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Patcomm PC-9000 HF Plus 6-Meter Transceiver

The High Sierra HS-1500 HF/6-Meter Mobile Antenna

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Patcomm PC-9000 HF Plus 6-Meter Transceiver

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What was that Yogi Berra-ism? "It's deja vu all over again!" A few years back, we reviewed the Patcomm PC-9000's daddy (see "Product Review," *QST*, Feb 1998), the PC-16000. In several respects, it was a troublesome review, but the net result was a significantly improved transceiver. Shortly afterward we invited the manufacturer to let us have an advance look at their next product—the PC-9000—then in the conceptual stages. It's unfortunate that, for whatever reasons, this did not happen.

Even so, Patcomm learned some lessons from the PC-16000 experience. The PC-9000 is a compact transceiver that, overall, represents a more refired product. Let's take a look at what it has to offer, what Patcomm learned along the way, and what they still might do better next time around.

What You Get

The PC-9000 looks much more like a piece of ham radio gear than did its sire. A sturdy black, no-frills, square-edged cabinet houses the PC-9000. Weighing in at around four pounds, this basic ham bands-only transceiver covers 160 through 6 meters, SSB and CW. FM is optional. It runs 40 W on HF and 20 W on 6 meters. On the low-power setting, the PC-9000 puts out around 3 or 4 W. It's suggested retail price is $799.

The earlier PC-16000 had a feature we'd never found on any other transceiver: You could simply plug in an AT-style computer keyboard and operate conventional 45-baud RTTY or keyboard CW. The radio would decode either mode on the display. The keyboard also permitted control over several of the radio's functions. The PC-9000 also lets you plug in a keyboard—via a DIN jack on the side of the transceiver—but its functionality is a little more limited in the standard configuration. On the PC-9000, you can quickly and easily send, but not decode, CW from the keyboard without any special software or TNC. You need an optional hardware/software package to get RTTY capability, but you also gain CW decode, direct frequency entry via the keyboard, message memories, and frequency memories. (This option was not yet available at the time of this review.)

Even without the option package, the keyboard control was pretty handy—even if you're not especially interested in sending CW from the board. It lets you change bands, dial the frequency up and down using the cursor keys, change modes, or lock the dial. The *User Manual* was a bit skimpy on the benefits of keyboard operation; I discovered most of them by trial and error. The *Manual* does list some keyboard shortcuts for sending special CW characters like $\overline{\text{AR}}$, $\overline{\text{SK}}$ and $\overline{\text{AS}}$. By the way, you can still use the internal keyer while you're in keyboard mode. The display shows the 16-character type-ahead buffer; type ahead more than that and it won't be transmitted.

The keyboard feature is the highlight of the PC-9000. The only downside is that when you're in keyboard mode, the display only shows the transmitting frequency.

Like Father, Like Son?

On the clearly labeled, brushed-finish front panel we recognized the same white pushbuttons that we'd seen on the PC-16000, and the same milled aluminum control knobs. But a significant improvement is the large, dimpled main tuning knob, its primary black offset by a nice beveled edge around the perimeter of its face. The knob has a great "feel" to it, and the dimple is actually usable. The dial "drag" is not adjustable. The red-white-blue stylized Patcomm logo above the knob testifies to the radio's domestic origins.

The green, backlit display appears to be identical to the one on the PC-16000. So does the horizontally oriented S/RF meter. The meter is pretty small, even for a compact radio like this—although let's face it: How often do you see real meters anymore? This one can be hard to read, and once a signal tops S9 you're pretty much on your own. Yes, there are divisions for what appear to be 10 dB over S9 and 20 dB over S9, but you'll need a jeweler's loupe to make them out. This is quibbling, though, because hardly anyone believes S meter readings anyway. With the PC-9000 you'll often be able to say, "You're pinning my S meter," and you won't be woofin' anyone either.

A substantial bail boosts the radio up toward eye level, if needed. A hefty mobile microphone plugs into a front-panel jack. There's a $^1/_4$-inch jack for headphones on the front panel too.

There's a down-firing speaker. The speaker itself is a small oval unit.

The display typically shows both the transmit frequency (top) and the receive frequency (bottom). Additionally, the display shows you the tuning step and the band memory number selected. This last feature is especially noteworthy since you apparently need an optional "upgrade software package" to take advantage of the memories. The unit will retain the last frequency you tuned to on each band.

From an ergonomic standpoint, the PC-9000 is easy to access and intuitive to use. Unlike some other, more compact radios, it's actually possible to get your fingers on the knobs or to press the buttons

BOTTOM LINE

The PC-9000 is a simple but functional HF and 6-meter transceiver that offers respectable performance and intuitive operation. Patcomm's unique computer keyboard connectivity adds built-in—and expandable—digital and control capabilities.

without the danger of making two adjustments for the price of one. There's no "menu" on this set. All the buttons and controls are on the front panel, so there's little guesswork involved.

