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Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

FEBRUARY 2004

CQ

1945 Our 60th Year 2004

The 100-Minute DXpedition

Beyond the Sunspot Numbers

CQ Market Survey: VHF/UHF FM Mobiles

CQ Reviews: Kuranishi SWR Analyzer Elecraft KX1 QRP Transceiver

On the Cover: A little bit of snow doesn't stop Ralph Fedor, KØIR, of Waite Park, Minnesota, from getting out to his towers... he just plows his own path! Details on page 92.

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THE RADIO AMATEUR'S JOURNAL

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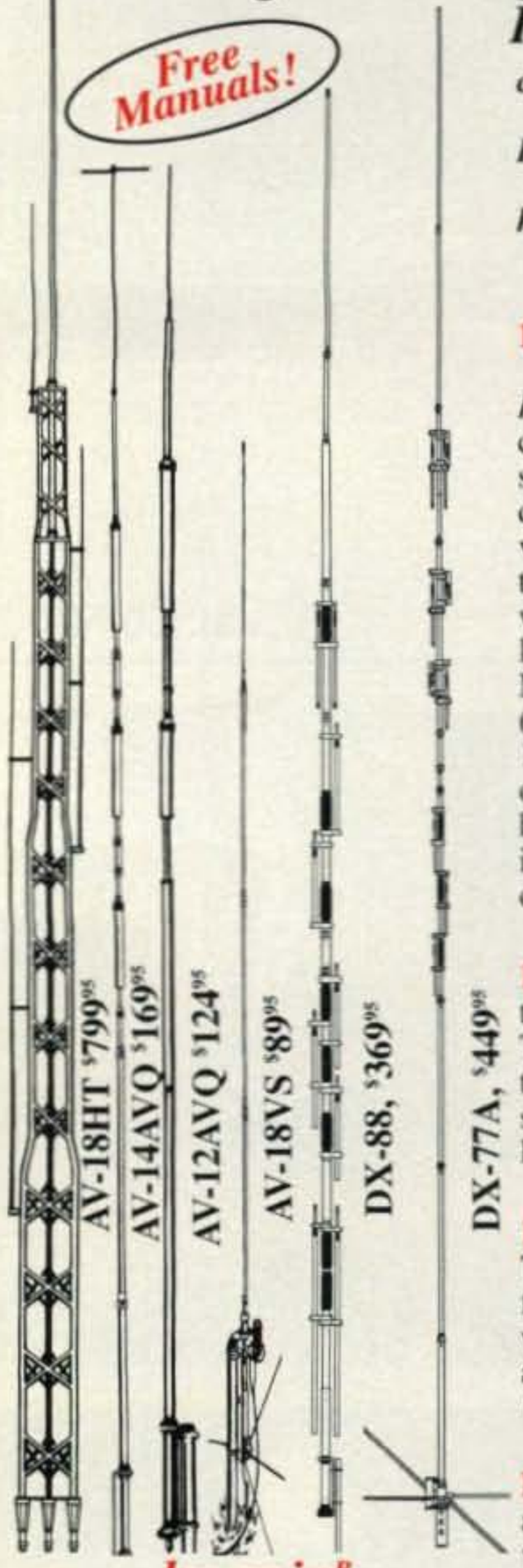

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AV-14AVQ, $169.95. (10,15,20,40 Meters). 18 ft., 9 lbs. The Hy-Gain AV-14AVQ uses the same trap design as the famous Hy-Gain Thunderbird beams. Three separate air dielectric Hy-Q traps with oversize coils give superb stability and 1/4 wave resonance on all bands. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

AV-12AVQ, $124.95. (10, 15, 20 Meters). 13 ft., 9 lbs. The AV-12AVQ also uses Thunderbird beam design air dielectric traps for extremely Hy-Q performance. This is the way to go for inexpensive tri-band performance in limited space. Roof mount with AV-14RMQ kit, $89.95.

AV-18VS, $89.95. (10,12,15,17,20,30,40,80 Meters). 18 ft., 4 lbs. High quality construction and low cost make the AV-18VS an exceptional value. Easily tuned to any band by adjusting feed point at the base loading coil. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

DX-88, $369.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs. All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $189.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs. *No ground radials required!* Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$799.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
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 w/o guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph w/o guy**	**1.5-1.625"**

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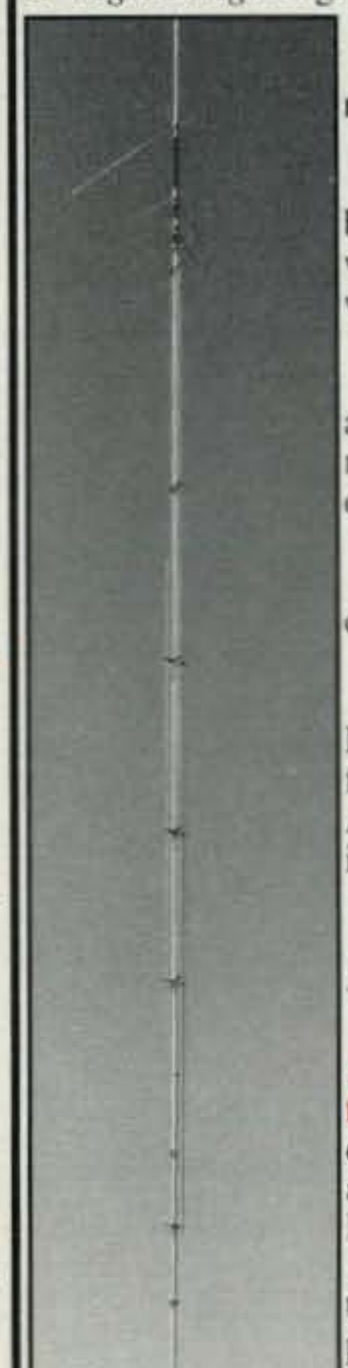

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hy-gain® warranty

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AV-640, $359.95. (6,10,12, 15,17,20,30,40 Meters). 25.5 ft., 17.5 lbs. The AV-640 uses quarter wave stubs on 6, 10, 12 and 17 meters and efficient end loading coil and capacity hats on 15, 20, 30 and 40 meters -- no traps. Resonators are placed in parallel not in series. End loading of the lower HF bands allows efficient operation with a manageable antenna height.

AV-620, $289.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

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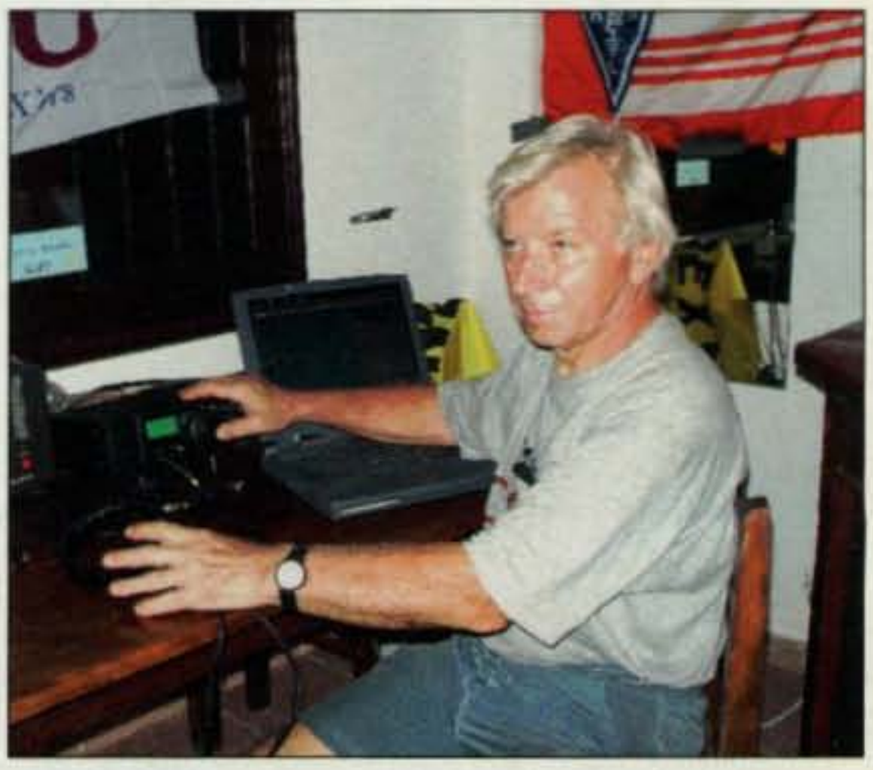

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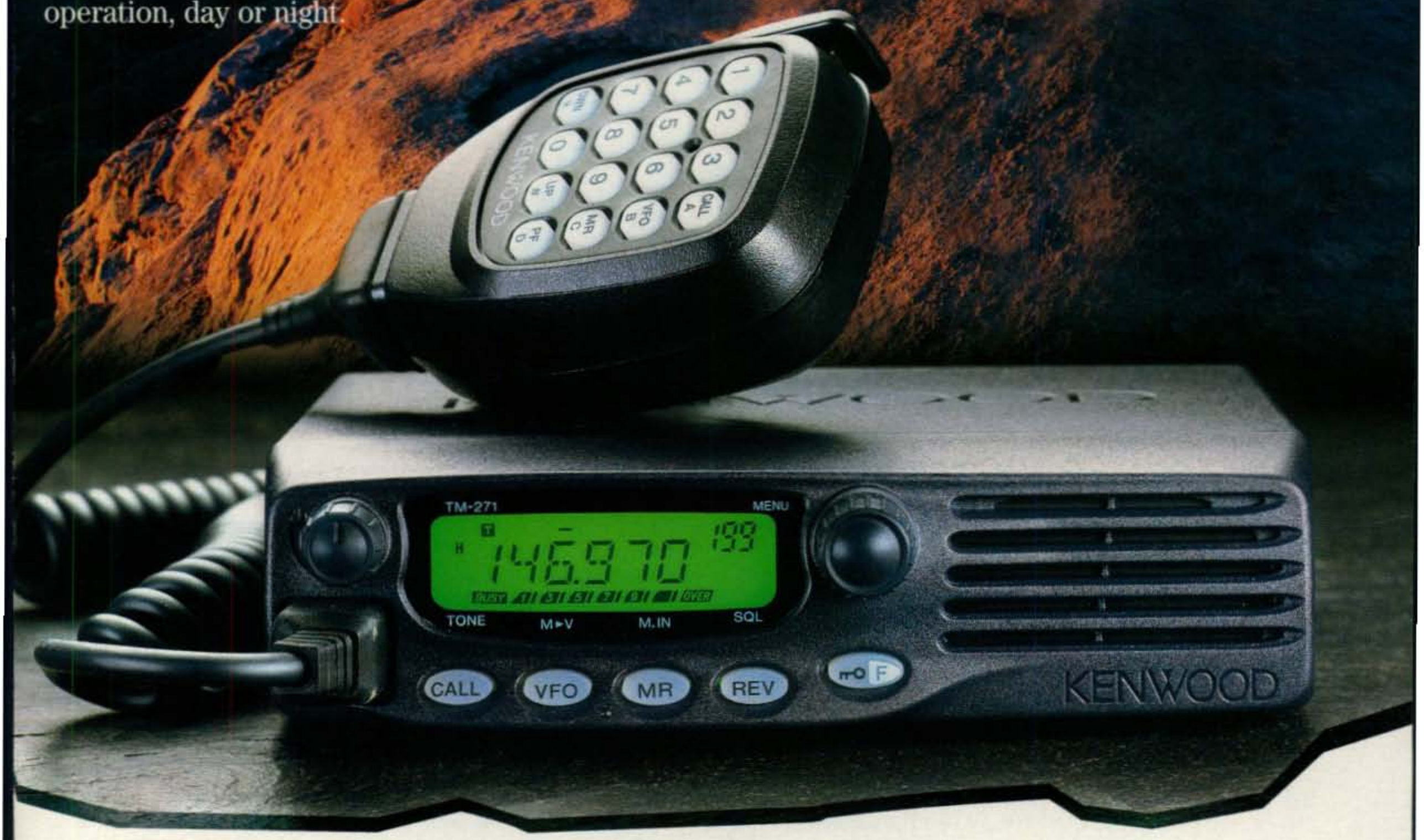
All-Terrain Performance

On or off the road, Kenwood's new TM-271A delivers powerful mobile performance with 60W maximum output and other welcome features such as multiple scan functions and memory names. Yet this tough, MIL-STD compliant transceiver goes easy on you, providing high-quality audio, illuminated keys and a large LCD with adjustable green backlighting for simple operation, day or night.



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TM-271A

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From the Publisher

About those damaged issues...

We've been battling a serious problem for much of the past year regarding subscribers' copies of *CQ* arriving severely damaged. In some cases what the subscribers have received is simply the magazine's cover without any of the inside pages of the magazine. Of course, as soon as we're made aware that a subscriber has received a damaged issue, a replacement is sent at no cost to the subscriber. We realize, however, that this is a problem that has to be solved, and not just "pasted over."

Back in the Spring of 2003, when the problem first began to appear, we had the feeling that it must be something we were doing wrong, or perhaps something our printer was doing differently. Mind you, the same printer has been manufacturing and shipping *CQ* and almost all of our other publications for over two decades without ever encountering problems of this magnitude. Something had changed. Our job was to find out what had changed, and fix it.

A few small technical adjustments were made in the printer's bindery, and for a few months the problem seemed to go away. Towards the end of 2003, the problem began to reappear, and with a vengeance. Our attempts to resolve the problem from the manufacturing side were just not working.

At about the same time we began to notice that other magazines were sometimes being destroyed in the same manner as *CQ*, and it began to suggest that the problem might not be just a *CQ* problem. When mainstream magazines like *Newsweek*, *Time*, *Model Railroader*, etc., also showed up in our mailboxes with the cover only, we were sure that something bigger was involved than just our little company. Sure enough, the investigation of our printer, American Press in Gordonsville, VA, as well as our own research, began to point in the direction of new automated mail sorting equipment that was beginning to be used on a wide scale by the US Postal Service.

While we're still unable to get confirmation of the problem from within the USPS, here's what we've learned so far: The new equipment is part of a massive USPS program to speed the processing of mail through automated sorting, in an effort to keep postal rates from rising. The equipment generally works quite well. So what's wrong? The unofficial information we're receiving indicates that as good as the systems are, they require very careful monitoring of adjustments on an ongoing basis. It sounds as if the new technology demands maintenance far beyond having a service crew fix it when it breaks, because it's not breaking. It's shifting out of tolerance. When the adjustment of the equipment shifts beyond a certain point, it begins to snag the open edges of magazine and catalog covers, either damaging them or tearing them off completely. The mailing address is on the cover. When the body of the magazine is separated from its cover and address, it goes into the trash as undeliverable, and another reader receives an empty cover.

We hold the USPS in very high regard. Despite the ease with which so many people blame the Postal Service for everything from late delivery to bunions, it's an incredibly good and efficient organization. Their rate of quick, effective and inexpensive delivery of mail is so close to perfect as to make us cautious about blaming this problem on them, but that's where the blame seems to lie. We know they're working diligently to make the problems go away. After all, even a huge agency like the USPS doesn't need a bunch of angry customers converging on them waving pitchforks. They'll fix the problem. It's just a matter of when.

"I just want my complete issue."

In the meantime, we're testing economically feasible temporary solutions that we can employ to keep your magazines together until the USPS gurus are able to work their magic. For example, this month we're using a different cover paper imported from Scandinavia, which has a higher resistance to tearing than our normal stock. It's more expensive, but if it reduces damaged copies, we'll continue to use it until the USPS is able to resolve the mechanical problems. We'll also continue to explore other potential solutions.

Some readers have asked why we don't simply wrap the magazines with those familiar poly bags. Yes, poly bagging would solve the problem, but honestly, we can't afford to do it. It's a very expensive process for a small publisher, adding tens of thousands of dollars a year to our costs. You may have noticed over the past year that more and more magazines you previously received in poly bags are now arriving plain, unwrapped. Cost is the reason, pure and simple. However, at the same time, you're probably noticing more and more catalogs arriving poly bagged. The economics are very different for catalog mailers. Every catalog that is destroyed in the mail or that doesn't get delivered can cost the mailer a great deal of money in lost sales. The economics of poly bagging work well with catalogs, but are no longer feasible for magazines.

Why are we taking up this much space to explain the situation? Our readers deserve an explanation. We know that our subscribers are bearing the brunt of this problem. Our subscribers are the backbone of this magazine. Without you there's no magazine. We ask that you continue to bear with us as we work out solutions. The vast majority of readers who have had to contact us about damaged issues have been wonderfully understanding, but we know it's hard to be understanding when you've received a cover only, for two or three months in a row as a handful of readers have.

One way or another, we'll make the situation right. Being a monthly magazine, everything happens very slowly. The test we're running this month will take a month to show us results, good or bad, and by then still another issue will have gone out. Have no doubt, though, that we're working to make things right for our readers, and we'll do it.

-KZMGA

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

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

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

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

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

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

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

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

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

Call your dealer for your best price!

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

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ham radio news

FEMA Calls BPL a Threat To "Essential Communications Services"

The Federal Emergency Management Agency (FEMA), now part of the Department of Homeland Security, has told the FCC that likely interference from Broadband over Power Lines, or BPL, would "severely impair" FEMA's own communications network in areas served by the technology, and could render useless other "essential communications services," such as RACES (Radio Amateur Civil Emergency Service), MARS (Military Affiliate Radio Service) and the Civil Air Patrol. For more extensive coverage of FEMA's response to the FCC's notice of inquiry on BPL, see this month's "Public Service" column on page 64.

Morse Code Gets New Character

Ever try to send your e-mail address in Morse code? You can't get it exactly right because there's no Morse character for the ubiquitous "@" symbol (named by the International Telecommunications Union as the "commat," a shortened version of "commercial at," since in the days before e-mail it was most commonly used for displaying prices, such as "10 @ $5 each"). Well, the ITU is coming to your rescue. According to the *ARRL Letter*, the ITU will recommend within the next several months that an A and C run together (.—.-.) become the official Morse character for "@," subject to approval by member states.

New General Question Pool Released

A new set of General Class exam questions to be used in tests given between July 1, 2004 and June 30, 2008 has been released by the Question Pool Committee of the National Conference of Volunteer Examiners. The new pool consists of 432 possible questions for the 35-question Element 3 exam. It is available online at <http://www.arrl.org/arrlvec/pools.html>. QPC Chair Scott Neustadter, W4WW, says the committee is now looking for suggestions for possible new questions for the Extra Class (Element 4) license exam. Question ideas should be e-mailed by May 1 to <w4ww@arrl.net> or <qpc@arrl.org>.

FCC Makes ULS Easier to Navigate

If you've ever tried to negotiate the FCC's Universal Licensing System website and thrown up your hands in frustration, we have good news. The Commission has completely revamped the website and made it much easier to view records and fill out forms online. According to the ARRL, anyone using the system to file forms must log on using their FCC Registration Number (FRN) and Commission Registration System (CORES) password. Social Security numbers will no longer be accepted for signing in. If you have trouble using the new site, tech support is available online at <http://esupport.fcc.gov> or by phone at (877) 480-3201. You may also use the main FCC help line at (888) CALLFCC (225-5322) and select option 2.

Antenna Group Names New Chief Lobbyist

Don Schellhardt, a veteran Washington lobbyist, has been named Vice President of Government Relations and Membership Development of the National Antenna Consortium. NAC is an association of tower and antenna owners and users working to promote a uniform national antenna policy and to override private sector bans on antennas imposed by many homeowners' associations. According to an NAC news release, Schellhardt will coordinate the group's lobbying efforts and will manage the development of a "new, more environmentally sensitive, 'compromise' approach to expedited siting and approval for antennas and communications towers." More information is available on the NAC website at <http://www.antenna-consortium.org>.

Ham Population of Albania Doubles

"Project Goodwill Albania 2003" (see *CQ*, November 2003), an international effort to incorporate amateur radio into the curriculum of the Polytechnic University of Tirana, resulted in a 95% success rate, with 39 students passing their full amateur license exams on December 12. According to a news release from project officials, the new crop of amateurs doubles the ham population of Albania, which a little more than a decade ago was at the top of most DXers' most-wanted lists. In addition, the program resulted in Albania's joining the European CEPT, which means that amateurs from across Europe (and the U.S.) who visit the country may now operate there without special permission (subject to standard CEPT rules).

The university radio club got its own callsign, ZA1UT, as well as a new Yaesu station donated by Vertex-Standard. An Albanian teacher working with the program was also licensed and will continue to include amateur radio as part of the university's technical curriculum. Project Goodwill Albania 2003 was organized by noted DXer Martti Laine, OH2BH, who first put the country on the ham bands back in 1970 and mounted a major training course and DXpedition there in 1991. Laine was honored as a "Senior Fellow of Polytechnic University of Tirana" for his work.

N5FG Named New WAZ Award Manager

Floyd Gerald, N5FG, of Wiggins, Mississippi, has been named the new CQ Worked All Zones Awards Manager as of January 1, 2004. He's succeeding Paul Blumhardt, K5RT, who stepped down due to increased work and family obligations. For details, see this month's Awards column.

CQ Technical Consultant Lew Ozimek, N2OZ, Silent Key

Lew Ozimek, N2OZ, a longtime "behind-the-scenes" contributor to *CQ* magazine, died December 17 at his daughter's home in Virginia after a short illness. Lew served as the magazine's "Technical Consultant," working with authors on technical articles to assure accuracy and to trim down lengthy articles without losing important information. Lew also assembled the *CQ* annual index for the past four years, and created a searchable index going back to 1980 for the *CQ* website. More recently, Lew supervised the editorial process of creating the series of Ham Radio Magazine Anthologies, the first four of which appeared at the 2003 Dayton Hamvention. Lew was an Annapolis graduate who served at sea in World War II, and was a retired engineer. He lived in Northport, New York, two doors away from his long-time friend, *CQ* publisher K2MGA. He was 81.

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.

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BY RICH MOSESON, W2VU

Beyond the Radio

Ham radio is a technical hobby, but that's only part of it. Of course, it's also a communications hobby and an emergency communications service. But a large part of being a ham happens off the air—beyond the radio—and it's an important part of our hobby that's rarely discussed, at least in public. Well, I'm going to reveal the secret: Ham radio opens doors and creates opportunities for many of us that we just plain wouldn't have if it wasn't for ham radio.

Ham radio has been the conduit through which I have made dozens of friends, both locally and around the world, and met important people, such as former Senator and Astronaut John Glenn. It's helped me get started in my career, meet my wife, find at least two jobs (yes, including this one), and one place to live. It's gotten me police escorts through New York City (for parades and other events), a summer day on a luxury yacht on Long Island Sound (operating in a net for a sailing race), and many front-row seats at the New York City Marathon. On September 16, 2001, ham radio took me on one of the most surreal rides of my life, in a Red Cross van across an empty Brooklyn Bridge, up a closed FDR Drive, and into sealed-off areas of lower Manhattan in the shadow of still-burning Ground Zero, to a very long day at a Red Cross shelter for people displaced by the attacks of September 11.

More recently, ham radio brought me back to lower Manhattan. In fact, the PATH train I took to the newly-reopened World Trade Center station emerges into daylight several stories below ground level – right along the edge of "the pit" where the World Trade Center towers used to stand. It was an experience I wasn't expecting, and one for which I wasn't quite ready. Maybe it's best that way—so we don't forget that day when 3000 people didn't get to walk away and go about their business.

I was in lower Manhattan to go to the Smithsonian's National Museum of the American Indian— beautifully housed at the old Custom House on Bowling Green at the tip of Manhattan until a permanent home is built in Washington, DC—for a meeting of the Museum, Library and Cultural Properties Facility Group of Greater New York City. It's a group I've mentioned here before, made up of people who are responsible (among other things) for the safety and security of some of the world's best-known museums, libraries, etc. Emergency preparedness is a big part of their jobs, and many members of the group are very interested in how ham radio might fit into their emergency planning.

The topic of this meeting was last summer's blackout and emergency communications. They heard from some representatives of the New York City Office of Emergency Management, who made excellent suggestions and whose primary advice, beyond having and following an emergency plan, was to have as wide a variety of communications options as possible—including cell phones from more than one provider—because when it comes to emergency communications, "you never know what works."

That gave me a perfect opening when I followed them to let them know they weren't quite right—that ham radio always works. I talked briefly about what hams in New York and other areas did during the blackout, during Hurricane Isabel, and during the California wildfires. I suggested they get in touch with the ARRL Emergency Coordinator for New York City, and at a minimum, install a ham antenna on a rooftop, with a cable to a location known to their security and safety people, so that during an emergency a ham could be directed to set up there and plug into an outside antenna. I also recommended that they encourage at least one person on their staffs to get a ham license, so they could keep in contact during an emergency without drawing down the pool of volunteers who might be needed at shelters, etc.

Why am I telling you this? First of all, it's another connection I never would have made without ham radio. Secondly, it's an example of the sort of connection you might be able to make where you live, and finally, because it ties in directly with another 9-11 related event I attended about a month earlier.

The (Disappointing) 9-11 Commission

In mid-November, the National Commission on Terrorist Attacks Upon the United States, better known at the federal 9-11 Commission, held a hearing in New Jersey titled "Private/Public Sector Partnerships for Emergency Preparedness." The goal was to explore ways in which government and the private sector could better communicate and cooperate in the event of future disasters.

I went to the hearing, curious to see if amateur radio got even a mention in passing. At first, I was encouraged. Commission Chairman Thomas Kean, the former Governor of New Jersey, said in his introduction that 85% of America's critical infrastructure is under private control, that on 9/11, "communications were disrupted, often with no backup," and that "(t)oday's hearing will provide information to help us make recommendations that turn into action for future preparedness."

I came away very disappointed, not only because there was no mention of amateur radio (I wasn't really expecting much in that department), but mostly because it appeared that, in the eyes of the Commission, "private sector" meant only "business." The entire non-profit and voluntary segments of the "private sector" were excluded. Testimony was by invitation only, and the groups on the "not invited" list included the American Red Cross, the Salvation Army, and the museum facilities group, not to mention the Amateur Radio Emergency Service.

Wouldn't you think that in a session on private/public sector partnerships for emergency preparedness, the Commission would want to hear from the private sector groups that respond to nearly every large-scale emergency? Wouldn't you think the people who orchestrated the Red Cross response—within hours of the attacks—would have something of value to contribute? Wouldn't you think the Commission would want to hear about how (and whether) the city, state, and federal governments coordinated with institutions such as the Metropolitan Museum of Art, the Guggenheim, and the New York City Public Library to assure the safety of their irreplaceable treasures in a city under attack? Wouldn't you think...? Apparently not. Apparently, the only segment of the private sector that had any value in he Commission's eyes was business.

It's interesting ... the hearing was well-covered by the major news media, and nearly all the coverage on the TV that night and in the newspaper the next day focused on family members of victims who came to listen (only two were invited to speak). Virtually every reporter in the room decided independently (and correctly) that the average person had no interest in how this business or that one managed to keep functioning even though half its staff had been killed ("business continuity" was the catch-phrase), but wanted to hear what the family members had to say. Perhaps if a representative of the Red Cross or Salvation Army had been there to testify about what was encountered when they arrived, what worked and what didn't, and how things might be improved in the future, the media would have focused a little more on what the hearing was supposed to be about. As a member of the private sector who volunteered in New York after 9/11, I felt that a huge group of voluntary emergency responders

(Continued on page 10)

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announcements

Anniversary of U.S. Power Squadron – The U.S. Power Squadrons Amateur Radio Net will sponsor special event station N9T on February 20 & 21 from 1300–2200 GMTon 28.367, 21.367, 14.267, and 7.267 MHz in honor of the 90th anniversary of the U.S. Power SQuadrons, a nonprofit educational organization dedicated to making boating safer. The station will be located in USPS Headquarters in Raleigh, NC and promote the National Safe Boating Council's National Safe Boating Campaign. Certificate available with 9x12 SASE from Donald R. Stark, N3HOW, 65 Stark Spur, Eighty Four, PA 15330 (no e-QSLs please).

Special Event Station WAØMNA – The Washington Area ARC will celebrate George Washington's birthday on February 21 from 1500–2100Z from Washington, Iowa. QRV the General portion of 10, 15, and 20 meters. QSL to WAØMNA.

The following hamfests are scheduled for February:

Feb. 14, **Cherryland ARC Hamfest**, Conception Elementary School, Traverse City, Michigan. Contact Joe Novak, W8TVT, e-mail: <jnovak@traverse.net>, 231-947-8555. (Talk-in 146.860; exams following hamfest, after noon)

Feb. 14, **Algonquin ARC Fleamarket**, Marlboro Middle School, Marlboro, Massachusetts. Contact Ann, KA1PON, 508-481-4988 (before 9 PM). (Talk-in 146.61; exams)

Feb. 14–15, **Dixiefest 2004**, Shelby County Building, Mid-South Fairgrounds, Memphis, Tennessee. Contact Randy, WB4LHD, 901-853-3187, or Ben, KU4AW, 901-372-8031; <www.dixiefest.org>. (Talk-in 146.82, backup 146.88; exams Saturday)

Feb. 15, **Aurora Repeater Assn. Hamfest**, Adams County Fairgrounds, Brighton, Colorado. Contact Wayne, NØPOH, e-mail: <n0poh@arrl.net>, 303-699-6335. (Talk-in 147.15[+]; exams 10 AM)

Feb. 22, **Richmond Frostfest 2004 & ARRL VA State Convention**, The Showplace, Richmond, Virginia. Call 804-790-0077 opt 4; <www.frostfest.com>.

Feb. 28, **Northern Vermont Winter Hamfest & ARRL VT State Convention**, Milton High School, Milton, Vermont. Contact W1SJ, e-mail: <w1sj@arrl.net>, 802-879-6589. (Talk-in 145.15; exams noon)

Feb. 28, **LaPorte ARC Cabin Fever Hamfest**, LaPorte Civic Auditorium, LaPorte, Indiana. Contact LPARC, P.O. Box 30, LaPorte, IN 46350; e-mail: <www.k9jsi.org>.

Feb. 28, **Cabin Fever Reliever Hamfest**, St. Cloud Armory, St. Cloud, Minnesota. Contact Fred, WØDOM, 320-255-1410; <www.w0sv.org>.

Feb. 28, **CDARC 3 Hams Memorial Hamfest**, St. Mary's Grade School, Bismarck, North Dakota. Contact Dennis Murphy, 701-258-6747; Central Dakota ARC, P.O. Box 7162, Bismarck, ND 58507-7162. (Talk-in 146.52; exams 9 AM)

Feb. 29, **Long Island Hamfair & Electronics Show**, Levittown Hall, Hicksville, LI, NY. Contact Brian, WB2YMC, e-mail: <WB2YMC@hotmail. com>. (Talk-in 146.85–, 136.5 PL; exams 10AM [info contact Al, W2QZ, <w2qz@limarc.org>, 516-623-6449])

Feb. 29, **VWS Winterfest**, Northern Virginia Community College, Annandale, Virginia. Contact Len, KG6ZR, 703-366-3979; <www.viennawireless.org>. (Talk-in 146.31/.91; exams Feb. 28 at 9 AM)

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Zero Bias *(from page 8)*

was slighted by the Commission's very narrow field of view, and that the panel missed a lot of valuable information by excluding the non-profit and voluntary sectors.

Personal Preparedness

Several articles in this month's issue focus on the personal side of emergency preparedness—how you as an individual ham can be best prepared to help when needed. WA3PZO's Public Service column focuses on watching out for your own health and safety (a big concern for volunteers at Ground Zero after 9/11), and how ham radio has helped save the lives of hams in trouble. Beginner's Editor KH6WZ lays the groundwork for long-term responses to emergencies with an introduction to gel-cell batteries that can far outlast whatever came with your handheld. And WB6NOA's annual market survey article focuses on VHF/UHF FM mobile rigs— the radios of choice for most emergency communications.

We also have a very interesting look at last year's generally rotten HF band conditions as viewed through the lens of the *K*-index, and Propagation Editor NW7US talks about holes in the magnetosphere that may account for some recent geomagnetic disturbances.

Score One for CW

Finally, we learned quite a bit from the responses to last October's reader survey, which are reported in this issue. We asked about your CW operating habits, and 2½ to 3 times as many people as usual responded. Some 70% of you operate at least some CW, and 40% use code at least 75% of the time you're on the air— an *increase* of nearly 38% since restructuring took effect in 2000. Far and away the major reason you operate code is *because you enjoy it* (61%; DXing, in second place, polled only 16%), and nearly six in ten *CQ* readers say they would have learned code even if it wasn't a license requirement. This speaks volumes for the strength and vitality of CW as an operating mode, and confirms our contention that CW will not go away anytime soon, whether or not it continues to be a license requirement.

By the time you receive this issue, the ARRL Board of Directors will have taken a position on what should be done with amateur licensing now that code proficiency is no longer an international requirement. The League has already indicated that it intends to file a petition for rule making on its own, rather than simply replying to those petitions already filed. It will be very interesting to see which direction the ARRL's directors are facing … forward or backward.

73, Rich, W2VU

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Here's what *QST* for April, 2001 said . . . *"I expected a subtle effect at best, but I was astonished . . . The result was remarkably clean, understandable speech without hissing, ringing or other strange effects . . . made a dramatic improvement . . ."*

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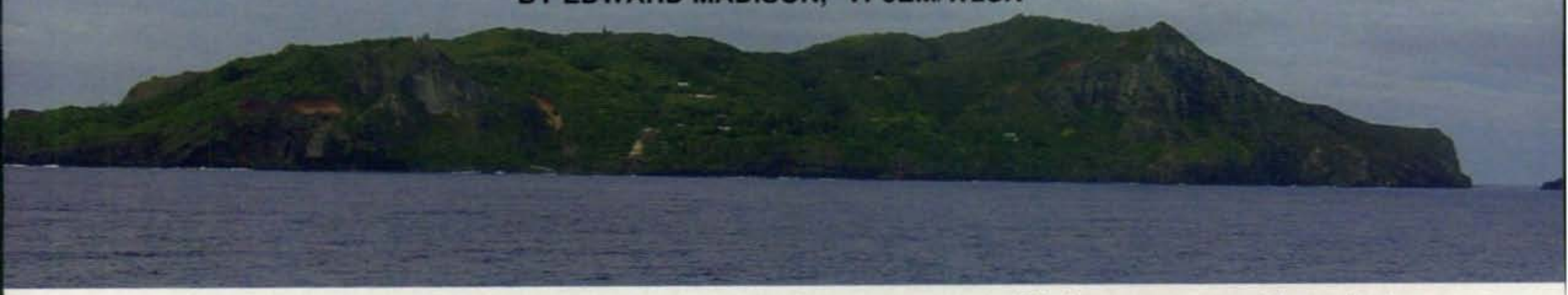
"CQ, CQ, CQ de VP6EM." Author W2SN's decades-old dream of operating from Pitcairn Island came true for him last February . . . even if it was just for an hour and a half.

The 100-Minute DXpedition

BY EDWARD MADISON,* VP6EM/W2SN



Pitcairn Island dead ahead. The dream of a lifetime is about to come true. (All photos courtesy of the author)

Amateur radio . . . stamp collecting . . . voices and visions of faraway, exotic places, fodder for the imagination of a young boy growing up in Brooklyn, New York. After sending in my dime for 100 free stamps and approvals, I was introduced to Pitcairn Island, home to the descendants of the mutiny aboard *HMAV Bounty*. My local library provided the *Bounty* trilogy, three novels by Nordoff and Hall, which made me determined to someday visit this tiny island in the South Pacific, the most isolated inhabited place on Earth.

Years later I was licensed as WA2HQA, then W2SN. Here, too, was a hobby in which I could not only read about exotic locations, but actually communicate with them. After my first DX contact with a Czechoslovakian station, and the QSL card that followed, I was bitten by the DX bug, seeking out new countries and patiently (?) awaiting their QSLs.

During the late 1970s I joined the Pitcairn Islands Study Group (PISG),[1] a philatelic organization that studied Pitcairn postage stamps and the history and daily life of this dot on the map.

A Chance to Live the Dream

You can imagine my excitement when in the Spring of 2002 I received information about a cruise from Valparaiso, Chile, visiting Robinson Crusoe Island, Easter Island, Pitcairn Island, and two French Polynesian islands before disembarking in Tahiti. Would the dreams of a young boy be fulfilled after 50 years, and . . . would it be possible to operate from Pitcairn Island? My wife, Virginia (WA2HQA), and I booked the cruise and I began to investigate operating from these ports, with Pitcairn Island as my first priority.

The events of September 11th have left an unfortunate scar that extends to cruise lines, and I was denied permission to operate aboard ship. Stops at the various islands were short, so I decided not to try getting permission to operate from them. Pitcairn was different; I *had* to operate from there.

Our travel agent is personally acquainted with Betty Christian, VP6YL, wife of Tom Christian, VP6TC. Betty informed her that in order to operate from Pitcairn I would need permission from the Commissioner for Pitcairn, Leon Salt. Mr. Salt is headquartered in Auckland, New Zealand. A few e-mails to a most cordial and cooperative Mr. Salt and I was licensed to operate as VP6EM. The excitement mounted!

Now for the details: Should I lug a radio, power supply, tuner, and antenna, which would have to be transported to the Island by longboat, or would one of the Pitcairners allow me to use his equipment?

When I first became interested in Pitcairn, it took months to send a letter and receive a reply. No telephones, no internet, only "snail mail." However, times have changed. Pitcairn is on the internet, and an e-mail put me in touch with Dave Brown, VP6DB, president of the Pitcairn Amateur Radio Club (VP6PAC).

Dave assured me that I could use radio equipment on the Island, and asked only that I bring a power supply capable of 110/220-volt operation. Despite Dave's objections, the power supply became my gift to the club station. With ten licensed amateurs among a population of approximately 50, Pitcairn has the world's highest ratio of amateurs to general population.

I am the president of the Kings County Repeater Association (KCRA) in Brooklyn, New York. Many club members were waiting for my initial contact. My mini DXpedition was also announced on the internet and in *QST*. I envisioned operating on the receiving end of my first pile-up.

All was set. Time passed slowly during a really cold New York winter until Virginia and I were off to Valparaiso, Chile. We met our fellow PISG travelers and boarded our cruise ship, the *MV Duetschland*.

Across the Endless Pacific

Pitcairn Island was our primary goal, but our stops at Isla Robinson Crusoe (where I met three local amateurs)[2] and Easter Island were also of great interest. We thoroughly enjoyed these islands but wondered if we'd be able to land on Pitcairn. Would the weather cooperate? Would I get to activate VP6EM and would propagation be good?

*7004 12th Avenue, Brooklyn, NY 11228
e-mail: <maded@mindspring.com>

VP6EM QSL card. Ed made 70 contacts in 100 minutes of operating.

Blending Ed's interests in stamp collecting and amateur radio, this Pitcairn Island stamp honors the Pitcairn Amateur Radio Club.

What luck! The weather was ideal and we quickly closed the gap across the endless Pacific. Pitcairn has an area of less than two square miles, but is steeped in history, its story inspiring many books, articles, and four Hollywood movies.

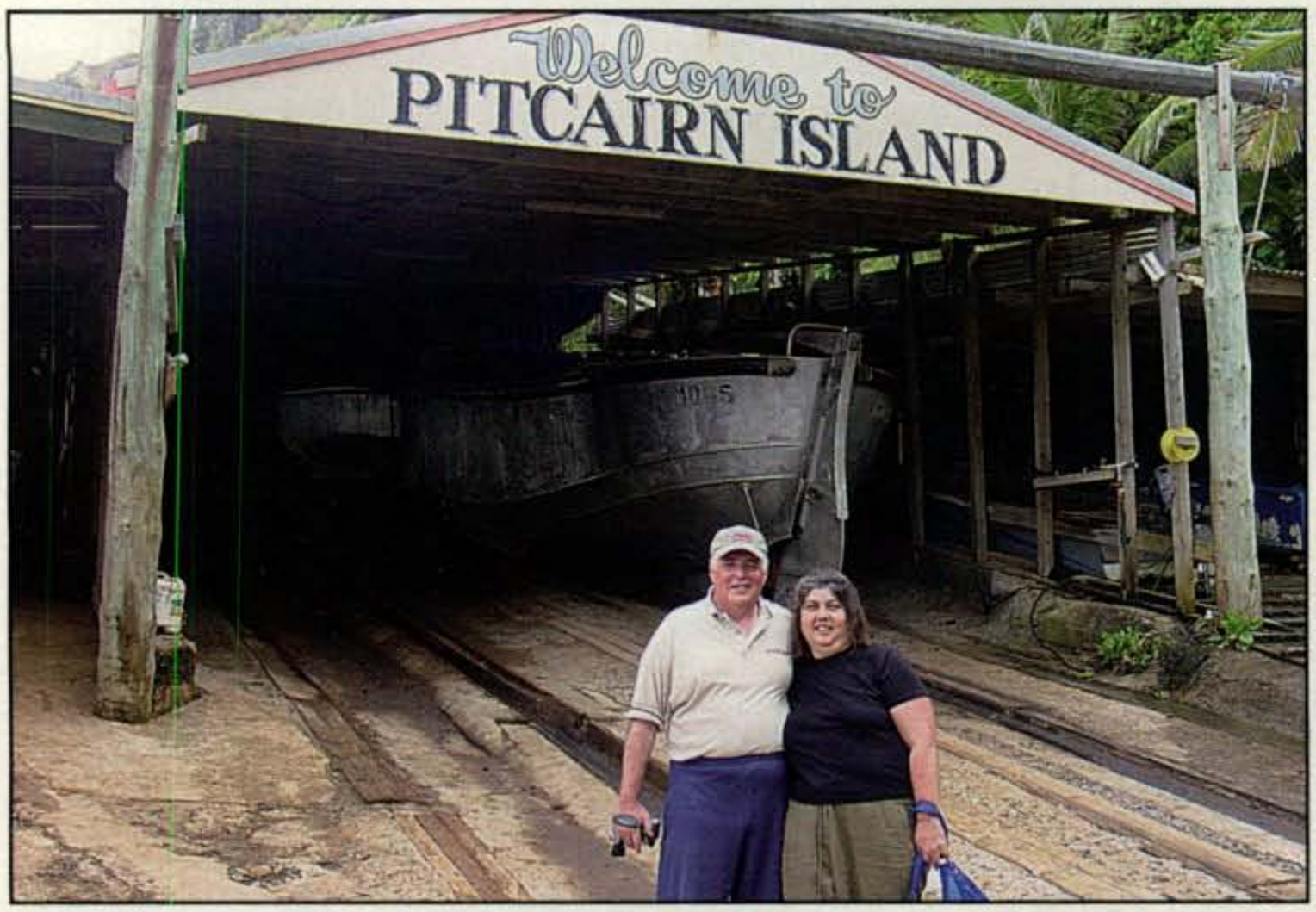
The day before we reached Pitcairn a storm drenched the ship. The ship's tenders could not be used to transfer us and only one longboat was available. The *Deutschland's* captain promised our group first crack at the longboat, so we remained optimistic.

At daybreak we lined the bow of the ship hoping for a glimpse of Pitcairn. As the sky brightened there it was, dead ahead. We could see activity on shore, and there they were, boarding the longboat. Tom and Betty Christian, Meralda Warren, and scores of other Pitcairneners were soon aboard our ship, setting out beautiful handcrafted items for sale. Pitcairn's economy depends on the sale of postage stamps and handicrafts, so this visit was important to the island's economy.

The captain appeared. Would he allow us ashore? We held our breath. The waves tossed the longboat against the boarding platform, but the skill of the Islanders and the relatively calm sea assured the captain of our safety. We boarded the longboat and off we went, among the fortunate few to transfer from a cruise ship to a Pitcairn longboat.

A short, exciting crossing brought us to shore, and we were soon on land, climbing the steep "Hill of Difficulty" from the boat landing in Bounty Bay to the Island's only village, Adamstown. As we arrived at the top of the hill, an Islander drove up on his three-wheel ATV, asking for me. This was my introduction to Dave Brown, our host on Pitcairn, who drove my wife and me to Taro Ground, high atop Pitcairn.[3] There we had a panoramic view of the island and the surrounding Pacific. At approximately 10 AM local time (18:00 UTC) I entered

Pitcairn longboat approaching the MV Deutschland, *bringing people and goods for sale. It was also the group's transportation to and from the island.*



Ed, VP6EM/W2SN, and wife, Virginia, WA2HQA, at the Pitcairn boat shed.

the radio station. Dave started the generator and connected the three-element triband beam (10-15-20 meters) to the Yaesu FT-1000.

The 100-Minute DXpedition

I tuned to 10 meters and called, "CQ, CQ, CQ, this is VP6EM, Pitcairn Island, South Pacific." My very first call was answered by Ken, N2KEN, a KCRA member. Thus, I logged my first contact at 18:05 UTC. With 10 meters open, the contacts piled up, and I also spoke to several other KCRA members. At one point N2KEN linked my signal to the club's 2-meter repeater, where I spoke with two other club members.

At 19:03 UTC I switched to 15 meters where the signal reports were generally poorer than on 10; 20 meters was not open, so all of my 70 contacts were on 10 and 15 meters. I logged SSB contacts to North America, South America, and Europe during my 100 minutes of operation. I went QRT at 19:45 UTC (11:45 AM local time) to tour the island. We were due back on board by 4 PM.

The Island and its People

Pitcairn Island is beautiful and is surrounded by the multihued blue Pacific. It is lush, with subtropical vegetation abounding, and the dirt roads that criss-cross the island are fun to travel on the motorcycles.

The Pitcairners are lovely, speaking perfect English with a hint of the 18th century English spoken by their seafaring ancestors. Among themselves they speak Pitcairnese,[4] a local dialect combining English, Polynesian, and phrases unique to the island.

As the *Deutschland* sailed away to French Polynesia, I watched Pitcairn slowly disappear astern. The images and memories of that day, long anticipated and beyond my expectations, are etched in memory forever.

I want to thank Mr. Salt for making the licensing process so easy and Dave Brown for all his efforts on my behalf. My new dream? To return someday to this paradise in the Pacific.

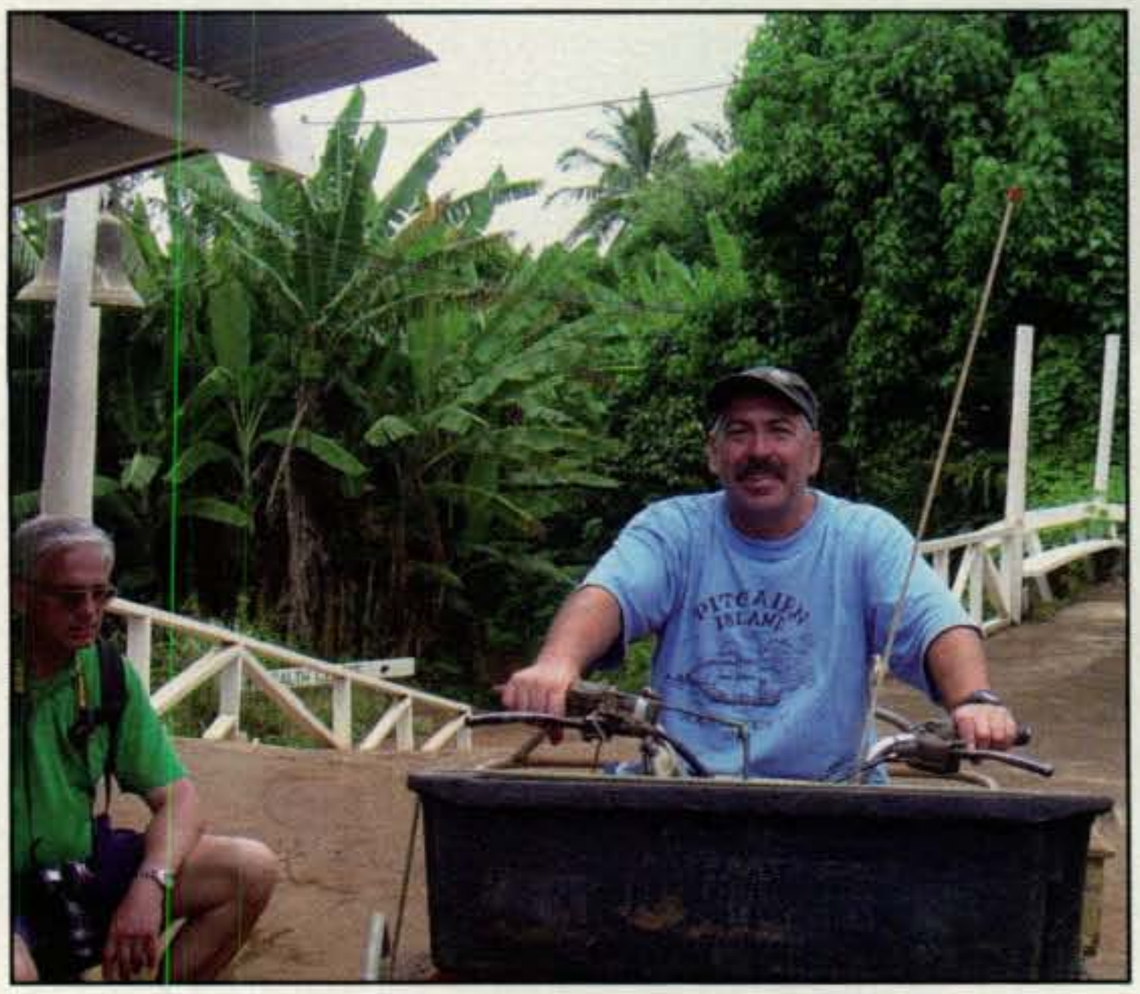
Notes

1. For further information on the Pitcairn Islands Study Group, see <http://www.pisg.org/>, or contact the author (address at bottom of first page of article).

2. A DXpedition by members of the "Kilo Papa International DX Hunter Group." See <http://www.kpidx.com/286.htm>.

3. See <http://www.government.pn/> for additional information about Pitcairn Island.

4. For more information on the Pitcairn language, see <http://www.geocities.com/TheTropics/Shores/3012/html1/language.htm>. ■



Dave Brown, VP6DB, was Ed and Virginia's host during their brief stay on the island.

On the air from Pitcairn! VP6EM logs another contact.

Why have HF band conditions been so bad in the past year? N2UN compared DXers' perceptions of poor propagation with the historical record to try to find an explanation.

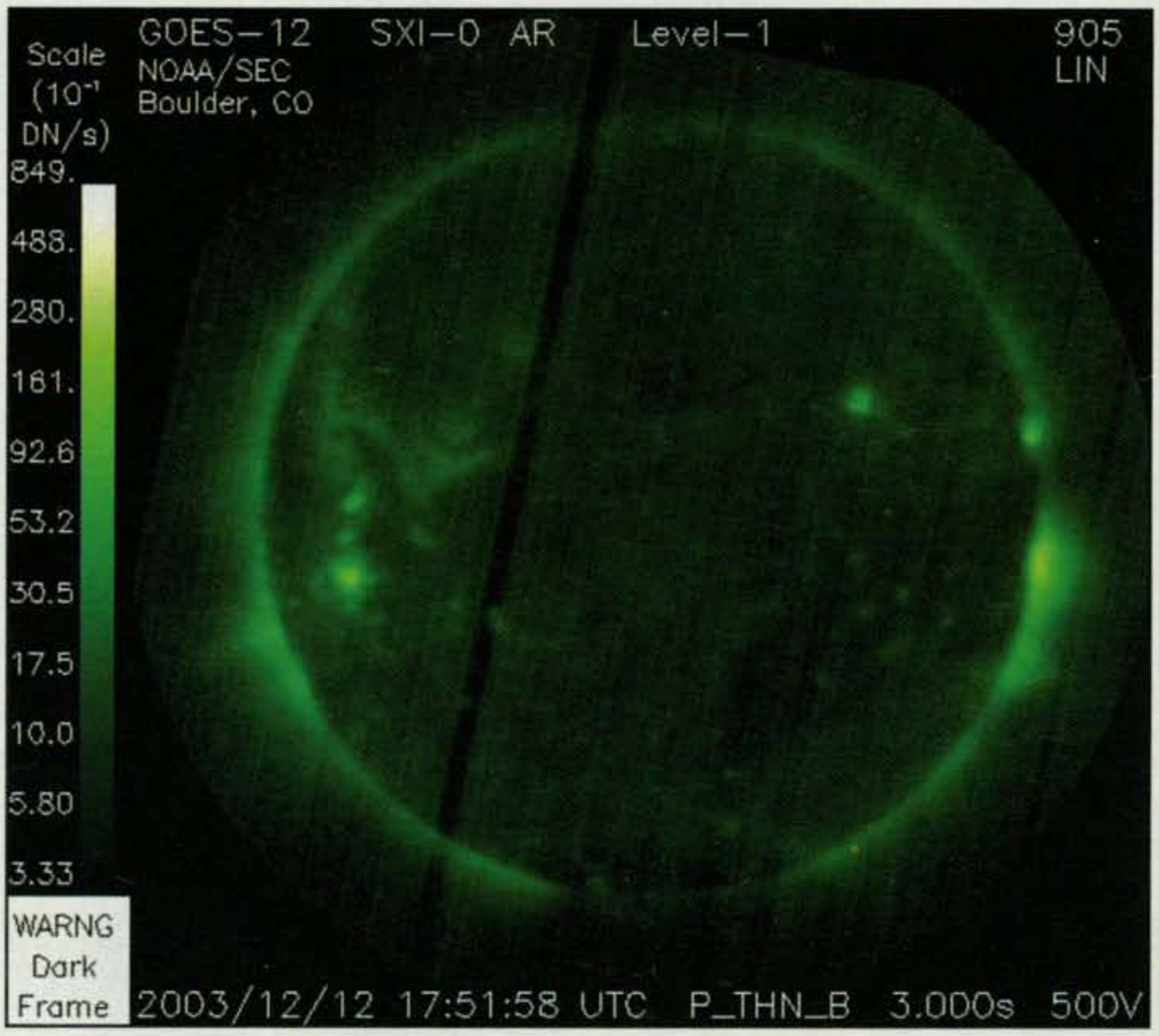
Propagation

Beyond the Sunspot Numbers

BY TONY JAPHA,* N2UN

In speaking with DXers and contesters recently, I have heard lots of complaints about the sad state of conditions on the high-frequency bands during 2003. Most DXers know that we're living through the declining phase of sunspot Cycle 23, which peaked in April 2000, but conditions seem to have been worse than a declining sunspot cycle can explain. Is there something else going on?

There is a good explanation for the poor conditions, and it is the elevated number of disturbances to the Earth's magnetic field experienced recently. Less obvious, even to scientists, is why we've had this sharp jump in magnetic disturbances. This article presents some straightforward statistics to demonstrate the prevalence of these disturbances and compares this recent experience with what occurred during several recent sunspot cycles. You don't need any understanding of the physics underlying the complex relationships among solar activity, geomagnetic disturbances, and HF ionospheric propagation to follow this article. I don't understand it myself!



An increased number of solar flares (see right-hand edge in this X-ray image) and other disturbances on the sun have resulted in HF band conditions that are unusually poor for this point in the solar cycle. (Photo courtesy NOAA Space Environment Center)

The Basics

Many hams, and in particular DXers, pay a lot of attention to the propagation indicators broadcast by WWV at 18 minutes past every hour. These same indicators are also available on a multitude of websites on the internet, and some are posted on the DX cluster network. There are three indicators of primary interest: **solar flux**, the ***A*-index**, and the ***K*-index**. Other things being equal, the higher the solar flux (which correlates highly with the sunspot number) and the lower the *A*- and *K*-indices, the better DX conditions will be on the HF bands. The *A*- and *K*-indices are measures of essentially the same thing—the degree of activity in the Earth's magnetic field. The *A*-index broadcast by WWV is a measure of magnetic activity on the previous day, while the *K*-index is changed every three hours and is broadcast currently. It is the most timely measure of real-time magnetic activity, and as such is extremely useful as a gauge of current conditions. Changes in the *K*-index are mirrored very quickly on the bands, and generally speaking, the lower the *K*-index number, the better conditions are on HF, regardless of the solar-flux level.

Focusing on *K*

While presentations of solar flux and sunspots over long periods of time are common and very helpful to understanding changes in propagation conditions, not much attention has been paid in the ham literature to changes in the *K*-index, which also help greatly to explain short-term changes in conditions. This article focuses on the *K*-index and what it has shown in recent months compared to how it has behaved at similar times during recent sunspot cycles.

The *K*-index of magnetic activity ranges from 0 to 9, with 0 being an indicator of an extremely quiet magnetic field and

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Percent of *K* Observations with *K* = or > 4 in Solar Cycles 19–23

	Cycle 19	Cycle 20	Cycle 21	Cycle 22	Cycle 23
Peak Sunspot No.	201	111	164	158	121
Peak Month/Yr.	3/1958	11/1968	12/1979	7/1989	4/2000
12 Month Period Following Peak					
First	25.4%	13.0%	12.9%	27.9%	18.5%
Second	29.5	12.7	22.4	23.5	12.6
Third	32.2	14.5	36.0	29.2	25.0
Fourth	15.3	13.5	30.3	23.9	na
Fifth	19.0	27.2	30.7	29.4	na

Source: Geo Forschungs Zentrum Potsdam (www.gfz-potsdam.de). Monthly tabulations of K values.

Table I– Comparison of current and past four sunspot cycles showing peak sunspots and month/year of each peak, followed by the percentage of "disturbed" K-index observations during each of the first five years after the respective peak.

9 being an indicator of a severely disturbed magnetic field. In practical terms, if the *K*-index for the immediate three-hour period is 0, 1, or 2, conditions can be expected to be very good; if the *K*-index is 3, conditions can be expected to be average; a *K*-index of 4 indicates a somewhat disturbed magnetic field and substandard conditions; and a *K*-index of 5 or more will signal poor conditions. If the *K*-index is 6 or higher, the DXer with other things to do should do them! The HF bands are likely to be dead or close to it (*Auroras resulting from these magnetic disturbances can produce enhanced propagation on 6 and 2 meters.—ed.*). Remember, these rules of thumb hold for any given sunspot or solar-flux number. While the 11-year sunspot cycle determines the general condition of the bands, immediate conditions are determined by the state of the Earth's magnetic field, which are conveniently measured by the *K*-index.

The *A*-index is also very useful for making historical comparisons of the degree to which we experienced geomagnetic disturbances. It has value, even though by the time you get the index, it is yesterday's news! The *A*-index for a day is essentially the average of the eight 3-hour *K* readings for that day, although the two measures have different scales. The two are related as follows:

K-index	0	1	2	3	4	5	6	7	8	9
A-index	0	3	7	15	27	48	80	140	240	400

In this article, the standard for a disturbed *K* reading is set at a minimum of *K* = 4. This may occur once or more during the course of a day. It would take a rather disturbed day for the *K* to average 4 over the day's eight observations. That corresponds to an *A* of 27 or more for the day.

No statistical analysis of the *A*-index was conducted for this article. However, the difference between the incidence of disturbed days in 2003 compared to 2002 is striking. In the first 11 months of 2002, there were 31 days for which the *A*-index was 27 or higher, and 14 days for which it was 48 or higher. In 2003 (some data are preliminary), there were 92 days for which the *A*-index was 27 or higher, and 19 days during which it was 48 or higher. In one 11-day stretch from Oct. 14 through Oct. 24, 2003, the *A*-index was more than 27 on nine days. On Oct.29, one of the largest solar flares ever recorded led to several *K* readings of 9 (as well as to widespread visible aurora). No wonder conditions appeared to be so bad during 2003.

With all this bad news, there have still been periods of very good DX conditions when the Earth's magnetic field was quiet. Just one example is the terrific propagation during the 2003 CQ WW DX CW Contest in late November. The *A*-index was 10 or lower for nine days in a row around contest time.

The *K*-index in the Declining Years of the Solar Cycle

It often has been noted that there are more disturbances in the Earth's magnetic field during the years following the peak of the solar cycle than during years of increasing solar activity. Thus, to some extent an increasing frequency of high *K* readings at this stage of the cycle is to be expected. It is helpful to know, however, if recent experience has been unusual. Has the recent behavior of the *K*-index differed from the pattern that the index exhibited in recent solar cycles? Table I summarizes the data. It shows the percentage of *K* readings equal to 4 or more in each of the first five 12-month periods following peak sunspot activity—as measured by the monthly smoothed sunspot number—during the current sunspot Cycle 23 and the previous four sunspot cycles. The analysis begins with Cycle 19, which peaked in March 1958 at a smoothed sunspot number of 201, the highest ever recorded. The 12-month periods (rather than calendar years) were chosen in order to eliminate seasonal variation in the *K*-index.

The frequency of major magnetic storms is higher during two periods of the year: March, April, May; and August, September, October. If periods of less than 12 months were chosen for the analysis, there would be a bias in the results, because the peaks in sunspot activity during the five cycles occurred during different months.

Table I shows some very interesting things:

• In every cycle the frequency of high *K* readings was higher in the third 12-month period following the peak than it was in the prior two periods. In that respect, Cycle 23 has not been unusual.

• The highest frequencies of high *K* readings in the first 36 months following the sunspot peak occurred during Cycle 19, which had the highest peak of them all, although the highest single period occurred during Cycle 21, another intense cycle. During the fourth and fifth 12-month periods, Cycle 19 had a relatively low frequency of disturbances. Cycles 21 and 22 had almost identical solar activity peaks and exhibited some periods of high frequencies of disturbed conditions.

• In the current cycle, the frequency of high *K* readings has not been particularly high when compared to the other cycles. In three of the previous four cycles, the frequency of high *K*

	May-Nov.	%K> or = 4	%K > or = 5
Cycle 19	1961	18.9%	8.9%
Cycle 20	1972	13.1	5.4
Cycle 21	1983	26.8	10.3
Cycle 22	1992*	21.3	9.7
Cycle 23	2003	39.5	19.0

** May–July were in the third year following the peak of this cycle.*

Table II– Comparison of disturbed K readings in the second half of the fourth year after the peak of the five most recent sunspot cycles, showing that this period of the current cycle is unusually active.

	K = 5	K = 6	K = 7	K = 8	K = 9	Total	% of all
Number of occurrences	1700	600	200	100	4	2604	8.1%
Number of days	900	360	130	60	4	1454	36.1%

Table III– Expectations for K-index readings higher than 4 over the course of an 11-year sunspot cycle. (Source: National Oceanic and Atmospheric Administration)

readings in the third 12-month period following the peak was higher than we have seen recently.

