Product Review Column from *QST* Magazine

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Index Laboratories New QRP Plus Transceiver

Comet CA-HV HF/VHF Mobile Antenna

MFJ-906 6-Meter Antenna Tuner

Sigmatech DX Peeper DX *PacketCluster* CW Decoder

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Edited by **Rick Lindquist, KX4V** • Assistant Technical Editor

Index Laboratories New QRP Plus Transceiver

Reviewed by Dave Newkirk, WJ1Z
Electronic Publications Editor

What QRPer—for that matter, what ham with a keen eye for unusual new gear—hasn't thought about test driving this cutie—the look-alike successor to the original Index Laboratories QRP Plus that debuted a couple of years ago. Almost a perfect cube, the New QRP Plus transceives SSB and full-break-in CW at 5 W PEP output, including split, RIT and XIT functions, on all ham bands from 1.8 through 29.7 MHz, and receives all frequencies throughout this range. Designed and built in the US, the New QRP Plus also features 20 memories (retained by an internal lithium battery that's easy to replace); switched-capacitor audio filtering (SCAF); a mike automatic gain control (AGC) circuit (also known as VOGAD, for voice-operated gain-adjusted device); a built-in iambic keyer; and low current drain in receive.

This review did not go as smoothly as most, primarily because the first of several New QRP Plus transceivers we examined failed to meet the manufacturer's specifications, especially in the area of dynamic range and spectral purity (more on these problems later). However, the whole exercise resulted in a "plus" for those who might purchase a New QRP Plus, since Index was able to successfully address *nearly* all of the various problems our ARRL Lab testing revealed. Index Laboratories' Bruce Franklin said he plans to incorporate the various improvements in current production. Those already owning a New QRP Plus should contact Index Laboratories for complete details on how to have these changes incorporated into their units.

Unusual Design

The main reason why this is the *New* QRP Plus is that Index Laboratories made major revisions in the receiver's design—focusing on the mixer—to improve its performance over the "original" QRP Plus, which used an SBL-1 mixer. The New QRP Plus, which uses a custom Synergy Microwave Index-1 mixer, is an up-converting, single-conversion superhet with an open front end and audio-derived receive AGC. The open front end means *all* signals between approximately 1.5 and 30 MHz appear at the mixer (this simplifies design and cuts cost and size). It has no preamplifier.

The radio's intermediate-frequency (IF) amplifiers, crystal filter (a six-crystal, SSB-bandwidth ladder), product detector/balanced modulator and beat-frequency oscillator (BFO) all operate at 50 MHz. As the New QRP Plus *Instruction Manual* explains: "The crystal filter is set to 2.4-kHz bandwidth, and its principal function is to reject the opposite sideband. Overall receiver bandwidth and filter shape factor are established by the variable…audio filters." A single-loop PLL frequency synthesizer acts as the New QRP Plus's local oscillator (its three VCOs operate between 42.7 and 79.7 MHz), and diode double-balanced mixers (DBMs) serve as the radio's mixer and product detector/balanced modulator. The transmitter's final amplifier is an IRF510 power MOSFET.

Panel Population

Its size aside, the visually striking thing about the New QRP Plus is its clean physical design: You're spared the thicket of knobs and buttons that complicates the front panels of many larger radios. It's a pretty easy radio to use, too—almost plug-and-play, and no long hours spent poring over a manual. So, how do you go about getting New QRP Plus performance out of that itty-bitty box?

The front panel contains 10 controls, jacks and indicators:

• A **NORM/20DB** toggle (RF attenuator).

• An **XCVE/RIT/SPLIT** (transceive/RIT/split) toggle. The radio transmits and receives on the same frequency with this toggle set to **XCVE**. **RIT** allows receive-frequency excursions without disturbing the transmitting frequency or (after pushing the **REV** button) transmit-frequency excursions without disturbing the receive frequency (in other words, **XIT**). **SPLIT** lets you set your transmitting frequency to another station's listening frequency while you're listening on his transmitting frequency. Let's say you want to call a DX station who's working split: First tune your receiver to copy the DX station, then hold down **REV** and tune until you hear the station who is working the DX station. Switching back to **XCVE** from **RIT** or **SPLIT** clears any offset added during **RIT** and **SPLIT** operation.

• Two momentary push-button pairs: **FAST** and **MEM** (this pair is co-labeled **STORE**), and **REV** and **BANDWIDTH** (this pair is co-labeled **SPEED**).

• **FAST**: Holding in this button changes the New QRP Plus's normal tuning rate (approximately 4 kHz per revolution) to about 100 kHz per revolution.

• **MEM**: Holding in this button allows the tuning knob to cycle through the radio's 20 memories. Simultaneously pressing this button and **FAST** stores the current tuned frequency in the current memory. (Index presets memories at the factory to a few frequencies in each amateur band.)

• **REV**: Selects **XIT** operation in **RIT** mode; lets you tune your transmitter to another station's listening frequency during **SPLIT** mode.

• **BANDWIDTH**: Pressing this button displays the radio's operating mode and audio-filter bandwidth (0.1 to 0.7 kHz in 0.1-kHz steps, then 0.8 to 2.4 kHz in 0.2-kHz steps), and lets the tuning knob set the filter bandwidth.