Protruding off the rear apron is a large heat sink. This is the primary means of cooling the radio; there is no cooling fan in the PC-9000 (the PC-16000 didn't have one either), so fan noise is not an issue. On the other hand, the PC-9000 runs rather warm, even if you're not transmitting. Some venting on the enclosure itself might help.

The back panel is uncluttered. A couple of 3.5 mm jacks permit connecting a keyer paddle and amplifier switching contacts. (The switching transistor will handle up to 180 V dc at 2 A, which means it can easily switch a Heath SB-220 or similar old brute if you need it to.) There's also an SO-239 for the antenna connection. For the dc power connection, Patcomm employs a two-prong polarized Jones connector. The power cord is a little over 5 feet long with a blade-type automotive fuse in the positive lead.

The PC-9000 lacks a specific ground connector. More important, it lacks a separate jack for a manual key or external memory keyer. That connection is available via the microphone jack. Other features not included in the PC-9000 package include VOX and full-break-in.

I did undo the four machine screws that hold the top cover in place to get a look inside the radio. It appears to be very neatly constructed using mostly surface-mount technology.

How Well It Works

I first tried the PC-9000 out in my favorite mode—CW. Once I got the dit and dah connections reversed on my Vibroplex paddle (the paddle sense is just the opposite of my other radios and keyers), it was a cinch to push the **KEY SPD** button and dial up an appropriate keying speed. While it indicates a minimum speed of 5 WPM and a top speed of 75 WPM, we measured the range at from 5 to 50 WPM.

Tuning around, the next thing I noticed was the tuning rate. The **TUNE RATE** button lets you step through four tuning *step*—not rate—settings: 10 Hz, 100 Hz, 1 kHz, or 10 kHz. Now, 10 Hz steps are fine for CW, but the problem with the PC-9000 is the encoder rate. Turn the knob slowly through a complete rotation and you'll cover just under 1 kHz of spectrum—I found this too fine for comfortable trolling on CW.

The curious thing was when I tried to speed up a modest excursion and discovered that the faster you spin the tuning knob the slower your progress! The *User Manual* acknowledges that the software sometimes misses pulses, but this was almost like spinning your wheels. According to the manual, the encoder generates up to 120 pulses per dial revolution, but because of the missed pulses, the territory covered with each spin of the dial may vary. Indeed! I tried giving the knob eight or nine fast cranks at the lowest tuning step only to wind up just about where I'd started out.

The net result—regardless of mode—is that you'll want to up the tuning step to compensate, a solution that is not entirely satisfactory, especially if listening to a receiver step through a CW signal 100 Hz at a time makes you cringe. The top two step rates are way too coarse for anything short of transband excursions, but the **TUNE RATE** button only steps up through the choices, so to get back to finer tuning steps, you have to step through the entire series.

The inability to set a comfortable tuning rate was an issue for SSB as well as CW.

The PC-9000 tunes CW from the high side and employs a fixed 800-Hz offset. There is no readily accessible adjustment for the sidetone volume.

At first I had mixed feelings about having both transmit and receive frequencies on display at all times. But this has some real advantages—especially if you operate split frequency a lot. This way, you'll always know where you're transmitting. Press the **SPLIT** button and you can toggle between enabling tuning to change either the receive or the transmit frequency. Unfortunately, Patcomm provides no way to quickly check your transmit frequency—eg, to look for QRM or to track pileup activity.

Tuning across a band in the CW or USB/LSB mode generates slight synthesizer "chuffing" noise. It's not enough to be objectionable except on a deathly quiet band, but it's easy to hear. Much more objectionable were the birdies! I'd noticed a few fairly faint spurious signals early on—too weak to do more than budge the S meter but still strong enough to provide competition for a puny signal. The straw that broke the camel's back—and nearly my eardrums—was when I was attempting to tune in a regional CW beacon on 50.060 MHz and ran smack into a bone crushingly loud birdie there instead.

I found other loud and not-so-loud birdies on 20 meters plus huge ones at around 1.825 and 18.099 MHz. There was an S4 birdie at 50.149. A squawky-sounding birdie was roosting at 14.0243 or so. Patcomm needs to explore ways to scatter the flock here.

On a much brighter note, the SCAF (switch capacitance audio filter) provided great control over selectivity. Some kind of relative or real (ie, displayed) indication of the bandwidth setting would have been helpful. According to the manual, the PC-9000 employs two AGC loops—a comparatively "soft" one in the IF and a tighter one in the audio stage. The SCAF works in the audio stage of the receiver, but attenuation due to tighter filtering does affect the reading you see on the S meter. By the way, a front-panel AGC button lets you select fast or slow AGC settings, but does not let you disable the AGC altogether.