One would have to conclude from these results that through early 2003 we were not experiencing a very high incidence of magnetic disturbances, at least in historic terms. It is true that the frequency of high *K* readings during the third 12-month period of Cycle 23 decline was twice as great as it was during the second period, a relative increase not matched in any of the four previous cycles. (The absolute increase in frequency of 12.4% was slightly exceeded during Cycle 21.) Still, the 25% frequency of $K = 4$ or greater cannot be said to be unusual given the data from the other sunspot cycles. It is, however, much higher than we saw during the prior 24 months, so that the perception that conditions have become much worse is borne out by the facts.

It bears repeating that in every one of the five sunspot cycles, the frequency of high *K* readings has been higher in the third 12-month period following the sunspot peak than in the prior two periods. It is also interesting that in each of the four previous cycles, the frequency of high *K* readings has fallen from the third to the fourth 12-month period following the sunspot peak and has increased again during the fifth period. In two of the four prior cycles, the frequency of high *K* readings during the fifth period exceeded the frequency during the third period, and on two occasions it did not.

The incidence of $K = 5$ or higher during the five periods of the five cycles was also examined. It showed that the frequency of very disturbed conditions, with $K = 5$ or more, has been lower during the first three periods of the Cycle 23 decline than in three of the four other cycles. Cycle 20, the least intense of the five cycles, had a lower frequency of such disturbances. Thus, for the first 36 months following the sunspot peak we saw relatively undisturbed conditions. During the third 12-month period specifically, we can say that magnetic conditions were somewhat disturbed but not seriously disturbed compared to conditions during recent sunspot cycles.

More Recent Developments

Now for a big surprise: The most recent data show that the magnetic field became unusually active during the remainder of 2003. You will be reading this article nearly four years after the Cycle 23 peak of April 2000. We don't yet have data for the full fourth year following the peak, but some conclusions still can be made:

The first seven months of the fourth year following the peak were the months of May through November 2003. A comparison of the behavior of the *K*-index during the similar period of Cycles 19–23 is in Table II.

What a change for the current cycle! The table shows that magnetic conditions were far more disturbed recently than in comparable periods during the last four sunspot cycles. The incidence of high *K* readings was roughly twice as high as it was during the last four cycles. The *K*-index was 4 or higher nearly 40% of the time during the latest seven-month period, and half that time it was at least 5. These results point to poor DX conditions for significant periods of time, and sharply contrast with the comparisons shown earlier.

Propagation conditions were still good during periods of relatively quiet magnetic activity. The difficulty is that those periods have been less frequent recently than would be expected from the experience of the sunspot cycles of the last 40–50 years. That's quite a significant finding. We still don't know why

One Possible Explanation: Cracks in the Magnetosphere

NASA reported in early December that new satellite images show that immense cracks sometimes develop in the Earth's magnetosphere, the outer portion of our magnetic field that generally protects us from the effects of solar storms. According to NASA, these cracks can be huge—one observed was the size of California—and can remain open for hours, allowing the solar wind to blow in and touch off auroras and geomagnetic storms. The lead researcher on the project compared the cracks to a window in a house, stuck open during a storm. "The house deflects most of the storm," he said, "but the couch is ruined."

For more information, see this month's "Propagation" column by Tomas Hood, NW7US. —*W2VU*

the sun has been behaving differently in recent months than at the same point in previous sunspot cycles. However, a variety of new satellites is allowing more intensive study of the sun than ever before, so we might begin to see some answers in the not-too-distant future. (*See sidebar, "One Possible Explanation"—ed.*)

A Look to the Future

The analysis in this article has covered the behavior of the *K*-index during the first five years of declining solar activity following the sunspot peak. How often during the course of a full sunspot cycle should we expect to encounter very disturbed geomagnetic conditions? Table III shows the National Oceanographic and Aeronautical Administration's (NOAA's) expectations for the *K*-index over the course of an 11-year solar cycle.

The table can be read to say that on 900 days during the course of an 11-year solar cycle we can expect at least one *K* reading of 5. On those days, the average number of *K* readings of 5 will be 1700/900 = 1.89. The bottom line is that about one in 12 *K* readings over the course of a full sunspot cycle will indicate seriously disturbed conditions. As noted above, a higher frequency will occur during some parts of the sunspot cycle and during some months of the year. Unfortunately, the expected frequency of $K = 4$ is not included in the NOAA figures, although it could be derived from detailed historical data.

What can we look forward to as Cycle 23 declines toward its trough? If the current cycle had exhibited changes in magnetic behavior similar to the four previous ones, we would have seen a drop in the frequency of disturbed conditions during most of 2003. The data shown above, however, indicate that magnetic conditions have been more disturbed than would have been expected. The fall in magnetic activity that normally occurs during the fourth year after a sunspot peak, 2003 in this case, did not take place. Maybe we will see that decline in 2004 instead. Let's hope so! We all want a return to more normal conditions.

I hope that this short analysis has sparked some interest in the *K*- and *A*-indices and in their cyclical behavior. This article examines only five years out of the 11-year sunspot cycle. As we approach the bottom of Cycle 23, projected to occur sometime during 2006 or 2007, an analysis of the trough and the climb to the peak would be interesting.

When you think the bands sound strange, watch the *K*-index. One simple number can tell you a lot. ■

Resources

There are many websites that contain useful information about the earth's magnetic activity. The following are some of the sites used to gather information for this article.

<http://sidc.oma.be> Royal Observatory of Belgium Sunspot Index World Data Center

<http://www.sec.noaa.gov> NOAA's Space Environment Center

<http://hfradio.org> *CQ* Propagation Editor NW7US's website

<http://www.cetp.ipsl.fr/welcomeA.html> French Center for the Study of Earth and Planets' Environments (English page; for French, leave off everything after .fr in the address)

<http://dx.qsl.net> (Note: No "www" in address) QSL.net's DXing page. Link from there to propagation page

<http://www.gfz-potsdam.de/pb2/pb23/GeoMag/niemgk/kp_index/> German Earth Science research site; this page (in English) is on Indices of Global Geomagnetic Activity.

our readers say

The Code Requirement

Editor, *CQ*:

Great, I am all for the no code test. To me it is very simple: If you don't pass a code test you cannot operate in the CW portion of the band. Amateur Extra Class, great, operate all the phone bands A through Z. However if you don't pass a code test *you cannot operate any digital mode in the CW portion of the band.*

Now, for all the operators who passed the code in the past, they may operate in the CW portion of the band be it Tech, General, Advanced, or even Extra. Hi!

To me it is very simple. Why make it harder than what it really is!

Leo Casey, K8HZK
South Lyon, MI

Will CW Survive and Flourish?

Editor, *CQ*:

I was filling out the survey on CW in the November issue when I came to the last question: "Would you have learned Morse Code if it had not been a license requirement?" For me, the real question is the reverse: "Would I be in ham radio without CW?" That answer is "No." The basis for my answer is the same reason CW will survive without a licensing requirement.

Will CW survive and flourish? You bet! In fact, I believe CW will be more popular than phone. Judging from band activity, it may be already. I often hear more signals in the tiny CW sub-band than in the entire phone portion. Almost two thirds of those who answered an eHam poll last year said CW was their primary mode.

Why is CW so popular? Because CW is a challenge and a skill with a unique and exclusive imagination-working magic. CW is unlike any other mode. It is our own secret code. When I tune across the CW spectrum, I hear the world. It speaks a language I understand and it understands me. I travel to exotic lands, listening and wondering what I might suddenly discover. I experience the thrill of the hunt. I build my own radio, fulfilling my need to tinker. Pipsqueak stations can communicate over thousands of miles. I am challenged with copying weak signals or keeping up with someone who is just a little too fast.

I don't worry about foreign languages, dialects, politics, or prejudice. The various fists and styles are the personality of the operator. I have learned to hear the difference between a straight key, bug, and keyer. Sometimes I can identify the rig or the country of origin by the sound alone. The warm tones of the signal mix with the buzz warble and crackle of the noise. I have no doubt I am listening to a vapor that passed magically through the ether from places near and far.

CW will flourish as long as there is ham radio, because CW has a unique magic. That magic can't be duplicated by the internet or any other mode. That is why I would not be in ham radio without CW.

Buck, K4IA
Fredericksburg, VA

Radio Classics

Editor, *CQ*:

Took *CQ* up on an offer early this year and just renewed. Enjoyed getting each one. I especially enjoyed a couple of Joe Veras, N4QB's *(now K9OCO)* columns. I didn't realize my comments e-mailed to him about the October column would join others in this month's issue (December '03) until he told me so some weeks ago....

Keep up the good work. You have helped make my enjoyment of the hobby all the greater.

Larry Kozal, K8PUJ
Grand Rapids, MI

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SS-18	15	18	1⅛ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3¼ x 7 x 9⅝	5.0

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MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

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

WITH SEPARATE VOLT & AMP METERS

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

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

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

WITH SEPARATE VOLT & AMP METERS

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

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

EF JOHNSON AVENGER GX-MC41
EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

NEW SWITCHING MODELS

SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
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

CIRCLE 134 ON READER SERVICE CARD

*ICS – Intermittent Communication Service

Market Survey

Here is the latest installment in our annual series of market surveys. This year "Gordo" explains the most important specifications and offers tips you won't find on a radio's "spec" sheet.

VHF/UHF FM Mobile Transceivers

BY GORDON WEST,* WB6NOA

A few years ago, when the major ham radio manufacturers came out with mobile HF radios that *included* VHF and UHF operation, many ham radio dealers became concerned that dedicated VHF/UHF mobile radios might lose their sales appeal. Four years later, however, dedicated mobile VHF/UHF transceivers are continuing to sell well. The reasons are quite clear: Many small-vehicle mobile radio operators are completely satisfied with their VHF/UHF radio opportunities and have little interest in working HF when driving in heavy traffic; some don't want to put HF antennas on their cars; and others don't have the budget for the more expensive "do-it-all" radios.

Even many HF mobile operators in mid-sized vehicles and motorhomes use their multi-mode "DC to daylight" rigs almost exclusively on HF, while simultaneously monitoring a single-band or dual-band, 50-watt, VHF/UHF mobile to listen in on the "locals." Another strong point for a single- or dual-band mobile *beyond* the compact HF mobile that does everything is the additional features that *only* the modern mobile VHF/UHF rig might offer, such as:

- Multiple scanning configurations
- Automatic search-and-load of local repeaters
- Built-in TNC for APRS
- Up to 200 memory channels
- Split CTCSS/DCS capabilities
- Weather-channel weather-alert mode
- Memory channel lockouts

You get the idea. . . . There is still much merit in the dedicated single-band, dual-band, and multiple-band VHF/UHF mobile radio that might sell for a couple hundred bucks versus "one radio for all" rigs seen selling for around $800 and higher.

WB6NOA has more radios in the center console of his van than many of us have in our whole shacks!

Spec the Spec Sheets

This year we offer two full pages of mobile VHF/UHF specifications (see pages 27 and 28). We have included over 35 topics to help you make an informed decision about which mobile radio may be in your future. However, as you will soon read, purchasing equipment by specifications alone is *never* advised. We strongly encourage you to travel to a local radio dealer to check out the equipment turned on and tuned in with an active antenna. As an alternate idea, go to your local ham radio club and encourage having a "show and tell" meeting out in the parking lot where each club member may talk about five likes and five dislikes of his or her mobile VHF/UHF transceivers.

You also will see that we specifically omitted certain specifications that might only be appreciated on a service monitor, such as IF rejection, image rejection, selectivity, sensitivity, spurious radiation, and modulation type. Some mobile VHF/UHF radios may look great on paper, but when driven downtown or to a hilltop full of antennas, they saturate terribly with intermodulation. Also, because intermod is dependent on

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The Ranger RCI-5054DX is a single-band 6-meter FM mobile rig, one of very few such radios on the market today. (Individual radio photographs courtesy of their respective manufacturers)

what specific frequencies and power levels are in use in a downtown area, there is no easy spec that might say which radio will work great and which one won't when used near strong out-of-band signals. Here, *local knowledge* at your club meeting will be much more useful than going by the spec sheet. Each city has its own unique mix of high-powered commercial and ham repeater stations which can mix together and cause certain specific radio models to growl and howl downtown, while other brands—possibly far less expensive— hear only what they are intended to receive on the 2-meter or 440 ham band.

Big Fingers?

No specification is going to show you knob size, but some of our photos this month will give you a feel for the size of the push-buttons and knobs on the face of the radio. These same photos also show off display color and display character size. Nothing in the specs might prepare you for the *big* differences in LCD readability.

Got Audio?

We noticed that most spec sheets indeed specify mobile radio audio output, but in actual use each radio has a classic audio output distinction that might only be appreciated (or not) by the mobile radio operator driving down the expressway in a new yellow T-bird with the top down (or not).

Therefore, let's take a look at some of those specifications we list on pages 27 and 28 and do a little reading behind the lines!

Bands

Here in our first listed specification we continue to disagree with manufacturers over semantics. The wording *dual bander*, in our view, should truly mean a mobile radio capable of hearing and displaying both bands *simultaneously*. If the VHF/UHF transceiver toggles between two different bands, manufacturers might call them *2 band*. If the radio *simultaneously* displays and receives three bands, indeed call it a *tri-bander*. For that four-band mobile radio, I might call it *4 band* with dual-band receive-and-display capabilities. The number of simultaneously running bands is particularly important for emergency communicators.

Single-, dual-, and triple-, and 4-band VHF/UHF mobile radios may likely tune out of band, too (receive only, of course). Our specification calls out whether they tune in AM aeronautical reception, plus extended receive on 200 and 300 MHz, which is a new capability on some recently introduced equipment. This makes these radios ideal at military airshows, where there is heavy use of 300 MHz. Some equipment also may tune 800 and 900 MHz (cellular blocked). There are still many municipalities running on 800 and 900 MHz without digital encryption. Same thing with extended 440-MHz reception into the 460-MHz public-safety frequencies. Check out the spec sheet.

Power Output

For the 2-meter band, 50 watts is nominal and anything more is hardly ever realized by receiving stations. For the other operator to clearly hear a substantial increase in power output, you would need to quadruple output power, rather than add 10 or 20 more watts above 50 watts. You really should tune into each manufacturer's product specification sheet and see how many *reductions* in power level you might dial up when working local repeaters or in the cross-band mode.

Memories and Alphas

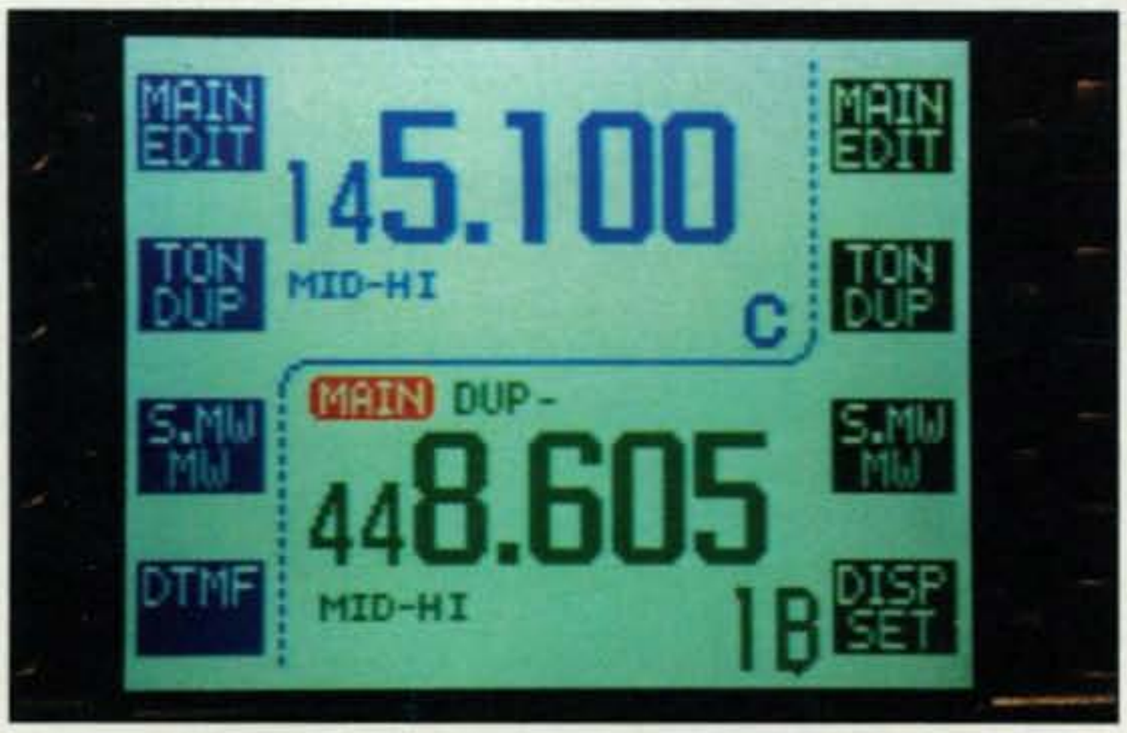
One-hundred and more memory channels have recently become the benchmark of new VHF/UHF mobile radios. Even with just 40 channels of memory, you may have more numbers than your brain can remember. This is where an alphanumeric display can really help. Even if you're good at remembering local repeaters by their frequency, a trip across several states may quickly reveal multiple repeaters on the same frequencies but with different tones, and here is another great example of why alphanumerics are important in naming your channels.

However, what they don't tell you in the book is the agonizing alpha input procedure if you're just trying to do it off the front panel or the remote mic. Here is where one of the specs near the bottom of the spec sheet takes on huge importance—whether the equipment is clonable or software addressable. Your local radio club may have a monthly meeting time when a master radio is brought into the room, specifically for member cloning, or maybe your radio officer brings in the laptop with multiple programs for a quick memory write, including all of the alphas. I continue to be completely perplexed as to why the typical local ham radio dealer with a storefront doesn't take more advantage of software programming by "pre-loading" a radio's memories. If ever they wanted an inexpensive edge over mail-order competition, that storefront dealer would offer new equipment programming of all of the hot frequencies in the area for a nominal charge or maybe for no charge, as an incentive to buy the equipment right at the store—rather than using the store as a showroom for a catalog company selling the equipment by mail without tax. *Dealers:* Beat your competition with some simple cloning and programming at the time of sale!

LCD Color

Most VHF/UHF mobiles use an amber or yellow background with black numbers as their LCD display. However, look at the photos; some displays feature big, black, bold numbers, yet other displays seem thin and not as easily seen at a glance when zipping down the highway. Keep in mind that driving safety is your most important consideration as you play ham radio behind the wheel.

Some LCD backgrounds may also be shifted to a light green for nighttime operation; this is good. Some displays may be electronically reversed, blue on white, and white on blue. Some viewers swear by this type of display, yet others may swear *at* it in direct sunlight.



Color LCD displays look cool, but the most important consideration for mobile use is clarity and ease of viewing.

Manufacturers continue to dazzle us with color LCD displays that are absolutely gorgeous at night, but may be difficult to read in bright sunlight. I enjoy my ICOM IC-2800 full-color LCD display, but this unit is no longer in ICOM's line, because, I am told, their exquisite display panels were no longer available. I also recently discovered this same display as an emitter of microwatt hash that sometimes blanked out weak signals to *any* radio within 10 feet of that display.

Head Separation

This may cost you a little bit more, but a separate head that sits on the top of your dashboard is a huge mobile safety step. Any time you look down low to spot what frequency you are on, your eyes are obviously off the road and you are probably more dangerous than someone yakking on a cell phone. Half the mobile installations I see are outright dangerous. Get your separated head display up high and viewable at dash level. Keep it safely away from any air-bag deployment system. Also, if you live in a hot climate, you may need to add some tinfoil over the display to keep the display from baking and ultimately turning dark in color as the inside element heats up.

Band Scope

Manufacturers must have received word from most hams that this is an almost useless feature. In most scope modes the receiver goes dead, and it's downright unsafe to be watching the blips on the horizontal axis as you're driving down the road. One form of band search, though, *does* make great sense. Yaesu calls it "Smart Search," and a special bank of up to 31 memories will self-load with active frequencies during a sweep of the band. You may still need to do some fussing with splits and tones, but it *is* a great way to find VHF/UHF activity when driving in an area of unknown repeater frequencies. This feature is found on all of Yaesu's new FM mobile rigs.

Tone

The modern VHF/UHF transceiver almost certainly will come with *both* CTCSS encode and decode, and hopefully also will be capable of digital coded squelch (DCS). During my last trip to Texas, I quickly learned that DCS is extremely popular there. DTMF tone memories are handy if you do a lot of autopatching, but now that cell phoning is so common, few hams these days are actively calling home via autopatch. However, DTMF tones are also used for a variety of control functions, such as bringing up other repeaters on linked systems, whether via RF or the internet (using systems such as IRLP, EchoLink, etc.)

Auto Repeater Shift

This is another great feature for the new ham (*a lot of us old-timers love it, too —ed.*), especially when local band plans may include a repeater pair on, let's say, 146.895. Is it a plus or minus offset? Or what about the new ham switching to 146.520 or 446.000 and forgetting that he or she left the negative offset still turned on? *Every* new VHF/UHF mobile radio should have automatic repeater offset, plus a *simple* automatic offset "seek and store" tone feature to briefly monitor the input, without operator intervention, to set the correct encode tone. Again, we are talking about ultra-automatic functions to add safety for those of us whizzing down the expressway, frantically trying to get in on a conversation when we know the offset but want a hassle-free way of getting the right tone onto our transmit signal.

Attenuator

I like a squelch circuit that is menu-driven to also include attentuation beyond squelch silence. This might help block more distant repeaters from breaking squelch, and might help minimize receiver intermodulation in downtown areas. New ICOM mobiles come with a *variable* attenuator, which I liked very much in the tests.

Mr. Microphone

Give me a microphone with direct frequency input, and let's make sure the microphone is back-lit for driving safety. Make sure that mic cord is well-shielded, too. There is nothing worse than stepping outside of your vehicle and grabbing the mic for a transmission, only to find out you jump bands and pop out of memory. The RF from your antenna gets into the mic cord, and the radio quickly finds a completely new band and frequency. This is why you'll find ferrite choke clamps on the cables of some mobile microphones.

Data Capabilities

If you are into your laptop, you would most certainly want a radio that is packet compatible. One of the most popular packet uses today is the Automatic Position Reporting System, or APRS. Many of this year's VHF/UHF radios have capabilities for 1200 bps packet; however, all but one unit require an optional internal (Alinco) or external terminal node controller (TNC). Kenwood builds a TNC into its popular TM-D700. What surprises me, though, is that they haven't offered a magnetic GPS antenna/receiver unit that could easily be sold below $100 as an accessory. In fact, now that GPS engines are built in a chip set small enough to fit into a cell phone, I continue to be baffled as to why we don't see equipment such as the Kenwood D7 handheld or the TM-D700 incorporate GPS within the radio itself to go along with their excellent built-in APRS packet controller capabilities! (Kenwood does deserve big credit, though, for putting most of its instruction manuals—including detailed technical notes—online for easy review and download.)

Software Programming and Cloning

This is another should-have feature in the modern VHF/UHF mobile transceiver. Again I look at the cellular phone equipment and see a simple chip set for cloning as well as user

cloning of specific ring options. We surely should have some of the same "bells and whistles" in the new line-up of amateur radio VHF and UHF equipment.

Soon we may see repeaters go to the more narrow 2.5-kHz shift, and this will open up additional 2-meter repeater and simplex channels that will make cloning and computer programming a real delight when getting that first radio set up to work at its fullest in a specific geographic area.

Cross-Band Repeat

This feature is now found in most dual-band transceivers with simultaneous band reception, as the name implies. The circuitry for cross-band repeat may cost manufacturers only pennies more to buy, and cross-band repeat now has generally been accepted as a benefit to emergency communicators even though FCC rules require a control operator at the cross-band set and ID on the "return" leg. This technology makes better use of our frequencies, and it also promotes good usage of frequencies at dramatically reduced power levels when your mobile is operating in the cross-band remote configuration. It was disappointing to see all the legal flap about Kenwood "Sky Command," which was an ingenious way of linking VHF and UHF to high-frequency operation. We're still waiting for a dual-band manufacturer to include a simple programmable CW or packet-burst identifier on cross-band transmissions.

Simultaneous reception on VV/UU is another good option to consider with dual-band equipment. When I'm out in rural regions, one side of my radio will monitor 146.520 mobile, the national simplex calling frequency, and the other side of the radio scans the 2-meter band for repeater and additional simplex activity.

New for 2004

Manufacturers continue to deliver us incredible radios at competitive ham radio prices. Similar radios in the land-mobile market cost nearly twice as much!

Alinco added more channels and alphanumerics, plus all of the different tone squelch capabilities to the new DR-620T. The ICOM IC-208H has up to 55 watts of power on VHF, and an amazing 50 watts of output power on UHF. Yaesu's FT-2800 adds weather-alert features, plus 65 watts of power, and ups the memory channel capabilities on this 2-meter single-band radio to 221.

A new, most-unique digital transceiver is the ICOM ID-1. I recently tested one on my 1282.4-MHz ICOM analog repeater, and it sounds like any great FM mobile. However, besides FM, it is also capable of GMSK digital modulation formats. The digital side of this equipment could support a 10 BASE-T ethernet for 128K data operation. This equipment is part of their "D-Star" open-protocol TCP/IP structure. For high-speed data applications, the 10-GHz band for ham radio point-to-point communications would tie in nicely with the 1.2-GHz mobile ICOM transceiver.

ICOM has also introduced its new V8000 with about the highest power output available on 2 meters without an external amplifier—75 watts! The V8000 has the look of ICOM's professional land-mobile radios and is a single-band, 2-meter mobile with 200 alphanumeric memories, an optional DTMF decoder, the new FM narrow-mode switch capabilities, and the very popular HM133 remote-control mic that has now become one of the favorite microphones of mobile ham operators. This same microphone is also part of the new ICOM IC-2720 dual-band transceiver which we have tested extensively in our classes as well as in the communications van.

The brand-new rig from Kenwood for 2004 is the TM-271A,

The new FT-2800M from Yaesu features 221 memories, weather alert, and 65 watts out on 2 meters.

which also looks like it came out of the Kenwood professional land-mobile mold. The 271A will hold 200 memory channels, but only 100 when used with alphanumerics. It, too, has the new switchable wide/narrow deviation capabilities, and like many Kenwood products, a memory control program is available free for downloading from the Kenwood website for clubs and radio dealers to do a fast upload of popular local channels. Finally, the rig's audio output will nearly blast you out of the driver's seat!

Yaesu USA (Vertex Standard) has just released its two-band FT-7800R (which it calls dual-band), capable of one band at a time for "back to basics" one-touch operation mobile with wide receiver coverage. The receiver goes well beyond the 2-meter and 440 ham bands, including AM aircraft reception, NOAA weather with weather alert, and a whopping 1000 memory channels with alphanumeric labels that may be broken up into 20 memory groups.

However, one of the hot capabilities of many Yaesu mobile radios is their WIRES™ internet linking compatibility. A push of the Atomic Energy Commission-looking logo button allows DTMF signaling capability to provide easy access to Yaesu's wide-coverage internet repeater enhancement system for internet linking nodes, as well as other linking systems that require a DTMF string for access. The 1000 memory channels with 20 memory groups will make this two-band radio a popular one among avid radio scanner hams, because it also includes full receive capabilities from 108 MHz through 520 MHz, plus 700 MHz through 999.99 MHz, minus cellular, of course.

Yaesu also introduces the FT-8800, a true dual-band mobile with simultaneous dual-band receive capabilities for independent two-channel operation. The head may be remotely mounted, and this unit also boasts 1000 memory channels broken up into 512 regular memories for each band. Yaesu also introduces "Smart Search"™ to load automatically up to 25 memories of channel activity in the scan mode. The circuit will sweep the band, looking for channels on which activity is found, and will load these busy channels into special "soft" memories.

For those of you who like scanning, the new 8800 from Yaesu covers 108 MHz through 520 MHz, and 700 through 999.995 MHz, cellular blocked.

Most interesting, though, is the relatively new Yaesu FT-8900 four-band mobile radio, with dual-band operation. The FT-8900 offers the traditional 144/440-MHz FM mobile frequencies, but also offers 29-MHz FM and 50-MHz FM to take advantage of repeaters on those bands plus sporadic-*E* or

Alinco's new DR-620T dual-bander features more memories than previous models, plus alphanumerics and DCS along with CTCSS tones.

F2 DX. With 50 watts of output power on 10 meters, 6 meters, and 2 meters, plus 35 watts of power on the 440 MHz band, this is no QRP mobile radio!

The FT-8900 offers around 800 memory channels, allowing you to program multiple 10-meter repeater channels where you might have the same repeater pair but five or ten different tones for each repeater station throughout the country. The same thing for 6-meter FM repeaters: There are about ten popular repeater pairs across the country, and by memorizing the same frequencies with multiple tones, you are bound to get some activity when the 10-meter and 6-meter bands are open.

Which Radio is For Me?

If you are on a budget and need to stay below $199 for a brand-new mobile, there are over ten 2-meter mobile transceivers with more features than you and I probably will ever use. If all you care about is a hardworking 2-meter transceiver with out-of-band receive capabilities including weather alert, save the bucks and go single band.

If your budget will allow $200–$300, go dual band on 2 meters and 440 MHz. The 440-MHz band is the second most-popular band for FM mobile beyond single-band, 2-meter operation. More and more new 440-MHz repeaters are popping up on the air as the 2-meter band becomes saturated, and you might be surprised at how well 440 repeaters work in downtown areas . . . often better than conventional 2-meter repeaters. There's also considerably less intermod on the 440-MHz band, and dual-band, 2-meter/440-MHz antennas are ultra-common.

The 440-MHz band also leads you to those repeater groups that may offer more than just repeater relay on a hill. IRLP, EchoLink, WIRES, IP, and many other popular internet linking modes may be available on the 440-MHz band, but not necessarily on 2 meters.

Spending a little more for a dual-band transceiver also gives you capabilities of cross-band repeat. This way you can go into the office with a little tiny 440 HT and still have a booming signal through your local 2-meter repeater! (*But to keep the FCC happy, you'd better be able to get to your car within three minutes to shut down the rig if it gets stuck in transmit; and to keep your car happy, be careful not to run down your battery by using high power while the car is parked.—ed.*) If you're not interested in hearing both bands at the same time, get a two-bander for uncomplicated operation. Many times I prefer to operate one band at a time, because there is nothing worse than zooming down the expressway and hearing a call to your station but not having a clue which band it came over, or for that matter, which of the three radios all turned on has a call holding for you. One band at a time from just one radio does the trick nicely!

For more exotic operation, you're going to go to the higher priced equipment in the $300 to $500 bracket which will probably include APRS capabilities. Alinco has a unique feature that allows you to buy into APRS gradually, and that is their optional *internal* TNC board which may be used for APRS with their single-band mobile—specifically, the DR-135T for the 2-meter band. With the Kenwood TM-D700, seen selling just below $500, the APRS is already built-in. Again, though, you will still need to get your own GPS receiver.

Installation

Now that power levels are extending beyond 50 watts output, the days of wiring to your accessory lighter receptacle are over. The wiring usually won't handle the high current. However, lately I have been seeing more new vehicles bring in a relatively hefty 10-gauge, 12-volt positive wire even with an available screw connection for adding additional 12-volt accessory equipment. Never run your mobile red lead to any vehicle wire that is the same size or smaller! Either go directly to the battery or to another red lead of a larger diameter. Always make sure there is a fuse in series located close to the positive battery terminal.

The ICOM IC-V8000 puts out a whopping 75 watts on 2 meters and includes an option for switching to the new (for hams) narrow FM mode.

Kenwood's new TM-271A offers switchable wide/narrow FM deviation and has up to 200 memories (alphanumeric tags each take up one additional memory channel).

FM Mobile Transceivers

	ADI AR-147+	ADI AR-447	ADI AR-247	Alinco DR-235T	Alinco DR-435T	Alinco DR135T MKII	Alinco DR-M06	Alinco DR-605TQ	Alinco DR-620T	ICOM IC-2100H	ICOM IC-208H	ICOM ID-1	ICOM V8000	ICOM IC-2720	Kenwood TM-261
No. of Bands	single	single	single	single	single	single	single	dual	dual	single	2	single	single	dual	single
Freq. Coverage	2m	440	220	220	450	2m	6m	2m/440	2m/440	2m	2m/440	1.2GHz	2m	2m/440	2m
6 m	—	—	—	—	—	—	TX/RX*	—	—	—	—	—	—	—	—
Air	RX	—	—	—	—	RX	—	No	RX	No	RX	—	No	RX	RX
2m	TX/RX	—	—	—	—	TX/RX	—	TX/RX	TX/RX	TX/RX	TX/RX	—	TX/RX	TX/RX	TX/RX
148–174 MHz	RX	—	—	—	—	RX	—	RX	RX	RX	RX	—	136+WX alert	Yes+WX alrt	RX
220 MHz	—	—	TX/RX	TX/RX	—	—	—	—	—	—	—	—	No	RX	—
440 MHz	—	TX/RX	—	—	TX/RX	—	—	TX/RX	TX/RX	—	TX/RX	—	No	TX/RX	—
450–470 MHz	—	1/2	—	—	RX	—	—	RX	RX	—	RX	—	No	RX	—
800–900 MHz	—	—	—	—	—	—	—	—	—	—	RX	—	No	RX	—
1270 cm	—	—	—	—	—	—	—	—	—	—	—	TX/RX,ana/dig	No	No	—
Power Out	60	35	30	35	35	50	20	50V/35U	50V/35U	50	55V/45U	10	75	50V/35U	50
Display Bands	1	1	1	1	1	1	1	2	2	1	1	1	1	2	1
Memories	81	81	81	100	100	100	100	100	200	113	500	105	200	212	61
Alphanumeric	No	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
LCD Color	amber	amber	amber	red	red	amber/red	amber	amber	amber	both†	both†	computer	both†	both†	amber
Remote Head	No	No	No	No	No	No	No	No	Yes	No	Yes	Yes	No	Yes	No
Band Scope	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No
CTCSS															
encode	✓	✓	✓	Yes	✓	✓	✓	✓	Yes	✓	✓	Yes	Yes	Yes	✓
decode	✓	✓	✓	Yes	✓	✓	opt	opt	Yes	✓	✓	Yes	Yes	Yes	opt
DCS	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	No	Yes	Yes	No
Auto Repeater Shift	No	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes	Yes
Attenuator	No	No	No	No	No	No	No	No	Yes	variable	variable	Yes	variable	variable	No
DTMF Memories	9	9	9	10	10	10	—	No	5/10*	14	16	—	8	14	15
Mic Direct Freq. Input	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	—	Yes	Yes	Yes
Backlit Mic Keypad	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Packet Compatible	Yes	Yes	Yes	DB9,1200/9600	1200/9600	DB9,1200/9600	No	1200/9600	1200/9600	Yes	1200/9600	Yes	1200	1200/9600	No
APRS Ready	No	No	No	opt	opt	opt	No	No	opt	No	No	—	No	No	No
Software Programming	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Cloning	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Crossband Repeat	n/a	n/a	n/a	—	n/a	n/a	n/a	Full	Full	n/a	No	—	No	Yes	n/a
Dual In-Band RX	n/a	n/a	n/a	—	n/a	n/a	n/a	No	All	n/a	No	—	No	Yes	n/a
Built-in Duplexer	—	—	—	—	—	—	—	Yes	Yes	—	Yes	—	—	Yes	—
Size	small	small	small	small	small	small	medium	small	medium	small	small	medium	small	small	small
Weight (lbs.)	2	2	2	2	2	2	2	2	3	2	3	2	2	3	2
Lowest "Street" $$ Seen	$149	$224	$209	$249	$259	$169	$259	$339	$339	$169	$329	$1600	$199	$379	$149

* RX 47-60MHz

† Amber & Green

FM Mobile Transceivers

	Kenwood TM-G707	Kenwood TM-461	Kenwood TM-V7A	Kenwood TM-541	Kenwood TM-331	Kenwood TM-D700A	Kenwood TM-742/642	Kenwood TM-271A	MFJ 3 models	Ranger 5054DX	Yaesu FT-90R	Yaesu FT-1500	Yaesu FT-2800	Yaesu FT-7800	Yaesu FT-8800	Yaesu FT-8900
No. of Bands	2	single	dual	single	single	dual	tri	single	single	single	2	single	single	2	dual	quad
Freq. Coverage	2m/440	70cm	2m/440	1.2GHz	222MHz	2m/440	various	2m	—	6m	2m/440	2m	2m	2m/440	2m/440	29/50/2m/440
6 m	—	—	—	—	—	—	opt	—	9406	TX/RX	—	—	—	—	—	TX/RX
Air	RX	—	RX	—	—	RX	RX	No	Mod 8621	—	RX	No	No	RX	RX	RX
2m	TX/RX	—	TX/RX	—	—	TX/RX	TX/RX	TX/RX	Mod 9402	—	TX/RX	TX/RX	TX/RX	TX/RX	TX/RX	TX/RX
148–174 MHz	RX	—	RX	—	—	RX	RX	Yes	—	—	RX	RX	RX+WX alrt	RX+WX alrt	RX	RX
220 MHz	—	—	—	—	TX/RX	RX	opt	No	—	—	RX	—	—	RX	RX	—
440 MHz	TX/RX	TX/RX	TX/RX	—	—	TX/RX	TX/RX	No	—	—	TX/RX	—	—	TX/RX	TX/RX	TX/RX
450–470 MHz	RX	RX	RX	—	—	RX	RX	No	—	—	RX	—	—	RX	RX	RX
800–900 MHz	MOD	—	—	—	—	RX	—	No	—	—	—	—	—	RX	RX	RX
1270 cm	—	—	—	TX/RX	—	RX	opt	No	—	—	—	—	—	No	No	No
Power Out	50V/35U	35	50V/35U	10	25	50V/35U	50V/35U	60	5 SSB	25	50V/35U	50	65	50V/40U	50V/35U	50V/35U
Display Bands	1	1	2	1	1	2	3	1	1	1	1	1	1	1	2	2
Memories	180	61	280	20	20	200	300	200	0	20	180	149	221	1000	1000	800
Alphanumeric	Yes	Yes	Yes	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
LCD Color	amber	amber	blue	amber	amber	amber	amber	green	dial	amber	blue	blue	orange	orange**	orange**	orange**
Remote Head	Yes	No	Yes	No	No	Yes	Yes x2	No	No	No	Yes	No	No	Yes	Yes	Yes
Band Scope	No	No	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No	No
CTCSS																
encode	✓	✓	✓	✓	✓	✓	✓	Yes	No	Yes	✓	✓	Yes	Yes	Yes	Yes
decode	✓	opt	✓	opt	opt	✓	opt	Yes	No	Yes	✓	✓	Yes	Yes	Yes	Yes
DCS	No	No	No	No	No	Yes	No	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes
Auto Repeater Shift	✓	Yes	Yes 2m	No	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Attenuator	No	No	No	No	No	Yes	No	No	Yes	No	No	No	No	Yes	Yes	Yes
DTMF Memories	8	15	15	—	—	10	—	12	No	—	8	8	8	16	16	16
Mic Direct Freq. Input	✓	—	Yes	—	No	Yes	Yes	Yes	No	—	Yes	Yes	Yes	Yes	Yes	Yes
Backlit Mic Keypad	Yes	Yes	Yes	Yes	No	Yes	opt	Yes	No	—	Yes	Yes	Yes	Yes	Yes	Yes
Packet Compatible	Din,1200/9600	No	1200/9600	No	No	1200/9600	No	No	opt	No	1200/9600	DB9,1200/9600	1200/9600	1200/9600	1200/9600	1200/9600
APRS Ready	Yes	No	Yes	No	No	Yes	—	No	opt	No	No	No	No	wires no	wires no	wries no
Software Programming	Yes	No	Yes	No	No	Yes	—	Yes	No	—	Yes	Yes	Yes	Yes	Yes	Yes
Cloning	Yes	No	Yes	No	No	Yes	—	Yes	No	—	Yes	Yes	Yes	Yes	Yes	Yes
Crossband Repeat	No	n/a	Full	n/a	n/a	Full	Full x3	—	No	No	No	n/a	n/a	No	Yes	Yes
Dual In-Band RX	No	n/a	All	n/a	n/a	All	No	—	—	—	No	n/a	n/a	No	Yes	Yes
Built-in Duplexer	Yes	—	Yes	—	—	Yes	No	—	No	—	Yes	—	—	Yes	Yes	Yes
Size	medium	small	medium	small	small	medium	medium	medium	small	medium	micro	vy small	small	medium	medium	medium
Weight (lbs.)	3	2	3	2	2	3	3	2.2	1	2	1	1	3	2.2	2.2	2.2
Lowest "Street" $$ Seen	$269	$439	$399	$449	$499	$519	$700	$199	$250	$300	$369	$159	$159	$279	$399	$439

* RX 47-60MHz

† Amber & green

** Omni-glow orange

For the black return lead, there is still debate over whether or not a close-by connection to the vehicle frame is the best way for connecting the negative lead to battery negative through the vehicle ground system. Audio experts tell me this is the way to minimize ground loops. However, many professional commercial two-way radio installers will always wire the black lead directly back to battery negative, not relying on the vehicle ground system. They say that ground loops could very well be noticed in high-power audio systems, but on a simple two-way radio installation, red and black wires going directly to battery positive and negative connections are the standard hook-up method. Comments?

Dual-band transceivers will need a dual-band antenna, and local radio dealers will have many varieties hanging on the wall for your inspection. During a recent dual-band mobile test out in the wilderness of Wyoming, the benefits of a higher gain and appreciably longer dual-band whip from leading manufacturers could have given us an edge in getting through to a distant repeater slightly farther out rather than a run-of-the-mill, $19.95, short, dual-band, mag-mount whip. I was surprised. I have a big Diamond and a big Comet dual-band collinear antenna setup on the comm van, and they always make me feel good when I'm reaching out to a repeater station 75 miles away. I was surprised that a tiny dual-band mag mount could still give me some decent performance, but I still want to have the maximum range, so the taller Diamond and Comet antennas will continue to be my favorites.

If you can afford it, go for the separate head and mount it up high on the dash. You will feel absolutely terrible if you accidentally tap into the person in front of you stopped at the stop sign when you are looking down changing bands. Get the display up high at eye level for safety, and again, heed the warning of air-bag manufacturers to keep the bag deployment area free from wires or other appendages.

I know your next question: Has any dual-band mobile caused an air bag to accidentally deploy on transmit? My answer is that I have *never* heard of any air-bag problems in high-power dual-band mobile operation.

Nearly all of the leading amateur radio manufacturers have recently introduced new models to their VHF/UHF mobile line, so get back down there to your local ham store and give the knobs a twist and figure out which rig is going to be best for *you*. ■

A new name in the ham radio marketplace brings with it a new choice for the growing number of hams who are including an SWR analyzer on their "must-have" accessory lists.

CQ Reviews:

Kuranishi Instruments BR-200 SWR Analyzer from NCG

BY RICK LITTLEFIELD,* K1BQT

SWR analyzers are permanent fixtures in a growing number of ham shacks, and now there's a new choice available. The Kuranishi BR-200, marketed in the U.S. by NCG (the distributor of Comet Antennas), is a "keep-it-simple" analog unit that delivers basic SWR and impedance-magnitude measurements from 1.8 to 170 MHz. Tuning is broken down into six bands, with frequency presented on a six-digit LED display positioned directly below the meter. The light-gray metal case is 3.1"W x 6.7"H x 2.4"W—a convenient size for handheld use. Power consumption is approximately 160 mA, permitting continuous use for up to 14 hours from six standard alkaline AA batteries. Weight is about 1.8 lbs. with the batteries installed. The unit also comes with a precision 50 ohm dummy load for verifying calibration, an external power plug, and a snap-on strap to prevent accidental tumbles off the tower.

First Impressions

The BR-200 is touted as a professional-grade instrument, an image that was immediately reinforced by its solid feel in the palm of my hand. I especially liked the size and readability of the large meter, the smoothness of the thumb-wheel tuning control, and the brightness of the LED frequency display—which is readable in full sunlight. Despite its professional billing, the BR-200 is extremely simple to operate. So much so, in fact, that I didn't need help from the manual to load the batteries, turn on the power, and put it through its paces. In a way, this simplicity was fortunate, because the accompanying documentation proved to be more entertaining than useful in terms of translation and technical accuracy.

Technical Check Out

Before testing antennas, I completed the recommended initial checkout using the dummy load packed with the unit. Impressively enough, the meter indicated 1:1 SWR and 50 ohms—right on the money—from 1.8 to 170 MHz. Pressing the issue further, I broke out my own set of precision loads covering a number of values between 12.5 and 200 ohms. Once again, the BR-200 performed well, nailing the anticipated SWR readings and showing only minor impedance discrepancies toward the very low end of the impedance scale and at the high end of the VHF range (very good performance for a handheld instrument).

The Kuranishi Instruments BR-200 SWR Analyzer, a "keep-it-simple" analog unit that delivers basic SWR and imped ance-magnitude measurements from 1.8 to 170 MHz.

Next, I flipped on my spectrum analyzer to check the quality of the oscillator signal. Output was exactly 0 dBm, as specified, and it varied less than 1 dB across the entire frequency span of the unit (very good, again). Harmonic suppression ranged from –20 dB to over –35 dB, which is pretty typical for an analog RF generator of this type. On a receiver, the analyzer delivered a smooth tone, much like a sine-wave-modulated FM signal generator. BR-200 ad copy claims the unit has a "no-drift" oscillator, so I checked it for stability. From a cold start, the oscillator slid down gradually in frequency for the first

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minute or two, then reversed back toward its initial setting. While not PLL-solid, the BR-200 clearly incorporates some form of temperature compensation that reduces drift. It was significantly more stable than my other analyzers.

Using the BR-200

This is the easy part! To test your favorite antenna, connect the feedline, hold the unit in your left hand, select frequency with your right, and watch the meter. That's it! The SWR/Impedance switch is mounted on the right side of the case and is perfectly positioned to toggle with your left fingertips (less user-friendly for southpaws).

Speaking of the impedance scale, this measurement is more correctly called Impedance Magnitude, a simple number that summarizes complex impedance ($Z = R \pm j$). Be aware that it's possible to read 50 ohms on the Impedance scale and still measure elevated SWR because of the reactance side of the impedance equation. Note, also, that handheld analyzers measure impedance *at the unit*, not at the antenna's feedpoint. If you want to know what's happening at the feedpoint, you'll need to connect the meter directly to it—or use an electrical half-wavelength of coax to rotate phase a full 360 degrees between meter and load. Most of the time I avoid these issues by sticking with SWR readings to tune up my antennas.

Bottom Line

The BR-200 clearly isn't the lowest cost analyzer on the market, and it lacks the added computational power offered by "digital" units. For some, I suspect the higher price and lack of advanced features may prove problematic. However, I find I rarely use these functions, especially when I'm hanging off a tower or sitting on a roof. I like the BR-200 because it's accurate, well made, and a real pleasure to operate. For me, it's not so much a matter of paying more money for fewer functions, but rather being willing to pay a little more to get a premium-quality analyzer that does exactly what I want.

The BR-200 is manufactured by Kurnanishi Instruments Limited of Japan and imported into the United States by NCG Company, 1275 N. Grove Street, Anaheim, CA 92806 (www.natcommgroup.com). List price is $429, with street prices running in the mid-$300s range from various ham radio dealers. For complete specifications and more details, you can check out the BR-200 at <http://www.cometantenna.com>. ■

Some old-timers yearn for the "good old days" of ham radio. But as W6BNB reminds us, in the words of baseball's Yogi Berra, "The good old days, they ain't what they used to be." A bit of radio history... plus the origins of things such as "E" for voltage and "I" for current in Ohm's Law.

Those (Not So) Good Old Days

BY BOB SHRADER,* W6BNB

During the 1700s and well into the early 1800s people we today would classify as "scientists" were making discoveries about magnetism and electricity. They knew that an iron-containing rock called *lodestone* could make a magnetic compass needle swing back and forth. They found that two different types of metal plates in an acidic solution acted in such a way that if a metal wire was connected between them, apparently something must be flowing through the wire, because it heated. Also, whatever was flowing in those wires must produce a magnetic effect, because while the wire was being heated a nearby compass needle would swing around.

They called their two-plate device an *electric cell* and labeled one terminal positive and the other negative. Whatever it was that moved through the wires was said to be a "current." It was found that the chemical-electrical pressure that caused current to flow in the wires could be increased by connecting two cells in series, or positive to negative, which formed a *battery* of cells. The electric moving force was known as an *electromotive force,* or an *EMF*. Apparently, there was some tie-in between electricity and magnetism!

When electrical effects began to be measured with DC meters, it was determined that if one "Volt" of force produced one "Ampere" of current through a wire, the wire must have one "Ohm" of Resistance. Thus, "Ohm's Law" could be expressed as A = V/R, or V = AR, or R = V/A. Today their V is expressed as **E** to mean Electromotive force measured in volts; **I** to mean *intensity* of flow in amperes; and **R**, *resistance* in ohms. A more modern Ohm's Law is usually expressed as I = E/R, or E= IR, or R=E/I. *(As Paul Harvey would say, now you know . . . the rest of the story!—ed.)*

When batteries were the source of electrical operation, the currents were always **D**irect, or one-way **C**urrents, or **DC**. When generators were developed, it was found that currents could be made to alternate in a circuit. In this case the voltage and current would build up to a maximum in one direction, then decrease to zero, and constantly repeat this alternating effect. This is **A**lternating

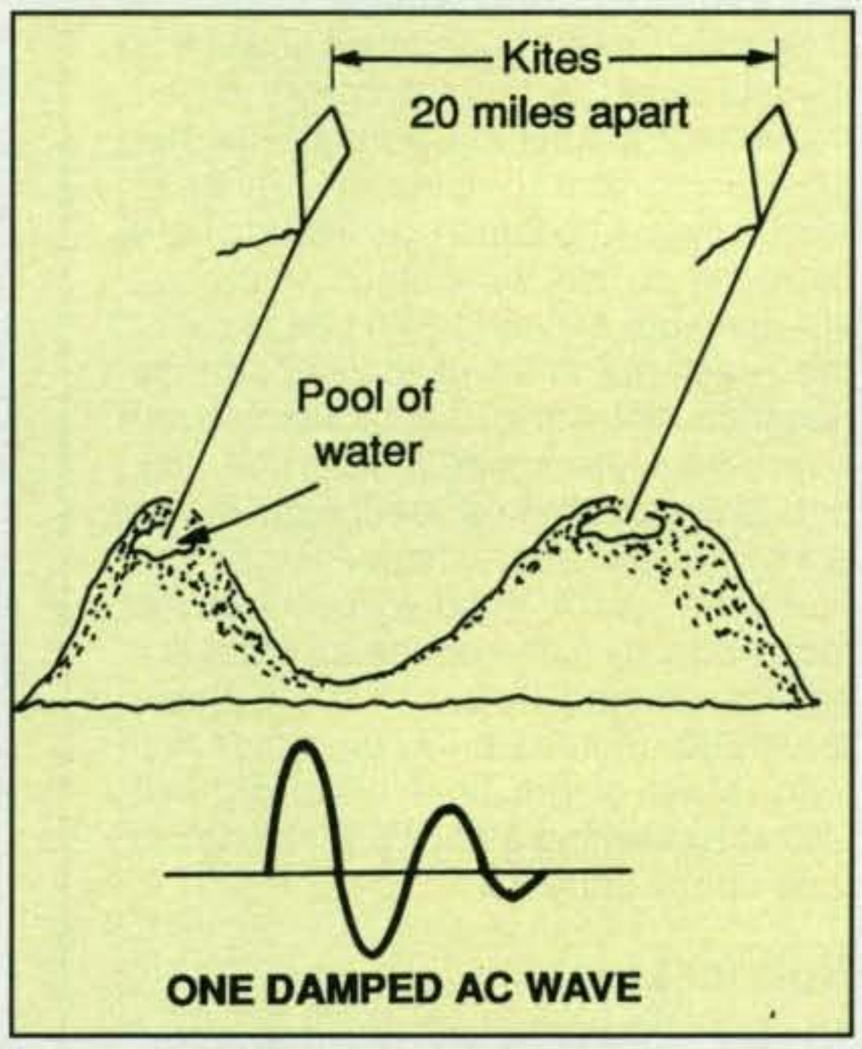
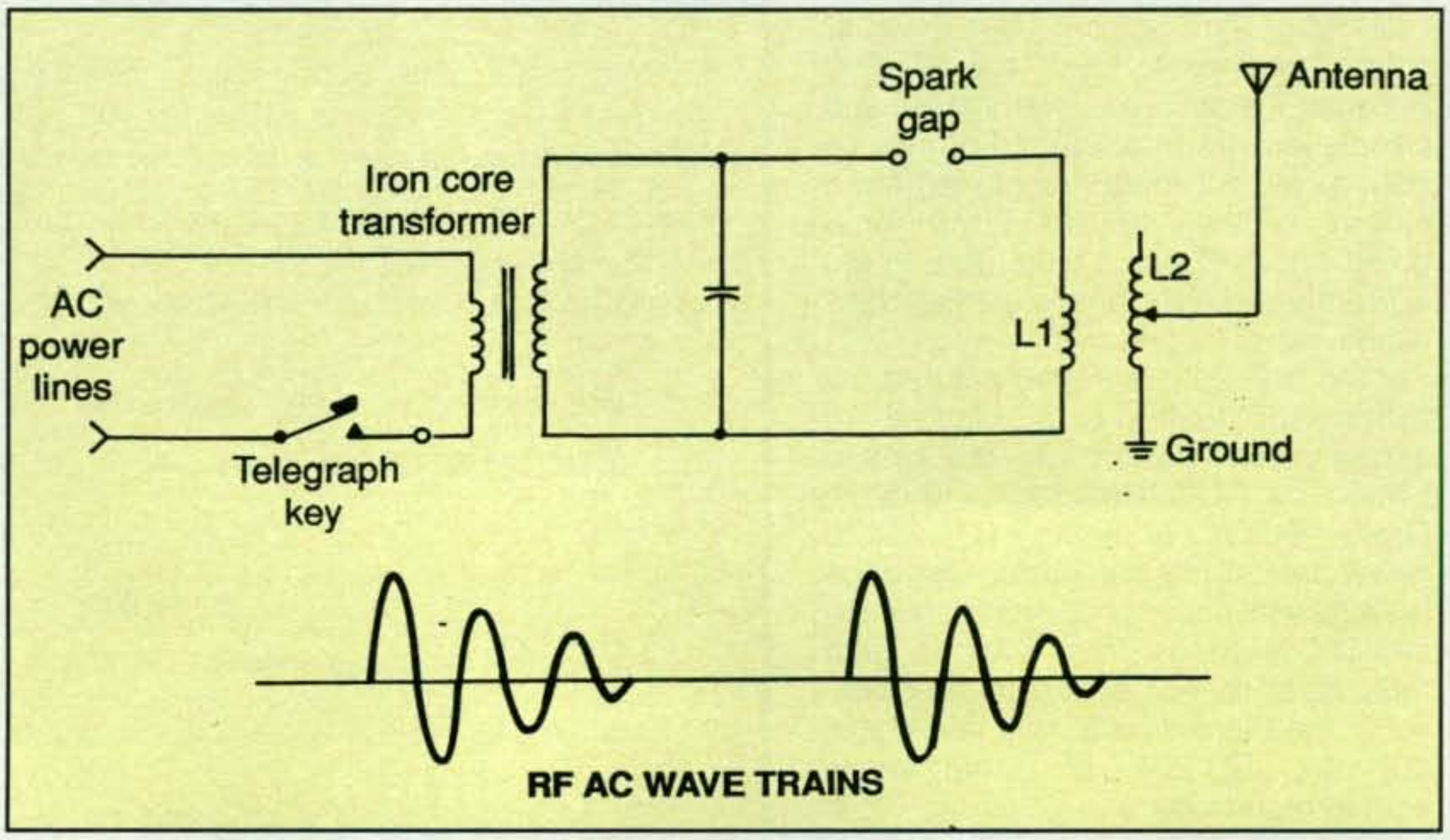


Fig. 1—Mahlon Loomis's communicating system and a damped RF wave.

Fig. 2– Basic spark transmitter circuit and two RF AC wave trains.



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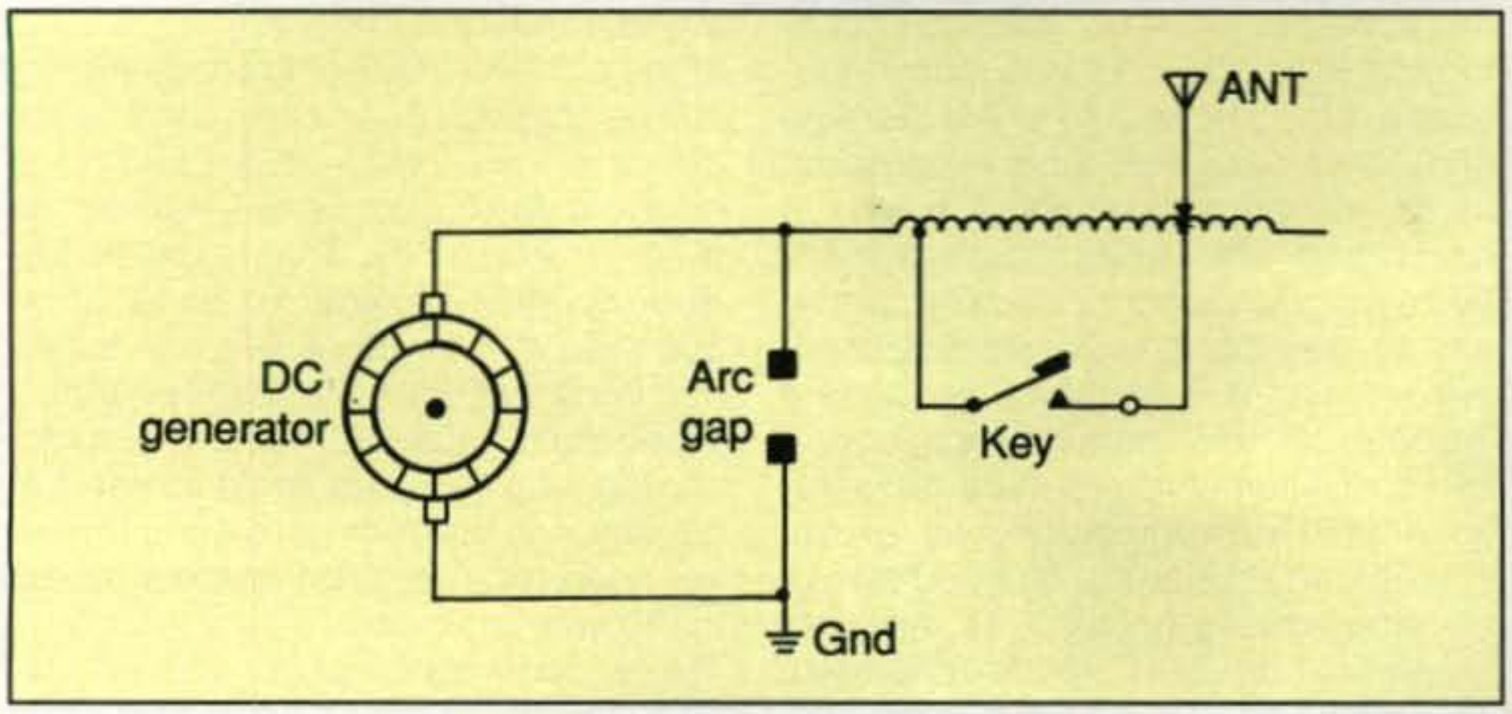

Fig. 3– Frequency-shift-keying arc transmitter circuit.

Current, or **AC**. Such AC generators are properly called *alternators.*

What formed the current in electric circuits was not known, nor was the direction of the current. It was just assumed that the current would flow out of the positive (greater?) and into the negative (lesser?) terminals of a cell or a battery. There were only two possible directions they could choose, and chance being what it is, they chose the wrong one. Later, when vacuum tubes were invented, it was found that it was negatively charged electrons being boiled off of hot filaments that were attracted to any positively charged plate in a vacuum. Thus, an electron current must flow from the negative terminal of a battery, through the tube and circuit, to the positive terminal. Many texts still consider current flow to be from positive to negative, which works out okay, because current direction has no effect on the mathematics of electrical circuits.

Our First Amateur Radio Operator?

In 1865 a dentist, Dr. Mahlon Loomis, experimented with communicating between the tops of two mountains in Virginia, 20 miles apart. He flew two kites using thin copper wires instead of strings. Although he really did not know what was happening, if the wires were disconnected from ground they would charge to hundreds of volts of **static** electricity, either positive or negative, depending on the polarity of the nearby clouds. When he **grounded** his charged wire by touching it to a coil of bare wire lying in a pool of water, it discharged the wire as a pulse of DC. This pulse produced a damped, or rapidly decreasing strength, AC oscillation in the antenna, or as he called it, the *aerial wire* (fig. 1). The current died out after a few cycles of AC at the resonant frequency of the wire's length. The AC frequency generated depended on the quarter-wavelength of the wire, the earth making up the other quarter-wavelength to make the antenna-ground circuit a half-wavelength long. If the wire was 117 ft. long—using the standard formula for a half-wavelength antenna, **length (ft.) = 468/MHz**—it resonated at 2 MHz.

The electromagnetic field caused by the damped AC developed in the first kite wire radiated outward in all directions. When some of this field hit the other similar-length kite wire, it induced a damped AC in the wire. If the receiving wire was the same length as the transmitting wire, the wires were in resonance and a maximum AC current was picked up. If the receiving wire was connected to ground through a DC galvanometer, such a DC meter would show a pulse every time the first antenna wire was grounded. The DC meter indicated only the first pulse, because the first half-cycle of the AC was much stronger than the following damped half cycles.

With a telegraph-type straight key, Loomis's pulses could also be used to activate a sensitive magnetic relay at the receiving end that would click much the same as a telegraph sounder would. Later he used some form of microphone, enabling many of his last communications to be by radio telephone! His system worked as long as there were enough clouds floating around to keep charging his kite wire with static electricity. He also communicated from a ship to a shore station a few miles away. He expected to communicate perhaps as far as from the USA to Japan some day, but he never made such a contact. Since he apparently never

made any money with his communication system, he and those working with him must have been our first amateur radio operators! (*Loomis tried to get Congress to fund his continuing experiments, but our lawmakers, in their infinite wisdom, saw no reason to waste taxpayer dollars on something of so obviously little value as wireless communication.—ed.*)

Early Transmitters

When AC alternators were developed, their voltages could be stepped up or down by using two coils of insulated wire, one wound next to the other. When an AC in the first, or **primary**, coil causes a build-up of alternating magnetic fields around itself, they expand outward and cut across the second, or **secondary**, coil, inducing an AC voltage into it. If the secondary coil has twice as many turns as the primary, such a **transformer** steps up the primary voltage to twice as much in the secondary. As the secondary coil is moved farther away from the primary, the pick-up of AC power or energy decreases. However, if the AC in the primary is powerful enough, the secondary coil can be moved quite a distance before its AC pick-up decreases to an unusable amount. By making the primary circuit an antenna wire, which is always resonant to some frequency, a resonant antenna receiving wire can be moved many miles away and still pick up usable AC energy. This is the basic idea of radio communicating.

