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Amateur Radio

COMMUNICATIONS & TECHNOLOGY

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OCTOBER 2003

CQ

Power Line Interference

Petitions Filed to End US Code Testing

QRP Contesting on 160

CQ Reviews:

Small Wonder Labs Rock-Mite Transceiver

NCS-3249 Audio Multi-Switcher

On the Cover: Ken Munford, N7KM, of Cedar City, Utah, operates portable with a "knee key." Details on page 91.

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THE RADIO AMATEUR'S JOURNAL

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Not only is this 2-Meter handheld PC Programmable, it comes loaded with many more features which include:

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- Auto Repeater Offset
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Now is your time to reach the pinnacle of portable 2-Meter operation with the TH-K2AT, from Kenwood of course!

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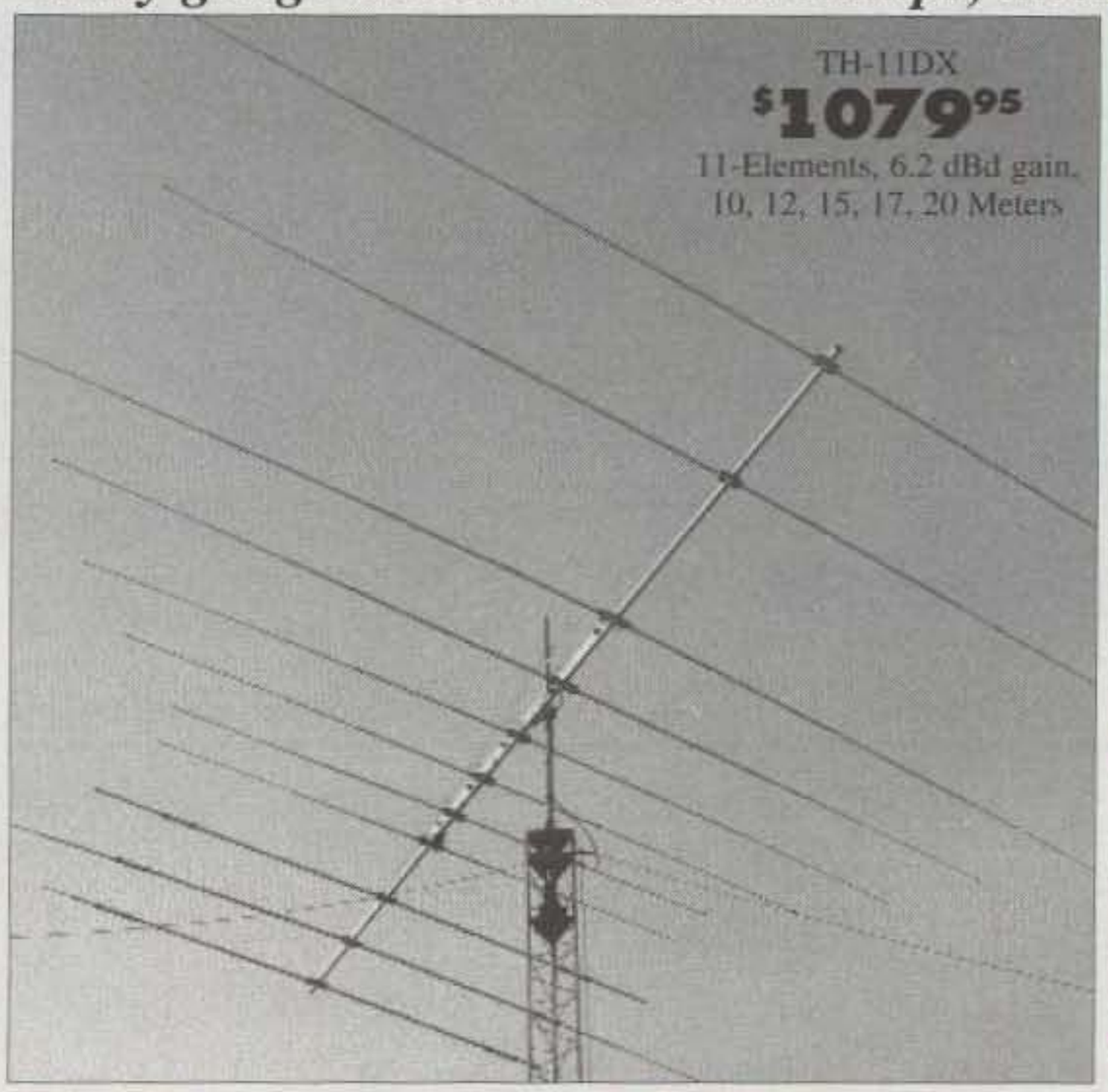


TH-11DX
$1079.95
11-Elements, 6.2 dBd gain.
10, 12, 15, 17, 20 Meters

TH-11DX, $1079.95. 11-element, 6.2 dBd Gain, 10,12,15,17,20M

The choice of top DXers.

With 11-elements, 6.2 dBd gain and 5-bands, the super rugged TH-11DX is *the "Big Daddy" of all HF beams!*

Handles 2000 Watts continuous, 4000 Watts PEP.

Every part is selected for durability and ruggedness for years of trouble-free service.

Features a low loss log-periodic driven array on all bands with monoband reflectors, BN-4000 high power balun, corrosion resistant wire boom support, hot dipped galvanized and stainless steel parts.

Stainless steel hardware and clamps are used on all electrical connections.

TH-7DX, $819.95. 7-element, 6.57 dBd Gain, 10,15,20 Meters

7-Elements gives you an incredible avg *6.57 dBd gain -- the highest* of any Hy-Gain tri-bander!

Dual driven for broadband operation without compromising gain. SWR less than 2:1 on *all* bands.

Uniquely combining monoband and trapped parasitic elements give you an excellent 27 dB F/B.

Includes *Hy-Gain's* diecast aluminum, rugged boom-to-mast clamp, heavy gauge element-to-boom brackets, BN-86 balun. For high power, upgrade to BN-4000.

TH-5MK2, $699.95. 5-element, 6.1 dBd Gain, 10,15,20 Meters

The broadband *five element* TH5-MK2 gives you an outstanding 6.1 dBd average gain.

Separate air dielectric *Hy-Q* traps let you adjust for maximum F/B ratio on each band.

Also standard is *Hy-Gain's* exclusive *BetaMATCH™*, stainless steel hardware and compression clamps and BN-86 balun.

TH-3MK4, $439.95. 3-element, 5.9 dBd Gain, 10,15,20 Meters

The super popular TH-3MK4 gives you the *most gain for your money* in a full-power, full-size durable Hy-Gain tri-bander!

You get an impressive 5.9 dBd average gain and a whopping 25 dB average front-to-back ratio. Handles a full 1500 Watts PEP. 95 MPH wind survival.

Fits on average size lot with room to spare -- turning radius is just 15.3 feet. Four piece boom is ideal for DXpeditions. Rotates with CD-45II or HAM-IV rotator.

Features *Hy-Gain BetaMatch™* for DC ground, full power *Hy-Q™* traps, rugged boom-to-mast bracket and mounts on standard 2"O.D. mast. Stainless steel hardware. BN-86 balun recommended.

TH-2MK3, $339.95. 2-element, 3.4 dBd Gain, 10,15,20 Meters

The 2-element TH-2MK3 is Hy-Gain's *most economical* full power (1.5kW PEP) full size tri-bander.

For just $339.95 you can *double* your effective radiated power and hear *15-20 dB* (=F/B) better!

Ruggedly constructed, top-performing, compact 6 foot boom, tight 14.3 foot turning radius. Installs almost anywhere. Rotate with CD-45II or HAM-IV. BN-86 balun recommened.

EXP-14, $549.95. 4-element, 5.9 dBd Gain, 10,15,20 Meters

Revolutionary 4-element compact tri-bander *lets you add 40 or 30 Meters!* Has 14 foot boom and tight 17.25 feet turning radius. Fits on roof tri-pod, mast or medium duty tower.

Hy-Gain's *patented* broadbanding *Para Sleeve* gives you less than 2:1 VSWR. 1.5kW PEP.

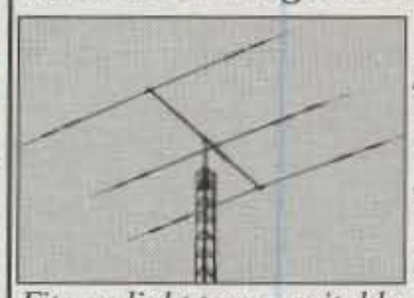
BetaMATCH™ provides DC ground to eliminate static. Includes BN-86 balun. Easily assembled.

***Truly** competitive against giant tri-banders at half the cost!*

QK-710, $169.95. 30/40 Meter option kit for EXP-14.

Compact 3-element 10, 15, 20 Meter Tri-Bander

For limited space . . . Installs anywhere . . . 14.75 ft turning radius . . . weighs 21 lbs . . . Rotate with CD-45II, HAM-IV



Fits on light tower, suitable guyed TV pole, roof tri-pod

TH-3JRS, $329.95. Hy-Gain's *most popular* 3-element 10, 15, 20 Meter tri-bander fits on most lots! Same top performance as the full power TH3MK4 in a compact 600 watt PEP design.

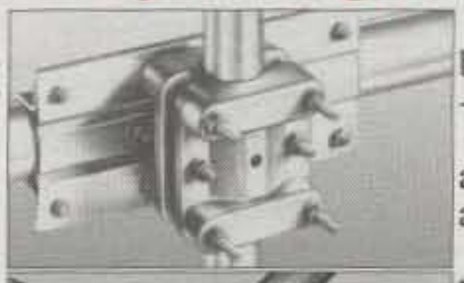
Excellent 5.8 dBd gain and 25 dB F/B let *you* compete with the "big guns".

Tooled manufacturing gives you *Hy-Gain* durability with 80 MPH wind survival.

Model No.	No. of elements	avg Gain dBd	avg F/B dB	MaxPwr watts PEP	Bands Covered	Wind sq.ft. area	Wind (mph) Survival	Boom (feet)	Longest Elem. (ft)	Turning radius(ft)	Weight (lbs.)	Mast dia O.D.(in.)	Recom. Rotator	Retail Price
TH-11DX	11	6.2	22	4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1079.95
TH-7DX	**7**	**6.57**	**21**	**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$819.95**
TH-5MK2	5	6.1	20	1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$699.95
TH-3MK4	**3**	**5.8**	**25**	**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$439.95**
TH-3JRS	3	5.8	25	600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$329.95
TH-2MK3	**2**	**3.4**	**15-20**	**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$339.95**
EXP-14	4	5.9	25	1500	10,15,20 (20/30/40)	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$549.95

Tooled Manufacturing . . . Highest Quality Materials

1. Hy-Gain's famous super strong *tooled* die cast *Boom-to-Mast Clamp*



2. *Tooled* *Boom-to-Element Clamp*

3. Thick-wall *swaged* aluminum tubing

***Tooled** manufacturing* is the difference between Hy-Gain antennas and the others -- they just don't have it (it's expensive!).

Die-cast aluminum boom-to-mast bracket and element-to-boom compression clamps are made with specially *tooled* machinery.

Hy-Gain antennas feature *tooled* swaged tubing that is easily and securedly clamped in place. All tubing is deburred and cleaned for smooth and easy assembly.

Durable precision injection molded parts.

***Hy-Gain** antennas are stronger, lighter, have less wind surface area, better wind survival, need no adjustments, look professional and last years longer.*

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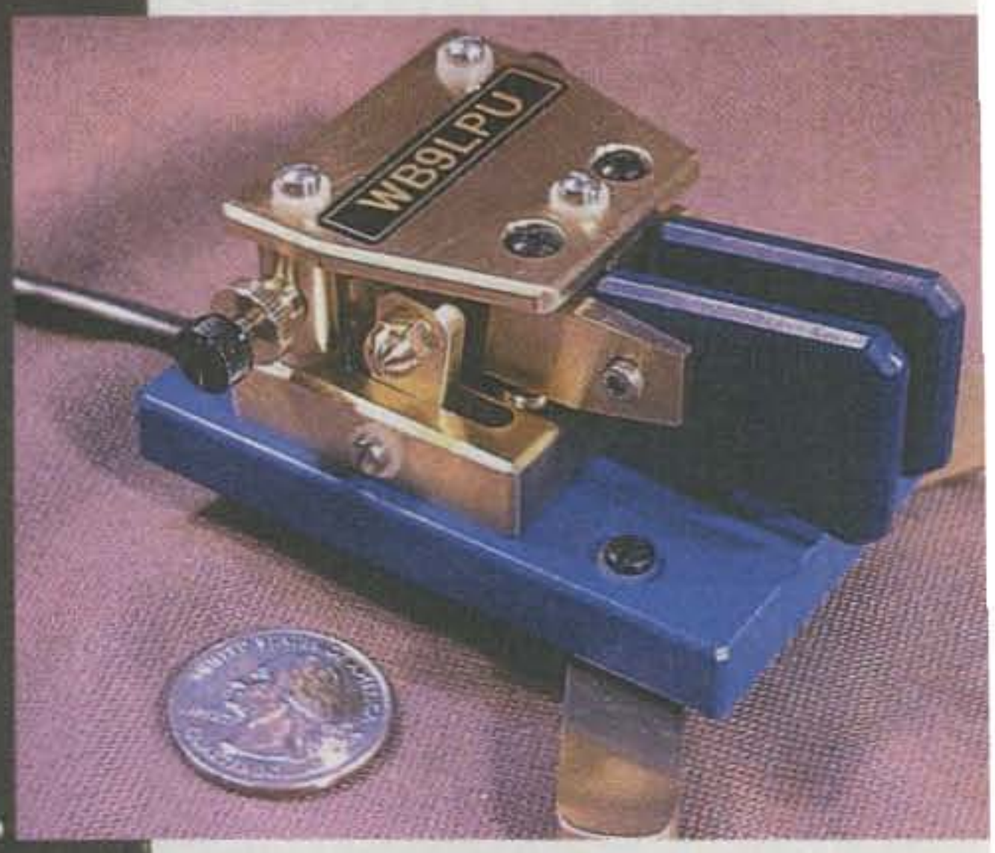

features

Vol. 59 No. 10

departments

AOR ARD9800 Fast Modem – Digital Voice and Image Interface

Convert Your Analog Transceiver to Digital Voice & Image In One Easy Step!

No transceiver modifications are necessary.

Use any conventional voice transceiver for digital voice communications and images* while you maintain analog capabilities.

The ARD9800 is a breakthrough in communications technology. By simply connecting the ARD9800 to a pair of transceivers, clear, reliable digital communications are a reality.

- **Digital voice communications using existing analog 2way radios.**
The ARD9800 uses the same audio frequencies (300 Hz ~ 2500 Hz) as microphone audio to modulate the voice signal. This allows you to use an analog radio as a digital voice radio.

- **Works on Single Side Band (SSB) mode.**
The Automatic frequency clarifier function adjusts frequency drift automatically in the SSB mode. (Approximately up to +/- 125 Hz). Utilizes the OFDM (Multi Carrier Modulation) circuit that is effective against Multi-path or Selective Fading, a powerful tool against adverse band conditions.

- **Automatic digital receive**
Automatic voice signal detector recognizes the received signal as analog or digital, automatically switching to the appropriate mode.

- **Digital Slow Scan TV***
Built-in video capture function (NTSC). Compresses the signal into AOR's original adaptive JPEG. Send and receive images (similar to analog slow scan TV, but better) in the digital mode. Built-in video output connector (NTSC) allows viewing the picture on an external monitor.

- **Built-in high grade Vocoder (AMBE)**
Utilizing high-grade digital voice compression delivers quality digital voice communications.

- **Built-in FEC error correction**
A powerful error correction circuit delivers stable and reliable communications also allowing "round table" conversations.

- **Small and compact unit. Easy to operate.**
Simply connect the ARD9800 between the microphone jack and microphone. No complicated modifications necessary.

- **Utilizes a uniquely designed high performance DSP engine**

- **Uses the established G4GUO open protocol**

Digital Amateur Radio could be the biggest development on the ham bands since SSB! Be sure to see the FAQ at www.aorusa.com!

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**image feature requires optional memory module.*
Specifications subject to change without notice or obligation.

NTIA Has "Broad Concerns" About BPL

The National Telecommunications and Information Administration, the spectrum management agency for federal government radio users, told the FCC it has "broad concerns" about the interference potential of proposed Broadband over Power Lines (BPL) high-speed internet service. According to the ARRL, the NTIA's comments—in response to an FCC Notice of Inquiry on BPL—acknowledged the "potential benefits" of BPL but cautioned that "the Commission must ensure that other communications services ... are adequately protected from unacceptable interference."

BPL would use power lines and frequencies between 2 and 80 MHz to deliver broadband internet service to homes and businesses. Receive tests by the ARRL in BPL test areas have shown consistent noise levels of S9 strength or greater across huge chunks of shortwave spectrum. ARRL President Jim Haynie, W5JBP, calls the noise "spectrum pollution." The CQ website includes links to audio/video (for high-speed users) and audio-only (for dial-up users) recordings of the ARRL tests at <http://www.cq-amateur-radio.com/Threat%20From%20BPL.html>. *CQ* staffers who have listened to the tests describe the noise as "devastating to HF and low VHF communications."

Roy Neal, K6DUE, SK

CQ Amateur Radio Hall of Fame member Roy Neal, K6DUE, passed away on August 15 while recovering from heart surgery. He was 82. Neal spent decades as NBC News space correspondent, covering the space program from the earliest manned flights through the Apollo moon landings and the early shuttle flights. He is also considered the person most responsible for bringing amateur radio into space.

Neal's contacts at NASA enabled him to reach the right people to persuade the space agency to permit amateur radio on board the space shuttle and later, the International Space Station. He was active in the SAREX (Shuttle Amateur Radio EXperiment, later Space Amateur Radio EXperiment) and ARISS (Amateur Radio on the International Space Station) programs from their beginnings and was chairman of the SAREX/ARISS Working Group at the time of his death. Neal was also heavily involved with the production of various amateur radio promotional videos.

"Amateur Radio Newsline," with which Roy worked closely since his retirement from NBC News in 1986, reports that his family requests that donations in Roy's name be made to the Astronaut Scholarship Foundation at the Astronaut Hall of Fame, 6225 Vectorspace Blvd, Titusville, FL 32780. Please mark your envelope to the attention of Linn Le Blanc.

First US-UK QSO on 60 Meters

Charly Harpole, K4VUD, of Geneva, Florida, and Paul Widger, GØHNW, of West Yorkshire, England, have the distinction of completing the first US-UK QSO on the new 60-meter band. According to the *ARRL Letter*, the contact was made on July 4, the day after the band was opened for amateur use in the United States, on 5405 kHz, the only frequency shared by both countries. Several other US-UK contacts followed, until propagation gave out. The ARRL notes that hams in the UK are authorized to operate on 5 MHz only for propagation and equipment experiments, and not for regular contacts.

More Countries Join No-Code Bandwagon

At least seven countries have dropped or announced plans to drop Morse code testing requirements for amateur radio licenses. In addition to Switzerland, the United Kingdom, and Belgium (discussed in W5YI's "Washington Readout" column on page 18), reports received since Fred submitted his column indicate that New Zealand, Germany, Austria, Germany, and Norway had joined the growing list. The countries' actions follow a decision by the International Telecommunications Union to allow each country to determine whether it wants to continue requiring code tests for hams authorized to operate below 30 MHz. Several petitions to drop code testing in the U.S. have been filed with the FCC. At press time the Commission had not taken any action in response to these petitions. See "Washington Readout" for details.

ARRL Calls for Stronger RFI Immunity Standards

The ARRL has called on the FCC to set tough interference immunity standards for consumer electronics devices, but not for amateur gear. Responding to an FCC Notice of Inquiry on "Interference Immunity Performance Specifications for Radio Receivers," the ARRL proposed a standard of receiver immunity "on the order of 3 V/m for receivers that might be in the near field of an Amateur Radio station," and suggested that the FCC either mandate a standard for all consumer electronics or adopt a grading or labeling system to let consumers know how well a piece of equipment is designed to reject strong nearby signals. The League stopped short of requesting standards for ham gear, saying that the amateur service is "essentially experimental" and that receiver immunity standards for ham equipment are neither necessary nor practical.

Jay Thompson, W6JAY
Young Ham of the Year

Jay Thompson, W6JAY (left), of Santa Ana, California, receives congratulations and a copy of *CQ* magazine from Editor Rich Moseson, W2VU, at the 2003 Newsline Young Ham of the Year presentation ceremony at the Huntsville (AL) Hamfest in August. CQ is a corporate sponsor of the award and provides each year's winner with a trip to SpaceCamp. Vertex-Standard, another corporate sponsor, provides the winner with a radio. The Young Ham of the Year award program is run by the Amateur Radio Newsline. (KØNEB photo)

The Groom May NOT Kiss the Bride...

. . . at least not yet. International Space Station Commander Yuri Malenchenko, RK3DUP, was married August 10 to Ekaterina Dmitriev, even though she was at the Johnson Space Center in Texas and he was 240 miles overhead, orbiting Earth on the space station. It was the first wedding at least partially in space. Texas law permits a proxy to stand in for one or both partners in a wedding. According to an ARRL account of an Associated Press report, Dmitriev stood next to a cardboard cutout of Malenchenko during the ceremony and the real Malenchenko participated via videophone. The cutout also greeted guests at the wedding reception. The Malenchenkos plan a more traditional church wedding when Yuri returns to Earth late this month, followed by a honeymoon in Hawaii.

FCC Denies ARRL Challenge of its Authority

The FCC has rejected an ARRL effort to block higher power limits for unlicensed Part 15 devices operating in the 24 GHz band. In a petition for reconsideration of a December 2001 ruling which permits a 10-times increase in field strength for Part 15 devices operating between 24.05 and 24.25 GHz, the League claimed that because of those devices' potential for interference with licensed services, the FCC did not have the authority to permit their operation unless it also required that they be licensed. According to the ARRL, the FCC rejected all of its arguments, insisting that it has jurisdiction to permit unlicensed operation at the power levels allowed, and disagreeing with ARRL claims that there was a significant potential for interference with licensed services. Amateur radio holds a primary allocation on 24.00–24.05 GHz and has secondary status on the rest of the band. The OSCAR-40 satellite has several transmitters on this band.

The Rising Price of Vanity

It now costs nearly $2.00 more to get the callsign of your choice. The FCC raised the vanity callsign fee from $14.50 to $16.30, effective September 9, according to the ARRL. The FCC reviews the fee each year and has adjusted it both upward and downward in the past.

Hams Shine During Blackout

When the power went out throughout most of the northeast in August, hams came through as usual, sending messages to families of stranded workers in New York City, staffing emergency operations centers, and keeping Red Cross chapters in touch with each other. The cellphone system crashed almost immediately after the power went off. Hams were able to get on the air using batteries, mobile units, and generator-powered stations. The *ARRL Letter* quoted New York City-Long Island Section Emergency Coordinator Tom Carrubba, KA2D, as saying the amateur response will "show the worth of amateur radio," adding, "There were people were on the air immediately." Carrubba also cautioned against complacency, advising hams to "(h)ave emergency power backup and make sure it's working!"

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

zero bias

BY RICH MOSESON, W2VU

Power to the People

I'm writing this in the immediate aftermath of "The Blackout of 2003," and it's kind of ironic, since one of my topics for this month is the plan by many power companies in the US to try to run high-speed internet service over power lines that seem to just barely be able to carry electricity. It is also worth noting that the second piece of infrastructure in the northeast to fail after the power network was the cellular phone network. Those nodes with emergency power were overloaded and the system simply stopped working, even though phone service in general remained intact. It took several days for reliable cell phone coverage to be restored ... something to think about the next time an emergency service agency tells you they don't need hams because they have cell phones.

In addition to the issue of Broadband over Power Lines (BPL), we have the renewed question of code testing, now that several petitions have been filed with the FCC to eliminate the code test for US licenses as a result of the decision at last summer's World Radiocommunication Conference to let each country decide whether to require code exams (see "Washington Readout" in this issue for more details). But my real topic this month is democracy, and your responsibility (yes, you!) to take part in the government decision-making process and help make "the system" work as intended. First, let's take a look at the two big issues of the month.

End of the Line for Code Tests?

The future of code tests as part of the amateur licensing process in the United States is now in the FCC's hands—and in yours. What will be the impact on amateur radio if the FCC goes along with the petitions to end code testing? There are those who feel that CW is an antiquated mode and that keeping the test requirement will impede future growth and eventually lead to the death of ham radio. At the other end of the spectrum are those who believe that the code is such an integral part of the fabric of amateur radio that eliminating the test will rob our hobby of part of its identity and will eventually lead to the death of ham radio. I believe both groups are in the minority and more importantly, that both are wrong, mostly because they fail to distinguish between CW the mode and a code test requirement for certain levels of amateur licenses.

I am constantly amazed by some CW enthusiasts' lack of faith in the appeal and staying power of CW as "just another mode" without the special "status" of being a license requirement. These folks seem to feel that if hams are not required to learn the code, then there will be no incentive to do so, and that use of CW will slowly fade and die. If that does happen (and I don't think it will), it won't have anything to do with whether learning the code was a license requirement. Passing a code test doesn't make you *like* CW and it doesn't make you a good ham or even a good CW operator. I've passed my 5, 13, and 20 word-per-minute code tests, but I still find *operating* CW somewhat intimidating, I don't consider myself particularly good at it, and I've never really enjoyed it. No amount of testing will make me enjoy CW more. BUT ... here's something that might: At the Huntsville Hamfest, *CQ* Contributing Editor Dave Ingram, K4TWJ, presented me with a "Micronaut" 20-meter QRPp transmitter built inside an Altoids mint tin (see photo). Guess what? If I want to use it—and I do—then I'm going to have to use CW, since it's a CW-only transmitter. And guess what else? I just might enjoy it, because I've got motivation, far more than I could ever get from a code test.

CW, as a mode, has so much going for it ... first of all, there are many, many hams who just plain like it. They find it fun. They'll continue to like it, and if they share their enthusiasm with other hams, they'll help bring along the next generation of CW enthusiasts. Then, there are other benefits ... there's lots of DX you can work on CW that you can't work on phone (especially if you have antenna restrictions); QRP (low power) "works better" on CW; if you want to work Aurora on VHF, CW is your only choice; and while JT44 is making digital Earth-Moon-Earth (EME) contacts a reality, most of the action on EME is still on CW. If low frequencies have caught your interest then, like Aurora, CW is the only game in town.

CQ columnist Dave Ingram, K4TWJ, built this 20-meter transmitter in a mint tin for W2VU. Rich says it will provide him much more motivation to operate CW than any code test ever did.

CW, the mode, is by no means antiquated, by no means obsolete, and by no means endangered. It can and will hold its own very well among the many other modes which we are privileged to have available to us. Many hams will continue to learn and use Morse code. In fact, many manufacturers of code-related products, such as keys, keyers, paddles, and training materials, report that sales are strong and growing. As one manufacturer notes, "CW will always appeal to a certain percentage of hams, whether or not they have to pass a test. If there are more hams, that percentage will be a bigger number... I'm not worried at all."

The Specter of BPL

Frankly, the whole code question may be moot if the FCC proceeds to authorize Broadband over Power Lines (BPL) and the system is widely deployed. The ARRL conducted receiving tests in BPL test areas and the results are frightening—wall-to-wall S9+ noise across entire ham bands, as well as short-wave broadcast bands and the rest of the HF/low-VHF spectrum up to 80 MHz. Printed words alone cannot convey the full nature of this threat. The ARRL has produced a short video of the test results and posted it on the web. It's downright scary. We have a link to it on our website (www.cq-amateur-radio.com). Go there. Click on it. Listen to it. Then you'll have a better understanding of what we're up against. If you are unable to listen to the video, let's just say that if BPL is widely deployed, there will be no point to debating the question of code tests for HF operating privileges since the entire HF spectrum will be drowned in BPL noise. And we haven't even talked about the effects a ham transmitter might have on a computer hooked to a big antenna (the power lines) and that's "listening" where you're transmitting. Speaking of power-line noise, be sure to read K5ZI's article on "Fundamentals of Power Line RFI" in this issue.

Are We Powerless?

What really surprises—and disturbs—me, though, is the air of resigned acceptance that seems to accompany both the code test and BPL proposals. "It's inevitable," I'm hearing from people across the spectrum. Sorry. I don't buy it. I've seen "the system" work as it should often enough that I have not reached the level of cynicism I'm hearing from some people, including some who should know better.

On the matter of code tests, it was made clear to us a month ago by a key FCC staffer that the Commission will do what the ham community wants on this issue, which is of importance only to hams. If you have strong feelings one way or the other about the future of code testing, let your voice be heard. Read the petitions that have been filed (or file your own) and file comments at the appropriate time.

BPL is a whole other ballgame. There's big money and hardball politics involved. This is clearly something that at least some FCC commissioners want to make happen, and

(Continued on page 66)

hy-gain Rotators

. . . the first choice of hams around the world!

Hy-Gain rotators are the first choice of hams around the world!

Hy-Gain's world famous Bell Shaped Rotator™ design is the standard that other rotators are measured against.

Its bell construction gives you total weather protection for super reliable operation. Its super heavy duty steel gear drive gives you years of superior and trouble-free performance. Many Hy-Gain rotators still provide excellent service after over 25 years of outstanding performance.

The last thing you want to fall apart is your rotator that's mounted on the top of your tower. You won't make any compromises when you buy and install high quality Hy-Gain rotators.

And we're the only manufacturer to offer a full line of rotators that are completely MADE IN THE USA.

HAM-IV, $559.95. *The heavy duty Ham-IV is the most popular rotator in the world!* It is designed for medium size antenna arrays up to 15 square feet wind load area when mounted in-tower, or 7.5 square feet when mast mounted with an optional lower mast bracket. New alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. New low temperature grease permits normal operation down to -30 degrees Fahrenheit. New wire-wound potentiometer gives reliable and precision directional indication, new ferrite beads reduce RF susceptibility, new Cinch plug connector plus 8-pin plug at control box (no screwdriver needed). Dual 98 ball bearing race for load bearing strength. Strong electric locking steel wedge brake prevents wind induced antenna movement. Easy-to-use Control Box has illuminated directional meter with North or South center of rotation scale, separate snap-action brake and rotation switches. Uses low voltage control for safe operation. Accepts masts up to 2 1/16 inches diameter. Rotator size is 13 1/2Hx8D inches.

T-2X, $649.95. *Extra heavy duty Tailtwister antenna rotator!* For large antennas up to 20 square feet wind load when mounted in-tower, or 10 square feet when mast mounted with optional support bracket. Triple 138 ball bearing race, strong electric locking steel wedge brake. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches. Accepts masts up to 2 1/16 inches diameter. Rotator size is 14 1/16Hx9 3/16D in.

CD-45II, $389.95. *Medium duty antenna rotator.* Handles antenna arrays up to 8.5 square feet windload area when mounted in-tower, or 5 square feet when mast mounted with supplied lower support. Dual 48 ball bearing race, disc brake system. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches with disc brake release. Accepts mast sizes up to 2 1/8 diameter. Includes light duty lower mast support, Rotator size is 17 3/8Hx8 D inches.

AR-40, $289.95. *Lightweight antenna rotator.* Handles smaller ham antennas and large TV/FM antennas up to 3.0 square feet windload area when mounted in-tower, or 1.5 square feet when mast mounted using the supplied lower support bracket. Dual 12 ball bearing race, disc brake system. Silent, automatic control box -- just dial and touch for desired direction. Accepts mast sizes up to 2 1/8 diameter. Includes light duty mast support. Rotator size is 17 3/8Hx8D inches.

Call your dealer for your best price!

Rotator Specifications	T2X	HAM-IV	CD-45II	AR-40
Wind Load capacity (inside tower)	20 sq. ft.	15 sq. ft.	8.5 sq. ft.	3.0 sq. ft.
Wind Load (with mast adapter)	10 sq. ft.	7.5 sq. ft.	5.0 sq. ft.	1.5 sq. ft.
Turning Power (in pounds)	1000	800	600	350
Brake Power (in pounds)	9000	5000	800	450
Brake Construction	Electric wedge	Electric wedge	Disc brake	Disc brake
Bearing Assembly/How many	Tripl race/138	Dual Race/96	Dual race/48	Dual race/12
Mounting Hardware	Clamp plate	Clamp plate	Clamp plate	Clamp plate
Control Cable Conductors	8	8	8	5
Shipping Weight (pounds)	28	24	22	14
Effective Moment (in tower)	3400 ft/lbs.	2800 ft/lbs.	1200 ft/lbs.	300 ft/lbs.

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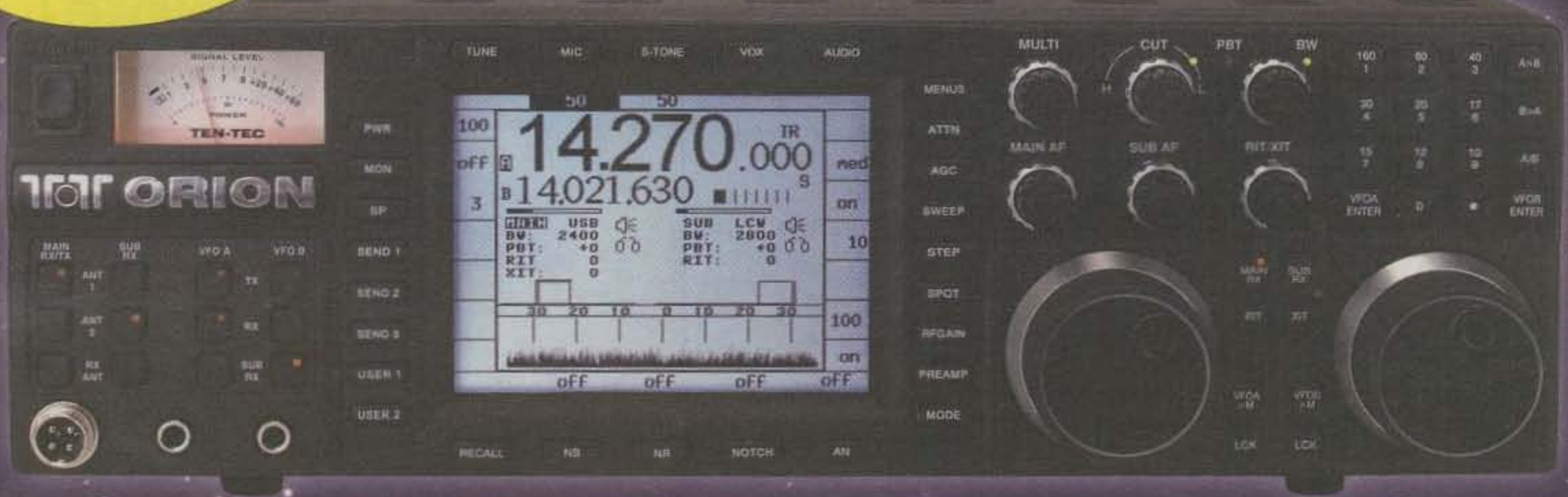

ORION represents the culmination of 35 years of Ten-Tec radio manufacturing expertise.

Our goal was to combine the very best receiver performance of any amateur transceiver to date with cutting edge high-tech features to provide active hams with THE top of the line HF transceiver available today.

Take a look at some of what is included in this revolutionary new radio:

- Dual 32-bit floating point ADI SHARC DSPs. Two 32-bit processors deliver significantly more processing "horsepower" than a single 32-bit radio can provide.
- Unmatched close-in HF receiver performance on the main receiver. Very high receiver intercept points and superior dynamic range are made possible by an industry-best low phase noise synthesizer, selectable crystal roofing filters and dual 32-bit DSP processing power.
- Two receivers, with an amateur-bands-only main receiver and general coverage subreceiver. Each receiver has fully programmable AGC characteristics and 590 IF-DSP filters standard. Receivers can be used separately or in tandem for diversity reception on any frequency with no compromise in RX performance. Use both receivers on a single antenna, or both on separate antennas.
- ORION is equipped with dual antenna outputs, two linear amplifier keying outputs, two band data connections. This allows two sets of amplifiers and antennas to be connected to the radio simultaneously to take full advantage of both receivers' capabilities.
- Continuous real-time spectrum display with 5 selectable widths.
- Adaptive DSP noise reduction filtering available in 9 stages. Dual noise blankers, both DSP and 'analog' are provided.
- Optional heavy-duty internal automatic antenna tuner matches up to 10:1 SWR (8 to 600 ohms load impedance).
- Panoramic Stereo™ receive. PS receive allows signals heard through headphones to 'move' across the spectrum spatially as they are tuned across. Makes copying a single signal in the presence of multiple signals on the same frequency (like a contest or DX pileup) much easier than with 'mono' output.
- SSB audio receive and transmit controls. 18 transmit bandwidths to a maximum of 3.9 kHz are provided along with equalization on both transmit and receive. Bass and treble response can each have their own EQ setting.
- Flash-ROM update capability allows an ORION owner to instantly upgrade their radio to the latest version by downloading a file from the Internet – free of charge.

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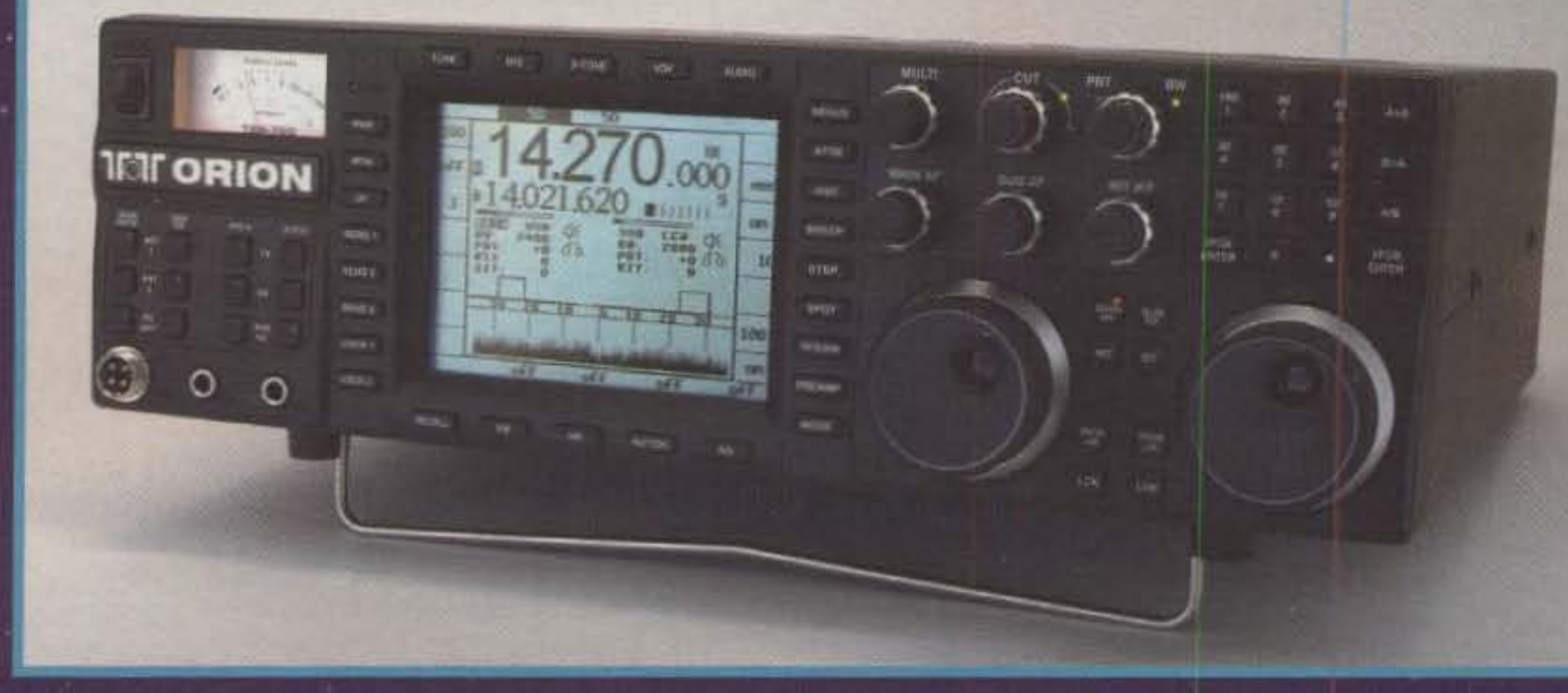

For the complete technical description of the ORION and/or to download the operator manual in .pdf format, visit our website at www.tentec.com.

ORION uses both crystal roofing filters and IF-DSP bandwidth filtering as part of the main receiver. The usual pitfall for top-notch performance in a modern HF receiver is the use of a 15- to 20-kHz wide roofing filter at the 1st I-F stage. This wide filter will allow unwanted signals outside of your receiver's passband to compromise receiver performance. By using crystal filters as selectable roofing filters at the 1st I-F, undesirable signals are kept out of the receiver chain and do not compromise close-in receiver performance.

Any signal that appears inside the roofing filter – even if you do not hear it in your receiver passband – will have a negative impact on receiver performance. Loud signals inside a roofing filter lead to a loss of dynamic range and receiver sensitivity. Consult any ARRL product review from the past two years and look at the difference in receiver performance numbers for 20-kHz spacing and 5-kHz spacing two-tone dynamic range and third-order intercept. The 5-kHz spacing numbers are always significantly worse than the 20-kHz numbers for our competitors transceivers – this is because of the presence of the loud test signals under their wide roofing filters. Imagine how much worse it is if you have several loud signals within 15 kHz rather than just two used for testing! The optimum receiver set up is to use high-rejection, very narrow crystal filtering up front, and brick-wall DSP filtering at the end of the chain at the 3rd I-F. No receiver system can top this! There are six crystal roofing filter positions in ORION. Three roofing filters at 6 kHz, 2.4 kHz, and 1 kHz are standard; three at 1.8 kHz, 500 Hz, and 250 Hz are optional. ORION's roofing filters are not to be confused with traditional crystal bandwidth filters – for bandwidth filtering, ORION has 590 built in DSP filters from a minimum of 100 Hz to a maximum of 6 kHz. What is the result? Receiver performance specifications that are significantly better than any other transceiver on the market to date.

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Not shown: #217-218-219 Optional Roofing Filters – $109.00

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announcements

The following expedition and special events are scheduled for October:

VE2CVI expedition to CQ zone 2, grid Fo60, for the CQ WW DX SSB Contest, October 25–26. QSL (with SASE) to R. Cloutier, VE2CVI, 239 Cotnoir Place, Boisbriand, QC, Canada J7G 1L5; <www.qsl.net/ve2cvi>.

N2UL, from Jamboree on the Air, Camp Winnebago, Marcilla, New Jersey; Robert D. Grant United Labor ARA; 1200–2400Z October 18 on 28.420, 21.360, 14.260 MHz. QSL for certificate to RDGULARA, c/o WA2VJA, 112 Prospect St., Nutley, NJ 07110-0716.

4-land, from commemoration of the 140th anniversary of the Civil War Battle of Ft. Williams, Glasgow, Kentucky; Mammoth Cave ARC; 1600–2200Z October 4 in General portion of 20 and 40 meters. For QSL send QSL and SASE to KY4X.

W5P, from Louisiana Purchase 200th anniversary, Arkansas; Benton ARS and Arkansas Section ARRL; October 6–15. For times, frequencies, and QSL information, see <www.arkansashams.org>.

W6CX, from ARRL Pacific Division Convention (Pacificon), coinciding with Boy Scout Radio Jamboree (Boy Scouts and Girl Scouts will be the ops); Mount Diablo ARC; October 18–19 on SSB 14.290, 21.360, 28.390 Mhz, and SSTV 14.230 MHz. For certificate send QSL and SASE to MDARC, P.O. Box 23222, Pleasant Hill, CA 94523.

NØCWP, from Anamosa Pumpkinfest, Anamosa, Iowa; Jones County ARC; 1300–1700Z October 4 on 14.260 ±QRM. For certificate send QSL and SASE to Jim McClintock, NØCWP, 301 Vine St., Morley, IA 52312.

WØUK, from Baldwin KS Maple Leaf Festival, trackside of the Midland RR, Nowhere, Kansas; Douglas County ARC; 1400–2100Z October 11 on 7.244, 14.244, 21.365, 28.365 MHz. For certificate send QSL and SASE to Ken Blair, KCØGL, 1711 W. 19 St. Terrace, Lawrence, KS 66046-2549.

The following hamfests, etc., are slated for late September and October:

Sept. 20, **Delaware-Lehigh ARC Hamfest**, Schnecksville Fire Deptartment, Schnecksville, Pennsylvania. For more information, see <http://www.dlarc.org>, e-mail Susan at <kb3idw@arrl.net>, or call 610-797-1437. (Talk-in 51.760, 146.700, 444.900, all PL151.4)

Oct. 4, **Rock Hill, SC Hamfest**, York County Technical College, Rock Hill, South Carolina. Contact Bob Bacharach, WA2EMF, 803-327-2634, or e-mail: <wa2emf@arrl.net>. (Talk-in 147.03 –600; exams 10 AM)

Oct. 4, **Ham Expo**, Bell County Expo Center, Belton, Texas. Contact Mike LeFan, WA5EQQ, 254-773-3590, e-mail: <mlefan@wm.com>. (Talk-in 146.820– [123.0], 444.700 [123.0]; exams)

Oct. 5, **Medina Hamfest**, Medina County Career Center, Medina, Ohio. Contact Mike, N8TZY, 330-273-1519 (after 7 PM), e-mail: <n8tzy@m3net.net>. (Talk-in 147.030+ PL 141.3; exams 9 AM, info contact Fred, K8FH, 440-236-3477)

Oct. 5, **Hoosier Hills Ham Club Hamfest**, Lawrence County 4-H Fairgrounds, Bedford, Indiana. Contact Tim, K9US, 812-277-8583, e-mail: <tim-k9us@msn.com>. (Talk-in 146.730, PL 107.2)

Oct. 11, **North Kitsap ARC Hamfest**, President's Hall, Kitsap County Fairgrounds, Bremerton, Washington. Contact Horace Ory, 360-779-2215, e-mail: <ory001@attbi.com>; <http://nkarc.home.donobi/net//>. (Talk-in 146.62–, PL 103.5, 146.52)

Oct. 11, **Northwest Ohio ARC Hamfest 2003**, Fair Radio Sales, Lima, Ohio. Contact Gary, KCØJDT, 419-227-6573, e-mail: NWOARC@nicsweb.com>. (exams 10:30 AM)

Oct. 11, **Lake Placid Hamfest & Northern NY Section Convention**, Lake Placid, New York. Contact Tom, WB2KLD, 518-827-4852, e-mail: <wb2kld@arrl.net>. (Talk-in 146.52, 145.110 PL 123; exams)

Oct. 12, **Kalamazoo Hamfest**, Kalamazoo County Fairgrounds, Kalamazoo, Michigan. Call 269-665-6421, e-mail: <Hamfest@KalamazooHamRadio.com>, <www.kalamazoohamradio.com/hamfest>.

Oct. 12, **Nutmeg Hamfest & Computer Show**, Mountainside Special Event Facility, Wallingford, CT. Information, e-mail: <nutmeghamfest@qsl.net>, <www.qsl.net/nutmeghamfest>. (Exams)

Oct. 17–19, **Pacificon**, San Ramon Marriott, San Ramon, California. For information see <http://www.pacificon.org>. (Talk-in 147.06+, PL 100 Hz; exams)

Oct. 17–19, **QCWA National Convention**, Crowne Plaza Hotel, Addison, Texas. Contact Jerrel, W5TUU, 972-423-0202, e-mail: <jerrelj@gte.net>, <http://www.qcwa.org/2003convention.htm>.

Oct. 18, **Oak Ridge Hamfest 2003**, Fraternal Order of Eagles Building, Oak Ridge, Tennessee. Contact Tom, AG4SF, 865-482-4123, e-mail: <muncytn@ msn.com>, <http://www.korrnet.org/orarc>. (Talk-in 146.970; exams)

Oct. 18, **WØDXCC Convention**, Holiday Inn, Bloomington, Minnesota. Contact WØDXCC 2003, P.O. Box 390633, Minneapolis, MN 55439-0633; e-mail: <w0dxcc@w0dxcc.com>; <http://www.w0dxcc.com>.

Oct. 19, **R F Hill ARC Hamfest**, Sellersville Fire House, Sellersville, Pennsylvania. Contact Creed, KA3MOP, 215-230-7728, e-mail: <ka3mop@comcat. com>; <www.rfhill.ampr.org>. (Talk-in 145.310; exams 10 AM to 12 PM)

Oct. 19, **MIT Radio Societies' Hamfest**, MIT, Albany & Main Streets, Cambridge, Massachusetts. Contact Nick, KA1MQX, 617-253-3776 (9–5 M–F); <http://web.mit.edu/w1mx/www/swapfest.html>. (Talk-in 146.52, 449.725/ 444.725– PL 114.8)

Oct. 26, **Mason-Dixon Hamfest**, Westminster, Maryland. For info see <http://www.qis.net/~k3pzn> or e-mail: <k3pzn@qis.net>. (Talk-in 145.410; exams)

Oct. 26, **Massillon ARC Hamfest & Auction**, Stark County Fairgrounds, Canton, Ohio. Information see <www.marcradio.org>. (Talk-in 147.18+)

Oct. 31 – Nov. 1, **2003 Michigan State ARRL Convention & Hamfest**, Zeeland High School, Zeeland, Michigan. Contact Chuck, W8GCW, 616-396-2294, e-mail: <riches@macatawa.org>. (Talk-in 147.06; exams)

Oct. 31 – Nov. 2, **RSGB International HF & IOTA Convention**, Britannia Country House Hotel, Didsbury, Manchester, England. For information see <www.rsgb.org/hfc>.

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our readers say

Antenna Mystery Solved

Editor, *CQ*:

I read with great interest the article by John Basilotto, W5GI, in the July issue, pages 18–22. I was initially mystified as to how this design could possibly produce in-phase sections as John claims it does, until I thought about skin effect. The coaxial sections are acting as phase reversing elements due to the fact that the RF is traveling down the center conductor and back on the inside surface of the shield and then back on the outside (radiating) surface of that shield. The phase reversal takes place, since the distance traveled down and back is one-half wavelength. Transmission-line characteristic behavior is not exhibited, as the currents on the center conductor and the inner surface of the shield inside the coaxial sections are in phase. Thus, the theory does support the observation. It is necessary to make the shorted end connection just as John has shown in photo C, or the phase reversal will not work properly. Photo C shows a completely RF tight seal of the entire circumference of the coaxial section. A simple jumper would allow RF to flow to the end section of the radiator without being forced to go back to the opposite end of the coaxial section, thus ruining the phasing capability of that section. Hats off to John!

Fred Scholz, K6BXI

WiFi For Hams

Editor, *CQ*:

In the July 2003 issue of *CQ* an article entitled "Wi-Fi for Hams, Part II" caught my attention. Thank you, Ron, KA3JIJ, for writing about this. I have been experimenting with this concept since 1998, and shortly thereafter I became a personal advocate. I think I found a couple of errors in your article, which is easy to do since the rules can sometimes be confusing:

"What happens if we use directional antennas? Well, we can increase the power to 4 watts EIRP under Part 15 rules."

The 4 watt EIRP limit you refer to applies to omnidirectional antennas. Under Part 15, directional antenna systems can somewhat easily reach 62 watts EIRP or greater. "Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi."

"Worst of all, while Part 15 designs could provide internet access, this Part 97 design would be precluded from doing so unless all internet commercial content could be filtered out before it goes to this network."

This second one may be somewhat disputable. The amateur rules now allow you to conduct commercial transactions (as long as they are only for your own private use); presumably you could even buy radio equipment online from a manufacturer's website, as long as you instigated the transaction, not the store. I can't think of why this is any different from the famous "buying a pizza with an autopatch" case that was specifically decided by the FCC a number of years ago. Is there something about doing this via the internet that would make it fundamentally different from doing it via an autopatch? [per John, W2FS]

Steve Lampereur, KB9MWR

KA3JIJ responds:

Thank you for your comments and insights. Your comment on the power difference between point-to-point and point-to-multipoint links is absolutely correct. This was originally written as a single article, and due to space considerations was broken into two for publishing. Point-to-point links and their power considerations were discussed in Part 1 (June issue). Part 2 was dedicated to only the implementation of a multipoint system.

Your second comment also has validity. I decided to err on the side of caution on this one, since there is no case law precedent on the subject. There are a lot of hams who want the rules to be interpreted to allow internet connectivity, but I don't think the rules as written and interpreted support internet connectivity. I'd hate to be responsible for condoning and championing illegal operation due to lack of legal clarity.

I think the big question on this front is this: Like ordering the pizza on an autopatch, ordering a CD or book off the internet using a Part 97 based data connection can be construed as the same thing, and should be legal.

The autopatch does not, however, load commercial advertising having nothing to do with the pizza order on the communication facility. The internet does. It's this unrelated commercial content over which the ham has no control that gives me concern. This practice of putting commercial material in every nook and cranny has become so pervasive that I can no longer get e-mail without advertising attachments (i.e., Yahoo groups).

If you get a chance to read Part 1, you'll see another area where I erred on the side of conservative operation. That is, how many of the 802.11 channels fall in the Part 97 band allocation? I have read in various places the opinions surrounding this topic, and generally I see six or seven referenced. Personally, I can't get my calculations to include seven. Six, I can understand. However, if you inspect the spectral mask of an 802.11 carrier, the main energy mask falls within ±20 MHz of the center frequency. There are, however, secondary energy signatures that pop back up and carry the energy signature out another 20 MHz. These secondary signatures reach a peak of over –25 dBc. I could find no case law on the level of out-of-band emission allowable, so I stated safe operation could occur only through channel 5.

I thank you for reading the article and taking time to reach out to me and offer your insightful comments. This use of amateur spectrum is in its infancy. It is also allowing amateur radio a set of connections to the world (the internet) that it never had before. With these changes will come new interpretations of the laws so that they can accurately reflect operation in this new environment. I, for one, look forward to some definitive FCC statements on these matters.

CQ on CD-ROM?

Editor, *CQ*:

Are there plans to archive *CQ* on CD-ROM? ARRL/*QST* has been doing this for some time. This past weekend I decided to donate all my *QST* back issues and replace them with CDs. I would love to do the same with *CQ*. My shelves were sagging under the weight.

Jim Reisert, AD1C

Jim—The short answer is "not yet." We discuss it regularly, and one of these days it will probably happen, but it's a big project and we don't have the staff resources that the ARRL has. So for now, it's still "not yet."—W2VU

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With the FCC promoting "Broadband over Power Lines," power-line interference may become an even more significant issue for hams. Understanding the basics can help you identify and eliminate serious problems.

Fundamentals of Power-Line RFI

BY BILL JOHNSTON,* K5ZI

Alternating-current power lines, essential to almost every aspect of modern civilization, reach to nearly every corner of the Earth. Few amateur radio stations can exist without them. However, along with the transmission of electrical power comes the bane of every radio user—radio frequency interference, or RFI. Generated by the same power lines that we can't do without, this "power-line noise" is at best an aggravation. At worst, RFI can entirely disrupt on-the-air operation.

Although this noxious gremlin affects all of us at one time or another, the fundamental underlying characteristics of power-line noise often are either misunderstood, or not understood at all, by radio amateurs and engineers alike. Thus, we can be ill equipped to deal with the problem. The fact is, though, that there are a few easily understood basic principles which explain the effects from power-line noise that we see. Understanding them is invaluable in identifying and eliminating RFI problems.

A complete discussion of electrical theory as it relates to power-line RFI fills volumes. My intent here is simply to set forth a few basic facts without digressing into detailed proofs.

Big Sparks and Little Arcs

Radio static is a form of electromagnetic energy. It originates not only from power lines, but from a variety of other sources as well. Lightning is the major source, but countless electrical machines also contribute to the electromagnetic cacophony. Nonetheless, a common characteristic of electrical static, regardless of its source, is its broadband nature. The interference from a single spark can be heard across the radio spectrum, from the very low frequencies (VLF), well up into the VHF bands.

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Lightning is one of the most powerful forces of nature. The electromagnetic energy contained in a single bolt can cause damage to electronic equipment miles away and radio frequency interference thousands of miles away. (National Weather Service photo by Harald Evans)

From an electromagnetic point of view, an arc on a power line is just a miniature version of its big brother, the lightning bolt, both of which cause radio frequency interference. This similarity makes it convenient to examine the lightning bolt for a basic understanding of the forces at play in all sources of radio static.

Square Waves and The Fourier Series

Why does a bolt of lighting create interference, and why does it do so across such a broad spectrum? The fundamental cause is the waveform of lightning's electrical current. Theoretically (and simplistically), it is a square wave (fig. 1). That is, before the bolt discharges, the current is zero. Then it

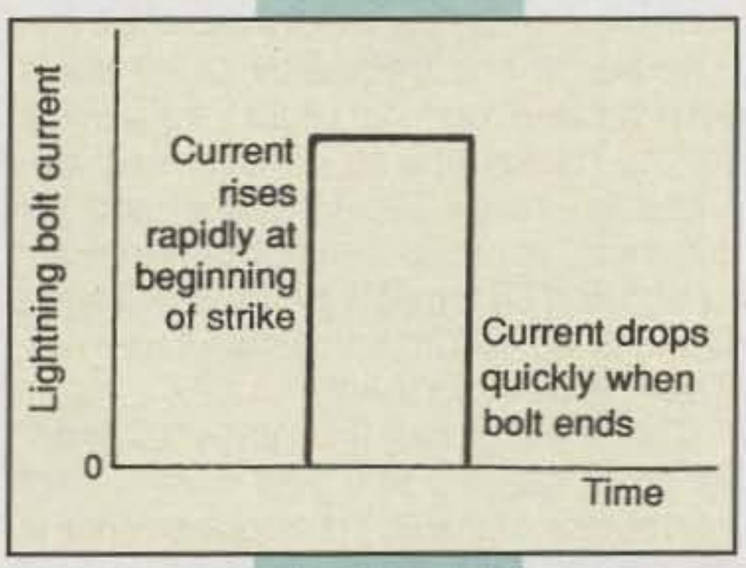

Fig. 1–Current flow within a lightning bolt rises almost instantaneously from zero to a very high level. After a few tenths of a second the current drops back to zero. The result is a square-wave pulse of current which contains electromagnetic components across a very broad spectrum of radio frequencies.

instantaneously jumps to a very high value and stays there for, say, several tenths of a second, after which it instantaneously drops back to zero.

Mathematical and electrical theory demonstrate that square waves actually are composed of a series of sine (and/or cosine) waves of progressively increasing frequency (and progressively decreasing amplitude). In other words, a square wave contains electromagnetic (RF) energy from many, many frequencies, spread over a very broad spectrum. The series of sine waves which makes up a square wave is called a *Fourier Series,* after the French mathematician who first postulated the theory.

Each bolt of lightning, therefore, can be considered to be a single high-intensity square wave, the component frequencies of which are heard at any *and every* point on the radio dial. Moreover, the electrical current in lightning is so great that RF energy generated by a single bolt can easily be detected by radio receivers thousands of miles distant. That is why you can hear the crackle of static on a radio when there are no storms in sight. Shortly, we'll see how RFI from other sources manifests itself in a similar manner.

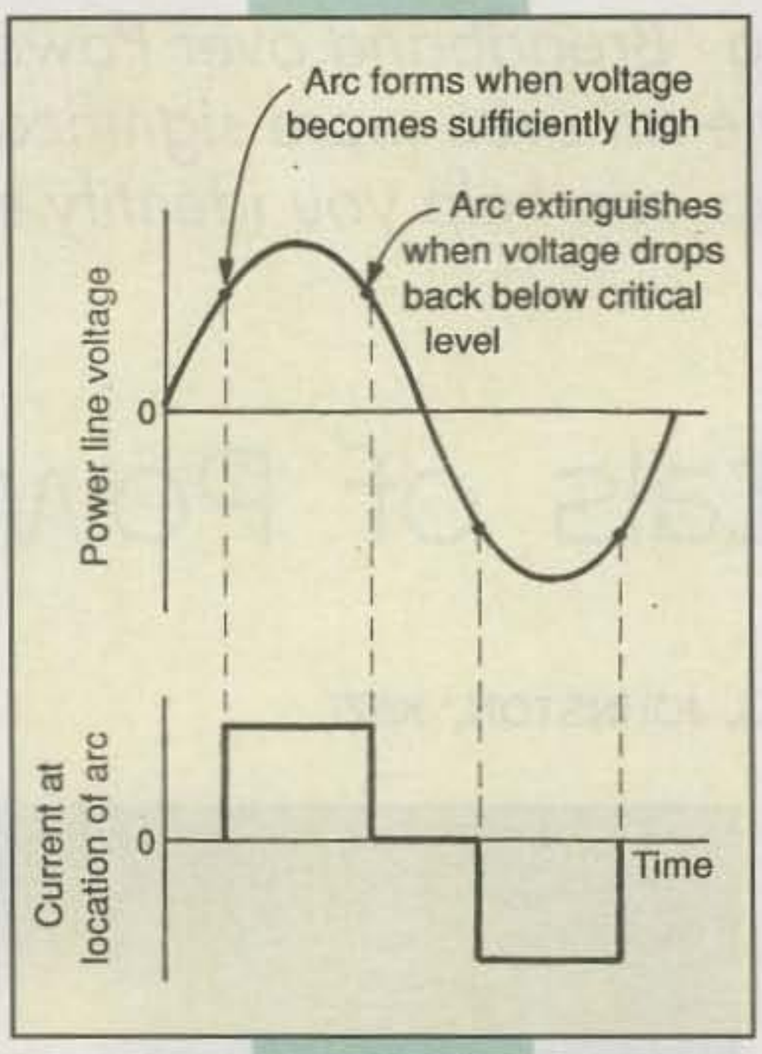

Fig. 2– When the 60 Hz alternating-current power-line voltage exceeds a critical level, an arc can form anywhere there are defective connections, insulators, etc. When the voltage drops below the critical level, the arc will extinguish. This process is repeated for each half cycle of the sine-wave voltage, for a total of 120 times per second.

Power-Line Noise

Many people will tell you that RFI caused by power-line noise comes from harmonics of the 60 Hz frequency (50 Hz in some countries) of the alternating current in the power lines. It does not. Repeat after me: "It does not! It never has, and it never will!"

Generally, by the time the 7th or 8th harmonic of a given frequency is reached, the energy contained in the harmonic is below measurable levels. The power-line frequency of 60 Hz is too far removed from radio frequencies for its harmonics to contain any detectable energy. The 15 meter band, for example, is at the 350,000th harmonic of 60 Hz. The 2 meter band at 144 MHz is the 2,400,000th harmonic. Trust me. There is nothing there.

The same power-line noise "experts" who will tell you that RFI comes from harmonics of the 60 Hz frequency of the power lines will also tell you that they can prove it by counting the interference bands appearing in an amateur slow scan television (SSTV) image. An SSTV image suffering from power-line RFI typically will have dark (or light) bands in the image which can easily be shown to have been recorded at a rate of 60 (or 120) Hz. In countries using 50 Hz power transmission systems, the bands will be recorded at a rate of 50 or 100 Hz. However, their "proof" is no proof at all, for if it were harmonics of the power-line frequency causing the interference, the entire image would be black, because the harmonics allegedly causing the RFI would be at a repetition rate 350,000 times faster than the mere 60 or 120 dark bands per second seen in an SSTV image on 15 meters.

If not harmonics, then what? Square waves! Little tiny lightning bolts! Arcing on power lines consists of trains of little sparks with all the characteristics of lightning that we discussed earlier, but at much lower energy levels. While RFI from lightning might travel thousands of miles, RFI from power-line noise is generally heard no more than a couple of miles from its source.

What is actually happening is this: The power lines carry an alternating current. By definition, such a current consists of a repetition of cycles. The voltage during each cycle starts at zero and (in the form of a sine wave) rises to some maximum positive amplitude, then drops back to zero. This is the positive half cycle. The voltage then continues to a negative amplitude equal to that reached during the positive half cycle, then returns to zero again. That completes the negative half cycle, for a total of one full cycle of alternating current.

