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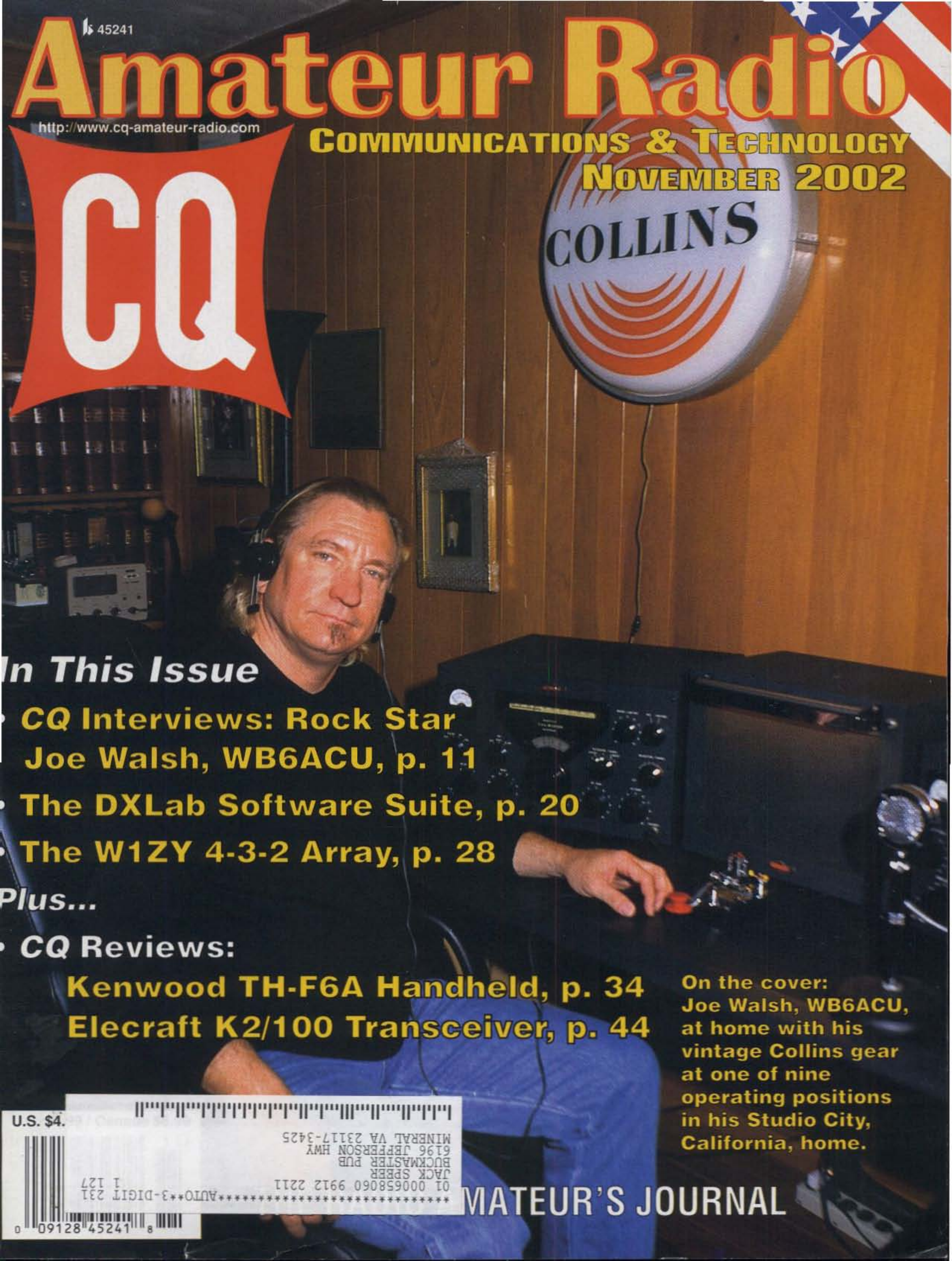
COMMUNICATIONS & TECHNOLOGY

NOVEMBER 2002

CQ



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On the cover: Joe Walsh, WB6ACU, at home with his vintage Collins gear at one of nine operating positions in his Studio City, California, home.

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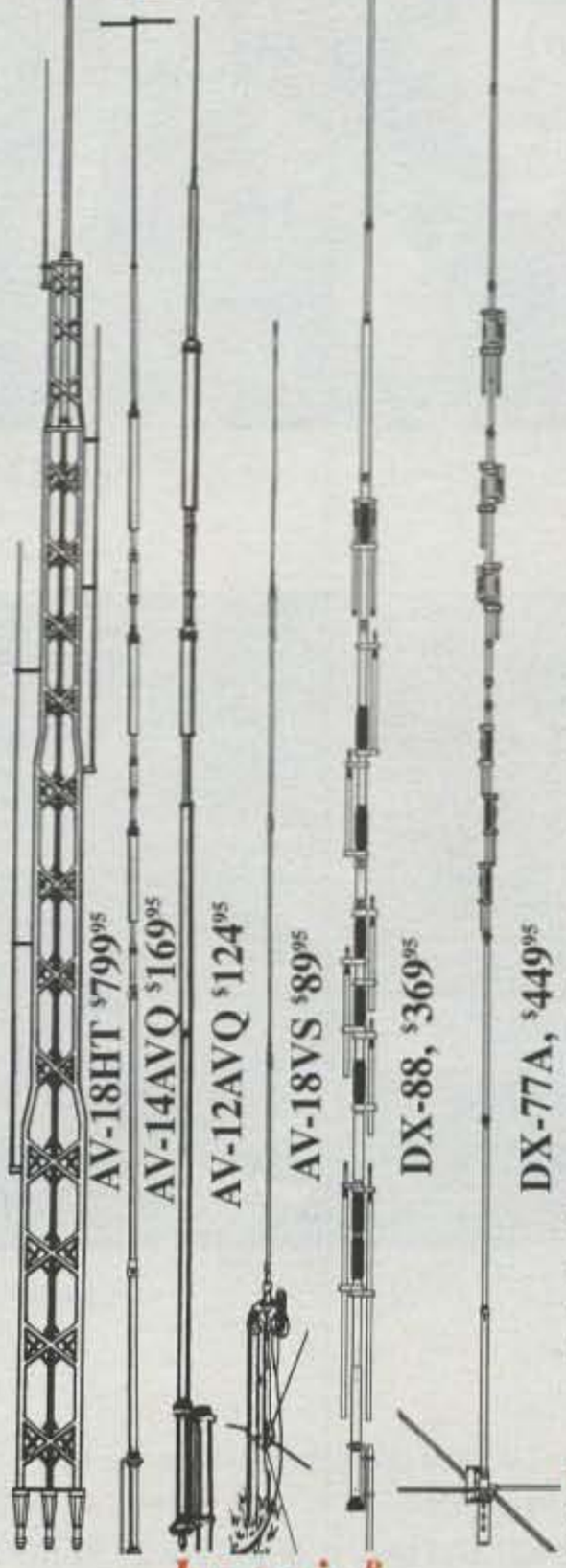

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AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$89.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

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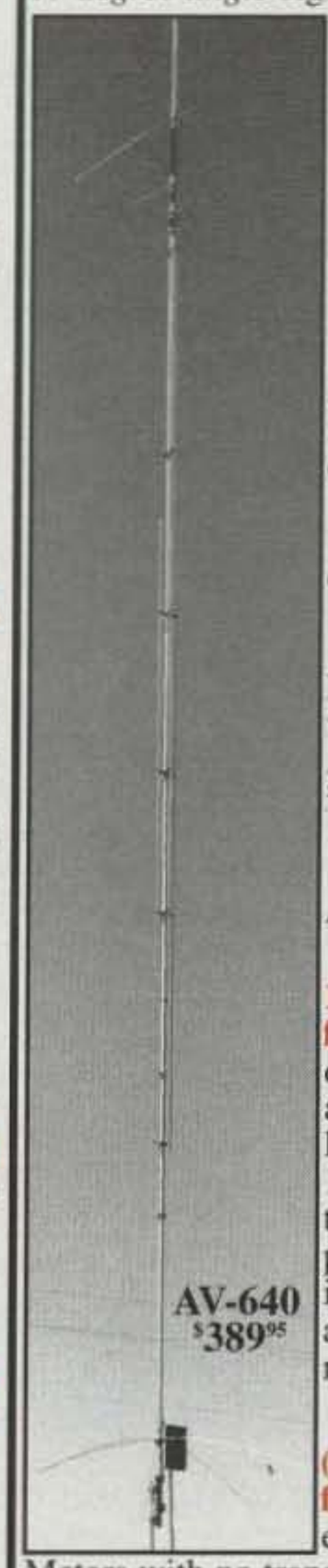

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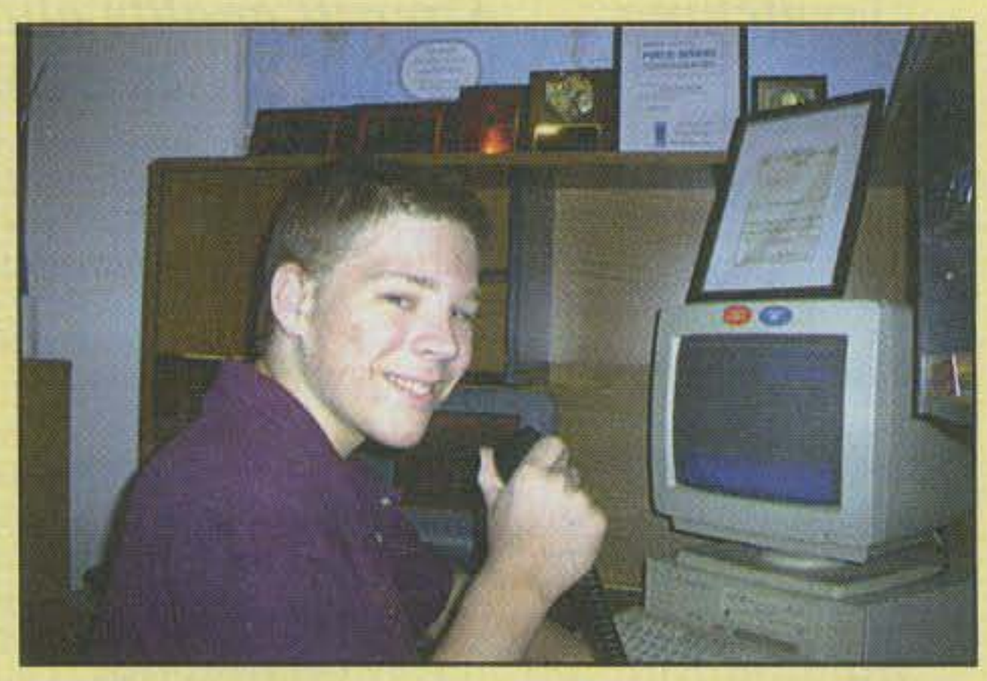

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ON THE COVER: Rock music legend Joe Walsh, WB6ACU, at his Studio City, California home. Under the lighted Collins sign is a mint Collins 75A-4 receiver, part of a pair of "Gold Dust Twins"; the other half is a Collins KWS-1 transmitter just outside the picture. Walsh loves old tube gear and has nine operating positions in his home! See our interview on page 11. (Cover photo by David E. Ellison, WB7AWK)

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Ham Radio News

From The CQ Newsroom

RS-12/13 Satellite Silent, Probably Dead

The Russian RS-12/13 satellite, long a popular "easysat" because of its downlinks on 10 and 2 meters and uplinks on 2 and 15 meters, is off the air and unofficial reports say it may be dead. According to postings on the AMSAT-BB internet reflector and AC5DK's RS-12/13 Satellite Page, Jerry Brown, K5OE, received word from a ham friend in Russia that the satellite had succumbed to last summer's blasts of solar radiation, first losing its receivers and control circuitry, then the beacon transmitters. Stressing that his information was unofficial, Oleg, RV3TH, also told Jerry that controllers will try to bring the satellite back to life, but have little hope of success. RS-12/13 was launched in 1991 as a secondary payload aboard COSMOS 2123, a Russian navigation satellite. The last transmissions from the satellite were heard on August 20.

Around the World...

Hams in Argentina have received a secondary allocation on 135.7–137.8 kHz, according to Radio Club Argentino President Roberto Beviglia, LU4BR. Beviglia says the use of the low-frequency band will be coordinated by the club for the next year, until the allocation is made primary.

Mexican hams may operate for the rest of this year with 6J prefixes instead of XE. This is in honor of the 70th anniversary of the Federacion Mexicana de Radio Experimentadores, the country's national amateur radio society. According to the International Amateur Radio Union, the special prefix may only be used for international QSOs between August 21 and December 31, 2002.

Amateurs in South Africa provided backup communications for the World Summit on Sustainable Development, held last August in Johannesburg. There were operations on both HF and VHF, according to the *ARRL Letter*. There were some 45,000 delegates at the 10-day conference. Speakers included British Prime Minister Tony Blair and U.S. Secretary of State Colin Powell. There were no major problems reported.

Belgian Astronaut Frank De Winne was scheduled for a tour of duty on the International Space Station beginning in late October. De Winne is ON1DWN. Special QSL cards will be available via ON7AQ or the ON QSL Bureau.

5 MHz Ham Band Proposal in Trouble

The agency that regulates the federal government's use of the radio spectrum has come out in strong opposition to an FCC proposal to give amateurs a secondary allocation at 5 MHz. The National Telecommunications and Information Administration (NTIA), often an ally of amateurs in the past, called the FCC's plan premature, citing the potential for interference to "critical government operations primary in the band."

In a letter filed after the FCC's cutoff date for reply comments, Frederick Wentland, NTIA Acting Associate Administrator for Spectrum Management, said the agency supports the Commission's proposal for a low-frequency amateur allocation at 135.7–137.8 kHz, but opposes any allocation on 5 MHz "at this time." Wentland said that the HF bands are currently used extensively by 15 different federal agencies, including the Department of Defense, the Coast Guard, and the Justice Department.

"Federal agencies need immediate access to these HF frequencies in times of emergency," wrote Wentland. "The Commission's proposal does not offer any procedure for a federal agency to immediately reclaim a frequency for emergency use once amateur operations have been established" and that due to differences in modulation types, amateurs "may not be able to hear or recognize a federal station's attempt to communicate."

The NTIA letter went on to propose talks with amateurs and the FCC to work on alternatives, including power and bandwidth restrictions and the "use of discrete frequencies rather than a band of frequencies" as a means of limiting possible interference.

ARRL General Counsel Chris Imlay, W3KD, told the *ARRL Letter* that he and the League's Board of Directors had long been aware of concerns held by the Coast Guard and Justice Department, but were surprised by the tone of the letter. "This is a lot worse than we were told to expect," said Imlay, noting that several months ago the FCC had cancelled a meeting that had been called to discuss the NTIA's concerns and went ahead with its proposal.

There's no indication yet of how the FCC will respond to the late-filed NTIA letter.

Dayton Scholarships Announced

Nine young amateurs are recipients of Dayton Amateur Radio Association scholarships totaling $12,000 for the 2002–2003 school year. William Bailey, KF4VAU; Victoria Morgan, KF4PNI; Jeanne Hansen, KB2RAP; and Sara Hanna, KE6MWX, were each awarded $1000 toward college expenses. Thomas Tenaglia, K3TAT; Nicholas Bishop, KG6JSA; Michael Haessler, KB9TGF; and Amy Morris, KI6F, each received $1500 scholarships; and Jeffrey Doub, KC8IOC, was awarded a $2000 scholarship.

Electric Utilities Take Aim at 222–225 MHz

A consortium of electric power cooperatives is calling on the FCC to reallocate the entire 135 centimeter band—222–225 MHz—from the amateur to the land mobile service. Data Comlink, Inc. and its 20 member utilities included the request in comments on an FCC proposal relating to the 220–222 MHz band, which *was* reallocated from amateur to land-mobile use in 1989. Data Comlink and its members are current users of 220–222. Its filing claims that the remaining amateur frequencies are underutilized, saying that "only handfuls of individuals in the Amateur Radio Service even use this spectrum, while hundreds of thousands of potential commercial users wait with no alternatives."

The ARRL quickly filed reply comments, first noting that the question of reallocating 222–225 was outside the scope of the proposal the FCC is considering and pointing out that the Commission earlier this year had allocated an additional 8 MHz of spectrum for land-mobile use. According to the *ARRL Letter,* the League also disputed Data Comlink's claim that 222 is underutilized, noting a steady increase in both the number of users and the number of commercial transceivers operating on the band since the 1989 reallocation, adding that 222 "remains a critical VHF allocation" for amateurs.

North of the border, meanwhile, Canada's regulators are facing pressure from land-mobile users to match the U.S. allocation on 135 centimeters. Canadian hams still have access to the entire 220– 225 MHz band, but according to the International Amateur Radio Union, the land-mobile industry is pushing the Radio Advisory Board of Canada to look at reallocating 220–222 to business use. The board will make recommendations to Industry Canada (their equivalent to the U.S. FCC) later this year.

State Legislator Named West Virginia Ham of the Year

West Virginia State Delegate Sharon Spencer, KC8KVF, is presented with a plaque naming her the state's Outstanding Amateur of the Year at an ARRL convention last August.

Sharon Spencer, KC8KVF, and a longtime member of the West Virginia House of Delegates, has been named "West Virginia Outstanding Amateur of the Year" by the West Virginia State Amateur Radio Council. Spencer introduced and secured passage of the Amateur Radio Antenna Protection Act, signed into law earlier this year, which mandates that county and municipal governments comply with federal requirements regarding amateur radio antennas—specifically that they be reasonably accommodated and that any restrictions represent the minimum practicable regulations.

According to West Virginia ARRL Public Information Coodinator Jim Damron, Spencer became a ham in 1998 after watching amateurs respond to severe flooding in her county that summer. Her award was presented at the West Virginia State Convention in late August.

Space Station Ham Antennas Fully Installed

Work on installing four amateur radio antennas outside the International Space Station has been completed. According to the *ARRL Letter,* the first two were installed during a spacewalk in January, and the last two were installed by space-walking crew members on August 26. The latest installation makes it possible to operate two ham stations simultaneously on the ISS, one on VHF and the other on UHF. AMSAT says the new antennas are also usable on 1296 and 2400 MHz. The antennas installed in January include one for HF, although there is not yet any HF ham gear aboard the station.

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.

Repeater QRM Leads to Warnings

Several hams in different parts of the country have received FCC warning letters relating to alleged interference with amateur repeaters. In one case, while an individual was cited for causing QRM, the repeater owners were also questioned about having adequate control of the repeater during the incident. Several other hams were "reminded" about the FCC rule requiring them to identify every ten minutes, and two unlicensed individuals were ordered to stop transmitting or face large fines. In addition, a Virginia ham was cited for 75 meter operation which allegedly involved "use of a callsign not assigned to you, interference, and slander."

Good news for one ham: Theodore Crutchfield, K4TFC, who had been ordered to retake his code test, initially failed the exam and was informed that his Extra Class license would be downgraded to Technician. However, he subsequently took the code test again and passed it, leading to an FCC letter informing him that his license "remains Extra Class and it is in good standing."

Zero Bias

BY RICH MOSESON, W2VU

An Editorial

Pay It Forward

You may recall the movie "Pay It Forward" that was in theaters a couple of years ago, or you may have read the book on which it was based, written by Catherine Ryan Hyde. According to the Warner Brothers website, Hyde's inspiration came from a time about 20 years ago that her car caught fire in what she termed "a rough area of downtown Los Angeles." Two men stopped and helped extinguish the flames then disappeared before she had the chance to thank them. She decided that if she couldn't do anything to repay the men for their help, then she would make a point of offering help to someone else in need. Hyde got the chance a few months later, helping another woman whose car had broken down. When the woman asked how she could pay her back, Hyde replied, "Don't pay it back to me ... Pay it forward to someone else."

According to Hyde's calculations in her book, if one person helps three other people, and the next day, those three people each help three other people, and so on, then by the end of two weeks, 4,782,969 people will have been helped by someone else with no agenda besides doing a good deed and having the recipient "pay it forward."

We hams have had a tradition of "paying it forward" for many decades. Somewhere along the line, the ARRL dubbed a person who helps another ham learn something new as an "Elmer." And while I hate the term (and was thus very pleased to avoid titling this month's column, "The Importance of Being Elmer"), the concept is one whose importance cannot be overemphasized. But sometimes, we don't make it very easy, especially for the "Elmee" (one of the reasons I hate the term "Elmer").

This week, a relatively new ham posted a message on the "Q&A" section of our website with a relatively simple question about the formula for determining the length of a quarter-wave antenna. While I appreciate his coming to us for this information (it's 234 divided by the frequency in Megahertz, by the way, with the result in feet), and I encourage all of you to visit and make use of our website forum pages, it's really too bad that he needed to. It's too bad that there wasn't a more experienced ham who had already made himself available to answer questions and maybe even help out with projects like building antennas.

It's not just new hams, either. One of the articles in this issue—"The W1ZY 4-3-2 Array"—talks about cutting a driven element for a beam at reflector length. I thought we needed to include a reference to what the difference is in length between a driven element (essentially a half-wave dipole) and a reflector, for those who don't already know. The number that jumped into my mind was that, generally speaking, reflectors are 5% longer than driven elements and the first director is 5% shorter. Wanting to confirm this, I started checking my trusty authorities on such things, including the *ARRL Handbook*, the *ARRL Antenna Book*, and our own antenna-related books. I couldn't find it! A simple, basic

The Right to Disagree

September 11, 2002—One year ago today, I sat here—like the rest of the world —in a state of shock, glued to my radio (broadcast and amateur) and/or TV. I was able to put down some of my thoughts on paper for this column before the day ended. Today, I feel the need to do that again, before the day ends.

This morning, I attended a commemorative event at our town's high school football stadium. There were two particularly striking aspects of the ceremony for me, though. First, the high winds kicked up clouds of dirt from the cinder track, covering those of us in the stands with a fine layer of gritty dirt. We had dirt in our eyes, in our mouths, in our pockets. I had so much gunk on me that I had to shower when I got home. Yet it occurred to me while sitting there how appropriate this was. At about the same time a year ago, people in lower Manhattan were dealing with much thicker, darker, heavier and far more hazardous clouds of dust, smoke, and who knows what else. That dust was so thick that it blocked out the same bright sunlight that shone down on us this morning, a year later. As we sat there in the wind, we had just the tiniest taste of what the 9/11 survivors in New York City had to endure.

Second was a comment during a speech by a member of our school board—who was about to head to a breakfast meeting at the World Trade Center's Windows on the World restaurant when the planes struck. Many of his friends and colleagues never came home from work that day. He said the events of last September 11 forced him to think about what and who he really appreciated in his life, and that when it came to "who," he realized the answer was "everyone," even those he disagreed with.

His comment made me recall something that I've been wanting to write about ever since last September 11. What is it about the United States that sets us apart from other countries, even many other democracies? What is it about the United States that people like Osama bin Laden are so afraid of, so much so that they are willing to attack us in an effort to change who we are and what we do? It comes down to this: *The Right to Disagree.* People like bin Laden and Saddam Hussein hold onto power through fear and intimidation, and they are very threatened by a society that's built on the Right to Disagree.

Of course, the right to disagree isn't specified in the Constitution. But it's at the heart of virtually all of the personal freedoms that are spelled out there—including freedom of speech, freedom of the press, freedom of religion, and the right to vote in free, open, elections. Each of these is about the right to disagree—with the government, with each other —without fear you'll be jailed or killed as a result.

We disagree regularly about the best way to approach common problems, or about which problems have higher priority than others. We disagree about which people seeking elective office will best represent us. But we settle these disagreements at the ballot box and, perhaps most importantly, we agree to abide by the results, even if we lose. Think back to our presidential election in 2000. In many other countries, an inconclusive vote that ends up being decided by the courts would not be accepted. There would be chaos. There might be demands for a new election, there might be a coup, there might even be civil war. But that's not America. When the result was finally decided, even those who disagreed with it accepted it. No one questioned the legitimacy of the outcome and once again, power was transferred peacefully from one party to another.

The fact that we can disagree—openly, loudly, in speech or in print, or in prayer—without those with whom we disagree feeling threatened, or without feeling threatened ourselves for taking a position at odds with the majority—is at the heart of what sets apart America as a nation. The Right to Disagree is what being an American is all about. If you don't think I'm right, feel free to disagree.

piece of information that's essential to Yagi design, and if it's in any of those books, it managed to escape me. Only the *Practical Antenna Handbook*, by the late Joe Carr, K4IPV, provided the information—and Joe put the number at 4%.

On the other side of the coin, when I was driving to work recently, I happened to bump into Del Schier, K1UHF, of West Mountain Radio, on a local repeater. Del asked me if I'd gotten on meteor scatter yet, using K1JT's "WSJT" software that's transforming meteor scatter from a highly-specialized mode into an everyday propagation mode on VHF. I replied that I'd downloaded the software but hadn't tried it yet, since I wasn't sure about frequencies or where to point my antenna, and because early morning—traditionally the best time for working meteor scatter outside of showers—was not a convenient time for me to get on the air. Well, Del spent the next 10 minutes talking me through the basics—start with NØUK's excellent "Ping Jockey" web page at <http://www.pingjockey.net/>—and later e-mailing me details on things I might not remember while driving down the road. I still haven't had a chance to try it out at this writing, but now I know I can, and sooner or later, I will. Tnx, Del.

This is a great example of the one-on-one help and instruction that we need, and it even happened on the radio! And on a repeater (see last month's rantings)! Best of all, it's happening in other places, too. The AMSAT News Service recently had an item about some hams in the Seattle area who were chatting on a local repeater about the possibility of making contact with the International Space Station (ISS). Other hams joined in and the discussion has stretched across many nights, with about a dozen people regularly taking part, exchanging information and expanding the scope of the discussion to include amateur satellites in general. As of mid-September, three members of the group had made voice contacts with the crew, and enough interest has been generated to try to persuade a local school to apply for a scheduled contact. This is yet another example of not only the value of one-on-one mentoring but also the value of repeaters in pulling additional people into an activity.

Next, be sure to take a look at this month's "Public Service" column, in which WA3PZO profiles the three finalists for *Newsline*'s "Young Ham of the Year" award—all of whom not only focus their efforts on public service but on sharing ham radio with others. One has started a ham station at a local Scout camp; another has developed a concept for using the internet to connect ground stations for school contacts with the International Space Station, thus making it possible to stretch contacts (within the crew's schedule availability) beyond the usual 10 minutes of a "pass" over a single location.

One more example of "paying it forward" in amateur radio: Our cover story this month is an interview with rock music legend Joe Walsh, who also happens to be WB6ACU. As part of the article, we have separate interviews with two of Joe's closest radio friends—Jim Walden, the ham who introduced *him* to amateur radio back in 1960, and Buddy Thornton, whom Joe introduced to amateur radio in the 1970s. Not only did Joe "pay it forward," but he gained two lifelong friends in the process.

So let's all follow Joe's example, and Del's, and KC7QYR's in Seattle—share what you know, seek knowledge from others and whenever you have the chance, "pay it forward."

Announcements

Arkansas QSO Party – This year's event will take place 0000–0600Z November 10 and 1400Z November 10 to 0100Z November 11. Frequencies: CW 3.550, 7.050, 14.050, 21.050, 28.050 MHz; phone 3.980, 7.260, 14.260, 21.360, 28.360, 145–147 MHz; PSK 3.580, 7.070, 14.070, 21.080, 28.120 MHz. Categories: SO, MS, Mobile, HP, LP, QRP, S/P/C, PSK. Exchange: RST, state or province, DX stations send "DX." (Ohio stations exchange county.) QSO points: PSK 3pts., CW 2 pts., SSB 1 pt. Score: QSO points × AR counties (Arkansas stations count states, provinces, and AR counties). Bonus stations: W5YM (25 pts. per band/mode), AR ARRL affiliated club station (10 pts.). For more information go to <http://www.arkan.us>. Logs are due 30 days after the contest and should be sent to <k1ark@arrl.net> or to Bill Smith, K1ARK, 2164 Magnolia Drive, Fayetteville, AR 72703.

• The following Special Event stations are scheduled for November:

N2UL, from CQ Veteran's Day, US Army Post, Fort Monmouth, New Jersey; Robert D. Grant United Labor ARA; 1200–2300Z November 11 *(no frequencies given—ed.)*. For certificate send QSL to RDGULARA, c/o WA2VJA, 112 Prospect Street, Nutley, NJ 07110-0716.

KA5VOT, in commemoration of the 1902 commissioning of the first US Navy Destroyer DD-1, the *USS Bainbridge*, the *USS Orleck*, DD-886, will operate from Orange Texas from 0000Z November 24 to 2400Z November 25 on 7.260 and 14.260 MHz. For QSL send SASE to KA5VOT, 6800 Lancaster, Orange, TX 77632.

N8F, from remembrance of the *Edmund Fitzgerald* and the crew lost in 1975; Stu Rockefellow ARS (W8NJH); 2300Z November 8 to 2300Z November 10 on 3.870, 7.270, 14.270, 21.270. Certificate: Richard Barker, W8VS, 264 N. East St., Brighton, MI 48116.

KØGRL, in recognition of Veteran's Day and General Curtis E. LeMay's birthday, Bellevue, Washington; Strategic Air Command Memorial ARC; 1200–2400Z November 11 on 3.947, 7.247, 14.247, 21.347, 28.347, whichever band is open best to most locations, plus 51.47 MHz and 146.46 simplex. Also listen to the 3905 Century Club WAS Net in the evening. For QSL visit the SACMARC website <www.sacmarc.org> for contact/mailing information (SASE).

• The following hamfests, etc., are slated for November:

Nov. 1–2, **West Texas ARC 2002 Hamfest**, Holiday Inn Center, 6201 E. Highway 80, Odessa, Texas. Contact Craig Martindale, 1719 Rosewood, Odessa, TX 79761 (915-366-4521 [work 367-8603]; e-mail: <w5bu@arrl.net>). (Talk-in 145.470, 444.425, HF 3.922; exams)

Nov. 2, **Lake ARA Hamfest & Computer Show**, Umatilla High School, Umatilla, Florida. Contact Lake ARA, 11146 Springdale Ave., Leesburg, FL 34788; <http:qsl.net/k4fc/index.html>. (Talk-in 147.255+, 147.000–, and 442.900+)

Nov. 2, **Enid Hamfest**, Garfield County Fairgrounds, Enid, Oklahoma. Contact Tom Worth, N5LWT, 580-233-8473; Jeff Worth, N5UBY, 580-233-1470; <enidhamfest@yahoo.com>. (Talk-in 145.29 –.600 and 444.400 +5.00; exams 1 PM)

Nov. 9, **Montgomery Hamfest & Computer Show**, South Alabama State Fairgrounds, Montgomery, Alabama. Contact Hamfest Committee, c/o 7173 Timbermill Drive, Montgomery, AL 36117-7405; or call Phil at 334-272-7980 after 5 PM CST; e-mail: <k4ozn@arrl.net>; <http://jschool.troyst.edu/~w4ap/>. (Talk-in 146.24/84, call W4AP; exams beginning at 8 AM)

Nov. 10, **LIMARC Fall Hamfair** (rescheduled), Briarcliffe College, Bethpage, Long Island, New York. For more information, call the LIMARC 24-hour infoline: 516-520-9311; <hamfest@limarc.org; <http://www.limarc.org>. (Talk-in W2VL 146.85 repeater [136.5 PL]) *Note: If you attended the Sept. 15, 2002 hamfest, bring your ticket with you, as it will be good for this hamfest.*

Nov. 16–17, **Fort Wayne Hamfest & Computer Expo**, Allen County War Memorial Coliseum, Fort Wayne, Indiana. For more information, call 260-484-1314 (leave message); or write with SASE to AC-ARTS/Fort Wayne Hamfest, P.O. Box 10342, Fort Wayne, IN 46851-0342; web: <http://www.fortwaynehamfest.com>. (Talk-in on 146.88–; exams Sat.) *Note: Riley Hollingsworth will be the guest speaker.*

Nov. 30, **Evansville Winter Hamfest**, Vanderburgh Co. 4-H Fairgrounds Auditorium, Evansville, Indiana. Contact Neil, WB9VPG, 812-333-4116 or 327-0749; or write to Neil Rapp, 2744 Pinehurst Dr., Bloomington, IN 47403; or e-mail ears@w9ear.org>. (Talk-in 145.150– Evansville, 146.925– & 443.925+ Vincennes; exams 12 noon)

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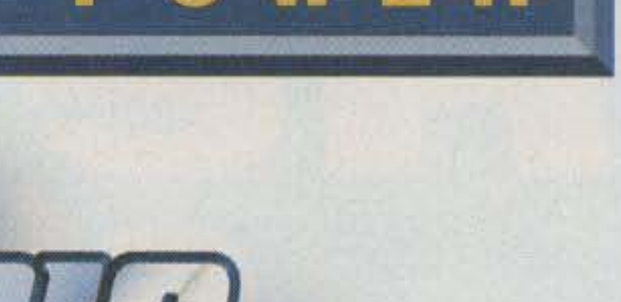

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One of the great things about ham radio, we always tell non-hams, is that you never know who might answer when you call CQ. It might be a teacher in New York, a farmer in Russia, or a rock star in California ... such as Joe Walsh of The Eagles, also known as WB6ACU.

CQ Interviews:

Joe Walsh, WB6ACU, at one of his basement operating positions — one of nine complete stations in his California home. This one features a Johnson 500 transmitter (partially obscured) and a Hallicrafters SX-88 purchased on eBay that sparked internet rumors of "a rock star driving up radio prices." (All photos by the author)

Joe Walsh, WB6ACU
Ordinary, Average Ham (and Rock Legend)

BY DAVID E. ELLISON,* WB7AWK

Flash back to 1977: Jimmy Carter was President, *Close Encounters of the Third Kind* was topping the box office, and transceivers from Kenwood and Yaesu had finally begun to cast a shadow upon aging giants Drake, Collins, and Heathkit in the world of amateur radio. Hobby computers were becoming commonplace; CMOS keyers were all the rage, and the then-tiny software company Microsoft was on the verge of earning its first million dollars in a single year.

By the summer of that year, the musical influence of guitarist Joe Walsh had helped propel the album *Hotel California,* by rock music super-band The Eagles, to the top of the Billboard charts and into the history books as one of the most successful record albums of all time. Walsh, already a guitar legend from his own solo career and from his days fronting another influential rock band, The James Gang, replaced Eagles guitarist Bernie Leadon in 1976, in a move the band hoped would bring more of a rock edge to its sound. By the end of 1977 there was little doubt the change was for the good.

Few, however, are aware of Walsh's long-time interest in amateur radio. First licensed as a Novice in 1960 with the callsign WV2KAC, Joe now holds an Extra class ticket as WB6ACU and is active, when his busy schedule permits, on all bands from 160 to 2 meters, running all modes from AM, CW, and SSB to FM and digital. His preference is for the great old tube rigs of the past.

For the last two years rumors have circulated on the internet that "some rock star" was amassing a large collection of Collins, Hallicrafters, and other vintage tube-era rigs through the auction site eBay. A few months back I sold several pieces of old gear to the famed guitar player in Studio City, California, and decided to put the rumor together with the facts. It was through these deals, and over the course of many e-mails, that I was able to persuade Joe to consent to an interview for *CQ* magazine about his music, his collection, and his interests in amateur radio. We also spoke with a couple of Joe's ham radio friends and his "Elmer."

CQ: How did you get started in amateur radio?

Joe Walsh: In 1960 my family moved from Columbus, Ohio to Flushing, New York (Queens, New York City). I was 12. I went from a very small town in Ohio to all of a sudden being in New York City, from a big house with a yard to a

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third-floor apartment. We moved in the summer, so there was no school, and there I was, 12, all alone in a huge city with no friends and nothing to do. That was a very long summer. We lived in Fresh Meadows; it's an apartment-based community in a rather nice part of New York. There was a Mosley TA-33 Jr. on the roof of our building. Sometimes it would turn. In the course of the summer I got on the roof and...traced the wires down to a first-floor window, got up enough courage to wait for the antenna to turn, and then knocked on the door. My Elmer, Jim Walden, W2IEY, now W6ESJ, answered. He invited me in and took me under his wing. He gave me my Novice exam that fall. The first radio I ever saw was his Collins KWM-1. My Novice call was WV2KAC.

CQ: Tell us a bit about Jim. What was he like at that time?

JW: He was the coolest guy on the block, the coolest guy I had met since leaving Ohio and I still think that. He was a hell of a guy to put up with me. I don't know where he got his patience to put up with all of my questions. I was very insistent about ham radio.

CQ: How did you master the code for your Novice exam?

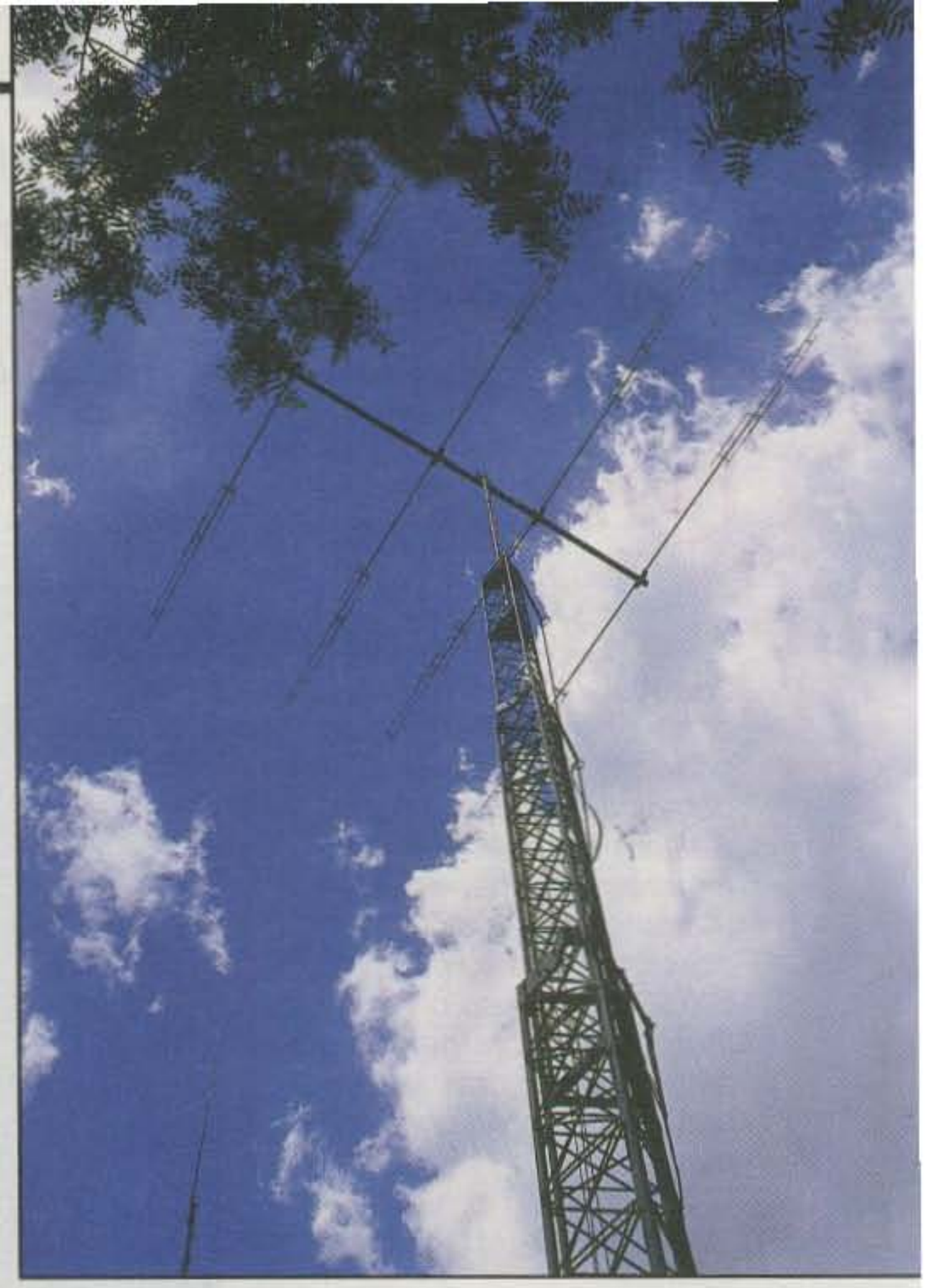
JW: I taught it to myself, I guess from being musical. I didn't know I was musical at the time, though. My mom actually helped with flashcards, but I really wanted to learn it so I taught it to myself.

CQ: After you got your ticket, what was your first station line-up?

JW: I had a Heathkit DX-20 and a [military surplus] BC-348Q receiver. I had a paper route and saved up the money to buy it. But the DX-20 didn't work the first time I plugged it in. I had to go back and rewire the oscillator section. That tears the ladder out from underneath you—when you spend hours and hours on a kit and it doesn't work. I wanted to throw it out in the snow, but instead I just barreled into it. I guess that's how you learn.

CQ: When did you upgrade your license?

JW: I wasn't active during high school. I kept my receiver and I listened to shortwave a lot, but my Novice license expired and we moved to New Jersey and I didn't know any hams. I was pretty much a loner, and I didn't have any motivation to go ahead and get my General. I was into [playing] football and discovered guitars and girls and stuff, so I took a little sabbatical from ham radio. But in college I went to Kent State [University] and I got my General. That was in 1965.



WB6ACU's connection with the ham radio world — a KLM KT-34 beam at 60 feet.

CQ: During your early band years, first with The Measles and later The James Gang, did you get much into the electronics of music?

JW: Yeah, audio circuits were a lot more basic back then and more serviceable. I didn't know a whole lot about it. Basically, I disconnected components to see what would happen, and if it sounded better I would leave it that way. But I found out a lot about guitars and audio modifications and stuff. It was fun. In those days you had to fix your own gear; we didn't have roadies. So if something broke, you didn't play unless you fixed it, and you didn't get paid unless you played. Makes one a bit more self-sufficient.

CQ: Your first big solo hit, *Rocky Mountain Way,* popularized a vocal effect that was innovative at the time—the "talk box," a device employing mouth movement to modulate an audio signal. While the effect had been around a while, your use of it first brought it to the Billboard charts. Was your talk box home built?

JW: Yeah, I built that. It's a good example for illustrating modulation. Instead of driving a guitar speaker, your amplifier drives a public-address horn-

Joe's main living-room operating position including (from left) a Viking tuner atop a Racal RA-1772 shortwave receiver and a complete Hallicrafters station — an HA-33 linear amplifier, HT-32 transmitter, and SX-115 receiver.

driver, sealed in a box so you can't hear it with your ear. A piece of surgical tubing is connected to the driver output so that the guitar sound comes through the tubing. You hold the end of the tube in your teeth. The guitar sound then comes through the tubing into your mouth, pretty much like the artificial larynx that cancer patients use. Since it's an audio source in your mouth, you move your mouth as if you were speaking, but instead of using your vocal cords to produce the sound, the guitar supplies the sound. When I explain [to other hams] about modulation, the talk box is a great way to do it.

CQ: Do you think ham radio has been a defining factor in your life and your success as a musician?

JW: I think it was very constructive off time. It's a very constructive hobby. You come away knowing stuff—a foundation of ideas you can apply, like fixing electronic equipment and overall knowledge—so much more than a Gameboy or computer game that has nothing to do with the real world. I'm very grateful I had a good electronics foundation. That's really helped me in the recording part of my career, and it's helped me make the transition from analog to digital in the studio. I shudder to think how my life would be if I had never met Jim Walden. I'm so grateful to him.

CQ: Have you ever passed the torch of knowledge yourself, as Jim Walden did for you all those years ago?

JW: Yeah, one guy, Buddy Thornton. I Elmered him and gave him his Novice exam. He's an ex-NASA engineer from Houston and a great guy. He was the maintenance tech at the studio in Miami where we were recording *Hotel California,* fresh out of NASA. He always wanted to get into ham radio, but just like me he had never met anybody in the hobby and didn't know how, so I got him going.

CQ: Did 13 solo albums and your break-neck pace of superstar status with The Eagles allow any room for your radio interests?

JW: At the time, I had a huge tower and a great station, and I was on 2 meters a lot. When I got home from a tour I always got on the radio because I could talk to people and just be one of the boys. It really took the edge off touring. When I get home and off the road, I love getting on the air and just talking to people. It gives me a chance to get grounded and get my mind off the road, and also to meet people that I would never meet in any other way. I like when friendships are formed and long-term friendships result—kind of rewarding. I'm just Joe on the radio, and that's important. I really, really like that.

CQ: Did you ever take gear with you on tour?

JW: Several times, but it didn't work very well. Mostly we were in tour buses. I could never find a place on a tour bus to mount an antenna resonator. I must have left a trail of Hustler resonators across the country [he laughs]. One came off at every toll booth. I'd go out with about six of them and come home with none. It was fun, but it was a real pain in the neck carrying gear around, setting it up, and tearing it down. Eventually I just got discouraged. There weren't little QRP rigs then like there are now. I had to lug the whole thing around with a power supply and hang an antenna out the window. I used Atlas 210s, stuff like that, the first generation of solid-state rigs.

CQ: When did you upgrade to Extra class?

JW: Not too long ago—about a year ago. I wanted to get it before they changed all the rules. I wanted to take the actual exam and do the code.

Joe Walsh with a stack of vintage receivers at a second basement operating position. Radios include a Technical Materials GPR-90, Hammarlund SP-600, National HRO-60, and an RCA AR-88.

CQ: How do you feel about the demise of Morse code as a means of communication globally, and the now-minimal requirements for amateur radio licensing?

JW: Oh, I think it's obsolete and [its demise] was inevitable. I am a traditionalist, though. In terms of the tradition, America is so starved for any kind of tradition whatsoever. Ham radio had a wealth of tradition going for it. I think any amateur who's worth a damn knows Morse code. I don't have much use for people who don't even attempt to learn it. But I'm kind of set in my ways a little bit, and I'm probably in the minority on that one.

CQ: What is your main radio line-up right now, your favorite radio to get on when you actually want to work someone? How often do you get a chance to get on the air?

JW: My Collins KWM-1. I prefer that over any of the Japanese stuff. I also have set up an HT-32 Hallicrafters and an SX-115, and of course I have the Gold Dust Twins [KWS-1 transmitter and 75A-4 receiver], the famous Collins stuff. Between those stations, that's what I use right now. I rotate

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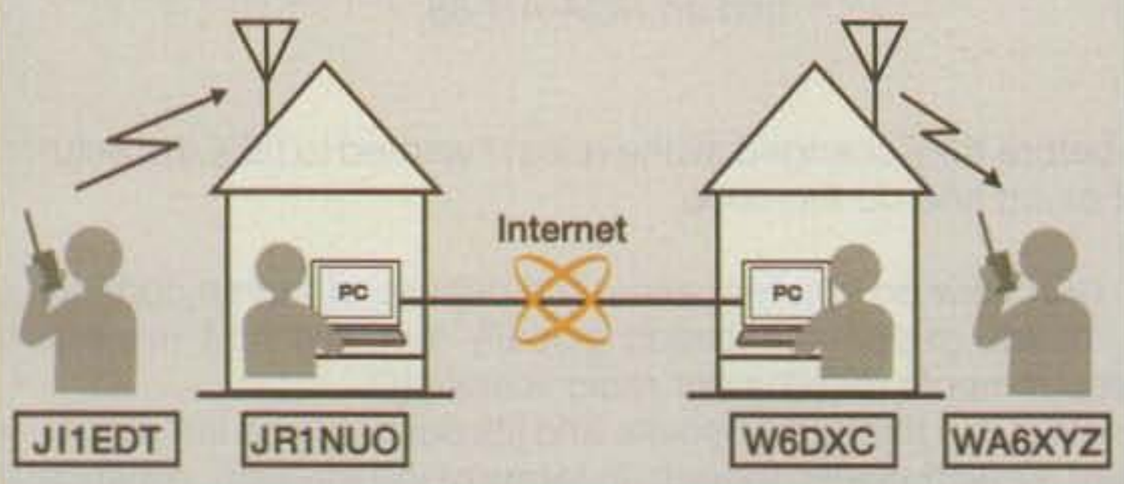
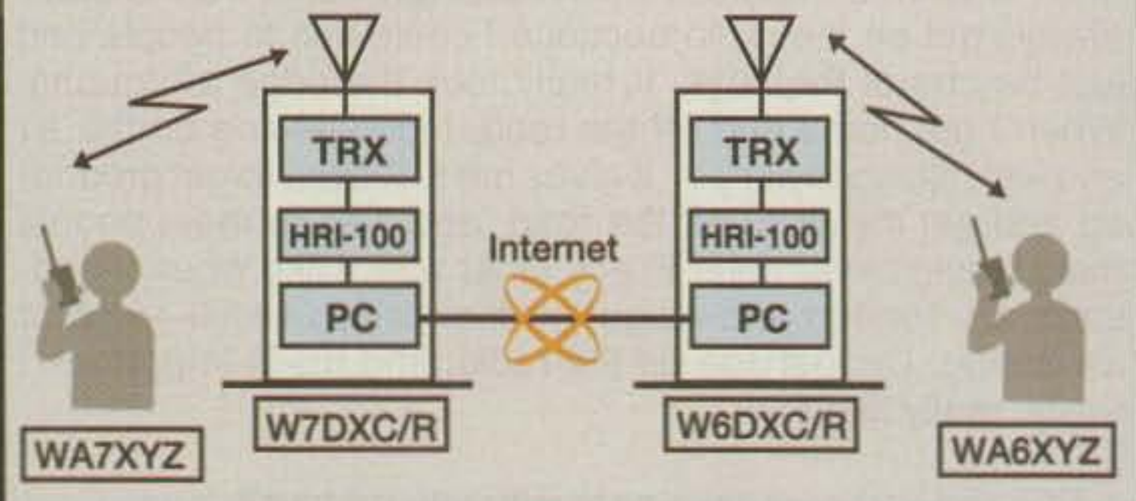


Repeater with WIRES™–II



WIRES™–II Amateur Radio Internet Linking Kit

HRI-100 Interface Box (Requires 12 V DC Input)

Components

- AP01 CD-ROM (Including Manual)
- Power Cable
- Data Cable (RS-232C DB-9 Plug)
- Data Cable (8-pin Mini-DIN Plug)
- Audio Cable (3.5 mm Plug) (2)
- WIRES™–II User/Server Agreement
- •Optional Accessory: NC-72B AC Adapter

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"Joe's Friends"

Jim Walden, W6ESJ, Joe's Elmer

"In 1956 I moved from Florida to an apartment in the Fresh Meadows apartment community in New York after I took a job offer in Brooklyn," recalled Jim Walden, now W6ESJ. "My callsign back then was W2IEY. Just after Christmas 1958 I acquired a Collins KWM-1 [3-band HF transceiver] on the recommendation of my Elmer, John, W4KRV (SK), in Miami. I went up to the roof, put up a 10 foot mast, an AR-22 rotor, and a Mosley TA-33 Jr. beam and started working the world with no problem at all.

"Joe moved into the building around that time, and that's when he saw the beam on the roof of the apartment. He followed the coax down to my window and wound up knocking on my door. It was on a weekend, and my wife answered the door. She said there was a young man at the door interested in radio. I wasn't that old myself—26 or 27. I brought him in and showed him the KWM-1. I got on the air and we made some contacts, and he started coming down every weekend. I got a little oscillator to practice code, and I ended up giving him the Novice test that fall. He got his license in late 1959 —WV2KAC. I got out my old logbooks and found he made his first contact from my station on January 30, 1960; he signed my log. It was just before the start of some contest.

"As time went on, we left Fresh Meadows and moved to Texas, and I think Joe moved to Ohio. The last time I saw him was in 1960. Then in 2000 I got an e-mail from him. 'Ham radio's such a big part of my life today, and has been responsible for so many other good things [for me]. I don't even want to think how different my life would be if you hadn't lived downstairs,' he wrote in April of 2000. The following October his band was playing at the Konocti Harbor Resort near Middletown, California. I e-mailed back to him and asked if he could maybe join us for my grandson's birthday party, and he said he would. Between shows he came down and spent the afternoon with us and we took pictures. That was the first time I'd seen Joe since the spring of 1960."

Joe Walsh visits with Jim Walden, W6ESJ, between tour dates in California. (Photo by Marilyn Walden)

Jim currently resides in Santa Rosa, California, and is on the air with his current callsign, W6ESJ.

Buddy Thornton, KA4JWP

Buddy Thornton, KA4JWP, is a long-time aerospace and electrical engineer, working over the years on high-profile projects such as the original Skylab, as well as for Douglas Aircraft on the Saturn-Apollo rocket program during the glory days of the space race. In the early 1970s, however, he left the high-tech dynamics of space travel to work in the world of rock and roll. After moving to Macon, Georgia, he went to work for Capricorn Records. As a staff engineer he worked on albums for some of the biggest names in southern rock: Charlie Daniels, Marshall Tucker, and The Allman Brothers, among many others. After touring with the Allmans for several years as their sound engineer, Buddy moved to Coconut Grove, Florida, where he worked for legendary record producer Bill Szymczyk at Bayshore Studios. One of the big acts to come along was a Joe Walsh solo project.

"I met Joe Walsh through Bill Szymczyk," Buddy told *CQ*. "One of the first things Joe recorded at Bayshore was his *But Seriously Folks* album, and I became friends with him while working on that project. Joe and I used to play around with all the equipment down in my maintenance shop. He would bring in some Heathkits, power supplies, some very unusual electronic music experiments, and I would help him put them together. We'd play around with them all hours of the night. I had always had an interest in radio, and I'd been into electronics for some time, but I never really took the time to sit down and learn the code.

"Joe brought in some radios and we put an antenna on the roof. We played around with CW, and he really got me interested in ham radio again. He ended up giving me a code practice oscillator and key, and told me to practice the code, and next time he was in town we'd work on it some more.

"While they were recording, they would work for a while then take a break and go back home to California. One trip when he came back, I had been practicing my code, so Joe gave me the written test and the five words-per-minute code test, and I was able to get my Novice. That's pretty much how I met Joe. He's a great guy."

Buddy Thornton, KA4JWP, in his Melbourne, Florida shack.

Buddy left the recording industry in 1982, after Bayshore Studio closed its doors and Bill Szymczyk retired. After going back to college to finish his electrical engineering degree, Buddy went to work for the Air Force and is currently employed as a radar test engineer working with Air Force airborne radar systems, and is still very active in music and amateur radio.

John Brosnahan, WØUN

John Brosnahan, WØUN, is no stranger to the amateur radio community. Formerly head of Alpha/Power, Inc., he has long been very active in contesting and DXing, as well as a renowned antenna and RF guru. John also spent four years in the high-profile rock and roll world during the heyday of some of the biggest names in the music industry, and it was through this work that he met Joe Walsh.

John Brosnahan, WØUN, with his 2002 BMW Dakar motorcycle.

"From 1969 to 1973 I owned Magnum Opus Inc., a company devoted to very high-powered audio systems, doing sound reinforcement for many of the most popular acts of the era," John told *CQ*. "We worked predominantly for rock-and-roll bands, who most need the amplification, but also for acts such as Bob Hope and Englebert Humperdink. The rock groups for which we ran sound included Jethro Tull, Jefferson Airplane, The Who, Led Zeppelin, Grateful Dead, and, of course, Joe Walsh and his band, The James Gang. I met Joe backstage doing sound somewhere. I don't remember exactly where we met, but as soon as we found out we were both into ham radio, we hit it off very well. We were just buddies who were out to have a great time together and shared an interest in radio. There were times when Joe thought it was more fun to ride along in the equipment truck with me talking about radio when I was driving the sound system than to ride with the band.

"Joe even bought me my first 2 meter FM radio. We went down to CW Electronics in Denver, and he bought a couple of Standard 826s so we could talk to each other on the road. It also was always fun to contact someone who was going to the band's concert.

"I had been licensed earlier than Joe, am a couple of years older, and probably had a little more [radio] experience than he had. But Joe is very, very sharp technically. A few years ago when he visited me, he asked more detailed questions about some of the ionospheric sounder schematics that I was working on than anyone else who has visited me, and not just hams, but people who make their careers doing ionospheric sounding. I was very impressed with his insights into the equipment. We've had a lot of fun together."

John has since retired from Alpha/Power and sold his ranch in Colorado. He has started a new company, Signal Hill Research, LLC and moved to a 126-acre ranch in the hill country of Texas, southwest of Austin. Looking back on his long friendship with Joe, John concluded, "Amateur radio's been a big deal for both of us, playing an important role in both our lives."

a lot of them to give all the capacitors equal time. But that's what I have set up and what I really enjoy. I have nine operating positions in my LA house. I just got into PSK and that's a lot of fun. I've been doing that for a while; it's pretty exciting with low power. Then I have AM stuff. There's a great AM community on 3.870 MHz in southern California. I have a Globe King 500 that I love, with an HRO-60. For an antenna I have a great big 80 meter half-wave with open-wire feeder so I can go to pretty much any frequency. In my Jeep I have a TS-50 and a Perth Outbacker for when I drive down to San Diego to see my family. When I'm "on duty" in Los Angeles I listen a good part of the day and try to get on the air when I can.

CQ: Do you get e-mails from other hams wanting to schedule a QSO? Do you ever QSL?

JW: Hundreds of people. I gave up to keep my sanity. I just can't sked people. I monitor 6 meters all the time if the band is open. I scan all the frequencies. I'm often on 20 meters a couple hours in the afternoon if I'm not on the road—14.250, something like that. But I don't often QSL. Every once in a while I'll get them out and get caught up.

CQ: A rumor has been running around the internet about a "rock star" buying up boatanchors on eBay and driving prices through the roof; a $4000 Hallicrafters SX-88 comes to mind. How do you respond to that?

JW: I'm aware of a lot of grumbling about my bidding [on eBay]. But in fact, I get out bid regularly, so the people who didn't try because I was bidding wouldn't have won the bid anyway. I will occasionally place a "stupid bid" to keep something in the country, but I think in general ham radio operators are grumpy old farts and should mind their own business [he laughs]. I don't think I single-handedly have driven up prices on eBay. I think eBay has peaked, but then again I think the economy has peaked. If I had found an SX-88 for less, I'd have paid less. But I don't think it will ever be worth less. It's pretty impressive to operate.

CQ: Do you think you're of the last generation to appreciate the old tube gear of the past?

JW: Yeah, I think we're the last generation. I think the tradition is going, with no-code and all. It's a shame, but I think [appreciation for the old gear] is going to die out. Technology is just progressing too damn fast. [In the future] I think we'll probably work the world with an HT via an uplink to a satellite. Cell phones will be the size of wristwatches. But it's hard to say. Technology is growing so fast it scares me. It's going faster than people had planned for.

CQ: One final question that I'm sure is on a lot of folks' minds. Is there another Eagles album somewhere out on the horizon?

JW: We're working on it right now. We're in the studio. It's going to be out early in 2003, and it's going to be good. So yes, there is another Eagles studio album in the works. We've completed enough of it so that I can say that.

Postscript

In April 2002 Joe invited me to his home in Los Angeles for a photo session with him and his radios. Nestled on a winding tree-lined lane on the hillside just above Studio City, Joe's house is a delight for anyone with an interest in classic radios of the tube era. "I threw out all the furniture to make room for more radios," he commented during one phone conversation.

Oh, yes, Joe does a little bit of music in addition to ham radio! Here he is in his basement recording studio with his home-assembled Synthesis Technology 28-module analog synthesizer system.

Outside of a crowded sofa, a grand piano, and a cluttered coffee table, he is entirely correct. A Collins 300-J broadcast transmitter looms 7 feet high at the far end of the living room adjacent to the fireplace and can hardly be missed when walking in the front door. Below that, a giant L-shaped table is arranged with multiple active operating positions, each with a sweeping view through tall arched windows of the ornate backyard pool and the suburban LA vista below. Amid guitars and amplifiers, still sporting yellow post-it notes marked "Joe," fresh from the studio, sat boxes of unopened radio goodies and just-delivered ham gear covered in bubble-wrap waiting a turn on the bench.

Around the house abound a myriad of memorabilia and awards from Joe's stellar music career: the platinum plaques for *Hotel California* and *When Hell Freezes Over*; keyboards, amplifiers, synthesizers, and guitars; props from record-album photo sessions from Joe's earliest days up to his "Ordinary Average Guy" solo release of the early 1990s; his trademark Uncle Sam top hat beside a KWM-1 high atop a bookcase; a personal photo of Ringo Starr. However, it's almost as if music is secondary to the radios. Even downstairs in and around the recording studio there are far more radios than audio processors and effects boxes, and it's clear that music is what Joe does, but indeed radio is what Joe loves.

As we moved around the house finding different backgrounds, we approached a large workbench with parts cabinets and bins stuffed with components, soldering irons, and assorted radio parts; it occupies most of the dining room. "That's not a dining room; it's a shop," Joe quipped. "Surely you have a dining table in your shop, don't you?"

We relocated the shoot from the main radio room into his library, where the Gold Dust Twins are set up on a desk beneath a beautiful light-up, round-emblem Collins sign. Joe struggled with a power cord for a while under the desk, moving gear and rearranging, trying to get the sign to light up. Finally the aging fluorescent bulb inside the massive circular chrome frame flickered to life, and Joe sat down beside the immaculate Collins twins. As he donned a pair of vintage headphones and tapped Morse code on a bright-red straight key, it was obvious that at the controls of a radio, Joe Walsh was no longer the legendary rock star, but in fact just an ordinary, average ham. ■

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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.