• A liquid-crystal display shows frequency at 0.1-kHz resolution (default) as well as mode and audio-filter bandwidth (with the **BANDWIDTH** button pressed) and keyer speed (with the **SPLIT** and **REV** buttons simultaneously pressed). The display features *large* numbers but no backlighting (Index says backlighting was left out to reduce current drain).

• A $^1/_8$-inch stereo **PHONES** jack.

• The tuning knob (the knob style has been updated from the original QRP Plus).

• A transmit-power (0 to 5, "relative power") and S meter (S1 to S9 + 30 dB).

• A **VOL**ume control with on/off switch.

• Eight controls and jacks live on the rear panel:

• A **POWER** barrel connector (Index advises that voltages greater than 15 V can damage the radio; the set shuts down if the

Bottom Line

The compact Index Labs New QRP Plus is a significant improvement over its predecessor, and it's fun and easy to use.

Table 1

Index Labs New QRP Plus, serial no. 1401

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receive, 1.8-29.7 MHz; transmit, not specified.	Receive, approximately 1.2-30 MHz; transmit, 1.8-2; 3.5-4; 7-7.3; 10.1-10.15; 14-14.35; 18.068-18.168; 21-21.45; 24.89-24.99; 28-29.7 MHz.
Modes of operation: USB/LSB, CW	As specified.
Power requirements: Transmit, 1.5 A; receive, not specified.	Transmit, 1.3 A; receive, ≈200 mA, tested at 13.8 V.
Size (height, width, depth): 4×5.5×6.2 inches; weight, 4 lb, 15 oz.	
Receiver	*Receiver Dynamic Testing*
SSB/CW sensitivity, 500-Hz bandwidth, –132 dBm.	Minimum discernible signal (noise floor), 500-Hz bandwidth, as specified.
Blocking dynamic range: Not specified.	Blocking dynamic range, 500-Hz bandwidth: 3.5 MHz 111 dB, noise limited. 14 MHz 111 dB, noise limited.
Two-tone, third-order IMD dynamic range: 500-Hz bandwidth, 20-kHz spacing, 92 dB, noise limited.	Two-tone, third-order IMD dynamic range, 500-Hz bandwidth: 3.5 MHz 96 dB, noise-limited. 14 MHz 93 dB, noise-limited.
Third-order intercept point: 20-kHz spacing, +15 dBm.	3.5 MHz +17 dBm. 14 MHz +16 dBm.
Second-order intercept point: Not specified	54 dBm.
S-meter sensitivity: Not specified	S9 signal at 14 MHz, 40 μV.
Receiver audio output: Not specified.	195 mW at 0.9% THD into 8 Ω.
IF/audio response: Not specified.	Range at –6 dB points (bandwidth): 100-Hz bandwidth: 610-873 Hz (263 Hz); 500-Hz bandwidth: 616-1319 Hz (703 Hz); 1-kHz bandwidth: 529-1691 Hz (1162 Hz); 1.8 kHz LSB bandwidth: 317-1819 Hz (1502 Hz); 1.8 kHz USB bandwidth: 316-1842 Hz (1526 Hz); 2.4-kHz LSB bandwidth: 325-1835 Hz (1510 Hz). 2.4-kHz USB bandwidth: 323-1861 Hz (1538 Hz).
Image rejection: Not specified.	48 dB.
IF rejection: Not specified.	42 dB.
Transmitter	***Transmitter Dynamic Testing***
Power output: SSB, CW: 200 mW to 5 W.	CW, SSB typically 5 W (max), <35 μW (min).
Spurious-signal and harmonic suppression: –30 dBc or better.	As specified. Meets FCC requirements for spectral purity at <5 W output (see text).
SSB carrier suppression: Not specified.	32 dB.
Undesired sideband suppression: Not specified.	>50 dB.
Third-order intermodulation distortion (IMD) products: Not specified.	See Figure 1.
CW keyer speed range: Not specified.	≈9-45 wpm (see text).
CW keying characteristics: Not specified.	See Figure 2.
Transmit-receive turnaround time: Not specified	PTT release to 50% audio output, S9 signal, ≈25 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	≈60 ms.
Composite transmitted noise: Not specified.	See Figure 3.

NOTE: Dynamic-range measurements are made at the ARRL Lab standard signal spacing of 20 kHz.

supply voltage drops below 11 V).

• A fuse holder (accommodates a standard 3AG 4-A fast-blow fuse).

• A **SIDETONE** trimmer pot.

• A 1/8-inch stereo **MIC** jack (the radio's mike *and* push-to-talk [PTT] connections are made via this jack's sleeve contact and common, with the mike's PTT switch intended to operate in series with the mike element; the tip contact is unused). The unit is designed for use with an electret microphone (not supplied).

• A **CW POWER** trimmer pot, which, despite its label, also adjusts power output for SSB.

• 1/8-inch **PADDLE** (stereo) and **KEY** jacks.

• An SO-239 **ANT**enna connector (design load, 50 Ω, but, Index states, "unlike most solid state transmitters the QRP Plus is not readily damaged by mismatch and does not shut itself down under high-SWR mismatched conditions").

There's a hole and label for where the microphone gain trimmer pot used to be in the original QRP Plus, but there's no such control in the New QRP Plus. Like the original transceiver, the New QRP Plus features a 4-inch, top-firing speaker. It also has the same fold-down unipod support that characterized its predecessor.