The PC-9000 offers true "single-signal" reception, too. We'd mentioned in the review of one extremely popular compact HF transceiver that it would—without an optional crystal IF filter—tune both "sides" of a CW signal—kind of like a direct-conversion set. The PC-9000 tunes just the desired side, regardless of the SCAF setting or signal strength, so I was impressed.

We noted one characteristic that might be SCAF-related. The PC-9000 tends to constrict audio on SSB reception. Measurements in the ARRL Lab indicated that the radio's not passing much more than about 1400 Hz of audio bandwidth when in the USB or LSB mode. The net effect is that the receiver audio on sideband is not as intelligible as it could be—even a good external speaker didn't help much. Patcomm is aware of this problem and has made changes in their current production units. Earlier production radios can be updated.

We didn't have the chance to test the PC-9000 during a major contest, but it seemed to handle nearby strong signals pretty well, and the numbers we saw in the Lab bore this out. Patcomm specified a two-tone, third-order dynamic range of 92 dB but without mentioning the bandwidth it was measured at. It came quite close to that, earning respectable numbers (see Table 1) with our ARRL Lab-standard 20 kHz spacing with the SCAF set at approximately 500 Hz.

Transmitting on CW is semi-break-in mode only, and the receiver recovers rapidly enough to suit most casual operators—although it would be nice to make this a user-settable adjustment. Keyboard CW was a joy. Just type and it sends. Stop typing and you're back in receive. The main complaint I got on CW concerned the element weighting on the internal keyer—and thus also on the keyboard. One CW veteran called it "choppy." Perhaps this could be fine-tuned in software.

On SSB, the radio garnered uniformly favorable reports of clean, crisp audio. The transmit audio level also is factory-set; there's no external microphone gain adjustment.

FM operation is pretty plain-vanilla and, without the option package, somewhat hampered by the inability to store channels and splits in memory. Additionally, the PC-9000 does not provide CTCSS tones for repeater access, and this does not appear to even be an option. You can set repeater offsets by pressing the **SPLIT** button, then dialing up the desired amount of split. There's a continuously variable manual **SQL** (squelch) control on the front panel.

Operation of the RIT was a bit dismaying. As I'd mentioned, the display typically shows the transmit and the receive frequencies. Press the RIT button and the little left-pointing arrow disappears from between the "T" and the displayed frequency. This means you can only change the receive frequency—which you can, as long as you are moving the main tuning knob (there's no

Table 1
Patcomm PC-9000, serial number 04069C0026

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receive and transmit, 1.8-2.0, 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, 50-53 MHz (receive 50-54 MHz).	Receive and transmit, as specified.
Power requirement: Receive, 1.5 A; transmit, 8 A (40 W output).	Receive, 1.8 A; transmit, 11.7 A. Tested at 13.8 V.
Modes of operation: SSB, CW, FM (optional), AFSK.	As specified.
Receiver	*Receiver Dynamic Testing*
SSB/CW sensitivity, bandwidth not specified, –128 dBm.	Noise floor (mds), 500 Hz filter: 1.8 MHz –124 dBm 3.5 MHz –126 dBm 14 MHz –122 dBm 50 MHz –117 dBm
FM sensitivity, 12 dB SINAD: Not specified.	For 12 dB SINAD: 29 MHz 2.1 µV 52 MHz 1.8 µV
Blocking dynamic range: Not specified.	Blocking dynamic range, 500 Hz filter: 3.5 MHz 96 dB 14 MHz 117 dB* 50 MHz 113 dB*
Two-tone, third-order IMD dynamic range: 92 dB.	Two-tone, third-order IMD dynamic range, 500 Hz filter: 3.5 MHz 86 dB 14 MHz 87 dB 50 MHz 86 dB
Third-order intercept: +10 dBm.	3.5 MHz +8.5 dBm 14 MHz +13.5 dBm 50 MHz +9.5 dBm
Second-order intercept: Not specified.	+36.2 dBm.
FM adjacent channel rejection: Not specified.	20 kHz channel spacing: 29 MHz, 57 dB; 52 MHz, 60 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz channel spacing: 29 MHz, 58 dB*; 52 MHz, 62 dB*; 10 MHz channel spacing: 52 MHz, 86 dB.
S-meter sensitivity: Not specified.	S9 signal at 14.2 MHz: 22 µV; 50 MHz, 24 µV.
Squelch sensitivity: Not specified.	At threshold, preamp on: FM, 29 MHz, 1.4 µV; 52 MHz, 1.6 µV.
Receiver audio output: Not specified.	1.8 W at 10% THD into 8 Ω.
IF/audio response: Not specified.	Range at –6dB points, (bandwidth): CW-N (500 Hz filter): 625-1136 Hz (511 Hz); CW-W: 694-2083 Hz (1389 Hz); USB-W: 694-2083 Hz (1389 Hz); LSB-W: 685-2000 Hz (1315 Hz).
Spurious and image rejection: Not specified.	First IF rejection, 14 MHz, 63 dB; image rejection, 14 MHz, 73 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output: HF: SSB, CW, FM, 40 W (high); 50 MHz: SSB, CW, FW, 20 W (high).	HF: CW, SSB, FM, typically 36 W high, 3.5 W low; 50 MHz: CW, SSB, FM: typically 18 W high, 3.4 W low.
Spurious-signal and harmonic suppression: Not specified.	HF, 45 dB; 50 MHz, 59 dB. Meets FCC requirements for spectral purity.
SSB carrier suppression: Not specified.	38 dB.
Undesired sideband suppression: Not specified.	52 dB.
Third-order intermodulation distortion (IMD) products: Not specified.	See Figures 1 and 4.
CW keyer speed range: Not specified.	5 to 50 WPM.
CW keying characteristics: Not specified.	See Figure 3.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 150 ms.
Receive-transmit turn-around time (tx delay): Not specified.	SSB, 9.2 ms; FM, 9.4 ms. Unit is not suitable for externally generated AMTOR modes.
Composite transmitted noise: Not specified.	See Figures 2 and 5.