When the voltage is at the zero point, there is no current flowing, and hence there can be no arcing. As the cycle progresses, the voltage rises. At some point it reaches a value high enough to cause an arc to suddenly snap on and start flowing (perhaps at a defective insulator). The arc remains in place as long as the voltage during that half cycle is sufficiently high. However, as the voltage returns toward zero, at some point it will become low enough that the arc will snap off and extinguish. One little miniature square-wave lightning bolt has just struck. Then the power-line voltage passes through zero and begins to increase in magnitude in the negative direction. Exactly the same process is repeated, with the only difference being that the electrons are flowing in the opposite direction this time. Another little miniature square-wave lightning bolt strikes during this negative half cycle. Thus, two of these little lightning bolts (arcs) strike during each full cycle of current on the power lines, or $60 \times 2 = 120$ little bolts per second (fig. 2). This train of arcs goes on forever, or at least until the electric company makes repairs.

Each little arc, being essentially a square wave, contains RF energy throughout the radio spectrum, creating static at the frequencies of our ham bands (among other places). It does not do so continuously, but in little spurts repeated at a rate of 120 times per second (100 times per second in some countries). Hence, the interference is interspersed with short, clear periods, resulting in an SSTV image that has dark bands produced 120 times per second by the arcs. In between are unaffected bands of the SSTV image, which are received during the time the arc is extinguished. Heard on the speaker of the radio, power-line RFI is a buzzing sound with a distinctive 120 Hz component.

Serendipitous Semi-Conductors

In the foregoing discussion it is important to understand that "positive" and "negative" merely refer to the direction the electrons are flowing during the two half cycles. The energy delivered is the same in each half cycle, such that two equal bursts of RFI are generated in every cycle. In practice, however, the two arcs produced during a single cycle

of alternating current are often of differing intensities. If, for example, an arc forms across a faulty insulator, then the insulator has become a conductor, albeit a poor one. Another way to say it is that the insulator has become a "semiconductor." This semiconductor, being in contact with a dissimilar material (i.e., wires or other metallic hardware), acts as a solid-state (semiconductor) diode.

A diode tends to pass current (the arc) freely in one direction and block current in the opposite direction. Although terribly inefficient, our serendipitous diode can function well enough to cause the arc produced in one half cycle to be markedly larger or smaller than the arc produced in the half cycle of opposite polarity. The difference can be great enough such that the RFI produced by the smaller arc might not be enough to degrade an SSTV image, with the result that the image has only 60 dark bands generated per second, rather than 120. Or, there may still be 120 bands per second, but every other one is lighter than the adjacent ones because the offending arcs in the corresponding half cycle are weaker.

Why PCs are a Source of RFI

The timing pulses in personal computers are square waves as well. Because they are square (irrespective of the computer's clock frequency), the timing pulses contain RF energy across a very broad spectrum. Consequently, a PC with a low clock frequency can be just as noisy from an RFI standpoint as one with a high clock frequency. Also, whereas a lightning bolt is only one cycle (or at most a few cycles) of electrical current flow, thereby causing interference for only a brief instant, a computer's clock runs continually, generating continuous RF interference which can sometimes be maddeningly difficult to eliminate from radio receiving devices.

Destructive Potential of Electromagnetic Emissions

Mere interference to radio reception is bad enough, but the sources of RFI—lightning in particular—have the power to destroy as well. Moreover, it turns out that high-tension power lines not only generate RFI, they can cause other entirely unrelated and unconnected devices to become additional secondary generators of even more RFI. How is this bizarre behavior possible? To find out, let's return once again to our lightning bolt to gain some additional insight into its electrical and magnetic

properties. As before, we'll forego detailed proofs and get straight to the heart of the matter simply by reviewing the fundamental principles which explain these behaviors:

• Any time an electrical current flows, a magnetic field is generated around the conductor carrying the current, regardless of whether the conductor is "good" (such as a copper wire, for example) or "poor" (such as air).

• The strength of this magnetic field is proportional to the magnitude of the electric current, and inversely proportional to the distance from the conductor.

• If the electrical current is constant, the magnetic field is stationary. That is, the "lines of force" of the magnetic field do not move.

• If the electrical current is changing, the magnetic field is in motion. That is, the lines of force move in and out around the conductor as the magnitude of the electric current varies.

• If a moving magnetic field passes through another electrical conductor, an electric current will be induced into that conductor. This occurs despite the fact that there is no direct electrical connection (such as a metallic conductor) between the original electrical current and the induced electrical current. This is the principle of *induction*, as set forth by the British physicist Michael Faraday in the early 19th century. The strength of the induced current is proportional to the strength of the magnetic field, and hence, to the magnitude of the original electric current.

• A lightning bolt is an electrical current passing through a conductor (air). Although air is a poor conductor, the amount of energy involved is so stupendous that electrical currents on the order of millions of amperes can flow. Moreover, a lightning bolt's electric current is a changing current by virtue of the fact that it rises from zero to some very high value, then falls back to zero.

• The changing electrical current of mind-boggling amplitude within a lightning bolt generates a moving magnetic field of mind-boggling magnitude. The lines of force from this magnetic field move outward for great distances (easily several miles) as the electrical current in the lightning bolt rises, then they fall back inward as the current in the bolt decays.

• The moving lines of magnetic force generated by the lightning bolt pass through air, earth, water, buildings, and yes, electrical conductors such as electrical power lines and telephone cables, and even water and gas pipes, not to mention antennas and lead-in cables. Consequently, electric currents are induced into every one of these conductors, whether they are hanging in the air, buried in the ground, or (seemingly) hidden in the walls of your house.

• The strength of the induced current is affected by many factors, but it can easily be (and often is) on the order of many amperes. Such currents develop extremely high voltages across devices connected to the conductors, with the result that any device not designed to withstand these forces can be damaged or destroyed.

• A key point to remember is that lightning does not have to strike an object directly to damage it. Lightning can induce destructive currents into conductors miles away, and those conductors in turn can carry the induced currents many miles farther. This is the case whether the lightning bolt is from cloud to ground or from cloud to cloud.

The Faraday Cage Effect

Lightning not only generates magnetic fields, but myths as well. Ask yourself this frequently posed question: Why are the occupants of an automobile relatively safe even if the car takes a direct strike from lightning? The most commonly given answer is that the occupants are protected by virtue of the fact that the car is insulated from the ground by its rubber tires. However, while it is true that tires are insulators, the notion that they stop lightning is pure malarkey. A lightning bolt easily travels 30,000 feet through air, and those little pieces of rubber do not prevent it from traveling the last four or five inches of air between the car and the ground. Indeed, the lightning bolt courses all the way from cloud to ground (or vice versa), irrespective of whether there is a car in its path.

The real reason that occupants of a car have a degree of protection from lightning is that they are partially encased in a metal cage. Electrical current tends to flow along the path of least resistance, and the metal structure of a car offers a much better path for the electric current to flow through than does the air inside the car. Consequently, most of the bolt's current is diverted to flow through the metal body of this cage, after which it exits the car and resumes flowing through the air.

One should keep in mind, however, that although *most* of the current flows through the metal body of the car, some of it does in fact flow through the air and other objects within the car. Usually, the amount of current flowing inside the car is small enough to be harmless, but it is

not entirely unusual for persons or objects within the car to receive burns or other injuries.

Incidentally, an automobile or any similar metallic cage which protects its contents from electrical currents, including currents which might be induced by magnetic fields, is known as a *Faraday cage*. The name is also applied to metallic enclosures designed to protect their contents from radio frequency interference. Special electronic research laboratories are often designed with this specific purpose in mind. Construction involves covering the walls, windows, and doors, not to mention the floor and ceiling, with fine-mesh copper screening.

On a smaller scale, metal compartments (or even just metal baffles, known as *Faraday shields*) are used within radio transmitters and receivers to protect the various stages from RFI which they might otherwise radiate between each other.

Induction Produces Secondary Sources of RFI

As mentioned earlier, most power-line RFI is the result of intermittent electrical arcing at various points in the high-tension transmission system (connectors, insulators, and so forth). However, it can just as well be caused by currents induced into nearby conductors by the alternating (moving) magnetic field which surrounds the transmission lines. For example, electrical current flow could be induced into a metal lawn chair situated near overhead high-tension lines. The induced current could then arc to another object (perhaps a table or another chair), generating the RF interference (RFI). Although the current might be small, an arc created by it is sufficient to cause serious radio frequency interference. The bottom line is that while the power line is the original source of the energy, the power-line noise itself can actually be emanating from a completely different object!

Military Applications

Although still highly classified, the U.S. Armed Forces (and undoubtedly those of other nations as well) have been developing, and are on the verge of fielding, weapons which will use powerful pulsed electromagnetic emissions to induce destructive electrical currents into the enemy's equipment. Appropriately sized and directed electromagnetic emissions can disable the ignition systems of vehicles, short out power distribution transformers, and burn up computers and communications equipment—and that's just for starters. In short, the enemy comes down with the Mother of all RFI Headaches. The hard part, of course, is to keep from melting down your own delivery vehicle. One can surmise that such a vehicle makes extensive use of Faraday cages!

Protective Measures

Thus, aside from building a giant tin can around our house, what can we do to protect sensitive electronic equipment from the effects of lightning? Countless models of surge protectors, lightning arrestors, and uninterruptible power supplies are on the market, and numerous books have been written on their application and efficacy. Rather than attempt to duplicate the wealth of information readily available from other sources, I will just say that the best method of protection is also the least expensive: Whenever your equipment is not in use, disconnect it from the electrical wall outlets, and disconnect all antennas. If a thunderstorm is approaching, turn off the equipment and disconnect it. Don't forget to disconnect the cord which connects the modem to the telephone jack.

Ideally, one would even reconnect all antenna and rotator cables to a solid earth ground while the equipment is not in use. This latter step is primarily to ensure than any lightning-induced currents in the lead-in cables are shunted directly to ground and do not arc over to other equipment inside the house. While these steps go a long way toward protecting equipment indoors, there is little one can do to protect things such as antenna-mounted preamplifiers. It is a fact of life that the occasional preamp will have to be repaired or replaced.

If one takes these precautions, do surge protectors, lightning arrestors, and uninterruptible power supplies serve any useful purpose? Absolutely! While your station equipment is in use, these devices provide protection from surges induced into the power lines by lightning which you are not aware of because it is miles away. Nonetheless, when there is any indication that a thunderstorm is approaching, it's time to shut everything down and disconnect it.

Conclusion

Because of its broadband nature, RFI from power-line noise is notoriously difficult to track down to its source. Once found, it is often even more difficult to get the electric company to repair the offending structure *(although the FCC has recently been getting involved in some of the more stubborn cases—ed.)*. However, knowing how RFI is produced and knowing its effects on radio communication and ATV images make the job significantly easier. ■

"Fundamentals of Power Line RFI" is an adaptation of material which was presented by the author in an article entitled "A Lightning Primer" in the September 2002 Remote Imaging Group Journal, *a quarterly publication produced in Great Britain for weather-satellite professionals and hobbyists. It is published here with permission of the* RIG Journal.

BY FREDERICK O. MAIA,* W5YI

Petitions for Rulemaking Filed To End U.S. Morse Code Exams

It hasn't taken long for the worldwide amateur radio community to act on the new international amateur radio rules which were enacted at the recently concluded World Radiocommunication Conference in Geneva.

WRC-03 ended on July 4 with a complete new set of international regulations governing the amateur services, Article 25, coming into effect the following day, 5 July 2003. Among other provisions, the new rules permit a country to determine whether it wishes to retain Morse code testing in the Amateur Service. For the past 75 years it had been an international requirement that radio amateurs demonstrate proficiency in "sending by hand and receiving by ear" Morse code messages.

Telegraphy Testing in the Amateur Service

Actually, until now the only changes made to the international Amateur Service regulations over those three generations concerned the frequency above which amateurs may operate without Morse code testing.

At its Washington, DC conference in 1927, the ITU (then called the International Telegraph Union, now the International Telecommunications Union) allocated frequency bands to the various radio services and established operating guidelines and operator qualifications. It was deemed important that amateurs prove an ability to transmit and receive communications in Morse signals, since at the time radiotelegraphy was the primary means of long-range communication. Since then, the member countries of the ITU have reviewed and voted to relax the Amateur Service's mandatory Morse proficiency requirement at nearly every international conference capable of doing so.

In 1947 (Atlantic City) the ITU agreed that Morse proficiency should only be required when the operation took place on frequencies below 1000 MHz (1 GHz). At the 1959 World Administrative Radio Conference this level dropped to 144 MHz. A further reduction to 30 MHz was made in 1979.

As a consequence, for the past 25 years Article S25.5 §3 read:

> Any person seeking a license to operate the apparatus of an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30 MHz.

At WRC-2003, the international Radio Regulation Article S25.5 §3 was revised to make the Morse code testing requirement a matter for each licensing administration to decide for itself. Article S25.5 §3 now reads:

> Administrations shall determine whether or not a person seeking a license to operate an amateur station shall demonstrate the ability to send and receive texts in Morse code signals.

Countries Begin to End Morse Exams

The United Kingdom started early and is way ahead of the rest of the world in phasing out a Morse testing requirement. Even before WRC-2003 ended, Great Britain was on record as to how it would end telegraphy exams. The UK had two versions of its Full privilege and Intermediate licenses—an all-band "A" version and a no-code VHF/UHF "B" version.

Their Radiocommunication Agency (or "RA," as it is known) simply merged the "B" version into the all-band "A" license, and all British amateurs now have all-band Full license privileges. As of July 26, 2003 the United Kingdom no longer administers Morse code exams.

However, the Radio Society of Great Britain (the UK's national ham radio society) will continue to conduct Morse proficiency tests for amateurs wishing to go abroad to countries where Morse is still a requirement.

The "Morse Assessment" for the UK's beginning Foundation license has not yet been discontinued. This simply consists of looking up the dot-dash sequence from a crib sheet and writing down the correct letters. In effect, it is not really a code exam at all. Great Britain now has slimmed down to three all-band license classes: Foundation (10 watt output), Intermediate (50 watts), and Full (400 watt power level).

While Great Britain was the first to enact regulations abolishing code exams, it was not the first to abandon its Morse requirement for HF operation. That distinction goes to Switzerland. Effective July 15, the Swiss Federal Office of Communications (OFCOM) granted all Swiss "no-code" licensees "provisional" access to the HF bands using their current callsigns. This temporary permission is in effect until the regulation can be officially changed.

We understand that Belgium also ended code testing in its amateur service effective August 4,

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2003, and it appears that other national amateur radio societies in Europe will be following shortly. They are waiting for CEPT, the European Conference of Postal and Telecommunications Administrations, to define a common position. Forty-six countries currently are members of CEPT.

The International Amateur Radio Union, a federation of national amateur radio societies from around the world, also is on record as opposing Morse testing. At its Council meeting held in Australia three years ago, the IARU adopted a policy resolution recognizing that "Morse code continues to be an effective and efficient mode of communication used by many thousands of radio amateurs, but the position of Morse as a qualifying criterion for an HF amateur license is no longer relevant to the healthy future of amateur radio."

The American Radio Relay League is the IARU headquarters organization and provides most of its funding. However, that does not mean that the ARRL supports ending Morse testing in the United States. Quite the contrary. The current policy of the ARRL is still to support retention of manual telegraphy testing.

At their July 2003 board meeting the ARRL directors decided they would again survey their members to see if their opinions had changed in view of the new Article 25. Thus, it appears that the ARRL may be many months away from any decision on the matter.

Petitions to End Morse Testing Filed in United States

Shortly after the ITU nations agreed that Morse testing should no longer be an international requirement in the Amateur Service, the Federal Communications Commission began receiving requests from the amateur community to do away with it. The first Petition for Rulemaking was filed July 16 by Kiernan Holliday, WA6BJH, an Extra Class amateur and ARRL Life Member from Santa Fe, New Mexico.

Holliday argues that the Commission would not include a Morse testing requirement if it were to establish the service today. "Fifty years ago the requirement was reasonable, but as Morse code use has declined in other services there is less reason to require it in the Amateur Service," he said.

"The Morse code requirement limits the number of people who take advantage of the Amateur Radio hobby," Holliday observed. He added it "...drastically limits the ability of handicapped

people to obtain Amateur Radio licenses," and believes that "(c)ontinued Morse requirements serve no useful purpose in the twenty-first century."

The Courage HANDIHAM System based in Minnesota provides for the needs of radio amateurs with disabilities. It agrees with Holliday and has publicly said, "The current five words-per-minute requirement still provides an artificial barrier to those with legitimate difficulties demonstrating proficiency. No one is required to become a concert pianist if they want to learn to play the guitar. There are still many disabled hams who will never be able to succeed at the five words-per-minute requirement but they would excel at some of the other modes of HF operation if given a legitimate, realistic opportunity."

Eric R. Ward, NØHHS, another Extra Class amateur from Durham, North Carolina, filed a similar petition on July 28. Ward acknowledges that many radio amateurs still use Morse code communications on a regular basis.

He points out that Morse code proficiency examinations were well considered by the FCC in 1999 when the Amateur Service was restructured to three license classes . . . and when the Commission adopted the codeless Technician license in 1991.

"The Commission determined in both cases that demonstration of proficiency in telegraphy using Morse code is no more or less than proof of proficiency in that mode of communication." Ward reminded the FCC that it stated in its decision that radiotelegraphy is simply one of many modes of communication and "...the emphasis on Morse code proficiency as a licensing requirement does not comport with the basis and purpose of the [Amateur] service."

Ward said the FCC agreed at the time that reducing the telegraphy examination to the minimum requirement meeting the ITU requirement "...was in the public interest," but that total elimination "...was not possible because the Radio Regulations did not allow waiving of the telegraphy requirement..."

Ward believes that continuing Morse examinations is no longer justified, since the ITU has now relaxed the telegraphy requirement and "...the IARU Administrative Council had previously resolved to support the removal of Morse code testing as an ITU requirement...."

Another Petition was filed by Dale E. Reich, K8AD (also Extra Class), of Seville, Ohio, requesting that the telegraphy requirement be removed from the General Class license only. He wants the 5 wpm Morse code exam to remain for the Extra Class.

VECs Also Petition to End Morse Code Examinations

The National Conference of Volunteer Examiner Coordinators (NCVEC) is the umbrella organization comprised of the 14 organizations charged since 1984 with developing and administering all amateur radio operator license testing and electronically filing successful applications with the FCC. Once a year the various VEC organizations meet to discuss issues that impact amateur radio operator testing. At their July 25, 2003 meeting held with the FCC in Gettysburg, PA, the VECs overwhelmingly agreed that Morse code testing should be immediately ended, since it is now possible to do so. It was also noted that other countries had already begun discontinuing their Morse examinations.

As a result, the VECs voted to file a Petition[1] asking that the FCC take expedited action to allow them to discontinue administering Element 1, the 5 words-per-minute telegraphy examination as soon as possible and to permit existing Technician Class operators to access HF spectrum currently permitted to Technician Class operators who have passed a telegraphy examination.

The VECs said that Morse code (or CW, as it is commonly called) communications "...has all but become obsolete in practically all other contemporary communication systems." (The last vestige of commercial Morse code communications had been by ocean-going vessels, but in the 1990s it was phased out in favor of satellite and digital communications technology. Manual telegraphy is no longer required in any radio service other than the Amateur Service.) The NCVEC petition added that the "send by hand and receive by ear" requirement was an unnecessary burden, especially since "...today's personal computers can easily send and receive telegraphy."

"Some amateurs believe that the effort and sacrifice needed to learn Morse code indicates a more dedicated and, therefore, a better candidate for amateur radio," the VECs said, adding, "No evidence exists, however, that supports a relationship between manual telegraphy proficiency and the quality, desirability, or motivation of the operator."

"What the Morse code licensing requirement does do, however, is to greatly reduce the number of applicants operating in the medium and high frequencies. Many people question why an individual with vast knowledge in the electronics field should be excluded from operating on HF spectrum due to a personal disinterest in the Morse code," the petition continued, adding that "It makes no sense from a regulatory perspective to require radio amateurs to be Morse proficient when the greater majority of radio amateurs do not desire to use that mode and there is no regulatory reason for them to do so. . . . In short, the Commission should ensure that the amateur examination elements are appropriate for the types of operation that will be performed by the licensee."

The VECs also believe Morse testing is an unnecessary burden upon the VE teams who must prepare and administer the CW examinations. "It requires extensive preparation and special equipment to prepare and administer properly. It is often disruptive and unsettling to those other examinees who are taking one of the written examinations within the same room."

The VECs believe "The Amateur Service community suffers from the loss to its ranks of a large number of potentially excellent operators who are turned away because of the CW requirement. Either because of lack of the requisite aptitude for sending and receiving CW or because of an unwillingness to spend the time acquiring a skill which they find of no value to them, they forego becoming amateur operators."

The VECs also mentioned that not everyone *can* pass a code test. "Now that the international (treaty) Morse code requirement is optional, the FCC can expect to receive numerous requests for waivers of the Morse code examination due to applicant hearing and other medical conditions in order to be compliant with the Americans with Disabilities Act (ADA)," the VECs said.

"Dealing with requests for a waiver of the code exam could create an unnecessary burden on the FCC and VECs/VEs and consume an excessive amount of time and resources. It seems illogical to require all amateur examinees to pass a requirement that could be waived by the actions of a physician. History has shown that physician-initiated waiver requests have been very controversial in the Amateur Service."

The Wheels Turn Slowly

Even though there are new international guidelines for the Amateur Service, it

could be some time before any adopted changes find their way into our Part 97 Amateur Service rules. This is because in the United States our democratic "Administrative Procedures Act" rule-making process requires lengthy public "Notice and Comment" participation.

It does not appear, however, that the fact that the WRC-2003 accord has yet to be ratified by the Senate will have any impact on implementing its decisions. The U.S. State Department advises that although several World Radio Conferences have taken place over the past decade, none has gone through the ratification process. However, many past conference provisions have already been implemented by the United States, such as the 30, 17, and 12 meter bands approved by WARC-79.

It takes time for new proposals to make their way through the FCC's rulemaking process and become law. For example, the recent restructuring of the Amateur Service was proposed in 1998 but did not go into effect until April 15, 2000. Historically, it takes about two years to go through the Petition for Rulemaking, Notice of Proposed Rulemaking, Comment, Reply Comment, and Report and Order stages. Thus, it is safe to assume that any Amateur Service rule changes —such as eliminating the code exam— could take a similar period of time. We point this out because it might just be wise to learn and pass the Morse code exam now rather than waiting for something that may or may not happen two years from now.

Once the code exam question has been decided, the FCC will again be taking a look at our overall Amateur Service license structure. The 2003 changes in the international Radio Regulations are certain to eventually set off sweeping changes to our license classes. The ARRL has already made a decision about the need to "refarm" (that is, reallocate) Novice spectrum . . . and its Petition (RM-10413) to redo the amateur license class structure has been before the Commission for more than a year. The possibility of adding up to a quarter-million current Technician licensees to those Novice bands, along with changes forthcoming for the 40 meter band in 2009, will certainly affect any eventual decision on "refarming."

73, Fred, W5YI

Note

1. The complete text of the NCVEC petition to the FCC is on the *CQ* website, as a Word® file, at <http://www.cq-amateur-radio.com/MorseCode73003.doc>.

Radio in the Azores

The Azores are volcanic islands and there is quite a bit of activity underground. These hot springs are near the village of Furnas on Sao Miguel.

Ham

In an effort to keep from changing the time on his watch, globe-trotting author SMØJHF decided to extend a winter vacation to Cape Verde by stopping in the Azores en route home. He found a vibrant and active ham community.

BY HENRYK KOTOWSKI,* SMØJHF

Is there anybody in North America who needs a QSL card from the Azores? Ask your consul for a sked. The Honorary Consul of Canada in Ponta Delgada, Sao Miguel Island, is Filipe Sousa Lima, CU2BD. The Consul of the U.S. in the same main city of the archipelago is Bill Meara, CU2JL. Bill is also N2CQR and has a lot of background information posted on his website at <http://planeta.clix.pt/n2cqr>. I met both consuls, but not on any official business, in December 2001.

As usual in my case, the decision to visit the Azores was last-minute. I came home from Cape Verde (D44CF) at the end of November. December is so dark in Stockholm that after a few days I was searching for a place with more sunshine. I have this dual-time wrist watch; I am lazy and don't want to change the clock back and forth. I looked at the world map and found out that Cape Verde is one of only three inhabited places in the world in the UTC 1 hour time zone. The others are a small section of eastern Greenland and the Azores archipelago. Both Cape Verde and Azores are composed of nine inhabited islands each and both are of Portuguese influence, and I wouldn't have to touch my dual-time wrist watch! No contest there. Sorry, Greenland, I never even considered going there.

The Azores archipelago is an autonomic part of Portugal, and the CEPT license is valid there without any fuss like in D44. Within a couple of days I was on a direct charter flight from Stockholm to Ponta

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"Honest, folks, it just sprouted right out of the tree ... must be some new type of palm frond!" This obviously tropical and impressive tower and antenna on the island of Sao Miguel in the Azores belong to the father-and-son team of CU2AA and CU2DX. (Photos by SMØJHF)

An impromptu meeting at club station CU2ARA. The man in the white jacket in front is the Honorary Consul of Canada in the Azores, Filipe Sousa Lima, CU2BD.

Delgada. I won't mention the cost so as not to upset some of the more price-sensitive readers.

On the Air from the Azores

As soon as I arrived and checked in at a decent hotel (Hotel Canadiano), I phoned Filipe, CU2BD, who had given me a cell-phone number via e-mail. The number was for his wife, Ana, CU2YAL, who works at the local university. Filipe is a busy man, but they had time to pick me up the next afternoon and drive me to the local ham radio club, CU2ARA. The club has about 350 members from the island of Sao Miguel alone. I met at least ten of them that evening. The club station is well equipped and spacious, and the premises are leased to the club for free.

Later Eduardo, CU2AF, enlightened me about the existence of ham radio in the Azores. During the 1980 earthquake, some local amateur radio operators, including Eduardo himself, provided radio communications between the islands. This was the turning point in the authorities' approach to amateur radio. I recall stories of similar acid tests for amateur radio's competence from Turkey and Madeira.

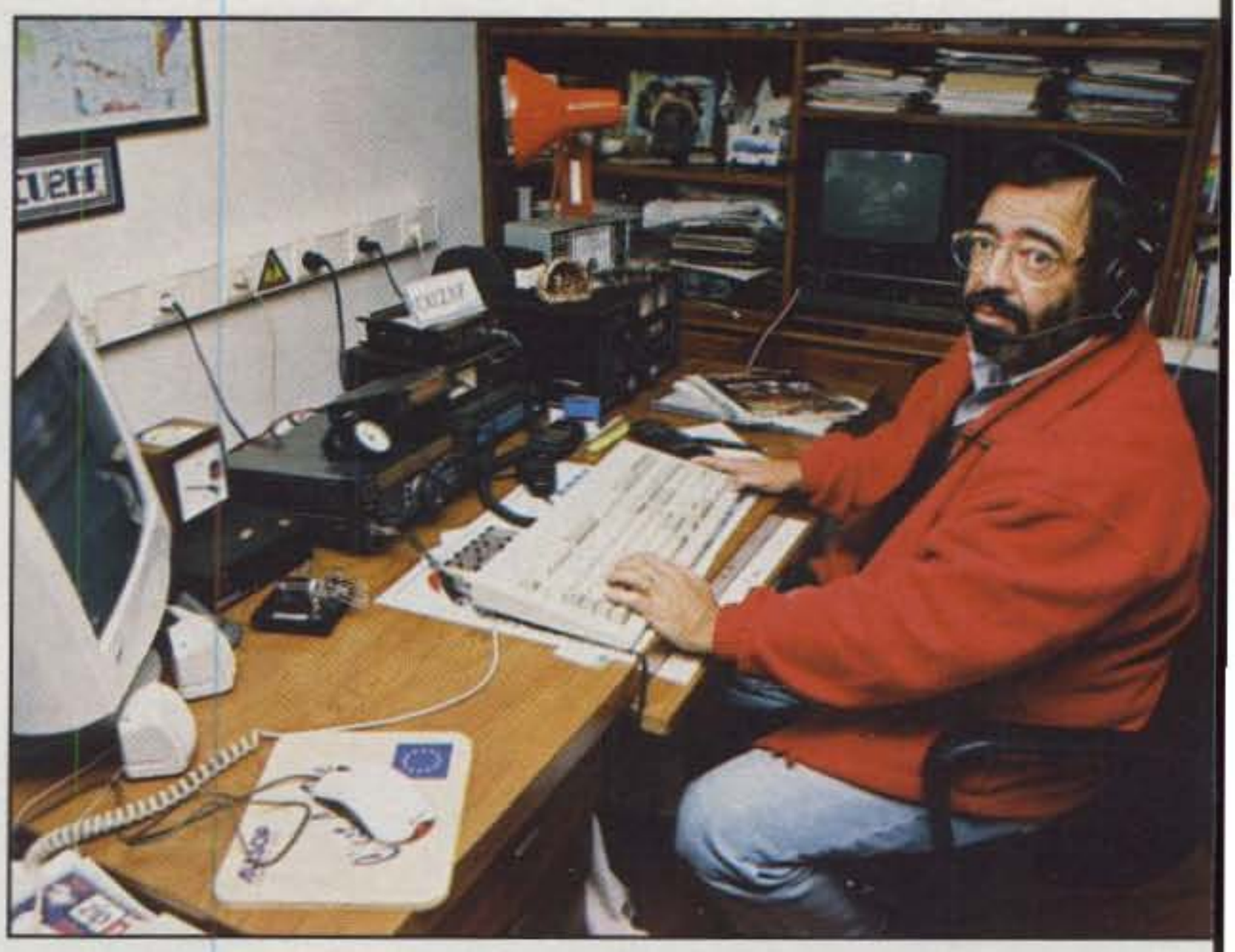
I threw a wire from the hotel window and tuned it with my automatic antenna tuner. It worked, even on 6 meters. There were great openings to Europe and the U.S. East Coast on 50 MHz!

I am primarily a tourist when I travel, so I rented a small car and explored the island. Tourism is important but not the main income source for people of the Azores. Agriculture, fishing, and manufacturing dominate the economy of the islands. It is 700 nautical miles to Portugal from there and three times as far to New York, but I had a feeling that ties with the North American continent are stronger than with Portugal. An estimated 1 million Azorians live in the U.S. and Canada, while only quarter of a million live on the islands themselves. The European Union subsidizes the rapidly growing infrastructure there, so some of you who left the Azores a few years ago are not going to recognize the islands, just as I did not recognize Madeira after an absence of five years.

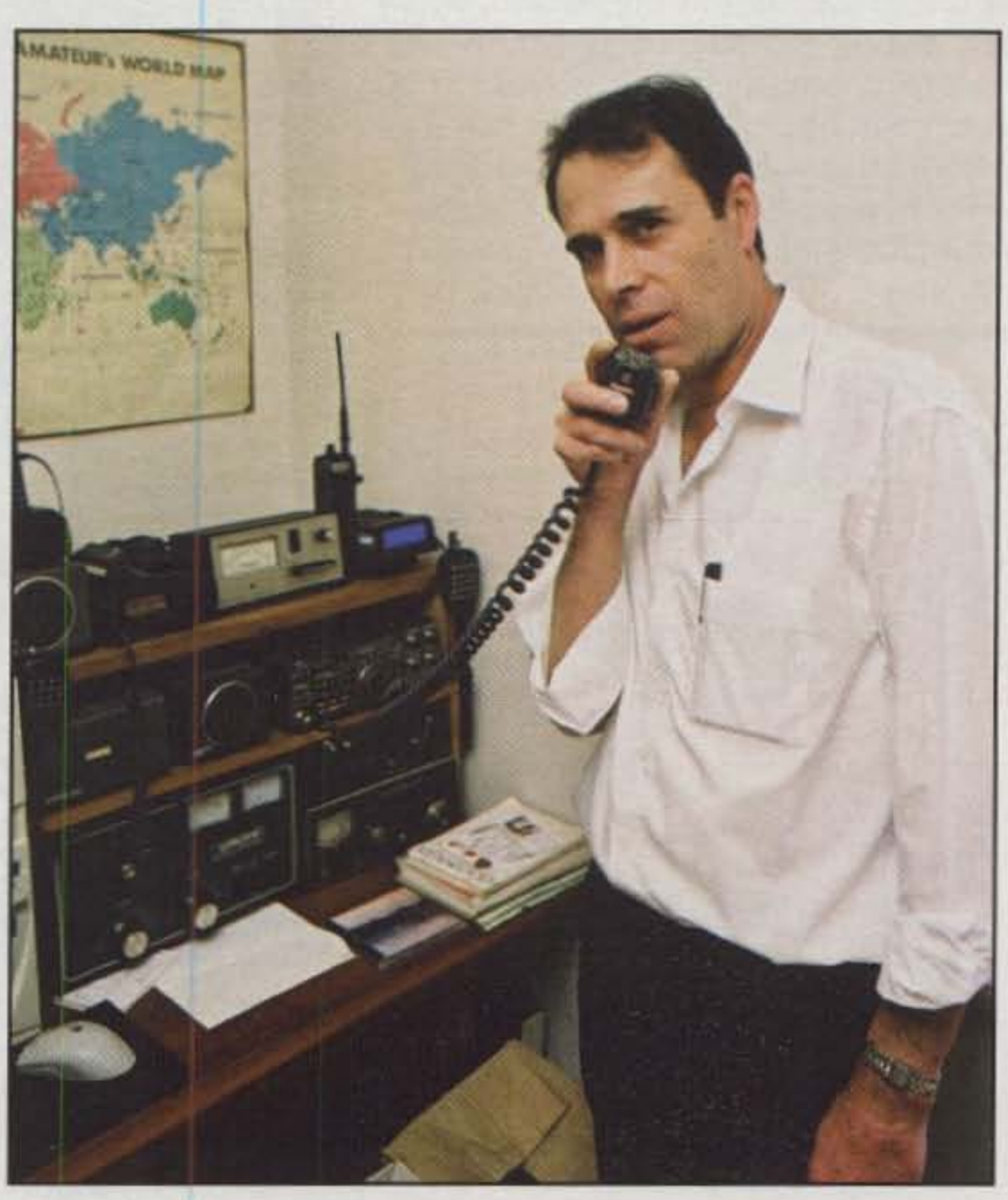
Prefixes of the Azores

Each island in the Azores has a distinctive prefix: Santa Maria, south of Sao Miguel, is CU1. Sao Miguel is, as you probably have guessed, CU2. Terceira, well known to Atlantic-crossing sailors and military personnel, is CU3. Terceira lies northwest of Sao Miguel, and northwest of Terceira is Graciosa with prefix CU4. West of Terceira and south of Graciosa are Sao Jorge (Saint George) with the CU5 prefix and Pico, CU6, the highest point in the entire Portuguese territory. Farther west, Faial is CU7, and almost 100 miles still farther west are Flores, CU8, and the smallest island of the archipelago, Corvo, CU9. Flores is the westernmost point of Europe, since these islands count for Europe in the amateur radio world. Each island is different and worth a holiday visit of its own, just like Cape Verde Islands.

The antennas of Filipe, CU2BD, in Ponta Delgada, Sao Miguel Island. Ponta Delgada is the main city in the Azores.



Eduardo, CU2AF, enjoys operating from his pleasant shack in the village of Faja de Baixa, outside Ponta Delgada.



Antonio, CU2FX, operates from the back room of his restaurant in the main square of Furnas.

Exploring the picturesque island of Sao Miguel (Saint Michael) takes some time in spite of its small size. The Azore islands are of volcanic origin and relatively young. There is still geothermic and volcanic activity in this area, which is part of a belt of seismic activity that stretches to Iceland. A serious earthquake is expected soon.

First I went to the western edge of the island, threw a wire in the bushes, and connected my IC-706 to the car battery. I made hundreds of contacts. Hearing the VE8BY beacon on 50 MHz and no other amateur station was irritating.

The next day I went to the village of Faja de Baixa, just outside Ponta Delgada. Eduardo, CU2AF, lives there among pineapples. He got his first license in 1978 as CT2CM. In 1985 the prefix for the Azores was changed to CU and Eduardo received his present callsign. The rest of his family is licensed as well. His XYL, Maria da Graca, is CU2YM; his daughter Patricia is CU2YP; and Eduardo's son, Pedro, is CU2PM. Eduardo is often on the air and quite frequently in contests. His old 10-element Wilson Systems antenna was scheduled to be replaced by a new Force 12 array, so probably by the time this story is printed a new antenna will be up.

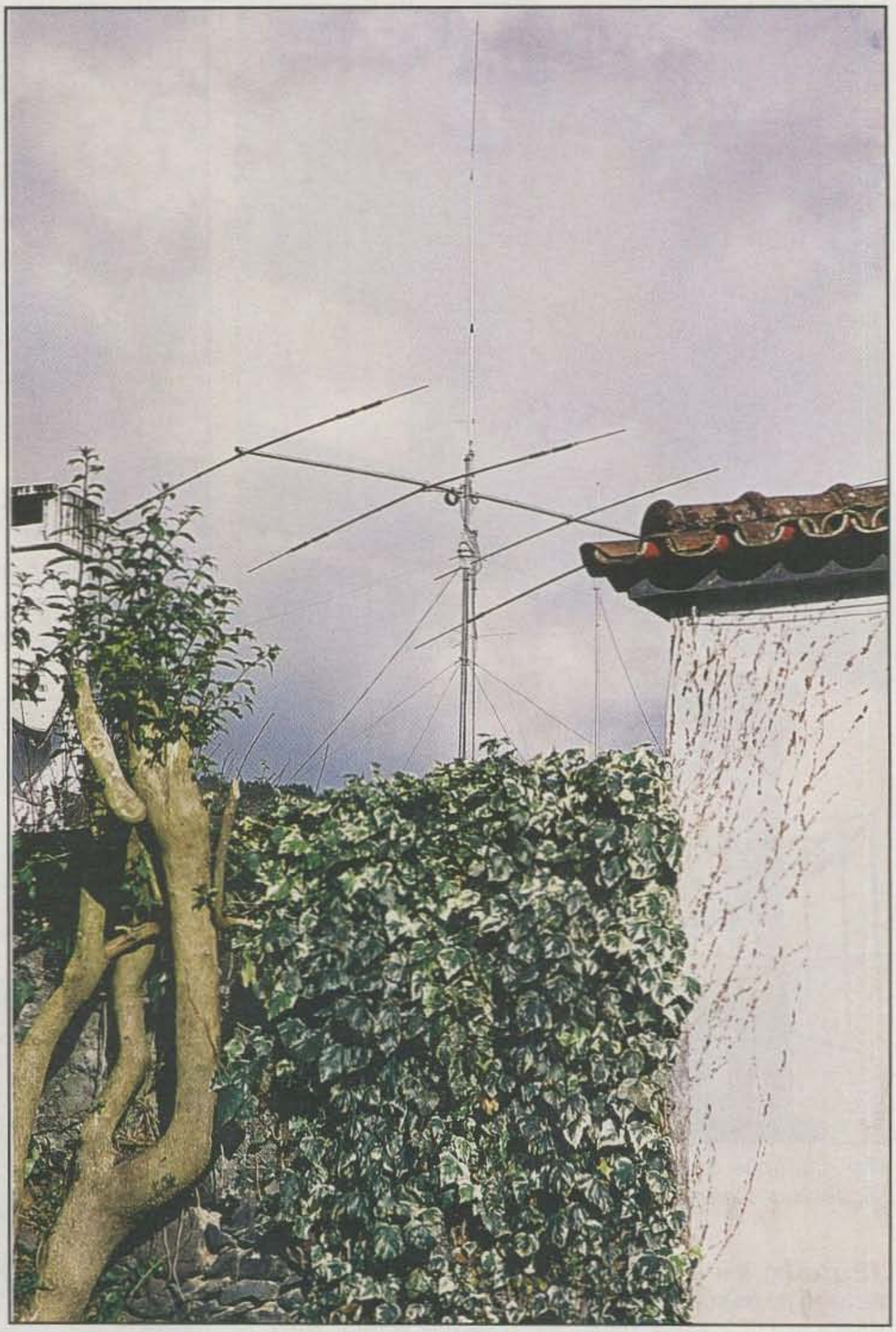
Going north, in the village of Livramento I spotted the tall tower of Jacinto, CU2AA. He shares this impressive antenna system with his son, CU2DX. However, Jacinto was not at home and Francisco CU2DX works long periods in Portugal. Bad luck.

I drove farther north to Ribeira Grande and was looking for the site of the recent CQ WW activity as CU2A from the home of CU2CE. Unless you have a good description of a place, though, it is impossible to find it. Thus I missed CU2CE.

On the other hand, finding CU2FX in the village of Furnas the next day was effortless. The village lies in the eastern part of the island in a deep valley with hot springs and close to a beautiful lake called Lagoa das Furnas in an extinct volcano. Antonio, CU2FX, owns a large restaurant in the main square of the village—Tony's Restaurant. A nice Cushcraft A4S graces the roof of the restaurant, and a closer look even revealed a 2 meter Yagi. The station is fully equipped, including an amplifier for HF. Antonio became a ham about 15 years ago and likes it very much. On 2 meters he regularly talks to the neighboring island of Santa Maria, CU1, despite being deep in a valley.

Back in Ponta Delgada I tried a few times to get good shots of the Filipe, CU2BD's antenna. His impressive tower in the old part of the town is in striking contrast to the dated façades of the middle-class houses. The sky is not blue in December in the Azores every day, but on Sunday I had luck for taking the photographs. However, Filipe was not at home, so he could not pose in front of his impressive antenna tower.

There is another identical antenna in Ponta Delgada. Doctor Carlos Alvim Pinieiro, CU2AZ, has the same 4-band



CU2FX's tower and antenna make Tony's Restaurant (and Antonio) easy to find while driving through the village of Furnas. ("You can get anything you want—including DX—at Antonio's restaurant!" . . . with apologies to Arlo Guthrie.)

Cushcraft model. His wife Marie is CU2YA, and they share the station and the antenna.

A Promising Future

Frankly, driving around Sao Miguel Island I could see quite a few HF and VHF antennas. The economy of the islands is good and getting better. Many people interested in CB radio have upgraded to ham licenses in the past decade, and the general level of technical know-how is increasing. A large percentage of the 350 CU2 licensees are active on the air.

The greatest potential for future amateur radio expansion, in my opinion, is on islands such as the Azores. Better education and economy, and the feeling of being physically far away from the main stream of human development, will stir more interest in getting on the air and bridging the gap using simple means. Let's encourage this interest and we'll have more DX to work! ■

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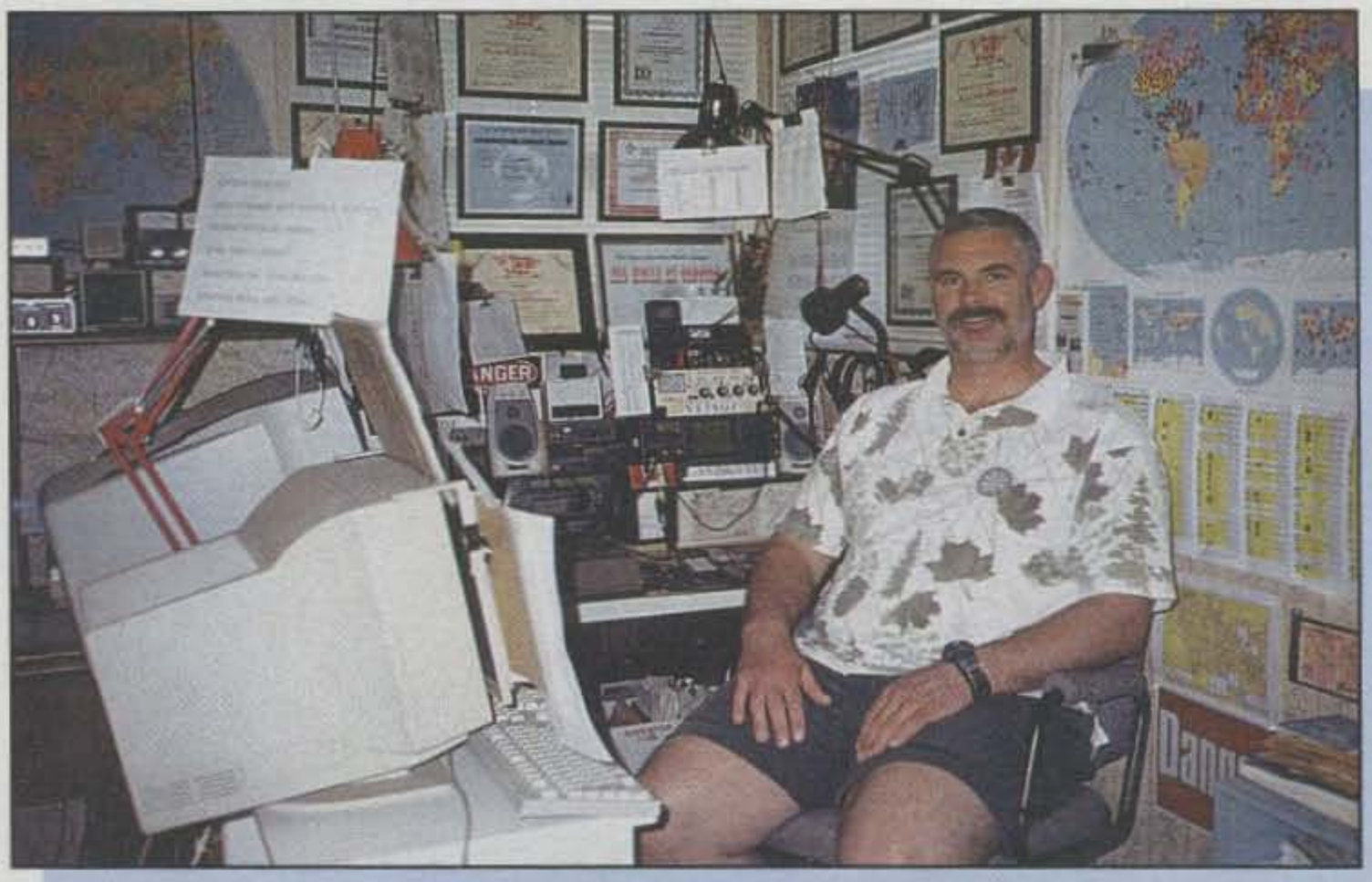
At first glance, the 160 meter band doesn't seem like a very friendly place for low-power, or QRP, operating, and certainly not for contesting. However, according to VE3MGY, who's won the QRP category of the CQ World-Wide 160 Meter Contest for three years straight and currently holds the world record, the results can be rewarding . . . if you're up for the challenge.

QRP Contesting on 160 Meters (or "You can't do that!")

BY BRIAN CAMPBELL,* VE3MGY, VY2MGY/VE3

I will never forget the day in 1998 when I entered a well-known radio outlet in Toronto, and by chance ended up talking to another contester about competing on 160 meters. He said that he had won his division in a major 160 contest a few years before, but only because he was running 5 KW (hmm, isn't that not only against the contest rules but illegal as well??). I let it go at that and then mentioned that I was starting to compete on 160 myself . . . in the QRP category. I can still hear him laughing as he said, "You can't do that! You'll never work anyone or win anything!" Well, on that note, and with three CQ WW 160M QRP first-place finishes, one world record, as well as other local, national, and continental "Topband" records under my belt, I would suggest to you that not only was he a cheater, he was also *wrong*. Also, for his information, I always run 4.5 watts, not 5 watts, so I would know for sure that I am not cheating, not even by mistake.



Brian Campbell, VE3MGY, holds the QRP world record in the CQ World-Wide 160 Meter Contest.

I hope to accomplish two things with this article: The first is to encourage more people to get on 160, either in a contest or just to DX, regardless of their power level. Second is to give an overview of what competing on 160 running QRP is really like, and personal insight on what to expect. David Thompson, K4JRB, CQ WW 160 Meter Contest Director, stated in the 2002 160 contest results (*CQ*, December 2002) that the number of QRP entries had increased dramatically once again. What he didn't say, and what I do not know, is why. Personally, I think that maybe people are starting to realize that with a little bit of theory and a lot of patience, competing or DXing on 160 with much less than 1500 watts is not only possible, but can even be fun and rewarding. Your three main considerations are power, propagation, and antennas.

Power Levels

Using QRP (5 watts or less) or even low power (100 watts or less) on 160 is, in my opinion, more of an art than a science. (By the way, many amateurs who hang out on 160 feel that 100 watts is QRP!) If you transmit 5 watts on 10 meters at the top of the solar cycle, it's possible to get 10 meter DXCC on a single weekend in a major contest. Now try the same thing at the other end of the spectrum, and I assure you that you will be in for a huge surprise.

First, of all the spectrum we currently inhabit, QRN, or natural noise, is second to none on 160, thanks to the inverse-square relationship that exists between RF frequency and atmospheric noise. Second, due to the long wavelength, you need pretty big antennas to transmit or

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e-mail: <vy2mgy@sympatico.ca>

receive with at least some sort of efficiency. This does seem to limit the number of people able to get out on Topband, but as we shall see below, even if you are "acreage challenged," that does not mean you can't work Topband and maybe even some DX.

Running QRP poses additional challenges. Openings to the Caribbean, for example, may last throughout the hours of darkness for a station running 1500 watts, or for several hours if you're running 100 watts. On QRP, however, I have found that you will be lucky to have an opening for two or three *minutes,* if at all. The same thing applies to circuits from Ontario into the midwestern United States and the U.S. west coast. In addition, even if the propagation is there to support the path, you need to have a high enough signal-to-noise ratio on both ends for a QSO to be made. Propagation is the one element of the three mentioned before (along with power and antennas) over which you have no control.

Propagation

Topband is an area of amateur radio spectrum where the vagaries of propagation make your contacts more often a case of what is possible rather than what is probable. Since there are some excellent resources for studying 160 meter propagation,[1] I will just touch on some of the basic points to remember for the budding Topband DXer or contester.

The main thing to know is there is still so much we *don't* know about propagation on this band, which has been rightly called one of the last great frontiers of amateur radio. Topband is still a place where discoveries can be made and experiments conducted. The following rules seem to apply only when they want to, as there are no hard and fast rules, other than the fact that you will be propagating only by ground wave during the hours of daylight. The following trends have been observed and discussed by many Topbanders, including the author, over the years:

Sunrise peaks, enhancing signals up to 30 dB, can occur anywhere from two hours to literally seconds before local sunrise on the eastern end of a path and last from a few seconds to a few minutes. The author has seen the band open and then close to the Pacific during the same CQ at sunrise! **Sunset peaks** are more general in that they typically occur about one hour after sunset on the western end of a path and can last longer than sunrise peaks. During these times, ionospheric ducting can occur in the *E,* and possibility *F,* layers

of the ionosphere and produce exotic and short-lived DX openings.

Midnight midpath peaks occur when it is midnight, midpath—that is, halfway between the transmitter and receiver—on east-to-west paths. There can also be **gray-line** propagation when both stations are in twilight, **dark-line** propagation when one station is in twilight while the other is in darkness, and **black-line** propagation when both terminals are in darkness.

Skewed propagation happens when a still unconfirmed phenomenon occurs that causes 160 meter signals to arrive from paths other than the usual short-path or long-path bearing to the transmitter. I experienced this first hand when Japan was uncopyable on my north-south Beverage antenna and audible only on my east-west Beverage—almost 90 degrees off the short-path bearing to Japan!

The last trend is my favorite, and I will call it "**RMP**," for "**Reverse Murphy Propagation**," because sometimes when you fire up the gear you will hear Europe or South America or even Africa booming into your headset and the contact cannot be explained using the above trends. Sometimes things just happen for no obvious reason.

You can get on Topband with a KW and a full-size 4-square array and work no one all night long on Monday, and then get on Tuesday night with 100 watts and a dipole at 40 feet and work into Europe with 579 signals. Results both evenings are due to propagation.

To sum up, then, propagation on 160 is easy . . . sort of. I can tell you when openings *should* occur, but no one can tell you when they *will* occur! Hence the mystery, magic, and challenge of this intriguing band.

Antennas

We said earlier that the three main considerations for success on 160 are power, propagation, and antennas. If you're operating QRP, then you're intentionally keeping your power low, and you have no control over propagation. Thus, the only remaining aspect of your station that can build up your communication range is the antenna system. This is why it is important to put up the best transmit and receive antennas you can for 160, both to maximize your outgoing signal and to minimize the QRN and local EMI (electromagnetic interference) that you may have to deal with on receive.

In this regard, I am very fortunate in that my QTH is about 1200 feet above Lake Ontario and slopes down in all directions within a few wavelengths of my antennas on 160 (unlike most other ham bands, it is quite common for 160 meter stations to use separate antennas for transmit and receive). This gives me a lower take-off angle relative to the horizon than I would have if I was, say, at the edge of Lake Ontario with the same antenna. Another advantage I have is that I live in a rural location, and as a result I have no EMI and my ambient background noise in the winter is usually S0-S1 at most. In the spring and summer I suffer with the same 40/9 lightning-induced QRN as everyone else. (On the topic of lightning, most thunderstorms in North America occur between April and October, with up to 36,000 [sometimes even more] lightning strikes per hour—that's 10 per second—as measured by lightning-detection equipment across the country. This is when operating on Topband is more of a challenge than a pleasure. In the winter months, though, I regularly see zero strikes registered across North America. Then all you have to worry about is the tropical and trans-equatorial induced QRN.)

The mainstay Topband antenna at my station is an inverted-L with 55 feet vertical and 80 feet horizontal, sloping down at about a 20 degree angle. This is fed against 104 quarter-wave radials, giving me about 15,000 feet of counterpoise. (For one contest/DX season I reconfigured my inverted-L to a T-top vertical but had mixed results, so I changed it back to an inverted-L.) I also use a 160 meter horizontal loop, or sky wire, that is 25 feet above the ground and fed with 450 ohm ladder line; two full-size 80 meter quad loops, one running north-south and the other running east-west; and two non-terminated 540 foot Beverages, again, one running north-south and the other running east-west.

With all of these choices, what is the best antenna to use for transmitting on Topband? For receiving? Is one antenna better for DXing and another for contesting? Over the last six years I have found that for DX work a vertically polarized antenna with the horizontal polarization phased out, such as a T-top vertical, will outperform a high-angle horizontally polarized signal, such as produced by a low dipole or loop, 85–90% of the time. The other 10% is owned by the sunrise and sunset enhancements made by the solar-induced terminator crossing over your site.

In order to take advantage of these openings, a take-off angle of close to 90 degrees is usually required for your RF

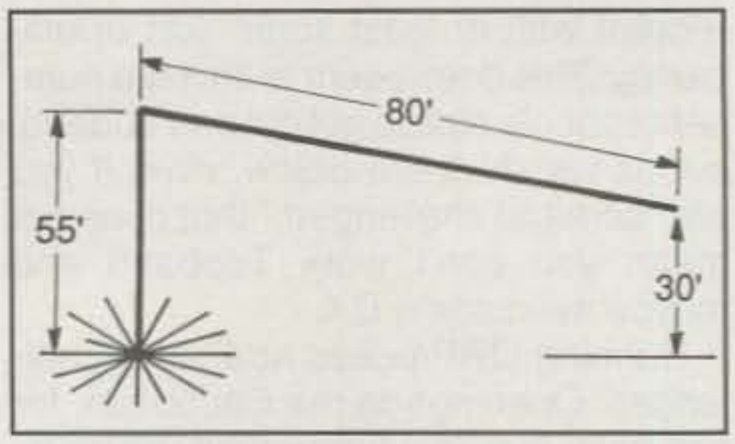

Fig1– The basic 160 meter inverted-L antenna at VE3MGY. It goes up 55 feet and out 80 feet, with lots of radials at the base. (See text for details.)

to enter ducts that sometimes form (see propagation section). I have heard and worked Australia with my 160 meter loop, and have been unable to copy the station with my inverted-L, quads, or Beverages; this was most likely ducting propagation. Two mornings later I had another opening to the same ham in Australia, but this time I could work him only on the inverted-L; this was most likely sunrise enhancement propagation only.

Antenna needs for contesting may be different than for DXing, depending on the contest. In most domestic 160 contests you want to work anyone and everyone you can, so NVIS (Near Vertical Incident Skywave) communications may be the way to go. Out to about 750 miles I have found that an antenna with a high take-off angle relative to the horizon will usually, but not always, outperform the inverted-L vertical. In one contest last season, I found that close to 30% of the stations I worked out to 750 miles never heard me on the inverted-L and responded only when I called on the horizontal loop. I guess the lesson here is that one should never profile a certain antenna for a certain job, since propagation polarization, especially on Topband, is an ever-changing phenomenon.

If other antennas regularly outperform my inverted-L, why do I say it's my mainstay antenna for 160? I tend to use the inverted-L to fill in the gaps, so to speak. Also, if you can or want to erect only one antenna for Topband, the inverted-L is the best compromise. It exhibits characteristics of both vertical and horizontal polarization so that you can get the best of both worlds with one antenna. You don't need an ocean of radials either. When I first started on Topband, I was working DX and competing with only 30 radials, and they weren't all a quarter-wavelength long, either. Just put down as many as you can fit. Remember, twenty 40 foot radi-

The *Titanic* Connection

I am a big *Titanic* buff, especially the wireless end of it, and my fascination with the famous ship led to both my callsign and my interest in 160 meters. My call is VE3MGY—the callsign of the *Titanic* was MGY—and I started out experimenting on Topband because it was the ham band closest to the frequency used by the *Titanic,* around 300 kHz. I started out experimenting on 160 during contests in the 1997–98 season and found that I also started winning! I had caught both the contest and Topband bug at the same time! This was shortly after the blockbuster movie "Titanic" was released. Anyway, that's why the suffixes of both my calls are MGY, and there is one station that I work every year in the CQ WW 160 who always says "hi" to the "Titanic." I guess he is also a *Titanic* fan. . . . Anyway, that's how I caught both bugs.

— VE3MGY

als will give you a much better signal than six 70 foot radials, because you want to cover as much ground under the antenna as possible to minimize ground return losses.

Using antenna analysis software such as EZNEC, I have found that my inverted-L antenna has a main lobe at approximately 30 degrees (excellent for DX) as well as significant RF leaving at higher angles for close-in work, such as ragchewing or contesting. That is not to say that a low loop or dipole would not be as effective, given certain conditions. (In this context "low" refers to any antenna erected at a height of less than one-half wavelength, which, on Topband, is equal to approximately 270 feet.) For example, in a contest I will start calling a station using my inverted-L, and if that doesn't work, I try the horizontal loop and then finally the quad loop. Usually one antenna will work, but five minutes later that antenna will not work and another one will. Such is the unpredictability of Topband.

In the early 1990s my first antenna was 300 feet of wire wrapped around a large oak tree in the back yard in the configuration you would use to decorate a Christmas tree (I *don't* recommend using this type of antenna!), and it had no radials. I fed the antenna with 100 feet of RG-58/U. I have absolutely no idea what the RF lobes looked like on any frequency. It shouldn't have even loaded for Topband, but it did, so I got on anyway. Over the winter I worked eight provinces and 35 states on 160, running 100 watts and living in downtown Toronto.

Contesting

I have never been able to find any documentation on competing strictly with QRP on 160 (and I've looked for years), so the following are my observations and opinions from a number of years of doing this. Even if you disagree with my conclusions, you will at least have the one thing I didn't have and really wanted when I started—the knowledge of what it is going to be like, and what to expect, before you get started with QRP contesting on Topband.

I feel that it takes a different kind of contester to sit in front of the gear for 30 hours over the weekend fighting QRN, knowing that he may only work a few dozen stations and will spend literally hours calling CQ with no response. It can be daunting when you see high-power stations with more than a thousand QSOs in their logs and all you can do is put maybe 100 in yours. Likewise, you can spend hours calling the same stations over and over, waiting for that one 30 second opening when you will have propagation, or a momentary lack of QRN, and hopefully not have someone else calling at the same time. Let's be honest, too; when you only work 80 stations in 30 hours, and miss another 40 or 50 due to the inability to complete the contact, your ego, if fragile, may take a beating. It can be frustrating at best for even for the most experienced contester.

Another thing I learned is that you have to set reasonable goals for yourself. Again, not knowing what to expect or how to deal with band conditions as they appeared, my early expectations and goals were through the roof. Even now, when I can set rational goals and can usually work around problems as they occur, I will never know beforehand when an opening will occur, or when conditions will rapidly deteriorate. As a result, I never go a complete weekend without revising my goals at least once to stay motivated and competitive.

If you do decide to try contesting on 160, don't expect the same contact rates as you would on other bands. In fact, if you're just getting started in single-band contesting, you might want to get some experience on other bands first, and you might want to start out running more power to keep from getting discouraged. I have worked just under 300 stations over the course of a weekend running QRP, but this is very rare, and average rates of about six QSOs per hour will make you competitive on this band on QRP.

It may sound like I don't want you to try 160, but it's really just the opposite. I want to encourage you to give it a try. However, I believe in being as honest and informative as possible so that there will be no surprises or disappointments when you arrive in the land ruled by QRN.

The Five Ps

I have made up what I call the Five Ps for Topband. They are: patience, perseverance, persistence, propagation, and prevalence. You need to have the *patience,* whether you're running QRP or QRO (high power), to continually check the band for DX openings. This could be every evening or morning throughout the winter months if you're DXing, or every 5 minutes throughout a weekend if you're contesting. When the openings aren't there and the QRN is 40/9, you will need the *perseverance* to hang in and wait for better conditions. (If you're competing seriously, then you have to hang in until sunrise.) If you have the *persistence* over the winter (or over the weekend if contesting), then you just may get the *propagation* that will let you *prevail* in the most challenging sport I know—QRP on 160 meters.

Don't sell yourself or your antenna short. If you can get out on 160, then all you need are the Five Ps and a few quiet evenings in the winter to work DX or compete in one of the contests. I hope to hear you on amateur radio's last wild frontier! ■

Notes

1. For more information on 160 meter propagation, we recommend:

Jacobs, Cohen & Rose, *The NEW Shortwave Propagation Handbook,* CQ Communications, <www.cq-amateur-radio.com>, and

Devoldere, John, *ON4UN's Low-Band DXing,* ARRL, <www.arrl.org>.

Plus, if you can find them...

Brown, Robert R., NM7M, *Long-Path Propagation, Revisited in the Year 2000,* self-published, out of print.

Brown, Robert R., NM7M, *The Big Gun's Guide to Low-Band Propagation,* self-published, out of print. (*Note:* Bob tells us he has eight copies of this book left. You may order directly from him for US$20, including shipping, in the U.S. and Canada; US$25 elsewhere. Contact Bob via e-mail at <bobnm7m@cnw.com>).

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An HF transceiver that fits in a shirt pocket? For $25? Small wonder that it comes from a company called Small Wonder Labs! N7RR reviews this tiny QRP radio.