Test Results

ARRL Lab test results on our *first* Index New QRP Plus were disappointing. Index's advertising (see *QST*, Aug 1996, p 136, for example) includes an inset photo of the radio's Synergy Microwave mixer, and characterizes the set as having "strong-signal performance and dynamic range to compete with the best full size transceivers." But we found blocking and third-order IMD dynamic ranges were noise-limited (94 dB and 83 dB, respectively, on 20 meters), indicating synthesizer phase noise as the culprit. While our sample New QRP Plus (and a second test unit obtained for comparison) exhibited sensitivity figures comparable to some more expensive radios (and a substantial improvement over its predecessor), our original test unit did not achieve the manufacturer's claimed third-order intercept point and IMD dynamic range specifications (+15 dBm and 92 dB noise-limited, respectively, at ARRL Lab standard 20-kHz spacing).

Index said that because of the radio's

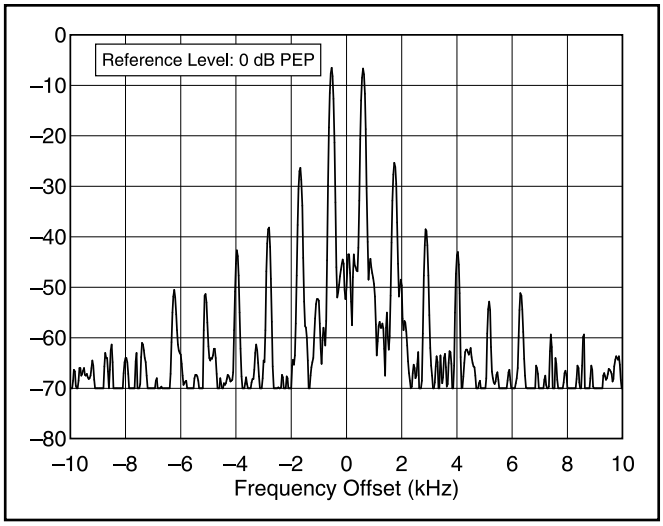


Figure 1—Worst-case spectral display of the New QRP Plus transmitter during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 26 dB below PEP output, and the worst-case fifth-order product is approximately 38 dB down. The transceiver was being operated at 5 W output at 3.9 MHz.

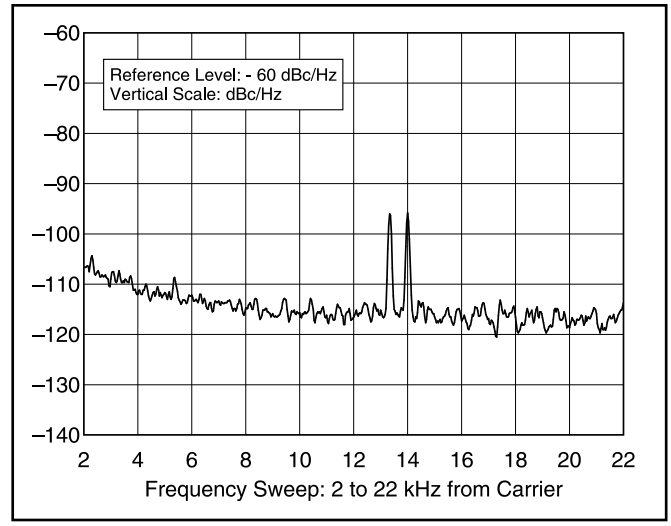


Figure 3—Worst-case tested spectral display of the New QRP Plus transmitter output during composite-noise testing. Power output is 5 W at 14 MHz. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

unique design—employing a low-noise, post-mixer amplifier instead of the traditional preamplifier—it's not directly comparable to more conventional sets. However, the company was concerned enough to go back to the drawing board and see if the problems could be corrected. Curiously, in one nonproduction unit Index sent us (we looked at four different units, all told) the manufacturer was successful in eliminating synthesizer phase noise to the point that dynamic range and third-order intercept measurements no longer were noise-limited but still not within spec. In the final incarnation of the New QRP Plus that we tested, however (see Table 1), the dynamic range numbers were much improved, within specifications and to the point of again being slightly noise limited. This time, the radio *exceeded* the manufacturer's third-order intercept specification! Additional measurements using 100-kHz spacing instead of our usual 20-kHz spacing yielded two-tone third-order dynamic range numbers on the order of 97 dB that were *not* noise-limited. Overall, the manufacturer's improvements resulted in a radio that now can claim dynamic-range specifications comparable to many higher-priced sets and a quantum leap better all around than the original model QRP Plus.

