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Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

APRIL 2002

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THE RADIO AMATEUR'S JOURNAL

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[1]Note that certain frequencies are unavailable. [2]5W output

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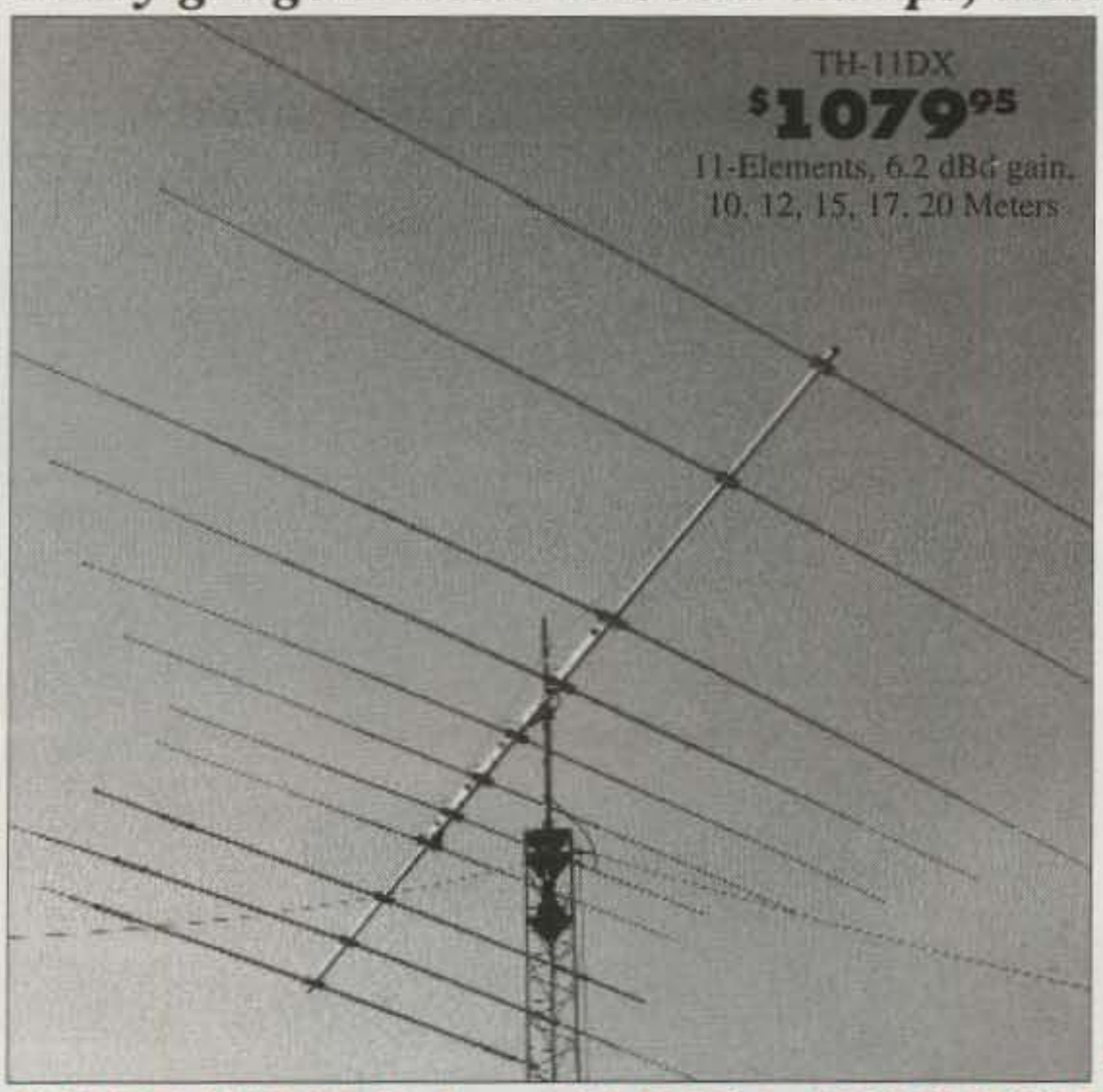

TH-11DX
$1079.95
11-Elements, 6.2 dBd gain.
10, 12, 15, 17, 20 Meters

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

The choice of top DXers.

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

Handles 2000 Watts continuous, 4000 Watts PEP.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

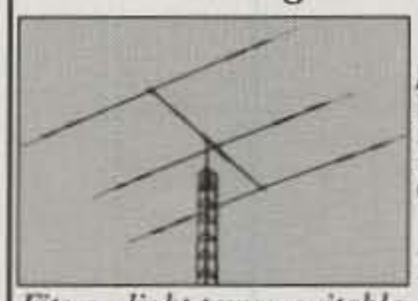
BetaMATCH™ provides DC ground to eliminate static. Includes BN-86 balun. Easily assembled.

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

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

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

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



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

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

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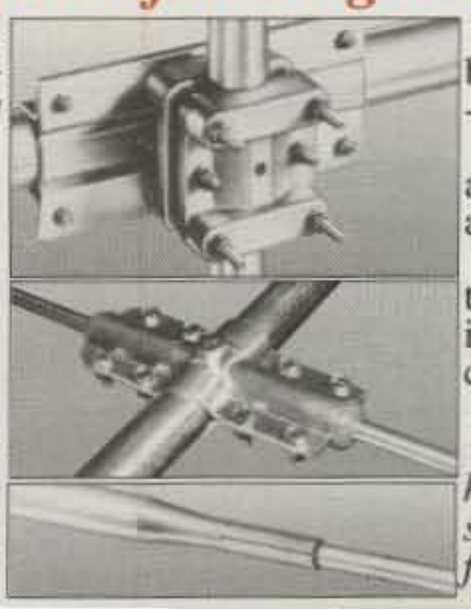
Model No.	No. of elements	avg Gain dBd	avg F/B dB	MaxPwr watts PEP	Bands Covered	Wind sq.ft. area	Wind (mph) Survival	Boom (feet)	Longest Elem. (ft)	Turning radius(ft)	Weight (lbs.)	Mast dia O.D.(in.)	Recom. Rotator	Retail Price
TH-11DX	11	6.2	22	4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1079.95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

Tooled Manufacturing . . . Highest Quality Materials

1. **Hy-Gain's** famous super strong *tooled* die cast *Boom-to-Mast Clamp*
2. ***Tooled** Boom-to-Element Clamp*
3. **Thick-wall** *swaged* aluminum tubing



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

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

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

Durable precision injection molded parts.

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DEPARTMENTS

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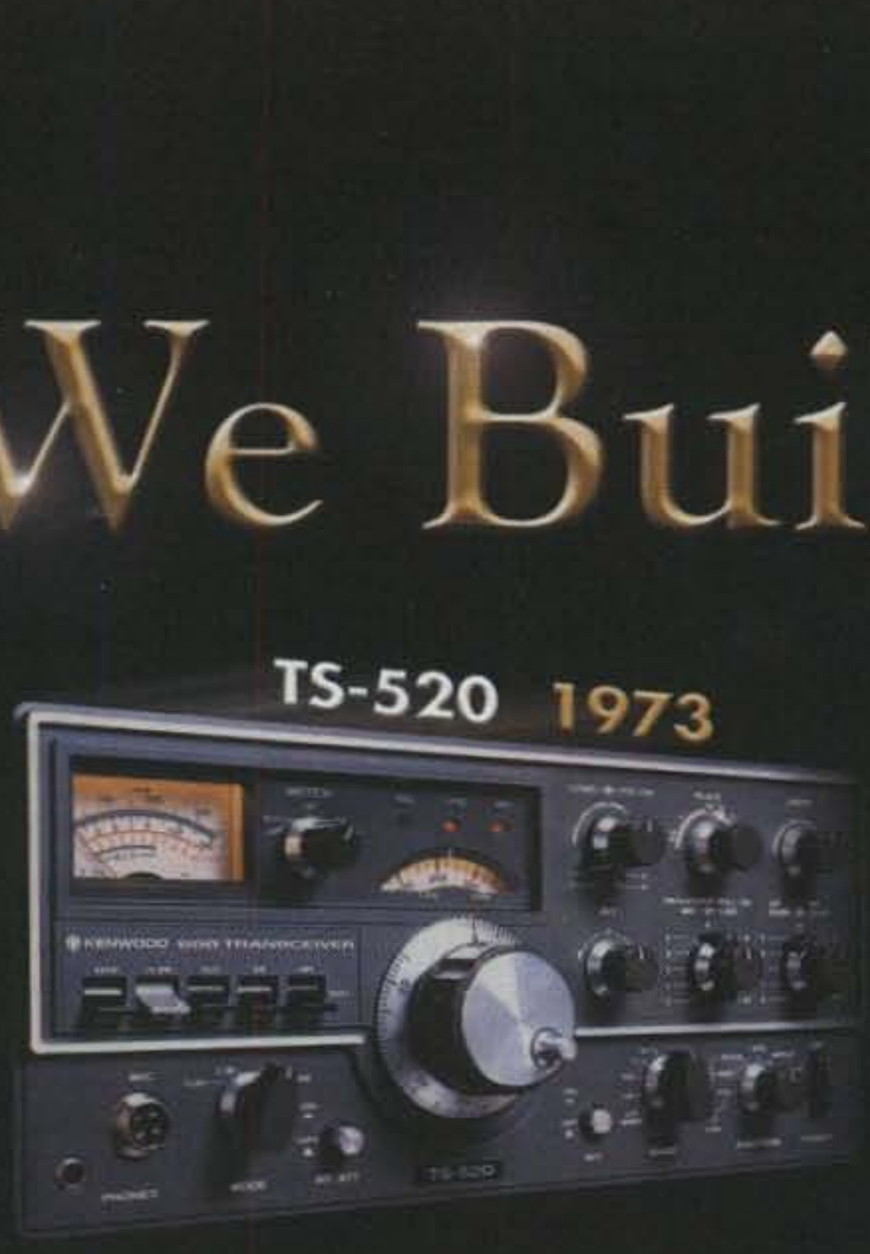

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Ham Radio News

From The CQ Newsroom

Hamvention Tightens Security

If you're planning to attend this year's Dayton Hamvention®, be sure you have photo ID handy and be prepared to have your things searched. The Hamvention® 2002 brochure outlines an array of security precautions that will be in place for this year's event, and they are creating quite an uproar among many hams, according to Hamvention® Executive Director Garry Matthews, KB8GOL, who says the brochure material "wasn't written correctly" and was too negative in tone. According to Matthews, most of the rules on the list have been in effect for years, but this is the first time they have been put into writing. He says 99% of Hamvention® attendees will not notice anything different from past years.

Among the rules that will be in effect are that everyone must show photo ID upon request and must be prepared to have vehicles, merchandise, and personal items searched. No weapons will be permitted, while large containers such as backpacks will be allowed but may be subject to search. Matthews says there *will* be tighter scrutiny of vendors as they bring truckloads of stuff into the fleamarket or exhibit halls.

"We are not trying to impact the ease and vitality of Hamvention® by becoming over-restrictive," explains Matthews. "We are just trying to do common-sense things that let us provide security for a show this size." Matthews encourages people with questions about security procedures to visit the Hamvention® website's security FAQ (frequently asked questions) page at <http://www.hamvention.org/security_faq.htm>.

President Bush Uses Ham Radio To Thank Volunteers

Hams on the Northern Florida Amateur Radio Emergency Service Nets had a surprise check-in on January 31—President Bush—from a station set up at a fire station he was visiting in Daytona Beach. The President spoke briefly and thanked volunteers for "helping our communities be prepared." For details, see this month's "Public Service" column on page 18.

Hams Help At Super Bowl, Olympics

Amateur radio was the backup communications system of choice for both the 2002 Super Bowl in New Orleans and the Winter Olympic Games in Utah. According to the ARRL, hams working with the Red Cross staffed key locations and accompanied Emergency Response Teams during the Super Bowl and pre-game festivities. At the Olympics, the League said, hams helped develop "a unique system that covers the entire Wasatch Front area, providing communications to reach numerous Olympic venues 24 hours a day." More than 200 amateurs volunteered to provide emergency backup communications for the Olympic Security Command.

In addition, three Utah hams installed a NOAA Weather Radio transmitter in Park City, which was home to the Olympic village and several events. According to the *ARRL Letter*, the NOAA station in Salt Lake City could not be heard in Park City because of an intervening mountain range. Plus, for those hams whose participation in the games was limited to watching events on TV, *Newsline* reports there were two special event stations on the air from the Olympics—W7U and K7O.

A final Olympic note: The *ARRL Letter* reports that the FCC gave special temporary authority to broadcasters to use the 13 cm amateur band (2300–2305 and 2390–2450 MHz) for broadcast auxiliary operations at Olympic venues through March 1. Amateur operation on the band was not restricted (unlike two years ago in Australia) during the time broadcasters were authorized as co-secondary users.

Hams Respond To Emergencies Everywhere

Hams around the world were called on for emergency help in January and February. The ARRL reports that more than two dozen amateurs helped provide communications for efforts to battle a wildfire in California that threatened more than 200 homes near San Diego. Hams in Turkey used linked VHF and UHF repeaters to provide communications for search-and-rescue teams after an earthquake struck the central part of the country in early February. *Newsline* reports that "hobby radio operators" were credited by authorities in Brazil with spreading the word about a major power outage that blacked out at least six major cities and cut off nearly 20% of the country's electricity supply for a three-hour period. Hams also helped out in two different medical emergencies involving sailboat passengers, one off the coast of Mexico and one in the Caribbean.

ARRL Prepares To Battle FCC Over 70 cm

The ARRL says it will "do whatever it takes" to keep the FCC from permitting "RFID tags" to operate on the 70 cm amateur band. These devices are used primarily for tracking parcels and vehicles and are currently permitted to operate at very low power. The FCC has tentatively agreed to permit these devices to operate with higher power and on 425–435 MHz.

In January ARRL representatives met with staff members of the FCC's Office of Engineering and Technology to explain their concerns and urge the Commission not to give the plan final approval. The League also filed comments in early February, saying the devices would cause "intolerable" interference to weak-signal operators and challenging the FCC's legal authority to permit them to operate without licenses.

FCC Okays First Ultra-Wideband Devices

The FCC has given its approval to new rules permitting certain types of new products on the market using ultra-wideband (UWB) technology. According to the FCC, UWB devices operate by transmitting "very narrow or short duration pulses that result in very large or wideband transmission bandwidths." Theoretically, these pulses are of such short duration on any one frequency that they can share spectrum without causing interference to existing services. Uses envisioned for the first generation of UWB devices include imaging systems such as ground-penetrating radar, devices to see into or behind walls, and certain medical and surveillance systems; vehicular radar systems; and communications and measurement systems, including high-speed networking and storage tank measurement devices. These systems would operate primarily between 1.9 and 10.6 GHz (including four microwave ham bands), and on 24 GHz (the 1.2 cm ham band), with some operation "below 960 MHz" as well. The devices generally would not need to be licensed and would operate under Part 15 of the FCC's rules.

FCC Redesigns Amateur Website

The FCC's amateur radio website has been redesigned in an effort to make it easier to find information and file routine license-related applications online. According to the FCC, the new page organizes information along most-requested topic lines and clusters different sorts of information on different parts of the page. For example, there are direct links to all decisions relating to PRB-1, the FCC's limited pre-emption of local and state antenna ordinances, and there are single-click links for filing address changes, license renewals, vanity callsign applications, and other "common filing tasks."

The FCC amateur site is located at <http://wireless.fcc.gov/services/amateur>.

Two Satellites Get OSCAR Numbers

PCSat and Sapphire are now OSCARs 44 and 45, respectively. According to the AMSAT News Service, OSCAR numbers were requested in February for the two satellites, built by students at the US Naval Academy and launched last September 30. PCSat has been designated NAV-OSCAR-44 (with NAV standing for Navy and OSCAR standing for Orbiting Satellite Carrying Amateur Radio), or NO-44, and Sapphire is now NAV-AMSAT-45, or NO-45. The numbers are issued on request for amateur satellites that successfully reach orbit and become operational. There is a separate numbering system for Russian amateur satellites.

ARRL's Antenna Modeling Course

Building on the success of its online continuing education courses in emergency communications, the ARRL Certification and Continuing Education Program is now offering its first technical course, "Antenna Modeling." According to the *ARRL Letter,* the course has been prepared by antenna authorities L. B. Cebik, W4RNL, and Dean Straw, N6BV. The course concentrates on two popular antenna modeling programs, EZ-NEC 3.0 and NEC-Win-Plus. The 31-lesson course runs from February 26 to May 21. For more information contact ARRL Certification and Continuing Education Coordinator Dan Miller, K3UFG, at <cce@arrl.org>, or visit the web page <http://www.arrl.org/cce>.

White House Proposes Payments to QSY

The Bush administration says it will propose setting aside hundreds of millions of dollars to reimburse federal agencies for moving off government frequencies that are auctioned off to commercial users. According to *Newsline,* federal agencies currently have to negotiate with the winning bidders to cover relocation costs, and now there is a stalemate between the Defense Department and Verizon Wireless over just such an arrangement. The President's new budget proposes setting up a $715 million fund out of auction receipts to cover those costs. The possible impact on amateur radio is that certain frequencies shared by hams and the military may move into commercial use sooner than previously expected.

FCC Goes After QRMers

Interference matters have been on the front burner recently at the FCC's amateur enforcement desk. A newly licensed ham in Texas has his license grant set aside after the FCC said it learned that he'd been on the air before his license was issued and had interfered with an amateur attempting to report a tornado sighting. After a request for additional information was declined, the Commission dismissed the original amateur license application. A ham in Pennsylvania has been warned that he might face fines and possible criminal prosecution for allegedly interfering with amateur repeaters, two county emergency management communications systems, and the Pennsylvania Turnpike radio system. A power company in Alabama has been told to cooperate with a local amateur in resolving electrical interference problems, as has a Georgia man whose electric fence has apparently been causing interference on a variety of radio frequencies. Both cases involving non-amateurs were also referred to the ARRL for help in resolving the problems.

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

Zero Bias

BY RICH MOSESON, W2VU

An Editorial

Lobbying 101

In case you missed last month's editorial, the main topic was the FCC's third and (for now) final refusal to extend its limited pre-emption of amateur antenna regulations—known as PRB-1—to such "private contracts" as deed restrictions and homeowner association rules.

It comes down to this: Even though the FCC is supposed to be a quasi-independent agency, making as well as carrying out telecommunications policy, the FCC commissioners don't want to take the political heat for imposing yet another federal rule on condos and other "residential communities." They apparently prefer to leave that to Congress, since the Commissioners essentially said they'd do a prompt about-face if Congress directed them to do so. So now it's up to us to contact our representatives in Congress, educate them about our concerns, and try to persuade them to support our point of view. Last month, we promised a tutorial on how to do this effectively, and here it is. We'll call it Lobbying 101.

Lobbying 101

Lobbying has gotten a bad name in recent decades, conjuring up images of cigar-chomping power brokers wining and dining ... and occasionally buying ... our elected representatives. It's a reputation that, unfortunately, has been largely well-earned. But there is nothing inherently bad about trying to influence legislation –it's an intrinsic part of our system of government and Constitutionally-protected right. The First Amendment, among other things, guarantees the right of the people "to petition the Government for a redress of grievances."

Here's the deal: We've got a grievance. Another part of the Constitution, the 14th Amendment, guarantees all citizens "equal protection of the laws." Those of us who live in deed-restricted housing developments or condominiums whose rules ban outdoor antennas or radio transmitting have fewer rights than our neighbors who don't. There's a law—PRB-1 (FCC rules have the force of law)—that protects one group of citizens but specifically denies that protection another group of citizens, those living under deed restrictions and restrictive homeowner association rules. Those of us who have been denied the equal protection of the laws are the ones with the direct grievance that needs to be redressed and are the ones with the greatest ability to influence members of Congress. The rest of us have a secondary grievance in that these rules have a negative effect on amateur radio's overall emergency preparedness (as explained below). The way to petition the government to redress this grievance is to ask Congress to pass a law requiring that the first law (PRB-1) apply to those who live in condos and private housing developments as well as those who don't.

There's one more law—a regulation imposed by the FCC on orders from Congress—that says condos, etc., may not prevent residents from putting up TV antennas, small satellite dishes and other "Over The Air Reception Devices" ("OTARD," in FCC-speak). At this writing, no bill had yet been introduced to direct the FCC to expand its "OTARD" ruling to include reasonable accommodation of amateur radio antennas. So it's best right now for hams directly and personally affected by these restrictions to make contact with their legislators. Who knows? One of them might agree to introduce such a bill.

After a bill is introduced, all hams should contact their Congressmen and Senators to urge them to co-sponsor and/or support the legislation.

The Message

We need to approach our legislators with a message they can understand (don't get technical) and one that ties in to matters that are high on the national agenda. Here are some basic points we should be making when we contact our representatives:

1) Amateur radio is essential for homeland security. Amateur radio is a decentralized communications system that cannot be shut down by a single terrorist attack. Unlike public safety agencies that rely on a single central dispatch station, hams can and do get on the air from virtually anywhere. As trained communicators with technical knowledge, we can quickly put stations on the air in remote locations or create makeshift arrangements to stay on the air if normal facilities are compromised. We don't need to wait for technicians to come set things up or reprogram our equipment. We can do it ourselves and we can do it on the fly. Our ability to do this is gained by our everyday use of our equipment. *Hams who are not permitted to have and operate home stations will not develop the skills needed for quick and efficient emergency response.*

2) Amateur radio is essential for response to natural disasters and weather emergencies. Hams somehow manage to get on the air and stay on the air when normal means of communications fail. Often, ham radio is the only means of communication between a stricken area and the outside world for hours or even days. Again, *hams who are barred from setting up and operating home stations will not be able to provide this level of assistance.*

3) The FCC has already recognized that amateur stations are only as effective as the antennas they use. Outdoor antennas are essential for efficient radio communication. Indoor antennas compromise signal reliability and may contribute to problems with interference and excessive RF exposure. Having an antenna outside and away from people and other electronic devices is a win-win situation.

4) The matter is a question of basic fairness and equal protection of the laws. The FCC ruled over a decade ago that state and local ordinances affecting amateur antennas and towers must "accommodate reasonably amateur operation" and must represent the "minimum practicable regulation" to accomplish the ordinance's "legitimate purpose." However, the FCC specifically excluded the law from applying to restrictive covenants and homeowner association rules because they are "private contracts." However, the FCC overrode these contracts in its OTARD ruling (see above) and required private developments and condos to permit TV antennas including small satellite dishes. But it refuses to extend this requirement to include amateur radio antennas – even antennas of approximately the same size. *Hams are not asking to be able to put up huge antennas; only reasonable accommodation, what is already required of state and local governments.*

5) Developers, homeowners' associations and condominium boards often act as *de facto* local governments – administering communities that can be as large in size or population as many small towns. They provide security, maintain roads, collect taxes in the form of fees and other assessments, levy fines for breaking the rules, and do just about anything else that a municipal government does, but without the safeguards for citizens under which real governments operate. (In fact, the problem really goes far beyond amateur radio antennas—it goes to the heart of American society in that people in many cases are being forced to agree to give up a wide variety of freedoms as preconditions for living in safe neighborhoods. This

(Continued on page 111)

VHF MULTI MODE

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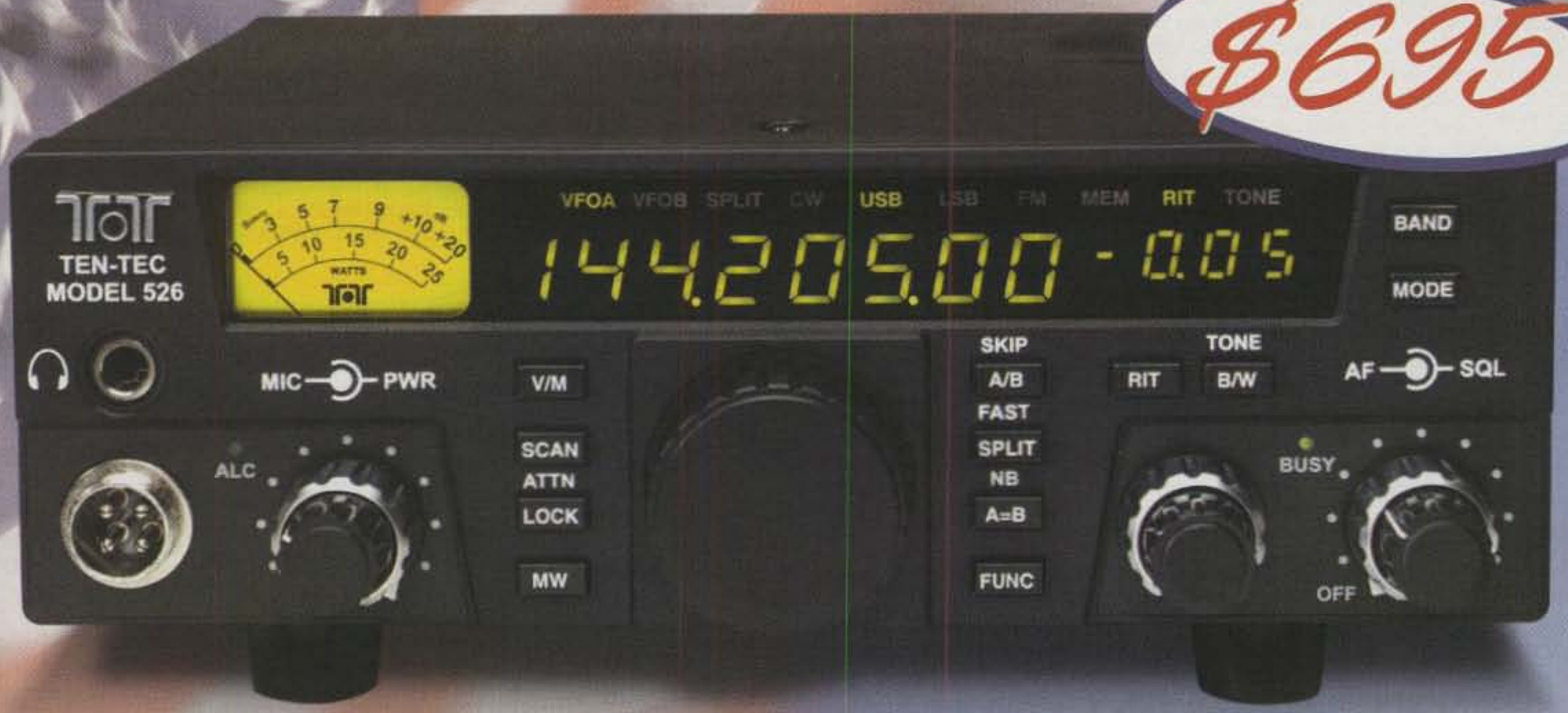

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Real innovation in a multi-mode VHF transceiver was long overdue. Introducing the Ten-Tec model 526 "6N2" VHF transceiver. Amateur radios' first IF-DSP multi-mode VHF rig. For a long time, there have been no affordable choices for either 6 or 2 meters in a single band VHF multi-mode transceiver. Active hams planted the idea with us - why not offer a single rig that has BOTH 6 and 2 meters, without sacrificing performance? Multi-mode HF/VHF rigs have been around for years, at over a thousand dollars and with compromised performance on the VHF bands at best. The "6N2" provides serious multi-mode VHF performance in a small, take-anywhere package at a significantly lower price than HF/VHF multi-mode transceivers. Why buy another HF rig to get VHF coverage, when you already own one?

Ten-Tec's years of experience designing DSP radio equipment for amateur, commercial, and military applications comes together to deliver a VHF multi-mode transceiver to meet performance demands of weaker signal VHF operators. Let's take a look:

- SSB, CW, and FM transceive operation on both 6 and 2 meters. Extended receive range from 136 - 174 MHz on 2 meters.
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Announcements

• **Missouri QSO Party** – Sponsored by the Boeing Employees ARS of St. Louis, April 6–7. For details see the club website: <http://www.qsl.net/w0ma>.

• **SETI League QSO Party** – Sponsored by the SETI League and the Burley ARC of Burley, Washington, 0000–2359Z April 20 on 14.204, 21.3, and 28.408 MHz. Stations operating on 14.204 may opt to listen 14.225 and up for calls in the lower end of the General class band segment. Call CQ SETI. SETI League members and staff work everyone; others work SETI League members, staff, and other interested stations. Exchange signal report, grid square, and SETI League membership status. Logs go to Burley ARC, P.O. Box 262, Burley, WA 98322, Attn. SETI. For details e-mail Tom Sanders, W6QJI, <ww2end@aol.com>. For more info on the SETI League, see <www.setileague.org>.

• **Florida QSO Party** – Sponsored by the Florida Contest Group, 1600Z April 27 to 0159Z April 28, and 1200–2159Z April 28. Object is for as many amateurs outside Florida to make contact with as many Forida stations as possible; Florida stations activate as many counties as possible, work everyone. Details : <http:// www.qsl.net/fqp>; e-mail: <fqp@qsl.net>.

• **These Special Events stations are scheduled for April:**

N2MO/IMD, from Marconi Day, Wall, New Jersey; Ocean Monmouth ARC; 0000–2400Z April 27 in the General portion of 80, 40, 20, 15, 10 meters, CW/SSB. For special QSL send QSL and SASE to OMARC, P.O. Box 267, Oakhurst, NJ 07755.

N2UL, from CQ Scout Invitational Camporee, Nutley, New Jersey; Robert D. Grant UL ARA; 1300Z April 27 to 2300Z April 28 on 14.260, 21.375, 28.420. For certificate send QSL and SASE to RDGULARA, c/o WA2VJA, 112 Prospect St., Nutley, NJ 07110-0716.

W3FT, from Greater Baltimore Hamboree & Computerfest and ARRL MD State Convention, Timonium, Maryland; Baltimore ARC; 1300–1900Z April 6 and 1200–1700Z April 7 on 7.230, 14.260, 28.415, 147.55. For certificate send QSL and SASE to BARC, c/o Awards Manager, P.O. Box 120, Reisterstown, MD 21136.

W9DK, from WW II submarine *USS Cobia* to celebrate Submarine Radio Reactivation Weekend; Mancorad Radio Club of Manitowoc, Wisconsin; 1400Z April 27 to 2200Z April 28 on 7.243, 14.243, 21.343, 28.343 MHz ±10 kHz. For *USS Cobia* QSL send QSL and SASE to Fred Neuenfeldt, W6BSF, 4932 So. 10th St., Manitowoc, WI 54220-9121.

GB90MGY, in memory of sinking of the *Titanic*, from Godalming Museum, Godalming, England; Titanic Wireless Commemorative Group; CW only on all amateur shortwave bands 80–10 meters (including WARC bands) from 10:30 AM Saturday, April 13 to 6:47 AM Monday, April 15. Contacts and reports will be confirmed 100% via the bureau. For more information see <www.gdrs.net/titanic>.

• **These hamfests, etc., are slated for April:**

Apr. 6, **Columbus ARC Hamfest,** Bartholomew County 4H Fairgrounds Community Building, State Road 11, southwest of Columbus, Indiana. Contact Marion Winterberg, WD9HTN, 11941 W. Sawmill Rd., Columbus, IN 47201-8000 (812-342-4670; e-mail: <carc_in@yahoo.com>). (Talk-in 146.790/146.190; exams at 11:30 AM, walk-ins okay, contact Millard Qualls, 812-332-0074, e-mail: <k9diy @arrl.net>)

Apr. 6, **Lincoln Trail ARC Hamfest**, Prichard Center, Elizabethtown, Kentucky. Contact Leon Priest, N4TFK, 1-270-351-4721, e-mail: <n4tfk @qsl.net>, <http://qsl.net/w4bej>. (Exams)

Apr. 6–7, **Greater Baltimore Hamboree & Computerfest**, Maryland State Fairgrounds, Timonium, Maryland. Contact GBH&C, P.O. Box 95, Timonium, MD 21094-0095 (410-426-3378; <www.gbhc.org>).

Apr. 13, **Irvington/Roseland ARC Hamfest**, West Orange High School, West Orange, New Jersey. Contact Harvey Moskowitz, W2YWC, 973-994-0637; <www.qsl.net/k2gq>. (Talk-in 146.415 +1.0, 85.4T; 447.875 –5.0, 156.7T; 146.520 simplex; exams)

Apr. 13, **Temple ARC Ham Expo**, Bell County Expo Center, Belton, Texas. Contact Ham Expo, P.O. Box 4511, Temple, TX 76505 (e-mail: <hamexpo@tarc.org>; <www.tarc. org>). (Talk-in 146.820–, PL 123.0)

Apr. 14, **Raleigh ARS Hamfest & NC State ARRL Convention**, Jim Graham Building, NCS Fairgrounds. Contact Jeff Wittich, AC4ZO, 211 Dundalk Way, Cary, NC 27511 (919-362-4787); <www.rars.org/hamfest>. (Exams, W4VFJ, 919-556-8551)

Apr. 14, **Madison Swapfest**, Mandt Community Center, Stoughton, Wisconsin. Contact Madison Area Repeater Assn., P.O. Box 8890, Madison, WI 53708-8890 (608-245-8890; <http://www.qsl.net/mara/>). (Talk-in 147.15)

Apr. 20, **Catawba Valley Hamfest & Computer Fair**, Burke County Fairgrounds, Morganton, North Carolina. Contact Don Beam, KK4NI, 828-652-3102, e-mail: <dbeam@wnclink.com>. (Guest Riley Hollingsworth)

Apr. 21, **York Springfest**, York County School of Technology, York, Pennsylvania. Contact Barry Anderson, 301-620-0270, e-mail: <banderso@eni.net>. (Talk-in 147.33+ .600, 146.52 simplex; exams 1 PM contact <W3AXC @peoplepc.com>)

Apr. 26–27, **Southeastern VHF Society Conference**, Garden Plaza Hotel, Oak Ridge, Tennessee. Contact SVHFS, P.O. Box 1255, Cornelia, GA 30531; <www.svhfs.org>.

Apr. 26–28, **International DX Convention**, Holiday Inn Plaza, Visalia, California. Contact Don Bostrom, N6IC, 4447 Atoll Ave., Sherman Oaks, CA 91423 (818-784-2590; e-mail: <n6ic@arrl.net>; <www.qsl.net/visalia2002>).

Apr. 27, **Valley of the Moon ARC ARRL Hamfest**, Sonoma Valley Veteran's Memorial Bldg., Sonoma, California. Contact VOMARC, 358 Patten St., Sonoma, CA 95476; or Darrel, WD6BOR, 707-996-4494. (Talk-in 145.35, –600, PL 88.5; exams 10 AM, registration starting at 9 AM)

Apr. 27, **Ararat AR Shrine Club Hambash 2002**, Ararat Shrine, Kansas City, Missouri. Tickets: Ray Pautz, 13 SE 125 Rd., Warrensburg, MO 64093. Tables: Steve Dowdy, WJØI, phone/fax 816-941-3392, <sdowdy@kc.rr.com>. Exam registration, form 610, to: Exam registration, P.O. Box 47067, No. Kansas City, MO 64188 (fax 816-941-3392). (Talk-in 145.13)

Apr. 28, **Athens County ARA Hamfest**, Athens Community Recreation Center, Athens, Ohio. Contact Carl Denbow, KA8JXG, 17 Coventry Lane, Athens, OH 45701-3718 (<ka8jxg @callsign.net>). (Talk-in 145.15, –600)

Apr. 28, **Penn-Del ARC Hamfest & ARRL Delaware State Convention**, Nur Temple, New Castle, Delaware. Contact Hal Frantz, KA3TWG, 302-793-1080, e-mail: <hfrantz@ snip.net>. (Talk-in 146.955–, 224.220 repeater; exams)

Apr. 28, **K8TKA 20/9 Hamfest**, Mahoning County Career and Technical Center, Canfield, Ohio. Contact Don Stoddard, N8LNE, 330-793-7072; e-mail: <n8lne1@neo.rr.com>. (Talk-in 147.315, 145.275)

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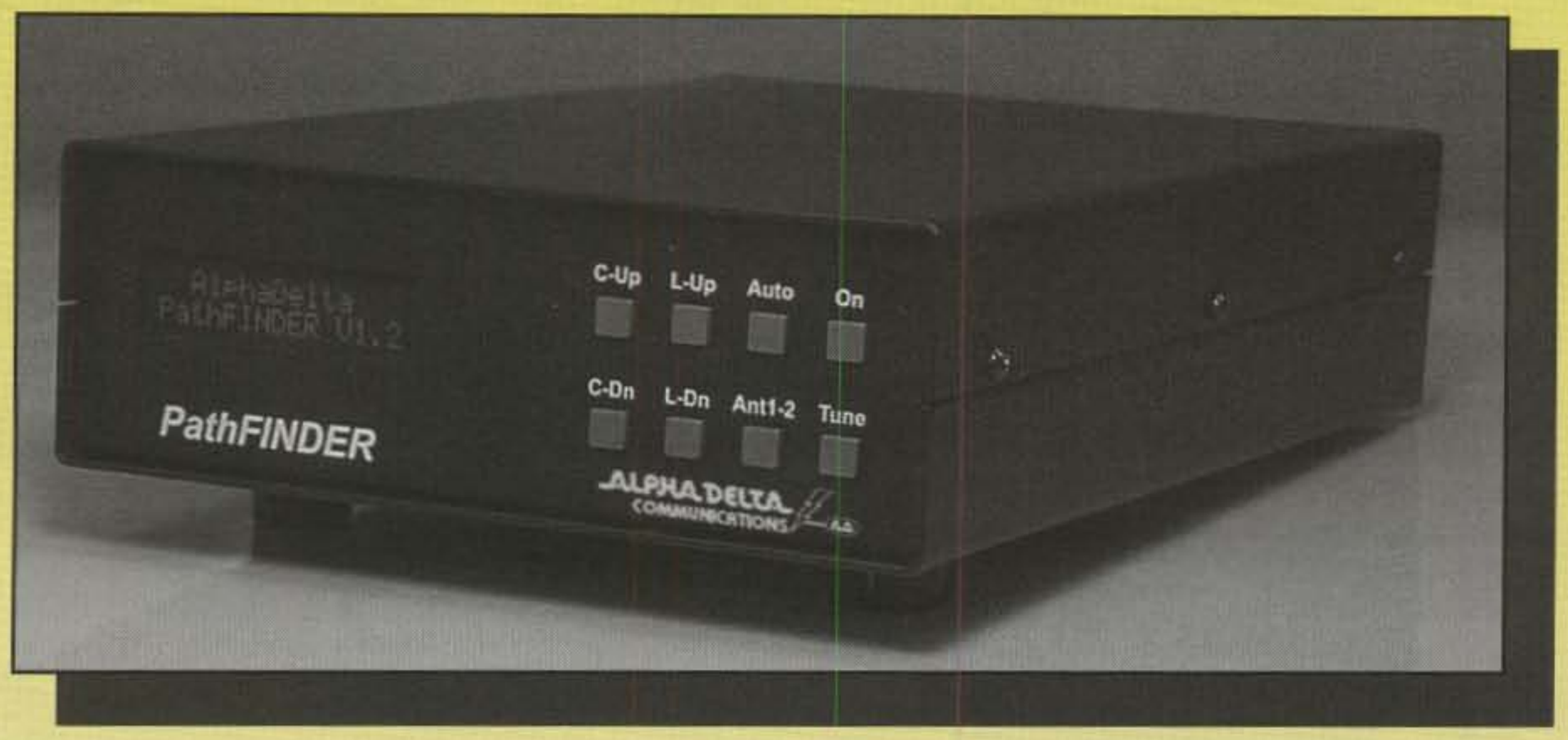

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Results of the 2001 CQ WW WPX CW Contest

BY STEVE BOLIA,* N8BJQ

Another interesting WPX CW contest is in the books. Summertime conditions are always challenging, and 2001 was no exception. Ten meters is still active and 160 provided some good opportunities for Top Band enthusiasts. Conditions were not record setting, but one world record was broken, as well as a host of USA and continental records.