CQ Reviews:

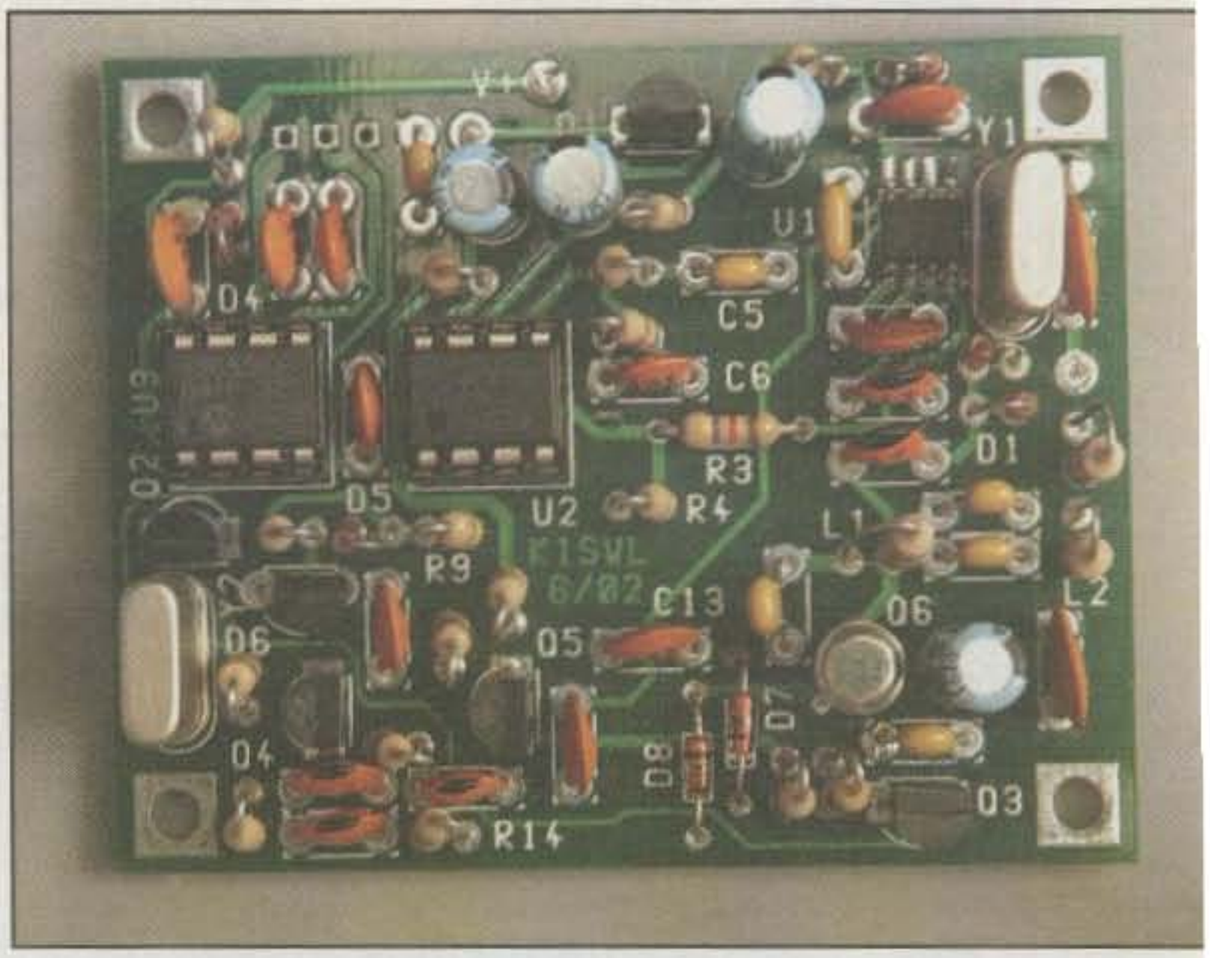
Small Wonder Labs Rock-Mite HF Transceiver

BY BRUCE PRIOR,* N7RR

Talk about fun! The tiny $25 Rock-Mite transceiver kit produced by Small Wonder Labs[1] has generated a line of fervent builders waiting for their shipment date. The Rock-Mite consists of a tiny board that includes a PIC microcontroller chip, a direct-conversion receiver with QSK (break-in keying), a mode B iambic keyer, and a CW transmitter with an output of 500 milliwatts, although a simple modification can boost the output closer to 1 watt.

So far, Small Wonder Labs has produced Rock-Mites for operating on 40 and 20 meters. The 40 meter Western Hemisphere Rock-Mite model uses two frequencies near 7040 kHz, and a European version operates on two frequencies near 7030 kHz.[2] (The traditional QRP calling frequencies for 40 meters are different for the Americas and elsewhere.) The 20 meter Rock-Mite transceives on either one of two frequencies near the 14.060 MHz QRP calling frequency approximately 800 Hz apart, starting with the lower frequency upon power-up. The direct-conversion receiver is broad-banded enough such that stations can be heard off-frequency.

The Rock-Mite kit includes a high-quality 2" × 2.5" double-sided PCB (printed circuit board) with all standard on-board parts, plus a length of RG-174 coaxial cable for connection to the antenna socket. This is a no-frills kit, however. The builder must provide an enclosure, hook-up wire, two mini-stereo sockets, a power socket, an antenna socket, and a momentary switch, plus an optional 1 MΩ or 100 kΩ pot, respectively, for use as either an AF or RF gain control.[3] If the pot includes a switch, it can be used to turn the power on and off. In addition, other parts are needed if the builder wishes to install various recommended modifications, such as provision for reduced supply voltage down to 9 volts, a BCI (broadcast interference) filter for operation near an AM broadcast station, and input voltage polarity protection. See the Rock-Mite Shopping List for more details.



PC Board for the Small Wonder Labs Rock-Mite miniature QRP transceiver.

Assembly

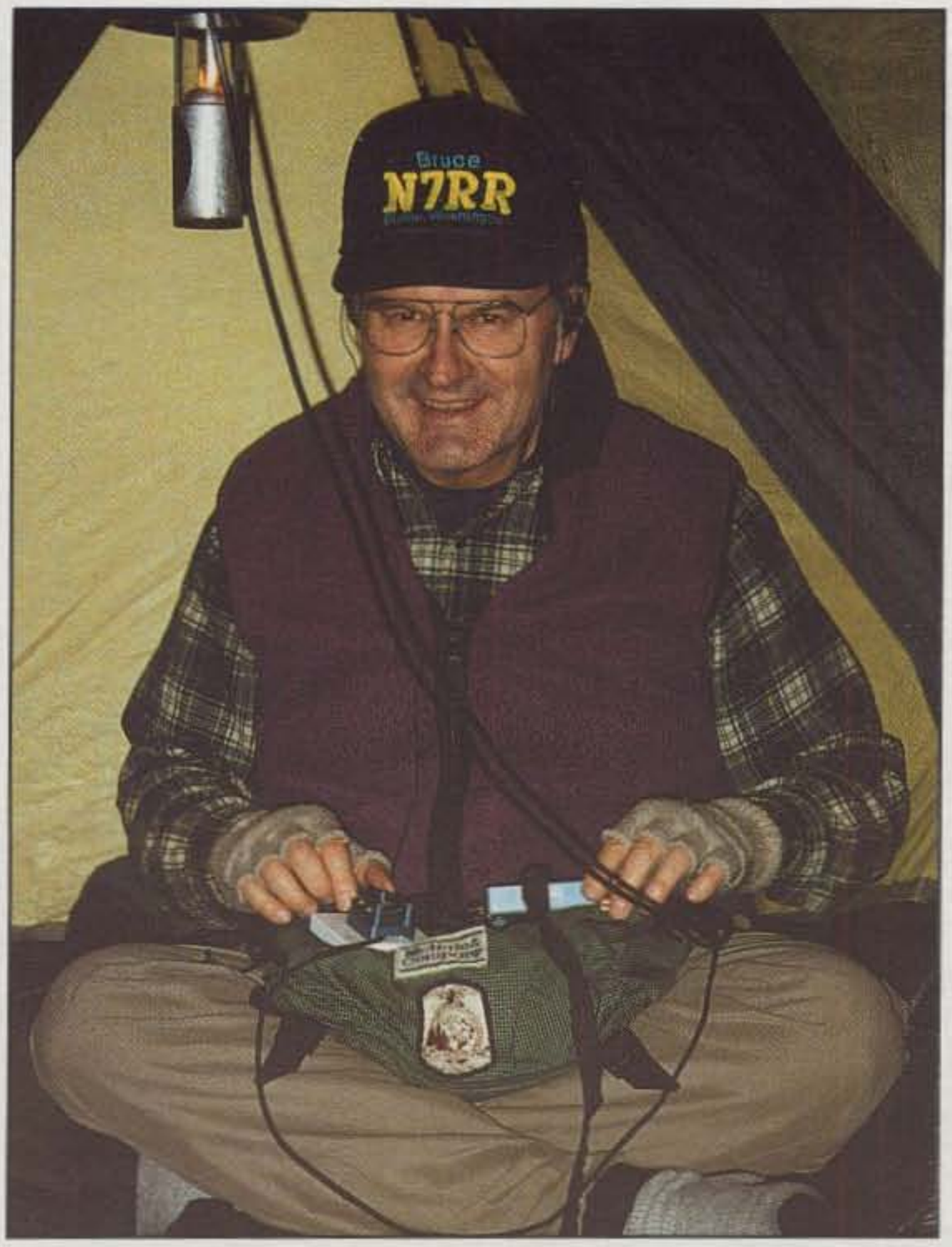
The process of assembling and soldering the circuit board is quite simple—truly a one-evening project. That's only part of the story, however. Installing the board into an enclosure is the challenging part. Many builders have been most creative when constructing and utilizing Rock-Mite enclosures. Take a look at the Rock-Mite resource website created by Rod Cerkoney, NØRC.[4]

The typical method is to use a drug-store mint box for an enclosure. However, only advanced builders should attempt to use this small container. Beginners would be well-advised to choose a larger casing. American Morse Equipment manufactures an elegant, custom-fit, anodized aircraft-grade aluminum "MityBox" Rock-Mite enclosure with pre-drilled holes and threading.[5] The same company produces a matching KE6RIE Straight Key and an iambic Porta-Paddle. The Porta-Paddle can be mounted on an optional heavy base or directly onto the MityBox. One famous QRP-Elmer, Chuck Adams, K7QO, has produced a detailed on-line builder's guide which is highly recommended for the novice builder.[6] All builders should download the guide, entitled "Supplement to Rock-Mite Kit Instructions."[7]

One company, Jackson Harbor Press,[8] has produced a substitute full-featured keyer chip specifically for the Rock-Mite, called the RMK. Designed for either potentiometer or paddle speed control for a range between 4 and over 40 wpm, the RMK includes a choice of mode A or B iambic keying, two message memories, two beacon modes, reverse paddles, and a tune mode.

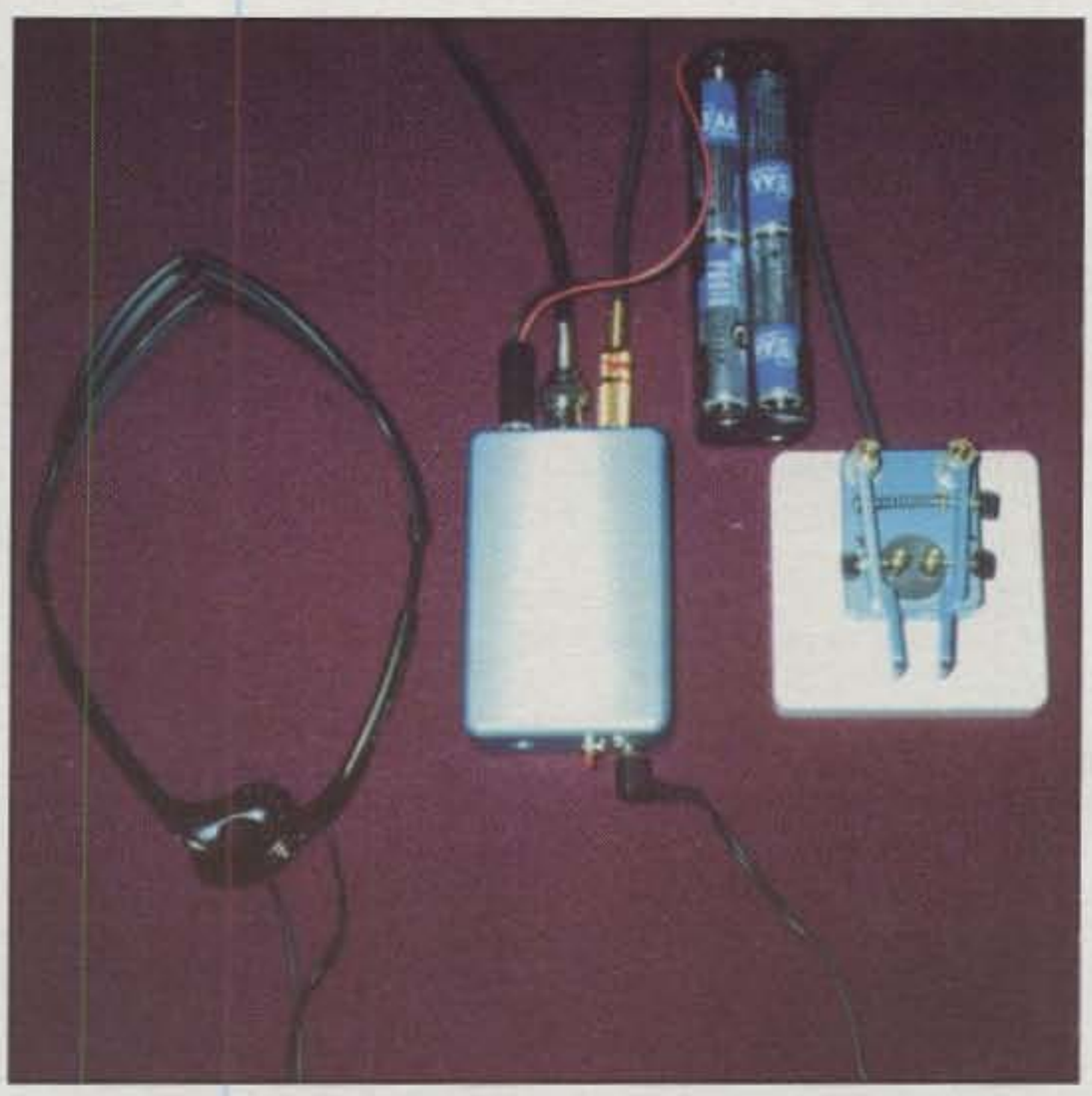
Another company, HamGadgets.com,[9] also offers a substitute keyer chip called the PicoKeyer Rock-Mite, or PK-RM. It has features similar to the RMK, except the bug mode, but the Ham Gadgets chip (with the addition of a special prosign) also allows the keyer memories to pause for operator input,

*853 Alder St., Blaine, WA 98230-8030
e-mail: <n7rr@hotmail.com>



Author N7RR operating the Rock-Mite in the MityBox with the Porta-Paddle.

The MityBox and the Porta-Paddle from American Morse make fine companions for the Rock-Mite.



such as for a signal report, before it resumes its pre-programmed message. Also, the PK-RM includes a variable-pitch audio sidetone and adjustable Morse weight and a factory re-set mode.

The most important features which both substitute products offer are their non-volatile memory keyers, which can be used in beacon mode. That way, Rock-Mite owners can activate a CQ sequence while doing other things around the shack, such as checking e-mail and cleaning up. The more Rock-Mites out there squawking, the better chance that others will be alerted to opening propagation paths.

Operation

Operating the standard Rock-Mite couldn't be simpler. Press the momentary switch briefly to switch between the two operating frequencies. Press and hold the same switch to set up the keyer speed control, then press the dit paddle to speed up or the dah paddle to slow down. For keying with a straight key or external keyer, using a monaural plug in the stereo socket automatically disables the internal iambic keyer upon power-up. Oh, yes . . . the Rock-Mite is a real talking machine. I've had lengthy cross-country chats on 20 meters using a simple dipole. Now I'm planning to

cross the Pacific pond with less than one watt and a dipole.

I live quite close to an AM broadcasting station, so I installed the recommended anti-BCI modification, adding a 1 kΩ resistor in parallel with D1 and D2. The modification effectively attenuates the BCI and makes the Rock-Mite a joy to operate.

You probably already have the equipment to operate the Rock-Mite without headphones: simply plug your computer speaker-amplifier pair into the Rock-Mite audio output socket and you're rockin'!

For more information or to order, contact Small Wonder Labs, 32 Mountain Road Colchester, CT 06415; web: <http://www.smallwonderlabs.com>.

Notes

1. <http://www.smallwonderlabs.com>
2. Available at <http://www.werdau.net/qrpproject/rockmite.htm>
3. QRP project offers an optional external parts kit.
4. <http://www.qsl.net/n0rc/rm/>
5. <http://www.americanmorse.com>
6. http://www.qsl.net/k7qo/rocky1.html>
7. <http://www.smallwonderlabs.com/RMhelps.pdf>
8. <http://jacksonharbor.home.att.net>
9. <http://www.hamgadgets.com>

Rock-Mite Shopping List

Small Wonder Labs: <http://www.smallwonderlabs.com>
- Rock-Mite 40 m or 20 m kit including s&h to USA and Canada, $25.00
- Rock-Mite 40 m or 20 m kit including s&h to elsewhere, $28.00

QRP Projects: <http://www.werdau.net/qrpproject/rockmite.htm>
- European 40 m Rock-Mite kit, 45.00 Euros
- External parts kit including two stereo jacks, power plug and jack, BNC jack, polarity protection Shottky diode and mint box, 12.50 Euros

American Morse Equipment: <http://www.americanmorse.com>
- MityBox including s&h, $23.00
- KE6RIE Straight Key including s&h, $57.95
- Porta-Paddle including s&h, $63.95
- Porta-Paddle Base including s&h, $22.95

Mouser Electronics: <http://www.mouser.com>
- panel-mounted 3.5 mm 3-conductor (stereo) jacks #161-3402, 2 @ $0.86
- panel-mounted BNC antenna jack #161-9323, $1.35
- panel-mounted power jack #163-4304, $1.61
- panel-mounted momentary push-button switch #10PA019, $1.03
- Shottky diode for polarity protection #511-1N5818, $0.20
- panel-mounted 100 kΩ potentiometer with SPDT switch for RF gain and power switch #313-1100-100K, $2.05
- panel-mounted 1 MΩ potentiometer with SPDT switch for AF gain and power switch #313-1100-1M, $2.05
- Mouser ground s&h, $6.00

Jackson Harbor Press: <http://home.att.net/~jacksonharbor/rmk.htm>
- The RMK substitute full-featured keyer chip kit to USA including shipping, $6.00
- The RMK outside of the USA including shipping, $9.00

Ham Gadgets: <http://www.hamgadgets.com>
- PicoKeyer Rock-Mite (PK-RM) including worldwide s&h, $8.55

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SS-12	10	12	1⅛ x 6 x 9	3.4
SS-18	15	18	1⅛ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3¾ x 7 x 9⅝	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅝	4.2
SS-30M*	25	30	3¾ x 7 x 9⅝	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
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GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
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UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

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SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
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CQ World-Wide DX Contest All-Time Records BY FREDERICK CAPOSSELA, K6SSS

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Phone Single Operator/Single Band WORLD RECORD HOLDERS

1.8	IG9/IV3TAN('96)	441,252	1,203	24 102
3.5	IG9T('95) (Opr. IV3TAN)	816,959	1,938	33 110
7.0	IG9GSF('97) (Opr. IT9GSF)	1,249,236	2517	35 137
14	PYØFM('94) (Opr. PY5CC)	3,202,242	5,109	38 175
21	ZD8Z('94) (Opr. N6TJ)	3,481,925	5,535	36 179
28	HC8A('01) (Opr. N6KT)	3,916,600	6,957	39 161

Single Operator/All Band

AF	EA8BH('99) (Opr. N5TJ)	25,646,796	10,253	176 692
AS	JY9NX('01) (Opr. JM1CAX)	10, 785,336	6,290	143 475
EU	GIØKOW('99)	10,457,664	6,375	155 589
NA	KP3Z('02) (Opr. N5TJ)	15,655,517	8,656	165 592
O	KH7R('00) (Opr. CT1BOH)	11,894,730	7,473	170 392
SA	HC8A('99) (Opr. N6KT)	18,607,050	8,638	175 595
QRP	P40W('00) (Opr. W2GD)	5,097,780	3,599	127 381
LowPwr.	D44TD('02) (Opr. IV3TAN)	11,199,793	6,097	141 508
Asst.	P4ØP('02) (Opr. W5AJ)	12,975,732	6,639	154 528

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	150	13	54
EA8BH	3.5	547	18	80
(Opr. N5TJ)	7.0	682	27	97
(1999)	14.0	2,655	39	158
25,646,796	21.0	2,071	39	148
	28.0	4,148	40	155
	Total	10,253	176	692

Multi-Operator/Single Xmtr.

AF	D44TC('01)	22,978,944	9,638	178 694
AS	P3A('02)	19,647,550	8,891	160 675
EU	IQ4A('90)	17,255,700	7,253	183 717
NA	VP2EC('92)	16,287,152	7,434	183 685
O	KHØAA('02)	12,599,064	6,872	158 490
SA	PJ1B('93)	22,596,570	9,386	164 646

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	148	14	57
D44TC	3.5	194	21	80
(2001)	7.0	290	29	97
22,978,944	14.0	2,380	38	145
	21.0	2,413	37	151
	28.0	4,213	39	164
	Total	9,638	178	694

Multi-Operator/Two Xmtr. (New Category 2002)

AF	ZD8Z('02)	24,897,950	11,284	166 604
AS	RK9CWW ('02)	8,235,462	4,437	144 573
EU	RW2F('02)	14,163,303	8,072	189 742
NA	V26B('02)	18,756,933	11,124	156 585
O	AH2R('02)	12,558,232	6,862	162 502
SA	PJ2T('02)	28,415,835	12,916	161 628

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	37	7	21
PJ2T	3.5	511	18	64
(2002)	7.0	1,624	30	109
28,415,835	14.0	2,762	36	142
	21.0	4,349	38	153
	28.0	3,633	32	139
	Total	12,916	161	628

Multi-Operator/Multi-Xmtr.

AF	CN8WW('00)	78,170,508	25,711	199 854
AS	A61AJ('02)	33,377,700	13,376	186 784
EU	LX7A('89)	26,578,978	14,947	175 751
NA	VP2KC('79)	37,770,012	17,767	175 677
O	KHØAM('90)	35,730,600	16,309	179 565
SA	PJ4B('99)	59,127,810	20,618	188 834

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	923	17	77
CN8WW	3.5	1,818	25	106
(2000)	7.0	3,545	37	138
78,170,508	14.0	6,737	40	177
	21.0	5,754	40	175
	28.0	6,934	40	181
	Total	25,711	199	854

CW Single Operator/Single Band WORLD RECORD HOLDERS

1.8	C4A('99) (Opr. 9A3A)	261,489	969	21 80
3.5	EA8EA('96) (Opr. OH2KI)	1,175,550	2,672	36 114
7.0	YV5A('95) (Opr. OHØXX)	1,364,465	3,095	35 122
14	P4ØV('91) (Opr. N7NG)	1,883,700	3,521	38 142
21	ZD8Z('97) (Opr. N6TJ)	2,357,967	4,589	39 140
28	ZX5J('99) (Opr. N6TJ)	2,131,942	3,962	39 152

Single Operator/All Band

AF	EA8BH('00) (Opr. N5TJ)	18,010,765	7,555	183 634
AS	A61AJ('01) (Opr. S53R)	10,720,332	5,957	161 523
EU	LY6M('99) (Opr. LY1DS)	7,140,784	4,634	163 558
NA	8P9Z('01) (Opr. K4BAI)	10,006,568	6,814	136 436
O	9M6NA('99) (Opr. JE1JKL)	7,402,265	4,211	169 442
SA	HC8N('99) (Opr. N5KO)	14,626,579	7,001	185 546
QRP	P4ØW('99) (Opr. W2GD)	5,024,800	3,277	137 413
Low Pwr.	P4ØW('01) (Opr. W2GD)	10,198,792	5,723	151 475
Asst.	CT9M('02) (Opr. DL2CC)	11,225,452	5,181	159 605

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	197	17	60
EA8BH	3.5	541	20	82
(Opr. N5TJ)	7.0	1,091	33	95
(2000)	14.0	1,601	39	129
18,010,765	21.0	1,746	39	134
	28.0	2,375	35	133
	Total	7,555	183	634

Multi-Operator/Single Xmtr.

AF	TS7N('00)	13,140,050	6,348	156 614
AS	P3A('02)	19,470,528	8,432	176 702
EU	RU1A('00)	12,753,600	5,670	203 757
NA	8P9Z('99)	18,711,252	8,245	192 669
O	AH2R('01)	9,283,872	4961	170 522
SA	HC8N('95)	14,302,820	7,252	162 503

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	264	13	61
P3A	3.5	1,121	27	98
(1999)	7.0	1,535	35	121
19,243,476	14.0	1,825	39	136
	21.0	1,782	39	136
	28.0	1,761	38	139
	Total	8,288	191	691

Multi-Operator/Two Xmtr. (New Category 2002)

AF	3V8BB('02)	22,702,797	10,549	171 622
AS	A61AJ('02)	24,384,292	10,505	194 704
EU	RU1A('02)	14,817,880	7,811	194 758
NA	K4JA('02)	14,084,994	5,748	182 721
O	AH2R('02)	11,311,266	6,390	171 482
SA	LT1F('02)	8,621,878	6,017	142 424

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	405	14	56
A61AJ	3.5	963	30	102
(2002)	7.0	2,546	36	129
24,384,292	14.0	1,679	38	140
	21.0	2,421	38	139
	28.0	2,491	38	138
	Total	10,505	194	704

Multi-Operator/Multi-Xmtr.

AF	CN8WW('99)	70,713,270	23,068	219 843
AS	A61AJ('99)	38,789,751	15,812	213 788
EU	OH2U('99)	22,244,067	10,956	211 786
NA	6Y2A('98)	39,279,140	17,609	192 740
O	KHØAM('92)	23,951,385	11,253	190 527
SA	PJ4B('99)	47,516,600	17,889	208 757

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	1,694	24	100
CN8WW	3.5	3,248	35	121
(1999)	7.0	4,358	40	141
70,713,270	14.0	4,837	40	159
	21.0	4,319	40	161
	28.0	4,612	40	161
	Total	23,068	219	843

CQ World-Wide DX Contest All-Time U.S.A. Records BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. contesters in the CQ World-Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	K1ZM('95)	55,420	215	15	70
3.5	K1ZM/2('96)	292,100	952	27	100
7.0	KC7EM('95)	409,446	1,083	34	95
14	K1OX('85) (Opr. KC1F)	1,131,328	2,176	36	140
21	KQ2M/1('99)	1,327,139	2,624	39	148
28	W4ZV('01)	1,464,255	2,654	40	155

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	21	8	15
K1AR	3.5	154	16	59
(1999)	7.0	231	29	84
7,898,499	14.0	1,145	38	142
	21.0	1,150	36	123
	28.0	1,393	33	128
	Total	4,094	160	551

QRP

KR2Q('00)	1,507,506	1,181	104	358

Low Power

K1ZM/2('00)	3,368,010	1,907	151	504

Assisted

KI1G('01)	8,053,315	3,768	168	617

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	32	12	30
K1AR	3.5	197	18	76
(1990)	7.0	154	26	95
11,193,606	14.0	1,370	39	167
	21.0	1,167	38	165
	28.0	1,517	37	170
	Total	4,437	170	703

Multi-Operator/Two Xmtr. (New Category 2002)

Station	Band	QSOs	Zones	Countries
	1.8	18	7	11
N3RS	3.5	316	21	89
(2002)	7.0	290	31	104
11,461,072	14.0	1,042	40	164
	21.0	1,954	39	170
	28.0	1,517	34	158
	Total	5,137	172	696

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	197	16	36
KC1XX	3.5	699	24	102
(1999)	7.0	746	31	119
25,963,386	14.0	2,711	40	185
	21.0	3,245	40	170
	28.0	2,596	36	170
	Total	10,194	187	782

CW

Single Operator/Single Band

1.8	K1ZM('95)	142,358	470	23	83
3.5	W1MK('00)	417,240	1,273	26	96
7.0	K1ZM('90)	839,520	1,783	34	125
14	K2WK('98)	1,007,781	1,955	39	144
21	K2SS/1('00)	974,440	2,035	36	134
28	W4ZV('00)	965,874	1,984	37	137

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	104	14	40
K5ZD/1	3.5	384	19	73
(2000)	7.0	971	29	103
8,756,568	14.0	988	33	105
	21.0	848	33	104
	28.0	1,189	33	106
	Total	4,484	161	531

QRP

K3OO('00)	1,731,450	1,299	114	371

Low Power

K1TO/4('02)	4,141,188	2,276	140	526

Assisted

K3WW('00)	8,465,815	4,091	166	589

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	49	13	46
K1AR	3.5	569	27	101
(1998)	7.0	1,384	35	136
12,063,114	14.0	991	38	151
	21.0	999	36	135
	28.0	1083	32	132
	Total	5,074	181	701

Multi-Operator/Two Xmtr. (New Category 2002)

Station	Band	QSOs	Zones	Countries
	1.8	79	18	56
K4JA	3.5	625	21	105
(2002)	7.0	1,480	36	133
14,084,994	14.0	911	38	146
	21.0	1,568	35	144
	28.0	1,085	34	137
	Total	5,748	182	721

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	291	23	63
KC1XX	3.5	1,040	34	116
(1999)	7.0	2,119	40	138
24,602,524	14.0	2,155	40	155
	21.0	2,028	38	150
	28.0	1,947	38	148
	Total	9,580	213	770

Club Record: Yankee Clipper Contest Club ('99) 702,296,971
Team Contesting: Phone – Neiger's Tigers Team #1 ('99) 66,546,582
CW – The Team ('98) 55,385,494

What You've Told Us...

No one can say *CQ* readers aren't well informed ... 92% of you said you were aware of the details regarding the new amateur allocation at 5 MHz, while only 7% said no and 2% weren't sure. Readers who responded to the survey were pretty evenly split over whether they plan to operate on 5 MHz within the next five years, with 32% saying yes, 39% saying no and 28% not sure. In addition, 50% of you say your current equipment can be upgraded to operate on 5 MHz, while 24% said you don't have upgradeable gear and 25% aren't sure.

It doesn't look as if 5 MHz is going to be a major factor in your future equipment and antenna purchases. Only 23% of you said operation on 5 MHz would be a factor in your next HF radio purchase. Likewise, only 21% said 5 MHz capability will be a factor in your next antenna purchase.

Finally, the largest number of you (38%) agreed with the statement about the FCC's 5 MHz decision that "It's too bad we couldn't get a regular band here, but we'll take what we can get." Another 17% felt the restrictions on the band would discourage most people from using it, and 10% said the restrictions would discourage *them* from using it. In addition, 16% said they had no interest in the band so it didn't matter to them, 14% said they had no problem with the band's structure, and only 9% felt the restrictions were an insult to hams.

This month's free subscription winner is Paul Gates, KD3JF, of Glen Burnie, Maryland. We'll be back in January with September's survey results after we take a couple of months off to catch some rays in the South Shetland Islands.

Reader Survey
October 2003

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

With proposals before the FCC to eliminate Morse Code testing, we'd like to get an idea of your activity on CW, both before and after the code test speed for General and Extra was changed three years ago.

Please indicate... — **Circle Response Card #**

1. ... the class of amateur license you presently hold (outside U.S., please select closest one):
   - Amateur Extra 1
   - Advanced 2
   - General 3
   - Tech-with-Code 4
   - Technician 5
   - Novice 6
   - Not currently licensed 7

2. ... whether you held a ham license before April 15, 2000:
   - Yes 8
   - No 9

3. ... your current level of CW (code) operation on the air:
   - Exclusive (100%) 10
   - Between 75% and 99% 11
   - Between 50% and 75% 12
   - Between 25% and 50% 13
   - Between 1% and 25% 14
   - Do not operate CW at all (0%) 15

4. ... your level of CW (code) operation on the air *before April 15, 2000:*
   - Exclusive (100%) 16
   - Between 75% and 99% 17
   - Between 50% and 75% 18
   - Between 25% and 50% 19
   - Between 1% and 25% 20
   - Did not operate CW at all (0%) 21
   - Was not licensed before April 15, 2000 22

5. ... whether you have taken a code test since April 15, 2000:
   - Yes 23
   - No, already hold license with code credit 24
   - No, have never taken a code test 25

6. ... your reasons for operating code (if you do) [Select all that apply]/ **Please double-circle your one primary reason:**
   - Enjoyment as an operating mode 26
   - For working HF DX stations unavailable on phone 27
   - For QRP operating 28
   - For contesting 29
   - For weak-signal VHF work (e.g., Aurora, EME) 30
   - For handling message traffic 31
   - For other reasons 32
   - Do not work CW at all 33

7. ... You would have learned Morse code if it had not been a license requirement:
   - Yes 34
   - No 35
   - Do not know Morse code 36

Thank you for your responses. We'll be back with more questions in January.

Extremely Xcellent

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DM-330 MVT
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This "breakthrough" switching power supply packs a lot of features into a compact, lightweight design that features 5 ~ 15 VDC variable output and delivers up to 30 amps continuous, 32 amps peak. Unlike some other "switchers" it's electrically quiet. But if you should find noise, the patented Noise Offset Circuit™ lets you move any noise you might find to another frequency. Other features include a large illuminated Volt/Amp meter, rear panel binding posts (32 A), front panel cigar outlet (10 A), two sets of snap-in terminals (5 A each), front panel voltage adjust, customer-defined output "memory", ripple less than 15mV p-p and triple circuit protection for short circuit, over temperature, and current limiting.

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EDC-36
Cigar Plug Cable with filter

EMS-47
Mic for Handhelds

EMS-14
Desk Mic

ESC-36
Soft Case for DJ-196 series

EDH-29
Drycell for DJ-V5TH

EDC-91
Rapid Charger for DJ-V5TH

EJ-47U
Digital Board for DR-620

EJ-50U
TNC Board for DR-620

For these and many more Xciting Xtras from Alinco, call or stop by your local Alinco dealer or visit Alinco on the web!

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Whoever first called radio "wireless" never saw the back side of many modern ham shacks (or, we'll guess, many early ham shacks). The folks at New Communications Solutions have a way to help you organize, if not eliminate, some of those wires . . . and make your operating easier at the same time.

CQ Reviews:

New Communications Solutions NCS-3249 Multi-Switcher™

BY DAN RICHARDSON,* K6MHE

Radio amateurs have a cornucopia of operating modes available. In recent years, computers using a wide variety of communication software packages have opened up a new array of enjoyable pursuits. However, those who operate multiple modes using multiple radios know the task of changing audio connections and adjusting drive levels for the various devices (radios, microphones, computer sound cards, HF modems, TNCs, and so forth) each time you change your type of operation is a major pain. Thus, if you are getting tired of unplugging, plugging, and readjusting your equipment each time you wish to change your radio and/or mode of operation, the folks at New Communication Solutions (NCS) have a solution—the NCS-3240 Multi-Switcher™.

I operate SSB, CW, RTTY, and AMTOR and dabble in some of the newer digital modes. I wanted to be able to switch my transceiver's audio inputs among the station microphone, an HF modem, and my computer sound-card interface. Choices of radios and modes of operations can be different for everyone. In this review I will describe how the Multi-Switcher capabilities met my requirements.

Photo A– You'll find all controls needed for full operation located on the Multi-Switcher's front panel.

The NCS-3240

The NCS-3240 Multi-Switcher is a station accessory that lets you connect just about any audio source you wish to up to four different radios (at proper audio levels) just by pushing one or two buttons, and at the same time it connects the selected radio's speaker output (including dual channel) to your station's speaker(s). The Multi-Switcher will also switch your CW key (or keyer) and a remote PTT (press-to-talk) control, such as a foot switch, to the selected radio.

The NCS-3240 (photo A) comes housed in a gray metal cabinet measuring 3½"H X 8?"W X 7½"D overall. All controls needed for full operation are located on the front panel, which features two 8-pin microphone jacks, a headphone jack, four audio-select and four radio-select pushbutton switches, transmit level controls for each radio, and an on/off power switch. All switches have LED indicators. The second microphone jack on the front panel was included as a convenience for those who use a headset/microphone in addition to the regular station microphone (such as during a contest). All remaining connections are made via the rear panel (photo B) using 8-pin DIN and RCA phono jacks, along with a coaxial jack (a matching plug is provided) for connecting 12–15V DC power to the unit.

NCS expects the unit's greatest appeal will be to those hams who want to easily switch audio inputs between different radios. I use only one radio in my station for multi-mode operation, so most of my first-hand experience was with switching among audio sources, although I did connect a second radio to check out the rig-switching features.

Installation

Installing the Multi-Switcher is not difficult. However, accurate jumper settings and correctly wired cables are a necessity. Therefore, you need to read the instructions carefully.

*PO Box 2644, Fort Bragg, CA 95437

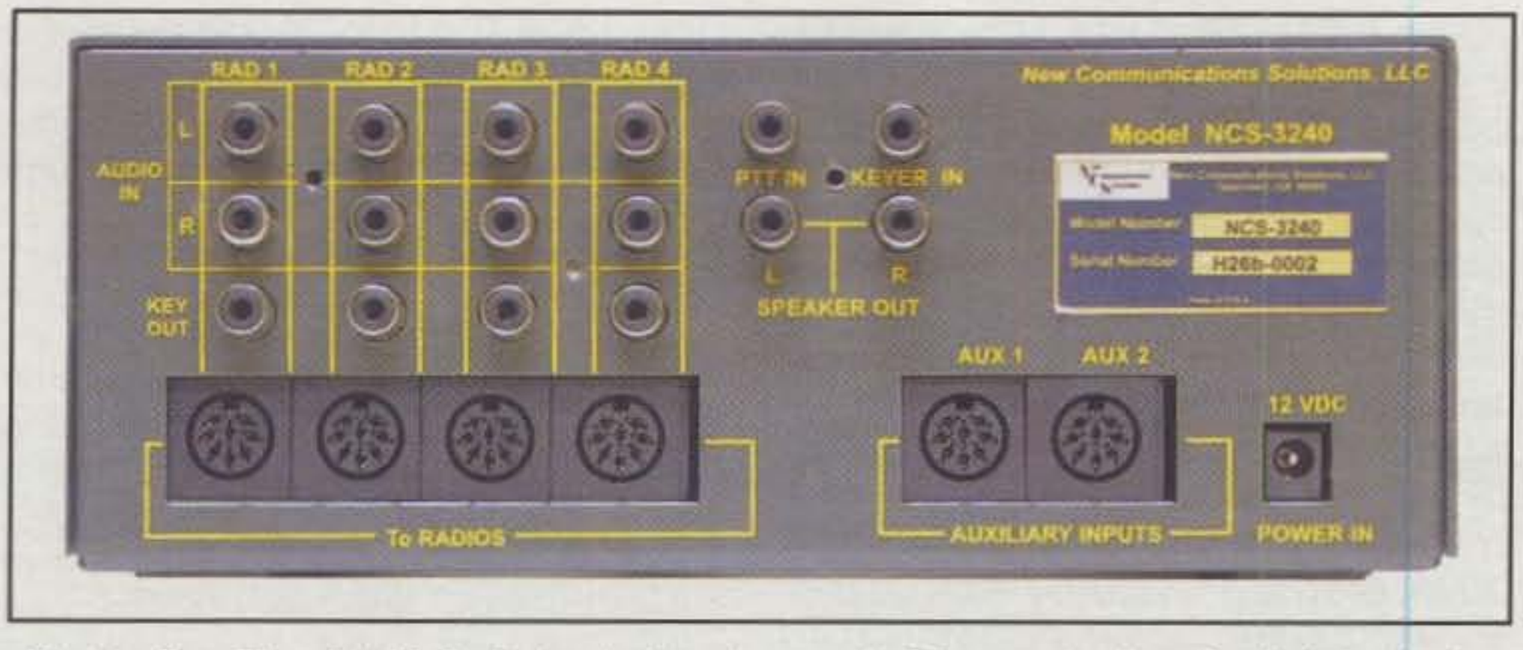

Photo B– The Multi-Switcher's back panel. The majority of all interfacing connections are made here.

The manual is well-written, and I found all instructions to be clear and easy to follow.

Installing the cabling is the area to which you will devote the greatest part of your installation time. Here you have some choices. You may make your own cable assemblies from scratch, obtain cabling kits, or purchase ready-made cable assemblies. NCS offers an array of cable kits and complete assemblies for use with the NCS-3240. The list is too extensive to be presented here, but you can investigate the various cable kits and assemblies on NCS's web page. I used NCS ready-made assemblies for my radio interfacing cables, an NCS cable kit for the sound-card interface, and a homebrewed cable assembly for my HF modem.

After you have the cabling in order, the next step is to install the internal jumpers for the microphone and auxiliary audio inputs. Jumpers are used for setting microphone pin functions, selecting impedance levels, and connecting a voltage supply when using electret microphone elements. The instructions for installing the jumpers are quite clear and take only a few minutes to complete. In addition to jumper placement diagrams, the manual provides microphone pin-out arrangements for many popular radios. I normally use a single station microphone. However, for testing purposes I also installed a second electret-type microphone that requires a voltage supply.

The next step is to adjust the input levels for the microphones and auxiliary inputs. You do this by adjusting internal gain controls while observing an LED level indicator. Again, this is spelled out quite clearly in the manual and is quite easy to do. After you've set the levels, all that is left to do is to replace the Multi-Switcher's top cover, connect your radio(s), and adjust the front-panel output-level controls for proper drive for each radio.

Once I had my cabling in place, it took me about ten to fifteen minutes to make all the adjustments (including replacing the cover). Overall, the installation went quite smoothly, and thanks to the clear instructions in the manual, I experienced no problems whatsoever. If you

use the pre-fabricated NCS cable assemblies, the installation will go very quickly. If you choose to make your own cabling, it may take up to couple of hours or more.

Slightly Different Twist

I was able to tune my installation more to my liking by using some of the Multi-Switcher's features in a slightly different manner. For instance, the NCS-3240 switches dual (stereo) speaker lines. This feature is normally used with a sub-receiver of a VHF/UHF dual-band audio, which I don't use. I do, however, have a fixed audio-level "line out" available on my transceiver that I use for connecting to my HF modem and sound-card interface. This allows me to vary my speaker volume without affecting the audio level going to those devices. By connecting my transceiver's fixed audio output to one line and the speaker output to the other, I was able to easily switch both audio channels to their respective devices. Since the NCS-3240 also has both speaker-line outputs available at the auxiliary audio input DIN jacks, I was able to route both the in and out audio paths for my HF modem and sound-card interface using just a single cable for each. This helped keep things a bit less cluttered.

Operation

When all connections are made and levels set, operating the NCS-3240 is a breeze. Just turn on the power, push a button to select a microphone or other audio source, push another button to select the radio you wish to use, and you're off and running. You change radios or your audio source simply by pressing the appropriate button. Pressing a selected radio or source button a second time will deselect (disconnect) it.

The unit operated flawlessly the moment I applied power. I found it a real pleasure to be able to quickly and effortlessly swap between my different audio sources simply by pushing a button. On-the-air reports and observations of the transmitted signals on a service monitor detected no hum, noise, or distortion.

Wish List

The NCS-3240 does not provide any visible method of monitoring audio levels in normal operation. It would be nice if the internal LED, used for setting input levels, was visible on the front panel. You could then monitor your audio levels while transmitting, as you can do with the ALC indicators found on many transceivers and amplifiers. Glancing at the indicator would reveal whether levels were correct and could be a good troubleshooting tool.

Also, while the NCS-3240 manual is quite complete and may be downloaded from the New Communications Solutions website, it does not include a schematic of the unit. However, NCS will provide a complete schematic of the unit to any customer who requests one.

Conclusion

There's no doubt about it. The NCS-3240 definitely takes the hassle out of what is otherwise a bothersome task. Simply pushing a button or two sure beats the plug swapping and level adjusting every time you change your audio source and/or radio mixture. If you are tired of the plug-and-adjust game when swapping audio inputs and/or radios, consider the NCS-3240 Multi-Switcher. It will do the job.

For more information, or to order, contact New Communications Solutions, 5364 Valley Mist Trace, Suite 101, Norcross, GA 30092 (phone 888-883-5788; web: <http://www.ncsradio.com>. ■

The author's 1954 Plymouth Belvedere (which also appears on his QSL card; see next photo). Ham radio has linked him up with fellow old-car buffs and he even has a club callsign for his chapter of a vintage Chrysler collectors' club.

If you're like most hams, amateur radio is one of several interests that you have, perhaps unrelated interests ... or so you may think. VE7ACM tells us how amateur radio has helped him make "connections" to several seemingly unrelated interests.

Connections

BY D. GARRY CAMERON,* VE7ACM

One of the best things about amateur radio is that you never know when you are going to make a special contact that will have a major effect on your life. We've all read about how an interest in amateur radio led to a career in electronics or engineering. I can make no such claim, but I can say that amateur radio has taken me in new directions on more than one occasion.

For my wife Janis (VE7AAP, first licensed in 1977) and myself (first licensed in 1978), amateur radio has been a part of our entire married life. In fact, my wedding gift to her was a 2 meter mobile rig! (My mother-in-law was *not* impressed!) We are always willing to try new things, to learn and grow together, and amateur radio has opened doors for us.

Trains, Cars, and Ten-Ten

Early in our marriage we decided to take a trip on the famous Royal Hudson Steam Excursion Train. We were accompanied by Ernie, VE7BYK, who was partially responsible for my interest in amateur radio. Ernie was a friend of Frank, VE7ALS, who at the time was the Royal Hudson engineer. Thanks to the radio connection, Ernie, Janis, and I were able to ride in the locomotive cab on the return trip. It was an unforgettable experience.

In 1980 I made contact on a local 2 meter repeater with George Green, VE7ACN. Early in the QSO George remarked, "I have a '41 DeSoto," magic words to a dyed-in-the-wool old-car buff like me! The QSO led to a meeting with George and his wife Rita the next weekend, and we have been friends ever since. George and Rita later founded

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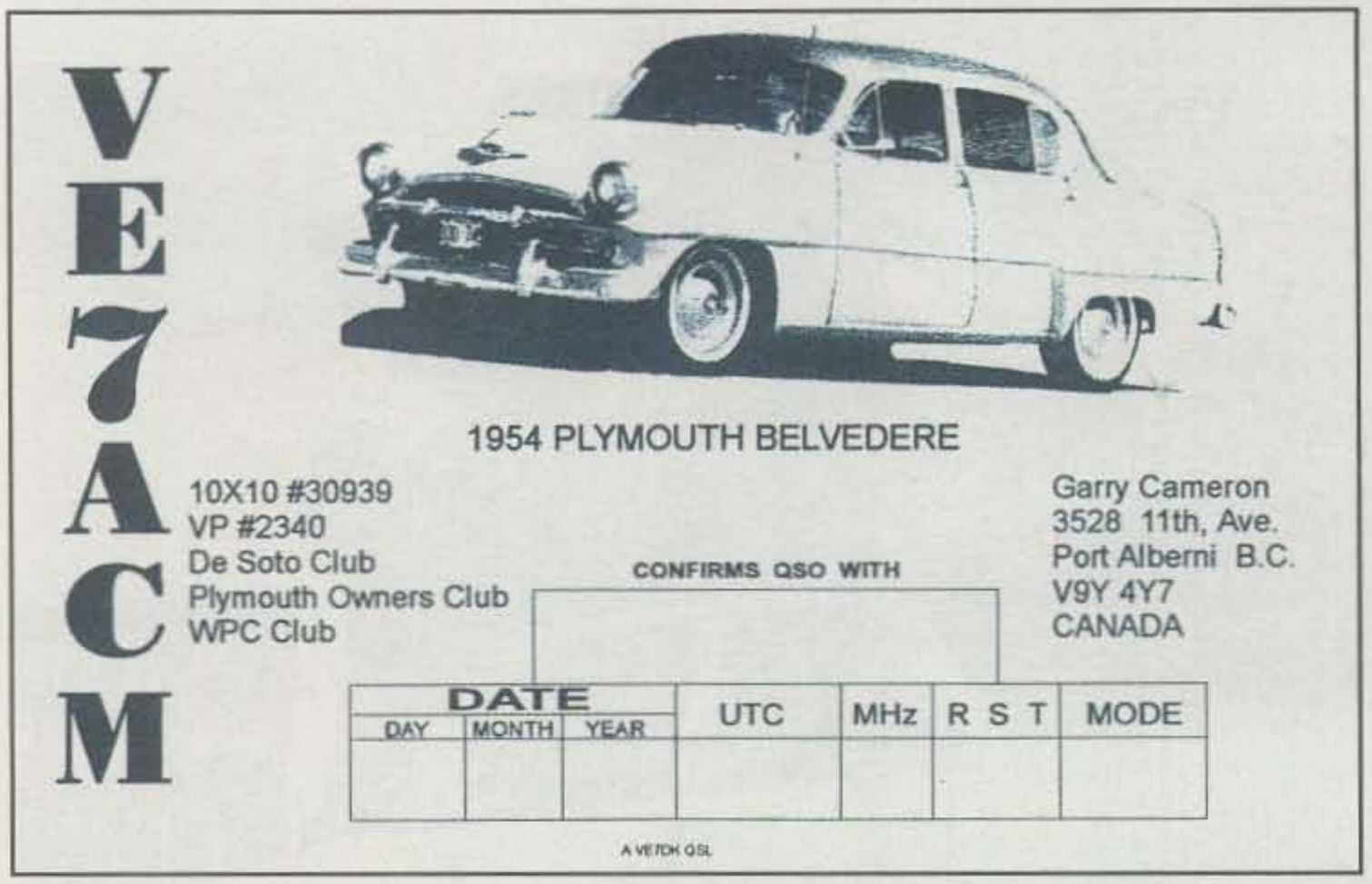


The author's QSL card helps him share his interest in vintage cars with other amateurs. Note that it lists his car club memberships as well as his radio club memberships.

the Vancouver Island Region of the WPC Club (the name is taken from the initials of Chrysler Corporation founder Walter Percy Chrysler and the club is "Dedicated to the preservation, restoration, and enjoyment of all Chrysler products"), and we joined in 1985. In 1986 I suggested to George that since there were several amateurs in the club, we could enhance our enjoyment of both hobbies by obtaining an amateur radio callsign for the club. George agreed and said I should be trustee, since it was my idea. I applied for and received the club call VE7WPC in August 1986.

In 1987 I renewed my membership in Ten-Ten International, also obtaining a number for VE7WPC, and began joining Ten-Ten chapters (see sidebar "What's a Ten-Ten?" if you're not familiar with this organization). When Janis saw all those certificates rolling in, she got "hooked," too, quickly obtaining her own Ten-Ten number and joining the "paper chasing" fraternity.

In 1989 we purchased a 1954 Plymouth (see photo and VE7ACM QSL card). We've had a great deal of fun with this car, and despite its having a 6 volt, positive-ground electrical system, we've operated 10 meter mobile from it by carrying a 12 volt battery in the trunk.

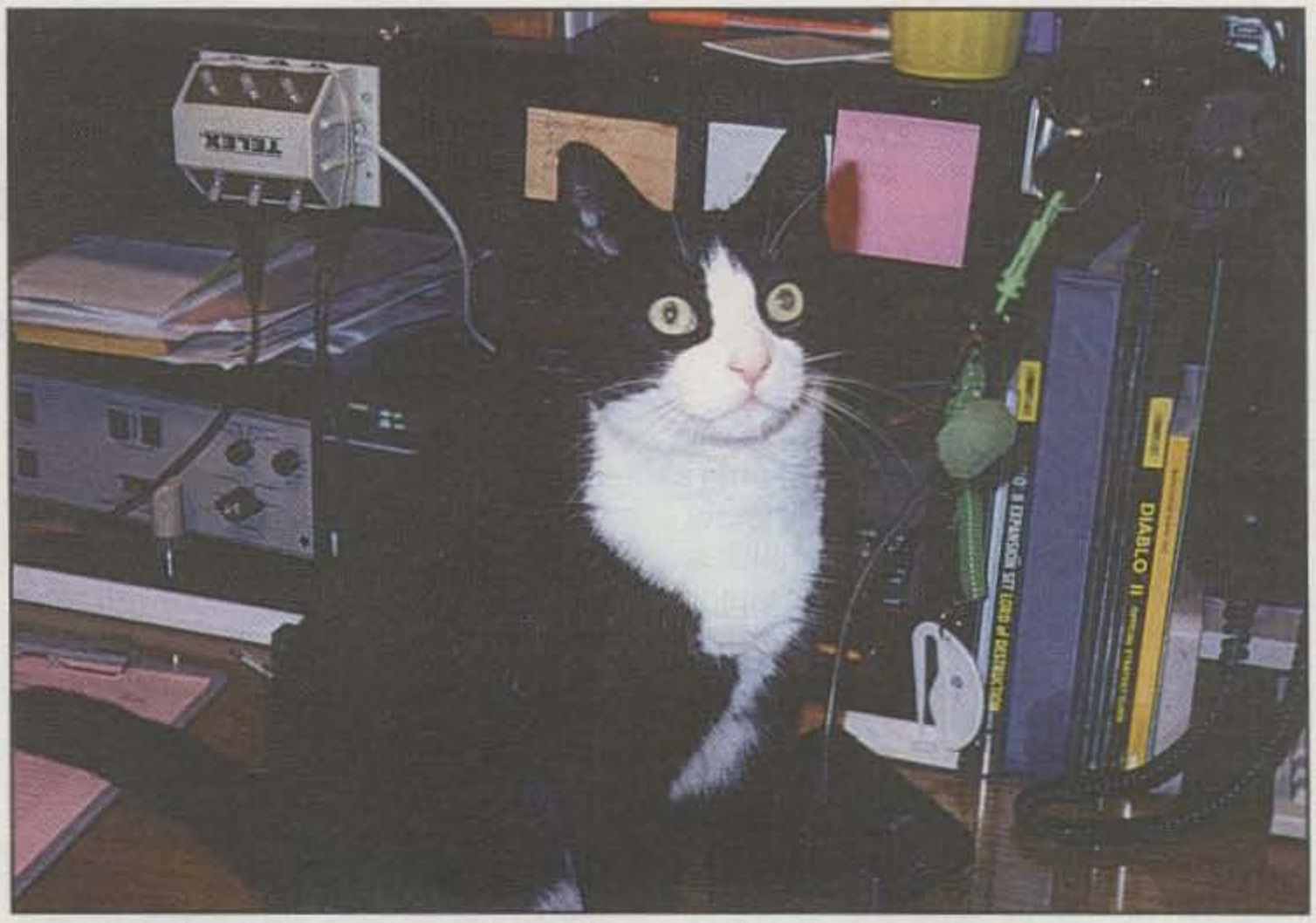
Janis and I are also cat lovers, and in 1993 we formed our own Ten-Ten chapter, "Feline Friends/Restoration Project." Ten-Ten members who send us photos of their cats are issued a "Feline Friends" number to go along with their Ten-Ten number (see photo and Janis's QSL). Those who join "Restoration Project" are made charter members if they own a qualifying collector vehicle (25 or more years old), or honorary members if they do not.

Star Search

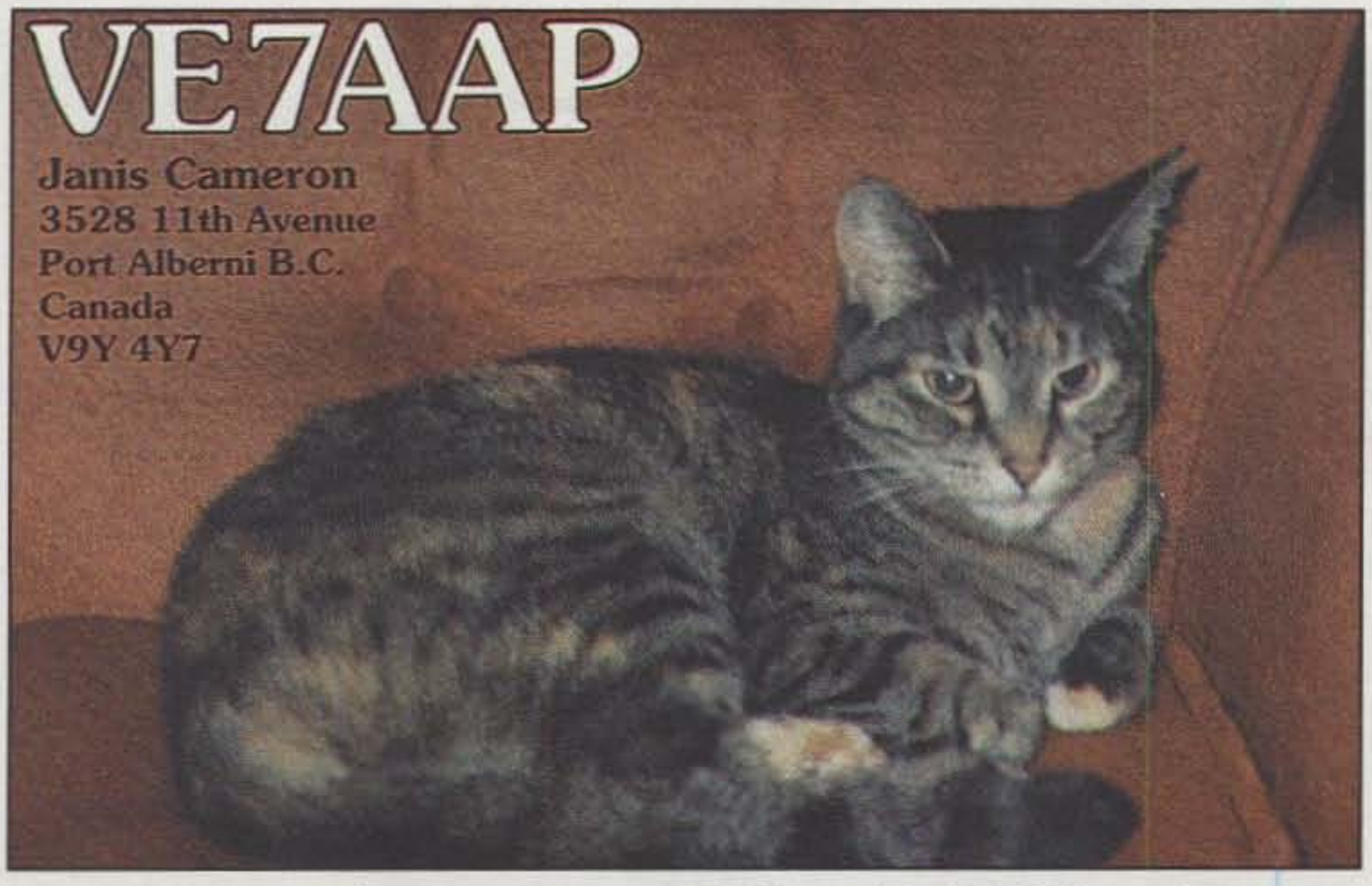
In September 1988 Janis and I made a 10 meter contact with Carolyn Donner, N8ST, and her husband Gary, K8BE, of Hamersville, Ohio. QSL cards and chapter lists were exchanged, and in an e-mail Carolyn mentioned that she is Commanding Officer (President) of "USS *Jurassic*," a chapter of "*Starfleet*," the international *Star Trek* fan association. Here, then, was another magical contact for me. I have been a science-fiction fan my whole life, and that naturally includes *Star Trek*.

Before long, Carolyn and Gary had joined our Ten-Ten chapter and I had joined USS *Jurassic* (Janis, alas, does not share my passion for science fiction, but she does support my interest). Inspired by the explanation that VE7WPC was a car club, not a radio club, Carolyn became sponsor of the *Jurassic* club station, K8SSJ ("Star Ship *Jurassic*").

We met Carolyn and Gary for the first time at the 1999 Ten-Ten convention in Oak Ridge, Tennessee. It felt as if we'd been friends our whole lives. Shortly after we returned from Tennessee, I applied for and received a second club callsign, this one for *Jurassic*, VE7SSJ (see QSL card). Carolyn and Gary were thrilled when we told them the news. *Jurassic* offers a certificate for contacting the two club stations, K8SSJ and VE7SSJ. For details, contact Carolyn Donner, N8ST, Box 158, Hamersville, OH 45130-0158 (e-mail: <n8st@worldnet.att.net>) or the author, Garry Cameron, VE7ACM, 3528 11th Ave., Port Alberni, BC Canada V9Y 4Y7 (e-mail: <VE7ACM@rac.ca>).



Purrcy the cat, apparently one of several "feline friends" who share their home with Garry and Janis. Their "Feline Friends" chapter of 10-10 International will issue a special "Feline Friends" number to any 10-10 member who sends them a photo of his/her cat(s).

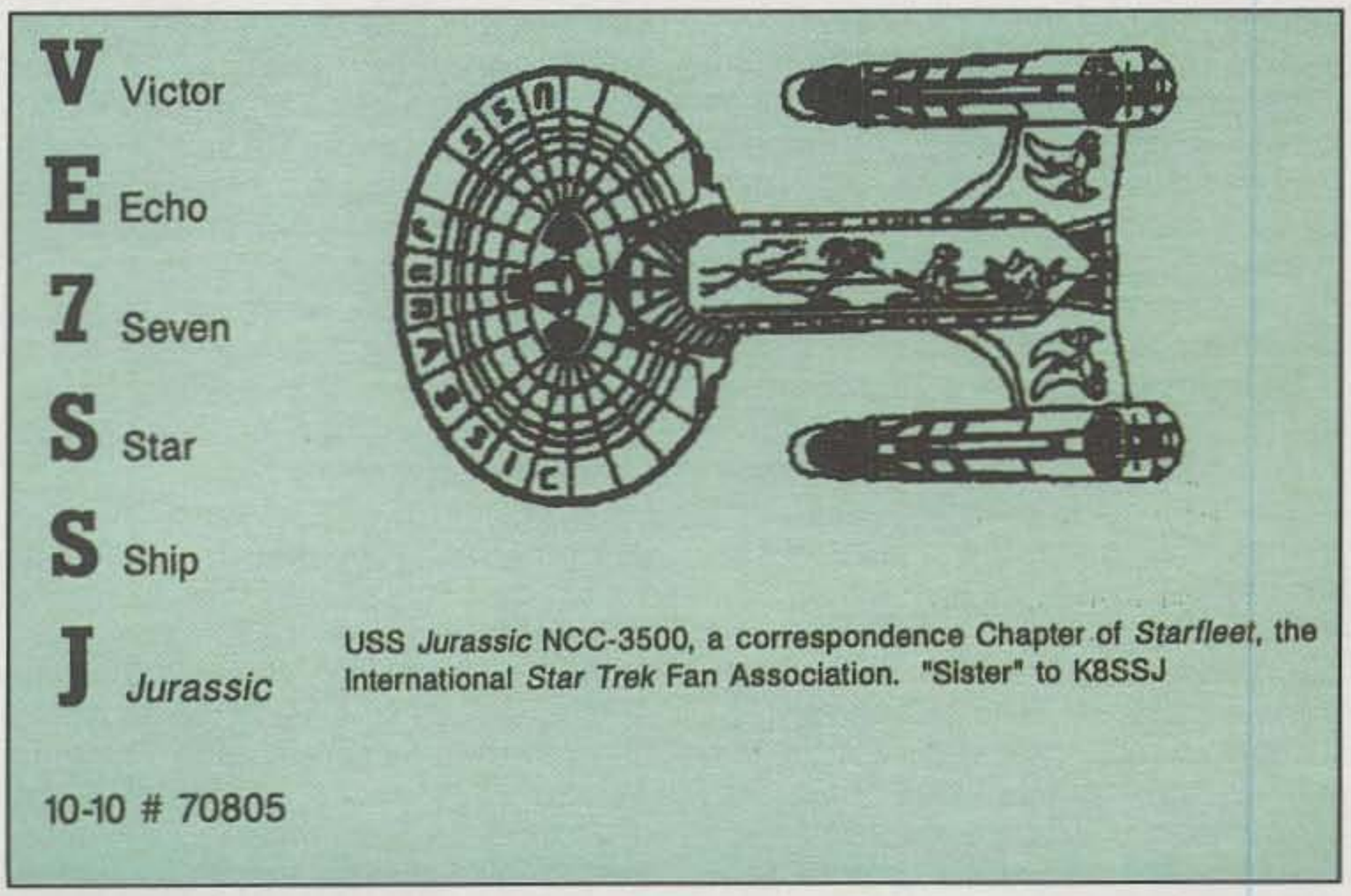


Another Cameron cat graces the front of Janis's QSL card.

More recently, the *Starfleet* chapter USS *Ohio* joined the amateur ranks, with Roger, WD8ITD, and Barbara, KC8SXM, becoming active, along with club station K8SSO. *Starfleet* members may hold honorary ranks, such as Petty Officer, Ensign, Captain, Admiral, etc. The ranks reflect how active the member is within the chapter. Members earn points toward promotion through recycling, public service, raising money for charity, and even taking part in Field Day. (Both K8SSJ and VE7SSJ have been active in Field Day and have submitted logs.) That, along with writing articles (fiction and non-fiction) for *Starfleet* and chapter publications, has allowed me to rise from my starting rank of Petty Officer to Commander.

