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APRIL 2003

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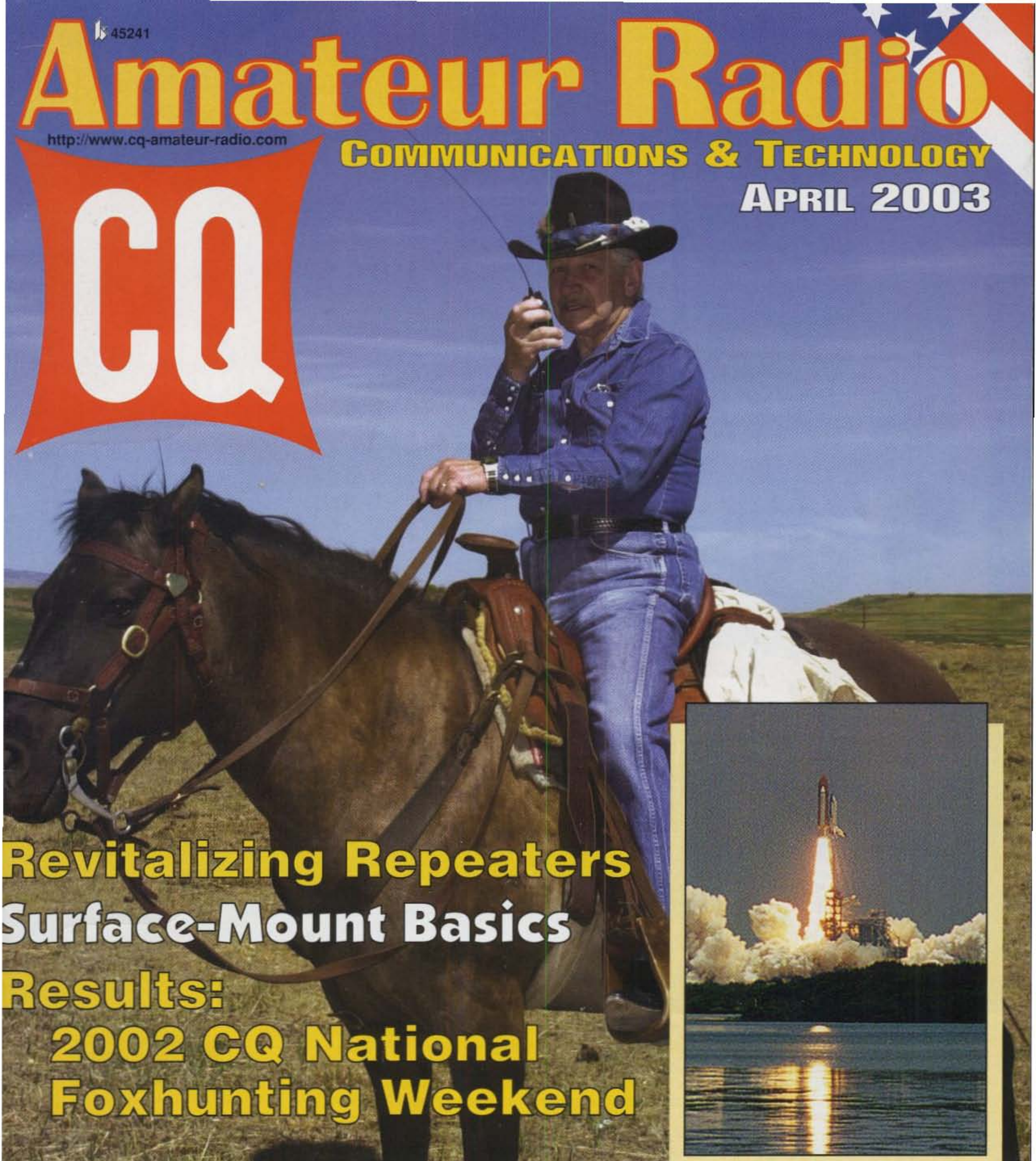

Revitalizing Repeaters

Surface-Mount Basics

Results: 2002 CQ National Foxhunting Weekend

Columbia Remembered

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ates

THE RADIO AMATEUR'S JOURNAL

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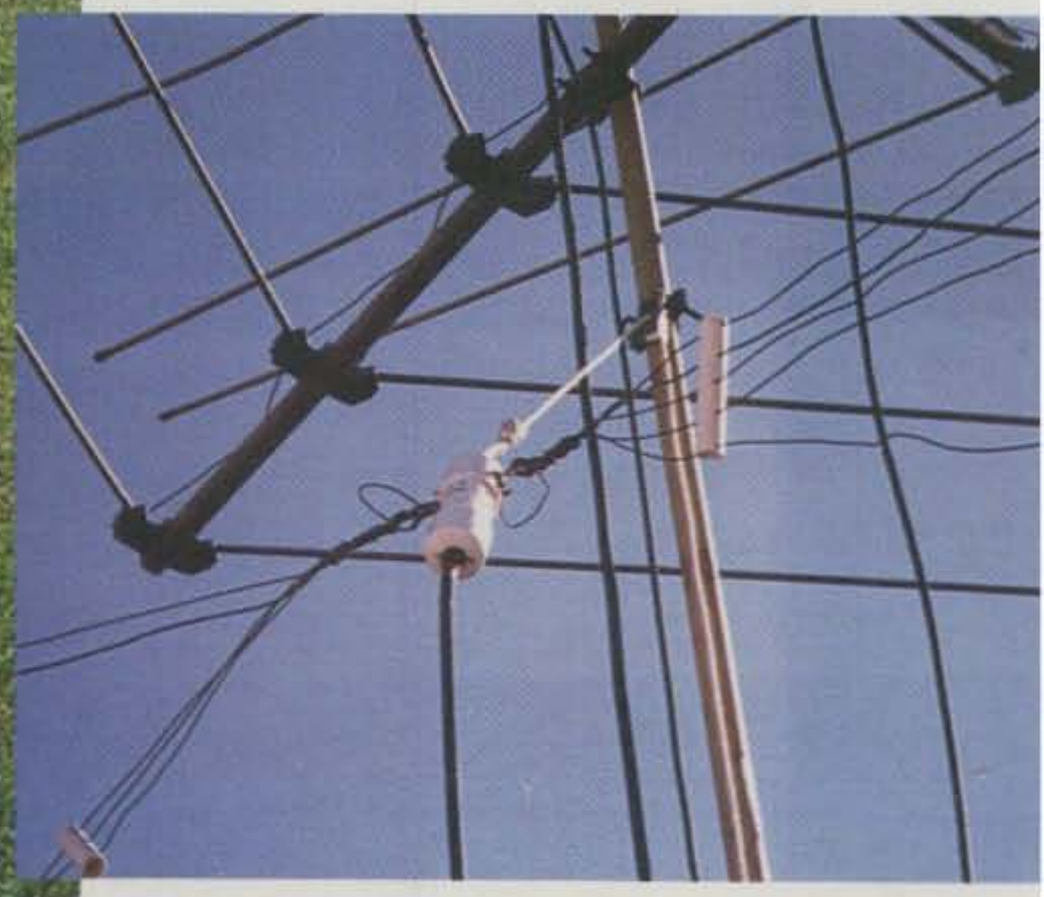
APRIL 2003



features

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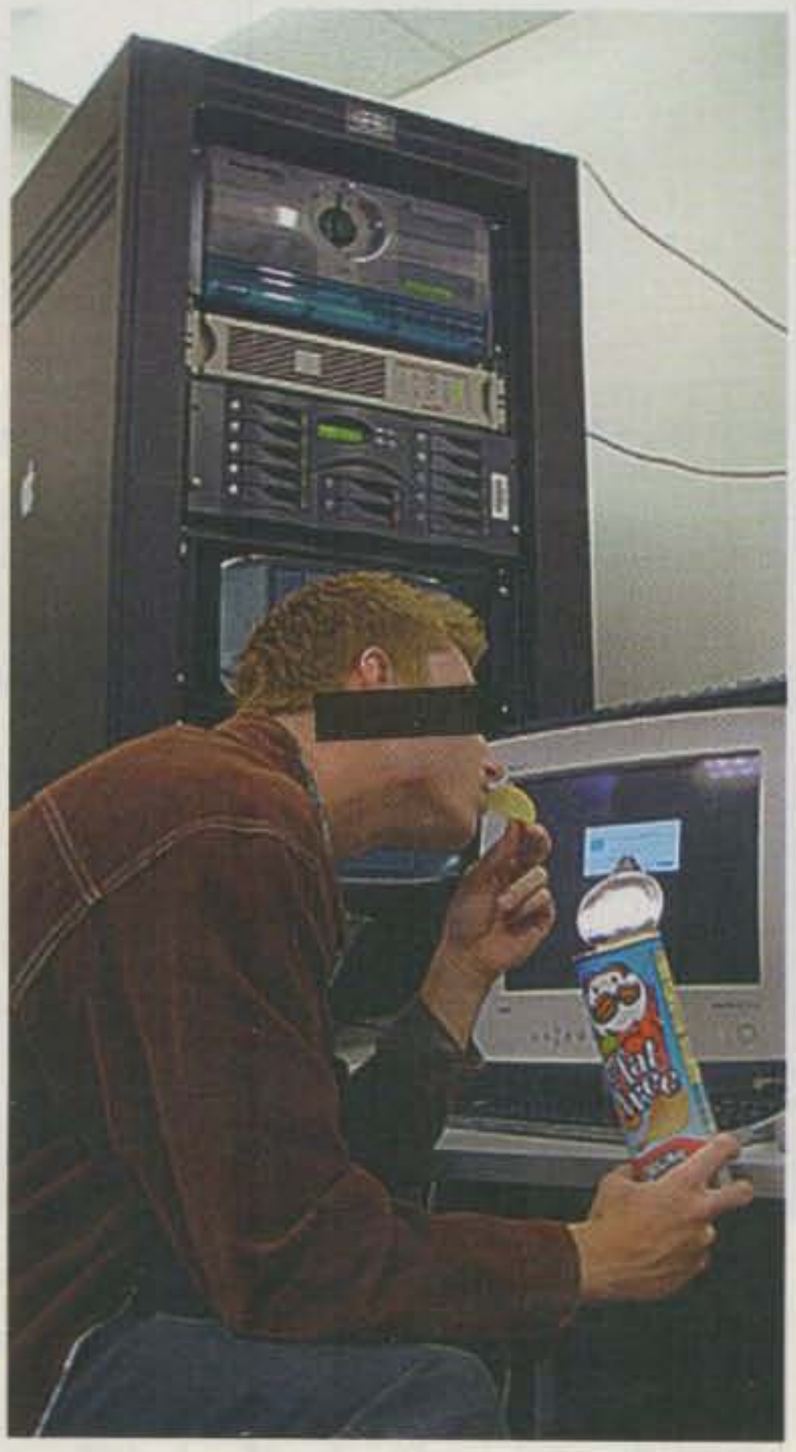

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announcements

Fifth Annual SETILeague QSO Party – Sponsored by the SETILeague, a worldwide organization of amateur radio astronomers devoted to the microwave Search for Extra Terrestrial Intelligence, this event will run from 0000Z April 16 to 2400Z April 19. SETILeague members and staff work everyone; others work SETILeague members, staff, and other interested stations. Exchange signal report, grid square, and SETILeague membership status ("A" active ARGUS site, "S" SETILeague member, "N" nonmember), the principal calling frequencies are 14.204, 21.3, and 28.408 MHz; 14.204 may opt to listen 14.225 and up. General class stations operate 14.225 and up. Discuss SETI, Project ARGUS, results to date, and the influence of Project ARGUS on microwave activity in amateur radio. Send logs to Burley ARC, P.O. Box 262, Burley, WA 98322, Attn.: SETI. Log deadline: June 16, 2003. Include 8 × 12 SASE for certificate confirming QSO with active Project ARGUS site or SETILeague staff. For more information, contact Tom Sanders, W6QJI, e-mail: <ww2end@aol.com>.

Amateur Radio Lighthouse Society Spring Lites QSO Party – To promote public awareness of ham radio and lighthouses, this event will be held from 0000Z April 19 through 2359Z April 27, all modes. Suggested frequencies: SSB 1.970, 3.970, 7.270, 14.270, 21.370, 28.370; CW 1830, 3.530, 7.030, 14.030, 21.030, 28.030 (all ±20 kHz). For details see the ARLHS website: <http://arlhs.com>.

CQ Teacher Hams – If you are a ham radio operator involved in education as a teacher, parent, or school volunteer, Matt Ryan, VK2KVE, in Australia would like to hear from you. He is setting up a national and international list of schools, both primary an secondary, that are able to participate in amateur radio activities that can serve the needs of various syllabi (sciences and geography in particular). The 2003 Schools in Space Project is looking at developing strategies to allow students to participate in a variety of radio astronomy and radio communications activities based on the amateur frequencies. Contact <mjaryan@hotmail.com>. You will receive a short questionnaire to e-mail back. For details about the Schools in Space Project, see <www.radioastro.net>.

OMARC Tech Classes, VE Sessions – The Ocean-Monmouth (NJ) ARC is sponsoring amateur radio classes through the end of May, and VE sessions every other month through the end of the year. For more information, contact Larry, KB2RIS, e-mail: <kb2ris@wmconnect.com>, or see <http://www.qsl.net/n2mo>.

The following Special Event stations will be on in April:

N2IP, from Pulteney, New York, U.S. International Police Assn. RC annual event to commemorate fallen police officers; local time 0000 April 27 to 2359 May 11 on 21.410, 14.240, 28.355, 3.850 MHz. For certificate contact five special 1×1 callsign stations. QSL direct to stations, For more info, e-mail: <n2pig@arrl.net>. The club holds its annual contest the first weekend in May (CW May 3; SSB May 4).

N9BQV, from WW II memorial submarine *USS Cobia* AGSS-245, Manitowoc, Wisconsin, celebrating memorial submarine radio room reactivation weekend; April 26–27 from 1400–2300Z on 3.843, 7.243, 14.243, 21.343, 28.343 MHz SSB +/–10 kHz. For *USS Cobia* QSL send QSL and #10 SASE to Fred Neuenfeldt, W6BSF, 4932 So. 10th St., Manitowoc, WI 54220-9121.

These hamfests, etc., are slated for April and early May:

April 4–5, **Joplin Hamfest**, Hammons Convention Center, Joplin, Missouri. See the hamfest website: <http://www.joplin-arc.org/hamfest03>. (Exams)

April 5, **Milford ARC Hamfest**, Milford High School, Highland, Michigan. Contact Rose, KC8NQJ, 810-632-5174, or see <www.qsl.net/w8ydk>.

April 5**, Hudson Div./Orange County ARC Hamfest**, Temple Hill School, New Windsor, New York. Contact Edward Moskowitz, N2XJI, 347-643-2518 (weekdays 8 AM to 5 PM), 845-534-3492 (8–11PM and weekends); e-mail: <n2xj@ arrl.net>. (Talk-in 146.760 (100 Hz); exams 8–11 AM)

April 5, **Ham Expo**, Bell County Expo Center, Belton, Texas. Contact Mike LeFan, WA5EQQ, 254-773-3590 (10 AM to 9 PM Central Time, Mon.–Sat.); e-mail: <expo@tarc.org>; <www.tarc.org>. (Exams 1 PM)

April 5, **LARCFest**, Boulder County Fairgrounds Exhibition Building, Longmont, Colorado. See <http://www.qsl.net/larc>. (Talk-in 147.270; exams 10 AM)

April 5, **Hangin Judge Parker Hamfest/ARKIE CON 2003**, K of C Hall, Fort Smith, Arkansas. Contact <w3tz@arrl.net>, phone 479-474-7633; <www.fsaarc>. (Talk-in 146.94)

April 12, **Columbus ARC Hamfest**, Bartholomew County 4H Fairgrounds, Community Building, southwest of Columbus, Indiana. Contact Marion Winterberg, WD9HTN, 812-342-4670; e-mail: <carc_in@yahoo.com>. (Talk-in 146.790/ 146.190, PL 100.0; exams 11 AM)

April 13, **Madison Swapfest**, Mandt Community Center, Stoughton, Wisconsin. For more info call 608-245-8890; <http://www.qsl.net/mara>. (Talk-in 147.15)

April 13, **Raleigh ARS Hamfest & Electronic Fleamarket**, Jim Graham Building, NCS Fairgrounds, Raleigh, North Carolina. Contact Jeff Wittich, AC4ZO, 919-362-4784; e-mail: <ac4zo@arrl.net>. (Exam info WA4GIR, 919-387-9152)

April 13, **Eastern Shore Hamfest & Computer Show**, Talbot County Community Center, Easton, Maryland. Contact Tinsley Meekins, K3RUQ, 410-228-8888, e-mail: <tinsley@towerleasing.biz>. (Talk-in 146.520)

April 19, **Catawba Valley Hamfest**, Burke County Fairgrounds, Morgantown, North Carolina. Contact Don Beam, KK4NI, 828-652-3102; <www.cvhamfest.org>. Dealer info contact Larry Withrow, AF4HX, 828-652-4195.

April 19, **Hambash 2003**, Ararat Shrine, Kansas City, Missouri. Contact Ray Pautz, NØRP, 660-747-5002, e-mail: <rpautz@charter.net>. (Talk-in 145.13–; exams, advance registration send completed form 610 to Exam Registration, P.O. Box 47067, No. Kansas City, MO 64188 [fax: 816-941-0620])

April 26, **Lewis and Clark RC Hamfest**, Lewis and Clark College, Gofrey, Illinois. Contact Chris Holland, N9WHH, 618-254-9465; e-mail: <n9whh@ezl.com>. (Exams 9:30 AM, contact Richard Morgan, KF9F, 618-466-2306; preregister for No-Code Tech, all others walk-in okay)

April 26, **Roseland RC Hamfest**, West Orange High School, West Orange, New Jersey. Contact Harvey Moskowitz, W2YWC, 973-994-0637; e-mail: <harvmosk @aol.com>. (Talk-in 146.415 +1.0, 224.480 –1.6, 447.875 –5.0, 146.520; exams)

April 26, **Valley of the Moon ARC Hamfest & Electronics Swapmeet**, Sonoma Valley Veteran's Memorial Building, Sonoma, California. Contact Darrel, WD6BOR, 707-996-4494; e-mail: <wd6bor@vom.com>. (Exams registration 9 AM, testing 10 AM)

April 27, **AARO Hamfest**, Galva High School, Galva, Illinois. Contact Matt Bullock, W9SIX, 309-856-7111; e-mail: <mbullock@theramp.net>. (Exams)

May 2–4, **Visalia International DX Convention**, Holiday Inn Hotel & Conference Center, Visalia, California. Contact Dick Letrich, W6KM, e-mail: <dlw6km @aol.com>; <www.ncdxc.org>.

A publication of

CQ Communications, Inc.
25 Newbridge Road
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Offices: 25 Newbridge Rd., Hicksville, NY 11801, Telephone 516--681-2922; Fax 516-681-2926. E-mail: cq@cq-amateur-radio.com. Web site: www.cq-amateur-radio.com. Periodical postage paid at Hicksville, NY 11801 and additional offices Statement of Ownership, Management and Circulation, October 10, 2002. CQ Amateur Radio, 25 Newbridge Rd., Hicksville, NY 11801. Publication #007-893X. Issued monthly, subscription price $31.95 per year (12 issues). Publisher: Richard A. Ross; Editor: Richard S. Moseson: owned by CQ Communications, Inc. Stockholders: Richard A. Ross. Circulation (Average of Preceding 12 Months): Net Press Run 46,198, Mail Subscriptions 23,336, Sales Through Dealers and News Agents 14,729, Other Classes Mailed 225, Total Paid 38,290, Free Distribution 332, Total Distribution 38,622, Copies Not Distributed 1,383, Total 40,005. Circulation (single issue nearest filing date): 44,432, Mail Subscriptions 22,205, Sales Through Dealers and News Agents 14,775, Other Classes Mailed 225, Total Paid 37,205, Free Distribution 341, Total Distribution 37,546, Copies Not Distributed 1,168, Total 38,714 s/Dorothy Kehrwieder, Business Manager.

Printed in the U.S.A.
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The Shuttle Tragedy

Hams Play Major Role in Columbia Recovery Effort

BY BOB JOSUWEIT,* WA3PZO

It was bright and sunny on the east coast—Saturday morning, February 1, a great day for weekend activities. The local all-news station was carrying reports of live coverage of the shuttle landing coming up in 15 minutes. It was expected to be a routine news event, the return of the space shuttle after a successful space mission.

In California it was early morning, around 5:53 AM. About a dozen members of the Stanislaus Amateur Radio Association were up early to see the space shuttle Columbia pass over the state on its way to a landing at Cape Canaveral, Florida. Chuck Marble, KE6AOG, of Patterson, California, has been following space flight for a long time. Hams in the Patterson area were listening to transmissions between the shuttle Columbia and Mission Control via a local 440 MHz repeater and holding their Shuttle-Watch Net on 2 meters. Marble told the Modesto Bee, "We were talking amongst ourselves, trying to see if anybody could see anything because we were fogged in down here. We were having a wonderful time, monitoring transmissions," he said. "Everything was going OK."

Rob Kirkpatrick and Rich Hall, KF6ARX, got above the fog and could see the shuttle. There was a wonderful, beautiful orange trail. The group was very up-beat, particularly when they reported that they got the pass on videotape. However, there was something else.

"They had never seen a re-entry before," said Marble. "They said (Columbia) seemed to be puffing." Five minutes later they heard mission audio indicating that voice communications, telemetry, and ground track had been lost. Maybe they saw the early signs of the problem. "What a terrible, terrible tragedy," Marble said. "I believe we were –sadly—the first voices on-air in the U.S. to state that "it looks like we lost Columbia." Marble said the pictures show what appears to be "anomalous activity in the ion trail."

Shuttle Moves East

Seven minutes later (8 AM Central Time) Columbia was streaking over Texas, but something had gone terribly wrong. Mission Control had lost contact with the shuttle. As it traveled at speeds over 12,500 miles-per-hour, or mach 18, it began to disintegrate. All seven astronauts aboard were killed.

The STS-107 crew, headed by Commander Rick D. Husband, included Pilot William C. McCool and Mission Specialists Kalpana Chawla, KD5ESI; David M. Brown, KC5ZTC; Laurel B. Clark, KC5ZSU; Michael P. Anderson; and Payload Specialist Ilan Ramon, Israel's first astronaut. Debris was scattered across a wide area of Texas and Louisiana. Additional debris has been reported as far west as California. This is the first mishap in the American space program to take lives since the space shuttle Challenger tragedy in 1986.

Hams Respond

As soon as members of The Palestine/Anderson County Amateur Radio Club heard about the disaster, they began going mobile with 2 meter radios. PACARC President Larry Davis, KB5JHW, said they "generally don't wait to be 'called out.' We hear about the need and just go ahead and respond."

Davis said word spread pretty fast, and "we fielded a good number of ham volunteers, but we really didn't know what to look for. At first we were looking for signs of smoke and large debris as one would see with an airplane crash. However, we soon found that the debris field was huge, and people were reporting finding pieces from postage- stamp size to car-hood size. Nothing larger than that."

Davis described this area of east Texas as very heavily forested. The debris found on the first day was in open areas along shoulders of roads and in people's yards and pastures. "There is no telling how much more is out there in the woods that may take years, if not decades, to locate. Several of us in Anderson County were out in the field and kept in contact with our net control, who was monitoring the police, sheriff, and volunteer fire department channels and relaying information to and from field spotters."

Astronaut Dr. Laurel Clark, KC5ZSU, talks on 20 meters to the Holloman Middle School in 1999. (Photo courtesy Dale Martin, KG5U)

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

"Some hams served as relay operators, while others went with the search teams and used their HTs to report back via the relay stations."

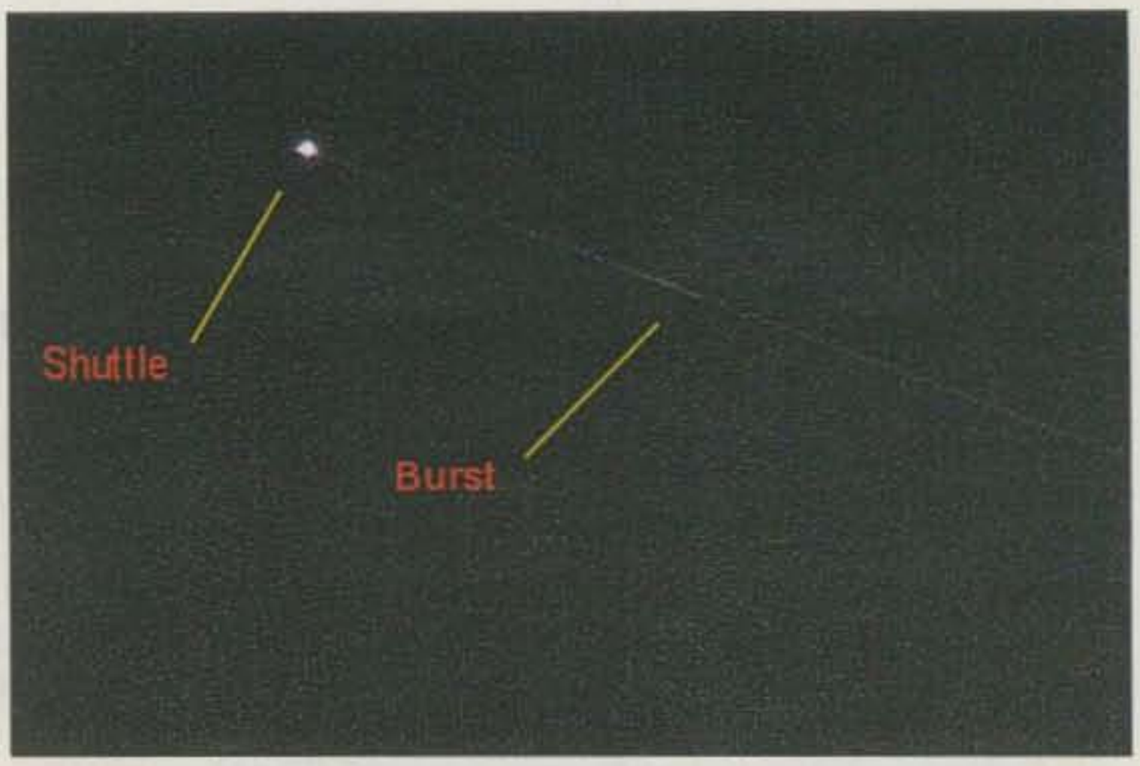
Hams in Anderson, Cherokee, and Nacogdoches Counties were very active all day in recovery efforts. "My search route took me over into neighboring Cherokee County, and I checked in with their net control while I was in that county," Davis continued, adding that Skywarn training paid off. "We have a pretty good county-to-county relationship here, as we often get severe weather that goes from county to county and we keep each other informed through our Skywarn nets." Summing up the first day's events, Davis said, "This is just so sad."

In Nacogdoches, the Nacogdoches Amateur Radio Club began providing support almost immediately. Army Curtis, AE5P, spent most of his day at the City Emergency Operations Center. "We have hundreds of reported sightings of debris from the shuttle in our immediate area, and the area has been flooded with news media, state and federal folks, and on-lookers. We currently have several mobile crews out with Geographical Informational Systems (GIS) specialists from our local university, the Stephen F. Austin College of Forestry (SFASU), and they are electronically mapping and photographing debris in our area. This effort will likely continue for several days or longer." Working in tandem with students from SFASU, the ARES volunteers surveyed the city and county of Nacogdoches, looking for debris from the shuttle.

Reports from the field indicated that some hams served as relay operators while others went with the search teams and used their HTs to report back via the relay stations. As the search moved on, HTs were more important while moving through the woods. It was cold and wet, and sturdy shoes and appropriate clothing were required. Items that were useful included a 4×4 vehicle, a mobile 2 meter radio, a digital camera, paper and pen, clip board, and a cell phone. As the search left the roads and began in the woods and farm land, all volunteers had to be physically in shape and able to walk in the woods for hours at a time. Other useful items included a laptop computer with a good mapping program, a 70 cm mobile rig, and binoculars. Operators were advised to be self-contained with a bedroll and personal items they might require.

GPS: An Important Tool

The lack of an adequate number of high-resolution GPS systems on site has limited the number of teams that could be fielded to properly log item locations. Hams who had GPS with 12-channel parallel processing were used as GPS operators. Those with less accurate GPS units still found them useful for navigating through the area. In order to make sure that all GPS units were well calibrated, each unit had to go through a certification process which took up to half a day.

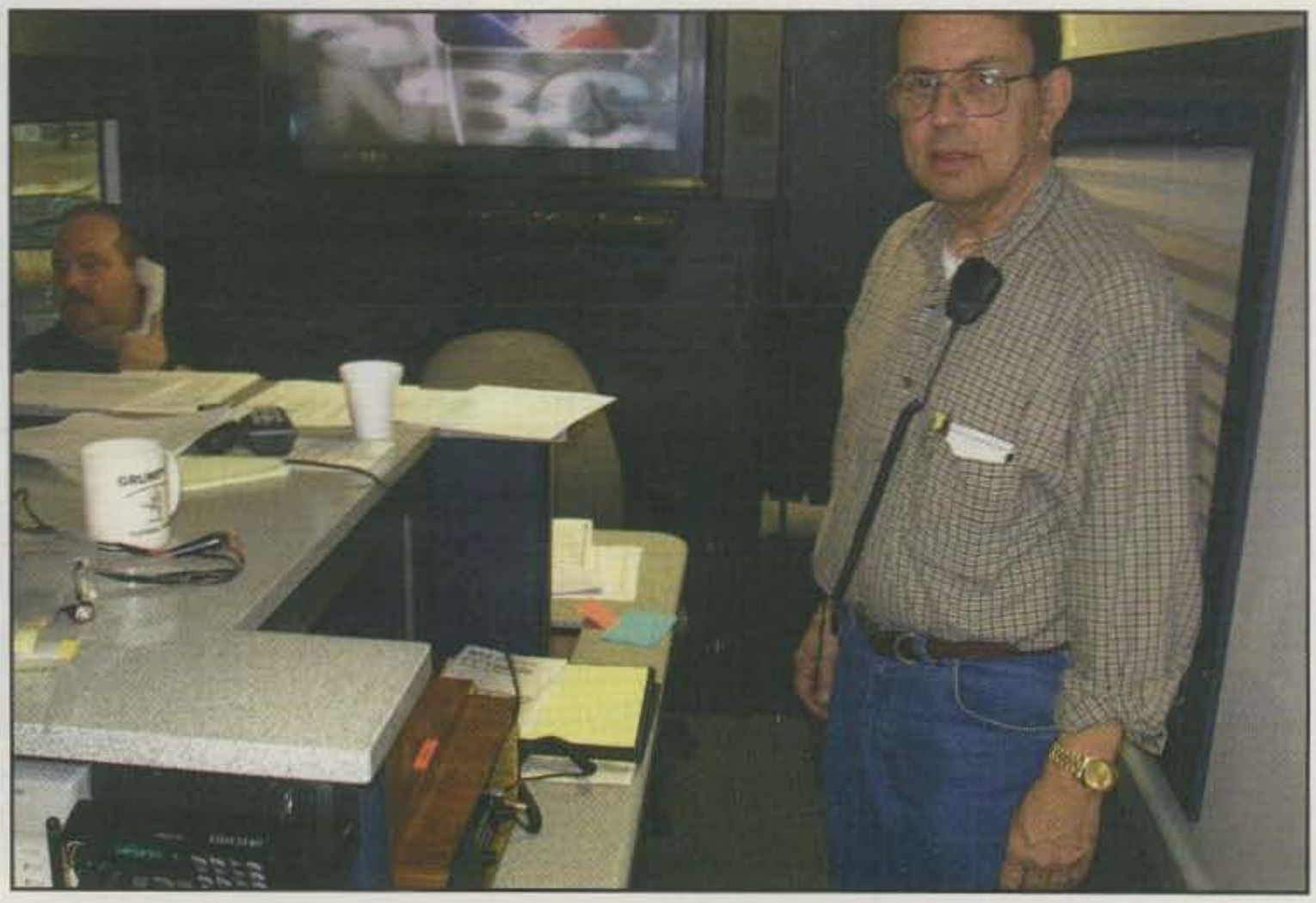


As Columbia raced over California, local amateurs could see a burst of light trailing behind the shuttle. (Photo copyright Rob Kirkpatrick and Rich Hall, KF6ARX; used by permission)

In many cases volunteers had to report the day before they were going to be sent into the field to be registered and have their equipment certified. The FBI expressed great interest in the hams' ability to provide complete directions to any GPS coordinates. Local emergency-management officials were interested in whether the group was providing the information via computer. Curtis answered yes. When asked what program was being used to supply the information, the local officials were told StreetMapUSA™. "Very high-tech stuff," said Curtis. The comment got a big laugh. However, it was an important tool. Curtis told the hams, "We may very well have a larger number of customers for this service tomorrow. Let's make certain we are prepared to quickly deliver accurate information when asked."

Hams More Reliable

Amateur radio operators and their equipment have proven more reliable than the government-provided "alternate" communication systems imported to assist with operations. On

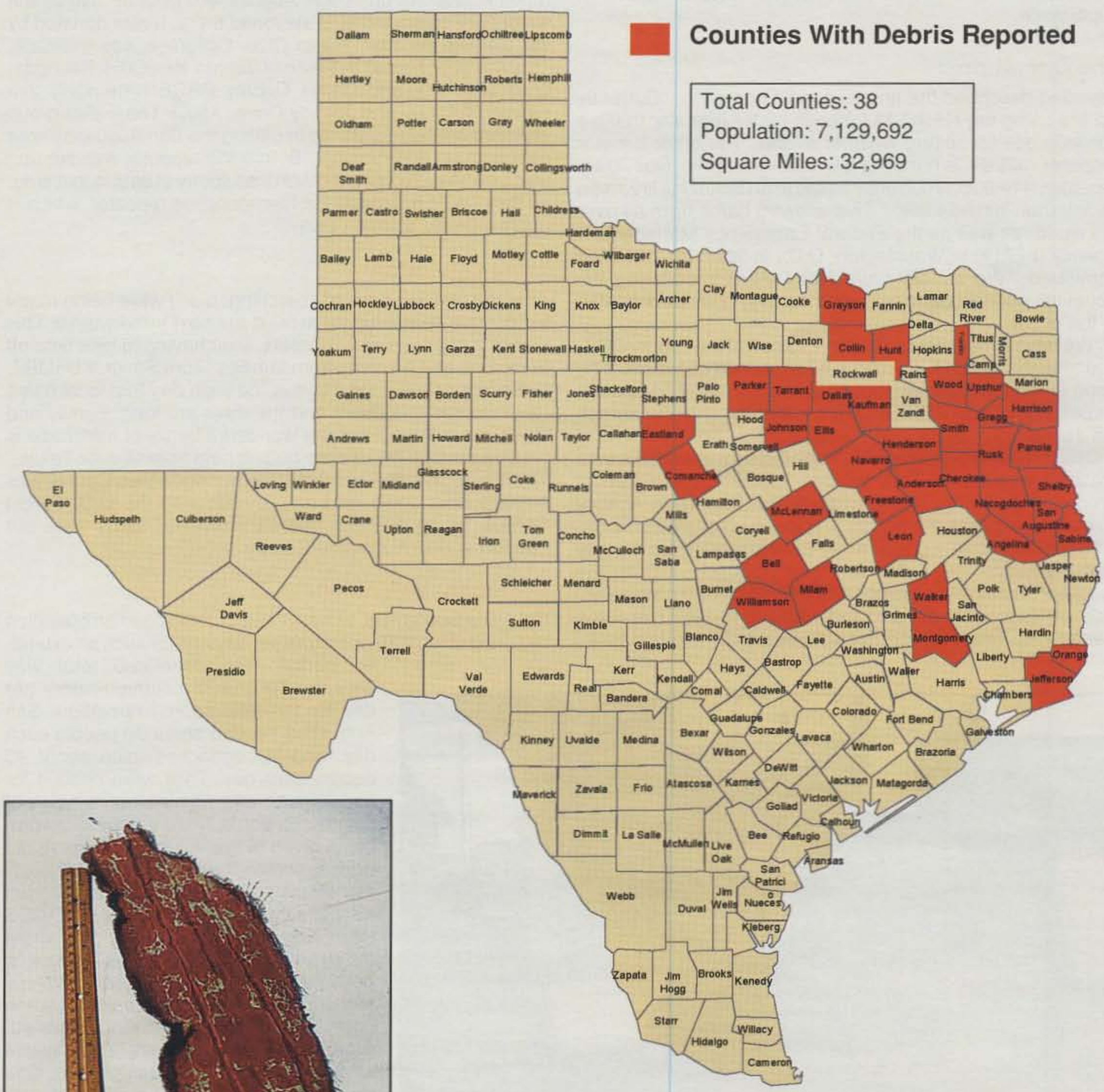


The entire operation was coordinated from the Communications Van at the Lightfoot Expo Center. Henry Middlebrook, N5SHL, coordinated the overall operation. (Photo courtesy Army Curtis, AE5P)

day three of the search, 24 teams were sent into the field, 14 of which included hams. They were the only ones that performed reliably as required by the command post. FBI teams specifically requested amateur radio operators for their teams due to their excellent reliability and efficiency. The radio operators became a standard part of each team.

NARC Public Information Officer Tim Lewallen, KD5ING, said the communications systems used by other federal and state organizations, while able to operate in an urban environment, cannot penetrate "The Pine Curtain," as it's known in east Texas. The dense forests and hilly terrain just swallow up most radio traffic, and even county sheriff and fire department radio systems have serious blind spots. Federal authorities have requested that every survey team have at least one amateur radio operator with them so the recovery efforts remain coordinated and organized.

Each team was tasked to locate pieces of the fallen shuttle and plot their coordinates with GPS equipment. The search teams in the woods along Chinquapin Creek included two GPS-equipped workers and a radio operator. They never knew what they were going to come across. One operator reported a blackened shoulder harness, another



Search teams located shuttle debris throughout many Texas communities. Here is one piece that was identified for pickup. (Photo courtesy Larry Davis, KB5JHW)

a piece of fabric. The hams followed the uniformed volunteer teams through the woods. When they located a piece of debris, they photographed it and logged its position. Someone else would pick up the piece later. The data was later downloaded into a database and the debris points superimposed over maps in the hopes that patterns will help NASA officials determine the nature of the catastrophic failure of the Space Shuttle.

Much of the information supplied to the Net Control was based on a specific set of guidelines given to each search team. In many cases a description of the specific item found was not given. Instead it was categorized by the team and reported by the category name, which indicated its level of importance.

The Operation

Lewallen described the amateur radio operation: "Currently we are using the NARC 147.32 two meter repeater that we normally use for severe weather events. The other 2 meter repeater, 146.84, is handling all non-event traffic. Our 70 cm repeater, 444.050, is currently linked to an EchoLink link radio for internet -based traffic." This allowed hams from all over the world, as well as the Federal Emergency Management Agency (FEMA) in Washington, D.C., to listen in. Lewallen continued, "We usually have Net Control monitoring the EchoLink connection to answer incoming questions related to the event."

"We have a main net controller, a liaison at the county EOC, and a liaison at the HUES/GIS lab," explained Lewallen. "The three of them coordinate incoming reports of debris and the dispatching of an ARES/GIS team to catalog and photograph the items."

One of the first concerns of Texas officials was to make sure the area schools were safe to open. Lewallen said amateurs accompanied NASA and Environmental Protection Agency officials to expedite the search and clean up of area schools.

Hams staffed key positions at the Nacogdoches County Sheriff's Office, the Lufkin and San Augustine EOCs, the recovery staging area located at the Expo Center on the west side of Nacogdoches, and the HUES/GIS lab. The Expo Center also was a shelter for volunteers coming into town,

"FBI teams specifically requested amateur radio operators for their teams due to their excellent reliability and efficiency."

since most of the hotels were filled to capacity. Hams responded from the Dallas-Fort Worth and Houston areas. Given the long duration of the operation, help was being accepted from other areas on a coordinated basis.

In addition to the Nacogdoches operations, a portable repeater was set up in San Augustine, Texas for use by the secondary command post stationed there. It was donated by the Garland Amateur Radio Club. Coverage was excellent. This was coordinated by Kevin Anderson, KD5CCH, Nacogdoches Skywarn, and Dallas County RACES members Jim Lawyer, AA5QX, and Johnny Davis, K5JD. The Dallas group provided critical assistance in getting the San Augustine area operation up and running. "Before the repeater was set up," said Lewallen, "communication was spotty at best in that area, as they could not reach the Nacogdoches repeater, which is approximately 50 miles away."

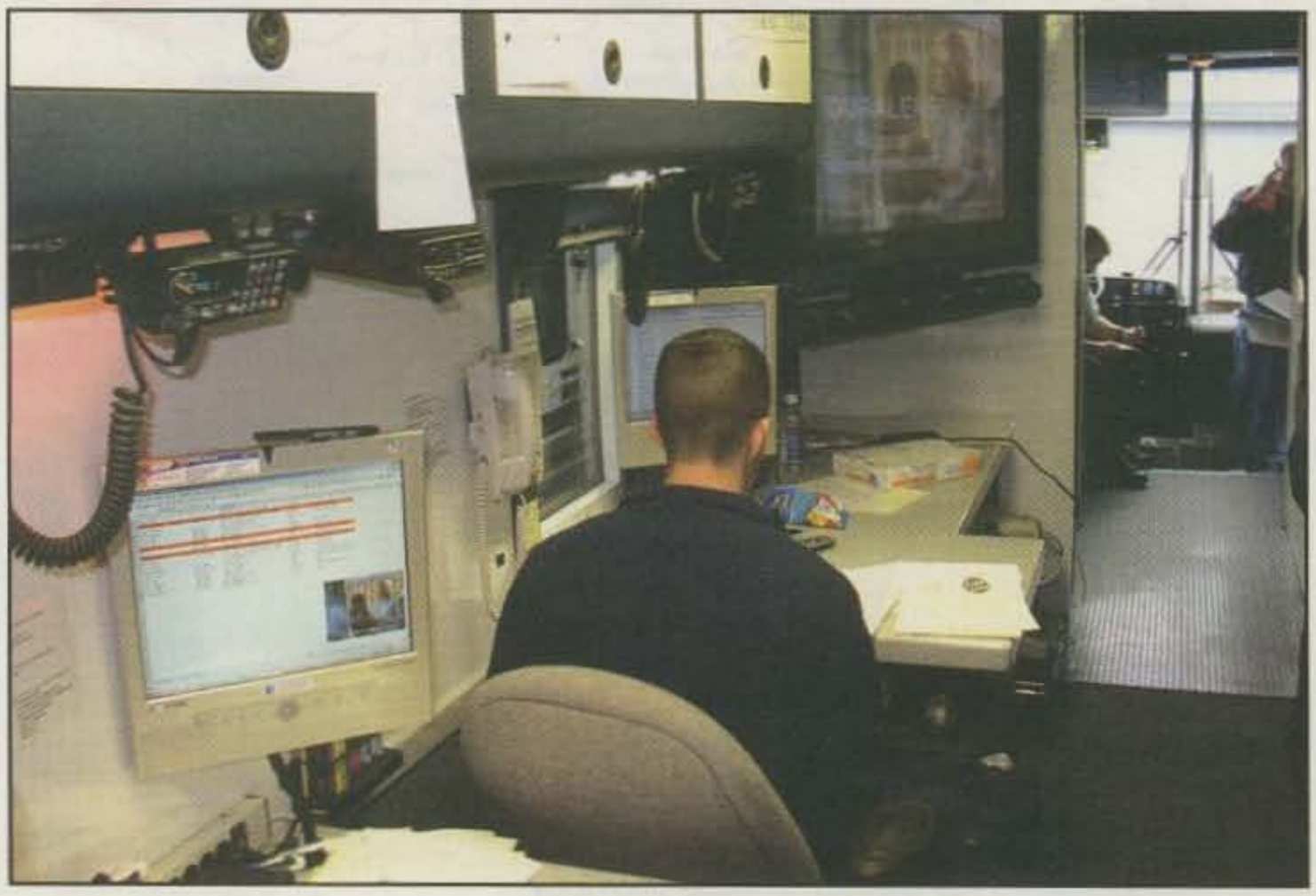
Long Operation

After the first few days of searching, plans were being made to continue searching for at least the next three weeks. This placed a strain on all volunteers, their having to take time off from work and be away from families. Tom Smith, KD5MBZ, of Nacogdoches, said, "This is the sixth day that local hams have worked this event and the days are long. Family and sleep are suffering, but the wonderful family of ham radio is coming through and we are getting help from all over Texas." The amateur radio involvement in Nacogdoches County was actually shut down on February 12, with the U.S. Forest Service taking over the search. However, hams were still needed in San Augustine County.

Managing Volunteers

Not since September 11 has amateur radio seen an operation requiring at least 70 operators per day and for such an extended period. The estimated total was between 70 and 75 communicators per day for the total search operation. San Augustine needed about 30 people each day, and Nacogdoches used about 40 people each day. They were needed for both search and administrative types of communication duty. As instructions were being given to the volunteers helping out with the search, it was clear that each operator would have to know how to program his radio, since frequencies and CTCSS tones were changing depending on where the operator was assigned. As the search became more organized and additional resources were brought into the area, the need for additional operators increased. Amateur radio organizers emphasized what the ham in the field might find. One report said, "Some items we found are very disturbing, but there are some other items the military is trying to recover that are of a very high importance to them."

Still, organizers were overloaded with offers of help from hams all over Texas



Net Control operators handled duties for many hours each day. (Photo via AE5P)

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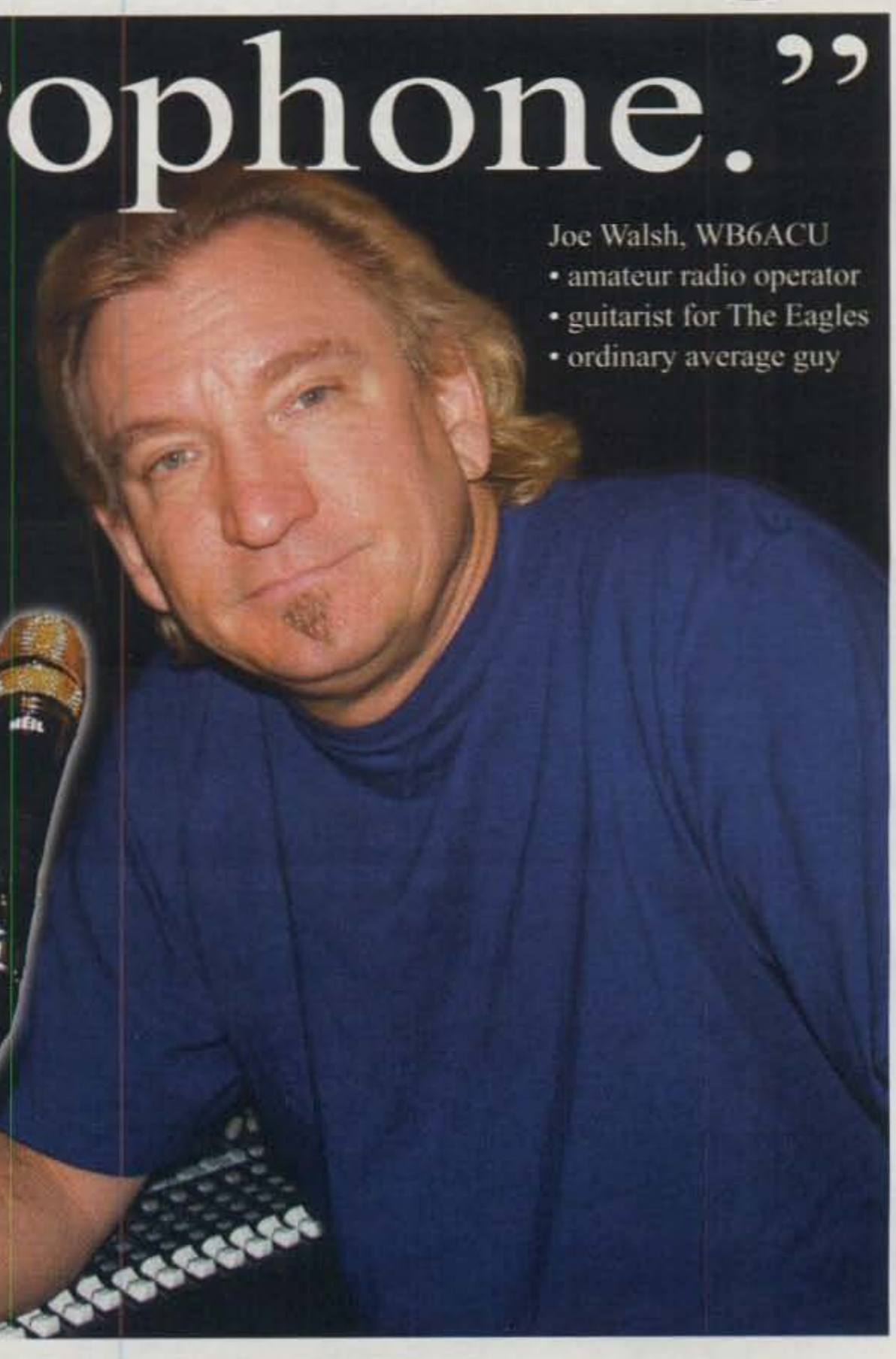

Joe Walsh, WB6ACU
- amateur radio operator
- guitarist for The Eagles
- ordinary average guy

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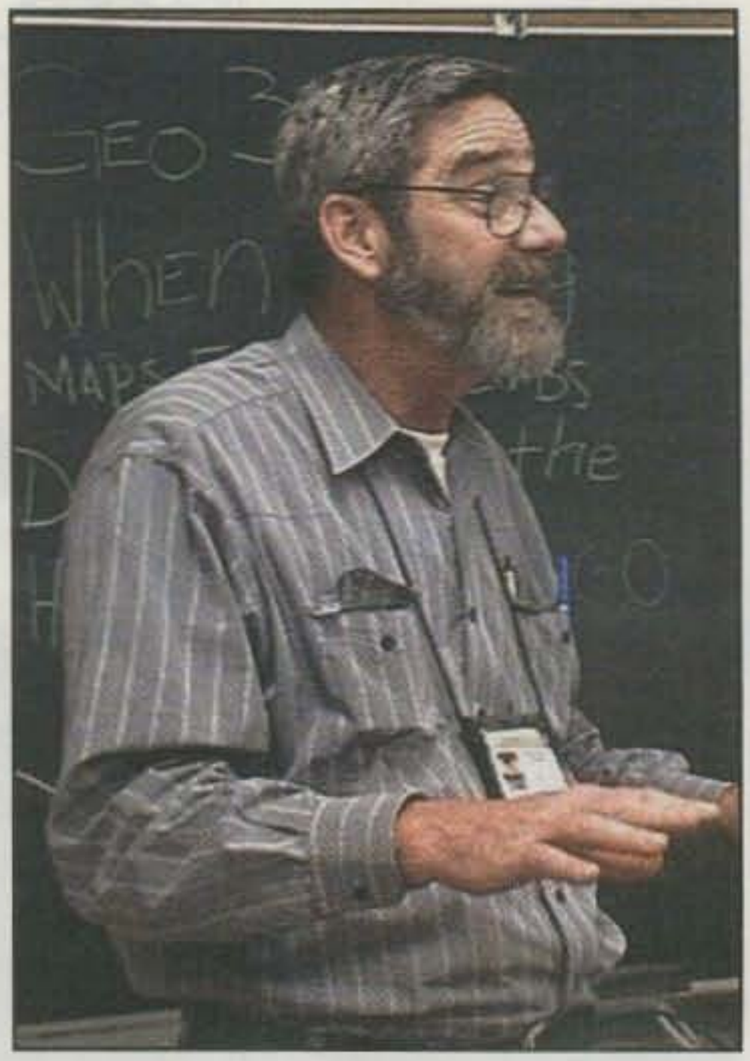
"Not since September 11 has amateur radio seen an operation requiring at least 70 operators per day and for such an extended period."

and beyond. There was a need to manage the list and the volunteers' availability. During the lengthy amateur response to the September 11 attacks, there was a need to schedule a large number of volunteers in New York City. Joe Tomasone, AB2M, established a web-based volunteer registration and scheduling database. The database registered hundreds of volunteers from across the country (see *CQ*, December 2001). Contacted by Texas hams, Tomasone once again set up a database to help with volunteer registration for this operation. Lewellan said, "Joe has produced a first rate application in a very short amount of time." In addition, Tomasone told *CQ*, "I am working on a system now where you can register your own database and choose some custom fields, so it will ultimately be a completely automated setup."

Triumph to Tragedy

Columbia's science mission had gone perfectly, and the flight had been viewed as a triumph for the space program until its tragic final seconds. Most of us never had the opportunity to meet or talk with Laurel, Kalpana, or David on the air, yet the fact that they were members of the ham radio fraternity brought their loss that much closer to each of us. Columbia itself has a permanent place in ham radio history as the platform for the first amateur radio contacts from space in 1983.



Robert Judy, KD5FEE, was the ARES liaison at the GIS lab. He helped coordinate the movement and assignments of the ARES/GIS search teams. (Photo courtesy Tim Lewallen, KD5ING)

At least two of the three licensed astronauts were no strangers to the educational benefits of ham radio. In May 1999, Dr Laurel Clark, KC5ZSU, made contact with students at the Holloman Middle School in Alamagordo, New Mexico. During the 20 meter contact Clark said it would be "a tragedy" to work in a profession you do not enjoy and to not have other goals. NASA's Captain Kent Rominger said Laurel "inspired us with her ability to always reserve time and energy for her family."

Kalpana Chawla, KD5ESI—K.C. to her friends—worked closely with the Amateur Radio on the International Space Station (ARISS) team for several years as the astronaut liaison. She stepped down from this position when she began preparations for the STS-107 shuttle flight. K.C. was admired personally for her extraordinary kindness and technically for her striving for perfection.

President Bush said David Brown, KC5ZTC, was asked by his brother what would happen if something went wrong on their mission. David replied, "This program will go on."

With Thanks . . .

This story would not have been possible without the help of those mentioned in the article. Until next time . . .

73, Bob, WA3PZO

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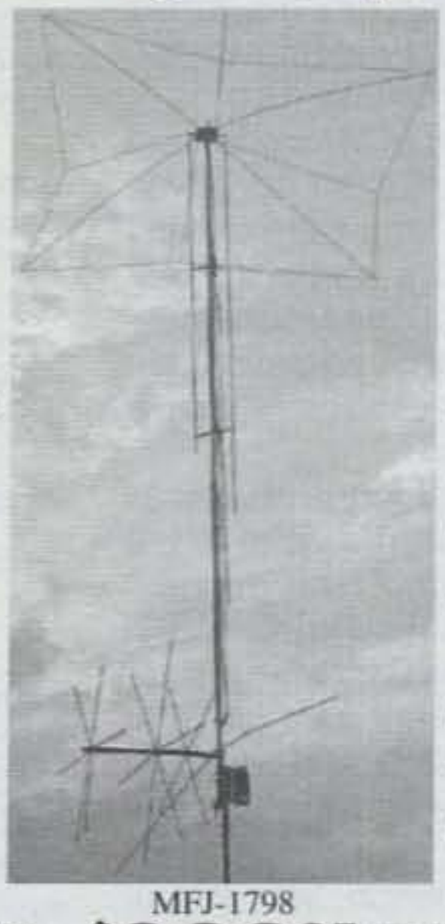

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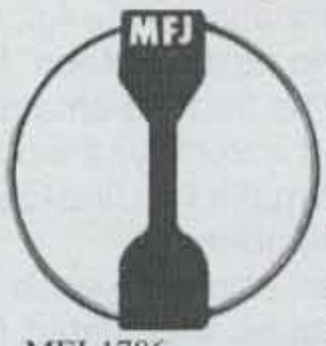

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Enjoy both DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection™*. It auto-tunes to desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

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Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

NEW! **MFJ-1788, $429.95.** Same as MFJ-1786 but covers 40 Meters-15 Meters continuous. Includes super remote control.

MFJ-1782, $339.95. Like MFJ-1786 but control has only fast/slow tune buttons.

MFJ-1780, $249.95. *Box Fan* Portable Loop is about the same size (2x2 foot) as a box fan, complete with handle. Covers 14-30 MHz. Control has fast/slow tunes.

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MFJ-1621 **$89.95** Ship Code A

MFJ-1621 lets you operate in most any electrically free area -- apartment, campsite, hotel, the beach, etc. DXCC, WAZ, WAC, WAS have been won with MFJ-1621! Work 40, 30, 20, 17, 15, 12 and 10 Meters with a telescopic whip that extends to 54 inches. Mounted on a sturdy 6x3x6 inch cabinet. Built-in antenna tuner, field strength meter, and 50 feet of RG-58 coax cable. Handles 200 Watts.

MFJ's G5RV Antenna

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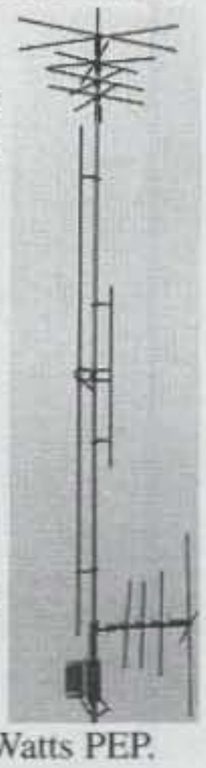
MFJ-1778, Ship Code A

Covers all bands, 160-10 Meters with antenna tuner. 102 feet long, shorter than 80 Meter dipole. Use as inverted vee or sloper to be more compact. Use on 160 Meters as Marconi with tuner and ground. Handles full legal limit power. Add coax feedline and some rope or other nonconductor and you're *on the air!*

MFJ halfwave vertical

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed



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BY JOE LYNCH,* N6CL

It Began with *Columbia*

It was one of those cold pre-winter nights in the Big Sky Country of Montana that first of December 1983. As usual for that time of year, though, winter had already made its appearance in Frenchtown, the QTH of Lance Collister, WA1JXN (now W7GJ).

Neighbors are hard to find in most of Montana, and that's the way some of the natives like it. Lance was one of those who preferred to be as far away from any neighbors as possible, and he had a particular reason. He was into bouncing signals off the Moon, making EME contacts, and he didn't want to amass complaints from neighbors about his antennas or his signals bothering their television sets.

This night, however, his 12-Yagi antenna array was not pointed at the Moon, but rather at a point in the sky somewhere over the west coast. Equally unusual was that he was not listening to his 2 meter radio on CW, but rather on FM. He, along with many other hams west and south of him, had their ears glued to their FM radios awaiting a first for ham radio—the first ham radio astronaut in space to be allowed to make contacts on the ham bands.

