Product Reviews and Short Takes

September 2012

Product Reviews:

TEN-TEC R4040/YouKits HB-1B Four Band CW QRP Transceiver

N6BT Q-52 Portable HF Yagi

Short Takes:

Comet CHV-5X HF Multiband Rotatable Dipole

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TEN-TEC R4040/YouKits HB-1B Four Band CW QRP Transceiver

Take four band CW to the woods with this petite transceiver

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The newest addition to the lineup of low power (QRP) equipment available from TEN-TEC is the TEN-TEC R4040/YouKits HB-1B. (We'll just call it the HB-1B for this review.) The HB-1B builds on earlier two band units, the R4020 (40 and 20 meters) and R4030 (40 and 30 meters), which we reviewed in February 2011 *QST*.[1]

Like its predecessors, the HB-1B was designed and manufactured in China by the company known as YouKits. TEN-TEC is the exclusive distributor for the United States. This addition to the lineup was anticipated by many QRP operators who followed announcements on the YouKits website (**www.youkits.com**). I eagerly received the radio to check out and try on the air as I was one of those following updates on the web.

Features and Enhancements

All of the good attributes of the two banders have been retained in this model plus some exciting improvements have been added. The HB-1B features full frequency coverage on the 80, 40, 30 and 20 meter bands for receiving and transmitting CW as well as reception of SSB phone signals. In addition to the four amateur bands, the receiver covers 3.2 to 16 MHz for shortwave listening. This can provide some additional entertainment when activity is slow in the ham bands. Memory storage increases from 20 to 30 addresses.

Probably the most important and appreciated feature is an adjustable four pole crystal filter, continuously variable from 400 Hz to 3 kHz bandwidth. In the two band radios, IF bandwidth was switchable among several fixed values. The HB-1B shows improved IMD dynamic range, several dB better on 20 meters compared to the R4020 two bander.

The original two band units are quite sophisticated and offer a nice array of features for the QRP operator. In the original review I fondly recalled the era of the classic Tuna Tin 2 transmitter featured in *QST* and marveled at how far modern QRP equipment technology has advanced.

The HB-1B is slightly smaller and lighter than the two band radios. This is welcome news for backpackers who value compact size and every little weight reduction that lightens their load. The radio weighs in at just over 13 ounces, about 3 ounces less than the two band unit without internal batteries, and is classified as a trail friendly radio (TFR). Aiding in the description of being trail friendly is the smaller size (5.2 × 3.4 × 1.4 inches, not including knobs).

The HB-1B features the same sturdy steel case construction as the two band radios, along with a BNC antenna connector. It is designed to lay flat on the operating position. The front panel features an easy-to-read bright blue LCD screen, the main tuning knob, four push button switches, IF filter and audio gain controls and a separate power switch. The LCD shows the frequency, mode, dc supply voltage, RIT offset, S meter on receive and power output on transmit. The main tuning dial and the four push buttons have multiple uses to enable selection of the various modes and functions.

A plus with the LCD frequency display is being able to know exactly where you are on the band. I've used some other QRP transceivers with vague frequency displays that make it a little more difficult to find the QRP calling frequency or keep a schedule with a friend. The main tuning steps can be changed by pressing the tuning knob to switch between 10 Hz, 100 Hz or 1 kHz. For verification of the change an underscore (_) appears on the display for the appropriate digit. For the general coverage frequency range outside the ham bands, the highest tuning rate is increased from 1 kHz to 5 kHz. For quick excursions, press and hold the tuning knob for 2 seconds to change the tuning step to 100 kHz.

To enter into the RIT mode, simply press the RIT/MOD button. A dash will be displayed and turn the tuning knob for your desired

Bottom Line

The TEN-TEC R4040/YouKits HB-1B QRP CW transceiver offers a wide array of features for its price range. With four bands (80, 40, 30 and 20 meters) to choose from, there's usually someone available for a low power CW QSO.

[1]C. Skolaut, KØBOG, "TEN-TEC R4020 Two Band CW QRP Transceiver," Product Review, *QST*, Feb 2011, pp 54-56. Product Reviews mentioned here are available to ARRL members online at **www.arrl.org/product-review**.