Size (hwd): 2.7×8.0×7.5 inches; weight, 4.0 pounds.

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.

*Measurement was noise-limited at the value indicated.

Third-order intercept points were determined using S5 reference.

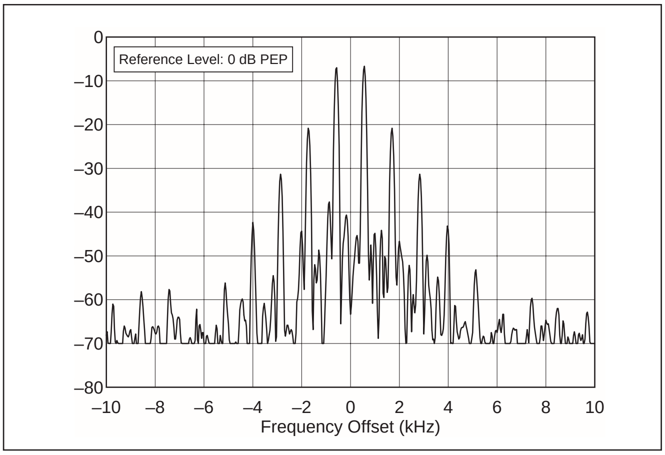

Figure 1—Worst-case HF spectral display of the PC-9000 transmitter during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 22 dB below PEP output, and the worst-case fifth-order product is down approximately 33 dB. The transceiver was being operated at 40 W PEP output at 21.250 MHz.

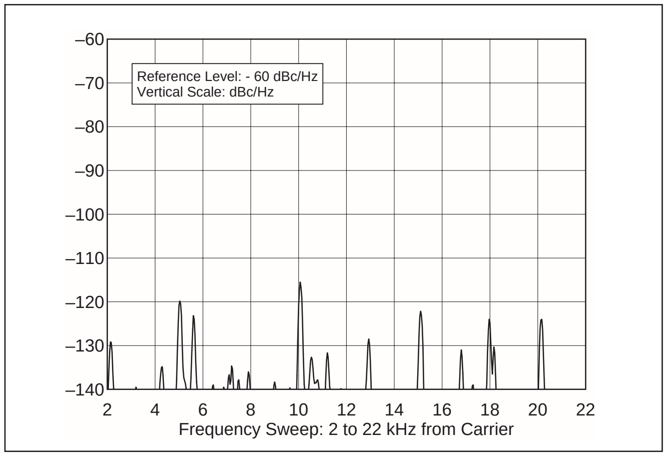

Figure 2—Worst-case HF spectral display of the PC-9000 transmitter output during composite-noise testing. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier. Note that the majority of the noise is below the base line of the graph. Power output is 40 W at 14.200 MHz.

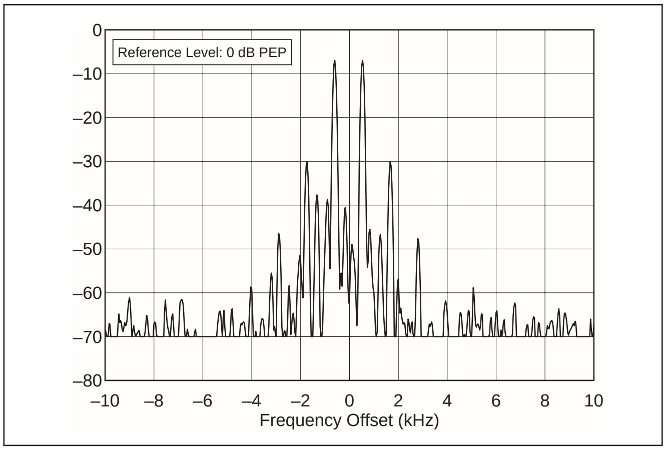

Figure 4—Worst-case VHF spectral display of the PC-9000 transmitter during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 32 dB below PEP output, and the worst-case fifth-order product is down approximately 47 dB. The transceiver was being operated at 20 W PEP output at 52.200 MHz.