It had taken years of talk, speculation, and negotiation with NASA to permit amateur radio operations in space. The powers that be at NASA were never really opposed to amateur radio being onboard. Early on, they saw the benefits of amateur radio, among them the positive publicity. A lot of their employees were hams, including a few astronauts, among them Owen Garriott, W5LFL, Tony England, WØORE, and John-David Bartoe, W4NYZ, which made for a good base for discussion about the hobby.

Hams outside of NASA also were lobbying for amateur radio activity in space. Principal among them was then NBC Science Editor Roy Neal, K6DUE. Also promoting amateur radio in space was ARRL staff member Rosalie White, WA1STO (now K1STO), and members of AMSAT. NASA also could see the publicity associated with ham radio in space.

With the development of the shuttle program and the successful launch of the first shuttle, *Columbia*, on April 12, 1981, space exploration was taking a different direction. One of the missions of the shuttle program was to conduct experiments in space that could not be conducted terrestrially. Using the logic of the experimental nature of the shuttle flights, what better experiment could be undertaken than that of a back-up emergency radio communications, and what better back-up than ham radio! Armed with that argument, the proponents pressed on.

Part of the hang up was how to bring on board the spacecraft equipment that was not germane to that spacecraft. The two problems were the radio and the antenna. The antenna in particular was a problem, because whatever kind of antenna would be used had to stay within the shuttle. An antenna was specially designed to fit within the window and a Motorola handie-talkie (HT) was acquired and configured to be hooked to a tape recorder.

The next hurdle was a licensed ham radio operator who also was an astronaut. Garriott was that person. Brought into the Apollo Program in 1965, he was one of the first six scientist-astronauts selected by NASA.

Celebrating Garriott's selection as an astronaut trainee, *CQ* magazine published his picture on its August 1965 cover, along with the speculative headline that he could be the first ham on the Moon. Commenting on Garriott's selection for the program, *CQ* magazine's then-editor (now publisher) Dick Ross, K2MGA, wrote in that August 1965 issue's editorial, "Zero Bias," that Garriott looked forward to being one of the scientist-astronauts the U.S. would send to the Moon. Ross speculated that Garriott would actually hear amateur radio signals while on the Moon.

Unfortunately, with the discontinuation of the Apollo program there would be no trip to the Moon for Garriott. Nevertheless, he would be hearing amateur radio signals while in space, and ironically, it would be an EME array that was used to make that first QSO (see sidebar "Number One Remembers").

Garriott's first space flight was aboard Skylab in 1973. Ten years after his first trip he was slated for his second ride, that being on the ninth shuttle mission, which would be on board *Columbia* and be designated STS-9, which would launch in September. Because of his status as a licensed ham radio operator, Garriott would be the logical choice if NASA gave its approval for the shuttle amateur radio experiment.

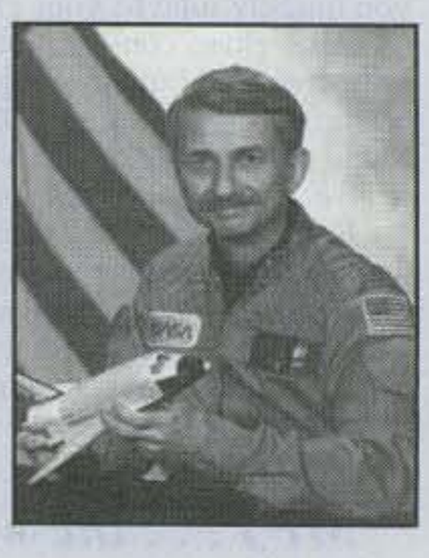
With the equipment readied, NASA gave its approval in April 1983 for Garriott to take the equipment on board for the experimental use of amateur radio in

e-mail: <n6cl@fuller.edu>

VHF Plus Calendar

April 1	New Moon
April 4	Moon Apogee
April 6	Poor EME conditions
April 9	First Quarter Moon and highest Moon declination
April 13	Very good EME conditions
April 16	Full Moon
April 17	Moon Perigee
April 20	Poor EME conditions
April 21	Lowest Moon declination
April 22	*Lyrids* meteor shower predicted peak
April 23	Last Quarter Moon
April 25-26	SVHFS Conference. See text for details.
April 27	Moderate EME conditions.

—EME conditions courtesy W5LUU



Owen Garriott, W5LFL, the first astronaut to communicate from space via amateur radio. (NASA photo)

Astronaut Laurel B. Clark, KC5ZSU, STS-107 mission specialist, uses a computer on the aft flight deck of the Space Shuttle Columbia. (NASA photo)

space. The shuttle amateur radio experiment gave the impetus to the name of a cooperative effort of AMSAT, the ARRL, and NASA. Working from the idea that amateur radio was to be an experiment onboard the shuttle, representatives of the three organizations came together to form SAREX, which at the time stood for the acronym Shuttle Amateur Radio Experiment. While an unofficial working group, the trio would later form the SAREX working group and ultimately the ARISS working group in the runup of ham radio operation from the International Space Station (ISS). The SAREX acronym later would take on the meaning Space Amateur Radio Experiment when the ISS began to be considered as a ham radio station location and the principal place where ham radio communications with people in space would take place.

On November 28, 1983, *Columbia* launched successfully and mission STS-9 was underway. It would be a couple of days later before Garriott would be ready to operate from space. He had determined in advance which orbits would be most conducive to working North American hams, and orbit 40 was his first choice.

Positioning his antenna in the window and his radio and tape recorder in his lap, Garriott made ready for his first QSO. After hearing Collister calling even before he was ready to operate, he finally made that initial QSO. With that first contact to "WA1 Juliet X-ray November" both amateur radio and space history were made. Amateur radio had found a home in space, and to this day it continues to be an integral part of NASA's astronaut training. Currently there are about 90 present and former astronauts who are licensed hams. In charge of this part of their training is Matt Bordelon, KC5BTL, SAREX Principal Investigator at NASA.

All told, Garriott made contact with over 300 ham radio operators. Tens of thousands of other hams and SWLs heard his transmissions from *Columbia*. Before Garriott's expedition, outside of Mission Control, the only persons to ever talk to an astronaut while in space were dignitaries and heads of state. Now, Garriott proved that any ham radio operator equipped with a suitable ham radio station could talk to hams in space. Ironically, one of his ham radio contacts *did* include a head of state—King Hussein of Jordan, JY1.

In commenting on the 15th anniversary of the flight, Roy Neal, K6DUE, then Chairman of the SAREX Working Group, remembers it well: "We were given a golden opportunity by NASA. The opportunity to show the world what happens when you marry Amateur Radio and space flight. So we set out to deliver the maximum number of contacts worldwide—and Owen delivered. He talked with hams from every walk of life, from King Hussein of Jordan, to entire groups of amateurs who had gathered in England, the United States, Germany, Australia and Japan. He delivered contacts that were sparkling in their clarity and outstanding in their content. They gave us the thrill of working the ultimate DX." *(Source: <http://www.amsat.org/amsat/ftp/news/1998/ans333.txt>).*

One of the unintended consequences of the trip was the huge interest by schools in following the progress of Garriott's ride on *Columbia*. Ham radio was brought into the classroom in a big way—a concept that was not lost on the principals of the SAREX working group. As SAREX began to determine a direction, it became clear that the best venue for amateur radio in space was the classroom.

From Garriott's ham radio operation from the shuttle *Columbia*, the vision of amateur radio communications from space was born in the classroom. No one can count the number of youth who have had the opportunity to listen to and even speak with an astronaut in space. Neither can anyone quantify the number of changed lives that have resulted from this program.

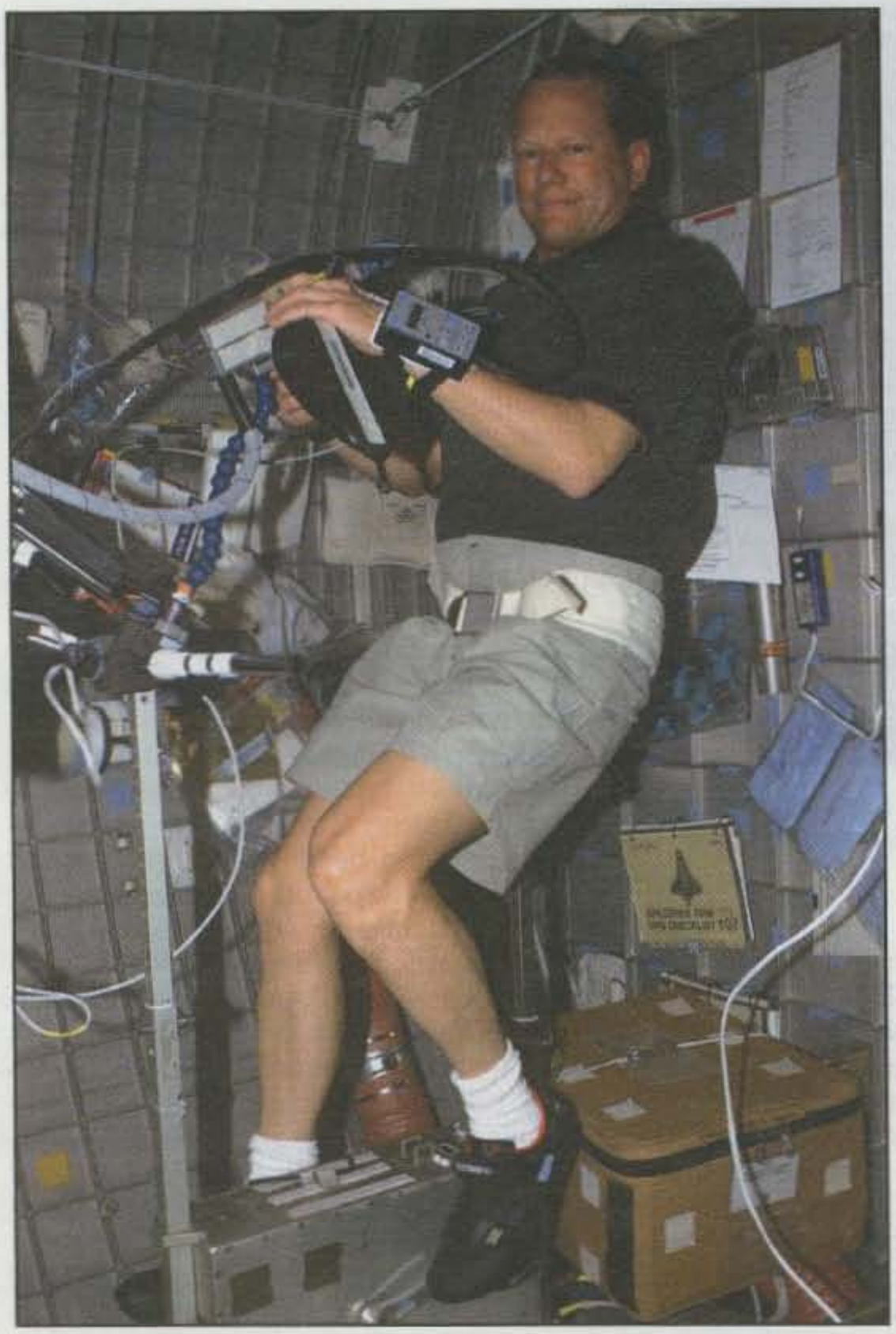
SAREX's Second Flight: It would be another year and a half before the next ham went into space. This time it was Tony England, W0ORE, the second ham to become an astronaut. He was part of STS-51F, on board *Challenger*, which launched on July 29, 1985. Also on board England's flight was John-David Bartoe, W4NYZ, who made a few contacts for Tony when he was busy with shuttle chores. Taking Garriott's ride much further, England became the first to send color television pictures back via amateur radio. Officials at NASA were so impressed with this experiment that they almost considered equipping every shuttle with ham TV. Even without permanent manifesting, however, SAREX would go on to become the most frequent flier of the shuttle program, riding on a total of 25 missions before being discontinued in favor of the ham station on board the International Space Station.

Just three months after England's flight, the first of the not previously licensed hams got his opportunity to be part of the SAREX program. Steve Nagel, N5RAW, was the pilot of his second ride in space, also on board *Challenger*, on mission STS-61A. Also on board were the first non-USA hams, Ernst Messerschmid, DG2KM, and Wubbo J. Ockeis, PE1LFO.

Nagel was among a class of hams who studied for and passed their Technician class examinations after becoming astronauts. Also included in this class was Linda Godwin, N5RAX, who would become the first woman-ham in space (on board *Atlantis*, mission STS-37, which launched on April 5, 1991 carrying the first all ham crew) and the future Mrs. Nagel.

On January 28, 1986 disaster struck the shuttle program when the *Challenger* blew up on launch, killing all on board. As a result of the accident NASA did not fly another shuttle for two years and nine months.

***Mir* Steps In:** During the time that the shuttles were not flying, *Mir*, the Russian space station, became active on ham radio. With the outside installation of a 2 meter antenna by Musa Manarov, U2MIR, *Mir* was on the air. Also on board at the time of their activation were Vladimir Titov, U1MIR (who later became licensed as KD5AOS, and Valery Polyakov, U3MIR.



David M. Brown, KC5ZTC, STS-107 mission specialist, participates in an experiment requiring the use of the bicycle ergometer in the SPACEHAB Research Double Module onboard the Columbia. *(NASA photo)*

Astronaut Kalpana Chawla, KD5ESI, STS-107 mission specialist, is shown here on the flight deck of the Earth-orbiting Columbia. *(NASA photo)*

Insofar as SAREX was concerned, it would be December 2, 1990 before another ham would operate in space. This flight, on board *Columbia*, mission STS-35, would include Ron Parise, WA4SIR, as a payload specialist and would signal the restart of the SAREX program. On the heels of that success came the all-ham SAREX flight mentioned above.

The final SAREX mission on board a shuttle took place on board *Columbia*. Designated STS-93, it launched July 23, 1999, with Eileen Collins, KD5EDS; Jeffrey Ashby; Cady Coleman, KC5ZTH; Steven Hawley; and Michel Tognini, KD5EJZ, a French astronaut, on board. Eileen was also the first woman commander of a shuttle flight.

The *Mir* also became home for U.S. astronauts, each of whom operated ham radio while on board. It was the place that ham radio in space saw two incidents of emergency communications. Jerry Linenger, KC5HBR, used amateur radio as back-up communications in the aftermath of a fire on board the *Mir,* and Mike Foale, KB5UAC, used amateur radio after a Progress rocket collided with the *Mir*. (See the sidebar for a list of U.S. hams on board *Mir*.)

On August 28, 1999, the last *Mir* crew—Jean-Pierre Haignere, FXØSTB, Viktor Afasnafyev, and Sergei Avdeyev—departed the Russian space station, thereby ending regular manned amateur radio operations from *Mir*.

In April 2000 cosmonauts Sergei Zalyotin and Alexander Kaleri, U8MIR, visited *Mir* to close down the station and switch the flight control systems away from the onboard computer. The orbiter also was raised to an operational orbit of 375 to 390 km. Amateur radio activity aboard the station was limited during that last mission. Nine months later, on March 17, 2001, *Mir* crash-landed in the Pacific Ocean.

The International Space Station: With the shuttles no longer carrying SAREX and *Mir* gone, what remained was the International Space Station (ISS). Each of the six expeditions on board the ISS has included at least one ham radio operator. Beginning October 31, 2000, William Shepherd, KD5GSL, Yuri Gidzenko, and Sergei Krikalev, U5MIR, occupied the ISS for the first time as a regular crew. To date, five other teams of three have been on board. Currently, Expedition Six includes Ken Bowersox, KD5JBP, Nikolai Budarin, and Don Pettit, KD5MDT. (See the sidebar for list of the expeditions that have been on board the ISS.)

Space Tourists on board ISS: In consideration of the need for cash for its space program, the Russian Federation developed its "space tourist" program, which would allow a tourist a ride to the ISS for a reported $20 million U.S. The first space tourist, in May 2001, was American Dennis Tito, KG6FZX, who was accompanied by Russian cosmonauts Talgat Musabayev as team commander and Yuri Baturin. Tito made a few contacts during his tenure on board the ISS.

In May 2002, South African Mark Shuttleworth, ZSRSA, accompanied by Russian cosmonaut and ISS veteran Yuri Gidzenko and European Space Agency astronaut Roberto Vittori, IZ6ERU, became the second tourist to visit the ISS. Because Mark had not had time to pass the test for licensing as a ham radio operator in South Africa, special arrangements were made to grant him a temporary license, with a special callsign. It was determined that because of his "in space" status, no number designator would be part of the callsign. The "ZS" portion of the call represents the official prefix for South Africa and the "RSA" portion of the call represents Radio South Africa. During his stay he made several random QSOs and a few prearranged school contacts.

'N Sync pop singer Lance Bass, KG4UYY, had been considered a possible candidate for a Soyuz taxi flight this month.

However, in the aftermath of the *Columbia* tragedy (and the need to keep the Soyuz taxi available for possible use by the ISS), the Russians have temporarily suspended their space tourist program.

It Ended With *Columbia*

While SAREX is no longer manifested on shuttle flights, astronauts who are licensed ham radio operators still continue to be crew. Unfortunately, out of sight has become out of mind. Such was the case with STS-107, the last mission designation for what would become the last flight of the shuttle *Columbia*. Practically no notice was given to the names of the crew. The STS-107 crew, headed by Commander Rick D. Husband, also included Pilot William C. McCool and Mission Specialists Kalpana Chawla, KD5ESI; David M. Brown, KC5ZTC; Laurel B. Clark, KC5ZSU; Michael P. Anderson; and Payload Specialist Ilan Ramon.

As the above list of the crew shows, three of the crewmembers were members of our fraternity. Each of them had become licensed after becoming astronauts, again due to the influence of ham radio on the astronaut program.

For Brown and Clark, this was their first flight. For Chawla, this was her second, having previously flown on *Columbia* on mission STS-87, which launched November 19, 1997.

While never having operated from outer space, each of these hams was involved in ham radio to some extent or another. In particular, both Chawla and Clark were very involved in promoting the SAREX and ARISS programs. Commenting in the *ARRL Letter*, ARISS International Chairman Frank Bauer, KA3HDO, stated that Bauer noted that "KC" Chawla had worked closely with the ARISS team for several years as astronaut liaison before stepping down when she began preparations for the STS-107 flight. "We will deeply miss her tremendous support, positive attitude, and heroism," he said.

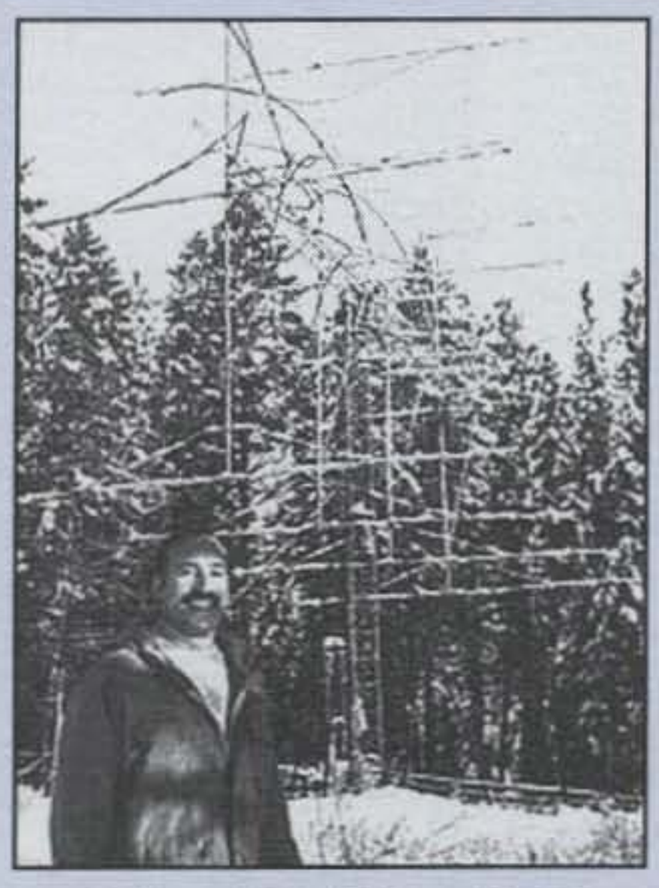
Also commenting in the *ARRL Letter*, ARISS International Secretary Rosalie White, K1STO, recalled that "KC" Chawla had sat next to her at an ARISS meeting at Johnson Space Center. "Kalpana was intelligent, quiet—a professional scientist with a genuine smile," White said. She also noted that Clark had done some "terrestrial SAREX QSOs" with students from W5RRR at Johnson Space Center. The *Columbia* mission—her first space flight—carried no amateur radio gear.

Regarding the test SAREX QSOs, Clark made the first of those in November 1999 during a 20 meter QSO with students at Pleasant Valley School in Winfield, Kansas. Operating from the Johnson Space Center Amateur Radio Club Station, W5RRR, she spoke to kids in their classroom. Making the arrangements on the Kansas end of the circuit were John Nickel, WD5EEV, and his wife, Karen, WD5EEU. The purpose of these terrestrial SAREX QSOs, according to Matt Bordelon, KC5BTL, SAREX Principal Investigator at NASA, was to give the astronauts practice with school contacts via amateur radio, and to keep ham radio visible. *(Sources: ARRL website, <http://www.arrl.org/news/stories/2003/02/03/1/?nc=1>, and ARRL Letter Online: Volume 17, Number 51/Volume 18, Number 1 (December 25, 1998/January 1, 1999), <http://www2.arrl.org/arrlletter/98/981225/>).*

Altogether, *Columbia* flew 28 times—many of them SAREX missions. It will be, however, this last mission that we will remember the most. Hopefully, we will re-

Number One Remembers

By Lance Collister, W7GJ, ex-WA1JXN



Lance Collister, WA1JXN (now W7GJ), posing in front of the EME array he used to be the first to contact Owen Garriott, W5LFL, on board the Columbia. *(W7GJ photo)*

It is hard to believe that it was 20 years ago this year! I recall that I came home from work and got on 75 meters to ask about the *Columbia* STS-9, and where I might aim my antenna to contact Dr. Owen Garriott, W5LFL. Some helpful hams told me that nobody had heard them yet, but that there was a low grazing pass in the southwest for my location around 7:40 PM that evening, and the word was that they were still hoping to find time at some point to be able to get on the air.

I asked about power recommendations, because I was uneasy about running my amp that far up the band. I was hopeful I could simply run 100 watts or so, and it seemed to me that I shouldn't need very much power, because the *Columbia* would be so close, and line-of-sight. However, I was advised that I should run as much power as I could muster, because on FM, only the strongest station would be captured. I was a bit disappointed to hear this, because the antennas and my homebrew 8877 amplifier were never meant to operate anywhere except the low end of the 2 meter band. However, I backed out the plate tuning on the 8877 as far as it would go, and managed to get 1000 watts out on the lowest calling frequency where they would be listening (144.910 MHz). Then I went upstairs for dinner.

At 7:30 PM (a convenient time in between TV programs) I came back down into the basement and began calling W5LFL on FM. Because he was only using a QRP handie-talkie, I figured he should hear me before I heard him. At least that always seemed to be the case when running 2 meter EME skeds with low-power stations. So, in similar fashion, I decided to at least get the contact going from my end before he was close enough for me to hear him. I will never forget my meteor scatter QSL from KØMQS back in the 60s; it showed a mother cat walking along the top of a fence, followed by her kittens. The caption was, "If you want to get results, you have to make calls!"

According to my logbook, I started calling him blind at 0231 UTC December 1, 1983 (7:31 PM, November 30, 1983 local time). I was happy to hear him finally come back to me ("WA1JXN in Frenchtown, Montana"), and I was especially surprised when he explained that I was the first station they contacted from space, and he had been hearing me calling while they were still out over the Pacific! Actually, I was very lucky that I started calling so early, because they were rolling the *Columbia* over as they approached the mainland, in order to aim their little window (against which the 2 meter antenna was mounted) down toward the Earth. During this maneuver, the little window pointed out to the east (toward Montana!) before it was facing directly downward. So, it was just a matter of being in the right place at the right time! My log shows the contact complete at 0238 UTC. My QSL card from NASA does not list a specific time, so I guess that will have to be the official time of contact.)

From the audiotape I eventually received from them, it was interesting to hear the effect of many thousands of hams calling them during our contact. I was certainly Q5, but there was a background noise level created by the other stations calling. At my QTH, though, he was definitely "full quieting" and his few watts pegged my S-meter!

Afterward, the phone began to ring as news services picked up the story. The two local TV stations came out to the house that evening, and I played the audiotape for them that I had made of the contact from my end. They were amazed that I could contact a space vehicle. I explained that although this was a great honor and an historic event, it actually was a *much* more difficult accomplishment to bounce weak signals off the moon and back, which was mainly what all my equipment was assembled to do. I don't think that really registered with the media, and they were happy enough with coverage about the Space Shuttle contact.

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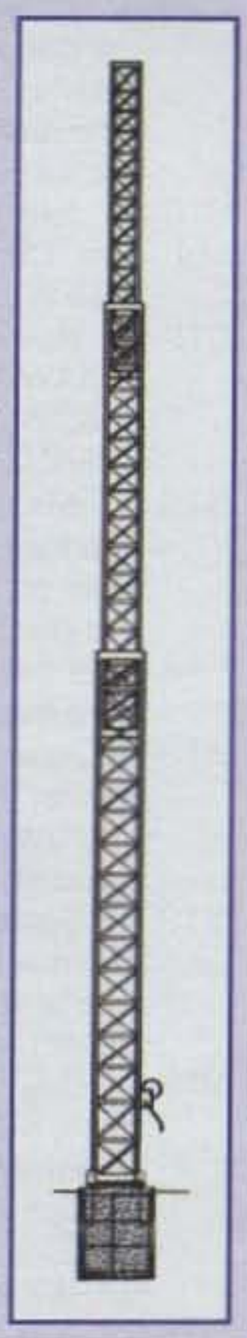

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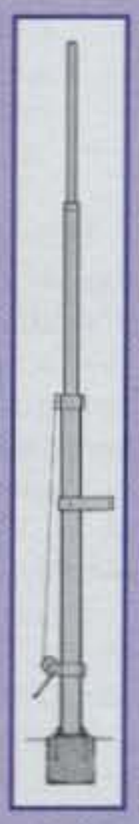

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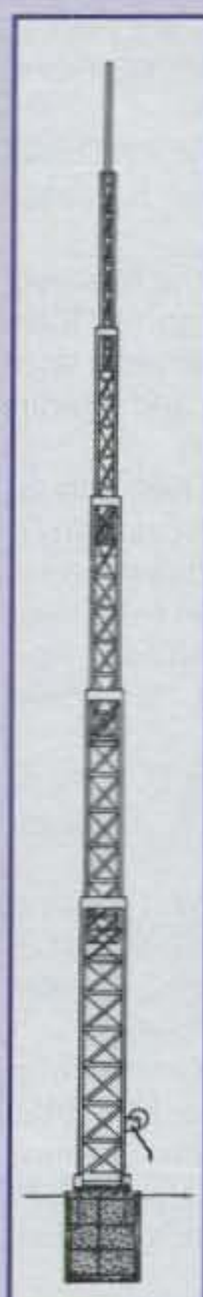

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Timeline of U.S. Manned Amateur Radio Space Operations

SAREX Flights on Board Shuttles

STS-9, November 28, 1983: Owen Garriott, W5LFL, on board *Columbia*

STS-51F, July 29, 1985: Tony England, WØORE, and John-David Bartoe, W4NYZ, on board *Challenger*

STS-61A, October 30, 1985: Steve Nagel, N5RAW, on board *Challenger*

STS-51L, January 28, 1986: Loss of *Challenger*, ending launches of shuttles for two years, nine months. SAREX put on hold until December 1990.

November 1988, Vladimir Titov, U1MIR (who later became licensed as KD5AOS); Musa Manarov, U2MIR; and Valery Polyakov, U3MIR on board Mir

STS-35, December 2, 1990: Ron Parise, WA4SIR, on board *Columbia*, first SAREX launch

STS-37, April 5, 1991: Entire crew has ham radio license—Steve Nagel, N5RAW; Ken Cameron, KB5AWP; Jay Apt, N5QWL; Linda M. Godwin, N5RAX; and Jerry Ross, N5SCW, on board *Atlantis*.

STS-45, March 24, 1992: Charles F. Bolden (who later became licensed as KE4IQB); Brian Duffy, N5WQW; Kathyrn Sullivan, N5YYV; David Leestma, N5WQC; Michael Foale, KB5UAC; Byron Lichtenberg; and Dirk D. Frimout, ON4AFD, on board *Atlantis*.

STS-50, June 25, 1992: Richard Richards, KB5SIW; Ken Bowersox, (who later became licensed as KD5JBP); Bonnie Dunbar (who later became licensed as KD5DCB); Lawrence J. DeLucas; Ellen Baker, KB5SIX; Carl Meade; and Eugene H. Trinh, on board *Endeavor*.

STS-47, September 12, 1992: Robert Gibson; Curtis Brown, Jr.; Mark C. Lee; Jan Davis; Jay Apt, N5QWL; Mae Jemison; Mamoru Mohri, 7L2NJY, on board *Endeavor*.

STS-56, April 8, 1993: Entire crew licensed—Ken Cameron, KB5AWP; Stephen S. Oswald, KB5YSR; Michael Foale, KB5UAC; Ken Cockrell, KB5UAH; and Ellen Ochoa, KB5TZZ, on board *Discovery*.

STS-55, April 26, 1993: Steve Nagel, N5RAW; Terence Henricks; Jerry L. Ross, N5SCW; Charles J. Precourt, KB5YSQ; Bernard Harris, Jr.; Ulrich Walter, DG1KIM; and Hans Wilhelm Schlegel, DG1KIH, on board *Columbia*.

STS-57, June 21, 1993: Ronald J. Grabe; Brian Duffy, N5WQW; David Low; Nancy J. Sherlock; Peter J. Wisoff; and Janice E. Voss, KC5BTK, on board *Endeavour*.

STS-58, October 18, 1993: John E. Blaha (who later became licensed as KC5TZQ); Richard A. Searfoss, KC5CKM; Margaret Rhea Seddon; William McArthur, Jr., KC5ACR; David A. Wolf (who later became licensed as KC5VPF); Shannon Lucid ; and Martin Fettman, KC5AXA, on board *Columbia*.

STS-60, February 3, 1994: Charles F. Bolden, KE4IQB; Kenneth S. Reightler Jr.; N. Jan Davis; Ronald M. Sega, KC5ETH; Franklin R. Chang-Diaz; and Sergei K. Krikalev, U5MIR, on board *Discovery*.

STS-59, April 9, 1994: Sidney M. Gutierrez; Kevin P. Chilton (who later became licensed as KC5TEU); Linda Godwin, N5RAX; Jay Apt, N5QWL; Michael Clifford; and Thomas D. Jones, on board *Endeavour*.

STS-65, July 8, 1994: Robert D. Cabana, KC5HBV; James D. Halsell; Richard J. Hieb; Carl E. Waltz; Leroy Chiao; Donald A. Thomas, KC5FVF; Chaiki Naito-Mukai, on board *Columbia*.

STS-64, September 9, 1994: Richard N. Richards, KB5SIW; L. Blaine Hammond, Jr., KC5HBS; Jerry M. Linenger, KC5HBR; Susan J. Helms (who later became licensed as KC7NHZ); Carl J. Meade; and Mark C. Lee, on board *Discovery*.

STS-63, February 3, 1995: James D. Wetherbee; Eileen Collins (who later became licensed as KD5EDS); C. Michael Foale, KB5UAC; Janice Voss, KC5BTK; Bernard A. Harris, Jr.; and Vladimir G. Titov, U1MIR (who later became licensed as KD5AOS), on board *Discovery*. No school contacts were made on this SAREX mission, but a few random contacts were made while in orbit.

STS-67, March 2, 1995: Stephen Oswald, KB5YSR; William Gregory, KC5MGA; Tamara E. Jernigan, KC5MGF; John M. Grunsfeld (who later became licensed as KC5ZTF); Wendy Lawrence, KC5KII; Ronald A. Parise, WA4SIR; and Samuel T. Durrance, PS, N3TQA, on board *Endeavour*.

STS-71, June 27, 1995: Robert L. Gibson; Charles J. Precourt, KB5YSQ; Ellen S. Baker, KB5SIX; Bonnie J. Dunbar (who later became licensed as KD5DCB); Gregory J. Harbaugh; Anatoly Yakovlevich Soloviev; Nikolai Mikhailovich Budarin, RV3FB; Norm Thagard, (who used the callsign RØMIR while on board Mir); Vladimir Dezhurov; and Gennadiy Strekalov, on board *Atlantis*.

STS-70, July 13, 1995: Terence T. Henricks; Kevin R. Kregel; Nancy Jane Currie, KC5OZX; Donald A. Thomas, KC5FVF; and Mary Ellen Weber, on board *Discovery*.

STS-74, November 12, 1995: Entire crew licensed—Ken Cameron, KB5AWP; James Donald Halsell, Jr., KC5RNI; Jerry L. Ross, N5SCW; William S. McArthur, Jr., KC5ACR; and Chris A. Hadfield, KC5RNJ/VA3OOG, on board *Atlantis*.

STS-76, March 22, 1996: Kevin P. Chilton, KC5TEU; Richard A. Searfoss, KC5CKM; Shannon Lucid (who used the callsign RØMIR while on board Mir); Linda Godwin, N5RAX; Michael R. Clifford; and Ronald M. Sega, KC5ETH, on board *Atlantis*. No school contacts made on this SAREX mission, but a few random contacts were made while in orbit.

STS-78, June 20, 1996: Terence T. Henricks; Kevin R. Kregel; Susan Helms, KC7NHZ; Richard M. Linnehan; Charles Brady, Jr., N4BQW; Jean-Jacques Favier; and Robert Brent Thirsk, VA3CSA, on board *Columbia*.

STS-79, September 16, 1996: William F. Readdy; Terrence W. Wilcutt; Thomas D. Akers; Jay Apt, N5QWL; Carl E. Walz, KC5TIE; John E. Blaha, KC5TZQ; and Shannon Lucid (who used the callsign RØMIR while on board Mir), on board *Atlantis*.

STS-94, July 1, 1997: James Halsell, KC5RNI; Susan L. Still; Janice Voss, KC5BTK; Donald Thomas, KC5FVF; Michael L. Gernhardt; Roger Crouch; and Greg Linteris, on board *Columbia*. *Note:* This mission and its entire crew replaced STS-83, which returned early because of mechanical problems and without having made any SAREX ham radio contacts.

STS-93, July 23, 1999: Eileen Collins, KD5EDS; Jeffrey Ashby; Cady Coleman, KC5ZTH; Steven Hawley; and Michel Tognini, KD5EJZ, a French astronaut, on board *Columbia*. This was the last SAREX mission on board the shuttles. The following year the ISS became activated and amateur radio activity in space continued from there.

U.S. Astronauts on Mir: All U.S. amateur radio operators on board the Mir operated the ham radio stations. In the case of Norm Thagard and Shannon Lucid, neither of whom held U.S. amateur radio licenses, they operated under the authority of the legal consideration that the Mir amateur radio station RØMIR was a club station, and any person on board the Mir could operate the club station insofar as the Russian government was concerned.

Mir-18/STS-71, March 15, 1995: Norm Thagard.

Mir-21/STS-76/STS-79, March 22, 1996: Shannon Lucid, not licensed, operated as RØMIR.

Mir-22/STS-79/STS-81, September 16, 1996: John Blaha, KC5TZQ.

Mir-22/Mir-23/STS-81/STS-83, January 12, 1997: Jerry Linenger, KC5HBR.

Mir-23/Mir-24/STS-83/STS-86, May 15, 1997: Michael Foale, KB5UAC.

Mir-24/STS-86/STS-89, September 25, 1997: David Wolf, KC5VPF.

Mir-24/Mir-25/STS-89/STS-91, January 22, 1998: Andy Thomas, KD5CHF.

Amateur Radio on board the International Space Station (ISS): To date each expedition team has had at least one of its members licensed as an amateur radio operator.

ISS Expedition One, October 31, 2000: William Shepherd, KD5GSL; Yuri Gidzenko; and Sergei Krikalev, U5MIR.

ISS Expedition Two, March 8, 2001: Yury Usachev, RW3FU, R3MIR, and UA9AD; James S. Voss; and Susan Helms, KC7NHZ.

ISS Expedition Three, August 10, 2001: Frank L. Culbertson, KD5OPQ; Vladimir Dezhurov; and Mikhail Tyurin.

ISS Expedition Four, December 5, 2001: Yuri Onufrienko; Carl E. Walz, KC5TIE; and Daniel Bursch, KD5PNU.

ISS Expedition Five, June 6, 2002: Valeri Korzun, RZ3FK; Peggy Whitson, KC5ZTD; and Sergei Teschev.

ISS Expedition Six, November 23, 2002: Ken Bowersox, KD5JBP; Nikolai Budarin; and Don Pettit, KD5MDT.

member the positive contributions of the heroes on board that last flight. Hopefully, also, these memories will serve to inspire us to do our best with our lives on this planet.

Satellite Named in Memory of Astronaut: In what is believed to be a first time a satellite has been named for an amateur radio operator, A. R. "Pop" Kumar, VU2POP, has announced that a geostationary weather satellite launched by India last September will be named Kalpana-1 in memory of Kalpana Chawla, KD5ESI.

Current Conference

Southeast VHF Society: The seventh annual SVHFS Conference will be held in Huntsville, Alabama during April 25–26, 2003. The conference location will be the Marriott Hotel, 5 Tranquility Base, Huntsville, Alabama. The room rate for conference attendees is $75/ night single or double occupancy. For reservations call the Marriott Reservations Department, toll free, at (888) 299-5174, the hotel at (256) 830-2222, or visit the hotel website at the special link set up at the Southeast VHF Society web site (http://www.svhfs.org). When making reservations, mention the Southeastern VHF Conference to get the special rate. Make your reservation by Thursday April 3, 2002 in order to qualify for the special rate. For conference registration, also use the special link set up at the SVHFS website, or contact Neal Sulmeyer, K4EA, at his callbook address or at e-mail address: <k4ea@contesting.com>.

Current Meteor Showers

The *Lyrids* meteor shower will be active during April 19–25. It is predicted to peak around 2220 UTC on 22 April. This is a north-south shower, producing at its peak around 10–15 meteors per hour, with the possibility of upwards of 90 per hour.

A minor shower is *pi-Puppids*, and its predicted peak is at around 0300 UTC on April 24. Another minor shower is the *eta-Aquarids*, and its predicted peak is at around 1130 UTC on May 6. The above information courtesy the International Meteor Organization and their website at <http://www.imo.net>.

Breaking the 3456 MHz NA DX Record 12 km at a Time

The following is from Al Ward, W5LUA:

On February 2, 2003 a high-pressure area set up over the Gulf of Mexico. As a result, we had some spectacular tropo from Texas to Florida with conditions also being good to Alabama, Georgia, and Tennessee. My best microwave DX in the morning was to W4ZRZ in EM63 in Alabama on 1296 MHz. Later that evening, I decided to place a telephone call to Ron, WA8TTM/4, who resides in EL98DP. Ron had sent me numerous emails updating me on his 10 GHz efforts. At nearly midnight I got his voice mail, which was probably better than getting one's wife at that hour. WA8TTM showed up on 2 meters some time later. WW2R and I proceeded to work Ron on 222, 432, 902, 1296, 2304, and even 3456 MHz. The distance from EM13QD to EL98DP is 1508 km, based on the 6-digit grid squares. So when I worked WA8TTM on 3456 MHz, I broke my old 3456 MHz record of 1507 km to KQ4PI. When WW2R tail-ended me and worked WA8TTM, Dave broke my record by one km, extending the North American 3456 MHz record to 1509 km! A part of me said I just gave away my 3456 MHz record! But oh well—records are made to be broken. I have had my share. We had no success on 10 GHz.

My equipment on 3456 MHz is a 5 ft. dish and 240 watts output. WW2R was running 5 watts output. I guess my 240 watts was warming up the atmosphere!

And Finally . . .

Like *CQ* magazine Editor Rich Moseson, W2VU (see his editorial in this issue), I too was fascinated with having heard Owen Garriott, W5LFL, from my mobile radio and whip installation. It's one of those moments in my hobby that I will never forget—a flashbulb moment, psychologists call it.

Astronauts Kalpana Chawla, KD5ESI (seated), and Laurel B. Clark, KC5ZSW, both STS-107 mission specialists, photographed prior to a training session in the Space Vehicle Mockup Facility at the Johnson Space Center. Chawla and Clark are seen wearing training versions of the full-pressure launch and entry suit. (NASA photo)

Many of us had a flashbulb moment on February 1, 2003, that moment none of us will ever forget. For my friends in Ft. Worth who were at the Saturday swap meet, they had more than their share of a flashbulb moment as they looked up and saw what was happening.

Elsewhere, we all were affected as we heard the news one way or another. My friend Chip Margelli, K7JA, who was at the Miami Hamfest, told me that a pall came over the entire hamfest as word spread of the tragedy.

Nevertheless, from a tragedy such as this there is a way to find hope. From Israeli Astronaut Ilan Ramon's heritage and tradition there are two thoughts, called *mishnas,* to think of as we attempt to grapple with this tragedy. First, eternity, in Ramon's tradition, is the remembrance of those who have gone on before us. Second, one does not arrive at doing greatness until one is unconscious of the greatness one has accomplished.

For us, eternity, for our fallen heroes, is accomplished by our remembering them. For them, sadly, in this life they will never know about the greatness they have achieved. However, as the *mishna* indicates, their unconsciousness of their greatness is precisely what makes them great to us.

Until next month... 73, Joe, N6CL

VHF Spring Sprints

The East Tennessee DX Association continues its sponsorship of the VHF Spring Sprints. The schedule for 2003 is as follows:

144 MHz Sprint: 7 PM to 11 PM (local time), Friday, April 4.
222 MHz Sprint: 7 PM to 11 PM (local time), Saturday, April 12.
432 MHz Sprint: 7 PM to 11 PM (local time), Saturday, April 19.
Microwave Sprint: 6 AM to 1 PM (local time), Saturday, May 3. This includes all amateur frequencies above 902 MHz (see rules for details).
50 MHz Sprint: 2300Z Saturday, May 10 to 0300Z Sunday, May 11 (*Note:* These times are UTC.).
Complete rules are at <http://www.etdxa.org>; click on the VHF link.

Please note: This information corrects and updates listings in the Winter issue of CQ VHF *magazine.*

If your local repeater is like many these days, it's very quiet most of the time. Some repeaters, though, are active all day long—with contacts being made locally, across the country, and around the world. WV5J shares a local success story that's being "repeated" in many other places.

How The Internet Can Save Your Repeater

Social Effects of Installing EchoLink

BY JOHN WOOD,* WV5J

In years past, repeaters operating in the 2 meter band were the busiest areas of amateur radio operation. Hams were always carrying on QSOs with other local hams or using the autopatch to call home or to talk with non-hams. In large cities and even small towns, repeaters were a lot of fun to use and to monitor. However, in recent times things have changed. Slowly the activity has dropped off. It seems to be a common problem in most areas, and the reasons tend to vary by locale. Some say it's because of the growing popularity of cellular phones or the internet, while others believe it's the graying or natural attrition of the amateur population.

No matter which reason is the popular one in your area, the results are the same: There has been a noticeable decrease in the activity on repeaters. What in the 1970s and '80s was a veritable flood of communications in all parts of the country has diminished to a trickle, and some repeaters in the 2 meter band are going unused for days. What was impressive growth that at one time forced the creation of a repeater sub-band on 2 meters and powered the expansion of repeaters in the 440 MHz band has petered out.

What can clubs and repeater associations do to spark renewed interest in communicating via VHF and UHF repeaters? The list can be pretty long, but before any work can be done, the process has to start with acknowledging that there is a problem and admitting, "Yes, we have noticed fewer amateurs talking on the repeaters in our area." Denial should not be an alternative here.

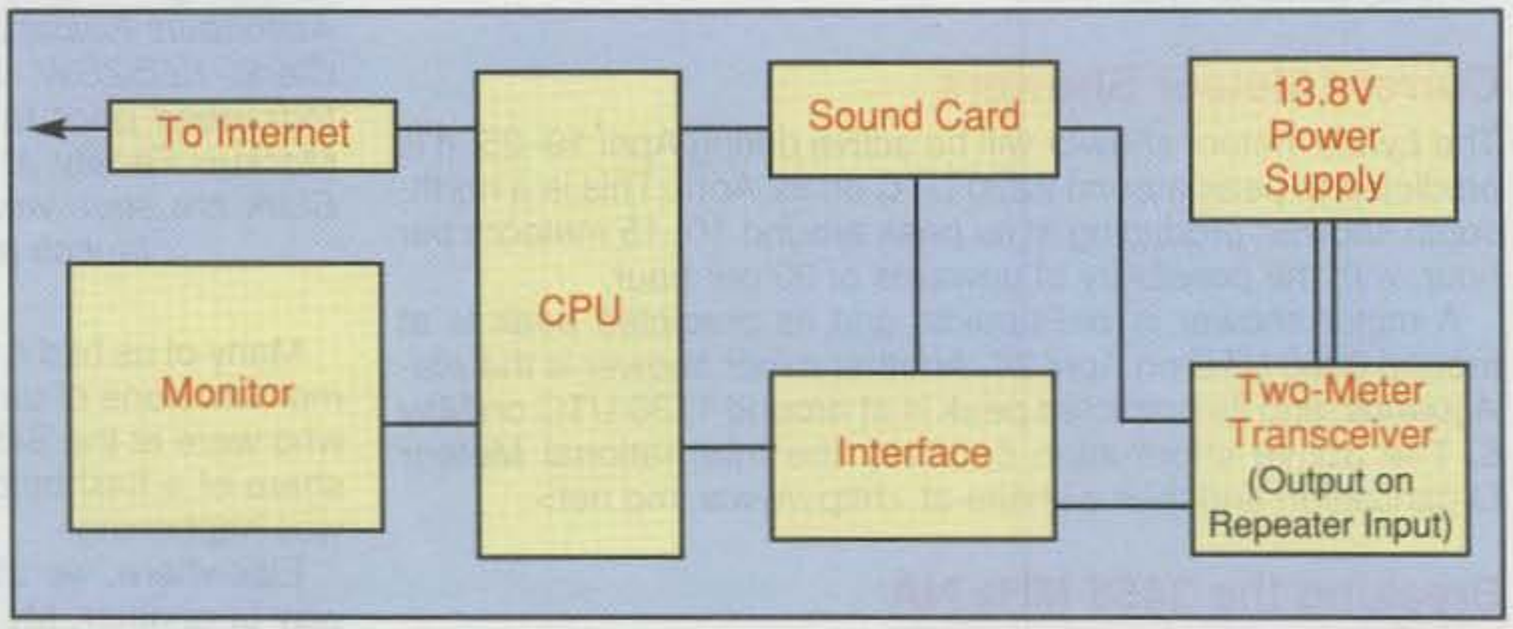

Fig. 1– Block diagram of the setup of an Echolink node station. This station does not have to be at the repeater site.

The question "Why?" follows naturally, and the answers are different and diverse. Maybe it's because the repeater was not maintained properly and intermod squeals quietly drove hams to alternative modes of communication (simplex, cellular, other repeaters, etc.). Maybe it is because the fun of listening to the repeater—or monitoring, as we call it—simply became boring.

Well, if you could pull some sort of magical rabbit out of your hat and begin hearing calls on your repeater from hams across the U.S. and from around the world, don't you think monitoring and using your repeater might just become a lot more interesting for the average amateur out there?

Well, your chance to stop thinking locally and begin thinking globally is finally here. A new version of repeater linking through the internet called EchoLink is now available for downloading from the internet. Depending on how you want to use it, you can link you and your local repeater to amateurs all over the world in real-time.[1]

Now I think I'm safe in assuming that some of you are already responding with claims of "impossible" or "too difficult to incorporate with our repeater." However, in all bluntness, you're wrong. EchoLink, by design, is easy to use either as a stand-alone station or as a system working with your local repeater. It doesn't have to be located at your repeater site and require you to make a lot of trips to make changes and adjustments. As a link station or working in conjunction with a repeater, EchoLink can be operated from someone's home, eliminating a number of

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security and maintenance issues. Yes, it takes a little work to set up and maybe a little thinking on your part, but in essence, EchoLink makes it easy enough for almost any amateur to set up and maintain.

Your journey to EchoLink Nirvana begins on the internet at <www.EchoLink.org>, where EchoLink is described as "software which allows amateur radio stations to communicate with one another over the internet using voice-over-IP (VoIP) technology. The program allows worldwide connections to be made between stations, from computer to station or from computer to computer. There are more than 37,000 registered users worldwide."

According to the website, EchoLink's author is Jonathan Taylor, K1RFD, with additional credit given to Graeme Barnes (developer of iLINK), Jutta Degener, Carsten Bormann, Chris Maunder, and Joe Wilcoxson. EchoLink is offered as freeware, runs on Windows 95 or above, and can be downloaded directly from the EchoLink.org website. Besides downloading the program, visitors to the website may also take a tour of the application, read about computer sound-card interfaces that work with EchoLink (such as the West Mountain Radio RIGblaster), and gain insight to setting up the program at home through FAQs (Frequently Asked Questions) and support information. In setting up my EchoLink computer and station for use in cooperation with the Tri-State Repeater Association, I have been a frequent visitor to the EchoLink website and have always found the answers to my questions there, no matter how technical or specific they might have been.

With EchoLink operation and installation covered elsewhere in this article, let's skip those preliminaries and go right into EchoLink's interaction with area amateurs.

EchoLink and Area Amateurs

The initial social interaction that those of us who first experimented locally with EchoLink had was negative. Some of the regulars on the repeater did not like EchoLink on "their" repeater. No matter. There was a simple solution. Since the association had acquired a number of repeaters over the years, we simply moved EchoLink from the first repeater to another repeater which had an even greater coverage area.

You may have a similar encounter when you begin to use EchoLink on your repeater, so my advice would be to have a backup plan to put EchoLink on another repeater should you encounter difficulty. Making this move is as easy as changing frequency on your EchoLink-dedicated 2 meter rig.

Now with EchoLink on a more powerful repeater, the effect on growth was amazing. Each day local hams prone to experimentation came on the air to give EchoLink a try or went to EchoLink.org on the web to download the stand-alone version to play with at home.

During the same time period growth of EchoLink internationally has been substantial, with over 800 stations logging onto the EchoLink servers every night. Stations from Portugal, Spain, Great Britain, Germany, Hawaii, Korea, you name it—any place where there are

How EchoLink Works

Without getting too technical, EchoLink is possible due to Voice over Internet Protocol (VoIP) technology. Owing its beginnings to iLINK and developer Graeme Barnes, EchoLink was created by Jonathan Taylor, K1RFD, to be an improved interface that allows anyone with a computer to be able to communicate via voice and keyboard with any other EchoLink-equipped station. This includes another computer or amateur station.

After downloading the software, a potential user is required to submit his/her amateur callsign for verification. This process checks the callsign to make sure it is valid before allowing the operator access to the EchoLink servers. Once verified, the world of EchoLink becomes available to the operator and access is granted to communicate with other verified stations who have opened the program on their computer and are consequently logged automatically onto the EchoLink servers.

The first time a station is allowed to log onto the database, it is assigned a node number. This number is part of the station's listing on the servers and is the same each time it logs on. Amateur operators, using their radios and Touchtone capabilities, may transmit the node number to an EchoLink repeater, just like they were sending tones for an autopatch. If the station is logged on to the system, EchoLink will establish a connection between the repeater and that station. It is this connection that allows the two stations, or more, to communicate.

Amateurs using only their radios to connect through EchoLink obviously cannot see a listing of stations logged onto the EchoLink servers like the home-computer users can. However, they can connect via the node numbers that they have written down or possibly requested from home users. This is the primary method used to connect to other EchoLink stations from the amateur radio side of EchoLink.

Home users of EchoLink have more options and flexibility available to connect to a station. They can do a search through the approximately 800 stations that are logged onto EchoLink at any given time for a station by its amateur callsign or node number, or just scroll through the listing and double click their mouse on the station with which they wish to connect.

The EchoLink screen provides a variety of necessary information, but primarily shows the operator a list by callsign of all the stations that are using the system and are logged onto the EchoLink servers. It also shows whether those stations are busy or available, along with when the stations logged on, and if they have logged off, at what time they did so.

Pull-down menus at the top are headed File, Edit, Station, Tools, View, and Help. The File menu lists Print options and program Exit choice, while Edit provides the typical Undo, Cut, Copy, and Paste options for highlighted stations. Under Station are options for Transmit (to a connected station) Connect and Reconnect, Disconnect, a request for station information, a station Find option, and a choice to Refresh the List of stations shown. The Tools menu lists options for Alarms to sound should a station become available on EchoLink, List Me as Busy option, Disable Link option, control windows for Setup, Preferences and Sysop settings, and Adjust Volume, which brings up the sound-card volume controls. The View menu gives you control over showing the Tool Bar and (station) Status Bar, an option to shift to a Larger Font on the display, and options for information on Connection Statistics, Station Summary, and reviewing your transmitted Server Message. The Help menu provides assistance for Contents, Search, Index, access to the EchoLink website, Help on the Web, and the usual information such as version number, author, and copyright under About EchoLink.

Once the freeware program has been downloaded from the EchoLink website, at the prompt the user must answer whether or not the program will be used as a Link station (stand alone) or a Repeater station. Choosing the repeater option instructs EchoLink to install the program with the Sysop options.

To work in conjunction with a repeater, EchoLink requires an interface. A good example is the RIGblaster sound-card interface sold by West Mountain Radio. This allows the signals that originate from the amateur station and are rebroadcast through the repeater to be sent over the internet to the connected station or stations. The interface also takes the audio coming from the internet side and going through EchoLink to be transmitted through a 2 meter radio and into the local amateur repeater.

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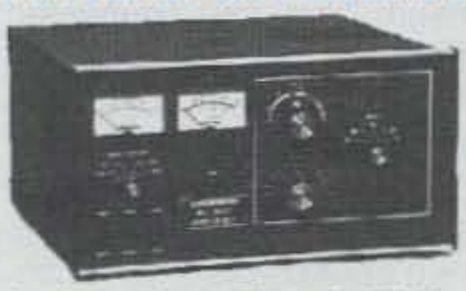

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Suggested Retail

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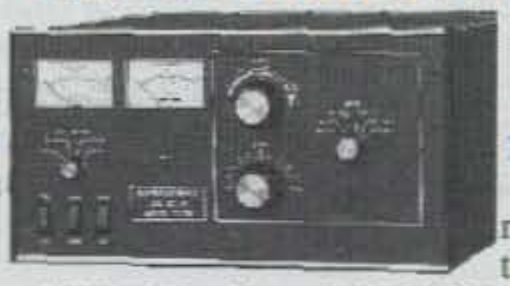
with Eimac® 3CX1200A7 tube



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with 2 graphite plate Amperex® 3-500ZG tubes

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Connecting EchoLink To Your Repeater

Interfacing your repeater to EchoLink is a fun project that requires the use of interconnecting basic building blocks such as a soundcard interface, a computer dedicated to EchoLink, and a 2 meter rig. This means that hams who might not be all that great at soldering capacitors and resistors can relax and enjoy putting together the components that make up an EchoLink station.

One of the biggest questions I had about putting together an EchoLink station was whether I could keep it at home or whether it would have to be located at the repeater site. You see, we have no mountains in the Memphis area, so we have to use manmade mountains (otherwise known as tall buildings) as repeater sites. Security and maintenance are problems we face with every installation, and if I could keep my EchoLink unit at home, those problems would be eliminated. Thus, the answer to my most pressing question was "yes," I could keep my EchoLink station at home.

Personally, I think it works better at home, especially when it comes to the stage in the installation process where you are performing final tweaks on the in and out audio levels. I can't imagine having to drive down to the repeater site, pass through security, and take that long elevator ride to the top floor every time I needed to make a slight adjustment to the rig or computer audio levels. Having the computer and 2 meter rig at home also means it is relatively secure, and we know where the electrical power is coming from, along with the internet access. We obviously don't have total control, but we have as much control as possible over the operation of the EchoLink unit, which includes being able to turn it off and on at our convenience. After all, there are times when the repeater is being used for another purpose, such as providing communication for a marathon or other public event when EchoLink connections could hamper or distract repeater users. By having the unit at home, we can turn it off whenever necessary without having to utilize the remote-control capabilities that are built into the software.

Construction

As stated, the EchoLink repeater station is made up of a basic computer (mine runs just fine on an old 166 MHz CPU using 32 MB of RAM) equipped with a sound card and running Windows 95 or better, some sort of internet access (mine uses broadband service), and a dependable 2 meter rig and its appropriate power supply. My station uses a Yaesu 1500M 2 meter FM transceiver running on the lowest power setting available and an Alinco DM-330MV power supply. All of the components I just listed have been running almost continuously for the past four months, so I would have to give them all high marks in the dependability rating category.

The connections are simple and straightforward. The interface I am using is a RIGblaster No Mic, which is connected via a supplied serial cable to the serial port on the computer. The interface is also connected to the microphone jack of the Yaesu through a special cable that was provided by West Mountain Radio at my request at the time I purchased the interface at the 2002 Huntsville Hamfest.

Audio out from the Yaesu is connected directly to the audio in of the sound card through a three-conductor (stereo) jumper, which is also supplied by West Mountain Radio. The audio out from the sound card goes to the audio in of the interface through the use of another three-conductor jumper.

As stated earlier, an internet connection is required. My computer is connected to the internet via my home Ethernet network and Roadrunner, but if a dial-up service is all you have available, it can be pressed into service successfully. We had another EchoLink station operated by my ham buddy Randy Wilder, WB4LHD, using dial-up, but the problems that popped up due to limited bandwidth become annoying and obvious, and he eventually switched over to broadband service and is much happier for the change. The bottom line is that dial-up service may be used, but broadband services do work better with EchoLink.

Initial Operation

Once all the connections have been made and the "gozintas" and "gozoutas" are secure, you are ready to switch on the computer, the power supply, and the 2 meter rig, which has been (I hope by this time) connected to a compatible antenna that enables two-way communication with your intended repeater. If you happen to have a second computer nearby that is connected to the internet and has the EchoLink software booted, you can use it to check your audio levels and other settings. If not, the best bet is to go to the Tools menu on the EchoLink program and adjust your levels to where mine are set and use these as starting points. Under playback, Volume and Wave are all the way up and all other settings are muted. Under Recording, only Line In is selected and it is set to full. Set your 2 meter rig's volume control to a moderate level (Mine is set at one-third of a full turn). These settings should provide you with a starting point where you can hear audio from the stations from the internet side and the amateur radio side going through EchoLink, which will allow you to make final adjustments as you listen.