Key Measurements Summary

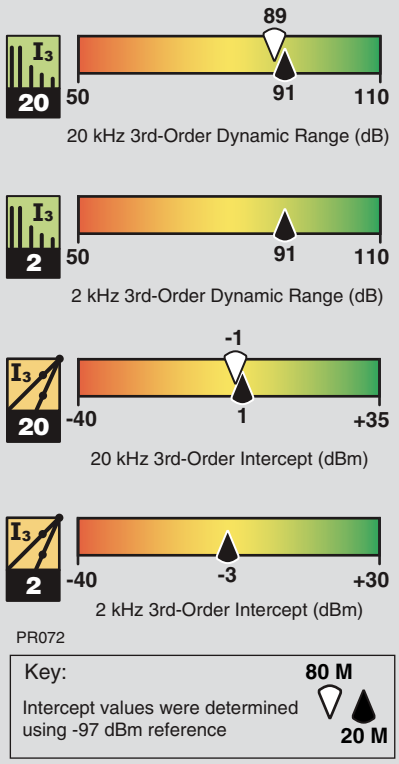

Table 1
TEN-TEC R4040/YouKits HB-1B, serial number N/A

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 3.2-16 MHz; transmit, 3.5-4.0, 7.0-7-3, 10.1-10.15, 14.0-14.35 MHz.	Receive, 3.1993-16.0007 MHz; transmit, 3.4991-4.00029, 6.9953-7.30429, 10.0967-10155.69, 13.9667-14.35569 MHz.
Current drain: transmit, 800 mA at 12 V dc; receive, about 80 mA; external supply voltage, 9-14 V dc.	13.8 V dc external power: Receive, max audio, no signal, 79 mA; transmit, 980 mA. Battery power (12 V dc): Receive, max audio, no signal 79 mA; transmit 890 mA. Minimum operating voltage, 6.0 V dc (0.5 W output).
Modes of operation: CW transmit and receive; SSB receive only.	As specified.
Receiver	**Receiver Dynamic Testing**
Sensitivity: Not specified.	Noise floor (MDS), IF filter set to minimum bandwidth, –130 dBm; IF filter set to maximum bandwidth, –126 dBm.
Noise figure: Not specified.	17 dB.
Blocking gain compression dynamic range: Not specified.	Not measured.*
Reciprocal mixing dynamic range: Not specified.	Not measured.*

ARRL Lab Two-Tone IMD Testing (IF filter set to minimum bandwidth)**

Band	*Spacing*	*Input Level*	*Measured IMD Level*	*Measured IMD DR*	*Calculated IP3*
3.5 MHz	20 kHz	–41 dBm	–130 dBm	89 dB	+4 dBm
		–33 dBm	–97 dBm		–1 dBm
14 MHz	20 kHz	–39 dBm	–130 dBm	91 dB	+7 dBm
		–32 dBm	–97 dBm		+1 dBm
		0 dBm	–17 dBm		+9 dBm
14 MHz	5 kHz	–39 dBm	–130 dBm	91 dB	+4 dBm
		–33 dBm	–97 dBm		–1 dBm
		0 dBm	–17 dBm		+9 dBm
14 MHz	2 kHz	–39 dBm	–130 dBm	91 dB	+4 dBm
		–34 dBm	–97 dBm		–3 dBm
		0 dBm	–17 dBm		+9 dBm

receiver offset. An up or down arrow on the display shows the direction. This RIT has a wide enough range to easily allow you to use split frequency operation to chase DX pileups. In the RIT mode, the tuning steps are 10 Hz and 100 Hz.

To change receiving modes, press and hold the RIT/MOD button for 2 seconds and then cycle through CW to USB to LSB. The HB-1B has 30 storage memories to store your favorite frequencies and modes to allow quick changes.

The ATT button permits turning the attenuator on and off. When the attenuator is on, the S in the S meter portion of the display will change to A. While transmitting, the HB-1B will display the approximate power output. The letter S on the dial will change to P followed with a series of vertical bars. Each three bars represent approximately 1 W of output power.

