch. All the components demonstrate high-quality craftsmanship, and the assembly process provides simplicity, ensuring swift setup and deployment.

The MC-750 antenna truly shines when it comes to performance. With a power rating of 100 W PEP, it is capable of handling the demands of high-power portable operations. It is designed to be used in situations where you have a park, field, beach, or grassy area where you can use the spike rod.

The antenna's clever adjustment approach sparked my initial interest. It features engraved band positions on the telescopic whip, eliminating the need for whip length measurements. Merely extending the whip to the marked point resulted in SWR levels consistently below 2:1, rendering cumbersome tuning practices unnecessary. This innovation benefits novices and guest operators alike. Moreover, for portable setups reliant on transceivers lacking an integrated antenna tuner, deploying the MC-750 antenna brings a smile.

Figure 6 — The JNCRadio Chelegance MC-750 installed in a park.

On the Air

I always have several use cases that align with my operating style. I grabbed the antenna bag and my Icom IC-705 backpack, and I drove out to the park and found a place to operate under a shady tree. The process of installing the ground spike onto the base unit and affixing the lower rod was seamless. The base rod, aided by its red hand grip, found its place in the grass, while the telescopic whip was attached and extended to the 14 MHz mark. The counterpoise wires were laid out and connected to the base unit counterpoise hub (see Figure 6). I used 25 feet of RG58 coax, and a quick SWR check returned a reading of 1.8. A slight whip adjustment dropped the SWR to a reading of 1.1 (see Figure 7), and I was ready to make some contacts. Afterward, I adjusted the antenna to 18 MHz to see if I could work the HF Pack hams on 18157.5 kHz. The SWR was 1.6, and I was on the air on that band within a minute.

I always collapse the telescopic whip starting with the lower elements first. I have used the telescopic whip more than 40 times, and it has proven to be well built. Nonetheless, I advise against prolonged outdoor exposure in rain and snow, and suggest prompt drying after exposure to moisture. With any antenna, proper care extends its lifespan. Like many portable antennas, this one is not waterproof.

Days later, my focus shifted to 40 meters to take advantage of somewhat favorable band conditions, to see if the longer radiating length over a shorter compromise antenna would make a difference. Setting up shop in my backyard, I conducted a face-off between the MC-750 antenna and a typical compromise antenna using an A/B switch. Employing the 40-meter coil and adhering to the instruction manual's guidelines, I found the SWR was fine and ran 50 feet of RG8X coax. I used my Yaesu FTDX3000 at 100 W to also test power-handling capability on SSB. I noticed that the antenna was very stealthy, making it an ideal antenna in a low-profile setting. Adding some orange flash tape would enhance visibility, particularly in a campsite or public park scenario. As expected, the MC-750 provided a 1 – 2 S-unit advantage over the other compromise antenna into the east coast.

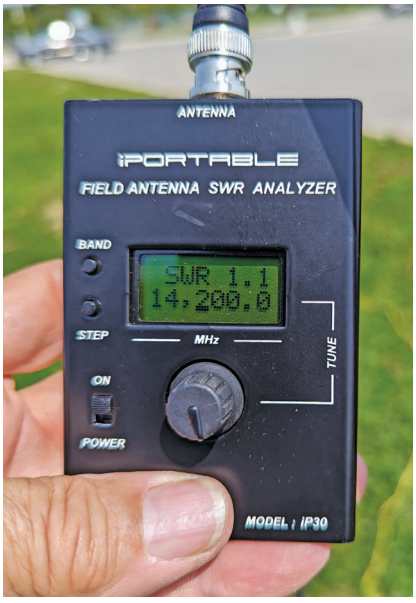

Figure 7 — The JNCRadio Chelegance MC-750 SWR on 20 meters.

Reception was about the same. I continued to use the compromise antenna until QSB dips brought me to a 55 level, while the MC-750 offered 56 peaking to 57. Thus, the more efficient MC-750 proved itself to be useful when conditions became worse. I noticed no heating of the base coil using high power.

One afternoon, I noticed 40 meters had good propagation and I heeded the call for a POTA activation. With the radio propped up on the passenger seat, I set up the antenna on the grass beside the corner parking spot. SWR was fine. I added 31 contacts to the log, and then it was time to get home for dinner. It was easy to pack up the antenna and put everything in its place in the carry bag. On the way home I realized that I had no problem making contacts and never even gave thought to what I was using, as the chasers were frantic in adding a new park to their logs. I worked everyone who called me across the 13 colonies with great signal reports using 20 W.