Under the Tools menu is a Setup choice which provides for four Timing options and two Audio selections. Through experience, I found it was best to leave these at the default settings at first, then later make adjustments while the EchoLink software was being tested with the help of two volunteer stations. This same advice applies to the settings to be found under Preferences and Sysop. For your guidance under Sysop Settings, RX Control should be set to VOX, while under TX Control DTR should be selected under PTT Activation. The serial-port selection is as assigned by your computer. I was able to settle on using COM2, but you'll have to figure out what works best for you and your computer.

Troubleshooting

It's impossible for me to predict what, if any, problems you may encounter once you set up your first EchoLink station, but the FAQs and the Troubleshooting section of the EchoLink website can be a lot of help when you find yourself needing direction. I personally can attest to this. I personally can also admit that we had a number of tweakings that had to be made before EchoLink settled down to normal, dependable operation.

One tip I can give you is to disconnect from the sound card any local microphone and speakers you might have had connected when you were using the computer as a stand-alone EchoLink station. Instead, you should have a couple of HTs around so you can monitor the input and output of your repeater, because listening to these frequencies also empowers you to hear the input and output of your EchoLink station. This eventually helped me a great deal, because we had a problem pop up that we would have never anticipated when we first put our EchoLink station on the air.

We have our EchoLink computer and rig adjusted to complement the operation of our local 146.88 MHz repeater. But unknown to me, I had a scanner connected to a nearby computer which generated a low-power, local interfering signal right on the repeater input of 146.28 MHz. I couldn't hear it, but the computer could, and it was causing EchoLink to go into a transmit lock. Only by listening to an HT on the repeater input frequency was I able to track down the offending signal.

I'm sure you'll find your own little problems and quirks in the setup and adjustment processes en route to EchoLink success, so be ready for them and handle them the best you can utilizing logic and the EchoLink.org website. You will get through, you will survive to see EchoLink functioning as advertised, and you will be able to enjoy listening to all of the area hams discover that their local repeater is now a global machine that has the capability of connecting with any other similarly equipped amateur station anywhere in the world.

hams and internet access, the word spread and communication use via EchoLink grew and has continued to grow, especially in the United States.

Locally, those who seem to embrace the technology are the younger or newer hams and the ones who like to experiment with computers and the accompanying technology. Those hams who have a specific need for what EchoLink provides seem to be the most enthusiastic. Our motivation, among others, was to provide a link so we could talk daily to a ham who lives around 500 miles from Memphis in Dayton, Ohio. John Grody, WB8TEK, and his wife Cathy have been great friends to me and other hams in our area for a long time, especially during our annual trips to the Dayton Hamvention®. However, at that range it was hard to talk to them via HF except maybe on 40 meters during the day when we were usually at work and too busy earning a living to take time to talk on ham radio.

Over the years we've tried everything—including 40 meters, 80 meters, 10 meters, and even packet radio—but nothing has fit the role quite like EchoLink. Now when we hear WB8TEK connect to our repeater, we tend to think of him as a local ham and not one who is 500 miles and a time zone away. Obviously, even though EchoLink ran into a measure of opposition at first, in the last few months it has been warmly embraced by the majority of hams in the Memphis area, mostly by those who understand its capabilities for today and its potential for tomorrow.

Speaking of the future, among a number of possibilities where EchoLink could be most beneficial is one which was suggested by a former Memphis ham who is now living in the Washington, D.C. area and working for a government agency that is responsible for responding to localized and wide-area disasters. What better way to get an accurate assessment of, say, a storm's damage in just a few minutes than to communicate through EchoLink and get a report from the scene from a trained storm spotter such as a radio amateur?

Limitless Potential

As you can see, the potential of EchoLink is practically without limits. If you think about it, EchoLink and similar systems are really what has been missing in repeaters for all these years. Amateur frequencies have always provided flexibility and mixed capabilities. There was nearly always a frequency available for either local or long-distance communications. VHF repeaters, by frequency and design, have always had a range limitation. Now, with EchoLink, that restriction has been removed and amateurs can use their familiar, nearby repeater to talk around the world, a capability they've never had before!

It will take some time, of course, for amateurs to see what EchoLink can do and what they need to know to make it work for them. With all the communications advantages offered by EchoLink, and with how simple it is to operate, I don't see it taking too long for most amateurs to get up to speed on the system and start taking off in different directions to explore the full capabilities of this new and innovative communications tool. The only limits are the physical resources of the internet and the imagination of all amateur radio operators. Let us begin the voyage of discovery!

Notes

1. Echolink is an outgrowth of iLink and is one of two currently popular systems for linking repeaters via the internet, the other being IRLP, the Internet Repeater Linking Project. Yaesu also has its proprietary WIRES system. Publication of this article on Echolink should not suggest an endorsement or preference by *CQ* of one system over another. ■

Newly declassified documents astound communications experts!

The Use of Pringles™ Containers To Enhance Network Security

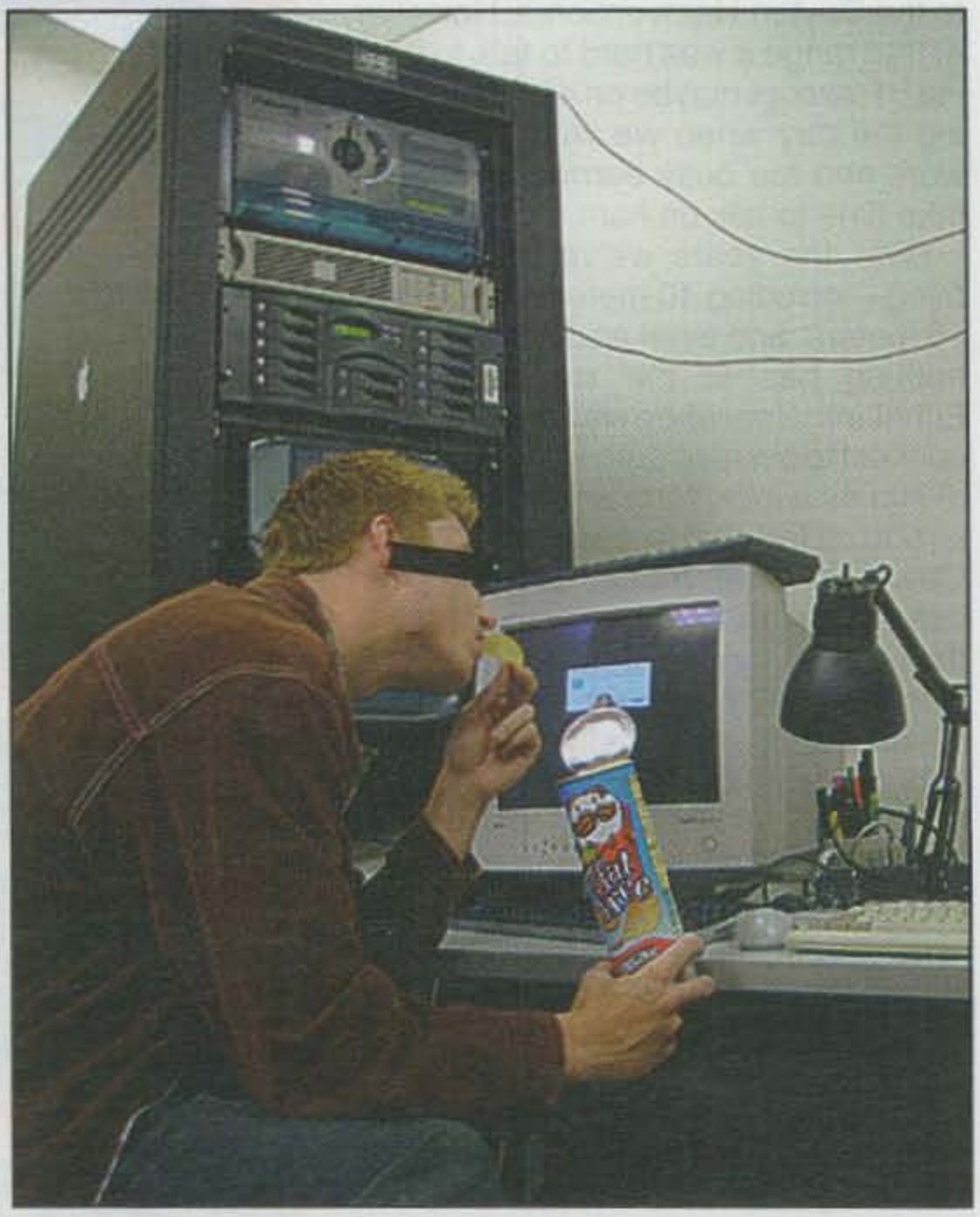
BY PROFESSOR EMIL HEISSELUFT*
Lauton Institute, Grossmaul-an der Donau, Austria
e-mail: <heisseluft.emil@mashuga.orf.ar>

It isn't often that we are able to pry open the lid of secrecy on esoteric communications-related equipment used by the intelligence community. But in this startling article, based on documents that were classified for almost 35 years, Professor Heisseluft reveals how a partnership involving a U.S. intelligence agency, Proctor and Gamble, and the Lauton Institute produced a unique cavity resonator in the late 1960s that is used today, for example, to sniff out holes in wireless network security. —W2VU**

Dear friends, it is not often that one is able to part the veil on technologies so revolutionary that they are classified to prevent disclosure. While I, as a graduate student at the Lauton Institute studying under the direction of Dr. Jerzy Ostermond-Tor (ex-YM4XR),[1] worked on the project I will reveal below, I have been unable, because of your country's secrecy laws, even to talk about it to this day. Now, however, through the normal process of classification downgrading and eventual declassification, I can tell you my story...a story so astounding that most of you will find it totally unbelievable.

In the mid-1960s, with use of the UHF (300–3000 MHz) and SHF (3–30 GHz) bands accelerating rapidly, one of your intelligence agencies headquartered in northern Virginia sent an agent to the Lauton Institute to ask for our assistance in developing a cavity resonator that could be used as an antenna for receiver systems operating in the low gigahertz region of the radio spectrum. The requirements were that the antenna had to be relatively inexpensive to build and that a nontechnical person could rapidly fabricate one from components available worldwide.

About the same time, Proctor & Gamble (P&G), your large consumer products corporation, came to the Lauton Institute for help in developing a potato chip that was characterized by having the same, uniform shape and size, piece after piece after piece. Many in the American public and others around the world had become dissatisfied with the uneven shape and size of the chips they found in bags, and they were looking for something better. It took almost ten years to develop a manufacturing process that used dried potato flakes, but in 1967 P&G, with the assistance of the Lauton Institute, was ready to introduce its new product—Pringles.[2] There was only one hitch: How should the new chips be packaged, not only to ensure that they were not damaged in shipment, but also so that they stayed dry until the package was opened?



A technician at a classified site in northern Virginia begins the difficult task of preparing a Pringles canister for conversion to a cavity resonator.

** Professor Heisseluft currently is vacationing in the South Pacific following his successful work on the redesign of Pringles so that the chips do not become airborne during the high-speed manufacturing process used by P&G. Mail conveniently may be sent to the professor c/o CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801*

*** For other antennas built using Pringles Potato Chip and Nalley Beef Stew containers, see: <http://www.turnpoint.net/wireless/index.html>.*

It was then that I saw the answer to both the intelligence agency's and P&G's problem: Create a canister with an inside diameter slightly larger than a Pringles chip *that used an aluminum lining to provide both the vapor barrier needed to protect the potato chips and the requisite conductor for a cavity resonator*. The only requirement for the height of the canister was that it had to be high enough to contain a good helping of chips *and* a multiple of half wavelengths at frequency of choice. To see why this is so, consider the physics of a cavity resonator.

Cavity Resonators

Cavity resonators are nothing more than a section of a waveguide. They are used at frequencies where wavelengths are on the order of centimeters. The frequency at which a cavity is resonant depends on the dimensions of the waveguide and the mode of oscillation. As seen in fig. 1, and for the lowest mode, the resonant wavelength for a cylinder is 2.61 times the radius of the cavity. When the height is less than one wavelength, the resonant wavelength is independent of the cylinder's height. For all other modes, the height must be a multiple of half wavelengths. *(Readers interested in learning more about cavity resonators are referred to the* The ARRL Handbook.[3]*—ed.)*

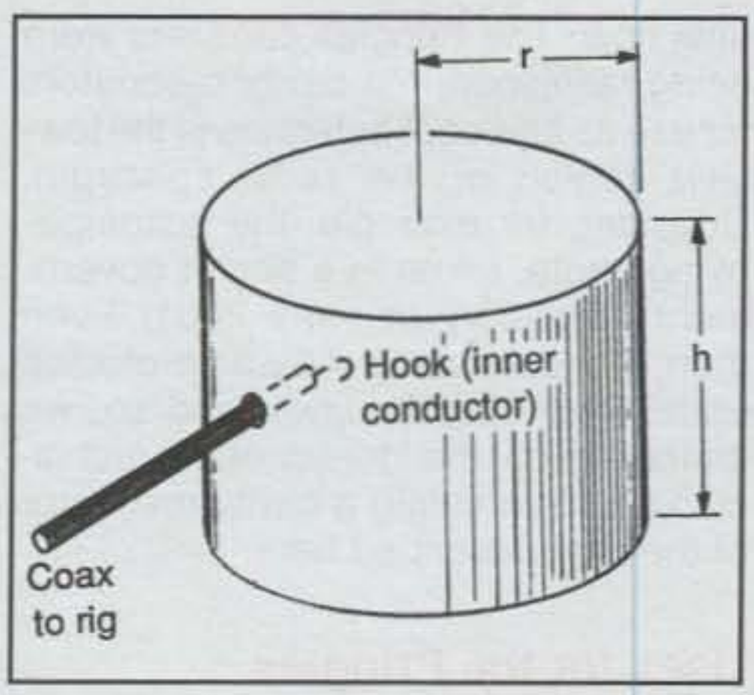


Fig. 1–For a cavity resonator, the wavelength is given by $\lambda = 2.61 \times r$ (lowest mode); h must be a multiple of half wavelengths at the resonant frequency.

To ensure that a Pringles container could also be used as a cavity resonator in the low gigahertz region of the spectrum, where intelligence and military operations were planned at that time, the Lauton Institute team, under my direction, selected 3 GHz as a nominal resonant frequency. Further, because we were told that Pringles potato chips are roughly elliptical, measuring 4 cm (minor axis) by 6 cm (major axis), I fixed the inside dimension of the aluminized container at a diameter of 7.5 cm.

To see why I selected this diameter, consider the following calculations:

$$\lambda = 2.61 \times r$$
$$= 2.61 \times (7.5/2)$$
$$\cong 10 \text{ cm (9.8 cm, to be exact)}$$

The corresponding resonant frequency, as planned, is roughly 3 GHz.

P&G also told us that they intended to pack roughly 105 chips in each container (7 servings, 15 chips per serving). For the number of chips specified, and for a multiple of half wavelengths, this would suggest a container height of roughly 20 cm.

In reviewing the suggested dimensions with P&G personnel, they insisted that additional room be provided at the top to accommodate variations in chip thickness and in the actual number of chips placed in any given container; the additional height also was desired to accommodate future changes that P&G might make in these two parameters. We finally settled on a height of 22.5 cm, which while slightly higher than I wanted, did not compromise the use

of the container as a cavity resonator for frequencies around 3 GHz. (Those seeking the absolute best performance certainly can saw off the end of the container, bringing its length into conformance with the desired measurement.) The final dimensions of the container (7.5 cm diameter, 22.5 cm height) are still used today.

When used as a cavity resonator, we determined that nothing more than a small hole need be punched in the side of the can at the point where the most intense part of the electric field would be found. We then inserted a small "hook" (coupling device) fashioned from the inner conductor of a piece of coaxial cable into the can. By turning the coax, we could vary the orientation of the coupling device and in so doing, the signal level produced in the coaxial cable.

The results of this research were classified at the highest levels of the intelligence agency involved. Also, despite frequent inquiries into why the U.S. intelligence agencies, the U.S. military, and other government activities appeared to be such great consumers of Pringles over the years, often receiving tractor-trailer loads of the product on a weekly basis, the reason for this apparent compulsion on the part of the personnel involved could not be revealed until now: The Pringles canisters were being fashioned into cavity resonators for use as intercept antennas in the low-GHz region of the radio spectrum. Consider, for example, the accompanying photo, taken in a secret government laboratory in early 2001. Even then, the technology still was protected under your security laws, and so, we cannot reveal the identity of the technician shown creating a cavity resonator of the type described here.

Uses for the Pringles Cavity Resonator

As noted above, cavity resonators produced using Pringles canisters have been used as intercept antennas by your country's intelligence agencies and military services for the past 35 years. Even today, according to the IEEE,[4] U.S. agents are using Pringles cavity resonators for "...sniffing out holes in wireless network security...."

The uses of this technology are, of course, only limited by the imaginations of users. Now that the Pringles cavity resonator has been declassified, radio amateurs worldwide can begin experimenting with this device in the low gigahertz region of the spectrum. Of importance, too, at higher frequencies they will find that metalized, frozen orange juice containers are required.

Notes

1. The claims of former U.S. Vice President Gore notwithstanding, it is Dr. Ostermond-Tor who is recognized universally as the Father of the Internet. In his seminal article "Special Subscriber Service: The Telephone Company's Answer to Amateur Radio" (*CQ*, April 1967, pp. 24–26), Professor Ostermond-Tor presented the essential elements for what we know today as the internet. Basically, the article described a future system in which telephones replaced transmitters, receivers, and antennas; licenses would no longer be required; and there would be no more QRM or frequency problems.

2. The name Pringles came from a street named Pringle Drive in Cincinnati. According to a spokeswoman for P&G, the name is cheerful, is a bit nostalgic, and sounds good when used with the words "potato" and "Proctor & Gamble."

3. *The Radio Amateur's Handbook*, 30th Edition, American Radio Relay League, 1953, pp. 425–426.

4. News Analysis, BRIEF, "Snacktech," IEEE SPECTRUM, November 2002, p. 16. ■

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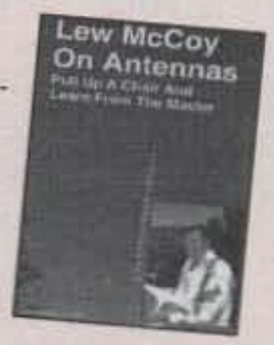

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BY DEAN F. POETH II,* K8TM

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SMDs can be easier to replace than through-hole components on multilayer boards. This is because it is very difficult to heat the long hole on a multilayer board, but much easier to heat just the pad and component terminal of an SMD on the surface of a board.

**218 Gower Rd., Glenville, NY 12302*
e-mail: <dpoeth@worldnet.att.net>

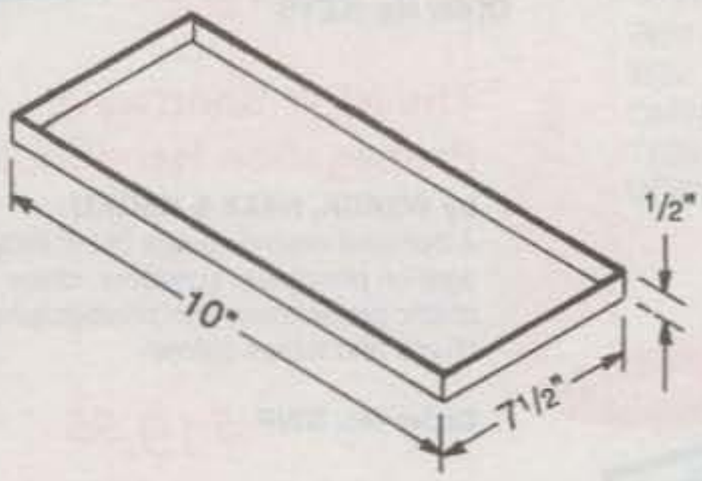


Fig. 1– SMD work tray. Line the inside with several layers of bright-white copy paper. Glue all edges and corners so components cannot slip underneath. Base material is the back of a 8 1/2" × 11" writing tablet.

This article is for those amateurs who would like to experiment with SMDs, yet do not have access to professional SMD rework stations, solder pastes, hot air jets, and illuminated magnifiers. SMDs can be challenging to solder, so it is best to learn general soldering skills on larger components before attempting to work with SMDs.

The methods presented here are not the only ones available. SMD components can be worked with in many different ways (just like through-hole components). The goal of this article is just to give a quick introduction to several methods that the amateur and professional can use to successfully work with this technology.

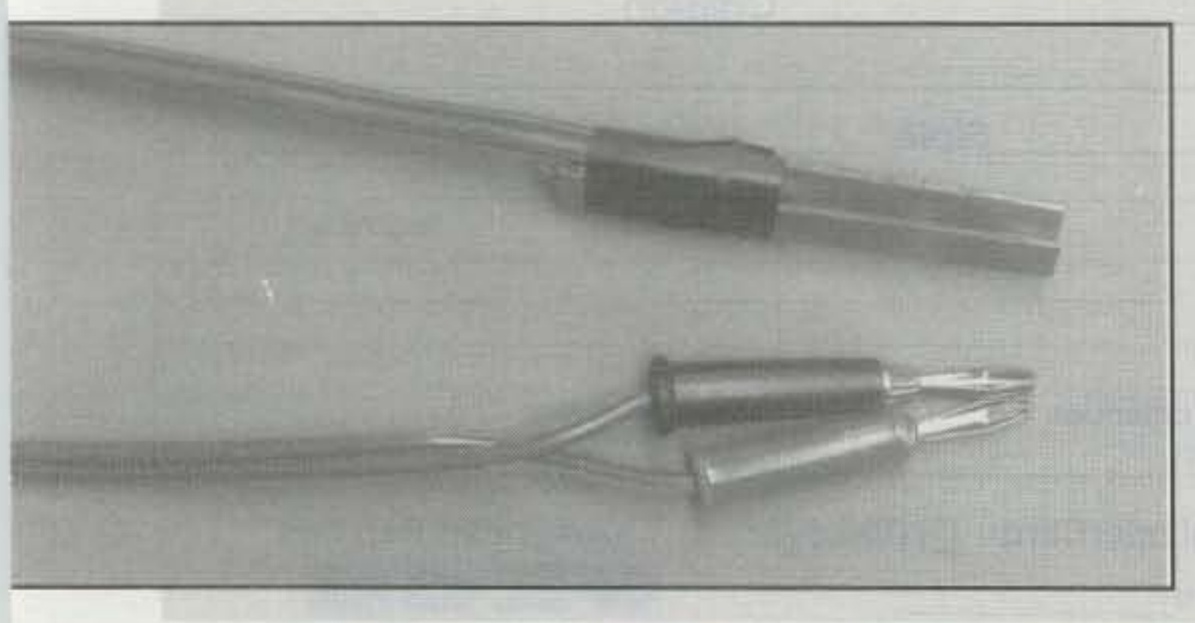
If you know a few tricks, working with SMDs can be fun!

Tools and Equipment

The tools and equipment you will need are shown in the sidebar. Self-locking tweezers cost only a few dollars (available from S. LaRose Inc., 1-888-752-7673, <www.slarose.com>) and work much better than regular tweezers. Select a low-wattage (15 or 25 watt) or temperature-controlled (600° F) pencil soldering iron with a pointed tip.

Tools and Equipment

- Safety goggles
- Self-locking tweezers
- 600° F or low-wattage soldering pencil with a sharply pointed tip
- Small-diameter solder 63/37 (eutectic)
- RMA solder paste
- Desoldering braid
- Plastic scouring pads
- Duco™ cement
- Toothpicks
- Small fan (to gently blow fumes away from face)
- Heat gun
- Magnet
- Flexible-neck lamp with 100 watt frosted bulb
- 4X watchmaker's loupe or magnifying glass



The test tweezers are made from two pieces of printed-circuit-board material separated by a small hardwood block.

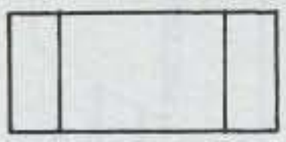
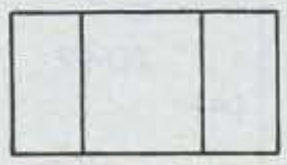
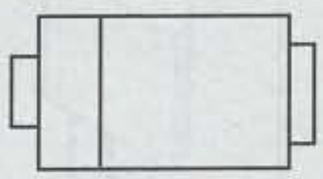
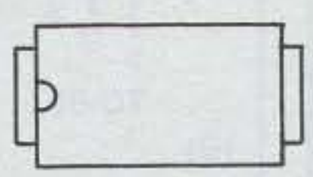
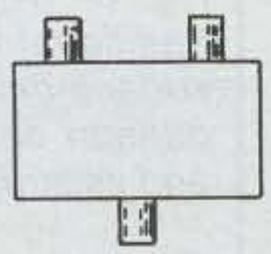
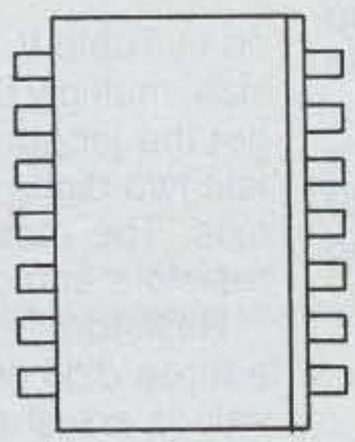
COMPONENT	SHAPE	MARKINGS
Chip resistor		Labeled with value (see Table 3)
Chip capacitor		Not marked
Polarized capacitor		Plus end marked with band, value marked
Diode		Cathode end marked with notch or band
SOT (Small Outline Transistor)		May be unmarked or marked with house numbers
SOIC (Small Outline Integrated Circuit)		May be marked, unmarked, or house numbered. Pin one marked with beveled side, dot, band, or notch.

Table I– Shape and markings of some common SMDs.

To clean the circuit board before soldering you will need a nonconductive abrasive pad. Don't use steel wool or a steel-wool scouring pad, since they may leave small (almost microscopic) steel wires behind. A strong magnet is useful for finding dropped components. You will also need a 4X watchmakers loupe or magnifying glass. Use this to read the component markings on chip resistors and electrolytic capacitors.

The Work Area

SMDs are very small, so the first thing to do is to make them "look" bigger. The trick is to illuminate the work surface with a *very* bright light. To illustrate this effect, take some difficult-to-read fine print (like on the back of a credit-card application) and try reading it in a dimly lit room, and then try reading it a few inches from a bright desk lamp. The difference is dramatic.

A swing-arm desk lamp with a 100 watt frosted bulb positioned close to the work surface works very well. The lamp should be adjustable from 6 to 24 inches above the desktop. Regular room lighting or shop lights just are not bright enough. It is also helpful to set up the lamp so it can be swung over the edge of the desk and illuminate the floor. This helps with finding dropped components.

The second trick is to work on an absolutely clean, bright-white surface. The SMD work tray shown in fig. 1 works very well. The white paper gives contrast to the components, and the small sides help prevent the SMDs from getting lost.

To build the SMD work tray, start by removing the cardboard back from an $8\frac{1}{2}" \times 11"$ writing tablet. On one side, glue two sheets of bright-white copy paper using rubber cement. Two sheets are necessary because the paper is not completely opaque. When the glue has

Case Size	Component Length	Component Width
0603	0.063	0.030
0805	0.080	0.050
1206*	0.126	0.063
2010	0.200	0.100
2512	0.250	0.125

** The most common size for SMD resistors and chip capacitors*

Table II– Common SMD case sizes.

Resistor Marking	Resistor Value (ohms)
105	1 meg
820	82
272	2.7K
104	100K

Table III– Typical resistor markings and corresponding values.

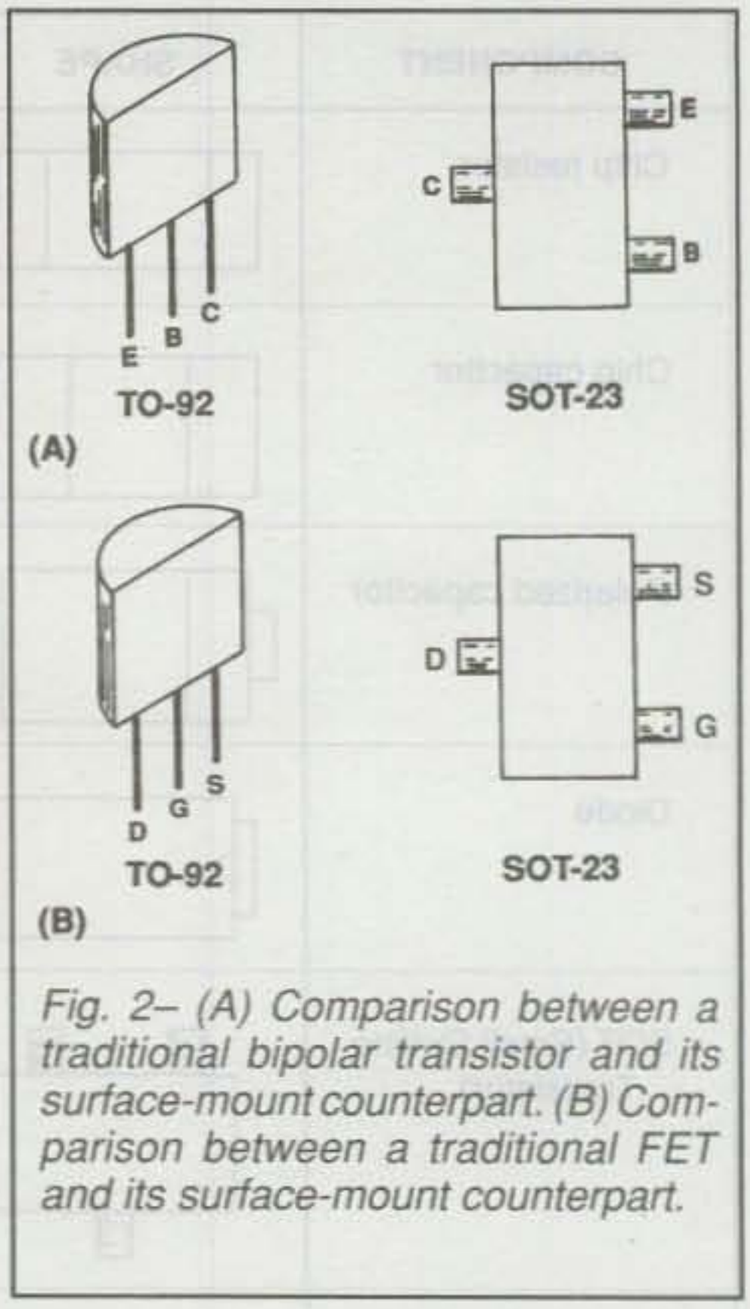


Fig. 2– (A) Comparison between a traditional bipolar transistor and its surface-mount counterpart. (B) Comparison between a traditional FET and its surface-mount counterpart.

dried, flip it over and draw a box 1/2 inch in from all four sides. Bend the cardboard at the lines, forming a 7 1/2" × 10" tray. Fold up each corner. Glue the corners together using white glue. Clamp each corner using a clothespin until the glue dries.

You will be amazed how much of a difference just a bright light and white work surface will make when working with these components.

SMD Safety Precautions

Surface-mount components are very small, and therefore special precautions (in addition to those required when working with through-hole components) must be taken.

- Do not eat or drink when working with surface-mount components.
- Do not use cups, plates, or any food-related items to hold or store surface mount components.
- Keep surface-mount components away from children and pets.
- Wear safety goggles.
- Work away from the edge of a desk or workbench to ensure that components will not fall on the floor.
- Keep a strong light and magnet available to search for components that have dropped on the floor

Identifying SMDs

The general shapes of some common SMDs are shown in Table I. Note that many components (such as chip capacitors) are not routinely labeled. This is why the test tweezers (described below) are so useful. Typical case sizes for chip resistors and capacitors are listed in Table II. To find the approximate size, multiply the first two digits by 10 to get the length in mils, and multiply the last two digits by 10 to get the width in mils. The most common size for chip resistors and chip capacitors is 1206.

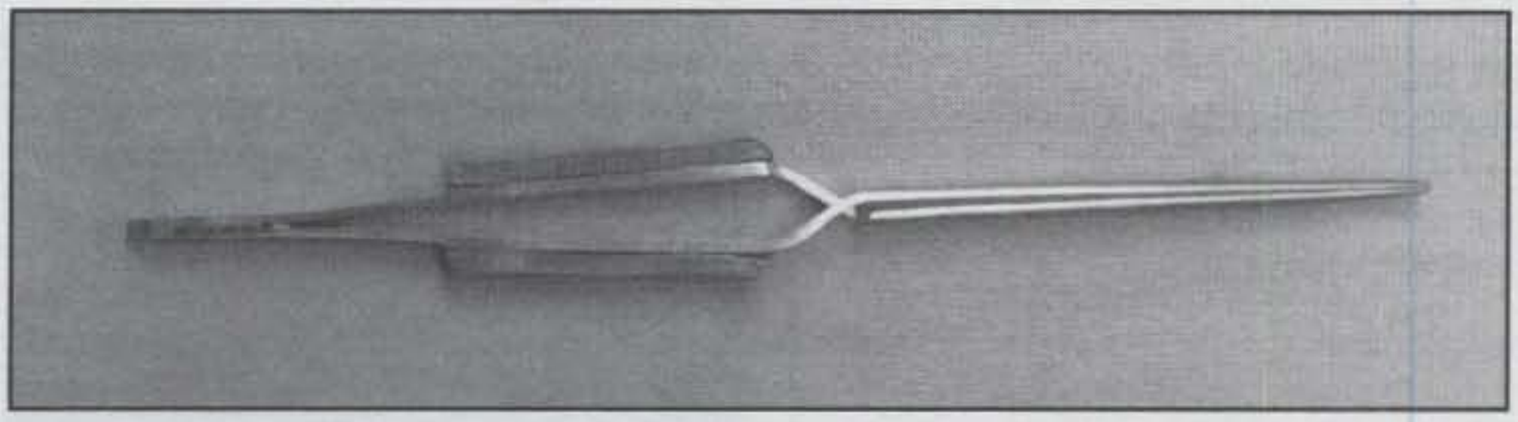
Resistors frequently are marked with a three-digit number, and some typical values are shown in Table III. The first two numbers are the significant digits of the value, and the last digit is the multiplier (the number of zeros to add to the first two digits). For example, a chip resistor labeled 102 has a value of 1000 ohms, or 1K ohms.

SMD transistors are shown in fig. 2(A) and (B) and are compared to the common T0-92 transistor case style. Notice that the leads for the SOT-23 are totally different than for the TO-92.

Testing and Measuring SMDs

Testing SMDs or measuring their values can be a challenge if you use regular test probes. The components will tend to flip or spin out of the probe tips when you apply pressure, which can be very frustrating.

A better way is to make the test tweezers shown in fig. 3(A) and (B). These tweezers grip the component using the copper foil on printed-circuit-board material, which is connected to the input of an autoranging ohmmeter or capacitance meter. The Craftsman autoranging multimeter model 82040 (about $20) works well for this job.



Self-locking tweezers are much easier to use than the non-locking variety when working with surface-mount components.

The tweezers are an easy one-evening project. Start by cutting out two strips of circuit-board material and a small wood spacer. I used oak for the spacer, but any hardwood should work. Polish the PC board's copper foil using a nonconductive abrasive pad until it is shiny. Next, glue the circuit-board pieces to the spacer (foil side in) using five-minute epoxy. When the epoxy has fully cured (about one hour), close the tips together and sand them until they are flush and square. Then solder the test leads to the foil. Use electrical tape or heat-shrink tubing to keep the wires out of the way. Keep the leads to the meter short if you are using a capacitance meter to prevent picking up noise or lead capacitance.

To use the tweezers, simply connect them to an autoranging ohmmeter or capacitance meter and grip the SMD. Very rapid measurements are possible using this simple tool. I frequently use it to sort surplus SMD components and to double-check component values right before mounting them to a circuit board.

Removing SMDs From Surplus PC Boards

Practice components can be removed from surplus boards by using an electric heat gun (available at most hardware stores) to slowly heat a small area of the board. Be sure to wear safety goggles. Once the solder begins to melt, gently tap the edge of the board on the bench to remove the components. With care and practice even semiconductors can be removed without damage. I do this job outside, because heating the board may cause it to smell or smoke a little.

Removing Individual SMDs

SMDs can be removed using special soldering stations employing custom desoldering tips or hot-air jets. If these are not available, you can (with a little practice) remove components using desoldering braid and flux.

To remove an SMD that is already mounted to a circuit board, you will need a roll of fresh desoldering braid and RMA (rosin, mildly activated) flux (liquid or paste). Desoldering braid oxidizes over time, so if it looks dull, replace it.

Infiltrate about one inch of the desoldering braid with flux (if it didn't come that way). Lay the braid over the solder joint and gently press down with the tip of a soldering pencil. The solder will wick into the braid. Each area of braid can only be used once, so trim it after each try. Repeat several times for each solder joint until all solder (except a very thin film) has been removed.

Grip the component with tweezers and gently twist to release the component (don't pull or you may lift the pads). If the component does not release from the pads, go back and try to remove more solder.

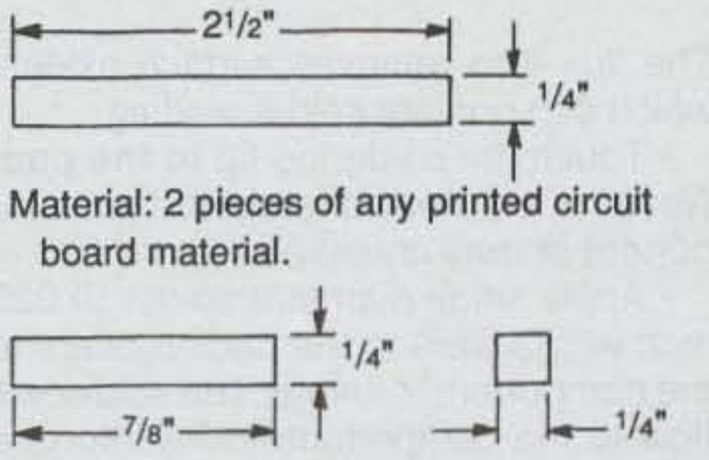


Fig. 3– (A) Parts for the SMD tweezers. (B) Assembly of the SMD tweezers.

Surface-Mount Device Electronic Component Suppliers

Electronic Goldmine, 800-445-0697, <www.goldmine-elec.com>
Surface-mount components, educational kits, circuit boards
Digi-Key Corp., 800-344-4539, <www.digikey.com>
Surface-mount components
Mouser Electronics, 800-346-6873, <www.mouser.com>
Surface-mount components
Wassco, 800-4wassco, <www.wassco.com>
Surface-mount tools and supplies
Newark Electronics, 800-263-9275, <www.newark.com>
Surface-mount components, tools, and supplies
Allied Electronics, 800-433-5700, <www.alliedelec.com>
Surface-mount components, tools, and supplies

This technique takes practice, so try removing several components from a surplus board before attempting it on an important project.

Soldering SMDs

There are several ways to successfully solder SMD components to a circuit board. Some are easier to learn than others, and some require the use of special materials (such as solder paste, which is a mixture of powdered solder and flux) or special equipment (such as SMD solder stations).

The easiest way I have found to solder SMDs is to first glue the components in position on a PC board, then solder the connections. The procedure is:

• Clean the copper side of the board with a nonconductive abrasive pad until it is shiny. Wipe off any residue with a tissue and denatured alcohol.

• Glue the components into position using Duco cement. Apply the cement to the end of a toothpick, then use the toothpick to apply a drop of cement to the circuit board. Do not get any glue on the pads or any place where you want the solder to flow.

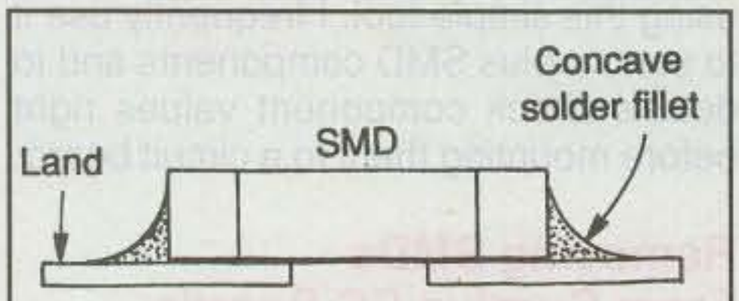


Fig. 4– Side view of an SMD solder joint.

• Using self-locking tweezers, position the components on the board. Let the adhesive dry.

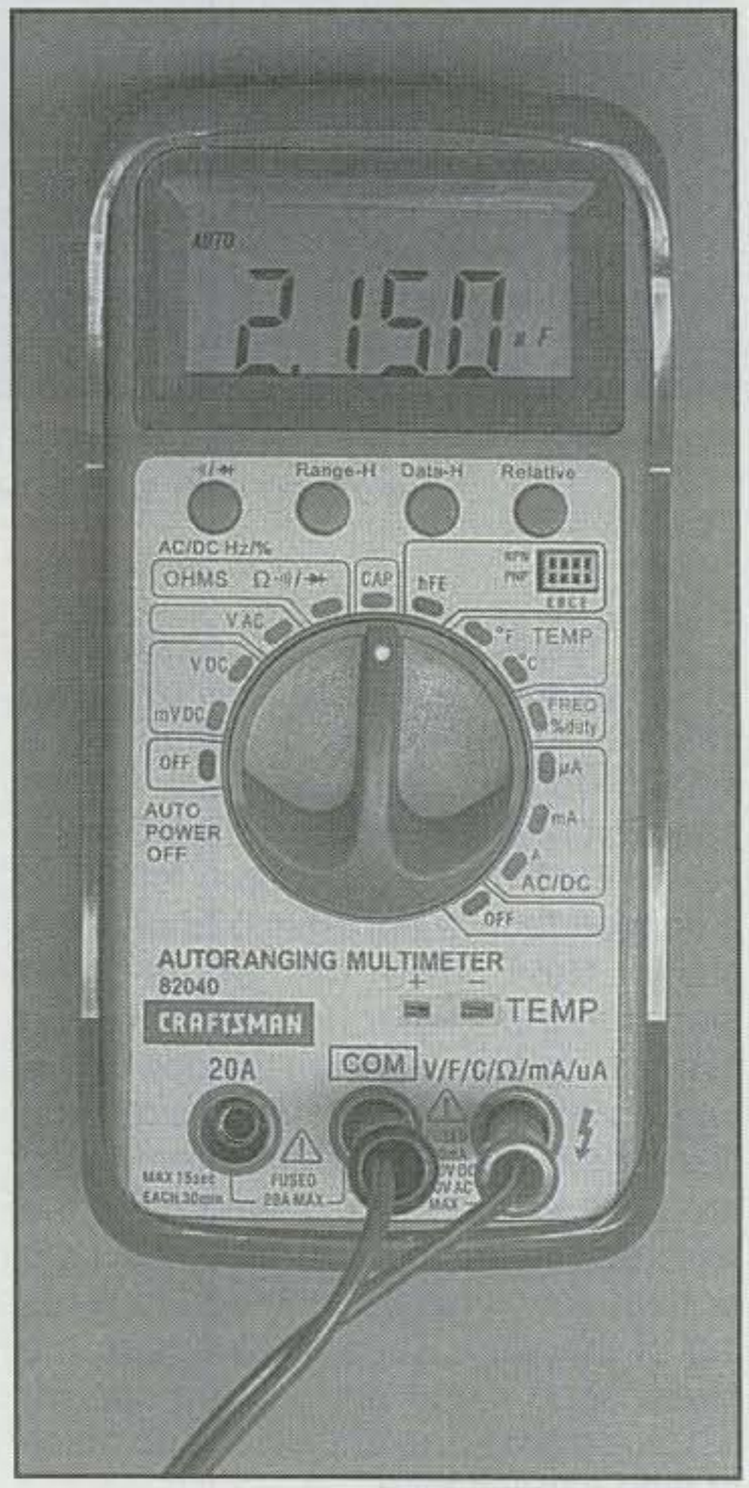
• Gently nudge the components sideways with a toothpick. If a component moves, try gluing it again.

• Apply RMA-type paste flux to the component terminals and pads using a toothpick. Apply the flux where you want solder to flow. The function of the flux is to conduct heat from the soldering tip uniformly to the pad and component. The flux also removes surface oxides, which can prevent solder wetting.

• Touch the soldering tip **to the pad**. *Never* apply heat directly to the component (it may crack).

• Apply small-diameter solder (0.020 inch works well) to the pad adjacent to the component terminal. The solder will flow to the component and will form a fillet between the component and pad.

• Let the solder cool and remove the flux with denatured alcohol. Inspect with a 4X watchmakers loupe or magnifying glass. The solder joint should be a concave fillet, bright and mirror smooth with no pits, as shown in fig. 4.



A simple multimeter can be used to measure the capacitance of an SMD component using the test tweezers.

Conclusion

Working with SMDs can be challenging, but can also be a lot of fun. Like the transition from point-to-point wiring to printed circuit boards, it is similar to traditional through-hole technology but requires some new skills. Mastering SMD takes a little patience and practice, but it is well within the capabilities of most hams. ■

What You've Told Us...

Our February survey asked a set of questions that nearly any ham could answer, and about a third more of you did than usual! We asked what bands you're equipped to operate on, which ones you use occasionally and frequently, and which one is your favorite. There were, as usual, a few surprises.

The greatest number of you are equipped to operate on 10 and 20 meters (77% each), followed by 40 meters (74%), 2 meters (71%), a tie between 15 and 80/75 meters (70% each), 17 meters (64%), 12 meters (62%), 30 meters (59%), 70 cm (50%), a tie between 6 and 160 meters (47% each), 135 cm (17%), 33 cm & higher (7%), and the European 4 meter band (4%).

Which bands do you actually operate? The DX workhorse, 20 meters, came out on top as the favorite band (21%), followed by 10 meters (15%), also a tie between 40 and 15 meters (10% each), by 6 meters (8%), 2 meters (7%), 80/75 meters (6%), 17 meters (5%), 160 meters (2%), and a 5-way tie for last place at 1% for each of the other bands.

Interestingly, the bands operated list did not match the favorites list, although the top spot did, with 20 meters holding #1 with 81% of you operating there either frequently or occasionally, followed by 40 meters (78%), 2 meters (77%), 15 meters (75%), 80/75 (73%), 10 (70%), 17 (59%), 12 (52%), 70 cm (49%), 30 (41%), 160 and 6 in another tie (40% each), then a steep drop to 222 MHz (16%), 902 MHz and up (7%), and 70 MHz (Europe only, 4%).

In summary, at least 40% of you are equipped to operate on every U.S. ham band from 160 to 2 meters plus 70 cm, and 40% or more actually operate at least occasionally on all of those bands. The "traditional" HF bands and 2 meters top the list, but the now two-decade old "WARC" bands plus 160 and 6 meters and 70 cm all are solidly in ham radio's mainstream. Only 222 MHz and the microwave bands have yet to crack that barrier.

This month's free subscription winner is William Kuning, W3BY, of Cambridge, Maryland.

Reader Survey April 2003

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

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

This month, we'd like to hear about your views on ham radio and the manned space program.

Please indicate... **Circle Survey Card #**

1. ... whether you have ever monitored NASA space-ground communications via amateur radio retransmissions:
- Yes 35
- No 36
- Don't know 37

2. ... whether you have ever heard an astronaut/cosmonaut transmitting *on ham radio* from orbit (live, not on tape):
- Yes 38
- No 39

3. ... whether you have ever made a *2-way contact* with a ham astronaut/cosmonaut in orbit:
- Yes, voice contact 40
- Yes, exchange of packet messages 41
- No 42

4. ... if you answered yes to Question 2, please indicate whether you've made more than one contact with an astronaut/cosmonaut in orbit:
- Single contact only 43
- More than one contact 44

5. ... whether you have made an automated (robot) packet contact with a manned spacecraft in orbit:
- Yes 45
- No 46

6. ... whether you have ever participated (including organization and setup) in a ham radio contact between astronauts/cosmonauts in orbit and a school group (circle all that apply):
- Yes, with the International Space Station 47
- Yes, with the US Shuttle 48
- Yes, with the Mir space station 49
- No 50

7. ... whether you are active on amateur satellites:
- Yes 51
- No 52

8. ... which of the following statements best reflects your views:

a. Ham radio participation with the manned space program so far has...
- ... benefited ham radio more than the space program 53
- ... benefited the space program more than ham radio 54
- ... benefited both ham radio and the space program about equally 55
- ... not benefited either ham or the space program 56

b. Continued ham radio participation with the manned space program is ...
- ...important for the future of amateur radio 57
- ...important for the future of the manned space program 58
- ...important for both ham radio and the manned space program 59
- ...not important for either ham radio or the manned space program 60

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

What in the world is kitbashing? Why would I want an antenna for 60 meters? What's a PD-8010? Read on to solve all of these mysteries...

Kitbashing the PD-8010 Antenna For 60 meters

BY WILLIAM M. RILEY,* N3SNU

Years before I got my ham license I was a model railroader. The model-railroad hobby has a grand tradition of "kitbashing," meaning to take one or more kits and use the parts to make a model of a locomotive, railcar, or structure for which there is no kit available. Just about every issue of a model railroad magazine contained a kitbashing article. In this same tradition, I found a need to modify the Van Gorden Engineering PD-8010 antenna to include the 60 meter band.

No, I'm not just doing this in anticipation of approval of the proposed amateur allocation in that band. I'm also a member of the U.S. Coast Guard Auxiliary. The Auxiliary has access to some government-only frequencies, and my Region holds a high-frequency net twice a month on 5.4225 MHz. My MARS-modified ICOM IC-725 will transmit on this frequency, but I needed an efficient antenna.

Since earning my amateur license in 1994, I have been through several antennas, working my way up the learning curve. My first HF contact was made with a Heathkit HW-8 transceiver and a Spiro Manufacturing LC-80 shortened dipole for 80 meters. When I got the used IC-725 at a hamfest, I connected it to a Shakespeare "Big Stick" CB antenna and made my first DX contact on 10 meters. Later I put together a triband dipole for 80, 40, and 15 meters from ladder line as described in the antenna chapter of *Now You're Talking*. Somewhere along the way I obtained an MFJ-971 tuner, and I was able to find settings that would allow me to work with the LC-80 dipole on just about all bands except 10 and 160. What I didn't realize was that the balun at the feedpoint of the dipole was really taking a beating during out-of-band operation. It eventually failed. My first few check-ins to the Coast Guard Auxiliary net may have been the last straw. It was difficult to find a tuner setting for that frequency, and the correct setting had a very narrow bandwidth. I needed a new antenna.

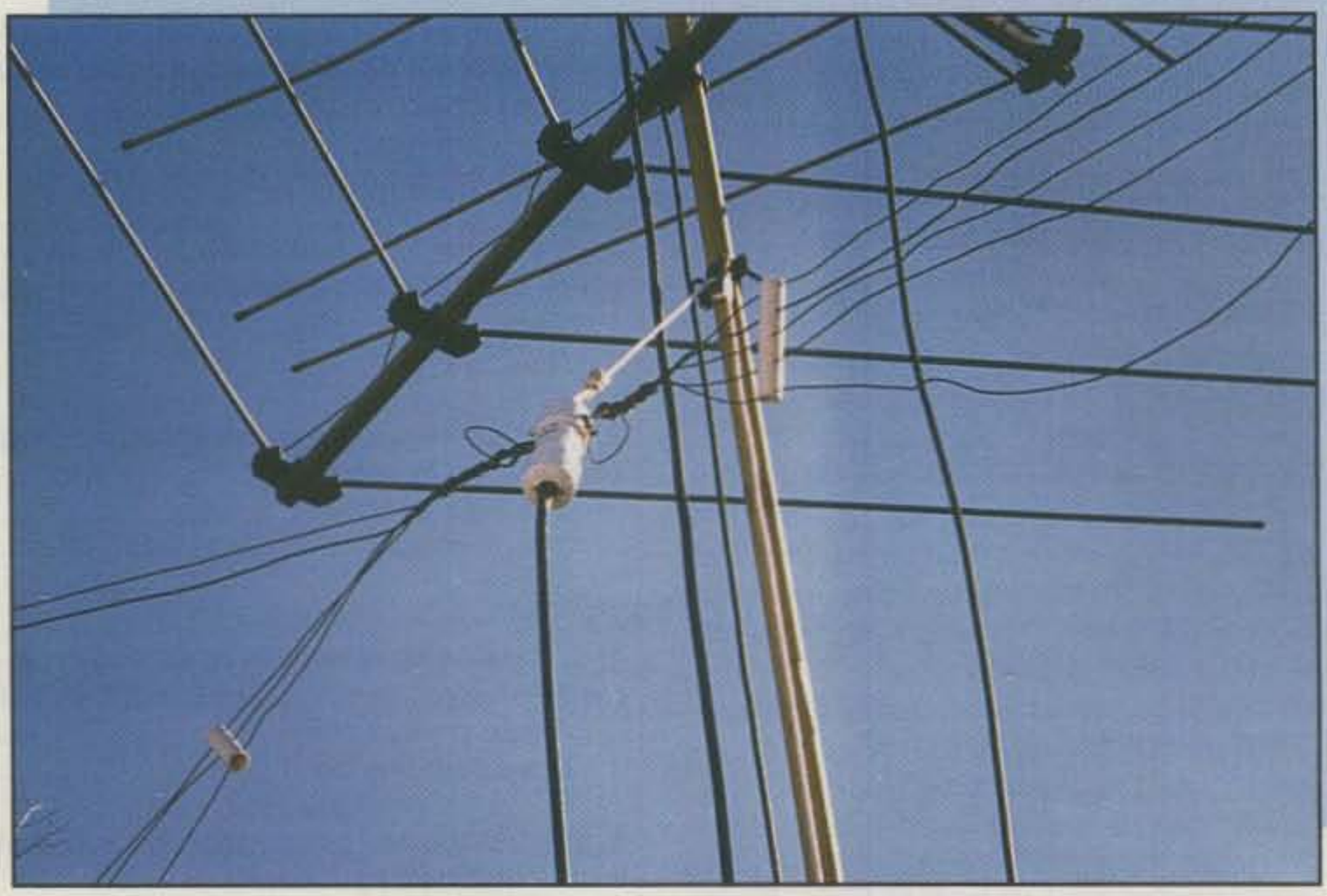


Photo A– The balun of the PD-8010 multiband dipole accepts a single feedline for all four bands of operation—or in the case of the author's "kitbashing" project, five bands. (Photos by the author)

The PD-8010 Kit

After some browsing through catalogs, I decided that the Van Gorden PD-8010 would be my best bet. It's a parallel dipole with four conductors, each cut to resonance on a different frequency, and center-fed with a single feedline (photo A). It's still fed through a balun, allowing me to use coax feedline. I considered using a dipole fed with ladder line, but all the literature warns against running the ladder line too close to metallic objects. The feedpoint of my dipole is supported by a steel mast bracketed to my chimney (photo B), and the feedline hangs straight down alongside this mast. The coax for the PD-8010 would simply be looped under the eaves, through an opening in the soffit, and across the attic to my den, where it would drop down through a wall cavity to a neat jack box. I was not sure what RFI problems I'd create following this route with ladder line.

At any rate, the Van Gorden PD-8010 seemed like the most versatile antenna for the money. Priced at only $44.95 in the Ham Radio Outlet catalog, it was almost like buying the balun and getting the rest of the parts free. Therefore, the antenna kit went on my birthday wish list, and was happily presented to me by my wife Pam, N3XFL.

The PD-8010 kit contains the balun, 280 feet of #14 stranded copper wire,

*12215 Malta Lane, Bowie, MD 20715-1811
e-mail: <raggallach@earthlink.net>

100 feet of nylon rope, eight spreaders, and four ceramic insulators. With Pam's help I measured and cut the four pairs of wires to a different length for each band as specified in the instructions. The instructions tabulate cutting lengths for several frequencies in each band. I cut mine to the length specified for the midpoint of each band. Knowing what I now know, I would have cut to the *longest* of the tabulated lengths. I found the antenna elements a bit short on almost all bands when I started fine-tuning. More on that later.

The 60 meter Mod

Now for the 60 meter modification: I calculated the dipole length for 5.4225 MHz using the formula in the antenna chapter of *Now You're Talking* (L = 468/f). I also calculated this theoretical length for the 80 and 40 meter bands, and compared that to the cutting lengths in the PD-8010 instructions to see how much they added for connections, etc. There wasn't enough of the wire leftover from the antenna kit to make this additional conductor, so I went to my local hardware store for more.

Funny thing about that; it's hard to find 14-gauge, uninsulated wire, either stranded or solid. After trying not only my favorite small hardware store, but also two "big box" home centers, I settled for a 100 ft. spool of Type THHN, #14, solid, multi-purpose wire with black insulation. I later found that Radio Shack does have 70 ft. coils of #14 stranded wire available under part number 278-1329, but I didn't make that discovery until I had already assembled the antenna. Oh, well. The solid wire actually turned out to be easier to work with in some ways. It holds its shape after being straightened out for measuring, unlike the stranded wire, which insists on springing back into a Slinky-type coil, or kinking badly.

The spreaders in the PD-8010 kit are white plastic bars about 6 inches long, pre-drilled with four, three, or two holes, depending on where they belong in the antenna assembly. I would have to make up another pair of spreaders with five holes to accommodate my fifth antenna element. While shopping for the wire, I also looked for things similar to the original plastic bars to make additional spreaders. Eventually, I decided that the most economical material would be 1/2 inch PVC pipe. I cut the pipe with a tubing cutter, clamped it in my vise, and drilled the holes with an electric drill. The dimensions are not critical; the holes are not uniformly

spaced on the original spreaders. Since I had to buy a whole length of pipe, I decided to replace all the spreaders rather than just insert one different pair (photo C).

With the wires threaded through the spreaders and the whole assembly laid out in a V across the back yard, I next had to make the common attachment of all the antenna elements to the balun. I had arranged the antenna on the ground with the feedpoint on the brick patio for soldering ease and safety. There was an outdoor electrical outlet nearby, and the working surface would be non-combustible.

The next problem was the size of the bundle of wires that had to be soldered together. The Van Gorden Hi-Q Balun has an eye-bolt on each side that is intended to be a mechanical support only. There is a solder lug to make the electrical connection. The instructions, written and illustrated with a simple dipole in mind, call for threading the antenna wire through the eyebolt, wrapping it back on itself with a 2 inch tail left over, then soldering this tail to the solder lug. However, with the PD-8010, each of the four sets of wires must be connected mechanically and electrically. There isn't room to solder all four original wires to the solder lug, let alone a fifth for my modification. It's tough even getting all these wires through the eyebolt.