The HB-1B is set up for stereo headphones, and one of the cautions is to not use a mono audio plug. There is no built in antenna tuner or speaker, but amplified computer speakers would supply plenty of audio for relaxed listening in the home shack.

CW Features

Either a straight key or paddles for the built-in keyer can be used with this transceiver. It has an automatic function that determines what type of key is being used. On power up you will hear the letter A sent in Morse code if a paddle is connected or the letter M if a straight key is connected. If no key is connected you will hear the letter A. You must plug in a straight key before turning on the power if you desire that kind of operation. A TUNE feature is available, useful for checking antenna SWR or adjusting an external antenna tuner.

The built-in keyer has a range of approximately 6 to 36 WPM. Operation is very much like the keyers in the dual band units. To set the speed, press the CQ/SET button for approximately 2 seconds and the letter S will be heard, then release the button. Within 8 seconds, push the paddle to the dot side to increase the keyer speed or to the dash side to decrease the keyer speed. When finished,

Manufacturer's Specifications	Measured in the ARRL Lab
Receiver	**Receiver Dynamic Testing**
Second-order intercept point: Not specified.	14 MHz, +33 dBm.
S meter sensitivity: Not specified.	S9 signal at 14.2 MHz: 3.47 µV (minimum IF bandwidth), 2.19 µV (max IF BW).
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth): CW and SSB; minimum filter bandwidth, 495-695 Hz (200 Hz). Equivalent rectangular BW: 217 Hz. Maximum filter bandwidth, 447 Hz-1690 Hz, (1243 Hz).
Spurious and image rejection: Not specified.	First IF rejection: 3.5 MHz, 59 dB; 7 MHz, 31 dB; 10.1 and 14 MHz, 40 dB. Image rejection: 3.5, 10.1 and 14 MHz, >140 dB; 7 MHz, 65 dB.
Receiver audio output: 0.1 W into 8 Ω.	27 mW at 7.5% THD into 8 Ω.
Transmitter	**Transmitter Dynamic Testing**
Power output: 13.8 V dc external supply, 4-5 W; 12 V dc supply: 3-4 W.	13.8 V dc external supply: 3.5 MHz, 5.8 W; 7 MHz, 5.4 W; 10.1 MHz, 5.7 W; 14 MHz, 5.0 W. 12 V dc supply: 3.9 W typ.
Spurious-signal and harmonic suppression: Not specified.	51 dB at 3.5 MHz; ≥60 dB other bands. Meets FCC requirements.
CW keyer speed range: Not specified.	6 to 36 WPM.
Iambic keying mode: Not specified.	Mode B.
CW keying characteristics: Not specified.	See Figures 1 and 2.
Receive-transmit turnaround time (tx delay): Not specified.	250 ms.
Composite transmitted noise: Not specified.	Not measured.†

Size (height, width, depth): 1.9 × 5.2 × 3.8 inches, incl protrusions; weight: 13.4 ounces.

Price: R4040/HB-1B, $299; 12 V dc power cube, $19.95; Lithium-ion battery pack, $29.

*The AGC could not be turned off. Blocking gain compression and reciprocal mixing measurements must be made with the AGC off.
**ARRL Product Review testing includes Two-Tone IMD results at several signal levels. Two-Tone, 3rd-Order Dynamic Range figures comparable to previous reviews are shown on the first line in each group. The "IP3" column is the calculated Third-Order Intercept Point. Second-order intercept points were determined using –97 dBm reference.
†Composite noise test not completed. Transmit frequency resolution did not permit tuning the transmitter to within 1 Hz of our low noise test oscillator, causing a PLL unlock on the test fixture.

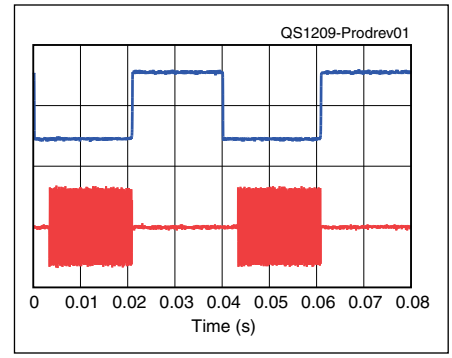

Figure 1 — CW keying waveform for the HB-1B showing the first two dits in full-break-in (QSK) mode using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. (Note that the first key closure starts at the left edge of the figure.) Horizontal divisions are 10 ms. The transceiver was being operated at 5 W output on the 14 MHz band.