Making the Connection

Amateur radio, while a great hobby in itself, has for me been a marvelous enhancement to two of my other passions—old cars and science fiction. What's next? Another life-changing event may come tomorrow, or ten years from now, or never. But even if it never happens again, knowing that it might is tremendously exciting. ■



QSL from VE7SSJ, the club station of the USS Jurassic *chapter of* Starfleet, *the international* Star Trek *fan association. VE7ACM is trustee. Again, the card makes Garry's interest in science fiction clear to other hams.*

What's a Ten-Ten?

Ten-Ten International (also known numerically as 10-10), which celebrated its 40th anniversary in 2002, was started by a group of California amateurs hoping to forestall the possible loss of 10 meters from the Amateur Service back in the early 1960s. The 11 meter band had been removed from the Amateur Service and given over to the Citizen's Band Service, and it was feared that 10 might also be lost due to lack of use during sunspot doldrums.

Hoping to encourage activity on 10 meters, a daily (except Sunday) net was started on 28.800 MHz at 1800Z (10 AM Pacific). The name 10-10 was derived from Ten Meters at Ten O'clock. The net still runs today, but is now supplemented by an additional net on 28.380 at the same time.

After a time, the net began to issue membership numbers which could be exchanged with other members, and certificate programs were developed, such as a Countries Award, a Worked All States Award, etc. Much later, a Counties Award was added—identical to CQ's USA-CA, except that all contacts must be on 10 meters with 10-10 members.

Over the years the group has experienced phenomenal growth. To date over 73,500 numbers have been issued around the world. Ten-Ten members exchange these numbers over the air—often referring to them as dollars and cents—in order to qualify for various 10-10 awards.

To obtain your own 10-10 number, simply work ten members on 10 meters, get their 10-10 numbers, and send a list (10-10 number, call, name, QTH, and date worked) to the appropriate manager. For those with a U.S. Zip Code, dues are $10.00 for one year and go to 10-10 International Net Inc, PMB142, 643 N. 98th Street, Omaha, NE 68114-2343. For those outside the U.S., dues are $13.00 (U.S. funds) and go to Carol Hugentober, WA8YL, 4441 Andreas Ave., Cincinnati, OH 45211-2622, USA. In addition to your own 10-10 number, you will receive a membership package and a one-year subscription to the quarterly *10-10 International News* (see the 10-10 website at <http://www.ten-ten.org/> for additional details).

Note that once you have received a number, it is yours for life. If you do not pay your dues, you will not receive the newsletter or be eligible for awards or contest certificates, but your number will always be good to pass out to those collecting. Numbers are never re-issued, and membership may be reactivated at any time by paying the current year's dues.

We all know our antennas are supposed to be resonant. But how many of us really understand what resonance is all about and what goes into making an antenna resonant? No need to admit it publicly if you don't, but you probably should read K5YNR's article...

Resonance

BY RON NOTT,* K5YNR

The mathematical definition of resonance is when inductive reactance is equal to capacitive reactance, or $X_L = X_C$. Is that all there is to it? Mathematically, yes. However, in its application to antennas there is much more. Every length of wire or rod has inductance, and it also has capacitance to the space surrounding it. In studying electronics, we are led to believe that every capacitor must have two plates, but even a one-plate capacitor, when suspended in space, has capacitance to space.

It follows, therefore, that when we stick a wire or length of tubing up into space and call it an antenna, it has capacitance as well as inductance. Old antenna textbooks show virtual capacitance from the antenna to ground, but the capacitance is actually to space as well as everything in the environment, including ground.

Hams often speak of an antenna being resonant. They sometimes take great pains in pruning a dipole to attain resonance, as indicated by minimum VSWR. However, where antennas are concerned, there are *two kinds* of resonance. This article will attempt to clear up some common misunderstandings about them.

Two Kinds of Resonance

The first kind of resonance is *self-resonance,* which is attained by adjusting antenna length until zero reactance is seen at the antenna input. There is then a pure resistance at the antenna terminals, and if the resistance is exactly 50 ohms (assuming the transmitter output and transmission line both have impedances of 50 ohms), the VSWR will be 1.0:1. If it is not 50 ohms, the resistance can be matched using a tuner and you will still get a 1.0:1 VSWR.

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Every antenna may have many self-resonant frequencies, although there may be wide variations of resistance at the different resonant frequencies. If you look into the input of an antenna with an instrument such as an AEA Vector Impedance Analyzer attached to a laptop computer and sweep through a wide spectrum, you will see the reactance repeatedly swing positive and negative. Each time the sweep goes through zero, the antenna is resonant. Between the excursions through zero reactance the antenna is off resonance.

Definition 1: Self-resonance occurs when the electrical dimensions of an antenna cause the input reactance to appear to be zero without the need for resonating components.

Self-resonance seems to be a tedious term, so most amateurs just use the term *resonance.* However, while this is correct, we know that it is also possible to resonate an antenna by using *reactance.* An example is the use of an inductor (coil) in an HF mobile antenna. Without the series inductor, the input impedance will contain both resistance and capacitive reactance. The inductor may be adjusted until its inductive reactance is the same value as the capacitive reactance, at which time the antenna is resonated and has a pure value of resistance at the input.

Definition 2: An antenna that has been resonated by a lumped reactance with a sign opposite that of the reactance of the unresonated antenna is still resonant at its input. It is just not self-resonant.

Concerning these reactances, we often say that the one cancels the other, but is this correct? The antenna still has inductance and it still has capacitance, but we have manipulated them until they are equal in value, resulting in a + and – addition which yields zero. Neither of the two reactances actually went to zero, however. They both are still there, but are now equal in value and opposite in sign. Thus, even though

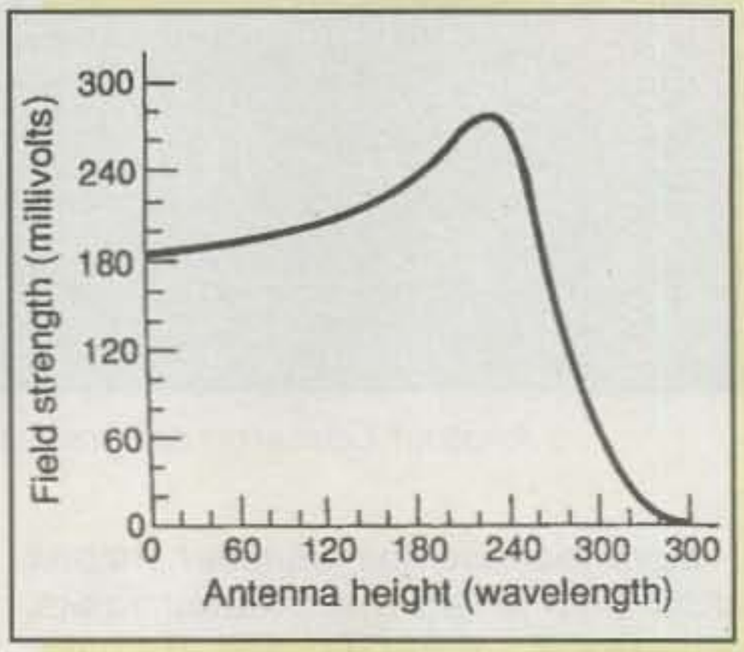

Fig. 1–A textbook curve illustrating the gain of a ground-based antenna based on its electrical height. Self-resonance would occur at four points on this curve—at 90, 180, 270, and 360 degrees. Note that at these heights no special improvement in gain occurs. (See text for additional discussion.)

it *appears* that they went away, they are still there—i.e., they were not cancelled.

Reactance at the input of an antenna can be viewed as an electrical spring. You can push RF energy into it, but it will spring right back at you as reflected power. That's why the first priority in impedance matching is to compensate the reactance, inductive or capacitive, with another reactance of equal value and opposite sign, which makes it appear that the reactance is then zero. When this is done, all that is left is resistance, which is then matched to 50 ohms with an antenna tuner.

Depending on the dimensions and geometry of the antenna, the reactance values can vary greatly. For example, after resonating they both might be 30 ohms, or they both might be 300 ohms, or most any other value of reactance as long as they are equal in value. This gets us into the Q of an antenna, which is then directly related to bandwidth. The important thing to realize, though, is that to attain resonance, each reactance value must be equal to the other. That's the definition of resonance mentioned in the first sentence of this article.

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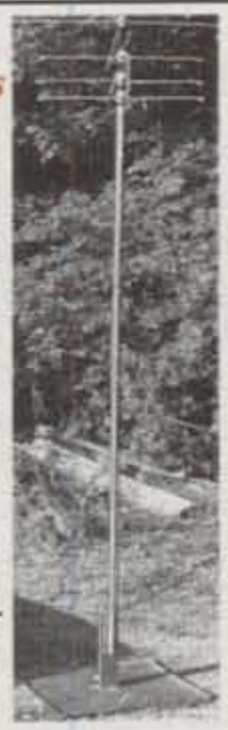

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Low angle of radiation for DXing, omni-directional, handles 1500 watts PEP, low SWR.

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When designing a matching network (L, Tee, or pi), it simplifies things to first resonate the antenna input, and then match the two different resistance values that remain. Even though there may be only three components in the network, it is important to remember that they perform two separate functions: The first is to resonate the antenna input, and the second is to transform the resistance differences between the transmission line and the antenna input (or transmitter output and transmission-line input in the case of conjugate matching).

What's in An Antenna Input?

To sum up, every antenna input contains three components:

1. Resistance, which is the sum of radiation resistance and loss resistance.
2. Inductive reactance.
3. Capacitive reactance.

Even though the input may appear to be purely resistive, both kinds of reactance are still there. However, because one has a + sign and the other a – sign, if they are equal in value, the reactance appears to be zero. Remember that every length of a conductor has inductance and it also has capacitance to space. They do not go to zero, they simply mathematically add up to zero.

Question

Is there an advantage or does an antenna perform better if it is carefully pruned to resonate at a certain frequency than if it is resonated with an antenna tuner? If the tuner components are very low loss, there is no real difference. Granted, you can manipulate pattern shape by antenna dimensions, but as far as antenna radiation efficiency, one is as good as the other.

Let's look at two examples that are very popular on 2 meters—a 1/4-wave vertical and a 5/8-wave vertical. The 1/4-wave has become a standard for two reasons: (1) It is the lowest height at which self-resonance occurs; and (2) simultaneously, it has a reasonable value of antenna input resistance (radiation resistance plus loss resistance). Combined, these two factors make it very easy to match impedance.

Unfortunately, a certain mystique has developed around this basic antenna, but there is certainly nothing magic or special about its performance. Pruning it for resonance does not make it work any better than a tuned antenna ... such as the 2 meter 5/8-wave vertical antenna so popular with mobile users because of its greater gain (see figures). This is not a self-resonant antenna, but has a tapped inductor in the base in order to compensate for the capacitive reactance that would otherwise be present at the antenna input.

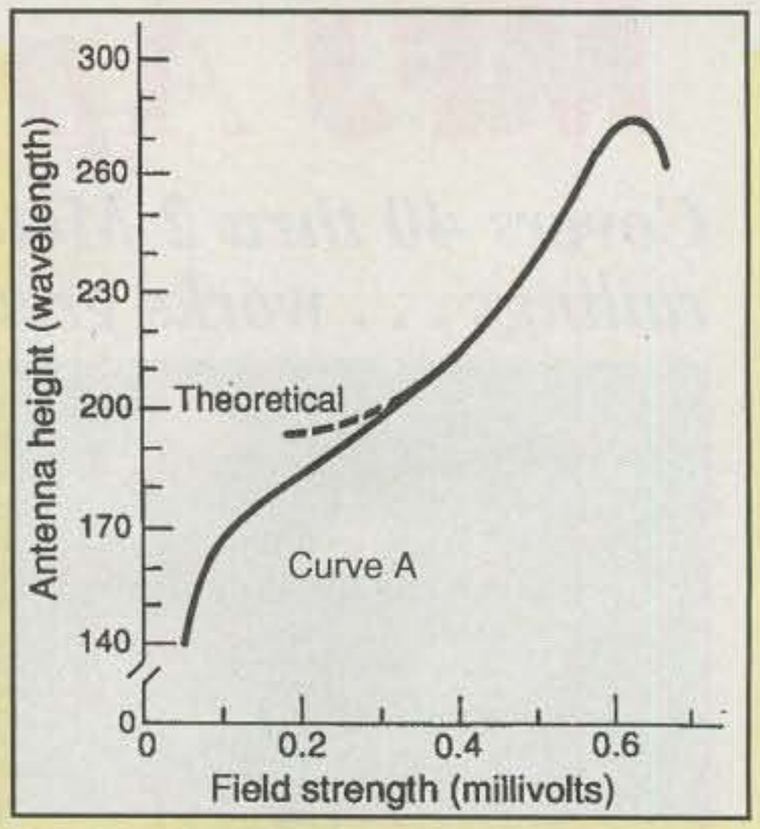

Fig. 2– This graph, from Part 73 of the FCC Rules, is a similar look at the relationship of antenna height in wavelength to the strength of its signal. This chart includes a "reality curve" (Curve A), on which signal strength decreases rapidly as the antenna height goes below 0.3 wavelength. (See text for additional discussion.)

The two graphs used for illustration show us the relationship in AM broadcasting of antenna height in wavelengths to field strength a mile away from the antenna (based on a 1 kilowatt transmitter feeding an omnidirectional vertical antenna with a ground system of at least 120 1/4-wavelength radials). Fig. 1 is a textbook curve based on the book *Directional Antenna Patterns,* by Carl Smith, published by the Cleveland Institute of Radio Electronics. The antenna-height scale is in degrees. Self-resonance would occur at four points on this curve—at 90, 180, 270, and 360 degrees. Note that at these heights no special improvement in gain occurs, and the greatest gain is at the non-resonant point of 230 degrees (equivalent to 5/8 wavelength). There is nothing magic about a self-resonant quarter-wave antenna over other heights. In fact, this chart suggests that if an antenna of zero or near zero height could be developed with no loss resistance (hasn't happened yet), it would perform nearly as well as a 1/4-wave antenna.

Fig. 2 is taken from Part 73 of the FCC Rules, and is a similar look at the relationship of antenna height (in wavelength this time rather than degrees) to

the strength of its signal. The "theoretical" curve is essentially identical to the one in fig. 1, except that at the upper end the FCC has deleted the part above 5/8 wave. This is because beyond this height the ground wave quickly becomes a sky wave to a point where when the antenna is a full wavelength tall, the radiation is all skywave—bad news in AM broadcasting, but great for hams! The chart also includes a "reality curve" (Curve A), on which signal strength decreases rapidly as the antenna height goes below 0.3 wavelength. This is because radiation resistance decreases inversely to the square of the height (approximately), so a short antenna becomes very inefficient because the loss resistance becomes greater than the radiation resistance. Again, if there was a way to eliminate loss resistance, an antenna of next to no height would perform nearly as well as a quarter-wave vertical! The greatest gain, as you can see from both charts, is at the 5/8-wave point, which is why that antenna is so popular among hams, even though it is not a self-resonant antenna.

Finally, remember that a VSWR meter does not measure the quality or performance of an antenna. It merely measures the quality of the impedance match. To really understand and evaluate antenna impedance, you need an RF impedance bridge, which measures both resistance and reactance, bearing in mind that none of them (including the VSWR meter) can tell radiation resistance from loss resistance. Fortunately, RF impedance bridges are available at reasonable prices from manufacturers such as MFJ and AEA.

Conclusion

In summary, the input impedance of all antennas includes radiation resistance, loss resistance, and reactance. They perform best when the loss resistance is minimized and the resulting total antenna resistance is near 50 ohms or is matched to 50 ohms. Reactance is always present, but if you cause the positive reactance and the negative reactance to be equal in value, they will balance out to zero, at which point the antenna will be resonant. This is important because in order for your antenna to accept RF power and effectively radiate your signal, it *must* be resonant, whether self-resonant or resonated with a reactive component. Understanding that there are two kinds of resonance, and understanding the difference between them, will help you get the most our of your antenna installations. ■

math's notes

BY IRWIN MATH,* WA2NDM

Temperature Control

Last month we discussed how you can build a simple, but accurate temperature-measurement instrument for experimental applications. This month we will continue the discussion with several temperature-control systems that should also be useful. Applications for such circuitry range from regulating the frequency of a crystal against ambient changes to turning a blower on and off as the need dictates. In this case, however, precision devices are not needed, as you will soon see.

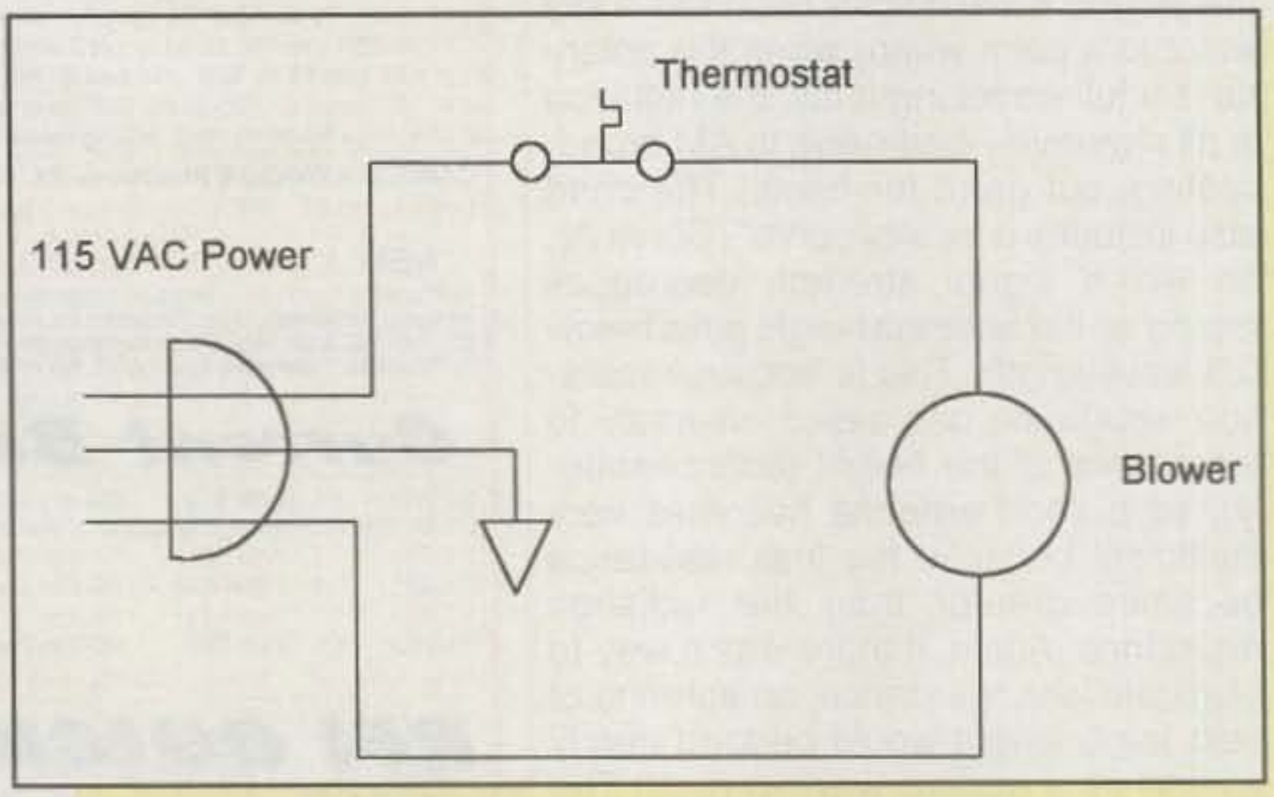

Fig. 1– Simple temperature-control circuit.

Fig. 1 is the simplest temperature-control system possible. It consists of a mechanical thermostat connected in series with a blower. You place the thermostat near or next to the device you wish to protect, and then you locate the blower so that its output passes over the device you are trying to cool. When the temperature exceeds the set point of the thermostat, the contacts close and the blower turns on. When the temperature drops, the thermostat cools and the blower turns off. Common, normally open thermostats for such operation cover the operating range of 35° to 100° C and usually cost under $10. They are available from sources such as DigiKey (see <www.digikey.com>) and are designed to switch loads of up to 15 amperes. Incidentally, normally closed versions also are available.

Another choice that is equally simple to connect is the thermal switch. DigiKey also carries these. Thermal switches are somewhat less expensive (under $8 for a single switch) and are available with wire leads or printed-circuit-board pins. The temperature covered by these devices ranges from 70° to 160° C. As in the case of mechanical thermostats, normally closed versions also are available.

Both of the above choices have one common feature: They are either fully on or fully off. As a result, the temperature variation of the device you are cooling tends to look like the curve in fig. 2. It cycles between a high (Hi) and a low (Lo) limit. Depending on the thermostat used and the heat loss of the system, this differential often can be several degrees or more. For example, in a coarse temperature-control system such as cooling fans for a final stage, this is not too important. However, for a critical system such as controlling the ambient temperature for an accurate frequency standard, it can be a disaster. Because of the crystal's temperature versus frequency characteristics, the output frequency of such a controlled oscillator can follow the temperature variations. As a result, a different scheme is needed.

Fig. 3 is a circuit of a proportional temperature-control system to regulate the temperature of a crystal oscillator. In this case we want the oscillator to operate at some high temperature and to be immune to the effects of room temperature variations. A typical operating temperature for such a circuit is anywhere from 50° to 75° C, so a heater is needed, as is a thermally insulated enclosure. In common practice the crystal, oscillator circuit,

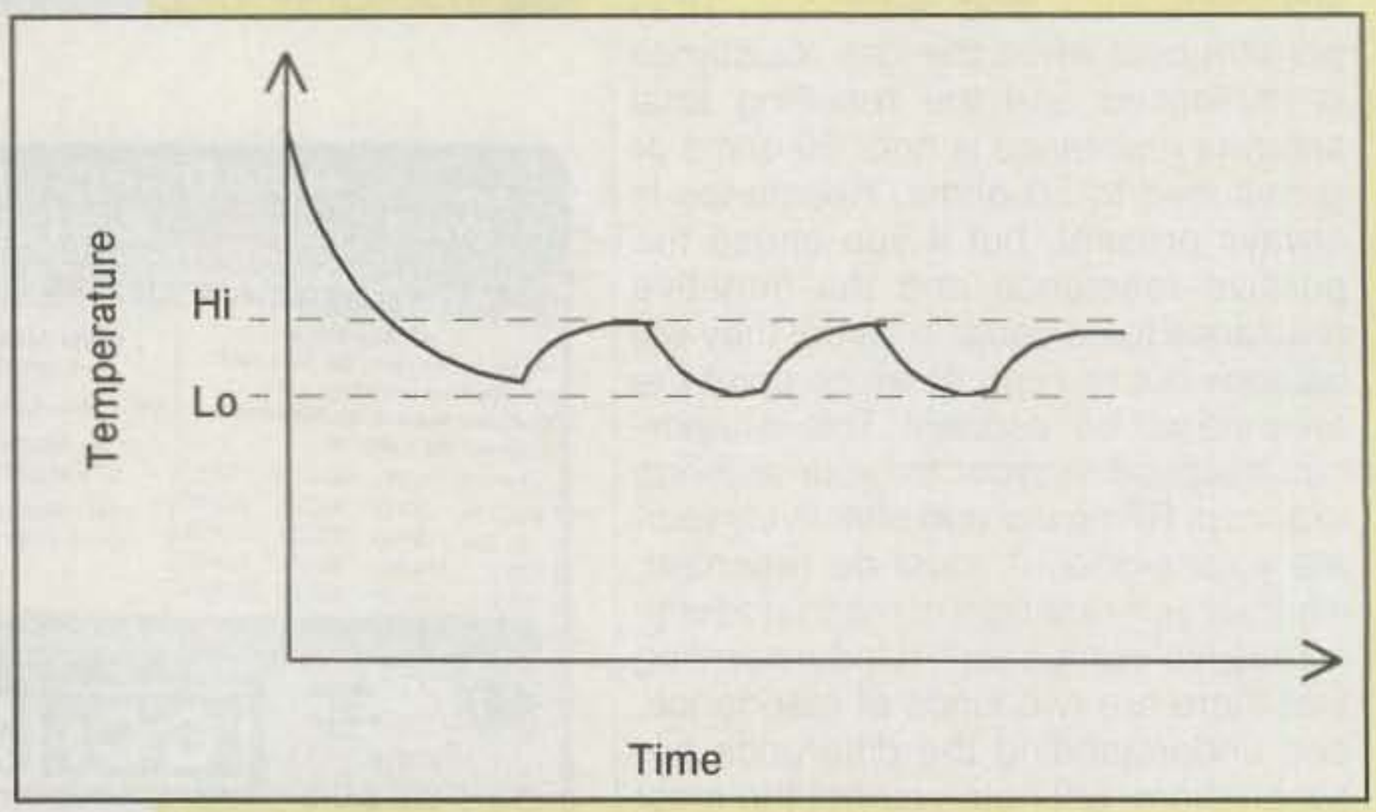

Fig. 2– Temperature cycles between high and low points.

*c/o CQ magazine

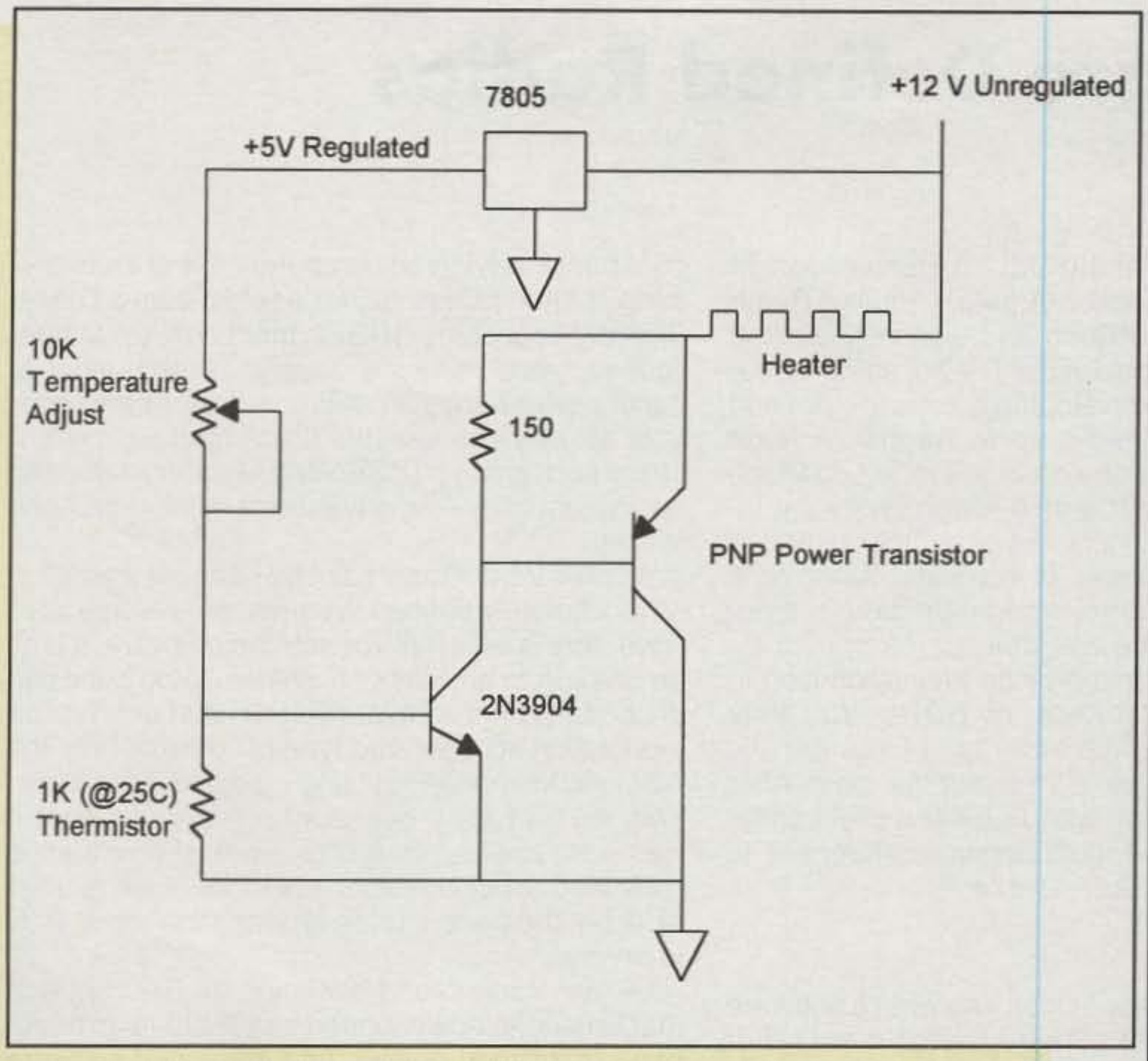

Fig. 3– Proportional temperature-control system.

heater, and temperature sensor usually are contained within the regulated enclosure.

In the circuit shown in fig. 3, a negative temperature coefficient thermistor is used as a temperature sensor and is glued directly to the crystal. When power is first applied, the thermistor is at room temperature (with a resistance of 1K in this example) and the NPN transistor is fully on, as is the PNP. This causes current to flow through the heater, and the enclosure begins to heat up. At some point, depending on the setting of the 10K potentiometer, the thermistor's resistance drops to the point where the NPN transistor starts to cut off. This causes the PNP also to begin cutting off, and the current through the heater drops. Less current through the heater means less heat produced.

This cycle eventually reaches a point where the heat lost through leakage through the enclosure walls just equals the heat being produced by the heater, and the temperature of the system then remains stable. By proper choice of the heater, sensor, and enclosure design, an overall temperature stability of better than 1 degree can readily be achieved. Also keep in mind that the full heater current passes through the PNP transistor, so choose it accordingly. Commercial crystal ovens are available that can maintain an internal regulated temperature of better than 0.01° C over an operating environment of 0° to 50° C, and there are even designs that are a magnitude better than that.

Years ago we were involved with the manufacture of high-precision frequency standards and built many such temperature-control systems. One of the main factors of a successful design was the insulation used to build the temperature-controlled enclosure. As a hint to those of you who wish to experiment with temperature control, one of the best insulators commonly available was (and still is) commercial styrofoam such as that used in packaging. Enclosures using this material were easy to construct, and often even die-cut shapes that exactly suited our needs were readily available. Glass wool taken from common household insulation is also a great insulator, but if you are not careful, you will start to itch!

Please let us know of your successes.

73, Irwin, WA2NDM

BY DON ROTOLO,* N2IRZ

Software Defined Radios

This past May at the Dayton Hamvention® I went to the Tucson Amateur Packet Radio (TAPR) PacketBash and was very excited to hear Gerald Youngblood, AC5OG, speak about his experiences in developing a software defined radio. As I mentioned here in August, a huge amount of experimentation is still being conducted by hams, but with a shift toward software instead of hardware. Here is yet another example of the awesome power of software, along with proof that cutting-edge experimentation in amateur radio is still alive and well.

This month I want to provide an introduction to Software Defined Radios, or SDRs. You may already have heard the term, but (if you are like me) didn't really know a lot about the topic. After all, we've had radios with RS-232 serial control ports for years. What could be much different? The answer, you'll soon see, is *a lot*.

What SDR Isn't

Before we take a deeper look into what a software defined radio *is,* let's look at what it *isn't.* For starters, there is a huge difference between a software *defined* radio and a software *controlled* radio. Modern rigs with computer interfaces are almost always software controlled radios. With these radios we have control over all the operating features of the radio that we would normally expect on the front panel: frequency, choice of mode, AGC fast or slow, and the like. Some radios, such as the Ten-Tec Pegasus, don't even have a front panel, relying on computer control for everything. Other radios utilize sophisticated Digital Signal Processing (DSP) functions to shape, squeeze, and munch the audio in the pursuit of better performance. However, none of these controls actually changes the fundamental aspect of the radio: It is still an SSB/AM/FM transceiver, and no amount of tweaking will make much difference in that.

A software *defined* radio, by contrast, has all of its functionality defined in software. The operative word here is *all.* Until you run the software, it isn't an SSB rig or an FM rig; it isn't anything but a pile of parts. It is the software you run that defines the modulation scheme, the type of squelch, how the AGC works, and *everything else* about the radio. This isn't an easy concept to grasp—at least it wasn't for me—so let's take a look at how such a radio works. For simplicity, we'll look at the receive side, but the transmit side is nearly the same, only in reverse.

Gerald Youngblood designed an RF front end that is used to downconvert an RF signal to baseband (explained below), and then used software and a PC sound card to take care of the rest.[1] Take a look at the basic block diagram in fig. 1. The RF stage is a direct-conversion (or zero-IF) detector, which takes the radio signal and downconverts the frequency in a single step to the audio range—a few kilohertz. Don't confuse that downconversion with actually demodulating and recovering the audio signal, as we've done nothing of the sort. All that happens is a shift of the radio signal to a much lower frequency.

That low-frequency signal coming out of the RF stage is now well within the range of a PC sound

*P.O. Box 114, Park Ridge, NJ 07656
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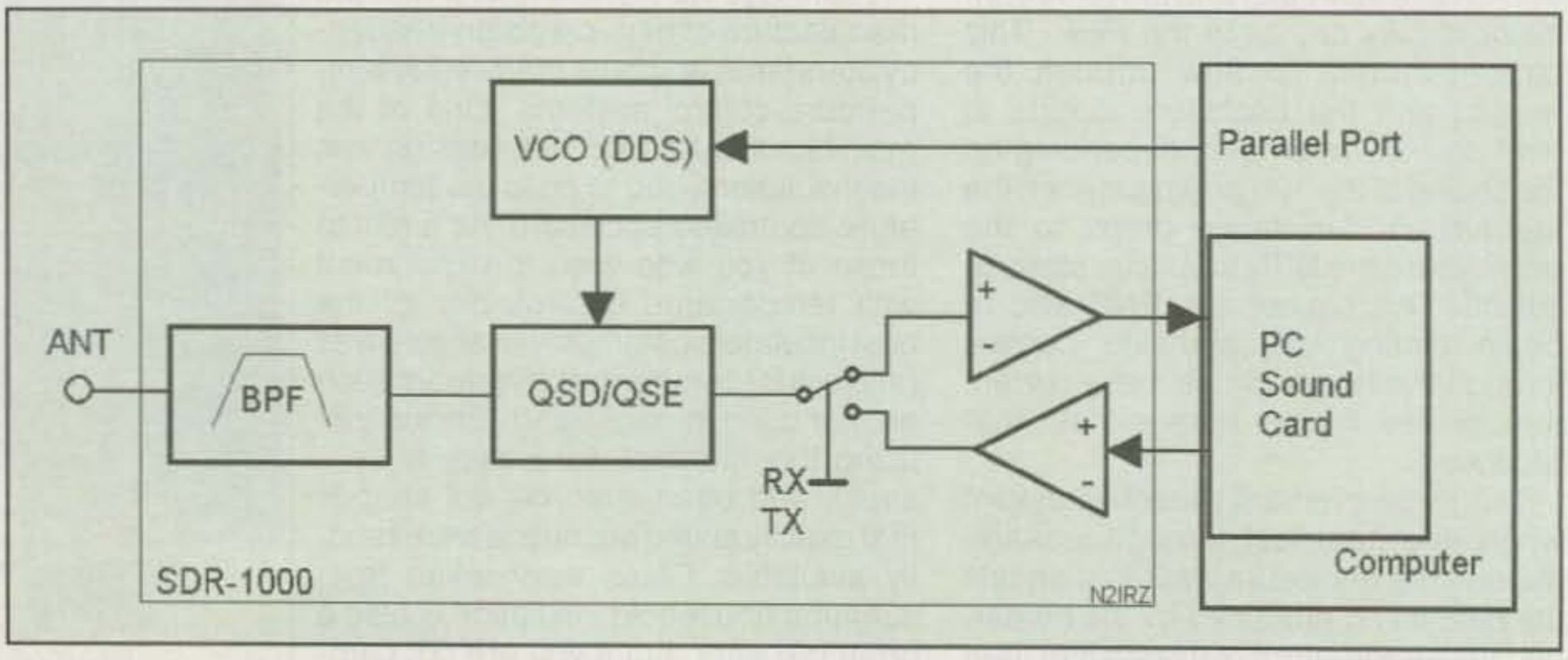

Fig. 1– A basic block diagram of the SDR-1000 software defined radio. Switched bandpass filters limit the RF, and a PC-controlled direct digital synthesizer generates the sampling frequency for the quadrature sampling detector (or exciter). Amplifiers condition the signal for the PC sound card. Notice that there's very little hardware, since all of the radio's functions are defined in software.

card, which typically has a frequency response up to about 20 kHz. Now we can take that signal and, using the generalized hardware in the sound card, process it in any way we like. One such task would be to demodulate it—to detect the amplitude envelope for AM, or track the changes in frequency for FM, for example.

One nice thing about sound cards is that they offer incredible power for converting audio-range signals into the digital domain at an incredibly low cost. Of course, you also need a computer, but even there the cost is low. Once in the digital world, we can perform all kinds of fancy math operations on the signal. Demodulation is an almost trivial operation, with filtering, level shifting, and whatever else not much more difficult. Whatever we want to do to that signal, we can do it in software, via the soundcard hardware.

Well, we can do *almost* anything. The sound card still only operates in the world below about 20 kHz, and we're trying to receive a radio signal, so we still have to shift the signal down a bit. The most common way we convert a signal from one frequency to another is to mix the desired signal with another signal produced in the receiver by a "local oscillator," or LO, which results in the sum and difference of the two signals. Actually, as in this example, if we were to mix a 28 MHz radio signal with a 20 MHz local oscillator signal, we would end up with *eight* signals. There would be one at 8 MHz (28 – 20), one at 48 MHz (28+20), the original signals at 20 and 28 MHz, plus the same four but at *negative frequencies.*[2] Filtering out the undesired signals is fairly easy at those frequencies, but anything that's filtered out unfortunately is lost, and that affects the noise performance of the radio.

In a typical radio we convert the desired signal down to some well-defined intermediate frequency (IF), where we can filter it with hardware to reject unwanted signals. Some radios use double or even triple conversion, with two or three IFs. However, there is a type of radio that doesn't use any IF at all; it converts the signal directly to audio, and it is known as *direct conversion* radio. For example, if you had a CW signal at 14.001 MHz and used a 14.000 MHz IF, one of the frequencies coming out of the mixer would be 1 kHz, or regular audio.

All that would be perfect, unless there also happened to be a signal at 13.999 MHz. Now that frequency is much too close to 14.001 MHz to filter out in the megahertz range, and when we get down to the 1 kHz range, it's right on top of the signal we're trying to get. (Actually, it falls at –1 kHz, an imaginary frequency, but it is real enough to interfere.) Even if there was no undesired signal at 13.999 MHz, the –1 kHz signal contributes to noise at the receiver output, and so it needs to somehow be removed. Even more important, if the original 14.001 MHz signal is single sideband (SSB), you *must* remove the unwanted sideband to avoid interference.

In the early days of SSB, one method of eliminating the unwanted sideband was to mix in a signal shifted by 90 degrees (or –90 degrees), which would cancel out the lower (or upper) sideband. The original signal is called the *in-phase* (or I) signal, and the 90-degree shifted signal is called the *quadrature* (Q) signal. This is known as *quadrature mixing* (or the *phasing method* of SSB detection) and was used successfully in many radios. The problem is that implementing an amplitude- and phase-accurate 90-degree shift in hardware is more difficult than the *filter method* used almost exclusively today. Even small inaccuracies in the 90-degree shift meant greatly reduced unwanted sideband suppression, resulting in poor performance.

However, if we can get accurate 90-degree phase shifts, then SSB (and all other) demodulation is easy. As Youngblood stated in his first *QEX* article on SDRs, "Give me 'I' and 'Q' and I can demodulate anything,"[3] which is literally true. (Most commercial RF chips use I and Q exclusively, for the flexibility.) The way Youngblood gets I and Q is with a so-called *quadrature sampling detector*, or QSD. He was inspired by a detector design published and patented a few years ago by Dan Tayloe, N7VE, which samples the RF signal four times each cycle, producing four outputs at 0, 90, 180, and 270 degrees. Because this is a sampling detector, and not a mixer, the losses and some other issues associated with mixers are

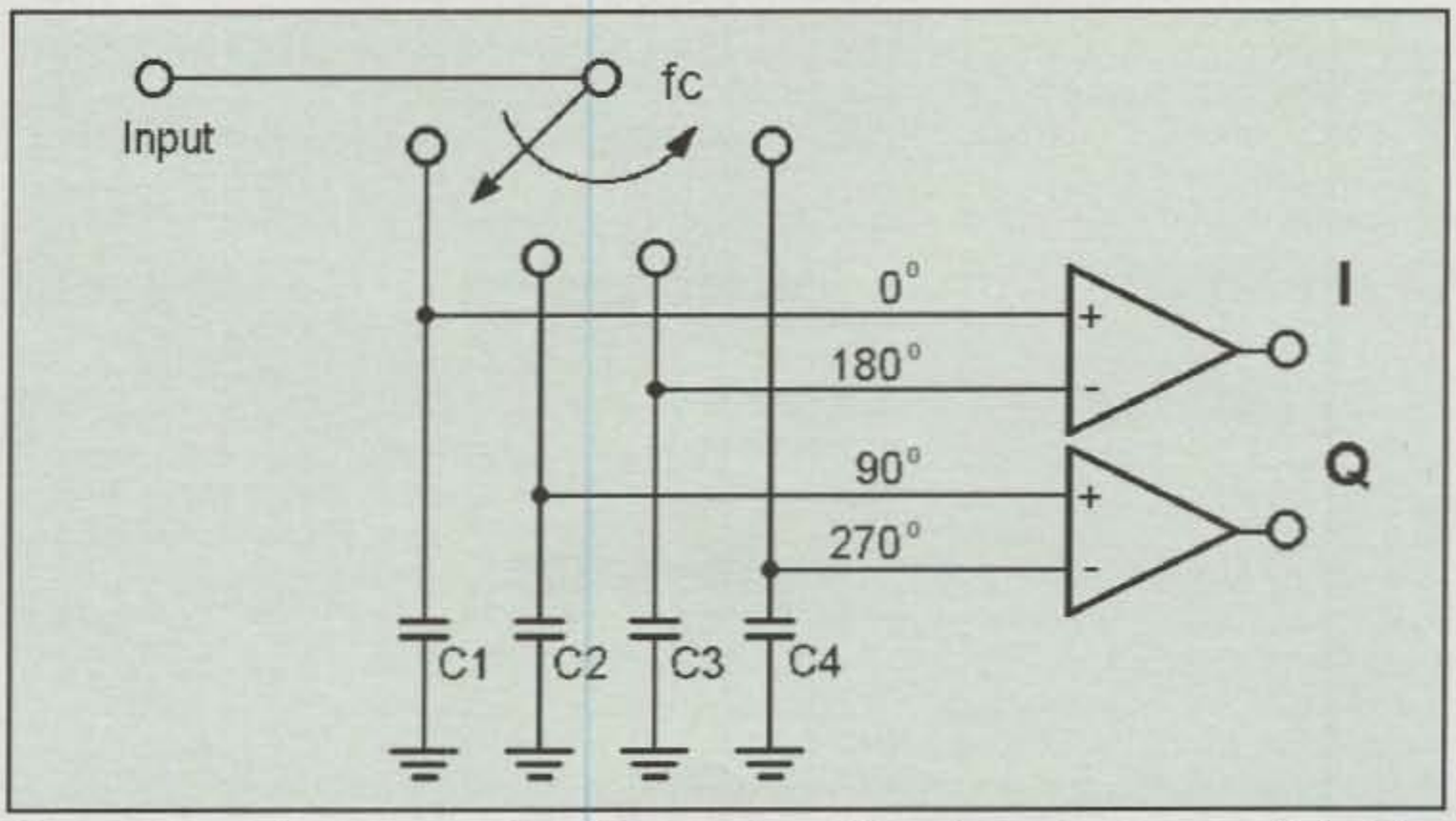

Fig. 2– A quadrature sampling detector is nothing but a four-way switch. The switch rotates (moves across all four outputs) at the RF carrier frequency, f_c. The capacitors sample the voltage during each quarter waveform, creating the four phases, which are fed to amplifiers to create the in-phase and quadrature signals, I and Q.

Aw, Hell(schreiber)

I want to correct a statement I made in the June column, where I wrote that "Hellschreiber means 'Light Writer' in German." While the words really do mean that, the Hell in Hellschreiber came from the name of the inventor of the mode, Dr. Rudolf Hell, who died only last year. Dr. Hell invented his Hellschreiber machine in 1929, just after inventing a scanning cathode-ray tube for image viewing (television) and a radio-beam direction finder that was a forerunner of autopilots for aircraft. In the mid-1950s, he developed a process for photographic scanning and reproduction which revolutionized newspaper production, and he was an early developer of electronic digital typesetting, which ushered out the days of lead type.

A brilliant man of many talents, Dr. Hell made his mark in a number of major industries. I should have heard of him, but hadn't. While this brief note is hardly a fitting tribute to Rudolf Hell, perhaps just a few more people will now know of his work. My sincere thanks to Hadi Tiechmann, DL2PJ, for bringing this to my attention.

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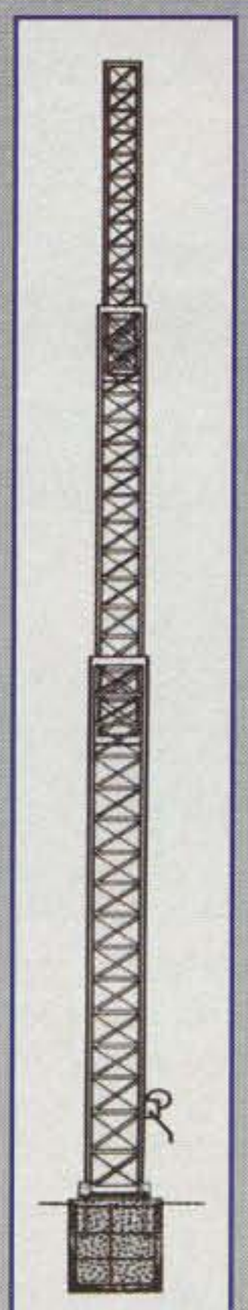

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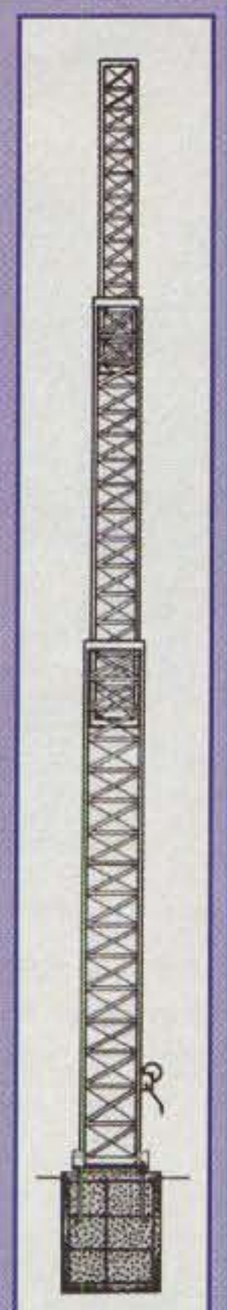

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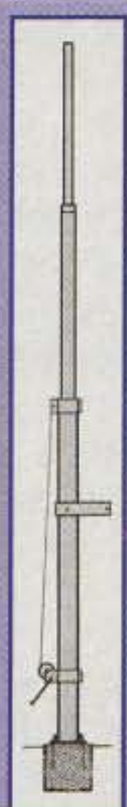

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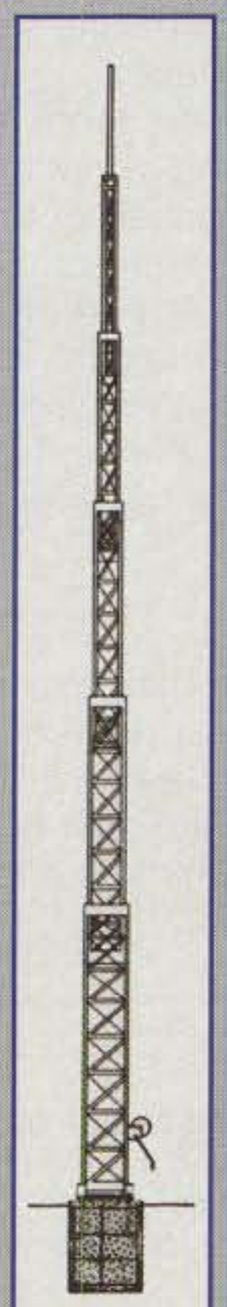

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eliminated, and you get quadrature outputs as well. Let's look at how that works.

Imagine a four-way rotating switch (see fig. 2) that is being rotated at the exact frequency you want to detect. Note the little capacitor on each switch, as well. Each switch sees a little "burst" of the incoming RF signal, exactly one-quarter cycle. The signal level of each burst is averaged by the capacitor, and you get a plain DC voltage across the capacitor. As stated by Tayloe,[4] "the voltage across C1 represents the 0 degree detected audio sampling of the input RF signal, C2 represents 90 degrees, C3 180 degrees, and C4 270 degrees. I use one op-amp to sum the 0 & 180 degree voltages to a single in-phase (I) signal, and another to sum [the] 90 & 270 degree voltages to a quadrature signal (Q)."

What's really cool about this circuit is that it naturally tends to reject signals that are at frequencies different from the rotation or sampling frequency. The detection of the original modulating signal occurs as a difference or "beat" frequency relative to the sampling frequency. The unwanted signals are then filtered out in the audio frequency range, allowing for good selectivity.

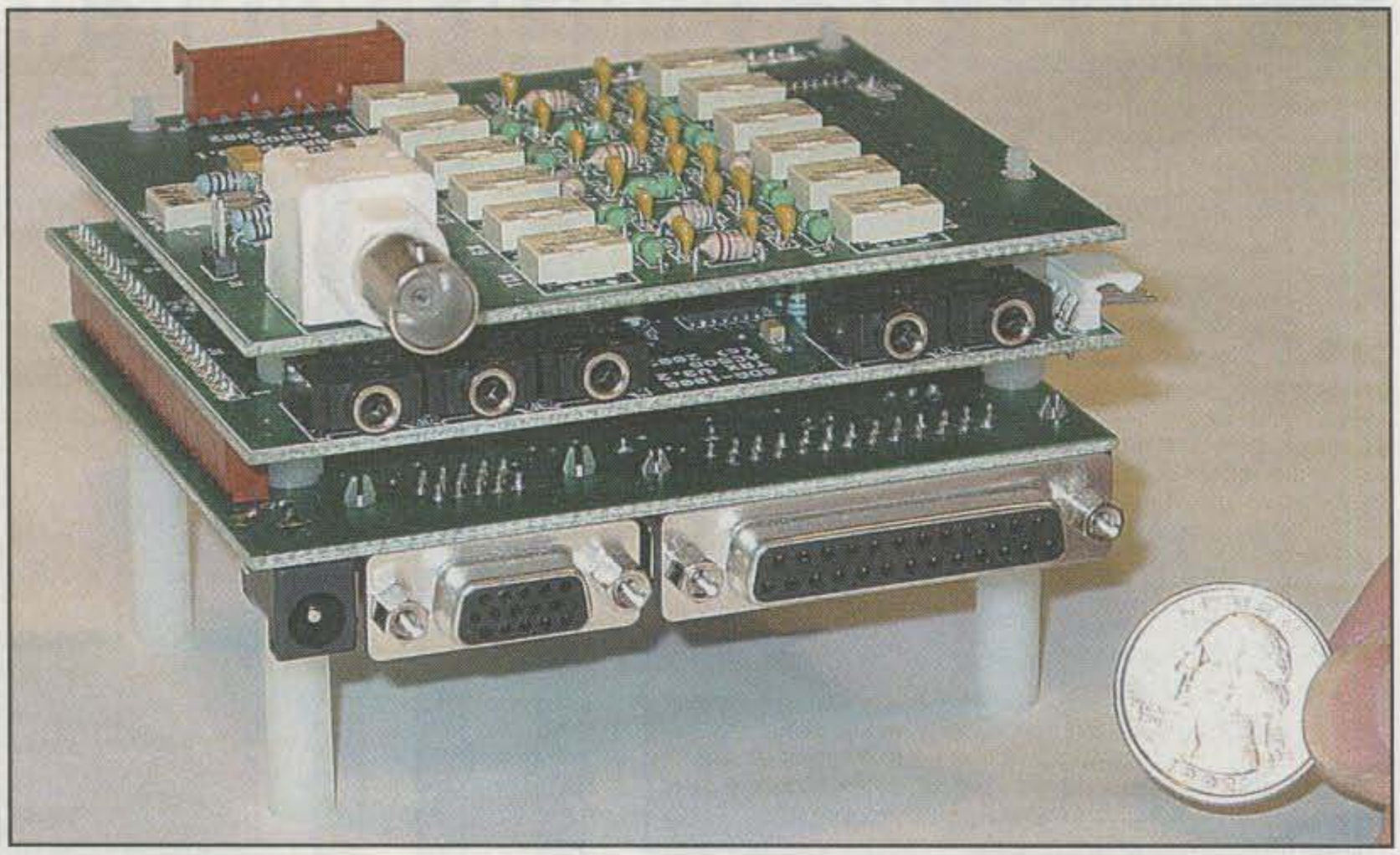

Fig. 3– The SDR-1000 hardware. On top are the RF input and the switched bandpass filters; on the bottom are the PC interface and power supply, and in the middle are the Quadrature Sampling Detector and Exciter, along with the amplifiers. (Photo courtesy Gerald Youngblood, AC5OG)

What About My Signals?

So far we have shifted our desired signal down to baseband and pulled out clean I and Q signals. We still have to filter and demodulate the signals, along with any other audio processing we might want. Youngblood uses a common PC sound card for all the rest of the receiver functions, harnessing the awesome powers of digital signal processing in software. It's a software defined radio, remember?

Using nothing but software, nearly any sound card can be set to apply automatic gain control (AGC), demodulate the signal (whatever it is), filter out what you don't want (with DSP just like the "big rigs"), handle noise blanking, squelch—absolutely anything that can be done with any radio you've ever seen, and quite a few things that can't. Yes, it's all done in software. Unfortunately, the details of how all of that is done are much too complex to be discussed here, but it really can be done. The same principles work just the same for the transmitter as well, in reverse, of course—starting with your voice being picked up by a microphone and ending up with a radio signal heading out to your antenna.

Because there is very little processing of the signal in the analog domain, and because of the detection and frequency-conversion method used, along with the opportunities for so many people to tweak the various parameters, a radio of this type can be expected to exceed the performance of the best available transceivers today.

The Big Difference

In presenting this article, my goal is to convey an appreciation of the difference between a software *controlled* radio and a software *defined* radio. The former is fairly common, and amounts to a bunch of switches and knobs that you can move from a distance. The latter is a complete radio that runs in software, with only a bare minimum of function-specific hardware, and the rest as (admittedly complex) software. I have simplified some of the technical issues here to promote understanding, but I believe that what I've presented is accurate. However, this is all new to me, too, so if you've found something not quite right, I'd greatly appreciate it if you'd write to me and tell me about it.

For a better understanding of the technologies involved, I strongly urge you to read what's out there. Start with Youngblood's *QEX* series, and the excellent references he provides, and don't forget to search the internet as well.

SDRs offer an opportunity for renewed experimentation, albeit in soft-

PSK31 Power

Just a couple of brief follow-ups on the August column on PSK31:

I didn't mention it, but PSK31 is inherently a low-power mode, as I was reminded by Al Marshment, K8LDS. There's rarely any need to run over about 25 watts. The power of DSP, demonstrated in our "wireless" experiment, allows for excellent copy even at very low power levels, so QRP please.

Randy Gawtry, KØCBH, related a story about another kind of PSK31 "wireless" experiment at the St. Paul (MN) Radio Club. They set up two computers with mics and speakers on each side of a PSK31 display. During the break in the meeting, they had members sit down at the computers and work each other on the acoustical bands. It was so popular, they had to extend the break period (so everyone could get a turn). What a great idea to try at your next club meeting! Thanks, Randy.

ware, but with effects similar to what occurred in the early days of radio when analog components and circuits were being perfected and breakthroughs were happening all the time.

By the way, you don't have to be a software expert to experiment with SDRs. Sure, you'll have to learn a *little* about software, but it isn't all that difficult with some effort. Gerald is offering semi-assembled kits of his SDR-1000 transceiver for under $500, available now at <http://www.flex-radio.com>, complete with the open-source software. With all of the tricky hardware and the bulk of the software already done, you'll be free to concentrate on the aspects of your SDR that interest *you*.

Some other aspects of SDRs might not be as obvious. Some easily imagined uses might be a totally flexible radio for the emergency services, where the same piece of hardware can be made interoperable with literally any other radio—instantly—on the fly, if you want. Digital voice? No problem. Pick your protocol, or let the other radio tell your SDR what you need. Don't know what the other signal is? Write software to scan through every mode and protocol until it figures it out—a few seconds maybe *(of course, writing the software will take considerably longer —ed.)*. With the power of today's personal computers, the only limit will be our own imagination. Also, no solder required.

Just an afterthought: If you end up getting involved in SDRs, please take a moment to write and tell me about it. Thanks. 73, Don, N2IRZ

Notes

1. See Gerald Youngblood's series of articles in *QEX,* starting with the July/August 2002 issue. You can read these online at <http://www.flex-radio.com>.

2. Negative frequencies, you say? Yes. While primarily a mathematical construct, such "imaginary numbers" are extremely useful when accounting for certain effects in many electronic circuits. We call them imaginary, since mathematically they are multiplied by the square root of –1, and therefore do not exist physically, but the effects they represent are very real.

3. G. Youngblood, AC5OG, "A Software-Defined Radio for the Masses, Part 1," *QEX* July/August 2002, p. 16.

4. E-mail message by Dan Tayloe posted on the QRP reflector at <qrp-l @lehigh.edu>, available online at <http://www.amrad.org/pipermail/tacos/1998/000464.html>.

Real Radio Spirit and Radio Fun!

BY DAVE INGRAM,* K4TWJ

Amateur radio is graced with many areas of special interest and pursuit, but few exhibit the simple elegance and widespread appeal of QRP. It has been with us since the early days of radio, it just gets better with each passing year. It continues to proves the operator rather than the rig makes the difference in real radio communications. If there is anything more special than QRP, it is the folks operating QRP. Aren't you glad you run QRP?

On that note, let's fast forward right into the wide array of exciting topics on tap for discussion this month. The hot news of the day comes from HamCom, held in Dallas during June, so let's begin at that point.

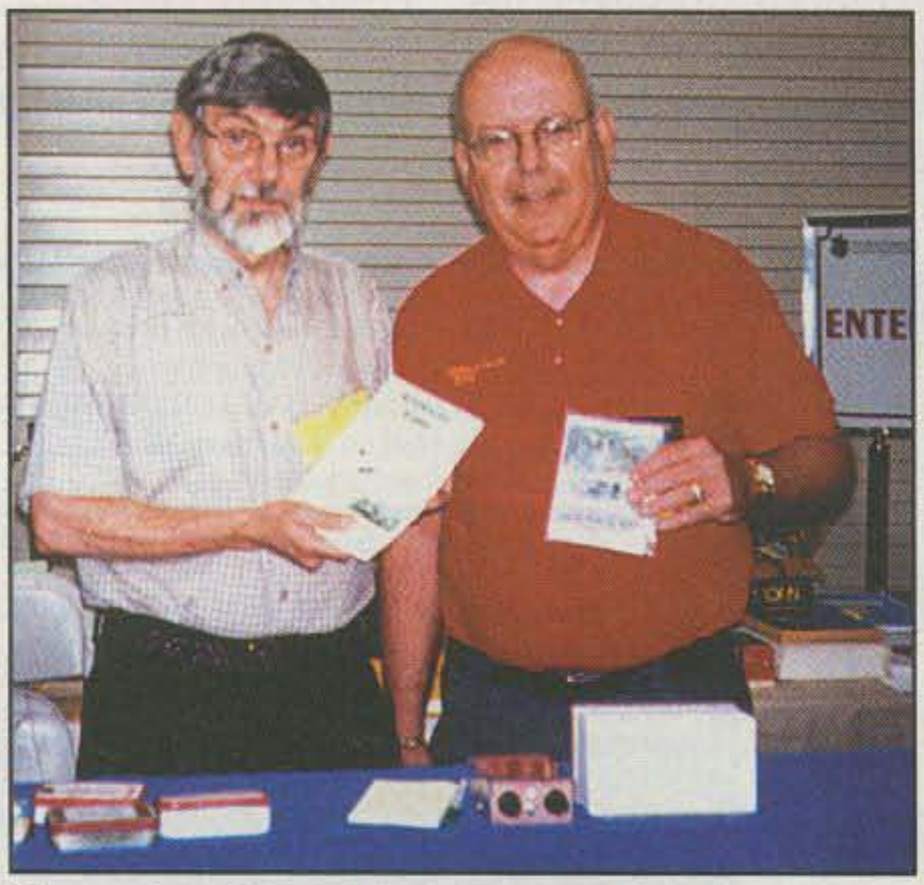

Photo A– QRP Hall of Famers George Dobbs, G3RJV (left), and Doug Hendricks, KI6DS (right), manned combined G-QRP and American QRP Club tables at HamCom 2003, selling books, kits, and "stuff" to the multitude. The "Tenna Dipper" kit shown in photos 4 and 5 was an especially favored item.

QRP Big at HamCom

The noticeable emphasis at HamCom this year was on QRP, with a wide array of kits and goodies gracing QRP club tables and top-name QRPers filling forum rooms to the max. This "who's who" of the QRP list included G3RJV, G3MFJ, G3WIF, KI6DS, WA6HHQ, KK6MC, W5RH, KG5U, AC5VF, and AG5RS. The clubs included NorTex, G-QRP, and the new AmQRP. Indeed, it was akin to a QRP conference (Texicon?) combined with a major-league hamfest and complete with everything, including a late-night homebrew session smoking 2N2222s and critiquing each others' built-from-scratch rigs.

Of particular interest was the discussion of bare-bones QRP, or "Minimalist Radio," by George Dobbs, G3RJV, founder of the famous G-QRP

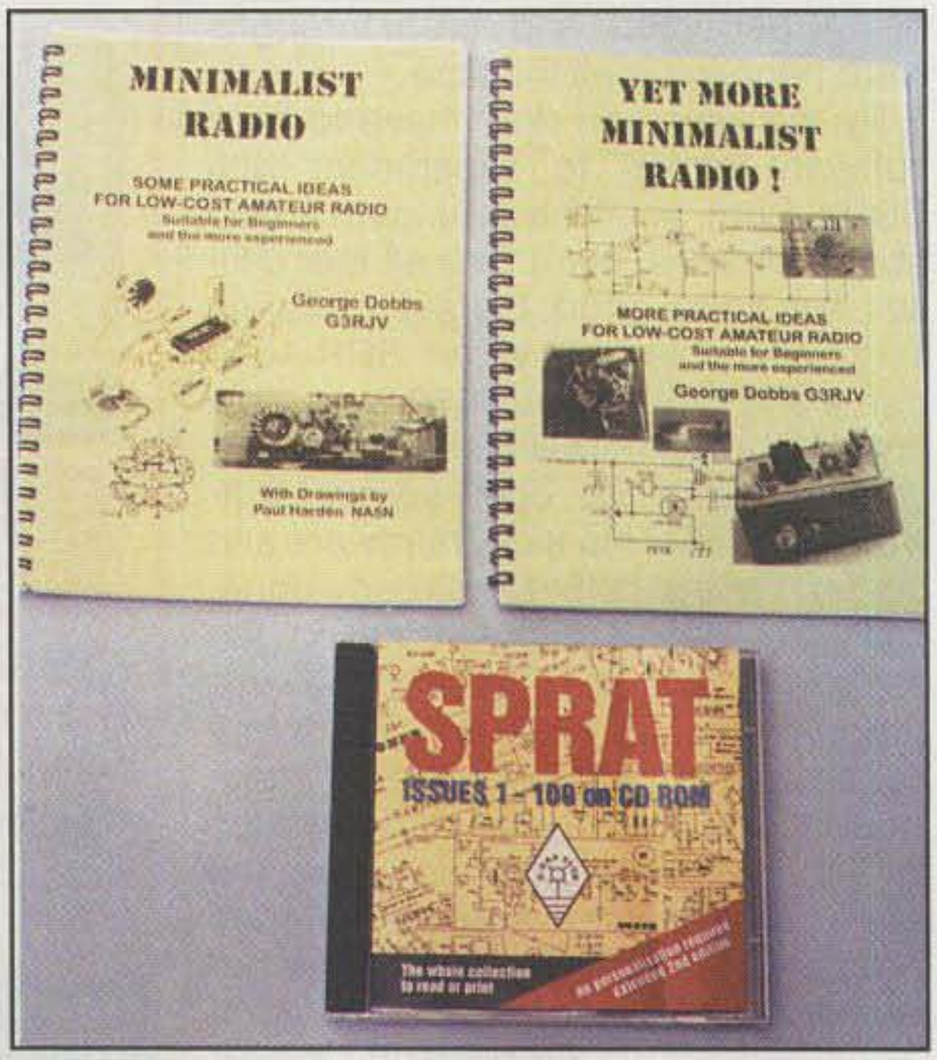

Photo B– Enjoy assembling simple and inexpensive QRP projects for both home and field use? Check out these new "Minimalist Radio" books by G3RJV and "100 Issues of Sprat," the G-QRP Club's long-running journal on CD. They are both filled with clever circuits for enthusiastic homebrewers, and they are available direct from <g3rjv@gqrp.co.uk> or from Bill Kelsey, N8ET, at <www.kangaus.com>.