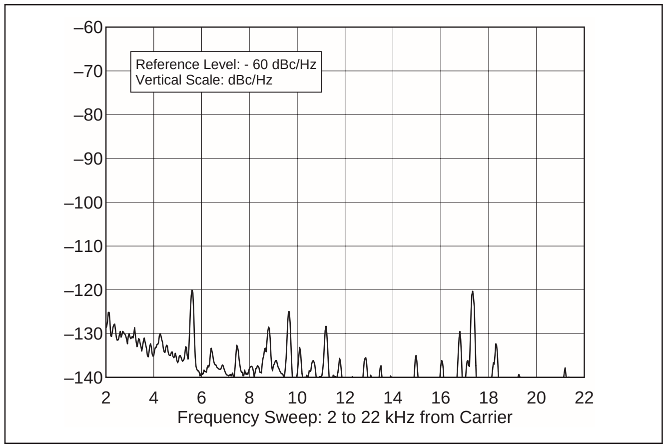

Figure 5—Worst-case VHF spectral display of the PC-9000 transmitter output during composite-noise testing. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier. The 2 kHz noise is –127 dBc/Hz, 22 kHz noise is below the base line of the graph. Power output is 20 W at 50.020 MHz.

separate RIT tuning knob). Stop tuning, though, and within about three seconds, the arrow reappears and you're out of RIT mode. I found it more convenient to set up in **SPLIT** and use that feature as an RIT.

The **BAND** button only steps in one direction—up. So, if you're on 20 meters and want to go back to 40 you have to step up through all the other bands until you reach 40 again.

By the way, the 40 W was plenty of power to work the world. Even on SSB, hardly anyone noticed the difference in signal strength when I switched from the Patcomm to another radio running 100 W.

A few words on the *User Manual.* Ours arrived in a three-ring binder and ran about 15 single-side sheets of information. It does not include a block diagram or a schematic of the PC-9000, but it does include everything you'll need to know about getting the PC-9000 up and running. There's little information about the available options it refers to, however.

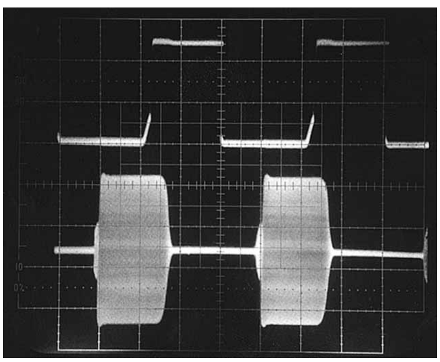

Figure 3—CW keying waveform for the PC-9000 showing the first two dits in full-break-in (QSK) mode using external keying. Equivalent keying speed is approximately 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 40 W output at 14.2 MHz.

Conclusions

Overall, the PC-9000 offers substantial improvement in fit and finish over its larger, more expensive ancestor, but it has a few rough edges. Still, it's a functional transceiver with respectable Lab numbers that offers plug-and-play keyboard CW and 6-meter operation to boot. Eliminating the annoying birdies would go a long way toward making the PC-9000 a better overall value.

Manufacturer: Patcomm Corporation, 7 Flowerfield, Suite M100, St James, NY 11780; 516-862-6512; fax 516-862-6529; **patcomm1@aol.com**. Suggested retail price: PC-9000, $799. Options: FM-9K, $79; EC-9K Expanded Capability Module (adds RTTY encode and decode, CW decode and 100 memories), $179.

The High Sierra HS-1500 HF/6-Meter Mobile Antenna

Reviewed by Wayne K. Irwin, W1KI
Assistant to the ARRL VEC Manager

Amateurs have been taking their stations on the road for over 60 years. Early mobile experimenters were first authorized to operate in the old 5-meter band. Designing mobile antennas for this band was not much of a challenge—a quarter-wave whip for 60 MHz is only about 4 feet high. Suitable antennas and mounts were easy to fabricate in a home workshop. It was certainly more difficult to assemble transmitters, receivers and power supplies that would operate reliably in a mobile environment than it was to design and build an antenna system.

Shortly after World War 2, interest in mobile operation on the HF bands began to grow. These lower frequencies presented some unique antenna challenges. Mobile antennas for 160, 75 and—to a somewhat lesser extent—40 meters typically consisted of long whips, large loading coils and impedance matching networks. These demanded more substantial mechanical construction and beefier mounting arrangements. As a result, most early mobile operators tended to concentrate their efforts on a single band.

Mobile Antenna Evolution

Enter the commercial manufacturer. Ready-made HF mobile antennas of predictable performance became available in the 50s and 60s. The amateur only needed to find a way to fasten the antenna to the vehicle (frequently on the massive steel rear bumper) and to establish a good RF path to ground. Multiband mobile operation became popular. Changing bands was relatively easy—just pull off the side of the road and replace a section of the antenna with the one provided for the desired band.