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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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Creating the DXLab Suite

A Free, Interoperating Array of Applications for the DXer

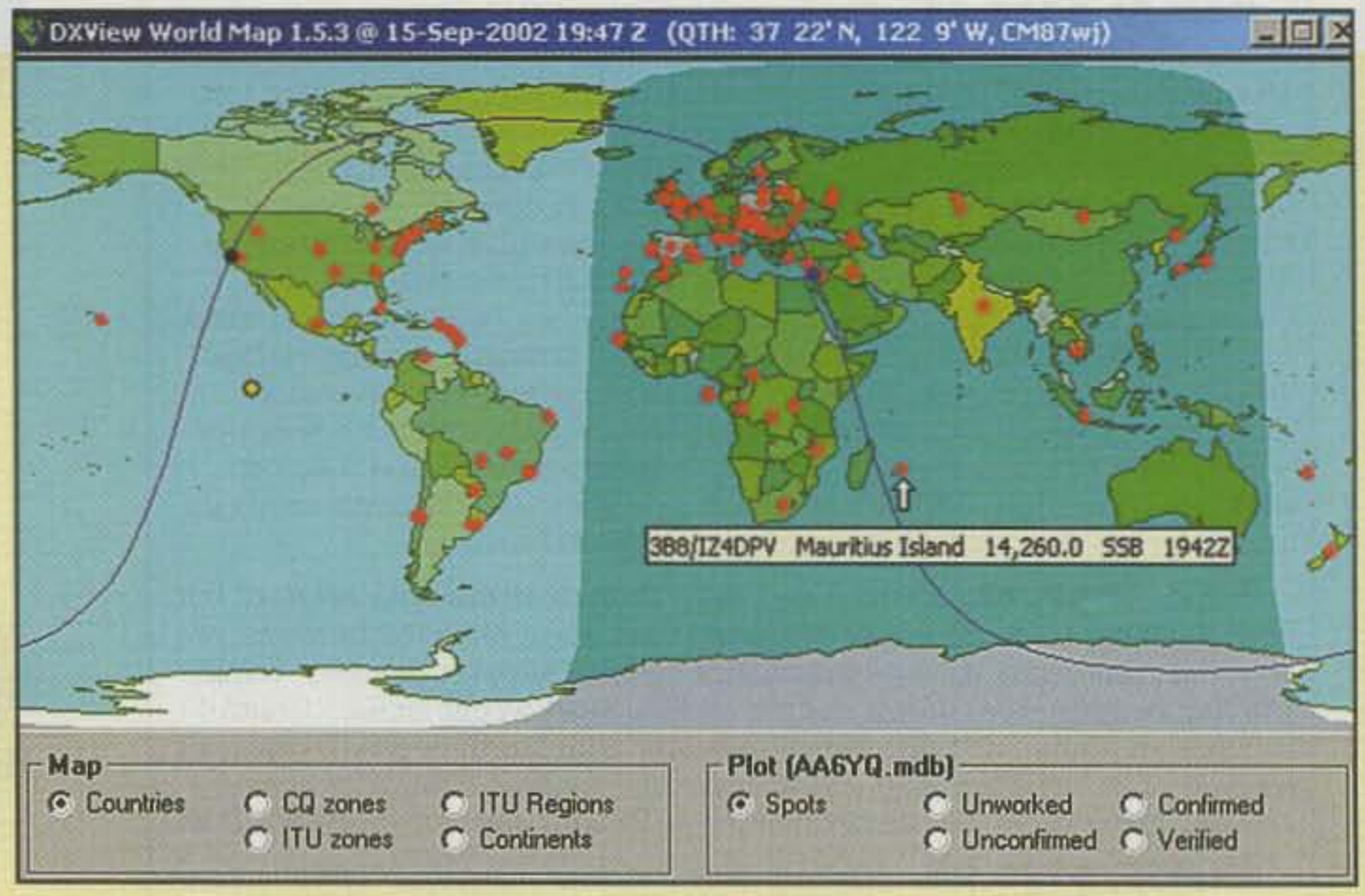
BY DAVE BERNSTEIN,* AA6YQ

If you're interested in DXing and believe that better software would improve your performance and enjoyment, then I'd like to introduce you to the *DXLab Suite* of free, interoperating applications and the collaborative process that is driving it forward. While I've been designing digital hardware and software since the late 1960s, I didn't get my ham license until 1990. At that point, two things happened in very quick succession: I caught the DXing bug, and I began writing software in support of my radio activities. What started as a simple PacketCluster monitor grew over the years to include ICOM transceiver control, logging, award tracking, QSL card printing, beam-heading computation and rotator control, propagation forecasting, and QSL-route searching.

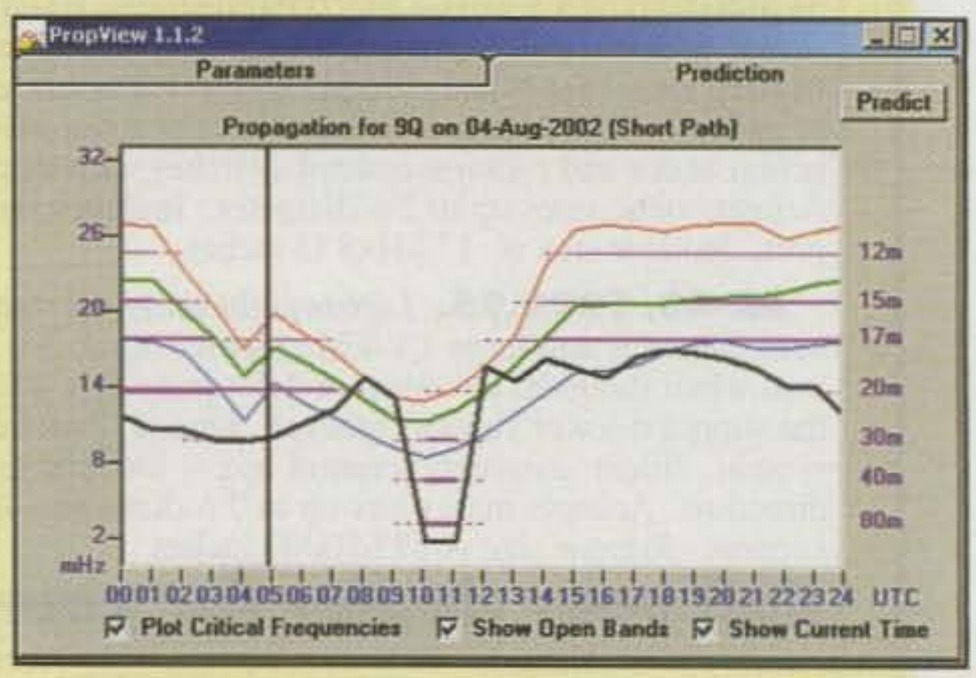
This functional conglomeration, which I called *DXLab,* was a very effective DXing accomplice. I could analyze the operating habits of DX stations I was chasing, correlate those habits to both primary and secondary band openings from my QTH, and QSY to a spotted DX station's frequency in one mouse-click, getting the needed QSO crucial seconds before the spot-chasing hoards arrived.

There were two significant problems, however. While placing all of these functions in one program made it easy to "integrate" these separate, but related task—i.e., click on a DX spot plotted on the world map and QSY the transceiver to the appropriate frequency and mode—the time required to build and test the program after adding a new feature was becoming problematic. Furthermore, the program was far too complicated for anyone else to install, much less understand or use. Visitors to my shack would marvel at DXLab's capabilities, but evolving this monolith into something usable by anyone but its author seemed impossible.

Early in 1999, Tony Gargano, N2SS, posted a message on an ICOM reflector asking for help in getting his IC-781

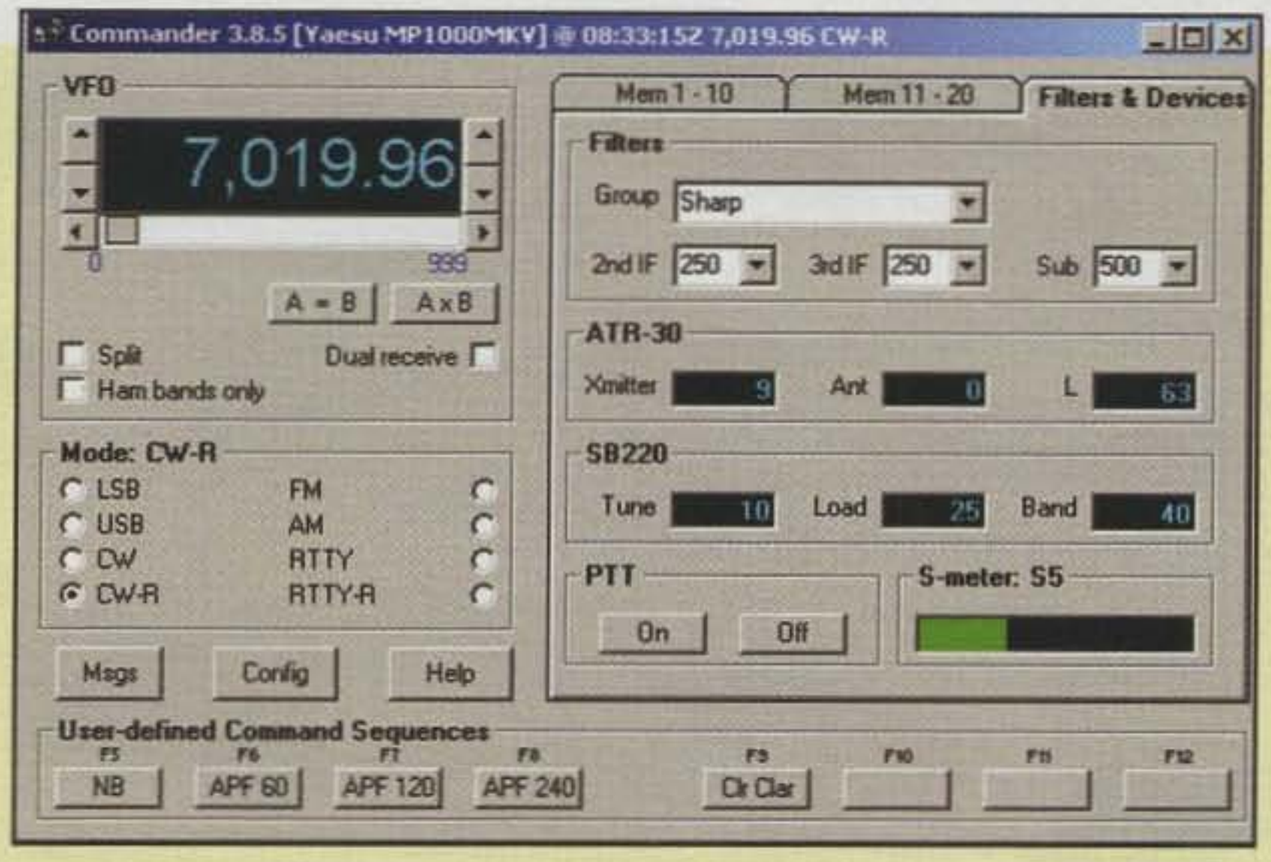


DXView's World Map (solar position is the yellow dot, nighttime area is shaded, beam heading is the blue line).



A PropView forecast showing the best times for selected bands and vice versa. →

e-mail: <dhb@attbi.com>



Commander's control window. This piece of the DXLab Suite provides computer control of properly equipped radios.

transceiver to interoperate with his PW-1 amplifier. In ICOM's design the PW-1 determines the transmitter's frequency by monitoring commands sent on the CI-V bus; this bus was originally designed to permit multiple radios to transceive in a master-slave relationship and then was extended to support Personal Computer (PC) control. Tony's 781 and PW-1 just weren't communicating, and it wasn't obvious why. It occurred to me that I could quickly assemble a CI-V bus monitor by using "parts" from DXLab's transceiver control function.

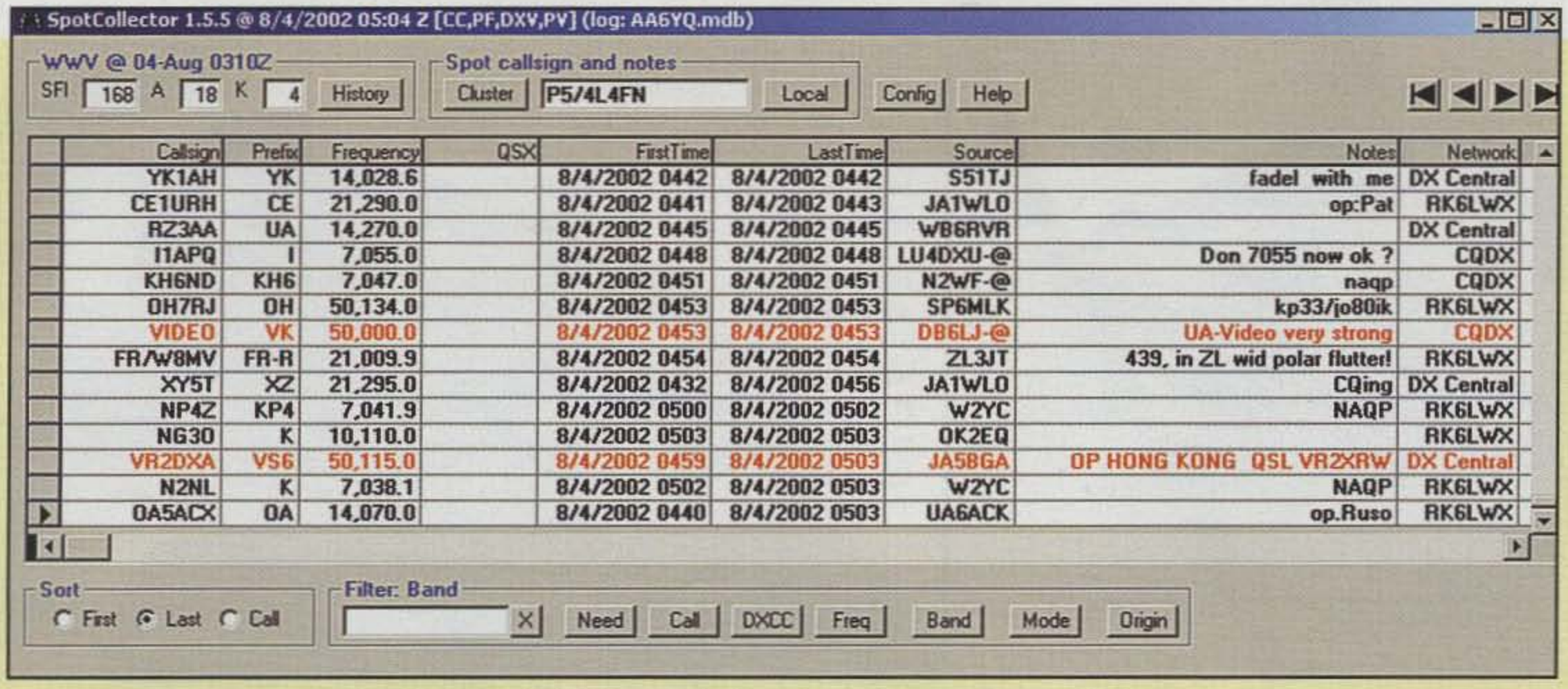
The notion of organizing software into components that can easily be re-used from one application to another is one of modern software engineering's holy grails; this was a trivial example. The result was a standalone application I called *CI-V Explorer*. It enabled Tony to find the blown fuse in his 781 that prevented the PW-1 from responding to his transceiver's CI-V messages, and it taught me the basics of packaging an application for installation by amateurs.

I made CI-V Explorer available for downloading from my personal website. Not many hams want to watch CI-V messages flow between their PC and transceiver, even if they have the choice of doing so in decimal or hexadecimal. Nonetheless, the primitive search engines of that era made CI-V Explorer visible to a few diehards, and their appreciation and encouragement was nearly as addictive as DXing.

Not too long thereafter, the continuous "What's the QSL route for X?" messages on the various DXing reflectors and newsgroups led me to extract more code from DXLab and create a specialized web browser called *Pathfinder*. There were plenty of websites with QSL information: Buckmaster, QRZ, RW1QM, OZ1C, K4UTE, etc. While it was easy to add these to your browser's Favorites, navigating to each and then re-entering the callsign was painful and time-consuming. There were also an increasing number of online callbooks for various DXCC entities; in all, I located more than 100 different web-accessible sources of QSL information.

Pathfinder lets you enter a callsign just once; it determines the DXCC entity for the callsign and gives you a button to click that searches the appropriate online callbook for that entity. Twelve additional buttons can be associated with your favorite online QSL sources, allowing rapid searching of the web, and more recently the *Radio Amateur's Callbook* CDROM.

Around this time I was fortunate to meet Fab Sartoni, IK4VYX, the author of DXTelnet. Fab helped refine my understanding of packaging software for web distribution, resulting in the beta release of Pathfinder 1.0 in August of 1999 to a group of 20 or so beta testers. I was also fortunate to discover the <http://www.qsl.net> site hosted by Al Waller, K3TKJ, who graciously provided a website from which Pathfinder could be distributed. Without Al's sup-



Callsign	Prefix	Frequency	QSX	FirstTime	LastTime	Source	Notes	Network
YK1AH	YK	14,028.6		8/4/2002 0442	8/4/2002 0442	S51TJ	fadel with me	DX Central
CE1URH	CE	21,290.0		8/4/2002 0441	8/4/2002 0443	JA1WLO	op:Pat	RK6LWX
RZ3AA	UA	14,270.0		8/4/2002 0445	8/4/2002 0445	WB6RVR		DX Central
I1APQ	I	7,055.0		8/4/2002 0448	8/4/2002 0448	LU4DXU-@	Don 7055 now ok ?	CQDX
KH6ND	KH6	7,047.0		8/4/2002 0451	8/4/2002 0451	N2WF-@	naqp	CQDX
OH7RJ	OH	50,134.0		8/4/2002 0453	8/4/2002 0453	SP6MLK	kp33/jo80ik	RK6LWX
VIDEO	VK	50,000.0		8/4/2002 0453	8/4/2002 0453	DB6LJ-@	UA-Video very strong	CQDX
FR/W8MV	FR-R	21,009.9		8/4/2002 0454	8/4/2002 0454	ZL3JT	439, in ZL wid polar flutter!	RK6LWX
XY5T	XZ	21,295.0		8/4/2002 0432	8/4/2002 0456	JA1WLO	CQing	DX Central
NP4Z	KP4	7,041.9		8/4/2002 0500	8/4/2002 0502	W2YC	NAQP	RK6LWX
NG3O	K	10,110.0		8/4/2002 0503	8/4/2002 0503	OK2EQ		RK6LWX
VR2DXA	VS6	50,115.0		8/4/2002 0459	8/4/2002 0503	JA5BGA	OP HONG KONG QSL VR2XRW	DX Central
N2NL	K	7,038.1		8/4/2002 0502	8/4/2002 0503	W2YC	NAQP	RK6LWX
OA5ACX	OA	14,070.0		8/4/2002 0440	8/4/2002 0503	UA6ACK	op.Ruso	RK6LWX

SpotCollector's database window shows the most recent DX spots.

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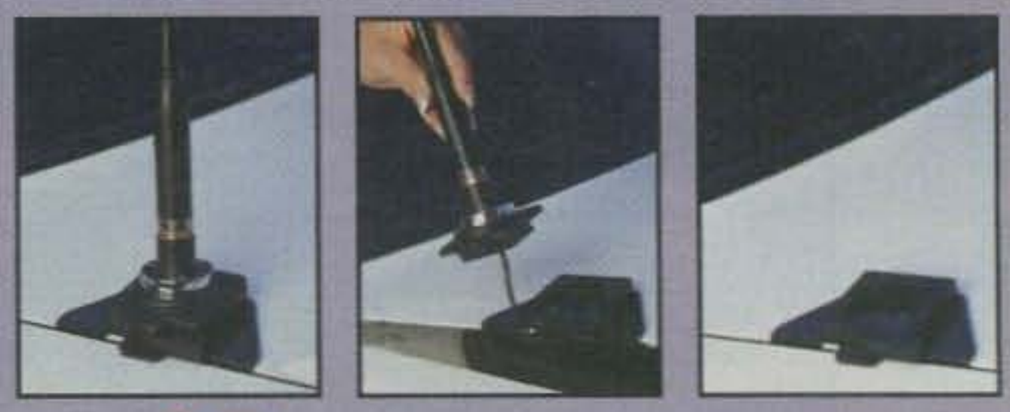

COMET CQ-5M Low-profile, "quick-disconnect" trunk lip mount. For quick storage, or theft prevention, the antenna and connector are disengaged from the mount base with the release of a lever. Offset washers provide up to 17 deg vertical antenna adjustment. Includes 16'9" of deluxe cable, 18" of mini RG-188A/U style coax for easy entry thru the weather seal. Gold-plated SO-239/PL-259 conns.

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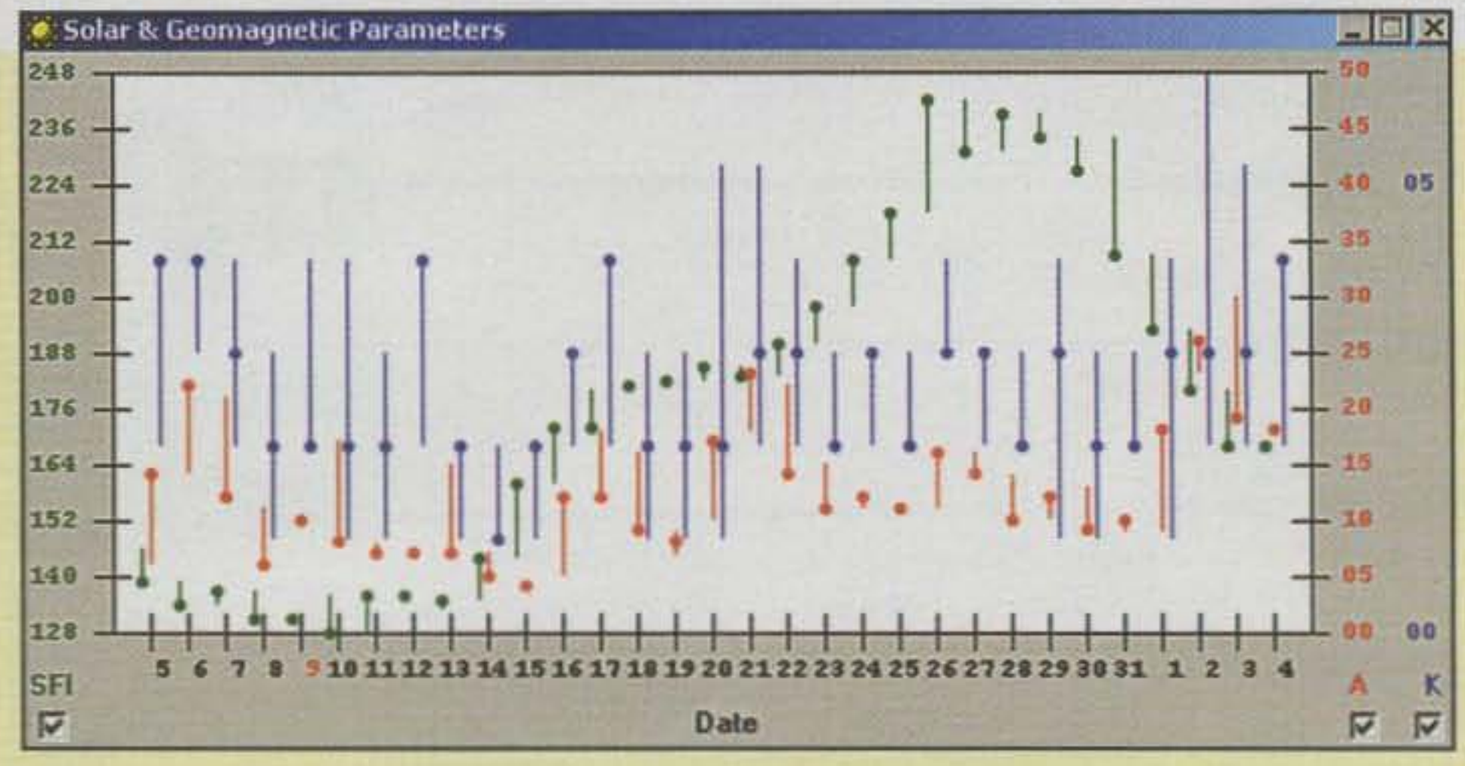


SpotCollector's solar history window lets you keep track of sunspot numbers and the A- and K-indices of ionospheric activity over a period of time.

port, neither Pathfinder nor any subsequent DXLab application would have ever seen the light of day.

Chasing down QSL information is a lot more interesting than watching CI-V messages go by, and lots of hams responded to my post seeking beta testers. No offense to the team, but I was not selective in assembling this group; anyone who volunteered and had a reasonable PC running Windows® 9X or NT was accepted. While this might seem foolhardy, it was extraordinarily effective; the broad range of skills, backgrounds, and expectations forced me to optimize Pathfinder for ease of installation and ease of use.

The term *intuitive user interface* graces the data sheets of most modern software applications, but I evolved a specific definition for this phrase: Most hams should be able to use Pathfinder by simply running it, with little or no reference to any online documentation. While there are many aspects of this approach, two stand out: There are *no menus*, but there are *meaningful tooltips* for every control.

Unless you are building a word processor, Microsoft's standard *File Edit View Insert Format Tools Window Help* menu structure is a poor match for most amateur radio applications. One must either shoehorn ham commands into this structure, or invent a new structure; either way, users are left to grope through the maze, hoping to remember how to change the RTTY baud rate to 50 before the pile-up arrives. To avoid this, all capabilities are directly accessible via command buttons, check boxes, sliders, grids, and other visual controls.

Tooltips is Microsoft's name for a conveniently accessible documentation mechanism: Let the mouse cursor hover momentarily over a control, and text describing the control's function pops up. Every control of every DXLab application should have a meaningful tooltip; yes, tooltips can be disabled en masse once you become familiar with an application. If the required controls can't fit in a window of reasonable size or would result in too complex a panel, tabbed dialog boxes let the user choose from a small, obvious set of activities—i.e., DXKeeper's Log QSOs, QSL, Check Progress, my QTHs, Import, and Export tabs.

After a rocky start, I established the infrastructure required to track incoming defect reports and enhancements. I created web pages for each of these so that the user community could see what was going on and comment or critique as they deemed appropriate. These mechanisms are still in use. You can visit Pathfinder's version history, defect log, and enhancement log online at <http://www.qsl.net/pathfinder>. Most interaction was accomplished with e-mail messages, typically copying everyone who was working with the application.

Pathfinder proved that I could extract a function from DXLab and make it broadly available, but the next advance came from an entirely different direction. Peter Martinez, G3PLX, had developed the PSK31 protocol; he had also developed PSK31SBW, a Windows® application that, together with a soundcard, performed PSK31 modulation and demodulation. I was excited by the potential of this new mode and began thinking about how to add support for it to DXLab, with appropriate interaction with the transceiver control and logging functions.

Peter and I discussed the creation of a PSK engine with programmatic inter-

faces that could be used by many different applications; such interfaces would allow me to add PSK support to DXLab without re-inventing the DSP wheels required for modulation, demodulation, and soundcard interfacing. When I discovered that Moe Wheatley, AE4JY, had constructed such an engine (PSKCORE), I was off to the races.

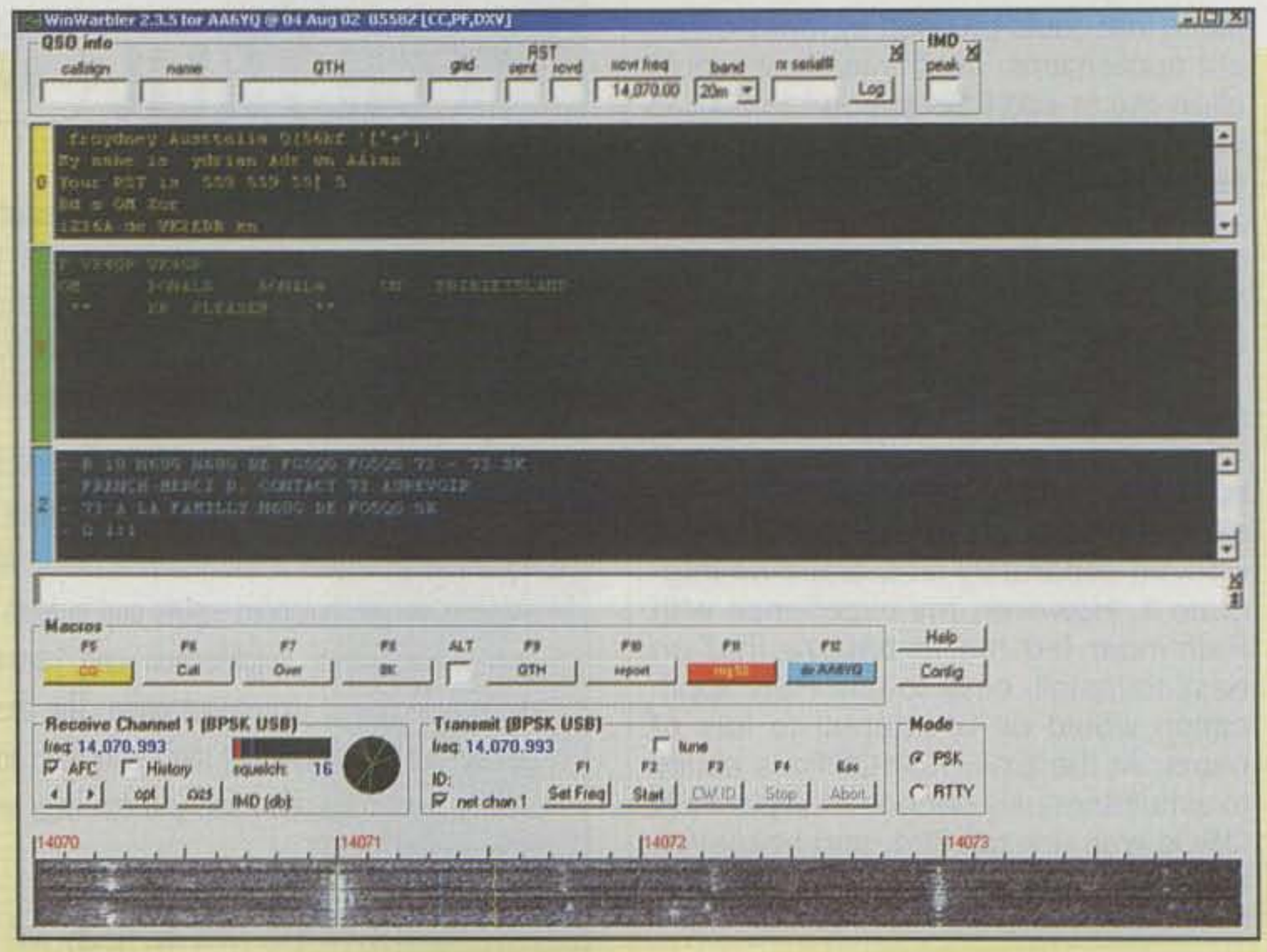
At first, my rationale for building a standalone PSK implementation using PSKCORE was simple: The process of building it inside DXLab would be too slow and cumbersome; better to get it working separately first, and then integrate it. However, my experience with Pathfinder led me to believe that an easy-to-install, easy-to-use PSK application would be of interest to lots of hams. At the time, PSKCORE's ability to simultaneously decode multiple PSK QSOs was unexploited, and I believed that PSK DXers would find this capability particularly useful.

Integration Issues

The fly in the ointment was integration. If I were to construct a standalone PSK application, how would it perform transceiver control? How would it perform logging and award tracking? It might start out as a standalone application, but eventually I'd have to add most of the functions already present in DXLab. The only thing worse than one monster application is two of them! Fortunately, there was another approach: Instead of one big program that does everything but becomes increasingly uninstallable, unusable, and unmaintainable, design a system of individual, specialized applications that detect each other's presence and interoperate automatically.

Microsoft Windows® provides mechanisms that allow applications to communicate by sending messages to each other. There are actually several such mechanisms; I chose one called Dynamic Data Exchange (DDE). Using DDE, a PSK application can obtain the current transceiver frequency from the rig control application, or direct it to QSY the transceiver so that the current signal is centered in the receiver passband. The PSK application can send QSO information to the logging program, and send a received callsign to Pathfinder to find a QSL route. A constellation of applications can do everything that one big monolithic application does, but with several fundamental advantages:

• A user can start with whatever application suits his or her fancy, master it, and then add additional applications in whatever order seems appropriate.



WinWarbler is DXLab's digital communications application. It lets you monitor multiple QSOs simultaneously while operating in either PSK31 or MMTTY.

• Development of individual applications can be more nimble and responsive to user feedback.

• Unique hardware devices—i.e., the transceiver, the antenna rotator, the soundcard—are accessible to multiple "client" applications simultaneously, including applications constructed by other developers.

This revelation led me to a new mission: the construction of a system of interoperating applications that automate DXing activities as did the monolithic DXLab, with no reduction in integration among functions. This system is the *DXLab Suite.* The PSK application became *WinWarbler,* and was later extended with Mako Mori, JE3HHT's *MMTTY* engine to support RTTY with a common user interface for both modes; with an outboard RTTY modem, WinWarbler can decode two RTTY signals simultaneously. *CI-V Explorer* became *Commander,* which provides a common user interface and DDE "server" for Kenwood, Ten-Tec, and Yaesu as well as ICOM radios. *DXView* was assembled to perform callsign lookups into a DXCC database, control the antenna rotator, and plot the resultant information on a world map along with beam headings and the real-time solar terminator position.

As the original DXLab's logging functions were built on an earlier generation of database technology, I chose to build *DXKeeper* from scratch around Microsoft's Jet database engine, the same engine that underlies Microsoft Access; DXKeeper exploits this engine to provide powerful, yet easy-to-use *filtering* of one's log to show some specific set of QSOs—i.e., "all QSOs with VK9NS" or "any QSOs that started within an hour of 23-Jul-2001 @ 1410Z." DXKeeper retained its predecessor's ability to track award progress, identify the QSOs for which QSLs were required, and generate the necessary QSL cards or labels; it supports multiple logs, multiple callsigns, and operation from multiple QTHs.

SpotCollector similarly exploits the Jet engine to create and maintain a local database containing merged DX spots and solar/geomagnetic parameters from a local PacketCluster, from up to four TelnetClusters, and from the DX Summit internet cluster; real-time analysis and filtering of this information provides the modern DXer with critical information in a form that facilitates rapid action—i.e., "show me all spots within 5 kHz of the transceiver's frequency."

PropView's forecasting functionality was extracted from the original DXLab, but its ability to assess actual propagation by monitoring the NCDXF/IARU High Frequency Beacon Network—directing Commander and DXView to QSY the transceiver and rotate the antenna to track a specified set of beacons—is a recent addition that illus-

trates the power of interoperation among an array of applications like the DXLab Suite. Detailed descriptions and comprehensive online help for each of the above applications are available via <www.qsl.net/dxlab>.

As each of these constituent applications came to life, Al, K3TKJ, provided a website to support its distribution, management, and online documentation. I recruited early adopters from the reflectors, accepting feedback and critique from anyone willing to offer it. To facilitate rapid response to this feedback, I employed iterative development, a style of software engineering characterized by frequent *development releases.* Every few months a stable development release is used to create a *full release* containing all software and documentation components.

To facilitate rapid evaluation, development releases are lightweight, containing only those components that have changed since the most recent full release. Users installing a DXLab application on a PC for the first time must first install the most recent full release. After installing a full release, one can obtain all subsequent defect repairs and feature additions by upgrading to the most recent development release. Instructions for downloading, installing, and upgrading with a matrix of available full releases and development releases are always available via <http://www.qsl.net/dxlab/download.htm>.

Since these applications interoperated, there was considerable overlap among their initial user communities. In a step that radically improved communication, Rich Drake, W3ZJ, created the DXLab e-mail reflector at <http://groups.yahoo.com/group/dxlab>, providing a common forum that anyone can join. This reflector has become the primary means by which DXLab development moves forward—suggestions are refined, alternatives are considered, and releases are critiqued. The result is a powerful flow of ideas whose implementation benefits all participants. Acknowledging the contributions made by reflector members to date would double the length of this article, and yet we've barely scratched the surface of what can be done with these technologies.

Want to try one or more of these freeware programs? Just visit <http://www.qsl.net/dxlab/download.htm>, select the application that suits your fancy, download it, and start having fun! While these applications are free, users are encouraged to contribute questions, comments, and suggestions via the DXLab reflector; to join visit <http://www.qsl.net/dxlab/reflector.htm>. ■

This article describes an inexpensive 4-wire, 3-element switchable parasitic array for 40 meters exhibiting 7.7 dBi forward gain and a 23 dB front-to-back ratio. It is a derivative of the 5-wire switchable Yagi, but eliminates the center reflector by causing the driven elements to act as reflectors for each other.

The W1ZY 4-3-2 Array

A 4-wire, 3-element, 2-Direction Switchable Parasitic Array for 40 Meters

BY WILLIAM K. DESJARDINS,* W1ZY

Switchable parasitic arrays have been part of the amateur radio antenna "recipe book" for many years, providing some directivity for hams who can't or don't want to install rotatable Yagis, especially for the low bands. The most common arrangement is a 5-element switchable parasitic array, which is essentially two 3-element Yagis placed back to back sharing a common reflector (fig. 1). By feeding either driven element, the directivity of the array is reversed 180 degrees. The array's forward gain is mostly derived from the mutual coupling between the driven element and the director. The feed impedance is mostly derived by similar coupling between the driven element and reflector. Dormant elements lying behind the reflector do not adversely affect performance, as indicated in fig. 2.

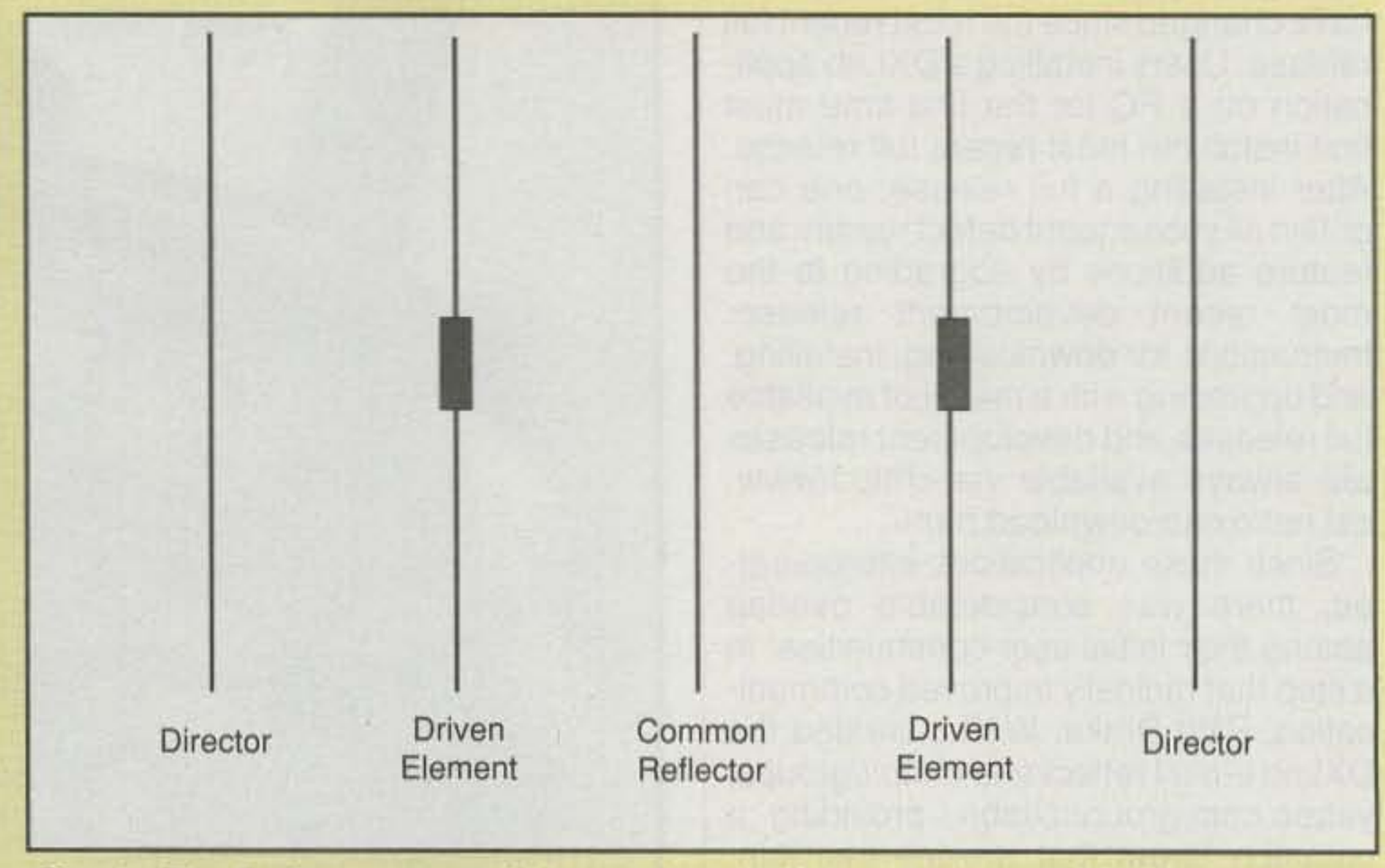


Fig. 1– The 5-element parasitic array is actually two 3-element Yagis which share a common reflector.

Further analysis reveals that in either beam heading, two of the five elements do not contribute to the array's performance. Their sole function is to reverse the array's directivity. Therefore, 50% of the boom length does not contribute to overall forward gain or front-to-back (F/B) ratio. On 40 meters, a 5-element switchable Yagi requires a 72 foot boom, of which only 36 feet and three of the elements are employed at any given time.

The 4-Element Design

In the 4-element design (fig. 3), the center reflector is eliminated. The two driven elements are then pushed together, reducing boom length by 20% and dropping the number of elements from five to four. Of these four elements, three actively contribute to the array's directivity at all times. These qualities represent more efficient use of boom length and elements, and reduce the physical space occupied by the array.

How does the 4-element array compare to its larger, 5-element cousin? Fig. 4 compares the two and shows that there is essentially no difference in performance between the two arrays. In fact, you have to look very closely to see any difference at all—a slight variation in the rear lobe. Computer modeling by L. B. Cebik, W4RNL, renders a 7.7 dBi forward gain and 23 dB front-to-back ratio for both designs. This performance approaches that of a conventional 3-element Yagi, thus further indicating that the dormant elements have no detrimental effect (see fig. 2).

Non-Resonant Driven Elements

In the 4-element array, the remote switching relay designates the roles played by the two driven elements (hereafter referred to as dipoles). The relay gangs the dipoles together, causing one to act as a reflector when the other is directly driven. When the relay is actuated, the dipoles switch roles. The dipole that had been acting as a

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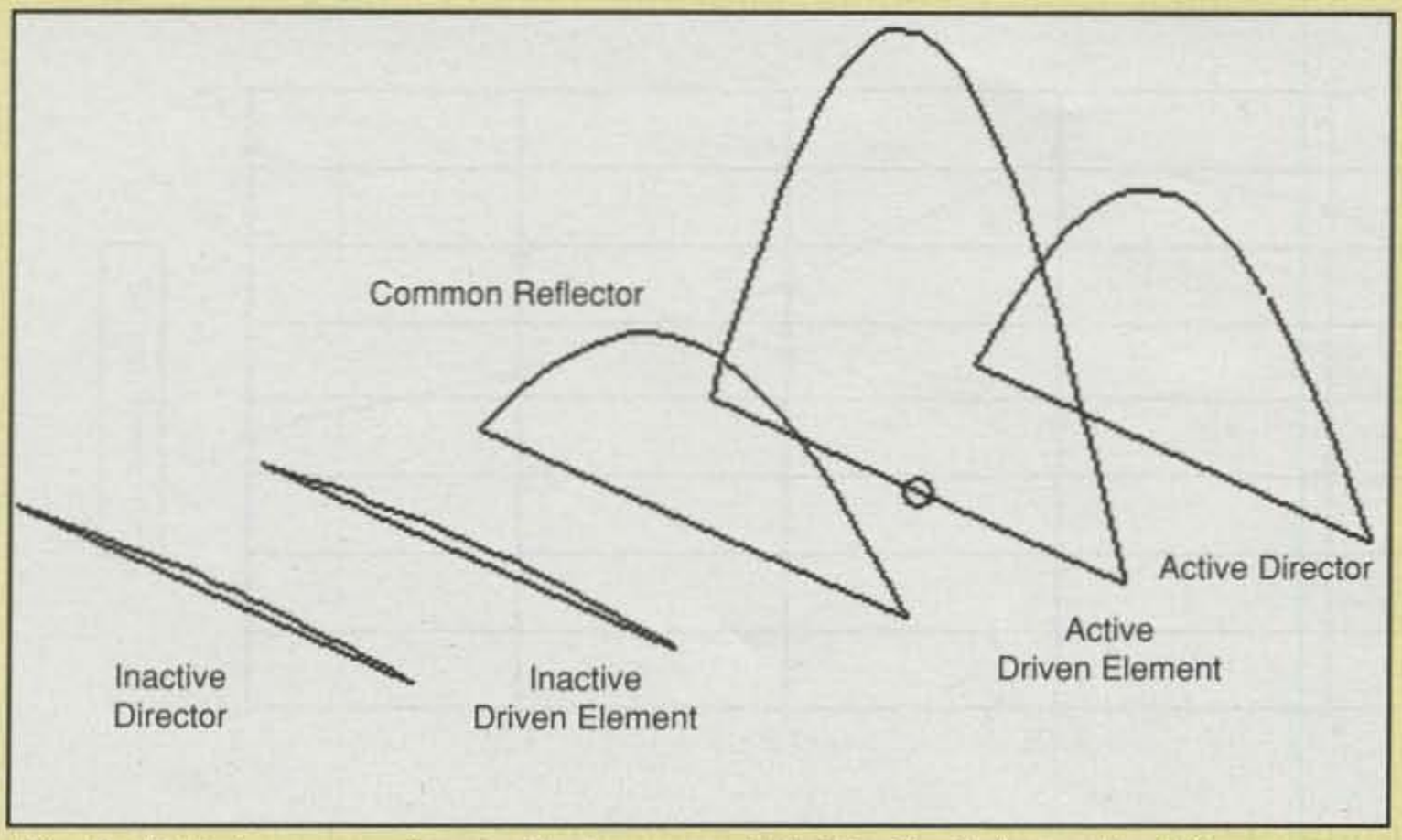

Fig. 2– Relative current magnitudes on switchable Yagi elements. (Figure courtesy W4RNL)

reflector is now directly driven, thus enslaving the other dipole to act as its reflector. This role reversal changes the directivity of the array by 180 degrees. In order for this to work, both dipoles must be cut as reflectors *(typically about 4% longer than a standard driven element.—ed.)*. At first glance, this appears highly unorthodox. Nevertheless, it works.

Driven elements in parasitic arrays do not have to resonate on the excitation frequency. A non-resonant driven element does not significantly alter mutual coupling with parasitic elements. However, a reactive component is introduced within the feedpoint impedance. As indicated in fig. 5, this reactive component starts at zero below the 40 meter band and then creeps up with frequency. The increase is nearly linear and purely inductive. The feedpoint resistance is 35 ohms at 7.15 MHz and drops to 25 ohms at the top of the band. As a result, the 4-element design must be tuned through an antenna tuner or transmatch—as is also the case with the 5-element design.

Remote Switching Relay

Each dipole is center fed with a 3/4-wavelength section of coax terminating at the remote switching relay. A third length of coax is then run from the relay back to the operating position. The shields and center conductors of the two 3/4-wavelength sections are connected to separate poles of the DPDT relay. The two wiper arm terminals are connected to the shield and center conductor of the coaxial run back to the shack. Fig. 6 illustrates the wiring diagram for the remote switching relay.

This configuration enables the remote switching relay to select which dipole is directly connected to the transmitter. At the same time, it forces a high impedance (open circuit) across the end of the 3/4-wavelength section of coax leading to the unfed dipole. This induces an RF electrical short across the center of the unused dipole, thus causing it to act as a reflector. When the relay is actuated, the dipoles reverse roles.

RF Transmission-Line Impedance

An RF transmission line exhibits interesting properties critical to this array. These properties manifest themselves as impedance variations distributed along the RF transmission line. Since these qualities are found at the heart of the 4-wire array, they deserve brief explanation.

P = EI: The power (P) of an RF signal is measured by multiplying its voltage (E) by its current (I). For a fixed amount of power, the voltage and current are inversely proportional. For example, a 100 watt RF signal can be composed of 100 volts at 1 amp or 1 volt at 100 amps. The higher the volt-

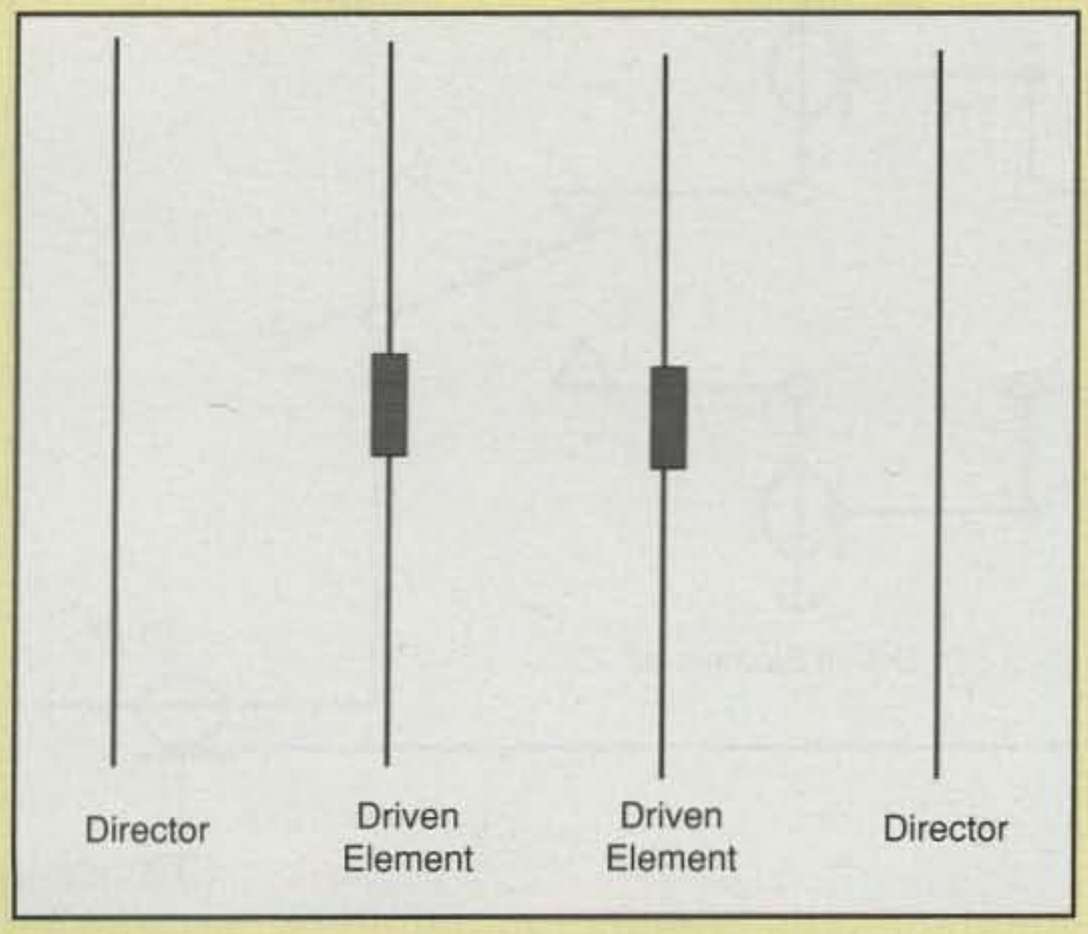

Fig. 3– In the 4-element design the reflector is eliminated and whichever driven element is not in use acts as the reflector. (See text for details.)

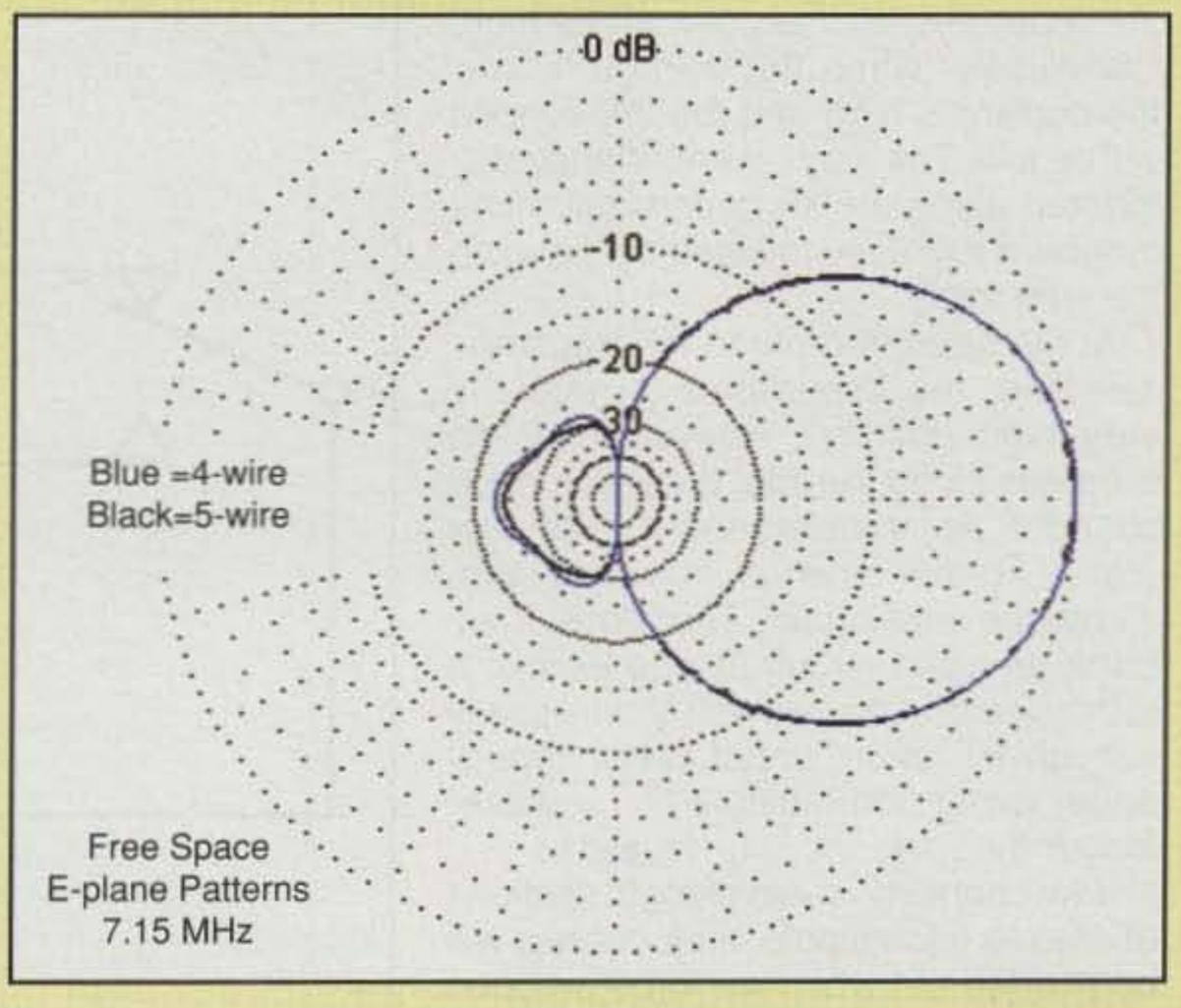

Fig. 4– Comparative analysis of the 5-element and 4-element arrays. The difference in their radiation patterns is minimal. (Figure courtesy W4RNL)

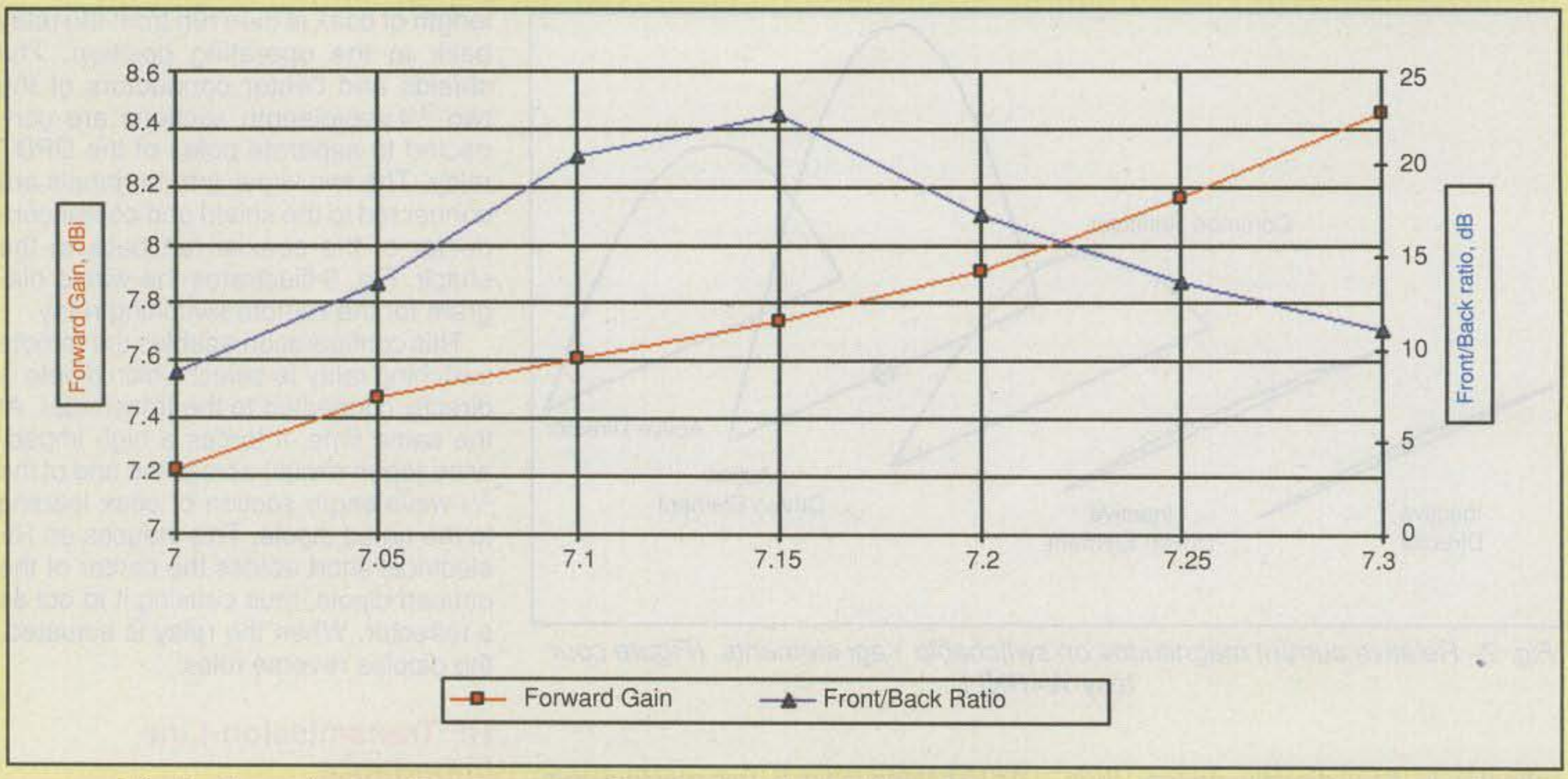

Fig. 5– Four-element 40-meter array: free-space gain and front-to-back ratio. (Figure courtesy W4RNL)

age, the lower the current for a fixed amount of power. Conversely, the lower the voltage, the higher the current. Voltage and current components maintain this relationship because when multiplied together they must equal the same number (RF power).

Z = E/I: As a result of the relationship between current and voltage, the impedance (Z) distributed along an RF transmission line varies in accordance with the interplay between the voltage and current components. When the voltage is high and the current is low, the impedance at that point will be high. Conversely, when the voltage is low, the current is high and the impedance will be low. The varying impedance distributed along an RF transmission line creates a tool used to electrically switch the wire array.

At the open end of the RF transmission line, the impedance is naturally very high (infinity). However, as we progress along the line, the impedance changes. At 1/4 wavelength it is very low (zero). Further down at 3/4 wavelength, it crosses zero again. Therefore, if we force an open circuit at one end of a transmission line, we will theoretically see an RF short circuit (zero impedance) every odd-multiple of 1/4 wavelength (i.e., 1/4, 3/4, 5/4, 7/4, etc.).

If we connect 1/4-wavelength sections of coax to each dipole, their centers will be shorted out when we force an open circuit at the other end. This is exactly what the remote switching relay does. When it connects one dipole to the trans-

Element	Length (wl)	Boom Length (wl)	Inter-Element Spacing (wl)
Director 1	0.464	0	
Driver/Reflector	0.502	0.174	0.174
Reflector/Driver	0.502	0.325	0.151
Director 2	0.464	0.499	0.174

Table I– Dimensions and element spacing for 4-element array as derived from 40 meter model. (Data courtesy W4RNL)

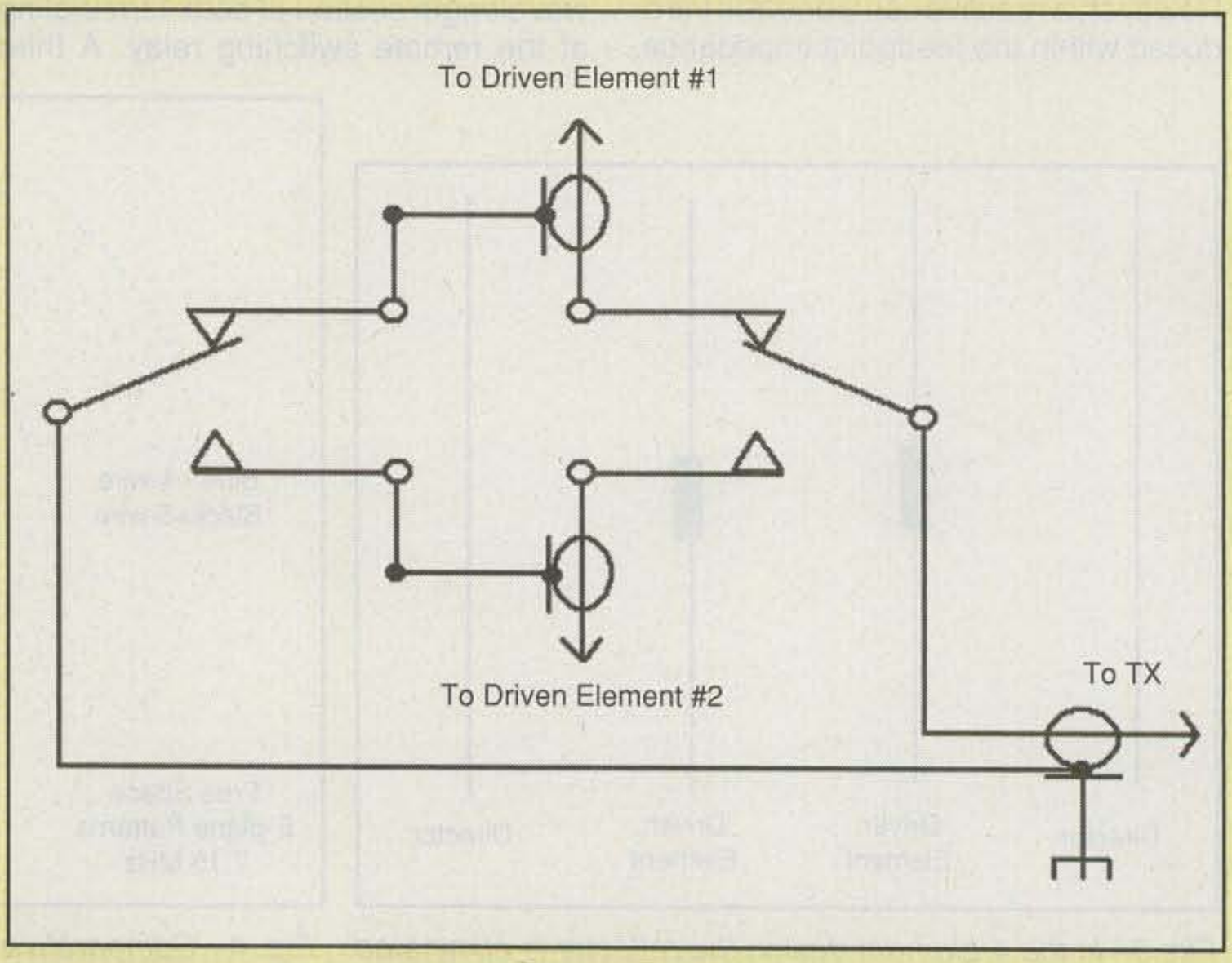

Fig. 6– Schematic of remote switching relay. Note: Coaxial shields are not commonly grounded. Each floats on its respective terminal.