ARRL Field Day 2023 provided for experimentation with antennas, transceivers, and power options. I embarked on the Friday with a clear agenda of tests. By employing an A/B antenna switch, I toggled between my 40/20-meter dipole and the MC-750 vertical. Unsurprisingly, the dipole excelled in engaging regional stations on 40 meters, while the vertical was best in reaching single-hop DX stations into Florida and Alabama. For Field Day I chose the MC-750 set up for 20 meters and switched it against my portable beam pointed to the east coast. This worked out very well. I used the beam for directed contacts, and the vertical gave me contacts everywhere else. The on-the-fly antenna swapping using the radio's A/B switch allowed me to use the best antenna while managing the logbook and contact exchanges.

The other advantage for my operating style is the ability to use this antenna on 6 meters. Having a single antenna to do that is a bonus.

My analyst friend asked to see some data points. So, this time I tested using the SOTABEAMS WSPR transmitter (100 mW output) and their DXplorer reporting system. The comparison for the MC-750 antenna was a shorter 7-foot antenna on 20 meters using four radials. The MC-750 got 23 reports,

and the shorter one got 14. The MC-750 was heard the farthest: KPH (3,705 miles), KP4MD (3,545 miles), and GMØUDL (5,216 miles). The shorter antenna was heard by VE6PDQ (2,738 miles), VE6JY (2,699 miles), and WDØE (2,170 miles). The MC-750 was better by 2 – 8 dB in SNR readings. It was better at WDØE by 4 dB and at KG5FNU by 9 dB, which heard both transmissions. Longer antennas are more efficient. The MC-750 performed better and was heard farther. The MC-750 showed reports from California, Nova Scotia, and Scotland, but the compromise antenna did not. Longer antennas radiate more signal, but the shorter one is more portable due to its smaller packed size. Receive comparisons with WWV at 15 MHz showed similar levels with the MC-750 better, but not consistently.

I did come up with a simple hack for the spike rod that has a very sharp tip. I used a small pill bottle that covered the tip nicely and then found a 3D-printed version for a similar design. There is no need to fiddle around with the antenna because it's designed to work with its supplied counterpoise wires. I did try it with longer 25-foot counterpoise wires that I had in my antenna bag, so there is room for experimentation, and I noticed signals did improve by an S-unit or two.

One improvement could be to use the ⅜-inch – 24 fine threading instead of the Asian metric threads so it can be used with other antenna products.

My practical experimentation has proven that the MC-750 antenna is more efficient than the typical compromise antenna due to its longer length. The antenna bandwidth is also wider, as the antenna has a lower Q factor, thus not having to adjust it for every frequency change within the band (*The ARRL Antenna Book* is your reference guide, with information in Chapters 1 and 19). Its fast deployment means I have more radio time instead of back-and-forth antenna adjustment time.

I also gave thought to a couple of concepts I wanted to investigate. If I have a second one, can I use it as a phased vertical, allowing some directivity and gain? The other idea is to use this antenna for field operations, where I can use my 40/20-meter linked dipole that's set up as an inverted **V** and use the A/B antenna switch to switch to the MC-750 vertical, and use whatever antenna is best.

Because the deployment is quick and easy, there is little effort required to do this all the time when operating outdoors. The antenna carry bag is more than 2 feet long, which makes it less able to fit in a backpack or carry-on suitcase than, say, a compromise antenna that can be anywhere from 12 to 18 inches long. If your budget allows only one antenna, then this one could be the one you need.

Conclusion

In conclusion, the JNCRadio Chelegance MC-750 antenna has proven itself as a remarkable choice for amateur radio enthusiasts seeking a high-performing multiband antenna. Its relatively compact size, ease of assembly, and reliable performance make it a valuable addition to any radio kit. Whether you're a portable operator, a POTA/SOTA enthusiast, or looking for a stealth option, the MC-750 antenna delivers on its promises.

Manufacturer: Chelegance JNCRadio, **www.chelegance.com**. Price: $179; add $48 for the optional 80-meter coil.