ARRL Lab testing of the New QRP Plus also turned up a potentially more serious problem, but it's one that won't trouble QRPp ops who prefer running the least amount of power they possibly can. Our New QRP Plus easily achieved the set's 5-W PEP maximum output spec on all bands (exceeding 6 W on a few bands), but to meet FCC requirements for spectral purity we had to run the transmitter at less than its rated 5-W output above 20 meters. After attempts to correct this problem, Index conceded defeat. This could still be a problem for units already purchased; all of *our* units

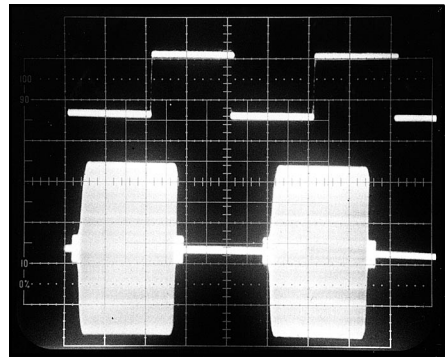


Figure 2—CW keying waveform for the New QRP Plus showing the first two dits. The equivalent keying speed is 60 wpm. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 5 W output at 14.2 MHz.

tested differently in this regard. For our review radio, the spurious output was down in excess of 40 dBc on 160, 80, 40 and 30 meters, but was between –35 and –40 dBc on the other bands (the FCC requires that spurious outputs be at least 40 dB below mean power for MF/HF transmitters of 5 W *or greater* output). We noted several close-in spurs on 12 meters, all in the range of –35 to –45 dBc. Of course, CW power is continuously adjustable down into the nether regions of the milliwatt range.

On the Air

The New QRP Plus's smooth tuning feel and easy-to-read LCD are great, and its keyer and QSK work fine. The switched-capacitor audio filters—which, despite their "digital" characterization by Index (similar to the practice of some other ham-equipment manufacturers), are *sampled analog*, not digital—work very well, as SCAFs go. It's fun to be able to simply dial up the appropriate bandwidth, all the way down to a 100-Hz sliver for CW. Although the New QRP Plus's SCAFs do an excellent job, even good audio filtering following a product detector is *not* the equivalent of the mode-appropriate, early-in-IF-strip radio filtering we've come to expect in full-sized transceivers.

The New QRP Plus's AGC is a great improvement over that of its predecessor. It's still *audio-derived* AGC—that is, the radio still develops its gain-controlling signal by rectifying post-SCAF received-signal audio, as opposed to the *IF-derived* AGC that's common in other radios near the New QRP Plus's price class—and it's still a single-decay-time AGC that can't be turned off. (Index says it stayed with an audio-derived AGC to make good use of the SCAF.) The ear-thumping signal-onset popping we heard in the original QRP Plus has been greatly reduced, although not eliminated, by the addition of IF-clipping diodes that also do RF speech clipping in transmit. Nonetheless, we tuned the New QRP Plus across busy bands and our ears still got thumped; we heard signal onsets, static crashes and strong off-tuned signals—sometimes, even signals outside the SCAF passband—momentarily deafen the receiver in a way that just plain doesn't happen in radios with IF-derived AGC. (On CW, we sometimes lost the first character or two of a strong station's transmission; on SSB, initial syllables sometimes disappeared before the receiver recovered.) An RF gain control and an AGC on/off switch would be a welcome workaround to AGC performance like this. Also, the New QRP Plus's 20-dB attenuator—*too much* attenuation in many instances when *some* attenuation is needed—just isn't the same as having an RF gain control.

The New QRP Plus does a good job of receiving shortwave-broadcast AM as SSB. The radio would be more useful as a general-coverage receiver, however, if it could receive *upper* sideband across its entire frequency range. That the New QRP Plus can't receive USB below 8 MHz is fine for most Amateur Radio purposes. By convention, ham SSB voice communicators usually use LSB on 160, 80 and 40 meters, but USB is the nonamateur standard on shortwave. As a result, the New QRP Plus cannot receive, among other things, CHU time signals at 3330 and 7335 kHz, aeronautical weather near 3.4 and 6.6 MHz (Gander Radio and New York Radio at 3485 and 6604 kHz in eastern North America), and the US Coast Guard's SSB marine weather transmissions in the maritime bands below 8 MHz. Of course, if you don't need to listen to any of these, the lack of USB below 8 MHz is not an issue for you.

The New QRP Plus's transmitter exhibited some undesirable CW keying characteristics we wouldn't expect to see in a transceiver in this price class. Using either internal or external keying, the CW note was solid in **XCVE**, but sounded chirpy at **RIT** and **SPLIT** offsets of more than a few kilohertz. Subsequent conversations with the manufacturer suggested that the chirp was a result of insufficient built-in delay to give the VCO more time to settle between transmit and receive. Changes in the radio's firmware very nearly corrected the chirp problem but introduced another: When using the internal keyer while using **RIT** or **SPLIT**, the maximum speed is approximately 38 wpm. Index says it's continuing to tweak the firmware.

Its SSB-transmit audio can be quite good with a microphone that's well-matched to the radio's mike/PTT circuitry. A last-minute production change in the VOGAD circuit (a resistor change) eliminated several complaints Index had received about excessive processing and pumping of background "room noise" during transmit. The simple change is dramatic. On our first, unmodified New QRP Plus, audio was routinely described as very processed-sounding and "bassy" or "muffled" almost to the point of impairing intelligibility. A radio with the modification in place had clean audio that other stations said "compared favorably" with a "big" transceiver.

Another last-minute PROM change in our unit moved the center frequency of the audio bandpass filter at the narrowest setting from 600 Hz to 700 Hz, so it matches the transmitter CW offset. It also moved a VCO switch point outside the 17-meter band and corrected some bugs.

We observed some drift on the New QRP Plus. Typically, after operating for approximately a half-hour, the unit's frequency dropped slightly more than 200 Hz.