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A gear driven turns counter and crank knob gives you precise inductance control.

Two 500 pf Tuning Capacitors

Two 500 pf -- *the highest of any antenna tuner* -- variable transmitting capacitors give you no-arc wide range impedance matching for true high power performance.

6:1 vernier reduction drives makes capacitor tuning smooth and easy.

Super Balun, 6 position Antenna Switch

Super heavy duty three core choke balun lets you match virtually any balanced feedline antenna without core saturation.

A 6 position antenna switch lets you select your desired operating antenna.

Read *true* Peak Power

Ameritron's active electronic *true* peak reading meter accurately reads forward and reflected power and SWR *simultaneously* on a lighted Cross-Needle meter.

Roomy Cabinet maintains High-Q

Roomy extra-strong .080 inch thick aluminum cabinet gives highest efficiency and lowest loss. 13¼Wx5⅝Hx17½D inches.

AMERITRON ATR-15 Antenna Tuner

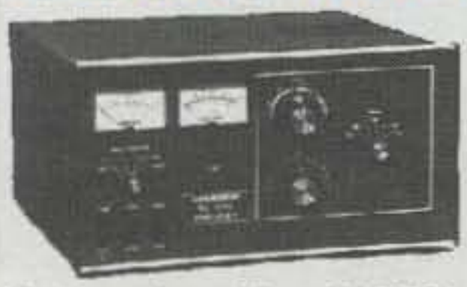
ATR-20, $459. Handles a full 1.2 kW SSB and 600 Watts CW. It's designed to safely handle the full SSB power of Ameritron's AL-811/811H/80B, ALS-500M/600 and other 1.2 kW SSB amplifiers. Compact all metal cabinet.

Ameritron has the best selection of *TrueLegalLimit*™ HF Amplifiers

AMERITRON's legal limit amplifiers use Peter Dahl super heavy duty Hypersil power transformer capable of 2500 Watts!

Ameritron's *most powerful* Amp

with Eimac® 8877 ceramic tube



AL-1500

$2995

Suggested Retail

TrueLegalLimit™

Ameritron's *most powerful* amplifier uses the herculean Eimac® 8877 ceramic tube. It's so powerful that 65 Watts drive gives you the full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 pounds, 18½Dx17Wx10H in.

Ameritron's *toughest* Amp

with Eimac® 3CX1200A7 tube

AL-1200

$2545

Suggested Retail

TrueLegalLimit™

Get ham radio's *toughest* tube with AL-1200. The Eimac® 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 18½Dx17Wx10H in.

Ameritron's *classic* Amp

with 2 graphite plate Amperex® 3-500ZG tubes

AL-82

$2495

Suggested Retail

TrueLegalLimit™

Most linears using 3-500s can't give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential. AL-82 is ham radio's *only* super 3-500 amp! 100 Watts in gives you full power out. All HF bands, all modes. Hefty 76 pounds, 18½Dx17Wx10H inches.

1.5 *plus* kW SSB HF Amp

with 2 Eimac® 3CX800A7 tubes

AL-800H, $2595 suggested retail. Two Eimac® 3CX800A7 tubes produces 1500 *plus* Watts SSB PEP with 55 Watts drive. 52 lbs., 8½Hx16½Dx14¼W in. **AL-800, $1775** suggested retail, single 3CX800A7, 1250 Watts out with 70 Watts drive.

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with four Svetlana® 572B tubes

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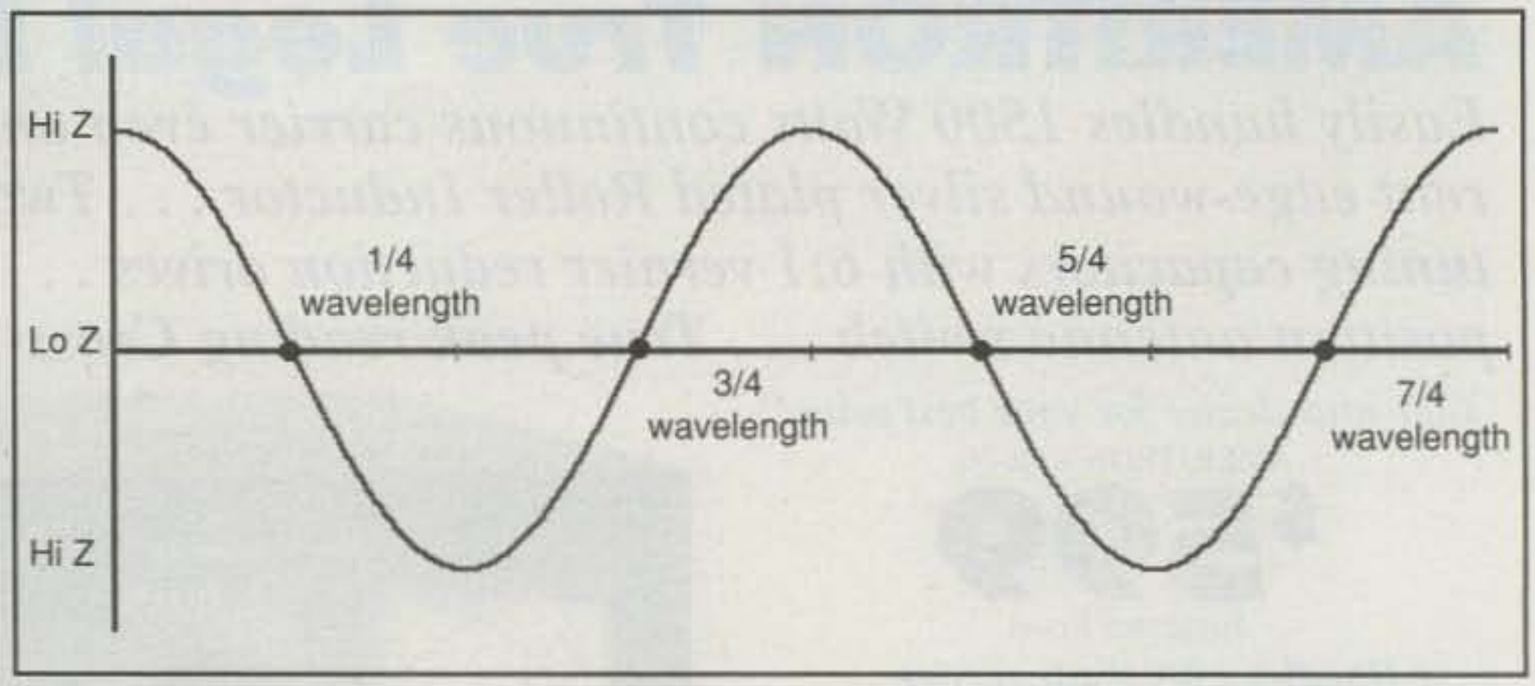


Fig. 7– Impedance distribution along RF transmission line with open circuit forced at one end.

mitter, it automatically forces an open circuit across the end of the coax going to the unfed dipole. This shorts out its center, causing it to act as a reflector. However, 1/4 wavelength is too short to physically span the distance between the dipoles and the remote switching relay. To get around this, we advance to the next point along the RF transmission line where its impedance crosses zero. This occurs at 3/4 wavelength. As a result, we cut each coax section to 3/4 wavelength in order to achieve the same electrical effect as 1/4 wavelength, while still spanning the distance between the dipoles and the relay. *Note:* It is crucial to include the velocity factor when measuring and cutting the 3/4-wavelength coaxial sections.

Side notes: This little trick can be used in other antenna designs. The theory behind it is illustrated in fig. 7. Also, if the formula Z = E/I looks suspiciously like Ohm's Law, R = E/I, that's because the same basic formula is used to calculate both resistance (R) in a DC circuit and impedance (Z) in an antenna system. Remember, both resistance and impedance are measured in ohms.

Construction

The 4-element array requires four supports. In my case, I chose an open space surrounded by maple trees. Four trees forming a rough rectangle were selected and 100 foot nylon ropes were dropped from the top of each tree. Two

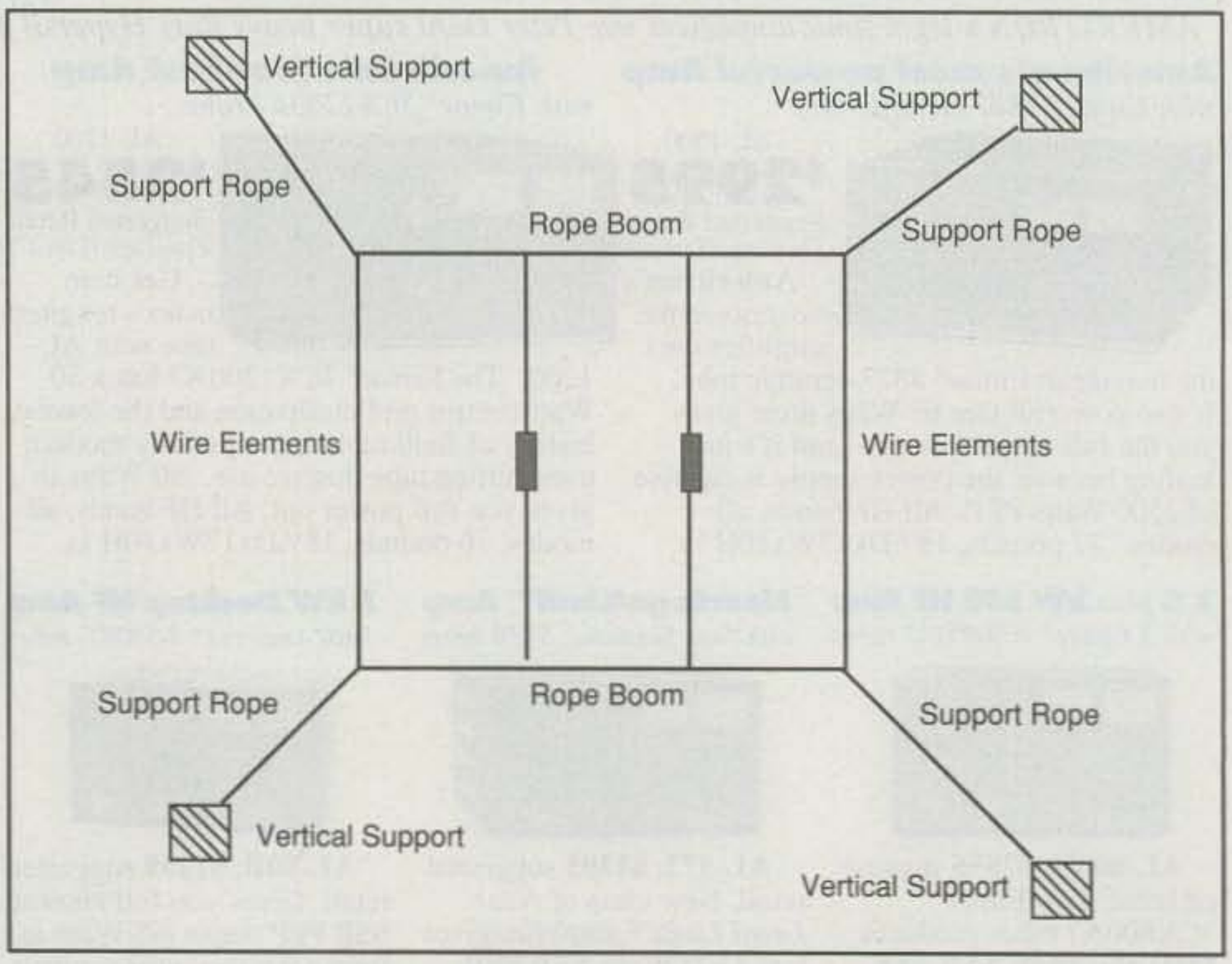


Fig. 8– The 4-element array approximates a perfect square once hoisted into its final position.

additional ropes were cut and run parallel to each other, their ends tied to each of the four ropes coming out of the trees. The four wire elements of the array were then strung between the two parallel ropes. Thus, the four elements were suspended between the two parallel ropes, which in turn were hoisted into the air by the four supporting ropes coming out of the trees.

The hardest part of construction was adjusting the four supporting ropes to square the array. It is crucial that the four wire elements be parallel to each other and lie within the same horizontal plane (see fig. 8). In pursuit of such ends, an assistant and I climbed up and down the four trees many times, letting out slack and tugging the support ropes until the array was squared. It would have been easier to use pulleys at the top of the trees through which the supporting ropes were passed and safely adjusted at ground level. We did not anticipate the amount of adjustment required to square up the array once lofted into the air. In hindsight, I recommend the use of pulleys and counterweights to maintain the esoteric tensions needed to keep the array squared through windstorms and winter icing.

Remote Switching Relay

The remote switching relay was a military-surplus DPDT encased in a metal jacket. Since the wiring diagram was etched on its case, wiring it up was easy. A hose clamp secured the relay to a wooden surveyor's stake, which in turn was driven into the ground beneath the array. Excess coax from the two 3/4-wavelength sections was coiled and affixed to two additional surveyor stakes subsequently driven on opposite sides of the remote switching relay. The main transmission line and DC control cable (zip cord) were bundled and run back to the shack. Two small by-pass capacitors (.01 µF) shunted both ends of the DC control line. Table I contains measurements optimized for 40 meters.

On the Air

Once the array is squared in the air, the fun part begins. In my case, I set the array to favor N/NW and S/SE, wiring the relay to be "off" when pointed in the N/NW position. I also did not remove a dipole I had previously used so as to have some type of reference antenna. After situating yourself at the operating position—hopefully as the sun sets—tune in a DX station located in one of the array's lobes. Watch for reductions in QSB and QRM compared to the reference dipole.

Flip the relay on and off while the DX station is transmitting. You will note a significant drop in its signal strength, as well as a likely rise in QRM. When I performed these tests in New England, many Asian and Pacific DX stations completely disappeared when the array was flipped from N/NW to S/SE (counter-intuitive, perhaps, but showing me that the DX signals were coming over the North Pole). The stateside QRM would also invariably rise. By toggling back and forth you will develop a sense for the characteristics of this array, as well as for propagation itself. It provides an educational experience not possible with a rotary beam. My own tests revealed a front-to-back ratio at times approaching 35 dB. Other times it would be less. On a few occasions when I flipped the antenna, I would hear the DX station, but with an echo—likely indicating long-path propagation. The same fun can be had by others while you are transmitting. Just remember to time out the VOX before switching the relay so as to not destroy it or your rig!

Conclusion

Whatever you discover in your own experiments, I am certain you will find this 4-element array an excellent addition to your antenna farm. It is inexpensive to build and requires less space than the conventional 5-element design. With the pulley system, the array lends itself well to tinkering and modification (stacked arrays?). Perhaps most important, the ability to instantaneously flip directivity 180 degrees adds a new dimension to your continuing exploration of the electromagnetic ether. I am indebted to my colleague L. B. Cebik, W4RNL (www.cebik.com), for modeling the array and lending his expertise, charts, and graphs for use in this article.

Three bands, over 400 computer-programmable memories, and (believe it or not) VOX in a handheld. WB2AMU looks at Kenwood's new 2 meter, 1.35 meter, and 70 centimeter HT, the TH-F6A.

CQ Reviews:

The Kenwood TH-F6A FM Tribander

BY KEN NEUBECK,* WB2AMU

The handie-talkie (HT) market has been very competitive recently, with size and frequency coverage being the main items of focus for potential buyers. No longer is a single-band HT the main staple for the ham into FM. Dual-band and even three-band models are the current trend in this market.

Last year Yaesu came out with its VX-5R, which covers 6 meters, 2 meters, and 440 MHz FM, as well as being a general-coverage receiver. Kenwood has responded with the TH-F6A, a three-band HT that covers 2 meters, 222 MHz, and 440 MHz FM, as well as providing an all-mode general-coverage receiver from 100 kHz to 1300 MHz. Based on what this reviewer has seen, along with comments heard from other hams, Kenwood appears to have a winning design!

Features

The TH-F6A makes use of a multi-function keyboard that resembles a calculator keyboard consisting of several miniature keys, including a function key to access a secondary tier of functions. There is also a joystick control that allows the user to access additional menu features. The keys are a bit small and require careful pressing with your fingers. Overall, the keyboard takes a little getting used to, but you can start using the radio with knowledge of a handful of keystrokes. However, regular use of the radio will require additional reading of the manual.

The TH-F6A has two distinct VFOs and you can switch between them by pressing an A/B mode button. The A VFO is used for FM transmit and receive on the three ham bands—2 meters, 222 MHz, and 440 MHz—while the B VFO is used for receive for all modes between 100 kHz and 1300 MHz. All modes means the following: AM, USB, LSB, CW, FM, narrow-band FM, and wide-band FM.

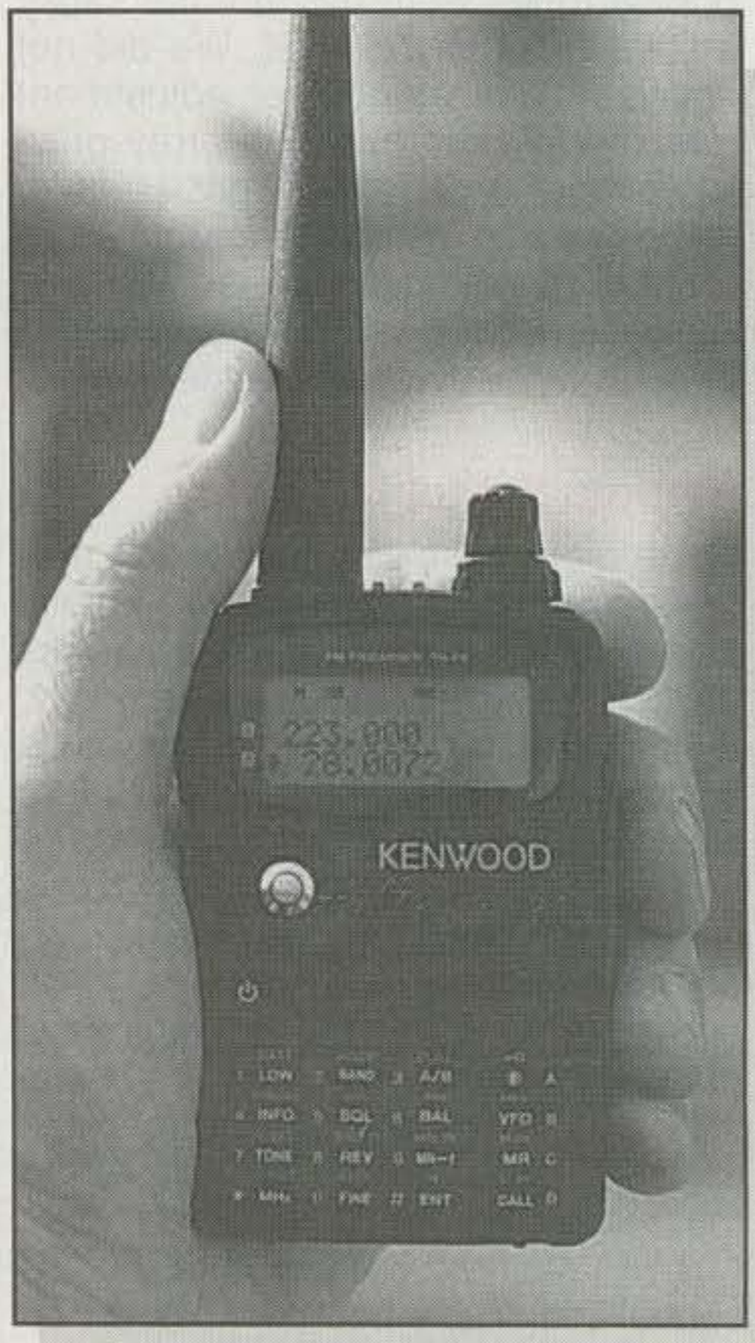
The radio is capable of three different power outputs ranging between 0.05 watts and 5 watts that vary depending on your power source. Using an external 12 volt DC source, the three levels are 0.5, 2, and 5 watts; with the supplied lithium-ion battery you get 0.05, 0.5, and 5 watts; and alkaline batteries using the optional BT-13 case provide power levels of 0.05, 0.3, and 0.5 watts. The full output power is available on all three transmit bands.

An HT with VOX!

Another interesting feature is that the TH-F6A has VOX control. Therefore, if you are not into pushing the transmit button on the side when you talk, you can set up the VOX with the desired delay time and sensitivity through the menu functions of the radio and have the radio go into transmit whenever you talk into it. Be careful using VOX in a noisy environment, though, as passing trucks and other noise sources could unintentionally trip the radio into transmit.

The HT comes with a massive operating manual that is split into two portions, one English, one Spanish. The instructions are very descriptive, and after going through the manual you realize the significant amount of features that are built into this radio. While many of us like to play with radios before reading the manual, this one requires that you read through it at least once to see what all the features are.

There is a four-way mini joystick control that is located on the left side of the radio. This joystick is very important in order to access menu functions. It is



The TH-F6A fits well inside the palm of the author's hand. The radio comes with a belt clip on the back that will allow for easy carrying. (Photos by the author)

* 1 Valley Road, Patchogue, NY 11772
e-mail: <wb2amu@cq-amateur-radio.com>

amazing to see the large number of functions that are programmed into today's small handheld units! The menu functions are explained in the manual and include options such as language selection, power settings, display contrast, hello message greeting, and repeater-offset frequency settings. You pretty much have to sit down with the radio and go through the menu function list as you would these days with any of the new HF transceiver.

This radio has a programmable CTCSS (PL®) tone that can be set to the desired frequency using the instructions as outlined in the manual. This is accomplished by pressing the function key and then the T button for tone. There are 42 different tone frequencies available, beginning at 67 Hz and going up to 254.1 Hz. The radio also features CTCSS decode and Digital Coded Squelch.

Automatic Simplex Check

Another interesting feature of this radio is the automatic simplex check (ASC) function. This feature comes into play when you are using a repeater. The ASC will check the strength of the signal that you are receiving directly from the other station. If the station's signal is strong enough so that direct contact can be made without using the repeater, the "R" indicator on the display will start to blink. It is interesting to see more of these types of features being used in HTs.

Operation

One of the first things of immediate interest to me was to check out how well the general-coverage receiver (from 100 kHz to 1300 MHz) performed. The thought of having a general-coverage receiver that covers HF and VHF and could fit in the palm of my hand was very enticing! I am devoting as much of this review to the quality of the receiver as to the normal HT functions.

The general-coverage receiver is provided only on the B VFO and has two tuning speeds, including a fine-tuning speed that will allow you to tune in narrow signals. Dialing up the frequency was accomplished by first hitting the VFO button and then the ENTER button. The display is blank, and you then punch in the numbers for the desired frequency, remembering to precede the selection with zero values for the lower HF frequencies. The rubber-duck antenna actually was able to pick up strong CW and SSB signals on the 40 meter band and on 10 and 15 meters during major contests. However, as expected, the rubber-duck antenna really is a big compromise when compared to using a regular HF dipole antenna. In order to use one of my dipoles, I purchased an SMA to PL-259 coax adapter which allowed me to hook up to the regular coax connectors.[1] What a difference in signal strength for the dipole over the rubber-duck antenna! I heard many more signals, and I found that the fine tuning worked very well. The F6A on HF is a hot receiver that works very well, especially considering its size.

Another thing that was noticed during use was that if you select the A mode, you will simultaneously hear signals coming from the B VFO. Some people find this to be a very useful feature, but I couldn't get used to it. In order to avoid hearing two different frequencies at once, you would have to select single mode, which goes to a large single display mode in lieu of the dual-frequency display.

The primary mode for this radio, the FM transceiver function, works well. I used the radio for a number of simplex contacts, along with monitoring a number of repeaters on 2 meters, with good results. The TH-F6 has 435 memories, 400 of which are programmable in eight banks of 50 channels each. In addition, there is a 10-channel weather station mode, allowing you to easily tune in NOAA Weather Radio broadcasts no matter where in the U.S. you are. There are also three call channels and 20 memories reserved for setting programmable scan limits. Kenwood offers free PC programming software for the memories, but you will have to buy a PG-4P data cable to hook together the radio and computer.

One test that I did on the recommendation of Gordon West, WB6NOA, was the intermod test, where I used a beam in a moderate-volume 2 meter repeater area in central Long Island. The radio seemed to scan well across the entire 2 meter spectrum without any freeze-ups from spurious emissions in the area (pagers, etc.) when scanning.

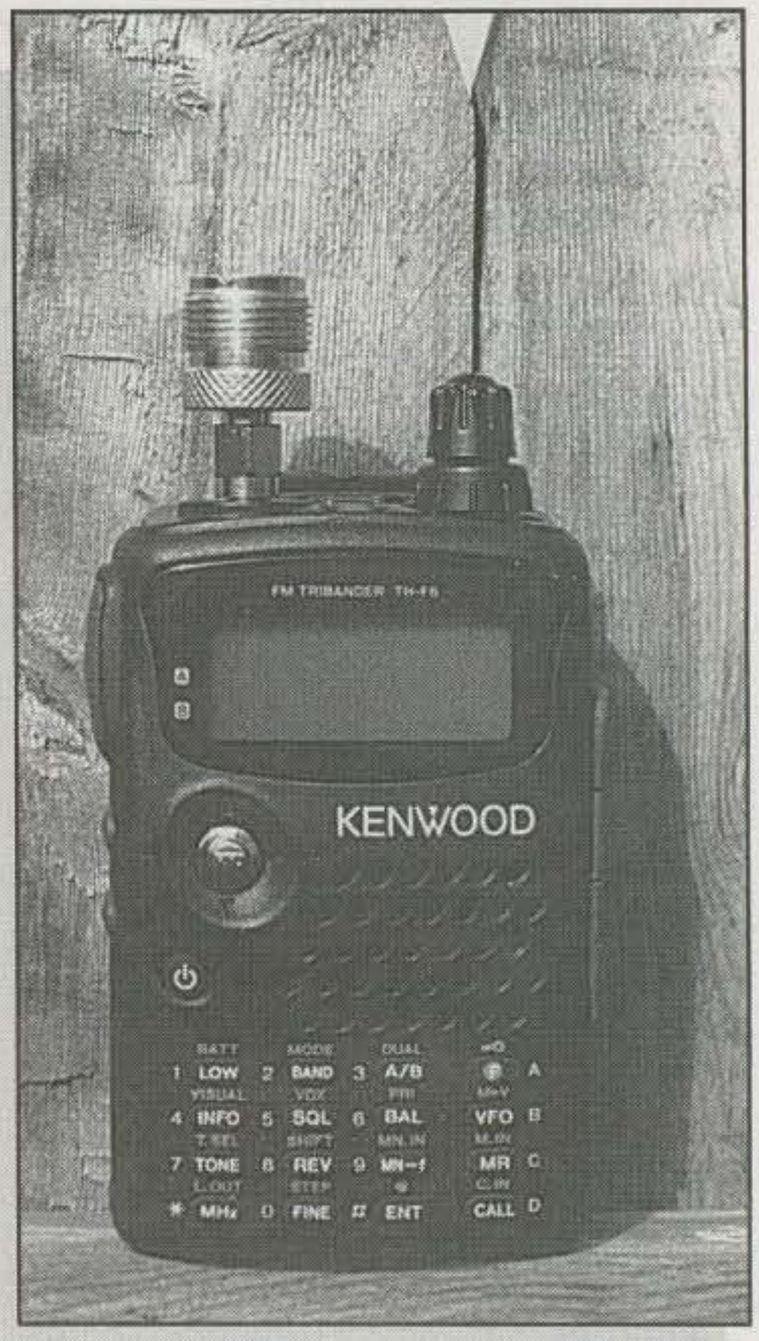
I also used the radio on 222 FM during the ARRL VHF Contest in January 2002 and for the June 2002 ARRL VHF contest. I constructed a three-element Yagi for 222 and used the SMA adapter for connecting the coax to the radio. I was operating single operator portable from atop a hill on Long Island running four bands (6, 2, 440, and 220). I was able to work K1TEO in southern Connecticut (about 30 miles away) with 5 watts output, but I could not work any greater distances even though I tried to

make a few other contacts with stations a little farther away that I heard. The FM mode has limits in distance compared to what can be worked on the weak-signal modes of CW and SSB. However, as 220 MHz gear is very difficult to get for the weak-signal modes, the use of an FM radio for 220 MHz is a decent substitute for VHF contest work. Hopefully, radio manufacturers will continue to put out more products for this band, both for FM and the weak-signal modes.

In June I used the same setup at the same location and worked three stations, one on Long Island and two in southern Connecticut, all within a 30 mile radius. Basically, I held the HT in one hand and had a beam on a stick in the other hand to make the contacts. The signal quality was good on all contacts made during the contest. Thus, 5 watts and a beam can do very well on FM simplex. The rubber-duck antenna was not able to cover these distances at all, and this would also point out some of the range limitation for repeater work.

Conclusion

The TH-F6 is an ideal HT to have when you are traveling and are not able to bring much equipment along. You have three VHF bands with FM capabilities that will allow you to work the local repeaters as well as listen to HF! The receiver for HF is hot. However, I would recommend that if you are serious about listening to HF using this radio, it would be a good idea to bring an SMA to PL-259 adapter and some extra wire to help improve the reception. The rubber-duck antenna appears to be a compromise for HF reception, as it is capable of picking up only the very strong signals on those bands. If you are planning to use one FM band exclusively, it may be a good ideal to make up a 1/4-wave whip on an SMA connector for that band in lieu of using the rubber-duck antenna.



Here is the TH-F6A with an SMA to PL-259 adapter attached to the antenna connector. This will allow regular 50 ohm coax feedline to be attached in order to connector to other antennas. However, you must take considerable care when connecting the feedline in order not to damage the SMA connector on the radio (see note 1).

The TH-F6A lists for $425. For more information, see your favorite Kenwood dealer, the Kenwood website at <www.kenwood.net>, or contact Kenwood Communications Corp., 3975 Johns Creek Court, Suwanee, GA 30024 (310-639-4200).

Note

1. SMA connectors are fragile. The SMA to PL-259 adapter of the type illustrated is best used in a stationary setting. Using such an adapter on a handheld can introduce significant pressure that might break the connector. We recommend using an adapter that includes a flexible cable between the SMA connector and the mating connector to whatever is on the end of your feedline. —*ed.*

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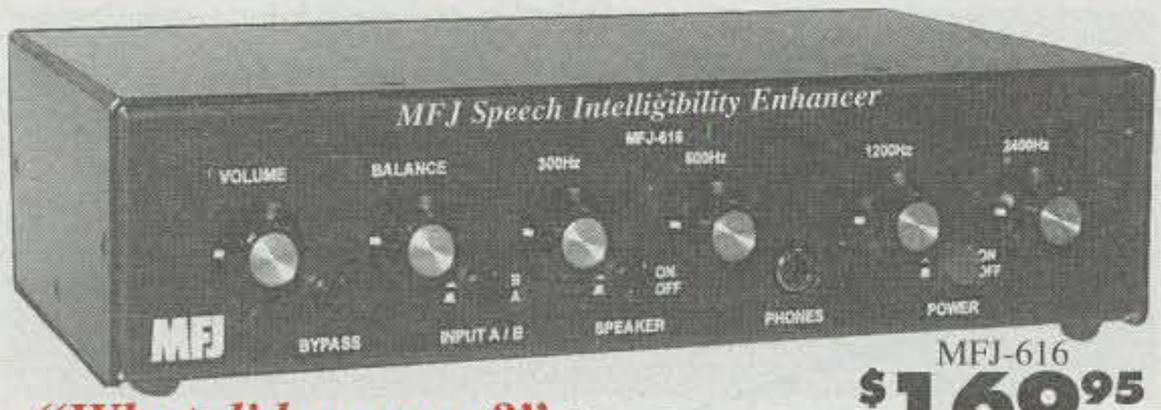

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It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

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Math's Notes

What's New And How To Use It

BY IRWIN MATH, WA2NDM

Laser Safety

With all of the solid-state laser diodes and other laser devices readily available on the surplus market, we thought it would be a good idea to bring our readers (especially the experimenters) up to date on the dangers and precautions necessary when working with these devices. Used properly, they are indeed wonderful, unique components. Used carelessly, they can pose real problems to a person's eyes. If you plan to use these devices now or in the future, please read on. The information presented here could have a major impact on your future!

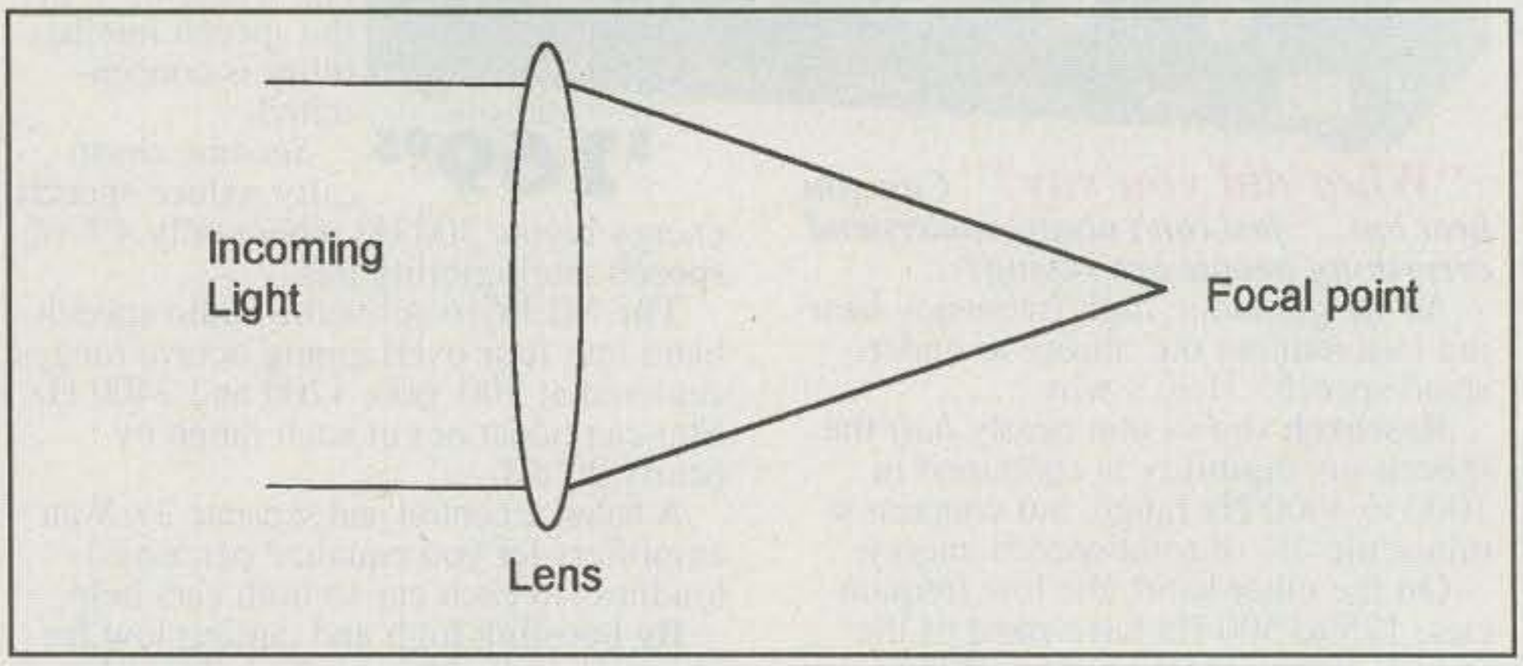

Fig. 1– Focal point of a simple bi-convex lens.

Optics

Let's first look at a couple of facts regarding optics so you can have a better understanding of what the problem is. Fig. 1 is basic diagram of the operation of a simple bi-convex lens, as you might remember from your high school physics textbooks. However, in reality it is an idealized diagram used to explain basic lens function. Fig. 2 is the real-world diagram. As you can see from fig. 2, the focal point is really a tiny image of the source. The source-to-lens and lens-to-focal point distances determine the final size of the image, and the farther away the source, the smaller the image. In addition, the size of the source controls the size of the image to some degree.

Incoming light usually is composed of many colors, and the degree of bending (or refraction) for each color is slightly different as it passes through the lens. Therefore, each color focuses at a slightly different point. The result is an image that is not a microscopic point as one would think, but is an actual image of the source with color fringes. Anyone who looks through an optical instrument with cheap lenses knows what I mean. Camera manufacturers, as well as fabricators of quality optical instruments, go through complex coating techniques and special combinations of lenses to reduce or eliminate this effect, but that is another story.

Fig. 2 is also the reason why our eyes normally are not damaged even by bright lights; the retina has a complete image rather than a single point imposed on it. Furthermore, the iris opens or closes to regulate the total amount of light entering the eye, providing still more protection. For those who wish to do the math regarding actual sizes of images, etc., I suggest you consult your high school text.

Lasers

A laser has two features that make it different from a conventional light source. The first is that the beam of light produced is very parallel, much more so than for a conventional light source. Now before the perfectionists start writing in, the actual light from the laser chip does diverge, but the actual emitting source is so small that it is almost a true point source. As a result, a simple lens placed at its focal point in front of a laser diode produces a beam that is so parallel that its divergence is measured in fractions of a degree. What this means is that the image produced by a secondary lens (such as the one in your eye) is by definition very small. In fact, it can be smaller than a single cell on the retina.

c/o CQ magazine

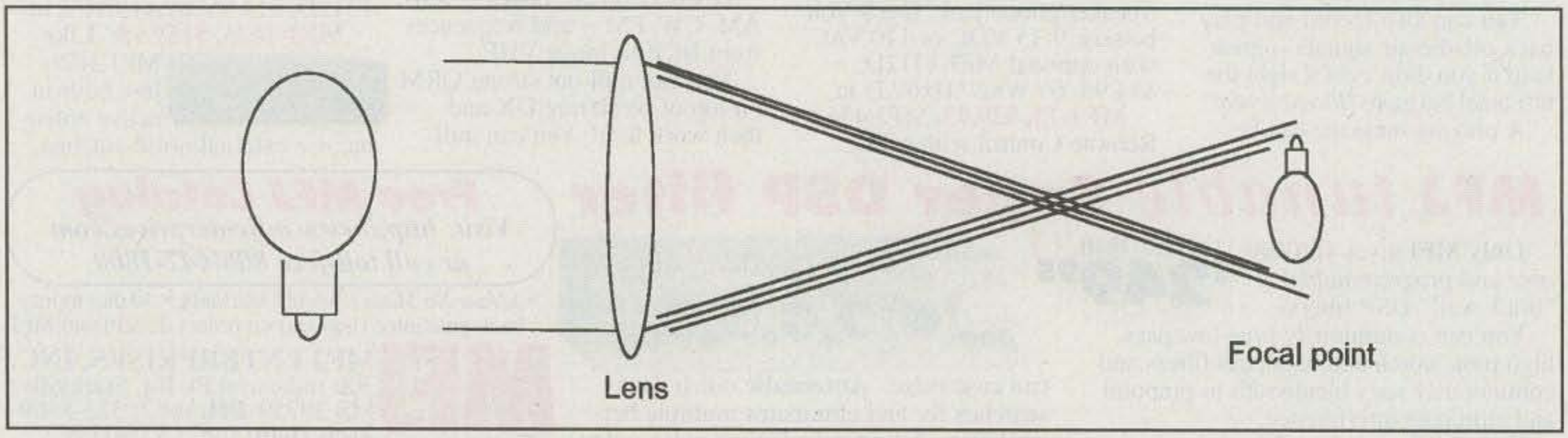

Fig. 2– Real-world focal point of a simple bi-convex lens.

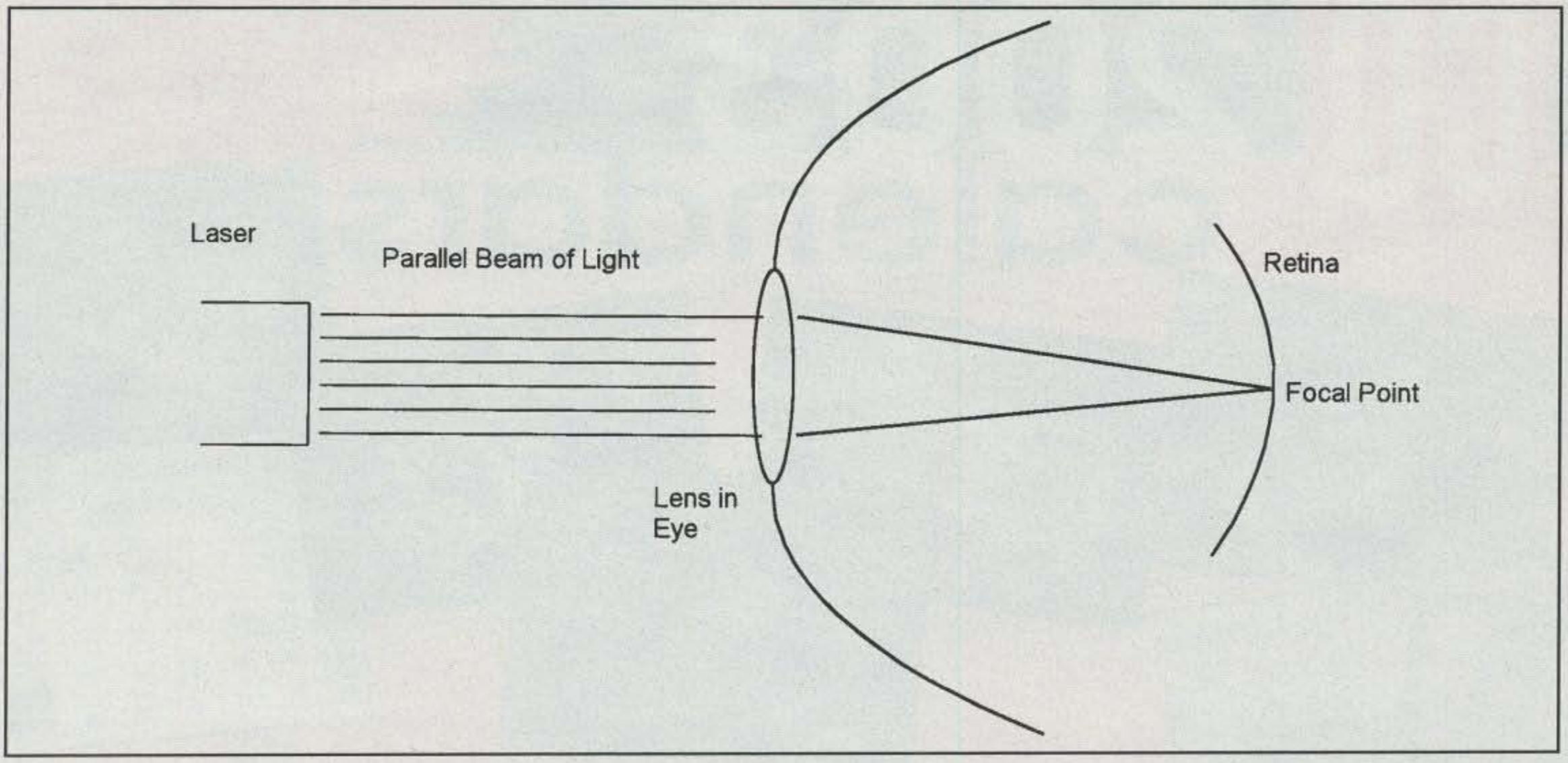

Fig. 3– What happens when you look at the output of a laser.

The other important feature is the color of the laser light is very pure, so pure that it can easily be within ±1 percent of the laser wavelength. What this means is that the image at the focal point of the lens is not a "blurry" image with fringes, but is a distinct point with dimensions that are smaller than a retina cell.

Finally, the diameter of the beam of light from a laser is often on the order of 1/8 inch or less. This small-size beam can easily pass through the pupil of the eye more quickly than the brain can command the pupil to close.

Now let's look at fig. 3. The output of the laser is parallel, a pure single color, and of a diameter that easily passes through the iris of the eye. Now the lens of the eye proceeds to focus the beam down to a tiny spot smaller than an individual cell. "So what?" you say. Well, consider the following: If the output of the laser is 1 milliwatt (a value that is typical for laser pointers), it means that the total power in the 1/8 inch diameter beam is 1 milliwatt, all of which passes through the pupil. If the focal-point spot is 0.001 inch, then the effective power at the point is 0.125/0.001, or 125 times 1 milliwatt, or 125 milliwatts, or 1/8 watt! This is often enough power to easily overheat and destroy (or at least damage) the cell that happens to be in its path.

Unfortunately, the human eye has another feature that doesn't help. It tends to scan, even when one stares at something. This means that the hot focused beam of light from the laser cuts a swath of cells in its path as the eye scans. The loss of a few cells from a single casual look may not be noticeable, but if too many cells are lost, blind spots can occur and vision can be impaired. As a result:

1. *Never* ever look directly at the beam of light being produced by a laser. This goes for visible lasers as well as the various infrared lasers available.

2. *Never, ever* look at the reflection of a laser beam from a mirror or other shiny surface. Although you may not get the full parallel beam, the spot of light at the focal point of your eye's lens may still be small enough to damage cells.

3. *Never, ever* look at laser light exiting an optical fiber or fiber-optic transmitter for the same reasons.

4. *Never* play with a laser pointer by shining it at someone. Even though some lasers may be labeled "eye safe," don't trust them. You can replace an electronic component, but you cannot replace a damaged retina, and retinal cells do not grow back!

All of the above is not meant to scare you, but to make you aware of the facts and problems that can occur when working with lasers, both solid-state and gas types. However, with caution the laser can be the heart of many interesting projects and experiments, and if used properly it can be a great source of enjoyment.

73, Irwin, WA2NDM

CQ 2003 calendars

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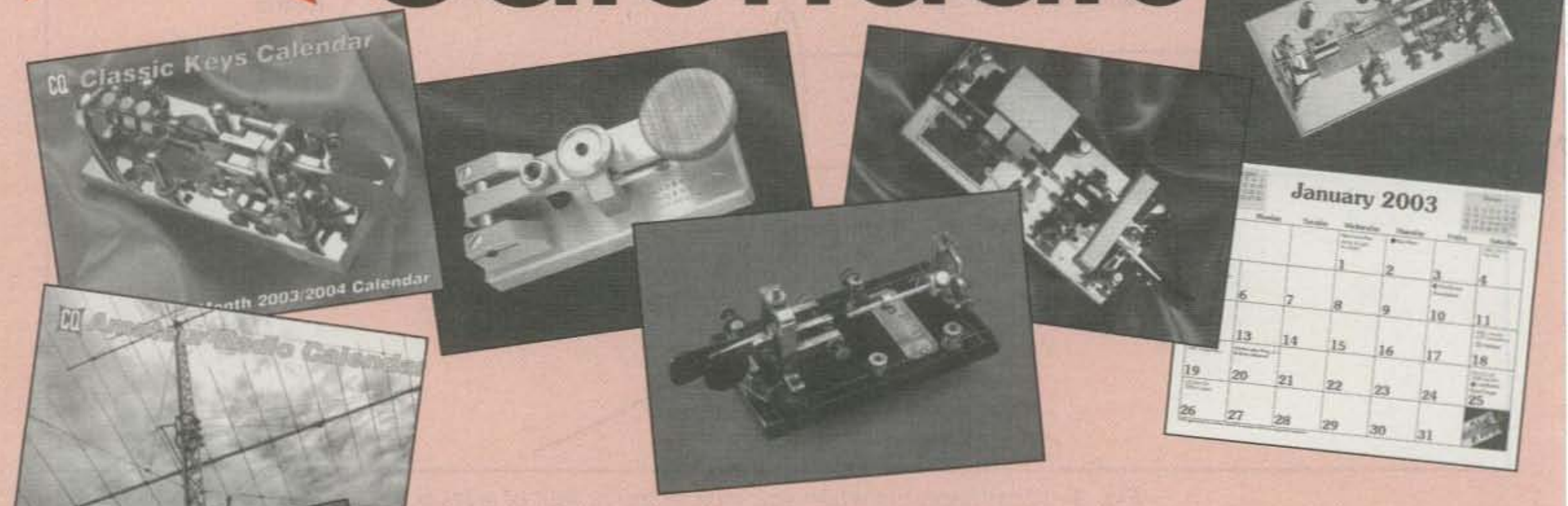

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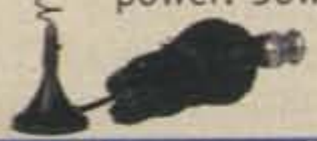

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CQ Reviews:

The Elecraft K2/100

Getting Back to Basics

BY SCOTT PRATHER,* N7NB

Anyone who has surveyed a current catalog of amateur radio equipment is well aware of the wide selection that's available today. No longer must one choose between an HF and a VHF/UHF transceiver, since many of today's units incorporate coverage of amateur bands from 1.8 to 450 MHz. Accessories such as keyers and antenna tuners frequently are built-in, and many radios can be controlled from a computer, allowing users to set up a customized virtual front panel that meets their liking.

Despite the broad selection of equipment that's available today, almost all of these new radios have one thing in common: They all essentially are commodity devices built to be produced in large numbers, not repaired. Surface-mount technology, once found only in more expensive commercial equipment, now is basically ubiquitous. In the past, an amateur who wanted to adopt an approach different from simply taking a radio out of the box and plugging it in could either home brew his equipment or build a kit. Unfortunately, today homebrewing is difficult, as sources for some of the more esoteric RF parts are drying up. Also, with the demise of Heathkit, Knight Kit, Eico, *et al.*, the majority of kits on the market are simple QRP radios. Many amateurs long to "get back to basics," but for some a QRP transceiver is not what they are looking for.

The Elecraft K2/100, a100 watt HF rig you can build yourself.

Enter Elecraft

Eric Swartz, WA6HHQ, and Wayne Burdick, N6KR, formerly of Wilderness Radio QRP fame, saw this need for a high-performance amateur radio transceiver kit with the basic features that today's ham wants while still being easy to construct at home. The Elecraft K2, introduced in 1999, was an almost overnight success. This 15 watt transceiver has a loyal, almost cult-like following. Numerous accessories have been added to the K2 over the past three years. However, the one aspect of the transceiver that many K2 owners longed for—higher output power—seemed elusive.

Early on, the Elecraft web page indicated that a "50 or 100 watt" PA would be available. However, as time passed, many questioned whether it would happen. Well, after waiting almost three years, it's here in the form of the Elecraft K2/100. If you are an amateur who has always wanted to build your own transceiver but didn't want to settle for QRP power levels, this is the radio for you. Let's lift the hood and take a close look at this high-performance, medium-power transceiver.

Under The Hood

The basic Elecraft K2/100 covers 80 through 10 meters, including the WARC bands, CW only, with RS-232 remote control. Accessory kits add 160 meters, SSB operation, receive audio filtering, real-time clock, and a noise blanker. The K2/100 provides all the basic fea-

*e-mail: <sdprat@worldnet.att.net>

tures one would expect from a modern HF transceiver, such as 100 watt output on SSB and CW, direct frequency entry to 10 Hz resolution, band-stacking registers, dual-VFOs, full QSK, RIT/XIT, band scanning, direct frequency readout for transverters, selectable CW receive sideband, and an iambic type A or B keyer with multiple CW message memories. All this in a lightweight package that measures just 3.4" × 7.9" × 9.9". The Elecraft K2/100 is easily one of the smallest 100 watt HF transceivers to come along in some time. It's so small it should easily fit into almost any vehicle for mobile operation, although unlike some of the competition it doesn't have the option of separating the control panel from the transceiver itself for remote mounting.

The K2/100 does not have an internal antenna tuner, as there simply isn't room for one. However, it does offer a unique feature. By removing the K2/100 top cover (which houses the 100 watt PA and RS-232 serial port) and replacing it with a K2 cover, the unit is converted to a 10 watt QRP transceiver. In the K2 top cover you can install an automatic tuner, a serial interface, and a 12 volt gel-cell battery. As a result, these two top covers allow you to change the radio from a "QRO" K2/100 to a "QRP" K2 just by removing and reinstalling six screws and plugging together a few connectors. No longer do you have to buy one radio for home/mobile use and another for backpacking. Now that's flexibility!

If you are looking for gimmicks, you won't find them in the K2/100. This radio was designed to perform, not to dazzle you with bells and whistles you don't really need. Lest you believe that the K2/100 is just another medium-power transceiver, keep in mind that the radio employs a high-performance receiver that is easily one of the best in its class. Its noise floor, blocking dynamic range, third-order, two-tone dynamic range are superb. This translates into true contest-grade performance. One criticism of the K2/100 is that it lacks a few features that some amateurs may consider "stock" on a transceiver of its class, such as passband tuning and a notch filter. However, the K2/100 easily makes up for this by its overall receiver performance, and a form of fixed passband tuning is possible thanks to the flexibility of the K2/100's crystal-filter adjustments.

K2/100 Construction

One of the primary attributes of the Elecraft K2/100 is the fact that you build the radio yourself. To be sure, there is a bit of a time commitment associated with the purchase and construction of the transceiver, but this is a large part of its appeal to some amateurs. The manual and all associated documentation are excellent, easily as good as or better than Heathkit.

The number of interconnecting wires has been kept to an absolute minimum in the K2/100, so the primary task during construction is "stuffing" the circuit boards. While there are a minimum of interconnecting wires, there is no shortage of toroidal inductors or transformers in this radio. While winding toroids is not particularly difficult, some consider this aspect of construction to be the least enjoyable. However, for a relatively small cost, you can purchase a kit of pre-wound toroids from an Elecraft-approved independent vendor, which may prove to be a worthwhile expenditure.

The K2/100 is a relatively complex kit, and it may prove to be a rather daunting experience for someone with very little kit-building experience. If you

Parameter	Value	Specification	Comments
MDS @ 3.75 MHz, Preamp Off	–135 dBm	–130 dBm	Measured in 300 Hz BW
MDS @ 7.2 MHz, Preamp Off	–135 dBm	–130 dBm	Measured in 300 Hz BW
MDS @ 14.2 MHz, Preamp Off	–132 dBm	–130 dBm	Measured in 300 Hz BW
MDS @ 21.2 MHz, Preamp Off	–134 dBm	–130 dBm	Measured in 300 Hz BW
MDS @ 28.5 MHz, Preamp Off	–130 dBm	–130 dBm	Measured in 300 Hz BW
MDS @ 3.75 MHz, Preamp On	–137 dBm	–135 dBm	Measured in 300 Hz BW
MDS @ 7.2 MHz, Preamp On	–140 dBm	–135 dBm	Measured in 300 Hz BW
MDS @ 14.2 MHz, Preamp On	–139 dBm	–135 dBm	Measured in 300 Hz BW
MDS @ 21.2 MHz, Preamp On	–140 dBm	–135 dBm	Measured in 300 Hz BW
MDS @ 28.5 MHz, Preamp On	–135 dBm	–135 dBm	Measured in 300 Hz BW
CW Passband Bandwidth (700 Hz Filter selected @ –3 dB points)	300 Hz	Not Specified	Measured with preamp off
CW Stopband Bandwidth (700 Hz Filter selected @ –60 dB points)	1210 Hz	Not Specified	Measured with preamp off
SSB Passband Bandwidth (SSB OPT1, FL1 selected @ –3 dB points)	1120 Hz	Not Specified	Measured with preamp off
SSB Stopband Bandwidth (SSB OPT1, FL1 selected @ –60 dB points)	3020 Hz	Not Specified	Measured with preamp off
3rd Order Intercept, Preamp Off	+18 dBm	+10 dBm	Measured @ 14.06 MHz
3rd Order Intercept, Preamp On	+0 dBm	0 to +7.5 dBm [1]	Measured @ 14.06 MHz
IF Rejection, Preamp On	90 dB	Not Specified	Measured at 7.2 MHz
Image Rejection, Preamp On	88 dB	Not Specified	Measured at 7.2 MHz
Output Power	100 watts	100 watts	Meets spec. on all bands
Carrier Suppression	>45 dB	>40 dB	Worst case (20 M LSB)
Opposite Sideband Suppression	>62 dB	Not Specified	
Spurious Suppression	–44dBc	–40 dBc or better	–44 dBc represents worst-case spur on 10M
Two-Tone Transmitter IMD (Measured relative to PEP)	–30 dB	Not Specified	Measured at 14.2 MHz
Harmonic Suppression	> –55 dBc	–45 dBc or better	
RX-TX Switching Time	22 ms	Not Specified	T/R Delay set to 0.00, Key-down to 90% TX
TX-RX Switching Time	50 ms	Not Specified	T/R Delay set to 0.00, Key-up to 90% RX

[1] Third-order intercept (IP 3) specification varies by band.

Table I– Elecraft K2/100 performance. Measured values vs. specifications.

would like a K2/100 and can't (or don't want to) build it yourself, Elecraft has a list of amateurs who will build your radio for a nominal fee (Some folks just can't build enough kits.). Another option is to acquaint yourself with Elecraft kit building by constructing the less-complex K1 CW-only transceiver.

On-Air Operation

The K2/100 is a surprisingly versatile package for on-the-air operation. It supports all the popular operating modes (with the exception of FM), and it really excels in its support of CW. The radio supports a total of nine CW memories, and there is a "Fast-Play" option that you can turn on for contests. Fast-Play allows you to tap a single key to play a CW message, instead of the normal requirement of pressing two keys. During CW operation, the QSK is unusually smooth, with no evidence of audio clicks or pops, even at high power while copying weak signals. SSB operators will find that the audio compressor does a credible job of bringing the average power up while maintaining readability. The radio also supports a scanning feature for CW and SSB operators that is probably one of the most practical operating aids I've ever come across. Unlike most scanning implementations that require a continuous carrier in order to lock, the scanner in the K2/100 *ignores* continuous signals and pauses for 25 seconds on keyed signals. This is an excellent tool for monitoring a band while handling other tasks.

Data and RTTY operators haven't been forgotten, as the radio supports a separate "data" mode which bypasses the audio compressor and allows custom setting of the IF filters. The K2/100 also supports a 4800-baud serial port, which can be used with any remote control/logging program that supports the Kenwood TS-570D command set. While the K2/100 isn't fully compatible with the Kenwood commands, there is sufficient support for most basic operation.

Elecraft also has its own software called "K2 Remote," which is available for free at its website. A unique aspect of K2 Remote is that you can use your PC as a CW keyboard. This, along with the scanning feature, would allow you to work on your PC, scan the CW portion of a band, and quickly call that rare DX station the K2/100 came across in the process. In the future, software will be available from Elecraft to support remote control over a 100/10baseT network. This connectivity could be used to support control of the radio over an 802.11 wireless networking link, allowing you to operate anywhere you have coverage from your home wireless network (WLAN).

K2/100 Performance

I ran the K2/100 through a number of parametric tests to validate basic receiver and transmitter performance. The results of this test suite are summarized in Table I.

All in all, the K2/100 is a radio that will give you a sense of ownership that goes well beyond the norm. The pride associated with taking a box consisting of hundreds of parts and turning into one of the best-performing medium-power HF transceivers on the market today can't be explained easily.

If you would like more information on the Elecraft K2/100, it can be obtained at the company's website: <http://www.elecraft.com>. ■

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Effective Portable Antennas For 75/80 Meters

BY SCOTT M. HARWOOD, SR.,* K4VWK

With the growing popularity of the new small HF rigs, more and more hams are taking their rigs "on the road." Perhaps the greatest challenge for these traveling hams is reliable operation on 75/80 meters. Putting up a 136 ft. half-wave antenna is not always practical or acceptable. Even a quarter-wave wire can present a challenge.

As one who travels quite a bit, I have discovered that my antenna needs usually fall into two categories: a very short vertical antenna to operate from condominium balconies, hotel rooms, etc., or a 40 to 50 ft. wire to string out while camping or at a beach house, river cottage, etc. With a little basic knowledge and ingenuity, most hams can create an effective antenna system that will work well under most circumstances. In this article I have described two systems developed over the last several years that have enabled me to operate consistently on 75/80 meters under varying distances and propagation conditions.

Short Vertical Antenna

Many hams have attempted portable or mobile operation using a short vertical antenna. It is well documented that this type of antenna is very inefficient, difficult to properly match, and requires a sufficient numbers of wire radials, or at least some type of "counterpoise" to be effective. A counterpoise is usually a short wire element connected to the antenna ground or coax braid at the antenna feed point. It is used to "balance out" the antenna system and to help tune the antenna. For my system, I decided to use an Outbacker™ Model OB8 antenna. One can operate most HF bands with this single antenna, and it breaks down into two small sections for portability. I tried several matching and counterpoise schemes with varying degrees of success until I came upon an article by Juergen Schaefer, DL7PE,[1] in *AntenneX© Magazine*[2] on extremely short transmitting antennas. The article is on the design and construction of a short portable antenna, but my attention focused on his ideas for the antenna counterpoise, which consists of a length of shield in the coax feed line. The center conductor connects to the antenna, and the outer braid remains open and not connected to anything at the antenna end. The other end of the counterpoise is connected through an RF choke to the transmitter (see fig. 1).