For many years around the turn of the 20th century the only transmitter used in radio communicating was the **spark** circuit (fig. 2). If a 120 volt low-frequency (LF) power-line AC, such as 60 Hz, was fed through a key to the primary of an iron-core voltage step-up transformer, its output could be many thousands of volts. As this AC voltage peaked on each half-cycle, it caused a spark of electrons to jump across a **spark gap**. This pulse of current in L1, by transformer action, induced a current and voltage into L2, the antenna loading or tuning coil. As the LF AC current dropped off, the antenna circuit went into oscillation at its resonant radio frequency (RF) in a damped AC waveform. The antenna radiated a damped train of electromagnetic fields at its resonant frequency for every spark generated. This would be 120 wave-trains per second with 60 Hz AC. The length of the antenna wire plus the number of turns in the loading coil determined the RF that was radiated. Radio receivers turned to that frequency as far as thousands of miles away could make these signals audible in earphones.

The other early RF transmitter was the **arc set**. Again, it was the length of the antenna that determined the transmitting frequency. Arc sets depended on the negative resistance of their DC electric arc. As many of you know, any added resistance in a circuit *reduces* the current in that circuit. However, if a negative resistance is added to a circuit, it will *increase* the current in that circuit. By adding a negative-resistance arc in series with a transmitting antenna-ground circuit (fig. 3), once shock-excited into oscillation, the power of its oscillations will increase up to a maximum value at its resonant radio frequency and will radiate that RF energy. The radiated RF energy, or power, comes from the DC generator that produces the arc. Arc sets generated **continuous amplitude waves** (**CW**), not damped RF wave trains.

A CW signal by itself cannot contain any information. However, if a few turns of the antenna loading coil of an arc set can be shorted out by a key, it will cause the antenna's resonant frequency to increase and the arc set will transmit on a higher frequency. This is called **frequency-shift keying**. To transmit on 500 kHz, with the key down, the antenna circuit was tuned to this frequency. When the key opened, the antenna resonated and radiated on a lower frequency, one to which the distant receiving operator's receiver was not tuned. In this way radio code was transmitted. These code transmissions used CW emissions, and this is why radio code became known as a "CW transmission."

An arc set more often used "back shunt" keying. When the key was opened, the arc RF circuit was connected by a keying relay to a shielded resistive load tuned to some considerably lower frequency. At the same time the relay switched the antenna from the transmitter to the receiver.

Whereas spark transmitters could operate on any RF frequency, the arc only operated satisfactorily down to about 500 kHz, or "600 meters" as it was known in those days. As a result, arcs were never used by radio amateurs after amateurs were limited to the "undesirable" wavelengths of less than 200 meters—i.e., above 1.5 MHz! The broad spark emissions became illegal for amateur use in 1927.

Early Receivers

How to make received RF signals audible was a problem in the early days. Although an energized primary coil might be able to radiate an AC to secondary that was moved a short distance away and could cause a tiny spark to jump a very small gap, this could never

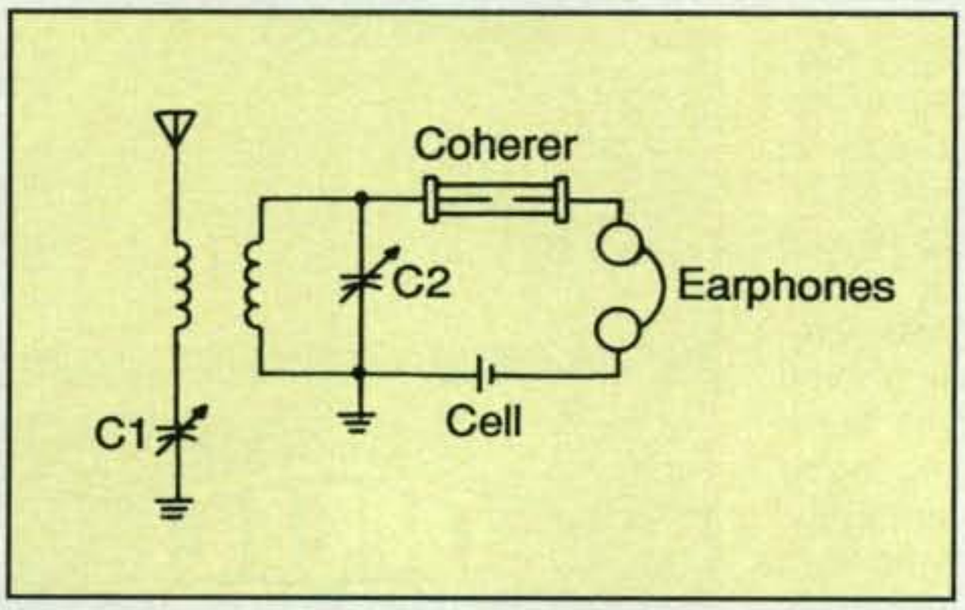

Fig. 4– Coherer detector receiver circuit.

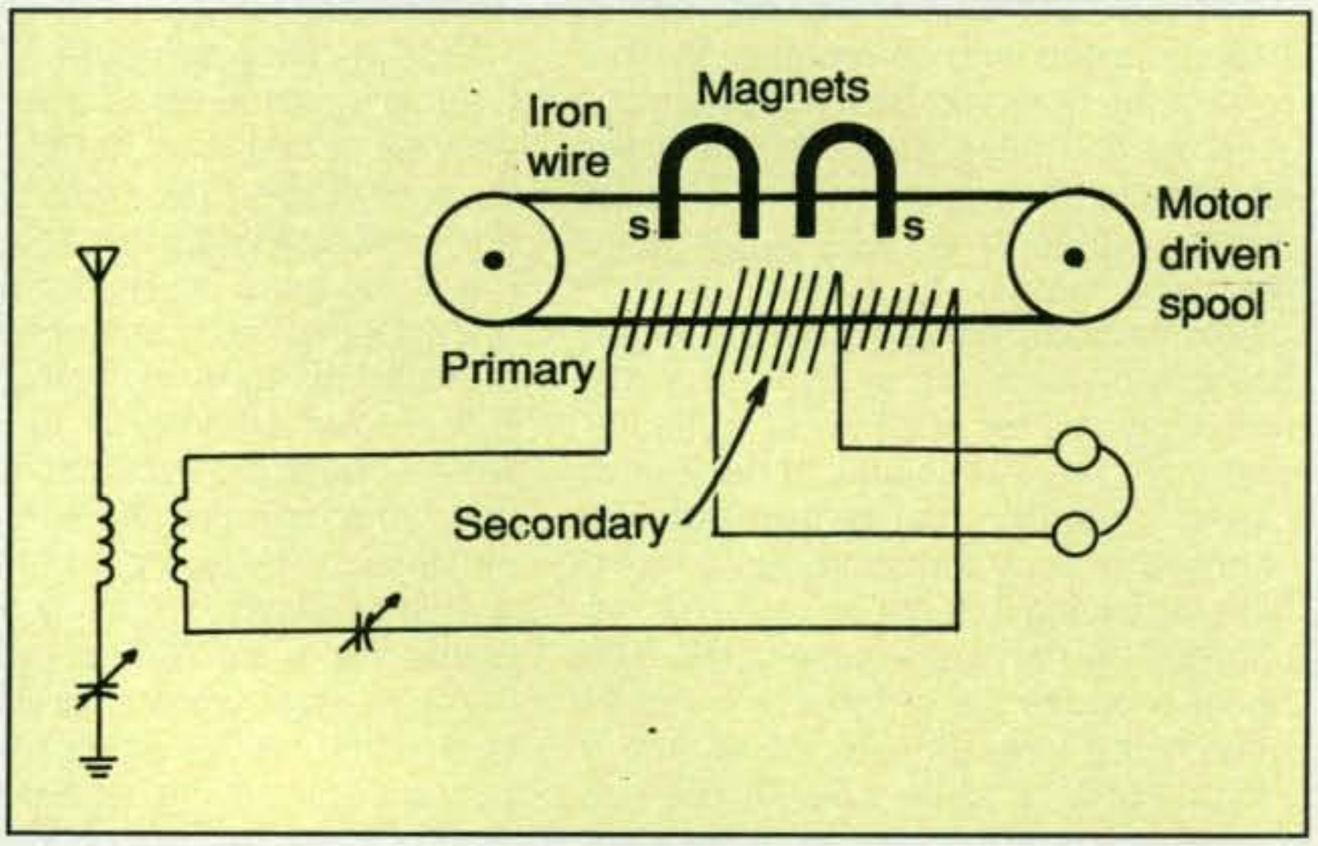

Fig. 5– Magnetic detector receiver circuit

MFJ *Apartment* Antenna

Covers 40 thru 2 Meters . . . Mounts outdoor to windows, balconies, railings . . . works great indoors mounted to desks, tables, bookshelves

MFJ-1622
$99.95
New!

New MFJ-1622 Apartment Antenna lets you operate 40 thru 10 Meters on HF and 6 and 2 Meters on VHF with a single antenna!

Its universal mount/clamp lets you easily attach it to window frames, balconies and railings. It also works great indoors mounted to a bookshelf, desk, or table. It's not a 5 element yagi, but you'll work your share of exciting DX!

Highly efficient air wound "bug catcher" loading coil and telescoping 5½ foot radiator lets you really get out! Radiator collapses to 2½ feet for easy storage and carrying.

It includes coax RF choke balun, coax feed line, counterpoise wire and safety rope. Handles 200 Watts PEP.

Operating frequency is adjusted by moving the "wander lead" on coil and adjusting counterpoise for best SWR.

MFJ Ground-Coupled Portable Antenna Base

Provides effective RF ground and stable mount for vertical antennas . . . Antennas radiate well with low SWR

MFJ-1904
$99.95
New!

MFJ *Ground-Coupled Portable Antenna Base*™ provides an *effective* RF ground 160 through 2 Meters and a stable mount for vertical antennas.

Capacitive coupling to ground is a *time-proven* principle. It needs no tuning and antenna radiates well and gives good SWR on all bands. Performance is similar to mobile stations when using a mobile antenna but is far better with longer antennas.

The base can support a lightweight multiband vertical antenna -- like the all band Hy-Gain 18AVS and the bandswitching MFJ-1795 -- and provide a semi or permanent installation.

You can easily set up and take down vertical antennas for stealth operation and hide the base by covering it with dirt.

The MFJ-1904 is a 2x2 foot *stainless steel* square with reinforcing bends that greatly strengthens it. Folded and tapered six-inch *stainless steel* legs firmly anchor the MFJ-1904 into the ground.

Built-in antenna mount with SO-239 coax connector and two U-bolts lets you mount most standard and homebrew vertical antennas.

Standard 3/8-inch x 24 mobile mount is built-in for MFJ Mobile Whips, bug catchers, *Hustlers* and screwdriver antennas.

Two handles make carrying and removing the base fast and easy. You can also attach radials for improved performance.

33 Feet Telescoping fiberglass Mast . . .

Collapses to 3.8 feet, weighs 3.3 lbs.

Super strong fiberglass mast has huge 1¾ inch bottom section. Flexes to resist breaking. Resists UV. Put up *full size* inverted Vee dipole/vertical antenna in minutes and get *full size performance!*

MFJ-1910
$79.95

MFJ Vertical

for Antenna Restricted Areas

40, 20, 15, 10 Meters, Automatic Band Switching

Perfect for permanent or portable operation in antenna restricted areas. Hide behind trees, fences, buildings, *in* bushes -- only 7 to 10 feet tall (adjustable).

MFJ-1795
$149.95
New!

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

Highly efficient end-loading. Entire length radiates.

Ground mounts with suitable ground such as MFJ-1904 *Ground-Coupled Antenna Base*, radials or ground rods. Or roof mount with radials.

HF mini-Bugcatcher

Highly efficient 40 - 6 Meter base-loaded 5½ foot Bugcatcher mobile antenna . . . Use light duty mounts

Become an *"HF Mobileer"* almost instantly with this *new* MFJ high-efficiency *mini-bugcatcher* mobile antenna! Have tons of fun rag-chewing and DXing on the HF bands. Turn boring drives into fun-filled ham adventures.

MFJ-1624
$79.95
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be satisfactory over long distances. Some of the early detectors of RF AC were the coherer, the magnetic detector, the electrolytic detector, and the various crystal detectors.

A coherer was a thin glass tube with iron or other metal filings lying loose between two metal end conductors a few millimeters apart. Normally the resistance across a coherer is quite high. If an instantaneous voltage was applied across it, the filings **cohered** and the resistance across it decreased to only a few ohms. If tapped, it went back into its non-conducting or high-resistance condition. In the circuit in fig. 4, the low-voltage battery could produce current through the earphones whenever the coherer was driven into a low-resistance state by a received spark RF signal. A tapper, or decoherer (not shown), if vibrating against the coherer 300 times a second could break up the earphone current as long as an RF signal was being received. The earphones would respond with 300 pulses of DC through them, producing a 300 Hz tone. The variable condenser (capacitor), C1, in the antenna-ground circuit tuned it to the received signal frequency. C2, the variable capacitor in the secondary, tuned this circuit to the same frequency to help weak signals produce as strong a received spark signal as possible. If the cell voltage was more than some fraction of a volt, the coherer might not decohere, resulting in no signals. Coherer receivers could only receive radio code up to about 20 words per minute and were rather insensitive.

In 1903 the magnetic detector, an improvement over the coherer, was developed. A diagram of a magnetic detector receiver is shown in fig. 5. It consisted of a multi-strand iron wire being pulled through a primary coil. A secondary coil wound around the primary was connected to earphones. The iron wire was pulled by an electric or a spring-wound motor that drove one of the two round rotating spools that moved the iron wire. Two horseshoe-shaped permanent magnets continually magnetized and remagnetized the moving iron wire. When a damped radio-signal current was received and fed through the primary coil, its AC also magnetized the moving iron wire. The difference between the two changing magnetizing effects produced a damped-wave signal in the earphones. The tone heard was the frequency of the damped spark trains, usually about 1000 Hz. This detector was used at sea for many of the early years.

Also in the early years an electrolytic rectifying detector was developed. The term *rectify* means to change an AC frequency, such as 100 Hz, into 100 pulses of DC (pdc) per second. One form of this detector consisted of a small pool of dilute acid electrolyte in a small metal cup and a very thin silver-plated platinum wire that just touched the surface of the solution. It was less than practical to use. It could not be used at sea, because the liquid would slosh around and open the contact. In addition, the tip had to be burned off often to assure a desirable contact, and the electrolyte could also evaporate. This detector's ability to rectify allowed it be used to detect spark or voice signals, but not CW signals.

Another early detector was the rectifying crystal detector, which was invented at the turn of the 20th century, although it was not used for radio receiving for several years. It consisted of some form of a crystal on which the sharpened end of a wire catwhisker was touched. When a "hot spot" was found on the crystal, an efficient diode rectifier was developed. Fig. 6 is a diagram of a crystal detector receiver. To find the desired station the secondary tuned circuit was first tuned to the desired frequency. To peak the signal the antenna circuit was tuned to the frequency. This detector worked well with the modulated, or the up-and-down amplitude, variations of spark trains and later with AM voice signals, but not with CW signals. Below the diagram are shown a damped

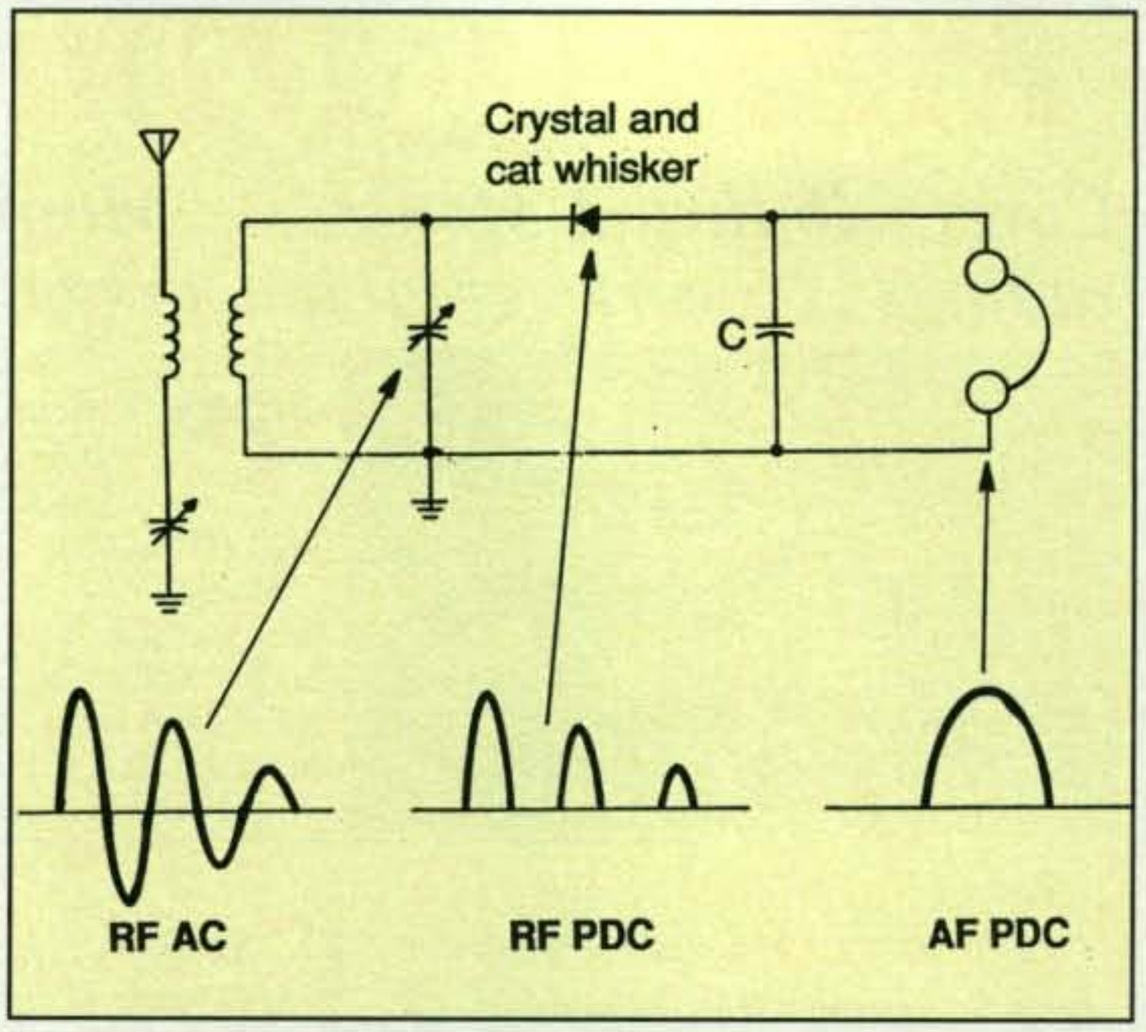

Fig. 6– Crystal detector receiver circuit showing RF AC wave trains, RF rectified pulses, and smoothed AC pulses.

RF AC spark signal, the rectified RF DC pulses, and the audio frequency (AF) DC waveform smoothed by capacitor C, which is fed to the earphones. If 60 Hz AC was used to power a spark transmitter, the tone heard was 120 wave trains, not a very pleasing sound. The power-line frequency for spark transmitters was often 500 Hz, from 500 Hz alternators, to produce a more pleasant-sounding 1000 Hz tone in the earphones. Later, amplitude-modulated broadcast signals were detected quite well by crystal diodes. Most AM broadcast receivers still use diode detectors. Today such devices are known as solid-state diodes.

Then Came Vacuum Tubes

In 1883 Thomas Edison invented the incandescent lamp, and the next year he found that if a metal plate was sealed into his evacuated bulb and made positive in respect to the filament by a battery, an electron current flowed to it and through the battery. However, if the plate was made negative, no current flowed. This is known as the Edison effect, but he did nothing with it.

In 1904 Fleming produced a similar rectifier and called it a Fleming valve, now known as a vacuum tube diode. When a grid of wires was placed between the hot filament and the plate, a 3-element, or **triode**, amplifier tube resulted. Now weak signals fed to the grid could be amplified, and the amplifying ability of the triode could be used to produce oscillator circuits to generate AC of any desired frequency and form. Spark transmitters were soon replaced by vacuum-tube transmitters. This changed the world, not only in radio communicating but in all other electrical forms.

Finally, in the late 1940s it was found that by adding a second catwhisker to a crystal diode, a 3-element, solid-state amplifying **transistor** resulted! Today most of our receivers and transmitters are transistorized, and look at everything else that transistors have brought us! So much for those good old days and their primitive radio equipment. The usual spark signals we hear today are those produced when the local power lines spark across. That's one spark signal we really don't need! ■

It was part of the ongoing struggle of man vs. nature . . . or in this case, antenna vs. squirrel. Both sides were clever and resourceful. Who would win?

The Squirrel Effect on Guy Ropes

BY LAWRENCE H. SANDERSON,* KDØYZ

A roof-mounted 25-foot mast with a Ringo Ranger II 2-meter vertical on top needs some guying. Of course, it was firmly bolted into a tripod, which, in turn, was solidly mounted on the roof with long, sturdy lag bolts. However, wind sway was quite evident and I decided to guy the mast halfway up and at the top with black Dacron rope. This was easily accomplished and proved to be quite satisfactory, as it twice withstood 75-mph winds with little sway and no damage. Several months went by. It seemed I had a satisfactory installation—or did I?

"A squirrel looked me in the eye, guy rope dangling from his mouth. It had chewed off the rope at the eye bolt where it was tied at the edge of the roof. "

One day as I was eating lunch, I happened to look out the patio door. Several feet of guy rope dangled over the edge of the roof and moved past my eyes. I wondered what was going on, so I stepped out on the deck to take a look. A squirrel looked me in the eye, guy rope dangling from his mouth. It had chewed off the rope at the eye bolt where it was tied at the edge of the roof. This apparently was excellent material with which to build a nest.

As I watched, the squirrel leaped from the roof to the electric service line about eight feet away. It was a well-calculated jump, and he caught the wire squarely. However, he had made one mistake: The rope was still attached to the mast, and the squirrel actually spun around the service wire! He caught his balance, the rope still in his mouth, and thought about it for a moment. A tug on the rope told him he couldn't carry it away, so he chewed off what he had and walked away on the wire, disappearing into the blue spruce, where the apparent construction project must have been taking place. I thought it must be quite a condo if black Dacron rope was part of the building material!

A Problem, A Solution (Maybe)

The squirrel's foray had now caused me a problem, but not a big one—or so I thought. The remaining length of rope wasn't long enough to reach the eye bolt. Not a big problem, though; just cut a new piece of rope to reach from the guy to the eye bolt and tie it off at each end. I promptly did that. Everything was snug and secure. Fine business, all taken care of.

A few days later, I was in the yard and happened to look at the antenna. Not one, but two of the six guy ropes were totally missing except for shreds hanging down where they had been tied to the mast and eye bolts. The Little Fiend had climbed the mast, chewed off the ropes at top and bottom, and hauled them away. Dumb animal, indeed!

My wife and I had to leave on a trip a few days later and would be gone for some time. I planned to make all necessary repairs when we returned. The first thing I did upon our return was check the mast and guys. All six guys were gone except for raggedy, dangling ends. To add insult to injury, one end of my 40-meter dipole was lying on the garage roof. The antenna end had been tied with Dacron rope to a short mast at the end of the garage. I'm actually surprised the little pest didn't discover a way into the garage and make off with the entire roll of Dacron rope stored there!

"The first thing I did upon our return was check the mast and guys. All six guys were gone except for raggedy, dangling ends. To add insult to injury, one end of my 40-meter dipole was lying on the garage roof. "

I repaired the dipole by replacing the rope with a piece of wire tied from the insulator to the mast. Try chewing that off! Next problem: What to do about the guys to the mast? Not far from the top of the mast are standoffs to support the feed points of the 40- and 80-meter dipoles. One antenna runs north-south and the other runs northwest-southeast. Both antennas are made of heavy insulated wire. I decided to see if they would also work as guys. They seem to be working well. There have been several years of summer and winter storms with heavy wind and ice and everything is standing firm.

And the Winner is . . .

I'm not sure who the winner is here, the squirrel or me. I will mention this, however: I was on the garage roof a few days ago, just checking. . . . I found tooth marks in the insulation on the wire. He hasn't given up! ■

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e-mail: <kd0yz@n-connect.com>

BY IRWIN MATH,* WA2NDM

Food for Thought

Okay, ladies and gentlemen, spring is coming and it's time to start thinking about experimenting again. As those of you who read this column are aware, I often remind today's amateurs of the major contributions that yesterday's amateurs made in the development of techniques, procedures, and equipment relating to RF communications. When I do get on my "soapbox," however, I usually receive many comments about how hard it is to invent or develop anything in this technically complex world without a full-blown research lab. Thus, this month I thought I'd give you a couple of unique ideas. You may think them dumb. On the other hand, you may be intrigued, and if you are, why not see if they can be developed into something useful.

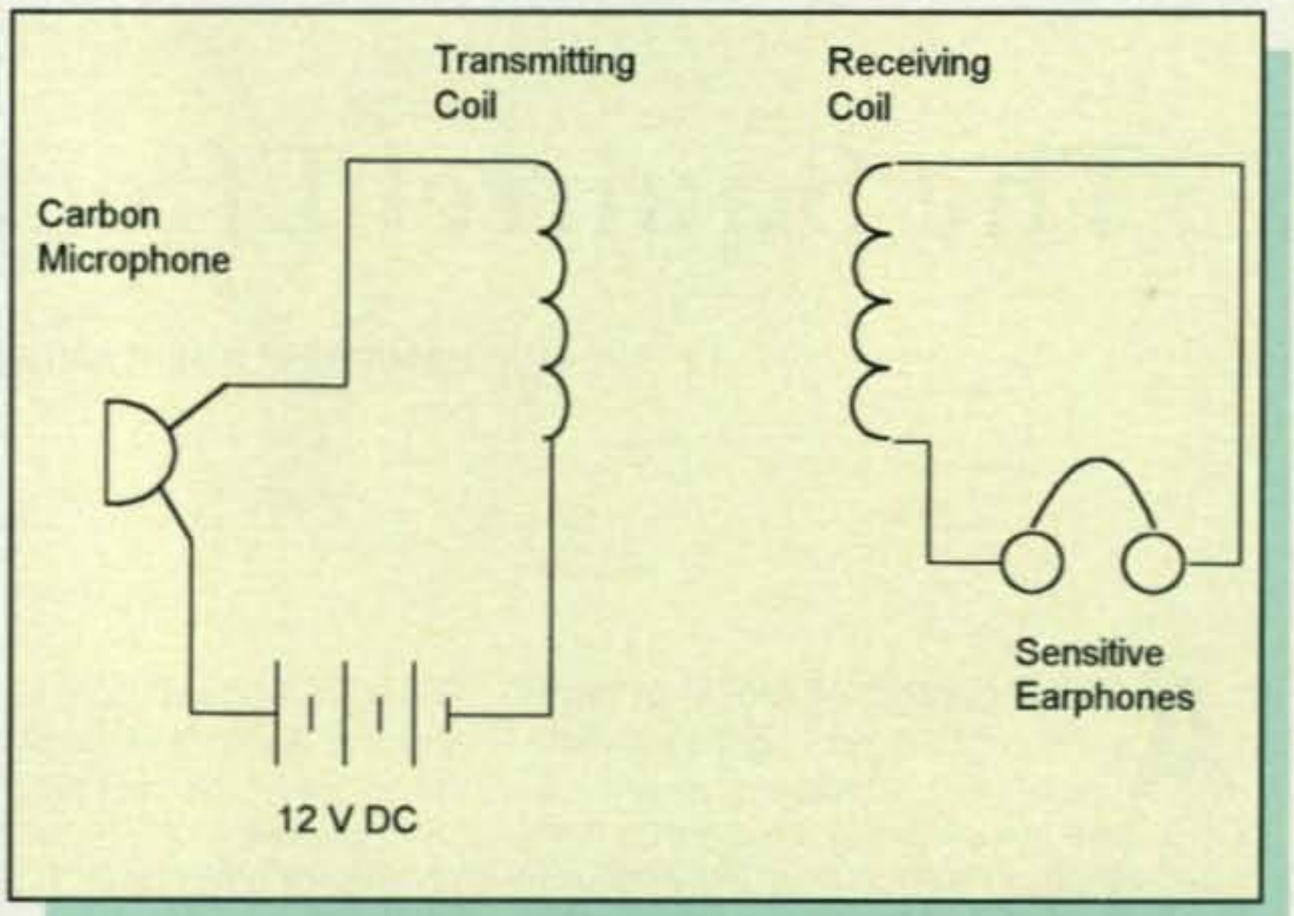

Fig. 1– Antique magnetic-induction communications system.

Back at the "dawn" of radio, those who did not understand what an electromagnetic wave was tried to communicate with a purely magnetic wave, which they understood somewhat better. The most elementary form of this technique is seen in a common transformer, where a 50- or 60-Hz magnetic field is coupled from a primary winding to a secondary winding solely via an iron core (and the air space between the coils and the core). Although AC voltages are transmitted, keep in mind that a 50- or 60-Hz sinewave is actually passing through the transformer. When an audio transformer is used, audio frequency signals pass easily. This technique obviously works quite well for short distances, and even works when the iron core is removed, but has anyone ever tried to expand its range? Sure they have! Fig. 1 shows the basic principle of what was tried back then. The experimenter of today can easily duplicate this setup (shown in fig. 2) using a common audio public-address amplifier as both the "transmitter" and "receiver."

A large coil of wire is used for the transmitting antenna and is wound so as to have an impedance of about 8 ohms. The larger the gauge of the wire used, the greater the diameter of the coil can be, as well as the greater the number of turns that are required. Ten to 20 turns of #20 wire is as good a starting point as any to try to match the output of the amplifier, but you will have to experiment with the number of turns, the diameter of the coils, and the various output impedance taps on the amplifier to determine the best match for maximum power transfer. By the way, in the past, coils of 5 to 6 feet in diameter were not uncommon. However, why

*c/o CQ magazine

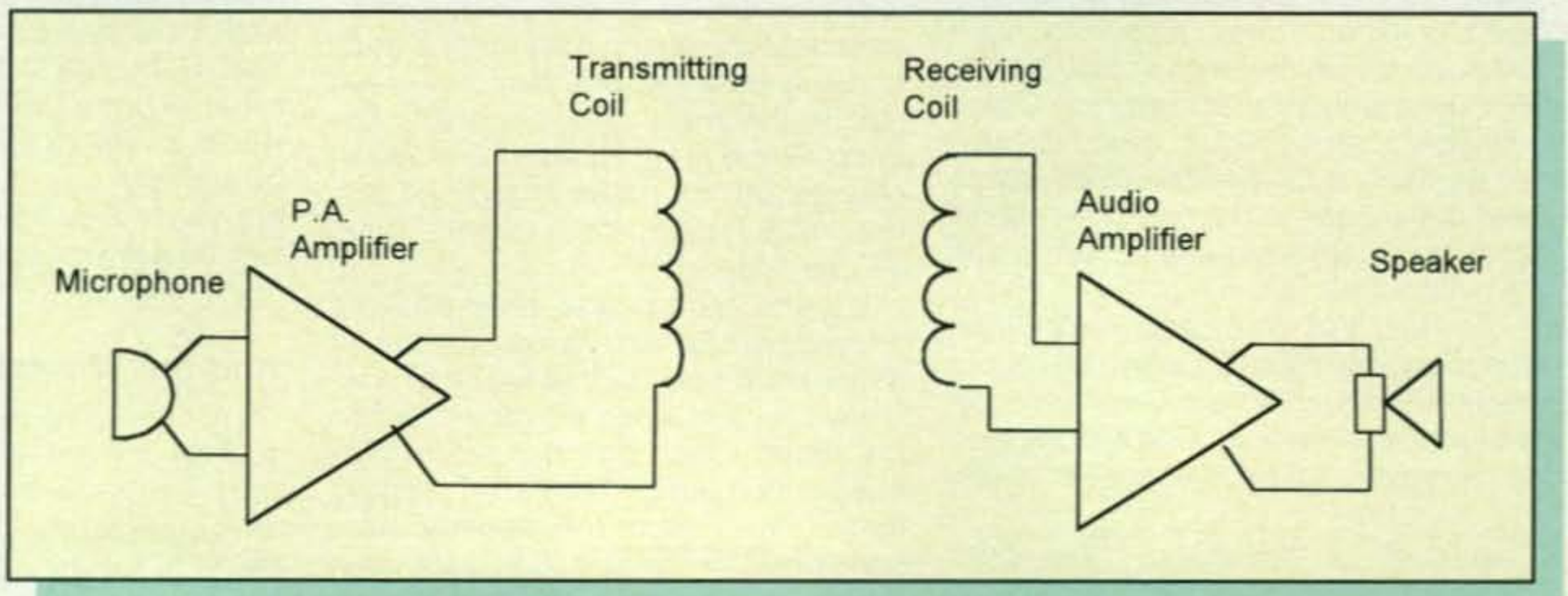

Fig. 2– Modern magnetic-induction communications system.

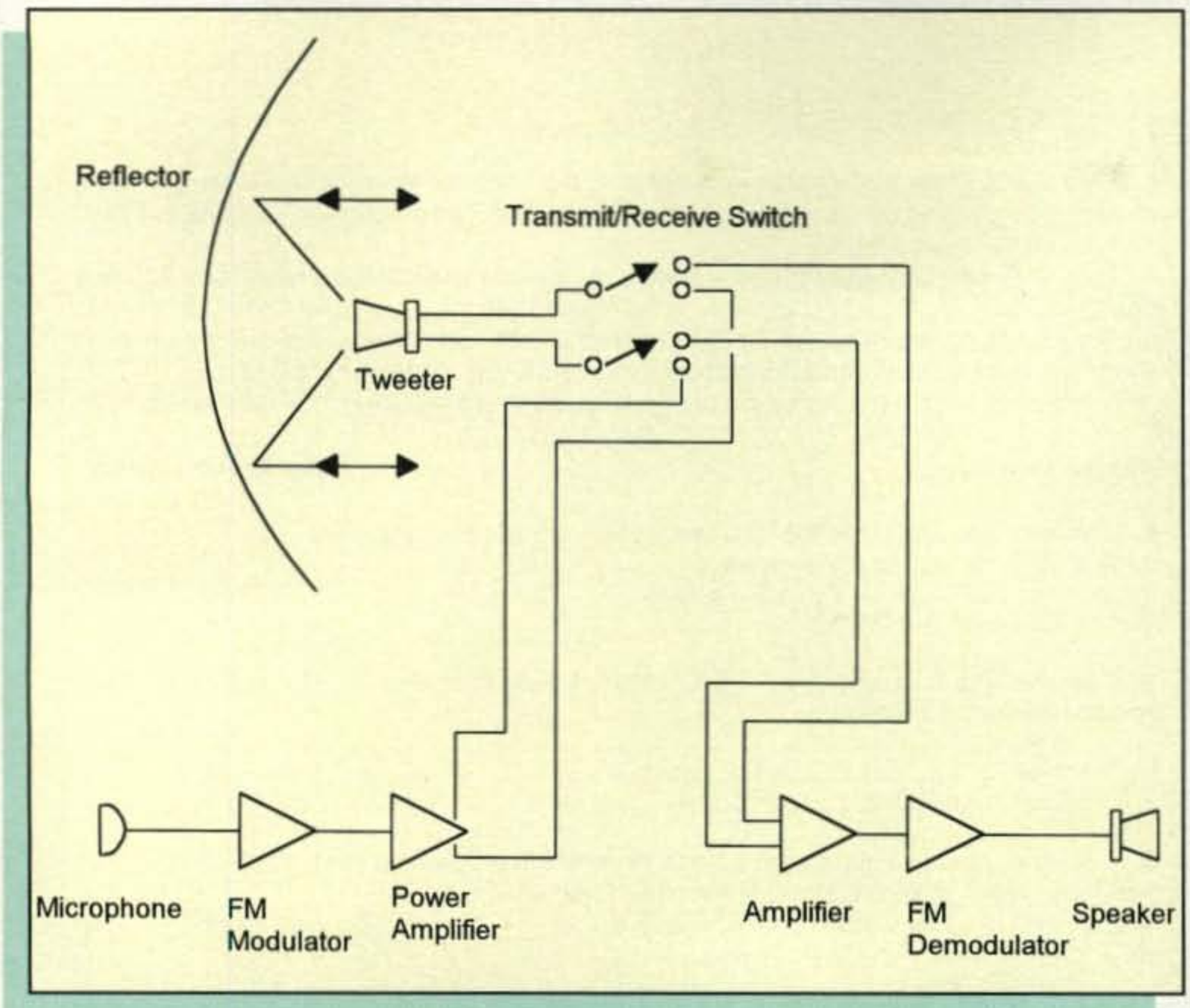

Fig. 3– Block diagram of an ultrasonic transceiver.

stop there? Go for it! Many of you don't hesitate to put up a 17-foot wide triband-er, so why not a 17-foot diameter coil?

Once the coil is wound, it should be connected to the output of the audio power amplifier. Now any audio passing through the coil will develop a varying magnetic field, which, like all fields, theoretically extends infinitely. For a receiver, you guessed it: Use the same coil or another one if space is not at a premium. This time connect the input of the amplifier to the receiving coil. Since 8 ohms is not a requirement for an amplifier's input, perhaps you can wind a receiving coil with many turns of finer gauge wire for a higher impedance and greater sensitivity, or experiment with an audio step-up transformer to match a low-impedance loop to a higher impedance amplifier input. Hum a problem? Install a high-pass audio filter, or a 50- or 60-Hz notch filter (or both) as needed. You get the idea!

Do you want to try for DX? Instead of basic audio (which is really AM), try modulating a power oscillator (say, 30 to 50 kHz or so) with audio and connect it to your transmitting coil. Be careful not to tune the transmitting coil, however, or you will have a 50-kHz RF transmitter, which would defeat the whole experiment. When the transmitting and receiving coils are aligned, regardless of what method you use, it would be interesting to see just how far you actually can communicate. Please let us know if you try this.

If magnetic waves are too much for you, consider sound waves. It is said that a dog can hear an ultrasonic whistle very far from its source, and indeed such devices are sometimes used for training purposes. The parabolic listening device that some people use for eavesdropping or for listening to birds can also pick up signals for miles (or so they infer). Why not combine the two as shown in fig. 3? Here we have arranged a 100-watt hi-fi tweeter (speaker) at the focus of a parabolic reflector made from a snow-sled, a refuse container top, or something similar. You might laugh at me for saying this, but even an old satellite antenna (of the solid reflector type) would be good.

For transmitting, limit the speech bandwidth to 300 to 3 kHz (telephone quality), FM modulate a 20-kHz oscillator, connect the oscillator to a power amplifier to drive the tweeter, and "illuminate" the reflector with the resultant signal from the tweeter. On the receiving end, employ a wide-range microphone at the focus of the dish, FM demodulate the received signal, and you are communicating with ultrasound—no hint of RF here! How far will it go? Who knows if you don't try it?

Although the two methods described above are somewhat unconventional, they could indeed work and in some instances could provide a clever alternative to RF. Both have had commercial success in the past, but never for two-way communications. The inductive loop is used in many of the self-guided tours offered by various museums, while the ultrasonic system was used in early TV remote-control applications. Modern electronics soon made these methods obsolete, but perhaps you can resurrect the past.

73, Irwin, WA2NDM

What You've Told Us...

Our October survey asked how frequently you operate Morse code and your main reasons for doing so. We also asked about your license class, whether you were licensed before April 15, 2000, when restructuring dropped the maximum code test speed to 5 words per minute, and whether you've taken a code test since that date. Not surprisingly, 62% of the readers who responded have Extra Class licenses, while 19% have Generals, 9% each have Advanced and Technician tickets, and the remainder are split between Techs with code, Novices, and readers without ham licenses. The vast majority of you (86%) were already licensed in April, 2000, and 82% had already passed a code exam by then. However, that means that 14% of our readers are relatively new hams and that half the readers who had not taken a code test before restructuring have since done so.

Moving to on-air usage, 40% of you said you used code on the air for 50% or more of your operating *before* restructuring ... that number is now up to 48%, with the biggest jump coming in the 75-99% of airtime category, leaping from 19% pre-restructuring to 30% now!

Why do you operate CW? First we asked for all the reasons, then for the single most important reason. Nearly everyone operates CW for DX opportunities not available on phone (92%), followed by those who just enjoy it (56%), who use it for QRP (27%), for contesting (25%), other (17%), VHF weak-signal (10%), and traffic-handling (4%), along with 26% who don't operate CW at all. The single most important reason, though, was pure enjoyment of the mode (61%), followed by DXing (16%), QRP (7%), contesting (6%), and the others each below 5%. Finally, we asked if you would have learned code even if it wasn't a license requirement ... 58% said yes, while 35% said no, and 4% said they haven't learned it. All in all, good news for the future of Morse code.

This month's free subscription winner is Rocky Robello, KA7EII, of Sandy, Utah.

Reader Survey February 2004

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

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

This month, we'd like your views on our periodic "market surveys" of ham equipment.

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

1. ... whether you have read the "CQ Market Survey" article in this issue on VHF/UHF FM mobile transceivers.
   - Yes 1
   - No 2

2. ... whether you have read previous "CQ Market Survey: articles on HF transceivers and on handheld transceivers.
   - Yes 3
   - No 4
   - Don't remember 5

3. ... whether you have purchased a piece of new ham radio equipment in the past three years, or plan to do so in the next 12 months.
   - Yes 6
   - No 7
   - Don't know 8

4. ... whether you used the CQ Market Survey articles as a tool in choosing your new radio.
   - Yes 9
   - No 10
   - Don't remember 11

5. ... whether you have personally found these market survey articles to be helpful to you in choosing a radio.
   - Yes 12
   - No 13
   - Don't know 14

6. ... whether you feel others may find these market survey articles to be helpful in choosing a radio.
   - Yes 15
   - No 16
   - Don't know 17

7. ... whether you have found these articles valuable to you in staying current with what's on the market.
   - Yes 18
   - No 19
   - Don't know 20

8. ... whether you believe other readers will find these articles valuable in staying current with what's on the market.
   - Yes 21
   - No 22
   - Don't know 23

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   - features 25
   - manufacturer 26
   - other 27

10. ... whether you find
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Thank you for your responses. We'll be back with more questions next month.

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This rugged VHF HT is built for heavy use and keeps coming back for more. Put the power of 5 watts and 40 memories to work for you. The large alphanumeric display makes it easy to manage and the full-size backlit keypad makes field operations easy, with direct frequency input and clearly marked secondary functions. Nothing's held back, with autodial memories, DCS, CTCSS encode+decode, and even a built-in theft alarm!

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DJ-496T UHF HT

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Packet radio as we knew it ten years ago in the US is pretty much dead except for some DX Clusters. However, the attention of digital-savvy hams is beginning to turn to wireless computer networks (of which packet, after all, was one of the first). Is the situation the same in the UK? G3LDI brings us up to date...

UK Packet Update 2004

BY ROGER COOKE,* G3LDI

Since I last wrote an update for *CQ* magazine from the UK (*"Packet Radio from the Other Side of the Pond," June 1990 CQ, p. 28—ed.)*, a lot of water has passed under the bridge! Unfortunately, the internet seems to have attracted a large percentage of packet users, and they, in turn, have forsaken the packet network. This has happened in the last two or three years and has had a drastic effect on the amount of traffic, both terrestrial and via Satgate, the amateur satellite packet gateway. From what I have seen, a similar situation exists in the USA.

Here in the UK we have had closures of BBSes and nodes, making it very difficult to maintain continuity in a national network. As users found difficulty accessing a BBS (Bulletin Board System, for the uninitiated), they turned to Telnet. Several BBSes have also gone the same way, offering their services on the internet instead of radio. In fairness, there are some that combine a Telnet BBS with RF access. However, this has created lots of aggravation that has been aired by means of bulletins. This, of course, only serves to further exacerbate the situation and drive away users. Traffic is being held up due to a lack of a path, following these closures, and then has to be passed in bulk via e-mail, making even further use of the landlines. Short of posting a disk via snail-mail, this would seem to be the only answer.

Traffic on the Satellite Gateway has also suffered. I now run the only UK Satgate, and to be frank, there is not really enough traffic to justify running one Satgate here, let alone two as we used to have. Indeed, at one stage we had plans for a three-way split! A few years ago it was not unusual to have problems running with two Satgates, and the normal daily upload was around 200k. Now, some days it is below 5k, and that is including the normal maintenance and monitoring traffic as well! Using UO-22, the turnaround time on normal personal mail is less than 36 hours, but of course that does not really compare with the instantaneous results obtainable on the internet. However, with all these problems, we are still hobbling along with three wheels on our wagon. Since the inception of packet in 1983, though, the user access speed has not moved much, and even now, in 2003, the majority of users still run at 1200 baud, with a few using 9.6k baud.

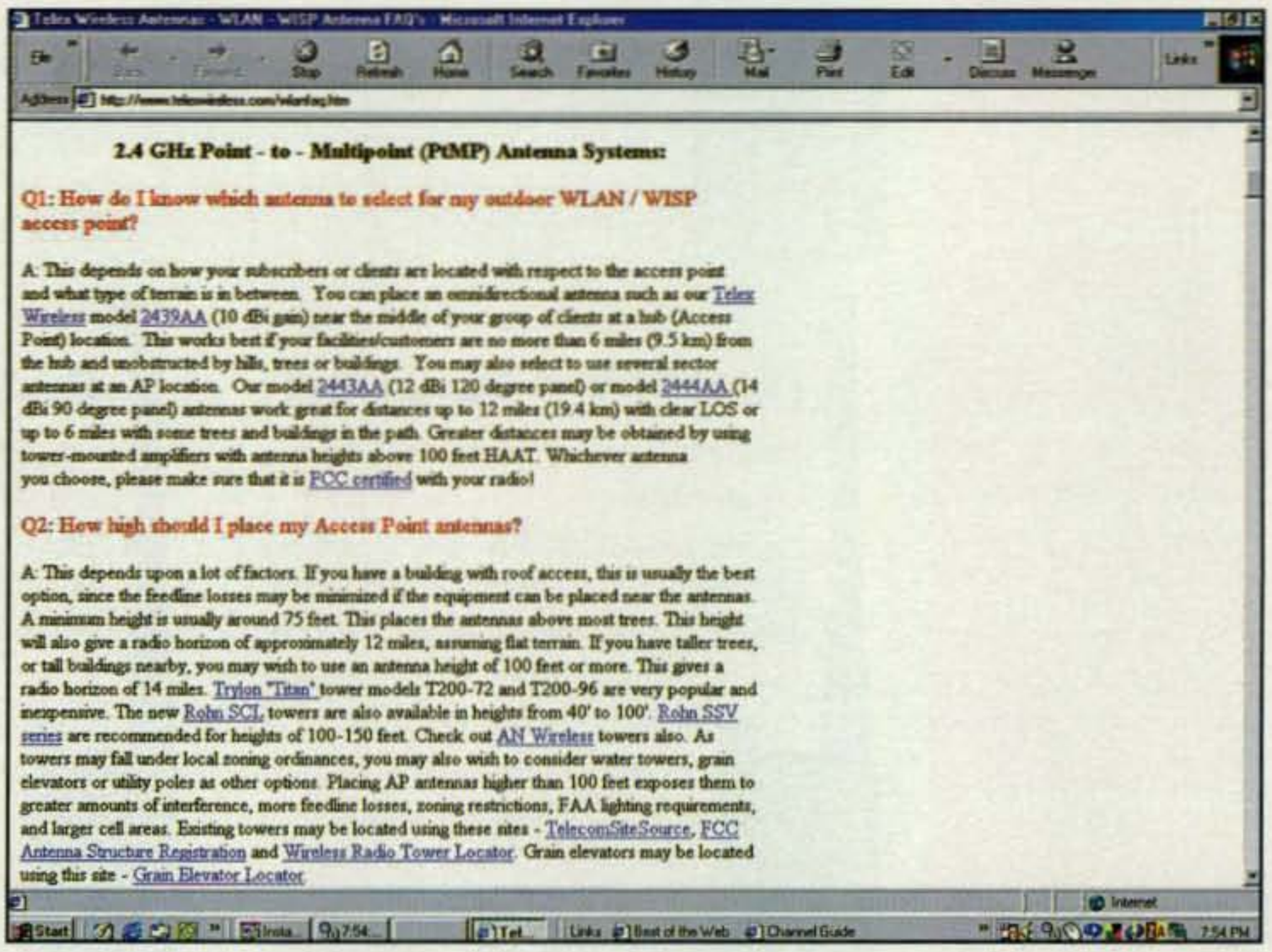

Fig. 1– Typical question-and-answer page about wireless computer networking. This one is from Telexwireless.com.

It is being muted now over here that packet is dying. In my opinion, talking it up is a fatal thing to do. The media do the same thing with regard to the stock market. The media hype a fall on the stock market and soon we have a burst bubble. I still think the media were in part to blame for the large falls we have seen in the last few years, on both sides of the Atlantic. My BBS still has users, and I still use the system myself. I would rather use amateur radio to send a message and wait a couple of days than use the internet and receive a reply within a few hours. As packet is an amateur-radio-based system, and a financially

* *The Old Nursery, The Drift, Swardeston, Norwich, Norfolk, NR14 8LQ UK*
e-mail: <g3ldi@qsl.net>

unsupported system to boot, we should be prepared to accept a lesser performance. It is much like talking to a friend in Australia. This is easy to do these days, and quite cheap actually, using a mobile phone. There is no need to have a large tower with a large beam, large amounts of coax, control cables for rotators, an expensive transceiver sitting indoors with a linear sitting beside it, not to mention all the ancillary equipment we all own. *But,* and this is the point, there is more satisfaction from using all this gear to talk, far more than using a mobile phone. There is even *more* satisfaction if all the gear is home-brew, something unusual these days, but when I was licensed this was the only way possible!

In my opinion, then, it is preferable to fight for an amateur packet network and use our very valuable amateur frequencies, rather than concede defeat and become landline operators instead. I use the internet, and as a resource it is quite invaluable, much like the encyclopedia that sits on the shelf, only probably more so. However, over here in the UK most internet access is at 56k or less. For this you can get a free ISP and pay as you go, or have access at any time, for which you pay around £14 per month. If you want ADSL, assuming you are able to have it, you will pay around £30 per month. Now ask a packet user to cough up £10 per annum for the use of the network, *all* of which is provided by other amateurs running BBSes and nodes on their own computers, using their electricity and so on, and he will throw a wobbly!

Just think what sort of National Backbone Network we could have with everybody paying £30—or nearly $50 in your money—*per month!* Cloud cuckoo land of course, but what a dream! All we really need is for Bill G. to subsidize our network, worldwide. With his wealth and knowing that most of us are using his software anyway, it wouldn't really cost him that much! He could use that fact in some of his advertising.

Packet in the New Millennium

Well, things might not be as bad as I have painted them. On both sides of the pond, interest is now growing in the use of Wireless LAN cards. This could revolutionize our sad networks and make the internet seem like a snail by comparison. However, it will take a *lot* of people to make it work.

The Wireless LAN

Inexpensive high-speed data could be just around the corner. It could knock the internet into a cocked hat, and would be cheaper to run than a dedicated multi-mode TNC. The only thing that is required is *you—lots of you!* Experiments have already taken place, both in the UK and the USA, using a basic Ethernet connection using radio. The WLAN enables somebody with a laptop to wander around the house or garden and have access to the internet via the PC indoors.

The cards operate on 2.4 GHz and use the IEEE 802.11 standards (see the February 2003 *CQ* "Digital" column). The speed at which these cards operate is in the range of 2 to 11 Mbps, and enhancements are already afoot to enable that to be increased to 54 Mbps. The actual speed attainable will depend on the bandwidth available and the link, but hey, let's not quibble! We are still using 1200 baud, which is stone-age by comparison. As they stand, the cards can be used *without* a license, as they are intended for access on a local basis. However, amateurs both in the UK and in the USA have already modified them and added external high-gain antennas—not difficult to obtain at these frequencies—and extended the range to around 15–25 km. They are essentially low power, ranging from 100 mW to about 4 W for the high-power version.

Obviously, these frequencies are line-of-sight only, and this is why we need *lots* of interest. If we could get enough people interested, running a few back-to-back nodes we could have a superb network. Several channels are available, six of which are already in the amateur part of the band. With careful thought and planning, the throughput could rejuvenate our crumbling dinosaur once again.

Ordinary AX25 traffic can be ported over a wireless Ethernet link using AXIP encapsulation. You would be able to mimic the internet, with web pages, conferencing, FTP, and a much more lively presentation, not to mention the possibility of digital speech, too.

Access Points

An access point (AP) is a bridge or router that connects between the WLAN (Wireless LAN) and the wired network. The wired resource can be regarded as the computer in the shack. The AP consists of a small box with a built-in antenna, a WLAN transceiver, and an Ethernet port. Modifications will have to be made in order to replace the internal antenna with a high-gain beam. Connection to the computer can be made via the Ethernet port, and the AP can be placed at some high vantage

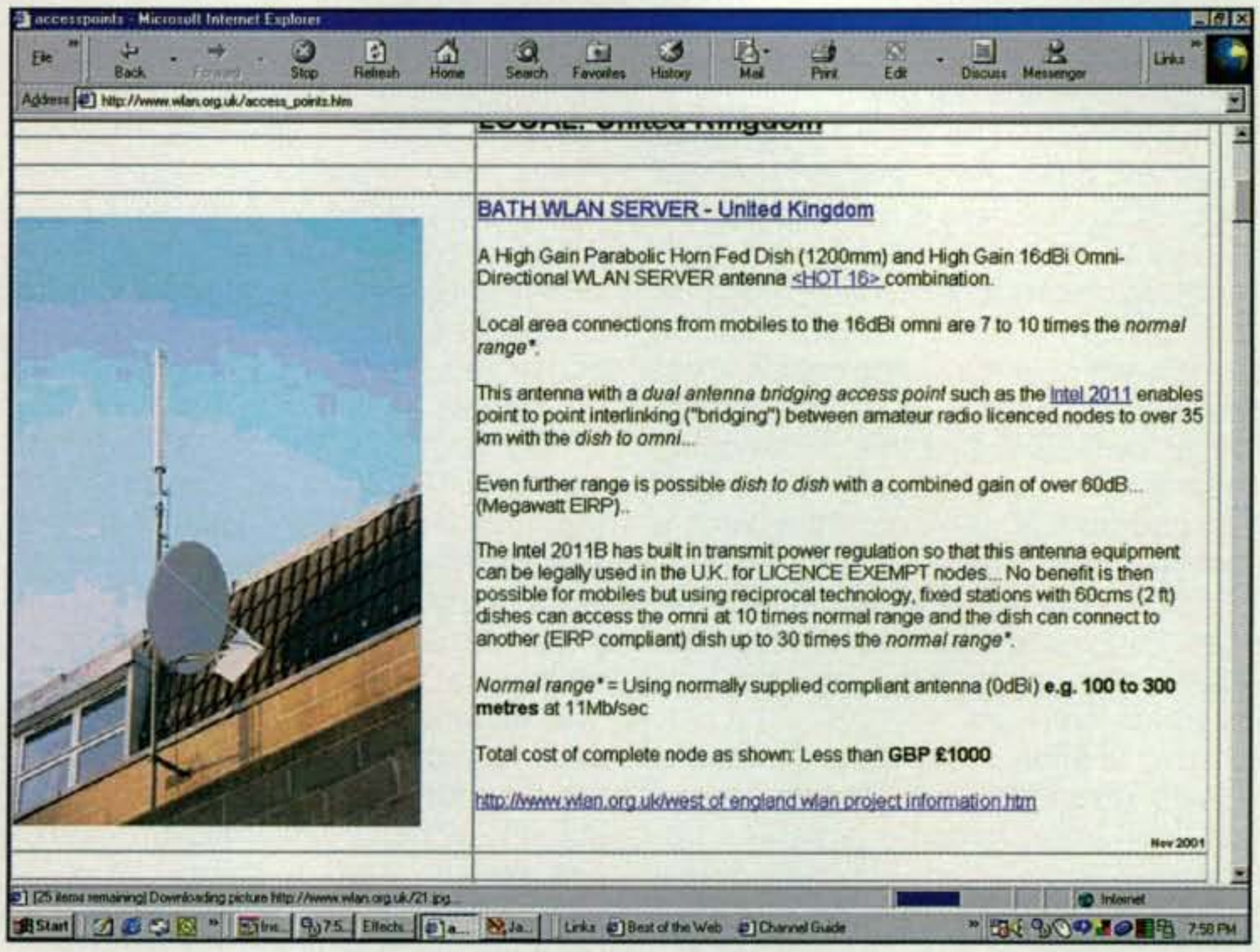

Fig. 2– An explanation of wireless network access points (APs) on the UK wire less networking site, <www.wlan.org.uk>.

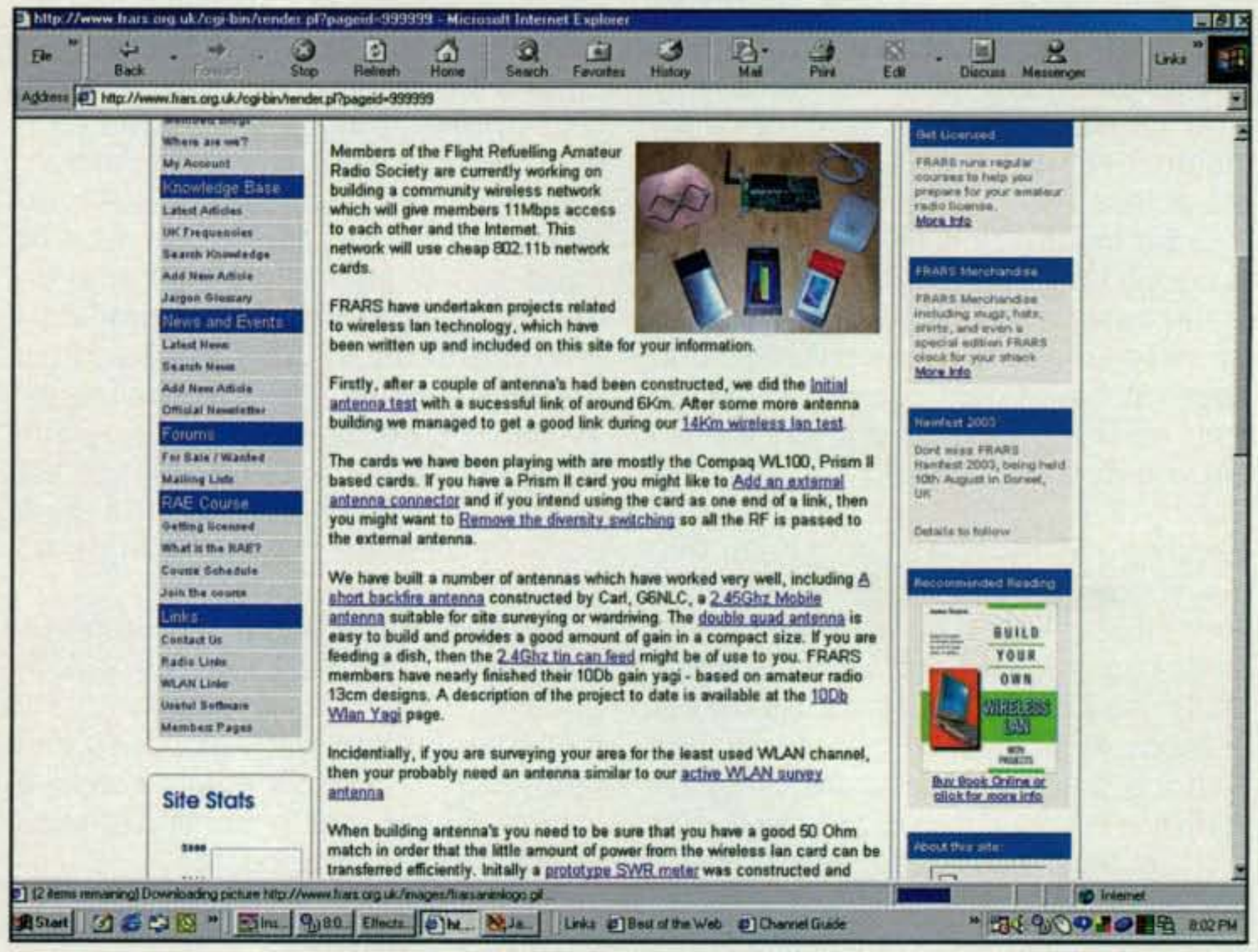

Fig. 3– Wireless LAN antenna advice from the Flight Refuelling Amateur Radio Society at <www.frars.org.uk>.

point beaming at the next node. The possibilities are very attractive, and it could bring a lot of users back to amateur radio once again.

Take a look at a few of the URLs listed in Table I. Further information is becoming available, and if you are really keen to get started, then please join the Yahoo group RF_LAN. This group was started a while back by Harry Bloomfield, <m1byt@gb7fcr.#16.gbr.eu>. There are quite a few members already, swapping ideas and information.

As interest and activity grow, particularly in high-population areas, I can see some problems. However, if we are

Internet Resources for Amateur-Radio-Based Wireless Computer Networks

<http://www.qsl.net/ke5fx/#uwave>
<http://www.telexwireless.com/wlanfaq.htm> (see fig. 1)
<http://www.wirelessanarchy.com/>
<http://www.bbwexchange.com/tutorials/index.asp>
<http://cedars.spoo.org/wardriving/index.html>
<http://www.wlan.org.uk/simple_double_quad.gif> (see fig. 2)
<http://trevormarshall.com/biquad.htm>
<http://standemo.orcon.net.nz/kipper.jpg>
<http://standemo.orcon.net.nz/wifiharb.jpg>
<http://www.frars.org.uk/cgi-bin/render.pl?action=link&url=999999&goback=1160> (see fig. 3)
Using an old SKY dish as a 2.4 GHz antenna:
<http://www.frars.org.uk/cgi-bin/render.pl?pageid=1160>
A homemade 2.4 GHz antenna from double-sided PCB:
<http://www.frars.org.uk/cgi-bin/render.pl?pageid=1162>
<http://www.petersheppard.com/wireless/>
<http://ewlan.g8gon.com/> (see fig. 4)
<http://www.wlan.org.uk/>
<http://www.arwain.net/arwain.htm>
<www.dabs.com> (look up their "Wireless Lan" components)
<http://www.oreillynet.com/cs/weblog/view/wlg/448>
<http://nocat.net/> more information and a few antenna designs
<http://www.frars.org.uk>

Table I– This lot should keep you very busy and might whet your appetite! To see what has already been achieved in the UK, take a look at the flightrefuelling website. Then take a look at what is going on in the USA at <www.qsl.net/kb9mwr/projects/wireless/plan.html> (see fig. 5) and also at <www.gbppr.org>.

operating within our band, we should be able to overcome most of them.