Club. George described the personal gratification of using simple homebrew gear and explained how to assemble your own QRP mini-rig in an easy, stage-by-stage manner. Later reviewing his discussed circuits (which are fully detailed in his *Minimalist Radio* and *More Minimalist Radio* books), I see they are neat universal building blocks one can use "as-is" or integrate "piecemeal" into various homebrew projects. A passive mixer using coils wound on readily available T-50-2 toroid cores, a single FET VFO, and a MOSFET transmitter are only three of the one-night projects delivering maximum fun at minimum cost.

If you missed Dobbs's presentation at HamCom, you can still review its main points by reading his "Minimalist" books. The books and the G-QRP Club's new "100 Issues of Sprat" CD are available from Bill Kelsey of Kanga U.S. , 3521 Spring Lake Drive, Findlay, OH45840 (telephone 1-877-767-0675, or <www.kangaus.com>). Keep on reading this "QRP" column for more QRP views from the UK and more words of wisdom from G3RJV, too, as we plan to include him as a special guest soon.

The previously mentioned AmQRP (American QRP) Club was founded in early June 2003 when two well-known "biggies," NorCal and the New Jersey QRP Club, merged to combine resources and expand QRP-community-supporting capabilities. As a result of combined west and east coast leadership teams, QRPers will be able to purchase

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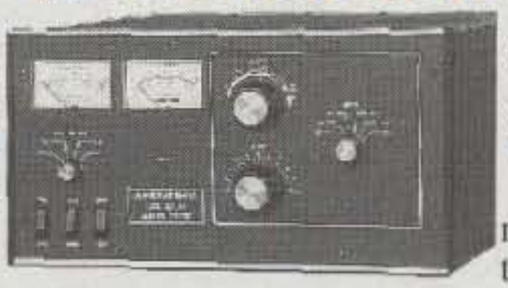

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The 'Tenna Dipper

Steven Weber, KD1JV kd1jv@qsl.net www.qsl.net/kd1jv

The "Tenna Dipper ("TD") is designed to allow you to find the 50 Ω resonant frequency of an antenna or to adjust an antenna tuner for best match. A built in frequency counter with Morse audio output is used to determine the frequency at which the "TD" is tuned to. By using a low power oscillator and a sensitive detector, the "TD" will not cause any significant QRM. The "TD" is small enough to fit into an Altoids tin, along with a standard 9 volt battery, making the unit ideal for use in the field.

How it works

The circuit starts with a Voltage Tuned Oscillator (VCO), which is part of a 74HC4046 PLL chip (U1). C1 and R1 sets the frequency range of the oscillator. It is possible to [illegible] course, tuning is touchy.

The output of the 74HC4046 (pin 4) is a square wave. This signal drives the input to the built in frequency counter and is buffered by a 74HC00 NAND gate to drive the bridge. The output of the buffer is first fed though a low pass filter to remove VHF harmonics and then into the resistor bridge. R4 is used to make the input impedance to the bridge 51 Ω.

The bridge consists of three 51 Ω resistors. The unknown impedance, Rx, (antenna or ATU) is used to complete the bridge. If the impedance of Rx is equal to 0j+51, that is, there is no reactive component, the bridge will be in balance. Therefore, there will be no voltage between the R5/R6 and R7/Rx junctions. In order to determine if the bridge is in balance or not, a transformer is connected between the R5/R6 and R7/Rx junctions. By using a step up transformer here, some passive gain is realized.

The output of the transformer is coupled to a high gain, darlington amplifier, consisting of Q1 and Q2. R8 and R9 bias the amplifier just below the point of turning on. A red LED is used as a visual indication of the current flowing in the collectors of Q1 and Q2. R10 limits the current to a safe level if the amplifier is being driven with a large signal. When the bridge is in balance, there will be no current flowing in the amplifier, so the LED will be out. As the bridge goes out of balance and a signal is applied to the amplifier, the LED will get brighter as the signal [illegible] application. Gates U2b and U2c are used to control the input signal to the PIC and are used to "clock out" the remainder left in the counter's prescaler at the end of the timing interval.

Construction

Before you start mounting parts, the board needs a little rework. One track on the bottom of the board got connected to the wrong pin on U2. The Track connects pins 1+2 to pin 4 and should connect pins 1+2 to pin 5. Cut the track now and we'll jumper it to the proper pin later. See layout diagram.

If the board is to fit into an Altoids tin, along with a 9V battery, the corners on

Photo C– The Tenna Dipper kit designed by Steve Weber, KD1JV, and packaged/sold by the Four State QRP Group. Unit is low cost, goes together in only three or four hours, and is a super-handy aid for checking and tuning antennas.

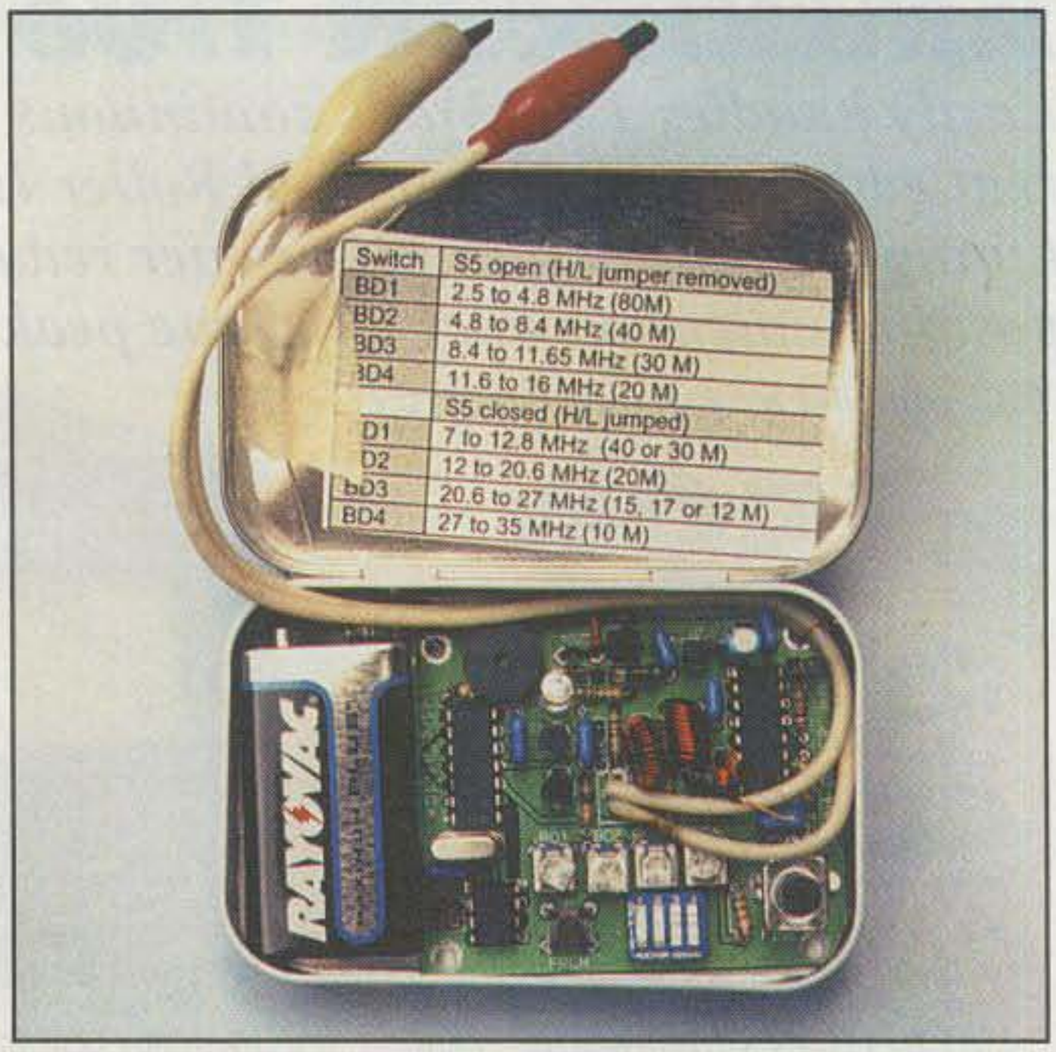

Photo D– The completed Tenna Dipper assembled and mounted in an Altoids tin. I added short clip leads to facilitate quickly checking SWR and resonant frequency of antennas or presetting an antenna tuner's controls for an optimum match as discussed in the text. Note frequency switch/range chart and 50 ohm "reference resistor" taped inside the lid.

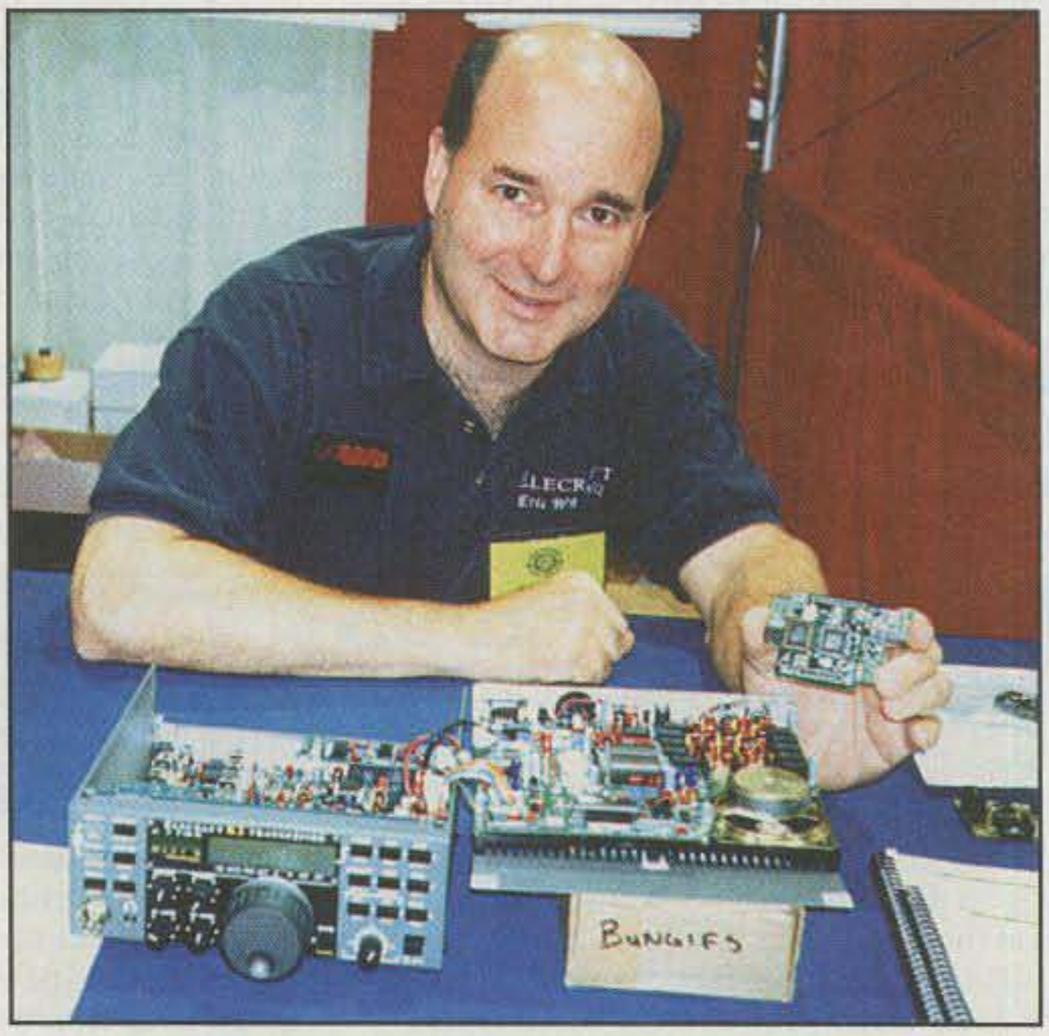

Photo E– Eric Swartz, WA6HHQ, enthusiastically describes the new plug-in DSP board and 60 meter mod board for his popular Elecraft K2 kit transceiver at HamCom. A little K1 with an internal battery pack was also displayed. Nice!

more cool kits at lower cost and more frequently from AmQRP. The NorCal and NJQRP Club magazines, *QRPp* and *QHB*, have also been combined into a new, larger magazine entitled *Homebrewer*. That makes sense, as a vast number of QRPers live with a key in one hand and a soldering iron in the other. Members of NorCal or NJQRP, incidentally, will automatically be switched over to receive the new magazine. More QRP meetings with Atlanticon and Pacificon type formats are also being planned, along with a notable thrust to reach and educate America's youth about amateur radio. Good show, gang! More details on the American QRP Club and its projects are available at <www. AmQRP.org>. Check it out!

The Tenna Dipper

One of the most handy station accessories we have seen in many moons (and one with high appeal to all amateurs, including non-QRPers) is the clever little Tenna Dipper kit displayed in the QRP "stuff" at HamCom 2003. This easy-to-brew kit was designed by Steve Weber, KD1JV, and may be visualized as a poor-man's antenna analyzer. You just connect it with clip leads to an antenna's feedline and adjust its potentiometer for minimum LED brightness, and it gives you a visual indication of the antenna's approximate SWR, plus reads out its resonant frequency in Morse code. You can then shorten or lengthen antenna wires, change coil turns, or tweak the top stinger length on a mobile whip for fine tuning to a specific frequency—all without even connecting your transceiver.

The Dipper covers all frequencies from 80 through 10 meters, is low cost (around $25), fits in an Altoids tin, runs off a regular 9 volt battery, and works with all types of 50 ohm antennas, dipoles, verticals, and more. It has four tiny DIP "rocker" switches for selecting bands/frequency ranges of operation, and the Morse Code frequency announcer can send slow or fast code, as desired.

Although small and simple, the Tenna Dipper is quite clever in concept. It consists of a single IC oscillator/signal generator with output filter driving a Wheatstone bridge with an LED as a "balance" indicator. It also has a signal-level buffer-

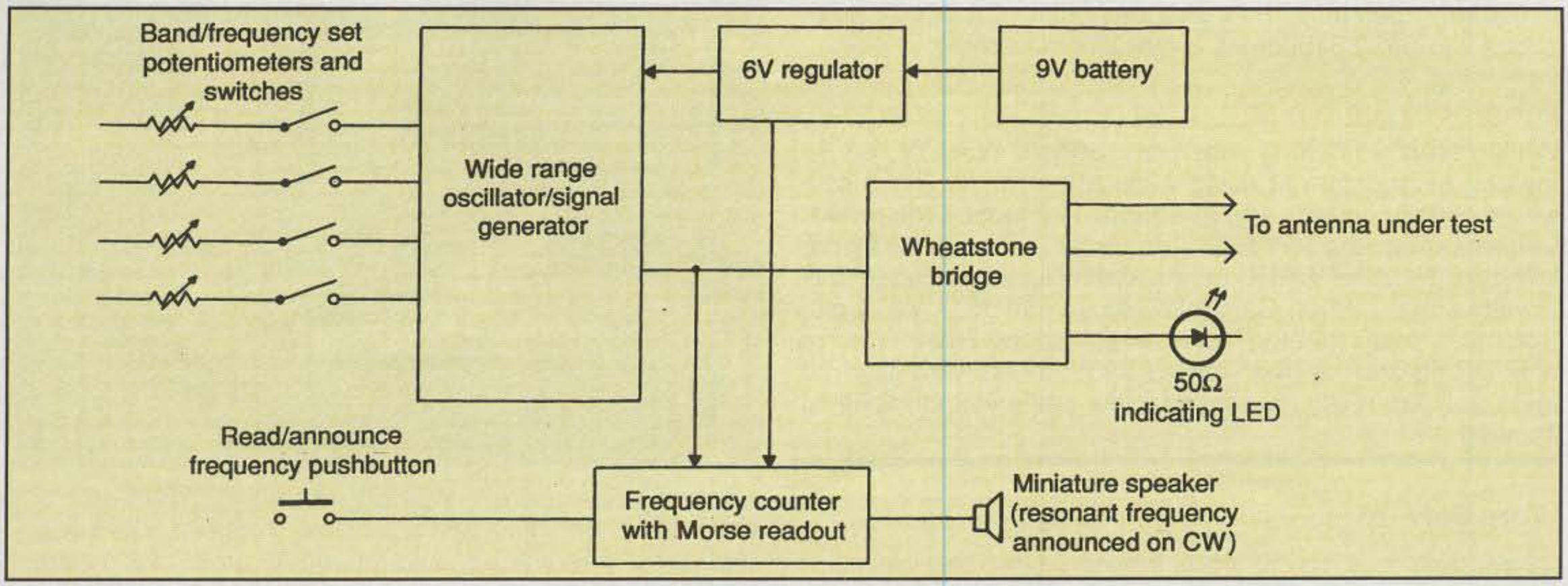

Fig. 1– Block diagram of the Tenna Dipper kit designed by KD1JV, and packaged/sold by NØMQ and the Four State QRP Group. It may look complex, but it is actually quite easy to assemble.

ing IC and a frequency-reading PIC driving a miniature speaker (figs. 1 and 2). As previously mentioned, the signal generator's frequency range is set by switches and trimmers with an adjacent on-board potentiometer providing fine-tuning over the selected frequency range. The PIC samples the signal generator's frequency, converts it to Morse Code, and applies it to the speaker. When the (connected) antenna's resonant frequency corresponds to the signal generator's frequency, the "left" and "right" sides of the Wheatstone bridge are balanced and there is no "difference voltage" to light the LED. When the antenna's resonant frequency and the signal generator's frequency are different, the bridge is unbalanced by the amount equal to the difference between 50 ohms on the input/left and 50 ohms on the load/right. The LED then lights according to the difference—bright if the difference/SWR is high (1.7:1 or greater), dim if it is low (1.2 to 1.4 or 1.5:1) and almost or completely off if the SWR is near 1:1. Using an LED rather than a meter is not exceptionally accurate, but it is close enough to fill most amateur needs—especially if you have access to a good SWR bridge for occasionally referencing the LED's brightness.

The Tenna Dipper is a real asset when operating portable, as unknown surroundings always influence SWR, and carrying a large and expensive antenna analyzer or wattmeter is not always practical. It also makes a good tuner/pretuner. In this case, you preset the Tenna Dipper to a desired frequency, connect it to the tuner's input, adjust the tuner for a dim or extinguished LED, then connect your transceiver in place of the Dipper and operate. The Tenna Dipper is low-priced ($25) and available from Gene Sailsbury, NØMQ, 603 North Free Kings Hwy., Pittsburg, KS 66762 (no telephone or e-mail info available).

Elecraft K1/K2 Update

In the commercial-gear area of HamCom, Eric Swartz, WA6HHQ, of Elecraft introduced some interesting new options for the popular K2 transceiver kit (for an extensive review of the K2, by Simon Lewis, GM4PLM, see the Summer 2003 issue of *CQ VHF* magazine). The big attention grabbers included a plug-in DSP board and a 60 meter-enabling board. The DSP board has 12 digital filters—4 for SSB, 4 for CW, and 4 for data modes. The filters are front-panel adjustable in both width and center frequency (via the main tuning knob; no "rebuilding" required) and work in cascade with the K2's existing/included filters. The DSP also includes an auto-notch feature for eliminating "tune up" carriers and adjustable noise reduction for assistance in copying weak signals. Details on the 60 meter mod board are sketchy, but it basically adds five frequencies/channels to the K2's transmit/receive capabilities,which is much more logical than opening a rig to transmit on any frequency.

Although not officially new, a K1 with an internal battery pack of eight AA cells caught our attention. Equipped with the optional pack, the K1 becomes a super-small, self-contained rig ready for action anytime, anywhere!

My kit-building time is extremely limited, so I personally have not checked out a K1 or K2 (I am pedaling as fast as I can, but still losing ground!). Judging by the large number of folks using them on the air and the fact everyone is keeping rather than selling them, the K1 and K2 must be outstanding rigs. They may even become QRP classics such as the Heath HW-7, HW-8, and HW-9. More information (and rigs!) are available

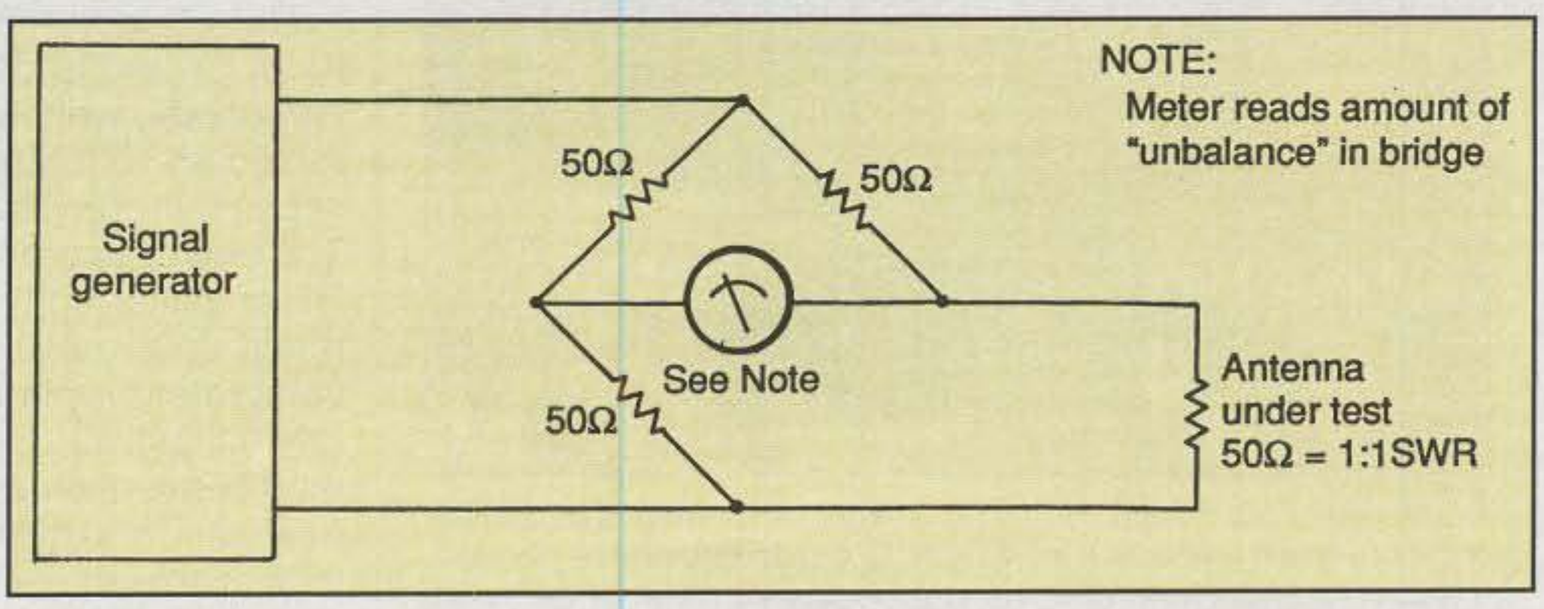

Fig. 2– Basic circuit and operational concept of a Wheatstone Bridge. When the two 50 ohm resistors on the left and the two 50 ohm resistors on the right (one of which is the antenna under test) are equal, the bridge is balanced and the meter reads zero. When an antenna's resistance is not 50 ohms, the meter indicates the amount of unbalance.

direct from Elecraft at P.O. Box 69, Aptos, CA 95001 (telephone 831-662-8345, or via <www.elecraft.com>).

A Rompin 'Lil HW-8

While recently chatting with Gary Borich, W5UDV, on 30 meters, his mention of using a classic Heathkit HW-8 at 5 watts output caught my attention. As most "seasoned" QRPers know, the HW-8 was produced several years prior to existence of the WARC bands and typically produced only 2 watts output. When Gary followed up our QSO with a picture of his setup (photo F) plus explained the HW-8 was his only HF rig and he had worked 86 countries with it on 30 meters, I was really impressed. Now that's vintage QRP at its best!

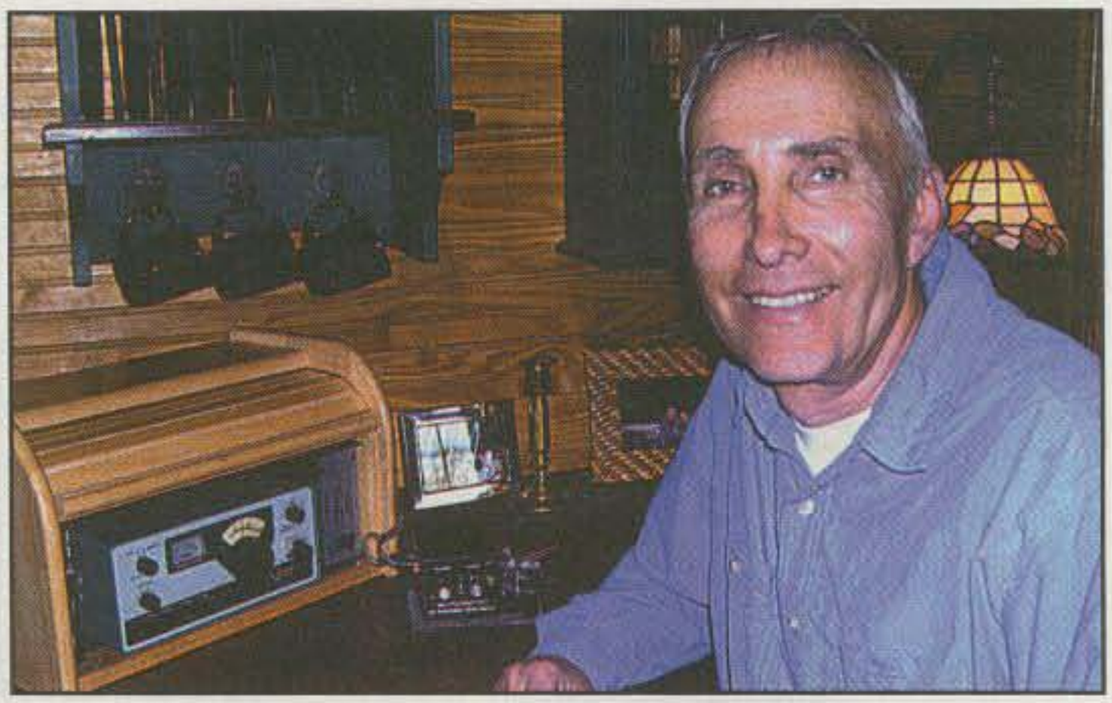

Photo F– Gary Borich, W5UDV, with his QRP-in-a-breadbox station. Setup consist of a classic Heathkit HW-8 "modded" for 30 meters and 5 watts output, an LDG Z-11 automatic antenna tuner, power supply, and keyer. Roll-top cabinet was obtained from a variety store (Target). Gary has worked over 85 countries with this trim, petite setup. Photo via Gary, W5UDV)

Photo G– The new, version 2 Hot Water Handbook *written and sold by QRP Hall of Famer Mike Bryce, WB8VGE, contains 100 pages of terrific mods, updates, and improvements for Heathkit's famous HW-7, HW-8, and HW-9 transceivers (shown gathered in support around the book).*

Naturally, I was curious, and I asked Gary how he "upgraded" the HW-8. His answer was fairly straightforward and easy to follow. The first step—finding an HW-8 in like-new condition—was the most challenging. The rest was easy. What an ideal way to breathe new life into a famous old rig!

The 30 meter conversion was devised by Howell Ching, KH6IJS, and is described in the new version 2 *Hot Water Handbook*, written by Mike Bryce, WB8VGE. It consists of replacing six capacitors and one crystal, eliminating three capacitors, rewinding three coils, and readjusting six coils. The power-upgrade mod involves changing the HW-8's final RF amplifier from a 2N4427 to an ECG488, rewinding four toroid coils that have changed inductance over the years, completely replacing two coils on new toroid cores, and retweaking all turns on coils (approximately six). The full mod/conversion usually can be accomplished in one or two evenings, and the brand-new version 2 *Hot Water Handbook* is available direct from Mike, WB8VGE, at 955 Manchester Ave. SW, North Lawrence, OH 44666 (telephone 888-476-5279, or <www.theheathkitshop.com>).

That overflows our space for this time, friends. Thanks for your continued support, and keep on having a ball with QRP!

73, Dave, K4TWJ

Zero Bias *(from page 6)*

power companies are no doubt among regular contributors to Congressional campaigns. But, to coin a phrase, "we the people" have something that power companies don't: votes. Elected officials *want* campaign contributions, but they *need* votes. Letters from a dozen constituents on a single "non-mainstream" topic carry a lot of weight in most Congressional offices. Plus, right now, power companies and the FCC are not winning popularity contests on Capitol Hill.

Many members of Congress already think the FCC overstepped its bounds in terms of allowing fewer companies to own more broadcast stations, and may be looking to pull in the reins a bit. Power companies are coming under tremendous pressure from Congress, the media and the public to put more resources into upgrading their power distribution systems—possibly including resources that might have been earmarked for BPL but that now may need to be redirected to what ARRL President Jim Haynie, W5JBP, calls "PPL," or "Power over Power Lines."

Add to that a few dozen well-written, well-reasoned, letters to every member of Congress (from voters in *their* districts), explaining how BPL will wipe out hams' ability to provide emergency communications over regional and long-distance paths; how it will affect international broadcasting, public safety agencies using the low VHF band, and other HF/low VHF users; plus the potential for interference *to* BPL users from properly-operating, federally-licensed radio stations, and there just might be enough pressure on the FCC to back off its apparent intention to make BPL happen no matter who complains. We can make the system work for us, and if we want to have continued use of the HF and low VHF parts of the spectrum, then we must. Get the facts, write clearly and concisely, and educate your representatives. Our future depends on it.

73, Rich, W2VU

Thank you to our Huntsville Helpers! Flight cancellations as a result of the northeast power blackout kept CQ Ad Manager Arnie Sposato, N2IQO, from getting to the Huntsville Hamfest. We kept our booth well-staffed, though, "with a little help from our friends": from left, Millie (KD4SHM) and CQ columnist Karl (W8FX) Thurber; Editor Rich Moseson, W2VU; CQ columnist Dave (K4TWJ) and Sandy (WB4OEE) Ingram, along with (not pictured) hamfest volunteer Allie Stone, KG4RLT, and "Newsline" Producer Bill Pasternak, WA6ITF, who took this photo. Many thanks to you all.

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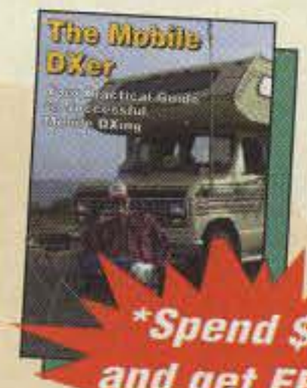

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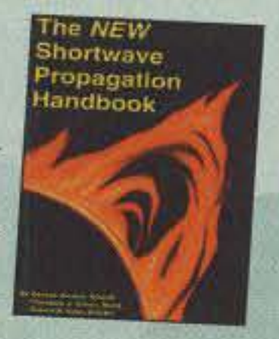

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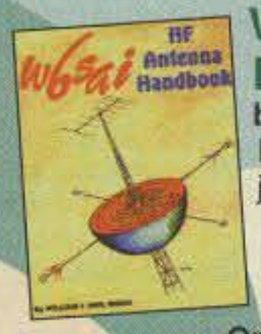

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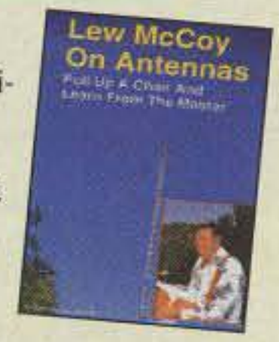

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BY BOB JOSUWEIT, WA3PZO

Personal Locator Beacons
New Challenge for Ham "Fox Hunters"

Contributing Editor Gordon West, WB6NOA, is filling in this month as a guest columnist. —W2VU*

Emergency radio beacons have been around for years, and have been used either as emergency position indicating radio beacons (EPIRBs) aboard boats at sea or as emergency locator transmitters (ELTs) aboard aircraft. Ham operators have worked closely with the United States Coast Guard Auxiliary, Civil Air Patrol, and local search agencies when called upon to help track down usually-accidental activations of one of these transmitters. Ham organizations such as the Santa Barbara Amateur Radio Club have been tracking down these emergency beacons for over 14 years by guiding the local rescue teams to the source of the signal. This group alone has assisted local authorities through:

7 airplane crashes
4 boating emergencies
52 accidental airport activations
22 accidental harbor activations
16 accidental land activations

A New Service

On July 1, 2003 the Federal Communications Commission began to allow the sale of personal locator beacons (PLBs) that transmit on 406.025, 406.028, and 121.5 MHz. The 406 MHz signals will be used mostly for satellite location, while the 121.5 MHz signal will be used primarily for close-in tracking. Signals at this frequency offer ham radio T-hunters (transmitter hunters) similar propagation challenges to those found on the 2 meter band.

The new personal locator beacons are authorized under the Personal Radio Service, Part 95, Subpart H, and are specifically designed for use on land when there is absolutely no other way of signaling for help. The 16 ounce, belt-worn, personal locator beacon has been permitted for use in Alaska since 1994 under an experimental program designed to test the feasibility of PLB usage throughout the United States. It was due in part to the success of the PLB program in Alaska, in which over 250 individuals have been rescued, that the FCC authorized PLBs for use nationwide beginning last July 1. The U.S. now joins many European countries, Russia, Australia, and Canada in permitting the use of 406 MHz personal locator beacons.

History Lesson

The emergency radio beacon "service" was developed in the early 1970s, primarily for airplane and commercial ship use in a dire emergency. Aircraft emergency locator transmitters (ELTs) activate upon impact within certain forward and downward G forces. The marine equivalent is the emergency position indicating radio beacon (EPIRB), which activates by floating free at a certain depth or by contact with salt water. Civilian transmitters emitted a signal on 121.500 MHz. Military beacons transmitted on 243 MHz. Search aircraft flying overhead would monitor these frequencies and pick up the signals.

Frequently, however, no airplane was overhead to pick up these 50–100 milliwatt VHF signals. The need for an ever-present listening and positioning system became apparent. Consequently, the COSPAS/SARSAT[1] satellite system was developed in 1979 by the United States, the Soviet Union, Canada, and France to monitor and alleviate missed beacon distress calls.

The COSPAS/SARSAT system consists of low-earth-orbit (LEO) satellites in a near-polar orbit, circling every 100 minutes, moving at 5 miles per second. Over a 12 hour period at least one satellite will eventually see every inch of the Earth.

When a COSPAS/SARSAT satellite receives an emergency signal, it immediately relays the signal to one of 46 ground stations, referred to as local user terminals (LUTs). These, in turn, pass the

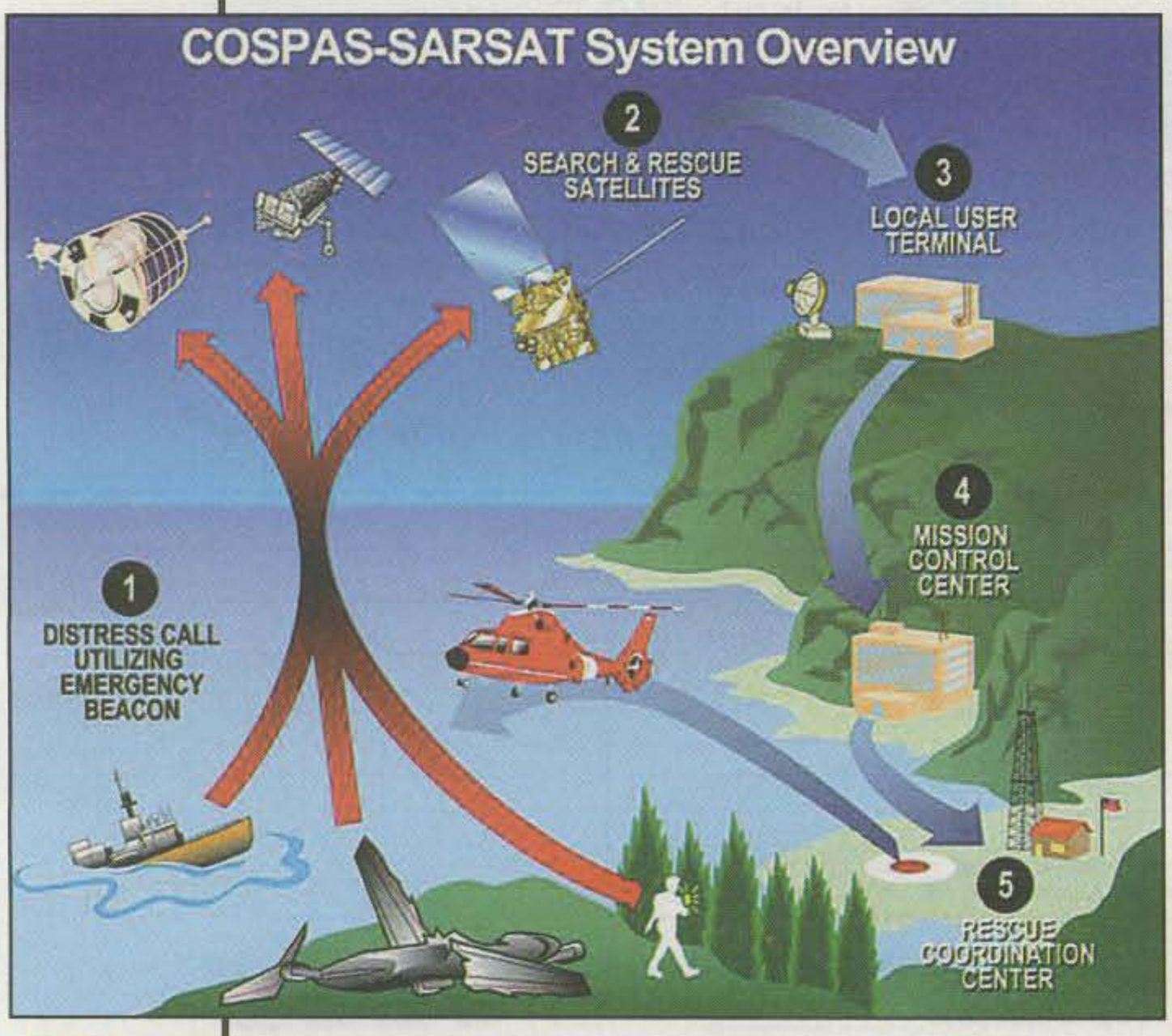

Fig. 1– Pictorial view of how the COSPAS/SARSAT satellite system picks up a signal from an emergency beacon and relays it to rescuers. (Courtesy NOAA)

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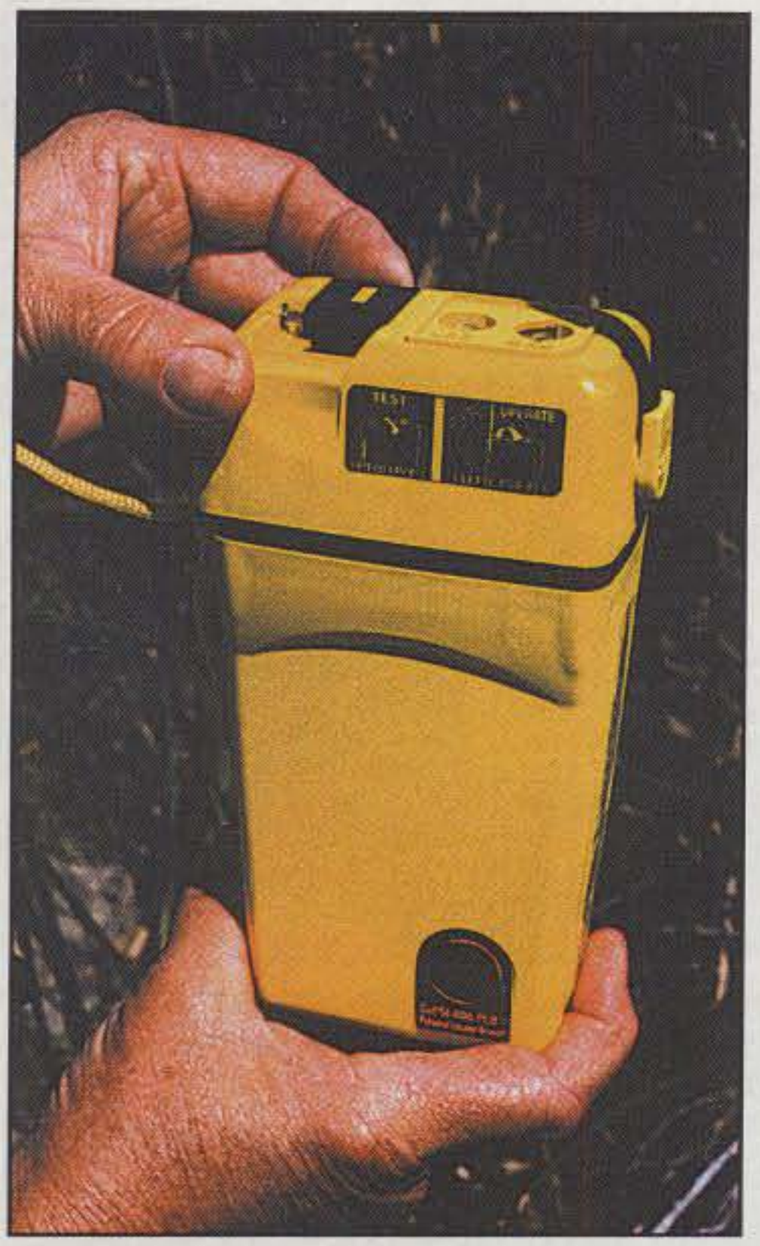
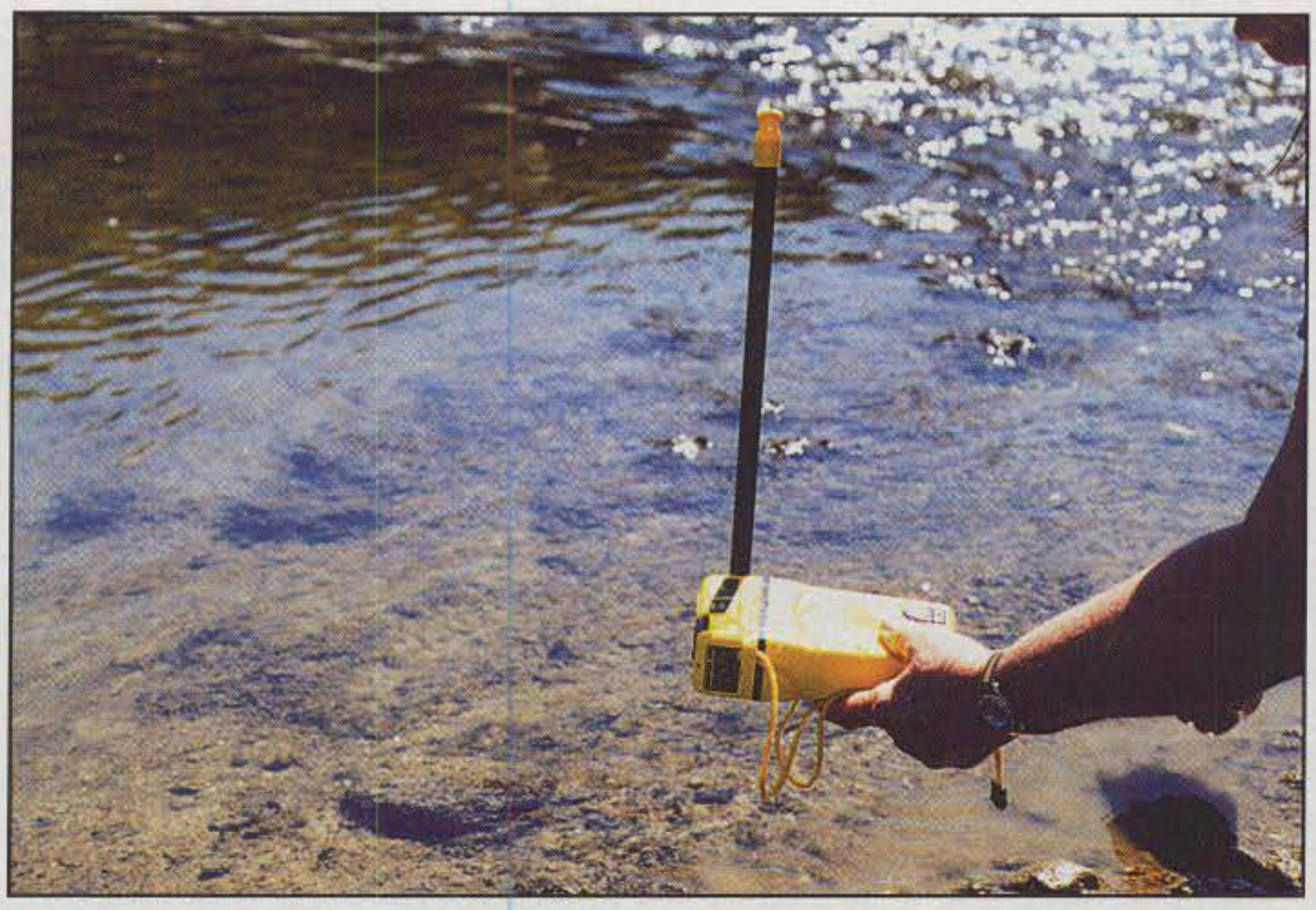


Close-up view of one model of personal locator beacons, or PLBs. They have been legal for use anywhere in the United States since July 1. (Photos by the author unless otherwise noted)



PLBs can be useful in the event of an emergency on land or even in a river, since they're built to be waterproof.

information on to the mission control center (MCC) for that region, then (in the U.S.) to the Air Force for inland emergencies or Coast Guard for marine rescue coordination. Finally, local search-and-rescue units may be notified through Civil Air Patrol or by state or local officials. The COSPAS/SARSAT agreement calls for a minimum of two American and two Russian satellites operating at all times. Currently, there are six satellites, all in good health, getting a "full view" of the whole planet every three hours.

Success Breeds Problems

Around 35 countries participate in this emergency satellite program, and as more and more airplanes and boats equip themselves with ELTs and EPIRBs, not only have rescue activations begun to increase, but along with them, a disproportionate amount of false activations. In fact, over 97% of ELT/EPIRB activations on 121.5 MHz are accidental. Until the activated unit can be tracked down, or goes silent from dead batteries after two or three days, the airwaves are clogged.

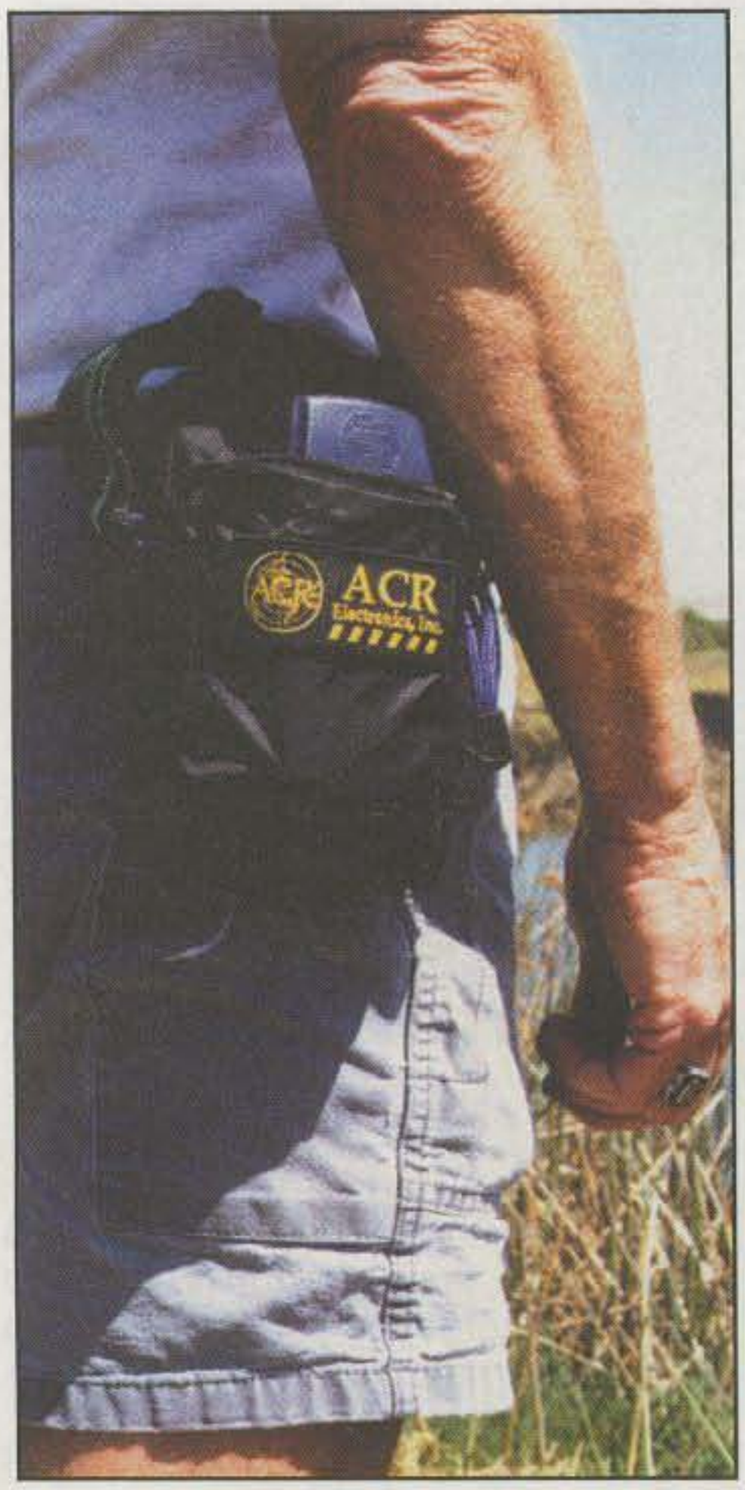
The relatively new GEOSAR[2] component of the COSPAS/SARSAT system consists of several satellites in geosynchronous Earth orbit to provide a continuous view of the Earth, although the view of polar caps is a bit limited. The GEOSAR satellites, as well as newer low-earth-orbit satellites, have onboard receivers that also tune in two new international emergency beacon data channels, 406.025 MHz and 406.028 MHz. All of the latest marine, air, and personal locator beacons now include a 5 watt, 406 MHz data transmitter, active for just 500 milliseconds (one half second) every 50 seconds, sending a data burst of specific beacon identification. In fact, the COSPAS/SARSAT program is beginning to phase out satellite monitoring on 121.5 and 243 MHz.

When a user buys the new 406 MHz beacon transmitter, it still includes the 25 to 50 milliwatt, 121.5 MHz, 2-to-4-times-a-second locator sweeping signal, which will only be used for local direction-finding after the satellite phase-out is completed in 2009. The 406 MHz data burst (which will continue to be monitored by satellite) gives rescue agencies a positive ID that there is indeed an activated beacon—and they can quickly find out exactly *which* beacon is sending the signal. The signal is processed by all ground LUT stations within range of the relaying satellite, and the identification is forwarded by automatic telephone link to the United States mission control center (MCC) in Suitland, Maryland, one of 21 interconnected MCCs worldwide. The registration information is then looked up by the National Oceanic & Atmospheric Administration (NOAA), and a phone call goes to the registered owner's emergency phone contact to ask whether this may be a real emergency activation.

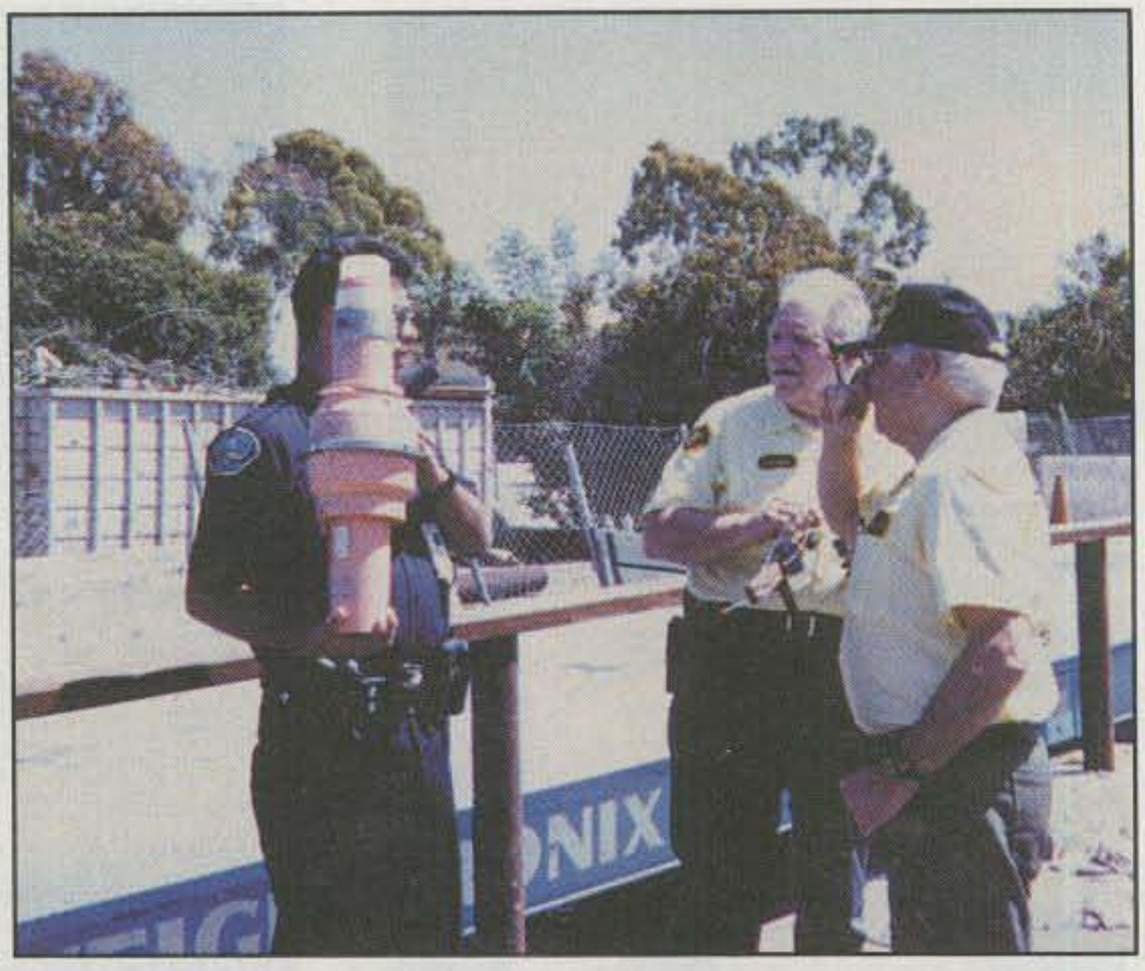
Depending on the transmitter and what's connected to it, the half-second-every-50-second data burst on 406.025 or 406.028 MHz might also contain the GPS coordinates of the emergency radio beacon. Some shipboard EPIRBs actually have a GPS receiver built into the equipment, while other aeronautical and land-portable emergency radio beacons will simply plug into almost any type of portable GPS receiver. Although the first new personal locator beacons will offer GPS input with an optical patch cable, I expect to see a new breed of beacons priced at around $800 that might actually contain the GPS chip set actually built into the beacon itself.

The 406.025/406.208 MHz signal is only on for a half second every minute, so it is *not* suitable for direction finding. However, the satellites, using Doppler shift and other measurements, can determine the approximate location of the activated transmitter, down to an elliptical area of 7 miles north/south and 15 miles east/west. The 406 MHz signal gets the rescue personnel started quickly, rather than the 6 to 8 hours previously needed to reconfirm a signal found on 121.5 MHz.

All older ELTs and some older EPIRBs continuously transmit 75–100 milliwatts at 121.5 MHz, except for the half second that the emergency beacon transmits the 406 MHz signal. This



A different PLB model, this one is easily carried in a belt pouch.



A Santa Barbara (California) police officer holds a discarded EPIRB transmitter, which was tracked down in the trash at a recycling center by two members of Santa Barbara South County ARES. (N6ZKJ photo)

During a drill, a Santa Barbara ARES member homes in on a practice ELT signal while a search-and-rescue team member takes notes. (N6ZKJ photo)

makes 121.5 MHz the frequency of choice for radio direction finding and homing purposes.

For land rescue situations, the United States Air Force rescue coordination center notifies the state agency responsible for search and rescue, per its agreement with the state involved. Search-and-rescue teams are then activated, sometimes assisted by the Civil Air Patrol, amateur radio operators, or other volunteers. Hams experienced with direction finding, also known as "fox-hunting," can be ideal helpers. One such group is the Santa Barbara Amateur Radio Club in California.

"The Santa Barbara Amateur Radio Club (SBARC) has the oldest and most extensive emergency locator transmitter monitoring system tied into amateur repeaters," comments Lou Dartanner, N6ZKJ, SBARC's Vice-President of Emergency Service and the ARRL Emergency Coordinator for the Santa Barbara South County Amateur Radio Emergency Service (ARES) unit.

The Santa Barbara County ARES members are gearing up for many more calls now that portable emergency radio beacons may be used by hunters, campers, skiers, snowmobilers, and other outdoor enthusiasts venturing into terrain that may not have cell-phone coverage.

"We believe that these rule changes will further the public interest by facilitating the use of radio spectrum to increase the safety of the general public in life-threatening conditions in remote environments after all other means of notifying search-and-rescue responders have been used," adds the Federal Communications Commission. The FCC anticipates that the personal locator beacons will be sold in various outdoor supply stores, camping supply stores, RV stores, and electronics stores, and through on-line and catalog distributors. Prices appear to be ranging between $300 and $700, depending on additional features.

"The Santa Barbara district ARES group has a memorandum of understanding with the Santa Barbara County Sheriff's Department to assist in locating, and turning off, inadvertently activated ELTs," explains Lou Dartanner, adding, "ARES can also assist in searching for an ELT on a missing or downed aircraft. We also help the U.S. Coast Guard by giving them information from the ELT monitoring system that our

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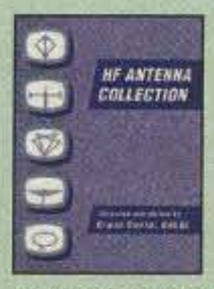

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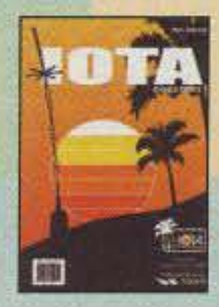

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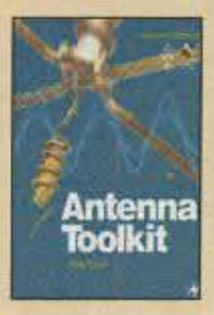

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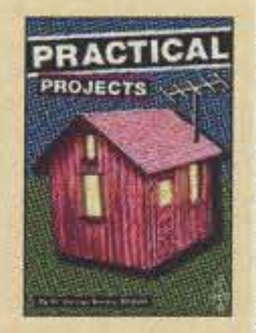

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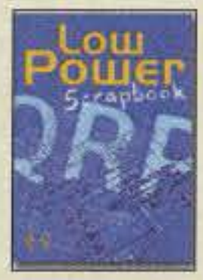

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own group operates, as well as fielding teams to give bearings from land to a location off shore."

All ham emergency groups should consider what the Santa Barbara club does for training. It offers an 8 hour training course in searching for the 121.5 MHz signals. The field exercise consists of practicing the basics of using direction-finding equipment, followed by two "hidden transmitters," one found by using DF antennas on vehicles to get close, and the other an actual ELT (on a test frequency) hidden in some weeds. The club also has 121.5 MHz monitors on all five of its repeaters. Several of the repeaters transmit an alert tone and/or pager tone when an ELT is detected at these high repeater sites. The Santa Barbara Amateur Radio Club invites those interested in becoming ELT hunters to log onto its web page at <http://www.sbarc.org> to learn more about how hams may take part in search-and-rescue operations.

Well-known ham direction-finding book author Joe Moell, KØOV, also conducts weekend transmitter hunts which allow amateur operators to perfect their skills in tracking down VHF signals, whether they are on the 2 meter ham band or on 121.5 MHz.

Overload?

So where do hams come in? This fall and winter it is expected that thousands of "weekend wilderness explorers" will be carrying these personal locator beacons, so the chance of a distress call from land will be higher than ever before. State, county, or city agencies tasked with tracking down emergency radio beacons may soon find their resources exhausted by this new type of beacon in the marketplace. Interested amateur radio groups should consult with their local, county, and state search-and-rescue agencies, explaining the training exercise they conduct (foxhunts) and how they can help with a search for a 121.5 MHz signal.

"Everyone who travels in the wilderness wants one," comments John Bell for ACR Electronics, one manufacturer of an FCC-approved personal radio locator beacon. Bell adds there is no monthly fee connected with this satellite-based distress radio beacon system. However, he notes that an activated radio beacon in a non-emergency situation may cost rescue agencies thousands of dollars in time and resources needed to track down the activated signal; and if the distress call is deemed a hoax, the violation is punishable by up to six years in the slammer, a quarter-million dollar fine, and restitution to the rescue agency for all

"Injured hiker" found — it took rescuers, guided by hams, just an hour to find the source of the emergency locator signal and the "injured hiker."

costs incurred responding to the distress signal.

Once the personal locator beacon is activated, thousands of dollars of our taxes may get tapped as a search aircraft or helicopter takes off to locate the source of the beacon. There may also be search-and-rescue and amateur radio direction-finding teams spending hundreds of hours looking for the activated PLB. It is also going to cost the user over $100 to get the beacon battery replaced after activation. Therefore, the word needs to spread that anyone activating a personal radio beacon should only do so in a life-and-death situation where there is absolutely no other way to signal for help.

Emergency groups throughout the country have already launched education programs for those purchasing the new PLB equipment before they head out to parts unknown. The basic instructions for activating the portable radio beacon are clear—only activate as a last resort! Also, they stress the importance of a "good" phone number which a rescue coordination center may call in the event of an activation to see whether there really is someone out in rough terrain who needs help.

The instruction manuals strongly urge the user *never* to initiate a PLB call if there is an alternative way to seek help. If the cell phone is working, use it to get help, not the emergency radio beacon. Send someone back to base camp to get help, rather than activating the radio beacon. If you think someone will discover you in the next few hours, hang in there until help arrives. *Do not activate the radio beacon until you have exhausted every last avenue of getting help another way.* However, if there is no alternative, *do* use it. Had that unfortunate rock climber in Utah had a PLB, he could have signaled for help when his arm was pinned by an 800 pound boulder.

Amateur radio operators trained in locating emergency personal locator beacons will be able to help. Ham radio emergency communicators now have a new "mission." Get ready.

For more information...