Instruction Manual

A compact, 23-page *Instruction Manual* accompanies the New QRP Plus. The little booklet contains the usual information about how to connect and use the radio, including descriptions of each control and how it works. Moreover, the booklet provides useful information on how to calibrate the output stage bias, the S meter and the synthesizer reference frequency as well as a description of the circuit, a block diagram, printed-circuit board assembly diagrams and schematic diagrams (albeit small) of each of the unit's four main PC assemblies.

Conclusions

To many QRPers, the Index QRP Plus is the Cadillac of low-power transceivers, and Index has made—indeed, continues to make—significant improvements in this latest model. Even for those of us with more general tastes, the New QRP Plus can be one fun little radio. Those looking for a conveniently small package to carry around, especially one capable of receiving for hours without depleting a gel battery, will probably find the New QRP Plus adequate, but a bit pricey. Those who absolutely have to own one of the neatest station-in-a-box packages to come along in recent years probably already have a New QRP Plus on order!

Index Laboratories offers an upgrade to make its earlier QRP Plus into a New QRP Plus. The factory retrofit provides "mostly new innards" for the radio. In addition, Index restarts the one-year warranty period.

My thanks to Rick Lindquist, KX4V; Dave Sumner, K1ZZ; Glenn Swanson, KB1GW; and Mike Gruber, WA1SVF, and Ed Hare, KA1CV, of the ARRL Lab for their contributions to this review.

Manufacturer: Index Laboratories, 9318 Randall Dr NW, Gig Harbor, WA 98332; tel 206-851-5725; fax 206-851-8385. Manufacturer's suggested retail price, $695. Retrofit from QRP Plus to New QRP Plus, $250.

Comet CA-HV HF/VHF Mobile Antenna

Reviewed by Rick Lindquist, KX4V
Assistant Technical Editor

My car bristles with antennas for my onboard HF and VHF gear, so I'm often asked—in jest, of course—if I have room for just one more antenna. Personally, I wouldn't mind eliminating one or two of them; not only can too much hardware be unsightly (even to a veteran mobile CW op such as myself), but undesirable interaction can result among all those sticks on the roof. Besides, my HF stick regularly whacks low-hanging tree limbs.

The folks at Comet obviously had hams like me in mind when they debuted the CA-HA quad-band mobile antenna (which, they say, began life as a dual-band VHF antenna). The explosion in small HF radios—including ICOM's immensely popular IC-706 HF/VHF transceiver—has helped create demand for a two-in-one product like this. Here's a handsome, modestly sized antenna that services one or two HF bands plus 6 and 2 meters. Add an optional duplexer (CF-530 or CF-706) and you can operate HF and VHF at the same time (assuming you're that nimble and suitably equipped)!

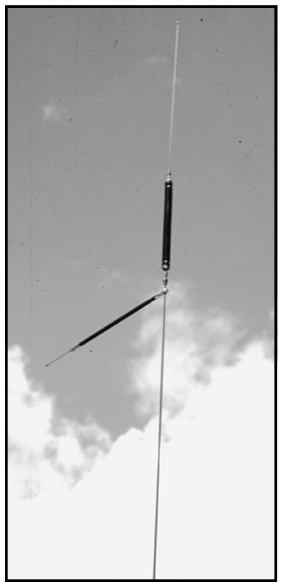
With the 40-meter coil installed, the antenna stands about 6 feet high atop a rugged 3-inch-high base coil (the mast is just 41 inches). Even mounted on the roof of my Ford Explorer, it rarely hits anything overhead. From the ground up, the CA-HV has a quality look and feel to it (although our first unit did not work properly, the second unit tuned up just fine). All metal parts are chrome-plated. It has a handy built-in fold-over hinge that makes it easy to change band resonators or to put the car in the garage or carport. The CA-HV might even be reasonably attractive to a nonham (spouses take note!).

Bottom Line

The Comet CA-HV is a great single solution for VHF and HF mobile ops who also want to keep a low profile.

The stock CA-HV comes with coils for 40, 15 and 10 meters. We ordered the optional 20-meter coil for our review unit. Flexible whips top each of the coils, which are protected by what appears to be black heat-shrink tubing. The 15 and 10-meter coils are especially slender, and the whip elements are surprisingly short on all of the coils. The one for 40 meters measures approximately 18 inches; the whips (if you can call them that) for the higher bands all are just 3 inches or less! Comet's six-page *Operation Manual* depicts 11 different configurations to use the CA-HV, from straight VHF-only use to various combinations of VHF and HF.

Because you might have to trim the whips to make the system resonant where you want it, Comet thoughtfully includes extra whip elements in case you cut too much. The CA-HV package also contains several Allen wrenches; one size does not fit all in this case, and you'll need them to tighten the mast onto the base, to secure the whip elements onto the coils and to attach the side adapter that holds the coil for the



The CA-HV set up for operation on 2, 6, 15 and 40 meters.

The CA-HV base coil and tilt hinge.

second HF band (if you have one installed). The second HF-band coil mounts at a right angle to the mast, with the first one continuing in the line of the mast, giving the system a jaunty look. Unlike many other popular HF-only mobile antennas, the CA-HV requires a UHF (SO-239) mount, such as Comet's RS-820.