In order to have a national network of this type, people are needed to overcome the distances. Even with a high-gain antenna on the access point at the top of the tower, range would be limited to about 20 miles, and that's on a good day. Thus, although at present we don't have enough interest to build such

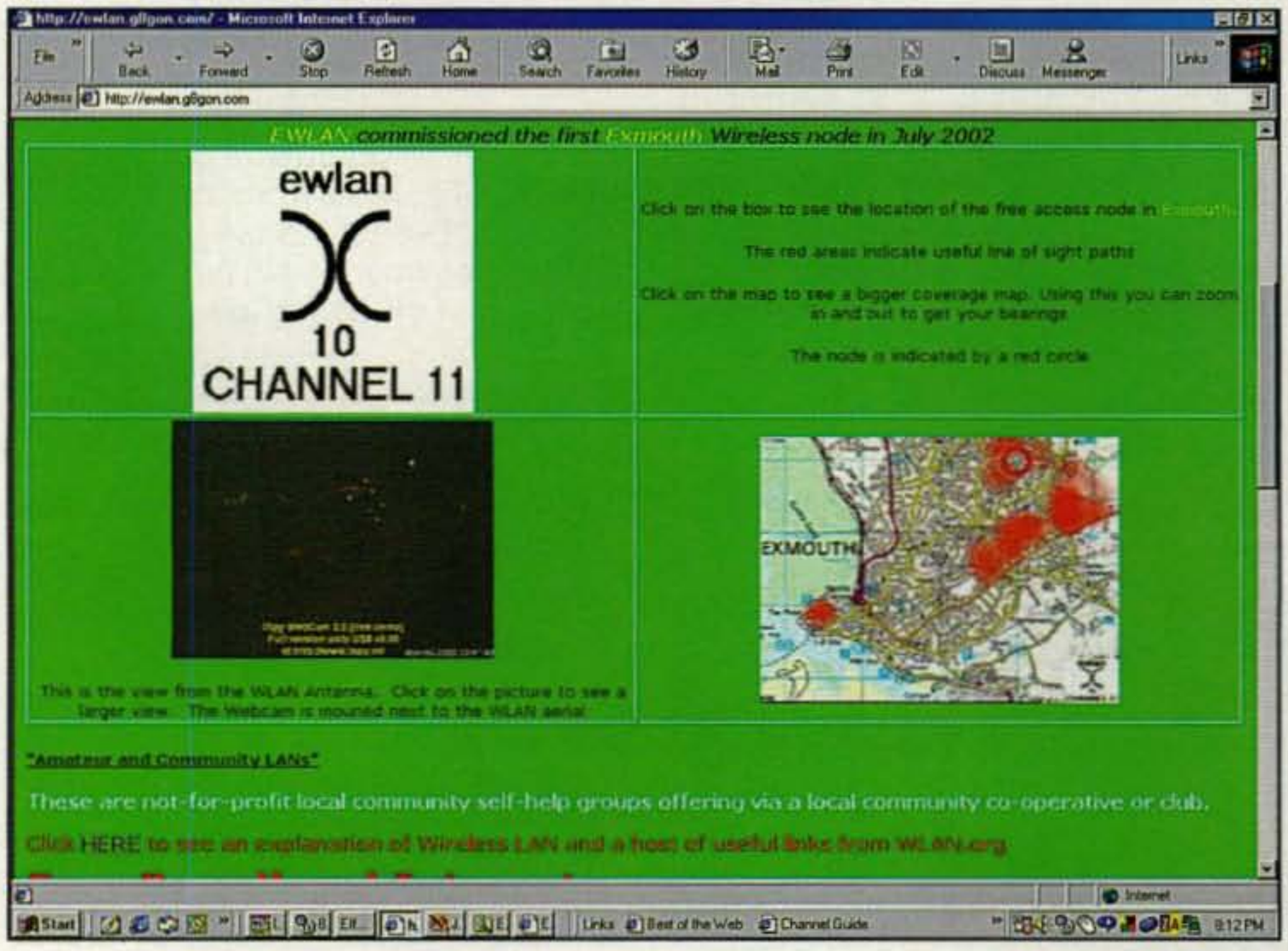

Fig. 4– Some hams are setting up community-access wireless internet links for their neighborhoods. The author would like to see some of that energy devoted to creating an amateur radio wireless network that can be even faster than the internet.

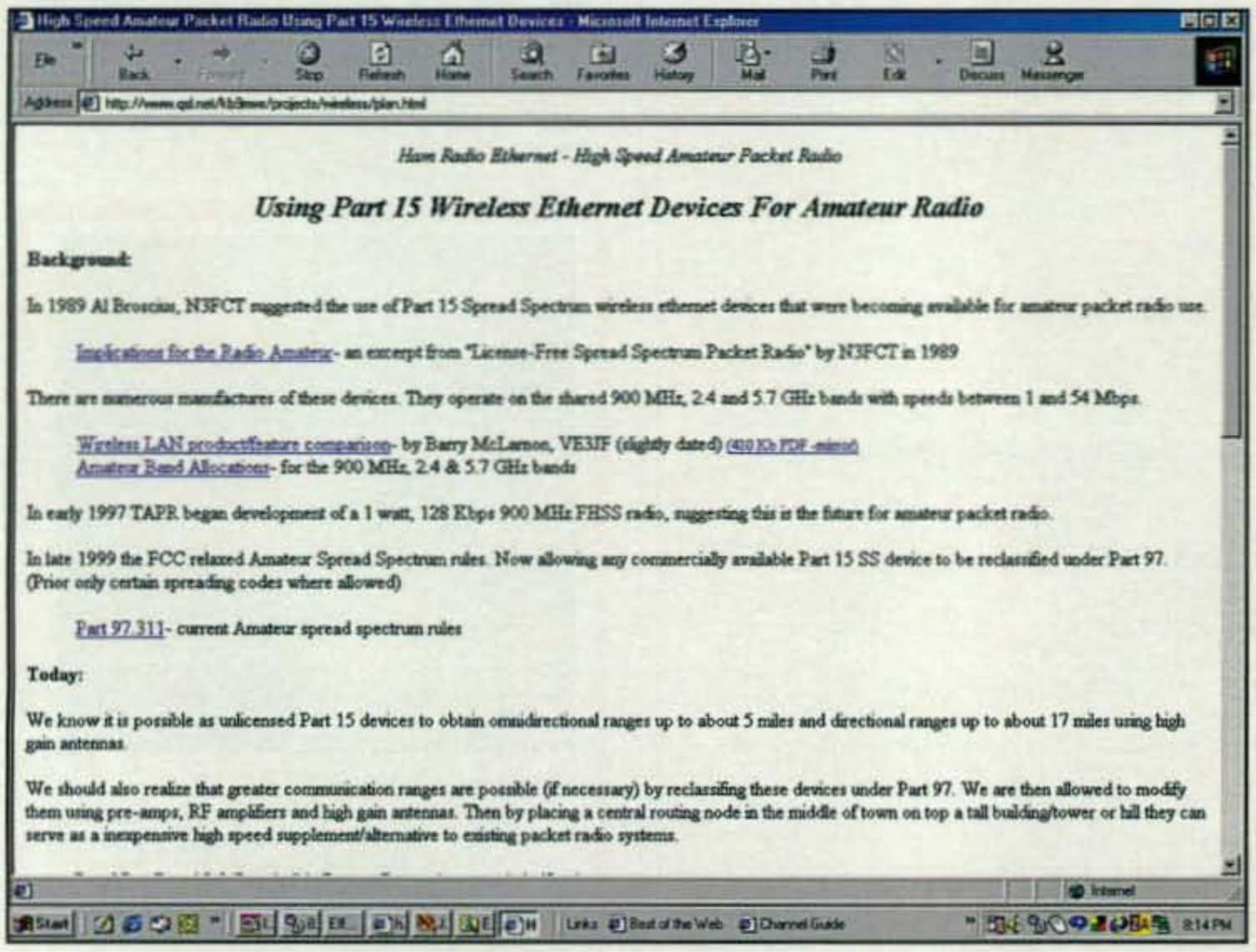

Fig. 5– A sample page from KB9MWR's website on converting low-power Part 15 wireless networking equipment for amateur use under Part 97.

a network, interest is growing and the potential is enormous. Personally, I would much rather have an amateur-radio-based network, with the ability to mimic internet presentation, than use the internet and thereby support a commercial enterprise.

Looking at some of the websites, it seems that there is a predominance of internet activity using WLAN and offering services to the community for high-speed internet access. While this is understandable, if the amateurs involved in those projects could devote some of their enthusiasm and knowledge to an amateur-*radio*-based network, then we could really rock and roll!

Don't read me wrong here. I do use the internet, and it definitely has a place. However, in my opinion, passing mail, chatting, DX-Cluster, and so on give me much more satisfaction if done via radio. This could be the answer. . . .

If you are interested, and I hope lots of you are, then please join in—the more the merrier. There is also a very good book entitled *Build Your Own Wireless LAN*, with projects by James Trulove. It is published by McGraw Hill and the ISBN number is 0-07-138045-0. It is available from <www.amazon.co.uk>, or probably from a good bookshop. It describes the basics, the types of LAN cards available, antennas to add on, how to make best use of the channels available, and so on.

Most amateurs have computers in their shacks these days, and this would be a superb project to kick some life back into our data network. Distance is the limiting factor; hence the need for *lots* of involved people, with APs at just about every amateur location. We could even negotiate a bulk purchase deal on the cards! Even if the overall throughput dropped from 11 Mbits to around 1 Mbit, well, that has to be better than 1200 bauds!

There are several wireless networking standards in existence and a number of proprietary systems. The IEEE 802.11b is the most widely used and operates on 2.4 GHz. The 802.11a cards operate on 5.2 to 5.8 GHz and offer higher speeds and less interference. Many of the 11a cards offer backward compatibility and can operate in both bands. With six of the channels already residing within an amateur band, this becomes a very attractive proposition.

Did somebody mention TVI? Heck no, but don't install your AP near your microwave, or you might get some interference from that! ■

BY DAVE INGRAM,* K4TWJ

CQ Reviews: Elecraft's New KX1 CW Transceiver Kit

No doubt about it, friends, QRP is the hottest special interest in amateur radio today! Just step back and look at the escalating worldwide interest in low-power communications, the numerous on-the-air QRP contests, QSO parties, and all the dazzling QRP gear, and you, too, will agree. It is maximum enjoyment at minimum cost. You can go first class with a brand-new attention-grabbing QRP transceiver plus antenna and accessories and still have money left over for other pursuits. Now that feat is hard to beat in today's world!

Ready to add an exciting new dimension with real go-anywhere, do-anything flexibility to your amateur radio life? Get rolling with QRP and start enjoying the good life!

As further encouragement to do more with less, this month's column takes an up-close look at Elecraft's captivating new KX1 transceiver kit. This multi-feature and coat-pocket-size rig is quite reasonably priced, a great little performer, and also surprisingly easy to assemble, even if you only have a few minutes of spare time a day. I did it, and my spare time is tighter than my monthly budget! I also took the new KX1 on a QRP road trip you should find interesting, so read on as we discuss Elecraft's new kit.

Photo 1– Equipped with all its options, Elecraft's new KX1 is a three-band CW transceiver with built-in battery pack, automatic antenna tuner, electronic keyer and paddle, LED, plus Morse code readouts and even a logging light. The little rig is microprocessor controlled with a superb receiver, 4-watt transmitter, and silky smooth break-in operation. (Photo courtesy Elecraft)

The New KX1

Wayne Burdick, N6KR, and Eric Swartz, WA6HHQ, of Elecraft have done it again. They have developed and packaged another outstanding CW transceiver kit, and it is loaded for big-time radio action! The new KX1 sports top-mounted controls for easy campsite, laptop, or handheld use. It is quite small (the size of a QSL card and only 1.2 inches thick) and fully self-contained. The little transceiver covers 40 and 20 meters plus receives adjacent-to-band frequency ranges and tunes the 49- and 22-meter international shortwave broadcast bands. An optional module adds 30-meter operation and enhances reception from 8 to 12 MHz. Power output is approximately 4 watts of band-blasting RF with a 13.5-volt DC supply or 2 watts when using internal batteries (six AA alkalines). Current drain is very trail-friendly at 32 ma receive and less than 700 ma on transmit at full power and about half that current at 2 watts, so battery life is exceptionally good. An optional CW paddle and internally mounted automatic antenna tuner further enhance stand-alone operations with the KX1. The tuner is a gem. It matches coax-fed antennas such as dipoles and verticals, and it also works with random longwires (really—longwires). It uses latching relays to hold settings without "keep alive" current. The optional paddle, which can be attached quickly, makes the KX1 a complete "grab and go" station you can carry anywhere in a coat pocket. Now this is QRP in style!

The KX1 really shines in the special-features department. It has a direct digital synthesized (DDS) VFO with microprocessor control, LED readout, three tuning rates, RIT, three-pole crystal filter, three frequency memories per band, and built-in electronic keyer with two message memories plus a beacon or auto-CQ mode. Receive bandwidth is panel-adjustable from approximately 2.0 kHz to a hair-splitting 300 Hz, and CW T/R delay time is selectable from 900 ms right down to zero. I think there is also a rocket launcher in there; I just have not found it yet.

Particularly attractive is the KX1's on-board microprocessor with a 16-function menu set that

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e-mail: <k4twj@cq-amateur-radio.com>

lets you customize the KX1 to fit your personal preferences. As an example, you can set the LED readout to bright or dim or to switch off after a selected time. You can also set the sidetone level and pitch, T/R delay, CW message record and play, beacon repeat internal, and low-battery-level warning point, plus switch the auto antenna tuner and Morse readout announcer on/off via the menu. If that is not enough, the microprocessor also has a second 100-count troubleshooting menu set that reads out a code when there is a problem, and the KX1's manual explains how to read the code and find the problem.

Building the KX1

It is difficult to believe this is a kit transceiver (it is elaborate!) or that it is easy to build, but both the rig and its manual are so well planned and laid out that anyone who can follow hand-holding, step-by-step instructions can do it. At the chance of sounding dumb, I would say if you have the time and patience to put together a couple of jigsaw puzzles, even if it is only a few pieces a day, you can build a KX1. All the components—even the controls, connectors, and readout—just mount in clearly marked holes on the main PC board. There are no wires to run, cross, or get confused. You can't miss. Dislike winding toroids? No problem. Check with Mychael Morohovich, AA3WF, at 412-481-2349 or e-mail him at <toroidguy@earthlink.net>. Mychael winds and sells toroid sets for the KX1, K1, and K2, and I can say firsthand that they are well worth the cost! I would estimate total KX1 assembly time as around 20 hours, and you gain substantial "hands on" experience working with new millennium circuitry in the process. While on a "special-frills roll," incidentally, check out the stick-on tuning-knob spinners from Wayne Smith at <K8FF@fingerdimple.com>. (See photos for more on constructing the kit.)

Circuit-wise, the KX1's single-conversion receiver consists of an NE612 "front end" mixer, a crystal filter, another NE612 as a BFO and product detector, and an LM-386N audio amplifier. Dual JFETs are included for receiver muting, and a transistor circuit handles AGC. The transmitter consists of three transistor stages driving a hefty 2SC2166 to 4 watts output. As previously mentioned, a microprocessor-controlled DDS VFO drives both receive and transmitter sections. The KX1's manual is such a great tool for teaching new and seasoned amateurs alike how

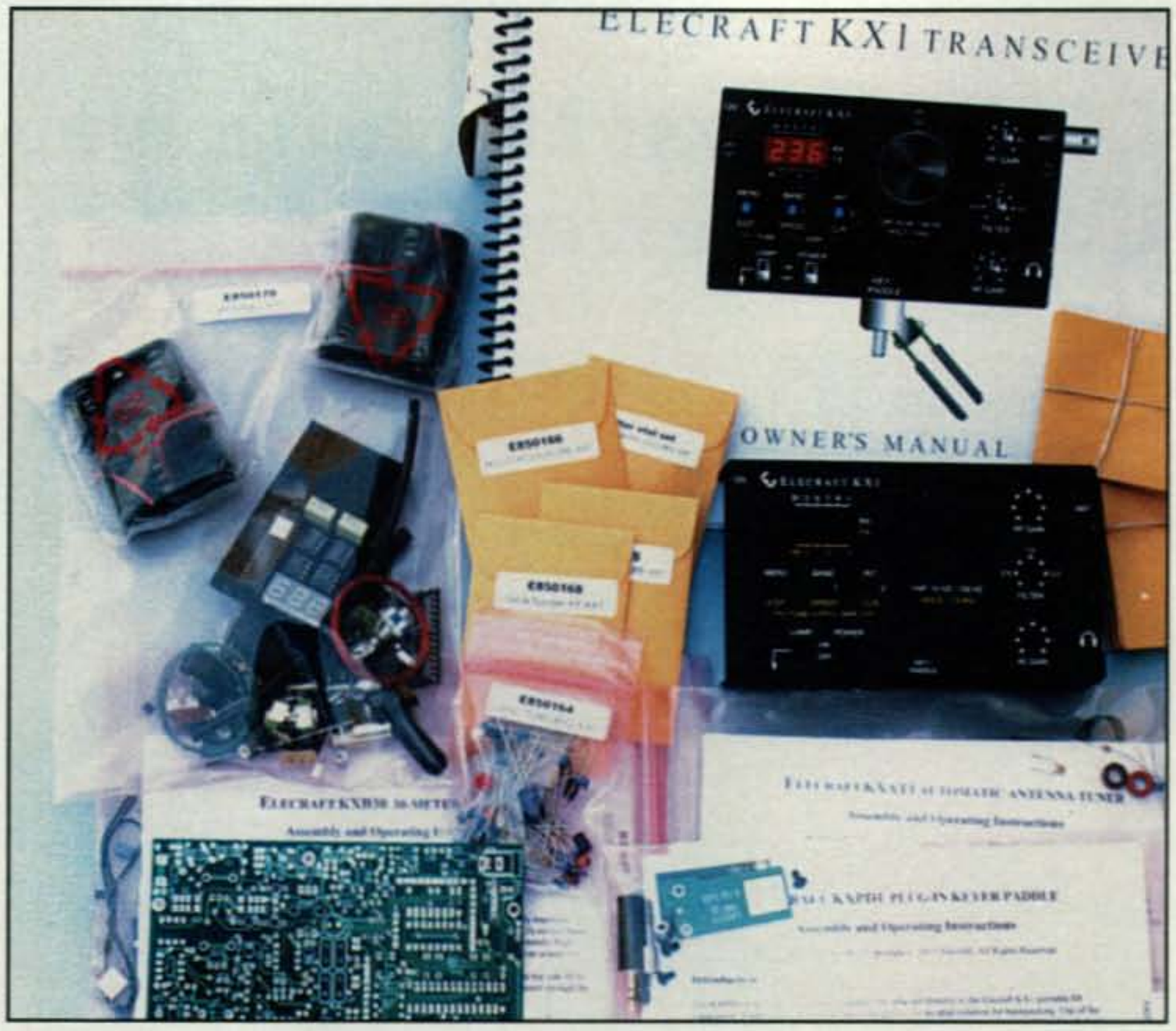

Photo 2– The full Elecraft KX1 kit as received, unpacked, and ready for assembly. Various components such as resistors, capacitors, and inductors are packaged in separate envelopes, while larger items such as transistors and ICs are in static-safe bags. The optional 30-meter board, antenna tuner, and paddle are also in separate bags.

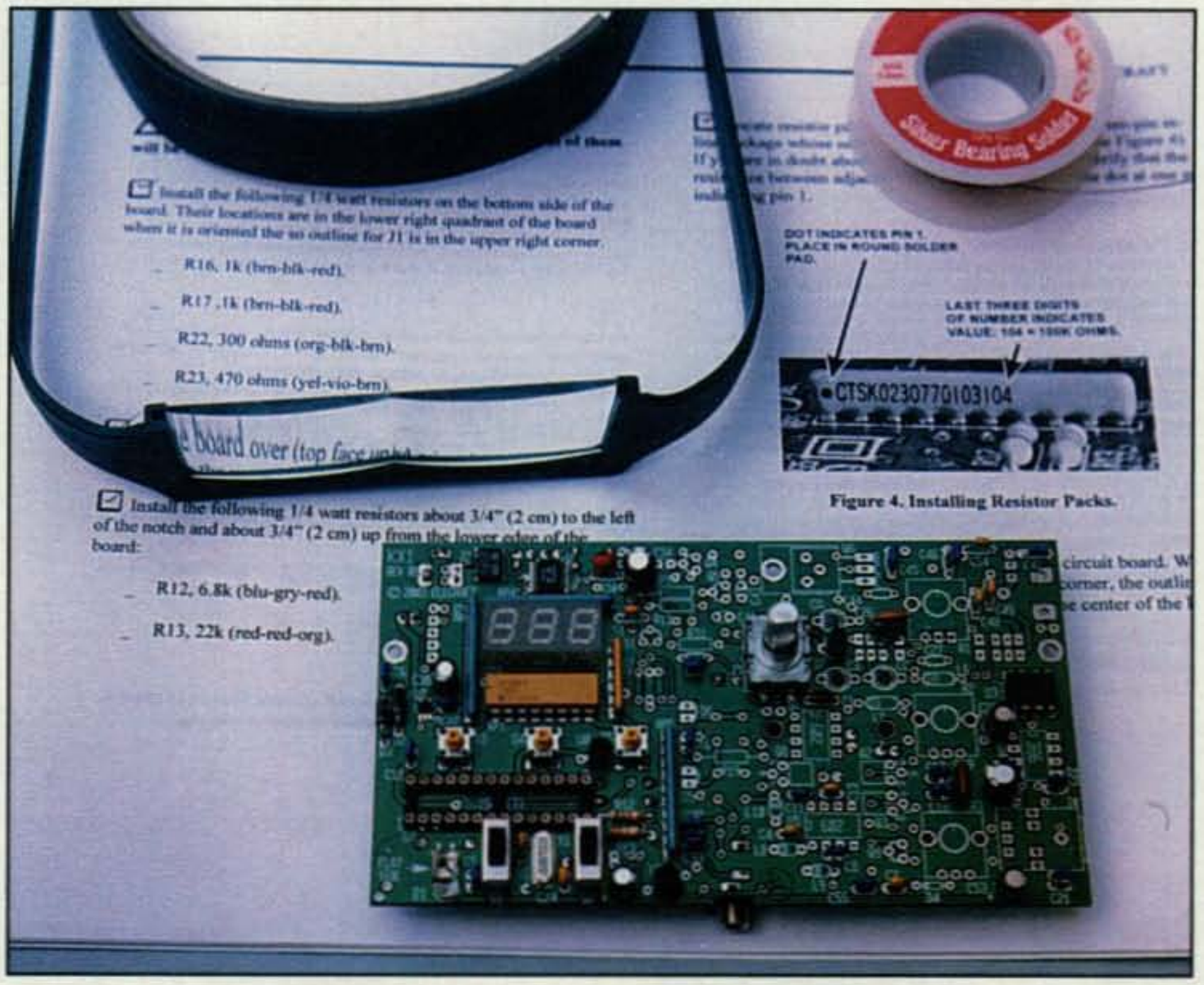

Photo 3– Assembly begins as various parts, switches, and LED display begin filling holes on the main PC board. The keys to building a kit rig such as the KX1 are a steady hand, small soldering iron, thin solder, patience, and a good magnifying visor (I use an inexpensive one from "Nancy's Notions," 1-800-833-0690).

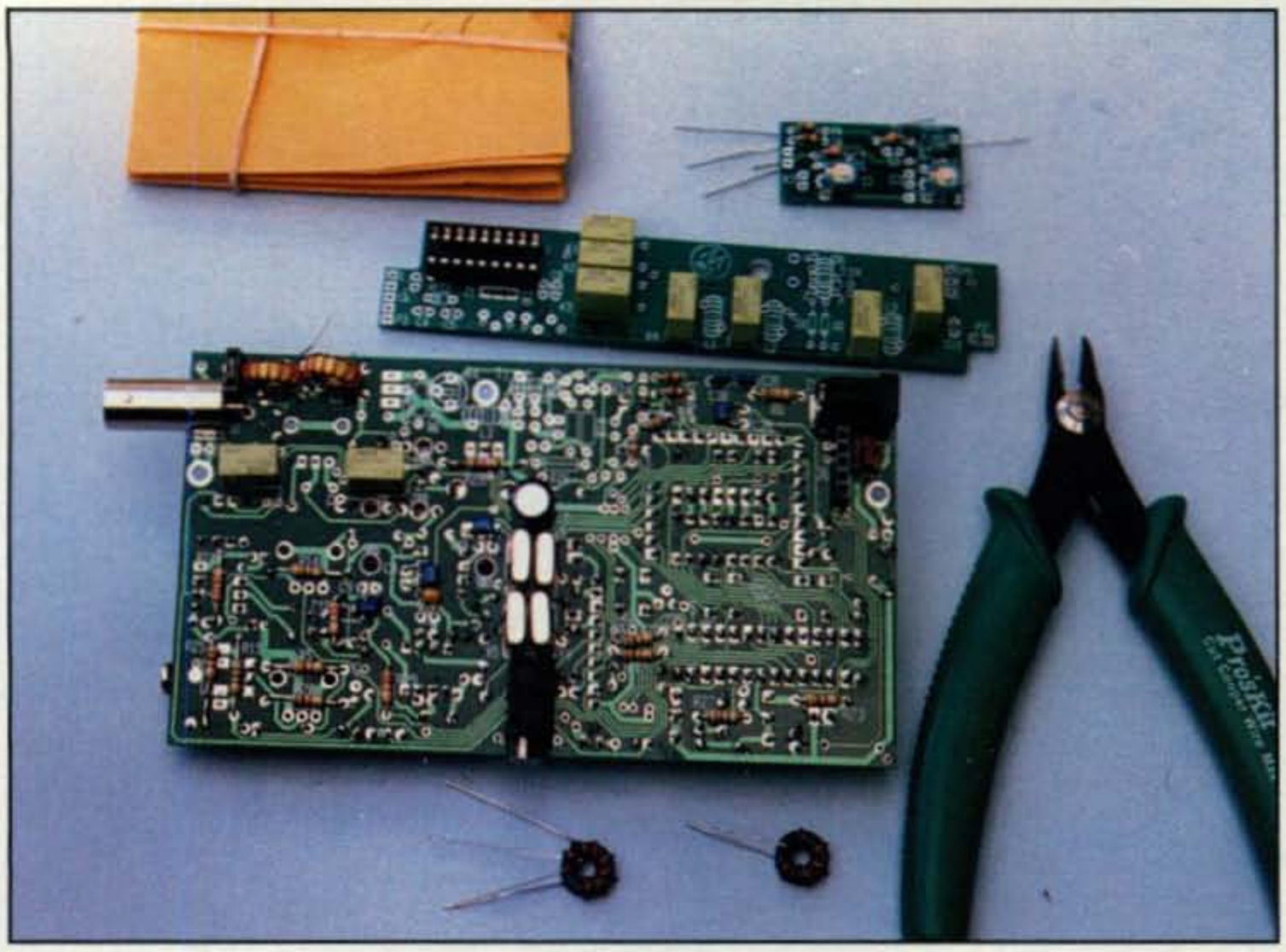

Photo 4– This "reverse view" shows how small parts mount on both sides of the main PC board. The receiver has now been assembled, and the transmitter section is half completed. Assembly has also begun on the optional automatic antenna tuner (long, narrow board) and 30-meter mod (small board). Two pre-wound toroids from AA3WF have been installed, two are ready to be installed, and four for the tuner are in envelopes.

to work with modern micro parts and PC boards that, thanks to Elecraft, it is the highlight of next month's "How It Works" column. Watch for it!

My KX1 worked like a champ right from turn-on. Even before I could check out and tweak the receiver on 30-meter band noise, I heard a YV calling CQ. I called him and received an immediate reply. I was still dinking with keyer speed settings and connecting a wattmeter to measure output when a KL7 started "QRZing" me, so I worked him, too (tweaking? Who needs it?!). I then switched to 20 meters and, by Jove, there was a YU completing a CQ. Yep, I worked him too. The little KX1 is a killer!

After the fun and games calmed down slightly (new rigs are so exciting!), I discovered several cool treats not mentioned in magazine ads. High-speed diodes are used for T/R switching, for example, so the previously mentioned T/R delay only affects receiver mute time. I also noticed the extended receive coverage was perfect for checking signal propagation reports from WWV on 10.0 MHz at 18 minutes after each hour and for monitoring east coast aviation weather data from New York Central on 10.051 MHz.

Another neat surprise was the "Morse Frequency Readout." You just tap the Band button once to read the frequency in Morse code and tap it again to switch bands (and read the new frequency). If you depress the Band button for one second, the keyer's speed is "read" in Morse, and speed changes (made by the main tuning knob) then also "read" in Morse. Tap the RIT button and you hear "R" and "O" for on and off. Tap the Menu button, scroll with the main tuning knob, and all menu selections "read out" on the LED and also in Morse. Those of us with visual impairments will find this feature essential.

We could continue for several more pages, but describing all of the KX1's assets in this column's limited space is nigh impossible. We thus encourage you to check with Elecraft at 831-662-8345 or <www.elecraft.com> for more

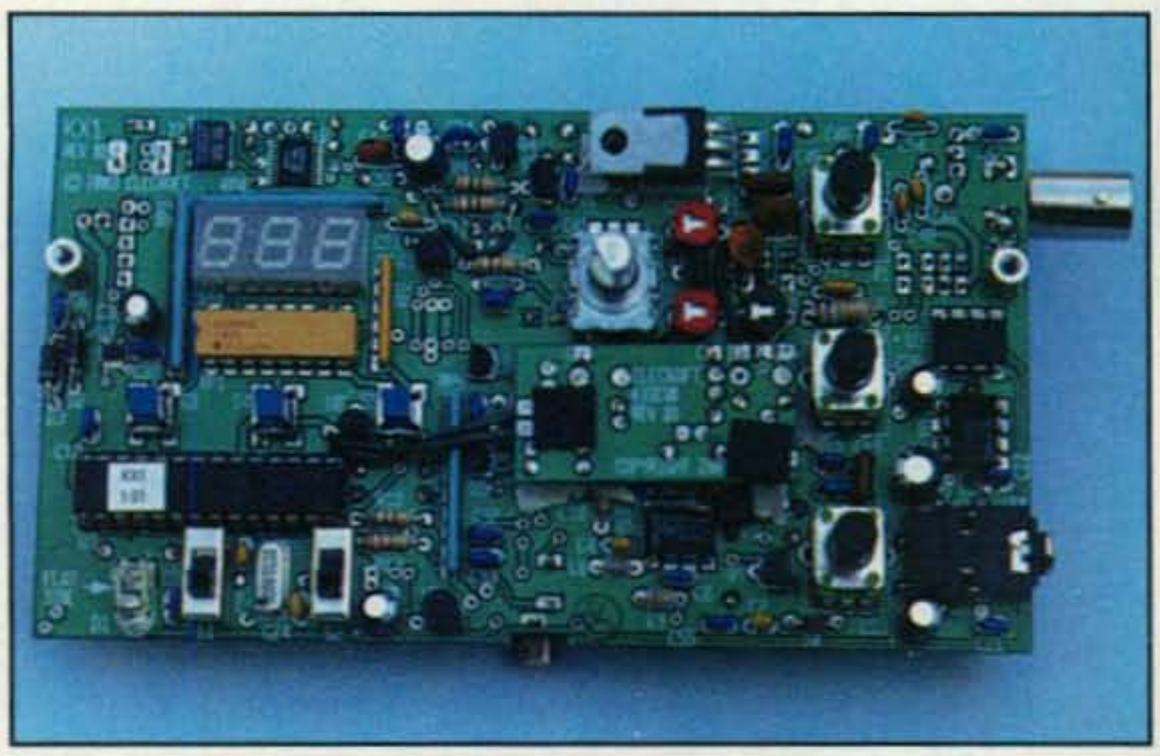

Photo 5– Top view of the fully assembled KX1 ready for installation in the case. The LED display is in middle left, the main tuning encoder (dial) is in middle right, and the three controls are vertical on the right. The RF output transistor is above the tuning encoder, the 30-meter board is mounted upside down below the encoder, and the automatic antenna tuner is mounted on the back side of the main board. The kit goes together very well.

Photo 6– Our "minimalist" gear laid out for the QRP road trip. Items include the Elecraft KX1 with optional case-mount paddle, external "Parkwood" paddle from WB9LPU (wb9lpu@earthlink.net), MFJ AC power supply, Maldol pull-up antenna with clip-on counterpoise, and self-supporting "Buddipole" antenna. Mobile antennas are not shown.

Photo 7– The main key to successful QRP mobiling is using the vehicle's metal frame as a solid ground. Here we scraped off 1/4 inch of paint so one of the mount's screws connects to ground. We then added a base matching coil and connected its ground strap to the mount's screws. A VOM check confirmed solid grounding.

Photo 8– "Instant mobiling" in a rental car is easy. Just put the transceiver in your lap, let the XYL drive, and use a small earbud for good copy over road noise and screeching tires. Notice the separate ground strap clipped to the antenna plug; it routes directly to a body bolt under the seat and makes a big difference in performance.

details or to purchase your own KX1. There is no better way to really get into QRP than with a brand-new dedicated QRP rig. Go for it!

QRP Road Trip

After "getting going" with the KX1, and with some folks still questioning if QRP really works out under totally unpredictable circumstances, we recently put our low-power show to the test. The results were most interesting. In addition to proving QRP's worth during good and adverse conditions

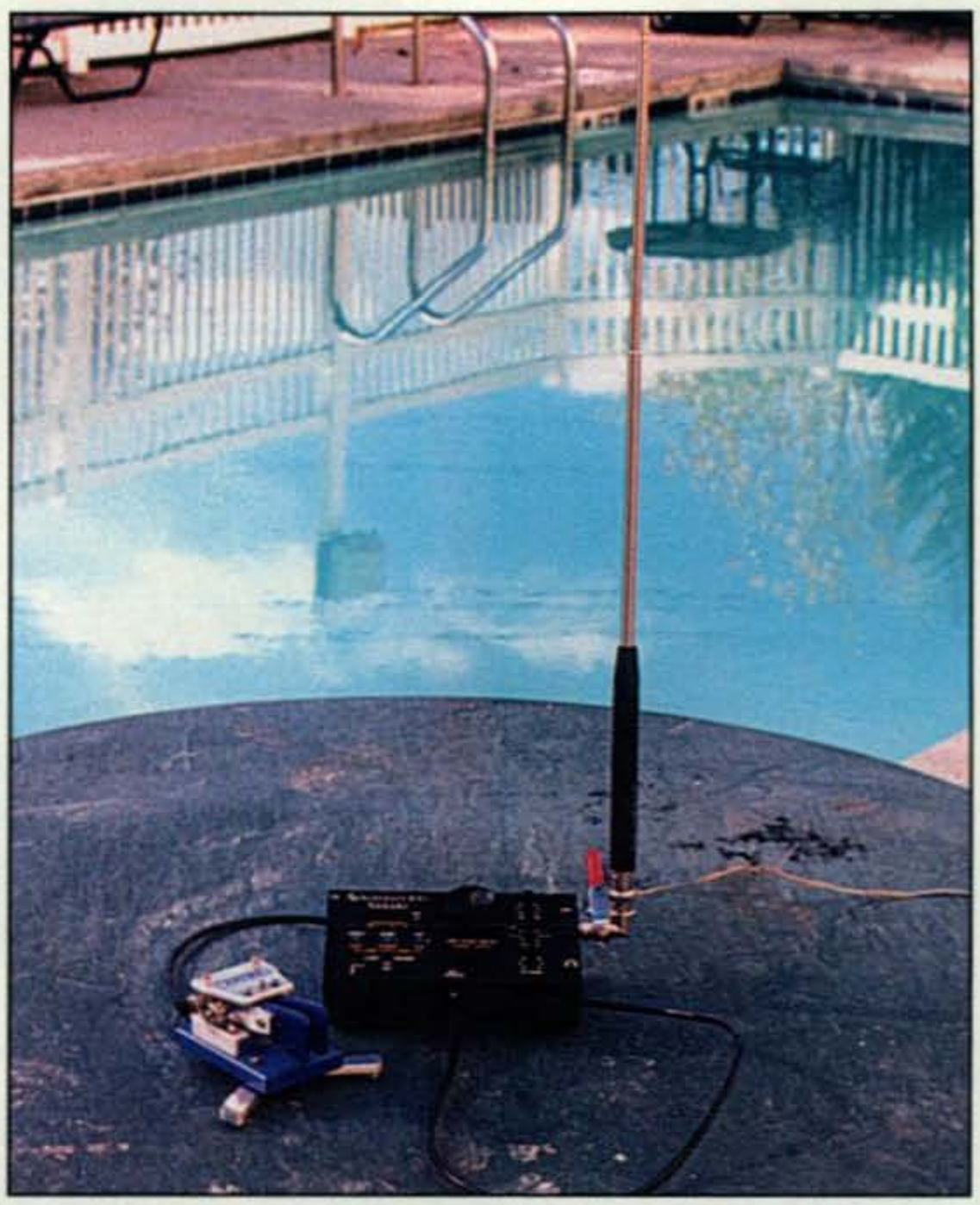

Photo 9– Poolside portable setup. Just plop down the rig, stretch out the counterpoise strap, and you are on the air in less than a minute. Try that with a big 100-watt rig. By the time you set up a power supply and run an antenna cable, I will have worked all the DX and gone parasailing!

alike, the secondary purpose of our short road trip was to check out the retirement possibilities and medical facilities in Panama City, Florida and Dothan, Alabama. Since we were traveling in a rental car, staying in motels, and moving at warp speed, hamming on the fly with minimum time for rig setup was vital.

Typical of unexpected circumstances, we were never in one spot long enough to string up a wire antenna or even quickly assemble the multiband "Buddipole" antenna we carried for use on the beach. Our main on-the-air time was mobiling from the car with the KX1 and 7-foot Hamsticks and operating "poolside portable" with the KX1 and a Maldol pull-up antenna (handicaps some non-QRPers would consider overwhelming). The results? While sporadically operating 20 meters during daylight hours, I worked stations from coast to coast with an approximate 75-percent reply to all calls—even to our own CQs. Results on 30 meters at night were even better, with 85-percent return to calls, many including good DX QSOs. Judging from past experiences under similar circumstances, I doubt that I would have been any more if I had used a 50- or 100-watt rig. The only good one that slipped away was a VK at daybreak on 30 meters. We were traveling in a fog and had to stop for food and fuel before I could call him. The fate of that call will always be a mystery, but one fact is certain: A little QRP goes a long way!

On that cheerful note, we must once again sign off for another month. Keep on working the world with low power, and I will be listening for you week nights on 30 meters.

73, Dave, K4TWJ

Yaesu's FT-897 isn't designed to be the "carry anywhere" radio that the FT-817 is, but it can be operated portable with optional internal batteries. WB6NOA looks at two options for batteries and chargers.

Battery Power For the Yaesu FT-897

BY GORDON WEST,* WB6NOA

The Yaesu FT-897 all-mode, 1.8 430 MHz transceiver has a removable base plate that reveals a shallow compartment for twin 4500 mAh nickel metal hydride (NiMH) battery packs selected by the battery A and battery B switch on the top of the unit. With two battery packs installed, you have 9 amp hours of battery capacity. The FT-897 will automatically sense that it's operating on battery power and drop back to 20 watts PEP HF output, and a little less on the 2 meter and 440 MHz bands. Since the twin internal batteries fit inside the bottom cover, you won't add an inch to the existing frame of the equipment.

In this article we'll look at two sources of the battery packs and required chargers: Yaesu itself and W4RT Electronics. The Yaesu part number for the NiMH battery pack is FNB-78, and you may install one or both. Each pack sells for around $120 under the Yaesu brand, or $100 from W4RT Electronics.

W4RT Electronics (www.w4rt.com) reminds Yaesu users that the FT-897 battery packs require a special charger to bring each battery back up to a full 15 volt DC charge. For $85, the W4RT Electronics OFC-897 One Fast Charger is less expensive than the two-part Yaesu system—the fast charger, Model CD-24, priced at $120, and the PA-26B AC charger (required for charging from an AC power source) at an additional $85. Depending on your needs, though, there are some benefits to the Yaesu unit, which we'll discuss later.

From a straight cost perspective, the W4RT system not only saves money, but can help keep the radio affordable. "I think I lose some sales when I start adding up the various components to keep the 897 on the air on internal batteries," commented a dealer at the recent Southwestern Division ARRL Convention. "But when I tell the customer a hundred bucks for the battery, and 85 bucks more for a fast battery charger, all from W4RT, they usually buy the Yaesu radio on the spot and order the W4RT battery and charger system direct. The less-expensive battery system helps me sell the radio."

W4RT has crafted a nice business of accessories for the Yaesu product line. This includes custom antenna tuners manufactured by LDG, backpacks specifically designed to hold either a big or small radio system out on a hike, CW and SSB filters, and several interesting DSP additions to the FT-817 micro-HF radio.

I ordered a pair of batteries and the fast charger, and within a week they arrived, all packaged in bubble pack and with enough documentation to make the battery installation a plug-and-play affair. Page six of the Yaesu FT-897 manual describes the simple process of removing six screws on the bottom cover, dropping one or a pair of batteries into the vacant holder inside the equipment, and simply plugging the three-pin battery leads into a connector. Be sure to align the batteries so the multi-pin charging plugs are next to each other. This allows the rear cover to drop back into place after removing the two plastic plug hole covers.

Two internal battery packs (4.5 amp/hours each) provide up to 9 amp/hours of portable operation for the Yaesu FT-897. They can be charged without being removed from inside the radio.

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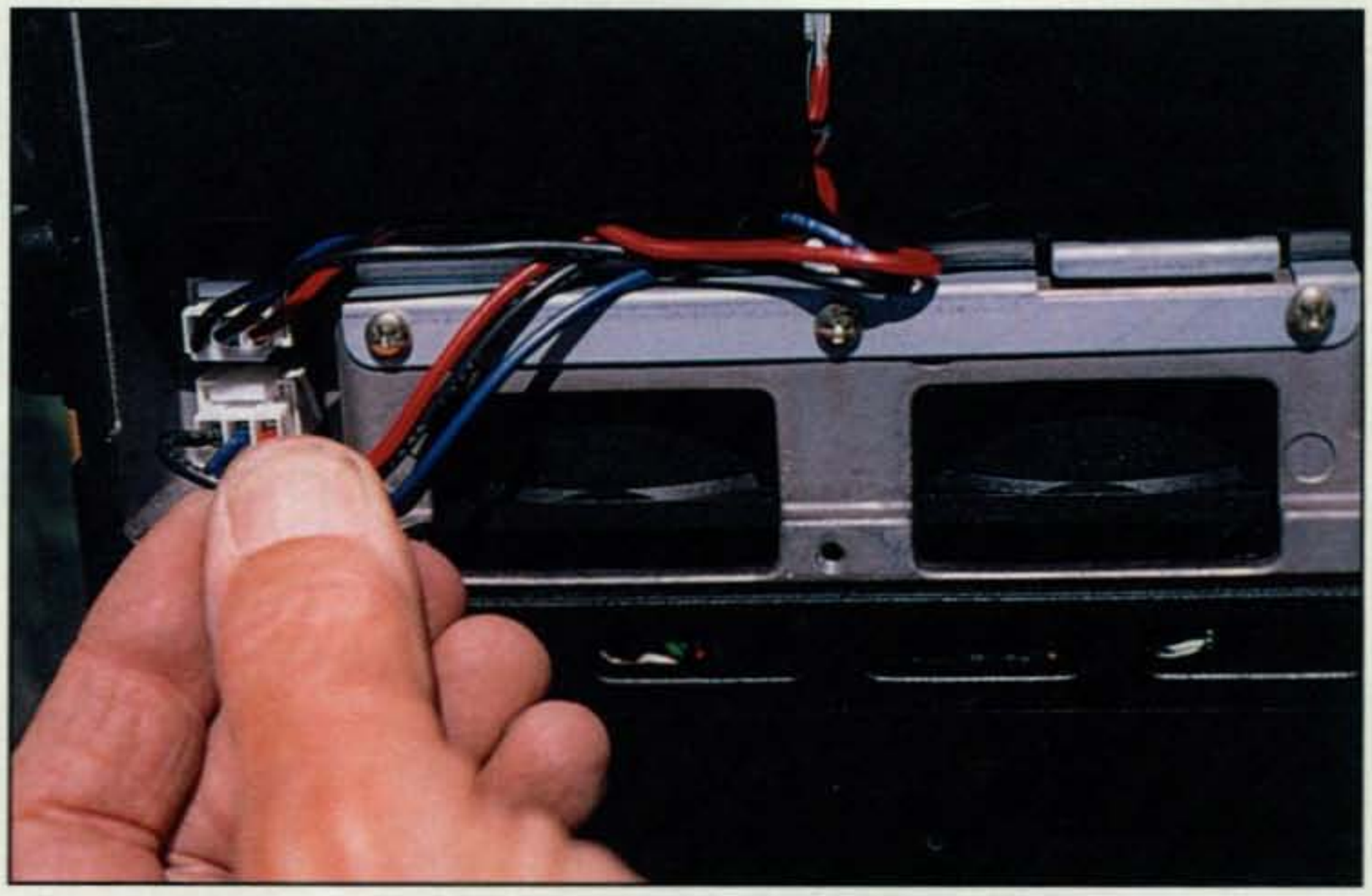


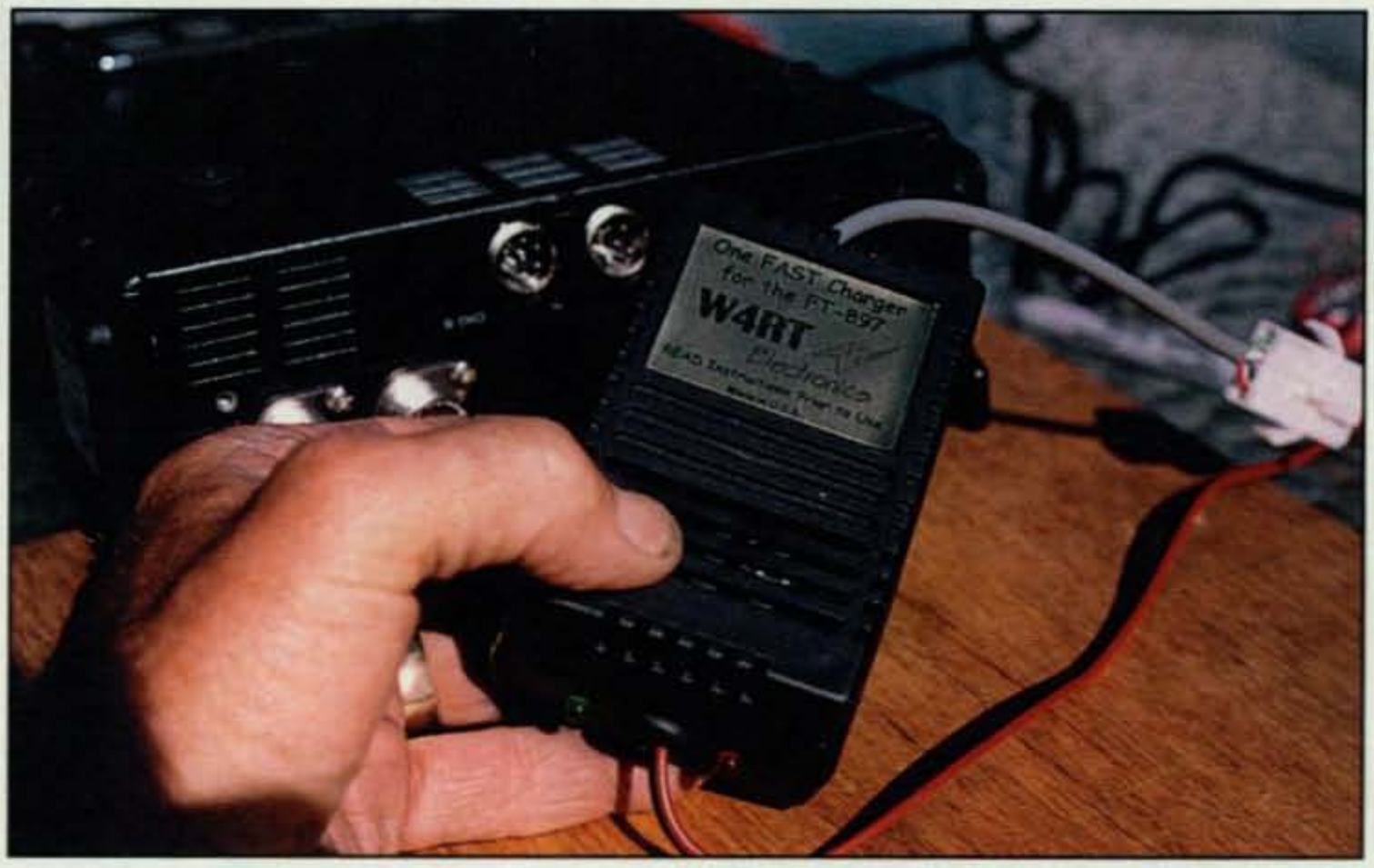
The battery packs simply plug into sockets inside the FT-847.

You can begin operating the equipment immediately, because W4RT sends the batteries partially charged (as does Yaesu). In fact, W4RT recommends *not* fast charging the batteries until they are more than half discharged (less than 13.2 volts on the 897's front-panel battery-voltage display).

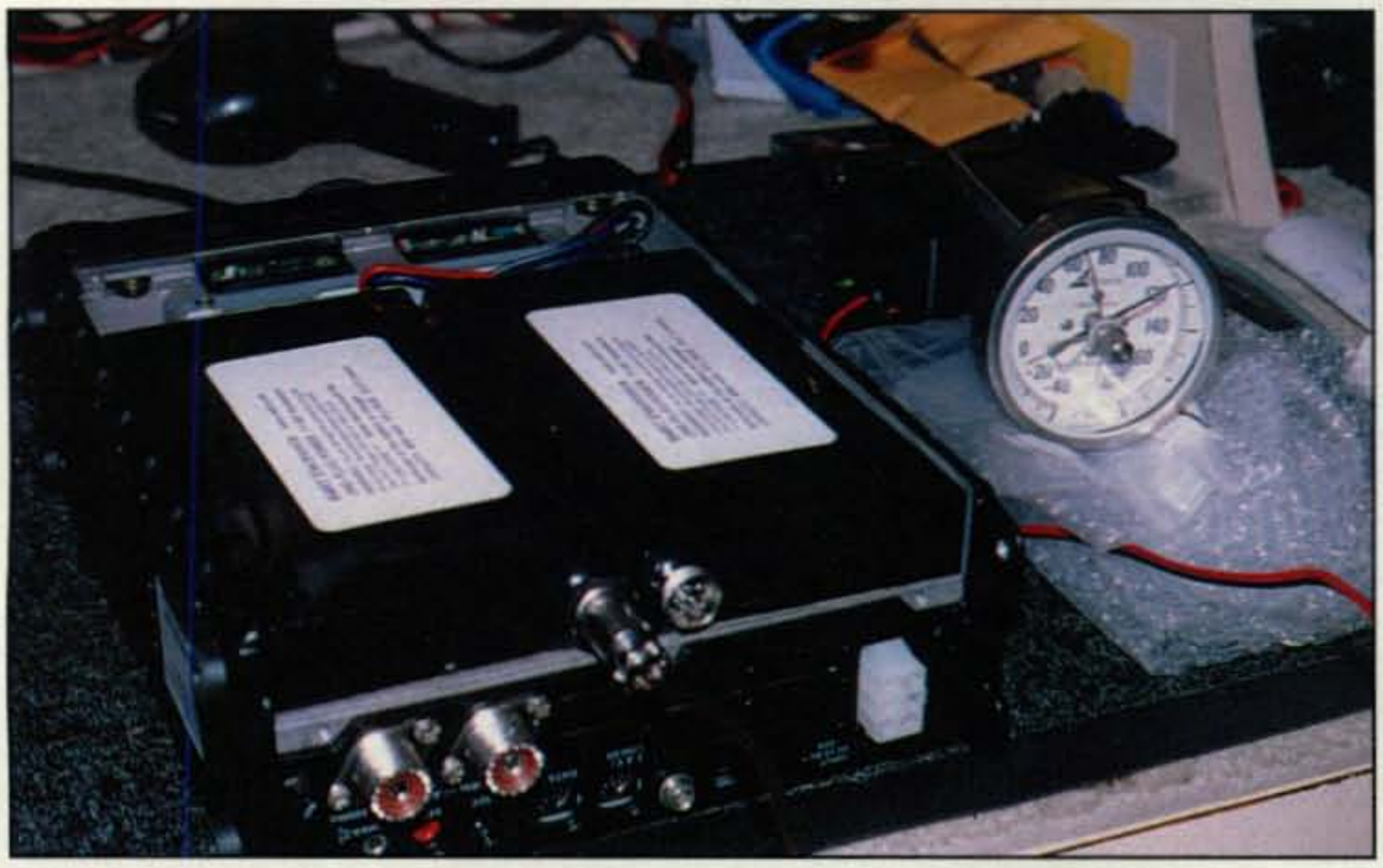
When you are ready to charge with the W4RT fast charger on AC, first plug in the multi-pin battery connector on the rear of the equipment, and then plug in the 16 volt AC transformer. The lightweight plastic charger control unit rests near the equipment, *ventilation holes up*. The folks at W4RT caution to make sure that the ventilation holes are up, and we found out why.

After three hours of fully charging a relatively depleted 4500 milliamp/hour battery pack, the AC transformer was only warm to the touch, but the charger controller, which cycled to automatic trickle after recharging, was very warm. We measured the temperature at 130 degrees, and we were told this is somewhat normal to restore a pretty much discharged battery back to full charge in just a few hours.

The Yaesu brand fast charger may run a little bit cooler, plus it is also designed for mobile use, taking power from your vehicle DC source or running it at home on an AC to DC power supply. This means you might want to consider how you plan to charge the equip-



Be sure to keep the ventilation holes UP on the W4RT fast charger. The unit gets very warm after a few hours of charging, so you don't want to block ventilation.



Each battery charges separately and runs the radio separately (there's a switch to select which one to use), allowing one pack to charge while the other is in use. Note the thermometer at the far right, measuring 120° F on the charger module!

ment before you decide which charger system to buy.

Either way, four hours to charge a big 4 1/2 amp/hour battery pack inside a radio is pretty swell, whether you do it off DC or AC. W4RT has redundant fail-safe circuits in both the battery pack and the charger assembly to ensure that fast charging always clicks out before the battery starts to overcharge (typical of NiMH charging techniques and "smart charger" circuits built into both Yaesu and W4RT charging systems). "Our circuit is a multi-stage charging process," explained Barry Johnson, W4WB, of W4RT Electronics. "As the NiMH charges, its voltage and temperature both rise, but not by much, *until* the pack reaches 80% of capacity. At that point, the voltage and the temperature both start to rise rapidly. We stop the high-rate charging when the temporal voltage slope is negative (dV/dt = <0), meaning that the voltage has peaked and is starting to decrease. When the red light goes out, we start a trickle charge."

If you're planning on taking your FT-897 for a hike, do consider one—or a pair—of 4.5 amp/hour batteries that fit nicely inside the chassis. If you plan to run the equipment strictly mobile, the Yaesu CD-24 four-hour charge system is all that is required. The Yaesu PA-26 is only necessary for converting house-power AC down to 13.8 volts DC.

The W4RT Electronics system with its relatively hot-running OFC-897 could also work without the AC transformer for mobile-only use. However, it needs a minimum of 16 volts DC to begin slowly charging the internal battery. This DC voltage is well beyond what you would normally get from your mobile system, and unless you want to dedicate several large solar panels to give you a higher voltage source, the best bet for mobile use with the W4RT system would be to purchase an inexpensive DC-to-AC power inverter and run the fast charger with its large AC adapter from that inverter.

Once you have those batteries charged, you will have a great time operating absolutely portable with over 9 amp/hours of internal voltage. Thus, if you enjoy portable operation, the FT-897 with its built-in single or double battery pack will keep you on the air for some time!

For more information, contact your favorite dealer or:

W4RT Electronics, 3077-K Leeman Ferry Rd., Huntsville, AL 35801; web: <http://www.w4rt.com>.

Vertex Standard (Yaesu), 10900 Walker St., Cypress, CA 90630; phone (714) 827-7600; web: <http://www.vxstdusa.com>. ■

Additional Battery Sources

The Yaesu batteries are also available from Batteries America, 2211-D Parview Rd., Middleton, WI 53562; phone 800-308-4805; on the web: <http://www.batteriesamerica.com>. W&W Manufacturing is introducing its own version of the battery pack this month. No price was set at press time. For more information, contact W&W Manufacturing, 800 South Broadway, Hicksville, NY 11801-5017; phone 800-221-0732; web: <http://www.ww-manufacturing.com>.

what's new

BY KARL T. THURBER, JR.,* W8FX

Software Defined Radio, PSK Meter, Diamond Antenna, ACE-HF, and more

This month in your "What's New" column we'll focus on some noteworthy ham-shack radio gear, and accessories, antennas, software, books, and other items we think will be of real interest to you. Let's dig right into the column to examine a new and even revolutionary type of radio.

Radio Gear

FlexRadio Systems Software Defined Radios™. FlexRadio Systems is now shipping the SDR-1000 Software Defined Radio (SDR) Transceiver (photo A), considered to be the first truly open-software transceiver for amateur radio experimenters and QRP enthusiasts. The new radio is based on the award-winning *QEX* series "A Software Defined Radio for the Masses," by Gerald Youngblood, AC5OG, which appeared in four 2002 and 2003 issues of *QEX*.

Consisting of an assembled-and-tested three-board set, the SDR-1000 offers general-coverage reception from 11 kHz to 65 MHz and transmits 1 watt RMS on all amateur bands, 160 through 6 meters, within the range. The SDR-1000 connects to a PC sound card and parallel port to provide the RF front end for the software radio.

Unlike traditional analog or even DSP radios, the SDR-1000's modulation, demodulation, and control are completely defined by software that's open to user modification. This means that the user community can be involved in continuous improvement of the radio. Since all functionality is defined in software, the radio allows the flexibility to quickly integrate new modes and control features. In other words, you might say that the radio and the personal computer have now merged into one!

All radio control functions are managed through the PC parallel port, including control for up to seven transverters or other accessories. Internal connections are included for controlling up to six filters and a TR relay for a user-provided linear amplifier. The SDR-1000 three-board set is $499.

For more information, contact FlexRadio Systems, 8900 Marybank Drive, Austin, TX 78750 (512-250-5435; e-mail: <sales@flex-radio.com>; on the web: <http://www.flex-radio.com>).