DX

Hrane, YT1AD, operating from the magic 3V8BB station, repeated as the world Single Operator All Band (SOAB) champion. N6TJ at P4ØT edged out K7BV at PVØF for the number two spot, with YT6A at VP5MM fourth and RZ9UA at P3A fifth. Tribander/Single Element (T/S) champion JM1CAX at JY9NX was sixth, followed by K6LA at PJ2U, FG/RW3QC, FM5BH, and K5ZD as AJ1I.

Ten meters provided some very close competition, with CX5BW edging out ZS4TX and LU5FA for the top spot. LU1FAM as LT1F was fourth and European champ 9HØA fifth. Mats, SM7PKK, as 5X1Z narrowly missed the world record on his way to the 15 meter title. Mats did set a new African record on 15 meters, though. Second place went to 5B4/RA9JX, with VR2BG at 9M6BG third, SMØCXU at HZ1AB fourth, and 9H1ZA fifth. K2VV was the 20 meter champion, just getting by DL5LYM and 5B4/RW9UP, K9NW, and OK2ZW as OK5W. EA9AZ was the 40 meter winner, with 9A3GW second, YU7GW as 4O7M third, Z33F fourth, and GW3NJW as GW7X fifth. 5B4/UA9YAB set a new Asian 80 meter record with his number one finish. Second place went to 9A3NM as 9A3ØY, with YLØA third, UA2FB fourth, and OK2ZU as OLØE fifth. Riki, 4X4NJ, as 4X3A was the 160 meter champion, edging out 9A6A for the top spot. 9A2VR as 9A3B was third, Low Power champ LZ2UZ fourth, and LZ2CJ fifth.

The top of the Low Power leader box remained the same with SU9ZZ and IH9/OL5Y repeating their 2000 finishes. Third place went to ZC4DW, with S5ØR fourth and WE1USA fifth. EA8NN edged out L4ØE for the Low Power 10 meter title, with LU9APM third, KP3W fourth, and 9A3VM fifth. HA3UU at HA3O was the 15 meter winner, followed by RA6LW, LZ9G, PY2NDX, and 4Z5FW. YM3D took 20 meter honors, with 9A1AA second, RJ9J third, K9QVB fourth, and US1ITU fifth. The Low Power 40 meter race was a close one, with S54A squeaking by 4Z5AX and UZ5I for the title. YU1KR was the 80 meter champion, followed by RW9AV and EU1AZ. LZ2UZ topped 4N1A and UT1FA for the Top Band title.

USA

The U.S. SOAB race was a close one, with five stations topping 7 million points. It took a record score to win, and that's exactly what Randy, K5ZD, as AJ1I did. Randy broke WW4T's 1999 record to surpass Tom, K1KI, as KG1D, and frequent winner Bob, KQ2M. Dan, K1TO, as NJ4M was also in the thick of things with his nice fourth place finish, followed by Dave, K1ZZ, as NW7R. K5GN as NU5A was sixth, N6RT as NE6N seventh, KI1G eighth, N2NL as WK4R ninth, and K1VR as KR7G tenth.

W4ZV as WW4M was the 10 meter champion, followed by KZ4DX and KT3M. Fifteen meters was hotly contested, with W5TM claiming the top spot, followed by WA6O, K4OAQ, and W6YA. John, K2VV, was the world and U.S. 20 meter champion, with Mike, K9NW, second and Dave, NT1N, third. W4SO as WX4CW edged out W3BGN for the U.S. 40 meter title, with N5DO coming in third.

Lee, WA1LNP, was the Low Power champion as WE1USA. Second went to AA3E, with K1VUT third, N4TZ as KS9K fourth, and WQ5L fifth. W4FMS topped the 10 meter box, with KN4Y second. K7ON and W9ILY were first and second on 15 meters. K9QVB was the U.S. 20 meter leader (and fourth in the world), with NJ3K second. W7DRA operated from home in the 2001 contest and captured the 40 meter title, with K9CJ second.

This is Yuri, VA3UZ, who finished second in Canada in the Single Op All Band category.

Tribander/Single-Element

There were nearly 250 entries in the increasingly popular Tribander/Single-Element (TB/Wires) category in 2001. That's about 16% of all Single Op entries. I would guess there are even more who qualify for this category who have not gotten the word.

JY9NX operated by JM1CAX was the 2001 champion, closely followed by FG/RW3QC. Third place went to CX6VM as CW6V, with Low Power leader IH9/OL5Y fourth and another Low Power entrant, ZC4DW, fifth. ER6A, YT7R, AN5FV, DL1IAO, and HA8JV rounded out the top ten. Single Band winners were Z31GX on 10 meters, 5X1Z (SM7PKK) on 15 meters, NT1N on 20 meters, Z33F on 40 meters, and OLØE on 80 meters. WW4RR (N4ZZ at the key) was the U.S. T/S champion, with K2PLF second, N2GA as WV2LI third, N2GC fourth, and N2ED fifth. U.S. Single Band winners were W8IQ on 15 meters, NT1N on 20 meters, and K9CJ on 40 meters.

QRP/p

NØKE used a slightly different call but the results were the same. TI5X (TI5N last year) was the 2001 QRP/p champion with an excellent 2.5 million point effort. It was not easy, and LY2PAJ as LY5A kept the pressure on the whole weekend. LY3BA as LY9A was third, followed by UN4L and U.S. leader K3WW. 4X1VF was the 10 meter champion, edging out I1BAY for the top spot. LY2FE as LY5G was the 15 meter winner, with RZ6HX second. SP4GFG took 20 meter honors, with OK1IF the 40 meter winner, OM3THV the 80 meter leader, and YU1RA the Top Band champion.

K3WW edged out N6MU for the U.S. title, with WQ1RP (nice call) third. K2CS was the 10 meter leader, K3TW was the 15 meter champ, N4IJ the 20 meter winner, and KU7Y the 40 meter winner.

Single Op Assisted

S5ØA operated by S57AW was the 2001 Single Op Assisted champion. Second place went to RM9H (RZ9HT), with IK4UPB as IR4T third, YL8M fourth, and W3PP as NX3A fifth. S5ØC (S53RM) was the 10 meter winner, IR2Y (IK2QEI) the 15 meter leader, 9A5W the 20 meter champ, S51U the 80 meter winner, and S57M the 160 meter leader. It appears Single Op Assisted was very popular in Slovenia. NX3A (W3PP) was the U.S. winner, with K5KG second, yours truly (N8BJQ) third, WF2B (K2ONP) fourth, and K9NR fifth.

Multi-Op

P49V (AI6V, S5ØA, and S59AA) was the 2001 Multi-Single champion, and also P49V was the only station to break a world record. Second place, and a North American record, belongs to the 6Y1A team of K2KW, KE7X, N6XG, and K6ST. N3OC and DL6LAU brought V25A home in third place, with ZW5B (PY1KN, PY2YP,

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e-mail: <n8bjq@erinet.com>

PY2BW, and PY2EX) fourth, and AH2R fifth with a new Oceania record. 9A7A (9A4RX, 9A8A, 9A7V, 9A3OS, 9A3TR, 9A4BT, 9A6DM, 9A2ME, and 9A4PA) was the top European Multi-Single and the new EU record holder.

The U.S. Multi-Single title, and U.S. record, belongs to KM9P operated by W4AN, K4BAI, and K5OT. KM4M (K4JA, AC4HB, K4ZA, K9GY, K9JY, and W4JVN) finished second, with KR5DX (K5MR, K5GA, KG5U, K1OJ, N5TU, and K5NZ) third, K2XR (K2XR, VA3UA, and N2IX) fourth, and AI7B (K7ZUM, KI7Y, W7GG, and N2WEW) fifth.

The crew at HC8N made a good run at their 1999 multi-multi record, but did not quite get there. N5KO, W6OAT, K5PI, W6RGG, OHØXX, K6TA, NØJK, and K6KO made a mighty effort, but came up a bit short. Second place went to KM3T (KM3T, KC1XX, K1GQ, K6AW, W1MD, W1FV) with a U.S. record from KC1XX's world-class station. Third place went to RU1A (RN1AM, RV1AW, RU1AA, RW1AC, RA1ACJ, UA1ARX, RX1AA, and UA1AKC), with HG9X fourth and NY4A (K2AV, K7GM, N4AF, N4CW, and W2CS) fifth.

KM3T topped the U.S. Multi-Multi box, with NY4A second, NQ4I (NQ4I, K2UFT, W7FB, N4AA, AA4S, KS5M, K4WI, and K4OGG) third, KM5G (KM5G, KØDEQ, K5ALU, WØJOE, NØEHW, N5OE, K5LG, N5DX, and K5GO) fourth, and WK4Y (K4GAU, W4DR, W4HJ, WA4QDM, WK4Y, W4MYA, and Lilly) fifth.

The Rest of the Story

The winner of the 2001 club competition was the Northern California Contest Club with close to 190 million points. The Potomac Valley Radio Club was the U.S. trophy winner. Winning one of the club awards is something that takes quite a bit of effort and coordination. Please make sure you put your club name on the summary sheet or in the Cabrillo header in the appropriate place so your club gets the proper credit.

As was for the SSB contest, this one was also an all Cabrillo contest. Those electronic logs that were not Cabrillo were converted, and all were checked and scored with the new software written by WT4I. It does a lot, but it can't read minds (yet), so it is very important that you fill out your Cabrillo header correctly. The software is looking for the key words as defined in the Cabrillo standard and does not make any attempt to guess what you mean. Single Operator All Band High Power Tribander/ Single CW does not compute. It is up to you to make sure your information is correct. If you have a doubt, please check the WPX website at <http://home.woh.rr.com/wpx/> and look under the section on e-mailing logs for info on the Cabrillo implementation for the CQ WPX contests. E-mail your log if at all possible, and send it as a Cabrillo file *please*. The more e-logs we get, the less I have to type and the less mistakes I may make.

In checking the logs this year it appears that some entrants are not paying attention to the off times. As a single op, your breaks must be 60 minutes and you must take off 12 hours. A couple of logs had large score reductions for operating 40 hours or more and several more lost smaller amounts of time. Anything over 36 hours will be removed from your logs. The software is very good at keeping track of breaks.

If you would like a copy of your log report, you may request one (it's free) from me at

TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND

WORLD: Steve Bolia, N8BJQ Trophy. Won by: **Station 3V8BB operated by Hrane Milosevic, YT1AD.**
USA: Dennis Motschenbacher, K7BV Trophy. Won by: **Station AJ1I operated by Randy Thompson, K5ZD.**
EUROPE: Ivo Pezer, 5B4ADA/9A3A Trophy. Won by: **OHØZ operated by Juva Tuovinen, OH7JT.**
OCEANIA: Tom Morton, K6CT Trophy. Won by: **Mike Gibson, KH6ND**.
CANADA: Radio Amateurs of Canada (RAC) Trophy. Won by: **John Sluymer, VE3EJ**.
JAPAN: The DX Family Foundation Trophy. Won by: **Kenji Koishi, JH3AIU**.
WORLD Low Power: Steve Bolia, N8BJQ Trophy. Won by: **Jaroslav Jamrich, SU9ZZ.**
USA Low Power: Ron Stark, KU7Y Trophy. Won by: **WE1USA operated by Gordon Muise, WA1LNP.**
CANADA Low Power: Amateur Radio League of Alberta Trophy. Won by: **Andy McLellan, VE9DX.**
ZONE 3 High Power: Jim Pratt, N6IG Trophy. Won by: **Station NE6N operated by Doug Brandon, N6RT.**
USA QRP/p: CQ Magazine Trophy. Won by: **Charles Fulp, K3WW.**

SINGLE OPERATOR, SINGLE BAND

WORLD: Pedro Piza, Sr., KP4ES Memorial Trophy. Won by: **Station 5X1Z operated by Mats Persson, SM7PKK (21 MHz).**
WORLD 7 MHz: William D. Johnson, KVØQ Trophy. Won by: **Pablo Zamora, EA9AZ.**
WORLD 3.5 MHz: Lance Johnson Digital Graphics Trophy. Won by: **Alex Vedernikov, 5B4/UA9YAB.**
OCEANIA. Won by: **Station 9M6BG operated by Brett Graham, VR2BG (21 MHz).**
USA: Kansas City DX Club Trophy. Won by: **John Yodis, K2VV.**
USA 28 MHz: Bernie Welch, W8IMZ Memorial Trophy. Won by: **Station WW4M operated by Bill Tippett, W4ZV.**
USA 21 MHz: Wayne Carroll, W4MPY Trophy. Won by: **Ed Gilliand, W5TM.**

MULTI OPERATOR, SINGLE TRANSMITTER

WORLD: Ron Blake, N4KE Trophy. Won by: **Station P49V operated by AI6V, S5ØA & S59AA.**
USA: Austin Regal, N4WW Trophy. Won by: **Station KM9P operated by W4AN, K4BAI & K5OT.**

MULTI-OPERATOR, MULTI-TRANSMITTER

USA: Yankee Clipper Contest Club Trophy. Won by: **Station KM3T operated by KM3T, KC1XX, K1GQ, K6AW, W1MD & W1FV.**

CONTEST EXPEDITION

WORLD. Won by: **Station 6Y1A operated by K2KW, KE7X, N6XG & K6ST.**

COMBINED SSB/CW

SINGLE OPERATOR, ALL BAND

WORLD: Al Slater, G3FXB Memorial. Won by: **Hrane Milosevic, YT1AD (3V8BB).**
EUROPE: Les Nouvelles DX Group Trophy. Won by: **Stefan Von Baltz, DL1IAO.**
USA: Steve Bolia, N8BJQ Trophy. Won by **Bob Shohet, KQ2M.**

Club (SSB & CW)

WORLD: *CQ* Magazine Trophy. Won by: **Northern California Contest Club.**
USA: Oklahoma DX Association Trophy. Won by: **Potomac Valley Radio Club.**

The "antenna farm" of N8BJQ. The tower on the left has monobanders for 2, 6, 10, and 15 meters. The tower on the right has a tribander stack (3) and a 2-element 40.

<n8bjq@erinet.com>. You will be able to see how your log was scored and how you fared with copying serial numbers. No point reductions were made for incorrect serial numbers in 2001, but in 2002 that will change. Make sure your log has the correct serial numbers sent and that you take an extra second to copy the received number correctly. Check with your software author to make sure your favorite software can generate a log file with the numbers that were actually sent.

"Great activity from EU, but we need to do more to promote W/VE and JA activity. This is a great, fun contest with really interesting propagation!" This is a quote from the log of KM3T. If you have not tried the WPX CW, please give it a shot. While conditions are not always outstanding, the contest can be very challenging with the summer weather and propagation. The bands are not always quiet, and you might have to work harder for Q's, but you will find some very interesting openings at unexpected times and can have some fun. It's also a great time to get new ops interested. Do a multi and invite some of local radio club guys over. Give us a try on the 25th and 26th of May 2002.

As always, thanks to all who make the extra effort to put a new prefix on the air or who go on an expedition, and also to all who participate. 1767 stations turned in an entry in 2001 and many more were active. If you operate in 2002, please send in a log. It's a painless procedure, and who knows, you might win something. If you need help with a log, drop me a note, or ask one of your local contest club members to help. Most would be glad to. See the 2002 rules on the WPX website and in the January issue of *CQ* for instructions on sending in a log.

WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

3V8BB (YT1AD)	13,639,976
P4ØT (N6TJ)	11,726,388
PVØF (K7BV)	11,639,509
VP5MM (YT6A)	11,035,570
P3A (RZ9UA)	10,723,620
JY9NX (JM1CAX)	10,113,847
PJ2U (K6LA)	9,825,816
FG/RW3QC	9,134,855
FM5BH	8,425,725
AJ1I (K5ZD)	8,213,226
KG1D (K1KI)	7,817,702
*SU9ZZ	7,799,260
KH6ND	7,768,297
KQ2M	7,756,329
NJ4M (K1TO)	7,354,704
NW7R (K1ZZ)	7,341,600
VE3EJ	7,076,970
VA3UZ	7,058,340
NU5A (K5GN)	6,883,173
PX2W (PY2YU)	6,830,928

28 MHz

CX5BW	4,698,344
ZS4TX	4,602,028
LU5FA	4,025,200
LT1F (LU1FAM)	3,971,976
9HØA	3,965,315
LT5F (LU4FPZ)	3,710,820
LP1F (LU5FC)	3,354,540
FM5GU	2,849,769
WW4M (W4ZV)	2,547,046
KZ4DX	2,096,016

21 MHz

5X1Z (SM7PKK)	6,362,352
5B4/RA9JX	5,078,472
9M6BG (VR2BG)	4,442,400
HZ1AB (SMØCXU)	4,044,200
9H1ZA	3,575,405
4O7A (YU7AV)	3,534,070
EA9EU	3,524,472
VA7CW	3,458,376
SN3A (SP3RBR)	3,456,102
*HA3O (HA3UU)	3,381,464

14 MHz

K2VV	3,523,488
DL5LYM	3,344,418
5B4/RW9UP	3,286,932
K9NW	3,268,210
OK5W (OK2ZW)	3,262,932
4O1X (YU1NW)	3,110,030
*YM3D	3,015,792
9A4X	2,959,872
NT1N	2,900,920
4O1J (YU1JW)	2,511,054

7 MHz

EA9AZ	4,212,447
9A3GW	2,878,644
4O7M (YU7GW)	1,995,019
Z33F	1,908,286
GW7X (GW3NJW)	1,883,700
*S54A	1,320,655
WX4CW (W4SO)	1,264,770
*4Z5AX	1,259,595
UY3QW	1,224,450
W3BGN	1,188,698

3.5 MHz

5B4/UA9YAB	1,332,058
9A3ØY (9A3NM)	801,408
YLØA	760,920
UA2FB	705,960
OLØE (OK2ZU)	625,464
T9ØU	576,840
RG3A (RZ3BW)	539,334
IO3P	486,090
LY2BM	482,806
OK1RR	443,556

1.8 MHz

4X3A (4X4NJ)	198,360
9A6A	171,589
9A3B (9A2VR)	153,075
*LZ2UZ	149,872
LZ2CJ	139,239
OH2BCI	134,310
UR6QA	118,096
HA1ZZ	117,107
*4N1A (YT1DX)	116,100
OH4MFA	102,752

LOW POWER ALL BAND

SU9ZZ	7,799,260
IH9/OL5Y (OK1FUA)	5,800,434
ZC4DW	5,314,681
S5ØR	4,309,032
WE1USA (WA1LNP)	3,956,437
LQØF (LU5FF)	3,910,400
UP6P (UN6P)	3,826,370
AA3E	3,555,627
ZK1EFD (DL1EFD)	3,366,927
K1VUT	3,274,200
VE9DX	3,258,996
KS9K (N4TZ)	3,193,823
WQ5L	3,112,218
UAØJQ	3,075,915
9G1MR (UA3AGW)	2,966,994

28 MHz

EA8NN	1,798,643
L4ØE	1,353,456
LU9APM	939,250
KP3W	910,623
9A3VM	853,902
W4FMS	662,872
YV6AZC	646,200
IR9AF	620,620
IU7M (IK7JWY)	509,220
UN9LN	459,360

21 MHz

HA3O (HA3UU)	3,381,464
RA6LW	1,829,502
LZ9G (LZ1NK)	1,730,535
PY2NDX	1,609,461
4Z5FW	1,274,560
EA8ASJ	1,117,974
SP9BBH	1,016,120
CO8LY	753,876
K7ON	747,450
W9ILY	656,604

14 MHz

YM3D	3,015,792
9A1AA	2,007,564
RJ9J (RA9JR)	1,757,610
K9QVB	1,737,736
US1ITU	1,403,864
LZ9R (LZ3YY)	1,291,549
IO7C	995,864
JI1RXQ	889,056
VA3SY	815,670
UXØZX	771,144

7 MHz

S54A	1,320,655
4Z5AX	1,259,595
UZ5I	1,125,157
OK1EE	918,050
4N1FG	780,125
8S5X (SM5HJZ)	527,960
UA3RF	525,965
DL6UAA	517,776
HB9HAW	390,630
OM8DD	364,968

3.5 MHz

YU1KR	432,291
RW9AV	405,960
EU1AZ	383,024
S53F	374,226
S57U	325,080
EW8OU	219,936
M5X (G3KKQ)	206,584
HA6VA	179,598
RA6FV	172,002
T9ØE (T95DXT)	169,122

1.8 MHz

LZ2UZ	149,872
4N1A (YT1DX)	116,100
UT1FA	95,518
Z36W	81,530
OK2SNX	49,024

TRIBANDER/SINGLE ELEMENT

JY9NX (JM1CAX)	A	10,113,847
FG/RW3QC	A	9,134,855
CW6V (CX6VM)	A	6,584,000
*IH9/OL5Y (OK1FUA)	A	5,800,434
*ZC4DW	A	5,314,681
ER6A (ER1LW)	A	5,192,856
YT7R (YU7BW)	A	5,018,400
AN5FV (EA5FV)	A	4,765,084
DL1IAO	A	4,734,828
HA8JV	A	4,382,466
VA3RU	A	4,225,020
IU4T (IK4MTF)	A	4,216,245
YU7NU	A	4,015,050
WW4RR (N4ZZ)	A	3,918,844
LY2IJ	A	3,522,813
*ZK1EFD (DL1EFD)	A	3,366,927
*VE9DX	A	3,258,996
RM3C (RA3CW)	A	3,257,400
*UAØJQ	A	3,075,915
K2PLF	A	3,043,260
Z31GX	28	1,495,680
OH6NJ	28	400,786
*VK4TT	28	342,236
5X1Z (SM7PKK)	21	6,362,352
DK2GZ	21	1,637,130
*CO8LY	21	753,876
NT1N	14	2,900,920
S53Z	14	591,209
SKØHB	14	492,264
Z33F	7	1,908,286
GW7X (GW3NJW)	7	1,883,700
*G3TJE	7	297,182
OLØE (OK2ZU)	3.5	625,464
IO3P	3.5	486,090
PY7IQ	3.5	149,380

ROOKIE

*NW7DX	A	2,426,044
OA4DKC	A	1,498,503
SM6WQB	A	636,402
*YT1RX	A	428,289
*MUØFAL	A	188,945
*AN7ASZ	28	126,795
*YT1D (4N1NW)	28	63,282
N8PW	21	1,749,532
EA2AAZ	21	61,074

QRP/p

TI5X (NØKE)	A	2,568,470
LY5A (LY2PAJ)	A	2,331,414
LY9A (LY3BA)	A	1,956,100
UN4L	A	1,751,703
K3WW	A	1,662,210
HG5Z (HA1CW)	A	1,659,553
N6MU	A	1,432,497
SM3C (SM5CCT)	A	1,311,058
YT7TY	A	1,267,182
VE1ZJ	A	1,025,882
4X1VF	28	166,888
I1BAY	28	155,330
JR3RWB	28	88,500
YO5DAS	28	37,973
OH6NPV	28	33,143
LY5G (LY2FE)	21	664,092
RZ6HX	21	571,128
YU1LM	21	453,951
LU5FZ	21	379,414
US9QA	21	357,396
SP4GFG	14	277,014
RN6FO	14	189,133
US3QW	14	185,982
N4IJ	14	160,740
GWØVSW	14	129,360
OK1IF	7	436,428
TE1W (W8QZA)	7	395,036
YU7DP	7	225,184
KU7Y	7	216,315
OK2BJL	7	145,379
OM3THV	3.5	73,457
UT1PO	3.5	9,728
YU1RA	1.8	3,640

ASSISTED

S5ØA (S57AW)	A	6,051,375
RM9H (RZ9HT)	A	5,388,972
IR4T (IK4UPB)	A	5,347,919
YL8M	A	5,056,064
NX3A (W3PP)	A	4,776,259
DK3GI	A	4,775,540
S51TA	A	4,765,152
RX3APM	A	4,386,015
K5KG	A	4,196,278
IKØYVV	A	3,916,465
RK3AWL (RV3BA)	A	3,862,788
N8BJQ	A	3,779,121
WF2B (K2ONP)	A	3,246,308
K9NR	A	3,098,224
*YU1OJ	A	3,040,901
S5ØC (S53RM)	28	1,459,164
LZ8T (LZ2FV)	28	962,920
*YU1QW	28	366,417
IR2Y (IK2QEI)	21	3,022,320
UA6LV	21	2,965,032
OH7M	21	2,024,880
PA3EWP	21	1,871,498
PI4TUE (PA3EZL)	21	1,204,257
9A5W	14	2,800,060
UA9TQ	14	1,426,809
AM3AJW	14	914,022
NO9Z	14	496,184
S51U	3.5	57,590
S57M	1.8	204,392
YZ1W (YU1ANT)	1.8	50,435

MULTI-OPERATOR SINGLE TRANSMITTER

P49V	19,760,774
6Y1A	17,772,811
V25A	12,898,742
ZW5B	12,020,645
AH2R	11,541,420
9A7A	10,915,020
RT9W	10,821,417
KM9P	10,691,724
OD5/OK1MU	10,503,504
RF9C	10,364,382
WL7E	10,288,032
OH2U	8,786,250
OHØB	8,709,134
KM4M	8,703,114
SN2B	8,615,705
HG1S	8,440,524
OH1F	8,388,408
ES5Q	8,212,644
OM7M	8,024,240
SK3W	7,964,832

MULTI-OPERATOR MULTI-TRANSMITTER

HC8N	50,454,459
KM3T	21,103,320
RU1A	19,788,600
HG9X	18,120,374
NY4A	15,461,384
NQ4I	15,379,484
LY7A	14,566,144
KM5G	13,293,397
OL7W	11,943,360
WK4Y	11,452,560
NR4M	9,770,292
OG3M/Ø	9,198,280
OL7R	6,529,536
WR3L	6,367,746
ZL6QH	5,701,696

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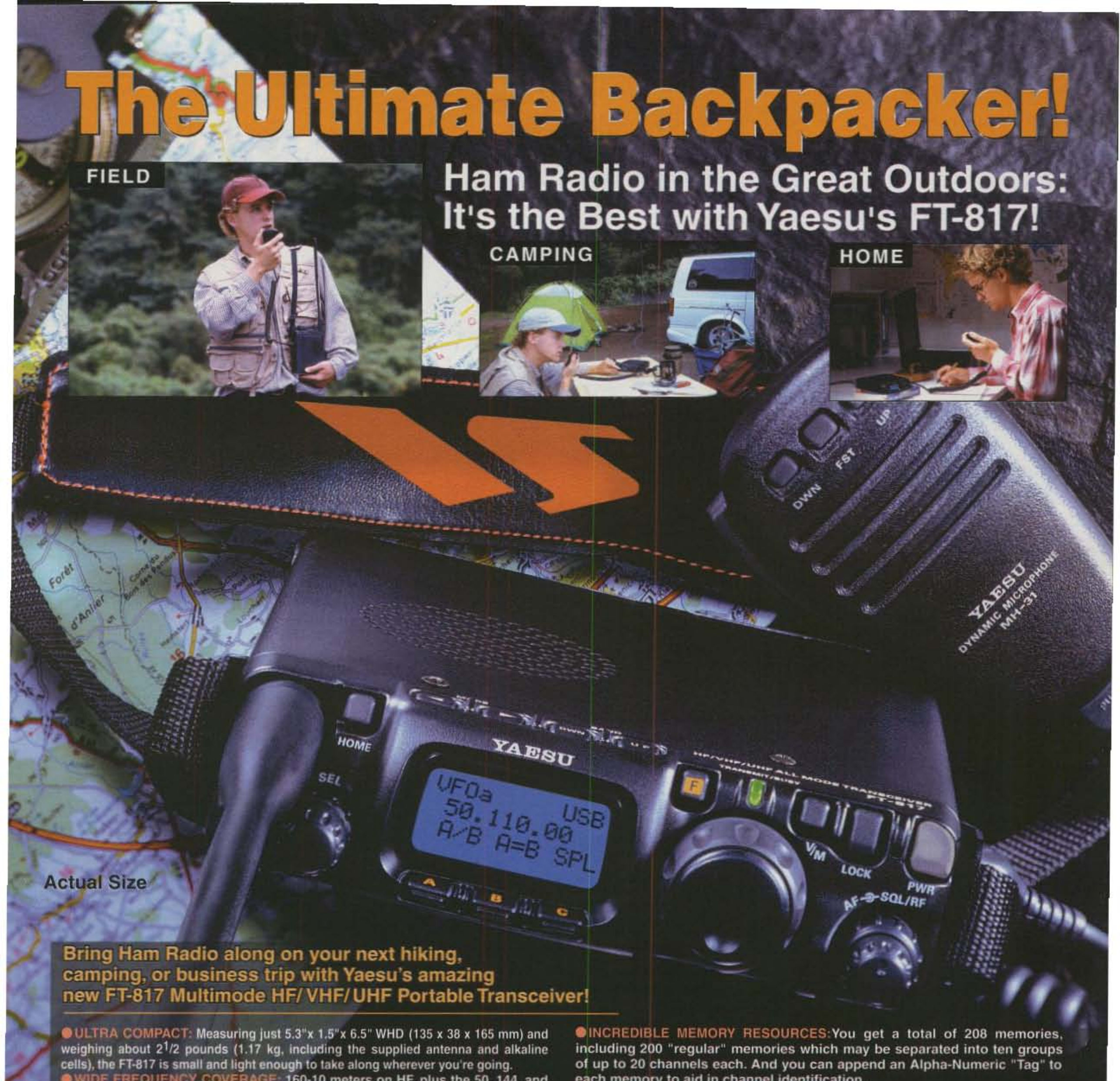

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USA TOP SCORES

SINGLE OPERATOR ALL BAND

AJ1I (K5ZD)		8,213,226
KG1D (K1KI)		7,817,702
KQ2M		7,756,329
NJ4M (K1TO)		7,354,704
NW7R (K1ZZ)		7,341,600
NU5A (K5GN)		6,883,173
NE6N (N6RT)		6,730,512
KI1G		6,608,835
WK4R (N2NL)		6,488,790
KR7G (K1VR)		6,031,608
WC1M		5,827,728
N3RS		5,546,520
KR1G		5,538,960
K3ZO		5,538,120
AA3B		4,885,050
KW2O (K2LE)		4,639,392
WE9V (KB3AFT)		4,629,912
KR4Z		4,430,149
WC4E		4,404,531
AD5Q		4,274,426

28 MHz

WW4M (W4ZV)		2,547,046
KZ4DX		2,096,016
KT3M (N3AD)		762,128
*W4FMS		662,872
*KN4Y		415,310

21 MHz

W5TM		2,871,302
WA6O		2,787,701
K4OAQ		2,609,511
W6YA		2,098,698
WZ1R		1,835,430
W9WI		1,773,477
N8PW		1,749,532
KTØR		1,218,052
*K7ON		747,450
WA7LT		699,885

14 MHz

K2VV		3,523,488
K9NW		3,268,210
NT1N		2,900,920
K2BA		2,330,880
*K9QVB		1,737,736
W9RE		1,604,351
W5FO		927,360
KØFX		663,490
KC7V		428,542
*NJ3K		356,568

7 MHz

WX4CW (W4SO)		1,264,770
W3BGN		1,188,698
N5DO		736,048
NA2X		121,635
*W7DRA		62,225

LOW POWER ALL BAND

WE1USA (WA1LNP)		3,956,437
AA3E		3,555,627
K1VUT		3,274,200
KS9K (N4TZ)		3,193,823
WQ5L		3,112,218
WV2LI (N2GA)		2,790,110
NW7DX		2,426,044
WD5K		2,196,116
WJ9B		2,139,291
WD4AHZ		2,087,416

28 MHz

W4FMS		662,872
KN4Y		415,310
KA2DIV (N4GM)		159,120
K4RV		1,564

21 MHz

K7ON		747,450
W9ILY		656,604
WA1FCN		439,304
K1MW		348,080
W6YJ		239,168

14 MHz

K9QVB		1,737,736
NJ3K		356,568
ND4AA		232,050
AE9B		207,480
W8UMR		147,825

7 MHz

W7DRA		62,225
K9CJ		32,680
KU6T		18,732
KX9DX		2,821
AA9IV		1,326

QRP/p

K3WW	A	1,662,210
N6MU	A	1,432,497
WQ1RP (K1RC)	A	753,848
N7IR	A	700,132
NØUR	A	475,524
K2CS	28	12,654
K3TW	21	135,600
WA6FGV	21	131,712
N4IJ	14	160,740
K6III	14	50,196
KU7Y	7	216,315

TRIBANDER/SINGLE ELEMENT

WW4RR	A	3,918,844
K2PLF	A	3,043,260
*WV2LI	A	2,790,110
N2GC	A	2,735,440
N2ED	A	2,637,504
W7UT	A	2,510,118
WD5K	A	2,196,116
*WD4AHZ	A	2,087,416
N2CU	A	1,951,670
*KJ9C	A	1,869,160
*W8IQ	21	188,244
NT1N	14	2,900,920
*K9CJ	7	32,680

SINGLE OP ASSISTED

NX3A (W3PP)	A	4,776,259
K5KG	A	4,196,278
N8BJQ	A	3,779,121
WF2B (K2ONP)	A	3,246,308
K9NR	A	3,098,224
WN9O (W9IU)	A	2,304,880
K3KO	A	2,213,106
WØTM	A	2,067,952
W2YC	A	2,055,375
*N6CW	A	1,577,442
NO9Z	14	496,184

ROOKIE

NW7DX	A	2,426,044
AC7LX	A	145,521
K9CU (KB9UWU)	A	57,450
W7EAI	A	28,994
N8PW	21	1,749,532

MULTI-OPERATOR SINGLE TRANSMITTER

KM9P		10,691,724
KM4M		8,703,114
KR5DX		7,655,265
K2XR		6,827,760
AI7B		6,740,872
WJ6O		6,075,132
NX6T		4,711,099
KF1V		4,354,176
K6ZM		4,210,075
KQ1F		735,471

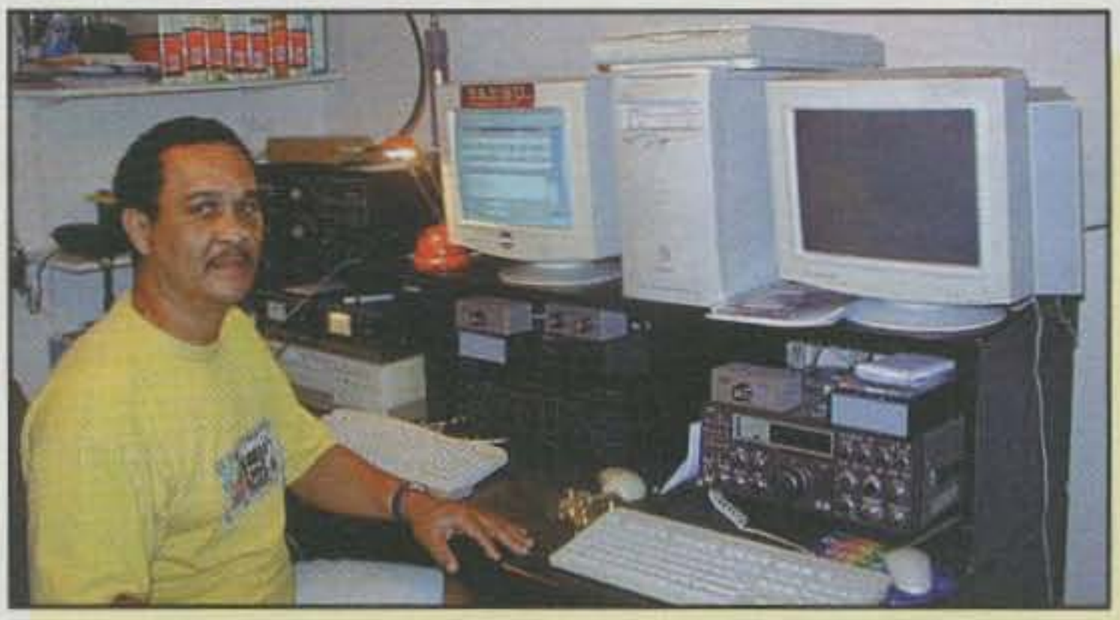
MULTI-OPERATOR MULTI-TRANSMITTER

KM3T		21,103,320
NY4A		15,461,384
NQ4I		15,379,484
KM5G		13,293,397
WK4Y		11,452,560
NR4M		9,770,292
WR3L		6,367,746
WQ7T		4,136,076
AK3Z		2,035,296

**Low Power*

We can always use some good pictures from your operation, whether it is an expedition or just pictures of you and your shack. We were a little short this year, so I've included a picture of the new N8BJQ antenna farm. It's far different from the photo I ran several years ago. To avoid seeing more of these pictures next year (I have hundreds), please send me some of yours. High-quality JPEG files are great.