The best solution I could come up with was to thread the bundle of wires through the eyebolt, and while twisting them back on themselves, introduce still another wire which would then be soldered to the lug (photo D). The bundle of five wires twisted together was so bulky that there was no way my electric soldering iron could ever heat it up enough. Therefore,

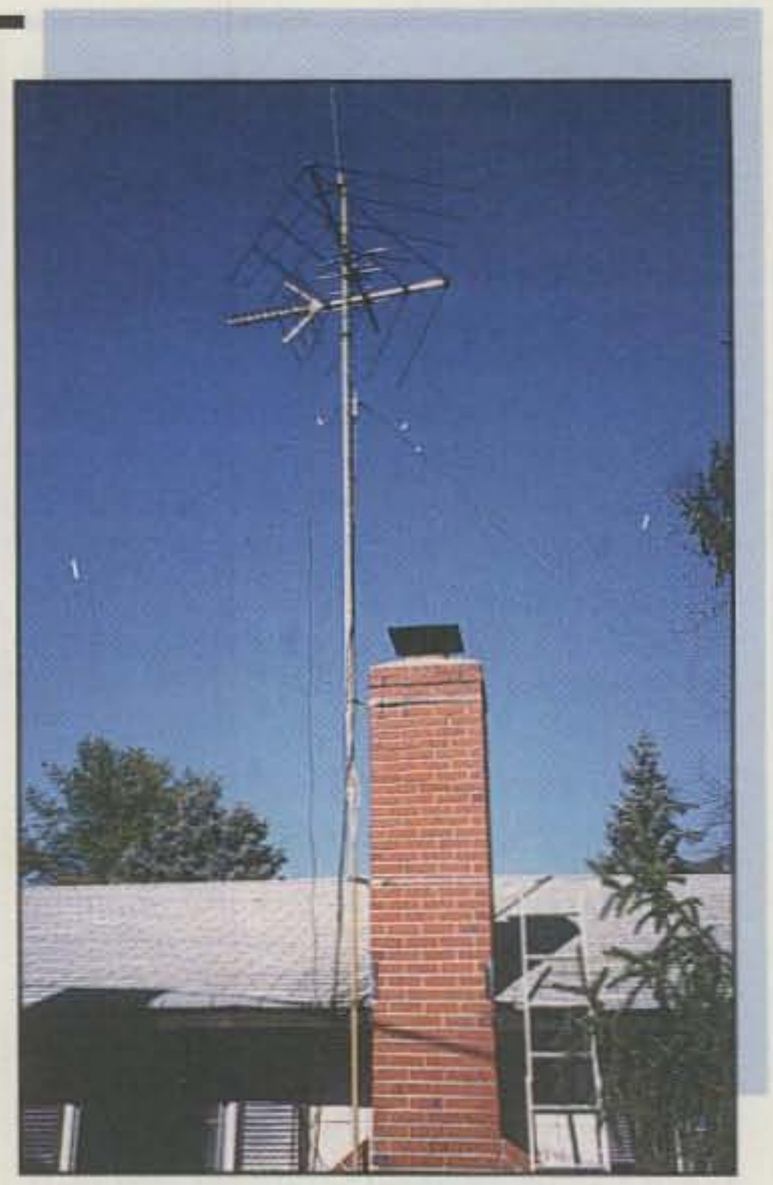


Photo B– Sharing space on a metal mast attached to the chimney made it essential to use a coax feedline instead of open-wire line, which might have been more tolerant of mismatches. However, ladder line could interact with the metal mast, causing it to radiate.

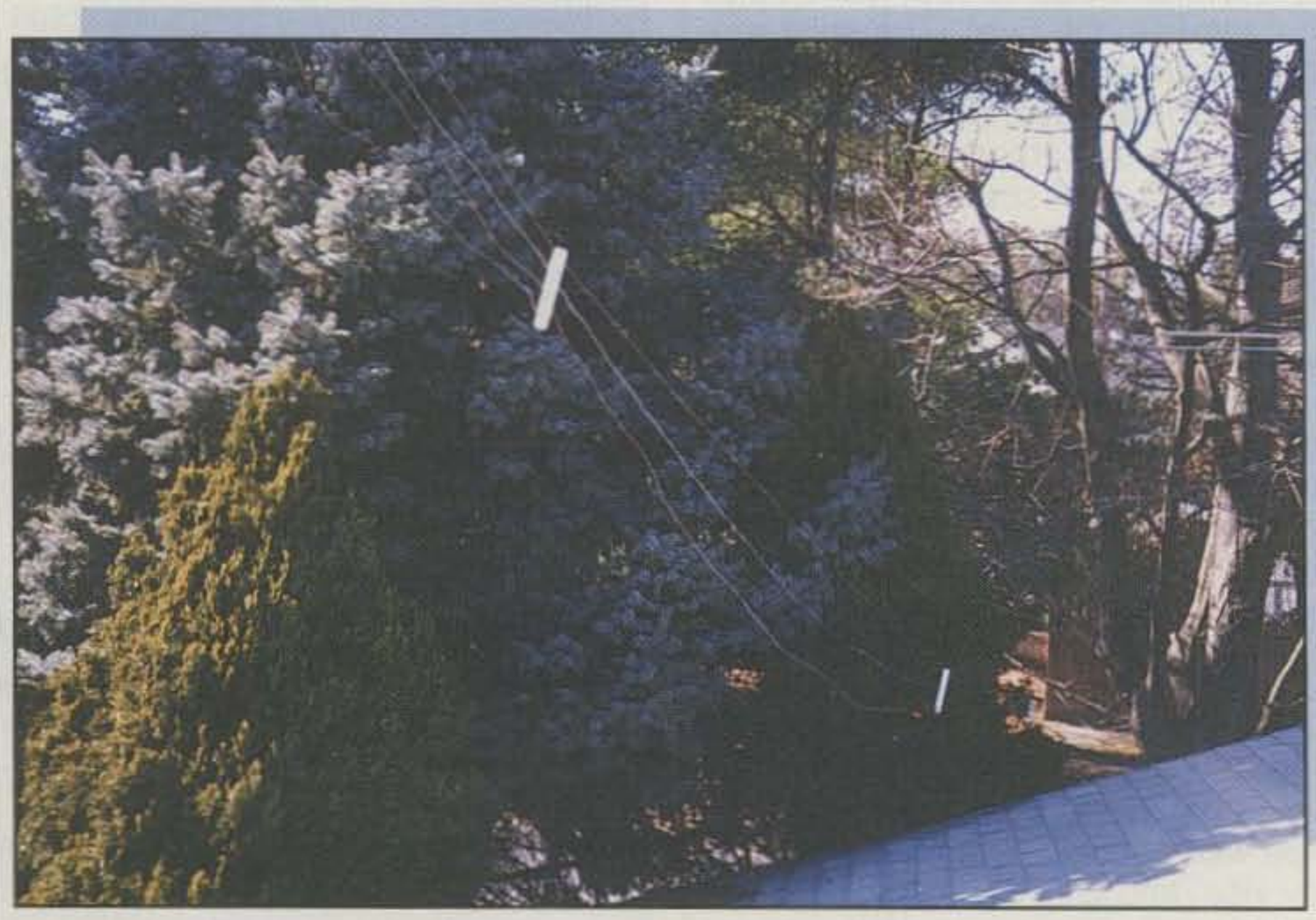


Photo C– This detail of the antenna leg heading toward the front yard shows the different length elements plus the author's redone spreaders.

I did the soldering with a propane torch, much like sweat-soldering a pipe joint. I heated the bundle of wires, touched the solder to it, and watched the solder melt and soak into all the cavities by capillary action. I kept my fingers crossed that the heat would not be too much for the balun. (It's hard to hold a propane torch with your fingers crossed, by the way.) By comparison, soldering the single wire to the lug with a soldering iron was no trouble at all.

I like to use wire rope clips for attaching the egg insulator to the end of antenna wires. I guess that's a throwback to my training as a merchant seaman. I use three clips on each end connection. The number of clips needed to achieve 80% of the strength of a wire rope is greater for larger sizes, but we're not talking about making up a mooring line or towing hawser here. The clips should be installed with the U-bolt on the bitter end of the wire and the saddle on the standing part. The distance between clips should be at least six times the diameter of the wire. The 1/16 inch clips available at my local hardware store are about the right size for this antenna wire. The clips also make adjustments to the length of the antenna easy. Just loosen the clips, shorten the antenna element by adjusting the amount of wire used in making the eye, and tighten the clips. If you're going in the right direction, you can cut off excess wire. If you've gone too far, you have some opportunity to lengthen the element a bit by shortening the eye.

In retrospect, wire rope clips might have been a better way to make the mechanical connection to the balun as well. The individual wires could have been twisted together, opposite to their individual twist, to form one "wire rope" which then could have been looped through the eyebolt and folded back on itself, secured with a set of larger wire rope clips. There would still have to be one conductor some 2 inches longer than the others for attachment to the solder lug. The whole assembly could still be sweat-soldered if necessary for good RF conductivity.

Final Tuning

When it comes to the final tuning, the PD-8010 antenna is perfect for someone who has more time than money. I have already pointed out that the kit is inexpensive. However, the trial-and-error process of trimming all four elements (five with my modification) is quite tedious.

I have the antenna feedpoint sup-

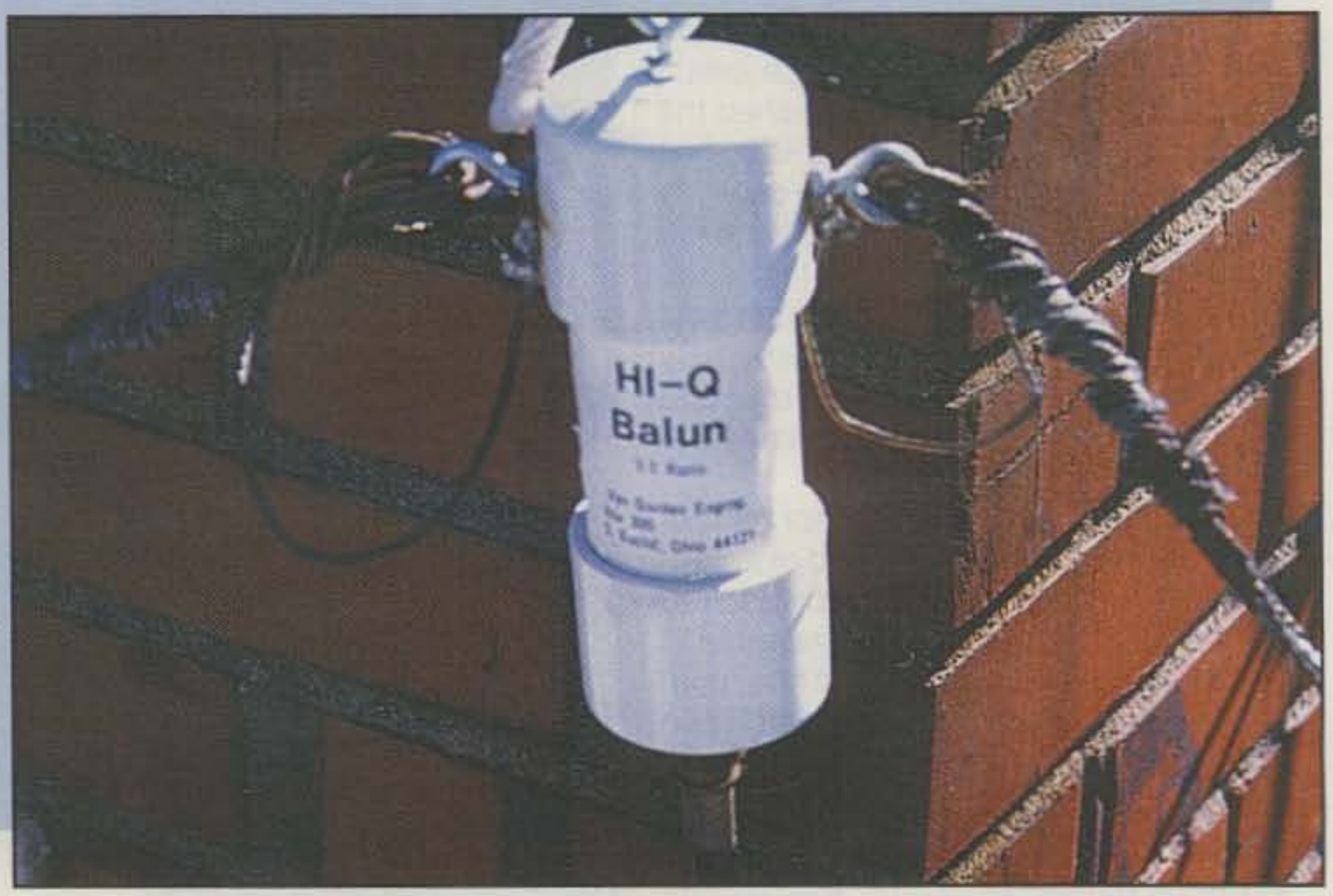


Photo D– A close-up of the balun shows both the mechanical and electrical connections of the wire elements.

ported by a rope and pulley attached to a 30 ft. mast bracketed to my chimney. The same mast also supports my 2 meter vertical and two TV antennas (A/B switch instead of a rotor), so the dipole is only about 25 ft. up at the center. The ends are tied off to trees in the front and back yards, between 10 and 15 ft. off the ground. I have no idea how many trips I made up and down the ladder to the roof and the three trees involved. This was the first time in almost ten years my neighbors actually got curious enough about my "aerial" antics to ask what I was doing. As I carried the ladder around the house, I kept thinking that it might be worth the cost of two more ladders to have one up against the back-yard tree, another at the front-yard tree, and yet another up to the roof.

I thought I remembered reading something within the past few years about the correct order in which to tune the elements of a parallel dipole, but I couldn't find any such advice. I arbitrarily started with the 80 meter element. Using a Radio Shack #21-524 SWR meter and the rig on low power, before long I had the antenna resonant near the 3.717 MHz frequency of the Maryland Slow Net. I decided to leave that as it was until later. If the interaction between elements made any difference, it would either move closer to the midpoint of the 75/80 meter band, or I would be able to trim it further if it went the other way. It eventually was resonant at 3.675 after all the others were adjusted. As it turned out, the 80 meter element was the only one that I could adjust by shortening it. I had to splice some extra length onto all the others.

After fighting with the soldering iron out in the yard several times trying to duplicate the neat splice illustrated in *Now You're Talking* and other textbooks, I hit on an idea many people will find blasphemous. I attached an extension to each element using wire nuts. I started with a 1 ft. piece of wire, and if that didn't work, I replaced it with a 2 ft. length, and so on. The shorter pieces that didn't work on the longer elements were useful later on the shorter elements, where a smaller change in length makes a greater change in frequency. With the wire nuts I could easily untwist the nut, snip an inch off the wire, and twist the wire nut back on. I repeated the process on the other leg of the antenna, hoisted everything back up, went inside, and tested the SWR again. I also found a bamboo pole handy for untangling the wires if they got crossed in the process of hoisting aloft.

Once I got the 60 meter element resonant close to the Coast Guard Auxiliary net frequency, I was able to confirm its performance by checking into the net, with Auxiliary Radio Facility CAROLINA BEACH II (Dan, WB4DHU) as net control. The 60 meter element still seems to have a narrow bandwidth, perhaps as a result of the insulated solid wire, but for now I only need it on the net frequency.

The 40 meter element is also intended to work on 15 meters, but I still

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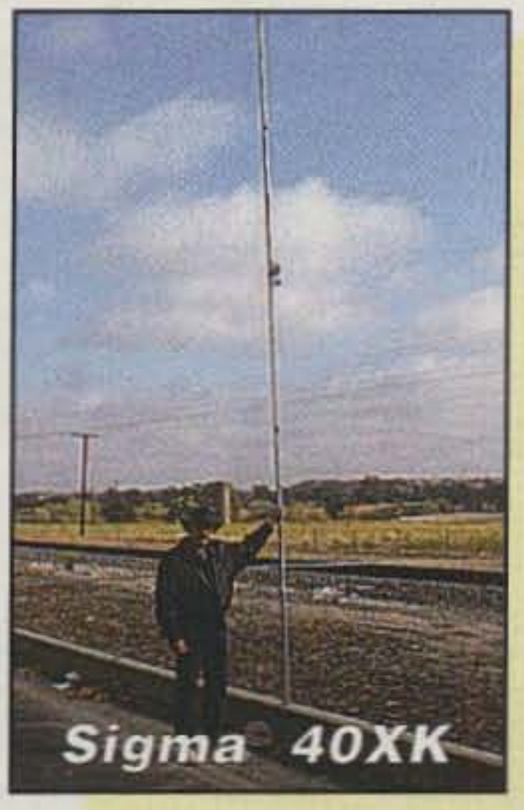

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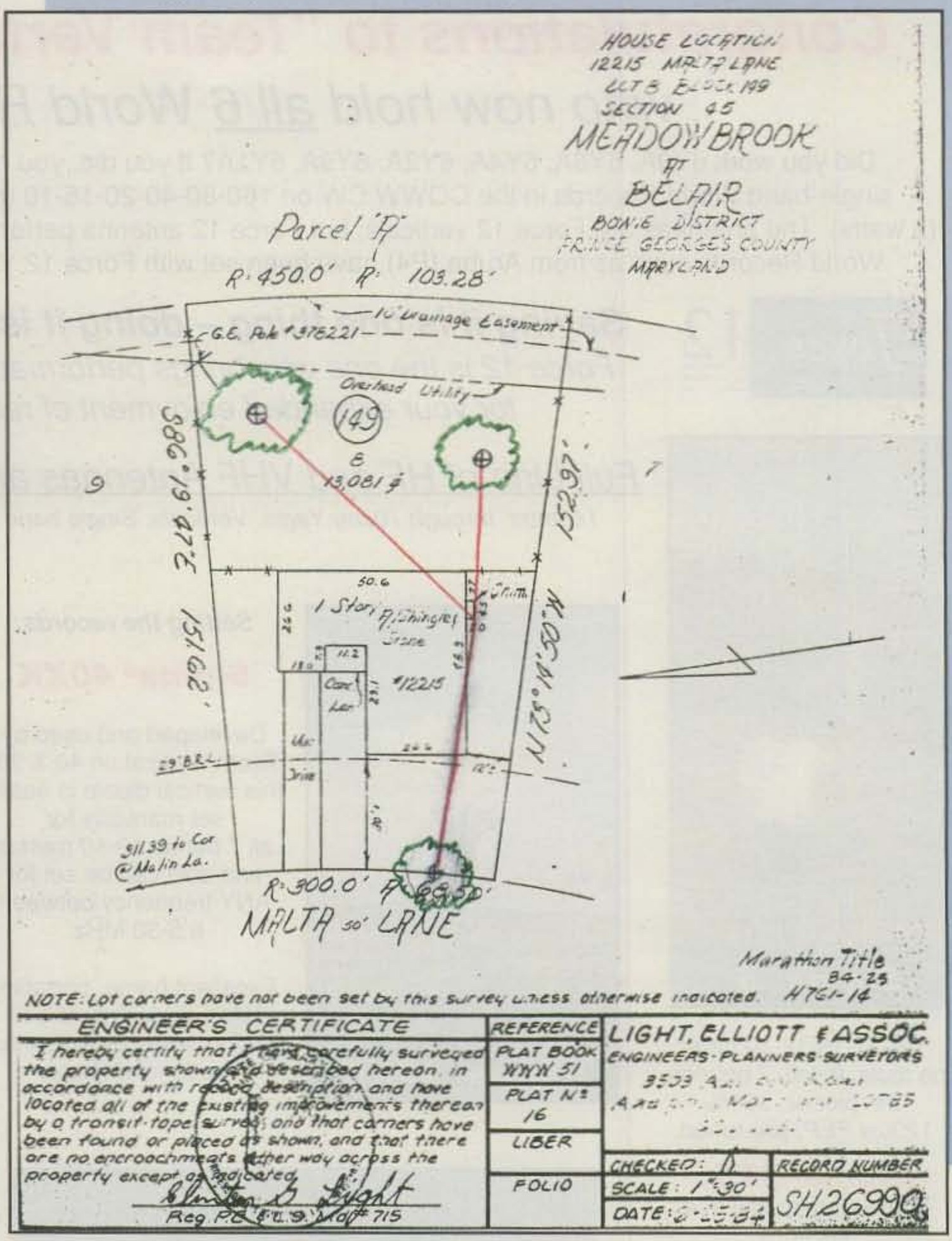

Fig. 1– Anyone who buys a house or has a mortgage probably has a survey map put away with other important papers. Having a few photocopies on hand can be very helpful in planning and plotting additions such as antennas.

haven't managed to tune it so that both 40 and 15 are resonant. Maybe if I was confining my efforts to the Novice CW subbands it would be possible. I'll keep trying. Meanwhile, it's resonant at 7.240 MHz and usable on significant portions of 40. When I got to the 40, 20, and 10 meter elements, I realized that I could separate these three and lead them to a different tree in the back yard for a more straight-line configuration. See fig. 1 for the final layout of the antenna on my property. Surveyors' plot plans such as this are useful for planning or illustrating the layout of your antenna farm. Just photocopy the plot plan you got when you purchased or refinanced your home and add the antenna details.

The 20 meter element was probably the second easiest element to adjust, and it has been the most useful. It's now resonant at 14.228 MHz. I check into the Maritime Mobile Service Net every chance I get, and now I'm trying to get on the air with PSK31 and a RigBlaster, not to mention all the other activity on this band.

The 10 meter element was a bit of a challenge. The SWR was too high to read accurately and almost flat across the band. At first I tried shortening the elements, looking for improvement, but it soon became evident I was not getting anywhere and the length was way too short. I spliced on an extension and started over, confident I was now beyond the correct length in the other direction. However, I still had that almost flat SWR curve close to infinity. Finally, I connected a CB radio and

Photo E– Crimped, solderless butt connector used to extend antenna length on 10 meters, for which the wire was originally cut too short. Antenna purists probably won't like it, but it meets marine standards.

found that the SWR was still high, but better at the low end of the 11 meter band. I kept trimming the antenna in small steps until I had good results on CB channel 40, and then went back to the 10 meter band. Now I had readings on 10 meters that made sense.

I continued to trim the antenna until the resonant frequency was 28.3 MHz, the transition between the CW and phone subbands, and the SWR was within acceptable limits on the Ten-Ten International Alternate (Novice) Net frequency of 28.380 MHz. The primary net frequency of 28.800 MHz has close to a 3:1 SWR. As it turns out, my Wilson Alpha V58 CB antenna still works better on 10 meters. During the Walt Disney 100th Birthday special event, I contacted WD4WDW in Florida using the PD-8010, but I had to switch to the 5/8-wave vertical to reach WD6MM in California.

The whole tuning and tweaking process took over a month after I had the antenna assembled and erected. It seems like a long time, but this is a hobby, and I only worked on it when I had time, and even then I tried to avoid the times of day when the band I was working on would be most active. I considered whether one of the fancy antenna analyzers would help, but aside from the cost, I thought the device might be hopelessly confused by all the parallel elements. Also, from what I could see in the catalogs, the 60 meter element would have been between the ranges covered. Since then I obtained a used MFJ-207 SWR analyzer at a local hamfest, and that will help with further adjustments of this and future projects.

As for those offensive wire nuts, don't worry. I replaced them after I finished tuning each element. The purists probably still won't like what I used. I replaced the wire nuts with crimp-on, solderless butt connectors (photo E). However, I installed these connectors using an Ancor Double Ratcheting Crimper, Model 70217, used by marine electricians and available at BoatUS for $42.99. It's a ratcheting device that will not release until the jaws are fully closed. When you are done, the splice is electrically and mechanically reliable to American Boat & Yacht Council standards (ABYC E-9.17.12.4 calls for a tensile strength test of 30 pounds on a connector for 14-gauge wire.). Add some heat-shrink tubing if you are still concerned about weatherproofing.

Conclusion

I learned a lot from this project. On most of the bands the bandwidths are narrower than advertised, but I attribute this to the fact that my antenna is not elevated even a half-wavelength above ground. If an ice storm takes this antenna down or the balun burns out, maybe I'll try something different next time. Meanwhile, I'm having fun, and I've proven to myself that this kitbashing project works. ■

Grab those loops, beams, and Doppler sets. It's time to get ready for a weekend of fun and adventure, either in your car, on foot, or both!

Announcing:

The Sixth Annual CQ National Foxhunting Weekend

May 10–11, 2003

Plus

Results of the 2002 National Foxhunting Weekend

BY JOE MOELL,* KØOV

Each spring hams around the world take to the roads and parks to see who is best at tracking down radio signals. They score themselves by the number of "fox" transmitters that they find in a given time, or perhaps by the number of miles they drive. Besides being excellent training for volunteer enforcement and search/rescue missions, it's a whole lot of fun!

CQ doesn't impose any rules or offer any prizes for its annual National Foxhunting Weekend (NFW). That's up to you and your fellow hometown hams. Some clubs like formal transmitter hunts with carefully crafted boundaries, specifications for signal parameters, time limits, and so forth. Others are totally content just by having one or more signals to hunt—no need for any regulations, they say.

Whatever your club's radio-direction-finding (RDF) contesting style, just be sure to make it safe, make it fun, and make it happen on or around the second weekend of May. The following reports of last year's NFW activities should give you plenty of ideas. There's not enough space for all of them, but here's a representative sample.

Chip Moore, K9IOC, of the Kankakee Amateur Radio Society hid his car so well that it wouldn't show up in a photo, so instead we'll show you the group of foxhunters that went out to find him. (Photo by Clay Melhorn, N9IO)

Basic T-Hunts Simple and Deceptive

In a typical no-frills, mobile, hidden-transmitter hunt, called a "T-hunt" or "foxhunt," the huntmaster (hider) puts one transmitter on the air at an undisclosed location. Two meters is the most popular band for T-hunting nowadays, but it could just as easily be 10 meters, 70 cm, or whatever is your club's favorite. Afterwards everyone gathers at the end point or at a restaurant to eat and share stories.

It doesn't have to be a long or difficult drive for everyone to have lots of fun, but it might be a good idea to make sure your equipment is ready for whatever the weather brings. For instance, if you hunt in Chicago, you might get wet. Here is a report from Mike Brost, WA9FTS:

Again the 2002 National Foxhunting Weekend coincided with the regularly scheduled hunt sponsored by the Arlington Communications League. We start at the William Rainey Harper College parking lot in Palatine, Illinois. This is the only monthly hunt that has boundaries. The fox for the evening was Tony Levand, AA9CC, who was also the fox on last year's NFW hunt. We started shortly after 8 PM with light to moderate rain and a chance of very heavy rain at any time.

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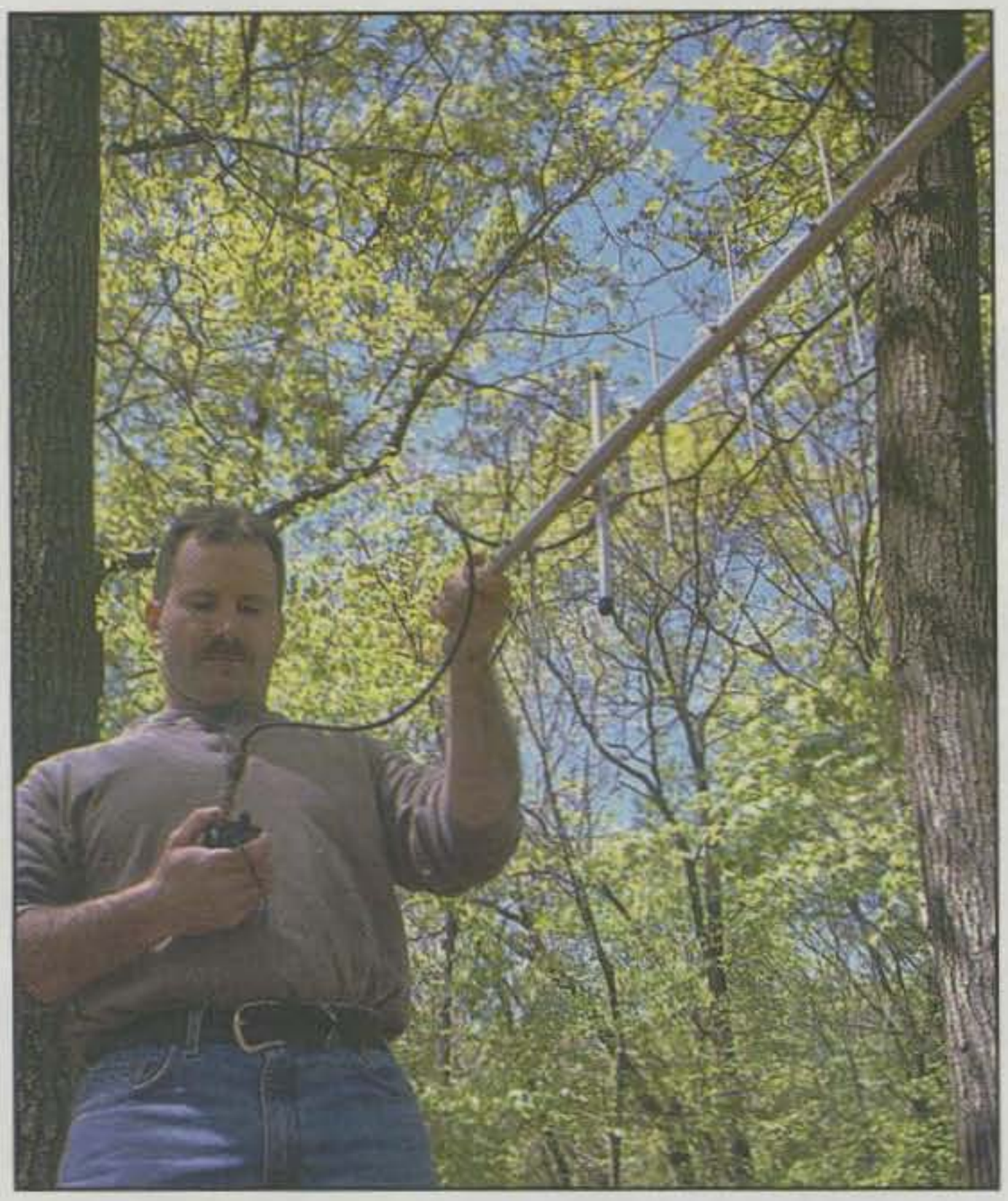


When you're really close, the best way to get bearings on a 2 meter fox may be to use a 70 cm Yagi with your receiver tuned to the third harmonic. Tim Mik, WY1U, demonstrates this technique on the Wallingford Repeater Association hunt. (Photo by Tim, WY1U)

Since Tony lives in Elgin, we got on the tollway and headed west as fast as we could. Some of the hunters bailed off at different times. The best move would have been to stay on I-90 and exit at IL-47, the western boundary of the hunt area. Nobody did that, so we all had to navigate the surface roads, most of which traveled away from Tony. There was no easy way off the tollway to get to him easily and quickly.

The hunters ended up in an area west of Elgin called Plato Center. Tony was in his truck, parked in back of a scrap-metal yard behind a Quonset hut. We all took 45 to 80 minutes to finish, with the winner being Charles, KB9DIM, and his six-year-old daughter, Alexis. Then as we got to the munch spot, the sky opened up and it poured.

On a clear spring afternoon the hider can be more creative. He or she isn't confined to a vehicle. However, the hunt for a vehicle can still be tricky, as hams in eastern Illinois discovered. Clay Melhorn, N9IO, Foxhunt Coordinator for the Kankakee Area Radio Society of Kankakee, Illinois, said the following about Chip Moore, K9IOC:

Chip knows how to fool you, and he's good at it! He is a seasoned veteran of 17 years, whose experience in foxhunting started at the age of 10 with his mom and dad. He found a great little picnic grove just north of Aroma Park and the Kankakee River, several miles from the starting point in Bradley, Illinois.

This area is so heavily wooded that radio signals reflect and travel down open roads like a pipeline. In a small picnic area with nobody around, Chip's four-door sedan seemed totally transparent. So well hidden was he that three of four hunting teams passed the grove more than once, since his signal didn't seem to come from his hiding spot. It appeared to emanate from a reflection beyond him. The husband/wife team of Don and Billie Kerouac (K9NR and K9QT) was first to figure out the trick. Way to go, Chip, thanks!

Clay's report reminds me of a hunt many years ago when Tom Curlee, WB6UZZ, drove his Volkswagen beetle into a depression in a large open lot and completely covered it with blankets and tarps to make it "invisible." As N9IO says, "Just when you think you have an 'easy run,' you find that you've been fooled."

Having lots of RDF gear may give you an edge over other foxhunters, but simple techniques such as the "body fade" (holding a handie-talkie tightly against your belly to block signals from behind you) may be all you need to get good bearings in some cases. I have heard stories of hams finding accidentally activated aircraft Emergency Locator Transmitters at airports with just this method.

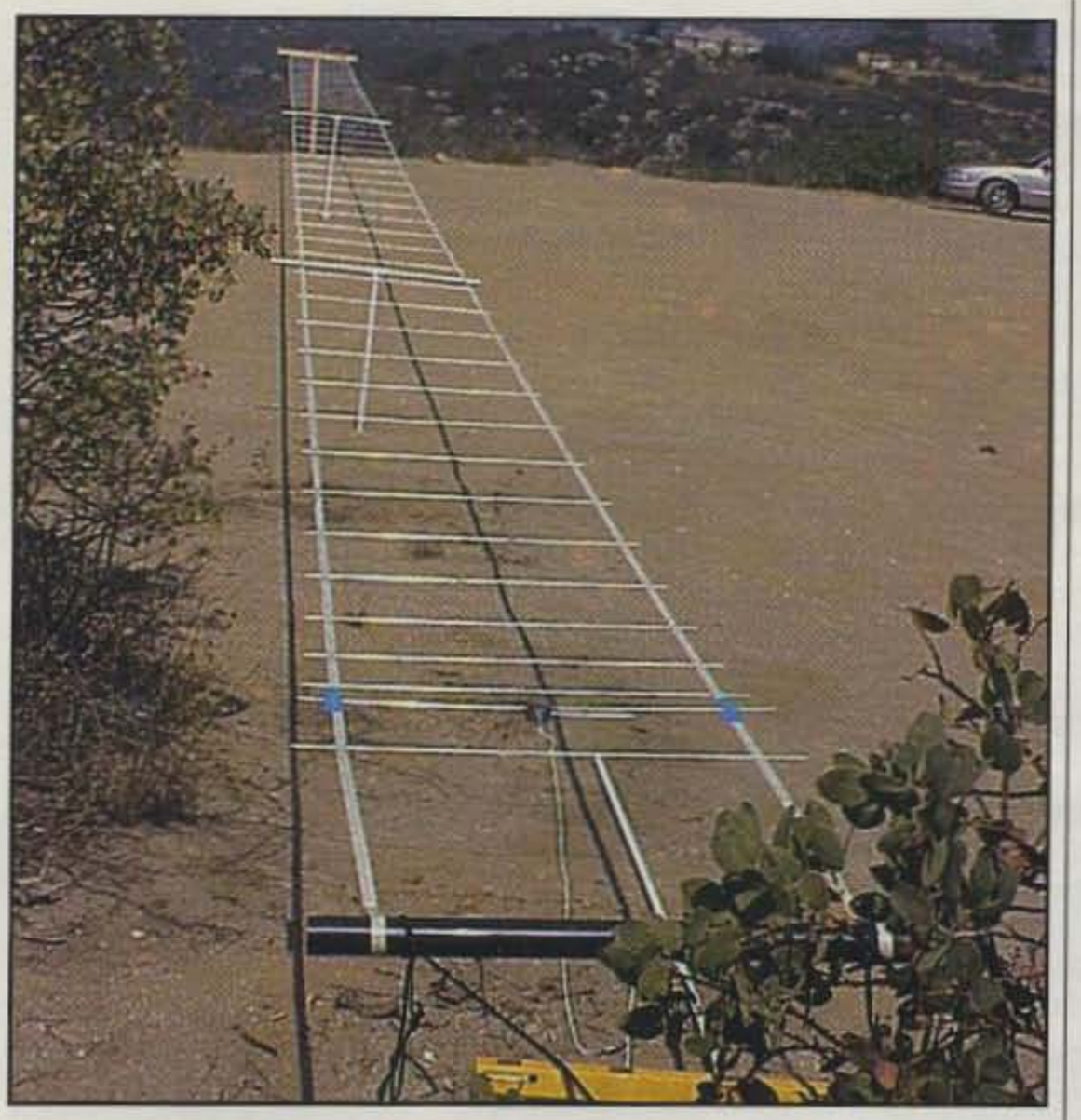
That's all it took to win the NFW event of the Wallingford Repeater Association in Connecticut. Huntmaster Tim Mik, WY1U, wrote:

On this sunny day, hunters started out at the usual parking lot, trying to catch a faint signal from my 50 milliwatt transmitter. Bob Carruthers, KB1FYL, was having fun with his new RDF equipment. At one point, he got out of the van and was taking a bearing when a woman came out of her house and asked what he was doing. Bob explained and she replied, "Oh! So it's not right here in my yard?"

Meanwhile, I had four-wheeled up a hill near the fox in a well-hidden spot and was monitoring the hunters' activity on the repeater. I had my APRS/GPS setup running, monitoring the track of Conrad Sheldon, K1EC, as he hunted. All of a sudden the K1EC icon popped up on my GPS display on West Dayton Hill Road. He was very close! I had been giving some vague hints like "The fox is in a wooded area," but I certainly was surprised to see K1EC so close so soon.

A car horn sounded at the bottom of the hill, and as I looked again at the GPS display, my fox waypoint was now covered up by K1EC. Conrad walked up the hill with his HT, stopped, did the body fade, turned, and headed farther up the hill, right to where the fox was

The VK3YDF team is ready to roll for the last event of the Victorian Foxhunting Championships in Australia. Because they had to hunt on six bands that day, there was lots of gear inside and antennas outside. This team took home the winners' trophy. (Photo by Bruce Paterson, VK3TJN)



How directional is a 44-element 2 meter Yagi? Foxhunters found out the hard way on a southern California convention T-hunt. (Photo by Tom Sneden, KE6VCR)

hidden. Very impressed, I asked if I had accidentally beaconed the fox's coordinates to the APRS network. He said no, and that he had only been using his HT with a rubber-duck antenna the whole time. Now that's skill!

Sometimes One Fox Isn't Enough

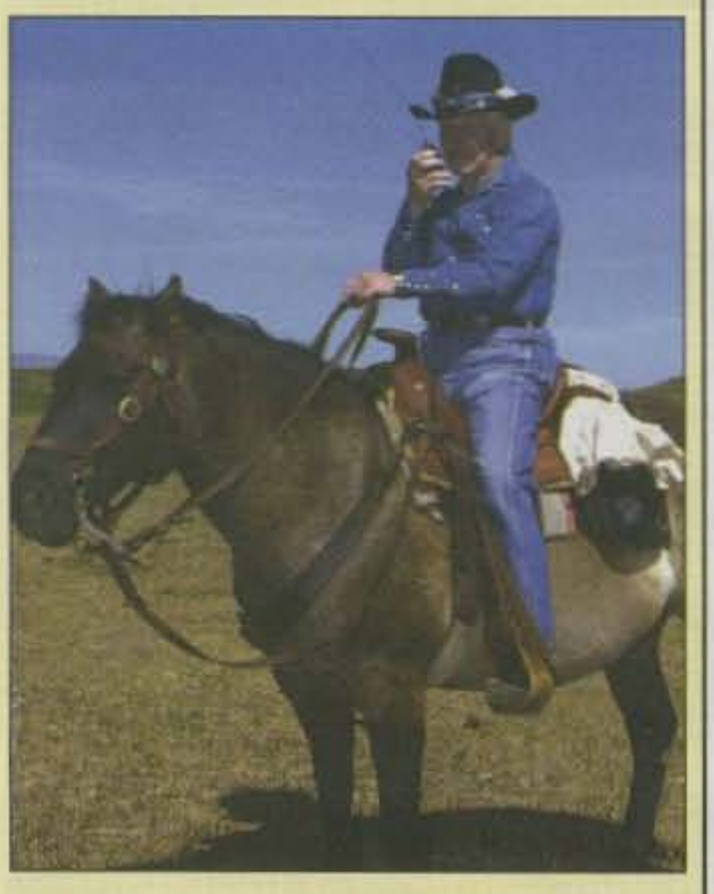
For the second year in a row, it was an international foxhunting weekend, with reports coming in from Canada and Australia. Tim Pekkonen, VE3UO, e-mailed about the "Tour of the County" foxhunt that started at Roblin Lake Park in the village of Ameliasburgh, Ontario. Like many others, these hunters encouraged safe driving by scoring their hunt entirely by mileage driven, and not by time. Wrote Tim:

Prince Edward County is an island, providing some natural boundaries for a foxhunt. The two local ham organizations, Prince Edward Radio Club and Quinte Amateur Radio Club, got together for the NFW. Peter Hodgson, VA3PKH; Dave Ward, VE3BIP; and I hid three transmitters on 146.565 MHz, squawking for one minute at a time in a three-minute cycle. Only the team of Brian Credico, VE3GRA; Adele Dibben, VE3PBD; and Judith Shaw, VA3JAS, found them all, driving almost 70 kilometers to do it. This was the first running of this event, and we are hoping to hold it annually.

Our friends "down under" also observed NFW with one of their "fair dinkum" all-day events. The Victorian Foxhunting Championships took place on May 11, as reported by Roger Lewis, VK3HRL. Although it was excellent, I can't include his entire report, because it was about the length of this article! That's because the Victorian Championships, like many of the mobile transmitter hunts of Australia, include multiple contests with multiple transmitters on multiple bands.

The day started with a not-too-hard 2 meter hunt for a vehicle concealed in a small forest, but that was just the warm-up. Next was a "three-legged race." No, not the picnic game where two people share a pair of trousers, but a hunt for three

On The Cover



Here's a fairly uncommon variation on "going mobile." Ray Snyder, WJ7V, of Lander, Wyoming operates his 2 meter handheld on horseback, and out in the wide-open spaces of rural western Wyoming, an HT probably has a pretty decent range. If Ray's local repeater is connected to one of the internet-based repeater linking systems, such as Echolink or IRLP, then his range while riding the range could be worldwide! The possibilities for your local repeater are laid out in detail in WV5J's article in this issue, "How the Internet Can Save Your Repeater" (page 26).

Another way to get really great range on a handheld is to operate it from space, something that hams who are astronauts have been doing regularly for nearly 20 years. The first ham radio operation from space, in late 1983, was from the shuttle Columbia, which was tragically lost in a re-entry accident on February 1. VHF Editor Joe Lynch, N6CL, reviews the history of amateur radio's close relationship with the manned space program in his "VHF-Plus" column on page 18. Ham radio played a vital role in the search for debris from Columbia in the largest long-term activation of amateur radio emergency communications since the attacks of September 11, 2001. Public Service Editor Bob Josuweit, WA3PZO, covers the ham radio response in detail in his column, which is our lead feature this month, on page 11.

Now here's a challenge to any other horse-equipped hams: This year's CQ National Foxhunting Weekend (page 52) will be held on May 10–11. How about a horseback-based hidden transmitter hunt? We'd love to hear about your results! (WJ7V cover photo by Larry Mulvehill, WB2ZPI. Columbia launch inset photo by Bob Hopkins, WB2UDC.)

separate foxes on three different bands: 70 cm, 6 meters, and 10 meters.

That would be plenty for many stateside foxhunters, but these Aussies were just getting started. After a spot of tea at a local church hall, which gave the foxes a chance to find new lairs, the hunters set out in their vehicles on the next event, where they were required to find five more foxes, in any order, one each on 23 cm, 70 cm, and 80 meters, and two on 2 meters.

Having worked up a good appetite through the afternoon, it was back to the church hall. A roast was waiting, along with decadent desserts. That was followed by an on-foot "sniffer hunt" outside to help everyone work off the food.

Now it was time for the five-leg night hunt. Foxes awaited on 2 meters, 70 cm, 6 meters, 10 meters, and another on 2, and they had to be found in that order. The final 2 meter fox was especially difficult, because it was on the side of a large volcanic crater, providing plenty of confusing signal reflections. Driving skills were put to the test, too. "The 'Land Crab' dash now features my

U.S. Has Best Year Ever of International-Rules Foxhunting

Beginning in the 1970s, hams in Europe developed a standard set of rules for all-on-foot foxhunting in large areas of woodland or farmland. The sport soon was recognized by the International Amateur Radio Union (IARU), which now sanctions the international competitions. It goes by a few names, including foxtailing, fox-teering, radio-orienteering, and ARDF.

At formal events there are separate hunts on separate days on the 80 and 2 meter bands. For each hunt five transmitters are placed in an area of 500 to 10,000 acres. Hunters are timed individually as they attempt to find all of them and get to the finish line before time expires. Fox transmissions are 60 seconds each, in rotating sequence.

There are nine age/gender categories, and those who find the most foxes in the least amount of time win the gold, silver, and bronze medals in these categories. National team medals are also awarded based on best individual performances. Team members may not assist each other on the courses.

The first World Championships (WCs) of ARDF took place in 1980 with just a few European countries represented. Since then the sport has spread to Asia and North America. WCs are now held in even-numbered years at sites approved by IARU.

In September 2002 twelve stateside hams traveled to the High Tatras of Slovakia for the Eleventh WCs to compete against more than 300 radio-athletes from 28 other nations. This was the third time that the U.S. was represented at the WCs, and we did better than ever before, coming within two minutes of bringing home our first WC medal. Nadia Mayeva from North Carolina took fourth place in her category, barely edged out by a YL from China. Gyuri Nagy, HA3PA/KF6YKN, placed fifth out of 50 in the hotly contested M40 (males ages 40 through 49) category. During the week before the championships Gyuri and his family had organized a one-week training camp for members of Team USA near his native hometown in Hungary.

Each country's team is limited to three persons per age/gender category, and for

OH-KY-IN's Foxhunt Coordinator, Dick Arnett, WB4SUV, is capturing a bronze medal in the over-50 age category for men at the 2002 USA ARDF Championships in Georgia. That earned him a position on ARDF Team USA for the 2002 World Championships in Slovakia. He and Bob Frey, WA6EZV, are co-chairs of the 2003 USA ARDF Championships, beginning July 30 near Cincinnati.

the first time, in 2002, more hams wanted to be on Team USA than there were spaces available. Final selection was based on performances in the first two USA national championships, 2001 in New Mexico and 2002 in Georgia.

For more information on Team USA and the sport of ARDF, including complete results of our performances in Slovakia and links to results of the Second USA ARDF Championships, go to <www.homingin.com>.

claw marks," John Nakulski, VK3BLN, commented. "Our driver (David Beard, VK3XAJ) overtook a mostly stationary SUV by driving off the bumpy track into 6 foot high grass—with totally unknown underlying topography!"

There hasn't been a NFW hunt of that magnitude here in the states so far (maybe in 2003!), but searches for a dozen or more transmitters in a day do happen here. Los Angeles area hams have occasional "free for all" hunts where each team hides one or more unattended transmitters in the morning, and then everyone tracks each other's signals for the rest of the day.

Hamfests and conventions provide excellent opportunities for large-scale mobile T-hunts. At the 2002 ARRL Southwestern Division Convention (HamCon) in Escondido, California, the San Diego area organizers outdid themselves. With $300 of total prize money at stake, the hunt had to separate the best from the rest, and it did. Tom Sneden, KE6VCR—with help from Joe Loughlin, KE6PHB; Tony Boegeman, WA6ZMZ; and Bruce Kripton KG6IYN—deployed seven 2 meter foxes, beaconing intermittently on 146.565 MHz. "We spent about 40 hours in preparing for the enjoyment of the hunters," Tom wrote.

The main T was in the Hellhole Canyon County Park area, about 14 miles from the starting point. It ran 35 watts into a 44-element Yagi. That's right, 44 elements, about 100 feet in length, suspended on ropes, lighting up Mt. Palomar and distracting the hunters away from the canyon. Along the way through the mountains and Indian reservations and along Lake Wohlford, alert RDFers could pick off the other transmitters, some of which ran as little as 20 milliwatts. Hunters were required to find as many of the seven foxes as possible and get back to the convention hotel within the time limit. Only two teams snagged the tags at all of them. The best mileage performance was by Steve Heinemann, N6XFC, and Deryl Crawford, N6AIN.

Seven non-synchronized foxes on one frequency definitely cause confusion and add to the challenge of the hunt. It's good practice for the next time you have to eliminate interference, whether malicious or accidental, that QRMs the users of your local repeater. A foxhunting group in Massachusetts gets similar practice by holding monthly T-hunts to simulate on-the-air emergencies such as jammers and stations in distress.

According to the group's website, "'The Hounds' is an unofficial, informal, unfunded, unsanctioned organization made up of radio-direction-finding hobbyists mostly from the Northern Berkshire Amateur Radio Club (NoBARC). It exists for no reason other than to let everyone else know how much fun we're having, and to try to coax them into coming along."

For NoBARC NFW 2002, Tim Ertl, KE3HT, simulated a party-crasher on the 146.91 repeater. The goal was for hunters to find him as quickly as possible, with signal reports and bearings from non-participants welcome. One ham, who happened to be atop Mt. Greylock, reported such strong signals that the hounds focused all attention on his area, even though KE3HT was on a hill far to the south. Everyone learned an important lesson about trusting their RDF gear more than the signal-strength observations of non-participants.

Try It on Foot

Mobile T-hunts are still the most popular form of RDF contesting among stateside hams. However, to many of them, no hunt is complete without some on-foot "sniffing" at the end. The NFW hunt that Ernie Howard, W8EH, put on for the OH-KY-IN Amateur Radio Society in the Cincinnati area satisfied

When the hunt is on foot, anyone of any age can take part. Standing behind Emily De Young after the OH-KY-IN ARC hunt are (left to right) Dick Arnett, WB4SUV; Janie Arnett; Bob Frey, WA6EZV; Brian De Young, K4BRI; and Ernie Howard, W8EH. (Photo by Elaine Howard)

the needs of both mobile and on-foot foxhunting fans. His main transmitter was high on a hill in French Park on the north side of Cincinnati, providing a strong signal to the hounds at the starting point.

Once at the park, there were five more transmitters to find on foot. It was much like a radio-orienteering event (see the sidebar), except that the foxes were all on different frequencies. "They were spaced 500 kHz and 1 MHz apart," W8EH wrote. "This made it troublesome for those with frequency-offset attenuators. Brian De Young, K4BRI, switched to hunting on the third harmonic to overcome this, but WB4SUV and WA6EZV continued to use their tape-measure Yagis with 500 kHz offset attenuators. K4BRI and his daughter Emily were the eventual winners."

"Our club incorporates transmitter hunts into many activities throughout the year," wrote OH-KY-IN's Foxhunt Coordinator, Dick Arnett, WB4SUV. "This includes YL hunts at the annual picnic and on-foot hunts at hamfest, Boy Scout JOTA, and ARDF events. We also have mobile fox, progressive, and night hunts. The monthly hunts have been held in sun, rain, snow, and ice for over 15 years. Our usual boundary is the I-275 loop, which encompasses parts of Ohio, Kentucky, and Indiana and is about 600 square miles."

Cincinnati is just one place where "foxtailing fever" has taken hold in recent years. Georgia hams and orienteers joined forces to host the Second USA ARDF Championships, April 19–21 at F. D. Roosevelt State Park near Pine Mountain. The competition got under way on Friday afternoon with a practice event, followed on Saturday by the main 2 meter hunt and on Sunday by an 80 meter hunt. In addition, there was a cookout on Friday evening, a spaghetti dinner on Saturday night, and an award ceremony following the 80 meter hunt. Laurie Searle, KG4FDM, did an outstanding job as the overall Meet Director. She was assisted by her OM, Sam Smith, N4MAP, who set the ARDF courses and supervised the starting lines.

Foxhunters from 14 states took part at Pine Mountain, including three from OH-KY-IN ARS. The Cincinnati hams paid special attention to how KG4FDM, N4MAP, and the other volunteers did their jobs, because OH-KY-IN will be staging the third National ARDF Championships from July 30 to August 3, 2003. IARU has designated this event as the Second IARU Region 2 ARDF Championships, so the Cincinnati hams expect visitors from all over the U.S., plus individuals from other countries in North America, Europe, and Asia.

The OH-KY-IN ARS Co-Chairs overseeing the plans are Bob Frey, WA6EZV, and Dick Arnett, WB4SUV. Both have a wealth of experience in the sport, having competed at the 2001 and 2002 USA National Championships, the 1999 IARU Region 2 Championships, and the 2000 and 2002 World Championships. Additional support will be provided by the Cincinnati Orienteering Group (OCIN).

The USA ARDF Championships are open to anyone at any foxtailing skill level, with or without a ham radio license. To simplify logistics for all competitors, especially for the anticipated visitors from Europe and Asia, group housing and local transportation will be available. OH-KY-IN ARS has arranged for a block of double-occupancy rooms at Havighurst Hall, a co-ed dormitory at Miami University in Oxford, Ohio, close to five buffet dining halls on the campus. As an alternative, attendees may arrange their own lodging and meals.

Regular radio-orienteering practice sessions are now taking place in southern California, Albuquerque (NM), and elsewhere to expose local hams to the sport and to help train advanced foxtailers. Why not include an all-on-foot event in your NFW festivities this year? Maybe you'll discover a future international champion in your midst.

Get Started Now

As this issue arrives, NFW 2003 is several weeks away, so there's plenty of time to plan your club's best foxhunting experience ever. Whether it's a hunt for multiple foxes, an all-on-foot event, new boundaries, new methods of scoring, or something else, let's make this year's NFW a time to try something different.

Afterwards write up the results and send them to me so that we can include them next time. Tell me the date of your hunt, what kind (mobile or on foot), number and frequency of transmitters, how the hunt was scored to determine the winners, plus the full (first and last) names and accurate callsigns of the hiders and the winners. Don't forget to include the name of your club and the city or area it serves. Readers also want to know what was unique about your hunt and what lessons (positive and negative) you learned from it.

The list of items to report is posted at my website, <www.homingin.com>, so you can copy it into your word processor and insert the details if that's convenient. If the report that is printed in your club's newsletter includes all the information, you can just send me a copy by electronic or postal mail. Also at my site you'll find suggestions for simple RDF equipment to get you and your club started.

As always, I eagerly await your reports and photos of NFW activities. Happy Hunting!

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digital connection

BY DON ROTOLO,* N2IRZ

History in the Making

The First Transatlantic HF Digital Voice QSO

"Kilo Foxtrot Six Delta X-Ray, this is Foxtrot Eight Kilo Golf Golf." So began the world's first transatlantic amateur radio contact using digital voice. On the morning of November 22, 2002 history was made. Digital HF voice became a reality.

Digital voice (DV) is nothing new. About a year and a half ago, *CQ* Editor Rich Moseson, W2VU, and I spent an afternoon playing with Alinco's then-new digital voice option on some of its FM handhelds. Before that, experiments with DV took place on the German high-speed packet network. Your digital cell phone uses digital voice. However, these applications, and others like it, use plenty of bandwidth. With this accomplishment, the relatively strict bandwidth limitations of the HF bands were maintained.

Photo A– Doug Smith, KF6DX, in the Ten-Tec shack. This was the USA side of the world's first transatlantic digital voice contact on HF radio, using unmodified Ten-Tec transceivers and Thales Communications' Skywave software. (Photo by Eric Guinn, AC4LS)

First, let's take a closer look at what exactly was accomplished just before last Thanksgiving, along with a brief look at the technology that was used. Then let's think about some of the implications for amateur radio.

A few weeks ago, I spent some time speaking with Doug Smith, KF6DX, one of the participants in that historic contact. Doug is a senior design engineer at Ten-Tec, Editor of the ARRL's technical journal, *QEX*, and Chairman of the League's Digital Voice Working Group (DVWG). His participation in the first transatlantic DV contact, made from Ten-Tec's headquarters in Tennessee, was in his volunteer role as DVWG chairman. What follows is based on our conversation.

Contact

It wasn't the first try. Since late summer amateurs in Paris and eastern Tennessee had been trying to get a new digital voice mode to work over transatlantic distances. They had been having some success, with words and phrases being copied, but it wasn't until that Friday in November that both callsigns and signal reports were exchanged, making it official. According to Doug, signals were S-5 to S-7, but the voice coming out of the speaker was almost as clean as an FM contact.

The contact between KF6DX and Didier Chulot, F5MJN (operating as F6KGG), was made with unmodified Ten-Tec equipment and PC soundcard software. Both sides were running about 100 watts with modest-gain antennas. Doug told me that most HF rigs can handle the digital voice signal; all that's really necessary is decent frequency response from about 300 Hz up to 3 kHz. The bandwidth can even be a bit narrower, at the expense of requiring a higher signal-to-noise ratio.

When I asked Doug to describe the audio, he said that it has an FM-like quality to it. He explained that the digital decoder ignores any QRM or QRN, giving the audio a relatively noise-free sound. According to subjective testing that was performed, the audio was rated with an MOS (Mean Opinion Score) of 3.5, better than the toll-quality (like a telephone) standard of 3.0. Unlike SSB or AM, digital voice doesn't degrade gracefully when signal conditions deteriorate. Basically, you either hear it well or not at all. Doug's tests showed that you need a signal-to-noise ratio of about 6 to 10 dB, similar to what typically is needed for SSB.

The Software

The Skywave digital audio software, written by Thales Communications of France, requires a modern PC and sound card for encoding and decoding the digital voice. Doug told me that we can expect the software to be released to the amateur community some time this year, and although it is called Skywave at the moment, the final product will likely be released under a different name. Although the price has not yet been determined, it should cost less than a decent antenna rotator or HF tribander.

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Thales Communications SA of France is a company providing equipment to the shortwave broadcast industry and a member of the DRM (Digital Radio Mondiale) consortium. DRM is a digital broadcasting standard for shortwave broadcasters (see below). It appears to me that the people at Thales recognized that there is a significant market in military and commercial HF radio users, so they developed a slightly modified version of the DRM standard. The most important modification, according to the description of the mode in the Jan./Feb. 2003 issue of *QEX*, was a decrease in bandwidth, allowing the signal to fit into the 3 kHz bandwidth so common on SSB channels. They also selected a vocoder optimized for voice, simplified some of the control functions, and enhanced robustness and error detection. *(A vocoder, short for "voice coder," brings voice frequencies into a range at which they can be efficiently transmitted in a narrow bandwidth.—ed.)*

It didn't hurt that some of the people at Thales happen to be hams. The DRM website notes that DRM is still in the testing phase, and they are actively soliciting radio amateurs to help with their reception testing. It is very encouraging to see that the value of ham radio is recognized internationally, and that fact wasn't lost on Thales. About a year and a half ago, they contacted KF6DX for some help with testing their HF version of DRM.