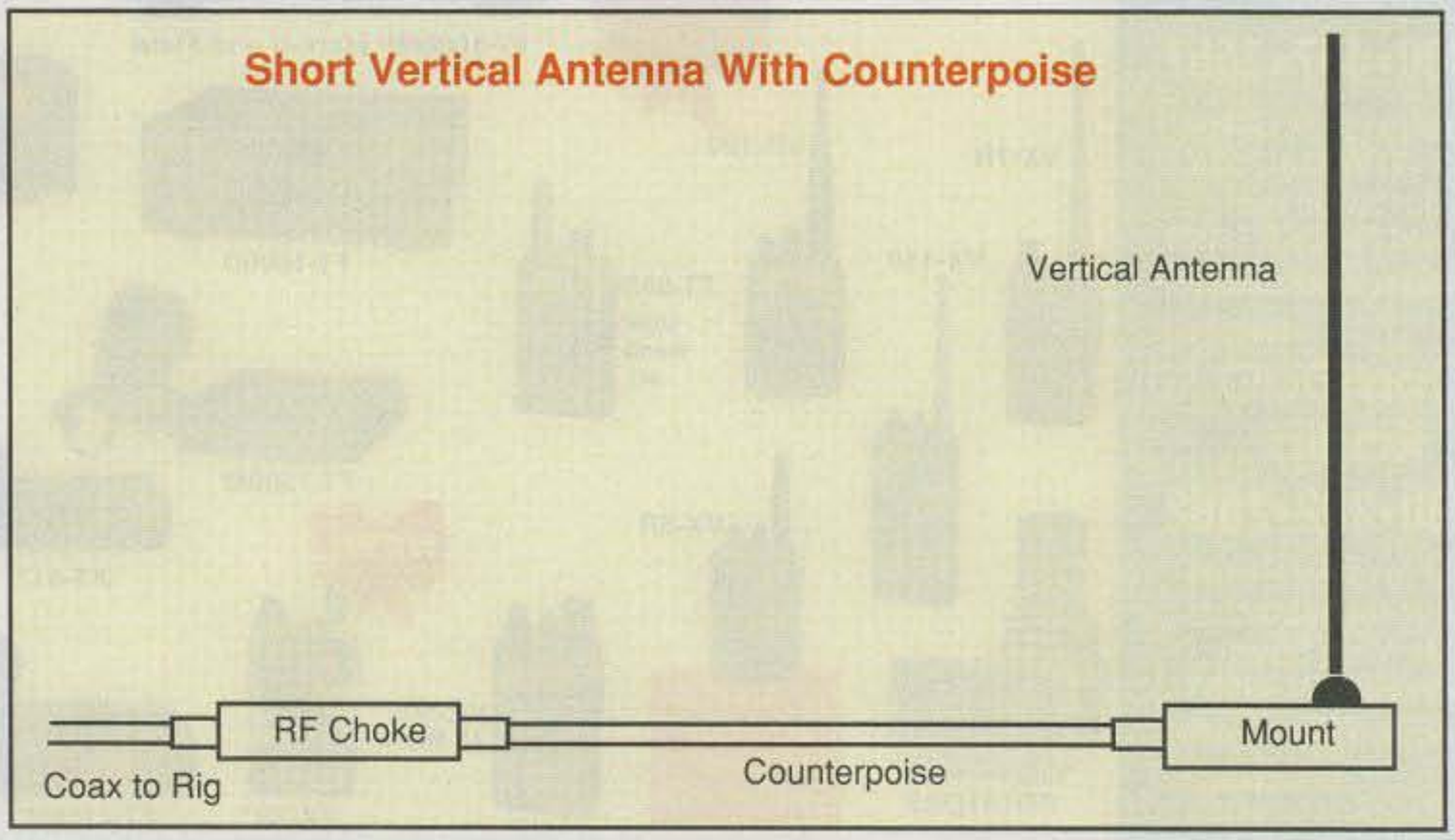

Fig. 1– Short vertical antenna with coax-cable counterpoise. The coax shield is left disconnected at the antenna, and the counterpoise/feedline is connected to the transmitter through an RF choke.

Juergen also states that his research shows that part of the energy of the radiator tends to "bounce back" from the counterpoise to the antenna element, and he could find no evidence of the counterpoise radiating. All radiating seemed to be done by the shortened antenna. Because of this, it makes no difference in signal strength if the bulk of the counterpoise is left in the building or coiled up in some out-of-the-way space! In his article he gives the formula for calculating counterpoise length (shown here converted from meters to feet):

$$L_r \text{ (ft.)} = 190/f \text{ (MHz)}$$

Construction

Using this formula, I calculated the length for 3.9 MHz at 48.71 ft. and fabricated a length of 49 ft. of RG-8X coax with standard PL-259 connectors at each end for my system. I have found that this length is not critical in any way. Also, any type of 50 ohm coax seems to work fine. Just make sure to use a good grade of coax with 90% shielding or better.

An insulated base mount was constructed using a small 2" × 4" × 1" plastic box with a standard threaded mount

* *P.O. Box 523, Farmville, VA 23901*
e-mail: <scotth@hsc.edu>

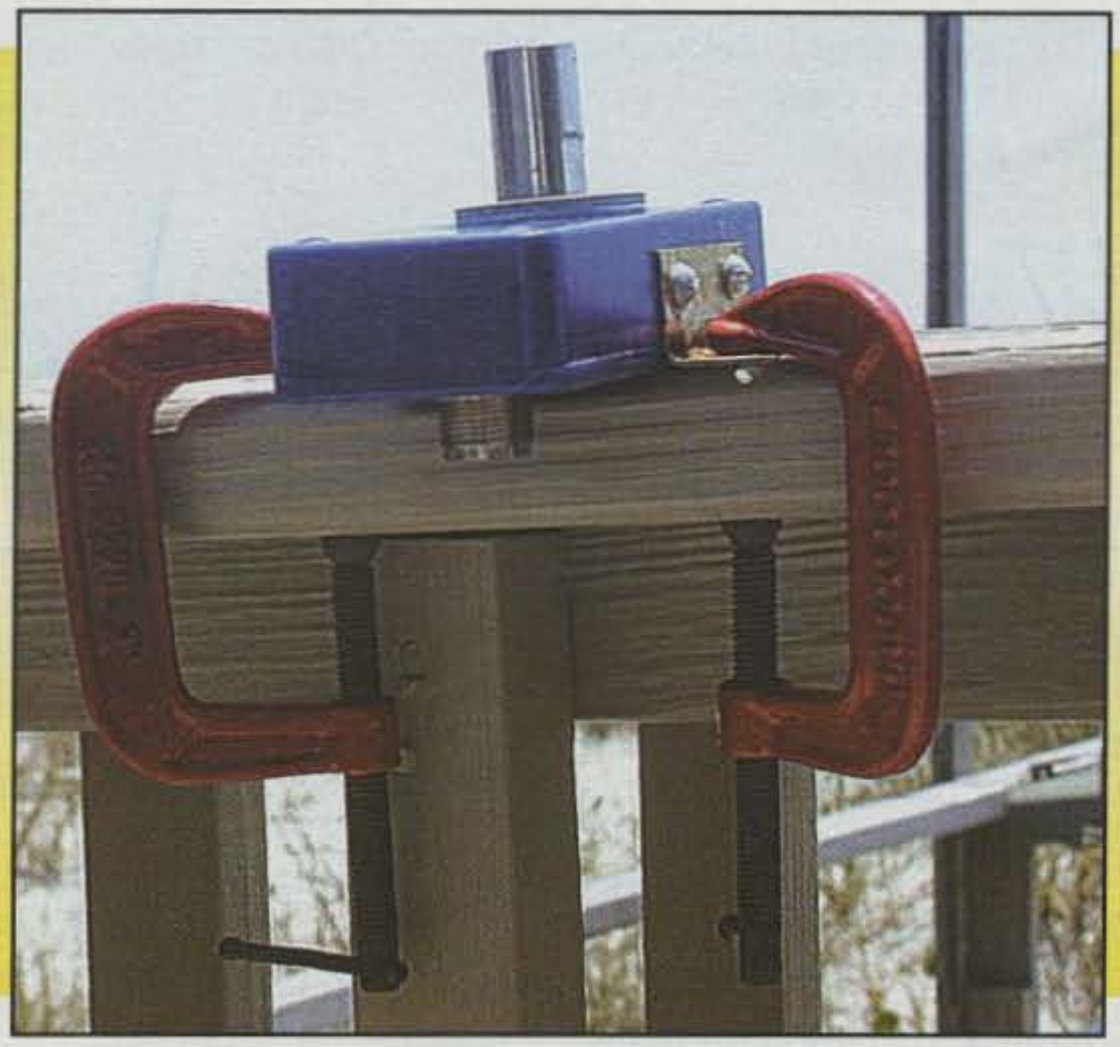

Photo A– Vertical antenna mount clamped to deck rail. (Photos by the author)

in the center of the top for the antenna (photo A). The mount is reinforced with two 1 1/2 inch washers. A standard SO-239 coax connector is installed as close as possible to one end of the bottom of the box. A short wire runs from the center of the coax connector to the threaded mount. A metal flange is added to each side of the box so that a pair of small C clamps could be used to mount the antenna. Nothing is critical here. Adapt the mount to your individual needs. Just keep the jumper wire from the coax connector to the antenna mount as short as possible and make sure the shield side of the coax is totally isolated. Do *not* attempt to connect any radials or grounds here. It will defeat the whole purpose of the counterpoise!

I selected a Model T-4 Line Isolator from Radio Works[3] for the RF choke. I happened to have the T-4 on hand, but if you prefer to "roll your own," three coax choke/baluns are described by NJ2L in an earlier *QST* article.[4] I also fabricated additional 3 and 6 foot sections of coax to make slight counterpoise length adjustments when changes in environmental conditions occur, as explained below.

Initial Tests

I did the initial testing using three different commercial mobile antennas: the Outbacker, a Pro-am™ 75 (helical "Hamstick" type) and an old center-loaded Hustler™ RM-75. I figured that if the counterpoise worked with all three of these, it would work with most shortened antennas. As you can see from the results in Table I, all three antennas worked well with the coax counterpoise section.

The calculated lengths for the counterpoise didn't seem to be that critical, and proper matching could be obtained by adjusting the length of the metal "stinger" (tuning rod) in the various antennas. Experimentation also revealed that lengthening the counterpoise lowered the resonant frequency of the antenna. The results are shown in Table II.

I have included this data to show the reader that there are several variables here, and the counterpoise and short vertical antenna system can be custom-tailored to meet almost any need. If one does not already possess a short vertical antenna for the project, DL7PE's article referenced above contains some great ideas for construction. Further information can also be found on his website, <http://www.home.t-online.de/home/dl7pe/menu.htm>.

Practical Results

Whenever I read an antenna article, I always am interested in the bottom line: Just how well did the antenna perform for the author? I am often amused by articles that contain information on the low SWR, great bandwidth, or calculated gain of an antenna, but say nothing about how well the antenna performed under field conditions!

In my case, the counterpoise system has exceeded my expectations. I have used this system over the past year with quite a bit of success. While in Florida, I could regularly check into Virginia nets

Antenna	Frequency	Field Strength	Bandwidth*	SWR at Resonance
Outbacker	3.950	2.0	100 kHz	1.0 to 1
Pro-am 75	3.950	2.0	80 kHz	1.0 to 1
Hustler RM-75	3.950	2.0	60 kHz	1.0 to 1

**3:1 SWR limits.*

Table I– Comparison of results for three mobile antennas using DL7PE counterpoise system.

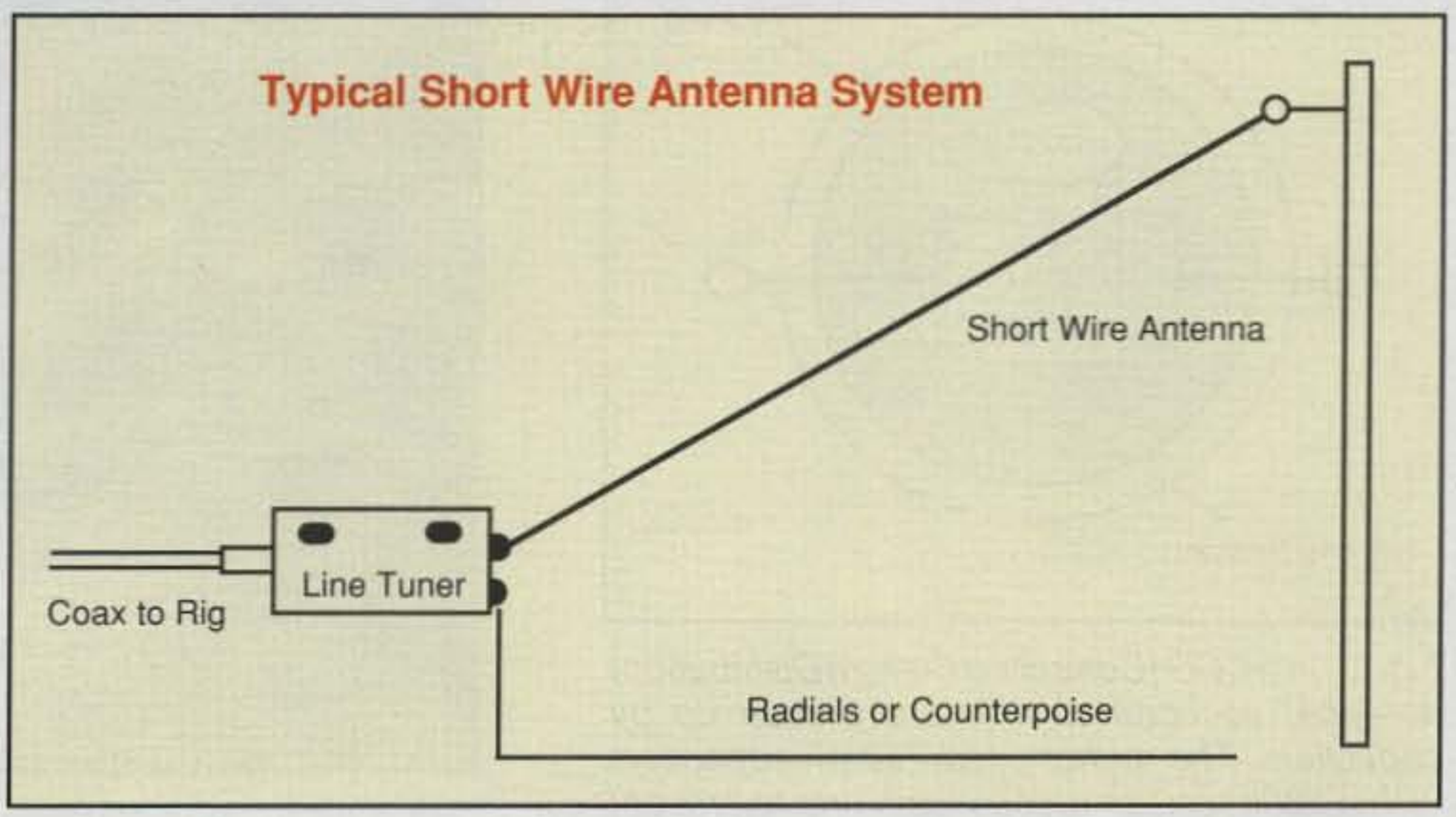

Fig. 2– Despite difficulty in tuning and RFI nightmares, many hams in restricted-space settings use short end-fed antennas like the one shown here.

Antenna	Counterpoise	Resonant Frequency
Outbacker	49 Feet	3940 kHz
Outbacker	52 Feet	3905 kHz
Outbacker	58 Feet	3875 kHz

Table II– Effects on resonant frequency of changing the length of the DL7PE counterpoise.

Length of Wire Sections (ft.) for CCD Antenna				
Freq (kHz)	#20 Wire	#18 Wire	#16 Wire	#14 Wire
3950	53.0	54.5	55.5	57.0
3850	55.5	57.0	58.5	60.0
3750	58.0	59.5	61.0	63.0
3650	61.0	62.5	64.5	66.0
3500	65.5	67.0	69.0	71.0

Table III– Cutting chart for wire sections of CCD antenna, based on thickness of wire.

on 75 and 80 meters. I also got quite nice reports from stations there. I have received good signal reports operating from ocean-front beach homes and hotel rooms with small balconies. Other amateurs consistently have expressed surprise when they learned exactly what kind of antenna I am using.

I have noticed, however, that the system resonance is greatly affected by the antenna environment. Height above ground, metal decks, concrete alcoves, railings, etc., all have an effect on system resonance. In each case, however, resonance could be obtained by using the different coax sections described above, thereby making the counterpoise longer or shorter than the calculated lengths and by adjusting the Outbacker stinger. In one case, while operating from a small semi-enclosed hotel deck, I also found that much better signal reports were obtained with the antenna mounted out from the deck rail in the horizontal position!

Short End-Fed Wire Antenna

Getting a short, random-length, end-fed wire antenna to perform properly is not a task for the faint-hearted! These antennas are notorious for being difficult to match, can be RFI nightmares, and bring plenty of RF into the shack. In addition, the overall radiation pattern is often unpredictable. In spite of this, many amateurs use them for portable operation in the configuration shown in fig. 2.

The CCD Solution

I have been a fan of the CCD (Controlled Current Distribution) antenna for many years. This is basically a wire antenna broken into sections, with capacitors inserted in series between the sections to cancel the inductive reactance of the wire sections. This tends to equalize the current throughout the antenna, much like filter capacitors do in an AC-to-DC power supply. Thus, according to Mills and Brizendine,[5] "radiation begins to focalize at a low angle [of radiation] and ... our antenna begins to perform amazingly well on DX, even when close to or near the ground." Other benefits of this antenna are "greater gain, full use of antenna element—no nodes, no high voltage points—can be laid on tree limbs, improved broadband characteristics, can be made any convenient length for available space." What better characteristics could there be for a portable antenna?

While most published articles deal with CCD antennas one wavelength or longer, I have built several shortened versions of this antenna and found them to be excellent performers. They are easy to load, not affected by nearby objects, and have no RFI or feedback problems. I have used the antenna described below for many years with great success.

Construction

My portable-antenna parameters required a wire length of 40 to 50 ft. For a frequency of 3.900 MHz and 750 pF capacitors, the section length worked out to be 55.5 inches for #18 wire (lengths for other wire sizes and frequencies are shown in Table III).[6] Thus, an 11-section antenna would be just under 50 ft. long.

I used a digital capacitance meter to select ten capacitors that were exactly 750 pF. I then soldered a 220k resistor across each capacitor to eliminate static charges that build up in the antenna. The capacitor/resistors were then sealed in 1/4 inch thick sections of 1 inch

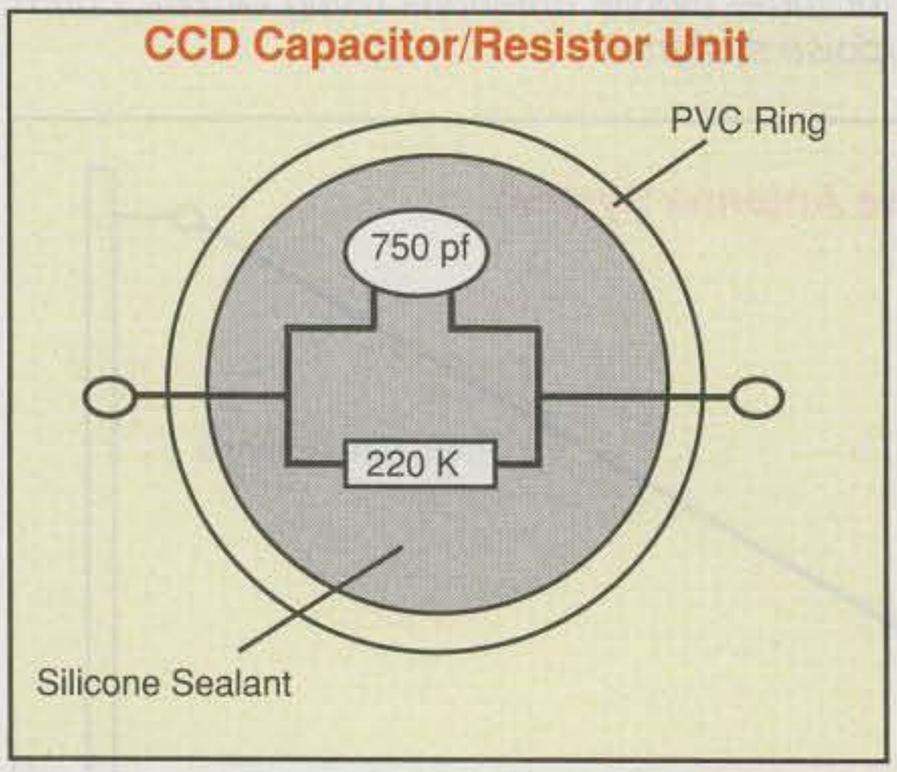

Fig. 3– In a CCD (Controlled Current Distribution) antenna, sections of wire are broken up by capacitors. The author used 750 pF capacitors with a 220k resistor across each one to prevent static buildup, then sealed the capacitor/resistor combo into a small piece of PVC tubing.

Photo B– Variable inductor is an important part of the shortened CCD (Controlled Current Distribution) antenna.

Photo C– The author's shortened CCD antenna at a beach house on Ocean Isle, North Carolina.

diameter PVC pipe (see fig. 3). After *carefully* measuring the wire sections, I soldered them to each capacitor/resistor unit. Although my antenna used 11 sections, the number can be varied according to one's needs. I have used as few as five sections for this antenna.

As with most shortened antennas, the CCD requires a series inductance to resonate the antenna within the 75/80 meter band. This inductance will vary with each location. For this reason, I constructed the "variable inductor" shown in photo B. Fifteen turns of insulated #12 wire were wound around a 3" × 1/2" ferrite rod. The fit is very snug so that the ferrite rod may be moved in and out of the coil windings to vary the inductance of the coil. This was wired in series with a 3 1/2 inch long 1 1/4 inch diameter air-wound inductor (12 turns per inch) and taped every other turn. The schematic diagram is shown in fig. 4.

Tune-up is simple. Select the entire tuner inductance and move the ferrite rod to obtain system resonance for 3500 kHz. Then taps can be selected along the air-wound coil to obtain resonance at higher frequencies. All of the parts came from my junk box. This coil is not critical and the builder can use just about anything handy. A total inductance of 20 to 30 µH should be adequate. Tapped windings on a T-200 toroidal ferrite core would make a nice compact inductor. The final antenna configuration is shown in fig. 5.

Practical Results

This has been a most gratifying portable antenna. I have received excellent signal reports wherever I have been. It is

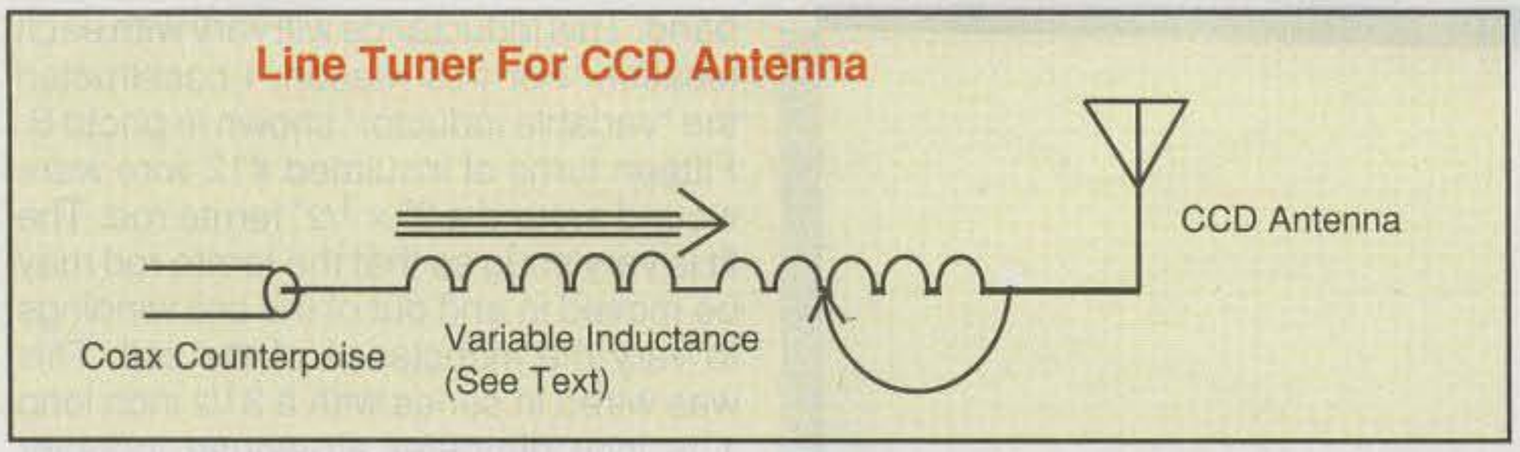

Fig. 4– The CCD antenna also uses a coaxial counterpoise, plus a variable inductor in the feed system to bring the antenna into resonance at the desired frequency.

very easy to tune and adjust; simply move among the coil taps or change the counterpoise length to adjust the resonant frequency. It is very broad (about 350 kHz), and I have never had a problem with RFI or RF in the shack. Multiband operation can be achieved by substituting a line tuner for the inductance and changing the counterpoise length. I have used an MFJ "Versa Tuner" Model 901B with quite a bit of success.

Conclusions

The purpose of this article is to provide you with some basic data for efficient operation of shortened antennas using an effective counterpoise system. As stated above, many variables can be created by different antenna environments, and individual experimentation should produce excellent results for those willing to make the effort. Both antennas seem to be relatively "tame," easy to tune with no RFI problems. Remember, the key word here is *effective* and not efficient. Don't expect miracles. These antennas will not replace or perform as well as a full-wave loop or half-wave dipole. They will, however, give you many hours of pleasure operating on 75 and 80 meters.

Those wishing to delve more deeply into CCD antennas may wish to refer to articles listed in the bibliography. I would be very interested in hearing from readers on any work done to improve or modify the antenna systems described in this article.

Notes

1. Juergen Schaefer, DL7PE, "Progress In Design of Extremely Short Transmitting Antennas," *Antennex©,* <www.antennex.com>, Archive IV Article 76. (For non-subscribers, a free copy can be downloaded at <www.antennex.com/preview/archive4/Apr601/microvert.htm>.)

2. *AntenneX©,* which stands for antenna experimentation, is an on-line magazine published by Jack L. Stone. Subscription information, sample articles, free downloads, and other info can be found at <www.antennex.com>.

3. Radio Works, Box 6159, Portsmouth, VA 23703 (800-280-8327).

4. James W. Healy, "Feeding Dipole Antennas", *QST,* July 1991 (reprinted in the ARRL's *Wire Antenna Classics,* p. 1-5), available from the ARRL.

5. Harry A. Mills, Gene Brizendine, "Antenna Design: Something New," *73* Magazine, October 1978.

6. An Excel spreadsheet for calculating section lengths for different wire sizes, capacitors, and frequencies is available from the author for an SASE or e-mail address.

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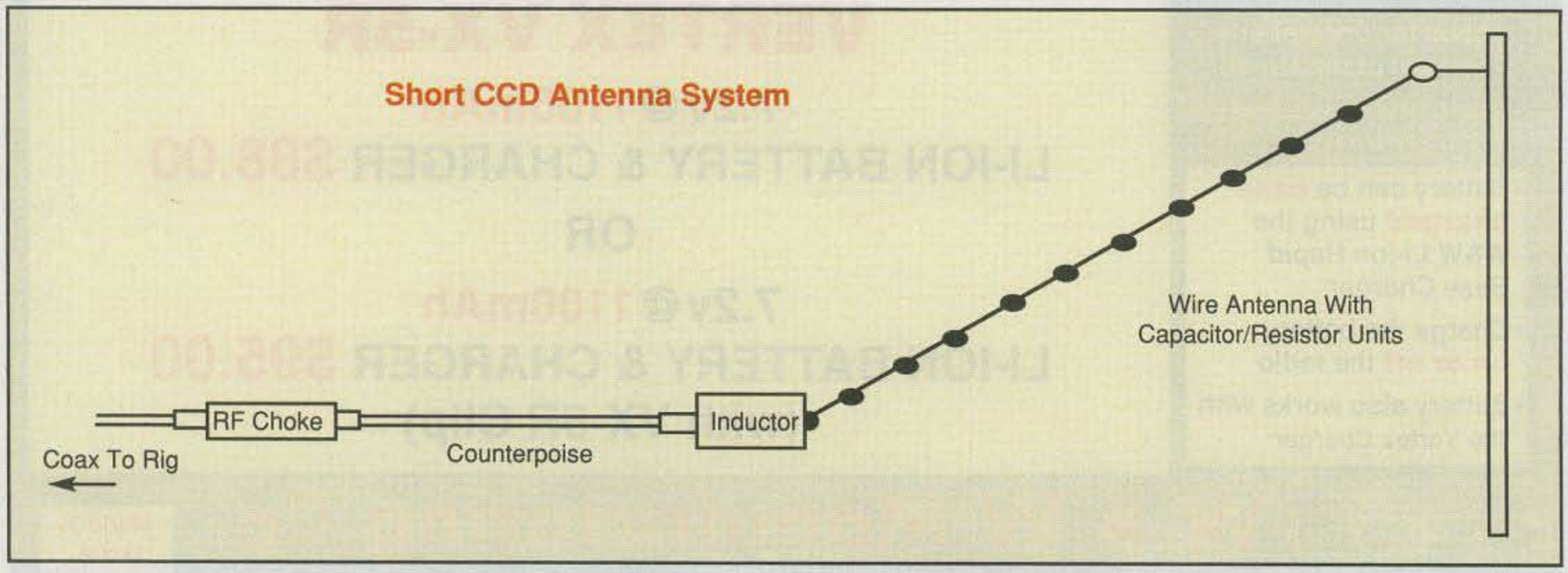

Fig. 5– Layout of a short CCD antenna system showing the RF choke between rig and antenna, a measured coaxial counterpoise, a variable inductor, and a series of short wire segments broken up by capacitor/resistor combinations. (See text for details.)

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Electricity is Everywhere
Part II

BY BOB SHRADER,* W6BNB

Last month the first installment of this two-part article explained, among other things, how atoms and molecules are involved in electrical current; how different atomic particles affect each other electrically; and how negative charges repel other negative charges, but attract positive charges, and vice-versa. Some of the different particles involved in atoms and electricity were described in basic terms.

We are told that all matter consists of "electrons, up quarks, down quarks, and neutrinos," which sets us out in search of what that means. Just what happens electrically when a light bulb is energized by a battery was described in easily understood terms. We also discussed how solids, liquids, and gases differ electronically, as well as the difference between matter and antimatter, and the differences between electrical static (electrostatic) and magnetic forces.

In addition, we examined some of the particles that make up the nuclei of all atoms, and explained ionization, as well as alpha and beta particles involved in radioactivity. Finally, we described very light mass leptons, which include electrons and the most numerous particles in the universe, neutrinos. All this leads up to a theory about electrostatic-electromagnetic waves, called photons, which are involved in much of our everyday life, which is where we begin Part II.

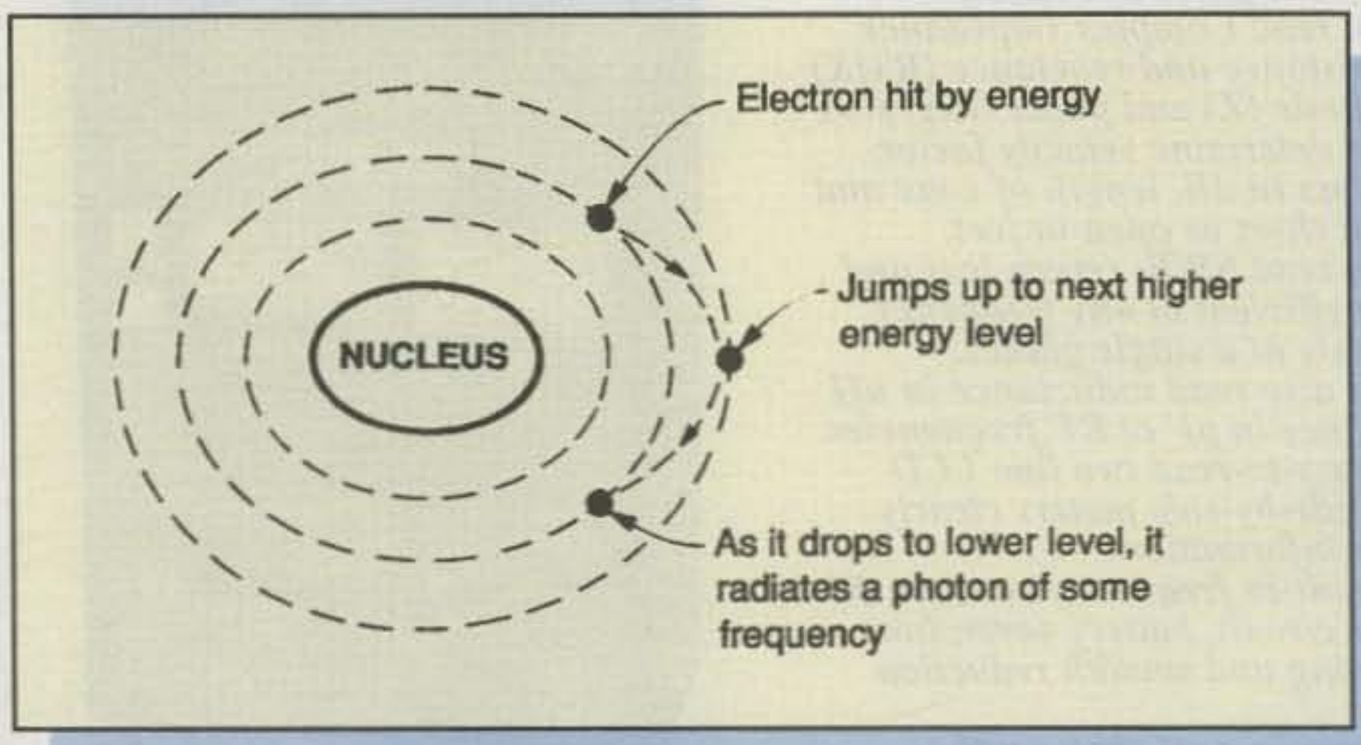


Fig. 3– Energy from an outside source briefly drives an electron up to a higher energy level. As it falls back down, it radiates a photon of energy.

Electrons and Photon Waves

All normal atoms, except hydrogen, will have from 2 to 92 electrons orbiting the nucleus at various energy levels. These different energy levels can be visualized as the orbits of different planets around the sun, except that each orbit may contain more than one "planet" and it's possible for the different planets to briefly move from one orbit to another.

If some outside energy force, such as heat, can drive an orbital electron up to a higher energy level for an instant, as it *falls back* to its former lower orbital energy level (fig. 3), it radiates the same amount of energy that drove it up, but in an electromagnetic-wave form. This radiated energy wave is called a **photon** and is an important electrical energy packet. Photon waves continually expand outward as their N/S and +/– energy waves oscillate, or alternate at a **frequency** depending on the amount of photon energy released by the falling electrons. When electromagnetic waves are mentioned, assume that an electrostatic wave is also present, and vice-versa. These two waves always act 90 degrees apart, or are "90 degrees out of phase" (when one reaches a maximum, the other reaches zero).

Frequency is the number of times something cycles, vibrates, alternates positive and negative, north and south, up and down, or back and forth per second. It is expressed in **cycles per second** (cps), or **hertz** (Hz). Photon energy waves may at times seem to act as if they are a quantum, or particle of energy, but to simplify things here, photons will only be considered to be expanding waves of energy. The sun is probably as close to an all-frequency radiator of photons as there is.

To learn how photons work, let's start with our own eyes. On the inside rear surface of our eyeballs is the **retina**. On it are three different sets of color sensitive photo-receptors called **cones** because of their shape. Their wide ends face forward. If any color frequency photons from a scene pass through the lens of an eye and strike one of these sensitive cones, the wave energy is converted to nerve signals that go to the brain.

Wavelength vs. Frequency

Waves of anything may be discussed in terms of either frequency or **wave-**

*e-mail: <w6bnb@aol.com>

length. (The wavelength is the distance a wave travels through space or some other medium, in the time it takes to complete one of its cycles.) Wavelength is another way of indicating something's frequency. The higher the frequency, the shorter will be its wavelength. If color-sensitive cones in our eyes are sensitive to electromagnetic photon waves at a frequency of about 400,000,000,000,000 Hz, or 400 trillion hertz, or 400 **terahertz** (400 **THz)**, they will develop electrochemical signals that register in our brains as deep red. This frequency can also be expressed as a wavelength of about 740 billionths of a meter, or 740 **nanometers** (740 **nm**). Light frequencies can be converted to wavelength by the formula: Wavelength in nm = 300,000/THz. The basic formula is wavelength (λ) in meters equals the speed of light, or 300,000,000 meters/sec (c), divided by its frequency (f) in hertz, or , $\lambda = c/f$. To keep things simpler, only frequency will be used in this discussion, although light is usually discussed in terms of wavelength.

(Back in the 1930s it was decided that all radio waves would be considered only in terms of frequency, since there was a firm starting point, zero, but none in wavelength. The 600 meter distress wavelength became the 500 kHz distress frequency. Why scientists still use wavelength for light computations, requiring us to invert our thinking from frequency to wavelength when the frequency is higher than 300 GHz, is unknown.)

The frequency of 400 THz produces deep red for our eyes. Cones sensitive to ±500 THz produce impulses we recognize as the color green. A third set of cones, sensitive to ±645 THz, send the brain signals we see as blue. A frequency of ±800 THz we see as deep violet. A rainbow is the reflection of the sun's all-frequency photons striking inner surfaces of raindrops, reflecting red, orange, yellow, green, blue, violet, plus other higher and lower frequency photons which our eyes cannot detect.

Since photons are expanding waves, the farther apart the wave-fronts are that strike our eyes, the less wave energy we receive, and the dimmer they appear.

Electricity of Sight

On the retina, along with the color-activated cones, are **rods**. The rods are only sensitive to brightness, or the *number* of photon wave-fronts striking them. It may only require a single photon to activate a rod, whereas several are required to activate cones. There are about 18 times more rods than cones. Rods are not only more sensitive to all photons than cones, but their nerve signals travel *faster* to the brain. If a glowing flashlight bulb is attached to a thrown baseball at twilight, the brighter bulb will appear to be perhaps a foot ahead of the harder-to-see reflected color photons from the ball! The stronger rod signals get to the brain faster, the weaker cone color signals lagging behind. At night it is the rods that pick up the visual images we see, unless an object is actually generating one or more color frequencies. Surprisingly, the signals from both cones and rods come out from their *front* surfaces, being converted by ganglion and bipolar cells to electrochemical signals that travel via vision nerves that join together at a small area in the back of the eye as an optic-nerve bundle connected to the brain.

No two people have the same number or arrangement of color cones and rods in their eyes, particularly in the small, most light-sensitive back-center area of the retina, called the **fovea**, a part of a larger **macula** area. Probably few people see objects exactly the same color-wise!

If all the red-, green-, and blue-sensitive cones are properly stimulated, the brain registers them as **white**. Color-television stations only have to transmit R (red), G (green), and B (blue) signals in proper percentages to provide white, plus all the colors seen by the human eye, including black, where there are no R, G, or B photons. TV sets sweep a "modulated" or varying strength, very thin, round beam of electrons across and down the inside face of the picture tube. When these electrons hit molecules of three special R, G, and B light-emitting phosphor paints laid down in three closely adjacent very thin vertical stripes on the inside face of a TV tube, they generate R, G, and B, plus X-ray, photons that radiate outward to strike our eyes so we can see them. To stop the X-rays lead is added to the glass of such tubes. As a result, when disposing of them they should be considered hazardous waste. Some of these tubes may have groups of three tiny, very closely spaced R, G, and B painted dots to produce color pictures. Color-blind people will lack R, or G, or B cones, or some combination of cones. (The three color cones in eyes may not be sensitive to exactly the stated R, G, and B color frequencies, but the basic idea is correct.)

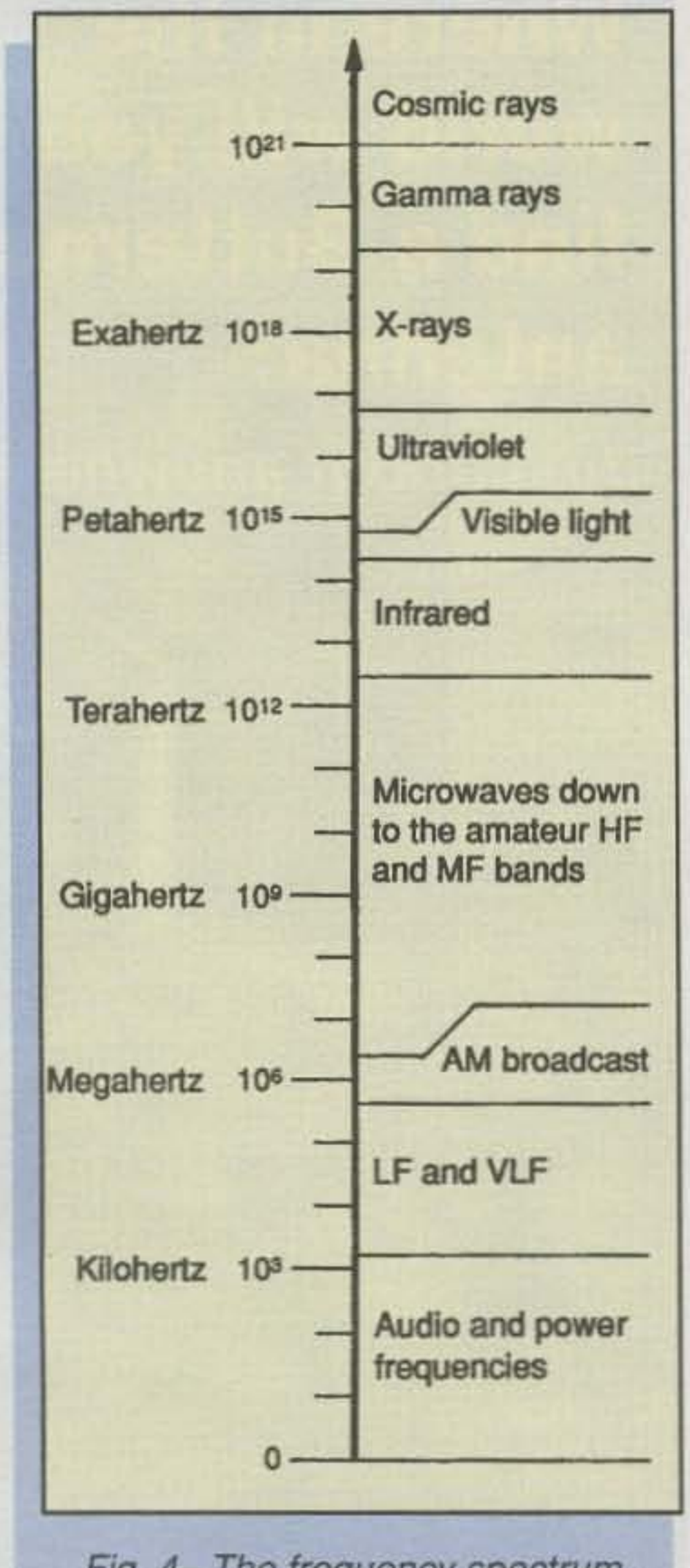


Fig. 4– The frequency spectrum.

When an object absorbs all visible frequencies but re-radiates none, it appears black. If all visible frequencies are reflected equally, we see it as white or bright. Something reflecting all visible frequencies, but with low intensity (few RGB photons), appears to be gray. Is it understandable why white, black, and gray are not considered to be "colors"?

Photons Other Than Light

Photons with lower frequencies than our eye cones can detect are said to be at an **infrared** frequency, meaning a *lower frequency* than deep red, or below ±400 THz. Modern electronic on-off digital signals carried along very thin silica-glass **optic fibers** are often infrared photons, although they might be of any frequency. The composition of the glass of an optic fiber and any contaminants in it determines the frequencies of the photon energy it carries best. For example, any water molecules in a silica fiber greatly reduce the transmission of frequencies around 215 THz. Most of these photon transmissions are in the microwatt or milliwatt range.

These theories are considered to be in the field of **quantum optics**, which includes **lasers.** A laser beam is a tightly focused, thin stream of single-frequency photons usually generated at some visible or near-visible frequency. Its rounded wave fronts are flattened and then passed through a small orifice, so there is no dispersion of the radiated wave. Lasers can generate from microwatts to more than kilowatts of radiant power.

Electric heaters convert electron flow into the radiation of huge numbers of photons. Most of this photon energy is radiated at an invisible **near-infrared** frequency. Electromagnetic photon waves can be also converted to **phonons**, mechanical vibrations of atoms or molecules in our tissues that are felt as heat when they activate nerve endings below our skin surface. The visible red glow given off by an electric heater's hot coils is photon energy at slightly higher frequencies than near-infrared. These photons can be seen as red by our eyes, but are also felt when converted to phonons in our tissues.

If a photon is produced at a frequency somewhat higher than can be seen, it is said to be a photon of **ultraviolet** (*ultra* meaning *higher than,* or above ±800 THz). Still higher frequency photons fall into x-ray, then gamma-ray, and finally cosmic-ray frequency bands, (fig. 4). An important fact about photons: *The higher the frequency of photons, the more energy they contain.* Usual daily amounts of infrared and visible frequency photons and phonons may heat our skin but normally do no damage. Ultraviolet, x-ray, gamma-ray, and cosmic-ray photons are harmful. Even high blue and violet frequency photons, if there are enough of them, can be harmful, particularly to the fovea and macula of our eyes. Red or orange sun glasses act as low-pass filters, passing only the lower visible frequencies.

At the top end of the spectrum (as far as we know right now) are cosmic rays. These are probably caused by explosions of supernovas, which blow hydrogen and helium and other atomic nuclei, plus alpha particles, out into space. Being positively charged, these particles are deflected by all magnetic fields they encounter while whizzing in every direction around the galaxy. When they strike our atmosphere, they produce ionization layers in the upper air and can develop extremely high-energy and high-frequency photons.

Going the other way, the lower the frequency of near- to mid- to far-infrared ranges, the less effect photons may have on our bodies. However, even in the microwave or very-far-infrared regions, say from 300 MHz and up to the far-infrared, several watts of photon power may be considered damaging. Microwave ovens, for example, are not good places for your body. Diathermy machines, which are really HF radio transmitters without antennas, operating in the 17 to 30 MHz range, with controlled powers up to perhaps 200 watts, can be used to develop heat deep inside the human body and can be dangerous if the power level is set too high. Doctors often use scalpels with a ±2 MHz power of 50 to perhaps 225 watts to burn or sear blood vessels shut as incisions are made across or through them. We never think of RF energy being radiated from a transmitting antenna as being photons, but it follows that radio waves are only lower frequency photons being generated by alternating electron currents striking atoms in an antenna wire!

It has been estimated that a 100 watt light bulb gives off something like 25×10^{19} (25 followed by 19 zeros!) photons per second, including all of the infrared, visible and ultraviolet frequencies. Actually, our bodies are being bombarded by zillions of photons all day long, every day, even when we are asleep in a warm, dark room. "Warm" means radiated energy from lower than visible frequency photons radiating outward from not-cold walls, floors, etc., being converted to phonons in our skin.

It is possible that future integrated-circuits (ICs) and other electronic devices may operate by photon rather than electron action and increase their speed of operation.

Many atoms and molecules can be made to **fluoresce**, meaning they will radiate photons when excited by some energy source, such as a current of electrons. Optical fluorescence is seen when moving electrons strike the gas or the paint molecules inside fluorescent lamps, in neon gas tubes, in **light-emitting-diode** (LED) lamps, and on the painted inside surfaces of oscilloscope, TV, and computer screens. The aurora borealis lights are upper atmosphere atoms usually fluorescing at a bluish frequency because of particular types of high-altitude gases being struck by the protons, ions, and electrons of solar winds caused by eruptions on the surface of the sun many hours before.

If the atoms or molecules of a wire carrying a current have several outer orbital electrons free to move, that wire

is said to be a good **conductor** of electric current. If a wire is made of atoms or molecules with few outer electrons free to move when an emf is applied, it will inhibit, or resist current flow. Such a wire is said to have electrical **resistance**. Materials having no outer electrons free to move under normal electrical forces are called **insulators**. Most insulators will break down if the voltage across them is high enough.

With the great reduction in the size of modern electronic equipment, such as in computers and other devices, manufacturers are beginning to think in terms of using low resistance connecting "wire" conductors between parts that are only one or two atoms in width! Testing gold and lead as one-atom-wide metallic conductors, gold, which is a good conductor of current in its normal bulk form, has only one outer-orbit electron free to move. In one-atom-wide conductors, lead has less resistance than gold because it has three electrons that can move, although it has about eight times more resistance than gold in normal bulk form. The current-carrying ability of a one-atom-wide conductor is about one ten-thousandth of an ampere (a mere 628,000,000,000,000 electrons per second!), which is enough to operate many modern transistor and IC circuits.

Quirks of Quarks

Getting back to electron current flow, there are six very important particles in the nucleus called **quarks**. They can help in forming different nuclear particles. They come in three pairs that are named and have the electric charges of:

First—**Up** quarks ($+^2/_3$) and **Down** quarks ($-^1/_3$)

Second—**Charm** quarks ($+^2/_3$) and **Strange** quarks ($-^1/_3$)

Third—**Top** quarks ($+^2/_3$) and **Bottom** quarks ($-^1/_3$)

Weird names, but that's another story. Three of these—the Up, Charm, and Top (or **uct**) quarks—all have fractional charges of $+^2/_3$. Thus, an **uct** group of quarks would have a total charge of $+^6/_3$, or +2.

The Down, Strange, and Bottom quarks also have fractional charges, but of $-^1/_3$. A **dsb** group of quarks would have a total charge of $-^3/_3$, or –1 (but not an electron).

When all six quarks group together, they have +2 plus –1, or a total charge of +1, and form a deuteron, the dumb-bell-shaped H^2 heavy hydrogen nucleus.

In quark terms, two Ups and one Down (**uud**), or $+^2/_3$ plus $+^2/_3$ plus $-^1/_3$, totals $+^3/_3$, or +1, and form a **proton**.

In quark terms, two Downs and one Up (ddu), or $-^1/_3$ plus $-^1/_3$ plus $+^2/_3$, total zero charge, and form a **neutron**. This is what physicists mean when they say that all matter consists of only electrons, up quarks, down quarks, and neutrinos.

Quarks can also form other particles, such as hadrons, baryons, and bosons. If the "Higgs" boson can be found, it may solve the mystery of why matter has mass and what produces gravity.

It is interesting that electrons and protons might endure forever, but neutrons, once they escape from an atom, will go into "beta decay" and within about 15 minutes break down into a proton, an electron, and an antineutrino.

Whereas a quark and an antiquark may hold tightly to each other, forming a particle called a **meson**, if an electron and a positron, also matter and antimatter, combine they will explosively annihilate each other, radiating extremely high photon energies at gamma- or cosmic-ray photon frequencies.

There is talk of mixing hydrogen and anti-hydrogen in an engine to develop a reaction with enough heat energy to trigger the type of thermonuclear fusion that powers hydrogen bombs. Physicists can produce anti-hydrogen and some day may be able to hold it in a magnetic chamber. It is just such energy that is needed to power an engine to drive a space vehicle to speeds of up to perhaps half the speed of light. Scientists have not found out how to do this yet, but they are working on it. At such speeds a vehicle might reach the nearest star Alpha Centauri, at a distance of about 4.3 light years, in a practical travel time of about 8.6 years, but of course not with any humans aboard. Information about the star and any possible planets orbiting it could be received back on Earth after about 13 years.

Who knows what wondrous things will be accomplished by the combining of matter and anti-matter, or by putting photons to presently unthought-of uses in the future?

Some very low-temperature experiments, those approaching absolute zero, have shown that electrons in a strong magnetic field behave in an unexpected way. When a very cold electron is struck by photon energy, it apparently breaks up into two **electrinos**. Such very unusual conditions demonstrate that particles that are thought to be understood today may behave quite differently under extreme conditions. As with the electron, it is possible that other things we now consider to be basic particles may someday be found to consist of still smaller particles plus forces.

The more exotic nuclear particles and forces mentioned here are not normally found in nature except during radioactivity or when nuclear particles are being smashed into each other. Apparently, at some time they were present to produce the nuclei of all of the present atoms in the universe.

It appears that the Greeks had their feet on the first rung of the ladder of our wonderful world of electricity, electronics, and physics with their ideas about ***atomos***. ■

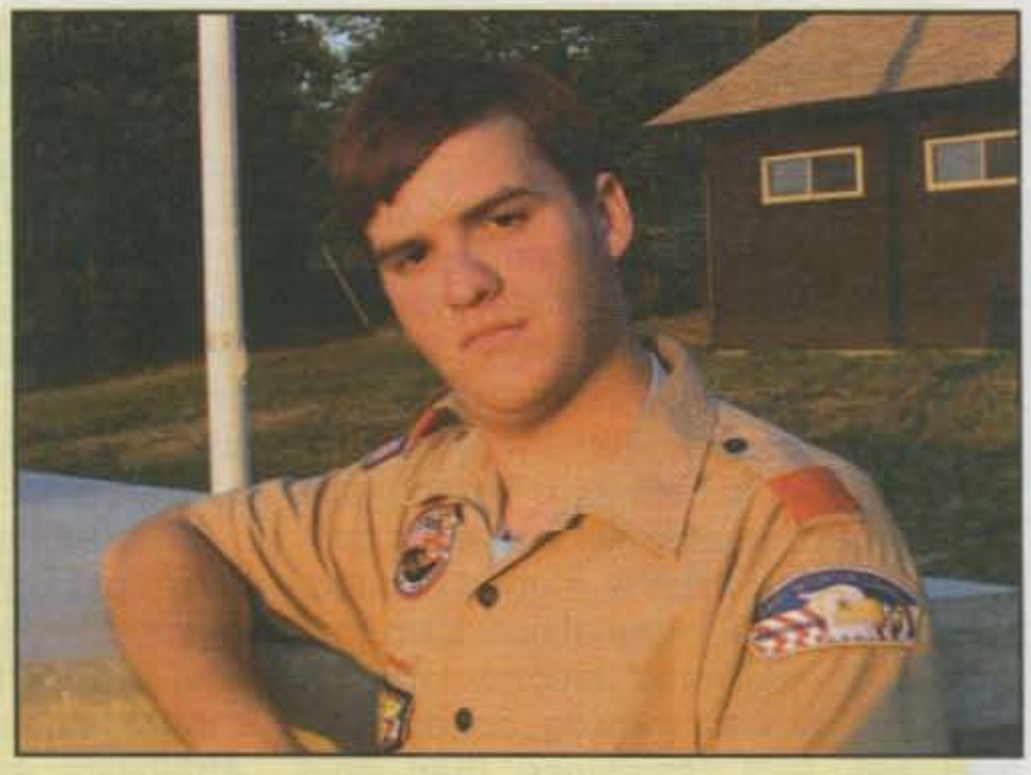
Public Service

BY BOB JOSUWEIT, WA3PZO

Public Service and Emergency Communications

Public Service—A Youthful Event

Amateur radio public service continues to thrive because of the young people who have become active in the hobby. Each year *Amateur Radio Newsline* selects a Young Ham of the Year, and *CQ* is one of the corporate sponsors. This year Josh Abramowicz, KB3GWY, of Reading, Pennsylvania was selected as the recipient of the award. The two runners-up were Evan Anderson, KCØCWP, of Ashland, Nebraska and Thomas Tenaglia, K3TAT, of West Chester, Pennsylvania. This month we meet these three individuals who serve their community in the public interest.



Josh Abramowicz , KB3GWY, winner of this year's Young Ham of the Year award, saw a perfect match between Scouting and amateur radio. (Photo courtesy the Abramowicz family)

An Eagle's Eye

It's always exciting to meet someone who has a zest for life and lives it to the fullest. Josh Abramowicz, KB3GWY, is one such individual. Josh is a 17-year-old Eagle Scout who takes advantage of the close relationship between amateur radio and scouting. According to the Young Ham of the Year award administrator, Bill Pasternak, WA6ITF, Josh promotes amateur radio to other youngsters through the Boy Scouts. He is part of a ham family. His dad Mark, NT3V, and mom Suzanna, NZ3G, both hold Extra class licenses.

Josh's interest in ham radio didn't fully grow until he received an offer to serve on the K2BSA special-event staff at the Boy Scouts' National Jamboree at Fort A.P. Hill, Virginia. In order to serve, Josh needed to have his ham ticket. He quickly studied and got his Technician class license and then quickly studied for the General exam. His General license arrived just before the Jamboree. Once at the Jamboree, Josh helped demonstrate amateur radio and train about 400 Scouts who earned their Radio Merit Badge. Larry Wolfgang, WR1B, Assistant Coordinator of the Radio Merit Badge program, said, "Josh was a valuable member of our staff, helping teach radio and electronics theory and assisting Scouts with shortwave listening and kit building. When he wasn't teaching Merit Badge classes, Josh could be found at the K2BSA demonstration station introducing Scouts to the joy of on-the-air contacts."

Josh made an immediate impression on the Scout leaders and was selected to be part of the team that would make contact with the International Space Station. For anyone not familiar with a National Jamboree, Wolfgang described the operation in terms of "setting up a major DXpedition station and operating in the middle of a large city with a steady stream of curious visitors coming to see what is going on."

Josh also has an interest in contesting. Frankford Radio Club member Steve Dobbs, NE3F, invited Josh to participate in the 2001 CQ World-Wide DX Contest. Josh quickly became familiar with the radio, antennas, and logging program. Having a seed planted within the Frankford Radio Club would provide Josh with additional help in serving the Scouting public.

Josh continued his interest in Scouting and knew that the Boy Scouts of America Hawk Mountain Council camp had recently completed construction of a new science center. As with many science centers, it has a computer room, an astronomy lab, and an empty room reserved for "Electricity and Communications" studies. Josh decided to help fill it with amateur radio. Josh knew he was going to need some help to make this dream happen. He began to recruit Scouts from the Order of the Arrow and the camp staff whom he knew, getting them licensed and having some fun!

After meeting with several adult advisors at the camp to discuss his proposal, Josh decided the best course of action would be to establish a Venture Crew. For those who may not be up on the latest in Scouting programs, Josh explained that the Boy Scouts of America used to have a program called Exploring: "It was designed to promote high-adventure activities for older teenagers in Scouting. Eventually it was converted into a career-oriented program." Venture Crews are designed to offer special-interest program possibilities for teenage Scouts. It also encourages involvement of teenage girls and young women.

Last April Josh presented his idea to Richard Bennett, Scout Executive for the Hawk Mountain Council. After hearing the proposal, Bennett asked where Josh would like to put the station. Josh showed him the location and told him of a plan to put in a cabinet where HF and VHF gear could be stored, along with a computer and other accessories. Not only did Bennett enthusiastically endorse Josh's concept, he also offered Josh encouragement to start a Venture Crew to support the station.

Josh had already been thinking about a ham radio Venture Crew. Each Venture Crew needs a club or organization to serve as its charter sponsor. Josh approached the Frankford Radio Club and asked for its help. In his proposal Josh wrote:

"You're asking, why am I coming to the FRC? The Boy Scouts of America requires a club, organization, or civic group to sponsor a Scouting unit. Churches and PTOs sponsor Cub Scout Packs and Boy Scout Troops. The same procedures follow for a Venture Crew. That's where the FRC can come in. While at the National BSA Jamboree last July, I met John Pice, KX1X. ... He started up a Venture Crew in his Scout Council and has a radio club as its sponsor.

c/o CQ magazine
e-mail: <wa3pzo@cq-amateur-radio.com>

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SS-18	15	18	1⅜ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅜	4.2
SS-30	25	30	3¾ x 7 x 9⅝	5.0

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅜	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 9⅜	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 9⅜	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 9⅜	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 9⅜	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

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ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
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SS-10MG, SS-12MG
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SS-12TK OR SS-18TK
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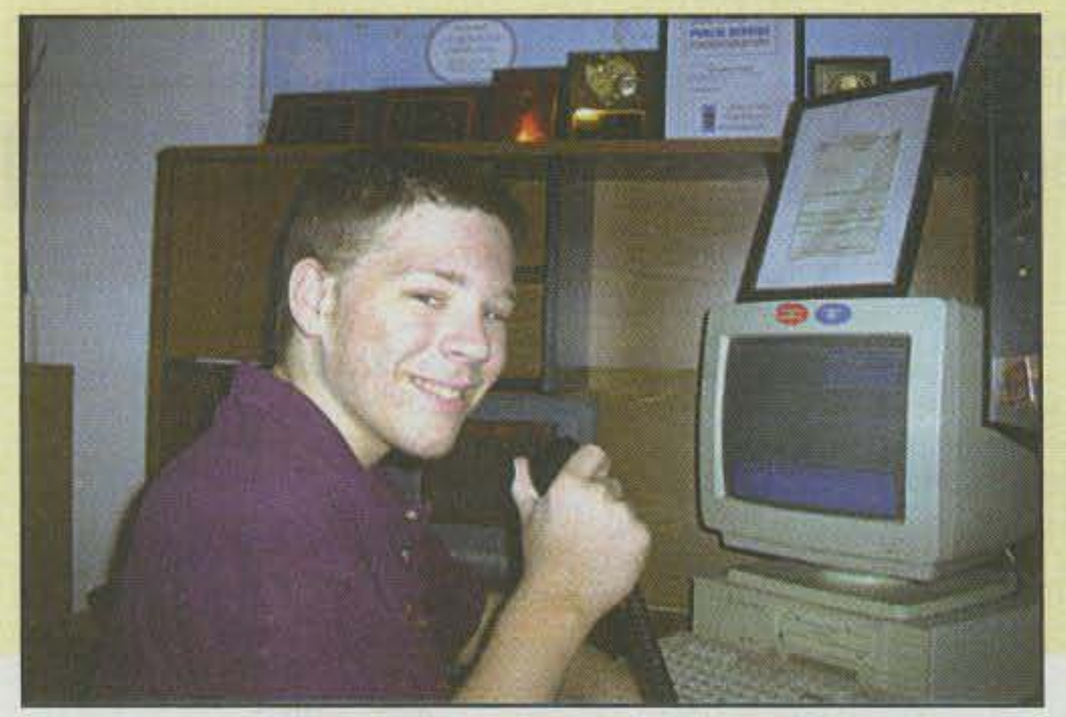
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service



Evan Anderson, KCØCWP, likes doing things for other people and being right there when something happens. (Photo courtesy KCØCWP)

However, he's training these young operators to become contesters. I've had many conversations with John about what he's doing. He's been real successful.