Additional information on tools and techniques for tracking emergency locator transmitters (including EPIRBs and PLBs) is available on the following websites:

- Santa Barbara Amateur Radio Club: <http://www.sbarc.org>
- Northwest Emergency Locator Transmitter Team: <http://home.pacifier.com/~nwelt/>
- Front Range Electronic Direction Finders: <http://www.fredf.org>

Three manufacturers of direction-finding equipment with built-in receivers are:

- L-Tronics: <http://www.ltronics.com>
- ACR Electronics: <http://www.acrelectronics.com>
- Finntracker OY: <http://www.trackerradio.com>

A comprehensive source of information on amateur radio direction-finding, including "T-hunting" and equipment you can build, is on Joe Moell, KØOV's website, <http://www.homingin.com>.

For more information on the COSPAS/SARSAT satellite system, see:

- <http://www.sarsat.noaa.gov>
- <http://www.cospas-sarsat.org>

Info courtesy Lou Dartanner, N6ZKJ

magic in the sky

BY JEFF REINHARDT,* AA6JR

The Shoe Has Dropped!

This was written in the immediate aftermath of the 2003 World Radiocommunication Conference, which, among its transactions, made Morse code optional by country as a component of amateur radio licensing. Already a few countries have dropped the Morse requirement, notably the United Kingdom and Switzerland.

In my first draft of this column, I entitled it "Waiting for the Other Shoe to Drop" and said it was only a matter of time until there was a proposal to drop the Morse requirement here in the U.S. The day I submitted it to *CQ,* it happened. (For details of the National Council of Volunteer Examiner Coordinators' petition, and others, see "Washington Readout" elsewhere in this issue. In addition, the full text of the proposal is on the CQ website.) Like so many issues that get decided, *how* this gets decided will open a whole raft of "what next" issues, such as refarming the HF band plans.[1]

The requirement for Morse proficiency on the HF bands had its roots in practical application. Specifically, when radio was in its infancy, code was the "only game in town" and the most reliable method for communicating with ships at sea. The *Titanic* disaster, and other events, made a case for monitoring the airwaves for distress calls, but how could you recognize such a call if you didn't know Morse? It became a requirement of radio operators and ultimately was adopted in international treaty. *[In addition, knowledge of code was required in order to assure the ability of amateurs to copy shut-down orders from the government if needed.—ed.]*

Over the years, Morse code proved its worth in the fields of maritime, aviation, and, of course, military communications. The Morse requirement for commercial and amateur operators created a ready pool of skilled communicators, but also created a common bond among those proficient in its use.

As technology advanced, the base value of Morse communications began to slide. Analog voice communications were quicker and easier, the creation of repeaters and satellite links made communications with any spot on the globe relatively easy, and advancements in encryption pushed Morse further down the communications hierarchy.

A Generation-Long Process

Indicators that Morse would one day go away began to show in the 1970s, driven by commercial communicators in both broadcasting and maritime interests. The FCC First Class Radiotelegraph license was the meal ticket of many a broadcast engineer, allowing operation of just about anything, including radio and TV transmitters. Sure, there were endorsements for radar and even a First Class Radiotelephone license, but the "big ticket" made its holders very employable. As technology advanced, though, and commercial operators looked to cut expenses, regulations were changed. Full-time, 'round-the-clock engineers were dropped at many radio and TV stations as requirements eased and a simple operating permit was all that was required at many outlets. Some years later, the Morse requirement was dropped for maritime operators, and rescue services announced that they would no longer monitor for CW distress calls.

The transition in amateur radio came more slowly. Initial proposals for a "no code" license caused upheaval (can you say "firestorm"?) in the ARRL and elsewhere for nearly 20 years. Proposals were made and shot down until the Morse requirement for Technician licenses was dropped in 1991. Arguments continue to this day on the possible transition of the amateur bands to CB-type communications and the so-called "dumbing down" of the licensing process.

Many amateur operators have clung to the Morse requirement, not so much as a functional asset, but as an initiation rite that demonstrates a "worthiness" to operate on the HF bands. Statements range from "I had to do it, so should you" to "It will get you through in an emergency."

Now, a Petition for Rule Making from the National Council of Volunteer Examiner Coordinators is asking the FCC to eliminate Morse as a requirement for an amateur radio license in the U.S. The bottom line is, I can't think of any logical reason why the FCC would (or could) reject such a proposal. In fact, rejecting it would fly in the face of logic.

Personally, I have no agenda on the use of CW. Yes, I'm an older 20 word-per-minute Extra, but so what? I got the Extra primarily to be a Volunteer Examiner and to enjoy full amateur privileges. I have worked some CW, but it's not my primary interest, and quite frankly, I wish I was better at it than I am (a fist of lead). Nevertheless, I have some good friends who are gifted at high-speed CW (35 to 50 wpm), and it's with simultaneous awe, respect, and admiration that I watch them operate.

The Fallout of a Post-Morse World

Every change that occurs brings on myriad consequences, some intended, some not.

Case in point: I don't think the breakup of the Bell telephone system was intended to interrupt my dinner every evening with a call from a differ-

*5904 Lake Lindero Drive, Agoura Hills, CA 91301
e-mail: <aa6jr@cq-amateur-radio.com>

[1]*The opinions expressed in this column are those of the author and do not necessarily represent those of CQ magazine or CQ Communications Inc.*

ent long-distance provider, but it is indeed one of the consequences.

So what happens if (when) Morse goes away as a requirement? Here's a partial list I've pulled together.

1. We *may* see an increase in HF activity. May? Yes. I believe most people really motivated to get on HF are already there. A 5 wpm requirement was attainable for a big contingent, far more so than the previous 13 wpm threshold. The second part of this has nothing to do with Morse code. Getting on HF requires an investment in equipment and an antenna, both of which require money and a commitment. Most newer communities severely restrict antennas (more on this below), limiting HF access to many who would like it, Morse or no Morse.

2. We need to re-think the HF band plans. Despite CW aficionados' concerns, their numbers will decrease and so will the use of their "reserved" bandwidth. In addition, CW is technically permitted everywhere, with the exception of the new 60 meter allocations. It may be time to get band plans out of the FCC rules and back among ourselves, perhaps examined on a regular basis by the ARRL or some other entity. After all, we're supposed to be self-regulating, yes? Is it time to scale back the CW allocations? What about voice, image, and digital modes? Do we need sub-bands at all?

3. It may be time to look hard at the license exam process. What is it that we really need to test for? And spare me the "dumbing down" arguments. At the ARRL National Convention in June, one speaker really drove home that point, saying he had taken his test in 1970. Nowhere on that test, he said, were there questions about satellite operating, FETs, logic circuits, digital modes, RF safety, and a host of other topics that are on today's exams. You still need to know "stuff" to get a license. It's just different "stuff." However, what are the important elements? The no-code Technician license has proven that the sky won't fall without Morse code. If you really listen to the HF bands, particularly some of the 40 and 80 meter "round table" discussions (highlighted some time ago in this column and elsewhere), testing for Morse has not ensured that all operators are smart, skilled, courteous, and technically proficient. There's probably a significant number of existing HF ops who couldn't pass a code test if you gave it to them today. And if you're an "old timer" who really thinks amateur radio has been "dumbed down," go online and take a test right now. Really.

4. What might we lose? One of the big benefits of Morse is its ability to be a "universal language." Using its handy abbreviations, it is possible to engage in conversation with a person whose language you cannot speak. CQ, QTH, RST, QRM, 73, and more at least provide a base set through which we can cross borders with ease.

5. In deference to the above, Morse code won't disappear overnight. It will have its boosters, preservation societies, and special events, but it will gradually fade away.

These are just a few of the topics I can identify. I'm sure there will be many more.

Somewhere you can still buy buggy whips, tubes for your classic Crosley, ignition points for your '55 Chevy, and other nostalgic items, but the message is clear: Time marches on. Like it or not, with the passing of the Morse code requirement, change is about to happen. How should we manage the new world of ham radio with a new generation of HF operators who won't have a clue about Morse code? It looks like we all have some thinking to do.

Different Subject—Antennas

As referenced above, antenna restrictions are probably the biggest threat to the longevity of amateur radio as we know it. Most newer housing developments have a policy against them. PRB-1 was a faint policy statement by the FCC asserting that communities should make a "reasonable accommodation" for antennas, but that only applies to local governments. It gives you no help in overcoming deed restrictions or "CC&Rs" (not in any way associated with John Fogerty, but rather the dreaded "covenants, conditions, and restrictions" on your property). It's more than a bit ironic to me, as a local elected official, that people will jump and scream about what the government may do, but they'll sign away some pretty significant concessions to a homeowners association that governs with an iron fist and with little remorse or sympathy. Government can't tell you what color to paint your house, but *they* sure can!

ARRL President Jim Haynie has chosen to focus legislative attention right now on the Spectrum Protection bill, which may finally have a chance to pass during this session of Congress. That leaves the Antenna Rights bill in limbo for now, but I agree with Jim's priorities. Without spectrum, there's nothing else to fight for. Nevertheless, we need antenna relief, and it should be the very next priority on the agenda at both the state and federal levels.

How can you help? Write to (don't e-mail) your representatives. No matter what you may have heard, it helps. Send a very brief note, maybe even on the back of a QSL card, asking for support of spectrum protection and antenna rights for ham radio operators. The shorter the better.

The recent passage of a PRB-1 type bill in California was a small victory for those who wrote notes and nudged their representatives. It's even more of an accomplishment when you consider the gridlock that has plagued the California legislature this year. Who knows, maybe they were happy they could just pass *something* and it didn't cost any money (which is important if you're already $38 billion in the hole).

The message here is that the process can work if you work the process. Using the internet, you can ascertain the name and address of your elected reps in less than a minute. Get on it!

After all, without you fighting for spectrum and antennas, there will be no "Magic In The Sky."

73, Jeff, AA6JR

BY DAVE INGRAM,* K4TWJ

Keys 2003
The Remarkable Romance, Part II

Amazing, but true! Amidst an era of internet-linked repeaters, relaxed licensing requirements, and digital audio evolutions, CW and keys are hotter than ever. Yes, and CW continues to prove its advantage for communicating with low power on the air every day. Case in point: It is early morning and there is a ZL calling CQ on 30 meters. We call him while running a scant 5 watts, and he replies immediately, giving us a 559 report. We switch over to 20 meters, spot a VU signing off with a DL, give him a quick call, and he too replies—with a 449 report. CW has more pull power than a John Deere tractor! May such thrills and romance last forever.

A number of readers suggested we swing from spring (see "Keys 2003 Part I" in the May issue of *CQ*) and feature a "keys special" during the fall, so we asked the "Queen of Halloween," Elvira, for her opinion. She not only agreed with the idea, she quietly revealed her own "Spookey" custom-made key by Bob Wertz, NF7E, in support (photo 1). That made sense to us. With her new humor-laden movie *Elvira's Haunted Hills* selling like crazy and shaking up video rental stores nationwide, this good-natured miss is having a key-down good time. (Movies/videos are available at <www.elvira.com>. Check it out, and sign her guest book too!) As a special Halloween treat for radio amateurs, Elvira is offering an autographed photo to the first three readers correctly identifying from whom she "lifted" Spookey's lever in the movie. (Hint: The lever is an oversized skeleton key. It has a large tassel on it in the movie, and Elvira used it to unlock the castle's dungeon door.) Send your answer to me at <k4twj@cq-amateur-radio.com>, and be sure to include your return e-mail address near the bottom of your message so it will not be deleted by the server. I will tally the results. Thanks, Elvira!

Photo 1– Hollywood's "Queen of Halloween," Elvira, reveals her own "Spookey" key custom-made by NF7E. The key's main arm is made from an oversize skeleton key like the one Elvira used to unlock the roadside castle's dungeon door the new video/movie Elvira's Haunted Hills. *(Photo courtesy Queen "B" Productions; rights used by permission.)*

Should you be unfamiliar with our special guest, Elvira's full/off-screen name is Cassandra Peterson, and she is actually an all-American redhead originally from Colorado Springs, Colorado. She has appeared in over 1000 TV shows, made several "Elvira" movies, and also finds amateur radio interesting. Who knows? Someday she may become licensed, visit Liberia on a wildlife rescue mission (she is also an animal rights activist), get a reciprocal license/callsign and return as EL Roman numeral 5 (V) IRA!

Our Hollywood highlighting tour continues with a view of the special cricket-type paddle Gordon Crowhurst, G4ZPY, custom-made for professional musician Eric Bikales, AC6NT (photo 2). Since Eric composes and records his own musical arrangements for television, plus tours with Neil Sedaka, the paddle is a good reflection of his artistic interests. It is made with three keys from a Yamaha grand piano. The left and right keys are dot and dash levers, and the middle/black key serves its function controlling and speed-adjusting a push-button for the built-in Tick keyer. As most dedicated CW operators know, incidentally, G4ZPY's hand-made keys and paddles are world-famous for their exquisite beauty, quality, and superb operation. Gordon is presently backlogged due to health limitations, but his keys are still in very high demand among CW devotees worldwide. Write to G4ZPY at 41 Mill Dam Lane,

*4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

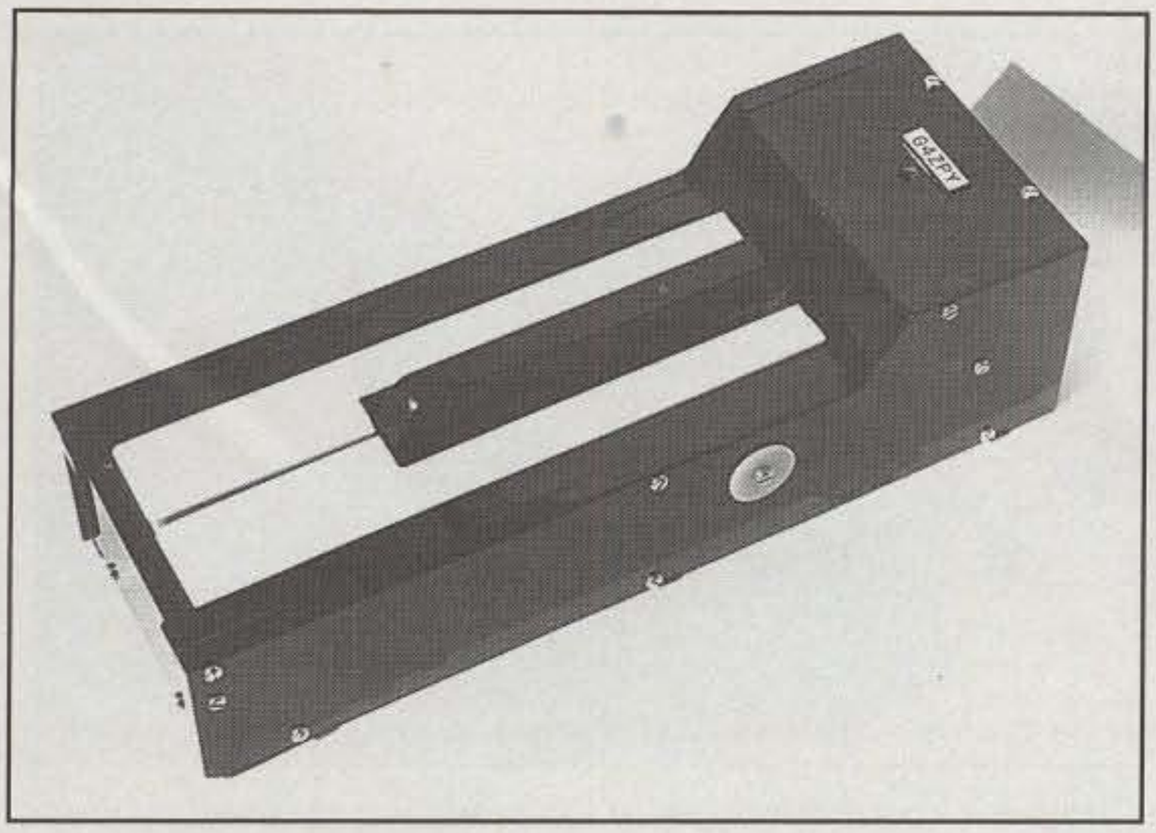

Photo 2– The grand old master of precision keys, Gordon Crowhurst, G4ZPY, recently made this cricket-type paddle for professional musician Eric Bikales, AC6NT. Paddle is made from three keys of a Yamaha grand piano. The left and right keys are dot/dash levers, and the middle key is a speed/function-controlling push-button for the internal Tick keyer.

Burscough, Ormskirk, Lancs, L4Ø 7TG England for more details on his keys. Also listen for Eric, AC6NT, operating portable (on CW naturally) while touring on the road.

Show Stoppers

Following our Hollywood hits with more glitz and glamour items proved a formidable challenge, but an all-out effort

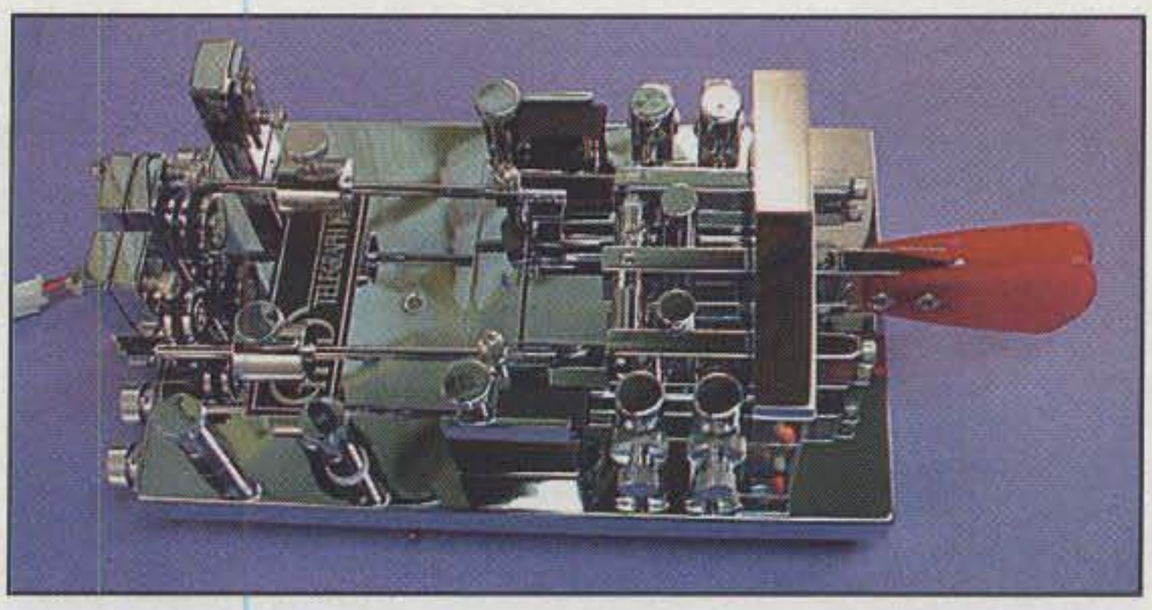

Photo 3– Bewitching, bedazzling, and beautiful best describe GHD's new model 907 combination semi- and fully-automatic "Superbug." Key sports dual levers and dual pendulums, optically coupled contacts, and a brilliant chrome finish topped with red fingerpieces. Small red LEDs near the center yoke blink with generated code during use. Item is available from Morse Express.

uncovered three special items worthy of recognition. First is GHD's new combination semi- and fully-automatic bug shown in photo 3. The key sports dual levers and dual pendulums, one for making dots and one for making dashes. The levers can be operated independently (with your CW skill and wrist coordinating the action) or linked together for single-lever operation like a regular (but automatic) bug. This 6 by 4 inch, 5 pound marvel also has optically linked contacts plus small red LEDs that flicker as you send code for visual rather than physical or "tactile" feedback as with a regular bug. The GHD is not low priced, but it is truly the ultimate key for the

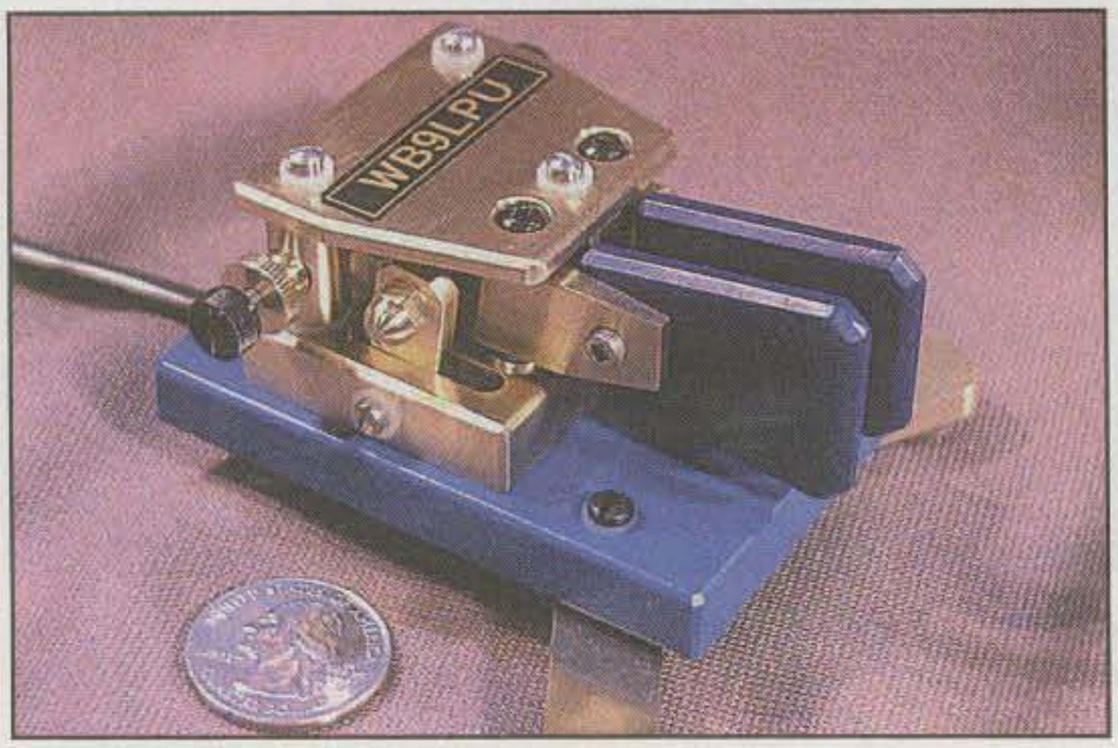

Photo 4– The new, remarkably impressive "Parkwood" paddle custom-made and in limited quantity by Richard Meiss, WB9LPU. The little iambic treat measures 2"H × 2"W × 3"D, and is available with brass or aluminum mechanism, spring or magnetic tensioning, and with exotic wood or colorfully painted steel base. Paddle looks and handles great, and it is available direct from WB9LPU. Check it out!

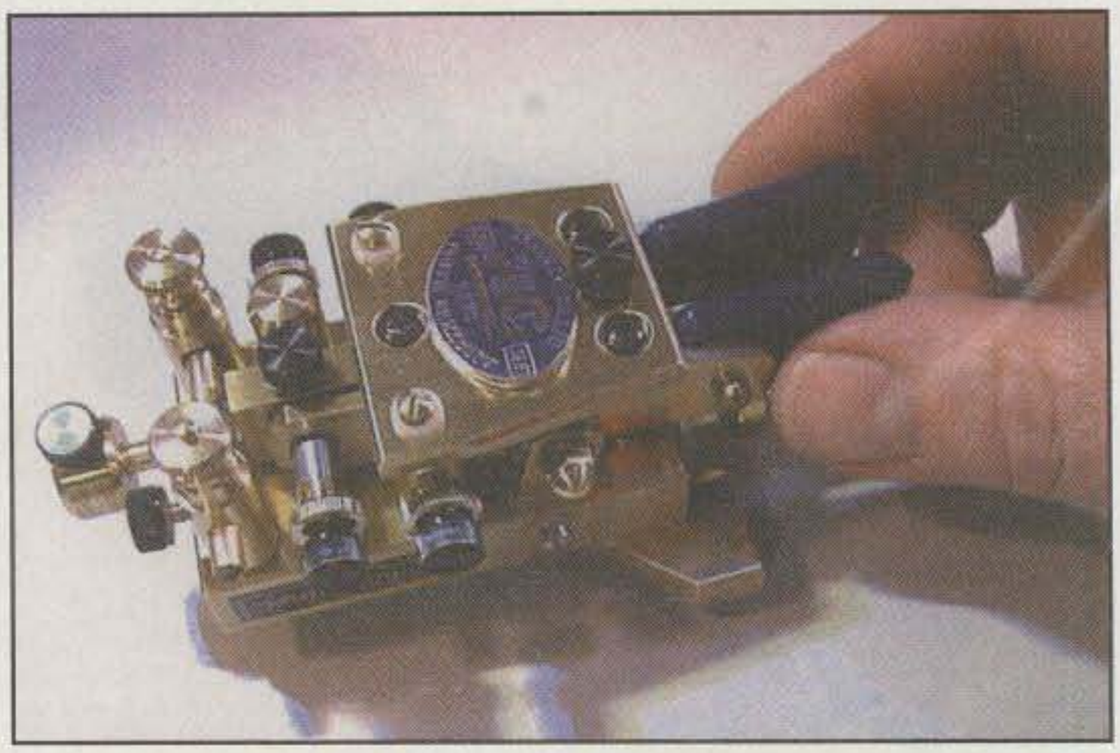

Photo 5– You are looking at the world's smallest fully functional bug, another work of art in brass made in limited quantity by Richard Meiss, WB9LPU. Key measures approximately 1.5 by 3 inches, is all brass with polished blue fingerpieces, and can also operate as a dual-lever paddle. This little dream key is also available from WB9LPU.

really serious CW operator! It is available right now from Morse Express, 2460 S. Moline Way, Aurora, CO 80014 (<www.MorseX.com>, order line 1-800-238-8205).

Two additional, totally captivating Morse delights are the unique dual-lever "Parkwood" paddle and micro bug made to order and in limited number by Richard Meiss, WB9LPU (photos 4 and 5). The paddle has a cleverly designed and well-protected aluminum mechanism fitted with rich-blue fingerpieces and mounted on a matching blue steel base with swing-out feet for solid "stay put" operation. It is a real eye-catcher! That design is only one of several options. The paddle is also available with a smart-looking aluminum mechanism, red fingerpieces, and a red base, or in a brass and cocobolo wood base version, and they, too, look awesome. I have been using one of these beauties for several months—in the shack, in the den, and even mobile—and really like its smooth, positive action. It's a winner! Richard, WB9LPU, makes some outstanding paddles!

The (WB9LPU) micro bug is barely larger than the paddle, but it really works quite well. Like the paddle, the micro bug has fine-thread adjustments and a small footprint and grabs your attention like a magnet. There is a real thrill in using a special bug or custom-designed paddle that is simply unequaled! We know of no better way to experience that thrill and enjoyment first hand than with a WB9LPU paddle or bug (go for the gusto and get them both!). There is probably a waiting list, so get in line before the list gets longer. Contact Richard, WB9LPU, direct at 2626 Parkwood Dr., Speedway, IN 46224, by telephone at 317-297-1253 or via e-mail: <wb9lpu@earthlink.net>.

Speed-X Lives On!

Over the years, several outstanding telegraphers and designers of magnificent Morse instruments have written their names in the annals of time. These notable figures include H. G. Martin (Vibroplex), J. H. Bunnell, Ted R. McElroy and the original producer of those neat little Speed-X keys, Les Logan of San Francisco. Specific details of Logan's background are rather sketchy, but he apparently began by making two or three styles of hand keys and three or four models of bugs during the 1930s. The keys were attractive, well-built, and affordably priced, so they quickly became popular and sold like crazy. Logan's Speed-X bugs were particularly unique, as they sported a Tee-bar yoke similar to Mac keys, twin triangular fingerpieces and replaceable dot/dash contacts. One model Speed-X was even smaller than a Vibroplex Blue Racer (a beautiful little gem!).

Sometime between 1945 and 1949, Les Logan sold Speed-X to E. F. Johnson in Waseca, Minnesota. Johnson double-labeled some items as E. J. Johnson/Speed-X, added a plastic-case bug (possibly acquired from Skilman Co.), and continued producing the line until the late 1960s or early '70s. Johnson then sold Speed-X (with the bugs phased out) to William M. Nye, and Nye moved it to Bellevue, Washington, in the general area where ICOM America and SGC are based

Photo 6– Legendary Speed-X hand keys originally designed by Les Logan of San Francisco are still made and available today from William M. Nye Co. and key dealers nationwide. They look good and work well and are genuine representations of telegraphic history in the U.S. Items shown here are an oval- base key with nickel-plated hardware (left) and with brass hardware on heavy brass base (right). Note famous Speed-X logo in the middle of the arm.

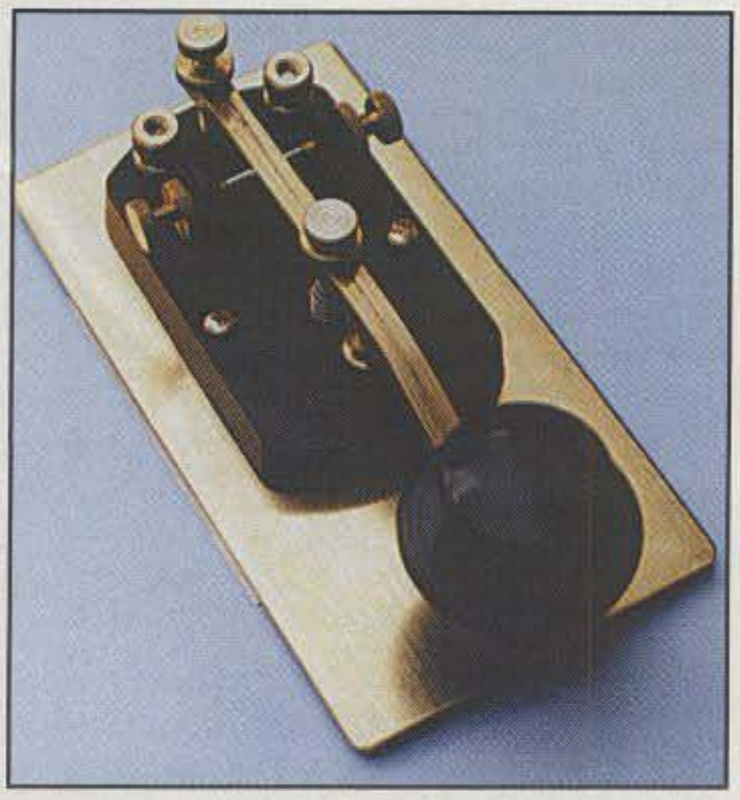

Photo 7– This rectangular-base Speed-X key is another all-time favorite pumper. Like the oval-base models, it has gold-plated contacts and is available with standard or Navy-type knob and with or without circuit-closing lever or brass base. A painted steel base is also available as an option.

today. Nye added a hand key and iambic paddle of his own design and sold the keys along with Nye-Viking Antenna Tuners until he retired and passed the business to his son and present Speed-X owner, William Nye, Jr., of Priest River, Idaho.

Nye, Jr. still makes Speed-X keys such as those featured in this month's column. In fact, their bases are still cast in the original mold used by Logan. (The mold has been reworked, however, to change owner names and ensure accurately fitted parts.) In talking with Nye, Jr., I sense he conscientiously respects the historical significance of Speed-X and is taking steps to ensure it will continue to live on for at least the next hundred years, and that's great. Don't wait that long, however, to purchase and enjoy using your own piece of telegraphic history. Do it now! Speed-X keys are available from several dealers nationwide. The main one is our previously mentioned Morse Express (1-800-238-8205 or the e-mail address shown previously).

Cool Minis

With QRP and ultra-light portable activities growing like crazy, interest in miniature keys and paddles is hotter than ever, and the variety of designs is amazing. Some recent examples are shown in photos 9 and 10. They all are reasonably priced, and any one (or two!) of them is an ideal way to spice up your "hamming light" pursuits.

The scaled-down replica of a famous J-38 hand key shown in photo 9 is being made in limited quantity by Lee Hutchins, KA6IRL, the winner of our first Survival Radio Challenge. He can't stop! The key is exact to the finest detail, and it really works. I can vouch for that fact, as I gave the key a go with my big rig on 30 meters and worked several VKs and JAs with it right off the bat. It's a treat and is available from Lee Hutchins, KA6IRL, 23 Linda Dr., Oroville, CA 95966 (telephone 530-533-2872 or <www.qrpj38.com>).

Bob Hammond, KI7VY, is also staying in the limelight by regularly updating his well-known Paddlette. His recent refinements of reinforced levers and red fingerpieces produce a feel like a full-size paddle and add a few dB of pizzazz in appearance. The little paddle still has a magnetic base, cable, plug, and self-store adjustment tool, making it attractive for use anywhere and anytime. A leg mount with mating magnetic base is

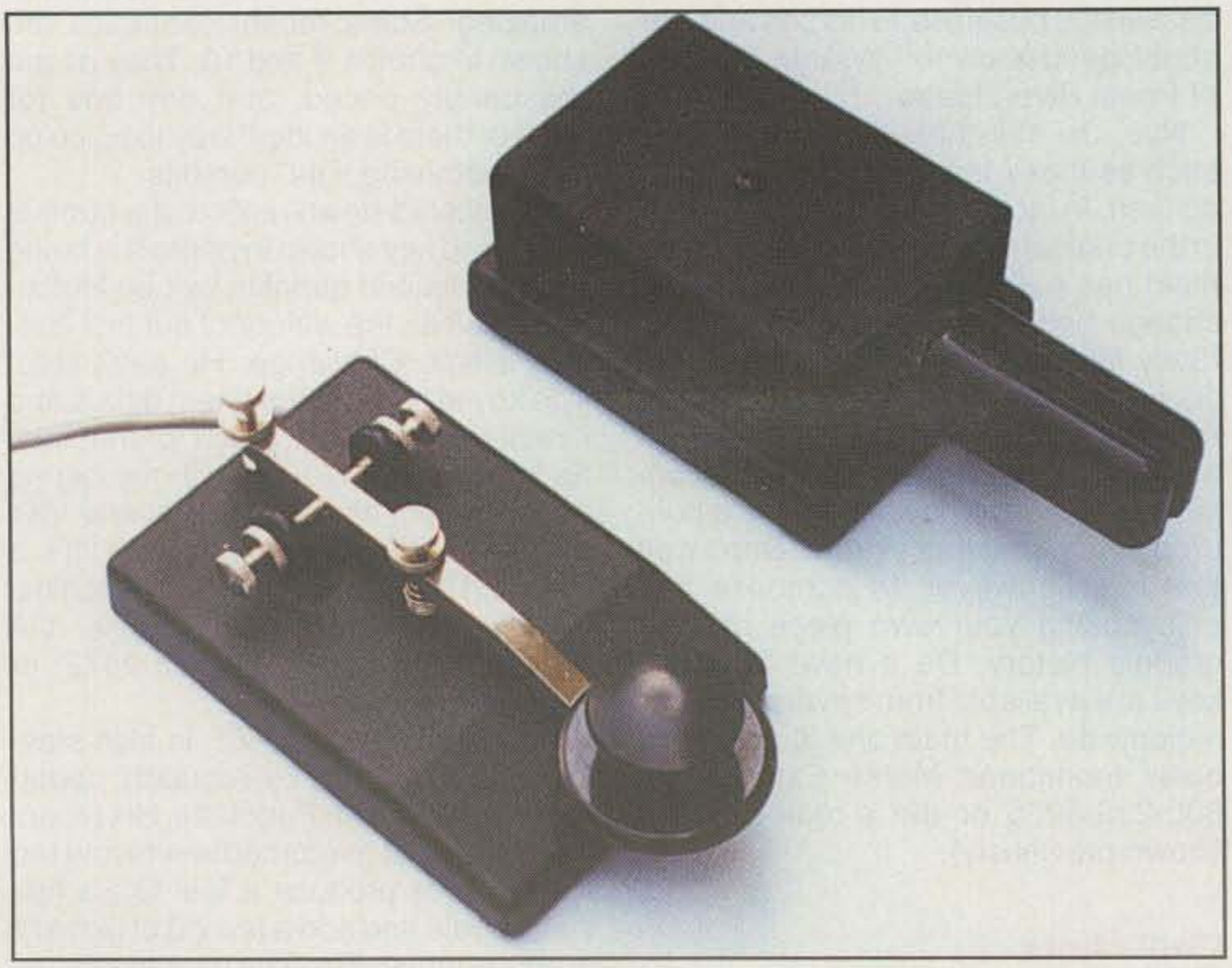

Photo 8– William M. Nye, Sr. designed and added this high-grade "Master Key" and enclosed-mechanism iambic paddle to the Speed-X line before retiring. Both keys are stout-hearted and especially suited for demanding field-type operations.

also available for mobiling. More details (and Paddlettes!) are available from Bob Hammond, KI7VY, of Paddlette Co., P.O. Box 6036, Edmonds, WA 98026 (telephone 425-743-1429 or <www.paddlette.com>).

Remember the little wood-base and stopper-foot "Bulldog" iambic paddle made by Louis Petkus, K9LU? It now has a micro-size cousin with a sure-footed magnetic base, and both Bulldogs make neat conversation items or traveling companions. 'Lil Bulldog is really special. It is one-inch square, holds to metal like, well, a bull dog, and handles surprisingly well for such a tiny paddle. Both keys are fitted with a 3 foot cable and three-conductor, 1/8 inch (stereo-mini) plug, and both are available direct from K9LU at 2 So. 872 Wagner Rd., Batavia, IL 60510 (telephone 1-877-227-9139, or <www.AmateurRadioProducts.com>.

Conclusion

That wraps up the views for now, but stay tuned, as more "Keys Specials" are already taking shape for next year. There is still room to highlight your own favorite key, too, so send us a photo or two and let's get some well-deserved recognition going your way. If you are looking for keys or have keys to sell, drop me a note, too. I will make every effort to put buyers and sellers in touch with one another. Meanwhile, get on the air and enjoy using your keys!

73, Dave, K4TWJ

Photo 9– Nothing inspires fond memories of our dear Novice days with a 6L6 transmitter and S-38 receiver more than a sweet little J-38 key. This miniature replica being made by Lee Hutchins, KA6IRL, brings the visions back to life in high style. The little gem is solid brass with a high-gloss finish. It has over 30 parts, is fully adjustable, and works, well, like a J-38! It is available in a black plastic and mahogany-base version direct from KA6IRL.

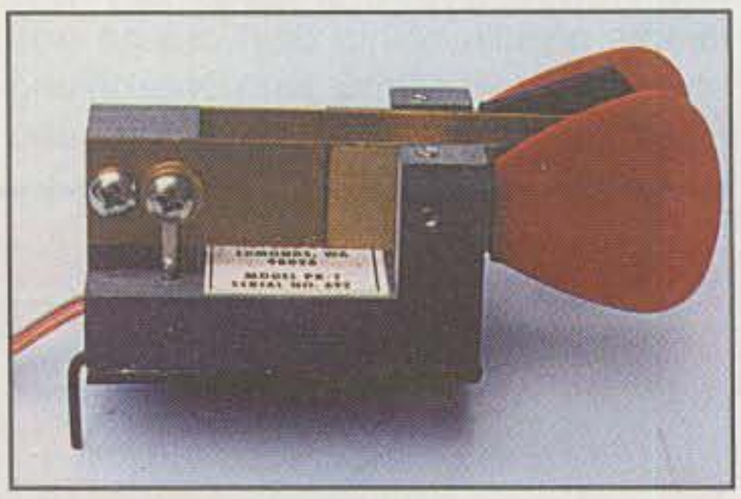

Photo 10– Bob Hammond's well-known Paddlette has been upgraded for 2003 with reinforced cantilever arms and red fingerpieces for smoother action and more "flash." The tidy little treat handles very well, and it is available direct from KI7VY of Paddlette.

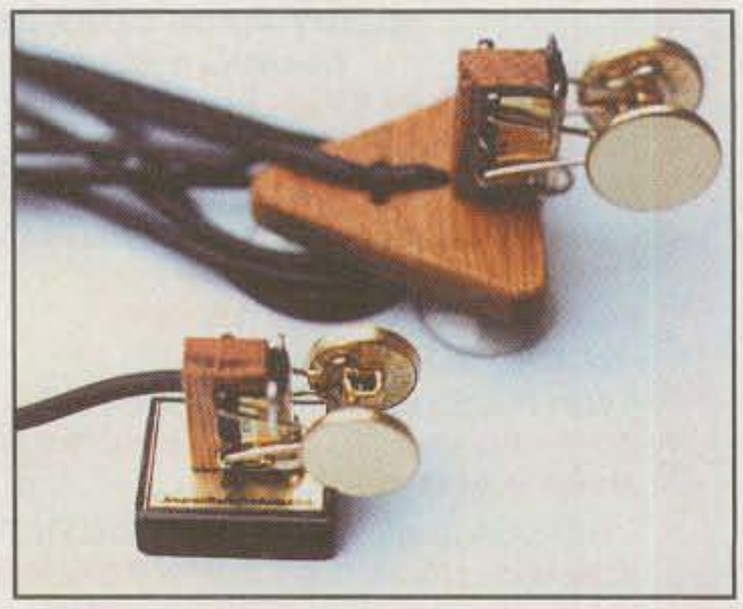

Photo 11– Meet Bulldog and 'Lil Bulldog, two novel paddles made by Louis Petkus, K9LU. Both Bulldogs sport solid-grip bases, adjustable levers, and iambic action, and work well for their small size. They are available from K9LU.

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Is Anyone Out There?
Lonely Repeaters and Autopatch

I was driving home after a very late night at the office. My mind was mushy, but I did manage to meet that really tight deadline. I didn't care to listen to the broadcast radio on this particular night, and I had left my jazz CDs at home. I wanted some company on my long commute, so I turned on my dual-band mobile transceiver and announced my presence on my favorite repeater: "KH6WZ listening."

I heard the familiar voice identifier, the repeater courtesy tone and then—silence.

I continued to drive southbound on the freeway, and about 15 minutes later I again announced my presence on the machine: "KH6WZ listening."

The courtesy tone indicated that my radio was working, and I know that my signal is reliable (in fact, my signal gets even stronger as I get closer to home). Huh. No one listening tonight, I thought.

I put the radio on memory scan to see what else was going on. There was a net in progress, a distant RACES repeater, and not much else. I wondered what would happen if I got involved in a traffic accident or saw a fellow motorist stuck on the side of the highway. How would I request help? Who would come to the rescue?

I know many people keep their radios on continuously, either locked-on to their favorite repeater channel or scanning their favorite frequencies. Where were they? Were they just shy and afraid to talk? Was my transmit audio distorted or my signal strength down? Had I offended someone?

Now, of course, other commuters, ham and non-ham alike, just might pull out their cell phones, and dial 911 in case of an emergency. Alas, though, I must be the only person who doesn't own a cell phone. (However, I do enjoy the freedom I have without that "electronic leash" tied to the office . . . but that's another story.)

This is when one must be able to access the repeater system autopatch, so if no one is listening, you still will be able to make contact with the outside world via a landline telephone link.

The autopatch is just one of possibly dozens of functions available to users in today's microprocessor-controlled repeater systems. These functions may range from linking one repeater to another repeater on a different band, accessing an HF or OSCAR satellite gateway station, or connecting to faraway hams and repeaters via EchoLink, the Internet Radio Linking Project (IRLP), Wide-Coverage Internet Repeater Enhancement System (WIRES™), or other systems.

Despite the complexity of any repeater, they all have one thing in common: You must "communicate" to the repeater with command signals that the machine can understand. In "ham-speak," the signal and control tones are called dual-tone multi-frequency (DTMF) signaling, more commonly known as TouchTone®, which is a registered trademark of AT&T.

In many (if not all) cases, autopatch access means that you need to be a "full member" of the repeater. Different repeater groups have various terms for this "full-access status," such as "Controller" or "Full User." In any case, we are talking about having access to the bonus features of the repeater, beyond its capability as a signal-booster.

Let's not mince words here. This means paying money for access to the "bonus features" of a repeater system. Now let's assume you've "paid your dues" (literally) and are ready to use an autopatch. Let's talk about how to do it right, in order to help yourself or someone else in a communications emergency.

First Things First

Although FCC Rules mention that your station callsign must be announced at the end of each transmission (FCC Rules 97.119), it is quite common that the repeater owner or owners might require users to identify first, and announce what their intentions are before they begin their transmission, especially when they are controlling the repeater.

A typical command to turn on the autopatch might be # 7 2. Remember that even though you are sending tones instead of your voice, you are

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e-mail: <kh6wz@cq-amateur-radio.com>

After you pay your dues and understand the basics of controlling a repeater, you get a chance to use all of those "extra" buttons on your VHF/UHF gear.

still transmitting a signal on the ham bands, and FCC Rules still apply. In addition, once you get a dial tone and are connected to the landline telephone system, you are operating a station with third-party traffic.

On top of all this, almost all repeater groups with autopatch and other bonus capabilities have their own operating procedures and etiquette to follow when controlling a repeater. Be sure you know and understand what the local procedures are before you do something dumb that may affect your (and the repeater owner's) ham license. You do not want to violate any FCC Rules.

Beware the Open Mic

If you're like me, you sometimes talk to yourself when doing something complicated. (I also know people who stick their tongue out as they do something; however, that's another story. . . .) Anyway, if you do this, you should know that many radios are put into an "open mic" condition when transmitting TouchTones® through the radio. Therefore, avoid talking to yourself (and announcing the command codes over the air) as you punch in the tones.

Also remember that most repeaters have a slight delay as signals travel from your radio and into the machine. Click the push-to-talk button, wait a second or two, and then start transmitting. This applies to both voice and control tones.

If you have one of those ultra-modern rigs, you may have a DTMF memory-dialer built into your rig or microphone. You may wish to pre-program the proper tones into your rig to increase safety and convenience, especially if you are trying to control the repeater while driving.

Safety Note: In many states, using a cellular telephone while driving is illegal or restricted to hands-free operation. (Although your ham radio set is not a cell phone, your radio sure can look like one to the officer asking you to pull over.) There may be similar laws in your area, so make sure you are not violating any traffic laws. Remember, though, in all cases your number one priority while driving is *driving*. If you do see an emergency, and want to report it via autopatch, pull your vehicle over to the side of the road, and then make the call.

Let's Give it a Try

Okay, now that we have the preliminary stuff out of the way, and now that you have paid your dues, we can give this fun aspect of FM operation a try.

Here is a typical command procedure to access the autopatch function on an imaginary repeater system:

1. Identify with your callsign, and say that you intend to access the autopatch for a quick phone call: "[Callsign] accessing autopatch." All other stations should now stand by until the repeater function is completed.

2. Push the PTT switch and enter # 7 2 to get a dial tone

3. Enter the desired phone number. Certain area codes and prefixes are probably disabled.

Remember that even though you're "making a phone call," you are still operating a ham radio station and are subject to several FCC Rules, including those regarding third-party traffic, control-operator responsibilities, and identification (see the References box for FCC Rules that apply).

4. During the conversation remember that most non-hams are used to "full duplex" conversations, in which all parties can hear one another. When a radio is interfaced to a telephone line, most communications operate in "half duplex." This means that only one person can talk at a time, and if the other person tries to interrupt, what he or she says will not be transmitted to the other person. You should make sure the person you are talking to is aware of this. The use of the word "over" at the end of each sentence may help.

You should also advise your party that you are talking on an amateur radio system and that the conversation is not private.

5. At the end of the conversation, and after the other person hangs up the phone, you must command the repeater to hang up. Usually you just say something like this: "[Callsign] clear autopatch." Then enter the hang-up command, in this case, # 4.

There should always be an "abort function" or "reset" or "ooops" command. In one system, the "oops" command is just the star (*) key. If you goof up something, or the repeater gets into some weird mode by accident, you transmit the star key and the repeater system forgets everything you just did, resets, and waits for another command.

The American Radio Relay League (ARRL) has some guidelines for autopatch use. You should take a look at the complete information on the ARRL website, <www.arrl.org>. A link to these guidelines appears in the References box in this column. Here is a summary:

• No business communications. However, you may use the autopatch to order a pizza from your Field Day site, but you cannot call your office to leave or collect messages. The key is that you may not conduct *your* business or your employer's business via ham radio.

• Do not use the autopatch to avoid telephone toll charges. Phone patches should never be made when normal telephone service could just as easily be used. This is important to consider when you have a cell phone available.

• Conversations should be kept as short as possible.

Summary

We began with a true story of a lonely night on the freeway in southern California. Similar nights just like mine are probably common all over the place. The moral of this story is that you really should belong to a repeater group, in the fullest sense of the term. Participate with the group as much as you can and get involved. Support the repeater system with money to help maintain the machine and to contribute to the expenses of keeping a system in operation. In exchange, you will get the privilege of extended communications range, access to the telephone system, and the social benefits of belonging to a group. And if you hear someone looking for a contact and getting no response, pick up the mic and reply.

73, Wayne, KH6WZ

References

ARRL autopatch and phonepatch guidelines: <http://www.arrl.org/FandES/field/regulations/phone-patch.html>

FCC Rules that apply to autopatch use:

- 97.3: Definitions
- 97.7: Control operator required
- 97.103: Station licensee responsibilities
- 97.105: Control operator duties
- 97.109: Station control
- 97.115: Third-party communications

EchoLink: <http://www.echolink.org/>

The Internet Radio Linking Project (IRLP): <http://www.irlp.net>

WIRES™—Wide-Coverage Internet Repeater Enhancement System: <http://www.yaesu.com/amateur/pdf/brochures/WIRES.pdf>

what's new

BY KARL T. THURBER, JR.,* W8FX

Weather Instruments, to CQ Books, to GuruNet, and more

This month we shine the *CQ* product spotlight on a variety of new radio shack gear and accessories, antenna-related goodies, software, and books we think will be of interest to you. Are you ready?

Radio Gear

Peet Brothers Ultimeter® Weather Instruments. We all talk about the weather without really knowing much about it. Peet Bros. Company, Inc., can help increase your weather knowledge. The firm makes affordable weather instruments, including "APRS-ready" weather stations for the amateur radio community.

The company offers four models, which differ by the weather functions they perform. Each weather station comes complete with wind sensor, outdoor temperature sensor, keyboard/display unit, plug-in cables, desk stand, AC adapter, cable ties, owner's manual with installation guidance, and operating instructions.

All systems include provisions for 9 volt battery backup, and they can be operated directly from a 12 volt vehicle supply. All share the same proven cabled-sensor technology, including a patented, all-digital wind sensor. The instruments use cabled sensors, rather than wireless sensors, for optimum performance, minimum maintenance, and maximum dependability.

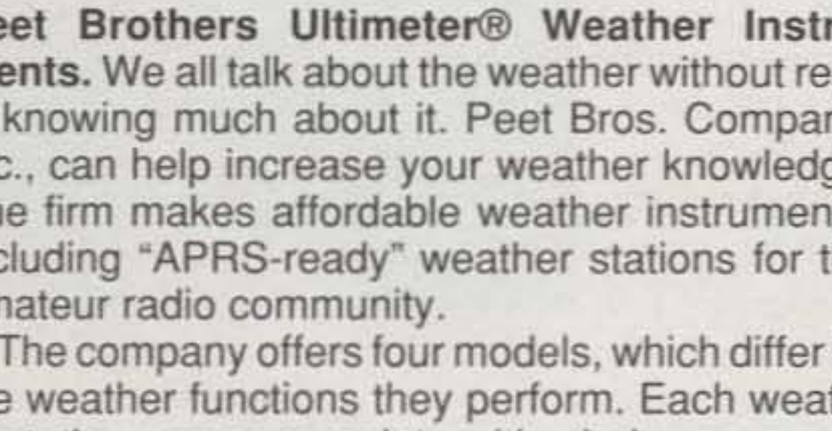


Photo A– The Peet Bros. Ultimeter® 2100 Weather Station displays barometric-pressure and numeric-pressure change, plus preset barometric storm alert, wind speed and direction, indoor and outdoor temperature, wind chill, time, date, and more. The unit comes "APRS-ready." (Photo from the Peet Bros. website)

The Ultimeter® 2100 Weather Station (see photo A) displays barometric-pressure and numeric-pressure change over a three-hour period, plus preset barometric storm alert, wind speed and direction, indoor and outdoor temperature, wind chill, time, date, and (with optional sensors) indoor humidity, dew point, and rainfall.

The Ultimeter 2100 ($399) features two versatile, four-mode serial ports that can accept remote commands, making it easy to communicate with external devices to transmit the date or collect it remotely by phone, modem, or radio link. The five-minute packet mode is useful for economical radio beacon transmission, and the unit comes "APRS-ready," requiring only direct cable connection to a TNC. (Note: *QST* contributing editor Stan Horzepa, WA1LOU, reviewed the Ultimeter 2100 in January 2003 *QST*; find the writeup by following the link at <http://www.peetbros.com/QSTreview.pdf>.)

For a free catalog, contact Peet Bros. Company, Inc., 31 E. 17th Street, St. Cloud, FL 34769 (1-800-USA-PEET; e-mail: <peetbros@peetbros.com>; on the web: <http://www.peetbros.com>).

AOR AR-ONE Receiver Relaunched; New Accessory Introduced. We got a little ahead of ourselves when we announced the "dream" AR-ONE Communications Receiver last December. Both AOR and *CQ* were well-intentioned, but gremlins sneaked into the works.

Photo B– The AOR AR-ONE Communications Receiver had to go through a pre-production design modification in components, forced by a change in suppliers. It is a very high-end, dream receiver for commercial and government applications. (Photo courtesy AOR USA)

Before release, the AR-ONE (see photo B), which covers from 10 kHz to 3 GHz, had to go through a pre-production design modification in components, forced by a change in suppliers for a key component. Incorporating new components required redesign, but AOR expects the change should also result in better performance over the original engineering specifications.

In case you don't have your December 2002 issue of *CQ* handy, the AR-ONE is a very high-end, dream receiver. It is designed primarily for professional users, such as governments, military applications, law enforcement, laboratories, and others who require the ultimate in a wide-range receiver. The AR-ONE's many features include ten

*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

VFOs; 1000 memory channels; an ultra-stable frequency reference oscillator; selectable tuning steps and resolution down to one Hertz (Hz); the ability to monitor AM, NFM, WFM, USB, LSB, CW, and data modes; a triple-conversion superheterodyne front end; an adjustable BFO; multi-IF signal output ports at 10.7 MHz or 455 kHz; and considerably more.

Also, looking at a small but important accessory, AOR has added an analog S-meter, the ASM8600, as an option for the AR8600 Mark II desktop receiver. This is in response to requests from users who desire the graphic accuracy of an external analog meter, in addition to the LCD signal strength indicator in the AR8600 Mark II. The ASM8600 is a free-standing, enclosed meter, connected to the receiver by wire, so you can easily place the meter in proximity to the receiver. However, the ASM8600 requires internal receiver modifications. To facilitate correct installation, and to minimize potential problems, AOR is offering to install the meter and pay return (ground) shipping for $20. AOR recommends that owners return the unit to ensure the installation is done correctly and without damage to the receiver.

The ASM8600 S-Meter MSRP is $92, available through AOR dealers. Note that the ASM8600 will only work with the AOR AR8600 Mark II. Earlier versions of the AR8600 are not compatible.

Contact AOR U.S.A., Inc., 20655 S. Western Ave., Suite 112, Torrance, CA 90501 (310-787-8615; e-mail: <info@aorusa.com>; web: <http://www.aorusa.com>).

Accessories for the Radio Shack

MFJ Atomic Alarm Clock. What next—an "atomic" alarm clock for the radio shack? Yes, indeed, and a new unit with very respectable specs is offered by MFJ Enterprises. The MFJ-132RC Atomic Alarm Clock (photo C) sports indoor temperature display, a backlight, and additional features for just $14.95. The additional features include large, 0.563 inch high LCD digits; receiver set at 60 kHz for WWVB reception; dual alarm; month and date, 24/12-hour selectable, and running seconds displays; indoor thermometer; and more.

For additional information or a catalog, contact MFJ Enterprises, Inc., 300 Industrial Park Road, Starkville, MS 39759 (1-800-647-1800; e-mail: <mfj@mfjenterprises.com>; on the web: <http://www.mfjenterprises.com>).

Photo C– The MFJ-132RC Atomic Alarm Clock sports indoor temperature display and a backlight. Other features include large, 0.563 inch high LCD digits; receiver set at 60 kHz for WWVB reception; dual alarm; month and date, 24/12-hour selectable, and running seconds displays; indoor thermometer; and more. (Photo courtesy MFJ Enterprises)

Photo D– GAI-Tronics has announced a series of Cellular Emergency Telephone Stanchions. The new upright supports accommodate the growing customer demand for reliable cellular technology and are available with several power options. The design is suited to remote locations without easy access to traditional telephone lines. (Photo courtesy GAI-Tronics)

Cellular Emergency Stanchions from GAI-Tronics. While not mainstream amateur radio products, these gizmos are really neat. GAI-Tronics Corporation has announced the release of a series of Cellular Emergency Telephone Stanchions (photo D).

The new stanchions (upright supports) accommodate the growing customer demand for reliable cellular technology and are available with several power options to allow customization for individual requirements. The basic design was drawn from the highly successful Model 234 series stanchions and is especially suited to remote locations that do not have easy access to traditional telephone lines.

Three standard cellular stanchion package options have been created. All options include a high-visibility beacon, making them easier for users and rescuers to locate. Also, any of the GAITronics standard flush-panel emergency telephones may be used with the stanchion.

Contact GAI-Tronics Corporation, P.O. Box 1060, Reading, PA 19607-1060 (1-800-492-1212; e-mail: <info@gai-tronics.com>; on the web: <http://www.gai-tronics.com>).

Antennas and Accessories

New Antennas from Maldol and Comet via NCG Company. NCG Company distributes several Japanese-based product lines, including Daiwa, Comet, Create, and Maldol. Recently, NCG announced two new antennas from Maldol. NCG is distributing the Maldol HVU-8 Ultra-Compact 80M through 70CM Base Station Antenna (photo E). It's a unique and ultra-compact HF, VHF, and UHF antenna for confined and restricted space installations or for temporary or portable use.

The HVU-8 includes the 80/40/20/15/ 10/6/2 meter and 70 cm bands in a compact design to complement new multi-band HF/VHF/UHF radios. Each HF band and 6 meters has its own independently tuned radiator and radial system, while the main antenna mast is tuned for constant operation on 2m/70cm. Manufacturer's suggested retail price (MSRP) is $349.95.

NCG Company also distributes the Maldol HMC-6S Multi-Band 20/15/10/6/ 2m/70cm Mobile Antenna to complement the new breed of multi-band HF/VHF/UHF radios. The inex-

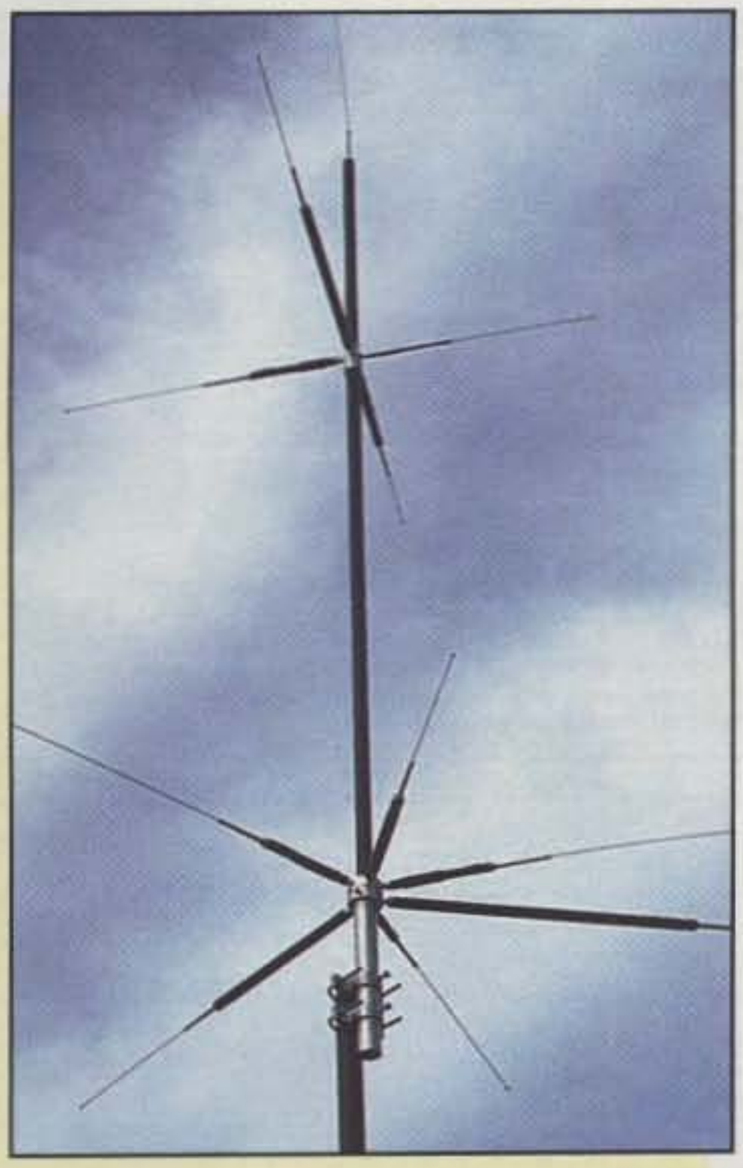


Photo E– NCG Company distributes the Maldol HVU-8 Ultra-Compact 80 meter through 70 cm Base Station Antenna. It's for confined and restricted space installations or for temporary or portable use. The antenna includes the 80/40/20/15/10/6/2 meter and 70 cm bands to complement new multiband HF/VHF/UHF radios. (Photo courtesy NCG Company)

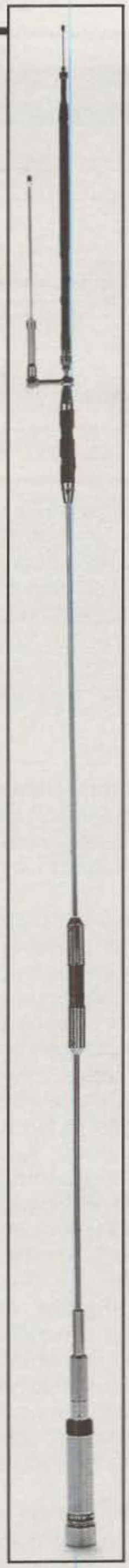


Photo F– Comet recently redesigned the UHV-6 Mobile Antenna for use with the Yaesu FT-8900 mobile transceiver as a quad-bander covering 10/6/2 meters and 70 cm. Newly designated the UHV-4, you can tune 10 meters and 6 meters independently of each other simply by adjusting the tuning element length. (Photo courtesy NCG Company)

pensive (MSRP $159.95) six-band HMC-6S offers the least amount of wind resistance possible; the height is only 68 inches and all of the coils are vertically oriented. The 6m/2m/70cm bands are all pretuned, while the user tunes the HF bands independently for best SWR.

The main antenna mast is tuned for constant operation on 15/10/6/2 meters and 70 cm. A 20 meter coil is attached to the top of the main mast, but it can be removed and replaced with a 40 meter optional coil; additional coils will be available soon. The HMC-6S is easily mounted using a standard trunk-lip or hatch/door mount.

Finally, you may recall our profiling the Comet UHV-6 Mobile Antenna in April 2001. Well, Comet redesigned the UHV-6 for use with the Yaesu FT-8900 mobile transceiver as a quad-bander covering 10/6/2 meters and 70 cm. Newly designated the UHV-4 (photo F), with it you can tune 10 meters and 6 meters independently of each other simply by adjusting the tuning element length. The 2 meter and 70 cm bands are furnished pretuned for the U.S. amateur bands, with no adjustments necessary. The UHV-4 MSRP is $119.95.

Contact NCG Company, 1275 North Grove St., Anaheim, CA 92806-2114 (1-800-962-2611; e-mail: <micks@cometantenna.com>; web: <http://www.natcommgroup.com>).

Software and Computers

DXtreme Station Log—Multimedia Edition™. DXtreme Software produces powerful and easy-to-use logging applications for all kinds of radio enthusiasts, from shortwave and medium-wave listeners/DXers to ham radio operators.