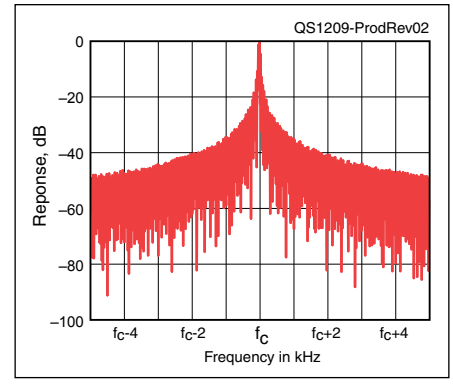

Figure 2 — Spectral display of the HB-1B transmitter during keying sideband testing. Equivalent keying speed is 60 WPM using external keying. Spectrum analyzer resolution bandwidth is 10 Hz, and the sweep time is 30 seconds. The transmitter was being operated at 5 W PEP output on the 14 MHz band, and this plot shows the transmitter output ±5 kHz from the carrier. The reference level is 0 dBc, and the vertical scale is in dB.

again press the CQ/SET button quickly to exit.

The keyer does not include user-defined memories but there is a memory preset to call CQ. To activate it, press the CQ/SET button quickly causing it to send CQ CQ CQ DE (your call sign three times) PSE K. Hitting the CQ/SET button for 1 second at any time during the CQ cancels it. To enter your call sign, press the CQ/SET button for about 2 seconds and you will hear the letter S. Continue to hold down the button until you hear the letter I, then release it and send your call sign with the paddle as usual. When done, a short click of the button will exit the setup. The PSE K format is a bit different than many are used to, but it works. This automatic CQ function is operational when using paddles but not with straight key use.

On the Air

How does it work in the shack? I was very favorably impressed with its operation and had no trouble making contacts with North Carolina, South Carolina, Pennsylvania, New York, Kentucky, Iowa, Ohio, Maine, Illinois and Virginia among others in a leisurely operating timeframe in the evenings on 40. This was with a basic 40 meter dipole only about 15 feet high — on par with many portable setups in the field. I found the audio output level and side tone volume very adequate. Full break-in (QSK) operation is smooth with few thumps.

I give the variable IF filter high marks for

performance in on the air use, finding a number of times when I could eliminate nearby interference that had crept into the passband with careful adjustment of the control. It would take several manually switched filters to match that versatility, and the variable feature ensured the enjoyable completion of the QSO. I had experienced this feature some years back from other manufacturers of QRP gear so it is good to see it incorporated in this model.

Power Sources

The HB-1B may be powered by a 9 to 14 V external power supply such as a battery or home station 13.8 V dc supply. It has a built in polarity protection circuit. Provision is made for an internal supply by using three AA size 14500 lithium-ion batteries (3.6 V, 900 mAh) in the included battery holder. TEN-TEC offers the optional R9411 rechargeable Li-ion battery pack (12 V, 2.2 Ah). It is certainly nice to be able to monitor the supply voltage on the LCD, especially while using the internal pack. Originally, a modification was necessary to be able to charge these batteries internally. A revision to the radio was made in March to add a charging jack and eliminate the need to make this modification.

During the review period I used both a gelled electrolyte 12 V battery and the optional regulated power cube from TEN-TEC. Good tone reports were received with both supplies. During Lab testing, we found that the HB-1B will operate from as little as 6 V dc and the transmitter will provide 0.5 W output at that level.

As with the two band units, SSB stations were easily tuned in and copied.

For better viewing of the display in the home shack atmosphere, I preferred to put a small spacer under the rear of the unit, but many in the field prefer the flat horizontal position. An accessory tilt bail would give an option in this area. TEN-TEC makes an attractive oak stand available for these QRP radios. The HB-1B comes with a four page instruction manual that is adequate but a more comprehensive manual would be a nice plus. A schematic diagram is available for download from the TEN-TEC or YouKits web page.