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

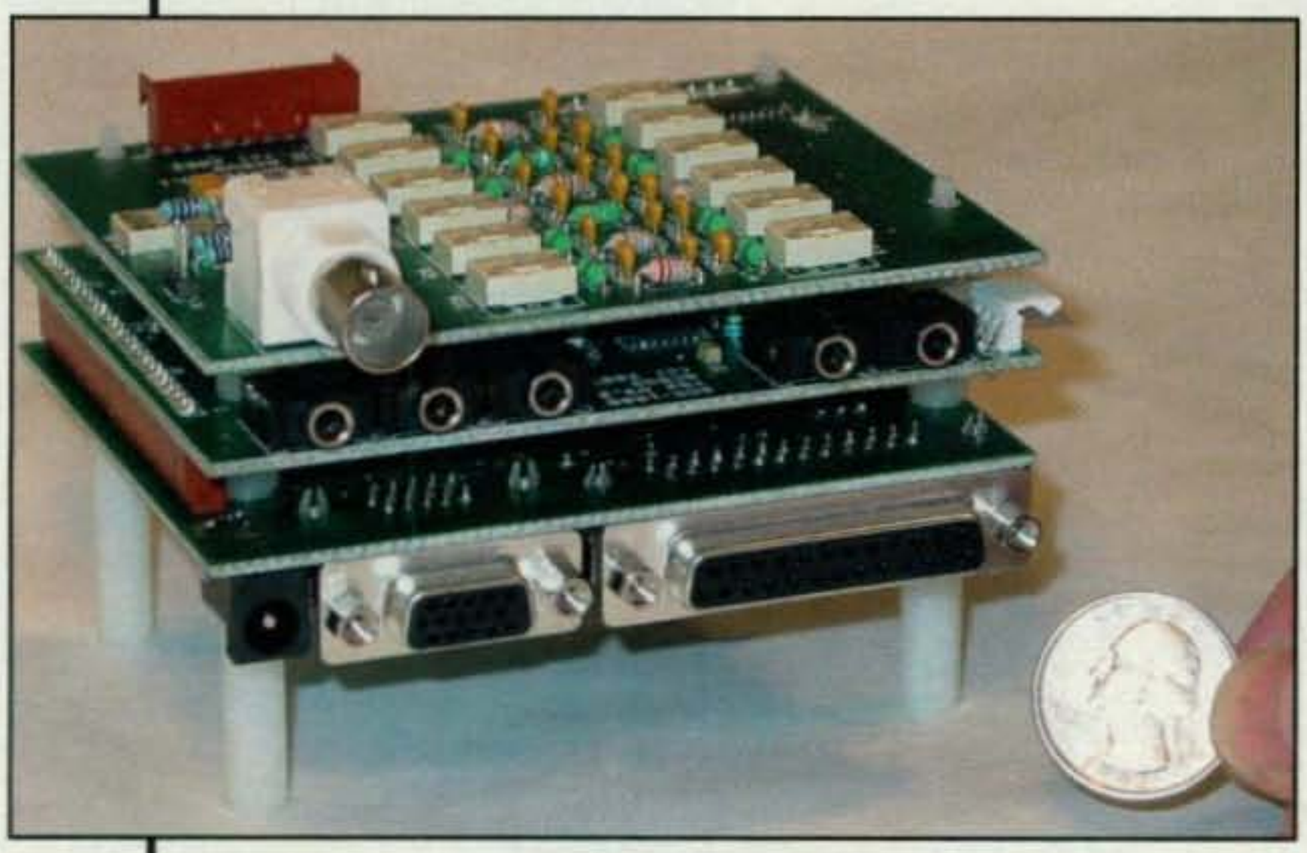


Photo A– Flex Radio Systems is now shipping the SDR-1000 Software Defined Radio (SDR) Transceiver, considered the first open-software transceiver for amateur radio experimenters and QRP enthusiasts. The radio, with its hardware assembly shown here, is based on Gerald Youngblood, AC5OG's award-winning QEX *series. (Photo courtesy FlexRadio Systems)*

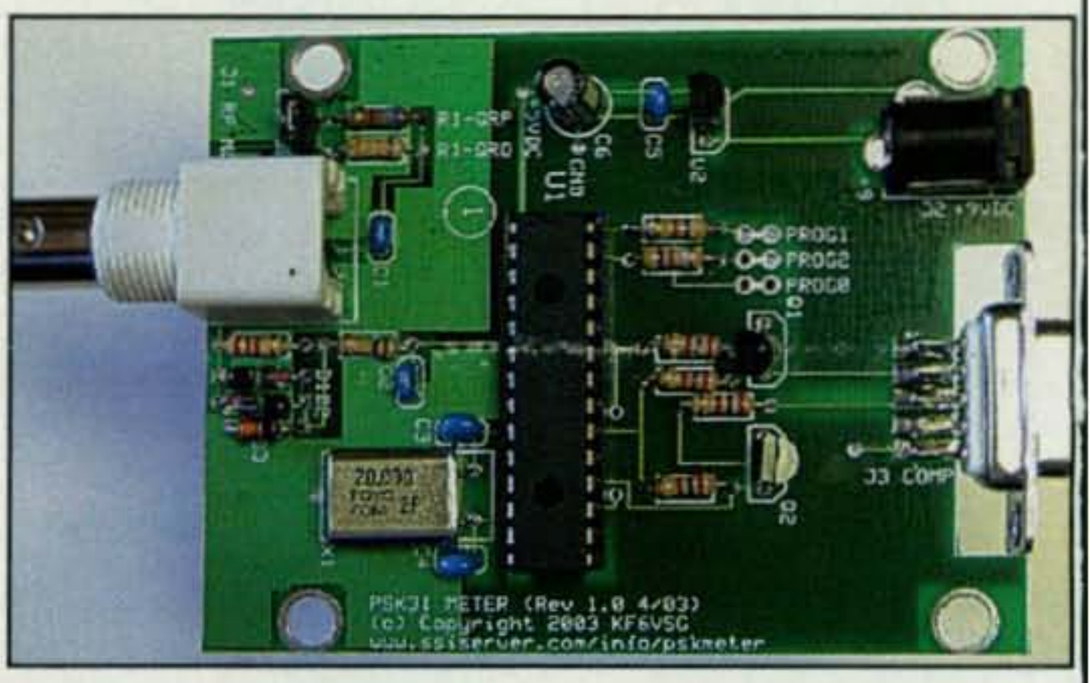


Photo B– Here's the Software Science PSKMeter printed-circuit board, a microprocessor-controlled device to monitor and control PSK-31 and PSK-63 RF output for maximum strength signal with little or no distortion (splatter). The company also offers a matching enclosure, not shown. (Photo courtesy SSI)

Accessories for the Shack

PSKMeter Kit. Software Science Inc. is now shipping its PSKMeter Kit (photo B), a microprocessor-controlled device to monitor and control PSK-31 and PSK-63 RF output for maximum strength signal with little or no distortion (splatter). The new kit comes with a printed circuit board, preprogrammed PIC processor, and all parts needed to construct the device in about one hour. The kit requires a second serial port (for Windows® 2000, you can download a special driver that enables a single serial port to be shared). The company also offers a USB converter option that you can use in place of the second serial port.

A Windows® application program, PSKMeter.exe, samples the RF output, analyzes the signal, and displays the outgoing intermodulation distortion

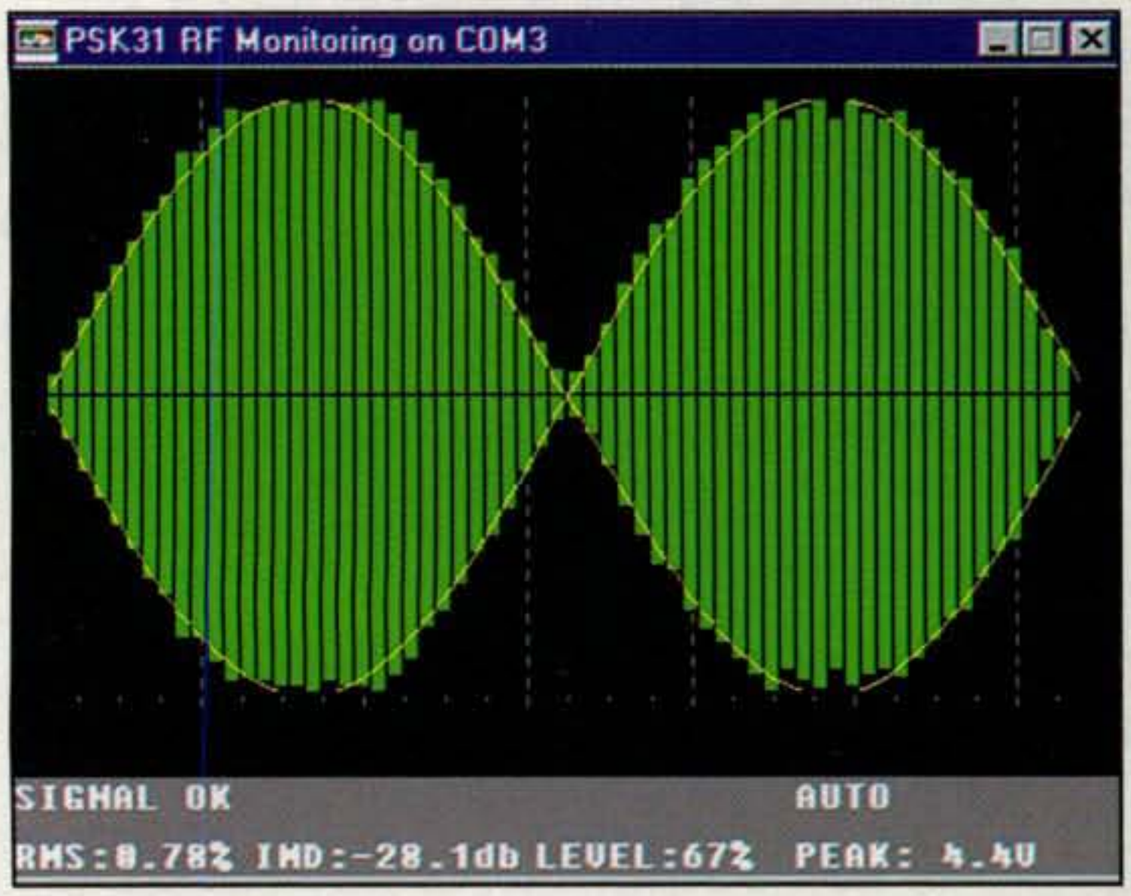


Photo C– Shown here is the PSKMeter Windows® application program displaying the measured PSK-31 RF envelope, RMS deviation from a perfect signal, IMD figure in dB, soundcard level, and measured signal amplitude. A popup menu allows you to configure the program's parameters. (Photo courtesy SSI)

(IMD) level (photo C). The program then controls the soundcard audio level, finding the optimum drive level for greatest signal strength without distortion. The kit's price is a modest $39.95.

For more information, including the downloadable assembly manual, user's guide, and PC software, go to the SSI website at <http://ssiserver.com/info/pskmeter>. You'll also find complete company contact information on the site.

Antennas and Accessories

New Diamond Antenna Products from RF Parts. RF Parts has been distributing the popular Diamond Antenna imports for many years and is the exclusive U.S. distributor for the antennas, which are sold to amateurs through authorized stocking dealers. Steve LaGaisse, K6NDG, of Diamond Antenna/RF Parts, let us know of three new antennas that have been added to the company's ever-growing list of amateur-band antennas.

The CR8900A Mobile Antenna (photo D) is Diamond's new 10m/6m/2m/70cm quad-band FM mobile antenna designed for the Yaesu FT-8900 and similar FM multiband radios. The CR8900A antenna is 49.5 inches in length. It acts as a loaded wavelength on 10 and 6 meters, a 1/2 wavelength on 2 meters, and a 2 5/8-wavelength collinear on 70 cm. A foldover feature allows for easy entry into garages and parking structures. Amateur net is $109.95. Use Diamond models K400C or K600M mounts to complete the installation.

The Diamond SRH320A HT Antenna (photo E) is Diamond's latest triband HT antenna covering 2m/1-1/4m/70cm; it's said to be ideal for the Kenwood TH-F6A and similar HTs. The antenna's flexible 14-inch length is said to offer significant improvement over standard HT antennas. The SRH320A sports an SMA connector and has a power rating of 10 watts. Amateur net is $49.95.

Not to be overlooked is the NR7900A High-Power Mobile Antenna. It's Diamond's latest 2m/70cm mobile antenna, one said to be capable of handling 300 watts on 2 meters and 250 watts on 70cm. As with the CR8900A, the foldover feature allows for easy entry into garages and parking structures. The antenna has a length of 58 inches and comes with a standard male UHF-type connector. Amateur net is $89.95. Use Diamond models K400C or K600M mounts for proper installation.

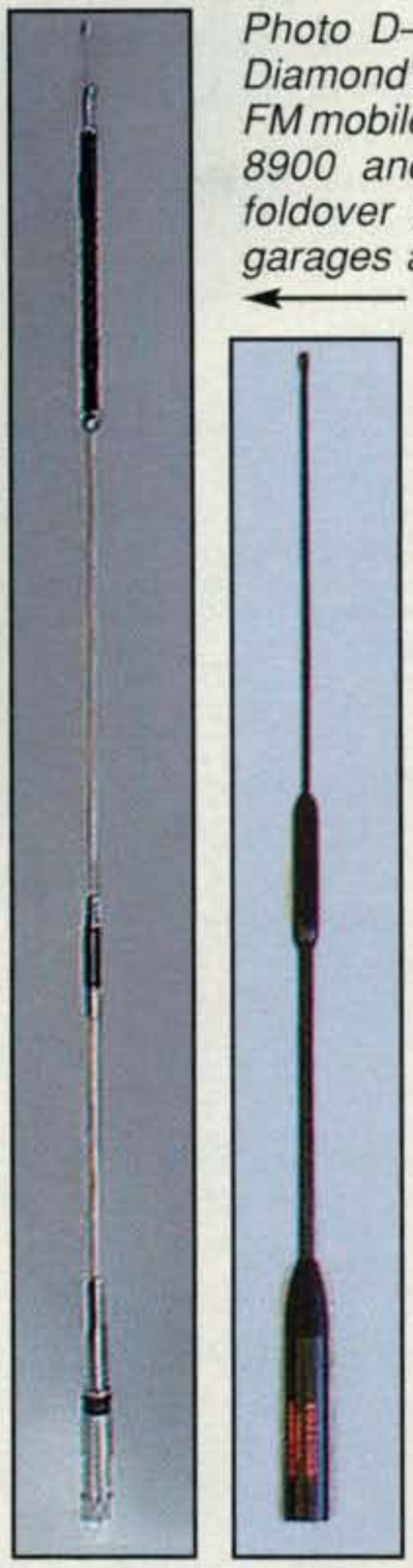


Photo D– The CR8900A Mobile Antenna is Diamond's new 10m/6m/2m/70cm quad-band FM mobile antenna designed for the Yaesu FT-8900 and similar FM multiband radios. A foldover feature allows for easy entry into garages and parking structures. (Photo courtesy Diamond Antenna) ←

Photo E– The Diamond SRH320A HT Antenna is Diamond's latest triband HT antenna covering 2m/1-1/4m/70cm. It's said to be ideal for the Kenwood TH-F6A and similar HTs. The antenna's flexible, 14-inch length is said to offer significant improvement over standard HT antennas. (Photo courtesy Diamond Antenna) ←

For more info, contact Diamond Antenna/RF Parts Company, 435 South Pacific Street, San Marcos, CA 92069 (760-744-0900; e-mail: <diamondantenna@rfparts.com>; web: <www.diamondantenna.net> or <http://www.rfparts.com/diamond>).

Antenex® Mobile Antenna Technology Reborn. Antenex® is known for its high-quality antennas and antenna systems, which it dubs "signal propagation systems." These are primarily rugged VHF and UHF models for business and commercial applications. Although most of the company's antennas thus are not designed specifically for amateur radio use, many of the antennas cover popular VHF/UHF amateur bands. Therefore, the antennas are suitable for the user interested in high-quality, rugged, and long-life antennas. A wide variety of antenna types are available.

Recently, Antenex® announced a completely improved family of mobile antennas. All Antenex® mobile load coil products now feature an insert molded housing that has added moisture resistance and enhanced mechanical durability. They also have an improved look and feel, with an attractive pebble-grain finish and hot-stamped logo.

Insert molding technology is applied where high-heat, UV-stable ABS resin is molded directly around brass top and bottom bushings to create a solid, one-piece molded housing. A bottom view of the product (photo F) reveals a gold-plated push-pin contact that stays corrosion-free and maintains good RF power transfer over time, as well as a permanent product identification label and a moisture-seal o-ring built into the base.

A further peek inside shows silver-content solder used on all solder joints, triple-plated solid-brass inserts, and a gold-plated-leaf spring top contact. A removable ferrule for car washes is included, and a stainless-steel shock-spring option is available for high-vibration applications. The new antennas are offered for all popular frequencies from 27 MHz to 2.5 GHz.

SAVE BIG ON ANTENNAS, TOWERS & CABLE

TELESCOPING ALUMINUM TUBING

DRAWN 6063-T832

.375	$.70/ft	1.250"	$1.55/ft
.500"	$.80/ft	1.375"	$1.75/ft
.625"	$.90/ft	1.500"	$1.95/ft
.750"	$1.00/ft	1.625"	$2.25/ft
.875"	$1.10/ft	1.750"	$2.50/ft
1.000"	$1.20/ft	1.875"	$2.75/ft
1.125"	$1.35/ft	2.000"	$3.00/ft
		2.125"	$3.50 /ft

In 6' or 12' lengths, 6' lengths ship UPS. Call for 3/16"& 1/4" rod, bar stock, and extruded tubing.

CUSHCRAFT ANTENNAS

13B2/A148-10S	$159/89
A270-6S/A270-10S	$79/99
A3S/A4S	$459/549
A50-3S/5S/6S	$99/169/269
A6270-13S	$199
AR2/ARX2B	$55/69
AR270/AR270B	$89/99
R6000/R8	$309/459
X7/X740	$649/269
XM240	$679

Please call for more Cushcraft items.

FORCE 12–MULTIBAND

C3	10/12/15/17/20m, 7 el	$599
C3E	10/12/15/17/20m, 8 el	$649
C3S	10/12/15/17/20m, 6 el	$539
C3SS	10/12/15/17/20m, 6 el	$559
C4	10/12/15/17/20/40m, 8 el	$759
C4S	10/12/15/17/20/40m, 7 el	$679
C4SXL	10/12/15/17/20/40m, 8 el	$979
C4XL	10/12/15/17/20/40m, 9 el	$1119
C19XR	10/15/20m, 11 el	$959
C31XR	10/15/20m, 14 el	$1299

Please call for more Force 12 items.

TRYLON "TITAN" TOWERS

SELF-SUPPORTING STEEL TOWERS

T200-64	64', 15 square feet	$1209
T200-72	72', 15 square feet	$1429
T200-80	80', 15 square feet	$1649
T200-88	88', 15 square feet	$1949
T200-96	96', 15 square feet	$2249
T300-88	88', 22 square feet	$2189
T400-80	80', 34 square feet	$2089
T500-72	72', 45 square feet	$1979
T600-64	64', 60 square feet	$1869

Many more Trylon towers in stock!

BENCHER / BUTTERNUT

Skyhawk, Triband Beam	$1129
HF2V, 2 Band Vertical	$249
HF5B, 5 Band Minibeam	$359
HF6VX, 6 Band Vertical	$339
HF9VX, 9 Band Vertical	$369
A1712, 12/17m Kit	$54
CPK, Counterpoise Kit	$129
RMKII, Roof Mount Kit	$159
STRII, Roof Radial Kit	$125
TBR160S, 160m Kit	$139

More Bencher/Butternut–call

M2 VHF/UHF ANTENNAS

144–148 MHz

2M4/2M7/2M9	$95/109/129
2M12/2M5WL	$165/209
2M5-440XP, 2m/70cm	$179

420–450 MHz

440-470-5W/420-450-11	$139/95
432-9WL/432-13WLA	$179/239
440-18/440-21ATV	$129/149

Satellite Antennas

2MCP14/2MCP22	$169/239
436CP30/436CP42UG	$239/279

ROHN TOWER

25G/45G/55G	$89/189/239
25AG2/3/4	$109/109/119
45AG2/4	$209/225
AS25G/AS455G	$39/89
BPC25G/45G/55G	$75/99/110
BPL25G/45G/55G	$85/109/125
GA25GD/45/55	$68/89/115
GAR30/GAS604	$35/24
SB25G/45/55	$39/89/109
TB3/TB4	$85/99

Please call for more Rohn prices.

US TOWER

MA40/MA550	$999/1549
MA770/MA850	$2599/3999
TMM433SS/HD	$1349/1649
TMM541SS	$1789
TX438/TX455	$1279/1749
TX472/TX489MDPL	$2899/7299
HDX538/HDX555	$2099/2549
HDX572MDPL	$6669

Please call for help selecting a US Tower for your needs. Shipped factory direct to save you money!

COMET ANTENNAS

GP15, 6m/2m/70cm Vertical	$149
GP6, 2m/70cm Vertical	$139
GP9, 2m/70cm Vertical	$169
B10NMO, 2m/70cm Mobile	$36
SB14, 6m/2m/70cm Mobile	$59
SBB224NMO,2m/220/70cm	$69
SBB2NMO, 2m/70cm Mobile	$39
SBB5NMO, 2m/70cm Mobile	$49
SBB7NMO, 2m/70cm Mobile	$69
UHV4/UHV6	$109/135

Much more Comet in stock–call.

M2 ANTENNAS

50–54 MHz

6M5X/6M7JHV	$209/269
6M2WLC/6M9KHW	$459/499

10/12/15/17/20m HF

10M4DX, 4 Element 10m	$399
12M4DX, 4 Element 12m	$399
15M4DX, 4 Element 15m	$449
17M3DX, 3 Element 17m	$399
20M4DX, 4 Element 20m	$529

More M2 models in stock–please call.

GLEN MARTIN ENGINEERING

Hazer Elevators for 25G

H2, Aluminum Hazer, 12 sq ft	$359
H3, Aluminum Hazer, 8 sq ft	$269
H4, HD Steel Hazer, 16 sq ft	$339

Aluminum Roof Towers

RT424, 4 Foot, 6 sq ft	$159
RT832, 8 Foot, 8 sq ft	$239
RT936, 9 Foot, 18 sq ft	$389
RT1832, 17 Foot, 12 sq ft	$519
RT2632, 26 Foot, 9 sq ft	$869

UNIVERSAL ALUMINUM TOWERS

4-40'/50'/60'	$539/769/1089
7-50'/60'/70'	$979/1429/1869
9-40'/50'/60'	$759/1089/1529
12-30'/40'	$579/899
15-40'/50'	$1019/1449
23-30'/40'	$899/1339
35-30'/40'	$1019/1569

Bold in part number shows wind-load capacity. Please call for more Universal models. All are shipped factory direct to save you money!

DIAMOND ANTENNAS

D130J/DPGH62	$79/139
F22A/F23A	$89/119
NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A, 2m/70cm Vertical	$129
X500HNA/X700HNA	$229/369
X510MA/510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock.

MFJ

259B	$219
269	$299
941E	$109
945E	$99
949E	$139
969	$169
986	$289
989C	$309
1798, 80–2m Vertical	$249
1796, 40/20/15/10/6/2m Vert.	$189

Big MFJ inventory–please call

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
RG-8X, Mini RG-8 Foam	$.19/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Ple ase Call

Please call for more coax/connectors.

TIMES MICROWAVE LMR® COAX

LMR-400	$.59/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

TOWER HARDWARE

3/8"EE / EJ Turnbuckle	$11/12
1/2"x9"EE / EJ Turnbuckle	$16/17
1/2"x12"EE / EJ Turnbuckle	$18/19
3/16" / 1/4" Big Grips	$5/6

Please call for more hardware items.

HIGH CARBON STEEL MASTS

5 FT x .12" / 5 FT x .18"	$35/59
10 FT x .18" / 11 FT x .12"	$129/80
16 FT x .18" / 17 FT x .12"	$179/129
20 FT x .25" / 21 FT x .18"	$315/235
22 FT x .12" / 24 FT x .25"	$149/379

GAP ANTENNAS

Challenger DX	$289
Challenger Counterpoise	$29
Challenger Guy Kit	$19
Eagle DX	$299
Eagle Guy Kit	$29
Titan DX	$329
Titan Guy Kit	$29
Voyager DX	$409
Voyager Counterpoise	$49
Voyager Guy Kit	$45

Please Call for Delivery Information.

LAKEVIEW HAMSTICKS

9106	6m	9115	15m	9130	30m
9110	10m	9117	17m	9140	40m
9112	12m	9120	20m	9175	75m

All handle 600W, 7' approximate length, 2:1 typical VSWR...$24.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV	$129/169/199
G6-270R, 2m/70cm Vertical	$169
G6-144B/G7-144B	$109/179

Hustler Resonators in stock–call.

ANTENNA ROTATORS

M2 OR-2800P	$1249
Yaesu G-450A	$249
Yaesu G-800SA/DXA	$329/409
Yaesu G-1000DXA	$499
Yaesu G-2800SDX	$1089
Yaesu G-550/G-5500	$299/599

ROTATOR CABLE

R62 (#18)	$.32/ft.
R81/82	$.25/ft./.39/ft.
R84	$.85/ft

PHILLYSTRAN GUY CABLE

HPTG1200I	$.45/ft
HPTG2100I	$.59/ft
PLP2738 Big Grip (2100)	$6.00
HPTG4000I	$.89/ft
PLP2739 Big Grip (4000)	$8.50
HPTG6700I	$1.29/ft
PLP2755 Big Grip (6700)	$12.00
HPTG11200	$1.89/ft
PLP2758 Big Grip (11200)	$18.00

Please call for help selecting the Phillystran size for your application.

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GREAT US TOWER CRANK-UP DEALS!

TX SERIES CRANK-UP TOWERS

• Handles 35 square feet of antenna load at 50 MPH, 14.75 square feet at 70 MPH.

• All models supllied with hinged T-base, anchor bolts, hand winch (except motor drive models), top plate, and rotor plate.

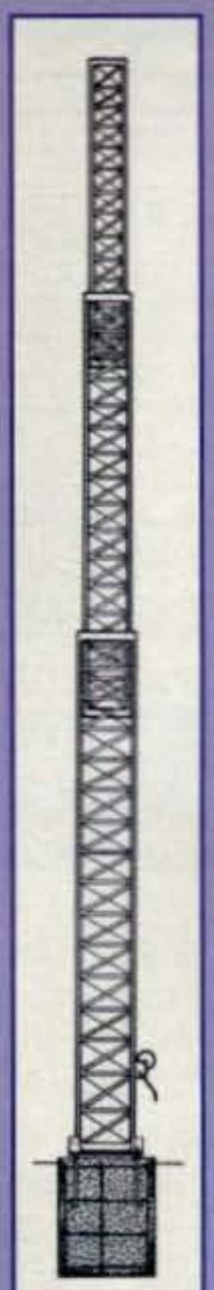
• MDP & MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

Now shipping from CA for west coast customers, and KS for east coast and midwest customers, to reduce freight cost!

TX SERIES HEAVY DUTY CRANK-UP TOWERS

TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
TX-438	38'	21'6"	355	$1,523	$1279
TX-455	55'	22'	670	$2,107	$1,749
TX-472	72'	22'8"	1040	$3,462	$2,899
TX-472MDP	72'	22'8"	1210	$5,571	$4,499
TX-489MDPL	89'	23'4"	1800	$9,034	$7,299



HDX SERIES CRANK-UP TOWERS

• Heavy duty, handles 44.7 square feet of antenna load at 50 MPH, 35 square feet at 70 MPH.

• All models supllied with hinged T-base, anchor bolts, hand winch (except motor drive models), top plate, and rotor plate.

• MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

Now shipping from CA for west coast customers, and KS for east coast and midwest customers, to reduce freight cost!

HDX SERIES HEAVY DUTY CRANK-UP TOWERS

TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
HDX-538	38'	21'6"	600	$1,807	$2,099
HDX-555	55'	22'	870	$3,162	$2,549
HDX-572MDPL	72'	22'8"	1600	$8,281	$6,669
HDX-589MDPL	89'	23'8"	2440	$10,841	$8,699
HDX-689MDPL	89'	23'8"	3450	$20,943	$16,499
HDX-5106MDPL	106'	24'8"	3700	$22,791	$17,549

MA SERIES CRANK-UP MASTS

• Handles up to 22 square feet of antenna load. (See chart below)

• MDP models include motor drive.

• All models supllied with anchor bolts, load-actuated hand winch, and house bracket.

• Options include coax arms, raising fixtures, motor drives, self-supporting and rotator bases, remote control panel, and more!

Now shipping from CA for west coast customers, and KS for east coast and midwest customers, to reduce freight cost!

MA SERIES CRANK-UP MASTS

MAST MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	50 MPH (sq. ft.)	70 MPH (sq. ft.)	LIST PRICE	SALE PRICE
MA-40	40'	21'6"	242	16.5	6.8	$1,209	$999
MA-550	55'	22'1"	435	22	9	$1,875	$1,549
MA-550MDP	55'	22'1"	620	22	9	$3,584	$2,999
MA-770	71'	22'10"	645	15.5	5.5	$3,091	$2,599
MA-770MDP	71'	22'10"	830	15.5	5.5	$4,890	$3,999
MA-850MDP	85'	23'6"	1128	15.3	6.3	$6,591	$5,499

TMM SERIES COMPACT CRANK-UP TOWERS

• Handles 20 square feet of antenna load at 50 MPH, 8 square feet at 70 MPH.

• Compact design is great for areas with tower restrictions, or where a less intrusive installation is desirable.

• All models supllied with hinged T-base, anchor bolts, load-actuated hand winch, 8' steel mast, top plate, and rotor plate.

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Photo F– Recently Antenex® announced a completely improved family of mobile antenna products. All Antenex mobile load coil products now feature an insert molded housing that has added moisture resistance and enhanced mechanical durability. See the text for an explanation of what these interior views show. (Photo courtesy Antenex®)

For more info, contact Antenex®, 2000-205 Bloomingdale Road, Glendale Heights, IL 60139 (1-800-323-3757; e-mail: <sales@antenex.com>; web: <http://www.antenex.com>).

Software and Computers

ACE-HF Product Enhancements. In the October 2002 column we took note of the ACE-HF Professional Propagation Software. As we mentioned then, ACE-HF produces point-to-point circuit predictions on-the-fly in seconds. Predictions for all HF amateur bands are made simultaneously. Summary graphics show when each band is open, and they frequently are automatically updated. You can specify several customizable antenna types for both transmit and receive locations. You also can show a traditional maximum usable frequency (MUF) chart.

ACE-HF Version 2, referred to as "system simulation and visualization software, is well into its third year of development, and thus has now fully matured. The company's policy is to keep the software current, and it will continue to post free upgrades as minor improvements are introduced.

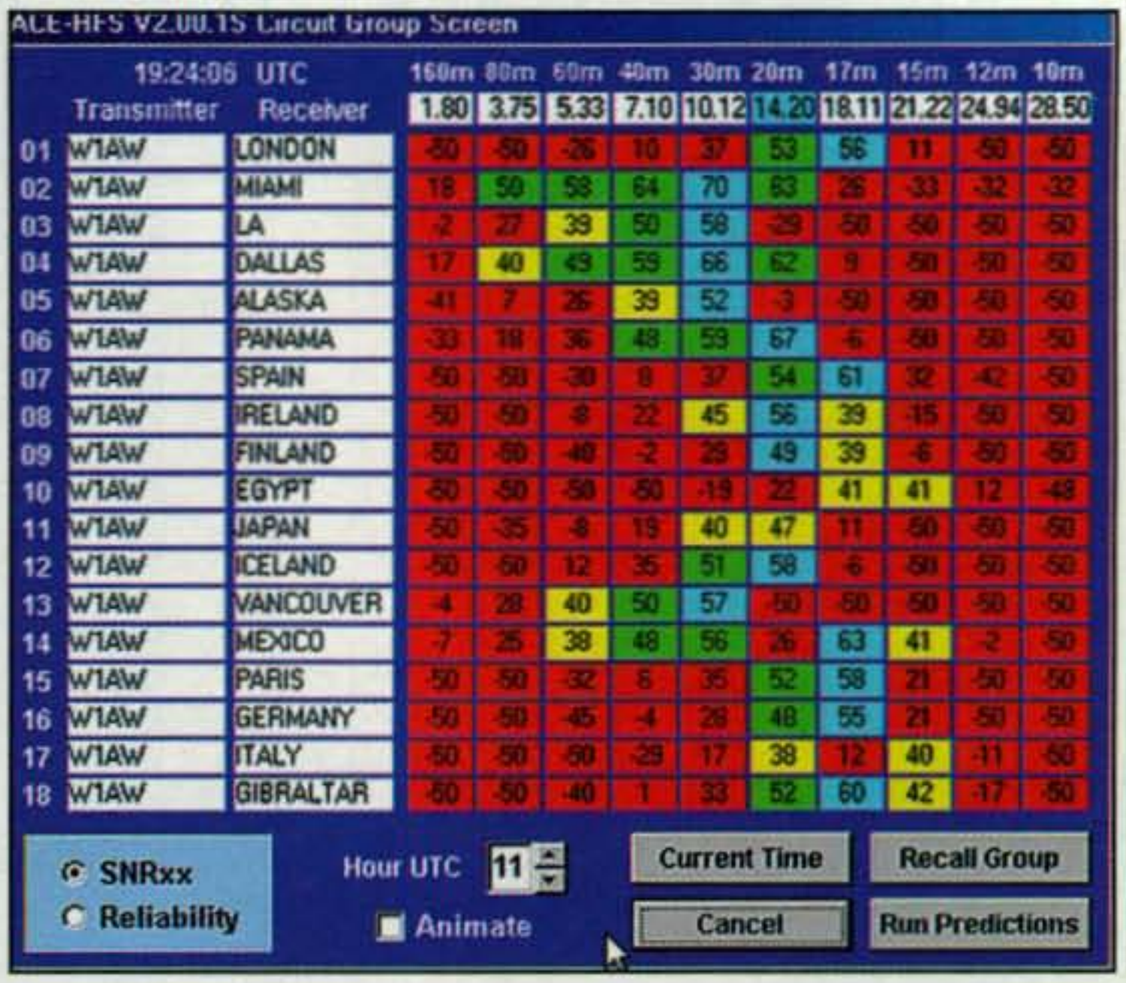

Fig. 1– Here, ACE-HF Circuit Group predictions are shown on a table listing 18 circuits vs. 10 frequencies. You can select signal-to-noise ratio (SNR) or reliability predictions at any time of day, and the chart can be animated. Any number of circuit groups can be saved and recalled. (Graphic courtesy ACE-HF)

The Version 2 software has many new features specifically designed to aid contesters and DXers, as well as to facilitate use by amateurs as a tool for learning about HF propagation. Some of the best new features in Version 2 include the following:

Up to 18 circuits run automatically to show when the bands are open to user-specified countries, making for a great way to manage contacts during high-pressure contest situations. An Active Beacon Chart shows predictions from all 18 NCDXF beacons to your station; the animated chart quickly shows which beacon is transmitting. Also, antenna selections have been greatly expanded, so you can select from dozens of new models. You can create or modify your own antenna models, as well.

Also, multi-antenna schedules let you to specify up to four different antennas at each end of each circuit, and you can set a different transmit power for each antenna of the schedule. New animated Area Reception displays can be created around any receive site, letting you see when bands will be open to a particular country. As always, the heart of ACE-HF lies in the animated area coverage maps, animated by time of day or band.

ACE-HF is priced at $59, and attractive upgrade pricing is available. For more information, contact ACE-HF, 2218 N. Tuckahoe St., Arlington, VA 22205 (703-241-2661; e-mail: <orders@acehf.com>; on the web: <http://www.acehf.com>).

Postscript: The ACE-HF website features an extensive, well-illustrated "take-the-tour" section. You may want to visit the site and take the tour for a quick overview of the software. Figs. 1 and 2 depict two of the website's "take-the-tour" images, illustrating some of the program's most popular features and capabilities.

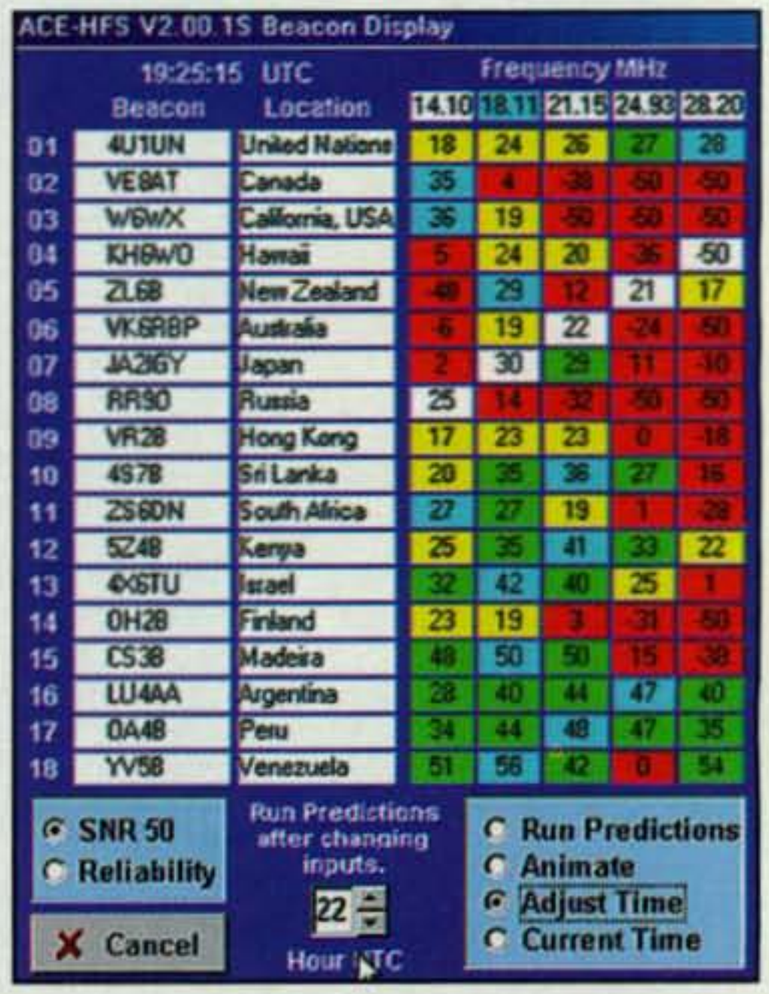

Fig. 2– NCDXF Beacon predictions are given in this ACE-HF chart, which also displays the current active beacons at each frequency. Both signal-to-noise ratio (SNR) and reliability predictions can be displayed, and the chart can be animated. (Graphic courtesy ACE-HF)

Expert MININEC Versions. Are you an antenna-modeling aficionado? If so, or if you're just thinking of delving into antenna modeling, check out EM Scientific's products. The MININEC Professional Series constitute advanced, Windows®-based engineering

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Three different versions are available from EM Scientific, Inc.: Expert MININEC Professional for Windows ($390), with powerful engineering design capabilities; MININEC Broadcast Professional ($790), for the professional broadcast engineer; and Expert MININEC Classic (now free).

Recently, version 6.0 of the Expert software was announced, with many improvements; attractive upgrade prices are available. New features include improved NEC file conversion, text-file input, catenary wire definition, batch run, solution routines, impedance interpolation, antenna matching, and much more. Also, we should point out that the free Expert MININEC Classic is a very useful tool for the radio amateur, novice, and beginning student, Expert MININEC Classic having been made available for public distribution. While the code is not for resale, you can download the software by pointing your browser to the EMSci website at <http://www.emsci.com> and clicking on the Expert MININEC Classic link for a comparison of options and capabilities of the three versions, as well as to download a 7-8 MB zip file containing the setup file for the Classic software.

Contact EM Scientific, Inc., 2533 N. Carson Street, Suite 2107, Carson City, NV 89706-0147 (775-888-9449; e-mail: <EMSci@aol.com>; on the web: <http://www.emsci.com>).

Incidentally, the EM Scientific website has some very interesting educational features. These include the development background on the MININEC series of antenna-modeling programs, as well as instructive descriptions of the modeling process, capabilities and limitations, and modeling accuracy. Antenna buffs, be sure to check out the site!

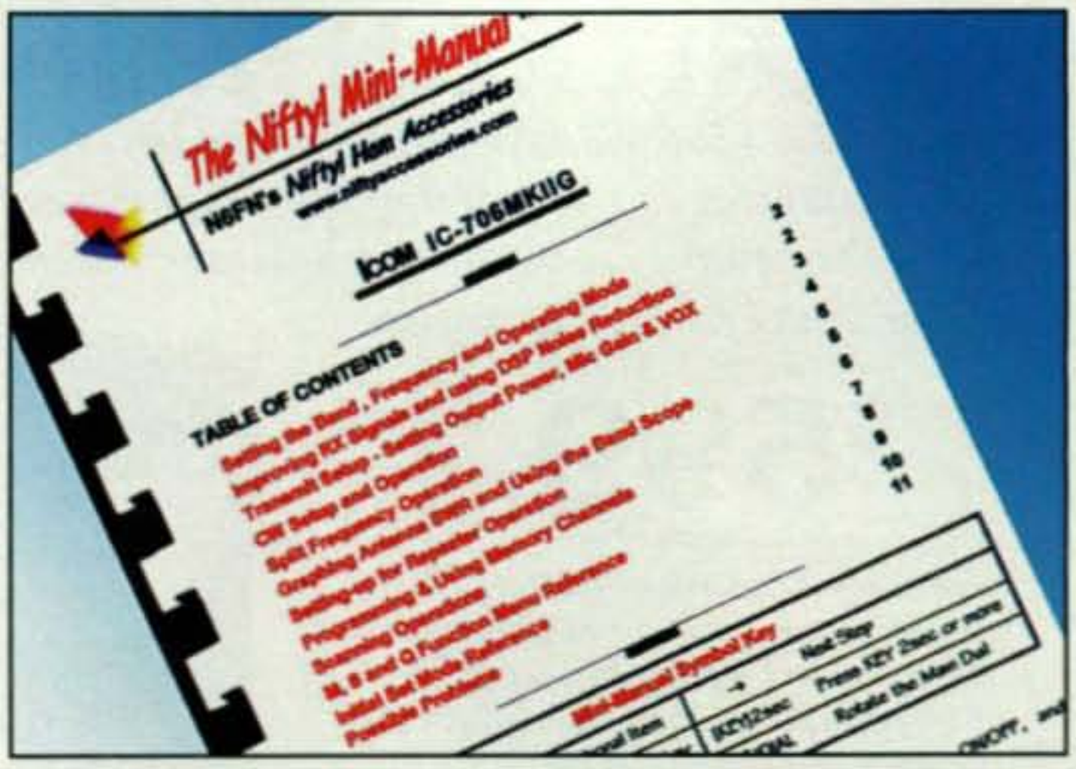

Photo G– Radio setup help has arrived for one of ICOM's most popular radios. This help comes in the form of the IC-706MKII-G Quick Reference Mini-Manual *from Nifty Ham Accessories. The guide provides simplified, step-by-step instructions for setting up and operating the radio and is printed in color and laminated for durability. (Photo courtesy Nifty Ham Accessories)*

From the Bookshelf

Quick Reference Nifty Mini-Manual®. Recently, Bernie Lafreniere, N6FN, let us know of a new addition to his company's series of Quick Reference Guide products. Bernie tells us that he started developing these series of reference guides, known as *The Nifty Mini-Manual™,* about two years ago. He now has more than 50 guides for various ICOM, Kenwood, and Yaesu radios available on the Nifty Ham Accessories website (see below). New guides are added regularly at the rate of several a month.

Bernie says that using a common format and methodology, he put considerable thought and effort into developing a set of Quick Reference Guides that use a common format across all radio types. With these guides, you can "come up to speed" very quickly on a new rig, or you can use the guides as an instant memory jogger to recall how to set up and operate your radios.

That having been said, radio setup help has arrived for one of ICOM's most popular radios. This help comes in the form of the *IC-706MKII-G Quick Reference Mini-Manual* (photo G), which Bernie has added to his series of guides. In 12 informative pages the guide provides simplified, step-by-step instructions for setting up and operating the radio. Printed in color and laminated for durability, the compact guide is designed to be kept with the radio, so it's there when you need it. The guide's price is $16.95 plus s/h.

For more details, contact Nifty Ham Accessories, 1601 Donalor Dr., Escondido, CA 92027 (760-746-7411; e-mail: <berniel@niftyaccessories.com>; on the web: <http://www.niftyaccessories.com>).

New Pasternack Enterprises Catalog. The latest paper version of the Pasternack Enterprises catalog we received was indeed a thick one. The comprehensive catalog includes thousands of different coaxial and fiber optics related prod-

ucts, many of which are manufactured by Pasternack, along with associated technical data. The supplier's catalog is an authoritative reference as well as a comprehensive purchasing resource.

The Pasternack catalog traditionally has shown a large selection of adapters, attenuators, coax and coax assemblies, in-line amplifiers, connectors, switches, patch cords, power dividers, switches, terminations, tools, twinax, directional couplers, DC blocks, and much more. The company, which was established in 1972, also has wisely brought their traditional paper catalog online. The menu-driven website greatly assists you in "finding stuff": you can find any part in the inventory without the need to know any part numbers. The website also lets you look up any part in the large inventory if you know the Pasternack number.

Contact Pasternack Enterprises, LLC, P.O. Box 16759, Irvine, CA 92623-6759 (949-261-1920; e-mail: <sales@pasternack.com>; on the web: <http://pasternack.com>). You can request the printed catalog online, or you can download an electronic (PDF file) version of the catalog from the website.

We Get Letters

Before wrapping up things this month, we would like to acknowledge some of the good folks who took the time and trouble to correspond with us in recent months. In no particular order, a tip of the ol' W8FX hat goes to John Almon, WA4JA; Jim Walroth, N3AWS; Michael Kennedy; Press Jones, N8UG; Mark Kachel, NØOKS; Alex Cozzi, LU5WW; Edward Jones, N8LIQ; Jerry Griger, N3SVK; Dennis Calderone, KC9DSP; Rush Johnson, W4QA; David Autry, WD8IOU; Steve LaGaisse, K6NDG; Bernie Lafreniere, N6FN; Tom Hix, W4TH; Gerald Youngblood, AC5OG; George Rothbart, KF6VSG; Dan Poorman, WB8QKR; Dick Buckner; and all the rest who took the time to check in with us.

A special note: If you e-mail me, please include your full name and call-sign (if any). It would be nice to know we're corresponding with a real person and not just an e-mail address!

Wrap-Up

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

Overheard: It's true that the tiniest step toward achieving your goals is a lot more valuable than a plethora of "good intentions."

73, Karl, W8FX

public service

BY BOB JOSUWEIT,* WA3PZO

Taking Care of Our Own

Each year hundreds of ham radio operators take to the road to serve in the public interest by providing communications for walk-a-thons, races, parades, and of course, real emergencies. One of the primary reasons we are on the front lines is to provide safety and logistical communications. In a typical race the communications group knows where and how to get a hold of medical attention for a participant. This month we take a look at how we can make sure members of our group stay safe and healthy so they can participate in the next event or emergency.

Safety Begins at Home

How often do you go to your favorite operating position to get on the air and check into a net or make a contact on HF? If you are like many hams, your radio shack is a room or area set up just for you. The rest of the family will be off doing other things and not in the room. Just think. . . . You could get an electric shock, or burn if you are working in the shack. You could have chest pains or fall and no one in the house would hear you. If you were to get sick or injured in the shack and needed medical assistance, would you know what to do?

Last year 83-year-old Walter Siebert, K3KBR, of Valley Lee, Maryland, started to suffer serious chest pains. He called 911, but for some reason no one answered. Siebert used the only other communication means he had in the shack—ham radio. Seibert turned on 75 meters and put out a cry for help. He said he was having chest pains and needed to go to the hospital. In Williamsburg, Virginia, Larry Wheeler, KG4RGN, heard Siebert's call. At the time, Wheeler was monitoring a net on 3947 kHz as part of a local nuclear power plant exercise. He notified the net to clear the frequency and contacted Siebert to get the necessary details. Wheeler got in touch with the local 911 dispatcher and relayed the information to Maryland officials. Siebert was then transported and hospitalized for treatment. He credited ham radio with saving his life.

Mario Nicosia, WB3KAG, has been a ham radio operator for over 20 years. Recently, his hobby turned out to be his lifesaver. Nicosia went into insulin shock. Unable to get to the phone, he put out a call for help on the radio. Two ham radio operators responded. They phoned Nicosia's local police department. The police responded and broke into his house to render assistance. The rapid response allowed Nicosia to continue enjoying his hobby. (Insulin shock may occur if someone with diabetes has too *low* a blood sugar level and does not act quickly enough to normalize it. If an individual has low blood sugar, he/she may feel shaky, sweaty, dizzy, crabby, hungry, or confused. If the individual has a fast heart beat, blurry vision, or a headache, there is a need to bring up the patient's sugar immediately.)

Movie Heart Attacks

Each year about 1.1 million Americans suffer heart attacks, about 460,000 of which are fatal. According to the National Heart, Lung, and Blood Institute, part of the National Institutes of Health, those figures would change if more Americans got to a hospital as quickly as possible when a heart attack happened. Some heart attacks are sudden and intense—the "movie heart attack," in which no one doubts what's happening. However, most heart attacks start slowly, with mild pain or discomfort. Often people affected aren't sure what's wrong and wait too long before getting help. Here are signs that can mean a heart attack is happening:

- **Chest discomfort.** Most heart attacks involve discomfort in the center of the chest that lasts more than a few minutes, or that goes away and comes back. It can feel like uncomfortable pressure, squeezing, fullness, or pain.
- **Discomfort in other areas of the upper body.** Symptoms can include pain or discomfort in one or both arms, the back, neck, jaw, or stomach.
- **Shortness of breath.** This feeling often comes along with chest discomfort. But it can occur before the chest discomfort.
- **Other signs.** These may include breaking out in a cold sweat, nausea, or lightheadedness

Not all of these symptoms may be present. For more information check out: <http://www.nhlbi.nih.gov/actintime/index.htm>.

Avoiding Potential Problems

Has your group provided communications for a parade or other event where you were asked to walk with a particular division for the entire route? Some of us are not used to walking long distances. Others can't do that because of other medical problems. It's important for event communication organizers to determine the abilities and limitations of the hams who have volunteered. At the same time, if you feel a particular assignment is beyond your capability, let your group leader know that it is too much for you. We are volunteering to serve in the public interest, not to injure ourselves.

Training

The American Red Cross offers a Community First Aid and Safety course which combines lectures, demonstrations, and video with hands-on training and practice. Participants in this course learn to recognize and respond to emergencies, including shock, cardiac, and breathing emergencies for adults, children, and infants; heat and cold emergencies; sudden illnesses; and poisonings. In

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

addition, participants will learn first aid for everything from cuts and scrapes to muscle, bone, and joint injuries. The 9.5-hour course is of value at home and in the field.

• • •

FEMA Expresses "Grave Concerns" About BPL Interference Potential

In early December, Barry West, Chief Information Officer of the Federal Emergency Management Agency (FEMA), filed comments with the Federal Communications Commission on Broadband over Power Line (BPL) systems. In his comments, West said the matters set forth in the comments are of "great importance to the national public safety." FEMA is part of the Department of Homeland Security.

West said that "FEMA has grave concerns regarding the interference that likely would be caused to Government communications by unlicensed BPL systems. By design, BPL systems use radio frequency energy on unshielded, unbalanced transmission lines, resulting in the unavoidable radiation of RF energy. This unintentional radiation will create harmful interference to licensed radio services throughout the HF and lower VHF spectrum."

FEMA operates and maintains a very large high frequency radio system known as the FEMA National Radio System (FNARS). FNARS is the primary command and control backup communications media for FEMA and interfaces with the other departments and agencies as specified in the Federal Response Plan. The Federal Response Plan outlines how the Federal Government will assist state and local governments when a major disaster or emergency overwhelms their ability to respond effectively to save lives; protect public health, safety, and property; and restore their communities. The FRP describes the policies, planning assumptions, concept of operations, response and recovery actions, and responsibilities of 25 federal departments and agencies, and the American Red Cross, that guide Federal operations following a Presidential declaration of a major disaster or emergency.

FNARS is used to communicate with disaster response elements at the federal, state, and local levels. The federal government relies on FNARS for communications, both for natural and man-made disasters. The safety, health, and welfare of our citizenry are directly tied to the successful execution of our communications programs. FNARS directly supports the federal Continuity of Government (COG) and Continuity of Operations programs (COOP) as required by Executive Order and various Presidential

Decision Directives. 2 FNARS is essential to other federal departments and agencies in terms of fulfilling their respective national security and emergency preparedness (NS/EP) responsibilities.

FEMA concluded that introduction of unwanted interference from the implementation of BPL technology into the high-frequency radio spectrum "will

result in significant detriments to the operation of FEMA radio systems such as FNARS."

West explained that FNARS HF radio stations are normally located in residential areas that would be serviced by Power Line Communication (PLC) systems, another name for BPL. FEMA also utilizes HF radio stations from other Government programs, including the Military Affiliate Radio System (MARS), the US Air Force Auxiliary – Civil Air Patrol (CAP), and the Radio Amateur Civil Emergency Service (RACES), which are similarly situated. The interference from PLC would render these essential communications services useless. The Radio Amateur Civil Emergency Service (RACES) is a special part of the amateur operation sponsored by the Federal Emergency Management Agency. RACES provides emergency communications for civil-preparedness purposes only. RACES is conducted by amateurs using their primary station licenses or by existing RACES stations. In the event that the President invokes the War Emergency powers, amateurs officially enrolled in the local civil preparedness group would become limited to certain frequencies, while all other amateur operations would be silenced.

FEMA said BPL will severely impair its mission-essential HF radio operations in areas serviced by the technology. "Tests have shown that in order for licensed transmitters to compensate for this noise level, there would have to be an increase in the signal level on the order of +30 dB," according to the FEMA comments. FNARS utilizes transmitters that range from 1 kW to 10 kW in output power. An increase in power of +30 dB to offset the increased noise floor would require a 10-kW station to increase power output to 1 mW. The maximum HF power level that the National Telecommunications and Information Administration (NTIA) will authorize is 10 kW for emergency operations, and only 3 kW for normal operations. Thus, says FEMA, the +30 dB increase is far beyond the level authorized by the NTIA and FNARS will not be able to compete with the encroachment of signals produced by BPL technology and devices. In addition, FEMA pointed out that to implement such an increase in power would require new transmitter equipment and antenna systems. It would also "present significant safety problems to personnel."

FEMA concluded that the loss of communication would directly impair the safety of life and property. Currently, there is "no alternative to HF radio communications in terms of meeting national security and emergency preparedness requirements at the national, state, and local levels."

Interference Goes Both Ways. FEMA further points out that while its receivers will suffer interference from BPL radiation, BPL users will also experience service interruption when FEMA's transmitters overpower the signal levels expected by BPL modems. West quotes ARRL's Ed Hare, "The total power of their [BPL systems] signal inside the line is going to be about 10 milliwatts, and when we transmit, PLC wiring may pick up 4 watts of our power right inside the frequencies PLC is using. It is unlikely that PLC systems will continue to function in the presence of these signal levels."

When interference from BPL systems occurs, which FEMA believes would be the result if the FCC adopts the proposal, questions will arise concerning how resulting interference problems are to be resolved, and by whom. FEMA believes the licensed radio services will be perceived by consumers as responsible for the interference, since most consumers do not understand that their unlicensed Part 15 devices must accept any interference received, including interference that may cause undesired operation.

Conclusions. FEMA concluded that the HF spectrum is a unique resource for survivable, long-distance fixed and transportable communications that are independent of fragile infrastructure, and that other communications media cannot meet FEMA's requirements for disaster response and other mission-critical communications. Other users of the HF spectrum are similarly affected by the proposal, and only HF radio can meet their needs as well. FEMA told the FCC that implementation of BPL under the present or relaxed emission restrictions would make HF radio unusable, depriving our nation of an invaluable and irreplaceable public safety resource.

Until next time....

This time we looked at several potential personal hazards while providing public-service communications. Be sure to take care of yourself when you are in the field and don't overdo it. We also took at look at FEMA's concern over the proposed BPL technology and how it could hinder HF emergency communications.

Do you have a story to tell? How is your group serving in the public interest? Until next time . . . 73, Bob, WA3PZO

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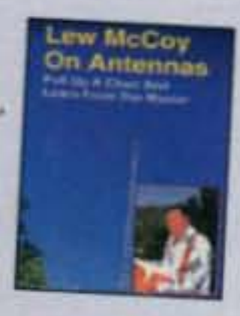
McCoy on Antennas

by Lew McCoy, W1ICP



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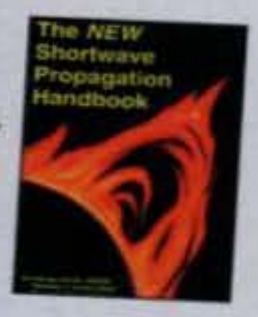

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beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Ditch That Battery Pack—Go Gel-Cell!

Having a reliable source of portable power is of the utmost importance in an emergency. Although many emergency communications guidelines and suggestions tell you that a spare battery pack is what you should keep with you, I find that this really is not as practical as it sounds. Also, beware of the alkaline battery case, because most radios will operate at lower than normal transmit power, or are only good for receive-only operation when powered with alkaline cells.

Even if you are not doing emergency communications, a dead battery pack makes carrying a radio around a real pain, because a portable radio (handie-talkie, or HT) with a dead battery is nothing more than a brick of dead weight you have to carry around. This is bad.

If you have ever participated in a "closed net" or special-event station or manned a communications post for some activity, you know how impatient the net control station (NCS) always seems to be. An on-the-air scolding probably goes something like this: "Why didn't you respond when I called ya?" the NCS says in that friendly but irritated tone of voice only a net controller can have. Your only response can be something like "My battery died and I had to change it out."

I sure did have a charged, spare battery pack ready to go into the HT, but this "simple battery change" is never quite so simple, is it? You have to un-plug the headset, remove the radio from its carrying pouch, unfasten the battery from the back of the radio, put the dead battery pack into the fanny sack, grab the fresh battery pack and insert it into the radio, put the radio back into its case, plug the headset back in, and turn on the radio. This is easy if you are sitting on a nice comfortable chair in front of a desk or table, but not so easy if you are walking the route and monitoring crowd control for a parade, marathon, or other event.

After a number of incidents like that I decided to prevent this scene from happening again. I started thinking of how to extend battery life. One solution would simply be to have another radio as a back-up when/if the first battery pack fails. Nope, another radio would be a bit too expensive and would double the amount of gear to carry around. More equipment also means more stuff that could possibly go wrong. Besides, my two HTs are from different manufacturers and no accessories are compatible. Well, at least now one thing is compatible with the other—DC power.

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Some Issues and Some Alternatives

I started searching for larger (more current capacity for more talk time) battery packs. Okay, this sounds more like it. Just get a bigger battery pack, and that should solve the power problem. As a bonus, when my HTs are powered with 12 volts, they put out 5 watts maximum power, so extra signal strength is available if needed.

Be sure to double-check the voltage requirements for your HT. Verify that putting 12 volts directly into the radio is okay, or check to see if you need some sort of voltage step-down ("buck") converter to go from a 12-volt source to whatever voltage your radio needs. For example, some older HTs require 7.2 or 8.4 volts to operate and need an adapter to prevent damage. A common accessory for those older radios is a DC-DC converter with a cigarette-lighter plug and cord. You can use that for the gel-cell system I am about to describe.

In my search for extra-capacity battery packs for my portable radios, I discovered some rather irritating things. For example, the little "wall wart" charger that came with the radio cannot charge the extra-large battery. The typical 1300 mAh battery pack is quite expensive, and then you need a special charger, too, so the total cost could be well over a hundred bucks!

Being the thrifty sort of guy I am, I decided to look for alternatives to the expensive "factory-

Photo 1– My growing family of 12-volt gel-cells. The big yellow box is disguised as an automotive emergency booster battery. Inside it is really just a 17-Ah gel-cell with an LED power/charge indicator. When looking for these units, get the heaviest ones you can find (bigger battery inside).

Photo 2– My HT power-pack system consists of a 5-Ah gel-cell with cables and Anderson PowerPoles. Thanks to Yaesu, the quick charger uses 12 volts, and the HT can take 12 volts input directly. As a bonus, the battery is charged when the radio is off and 12 volts are applied.

brand" and "after-market" battery packs and chargers. I decided to go with an external 12-volt lead-acid gel-cell battery and a charger. I went to my favorite electronics parts and surplus store and was amazed by the huge range of gel-cell battery shapes and sizes and voltages available (see photo 1).

Of course, there can never be too much power when it comes to batteries. The selection of the appropriate gel-cell is then based on more practical criteria, such as how much it weighs and how big it is, and where you will have to store and maintain it when it is not being used. For a more technical guideline on how to calculate a match between your equipment demands and gel-cell capacity, see the "References" section at the end of this article.

Gel-cells need specific "smart" chargers so you won't damage or blow them up. Suitable chargers can easily be found. I listed the ones I use in the "References" section. You can even build your own from a kit (see "A Look at Homebrewing" in the September 2003 issue of *CQ*).

Alternative Sources of Gel-Cells

In many cases, you can find suitable gel-cells for free, or for almost nothing. For example, one day the "telecom person" who takes care of the various telephone installations around our office was whining about the new environmental requirements and how to get rid of all the "hazardous waste" in the form of the now defunct back-up uninterruptible power supplies (UPS) and their batteries. I saw the immediate value in these gel-cells and matching power-supply/charger systems and offered to take them off her hands, solving the hazardous-waste-disposal issue. I am happy to report that not only was I able to get several complete battery packs and chargers, I also avoided adding some hazardous waste to the land-fill at the same time. Certainly, this was a win-win situation if I ever saw one!

Cabling Up

Okay, now that we have a robust and portable power source, we need to build a cable to go from the battery to the radio. An appropriate fuse in the line would be wise. Over the years I have converted all of my 12-volt operated gear to a common power connector, the Anderson 1330 Series PowerPole. There is another connector available, and it is compatible with the Anderson PowerPole. It's the Tyco Electronics Power Lock Connector, part numbers 53894-4 (housing) and the 53892-4 (contact).

First, a complete assembly or "pair" (one "set") consists of one red and one black housing (or hood), two contacts, and one roll pin. Thus, in order to make up a cable for your 2-meter HT, you actually will need two PowerPole sets; the first set will attach to the cable coming from the power source (gel-cell), and the second pair goes from the power source into the radio. Photo 2 shows my gel-cell system and accessories.

PowerPole Assembly Tips

The Anderson Power Products website <www.andersonpower.com> has complete assembly instructions, so I won't present them here. However, here are some hints for successful assembly that I have developed over the years:

1. The Anderson-recommended attachment method is crimping, but this requires a special (and expensive) tool. I tried my regular solderless "terminal-smasher," but it distorts the terminal, preventing a proper fit into the plastic housing. Soldering is Anderson's "second-approved" method and is more practical for amateur use.

2. When soldering, place an old towel or rag on your work surface to absorb excess flux.

3. Lightly tin the wire before inserting it in the connector.

4. Insert the wire into the terminal "barrel." A twisting motion will help seat the wire. You may also gently tap the terminal onto the wire, but make sure that you do not bend the tab. Leave about 1/16 of an inch of wire exposed.

5. Note that the terminal does not have a seamless solder "cup," but rather is a rolled terminal with a seam. Too much solder will escape and flow onto the sliding contact surface if you are not careful. *Do not* get any solder on the flat, sliding contact surfaces. The fit on these connectors is so precise that a thin film of flux or solder may prevent the contact from sliding into its housing. Photo 3 shows what the soldered terminal should look like.

6. If you do get flux or solder on the flat, sliding portion of the terminal, you may be able to save it by gently filing the material away. However, by doing this, the silver plating is removed and may affect conductivity later, so try to avoid this.

7. The PowerPoles used at KH6WZ are the 30A types and accommodate number 12 wire. If a smaller gauge wire is needed, adapters are available. However, you can simply strip additional insulation from the ends and fold the bare wire back to fill up the space.

8. You should feel and hear a distinct "click" when inserting the terminal into the housing. The tip of the flat terminal must seat into a slot at the front of the connector housing.

Photo 3– This is a close-up photo of what the wire-to-terminal joint should look like. Solder is wicked into the wire strands and has adhered to the terminal, without distorting the terminal or contact surfaces. There is no flux or excess solder on the sliding contact area.

Conclusion

Now that the power issue is resolved, there is no excuse for missing a call from the NCS. Even if you do not regularly participate in emergency communications activities, you can rest assured that you will have a source of reliable and inexpensive power when you need it. By the way, your new 12-volt power source will also be useful for many non-ham gadgets, such as lanterns, flashlights, radar detectors, and all kinds of accessories. Have fun!

73, Wayne, KH6WZ

References

A&A Engineering, 150-KIT or 150-ASY Smart Battery Charger: <http://www.a-aengineering.com>

Amp/hour calculation: <http://windturbine.ca/calculate1.html> also <http://www.cprl.ars.usda.gov/programs/TDR_S6.PDF>

Anderson Power Products: <http://www.andersonpower.com>

"Inspection and Test of Donated Used Batteries for ARES," By Ed Harris, KE4SKY, AEC, Fairfax County (Virginia) ARES, December 1, 1998: <http://www.arrl.org/news/features/1998/1201/3>

Electronics parts, batteries, electronics surplus: JK Electronics, Westminster, CA: <http://www.jkelectronics.com>

Ramsey Electronics, LABC-1 lead-acid battery charger: <http://www.ramseyelectronics.com>

Tyco Electronics, Power Lock Connector: <http://www.tycoelectronics.com>

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Order: RSHFAR $21.00

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Edited by Dick Biddulph, G8DPS and Chris Lorek, G4HCL.
RSGB, 7th Ed., 2000, 820 pages.
This book is an invaluable reference for radio amateurs everywhere. It also provides a comprehensive guide to practical radio, from LF to the GHz bands, for professionals and students.