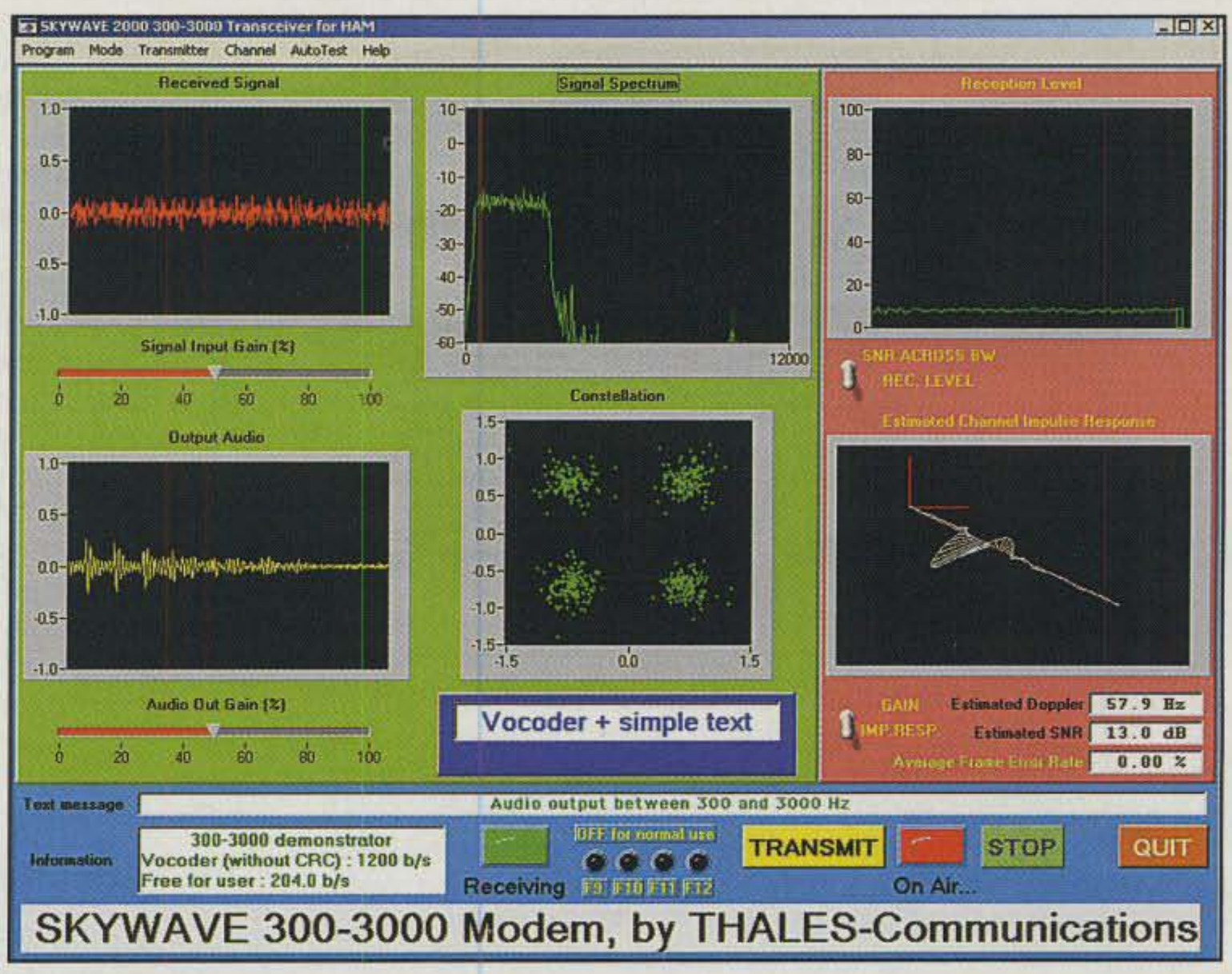

Photo B– A screen shot of Thales Communications' Skywave software. This application, which should become available later this year, was used for the first transatlantic digital voice contact late last year. The graphical features of the software allow the operator to monitor the performance of the radio system.

Technical Details

It all started a few years ago, when a consortium of national and international radio broadcasting authorities, broadcast equipment manufacturers, and broadcasters finally decided on a standard for digital SW broadcasting. The Digital Radio Mondiale standard was accepted by the International Telecommunications Union (ITU), and work could begin on implementing it. DRM is an intelligent and flexible approach to moving shortwave broadcasting into the 21st century.

Briefly, the DRM standard calls for an up-to-10-kHz-wide digitally-encoded signal, made up of dozens of relatively narrow carriers, kind of like 100 PSK31 signals all crammed together. Sophisticated coding techniques are used to keep these closely spaced carriers from interfering with each other. In the amateur version, a data rate of about 3600 bits per second can be maintained—better than 1 bit per second per Hz.

The basic signal, which for the broadcast standard is 4.5 kHz wide, carries

Photo C– With a few minor modifications, even my Heathkit SB-102 transceiver can be made to handle digital voice. The most critical modification involves replacing the too-narrow 2.1 kHz SSB filter with one having at least 2.5 kHz, ideally more. The Skywave digital voice software prefers a 3 kHz audio bandwidth (most newer rigs are okay) although a slightly narrower bandwidth can be used, if you have a high enough signal-to-noise ratio.

not only the program information (usually voice or music), but also information to control the receiver (which decoding scheme to use, etc.) and program content information (artist, title, upcoming programs, etc.). Most broadcasters will use wider-bandwidth versions of the DRM standard, but the program and control information will still reside in the relatively narrow basic carrier. The encoding scheme can be changed, even on the fly, for greater resistance to interference, with the receiver able to track these changes instantly. Broadcasters with wider bandwidth available will use it to improve signal fidelity as well as robustness.

One nifty trick DRM can use is a superposition of a compatible AM signal atop the digital signal so that listeners with traditional analog radios and those with digital radios can both hear the programming on the same channel. Another trick to increase the perceived audio fidelity is Spectral Band Replication (SBR). The high-frequency portions of an audio signal are mostly noise-like, kind of a hissing sound. SBR encodes the loudness and duration of these sounds, and at the receiver, the SBR decoder just kind of hisses at the right moments. The effect is amazing: Your mind really hears a much wider audio range than is actually present. To experience this for yourself, try the audio samples at the DRM website, <www.drm.org>.

To Probe Further

If you are interested in more of the technical details, there are a few resources you should review. The most detailed resource is the DRM standard itself (where most of this information came from), available from the EDSI website <www.edsi.org> (search on "DRM"). There's a link to the EDSI site from the DRM site <www.drm.org>. The DRM website is full of information, including audio samples, and even a place for amateurs to sign up to participate in reception testing. (It is gratifying to see that DRM places a high value on the technical expertise of the amateur community).

Of course, you should also have a look at the article by Cédric Demeure and Pierre-André Laurent in the Jan./Feb. 2003 issue of *QEX* (<www.arrl.org/qex>). Unlike EDSI and DRM, the article also explains the adaptations that were done for the amateur and HF version of the system. Some of the modifications to the DRM standard include changes to accommodate the PTT (Push To Talk) nature of HF communications, the reduction in signal bandwidth, selection of a voice-only digital encoder, and removal or simplification of some of the features in which mainly broadcasters would be interested.

Finally, you can take a look at the latest edition of TAPR's Packet Status Register, available on the TAPR website <www.tapr.org/PSR>. A short article (written by yours truly) attempts to explain the DRM standard and its amateur cousin in simple terms. Although I admit that some of the explanations are not precisely accurate, the liberties taken are not significant, and they make it a little easier to conceptualize how the digital voice system works. Read it first, then the *QEX* article, and then review the DRM website, and you'll end up with a good understanding of the really ingenious technology at work here.

What Does It Mean For Ham Radio?

The digital revolution started quite some years ago, but it's been picking up steam in recent years. Witness the home computer, packet radio, and the internet. It's kind of exciting to realize that we're at just the beginning. Information transfer is the next great leap for humanity, and we're in at the ground floor.

What does this historic contact mean for amateur radio? Well, one of the first things that comes to mind is that we now have a new mode to play around with. We can start learning about digital voice, its advantages and disadvantages. This will keep us occupied for a little while, but there's much more than meets the eye. Some of the more subtle possibilities bear investigation.

One of the features of this digital voice system is that the specific encoding scheme can be changed on the fly. The detailed information required by the receiver is encoded into the signal in a standardized format, so the receiver can also switch modes at any time, automatically directed by the transmitting station. Say the signal is getting weak, as determined by an increase in the Bit Error Rate (BER). The receiving station can let the transmitting station know and various actions can be taken. For example, the transmitter can increase power or switch to a more robust encoding scheme. Perhaps the entire contact can move to a more favorable frequency, or even a different band—all automatically, all on the fly, all completely transparent to the users.

Do You Need Software?

Here's an interesting offer: A reader, who happens to be a software professional and a ham, is looking for a software project. It should be something useful to a wide audience, and of course be related to amateur radio. It also shouldn't be a re-hash or minor change to something that already exists, like another logging program. No sense reinventing the wheel.

This reader has considerable experience programming in DOS and Windows®, and is also interested in learning more about Linux. In the amateur world, he has written a moderately popular contest logger, which is still in use, as well as dabbled in satellite trackers, propagation predictors, and test study programs.

To avoid being inundated with requests, he prefers to remain anonymous for now. If you have any ideas for software you'd like to see, and are willing to commit to working with a software developer to define what the software should do, please drop me a note and we can discuss it.

The control of the receiver by the transmitting station brings up some interesting possibilities: trunking-radio-type frequency usage, enhanced spectrum utilization, received audio quality feedback, automatic power control.

The digital voice software can also pass small amounts of data, piggybacking on the main signal. What's envisioned is perhaps a few hundred bits per second. While that's not enough to send large files, it would be easy to encode your callsign or your QSL information. During a contest you might actually log yourself in the other station's log! (Hopefully, they'll do the same.) Now that would simplify logging quite a bit, wouldn't it?

The auxiliary data stream has other possibilities as well. Doug Smith, KF6DX, offered a few examples in our recent conversation: "You could send a directed CQ, using [the auxiliary data stream] to include your areas of interest." Want to talk about antennas or feedline? Just include that message in your signal. "You can also use it to send a file or SSTV image. The slow-scan people won't even have to stop talking to send an image." That's because the digital voice signal and auxiliary data stream are sent at the same time.

Part 97

Now I can just hear hundreds of digital-savvy readers saying to themselves, "Gee, if I didn't send any voice at all, then I could use the whole signal for data. That would sure be a lot faster than SSTV or even 300 baud packet." Yes, it sure would be faster, but it would also violate Part 97.307(f)(3) of the FCC rules, which specifies that the baud rate of digital signals below 28.0 MHz must not exceed 300 bauds.

Okay, I can now hear *all* of you saying "Hey, that means digital voice isn't legal on HF, since it's much faster than 300 baud." Nope. The FCC traditionally has looked at signal *content* as opposed to encoding method. In this case, digital voice is a phone emission and isn't subject to a data-rate limitation. Sure, the supplemental data discussed above has a limit, but not the voice signal (other than the 3 kHz bandwidth, of course). If you doubt this interpretation, ask yourself if it is legal to transmit (digitized) music via packet. No, it clearly is not legal, which in my opinion demonstrates that the content of the signal is what is important, not necessarily the mode.

What's New is Old

Digital voice over HF is a new old idea. While digital voice isn't new, getting a better-than-toll-quality voice signal into a 3 kHz HF channel is extraordinary. Just a few months ago, the first transatlantic HF contact using digital voice was made. Using a modified version of the Digital Radio Mondiale broadcast standard, amateurs will soon have an extraordinary new mode available, the possibilities of which are only just starting to be explored. The rise of the gigahertz PC processor, along with the ubiquitous sound card, has shown its power to the amateur community for some years now. This new mode, while still experimental, shows that the power of these tools is only limited by the imagination.

Can you imagine other uses or advantages of digital voice, or the auxiliary data stream, that I haven't mentioned? I've touched upon just a few ideas, admittedly the more obvious ones. With the huge diversity of the *CQ* readership, there must be literally thousands of new and useful ideas on how this technology can be used. Please e-mail or write to me, even if you're not sure about your idea, and we can discuss it. I'll use the most interesting ideas in a future column.

In the February issue I mentioned that I would offer an overview of the various HF modes this month. Obviously, that didn't happen. At the last minute I decided that the historic and exciting digital voice contact last year would be more interesting, and I hope you agree. To get ourselves back on track again, in the June issue we will indeed take a look at the various HF digital modes. Until then,

73, Don, N2IRZ

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magic in the sky

BY JEFF REINHARDT,* AA6JR

Highs and Lows—Binaries, Hilltops, and Eagles

In our last visit we discussed what role digital voice communications may have in ham radio. I received some comments to share with you. The first is from a person employed by a manufacturer and distributor of amateur radio gear in the U.S. I have not included his name, as it serves no purpose to associate his comments with his employer.

"I think the critical-mass element in pushing ahead with digital voice is that the customers really don't know what it would bring to the table to make their communication 'better' compared to what they have today with their 50 watt FM analog radios, and I am not sure I have an answer."

Another lengthier response was received from Peter Chadwick, G3RZP. Peter's take includes some technical elements that are food for thought:

> I must confess that I'm very dubious about this digital stuff. Having said that, I've 'done my time' on digital radio, as they say. I was a member of IEEE802.11 on Wireless LANs back in the early days, and I chaired the European Telecommunications Standards Institute (ETSI) group that produced the PHY layer standard for the Hiperlan 15 GHz RLAN standard. In fact, I haven't worked professionally on an analogue RF system since 1991.
>
> Where I query digital voice for amateurs is in terms of coverage. If we take a 30 kHz FM system, we can get a 12 dB SINAD from a detector C/N of 3 dB; in fact, you need to do this for AMPS (cell phones). I haven't found a digital system that can give you a low enough BER (Bit Error Rate) to do that in the same bandwidth. Sure, given a higher SNR (Signal-to-Noise Ratio), digital can sound better—although GSM doesn't seem to have the same speech quality as the analogue system it replaced. And, of course, the digital system is either there or it isn't—no fading, but still just about usable to communicate with. For cellular applications, the co-channel rejection can be a great help, but amateurs aren't generally too bothered. Indeed, judging by the comments on both sides of the pond, 2 meter channels are so quiet these days that co-channel isn't a problem. So I have to ask, "What advantage is there in digital voice for the amateur service? Is it better in terms of SNR, weak-signal performance, multipath, or power consumption?

Again, much of amateur radio's *raison d'etre* is our demonstrated ability to conduct and support emergency communications. Many believe it is that function which justifies keeping our service around, along with the (valued) spectrum we occupy. With Homeland Security now a cabinet office with sweeping responsibilities, ham radio has been mentioned as an element in that agency's response matrix.

A shift to non-compatible digital systems on the ham bands could threaten our ability to pass emergency traffic in a dependable manner, and with it, our usefulness.

However, are there other reasons to consider going digital, in whole or part? In a strange twist of irony, is technology passing us by? Your thoughts on this topic are most appreciated.

Any discussion of digital must include the potential consequences. A recent police chase in Tennessee may have ended in tragedy because one responding agency had digital communications and another did not. Communications seem to have become confused, and as a result, a police vehicle apparently was unaware that a helicopter was tracking the chased vehicle and thus ground units could back off the high-speed effort to capture the subject. The pursuit ended in a fatal accident.

That's one reason I believe we all need to be "on the same page" regarding digital.

Vanishing Hilltops

The ideal location for a VHF/UHF repeater is usually somewhere high. Hams have shown ingenuity in placing repeaters on broadcast towers, on the tall buildings of New York and other cities, atop water tanks, and on hilltops.

Until recently in southern California, it was not unusual to find at least one ham repeater on just about every significant hilltop or mountain. Commercial repeaters, microwave links, and paging transmitters were among the many users often co-located on these sites, along with public-safety agencies. With the explosion of wireless during the last decade, real-estate investors bought up many of the privately owned mountaintop communications facilities. Also, the National Park Service placed severe restrictions on land it controls, in fact, closing off several sites formerly used for communications, returning them to their natural state.

The commercial real-estate investors are profit-driven (that's the very nature of their business) and seemingly concerned with wringing every possible cent out of their sites. In the old days of private hilltop ownership, hams often got a "free ride" at these sites, some of which even were owned by hams. Others may have paid rent, but at a reduced rate. Many ham operations also used power donated by others or creative power sources such as wind and solar. However, change has come, and many ham repeaters have been told to pay rents at the same rate as commercial operators or move out. In addition, private ham repeater owners or clubs are being told to obtain a commercial liability insurance policy of $1 million, the premiums for which are quite steep. Individual power metering is another requirement at some sites, along with building (electrical) permits and inspections. Tower-climbing certification, while a good idea, is also a new requirement at most sites. An alternative is the hiring of a contract climber, which some sites are requiring no matter what. All these requirements are costly. As a result, many repeater operations are scrambling to find space at other locations or just folding up shop.

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Government is also in the mix. As mentioned, the National Park Service reportedly has been closing down radio sites and not allowing new ones. In other areas there are restrictions on constructing new towers and tower space has become a restricted commodity. Where this happens, operators are being required to use "common feed" antennas, which, like many solutions, solves one problem but opens a whole new set of others. Some commercial operators reportedly are refusing to share an antenna with hams because of fears related to (supposedly) inferior equipment or (perceived) sloppy maintenance and/or engineering.

As many trends start in California and move east, consider this a "warning shot" to your favorite repeater. Indeed, other areas are already experiencing similar problems. Repeater operators would be wise to cultivate "warm and fuzzy" relationships with hilltop owners and/or with municipalities that see the value of our emergency-service capabilities.

Not long ago I wrote a PowerPoint presentation on how to pitch a repeater location to your local government. If you want a copy, it's yours free with an SASE of sufficient size for a CD computer disk (the file is too large to e-mail). Sending a blank CD-R or CD-RW will also help keep my costs down. We will also try to post a copy for downloading on the *CQ* website.

If you have creative suggestions on locating or maintaining a repeater in a coveted location, let me know and I'll pass them along through this column. This is a problem that is not going to go away. We need to deal with it through creativity, tact, diplomacy, and good ol' ham ingenuity.

Eagles Fly High

Recently I had the pleasure of attending a Court of Honor, where Eagle Scout status was conferred on an extraordinary young man, Ronnie Seese, KE6TCQ. Ham radio was a key element (pardon the pun) in Ronnie's ascension to Eagle. With the love, support, and encouragement of his parents (his dad is N6MBR) and others, Ronnie proved worthy of Scouting's highest rank. Taking a lesson from the Eagles, however, we recognize that superior achievement is not an end in itself; it is the beginning of a new set of challenges. I hope you're lucky enough to speak with Ronnie and other Eagles on your transceiver. They, along with you, are wonderful additions to the Magic In The Sky.

73, Jeff, AA6JR

Heading Toward WRC-03: Entering the Home Stretch

BY FREDERICK O. MAIA,* W5YI

The Second Conference Preparatory Meeting (CPM) to the 2003 World Radiocommunication Conference (WRC-03) was held between November 18 and 29, 2002 at the International Telecommunications Union (ITU) in Geneva, Switzerland to prepare for the upcoming conference, which will be held between June 9 and July 4. More than 1000 delegates from around the world reviewed and approved of the draft CPM Report, a huge volume more than 500 pages long. The document, which becomes the framework of WRC-03, spells out different methods to satisfy the various agenda items and the advantages and disadvantages of each.

The text of the CPM Report was developed from a consensus of more than 150 contributions from the various administrations and Sector Members that will be attending WRC-03, as well as assorted ITU committees and study groups. (A Sector Member is an ITU-approved member of industry or the public who has an interest in telecommunications and its regulation. The International Amateur Radio Union, or IARU, is an ITU Sector Member.) The CPM recommendations are not binding, and additional "methods" to satisfy each agenda item may be brought up at the conference itself.

The CPM Report has now been finalized and in January 2003 was delivered to the member countries and Sector Members around the world. It becomes the consolidated framework of WRC-03 and represents the best information on technical, operational, regulatory, and procedural issues relevant to the agenda available at the time of its preparation

The CPM Report comprises seven chapters, each of which is overseen by a "Chapter Rapporteur." Amateur radio issues are covered in Chapter 5, along with maritime mobile and MF/HF broadcasting services.

The Rapporteur for Chapter 5 is the USA's Dr. H. Don Messer, who is Chief of Voice of America's Office of Engineering, Spectrum Management Division, and a director of the International Broadcasting Bureau. (The IBB provides the administrative and engineering support for U.S. government-funded non-military international broadcast services and is the parent of the VOA.)

The major agenda item of interest to hams at WRC-03 is item 1.7, which proposes several changes to Article 25 of the international Radio Regulations. This is the article that deals with amateur radio. Here is what the CPM report has to say on this part of the WRC agenda. Each segment consists of the proposal followed by a brief assessment of advantages and disadvantages of making the proposed change:

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Possible Revision of Article 25

Section I—Amateur Service

Article 25.1: The conference may consider the suppression (elimination) of No. 25.1 prohibiting international communications under certain conditions. It is the sovereign right of each Member State to regulate its telecommunications. If an administration chooses to prohibit international communications, it should be the concern of the administration to enforce this rule and not a general obligation.

Advantages:

Simplify the Radio Regulations.

Clarify the status of international radio communications following a disaster.

Reduce the cost of ITU paperwork regarding the notification for the objection of such communications.

Still retain the sovereign right of the State to regulate its communications.

Disadvantage:

None have been identified.

Article 25.2: The conference may consider simplifying and shortening the text of No. 25.2, which defines the content of amateur communications. An example of such modification could be:

25.2 Transmissions between amateur stations of different countries shall be limited to communications incidental to the purposes of the amateur service, as defined in No. 1.56 or of a personal character. Transmissions between amateur stations shall not be encoded for the purpose of obscuring their meaning.

Advantages:

Simplify the Radio Regulations.

Clarify the ambiguous wording.

Take into account changes in telecommunications.

Eliminate obsolete restrictions while retaining the non-commercial nature of the service.

Disadvantage:

None have been identified.

Article 25.3: *(Note: This proposal, if adopted, would eliminate the current restrictions on international third-party communications unless a government specifically objected to it.—ed.)*

Method A: The Conference may further con-

sider revising No. 25.3 with regard to international communications. As several administrations currently permit this kind of communication, the general rule of the Radio Regulations should be to allow it unless an administration chooses to prohibit it.

An example of such modification could be:

25.3 2) Amateur stations may be used for transmitting international communications on behalf of third parties unless objected to by one of the administrations concerned.

Advantages:

Simplify the Radio Regulations.

Removes the burden for the administration.

Disadvantage:

None have been identified.

Method B: The conference may consider suppressing No. 25.3 with regard to international communications. As some administrations currently permit this kind of communication, the general rule of the Radio Regulations should be to allow it unless an administration chooses to prohibit it.

Advantages:

Simplify the Radio Regulations.

Removes the burden for the administration to enter into specific bi-lateral or multi-lateral international agreements to permit the transmission of third-party communications by amateur stations.

Other regulations are sufficient to protect the non-commercial nature of the service.

Disadvantage:

None have been identified.

Article 25.4: In consequence with the above proposals the conference may consider the suppression of No. 25.4.

Advantage:

Simplify the Radio Regulations.

Disadvantage:

None have been identified.

Article 25.5: *(Note: This is the regulation that currently requires Morse code proficiency in order to operate below 30 MHz.—ed.)*

Method A: The question of whether there should be a domestic Morse code requirement should be left up to administrations. In consequence the conference may consider the suppression of No. 25.5.

Advantages:

This would give administrations fur-

ther flexibility in revising and updating the qualifications related to the use of Morse code.

Abolition of the requirement for the knowledge of Morse code in the HF bands will increase the number of radio amateurs available for communications during disaster situations.

Abolition of the requirement for the knowledge of Morse code in the HF bands will produce a significant increase in the number of radio amateurs licensed to operate below 30 MHz. This possibly will encourage newcomers to enter the service.

May encourage the development of Amateur Services.

Disadvantages:

Abolition of the requirement for the knowledge of Morse code in the HF bands will produce a significant increase in the number of radio amateurs licensed to operate below 30 MHz, possibly leading to a congestion of the amateur bands.

Eliminating the requirement for knowledge of Morse code might lower the level of proficiency.

Method B: The conference may consider modifying No. 25.5 in such a way that Morse code is no longer mandatory, but if an administration chooses to require Morse code, it should be the concern of the administration to apply such a rule and not an international obligation. An example of such modification could be:

25.5 3 1) Administrations shall determine whether or not a person seeking a license to operate an amateur station shall prove that this person is able to correctly send texts in Morse code signals.

Advantage:

Encourages the maintaining of the Morse code skill in the amateur services.

Disadvantages:

Discourages a global harmonization of amateur services.

May discourage the development of amateur services.

Article 25.6

Method A: The Conference may consider modifying No. 25.6. An example of such modification could be:

25.6 2) Administrations shall verify the operational and technical qualifications of any person wishing to operate the apparatus of an amateur station.

Advantage:

Simplifies the Radio Regulations.

Disadvantage:

None have been identified.

Method B: The conference may consider modifying No. 25.6 such that Recommendation ITU-R M.1544 becomes mandatory through the principle of incorporation by reference. See Resolution 27 (Rev.WRC-2000).

[Note: Drafted by the International Amateur Radio Union (IARU) and approved by the ITU, Recommendation ITU-R M.1544 recommends that administrations adopt a series of minimum qualifications for all radio amateurs in all countries. Specifically, the document recommends that at a minimum, any person seeking an amateur license should demonstrate theoretical knowledge of certain specific topics in the areas of radio regulations, methods of radiocommunication (including radiotelegraphy), radio system theory, radio emission safety, electromagnetic compatibility, and avoidance and resolution of radio frequency interference. The recommendation has been sent to all ITU member states for consideration.]

An example of such modification could be:

25.6 2) Administrations shall verify the operational and technical qualifications of any person wishing to operate

an amateur station. A person seeking a license to operate an amateur station shall be required to demonstrate a knowledge of the topics specified in Recommendation ITU-R M.1544.

Advantages:

Incorporation by reference of Recommendation ITU-R M.1544 establishes a minimum international standard for amateur licensing.

This approach would give administrations some increase in flexibility in revising and updating the qualifications as appropriate in the context of rapidly evolving communications technology.

Disadvantages:

Incorporation by reference may result in confusion or conflict between the version incorporated and any updated version.

The Recommendation does not lend itself to incorporation by reference.

This approach would remove flexibility for administrations in revising and updating the qualifications as appropriate in the context of rapidly evolving communications technology.

Method C: The conference may consider modifying No. 25.6 such that Recommendation ITU-R M.1544 becomes non-mandatory through the principle elaborated in 6 of Annex 1 to Resolution 27 (Rev. WRC-2000). An example of such modification could be:

25.6 2) Administrations shall verify the operational and technical qualifications of any person wishing to operate an amateur station. Standards of competence are contained in the most recent version of Recommendation ITU-R M.1544.

Advantage:

Provides flexibility to administrations, as the Recommendation can be updated to a later version as desired since it is non mandatory text.

Disadvantage:

Administrations might lower the minimum competence level by either modifying or failing to implement the Recommendation.

Article 25.7: The conference may consider the suppression of No. 25.7.

Advantages:

Simplify the Radio Regulations.

Redundant. See No. 15.2, which provides that "Transmitting stations shall radiate only as much power as is necessary to ensure a satisfactory service."

Disadvantage:

None have been identified.

Article 25.8: The conference may consider the suppression of No. 25.8, which is redundant with Nos. 3.6 and 3.7.

Advantages:

Simplify the Radio Regulations.

The text reiterates concepts included generically in the Radio Regulations and applicable to all radio services.

Disadvantage:

None have been identified.

Article 25.9: The conference may consider the suppression of No. 25.9, which is redundant with Nos. 19.4 and 19.5.

Advantage:

Simplify the Radio Regulations.

Disadvantage:

None have been identified.

Section II—
Amateur-Satellite Service

Article 25.10 6: The provisions of Section I of this Article shall apply equally, as appropriate, to the amateur-satellite service. (No change)

Article 25.11: The conference may wish to simplify the provision of No. 25.11. An example of such modification could be:

25.11 7 Administrations authorizing space stations in the amateur-satellite service shall ensure that sufficient earth command stations are established before launch to guarantee that any harmful interference caused by emissions from a station in the amateur-satellite service can be terminated immediately (see No. 22.1).

Advantages:

Simplify the Radio Regulations.

The first sentence is redundant; see No. 22.1.

Procedures for notification to the Bureau are given in Resolution 642 (WARC-79).

Disadvantage:

None have been identified.

Additional Provisions to Article 25

New provision concerning amateur communications in support of disaster relief.

The conference may consider adding a provision to the regulations concerning amateur communications in support of disaster relief. An example of such a provision could be:

25.X Administrations are urged to take the necessary steps to allow amateur stations to prepare for and meet communication needs in support of disaster relief.

Advantage:

Recognizes the value of amateur communications during disaster situations.

Disadvantage:

None have been identified.

New provision permitting amateurs from another administration to operate.

The conference may consider adding a provision to the regulations which permits administrations to allow amateurs of other administrations to operate while temporarily in its territory. Article 18 requires that all transmitting stations be licensed but provides for special arrangements in certain circumstances. None of these special arrangements apply to the amateur and amateur-satellite services. An example of such a provision could be:

25.XX Administrations may determine whether or not to permit a person who has been granted a license to operate an amateur station by another administration, to operate an amateur station while that person is temporarily in its territory, subject to such conditions or restrictions it may impose.

Advantages:

Allows such an operation.

The proposed addition makes it clear that administrations are authorized and encouraged to permit visiting amateurs to operate without being required to issue them a license while protecting the prerogatives of administrations.

Disadvantage:

None have been identified.

Agenda Item 1.7.2

"review of the provisions of Article 19 concerning the formation of callsigns in the amateur services in order to provide flexibility for administrations"

Composition of national identifiers: At the present time, some countries cannot have amateur callsigns because of the restriction imposed by No. 19.49 when the letter O or I is used as the last character of the national identifier. Modes of radiocommunication in current use in the amateur services are such that there is no difficulty distinguishing between the numbers 0 and 1, and the letters O and I, respectively.

Methods to satisfy the agenda item: The conference could consider suppression of No. 19.49 c).

Advantage:

Suppression of No. 19.49 c) would remove the restriction for some identifiers, thus adding more flexibility for administrations, especially those unable to have amateur callsigns at present.

Disadvantage:

None were identified.

Composition of callsign suffixes: No. 19.68 limits amateur and experimental callsign suffixes to "a group of not more than three letters." This restriction places a limit on the number of possible callsign combinations and their formulation and prohibits the use of certain combinations for special events.

Methods to satisfy the agenda item: The conference may consider revising No. 19.68 so that more flexibility is allowed for administrations to issue callsigns. An example of such modification could be:

19.68 30 1) One character (see No. 19.50.1) and a single digit (other than 0 or 1), followed by a group of not more than four characters, the last of which shall be a letter, or two characters and a single digit (other than 0 or 1), followed by a group of not more than four characters, the last of which shall be a letter.

Advantage:

Such a change would considerably

expand the number of possible callsign combinations and provide administrations with increased flexibility without creating conflict with the callsign formats specified for stations in other services.

Disadvantage:
None were identified.

Addition: 19.Y On special occasions for temporary use, administrations may waive the requirement of the callsign to contain not more than four trailing characters.

Advantage:
Provides additional flexibility for administrations.

Disadvantage:
None were identified.

Agenda Item 1.7.3

"review of the terms and definitions of Article 1 to the extent required as a consequence of changes made in Article 25"

Studies conducted to date have not indicated the need for any consequential changes to Article 1.

U.S. Update

On January 15, the FCC's WRC-03 advisory committee released its recommendations for U.S. positions at the conference. It recommends letting each country decide whether to require code proficiency for HF operation; supports the proposal to eliminate the blanket prohibition on international third-party communications unless both governments involved have agreed to allow it; and supports permitting hams licensed anywhere to operate temporarily in any other country (except those which object) without the need for additional licensing.

On the issue of realigning the 40 meter band to reduce interference between hams in North and South America and broadcasters in the rest of the world, the FCC Advisory Committee report reflected the disagreement within the U.S. government over the proposals currently on the table. The FCC supports realignment, while the National Telecommunications and Information Administration (NTIA)—the FCC's equivalent for federal government communications—opposes any changes.

Finally, the advisory committee recommended U.S. opposition to a proposal for an international allocation to the Earth Exploration Satellite Service in the 420–470 MHz band.

The final U.S. positions will be adopted prior to the beginning of the World Radiocommunication Conference in June. 73, Fred, W5YI

Mobile Mania

BY DAVE INGRAM,* K4TWJ

The sheer fun and exhilaration of mobiling—of putting together a personally attractive setup and taking HF on the road—never wanes but just gets better with each passing year. Today's progressive-minded amateurs are also expanding and customizing their mobile rigs in various ways that we all enjoy studying. In light of that fact, this month's column recognizes the cool-going mobile setups of VE3JC and K2ACB, plus highlights LDG's neat RT-11 automatic antenna tuner and some new "super antenna" treats from W6MMA. We will also squeeze in some additional notes and tidbits everyone should find helpful along the way, so let's get rolling—err—started!

Photo 1– Now this is big-time mobiling for sure! The setup belongs to John Cumming, VE3JC, and it has traveled hundreds of miles, worked DX galore, and is also easy to duplicate. Note the Elecraft K2 transceiver sits in a handlebar-mounted and suspension-braced bracket. An Outbacker antenna is mounted to an aluminum support tube attached with L brackets to the frame of a Gary Fisher Big Sur mountain bike. (Photos 1, 2, and 3 via VE3JC)

Eight-Band Bike Mobile

Remember John Cumming, VE3JC, and his classy bicycle mobile setup featured in this column a few years ago? John now has an upgraded/second-generation bicycle mobile station, and since it supports good exercise plus heart-healthy hamming, we are sure you will enjoy seeing it (photos 1, 2, and 3).

The setup consists of an Elecraft K2 SSB/CW transceiver with an Outbacker "Perth" mobile antenna mounted on 24-speed Big Sur mountain bike.

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Photo 2– A closer look at the "gear end" of the VE3JC setup shows the Elecraft K2 secured to its support bracket with bungee cords. Note the mic on the boom, the tiny K9LU "Bulldog" iambic paddle on end of the right handlebar, and the tip of the parking stand rod on the left handlebar.

Photo 3– A custom water-repellent cover protects the transceiver during inclement weather or when traveling on dusty roads. Rig is powered from an internal battery pack, and an auxiliary battery pack rides in the saddlebag.

The antenna is supported by a mirror-mount bracket attached to an approximately 7 foot aluminum tube, which in turn is bolted to the bike's frame, seat bracket, and pannier rack with angle brackets and U bolts. This "front, middle, and rear" mounting arrangement is quite stable, and the long aluminum mounting tube also serves as an effective counterpoise or ground radial for the antenna. In addition, a short jumper strap connects the aluminum tube to the K2 transceiver so the complete setup has a single low-resistance ground system. Whether mobile in a car or on a bicycle, incidentally, this common ground system makes a noticeable difference in overall station performance.

I have talked with many amateurs who used mag-mounted antennas and/or accessory-socket-powered rigs lacking ground straps at *both* antenna and rig, and problems always developed. Sometimes SWR was high, sometimes bandwidth was narrow, and sometimes on-board computer "hash" interfered with reception. Sometimes the vehicle stalled or stumbled from RF feedback when transmitting (sound familiar?). I've said it before, friends, but maybe it warrants repeating: Never rely on a power cable's negative lead or assume that grounding only one end of a coax cable is sufficient. Solidly ground the transceiver and the antenna (and with separate straps) to the vehicle's metal frame or counterpoise for best results.

Looking closer at the VE3JC setup, John mounted a small metal deflector atop his K2 to direct audio toward him and sidestep the need for headphones (a good, safe biking touch). He also adapted two ski poles and a boom-to-mast bracket from an old beam to serve as a handlebar-stabilizing stand for the bike. The poles are carried clamped to the antenna's mounting tube when riding.

John is an active member of two groups that support ultra-light hamming—the Bicycle Mobile Hams of America (<www.LaFetra.com/BMHA/>) and the HF packers (<www.hfpack.com>). If you enjoy hamming outdoors to any degree, joining either or both of these fine groups is a great idea. Go for it! If you would like to ask John some special questions about his setup or bicycle mobiling in particular, you can e-mail him at <jbcumming@wwdc.com>. Thanks for sharing the views, John!

Disappearing Mobile

Alan Brennglass, K2ACB, and I had a QSO on 20 meters a few months ago,

and his mention of a "disappearing" rig piqued my curiosity. Alan sent some photos of his setup afterwards, and they vividly illustrate what one can accomplish with some creative imagination (photos 4, 5, and 6).

A Yaesu FT-100 and ATAS multiband antenna grace his 1999 Honda Odyssey van in a quite low-profile manner. The transceiver's control head is mounted in a medium-size accessory tray on the center console, and the antenna's mast is secured in place with a popular Diamond K-400 trunk-lip mount. Alan says he and his XYL share the van, plus he occasionally must leave it parked in the Manhattan area of New York City and an out-of-view transceiver is vital for security.

Study Alan's photos for a couple of minutes, and then take a close look at the accessory tray or even the center console's storage box in your own vehicle. One or both of those spots may prove ideal for covertly mounting your own mini-transceiver. Every amateur needs a good HF mobile rig, right? If you have questions for Alan about his setup, incidentally, you can reach him at <k2acb@arrl.net>. Thanks, Alan. Keep on mobiling in style!

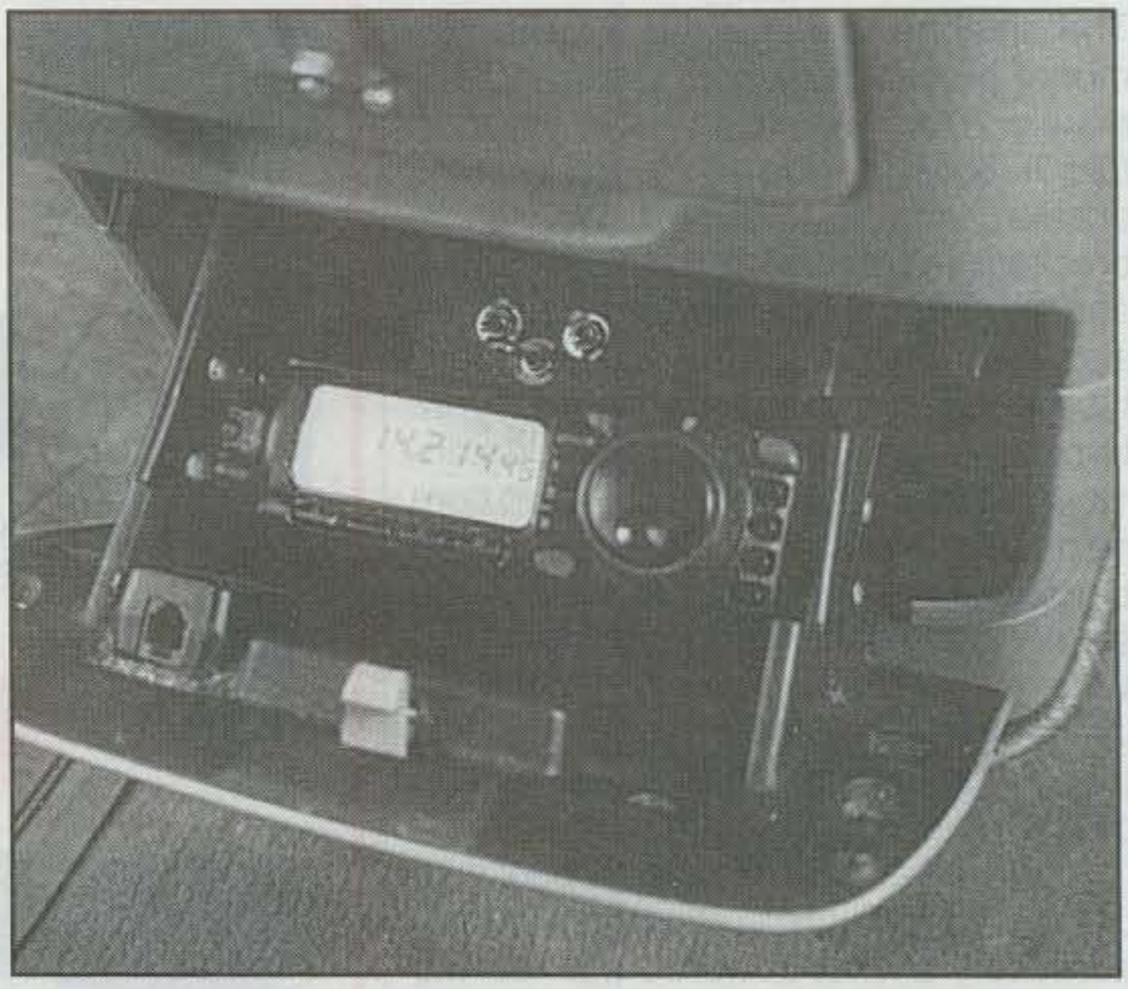

Photo 5– The center console's lower compartment opens to reveal the control head of a Yaesu FT-100 transceiver ready for multiband operation. Its microphone stores in the upper tray and hooks on the mic hanger for convenience. Switch box above the rig controls front and rear fog lights plus back-up sounder.

Super Mobile Auto Tuner

Looking for a cool remote-mounting automatic antenna tuner for mobile, portable, or even home station use? Want something that is compact, versatile, and works with any type or model HF transceiver? Check out the new LDG RT-11 tuner shown in photos 7 and 8. It operates with RF levels as low as 100 milliwatts or as high as 125 watts, matches impedance of 6 to 800 ohms, and tunes everything from mobile whips and verticals to dipoles, beams, and more. It's a gem!

Why use an antenna tuner for mobiling? The typical feedpoint impedance of a vehicle-mounted whip is only a few ohms, so a base-located tuner matches it to a 50 ohm cable/feedline for highest efficiency and lowest SWR. Could a base matching coil serve roughly the same purpose? Yes, but it initially requires careful tap setting to yield a low SWR, and must be manually readjusted when changing bands. Further, a base coil is exposed to extremes of weather that can corrode its tap points and cause intermittent connections.

Photo 4– At first glance, the dash and center console of this Honda Odyssey van belonging to Alan Brennglass, K2ACB, looks stock and conventional. A neat 100 watt rig, however, rides behind that closed lower door. (Photos 4, 5, and 6 via K2ACB)

Photo 6– Rear view of the K2ACB van. The Yaesu ATAS multiband antenna mast is supported by a Diamond K-400 lip mount and almost looks like a natural part of the van's design. It is low profile and nice!

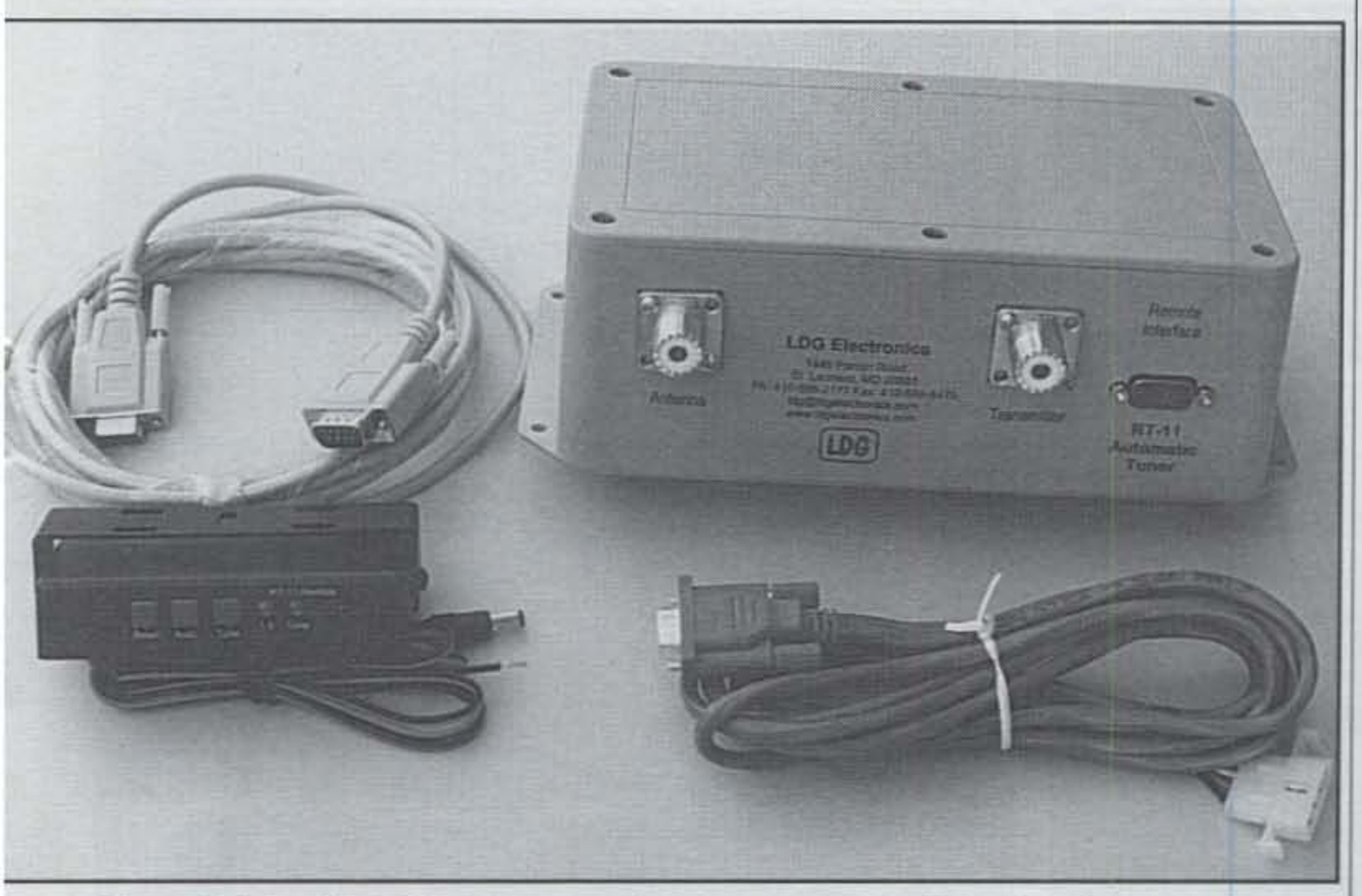

Photo 7– The LDG RT-11 automatic antenna tuner with optional remote control unit and interface cable plus additional cable to mate it with an ICOM IC-706 or similar transceiver. This remote-mounting and "configure to fit your needs" tuner works with all types of coax-fed antennas and matches impedance from 6 to 800 ohms.

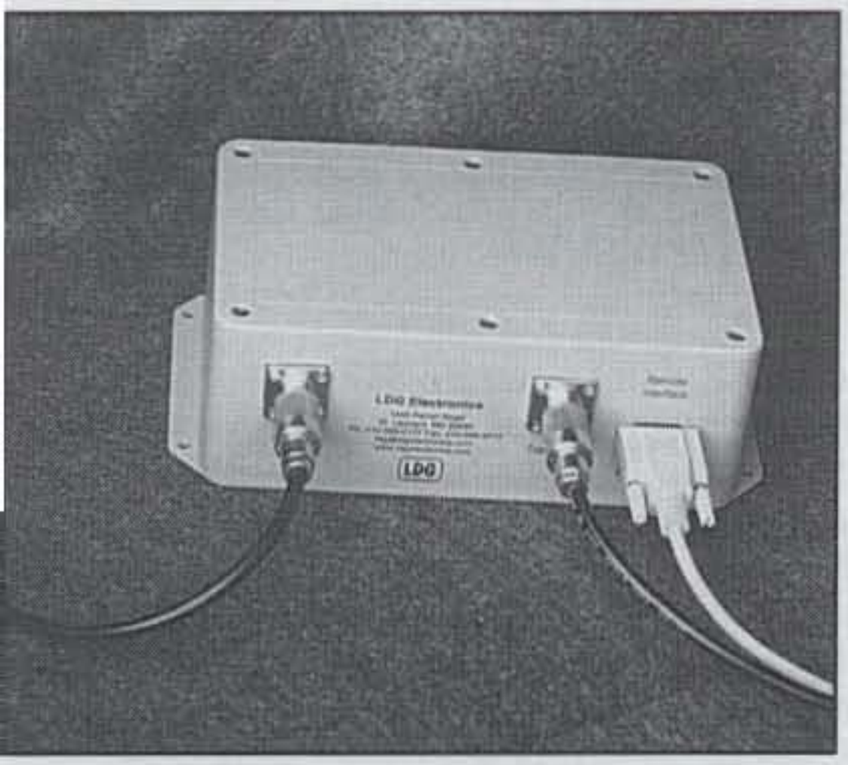

Photo 8– The LDG RT-11 automatic antenna tuner remotely mounted in the trunk of XYL WB4OEE's Chevy Cavalier. Unit lets you work a full band without stopping to re-adjust a stinger. It is ideal for no-fumbles and all-fun mobiling.

Conversely, an automatic tuner stays snug and dry in a car's trunk and doesn't require roadside stops for readjustments. Mobile whips are also limited in low SWR bandwidth, so an automatic-operating tuner lets you cover a full band with the press of a button. In fact, the RT-11's wide matching range goes even further here: It usually will tune a monoband whip or "Hamstick" across its full band plus a band higher and a band lower in frequency. As an example, it can tune a 20 meter antenna for operation on 30, 20, 17, and possibly 15 meters, etc. Now that's a rompin' good tuner!

Generally speaking, the RT-11 can be installed in one of three ways. It can be connected to the remote tuner socket on an ICOM IC-706 or IC-718, an Alinco DX-70 or DX-77, or a Yaesu FT-100 with an optional LDG interface cable (additional cables are presently being developed for the FT-897 and Kenwood TS-50). As an alternative, an optional 4" × 2" × 1" mini-controller produces stand-alone "one punch" operation with any QRP or 100 watt level transceiver. Finally, one can devise a custom remote-control cable supplying 12 volts at a few ma for operation and grounding a sense line to tune.

The tuner section proper is enclosed in a water-resistant ABS plastic case that's 3.0"H × 8.5"W × 5.5"D. It covers 160 through 6 meters and uses an L-type matching network with a built-in microprocessor, evaluating input impedance and selecting the proper L-C combination as required to achieve a low SWR.

I put the LDG RT-11 to the test in both mobile and home station applications, and it worked like a champ. Yes ,indeed—just punch on and transmit. What a gas! The tuner also proved terrific for home use, matching my crazy-brew skywires with unusual SWRs. In addition, the RT-11 makes the challenge

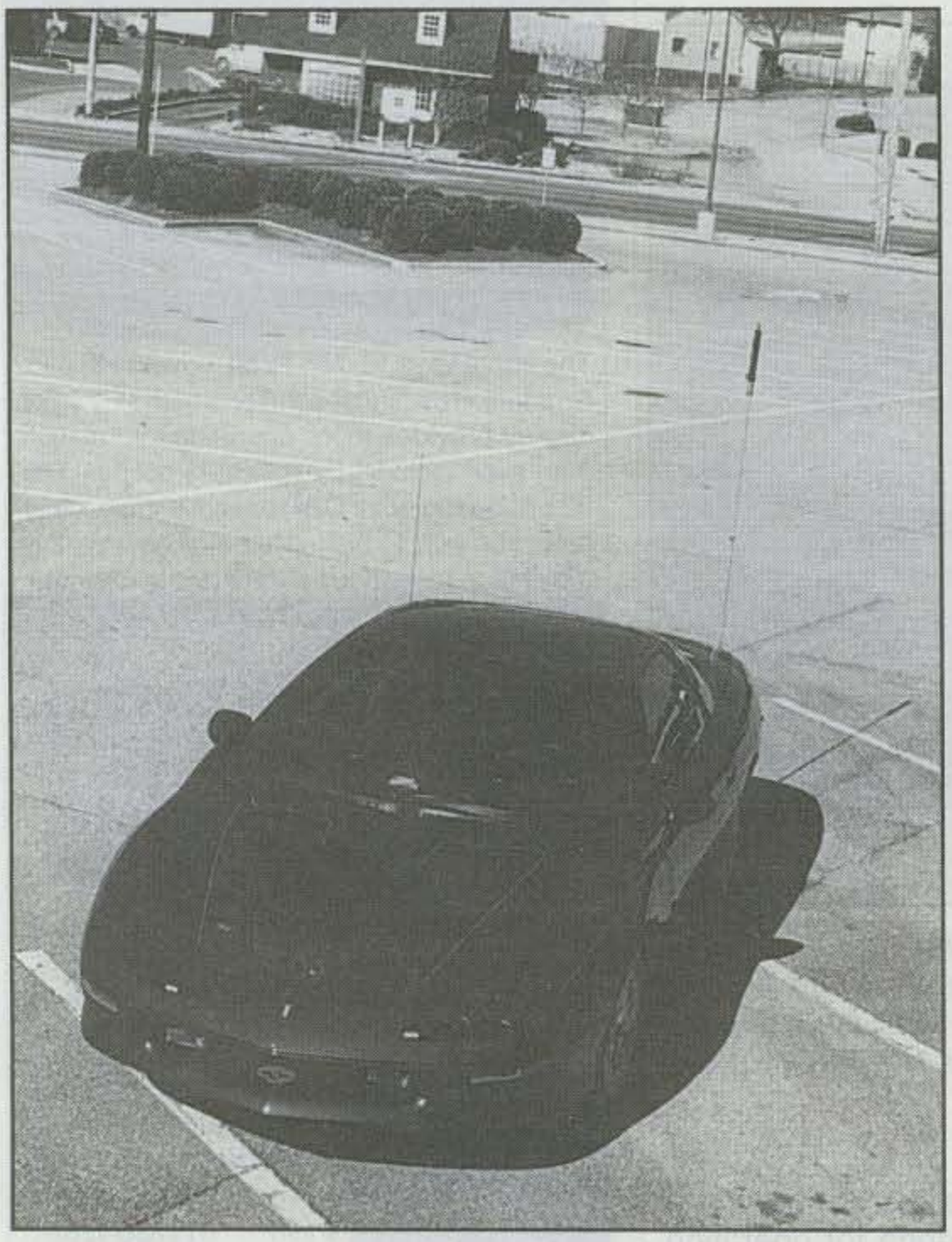

Photo 9– Check out this extra-tall version of W6MMA MP1 mobile antenna on my '96 Camaro, friends. It works 40 through 10 meters, stands 13 feet 3 inches from tip to ground, and pumps out a killer signal.

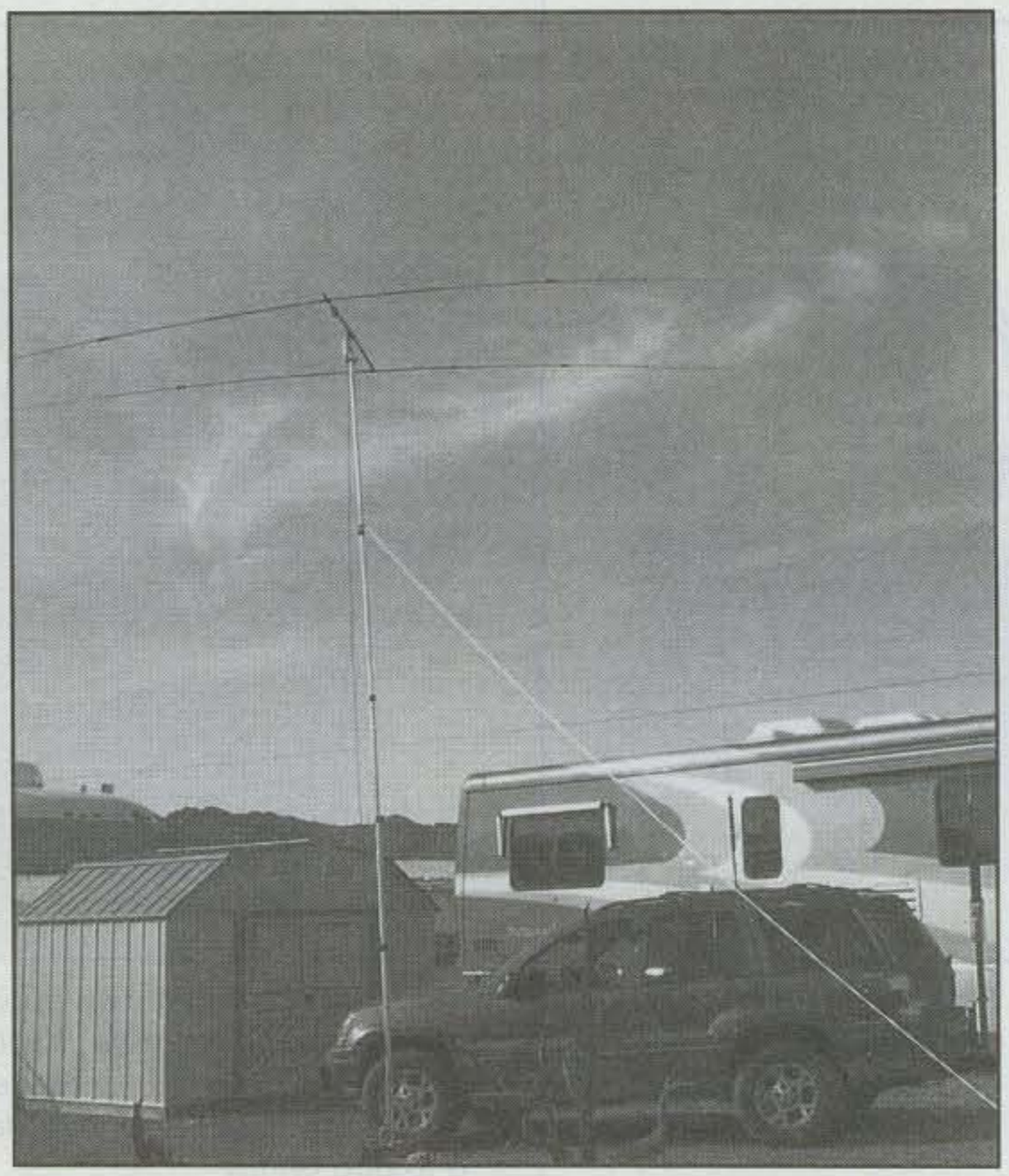

Photo 10– Fixed mobile supreme! The new W6MMA two-element minibeam sits atop its optional 23 foot telescopic mast, which is supported by a drive-on base plate under the front wheel of the Jeep. Antenna can be set for 6, 10, 12, 15, 17, or 20 meter operation. Look carefully and you can see the next new W6MMA treat—a mini-rotor atop the mast! (Photo via W6MMA)

of installing an antenna outdoors during winter (when the temperature is just too cold for fine-tuning) a cinch. Spend 40 minutes on a rooftop during blowing snow to appreciate that fact! If you like the convenience of quickly installing an antenna and then tweaking its SWR with a tuner, the LDG RT-11 definitely warrants closer investigation. It is a "five star" winner. Details are available at <www.ldgelectronics.com>.