For years now, I've used those single-band, helically wound, center-loaded antennas put out by several manufacturers (plus one I made myself for 15 meters). They're inexpensive, screw into a $^3/_8$-inch fitting, work well with a magnetic mount, and I've had excellent results working stateside and across the pond. But changing bands always meant a roadside stop. So, it seemed the CA-HV could not only mean one less stick on my vehicle, but also added operating convenience.

After fitting the 40 and 20-meter coils, I roof-mounted the unit and fired it up. It worked, but it didn't resonate where I wanted it to. As the manual points out, it doesn't take much adjustment of the whip elements to tune the system to the desired band segment. While I didn't confirm it, the manual says a 1-cm adjustment of the whip (1 cm is about $^3/_8$ inch) results in a 42-kHz shift on 7 MHz and a whopping 500 kHz on 28 MHz.

Having to physically trim the elements to achieve resonance seemed a tad drastic. It would have been more convenient if the manufacturer had allowed the whip elements to slide further inside the fitting on the band coil. As it stands, you might need those extra whip elements to cover both ends of the band, because the bandwidth of the CA-HV on HF is pretty narrow.

I checked to see how much of each HF band the CA-HV would cover by logging the points where my Kenwood TS-50S began to fold back its output as the SWR rose (approximately 2:1). On 40 meters, the radio would deliver full power over more than 40 kHz of the band; on 20 meters, the bandwidth was almost double that. On 15 meters, the antenna was flat across more than 275 kHz, while it easily spanned 600 kHz on 10 meters. These numbers correlated with the rough bandwidth-versus-SWR charts in the manual. (In comparison, using my somewhat taller single-banders, I could comfortably cover more than 60 kHz on 40 meters and nearly the entire band on 20 before the TS-50S started to fold back.)

On the air, I worked lots of DX easily on 20 meters running 100 W on CW—not bad, considering the recent poor band conditions. It was the same story on 40 meters. Other performance checks seemed to suggest the CA-HV performed as well or nearly as well as the slightly taller antenna I'd been using. One morning, I checked in with a group of on-the-air cronies on 40-meter CW during less-than-ideal conditions. I was almost ready to blame the CA-HV for a mediocre report from Virginia until I realized I'd left the transmitter at 10 W!

Beyond the trouble with the initial CA-HV (which did not want to work on VHF for some reason), the antenna was not problem-free. It's rated at "120 W SSB," but the coils can get quite warm under normal use. Early on in my acquaintance with the system, I managed to overheat the 20-meter coil while running CW at 100 W, causing the shrink wrap to bubble up at one end. I also discovered that outside temperature somewhat affected the resonant frequency of the system on HF. The difference between resonance on a hot summer day and during the cooler evening temperatures appeared to be 10 kHz or so. By the way, the antenna performs quite well on 6 meters and seemed to be an exceptional performer on 2 meters.

Overall, the CA-HV is a reasonable compromise in terms of cost, size and operating convenience versus bandwidth. Other systems—including some costing much more—can cover bigger band segments, but they won't look as classy on your vehicle and they won't cover VHF either.

Manufacturer: NCG/Comet Antenna, 1275 North Grove St, Anaheim, CA 92806, tel 714-630-4541; customer assistance 800-962-2611; fax 714-630-7024. Manufacturer's suggested retail price, $139.95; L-14 20-meter coil, $36.95; RS-820 mount, $49.95; CF-530 or CF-706 duplexer, $74.95.

MFJ-906 6-Meter Antenna Tuner

Reviewed by Rick Lindquist, KX4V
Assistant Technical Editor

What's that, you say? You'd like to get on 6 meters to check out all the sporadic-E (Es) activity you've been hearing about, but you don't have an antenna for "The Magic Band"? Well, if you have any antenna at all, just add an MFJ-906 antenna tuner and you're on your way.

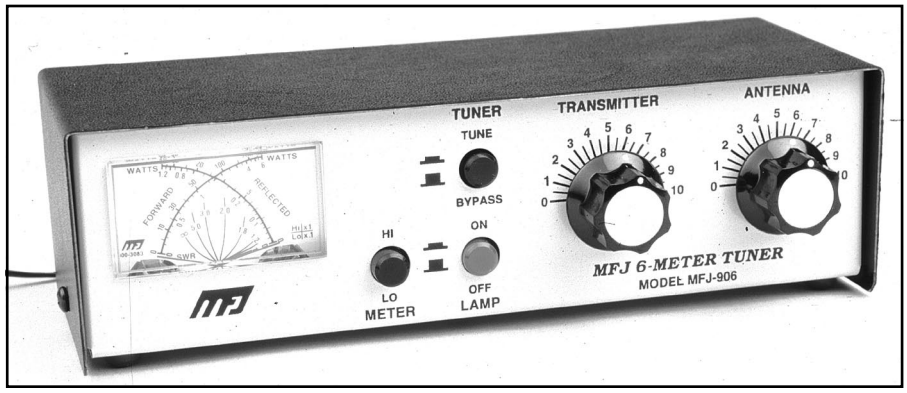
Let's be clear, however: Using a tuner to put your 20-meter dipole or triband beam on VHF is *not* an ideal solution, but it might make your transceiver or transverter a lot happier if you're stuck with using an antenna that's not cut for the band. It's not like having a six-element wide-spaced array at 70 feet, but you *will* get out. In fact, depending on the peculiarities of your antenna, you might find you get out quite well. This unit also comes in handy for those with a 6-meter antenna to make excursions to parts of the band where their system is not quite resonant.