A Few Rough Edges

ARRL Lab Test Engineer Bob Allison, WB1GCM, noted a few things as he put the radio through its paces. The voltmeter on the display reads 0.5 V higher than the actual input dc voltage; all voltage readings appearing in Table 1 are the true values measured during the various tests. The radio can transmit slightly outside of each of the four ham bands covered; the user needs to keep that in mind if operating near the band edges.

We were disappointed that the keying waveform (Figure 1) and keying sidebands (Figure 2) are very similar to the two band units and could use some attention. The square corners on the waveforms in Figure 1 indicate "hard" keying. Figure 2 indicates signal energy only 40 dB down at ±2 kHz from the carrier. With typical 100 W all band transceivers that energy is 60 to 80 dB down. Given the QRP power levels involved we received no reports of key clicks but the potential is there. Operators will want to check their signal if they plan to use an amplifier together with high speed CW operation.

While using the HB-1B, I noted that the tuning dial has mechanical detents, and there is a bit of play in the shaft/bearing arrangement.

Wrapup

Overall I found the HB-1B to be a good performing CW transceiver that is easy and fun to operate. It offers a lot of features for QRP gear in this price range! For some hams this is a good entry to QRP or backpacking operation because the HB-1B comes assembled, tested and with a warranty.

For me the QRP world remains exciting and it's great to see so many changes and revisions to various models appearing often. Low power or portable operation may be a good alternative for an amateur who is having problems with antenna restrictions or RF interference with neighbors. QRP definitely works, but it may require more patience, timing and persistence than higher power operation. The resulting QSOs can be very satisfying and contribute to the WOW (wits over watts) factor. I would urge any active amateur to take a look at the gear that's currently available, accept a new challenge and give QRP a try!

US distributor: TEN-TEC, Inc, 1185 Dolly Parton Parkway, Sevierville, TN 37862, tel 800-433-7373; **www.tentec.com**.

See your digital edition of *QST* for a video overview of the YouKits transceiver.

N6BT Q-52 Portable HF Yagi

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When ordering my Bravo-7K multiband HF vertical from Tom Schiller, N6BT, I noticed the planned introduction of the two element Q-52 HF Yagi.[2] Tom had a prototype on display at a convention I attended last year, so I suggested a *QST* review when the antenna was ready for production and here it is!

General Specs and Design

The Q-52 is a *five* band, *two* element Yagi — thus the model name (there is also a Q-51 rotatable dipole). It is full size on 10 meters and loading inductors are switched in with relays to lower the resonant frequencies of both the driven and reflector elements for use on 12, 15, 17 and 20 meters. A control box (Figure 3) turns the relays on and off from the shack through a multiconductor control cable. Band switching is instantaneous and could probably be adapted to automated switching schemes.

A separate switch on the control box opens the reflector element for "bidirectional mode," using the driven element as a rotatable dipole. A small inductor is used for a hairpin match to 50 Ω. Ferrite beads create a choke balun between the unbalanced coaxial connection and the symmetrical loading networks. Thus, no additional balun is needed on the feed line. The control cable, I discovered, *does* pick up RF and *does* need a coiled or ferrite bead choke.

Physically, the antenna is lightweight (16 pounds) and has a turning radius of only 9 feet. The boom is just less than 9 feet long and a light duty rotator such as the Hy-Gain AR-40 would suffice. For portable or Field Day use, it could be supported by a guyed push-up mast or fiberglass pole up to about 20 feet and rotated by hand.

A plastic enclosure mounted on the boom houses a circuit board, loading inductors, switching relays and a terminal strip as shown in Figure 4. All supplied tubing is drawn aluminum and the hardware is stainless steel. The plastic enclosures are high impact ABS with sealing O rings (one enclosure did arrive with a minor chip received during shipping).

Table 2 summarizes the published specifications. At 30 feet in height, forward gain is specified to be a minimum of 3 dBd on 20 meters and increasing with frequency. Front-to-back ratio is given as typically 8 to 10 dB. Each antenna is assembled and tuned at a height of 30 feet before shipping.