That's it for this year. I am looking forward to seeing everyone at Dayton and in the WPX CW contest. If you need paper log forms, you can get them from *CQ* for an SASE, or there are scanned copies on the WPX website: <http://home.woh.rr.com/wpx/>. 73, Steve, N8BJQ



Here is Laurent, FM5BH, who finished in the top ten in the Single Op All Band category.

Random Comments

During Grand Prix is hard working in CW. . . . **3A/DL2JRM/P**. Many problems with the equipment on the start of the contest, but we manage to work around it. We enjoyed the contest a lot. . . . **4G1A**. Conditions were very poor. There were no sunrise peak QSOs to North America, and only one Q with Japan. Signal levels were low in general. . . . **4X3A**. Revised strategy really helped the score with the new M/S rules in the end; the mult station only provided a small % of the score increase we had this year. . . . **6Y1A**. The 1st day no good at all, 2nd day just a little bit better, but I could get *no satisfaction!* Am JA's 3rd Class licensed: only 10w output and usin' whip ant up abt 13mh: So *coool*? GL72/73. . . . **7K2PBB**. First all band effort in over 1 year due to replacement of the old antennas. I had a lot of fun in trying SO2R (Single Op 2 Radios) for the first time! Still have some antennas to install. . . . **7S2E**. Not too bad for first SOSB 10m WPX. . . . **9A3MA**. Thanks to Michael for loaning me his callsign for contest operation while awaiting my own local license issue. Unfortunately business duties limited my on-the-air time to 24 hrs only. Surprised that you can have good pile-ups from here using only 3-ele and single transceiver. Thanks to everyone who gave me a call. . . . **9G1MR**. Great conditions!. . . . **9M6BG**. Rig used was an old Ten-Tec Triton at 5 watts. Wish I had more time to play. . . . **AB8DF**. Lost a lot of time on Saturday due to many thunderstorms rumbling through the area forcing me to shut everything down, but conditions were better than expected based on prop forecast. . . . **AE4EC**. Great contest as usual. Increased my score slightly by getting up at 4 AM Sunday morning to work JA's on 40m. It paid off with two hours averaging 330 points each—by far the best of the contest. . . . **AE6Y**. Partial effort during spare times between family obligations. . . . **AE9B**. 10m sucked from the NW but what's new! JA activity continues to drop it seems in all contests. EU activity up though. No help to the left coast with JA activity down! Way too many dupes in the log —95 total!. . . . **AI7B**. New USA record. Great single op competition this year. . . . **AJ1I**. After looking forward to this one, I just wasn't with it. I guess I didn't get enough sleep before the contest, and quit while well ahead of last year, even though I might have made my goal of 3000 Qs. Hit the road early Sunday AM for Cape Cod after sleeping through the night with the bands really hot. . . . **AK1N**. After making about 10,000 QSOs in a very short time here, I found myself in a pretty bad mood when just nobody would answer my endless CQs. In the contest a good prefix MUST be accompanied by more than a good signal. . . . **AP2ARS**.

Was a great fun again. Hope to hear everyone again next year. . . . **DFØFS**. Heavy to run 48 hours with two operators only, but surprising what is possible with simple rig within a big contest. . . . **DFØSX**. It's my first WPX as SO/LP. . . . **DFØWER**. Hard-disk crash Sunday at 1100 UTC, generator crash Sunday at 1530 UTC. . . . **DK2GZ**. Where are all the stations outside contests?. . . . **DM3XI**. As usual had lots of fun but couldn't make full entry neither LF bands. See you next year!. . . . **EA8CN**. I participate as Single Operator, Band Restricted (only 28.1–28.15 MHz). I make this archive with a homemade program. I work with 10w and a vertical antenna. My transceiver is a President Lincoln; it's a monoband Trx. . . . **EF7AMD**. Thanks everyone who call me and give some points. It's make result as possible. Please call me again. 73! . . . **EM3J**. Conditions were not very good on 28 MHz. Not many time. . . . **F5JY**. Vy 1st entry with my K1, 20m and 15m, 5W, using a broadband GP. Really amazing to see how QRP can get to really DX locations! Tnx for the fine contest. . . . **F5PBL**. *Nice condx!* . . . **F8PDR**. Great weekend as usual. See you next year. . . . **FM5BH**. First time as a contest expedition station. Wonderful experience operating from Mai Moana Resort at Bora Bora. Thanks to Stan (FO5IW) for the wonderful location, great support, and fantastic food!. . . . **FO8DX**. First time in WPX. Had to ride out on my motorbike after a few hours of operating to get the narrow filters. Rig was much better after that and able to cope with the amount of traffic. . . . **GØDCK**. Good condx great fun; not so many hours to spare this year. . . . **G3LHJ**. This really is the best contest of the year with plenty to work at all times of the night and day. Can I enter a plea for the boy racers to come down below 50 wpm when called by a slower station? . . . **G3OOU**. At first I was only going on to give points, but got interested and here is an entry. . . . **G3RSD**. WPX CW always produces a few brain-teaser prefixes. This year was no exception. Importing the CQ WPX log into the station log after the event usually throws up a few that require some tweaking to the station log's "country file." . . . **G3TXF**. Had to work nights so missed out on a lot. Will do better next year. . . . **G3UFY**. Only a few hours due to work/sleep/family commitments; good fun though. . . . **G3VQO**.

Vast improvement on last year's conditions, but even so we are being short changed by the sun this time. . . . **G3YDD**. After my 100 QSOs I took a 3 hour drive to Scotland and reappeared as GM4OBK. . . . **G4OBK**. Only able to spend a few hours, but sending

(Continued on page 101)

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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 9⅛	4.2
SS-30	25	30	3¼ x 7 x 9⅛	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 9⅛	4.2
SS-30M*	25	30	3¼ x 7 x 9⅛	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 9⅛	6.5
SRM-30	25	30	3½ x 19 x 9⅛	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅛	6.5
SRM-30M	25	30	3½ x 19 x 9⅛	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 9⅛	10.5
SRM-30-2	25	30	3½ x 19 x 9⅛	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅛	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅛	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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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
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MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
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SS-18GX
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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

*ICS – Intermittent Communication Service

Public Service

BY BOB JOSUWEIT, WA3PZO

Public Service and Emergency Communications

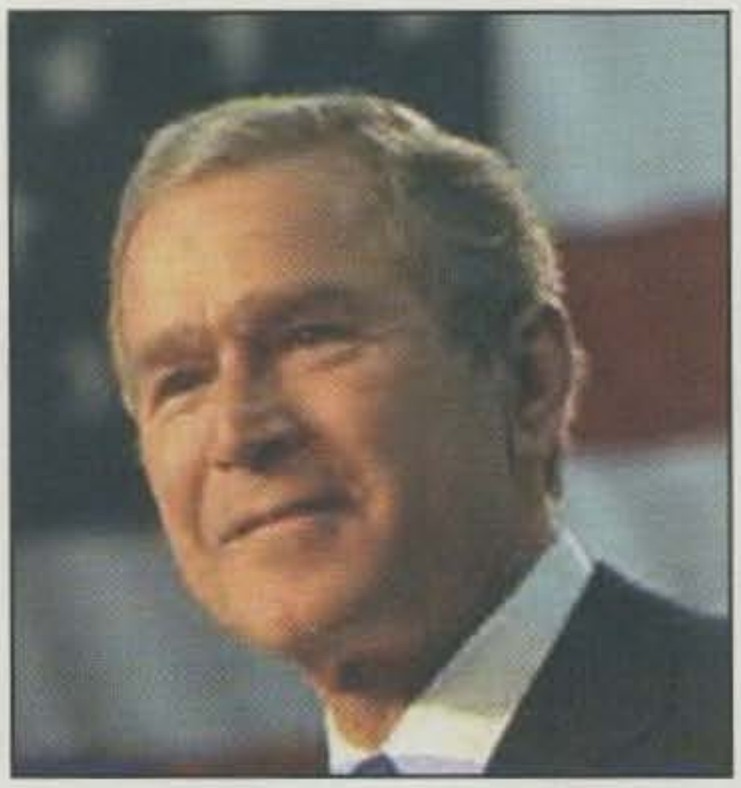
President Bush Praises Hams, Calls for More Volunteering

Many of us are familiar with the scout motto of being prepared. Hopefully we all are familiar with a section of the amateur radio rules which deals with the "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."

Now President George W. Bush has called upon "Americans to commit at least two years—4000 hours over the rest of your lifetime—to the service of your neighbors and your nation." The President brought that message directly to Florida amateur radio operators in late January. On a visit to a Daytona Beach, Florida fire station the President stopped by a ham radio station set up by John Schmidt, AF4PU. Schmidt explained that ham radio operators were checked into the Northern Florida Amateur Radio Emergency Service Net (NFAN). According to *CQ*'s Billy Williams, N4UF, the President told the approximately 40 stations checked into the net:

"I want to thank all the volunteers who help make sure that Florida is prepared for any kind of emergency. I also want to assure you that your Federal government is doing everything we can to make sure that there is not an emergency, starting with unleashing the mighty U.S. military overseas to bring evil ones to justice. But should there be a need for a response, I want to thank you all for helping our communities be prepared. And finally, I want to tell you, we are lucky to be Americans and may God continue to bless this great land of ours. Thank you very much."

ARRL President Jim Haynie, W5JBP, said he was "extremely gratified" that President Bush recognized the valuable service amateur radio operators provide in times of emergencies. "Volunteerism goes straight to the core of all radio amateurs who provide their communication skills, time, and equipment in times of communication disruptions," Haynie said. "I know that all hams in the United States stand ready to do their part in America's Homeland Security Program." Haynie, who was reelected this month, has said that defining amateur radio's role in homeland security would top his list of initiatives for his second term.



President Bush tells Florida hams, "I want to thank all the volunteers who help make sure that Florida is prepared."

Haynie told *CQ* there was a need to identify a role for amateur radio operators. Once that need is identified, he had no doubt that amateur radio can play a "vital role" in the security and well being of this country. Within weeks after the President's State of the Union Address, Haynie and other ARRL officials had meetings scheduled with the Federal Emergency Management Agency and the Department of Justice. According to Haynie, amateur radio offers so much to support the infrastructure because it is such a diverse communications service.

Local Involvement

Many amateur radio operators are already involved in public service by providing communications for local governments or disaster relief agencies such as the Red Cross and Salvation Army. Others are active teaching radio classes to the scouts or to the public. If you are not helping out in your community, here may be a good place to start. This may be the community project that will help create interest in your club.

The President has invited all Americans to join the new USA Freedom Corps. President Bush said, "The Freedom Corps will focus on three areas of need: responding in case of crisis at home, rebuilding our communities, and extending American compassion throughout the world.

One purpose of the USA Freedom Corps will be homeland security. America needs retired doctors and nurses who can be mobilized in major emergencies, volunteers to help police and fire departments, and transportation and utility workers well-trained in spotting danger."

The USA Freedom Corps, through its participating agencies and programs—the newly created Citizen Corps, plus AmeriCorps, Senior Corps, and the Peace Corps—will work with local officials and community groups to offer expanded service opportunities for Americans at home and abroad.

Citizen Corps Councils

A Citizen Corps Council is a locally organized group made up of leaders from all sectors of your community who are committed to making your community safer from the threat of terrorism and other hazards. The Federal Emergency Management Agency (FEMA) will coordinate with states and local communities to support the establishment of the Councils. The Administration will help support local Citizen Corps Councils through training, materials, and certification. Certification will include responsibilities for maintaining the Councils and programs.

Council members can include local elected officials, emergency managers, safety officials such as a local fire chief and police chief; business professionals; leaders of volunteer organizations; representatives from local health care, transportation, and communications providers; local media executives; the educational community; and leaders from your local government's agencies and service providers.

What is the Role of the Citizen Corps Council?

Citizen Corps Councils are responsible for creating an active Citizen Corps in your community. Councils work with state and federal agencies—such as the Federal Emergency Management

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HAM-IV, $529.95. *The heavy duty Ham-IV is the most popular rotator in the world!* It is designed for medium size antenna arrays up to 15 square feet wind load area when mounted in-tower, or 7.5 square feet when mast mounted with an optional lower mast bracket. New alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. New low temperature grease permits normal operation down to -30 degrees Fahrenheit. New wire-wound potentiometer gives reliable and precision directional indication, new ferrite beads reduce RF susceptibility, new Cinch plug connector plus 8-pin plug at control box (no screwdriver needed). Dual 98 ball bearing race for load bearing strength. Strong electric locking steel wedge brake prevents wind induced antenna movement. Easy-to-use Control Box has illuminated directional meter with North or South center of rotation scale, separate snap-action brake and rotation switches. Uses low voltage control for safe operation. Accepts masts up to 2 1/16 inches diameter. Rotator size is 13 1/2Hx8D inches.

T-2X, $619.95. *Extra heavy duty Tailtwister antenna rotator!* For large antennas up to 20 square feet wind load when mounted in-tower, or 10 square feet when mast mounted with optional support bracket. Triple 138 ball bearing race, strong electric locking steel wedge brake. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches. Accepts masts up to 2 1/16 inches diameter. Rotator size is 14 1/16Hx9 3/16D in.

CD-45II, $369.95. *Medium duty antenna rotator.* Handles antenna arrays up to 8.5 square feet windload area when mounted in-tower, or 5 square feet when mast mounted with supplied lower support. Dual 48 ball bearing race, disc brake system. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches with disc brake release. Accepts mast sizes up to 2 1/8 diameter. Includes light duty lower mast support, Rotator size is 17 3/8Hx8 D inches.

AR-40, $269.95. *Lightweight antenna rotator.* Handles smaller ham antennas and large TV/FM antennas up to 3.0 square feet windload area when mounted in-tower, or 1.5 square feet when mast mounted using the supplied lower support bracket. Dual 12 ball bearing race, disc brake system. Silent, automatic control box -- just dial and touch for desired direction. Accepts mast sizes up to 2 1/8 diameter. Includes light duty mast support. Rotator size is 17 3/8Hx8D inches.

Call your dealer for your best price!

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

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Would you be prepared to provide communications if your community was hit by a flood? This photo was taken in Kinston, North Carolina. (FEMA News photo by Dave Saville)

Agency, the Department of Justice, and the Department of Health and Human Services—to bring training and information to your community on Citizen Corps programs.

In addition, Citizen Corps Councils will be responsible for meeting the criteria of the community designation program, which will be announced later this year. The criteria will help your community be better protected and prepared in the event of a terrorist attack or natural disaster and are likely to include developing local preparedness and mitigation plans, assessing your community's possible threats and vulnerable areas, and improving public awareness and education.

There are several programs which may be able to utilize help from amateur radio operators.

The **Community Emergency Response Team (CERT)** is a training program that prepares people in neighborhoods, the workplace, and schools to take a more active role in emergency management planning and to prepare themselves and others for disasters.

An expanded **Neighborhood Watch Program (NWP)** will incorporate terrorism prevention and education into its existing crime prevention mission.

Volunteers in Police Service will provide support for resource-constrained police departments by utilizing civilian volunteers in order to free up more law enforcement professionals for front-line duty.

The **Medical Reserve Corps (MRC)** will coordinate volunteer health professionals during large-scale emergencies to assist emergency response teams, provide care to victims with less serious injuries, and remove other burdens that inhibit the effectiveness of physicians and nurses in a major crisis.

Operation TIPS, the Terrorist Information and Prevention System, will be a nationwide program providing millions of workers—who by the nature of their jobs are well-positioned to recognize unusual events—with training, materials, and a formalized way to report suspicious activity to the nearest FBI field office.

Citizen Corps efforts at state and local levels will be coordinated nationally by the Federal Emergency Management Agency (FEMA).

Radio Active Could Mean CERT Active

There are CERT groups already active in many parts of the country. In California CERT members are recruited from a variety of organizations. They include Neighborhood Watch groups, Parent-Teacher Organizations (some CERT use a school as a staging area if they activate), neighborhood and homeowners associations, church groups, members of a business or industry, responders' families, government offices, AARP, Explorer Scouts, Volunteer Ski Patrol, and amateur radio clubs!

Specialized Training

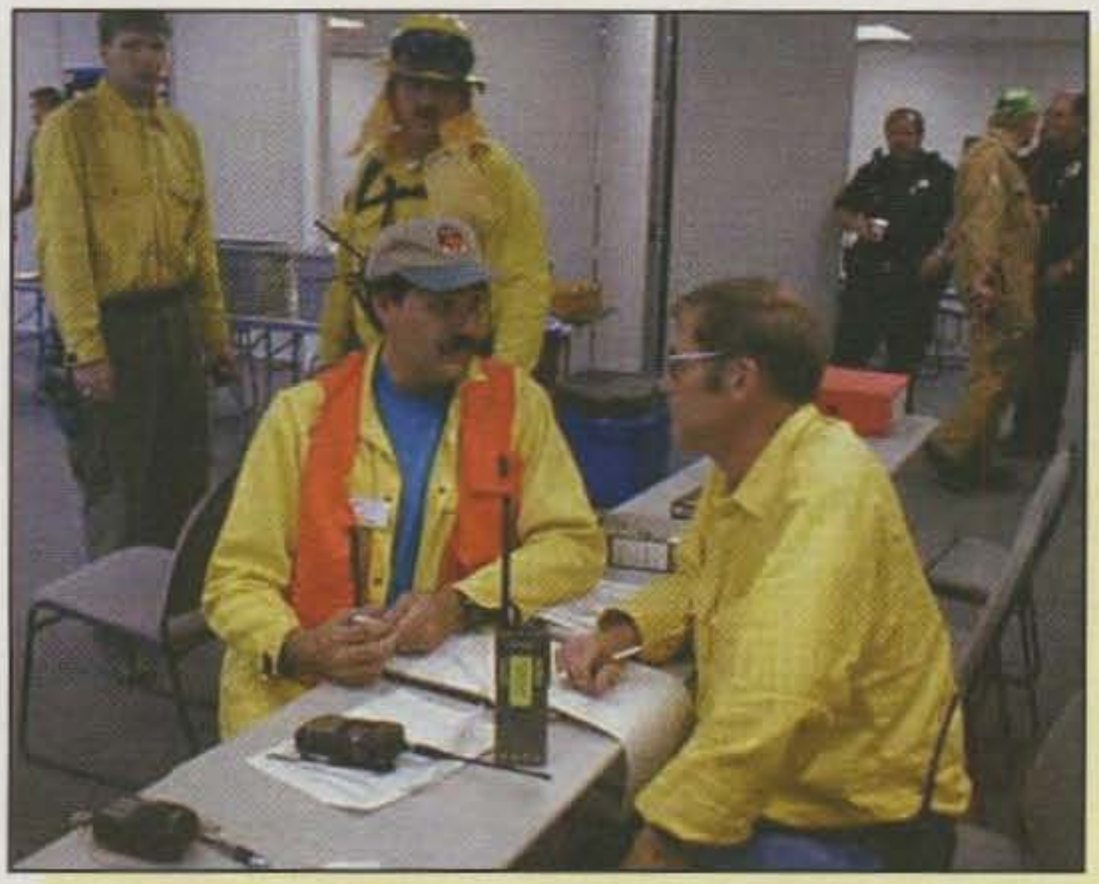
CERT members may receive specialized training. Depending on where you live, training may be offered in conducting damage assessment, establishing perimeters, filling sandbags, building flood walls, or assisting with evacuation, etc. In Portland, Oregon with fire department help CERT members established perimeters around downed power lines following an ice storm. Since amateur radio operators provided the communication link, fire department staff and equipment were freed up for other duties.

In Florida an emergency manager provided CERT leaders in high-rise retirement condominiums with alphanumeric pagers. The manager updated CERT leaders on hurricane conditions and evacuation orders. If there was a ham radio operator in the condominium, communications was able to be maintained between the Emergency Operations Center and the high rise. The radio operator could provide the EOC with information about the status of the evacuation and potential problems.

CERT members could participate in a Disaster Preparedness Fair. Local ham radio operators could set up a display on emergency communications and recruit new hams! Graduates of the class could be issued patches or stickers that say they are a ham radio operator.

Hams Wanted

There are several examples of CERT programs utilizing amateur radio communications. While the formal CERT program does not center on communications, each group realized that if they



Amateur radio operators were essential during the first hours of a fire in Colorado, linking the division supervisors with the command center. Jeff Martin (center), communications leader, coordinates radio assignments. (FEMA News photo by Bryan Dahlberg)

were going to exchange information with their team leaders or emergency operations center, amateur radio would be a valuable tool.

CERT training involves about 21 hours of formal instruction. In Seminole County, Florida many of the initial students involved with the program were ham radio operators. According to an article in *The Connection,* published by North American Emergency Management, "Joe McCluan, KE4ZIO, CERT Coordinator/Emergency Manager, recognized a missing element to the program. We were training people not only to help themselves, but also their neighbors. CERT was developed so neighborhoods could develop teams and respond. It became clear that if we had teams in the field they would need to communicate with other groups and maintain communications with the Seminole County Emergency Operations Center."

From the initial group, the public-service-minded volunteers who joined CERT were introduced to amateur radio. Many expressed interest in getting their no-code Technician license and increasing their value in the CERT program. Many also became interested in Skywarn and other amateur-radio-related public-service roles. Now amateurs are encouraged to take the CERT training. The program has turned out to be a win-win situation, as both CERT volunteers and the number of hams increased in the community.

At Brigham Young University in Utah CERT members assisted during a large-scale disaster exercise by assisting with all aspects of treatment and transportation to local hospitals. Many of the simulated casualties were transported by non-emergency vehicles such as busses or vans. Each vehicle had a CERT member on board, as well as a ham radio operator to help maintain contact with the hospital.

When an earthquake occurred in Washington state, CERT members were busy helping with damage assessment. Telephone lines were congested and they were not able to phone in their reports. Diane Middleton of the Whatcom County CERT team said, "If this system had been in place prior to the earthquake, we would have been able to use their amateur radio communication systems to relay information the CERT members had collected to the EOC, saving time and phone lines."

In early February the Roanoke, Virginia Police Department unveiled its Homeland Defense Initiative. After the events of September 11 all law-enforcement agencies were forced to self-evaluate their response to acts of terrorism. The Roanoke Police Department has taken a pro-active approach to reduce the risk and subsequently prepare the community for these threats. The Homeland Defense Initiative will assist organizations in the private, public, and government sector with awareness and understanding of combating terrorism through teamwork and partnerships. While the department said everyone who wants to help might be called upon, there is particular interest in citizens with special skills, such as ham radio operators, bilingual residents, heavy-equipment operators, and mechanics. One point stressed at the meeting was that coordinating the program would require humility on the part of police officers. They will rely on help from the community.

Non-traditional Ways of Volunteering Your Skills

Through the USA Freedom Corp there may be some ways that you can get involved without performing traditional public-service communications. The Retired and Senior Volunteer Program's (R.S.V.P.) Speakers Bureau provides stimulating programs for groups of school children, seniors, nursing-home residents, community organizations, and wherever there is interest in informative and entertaining programming. Their speakers are dynamic retirees who bring to their presentations a wide range of expertise, interests, and life experiences. Here's an opportunity to share stories involving your experiences as a ham radio operator.

Another organization is involved with low-power FM radio stations. It is looking for hams to help set up these stations. The organization's literature comment's that almost any ham radio operator would like to tinker in a broadcast station! This statement may not be far off the track, as you can see if you go back and trace the history of broadcasting. Many early radio stations started as amateur stations, with operators who added music and other materials to their radio signals.

Online Resources

Click on any of the links below to go to other helpful websites.

Courtesy FEMA:

White House: <www.whitehouse.gov>
Office of Homeland Security: <www.homelandsecurity.gov>
USA Freedom Corps: <www.USAfreedomcorps.gov>
Peace Corps: <www.peacecorps.gov>
AmeriCorps: <www.americorps.org>
Senior Corps: <www.seniorcorps.org>
Federal Emergency Management Agency: <www.fema.gov>
Citizen Emergency Response Team: <www.fema.gov/emi/cert>
National Crime Prevention Council: <www.weprevent.org>
National Neighborhood Watch Program: <www.sheriffs.org>
Medical Reserve Corps: <www.hhs.gov>
Department of Justice: <www.usdoj.gov>

Freedom Corp:

For further information on volunteer opportunities in your community check out:

<http://www.freedomcorp.gov/shortterm_vol.html>

Here you can look for opportunities close to your home. Just enter your zip code and the number of miles from your home that you want to search.

Opportunities There Now What?

Some amateurs around the country have experienced roadblocks when they try to offer their service to the local emergency management agency. It is sometimes very difficult to tell a community that their communications system, which costs thousands of dollars, has the potential of failing and can be backed up by a group of volunteers. Bill Mayers, KG2DI, of Canastota, New York had just that problem: "As an assistant county EC for ARES, I can tell you that *every* effort I made to approach local law enforcement and fire-and-rescue companies met with hostility—"We *don't* need *your* help!" The local chapters of the Red Cross and Salvation Army were entirely uninterested."

Times have changed. Many members of law enforcement are being assigned other tasks. There is an increased interest in Homeland Security. There now may be opportunities to provide communications that didn't exist a few months ago. Keep an ear out. Watch the newspapers! Attend meetings of your neighborhood civic association, your apartment tenants association, or other community meetings. The bottom line is to be active in your community and listen for the opportunity to offer a communications resource. Maybe you are limited by the type of antenna system you can put up. If you can now offer to keep local residents in contact with emergency management officials, the National Weather Service, or another agency, you may have an opportunity to expand your radio operation.

Do You Have a Story to Tell?

We are living in some interesting times. Amateur radio operators will be getting involved in public service in many new ways. We would like to hear about your interest and experiences. Do you have a topic that you would like us to cover? Drop us a note. We want to hear how you are serving in the public interest.

73, Bob, WA3PZO

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Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

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Washington Readout

Regulatory News In The World Of Amateur Radio

BY FREDERICK O. MAIA, W5YI

Preparations for WRC-2003 Coming Down the Home Stretch
An Interview with ARRL Technical Relations Manager Paul Rinaldo, W4RI

Samuel Morse ushered in the telecommunication age when he sent his first public message over a telegraph line between Washington and Baltimore on May 24, 1844. In the following decade telegraphy became available as a service to the general public. Back then, however, telegraph lines did not cross national borders, and each country used a different system. Messages had to be handed over and retransmitted over the telegraph network of a neighboring country. By 1864 countries began to develop regional working arrangements.

The International Telegraph Union (ITU) was formed the following year when 20 European States met to develop a framework agreement covering international telegraph interconnection. On May 17, 1865 the first International Telegraph Convention was signed in Paris by the 20 founding members, and the ITU was established to provide a vehicle for future amendments to the initial agreement.

Telephone and radio communications were added to the organization's activities in 1885 and 1906, respectively. The first International Radiotelegraph Conference held in 1906 in Berlin gave rise to the first regulations covering wireless telegraphy. These regulations, which have been expanded and revised at numerous radio conferences, are now known as the Radio Regulations.

The first radio frequency allocations were made in 1927 for the five radio services existing at the time. They were the fixed, maritime and aeronautical mobile, broadcasting, amateur, and experimental radio services.

In 1932 the name International Telecommunication Union was adopted to reflect the expanded responsibilities of the organization. Fifteen years later the ITU became a specialized agency of the United Nations and its headquarters was moved to Geneva, Switzerland.

The International Frequency Registration Board (subsequently renamed the Radio Regulations Bureau, or RRB) was established in 1948 to coordinate the increasingly complicated job of managing the radio frequency spectrum. The Table of Frequency Allocations, introduced in 1912, was made mandatory.

Paul Rinaldo, W4RI, head of the ARRL's Technical Relations Office, has been very involved in WRC-2003 preparations.

In 1992 the ITU was reorganized into three Sectors corresponding to its three main areas of activity: Telecommunication Standardization (ITU-T), Radiocommunication (ITU-R), and Telecommunication Development (ITU-D). The new system also introduced a regular, more frequent cycle of World Radio Conferences to help the ITU more rapidly respond to technological advances.

Today, more than 135 years after its inception, the reasons which led to the establishment of the ITU still apply, and the fundamental objectives of the organization remain basically unchanged.

For the past five years amateur radio issues were proposed to be considered at upcoming World Radio Conferences, but never made it to the agenda. However, the WRC to be held next year will be deliberating on some important amateur radio matters.

Paul Rinaldo, W4RI, heads up the American Radio Relay League's Washington-based Technical Relations Office and has been heavily involved in preparations for WRC-03. We recently had a chance to chat with him.

Fred, W5YI: First of all, Paul, how does the FCC/NTIA/State Department ...and the ITU prepare for a World Radio Conference?

Paul, W4RI: The United States prepares for World Radiocommunication Conferences (WRCs) through three processes. The federal government preparation is centered in the Radio Conference Subcommittee (RCS) of the Interdepartment Radio Advisory Committee (IRAC) led by the National Telecommunications and Information Administration (NTIA).

All non-federal preparation is under the Federal Communications Commission (FCC) WRC Advisory Committee (WAC) and its Informal Working Groups (IWGs). The results of the deliberations of the RCS and the WAC are then discussed among the FCC, NTIA, and Department of State.

If there is agreement, first a "preliminary view" is published, then a "U.S. proposal." About six months before the conference, the State Department forms a U.S. delegation, which becomes responsible for developing support for the U.S. proposals, preparing position papers, and promoting the U.S. proposals at the conference. Part of the job of the delegation is to review foreign proposals and devise strategies of support or opposition.

Fred, W5YI: What are the most pressing issues facing amateur radio at WRC-2003?

Paul, W4RI: The most pressing issues facing amateur radio at WRC-2003 concern spectrum allocations and any conditions concerning their use. A longstanding goal of the ARRL and the International Amateur Radio Union (IARU) has been to regain frequencies lost in 1938 to achieve 300 kHz of bandwidth at 7 MHz worldwide.

There are several other spectrum issues, such as the desire on the part of broadcasters for additional frequencies in the 4–10 MHz range, interest by Earth-exploration organizations to

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

have 6 MHz of bandwidth centered at 435 MHz for space-borne synthetic-aperture radars (SARs), and some possible new services in the 5650–5725 MHz band where the amateur service has a secondary allocation.

In addition, there are several regulatory issues concerning possible revision of Articles S1, S19, and S25 of the Radio Regulations. *[S25 contains the basic regulations for the amateur and amateur-satellite services.]*

Fred, W5YI: I understand that there are specific procedures and protocol that are followed. What are the various preparatory steps, nationally and internationally, that are undertaken to get ready for a WRC? How are the amateur community, the ARRL, and the IARU involved?

Paul, W4RI: All of the various committees (working groups, or whatever they're called) work by consensus. That is, the idea is to keep talking until there's a meeting of the minds. If *one* member objects, that means more talk is needed until something is agreed upon. At an FCC IWG, one participant's opposition means that nothing can go forward. Ultimately, the goal is to have a proposal that everyone can live with (at least not object to) even if it means everyone will be equally unhappy.

It is important to know that there are several processes going on. One is the development of proposals and positions for the conference. But this is only one track. Another is all the work of ITU Radiocommunication Sector (ITU-R) Study Groups, their Working Parties and Task Groups, the Special Committee on Regulatory and Procedural Matters (SCRPM), and the Conference Preparatory Meeting.

Yet another track is the preparation done in regional organizations such as in the Inter-American Telecommunication Commission (CITEL), an agency of the Organization of American States. The ARRL and the IARU are involved in all these activities.

Fred, W5YI: What is CITEL and how is it involved?

Paul, W4RI: The three IARU Regional Organizations are also involved in developing IARU positions and working with their counterpart regional telecommunications organizations such as IARU Region 1 with the European Conference of Post and Telecommunications Administrations (CEPT), IARU Region 2 with CITEL, and IARU Region 3 with the Asia-Pacific Telecommunity (APT).

Each of the IARU Regions holds a conference triennially (one Region each year in a three-year cycle) at which WRC-related issues are debated and positions formed. The IARU Administrative Council meets annually, usually in association with these conferences, to develop policies and strategies for WRC issues.

Fred, W5YI: It appears to me that the ARRL's Walter Ireland, WB7CSL, is primarily involved in the national WRC-2003 amateur radio preparation and you, Paul, are involved in the international aspect.

Paul, W4RI: Our staff consists of Technical Relations Manager Paul Rinaldo, W4RI, and Technical Relations Specialists Walter Ireland, WB7CSL, and Jonathan Siverling, WB3ERA. Actually, the entire ARRL Technical Relations staff is involved in both national preparation and international aspects of WRCs. We do not have a national/international split of our work, but concentrate on different issues.

Rinaldo handles Study Groups 1 and 8 (spectrum management and mobile/amateur/radiodetermination), Ireland works with SGs 6 and 7 (broadcasting and science services), while Siverling is involved with CITEL and is fluent in Spanish. Yet because of scheduling conflicts, it is necessary for each of us to cover any meetings and be aware of the issues.

Fred, W5YI: Can you explain when your WRC-2003 involvement began and what you do?

Paul, W4RI: Our involvement with WRC-2003 began about a year before WRC-2000. We participated in an IWG that formed U.S. proposals for WRC-2003 agenda items. Our preparation for WRC-2003 itself began immediately after the gavel went down at the end of WRC-2000.

The objective of the FCC's IWG-6 is to form a non-federal-government view on WRC-2003 agenda items and draft proposals for consideration by the FCC WAC. All the amateur items and broadcasting and Earth-exploration items happen to be in the same group. Ireland is the vice chairman of IWG-6 by virtue of his background in the various issues. I participate as spokesman for amateur issues on behalf of the ARRL.

ITU-R Working Party 8A is a different kettle of fish. It is concerned with land mobile, the amateur service, and the amateur-satellite service. Its main purpose is to develop questions and perform studies. It has two end products: (a) Recommendations, which are published and sold by the ITU Bookstore and (b) draft text for the Conference Preparatory Meeting related to issues assigned to WP 8A. Within WP 8A I chair Working Group 1, dealing with amateur issues.

The U.S. has counterparts of all the ITU-R groups, and they meet about three times in preparation for each international meeting. There is a U.S. WG 8A for land mobile matters and a U.S. Ad Hoc 8E for amateur issues, which I also chair.

Fred, W5YI: What is a "Preliminary View" and what is done with it?

Paul, W4RI: A Preliminary View (PV) is a concise statement of an early position on a WRC agenda item. A PV can start with the RCS or an IWG. There are usually some differences that can be resolved by the FCC, NTIA, and State.

There are PVs on each of the agenda items affecting the amateur services. Those developed by IWG-6 can be found on the FCC website.

Fred, W5YI: What is the WRC Advisory Committee and what do they do?

Paul, W4RI: The WRC Advisory Committee, or WAC, creates the IWGs and is the body to which the IWGs report. The product of the WAC needs approval by the FCC before it leaves the Commission.

Fred, W5YI: How does a Preliminary View lead to a U.S. Proposal or Position?

Paul, W4RI: The idea of a PV, once approved by the three agencies, is to have something that can be shown to other administrations to let them know what the U.S. thinks about an agenda item. An upcoming CITEL meeting tends to serve as a reminder for the U.S. to finish as many PVs as possible in time for the meeting.

A PV is a first step in developing a proposal. Unless something has changed in the meantime, the author of a draft proposal can use the PV as the basis for writing the detailed proposal in a prescribed format.

Fred, W5YI: I note that the NTIA also gets involved in amateur radio issues. Why? Aren't they primarily interested in federal spectrum?

Paul, W4RI: While the FCC regulates the Amateur Radio Service in the United States, there is some involvement by

NTIA in certain aspects. NTIA's main jobs are to regulate the federal government's use of the spectrum and to advise the President on telecommunications policy.

Many amateur bands are secondary allocations to government radiolocation (radar) bands. It is difficult to surgically split spectrum issues between the FCC and NTIA.

Fred, W5YI: Paul, you have spent several weeks in Geneva on Amateur Radio WRC-2003 business. What was accomplished?

Paul, W4RI: Make that several *months*. Over the past ten years I have averaged about three or four months overseas every year. As for WRC-2003 related business, I spent two months in 2001 and expect to be in Geneva for three months in 2002, most of it somehow related to WRC-2003. As for things accomplished, WP 8A has drafted CPM text for the amateur WRC-2003 agenda items (subject to further refinement) and approved ITU-R Recommendation M.1544, which outlines basic qualifications of persons seeking amateur licenses.

Fred, W5YI: Can you explain exactly what ITU-M.1544 is and the "incorporation by reference" scheme?

Paul, W4RI: An IARU objective is to incorporate by reference M.1544 into Article S25 of the Radio Regulations. Simply, that says that there would be a sentence in Article S25 that refers to M.1544 (rather than spelling it all out in that Article) so it is considered part of the Article.

It has been considered a foregone conclusion that the Morse code requirement (S25.5) will be deleted at WRC-2003, and the IARU wants to call attention to the more general operator qualifications in M.1544 so it is clear that the amateur services have licensees meeting substantial requirements. M.1544 is an approved ITU-R Recommendation. Whether it will be incorporated by reference in a new version of Article S25 is a decision of WRC-2003 itself.

Fred, W5YI: The Conference Preparatory Meeting (CPM) is coming up shortly. What are the CPM and the CPM Report? Isn't the CPM a preliminary agreement on the various agenda items facing the conference?

Paul, W4RI: The CPM for WRC-2003 will be held for two weeks in November

2002. Its function is to consider the draft texts from ITU-R Working Parties and Task Groups and produce a CPM Report, which becomes the technical basis for the WRC.

The CPM is supposed to collect the results of technical and regulatory studies. If there is general agreement on an issue, then one could say there is preliminary agreement. More likely, however, the report will state the results of studies and outline several methods of satisfying the agenda item.

Fred, W5YI: How are the FCC, NTIA, State Department, and ITU involved in the CPM?