Order: RSRCH $50.00

Amateur Radio Mobile Handbook

RSGB. 2002 Ed., 128 pages.
The Amateur Radio Mobile Handbook covers all aspects of this popular part of the hobby. It includes operating techniques, installing equipment in a vehicle and antennas, as well as maritime and even bicycle mobile. This is essential reading if you want to get the most out of your mobile station.

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RSGB, 1st Ed., 2000, 208 pages.
Whether you have a house, bungalow or apartment, Backyard Antennas will help you find the solution to radiating a good signal on your favorite band.

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Your Questions about FCC Licensing Rules Answered

BY FREDERICK O. MAIA,* W5YI

From time to time we cover your questions concerning the regulatory side of ham radio. We have been saving your amateur radio licensing questions, so here goes. . . .

Q: We continue to receive many questions concerning common FCC application filing tasks such as: "How does a radio amateur change his/her address with the FCC . . . or check on the status of an application . . . obtain a vanity callsign . . . renew a license . . . or get a duplicate license?

A: This can be done in one of two ways, either by submitting paper forms to the FCC (or a VEC) or by submitting an application online using the FCC's Universal Licensing System (ULS).

Two FCC Forms are necessary if you submit using a paper document: FCC Form 605 (main form) and its Schedule "C." These forms are available by telephoning the FCC Forms Distribution Center at (toll free) 1-800-418-FORM (1-800-418-3676) or by downloading them online at <http://www.fcc.gov/Forms/Form605>. Be sure to use the FCC's version of Form 605 and not the NCVEC Form 605, which is used only by the Volunteer Examiner Coordinators.

To file an application online, go to the ULS website located on the World Wide Web at <http://wireless.fcc.gov/uls/>. Click on the Filing Purposes link located under the Online Filing button. Note that a name or address change is an Administrative Update (AU), a duplicate license is a DU, renewal only is an RO, a Vanity callsign application is a Modification (MD), and so forth.

Click on the "Online Filing" button and enter your FCC Registration Number (FRN) and ULS password. Your FRN can be obtained by accessing any of the online databases (such as at <www.qrz.com> or <www.arrl.org>) and entering your callsign. Your ULS password is listed on a letter that the FCC mailed to you when you were registered in CORES (the Commission Registration System).

After successful submission of your ULS application, you will receive a ten-digit file number. At the start of the next business day you can use this file number to check the status of your application in the Application Search section of ULS.

In practice, however, very few amateurs do their own filing, since many find the FCC system confusing. Instead they use a VEC to do it for them, for which there is a $6.00 charge (although the ARRL does it free for its paid-up members). VECs also automatically mail out renewal notices 90 days before license expiration. All you have to do is sign the renewal card and return it, or if there is an address change, complete the accompanying NCVEC Form 605, which is part of the renewal package.

You can also complete common filing tasks on the W5YI Group website at <www.W5YI.org>. You will find this system a lot simpler. (Click on the Renew, Change Address, or Duplicate License link on the home page, or click on the "Vanity Call Sign" button to apply for a vanity call. Again, there is a $6.00 fee for this service.)

Q: What is the procedure for renewing my vanity call? *(E. K., Batesville, AR)*

A: The first vanity callsign was issued in May 1996 for a ten-year term, so vanity callsign renewals will not begin until 2006. At that time you will have to remit the appropriate regulatory fee (currently $16.30, but it tends to change every year) along with an FCC Form 159 Fee Remittance Advice. You will be able to renew your vanity callsign either by submitting a paper FCC Form 605 and 605c application form or by renewing online. Two separate post office box addresses have been set up by the FCC. One is for manually submitted (paper document) renewals, and another is to receive the regulatory fee for vanity callsigns renewed online. You will get the next available sequential callsign for your license class group if you fail to renew your vanity callsign. The FCC will have more to say about this once we get closer to 2006.

Q: My husband died recently. He held an Extra Class license and a local club (he was not a member) wants to get his station callsign as a memorial to him. What do I have to do besides provide the club with a written statement of approval? *(D. M., Manitowoc, WI)*

A: The current vanity callsign rules only provide for club stations to obtain callsigns of deceased members. The club does not have to wait the customary two years. Furthermore, the trustee must have a license class equal to or higher than the deceased. However, since your husband was *not* a member of the club, it will have to wait two years and apply for the callsign under the vanity callsign program.

Q: Can you explain the so-called "two-year hiatus" during which an expired, cancelled, or callsign of a deceased amateur may not be obtained under the vanity callsign program? *(T. R., Coral Gables, FL)*

A: An amateur radio license term is ten years, plus a two-year grace period during which time a licensee may still renew and not lose his or her station call. The two-year waiting period is to protect an expired licensee's callsign from being reissued.

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There are other reasons, though. It eliminates "trafficking" in callsigns whereby an amateur might sell his or her callsign and relinquish it to someone else. The two-year requirement also provides a priority period during which close relatives or club members may apply for the deceased amateur's callsign. Also, you may request to get back your former callsign even though it has been unassigned for less than two years.

Q: I keep hearing references to "Amateur Callsign Systems." Just what are the callsign systems? *(S. P., Lynchburg, TN)*

A: There are three of them. A new amateur with a continental USA mailing address first receives a station callsign from an alphabetized list of callsign groups available to his or her license class. First-time Technician and General Class radio amateurs are currently receiving two-by-three format callsigns from the KA-to-KZ prefix block. A new (first time licensed) Extra Class amateur gets an AA-to-AL prefix by two-letter suffix callsign. This is known as the *Sequential Call Sign System*, since the callsigns are issued in strict alphabetical order. You can also change your callsign sequentially at any time by just submitting a "Change Call Sign" application to the FCC.

The *Vanity Call Sign System* allows you to specify a list of callsigns available to you or your club's station, with the FCC assigning the first available one to you. A vanity callsign may only be chosen from a callsign group appropriate for your license class. There are four callsign groups.

Group A callsigns are the shorter one-by-two (that is one prefix letter [K, N, or W] followed by a radio district numeral [0 through 9] and two suffix letters [AA through ZZ]), two-by-one, and AA-to-AL-by-two callsigns. Group A callsigns are available only to Extra Class radio amateurs.

Existing Advanced Class (and Extra Class) amateurs are eligible for Group B two-by-two callsigns with KA–KZ, NA–NZ, and WA–WZ prefixes.

Any license class (except Novice) may choose one-by-three format Group C callsigns beginning with the single prefix letter K, N, or W.

An existing Novice Class operator may select only Group D (two-by-three) callsigns. Group D callsigns begin with KA–KZ and WA–WZ, but not NA–NZ, which currently are not assigned by the FCC.

U.S. hams with mailing addresses outside the 48 lower states (such as Alaska, Puerto Rico, and Hawaii) have certain prefixes (AH, AL, KH, KL, KP, NH, NL, NP, WH, WL, WP) reserved for them.

The vanity callsign program has a very complex set of rules with special provisions applying to former holders, close relatives of deceased amateurs, and club stations, including "memorial" calls honoring deceased members. In addition, certain callsigns, for one reason or another, are not available to anyone under either the Sequential or Vanity Call

Amateur Reciprocal Operating Arrangements

The countries with which arrangements are in effect are as follows:

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.

Foreign radio amateurs holding a CEPT radio-amateur license or an International Amateur Radio Permit (IARP) are also authorized to operate in the U.S. and its possessions.

Third-Party Communications

The following countries have made the necessary arrangements with the United States to permit an amateur station regulated by the FCC to exchange messages for a third party with amateur stations:

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.

Sign System. As a general rule, however, you can use any of the online callsign databases or the FCC's Universal Licensing System license search function to determine which callsigns are available to you. (Read the Vanity Call Sign FAQ (frequently asked questions) on the <www.W5YI.org> website.)

The *Special Event Call Sign System* allows any licensed radio amateur (of any license class) to temporarily use a one-by-one format callsign (for example, W1A) when transmitting in conjunction with an event of special significance. You obtain a one-by-one callsign by contacting one of the Special Event Call Sign Coordinators. There are 750 one-by-one callsigns available for use in the special-event callsign system.

The format of each one-by-one callsign consists of a single-letter prefix K, N, or W, followed by a single-digit numeral Ø through 9, followed by a single letter A through Z (except the letter X, which is not available to amateur stations). The coordinators maintain a common online database for the day-to-day usage of the one-by-one format callsigns. You can find this database and the guidelines applying to one-by-one callsigns on the web at <http://ncvec.spindle.net>.

Q: When may a foreign radio amateur operate in the United States and what callsign would he or she use? *(W. C., Logansport, IN)*

A: Canadian radio amateurs are considered to automatically be licensed in the U.S., and vice versa, under a 50-year-old treaty arrangement.

It used to be that amateur radio operators licensed in other countries needed to first obtain a Reciprocal Operating Permit before they could operate their ham equipment in the U.S., but no more. Citizens of countries holding an Amateur Service license granted by a country with which the United States has made reciprocal operating arrangements are also authorized to operate an amateur station in the U.S. or its possessions. No additional FCC-issued documents are required. See the first sidebar for a list of countries with which arrangements are in effect.

Special "station indicators" are used in conjunction with the foreign amateur's assigned callsign when operating on U.S. soil. Canadian amateurs must append their callsign with an indicator consisting of the appropriate letter-numeral designating the station's U.S. operating location (e.g., VE1XX/W4). Countries (other than Canada) include the location indicator before the callsign (e.g., W1/G1XXX).

While we are on the subject of international operating arrangements, we are including a second sidebar, an up-to-date list of countries with which FCC-licensed radio amateurs may transmit third-party communications. Third-party traffic is defined as communications on behalf of persons (a third party) other than the two control operators (the first and second parties).

Other Questions?

If you have a licensing question we haven't answered here, or another question about FCC rules or procedures, drop us a line and we'll try to answer it in our next Q&A roundup.

73, Fred, W5YI

Marvelous Crystal Radios Return!

BY DAVE INGRAM,* K4TWJ

Goodness gracious, friends, your interest in crystal radios is insatiable! Indeed, the more we feature these easy-brew gems, the more you ask for additional views and share details of your own home-assembled crystal sets in return. In light of those requests, we are proudly highlighting more of the little delights in this month's column. Look, build, and enjoy!

Photo A– Everyone's favorite crystal set, the dear little Rocket Radio of the 1950s, is back! A limited number of these romantic retros are presently available from the Crystal Set Society (www.midnightscience.com).

Crystal sets, or free-playing crystal radios, incidentally, have been with us since the very first days of wireless communication, and they continue to be quite popular today. Primitive versions with galena crystal rock detectors were mated with spark-gap transmitters during the early 1900s, and then more consumer-grade versions were sold as novelties later on. In particular, the famous Rocket Radio and Satellite Radio produced during the 1950s stand out as all-time favorites. Original versions of both radios obviously have faded in the annals of time, but the good news is they are back, and you can now purchase one and homebrew the other one!

Remember the Crystal Set Society spearheaded by Rebecca the Crystal Queen and highlighted in our previous crystal radio columns? In addition to producing a superb quarterly newsletter, the society also sells books, easy-to-assemble kits, and difficult-to-find parts, plus Rebecca now has a limited number of new retro Rocket Radios for sale (photo A). The little retro looks and works just like the original and is priced at only $12 plus $4.95 shipping. You can order the radio from the Crystal Set Society at P.O. Box 1625, Norman, OK 73070, or via <www.midnightscience.com>. Add a year's membership to the society, which includes four issues of the newsletter, for $12.95 and you win twice!

Satellite Crystal Set

Thanks to Dan Petersen, W7OIL, and the Crystal Set Society, this month's featured treat is a homebrew reproduction of the palm-size Satellite Crystal Set (photos B, C, and fig. 1). Dan comes up with one great crystal set after another. His ingenuity is incredible, and many of his designs are featured in "XSS" newsletters. This particular radio was in the summer 2003 newsletter, and it looks identical to the original 1950s "space race" version, which was modeled after Russia's classic *Sputnik* satellite. It is a really fun project to build, especially since its case (or shell) is a readily available fishing-line bobber topped with long screws for dummy antennas.

Start gathering parts by visiting your nearby fishing-tackle supplier and looking for a large ($2^1/2$ inch) plastic fishing-line bobber. This is also a good time to visit a hobby or variety store and purchase an Exacto® "Razor Saw," a sharp-edge Dremel

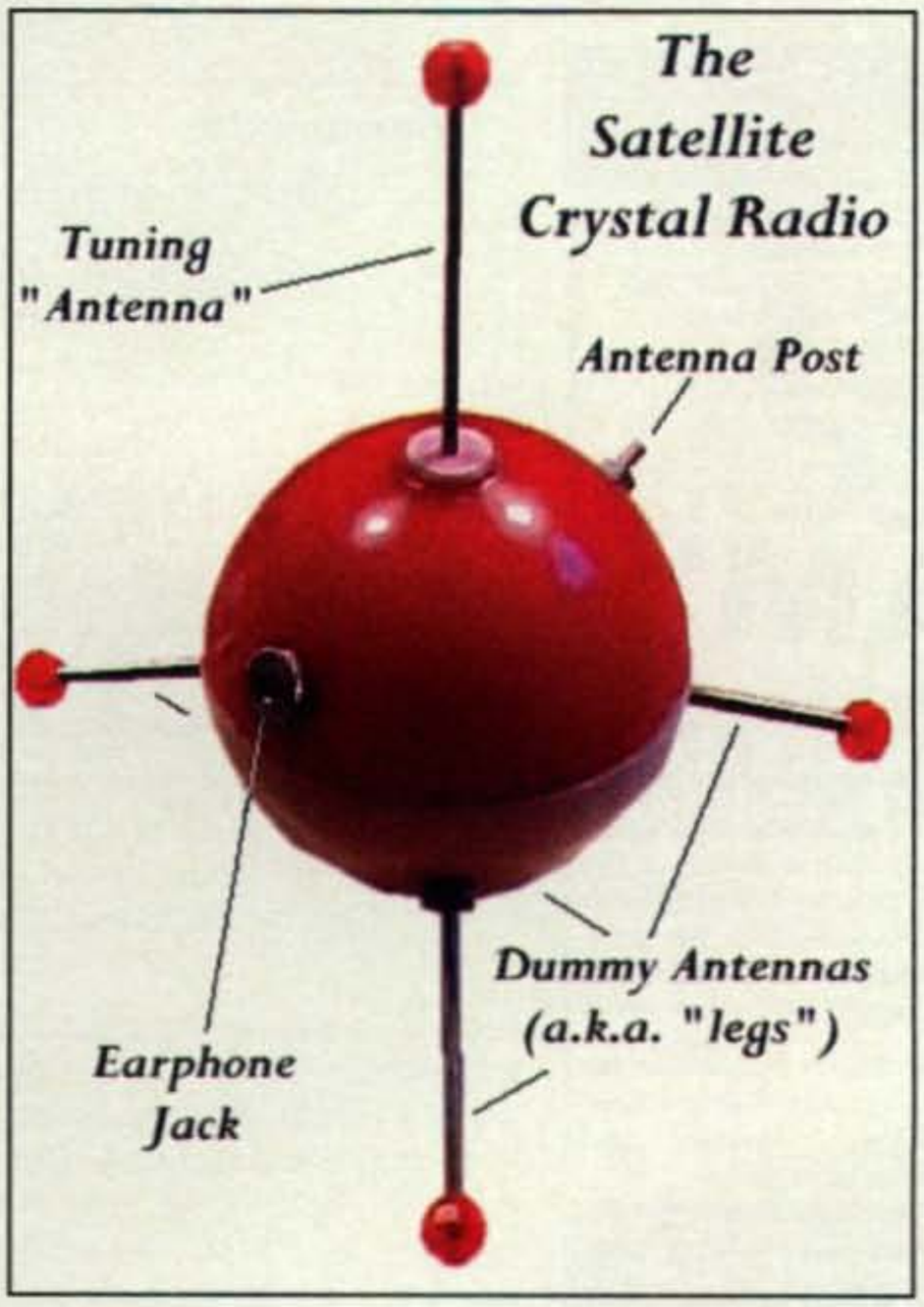

Photo B– Equally captivating is this marvelous reproduction of the famous Satellite Crystal Radio, which, thanks to Dan Petersen, W7OIL, you can homebrew from readily available parts right now (the case is a $2^1/2$-inch fishing-line bobber). This little delight looks great and works as well as or better than the original. Romance recaptured for sure. (Photo courtesy W7OIL)

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

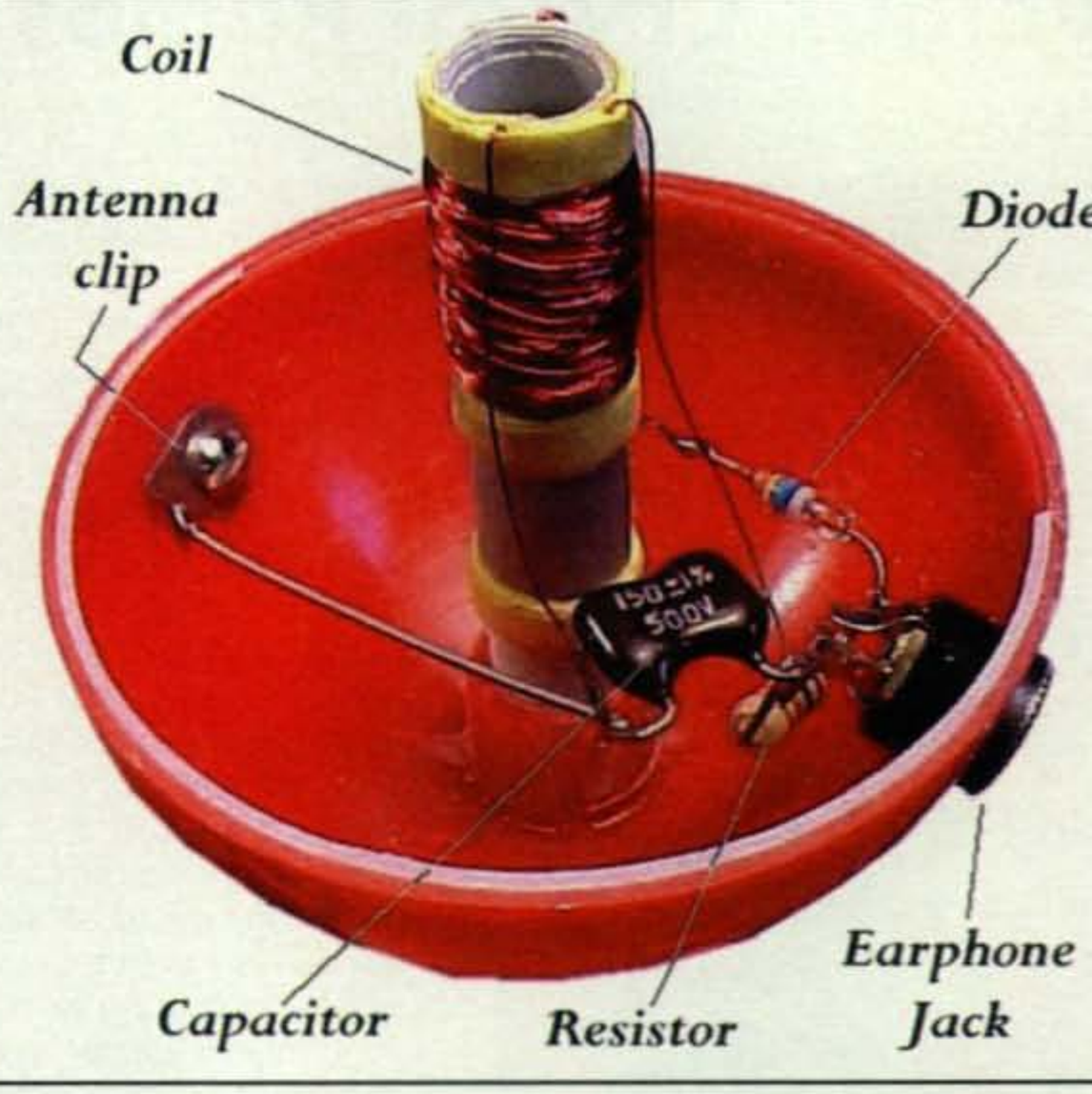

Photo C– Inside view of the Satellite Radio showing the homemade loopstick fitted into the hole originally housing the bobber's line grabber tube. All circuitry is contained in the upper half of ball, while three 2-inch long screws with nuts simulate dummy antennas in the lower half of ball. (Photo courtesy W7OIL)

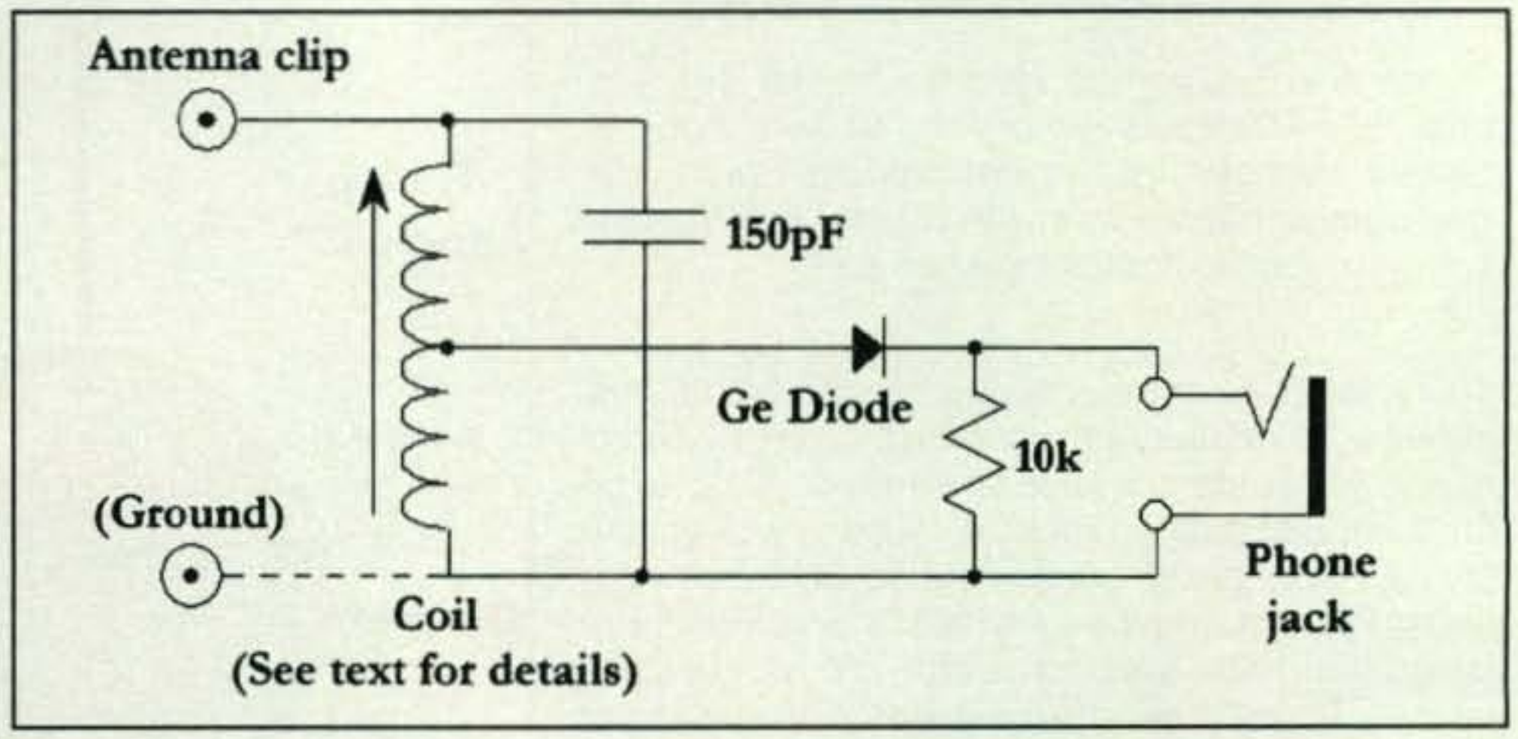

Fig. 1– Circuit diagram of the Satellite Radio designed/reproduced by Dan Petersen, W7OIL. Crystal radios require a high-impedance earphone, and the Crystal Set Society sells them for only $3.00 each plus shipping.

tool, or a similar fine-cutting blade for (carefully!) slicing the bobber in half so you can install the circuitry and add the long dummy antennas. Before cutting the line bobber in half, you should remove its spring-loaded line grabber (the radio's loopstick tuner will mount in the resultant hole). Just push down on the top stub and use needlenose pliers to straighten the line-catching hook that extends from the bottom, and the complete spring-loaded mechanism should pop right out. Then carefully hold the ball with thick work gloves while you slice it in half. If the halves do not separate, they probably are being held by plastic in the line-grabber tube. Carefully drill down through the tube until the ball separates.

The original Satellite Radio was tuned with a now scarce-as-hens-teeth loopstick, so Dan explains how to home-fabricate a modern replica: "Begin by rolling up and gluing a length of construction paper or poster paper to produce a tube of 3/8 inch in diameter and 2 3/8 inches long. A Bic pen makes a good winding form here. Next wind and glue two 1/8-inch wide paper strips separated by 1 inch around one end of the tube to define

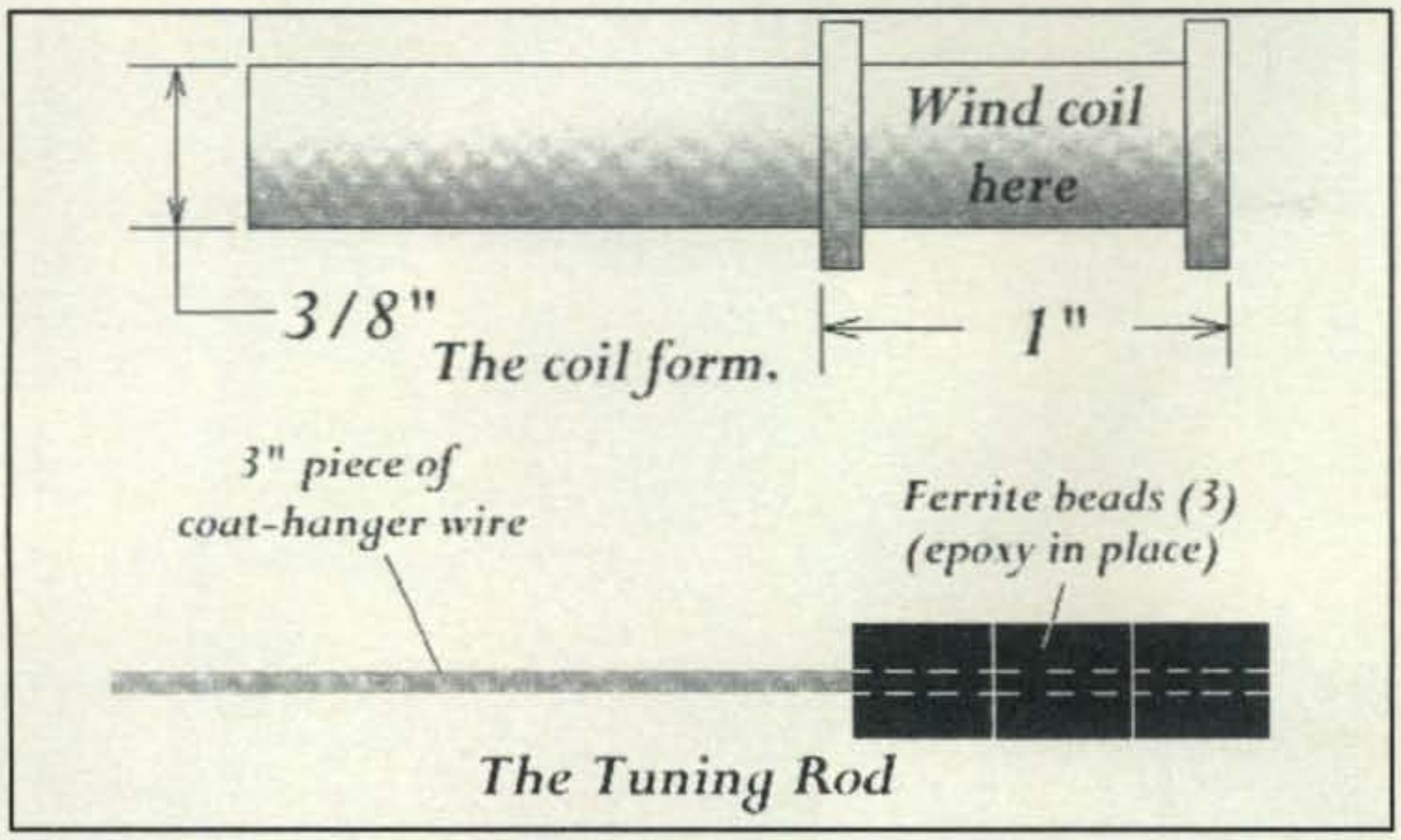

Fig. 2– Outline for homebrewing the loopstick tuning coil form and sliding ferrite rod. (Discussion in text.)

the coil winding area and yield an anchor point so you can push coil wire ends through to hold them in place (fig. 2). Then scramble-wind 50 turns of No. 30 or 32 wire on the coil area of the homebrew loopstick form, bring out and twist a 1- or 2-inch section to make the tap, and then wind 50 more coil turns and secure its end in place on the form. Next make the loopstick's tuning wand, or 'antenna,' by gluing some ferrite beads on a 3-inch piece of coat hanger. Three 5/16 long by 9/32 diameter Amidon FB43-801 beads are ideal here. Finally, wind and glue a 1/4-inch wide roll of paper to the coat hanger wire so it is just large enough to fit snugly inside the loopstick form. It should then act as a stabilizing plunger with just enough resistance to hold the tuning wand/or 'antenna' in place while and after tuning in a station." Thanks, Dan.

Being extremely pressed for time, I took the quick-brew approach to case/shell hunting and loopstick construction (one-stop shopping at Wal-Mart). First I found the largest line bobber available (a 2-inch item) plus a plastic straw that would fit and glue into the (vacated) line-grabber hole. I then cut the straw to 1 5/8-inch length and wrapped it with a layer of freezer tape to produce a textured surface. I wound the coil over the freezer tape and just glued its ends right to the straw form. Then I glued a couple of junk-box-obtained ferrite beads to a wooden match stem, slipped a couple of tiny rubber washers on the match stem's opposite end, and force-fit the whole thing into the straw. I glued the washers in the straw so that when they dried, the match stem with ferrite beads would slide (with mild resistance) in the washers for tuning. Now add your own creative thinking to those two approaches, and devising your own makeshift loopstick should be easy.

Look back at photos B and C and notice the bobber's—err . . . satellite's—upper half has also been drilled and fitted with an earphone socket and a short 4-40 screw and nut, serving as an antenna clip. Likewise, the lower half is fitted with three 2-inch long screws and nuts positioned 120 degrees apart to resemble a tripod of dummy antennas, which also lets the satellite sit upright on a table. The coil's ground lead connects to one of the dummy antennas. Top the four antennas with shiny plastic beads removed from some fishing lures, wire up the circuit, and the satellite radio is ready to shine. Remember, however, to ensure the little marvel is working smoothly before gluing the shell/bobber's upper and lower sections back together. Cracking it back open is not fun.

Our sincere thanks to Dan Petersen, W7OIL (e-mail: <Petersen@wa-net.com>), for sharing details on his retro Satellite Radio. It is even classier than the original. Build one and you'll agree!

More Crystal Sets!

Another friend and homebrew enthusiast, Walt Bullerwell, KF4YJQ, also recently assembled some interesting crystal radios worthy of recognition. These radios may not look as fancy as our previously highlighted Rocket Radio and Satellite Radio, but there are some significant details and historically related stories behind each one.

The first radio (photo D) sports an authentic spider-web coil of approximately 44 turns of No. 24 enamel-coated copper wire weaved around a 3 1/2-inch pressboard form with nine sections. Winding a spider-web coil is easier than it seems. Just start at the center and weave the wire in and out of

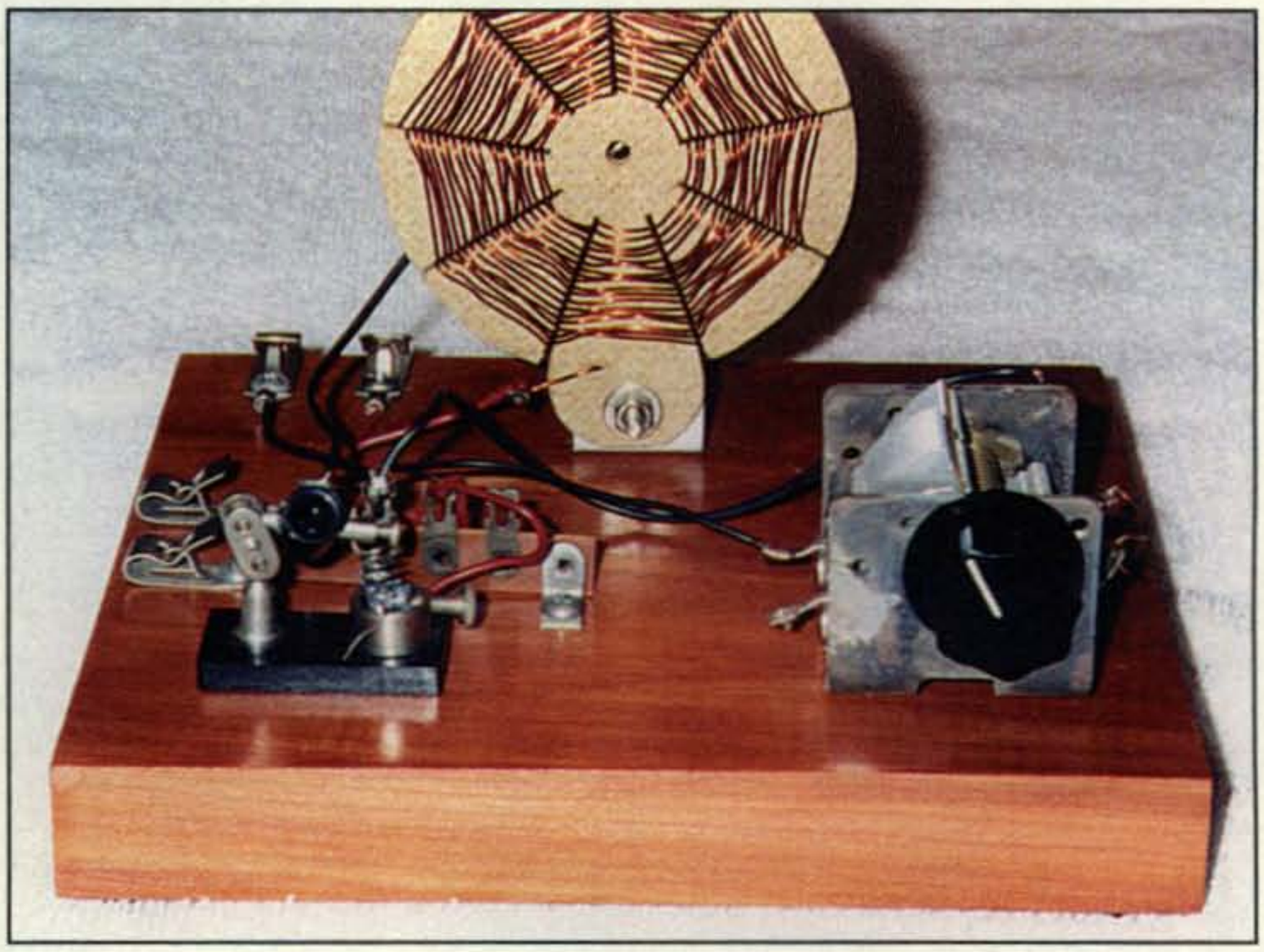

Photo D– This spider-web-coil-equipped crystal set was built by Walt Bullerwell, KF4YJQ, and tunes the AM broadcast band with slightly better than average selectivity. The little radio also uses an open-air galena and catwhisker-type detector like those employed during the era of spark. (Discussion in text.)

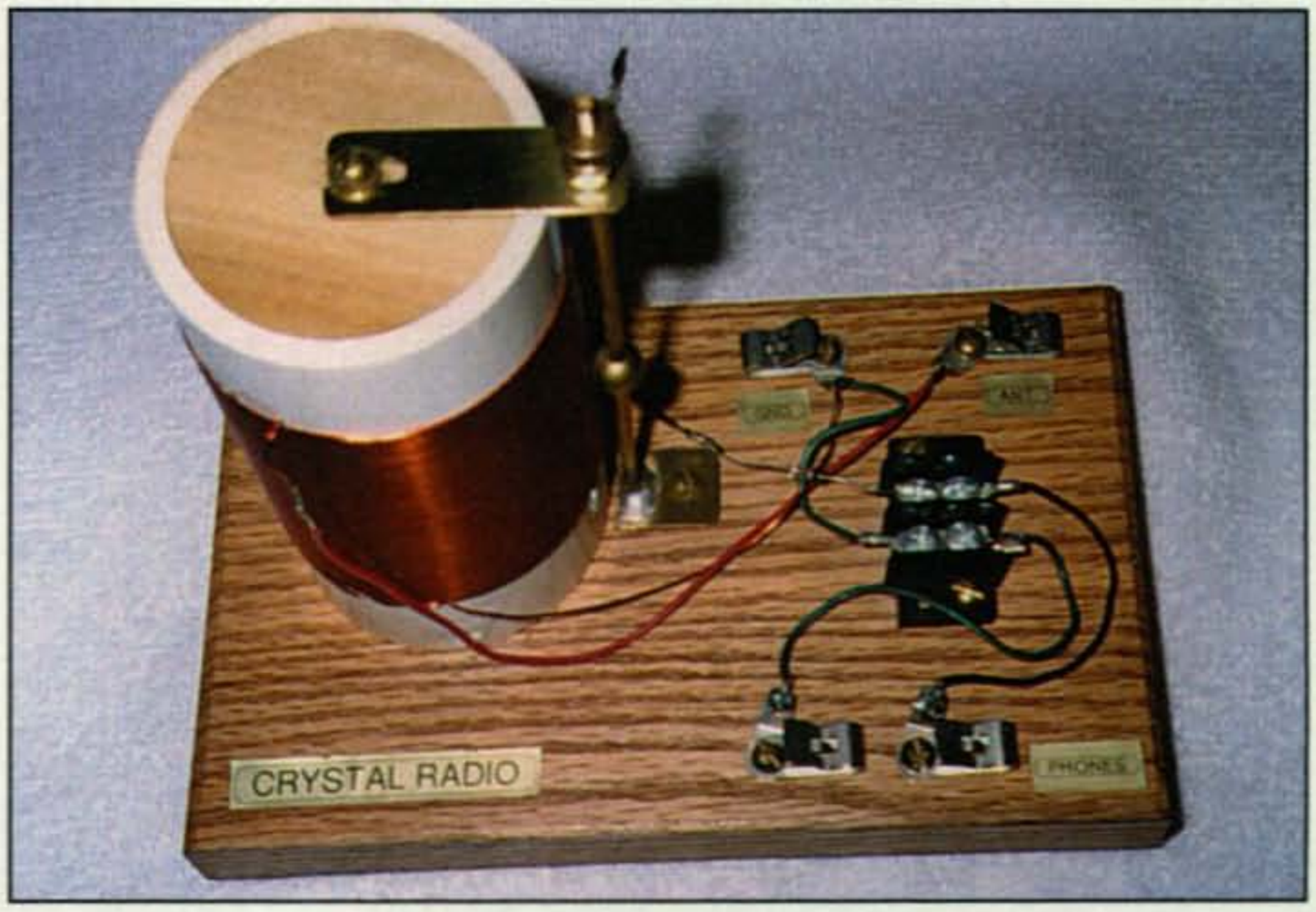

Photo E– Crystal sets such as this quick-brew version from Walt Bullerwell, KF4YJQ, make good afternoon projects for introducing youngsters to the wonderful world of radio. This item uses a brass ball-on-welding-rod slider for tuning the AM broadcast band, a 1N34 Germanium diode detector, and a 2-inch diameter coil of 60 turns of No. 24 enamel-coated wire to cover the AM broadcast band.

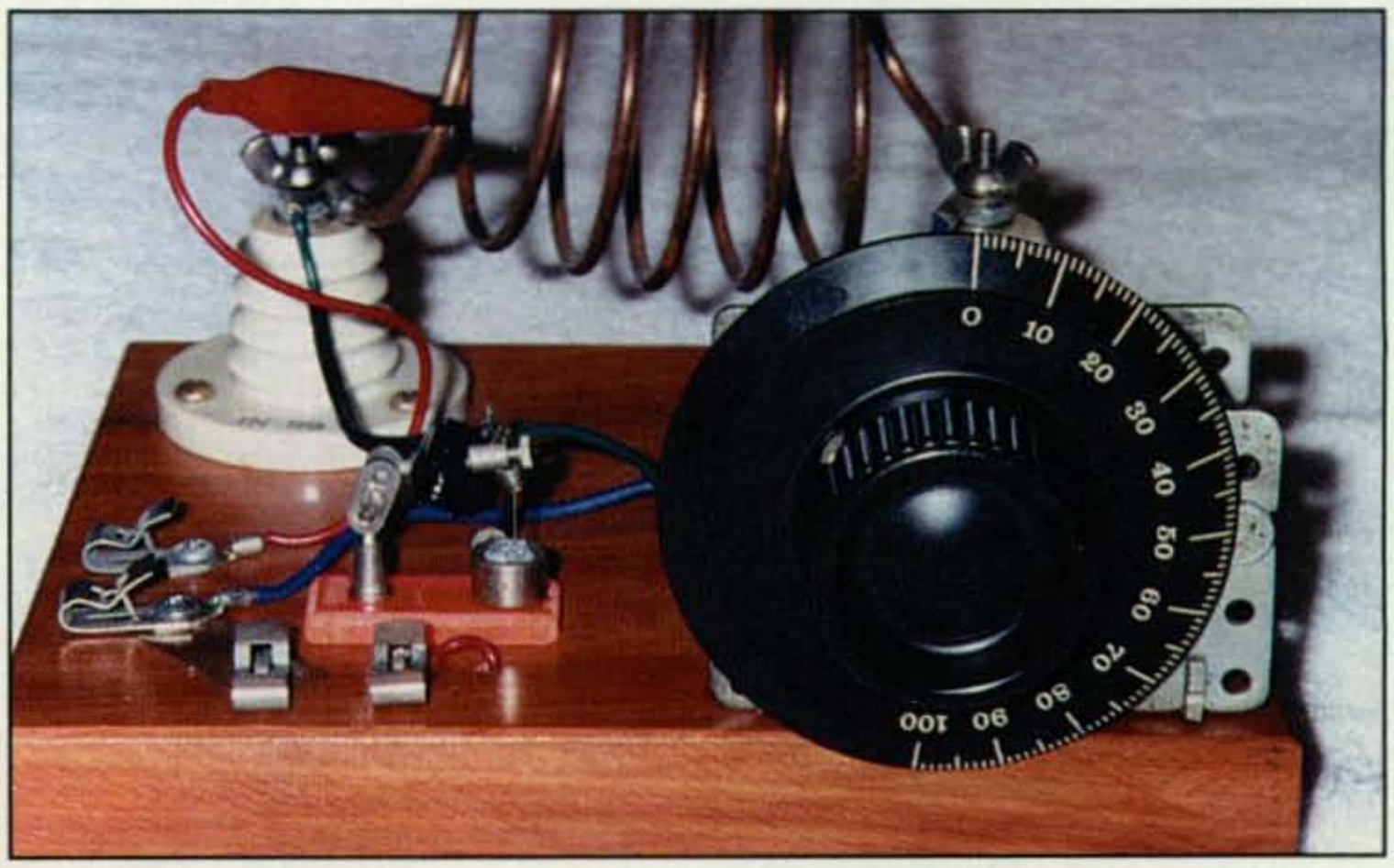

Photo F– The coil in this crystal set, built by Walt Bullerwell, KF4YJQ, is seven turns of 1/8-inch diameter copper tubing wound with a 2-inch diameter. Combined with a single-section 365 pFd capacitor, it receives AM shortwave stations around the popular 49-meter band. (Photo courtesy KF4YJQ)

the form's spokes while spiraling out with each turn. The odd number of sections on the form helps ensure you begin adjacent turns on opposite sides of the form, so the possibility of errors is minimized. Try making one or two (it's fun), and the more you make, the better they look! Walt's spider-web radio is mounted on a 6" × 4 1/2" red cedar board finished with tung oil and fitted with a homemade "catwhisker and cup" detector like that used in vintage crystal sets. That detector also reminds me of two real-life tales from yesteryear begging to be shared with younger amateurs reading this column. . . .

During the early days of wireless communication (the term used for radio prior to radio, and long before cell phones), an amateur or a ship's spark-rig operator would hunt along sandy creek edges for galena crystal rocks (they look similar to fool's gold). Then when he came back with his wireless "apparatus" (the term prior to "gear" or "rig"), each crystal was secured in the detector's cup and

its fine "catwhisker" wire was moved across the crystal to find its most sensitive point of signal detection/reception. The spot was then marked with a pencil or knife scribe, and the galena crystal was carefully stored so it could be grabbed and swapped in the cup on a moment's notice. Why replace a crystal and why so quickly? To survive moving "rock crushers," naturally.

Amateurs were not the only folks using spark apparatus. High-power spark setups were also used aboard ships, and the setup usually was housed in a closed room for security. As a result, the operator could not see when another (spark-equipped) ship was nearby. When the other ship's operator "fired up" (literally!) his spark transmitter, it burned out (totally destroyed!) the galena's sensitive detection point right when the first ship's operator was copying messages from shore. A really sharp spark operator could bleep a "QRT! QRT!" message, swap galenas, reset the catwhisker, and continue copying without missing more than two words. Now that, dear friends, is what you call a real radio operator! May their legacies live forever!

A spark transmitter and crystal set receiver was also utilized aboard the *Titanic* and other ships involved in rescuing its survivors. Amateurs from Maine to Florida copied that famous SOS on their homebrewed crystal sets, too. How? Rotary spark transmitters produced raspy buzzing sounds rather than the tones of today's CW, and crystal sets copied them just like AM.

Now remember these true stories from our proud past and pass them on to next-generation amateurs many years "down the line." Add a similar "pass it on down" stipulation so our proud legacies and history will live on forever.

Space is now tight, but check out the quick-brew crystal set from K4YJQ which covers the AM broadcast band and is shown in photo E, and the shortwave receiving crystal set shown in photo F. What is the difference between an AM band and (AM) shortwave receiver? The coil. The one shown in photo F uses only seven turns of 1/8-inch copper tubing wound with a 2-inch diameter. Reception (of stronger shortwave stations) is surprisingly good. Our special thanks to KF4YJQ for sharing these views.

On that note, we wrap up yet another crystal-set special. We trust you enjoyed the views and tales, and we will once gain take our cues (and views!) for more crystal features from your comments and input.

73, Dave, K4TWJ

mobiling

BY JEFF REINHARDT,* AA6JR

Mobiling with a Screwdriver

The term *screwdriver* could mean a tool or a cocktail. Recently the term has been expanded to include a tunable HF antenna, usually used in mobile applications. Last time we looked at "supertuner" systems and promised our next outing would look at the "screwdriver" antennas that have become so popular for mobile operations.

Some Unfinished Business

Before we get to new business, though, let's follow Robert's Rules of Order and do a follow-up to our column on "supertuners." You may recall I referred to a number of manufacturers' products, and SGC was among them. Just after publication I received the following from Terry Dettman at SGC:

I wanted to say thank you for mentioning SGC in your article in the November 2003 issue of *CQ* magazine. There are several points, though, that we thought we should follow up on with you:

1. Using coax on the output of the tuner: While Smartuners are designed with lugs for RF output and we recommend direct connection at the antenna feed point, the use of coax on the output is not uncommon. The biggest problem with using coax there is usually that it is poorly installed. With proper installation and reasonable care, it certainly can be used. However, we point out to people that if there is a strong mismatch at the antenna feed point compared to their 50-ohm cable, then SWR will be very high on the cable and voltages at various points along the cable can get very high. This has caused arc-over in some instances. We always recommend that for an optimum installation, put the coupler directly at the antenna feed point or as close to it as practical. You may wish to look over some recent material we've published on our website about mobile installations. You can find it at <http://www.sgcworld.com/Newsletter/Oct03/MobileGnd.html>.

2. The Quick Mount System antennas: You referred to these as our "strap-on" system, which is accurate as far as it goes. There certainly are benefits to installation outside the vehicle (minimizes interference, etc.). However, beauty may be in the eye of the beholder, and many wives wouldn't accept this as a "nice" addition to the family car. Important benefits, though, include ease of installation and the fact that it can be installed without drilling holes in the car at any point. Some of our customers who have concerns about leaving such a mounting on their vehicles in unsafe areas have mounted it more permanently to roof racks and other locations with great success. You can find a recent article with pictures of such an installation on our website at <http://www.sgcworld.com/Newsletter/Sep03/MobileQTH.html>.

Several of the hams in our office have QMS systems installed on their vehicles and have had no problems with theft or attempted theft. In fact, most comments from people have been "What is that?" and "So you're a ham radio operator?" Both have led to some interesting chats.

Thanks, Terry. It's nice to hear from the manufacturer and get information straight from the source. Let me add, though, that Terry's comments about using coax apply only to SGC products. I wouldn't try using coax on the output of any other supertuner unless the manufacturer specifically allows the practice, and as Terry mentions, it can cause problems.

Photo 1– WØROB's motorized Yaesu ATAS-100. (WØROB photo)

Also from the column in the November issue, we received a note about the 160-meter mobile photo:

You wrote a nice article on mobile antennas in November *CQ*. In looking at your 160-meter mobile antenna, are you using a Diamond K400 3/8 antenna mount? How well has it held up for you?

—Merit Arnold, W6NQ, (of Diamond Antennas)

Merit, that wasn't my installation, but I have used the Diamond mount you mention with good success. I have found it sturdy and able to support a rather hefty Outbacker Perth antenna, and as the Aussies say, "no worries." I do recommend tightening the set screws periodically, which is good advice with any mobile mount, particularly with heavier antennas that exert stronger wind loads on the mount.

Bring on the Screwdrivers

The screwdriver antenna derives its name from early versions of the antenna that used the motor

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e-mail: <aa6jr@cq-amateur-radio.com>*

Photo 2– WØROB's FT-100 is nicely positioned clear of the airbag deployment zone and at the operator's fingertips. (WØROB photo)

Photo 3– W6RH creates a template with tape prior to drilling holes in the car's body. (W6RH photo)

from a hand-held power screwdriver to move a slug up or down a large coil that is attached to a radiating element. This ingenious design allows the mobile (or space-challenged base) operator the ability to get an optimal SWR match into the radiating element.

Now without going into a lot of antenna theory and the never-ending discussions about how much signal is radiated, etc., the anecdotal evidence is very strong that the system works well in terms of optimizing the match between the antenna and the transceiver. Like many other developments in ham radio, word spread like wildfire, others emulated the successful designs, and ultimately commercial manufacturers started making highly finished screwdriver antenna systems. In spite of higher grade motors being employed in newer designs, the term *screwdriver* stuck and seems likely to remain in use to define just about any motorized, tunable coil antenna system.

There are many variations and types of screwdriver antennas (see the photos for examples from High Sierra and Yaesu). Other companies that manufacture motorized screwdriver-type antennas include Hi-Q Antennas and Tarheel Antennas. In addition, MFJ offers a manual (non-motorized) screwdriver antenna. See their ads in *CQ* for details.

Operation

Screwdriver antennas require the operator to find the "sweet spot" of resonance for the desired operating frequency. Initially, this can take some time, particularly if one is agile from band to band. Like most mobile antennas, the sweet spot is very narrow, so moving just a few kHz requires a "touch-up" tune. Some newer antennas are being built to work in concert with certain transceivers, such as the popular ICOM IC-706, and certain Yaesu mobiles are designed to work with Yaesu's ATAS-120. (In addition, W4RT Electronics has a controller called the "Antenna Boss" for those Yaesu radios that allow users to automatically tune any brand of motorized antenna by pressing the radio's "tune" button. (See W4RT's ads here in *CQ* for details.) Just as screwdrivers have evolved, so have operations, with some tuning systems now being handled by computer!

Limitations

Like everything else in life, there are limitations and some drawbacks with screwdriver systems. Earlier systems were heavy, as some still are today. This requires a hefty mounting system for a "classic" screwdriver design. Granted, some newer systems coming into use are smaller and lighter, but the coil and motorized mechanism are going to have more mass than a "stick"-type HF antenna. Even so, some of the most compact

Photo 4– The High Sierra antenna system is substantially built. (W6RH photo)

Photo 5– W6RH completed his High Sierra installation by placing the antenna control switch in the dash next to his Alinco DX-70 for a very professional look. (W6RH photo)

units are light enough to be mounted securely on a trunk-lip mount or one of those big triple-magnet mounts.

Some screwdriver designs, particularly home-built units, are found to be very susceptible to water intrusion. This can play havoc with your HF system! Also partly due to their weight, they are subject to vibration and can exert strain on the mounting system unless a sturdy bracket is secured to the vehicle. Also, due to their size, screwdriver antennas may be damaged by impact. To get an idea of the commitment needed for some screwdriver systems, see the May 2003 *CQ* cover and the photos that accompany this story.

Nevertheless, a dedicated cadre of hams swear by their screwdriver antennas, and why not? The relatively small package can give you frequency agility through most, if not all, HF bands (depending on the design), which is their primary appeal. Who wants to get out of the vehicle to change sticks or taps? The screwdriver is the answer for the frequency hopper.

Getting Screwdrivers On The Air

Showing two different motorized antenna installations, we'll call on the skills of two Roberts to share their installations with us.

Bob Baker, WØROB, was kind enough to send some pictures showing his well-organized mobile installation, which includes a Yaesu FT-100 working into a Yaesu ATAS-100 motorized antenna tuner (photos 1 and 2). Bob reports good results using the system, which one would expect when using matched components from a single manufacturer.

High Sierra sent along a screwdriver system for our review. With the help of Rob Hanson, W6RH, we installed it on a Honda CRV (a mini-SUV), and the results have been impressive. From the moment you open the box, it's apparent that the unit is well made. The design and construction exude a "quality" message, which is also reflected in the price. However, as they say, "quality costs." For more information, and to see some very interesting antenna installations, check out their website at: <http://www.cq73.com/FramePages/hsaSet.htm>.

We've included photos of W6RH installing the High Sierra unit (photos 3, 4, and 5). Rob seems to have found the perfect spot on his CRV for mounting, and his installation of the High Sierra control switch next to the Alinco DX-70 has a very professional appearance.

As evidenced by Rob's installation, choosing a mounting location is a key element. As referenced above, it must be an area of the vehicle that is sturdy and less prone to damage. (More than one side-mounted screwdriver has met an untimely end brushing against objects, both stationary and moving!) Note that Rob carefully drilled holes in the vehicle body for a secure mount. It's a commitment Rob was willing to make.

Unlike other antenna systems that just require a coaxial cable connection, the screwdriver system will require a power cable for moving the tuning mechanism to and fro. The mounting bracket should also be well grounded. A control switch for operating the antenna will need to be at the fingertips of the operator, and of course, an adequate 12-volt power source must be provided to make the motor work. In other words, one must carefully plan the design and installation of the screwdriver assembly and its support components.

Is a screwdriver antenna right for you? Only you can answer that one. It's a major commitment, but screwdriver users seem happy with the results!

73 and happy traveling.

73, Jeff, AA6JR

BY DON ROTOLO,* N2IRZ

Computer Security

Just because you're paranoid doesn't mean they're not out to get you. There are some very intelligent folks out there who make their money illegally by stealing what is yours. In the digital world in which we find ourselves, stealing with a computer is much cleaner than using a gun, and it's harder to get caught, too. Since most hams have a computer and use the internet, an introduction to the darker side of digital seems like a good topic to consider this month, along with some ways to shield yourself against it.

Computer-based crime is rising, but the amazing thing is that such a large percentage of computer users do absolutely nothing to protect themselves. All anyone has to do is take some simple precautions and the criminals will probably look elsewhere, kind of like locking your car and taking your keys to prevent your car from getting stolen. Not until most cars are locked will a thief bother to break the glass. It's much easier (and safer) to just move on to an unlocked car . . . or computer.

Computer security has many aspects. We should worry about people getting into our computer and hijacking it while we're online, as well as people guessing our passwords or sending nasty software to damage our data. We should also worry about simple mechanical or electrical failure and ordinary theft of our hardware. Let's look at each of these issues in turn, and see how we can help guard against the problems they may cause.

Fig. 1– An older version of Zone Alarm at work. This is a fine example of a software firewall, which prevents any program that you don't specifically enable from sending data to or from your computer. Anyone who uses the internet needs a firewall. Note that over 500 potential intrusions were blocked during a single three-hour dial-up internet session. You can download Zone Alarm basic for free (see the text).

Unauthorized Access, Part 1

Did you know that unless you have taken specific precautions against it, people can access your computer any time you are online? Here's a test: Go to <http://www.grc.com>, look for "ShieldsUP!" and allow them to test your security for "common ports." Unless you have a firewall, you'll be shocked at the results. (Feel free to run the other tests as well.) Anyone with some simple software and malicious intent can attack, take control of, and even damage your computer.

The weak point is your *ports*. Various legitimate internet services use specific software hooks or "ports" to access your computer, sort of like virtual COM ports. When connected to the internet, certain types of internet applications use certain ports for their work. For example, telnet uses port 23, and http uses port 80. The problem is that there are many ports defined, and if you haven't specifically closed a port, it is open, and it allows access to your computer. A malicious person can use that access for evil, such as destroying your computer, introducing a virus, or using your computer to do evil things to some other computer. This last item is a common tactic in Denial-of-Service attacks against a website, where some unsuspecting site is so inundated with bogus web hits it cannot serve legitimate users.

The solution is simple and inexpensive—a firewall. Just like a real firewall, which divides a larger building or structure into smaller areas for fire protection, a computer firewall divides a computer network into sections for protection against damage from most "bad things." A firewall can be a software program or a piece of hardware that watches all of the communications to and from your computer, allowing only the activity you feel is safe. Note that a pop-up blocker is *not* a firewall.

Software firewalls are perfectly fine for single computers and small networks. For larger networks, a hardware firewall might offer better speed and performance, since they are optimized for a single purpose. You can download one of the best software firewalls in the business for free from <http://www.zonelabs.com>, or you can buy

*P.O. Box 114, Park Ridge, NJ 07656
e-mail: <n2irz@cq-amateur-radio.com>

the Norton or McAfee firewall software, as well as others.

While broadband users are especially vulnerable, since their internet connections are active even when they're not being used, having a dial-up connection is no reason for confidence. Without this very basic level of protection, anyone connected to any network is leaving his/her computer open to attack.

Okay, so here is the first task on your To Do list: **Obtain and install a firewall for every computer that can connect to the internet**. Most home users would install a software firewall for one to three computers, and perhaps get a hardware firewall for larger installations. Either option is sufficient.

Unauthorized Access, Part 2

If you're alive enough to read this, you surely have at least one password you need to remember. Most of us have literally dozens of password-protected accounts, and if you're like most humans, you use the same password for almost all of them. That's a problem that you must fix right away.

You probably also use a fairly simple password, such as "tiger," or (horrors!) you use a form of your name, birth date, wedding date, user ID, address, or some other easily guessed word. If so, *stop it immediately!* You're setting yourself up for a massive security breach, which will definitely take the better part of a few years to clear up. Imagine if someone, just for one night, had complete access to all your accounts? Ever set a password on a website to get something (for free!)? You may have just given away the keys to your kingdom.

What you need to do is set up a "strong" password system for yourself. By *strong* I mean not easily guessed or learned, and by *system* I mean a way of setting a different password for each and every account you have, but without having to remember dozens of different passwords.

A strong password is at least six characters long (I recommend eight to 12), does not contain all or part of the user's account name, and contains at least three of the four following categories of characters: uppercase characters, lowercase characters, digits 0 through 9, and symbols found on the keyboard (such as !, @, #). For example, "strong" is not a strong password, but "sTr0ng" is.

Come up with a memorable but somewhat random word of about six to eight characters and make subtle changes to it so that it becomes strong. This will become one of your "core" passwords; you should use different ones for work and home. For example, the word "savings" could be strengthened to "$a1VngS." Nobody would ever guess that, especially as I misspelled it.

Even with a strong password like that, using it everywhere defeats the whole purpose. Of course, if you had to remember a different strong password for every single account, you might resort to writing your passwords down—one of the biggest breaches of security you can commit. (If you *do* have them written down, don't. Okay, maybe one copy for the safe-deposit box, but that's it!). Writing them down won't do, so instead develop a system for each account using the strong core, but making modifications that only you would know.

Here is an example of a password system you could use. I urge you to come up with a variation on this theme, and make that *your* system. In this way, all of your passwords will be strong, and it is very unlikely that someone will be able to gain access to any of your accounts in this way. Even if they

do get one password, the others will still be secure.

Start with a secure core password such as $a1VngS. Take the first two letters of the site name, such as "eb" for eBay.com, and add those to the beginning of the strong core. Then count the number of characters in the site name—four for "eBay—and add that to the end of the strong core, resulting in "eb$a1VngS4" for your eBay account and "pa$a1VngS6" for your PayPal account.

You can see how each account's password will be different and difficult to guess, but easily memorized if you know the system and the core. Please feel free to use the system described, but I strongly recommend making at least some minor changes, such as reversing the letters, or moving the number, or something like that. So that's the second item on your to-do list: **Create and use a strong password system wherever possible.**

Oh, one last point related to passwords: If you ever leave your computer unattended, such as when you go to lunch at work, either lock your computer (Ctl-Alt-Del and press Enetr for Win XP and 2000) or at least set your screen saver to require a password. That will help minimize the risk of someone getting onto your computer and, say, sending a letter of resignation from your mail account.

Virus Protection

If you don't know about the threat from computer viruses, you shouldn't be allowed to use a computer. Linux and Mac users might feel more secure, but they also need to understand that a virus can be written for any operating system. Windows® just happens to be a big target.

If you do not have anti-virus software on your computer—software that is consistently up-to-date *every week*, set to screen everything coming in, and used regularly and frequently—you do not have any virus protection at all. You might as well save yourself the trouble and format your hard drive; at least there won't be any hardware damage or stolen information.