Since the 1996 version of DXtreme, the software has come a long way. Bob Raymond, NE1I, has announced a new edition, DXtreme Station Log—Multimedia Edition™. Like other loggers, it lets you log your contacts and import ADIF (Amateur Data Interchange Format) files from popular contest programs. Unlike others, Station Log offers intriguing multimedia and advanced functions.

Station Log features an embedded audio facility that lets you create and maintain an audio archive of your memorable contacts. Station Log also in-

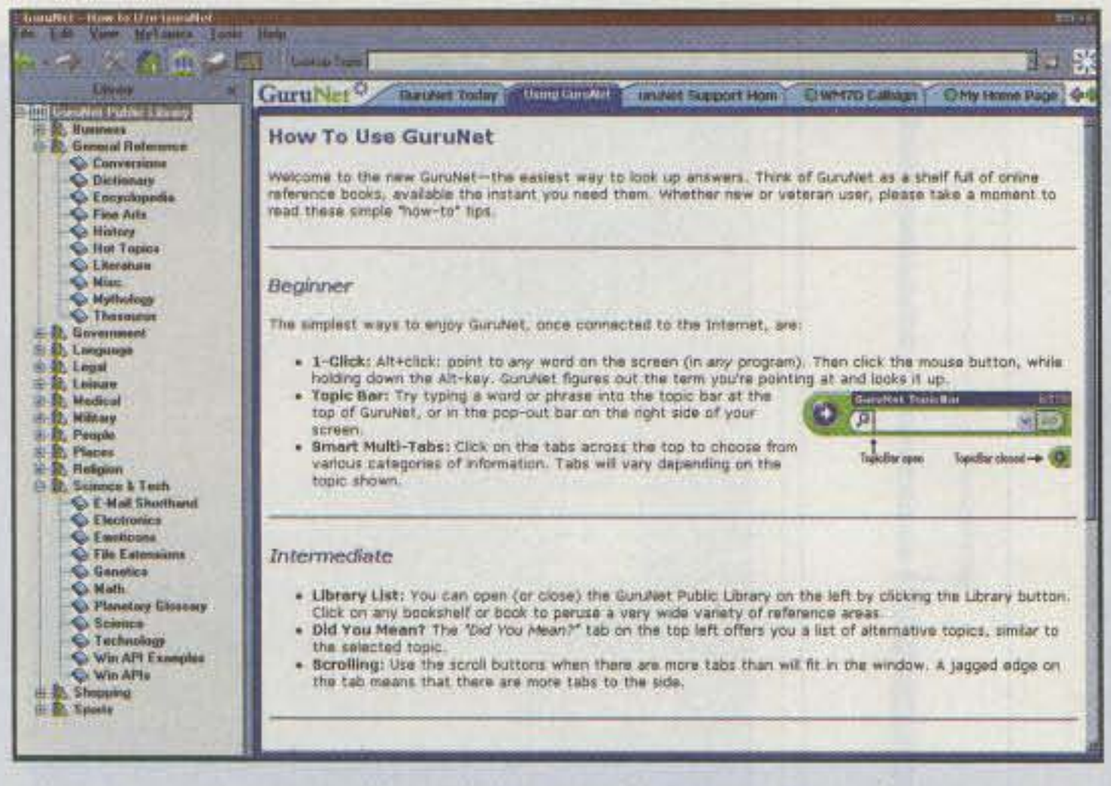


Fig. 1– Here's a GuruNet display showing a Help screen and some user-personalized "home tabs." You can think of GuruNet as a library full of online reference books on demand packed into a small bar on your screen, available exactly where and when you need them. (W8FX screen capture from GuruNet)

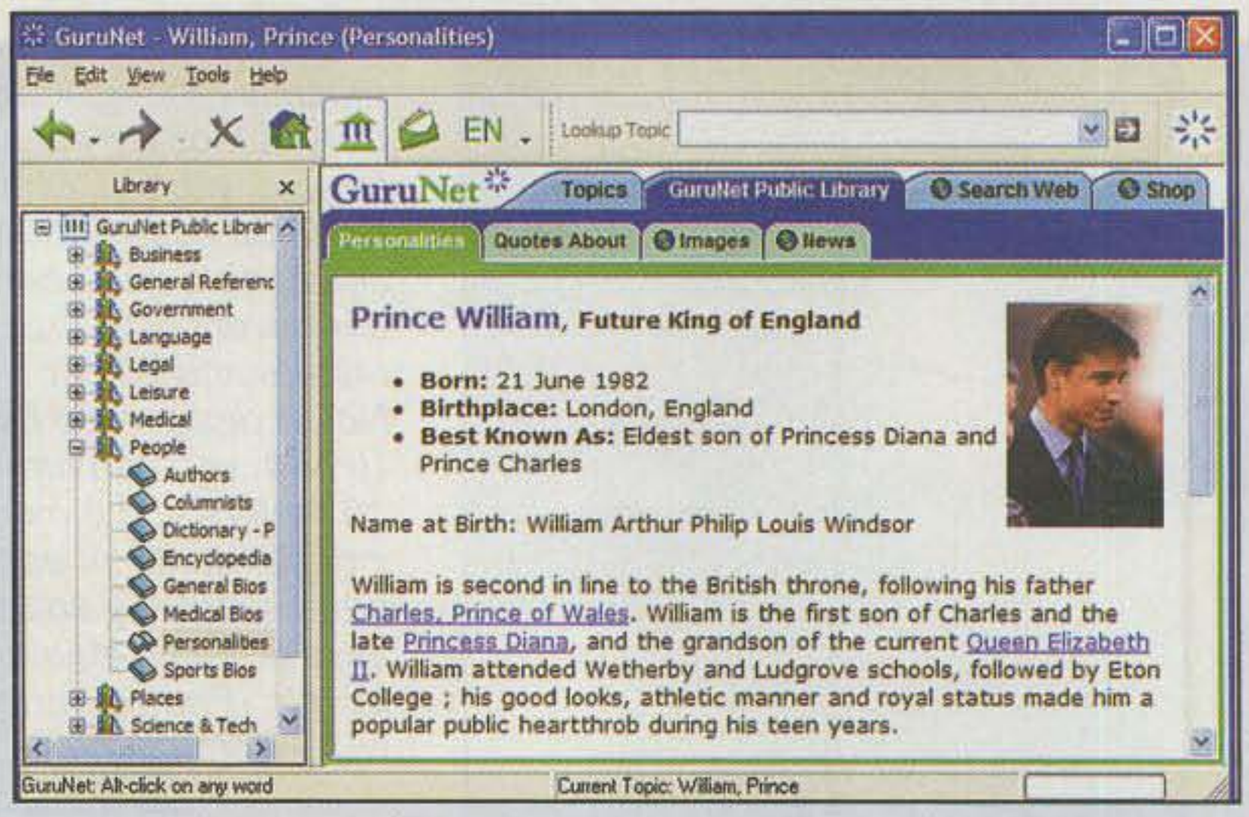


Fig. 2– As opposed to traditional internet search engines, which produce long lists of links, GuruNet displays pre-compiled, organized reference data from over 60 premium content sources. Here's a sample lookup and data retrieval on Britain's Prince William. (W8FX screen capture from GuruNet)

cludes an integrated QSL imaging facility that lets you scan the physical QSL cards received from regular mail and capture electronic QSLs from the internet. The software saves both types of QSLs as compatible digital images that you can view at any time.

Station Log integrates with Microsoft® Word to create customized, rich-text-formatted QSL labels for physical QSLs. The software also produces ADIF-based electronic QSLs for uploading to websites that specialize in the delivery of eQSLs. To help hams track the performance of their stations, Station Log offers a variety of reports. It can output the reports to printers, as well as to the DXtreme Active Report Viewer. The viewer lets you view and sort reports within Microsoft Internet Explorer, and you also can upload reports to the web for remote viewing.

Station Log is $79.95 USD in North America and $82.95 USD elsewhere. Prices include shipping/handling. Contact Bob Raymond, NE1I, DXtreme Software, 26 Langholm Drive, Nashua, NH 03062 (e-mail: <bob.raymond@dxtreme.com>; on the web: <http://www.dxtreme.com>).

GuruNet: A Terrific One-Click Fact-Finder. Atomica Corporation has introduced the GuruNet reference tool. Although not an amateur radio program, this is one neat online, one-click fact-finder, and I regularly use it to help prepare this column. You can think of GuruNet (see fig. 1) as a library full of online reference books on demand packed into a small bar on your screen, available exactly where and when you need them.

With a single click on any word or phrase on the screen, GuruNet delivers real-time and reference information on demand. It accesses encyclopedias and dictionaries, thesaurus, acronyms, biographies, technical terms, quotations, company descriptions, stock quotes, news, sports, weather, maps, and much more. Working within any Windows® application, GuruNet displays an unobtrusive pop-up window, without interrupting your work.

GuruNet displays pre-compiled, organized reference data from over 60 premium content sources (fig. 2). It eliminates the need for you to follow links back and forth, searching for relevant information. Rather, it delivers facts on demand in a quick, concise, authoritative, readable summary. It even offers automatic translation of answers from English into 11 languages.

You can download and enjoy GuruNet free of charge for 14 days before you're asked to pay $39.99. If you decide not to pay, you can still use it free as a dictionary and thesaurus.

Contact Atomica Corporation, 441 Route 306, Wesley Hills, NY 10952 (845-818-3988; e-mail: <support@ atomica.com>; on the web: <http://www.atomica.com>). *Note:* If you go to the website, you can do several sample online lookups to see GuruNet in action, without downloading the software.

From the Bookshelf

New Books from CQ Communications. Recently, CQ Communications introduced seven new book titles, and more are on the way. See *CQ*'s own magazine ads, or point your web browser to <http://www.cq-amateur-radio.com> to check out all of them.

First, there's the Second Edition of *Heathkit – A Guide to the Amateur Radio Products,* by Chuck Penson, WA7ZZE, at $29.95. Greatly expanded and updated, this 328-page collection of facts, photos, and Heathkit history offers a terrific trip down memory lane. With photos and information about virtually every piece of amateur radio equipment and amateur-related accessory ever sold by Heath, Penson's guide offers hours of enjoyable reading.

For fans of the former *ham radio* magazine, a new series of anthologies is now available. The first four volumes are *Antennas 1968–1972, Antennas 1973–1975, Homebrewing Techniques,* and *Test Equipment and Repair Techniques. ham radio* was published from 1968 to 1990 and is generally acknowledged as the premier amateur radio technical magazine of its time. All of the anthologies were compiled by *CQ* Technical Consultant Lew Ozimek, N2OZ, and are priced at $19.95 each.

Finally, two additional topics are covered in authoritative

new books by Jerry Sevick, W2FMI. One is *The Short Vertical Antenna and Ground Radial*. At $10, it's a small, but solid guide that walks you through the design and installation of inexpensive, yet effective short HF vertical antennas. With antenna restrictions becoming a real problem, this book could help keep you on the air.

Jerry's second new book is *Understanding, Building, and Using Baluns and Ununs*. The $19.95 book is the successor to his earlier *Building and Using Baluns and Ununs*, and includes new tutorial material, designs, and explanations of how and why these little-understood devices work. This new book offers an opportunity to learn about the application of baluns and ununs for antenna tuners and countless antennas.

See your favorite amateur radio dealer, or contact CQ Communications, Inc., 25 Newbridge Rd., Hicksville, NY 11801 (1-800-853-9797; e-mail: <cq@cq-amateur-radio.com>; on the web: <http://www.cq-amateur-radio.com>).

American Science & Surplus Catalog. An interesting catalog appeared in my snail mail: it's the American Science & Surplus catalog. The publisher is fascinated by discovery and invention, and its accompanying website invites us to view its ever-changing pile of "incredible stuff at unbelievable prices" and to inspect the "just off the truck" goodies.

The catalog includes an eclectic mix of industrial, military, and educational items, with an emphasis on science and education. The catalog includes many unusual and hard-to-find items for the hobbyist, tinkerer, artist, experimenter, home educator, do-it-yourselfer, and bargain hunter. The firm notes that value is important; closeouts, inventory overruns, mismanufactures, and items "whose time has not come" are featured.

For a free catalog, contact American Science & Surplus, P.O. Box 1030, Skokie, IL 60076 (1-800-934-0722; e-mail: <info@sciplus.com>; on the web: <http://www.sciplus.com>), or visit stores in Chicago, Geneva/West Chicago, and Milwaukee.

Wrap-Up

That's all for this time, gang. Next time more "What's New." See you then.

Overheard: As when considering the dreaded SARS (Severe Acute Respiratory Syndrome) scourge, I've found that having a positive attitude is also highly contagious—but in a welcome way!

73, Karl, W8FX

dx

BY CARL SMITH,* N4AA

Fall DXpeditions

Almost daily thunderstorms with lightning and rain, even hail, have made the east coast of the U.S. very uncomfortable this summer, although it has been cooler than normal. Add that to the declining solar cycle numbers, and one could say it has been a pretty rough time for DXing for the past several months—at least in my part of the country. As I write this in early August, I am looking forward to at least drier conditions before the contest season so I can do a little antenna work. Hopefully, you have not been subjected to these conditions.

The Good News

The good news this month is that DXpeditions announced for the end of the year are piquing everyone's interest, and I wish all the travelers good luck as they endeavor to bring some really good DX to the deserving.

Kure Atoll, KH7K will be on the air the last few weeks of October. A large international team headed up by Kimo, KH7U, and Pat, NH6UY, will activate this most needed country with four to six stations, and also will be on for the CQ WW DX SSB Contest weekend (October 25–26). Many of the operators were with the Kingman Reef (K5K) operation and are very experienced DXpeditioners. They will place a lot of emphasis on working Europe, where Kure is ranked #2 on the Most Needed list. However, they promise not to neglect the rest of us.

Pratas, BQ9P will be on the air in October. The specific dates are not known as this is bring written, so watch the DX news sources for further word on this one.

Cambodia, XU has been activated several times this year, and yet another group will be there in October for about ten days, October 19–28.

Other operations announced for October include **South Cook, ZK1** for October 20–29 and **Christmas Isl., VK9XG** for October 26 to November 9.

There are operations from other "goodies scheduled for late September (hopefully you will be reading this in time), such as: **North Cook, ZK1USN** for September 22–30; **Annobon, 3CØ** for September 27 to October 10; and **Myanmar, XZ** for September 30 to October 17.

Banaba, T33, ranked #26 on the last *DX Magazine* Most Wanted survey, is scheduled for a major operation in the March/April 2004 time period.

Overall, the next several months look pretty good for DXing, as long as we have some reasonable propagation.

WRC-2003

At the end of July 2003, following the WRC 2003 Conference, the National Conference of Volunteer Examiner Coordinators filed a Petition for Rule Making with the FCC. The subject of the Petition is Amendment of Part 97 of the Commission's Amateur Service Rules to Eliminate Morse Code Testing. The petition states, "At their July 25, 2003 meeting held with the FCC in Gettysburg, PA, the VEC's overwhelmingly agreed that Morse code testing should be immediately ended since it was now possible to do so. It was also noted that countries have already begun discontinuing Morse examinations."

It further states, "This request to eliminate Morse code (Element 1) examination does not necessarily have the support of the ARRL Board since they have yet to develop a position on the matter."

I suppose that after the action taken during the recent WRC 2003 Conference, and the subsequent action taken by some European countries, this was certain to happen in the U.S. It saddens me to see 100-plus years of tradition fall by the wayside. Tradition doesn't seem to mean much anymore, and it's sad to see technology cast aside this mode of communication as being "useless."

Am I partial to CW? You bet I am. If I had my choice of modes to operate, I would pick CW every

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

The Officers of the Vietnam Amateur Radio Association at their inaugural meeting following approval as an IARU Society. Left to right: Mr. Hau, 3W2LI, Vice President; Mr. Binh, Vice President; Mr. Duc, 3W2REH, Chairman; Mr. Chien, Secretary; and BacAi, XV2A, President. (Photo courtesy Karl, W9XT)

The WAZ Program

12 Meter SSB

29 .....EA1JG 30 .....K6YUI

15 Meter SSB

599 .....JG2REJ

12 Meter CW

42 .....DJ7RD

15 Meter CW

313 .....KA4RRU

17 Meter CW

51 .....DJ7RD

20 Meter CW

537 .....JHØLME

30 Meter CW

56 .....DJ7RD

40 Meter CW

236 .....NIØC

160 Meters

185 .....UA9KAA (30 zones)

All Band WAZ

SSB

4874 .....PY5IP 4878 .....W3CK
4875 .....PP5VB 4879 .....VE3PMA
4876 .....K2EVY 4880 .....DJ5KL
4877 .....K7SAM

Mixed

8248 .....W6FRH 8251 .....JA8BMB
8249 .....KW1DX 8252 .....NN6EE
8250 .....I1ASU 8253 .....JA8JCR

All CW

377 .....G3SWO 381 .....7N4KDU
378 .....K9CS 382 .....W2OO
379 .....W6VFU 383 .....F5LPY
380 .....KC2FXH

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

CQ DX Awards Program

CW

1052.....WA2RZJ

SSB Endorsements

320.....IK6GPZ/335 320 .....HB9DDZ/326

CW Endorsements

320 .....HB9DDZ/332 28 MHz WA2RZJ
150 .....WA2RZJ/162

The basic award fee for subscribers to *CQ* is $6. For nonsubscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 335 active countries. Please make all checks payable to the award manager.

On the Cover

Ken Munford, N7KM, of Cedar City, Utah, operates "knee CW" from his portable radio setup in a park. He is involved in Boy Scouts, and uses the portable equipment while on camping trips.

On Ken's knee is a special Morse code key he created from a "Bulldog" paddle, made by K9LU, attached to an old military knee brace designated as KY116/U. At the far right end of the table is an MFJ VersaTuner, which is connected to his home-made G5RV antenna. On top of it, next to an HT, is a NorCal 40A 40-meter QRP CW transceiver. It can put out 1.8 to 3 watts, and Ken uses it at about 2 watts. To the left of the NorCal and the VersaTuner is a battery that Ken uses to power his portable setup. Next on the left is an Elecraft K2 transceiver, which he runs at about 5 watts. The white box next to the K2 is the controller for a solar panel that can be used to power the equipment and recharge the battery.

Ken gets excellent range with his portable ham shack. He says he can work anyone, anywhere in the US and Canada, and has had contacts in Japan, Russia, and even South Africa. Ken has been a ham since 1956, and has an Extra-class license. His favorite on-air activity is rag-chewing on CW, around 7.040 MHz. When he's on the air, he tries to meet someone new every day.

For hams interested in trying portable operation, Ken advises you to be patient—he says you'll need a great deal of it—and to ask for help from fellow hams with more experience. "The antenna," says Ken, "is the key to succeeding at low power."

— Dan Moseson

(Cover photo by Larry Mulvehill, WB2ZPI)

The WPX Program

CW

3116.....KE4HBE 3118.....DL2CHN
3118.....DL2CHN

SSB

2872.....K4HB

Mixed

1924.....DL2CHN 1925.....K4HB

CW: 600 DL2CHN.

SSB: 550 JR1DHD. 650 K4HB. 1150 DL2CHN. 3400 EA8AKN.

MIXED: 800 K4HB. 1250 DL2CHN. 2000 AA1KS. 2500 JN3SAC.

10 Meters: DL2CHN
15 Meters: DL2CHN
20 Meters: DL2CHN
40 Meters: DL2CHN
80 Meters: DL2CHN

Asia: DL2CHN
Africa: DL2CHN
N. America: DL2CHN
S. America: DL2CHN
Oceania: DL2CHN

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KUØA, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, W4BP, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN.

160 Meter Endorsement: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SM0DJZ, DK3AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WBØDD, IØRIZ, I2MQP, F6HMJ, HB9DZZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA5CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, UAØFZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, W4GP, DL6ATM.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. ***NOTE:*** *WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Park, DS4NPL, likes to work North America at around 2200Z on 20, 15, or 10, depending on conditions. (Photo courtesy John, KDØJL)

Alan, F6BFH, has operated from some 32 countries, and even from home in France. He is shown here operating as LU8XW. (Photo via KDØJL)

time. Unfortunately, it has become "necessary" to use other modes in recent years to just "keep up with the Joneses." If one is to be "on top" with all of the awards out there, then one must use those other modes. As for just plain communicating, I personally don't think there is any mode that can stand up to CW for getting the information conveyed in the easiest way possible, with the least chance of mistakes. I say this from a lot of experience in operating on the National Traffic System CW nets, where you must send and receive the information correctly—and I mean more than "599, 73 QRZ."

Have you ever listened to one of those "phone nets" passing traffic? Everything has to be spelled out phonetically, and it takes forever to get one message done. There is too much margin for error, and far too much wasted time that just doesn't happen with CW. I'm going to catch it from the phone-only gang on this, but it is *my* opinion, not that of anyone else associated with this column or this magazine.

Am I saying mistakes are never made on CW? Of course not; they are. However, there are far fewer mistakes than with the voice modes. I guess what it boils down to is where I came from, how I started out in amateur radio, etc. As a teenager, with little money to buy the "good stuff," I achieved my first DXCC with less than 100 watts (a *lot*

5 Band WAZ

As of August 15, 2003, 634 stations have attained the 200 zone level and 1341 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:

LU1BRT 9A3KR

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
K5MC, 199 (22)
W1JZ, 199 (24)
K2UU, 199 (26)
W1WAI, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
KY7M, 199 (34)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
OE2BZL, 199 (1)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
UA4PO, 198 (1, 2)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
KF2O, 198 (24, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
N4XR, 198 (22, 27)
N4PQX, 198 (24, 26)
RU3DX, 198 (1, 6)
UT5JAJ, 198 (12, 30)
N6HR/7, 198 (34, 37)
N4MM, 198 (24, 26)

The following have qualified for the basic 5 Band WAZ Award:

None

Endorsements:

KC7V (200 zones)
NIØC (188 zones)
KØGT (200 zones)
HL1XP (200 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

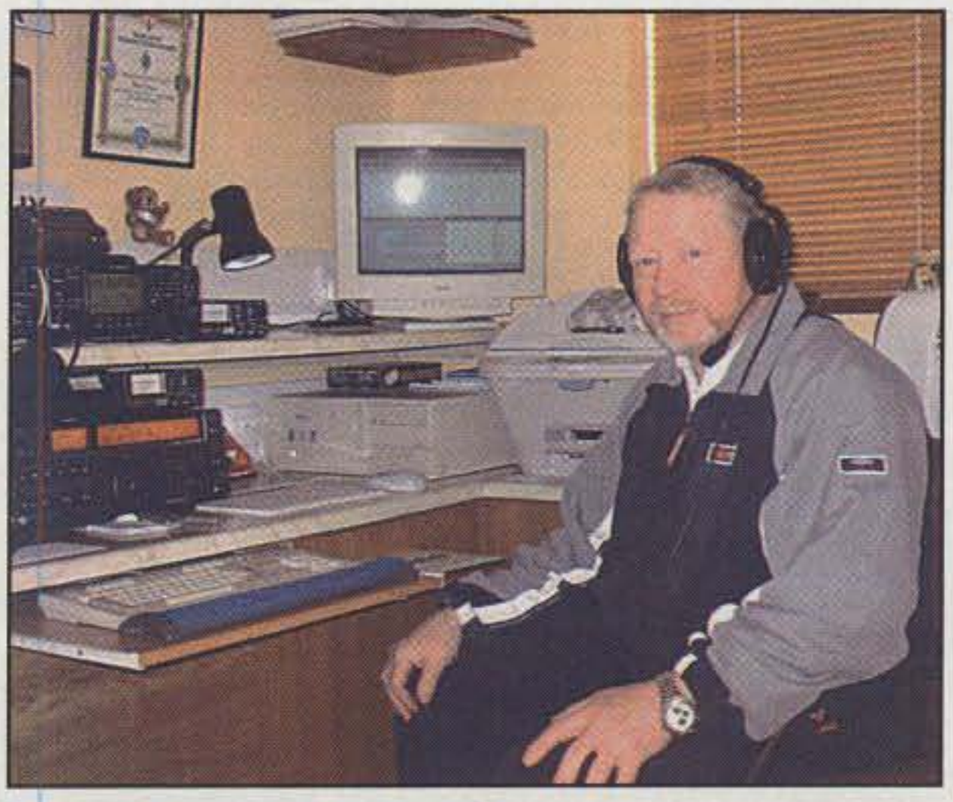
Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

less) and pieces of wire for antennas. That first DXCC was gained using 99 percent CW from Kansas—not exactly the best location in the U.S. for working DX anyway (the Midwest "black hole").

CW eventually will become an oddity, a thing of the past, like vacuum tubes and so many other things. I just hate to see it go away as a part of obtaining a license. It's the end of yet another era.

Logbook of The World

This system was expected to become operational on September 15. I'm told there will be an article on it in the October issue of *QST* explaining the system and how you can use it.



Patrick, EI9HX, enjoys building towers, making antennas, and of course, working DX. With this outstanding array of equipment inside, connected to an impressive layout of antennas outside, he certainly has the capability of working anything he wants to work. (Photo courtesy KDØJL)

Eli, 9M8RC , sometimes operates with 5 watts and a dipole 9 feet up, using an IC-735 on 15 meters SSB. (Photo via KDØJL)

Time will tell how this works, although during the test period to work out the bugs everyone seemed to be enthusiastic about it. Now if we can just get people to make their logs available, it should solve many QSLing arguments.

You won't be able to get your "wallpaper" from the system, but you will be able to get that all-important credit for awards. If you want the actual card, you still have the option of sending for it, but it won't be mandatory to have it in hand to get credit. DXpeditioners could gain considerable public relations and good will if they make their logs available for the LoTW system, especially those

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

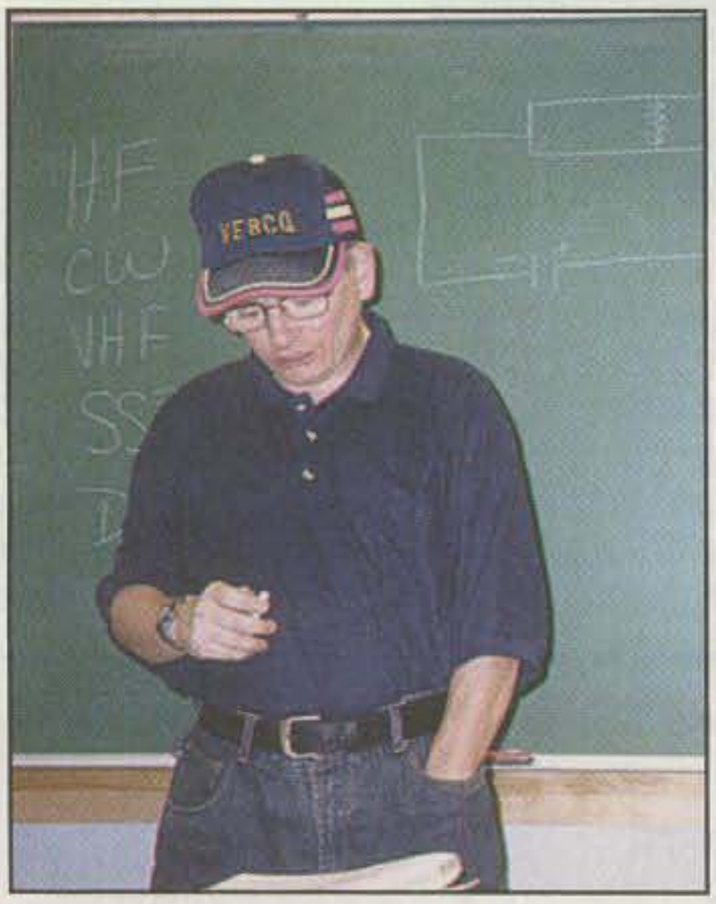
5167 .....9A2AA	3823 .....VE3XN	3233..WB2YQH	2952 .....W2WC	2436 .....W7OM	2203 .....W4UW	1772 .....VE9FX	1487 .....WT3W	1130 ..PY1NEW
4590 .....W2FXA	3726 .....I2PJA	3230 .....KF2O	2944 ....IT9QDS	2421 .....W9OP	2126 ..WB3DNA	1724 .....W7CB	1472 .OK1DWC	933 ....SM7GXR
4151 .....F2YT	3668 .....N4MM	3167 .....S53EO	2824 .....W2ME	2390....W8UMR	2018 .....HA9PP	1705 .....K0KG	1448 .....NG9L	865 .....N5DD
4146 .....W1CU	3633 .....YU1AB	3140 .....K9BG	2772 ..YU7GMN	2376 ...JN3SAC	1999 .....I2EAY	1697 .....Z35M	1421 .....KX1A	803.....VE3NQK
4098 .....EA2IA	3548 .....N9AF	3121 ..PAØSNG	2655 ..WA1JMP	2361 ....W6OUL	1976 .....DJ1YH	1674 .....YBØAI	1369 ..KW5USA	742 .....K5IC
4014 .....9A2NA	3489 ..SM3EVR	3088 .....KØDEQ	2585 .....9A4W	2340 .....K5UR	1958 ...CT1EEB	1587 .....W2EZ	1226 ...EA2BNU	699 .....W2OO
3999 .....N4NO	3465 .....N5JR	3008 .....IK2ILH	2545 .....W9IL	2304 ...OZ1ACB	1949 .....VE6BF	1561 .....N1KC	1163 .....K6UXO	697 .....KL7FAP
3833 .....N6JV	3376 .....I2MQP	3005 .....HAØIT	2454 .....K2XF	2212 ...PY2DBU	1837 .....AA1KS			

SSB

4446 .....I0ZV	3211 .....9A2NA	2734 .....4X6DK	2325 .....CX6BZ	1969....CT1EEB	1821 .....W9IL	1555.....W2FKF	1218.....WT3W	990 .....HA9PP
4050.....ZL3NS	3198.....I2MQP	2719 .....KF2O	2301 .....HAØIT	1954....CT1EEN	1736 .....K3IXD	1538 .....VE9FX	1194 .....N1KC	959 .....VE7SMP
4018 .....VE1YX	3165.....EA2IA	2594 .....I8KCI	2270 .....IN3QCI	1937 .....I8LEL	1721 .....DK5WQ	1533 .....KI7AO	1193.....I2EAY	903.....N9DI
3705 .....I2PJA	3121 .....N4NO	2570....LU8ESU	2259 .....K5RPC	1898 .....NQ3A	1704 .....IT9SVJ	1520 .....DF7HX	1190 .....K4CN	844.....KX1A
3649 .....F6DZU	3049.....F2VX	2513 .....KF7RU	2094 .....LU5DV	1864 .....K2XF	1685 .....W6OUL	1384 ...LU3HBO	1162....EA5DCL	822 .....K1BYE
3354....EA8AKN	2960 .....I4CSP	2509 .....EA5AT	1994 .....W4UW	1862 .....EA7TV	1606 .....K8MDU	1368 .....NG9L	1148 .....AG4W	812 .....KU6J
3260 .....CT4NH	2938 ...CT1AHU	2455 .....EA1JG	1988 .....K5UR	1852.....W7OM	1562 .....W2ME	1254 ....JN3SAC	1078 .....EA3KB	776 .....YBØAI
3243 .....OZ5EV	2885.....N5JR	2388 ...OE2EGL	1978.....N6FX	1839.....I3ZSX	1562 ...SV3AQR	1238 .....LU4DA	1048....EA3EQT	702 .....KU4BP
3234 .....N4MM	2741 ...PAØSNG	2337 .....W2WC						

CW

4273 ..WA2HZR	2822 .....LZ1XL	2341.....KA7T	2102 .....N6FX	1898.....K5UR	1728 .....W9IL	1483 .....EA6AA	1146 .....K6UXO	898.....WT3W
3834.....N6JV	2583.....W2ME	2325 .....KF2O	2009 .....OZ5UR	1847 ....IK3GER	1694 .....I2MQP	1342 .....WO3Z	1118 ...EA2BNU	830.....N1KC
3558.....N4NO	2578.....N5JR	2312....JA9CWJ	1955 .....G4SSH	1846 .....KS4S	1679...EA7AAW	1332.....EA2CIN	1118 ...HB9DOT	809.....KU6J
3476.....K9QVB	2558.....N4MM	2301....EA7AZA	1938 .....LU2YA	1832 .....VE6BF	1671 .....DJ1YH	1309 .....AC5K	1081 .....W4UW	767 .....VE9FX
3469 ...VE7CNE	2428 .....W2WC	2197....W8UMR	1919.....K2XF	1803.....W6OUL	1668 .....I2EAY	1282.....DF6SW	1075 ..WA2VQV	710 .....KØCF
3178.....EA2UA	2399 .....HAØIT	2147 .....I7PXV	1905....JN3SAC	1797 .....W7OM	1520 .....4X6DK	1158.....YU1TR	953 .....KX1A	642.....PP6CW
2831 .....9A2NA								



Neil Sutherland, VE8CQ, lecturing on radio theory to a group of prospective VE8's at the July 25, 2003 meeting of the Western Arctic ARA in Yellowknife. Neil is president of the club. (Photo courtesy Tom, W4YOK)

DXpeditions that try QSLing from countries with mail theft problems.

In Closing . . .

The contest season is upon us. The next few months we'll be doing our best in the CQ WW DX Contests and the ARRL Sweepstakes, etc. You won't see my call at the top of those results, but you will hear my signal on the air on those weekends. After 50 years, I am taking it easy nowadays and just operate a few hours now and then, but I'll be in there. Good luck to all of you whether, you're out to set a record, add a few band/mode contacts to your totals, or just have a little fun like me.

Until next time . . .

73, Carl, N4AA

QSL Information

3B8MM via DL6UAA
3B9ZL via FR5ZL
3CØA via DJ9ZB
3CØF via DJ9ZB
3CØNNN via DJ9ZB
3CØR via DJ9ZB
3CØV via DJ9ZB
3D2BT via OM2SA
3D2MO via OM2SA
3D2RK via W7TSQ
3DAØDX via ZS5WI
3DAØSV via K4YL
3DAØWC via VA7DX
3V8SM via DL1BDF
3V8SQ via DL1BDF
3ZØCDP via SP6M
3ZØI/1 via SP6ZDA
4A2Q via WD9EWK
4L1MA via ON4RU
4N1A via YU1YV
4N1X via YU1AI
4N5ØA via YU1YV
4N7N via YU7BPQ
4N9A via YU1YV
4N9C via YU1JU
4N9T via YU1JU
4XØIS via 4X1GA
5B4AGD via YU1FW
5JØJ via TBD
5T5M via ON4IQ
5T6M via ON4ANT
5WØGW via DL2AWG
5WØVB via UA4WHX
5W1SA via JH7OHF
5WOAH via DL2AH
6D2X via AC7DX
6NØZS via 6K5SSR
7P8DA via K4YL
7P8EW via KA2UCA
7P8KA via N2LA
7P8LA via N2LA
7P8NI via IK2ANI
7P8NI via IN3ANI
7P8NK via VA7DX
7P8NN via A22NN
7P8NR via IN3ZNR
7X5ST via 7X2LS
8JØJCC via JAØDWY
8J1ITU via JO1ZZA
8J2C via JHØMUC
8J3C via JH3GXF
8J3HAM via JJ3WPF
8J7C via JA7FFN
8J8FST via JH8CBH
8Q7LC via VK6LC
9A/F5OGG via LX1NO
9AØHQ via 9A1A
9AØPAX via 9A7K
9AØR via 9A9R
9A100IP via 9A1RKA
9A1V via 9A4RV
9A5V/P via 9A5KV
9A6NL via HA6NL
9A7T/P via 9A2EU
9H3MR via IK1PMR
9H3TM via DL1ASA
9H3UT via DL9GDB
9JØS via G3TEV
9N1AC via N3ME
9N7AS via JH3PAS
9S3UT via DL9GDB
9UACH via IK3CHI
A22AN via IK2ANI
A22FV via IN3ZNR
A22NI via IN3ANI
A22NR via IN3ZNR
A25FV via IN3ZNR
A35XM via DL8YRM
AY8XW via WD9EWK
B4HQ via BA4RD
BI5P via BA4RD
BU2/JJ1TBB via JL1ANP
BV9L via BV4YB
C53M via OH9MM
C56R via OH9MM
C6AMK via N8IK
C6ASB via AKØM
C8A via ZS6MG
CO0US via K7JA
CO2JZ via XE1CI
CO3VK via IZ8EBI
CQ0BWW via CT1BWW
CQØQXL via CT4IS
CQ1BWW via CT1BWW

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," P.O. Box 3071, Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

BY TED MELINOSKY,* K1BV

Completing the USA-CA Record Book

What's happening with USA-CA? For the first half of 2003 there were 41 submissions; 19 (46%) were from DX and 22 (54%) from the U.S. While completing the award is very difficult for DX stations, almost half came from overseas, and 11 (26%) were for All Counties—no intermediate steps, just step to the top of the pile! There were 19 (46%) applications for the entry level of 500 counties, 14 of which came from DX stations. There were 5 endorsements for 1000, and only a few each for higher levels. As with any award with multiple levels, the trick seems to be sustaining interest once you are past the entry point.

Q&A—Completion of the Record Book

Q: Most of my contacts are from mobile stations. They don't normally give the city/town they're operating from. Will my record book be thrown out for not having cities listed?

A: No, we're not that cruel! Just write the word "mobile" in the town/city field of the booklet.

Q: I earned USA-CA 1000 some years ago using mixed bands and modes. I'm back into county hunting now and am interested in pursuing CW endorsements. Must I switch over to CW only, or can I pursue both mixed and CW?

A: The USA-CA is issued as a one-time award, which may be endorsed for band and mode at your request. There are no provisions for separate certificates, so you need to decide how you want the certificate to be issued. If you decide on all CW, then your next submission, for example the 1500 level, should show a list of all CW contacts, and you should ask me to send you an All CW endorsement. MARAC (The Mobile Amateur Radio Awards Club) offers a full complement of awards for those continuing onward after earning their USA-CA Award.

W4YDY, USA-CA All Counties #1069

This month we hear from David Langley, W4YDY, USA-CA All Counties #1069, May 31, 2003.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

David Langley, W4YDY, USA-CA All Counties #1069, May 31, 2003.

USA-CA Special Honor Roll

John Cunliffe, VK6NZ
USA-CA All Counties #1070
July 21, 2003

USA-CA Honor Roll

500		1500	
KT5RR	3248	VK6NZ	1362
KW1DX	3249		
WA2BQI	3250	**2000**	
JE1GNG	3251	VK6NZ	1261
JI1CQA	3252		
VK6NZ	3253	**2500**	
RA9LA	3254	VK6NZ	1181
N3WD	3255		
1000		**3000**	
VK6NZ	1633	VK6NZ	1091
		HAØDU	1092

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

County hunting came by way of the CQ Millennium Award. I had decided to try for that one, since I had checked my computer and completed all the requirements for it in 2000, including 581 counties. Then I remembered that there might be some kind of county hunters net up on the high end of 20 meters. I found the county hunters on 14.336 MHz on January 15, 2001 and listened for a while. I heard them working mobiles in a lot of counties, so I jumped in and called WB4FFV/M in an 18-wheeler in Scott County, MN. He came right back and gave me a 59 report, and I returned it. That was easy, so I decided I could satisfy the county requirements on the net. Eighteen days later I had the 500 counties for the Millennium Award. That was fun! I decided I would try to work as many as I could, but figured I would never get close to all of them. 3077 was a large order.

I'm glad I took the time to enter my logs going back to 1952 in the Logic logging program (www.hosenose.com). I was able to do a quick check with it and found that I had worked over a thousand counties and had about 400 confirmed starting from when I was first licensed as WN4YDY and W4YDY. County number one came on December 25, 1952 with my first contact as WN4YDY, and over 50 years later, along came county number 3077! It really doesn't take that long, because I worked over 3000 on the County Hunters Nets in a little over two years.

Several county hunters encouraged me to keep trying for the award. I thought that getting over 2600 more counties confirmed would be an expensive endeavor. Sharon, KJ8F, sent me some of her mobile reply cards (MRCs) with about 25 counties confirmed for me. She explained how the system works, and over several e-mails gave me the encouragement to keep trying. I designed an MRC card for the Logic program with Dennis, WN4AZY, author of the program, giving me some help. The basic card is now included with his program. I was then able to print

MRC cards with QSO info coming from the log. Up to eight counties can be printed on a card.

I got an envelope back that had 111 counties confirmed from one station, Bob, KC1NA. He drives a big 18-wheeler all over the country putting out counties. So far I have worked him in 537 counties and 44 states. I'm still waiting for him to drive that big rig to Alaska and Hawaii! I have worked Ralph, WB4FFV, in 17 states and 290 counties in the Midwest.

I worked some of the counties on CW after N4CD and KA3MMM encouraged me to go to 14.0565 MHz. It had been years since I had been on CW, but the county hunters are patient.

It wasn't long before I was down to just four counties left. Jack, K7DZE, got the last one in South Dakota and west of the Mississippi River! Rick, AI5P, got the last one in New York when he was in the area. Dan, KM9X, e-mailed me to inform me that he and Judy, KB9MGI, were going about 150 miles south to Casey, KY for me. A week after getting NY, Dan and Judy completed KY for me. Dan was surprised when I told him I was now down to one left.

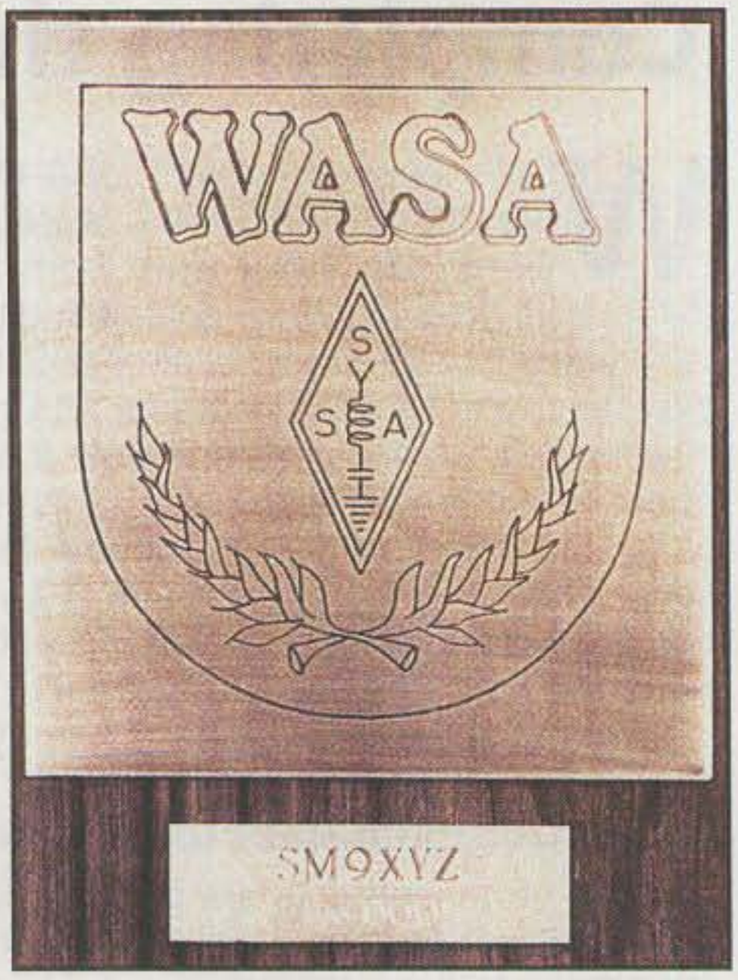
Ray, WG6X, was at Dayton, and he told me that he was going to Casey in case Dan and I didn't make contact. So he decided to go back to Pensacola via Bacon, GA to get the last in the state for me. When I told him it would be for the whole ball of wax, I could hear his engine speed up!

Two days after getting KY, Ray was in Bacon, GA for my last one. I was returning from taking my grandson to school, and we worked it on 40 meters, mobile to mobile, both using Tarheel antennas (www.tarheelantennas. com). Ray drove over 300 miles extra on his way home and arrived about 24 hours later than he had planned. County hunters really go the extra mile—or miles!

I want to thank the many mobiles who put out the counties, from Ralph, WB4FFV/M, to Ray, WG6X/M, and the 513 mobile stations in between. Also many thanks to Jim, KZ2P/W2JG, for his many hours as net control, and to the many other net control stations. Without their assistance, the task would not have been completed. Also, thanks to CQ magazine for offering the award, and to K1BV, the award manager. Do it the second time around? Yakkey-Dee-Yak will be back!—*W4YDY*

The Swedish Radio Society Awards Program

This month we're pleased to be able to feature the official awards series sponsored by the Swedish Radio Society (SSA). Two of the principal awards require contacting stations located within Maidenhead Locator squares, one for Sweden and the other one for the entire world. Many SM stations indicate their locator square on their card. A good place to determine the correct square is on Buckmaster at <http://www.buck.com/cgi-bin/do_hamcall>. A half hour spent going through your collection of cards from Sweden will probably show that you qualify for at least the entry level of the award, which requires 25 squares. Buckmaster shows this information for all stations in all countries, although it could get tedious after the first few thousand lookups!



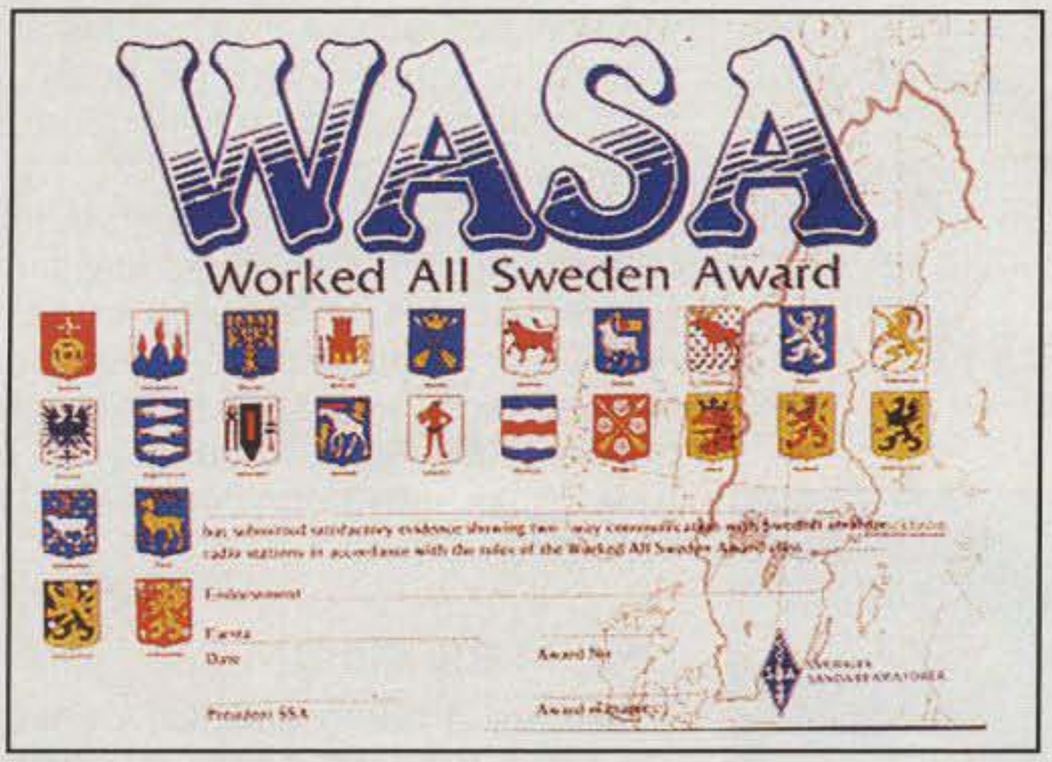
The Worked All Sweden Award plaque offered by the Swedish Radio Society.

General Requirements. Contacts must be made after January 1, 1988 and from the same QTH or within a radius of 150 km. Only surface stations may be worked, and no repeater contacts are allowed. Endorsements are available for band, mode, or combination at your request. GCR list accepted. Apply to: Diploma Manager, SSA, Ostmarksgatan 43, S-123 42 Farsta, Sweden (http://home.swipnet.se/SM6DEC/english.htm).

Fee Schedule: Basic award 40 SEK (6 IRCs, 4 Euros, 4 $US); endorsement sticker 5 SEK (5 IRCs, 1 Euros, 1 $US); Rosette (Field Award) 40 SEK (6 IRCs, 4 Euros, 4 $US); plaque 150 SEK (25 IRCs, 15 Euros, $15 US); record book 40 SEK (6 IRCs, 4 Euros, 4 $US).

Note: Comprehensive record books providing complete lists of LANs (Swedish counties for WASA, HASA), Locators (SLA), and Fields (Field Award) with maps and room to record all necessary data are available from SM6DEC at a very reasonable cost. These are highly recommended tools for the awards. Write to: Bengt Hogkvist, SM6DEC, Ostbygatan 24 C, SE-53137 Lidkoping, Sweden.

Worked All Sweden Award (WASA). Contact Swedish counties (LANs) and callsign districts as follows:



The Worked All Sweden Award is issued for contacting Swedish counties (LANs) and callsign districts.

The Heard All Sweden Award is available under the same conditions as theWorked All Sweden Award, but for SWLs only.

The SSA Field Award is issued for contacting different fields all over the world as defined by the Maidenhead locator system.

Class 3—Europeans need all LANs on two bands; others need all callsign districts 0–7.

Class 2—Europeans need all LANs on three bands; all others need all LANs.

Class 1—Europeans need all LANs on four bands; all others need all Lans on two bands.

Shield—Europeans need all LANs on 5 bands; all others need all LANs on five bands.

Stickers are available for 2×CW, 2× phone, 2× SSB, and 2× RTTY. Fee for each diploma is 30 SEK, 10 IRCs, or $5US.

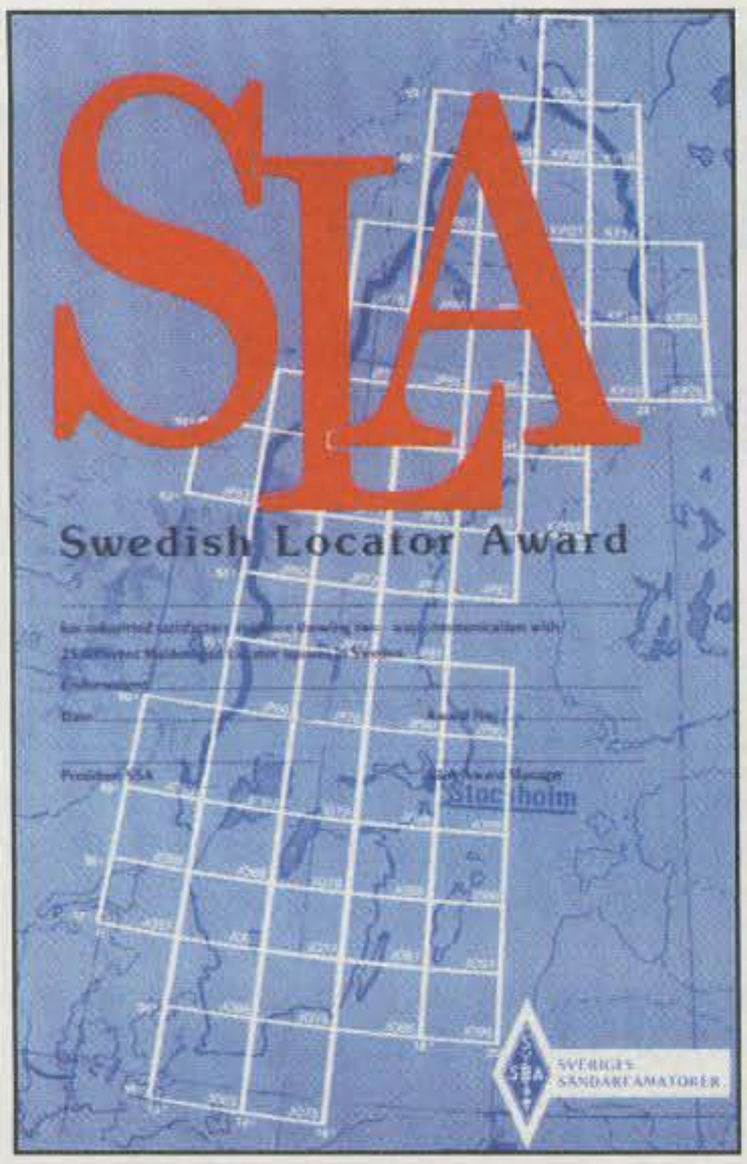
List of Swedish LANs: AB Stockholm City, C Uppsala, D Södermanlands, E Östergötlands, F Jönköpings, G Kronobergs, H Kalmar, I Gotlands, K Blekinge, L Skane, N Hallands, O Vastra Gotalands, S Värmlands, T Örebro, U Västmanlands, W Dalarna, X Gävleborgs, Y Västernorrlands, Z Jämtlands, AC Västerbottens, BD Norrbottens.

Heard All Sweden Award (HASA). Available under the same conditions as WASA, but for SWLs only for reports of reception after January 1, 1988. No shields awarded.

The Field Award. Contact different fields all over the world as defined by the Maidenhead locator system, after January 1, 1985. Six classes: Bronze (Basic) = 100, Silver (Rosette) = 150, Gold (Rosette) = 200, Platinum (Rosette) = 250, Plaque = 300, Gold Seal Plaquette = 324.

All modes and bands. No endorsements. Surface stations only. QTH must be on the QSL with enough accuracy so that the field may be determined. SSA reserves the option to request a sample of your cards. Send GCR list with name of city/town contacted, or in the case of Maritime Mobiles, the latitude and longitude.

Swedish Locator Award (SLA). Issued for verified contacts with various locator squares in Sweden as defined by the Maidenhead system. SWL okay. Basic diploma requires 25 squares. Endorsements at 35, 45, 55, 60, 61, 62, 63, and 64 squares.



The Swedish Locator Award is available for contacts with the various locator squares in Sweden.

List of locators in Sweden: JO57, JO58, JO59, JO65, JO66, JO67, JO68, JO69, JO75, JO76, JO77, JO78, JO79, JO86, JO87, JO88, JO89, JO96, JO97, JO98, JO99, JP53, JP60, JP61, JP62, JP63, JP64, JP70, JP71, JP72, JP73, JP74, JP75, JP76, JP80, JP81, JP82, JP83, JP84, JP85, JP86, JP87, JP88, JP90, JP92, JP93, JP94, JP95, JP96, JP97, JP98, KP03, KP04, KP05, KP06, KP07, KP08, KP09, KP15, KP16, KP17, KP18, KP25, KP26.

The SSA Activity Award 2003 is the first such annual award issued by the Swedish Radio Society for working or hearing 365 stations in a calendar year.

SSA Activity Award 2003 (A-2003). The SSA has started an annual award for making contacts during a calendar year, first available for 2003. This award is open to radio amateurs and SWLs to promote operating activity on the amateur radio bands. Work (or hear) 365 radio stations during the period January 1 through December 31, 2003.

All bands and all modes. The same station may be worked several times. The award fee is 5 Euros or $US5. Apply with a simple statementsuch as: "I have made at least 365 radio contacts during 2003." Apply to Bengt Hogkvist, SM6DEC, Ostbygatan 24 C, SE-53137 Lidkoping, Sweden.

URL of the Month

There are a number of IOTA (Islands On The Air) oriented sites available on the internet. I've found the "Islands on the Air Web Japan" a very informative source, with many articles in English. There are current and planned activities with an emphasis on Asian islands, as well as many stories and images of mini-expeditions. Take a look at <http://www3.ocn.ne.jp/~iota>.

I'm still looking for you to send me the rules for your club or group's award. People won't apply if they don't know it exists! *CQ* magazine is an excellent way to get the word out.

73, Ted, K1BV

BY JOHN DORR,* K1AR

What Makes A Great Contester?

October's Contest Tip

Microphones and paddles are probably the most used accessories in any contest station, yet we never seem to do much preventive maintenance on these devices. Have you taken a few minutes to clean them up, checking for crystal-clear audio (transmitting and receiving) and solid CW that comes from proper spacing of clean contacts? It may seem trivial to worry about these things, but it's just another example of what differentiates a winner from a follower. Check it out!

Calendar of Events

Sept. 20–21	The 45th SAC CW Contest
Sept. 20–21	Washington State Salmon Run
Sept. 27–28	**CQ World-Wide RTTY Contest**
Sept. 27–28	The 45th SAC SSB Contest
Oct. 4	EU Autumn SSB Sprint
Oct. 4	QCWA QSO Party
Oct. 4–5	California QSO Party
Oct. 4–5	2003 Oceania SSB Contest
Oct. 5	ON 80M SSB Contest
Oct. 5	RSGB 21/28 MHz SSB Contest
Oct. 11	EU Autumn CW Sprint
Oct. 11–12	2003 Oceania CW Contest
Oct. 11–12	Iberoamericano Contest
Oct. 11–12	Pennsylvania QSO Party
Oct. 12	ON 80M CW Contest
Oct. 18–19	JARTS WW RTTY Contest
Oct. 18–19	Worked All Germany Contest
Oct. 19	RSGB 21/28 MHz CW Contest
Oct. 19	Asia-Pacific CW Sprint Contest
Oct. 25–26	**CQ WW SSB DX Contest**
Nov. 29–30	**CQ WW CW DX Contest**

If I were to think about the question I am most often asked by newer contesters, it would be something like "What are the secrets to winning?" or "Why is it that some contesters are able to consistently place so high in the standings?" Put another way, what are the real factors that make a contest operator great? If you're a seasoned operator, it won't hurt for you to have a little review (or share your experience with others) before we start another contest season. If you're relatively new to contesting, get ready to take some notes. What follows is some "down-to-earth," practical advice that may help you!

The simple element of success in contesting, and perhaps the best-kept secret, is that there are no secrets. Having said that, there is an assumption in any competitive avocation that the successful participants lead by creating a "by invitation only" environment for everyone else. New winners can claim membership only by being the beneficiary of the experienced champions sharing a guarded portion of their precious experience and tricks of the trade. Today's society fuels this thinking, in that we have been programmed to aspire to instant gratification at the expense of our investment in time and experience. I'm here to tell you that perhaps more than with any other activity in which I've ever participated, contesting is all about blood, sweat, and tears.

A few years ago, one of my contesting heroes, Trey, N5KO (see last month's column), outlined a few of the critical success factors for being a contest winner. In summary, Trey believes:

- Know the code; 50 wpm conversational speed is a nice milestone.
- Know the bands. There's no substitute for knowing the right band to be on to improve your score.
- Know your station. Knowing whether or not your station has the gusto to run people or crack pileups under given conditions on a given band is a real time saver.
- Stay in the chair. You can't be the best station in a contest if you are not on the air.
- Get on the air and operate! Experience is king. Expect to learn something every time you operate.
- Solicit advice from a variety of experienced people. Some of the "experts" will be more compatible with you on a personal level than others, so shop around and get a variety of viewpoints.

Trey was off to a great start with his suggestions. Here are some more ideas for you to consider:

- When operating CW, sending/copying speed is not the critical factor. What is really important is to be able to copy a callsign—the first time—in your head at speeds of up to 40 wpm.
- With the current state of the sunspot cycle, it isn't too hard to be on the right band. Once the sunspots come back, however, it will be easy to make serious mistakes. That's the time to consult others for advice!
- Never underestimate your ability, or your station's ability, to run.
- Know the callsigns of stations in the target area. This is strongly related to the "operate a lot" advice. Familiarity with common callsigns is a big plus.
- When you're running, really dig for the weak ones. Don't get lazy, no matter how tired you are. Your inability to pull out a calling station is a personal defeat!
- Even when conditions stink, don't give up. Consider it to be a learning experience that will reap dividends in the next contest. Some bad conditions will exist for everyone in a given contest.

In addition to the above, I pulled together some other ideas that originated from a pre-ARRL Sweepstakes training session sponsored by the Southern California Contest Club. Keep this list handy, as well.

Before the Contest

Make a checklist of non-negotiable contest

*2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

preparations customized to your needs. Here are some examples:

- Set your computer to the exact UTC time.
- Set up all the computer files, CW/voice memories, keyboard overlays, etc., before the contest.
- Simulate a few QSOs on the computer, with the rig and other devices fully interfaced.
- Get the latest propagation forecast and stay on top of it.
- Review past contest logs and contest results.
- Update all labeling and check for RFI in the shack while operating at full power.
- Make sure your contesting eyeglasses are handy (and clean).
- Keep lozenges handy for phone contests (and perhaps your shrink's phone number).
- Make sure your coffee-cup heater is working and in place.
- Verify that your rig's attenuator, AIP, notch, noise blanker, and split VFOs all are off.
- Make sure your computer boots cleanly and is properly configured.
- Have an inventory of telephone and high-pass filters ready to hand out to neighbors in response to any potential problems. It may be a quick way to diffuse a problem.
- Brief your spouse on what to say on the telephone to neighbors if they call.
- Verify VOX delay setting.
- Have contest rules handy and be sure to review them.
- Prepare a sheet with suggested frequencies (for example, nets, foreign band restrictions, etc.).
- Check receiver noise with the computer on. Does turning the antenna slightly help?
- Establish a difficult but achievable goal for the contest.
- Look at last year's rate sheet to fine-tune your strategy for band changes and other operating decisions.

During the Contest—General Advice

- Ignore other people's QSO numbers and interim results. There are too many variables that could make their score different from yours. Also, you can only control your own result, not theirs.
- Use short pauses between CQs so that a limited few turn the dial past you while the frequency is silent.
- Avoid bad operating: Who was the Yankee Zulu? Use good operating practices: Yankee Zulu, you're 5903.
- Maintain your accuracy. Remember that every QSO is important.
- Absolutely no alcohol, and limit the use of over-the-counter medication except as absolutely needed.
- Have a game plan for food. As part of your planning, think about what makes you alert and what makes you tired.
- Use the highest band open during daylight hours, but think creatively about odd openings.
- Consider a set of motivation techniques that work for you.

During the Contest—CW

- Start the contest at higher speeds and slow down as the rate or circumstances dictate.
- As a DX station (or if you're KC1XX), if your pile-up grows, increase your speed until it begins to thin out.
- Try reducing your AGC and riding the RF gain.
- Always use your RIT and tune ±400 Hz after CQing
- Go high in the band sometimes and try slower CQs to attract the casual participants.
- When tuning the bands in a contest (search and pounce, as opposed to calling CQ), tune from the high part of the band to the low part to maximize the number of stations you will hear. Based on experience, tuning from high to low is better than from low to high.

Correction 2002 CQ WW VHF Contest Results

In the June issue, E21SKK was inadvertently left out of the 2002 CQ WW VHF Contest results. He is the winner for Single Operator, 2 meters, in Grid Locator OK03 in Thailand with a score of 8,952 points (373 QSOs with a multiplier of 12).

During the Contest—SSB

- Attract casual callers with plaintive CQs. Make callers say the entire contest exchange. Don't assume anything.
- Use Fast AGC to protect your ears. Ride the RF gain control to avoid compression.

Finally, don't leave out one of the most important qualities of contest operating, one that is very difficult to teach because it's a personality trait and not based on knowledge, data, or information. In any sport, success is based in large part on the desire to win! Becoming a world-class operator starts with a love affair. Joseph Campbell exhorted us all to "follow your bliss." The few who do become the heroes who inspire us all!

And in Honor of David Letterman . . .

Maybe you missed this one on TV the other night, but I could swear it happened on Letterman. Well, okay, it's not the April issue, but enjoy nevertheless. . . .

Top Ten Ways to Become a Big-Time Contester

10. Send the wife and kids to Disneyworld for the weekend.
9. When buying a house, instead of "location, location, location," be reminded that it's really about "conditions, covenants, and restrictions."
8. Attend the 12-step program offered by Packet Users Anonymous.
7. Don't learn your logging program during the contest.
6. Take sleep breaks only when there won't be any new multipliers on.
5. Get a big-time contester to guest op, using your call.
4. The contester's best friend—F1
3. Work as many people as you can as fast as you can.
2. Buy a beam (or two).
1. One word: Caribbean.

Well, you are officially an armed and dangerous fellow contester! Now get out there and operate. You can be a winner if you really want to be. It may take years of investment, but desire will always prevail over blind luck! See you this fall!

Final Comments

Well, that's it for this month. The K1AR callsign will be at rest this fall (as will my QSLing obligations) as I operate from PJ2T and KC1XX . Suffice it to say, however, I've hardly lost my enthusiasm and interest in the sport. The beauty of our hobby is that it can be great regardless of conditions. Make the best of it this contest season. I know I will be doing exactly that!