More gear than ever is available for 6 meters these days, including HF/VHF transceivers like the JST-245, the Alinco DX-70T and, of course, the ICOM IC-706, as well as dedicated radios for FM-only. For the thrifty, several transceivers are now on the market, including the Ten-Tec T-kit 1208, which sells for less than $100 (see "Product Review," *QST*, Jun 1996, pp 62-64). Owners of these and other rigs—perhaps weary of the lackluster conditions on HF—have been moving on up to 6 meters in increasing numbers.

The MFJ-906 is a very basic little tuner available in two models. One has a built-in cross-needle SWR and wattmeter and a bypass switch; the economy model (MFJ-903) does not. The built-in SWR meter is a nice touch, however, especially if you don't have an SWR meter that is accurate on VHF.

Bottom Line

The MFJ-906 lets you use your HF antenna system as a workable radiator for 6 meters, but it won't replace a "real" antenna.



The MFJ-906 is quite compact, measuring just 2 1/2×8 ×3 inches (HWD). The enclosure consists of a sturdy aluminum "half shell" onto which all components are mounted. It's topped by a lightweight cover held in place by just two self-threading screws.

Two black front-panel pointer knobs—labeled **TRANSMITTER** and **ANTENNA**—are the primary adjustments. There are 0-to-10 logging scales behind each. Three push-button switches are between the knobs and the lighted cross-needle meter: **TUNER TUNE/BYPASS** lets you enable or disable the tuner; **METER HI/LO** lets you select a high (300-W) or low (60-W) metering range; **LAMP ON/OFF** controls the meter lamp, which requires an external 12-V power source (not supplied). The tuner function of the MFJ-906 requires no outside power, however.

The rear panel contains SO-239 jacks for **ANTENNA** and **TRANSMITTER**. The MFJ-906 is designed for use with coaxial-cable-fed antennas. A coaxial power jack accepts 12 V to illuminate the meter lamp. You simply attach coax connectors from your transmitter (100 W maximum on FM or 200 W maximum SSB PEP) and to your antenna, connect 12 V for the meter lamp, and you're in business.

The little 1×2-inch meter is hard to read, and the scales are quite compressed at their upper ends. For example, the difference between 40 W and 60 W on the forward scale is slightly more than 1/8 inch of needle travel. However, it's easy to tell when you're tuned for lowest SWR.

As with similar devices for HF, you should use minimal power to tune for minimum SWR. MFJ suggests starting out with the capacitors at midpoint (5 on the front-panel scale), then adjusting first the **TRANSMITTER** control for a drop in SWR, then the **ANTENNA** control for minimum SWR. At that point, fiddling with both controls should yield a 1:1 SWR (according to the built-in meter, at least). The two controls interact and can be a bit touchy.

What does the work inside is a rather modest pi-section tuner. On the **TRANSMITTER** side is a tiny 160-pf variable capacitor; on the **ANTENNA** side is an equally diminutive 150-pf variable. Both have ceramic insulation and are quite close spaced. A seven-turn, small-diameter tapped coil is supported between the stators on each capacitor. The caps both are mounted directly onto the front-panel side of the enclosure.

I was able to tune my 160-meter Zepp—which presented a very high SWR on 6 meters—to work well enough so that I could enjoy numerous local and out-of-state Es contacts as far away as the upper Midwest while running a transverter at just 15 to 20 W. It also let me load into a 6-foot mobile whip. Thanks to the MFJ-906, I logged several new grid squares on 6 meters. We also tried it out with a popular tribander, which, according to the meter on the MFJ tuner, presented a 2:1 SWR at 50.125 MHz. The tuner brought it down to nearly 1:1. The tuner was also able to "match" a balky attic-mounted dipole (ostensibly cut for 6 meters).

The only real problem we had with the review unit was erratic operation, especially while running 100 W or more on CW or SSB. We determined the most likely cause was a poor electrical connection between one or both of the capacitors and the front panel. Correcting this seemed to cure the problem, and the unit handled 100 W on SSB and CW without difficulty.

If you lack an antenna for 6 meters, the MFJ-906 could be your admission ticket to lots of fun. Although the Es season on 6 meters is drawing to a close, there's still time to get in on the action! Lots of folks also find 6 meters is a good place to get away from the madding crowd for local contacts, too. And don't forget the ARRL September VHF QSO Party, September 14-16.

Manufacturer: MFJ Enterprises Inc, Box 494, Mississippi State, MS 39762, tel 601-323-5869; orders 800-647-1800. Manufacturer's suggested retail price: MFJ-906, $79.95; MFJ-903, $49.95.

Sigmatech DX Peeper DX *PacketCluster* CW Decoder

Reviewed by Glenn Swanson, KB1GW
Educational Programs Coordinator

With DX Peeper and a VHF receiver, you need never again miss another DX spot—even while mobile! And, for sightless hams (or those looking for some code practice), the DX Peeper gives you an easy way to monitor your local DX cluster—all you have to do is "know the code"! Sound like one of those glib TV pitches? Well, it's all true!