Paul, W4RI: The U.S. (FCC, NTIA, State, and industry of which the ARRL is a part) has participated in the Working Parties and Task Groups drafting text and will be contributing to the CPM itself. There will be a series of CPM-preparatory meetings in the U.S., and the U.S. is expected to propose different versions of the CPM text.

Fred, W5YI: Who makes the final decision on the contents of the CPM agreement?

Paul, W4RI: The final decision of CPM Report content is that of the Member States (administrations) participating in the CPM meeting. The decision is reached by consensus. If there are differing opinions, the alternatives are given.

Fred, W5YI: How are the ARRL and IARU involved in the contents of the CPM text?

Paul, W4RI: The ARRL drafts CPM text that goes through U.S. Ad Hoc 8E and through the U.S. ITU-R National Committee to ITU-R WP 8A, which in turn submits its draft text to the CPM. The National Committee consists of over 100 people (myself representing the ARRL) and reviews every input document going to ITU-R Study Groups, Working Parties, and Task Groups.

As a Sector Member of ITU-R the IARU participates in meetings of the relevant ITU-R Working Groups and has an opportunity to influence the draft text. The IARU will also participate in the CPM.

Fred, W5YI: What happens to the CPM report once it is agreed upon?

Paul, W4RI: Once the CPM Report is agreed upon at the CPM meeting, the very next day a CD-ROM in English, French, and Spanish is available to those who participated. There may or may not be paper copies available, depending on cost.

Fred, W5YI: There is a six month period between the conclusion of the CPM and the beginning of WRC-2003. What takes place during that period?

Paul, W4RI: This time is used by administrations to complete and submit their proposals, to form delegations, and to try to generate support for their proposals in their regional organizations as well as in bilateral talks with other countries.

Fred, W5YI: I understand that more than 100 nations will be represented at WRC-2003, which will last about a month (June 9 to July 4). Can you explain what happens during that month? How does the conference do its work and how is the vote taken?

Paul, W4RI: There were about 150 administrations represented at WRC-2000, and a similar number are expected to attend WRC-2003. The first few days are devoted to ceremony, including ministerial speeches, and organization of committee work. The ITU staff will have compiled all the separate country proposals into one thick document organized by agenda item.

In a nutshell, one can see which ones will require the most work. Then every proposal is assigned to a committee for consideration. Usually there are two substantive committees—one dealing with spectrum allocations, the other for regulations and procedures.

The committees meet and break down the considerations into Working Groups. There can be a further breakdown into Drafting Groups. Then every item is sent back through committee to the Plenary, which makes the final decisions. Decisions are usually by consensus. It is a rare event that a vote is taken.

There will also be a group assigned the responsibility of developing the agenda for the next WRC, which will appear as a Resolution. Immediately following the WRC, a new preliminary CPM will be held to apportion the studies to the various Working Parties and Task Groups, and the Chairmen and Vice Chairmen of the Study Groups will meet to agree on meeting schedules.

CQ: *Thank you, Paul, for taking the time to discuss and explain the often confusing process of getting ready for a World Radiocommunication Conference, and its importance to the future of amateur radio.*

On the Cover

Start with a location 9000 feet up in the Rocky Mountains, add a Yaesu FT-1000MP and Alpha 89 amplifier, connect them to a KLM KT-34XA triband Yagi up another 65 feet and a Cushcraft 40-2CD two-element beam for 40 meters up 75 feet (each on its own tower), and you're going to have a signal that's *heard!* Hams around the world apparently have no trouble hearing Tom Stavish, WØGG, from his station in Florissant, Colorado, about 40 miles west of Colorado Springs (and 20 miles west of Pike's Peak). Tom's main interests are DXing and contesting, and he's confirmed 315 countries and won a variety of contesting awards. Tom says he often hosts the Pike's Peak DX Group's Field Day operations on his 35-acre property, and in 2000 the group—using his call —placed 7th overall in the event and took 1st place nationwide in the 3A category.

Tom holds an Extra Class license and has been a ham for 45 years. If you look closely at the cover photo, you might be able to see one of his first rigs, a Globe Chief 90 transmitter, which covered 160– 10 meters on CW (and AM with an external modulator). Professionally, Tom is president of a small company that compounds semiconductor materials, principally gallium arsenide. So if you use a GaAsFET preamp for weak-signal reception, some of that GaAs may be Tom's!

Tom notes that even after 45 years he still gets excited when he manages to snag a new country, and points out that his QTH—which is right next to Cripple Creek, where gold found in 1890 sparked the "Pike's Peak or Bust" gold rush—today provides a golden opportunity for DXing, with a clear shot to the South Pacific and other exotic parts of the world. I don't know, Tom, "Florissant or Bust" just doesn't have the same ring to it!

(Cover photo by Larry Mulvehill, WB2ZPI)

Lots of mysterious things seem to have triangles involved with them, such as the Bermuda Triangle. SMØJHF says he's discovered a new one...

The (Golden) Triangle of Contesting in Poland

BY HENRYK KOTOWSKI,* SMØJHF

I don't know why some phenomena occur in triangles. Everybody has heard about the Bermuda Triangle where things disappear; some have heard about the Opium Triangle in Southeast Asia where poppy is abundant. Few, I among them, have heard about the triangle of winemaking in Stellenbosch in South Africa. Recently I discovered a *Triangle of Contesting* in Poland, Central Europe. The scores achieved by those involved indicate that this might be another Golden Triangle.

I was not aware of the existence of this supernatural area until the autumn of 2001. I was visiting Poland, my home country, and since the weather conditions were just lovely, I decided to visit a few of the so-called Big Guns. While plotting my route on the map, I noticed that the points I wanted to visit created

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Map of Poland showing the "Golden Triangle" of contesting.

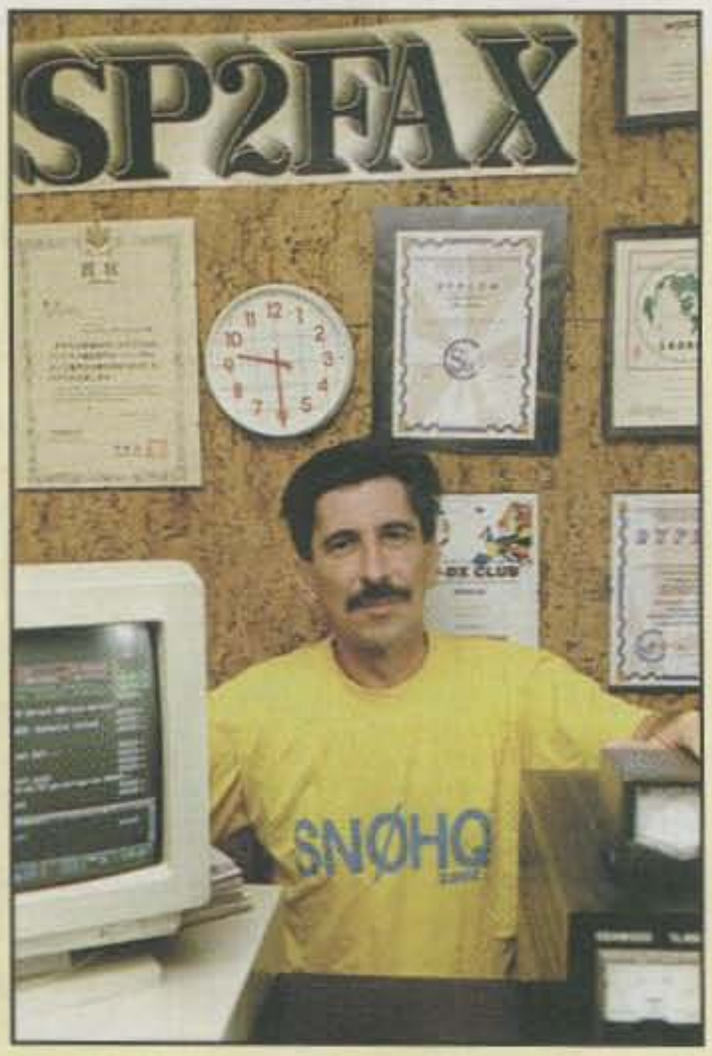
Jurek, SP3GEM, at the radio. Jurek is considered the father of "big gun" contesting in Poland. (All photos by the author)

In recent years SP3GEM has concentrated on 15 meters, primarily using the 6-over-6 Yagis seen here. A 2-element quad is on the left. →

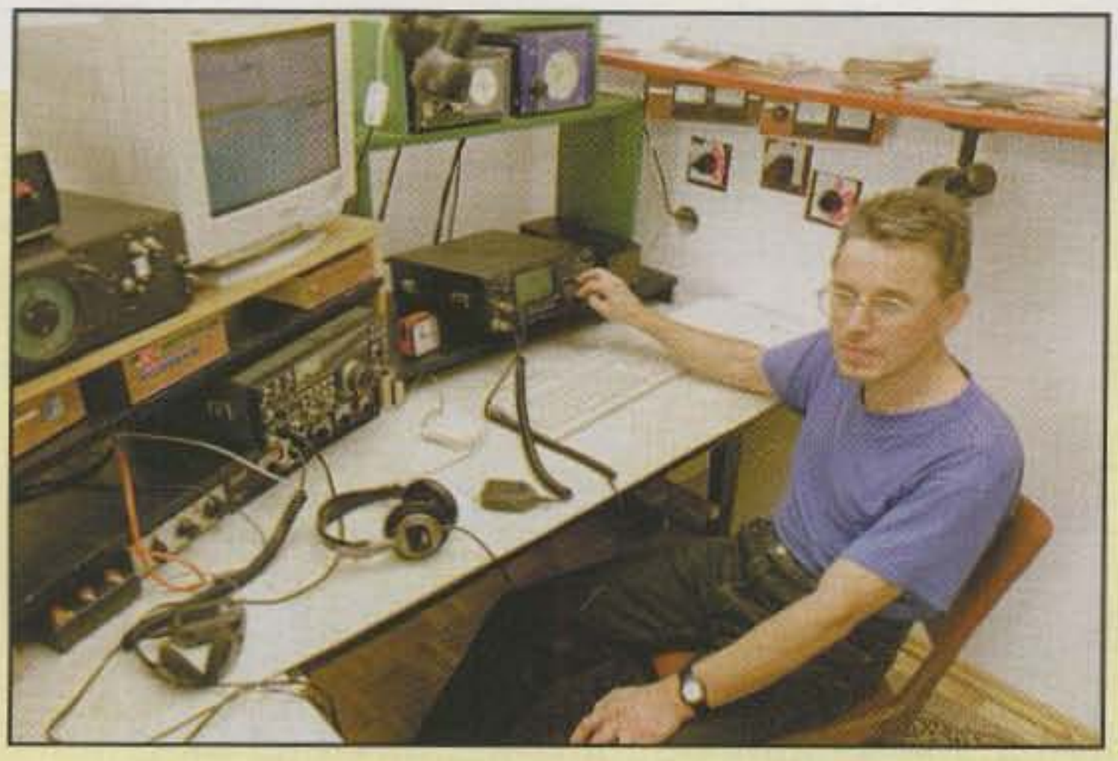
The house and the towers of Kazik, SP2FAX. ←

a triangle in the middle of Poland, halfway between Berlin and Warszawa (Warsaw). The corners of this triangle are defined by three half-wave verticals for the 75 meter band! It just can't be a coincidence.

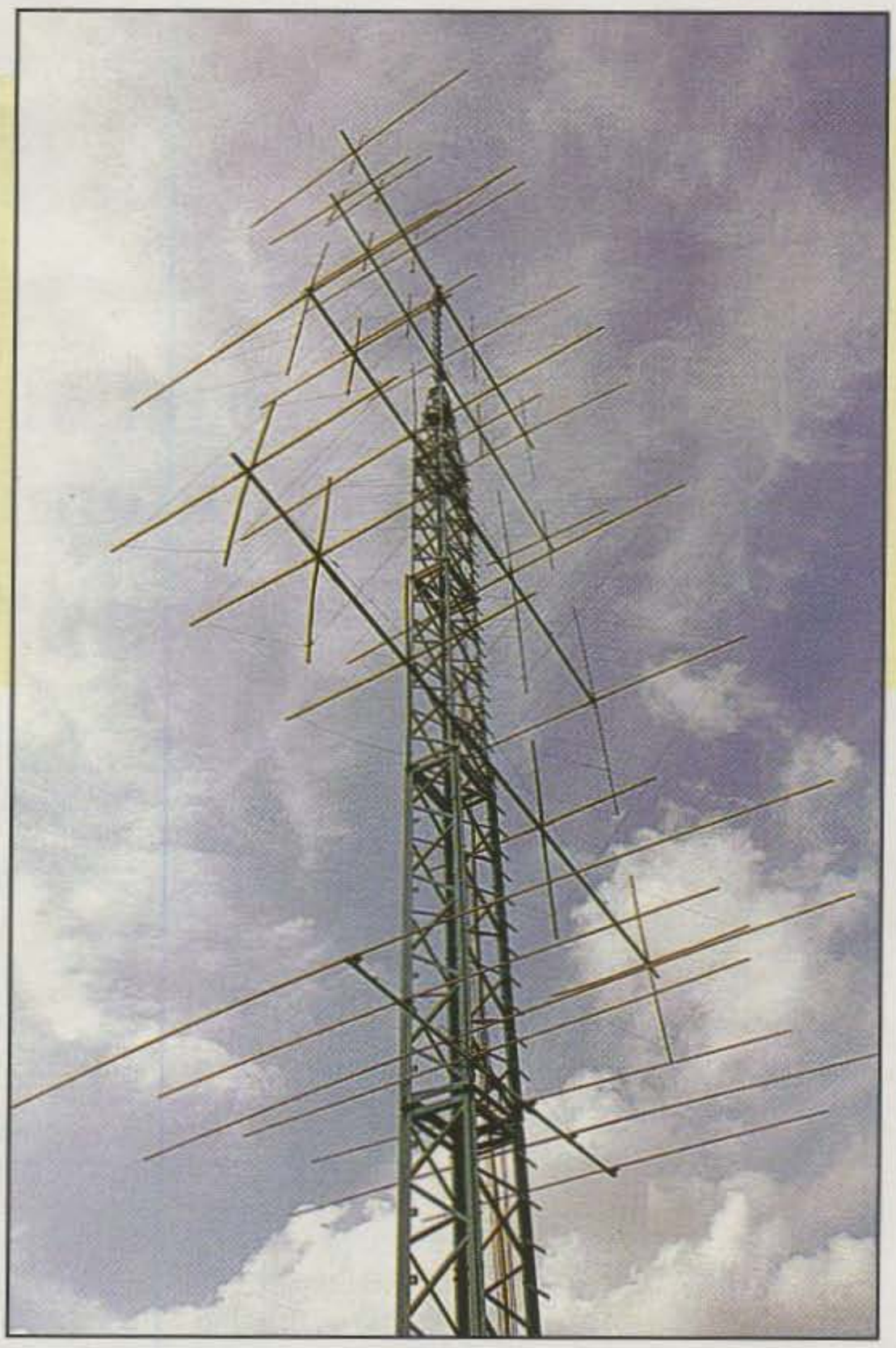
Each of the vertical antennas belongs to a successful amateur radio station owner and serious contest operator. Each of them has a slightly different approach and background. The man who really started it all, and also the oldest of the trio, is Jurek, SP3GEM.



Kazik, SP2FAX, organized the SNØHQ operation from the headquarters of Poland's national amateur radio society. →



Chris, SP7GIQ, in his shack tuning the author's IC-746.



A rotary tower of SP7GIQ with stacked quads and a modest WARC bands Yagi at the bottom.

Jurek's adventure with radio started in 1968 while he was a student in Poznan and became a member of radio club SP3KCK. I visited him for the first time some ten years ago when he was 44 years old and had recently started an antenna manufacturing business, also for the amateur radio market. It was a brave business decision at that time, as deliveries of aluminum tubing were still unreliable and some customers could hardly pay. Testing his products on the air turned into contesting. Eventually the number of antennas to be tested was large enough to stage multi-operator crusades, sometimes using a shorter, contest-type callsign—SN3A. Suddenly a station from Central Europe started making top contest scores.

High-level contesting was nothing new for Jurek. For five years he had lived in Venezuela and was fortunate, apart from teaching at a university there, to be responsible for assembling and maintaining the well-equipped station of YV3BRF, where he could try his hands on state-of-the-art equipment and the excellent propagation near the equator.

Sometime in the middle of the 1990s two other amateur radio operators started building large contesting stations, and both chose locations exactly 75 miles from SP3GEM. One of them was Kazik, SP2FAX, who had been off the air for more than a decade after the martial law authorities impounded his equipment in 1981. Kazik decided to come back to our hobby, for which he had a passion as a teenager. He bought a few acres of land outside his hometown of Bydgoszcz, asked Jurek to design and build competitive antennas for him, erected a few towers, and when all was working, he built a house *(Isn't that the way everybody does it?—ed.)*. Everything is very impressive now, including Kazik's contest scores. Sometimes, particularly when operating in the multi-operator category, his station signs SN2B. The antenna farm consists of a few towers with monoband Yagis for 40 through 10 meters; some of them are rotary and some are fixed.

Kazik is the brains behind recent IARU HF Competition efforts as the PZK (Poland's national amateur radio organization) Headquarters Station. He managed to engage many of the best operators and station owners in a joint operation as SNØHQ.

Chris, SP7GIQ, who also decided to build his superstation miles from SP3GEM, chose a different approach. He prefers quad antennas and builds them himself. He lived in the outskirts of Warszawa, the capital city, when he became interested in radio at the age of 15. That was in 1970. Chris joined a local club and was introduced to radio contesting. Later, while attending the Warsaw Polytechnic University, he became one of the regulars on the SP5PBE team, a very prolific radio club engaged in contesting, propagation research, latest technologies, and so on. In the '80s Chris moved to a small town called Lask and tried to revitalize the local radio club, but in the early '90s he gave up and decided to build a competitive station of his own. Today he has a few towers with quad arrays from 40 through 10 meters.

Now here's the real question: While all three of these installations are certainly excellent contest stations, there are many others of the same caliber throughout the world, but their operators do not do as well on a consistent basis. I am not a scientist and have not discussed this mystery with any scholars or scientists. However, I intend to do some research on this triangle in Poland. I'll start with infrared satellite pictures, soil conductivity charts, tectonic maps, and geological survey data. There might be a clue.

On the other hand, the explanation of this augmented activity might be purely psychological; people tend to put a lot of effort into realizing things that previously were not allowed or not feasible.

Why in a triangle, though?

Using a computer system developed by the Lauton Institute together with data from solar and geophysical observatories around the world, Dr. Heisseluft has developed a fool-proof technique for trading electrical power futures.

The Impact of Solar Storms on World Economies and the Birth of A New Commodities Trading Technique

BY PROFESSOR EMIL HEISSELUFT*
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CQ magazine has long been in the forefront of studies involving solar and geophysical data, most of which were related to understanding phenomena related to ionospheric propagation. Our "Propagation" column has long been considered the premier source of data for HF and VHF enthusiasts worldwide. Other studies we have published—for example, those related to developing do-it-yourself propagation predictions and the first exposition on 160 meter signal ducting published in the amateur literature—attest to our position at the leading edge of scientific discovery. Now Professor Heisseluft has developed a way of using solar and geophysical data to trade futures in the U.S. spot electrical power market. The results have been nothing less than spectacular! At my urging, the good professor has finally agreed to share his secret trading technique with our readers.—W2VU

No! It is impossible! What caused my incredulous, angry outburst were the real-time data streaming into my home office on spot wholesale market prices for electricity in New York City on Saturday night, July 15, 2000 (actually, early Sunday morning my time). I was contemplating the possibility of incurring a major loss in my futures trading account when the markets opened on Monday, because prices for electricity had increased from $50 per megawatt hour (MWH) to $250 per MWH in a matter of minutes. *(Readers will be relieved to know that the professor, who had sold electricity futures short, was not hurt by this excursion in rates—and, in fact, closed his position with a profit—because by Monday the wholesale cost of electricity had fallen to less than $50 per MWH.—ed.)* What could have caused this anomaly . . . an anomaly that was characterized by unbelievable price fluctuations that drove wholesale prices in some areas to levels up to seven times higher than normal? The answer, I soon determined, was a geomagnetic storm event that apparently caused power operators to reduce transfer capacity on major transmission systems, thereby preventing significant amounts of energy from reaching their markets. It now was profoundly apparent to me that solar activity—and, specifically, geomagnetic activity—had a more significant impact on our lives than heretofore thought possible. I was facing financial ruin for having overlooked the obvious!

**Prof. Heisseluft currently is in St. Martin, French West Indies, enjoying the spa at La Semana. He will soon be in Washington to testify in the Enron investigation. Correspondence may conveniently be directed to the professor c/o CQ magazine.*

Studies of How Solar-Driven Phenomena Affect the Earth

It has been hypothesized for some time that solar activity has a major impact on our lives on Earth. Late in the 1800s, Maunder (1890[1], 1894[2]; also Heisseluft[3]) identified a 70-year period (1645–1715) in the historical record of solar activity during which time almost no spots appeared on the surface of the Sun. Called the Prolonged Sunspot Minimum (or the Maunder Minimum), this anomaly, if it did occur, was one of the first events to call attention to a possible link between solar activity and the Earth's weather. The lack of sunspots, by the way, could not have been the result of poor instrumentation or the ability (or lack thereof) of astronomers at the time, dear readers. You of course remember that during the Prolonged Sunspot Minimum

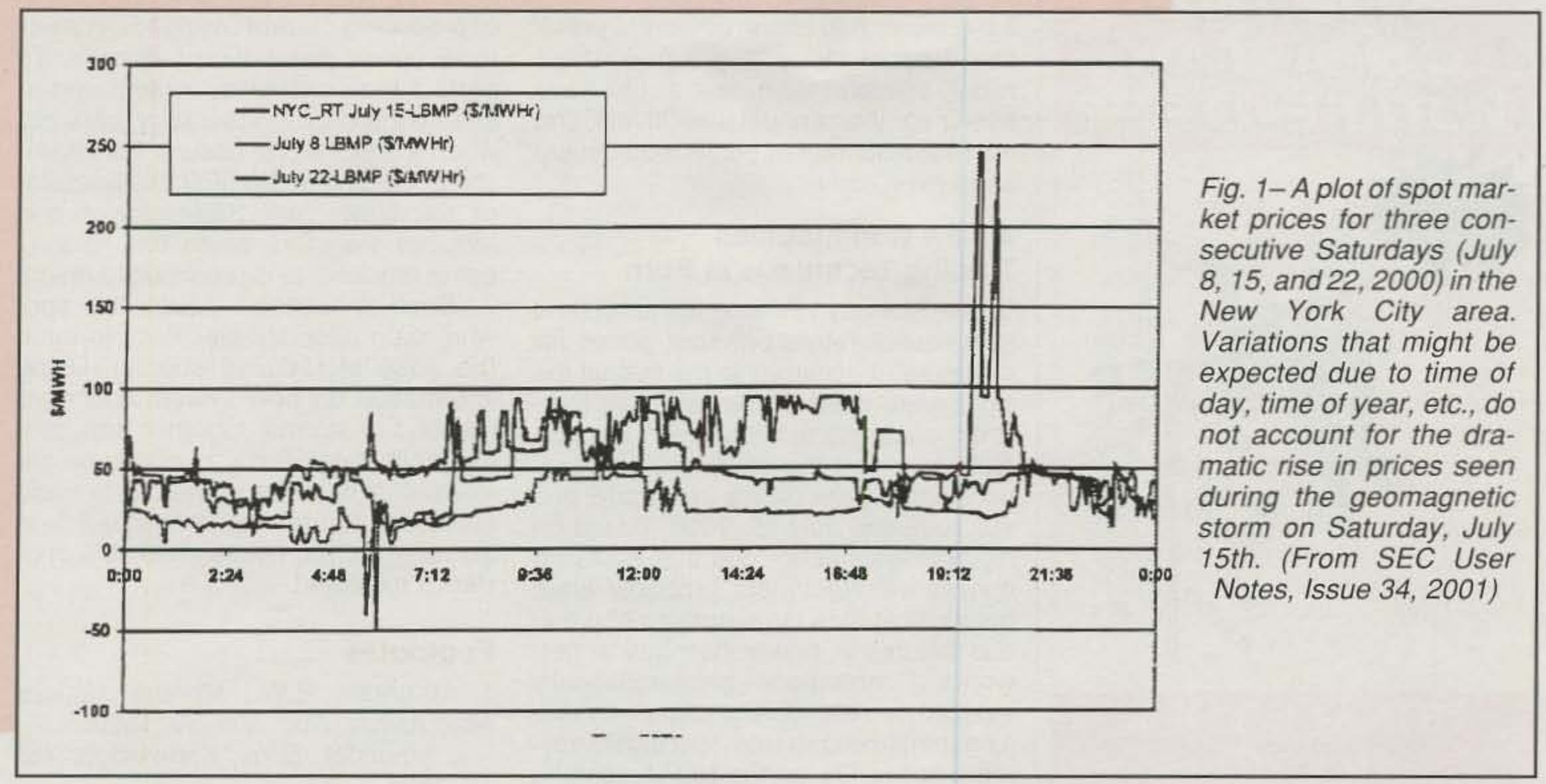

Fig. 1– A plot of spot market prices for three consecutive Saturdays (July 8, 15, and 22, 2000) in the New York City area. Variations that might be expected due to time of day, time of year, etc., do not account for the dramatic rise in prices seen during the geomagnetic storm on Saturday, July 15th. (From SEC User Notes, Issue 34, 2001)

astronomers discovered the first division in Saturn's ring (1675) and found five of Saturn's satellites (1655–1684). No, the minimum was a "real" phenomenon.

During this minimum no sunspots whatsoever were observed! Winters were incredibility severe, and the period around 1700 has even been referred to as "The Little Ice Age." The length of the growing season in England dropped 25 percent, from 280 days to 220 days[4], and there were reports that in July of one year it was possible to ice skate on the Thames River in London.

Other links between solar activity and terrestrial weather abound. Roberts[5], for example, demonstrated that droughts in certain parts of the United States tended to occur every second sunspot minimum. In addition, my own early studies of the relationship between lightning and the solar cycle, conducted in conjunction with M. F. Stringfellow[6] of the United Kingdom's Electricity Council Research Centre, confirmed that there is an underlying trend in lightning activity that is directly correlated to peaks in the solar cycle. These and other studies clearly demonstrate a link between solar activity and the Earth's weather.

The Impact of Solar Activity on Electrical Distribution Networks

We have read above how higher levels of solar activity are correlated to increases in lightning strikes on Earth. It is readily understood that lightning strikes have the potential to disrupt energy distribution through strikes that hit distribution assets and trigger breakers. Beyond these problems, however, lie the effects from induced geomagnetic variations in the atmosphere that can severely disrupt power distribution over areas spanning a continent. For example, major solar flares on March 9 and 10, 1989 produced severe magnetic storms on Earth during the period 13–14 March. The resulting aurora was so intense that it was observed overhead as far south as Texas. More important, huge geomagnetic variations over Canada caused induction problems that disabled portions of that nation's power distribution system. In fact, six capacitor banks were tripped at Hydro-Quebec during the storm. It later was determined that the capacities of transmission lines in the system were pushed beyond safe thresholds as a result of induced currents. *(Interested readers may wish to consult Jacobs et al[7] (pp. 1-27 through 1-29) for additional information on, and pictures of, the solar activity of March 9 and 10, 1989.—ed.)*

It did not take me long to discover that solar activity also was responsible for the wholesale price increases that were observed in July 2000. Working in my computer laboratory at the Lauton Institute using a robust simulation of the U.S. East Coast power distribution network, I determined that the storm had reached thresholds beyond which damage could occur to the network. I further deduced that to prevent such damage, the power system operators had reduced the levels of energy transferred so that the transmission lines did not become overloaded. With transfers restricted, spot shortages appeared and prices jumped to levels never before experienced. I immediately published my findings in Europe's premier electrical power journal.[8]

My findings were subsequently confirmed by the Space Environmental Center (SEC) of the National Oceanic and Atmospheric Administration (NOAA).[9] Specifically, the SEC noted that "...the New York and the Pennsylvania/New Jersey/Maryland electric power pools have standing procedures in place for system reliability due to geomagnetic storm events. When alerts are declared, they restrict transfers to 90% of transmission network transfer limits, which at times can cause changes of upwards of several thousand MWHs or of schedules in expected transfers."

What happened, then, is that as a result of a major geomagnetic storm on July 15, 2000 the power pools imposed storm constraints on their network, causing rapid upward excursions in the wholesale price of electricity. Fig. 1, taken from the SEC report, shows the spot market prices for three consecutive Saturdays in New York City. Note the dramatic rise in prices experienced on July 15th. In one location (Millwood, New York) prices spiked even higher than shown here, jumping from $47 per MWH to $353 per MWH within a very short period of time! As the SEC noted,

if the storm had occurred on the previous Wednesday, during a major heat wave, the load demands would have been near their annual peak levels, and the real-time market prices would have been even higher.

A New Commodities Trading Technique is Born

On the Monday following the jump (and subsequent retreat) in spot prices for electricity, it occurred to me that all the signs were there that would have foretold the coming of this event. I immediately reviewed the solar and geomagnetic data for the events of March 9 and 10, 1989 and July 15, 2000. Based on my findings, I concluded that eastward convective electrojets probably were responsible for a large number of previous failures in power distribution networks. Furthermore, geomagnetically induced currents (GICs) caused by major geomagnetic storms (specifically anything above G4 on the NOAA scale[10]) could be expected to trigger power shortages as electrical system operators take steps to protect their assets.

I immediately began monitoring solar activity in real time using a variety of data from national observatories and other organizations (e.g., NOAA) around the world. Using these data, I programmed my computer system to automatically enter "buy" orders, when the market was open, for electrical power futures on the East Coast of the U.S. when *Kp*, the three-hour planetary *K*-index, reached a value of 9. From that point, the computer would determine the peak value of any given excursion and issue a "sell" order at a spot price 10% down from the peak. As an alternative, the computer would close the position at the market if local time on the East Coast was within 20 minutes of the market's closing time.

Results

I have used this technique for almost two years. The results have been astounding; in some cases they were absolutely spectacular! It also is interesting to monitor how the system behaves when the markets are closed. I do this to check for proper operation of the algorithms. One such check, using data for March 30–31, 2001 (which, unfortunately, was a Friday and Saturday), would have captured amazing profits, as the wholesale peak price for New York City spiked to levels not observed since July 15, 2000.

Conclusions

Geomagnetic storms have the potential of producing current overloads in electrical power distribution networks. To protect their networks, system operators now reduce transmission capacity when a major storm occurs. For example, according to the SEC, the operator of the New York State power grid reduces transfers when the *K*-index either reaches, or is predicted to reach, 7. Such reductions cause the spot wholesale price for electricity to jump (because of reduced supply). Using information on how system operators respond to storms, together with geomagnetic data readily available on the internet, it has been possible to trade electrical futures automatically and achieve profits on better than 60% of all trades executed.

Footnotes

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7. Jacobs, G., T. J. Cohen, and R. B. Rose, *The NEW Shortwave Propagation Handbook*, CQ Communications, Inc., Hicksville, NY, 1997 (second printing).

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9. Anon., "Electricity Spot Market Prices and the Geomagnetic Storm of July 15, 2000," from notes by J. Kappenman, Metatech, and the work of O. C. St. Cyr and Kevin Forbes of Catholic University, SEC User Notes, Issue 34, July 2001. (The reader also is referred to <http://sec.noaa.gov/ElecPower/index.html> for additional information relevant to the electrical power distribution problem.)

10. G4: Severe; Power systems: possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. (See <http://sec.noaa.gov/NOAAscales/> for the NOAA Space-Weather Scales] ■

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If you enjoyed part one of W6BNB's recollections of being a shipboard CW operator in the 1930s, you'll love part two!

The Heyday of CW at Sea
Part II: A Radio Operator's Life at Sea

BY ROBERT SHRADER,* W6BNB

Bob Shrader, W6BNB, discovered radio in the 1920s, became a ham while in high school in the 1930s, and graduated right in the middle of the Great Depression. But his amateur radio skills were able to secure him a scarce job as a ship's radio operator. In part one of this article Bob described the radio technology of the day and the physical layout of the radio shack aboard his ship. Now Bob concludes with reflections on the sometimes exciting, never boring, life of a shipboard radio operator in the 1930s. –W2VU

Two shipboard radio operators standing watch for 24 hours a day meant 12-hour work days for both. This was essentially every day of the week at a monthly salary of $60. Assuming 30 days a month, this computes to $2 a day, and dividing by 12 it comes out to be $0.17 an hour. Not everyone gets to start a "high-tech" job at 17¢ per hour! Of course room and board were included. Above everything, though, in that day and age, 1933, it was a *job*—no, a *position!*

Radio officers took their meals in the Officers Mess with the same menu the first-class passengers had. The radio watches were set up so that the off-watch operator ate first. As soon as he finished, he went on watch. This allowed the other operator to eat at the second sitting. Such an arrangement was used for all ship officers. As a result, watch hours were not always whole-numbered on and off, but they did total 12 hours a day. Of course, the choice watch hours always went to the Chief Operator—naturally!

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

Operators had to purchase their own uniforms—dress blues, dress whites, and general watch-standing khakis. The blues were worn in northern latitudes, and the whites in the tropics. In between, for a few days it might be white pants and blue jackets. With gold stripes and insignia, plus caps with gold braid and insignia, we had quite the look of yachtsmen during those interim periods.

Shortly before entering a port, the radio operator on duty would call the local shore station and send something such as "KDMW QTP Singapore 1630 GMT." All radio business used Greenwich Mean Time. All shipboard activities, watch standing, meal times, emergency drills, going ashore, return to ship, etc., used ship's time or local port time. After the QTP message the radio station usually was closed, and the operators changed to shore-going clothes and waited at the gangplank until it was lowered so that they and the other passengers could go ashore.

If the ship was scheduled to stay two days in a port, normally we were off duty for that amount of time, free to do anything we wanted to do and go anywhere we wanted. The only requirement was to be back aboard ship one hour before sailing time. Operators sometimes did miss their ships. Freighter or tanker operators sometimes missed because of an unscheduled early sailing time. With multi-operator ships, any left-behind operator was flown or sent by train to the next scheduled port to meet the ship. Single-operator ships could not leave without an operator. If they did and then found that the operator was missing, they had to return to pick him up. Shipping companies were not fond of doing that!

The Dollar Line, my employer, had about two dozen ships sailing trans-Pacific and around the world. Those having HF radio equipment aboard kept "WDOL" (the Dollar Line general call) schedules on one or more HF ship bands every four GMT hours. At schedule times a ship might make a call such as "WDOL de KDMW" on a specified WDOL frequency and wait for an answer. If there were any DHCO (no-cost DeadHead COmpany) messages to relay to a port to which one of the company ships was headed, these messages would be relayed to that ship and they would be held by the operators until the ship docked. Ships relayed many messages ship to ship if the messages originated from long distances from delivery ports, possibly as far as half a world away. When ships receiving DHCO traffic docked, all such received traffic was handed over to any company representative who came aboard. This provided a very inexpensive system of top-grade communications for the shipping company. The companies profited greatly by their radio operators.

Sending and receiving all the radio traffic, plus other required operations, made standing radio watches quite interesting. Besides handling DHCO and standard paid messages, weather reports were copied and press items had to be copied to produce the daily ship's paper. If the radio operators put out the daily paper, they received a slightly higher salary. Out in the Indian Ocean this became a difficult task because English-language press could not be heard. A German station, DAN, sent press in English at about 7 wpm at around 2 AM ship's time. The operator slowly typed out those letters, sometimes dozing off near the end of a line, but his fingers kept punching out the letters his ears were hearing. When the bell rang at the end

of the typewriter's carriage travel, it woke up the operator. A letter or two might be missed, but after throwing the carriage back, the operator resumed plunking away at the keyboard.

Daily time ticks were required for the bridge to correct the navigational clock. At noon, ship's time, position and weather ("TR") reports were exchanged on 500 kHz with any other ships within several hundred miles hearing distance, advising ships what surrounding weather was like. Operators often were called up to the bridge to read blinker signals from other ships being met or passed. Passenger messages were sent to and from shore stations all over the world as well as to and from other ships at sea. All of the shore stations which might have had traffic for the ship were contacted on each watch and asked, "QRU?" ("Any traffic for this ship?").

During off-duty times operators could read, play cards, sun bathe on top of the radio shack, throw a medicine ball, or get involved in some other athletic activity with the doctor or other officers. For the most part, operators were supposed to have minimal contact with passengers except for those who came to the radio room. After a couple of days at sea there were usually a couple of passengers who tired of other passengers or ship activities and came up to the radio shack to talk with the operators. On one ship another operator and I enjoyed practicing pellet pistol shooting at tin cans tossed up and over the side (no one cared about polluting the ocean in those days). For entertainment during heavy weather we practiced lighting fixed matches with pellets at about a 6 foot distance in the radio shack (not easy). Deck or engine-room officers often came in to discuss ship business or what was going on in their area or the outside world. It was an easy, interesting, and enjoyable life.

In 1936 the FCC decided that DHCO traffic was illegal. From then on, operating interest declined. Operating was not nearly as lively as it had been when hundreds of DHCO messages (word counts of from a dozen or so to several hundred) were being relayed ship to ship, or from XSG, the company station at Shanghai, or to ships for delivery at dozens of ports. Coming into Los Angeles, it was not unusual to receive many messages from XSG and others that totaled thousands of words. The approach of WW II was also beginning to have an effect on the volume of our traffic.

Radio operators aboard our ships always typed out messages being received. They counted check (word count) as they went along by double-spacing after every five words and putting only ten words on a line. With long messages the lines were double-spaced after every two lines (20 word groups). If a message had a check count of over 100, a second message blank was fed into the mill at about the eighth line. If a message had one full page, plus two lines plus six words on a second page, it was obvious, without having to count, that the CK count was 126. When sending long messages, operators sent "BK 100 AA" at the end of each 100 words. The AA indicated the operator was going to continuing if not broken. Operators always used break-in ("QSK") so that any missed letters or detected errors could be corrected immediately. To enable corrections to be made without strike-overs, operators always copied at least three to ten letters behind what was being sent. With good signals, traffic speeds were usually in the 25 to 35 wpm range. Bugs or sideswipers ("cootie keys") generally were used for message handling unless conditions were bad, in which case the Morse key was used. Electronic keyers had not yet been invented.