Table 2
Q-52 HF Yagi

Manufacturer's Specifications

Boom length:	8 feet, 9 inches (9 feet, non-telescoping model).
Turning radius:	9 feet.
Weight:	16 pounds (approx).
Wind survival:	100 mph.
Wind load:	<2 square feet.
Feed point impedance:	50 ohms.
Power rating:	1 kW SSB, 750 W CW.
Minimum gain:	3.3 dBd (20 meters, 30 ft height).
Typical F/B:	8-10 dB (30 ft height).
Power requirement:	12 V dc.
Price: $549.	

First Impressions and Assembly

As with other products I've purchased from N6BT over the years, the mechanical portion of the antenna is robust and well built. Holes that were supposed to line up did so. U-bolts and other hardware were high quality. Welds had no gaps or blobs. Figure 5 shows the parts ready for assembly right out of the box.

The electrical relay assemblies appeared to be soldered well and the coils were made from heavy duty wire. Following the instructions is important but not difficult. I would like to see the photos and drawings integrated with the assembly checklist, though. Total assembly time was a little over an hour from opening the box.

One thing I definitely liked was that the switching enclosures and element center assemblies came already mounted on the boom. This saved a *lot* of time and probably eliminates numerous opportunities for assembly errors. All I had to do was bolt the

Bottom Line

The Q-52 is a compact rotatable gain antenna that covers the upper five HF bands. It is a good choice for an amateur with limited space or for portable operation.

[2]H.W. Silver, NØAX, "Bravo-7K Portable Vertical Dipole," Product Review, *QST*, Mar 2012, pp 52-53.

Figure 3 — The Q-52 control box has a single rotary switch for band selection and a toggle switch to open the reflector element for bidirectional mode.

Figure 4 — The driven element's relay and inductor assembly with the control cables to the shack and to the reflector element attached to the terminal strip.

Figure 5 — The pieces of the antenna as delivered. All pieces are 3 feet or shorter, making the Q-52 easy to transport for portable operation. Total weight of the antenna is 16 pounds.

boom together, telescope and mount the tapered element sections, and attach the control and coaxial cables. This antenna would be simple to deploy in the field.

Once I started the assembly and tuning process, I found several nits that are typical of new products. I've given N6BT a complete list of the things I noticed for future manual revisions. For example, the list of needed tools is missing a couple of items and some additional text or a drawing is needed in a few places. It would be a good idea to specify the use of anti-oxidant compound when assembling all of the metal-to-metal junctions, too.

The electrical assembly is very simple — stick the control cable through the hole and attach the wires in a certain order. The only complaint I have with this part of the process is that the terminal strip orientation makes it difficult to tighten the screws but it is not likely this will need to be done on a regular basis. I also had to tin the stranded wires of my control cable to clamp properly with the solid wire of the provided cable. This minor difficulty aside, the checkout routine went smoothly. It was roof time.

Installation and Tuning

The Q-52 is light so it was not hard to carry the antenna up onto the roof then hold it in place while wrestling the U-bolts into place around the mast. The antenna was easily balanced and mechanically aligned at the mounting point, as well. For a portable or temporary installation this would be a *big* plus. Finding the balance point for the boom-to-mast plate is a step that should be included in the ground level assembly section of the manual.

As you can see in Figure 6, the antenna is installed not far above a wood and composition shingle roof. I found this affected the tuning of the antenna on 20 meters quite a bit. The initial frequencies of minimum SWR were about 200 kHz lower than expected although higher frequency bands were less affected.

After some conversation with Tom, N6BT, a field readjustment procedure was created and has been added to the manual along with an explanation of the circumstances that affect element tuning. In general, any antenna with a standoff distance of less than ¼ wavelength from other antennas or surfaces will be detuned compared to the same antenna mounted in the clear. This is particularly true for Yagis and other parasitic arrays that are highly dependent on coupling.

Back on the roof, and starting with the as delivered element lengths and coil configuration, I was able to raise the 20 meter resonant frequencies easily by adjusting element lengths and the loading coil values. Coil inductance is adjusted by squeezing the turns together (more inductance) or spreading them apart (less inductance).