With some other designs, all that was needed to switch bands was to pull over, hop out, and change the location of a tap wire on a large coil mounted near the center of the antenna. This design—appropriately dubbed the "bug-catcher"—is still a popular multiband mobile antenna system. Mobile enthusiasts whose primary interests lie in the 40-meter and lower HF bands are particularly fond of this antenna configuration. The large high-Q loading coil results in a relatively efficient radiator, although the usable bandwidth becomes narrower as the operating frequency is reduced. (Changing frequencies by more than 25 to 30 kHz on the 75-meter band, for example, usually means a trip to the antenna to change the tap position.)

Bug-catchers are not especially esthetically pleasing, but they do represent an effective antenna system for low frequency HF mobile operation. They are often among the top performers in the "Mobile Shootouts" (see *California Mobile Antennas and the Moment of Truth*, *QST*, September 1995).

What if you could change the tap point remotely? The "screwdriver" style antenna, invented by Don Johnson, W6AAQ, is essentially a variation of the bug-catcher. Jim Heath, of High Sierra Antennas, has presented the amateur community with his version of this interesting antenna.

Design Details

The screwdriver antenna uses a small dc motor (a modified cordless power screwdriver in Don's original incarnation) to change the tap location of a loading coil—similar to the moving tap on rotary inductors found in some antenna tuners. As the motor turns, the amount of coil exposed above a large diameter tube that serves as the lower portion of the antenna varies. An electrical connection is established between the top of the tube and the rotating loading coil. The exposed portion of the coil becomes an active part of the antenna. That part below the connection, and within the tube, is effectively out of the circuit.

One of the specific design details that distinguishes this antenna from similar screwdriver style antennas offered by other manufacturers is the arrangement High Sierra uses to provide contact between the top of the lower tube and the moving coil windings. Some designs use copper finger stock. In the HS-1500, the upper end of the tube is fitted with a collar that has a groove machined into the inner wall. A special stainless steel spring is installed in the groove and provides a multiple-contact mating surface with the windings of the rotating loading coil. Should this contact spring ever wear out, it can be replaced with relative ease.

The HS-1500 is tuned to the desired frequency with a remote control box. Pushing a switch in one direction causes the motor to rotate counterclockwise, exposing more of the coil above the tube and lowering the resonant frequency. Pushing it in the other direction causes the coil to rotate clockwise, retracting it into the tube and increasing the resonant frequency. An LED indicates when the coil reaches the end points of its travel. The control box is small, and can be mounted in any convenient location in the vehicle. The antenna is adjusted for the lowest SWR. No metering is included in the control box—you can use your radio's internal SWR meter or install an SWR meter in your antenna feed line.

The HS-1500 package I ordered came with the control box components—a switch, an LED, an enclosure and related hardware—as a kit. It was a simple matter to put it together. (It is also available assembled for a small additional charge.) I also purchased the HS-110A 72-inch whip, the HS-303 whip Quick Disconnect and the HS-201C Universal Mounting Bracket.

Let's Get It On

The HS-1500 is not an antenna that lends itself to a quick installation—it requires some thought and consideration. It's a fairly large assembly, as mobile designs go.

When choosing your mounting location,

Table 2
High Sierra HS-1500
Manufacturer's Specifications
Electrical
Frequency coverage: 3.5 MHz to 30 MHz and 50 MHz to 54 MHz
SWR: <2.0:1 (typically <1.5:1)
Feed impedance (nominal): 50 Ω
Power rating (maximum): 800 W PEP; 400 W average
Power requirements: 13.8 V dc (nominal) at 3 A

Mechanical
Lower mast: 2 inches in diameter, 37 inches in length
Finish: Powder-coated baked-on. Available in black, white or silver/gray.
Whip antenna (upper mast): 72 inches
Total height with 72-inch whip at 3.5 MHz, 125 inches; 30 MHz, 110 inches (typical).
Weight with 72-inch whip: 6.3 lbs

care should be taken to ensure that the top of the antenna does not exceed the maximum height allowed by state motor vehicle laws. On my car, when the antenna is extended for 75-meter operation, the tip of the whip winds up about 11 feet above the ground.

For my particular installation, I had a local metal shop fabricate a 1-inch tubular arm that bolts to my car's frame just forward of the rear bumper. It extends below the bumper and curves up to a point just behind the trunk deck, where I attached the Universal Mounting Bracket. This mounting bracket is fitted with a tapered stud that engages a tapered hole in the base of the HS-1500 and a stainless steel hose clamp that secures the top of the bracket to the lower portion of the antenna. This stud and clamp setup allows me to remove the antenna from the vehicle in just a couple of minutes.