Keying and copying code at sea normally was simple enough. However, when the ship was rolling and pitching in heavy weather, a bug often gave trouble. If it was lined up fore and aft on a rolling ship, a roll to one side produced faster dots, and a roll to the other side resulted in slower dots. With very heavy rolling, the dot contacts might lock together when rolling to one side and could not be made at all on the other side. As a result, bugs were placed athwart-ship as much as possible, since fore-and-aft pitching is always much less than side-to-side rolling. Under very heavy weather conditions, operators often were forced to use Morse keys or sideswipers. Electronic keyers would have been a great help.

A similar difficulty occurred with typewriters. If the carriage ran athwart-ship, with a roll to one side the carriage might not be pulled uphill by its spring. The operator either kept pushing it with one hand as he punched out received letters with the other hand, or he copied behind and waited until the ship rolled to the other side, then typed like mad to catch up before the carriage stopped again.

Sights seen at the many foreign ports visited were always interesting. An event that stands out in my memory is one warm evening on my last trip around the world. A group of us were

sitting around talking at a little sidewalk cafe on the sandy main street of Suez, Egypt. The subject of Cairo and the pyramids, only about 95 miles to the west of us, came up. After discussing them for a while, two young steward department college kids and I decided that it would be fun to go see them. Having three operators on our ship by this time, the two others agreed to split my watches for the two days it would take the ship to get to Port Said and then Alexandria, Egypt. (We had split the Chief's shifts between us a couple of times when he went to visit his folks while we sailed from New York to Boston and back to New York.)

We rented a hotel room, and after a few hours of sleep we boarded a train that ran westward across the flat, green Nile delta to Cairo. There we bought airplane tickets to Alexandria, visited the renowned Shepherd Hotel, saw some other Cairo sights, and hired a taxi/guide to take us to the Giza plateau and the pyramids. The rickety old taxi broke down once, but we finally made it. We walked all around two of the pyramids, climbed up several of their huge stone blocks, went over to see the still somewhat sand-covered sphinx, rode a camel, and then got back into the taxi and set off for the airport. We climbed aboard the 1930's two-engine monoplane and flew north the 150 miles to Alexandria. Luckily the ship was late docking due to all of the warships in the vicinity because of the imminent European war, so we had plenty of time. To be safe, we waited until passengers began returning to the ship so that we could go aboard with them and not be noticed.

Traveling across oceans is not always clear sailing. Ships often run in fog for many hours or even days, with the fog horn on the funnel sending out thunderous warning blasts every few minutes. That makes it tough sleeping for everyone, especially those living right under it, such as radio operators. While crossing the Indian Ocean there were often monsoons, with typhoons around the Philippines and hurricanes off our Atlantic coast. Once after passing Gibraltar on a Marseilles to New York trip, we headed into a real winter storm. The ship rode up one huge wave, coasted down the other side, and plunged into the next one. As the ship raised its bow with a shudder, blue sea water tossed up and over the radio shack at least 350 feet aft. Not too many passengers were seen on deck or showed up for meals! After several days the ship's engine oil ran low, necessitating a detour to Halifax, Nova Scotia to take on more oil. We were lucky. A few hours after we left, Halifax closed down due to increased storm intensity. Our arrival in New York was three days behind time.

War Comes Early!

In 1937 I was serving on the *SS President Hoover,* which became involved in carrying U.S. Marines and troops to and from Shanghai and Manila. It was a time when the Japanese and the Chinese were at war. That is why our American ship, at anchor in the Yangtze River, was bombed by Chinese aircraft. They thought we were the Japanese luxury liner *Asama Maru. (This was the first attack of World War II on an American ship.—ed.)* Being on watch at the time, I had to send the SOS describing the attack. All the officers had congregated on the deck below the bridge. The skipper said to me, "Well, Sparks, I guess you'd better send an SOS," so I did.

After the bombing stopped, messages from passengers addressed to family and friends in the U.S. began to pour into the radio station. The signal path between the Yangtze and San Francisco happened to be quite poor that evening. Two of us were operating separate transmitters and receivers at the same time. My States traffic was all going to KTK in San Francisco and had to be sent by Morse key at about 12 wpm—over 5 hours of it without a stop except for breaks! It was a great relief to send that last message. The other operator was receiving messages from the U.S. to our passengers.

As the war clouds in both Europe and Asia thickened, life aboard ships became less carefree and less appealing. By 1939 radio operating at sea was no longer the pleasure it had been. I signed off a ship and took the oath of a Deputy Sheriff in Alameda County, California to work with several hams I knew in the communication division. After a teaching stint as officer in charge of radio and electricity at the U.S. Merchant Marine Academy during the war, I became the teacher of radio communication at Central Trade School (now Laney College) in Oakland, from which I had graduated.

From listening to my students who went to sea as radio operators and returned to visit the class, it was evident that radio operating was just a well-paying job, thousands of dollars a month, but it lacked all the old fun. Pre-WW II we were never paid more than about $180 a month, but those old-time operators were lucky to be in ship radio operating when it was in its fascinating heyday! Today there is no more licensed U.S. sea-going CW radio operating. Communications are now either by satellite or SITOR, somewhat similar to our AMTOR and RTTY. What a shame such an interesting occupation is gone forever, never to be experienced by anyone again. ■

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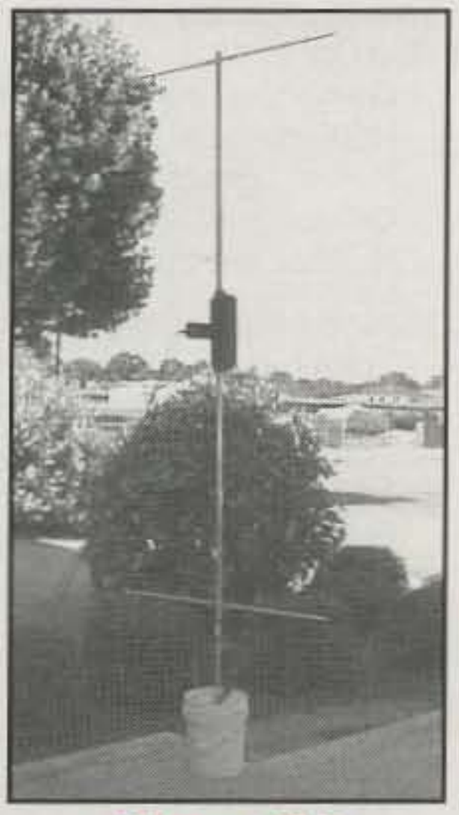

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Reader Survey
April 2002

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 Reader Service 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 experiences with antenna restrictions.

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

1. ...what sort of home you live in

Own private home – no homeowners' association....31
Own private home – with homeowners' association....32
Own condo/coop/townhouse....33
Own mobile home....34
Rent house or apartment....35
Other....36

(*If you chose #31, please skip to Question 5*)

2. ...whether there are any restrictions of which you are aware on installing antennas &/or towers where you live (Please *do not* answer questions 2–4 if you chose #31 on the previous question).

Yes....37
No....38
Don't know....39

(If you answered no or don't know to this question, please skip to question 5)

Please answer Questions 3-4 ONLY if you answered yes to Question 2.

3. Please indicate where the restrictions on antennas at your location are spelled out.

Ownership deed (CC&Rs)....40
Homeowners' Association rules....41
Rental agreement (lease)....42
Other....43
Not spelled out in writing....44

4. Please indicate the nature of the restrictions with which you live.

Total ban on all amateur antennas....45
Total ban on outdoor amateur antennas....46
Total ban on radio transmitting....47
Some antennas permitted, subject to approval process....48
Some antennas permitted, subject to restrictions....49
Other....50
None....51

5. Regardless of the type of home you live in, have you ever applied for a permit or other permission to erect a tower &/or antenna for amateur radio use?

Yes....52
No....53

6. If you answered yes to question 6, please indicate the final disposition of your request.

Approved as submitted....54
Approved with modifications....55
Approved on appeal to higher authority....56
Denied....57

7. Do you feel the restrictions on antennas where you live "reasonably accommodate amateur operation," as the FCC requires for local governments?

Yes....58
No....59
Don't know/no restrictions....60

Thank you for your responses. We'll have more questions for you in our next reader survey.

What You've Told Us...

Our February survey asked readers for advice on whether *CQ* should occasionally run articles without a direct connection to amateur radio. The results are mixed, but leaning toward negative.

First of all, 3 in 5 readers say they're either very interested or intensely interested in science and technology beyond amateur radio; half subscribe to or regularly read professional journals covering science and technology; 43% subscribe to or regularly read science/technology trade magazines; and 53% subscribe to or regularly read science/technology related consumer magazines.

When asked if *CQ* should occasionally devote space to information that is not directly related to amateur radio, 50% of the readers who responded said no, while 40% said yes and 12% had no opinion (the 102% total is a result of rounding). On the question of how such articles should be presented if we do them, 40% said don't do it at all; 37% preferred occasional feature articles, 12% said work the information into existing columns, and another 12% favored a regular "roundup" column. Finally, 70% said the occasional inclusion of information not directly related to amateur radio would not change their *CQ* reading habits or subscription decisions, while 19% said it might prompt them to stop buying the magazine, and 10% said it might influence them to renew or purchase the magazine more often.

We've also had mail on the subject, most of which recommended introducing new technology but trying to find a potential ham radio tie-in. Others, however, pointed out that presenting new technology even without a ham connection could provide the impetus for the experimenters among us (about one quarter of you, according to our surveys) to develop amateur applications.

Thank you to all who responded. We appreciate your input and will take your suggestions into account as we select our articles in the future. This month's winner of a free one-year subscription to *CQ* is Gerald E. Engman, WB3IWY, of Manassas, Virginia.

Are You Prepared?

Every radio enthusiast should own at least one scanning receiver.

Alinco offers four great choices!

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Alinco's top of the line "Intelligent Receiver" tunes from 100 KHz ~ 2.15 GHz with excellent sensitivity and a triple conversion front end. Receives WFM, NFM, AM, USB, LSB, CW and FM stereo*, 2000 memory channels with alpha-numeric labeling, download free computer control software from the Alinco web site. Flash Tune™ locks onto and monitors strong local signals! On board "Help" feature, digital recorder, frequency counter, CTCSS search & decode, Channel Scope™ spectrum activity display, Ni-Cd battery & quick charger included. BNC antenna port with new, wide-range "ducky" antenna included.

DJ-X3

Amazing performance in a small, easily carried package! Coverage range from 100 KHz ~ 1.3 GHz with 700 memory channels. Receives WFM, FM stereo*, NFM and AM modes. Includes SMA "ducky" antenna, earphone, and internal ferrite-bar antennas for AM & shortwave. Ultra sensitive triple-conversion front end. Large illuminated display. Free downloadable control software from the Alinco web site.

DJ-X10

This high-performance receiver covers 100 KHz ~ 2 GHz, has 1200 alpha-numeric memory channels, internal "help" feature, Channel Scope™ spectrum display, receives, AM, NFM, WFM, USB, LSB and CW, triple conversion front end, superb sensitivity, BNC antenna port with wide-range "ducky" antenna and an amazing array of optional accessories. Check Alinco's web site for computer control software.

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As restrictions on mobile use of wireless telephones increase, hams may want to consider this simple "hands-free" approach to mobile microphones.

Make Your Mobile Mic "Hands-Free"

BY BOB SHRADER,* W6BNB

Many of our states are in the process of developing or passing laws prohibiting automobile drivers from using hand-held radio telephones, cell-phones, etc., while underway. Of course, the basis for these laws is to reduce the number of accidents that occur while drivers are dialing up or talking into such devices. In a recent year there were 47 known deaths. The total may be much greater, too, because whether the driver was using a hand-held telephone may not always be known or included in an accident report.

It is probably true that amateurs operating their rigs while driving sometimes do things that are dangerous to themselves and others. Any driver holding a microphone in one hand and speaking into it for extended periods, for example, must be using only one hand to steer, shift gears, sound the horn, set turn signals, adjust headlights from high to low, adjust windshield wipers, and so on. Hopefully, drivers would drop the microphone into their laps in an emergency to get both hands into the driving position, but a sudden emergency could freeze a driver's hand for that fraction of a second that might prevent dropping the microphone in time.

One wonders, however, if using a hand-held transceiver is more dangerous than driving after several drinks, or looking for some other AM or FM radio station while driving, or fiddling with CD or tape players, or checking electronic navigation systems, or examining dashboard video screens, or turning and talking to others in the passenger or back seats, or yelling at the kids, or drinking beverages, or shaving, or watching while combing one's hair, or putting on make-up, or looking at things going on to the right or left side of the road, or reading a newspaper or map, or dozing off due to fatigue—all of which can cause accidents. Should we have laws against all of these? *(We already do. Virtually all states have laws against distracted driving, begging the question of whether specific bans on cell-phone usage are redundant.—ed.)*

Will such laws mean that all drivers of vehicles with mobile radio telephones might not be allowed to transmit while in motion? It can be expected that emergency vehicles, police cars, etc., being protected by flashing lights, sirens, or horns, would be exempted. However, the millions of mobile CB operators in the U.S., especially truck drivers, will be expected to put up quite a battle to allow their continued ability to transmit while in motion. What about mobile amateur radio operations? This writer has operated untold thousands of amateur, police, fire, and CB mobile-in-motion communications since the late 1930s and has never had any driving difficulties while doing so. It is going to be interesting to see how different states handle their mobile radio telephone operations. But if discretion is the better part of valor, then this might be a good time to consider ways to make mobile operating even safer.

W6BNB's "Rube Goldberg" hands-free holder for mobile microphones. The inset shows how the press-to-talk (PTT) switch is held in the transmit position.

Safer Microphones

There are headset microphones with or without an earphone that can be hung on a driver's head in a variety of ways that put the mic in front of the operator's mouth. Such "hands-off" microphones work nicely when Voice Operated Xmissions (VOX) are used. With Push-To-Talk (PTT) operating for extended periods, some kind of a switch is required to hold the transmitter circuit "ON" to free the hands. Headset-mics with an earphone may not allow others in the car to hear what is being received and can also interfere with the driver hear-

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ing important sounds from outside or inside the car. If the manufacturer of your transceiver makes a headset-mic for your mobile equipment, it might be wise to investigate getting one. Otherwise, what amateurs need is a simple device to provide hands-off operating of their mobile mics.

A Simple Answer

There is a very inexpensive and fairly simple gadget that can be put together to provide maximum safety for amateur radio mobile operators carrying on QSOs while driving. It uses the transceiver's own hand-held microphone mounted on a small chest plate to hold the mic in front of the driver's mouth. It must have a transmit-receive (TR) switch to keep both hands free to drive and both ears free to hear (see photo). I started using such a device back in the early days of HF mobiling. I felt that such a thing was necessary for safe driving during daily mobile-to-mobile QSOs. Those 30-minute driving-to-work and returning-home periods involved talking on the air about one third to one half of those times. Then there were the other general everyday driving excursions when I would be talking for stretches of perhaps three to five minutes at a time. Today such a microphone holder is also important for many QSOs using FM repeaters.

The mobile equipment microphone can be attached to a chest plate in a manner somewhat similar to that shown in the photo. This particular microphone holder was thrown together about 20 years ago as a trial venture with the idea of improving it later. It worked so well that it has never been changed. The chest plate is held in position by a bent aluminum strip attached to it. The strip goes up and around the neck of the driver-operator and holds the mic in a fixed position an inch or so in front of the driver's mouth. Modern transceivers often have complicated electronic switching circuits inside their hand-held microphones. With the mic holder shown, it is not necessary to get into any such electronic circuitry.

Making A Mic Holder

The home-brew neck-held microphone shown is an interesting construction project, requiring only the following:

1. A small, flat, handmade chest plate
2. A thin, bent metal strip to fit around the neck
3. A 6 inch metal support strip to hold the microphone
4. Some means of switching the transceiver ON and OFF, if VOX is not used

Explanations of these four requirement are:

(1) The chest plate can be a sheet of 1/4 inch 3-ply wood, or a thin plastic or other available sheet material. It should be cut to a square of about 5 × 5 inches. Rounding the corners makes it less likely to catch on things and makes it look better as well.

(2) The around-the-neck strip should be about 1/16 inch thick, 17 inches long and can be cut from a 3/4-inch-wide strip of sheet aluminum or galvanized iron. The strip should be thin enough to bend into the desired shape without too much trouble, but thick enough to hold its shape with use. Bolt the bent metal strip to the top right corner of the chest plate with two machine screws, as shown.

(3) A second similar metal strip, but only about 6 inches long, is used to support the microphone. The bottom 1/2 inch should be bent at an angle and bolted to the chest plate with two machine screws, as shown.

(4) Assuming VOX is not to be used, modern hand-held microphones for mobile PTT operating have a push-button switch on them. If pushed in, the switch holds the microphone circuit in the "ON" position while transmitting. When released, it switches the transceiver to receive. Rather than taking the chance of screwing up internal wiring in the microphone, it is better to develop some kind of a simple, external "Rube Goldberg" device to hold the switch in a pressed-down "T" position while transmitting. One way of doing this is to use a rotatable copper wire, painted white for clarity and shown in a vertical, or "R," position in the illustration, attached to the microphone case. It must be able to rotate down to allow it to hold the TR switch in the "T" position, as shown in the side view of the insert.

A small threaded base part on which the copper-wire switch holder can be mounted is required. Such a base part can be made by drilling and tapping a short piece of 3/16 inch plastic rod or hardwood dowel. Its bottom surface must be filed to a shape that fits the part of the microphone case to which it will be cemented. The top surface of the rod must be parallel to the microphone push-button's surface to enable the wire to rotate down and hold the button fully on. This short tapped rod is cemented to the microphone case next to the TR or PTT switch and under the machine screw head in the insert.

The 1 1/2 inch piece of #14 bare copper wire can be bent into a round loop at one end. A 1/4 inch 6-32 machine screw, when fed through the loop, can be screwed (but not tightly) into the top surface of the plastic or wood rod. To hold the push-button switch of the microphone in the ON or "T" position, the looped wire must be rotated down to lock the switch in the closed position. When the necessary adjustments are made and the locking wire works properly, the machine screw should be removed and some contact cement should be fed down the threaded hole in the short rod. Reset the screw through the wire loop to the desired depth in the threaded rod. After the cement dries, the locking wire should neither loosen nor tighten as it is rotated down or up. (A 1 inch long, 1/4 inch wide sheet aluminum or iron piece, drilled at one end, could be substituted for the looped wire.)

Note that when used with the external TR switch lock, the transceiver is being operated exactly as it was originally designed to operate. No electronic changes have been made. This is an important point for warranty or resale.

How About VOX?

Many mobile operators do not use VOX operation even if it is included in the equipment, because noises inside the vehicle may trip a VOX system ON when not wanted. However, if the distance between the microphone and the driver's lips is held at only an inch or so, the mic gain control can usually be turned down far enough to make VOX possible, even with the driver-side window open. Of course, if VOX operating is used, it will not be necessary to make the TR switch locking device even if the rig is always left in the transmit, or "T," condition.

Attaching the Mic

How to fasten the microphone to the top of the 6 inch support strip depends on which of the large variety of today's microphones is used, whether or not it has a key-pad, and whether the key-pad is on the front or rear of the microphone.

Some microphones have spring-loaded clips on the back, making them simple to mount on top of the 6 inch metal strip. Most hand-held microphones have some kind of a fitting on the back at the top which allows them to be hung on a hook of some type when not in use. If this is a metal piece projecting up from the back, a machine screw and knurled-nut or wing-nut can fasten the mic to the support strip after drilling a hole in the strip at its top. Or, a machine screw, with its head filed flat, can be cemented to a free, flat area somewhere at the center and near the top of the back of the microphone's plastic case. When the cement is completely dry, the screw can be fed through a hole drilled at the top of the support strip and fastened there with the nut.

If the key-pad is on the back of the microphone, the mounting screw can be placed on the front of the microphone case. The narrow mounting strip should not interfere with voice sounds getting into the mic. If drilling a hole in the microphone's plastic case doesn't bother you, a machine screw through the case will provide a more sturdy mount.

The photo illustrates the means by which I mounted my microphone to the top of the 6 inch strip with the key-pad on the front. How the microphone should be attached to the top of the mounting strip depends on the make-up of your microphone. However, the mounting scheme should be simple enough to allow the microphone to be removed easily.

The cable coming out at the bottom of the microphone should be held to the mounting strip in some way that is easily released. In the illustration a #14 copper wire is bolted to the back of the microphone holder strip. The ends of this wire can easily be bent to hold the microphone cord to the strip. They may be bent open easily when the microphone must be dismounted.

The heads of all machine screws should be on the back of the chest plate, with nuts on the front surface. If there are any sharp edges on any screw slots, they should be filed smooth so they will not catch on wearing apparel (see "Editor's Note" at the end of this article).

Fitting the Neck Strip

Bend the neck strip to fit around your neck. If it doesn't feel comfortable, keep adjusting the bend of the strip and the angle to your shoulder and neck from the chest plate until it does. When the microphone is attached, the chest plate should remain essentially unmoving when the upper body is turned from side to side. Even moving the head from side to side does not move the lips far enough from the microphone to prevent good voice pickup. Bend the mic mounting strip forward or backward at the bottom until the microphone rests about one inch from your lips. It does not have to be directly facing the mouth. It can lie forward at a slight angle.

A variation of this type of microphone holder that was used successfully for many years had two metal strips, one running from each of the two top corners of the chest plate, extending up and over the driver's shoulders. This works as well as the single neck strip but is larger overall and harder to store when not being used.

Miscellaneous Items

When the microphone is not in use, it can be hung on a hanger installed on the dashboard at some free spot. It may also be put down on the seat between the driver and passenger or be placed between the front seats, or it may be hung on a hook on the passenger side of the central controls area or perhaps around a central shift lever or emergency brake. Unfortunately, all automobiles are built differently and never with amateur radio equipment in mind. As a result, it usually requires the amateur to dream up some ingenious solutions.

A microphone of this type also works well when operating a radiotelephone transmitter at a home or other fixed operating position. It has the advantage

of keeping a constant distance between microphone and lips. It allows the operator to use both hands for tuning, writing, or doing anything else while talking. (It's great for those who like to gesticulate with their hands for emphasis while speaking!) Swinging around in a chair does not change the microphone-to-lips distance while in a QSO, a big advantage over a desk-mounted mic in the usual highly reverberating ham shack. It allows a very low microphone gain setting, thereby assuring the best possible audio signal-to-noise transmitting ratio. With its low required microphone-gain setting, all normal room noises—such as telephone bells or beepers, doors closing, people talking, dogs barking, etc.—will not interfere with the voice sounds being transmitted. Of course, the mic holder can be used for either VOX or PTT operation at a fixed location.

Even if no hand-held radiotelephone-in-motion safety laws are ever passed, this type of microphone holder provides all amateur radio operators with a smart means of reducing the risk of having an accident while operating mobile in motion. (Incidentally, such a chest plate can also be used as the mounting base for a small hand key for mobile CW. While it does not free both hands, it does put the keying hand very close to the steering wheel.)

Please, if you must make complex adjustments to your radio or automobile equipment, read maps, use key-pads, or anything else that requires your attention, pull over and stop the car to do those things.

Editor's note

My first response, when looking at the photo of Bob's mic holder was, "Hmm, I'll bet some sort of padding or covering would make that feel and look a whole lot better." I mentioned that to Bob, who told me he's already considered, and decided against, such cosmetic "improvements" for his mic holder.

"On the cold metal around your neck," Bob said, "I think of that every time I put it on, but in about 10 seconds I forget it because it only takes that amount of time for it to warm up. I have thought of asking my wife to sew up a little cap to put over the neck hook, but it would get dirty in no time, I am afraid. I have also thought of gluing a thin piece of felt on the inner surface, but again, after 10 seconds, I always forget about it."

I haven't built one yet, so I can't argue with Bob's logic. Still, if I did, I might go for some sort of covering. Your call on what works best for you. —W2VU

Amateur Satellites

BY PHILIP CHIEN, KC4YER

Ham Radio in Space

More Pirates from Space on the Ham Band

In mid-January an unidentified transmitter from space (UTFS) caused a stir in the amateur radio community. Weak-signal hams around the world were hearing a loud FM Morse Code beacon on 144.1 MHz. It had a Doppler shift indicating that it was moving extremely rapidly across the sky and had to be coming from a satellite in orbit.

Many hams monitored the beacon: VVV DE CN/ZARKAA AL YAMAMA. CN is the ITU prefix for Morocco, which helped isolate the offender as MAROC-TUBSAT. What is "Zarkaa Al Yamama"? Literally it means "the blue dove." She was a non-believer who converted to Islam and was thought to have the incredible ability to see friends and foes from miles away—a pretty good description of an earth observation satellite!

MAROC-TUBSAT was launched on December 10, 2001 from the Russian-operated Baikonur launch complex in Kazakhstan. Besides its ham-band 2 meter transmitter, MAROC-TUBSAT also has transmitters on 436.075 MHz and 2,200 MHz, both shared allocation bands. Thus, while 436.075 MHz does fall in the 70 cm ham radio allocation, it's also used by other legitimate users.

How can a satellite designer use 144.1 MHz for a beacon? Morocco is an ITU country. It is a sovereign country and has every right to decide how to use its radios within its borders. However, once that radio signal crosses a national border, it enters the realm of international treaties, and 144–146 MHz has been allocated worldwide for amateur radio operators. ITU region 2 (North and South America) has an additional 2 MHz from 146 to 148 MHz. That's international treaties: Thou shalt not transmit on 144 to 146 MHz for non-amateur radio activities. By gentleman's agreement (band plans), 144.05–144.10 is reserved for general CW and weak signals and 144.10–144.20 for Earth-Moon-Earth transmissions and weak-signal Single Side Band (SSB) communications. Therefore, in addition to occupying a ham radio frequency, MAROC-TUBSAT is in violation of the band plans with its relatively high-power FM transmitter. On the plus side, controllers did agree to shut off their 2 meter transmitter when they were informed about the interference. German space hams contacted the Technical University of Berlin, which helped built MARCOC-TUBSAT, and informed them about the interference.

A separate, unrelated issue of a questionable amateur radio satellite is Project HAND (Human Activated Nano-satellite Demonstration) from Bristol University in England. Recently the team asked amateurs to make recommendations for its transmission protocols. The group is working with the AMSAT-UK group for frequency coordination.

HAND is a proposed hand-deployed satellite. The intent is to carry it to the space station as cargo and have an astronaut drop it overboard during a spacewalk. The team is planning to use 435 MHz. HAND would use primary batteries and would only transmit for about six days before becoming another piece of space debris.

The team has stated that the first prototype satellite will not include any transponder, just telemetry and possibly a science instrument. They have implied that future spacecraft may include amateur radio payloads.

Is the prototype HAND satellite a legitimate use of amateur radio? The satellite will last for one week, so the amount of usage will be relatively minimal. In addition, 70 cm is a shared band; it's not like there aren't already other users on those frequencies. However, there is a lot of concern within the amateur radio satellite community, and in the amateur radio community in general, that there are outside concerns who want access to the ham bands and are testing the waters by first using simple, relatively innocent requests to use ham frequencies, and will then use the data from those tests to "prove" that they can co-exist with hams as justification for further tests and possibly eventually gaining control of the ham bands. I suppose the key question is how pure are the intentions of the University of Bristol teams in what they're trying to accomplish, and what are they willing to do for the ham radio community in exchange for the use of the ham frequencies and the expertise of the experienced hams they have asked for assistance.

Bottom line: The debate on how amateur frequencies are used, especially for spacecraft communications, will always continue. The "inclusionists" believe that anything that transmits on ham radio frequencies is good because it helps keep our bands. On the other side, the "exclusionists" believe that only pure non-profit transponders, solely for use by the general ham radio population, should be permitted on amateur radio satellites. Clearly the actual definition should lie somewhere between the two extremes.

STS-45 Commander Charles F. Bolden, KE4IQB, talks to amateur radio operators on Earth. On this flight Bolden did not have a ham license and operated via a control operator. Bolden has just been named NASA's Deputy Administrator, the agency's #2 position. (NASA photo)

A satellite does not have to have an open ham radio transponder to be considered a legitimate ham radio satellite. Some of the ham radio satellites with just beacons included Sputnik RS-17, Dove DO-17, Starshine 3 SO-43, and even the original OSCAR 1!

One of the most important criteria for ham radio, however, whatever the application, is that all transmissions must be publicly available and unencrypted. It's perfectly legitimate to use Morse Code, AX-25, JPEG, or other encoding techniques to facilitate transmitting a signal, but it's not legal to encrypt the signal or put it in any form to prevent others from decoding the data. The only exception is the commands to control the satellite itself. There are specific waivers to permit

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their encryption to prevent malicious interference by a rouge ham trying to take over the satellite.

There are also many cases of amateur radio satellites carrying non-amateur radio experiments. Some of AO-40's secondaries include the arcjet motor (developed by the University of Stuttgart), the radiation monitoring experiment, and the GPS receiver.

AO-40's orbit takes it far above as well as below the GPS constellation's 20,200 km altitude. NASA's Goddard Spaceflight Center arranged for the GPS unit plus vibration testing for AO-40 in exchange for AMSAT providing room on the satellite and the data from the experiment.

Other Ham Satellite News

• Contrary to a recent AMSAT bulletin, AO-40 is not the first satellite to receive GPS signals from above the GPS constellation, and not even the first one in which amateur radio operators were encouraged to participate! However, while the AMSAT release is incorrect in that respect, the GPS experiment is still an important accomplishment and AO-40 does set the altitude record for anything with a GPS receiver.

• The first two ham radio antennas have been installed on the international space station. The original plan was to install all four antennas on the same spacewalk, but Russian schedulers decided to split the tasks over several spacewalks.

• Former astronaut and Marine Corps Major General Charles Bolden, KE4IQB, will return to NASA as Deputy Administrator, the second highest position for the nation's civilian space agency. Bolden flew on four shuttle missions and obtained his license while training for STS-60. That made him the first African-American astronaut to obtain a ham radio license. However, he is not an active ham.

• Dr. Shannon Lucid, a veteran of six months aboard the Russian Mir space station, has been named NASA's Chief Scientist. Lucid never did obtain a U.S. ham radio license, but was permitted to use Mir's "club station" while on board. She used the club callsign RØMIR during her six months in space and talked to hundreds of hams around the world.

Web Resources

MARCOC-TUBSAT web page: <http://www.vectronic-aerospace.com/Image_Gallery/MAROC-TUBSAT/hauptteil_maroc-tubsat.html>.

One SWL's monitoring of MAROC-TUBSAT: <http://www.users.wineasy.se/svengrahn/trackind/maroctub/Maroctub.html>.

Project HAND homepage: <http://www.handsat.co.uk/>

Hams have traditionally homebrewed equipment—hardware. With computers becoming an integral part of so many ham shacks today, here's a new twist: homebrewing software, logging software in this case.

Softbrewing a Logbook
A Primer For Database Design

BY RAY JACOB,* KB2ZPE

The August 2001 issue of *CQ* contained a nice article on station logging written by Peter O'Dell, WB2D. He explained why hams today still benefit from logging contacts even though the FCC doesn't require it. Written for the benefit of newcomers, Peter described the paper logbook and mentioned some of the advantages of logging software.

After reading Peter's article, I decided to write a "spin-off" piece focusing on computer logging, but with a twist. Computer-tinkering hams should consider homebrewing an electronic logbook of their own as an alternative to purchasing ready-to-run software. This can be a rewarding and educational exercise, and the result of your efforts will be a "product" with real practical application that you can continue to tweak and enhance as your database skills increase.

For this project you will need to acquire database management system (DBMS) software. Among the most popular of the genre is Microsoft Access, which can be purchased at practically any computer store. *(A note of caution: Microsoft Access will probably cost you more than any commercial logging program on the market, so your goal here should be learning database management skills and getting a useful logging program as a side-benefit!—ed.)* You will use the DBMS to build, or "softbrew," your electronic log. Learning to navigate its menus, tools, and wizards is not much different than with other Windows®-based programs, and a moderately experienced Windows® user will become familiar with where things are in a short amount of time.

This article was written to help you understand basic database design concepts, with special emphasis on how they apply to a radio amateur's log. The ideas presented here will make working with the DBMS easier and provide a foundation for designing your own electronic logbook.

To begin, let's look at a few basic definitions:

Database—a collection of data organized into one or more tables.

Table—a collection of data organized into records.

Record—a collection of facts which describe something; records are organized into fields.

Field—a fact.

What is a fact? In a logbook, a station's callsign is a fact. The date of the QSO is a fact. The city, state, and country of the station are facts, as are the frequency and time of the QSO. Did you send a QSL card? Did you receive one? These are also facts. A single fact logically combined with other facts serves to describe something. In our case, we collect and group facts that describe on-the-air encounters with other amateurs. Your paper log helps you to organize facts by providing you with a grid. Across the top of the grid are headings such as Callsign, Date, Freq., Mode, QTH, etc. Down the side of the grid are numbered rows. If you compare the paper log to an electronic database, think of the column headings as *fields*. Likewise, think of each row as a *record*. Think of the entire grid as a *table*. Your paper log, in computer terms, is actually a single-table database.

Field	Type	Table	
Callsign	static	Station	*Common Field*
Name	static	Station	
City	static	Station	
State	static	Station	
Country	static	Station	
QSL	static	Station	
Callsign	static	QSO	*Common Field*
Date	transactional	QSO	
Time	transactional	QSO	
Mode	transactional	QSO	
Band	transactional	QSO	
RST	transactional	QSO	

Fig. 1– Fields and table structure.

Planning the Database

When you log a QSO, two sets of facts are recorded. The first set of facts includes the operator's name, callsign, and QTH information. The second set contains the date, time, mode, band, and signal report. You can say that the first set of facts describes the station, while the second set describes the actual QSO. This distinction is important, for it will help us determine where to store data within the structure we are building.

In an electronic database each fact is stored in a *field*. Fields are characterized as *static* or *transactional*. Static fields contain facts that are collected once and rarely or never change, such as those which describe a station. For efficiency, electronic databases require that static fields be grouped together in a table containing other static fields. When you design your database, you will create a table called **Station** and populate it with fields for name, callsign,

*633 Johnson Court, Teaneck, NJ 07666
e-mail: <kb2zpe@arrl.net>

If you ask the database to display information for KB2YJK, it will retrieve . . .

This from the Station table	. . . and . . .	This from the QSO table
KB2YJK		KB2YJK
Jim		2/10/98
Brooklyn		17:45
NY		USB
USA		6
		5x9
		KB2YJK
		3/15/98
		15:30
		SSTV
		20
		579

Fig. 2– Table relation.

and QTH info—in other words, the static facts describing a station.

Each station in the database will have a QSO history associated with it, whether it's a single contact or multiple contacts. Each QSO is regarded as a *transaction* with the station to which it is associated. As such, the group of facts which describe the QSO (date, time, mode, band, signal report) are regarded as *transactional* and must be stored together in their own table. When you design your database, you will create a second table called **QSO** and populate it with these fields.

Fig. 1 lists the basic fields for logbook tracking. Each field is classified as static or transactional and is assigned to the **Station** or **QSO** table.

In fig. 1 note that the **Callsign** field appears in both tables and is identified as a *common field*. The role of the common field is to link related information between the two tables. Fig. 2 illustrates this and shows how information for KB2YJK would be stored in a relational database. Note that part of the information for KB2YJK is stored as a record in the static table and part is stored as a record in the transaction table. The computer knows that the records in each table are related based on matching data in their common field. The process of linking two tables through a common field is called *joining the tables* and is a design step that MSAccess, and any DBMS, will require you to execute. I'll discuss this later on.

The common field is so important that it has its own set of rules. We must be sure to implement these in our database design:

(i) *The common field must exist in both tables.* We've chosen **callsign** as the common field. Create it in both the **Station** and **QSO** tables.

(ii) *The common field field-type must be the same in both tables.* You must tell the DBMS what kind of data you will enter into the fields you define. The choices are generally text (alphanumeric), numeric, date/time, and memo. Callsigns are made up of letters and numbers, so it is an alphanumeric data type. In both tables define the **callsign** field as *text,* and make the *field-length* equal to eleven (11) characters. (This length should allow for additional identifiers, such as /4 or /mob. If you feel squeezed, you can make the field length 15 characters instead of 11. Another option is to add a separate **identifier** field in the **QSO** table [see below].)

(iii) *Make callsign unique.* All database designs require a field that uniquely identifies each record in the static table. This is to avoid problems that result when duplicate records exist. Some databases will automatically generate a sequential numeric identifier each time a new record is created. Other commonly used identifiers are a person's telephone or social security number. In amateur radio a person's callsign is unique in the world, so we'll use it as the identifier. In the **Station** table make the **callsign** field the *primary key*. Its field attributes will be set to *index* and *allow no duplicates,* and this will prevent you from accidentally entering a station record more than once. In the **QSO** table set the **callsign** field attributes to *index* and *duplicates ok.*

This program will identify KB2ZPE/3, KB2ZPE/1, and VE3/KB2ZPE as three different stations, another good reason to consider a separate **identifier** field in the **QSO** table.

Planning the Table Join

We have created two tables, but neither is aware of the other until we execute the DBMS's *table join* function. This important step links the two tables over their common field so they function as a single database. When you execute the table join, the DBMS will ask you to answer the following questions:

(i) *What are the tables to be joined?* You will specify **Station** and **QSO**.

(ii) *Which field should be used to join the tables?* Specify the **callsign** field.

(iii) *What is the relationship between the Station table and QSO table?* Specify **one-to-many**.

Look again at fig. 2, and you will see that the station record for KB2YJK is associated with two records from the QSO table. The *one-to-many* attribute, known as the *join condition,* tells the DBMS that each Station record will have at least one, but perhaps many, associated QSO records, but not vice versa. This establishes the static/transaction relationship between the two tables, enabling the DBMS to properly map related data between them.