I first saw this unique little box when I stopped by the Lynics International booth at the ARRL Maryland State Convention earlier this year. Lynics' primary products are lightning-protection devices, but a little box and the "DX Peeper" sign caught my eye. Of course, I *had* to ask "What *is* a 'DX Peeper?'" The folks at Lynics told me they'd imported the item for a friend in Japan. When they told me what it did, I was hooked. So, let's take a peek at the Peeper!

The DX Peeper consists of a small dark gray metal box (1 7/8×4 3/4×6 inches), with rear-panel **AUDIO IN** (1/8-inch), and dc power input **DC12V** (coaxial), jacks. The whole thing is really pretty small and quite solid, weighing in at just over 1 lb, 5 oz.

To get started with DX Peeper, you need only run a shielded two-wire connector from the audio output jack of your VHF transceiver (or receiver, or scanner) to the high-impedance **AUDIO IN** jack on the Peeper's rear panel (it accepts 50 mV to 1 V of audio), provide 8-14 V dc (12 V, typical) at 40 mA, tune your radio to your local DX packet node, and—*voila!*—you're set to monitor DX "spots" as soon as they're issued from your local node. A toggle **POWER ON/OFF** switch turns the unit on or off, while the **VOL**ume control adjusts the CW playback audio level. A tiny red **DCD** LED lights as data from your local node are received. The green **STA** LED only comes on when the unit is receiving a DX spot or when it's playing back previously received DX information (more on that later).

So, how's it work? Each time your local

Bottom Line

The DX Peeper is a unique product that spouts DX packet spots in CW. Just hook it up and listen for the DX call signs!

node sends out a DX spot, DX Peeper decodes the packets and sends the DX call and frequency out to you in Morse code! No computer (or monitor), no software, no hassle. It's that easy!

For the computer-impaired, here's one way to take advantage of the DX spots! For example, when a spot comes in, the unit might send "DE CYØAA 50101," which means CYØAA is on 50.101 MHz. When you're using the unit mobile or you've got it running in the background, the "DE" is a handy attention-getter, a kind of "heads up" for incoming spots. The default CW speed is around 14 wpm, but using an internal DIP switch, the speed adjusts from a minimum of around 12 wpm to a top speed of almost 20 wpm. The unit handles *only* 1200-baud packets.

What did the ops who used the DX Peeper think? Well, the DX Peeper was a hit with everyone who used it. "Cute" and "clever" were the initial reactions of one op who spent an evening monitoring his DX cluster with this diminutive box. DX Peeper goes where your computerized DX spotter won't go—like mobile, as you await word on when that rare DXpedition will become active. Say you're waiting for the Italian DXpedition to Yemen to begin, but your spouse has sent you on an errand. Hook DX Peeper up to a 12-V power source and tap audio from your mobile or handheld transceiver and you're covered for the duration. One of our resident mobile ops called it "the ideal addition to my mobile shack" (and, yes, he works a lot of DX while on the road).

DX Peeper not only grabs the spots and spits them out in code, it automatically saves up to six DX spots. Just press the **MEMO** button when you want to play them back. The unit's buffer fills up on a first-in, first-out basis. The last spot recorded is the first to play back. So, if you've recorded three DX spots and a new one comes in, DX Peeper sends the new one then stores it as number 1, moving the former number 1 to number 2, etc. When you play back received spots, the unit also sends the time the spot was received. For example, it might send "DE 5Z4AA 14198 0134Z" to indicate where and when 5Z4AA was spotted. While playing back spots, you can skip over the ones you don't need to hear by pressing the **SKIP** button. It doesn't erase the spots you skip.

As much as most everyone enjoyed using the DX Peeper, there were a few negatives. For starters, the speaker fires downward, so it doesn't work that well while sitting on your car seat. A jack for headphones or an extension speaker would be real handy. In addition, the audio from the speaker is not that loud, even with the **VOL**ume control cranked all the way up. It's marginal at best if you're using the unit in a noisy car or truck. But the Peeper's audio output was judged more than sufficient for at-home use. One op who used the DX Peeper to monitor his local DX cluster thought the CW audio tone was "something less than a pure sine wave," but deemed that not to be a problem. Some ops might wish for faster CW speed, too, but one tester saw the unit's moderate code speed as an advantage, since you might not be quite QRV when the Peeper starts to peep.

The two-sheet *User's Manual* is worth a mention. While it contains basic information on using DX Peeper, its primary language is Japanese, and the English translation could be a tad smoother. An example: "No backup battery is included. Stored information in the memory is vanished when it is power off."

On the other hand, we found it hard to dwell for too long on the unit's deficiencies. Compared with a full-blown computerized setup, the DX Peeper is inexpensive. All you need is a scanner and DX Peeper to monitor your nearby DX cluster. For the visually impaired, this is a big plus. The CW pitch is adjustable, by the way.

If you're at all interested in knowing where the DX lurks, we think you'll find DX Peeper is a real blast.

Thanks to these HQ hams for their contributions to this review: Chuck Hutchinson, K8CH; Rick Lindquist, KX4V; and Rich Roznoy, KA1OF.

Manufacturer: Sigmatech Co Ltd, 1-7-5 Miyamaedaira, Miyamae-ku, Kawasaki 216, Japan; US Importer: Lynics International Corp, 8 Amlajack Blvd, Suite 362, Newnan, GA 30265, tel 770-251-2235; fax 770-502-9827. Manufacturer's suggested retail price, $189.95.