'Tenna Talk

New mobile antennas are always popular items of interest, and the W6MMA Super Antennas highlighted in previous columns continue to prove that fact. What's the special attraction? The sliding coil cover on both the manually adjustable and motor-driven versions of this multiband antenna act like a capacity hat to maximize efficiency and give it a performance edge over similar-size antennas. The coil, base mast, and top stinger sections also use standard 3/8 24-thread fittings, so a manual MP1 or motorized MP2 antenna can easily be sized up or down to fit each amateur's needs. A 54 or 57 inch mast from an unused Hustler or borrowed from one side of the new W6MMA minibeam's driven element, an MP coil, and a 45 inch stinger, for example, will produce an extra-tall antenna for big-time mobiling (photo 9). Then for mild-mannered city use and easy garaging, you can reconfigure the antenna with a 12 or 24 inch mast and retractable stinger.

Flash! After writing this month's column, W6MMA revealed a new Screw Drive Controller for his MP2 mobile antenna. The controller connects between the MP2's motor and an ICOM IC-706, an Elecraft K2, or a Yaesu FT-817, 847 or 100, and it automatically sets/adjusts the coil to your transceiver-selected band/frequency. It has memories to store settings, an SWR monitor so you can double-check its operation, and an optional interface box for use with those big (massive) "screwdriver" antennas from other companies. It is awesome!

Want to really go first class when stopped or parked for the night? Latch on to a new two-element WBMMA minibeam with its optional 23 foot telescoping mast and drive-on base plate (photo 10). The beam can be set for 6, 10, 12, 15, 17, or 20 meter operation, packs into its supplied 3 foot bag for traveling, and expands to approximately 16 feet by 7 feet for operating. Assembly time is approximately seven minutes, and the beam truly adds "big rig clout" to your mobile signal. Every well-equipped mobileer and weekend vacationer needs one! Want more details? See <www.superantennas.com>.

Conclusion

That overflows column space for this time, gang, but the ideas, views, and new goodies for top-notch mobiling just keep on coming. We'll be returning to this subject in a few months, so if you have some new items or ideas for great mobiling, send them to me now. Also, if you send an e-mail, please include your return address (e-mail) at the end. Top-located addresses are being deleted/lost, and replying to cyberspace does not work. Meanwhile, remember you need not be in motion or in a vehicle's driver's seat to enjoy the benefits of a good mobile setup. 73, Dave, K4TWJ

BY WAYNE YOSHIDA,* KH6WZ

Every Ham's "Fundamental Purpose": Public Service

"The rules and regulations in this Part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications . . . ."

Excerpt from FCC Rules Subpart A— General Provisions §97.1 Basis and purpose

A few years ago, after a period of inactivity, I decided to rekindle my interest in ham radio. At about the same time, I received a recruitment letter from the local Radio Amateur Civil Emergency Service (RACES) group. I applied for membership in RACES, with the intent of killing two birds with one stone—getting more active in ham radio and providing community service. Besides, public service is the primary reason ham radio exists, and so I believe we all must be ready to lend communications assistance in an emergency situation, natural or man-made.

However, it is not enough to "be prepared." You must be trained in the proper techniques and procedures and be recognized by a public-service organization. While it is true that in a life-and-death situation just about all the rules "go out the window," most emergency situations can be defined in less-drastic terms, especially if there is an officially organized team of communications volunteers and paid personnel supporting the response team. There is a commercial on the local news radio station that goes something like, "There is a difference between being *willing* to help and being *able* to help." Let's try our best to *be both* willing *and* able to help when the time comes.

The first step, then, is to find an organization that interests you and join in the serious fun of emergency communications and public assistance. Ham radio public-service-oriented groups include RACES, Amateur Radio Emergency Service (ARES), SKYWARN, and others. A list of organizations and their websites is included in the reference section at the end of this column. Don't forget to keep up with the "Public Service" column in *CQ* and other radio magazines.

No matter what group you choose, all of them have several things in common: You must have reliable communications capability anywhere and at any time. All groups will have regular training exercises and drills to practice your skills and test your gear. Depending on your situation and assignment, you may be called upon to deliver communications on any ham band, and perhaps even on non-ham frequencies. Again, check with the organization you are planning to join, and see what capabilities they require and what capabilities you will need to participate. I am sure you will find a match somewhere.

Most groups operate on VHF and UHF FM simplex and repeater frequencies for portability and simplified equipment needs. In my experience with the local RACES group, the events are split between mobile and on-foot, "pedestrian mobile," operations, which means that plenty of battery power and gain-type antennas are needed.

Photo A– The "all mission" gear, with all absolutely essential items needed for any assignment: a dual-band HT, an extra battery pack, a gain antenna, and other accessories. All items are carried in a fanny sack or my pockets for total portability.

My "Grab 'n Go" Kit

The basic gear I use for all deployments is shown in photo A. It allows me to be extremely portable, since everything is carried on my body. Assignment duration with this "bare bones" setup is limited to battery life and operator stamina, an average of 4 to 10 hours. A boom mic/headset with push-to-talk (PTT) is essential for high-noise environments, such as parades, and enables "hands-free" operation. A speaker-mic, with an earphone, is ready for a back-up in case the headset breaks. Don't forget your ID badge and supplemental credentials, if needed.

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Photo B– Longer duration assignments call for more stuff. In addition to the fanny sack, these items are carried in a small, soft backpack. A switch-mode power supply is also carried, if AC power is available.

For longer duration assignments, the equipment list expands. Power is still the first priority, since a communications volunteer with a dead battery is useless. I have a Yaesu VX-5R triple-band HT, which is powered with a lithium-ion (Li-ion) battery. I used to carry a second battery pack, but now I use a 7 Ah (amp-hour) gel-cell.

The optional quick charger for my HT gets its power from the original 12 VDC "wall wart" that comes with the radio—a nice money-saver. I increased its capability by cutting the power cord and attaching an Anderson Powerpole® connector on each end. Now the charger can be plugged into any 12 VDC source.

Longer duration assignments may also call for "stationary" or base station operation, as shown in photo B. The coil of cables includes 50 feet of RG-8X coax with PL-259 connectors on each end, and a dual band roll-up J-pole antenna. A 1/2 inch PVC "radome," cut up into pieces about a foot long each, makes the antenna compact enough to fit into a fanny sack. The J-pole can be hand-held or clamped to a support. This antenna was described in the *CQ* "Beginner's Corner" for July 2002, on page 77. Various coax adapters are included so that the coax can be used with either a mobile radio or HT.

Remember Personal Needs

Some personal items, such as allergy medications, sunblock, coins for telephone use, candy and snacks, are also included. "Civilian clothing," including T-shirt, sweat pants, hooded sweat shirt, hat, and poncho are added. The clean clothes will increase your comfort and may become very important for a long-duration event. Clothing should be adjusted as weather conditions demand.

Disposable rubber gloves, waterless hand cleaner, a first-aid kit, spare eyeglasses, copies of your ham license and your radio's operating manual, and a simple tool kit also should be part of your emergency setup. My tool kit has been evolving over the years, from previous DXpeditioning experiences. Replacing a blown or broken fuse, checking for correct AC voltages, checking continuity in cables, verifying polarity, and checking for shorts or open circuits are the most common field checks. Anything beyond this is not going to be fixable in the field. A back-up radio is the best alternative. Highlights in the tool section include the cordless butane-powered soldering iron/torch, the $5 VOM from an online surplus store, and the Schrade® multi-tool.

I also have a "meal kit" which contains various canned or dried foods from the grocery store. Here's a hint: Each time you go grocery shopping, pick up some "emergency food." I used to think I could survive on canned Vienna sausages, until I actually tried eating them. They are now deleted from my food kit, and I've substituted tastier foods. Fresh

fruits and bottled water are always on-hand, and are stuffed into the sack just before departure.

In the Trunk: PVC and "Giant Pants"

Finally, in my car trunk (see photo C), I have a 12 V, 17 Ah gel cell. That thing will run my mobile radios for several days or even weeks without re-charging and can be used to jump-start the car engine if necessary.

Three lengths of scrap 1 1/2 inch PVC pipe, with couplers, can be used as a temporary mast for wire antennas or even a mobile antenna. One-half inch PVC pipe is also included to support home-brew UHF and VHF ground-plane antennas. A woodworker's bar clamp or large hose clamps can be used to attach the mast and antenna to a suitable mount, such as a stair or balcony rail, or even a vehicle roof rack.

A 2W-in, 25W-out, 2 meter "brick amp" can boost HT power if needed, and if suitable DC power is available. Two types of magnet mounts, NMO and M, are also stored in the trunk. A gallon or two of fresh drinking water is placed into the trunk just before departure. I also keep a pair of "giant pants" in the trunk. This is a pair of jeans I bought at a thrift store, something like 4 or 5 inches larger than my size. I can put the giant pants over my street clothes if I need to do some messy or dirty work, such as changing a tire or crawling under the vehicle for something. It can also be used for additional warmth if the weather turns cold.

I've been assembling this gear over the last several years, and most of it was already on-hand. Just like a tool collection, items are added as "disposable income" allows. Other items and supplies can be added as your experience and local needs arise. Weather certainly will impact what you keep in your "Grab-n-Go" bag. For example, tire cables or chains and a sack of kitty litter or an old welcome mat may be very useful in the snow or mud to add traction under your tires.

As emergency communicators, we all need to be fully equipped and ready to go at a moment's notice. This means several significant changes to one's way of thinking, operating- and station-equipment-wise.

Do you have anything interesting in your "go kit"? If so, let me know about it, and I'll mention the most useful items in this column.

73, Wayne KH6WZ

Photo C– The car trunk stores a 12 V, 17 Ah gel cell, portable antenna mast, RF amplifier, and even more stuff. The blue sack stores 50 feet of coax, PVC pipe-mast, and various home-brew portable antennas to boost signal strength. A fire extinguisher and a pair of "giant pants" are also included.

References

Amateur Radio Emergency Service (ARES)—American Radio Relay League (ARRL): <http://www.arrl.org/FandES/field/pscm/sec1-ch1.html>

Radio Amateur Civil Emergency Service (RACES): <http://www.races.net>

Salvation Army Team Emergency Radio Net (SATERN): <http://satern.org>

SKYWARN National Homepage: <http://www.skywarn.org>

math's notes

BY IRWIN MATH,* WA2NDM

Wired/Wireless Communications
An Alternative to Radio?

In the early days of radio, in addition to the use of radio frequencies there were many schemes that were developed to try to achieve communications without wires. Hence the term *wireless.* One of these which seemed to have real promise was to use the ground itself as a medium for conducting signals. However, as soon as Marconi captured the imagination of the public through his transatlantic feat and convinced the world that electromagnetic radiation was the way to go, this means of communications was quickly forgotten. There is always some merit in older ideas, though, and we believe that this means of communications should seriously be revisited, as it certainly has interesting possibilities, particularly considering the circuitry and techniques we have available today. First, however, a bit of theory.

We all know that the earth conducts, but that it is not a perfect conductor. That is why people often soak the ground around antenna radials, pack salt into it, and go through all sorts of machinations to try to lower its resistance. Well, it is exactly this "shortcoming" on which ground communications relies. Referring to fig. 1 we can consider the ground between any two points as a resistor. However, fig. 1 is not totally accurate. The true nature of the ground is that it is an infinite number of resistors, connected in series/parallel as shown in fig. 2. This series/parallel three-dimensional combination extends to cover the entire earth, as I am sure you will agree. As a result, if we were to induce a signal across one resistor, it absolutely would have to appear across all of the others, but, of course, attenuated due to the numerous series/parallel combinations.

When this was tried (at the turn of the century), the only equipment available were crude carbon microphones and simple earphone elements which while sensitive, really were not up to anything we could configure today. Fig. 3 shows what an early scheme consisted of. Such a system would work as far as a hundred feet or so, but not too much more. The signals quickly were lost due to attenuation. Raising the battery voltage did not help much, since there was still significant conductivity between the "transmitting" ground rods, and using too high a voltage resulted in heavy currents and heating of the microphone.

To see if there was any merit in continuing to explore this mode of communication, we tried the following experiment on the first of February. In a nearby open field we drove two 6 foot ground rods into the ground 25 feet apart, leaving about a foot of each rod exposed. Next we connected the 8 ohm output of a 100 watt audio amplifier (with two 4 ohm 50 watt resistors in series with each lead for safety) to the two ground rods. We then connected a CD player loaded with a "heavy rock" CD (which we thought appropriate) to the amplifier, thereby driving what we referred to as a "solid rock signal" into the ground.

We then built a small receiver, which was really nothing more than a simple battery-operated audio amplifier as shown in fig. 4. We connected this to two smaller ground rods, each made of 12 inches of coat-hanger wire rubbed with sandpaper so that any protective insulating coating was completely removed. When we pushed the coat-hanger wire rods into the ground, about 10 feet from the "transmitting" rods, the sound was quite clear. We then tried to see just how far from the transmitter we could go and still receive the signals. We ran out of space, since the field was only a couple of hun-

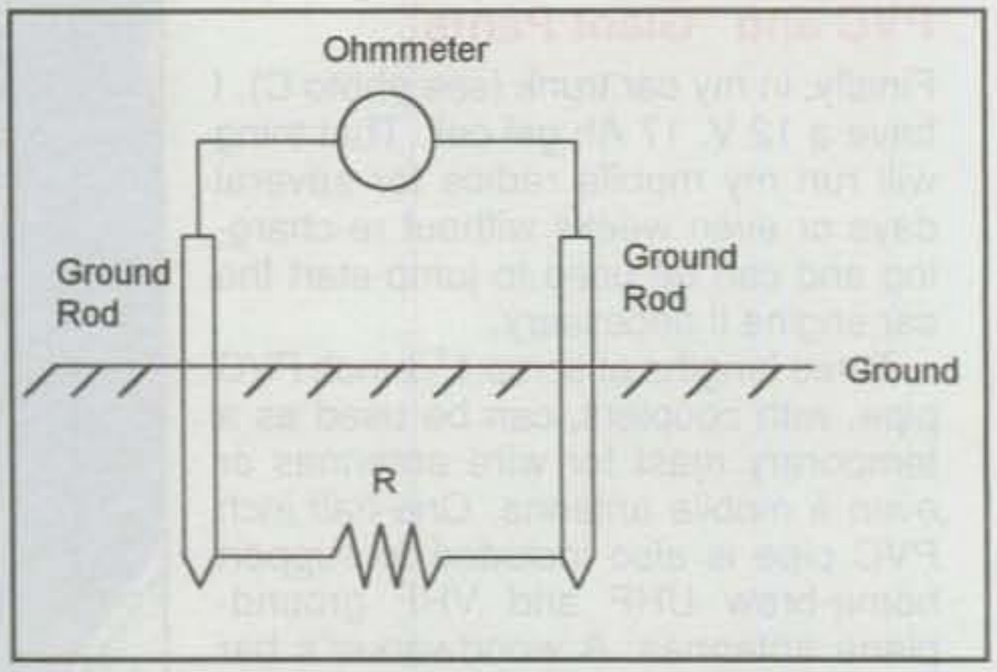


Fig. 1– Basic schematic diagram of the earth.

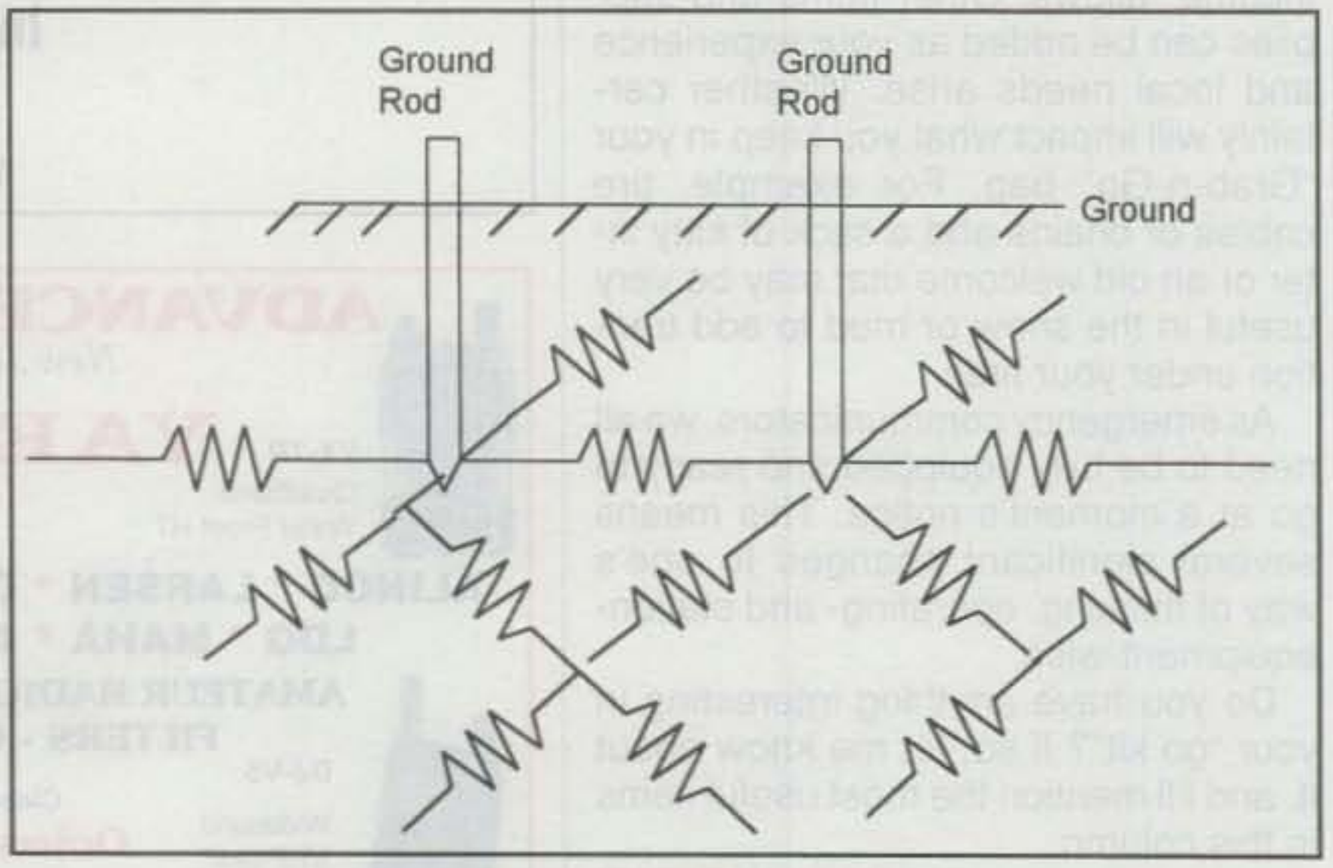


Fig. 2– Real-world schematic of earth.

*c/o CQ magazine

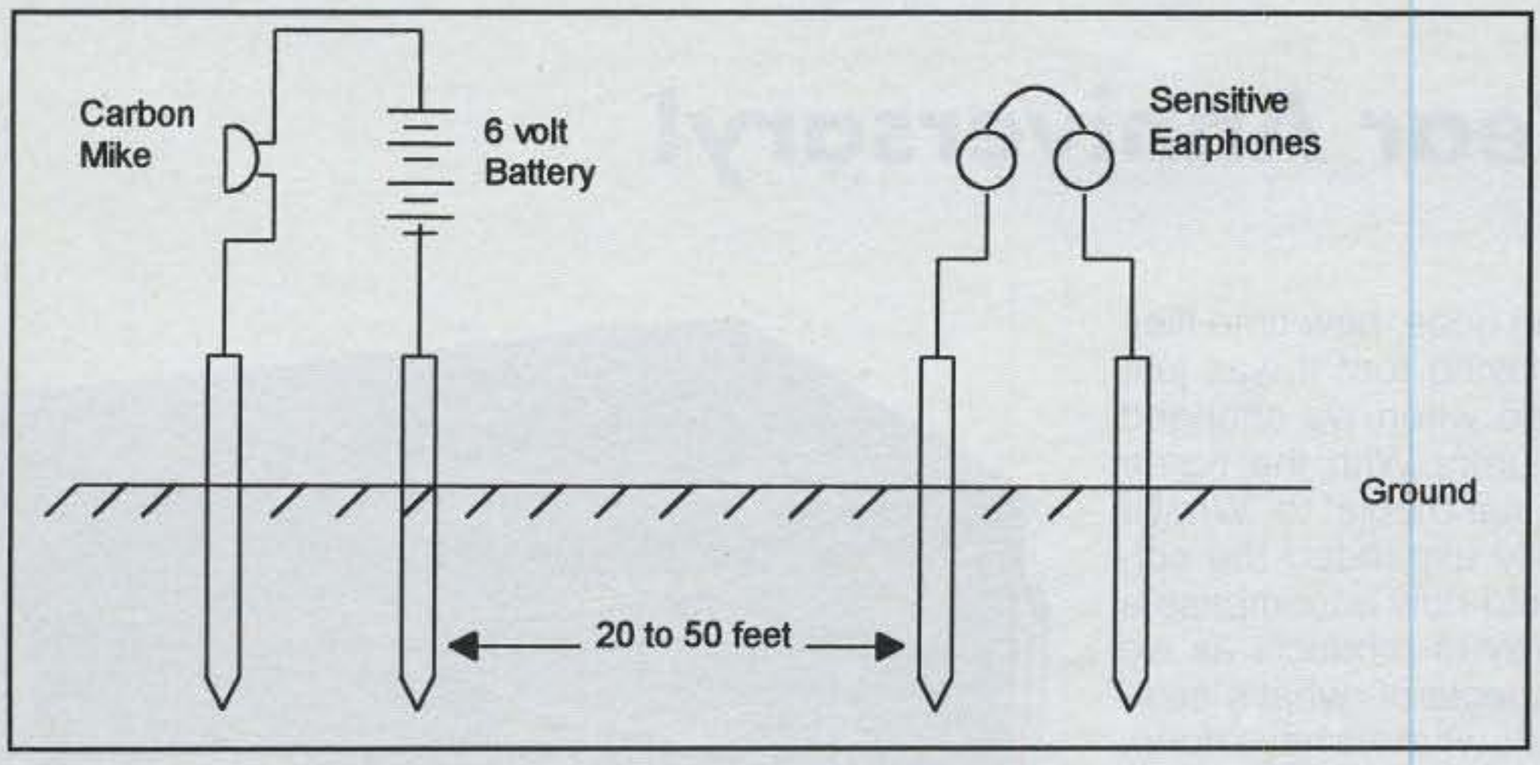


Fig. 3– Early ground communication system.

dred feet long. At 125 feet, however, we could still hear the signal clearly, but we also encountered quite a bit of static and 60 Hz hum when we cranked up the gain. It seemed that if we could just reduce or eliminate the noise and hum, we could extend the range quite a bit. Furthermore, the use of an even more powerful amplifier would no doubt have increased the range even more.

The scheme we just described is, of course, simple AM. The noise, static, etc., is the common "partner" of AM transmissions, so it is easy to see how the transmission range would be limited. What if we used FM, or to be really modern, digital modulation techniques? Surely one could easily build a high-power oscillator at, say, 50 or 100 kHz and FM or digitally modulate it with audio. How far would this increase the transmission distance? Now a simple limiter circuit could easily eliminate any amplitude-caused noise. Furthermore, if a 100 kHz carrier were used, perhaps better coupling to the ground would result, since we would now be concerned with impedance between the transmitting and receiving ground rods, not just simple resistance. Tuned circuits at the receiver could then be used to narrow the passband of what we were receiving, filter out any 60 Hz hum, and reduce unwanted signals even more. Going still further, by using standard radio techniques such as different operating frequencies, many users could communicate without interfering with one another.

It seems to me that with some serious experimentation we might be able to develop an entire alternate to wireless radio as we know it. By using both methods simultaneously, we could then double the amount of spectrum available for wireless transmissions.

Please be sure to let us know of your results before next April!

73, Irwin, WA2NDM

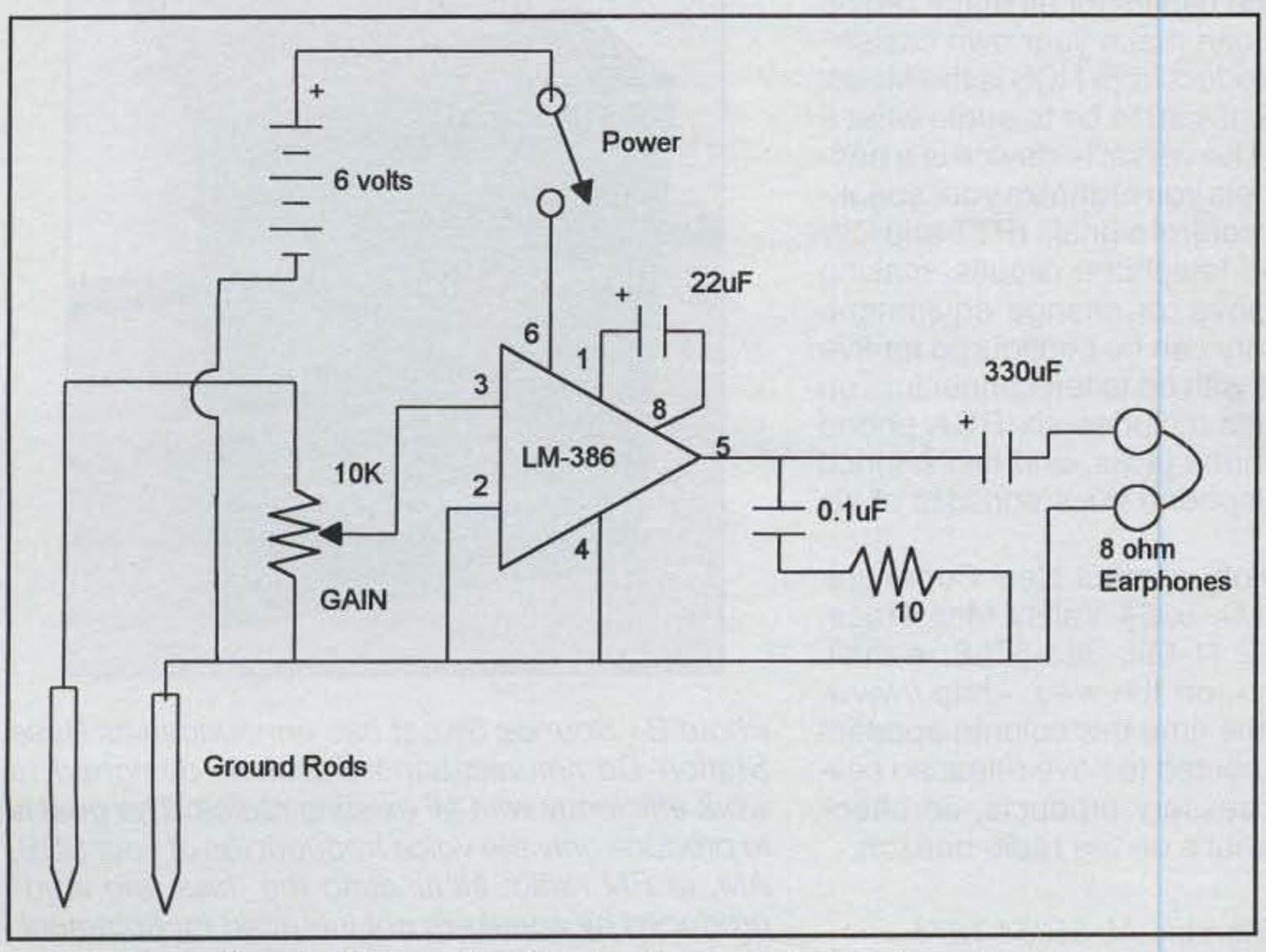


Fig. 4– Schematic of a simple ground signal receiver.

Reader Feedback

Editor, *CQ:*

We always enjoy reading our copy of *CQ* when it arrives at our very ham (100% participation) household. But today I was especially intrigued by WA2NDM's "Unijunction transistor time-delay relay" schematic on p. 78 in the article "It Seems Like Old Times—Again" (Math's Notes, January 2003 issue).

I suspect it might take a somewhat higher value for the 1 meg potentiometer to ensure that the device truly provides "eternal contacts" as labeled in the schematic. While I'm not a circuit guru, I can think I provide a design that will provide eternal contacts with an even lower parts count. This will prove, once again, consistent with the spirit of the article, that low-tech approaches can be better. Details on request.

VHF/UHF ops shpould bear in mind that eternal contacts can be disruptive to smooth repeater operation.

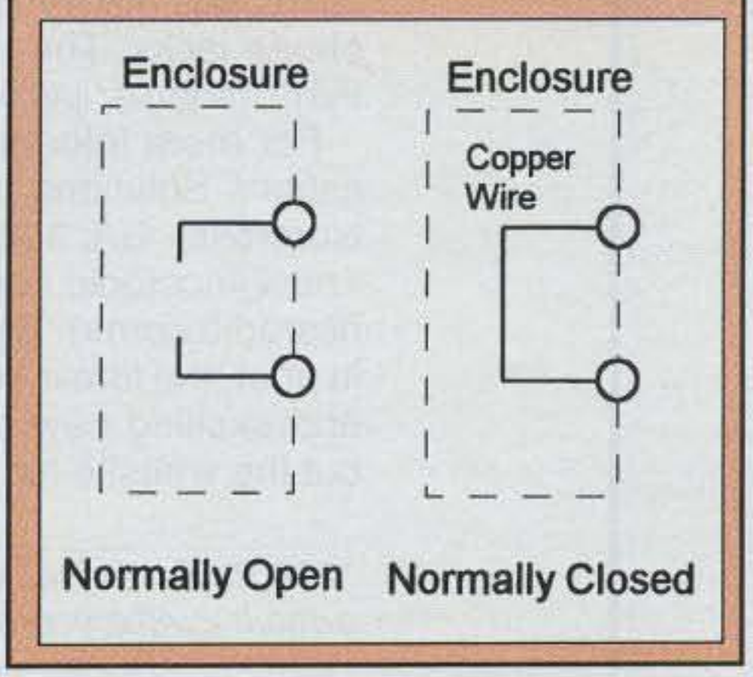
73 with tongue firmly in cheek
Maggie Leber, K3XS

WA2NDM replies:

Hi Maggie,

Thank you for your kind comments regarding my January 2003 column. I too have come up with a much better and simpler "eternal" contact circuit. See the accompanying diagram for two versions, the eternally open circuit and the eternally closed circuit. Either can be used as per your requirements. Please note that the eternally open contact is truly eternal. The eternally closed contact is only eternal as long as the connecting wire remains conductive. If in 10×100 centuries the copper transmutes into a non-conductor, then the circuit will cease to be eternal.

These are really quite simple and should be able to be easily constructed by anyone with a moderate amount of electronic experience. — 73, Irwin



what's new

BY KARL T. THURBER, JR.,* W8FX

Three-Year Anniversary!

As the old saying goes, how time flies when you're having fun! It was just three years ago when we changed the name of our column. With the name change from "The Digital Dipole" to "What's New," we dramatically expanded the column's scope. We could now encompass a greatly expanded array of products as we examined various aspects of "what's new" in amateur radio. That's what we have done, so let's get started as we begin our fourth year, with this month's focus largely on radio shack accessories.

Photo A– The versatile NCS-3240 Multi-Switcher is said to take "fingertip" shack control to a new level. The mini-console lets you switch one of four audio sources to one of four radios. (Photo courtesy NCS)

Accessories for the Radio Shack

NCS Model 3240 Multi-Switcher. New Communications Solutions is a new company whose focus is to provide innovative products not generally available in today's ham marketplace. One of two new products is the NCS-3240 Multi-Switcher (photo A), which is said to take "fingertip" shack control to a new level.

According to NCS's Doug McDowell, K4SWJ, the $249.95 device is a mini-console that lets you switch one of four audio sources—which might include a desk mic, headset, TNC, and computer sound card—to one of four radios. One of the unit's unique features is that it matches the impedance, audio level, and pin-out of any microphone or other mic-level audio source to virtually any radio. The unit also switches your PTT foot- or hand-switch to the selected radio, and handles receive audio when connected to the receive audio output from your radio(s). Interface cables for all major radios are available, or you can make your own cables.

The second new product from NCS is the Model NCS-3400 Multi-Patch, said to be to audio what a power strip is to DC. The versatile device is a passive patch panel that lets you organize your speaker level audio, video, control signals (PTT and CW paddle or keyer), and telephone circuits, making it simple to add, remove, or change equipment. The $129.95 accessory can be configured for five to ten rows or busses with up to ten connectors on each buss. Each buss includes six RCA phono jacks, two 3.5 mm phone jacks, and two 1/4 inch phone jacks. The telephone buss consists of six RJ11 modular jacks.

For more information, contact New Communications Solutions, LLC, 5364 Valley Mist Trace, Norcross, GA 30092 (1-888-883-5788; e-mail: <ncs@ncsradio.com>; on the web: <http://www.ncsradio.com>). By the time this column appears in print, the firm is expected to have released several exciting new accessory products, so check out the website for what's on the radio horizon.

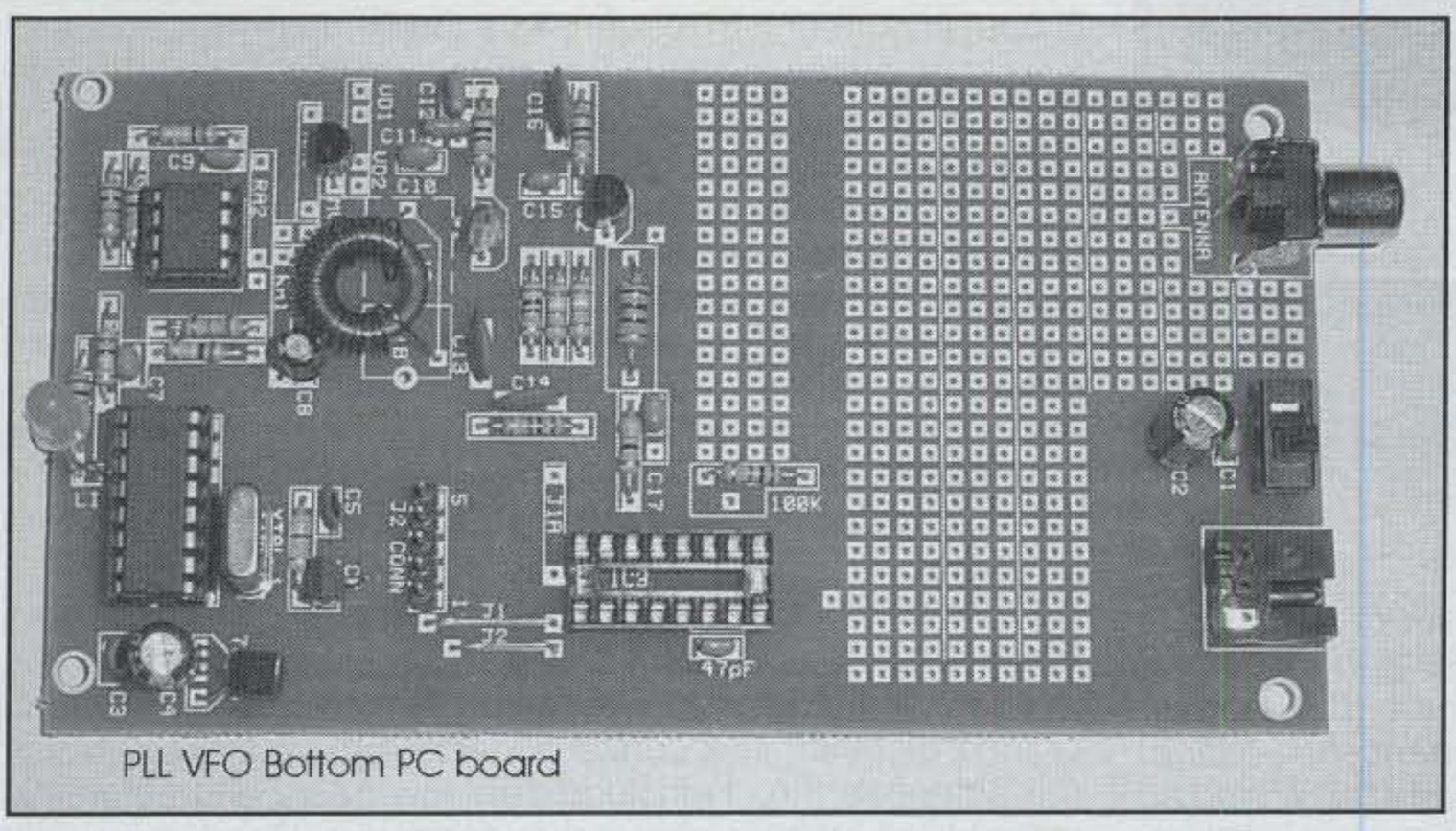
*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

Sounds Sweet Base Station Communications Speaker. Are you ready for some sweet-sounding audio? Sounds Sweet has announced its entry into the communications speaker arena with its uncompromised Base Station Communications Speaker (photo B). The new speaker's many features include a tuned port bass reflex cabinet, solid 3/4 inch construction, dual-cone dri-

Photo B– Sounds Sweet has announced its Base Station Communications Speaker, designed to work efficiently with all existing radios. The goal is to produce only the voice frequencies of your SSB, AM, or FM radio, eliminating the "hiss and mud" produced by speakers not intended for communications use. (Photo courtesy Sounds Sweet)

ver, high efficiency, and frequency response tailored specifically for amateur radio, two-way radio, shortwave, and scanner listening. The speaker is designed to work efficiently with all existing radios, whether full-featured transceivers or two-way portables. The goal is to produce only the voice frequencies of your SSB, AM, or FM radio, eliminating the "hiss and mud" produced by speakers not intended for communications use.

The new speaker is $99. For more information, contact Sounds Sweet, 99 W. Shore Dr., Carmel, NY 10512 (e-mail: <sales@soundssweet.com>; on the web: <http://www.soundssweet.com>).



PLL VFO Bottom PC board

Photo C– DATAK Manufacturing has introduced its phase-lock-loop (PLL) controlled DATAKIT®. The PLL-VFO Experimenters Kit offers rock-steady frequency control from 440 kHz to 185 MHz. A two-circuit board kit, the guts of the device is the "bottom board" (shown here), which contains the VFO itself, with an area for experimenters to add their own circuit. (Photo via DATAK)

PLL-VFO Experimenters Kit from DATAK Manufacturing. Claiming to have "the most sophisticated VFO kit ever offered," DATAK Manufacturing has introduced the phase-lock-loop (PLL) controlled DATAKIT®, stock no. 80-1401. The PLL-VFO Experimenters Kit offers rock-steady frequency control from 440 kHz to 185 MHz. A two-circuit board kit, the "top board" contains a keypad for entering the frequency as well as the digital readout module. The guts of the device is the "bottom board" (photo C), which contains the VFO itself, with an area for the experimenter to add his/her own circuit—receiver, transmitter, or signal generator.

Not intended to be a complete circuit, the kit is a platform on which the builder can work, adding just about any circuit that requires precise frequency control. Included are circuit ideas, such as a 2 watt, 40 meter CW transmitter; a receiver; and others. The device operates on 12 VDC, and it also fits nicely into a Philmore PB170 case (not included).

For more information and pricing, contact DATAK Manufacturing Company, division of LKG Industries, Inc., 3660 Publishers Drive, Rockford, IL 61125-1386 (phone 1-800-645-2262; e-mail: <lkgindustries@compuserve.com>; web: <http://www.philmoredak.com>).

QwikRadio™ Transmitter-Receiver Pair. An ASK (amplitude shift keyed) transmitter-receiver pair providing up to 115 kbps data-rate at 800 MHz to 1 GHz operating frequencies is now available from Micrel Semiconductor. The pair is aimed at low-cost, short-range wireless applications. The firm, billed as The Infinite Bandwidth Company™, is an industry leader in analog and broadband communications integrated circuits.

The pair, consisting of the MICRF005 receiver and MICRF103 transmitter, is the latest addition to Micrel's family of QwikRadio™ products. The pair is said to provide a unique combination of high data-rate, low cost, low power, and ease of use. Also, the devices are more highly integrated and easier to use than were earlier RF ICs. Target applications for the pair include wireless keyboards, video-game controllers, and home automation. Both devices operate off 5 VDC.

For more information and product pricing, contact Micrel, Inc., 1849 Fortune Drive, San Jose, CA 95131 (phone 408-944-0800; on the web: <http://www.micrel.com>).

Lowepro® Computer Briefcases, Backpack, and More. Are you forever toting around your laptop, camera, radio gear, and other electronics, and worrying about their physical safety? If so, read on.

Lowepro® is an innovator in carrying and protecting a variety of photographic, video, and electronic equipment. The firm now has added laptop computer bags, in both briefcase and backpack styles, to its popular sleek steel gray/ black Tech collection (photo D). The laptop computer bags and the backpack will comfortably hold a laptop, with multiple pockets and dividers for paperwork and peripherals.

The "hip" Tech collection bags have a padded computer compartment with flat and expandable pockets for paperwork, peripherals, PDA, cell phone, and more. The backpack is said to be a road warrior's treasure trove of storage with a multitude of pockets, including two padded side pockets for cell phone, headset, or energy bar, and an outside flap pocket as well. The bags are durable, good-looking, and comfortable, with padded shoulder straps or carrying han-

Photo D– Lowepro has added laptop computer bags, in both briefcase and backpack styles, to its popular, sleek steel gray/black Tech collection. The backpack shown on the left, and the laptop computer bags on the right, will comfortably hold a laptop, with multiple pockets and dividers for paper work and peripherals. (Photo courtesy Lowepro)

dles in pressed foam. Several other series of protective bags and cases are available, including the stylish Metro and Linx collections.

For more information, pricing, or product brochures, contact Lowepro, P.O. Box 6189, Santa Rosa, CA 95406 (phone 707-575-4363; e-mail: <info@lowepro.com>; on the web: <http://www.lowepro.com>).

Photo E– If only the very best will do for your radio shack, Novatech Instruments offers the first-class Model 2955AR Rubidium Frequency Standard. It contains a direct digital synthesizer, locked to the atomic resonance Rubidium oscillator, providing any frequency between 100 Hz and 30 MHz in 1 µHz steps with atomic clock accuracy. (Photo courtesy Novatech)

Novatech Model 2955AR Synthesized Rubidium Frequency Standard. Don't you just love to visualize really rugged, high-accuracy "dream" equipment, even if the gear might be outside your price range? If only the very best will do in your ham shack, Novatech Instruments has a pricey but definitely first-class frequency standard you can save up for.

The Model AR2955AR Rubidium Frequency Standard (photo E) contains a direct digital synthesizer, locked to the atomic resonance Rubidium oscillator. It provides any frequency between 100 Hz and 30 MHz in 1 µHz steps with atomic clock accuracy and stability, along with simultaneous sinewave fixed outputs of 10 MHz, 1 MHz (5 MHz optional), and 1 pps (pulse per second).

The Model 2955AR is ideal for use as a master oscillator in labs, as well as for demanding test and calibration applications. The synthesized output can be set using RS232 serial commands to generate any frequency within the unit's range. Needless to say, long-term stability is superb. The unit is priced at $4950, attractive when compared with most comparable products.

Contact Novatech Instruments, Inc., P.O. Box 55997, Seattle, WA 98155-0997 (phone 206-363-4367; e-mail: <sales@novatech-instr.com>; web: <http://www.novatech-instr.com>).

Antennas and Accessories

Barker & Williamson Broadband Folded Dipole Antennas. I fondly remember "the good old days" when Barker & Williamson was heavily into amateur equipment production alongside now-departed ham-gear names such as E.F. Johnson, Collins, Hallicrafters, National, Hammarlund,

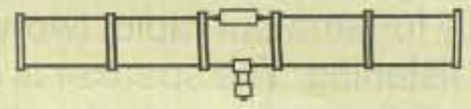


Fig. 1– Barker & Williamson offers a family of rugged, broadband HF antennas that provide fully automatic, low-SWR operation from 1.8–30 MHz continuously, without the need for an antenna tuner. Ready to go right out of the box, there are no taps to change, there is nothing to tune, and no antenna tuner is required. A simplified representation of these folded-dipole type antennas is shown in this sketch. (Artwork courtesy Barker & Williamson)

Globe, and others. In recent years the company has focused largely on supplying a variety of commercial, amateur, and SWL antennas, coils, and accessories.

The firm offers a family of rugged, broadband HF antennas that provide fully automatic, low-SWR operation from 1.8 MHz to 30 MHz continuously, without the need for an antenna tuner. The antennas are frequency-agile, which is a necessity to operate ALE (Automatic Link Establishment) capable radios, as in homeland defense applications. The antennas also will propagate NVIS, or Near Vertical Incidence Skywave (sometimes known as "scattering skywave"), which allows a very dense coverage area of up to several hundred miles with no skip zone.

While such antennas often are closely identified with government and military use, they also can perform well in amateur use, in that the same antenna will cover local, medium, or long distance in a conventional setup. Other features of the antennas (fig. 1) include very low noise and automatic static bleed-off from wind or thunderstorms. Ready to go right out of the box, there are no taps to change, there is nothing to tune, and no antenna tuner is required.

Several models are available. The BWD-1.8-30, at $219, is made of Copperweld© wire and covers 1.8 to 30 MHz; the BWDS1.8-30 uses stainless steel wire and is $349. Also available are models for smaller lots that cover 5–30 MHz,

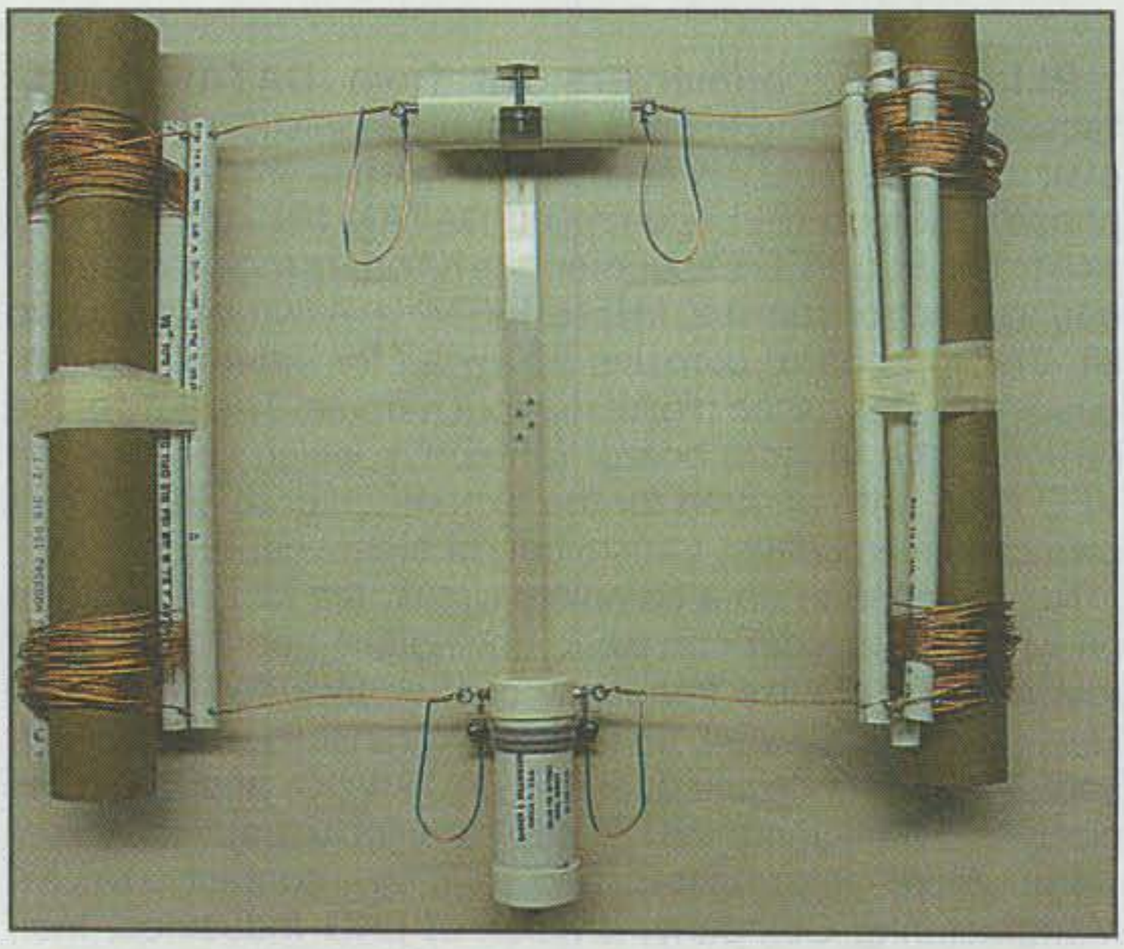


Photo G– The Model FDMK Folded Dipole Mounting Kit allows easy, permanent or pulley three-pole mounting of Barker & Williamson's folded dipoles. The kit consists of a support system and ancillary items to mount the antennas in a three-support system. The photo shows an antenna with the parts of the mount kit attached, but not the rope or pulley. (Photo courtesy Barker & Williamson)

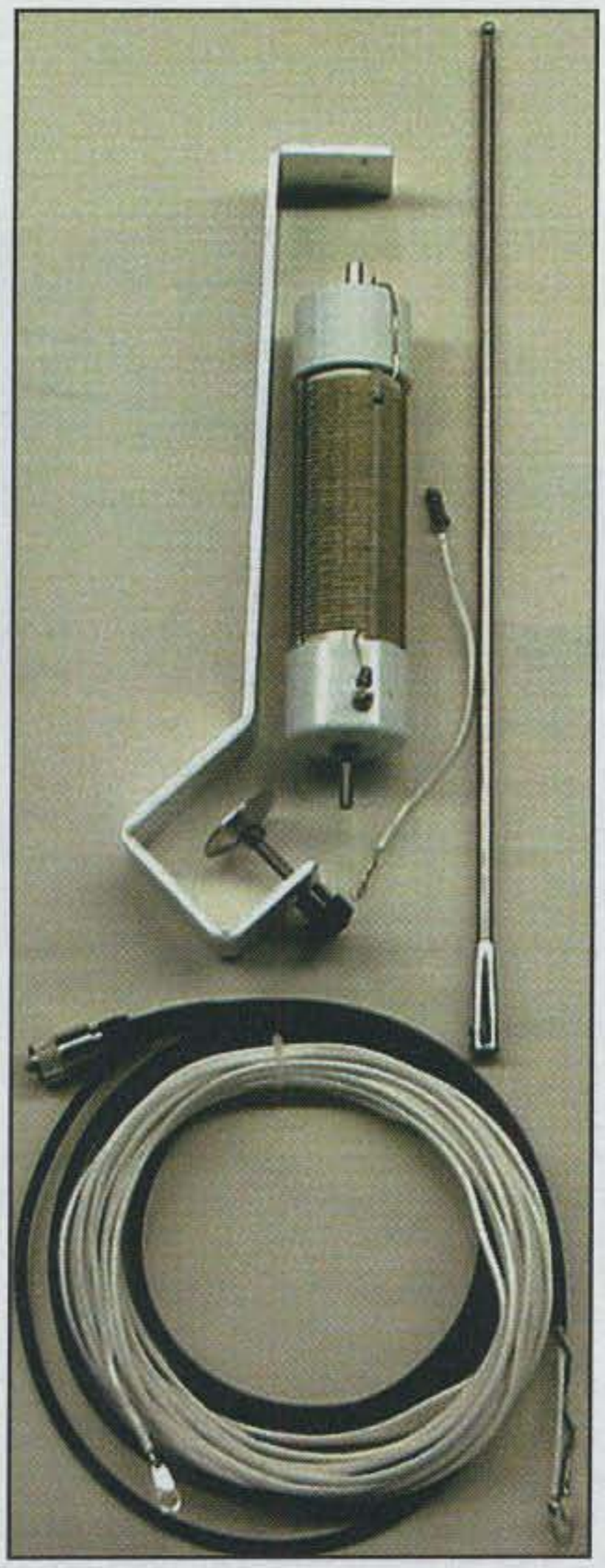


Photo G– For those who can't put up a permanent outdoor antenna, the Model AP-10A Window/Balcony/PortableWhip Antenna offers 40–10 meter continuous coverage. Power rating is 300 watts CW/SSB. Coverage of 6 and 2 meters also is included.(Photo via Barker & Williamson)

as well as end-fed Vees that cover 1.8–30 MHz. The completely assembled antennas handle 2 KW SSB/CW in intermittent use.

The Model FDMK Folded Dipole Mounting Kit (photo F) is $39; it allows easy permanent or pulley, three-pole mounting of the company's line of folded dipole antennas, such as in inverted-Vee configurations. The kit isn't required for two-pole horizontal or sloper installations.

Also, for those with restricted space, the Model AP-10A Window/Balcony/Portable Whip Antenna (photo G) offers 40–10 meter continuous coverage, plus 6 and 2 meter operation; it's $89.

For more information, contact Barker & Williamson, 603 Cidco Road, Cocoa, FL 32926 (321-639-1510; e-mail: <custsrvc@bwantennas.com>; web: <http://www.bwantennas.com>).

From the Bookshelf

***WIREBOOK IV* from The Wireman.** Coax, wire, and antenna accessory products from Press Jones, N8UG, the legendary "Wireman™," have been covered in many columns for many years. Recently, Press updated his popular *WIREBOOK*. We're pleased to tell you that the new edition is now available, and it's bigger and better. *WIREBOOK IV* is a concisely written mini-manual, an excellent, how-to-do-it resource for coaxial cable, coax connectors, antenna wire, baluns, lightning protection, grounding, and accessories.

The 224-page, nine-chapter (plus catalog section) book is produced in a handy $5\frac{1}{2}$" × $8\frac{1}{2}$" format. As such, it's a highly readable collection of hints, tips, and advice for the antenna builder and hobbyist. While the book won't tell you all there is to know, it will help you make better choices, find and learn about the things you do and don't need, and learn how to do many of the hobby's tasks and projects. The book is intended as a reference, training aid, and Wireman product catalog, and while primarily for amateurs, the book also is invaluable for SWLs.

WIREBOOK IV is full of highly useful information, pictures, charts, and tables carefully gathered by Press as a result of thousands of conversations at hamfests and on the telephone, and from discussions with authors, researchers, tech reps, engineers, and quality-control people. Many of our readers are aware of The Wireman's marketing of "certified quality" coaxial cable and other wire and cable products.

WIREBOOK IV is $12 with orders (plus $2 for separate shipping) from The Wireman, Inc., 261 Pittman Road, Landrum, SC 29356-9544 (telephone 1-800-727-9473; e-mail: <n8ug@thewireman.com>; on the web: <http://www.thewireman.com>).

More Titles from Newnes. As we've noted in several previous columns, Newnes offers many popular book titles in computing, electronics and electrical engineering, broadcasting, film and TV, video and audio, and other technology. One new Newnes title is of special note this month.

The book is *Practical RF Handbook, Third Edition,* by Ian Hickman. The 304-page paperback, which boasts 15 chapters, 14 appendices, and an index, is a hands-on guide to RF design for engineers, technicians, students, and enthusiasts. In the book Hickman draws on his own radio engineering background to present a comprehensive and methodical text. Using a minimum of math, the book covers all the key topics in RF: analog design principles, transmission lines, transformers, couplers, amplifiers, oscillators, modulation, transmitters and receivers, propagation, and antennas.

Contact Newnes, an imprint of Elsevier Science, 200 Wheeler Road, Burlington, MA 01803 (1-800-545-2522; e-mail: <custserv.bh@elsevier.com>; web: <http://www.newnespress.com>). The Newnes online catalog is available on the website, and you can request that a paper copy of the catalog be sent to you. Some popular Newnes titles are also available from the ARRL, including the respected *RF Components and Circuits,* by the late Joe Carr, K4IPV, which we profiled in last December's column.

Wrap-Up

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

Overheard: Always aim high. Why? I've found that if I take aim at nothing at all, I'll hit the target squarely, each and every time. 73, Karl, W8FX

Retro-Radio QRP

BY DAVE INGRAM,* K4TWJ

Although surely a myth, we hear there are still some lost sheep out there debating if QRP can really go the distance. Oh ye of little faith and low antennas! We will say this one more time, dear friends, and then we will let the dogs chew each and every non-believer's antenna cables to shreds. You bet, Sherlock! QRP romps!

What can you work with QRP? Almost anything you can work with 100 watts, provided you have a good rig and the right mindset, I would say. While using a little FT-817 and Hy-Gain AV-640 vertical during a recent DX contest, for example, I worked JT1CO, XT2DX, D44TD, A52R, and several other "raries" by constantly searching and pouncing rather than battling pile-ups. I thought I was cooking until Bob Roser, K4OCE, passed along a photo of his recently received QRP QSO QSLs (photo A). This guy really proves a little QRP goes a long way—3Y, 4S7, 9MØ, A52, YA, YI—that's big-time DX!

Photo A– What can you work with QRP? As Bob Rosier, K4OCE, shows us in this photo of recently received QSLs, the whole world! All it takes is a good operating savvy and a good rig. Bob's setup runs 5 watts to a Cushcraft X9 beam up 60 feet. Impressive! (Photo by K4OCE)

Ah, but let's not see short the kit-building and homebrewing side of QRP. That is a continuously popular interest among numerous QRPers, and it is also the main focus of this month's column, so let's look farther in that direction.

Packaging Makes the Difference

Like many of you, I thoroughly enjoy building QRP projects during spare(?) time, but fall rather flat on neat enclosures for the little delights. Far too many times I store small projects and mini-rigs in Altoids tins, then just pull them out of the tins and use them "open-air style" on a desk with a handful of clip leads connecting power, antenna, and key. This "impromptu QRP" or "mini spy rig" arrangement is handy for dinking or traveling light, but something a bit more "den friendly" is desirable for casual around-home use.