As you might expect, changing the 20 meter settings also required some tweaking of coils on the higher bands. All told, it took a bit more than a half-hour of adjustment and checking to get the antenna tuned to where I wanted it. The final settings are given in Table 3. The two 20 meter tuning positions overlap enough to keep SWR below 2:1 from the bottom of the band to about 14.300 MHz. My rig's internal tuner easily handled the mismatch above 14.300 MHz.

Since the Q-52 is likely to be installed at low heights, near roofs and buildings, and in the vicinity of other antennas, owners should expect to have to adjust the antenna's tuning on the lower bands, at least.

Rotating the antenna so that the elements were parallel to my 105 foot dipole, which is about 15 feet from the beam, did show some interaction, adding 0.2 to the SWR on 20 meters. No other bands seemed to be greatly affected and I am using both antennas without any problems.

On the Air Performance

I also have nearby a 14 foot vertical antenna/

Table 3
Q52 SWR Data, 50 Foot RG-8X Feed Line

Band Setting	Frequency (MHz)	SWR	2:1 SWR Bandwidth
20L	14.080	1.3:1	140 kHz
20H	14.220	1.3:1	170 kHz
17	18.090	1.3:1	250 kHz
15	21.120	1.5:1	900 kHz
12	24.95	1.1:1	1.5 MHz
10	28.7	1.2:1	1.9 MHz

auto tuner combination with the base height a few feet below the beam. I rewired the shack antenna switching so that I could quickly switch among the dipole, beam and vertical for comparisons. HF propagation is highly variable and very dependent on vertical takeoff angle so it is challenging to give a true comparison of the beam to the dipole and vertical using live signals. I often found signal levels changing by 20 dB or more in a matter of seconds among the three antennas as conditions along the signal path changed.

On 10 and 12 meters, where weak signals accentuate an antenna's strength and weaknesses, I found the Q-52 and dipole to be competitive in the dipole's most favored directions and the Q-52 regularly an S unit or two better away from the dipole's main lobes — the manual provides comparison patterns between a 102 foot G5RV antenna and the beam. The vertical generally came in third although at certain times and in certain directions it would out shine either of the higher antennas. I kept the antenna switch busy!

I found signals on the Q-52 to be up to an S unit stronger on the lower bands than either the dipole or vertical. The Q-52 performed better in directions where the dipole pattern had a null along its axis and on bands where the vertical's gain approached 0 dBd. It wasn't that the Q-52 had all that much more gain than the dipole or vertical but being able to aim the gain carried the day several times beaming over the North Pole and straight east or west to Africa and the Pacific on these bands. Sometimes the height of the individual antennas was just right for a particular signal at a particular time of day, too.

The Q-52's ability to reject noise in directions the symmetrical dipole and vertical could not was also welcome, improving signal-to-noise ratio significantly on occasion. Even at the low height of 30 feet (about ½ wavelength on 20 meters) the advantages of the Yagi pattern were apparent in rejecting interference from other signals and from local noise sources of which there are many in this urban location.

Figure 6 — The completed Q-52 installed on a rooftop mast about 30 feet above the ground. The antenna mounts easily on a 1½ inch mast and can be turned with a light duty rotator such as an AR-40.

Summary

The Q-52 is a very attractive option for a ham with limited space in need of a rotatable gain antenna that covers the upper five HF bands. It is light enough for a chimney mount and a roof tripod will handle it easily. It would be a great step up from a ground-mounted vertical or low dipole if a typical three-element multiband beam isn't a practical option.

For portable operation, the Q-52 is very competitive with other small Yagis. The modest amount of directivity improves the receive signal-to-noise ratio for easier copy of marginal signals and the extra gain over a dipole is always welcome. It seems to me that N6BT has created another winner in the small-antenna field.

Manufacturer: N6BT Antennas, PO Box 1859, Paso Robles, CA 93447; **www.n6bt.com**.