Another available option (the HS-204C) can be used in conjunction the '201C. This adapter allows you to make use of a 2 × 2-inch receiver type trailer hitch as the vehicle mounting point. A built in fold down system lets you hinge the antenna rearward so that you can open tailgates or hatches.

The 72-inch upper stainless steel whip is somewhat flexible. Expect the tip of the antenna to occasionally hit a low tree limb, but this should not be a problem unless your travels take you down an unusually shady lane. The Quick Disconnect option makes separation of the whip from the top of the coil an easy task. With the whip removed (depending on your particular vehicle mounting location) you should have adequate clearance to enter parking garages and drive-throughs.

Once securely mounted, the lower portion of the antenna does not lean back from the force of the wind when the vehicle is in motion. Some relatively minor leaning of the upper whip will be observed at highway speeds. A fishing line guy, as is sometimes needed with other large antenna designs, should not be required.

The HS-1500 can also be installed on mobile homes, motor homes and trailers. Additional mounting accessories are available for such installations. With a suitable RF ground plane, the antenna can be employed for fixed station applications as well.

A printed brochure is available from High Sierra describing the HS 1500 and its accessories. High Sierra also has a Web site: **http://www.hsantennas.com/**. The brochure and the Web site provide useful mounting suggestions. Several example installations are included.

One Small Problem—Sort of...

After the review unit was installed, I soon discovered that the antenna would not resonate on the 10-meter band. I have some whips from other antennas in my collection, so I tried substituting a shorter one. No problems with 10 meters after that—but now the antenna would no longer resonate on 75.

A quick e-mail to High Sierra brought a prompt reply: "Did you check the RF grounding?" The manufacturer recommends a wide flat ground connection from the mount to the vehicle. I had initially used a single piece of number 14 wire. Replacing this inadequate ground wire with a piece of half-inch tinned braid solved my problem. The RF ground system is something that cannot be ignored in nearly any efficient HF mobile antenna installation—the HS-1500 is no exception!

Final Impressions

The High Sierra HS-1500 is a well-made relatively attractive HF mobile antenna that provides continuous coverage from 80 to 10 meters. Oh yes, remove the top whip and adjust the coil to its fully retracted position and it also covers 6 meters!

How does it perform? It is not unusual to hear comments such as, "Are you sure that you are mobile?" "You must be running an amplifier." "One of the best mobile signals I have heard in some time."

If you are serious about HF mobile operation, the High Sierra antenna is certainly worthy of consideration. With it, you will enjoy an installation that allows you to QSY from one end of the HF spectrum to the other—from the front seat of your car—and will provide you with a mobile signal that demands attention.

Manufacturer: High Sierra Antennas, PO Box 2389, Nevada City, CA 95959; 888-273-3415; fax 530-273-7561; **heath@hsantennas.com**; **http://www.hsantennas.com/**.

Manufacturer's list price: HS-1500 (with powder-coated finish), $295; HS-110A 72-inch stainless steel whip, $20; HS-201C Universal Mounting Bracket, $55; HS-204C Receiver Hitch Adapter, $85; HS-303 Whip Quick Disconnect, $15. Several additional accessories and package discounts are available.

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment off the shelf from dealers. ARRL receives no remuneration from anyone involved with the sale or manufacture of items presented in the Product Review or New Products columns.—*Ed.*]

The ARRL-purchased Product Review equipment listed below is for sale to the highest bidder. Prices quoted are minimum acceptable bids, and are discounted from the purchase prices. All equipment is sold without warranty.

ADI AR-147 VHF FM Mobile Transceiver (see: "Product Review," October 1999 *QST*). Minimum Bid: $145.

Alinco DR-M03SX 10-Meter FM Mobile Transceiver (see: "Product Review," September 1999 *QST*). Minimum Bid: $165.

AOR AR7000B Wide Range Communications Receiver (see: "Product Review," July 1999 *QST*). Minimum Bid: $795.

Hamtronics R139 Weather Satellite Receiver (see: "Product Review," June 1999 *QST*). Minimum Bid: $160.

ICOM IC-2800H Dual-Band FM Transceiver (see: "Product Review," October 1999 *QST*). Minimum Bid: $445.

ICOM IC-706MKIIG HF/VHF/UHF Transceiver with FL-100 500-Hz CW filter (see: "Product Review," July 1999 *QST*). Minimum Bid: $1015.

Kenwood VC-H1 Interactive Visual Communicator S/N 00100076 (see: "Product Review," December 1998 *QST*). Minimum Bid: $275.

Kenwood VC-H1 Interactive Visual Communicator S/N 00100078 (see: "Product Review," December 1998 *QST*). Minimum Bid: $275.

Maha-Rexon RL-501HP Dual Band 2m/70cm FM Hand-Held Transceiver (see: "Product Review," April 1999 *QST*). Minimum Bid: $165.