A sure-to-please answer here is mounting favorite QRP rigs in plastic transistor-radio cases and/or tabletop radio cabinets. Now before you start accusing Doctor Dave of mutilating increasingly popular collectibles, understand that I am talking about retaining their original beauty and expanding their life as a ham rig. Furthermore, my "docking booster concept" works for adding (and just as easily removing or swapping) PC-board units of all types. You must try this idea to appreciate it, friends.

Switching on a neat '50s- or '60s-style radio in the kitchen, den, or bedroom and tuning a favorite ham band is a blast of fun. Then you tap out CQ on an adjacent key or paddle and get a reply. That's the real treat! Soon you are putting "disguised" QRP rigs in every room, plus the garage and the barn—and all at a fraction of a big-rig cost. Yes, indeed, home is where the ham rigs are!

Romantic Retro-Convert-o

Our first example of a rig-enhanced radio is shown in photos B and C. It begins with a captivating little '50s-model Crosley replica radio from Universal Radio, Inc. in Reynoldsburg, Ohio (1-800-431-3939 or <www.universal-radio.com>). The radio is an AM-FM unit with a built-in cassette tape deck and a fair amount of extra interior space to hold a small PC-board rig, and later add a mini-RF amplifier and power supply. What kind of rig? That depends on what you want or have available and what you visualize as a finished project. Every setup will be different—an original creation from your own imagination, so to speak, and that is what makes it extra special. Mounting problems? A little Krazy Glue® and some double-sided tape does the trick. How do you mount knobs and switches? Just gang them together with the radio's existing controls or mount them on the back along with key and antenna sockets. Think creatively and positively. You can do it!

In my case, the starter rig is a popular Tixie 500 mw mini-transceiver kit from Embedded Research of Rochester, NY (<www.embres.com>). I plan to substitute a new Rock Mite kit transceiver and a NorCal Mini-Boots amplifier kit when it becomes available, so I just tack-soldered cables and wires

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- HEAVY DUTY DESIGN
- LOW PROFILE, LIGHT WEIGHT PACKAGE
- EMI FILTER
- MEETS FCC CLASS B

PROTECTION FEATURES:

- CURRENT LIMITING
- OVERVOLTAGE PROTECTION
- FUSE PROTECTION.
- OVER TEMPERATURE SHUTDOWN

SPECIFICATIONS:

INPUT VOLTAGE: 115 VAC 50/60HZ
OR 220 VAC 50/60HZ
SWITCH SELECTABLE

OUTPUT VOLTAGE: 13.8VDC

AVAILABLE WITH THE FOLLOWING APPROVALS: UL, CUL, CE, TUV.

MODEL SS-18

DESKTOP SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1⅛ x 6 x 9	3.2
SS-12	10	12	1⅜ x 6 x 9	3.4
SS-18	15	18	1⅜ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3¾ x 7 x 9⅝	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

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

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

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

WITH SEPARATE VOLT & AMP METERS

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

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

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

WITH SEPARATE VOLT & AMP METERS

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

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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

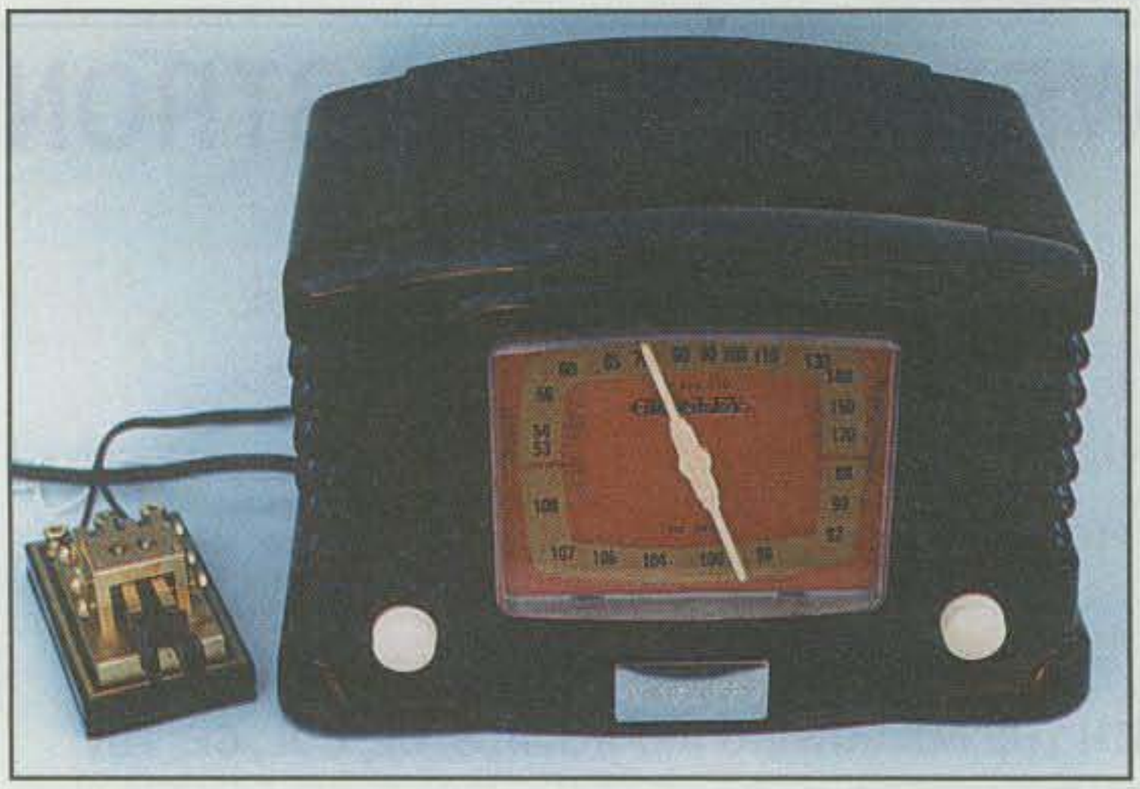


Photo B– Remember this marvelous Crosley retro radio from Universal Radio, Inc.? We highlighted it in our December 2002 "Christmas Gifts" column. We expanded it into a QRP transceiver without detracting from its original appearance, and even use its audio amplifier section to fill a room with ham band sounds.

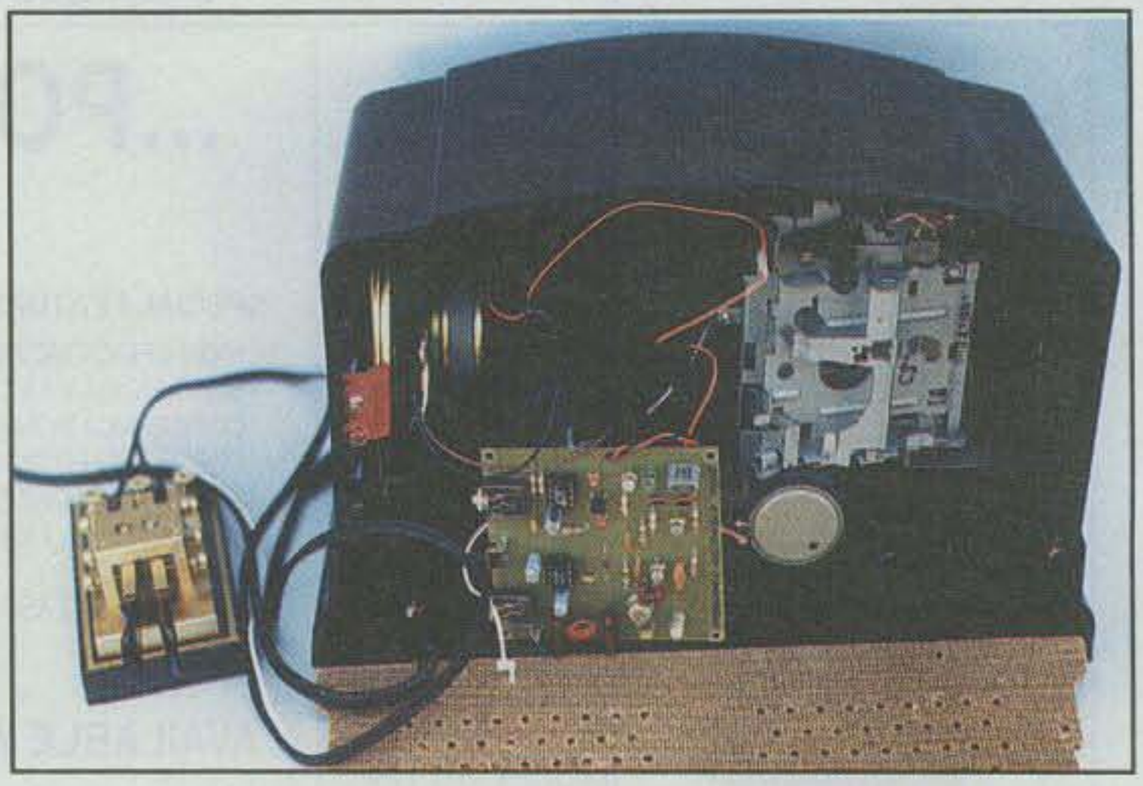


Photo C– A peek inside the Crosley retro radio reveals a Tixie mini-transceiver board from Embedded Research, Inc. mounted with double-sided tape. Connections for key, power, audio, and push-button controller are tack-soldered to existing sockets on the board for easy use or removal/upgrading. The radio's original circuitry remains intact behind a black plastic separator behind the Tixie board. (Discussion in text.)

to on-board connectors and left everything functional as is. One cable routes from the Tixie's earphone socket/LM-386 output to the cassette player's pickup head. This way I can switch the Crosley to "cassette" but not insert a tape, and ham band signals will be amplified enough to fill a room. I anticipated the pickup head might load down the LM-386, but it worked out fine. As an alternate plan, I could have connected the Tixie's audio output to the Crosley's volume control (between its wiper and ground terminal). Either way would route the mini-rig's output to the radio's audio amplifier and speaker.

The above-mentioned Rock Mite, by the way, is a very compact 500 mw 40 or 20 meter transceiver available from Dave Benson's Small Wonder Labs (<www.smallwonderlabs.com>). It operates on two selectable frequencies, it is controlled from a single pushbutton that can be remotely mounted, and it should fit in the smallest '60s-era transistor-radio case with room to spare. What a cool conversation piece!

The NorCal Mini-Boots kit is a .5 watt or one watt input/5 watt output RF amplifier using an IRF 510 power MOSFET. It covers 40 and 20 meters and should be available by the time this column appears in print. Check <www.norcalqrp.com> for more details, and remember that website for checking out more forthcoming goodies such as the new NorCal 30, a complete-package 5 watt, 30 meter transceiver kit with some

Photo D– Plastic-case AM radios from the 1960s and '70s make neat homes for small PC-board QRP rigs. Mating the two units is usually simple, and the radio's original audio amplifier stage(s) usually can be interfaced with the QRP rig's earphone output.

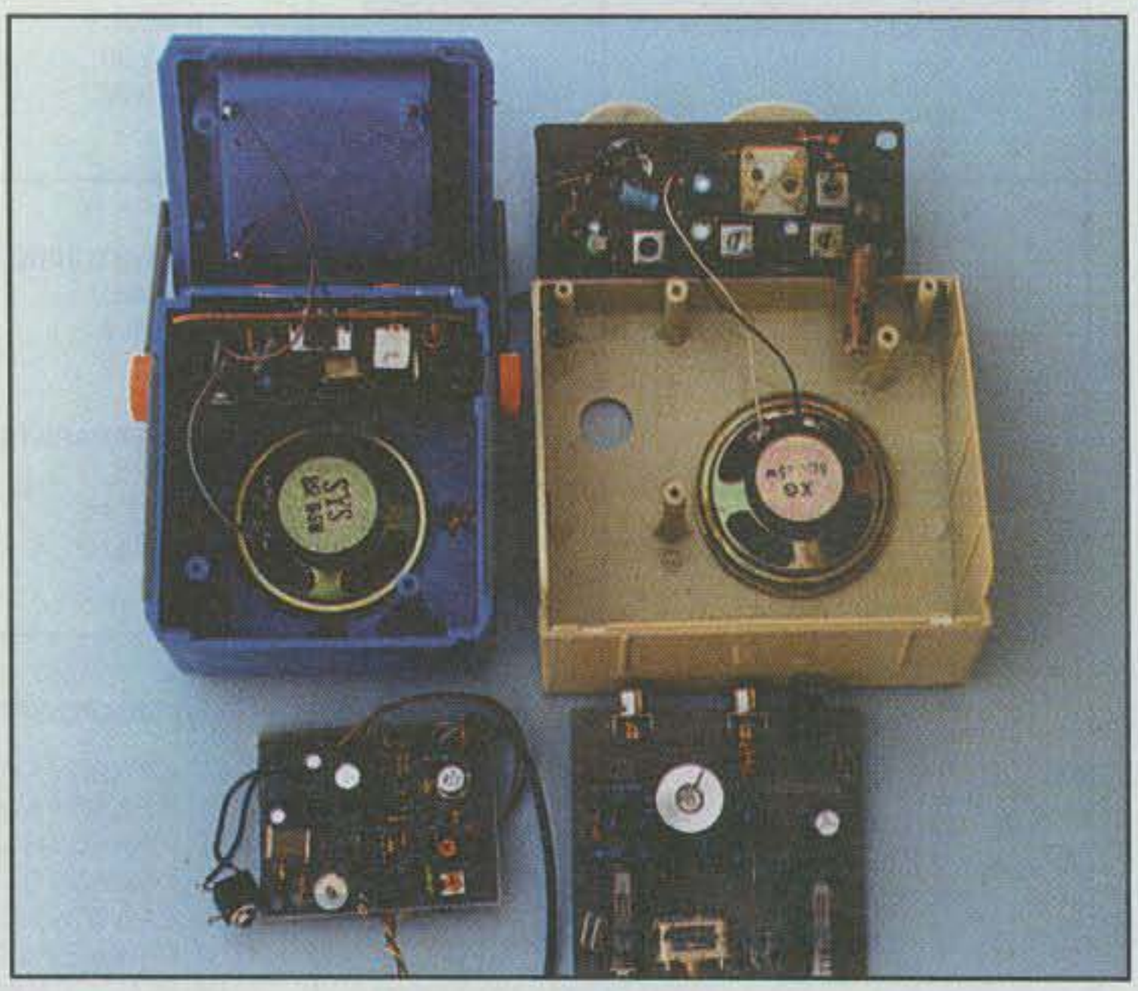


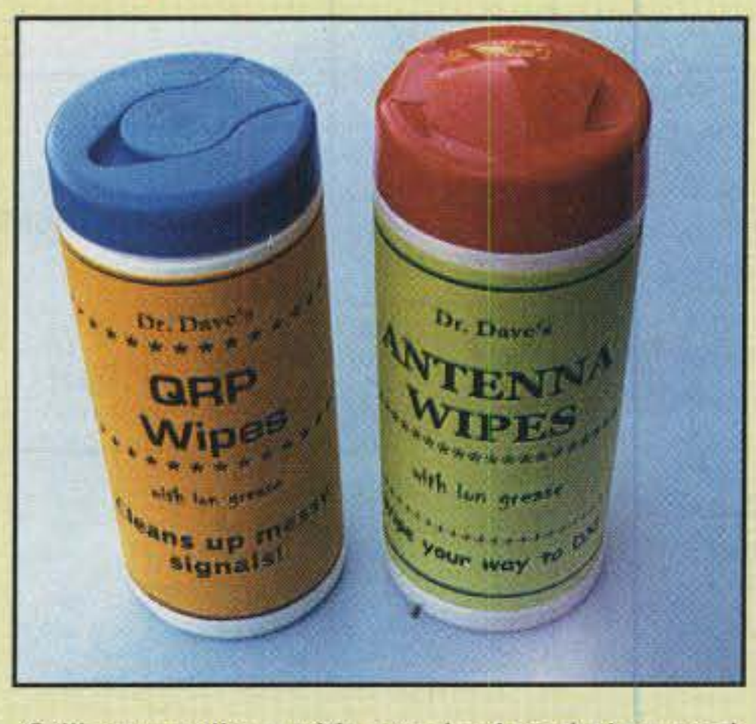
Photo E– Looking inside two small transistor radios, we see a NorCal 49er board will mount right to the speaker's magnet with double-sided tape or fit directly into the radio's circuit board slot (radio on left). Likewise, a Vectronics board easily mounts to the speaker's magnet in the tan-case radio on the right. Numerous other radio/rig combinations are also possible.

Dr. Dave's QRP Wipes and Antenna Wipes

Okay, friends, you asked for a couple of timely miracles and here they are—Dr. Dave's Ham Wipes for rigs and antennas. They are the ideal quick-fix answer to supercharging your favorite rig and antenna. Just one wipe a month does the trick.

How do they work? Some folks say it's magic, but the real secret is in the wipes ion grease. This stuff is colorless, odorless, and has zero density, but it makes signals squeaky clean so they slip and slide all the way from a transmitter's oscillator to a distant receiver's speaker. Some tests indicate the wipes actually accelerate signals faster than the speed of light so they arrive at a distant station before you transmit them. Imagine commanding such a DX advantage!

Dr. Dave's ham wipes are available from amateur radio dealers nationwide, but we hear some folks are denying that fact and stockpiling the wipes for their own use. Do not accept no for an answer, friends! Tell them you know they are hiding the wipes and demand to purchase a container on the spot! Also consider buying up their whole stock so other ops can't romp over you in the pile-ups!



Still struggling with weak-signal rigs and low-hanging antennas? Stop beating a dead horse and wipe your way to DX success with Dr. Dave's Ham Wipes. They are easy to use and one wipe last 30 days.

unique circuitry. NorCal continues to pave the way in innovative circuit ideas, and this new 30 meter rig is a shining example of that fact. It sports a quadrature signal detector with I and Q phasing sections, a mini-switching DC power converter, and more.

Returning to my modified '50s, '60's model Crosley, I considered recalibrating its beautiful airplane-style dial for ham band frequencies, then re-thought the idea. Rigs such as the popular MFJ Cub do not use a calibrated dial. Why should this rig need one? An audio frequency annunciator seems like a better idea here. Small Wonder Labs has one available in kit form, if I remember correctly. A frequency announcer would parallel-connect with a mini-transceiver's earphone output, which, as previously mentioned, routes to the Crosley's audio amplifier and speaker. Then the little retro-radio will really shine! There is a bit more spare room in the Crosley's case, so adding a small power supply in one corner and a random-wire antenna tuner in another corner holds good merit. Again, specific details on mounting—and on PC-board mini-rigs to interface—are left to your preference. I am simply sharing ideas to get you homebrewing creatively.

Pocket-Size Radios for QRP

Some additional examples of plastic-case retro radios and small PC-board QRP rigs are shown in photos D and E. This mix-and-match collection obviously will differ in each amateur's situation, but that's fine. It's the variety that makes each retro rig unique and special. Generally speaking, a strip of double-sided tape and/or a touch of Krazy Glue® is all that's needed to mount a

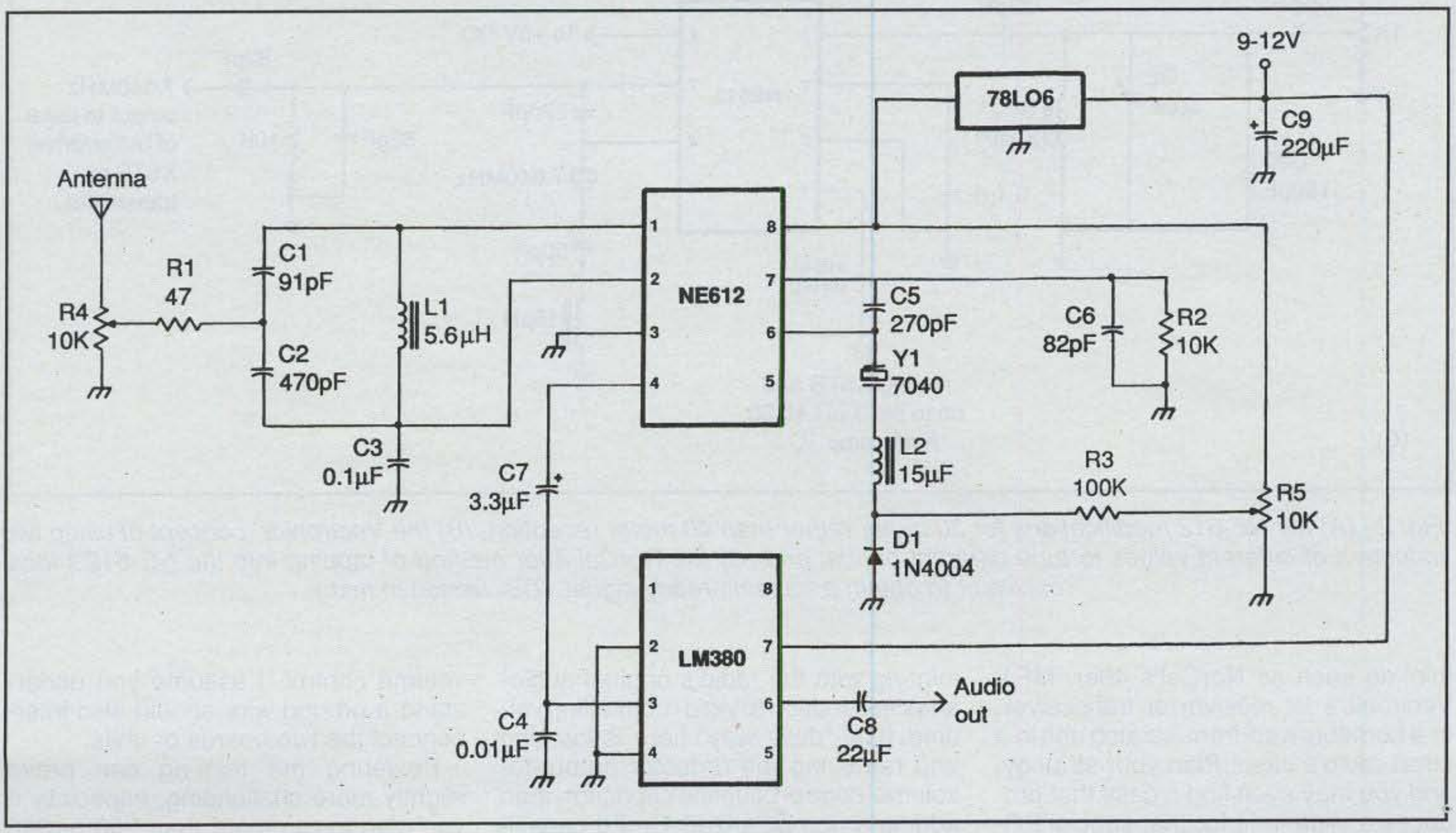


Fig. 1– Circuit diagram of the little "MRX" receiver. Unit was designed and made into kit form by Steve Bornstein, K8IDN, a few years ago and still works great.

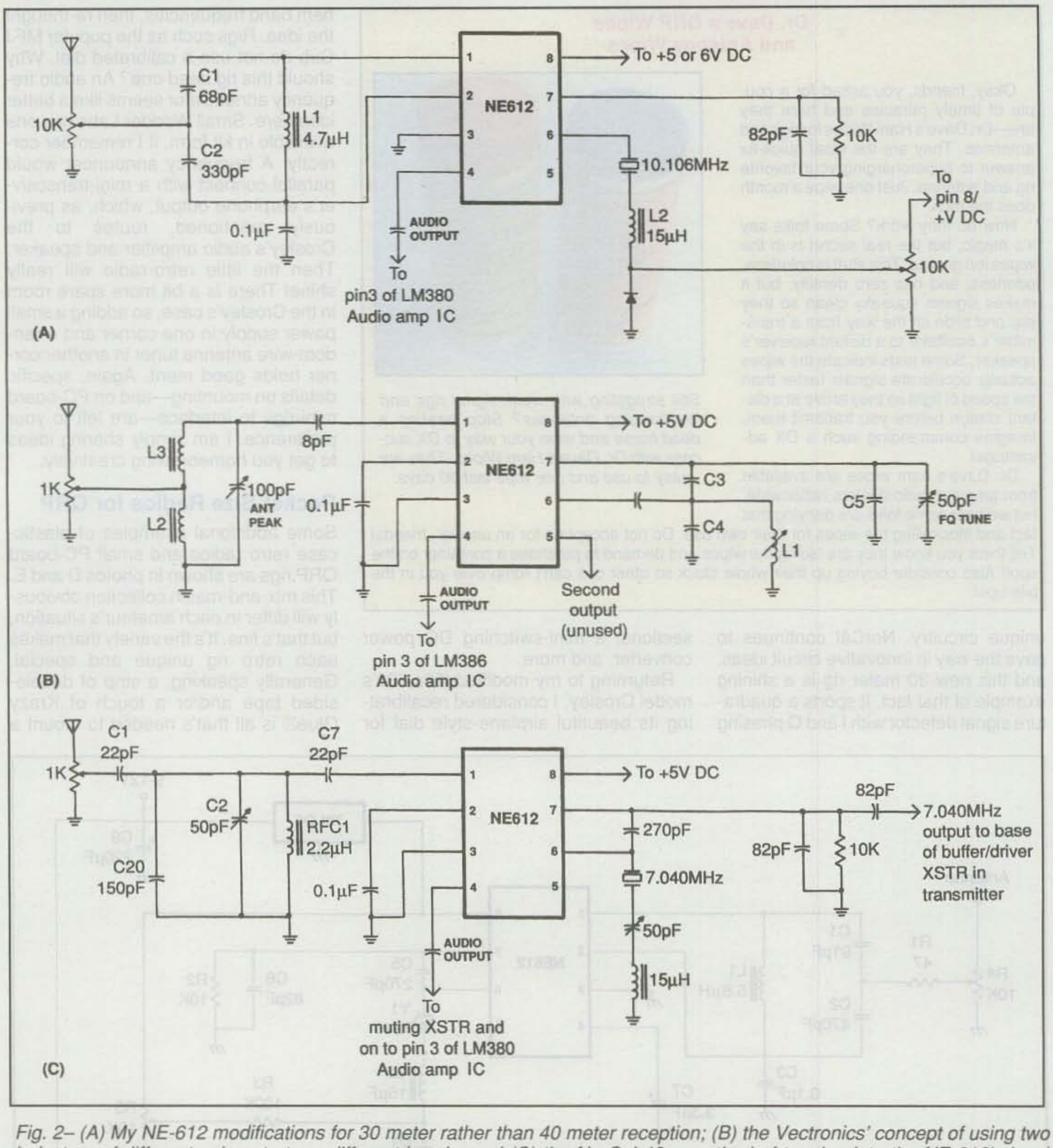


Fig. 2– (A) My NE-612 modifications for 30 meter rather than 40 meter reception; (B) the Vectronics' concept of using two inductors of different values to tune different bands; and (C) the NorCal 49er method of tapping into the NE-612's local oscillator to obtain a transmit-ready signal. (Discussion in text.)

mini-rig such as NorCal's 49er, MFJ/Vectronic's kit receiver or transceiver, or a homebrewed-from-scratch unit in a small radio's case. Plan your strategy, and you may even find a case that produces a slide-in fit for that special PC-board project.

Also, you probably can interface the mini-rig with the radio's original audio-amplifier section to yield room-filling volume. The "easy way" here is locating and removing the detector output-to-volume-control coupling capacitor, then adding a non-polarized 1 mFd capacitor between your QRP rig's earphone output line and the wiper of the radio's volume control. I assume you understand a ground wire should also interconnect the two boards or units.

Powering the mini-rig can prove slightly more challenging, especially if you plan to run more than 250 or 300 milliwatts or use 12 volts rather than a 9 volt battery. Two solutions are possi-

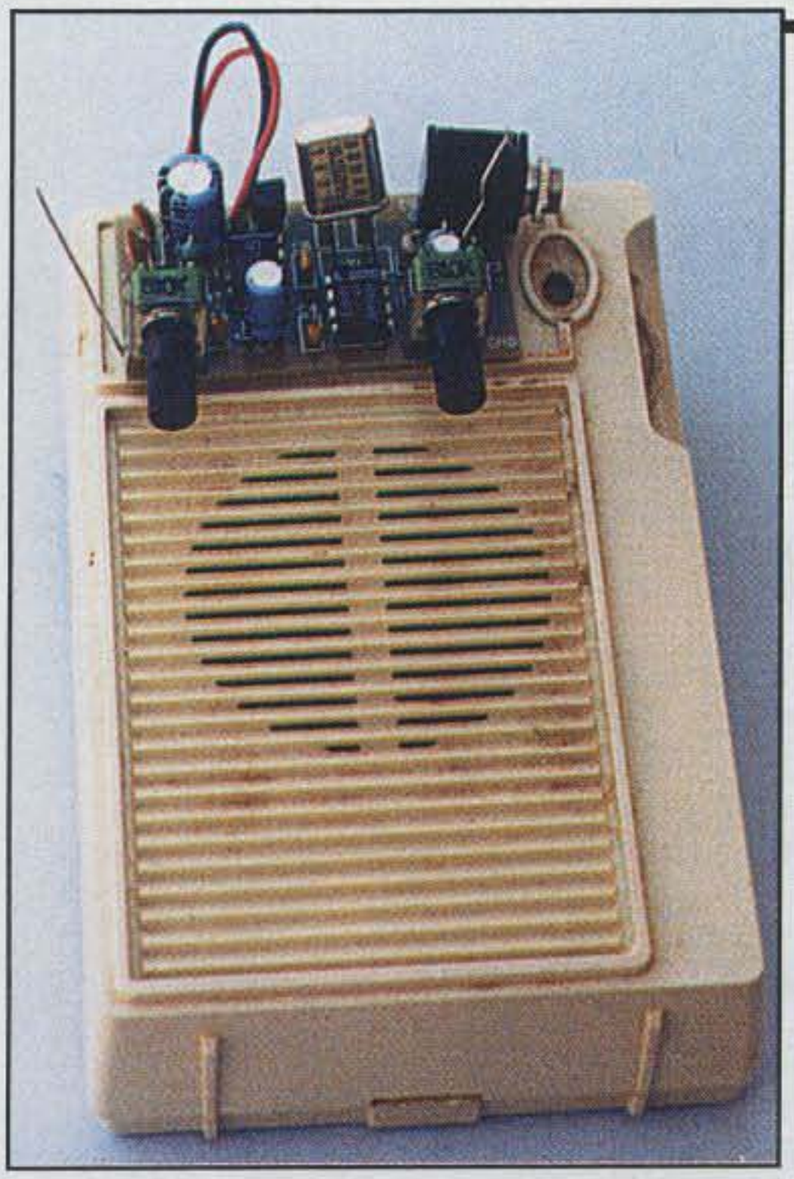


Photo F– The ever-popular "MRX" two-IC receiver is small and flexible enough to fit in any pocket radio's case. PC boards are available from FAR Circuits. (Discussion in text.)

ble here—using a well-filtered "wall wart" or adapting a second radio case to serve as a battery holder.

Thinking further on easy-brew QRP projects that fit in small radio cases, the little two-IC receiver shown in photo F and fig. 1 is always a popular item worthy of consideration. It goes together in a couple of hours, works well, and measures only 2 inches wide by 1 inch deep. A varicap and potentiometer are used for tuning, so the pot can be moved off-board or changed to a 10-turn version to fit in place of a radio's existing controls or mate with a dial cord-driven mechanism. Want to go fancy? Wire two (regular type) pots on a switch and use them "VFO-A/VFO-B" fashion.

The two-IC receiver's NE-612 is ideal for experimenting with different "front-end" circuit designs, plus it can cover any range from 160 to 6 meters by changing its support components. I modified my two-IC receiver for 30 rather than 40 meters, for example, by just changing C1 to 68 pFd, C2 to 330 pFd, L1 to 4.7 µHy, and substituting a 10.106 MHz crystal on pin 6 (fig. 2A). Vectronics has an even better idea in their kit version of this receiver (item number VEC-1120K, available from MFJ at 1-800-647-1800 or Vectronics at 1-800-363-2922). They use a 100 pFd capacitor for input peaking, then change input coils L2 and L3 to cover each band (fig. 2B). Vectronics also uses an L-C circuit rather than a crystal for NE-612 oscillator control (L1 plus C3, C4, and C5), so changing one additional coil and three capacitors (C3, C4, and C5) completes the band-shift mod.

Need I also point out here that changing L1 plus C3, C4, and C5 to another range (such as 10.555 MHz) while retaining a desired band input (10.100 MHz, for example) can produce a 455 KHz output at pin 4 or 5 for superheterodyne rather than direct-conversion operation? Or, you could add such a circuit "in front" of a regular AM radio plus modify its IF stage to oscillate and copy ham-band SSB or CW. It's an old trick, so I will assume you can take it from here, or should we go over it in a future column?

Now quickly study fig. 2C, which is the "front end," or NE-612, configuration used in NorCal's little 49er mini transceiver popular a couple of years ago. It and the two-IC receiver are very similar, except the 49er uses two parallel rather than series-connected input capacitors—academic, but interesting. Ah, but notice a small 82 pFd coupling capacitor connected to pin 7 extracts some of the NE-612's local oscillator, which can drive a 2N2222 driving a 2N3053 and consequently produce a small transceiver. (Again, such circuits are quite common, but I can get more specific if desired.) Now imagine building such a two-IC and two-transistor transceiver surface-mount style. The whole kit-and-caboodle, including a couple of coin cells, could fit in a small homebrewed case and be worn wristwatch style. Homebrewing is truly a captivating pursuit!

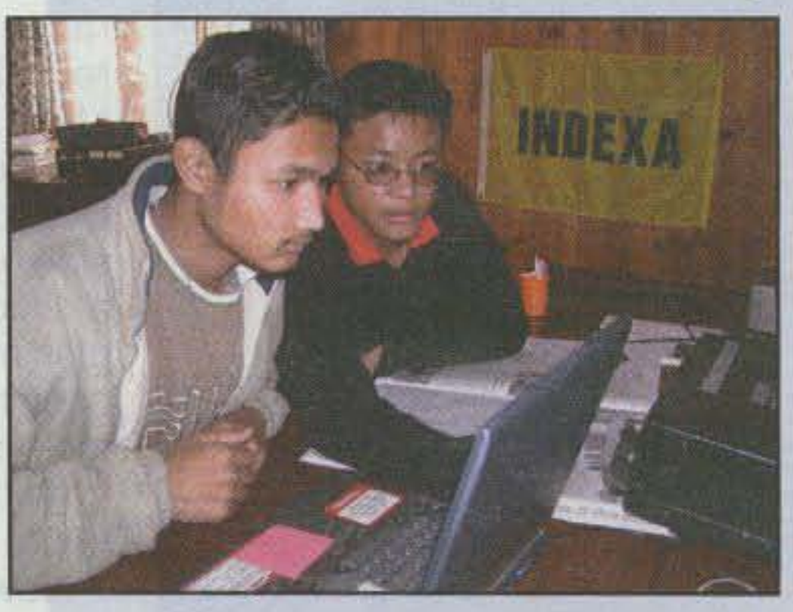
The previously highlighted two-IC or "MRX" receiver, incidentally, was produced as a kit by Steve Bornstein, K8IDN, and the Columbus (Ohio) QRP Club a couple of years ago. The boys have now stopped producing kits, but the receiver's PC board is available from FAR Circuits (<www.cl.ais.net/farcir/>), and parts are available from well-known suppliers such as Mouser Electronics (<www.mouser.com>). If you are interested in changing a pocket transistor radio into a mini ham rig, this two-IC receiver is a good starting point or building block.

On that note, we must bow out once again, with an open invitation to share your adventures and experiences in QRP with other *CQ* readers. Drop us a letter and photo on what you are running, working, and homebrewing, and let's get some well-deserved recognition going your way. Good luck to all and keep on DXing with QRP! 73, Dave, K4TWJ

BY CARL SMITH,* N4AA

Keeping Your QTH Info Current

By now the CQ WW WPX SSB Contest and the ARRL DX Contest weekends are history. I hope you all enjoyed these events and achieved your personal goals—either a big score or adding to your worked totals. If you participated in these contests, you found out pretty quickly whether your station was "competitive" in those contest pile-ups. Now you know what you have to do this summer to improve your station so you can try again in the fall contests. I know I found out a few things, and I've been contesting for a very long time. Mr. Murphy always seems to bring something to our attention.



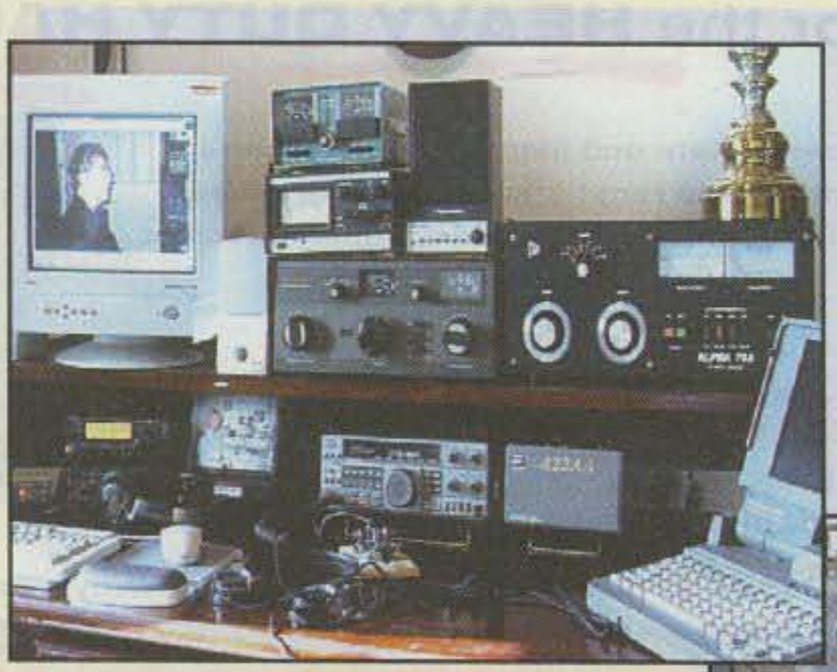
A51B CQ WPX RTTY Contest operation with Varun and Pema, both 16 years old and budding contesters! The taller boy is Varun, A51VR, and the shorter one with glasses is Pema, A51BB (not Pema, A51PR, who is often on 20 meters SSB). Photo courtesy Glenn, WØGJ/A51B)

Keeping Your Route Current

Something that bears mentioning recently came to light. A reader wrote to say that he had been trying to QSL a DXpedition for some time, but mail to the QSL manager, in the U.S., kept coming back as "UNKNOWN." Strange, since according to the FCC rules we are supposed to keep our mailing address current. This means if you move, you are supposed to notify the FCC of your new address. The folks who produce address databases typically use the FCC database to maintain and update their information.

I heard of one case in which a relatively well-known U.S. amateur failed to notify the FCC of his address change. When the FCC sent mail to him and it was returned "UNKNOWN," they cancelled his license. If the FCC couldn't find him and since

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



Have you worked Charles, S9SS, or perhaps his wife Leslie, S9YL? This is the hamshack they share in Sao Tome. (Photo courtesy Jerry, N4JR)

Kutty, VU2PKK, regularly shows up on/around 14.200 at around 1145Z with a great signal into the U.S. Kutty is an old timer who likes 15 and 20 meters SSB. His son VU2KVG is a physician, and his daughter-in-law is VU2GVP. (Photo courtesy John, KDØJL)

The WPX Program

SSB

2854.....DL6ATM 2856.....W2VU
2855.....K2PH 2857.....KN6OXD

Mixed

1912.....W2VU

AWARD OF EXCELLENCE: DL6ATM

160 METER BAR: DL6ATM

CW: 1150 K6UXO. 2000 EA7AAW.

SSB: 350 K2PH. 400 W2VU, K2PH. 600 DL6ATM. 650 DS5ACV. 850 K1SHM, G3TSZ. 900 NØYYO

MIXED: 1200 K6UXO. 1650 WZ4P. 5150 W2FXA.

10 meters: DL6ATM
15 meters: DL6ATM
20 meters: DL6ATM
40 meters: DL6ATM

Asia: DS5ACV
Africa: DL6ATM, VE9FX
No. America: DL6ATM, K2PH
So. America: DL6ATM
Europe: DL6ATM, DS5ACV
Oceania: DL6ATM, DS5ACV

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KUØA, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, W4GP, K4LQ.

160 Meter Endorsement: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF N4NX, SMØDJZ, DK3AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WBØDD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA5CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, UAØFZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, W4GP.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. ***NOTE:*** *WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Yves, F6CTL, is shown here operating as FO/F6CTL from his French Polynesian trip to Tubuai Island. The antenna was a vertical on the beach. (Photo courtesy KDØJL)

he didn't respond to the mail, they didn't know where he was and made the logical assumption that he didn't exist anymore. I understand that he did finally get the matter resolved, with his license reinstated, but it took time and caused him considerable embarrassment.

Don't get caught in this situation yourself. If you move, notify the FCC of your new address. It could save your license, and it will make things a lot easier for

CQ DX Awards Program

SSB

2393.....EA3JL 2394.....VE7KDU

CW

1038.....VE7KDU

SSB Endorsements

320.....IN3DEI/335
320.....K9OW/335
320.....IØZV/335
320.....K4CN/334
320.....EA3KB/334
320.....W6SHY/334
320.....EA3JL/331
320.....W9IL/328
320.....WN9NBT/322
310.....KE4SCY/315
310.....KD5ZD/314
300.....VE7KDU/302
300.....XE2NLD/300
275.....W4PGC/290

CW Endorsements

320.....K4MQG/334
320.....K4CN/333
320.....K9OW/328
320.....N4OT/325
310.....N7WO/318
310.....W6YQ/311
300.....VE7KDU/300
275.....W9IL/298
150.....W4PGC/167

RTTY Endorsements

320.....NI4H/325

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

5 Band WAZ

As of February 15, 2003, 610 stations have attained the 200 zone level and 1306 stations have attained the 150 zone level.

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

None

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

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
KL7Y, 199 (34)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
KC7V, 199 (34)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
K5MC, 199 (22)
W1JZ, 199 (24)
K2UU, 199 (26)
W1WAI, 199 (24)
W1FZ, 199 (26)
UT4UZ, 199 (6)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
KY7M, 199 (34)
W8AEF, 199 (40)
W9NGA, 199 (26)
K8RR, 199 (26)
UU5JR, 199 (4)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
KØSR, 198 (22, 23)
UA4PO, 198 (1, 2)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
LA7FD, 198 (3, 4)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
KF2O, 198 (24, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
N4XR, 198 (22, 27)
OE2BZL, 198 (1, 27)
N4PQX, 198 (24, 26)
RU3DX, 198 (1, 6)

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

K4YT (191 zones)
N4GG (185 zones)
PY2DBU (152 zones)
W8GF (170 zones)

Endorsements:

W3TN (172 zones)
K1MY (193 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

The WAZ Program

10 Meter SSB

547.....JA6EFT

17 Meter SSB

32.....W7LGG

20 Meter SSB

1107.....DL1NAI

17 Meter CW

46 .....JA7FVA

160 Meters

109 .....DL3JJ (38 zones)

All Band WAZ

SSB

4839.....W6DRB
4840 .....W7AH
4841 .....N1ED
4842 .....VE3DRZ
4843.....EA3ARL
4844 .....HL3AHQ
4845 .....IK3TJO
4846 .....PY2KQ
4847 .....K8YC

Mixed

8205 .....KC5KJE
8206 .....JA1CON
8207 .....G4XBL
8208 .....2EØAOZ
8209 .....JA7FVA

All CW

347 .....K8MV
348 .....JR1XFS
349 .....HLØCAC
350 .....K8YC
351 .....JA7FVA
352.....K3VAR

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

those trying to send mail to you—those QSL requests.

Upcoming Events

There are some big events for DXers coming up. First we have the Visalia International DX Convention in May. Here's the story:

The **2003 International DX Convention** will take place May 2–4, 2003 (two weeks before the Dayton Hamvention®) at the Holiday Inn Hotel & Conference Center in Visalia, California. This is an ARRL-sanctioned convention that is being sponsored this year by the Northern California DX Club. It will feature programs from recent DXpeditions and is expected to draw visitors from around the world, as always.

The popular barbecue will return to the convention this year. U.S. Tower Corporation will again host the event at their manufacturing facility on Marcin Road, with support from the Northern California DX Club. Other convention offerings will include DX, Top-band, and contest forums; technical talks; many door prizes; both Friday and Saturday evening "attitude adjustments"; vendor exhibits; and QSL card checking.

Additional information and registration forms are available on the convention web page; go to <www.ncdxc.org> and follow the convention links. Additional registration information can be obtained by contacting Convention Registration Chairman Dick Letrich, W6KM, via e-mail at <dlw6km@aol.com>.

Then we have the **Dayton Hamvention®** May 16–18. Little needs to be said about Dayton for most DXers. Many of you have been there and know the story. There will be many, many DXers from outside the U.S. to meet and greet, as well DXers from around the U.S. who come to see and be seen. A

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

5062 9A2AA	3823 VE3XN	3230 KF2O	2944 IT9QDS	2436 W7OM	2121 PY2DBU	1949 VE6BF	1561 N1KC	1226 EA2BNU
4539 W2FXA	3726 I2PJA	3167 S53EO	2898 IK2ILH	2361 W6OUL	2063 WB3DNA	1837 AA1KS	1501 W2EZ	1163 K6UXO
4154 F2YT	3668 N4MM	3140 K9BG	2824 W2ME	2340 K5UR	2018 HA9PP	1724 W7CB	1472 OK1DWC	1130 PY1NEW
4146 W1CU	3633 YU1AB	3187 WB2YQH	2694 YU7GMN	2331 W8UMR	1999 I2EAY	1697 Z35M	1461 WT3W	742 K5IC
4098 EA2IA	3548 N9AF	3121 PAØSNG	2655 WA1JMP	2304 OZ1ACB	1983 W9OP	1674 YBØAI	1448 NG9L	728 VE3NQK
3928 N4NO	3489 SM3EVR	3043 KØDEQ	2545 W9IL	2226 JN3SAC	1976 DJ1YH	1641 KØKG	1421 KX1A	697 KL7FAP
3833 N6JV	3465 N5JR	3005 HAØIT	2522 9A4W	2203 W4UW	1958 CT1EEB	1573 VE9FX	1369 KW5USA	607 VE9FX
3827 9A2NA	3235 I2MQP	2952 W2WC	2454 K2XF					

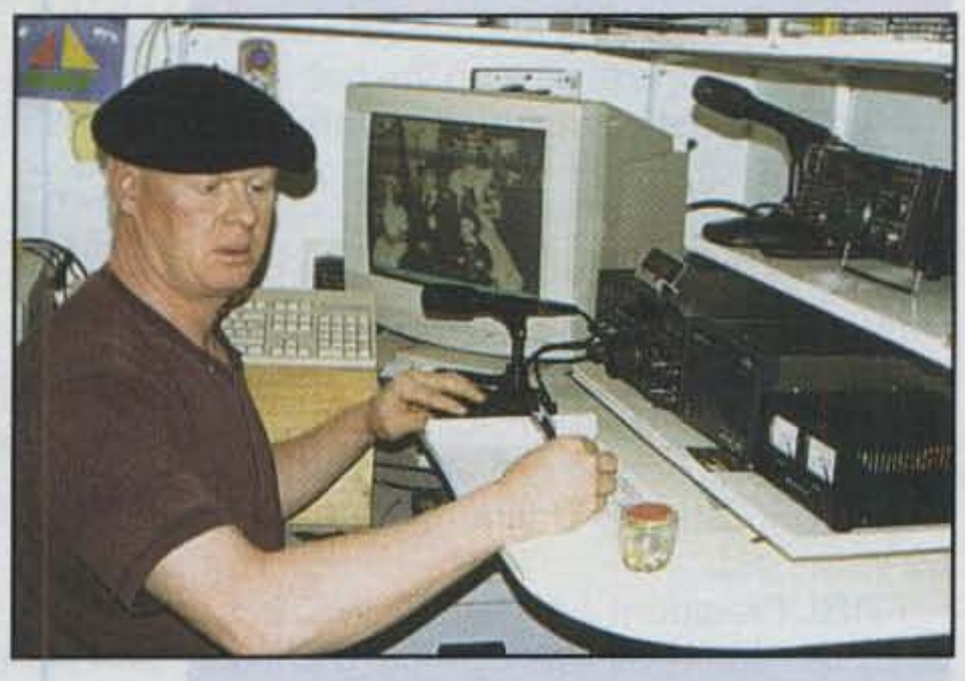
SSB

4446 IØZV	3068 N4NO	2667 4X6DK	2325 CX6BZ	1969 CT1EEB	1736 K3IXD	1555 W2FKF	1194 N1KC	990 HA9PP
4050 ZL3NS	3066 I2MQP	2594 I8KCI	2301 HAØIT	1954 CT1EEN	1730 I3ZSX	1520 DF7HX	1193 WT3W	959 VE7SMP
4018 VE1YX	3049 F2VX	2570 LU8ESU	2270 IN3QCI	1937 I8LEL	1721 DK5WQ	1415 KI7AO	1193 I2EAY	903 N9DI
3705 I2PJA	3030 9A2NA	2509 EA5AT	2259 K5RPC	1893 NQ3A	1704 IT9SVJ	1384 LU3HBO	1190 K4CN	844 KX1A
3525 F6DZU	2885 I4CSP	2487 KF7RU	2002 LU5DV	1864 K2XF	1685 W6OUL	1377 VE9FX	1162 EA5DCL	822 K1BYE
3260 CT4NH	2885 N5JR	2388 OE2EGL	1994 W4UW	1862 EA7TV	1606 K8MDU	1368 NG9L	1078 EA3KB	812 KU6J
3234 N4MM	2824 CT1AHU	2386 EA1JG	1988 K5UR	1852 W7OM	1562 W2ME	1254 JN3SAC	1062 AG4W	776 YB0AI
3180 OZ5EV	2741 PAØSNG	2337 W2WC	1978 N6FX	1821 W9IL	1562 SV3AQR	1238 LU4DA	1048 EA3EQT	702 KU4BP
3165 EA2IA	2719 KF2O							

CW

5397 WA2HZR	2822 LZ1XL	2399 HAØIT	2147 I7PXV	1905 JN3SAC	1780 IK3GER	1483 EA6AA	1146 K6UXO	1032 WA2VQV
3834 N6JV	2681 9A2NA	2325 KF2O	2102 N6FX	1898 K5UR	1728 W9IL	1464 4X6DK	1118 EA2BNU	953 KX1A
3469 VE3CNE	2583 W2ME	2315 KA7T	2009 OZ5UR	1846 KS4S	1679 EA7AAW	1332 EA2CIN	1118 HB9DOT	871 WT3W
3485 N4NO	2578 N5JR	2312 JA9CWJ	1955 G4SSH	1832 VE6BF	1671 DJ1YH	1309 AC5K	1096 YU1TR	830 N1KC
3217 K9QVB	2558 N4MM	2301 EA7AZA	1938 LU2YA	1803 W6OUL	1668 I2EAY	1282 DF6SW	1081 W4UW	809 KU6J
3178 EA2IA	2428 W2WC	2197 W8UMR	1919 K2XF	1798 W7OM	1571 I2MQP	1218 WO3Z		

Bob, K4RB/SU9US, sent along this photo. He says, "Greetings from Cairo! We had a gathering of hams about a week ago at my QTH and here they are (left to right): Dennis, SU9DP/N3QKB; Jim, W3VG; Tom, N9NC (now SU9NC); Bob, SU9US/K4RB; Luciano, SU9LL/EA7CHR; Dave, KD5UFQ; Hans, SMØCFO; Sayed, SU1SA; Greiss, SU1GS; and Ezzat, SU1ER.



Jean-Marc, FP5BZ, at his station on St. Pierre. He uses a TS-870 with an FT-890 as backup. An MQ2 six-band hybrid quad rounds out the setup. Look for him on all bands 40 through 10 meters. (Photo courtesy KDØJL)

great time will be had by all, and if there's any way you can be there, please do so. I'll be at my own booth (#313) most of the time, but will spend some time at the CQ booth as well. I might even find time to walk around and see what is being offered by the manufacturers. Many of them debut new products at Dayton, so it's a good time to see what is out there to whet our appetites for a new radio or some other gadget to add to the ones we already have. The great flea market is always *the* place to find those hard-to-locate parts for a pet project, antique radios for your collection, or other things you simply *must* have.

Then there's Dayton's annual DX Dinner. Hopefully you already have your tickets for **The Southwest Ohio DX Association's 18th Annual DX Dinner** to be held on Friday, May 16 at the Crowne Plaza Hotel. There will be a cash bar at 6:30 PM and dinner at 7:15 PM. Tickets are $34 and must be purchased in advance. Seating is limited. Groups wishing to sit together must order as a group. A table seats eight. Please make your check or money order payable to SWODXA and send an SASE for ticket return. Seats will be assigned (on 16 March) in the order that requests are received. Tickets may be ordered from Steve Bolia, N8BJQ, 7354 Thackery Rd., Springfield, OH 45502. For information on the dinner, check <http://my.erinet.com/~n8bjq/> or contact N8BJQ at 937-788-2803 or e-mail: <n8bjq@erinet.com>.

They had not posted the speakers for the DX Dinner at the time this was written, but I hear that Don Miller, AE6IY (ex-W9WNV), will be there and perhaps speaking at the dinner. This is *not* confirmed at this time. Keep checking the above website for further details.

Africa DXpeditions

It appears that a lot of the countries in Africa are attracting the attention of DXpeditioners. It seems there are a lot of individuals operating from various locations. Whether these people are working for the UN or other humanitarian organizations or just going on their own, I don't know. It appears that there are some of all of these. Whatever the rea-

son, they are there, and DXers are having a great time having QSOs with them, especially on the low bands and the WARC bands.

Bhutan and Attracting Youth To Amateur Radio

We continue efforts to attract young people to amateur radio. Glenn Johnson, WØGJ, makes periodic trips to Bhutan, where he is licensed as A51B. On his most recent trip, in February, he had the opportunity to demonstrate RTTY during the CQ/RJ RTTY Contest to two 16-year-old Bhutanese boys. The photo in this column shows these two young men wide-eyed as they watch the screen on a laptop computer during the contest. Both are already licensed in Bhutan, and along with Glenn they made about 400 contacts during the contest.

If we can get young people in the U.S. involved in something like this we might make some progress in lowering the average age of radio amateurs in our country. If we don't start doing something to attract young people, we're going to end up with a lot of old timers sitting around the fire talking about how it used to be, with no one to pick up the ball and run with it. What have you done lately to involve young people in ham radio?

Jim Maxwell, W6CF, SK

Ham radio lost one of its well-known members in early February. Jim Maxwell, W6CF, ARRL Pacific Division Director, died February 6 at his home in Redwood Estates, California. He was 69 years old.

ARRL President Jim Haynie, W5JBP, said, "Jim Maxwell was a gentle giant of a man. He was one of the best assets Amateur Radio could have in a leadership position."

ARRL CEO Dave Sumner, K1ZZ, said, "Jim Maxwell was one of the most brilliant people I have ever had the privilege to know. He was also one of the most unselfish and one of the most modest."

Jim was an avid DXer and contester. He was a Life Member of the ARRL who had previously served as Pacific Division Vice Director and Santa Clara Valley Section Manager. He served as an ARRL Emergency Coordinator from 1991 to 1999, and he was a member of the ARRL DX Advisory Committee from 1988 through 1994. Jim previously held the call W6CUF.

Jim's interest in radio and electronics history was well known, and he had an extensive collection of amateur radio documents and memorabilia. Professionally, Maxwell held doctoral degrees in aeronautical engineering and biomechanics. He retired from the Lockheed Missiles and Space Corporation as a technical consultant in 1992 and from Scitor Corporation in 1998.

The amateur radio community will miss him.

Until next time, I look forward to seeing many of you at the DX gatherings around the country, and especially at Dayton in May. 73, Carl, N4AA

QSL Information

3B8/DK7AO via DL3APO
3B8/ON4AME via ON4AME
3D2RJ via ZL1BQD
3DAØZ via ZS6EZ
3DA6Z via ZS6EZ
3V/F5VHH via ON4CKY
3W2XK via W9XK
3W6WE via K2WE
3ZØOL via SQ4NR
3Z5PW via DL3KDC
4F7EWW via KK5CM
4J6ZZ via UT3UY
4L1DX via OZ1HPS
4L1MA via ON4RU
4N4KP via YU1FW
4N4MB via YU1FW
4O3A via YU1FW
4O6A/5B4 via YU1FW
4U1VIC via 4U1VIC
4V2PK via N3SL
4V4H via N3SL
5B4/AI5P via AI5P
5B4AHB via LA8LA
5H4IR via ZS6EZ
5H9IR via ZS6EZ
5JØT via YU1FW
5L7T via YU1FW
5NØNHD via JH8BKL
5R8GZ via G3SWH
5U7JB via ON5NT
5W1ER via K2FJ
5W1FP via ZL1BQD
5X1DC via DL7AFS
5X1GS via WB2YQH
5X1T via ON5NT
6J2AC via EA5OL
6LØNJ via DS4AEN
6W7/F6AXX via F6AXX
6YØA via K3DI
6YØT via K3TEJ
6Y5/AC8G via AC8G
6Y5/K3DI via K3DI
6Y5/K3TEJ via K3TEJ
7J1AOE via K3DI
7Q7BP via G3MRC
7Q7HB via GØIAS
7Q7LA via GØIAS
7Q7RV via ZS6DX
7Q7TV via ZS6DX
7Q7XT via ON5NT
7X2RO via OM3CGN
7Z1ZZ via 7Z1ZZ
8P5A via NT1N
8P6GE via 8P6GE
8P6JC via 8P6JC
8P6JQ via 8P6JQ
8P6KY via K2QIE
8P9AP via K2WE
9AØCI via DEØMST
9G1OO via PA3ERA
9G5AA via GM4FDM
9H3CT via VS6CT
9J2BO via G3TEV
9K2AI via N9NU
9K2K via W6YJ
9L1BTB via SP7BTB
9M2TO via 9M2TO
9M8/WB4RRK via N3EQF
9N7AS via JH3PAS
9Q2T via ON5NT
9Q5TT via ON5NT
9S1X via F2YT
9U5JB via ON5NT
9V1DJ via JA3KAB
9V1GA via JA4BJO
9X/RV6LNA via UA6MF
9X1A via UA6MF
9Y/DL1SEN via DL1SEN
9Y/DL2SEK via DL2SEK
9Y4/DL6RAI via DL6RAI
9Y4/IV3IYH via IK2ILH
9Y4TBG via DL4MEH
9Y4W via K2SB
A35TL via HB9TL
A4/IV3NCC via IV3NCC
A45WD via YO9HP
A51WD via F8IJV
A61AD via N1DG
A61AO via N1DG
A61AR via UA6MF
A71AW via W3HNK
AA4NC/KP1 via AA4NC
AA8LL/C6A via AA8LL
AH3D via OH2BH
AP2ARS via ON5NT
AP2NK via AP2NK
BW3/UA3VCX via UA3VCX
C31LJ via VE3GEJ
C56/GØVUH via GØVUH
C6A/AA8LL via AA8LL
C6A/K8LIZ via K8LIZ
C6AHL via K3DI
C6ALB via AA8LL
C6ANK via W9AU
CB4Y via CE4FXY
CE3N via CE3NR
CE9R via CE3HDI
CN2RL via YU1FW
CN8NK via EA5XX
CO2PH via F6FNU
CO6XN via N3ZOM
CT1FJK via CT1FJK
CT3/DL5AXX via DL5AXX
CUØWPX via K3AIR
CU3LF via K3AIR
CX7OV via EA5KB
CY9/AA9GZ via KØSN
CY9/N9JCL via KØSN
CY9/WB9OBX via KØSN
CY9/WC9E via KØSN

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," P.O. Box 3071, Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

BY JOHN DORR,* K1AR

Balancing Aggressive Operating and Courtesy

April's Contest Tip of the Month

Have you ever *really* taken the time to understand the benefits that come from sunrise/sunset propagation? Some would suggest that managing the positive effects that come from enhanced propagation at these times is one of ham radio's great equalizers. It's not limited to the low bands either, as many think. Strategic attention to sunrise/sunset times will increase your next contest score—guaranteed. Check it out!