"I believe that if our hobby is to grow, we need to go out and recruit teenagers and young adults to get active and on the air. I've gone out with my father on radio demonstrations and have worked on presentations for the Radio Merit Badge. I take my HT with me when I go out camping and show it off to the guys. They're interested. I told them about the things the hobby has to offer, like talking around the world or to the International Space Station, or using computers and the like. They're interested!"

In early May Josh created a display to recruit new Venture Crew members. He set up a dipole and mounted a tribander on a tripod and had HF and VHF radios. He also brought along a computer on which he played a CD of photos from the K2BSA operation at the BSA Jamboree. On that CD were the audio portion and lots of photos of the K2BSA-ISS contact. According to Wolfgang, "That presentation alone had the boys filling out interest forms to join the crew and get their licenses."

Josh made contacts on the local repeater. He also put the Scouts on HF and made contact with a Scout camp in Nottingham, England and with an operator in Idaho who generously gave a good 50 minutes of his time to talk to all the boys present.

On one Saturday night Josh got permission to have the older Scouts meet him at the radio area. It was the weekend of the New England QSO Party. Josh and the future Venture Crew members/hams handed out contacts from eastern Pennsylvania to several stations. Wolfgang said, "The kids were hooked!" Josh distributed participation certificates with his callsign on them and listed the Scouts who participated at the station.

"Spark in the Eye"

Tom Tenaglia, K3TAT, is far more than electrons and projects. Jim Biddle, W3DCL, who nominated Tom for the Young Ham of the Year award, said he "has the 'spark in the eye' and 'fire in the belly' that make being around him a fun experience." Tom has helped the Marple Newtown Amateur Radio Club with its club newsletter and web page, and has served as a net control station, repeater control operator, and IRLP (Internet Repeater Linking Project) trustee. According to Biddle, "Tom has been an active amateur radio operator while also providing sufficient balance to permit school, social, and general computer-based outreach."

"His humility was temporarily a partial stumbling block," said Biddle, "when it was announced that he had been awarded a position as a student in the highly competitive Pennsylvania Governor's School for Information Technology Leadership Project." Tom's project, Project Birdcage, would link "amateur radios around the world, via IRLP technology, that are strategically placed throughout the International Space Station's orbit (including oceans) so that the ISS can be heard by and spoken to by licensed amateur radio operators at anytime from any place. Also, schools and the rest of the public would be able to hear the ISS via the Internet (Real Audio Server)."

Tom said, "This network would open a gateway for other manned satellites to talk to each other and earth; international and emergency communications would eventually become possible. Only licensed amateur operators would be able to communicate with the ISS (except for third party, of course) due to the use of amateur frequencies. This project would eliminate the fact that the ISS can only be heard for a maximum of about ten (10) minutes while it is over a given location."

Not only is Tom interested in the technical side of IRLP, he also works closely with the end users by creating easy-to-read documentation for both the general population and control operators. If the tutorials don't work, Tom offers individual instruction. Locally, he is working on an IRLP link that will permit local EOC and ARES/RACES operations to be in contact with the state emergency management agency.

The Dayton Amateur Radio Association Scholarship Committee also awarded Tom a $1500 scholarship. He will study computers and information systems at Drexel University in Philadelphia.

Evan Anderson, KCØCWP

How many 12-year-old kids do you know who have served as president of their local radio club, run the local ARES and severe weather nets, and helped out with many community events, including Halloween night patrol, parades, and fundraisers for the club?

According to Dale Hoffart, KØAMP, Evan Anderson, KCØCWP, is a remarkable person. When Hoffart first heard Evan on the radio, he thought he was listening to a 16- or 17-year-old. "He is very mature for his age," said Hoffart.

Now 14, Evan is proud of getting his Novice license at age 10 and then studying for his Technician license. "It was very tough," said Evan, "but I did it with the help of my dad Matt, KAØBOJ, my mom Gwen, KØGAA, and my grandfather, Marvin, KAØEOE, as well as the encouragement of other hams in the local community."

What makes Evan an even more amazing person is that he is limited to a wheelchair. He has spina-bifida, a birth defect which left him paralyzed from the legs down. "Limited" does not seem to be part of Evan's vocabulary, however. He is a member of the Nebraska Red Dawgs basketball team and has gone to the national playoffs. Evan takes along his handheld wherever he goes.

"I have two other siblings, my brother Nick and my sister Natalie, both of whom are studying for their ham radio tickets," said Evan. "I recently upgraded to General and enjoy SSB, CW, packet, ATV, satellite work, PSK-31, 6 meters, and everything else the hobby has to offer."

Why public service? I liked the idea of being able to help out the community at large, being a part of something bigger," said Evan. "I like doing things for other people. I enjoyed the fast-pace aspect of the weather nets. I like being right there when it happens." He continued, "We get to help out at the Nebraska State Fair, which is fun. You get to meet lots of people, and they always ask a lot of questions about us guys with the radios."

Attention MARS Operators and Users

A project for the USMC Historical Division is seeking written and oral histories of service and civilian personnel who participated as operators in the MARS (Military Affiliated Radio System) program. Although the main focus is Navy/Marine Corps MARS during the Vietnam Era, contributions from all services and all eras are welcomed and encouraged.

In addition, if you used the MARS systems to communicate with your family or others via either phone patches (Over!) or MARSGRAMS, please contact them.

They are also seeking artifacts for the exhibit at MCRD San Diego, including MARSGRAMS, pictures of stations and personnel, orders (DNC-8), etc.

For further information on the project, or if you would like to submit your MARS service dates, stories, etc., contact <MARS @borgmangroup.com>. The group has been helpful in *CQ*'s coverage of MARS operations. We at *CQ* would also be interested in hearing your stories, which may be sent to <wa3pzo@cq-amateur-radio.com>.

Evan encourages other hams to get involved with public service: "I tell other hams about the fun and excitement that we have when we do storm nets, or special events such as the Nebraska State Fair, parades, Field Day, Scout Jamboree, Kid's Day, just to name a few. I challenge them to think back to when they first got their license and how excited they were, and tell them that they can enjoy that kind of excitement every day by helping out others."

Evan also encourages people to get involved with ham radio. "I tell them about the fun I have talking to people all over the world," he said. "There are so many aspects to this hobby. I pick out a few and tell them about them. The best way is to get them to come over and see my shack and let them touch the dial and tune around. I let them talk with someone either across town or around the world. It's fun to watch their eyes light up when that person on the other end comes back to them and see the disbelief of how easy it is. One of the things I tell them about is the International Space Station, because most people have heard of that. I tell them that most on board are ham radio operators, and they talk to people like you and me. I also tell them that with a little hard work they too can have their own amateur radio license." He continued, "Most people I talk to become interested, and if they want to, I tell them I can help them with any questions that they might have."

Three stories, three incredible young men. Each one is energetic and has accomplished more in a year than some of us have in a lifetime. Each one has done many good things to promote amateur radio and help it to grow and prosper, especially with regard to recruiting youth into our hobby. Remember, public service is not just emergency communications. Serving the public can also involve education and inspiring our youth.

This month we want to thank the friends, families, and especially our three incredible young men for sharing their stories with us. Do you have a story to tell? Drop us a note. Until next time, 73, Bob, WA3PZO

How It Works

BY DAVE INGRAM, K4TWJ

Theory 'n Practice

Straight Talk on Reduced-Size Antennas: A Basic Study

As you will recall, our last two "How It Works" columns discussed antennas and explained their basic concepts of operation. Since these signal radiators are always a popular topic among radio amateurs and since questions on antennas are included in all FCC license exams, this month's column looks slightly further into the subject. This time we will consider an area affecting a large number of amateurs new and old—reduced-size antennas and the techniques for reducing their physical rather than electrical dimensions. Then in the next few months we will shift focus and cover other areas of interest such as switching power supplies, power-line noise causes and cures, etc. The overall study promises to be both interesting and informative from several points of view, so stay with us and continue to expand your amateur radio horizons.

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Photo A– Loading coils such as those employed in Hustler resonators are often used to reduce an antenna's physical size. The more turns of wire in the coil, the smaller the antenna element, but signal capture/radiation area and the efficiency are also reduced.

Now let's discuss antennas, specifically the popular ways of cutting them down to a size we can handle, starting with the ever-famous loading coil.

Loading Coils and Traps

Surely the most familiar and popular means of reducing the height or length of an antenna's radiating element is with the use of a loading coil. A convenient and easily recognized example of this technique is a mini Hustler HF mobile antenna as shown in photo A. This 20 meter antenna has an electrical height of one-quarter wave, or approximately 16 feet, but a physical height of only 4 feet. The "missing 12 feet," so to speak, is made up in the enclosed coil. That does not necessarily mean the coil consists of exactly 12 feet of wire, however, or that all coils perform equally. Why?

A coil's combination of distributed capacity and inductance plus its turns count and location on its related element determine the antenna's overall length and efficiency. Generally speaking, the shorter the antenna, the more

Photo B– This new "Buddipole" portable multiband dipole utilizes longer elements and fewer turns of coil wire, resulting in higher efficiency and improved performance. (Discussion in text.)

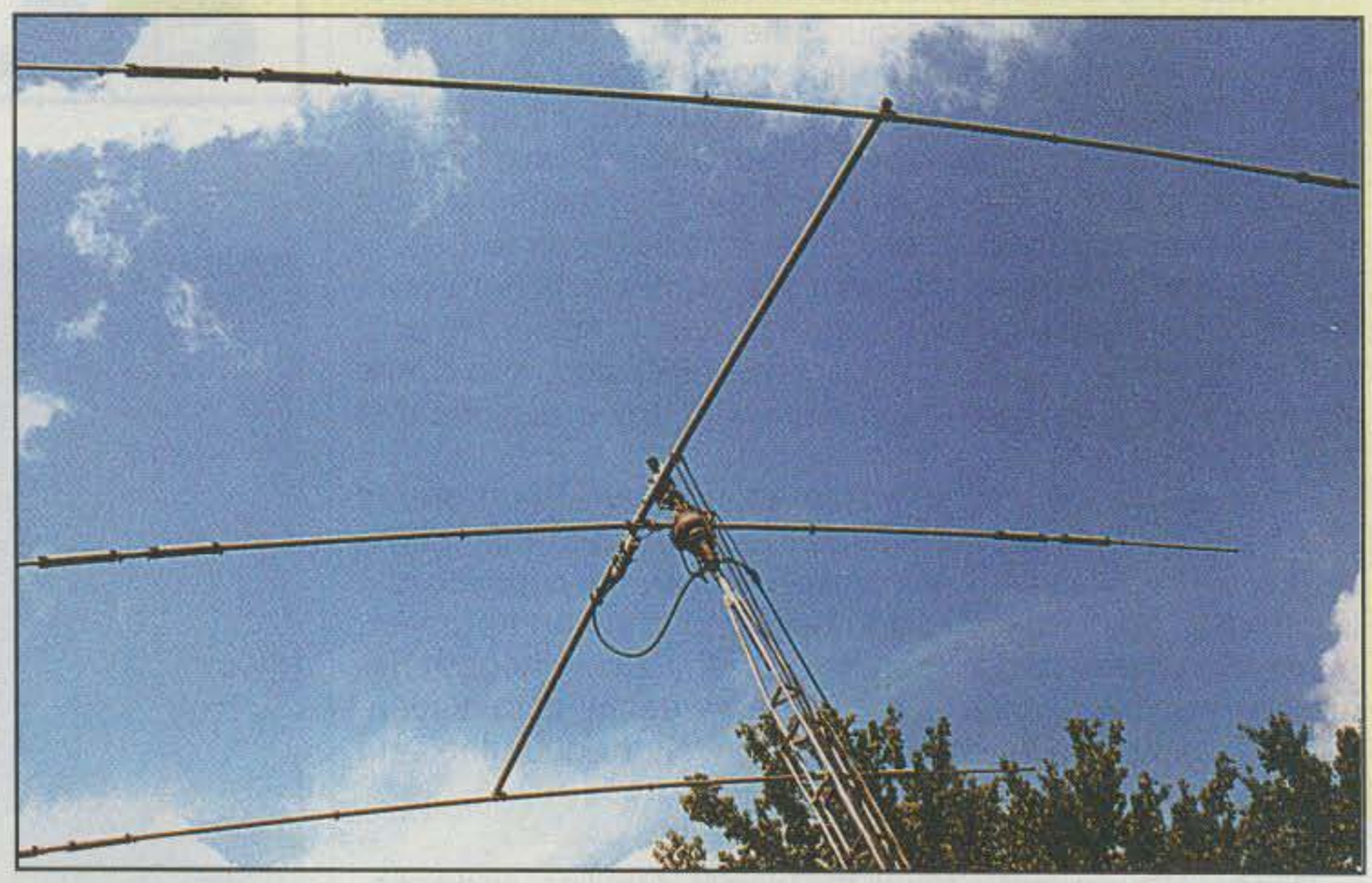
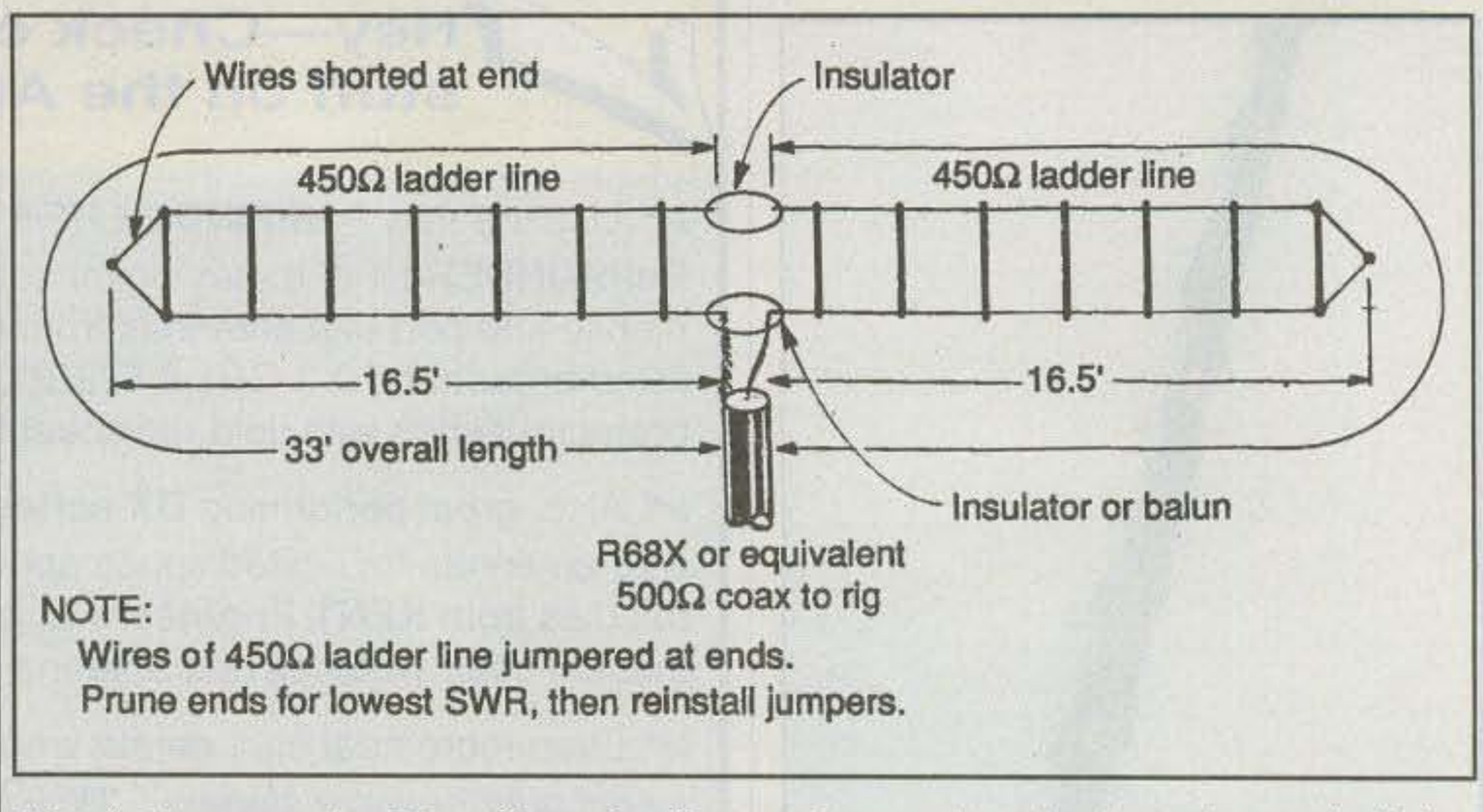


Photo C– Traps such as those employed on triband beams use enclosed coils and tubular capacitors to electrically separate outer sections of elements according to bands. As discussed in text, the coils also shorten length of elements.

Photo D– Although not visible beneath its glossy outer cover, the popular Outbacker mobile antenna employs a helical winding as both a radiating element and a "stretched coil" for multiband loading. Winding on lower shaft area is basically a jumper for selecting bands. (See text.)

coil turns it requires to cover a particular band; and the more coil turns it requires, the narrower its bandwidth and and the lower its efficiency. It is this quest for perfection that continuously inspires improvements and expansions in loading-coil designs.

Now study the loading coil on a new W3FF "Buddipole" portable dipole as shown in photo B. This coil is larger in diameter and mated with longer elements, a combination that reduces the amount of coil needed and improves efficiency. Large antennas always "reach out" better than small antennas. The Buddipole, incidentally, is a very promising new style of break-down multiband dipole you can pack in its own 2 foot long case, carry anywhere, and use for on-



NOTE:
Wires of 450Ω ladder line jumpered at ends.
Prune ends for lowest SWR, then reinstall jumpers.

Fig. 1– An example of how linear loading can be employed to homebrew a half-size yet impressive-performance dipole. The 40 meter dipole shown is assembled from readily available ladder line, which is jumpered at its ends. Total ("wrap-around") length of each side is calculated with the classic formula 234/f(MHz) = L (feet).

the-spot HF'n. More details on it were in last month's "World of Ideas" column and are also available on the web at <www.buddipole.com>. Check it out!

An interesting variation or expansion of the loading-coil concept is the famous band-selecting trap as shown on a Cushcraft A3 beam antenna in photo C. Simply explained, a trap consists of a coil and a capacitor which is often tubular-shaped and also serves as a cover for the coil. The combination acts as a band-stop circuit or frequency-sensitive switch to electrically separate outer element sections of an antenna so it can work more than one band. As a secondary benefit or action, the trap's coil reduces element length. The amount of reduction depends on the coil's size and/or turns count. This also explains why multiband "trapped" beams are somewhat smaller than beams with full-length elements and why full-size beams perform slightly better than "triband" beams. Another thought worth remembering is gain figures for trapped multiband beams usually relate to their highest frequency band where dimensions are closer to full size rather than lower bands where maximum coil loading is used. Fortunately, that difference is usually only around 3 dB, which is an acceptable trade-off for multiband operation.

Helically-Loaded Elements

Yet another variation of the loading coil is a helically-wound element as shown by the well-known Outbacker multiband mobile antenna shown in photo D. Here, a flat, tape-like copper conductor is wound with wide-spaced turns along the full length of a non-conductive fiber-

Photo E– Capacity hats such as employed on this Hy-Gain AV-640 3/8-wave vertical are quite effective for extending an antenna's electrical height while keeping its physical height within a reasonable limit. Notice these capacity hats are used in conjunction with loading coils and are also larger rather than smaller near the top. That is because they are connected in parallel rather than in series. (Discussion in text.)

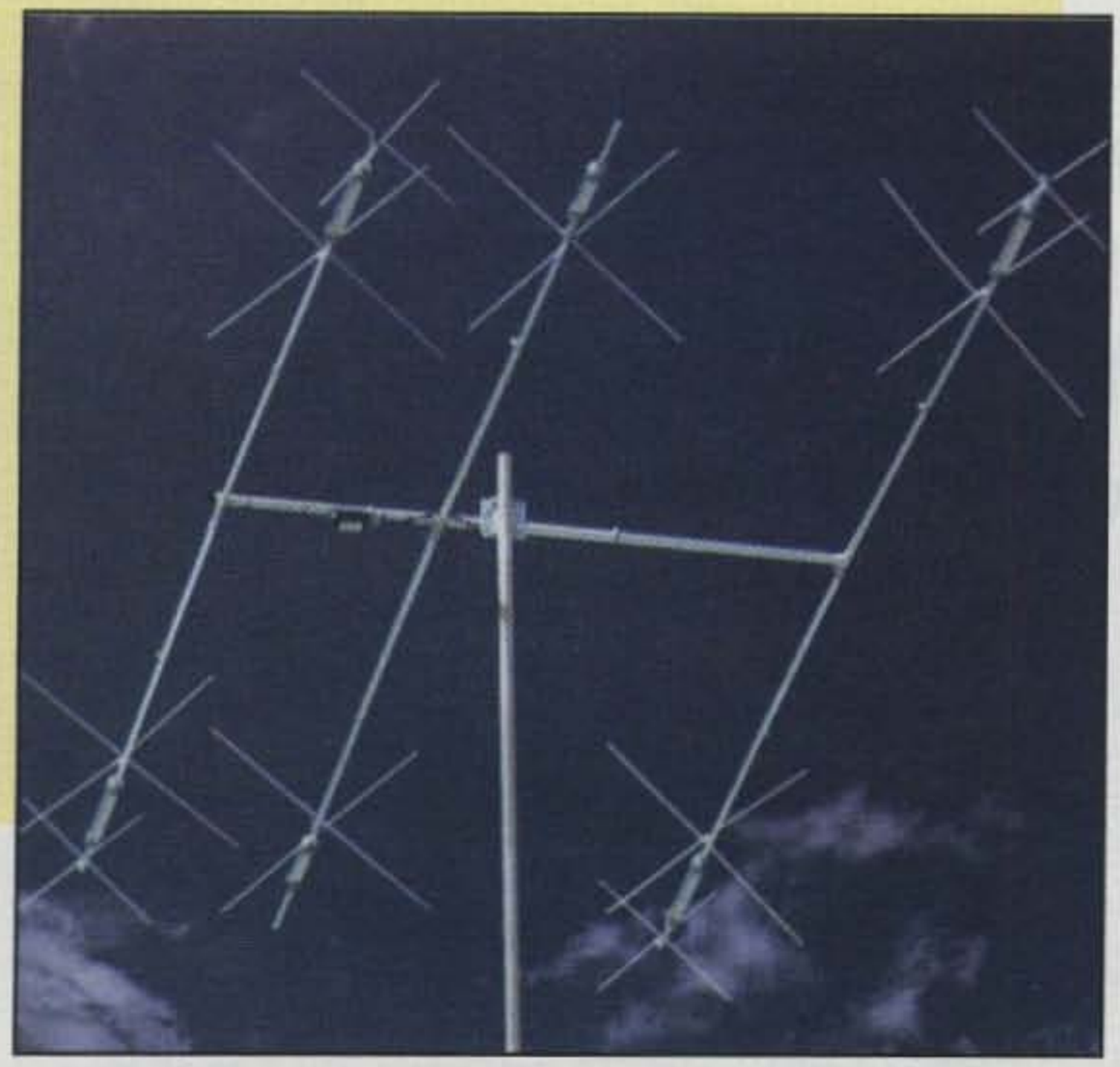


Photo F– The new Cushcraft MA5B multiband minibeam uses loading coils plus capacity hats connected in series to switch bands and shorten element lengths. This concept is an effective and clever way to reduce an antenna's size, as capacity hats help reduce the amount of inductance (coil turns) needed and thus improve antenna efficiency.

glass shaft (a helix rather than a coil). Taps are included at various points along the helical winding, and a jumper wire is used to short out turns for selecting different bands. The approach of using a "stretched out coil" as a radiating element can deliver surprisingly good performance, especially when its helical turns are spaced to produce more radiating surface than coil. In the case of the Outbacker, the jumper wire, or "Wander Lead," for changing bands is wound in the opposite direction of the helical winding so jumpered turns cancel and become straight radiators. Another easily recognized example of helically-loaded elements, incidentally, is the classic "rubber duckie" we all use with our 2 meter FM handhelds.

The overall efficiency (and versatility) of a helically-wound antenna/element depends on its height, length, and number of turns per feet. As always, taller or longer antennas/elements have more signal capture and/or radiating area and thus exhibit an advantage over shorter antennas. Ah, but shorter antennas have the low-profile advantage and can go places where taller antennas cannot go. Everything has its advantages and its trade-offs.

Linear Loading Sections

Another technique for reducing the overall physical length of an antenna involves linear loading or "folding part of its radiating element back on itself" las illustrated in fig. 1. Here, a homebrew 40 meter dipole (which is normally 66 feet long) is reduced to an overall length of 33 feet by linear loading. The antenna is made from 450 ohm ladder line simply because it is readily available. Other wide-spaced twin wires such as 600 ohm "open line" work equally well. The wires are jumpered together at the end to double their electrical length. Since each linearly-loaded section or half fills more free air space than a coil and since that space is adjacent to an already-in-use (33 foot) section of wire, signal-radiating capabilities are quite good.

Keep this idea in mind, friends. It is a cool way to pump out a hot signal in half the usual space. This antenna design also should prove very attractive for working 60 meters with a 45 foot rather than 90 foot (approximate) antenna when the band is opened for amateur radio use. Some additional examples of linearly-loaded elements, incidentally, are found in KLM or M^2 Antenna System's KT34-series of beams and Butternut's super-small but impressive-performing HF2B "Butterfly" beam. Linear loading works great!

Capacity Hats

A final and increasingly popular means of reducing an antenna's overall height or length is with the use of one or more capacity hats as shown on the Hy-Gain AV-640 multiband vertical in photo E. Here the aluminum rods or "spokes" positioned near the antenna's top and at right angles to the element are used in conjunction with loading coils to both reduce overall length and minimize the amount of loading coil required for achieving resonance. This combination works like a champ because it exchanges actual radiating surface (the capacity hat) for coil turns and thus packs more punch into a specific antenna size. The AV-640, for example, is a 3/8-wave vertical which calculates to a height of 49 feet for 40 meters. The capacity hat and coil, however, reduce the antenna's height to 24 feet. Clever!

Here is another noteworthy point. Using multiple capacity hats and loading coils (or coils in traps) can produce a reasonably high-performance yet remarkably compact multiband beam. An easily recognized example of that fact is the Cushcraft MA5B shown in photo F. Each amateur's needs differ. Knowing the options and trade-offs of size and performance at your access make life easier, right?

Miniature Antennas

An ever-increasing selection of ultra-small and retractable HF antennas has mushroomed in popularity during recent months. The convenience in setting up and using these 4 foot (typical) wonders is unequaled, but bear in mind reduced size also means reduced performance. In addition, many folks tend to place miniature antennas in areas where radiation is totally stifled. Even a large high-performance antenna would have difficulty "working out" from such restricted places. Remember, too, miniature vertical and pull-up whips must have a ground-synthesizing counterpoise to operate at even 50 percent efficiency. Understand I am not criticizing "pocket size" HF antennas: they cannot be expected to work like full-size antennas, but they are great for their intended purpose of providing instant HF capabilities from anywhere and at any time.

Conclusion

Every amateur dreams of owning a massive-size beam antenna atop a super-tall tower, but factually speaking, most of us are limited to smaller antennas. Multiband verticals and dipoles have always been and continue to be the all-around most popular and often used antennas. They are affordable, easy to assemble without assistance, and work well. More important than owning a big antenna is using your license and gear to your benefit. Exercise that on/off switch! Get on the air at least a few minutes every day! Have fun! You only live once. Enjoy it! Listen for me, too. I frequent 14.200–14.250 MHz Saturdays and Sundays at around 2300 UTC. Let's QSO!

73, Dave, K4TWJ

Beginner's Corner

BY PETER O'DELL, WB2D

For the Newcomer to Ham Radio

Antennas On The Rocks?

Summer is gone, it's time in most places to turn back the clocks, and soon many of us will be knee-deep in the white stuff. Blizzards are more of a threat than hurricanes for the next several months. You could procrastinate, but why not take a few minutes to think about what is coming? How will you be spending those long, cold evenings?

Three popular coax connectors (left to right): Type N, BNC, and "UHF." The first two are somewhat weather resistant, while the ubiquitous UHF connector is as worthless at keeping moisture out as it is at keeping impedance constant.

Antennas

A long, long time ago in a state far, far north of here, I put up the most elaborate set of antennas that I had owned up to that point. Two friends came for the weekend in late fall, and we spent hours getting everything just right. The antennas were as high as you could reasonably go without benefit of a tower. Everything was perfect, except I had never lived where ice storms were routine each winter. During the first storm of the season one guy wire snapped and everything came down much more quickly than it had gone up. It was a long time before I got the antennas back up. Children, can you say frustration?

Weird things happen in winter, even to those who own towers. My friend had a 90 ft. tower (might have been *slightly* overloaded) in his backyard. Then came ice followed closely by the wind and a very strange series of noises. When he went out the next morning, he found that one of the top guy wires had snapped. He still had the 90 ft. tower, the first 60 ft. were still vertical, but the top 30 ft. were now horizontal. Yes, he managed to get the antennas down, but not until spring.

Assume the worst is going to happen and that all your outside antennas are going to be wiped out at a time when you just don't want to go outside. As a backup, buy or build a simple antenna that can be erected quickly and easily and store it with *everything* (including feedline, mounting hardware, and a simple mast) you need in your garage or storage shed.

Maintenance

If you have outside antennas, now is the time to give them a thorough preventive maintenance checkup. Screws come loose, connectors come loose, and sometimes things that should be waterproof aren't. It's far better to check out everything now while the skies are clear and the temperatures are not yet frigid.

If you haven't done so recently, start with a simple SWR test (or check for a higher than normal reflected power reading if you are using a wattmeter). Does it seem normal? Just because the SWR or reflected power reading *seems* normal doesn't mean that it is. For instance, moisture inside a piece of coaxial cable often acts as an attenuator without disturbing the apparent impedance of the cable, particularly if you are taking an SWR reading at the dry end of it.

When I worked in the commercial two-way radio business years ago, we had a UHF base station that was giving its owner fits, poor reception, weak transmitted signal, etc. However, the radio checked out just fine on the bench. The antenna? It read 100 watts forward and less than 1 watt reflected, apparently an ideal SWR. Finally, we climbed the tower and put the wattmeter inline between the 7/8 inch transmission line and the antenna. Now we had about 3 watts forward power and still very little reflected power. Obviously there was something wrong with the transmission line. We replaced the line, and all the problems disappeared. There was nothing *visibly* wrong with the transmission line until we took off the connector at the antenna end. Water poured out of the line. We threw away that piece of cable. The moral of the story is to move the wattmeter to the antenna if there is any hint of a problem. That will give you a good idea of whether the problem is in the antenna or the transmission line.

You should also check the antenna itself for hardware that has loosened up or corroded. Both can be the source of major problems with an installation. If there is corrosion, you should clean it off and re-establish the connection. You might want to consider treating the connection with something to minimize further chemical reactions, particularly oxidation. Over the years I have heard of just about everything being used for treatment. Spray paint (use a good grade) works well in many situations, but I have also heard of hams using everything from petroleum jelly to nail polish to seal sensitive contacts.

As far as coaxial cable connectors are concerned, it is a good idea to disconnect the cable from the antenna and reconnect it. The abrasion from that simple act is enough to break up any minor corrosion that might have built up between the surfaces of the connectors. Some connectors are reasonably weather tight (BNC and N, for instance), while others are notoriously terrible in this respect (such as the ubiquitous "UHF" connector or PL-259).

For a couple of dollars at RadioShack you can buy a roll of very pliable putty that forms a wonderful seal around any coax connector. It will add an additional level of protection to the good connectors and save the bad ones from inevitable destruction. In a pinch, you can use a substance called "duct putty" found in building-supply stores. It is very similar to the stuff RadioShack sells, but it is less convenient to use because it comes in a block instead of strips. In-

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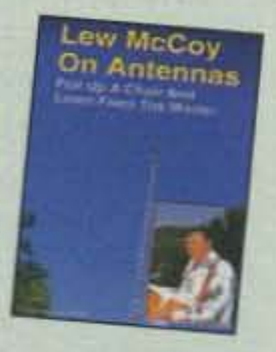

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A small butane-powered torch with a soldering-iron attachment. This may be the only soldering iron you ever need for small jobs, and a necessity if the power goes out and you need to make a minor repair. Note that it lacks the punch to solder heavy wires such as might be used for typical HF antennas.

cidentally, the connector on the 7/8 inch hardline that I mentioned theoretically was waterproof. Sure.

One note of caution here: I have never found plastic electrical tape to be of much value for weather proofing. Some hams swear by it, but based on my own experiences, I would be more inclined to swear at it. On the other hand, using it as an outer cover of the pliable putty does add a measure of mechanical stability to the putty, particularly if there is likely to be any flexing of the transmission line near the connector (say, with a rotating beam).

There are other considerations, too. Maybe you want to add a new antenna to the farm. Is it better to do it now or in the middle of February? When I worked for the two-way radio company, I had to take care of an outdoor problem on a day when the temperature never climbed above 10 degrees F, and this job was totally on the ground. I got the job done, but it took about six times as long to do it, and I apparently suffered some mild frostbite on my fingers. Maybe Santa Claus can come a little early and deliver the antenna now rather than waiting for the coldest part of the winter. Trust me: Putting up any antenna is easier, faster, and safer in warm weather.

So far we have just been considering scenarios that pretty much maintain the operational status quo for you. Maybe you want to do something different this winter. Think about it now. If you've never tried weak-signal work, this winter might be the time to get started. One thing you will find out very quickly if you don't already know it is that FM antennas are not good for most weak-signal work. That is because FM is standardized on vertical polarization, while weak-signal modes use horizontal polarization. Some studies have suggested that there can be up to 90 dB isolation between vertical and horizontal polarization. That is a lot of signal to give away. (Space communications can be done with a vertical antenna in some cases, but it is far from ideal.)

Suppose you are thinking of trying out a new band. Most of the time, we probably would get the equipment first and the antenna second. Why not the other way around? You could get the antenna now and install it while the weather is decent. Honestly, there is no truth to the rumor that you get an extra 3 dB gain for every 10 degrees below freezing the temperature is at the time of installation. The ARRL lab proved that this was bogus years ago. Go ahead and put up the antenna now.

Emergency Prep

The same forces that bring down antennas and towers also wreak havoc on power and phone lines. What are you going to do if a storm suddenly cuts you off from the rest of the world? Now is the time to prepare. If your circumstances permit it, an auxiliary electric generator is an excellent choice. If it has the capacity, you can keep your gas/oil furnace running as well as the radio. If choices have to be made, just tell the rest of your family that it is far more important to provide auxiliary power to your ham radio than to the big-screen TV, unless the Super Bowl is on. If a generator is out of the question, a large storage battery can keep a 2 meter FM rig running for days. You would want a deep-discharge marine battery instead of a car battery.

One very useful accessory for a handheld is a battery pack that accepts disposable cells. Some of the tiny handhelds do not have such an accessory available, but you can always make an external supply out of a few parts from RadioShack. Most rigs offer a DC input jack. If all else fails, you can always cut up a defunct battery pack and use it to connect the external power source.

These preparations should be made now while you have electricity and the stores are open for the inevitable one or two missing parts. That's not to say you won't have to jury-rig something during an emergency. A butane-powered torch/soldering iron is worth its weight in gold at that point. They are inexpensive and come in handy in all sorts of situations. Get one now.

Long Winter Nights

Except for the "Sopranos," the new TV season has proven to be yet another excursion into the vast wasteland, and you have rented all the movies from your local video rental place. There is only so much operating that you can do. What are you going to do with all that free time in the evenings? Upgrading your license comes to mind. If your club or another one is offering an upgrade class, take it. If not, you can do it solo. Either way, it is probably much easier than you have imagined.

One of the things to keep in mind is that CW is a skill that is learned. There has never been a newborn CW operator. Everybody must learn. Some people have a more efficient learning strategy for mastering CW than others. That just means that they will do it quicker and easier than the others. I'm not suggesting that you try *harder*, but I do suggest that you work *smarter*.

It is an auditory skill, so the first rule is to think in auditory terms. That means listening to whole character patterns, not breaking each character down into its component dots and dashes. There are two things that make this much easier: First, make sure the speed is *too fast* to count characters. In other words, I think you should completely bypass 5 wpm and start with 20 wpm or better. When the code is coming that quickly, you can't count the dots and dashes. Second, instead of listening to the dots and dashes, focus your attention on the *silence* surrounding them. In effect,

these two "tricks" force you to listen to the sound of the character.

Using this method, I have known people who went from little or no CW knowledge to 20 wpm in three days. Will you be as efficient as they were? Maybe not. Perhaps it will take you a long time, two or three weeks, to master 20 wpm. However, no matter how quickly you learn using this method, it will be much faster than counting dots and dashes. If you do it that way, you would get to about 7-9 wpm and be stuck at that plateau for a long, long time.

There are a number of good study guides on the market for the theory exams. After you've read through the study material, I think one of the best ways to prepare is to take practice exams. Several companies offer computer programs that generate sample exams from the question pools, and sample exams are also available on the internet. You will get used to the format of the exam and quickly identify the areas that you need to review further. If you have a bean-counter bent, you can even track your progress with records and charts.

The one secret to upgrading is to make it fun, CW or theory. An hour with a playful attitude is worth about 20 hours of hard work. This is a hobby. Just play with it and make it fun.

Other Challenges

This is the perfect time to think about broadening your horizons a bit, too. Why not take up that new mode you have been thinking about trying? Maybe you want to try your hand at building an accessory for the station. You will find books and video tapes on many facets of our wonderful hobby.

Are you ready? The long winter nights will soon be upon us. 73, Pete, WB2D

Feedback

From Ben Bass, N2YDM: Excellent article on organizing a workbench (September "Beginner's Corner"). However, there are a few items I would suggest adding. Personally, I would be lost without my fluorescent lamp/magnifying glass. It is invaluable for anything involving circuit boards. Another essential is a hobby vise with a swivel head and interchangeable plastic jaws, great for holding boards or connectors at just the right angle. Sears frequently sells these for under $20. Sears also frequently runs their "precision" miniature pliers and jeweler's screwdriver sets for $20 or so. These are almost a necessity for the miniature stuff we see these days. A heat gun for heat-shrink tubing is handy as well.

What's New

BY KARL T. THURBER, JR., W8FX

A New Column for A New Century

More Fall's Finest

This month we again shine the W8FX spotlight on fine, new radio gear and accessories, portable and mobile goodies, software, books, and more—items we think will be of real interest to you. Let's begin by looking at some new radio gear.

Radio Gear

Elecraft K2/100 High-Performance, 100 Watt HF Transceiver Kit. Eric Swartz, WA6HHQ, of Elecraft, makers of innovative electronic kits, let us know of Elecraft's new K2 transceiver. The K2/100 (photo A) is based on the popular Elecraft K2. Both transceivers have the portability and efficiency of QRP rigs, but the new radio also has a 100 watt punch when needed. By using an integral heatsink as its top cover, the K2/100 retains the same form factor as the K2, on which the new unit is based.

The K2/100 includes a number of distinguishing features, including silent, diode-switched transmit/receive; a built-in RS-232 remote-control port; light weight and low receive-mode current drain for enhanced portability; instant switching between high- and low-power modes; and dual-power-supply capability, with automatic switching to a low-current backup supply or battery for emergency operation at the 15 watt level. All basic K2 transceiver features are present, including dual VFOs, multiple memories, split TX/RX operation, RIT/XIT, full break-in CW, memory keyer, narrow IF crystal filtering, excellent receiver dynamic range, and IF-derived AGC.

The new K2 sells for $589, and the KPA100 100-watt internal integration kit, which completes the K2 as a K2/100, is $349. For more information, contact Elecraft LLC, P.O. Box 69, Aptos, CA 95001-0069 (831-662-8345; e-mail: <sales@elecraft.com>; on the web: <www.elecraft.com>). *(See our review elsewhere in this issue.—ed.)*

AR8600 Mark II Mobile/Base Receiver. Recently, AOR ("Authority on Radio Communications") introduced the AR8600 Mark II Mobile/Base Receiver, a wide-range desktop radio (photo B). The Mark II features expanded frequency coverage, an improved RF front end, better receive audio response, and the ability to accept a new video reception module, which is being developed.

Similar in appearance to its predecessor, the AR8600, the Mark II now covers 100 kHz to 3 GHz (less cellular frequencies). The radio features 1000 memory channels, alphanumeric channel labels, RS-232C port for computer control, a new on/off function for internal lighting of the unit, and free control software available for download at the AOR website. The Mark II can use its 10.7 MHz IF output in conjunction with the SDU5500 Spectrum Display Unit, and it also can indicate spectrum activity on its front-panel display.

The manufacturer's suggested retail price (MSRP) for the AR8600 Mark II is $999.95. For more information, 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>).

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Photo A– Elecraft's new K2/100 high-performance, 100 watt HF transceiver kit is based on the popular Elecraft K2. Both transceivers have the portability and efficiency of QRP rigs, but the new radio has a 100 watt punch when needed. (Digital photo courtesy Elecraft)

Photo B– Recently, AOR introduced the AR8600 Mark II Mobile/Base Receiver. The wide-range desktop unit features expanded frequency coverage, an improved RF front end, better receive audio response, and the ability to accept a new video reception module being developed. The Mark II now covers 100 kHz to 3 GHz (less cellular frequencies). (Digital photo courtesy AOR)

Accessories for the Shack

MFJ-890 DX Beacon Monitor. What will the good folks at MFJ think of next? Indeed, the new and novel MFJ-890 DX Beacon Monitor (photo C) lets you get up-to-the-minute worldwide DX band conditions in just minutes on the 14, 18, 21, 24, and 28 MHz bands using the International Beacon

Photo C– The MFJ-890 DX Beacon Monitor lets you get up-to-the-minute worldwide DX band conditions in just minutes on the 14, 18, 21, 24, and 28 MHz bands using the International Beacon Network of 18 beacons. You instantly see which beacon you are hearing on your transceiver; an LED lights up on its world map to show you the beacon location and where to point your antenna. (Digital photo courtesy MFJ Enterprises)

Photo D– The PowerPort VX-7R Radio Glove™, shown at right, coddles your Yaesu VX-7R in protective leather and provides a secure pocket for an extra antenna tip. The Yaesu VX-7R Tri-Band Magnesium Handie, shown at left, is rugged, water resistant, and versatile. (Photo courtesy Cutting Edge Enterprises)

Network of 18 beacons throughout the world. As such, the DX Beacon Monitor is a great asset for DXers, contesters, and even ragchewers and SWLs.

The new unit lets you instantly see which beacon you are hearing on your transceiver; an LED lights up on its world map to show you the beacon location and where to point your antenna. To be sure, it's fascinating to hear and watch each beacon location light up as the beacons become active across the world.

The MFJ-890 works in conjunction with your transceiver. By storing the beacon frequencies in your radio's memory, you can quickly check all five bands to see which one has the best propagation to a particular part of the world. Also, you don't have to copy fast CW to identify a beacon: when you hear one, an LED instantly lights up on a world map to show you the beacon's location. You can positively identify each beacon, and the world-map display also tells you just where to point your antenna.

To use the unit, you simply tune to a beacon frequency. If band conditions are good, you will hear each beacon identifying in Morse, along with four dashes at a lower power level. The more beacons you hear, the more open the band is to different parts of the world. In just three minutes you will know how band conditions are worldwide. The MFJ-890 is $99.95; the optional MFJ-1315 AC power adapter is $14.95.

For your nearest dealer, or to order, 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>).

Portable and Mobile Goodies

PowerPort VX-7R Radio Glove™. Once again Cutting Edge Enterprises has come through with a well-designed, high-quality leather pouch for one of Yaesu's hottest new radios (both are shown in photo D). The PowerPort VX-7R Radio Glove coddles your Yaesu VX-7R in protective leather and provides a secure pocket for an extra antenna tip. The spring-steel, leather-covered belt clip forms a bond with your belt and holds it in place better than any clip around, according to Cutting Edge Enterprises.

The pouch's Velcro®-style closure provides easy access to the display, and the PTT button is still fully accessible while the radio is in the pouch. All this adds up to a classy, leath-

ery look, smell, and feel that just gets better over time! The VX-7R Radio Glove, Part No. HI-7V, is $19.95.

Oh, yes, the spiffy Yaesu "handheld magnesium handie" that the Radio Glove coddles is no slouch, either. It's heralded by the manufacturer as "the brightest star in the ham radio galaxy!" The Yaesu VX-7R radio features 50/ 144/430 MHz capability as a 5 watt FM transceiver. It's also a wide-range receiver, with both shortwave broadcast and marine-band memory banks, plus a weather broadcast radio with a severe-weather-alert capability. The radio also sports low-power 222 MHz transmit capability, 500 memory channels, and much more.

For more details on the VX-7R Radio Glove, contact Cutting Edge Enterprises, 130 Anacapa Circle, San Luis Obispo, CA 93405 (1-800-206-0115; e-mail: <info@powerportstore.com>; <http://www.powerportstore.com>).

For more details on the new, ultra-rugged Yaesu radio that the VX-7R Radio Glove coddles, contact Vertex Standard, U.S. Headquarters, 10900 Walker St., Cypress, CA 90630 (714-827-7600; e-mail: <amateursales@vxstdusa.com>; <http://www.vxstdusa.com> or <http://www.yaesu.com>).

Software and Computers

MobileLog Ham Radio Logging for the PocketPC. Have you ever wished you could easily update your home PC logging software while on the road? Have you ever made a mobile QSO and wondered if you just picked up a new country/band/mode? Also, do you need a low-cost, low-power, low-weight alternative to laptop logging in the field?

If you own a PocketPC, MobileLog puts the power of a desktop logging application into the palm of your hand. In fact, as PocketPC PDAs (personal data assistants) have dropped dramatically in price, why should portable/ mobile hams bother lugging laptops into the field?

MobileLog is designed to meet the needs of hams who use PocketPC and Windows CE devices such as the Compaq™ iPAQ™, HP Jordana, Casio™ Cassiopeia™, Audiovox™ Maestro™, and the Toshiba™ e310 devices.

With MobileLog (see fig. 1), you can import and export logs in ADIF or CSV format, thus allowing you to sync your PDA log with your radio shack PC. You can track DXCC award status by band or mode, calculate approximate beam headings and distance to DX stations, and easily search for previous QSOs. Some nifty MobileLog features make it easy for hams on the go. These include RST arrows (to change RST quickly with your PDA stylus), a modifiable user interface, "Quick County" logging, and even temperature conversion.

For details, contact Pat Rundall, NØHR, 2228 228th Place, Boone, IA 50036 (515-292-0747; e-mail: <pat@n0hr.com>; web: <http://www.n0hr.com>. You can order online through the popular PayPal system. A fully functional, 15-day demo version of MobileLog is available for download; registration is $29.99.

WinCAP Wizard 3 from Taborsoft. The popular Kangaroo Tabor Software website is sponsored by Jim Tabor, KU5S. It features many useful software programs, especially some unique "HamTools" designed for radio amateurs, shortwave listeners, and others interested in communications analysis. For these useful software tools, be sure to check out Jim's websites (see below).

Recently, Jim released WinCAP Wizard 3, the third generation of his popular HF propagation prediction engine interface. Wizard 3 combines enhanced versions of the best features from CAPMan and previous versions of WinCAP Wizard. WinCAP Wizard 3 focuses on use of the VOACAP

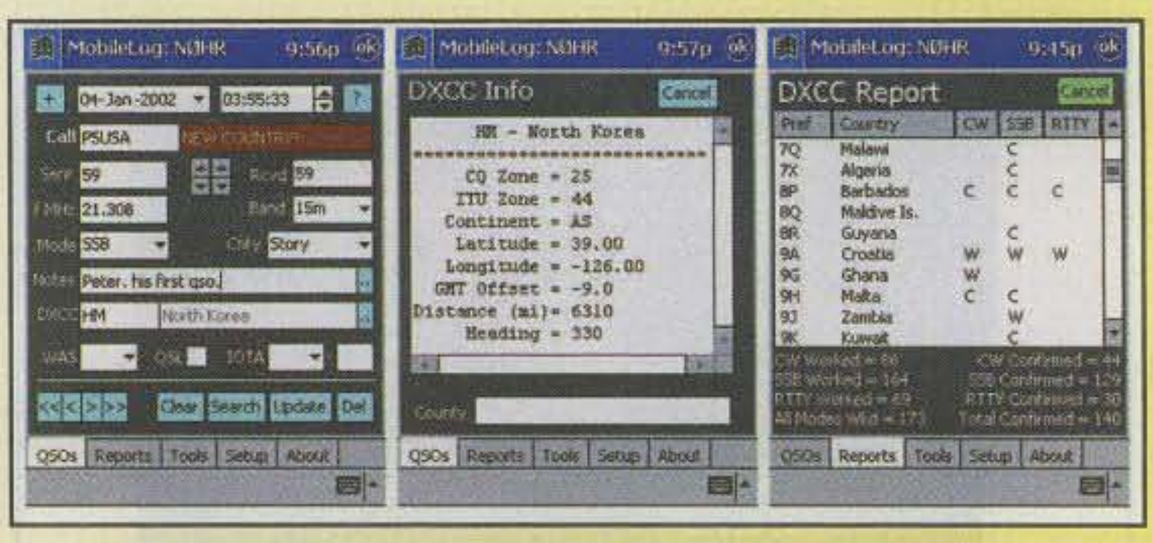

Fig. 1– Do you need a low-cost, low-power, low-weight alternative to laptop logging in the field? If you own a PocketPC, NØHR's MobileLog puts the power of a desktop logging application into the palm of your hand. You can track DXCC award status by band or mode, calculate approximate beam headings and distance to DX stations, easily search for previous QSOs, and much more. (W8FX screen capture from the NØHR website)

prediction engine for three "types" of predictions: point-to-point, NCDXF/IARU International Beacon Network, and "user batch." Without getting bogged down in the technical details of what all this means, let's just state that Wizard 3 effectively provides HF propagation predictions from 18 DX locations around the world, simultaneously. Charts and report "prediction views" are provided to enhance the usefulness of the VOACAP prediction engine.

Jim indicated that one of the design goals for the new software was flexibility. To that end, the "prediction views" are independent of one another. This allows simultaneous display of different prediction groups in each prediction view. The bottom line is that you will likely find the WinCAP Wizard 3 software package to be exceptional at HF radio communications analysis and propagation prediction—or, as Jim would have it, "skywave analysis with a difference."

Contact Kangaroo Tabor Software, 1203 County Road 5, Farwell, TX 79325-9430 (fax 806-225-4006; e-mail: <jim@taborsoft.com>; web: <http://www.taborsoft.com> or <http://www.hamtools.com>). A fully functional WinCAP Wizard 3 trial can be downloaded at <http://www.taborsoft.com/wwizard3>; registration is $65.

Log Windows 4.0 32-bit Version Released. Rick Ruhl, W4PC, of Creative Services Software, has announced that version 4.0, the first 32-bit version of the popular logging program Log Windows, has been released. The new 32-bit version includes a number of new features. These include USB support, support of PC communication ports from COM1 to COM24, a new point-and-click CD callbook chooser, and much more.

Rick says that it's been a long road getting here from when CSS took over Log Windows in 2000, but he's glad he finally has the 32-bit version on the street, especially for those who have been waiting for it. Log Windows runs under all versions of Windows® from 95 to XP.

The new product retails for $89.95. Those who have purchased version 3.06.50 or greater get this upgrade for free; Log Windows also appears on the Digital Trio CD. Log Windows is available from dealers around the world, as well as directly from CSS.

Recently, CSS also released version 1.6 of its other products, PacTerm for Windows, PKTerm for Windows, and MultiComm Host. These updated versions allow synchronizing with the Log Windows 32-bit software from a DX Cluster packet window.

Contact Creative Services Software, Inc., 503 West State S., Suite 4, Muscle Shoals, AL 35661 (256-381-6100; e-mail: <sales@cssincorp.com>; <http://www.cssincorp.com> or <http://www.logwindows.com>).

From the Bookshelf

New Extra Class Study Materials. Today, the Extra class license is the goal of most amateur radio operators, especially since it authorizes maximum power level, mode, and frequency privileges. The license is as high as you can go, although less than 15 percent of all amateurs actually achieve that level.

To help you become one of those fortunate few, Gordon West, WB6NOA, has announced the release of his new Extra class Element 4 FCC license preparation book and six long-play audiocassettes. Both the book and tapes cover the new Extra class text questions effective July 1, 2002 through June 30, 2006. They are designed to make the learning process fun.

"My book and tapes will instantly explain that the new longer Extra class question pool is absolutely no harder to learn than the original question pool," comments West, who is well known to *CQ* readers for his humorous style of amateur radio and commercial-radio training books and audiocassettes.

The West six-tape audio course parallels the book and adds all of the radio sounds behind many topic areas within the question pool. You'll hear the sounds of PSK-31, get a laugh out of some repeater calls, and you may not believe your ears when you hear the sounds of "phantom voices" bouncing off an aurora.

The book and tapes cover all 801 questions and answers, as well as an upbeat description of the correct answers. West also reveals some of his classroom secrets on how to spot many of the technically correct answers before you begin to work out the problems on your calculator. All calculator keystrokes are clearly explained for those amateurs who may be a little rusty.

All Gordon West training materials are published by Master Publishing, Inc., and are available at amateur radio dealers throughout the country. The Technician and General class books for beginners also are available at RadioShack stores.

For more information and pricing, contact The W5YI Group, Inc., P.O. Box 565101, Dallas, TX 75356 (1-800-669-9594; e-mail: <w5yi@w5yi.org>; web: <www.w5yi.org>).

Update from antenneX. In last May's column we profiled an excellent antenneX book, L. B. Cebik, W4RNL's *LPDA Notes, Volume 1: Pure LPDAs.* We noted that the book, the first in a two-part series, acknowledged that log-periodic dipole arrays (LPDAs) number among the least understood antennas in the amateur community. The book looked at the basic properties of pure LPDAs, with special emphasis on the types of antennas usually created by radio amateurs.

Now antenneX has announced the publication of the second book in the series, *LPDA Notes, Volume 2: Hybrid LPDAs.* In it L. B. continues his exploration of log-periodic dipole arrays, and enters the realm of hybrid LPDAs. The second volume, which consists of three parts, includes discussion of the "hybrid" logcell Yagi (essentially a 2–5-element LPDA with the addition of a parasitic director and reflector); the proper long-boom design for such antennas; and a number of considerations for practical LPDAs of various designs. As with all W4RNL books, the volume is extensively illustrated, both graphically and with analytical antenna designs. The book contains 200+ pages and 180+ illustrations of various types.

For more details about this book and pricing, go to: <http://www.antennex.com/Sshack/lpda/lpda2.html>. The website is sponsored by antenneX Online Magazine, P.O. Box 271229, Corpus Christi, TX 78427-1229 (1-888-855-9098; e-mail: <info@antennex.com>; <http://www.antennex.com>). Be sure to check out the website, which is chock full of books, online articles, software, modeling files, and other types of useful and authoritative antenna information.

Postscript: As this was written, we learned that the book's author, L. B. Cebik, W4RNL, also has assumed duties as Technical Editor for antenneX Online Magazine. In this capacity, L. B. will review and edit all of the articles published in each monthly issue of the magazine. He is eminently qualified for the post, as a retired professor from the University of Tennessee at Knoxville. He is also a technical and educational advisor to the American Radio Relay League (ARRL).

Wrap-Up

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

Overheard: Be optimistic about the chances of success; we can usually do at least a little more than we think we can. 73, Karl, W8FX

Washington Readout

BY FREDERICK O. MAIA, W5YI

Regulatory News In The World Of Amateur Radio

Amateur Radio—What You Need to Know, Part III

Amateur Radio Operation and the Law

Last month we discussed ham radio licensing. This month we are going to talk about your responsibilities as an amateur radio operator and what the Federal Communications Commission (FCC) expects from you as one of its licensees. Since the vast majority of our readers live in the United States, we are going to focus on the FCC's rules and requirements. If you live elsewhere, the specifics may differ, but the basic concepts are fairly universal.

Let's start by going over some definitions. An amateur radio operator is a person of any age who has been licensed by the federal government to control an amateur radio station. A person is considered to be licensed when a record containing his or her name, address, license class, station callsign, and license expiration date appears in the FCC's database of amateur radio operators.

The countries with which the United States has entered into a reciprocal operating arrangement are:

Antigua and Barbuda, Argentina, Australia, Austria, The Bahamas, Barbados, Belgium, Belize, Bolivia, Bosnia-Herzegovina, Botswana, Brazil, Chile, Colombia, Costa Rica, Croatia, Cyprus, Denmark (including Greenland), Dominica, Dominican Republic, Ecuador, El Salvador, Federated States of Micronesia, Fiji, Finland, France (including French Guiana, French Polynesia [Gambier, Marquesas, Society, and Tubuai Islands and Tuamotu Archipelago], Guadeloupe, Ile Amsterdam, Ile Saint-Paul, Iles Crozet, Iles Kerguelen, Martinique, New Caledonia, Reunion, Saint Pierre and Miquelon, and Wallis and Futuna Islands), Federal Republic of Germany, Greece, Grenada, Guatemala, Guyana, Haiti, Honduras, Iceland, India, Indonesia, Republic of Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kiribati, Kuwait, Liberia, Luxembourg, Macedonia, Republic of the Marshall Islands, Mexico, Monaco, Netherlands, Netherlands Antilles, New Zealand, Nicaragua, Norway, Panama, Paraguay, Papua New Guinea, Peru, Philippines, Portugal, Seychelles, Sierra Leone, Solomon Islands, Republic of South Africa, Spain, St. Lucia, St. Vincent and the Grenadines, Surinam, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, Tuvalu, United Kingdom (including Bermuda, British Virgin Islands, Cayman Islands, Channel Islands [including Guernsey and Jersey], Falkland Islands [including South Georgia Islands and South Sandwich Islands], Great Britain, Gibraltar, Isle of Man, Montserrat, Northern Ireland, Saint Helena [including Ascension Island, Gough Island, and Tristan Da Cunha Island], and Turks and Caicos Islands), Uruguay, and Venezuela.

Citizens of Canada holding an amateur service license granted by the Government of Canada and citizens of countries holding an amateur service license granted by a country with which the United States has made reciprocal operating arrangements are authorized to be the control operator of an amateur station transmitting from a place where the Amateur Radio Service is regulated by the FCC.

Table I– Reciprocal amateur radio operation.

The Control Operator

A *control operator* is, therefore, an FCC-licensed radio amateur of the appropriate class who is responsible for the transmissions from a ham radio station, either his or her own or one belonging to another licensee. When the control operator is a different amateur operator than the station licensee, both persons are equally responsible for proper operation of the station. The FCC presumes that the station licensee is also the control operator, unless documentation to the contrary is in the station records.

A station may be operated only to the extent permitted by the control operator's license. This means that a station owned by an Extra Class licensee but solely operated by a Technician Class control operator may only be operated within Technician class privileges.

A control operator may also be a non-citizen of the United States who is authorized to operate a station in the U.S. or its territories and possessions because of an existing reciprocal operating arrangement. The FCC no longer issues reciprocal permits for alien amateur licensees. Instead the foreign amateur's license is the authorization. The FCC periodically issues lists of countries with which the U.S. has such an agreement. You will find the current list in Table I.

Holders of an International Amateur Radio Permit (IARP) or CEPT (European) radio amateur license are also recognized by the FCC as being authorized control operators. Licensed citizens of Canada may operate in the United States (and vice versa). The basic rule regarding the availability of U.S. amateur spectrum to foreign operators is that if the frequency is available to them in their home country and is also available to a U.S. Extra Class operator, then they may operate on that frequency here.

The location from which the station is being operated is called the *control point*. Every station must have at least one local or remote control point and a control operator must be at that point during station operation. An exception is when a station is authorized to operate under automatic control.

Automatic control is when an amateur station is transmitting so that compliance with the FCC Rules is achieved without a control operator being present to constantly monitor the activity on the channel. The FCC can require that a station discontinue automatic operation if the communications transmitted are contrary to the rules or are causing harmful interference. (In some recent cases of ongoing problems with repeaters, the FCC ordered repeater owners to stop automatic operation and have a control operator at the control point whenever the repeater is on the air.)

Types of Operation

If the controls of an amateur station are being manipulated indirectly through some sort of radio link, it is said to be *remotely controlled*.

A *repeater* is a station that is used by amateur radio operators to increase the communications distance of amateur transmissions. All receiving and transmitting frequencies used by repeaters must be within certain repeater subbands in the 10 meter and shorter wavelength bands as specified in Rule Sec. 97.205(b).

An amateur repeater user transmits on the *repeater input* frequency to a

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (telephone 817-461-6443) e-mail: <w5yi@cq-amateur-radio.com>

repeater station usually located in a high location. The repeater automatically retransmits the communications out on another *repeater output* frequency, usually at higher power using a high-gain antenna. The increased power results in greater radio range. More on repeaters later.

An *auxiliary station* is one which is used to relay communications (other than messages) from one specific location to another. Auxiliary stations are part of a system of stations and are required to operate on frequencies above 222.15 MHz as per Rule Sec. 97.201(b). Examples of auxiliary operation might be the one-way remote control of a repeater station using a point-to-point radio link, or a point-to-point voice link between two or more stations within a system of stations. Repeater and auxiliary stations retransmit the signals of other amateur stations and both may be controlled automatically.

A *message-forwarding system* is a group of amateur stations participating in a network in which messages are sent from one amateur station to another through one or more forwarding stations.

A *telecommand station* is an amateur station that transmits one-way radio transmissions to control a device, such as a satellite, at a distance. *Telemetry* is the one-way radio transmission of measurements from a measuring instrument. Satellites routinely transmit telemetry information about the status of their equipment so controllers can send up any necessary commands. A *space station* is an amateur station located more than 50 kilometers (about 30 miles) above the Earth's surface, generally a satellite or a manned space vehicle such as the International Space Station.

If you don't have your license yet, you can expect to get questions about these types of operation on your Technician Class examination.

Your Responsibilities as An Amateur Radio Operator

The FCC expects certain things of its licensed ham operators. Here is a capsule list of them. We will expand on some of these things later in this series.