Getting It to Work

By itself the database can't really do anything, for it is just one of several components that make up a complete work-

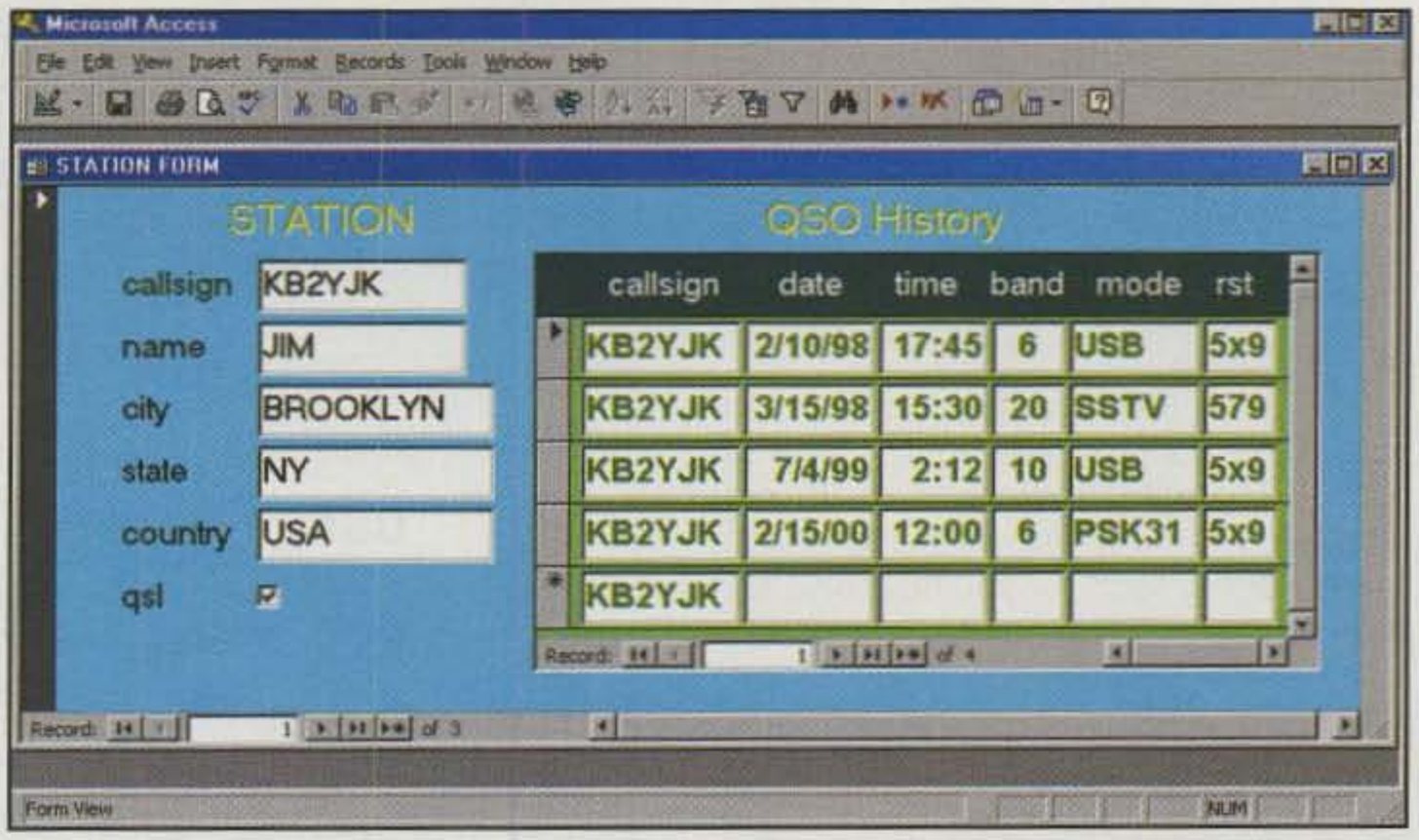

Fig. 3– Screenshot of the Station Form and QSO Subform in an MSAccess database.

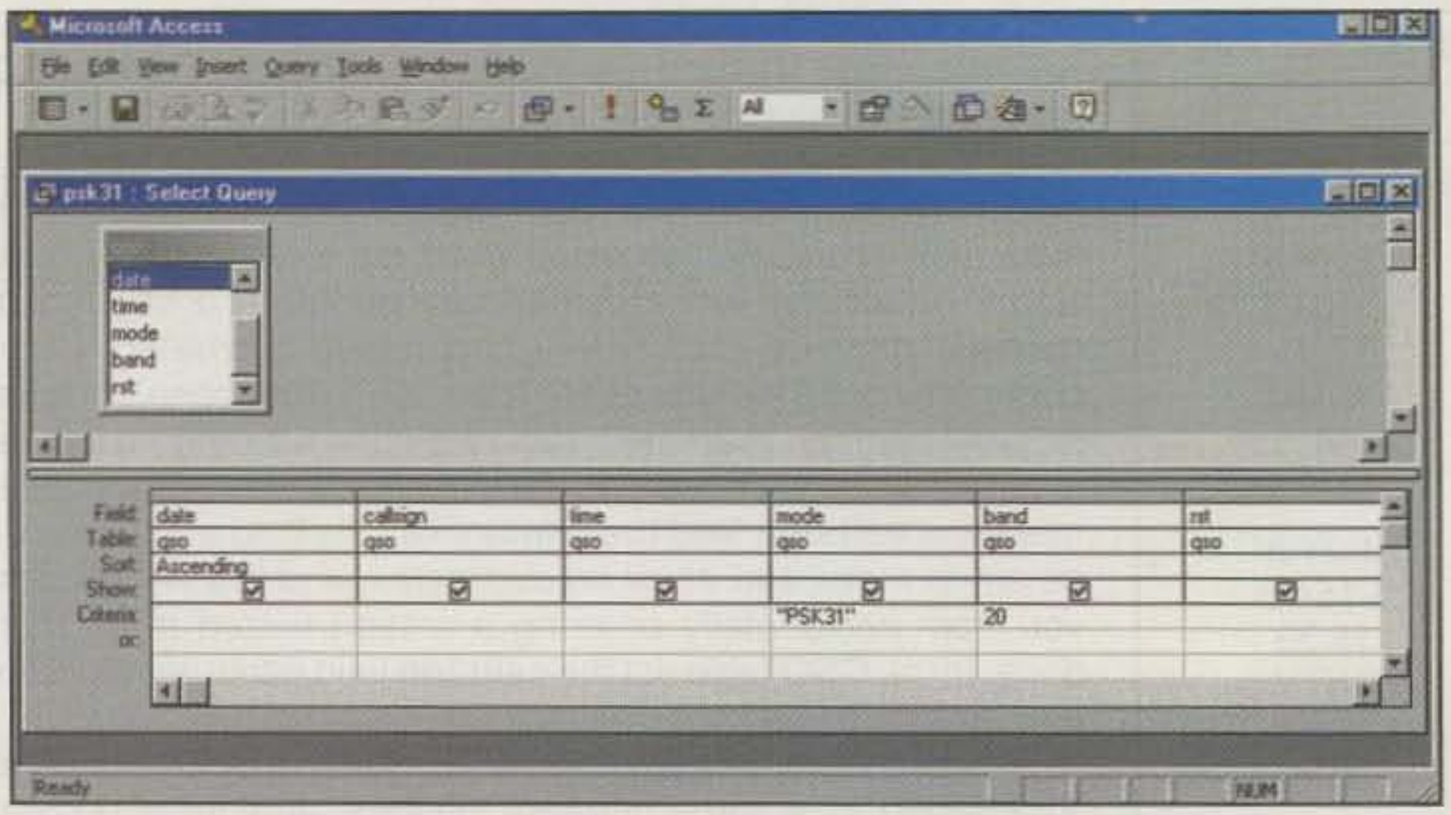

Fig. 4– Screenshot of an MSAccess select query. When invoked, this will produce a list of PSK31 contacts on 20 meters, listed in date order.

ing application. In order to make the database usable, you will have to build at least two *forms.*

Forms are used to view information. Fig. 3 is an example of a form for viewing the logbook in an MS Access database. This same form can be used for entering data. Designing one requires that you specify the *data source* (sometimes called the *record source*) from where the form should "pull" information. This is often one of the tables in the database. You also specify which fields will be displayed on the screen. Using a tool such as the MS Access Form Wizard makes this easy because it asks you questions about the database and then designs the form for you. For this project you will create a Station Form and make the Station Table its data source. Design the Station Form so that it displays all the fields contained in the Station Table. Create a QSO Form using the same logic.

The screenshot in fig. 3 shows a main form (Station) and a subform (QSO) displayed in the same panel. A *subform* is a form that it is piggybacked onto another so that data from two tables is displayed simultaneously. This lets you look up a callsign and see station information and its QSO history together.

If you want the ability to extrapolate subsets of your log—for instance, a list of PSK31 contacts worked on 20 meters—you need to know how to build a *query*. Query tools let you filter and sort data so that you can create lists for specific needs, such as for awards tracking, QSL confirmations, etc. An easy-to-use implementation is the *select query* format featured in MSAccess, shown in fig. 4. In the *select query* format you work inside a grid where each column represents a field in the source table. You build the query by typing search criteria into the appropriate column. In fig. 4 I entered "20" in the **band** column, and "PSK31" in the **mode** column. Note that I also specified an ascending sort in the **date** column. When invoked, this query will generate a list of 20 meter PSK31 contacts from the **QSO** table and list them in date order.

Queries can be saved and invoked as needed. The queries you create will be based on your interests in radio, what information you choose to capture, and how you choose to use that information. Eventually you will wind up with a library of canned queries. This is what really gives an electronic log the power and flexibility to provide interesting and useful information.

Hopefully I've armed you with enough background to motivate further exploration into designing your own electronic logbook. Start out simple and build something very basic. Get used to applying the concepts described above by creating two small tables with just a few fields each. Join the tables, then create the Station and QSO forms. When you're finished, enter a few items from your logbook, or if you've never logged before, just make up something. As your database skills develop you can add fields to the tables, design creative forms, and build more complex queries. Take advantage of the online help, and don't forget the library or bookstore if you wish to delve further into this fascinating science. Good luck!

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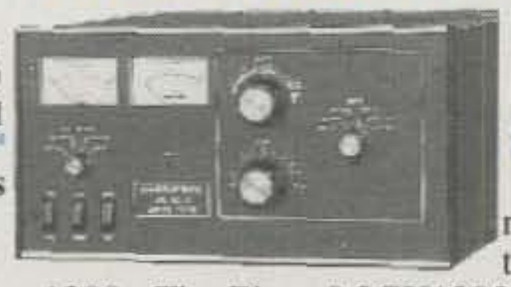

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Math's Notes

What's New And How To Use It

BY IRWIN MATH, WA2NDM

Listening to the Past

As they used to say on a popular British comedy series a few years ago, "and now for something completely different!"

Last year we discussed the possibility of listening to the future using the supposedly faster-than-light speed of a laser pulse passing through a cesium gas tube. While this technique is highly experimental, to be sure, the materials are hard to come by and "tuning" is extremely critical, which is probably why we have not heard much in the way of concrete results. Since the future seems to elude us for many other reasons as well (one of which is that it hasn't happened yet), let's try to change our point of view and look at eavesdropping on the past (which most certainly has happened).

If you want to listen to past events, you could easily purchase recordings in disk form (78 rpm records) that would take you back to the 1920s or so. If you then went to cylindrical recordings of the Edison type, you could even travel back to the late 1800s. This we all know. What I am proposing, however, is going to take us much farther back than that. This might seem impossible, since recording techniques simply did not exist before the late 1800s—or did they? To begin our adventure let's first consider how the original recording methods actually worked.

Anyone who has even a rudimentary knowledge of records (although my 8-year-old granddaughter Lauren thinks a record is just a large CD) knows that an audio signal to be recorded is first electronically amplified then applied to a solenoid. The solenoid controls a sharp stylus that cuts a groove into a vinyl, bakelite, or hard-shellac disk (or cylinder) as shown in fig. 1. Note that this drawing is only for informational purposes.

Commercial recording equipment is or was much more elaborate. The walls of the groove being cut vary in amplitude and/or width with the variations of the audio signal, and the result is a mechanical analog of the original sound cut into the record groove. When playing back the record, a needle in the phonograph cartridge vibrates as it passes through the grooves in accordance with the previously made audio-related mechanical variations. The vibrating needle generates a small current in a coil contained within the phonograph cartridge. This current is then amplified, and "presto," we have our recovered audio. There are many factors that determine the quality of the audio and these include the weight and mass of the needle, the bandwidth of the recording and playback amplifiers, and even the regulation of the speed of the drive motor turning the record. Nevertheless, the system absolutely works, and for that matter has worked quite well for many years. What does all of this have to do with the past? Well, read on and learn!

Let's now travel back to, oh, say, the studio of an artist such as Leonardo da Vinci. While painting the Mona Lisa he undoubtedly spoke to his model or perhaps even sang an old (then it was probably new) Italian aria while he was working. "So what?" you say. "What does this have to do with recording?" Everything!

While Senor da Vinci spoke or sang, the canvas he was working on (that had been tightly stretched on a wooden frame as was and still is the common

c/o CQ magazine

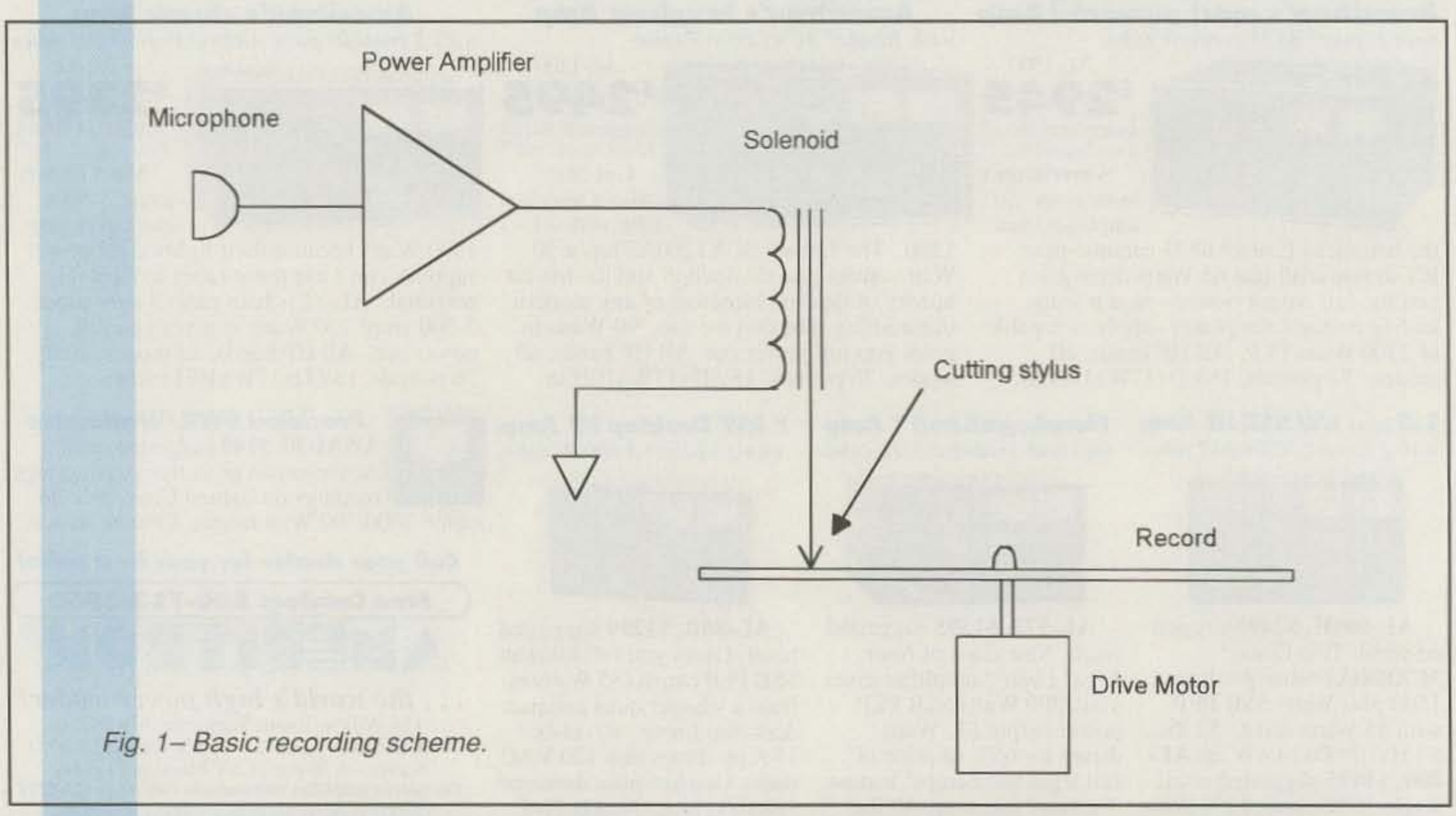

Fig. 1– Basic recording scheme.

technique) obviously vibrated in step with the sounds in the room just like the diaphragm in a microphone that vibrates when sound waves hit it. If he used a fine enough brush, each hair of that brush moving on the vibrating canvas traced a line, in the paint, that almost certainly produced a groove with audio variations—just like the cutting stylus of the 20th century recording equipment. Unfortunately, the line lengths were not uniform nor was the speed of the brush constant, but it is a sure bet that bits of audio were recorded. In fact, almost any artist painting any type of picture with lines of any significant length no doubt did the same. It is now up to us to figure out a way to recover these sounds.

One way that immediately comes to mind is to obtain one of the older models of phonograph cartridges of the type that held the needle in a small chuck. You could then remove the needle and replace it with one bristle plucked from a modern paint brush. The cartridge would then be placed in some sort of handle for ease of use. Now simply connect the output of the phonograph cartridge to a common audio amplifier (one with a "phono" input) and you are ready to start searching. The technique is to lightly brush your "pickup" over any straight-line segment in an old picture. You will have to experiment with the speed of your "brushing" and the direction as well, but if you are lucky and develop the correct technique) you may actually recover a bit of sound. Obviously, you would have a hard time getting permission to brush your pickup over the actual Mona Lisa, but you might try the procedure with a less expensive painting to develop the right technique. Remember, any audio recovered would only be in very short bursts, the length of a painted segment. By connecting the output of the amplifier to a tape recorder, you could then record each burst segment and try to reorganize the segments into coherent sound. For this purpose a digital audio recorder would come in handy.

Now let's travel even farther back in time. In fact, let's really take a "leap of faith" and try to listen to sounds recorded many thousands of years ago. Consider some of the older pottery made by hand by ancient man. If a particular pot happened to be made on a rotating table from wet clay, some of the lines around the circumference of the pot would have been made by lightly brushing the fingers into the clay. Any sound in the area therefore easily could have been recorded in the same manner. Here the "needle" would be the size of a finger, but the principle would still be the same. In fact, in this example you could have long stretches of sound, since the distance around the pot lent itself to long recording grooves.

If you think about it, any movement that has occurred in the past is a potential recording of sounds that were produced in the immediate vicinity. This could even be extended to include anything from a tree branch tracing a line in the mud to the grove cut by a slave into a stone block while polishing stone for an Egyptian pyramid.

With enough time and patience it is possible that you could collect a rather impressive file of "sounds from the past." Let us know what you hear!

73, Irwin, WA2NDM

World Of Ideas

BY DAVE INGRAM, K4TWJ

A Look At The World Around Us

Keys 2002—New, Old, and Always Terrific! Part II

Plus The New "Adopt-A-Depot" Program

Did our unique key views and telegraphic tales featured in Part I last month boost your interest in CW, friends? Are you ready for more Morse magic and a special "get involved" project? (Need we even ask?) Well, the fun and excitement start right now, and the main attraction is a new program to promote greater public awareness of both landline telegraphy and amateur radio today, tomorrow, and beyond. I call this endeavor "Adopt-A-Depot." It is open to amateurs of all license classes and is the perfect way to give something back to the super hobby that has brought all of us so much enjoyment over the years. What is this plan, why depots, and how do you fit into the picture? Read on!

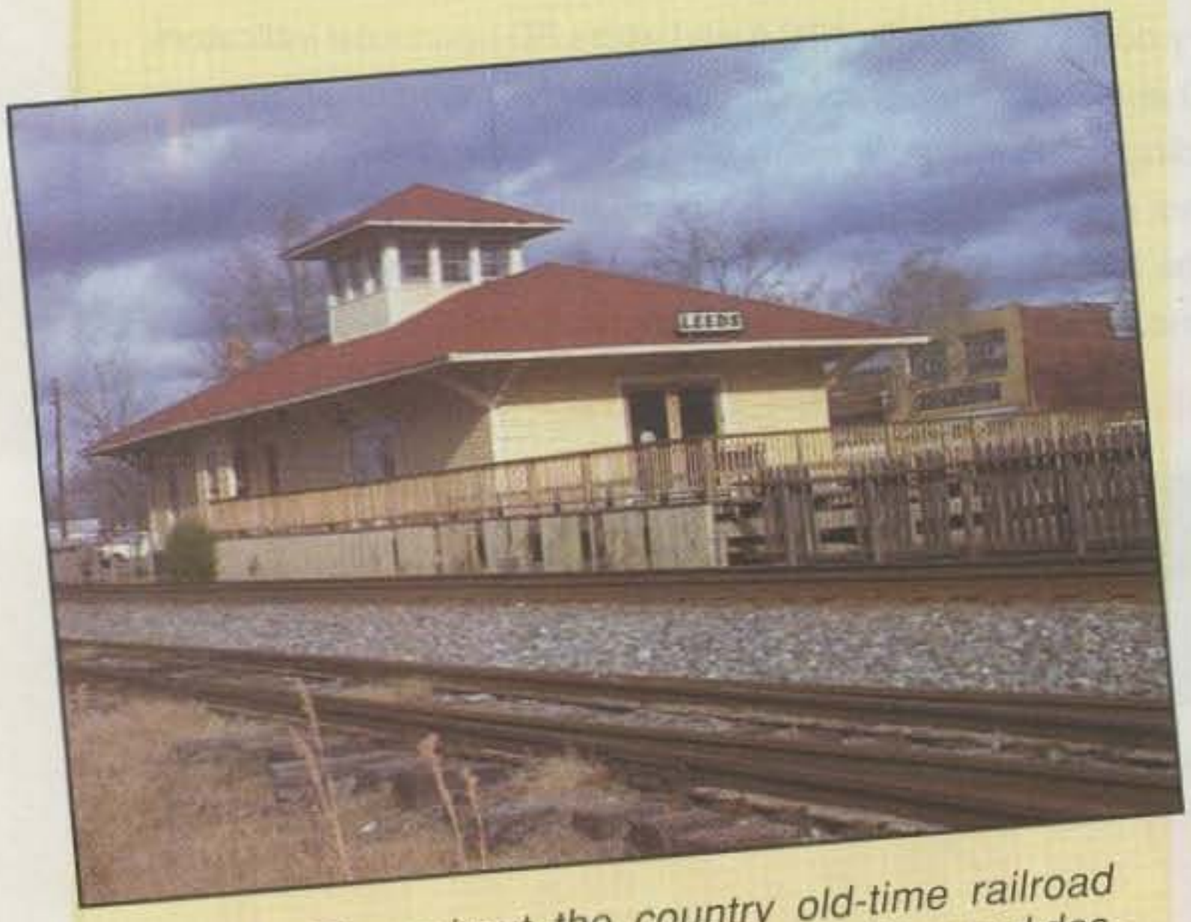

Photo 1– Throughout the country old-time railroad depots are being restored to original condition and designated classic landmarks, historical sites, museums, and/or Chamber of Commerce offices. Our Adopt-A-Depot program involves ensuring original-era telegraph equipment, plus information on how to get started in amateur radio, is prominently displayed and maintained in every depot. It also embraces supporting individuals and groups with existing gear and continuing our proud legacy into the future. Is there a depot in your area? Check it out! (Photo by Tom Desaulniers, K4VIZ)

Simply explained, Adopt-A-Depot involves placing small, yet functional telegraph setups—complete with documentation on their use, donors, and relationship to amateur radio—in restored railroad depots nationwide. Every setup obviously would be different, but a basic system would include a key, sounder, battery, copy of the Morse code, and brochures on how to learn more about telegraphy and amateur radio today. A more deluxe installation might include a KOB (Key On Board) practice set and/or second telegraph setup so the two "stations" could exchange messages, pique curiosity, and spark amateur radio interest. The logic behind Adopt-A-Depot for displaying classic telegraph gear is quite simple. Townships, rotary clubs, and civic groups across the country are restoring old-time railroad depots and maintaining them as historical sites, museums, and/or famous landmarks. Some are also being used for town and club meeting halls and Chamber of Commerce offices (photo 1). During my recent travels I saw one depot boarded up and awaiting rescue and another being modified into an upscale restaurant. All of these places are ideal locations for people to discover amateur radio in their own naturally curious way!

Thanks to original-era, retired telegraphers, the Society of Wireless Pioneers, and the nationally acclaimed Morse Telegraph Club, a creditable number of depots nationwide should presently have some form of telegraph gear on display. I do not advocate upstaging any of that historically significant gear, but rather supporting it and its donors plus complementing it with an amateur-radio-documented link. If the original donor is unknown, I encourage acting as its ongoing caretaker or curator and training a next-generation amateur to continue the program if something happens to you. In my opinion, we cannot—we must not—leave such a noteworthy mission to blind fate or disinterested parties of future times. We alone are responsible for carrying forth the proud works and traditions of our forefathers and enjoying the gratification of a "job done right."

It takes someone or some group quite special to Adopt-A-Depot, someone with a high level of interest and enthusiasm to stay dedicated over the long run. That person or group must also be sufficiently motivated to continue the endeavor possibly even without encouragement, support, or apparent appreciation. The only reward is knowing you are helping preserve an important part of communications history and writing your name in the annals of time.

Do you have such dedication? Can you set up a classic key, bug, and sounder plus papers explaining the gear, Morse code, and how/where to learn more about amateur radio? Go for it! Take some photos of your work, tell us what you did, and we will feature you in a future keys column. We may even expand the program to include an annual Depots-On-The-Air operating event. We also need an enthusiastic person(s) to set up a website for collecting, cataloging, and exchanging notes, papers, and information among all Adopt-A-Depot enthusiasts. Can *you* handle the challenge?

I would like to hear from you, preferably via postal mail with an SASE so I can read your note and scribble a *brief* reply to you while flying to hamfests or sightseeing in Tijuana!

I sense you now are anxious to read about the keys pictured herein, so let's jump to the views. As you probably expect, they all have a landline telegraph connection.

Extra Special Semis

Although hand keys were used by necessity during the early years of landline telegraphy (approximately 1850 to 1902),

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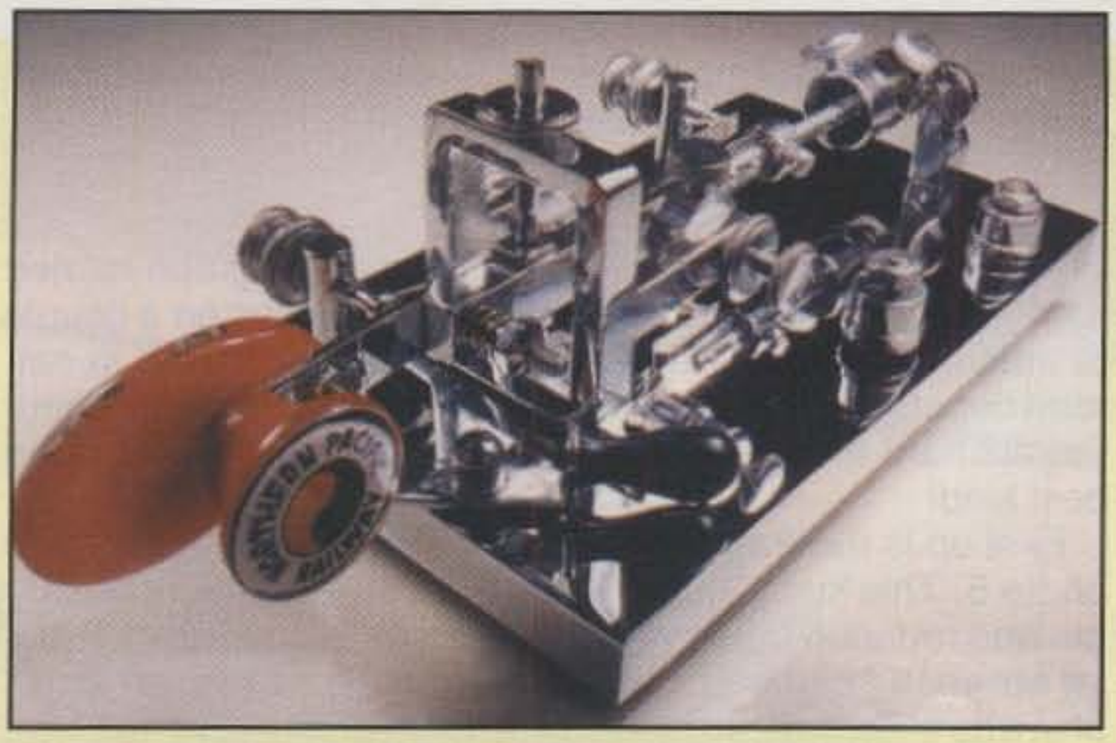

Photo 2– This dazzling work of art was rescued from extinction by John Bipes, KØYQX, in Minnesota. John restored it, had it rechromed, and then made custom fingerpieces with Northern Pacific Railway logos inlaid in the red plastic. Now this is a beauty any depot could display with pride! (Photo by KØYQX)

Photo 4– A slightly later version of the 73 bug with its cover fully removed for study. Notice this version's mechanism is similar to the earlier version, but includes interchangeable parts that can be shifted around or "field configured" to produce a single- or dual-lever, right- or left-hand bug.

Photo 3– This palm-size bug was designed by a railroad telegrapher during the 1920s, and a small number were both landline telegraphers and radio amateurs. Examine it and you will see it is akin to a regulator movement around each other to reduce friction. Indicated key collector

Photo 5– The look of old wild west telegraphy flourishes from every viewing angle of this classic Patrick and Carter hand key. Notice its oval base, pressed-into-arm trunnion/pivot pin, and step-lever arm, all indicated of a pre-1900 item.

finger-chroming job and that neat, round Northern (actually, custom molded into) the What a prize! In talking at a local hobby

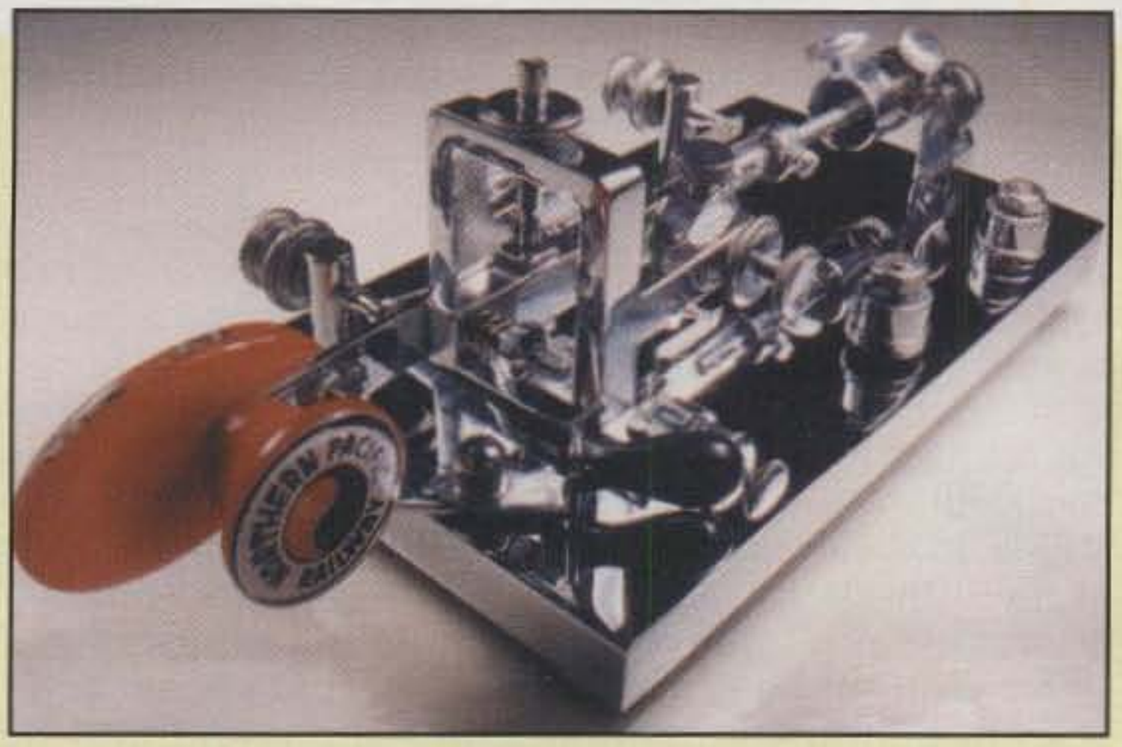

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Photo 4– A slightly later version of the 73 bug with its cover fully removed for study. Notice this version's mechanism is similar to the earlier version, but includes interchangeable parts that can be shifted around or "field configured" to produce a single- or dual-lever, right- or left-hand bug.

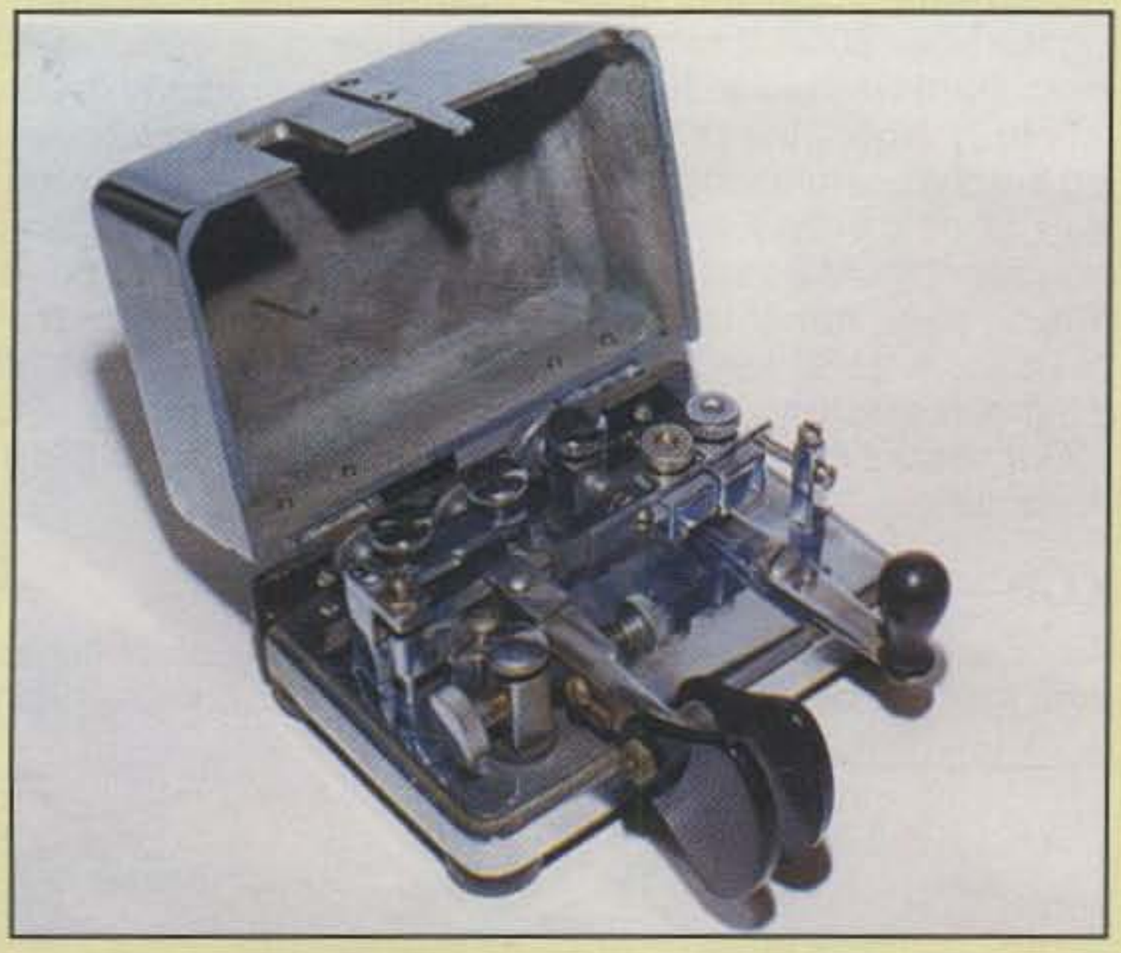

Photo 3– This palm-size bug was designed by a railroad telegrapher during the 1920s, and a small number were sold to both landline telegraphers and radio amateurs. Study the mechanism, and you will see it is akin to a regular bug with its parts folded around each other to reduce size. (Photos 3 through 9 courtesy dedicated key collector Gil Schlehman, K9WDY)

Photo 5– The look of old wild west telegraphy flourishes from every viewing angle of this classic Patrick and Carter hand key. Notice its oval base, pressed-into-arm trunnion/pivot pin, and step-lever arm, all indicative of a pre-1900 item.

semi-automatic keys, or "bugs," gave it a special touch of glamour during following decades. Unlike Western Union operators who were legally restricted to using Vibroplex keys, railroad telegraphers were allowed to use all types of flashy bugs. They enjoyed working Morse code almost as much as radio amateurs did!