Yaesu FT-90R Dual-Band FM Mobile Transceiver (see: “Product Review,” September 1999 *QST*). Minimum Bid: $275.

Yaesu FT-100 MF/HF/VHF/UHF All-Mode Transceiver with XF-117C 500-Hz CW filter, S/N 9D021081 (see: “Product Review,” June 1999 *QST*). Minimum Bid: $995.

Yaesu FT-100 MF/HF/VHF/UHF All-Mode Transceiver with XF-117C 500-Hz CW filter, S/N 9D021145 (see: “Product Review,” June 1999 *QST*). Minimum Bid: $995.

Yaesu VX-5R Tri-Band 6m/2m/70cm FM Hand-Held Transceiver (see: “Product Review,” May 1999 *QST*). Minimum Bid: $155.

Sealed bids must be submitted by mail and must be postmarked on or before December 1, 1999. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

In your bid, clearly identify the item you are bidding on, using the manufacturer’s name and model number, or other identification number, if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by ARRL. Please include a daytime telephone number. The successful bidder will be advised by telephone or by mail. Once notified, confirmation from the successful bidder of intent to purchase the item must be made within two weeks. No response within this period will be interpreted as an indication of the winning bidder’s refusal to complete the transaction. The next highest bidder will then have the option of purchasing the item. No other notifications will be made, and no information will be given to anyone other than successful bidders regarding final price or identity of the successful bidder. If you include a self-addressed, stamped postcard with your bid and you are not the high bidder on that item, we will return the postcard to you when the unit has been shipped to the successful bidder.

Please send bids to Bob Boucher, Product Review Bids, ARRL, 225 Main St, Newington, CT 06111-1494.

Feedback

◊ Please refer to Francesco Morgantini, IK3OIL, “A PIC 16F84-Based CW Decoder,” *QST*, Aug 1999, pp 37-40. An updated program and related files (IK3OIL2.ZIP) has been posted at the ARRL’s download site. Read the included README.TXT file for an explanation of the contents and use of the .ASM and .HEX files that apply to various LCDs, including the Optrex 16117A. Contact FAR Circuits for PC board or IC replacements (18N640 Field Ct, Dundee, IL 60118-9269; tel 847-836-9148 (voice and fax).

◊ In “Using the MFJ-259 SWR Analyzer to Find a Short Circuit in Coaxial Cable,” Technical Correspondence, *QST*, Oct 1999, p 66, the unit of measurement for the Short Location in Equation 1 should be in *feet*, not inches.

◊ Sharp-eyed bit masters detected some “parity errors” in “Test Your Knowledge” in the October 1999 *QST*, page 52. The final three rows of the truth table in answer 3 should show Amp Key as logic zero. The correct answer to question 5 is that PTT B should be set to logic zero, lest the amp be keyed whenever the antennas are ready. The answer for question 7 is actually one-half of 33.3 MHz or 16.67 MHz. Thanks to K5RA, N1XS, and WB6IKJ and others.

◊ Please refer to Wes Hayward, W7ZOI, and Terry White, K7TAU, “A Spectrum Analyzer for the Radio Amateur—*Part 2*, *QST*, Sep 1998, p 40, Fig 16. The six 2-W input resistors for the 20-dB pad should be 620 Ω units, not 820 Ω as originally specified.—*Wes Hayward, W7ZOI (tnx EA2SN)*

W1AW SCHEDULE

Pacific	Mtn	Cent	East	Mon	Tue	Wed	Thu	Fri
6 AM	7 AM	8 AM	9 AM		Fast Code	Slow Code	Fast Code	Slow Code
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	Visiting Operator Time (12 PM - 1 PM closed for lunch)				
1 PM	2 PM	3 PM	4 PM	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code
2 PM	3 PM	4 PM	5 PM	Code Bulletin				
3 PM	4 PM	5 PM	6 PM	Teleprinter Bulletin				
4 PM	5 PM	6 PM	7 PM	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code
5 PM	6 PM	7 PM	8 PM	Code Bulletin				
6 PM	7 PM	8 PM	9 PM	Teleprinter Bulletin				
6^{45} PM	7^{45} PM	8^{45} PM	9^{45} PM	Voice Bulletin				
7 PM	8 PM	9 PM	10 PM	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code
8 PM	9 PM	10 PM	11 PM	Code Bulletin				

W1AW’s schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

♦ **Morse code transmissions:**

Frequencies are 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, $7\frac{1}{2}$, 10, 13 and 15 wpm.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, “Text is from July 1992 *QST*, pages 9 and 81,” indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by W6OWP, with K6YR as an alternate. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Send a 9×12-inch SASE for a certificate, or a business-size SASE for an endorsement.

♦ **Teleprinter transmissions:**

Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ **Voice transmissions:**

Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ **Miscellanea:**

On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors from 10 AM until noon and from 1 PM until 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy.

In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year’s Day, President’s Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day.