Amateur License Rules. You must have been granted a license in order to operate an amateur radio station in the United States, in any of its territories or possessions, or from a vessel in territorial waters or aircraft registered in the U.S. The single license authorizes both the operator privileges and the station operation. The operator privileges are determined by passing one or more written or telegraphy examinations before volunteer examiners in your community. In the U.S. no license is required for receiving.

Your license will contain your station callsign, the format of which is determined by the class of license for which you are qualified. The callsign will be selected from an alphabetized list corresponding to the geographic region of your mailing address and operator class.

Once you have the license, you may keep it for life without being retested. However, it must be renewed every ten years. You may apply to have your license renewed no sooner than 90 days before expiration. There is a two-year grace period beyond the ten-year term in which your expired license may be renewed. You have no operating privileges during this two-year period. The FCC does not charge to renew your license, but there may be a filing fee if the renewal is handled by a VEC (Volunteer Examiner Coordinator) and there is a fee for renewing vanity callsigns (one which is selected by the amateur; more on this later).

Licensed amateurs who upgrade

FCC-licensed amateurs (first party control operators) are authorized to send messages to another amateur station control operator (second party) on behalf of another person (third party). Third-party messages may not be transmitted to foreign countries unless a prior arrangement has been made to permit their transmission. The following countries have made the necessary third-party message arrangements with the United States:

Antigua and Barbuda, Argentina, Australia, Belize, Bolivia, Bosnia-Herzegovina, Brazil, Canada, Chile, Colombia, Federal Islamic Republic of Comoros, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, The Gambia, Ghana, Grenada, Guatemala, Guyana, Haiti, Honduras, Israel, Jamaica, Jordan, Liberia, Republic of the Marshall Islands, Mexico, Federated States of Micronesia, Nicaragua, Panama, Paraguay, Peru, Philippines, St. Christopher and Nevis, St. Lucia, St. Vincent and the Grenadines, Sierra Leone, South Africa, Swaziland, Trinidad and Tobago, Turkey, United Kingdom (special-event stations with callsign prefix GB followed by a number other than 3), Uruguay, and Venezuela. The United Nations also has arrangements with the United States to permit an amateur station regulated by the FCC to exchange messages for a third party with amateur stations 4U1ITU in Geneva, Switzerland, and 4U1VIC in Vienna, Austria.

No amateur station regulated by the FCC shall transmit messages for a third-party to any amateur station located within the jurisdiction of any foreign government not listed above. This prohibition does not apply to a message for any third party who is eligible to be the control operator of the station. In other words, messages on behalf of other hams with privileges on the frequency you are using are permitted.

Table II– Third-party communications.

may immediately begin using their new privileges on the air in advance of receiving their license grant if they append their callsign with an identifier. A Novice who upgrades to Technician would say "temporary KT" after his/her callsign, or "/KT" if on CW. A Technician upgrading to General would say "temporary AG," or if upgrading to the amateur Extra Class, "temporary AE."

You must notify the FCC when your mailing address or name changes. This is called a license modification. You do not automatically get a new ten-year term when you modify your license or upgrade to a higher class; instead your license will contain the original expiration date. You will, however, get a new ten-year term when you are granted a vanity callsign.

It is not necessary to apply for a duplicate license if your paper document license is lost, mutilated, or destroyed. You may, however, file for a duplicate copy if you wish. Your license is affirmed by its existence in the FCC's Amateur Service database and not by a document. You will never be asked to produce a paper license.

Amateur Station Operation. The station equipment must be under the physical control of the licensee and inaccessible to others without your permission. The station licensee is responsible for the proper operation of the station.

An amateur radio transmitter may be operated with a power level of up to 1500 watts PEP except when a lower power level will carry out the desired communications. No station may transmit with a transmitter power exceeding 200 watts PEP on certain segments of the 80, 40, 15, and 10 meter bands that are used by Novice and Technician Class operators with code credit. All operation on the 30 meter band is also limited to 200 watts using CW, RTTY, or data emissions. Certain other power restrictions also apply (see Sec. 97.313, 97.203[c] and 97.215[c]). The general rule of thumb, though, is to use the minimum amount of power necessary to establish and maintain communication.

Amateur stations within one mile of an FCC monitoring station must not interfere with that facility. Amateur stations also may not cause excessive human exposure to RF electromagnetic fields. A formal RF environmental evaluation is required when an amateur station exceeds specific power limits on certain wavelength bands. More on this later.

All amateur station operators must periodically announce their callsigns when on the air. The purpose of station identification is so that the source of the transmissions can be identified. Minimum ID requirements are at the end of a transmission or a series of transmissions and at intervals not to exceed 10 minutes. You may communicate in a foreign language on the ham bands, but the identification may be given in Morse code or, if using voice, in English. You are not required to identify the station with which you are in communication unless you are passing international third-party traffic. It is also not necessary to announce that you are operating mobile or portable.

The installation and operation of an amateur station on a vessel (ship) or aircraft must be approved by the ship's master or the pilot in command of the aircraft. You may not transmit on the ham bands using radio equipment that is already installed as part of the ship or aircraft. The amateur station equipment must be separate and independent of the ship or aircraft radio communication system. A common antenna may be used, however, on recreational vessels.

Amateur antenna structures may be up to 200 feet in height. Amateurs with taller antennas—or antennas near public airports—must register with the FCC and notify the Federal Aviation Administration. Your antenna and its support must not exceed 1 foot in height for each 100 feet it is from the nearest end of the nearest runway.

Although not defined in the rules, all amateur stations must be operated in accordance with good engineering and amateur practice. All radio amateurs must cooperate in selecting transmitting channels and making the most effective use of amateur spectrum. No frequency will be assigned for the exclusive use of any station.

All amateur station licensees must make their stations and station records available for inspection upon request by the FCC. The FCC may impose certain restrictions on amateur station operation if such action will promote the public interest or fuller rule compliance. The station license modification can be either for a limited period or for the remainder of the license term.

If an amateur station interferes with local reception on a television of good design, the FCC may also impose so-called "quiet hours" on a station during prime TV viewing hours. These hours extend daily from 8 PM to 10:30 PM local time, and on Sunday from 10:30 AM to 1:00 PM.

Amateur Communication Guidelines. Amateurs may communicate only with other amateurs unless specifically authorized by the FCC or government and must yield at all times to stations providing emergency communications. One-way transmissions are prohibited except for short tests, temporary observation of radio-wave propagation phenomena (beacon operation), radio control of remote objects, and the transmission of code practice and bulletins of direct interest to the amateur community.

Amateur radio stations may not broadcast to the general public at any time. Playing music on the amateur airwaves is prohibited, as is the transmission of indecent or obscene language and false or deceptive messages, signals, or identification. No amateur operator may willfully interfere with or cause interference to any radio communication or signal.

You may not send encoded messages where the transmission cannot be understood by anyone except the

recipient, nor may you use amateur radio to participate in any activity that is illegal under local, state, or federal law. Only amateur radio communications may be retransmitted on the ham bands with two exceptions: propagation and weather information originating from U.S. government stations, such as WWV and NOAA Weather Radio, and communications between the space shuttle and ground control. Note that the rules specify the shuttle and do not permit retransmission of communications with the International Space Station. A petition to change this rule is pending before the FCC.

Amateurs may not sell a communications service or participate in communications on behalf of their employer. Although they may be reimbursed for incidental expenses, an amateur may not be compensated for providing communications of any kind to anyone. Amateurs may, however, infrequently use amateur spectrum to list the availability of personal station equipment for sale to other amateurs (i.e., swap nets).

Third-party communications, that is messages exchanged between licensed control operators on behalf of another person, are permitted except for international message traffic with countries that do not allow it (see Table II). Messages transmitted on behalf of others by amateur stations are not considered private and are not afforded privacy protection. At the end of an exchange of international third-party communication, your station ID must also include the callsign of the other station.

Besides abiding by the FCC-mandated frequency, power, and emission limitations, amateurs are encouraged to conform to the voluntary band plans that have been established on the various ham bands. These so-called "gentleman's agreements" usually emerge through consensus or are sanctioned by some local or national group.

A licensee may permit another licensed amateur to operate his or her station. Their privileges are governed by the class of their operator license and not the license class of the station owner/licensee. When the operator license held by the control operator exceeds that of the station licensee, an indicator consisting of the callsign assigned to the control operator's station must be included after the callsign.

An unlicensed person, or an amateur operating at frequencies not authorized by his or her license class, may operate from a licensed radio station as long as a control operator of an appropriate license class is at the controls of the transmitter.

It is not necessary for radio amateurs to keep a written log of their transmissions. The FCC may, however, require a record of station operations if it feels it is necessary to assure compliance with the FCC rules.

Finally, in life-and-death emergencies when normal communication systems are not available, the rules specifically allow amateurs to use any radio communication at their disposal to provide essential communications in connection with the immediate safety of human life and immediate protection of property. Also, a station in distress may use any means available to attract attention and get assistance, and any ham responding to a distress call may use any means of radio communication at his/her disposal to provide assistance. In other words, the restrictions on license privileges, subbands, modes, etc., do not apply when someone's life or property is on the line. Thus, a Technician hearing a distress call on 20 meters may respond and provide assistance without getting in trouble for doing so.

Next month we will will take a break from this series to examine the pros and cons of comments filed on the FCC's proposal for two new ham bands and a change in status for one other. Then we will return and take a look at amateur radio license examinations and how your new license application is filed and your license issued.

73, Fred, W5YI

World Of Ideas

BY DAVE INGRAM, K4TWJ

A Look At The World Around Us

HF Pack'n in the U.S.A.—Part II

Last month in this column we presented a basic "what it is and how you can join the fun" discussion of an up-and-coming new pursuit called HF Pack. We also introduced the founder of HF Pack, Bonnie Crystal, KQ6XA, and two "kingpins" who keep activity jumping on the hot HF Pack frequencies 18.157.5 and 14.342.5 MHz—Budd Drummond, W3FF, and Bob Follett, AB7ST.

This month we continue with more HF Pack views and details, plus discuss gear, battery packs, another new Super Antenna from W6MMA, and much more. The idea here is to show you the fun side of HF Pack during normal times, while also letting its instant-preparedness benefits pique your interest for emergency communications. Let's begin with some more enthusiasm-generating views of HF Pack in action. Since pedestrian mobile was the main focus last month, let's look at things from a slightly different angle this time.

HF Pack'n to the Max

First up is Man Mohan, VE7FM, mobiling with his Easy Racer EZ-1 recumbent bicycle in Vancouver Island, British Columbia (photo 1). Mohan's handlebar-mounted gear consists of a 5 watt Index Labs QRP Plus transceiver in a custom carry bag, a dual-band FM talkie, and a GPS receiver. His antenna (attached to a battery case behind the seat) is a homebrewed and center-loaded 6 foot whip. The bicycle's metal frame serves as a ground or counterpoise. I recently worked Mohan during a midday ride, and his 18.157.5 MHz SSB signal was quite good for such a low-power setup. What a terrific way to avoid power-line noise and home antenna restrictions while having a ball on the air!

Next is Mike Melland, W9WIS, with his "picnic table portable" setup for outdoor fun (photo 2). Mike's gear is simple but effective: An FT-817 transceiver is teamed up with a W6MMA model MP-1 multiband-vertical/mobile antenna clamp-mounted to the table and complemented with a ground-simulating counterpoise wire. I also worked W9WIS recently on 18.157.5 MHz, and his 5 watt signal was surprisingly good. It is amazing how only a few watts of power can reach out on 17 meters, even on SSB.

Finally, photo 3 shows this author "pack'n to the max" with a back-strapped rig and (gasp!) two-element W6MMA minibeam. No, we are not kidding, no we are not professionals, and yes, you too can (and really should!) try this at home—and while traveling. Details on the new W6MMA multiband minibeam are included later in this column. Read on. . . .

Give It A Go!

Like to try your own hand at HF Pack? Jolly good idea! As discussed in last month's column, the main requirements are a portable transceiver and battery pack, a lightweight antenna, and high enthusiasm for operating stand-alone style with low power.

Photo 1– Mohan, VE7FM, checks in with the HF Pack group on 18.157.5 MHz while mobiling on his "Easy Racer" recumbent bicycle. Setup consists of handlebar-mounted QRP Plus transceiver, dual-band FM talkie, GPS receiver, plus homebrew antenna and gel-cell battery. Now that's biking in style! (Photo courtesy VE7FM)

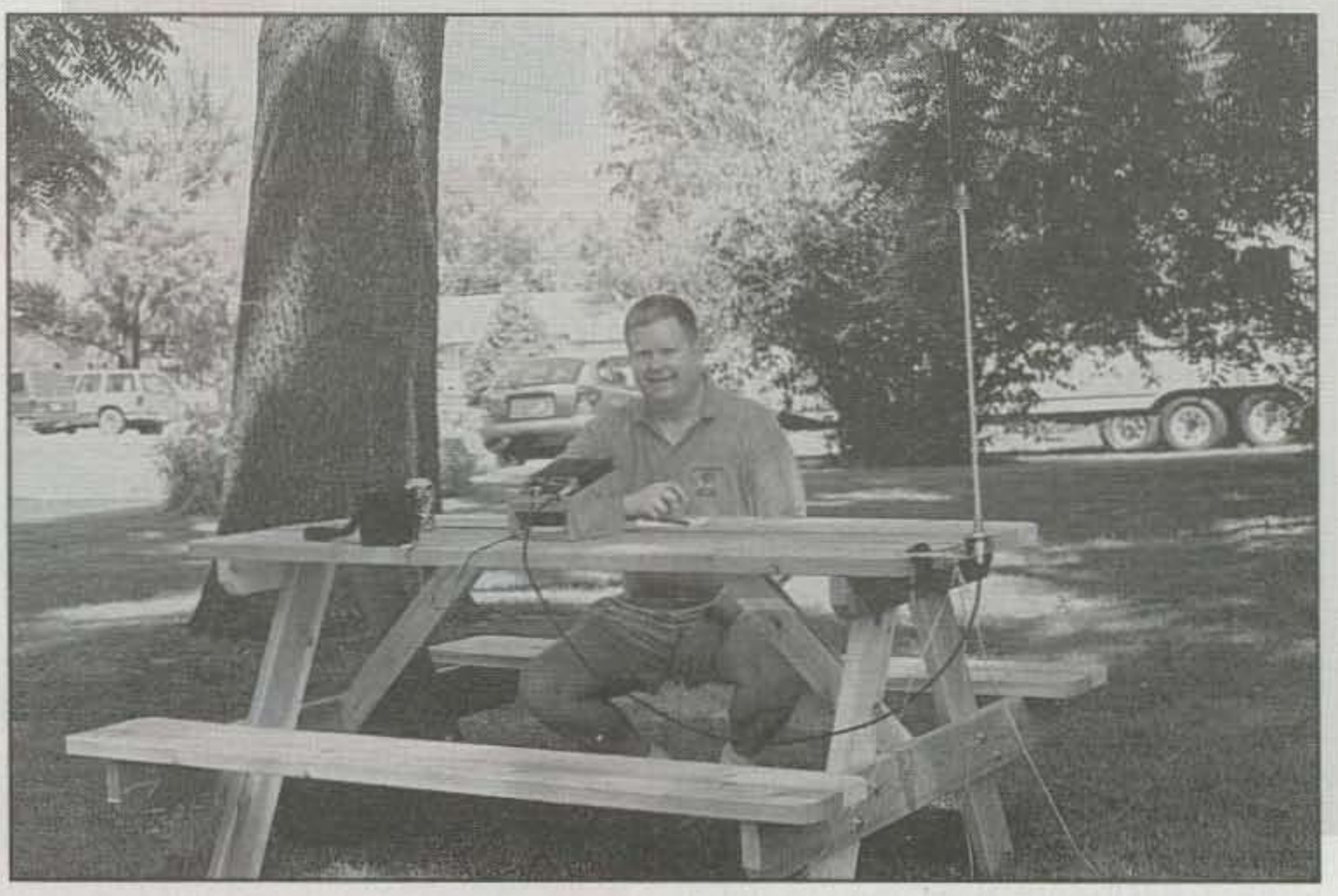

Photo 2– Mike Melland, W9WIS, enjoys camping on weekends and often calls into the HF Pack 17 and 20 meter meets while operating "Picnic Table Portable." His gear consists of an FT-817, 7 amp battery, and W6MMA break-down MP-1 vertical with counterpoise and table-edge clamp. (Photo courtesy W9WIS)

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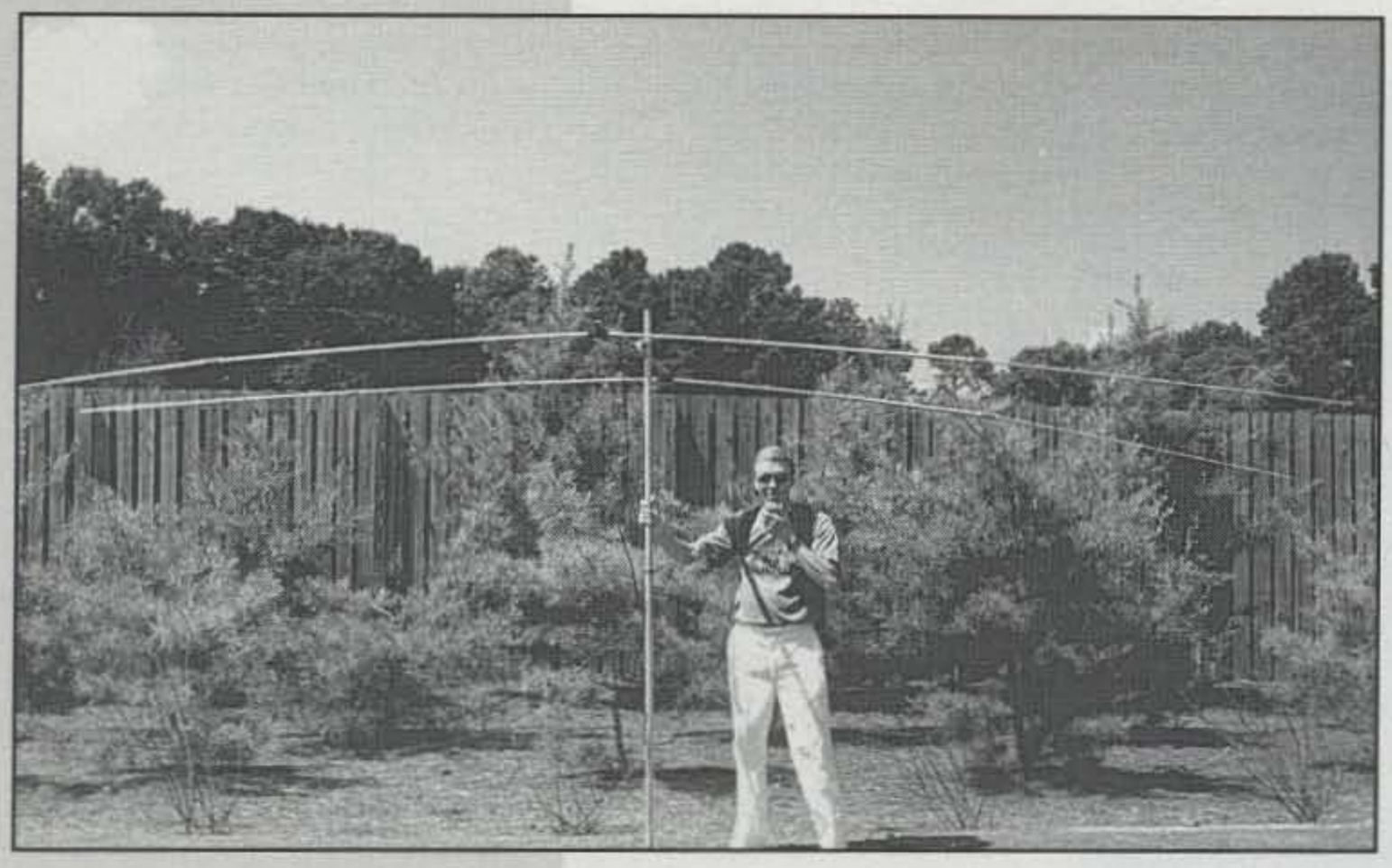

Photo 3– Your columnist enjoying the warm southern sun (!) while tromping through the tulips with a new W6MMA two-element minibeam. Antenna is so light that walking with it is easy. Dodging obstructions, however, is a different matter!

Photo 4– Little known Ten-Tec model 120 manpack HF transceiver produced during the 1980s. Although challenging to find today, the rig could prove a unique and fun item for use HF Pack'n. (Photo courtesy Ten-Tec)

Is the concept really that simple? Well, yes and no. If the shoulder-strapped or back-packed rig runs more than a couple of watts, it (and its associated battery pack) can become somewhat cumbersome and heavy when carried for long periods of time. Reducing the battery pack's size and weight is a logical alternative here, but that also limits how long you can operate between recharges. Watching your transmit and receive time ratios can help optimize available battery time/energy.

Next, using a vertical antenna gives maximum flexibility for moving around, but remember to pull a quarter-wave counterpoise wire behind you. Depending on the surroundings and ground conductivity, SWR still may vary, and you may wish to include an automatic antenna tuner such as the LDG Z-11 in your gear. As an alternative, you may opt for a horizontal-type antenna and thus sidestep vertical-related entanglements.

Everything has its advantages and pitfalls, and everything is a compromise in one way or another. Deciding which aspects most parallel your own interest and lifestyle is the key to both success and long-run enjoyment. As further inspiration, a list of popular HF Pack frequencies as shown in last month's column is included again in Table I. As I said earlier, give it a go!

More Rig Notes

If the previous discussion gave you the impression that the FT-817 transceiver and a short pull-up vertical antenna are a hot combo for HF Pack'n, you are right. However, they are not the only game in town, so to speak. That fact was made obvious by Bonnie Crystal, KQ6XA's unique collection of portable HF transceivers, and Budd Drummond, W3FF's break-down dipole highlighted in last month's column.

Other gear ideas include (If you can find them!) Yaesu's discontinued but still popular FT-70, the Vertex model VX-1200, and several military-type PRC transceivers. Ten-Tec produced three model 120 manpack transceivers during the 1980s (photo 4) and many are still floating around out there. Kachina also made a smart-looking model MP-25, and Mizuho produced some 2 meter talkie-looking HF SSB rigs that might be obtainable with a little work and ingenuity. In fact, I noticed a couple of neat Mizuho talkies with all their accessories in a recent full-color catalog from Waters and Stanton, the UK's big-time amateur radio dealer (see <www.wsplc.com>).

Prefer another approach? Compact mobile transceivers such as ICOM's IC-706 work great for HF Pack when reduced to 20 or 30 watts output and mated with a 7 or 8 amp-hour battery. This rig uses a fair amount of current (roughly 2 amps on receive and 6 or 7 amps on low-power transmit), but that's beside the point, especially if you already have one on hand. Just use a good backpack to carry the setup and have fun.

Thinking further about backpacks (and our upcoming discussion of batteries), PowerPort has a couple of recently upgraded items you should find attractive for Pack'n (photo 5). First, the popular WorldPack for carrying an IC-706-size transceiver now sports extra straps and ties for carrying an antenna, tuner, and other accessories. Second, PowerPort also sells rechargeable 7 and 8 amp-hour batteries that fit right in the WorldPack for walk-and-talk HF-n. The company also handles solar chargers for the batteries. Now that's one-stop shopping and survival preparedness supreme! More details are available from PowerPort/Cutting Edge Enterprises at <www.powerportstore.com>.

With respect to antennas, the classic rule of thumb is "larger is always better" (but more cumbersome). In other words, "pocketable" and/or pull-up antennas offer maximum flexibility and portability, but they cannot reach out like a big antenna. Typically, they make a 5 watt signal sound like a 2 watt signal. If you want a stronger signal, opt

Photo 5– Need a quick and easy way to go HF Pack'n with an IC-706-size transceiver, portable antenna, tuner and 7 or 8 amp battery? PowerPort's "WorldPack" with bottom-carried rechargeable battery like shown here is the answer. Just strap it on and go. Details in text.

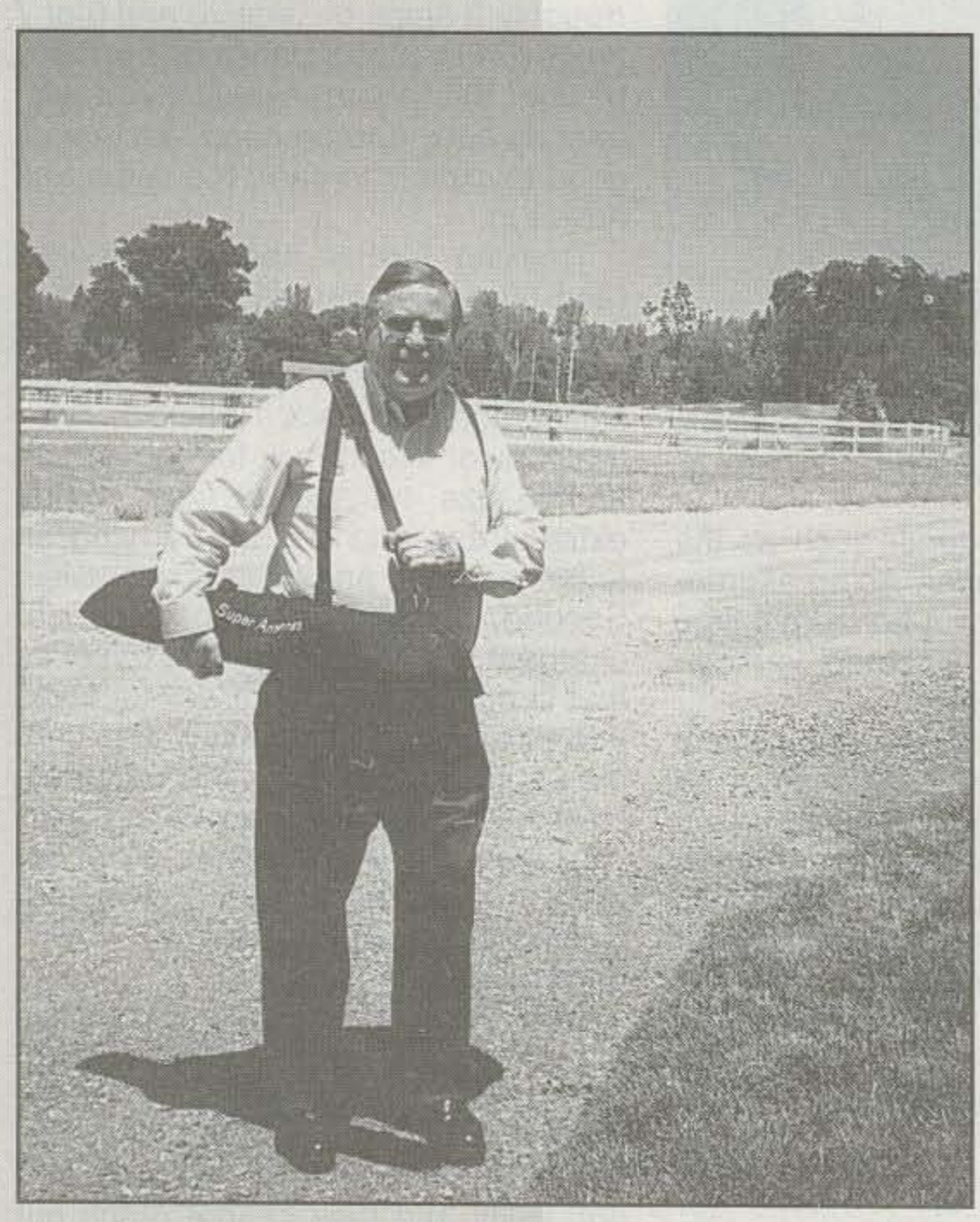

Photo 6– Meet the man behind "Super Antennas," Vern Wright, W6MMA. In that 3 foot long case Vern is carrying one of his new items—a six-band, two-element minibeam.

Band	Frequency & Mode	Popular Time of Group Activity
80 m	3.687.5 MHz CW 3.997.5 MHz SSB	Eclectic activity—mainly on weekends
40 m	7.087.5 MHz CW 7.242.5 MHz SSB	Eclectic activity—mainly on weekends
30 m	10.137.5 MHz CW	Eclectic activity—mainly on weekends (soon to increase)
20 m	14.342.5 MHz SSB	1700 and 2300 UTC Daily & especially weekends
17 m	18.157.5 MHz SSB	1630 and 2230 UTC Daily & especially weekends
10 m	28.327.5 MHz SSB	Eclectic—mainly on weekends

Table I– If you missed last month's column, this is an outline of popular frequencies and times for group-type HF Pack activities. Main spot of 18.157.5 MHz is the most active frequency, especially on weekends..Make two copies and keep them handy.

for carrying a 6 or 7 foot whip. It will make your 5 watt signal sound like 5 watts. If you prefer top-of-the-line results, use a break-down dipole or minibeam. Then folks will be amazed at how well you are working out with only 5 watts. It all depends on your particular needs.

Mating Batteries and Rigs

As you probably have surmised, mating battery packs, transceivers, and power levels can be a rather challenging situation. Rather than blindly guessing at energy requirements, however, a couple of quick mathematical comparisons and calculations simplify the task. How so? Just check your rig's manual or specifications to determine its receive and transmit current ratings, convert those figures to milli-amp-hours, and then compare them to your selected battery's capacity. As an example, Yaesu's FT-817 typically draws 450 ma on receive and 2 amps (2000 ma) on transmit (at 5 watts). If it is left on receive for a solid hour, that's 450 milli-amp/ hours. If it receives for three hours, that's (3 hours × .450 amp) 1350 mAh, or 1.35 amp-hour. If it is used on transmit for a total of 15 minutes during that three hour period (.25 hour × 2.0 amps, or 500 mAh), the total battery current used is (1350 + 500) 1850 mAh. A fully charged 1800 mAh NiMH battery pack would thus last roughly four hours before hitting discharge condition.

An IC-706 transceiver typically draws 2 amps at regular volume on receive and 6 or 7 amps on transmit at 20 or 30 watts. Assuming it is powered by a 7 amp-hour battery, the rig could receive for approximately 2 hours and 20 minutes (4.7 Ah) and transmit for 15 minutes (1.75 Ah) before going from fully charged to discharged status. Check your rig's manual and battery pack's specs and calculate your own operating times. It's fun and it works!

New W6MMA Minibeam

Vern Wright, W6MMA, has done it again. He has developed another "Super Antenna" for traveling or working out from restricted areas, and it is a winner. The antenna is a snap-together two-element minibeam that can be quickly set and reset as desired for operating 20, 17, 15, 12, 10, or 6 meters with good gain and impressive front-to-back and front-to-side ratios (see photos 6, 7, and 8).

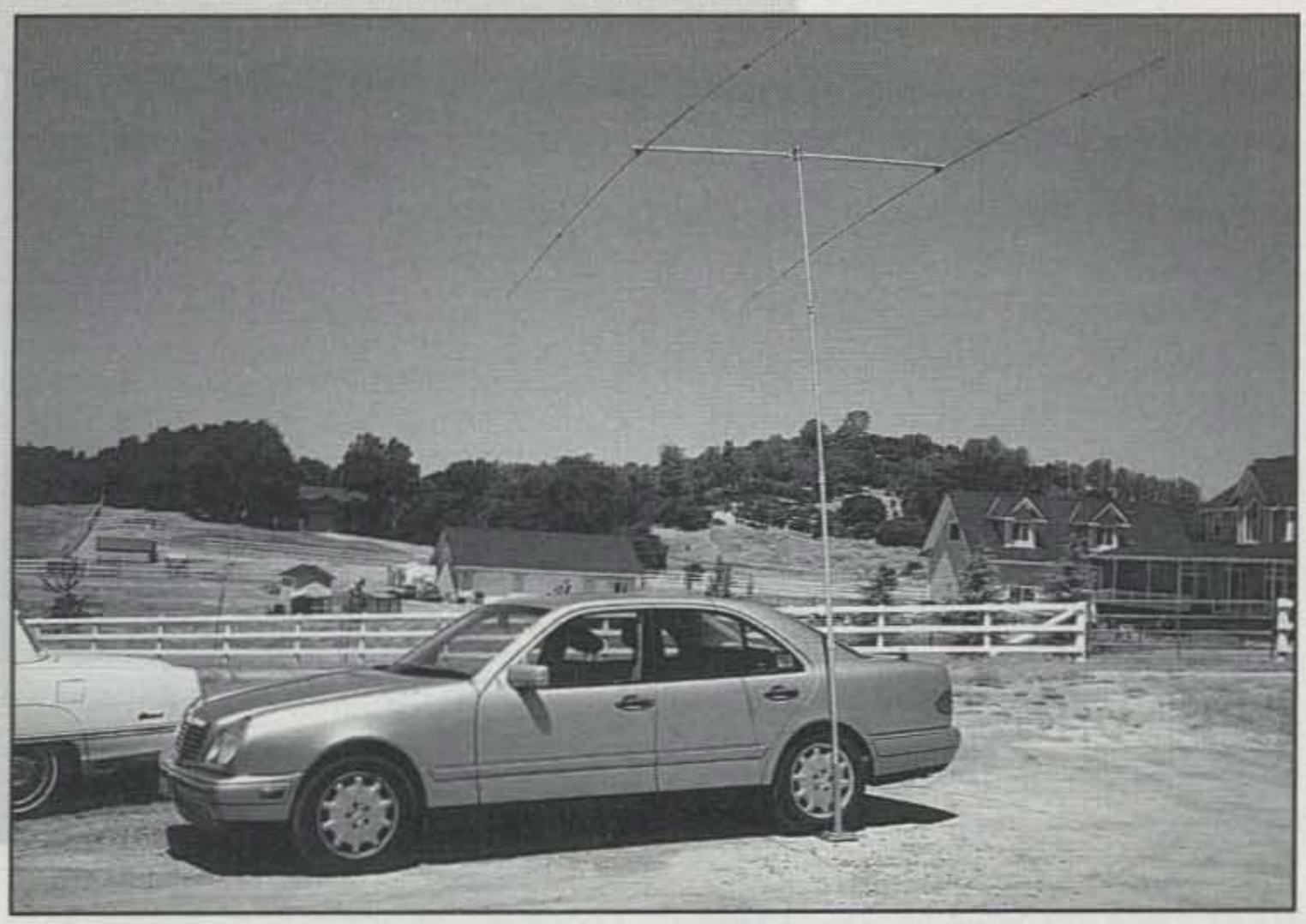

Photo 7– Within five minutes Vern, W6MMA, has assembled the minibeam, set it up for working 20 meters, and secured its mast to a drive-on mount. First class!

This portable two-element Yagi has an approximate "wingspan," or element length, of 16 feet and an approximate boom length of 7 feet, and weighs only 4 or 5 pounds. I say "approximate" on dimensions because you set element and boom length according to the desired band. The beam is so light it can be supported by a "Mr. Longarm" painter's pole, which is lighter than a TV mast.

Are you getting the picture here, friends? This beam-in-a-bag is ideal for HF Pack'n, camping, vacationing, fixed-position mobiling and/or operating from a condo, and it works like a champ!

The minibeam is supplied with a fancy 3 foot long carry bag and includes a balun, knurled set screws for hand-setting element lengths, plus a position-locking tape measure. The boom has spring-loaded ball bearings with mating holes you just press and slide into length-defining positions, and everything is pre-aligned for perfect horizontal/vertical positions. Further, laminated quick-reference dimension cards are

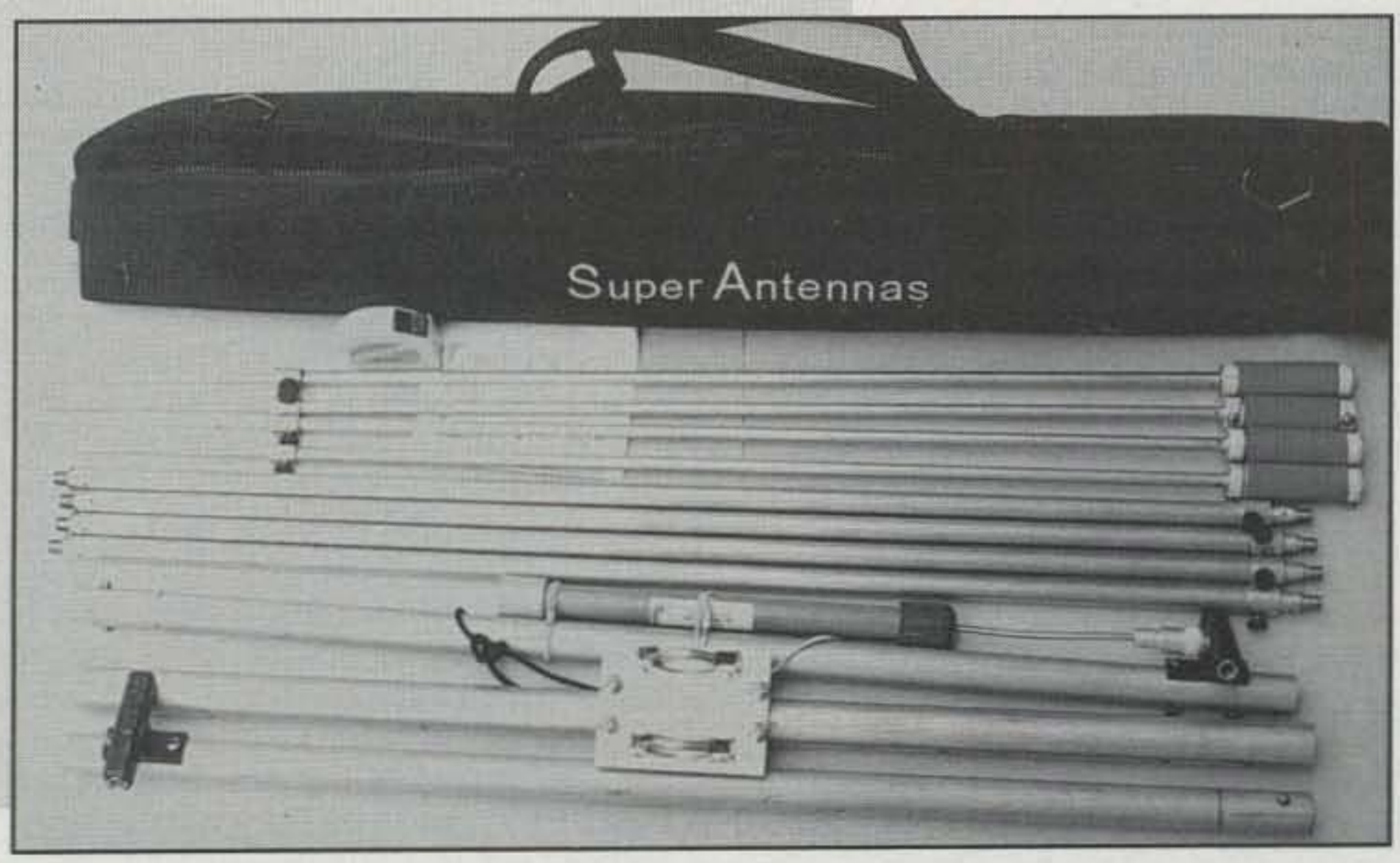

Photo 8– The W6MMA minibeam broken down and ready for repacking in its carry case. The antenna can quickly be assembled and tuned using only your own two hands and the supplied tape measure.

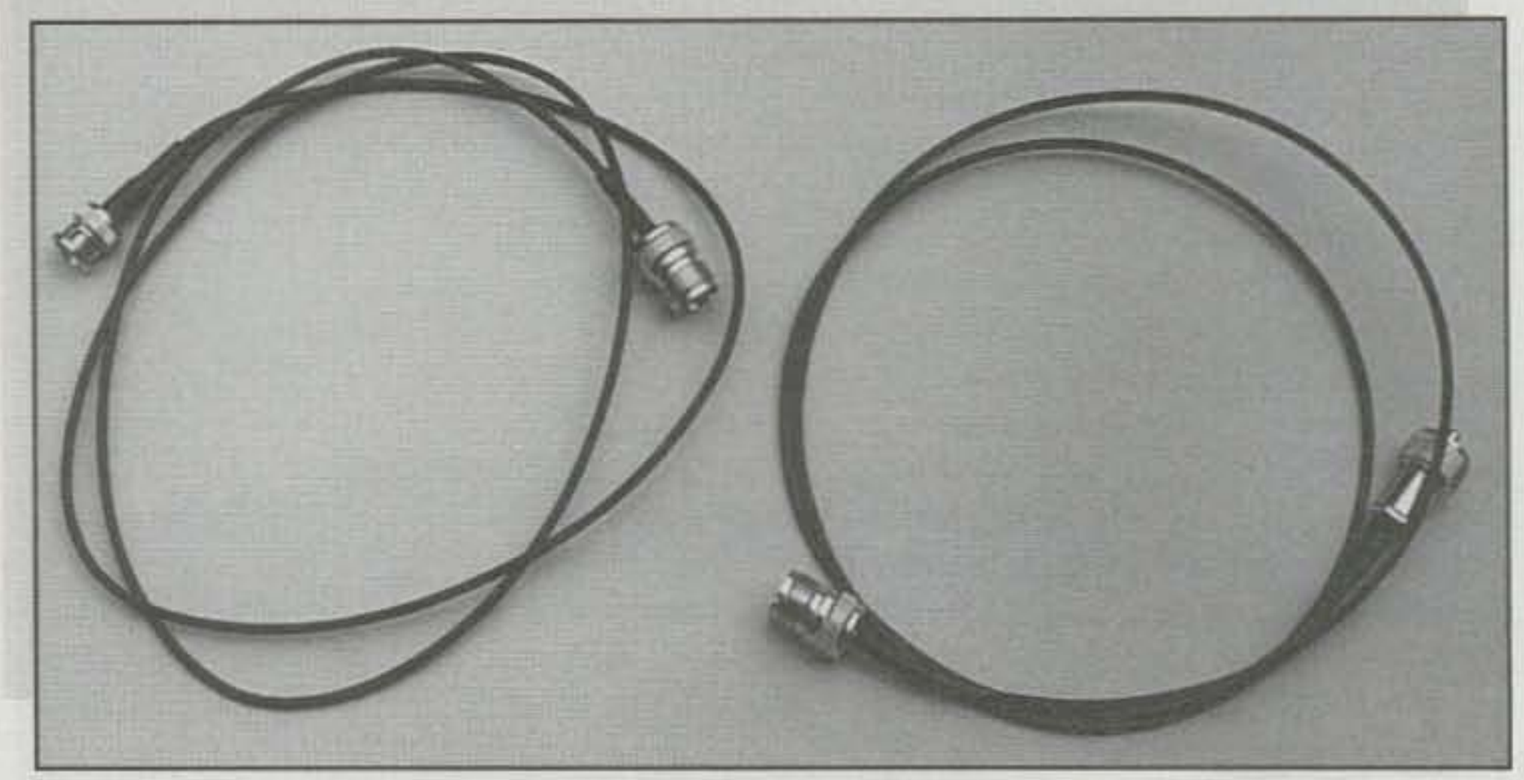

Photo 9– Need a low-loss, pre-assembled coax cable for connecting your HF Pack transceiver and antenna? Just contact Jim Glaze, K4SUS, of Antenna World.com and he can zip one of these gems to you. (Details in text.)

packed with the beam so you can even snap it together in the rain. After assembling the antenna once or twice for familiarization (and marking element settings with colored felt pens), the minibeam can go from bag to ready-for-operation setup in around 5 minutes—and that's working alone.

Before going pedestrian mobile with the minibeam, I set it up on a "Mr. Longarm" at home and compared its performance with my A3 triband beam and AV-640 vertical. It did great, especially on what I considered the most challenging bands—20 and 15 meters. Typically, performance was between my AV-640 (which is a gain-type 3/8-wave vertical) and three-element beam. In fact, it often performed on par with the beam, even though it was only at a height of 20 feet. This beam is definitely small in size yet big on performance, and that sure looks attractive to us! Want more details or an antenna? Check with Vern Wright, W6MMA, of Super Antennas, 1606 Pheasant Way, Placerville, CA 95667 (phone 530-622-6668 or <www.superantennas.com>).

Conclusion

The closing wire now approaches, but a couple of final items still beg for recognition. They are the pre-assembled cables for quickly connecting portable antennas and transceivers (photo 9). These cables are small diameter, low loss, available in various lengths, and just make life easy. Order one or two when you order an antenna for your mini rig, and you will be ready for portable HF'n before the week's end. These cables are available from Tom Glaze, K4SUS, of Antenna World, telephone 1-800-637-0222 or on the web: <www.antennaworld.com>.

Good luck with HF Pack and remember that copies of my new book, *Ultra Light HF'n* (and HF Pack'n) are available direct to your house from mine (K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210) for $16 plus $2.50 book-rate mail or $3.85 priority mail.

73, Dave, K4TWJ

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Radio Classics

BY JOE VERAS, N4QB

Vintage Gear and Its History

Inside Radio Row—Remembering Gross Radio

In large metropolitan areas, it is common for similar businesses or trades to congregate in the same area of the city. From 1930 until the early 1960s, the few blocks either side of Cortlandt Street, near the Hudson River in New York City's borough of Manhattan, had the world's greatest concentration of radio-related businesses.

Known as *Radio Row* to everyone with an interest in such matters, the area was comprised of storefronts, warehouses, lofts, and even dilapidated houses. All helped in providing some kind of accommodation for the radio and electrical/electronic parts businesses. What couldn't find a place indoors spilled out onto the sidewalks.

In the early 1960s, the Port Authority of New York/New Jersey, along with the state and city governments of New York, announced plans for a World Trade Center complex. The proposed location was bounded on the north by Vesey Street, on the south by Liberty Street, on the east by Trinity Place, and on the west by the elevated highway. Cortlandt, Dey, Fulton, and the cross streets between them in that area would disappear, and along with them, Radio Row!

Demolition of Radio Row began in 1962 and work on the twin towers of the World Trade Center was completed a decade later. They stood on that spot until September 11, 2001.

Two Radio Row companies well known to amateur radio operators in the pre-war years were Leeds Radio Laboratories and Gross Radio. Leeds began doing business there as a distributor of radio parts in the mid-1920s. It stocked components from almost every major manufacturer, specializing in those needed for transmitting apparatus. Gross Radio officially arrived on the Row in 1933. The common thread running through both companies was Jerome Gross, W2AAE.

Gross went into business for himself in 1925 as J. Gross & Company. His modest product line consisted of low-loss inductors, rack-and-panel transmitters, and wave meters. He ran the office functions of J. Gross from his residence, an apartment on Manhattan's Upper East Side. Late that year, Gross moved the business end of his operation from 323 E. 83rd Street to 907 Fox Street in The Bronx. In August of 1926, he consolidated business, laboratory, and manufacturing under one roof at 30 Park Place in Manhattan.

From its Park Place location, J. Gross & Company sent on-the-air code practice with a Teleplex machine using the call W2AUD. The company's main products were two- and three-tube receivers, and 7 1/2- and 75-watt transmitters in either Hartley or Tuned-Plate Tuned-Grid circuitry. All of these were available in kit form or wired-and-tested. The business was successful and popular with hams. Jerry Gross must have felt the need to get closer to the real scene of action, though—Radio Row.

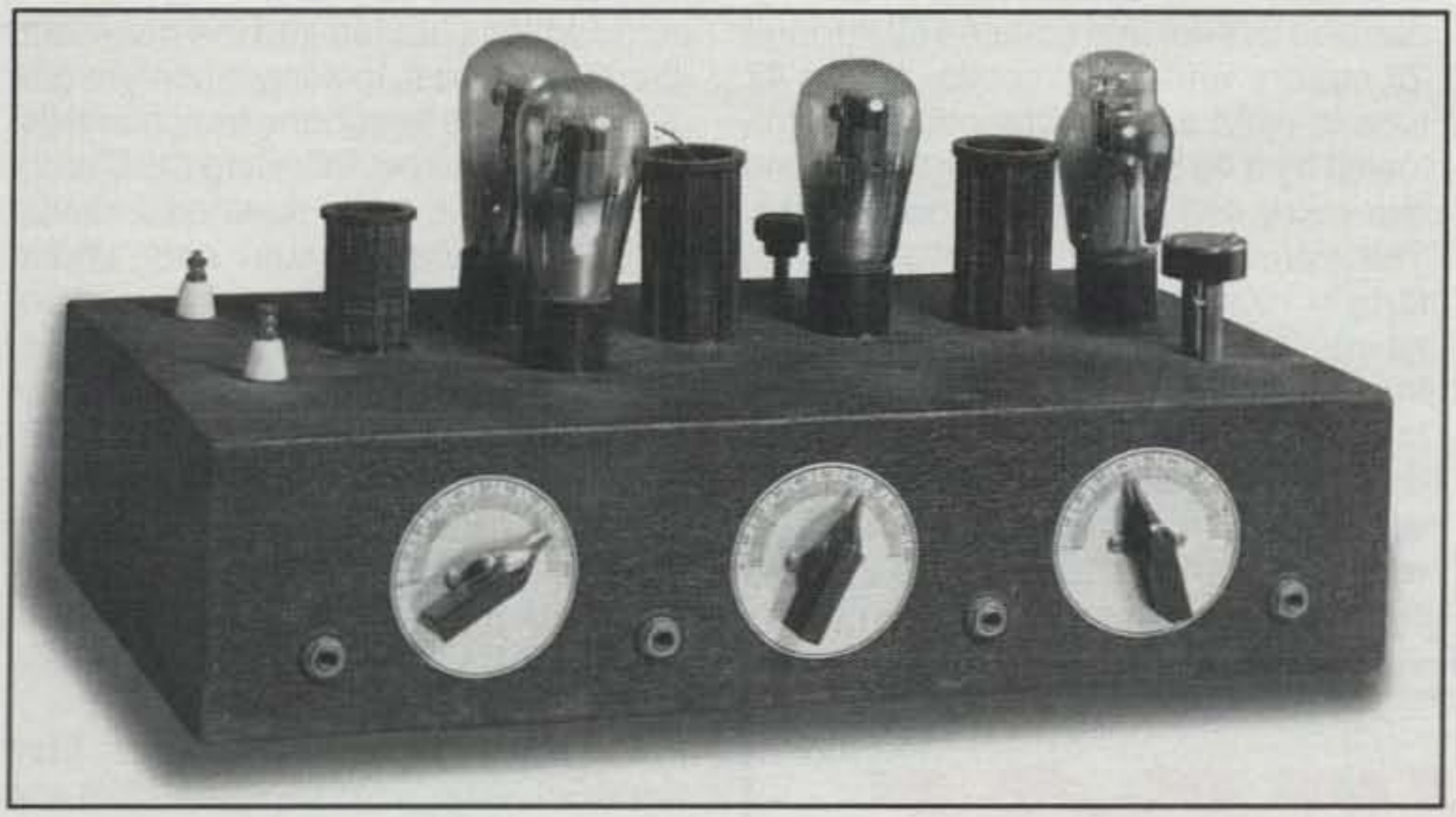
Leeds Radio's ads appearing in May 1929 announced, "Famous Shortwave Specialist, Mr. Jerome Gross, supervising new department equipped to design, construct, and advise on any material for the ham, BC station, or laboratory." Subsequent advertisements invited hams to stop by the store or write to "Jerry" with their problems. Cultivating this familiarity must have proven a good sales tool; Gross used it effectively when he went out on his own again in the fall of 1931.

In 1925 Jerome Gross began J. Gross & Co. from his residence at 323 E. 83rd St. on Manhattan's Upper East Side.

The first several pieces of new ham equipment Leeds advertised and sold after Jerry Gross joined the company were actually older Gross designs. They previously sold under his name, but appeared with the Leeds nameplate once he signed on as their "shortwave specialist." Even though they were part of the J. Gross & Company's 1927 product line, Leeds introduced the Hi-C 75-watt transmitter and 1930 Special receiver as new items. In the case of the receiver, calling it a 1930 model did make it new, in the same fashion automobiles are introduced annually.

Late in the summer of 1931, the *Shortwave Specialist* disappeared from Leeds Radio's advertisements. Jerry Gross had decided the time was right to resume doing business under his own name. In September he opened a store at 25 Warren Street, a few blocks north of Radio Row, near City Hall. Although it catered to general radio hobby and commercial interests as well, amateur radio business was the cornerstone of Gross Radio.

P.O. Box 1041, Birmingham, AL 35201
e-mail: <n4qb@cq-amateur-radio.com>
**For more recollections of Radio Row, see the Sept. issue of* CQ.



Gross CW-25 Transmitter, 25 watts out from a pair of type '46s in push-pull on 160 through 20 meters.

The store offered code-practice sessions for those wishing to learn the code or for hams seeking to increase their Morse proficiency. As he had done at Leeds, Jerry offered personal assistance in solving radio problems. The store's service benches welcomed troublesome equipment . . . commercial or homebrew . . . for a quick diagnosis. The purchaser of a chassis for a homebrew project could have it drilled and punched at no cost. Advertising for the firm called the store *Jerry's Place,* overpowering the smaller, more formal type-face used for the official logo. Creating personality and goodwill was important to Jerry Gross's business plan.

Gross Radio's first products were modular units, including a crystal oscillator, amplifier/doubler, and output stage that could be combined into a low-power HF CW transmitter. Other output-stage modules were available to increase the transmitter's power to either 50 or 75 watts. Gross's inventory remained transmitter intensive as long as he was in business. The building-block philosophy was a trademark of the company's engineering, with the simplest transmitter in a series furnishing the basis for the rest of the line. Stages, modulators, amplifiers, and increased power-supply capacity were added as one climbed the model-upgrade ladder, but basic circuitry and components remained the same.

In January 1932, the Gross *Hawk* receiver appeared, followed by the *Hawk junior* in April. These appear identical both physically and electrically to receivers made and sold by Radio Engineering Laboratories of Long Island City, New York at the same time. In July of '32, Gross brought to market a 5-meter transmitter and receiver pair based on an article by Ross Hull published a year earlier in *QST.*

The following summer found the restless Jerry Gross on the move again, this time to 51 Vesey Street, the heart of

Radio Row, and only a few doors from his old employer, Leeds. From this location he would produce the CW, CP, and CB series of transmitters. The letters indicated the transmitter's configuration: CW = an RF deck; CP = RF deck + amplifier and power supply; CB = RF deck, amplifier, and Class-B modulator + power supply. The letter designation was followed by numbers representing the transmitter's output power. Thus, a CB-100 was a 100-watt, Class-B modulated phone transmitter.

The CW-25 in the photograph accompanying this column covers 160 through 20 meters with plug-in coils. A type 47 tube is used as a crystal oscillator, followed by a 46 buffer/doubler stage, and two more 46s in push-pull for the PA. The transmitter sold for $13.95 in kit form in 1934. An external power-supply kit cost $8.95. A milliammeter plugged into phone jacks on the front of the transmitter chassis measured current in the different stages for tune-up purposes. Even some of Gross's larger rack-mounted transmitters used this technique. The meter panel had flexible cords which plugged into the panel and circuit of interest, looking much like one of the old-style telephone switchboards.

The transmitters following the CW-25 evolved from it. Most retained a similar crystal-oscillator circuit and added power and features. The first evolutionary steps—the CB-25, CB-50, CB-55, and CP-100—were rack-and-panel construction. The CB-100, CB-150, CB-200, 250, 300, and 350 were rack-mounted transmitters in fully-enclosed cabinets. Meters were provided for individual stages, so it was no longer necessary to use the plug-and-jack method of switching.

The last of the numerical series, from the CB-150 up, sold between 1938 and 1940. Still crystal-controlled and non-bandswitching, they were aimed squarely at the commercial and maritime as well as amateur markets.

The history of Gross Radio and the biographical details of its founder become sketchy during the World War II and post-war years. Jerome Gross remained a Manhattan resident for most of his life, moving to The Bronx around 1960. Amateur radio was an active part of that period of his life, as well. Before this columnist pens inappropriately elegiac words prematurely proclaiming the key of W2AAE silent, I will admit I do not know for certain. His passing was never noted in amateur publications; if he *was* mourned in print, I have not been able to find it. I welcome contributions from readers having additional information on the proprietor of *Jerry's Place*. If you can help with this, please get in touch with me via the e-mail or snail-mail addresses associated with this column.

On a personal note, I'm embarrassed because I don't have anything to sell in the "Radio Classics" column. The only thing I've been able to think of is tomatoes from the garden. I know that's not really amateur radio related, but they *were* grown in the shadow of the N4QB tower. No, Wait! I took pictures of some keys, and CQ is using them in a new calendar advertised elsewhere in this issue. You could buy one of those. That would help.

As always, there are vintage radio pictures (new ones each month) on the <www.n4qb.com> website, as well as other ham and non-ham stuff.

Thanks to Marty, AA4RM, for supplying the Gross CW-25 transmitter for the photo in this column. He also supplied two Campbell's soup can lids, but you'll have to ask him about that at a hamfest sometime. 73, Joe, N4QB

DX

BY CARL SMITH, N4AA

News Of Communication Around The World

Here and There

After a sluggish summertime DX season, I think everyone is looking forward to the late-fall DXing and contest season. Hopefully we will see some DXers traveling to activate some of those rare spots that have been hard to come by recently.

This month I am going to focus on DXers, and one group in particular that has been working to give something back to the hobby.

Honor Roll YL

First, though, we find a DXing YL, and an Honor Roll DXing YL at that. This is not a person who has been playing at DXing. She's been at it "tooth and nail" for a long time, and her Honor Roll status proves that. Let's have a look at Ilene Hammack, K5IH.

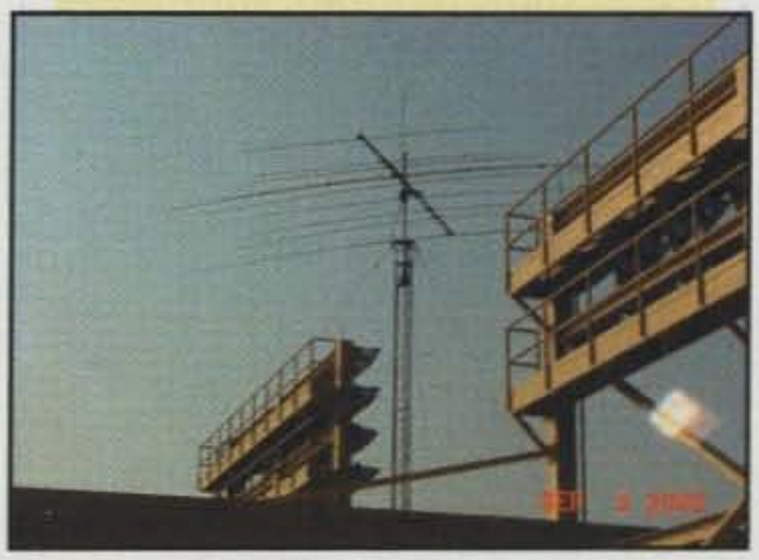
Ilene, K5IH, in her ham shack surrounded by walls full of operating achievement awards.

Ilene was originally licensed as WA5VWP in 1968 while attending college at Oklahoma State University. She upgraded to Extra in 1978 and chose K5IH, as allowed back then, for her new call. She is a Life Member of the ARRL and has been a member of the Young Ladies Radio League (YLRL) since 1979. Ilene is also a member of the Durango (Colorado) Amateur Radio Club. Her current DXCC country count stands at 342/333; she still needs VU4 and VU7. Following a move from the Oklahoma panhandle in 1992, she now chases DX from cool, colorful Pagosa Springs, Colorado.

With so much time spent pursuing the hobby, it is obvious that Ilene has some other ham radio interests beyond HF DXing. For instance, she was pleased to work Owen, W5LFL, during the first obiter flight carrying amateur radio—the shuttle Columbia in 1983. She was also fortunate to work VE3ONT via EME, utilizing a simple 14-element OSCAR 432 antenna in 1993. The Toronto VHF Society borrowed a 46 meter dish radio telescope antenna northwest of Ottawa for a weekend effort. The society's effort gave those with small antenna systems a one-time chance to work EME, and Ilene took advantage of it. She says, however, "My true passion remains chasing DX on the HF bands."

Congratulations to Ilene for her achievements. It's nice to see a YL standing tall among all of the "grumpy old men—hi!

Now for that group giving something back, as I mentioned at the beginning of this column.



The new antenna at the University of Tennessee, some 200 feet above the ground on top of the football stadium.

Antenna Goes Up on Neyland Stadium

By Lynn Lamb, W4NL

A new addition to the skyline of Knoxville, Tennessee was made possible by DXers who know that antennas are "most" of any good signal. They also know how to make things happen. In this case, the antenna does much more than provide a good signal.

The WPX Program

SSB

2846.....WB9IHH 2848.....VE3MQW
2847.....IZ2CEG

CW

3094.....YBØGJS 3096.....KG4AZU
3095.....OK1FED 3097.....VE3MQW

Mixed

1903.....WB5SYT 1905.....VE3MQW
1904.....N2LM 1906.....DL2NAI

CW: 500 VE3MQW. 550 KØKG. 1000 WA2VQV. 2000 KS4S. 2550 JA9CWJ.

SSB: 350 WB9IHH. 400 IZØBNR. 600 IZ2CEG, VE3MQW. 750 G3TSZ. 800 NØYYO. 1300 JN3SAC. 1950 KS4S.

MIXED: 600 K4IJQ. 850 VE3MQW. 2000 DL2NAI. 2350 JN3SAC. 2650 KS4S. 4750 F2YT.

10 meters: OK1FED
15 meters: OK1FED, WB9IHH
20 meters: OK1FED, NØYYO
40 meters: OK1FED, WB9IHH
80 meters: OK1FED, WB9IHH
160 meters: OK1FED

Asia: OK1FED, WB9IHH, 7N1NXF
Africa: JN3SAC
No. America: OK1FED, KG4AZU
So. America: WB9IHH
Europe: OK1FED
Oceania: 7N1NXF

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, 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, WB8ZRL, WA8YM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, 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, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, 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, W4GP, K4LQ.

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, SMØDJZ, 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, HB9DDZ, 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.