73, John, K1AR

BY JOE LYNCH,* N6CL

BPL: A Threat to the VHF-Plus Ham Bands

On August 2, at the Austin Summerfest 2003 hamfest and ARRL West Gulf Division Convention, ARRL President Jim Haynie, W5JBP, addressed a standing-room-only audience concerning the Broadband over Power Line service (BPL) threat to the amateur radio frequencies. The point of Haynie's talk was to alert those in attendance to the grave threat that the BPL service poses to the ham bands. Nevertheless, what, you may ask, has this problem to do with VHF? Most of the attention concerning the proposal has been centered on the potential interference to the HF bands. However, since the service uses frequencies between 2 and 80 MHz, 6 meters is in the BPL's bore site, as well.

At the Austin Summerfest 2003 and ARRL West Gulf Division Convention, ARRL President Jim Haynie, W5JBP, addressed a standing-room-only audience concerning the Broadband over Power Line service (BPL) threat to the amateur radio frequencies.

According to the League, "A form of power line carrier (PLC) technology, BPL would use existing low- and medium-voltage power lines to deliver broadband services to homes and businesses. Because it uses frequencies between 2 and 80 MHz, BPL could affect HF and low-VHF amateur allocations wherever it's deployed. BPL proponents—primarily electric power utilities—already are testing BPL systems in several markets, and one reportedly is already offering the service. FCC rules already allow BPL, although industry proponents want the FCC to relax radiation limits. It's feared such a change could exacerbate BPL's interference potential."

During Haynie's talk he premiered a short (six minute) video prepared by ARRL Lab Manager Ed Hare, W1RFI, who made a tour of communities in which BPL trials were underway during the end of July. In the video Hare uses a Kenwood TS-440 mobile traveling around areas where the BPL service is in use. According to Walt Dubose, K5YFW, who is the assistant chairman of the ARRL High Speed Multimedia (HSMM) Working Group, he indicated that noise level was about what he'd expected. "But for most attending Haynie's talk—maybe 60 percent—it was much worse than they had imagined, and for some it was a real shocker," he reported. Dubose reported that a few of those viewing the video simply couldn't believe that BPL actually was causing the high noise level.

For your editor, viewing the video was stunning. Interference to the 20 and 15 meter ham bands made them useless. The noise was constantly in excess of S-6 and sometimes over S-9 on the Kenwood transceiver. The only copyable signals that Hare could make out were those well over the noise level of the BPL signals. Incidentally, the video is available online on the League's website at: <http://www.arrl.org/news/stories/2003/08/08/2/?nc=1>. The file is 24 megs, so it's best to have a broadband service to download it for viewing.

In an impromptu interview with President Haynie, your editor queried him concerning his talk. Jim related that his fears were grave due to the money and power behind the effort to get FCC approval. When I asked him about the military and whether or not they have taken an interest in this issue, he indicated that he has hopes that the military will come alongside the amateurs and join the fight to oppose the industry's attempts to gain the necessary approval. Indeed, the military may be our best hope in opposing this threat, since each of the services still uses HF extensively for its long-haul communications. In addition, since amateur radio has been cited as a key element of homeland securi-

VHF Plus Calendar

Sept. 30	222 MHz Fall Sprint. (See text for details.)
Oct. 2	First quarter Moon and lowest Moon declination.
Oct. 4	Joint RMG/NTMS meeting at the Belton Hamfest. (See text for details.)
Oct. 5	Moderate EME conditions.
Oct. 8	432 MHz Fall Sprint. (See text for details.)
Oct. 8-9	*Draconids* meteor shower predicted peaks.
Oct. 10	Full Moon
Oct. 12	Poor EME conditions.
Oct. 14	Moon apogee.
Oct. 17	Highest Moon declination.
Oct. 18	Last quarter Moon. Microwave Fall Sprint. (See text for details.)
Oct. 18–19	First weekend of the ARRL International EME Contest. (See text for details.)
Oct. 19	Good EME conditions.
Oct. 21	*Orionids* meteor shower predicted peak.
Oct. 25	New Moon.
Oct. 25–26	50 MHz Fall Sprint. (See text for details.)
Oct. 26	Moon perigee. Moderate EME conditions.
Oct. 29	Lowest Moon declination.
Oct. 31	First quarter Moon.

EME propagation predictions courtesy W5LUU

e-mail: <n6cl@fuller.edu>

ty, an argument can be made that our effectiveness and usefulness would be seriously impaired should the relaxed standards be implemented.

What can we do about the threat? While we are well past the initial comment deadline of August 20, we can continue to monitor FCC announcements concerning any implementation of the requested changes in Part 15 regulations. A good FCC URL to monitor is: <http://gullfoss2.fcc.gov/ecfs/Upload/>.

For more information on shortwave radio comments related to the interference caused by BPL, see the following websites:

A European DX Council paper is posted at <http://www.edxc.org/modules.php?op=modload&name=Sections&file=index&req=viewarticle&artid=1&page=1>; and a BBC research and development white paper is posted at: <http://www.bbc.co.uk/rd/pubs/whp/whp013.html>.

(Portions of this report were excerpted from the ARRL news story "BPL is 'Spectrum Pollution,' ARRL President Says" posted on the ARRL's website, <http://www.arrl.org/news/stories/2003/08/08/2/?nc=1>.)

European Sporadic-*E* Wrap-up

Through the end of July, **Udo Langenohl, DK5YA,** continued posting on his website reports of the remarkable European sporadic-*E* propagation this past season. As of the writing of this column, his reports ended on July 26. As anticipated, the season began winding down during mid to late July. To date, Udo had no reports posted for August. Should he have additional information, it will be listed here next month. The following are the remaining reports that he has posted to date:

July 17, 2003: After several days of silence on both 50 and 144 MHz, sporadic-*E* is back. The MUF was high the whole day all around Europe, and at 1630 UTC 144 MHz was open short from EA7 to I. At the same time there was a huge cloud in the east with big broadcast signals from TA and 4X4 into UA3, while OH and ES were booming up to 108 MHz in UA6. Again the poor boys in OH didn't see any opening on 144 MHz. Countries involved today included I and EA.

July 19, 2003: What a promising day was anticipated, with propagation early in the morning. The MUF was very high in the eastern part of Europe, with lots of broadcasts from all around, said the boys from UA6. However, nil on 144 MHz except several taxi drivers from unknown Arabian countries on 145.0 to 145.5. Later we had a short and very spotty one from 4X4 and SV5 into parts of Italy, and a bit later again extreme short openings from Italy to both LA and G, while OZ was into southern France but for seconds only. The propagation appeared to be more meteor scatter than sporadic-*E*. The MUF was still high until the evening in all of Europe, but nil on 144 MHz. Countries involved included 4X4, SV5, I, OZ, LA, G, and F.

July 21, 2003: July is the month for the *big* openings in the eastern part of Europe. After checking 24 years of 144 MHz sporadic-*E*, I found July to be the best time for strong, long openings from western to eastern Europe and from northern Europe to the south. Today the MUF was high early in the morning, and at approximately 1300 UTC broadcasts from all of Europe were audible in both UA6 and UA3 up to 108 MHz. A huge cloud formed, and at 1450 UTC 144 MHz was open from UA6 to OH and a bit later from OH also into LZ and Z32. A big opening started, and there were at least two big clouds active in the east. Again FM was a nice mode, because several very rare squares were active on both 145.500 and 145.550. The MUF was very high again when LA was working into EW on FM on a QRB below 1000 km. This huge and extremely widespread opening lasted until 1825 UTC, when the last signals from UT5 and UA3 were audible in DL and PAØ. For this writer, there were 3 1/2 hours of very strong sporadic-*E* after work. Now that was nice! Countries involved included G, PAØ, ON, F, DL, OZ, LA, SM, OH, ES, LY, YL, ER, EW, SP, OK, OM, HA, HB9, OE, OK, I, S5, 9A, YO, LZ, YU, T9, Z32, SV, TA, UT, UA1, UA3, UA4, and UA6.

July 22, 2003: I don't have any idea what is happening to the ionosphere this year. Today's propagation was almost a copy of yesterday's, but much stronger and longer, lasting almost seven hours! The MUF didn't drop that much during the night from July 21 to July 22. In fact, the MUF was very high in the early morning both above Italy and again in the east. The first 144 MHz opening took place at 0722 UTC from EA and F to LZ and SV, while LZ was working into UA3 at the same time! The MUF dropped at 0800 UTC below 144 MHz, but was still extraordinary high. Broadcasts were heard from almost everywhere in Europe all around in each and every country. In fact, the 87–108 MHz FM sounded more like HF than VHF. At 1347 UTC 144 MHz was open again from DL to YO, and a bit later also from OZ to LZ, YO, and TA. Later G made UA6 on a QRB beyond 3000 km. G8VHI was the winner today with 3032 km. Congratulations, Reg! That is pretty rare across the continent. This opening was really huge and extremely widespread with very high MUF again reaching 250 MHz from LY to DL! The last signals were very late in the evening at 2021 UTC. Take a look at the map, fig. 1, as it says more than thousand words. This opening was for sure the best and strongest so far in year 2003. Countries involved included: G, PAØ, ON, EA, F, DL, OZ, LA, SM, OH, ES, LY, YL, ER, EW, SP, OK, OM, HA, HB9, OE, OK, I, ISØ, S5, 9A, YO, LZ, YU, T9, Z32, SV, TA, UT, UA1, UA2, UA3, UA4, and UA6.

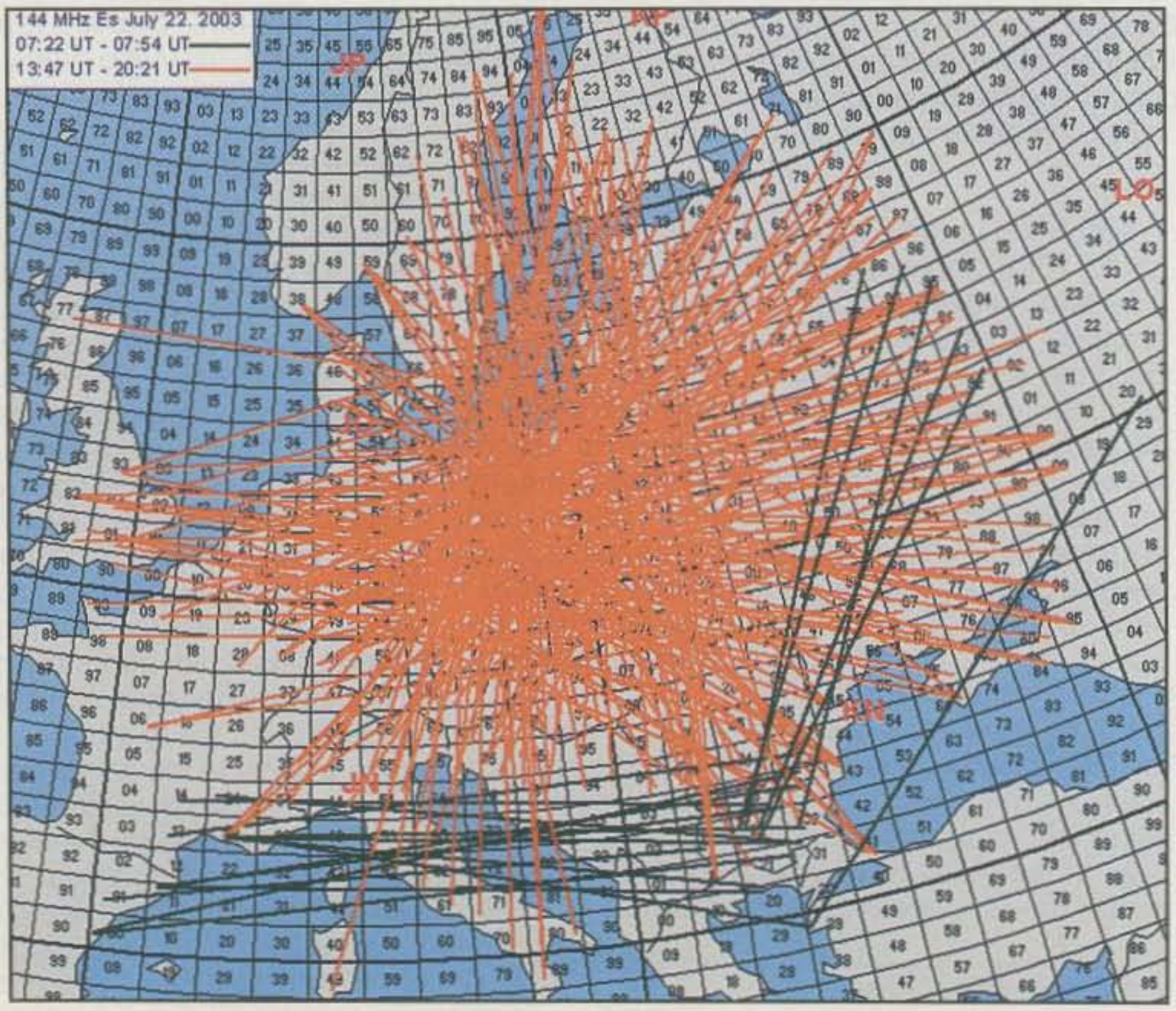


Fig. 1– From the European sporadic-E reports, specifically July 22, this opening was noted to be huge and extremely widespread, the best and strongest so far in 2003.

July 26, 2003: When I left home early this Saturday morning for QRL (at approximately 0530 UTC), I found Russian OIRT-TV up to 93 MHz to be very strong into DL. Later, the MUF was very high until noon, when it dropped rapidly. The early morning high MUF led to a short opening far in the east, where another cloud was active up to 144 MHz for some 30 minutes. HA was heard shortly in UA6, while ER made UA6 and 4K6. At the same time UA4 had a short opening into TA, and later UT5 was working into S5 and 4X4. Countries involved included ER, UA4, UA6, TA, 4K6, UT, 4X4, and S5.

Udo's documentation ends on July 26, 2003. Next month, if warranted, the remainder of the season's reports should appear. Also, an article about this intense sporadic-*E* season is slated for publication in the fall issue of *CQ VHF* magazine.

New Ham Crew On Board ISS This Month

The following is from the ARRL Space Bulletin 012, dated July 25, 2003:

Another two-ham crew will take over the reins of the International Space Station (ISS) this month. Veteran NASA astronaut Mike Foale, KB5UAC, and seasoned Russian cosmonaut Alexander Kaleri, U8MIR, have been named as the ISS Expedition 8 crew. Former crewmembers aboard the Russian *Mir* space station, Foale and Kaleri will kick off their latest space station duty tours October 18. They'll head into space aboard a Russian *Soyuz* spacecraft with a third ham, Spain's Pedro Duque, KC5RGG, representing the European Space Agency (ESA). They'll dock two days later at the ISS.

The English-born Foale, 46, will serve as the Expedition 8 commander and NASA ISS science officer. Kaleri will be the *Soyuz* commander and ISS flight engineer. They'll replace Expedition 7 crewmembers Commander Yuri Malenchenko, RK3DUP, and Ed Lu, KC5WKJ, who have been aboard the ISS since April. Duque will ride into space with Foale and Kaleri on the outbound mission and return to Earth with the Expedition 7 crew, Malenchenko and Lu, aboard the *Soyuz* now docked at the ISS.

A native of Latvia, Kaleri, 47, was a member of the backup crew for Expedition 5 and had been scheduled to be the third Expedition 7 crewmember. With the NASA shuttle fleet still grounded at least until early next year in the wake of the *Columbia* tragedy, however, the Expedition 7 crew was trimmed to two people, and Kaleri was cut.

Two-person crews will be the rule at least until the space shuttle—with its significantly larger cargo and crew capacity—returns to flight. The *Soyuz,* which carries three passengers, will remain the prime crew transport system. Foale and Kaleri are scheduled to spend approximately six months aboard the ISS.

In early August NASA announced its intentions to plan for a possible March 11, 2004 date for the next shuttle launch. Most likely this first trip in space will be a shakedown cruise. Assuming that all goes well, a shuttle could possibly be used in April or May to provide transportation for Foale and Kaleri's replacements.

TransOrbital is planning on using the Hewlett-Packard iPaq Pocket PC to send pictures back from the Moon early next year.

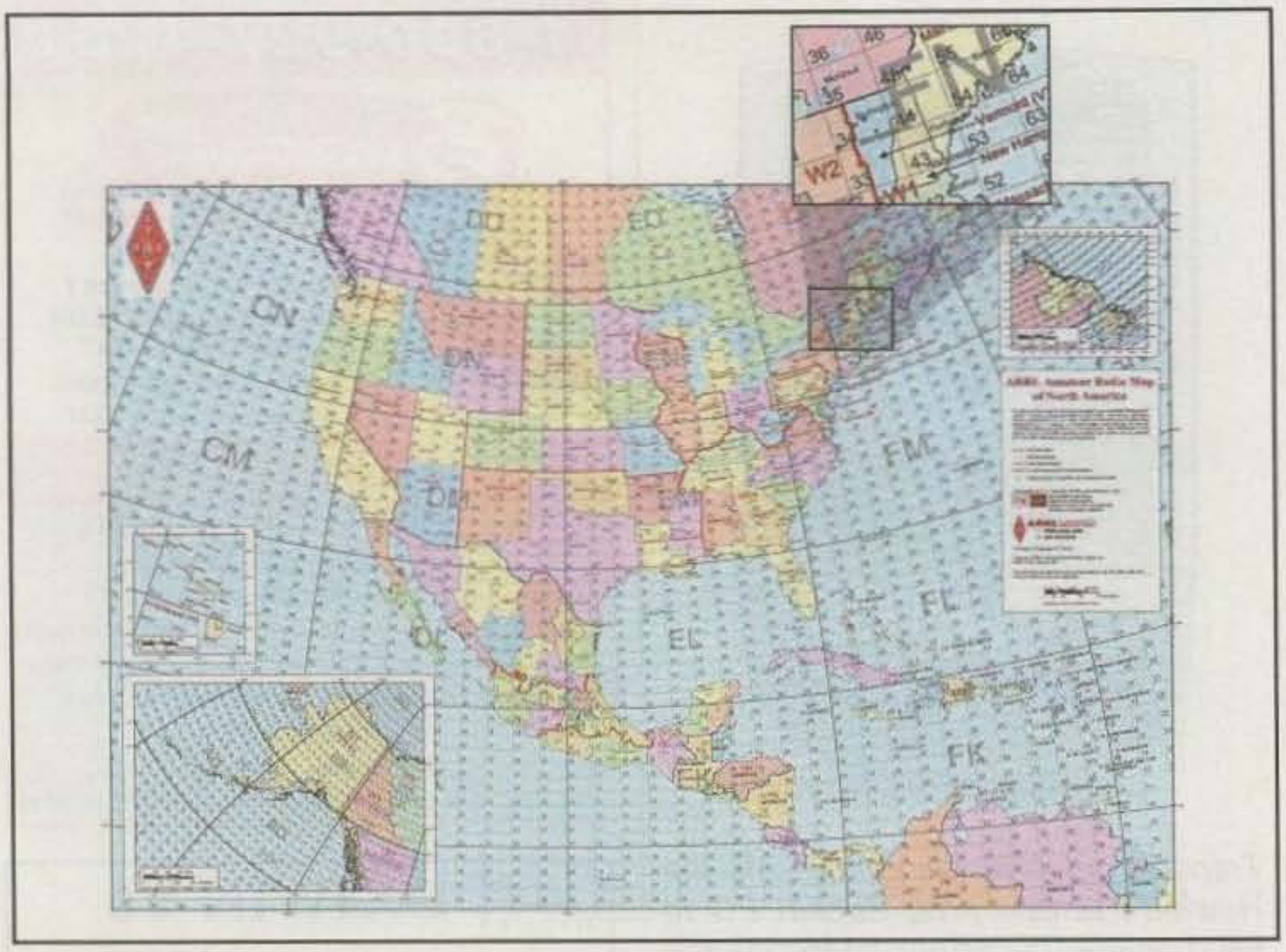
New VE 6 Meter Group Formed

This past August a group of Canadians formed the Canadian Six Meter Group for the purpose of exchanging information related to operating on that band. Their website is <http://www.csmg.ve2qcg.com/>. It is in both English and French. If you are Canadian and are on 6 meters, you are encouraged to participate in this organization.

VA6SZ Correction

The following is from **Andy Clarke, VA6SZ:**

Hi, Joe. Thanks for printing my 6 meter band report in the August edition. You got my call sign wrong though. I know it's probably just a "typo," but I thought I would let you know. VA6SV was printed and it should have been VA6SZ. Anyway, it's been a terrific sporadic-*E* season. Since April 22, I've put almost 900 Q's in the log and worked over 100 new grids. I know that my conditions aren't as exotic as out on the east coast or as in Europe. Even so, I've had a great time this summer season. I've enjoyed some multiple-hop openings and even Jack Williams, VE6JW, worked into Europe on one spectacular opening on June 25. This is only the fourth time ever that a station from this province has worked into Europe! I had to work that day, so I missed it (was I ever



The new ARRL Amateur Radio Map of North America, with inset magnified for details. There is no inset on the map itself.

disappointed!). Now that this season is winding down (we haven't had an opening for almost two weeks), I'll concentrate on putting up another two towers before the snow starts. So, thanks again, Joe! See you on 6 meters (and soon with a stack for 2 meters and QRO).

Tokyo Hi-Power 6 Meter Linear Back in Production

For those of you who are interested in more serious power on 6 meters, Caity Martin, K7VO, recently notified the VHF reflector that the Tokyo Hi-Power HL-1K6 is back in production. It is a 500 watt output amp that uses two 4CX250 tubes that are air cooled. It requires approximately 10 watts drive for full power out. For more information on this amp, you can look it up on Tokyo Hi-Power's website, <http://www.thp.co.jp/thp%20hp%20Eng/amateur_eng/vhf50_eng.htm#hl_1k6>.

New ARRL Map of NA

The new ARRL Amateur Radio Map of North America is now available. It is a large (27"×39"), colorful, laminated wall map that features current geographic detail and labels, grid locators, callsign prefixes, boundaries, and more. It was created by Curt Roseman, K9AKS—who also created the 1983 black-and-white grid map that many of us use—at the University of California GIS lab with us weak-signal operators in mind. It is a great resource for contesters and for those who are working toward awards such as Worked All States, VHF/UHF Century Club, etc. It also is useful as a hurricane-tracking map. It is available from the ARRL (225 Main St., Newington, CT 06111; <www.arrl.org>) for $15, shipped in a protective tube.

A Lunar Data Backup

David Anderson, GM4JJJ, recently shared information about a company that is planning on using the Moon as a remote backup for computer data. In an internet-posted article written for *PC Magazine* by Sebastain Rupley and entitled "Backup Data on the Moon?" (<http://www.pcmag.com/article2/0,4149,1200791,00.asp>), he writes that TransOrbital of La Jolla, California, "is getting ready to send a commercial mission to the moon and intends to send servers, data, handheld computers, and digital cameras along for the ride." According to Dennis Laurie, the company's president and CEO, it took them more than 2 1/2 years to obtain all of the necessary approvals from the military and the State Department. In particular, they had to have permission to take pictures from space, since they are planning on tethering digital cameras on the outside of their vehicle for the purpose of taking pictures with Earth and Moon in the background of the shots.

They also are planning on using the Hewlett-Packard iPaq handheld computer, with its wireless communication features, to communicate with downlink protocols that they have developed. It's their plan to post pictures transmitted from the iPaq on their website.

Laurie's justification for the commercial use of the Moon is that in the aftermath of September 11, 2001, his customers are looking for the ultimate location for data backup and protection. As of this writing they are planning for a launch date of some time in the first quarter of next year.

As a kid, I remember Dick Tracy communicating with lunar humanoids via his wrist radio in the runup of our launch of the first manned flight to the Moon. All of that fiction went away when we landed on the Moon and found that no one lives there. Even so, it was always intriguing to me that wrist radio communications could take place between the Earth and the Moon. Now it appears that science is once again catching up with fiction—albeit from a direction opposite that which Chester Gould, the then cartoonist for Dick Tracy, intended.

The Roadrunners Microwave Group

This past August your editor joined the Roadrunners Microwave Group (RMG), a small group with a big vision. I had the opportunity to meet with their members at the Austin Summerfest 2003. The following comes from the group's website, <http://www.k5rmg. org/>: "The Roadrunners Microwave Group (RMG) is organized to promote operation on the amateur bands above 420 MHz. The group is generally comprised of microwave enthusiasts in south Texas, but membership is not restricted by geography. Increasing activity on the bands above 420 MHz within any geographical area, or among such areas, requires the involvement of myriad amateur radio operators, and this group is to provide a focal point for such an effort."

One of the goals of the RMG is to be a clearinghouse for microwave beacons. By going to their website you can find out about their beacons as well as be linked to other URLs that also list beacons.

For those of you who reside in Texas and the surrounding states, an opportunity to meet with RMG and the North Texas Microwave Society members will be at the Belton Ham Expo swapfest on October 4. The swapfest is in the Bell County Expo Center, which is off I-35 exit 292. For more information on the joint meeting consult the RMG website, and for details of the Belton Ham Expo see <http://www.tarc.org/hamradio/hamexpo/oct2002early.html>. Having been to a couple of these swapfests, I can testify that it is more than a swapfest. It is a happening with barbe-

quing taking place the night before in the parking lot and swapping taking place beginning early Saturday morning. If you sleep past 7 AM, you might as well stay home.

Current Contests

The **222 MHz Fall Sprint** will be held September 30, 2003 from 7 to 11 PM local time. The **432 MHz Fall Sprint** will be on October 8 from 7 to 11 PM local time. The **Microwave (902 MHz and above) Fall Sprint** will be October 18 from 6 AM to 1 PM local time. The **50 MHz Fall Sprint** will be from 2300 UTC on October 25 to 0300 UTC on October 26. The first weekend of the **ARRL International EME Competition** is October 18–19.

Complete rules for the Fall Sprints should be on the Southeastern VHF Society's (sponsor) website, <http://www.svhfs.org>. If they are not posted by the time you read this column, send an e-mail to Tom Shutters, K4FJW, at: <k4fjw@bvunet.net>. Logs go to the following:

144 MHz Sprint: Ottmar Fiebel, W4WSR, P.O. Box 957, Hayesville, NC 28904, <ottf@webworkz.com>.

432 MHz Sprint: Jim Worsham, W4KXY, 1915 Oak Wind Lane, Buford, GA 30519-6766, <w4kxy@arrl.net>.

Microwave Sprint: Greg Robinson, KB4NVD, 208 Dogwood Acres Rd., Hampton, TN 37658-3348, <Rover@wireco.net>.

50 MHz Sprint: Ray Rector, WA4NJP, 3493 Holly Springs Rd, Gillsville, GA 30534, <wa4njp@bellsouth.net>.

My thanks to John Lindholm, W1XX, for forwarding to me an e-mail he received from Tom Shutters, K4FJW, concerning the rules of the sprint contests. Unfortunately, I did not have this information in time for last month's column, which resulted in my guesses of the dates being wrong. I regret the errors, but also caution contest sponsors that we editors have very long lead times for our publications—particularly *CQ VHF* magazine, which is only published quarterly. Therefore, please try to get your information to us as early as possible—preferably six months in advance. Thank you.

Complete rules for the ARRL International EME Contest can be found in the September issue of *QST*. They can also be found on the League's website, <http://www.arrl.org>.

Current Meteor Showers

The *Draconids* is predicted to peak somewhere between 0930–1240 UTC on October 9. Additional times and dates to watch for are 2000 UTC on October 8 and 0400 UTC on October 9. Considering that the Moon will be full on October 10, there will not be much to look for, so stay inside and get on the air. The *Orionids* is predicted to peak at 2100 UTC on October 21. For more information on the above meteor shower predictions visit the International Meteor Organization's website, <http://www.imo.net>.

And Finally . . .

I have known Jim Haynie, W5JBP, for a long time, and from my observation at the Austin Summerfest 2003, never have I known him to be as concerned about an issue affecting amateur radio as he is about BPL. Furthermore, in all of my years as an ARRL section manager attending dozens of ARRL forums, I have never seen such a high attendance at a regional convention as I witnessed at the Austin Summerfest. Truly, this threat has caught the attention of many of us amateur radio operators. Indeed, when I checked the FCC site, I found nearly 2500 comments logged on this issue—and not a few of them from hams I know. To those of you who have taken the time to comment, I personally thank you for your efforts. Hopefully, our collective fraternal voice will be heard.

The Central States VHF Society Conference was very successful, with more than 160 hams and many of their family members in attendance. At least one of the talks, "Russian Power Tubes in Amateur Radio" by Paul Goble, ND2X, will be reprinted in the Fall 2003 issue of *CQ VHF* magazine.

That's a wrap for another month of reporting on your VHF+ activities. If you would like to see something specific in this column, please contact me with your information at the e-mail address listed at the beginnng of this column. Thank you again for your input in this, your column. Until next month . . .

73, Joe, N6CL

Roy Neal, K6DUE, Silent Key

A longtime friend of the amateur radio in space programs and a member of the CQ Amateur Radio Hall of Fame, Roy Neal, K6DUE, became a Silent Key on August 15 following major heart surgery on August 12. He was born on May 30, 1921 in Philadelphia, Pennsylvania. Named Roy N. Hinkle, he was best known by his on-the-air name, Roy Neal.

Roy endeared himself to those of us who followed the early years of the U.S. space program as the NBC News space correspondent, producer, and executive. Despite his many accomplishments, he is little remembered as the pool producer for U.S. Astronaut Wally Shepherd's first suborbital Mercury flight. From that beginning, he became a regular figure on NBC, educating us on the Mercury space flights from his vantage point at Cape Canaveral, Florida. As with the Shepherd flight, Roy was also responsible for producing several national and international broadcasts of subsequent space flights. Later he covered the Gemini, Apollo, and Space Shuttle flights from the Johnson Space Center in Houston, Texas.

As an avid amateur radio operator, Roy's involvement with the SAREX program was a natural fit. He tirelessly worked on getting amateur radio in space via a live ham radio operator-astronaut. He finally was successful in getting a station on board the Shuttle program, convincing NASA to allow Owen Garriott, W5LFL, to take a specially rigged handheld onboard his STS-9 Columbia shuttle flight in December 1983. By all accounts Garriott's ham radio experiment was a resounding success.

In commenting on the 15th anniversary of Garriott's flight, Roy stated, "We were given a golden opportunity by NASA. The opportunity to show the world what happens when you marry amateur radio and space flight. So we set out to deliver the maximum number of contacts worldwide—and Owen delivered. He talked with hams from every walk of life, from King Hussein of Jordan, to entire groups of amateurs who had gathered in England, the United States, Germany, Australia, and Japan. He delivered contacts that were sparkling in their clarity and outstanding in their content. They gave us the thrill of working the ultimate DX." (Source: <http://www.amsat.org/amsat/ftp/news/1998/ans333.txt>).

In the aftermath of that highly successful flight, the Shuttle Amateur Radio Experiment (SAREX) working group was formed. Roy would eventually chair this nine-nation consortium. Later, while keeping the same acronym, it became known as the Space Amateur Radio Experiment working group after ham radio activity all but ceased on board the shuttles. Eventually, the Amateur Radio on the International Space Station (ARISS) program succeeded SAREX.

On January 28, 1986 the shuttle Challenger blew up on launch, killing all on board. That year Roy decided to end his long career with NBC after thousands of in-front-of and behind the camera assignments. During his retirement years he became even more involved in his hobby of ham radio. Roy was a regular attendee and sometimes presenter at Dayton's annual Hamvention®. There I first met Roy, and he told this "green" columnist that I was doing a great job and to keep it up.

As a regular reader of this column, Roy would send me kind notes of encouragement, especially in the early years of my tenure as your editor. I will never forget how he took the time on more than one occasion to encourage me. We last spoke in February, following the shuttle *Columbia* disaster. I will certainly miss his distinctive, steady voice.

Roy is survived by his wife Pat and sons David and Mark. He also leaves behind thousands of friends and fans, and I count myself as both.

—N6CL

propagation

BY TOMAS HOOD,* NW7US

Above Normal Conditions Predicted For CQ WW DX SSB Contest

A Quick Look at Current Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, July 2003: 85
Twelve-month smoothed, January 2003: 81

10.7 cm Flux
Observed Monthly, July 2003: 128
Twelve-month smoothed, January 2003: 149

***Ap* Index**
Observed Monthly, July 2003: 20
Twelve-month smoothed, January 2003: 18

Solar Cycle 23 is clearly moving toward the solar cycle minimum years. Will solar activity remain high enough to support near record-breaking scores in the CQ WW DX SSB Contest this year? As is typical of recent solar cycles, this year is one filled with a high level of geomagnetic activity and some challenging periods of propagation on the high frequencies. However, it looks like conditions will be great during the contest weekend.

The 2003 CQ WW DX Contest will be held on the following dates:

SSB: 0000 UTC, Sat., October 25 to
2400 UTC, Sun., October 26
CW: 0000 UTC, Sat., November 29 to
2400 UTC, Sun., November 30

Table I compares observed sunspot levels during WW DX Contest periods since 1992, and the level predicted for the 2003 contest. Contest conditions could be somewhat like those of 1993, and looking at the trend based on the 27-day cycle, as used in preparation of the Last-Minute Forecast, we can expect Above Normal conditions on the HF bands for both days during the October event. This should provide reasonable propagation during the contest, especially from locations in the low to middle latitudes.

The DX Propagation Charts and other information in this month's column are designed to help you to make the most of propagation conditions during the contest. Even if you are not a dedicated contester, you should give it a try. If you are working toward your DXCC or other award, this is the contest of choice. Plus, many die-hard participants will appreciate putting you in their log. Take some time before the contest weekend to improve your antenna system, check your equipment, and hone your skills. While conditions may not be as hot as during the years of the solar cycle maximum, there's a lot of life left on the HF contest bands, especially for those who have worked hard to get the most out of their station's ability.

A change in propagation conditions in the Northern Hemisphere can be observed as we move away from the long sunlit days of summer into the longer hours of winter's darkness. However, the change in the length of daily darkness is not the only influence on the propagation of radio waves through the atmosphere. The amount and strength of radiation arriving and passing through our atmosphere varies from season to season, as well as from the solar cycle minimum to the solar cycle maximum.

*P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for October 2003

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 12, 14, 25-27	A	A	B	C
High Normal: 3-4, 8, 10-11, 13, 15, 18, 22-24, 30-31	A	B	C	C-D
Low Normal: 5, 7, 9, 16-17, 20	B	C-B	C-D	D-E
Below Normal: 19, 21	C	C-D	D-E	E
Disturbed: 1-2, 6, 28-29	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.
2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be poor (D) on October 1st and 2nd, good (B) on the 3rd and 4th, fair to good (C-B) on the 5th, etc.

	1992	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03
Oct.	76	45	27	12	9	32	71	108	115	114	91	51*
Nov.	74	41	26	11	10	35	73	111	113	116	85	49*

** Predicted values expected during the 2003 contest.*

Table I– Smoothed sunspot numbers recorded during CQ World-Wide DX Contests since 1992 (October SSB, November CW).

During the Northern Hemisphere's winter months, the Earth is closer to the sun than during any other time in its orbit. This makes the winter daytime ionization more intense than that of the summer. Think of a wood stove, where you open the front door to add more fuel to the fire. When you open the door and are very close to the fire, you feel intense heat. When you close the door and back away, the heat decreases. This is much like the position of the Earth in the winter—closer to the sun than during the summer. However, the "door" is only open during the short period of daylight. With the more intense ionization during winter's daylight hours, the radio waves refracted off the ionosphere are relatively higher in frequency than those of summer. At the same time, during the longer winter hours of darkness, the ionosphere has more time to lose its electrical charge. These conditions cause a wide daily variation in the maximum frequency that can be refracted by the wintertime ionosphere.

In the summer, the long hours of sunlight keep the ionosphere from recombining, making the nighttime critical frequencies higher than during the winter nights. However, the daytime critical frequencies are generally lower than those during the winter daytime. In addition, winter nights are far more quiet on the lower HF bands due to the seasonal low in tropical storms, and because the lower critical frequencies won't propagation as much of the atmospheric and man-made noises.

It is the combination of these conditions that cause many radio enthusiasts to celebrate the arrival of the winter DX season. From October through November 2003 we will see a steady improvement in the DX bands. During the CQ WW contests taking place in both months, we should experience fairly good success with DX.

The best tool available to predict HF propagation conditions in advance is the 27-day recurrence tendencies of geomagnetic, solar, and ionospheric conditions. It is not an absolute method, but it does give a very good indication of what is expected. This column is being written in early August, approximately three 27-day solar rotation cycles away from the start of the WW DX SSB Contest weekend. Based on a study of the patterns expected during the next three rotational periods of the sun, it looks as if conditions for the contest on both October 25 and 26 will likely be Above Normal for middle- and low-latitude openings.

Predictions for one 27-day rotational period are far more accurate than for three 27-day rotational periods. Be sure to carefully check conditions on September 28 and 29, since this would be one rotational period before the SSB contest weekend. There is better than a 90-percent chance that conditions observed on those days will recur during the October contest weekend.

See the Last-Minute Forecast at the beginning of this column for additional information concerning expected day-to-day conditions for the entire month of October. An updated day-to-day forecast for the SSB contest weekend will appear as a bulletin at the beginning of next month's column. The November issue should reach most subscribers before the SSB contest begins.

Current Solar Cycle Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports an observed monthly mean sunspot number of 85 for July 2003, down from 77 for June. The 12-month running smoothed sunspot number centered on January 2003 is 81, one point down from December 2002. The sunspot low for the July 2003 was 28 on July 26. The sunspot high of 161 occurred on July 20. This range was wider, with a significantly higher peak, than June's range of 38 to 116.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7 cm observed monthly mean solar flux of 128 for July 2003, down a point from June. The 12-month smoothed 10.7 cm flux centered on January 2003 is 149, down several points from December 2002.

The observed monthly mean *Ap* index for July 2003 is 20, down four points from June's 24, yet considerably higher than the *Ap* of 11 for July 2002. The 12-month smoothed *Ap* index centered on January 2003 is 18, up one point from December.

A smoothed sunspot level of 51 and a 10.7 cm solar flux of about 105 are predicted for October 2003. The geomagnetic planetary *A* index (*Ap*) may decrease a bit during October, and certainly will through the winter season.

October Propagation

The following is a band-by-band summary of DX propagation conditions expected from mid-October through mid-December and centered on the two WW contest weekends. Next month's column will update this summary.

160 meters: Expect a few DX openings on this band during the hours of darkness and into the sunrise period. Considerably decreased static levels and longer hours of darkness in the northern latitudes should provide a number of DX openings. These openings will often be weak due to the relatively high signal absorption, higher levels of static, and the lower power levels used on this band. Give it a try, though, as some fairly good openings should be possible. Look for openings toward Europe and toward the south from the eastern half of the United States and towards the south, the Far East, Australasia, and the South Pacific from the western half of the country. Other DX openings might also be possible. The best propagation aid for this band (and for 80 and 40 meters as well) is a set of sunrise and sunset curves, since DX signals tend to peak when it is local sunrise at the easterly end of the path. A good internet website featuring a gray-line map display may be found at <http://www.fourmilab.to/earthview/>. Follow the link "map of the Earth," showing the day and night regions.

80 meters: This should be a good band for DX openings to many areas of the world during the hours of darkness and into the sunrise period. The band should peak towards Europe and in a generally easterly direction around midnight. For openings in a generally western direction, expect a peak just after sunrise. The band should remain open toward the south throughout most of the night. Propagation in this band is quite similar to that expected on 40 meters, except that signals will be somewhat weaker on the average, noise levels will be a bit higher, and the period for band openings in a particular direction will be a bit shorter.

40 meters: This should be the hottest DX band during the hours of darkness, as the seasonal static levels are lower than they were during the summer. The band should be open first for DX toward Europe and the east during the late afternoon. Signals should increase in intensity as darkness approaches. During the hours of darkness expect good DX openings to most areas of the world. Signals should peak from an easterly direction at about midnight, and from a westerly direction just after sunrise. Excellent openings toward the south should be possible throughout most of the nighttime period. With conditions Above Normal or High Normal, the choice for best nighttime band will be between 40 and 20 meters.

20 meters: DX openings should be possible on this band both day and night. Conditions should peak from

about an hour or two after sunrise and again during the late afternoon and early evening hours. Expect to work into most areas of the world between sunrise and sunset. Good to Excellent openings should be possible to many areas of the world well into the hours of darkness as well. When conditions are Above Normal, expect 20 meters to remain open for worldwide DX during most of the night. Look for long-path openings for about an hour or so after sunrise and again for an hour or so before local sunset. Signal levels are expected to be exceptionally strong during the October contest period. If you plan on operating on a single band during the WW SSB contest, this band should be your choice. This will be the band that will produce the longest period for DX openings, the strongest signals, and openings to more places of the world than any other single band during the contest period. Of course, with the majority of contestants using 20 meters, you can expect a challenge for your skill in working a crowded band!

15 meters: This year 15 meters will not be as hot as the previous few years. However, during the daylight hours this band should still see some significant action. Good to Excellent conditions are expected from shortly after sunrise through the early evening hours. The band could remain open into the evening toward southern and tropical areas.

10 meters: For those in low and middle latitude locations, this band will yield a number of daytime contacts during the contest weekends. However, I don't expect too much excitement on this band. With the decline in solar activity, the highest HF bands suffer. An occasional opening towards Europe and in a generally easterly direction, with a peak an hour or two before noon, might be found during October and November. The same holds true for more common openings toward South America and the Africa area, with expected peaks during the early afternoon hours. Possible, but rare, openings towardsthe Far East, Australia, southern Asia, and the South Pacific are forecast for the late afternoon and early evening hours, especially from stations in lower latitudes. Those in the Caribbean and other tropical regions possibly will find 10 meters a usable band this year.

Overall, expect good conditions on the low to middle frequencies on the HF spectrum. It is unlikely that there will be any major solar or geomagnetic storm during the October contest weekend. Of course, anything can happen. If a radio storm should develop, concentrate on working transpolar paths on 15 and 20 meters during the daylight hours. The storm's influence generally will extend outward from the polar regions the more severe the storms become. Expect considerably fewer openings, weaker signals, higher noise levels, flutter fading, and increased deep fading. Check the 40, 80, and 160 meter bands for possible openings to some areas of the world during the hours of darkness, although these bands will become erratic as well.

Time EST	Optimum Band (meters)	Areas To Which Band Is To Be Open
00–02	40	Most of Europe, Eastern Mediterranean, and Middle East. Most of Central and South America. A few African areas and possibly Antarctica.
02–04	20	Some South Pacific, New Zealand, and Australasia. A few Far East and Asian areas. Some South America and Antarctica.
04–06	40	South Pacific, New Zealand, Australasia. Many South American areas. A few Far Eastern and Asian areas. Possibly Antarctica.
06–08	20	Most of Europe, South Pacific, New Zealand, and Australasia. Most of Central and South America. A few African areas. Some Far East and Asian areas.
08–10	15	All of Europe, Eastern Mediterranean, and Middle East. Some of Africa. Most of Central and South America. South Pacific, New Zealand, and Australasia. A few Asian areas.
10–12	10	Most of Europe and Africa. Most of Central and South America. A few Asian areas, New Zealand, South Pacific, and Australasia.
12–14	15	Some of Europe and most of Africa. Most of Central and South America. A few areas of the South Pacific, New Zealand, and Australasia.
14–16	15	Most of Africa, and Central and South America. Some of South Pacific, New Zealand, and Australasia. A few Asian areas.
16–18	20	Most of Europe, Eastern Mediterranean, and Middle East. All of Africa, and Central and South America. A few Australasian areas.
18–20	15	Lots of South Pacific, New Zealand, and Australasia. Some of Far East and Asia. Most of Central and South America. Possibly Antarctica.
20–22	20	Most of Africa, Far East, South Pacific, New Zealand. Australasia, Central and South America. A few European areas and Middle East. Some Antarctica.
22–00	20	Lots of Far East, South Pacific, New Zealand, Australasia, Central and South America. A few African and Asian areas. Antarctica.

**Similar work plans can be devised for single-band operation or for openings to specific DX areas.*

Table II– Sample multi-band work plan for eastern U.S. QTH. (Courtesy of George Jacobs, W3ASK)

Contest Work Charts

The DX Propagation Charts in this issue show the times when each amateur band from 160 through 10 meters is expected to open from each time zone area in the continental U.S. to the major DX areas in the world. The information contained in these charts, while useful during the contest period in their present format, can easily be reorganized into more operational work plans or schedules. Experience gained during previous contests has shown that specifically tailored schedules derived from the charts can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table II is an example, courtesy of George Jacobs (who wrote this column for 50 years until December 2001, without missing a single issue!), of one of several types of plans that can be devised. It is a multi-band operational work plan which shows the bands and times when propagation conditions are expected to be optimal to various areas of the world for each two-hour period throughout the day. An eastern QTH was chosen for this example, but similar plans can be devised for central and western locations.

VHF Conditions

Conditions during October should start to become exciting, with a rare *F2* opening or two in a north-south direction (U.S. into the Caribbean or Central America, and western Europe into parts of Africa). There should be moderate levels of transequatorial propagation (TE) in which stations in the southern states and

parts of the Caribbean will be able to work into the northern areas of South America during the late afternoon.

Sporadic-*E* activity is sparse during October in the northern temperate zone (where much of the U.S. is located). If a sporadic-*E* opening should occur and link with a TE or *F2* opening toward the south, expect a possible opening into Argentina, or possibly even into Australia and the South Pacific.

While the contest weekend looks like a quiet period, there will be plenty of days in October with high geomagnetic activity and possible radio storms. It is possible to have a few aurora events during October as well. Remember that digital modes and CW are the best way to go with aurora, particularly on 144 through 432 MHz, as the voice modes become extremely distorted and unrecognizable due to the effects of the aurora. The best times to check for VHF aurora openings are when conditions are expected to be Below Normal or Disturbed, as shown in the Last-Minute Forecast.

There is some possibility of extended tropospheric conditions during October because of the changing weather patterns. Two meters is the best band to watch for this.

A possible meteor shower, the *Draconids,* is expected to peak on October 8 and 9. The *Draconids* is primarily a periodic shower which produced spectacular, brief meteor storms twice in the last century (in 1933 and 1946). In 1999 a totally unexpected minor outburst was witnessed from the Far East. *Draconid* meteors are exceptionally slow moving, a characteristic which helps distinguish genuine shower meteors. This shower could produce meteor-reflection-type ionospheric openings on the VHF and UHF bands. During other showers I've worked stations off the ionized tails (left by the meteors) with just a vertical mobile antenna and 100 watts. It was one of the most exciting experiences I've had. Also, try the *Orionids,* which is predicted to peak on October 21, with an expected 20 meteors per hour. Check out <http://www.imo.net/calendar/cal03.html> for a complete calendar of meteor showers in 2002.

Useful Web Sites (URLs)

One great resource you can utilize during a contest is the internet. Real-time solar, geomagnetic, ionospheric, and HF propagation prediction information is right at your fingertips, allowing you to better plan your on-the-air operation.

If you want to be alerted any time the *Kp* index rises above 4, or the solar flux changes, and so on, then you will want to subscribe to my propagation eAlert service (a free resource). If you have a pager, a cell phone with e-mail features, or an open e-mail client on your contest computer, these eAlerts will let you know when conditions are changing. Direct your web browser software to view the eAlert subscription page at <http://prop.hfradio.org/ealert/>. When you fill out the form, enter the e-mail address you will use to receive these eAlerts.

If you are at a location where you do not have easy internet access, but you have a WAP/WML device (nifty technology), you can gather the latest propagation information, warnings, alerts, and a look at conditions by pointing your WAP device to <http://wap.hfradio.org/>. This is a special URL for wireless access to this free resource.

If you have live internet connectivity at your contest location, use the following websites, which provide real-time data, forecasts, links to in-depth historical data, and graphical content:

The NW7US Propagation Center: <http://prop.hfradio.org/>. This site provides a rich collection of live propagation information. In addition, you will find a lot of links to educational resources covering the science of propagation, links to the many space and earth science resources found around the world, forecasts, and archived analysis and data.

D-Region Absorption Prediction: This is a great resource for those times when you want to know if the lower bands are experiencing degradation due to solar activity. <http://sec.noaa.gov/rt_plots/dregion.html> is updated once every minute. Long-range communications using high-frequency radio waves depend on reflection of the signals in the ionosphere. Along the path to the *F2* peak, the radio-wave signal suffers attenuation due to absorption by the intervening ionosphere. This site shows current and forecast conditions of the ionospheric *D*-Layer, which has direct influence on the ability of your contest signal reaching its destination.

160 Meter Radio Propagation Prediction Table: <http://solar.spacew.com/www/160pred.html>. Don't miss this page. It is based upon selected high-latitude magnetic observatory data that is used to estimate the influence of the auroral oval on 160 meter path propagation. For details refer to the March and April 1998 issues of *CQ* magazine: "160 Meters: An Enigma Shrouded in Mystery," by Cary Oler and Ted Cohen, N4XX.

October 15 - December 15, 2003
Time Zone: EST (24-Hour Time)
EASTERN USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-09 (1) 09-11 (2) 11-13 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (3) 12-13 (2) 13-15 (1)	04-05 (1) 05-06 (2) 06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-18 (2) 18-21 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European CIS	08-11 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-12 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (3) 13-14 (2) 14-16 (1)	17-19 (1) 19-02 (2) 02-04 (1) 20-03 (1)*
Eastern Mediter-ranean & Middle East	08-09 (1) 09-10 (2) 10-12 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-13 (1)	06-10 (1) 10-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-20 (2) 20-23 (1) 23-01 (2) 01-02 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western & Central Africa	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	04-05 (1) 05-07 (2) 07-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-20 (3) 20-22 (2) 22-01 (1)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
Eastern Africa	09-11 (1) 11-13 (2) 13-15 (1)	07-11 (1) 11-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	07-14 (1) 14-16 (2) 16-20 (3) 20-00 (2) 00-01 (1)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Southern Africa	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	07-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-22 (1) 22-01 (2) 01-02 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	08-10 (1) 17-19 (1)	07-10 (1) 17-20 (1)	06-07 (1) 07-09 (2) 09-12 (1) 19-22 (1)	18-21 (1) 06-08 (1)
Southeast Asia	09-12 (1) 17-20 (1)	08-12 (1) 18-20 (1)	06-07 (1) 07-09 (2) 09-13 (1) 18-22 (1)	18-20 (1) 05-07 (1)
Far East	08-10 (1) 17-20 (1)	08-10 (1) 16-17 (1) 17-19 (2) 19-20 (1)	02-04 (1) 06-07 (1) 07-09 (2) 09-12 (1) 16-19 (1) 19-22 (2) 22-00 (1)	04-08 (1) 05-07 (1)*
South Pacific & New Zealand	09-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-14 (1) 14-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	04-06 (1) 06-07 (2) 07-09 (4) 09-11 (2) 11-17 (1) 17-18 (2) 18-21 (3) 21-02 (2) 02-04 (3)	00-03 (1) 03-05 (3) 05-07 (2) 07-09 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Austral-asia	09-12 (1) 14-16 (1) 16-17 (2) 17-18 (1)	08-10 (1) 10-13 (2) 13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-15 (1) 15-17 (2) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-03 (1)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-09 (1) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-02 (2) 02-06 (1) 06-07 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (2) 05-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (2)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-09 (1) 09-13 (2) 13-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (3) 10-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 18-20 (1)	14-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-02 (2) 02-06 (1) 06-09 (2) 09-11 (1)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound, Antarctica	14-17 (1)	06-09 (1) 15-17 (1) 17-19 (2) 19-20 (1)	16-18 (1) 18-20 (2) 20-22 (3) 22-02 (2) 02-06 (1) 06-08 (2) 08-09 (1)	00-06 (1)

Time Zones: CST & MST
(24-Hour Time)
CENTRAL USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	08-09 (1) 09-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-11 (3) 11-12 (2) 12-14 (1)	05-06 (1) 06-08 (3) 08-12 (2) 12-15 (3) 15-19 (2) 19-21 (1) 00-02 (1)	17-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-02 (1) 19-20 (1)* 20-22 (2)* 22-00 (1)*
Northern & Central Europe & European CIS	08-10 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-13 (1)	06-07 (1) 07-09 (2) 09-11 (3) 11-13 (2) 13-16 (1) 01-03 (1)	18-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*
Eastern Mediter-ranean & Middle East	08-10 (1)	07-09 (1) 09-11 (2) 11-12 (1)	06-08 (1) 08-11 (2) 11-13 (3) 13-15 (2) 15-17 (1) 17-19 (2) 19-22 (1) 01-03 (1)	17-19 (1) 19-22 (2) 22-23 (1) 20-22 (1)*
Western & Central Africa	08-09 (1) 09-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-20 (3) 20-22 (2) 22-02 (1)	17-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern Africa	09-10 (1) 10-12 (2) 12-14 (1)	08-10 (1) 10-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	06-14 (1) 14-17 (2) 17-20 (3) 20-21 (2) 21-22 (1)	20-00 (1) 21-23 (1)*
Southern Africa	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	07-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-17 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	07-10 (1) 19-21 (1)	07-10 (1) 17-18 (1) 18-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-18 (1) 18-21 (2) 21-23 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-12 (1) 16-18 (1)	09-12 (1) 14-16 (1) 16-18 (2) 18-20 (1)	06-08 (1) 08-11 (2) 11-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-07 (1)
Far East	15-16 (1) 16-18 (2) 18-19 (1)	08-10 (1) 15-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	02-03 (1) 03-06 (2) 06-09 (1) 02-04 (1)*
South Pacific	11-13 (1) 13-15 (2)	08-09 (1) 09-11 (2)	06-07 (1) 07-09 (3)	23-01 (1) 01-06 (3)
Northern Countries of South America	13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	14-16 (3) 16-19 (4) 19-22 (3) 22-02 (2) 02-06 (1) 06-07 (2)	03-05 (2) 05-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (2)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-09 (1) 09-13 (2) 13-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (3) 10-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 18-20 (1)	14-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-02 (2) 02-06 (1) 06-09 (2) 09-11 (1)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound, Antarctica	14-17 (1)	06-09 (1) 15-17 (1) 17-19 (2) 19-20 (1)	16-18 (1) 18-20 (2) 20-22 (3) 22-02 (2) 02-06 (1) 06-08 (2) 08-09 (1)	00-06 (1)
New Zealand	15-17 (3) 17-18 (2) 18-19 (1)	11-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	09-11 (2) 11-17 (1) 17-18 (2) 18-19 (3) 19-21 (4) 21-22 (3) 22-00 (2) 00-02 (1)	06-07 (2) 07-08 (1) 00-02 (1)* 02-06 (2)* 06-07 (1)*
Austral-Asia	09-12 (1) 14-15 (1) 15-17 (2) 17-18 (1)	08-09 (1) 09-11 (2) 11-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	17-19 (1) 19-21 (2) 21-23 (3) 23-02 (2) 02-04 (3) 04-05 (2) 05-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-14 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-09 (1) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (2) 08-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (2) 07-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-19 (4) 19-22 (3) 22-01 (2) 01-06 (1)	18-19 (1) 19-21 (2) 21-02 (3) 02-04 (1) 04-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-09 (1) 09-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	02-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-20 (4) 20-22 (3) 22-02 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-05 (1) 21-04 (1)*
McMurdo Sound	14-17 (1)	07-10 (1) 15-17 (1) 17-19 (2) 19-20 (1)	16-18 (1) 18-20 (2) 20-00 (3) 00-02 (2) 02-06 (1) 06-08 (2) 08-10 (1)	23-05 (1)

Time Zone: PST
(24-Hour Time)
WESTERN USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	07-08 (1) 08-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-13 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (3) 14-16 (2) 16-20 (1) 00-02 (1)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Central & Northern Europe & European CIS	07-09 (1)	07-08 (1) 08-09 (2) 09-11 (1)	06-07 (1) 07-11 (2) 11-16 (1) 23-02 (1)	21-00 (1)
Eastern Mediter-ranean & Middle East	07-10 (1)	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 21-23 (1)	18-22 (1) 06-08 (1)
Western & Central Africa	08-09 (1) 09-12 (2) 12-14 (1)	06-10 (1) 10-12 (2) 12-15 (3) 15-17 (2) 17-18 (1)	06-10 (1) 10-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	18-23 (1)
Eastern Africa	10-13 (1)	08-12 (1) 12-15 (2) 15-17 (1)	08-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-21 (1)	18-21 (1) 06-08 (1)
Southern Africa	08-09 (1) 09-11 (2) 11-12 (1)	06-10 (1) 10-11 (2) 11-12 (3) 12-14 (4) 14-15 (2) 15-16 (1)	06-12 (1) 12-15 (2) 15-18 (3) 18-20 (2) 20-21 (1) 00-02 (1)	18-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-19 (1)*
Central & South Asia	07-09 (1) 17-19 (1)	16-17 (1) 17-19 (2) 19-20 (1) 07-09 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-21 (1)	04-09 (1) 17-19 (1)

Southeast Asia	14-15 (1) 15-17 (2) 17-18 (1)	09-11 (1) 13-15 (1) 15-18 (2) 18-19 (1)	06-07 (1) 07-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-22 (1)	02-03 (1) 03-05 (2) 05-08 (1) 03-05 (1)*
Far East	14-15 (1) 15-17 (2) 17-18 (1)	12-14 (1) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-23 (1)	23-02 (1) 02-05 (2) 05-08 (1) 01-03 (1)*
South Pacific & New Zealand	08-10 (1) 10-12 (2) 12-13 (3) 13-16 (2) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-16 (2) 16-18 (4) 18-19 (2) 19-20 (1)	05-07 (1) 07-09 (4) 09-11 (2) 11-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 01-05 (3) 20-22 (3) 22-00 (2) 00-03 (1) 03-05 (2)	21-22 (1) 22-05 (3) 05-07 (2) 07-08 (1) 22-00 (1)* 00-05 (2)* 05-06 (1)*
Austral-Asia	08-10 (1) 12-13 (1) 13-14 (2) 14-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-14 (2) 14-16 (3) 16-18 (4) 18-19 (2) 19-21 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-04 (3) 04-06 (2) 06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1)	02-03 (1) 03-04 (2) 04-06 (3) 06-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central, America & Northern Countries of South America	07-08 (1) 08-09 (2) 09-10 (4) 10-12 (3) 12-14 (4) 14-15 (2) 15-16 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-13 (2) 13-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	07-09 (4) 09-13 (2) 13-15 (3) 15-18 (4) 18-20 (3) 20-00 (2) 00-05 (1) 05-06 (2) 06-07 (3)	18-19 (1) 19-01 (3) 01-04 (2) 04-05 (1) 19-22 (1)* 22-01 (2)* 01-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-11 (2) 11-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-23 (3) 23-02 (2) 02-04 (1) 04-07 (2)	20-22 (1) 22-00 (2) 00-02 (1) 22-00 (1)*
McMurdo Sound, Antarctica	12-16 (1)	07-14 (1) 14-18 (2) 18-20 (1)	16-18 (1) 18-20 (2) 20-00 (3) 00-02 (2) 02-06 (1) 06-08 (2) 08-10 (1)	00-05 (1)

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

Propagation charts prepared by George Jacobs, W3ASK.

The Solar Terrestrial Activity Report: From the DX-Listeners' Club in Norway, <http://www.dxlc.com/solar/>. The Solar Terrestrial Activity Report is generally updated once a day. The report contains a graphical view of the last three months of solar-flux values, sunspot count, and planetary *A* index. In addition, there is information on recent solar events as well as a forecast for the next few days. Charts of all sunspot cycles from Cycle 1 are available, as well as comparisons of the most recent cycle to previous cycles.

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I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. See you on the air, perhaps during the contest weekend!

73, Tomas, NW7US/AAMØEWA

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Update

In our 60 meter operating guide article in the August issue, we reported that a firmware upgrade might possibly become available for the Kenwood TS-2000. This was based on the best information available at the time. Kenwood now informs us that there will be no firmware upgrade for the TS-2000, and that the only way to access 60 meters on that radio will be via the MARS/CAP modification. As with all such mods, you need to be very careful to assure that the transmitter meets FCC technical standards on these frequencies, since the radio was not designed for transmitting at 5 MHz. We regret any confusion that may have resulted from our original report.

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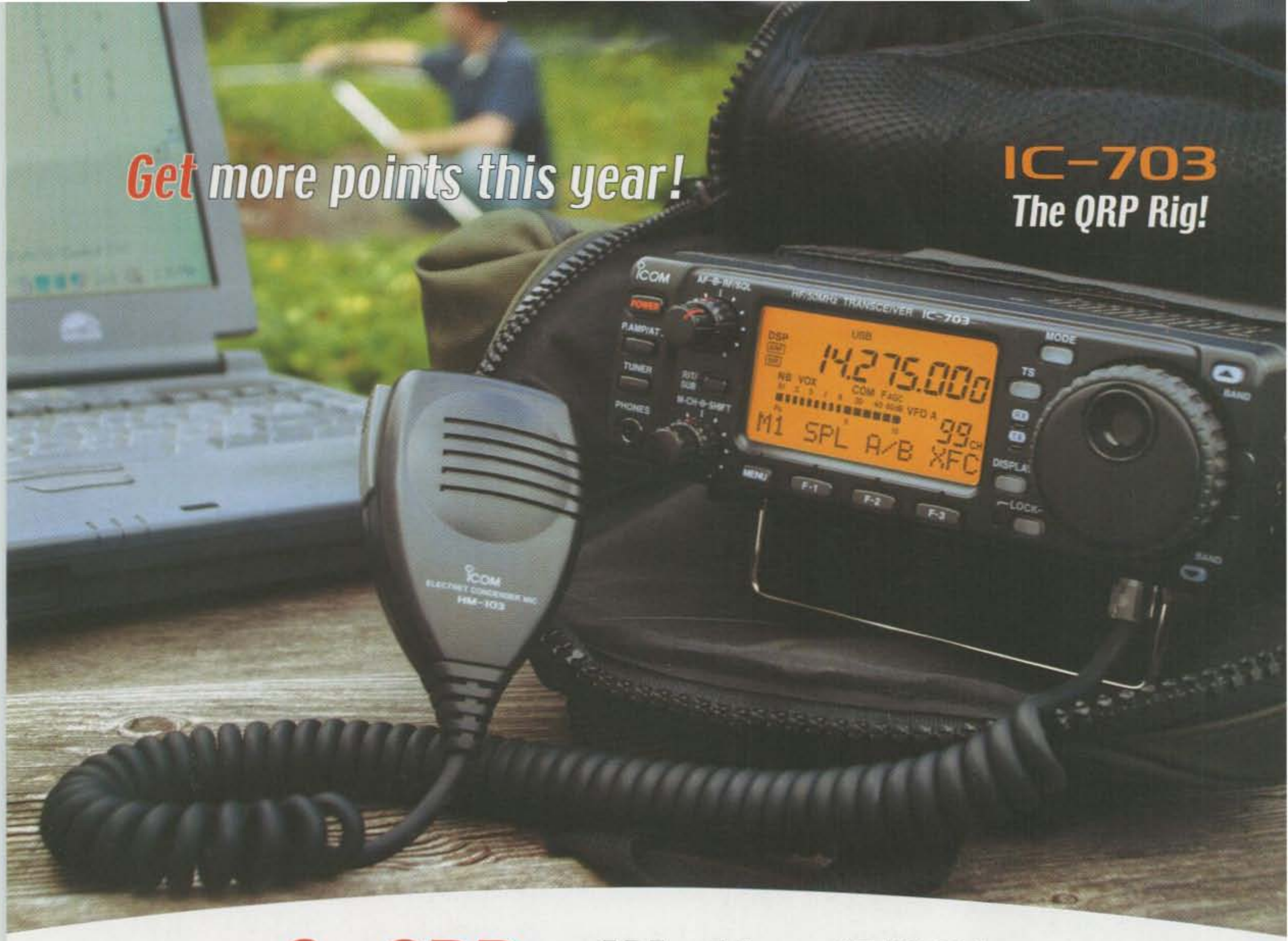

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