Yes, that's a strong statement, but not excessively so. The plain and simple fact is you need anti-virus software. The range of viruses, and the myriad ways they can do harm, demands at least some preventative actions. Looking at the sale flyers from Best Buy, CompUSA, Staples, and Office Max, I see that both McAfee Anti-virus 8 and Norton Anti-virus 2004 are on sale for less than $20, and there's even a rebate if you're upgrading. You're even entitled to at least a year's worth of free updates to the virus definition files. For $20, consider it health insurance for your computer,and let it go. If the money is an issue, you can get free virus scans at the McAfee and Symantic (Norton) websites.

Since many more people have, maintain, and use anti-virus software than firewalls, this issue is only number three on our hit parade. Nonetheless, those who have no virus protection, or who don't keep their updated, are just sitting ducks, driving with their eyes closed. Something bad will happen, sooner rather than later, and a few bucks for protection will then seem like a cheap price to pay. The need for anti-virus software applies even if you don't have internet access; that floppy or CD you borrowed is just as effective for infecting your computer. Therefore, the third item on your To Do list is: **Get, maintain, and use anti-virus software.** The key word is *maintain*. An ounce of prevention is worth a pound of cure.

Plain Old Troubles

After looking at some of the electronic pitfalls awaiting us, these next few will seem like old friends—or enemies, really. However, we tend to be more comfortable around familiar foes than around unfamiliar ones. Nonetheless, these old foes are just as troublesome as ever, lest we forget.

The first of these is plain old theft. While you're on break at a conference, someone lifts your laptop—with your company's confidential new product

Looking Ahead in CQ

Here's some of what we're working on for upcoming issues of *CQ:*

CW Results, 2003 CQ WW WPX Contest, by K6AW
"Hams and Homeowners' Associations," by KGØKI
"Secrets of Top DXers," by W1HEO

Plus...

"Recommended Training for Amateur Radio Emergency Communicators," by KW7J
"Review of the ARRL Emergency Communications Course," by WB6NOA
"The Life of Collins," by #4

Do you have a ham radio story to tell? See our writers' guidelines on the CQ website: <http://www.cq-amateur-radio.com>.

Photo A– Lightning protection is a given, but thunder protection? These ear plugs and their unique carrying case were being handed out by the PolyPhaser folks at Dayton last May. I have been using all PolyPhaser equipment for the antennas at my station, after their book The "Grounds" for Lightning Protection *opened my eyes. It's good reading, and it shows how any station can be protected against any lightning strike.*

plan. Oops! Laptops, and to a lesser degree even desktop computers, are like pets or children: You need to keep your eyes on them, because it only takes a second for them to go missing.

To prevent hardware from walking out the door too easily, use brute force. One of those cheap laptop locking cables is a good idea. Sure, a determined thief can defeat the lock in under a minute (I've seen it), but maybe it will make the thief pick up someone else's laptop instead. Good enough. The same idea works with desktop systems, too. Like the old joke goes, you don't have to outrun the bear, just outrun your buddy.

The second is externally induced mechanical or electrical failure. The simple version is to make sure the expensive hardware is protected against water, falling, things falling on it, and the like. The subtle version is to protect against power surges and lightning strikes. After all, protecting a PC is a lot easier than protecting a transceiver.

Get a mid-priced surge protector for the PC's power input and any communications lines, such as the phone or network wiring. The $5 surge protectors are worse than worthless, since you're fooled into thinking they are effective. I've seen surge protectors in the $25 range that are generally sufficient. On my own equipment I use an ISO-BAR (with RF filtering) that cost $85 fourteen years ago, along with a whole-house surge suppressor installed in the main breaker panel ($65 plus installation—definitely not a DIY job) and an inexpensive Belkin Surge-Master switch box. I don't think that's overkill.

The last major foe is plain old Hard Disk failure. It happens more often than you think, and you're a candidate as long as you have a hard disk. The solution is a simple backup, done regularly. Whether you use floppies, a tape drive, or recordable CDs or DVDs, you need to store copies of your most important data somewhere that isn't on your hard drive. These days, with the price of hard disks so low (120 GB costs less than $80 retail), it might even make sense for you to buy a new hard disk, copy everything onto it, and unplug it again so it can't get damaged.

Although a complete backup and restoration set for your entire computer is the ideal solution, it may be impractical on a regular basis. Also, consider that not everything needs to be backed up. Things such as your operating system and software packages, which can be reinstalled from their original disks, really don't need to be backed up. In the event of a catastrophe, all you need backups of are the files that you created or changed. For Windows® users, the contents of the "My Documents" folder would be a good start. Look for any other items that can't be downloaded or otherwise replaced and back those up, too.

There are many utilities that can be used for a regular backup program. Windows® comes with one, my CD burner came with one, and there are a few freeware and shareware versions available for download. You can also buy a backup utility (they are very reasonably priced) and (trust me) if you ever have to do a restore, you will be so happy you had a backup copy made.

Which brings us to the fourth item on your To Do list: **Make regular data backups for when your surge protector blows up, or your laptop is stolen.**

There you have it, computer security in a nutshell.

With only four items on your list, you should have no trouble completing these by the time the April issue of *CQ* shows up. If you take the time to do them, you will have a solid and stable computing system, safe from evildoers, which will bring you happiness and pleasure for years to come. At least it will be less painful when something *does* go wrong. Good luck . . .

73, Don, N2IRZ

New Ultra-High Microwave Records

Brian Justin, WA1ZMS, reports what he believes to be a new claimed world and North American distance record of 61.8 km for the 241-GHz amateur radio allocation. It happened on December 3, 2003, a day on which there was some rather dry weather in Virginia and Brian just couldn't pass up trying to better the November 14, 2003 DX record of 34.9 km for this band *(see last month's column for a report on that QSO)*.

Here is the specific information for this latest QSO: At 0148 UTC December 3, Brian, using the call **W2SZ/4**, worked **Pete Lascell, W4WWQ/4**, for a new distance record on the 241-GHz band. Brian was located at FM07fm, 37-31-04N 79-30-40W, and Pete was located at EM97xe, 37-10-49N 80-03-59W.

The W2SZ/4 end of the new 241-GHz record DX QSO. (WA1ZMS photo)

The weather at the time of the QSO at the W2SZ/4 QTH was as follows: temperature –6.1°C, dew point –17°C, relative humidity 40%, and station pressure 876 mb. Brian states that these weather conditions resulted in a total atmospheric loss of 0.541 dB per km. Brian goes on to state: "The weather at the W4WWQ/4 QTH was not logged, but since Pete's elevation is around 600 meters lower than mine, his dew point should have been slightly higher."

Brian indicates that the QSO came close to never happening, commenting: "After shorting out a set of gel-cell battery terminals while setting up the gear, I thought we'd never make the QSO! No fire, just a melted 1/4-inch plug on the cable end of the CW straight key."

Brian did complete the new DX record QSO, only this time he operated under the Mount Greylock Expeditionary Forces club call, W2SZ/4, because several people within the club have helped him with this 241-GHz project.

Commenting from the other end of the QSO, Pete wrote: "Brian, WA1ZMS, has almost perfected the microwave art. With his calculations of electrical parameters, path loss, etc., it is almost a given beforehand that it will work after watching the NOAA weather and dew-point forecasts. And his attention to detail leaves no surprises (except for the short caused by the spring strain relief on the key's 1/4-inch phone plug. Who would have thought? Now back to the basics. . . . the battery terminals will have insulation added!

"It was nice to be able to carefully set up all the equipment, thinking it would be a long cold evening trying to make the mw shot—while going through the sequence of powering up the different pieces, double checking everything was phase locked, etc., to then be able to shout over the liaison link 'tune to 439.1987' before we were really ready to search for each other. The gun sights were right on and no antenna peaking was required. We even had margin we could measure with attenuators, so there is another DX record coming.

"Since Brian designed and built the two microwave stations, and I only operate one of them so he has someone to QSO with, I see myself as an appliance operator. Even so, this facet of ham radio has taken it to extreme!"

More information on Brian's accomplishments can be found on the Mount Greylock Expeditionary Force website: <http://www.mgef.org>. Contributing to this report was Buck Rogers, K4ABT.

e-mail: <n6cl@fuller.edu>

VHF-Plus Calendar

Feb. 1	Poor EME conditions
Feb. 3	Highest Moon declination
Feb. 6	Full Moon
Feb. 8	Good EME conditions
Feb. 13	Last quarter Moon
Feb. 15	Very Poor EME conditions
Feb. 16	Moon perigee and lowest Moon declination
Feb. 20	New Moon
Feb. 22	Good EME conditions but near New Moon
Feb. 28	Moon apogee and first quarter Moon
Feb. 29	Very Poor EME conditions

—EME conditions courtesy W5LUU.

Six Hams Slated for "Return to Flight" Mission

Six of the seven crewmembers scheduled to be on board the shuttle *Atlantis* when it returns to space later this year are hams. The mission, STS-114—which NASA is calling the "Return to Flight" mission—will be the first since *Columbia* broke apart February 1, 2003 during re-entry following a 15-day space flight. According to still-tentative NASA information, *Atlantis* will go into space no sooner than September 2004.

Eileen Collins, KD5EDS, will head the crew of seven astronauts when the space shuttle Atlantis *returns to flight late this year. (NASA photo)*

NASA has announced that the STS-114 crew members will be Mission Commander Eileen Collins, KD5EDS; Pilot James Kelly, KC5ZSW; Mission Specialist Charles Camarda, KC5ZSY; Mission Specialist Wendy Lawrence, KC5KII; Mission Specialist Soichi Noguchi, KD5TVP; Mission Specialist Stephen Robinson; and Mission Specialist Andy Thomas, KD5CHF/VK5MIR. A veteran of three space flights, Mission Commander Collins has logged more than 530 hours in space. During the Return to Flight mission the crew will test and evaluate new procedures for flight safety and shuttle inspection and repair techniques.

Due to the extensive amount of work involved in this shakedown flight, it is highly doubtful that amateur radio will be on board. Amateur radio has not been onboard the space shuttles since the International Space Station became operational on the ham bands on October 31, 2000. William Shepherd, KD5GSL, Yuri Gidzenko, and Sergei Krikalev, U5MIR, were the first three to occupy the ISS as a regular crew.

The above courtesy the *ARRL Letter* online, December 3, 2003(http://www.arrl.org/news/stories/2003/12/03/4/?nc=1).

Phase 2 Ham Radio in Space Now Operational

This past December the crew onboard the International Space Station completed the installation of the Kenwood TM-D700E dual-band transceiver in the ISS *Zvezda* Service Module, which serves as the crew's living quarters. ISS Expedition 8 Commander Mike Foale, KB5UAC, set up the new transceiver at NA1SS during the week of December 10. Activation of the new equipment means a power boost for the NA1SS downlink signal. The additional equipment also includes a Yaesu FT-100 HF/VHF/UHF transceiver that should have gone into space last month, along with the new SSTV gear. According to ARISS International Chairman Frank Bauer, KA3HDO, this will mean the ARISS station will have multi-op, multi-station capability.

UK Ham and AMSAT-DL Ground Station Successfully Receive ESA's *Mars Express* Probe

On December 9, 2003 **Charlie Suckling, G3WDG**, copied a signal from the European Space Agency's *Mars Express* spacecraft. Using what he described as "just a quick throw-together" system, including a 3-meter dish, Charlie reported that he heard the *Mars Express* signal on X band (8.4 GHz). In a message to James Miller, G3RUH, who advised Charlie on setting up his equipment, Charlie said his system noise factor was about 1 dB, and he used Miller's S-Band 2.25-turn helix scaled to 8.4 GHz as the feed, with left-hand circular polarization (LHCP).

"Signals seemed very consistent for about two hours," he reported. The signal level was "very approximately" 0 dB S/N in 2.5 kHz. Charlie indicated that it was not too hard to locate the signal, that it took him about 10 minutes of searching ±100 kHz and tweaking his azimuth and elevation settings.

While Charlie's reception was the first for the United Kingdom, according to **Karl Meinzer, DJ4ZC**, on Sunday, November 16, Germany was the site of the first reception when "a strong (40 dB Hz ~ 6 dB s/n at 2.4 kHz bandwidth) 8.4-GHz signal of the *Mars Express*—at that moment 102 million kilometers distant—was directly received at Bochum over a number of hours. Although traveling through space with the speed of light, it took about six minutes for the signals to be received on Earth!" Karl reported that the receive equipment was a horn, low-noise down converter to 1270 MHz and a Yaesu FT736R radio plus power meters.

In addition, after the receiving system was improved by more than +4 dB, on November 22 the *Mars Express* was again received, with a stronger signal than before. In addi-

This 20-meter parabolic antenna in Bochum, Germany was used for the first amateur radio reception of the Mars Express *spacecraft. This dish is to serve as AMSAT-DL command station for the P5A Mars Mission, which is scheduled for 2007. (AMSAT-DL photo)*

tion, the AMSAT/ IUZ team succeeded in receiving the American probe *Mars Odyssey* on 8407 MHz. Since October 2001 *Mars Odyssey* has been orbiting the red planet, and Karl reported that the large Doppler effect of approximately ±100 kHz of the Mars orbit could easily be observed.

Since June 2, 2003 the *Mars Express* probe has been on its way to the "red planet," arriving on December 25 and deploying the lander *Beagle 2* toward the Mars surface. Karl indicated that joint preparations by the IUZ (Institut für Umwelt- und Zukunftsforschung [Institute for Environment and Future Research]) and the AMSAT-DL for this event had started months earlier, because the 20-meter parabolic antenna is also set to be used as a ground station by AMSAT-DL for the future P5-A Mars Mission.

As the AMSAT-DL P5A Project Leader, Karl reported that for the project team (all of whom are amateur radio operators), "this is a decisive breakthrough for the AMSAT P5A Mars mission, due for launch in 2007." He reported, "this success was only possible after intensive renovation of the whole antenna installation." The renovation included dismantling, building, and reassembling much of the electrical and mechanical systems for command and control, which was performed by the IUZ (Bochum observatory) under the direction of IUZ leader Thilo Elsner, DJ5YM, with support from companies Eurotherm Deutschland and Mach4 Automatisierungstechnik.

Karl reported that AMSAT-DL was responsible for the cooperation and for the planning and implemention of the control engineering for antenna pointing as well as for the RF techniques for receiving and converting of the signal. "Thanks to these new systems, positioning of 1/100° was achieved for the 20-meter parabolic antenna," commented Karl.

The IUZ staff involved in the project included Guido Elsner, DL9DBP; Werner Klein, DL5DAA; Stefan Keidel, DB4QW; Stefan Schröer, DH1DAC; Ralf Höinghaus, DG5DAT; and Thilo Elsner, DJ5YM. The participating amateur radio personnel from AMSAT-DL included Hartmut Päsler, DL1YDD (drive engineering and liaison with AMSAT-DL); Freddy de Guchteneire, ON6UG (feed system and RF-integration); James Miller, G3RUH (tracking and antenna control software); Karl Meinzer, DJ4ZC (system design and AZ/EL-servo design); and Michael Kuhne, DB6NT (8.4-GHz preamplifier and downconverter).

Portions of this report courtesy the *ARRL Letter* online edition, December 10, 2003 (http://www.arrl.org), and AMSAT-DL (http://www.amsat-dl.org/p5a/p5a-bochum-eng.htm).

Amateurs Complete 82-mile Two-way DSSS Link on 2.4 GHz

While some of us complain of not being able to communicate from room to room with our wireless cards in our computers, ARRL HSMM Working Group Chairman, and *CQ VHF* magazine feature writer John Champa, K8OCL, reports that ARRL High Speed Multimedia (HSMM) Working Group member Ken Cuddeback, NT7K, and his students at Weber State University in Ogden, Utah, recently completed two-way direct-sequence spread-spectrum (DSSS) communication on 2.4 GHz over a distance of 82 miles. The WSU students, who included one ham, Brandon Checketts, KG4NZV, and several prospective licensees, broke the current world record of establishing a wireless link on 2.4 GHz with DSSS (using IEEE 802.11b "Wi-Fi" protocol). Cuddeback reported that his students used PrimeStar dishes with unamplified Cisco Aironet 350 cards in each laptop. "We set up a NetMeeting session and transferred a 2.5-MB mp3 file successfully," he said. The Cisco Wi-Fi cards run about 100 mW.

Portions of this report courtesy John Champa, K8OCL, and the *ARRL Letter* online edition, December 10, 2003 (http://www.arrl.org).

The First Afghanistan EME QSO Reported

EME pioneer Dave Blaschke, W5UN, of Mt. Pleasant, Texas, reported that he worked Bob Sutton, YA1RS, in Kabul, Afghanistan, via moonbounce on December 4, 2003. Dave indicated that the contact was 2-meter EME DXCC entity number 168 for him.

"This is the first EME QSO ever for a station in Afghanistan, as far as can be determined," Blaschke said. Bob was running 150 watts to a small array at the time of the contact, but Blaschke said Sutton is hoping to be able to get an amplifier up and running and will be available to work others in the near future.

This report courtesy the *ARRL Letter* online edition, December 10, 2003 (http://www.arrl.org), and the Moon-Net reflector (http://www.nlsa.com/nets/moon-net-help.html).

Calls For Papers

The following organizations have issued calls for papers for their *Proceedings* to be published in conjunction with their respective 2004 conferences:

Ray Rector, WA4NJP, has announced a call for papers for the eighth annual Southeast VHF Society (SVHFS) conference to be held in Atlanta, Georgia, April 23 and 24. Ray states that you may contact him via e-mail at <wa4njp@bellsouth.net>, or via his home address, 3493 Holly Springs Rd., Gillsville, GA 30543.

The conference location will be the Holiday Inn Hotel & Suites in Marietta; this is a new hotel for the event. The hotel address is 2265 Kingston Court, Marietta, GA 30067. The direct telephone number for the hotel 770-952-7581. Be sure to mention "Southeastern VHF Society Conference" to get the special room rate.

The **International Forum of Radio Amateurs**, FIRHAV 2004, to be held in Havana, Cuba, on March 15–18, has issued a final call for papers for this conference. In order to ensure translation and printing, papers must be sent to the Organizing Committee before February 1, and go to FIRHAV 2004, POB 6060, Havana, 10600, Cuba, or to e-mail address <frcuba@enet.cu>. If sending it by e-mail, please indicate FIRHAV 2004 Paper in the subject line. For more information, go to: <http://frc.co.cu/firhav/call.doc>.

The **Central States VHF Society** has issued a call for papers for its conference to be held July 22–25 at the Delta Meadowvale Resort and Conference Center in Mississauga, Ontario, Canada. The society welcomes anyone interested in presenting a technical paper to contact Bob Morton, VE3BFM, at <ve3bfm@csvhfs.org>.

The **11**th **International EME Conference** has issued a call for papers for the conference to be held on August 6–8 at The College of New Jersey, located in Ewing Township, New Jersey. For more information, see their website, <http://www.qsl.net/eme2004/index.htm>, or send an e-mail to <eme2004@qsl.net>.

New Beta WSJT Available

Joe Taylor, K1JT, has announced that a new Beta Release of WSJT is available for free download at the WSJT home page, <http://pulsar.princeton.edu/~joe/K1JT>. Its principal attraction is a new mode called JT65, which includes pow-

On the Cover

Ralph Fedor, KØIR, of Waite Park, Minnesota, doesn't let a little snow get between him and his antennas. He just fires up the John Deere 4WD tractor and clears a path to wherever he needs to go. Ralph lives out in the country on 25 acres, "where you can put up some antennas." And that he has … you can see only a couple of his six towers on our cover photo. The tallest is a 190-foot high rotating tower, with a 4-element 40-meter beam on top, plus two stacked 6-element monobanders on 20 meters and two stacked 7-element monobanders on 10 meters. Another tower holds beams for 15 and 6 meters; yet another covers the WARC bands (12, 17, and 30 meters); and the last two give him some "redundancy" on 10, 15, 20, and 40! Comes in handy when he runs a multi/multi contest operation from the three Yaesu FT-1000Ds, one FT-1000MP MkV, and the ICOM IC-756 Pro2 inside his shack!

But Ralph, who's a radiologist in nearby St. Cloud, MN, says he only "dabbles" in contesting. His real love is DXing, and especially DXpeditioning … he's been on seven so far, all to Antarctic islands (he doesn't want to leave that snow!), including two visits each to South Sandwich (VP8SSI & VP8THU) and South Georgia (VP8CBA & VP8GEO), plus 3YØPI on Peter I Island, XRØY from Easter Island, and VKØIR from Heard Island.

Ralph has been a ham since 1961 and made his first DXpedition in 1992. Why such a long wait to get started? "It was a case of finish your education, get your career started, finish raising your family," explained Ralph, "then you can start thinking about the stuff you've been dreaming about for 30 years." *(Cover photo by Larry Mulvehill, WB2ZPI)*

erful FEC (forward error correction) and will be able to work with significantly weaker signals than JT44.

Spring Sprints Dates

The following is from Jeff Baker, WU4O: "Here are the dates for the 2004 East Tennessee DX Association sponsored VHF/UHF Spring Sprints: 144 MHz, April 5 (Monday); 222 MHz, April 13 (Tuesday); 432 MHz, April 21 (Wednesday); Microwave, May 1 (Saturday); and 50 MHz, May 8 (Saturday).

For details, see the ETDXA website, <http://www.etdxa.org>. Questions may be sent via e-mail to <springsprints@etdxa.org> or <jjbaker@ntown.com>.

And Finally . . .

***Columbia,* One Year Later.** The first anniversary of any tragedy is one of the hardest times. It was a year ago this month that the *Columbia* space shuttle was lost in re-entry over Texas, killing its entire crew, including three of our fellow amateur radio operators: Mission Specialists Kalpana Chawla, KD5ESI, David Brown, KC5ZTC, and Laurel B. Clark, KC5ZSU. While this column is not the venue in which to rehash all that went wrong and all of the what-ifs of the lost mission, it is important to remember the loss this month with the accompanying declaration "Never again!"

For an extensive summary of last August's "*Columbia* Accident Investigation Board Report," go to the following URL at Space.com: <http://www.space.com/missionlaunches/caib_details_030826.html>.

The Winter 2004 issue of *CQ VHF* magazine should be available within days of your reading this column. For your subscription, please see ads elsewhere in *CQ*. Two new columnists begin their editorial work with that issue, Joe Moell, KØOV, and Chuck Houghton, WB6IGP. Joe will continue his popular "Homing In: Radio Direction Finding for Fun and Public Service" column, which previously ran in *73 Magazine*. Chuck will write about microwave activities, as he did for *73 Magazine*. Along with these new columnists are the usual quality articles about the VHF-and-above ham bands that you have come to expect in *CQ VHF* magazine.

If you have something interesting for this column or *CQ*'s sister publication, *CQ VHF*, please send me an e-mail at the address listed at the beginning of this column. I look forward to hearing from you in the near future. Until next month . . .

73 de Joe, N6CL

dx

BY CARL SMITH,* N4AA

Europa and the 2003 Most Wanted Survey Results

As I write this, Christmas is still in the future by two weeks or so. We have had our first snowfall, and it's cold enough to keep any sane person inside by a warm fire—well, at least in the room where the amp generates enough heat to keep one warm. The amp has been running a lot over the last few weeks, with some good DX available. TO4E from Europa has been workable from the east coast of the U.S., although the west coast has not had a very good shot at working them. Upon their arrival, the team was frustrated to learn from the military on the island that the generators were only available for a few hours each day. Unfortunately for DXers, the times that the generators were made available for powering the radios were not the right times for propagation to the U.S., at least on the low bands. Europa is classified as a Nature Reserve, and as I understand, even the noise of the generators running can disrupt the wildlife. One report from the team said that turtles coming out of the sea at night to sleep on the beach were tearing up the antenna systems. Every morning they had to rebuild the antennas to be able to operate.

Early on, many DXers complained that the hours the Europa team was operating were not compatible with propagation. I doubt the DXers were any more frustrated than the five team members were. They were sitting on an island with nothing to do but watch the clock until the next scheduled "run time" for the generators. Can you imagine yourself in such a dilemma?

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The French team at TO4E (left to right): Eric, F5JKK, Dany, F5CW, Freddy, F5IRO, Jean-Louis, F5NHJ, and Pascal, F5PTM, as they were enroute to the island. (Photo courtesy Rafik, F5CQ)

I did note that as of December 11 they had made nearly 22,000 QSOs as TO4E and another 4100 as TO4WW in the CQ WW Contest. Fifteen meters seemed to be their best band, with 6600 Qs; 17 and 10 had 3200 each; and there were 2800 Qs on 20 meters, 1800 on 30 meters, 1400 on 40 meters, 350 on 80, and 126 on 160. CW has been best, with 11,200 Qs, and then there is SSB with 8500 and RTTY with 2500. They were trying to negotiate more generator time at more appropriate hours, but that has not happened as of this writing.

Overall, they really have done a respectable job considering the limitations that were imposed on them after arriving on the island. Also, as of right now they have another week before wrapping it up and going home.

Solar conditions certainly haven't been helpful either, with the SFI dropping below 100 during the second week of December, making things even more difficult.

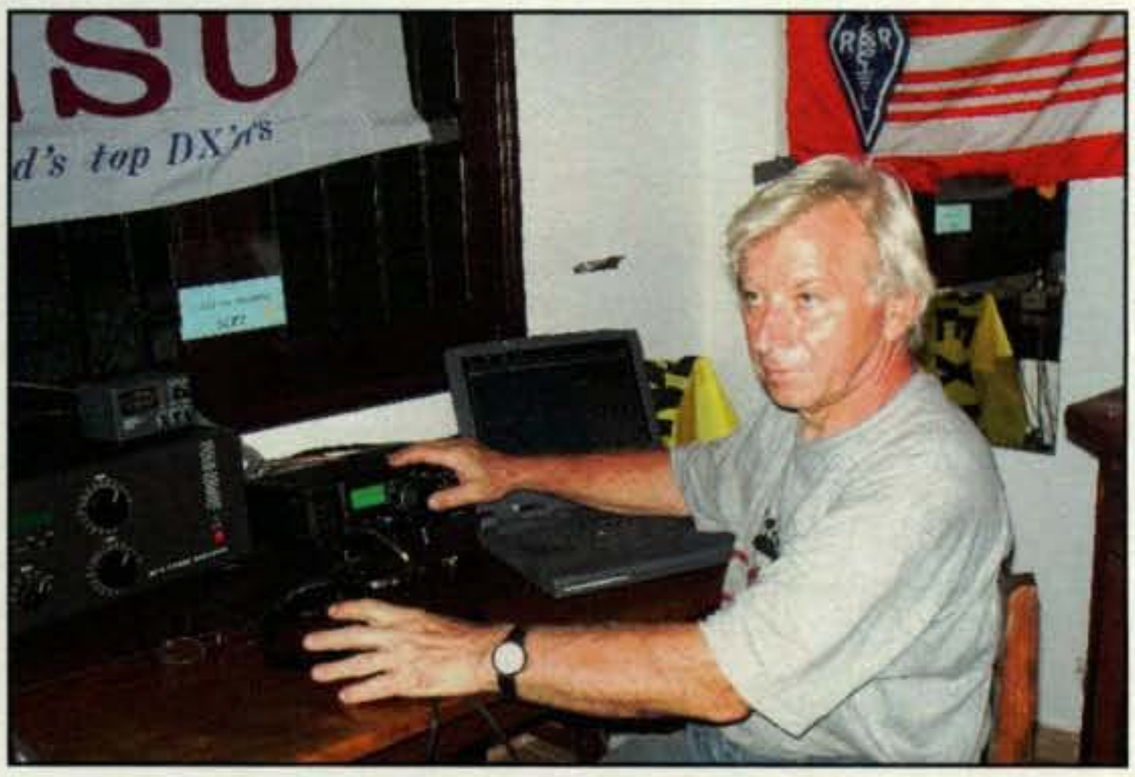
With a sunset like this almost every day, would you be on the radio? Charles, S9SS, regularly enjoys this view from his home in Sao Tome. (Photo courtesy Charles, S9SS)

2003 Most Wanted Survey

The results of *The DX Magazine*'s annual Most Wanted Survey for 2003 were released in January. A great number of DXers at the upper levels of "the chase" need only a few to make it to the top. Unfortunately, those few remain elusive. Scarborough Reef (BS7) is at the top of the list this time, with Andaman (VU4), North Korea (P5), Lakshadweep (VU7), and Peter I (3Y/P) rounding out the top five.

Actually, there wasn't much change in the top dozen or more from 2002 rankings. With little or no activity from these places, we can't expect to

Mark, YI/NG5L, has put Iraq in a lot of logs in the last several months. (Photo courtesy Marcus, W4ZAN)



Franz, DJ9ZB, operating one of the stations at 3CØV, Annobon. (Photo courtesy Franz, DJ9ZB)

see them move lower on the Most Wanted list. With the Europa (FR/J) operation in November/ December, that one should drop down in at least some areas of the world for next year. The only other Top Ten listing that might move significantly in 2004 is Aves Island (YVØ). An operation has been announced for January/February 2004. Depending on the results of that DXpedition, Aves Island could drop down somewhat. The postponed DXpedition to Peter I won't happen in time to affect the 2004 Survey, so we can expect it to continue to be near the top of the list again in 2004. DXpeditions to Banaba (T33) and Kure (KH7K) are expected in 2004, both of which are expected to generate a lot of activity.

The recent operation from Annobon (3CØV) isn't expected to have much effect on its ranking for 2004. Unfortunately, that operation was cut short for reasons beyond the control of the sponsors. They did a good job for the short time they were allowed to operate. Had they been able to finish out the scheduled time on the island, Annobon no doubt would have been "less needed." We'll just have to wait it out a bit longer for this one, too.

Yemen (7O) remains near the top of the rankings, and as long as the political situation in that country continues as it is, I don't see much chance of a valid operation from there for some time to come. Having said that, most of us never expected to see North Korea active in the recent past either. Anything can happen, at any time, so be prepared, just in case.

More of the French islands (Amsterdam, Crozet, Glorioso, and Kerguelen) still sit high on the Most Wanted list. These islands have seen little or no major activity in recent years and therefore continue to be "Most Needed" year after year. Perhaps after their experience on Europa our French friends can find the open door to activate some of these hard-to-work places.

The survey results reflect overall needs, regardless of mode or band. In March 2004 there will be a listing by mode that I believe will reflect a trend toward the digital modes. In 2003 a significantly larger number of responses indicating needs on RTTY were received than in previous years. Many have asked for a survey by band, and that is being considered, at least for the low bands as we get deeper into the sliding solar cycle. This would definitely be a major undertaking for both the respondents and for *The DX Magazine*'s very limited staff. However, it is being considered.

The contest season is well underway, but there is still a long way to go. I'm looking at the ARRL 10 meter contest in December as I write this column, plus there are the ARRL RTTY Roundup, CQ WW 160 CW Contest in January and SSB in February, the ARRL DX contests in February and March, etc., etc. The list goes on through June and July, so you have a lot of weekend activities to keep your interests up while the

The WPX Program

CW

3127 .....RD3AF 3128.....NI5F

SSB

2883 .....KO6LU 2885 .....EA5JE
2884 .....NI5F

CW: 400 NI5F. 500 RD3AF. 1500 EA2BNU. 1600 WA2EYA.
SSB: 700 KO6LU. 1000 K6IRA.
MIXED: 650 NI5F. 1000 WK5K. 1550 EA2BNU. 2900 N4UH. 4650 W1CU. 5300 W2FXF.

10 Meters: K6IRA, KO6LU
15 Meters: K6IRA, KO6LU
20 Meters: K6IRA, NI5F
160 Meters: NI5F

Asia: K6IRA, KO6LU
No. America: K6IRA, KO6LU, NI5F
Europe: K6IRA, KO6LU, NI5F
Oceania: K6IRA, KO6LU

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KUØA, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, W4BP, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN.

160 Meter Endorsement: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SM0DJZ, DK3AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WBØDD, IØRIZ, I2MQP, F6HMJ, HB9DZZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA5CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, UAØFZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, W4GP, DL6ATM.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Please Note: As of February 2004, the price of the 160 meter bar for the Award of Excellence is now $6.50.

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

5167 9A2AA	3770 YU1AB	3275 WB2YQH	2824 W2ME	2436 W7OM	2126 WB3DNA	1765 KØKG	1502 KX1A	953 PY4WS
4691 W2FXA	3726 I2PJA	3175 KØDEQ	2772 YU7GMN	2390 W8UMR	2070 I2EAY	1724 W7CB	1487 WT3W	933 SM7GXR
4257 W1CU	3668 N4MM	3166 K9BG	2655 WA1JMP	2376 JN3SAC	2018 HA9PP	1697 Z35M	1472 OK1DWC	865 N5DD
4154 F2YT	3548 N9AF	3140 I2EOW	2643 W9IL	2361 W6OUL	2005 VE6BF	1674 YBØAI	1369 KW5USA	803 VE3NQK
4098 EA2IA	3489 SM3EVR	3121 PAØSNG	2627 W3AP	2340 K5UR	1976 DJ1YH	1587 W2EZ	1226 EA2BNU	742 K5IC
4014 9A2NA	3465 N5JR	3008 IK2ILH	2585 9A4W	2304 OZ1ACB	1958 CT1EEB	1561 N1KC	1163 K6UXO	738 AK6I
3999 N4NO	3376 I2MQP	3005 HAØIT	2531 W9OP	2212 PY2DBU	1837 AA1KS	1535 AI6Z	1130 PY1NEW	710 KØCF
3833 N6JV	3334 KF2O	2952 W2WC	2510 K9UQN	2203 W4UW	1772 VE8FX	1521 NG9L	1090 W2OO	697 KL7FAP
3823 VE3XN	3281 S53EO	2944 IT9QDS	2454 K2XF					

SSB

4509 IØZV	3211 9A2NA	2816 KF2O	2350 IN3QCI	1969 CT1EEB	1839 I3ZSX	1538 VE9FX	1194 N1KC	903 N9DI
4050 ZL3NS	3198 I2MQP	2741 PAØSNG	2337 W2WC	1954 CT1EEN	1806 K3IXD	1533 KI7AO	1190 N4CN	893 KX1A
4018 VE1YX	3165 EA2IA	2734 4X6DK	2325 CX6BZ	1943 W3AP	1721 DK5WQ	1520 DF6HX	1162 EA5DCL	822 K1BYE
3705 I2PJA	3121 N4NO	2646 LU8ESU	2301 HAØIT	1937 I8LEL	1704 IT9SVJ	1460 NG9L	1148 AG4W	812 KU6J
3649 F6DZU	3049 F2VX	2594 I8KCI	2259 K5RPC	1933 W9IL	1685 W6OUL	1385 JN3SAC	1082 VE7SMP	793 KU4BP
3354 EA8AKN	2960 I4CSP	2513 KF7RU	2094 LU5DV	1893 NQ3A	1670 K8MDU	1384 LU3HBO	1078 EA3KB	776 YBØAI
3260 CT4NH	2938 CT1AHU	2509 EA5AT	1994 W4UW	1864 K2XF	1562 W2ME	1259 I2EAY	1048 EA3EQT	733 AK6I
3243 OZ5EV	2885 N5JR	2455 EA1JG	1988 K5UR	1862 EA7TV	1562 SV3AQR	1238 LU4DA	1043 AI6Z	670 VE6BF
3234 N4MM	2817 I2EOW	2388 OE2EGL	1978 N6FX	1852 W7OM	1555 W2FKF	1218 WT3W	990 HA9PP	

CW

4273 WA2HZR	2831 9A2NA	2362 KA7T	2106 W3AP	1898 K5UR	1803 W6OUL	1531 I2EOW	1282 DF6SW	1081 W4UW
3834 N6JV	2583 W2ME	2325 KF2O	2102 N6FX	1893 EA5YU	1798 W7OM	1520 4X6DK	1235 AI6Z	988 KX1A
3558 N4NO	2578 N5JR	2312 JA9CWJ	2047 JN2SAC	1868 VE6BF	1718 I2EAY	1483 EA6AA	1158 YU1TR	898 WT3W
3476 K9QVB	2558 N4MM	2197 W8UMR	1955 G4SSH	1847 IK3GER	1694 I2MQP	1430 EA2CIN	1146 K6UXO	830 N1KC
3469 VE7CNE	2428 W2WC	2149 K9UQN	1938 LU2YA	1847 KS4S	1679 EA7AAW	1342 WO3Z	1118 EA2BNU	809 KU6J
3178 EA2IA	2399 HAØIT	2147 I7PXV	1919 K2XF	1834 W9IL	1671 DJ1YH	1309 AC5K	1106 WA2VQV	767 VE9FX
2948 LZ1XL	2386 EA7AZA	2112 OZ5UR						

solar cycle does its natural thing over the next few years.

Logbook of The World

The Logbook of The World has generated an almost unbelievable amount of interest. Mike Mraz, N6MZ, has come up with an unusual offer. Here's what he says:

From all indications, the ARRL's Logbook of the World (LoTW) is a hit with hams worldwide. As of December 9, 2003, there were over 26,000,000 QSOs in the database, submitted by almost 5000 individual users. To encourage DX stations and DXpeditions to upload their logs to the LoTW, Mike, N6MZ, has volunteered to assist with the conversion of logs to ADIF format, obtaining certificates, uploading files, and so on. If you're a DX station or DXpedition who would like help uploading your logs to the LoTW, contact Mike via e-mail at <n6mz@arrl.net> or via U.S. mail using his Callbook address.

Glenn, K2FF, in his shack in Mississippi. Recently he put up several beverages and has been having a great time on the low bands, now that he can hear those weak ones. He was also one of the operators of the PZ5A team during the CQ WW CW contest last November. (Photo courtesy Glenn, K2FF)

The number of QSOs in the database is amazing—26,000,000 from 5000 users in the first three months it has been available. That's an average of 5200 per user. Considering those numbers were as of December 9th, I can only imagine what they might be after a few more contest weekends.

Upcoming Events

The hamfest season is starting already. The Charlotte, North Carolina affair will be March 13–14. I will be conducting a

CQ DX Awards Program

SSB

2419.....N6PSN 2420.....LU1DHM

SSB Endorsements

320.....VE7WJ/334 310.....KE4SCY/317
320.....SV3AQR/320 275.....W9ACE/291

CW Endorsements

320.....N7WO/320

RTTY Endorsements

320.....K3UA/327

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. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, 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.

DX Forum on Saturday. I'll be working on the program for the forum between now and then and expect to have a good one for all of those who can attend.

Don't forget the DX convention, April 23, 24, and 25, 2004 in Visalia, California. The 55th Annual International DX Convention will be sponsored by The Southern California DX Club will be held at The Holiday Inn Hotel & Conference Center, Visalia. If you have general questions or comments, please e-mail the group at <visalia@scdxc.org>. For full details see the website at <http://www.scdxc.org/visalia/index.html>.

Due to a glitch in the system, the 5 Band WAZ and regular WAZ charts do not appear in the column this month. They'll be back in the March issue.

I hope you are looking forward to spring with warmer weather and outside activities as much as I am.

Until next time, though, enjoy the chase and *have fun!*

73, Carl, N4AA

QSL Information

5J0X via N1WON
D44AC via ON4WW
D44TA via OE5OHO
D44TD via CT1EKF
D44TT via K1BV
D4B via K1BV
D68RH via KB7NK
D68RS via DC8TS
D70IAF via HL1IWD
D88S via DS4CNB
D90HC via DS2BGV
D90HC/2 via DS2BGV
DA0HC via DL6KAC
DK/MU0BKA via K4ZLE
DK1CE/H44 via DJ9ZB
DK1CE/KH8 via DJ9ZB
DM4WPF via DL9USA
DN2EI via DL6KAC
DS0DX/2 via HL1XP
DS5FNE/4 via HL1IWD
DS5RNM via W3HNK
DU1ZB via DJ9ZB
DU2/WA4QDE via N2OO
DU2/WD4KMD via N2OO
DU3NXE via W3HNK
DU7/N0JN via K0JN
DU9ZB via DJ9ZB
E30BA via DJ9ZB
E30GA via N2OO
EA2RCF via EA2RY
EA8AK via W3HNK
EB2DRV via EA2RY
EC2ADR via EA2RY
ED2FCR via EA2RY
ED2FSP via EA2RY
ED2RCF via EA2RY
ED2XXI via EA2RY
EF2XXI via EA2RY
EI4VBC via DF8AN
EJ4VBC via DF8AN
EL2AE via KB7NK
EL2EA via KB7NK
EL2JH via KZ5RO
EL2LE via K4ZLE
EL2RR via WC4H
EM225G via UR3GM
EN100WAY via UT7WZ
EO12ID via US7IGF
EP2AH via DJ9ZB
ER4OT via W3HNK
ER5AL via W3HNK
ER5GB via W3HNK
ER5WU via W3HNK
ES5MC via W3HNK
ET3BN via DL1JRC
ET3BT via K1WY
ET3PG via DJ9ZB
ET3PS via DJ9ZB
EW/NP3D via W3HNK
EW/NP3D via W3HNK
EW1KP via EW1KP
EW3LB via W3HNK
EX2M via W3HNK
EX8ML via W3HNK
EY1ZA via W3HNK
EY8MM via K1BV
EY8WW via K1BV
EY90MT via K1BV
EZ8AI via W3HNK
F0ZN via DJ9ZB
F2DX via TK5NN
F2DX/FJ via F6BFH
F2DX/FS via F6BFH
F2DX/PJ5 via F6BFH
F2DX/PJ6 via F6BFH
FB8WE via F6BFH
FB8WH via F6BFH
FB8WJ via N2OO
FB8YE via F6BFH
FBC6BFH via F6BFH
FC0ZN via DJ9ZB
FG/EA2RU via EA2RY
FG/EB2DTP via EA2RY
FG/F6BFH via F6BFH
FG/FS5PL via WC4H
FG/N2WB via N2OO
FG/PA3BBP via PA2R
FG/PA3ERC via PA2R
FG/PA3EWP via PA2R
FG/PA3FQA via PA2R
FG0EVT via F6BFH
FG0P via F6BFH
FG0ZN via DJ9ZB
FG5UQ/FS via W3HNK
FG7XT via F6BFH
FH/TU5AX via F5OGL
FJ/F6FVY via F6BFH
FK0AW via F6BFH
FK30FU via NA5U
FK30KRU via NA5U
FK8AH via W3HNK
FK8BB via DJ9ZB
FK8DH via DJ9ZB
FK8DZ via F6BFH
FK8FU via NA5U
FM/PA3BBP via PA2R
FM/PA3ERC via PA2R
FM/PA3EWP via PA2R
FM/PA3FQA via PA2R
FM0EVT via F6BFH
FM0ZN via DJ9ZB
FM5/F2PI via F6BFH
FM5BH via W3HNK
FM5WD via W3HNK

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

BY TED MELINOSKY,* K1BV

DX USA-CA Award Holders

There's no doubt that the USA-CA award is a formidable challenge for anyone, and doubly so for those living outside of the U.S. Jacques, F6HMJ, is our award coordinator for France. During correspondence relating to the most recent European winner, F6CUK, Jacques provided me with an analysis of the 38 DX stations who have worked all the U.S. counties since the beginning of the program in the early 1960s. Congratulations to all of them for their persistence, dedication, and hard work. They are truly an inspiration.

Europe: CT1IZ, DJ3EO, DJ4GJ, DL9YC, F6CUK, G1AFQ, G2AFQ, G4JZ, G4KHG, G5PQ, GM3BCL, GW3NWV, HB9AFI, HB9RG, I2PHN, I6FLD, OE2EGL, ON4UN, SM4BNZ, SM4EAC, SM5BHW, and SM6VR.

South America: HR1KAS, PS8YL, PT2TF, and YV5AGD.

Oceania: VK3CB, VK3MW, VK4AAR, VK4BS, VK4SJ, VK5AQZ, VK6NZ, ZL1KG, ZL2ACP, and ZL2BCX.

Asia: JH8GWW.

Caribbean: 6Y5RS.

USA-CA Special Honor Roll

Gail Inkrote, WB2AXH
USA-CA All Counties #1082
October 31, 2003

Thierry Mazel, F6CUK
USA-CA All Counties #1083
November 18, 2003

Francis E. Pavolko, W3FEP
USA-CA All Counties #1084
November 24, 2003

USA-CA Honor Roll

500		1500		2000	
WB2AXG	3271	WB2AXG	1370	WB2AXG	1270
K6IRA	3272	W4OV	1371	F6CUK	1271
KQ9X	3273	F6CUK	1372	W3FEP	1272
K3MI	3274	W3FEP	1373		
W2OO	3275	AF3X	1374	**2500**	
F6CUK	3276	AA4UT	1375	WB2AXG	1190
KD4ZAT	3277			F6CUK	1191
W3FEP	3278	**1000**		W3FEP	1192
AF3X	3279	WB2AXG	1643		
AA4UT	3280	F6CUK	1644	**3000**	
		W3FEP	3278	WB2AXG	1102
		AF3X	1646	F6CUK	1103
		AA4UT	1647	W3FEP	1104

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

Byron L. (Les) Green, KØLG
USA-CA All Counties #1072

This month we hear from Les, KØLG, who attained USA-CA All Counties #1072 on August 18, 2003.

I was first licensed at age 16, in 1957, as KNØMUP. I upgraded to General in 1958, Advanced in 1974, and then to Extra in 1978, at which point I changed my call to KØLG. Starting at about age 12, I was burning up old radios while trying to find out what made them work. I had an interest in radio, electricity, and the wonders of crystal sets, transistors, and the miracle of electronics. This interest has never faded and led to a ham license, commercial license, and a career in electronics and communications.

My first job right out of high school was at Walter Ashe Radio Co. in St. Louis, MO. Walter Ashe Radio sold ham equipment, stereo systems, tubes, and components. I was like a kid in a candy store. There were Collins, Hallicrafters, and National transmitters and receivers; Mosley antennas; and almost anything else you could want for ham radio. I liked Hallicrafters equipment. My first SSB station was a Hallicrafters SX-101A receiver, HT-37 exciter/transmitter, 100 watts, and a Mosley TA-33 Jr. This was a nice station for an 18-year-old kid making $2.00 an hour.

Mike, NØDIA, first introduced me to county hunting in 1991. He explained what it was all about and how much fun it was. I guess I just wasn't ready then for that much fun.

Later my job at the phone company required my driving to numerous locations in a five-state area of the Midwest. At first I passed the time by listening to books on audio cassette as I drove. I guess I finally got ready for the fun in about April of 1996, when Jim, WØFF, suggested that I put a mobile rig in the company truck and put out all those counties I was driving through. So I did, with the tacit approval of my boss and no damage to the vehicle. I installed an ICOM 735, magnet mount with a 3-ft. mast, and Hustler resonator. Off I went with a tape recorder and no idea what to do.

I remember being in Lonoke, AR and running that county. I believe it was the first one ever. I had worked some counties mobile to mobile before that. I remember the net control asking me the usual questions any new mobile gets: do you have a way to log the contacts, etc. This was fun, and it certainly made miles of driving a lot more pleasant. Often I would seem to get to my destination too quickly; there were still counties to work. The logging was the hard part, as I would be up late at night in a motel room listening to tapes from the day's runs.

I was really hooked. I had to get a mobile rig for my car so I could leave the one in the company vehicle. I bought an IC-706 MKII, tuner, and antennas and started mounting and drilling holes in my new minivan. Who cares about holes? I figured when I got done the van wouldn't be worth much anyway. I never left home without the rig . . . almost forgot the wife once. She wasn't worth much when I got rid of her, had a lot of radio miles . . . the van, that is!

Then one day I won the lottery! Well, not exactly. I was down to four counties to finish all 3077. I needed Greene, IA and was having a tough time with the propagation to Iowa, since I live in Missouri. Anyway, I was driving home from Utah and had heard three different mobiles running

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

in Iowa, and not one of them was near or going to Greene county. Frustrated, I switched over to CW and heard Guff, KS5A, running the county line of Storey and Boone, IA, the fourth mobile in Iowa that afternoon. Upon finishing the run, he announced that Greene would be next. What luck! I worked Guff when he got into Greene.

The last three I needed were in Illinois, and KCØJG and NØDIA saddled up and went out and got them for me so I could finish.

So here I am seven-plus years later and finally finished all 3077 counties. The road to get here was sometimes bumpy, but it was fun. I look at my log now and see that 3047 remain for the second time around. Yes, I have started on the second time. I must be crazy. I may not be able to handle this much fun again.

As I reflect back on these seven-plus years and the effort of so many who made it possible for me to accomplish USA-CA #1072, I think of KC4UG (SK), KIØJD, N4CD, N8STF, who gave me so many counties, and all the other mobiles and net controls KZ2P and W7LQT, whose time and effort made this possible not only for me, but for the many before me as well. I have made many friends and acquaintances through county hunting. It is enjoyable to meet them in person at the "mini" conventions held around the country throughout the year.

Thank you for making county hunting possible for all to enjoy. *—73, Les, KØLG*

DX Awards

Germany's European CW Association Award. CW may be on a downward path, looking at what is happening with the licensing requirements in many countries, but its popularity has spawned the creation of many specialty clubs and groups across Europe. The EUCW Association is made up of over 30 of these clubs and offers the following award for contacting its members. It's a handsome replica of an early map of Europe. I suspect that your pile of QSL cards contains many contacts that would count toward the award. Just look on the card for the little symbol or letters that show membership in the particular country's club.

The EUCW Association is made up of over 30 of CW clubs and offers the following award for contacting its members.

Activity Group CW DL	AGCW-DL	Germany
Benelux QRP Club	BQC	Netherlands
Belgian Telegraphy Club	BTC	Belgium
Club Francophone Telegraphiste	CFT	Belgium
CT CW Club	CTCW	Portugal
EA CW Club	EACW	Spain
Belgian Telegraphy Extremely High Speed	EHSC	Belgium
FISTS CW Club	FISTS	England
First Class CW Operators Club	FOC	England
G-QRP Club	G-QRP	England
Greek Telegraphy Club	GTC	Greece
Hungarian CW Group	HACWG	Hungary
Hispania CW Club	HCC	Spain
Radio Telegraphy High Speed Club	HSC	Germany
Helvetia Telegraphy Group	HTC	Switzerland
Italian Naval "Old Rhthmers" Club	INORC	Italy
Italian QRP Club	I-QRP	Italy
Italian Telegraphy Club	ITC	Italy
Macedonian Telegraphic Group	MCWG	Macedonia
OE-CW Group	OE-CW-G	Austria
OH Telegraphy Club	OHTC	Finland
OK QRP Club	OK-QRP	Czech Rep.
Radio Telegraphy Club	RTC	Germany
Prof. Radio Operators CW Club Intern.	PRO-CW	Romania
Scandanavian CW Activity Group	SCAG	Nordic Countries
Radio Telegraphy Super High Speed Club	SHSC	Belgium
Polish Telegraphy Club	SPCWC	Poland
International Morse Telegraphy Club	UCWC	Ukraine
Union Francaise des Telegraphistes	UFT	France
CIS High Speed CW Club	U-QRQ-C	CIS Countries
Radio Telegraphy Very High Speed Club	VHSC	Netherlands
YL CW Group	YL-CW-G	Germany
Groupe Monegasque du Telegraphie	3A-CWG	Monaco
9A CW Group	9A-CWG	Croatia

Table I– European CW Association member clubs.

The award is issued for confirmed CW contacts with at least 100 members of the EUCW clubs after 27 April 1991 on at least three different amateur bands with a minimum of 20 stations per band. SWL okay. The EUCW clubs are listed in Table I. The stations worked must include at least three members of six different EUCW clubs. Three classes of the award are available: (1) Standard, using any authorized power; (2) QRP, not over 5 watts used by the applicant; and (3) SWL.

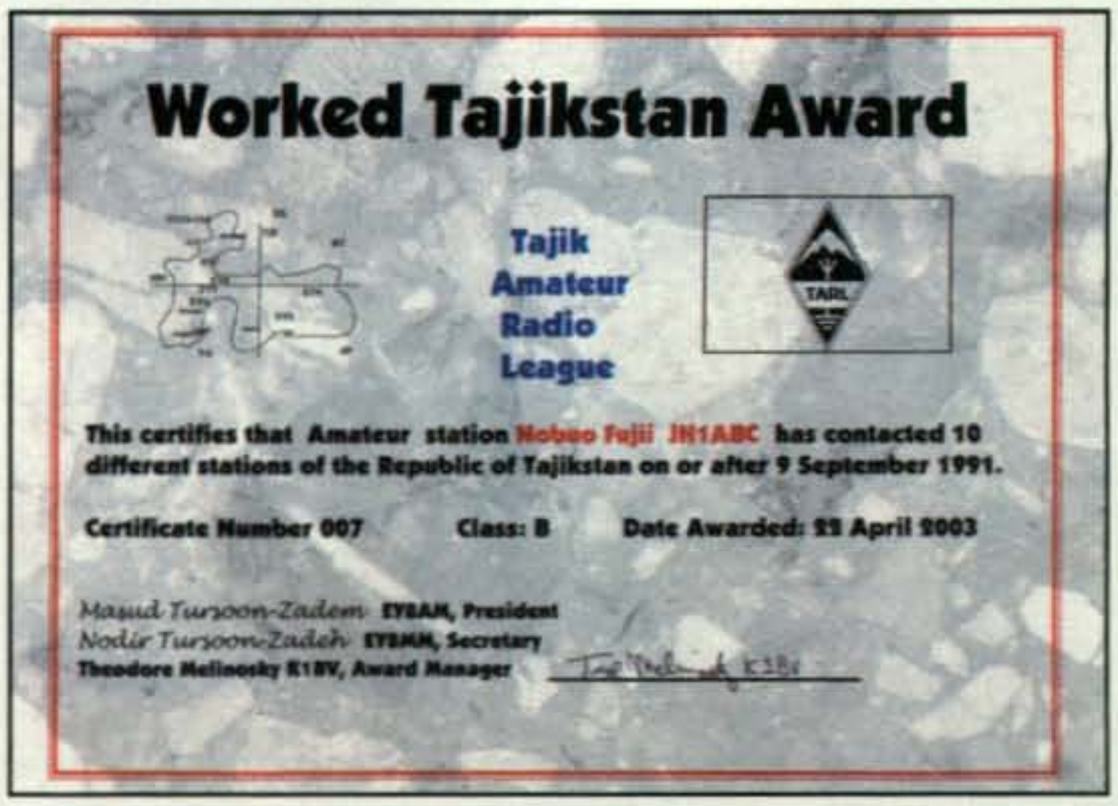
Send GCR list including EUCW club and member number plus fee of 6 Euros, $US8, or 12 IRCs to: Gunther Nierbauer, DJ2XP, Illinger Str. 74, D-66564 Ottweiler/Saar, Germany.

Kaliningrad Districts Award. This award is sponsored by the Kaliningrad Radio Amateurs Association and the UA2 Contest Club. Last month's column provided the rules for the Kaliningrad-Konigsberg 750 Award, celebrating the 750th anniversary of the founding of this ancient city. A companion award has also been offered by the UA2 Contest Club. This one will be more of a challenge, as it requires you to contact different UA2 districts (see Table II), not just a small number of UA2 stations. The sponsor suggests entering the annual UA2 QSO Party as a way of getting some of the rare districts.

Contact ten different UA2 districts. All bands and modes may be used. SWL okay. The application should be sent to: Yuri Trubey, UA2FAO, P.O. Box 810, 236016 Kaliningrad, Russia. Send the fee ($US5, 5 Euros, or 10 IRCs) to: Ulrich Mueller, DK4VW, Kreutzacker Str. 13, Marburg D-35041, Germany (e-mail: <kda@aalog.com>). The UA2 Contest Club also offers a special plaque (fee $US30) for working all 23 UA2 districts.

Tajik Amateur Radio League Awards. In 1997 I volunteered to be the

Contact ten different UA2 districts to earn the Kaliningrad Districts Award.



The Worked Tajikstan Award offered by the Tajik Amateur Radio League.

Kaliningrad-city	
aW-01	Baltijskij rajon
aW-02	Leningradskij rajon
aW-03	Moskovskij rajon
aW-04	Oktyabr'skij rajon
aW-05	Tsntral'nyj rajon
Cities	
aW-06	Baltijsk (incl. Primorsk)
aW-07	Pionerskij
aW-08	Svetlogorsk (incl. Yantarnyj)
aW-09	Svetlyj
aW-10	Sovetsk
Other UA2 Cities	
aW-11	Bagrationovskij rajon (incl. Bagrationovsk, Ladushkin, Mamonovo)
aW-12	Gvardejskij rajon (incl. Gvardejsk)
aW-13	Gur'evskij rajon (incl. Gur'evsk)
aW-14	Gusevskij rajon (incl. Gusev)
aW-15	Zelenogradskij rajon (incl. Zelenogradsk)
aW-16	Krasnoznamenskij rajon (incl. Krasnoznamensk)
aW-17	Nemanskij rajon (incl. Krasnoznamensk)
aW-18	Nsterovskij rajon (incl. Neman)
aW-19	Ozyorskij rajon (incl. Ozyorsk)
aW-20	Polesskij rajon (incl. Polessk)
aW-21	Pravdinskij rajon (incl Pravdinsk)
aW-22	Slavskij rajon (incl. Slavsk)
aW-23	Chernyakhovskij rajon (incl. Chernyakhovsk)

Table II– The UA2 districts. The UA2 Contest Club offers a special plaque for working all 23 districts.

QSL Manager for Nodir Tursoon-Zadeh, EY8MM, who now is a well-known central Asia contester. Nodir asked me to develop several awards for the Tajik Amateur Radio League (TARL) and to act as the group's awards manager. Tajikstan is a very mountainous country that borders on China and Afghanistan. It reminds me of the Colorado Rockies, so when I was designing the certificates, I chose a special designer paper with a stone-like texture.

It was necessary to keep the requirements for this award at a level where it would be challenging, yet not too easy nor too difficult. You be the judge.

General Requirements: All bands and modes. Contacts after 9 September 1991 count for the award. Single band or mode endorsement available upon request. Send GCR list plus fee of 10 IRCs or $US5 or equal-value currency to award manager Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237-1525 USA.

Central Asian DX Award. Contact stations from the following group of countries in CQ zone 17. Class A requires at least one QSO in each area/country; Class B requires three in each.

Floyd Gerald, N5FG New Worked All Zones Manager

Floyd Gerald, N5FG, has been named CQ's new Worked All Zones (WAZ) Awards Manager, effective January 1, 2004. Gerald succeeds Paul Blumhardt, K5RT, who is stepping down after four years in the position due to increased work and family commitments. "We will miss Paul's dedication to WAZ and the CQ awards program in general," said Ross, "and we thank him for his many contributions. He sets an excellent example for his successor, and we welcome Floyd to the CQ 'family.' "

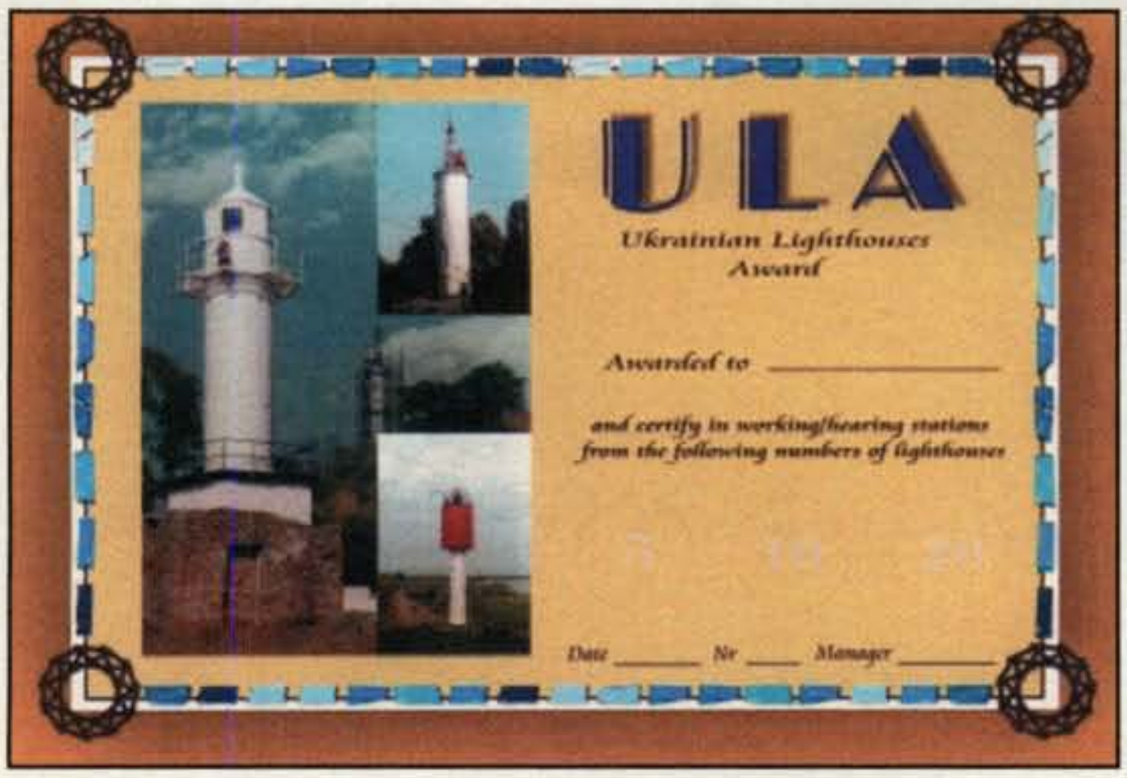
Floyd Gerald, N5FG, has been an amateur since 1972 and is an accomplished DXer. He holds many amateur radio operating awards, including 5BWAZ (200 Zones), #1 DXCC Mixed and SSB, CQ DX Honor Roll SSB and CW, 9 Band DXCC, and 6BWAS. He is also a founding member of the Magnolia DX Association.

Floyd served as the manager of the W5 QSL bureau from 1998–2002. During his tenure, the W5 QSL Bureau was the first QSL Bureau to employ a website so users could check on their QSL "accounts" on line. He's also served as a CQ Awards and ARRL DXCC Checkpoint, and has been a QSL manager for several DX stations.

Floyd is retired from the housing industry and lives near Wiggins, Mississippi, with his wife, Sherry, on their five-acre antenna farm.

CQ would like to ask WAZ applicants to delay sending applications (and cards) to Floyd until February 1, 2004 in order to allow for an orderly transition and transfer of records. We apologize for this delay, but feel that it will reduce confusion and possible loss of anyone's application during the transition. Applications and cards sent to K5RT will be forwarded to N5FG each month. After February 1, WAZ applications and cards should be sent to Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577-8318.

The Worked All Zones awards are part of a comprehensive operating award program sponsored by *CQ* magazine, the world's leading independent amateur radio publication.



Contacts with only five different lighthouses are needed to qualify for the Ukrainian Lighthouses Award.