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.*

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

The WAZ Program

10 Meter SSB

539	JH1HPH	541	KU4BP
540	DL1NAI	542	N1RR

15 Meter SSB

580	JN3SAC	581	KU4BP

20 Meter SSB

1100	JN3SAC

12 Meter CW

34	W2FV

15 Meter CW

306	N1RR

17 Meter CW

43	W2FV

30 Meter CW

52	W2YC

40 Meter CW

228	N1RR

All Band WAZ SSB

4799	N4GU	4802	KBØRNC
4800	DL5JSP	4803	OZ6XR
4801	HB9DAU		

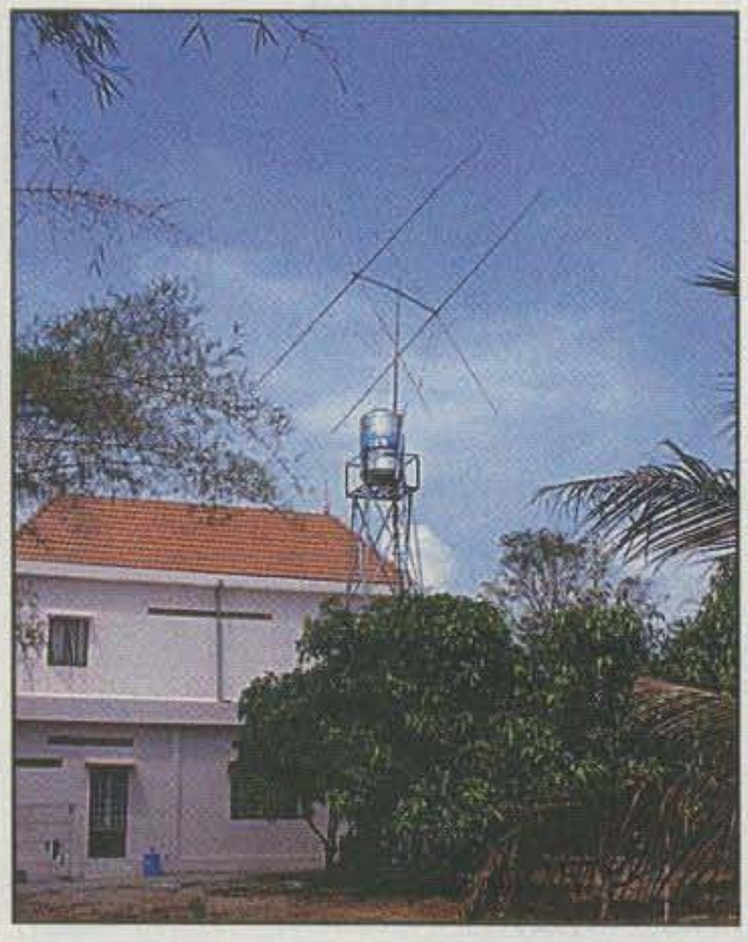
Mixed

8177	VE6KG	8180	RW9QA
8178	VE6DA	8181	AC9A
8179	N8WXQ	8182	VE3MQW

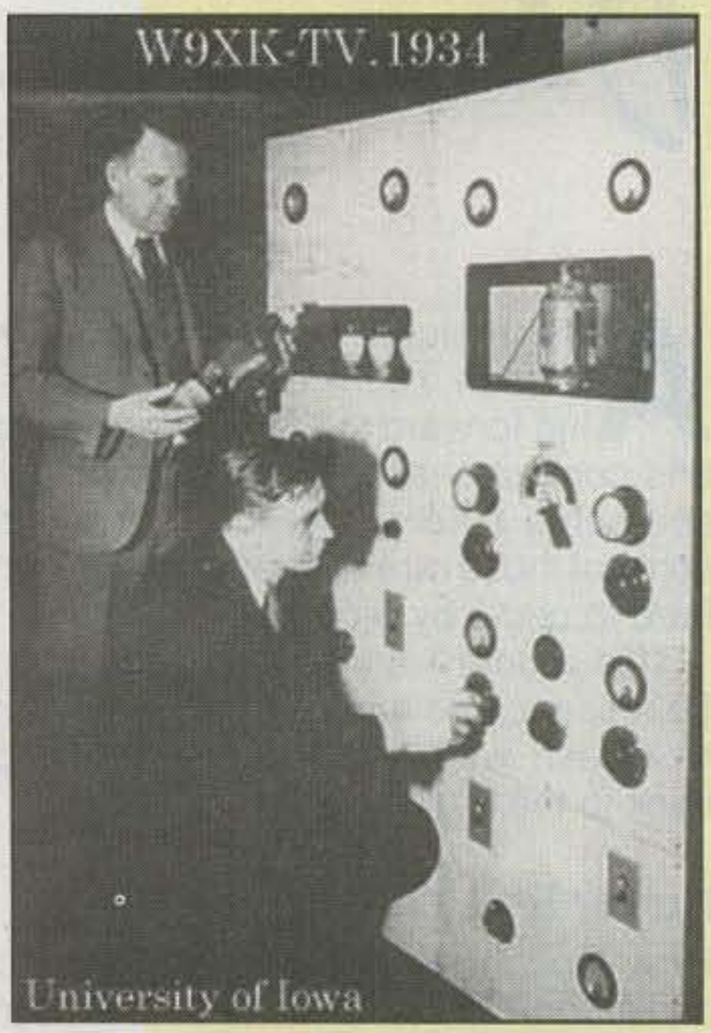
All CW

327	VE3MQW	331	W5WP
328	JL8EZA	332	W3UI
329	JK1VSL	333	N4GU
330	DL1SVI		

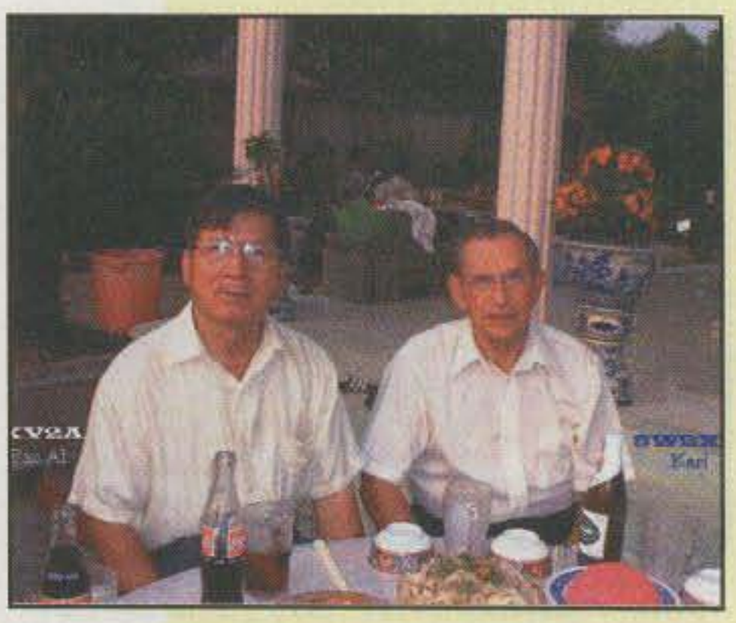
Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your 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>.



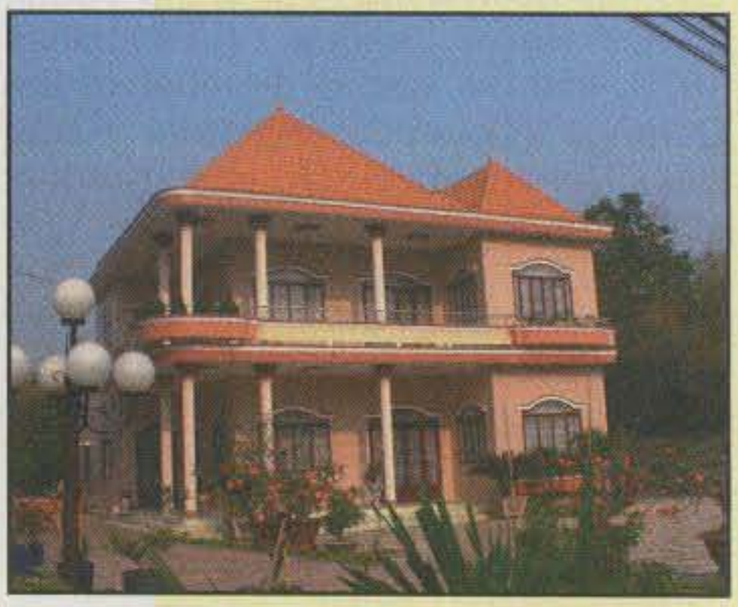
W9XK/3W2XK's homebrew tri-band quad. He says the bamboo spreaders were readily available and have survived quite well.



A view of the equipment used at the experimental TV station W9XK in 1934 at the University of Iowa.



Bac Ai (left), XV2A, and Karl, W9XK/3W2XK, having lunch. Note the ever-present cola bottles (remember Gus Browning?). Bac Ai is founder and president of the Saigon Amateur Radio Club. He gets the licenses for Vietnam from the Hanoi office.



The Vietnam home of Karl, W9XK/3W2XK, about 30 km from Saigon.

About a year ago, Sam Brown, WA4IUM (who has worked all entities), knowing the old antenna of the University of Tennessee Amateur Radio Club had been removed to make room for new sky boxes, wanted to do something to help the club. Sam is a news anchor/investigative reporter in the area and a shaker and mover for good causes. He went to work, just as he did to work Ed in P5 . . . *not holding back!*

Obtaining permission for an antenna was an incredible feat, but now a Force 12 XR-5 is above the lights at Neyland Stadium at a height of approximately 200 ft. It's a DXer's delight, made possible by a group of DXers working with Sam, the club officers, and the staff, headed by Tim Rogers, Vice Provost for Student Affairs. The anxious feeling a young ham must have arriving in this very intimidating setting/situation is now eased by a symbol of our hobby. There surely is comfort in knowing there is a friendly and secure place called "a shack" at the end of the coax of this very visible symbol.

DXers can make things happen. Contesters also make things happen, and how well we know. DXers and contesters are the Extra class, they are the climbers, they are the aggressive leadership of amateur radio, they are the ones who spend the most on the hobby, and they do have a sense of responsibility to pay back to this hobby, which has been so good to them. DXers provide and share with others DXers/contesters, but also with amateur radio in general.

The dream WA4IUM had is now a reality and an example for other DXers to follow in making big signals "for the Deserving," as Cass *(Hugh Cassidy, WA6AUD, a former editor of CQ's "DX" column—ed.)* so often said, and we miss him. Is this a challenge or what?

Karl Melter, W9XK/3W2XK

Now here is a guy with a history. Karl spends several months each year living in Vietnam and operating as 3W2XK. Karl was born in Hungary, and his interest in radio goes back to 1943, when he first learned Morse code as a plane spotter. He came to the United States in 1951 and lived in the Chicago area. He served with the U.S. Coast Guard for 25 years and is now retired in the western North Carolina town of Waynesville. Karl speaks three languages: English, Hungarian, and German.

The callsign W9XK was issued to Karl in the 1970s. He discovered that it had been assigned in the 1930s as one of the recognized Frequency Standards in the U.S. and was even cited as such in the Federal Radio Commission exams. Later it was assigned to a station at the University of Iowa in Iowa City for experimental TV broadcasts with sound on its radio station, WSUI. Karl says W9XK was the first educational station with regularly scheduled programs.

More about Karl and the interesting history of the callsign W9XK can be found on Karl's web page at <http://webpages.charter.net/w9xk/den.htm>.

At the end of November Karl and his wife will be going back to Vietnam, where they will spend about five months before going home to North Carolina. Karl will be active on 20, 15, and 10 meters. Due to his past bad experience

5 Band WAZ

As of September 15, 2002, 606 stations have attained the 200 zone level and 1292 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:

N3BB UA6LV

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	UT4UZ, 199 (6)
W4LI, 199 (26)	SM7BIP, 199 (31)
K7UR, 199 (34)	PY5EG, 199 (23)
WØPGI, 199 (26)	SP5DVP, 199 (31 on 40)
W2YY, 199 (26)	KY7M, 199 (34)
VE7AHA, 199 (34)	W8AEF, 199 (40)
IK8BQE, 199 (31)	W9NGA, 199 (26)
JA2IVK, 199 (34 on 40m)	W6BCQ, 199 (37)
KL7Y, 199 (34)	K8RR, 199 (26)
NN7X, 199 (34)	EA5BCX, 198 (27, 39)
IK1AOD, 199 (1)	G3KDB, 198 (1, 12)
DF3CB, 199 (1)	KG9N, 198 (18, 22)
F6CPO, 199 (1)	KØSR, 198 (22, 23)
KC7V, 199 (34)	UA4PO, 198 (1, 2)
GM3YOR, 199 (31)	JA1DM, 198 (2, 40)
VO1FB, 199 (19)	9A5I, 198 (1, 16)
KZ4V, 199 (26)	LA7FD, 198 (3, 4)
W6DN, 199 (17)	K5PC, 198 (18, 23)
W6SR, 199 (37)	K4CN, 198 (23, 26)
W3NO, 199 (26)	KF2O, 198 (24, 26)
K4UTE, 199 (18)	G3KMQ, 198 (1, 27)
HB9DDZ, 199 (31)	N2QT, 198 (23, 24)
RU3FM, 199 (1)	OK1DWC, 198 (6, 31)
HB9BGV, 199 (31)	W4UM, 198 (18, 23)
N3UN, 199 (18)	US7MM,198 (2, 6)
OH2VZ, 199 (31)	K2TK, 198 (23, 24)
K5MC, 199 (22)	K3JGJ, 198 (24, 26)
W1JZ, 199 (24)	W4DC, 198 (24, 26)
K2UU, 199 (26)	N4XR, 198 (22, 27)
W1WAI, 199 (24)	OE2BZL, 198 (1, 27)
W1FZ, 199 (26)	N4PQX, 198 (24, 26)

The following have qualified for the basic 5 Band WAZ Award:

IKØIZW (153 zones)	KU4BP (161 zones)
EU1TT (185 zones)	N1RR (194 zones)
IK4EWN (159 zones)	

Endorsements:

YU7FW (189 zones)	K8RR (199 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>.

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 335 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K2TQC 334	W2FXA 333	K4CN 332	K3JGJ 331	K8PV 327	OK1MP 325	KUØS 322	HB9DDZ 314	KH6CF 301
K2FL 334	EA2IA 333	KA7T 332	N4AH 331	W4QB 327	W4LI 325	KE5PO 322	N1HN 313	KØHQW 299
K9BWQ 334	F3AT 333	W8XD 332	N4CH 330	W4UW 327	WA8DXA 325	W7IIT 322	CT1YH 313	F6HMJ 296
K9MM 334	DJ2PJ 333	WØHZ 332	W6DN 330	I1JQJ 327	I5XIM 325	K6CU 321	K9OW 313	WG7A 295
W7OM 334	W7CNL 333	WØJLC 332	W2UE 330	YU1TR 327	K5UO 325	N4OT 321	N7WO 312	W9IL 294
K2JLA 334	YU1HA 333	K8LJG 332	I4LCK 330	I4EAT 327	N5HB 325	HA5DA 321	K9DDO 312	KD8IW 288
K2ENT 333	PA5PQ 333	NØFW 331	VE7CNE 330	DL8CM 327	YU1AB 325	VE7DX 320	W3II 312	EA3BHK 282
N7FU 333	DL3DXX 333	N5FG 331	4N7ZZ 330	SM6CST 327	IK2ILH 325	IKØADY 320	YT1AT 310	YC2OK 282
K3UA 333	IT9QDS 333	PT2TF 331	K7LAY 329	N4KG 327	N5FW 325	WG5G/QRPp 320	KF8UN 308	DJ1YH 281
K2OWE 333	G4BWP 333	K6LEB 331	K9IW 329	IT9TQH 326	9A2AA 325	HA5NK 319	PY4WS 308	UA9SG 279
N4MM 333	K4CEB 333	N4JF 331	WB4UBD 329	K7JS 326	LA7JO 324	K1FK 319	W6YQ 306	XE1MD 278
W4OEL 333	N7RO 332	VE3XN 331	G3KMQ 329	I2EOW 326	SM5HV/HK7 324	G3KMQ 317	YU7FW 306	EA2CIN 278
F3TH 333	K6GJ 332	W1WAI 331	KZ4V 329	NC9T 326	W6SR 323	K8JJC 315	LU3DSI 302	I3ZSX 276
WB5MTV 333	K4IQJ 332	K2JF 331	K1HDO 328	K4JLD 326	9A2AJ 323	OZ5UR 315	F5OIU 302	G3DPX 275

SSB

K6YRA 335	K2ENT 333	VE2GHZ 333	W8KS 331	W2FKF 329	W6SR 326	WR5Y 322	CT1YH 311	I3ZSX 290
K2TQC 335	K7LAY 333	VE2PJ 332	YV5IVB 331	KE4VU 328	N4KG 326	WA4ZZ 322	YV5NWG 311	N8SHZ 290
W6EUF 335	ZL3NS 333	YV1KZ 332	VE4ROY 331	K1HDO 328	K7TCL 326	N3RX 321	LU3HBO 310	W4PGC 288
K2JLA 335	N4MM 333	YV1AJ 332	KX5V 331	K5UO 328	W5LLU 326	XE1CI 321	SV3AQR 310	YV5NWG 287
K4MQG 335	OZ3SK 333	W2FXA 332	I8LEL 331	KF8UN 328	W9HRQ 326	CT1ESO 321	HA6NF 310	RW9SG 286
IK1GPG 335	N4CH 333	W8ZET 332	K9OW 331	EA3EQT 328	W4QB 326	YT1AT 321	HB9DDZ 310	VE7HAM 285
K5OVC 335	IØZV 333	OE2EGL 332	W2CC 331	KB2MY 328	K8PV 326	EA8TE 321	EA3BHK 307	KKØDX 285
NØFW 335	K7JS 333	KSØZ 332	W4WX 331	KZ4V 328	DL6KG 326	W6MFC 321	N1ALR 306	F5RRS 284
K9MM 335	W4UNP 333	N5ZM 332	K3JGJ 331	XE1D 328	W4LI 326	K3LC 320	XE1MDX 305	CT1CFH 284
W6BCQ 335	N5FG 333	WB4UBD 332	N5ORT 331	KD8IW 328	IKØIOL 325	N4CSF 320	EA5OL 305	WØIKD 283
XE1AE 335	DJ9ZB 333	WB3DNA 332	W7FP 331	ZL1BOQ 328	K1EY 325	N4HK 320	WB2AQC 305	EA3CYM 283
W7OM 335	EA2IA 333	CT1EEB 332	W9SS 330	I1EEW 327	K9IW 325	DL3DXX 320	N1KC 305	W9ACE 283
KZ2P 335	XE1L 333	K4CN 332	K8CSG 330	SV1ADG 327	WA4JTI 325	KØFP 320	KE4SCY 304	AC6WO 283
IK8CNT 335	4N7ZZ 333	K9PP 332	W6DN 330	DL8CM 327	NI5D 325	EA1JG 320	KC4FW 304	F5JSK 281
VK4LC 335	KE5PO 333	W6SHY 332	WA4IUM 330	I1JQJ 327	KC4MJ 325	EA7TV 320	K3BYV 303	WN6J 281
OE7SEL 335	PY4OY 333	I8KCI 332	EA3KB 330	F9RM 327	K7HG 324	SV1RK 320	YC2OK 303	YU1TR 280
VE3MR 335	VE1YX 333	LU4DXU 332	YV1CLM 330	XE1MD 327	AC7DX 324	WA4DAN 319	WB2NQT 303	KK5UY 280
VE3MRS 335	XE1VIC 333	W5RUK 332	K9HQM 330	I4EAT 327	KØHQW 324	CE1YI 318	VK3IR 303	KA5OER 280
K4MZU 334	IN3DEI 333	VE2WY 332	LA7JO 330	W3GG 327	WØULU 324	YV4VN 317	W2GZI 302	EA3CWT 278
OZ5EV 334	I4LCK 333	VE7WJ 331	AB4IQ 330	AA6BB 327	W9IL 324	EA5GMB 317	N5QDE 302	VE2DRN 277
DU9RG 334	VE3XN 333	PT2TF 331	AE5DX 330	SM6CST 327	EA3BKI 323	W5OXA 317	KD4YT 302	XE2NLD 277
N7BK 334	W2JZK 333	W3AZD 331	WS9V 329	W9OKL 327	K4JDJ 323	CT1AHU 316	YT7TY 300	9A9R 277
N7RO 334	EA4DO 333	OE3WWB 331	I2EOW 329	WD8MGQ 327	EA3BMT 323	N5HSF 316	SV2CWY 300	W6UPI 276
K5TVC 334	PA5PQ 333	DL9OH 331	K2JF 329	CX4HS 327	WW1N 322	K6RO 316	4X6DK 300	VE2AJT 275
K2FL 334	K8LJG 333	N2VW 331	ZL1AGO 329	IØSGF 327	F6BFI 322	CP2DL 314	KK4TR 300	Z31JA 275
WØYDB 334	W8AXI 333	YZ7AA 331	N5FG 329	IT9TQH 327	K6CF 322	K9YY 313	K6GFJ 299	G4URW 275
W4UW 334	K3UA 333	YV1JV 331	DU1KT 329	IT9TGO 327	LU7HJM 322	NØMI 313	WA1ECF 295	
K9BWQ 334	K4JLD 333	WA4WTG 331	4Z4DX 329	DK5WQ 327	K5NP 322	KD5ZD 313	N5WYR 293	
W4NKI 334	VE4ACY 333	N4JF 331	VE7DX 329	UY5XE 327	NI5D 322	W5GZI 311	K7ZM 292	
WDØBNC 334	YU1AB 333	EA1JG 331	W2FGY 329	K6BZ 327	PY2DBU 322	WZ3E 311	OA4EI 292	
K6GJ 333	KØKG 333	K1UO 331	CT1EEN 329	KE5K 327	LU5DV 322	VE3CKP 311	KØOZ 291	

RTTY

K2ENT 331	NI4H 321	W2JGR 316	KE5PO 297	I2EOW 291	EA5FKI 284	W4QB 280	YC2OK 280	PA5PQ 272
WB4UBD 327	K3UA 318	G4BWP 312	W4EEU 291	I1JQJ 289				

with QSL requests, Karl says he will only respond to *direct* requests that include an addressed return envelope and adequate postage/funds for returning the card to your QTH.

CYØMM Sable Island DXpedition

Sable Island was ranked #49 in *The DX Magazine* Most Wanted Survey for last year. It actually ranked #27 for the world, outside of the U.S. and Europe. VE3NE, VE3EY, and VE3NZ are making an effort to bring Sable Island to "the Deserving" from November 15–25. Their website at <www.dipole.com> says: "Sable Island is one of the most remote Canadian Islands, and it is infamous for its difficult access by sea, due to the surrounding shallow waters, which have been proven deadly for many nav-

QSL Information

T24DX via EA4DX
T32CY via JA1PCY
T48W via SM0WKA
T88ZF via DK2ZF
T94WJ via DL9KBX
T9A via K2PF
TAØ/Z36W via NN6C
TA2AP via AD6KA
TF/VE7RKK via XE1KK
TG4/AC4LN via UA4WHX
TI3M via EA5K
TI4GCV via EA7FTR
TI4NJ via EA7FTR
TI5N via W3HNK
TJ7AS via EA4AHK
TJ7EC via EA4AHK
TK5EL via F6FNU
TMØA via F6OIE
TM1C via F5NLY
TM4X via F5GTW
TM5B via F5XX
TM5CW via F5SJB
TM5RGE via F5LBM
TM6JUN via F5RJM
TO8CW via F8CMT
TU5JD via IK2IQD
TZ6XO via VE2XO
UE3RFF via RK3RB
UN2O via IK2QPR
UN7EN via EA7FTR
UN7JX via IK2QPR
UT1QK via DJØLZ
UZ4WWQ via AA4NU
V31BV via UA4WHX
V31JR via W1LLU
V31KQ via WA0ETE
V47CA via VE3BW
V63VB via W7AVA
V63ZF via DK2ZF
V73AA via JA1VND
V73XX via JF1OCQ
V8AJV via PA1JAV
VC1JA via VY1JA
VC6X via VE6BF
VG1JA via VY1JA
VK4DEY via KE4DA
VK9LO via PA3GIO
VP2EI via KD6WW
VP5/K9DX via K9QVB
VP6AJ via N9TK
VP8CXV via GØTQJ
VP8ITN via GM3ITN
VQ9FW via KG4ESX
VQ9HK via WB4DAH
VQ9M via WB7OJV
VQ9SH via KD4RHO
VQ9T via N1OT
VU2TS via I1YRL
VU2UR via SM3DBU
VU3JDI via AD6TF
VY1A via VY1JA
VY1RAC via VY1JA
VY3JA via VY1JA
VY5JA via VY1JA
VY5OJA via VY1JA
W4/YV5DTA via W4DTA
WA4RX/CY9 via KC6AWX
WB5LBJ/DU6 via W6IBU
WHØC via JA6AGA
WP3C via W3HNK
WV2B/CY9 via KC6AWX
XF1DN via XE2DN
XK1JA via VY1JA
XM3YDX via RW4WM
XM3ZIK via VE3ZIK
XM6/VU3SNM via 9V1SM
XM7/VU3SNM via 9V1SM
XN5JA via VY1JA
XN9JA via VY1JA
XO1JA via VY1JA
XU1NOM via GM4FDM
XW1OM via GM4FDM
XX9TXW via K9XW
XY1HT via GM4FDM
YA3GIB via UA3GIB
YB0AZ via W7TSQ
YBØDPO via K5ZE
YBØGJS via K5ZE
YB1HDF via EA5KB
YB4JIM via EA7FTR
YC1CVQ via EA7FTR
YC1GTS via EA7FTR
YC1NZM via EA7FTR
YC3MM via IZ8CCW
YI1DZ via WA4JTK
YJ8DA via KE4DA
YKØA via W6OAKT
YMØKA via TA1KA
YM3LZ via LZ2CJ
YN1MAC via EA7FTR
YN2EJ via K5LBU
YN2EJ via G3UML
YP3A via YO3KPA
YS1/AC4LN via UA4WHX
YS1JBL via EA7FTR
YTØA via YU1EXY
YU1KN via DJØLZ
YU2000A via YU1FJK
YU8DX via DJØLZ
YV5ANF via EA7FTR
YV5DTA via W4DTA
YV5OHW via EA7FTR
YW1D via EA7JX
YW1T via W4SO
YZ1W via YU1ANT
Z21HS via 5H3RK
Z31GX via DJØLZ
Z31PK via DJØLZ
Z31VJ via DJØLZ
Z32FD via DJØLZ
Z34M via DJØLZ
Z35V via W3HC
ZC40BS via ZC4BS
ZC40DW via GØDEZ
ZC40VG via GØUVX
ZC4ATC via 5B4YX
ZC4BS via G4KIV
ZC4DW via GØDEZ
ZC4OVG via GØUVX
ZC4VG via GØUVX
ZF1A via W5ASP
ZK1KH via ZL4HU
ZK1NFK via DL7NFK
ZL2HU via ZL4HU
ZL5CP via AI3D
ZL6QH via ZL2AOH
ZL7AA via ZL4HU
ZL8RI via ZL4HU
ZL9CI via ZL4HU
ZM7A via ZL4HU
ZP67PAZ via ZP9EE
ZS6FF via K5LBU
ZS6SRL via ZS4BS
ZW5T via IV3NVN
ZZ2Z via AC7DX

(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>.)

CQ DX Awards Program

SSB

2382.....WN9NBT

SSB Endorsements

320.....K2JLA/335
320.....XE1AE/335
320.....IK8CNT/335
320.....OE7SEL/335
320.....K4MQG/335
320.....IK1GPG/335
320.....K9MM/335
320.....K9BWQ/334
320.....W4NKI/334
320.....K2FL/334
320.....W0YDB/334
320.....WDØBNC/334
320.....OE3WWB/334
320.....VE2GHZ/333
320.....KØKG/333
320.....K3JGJ/331
320.....W7FP/331
320.....W2FGY/329
300.....KK4TR/300
275.....N5WYR/293
150.....IZ8DQK/155
1.8 MHz.....KK4TR

CW Endorsements

320.....K9BWQ/334
320.....K2FL/334
320.....K9MM/334
320.....K2JLA/334
320.....KA7T/332
320.....K3JGJ/331
320.....WG5G/QRPp/320

RTTY Endorsement

310.....K3UA/318

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, 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.

igators during past centuries. Presently, the only Canadian Coast Guard approved safe transportation to the island is a dedicated charter flight, with a specially equipped airplane, since the island does not have any manmade airstrip. However, this flight is expensive, and accommodations and associated costs are very high on Sable Island."

Any assistance, no matter how modest, will be greatly appreciated by the group. Donations will be acknowledged on the QSL card, on the internet site, and in printed media.

Plans call for the three ops to work CW/SSB and RTTY with a IC-765 + PA; FT-1000MP + PA; a TS-930; and a TS-690 for 6 meters. Antennas will consist of a TH33 for 20/15/10 meters, an A3WS for 12/17, and delta loops for 160/80/40/30. They will be operating during CQ WW DX CW Contest as well.

Donations may be sent to Lajos Laki, VE3NE, 53 Widdicombe Hill Blvd, Suite 101, Toronto, Ont M9R 1Y3, Canada (e-mail: <cy0mm@dipole.com>).

Contest Operations

We are into the contest season now, and there are a lot of operations scheduled from some interesting DX locations over the next few months. Contesting isn't for everyone, but contests do provide the opportunity for you to add to your totals for band and/or mode credit. An excellent source for scheduled operations during the contests is the website of Bill Feidt, NG3K. Bill keeps the list updated almost daily, so you can see what is coming up. Take a look at <www.ng3k.com>.

Enjoy the operating activities, prepare for the upcoming holiday season, and just have fun! 73, Carl, N4AA

Awards

BY TED MELINOSKY, K1BV

News Of Certificate And Award Collecting

Every few months it's necessary to define one of the common terms used in award hunting. *GCR* stands for General Certification Rule. Whenever you see "GCR okay" in the rules, it means that the sponsor will accept a statement signed by two licensed amateurs acting as witnesses to certify that they have seen the QSL cards you are using to apply for an award. In a very few cases, for extremely difficult and prestigious awards, the actual cards must be sent and examined by the sponsor. For all the rest, the sponsor really does not want to handle and return cards.

On another note, at this time e-QSLs are not valid for the USA-CA award, nor for any other awards offered by *CQ*.

Sharon Martarello, KJ8F, USA-CA All Counties #1043, 5-4-2002.

Sharon Martarello, KJ8F
USA-CA All Counties #1043

My interest in amateur radio grew as my interest in CB radio dwindled. A group of CB people learned the local ham club was going to give a Novice class, so we signed up. In the end a few took the class and only a couple passed the test. I think I am the only one of the group who pursued a higher class license, and who is still active 25 years later.

I was first licensed in June 1977 as WB8MRU. The following November I upgraded to Technician. My first setup was a Kenwood TS-820S and 4BTV antenna. I was in my glory hammering away on the rig. I continued to study and upgraded to General at a Dayton Hamvention®.

Having two young children to care for and another on the way, the humorous note on the local repeater was my baby would be the only one in the nursery who knew CW. The new baby did not lessen my desire for the Extra class license, though. Once again, it was back to the books and key to practice. Finally, in August 1980 I upgraded to Extra and at that time changed my call to KJ8F.

Over the years I have been active on several nets, collected wallpaper, chased DX, and dabbled a bit in contesting. I stopped by 14.336 MHz on a few occasions, but never really got involved.

On May 23, 1993 I finally got the nerve to jump in and try county hunting. My first contact was with AI5P in Ashley, Arkansas. I got hooked, and the hunt was on. My country hunting and radio activity lessened a bit due to commitments with family, moving to a new home, and not having an antenna for a short time. Still realizing my USA-CA goal, I knew I needed to get busy.

The first 1000, then 2000 counties came fairly easily. When I got my first mobile setup, I was really happy. Joe and I having been traveling about the country giving out counties and getting some in return. I have really enjoyed county hunting and see it as a challenge. I knew someday I would have a star, and finally it happened. On April 11, 2002 I got my last county, Wilson, Kansas. Thanks to KAØSHC, Larry, for making a special trip.

I am a member of the local radio club and assist them as ARRL-VE, am a member of the YLRL and Buckeye Belles, and am a life member of the International DX Association and Quarter Century Wireless Association.

I would like to take this opportunity to thank each and every one who helped me in any way to reach my goal. A special thank you to my own Joe, who has supported my hobby from the beginning, using his time to get the tower and antennas up and running to keep me on the air. I think sometimes he wishes I had chosen to collect baskets. Now for the second time around.—*Sharon, KJ8F*

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll
James Layton, KR4ZH
USA-CA All Counties #1048
July 29, 2002

PSK31 Awards

This (relatively) new mode is generating its own collection of awards. PSK allows reliable communication with low power, and most hams have the required equipment: an HF transceiver, a PC loaded with one of the many free PSK programs, a sound card in the computer, and a variety of cables to connect the sound card to the transceiver. Low power is the rule of the day, and it seems to be very efficient at QRP levels. Steve Melachrinos, W3HF, sent in samples of several awards offered by different groups.

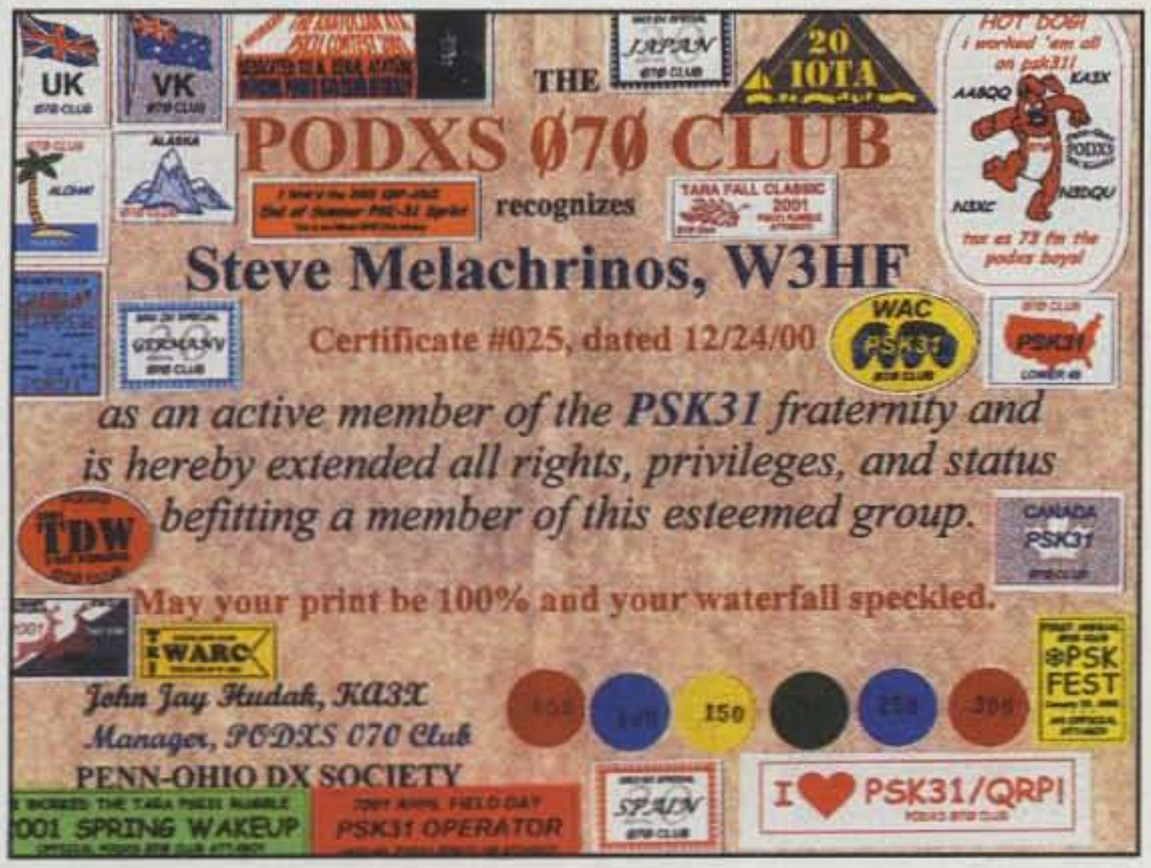
Penn-Ohio DX Society Awards Program

In the U.S. the premier group promoting PSK31 is the PODXS 070 (part of the Penn-Ohio DX Society). Their internet site contains a wealth of information regarding PSK and DXing using digital modes, and links to the PSK awards in this month's column. The group and its members have produced a continuous stream of special endorsements designed to stimulate activity. Look at Steve's membership certificate, which shows affiliated member groups from G, VK, JA, IOTA, VE, EA, DL, KH6, etc.

General Requirements. Awards are available to members. Becoming a member of the PODXS requires submitting a special application to <jhudak3rd@aol.com>, or by snail mail to Jay Hudak, 212 Beechwood Blvd., Pulaski, PA 16143 (<http:// www.podxs.com/html/070_club.html>).

Basic Award. Make contact with 50 different stations using PSK31 mode, 160 to 6 meters, WARC bands included. Contacts after June 1, 2000. No use of repeaters or cross mode. One QSL card must be submitted. When you have been accepted as a member, the card will be returned to you together with the 070 membership certificate. Endorsements available each additional 50 contacts, up to 300. Award fees are $1 for the U.S. Basic Certificate and $2 for the DX Basic Certificate. Upgrade stickers are $1 each. IRCs are not accepted at this time. Apply to: Jay Budzowski, N3DQU, 109 S. Northview Avenue, New Castle, PA 16102-1633 (e-mail: <n3dqu@aol.com>).

Penn-Ohio Digital Prefix Awards Program. This award is available in Mixed, RTTY, and PSK31. RTTY is normal teletype operation. PSK modes are BPSK, QPSK, and PSK10. Mixed is RTTY, PSK, and may include other modes such as MFSK, Hellscheiber, Throb, and MT63. Additional modes to be added. CW, regardless of how it is generated, is not considered a valid mode for this award. All applications must use the PODXS DPX Application Form (PODXS form 3-36) and the Endorsement List Form (PODXS form



Membership certificate of the PODXS 070 Club.

3-37). Both of these, plus the DPX Rules, can be downloaded from <http://www.qsl.net/wm2u/podxs_dpx.html> or <http://hometown.aol.com/ n3dqu/podxs_dpx.htm>.

Complete all the forms and enclose your application fee. Mail to: PODXS DPX Awards Manager, Ernie Mills, WM2U, 9 Morningside Dr., Ballston Lake, NY 12019-1531 (e-mail: <wm2u@qsl.net>).

Applications for Basic Certificate. Complete the application form. You must fill a separate form out for each Basic Certificate and attach an endorsement form showing your claimed prefix contacts. You can include any number of prefix, band, and/or continent endorsements on a single application form, but submit a prefix list, one for each, on PODXS 3.37 and clearly label it.

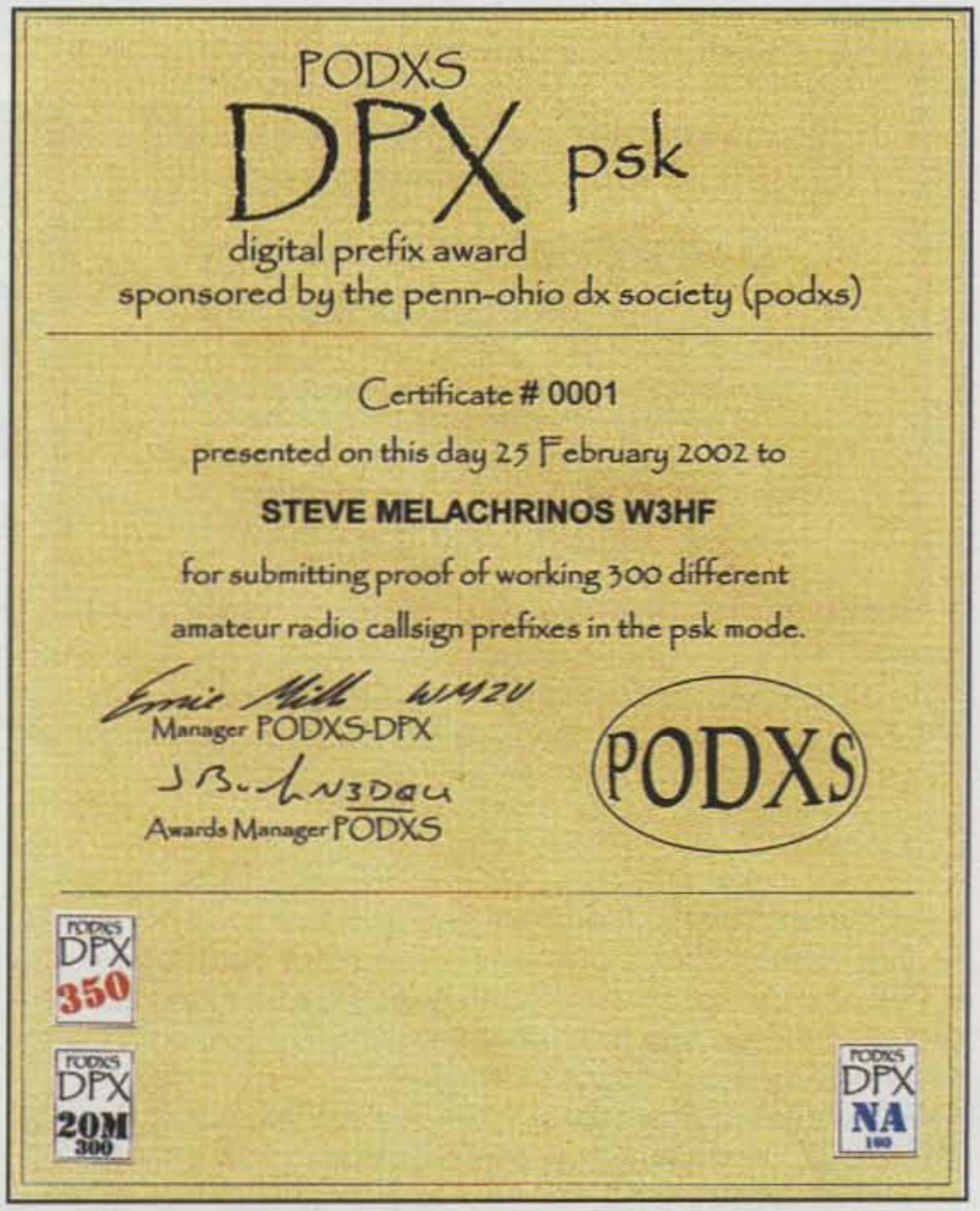
Application for Endorsements. Each prefix upgrade, band or continent endorsement must have a separate form PODXS 3-37 completely filled out, and clearly showing the type of endorsement. List the callsigns in alphabetical order, and make sure that any portable prefix is in its proper position—i.e., G3/WM2U would count as G3. The portable prefix is a prefix, not a suffix. Proper authorized prefixes only may be used. Maritime and interim license class prefixes do not count—i.e., /G, /E, etc. Any portable prefixes without numbers must be designated zero (Ø). AIR counts as AIØ.

Band endorsements are available for working the following number of prefixes on these bands: 50 on 160 meters; 175 on 80 meters; 250 on 40 meters; 300 on 20,15, and 10 meters; and 75 on 6 meters.

Continent endorsements are available for working the following number of prefixes per continent: North America (NA) 160, South America (SA) 95, Europe (EU) 160, Africa (AF) 90, Asia (AS) 75, and Oceania (OC) 60.

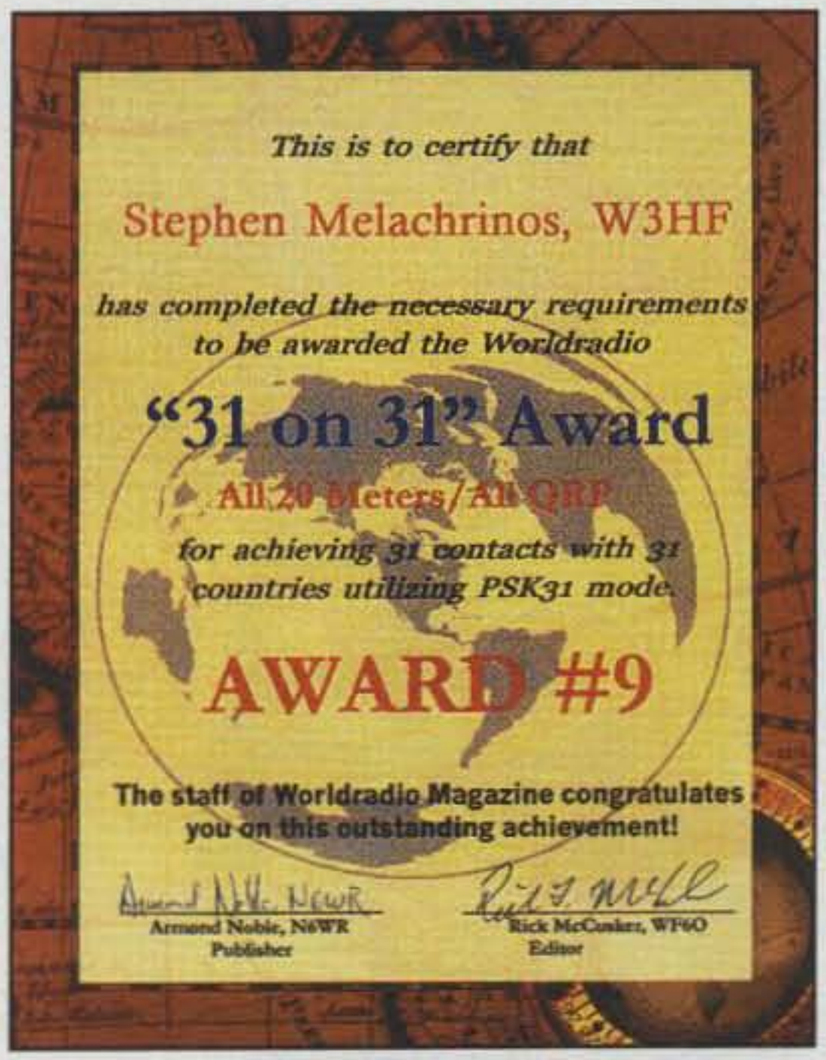
When applying for a prefix upgrade endorsement, send an alphabetical- order list of the additional prefixes being claimed over the last endorsement, or a photocopy or computer printout of your complete prefix list, but maintain a format similar to form PODXS 3.37.

Include application fee: PODXS 070 club members $3 and indicate 070 certificate number. Endorsement stickers are $1.



The Digital Prefix Award is offered by the Penn-Ohio DX Society.

Work 31 countries from the WorldRadio *list of nations on PSK31 to earn the 31 on 31 Award sponsored by* WorldRadio *magazine.* →



31 on 31 Award

Work 31 countries from the *WorldRadio* list of nations on PSK31. Application form and country list are available for an SASE from the sponsor. The countries required are real sovereign nations—no little possessions, overseas territories, half-awash reefs, sand banks, navigational hazards, or colonies of another country. Send list of contacts including callsign, date, time, and band, enclosing the fee of $3.10, to: WorldRadio, 2120 28th St., Sacramento, CA. 95818.

BARTG Awards

The British Amateur Radio Teledata Group Series (BARTG) is an English club which promotes the use of digi-

The British Amateur Radio Teledata Group issues the PSK31 40 Award for working 40 different countries on PSK31 on any band.

tal communications. It offers a series of five awards for contacting combinations of member or other countries using RTTY and packet and has just added PSK31 to the list. The group's internet site is quite interesting: <http://www.bartg.demon.co.uk/Awards/psk31.htm>.

General Requirements. GCR acceptable. Cost: UK £6, US $10, or 30 IRCs. Endorsement stickers: UK £50, US $2, or 3 IRCs. Send US $2, UK £50, or 5 extra IRCs if you send cards for checking. Apply to: Nigel P. Roberts, G4KZZ, 13 Rosemoor Close, Hunmanby, North Yorkshire, England YO14 0NB. (Membership information about this group is available from: Bill McGill, GØDXB, 14 Farquahar Road, Maltby, Rotherham, South Yorkshire, England S66 7PD.)

BARTG PSK31 40 Award. Available to licensed amateurs and SWLs on the submission of satisfactory proof of having heard/ worked 40 different countries using only PSK31 on any band beginning 1 January 1999. No cross-band or cross-mode contacts allowed, and there are no endorsements. You may either submit the cards or photocopies that clearly show callsign and mode. GCR accepted if signed by two officers of a recognized radio club. Claims will be accepted based on a contest log submitted for any BARTG HF contest. The ARRL DXCC list is used to determine countries.

URL of the Month

The Gibraltar Amateur Radio Society offers two awards on their website. The rules are pretty simple, the fees are modest, and while ZB2 is not a common prefix, it's likely that you've worked enough different ZB2 stations (six) to qualify for the ZB2 Award. The site also contains useful information on how to get a Gibraltar license. The site is at: <http://www.gibnet.com/gars/>.

By the time this goes to print, I will have moved to a new QTH as noted on the first page of this column. However, as this is being written, the tower is still waiting to be dismantled and everything has to be packed!

Keep sending me those award rules and samples (to the new address). Publicity is the key to a successful awards program for your club or group, and *CQ* magazine will do its part.

73, Ted, K1BV

Announcing:

The 2003 CQ World-Wide 160 Meter DX Contest

CW: 0000Z January 25 to 2359Z January 26
SSB: 0000Z February 22 to 2359Z February 23

The objective of these contests is for amateurs around the world to contact other amateurs in as many U.S. states, Canadian provinces, and countries as possible on the 160 meter band. **NOTE: Each contest is now 48 hours and starts 2 hours later than in previous years. Single operator stations may only operate 30 out of the 48 hours.**

Classes: Single and Multi-Operator only. Use of packet, a spotting net, or logging assistance makes an entry Multi-Operator. Multi-Operators must show the actual operator for each QSO. Under Single Operator there will be a designation of power level: H = power over 150 watts, L = power under 150 watts, and Q = 5 watts or less. Score listings will be per state or country, but if there is sufficient category activity or if a high enough score is made, then a certificate will be issued. Minimum score for a certificate is 5,000 points for Low Power and 1,000 points for QRP. Multi-Operators will all be considered high power.

Exchange: RS(T) and state for U.S., province for Canada, and either prefix or country abbreviation for DX. Contacts without some location indicator will be ruled invalid.

Scoring: Contacts with stations in own country, 2 points. Contacts with other countries on same continent, 5 points. Contacts with other continents, 10 points. Maritime mobile contacts count 5 points. There is no multiplier value for a maritime mobile contact.

Multiplier: Each continental U.S. state (48), U.S. District of Columbia (DC), Canadian area (14), and DX country. KL7 and KH6 are considered DX and not states for this contest. DX countries are DXCC plus WAE (IT, GM Shetland Islands, et. al). Canadian areas include VO1, VO2, NB, NS, PEI, VE2, VE3, VE4, VE5, VE6, VE7, NWT, **VY0**, and Yukon. Do not count the United States and Canada as separate countries.

Final Score: Total QSO points times the sum of all multipliers (states, VE, DX countries).

Penalties: Three additional contacts may be deleted for each unverified contact removed from the log.

Disqualification: A log may be disqualified for violation of amateur radio regulations, unsportsmanlike conduct, or claiming excessive unverified contacts.

Awards: Certificates will be awarded to the top scorers in each class (see provisions under classes) by state, Canadian area, and DX country. Runners-up with high scores over 100,000 may also receive certificates. The following plaques, with donating sponsors as indicated, will be awarded for exceptional efforts.

2003 PLAQUES

SINGLE OPERATOR

	CW	SSB
World	W4ZV	N4NX
USA	K4TEA	K4JRB
Canada	TBA	WØETC
Zone 3 USA	N5IA	N4TMW
Zone 4 USA	K4WA	N4XMX
Zone 5 USA	N4XMX	K4ODL
Europe	K9UWA	WB4ZNH
Africa	TBA	TBA
Oceania	TBA	TBA
Asia	K4SX	NT4TT
Japan*	W4ZV	—
Russia	RZ3AA	—
S. America	TBA	TBA
N. America**	CQ	CQ
	N4IN Memorial	K2EEK Memorial

MULTI-OPERATOR

World	N4RJ	SE DX Club
USA	W8UVZ, WØCD, K8GG	WB9Z
Zone 3	4X4NJ	4X4NJ

TBA = to be announced.

**There is no SSB operation allowed in Japan at the present.*

***North America outside U.S. and Canada.*

The plaque procedure is the top scorer in the indicated area wins the plaque. However, a station can only win one plaque per contest section. The plaque is then awarded to the next highest scoring station. For example, WX8ZZZ wins top World Multi-Operator. Then the next station in the U.S. wins the U.S. plaque.

The DX window is dropped for both sections. All stations will operate under the rules and regulations of their licensing agency regarding frequencies allowed and power levels. Please allow intercontinental QSOs, as this is an international DX contest. This is a gentleman's contest and band, so let's help make intercontinental contacts happen.

Computer Logging: Please submit your log via e-mail in the Cabrillo format. The Cabrillo format is created by all the major logging programs. Be sure to put your call and mode in the "Subject" line of each log. The log must be an attachment and not in the body of the text. *Large logs may be zipped using WINZIP, for example.* Please label the contest logs either CQ-160-CW or CQ-160-SSB and put in a claimed score (if you want to be listed in claimed scores). Your e-mail log will be automatically acknowledged by the server and checked for proper Cabrillo format. You may mail a diskette; if you do so you must attach a printed summary sheet. The diskette must be clearly labeled with the call of the entrant, the mode (CW or SSB), and the category. If you print out a computer log, you must also send a diskette. Do not send .bin files, database files, or other nonconforming files. Do not remove duplicates from your log, as there is no penalty for duplicate contacts.

Manual Logs: Sample log and summary sheets may be obtained from *CQ* by sending a large SASE with sufficient postage to cover your request. You can also download paper log forms from the CQ website <http://www.cq-amateur-radio.com>, or make your own with 40 contacts per page with columns for GMT, exchanges, multiplier, and points. Paper logs with over 200 QSOs must include a dupe/check sheet with all calls in alpha-sort order. Show the multiplier only the first time it is worked. Each page must have sub-totals for multipliers, contacts, and points. A running total below the sub-total on each page is recommended. Include a summary sheet with your entry showing the scoring and other essential information. A printed name/mailing address is recommended and a signed declaration that all rules have been observed. Clearly mark all duplicate contactsand remember they have no point value. Please put the summary sheet at the front of the log. Manual logs should clearly indicate total multiplier, W/VE multiplier, and DX multiplier.

Club Competition: Any club that submits at least three logs may enter the Club Competition. The name of the club must be clearly identified under club competition on the summary sheet, or summary portion of the Cabrillo log. Club Competition is "for fun" to foster more activity. There is a separate listing for club scores.

Log Submissions: Mailing deadline for CW entries is February 28, 2003; for SSB entries March 31, 2003. *Exception:* You may send both logs at once as long as the CW log is received by March 31, 2003. For manual and diskettes logs send them early to assure receipt by the deadlines. For a return receipt enclose an SASE or SAE with postage or 1 IRC. Avoid the registered postal route, as this delays getting the log until someone can sign the receipt. For paper logs, proofread your log before submission. Each year many errors are corrected that you should catch.

Send e-mail logs to: <cq160@kkn.net>.

Send all other logs to CQ 160 Meter Contest, 25 Newbridge Road, Hicksville, NY 11801 USA. Please indicate CW or SSB on the envelope.

VHF Plus

BY JOE LYNCH, N6CL

All About The World Above HF

Leonids to Light the Night Skies

Ever since the results of last year's *Leonids* meteor storms began to surface, the withering question among ham radio ping jockeys' has been, "Will there be another storm in 2002? All predictors say yes! In fact, the three best-known predictors—the team of David Asher of the Armagh Observatory in Northern Ireland and Robert McNaught of the Australian National University (see <http http://www.arm.ac.uk/leonid/>); Finnish astronomer Esko Lyytinen (see <http://www.ursa.fi/ursa/jaostot/meteorit/leoeng02.html>); and Peter Jenniskens of the SETI Institute (see <http://leonid.arc.nasa.gov/ACM2002.pdf>)—all indicate two storms will occur, one over western Europe and the other over the Americas.

What makes these forecasters so sure of themselves? Last year's predictions, in particular those of Lyytinen, were the most accurate forecasts of *Leonids* meteor activity ever. Riding on that success, these four have examined their models and predict that this year will be lots of fun.

That's the good news. The not-so-good news is that except for a higher than normal activity level in 2006, this will be the last we see of the *Leonids* until 2099–2100, when the Earth again will pass through debris left in the orbit of the Tempel-Tuttle Comet, the parent comet of the *Leonids* meteor showers. The reason is why is similar to what happened in 1899, when the Jupiter-Saturn gravitational pull on the debris clouds that the Earth would have passed through or near was enough to negate any real *Leonid* activity. This will happen again during the 2033 and 2066 normal peak timeframes.

Speaking of debris clouds, these are what make for the possibility of storms. When the Earth either passes through or near the debris clouds that are left behind in the aftermath of the comet's perihelion and associated gravitational influence from the Sun, the possibility of an increase in meteor activity may occur. When the comet approaches the Sun, ices evaporate and the dust particles are ejected into orbit in geyser-like fountains. These fountains appear as clouds of dust that (as near as the researchers can tell) remain in an elliptical orbit that the Earth sometimes encounters during its circular orbit around the Sun.

In the case of this year's predicted storms, as last year, the Earth will pass through debris left behind after the 1767 and 1866 perihelia. For the western European event, the Earth will pass through the debris cloud left behind from the 1767 perihelion; for the Americas event the Earth will pass through debris left behind from the 1866 perihelion.

By way of illustrating how the Earth will pass through these debris clouds, David Asher has drawn a series of plots showing a timeline of where Earth will be in relationship to the various debris clouds of previous *Leonids* perihelia. Fig. 1 illustrates this year's path. As part of the ongoing research program Leonids MAC (Multi-instrument Aircraft Campaign) project, NASA illustrators have taken Asher's plots and combined them with graphs that illustrate the intensity (in zenith hourly rates) of the meteor shower or storm for the years 1998–2002. In the case of 2002, the graph represents a prediction of how

VHF Plus Calendar

Nov. 3	Moon perigee. Good EME conditions.
Nov. 4	New Moon.
Nov. 7-11	20th Space Symposium and AMSAT-NA Annual Meeting. See text for details.
Nov. 8	Lowest Moon declination.
Nov. 10	Poor EME conditions.
Nov. 11	First quarter Moon.
Nov. 17	Poor EME conditions.
Nov. 18	Moon apogee.
Nov. 19	*Leonids* meteor shower predicted peak. See text for details.
Nov. 20	Full Moon.
Nov. 23	Highest Moon declination.
Nov. 23-24	ARRL Int'l EME Competition second weekend.
Nov. 24	Moderate EME conditions.
Nov. 27	Last quarter Moon.

• *EME conditions courtesy W5LUU*

The 1833 Leonids *meteor storm as seen from Niagara Falls, New York. (From* Smith's Illustrated Astronomy, *a school book by Asa Smith, 1864).*

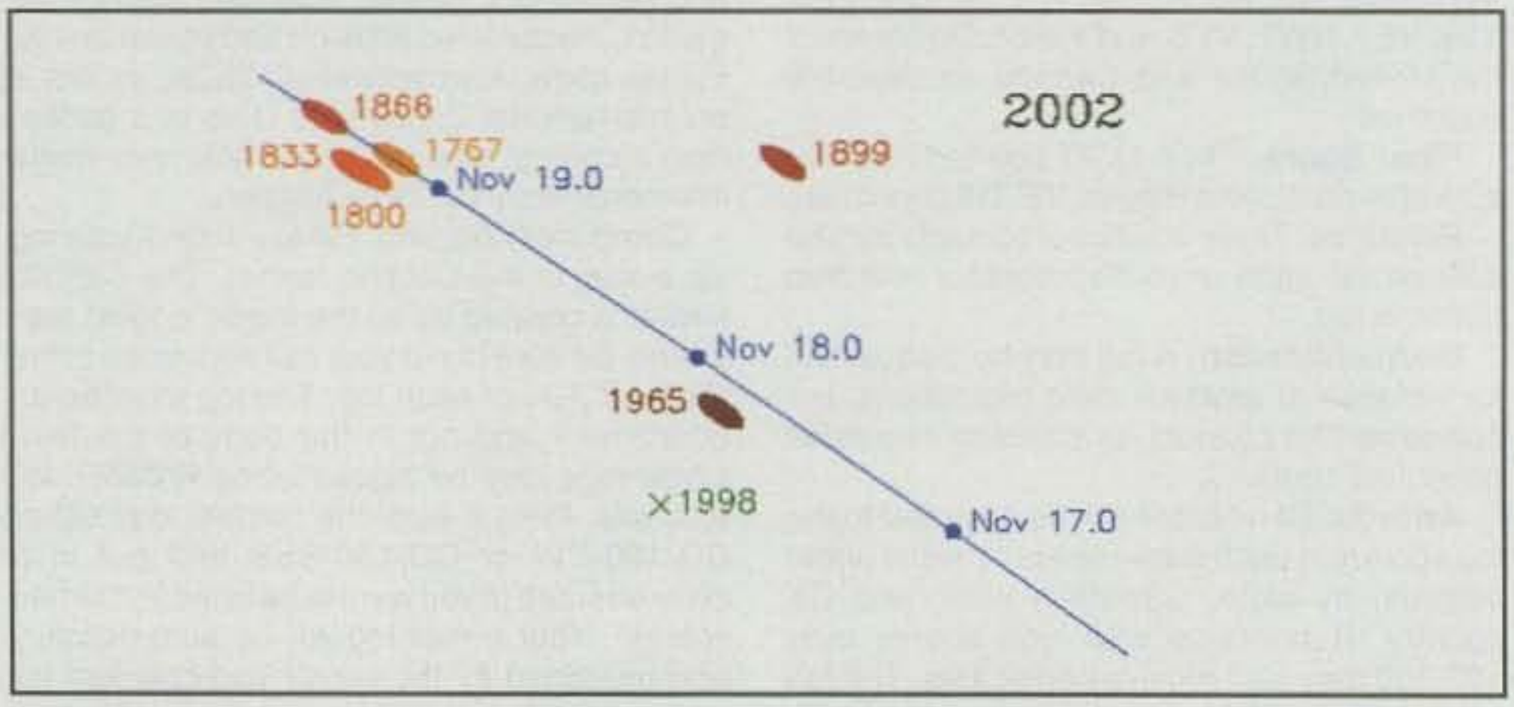


Fig. 1– Leonids dust trails for 2002. (Used with permission of David Asher)

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(phone 918-627-6625; fax 918-835-9785)
e-mail: <n6cl@cq-amateur-radio.com>

Predictor	Best Seen From	Peak Time (UTC)	ZHR	Duration (hours)	Dusted Ejected in Year
Asher/McNaught	Western Europe	03:53	3000/hr.	1.5	1767
Lyytinin	Western Europe	04:03	3500/hr.	1.76	1767
Jenniskens	Western Europe	03:48	5900/hr.	0.64	1767
Jenniskens	Western Europe & Americas	04:50	51/hr.	4.1	1799
Jenniskens	Americas	05:59	28/hr.	4.8	1833
Lyytinin	Americas	06:36	160/hr.	—	1866
Asher/McNaught	Americas	10:29	10,000/hr.	1.2	1866
Lyytinin	Americas	10:40	2600/hr.	2.03	1866
Jenniskens	Americas	10:23	5400/hr.	0.6	1866

Table I– Summary of Leonids *forecasts for November 19, 2002 UTC (from <http://leonid.arc.nasa.gov/1998.html>). Note: On November 17, at 20:10 UTC (Asher) or 19:30 UTC (Jenniskens), Earth will pass by the 1965 dust trail at a considerable distance. Predicted peak rates are less than ZHR = 1, but east Asian observers should be on the alert for a possible minor outburst that night.*

the spike in meteor activity will appear. Out of respect for Asher's copyright restriction on his plots, we are not reprinting NASA's adaptation of them here. These illustrations can be seen at <http://leonid.arc.nasa.gov/why.html>.