Calendar of Events

Mar. 21–23	Oklahoma QSO Party
Mar. 29–30	**CQ WW WPX SSB Contest**
Apr. 5–6	MARAC County Hunters SSB Contest
Apr. 5–6	SP DX Contest
Apr. 11–13	Japan Int'l CW DX Contest
April 19	Holyland DX Contest
Apr. 19–20	YU DX Contest
Apr. 19–20	Michigan QSO Party
Apr. 19–20	Ontario QSO Party
Apr. 19–20	GACW CW DX Contest
Apr. 19-27	ARLHS Spring Lites QSO Party
Apr. 26–27	SP RTTY DX Contest
Apr. 26–27	Helvetia Contest
Apr. 26–27	Florida QSO Party
May 3–4	ARI Int'l DX Contest
May 10–11	CQ-M DX Contest
May 17–18	Baltic DX Contest
May 24–25	**CQ WW WPX CW Contest**

Well, I can already hear the crowds lining up to discuss this month's topic. The reality of contesting in today's competitive climate is that many of us struggle with the balance between aggressiveness and courtesy. As I see it, however, the debate can be boiled down to one central issue: The use of any of our spectrum is not an inalienable right available to an individual at the expense of everyone else. As conditions in this solar cycle continue to deteriorate, and with the band utilization compressing down to the happy haven that some call 20 meters, we need to be thinking more about this. In any event, I hope you'll give some serious thought to this month's topic as we strive to clean up our operating habits—where needed—in the heat of battle.

Calling...Calling...and More Calling

This topic is a particular favorite of mine, and we've all done it. Do you recall those 80 meter LU pile-ups? Then there's that 21304 fracas with AA6ABC/HR2 that gets completely out of control. The fact is that on more occasions than we'd like to admit, contesters get carried away. We become so compelled to get that "double multiplier" that we call and call and call again. Many DX stations simply can't handle it.

I spent some time this past month asking some casual DX stations about the troubles they encounter while operating. Unlike the fringe-oriented contester, most stations in rare DX locations turn on the radio and unknowingly find a DX contest in progress. The attempt they make to work guys under those conditions is largely to provide a service to the serious operator. In their minds, this activity could just as easily be replaced by a trip to the local beach. In a funny sort of way, I guess that's why most equipment manufacturers put a T/R relay in their radios. It's so you can listen as well as transmit!

"The W7-Delta Station Go Ahead"

How many times have you heard a DX station say "the W7-Delta station...5936" followed by three or four completely unrelated stations dumping in their calls. We tend to get particularly aggressive when someone is operating split, because the callers can no longer "hear" us. The excitement of the moment often gets the best of us. I equate this scenario with someone at the supermarket deli counter calling your number, only to have six people with higher numbers run ahead of you and place their orders. Skilled operators such as contesters simply should be better than that.

Papa-Papa

Ah, yes . . . the last two letters of your callsign (or was it the first three, year of birth, or zip code?). Few know where this operating technique came from, and many more know where they would like it to go. Although the temptation to go on a rampage here is extreme, the simple fact is that in nearly every case, signing the last two letters of your callsign in a pile-up slows down the other operator.

There is nothing more frustrating during a fast run than to have a 59+40 station cover a pile-up with the pronouncement "ALPHA BRAVO," requiring you to ask for an unnecessary fill on his callsign. There are many operators who have taken a fairly extreme position on this style of operating and simply won't respond to stations who don't sign what's printed on their license. My experience from PJ2T last fall put me very close to that edge.

Now to be fair, there are times when a DX station demands that you operate in this manner. My advice is simple: Just sign your callsign the way it was given to you. That's the way it was intended, just as you give someone your phone number, Social Security number, or last name. I'll take the loss from not working someone any day of the week rather than succumbing to the "Alpha Radio" game.

Is This Frequency in Use?

I recently read an article detailing the history of telephony. In particular, the author speculated as to the content of the first phone message. Although none of us will ever know for sure, he was quick to point out that we can assume history's second transmission had to be "Frequency is in use." Another

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e-mail: <K1AR@contesting.com>

2002 CQ WW 160 Meter Contest Results Corrections

The following corrections have beennoted:

CW: The **VY2MGY/VE3** QRP log was left out of the checking program. The corrected score is 40,205 points, 196 QSOs, 43 USA/Canadian Mults,) DXCC. He is Top Canada and Ontario QRP.

SSB: OT2T (Op. ON4UN) was not located on either the receiving robot or the Contest Director's computer. John's claimed score of 397,319 points; 703 QSOs; 32 USA/Canadian Mults; and 58 DXCC (before log checking) would have placed him in line to compete for the top overall score. John's CW log was received and placed Second World High Single Operator, giving OT2T (Op. ON4UN) the Single Operator Europe first-place trophy.

For those entering the 160 Contest, please check the high-claimed scores on the CQ website (www.cq-amateur-radio.com) to assure your log is accounted for.— *Dave Thompson, K4JRB, CQ WW 160 Meter Contest Director*

favorite I've heard over the years is in the definition of "Is this frequency in use?" For too many of us, that question translates into a meaning along the lines of "WARNING: I will be calling CQ in approximately 30 nanoseconds."

Simply put, how much do we really check to see if a frequency is in use? The operating approach on this point varies from one or two dits on CW to three or four honest attempts to determine ownership on SSB. The result is at least one ensuing battle in each contest with someone who thought he was there first.

There really are two kinds of operators to consider. There are the guys who expect a 10 kHz swath of clarity on 20 meters SSB. There are the others who respect the reality of crowded conditions (especially around band edges) and merely want a little breathing room. My experience has shown that nearly everyone will move if they feel there is any question of frequency ownership and that the debate started at the first sign of confrontation. Fewer of us are making that genuine attempt to check before we get started, and more important, often hold the opinion of the "non-contester" in lower regard.

Co-existence with Net Operations

This is perhaps one of the most contentious areas of "battle" during many contest events. In fairness, net operations do require some order. For them to function effectively, they require a starting and ending time. They also have the need for a standard operating frequency. Once in operation, contesters do need to move off the net frequency. That deference for their right to frequency usage is no different than for anyone else. However, balance is needed as well. For example, if a contest operator is already using a net's "targeted" frequency and has been for a significant period of time, it's fair to claim that there is no free license available that permits the network to automatically fire up its big guns. Nor should contesters be expected to offer up any more bandwidth than they would for any other station. It's a give-and-take deal. Both sides need to think about their actions for order to be preserved. Yes, common sense does prevail in this and most other matters of contention regarding frequency.

Fortunately, contesters are, and will remain, among the most proficient group of operators amateur radio can offer. As we continue with this year's contest season, let's think about our balance of operating courtesy versus aggressiveness. At the very least, you'll help your high blood pressure levels settle down. Who knows? You might even have more fun operating contests!

Final Comments

I'm afraid that's all that time and space will allow for this month. For those of you who belong to the "procrastinator's club," might I suggest that now is the time to begin thinking about your summer projects. The time to get started is right around the corner.

73, John, K1AR

Jim Maxwell, W6CF, Silent Key

Many of us have had the honor of claiming one of ham radio's statesmen, Jim Maxwell, W6CF, to be our friend. In life there are leaders and followers. Jim represented quintessential leadership on behalf of ham radio in general and contesting/DXing in particular.

In early February we lost Jim. As a tribute, Doug, K1DG, wrote some of his own personal memories of Jim that I thought I'd pass along. We'll miss you, Jim.

I had the privilege of knowing Jim for the past 15 or so years. He was one of the most knowledgeable individuals on the subject of ham radio and telegraphy history that I've ever met, and I learned a lot from him over that period. I once saw him give a talk on the early days of the telegraph to a local non-contest sort of club in the San Francisco Bay area, where he held a roomful of new hams spellbound for over an hour. I'll bet there were some converts to CW that night.

Jim was an avid collector of radio and technical books, magazines, and memorabilia, and had some amazing items in his collection from the earliest days of the telegraph. He was also "one of us," winning the ARRL Sweepstakes over 50 years ago (1951) with a record score on his first try at the contest as an 18-year-old guest op. He won it again 15 years later from his own station. Later Jim became the chairman of the first-ever ARRL Contest Advisory Committee, although he insisted that it was an interim position until a real chairman could be selected. I think he served two years.

Most agree that Jim had a lightning quick wit, and we spent many late nights in the hallways at Dayton where, with a mischievous twinkle in his eye and that big goofy grin, he would share some tidbit of history that had only been passed along by word of mouth. He held too many positions in ARRL officialdom to count, and most recently served as ARRL Director for the Pacific Division. He also worked behind the scenes in many ways.

Jim, W6CF, and his wife Trudy, KC6NAX. (Photo courtesy ARRL)

Jim's passion for this hobby was so strong that it was infectious. He bonded immediately with anyone who took any aspect of the hobby seriously—DXer, volunteer examiner, club officer, and especially contesters.

Ham radio is better because of Jim, and everyone who ever knew him will miss him—a lot. 73, OM, and rest well.—*Doug, K1DG*

awards

BY TED MELINOSKY,* K1BV

Marconi Special Event

Every year on the anniversary of Guglielmo Marconi's birth date, the Cornish Amateur Radio Club of Cornwall, England celebrates his accomplishments. The club coordinates and publicizes special-event stations which operate from locations associated with the famed Italian radio pioneer. This year the event will be held the 24 hour period beginning Saturday, April 26, 2003. All HF bands will be used, and based on my experience, 20 meters is the place to look. The club makes available a handsome certificate patterned after the Marconi Wireless Company's stock certificate.

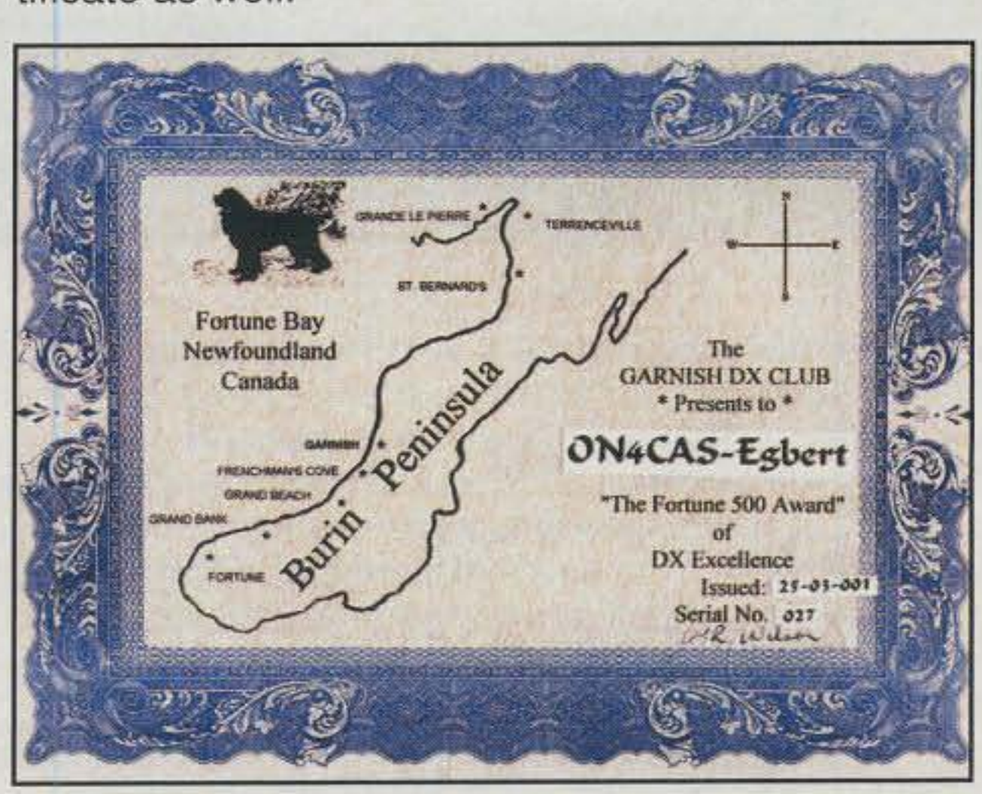
Each year on the anniversary of Guglielmo Marconi's birth date, the Cornish Amateur Radio Club coordinates special-event stations which operate from locations associated with the famed Italian radio pioneer.

You will need to work 15 different participating stations during the 24 hour period. Many of them will use calls that include IMD (International Marconi Day) in the suffix. Most of the stations periodically will announce their specific location and how it relates to the life and history of Marconi. Only one contact with each participating station may be used. Submit a certified copy of the log page or printout. Ideally, another amateur should certify that the log extract represents a true copy of the original entry, but is not absolutely necessary.

Submit the log extract and a fee of $US10, UK £4, or 12 IRCs to: Sue Thomas, GØPGX, Awards Manager, Cornish ARC, P.O. Box 100, Truro, Cornwall, TR1 1RX England. Additional information is at the website: <http://www.gb4imd.co.uk/imdaward.htm>.

DX Awards

Canada Fortune 500 Award. The Garnish DX Group of Newfoundland, Canada offers a club certificate for contacting both members and non-members located in the Fortune Bay area. The border of this certificate is one of the most intricate and finely designed pieces of engraving work I've seen in many years. A small image of the famed Newfoundland breed of dog is shown on the certificate as well.



Contact members of the Garnish DX Group operating from "The Shores of Fortune Bay, Newfoundland" on or after August 1, 1990 to earn the Fortune 500 Award.

Contact members of the GDX Group operating from "The Shores of Fortune Bay, Newfoundland" on or after August 1, 1990. You must earn 500 points. Contacts must include at least one Garnish station. Point values are as follows:

1. Resident of Garnish or Garnish club call = 50 points.
2. GDX Group member on Fortune Bay = 30 points.
3. GDX Group member elsewhere in Newfoundland = 20 points.
4. GDX Group members worldwide = 40 points.
5. Non-GDX Group station on Fortune Bay = 10 points.

All bands and modes. No use of repeater contacts except satellite. Stations may be contacted once per year per band per mode. Each different

USA-CA Honor Roll

500	1000	2000
JA2FJP 3223	JA2FJP 1618	HB9BYZ....1250
NL7CO.....3224		

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.

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

Zero Bias *(from page 7)*

icy. He doesn't even have a vote (except to break a tie) at the Board meetings over which he presides (this is typical of most organizations that operate under Robert's Rules of Order). He has only what former U.S. President Theodore Roosevelt called a "bully pulpit" from which to try to influence other people's opinions. And the fact remains that there are certain ARRL Directors, Vice Directors, Section Managers and non-elected but highly visible appointees who have the attitude that HF is all that matters and make no secret of how they feel.

With the number of Technician Class hams approaching 50% of all FCC-licensed amateurs (as of the end of January, Techs comprised 47% of the total number of US hams), it is incumbent on those who speak for the ARRL or who are perceived as speaking for the ARRL to broaden their horizons or risk leading the organization into irrelevance. People like Jim Haynie and Dennis Motschenbacher, K7BV (the League's Sales and Marketing Director), are heading in the right direction, but they have their work cut out for them in trying to drag the rest of the organization with them.

A Speedy Recovery...

We've just heard that regular *CQ* contributor and "Hamcalc" author George Murphy, VE3ERP, has suffered a stroke. We don't know yet how significant or long-lasting its effects will be. We still have several of Murph's articles "in the queue," and most of them involve the use of some portion of his Hamcalc program. For now, Murph will not be able to provide copies of the program to individual hams. At his request, we will be posting the latest version of Hamcalc (v.62) on the CQ website for downloading. Please check the site—www.cq-amateur-radio.com (most likely in the CQ Information Center area)—for specifics on where to find and how to download the program. Please join us in prayers and best wishes to Murph for a speedy and complete recovery.

73, W2VU

prefix used counts separately. Special calls or prefixes used by members count as separate QSOs.

Paper certificate fee is $C6.50, or $US5. Plaque mounted on walnut base = $US45, or $C50.

The special application and member list are available from the sponsor for an SASE. Apply to: Awards Manager W. R. Wilson, VA1WRW, Garnish DX Group, 3520 Albert Street, Halifax, NS, Canada B3K 3N3.

The French Cantons Award is sponsored by the French IARU society REF for working stations in the various French cantons.

French Cantons Award (DDCF). A newly introduced award from France has the potential of rivaling *CQ*'s USA-CA in the total number of contacts required for its upper levels. It is sponsored by the French IARU society REF for working stations in different French cantons. France is composed of 3026 *cantons,* which in turn comprise 337 *districts,* which in turn comprise 101 *departments* (96 are in France itself; the rest are overseas). This might be compared to little towns which comprise counties, which in turn form states in the United States. Anyway, starting January 1, 2003, we are hoping that French stations will start to add the necessary identification to their QSLs to help us earn this award. (French provinces can always be identified by the first two digits of their postal code. Perhaps their cantons will be identified just as easily.)

A complete list of cantons is available from the award manager. A special file, which facilitates your record keeping and application and includes all cantons, is available in Excel format.

Following are the award classes, including the requirements for each:

Basic award—500 cantons

Endorsement stickers—each additional 500 cantons

Werner F. Brill, DL9YC
USA-CA All Counties #1049, September 3, 2002

Werner Brill, DL9YC, USA-CA #1049.

Werner, DL9YC, sent us an outline of his ham/counties experience, much like a resume. The list that follows plus the photos included here tell his story.

QTH: Wesel, Germany, a small city with a population of about 60,000 on the right bank of the Rhine river near the Dutch border.

Age: A young man of 72.

License date: March 21, 1952

DXCC: Current countries confirmed 326 (plus 19 deleted countries confirmed).

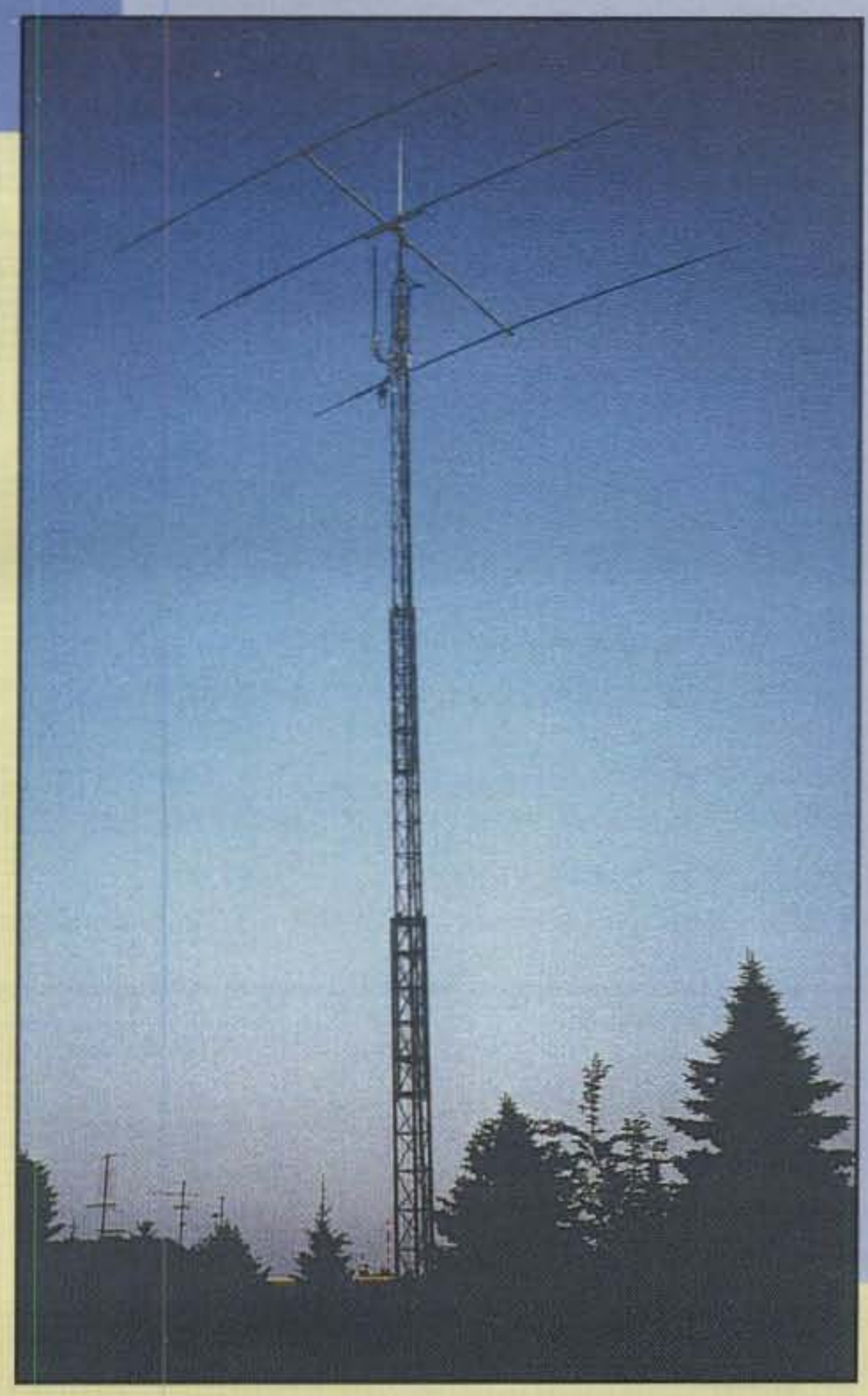
Member: DARC, QCWA, DIG.

Station: Yaesu FT-1000MP Mark-V, Yaesu VL-1000, Mosley CL-33 antenna up 18 meters on a tower.

Modes: CW, SSB, RTTY, packet on 430.

County hunting: Mainly since 1979 with big interruptions for professional reasons.

USA-CA: 11-12-80, USA-CA-500 #1530 Mixed
05-21-81, USA-CA-1000 #672 Mixed (#4 to Germany)
03-12-82, USA-CA-1500 #568 Mixed (#1 to Germany)
02-18-83, USA-CA-2000 #562 Mixed (#1 to Germany)
12-14-01, USA-CA-3000 #1057 Mixed



DL9YC's antenna setup consists of a Mosley CL-33 up 18 meters.

DDCF Excellence—10 cantons in each of the 96 French departments

DDCF Honor—30 cantons in each of the 96 French departments

Only contacts after January 1, 2003 are valid. The award can also be achieved by SWLs. French stations are required to send in the cards. All others may use GCR procedures. The award fee is 12 Euros to: Pierre Peruchon, F2WS, 10 Route Auxerre, F-89110 Aillant sur Tholon, France.

U.S. Awards

Ohio Bicentennial Awards Series. Here's another challenge to keep you active during 2003. Ohio celebrates its bicentennial year, and the North East Ohio ARC has established two awards to help mark the occasion. There are enough activity levels to ensure that everyone can earn a certificate.

General Requirements: All contacts must be made between January 1, 2003 and March 1, 2004. All bands. No

Offered by the North East Ohio ARC, the Ohio Bicentennial Award is issued for contacting 100 different Ohio stations. The club also sponsors an award for contacting Ohio counties (see text).

use of repeaters, except space-based transponders. Contest QSOs are okay, and the sponsor suggests you participate in the Ohio QSO Party for added contacts. An SWL version will be offered. Provide a list of contacts which include callsign, band, date, and time (UTC). If applying for the county award, list counties alphabetically in your submission. If using a KO8HIO contact for a wild card, please note the county for which it is a substitute. Special endorsement for QRP (5 watts or less); also for single band or mode. There is no cost for the Gold Level awards earned by U.S. amateurs. All other awards cost $US7 or 7 IRCs for U.S. hams, and $US10 or 10 IRCs for DX hams to cover printing and postal costs. Applications should be sent to Anthony A. Luscre, K8ZT, 5441 Park Vista Court, Stow, OH 44224-1663. For further details, see: <http://www.qsl.net/k8zt/ko8hio.html>.

Ohio Bicentennial Award

Basic Level—Work 100 different Ohio stations. Any band or mode, but no repeater contacts.

Red Level—Work KO8HIO and 100 different stations in the state of Ohio.

White Level—Work KO8HIO and 200 different stations in the state of Ohio.

Blue Level—Work KO8HIO on at least three different bands and/or modes plus 200 different stations in the state of Ohio.

Gold Level—Work KO8HIO on at least five different bands and/or modes plus 200 different stations in the state of Ohio.

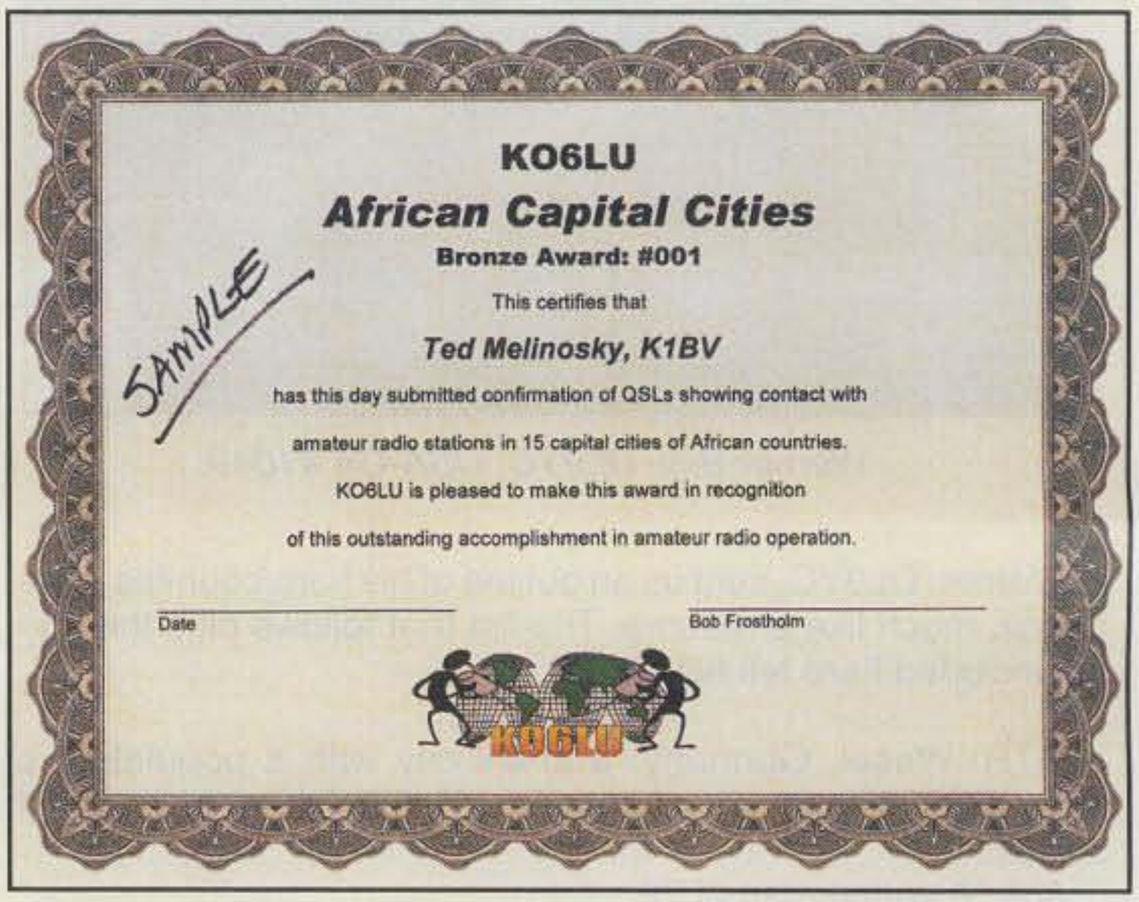
Ohio Counties Bicentennial Award

Red Level—Work stations in 44 of the 88 Ohio counties. You may use one contact with KO8HIO as a wild card for credit in any missing county.

White Level—Work stations in 66 of the 88 Ohio counties. You may use up to two contacts with KO8HIO as two wild cards for credit in any missing county.

Blue Level—Work stations in 88 of the 88 Ohio counties. You may use up to three contacts with KO8HIO as three wild cards for credit in any missing county.

Gold Level—Work stations in 88 of the 88 Ohio counties and work KO8HIO at least once.



The African Capital Cities Award is offered by KO6LU in various levels for working the capital cities of the countries in the continent of Africa.

KO6LU Series, African Capital Cities. Bob Frostholm, KO6LU, sponsors an extensive array of interesting DX-oriented certificates. They are challenging, well-designed, and educational. A new addition to the series is the African Capital Cities certificate. Four award levels are available: Bronze = 15 African capital cities, Silver = 25, Gold = 40, Platinum = all 57.

Awards are available even if the contacts are unconfirmed. Log extract is acceptable. Use applications that the sponsor has prepared on the website <http://www.ko6lu.com/>. The fee for each award is $US5. Apply to: Bob Frostholm, KO6LU, P.O. Box 3673, Los Altos, CA 94024.

URL of the Month

Several European countries offer awards for contacting their "castles, chateaus, or fortresses." The award rules generally allow contacts that are made from close proximity to the structure, and don't require the station to string dipoles from the turrets and battlements. I guess the castle owners wouldn't care for that! Some of the award custodians have done amazing research on valid locations and have lists of hundreds and hundreds of them. These lists are generally organized by province, by type of structure, and by a sequence number. A good site to refer to is the Italian Castles Award at <http://www.dcia.it/>.

I'd like to see your club or group's awards program with complete rules and samples. Free publicity is what we're talking about.

73, Ted, K1BV

New Propagation Mode Discovered?

BY TOMAS HOOD,* NW7US

It seems that a new mode of propagation has been discovered with methods developed to take advantage of this exciting mode. Those who have begun to explore this mode have found worldwide openings occurring nearly all times of the day. There have been reports that short-distance openings are just as hot as the long-range paths, and that you only need low-power radios to take advantage of these openings. Interestingly, the mode has put new life into a segment of amateur radio that might have been seeing a decline in activity.

I've tried it out. I was able to make contact from my QTH in Washington State with a station in Perth, Australia. A little while later I heard a station from Great Britain contact a local station.

What is this new mode? As has been written about recently in many articles, it is known as IRLP, and it is quite attractive to many amateur radio operators. The mode is a combination of modes, actually—line-of-sight, tropospheric scatter, and so forth—between a VHF or UHF transceiver and a repeater system that is then tied to a distant repeater via an internet connection. An interesting thought has occurred to me: Will the future include the need for this column to present internet weather reports?

Current Solar Cycle Progress

During January solar activity continued to show a decline in the current cycle. Canada's Dominion Radio Astrophysical Observatory at Penticton, British Columbia reports a 10.7 cm observed monthly mean solar flux of 144 for January, down from December. The 12-month smoothed 10.7 cm flux centered on July 2002 is 176, down from June's 183. A smoothed 10.7 cm solar flux of about 122 is predicted for April 2003, plus or minus about 17 points.

The Royal Observatory of Belgium reports a monthly mean sunspot number of 80 for January 2003, down two points from December 2002. The low for the month was 27 on January 2nd, and the high was 117 on January 10th and again on the 11th. This results in a smoothed sunspot number of 103 centered on July 2002, down from June. A smoothed sunspot level of 65 is expected for April 2003, plus or minus 12 points.

The observed monthly mean planetary *A*-index (*Ap*) for January 2003 is 13, the same as for December. The twelve-month smoothed *Ap*-index centered on June 2002 is 13.9.

Table I is a chart of the smoothed sunspot numbers of Cycle 23. The forecast shows that this cycle is on the way out. 2003 still holds a lot of activity, but clearly the DX openings throughout the year on higher frequencies will become shorter and weaker.

April Conditions

Expect fewer openings on 10, 15, and 17 meters compared to the winter months. However, with the sunspot cycle still in a high stage (ranging from a

*P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for April 2003

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 8-9, 19	A	A	B	C
High Normal: 1, 7, 10, 20, 28	A	B	C	C-D
Low Normal: 2-6, 11-16, 18, 21, 23-24, 26, 29-30	B	C-B	C-D	D-E
Below Normal: 17, 22, 27	C	C-D	D-E	E
Disturbed: 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 good (B) on April 1st, good to fair (B-C) on the 2nd through 6th, good (B) on the 7th, excellent (A) on the 8th, etc.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	10	10	10	9	8*	9	8	8	8	9**	10	10
1997	11	11	14	17	18	20	23	25	29	32	35	39
1998	44	49	53	57	59	62	65	68	70	71	73	78
1999	83	85	84	86	91	93	94	98	102	108	111	111
2000	113	117	120	121	119	119	120	119	116	114	113	112
2001	109	104	105	108	109	110	112	114	114	114	116	115
2002	114	115	114	110	109	106	103	*100*	*96*	*92*	*87*	*83*
2003	*80*	*75*	*70*	*65*	*61*	*58*	*54*	*51*	*49*	*47*	*44*	*43*

** = May 1996 marks Cycle 23's mathematical beginning.*
*** = October 1996 marks the beginning of Cycle 23 according to a consensus of scientists, which NGDC is now using.*
Italics indicate predicted values.

Table I– Smoothed sunspot numbers for Cycle 23.

smoothed sunspot number of 60 to just over 100), the 10 and 12 meter bands should remain alive during April and the spring months. Expect good DX openings to most areas of the world during the hours of daylight. While normal seasonal changes in propagation will result in fewer east-west openings, conditions towards southern and tropical areas are expected to hold up very well. Look for peak signal levels to most areas of the world during the late afternoon hours.

Expect 15 and 17 meters to be the best bands for daylight DX during April and the spring months. Both bands should be reasonably active, with DX signals from just after sunrise to well beyond sunset. Signals should be strongest to most areas of the world during the afternoon hours, but look for good, solid openings towards the southern and tropical areas well into the early evening hours.

Twenty meters is expected to be a near 24-hour DX band during April and the spring months. Strongest signals, with DX openings to just about every area of the world, should occur during a two hour window after local sunrise and again during the late afternoon and through the evening hours to as late as midnight.

Shorter hours of darkness and increasing static levels in the Northern Hemisphere will result in somewhat poorer DX conditions on the 30, 40, 80, and 160 meter bands during April and the spring months. Nevertheless, strong, stable signals should be possible to many areas of the world on 30 and 40 meters during the hours of darkness. Signals should peak from an easterly direction about an hour or two before midnight, and from most other directions about an hour or so before local sunrise at the U.S. end of the path. Some fairly good DX should also be possible on 80 meters during the hours of darkness. Propagation patterns on 80 meters should be similar to those observed on 40 meters, but openings will be weaker and noisier. There is a chance for some DX openings on 160 meters during the hours of darkness, but expect to encounter increasingly high static levels. Thunderstorm activity is expected to increase during April in the Northern Hemisphere, and this should add to the static levels on all HF bands, but especially on 40, 80, and 160 meters.

The favorable equinoctial propagation conditions discussed in last month's column should continue through most of April. Check both long- and short-path openings during the sunrise and sunset periods on all bands between 10 and 80 meters for all paths between the northern and southern hemispheres.

For short-skip openings up to approximately 250 miles, use 80 meters during the day and 160 meters at night. For distances between 250 and 750 miles, 30 and 40 meters should be the best during the day, 40 and 80 meters from sundown to midnight, and 80 meters from midnight to sunrise. For openings between distances of 750 and 1300 miles, try 20 meters during the day, with 30, 40, and 80 meters best during the hours of darkness. Between 1300 and 2300 miles check 15, 17, and 20 meters during the day; 20, 30, and 40 meters from sundown to midnight; and 40 meters from midnight to sunrise. Short-skip openings beyond 1300 miles may also be possible on 10 and 12 meters during most of the afternoon hours.

VHF Ionospheric Openings

Lyrids, a major meteor shower, should take place April 16–25. Expect it to peak on April 22 at about 2200 UTC. The unpredictable nature of the shower in any given year always makes the *Lyrids* worth watching, since we cannot say when the next unusual return may occur. If this year's event is average or better (30 to 60 good-size meteors entering the Earth's atmosphere every hour), this should make possible meteor-scatter-type openings on the VHF bands. Check out <http://www.imo.net/calendar/cal03.html> for a complete calendar of meteor showers in 2003.

A seasonal increase in sporadic-*E* ionization usually begins during April and continues through the spring and summer months. Expect an increase in short-skip openings on both 15 and 10 meters during April, as well as a possible occasional opening on 6 meters. While sporadic-*E* openings may occur at any time, they tend to peak between 8 AM and noon, and again between 5 and 9 PM local time.

Widespread auroral displays can occur during April, bringing with them unusual ionospheric short-skip openings on the VHF bands. The best times for these to occur are during periods of radio storminess on the HF bands. Check the Last-Minute Forecast at the beginning of this column for those days in April that are expected to be Below Normal or Disturbed.

Feature	Ace-HF	WinCAP Wizard 3
Point-to-point path analysis	Yes	Yes
Ability to change your station location	Fee	Yes
Batch Analysis of multiple distant station QTH	No	Yes
Area Coverage maps and analysis	Yes	No
Reversing of paths	Yes	Yes
Short Path and Long Path analysis	Yes	Yes
MUF Charts, LOS Curves, Best Bands Tables	Yes	Yes
Comparisons of Bands Open	Yes	No
Beacon and Station Animations	No	Yes
Interactive Map for quick Circuit Analysis	Yes	No
Ability to customize reports and graphs	No	Yes

Table II– Comparison of features of Ace-HF and WinCAP Wizard 3.

Comparison of WinCAP Wizard 3 and Ace-HF

In January's column I took a look at Ace-HF, by R. P. Buckner, P.E. Last month I reviewed Jim Tabor's propagation software, "WinCAP Wizard 3." I find that both of these programs are worth consideration as your DX aid, as they are both very powerful propagation analysis tools.

Both Ace-HF and WinCAP Wizard 3 are built on top of VOACAP <http://elbert.its.bldrdoc.gov/hf.html>, which is a very powerful HF prediction model. VOACAP is considered the most accurate HF propagation analysis program now available. VOACAP represents the culmination of nearly 60 years of ionospheric research and simulation by the HF community and is the de facto standard for HF commercial broadcast use. It is based on IONCAP, the Ionospheric Communications Analysis and Prediction Program. In 1985 the Voice of America (VOA) adopted IONCAP as the approved engineering model to be used for broadcast relay station design and antenna specification. As the program was modified by the Naval Research Laboratory and the Institute for Telecommunications Sciences (Department of Commerce, NTIA) for these purposes, the name was changed to the Voice of America Coverage Analysis Program (VOACAP) to distinguish it from the official National Telecommun-

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.

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 *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 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.

ications and Information Administration (NTIA) IONCAP program.

For those of you curious enough to delve into using VOACAP directly, there is a great introduction to its use at Jari Perkiömäki's (OH6BG) website, <http://www.uwasa.fi/~jpe/voacap/>. A very detailed user guide can be found at George Lane's resource, <http://elbert.its.bldrdoc.gov/pc_hf/rockwell/>. For the rest of us, the authors of both Ace-HF and WinCAP Wizard 3 have taken the complex and made it simple.

One note about using either program: VOACAP is calibrated against smoothed sunspot numbers (SSN) and predicts hourly values averaged over the month. For example, when one runs for a required reliability (time availability) of 90%, it simply means that at the given month, hour, and SSN, the prediction will be as stated or better 27 days out of a 30-day month. Thus, using daily numbers seems intuitively wrong. Also, note that you must select an antenna that is somewhat close to the kind you are using, as well as a type that you expect on the other end of the circuit you are analyzing. In my case, I selected a dipole, with a Yagi on the far end.

As I began to try to compare Ace-HF with WinCAP Wizard 3, I discovered just how complex such a task really is. VOA-

April 15 - June 15, 2003
Time Zone: EDT (24-Hour Time)
EASTERN USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	*Nil*	09-14 (1) 14-18 (2) 18-19 (1)	05-06 (1) 06-10 (2) 10-12 (1) 12-14 (2) 14-17 (3) 17-20 (4) 20-21 (3) 21-22 (2) 22-01 (1)	19-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 20-21 (1)* 21-22 (2)* 22-00 (3)* 00-01 (2)* 01-02 (1)*
Northern Europe & European CIS	*Nil*	10-13 (1) 13-15 (2) 15-17 (1)	06-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-23 (1) 23-01 (2) 01-06 (1)	19-20 (1) 20-23 (2) 23-01 (1) 20-00 (1)*
Eastern Mediter-anean & Middle East	*Nil*	11-15 (1) 15-17 (2) 17-19 (1)	06-08 (1) 13-16 (1) 16-19 (2) 19-23 (3) 23-00 (2) 00-02 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Western Africa	14-18 (1)	08-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	08-14 (1) 14-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-01 (2) 01-06 (1)	20-22 (1) 22-02 (2) 02-03 (1) 00-02 (1)*
Eastern & Central Africa	16-18 (1)	09-11 (1) 11-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-08 (2) 08-09 (1) 14-16 (1) 16-18 (2) 18-21 (3) 21-23 (2) 23-01 (1)	21-01 (1) 22-00 (1)*
Southern Africa	*Nil*	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	14-16 (1) 16-17 (2) 17-18 (3) 18-19 (1) 23-01 (1)	21-22 (1) 22-00 (2) 00-02 (1) 22-01 (1)*
Central & South Asia	*Nil*	10-12 (1) 18-20 (1)	07-10 (1) 14-16 (1) 19-22 (1)	05-07 (1) 19-21 (1)
Southeast Asia	*Nil*	10-12 (1) 18-20 (1)	07-08 (1) 08-09 (2) 09-11 (1) 19-22 (1)	*Nil*
Far East	*Nil*	18-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 22-00 (1) 00-02 (2) 02-04 (1)	04-06 (1)
South Pacific & New Zealand	17-20 (1)	08-09 (1) 09-11 (2) 11-16 (1) 16-18 (2) 18-19 (3) 19-20 (2) 20-22 (1)	04-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-20 (1) 20-22 (2) 22-00 (3) 00-04 (2)	02-03 (1) 03-04 (2) 04-06 (3) 06-07 (1) 02-03 (1)* 03-05 (2)* 05-06 (1)*
Australasia	18-20 (1)	17-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 15-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (3) 01-03 (2) 03-04 (1)	03-05 (1) 05-07 (2) 07-08 (1) 04-07 (1)*
Caribbean, Central America & Northern Countries	10-14 (1) 14-17 (2) 17-19 (1)	08-10 (1) 10-11 (2) 11-14 (3) 14-18 (4) 18-19 (3) 19-20 (2)	04-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-07 (1) 21-02 (1)*
of South America		20-22 (1)	15-17 (3) 17-22 (4) 22-00 (3) 00-04 (2)	02-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	00-14 (1) 14-16 (2) 16-17 (3) 17-19 (1)	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (2) 19-21 (1)	04-06 (1) 06-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-22 (4) 22-01 (3) 01-04 (2)	20-21 (1) 21-04 (2) 04-06 (1) 23-03 (1)* 03-04 (2)* 04-06 (1)*
McMurdo Sound, Antarctica	*Nil*	14-15 (1) 15-17 (2) 17-19 (1)	07-08 (1) 08-09 (2) 09-10 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	01-05 (1)

Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	*Nil*	14-18 (1)	06-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (3) 17-18 (4) 18-19 (3) 19-21 (2) 21-22 (1) 22-00 (2) 00-02 (1)	19-21 (1) 21-23 (2) 23-01 (1) 21-00 (1)
Northern Europe & European CIS	*Nil*	13-15 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-17 (2) 17-19 (1) 22-00 (2)	20-00 (1)
Eastern Mediter-ranean & Middle East	*Nil*		07-09 (1) 13-16 (1) 16-22 (2) 22-00 (1)	20-00 (1)
Western Africa	13-17 (1)	12-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-08 (2) 08-09 (1) 12-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	20-01 (1)
Eastern & Central Africa	14-17 (1)	10-14 (1) 14-16 (2) 16-18 (1)	06-08 (1) 13-16 (1) 16-17 (2) 17-19 (4) 19-20 (2) 20-21 (1)	21-00 (1)
Southern Africa	*Nil*	08-10 (1) 10-12 (2) 12-13 (3) 13-14 (2) 14-15 (1)	14-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 22-23 (1) 23-01 (2) 01-02 (1)	20-22 (1) 22-00 (2) 00-01 (1) 23-01 (1)*
Central & South Asia	*Nil*	09-11 (1) 18-21 (1)	07-10 (1) 18-20 (1) 20-22 (2) 22-23 (1)	05-07 (1) 19-21 (1)
Southeast Asia	*Nil*	08-10 (1) 19-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-22 (1)	05-07 (1)
Far East	*Nil*	18-21 (1)	20-00 (1) 00-04 (2) 04-06 (1) 06-07 (2) 07-08 (3) 08-09 (2) 09-11 (1) 15-18 (1)	03-05 (1) 05-06 (2) 06-07 (1) 05-06 (1)*

South Pacific & New Zealand	14-16 (1) 16-18 (2) 18-20 (1)	07-09 (1) 11-14 (1) 14-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	16-19 (1) 19-21 (2) 21-23 (3) 23-01 (4) 01-03 (3) 03-07 (2) 07-10 (3) 10-11 (2) 11-12 (1)	00-02 (1) 02-04 (2) 04-05 (3) 05-06 (2) 06-07 (1) 02-04 (1)* 04-05 (2)* 05-06 (1)*
Austral-Asia	17-20 (1)	09-11 (1) 16-18 (1) 18-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-15 (1) 15-18 (2) 18-21 (1) 21-23 (2) 23-01 (3) 01-03 (2) 03-06 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Carib-bean, Central America & Northern Countries of South America	10-14 (1) 14-17 (2) 17-19 (1)	07-09 (1) 09-11 (2) 11-14 (3) 14-17 (4) 17-19 (3) 19-20 (2) 20-22 (1)	00-04 (2) 04-06 (1) 06-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-22 (4) 22-00 (3)	19-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	10-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	07-08 (1) 08-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	05-06 (1) 06-10 (2) 10-16 (1) 16-18 (2) 18-19 (3) 19-23 (4) 23-01 (3) 01-02 (3) 02-04 (2) 04-05 (1)	21-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-06 (1) 00-04 (1)*
McMurdo Sound	*Nil*	13-15 (1) 15-18 (2) 18-19 (1)	06-09 (1) 17-18 (1) 18-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	00-06 (1) 15-18 (1)

Time Zone: PDT
(24-Hour Time)
WESTERN USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	*Nil*	12-16 (1)	06-08 (1) 08-11 (2) 11-13 (1) 13-17 (2) 17-19 (1) 20-22 (1)	20-21 (1) 21-23 (2) 23-00 (1) 2123 (1)*
Northern Europe & European CIS	*Nil*	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 12-15 (2) 15-17 (1) 20-22 (1)	20-23 (1) 21-22 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	13-15 (1)	07-10 (1) 10-12 (2) 12-13 (1) 13-15 (2) 15-17 (1) 20-22 (1)	20-23 (1)
Western Africa	13-15 (1)	09-12 (1) 12-15 (2) 15-17 (1)	05-06 (1) 06-08 (2) 08-15 (1) 15-18 (3) 18-20 (2) 20-22 (1)	20-23 (1)
Eastern & Central Africa	*Nil*	10-14 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1)	20-22 (1)
Southern Africa	*Nil*	10-12 (1) 12-14 (2) 14-15 (1)	07-09 (1) 13-14 (1) 14-17 (2) 17-18 (1) 21-22 (1) 22-00 (2) 00-02 (1)	19-21 (1) 21-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	*Nil*	09-11 (1) 19-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1) 19-21 (2) 21-23 (1)	04-07 (1)
Southeast Asia	*Nil*	09-11 (1) 16-19 (1) 19-21 (2) 21-22 (1)	04-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 22-00 (1) 00-04 (2)	04-07 (1) 05-06 (1)*
Far East	*Nil*	14-17 (1) 17-20 (2) 20-22 (1)	04-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-12 (1) 12-14 (2) 14-21 (1) 21-23 (2) 23-00 (3) 00-02 (4) 02-03 (3) 03-04 (2)	02-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
South Pacific & New Zealand	13-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	10-12 (1) 12-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-23 (1)	05-08 (1) 08-12 (2) 12-17 (1) 17-19 (2) 19-21 (3) 21-23 (4) 23-01 (3) 01-05 (2)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 01-02 (1)* 02-05 (2)* 05-06 (1)
Austral-Asia	15-17 (1) 17-19 (2) 19-20 (1)	13-16 (1) 16-18 (2) 18-20 (3) 20-22 (2) 22-23 (1)	05-08 (1) 08-10 (3) 10-12 (1) 18-20 (1) 20-22 (2) 22-00 (3) 00-02 (4)	01-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1) 02-03 (1)* 03-05 (2)*
Austral-Asia			02-03 (3) 03-05 (2)	05-06 (1)*
Carib-bean, Central America & Northern Countries of South America	10-14 (1) 14-17 (2) 17-18 (1)	07-09 (1) 09-11 (2) 11-14 (3) 14-17 (4) 17-19 (3) 19-20 (2) 20-22 (1)	00-03 (2) 03-05 (1) 05-06 (2) 06-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-20 (4) 20-00 (3)	19-20 (1) 20-21 (2) 21-02 (3) 02-04 (2) 04-06 (1) 21-00 (1)* 00-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	13-15 (1) 15-17 (2) 17-18 (1)	07-08 (1) 08-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	00-02 (2) 02-06 (1) 06-10 (2) 10-15 (1) 15-17 (2) 17-18 (3) 18-23 (4) 23-00 (3)	20-22 (1) 22-02 (2) 02-04 (1) 21-03 (1)*
McMurdo Sound, Antarctica	15-17 (1)	15-16 (1) 16-18 (2) 18-19 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-01 (1) 04-06 (1) 07-09 (1)	23-03 (1) 03-06 (2) 06-07 (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.

CAP is a very complex program, requiring attention to detail and a good understanding of some fundamental principles. Both programs make a great attempt at making such interaction between user and the VOACAP program easy, and most of the details that a user would have to manipulate are taken care of for you behind the scenes. Each program makes available typical choices for your antenna, station power, and other parameters that are required by VOACAP. This simplifies life for the average amateur radio operator. Both programs do allow you to modify the "typical" and tailor the input values, if you wish to refine the results of your analysis and predictions. However, that is what makes a direct comparison difficult. The default parameters and behind-the-scenes operations are different in each. In addition, each program approaches the analysis differently. Ace-HF, for instance, uses computational models based on the extensive work done in another program, "Ace-VLF," a program developed for Navy agencies. I finally decided that the best way to present a comparison for you to use in making a choice about which to employ in your daily operation is to compare features and user interface differences.

Both programs run with 32 megabytes RAM, yet both certainly would benefit from a lot more memory. CPU speed is important, too. On slower computers some of the calculations may take a long while.

Take a look at Table II, a side-by-side list of features of each program. What features are most important to you? Certainly, point-to-point propagation analysis is critical to most applications. Your QTH is one end of a point-to-point path, and the other end is the station you want to contact. Both programs make this function easy to use and quickly chose other paths. However, the ability to change your QTH is limited in Ace-HF. You must purchase a "key" for each QTH from which you wish to make an analysis.

WinCAP Wizard 3 has a cool feature with which you can create a batch of many locations and run an analysis for all of them. The resulting reports can be printed, and then you can run a map where each station is displayed with the best usable frequency and other details. Ace-HF has Area Coverage Maps, however. These can be used to create movies so you can watch the coverage area change through time, or from band to band. If you are planning for Field Day, the reports from WinCAP Wizard 3 might be useful, while the movies and coverage maps could give you quite an edge on how to plan your operation.

Both programs have the basic features, of course. Reversing the path by switching which side of the path is the

transmitting station, or selecting long- or short-path analysis, is standard, as are MUF tables, best band reports, and so forth. Ace-HF adds a unique set of features, though, that allow you to quickly see what bands are open between your station and any point on the map. You simply click and point to a new location, and instantly you have a view of each band condition on that path. Then you can analyze that for any time of the day. I love this feature!

WinCAP Wizard 3 also has the Beacon network as a feature. By selecting the Beacon map, you will get real-time indication of which beacon is transmitting at that moment, and then you will also get an analysis of path conditions (best frequency, signal-to-noise, and so forth). That's pretty neat.

The interactive map offered in Ace-HF, with the quick view of what band is open, and so on, is one of the hottest interface features, along with the movie feature. While WinCAP Wizard 3 has a mapping feature, it is not as interactive as the interface provided by Ace-HF.

I think WinCAP Wizard 3's emphasis on printed reports and many graphical reports, all of which are customizable, is a serious and useful feature that is not offered in Ace-HF. There are those who need a printed analysis to take to a portable location. For those who can take a laptop, however, Ace-HF gives you some very powerful instant views of the propagation model.

With an amazing set of choices, the ability to save all results, and the fact that it is built on top of the very powerful VOACAP software, both Ace-HF and WinCAP Wizard 3 are powerful HF propagation analysis tools. It would be hard for me to choose! I would prefer to use both programs, as each one has a strong feature missing in the other. Ace-HF is found at <http://www.acehf.com/> and WinCAP Wizard 3 is found at <http://www.taborsoft.com/>.

In Closing . . .

I would like to hear from you. Please share your observations about the current solar cycle, or ask questions that you would like me to explore in this column. My propagation page is available as a resource at <http://prop.hfradio.org/> or using a WAP device (for example, a WAP cell phone), go to <http://wap.hfradio.org>. You might also wish to have my automated e-mail reports. You can sign up at <http://prop.hfradio.org/ealert/>.

Until next month, I wish you great DX. Look for me on the bands!

73, Tomas, NW7US

our readers say

Cootie Keys

Editor, *CQ:*

I greatly enjoyed the article "Telegraphy and the Double Speed Key," by Bob Shrader, W6BNB, in the December 2002 issue of *CQ*. However, there is one glaring error: The opening paragraph states that the old-time *American* Morse and the *Continental* Morse were the same. *Not true.* The book *American Telegraphy: An Encyclopedia of the Telegraph* states that they are different. American Morse was indeed the code of the railroads and Western Union, but the Continental code was the same as the International Morse Code of radiotelegraphy.

Keep up the articles on communication history. They are great!

J. H. Garner, W8IQV
Columbus, OH

JH: You are absolutely correct. Continental and International Morse codes are the same, while American Morse, used by landline telegraphers, was separate. Thanks for the good "catch."

Editor, *CQ*:

The December issue of CQ was great. I particularly liked the article by Bob Shrader, W6BNB, about early telegraphy, since my father was a railroad and government telegrapher in the early years of the last century using, of course, American Morse code. I was with Shrader all the way until the last few paragraphs in which he celebrates CW ops who purposely distend dits, dahs, and spaces for effect. Shrader calls this sending CW with a "swing." I call it abominable.

Rubato has a place in the concert hall under a knowing symphonic conductor, but it has no place in telegraphy. Whenever I hear a CQ sent by a "swinging" operator, I keep on moving up or down the dial. I am sorry Shrader chose to praise this questionable practice.

It is nice that some CW ops, myself included, still use keys and keyers rather than computers. And fists do vary, albeit within narrow parameters. If too many "swingers" get on the air, I may be forced to switch to a computer for sending CW in self defense.

John Rippey, W3ULS
Montross, VA

Free-Banders DXpeditions

Editor, *CQ*:

I can not disagree more strongly with the assertion by Carl Smith, N4AA (January 2003 *CQ*, DX column) that DXpeditions which include "free-banders" should be accepted by our DXCC desk if "free-banding" is considered acceptable (legal?) by the host country. Since when do we set our operating standards (or more precisely, our morals) by what other countries consider acceptable? Given this standard of judgment, should we also accept the beating of women who show their faces in public, the killing of "wrong" sex children, or the use of chemical weapons against those whose religious beliefs differ from our own? These acts are all "acceptable" by various countries around the world. Granted, "free-banding" pales in comparison, but the principle is the same.

Radio waves travel beyond borders. That is why international treaties and regulations govern their use. Whether or not a given country accepts "free-banding" is irrelevant. Even if you argue that "free-banding" is not specifically covered by international regulation, the argument is irrelevant. Do we really need an on-point law to tell right from wrong? Are we so anxious to get one more DXCC credit that we are willing to accept, and thereby promote, unacceptable behavior?

My DX total stands at 299. I'm excited about the possibility of reaching that magical 300 mark...but if it comes in the form of a QSL from a ham-plus-free-banding operation, the card is going right in the shredder. And if the ARRL DX desk ever...EVER...stoops to accrediting such operations, my DXCC certificate will follow, along with my dues check.

Fortunately, I have faith that that will never happen. The ARRL usually exhibits pretty good common sense, and that's all it takes to make this call.

Gregory Brown, KTØK

The following letter was addressed to CQ Public Service Editor Bob Josuweit, WA3PZO:

Praise for Hurricane Coverage

Hi Bob:

What a great surprise to see your article in the December *CQ* magazine. Again you did a fantastic job putting together a very nice, consistent, and well balanced article from the bit and pieces of information that were sent during the Hurricane operations.

Your articles are very important, as they illustrate how ham radio operators use their unique skills for emergency communications and in turn also promote international goodwill. Keep up the good work.

Julio Ripoll, WD4JR
Asst. Amateur Radio Coordinator
National Hurricane Center

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