1. RA/RN/RU-RZ9A, C, F, G, J, K, L, M, Q, X (or UA9__)
2. EZ/UH Turkoman
3. UI/UJ–UM Uzbekistan
4. EY/UJ Tajikstan
5. UN–UQ/UL Kazakhstan
6. EX/UM Khirgizstan

Worked Tajikstan Award. Contact different Tajikstan stations (EY/UJ). Available in three classes: Class A = 5, Class B = 10, Class C = 15.

Ukrainian Lighthouses Award. The lighthouse parade continues. The coastline of the Ukraine includes numerous ports on the Sea of Azov and the Black Sea, where trade has been conducted since Biblical times. The requirements of the award are modest, as contacts with only five different lighthouses are needed to qualify. Lighthouses are defined as a luminous mark, not a radio beacon. The lighthouse can be located on any island (sea, river, etc.) and at any point on the continental coast. The lighthouse should be working. Check with the sponsor for any lighthouses not on the list which you feel should qualify. All beacons located on islands and on the coast with 20 miles or more visibility are also eligible.

Whenever you're prowling the HF bands and hear a small pile-up for an EM, UR, US, UT, or UU station, make the contact. If the station identifies giving a designator starting with "ULA-" then the chances are good that you've gotten one of the 38 lighthouses that are valid for the award.

There are endorsements for 10 and 20 contacts. Endorsement stickers $0.60. All bands and modes may be used. Cost of the award is $US7, or 7 Euros. IRCs are accepted as payment at the rate of $ 0.60 each. You must have the cards in your possession. Send photocopies of the QSLs with your application. Apply to: Max F. Yevsyukov, P.O. Box 57, Kerch 98312, Ukraine (e-mail: <uu4jdd@mail.ru>).

URL of the Month

There are a number of sites that have links to the many awards described on the internet. Toshio, JI1CMZ, has one such page, and it's a good reference for a large number of Japanese awards. Give it a try. Go to: <http://www.t-u.jp/ham/al.htm>.

Clubs and groups: I still need to hear from you. *CQ* magazine is an excellent way to tell the world about your award.

73, Ted, K1BV

Announcing:

The 2004 CQ World-Wide WPX Contest

SSB: March 27–28 CW: May 29–30

Starts: 0000 GMT Saturday Ends: 2359 GMT Sunday

I. Period of Operation: 48 hours. Single Operator stations may operate 36 of the 48 hours. Off times must be a minimum of 60 minutes in length and clearly marked in the log. Listening time counts as operating time. Multi-Operator stations may operate the full 48 hours.

II. Objective: The object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 1.8, 3.5, 7, 14, 21, and 28 MHz bands may be used. No WARC bands allowed. *Observance of established band plans is strongly encouraged.*

IV. Terms of Competition (for all categories): All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. Only the entrant's callsign may be used to aid the entrant's score. A different callsign must be used for each entry. Transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant. All high power categories must not exceed 1500 watts total output power on any band. No self-spotting of any form on DX spotting nets is permitted for any category. Self-spotting is defined as generating packet spots for your contest callsign by: (a) using your own callsign; (b) spotting your call while using another callsign; or (3) spotting of your callsign by other stations as a result of prearranged solicitation.

Categories: Note—CATEGORY and CATEGORY-OVERLAY** names for use in the CABRILLO file header are shown in (*italics.*)

1. Single Operator (Single Band and All Band) *(SINGLE-OP ALL HIGH or SINGLE-OP [BAND] HIGH)*

(a) One person performs all of the operating, logging, and, for the Assisted category only, spotting functions. Only one transmitted signal is allowed at any time. **Maximum power allowed is 1500 watts total output**.

(b) Low Power *(SINGLE-OP LOW or SINGLE-OP [BAND] LOW):* Same as 1(a) except that output power shall not exceed **100 watts**. Stations in this category will compete only with other low power stations.

(c) QRP *(SINGLE-OP ALL QRP or SINGLE-OP [BAND] QRP):* Same as 1(a) except that output power shall not exceed **5 watts**. Stations in this category will compete only with other QRP stations.

(d) Assisted/with Packet *(SINGLE-OP-ASSISTED ALL HIGH or SINGLE-OP-ASSISTED ALL LOW):* Same as 1(a) except the passive use (no self-spotting) of DX spotting nets or other forms of DX alerting is permitted. Stations in this category will compete only with other Assisted stations.

(e) Tribander/Single Element *(TB-WIRES)**:* Tribander (any type) for the high bands with a single feedline from the transmitter to the antenna, and single-element low-band antennas (wires) category. During the contest, an entrant shall use **only one (1) tribander** for 10, 15, 20 meters and single-element antennas on 40, 80, and 160.

(f) Band Restricted *(BAND-LIMITED)**:* An eligible entrant must hold a license restricting operation to less than the six (6) contest bands (160, 80, 40, 20, 15, 10) on both modes. Examples of such licenses in the USA are: Novice, Technician, 4 class license, etc. Since frequency privileges differ from country to country, competition is between stations within one's own country.

(g) Rookie *(ROOKIE)**:* To enter this category you must have been licensed as a radio amateur three (3) years or less on the date of the contest.

***These categories require an additional line in your Cabrillo header called CATEGORY-OVERLAY. See paragraph XIV.**

2. Multi-Operator (All band operation only)

(a) Single-Transmitter *(MULTI-ONE):* Only one transmitter and one band permitted during the same time period (defined as 10 minutes). **Exception: One other band may be used during any 10-minute period if the station worked is a new multiplier. Use separate serial numbers for the multiplier station. Logs found in violation of the 10-minute rule will be automatically reclassified as multi-multi. Maximum power allowed is 1500 watts total output. Your log MUST show the correct serial number sent and received for each contact.**

(b) Multi-Two *(MULTI-TWO):* A maximum of two transmitted signals at any time on different bands. Both transmitters may work any and all stations. A station may be worked only once per band regardless of which transmitter is used. **Each transmitter must keep a chronological log containing its own serial numbers and unique transmitter identifier.** Each of the two stations may make a maximum of 8 band changes in any clock hour (00 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. **Maximum power allowed is 1500 watts total output.**

(c) Multi-Transmitter *(MULTI-MULTI):* No limit to transmitters, but only one signal (and running station) allowed per band at any time. *Note:* All transmitters and receivers must be located within a 500-meter diameter area or within property limits of the station licensee, whichever is greater. All operation must take place from the same operating site. **Maximum power allowed is 1500 watts total output**.

V. Exchange: RS(T) report plus a progressive contact three-digit serial number starting with 001 for the first contact. (Continue to four digits if past 999 and five if past 9999.) **Multi-operator, multi-transmitter stations use separate serial numbers for each band. Your log MUST show the correct serial number sent and received for each contact.**

VI. Contact Points:

(a) Contacts between stations on different continents are worth three (3) points on 28, 21, and 14 MHz and six (6) points on 7, 3.5, and 1.8 MHz.

(b) Contacts between stations on the same continent, but different countries, are worth one (1) point on 28, 21, and 14 MHz and two (2) points on 7, 3.5, and 1.8 MHz. **Exception: For North American stations only—contacts between stations within the North American boundaries (both stations must be located in North America) are worth two (2) points on 28, 21, and 14 MHz and four (4) points on 7, 3.5, and 1.8 MHz.**

(c) Contacts between stations in the same country are worth 1 point regardless of band.

VII. Prefix Multipliers: The prefix multiplier is the number of valid prefixes worked. A PREFIX is counted only once regardless of the number of times the same prefix is worked.

(a) A PREFIX is the letter/numeral combination which forms the first part of the amateur call. Examples: N8, W8, WD8, HG1, HG19, KC2, OE2, OE25, etc. Any difference in the numbering, lettering, or order of same shall constitute a separate prefix. A station operating from a DXCC country different from that indicated by its callsign is required to sign portable. The portable prefix must be an authorized prefix of the country/call area of operation. In cases of portable operation, the portable designator will then become the prefix. Example: N8BJQ operating from Wake Island would sign N8BJQ/KH9 or N8BJQ/NH9. KH6XXX operating from Ohio must use an authorized prefix for the U.S. 8th district (W8, K8, etc.) Portable designators without numbers will be assigned a zero (Ø) after the second letter of the portable designator to form the prefix. Example: PA/N8BJQ would become PAØ. All calls without numbers will be assigned a zero (Ø) after the first two letters to form the prefix. Example: XEFTJW would count as XEØ. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes. **You may not make up your own prefix.**

(b) Special event, commemorative, and other unique prefix stations are encouraged to participate. Prefixes must be assigned by the licensing authority of the country of operation.

VII. Scoring (QSO Points):

1. Single Operator: (a) All Band score = total contact points from all bands multiplied by the number of different prefixes worked (prefix multiplier; prefixes are counted only once). (b) Single band score = total contact points on the band entered multiplied by the number of different prefixes worked (prefix multiplier).

2. Multi-Operator: Scoring is the same as Single Operator, All Band.

3. A station may be worked once on each band for QSO point credit. Prefix credit can be taken only once.

IX. QRP Section: Single Operator only. **Output power must not exceed 5 watts**. You must denote QRP in the header of your Cabrillo file, or in the case of non-Cabrillo logs, on the summary sheet and state the actual maximum output power used for all claimed contacts. Results will be listed in a separate QRP section and certificates will be awarded to each top-scoring QRP station in the order indicated in Section XI.

X. Low Power Section: Single Operator only. **Output power must not exceed 100 watts**. You must indicate low power in the header of your Cabrillo file, or in the case of non-Cabrillo logs, on the summary sheet and state the actual maximum output power used for all claimed contacts.

Results will be listed in a separate low power section and certificates will be awarded to each top-scoring low power station in the order indicated in Section XI.

XI Awards: Certificates will be awarded to the highest scoring station in each category listed under Section IV—

1. In every participating country

2. In each call area of the United States, Canada, Australia, and Asiatic Russia.

All scores will be published. To be eligible for an award, a single operator station must show a minimum of 12 hours of operation and multi-operator stations must show a minimum of 24 hours of operation.

A single-band log will be eligible for a single-band award only. If a log contains more than one band, it will be judged as an all-band entry unless specified otherwise.

In countries or sections where entries justify, second- and third-place awards will be made.

XII. Trophies, Plaques, and Donors:

SSB

Single Operator, All Band

WORLD – Stanley Cohen, W8QDQ
USA – Atilano de Oms, PY5EG
EUROPE – Jim Hoffman, N5FA
SOUTH AMERICA – Ron Moorefield, W8ILC
OCEANIA – Phillip Fraizer, K6ZM Memorial
AFRICA – Peter Sprengel, PY5CC
JAPAN – The DX Family Foundation
WORLD Low Power – Caribbean Contesting Consortium
USA Low Power – Oklahoma DX Association
CANADA Low Power – Ontario Contest Club
USA QRP/p – Doug Zwiebel, KR2Q
USA ZONE 4 HIGH POWER – Society of Midwest Contesters
USA ZONE 4 LOW POWER – Society of Midwest Contesters

Single Operator, Single Band

WORLD – John N. Reichert, N4RV
WORLD 28 MHz – Alan Dorhoffer, K2EEK Memorial
WORLD 7 MHz – William D. Johnson, KVØQ
USA 21 MHz – Bernie Welch, W8IMZ Memorial
USA 3.7 MHz – Lance Johnson Digital Graphics
USA 14 MHz Low Power – Boomer Contest Club

Multi-Operator, Single Transmitter

USA – Steve Bolia, N8BJQ
USA ZONE 4 – Society of Midwest Contesters
ASIA – W2MIG Memorial (NT4TT Sponsor)

Multi-Operator, Two Transmitters

WORLD – Doris Wong, AG1RL

Multi-Operator, Multi-Transmitter

WORLD – Gail Schieber, K2RED

Contest Expedition

WORLD – Kansas City DX Club

CW

Single Operator, All Band

WORLD – Steve Bolia, N8BJQ
USA – Dennis Motschenbacher, K7BV
EUROPE – Ivo Pezer, 5B4ADA/9A3A
OCEANIA – Tom Morton, K6CT
CANADA – Radio Amateurs of Canada (RAC)
JAPAN – The DX Family Foundation
WORLD LOW POWER – Caribbean Contesting Consortium
USA ZONE 3 HIGH POWER – Jim Pratt, N6IG
USA ZONE 4 HIGH POWER - Society of Midwest Contesters
USA ZONE 4 LOW POWER - Society of Midwest Contesters

Single Operator, Single Band

WORLD 7 MHz – William D. Johnson, KVØQ
WORLD 3.5 MHz – Lance Johnson Digital Graphics
USA – Kansas City DX Club
USA 28 MHz – Bernie Welch, W8IMZ Memorial
USA 21 MHz – Wayne Carroll, W4MPY

Multi-Operator, Single Transmitter

WORLD – Ron Blake, N4KE
ASIA – W2MIG Memorial (NT4TT Sponsor)
USA ZONE 4 – Society of Midwest Contesters

Multi-Operator, Multi-Transmitter

WORLD, Steve Merchant, K6AW

Contest Expedition

WORLD – Steve Bolia, N8BJQ

Combined SSB/CW

Single Operator, All Band

WORLD – Al Slater, G3FXB Memorial

Club (SSB & CW)

WORLD – CQ Magazine

A station winning a World trophy will not be considered for a sub-area award. That trophy will be awarded to the runner-up for that area if the returns justify the award.

XIII. Club Competition: A trophy will be awarded each year to the club that has the highest aggregate scores from logs submitted by members. The club must be a local group and not a national organization. Participation is limited to members operating within a local geographical area (exception: DXpeditions specially organized for operation in the contest and manned by members). Indicate your club affiliation on the summary sheet or in the CABRILLO file. To be eligible for an award, a minimum of three logs must be received from a club.

XIV. Instructions for Submission of Logs:

(a) All times must be in GMT. All breaks must be clearly marked (not required for CABRILLO logs). Single operator and multi-single logs must be submitted in chronological order. Multi-two logs must be submitted chronologically by station. Multi-multi logs must be submitted chronologically by band.

(b) All sent and received exchanges are to be logged. Logs without sent and received serial numbers will be reclassified as Checklogs.

(c) Electronic submission of logs is the encouraged method for all participants. It is required for all top-scoring entrants, for anyone wishing to compete for an award, and for all who use a computer to log the contest or prepare contest logs.

(d) INSTRUCTIONS FOR CABRILLO LOGS: The CABRILLO file format is the standard. Do not rely on your logging program; use a text editor (Wordpad, Notepad, DOS Edit – no word processors) to make sure all of the CABRILLO header information is there, including the extra line in the header for CATEGORY-OVERLAY if you are entering the Triband/Single Element, Band Restricted, or Rookie categories. Also be sure to indicate your club affiliation. For detailed instructions on filling out the CABRILLO file header, see the WPX Contest website, **<http://www.cqwpx.com>**. Failure to fill out the header correctly can result in your entry being placed in the wrong category.

(e) INSTRUCTIONS FOR NON-CABRILLO LOGS: If you are not able to submit a CABRILLO log, you may submit the ASCII output from most of the popular logging programs such as TR, CT, NA, Writelog, and SuperDuper. You may also submit the *.BIN,*.DAT *.QDF files from CT, TR or NA. If your log is not in CABRILLO format, a separate summary sheet is required. Please name your files with your call and the file type. Example: N8BJQ submits a CABRILLO file. It should be named N8BJQ.LOG. If N8BJQ chose to submit a non-CABRILLO file such as TR's .dat file, he should name the log file N8BJQ.DAT and the summary file should be N8BJQ.SUM. See the WPX website for more information on e-mail log formats. Any logs sent on floppy disk should be on 3.5-inch diskettes and sent in a proper mailer to prevent damage. Non-CABRILLO Logs must be checked for duplicate contacts, correct QSO points, and prefix multipliers. Duplicate contacts must be clearly marked. An alpha/numeric check list of claimed prefix multipliers must be submitted with your log. Each non-CABRILLO entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition, and the entrant's name and mailing address in BLOCK LETTERS. Also submit a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

(f) E-mail is the preferred method of log submission. **SSB CABRILLO logs should be sent to <ssb@cqwpx.com>** and **CW CABRILLO logs should be sent to <cw@cqwpx.com>**. Remember that non-CABRILLO e-mail or disk submissions require a summary sheet as well as the log file. All logs received via e-mail will be confirmed via e-mail. A listing of logs received can be found on the CQ WPX website at **<http://www.cqwpx.com>** and will be updated frequently.

(g) Official log and summary sheets are available from *CQ*. You may make your own forms as long as all required information is present. Please remember to send in early for WPX contest log and summary sheets.

XV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. An entrant whose log is judged by the WPX Contest Committee to contain an excessive number of discrepancies may be disqualified as a participant operator or station for a period of one year. If within a five-year period the operator is disqualified a second time, he or she will be ineligible for any *CQ* contest awards for three years.

Declaration: By submitting an entry in the CQ WPX Contest you agree that you have read and understood the rules of the contest and agree to be bound by them, as well as all rules regulations of your country which pertain to amateur radio. All actions and decisions of the WPX Contest Committee are official and final.

XIII. Deadline:

All entries must be postmarked **NO LATER than May 1, 2004** for the SSB section and **NO LATER than July 1, 2004** for the CW section. All logs, including e-mail entries, are subject to these deadlines. If you snail-mail your entry, indicate SSB or CW on your envelope, and send your log to CQ WPX Contest, CQ Communications, 25 Newbridge Road, Hicksville, NY 11801 USA. Logs postmarked after the deadline may be listed in the results, but will be ineligible for any awards.

Questions pertaining to the WPX Contest may be mailed to WPX Contest Director, Steve Merchant, K6AW, 441 Palo Alto Avenue, Mountain View, CA 94041 or via e-mail to <k6aw@cqwpx.com>.

contesting

BY JOHN DORR,* K1AR

Anatomy of an Hour at PJ2T

February's Contest Tip

Effective contest operating is all about efficiency—reducing the number of exchanges back and forth. One technique that I use in this context is when calling CQ. If I am only able to receive a partial callsign from a calling station, I make sure to answer that station with the information I have, including my exchange. This is in contrast to first asking only for the callsign. By using this operating method, you save an extra two-way transmission and will likely get a fill on the call when the station answers you with his/her exchange. If not, you can always ask for a repeat on the callsign at the end of the QSO.

Calendar of Events

Jan. 24-25	**CQ WW 160M CW Contest**
Jan. 24-25	REF CW Contest
Jan. 24-25	BARTG RTTY Contest
Jan. 31-Feb. 1	UBA SSB DX Contest
Feb. 7	Minnesota QSO Party
Feb. 7-9	Delaware QSO Party
Feb. 8	North American SSB Sprint
Feb. 14-15	**CQ RTTY WPX Contest**
Feb. 14-15	Dutch PACC Contest
Feb. 14-15	RSGB 1.8 MHz CW Contest
Feb. 15	North American CW Sprint
Feb. 21-22	ARRL CW DX Contest
Feb. 28-29	**CQ WW 160M SSB Contest**
Feb. 28-29	REF SSB Contest
Feb. 28-29	UBA CW DX Contest
Feb. 28-29	Mississippi QSO Party
Feb. 29-Mar. 1	North Carolina QSO Party
Mar. 6-7	ARRL SSB DX Contest
Mar. 14	North American RTTY Sprint
Mar. 27-28	**CQ WW SSB WPX Contest**

One of the measures of successful contesting is operating rate, or the number of QSOs you can work in one hour in a contest. It seems that over the years, the record level of QSOs/hour has continued to climb on both SSB and CW, making one ask if there is any limit to speed (and hopefully accuracy) in contesting.

A recently published e-mail message by OH1NOA is helpful in understanding the facts around contest rates. Timo has created a section on his website that tracks historical contest rate records (check out <http://www.qsl.net/oh1noa/rates.htm>). In fact, the highest known SSB rate was set in the 2003 CQ WW DX SSB Contest by Jeff, N5TJ, at VP2E, with an astounding 464 QSOs in one hour (that's 7.7 QSOs per minute!). The CW record is held by VE3DZ at VE2IM, with a total of 267 QSOs (in one hour, Yuri worked 4.5 QSOs/minute).

Needless to say, there are some real speedsters out there. These huge contest rates are made possible by a combination of operator skill, supreme conditions, and the right environment of callers (not too many, not too few) who do little in their own right to slow down the runner.

On to PJ2T

Speaking of the right operating environment, I had the good fortune to return to one of contesting's Caribbean jewels, PJ2T, for last year's CQ WW SSB contest (your other web assignment this month is to check out <http://www.pj2t.org>, where you will discover a ton of useful information about the station and its availability). The PJ2T superstation, like VP2E and others, is ideally set up for huge contest rates. They have the right location for enormous runs into the U.S. and an antenna arsenal to beat the band.

Our tradition (if you can call the past two years a tradition) is for me to start on 15 meters. As I was warming up my pending run frequency with 15 minutes to go before the contest, it was clear that conditions were right for a huge rate hour. The state-side guys were averaging 20–30 over S9 and other DX was sneaking in as well. My fear was that the pile-up might get too big and actually slow me down. With a crystal-clear run frequency on 21295 kHz, a pile-up in the wings, and a major contest about to start, let's discuss what the anatomy of an hour really is all about.

*2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

The Contest Begins

0000–0009Z
75 QSOs (10 minutes)/75 QSOs (total)

There's nothing more exhilarating than the rush that comes in the first ten minutes of a contest, and rush it was in this case. As the clock turned over to 0000Z, my chatty pile-up transitioned into a contest run. The first minute was intimidating in many ways as I adjusted to the effects of "information overload" on 21295. However, eight QSOs made it into the log in the first minute and I was off to the races.

As 0001Z came along, so did a near disaster. The computer I was using proceeded to pop up a Norton anti-virus window, asking me if I wanted to update my data files (after all, it is a new day!). Normally this sort of thing is not a problem, but when you have planet Earth calling you, it does present a source of major inconvenience. I can laugh now, but at the time humor was not at the top of my response list. With a mouse click ("Hey, Steve, where's the mouse?"), I returned to the comfort of my logging program.

CQ WPX RTTY Contest
February 14–15, 2004

Please note that the dates of this year's CQ WPX RTTY Contest are **February 14–15**, *not* the 7–8 as listed in the rules in the January issue of *CQ*. Logs are due no later than March 19, 2004.

0050Z	7 QSOs (357 total QSOs)
0051Z	6 QSOs (363 total QSOs)
0052Z	8 QSOs (371 total QSOs)
0053Z	8 QSOs (379 total QSOs)
0054Z	5 QSOs (384 total QSOs)
0055Z	10 QSOs (394 total QSOs)
0056Z	**6 QSOs (400 total QSOs)!**
0057Z	10 QSOs (410 total QSOs)
0058Z	5 QSOs (415 total QSOs)
0059Z	4 QSOs (419 total QSOs)

Table I– Final 10 minutes of hour #1 at PJ2T.

As exciting as the first ten minutes proved to be, I actually was behind the rate of VP2E, which makes Jeff's hour seem even more amazing to me. We even had two JAs sneak into this first operating segment in between a predominately East Coast invasion, which is amazing considering the wall of stations calling.

0010–0019Z
73 QSOs (10 minutes)/
148 QSOs (total)

To be honest, my real goal for this hour was simply to break the 400 QSO/hour barrier, which would have been a personal record for me. With a solid ten minutes under my belt, it was looking pretty good so far. One of the factors contributing to high rates is being able to benefit from friends calling you in the pile-up. In the second 10-minute segment I was able to have several QSOs that can be described as nothing more than a one- or two-second data burst. The scenario is simply described as a loud friend dumps his call in with no phonetics and literally is in and out in a matter of a second or two (let's see, an hour of two seconds per QSO equals a rate of 1800 QSOs/hour). In reality, that happened several times, resulting in two 9-QSO minutes. DU9RG also called, along with three JAs. I distinctly remember a huge wall of JAs calling, but avoided the temptation to focus on them because their signal strength undoubtedly would have slowed me down.

0020–0029Z
67 QSOs (10 minutes)/
215 QSOs (total)

As the first half hour approached, it appeared that I was still on a path to break 400 QSOs that hour (in fact, 430 QSOs was the track at the time). Unlike the first few operating segments, I had my first bout with QRM. It's amazing how just a little off-channel interference can affect your rate. A dose of the XIT button to the offending station solved the problem, but it resulted in a slight slowdown in operating speed (approximately 10 QSOs).

The East Coast was still pouring in, which is critical to maintaining a high rate. From the Caribbean, propagation moves from east to west. As long as the east stays resilient, your rate will hang in there as the entire U.S. continues to call.

0030–0039Z
67 QSOs (10 minutes)/
282 QSOs (total)

The 0030Z minute turned out to be a disaster. For some reason, everyone stopped calling. I actually had to call CQ one or two times (not a solid formula for a 400-QSO hour), resulting in a 4-QSO minute. As I was watching my 400-QSO hour vaporize right in front of my eyes, the rate picked right back up again with 8 QSOs in the 0031Z minute. However, it was becoming apparent that the East Coast was starting to fade a bit, making me wonder how I was going to work 185 stations in the remaining 30 minutes of the hour. Fortunately, W3LPL, W3BGN, K1ZZ, and other loud stations called, providing encouragement that this hour still had some legs left in it, including a 9-QSO minute at 0039Z.

0040–0049Z
68 QSOs (10 minutes)/
350 QSOs (total)

I was now at the "make or break" point in the hour. If the rate kept up, a 400-QSO hour would be a breeze. If it dropped, the elusive goal would vaporize. As it turned out, the rate held, with this segment being the third best of the entire hour. With only 5 QSOs in the 0040Z minute, I had some concern, but that was quickly followed by several 7- and 8-QSO minutes. In fact, 27 of my 68 QSOs were with Zone 5 stations (39.7%), so conditions were definitely hanging in there.

0050–0059Z
69 QSOs (10 minutes)/
419 QSOs (total)

While the rate continued at a good level, I still had the imposing task of working at least 50 stations in the last 10 minutes of the hour. As you can see in the table, with 4 minutes to spare, I crossed the 400 barrier, bolstered by a 10-QSO minute at 0055Z.

Unfortunately, PJ2T homeowner Geoff, WØCG, couldn't be with us that weekend, but he listened to the run from his home station and asked one simple question at 0100Z: "Did you do it?" Happily, I was able to say, "Yes!"

Final Comments

Many people have had high rates in contesting, so my coverage this month is more about trying to share with you how exciting it can be when you experience it yourself. Frankly, analyzing an hour of contesting is almost as tiring as actually operating it! Hopefully, you too will be able to experience the excitement that comes from high-rate contesting, if you haven't already done so. It's clearly one of the reasons why contesters spend their hard-earned money year after year to make annual treks to islands afar. If you've never considered the possibilities, maybe now is the time as the solar conditions continue to wane. Check it out!

73, John, K1AR

propagation

BY TOMAS HOOD,* NW7US

Cracks in the Magnetosphere

A Quick Look at Current Cycle 23 Conditions
(Data is rounded to nearest whole number)

Sunspots
Observed Monthly, November 2003: 67
Twelve-month smoothed, May 2003: 68

10.7 cm Flux
Observed Monthly, November 2003: 153
Twelve-month smoothed, May 2003: 135

***Ap* Index**
Observed Monthly, November 2003: 31
Twelve-month smoothed, May 2003: 21

Space is not a vacuum, at least not in our solar system. The sun's atmosphere actually extends very far out from the Sun, past the outermost planet, and is called the *heliosphere*. Space in our system is filled with plasma. The temperature of the corona is so high that the Sun's gravity cannot hold on to it. The solar wind streams off the Sun in all directions at speeds of about 400 km/s (about 1 million miles per hour). The solar wind changes speed and carries with it magnetic clouds, interacting regions where high-speed wind catches up with slow-speed wind. The solar wind speed is high (800 km/s) over coronal holes and low (300 km/s) over streamers. These high- and low-speed streams interact with each other and alternately pass by the Earth as the Sun rotates.

Blocking most of this is the Earth's *magnetosphere*. The Earth has a magnetic field with north and south poles which is enclosed in a region surrounding the Earth called the magnetosphere. As the Earth rotates, its hot core generates strong electric currents that produce the magnetic field which reaches 36,000 miles into space. The magnetosphere prevents most of the particles from the Sun, carried in the solar wind, from impacting the Earth. The solar wind distorts the shape of the magnetosphere by compressing it at the front and causing a long tail to form on the side away from the Sun. This long tail is called the *magnetotail*.

According to new observations made by NASA's IMAGE spacecraft and the joint NASA/European Space Agency Cluster satellites, immense cracks have been discovered to sometimes develop in Earth's magnetosphere and remain open for hours. This allows the solar wind to occasionally pour through the magnetosphere and cause stormy space weather.

The new observations show that these cracks can remain open for long periods of time. Earth's magnetosphere generally does a good job of deflecting the particles and complex magnetic fields (the Interplanetary Magnetic Field, or IMF) carried by coronal mass ejections (CMEs). Even so, space storms and their observable effects, such as auroras and the degradation of the ionosphere, have long indicated that the shield was not impenetrable.

Jim Dungey of the Imperial College, United Kingdom first predicted cracks in our magnetic shield in 1961. He said that these cracks might form when the solar wind contained a magnetic field that was oriented in the direction opposite to a portion of the Earth's magnetic field. As you might remember from science class, when you line up one mag-

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for February 2004

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 16-24	A	A	B	C
High Normal: 8-9, 14-15, 27	A	B	C	C-D
Low Normal: 5, 12-13, 26	B	C-B	C-D	D-E
Below Normal: 1-2, 4, 6-7, 11, 28-29	C	C-D	D-E	E
Disturbed: 3, 10, 25	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be poor to fair (D-C) on Feb. 1st and 2nd, poor (C) on the 3rd, fair to poor (C-D) on the 4th, etc.

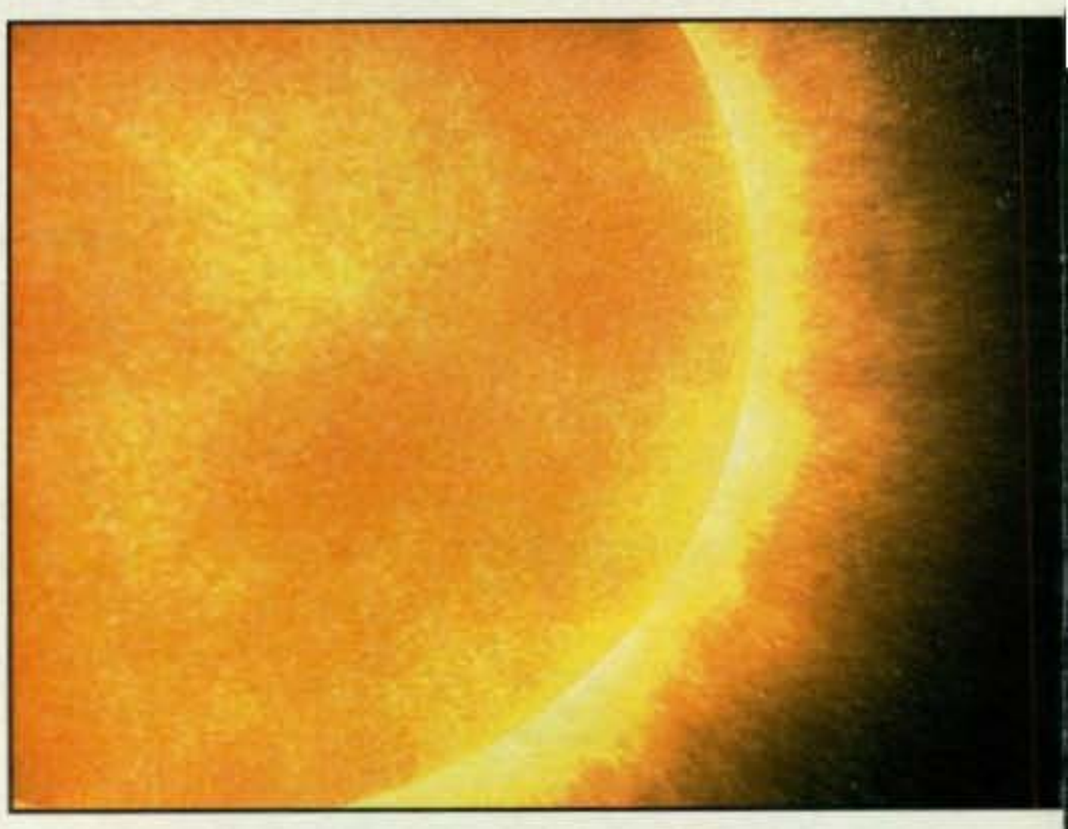
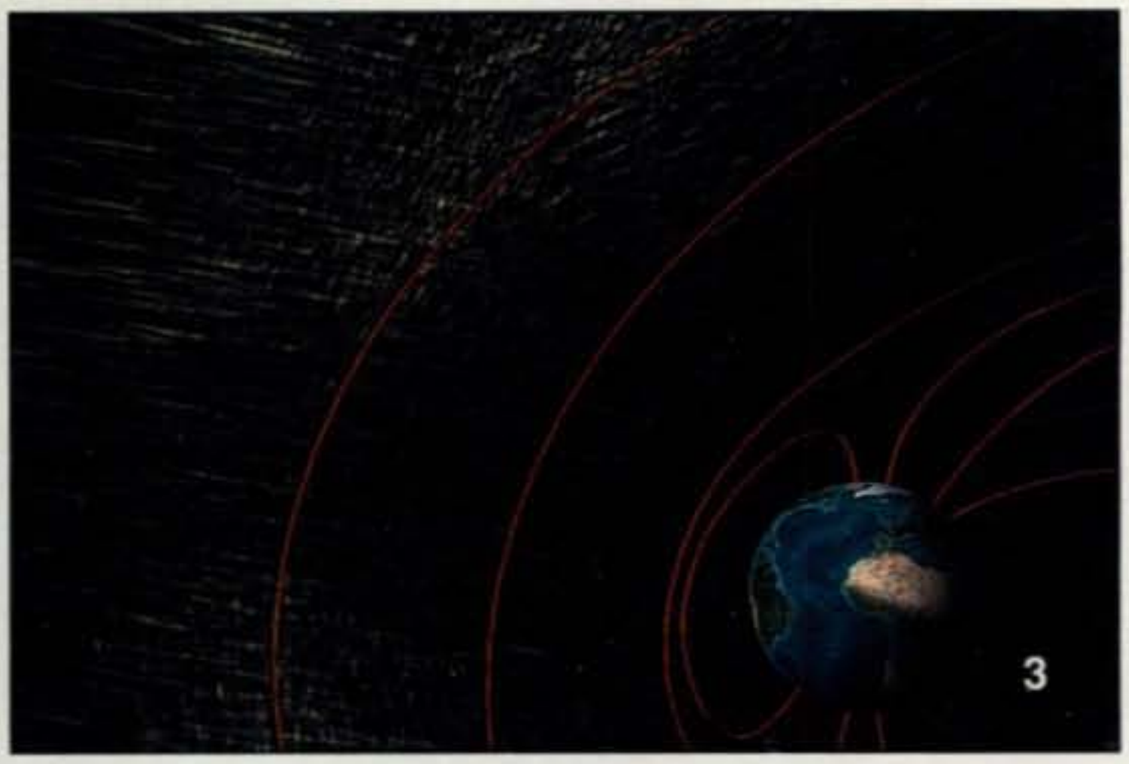
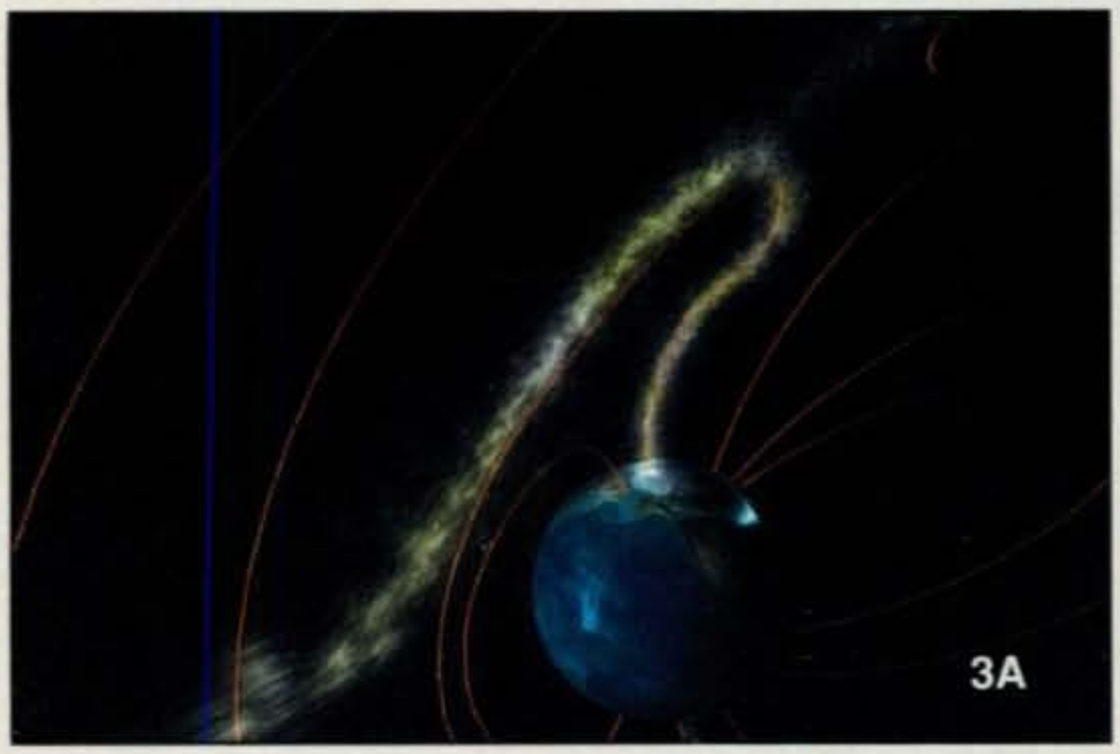
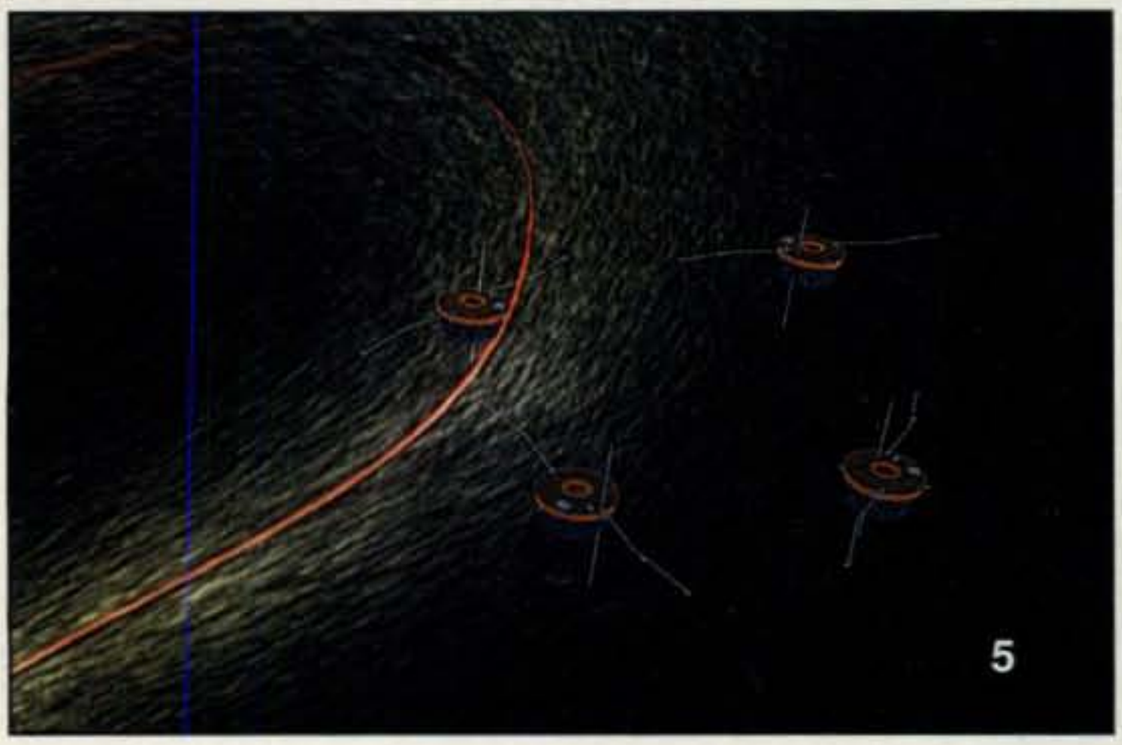


Image 1– The solar wind as it emanates from the Sun into the Earth's magnetic field (represented by red lines in the images). Where the solar wind's magnetic polarity is opposite that of the Earth's magnetic field, some electrically charged particles of the solar wind enter the Earth's magnetosphere through a crack formed during the interconnection of the Sun and Earth's magnetic field lines. (NASA image)







Images 2, 3, 3a, 4, &5–The formation of the crack is represented by the white area in image 2, and the solar wind particles are represented by white dots in images 3, 4, and 5. These particles flow like a waterfall down the field line (image 3a) and splash on the ionosphere, creating a spot in the ultraviolet proton aurora about the size of California. (NASA images)

net's north pole to a second magnet's south pole, they pull toward one another. If you line up each magnet's poles so that north meets north and south meets south, they repel one another. In the regions of the Earth's magnetosphere where the IMF is oriented toward the south, the two magnetic fields interconnect through a process known as *magnetic reconnection,* forming a crack in the shield through which the electrically charged particles of the solar wind can flow.

Goetz Paschmann of the Max Planck Institute for Extraterrestrial Physics in Germany first detected the cracks in 1979 using the International Sun Earth Explorer (ISEE) spacecraft. However, since this spacecraft only briefly passed through the cracks during its orbit, it was unknown if the cracks were temporary features or if they were stable for long periods.

Recently, the Imager for Magnetopause to Aurora Global Exploration (IMAGE) satellite revealed an area in the arctic upper atmosphere where a proton aurora raged for hours over an area almost the size of California. This observation was made possible by using a special instrument capable of seeing ultraviolet light (invisible to our human eyes), the Far Ultraviolet Imager aboard IMAGE. A proton aurora is a form of aurora caused by heavy solar ions striking Earth's upper atmosphere, causing it to emit ultraviolet light. While this aurora was being recorded by IMAGE, the four-satellite Cluster constellation flew far above IMAGE, directly through the crack, and detected solar wind ions streaming through it.

This stream of solar wind ions flowed into our atmosphere in exactly the same region where IMAGE saw the proton aurora. IMAGE was able to view the proton event for more than nine hours, implying that the crack in the magnetosphere remained open continuously. Space scientists estimate that the crack was twice the size of Earth at the boundary of our magnetic shield, about 38,000 miles above the Earth's surface. Since the magnetic field converges as it enters the Earth in the polar regions, the crack narrowed to about the size of California down near the upper atmosphere.

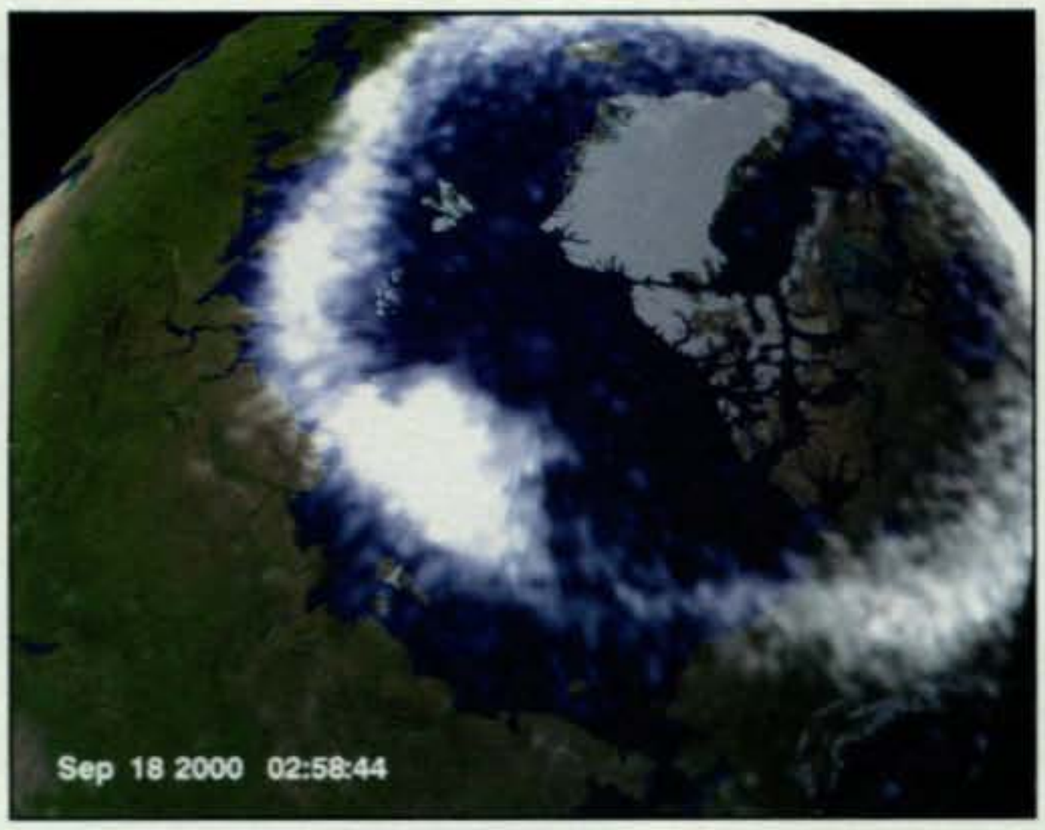


Image 6– Data from NASA's IMAGE spacecraft shows a spot the ultraviolet proton aurora (blue ring) created as solar material fell through a crack in the magnetosphere onto the Earth's ionosphere. The spot in the proton aurora is the bright-blue section in the bottom half of the blue ring (the spot is circled in the animation). (NASA image)

Fortunately, these cracks don't expose the Earth's surface to the solar wind. Our atmosphere protects us, even when our magnetic field doesn't. The ionosphere plays a significant role in absorbing these particles and energy, and is in part why we have such a variety of auroras.

CQ WW DX CW Contest—Conditions were Great

How did space weather and the geomagnetic field cooperate with your 2003 CQ WW CW participation? My original forecast called for excellent conditions. The solar activity that took us by surprise during the end of October and beginning of November 2003 had me revising my outlook for the CQ WW CW contest period of November 29 and 30. I expected conditions to be somewhat degraded compared to the forecast conditions originally published in this column. Overall, though, I expected Above Normal for day one and High Normal conditions for day two. Did that play out?

The Provisional daily International Sunspot Numbers recorded for the two contest days were 113 and 116, while the SESC sunspot numbers were 177 and 178 for each day. The 10.7-cm solar flux was 166 and 153, and the *Ap* for each day was 9 and 10, with the *K*-index readings never going above 3 both days. Flare activity was minor, with only C-class flares occurring (see <http://sidc.oma.be/edu/classification.html>). This made for excellent propagation over most paths, with only minor over-the-pole degradation. It is reported that records were broken during the contest.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for November 2003 is 67, only one point up from October. The 12-month running smoothed sunspot number centered on May 2003 is 69, down one point from April. The lowest daily sunspot value during November 2003 was recorded on November 6 with a count of 9. The highest daily sunspot count for November was 132 on November 27. A smoothed sunspot count of 43 is expected for February 2004.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 153 for November 2003, the same as for October. The 12-month smoothed 10.7-cm flux centered on May 2003 is 135, staying about the same as April. The predicted smoothed 10.7-cm solar flux for February 2004 is about 104, give or take about 18 points.

The observed monthly mean planetary *A*-index (*Ap*) for November 2003 is 31, just one point lower than October. The 12-month smoothed *Ap*-index centered on May 2003 is 21, only one point higher than April. Expect the overall geomagnetic activity to be active to disturbed for most of the month.

February Propagation

Beginning about the middle of February and continuing through March and early April, typical equinoctial propagation conditions can be expected on the HF frequencies. This usually means a noticeable improvement in conditions between the northern and southern hemispheres. Look for improvements between the United States and South America, Africa, Australasia, Antarctica, and parts of Asia. Equinoctial propagation occurs during the spring and fall months, when the Sun is most directly overhead at the equator, producing similar ionospheric characteristics over large areas of the world. It tends to maximize during sunrise and sunset periods and over both short- and long-path openings.

During daylight hours, optimum DX propagation conditions are expected on 15 meters. The band is forecast to open to all areas of the world sometime during this period, often with strong and stable signals with little fading or noise.

Daytime conditions on 10 and 12 meters should run a distant second, especially for stations in low latitudes using north-south paths, with few openings expected into Europe and the Far East.

Excellent worldwide DX openings to most areas of the world are forecast for 17 and 20 meters during the daylight hours. Conditions are expected to become optimal for an hour or two after sunrise and again during the late afternoon. With increasing hours of daylight during February, expect the HF bands to remain open for an hour or so longer into the early evening than during the winter months.

Although the solar cycle is declining, be sure to check the 6-meter band for possible DX openings, particularly when conditions are High or Above Normal. We have had some surprises recently, such as the great opening during the end of October and during November 2003. Openings are expected to be rare, but some openings may still be possible during the hours of daylight. The best bet is for openings towards Central and South America, but other openings may also be possible.

During the early evening hours and to as late as midnight, seven bands should be available for DX openings: 15, 17, 20, 30, 40, 80, and 160 meters. Fifteen and 17 meters should hold up for openings towards Central and South America and the Caribbean, the Pacific area, Far East, and parts of Asia. Even better openings to many areas of the world may be possible on 20 meters during this period, with the strongest signals from southerly and westerly directions. Good DX conditions are also forecast for 30, 40, and 80 meters for openings towards the east and the south. Openings in the same direction, but with higher noise levels and weaker signals, should also be possible on 160 meters.

Between midnight and sunrise it should be a toss-up among 20, 30, and 40 meters for DX paths. These bands should open to many areas of the world with conditions favoring openings towards the south and the west. Expect similar conditions on 80 meters, but with weaker signals and higher noise levels. Be sure to check 160 for some unusual

7 GREAT New Books from CQ

Heathkit - A Guide to the Amateur Radio Products

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This greatly expanded Second Edition is a must for collectors and Ham history buffs, but is a terrific trip down memory lane for any Ham who was there or wishes he had been. Pick up this 328-page volume and you won't be able to put it down!

Order No. HEATHKIT $29.95

The Short Vertical Antenna and Ground Radial

by Jerry Sevick, W2FMI

This small but solid guide walks you through the design and installation of inexpensive, yet effective short HF vertical antennas. With antenna restrictions becoming a real problem, this book could keep you on the air!

Order No. SVERT $10

Understanding, Building & Using Baluns & Ununs

by Jerry Sevick, W2FMI

The successor to the popular and authoritative *Baluns and Ununs*. Great deal of new tutorial material, also includes new designs not in his previous book, and crystal clear explanations of how and why they work.

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Antennas - 1968-1972.....**Order No. ANT1** $19.95 **Antennas - 1973-1975**.....**Order No. ANT2** $19.95

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DX openings towards the south and the west during this period. Conditions on the bands between 160 and 20 meters are expected to peak at local sunrise.

VHF Conditions

As mentioned previously, check for 6-meter DX openings during the daylight hours. Some short-skip openings over distances of about 1200 to 2300 miles may also occur. Best times for such openings are during the afternoon hours.

Trans-equatorial (TE) scatter propagation tends to increase during the equinoctial period, and some 6-meter openings may be possible between 7 and 10 PM local time. The best bet for such openings is between the southern tier states and South America for paths approximately at right angles to the equator. An occasional TE opening may also be possible on 2 meters. Unlike *F2*-layer or sporadic-*E* openings on 6 meters, TE openings are characterized by very weak signals with considerable flutter fading.

Auroral displays tend to occur somewhat more frequently during the equinoctial period. Unusual short-skip conditions often occur on the VHF bands during these displays. Openings, generally over distances of several hundred miles and up to about 1300 miles, may take place by means of reflection from the ionized region produced by an auroral display. Flutter fading and multi-path echoes characterize auroral-type openings. To take maximum advantage of such openings, rotatable antennas should be pointed towards the auroral display, if it is visible.

Large areas of sporadic-*E* ionization also accompany most auroral displays. Reflection of VHF signals from these regions may make possible short-skip openings between distances of 750 and 1300 miles. Signals reflected in this manner are usually strong and stable as compared to those reflected directly from an auroral display.

Auroral activity often occurs during periods of radio storminess on the HF bands. Check the Last-Minute Forecast at the beginning of this column for those days expected to be Below Normal or Disturbed during February. These are the days on which VHF auroral-type openings are most likely to occur. Don't forget to check out the *CQ VHF* magazine propagation column for an in-depth look at propagation on VHF and above.

I want to thank those of you who have taken the time to write to me. I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. I also have an EchoLink node where you might catch me; look for node number 152783, NW7US-L. I also invite you to participate in my online propagation discussion forum at <http://hfradio.org/forums/>. Don't forget to check out the NW7US Propagation Center at <http://prop.hfradio.org/>. I look forward to hearing from you. Happy DXing!

73, Tomas, NW7US/AAMØEWA

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates best time to check for 6 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. 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.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *standard* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength 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.

6. 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.

February 15 - April 15, 2004
Time Zone: EST (24-Hour Time)
EASTERN USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	10-12 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	17-18 (1) 18-19 (2) 19-00 (3) 00-02 (2) 02-04 (1) 18-20 (1)* 20-21 (2)* 21-23 (3)* 23-00 (2)* 00-02 (1)*
Northern Europe & European CIS	*Nil*	08-09 (1) 09-11 (2) 11-12 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-16 (1)	17-19 (1) 19-02 (2) 02-03 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Eastern Mediter-anean & Middle East	*Nil*	08-09 (1) 09-10 (2) 10-12 (1)	06-07 (1) 07-09 (2) 09-11 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-19 (1)	18-19 (1) 19-22 (1) 22-00 (2) 00-02 (1) 20-23 (1)*
West Africa	10-13 (1)	08-10 (1) 10-12 (3) 12-14 (4) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	18-20 (1) 20-00 (2) 00-02 (1) 22-01 (1)*
East & Central Africa	11-13 (1)	09-11 (1) 11-15 (2) 15-16 (1)	13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	19-22 (1) 22-00 (2) 00-01 (1)*
South Africa	10-13 (1)	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	18-20 (1) 20-22 (2) 22-00 (1) 21-23 (1)*
Central & South Asia	*Nil*	08-10 (1) 16-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 18-20 (1)	19-22 (1) 04-06 (1)
Southeast Asia	*Nil*	17-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-21 (1)	19-22 (1) 05-07 (1)
Far East	*Nil*	16-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-18 (1) 18-20 (2) 20-21 (1)	05-08 (1) 05-07 (1)*
South Pacific & New Zealand	13-14 (1) 14-16 (2) 16-17 (1)	12-15 (1) 15-18 (2) 18-20 (1)	15-19 (1) 19-23 (2) 23-07 (1) 07-09 (2) 09-11 (1)	00-01 (1) 01-02 (2) 02-05 (3) 05-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	15-18 (1)	09-11 (1) 14-16 (1) 16-19 (2) 19-21 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-15 (1) 15-17 (2) 17-18 (1) 18-21 (2) 21-23 (1)	03-05 (1) 05-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Central America & Northern Countries of South America	09-12 (1) 12-16 (2) 16-17 (1)	07-08 (1) 08-09 (2) 09-11 (4) 11-13 (2) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-09 (4) 09-10 (3) 10-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	18-19 (1) 19-20 (2) 20-03 (3) 03-05 (2) 05-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-13 (1) 13-15 (2) 15-16 (1)	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-10 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (4) 19-20 (2) 20-22 (2) 22-00 (1)	19-21 (1) 21-03 (2) 03-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	*Nil*	14-15 (1) 15-18 (2) 18-19 (1)	17-19 (1) 19-22 (2) 22-00 (1) 06-08 (1)	22-00 (1) 00-04 (2) 04-06 (1)

Time Zones: CST & MST
(24-Hour Time)
CENTRAL USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	*Nil*	08-09 (1) 09-13 (2) 13-14 (1)	06-07 (1) 07-09 (2) 09-11 (2) 11-13 (2) 13-14 (3) 14-16 (2) 16-17 (1)	17-19 (1) 19-22 (2) 22-00 (1) 00-02 (2) 02-03 (1) 19-21 (1)* 21-00 (2)* 00-01 (1)*

Northern & Central Europe & European CIS	*Nil*	08-11 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-13 (2) 13-15 (1)	19-22 (1) 22-00 (2) 00-02 (1) 22-01 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	08-11 (1)	07-12 (1) 12-14 (2) 14-17 (1) 22-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
West Africa	09-12 (1)	08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-16 (1)	07-12 (1) 12-14 (2) 14-16 (3) 16-18 (2) 18-20 (1)	18-20 (1) 20-22 (2) 22-01 (1) 21-00 (1)*
East & Central Africa	*Nil*	08-11 (1) 11-14 (2) 14-15 (1)	07-12 (1) 12-14 (2) 14-15 (3) 15-17 (2) 17-19 (1)	19-22 (1)
South Africa	09-12 (1)	07-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 23-01 (1)	19-220 (1) 20-21 (1)*
Central & South Asia	*Nil*	08-10 (1) 18-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-21 (1)	05-07 (1) 18-20 (1)
Southeast Asia	*Nil*	10-12 (1) 17-19 (1)	06-07 (1) 07-10 (2) 10-12 (1) 17-21 (1)	05-07 (1) 18-20 (1)
Far East	14-18 (1)	14-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-21 (2) 21-23 (1)	02-04 (1) 04-06 (2) 06-08 (1) 05-07 (1)*
South Pacific & New Zealand	12-14 (1) 14-16 (2) 16-17 (1)	10-12 (1) 12-14 (2) 14-16 (1) 16-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-18 (1) 18-20 (2) 20-21 (3) 21-23 (2) 23-01 (1)	22-00 (1) 00-01 (2) 01-06 (3) 06-07 (2) 07-08 (1) 00-02 (1)* 02-05 (2)* 05-07 (1)*
Australasia	14-17 (1)	08-10 (1) 13-16 (1) 16-19 (2) 19-21 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-15 (1) 15-17 (2) 17-19 (1) 19-21 (2) 21-01 (1)	01-04 (1) 04-06 (3) 06-07 (2) 07-08 (1) 04-05 (1) 05-06 (2)* 06-07 (1)*
Central America & Northern Countries of South America	09-13 (1) 13-15 (2) 15-16 (1)	07-08 (1) 08-10 (2) 10-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-09 (4) 09-10 (3) 10-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	18-19 (1) 19-20 (2) 20-02 (3) 02-04 (2) 04-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	11-13 (1) 13-14 (2) 14-16 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	14-15 (2) 15-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-01 (2) 04-06 (1) 06-08 (2) 08-14 (1)	19-20 (1) 20-02 (2) 02-05 (1) 21-04 (1)*
McMurdo Sound, Antarctica	*Nil*	13-16 (1) 16-18 (2) 18-20 (1)	16-19 (1) 19-22 (2) 22-01 (1) 07-10 (1)	22-02 (1) 02-04 (2) 04-06 (1)

Time Zone: PST (24-Hour Time)
WESTERN USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	*Nil*	08-12 (1)	06-07 (1) 07-10 (2) 10-12 (1) 12-13 (2) 13-15 (1) 22-00 (1)	19-22 (1) 22-00 (2) 00-01 (1) 20-22 (1)*
Central & Northern Europe & European CIS	*Nil*	08-10 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-12 (2) 12-14 (1) 22-00 (1)	19-21 (1) 21-22 (2) 22-23 (1) 20-22 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	08-11 (1)	07-11 (1) 11-13 (2) 13-15 (1) 22-00 (1)	18-21 (1)
West Africa	09-12 (1)	07-09 (1) 09-11 (2) 11-12 (3) 12-14 (2) 14-15 (1)	04-06 (1) 06-08 (2) 08-11 (1) 11-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	18-22 (1) 20-21 (1)*
East & Central Africa	*Nil*	08-10 (1) 10-12 (2) 12-13 (1)	06-08 (1) 12-14 (1) 14-16 (2) 16-17 (1)	18-20 (1)
South Africa	09-12 (1)	08-10 (1) 10-13 (2) 13-15 (1)	05-06 (1) 06-08 (2) 08-13 (1) 13-17 (2) 17-18 (1) 23-01 (1)	18-21 (1) 20-21 (1)*
Central & South Asia	*Nil*	08-10 (1) 17-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	05-07 (1) 19-21 (1)
Southeast Asia	16-18 (1)	08-10 (1) 15-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 21-23 (1) 02-04 (1)	02-04 (1) 04-06 (2) 06-08 (1) 05-07 (1)
Far East	*Nil*	14-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 11-13 (2) 13-16 (1) 16-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	01-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1) 02-03 (1)* 03-05 (2)* 05-07 (1)*
South Pacific	12-14 (1) 14-16 (2)	10-14 (1) 14-16 (2)	06-08 (1) 08-11 (2)	19-21 (1) 21-22 (2)
& New Zealand	16-17 (1)	16-18 (3) 18-20 (2) 20-21 (1)	11-17 (1) 17-19 (2) 19-20 (3) 20-02 (4) 22-23 (3) 23-04 (2) 04-05 (1)	22-05 (3) 05-07 (2) 07-08 (1) 22-01 (1)* 01-05 (2)* 05-07 (1)*
Australasia	14-17 (1)	09-12 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-17 (1) 17-19 (2) 19-21 (3) 21-23 (2) 23-03 (1)	00-02 (1) 02-03 (2) 03-05 (3) 05-07 (2) 07-08 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)
Central America & Northern Countries of South America	09-12 (1) 12-14 (2) 14-15 (1)	07-08 (1) 08-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	06-07 (1) 07-09 (3) 09-15 (2) 15-16 (3) 16-19 (4) 19-20 (3) 20-22 (2) 22-02 (1)	18-20 (1) 20-00 (3) 00-03 (2) 03-06 (1) 19-21 (1)* 21-02 (2)* 02-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	10-12 (1) 12-14 (2) 14-16 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-16 (3) 16-17 (2) 17-19 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-22 (2) 22-00 (1)	18-20 (1) 20-01 (2) 01-03 (1) 22-02 (1)*
McMurdo Sound, Antarctica	*Nil*	12-15 (1) 15-18 (2) 18-20 (1)	16-19 (1) 19-22 (2) 22-02 (1) 06-07 (1) 07-09 (2) 09-10 (1)	22-02 (1) 02-04 (2) 04-06 (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

ham shop

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