New Products

WXWarn Weather Software

WXWarn from Scott Davis, N3FJP, is designed to download and parse weather data published by the National Weather Service (NWS). *WXWarn* monitors NWS warnings, watches and forecasts and gives an alert as new ones are issued. Audio alerts announce the location and nature of each report. The software can be configured to monitor the entire United States or just a state, county or county list. It can also monitor and screen for specific alerts. *WXWarn* will display up to 12 real-time weather graphics that can be configured for content and size. The software requires *Windows* and an active an Internet connection for current NWS data. *WXWarn* is free of charge and fully functional for permanent use with a small banner ad, or the user can register for $7 to remove the banner ad. For more information, or to download, visit **www.wxspots.com**.

Comet CHV-5X HF Multiband Rotatable Dipole

Mike Corey, KI1U
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When you're operating in the field on a public service deployment, it helps to have an antenna that meets the demands of portability, multiband operation and ease of assembly. The Comet CHV-5X is just such an antenna. It is a rotatable dipole that covers the 6, 10, 15, 20 and 40 meter amateur bands — all within an exceedingly small footprint.

The Comet CHV-5X antenna attached to a mast on the author's deck.

Each arm of the CHV-5X dipole accommodates five "stinger" style antenna elements that screw into the ends, one for each band. The arms can be positioned in a V formation, a ground plane, or just horizontally by adjusting bolts at the center point. At the feed point there is a balun that accepts 50 Ω coax.

What's in the Box?

The CHV-5X arrives in a single box and contains surprisingly few parts; the feed point arrives partially assembled. Included for your assembly are the two arms of the dipole, the antenna elements, the feed point section, U-bolts for mounting, tape and a hex wrench to adjust the rods on the antenna elements. Other than an adjustable wrench few other tools are needed for assembly or installation.

The CHV-5X manual is well written. I found the assembly process to be pretty intuitive and referred to the manual only to double check my work. The manual does provide two pieces of information that are quite useful: (1) the required lengths of the antenna element rods to achieve resonance in each band (the lengths are expressed in millimeters, so you may have to make the conversion to inches), and (2) the 1.5:1 SWR bandwidths on each band. As expected, the SWR bandwidths are very narrow. More about that in a moment.

Putting it Together

Assembly is straightforward. The 40 meter elements screw into the ends of each arm. The other band elements screw in around the 40 meter elements in no particular order. Each arm is then screwed into the feed point assembly. There are collars on the ends of the arms that secure the arms to the feed point.

I assembled the antenna in the horizontal configuration and the total length was about 13 feet. I finally secured the CHV-5X to a mast on my deck using the included U-bolts. There was some noticeable sag due to the weight of the arms and elements.

Total time assembling the CHV-5X, including tuning, was about 30 minutes.

On the Air

I chose ARRL Field Day weekend to try the CHV-5X on the air. After installing the antenna I set up my Yaesu FT-857D transceiver and checked the bands. As expected, I heard far fewer stations on the CHV-5X compared to my full-sized wire dipole antenna. That said, I could still work any reasonably strong station I could hear.

The SWR performance seemed to be as advertised. With an automatic antenna tuner I was able to operate well outside the 1.5:1 SWR bandwidths. When operating without a tuner, be advised that the 1.5:1 SWR bandwidth on 40 meters is only about 22 kHz, increasing to 1.8 MHz on 6 meters.

A close-up view of the CHV-5X center feed point.

In a portable or emergency setup you would likely (1) be using specific frequencies on each band and (2) be communicating with fixed stations that are equipped full size antennas. So, the CHV-5X's limited SWR bandwidth and performance would not necessarily be a liability.

Kudos and Nits to Pick

The CHV-5X is a compromise antenna and that should be understood from the outset. Still, it has definite strong points.

The CHV-5X breaks down to a very portable size. I found that the arms and antenna elements can be packed into a tube similar to one used to transport a fishing rod. The feed point assembly could easily be put into a backpack or go-kit. There aren't too many small parts that could end up getting lost. Additionally the antenna covers some key HF bands, and having 6 meters is a plus. I would suspect that you could attach only the elements for the bands that you intend to use, but I'm not sure how that may affect performance. Such a configuration with only the 6 meter elements would be a handy setup for Field Day to monitor for band openings.

The one nit I have to pick is weight. The CHV-5X is not heavy in the hand, but it appears to put some strain on the feed-point assembly. Since the antenna is not designed for a permanent installation, however, this may not be a major issue.

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