Making Contacts This Year

The following is an excerpt from a sidebar on the *Leonids* that is a part of a two-part series on meteor-scatter communications written by Shelby Ennis, W8WN, and appearing in the fall issue of *CQ VHF* magazine:

How good will this shower be for communications? This is impossible to tell. It is usually assumed that any shower that has a ZHR peak above 100/hour or so will be very good during the peak times; therefore, with the likelihood of a storm, the *Leonids* should be very good. However, this also is dependent upon the size of the particles. Interestingly, many felt that the "fireball storm" of 1998, even though it had a lower rate, produced better MS conditions than did the much higher rates (but with smaller particles) of the next two years.

Which mode of communications should be better, SSB or HSMS? This depends as much on the size of the particles as the rate. If they are large, SSB will definitely be better. If they are small (more likely), HSMS will probably do better except near the actual peak. (It is not unusual for there to be some sorting of sizes, with the larger particles occurring at a slightly different time than the smaller ones.) So any suggestion would be only a guess.

Is extreme DX possible during the *Leonids*? Nobody knows for sure. Even so, this is expected to be the last major display for many, many years, so now is the time to find out! For more on this aspect, see the last part of the *Leonids* section on the Hot News at <http://www.qsl.net/w8wn/hscw/papers/hot_news.html> and follow the links, both in the *Leonids* section and also at the bottom of the page.

For further reading, I suggest that you pick up a copy of the November issue *Sky and Telescope,* as it is anticipated that this magazine will feature an article on the *Leonids*. For the latest information on the World Wide Web, use Google to search the web. Even without these two other sources, all of the information you really need is available in the fall issue of *CQ VHF* magazine and on the Hot News page indicated above. With that in mind, I urge you to get on the air and join the excitement!

The Predictions

Table I summarizes the present predictions. For the latest update, visit <http://leonid.arc.nasa.gov>. As the table indicates, the Americas are favored with plenty of meteor shower activity. As with last year, it is advisable essentially to give up sleeping overnight, as the possibility exists for meteor-scatter QSOs for as long as the Leo constellation is visible—and perhaps even earlier or later depending upon the residual dust the Earth passes through before and after its encounter with the main debris clouds.

Meteor-Scatter Extra Class License Questions

As part of my ongoing examination of Extra class license questions that we in the weak-signal communications specialty should know anyway, we present the following meteor-scatter-related questions from the new question pool:

E3A09: When a meteor strikes the Earth's atmosphere, a cylindrical region of free electrons is formed at what layer of the ionosphere?

A. The E layer
B. The F1 layer
C. The F2 layer
D. The D layer

The correct answer is A, the E layer. This layer supports communications via sporadic-*E*, which typically extends out to around 1300 miles. While it is more common to experience double- or even multi-hop communications on 50 MHz, it is extremely rare to experience such communications on 144 MHz and likely never to occur on 222 MHz and above. Even so, with likelihood of a meteor storm this month, as Shelby suggested, this may be the year to make the attempt for a multi-hop meteor-scatter contact on 144 MHz.

E3A10: Which range of frequencies is well-suited for meteor-scatter communications?

A. 1.8–1.9 MHz
B. 10–14 MHz
C. 28–148 MHz
D. 220–450 MHz

The correct answer is C, as these also are the frequencies that most likely experience sporadic-*E* communications. As with sporadic-*E* communications, meteor-scatter communications occurrences are inversely related to frequency, with the most occurrences being on 28 MHz. While meteor-scatter communications can occur on 222 and 432 MHz, it is less likely because, as Shelby points out, the size of the grains of sand tend to dictate the intensity of the ionization of the *E*-layer. The more intense the ionization, the more likely communications will occur on 222 and 432 MHz, and then for extremely short periods of time.

Conversely, meteor-scatter ionization of the *E*-layer occurs so often that a meteor-scatter contact will take place on 28 MHz without at least one of the participants ever realizing it. When the short-duration ionization of the *E*-layer occurs between two stations attempting to make contact with one another, the contact is made possible. Serious HF

and 10 meter contesters take advantage of meteor-scatter communications on this band by continuously calling CQ.

When the ionization occurs, an operator in the path will suddenly hear the contester and answer his or her CQ, thereby beginning the contact. These operators will complete the contact in short order during the ionization. Then ionization dies down and there is no more propagation, which often leaves the non-contester wondering where the contest station went. Conversely, after the contact, the contester reverts to the CQing mode until the next meteor-scatter ionization occurs.

VHF contesters also take advantage of meteor-scatter communications by hammering away calling CQ. As with 28 MHz, when a path is created by the meteor's ionization of the *E*-layer, a contact can take place. By contrast to 28 MHz, however, both operators are most likely aware that they are completing the contact via meteor scatter.

E3A11: What transmit and receive time sequencing is normally used on 144 MHz when attempting a meteor-scatter contact?

A. Two-minute sequences, where one station transmits for a full two minutes and then receives for the following two minutes.

B. One-minute sequences, where one station transmits for one minute and then receives for the following one minute.

C. 15-second sequences, where one station transmits for 15 seconds and then receives for the following 15 seconds.

D. 30-second sequences, where one station transmits for 30 seconds and then receives for the following 30 seconds.

Here is a question that deserves a bit of clarification. Typically, in the past the sequencing for SSB contacts has been 15 seconds. However, the sequencing for the WSJT software program is 30 seconds. Even so, for the purposes of the Extra exam the correct answer is C.

Ironically, it is this 30-second sequencing for the WSJT program that, according to Russ Pillsbury, K2TXB, probably cost him and Doug Allen, WØAH, their record-setting 1617 mile QSO. In an e-mail to Shelby, Russ stated:

I ran FSK441 skeds with WØAH, Doug in Colorado, over a 1617 mile path (2602 km) on the 12th and 13th [of August] at 1600 UTC, the predicted best time for us. On the 12th, at 1646 UTC we experienced a burn that lasted for around 90 seconds. I copied

The indefatigable Dr. Joe Taylor, K1JT, at the Prague 2002 EME Conference. (Photo courtesy OK1DIG)

both calls in the first 30 seconds. Doug got full calls from me in the second 30 seconds, and in the first 30 seconds of the next minute at 1647 UTC I copied calls again plus a 26 report! Doug's signal here peaked at 4 dB above noise, and was very unstable in strength during the approximately 45 seconds I was hearing it weak and fluttery.

Subsequently, Doug also copied my 26 report, but no rogers were exchanged so it is not a contact, but close! The next day we switched to 15 second sequences but nothing was heard. However, if we had been running the 15 second sequences on the 12th,

Group photo of participants at the 10th International EME Conference, Prague 2002. (Photo via OK1DIG)

I believe we would have made it. We are going to try this again in November and hope we get another fabulous burn like that one!

10th International EME Conference, Prague 2002

The following was submitted by Dr. Daniel Glanc, OK1DIG, Public Relations Manager of the 10th International EME (Earth-Moon-Earth) Conference, which took place in Prague in August:

On August 17 and 18, 2002 despite the devastating floods, Prague hosted the 10th International EME Conference. The 195 participants (115 hams and 80 accompanying persons) originated from 5 continents and 26 DXCC countries.

The conference consisted of technical lectures and four roundtables. The roundtables discussed some procedural topics of EME traffic and the acceptance of digital communication in EME. The results are formulated in the "Prague EME Convention" published on the conference website <http://www.emeconference2002.cz>. There was a Noise Figure Contest going on during the conference, where 37 preamplifiers for different EME bands were measured.

On Saturday evening there was a gala dinner where 29 EME operators received the Johannes Kepler EME Awards and Trophies. The results of the Noise Figure Contest were announced and the winners were presented with awards and prizes.

The social evening proceeded with several speeches addressing the attendees and organizers. Ian, G3SEK, presented the results of the European EME Contest. Paul, N6TX, contributed to the good mood of the evening, giving one of the SETI songs. One of the highlights was the tombola with many VHF/UHF goodies and a 3 cm preamplifier (donated by DB6NT) as the main prize.

Accompanying persons visited the historical town Kutna Hora at the same time as the technical program of the conference on Saturday. Recessive floods made the sightseeing of downtown Prague possible on Sunday. The event was the biggest EME conference so far, and as many say a happening to remember.

The conference proceedings contain the complete lectures and other submissions from different authors. There is also a complete CD that can be obtained through the conference website (see the URL above).

20th Space Symposium and AMSAT-NA Annual Meeting

This event will be held November 7–11 at the Lockheed Martin Recreation Area in Fort Worth, Texas, which is located in the North Texas Metroplex. Ameri-Suites Fort Worth/Cityview has been designated as the official hotel, and they have offered an excellent rate for the conference. Make your reservations as soon as possible and remember: Call the hotel directly at 817-361-9797(don't

Eddie Chandler, KD5JGA, one of the operators at the N5V site during the September VHF QSO Party. (Photo courtesy KB5HMZ)

Special-event station N5V operated on 6 and 2 meters and 70 cm from Chandler Park in Tulsa County, Oklahoma during the September VHF QSO Party. (Photo via KB5HMZ)

use the web- page form) and ask for the AMSAT group rate ($75/day plus taxes). For more information, visit the AMSAT-NA website: <http://www.edtexas.com/amsat/>.

ARRL International EME Competition

The second weekend of the ARRL International EME Competition is November 23–24. Complete rules for this contest can be found in the September issue of *QST* or on the ARRL website: <http://www.arrl.org/contests/rules/2002/eme-rules.html>.

Special-Event Callsigns—A Way to Increase Activity

As I did last year, I arranged with the ARRL Special Events Callsign Coordinator to be assigned N5V for the block party that my church held on the third Saturday in September, in conjunction with the City of Tulsa citywide block parties. I invited the members of the Tulsa Amateur Radio Club to run the special-event station from the church parking lot. Activities associated with the block party included a health fair sponsored by one of the area hospitals, a fly-in by the Tulsa Life Flight helicopter, and representatives of the Tulsa police and fire departments being present.

In addition this year I asked that the duration of the special-event callsign be extended to include the weekend of the September VHF QSO Party. Members of TARC took advantage of the callsign and operated stations from Chandler Park on 50, 144, and 432 MHz, making around 50 contacts, which is about par for us here in Oklahoma.

Here are a couple of the payoffs for operating with the special-event call: Operating from the public locations of the park and the church parking lot gave exposure to our hobby. Using the special callsign drew attention to our city and the community-related activities associated with the health fair at the block party. I am sure you can think of other benefits that we received, and quite possibly some of your own should you decide to copy our idea.

And Finally . . .

Thanks to the predicted *Leonids* meteor storm, this month presents the possibility of once-in-a-lifetime weak-signal contacts. It also presents us with once-in-a-lifetime opportunities to mentor new or potential hams. The full moon will preclude all but the brightest meteors being visible, so this would be a good time to invite the local astronomy club to your shack to demonstrate to their members an alternate way of observing the meteors. While it is unlikely that you would get many takers to give up their night of obscured observation, you could still invite them over the weekend ahead of the peak, or you could get yourself invited to their club to make a presentation on amateur radio.

Another possibility is media coverage of what your club is doing to observe the meteor storm. Most media outlets are always looking for unique angles to stories. I can imagine your local TV weather person out at your house interviewing you during the evening news as you explain how you are going to use your radio to detect the meteors during the forthcoming meteor storm.

Should you get on the air on your local TV station, please let me know about it, as I would love to write about your adventures in a future column.

Until next month...

73, Joe, N6CL

Contesting

BY JOHN DORR, K1AR

News/Views Of On-The-Air Competition

2002 CQ Contest Survey—The Final Results

November's Contest Tip of the Month

It pays to listen. When a rare DX station provides instructions to "listen up," keep in mind that not all split operating ranges were created equal. Often a DX station will announce that they are listening up 1–2, only to be also working stations up 0.5–1 kHz with few callers. The same technique can work on CW or phone. In most cases, those who quickly work rare multipliers in contests do so by calling where others are not. Remember, it doesn't take a big antenna to outsmart the competition!

Calendar of Events

Oct. 19-20	JARTS RTTY Contest
Oct. 19-20	Worked All Germany Contest
Oct. 20	RSGB 21/28 MHz CW Contest
Oct. 26-27	**CQ WW DX SSB Contest**
Oct. 26-27	ARRL Int'l EME Contest
Nov. 2-3	Ukrainian DX Contest
Nov. 2-4	ARRL CW Sweepstakes
Nov. 8-10	Japan Int'l SSB DX Contest
Nov. 9-10	Worked All Europe RTTY Contest
Nov. 9-10	OK/OM DX Contest
Nov. 16-17	LZ CW DX Contest
Nov. 16-17	RSGB 1.8 MHz CW Contest
Nov. 16-18	ARRL SSB Sweepstakes
Nov. 23-24	**CQ WW DX CW Contest**
Nov. 23-24	ARRL Int'l EME Contest
Dec. 6-8	ARRL 160M Contest
Dec. 14-15	ARRL 10M Contest

This month I'm pleased to report the final results of the 2002 *CQ* Contest Survey. Thanks to you, along with a little help from the internet, the floodgates opened up, with nearly 1500 responses arriving from both the exotic (one reply came in from the Sudan!) to the expected (near 250 responses from W1) places. As if you didn't expect it, I received only 12 replies via the traditional snail-mail system (less than 1%). This year smashed all previous records, with nearly four times the number of responses ever recorded for a *CQ* Contest Survey. In fact, one day alone yielded over 120 replies! I want to offer a special thank you to Tom, K8CX, and Bill, W4AN, for supporting this effort via their websites at <hamgallery.com> and <contesting.com>, respectively.

While there wasn't a centralized theme to this year's survey *per se,* I did try to touch upon a number of issues that have been widely debated in recent months. You certainly voiced your opinion, as over 30% of the survey responses included some additional commentary and input which was extremely interesting.

One disturbing fact with these surveys is the continuing increase in our average age. Here are the facts:

- All responses 2002: 48.4 years
- U.S.-only 2002: 49.5 years
- DX-only 2002: 39.4 years

Although the numbers were much more encouraging from an overseas perspective, the overall trend is not good. For example, take a look at the average age of respondents over the past few years of this survey:

- 2001: 47.5 years
- 1997: 45.3 years
- 1996: 44.2 years
- 1995: 43.4 years

Well, enough of the preliminaries. Let's get on with the final results.

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e-mail: <K1AR@contesting.com>

Your Survey Answers

1. Some would claim that there has been a significant decline in the "spirit of contesting." Competitors often have a "win at all costs" attitude that results in poor operating habits and a search for loopholes in rules. What is the best way to arrest this behavior?

a) Peer pressure: 676 (48%)
b) Tightening of the rules: 409 (29%)
c) There are no meaningful problems in this area. Leave things the way they are now: 205 (15%)
d) Other: 105 (8%)

I'm sure many of us can recall one or more on-the-air incidents, either personally or with someone else, we've overheard that were outside of the spirit of ham radio operating. What you told us with this response is that there is some degree of a problem (only 15% suggested we leave things the way they are). Nearly half of you felt that peer pressure prevails, and your additional comments reflected that point. There is a growing movement, however, to use the rules as a punitive measure against poor operating and the search for contest loopholes. However, in several of those responses, you admitted that while it's an admirable goal, it is tough to administer from a practical standpoint.

2. On a scale of 1 to 10 (ten as the highest rating), how would you assess your optimism of the long-term survival of our hobby over the next sunspot cycle?

Average: 7.81

I had no idea what to expect when I asked this question. Given the rising age of our constituency and the continuing decline in "new blood," the possibility existed for a very negative result. Fortunately, we remain an optimistic lot. There were only three responses that gave the answer zero, or the lowest possible rating. Many of you remain very optimistic, submitting a solid ten score. In fact, over 300 of you fell into that group. One response very aptly pointed out that the survival of our hobby depends on us, not the sun.

3. How many contests have you entered full-time in the past 12 months?

Average: 5.43 contests

A subject that often is a point of contention among many hams (especially non-contesters), your average number of contest entries fell way below the number of contests that are being run on an annual basis. There were two respondents who indicated that they enter 40+ contests per year. Now that's what I call a passion for contesting! I wonder what their families call it?

4. Have you spent more or less time operating contests this year than in years past?

a) More: 450 (32%)
b) Less: 585 (41%)
c) Same: 387 (27%)

Unfortunately, your responses are telling us that there has been a noticeable decline in operating activity this year for many of you. That was particularly surprising in light of the continuing good conditions on the bands. As you'll see in the next question, there are some very good reasons for this, though. The other way to look at this question, however, is that over half of you have at least "held service" or increased your operating activities, indicating there is indeed some hope in this area.

Call Area	# Responses
W0	58
W1	249
W2	143
W3	132
W4	90
W5	100
W6	58
W7	69
W8	53
W9	37
VE	56

Total U.S./Canada responses: 989

Table I– U.S./Canada geographic survey response analysis.

5. If you answered "less" to question 4, what has been the primary reason for this?

a) Work commitments: 191 (32%)

b) Losing interest in contesting overall: 68 (12%)

c) Personal/family commitments: 185 (32%)

d) Too costly to stay competitive: 33 (6%)

e) Other: 103 (18%)

For those of you who are operating less these days, it's not surprising that the pressures of work and family are prevailing over your desire to enter contests. I know from my own personal experience that work pressures have never been higher. Also, as indicated by our average age, many of us are entering a phase of life where are careers are peaking, our children are entering college, and so on. Interestingly, a growing number of you indicated that age is becoming a significant contributing factor to the amount of operating you do. "I just can't operate the same number of hours anymore" was a not so uncommon a response.

6. Do you believe it is appropriate to adjust contest logs after the contest?

a) One should never correct a contest log afterwards under any circumstances: 165 (12%)

b) Only for obvious typographical mistakes: 1023 (72%)

c) It is fair game to use any method available to "get it right" before you submit a log: 224 (16%)

Well, your responses to this question were pretty black and white. Over 84% felt that it is essentially inappropriate to "work your log" except for obvious typing errors. There were, however, a meaningful number of respondents who feel it is acceptable to do whatever you need to do to get a log in shape. With the growing movement afoot to shorten log submission times, this debate may become moot. However, the difference of opinion continues, albeit the majority in this analysis is clearly prevailing.

7. Should the results of log checking (i.e., UBN reports and other data) be made publicly available after contest results are published for any contest entry?

Yes: 1149 (80%)

No: 282 (20%)

Wow! When I wrote this question, I was certain that the answers would be skewed in the direction of public disclosure; I just didn't think it would be nearly as biased as the results show. Those who answered "no" pointed out concerns over misinterpretation of the data and general apprehension over the impact this information would have on a contester's reputation. On the other hand, the vast majority felt that publishing log-checking data would have a meaningful and positive impact on the quality of contest operating, noting that peer pressure is a powerful tool. To a certain extent, we've already seen this, as accuracy rates in contesting have improved dramatically since the advent of improved log-checking techniques. To all of the contest reporters reading this: Take note of what your audience is telling you!

8. Do you feel most contesters don't care about the QRM they may cause to non-contesting operators during a contest, or do they just get a bad rap?

a) Most contesters genuinely care about how their operating affects the bands and get a bad rap from the non-contesting crowd: 806 (57%)

b) Most contesters operate with an attitude that nothing else matters but the contest itself: 605 (43%)

While disturbing in some ways, I found these answers to be positive in the sense that we are at least being honest with ourselves. Nearly half of you admitted to the fact that our custodial attitudes towards the ham bands need to be improved during contest operations. That's a good start. Our challenge is to take action. I'd like to think we could do better as a group and make this number drop considerably in future contest surveys.

9. Would you spend more time in a contest (or attempt to operate one you have never participated in) if there were participation awards such as mugs, T-shirts, certificates?

a) Yes: 680 (48%)

b) No, contest marketing doesn't matter to me: 729 (52%)

Well, as a group, we love our contest trinkets. Whether it's mugs, T-shirts, or operating certificates, the fact is that they contribute to the enthusiasm for and overall interest in contesting, especially by the casual operator as you mentioned in many of your responses. Several of you pointed out the ARRL SS mugs and WRTC awards as examples. Too, perhaps a few of you remember the old ARRL brooms we got for working a clean sweep in the Sweepstakes contest (working all available ARRL section multipliers in the contest). This is an area of contesting that needs volunteers, both from a financial and administrative point of view. With many contest sponsors struggling just to do the basics, your help can make a big difference! Give it some thought.

10. Overall, what do you consider to be the worst problem in contest sponsorship/administration?

a) Timeliness of results: 591 (42%)
b) Timely receipt of awards: 411 (29%)
c) Accuracy of results: 107 (8%)
d) Clarity of contest reporting: 81 (6%)
e) Other: 203 (15%)

This question had all the makings of giving you the opportunity to "hammer" contest sponsors' poor administration of contest awards—including *CQ*. For the nearly one third of you who voted in that way, you made your point loud and clear. Interestingly, more of you, however, considered the timeliness of contest reporting to be a bigger concern. In this group, you suggested that the need exists to significantly reduce the timeframe for log submissions from weeks to days as one way to speed up the process. The contest community is moving in this direction as the internet and printed page continue to converge. Over time I believe you will see even more expanded contest reporting and within shorter periods of time as the realities of publishing costs and the demand for more information continue to rise.

11. Do you think high-quality contest operating helps the reputation of the amateur community in times of public service/emergency, or is that concept overrated?

a) It's a great help to amateur radio's ability to serve the public: 833 (58%)
b) Overrated and has little meaningful impact: 600 (42%)

Amateur radio has enjoyed a long-standing reputation for supporting the communications needs of disasters and other events. For example, it played a critical role during the challenges of

September 11th last year. However, most of you agreed that it's a stretch to assume that providing communications assistance via traditional 2 meter handhelds is enhanced by our HF contest skills. In fact, many of you indicated that as contesters you have never participated in any public-service communications efforts. I view this as a call to action. Experienced contesters have tremendous communications skills that can translate into significant value in time of need. It's up to us to prove it!

12. What is the height of your tallest tower?

a) Average height 70.94 feet: 1089 (76%)
b) I do not have a tower: 337 (24%)

Perhaps related to the next question regarding the sophistication of your shack, nearly a quarter of us use wires in the trees as the primary antennas for our stations. It was encouraging, however, to see that the majority of the respondents have at least a minimal tower setup, with the lowest recorded tower being 12 feet tall (Hey, at least it's a start!) and the highest one being well over 200 feet.

13. How do you rate your contest shack in terms of equipment, layout, computers, etc.?

a) Sub-par: 277 (20%)
b) Average: 566 (40%)
c) Above average: 361 (26%)
d) Professional: 179 (13%)
e) A ham's dream: 18 (1%)

Not surprisingly, over half of us have average contest stations at best. A common theme among those of you with this class of station is that you also routinely operate somewhere else during a contest (This certainly applies in my case, as I operate nearly all the time from K1EA's super-station.). While time and motivation were two critical factors in the low number of large contest stations, a significant number of you pointed out that economics were a significant limitation as well.

14. Do you feel single operators using two radios have an unfair advantage over those who only use one radio in a contest?

Yes: 650 (46%)
No: 769 (54%)

To be honest, the responses to this one surprised me and maybe surprise you as well. While the subject of technology and contesting has been widely discussed in the past, it has been generally accepted that our sport encourages, within reason, the use of station design as a means of differentiating one operation over another. Just as antennas at one station may be vastly superior to those at another, many single operators are using two radios (otherwise known as Single Op/2 radios [SO2R]) as part of their operating arsenal. The fact that nearly half of you feel this is an unfair advantage is curious indeed. I'd like to hear from more of you on this subject and we'll be sure to cover it in more detail in future columns.

DX Country	# Responses	DX Country	# Responses
4W	1	LX	1
5B4	3	LY	9
9A	3	LZ	3
9K	1	OE	2
9M2	1	OH	8
9V	1	OK	7
A9	1	ON	7
BV	1	OY	1
CE	2	OZ	4
CT1	1	P4	2
CT3	1	PA	8
DL	28	PY	11
DU	1	S5	3
EA	10	SM	11
EA6	1	SP	2
EA9	1	ST2	1
EI	4	SV	3
EU	1	T9	2
F	11	TA	1
G	36	TF	1
GI	1	TG	1
GM	8	UA1	6
GW	2	UA2	1
HA	1	UA9	3
HB9	3	UR	2
HK	1	VK	9
HZ	1	VP9	1
I	9	VU	3
IT9	3	XE	4
J6	2	YB	3
JA	1	YL	2
JY	1	YO	1
KH6	7	YU	1
KL7	8	YV	5
KP2	1	ZC4	3
KP4	4	ZF	1
LA	1	ZL	1
LU	8	ZS	1

Total DX Responses: 306/76 Countries
No Geography Indicated: 109
Total Overall Responses: 1460

Table II– DX geographic survey response analysis.

Some Special Contest Errata

In recent weeks I've been in contact with a number of unfortunate competitors who had their scores incorrectly reported in (or left out of) the 2001 CQ WW results in the August and September issues (see the errata section of this month's column). Obviously, we apologize for these mistakes. While it's a shallow victory to appear in this part of contest reporting, rest assured your entries are just as important, and hopefully next year will bring improved contest reporting accuracy.

One contest operation that stood out in the midst of my correspondence came via an e-mail message from Ken Knopp, K7ZUM. Perhaps some of you remember his operation from PJ7/K7ZUM.

Given the events of September 11th last year, Ken and his operating partner, Craig Maxey, AH8DX, were justifiably worried about attempting to go to the Caribbean and taking so much gear to their favorite island QTH on PJ7 for the CQ WW. In the end, they lightened their load by a significant margin, bringing only a single radio with an amp per operator, two laptops, and a five-band Butternut vertical with a dozen radials.

They didn't know how well they would do, but their goal, nevertheless, was 5000 QSOs for each operation. At the end of it all, they were short by only 36 QSOs, for a final score of 4.8 million points. All in all, not so bad for a single vertical from a 2-point QTH. Ken's partner (FS/AH8DX) on the other side of the island ended up placing 9th in the world using his Butternut vertical, again from 2-point land! The point is very simple: You can do well without all of the big equipment and antennas. It's an unfortunate that in many contest reports the little guys get

Additions/Corrections CQ Contest Results

The following errors have been brought to the attention of the CQ WW Contest Committee.

2001 CQ WW DX SSB Contest

K7ZUM was really K7ZUM/PJ7. He was scored as if he was in the U.S. His true score was: Final Score 4,785,393, Q's 4787, Zones 108, Countries 323. His effort in PJ7-land was with a single 5-band Butternut vertical with nothing more than a few pieces of wire lying on the ground.

S50K was left out of the European Top Score box. Marko was 4th in Europe on 28 MHz High Power with Final Score 1,224,840, Q's 2973, Zones 37, Countries 140.

P40B (W5AJ) is the World All Band Low Power record holder, not P40W as stated in the text.

UA9AM was the #8 World Assisted All Band score. He was left out of the Top Scores box. Yuri's score was 5,662,666.

VE2IM operated by VA3UZ was the winner of the Canadian Single Operator All Band trophy, not VE3OI as printed. VE2IM was also shown to be in zone 5 in the Most Active Zones list on the website; he was in zone 2.

LY2FY was the #10 score in Europe in the Assisted All Band category (not DF4RD as printed) with a score of 3,478,158.

SM4DHF was really TI2/SM4DHF. He was the Low Power 21 MHz winner for Panama. He was incorrectly listed under Sweden.

NX9T/4 was left out of the results. He operated All Band High Power and is a member of the PVRC. His line score was: Final Score 2,945,163, Q's 2143, Zones 113, Countries 368. He was #4 in the 4th call area U.S.

The teams of Contest Club Finland (CCF) were left off the *CQ* web page. They have been added; see the expanded results at <www.cq-amateur-radio.com>.

VY2ZMM (K1ZM) was mistakenly listed as assisted. He was not assisted and finished #3 in the World.

JA9SCB/1 was listed as JA9SCB/9. He was #1 in the first call area JA in the Low Power 28 MHz category.

The dedication for the Asian Multi-Single trophy donated by Ed Campbell, NT4TT, was left out. It is the AA6BB/KA6V Memorial trophy.

W9IGJ/4 was left out of the results. He was #5 in the U.S. High Power 14 MHz and #1 in the 4th call area.

N4YDU was #1 All Band Low Power, U.S. 4th call area.

N4TZ/9 was listed as N4TZ. He was #1 All Band Low Power, U.S. 9th call area.

HB9/K1ZZ was listed as K1ZZ in the QRP category.

K8EP/5 was Low Power 21 MHz and not high power as the results showed. He had the #1 score in the U.S. in the L21 MHz category and is a certificate winner.

K2MFY was Low Power 28 MHz not high power. He was #2 in the L28 MHz category for the 2nd call area.

WA4DOU was Low Power not high power.

Corrected/added operator lists are on the CQ web page. In addition, we have the following:

The operators of ZK1CG were: ZK1CG, ZK1AKX, ZK1APM, ZK1ASQ, and ZK1VVV.

The operator list for 6Y6L was listed under multi-single instead of multi-multi on the web.

The operators of IH9P were: W1NA, W7ZB, OL5Y, I2IFT, IK2ANI, IK2CIO, IK2HKT, IK2RZP, IK2YCN, IK2SND, IN3QBR, I8QLS, I8ULL, I8UZA, IK8ETA, IT9BLB, IT9VDQ, IT9WPO, IT9ZMX, and Matteo.

The operators of K9NS were: K9HMB, K9NO, K9QVB, K9RS, K9VV, KO9A, W9RM, AA9D, K9DX, K9GS, K9PPY, K9PW, K9RO, and KS9W.

2001 CQ WW DX CW Contest

VK4DX's category was Low Power 14 MHz, not all band high power as printed in the results. His score was #1 World.

RA6AX 1.8 MHz score was miscalculated as shown in the Top Score box. The true World Top Score was 4X3A (4X4NJ). The #6 World score was HG3M (HA3MY) with a score of 65,875.

SU1ER (N9NC) was the winner of the World 7 MHz trophy, not OK1RF.

The operator lists for the Combined SSB/CW Trophies for KC1XX and JE4VVM are on the *CQ* magazine website.

The correct score for the top club entry, the YCCC, is 431,776,382, not the one shown in the club listings box.

K2BA/5 was listed as K2BA.

VY2ZMM (K1ZM) was mistakenly listed as assisted. He was not assisted and finished #4 in the World.

UA9CDV's log was left out of the results. The wrong log was sent by mistake. His All Band High Power claimed score was 4,084,469 and he is a member of the Ural Contest Group.

XE2/W6RW was listed as Assisted. He was *not* Assisted. Mike set a new zone 6, 28 MHz record.

2001 CQ WW VHF Contest

W5USJ should have been listed as a QRP entry with 4,028 final score, top 5th district QRP.

2002 CQ/RJ WPX RTTY Contest

JA1BWA was listed incorrectly. He was Single Op All Band High Power with a score of 905,310 points, #1 in the JA1 call area.

KH6ND's score was 881,274 points (773 Q's, 2307 Q points, 382 mults), making him #2 World Single Op 10 meters.

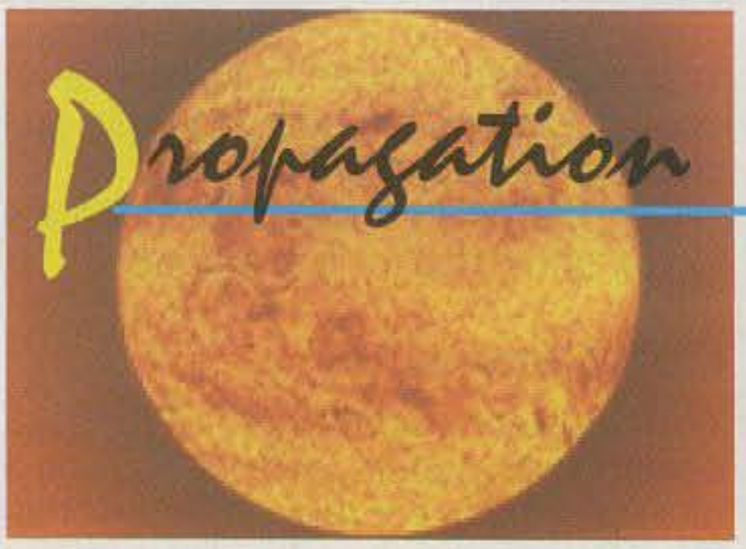
ignored, often appearing to be inferior operators when compared to the big-gun stations that get all the coverage.

Ken, we noticed this time. Congrats to you and Craig for fine efforts!

Final Comments

Well, it's been a month that saw my desk covered with papers, calculators, and a bit of sensory overload as I had the challenge of weeding through all of the input you provided to me for this year's contest survey. I hope you enjoyed reading the results as much as I benefitted from what you had to say. As if I can't say it enough, thank you for the input you provided. It's not only useful for this survey, it's enormously helpful in my design of future contest columns.

As I type this, the contest season is upon us again. If you're like me, you are wondering what propagation will be like this time around and whether or not 10 meters will have one more round in it before the sun goes to sleep again. Given that 10 meters was filled with signals this morning, I'm optimistic about this contest season. However, whether conditions are superb or not, I'm sure you'll be in for a great contest season. Enjoy the moment! 73, John, K1AR



BY TOMAS HOOD, NW7US

The Science Of Predicting Radio Conditions

High to Above-Normal Conditions Predicted for CQ WW DX CW Contest

The 2002 CQ WW DX CW Contest will be held on November 23–24. Compared to the conditions experienced last year, this year's propagation conditions promise to be quite a bit better. High Normal conditions are expected for both days, with slim chance for any major solar flare or geomagnetic storminess. Last year, the first day was quite frustrating for most contest participants due to a solar flare and the related degradation in conditions. Solar-flux levels in excess of 130 and corresponding sunspot counts in excess of 75 are predicted during the CW contest weekend. While these levels are somewhat lower than in the past few years, solar activity is still high enough to keep the contest bands alive with opportunity.

We will have a more up-to-date forecast for the CW contest at the beginning of next month's column. Check on-the-air conditions on October 27 and 28, which would be just one 27-day rotational cycle prior to the CW contest weekend, for an indication of how conditions should be November 23–24.

The Last-Minute Forecast on this page lists expected conditions throughout the month of November. Be sure to refer to the October column for propagation DX charts for November, if you are planning on participating in this year's CW contest. The October issue also provides useful resources you can use to increase your score.

Progress of Solar Cycle 23

The solar-cycle activity increased a bit during July and August. The Royal Observatory of Belgium reports the monthly mean observed sunspot number of 116 for August 2002, up from 100 for July. The 12-month running smoothed sunspot number centered on February 2002 is 115, up one point from January. The lowest daily sunspot value during August 2002 was recorded on both August 9 and 10 with a count of 73. The highest daily sunspot count for August was 186, occurring on August 17. A smoothed sunspot count of 79 is forecast for November 2002 by the Space Environment Center. The expected smoothed sunspot range is from a low of 66 to a possible high of 91.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada reports a 10.7cm observed monthly mean solar flux of 184 for August, up from 175 for July. The 12-month smoothed 10.7cm flux centered on February 2002 is 197, up two points from January 2002. The Space Environment Center predicts a smoothed 10.7 cm solar flux of about 133 for November 2002. The 10.7 cm smoothed solar-flux range is expected to be from a low of 116 to a possible high of 150.

The observed monthly mean planetary *A*-index (*Ap*) for August 2002 is 16, up a bit from an *Ap* of 13 for July. The 12-month smoothed *Ap*-index centered on February 2002 remains 12. Geomagnetic storming will be much the same as we had during October.

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for November 2002

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 3, 15, 18-20 24, 26-27, 30	A	A	B	C
High Normal: 6-8, 12-14, 16-17, 21-23	A	B	C	C-D
Low Normal: 4, 10	B	C-B	C-D	D-E
Below Normal: 2, 5, 9, 29	C	C-D	D-E	E
Disturbed: 1, 11, 25, 28	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 S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, 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 Nov. 1st, fair to poor (C-D) on the 2nd, excellent (A) on the 3rd, etc.**

CQ WW SSB Contest Forecast Looks Good!

Since this issue of *CQ* should reach most subscribers prior to the start of the CQ World-Wide SSB Contest weekend of October 26–27, here is an updated forecast made at press time for the general propagation conditions expected during the SSB contest. Based on the 27- and 74-day recurrence tendencies of solar and geomagnetic conditions, it continues to look like there will be High Normal HF conditions during both days of the contest.

Daily 10.7cm solar flux levels are expected to stay at or above the 155 mark during the contest weekend, with the corresponding sunspot counts likely to exceed 90. The geomagnetic planetary *A*-index is expected to remain below 14 during both days.

Propagation conditions during this year's SSB contest should be considerably better than last year, since no major storm is predicted. Expect an outstanding contest period. To maximize scores, be sure to check the DX Propagation Charts in last month's column.

Updated Propagation Conditions, Band by Band

Last month's column contained a detailed review of conditions expected during October. Let's look at what we can expect this month.

160 meters: Expect an increase in DX openings on this band during the hours of darkness and into the sunrise period, with considerably decreased static levels and longer hours of darkness in the northern latitudes. Using CW in this month's CQ WW Contest with the seasonally better conditions, participants should experience higher scores on this band. As suggested in the October column, look for openings toward Europe and toward the south from the eastern half of the U.S., and toward the south, the Far East, Australasia, and the South Pacific from the western half of the country. These openings should be strong during the contest period. Remember, 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.

80 meters: This should be a great band for DX openings to many areas of the world during the hours of darkness and into the sunrise period. With nighttime Maximum Usable Frequencies (MUFs) at or below 7 MHz for most paths, 80 meters becomes a reliable long-distance band throughout the entire period of darkness. The band should peak toward 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. Noise levels will be considerably down from October, and the period for band openings in a particular direction will be a bit longer. Some contest operators may take the challenge of operating *exclusively* on 80 meters, an exercise in skill and patience. The conditions are expected to be favorable for high scores on this band.

40 meters: Competing with 80 meters, this should be the hottest DX band during the dark hours, as the seasonal static levels are lower than they were during the summer. However, because nighttime MUFs could fall below 7 MHz this month, it might lose some steam until morning hours. 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. Signals should peak from an easterly direction closer to midnight, and from a westerly direction just after sunrise. Remember, just as with 80 meters, signals tend to peak as the sun rises on the *eastern* end of a propagation path. Working against the CW operator is the interference that increases when the propagation is excellent.

20 meters: This is the workhorse band for the contest. DX openings should be possible on this band mostly during the day, and somewhat during the night. However, because of the shorter daylight hours in the Northern Hemisphere, nighttime path openings will be open for a shorter period this month compared to October, with signal peaks from about an hour or two after sunrise and again during the late afternoon and early evening hours. Don't forget to look for long-path openings for about an hour or so after sunrise and again for an hour or so before local sunset.

15 meters: DX propagation conditions should be excellent on this band.

PST Time	UT Time	Areas to which good openings are expected
00–03	08–11	SE Asia, Far East, South Pacific, New Zealand, Australasia, Antarctica
03–06	11–14	South Pacific, New Zealand, Australasia
06–09	14–17	Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Europe, Caribbean, Central America, and Northern Countries of South America
09–12	17–20	Far East, Caribbean, Central America
12–15	20–23	Western & Central Europe, North Africa
15–18	23–02	Europe, Africa, Caribbean, Central America, South America
18–21	02–05	Africa, Central & South Asia, South Pacific, New Zealand, Caribbean, Central America, South America
21–24	05–08	Far East, South Pacific, New Zealand

Table I– Sample 20 meter single-band work plan for western USA QTH. (Courtesy George Jacobs, W3ASK)

A daytime band, 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. Peak openings should occur toward a specific geographical area about an hour or so after the peak has occurred to the same area on 10 meters. While 15 meters might possibly be the best daytime band for the contest weekend, it will be close a bit earlier and open a bit later than it did in October.

10 meters: While most likely not record breaking, look for good DX conditions on 10 meters. As in October, those in low- and middle-latitude locations can expect a high number of daytime contacts during the contest weekend. The band will be hot right after sunrise, and just a bit before sunset, local time. Openings towards Europe and in a generally easterly direction should peak an hour or two before noon, while those towards South America and Africa area expected to peak during the early afternoon hours. Optimum conditions towards the 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.

CW Contest Tips

Overall, expect good conditions on 10 meters, and excellent DX openings on both 15 and 20 meters during most of the daylight hours. Fifteen meters will be really hot for most participants throughout the daylight period.

From sundown to midnight, 40 meters should be the best band for openings toward the east, north, and south. Twenty meters will close in many locations before midnight, while 80 meters will be a hot band with openings into the same areas as for 40.

Between midnight and sunrise the best DX band should be 40 meters, with 80 a close second. Openings on both bands should be possible to most areas of the world, with conditions peaking toward the south and west. Some fairly good 20 meter openings are also expected during this period, mainly toward the south and west. One-sixty should wake up, offering some fair DX openings, similar to 80 meters but with somewhat weaker signals.

It is unlikely that there will be any major solar or geomagnetic storms during the November contest weekend. However, if a storm develops, work the higher bands and look for openings on a north/south propagation path.

During the contest be sure to check my propagation web page <http://prop.hfradio.org/> for up-to-the-minute conditions. If you are at a location where you do not have easy internet access but you have a WAP/WML device, 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. There are more resources listed in the October column.

VHF Ionospheric Openings

6 meter DX: Solar activity remains high enough to permit occasional 6 meter DX openings during November's CW contest. Conditions should peak toward Europe and in a generally easterly direction before noon. After noon, openings should improve towards Africa, and then swing in a clockwise direction during the early afternoon hours.

Openings toward the Caribbean and Central and South American areas should occur from late morning until shortly after noon. By late afternoon start looking for openings to the south and southwest. Conditions will be erratic, and most openings will be short.

Auroras will increase during November, but none is forecast for the contest

weekend. November is usually a month of fairly intense and widespread auroral activity, which can result in short-skip propagation on the 6 and 2 meter bands for distances up to approximately 1200 miles. Look at the Last-Minute Forecast for days with Below Normal or Disturbed conditions, as these are the days most likely to experience aurora.

Propagation Software Review

Starting this month, I am reviewing propagation software. Each month will feature one review. If you have software that is propagation related (including beacon software, and so forth), please contact me about it.

This month I am reviewing the software by Crawford MacKeand, WA3ZKZ, called SNAPmax. SNAP stands for "Signals, Noise, and Propagation." The version I evaluated is 5.01, which is DOS executable with supporting files. It ran fine for me under a DOS window in Windows 98. It might not run on newer operating systems that don't support true DOS.

Installing it was rather simple. I obtained the software on a diskette, and followed the directions which had me copy the EXE file, as well as the SNAP.QTH and SNAPxxx.ini files (xxx is replaced by the version, which in this case is 501), into a directory of my choice on my computer's hard drive. I chose "C:\SNAPMAX." I renamed SNAP501.EXE to SNAP.EXE, and then ran it with the command "C:\SNAPMAX\SNAPMAX.EXE."

After the welcome screen, a menu with control options is displayed (fig. 1). The menu is pretty simple, allowing you to modify the program's options such as the solar flux and *A*-index values, the local and remote site coordinates, and other required settings. A useful feature of SNAPmax is the ability to select the bandwidth and modulation. From the main menu, selecting "B" will bring up a new menu that allows you to select your operating mode. Those available are PSK, CW, RTTY, TOR, SSB, AM, FM, and BCAM. The required bandwidth is automatically entered, as are the signal-noise requirements for good, median, and fair signals. As in the main scan modes, probable multi-path conditions are flagged for digital work. Once you have set all of the parameters and options, you simply press <SPACE> to start processing your analysis/forecast.

I selected "SSB" as my bandwidth and modulation setting, along with setting my latitude and longitude, then selecting a spot in England as the remote site. I chose the "Signal-noise ratio (S units) shown vs. Frequency and Time" mode ("M" on the main menu, "SN" on the submenu). I set the solar flux to 183, the *A*-index to 6, and the *K*-index to 2. The remote location was VK3 (yes, you may enter a prefix when selecting a site). Then I hit the <SPACE> bar. The resulting calculations are shown in fig. 2.

A blank space says that there is not likely to be enough signal for a useful QSO. A dot (.) says that signal/noise ratio is up to one S-unit below noise. A number in any space, and its associated display color in that space, will show by how many S-units (which are arbitrarily set at 6 dB each) your desired received signal will exceed your local noise level. A plus sign (+) indicates that predicted signal level is more than 9 S-units over noise. A star (*) shows that this signal (the level being indicated only by the color) is above the Maximum Usable Frequency (MUF) and is probably present only ten days in the month. A dash (–) shows signals probable on five days of the month.

In SNAPmax, the MUF is defined as the maximum operable frequency on 15 days of the month, while the FOT (abbreviated from the French term *Frequence optime du travail*), which is about 0.8 × MUF, is defined as likely to be operable on 27 days of the month (90%). FOT is shown by a magenta background if a signal is likely to be present, or a narrow magenta stripe if no signal is predicted.

Looking at the result (fig. 2), I see that the best time to work VK3 stations would be around from 0400Z to about 0600Z on 15 meters. It might be possible around 0300Z to work on 10 meters, but it's not likely.

The program completed this analysis rather quickly on my 400 MHz computer. The screen display is simple, yet functional.

SNAPmax is flexible and easy to use. It presents the probable workability of an ionospheric radio path between any two sites, and ground wave to local

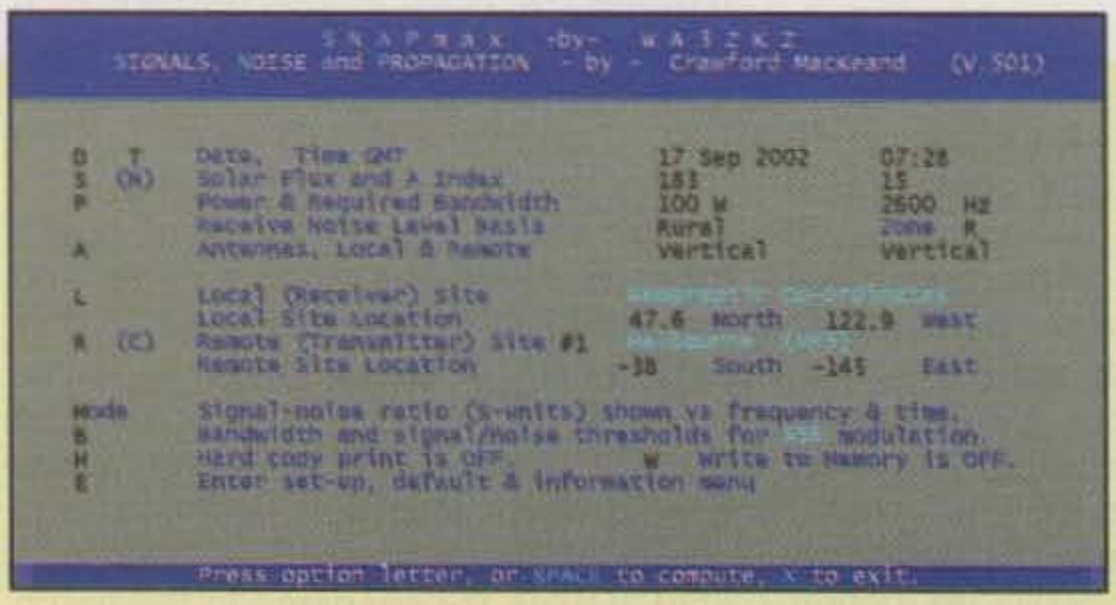

Fig. 1– Main menu of SNAPmax.

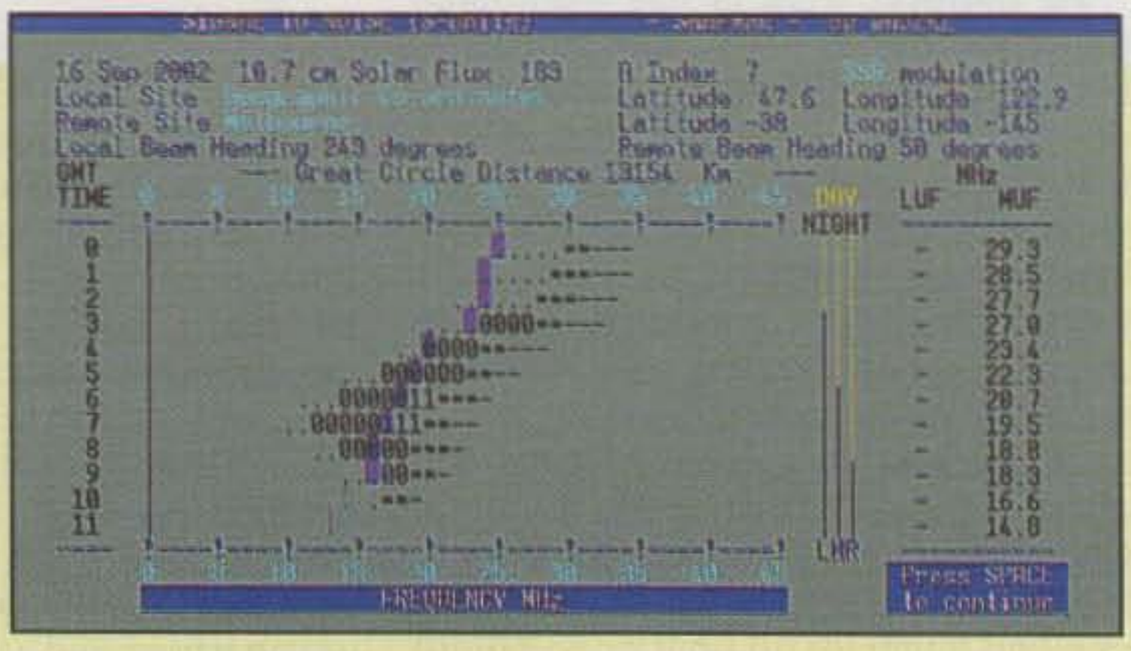

Fig. 2– Analysis results showing signal-to-noise ratios by time and frequency.

sites. The analysis uses the angle of ray elevation to obtain realistic gain values for some typical antennas at those ray angles, and path attenuation values based on the NBS Monograph 80 (*Ionospheric Radio Propagation,* Kenneth Davies, Dover), K. Rawer's classic analysis, and a number of other sources. The software's author also includes auroral loss information and related algorithms. Both *F*-layer and *E*-layer paths are calculated, and this latest version also includes some ground-wave calculations from CCIR 386-2.

SNAPmax uses a design concept more familiar in cost estimating for engineering projects than elsewhere. It holds that any known trend should be included, with the basis that while some inputs will be underestimated in their contribution to the final answer, others will similarly be overestimated. Thus, the sum of the estimates will be better than the individual parts.

SNAPmax is better suited for looking at current conditions (what the author calls "nowcasting"). This is the prediction of the goodness of any given circuit today, based on today's best data. While you may select a date in the future (or the past), you only see one path's conditions, making it cumbersome for general forecasting of many paths over many frequencies and times, for instance. If you are planning a specific schedule with a buddy who plans on a trip to Hawaii, SNAPmax might serve you well in analysis of possible bands to use during available schedule times.

Because it runs in DOS, this is a great program to have with you during a contest on a used, slower computer. You can see at an instant the condition of a given path, helping you schedule your operation for the best time to get that DX area.

The best part of SNAPmax is the price. It is available for free from several freeware sites, as well as from Tyndar Press, P.O. Box 236, Montchanin, Delaware 19710. To make it convenient for you, I have it available for download at my site, <http://hfradio.org/softdown.html>, under "Propagation Software." Crawford MacKeand, WA3ZKZ, has written a book, *The Friendly Ionosphere,* also available from Tyndar Press. The author may be contacted at <tyndar@juno.com>.

I hope to hear your station on the air, especially during the CW contest weekend. I am not the fastest CW operator, but I expect to be in the mix somewhere on the bands, increasing my skill little by little. Good luck in the 2002 CQ WW DX CW Contest! 73, Tomas, NW7US

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. In the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart
November & December 2002
Band Openings Given In Local Standard Time At Path Mid-Point (24-Hour Time System)

Band (Meters)	*Distance From Transmitter (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-230*
10	Nil	Nil	08-11 (0-1) 11-17 (0-2) 15-17 (0-1)	08-09 (1) 09-11 (1-2) 11-15 (2) 15-17 (1) 17-19 (0-1)
15	Nil	09-11 (0-1) 11-15 (0-2) 15-18 (0-1)	07-08 (0-1) 08-09 (0-2) 09-11 (1-3) 11-15 (2-4) 15-16 (1-3) 16-18 (1-2) 18-19 (0-1)	07-08 (1) 08-09 (2) 09-11 (3) 11-15 (4) 15-16 (3) 16-18 (2-3) 18-19 (1-2) 19-21 (0-1)
20	10-12 (0-1) 12-14 (0-2) 14-16 (0-1)	06-07 (0-1) 07-10 (0-2) 10-12 (1-3) 12-14 (2-4) 14-16 (1-4) 16-17 (0-3) 17-19 (0-2) 19-22 (0-1)	06-07 (1) 07-09 (2-3) 09-10 (2-4) 10-12 (3-4) 12-16 (4) 16-17 (3-4) 17-19 (2-3) 19-22 (1-2) 22-00 (0-1)	06-07 (1-2) 07-09 (3) 09-15 (4-3) 15-17 (4) 17-19 (3-4) 19-21 (2-3) 21-22 (2) 22-23 (1-2) 23-00 (1) 00-06 (0-1)
40	07-08 (0-2) 08-09 (1-3) 09-17 (3-4) 17-19 (2-3) 19-21 (1) 21-00 (0-1)	06-07 (0-2) 07-08 (2-3) 08-09 (3) 09-15 (4-3) 15-17 (4) 17-19 (3-4) 19-21 (1-3) 21-00 (1-2) 00-03 (0-2) 03-06 (0-1)	06-07 (2-3) 07-08 (3) 08-09 (3-2) 09-15 (3-1) 15-17 (4-2) 17-19 (4) 19-21 (3-4) 21-03 (2-4) 03-06 (1-3)	06-08 (3-2) 08-09 (2-1) 09-15 (1-0) 15-17 (2-0) 17-19 (4-3) 19-03 (4) 03-06 (3)
80	08-21 (4) 21-01 (3-4) 01-04 (42-3) 04-07 (1-2) 07-08 (3)	08-09 (4-2) 09-16 (4-1) 16-18 (3-1) 18-20 (4-3) 20-04 (4) 04-06 (3-4) 06-07 (3) 07-08 (3-1)	08-09 (2-1) 09-16 (1-0) 16-18 (3-1) 18-20 (4-3) 20-04 (4) 04-06 (3-4) 06-07 (3) 07-08 (3-1)	08-09 (1-0) 09-16 (0) 16-18 (1-0) 18-20 (3-2) 20-04 (4) 04-06 (4-2) 06-07 (3-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-07 (4-2)	07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-21 (4-2) 21-04 (4) 04-06 (2) 06-07 (2-1)	07-19 (0) 19-21 (2-1) 21-04 (4-2) 04-06 (2-1) 06-07 (1-0)

HAWAII
November & December 2002
Openings Given in GMT

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	08-10 (1) 10-12 (2) 12-14 (1)	07-08 (1) 08-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	06-08 (2) 08-13 (1) 13-14 (2) 14-17 (3) 17-20 (2) 20-00 (1)	16-18 (1) 18-02 (3) 02-04 (1) 18-20 (1)* 20-01 (2) 01-03 (1)*
Central USA	08-10 (1) 10-14 (2) 14-16 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (2) 07-08 (3) 08-13 (2) 13-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1)	17-19 (1) 19-20 (2) 20-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-02 (2)* 02-04 (1)*
Western USA	08-10 (1) 10-14 (2) 14-17 (1)	06-07 (1) 07-08 (2) 08-12 (3) 12-14 (4) 14-16 (3) 16-17 (2) 17-19 (1)	06-07 (2) 07-09 (4) 09-14 (3) 14-16 (4) 16-18 (3) 18-22 (2) 22-02 (1)	17-18 (1) 18-20 (2) 20-01 (4) 01-04 (3) 04-06 (2) 06-07 (1) 18-19 (1)* 19-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

ALASKA
November & December 2002
Openings Given in GMT

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	19-22 (1)	16-18 (1) 18-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	18-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-04 (1)	06-12 (1) 07-11 (1)*
Central USA	19-23 (1)	17-18 (1) 18-21 (2) 21-00 (3) 00-01 (2) 01-02 (1)	17-20 (1) 20-23 (2) 23-02 (3) 02-03 (2) 03-05 (1)	06-14 (1) 07-12 (1)*
Western USA	19-21 (1) 21-23 (2) 23-00 (1)	17-20 (1) 20-21 (2) 21-22 (3) 22-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	14-17 (1) 17-20 (2) 20-22 (3) 22-00 (4) 00-02 (3) 02-04 (2) 04-06 (1)	02-03 (1) 03-05 (2) 05-14 (3) 14-15 (2) 15-16 (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.

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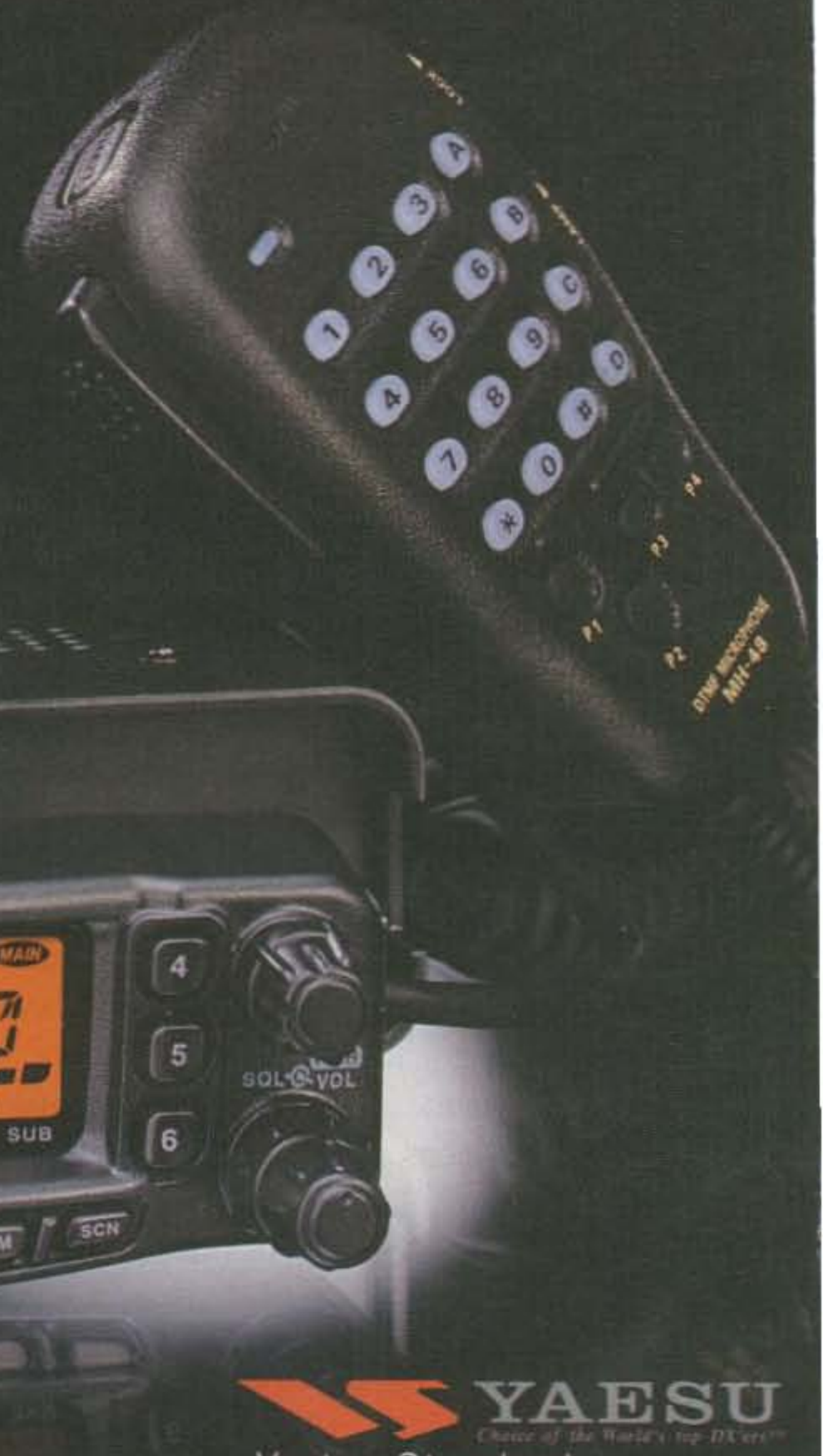

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-Glenn Johnson WØGJ , A50A WW SSB Contest

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-Bob Voss N4CD, TI9M DXpedition

I was very impressed with the reliability of the IC-756PROII transceivers and IC-PW1 linear amplifiers, given that our environment on the island was challenging in some respects. At the CW site, there was so much talcum-powder fine volcanic ash blowing around that the radios, amplifiers, and everything else in the tent was covered with a thick layer of dust. I was especially concerned about the 'PW1s given that the fans were running almost continuously, pulling in this dust. We also had a troublesome generator which caused large fluctuations in voltage and frequency (we eventually replaced it). Even with these conditions, the ICOM equipment ran perfectly for 10 days, 24 hours per day. I'd feel confident taking your equipment to any location on the planet.

-Michael Mraz N6MZ, XRØX DXpedition

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