In light of that fact, our first featured delight is the breathtaking showpiece John Bipes, KØYQX, rescued from extinction and lovingly restored to better-than-new condition (photo 2). We are unsure of this little orphan's history, but since it lacks a nameplate and has an unusual Speed-X-looking rear damper, we doubt if it is a Vibroplex. Ah, but look at that marvelous re-chroming job and that neat, round Northern Pacific Railway logo on (actually, custom molded into) the handmade replacement fingerpiece. What a prize! In talking with John, I learned he purchased the logo at a local hobby shop. He then stuck it on his red-dyed, plastic, resin fingerpiece; covered it with clear plastic resin; and shaped/polished the fingerpiece to a high luster. Wow!

Another unique bug with railroad ties (no pun intended!) is shown in photo 3. This palm-size gem is called the "73 Bug." It was designed by an active railroad telegrapher and produced by the Ultimate Transmitter Company of Los Angeles during the 1920s. The bug measures 2 1/2 by 3 1/2 inches, and

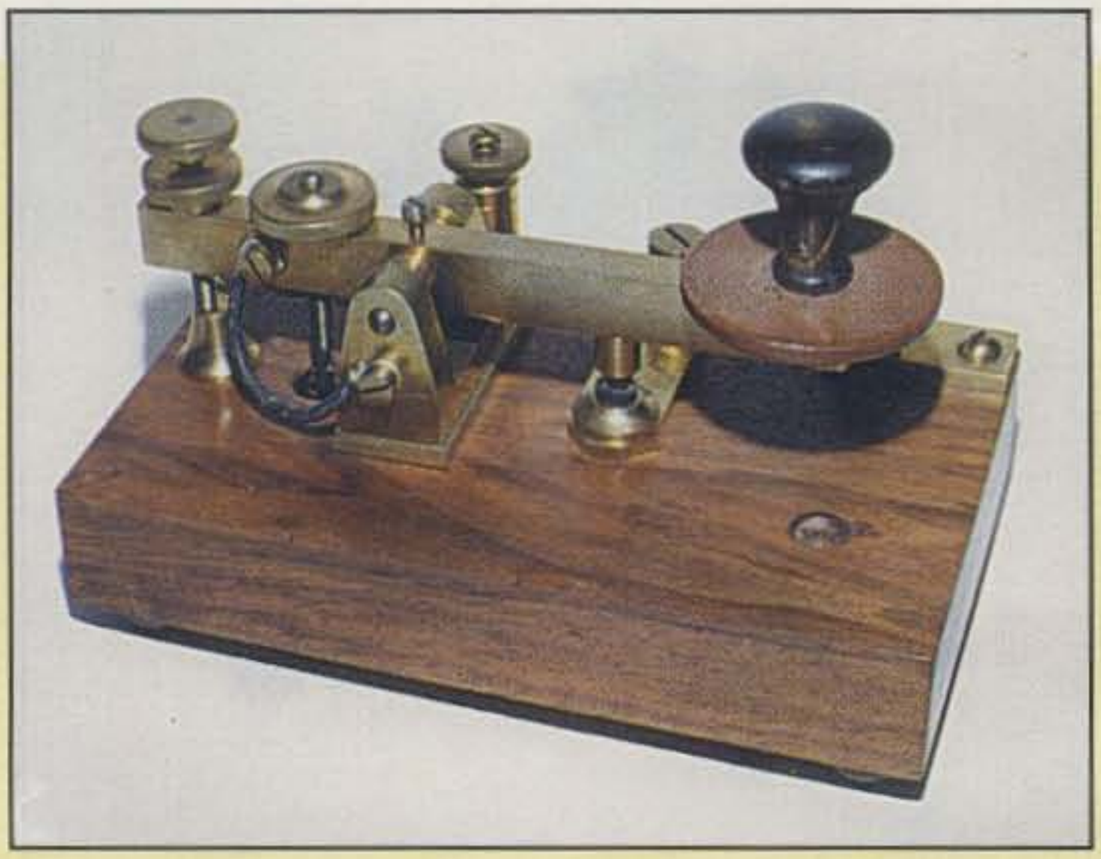

Photo 6– This DuCretet and Rogers pump key glows with the look of old-time telegraphy in a European railroad depot. The fulcrum assembly and rear "pull down" tension spring in particular reflect classic British influence.

its hinged cover has been raised so we can study the mechanism. Notice the main lever, mainspring, and vibrating pendulum (with dual square weights) are located diagonally across the bug's rear area and at a right angle to the fingerpiece. The pendulum's damper is on the extreme right side, dot contacts are in the right rear area (to the left of the weight), and dash contacts are in the left front area.

If that does not blow you away, check out the more versatile and removable top version of 73 bug shown in photo 4. This one has interchangeable parts and locking levers so it can be field-configured as a single or dual lever and right- or left-hand bug. Incredible!

Thanks to dedicated key collector Gil Schlehman, K9WDY, for sharing views of these bugs plus the upcoming hand keys and Key-On-Board practice sets.

Prized Pumpers

We are striving to cover a wide range of telegraph-related items in this month's column, so let's now focus on a couple of authentic wood-based keys typical of types used in railroad depots of yesteryear. Needless to say, these little beauties are hard-to-find, historically significant collectables of the best kind!

First up is the Patrick and Carter step-lever key shown in photo 5. This key's split-level arm with press-fitted trunnion pin and rounded frame are synonymous with designs popular between 1860 and 1880, the time when landline telegraphy was starting its massive growth. The split-level key and its close cousin, the camelback key, were also first-era attempts to minimize "telegrapher's cramp," or carpal tunnel syndrome, from constant key use. Today this key and many others similar to it stand as proud momentos of telegraph's early days. They may not look exotic, but each one is as cherished as a fine 150-year-old painting and equally worthy of pursuing.

Our next pumper was made by DuCretet and Rogers during the late 1800s. It exhibits British influence in design and looks like it was pulled right out of a European railroad depot (photo 6). Notice the stubby arm, center-top set screw securing the pivot's trunnion pin, and "smokestack" knob with wide skirt. Look carefully and you will also notice the arm's tension spring pulls down on the arm from behind the pivot point "British style" rather than pushing up from in front of the fulcrum like a "U.S." key. This gem is also a priceless piece of telegraphic history.

Our special thanks to Gil Schlehman, K9WDY, for sharing these views.

KOB—Key On Board

Key On Board or telegraph practice sets are popular items among collectors of Morse-related items and also make neat

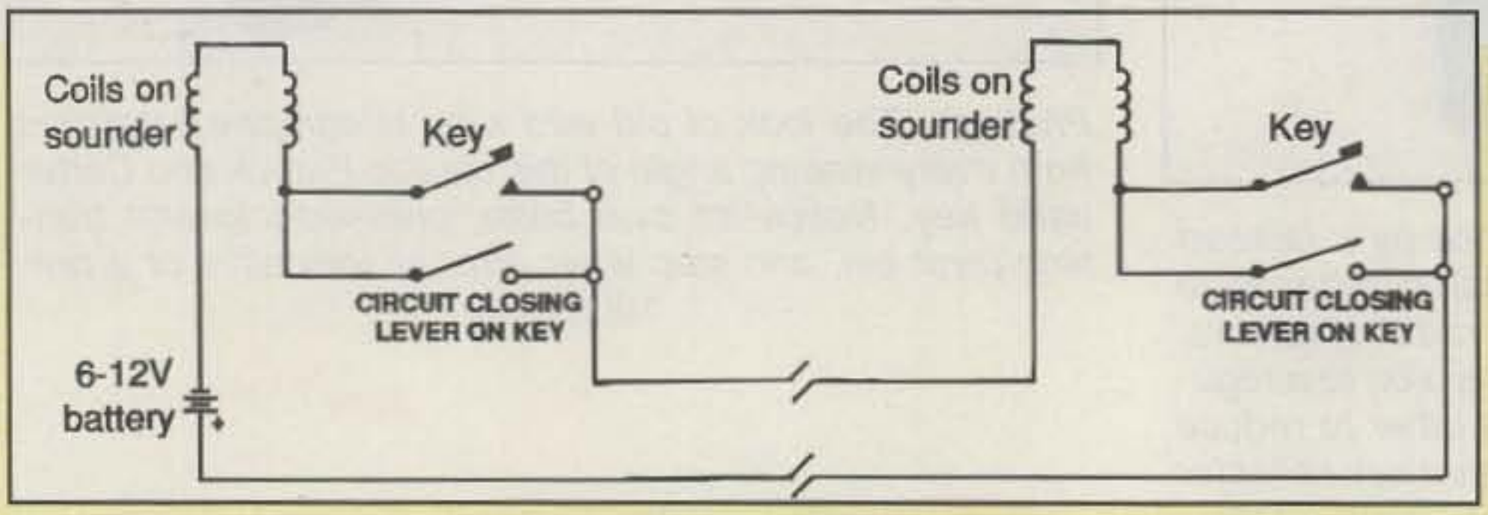

Fig. 1– Wiring diagram for interconnecting KOBs to simulate landline telegraphy. (Discussion in text.)

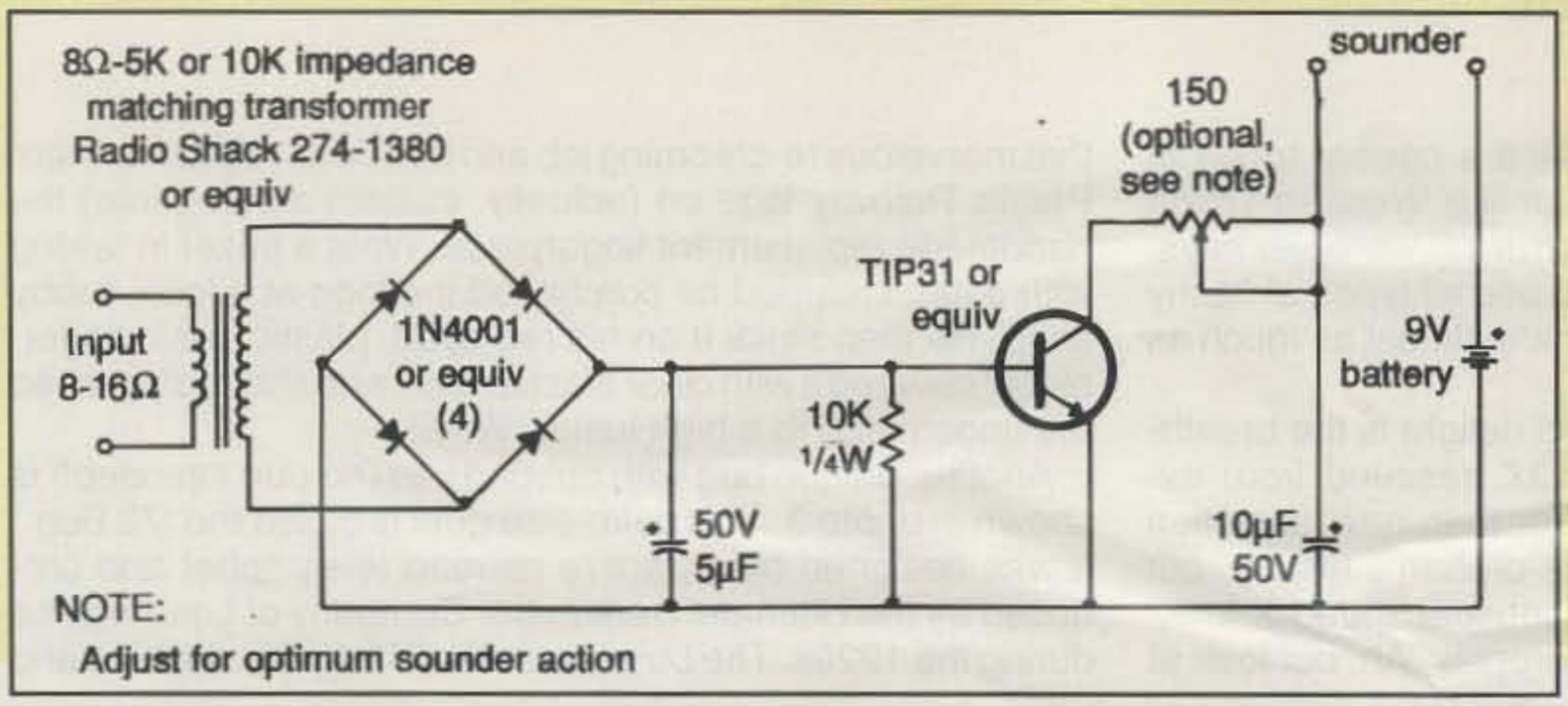

Fig. 2– Simple interface circuit for operating a classic landline telegraph sounder from speaker-output CW on a modern transceiver. A 5 or 10 watt adjustable resistor of 0 to 150 ohms can be added in series with the collector of Q1 for optimizing sounder action, if desired. (Circuit courtesy AD9E)

Photo 7– Every KOB, or Key (with sounder) On Board, is a fascinating study in telegraphic history. This particular model was made by Jerome Redding Company and is quite deluxe in appearance. Notice the gold -leaf pinstriping and camelback key with all-brass arm. Classy!

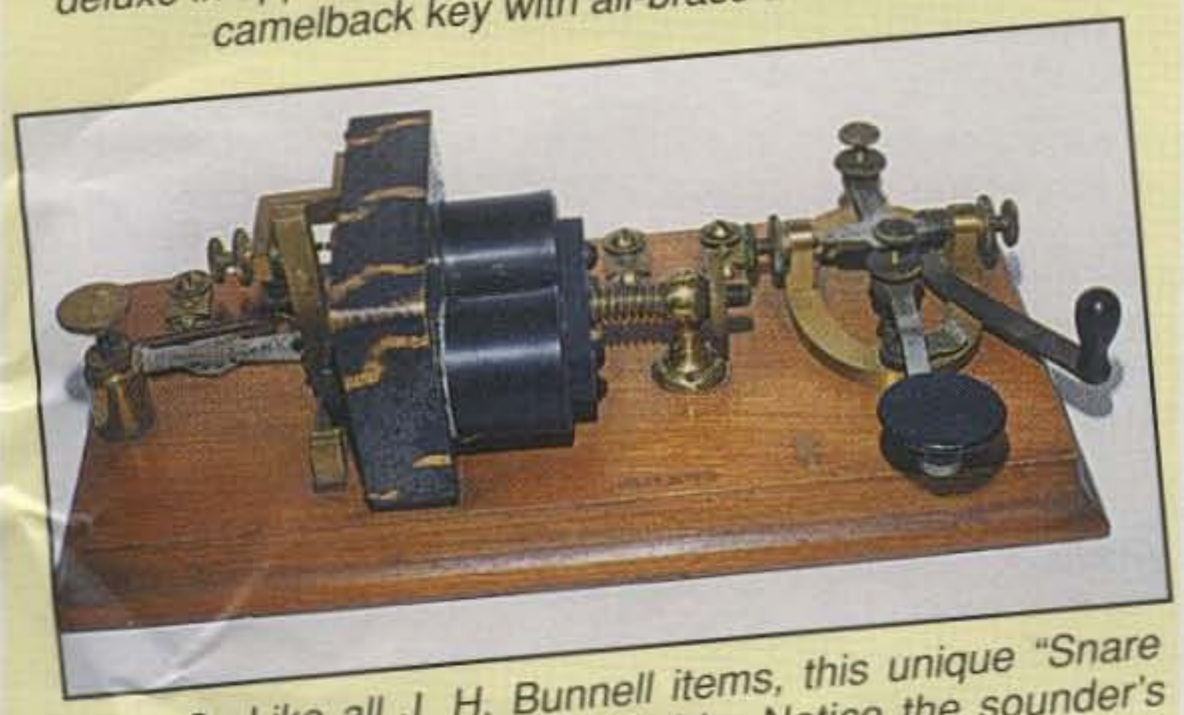

Photo 8– Like all J. H. Bunnell items, this unique "Snare Drum" KOB is a prized collectable. Notice the sounder's unusual design and vertically-positioned arm, together producing a snare-drum sound.

stand-alone setups for on-the-spot demonstrations of landline telegraphy. A fairly large number of KOBs were made, so finding one today should not be too difficult for a sharp-eyed collector. Getting it working should also be easy. As shown in fig. 1, the unit's sounder and key simply are wired in series. If a second KOB is available, the two units plus a battery of usually 6 volts are all wired in series to produce a complete two-station telegraph system. Place the two units on opposite corners of a large room, and you have a real attention-catching display.

Like to have some real fun with a KOB or sounder? Quickly assemble an interface circuit as shown in fig. 2, connect it between your receiver and sounder, and then let the "click-clack" sounds of classic telegraphy fill your shack (or an adopted depot). What a blast! The interface circuit was passed to me a few years ago by Morse Telegraph Club President Bill Dunbar, AD9E. It is a basic audio tone-to-DC voltage converter with Q1 passing current to activate the sounder's coil according to rectified input tones on its base.

Space is now very tight, so let's quickly look at some terrific KOBs courtesy of Gil, K9WDY (photos 7, 8, and 9). Notice the Jerome Redding-produced unit is really first class with an all-brass sounder bar and key arm (which is also a camel-

Looking Ahead in CQ

Here are some of the articles that we're working on for upcoming issues of *CQ*:

• "CQ National Foxhunting Weekend—2001 Results, 2002 Announcement"

• "*CQ* Reviews: High Sierra HS-1500MkII Antenna," by WB6NOA

• "An Electrically-Shortened Two-Band Dipole," by VE3ERP

Plus...

"An Automatic Power Supply/Battery Charger," by K7PF

"Confessions of a Radio Modifier (Butcher)," by KØGRM

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

Photo 9– This later KOB with buzzer was designed more for radio than telegraph practice and was made by the William B. Duck Company. This famous manufacturer was also well known for its loose couplers, crystal sets, and other spark-era apparatus.

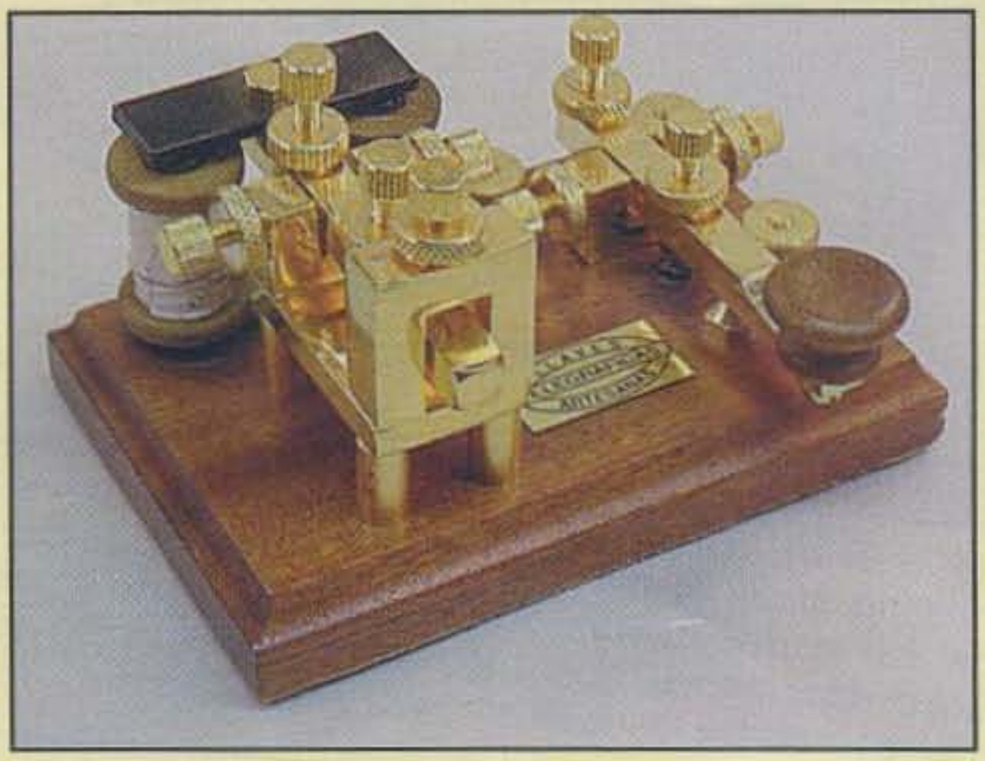

Photo 10– Here is a brand-new KOB with sounder made in Spain and available in the U.S. from N1FN of Morse Express. It sports a glamorous gold-plated mechanism on a smart-looking wood base, operates from a regular 9 volt battery, and is the perfect way to add sparkle to an adopt ed depot. (Photo via N1FN)

back), plus gold-leaf pinstriping on both the key and sounder—very impressive! The J. H. Bunnell "Snare Drum" KOB (photo 8) acquired its name from its unique sound and vertically positioned sounder arm (most sounders have horizontally positioned arms). Adjustments for the coils and tensions are also unusual. Finally, the William B. Duck KOB in photo 9 represents a later-generation item. Rather than a telegraph sounder, it sports a radio tone-simulating buzzer and a blinking light. This unit also inspired a fascinating series of toy telegraph sets that became popular during the 1940s and '50s. If all goes as planned, some of those items will be highlighted in our next "Keys Special."

Our concluding item is a brand-new treat guaranteed to add genuine telegraphic flash and flavor to any shack, office desk, or railroad depot: the polished wood and gold-plated KOB shown in photo 10. This "Telegrapho" unit is made by LTA in Spain, imported to the U.S. by Marshall Emm, N1FN, of Morse Express, and sells for slightly more than $100. It is a fully functional practice set, and the only deluxe KOB with a sounder built in at least 30 years. It operates from a regular 9 volt battery or 12 volt supply, and it also works with our rig-to-sounder converter previously featured. Awesome! You can purchase one by contacting Morse Express, 2460 S. Moline Way, Aurora, CO 80014, telephone 1-800-238-8205, or <www.MorseX.com>.

Wrap Up

Enthusiasm for keys and CW has overflowed column space (again!). Yes, and the good news is still coming in. G4ZPY is preparing to reveal a new key; KD6VDH is starting work on two new mini keys; RA1AOM is developing a new miniature paddle; and his friend Gregory Ulsamer, DL1BFE, has written a new collector's guide on keys, *Faszination Morsetasten*.

Locally I have heard some fans were paying two and three times the published price for used copies of my *Keys, Keys, Keys* book, and K4UE passed along a printout from e-Bay with a copy going for $46. I am flattered! Note, however, that *CQ* still has books in stock, and they are priced at just $5.95 each plus $2.00 shipping and handling. More rare and exotic keys are also featured in my popular *Keys II* book, which is available directly from me. Are you collecting the series? Hold on to them; I am now working on a third keys book, and it will be an absolute gem!

73, Dave, K4TWJ

Show Us Your Keys!

Do you use or make a special key or paddle? Pass along some photos and details to me via postal mail (4941 Scenic View Drive, Birmingham, AL 35210) and let's get some recognition going your way! Questions? Telephone me at 205-951-0162. —*K4TWJ*

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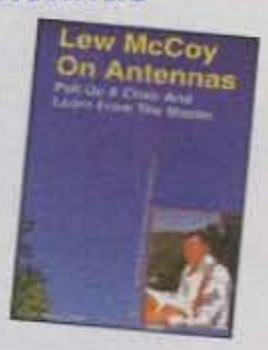

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Digital Wireless

Packet Radio and Beyond

BY STEVE STROH, N8GNJ

Broadband Wireless Internet Access and Amateur Radio

In my day job of writing about developments and technology in the Broadband Wireless Internet Access industry, I'm privileged to get to talk to some of the brightest folks I've ever met. As part of my job, I interview Chief Executive Officers, Chief Technical Officers, and lots of people who have marketing and financial backgrounds. Because of the nature of my questions, I'm occasionally asked what my journalism or technical background is. That's when I confess to them that my "foundation" knowledge about wireless data communication stems from my experiences with amateur radio digital communications. That's almost always one they haven't heard before.

Steeped as I am in both amateur radio digital communications and now Broadband Wireless Internet Access, I'm constantly encountering "connections" between the two worlds. The most recent example of this is "mesh networking," one of the latest technologies to emerge in the BWIA industry. Ensuring a full-coverage area, especially at frequencies beginning at 2 GHz, is a challenge, and the BWIA industry has evolved a number of NLOS (Near, or Non Line Of Sight) technologies that help enhance coverage, such as taking advantage of multipath. However, there are plenty of situations in which NLOS simply cannot help. Increasingly, mesh networking is the answer to such coverage issues, and a number of new companies in the BWIA industry are coming out with products that incorporate mesh networking. At a recent conference I interviewed several of these companies and we compared notes about just how many implementations of mesh networking there were currently. My version of that list ran considerably longer than others, and I included in that list amateur radio networking.

I remember vividly the heady days in the late '80s /early '90s when Net/ROM reigned supreme and we seemed well on our way to developing a national network of interconnected nodes. The overall concept of Net/ROM—a wireless network with multiple dynamically formed links—is the essence of mesh networking. Before that, the inherent ability of each Terminal Node Controller (TNC) to act as a relay point (digipeater) or make use of a relay point/digipeater was something we took for granted... but is just now beginning to make its way into common practice in the BWIA and wireless data industries.

There are numerous other examples that space doesn't allow me to delve into, such as

- The elegant short messaging system via internet that's grown to be an integral part of Automatic Position Reporting System (APRS) before the rise of Short Messaging Services (SMS) on mobile phones.
- That the two big dedicated wireless data networks in the US: Cingular Interactive (formerly BellSouth Wireless Data, Mobitex) and Motient (formerly ARDIS) don't offer speeds much greater than 9600 baud, which amateur radio has easily achieved.
- APRS integrating Global Position System (GPS) receivers into "user stations" and transmitting the positioning info, predating such GPS receiver integration into cell phones for positioning info for 911 calls.
- That the innovative Ricochet wireless internet access system (another example of mesh networking often overlooked) was inspired by early Net/ROM networks in California.
- That Dataradio Corporation, which claims to be "a leading designer and manufacturer of advanced wireless data products and systems for mission critical applications" was founded by Montreal amateur radio operators on the basis of the first amateur packet radio experiments.

When I tell people in the BWIA industry about my "foundation" knowledge in amateur radio, I do so absolutely without shame or embarrassment. My amateur radio experience has served me very well, and continues to do so.

In one of the most recent issues of my newsletter, "Focus On Broadband Wireless Internet Access," I wrote about what it takes to begin a Wireless Internet Service Provider. One of the points I made was that RF knowledge is no longer optional. At one point it was possible to learn about RF as you went along. That's simply not the case in 2002; mistakes are too costly in money, time, and customer satisfaction. Amateur radio is one place where you can, in fact, learn RF "on the job." I'm observing a small, but detectable rise in the number of amateurs involved in the Broadband Wireless Internet Access industry and that's no surprise to me. It's a lot easier to teach a person who knows RF about networking than it is to teach a person who knows networking about RF. Extrapolating from a networking background, RF should be easy—just physics, right? RF should be just a different type of network, right? We amateur radio operators know only too well, however, that there's a significant amount of "art" in RF. It's not "just" science.

One last mention about BWIA: In many communities, especially small and rural ones, there's a dearth of broadband internet options. DSL and cable modems are only rarely available. Satellite-based Broadband Internet Access is available, but it has irritating latency and congestion issues. That leaves wireless. If your community doesn't have broadband internet access and you'd be interested in being involved, talk to your local Internet Service Provider. Chances are good that he or she is considering wireless and might need the help of someone who knows RF.

56K Packet Radio

Dale Heatherington, WA4DSY, debuted 56K technology to amateur radio with great fanfare in 1987, and it seemed like the wave of the future. In short order there were numerous add-on developments:

- Gracilis debuted a PC interface card and standalone TCP/IP router intended for use with WA4DSY modems.
- Georgia Radio Amateur Packet Enthusiasts Society (GRAPES) offered the WA4DSY 56K modem kit for sale.
- The Packet Working Group of the Ottawa Amateur Radio Club debuted the Packet Interface (PI) card and later the much improved PI-2 card intended for use with WA4DSY modems.
- The Awesome I/O Card, a high-performance PC interface card, and the PS-186, a high-performance stand-

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alone 4-port TCP/IP switch are described at various Digital Communications Conferences.

• As partial compensation for the loss of 220–222 MHz, the ARRL secures the conditional use of 219–220 MHz for high-speed amateur radio point-to-point links. 219–220 MHz is proposed to be divided into ten 100 kHz channels to allow use of WA4DSK 56K modems.

• 56K repeaters and networks were constructed in Ottawa, QC; Atlanta, GA; Chicago, IL; Vancouver, BC; and perhaps other areas.

In 2002...

• The Gracilis product line was absorbed by PacComm Packet Radio Systems, who ended up not being able to actually sell Gracilis products due to lack of support from Gracilis.

• WA4DSY's cost-reduced, greatly simplified 56K "v2" modem was commercialized by PacComm, who has stated that once current stock is exhausted, WA4DSY modems will be discontinued.

• The Packet Working Group is out of the PI2 card business, the intellectual property given over to TAPR, which has no plans to offer the PI2 as a product.

• The Awesome I/O Card and PS-186 never emerged as actual products.

• I've queried the ARRL several times, and knowledgeable personnel are unable to cite, from actual knowledge, any actual amateur radio use of 219–220 MHz (in fairness, some of the conditions for use make it difficult to use).

• WA4DSY reports that "interest in 56k packet here in the Atlanta area has dropped to zero." A similar situation is reported in for the Vancouver 56K systems. Likely the situation is similar in Chicago and Ottawa, if in fact 56K systems are even still on the air.

Why?

56K was expensive compared to "conventional" packet radio. The 56K modem cost several hundred dollars; not just the commercial version, but even a kit or do-it-yourself project isn't much cheaper. Not only did you need the modem, but you needed a transverter to go from the 28 MHz output of the modem to the band of your choice —another several hundred dollars. Of course, you needed a high-speed 56K interface card; that was relatively cheap at $100 to $200.

The other factor was that WA4DSY's modem required 100 kHz of dedicated bandwidth, so a UHF repeater required a 100 kHz transmit channel and a 100 kHz receive channel. Few urban areas, where the interest was the greatest, had that much vacant adjacent spectrum available. One daunting task in building a 56K repeater was the duplexer; it had to be custom-made to accommodate the 100 kHz channels. Building such a duplexer or financing a commercial custom-made unit was a complex challenge.

56K users just gradually drifted away, and newcomers didn't come to replace them.

In Seattle we're a bit luckier. Dennis Rosenauer, AC7FT/VE7BPE, is an RF Design Engineer working in the Seattle area. Dennis built and installed the two Vancouver 56K repeaters using his own independent design of the WA4DSY 56K modem and a matching synthesized UHF transverter. Dennis noted the lack of use of one of the 56K repeaters (on Sumas) and decided to see if he could find a home for it closer to him in the Seattle area. As of January, the Puget Sound Amateur Radio TCP/IP Group (which prefers to be known as "the WetNET Group") has tentatively identified a temporary location for the 56K repeater, and perhaps

sufficient vacant spectrum on UHF in which to operate it. (The WetNET Group's newly revised web page is now online at <http://www.seatcp.net>.)

Finding 56K equipment, given the situation outlined above, will be a bit of a challenge. The biggest challenge is the issue of interface cards. I'll provide updates the Seattle 56K repeater project evolves.

802.11

I've written several times about 802.11b (11 Mbps), also known as "Wi-Fi," equipment and that I think amateur radio operators should be working to familiarize themselves with 802.11b. Don't think "limited range RF"; think "Ethernet cable and hub, without the hassle of wires." Hams use Ethernet cable all the time now.... they shouldn't be intimidated by 802.11b.

I haven't seen any 802.11b equipment that I was the least bit tempted to recommend to hams to become familiar with 802.11b... until now.

The Linksys (<www.linksys.com>) WAP11 meets most of my criteria for what's needed in an 802.11 system hams would be interested in:

- It's inexpensive at $100 to $200. Watch for sales at CompUSA, Office Depot, etc.
- It has non-integral antennas. The rubber-duck antennas are on connectors.
- It has a hub *and* a client mode (most 802.11 access points are hubs only).

The WAP11 has some issues that you should be aware of:

- Linksys's reputation for support is terrible (but the community support for the WAP-11 is very good). If a WAP11 has problems out of warranty, there's no repair-for-fee offered. You simply have to buy a new one.
- It can be tough to configure; you might be in for a frustrating experience, especially if you're not a Windows user.
- In "client" mode, the WAP11 will *only* communicate another WAP11 (running in access point mode). Apparently, the "client" communication is implemented in a proprietary way.
- There's no repeater (hams would call it digipeater) mode (although

The 2002 Digital Communications Conference

This information is slightly in advance of the actual, blessed press release, but the essentials won't change.

The 21st Annual ARRL and TAPR Digital Communications Conference will be held September 13–15, 2002 at the Denver Marriott Southeast Hotel, 6363 East Hampden Avenue, Denver, CO 80222 (303-758-7000, <www.marriott.com>). Mark your calendar and start making plans to attend the premier technical conference of the year.

The conference is an international forum for radio amateurs to meet, publish their work, and present new ideas and techniques. Presenters and attendees will have the opportunity to exchange ideas and learn about recent hardware and software advances, theories, experimental results, and practical applications. Topics include, but are not limited to, software-defined radio (SDR), digital voice, digital satellite communications, spread spectrum, global position system, Automatic Position Reporting System (APRS), Precise Timing, HF digital modes, and Digital Signal Processing (DSP). To which I add the following:

- Sort messaging (a mode of APRS)
- Internet interoperability with amateur radio networks
- Mesh/peer-to-peer wireless networking
- Amateur radio use of 802.11 technologies
- Emergency/Homeland Defense backup digital communications
- Examples of commercial wireless digital communications practice that are applicable to amateur radio communications
- Using TCP/IP networking over amateur radio
- Use of Linux in amateur radio
- Updates on AX.25 and other wireless networking protocols.

The conference is for all levels of technical experience, not just for the expert. Not only is the conference technically stimulating, it is a weekend of fun for all who have more than a casual interest in any of the amateur digital communications.

This is a must-attend conference. Now, more than ever, amateur radio needs this great meeting of the minds to demonstrate a continued need for the frequency allocations we now have by pushing forward and documenting our achievements. The conference is the best way to record our accomplishments and challenge each other to do more. This is where the radio art is advanced!

Technical papers are solicited for presentation at the meeting and publication in the annual conference proceedings published by the ARRL. Presentation at the conference is not required for publication. Submission of papers is due by August 5, 2002.

Registration details and updates are available at <http://www.tapr.org/dcc>.

Linksys continues to update WAP11 firmware, so a repeater mode isn't out of the question).

In practice, what makes the WAP11 so interesting is most 802.11b devices are either Access Points *or* clients, but not both. Most client 802.11b devices are PC cards for laptops or slot cards for desktops. It's relatively rare to have an 802.11b Access Point, with the ability to remote it via Ethernet cable and the ability to use external antennas that can function in client mode. Two WAP11s can form an inexpensive, high-speed, short-range link with one WAP11 configured as an access point and the other as a client. You can also form a network with one WAP11 configured as an access point (in a high-profile location, much like a repeater or digipeater would be), and a number of WAP11s configured as clients connecting to the access point.

The Big Gotcha

Modifying a Part 15 device, even attaching external antennas, is a violation of FCC Part 15 rules. A Part 15 certification is certification for the *system,* not just the "radio." Modifications void the "implied license for this device to transmit." "Amateur radio" modification of a Part 15 device is permitted, *if* you are able to modify the device in such a way that transmissions are restricted to the amateur radio segment of the 2.4 GHz band. Since Linksys has not, and likely will not, release detailed enough information to be able to make such a change, "pure" amateur radio use of this device doesn't seem likely. In any case, before considering modifications, I recommend a thorough reading of the FCC Part 15.247 rules.

One of the best writeups on the WAP-11 is at the website: <http://www.practicallynetworked.com/reviews/linksys_wap11.asp>.

In Closing . . .

I *highly* recommend attending the 2002 Digital Communications Conference. Last year's DCC was a subdued affair (but still quite lively and interesting) in the aftermath of the events of 9/11/01. If you're reading this column and find it the least bit interesting, then you'll thoroughly enjoy attending the DCC, even if you have to go to some expense to travel there. It's total immersion in the technical aspects of amateur radio digital communications. You get to meet fascinating people doing fascinating things.

Because the DCC travels to different parts of North America each year, you get to meet different groups of people. One of the most memorable DCCs I attended was held in Colorado Springs, CO, where I met one of my personal heroes, Bdale Garbee, N3EUA, author of the very popular "Bits In The Basement" column in the TAPR "Packet Status Register" newsletter, on which I've mentally modeled this column on more than one occasion.

Space, and more important, time, is up for this column. In my next column I hope to tell you about:

- The Seattle Software Radio Project.
- My idea for a Wireless ISP Smart Radio and how it relates to amateur radio.
- A "repeater grade" 802.11b Access Point that could form the basis of an 802.11b network with long range.
- A line of high-speed radios and TNC-like devices from Germany (<http://www.symek.com/g/index-g.html> if you want to peek), and my impressions of their product line in the face of what has happened to 56K packet radio in the US.

73, and please write!
de Steve, N8GNJ

What's New

BY KARL T. THURBER, JR., W8FX

A New Column for A New Century

A Two-Year Anniversary

It was just two years ago that the "under construction" wraps came off our retitled column. With the name change from "The Digital Dipole" to "What's New," we dramatically expanded the column's scope. To recall, we no longer focused (as we had since 1980) strictly on antennas, antenna accessories, software, books, and computers. Instead, we now tackle a greatly expanded array of products as we examine what's exciting and new in amateur radio. Let's get started as we begin our third year of "What's New."

Antennas and Accessories For the Radio Shack

Fluidmotion SteppIR Remotely Adjustable Antennas. Fluidmotion Antenna Systems has introduced its SteppIR series remotely adjustable antennas, according to the company's Mike Mertel, K7IR, and John Mertel, WA7IR. The antennas are available as a dipole (photo A) or as a 2- or 3-element Yagi. The antennas are unique in that they allow for continuous frequency coverage between 20 and 6 meters, with an SWR close to 1:1.

Each antenna element consists of two spools of flat copper-strip conductor mounted in the antenna housing. The copper strips are perforated to allow a brushless stepper motor to drive them simultaneously with a sprocket for precise control of antenna length. The copper strip is driven out into hollow, lightweight fiberglass support elements, forming an element of any desired length up to 36 ft. long.

The fiberglass poles are telescoping, lightweight, and very durable. When fully collapsed, each element measures 48 in. in length, making it an ideal choice for either permanent or portable installation. The antenna is connected to a microprocessor-based controller via cable. Because the SteppIR antenna is tuned to its ideal length on every frequency, it can be optimized at every frequency without regard for bandwidth. This reportedly allows for the antenna to approach the gain of a monoband antenna at each frequency, with high front-to-back (F/B) ratios.

Photo A– Fluidmotion Antenna Systems has introduced its SteppIR series remotely adjustable antennas, which are available as a dipole (shown here being used as a vertical antenna on a boat) or as a 2- or 3-element Yagi. The antennas are unique in that they allow for continuous frequency coverage between 20 and 6 meters. Price ranges from about $440 for the dipole to $1000 for a 3-element beam. (Photo from the Fluidmotion website)

It is interesting to note that the Yagi version offers several unique features, including the 180-degree mode, which reverses the direction of the antenna by changing the lengths of the reflector and director, all in under three seconds. The Yagi also has a bidirectional mode, which is said to offer gain in two different directions simultaneously.

For more info, contact Fluidmotion Antenna Systems, 1075 Bellevue Way NE #107, Bellevue, WA 98004 (telephone 425-456-0200; e-mail: <sales@fluidmotion.ws>; web: <http://www.fluidmotion.ws>).

Focus on Nemal Electronics. Several times in the past we have updated readers on the latest from Nemal Electronics. As we pointed out, the firm is much more than an amateur radio cable supplier. Rather, it is a manufacturer and distributor of electronic cable, connectors, cable assemblies, and patch panels used in broadcast, RF, data, and electronic control applications. Nemal Electronics offers a complete line of precision audio, video, snake, and triax cables—more than 3000 cable and connector products, including all types of RF connectors and crimping tools.

The firm serves its customers from south Florida in its main, 14,000 sq. ft. North Miami building. The manufacturing capabilities include design, production, and testing of a wide variety of specialized cables and connectors.

For more information, contact Nemal Electronics International, Inc., 12240 N.E. 14th Ave., North Miami, FL 33161 (telephone 1-800-522-2253; e-mail: <info@nemal.com>; web: <http://www.nemal.com>). We should mention that the entire Nemal catalog with ordering information is online at the website. Also, they have an automated fax-back system where you can obtain catalog pages and product information; it's at 305-981-9800.

Portable and Mobile Goodies

The Miracle Whip for the FT-817. Here's another accessory for the popular Yaesu FT-817 Multimode Transceiver. It's the Miracle Whip (photo B), and while it's designed for the FT-817, it's suitable for a wide variety of rigs from 3.5 to 450 MHz. The unit is a QRP natural to work DX with up to 20 watt (PEP) rigs from diverse locations such as a picnic table, patio, or desktop with typical SWR of 1.5:1 or better. It features advanced C-VAT (continuously variable autotransformer) technology.

While the Miracle Whip really doesn't perform miracles, its performance is said to be remarkable. The all-band, self-contained unit has a 57 in. telescoping whip antenna (with an integrated tuner for receiving and transmitting) that mounts easily to your radio. Thus, with the right radio you can work a DX SSB or CW station overseas on 10, 15, or 20 meters; check into the local 40 meter swap net; go to 2 meters or 440 MHz for a chat with the boys; and wrap up the evening with a European shortwave news broadcast. The Canadian-made device is $129.00 USD.

The same folks have another design coming, the Bandito, which is similar to

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

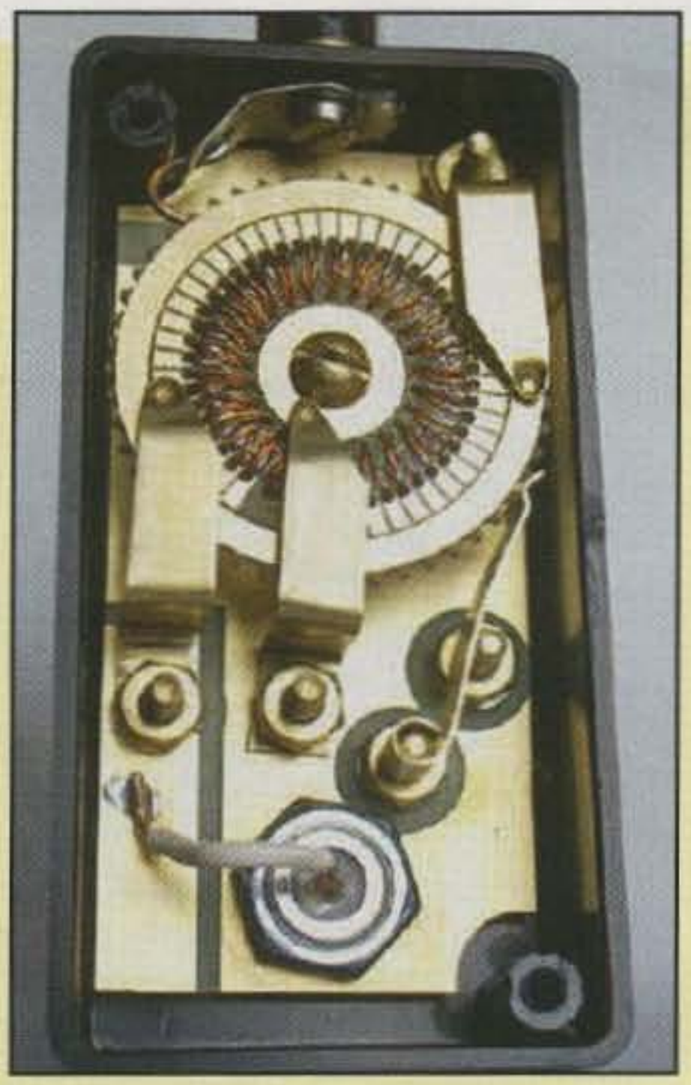

Photo B– Here's a sneak peek inside the Miracle Whip, designed to work with the Yaesu FT-817 or other rigs up to 20 watts (PEP) from locations such as a picnic table, patio, or desktop. The construction features C-VAT (continuously variable autotransformer) technology; the rotor, visible here, is meticulously hand-wound. (Photo from the Miracle Antenna website)

the Miracle Whip, but which instead provides a random-length, multiband tunable dipole instantly, anywhere, from 3.5 to 30 MHz with a typical SWR of 2:1 or better. Billed as a QRP traveler's delight, the dipole tuner installs at your dipole feedpoint. Putting up one is easy: Just take two equal lengths of almost any wire, attach them to the Bandito's binding posts, toss the ends over any convenient supports, and you're on the air. Availability is to be announced.

Other accessories on the horizon include the Base Camp, a desktop version of the Miracle Whip for home or office; and the Miracle Clothesline, a full-size antenna with super-quiet receive characteristics and an ultra-low profile.

Contact Miracle Antenna, P.O. Box 48144, 5678 Park Avenue, Montreal, Quebec, Canada H2V 4S8 (1-866-311-6511; e-mail: <lebloke@netcom.ca>; web: <http://www.miracleantenna.com>).

More Goodies for the FT-817 de W4RT. What? Yet another accessory for the Yaesu FT-817 Multimode Transceiver? As we've said before, the availability of so many accessories says something about this rig's popularity!

In a previous column we noted that W4RT Electronics™ offers One-Touch Tune (OTT), a trademarked add-on accessory for the FT-817. As we indicated, OTT solves the tedious, annoying tuning process that you presently must go through to produce a carrier for adjusting an antenna tuner.

Now W4RT Electronics has expanded its line of FT-817 accessories to include new goodies, including the One-Board Filter™ dual-filter solution and the One Big Punch™ speech compressor. We particularly would like to draw your attention to a simple, but popular new W4RT FT-817 accessory, One-Plug Power™ (see fig. 1), an internal FT-817 battery solution billed as "the easy way to charge the FT-817 batteries." One-Plug Power is comprised of a 1650 mAh NiMH battery pack, both over-temperature and over-current protection, connection to the FT-817 Molex connector, and a modified Yaesu battery cover door featuring a power jack that allows connection of a suitable battery charger. You plug One-Plug Power into the radio, close the door, and fast charge the battery pack thereafter without having to open the battery door cover or "make-and-break" connection at the tiny Molex connector. It's $69.95 plus $7 s/h.

For more information, contact W4RT Electronics, 3077-K Leeman Ferry Road, Huntsville, AL 35801 (fax 256-880-3866; e-mail: <info@w4rt.com>; <http://www.w4rt.com>).

Accessories for the Shack

Two from Jensen Tools. Are you "into" Global Positioning System (GPS) navigation? Jensen Tools, a division of the Stanley Works, is a full-line distributor of tools and test equipment. One of its new offerings is The StreetPilot III™ (see photo C), which follows in the footsteps of the original StreetPilot. It goes a step further, though, by adding turn-by-turn navigation, voice prompting, and a 16-color higher-resolution display. The new unit is completely portable, and it has no monthly service fees, installation requirements, or external processor. It features an auto-routing function, automated voice prompts, and CD-ROM based street maps for major cities; the map set may be downloaded into an included removable memory cartridge. The package includes the GPS unit, an auto mounting bracket, a PC interface cable, a power cable, and more.

Another new offering is Jensen's LanRover Pro Cat5 Cable Tester (photo D) to test for shorts, opens, and other cable problems. The alphanumeric LCD with icons and four control buttons provide the results in a very easy-to-read form. Among the unit's many features is a tone generator; in this mode, individual pairs or wires can be selected to carry a tone. The kit includes the tester, eight remotes, a coax adapter, patch cables, and a carrying case.

For more details and pricing, contact Jensen Tools, Inc., 7815 S. 46th St., Phoenix, AZ 85044-5399 (1-800-426-1194; e-mail: <Jensen@stanleyworks. com>; <http://www.jensen-tools.com>).

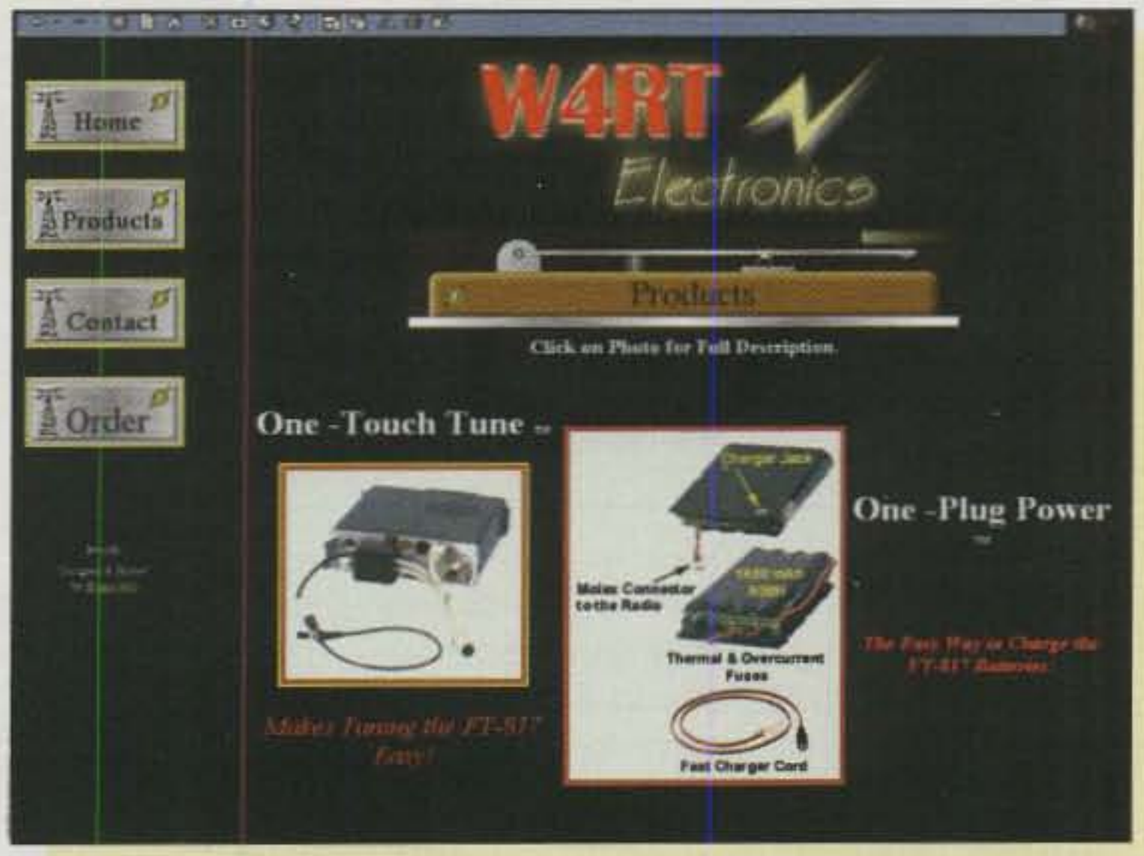

Fig. 1– Here's a page from the W4RT Electronics website featuring the new FT-817 accessory, One-Plug Power™, on the right. It's an internal FT-817 battery solution and is described in the text. Just plug One-Plug Power into the radio, close the door, and fast charge the battery pack without having to open the battery door cover or "make-and-break" connection at the tiny Molex connector. (Graphic from the W4RT Electronics website)

Photo C– One of Jensen Tools' new offerings is The StreetPilot III™. The unit follows in the footsteps of the original StreetPilot, but with added turn-by-turn navigation, voice prompting, and 16-color higher-resolution display. The unit is completely portable, and it has no monthly service fees, installation requirements, or external processor. (Photo courtesy Jensen Tools)

Photo D– Also new from Jensen Tools is the LanRover Pro Cat5 Cable Tester, which is useful checking for shorts, opens, and other cable problems. The alphanumeric LCD with icons and four control buttons provide the results in a very easy-to-read form. The kit includes the tester, eight remotes, a coax adapter, patch cables, and carrying case. (Photo courtesy Jensen Tools)

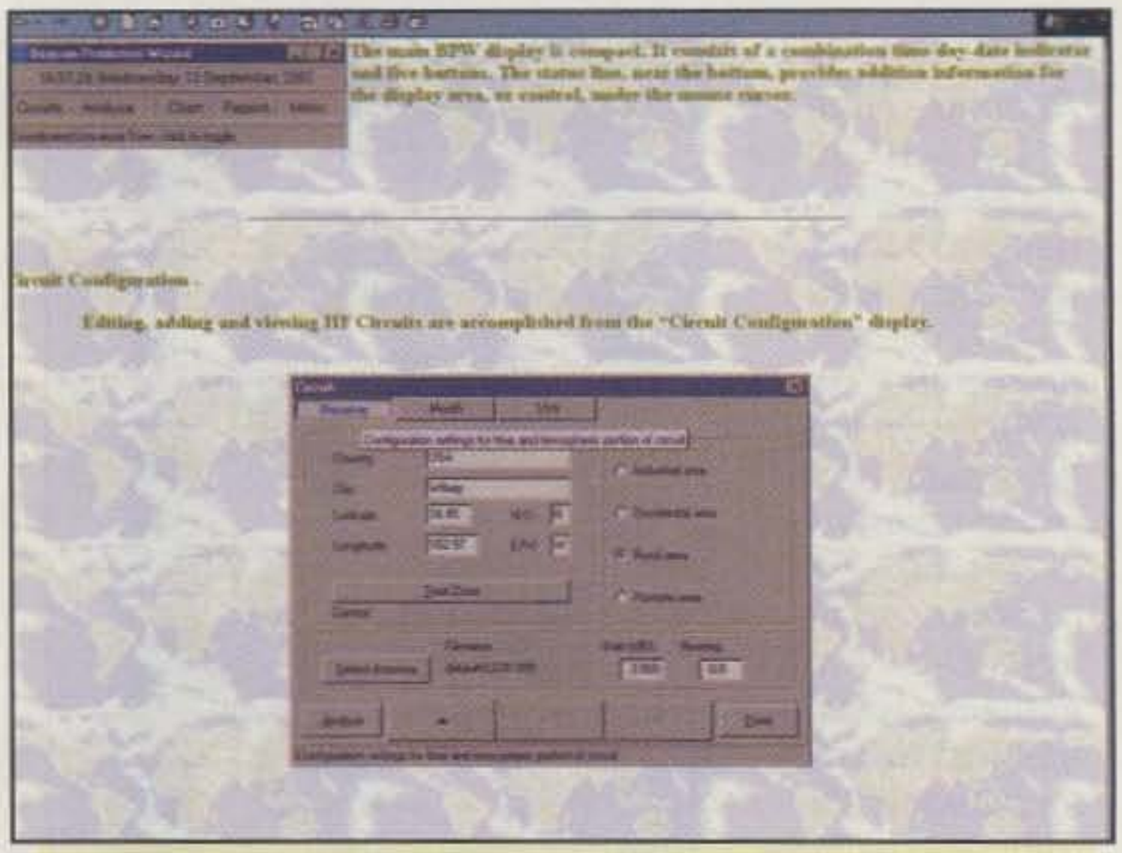

Fig. 2– Here's a small part of Jim Tabor, KU5S's Kangaroo Tabor Software website showing some details of one of his newest ham tools, Beacon-Prediction Wizard (BPW). BPW is a specialized, easy-to-use interface for the communications analysis prediction engine provided by the freely-available VOACAP. (Graphic from the Kangaroo Tabor Software website)

Software and Computers

New Downloads from Kangaroo Tabor Software. As we've pointed out before, the Kangaroo Tabor Software website is sponsored by Jim Tabor, KU5S. It features many useful software programs, especially tools for those interested in communications analysis as well as current and future solar conditions. These programs include Active Beacon Wizard++, Beacon-Time Wizard, CAPMan, WinCAP Wizard, Alert Wizard, ID Wizard, NerdAlert, KCal+ Time Zone Browser, Sked Wizard, and other tools, several of which we profiled in previous columns. Check out the Kangaroo Tabor Software website at <http://www.taborsoft.com> (fig. 2); it features a variety of freeware, shareware, and commercial products of considerable interest to radio amateurs.

Now Jim has come up with yet another tool, Beacon-Prediction Wizard (BPW). BPW is a specialized, easy-to-use interface for the communications analysis prediction engine provided by VOACAP. We should mention that VOACAP predicts expected performance of HF radio systems. As such, it's useful in the planning and operation of HF transmissions for the four seasons, different sunspot activities, hours of the day, and geographic location. BPW focuses on the use of VOACAP prediction engine with the NCDXF/ IARU International High Frequency Beacon Network. You can download BPW at <http://www.taborsoft.com/ bpw>. The download is a 30-day, fully-functional demo; product registration is $20. You also can download the VOACAP engine from the website.

Contact Kangaroo Tabor Software, Rt. 2, Box 106, Farwell, TX 79325-9430 (fax 806-225-4006; e-mail: <jim@ taborsoft.com>; <http://www.taborsoft. com> or <http://www.hamtools.com>).

AudioEdit Deluxe. Don Rotolo, N2IRZ, editor of *CQ*'s "Computers and Internet" column, brings news of the release of AudioEdit Deluxe. While the new program isn't specifically for amateur radio use, if you're "into" using your PC for manipulating audio files, this program may be just for you.

The program is a sophisticated audio editing tool that lets you create, edit, copy, move, select, and mix different audio clips. It has many advanced features that even a professional sound editor can use to change clips. The program supports files from your CD collections to MP3, WMA, WAV, and

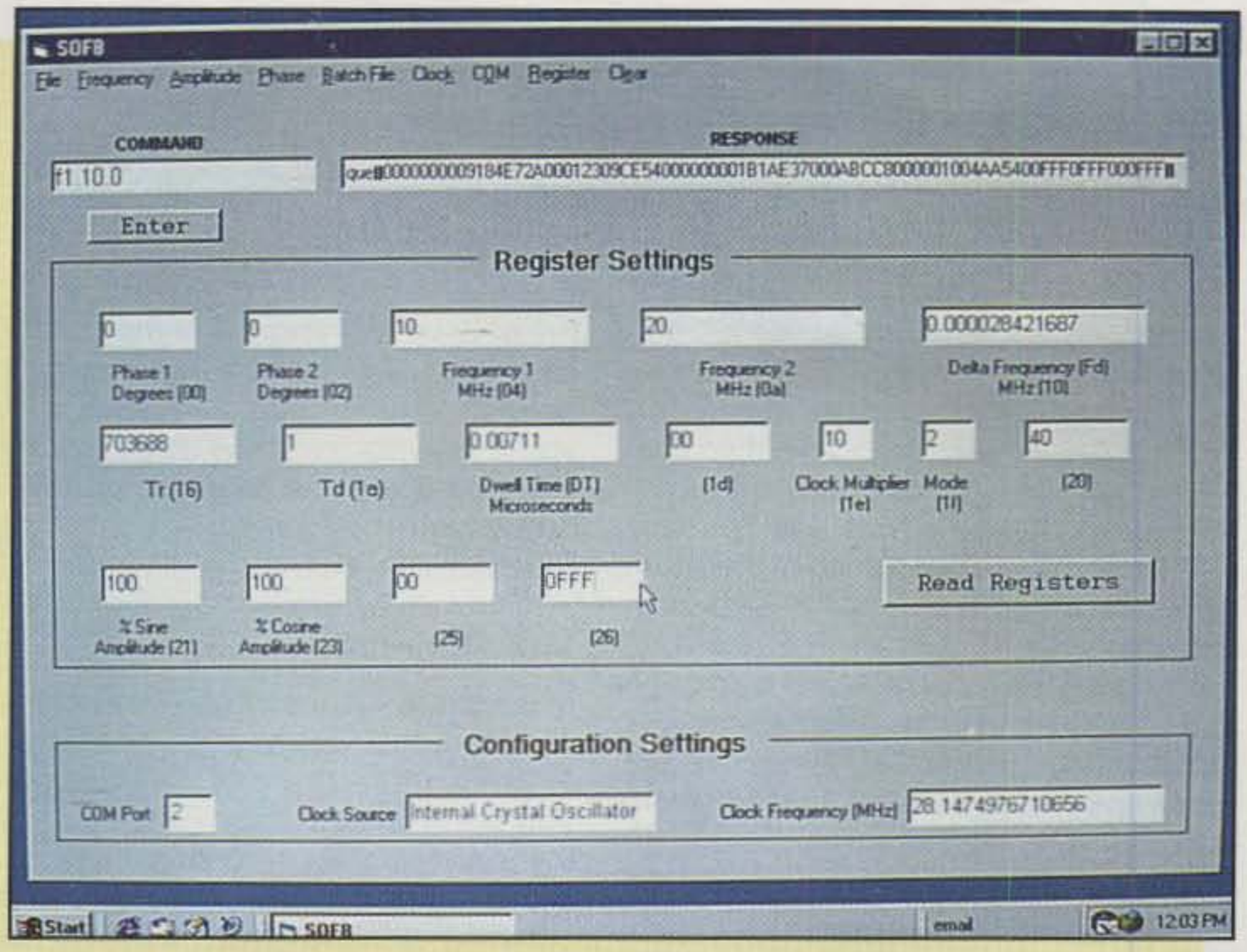

Photo E– With the SOF8 signal-generator control software it's convenient and easy to set up and operate Novatech Instruments signal generators from any PC using Windows®. The SOF8 program lets you select from drop-down menus, then generates the appropriate commands and sends them to the signal generator. (Photo courtesy Novatech Instruments, Inc.)

numerous other formats. You can do two-way conversions between these formats and also add various special effects to the recordings. You can freely download a 15-day shareware version, or purchase the software for $40.

For more information, contact Mystik Media, 296 Captain Beam Blvd., Hampstead, NC 28443 (fax 775-924-4436; e-mail: <info@mystikmedia.com>; web: <http://www.mystikmedia.com>).

Novatech Signal Generator Control Software. Novatech Instruments has introduced the SOF8 Signal Generator Control Program for Windows®-based computers (photo E). The easy to set up, convenient software supports the firm's line of precision signal generators. The generators have outputs to 100 MHz and can be programmed over a USB or RS232 interface using ASCII commands to perform tasks such as amplitude control, phase-control FSK, BPSK, chirp, and frequency sweeps.

The SOF8 program lets you select from drop-down menus and then generates the appropriate commands and sends them to the signal generator. The new software also lets you run a sequence of commands to automate repetitive operations.

For details, contact Novatech Instruments, Inc., P.O. Box 55997, Seattle, WA 98155-0997 (206-301-8986; e-mail: <sales@novatech-instr.com>; <http://www.novatech-instr.com>).

From the Bookshelf

Peter Norton's Complete Guide to Microsoft Windows XP. Have you "taken the plunge" into the new Microsoft® Windows® XP operating system? If so, you might want to place a copy of *Peter Norton's Complete Guide to Microsoft Windows XP* close by your PC. The new book by gurus Peter Norton and John Mueller introduces and discusses all of the new XP features in a style that is friendly, personalized, and authoritative. It's billed by the publisher as "everything you need to know about the inner workings of Windows XP Home and Professional—in plain English!"

The book covers deciding why and when to upgrade to XP and how to do it; understanding new and enhanced services and features; explanations of the new internet options; details of registry configurations; home networking topics; troubleshooting and other tips; and much more.

The new, 731-page Sams book is $44.99 and is available in book stores, or contact Pearson Technology Group, 201 West 103rd Street, Indianapolis, IN 46290-1097 (1-800-858-7674; e-mail: <info@mcp.com>; web: <http://www.samspublishing.com> or <http://www.mcp.com>).

We Get Letters

Once again we're just about out of space. Before wrapping things up, we would like to acknowledge some of the good folks who corresponded with us in recent months. A tip of the W8FX hat goes to Jim Eiland, KR4JY; Joao Carlos de Carli, PY2NQ; Barry Johnson, W4WB; Charles R. McIntosh; Phillip Walker, KØVX; Ray Palmer, KO4RN; and Clarence Buersmeyer, KG7WZ.

Keep the cards, letters, and e-mails coming, and let us know what "new stuff" you'd like to see here.

Wrap-Up

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

Overheard: A long time ago I found out that we don't come equipped with an ironclad warranty that says life is fun, fair, and easy. 73, Karl, W8FX

Beginner's Corner

BY PETER O'DELL, WB2D

For the Newcomer to Ham Radio

Repeaters—What Goes On Inside "the Machine"

I joined a local radio club last night. This is a club I had visited before but had not joined. As far as I'm concerned, if you are going to use the repeater, you should pay your dues.

What I found amusing was the business-session part of the club meeting. "We are having problems with the repeater, and maybe it's time to consider buying a new one. . . ." I have heard this same discussion about a hundred times in the last 30 years, and there is good reason why this topic comes up again and again.

Have you ever listened to how hams describe their local repeaters? Not just the words, but the inflection and tone of voice. Sometimes it is done with the reverence normally reserved for deities (self-proclaimed and otherwise). Just listen a bit and pay attention to *how* they are talking more than *what* they are saying. They talk about *the repeater* or *the machine*. As they mention it, their eyes glaze over a bit, their voices becomes softer, fuller, and you may even notice their faces becoming a little more symmetrical. You'll have to look really close with this last one, but it is there. It is as if they are in love with the repeater.

I think repeaters are wonderful, and I think ham radio would have died off if not for the FM "craze" of the '70s. Old timers would snarl at the guys with handhelds and grumble, "This won't last." Excuse me? However, I also believe we need to recognize repeaters for what they are—a technological communications system that takes a lot of abuse.

Specifically, it is an automatic relay station designed to boost the communications range of portable and mobile stations (primarily). The more you know about how a repeater is constructed, the better you can use it and benefit from it. This knowledge also could save you from sounding like a greenhorn, even if you are one.

To be sure, there are many different kinds of repeaters around. Most TNCs can serve as digital repeaters, or *digipeaters* as users often call them. You can also have single-frequency repeaters that use time delays for store-and-forward operation (the only common examples are a few amateur satellites). There are also ATV (amateur television) repeaters. Again, however, these are relatively rare. Let's then limit the discussion to voice repeaters on the VHF/UHF bands. Most towns big enough to have a post office of their own have one or more of these repeaters in the area.

The one aspect of repeater operation that sets it apart from other stations is that it must, by definition, transmit and receive at the same time—all the time it is in use! The technical implications for this are profound. Many repeaters are exposed to temperature and humidity extremes, too. The typical site is often on a hill or on top of a tall building. Housing varies, but it ranges from a heated/cooled room, to a shack with a tin roof, to a metal box strapped to the side of the tower. "Heated/cooled" is a good thing. . . . The poorer the housing, the more durable the equipment should be.

There are four main sub-systems of a repeater—a transmitter, receiver, controller, and antenna. Each of these sub-systems has a set of "needs" associated with it that will set it apart from your home station. We'll go through each of these.

The Transmitter

The transmitter has to be capable of transmitting for a long time without stopping. It transmits while you are listening, but it also transmits while you are talking. That is called a 100% duty cycle. The average off-the-shelf rig is not designed for this kind of treatment, so most transmitters are ones which have been specially designed and built for this use, or they are heavy-duty units "retired" from commercial service.

Since the transmitter is always transmitting when the receiver is receiving a signal, RF isolation becomes a major issue. If any stray RF finds its way out of the transmitter and into the receiver—say, along power leads—it is going to degrade the performance of the receiver. Shielding, bypassing, and decoupling have to be bullet-proof. The only RF coming out of the transmitter must be that coming out of the antenna connector (theoretically, it should be that way for your home rig, too—not always the case, but it should be). Also, the only RF coming out of the transmitter should be that of the transmitting frequency. This sounds silly, I know, but you'd be surprised how many transmitters do have small spurious signals. At home you may never notice it. At a repeater site it can be a disaster.

The Receiver

It is critical for the receiver to be well shielded, too. Just as you do not want stray RF coming out of the transmitter, you do not want stray RF getting into the receiver. Therefore, you will find similar shielding, by-passing, and decoupling at the receiver. It is also mandatory that a repeater receiver have good selectivity in the front end. You want the passband of the front end to be as narrow as you can make it. At VHF and low UHF frequencies this usually means using devices called *helical resonators*. You won't find these in many of the rigs designed for home use. It is more important for a repeater receiver to have good selectivity than it is for it to have good sensitivity.

If an off-frequency signal gets into the receiver, it will cause a problem known as *desensing* the receiver. For instance, if some of the transmitter's energy is leaking into the receiver, desensing will be constant. However, if it is coming from another source, desensing will only happen when the other transmitter is on the air. To the extent that desensing occurs, it will block out the weaker signals. In severe cases a repeater can be made virtually useless by desensing.

An associated problem is called *intermodulation distortion,* or *IMD* for short. Here the offending signal is the product of two or more off-frequency (often out-of-band) signals that mix in a nonlinear device). Put into plain English, this means that two or more signals happen to arrive at the same time at something that is acting like a diode, say a corroded connector or the front end of a poorly installed receiver or whatever. These signals then mix or heterodyne, and by chance one of the products falls into the input range of the receiver (or someone else's receiver).

Suppose there are three signals mixing to produce a product that is near a repeater input frequency. The interference will only occur when all three trans-

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mitters are on the air at the same time. This is a problem that can give repeater tech crews nightmares and often requires extensive detective work to track down. Eventually you'll hear hams talking about desensing and IMD. These are the problems they are talking about.

Obviously, the repeater and transmitter cannot be on the same frequency. The receiver frequency is called the *input frequency,* while that of the transmitter is the *output frequency*—pretty straightforward. The difference between the two is called the *split,* or *separation.* On 2 meters the standard split is 600 kHz. There is nothing magical about this particular frequency. It grew out of the maximum front-end passband of some of the early commercial receivers that were converted to ham use. The commercial rigs only had a few channel positions, and crystals were expensive. Say the local repeater was on 146.34/146.94 MHz. The average user would set up two channels (Your input/output frequencies will always be the mirror image of the repeaters.). First would be 146.34 transmit and 146.94 receive. The second would be transmit and receive both on 146.94. The reason for this was that when the repeater was off the air, locals could talk mobile to mobile on 146.94 simplex. Repeaters are a lot more reliable these days, and most groups frown on simplex activity on the output, and certainly on the input, frequencies.

Thus, 600 kHz became the standard split because of a historical accident. However, it is not the only split. Flip

Feedback from Readers

William Shanney, W6QR: I was reading W9GXR's comments in the Feedback box in your January column. It reminded me of the troubles I had getting my second floor shack quiet. I am an engineer (BSEE '68), and it took me several months and at least $100 to eliminate ground radiation that was getting into almost every electronic appliance in my home and that of several neighbors as well. The counterpoise wires you suggested are resonant and will radiate if above ground. The wire size doesn't matter . . . they will still act as antennas. They will, however, serve as a ground return to the rig and eliminate RF currents on the mic and key. I found several equally good solutions:

• Use quarter-wave sections of coax as a counterpoise; coiling the coax forms a choke to prevent shield radiation. I even use coax radials on my 160/80 meter inverted-L (another story). Attach the center connector to "ground" of your rig. Leave the braid unconnected. Short the other end of the coax. The length of the coax is based on 1/4 wavelength times the velocity factor of the coax.

• Run the counterpoise wires through lossy beads to reduce the currents and the radiation. I use ChoSorb beads. It's important to use lossy (i.e., resistive) beads, not high μ ferrite that would present a high impedance in series with the counterpoise, negating its effect.

• Run a heavy braid or pipe to one or more ground rods outside your shack. Connect your rig, power amp, and antenna tuner to the ground using a heavy wire run through three or four of the ChoSorb beads. The bead absorption creates its own artificial ground in the shack.

I just installed a new computer in my shack and had to put high μ ferrite beads on the speaker (especially the sub-woofer wire) and power supply wires to prevent pickup at power levels >50 watts.

I use both the second and third technique in my shack as well as ChoSorb beads on all coax lines to eliminate outer feedline currents (another source of unwanted radiation).

ChoSorb beads are a product of Emmerson Cummings. . . . I'm not sure if they were bought up or not, but their Eccosorb materials are widely used in the RF and microwave industries, so I'm sure they can be found.

Kenneth J. Slusher, N2DF: Your story about the downed American pilot in the january issue of *CQ* reminded me how a copy of *QST* magazine also helped me out in a sticky situation. No, the magazine did not save my life, but it certainly did save the day.

On one of my trips down to my parents' retirement home in Florida in the Port St. Lucie area, I decided to bring an HF rig. I packed up an Atlas 210x transceiver, power supply, and 10 meter dipole with a balun in an attache case. Because the rig was a loose fit in the case, I decided to add some packing materials—a few copies of ham radio magazines. Well, the case went through the security check at Kennedy Airport with no problem. However, on my return trip from West Palm Beach Airport the security officer asked me to open the case. The rig and power supply posed no problem. However, she was suspect of the 10 meter dipole wrapped around a W2AU balun. I tried to explain what all this stuff was, but to no avail. When her supervisor came over, he picked up a copy of *QST,* glanced at it, and then asked me if I was a ham radio operator. What a relief! I never found out if he was also a ham, but because of the inconvenience we were placed in first class. Under current conditions I do not know if I would attempt to bring radio gear aboard a flight as carry-on luggage.

through the *ARRL Repeater Directory* and you will find repeaters with other splits—mostly 1 MHz. Most modern equipment is set up to easily handle these "odd-ball" splits. (Next month we'll look at the social aspects of repeaters, including frequency coordination.)

One of the most desirable aspects of FM operation is what is called the *capture effect* of an FM receiver. What this means is that if two on-frequency signals show up at an FM receiver input at the same time, the stronger signal will "capture" the receiver. It will be as if the second signal was not there at all. The difference does not have to be significant either. Even when two signals are close to one another in signal strength, the stronger one captures the receiver. It makes for much more pleasant listening than on AM-based systems. On AM, signals 100 times weaker still cause annoying interference.

FM receivers also tend to have a fairly sharp cutoff in terms of signal strength. At a certain point a weak signal simply drops out. These two factors together give FM (and repeaters) the distinctive, limited coverage area. Cross that magic line, and you are "out of range." Terrain plays a big part in this, too.

That point was driven home to me dramatically during the flight of STS-9, Owen Garriott, W5LFL's inaugural manned-use of ham radio in space. The day after launch, Columbia was coming down over the western edge of the U.S., and officially we were not expecting him on the air for another few hours. However, Roy Neal, K6DUE, guessed that he might come on the air early and left his handheld tuned to Owen's frequency. Sure enough, Owen's voice came booming out of the receiver as he worked several West Coast hams. Roy was on the sixth floor of the Hilton Hotel across the street from Johnson Space Center. We later estimated that it was about 1300 miles, but there was nothing in between the two radios except a few air molecules. Ah, the blessing (and curse) of a "tall tower."

The Controller

A controller serves several functions: First, when a signal is received it turns on the transmitter with a device called a Carrier Operated Relay (COR). It turns it off once the signal disappears. This second part satisfies some of the FCC rules around repeaters. A number of "timers" usually are built into a controller. Most repeaters have a timer set to shut off the transmitter when the input signal has been present for an extended period of time, typically around three minutes. If you are long winded, you run the risk of "timing out the machine." This is not considered a good thing to do.

Another common device is the "hang-time" timer, which keeps the transmitter on the air for a few seconds after the input signal disappears. The purpose of this is to reduce wear and tear on the transmitter, particularly older ones that use mechanical relays. Also, if a signal is marginal, say a mobile at the edge of the coverage area, the signal strength will bounce above and below the critical value the receiver detects. Without a hang-time timer, the transmitter would pop on and off with the received signal level. This is not a good thing to listen to.

There is no actual requirement that a repeater have a built-in electronic identifier, but there is the requirement that it be IDed in accordance with FCC rules. The only practical way to do this is to include an IDer, either CW or voice. Of course, there is another timer associated with the IDer.

At the level of the controller repeaters can really start to shine with bells and whistles. Sophisticated controllers have a Dual-Tone-Multi-Frequency (DTMF)

receiver that is used to activate various functions. You probably know DTMF by the telephone company's trademark, "TouchTone." The keypad on your handheld or mobile microphone generates the same tone signals as those on your landline phone at home.

With a DTMF receiver you can start to turn on or off virtually any device or accessory, and depending on the design, you can control its setting. The most popular use over the years has been the autopatch. An autopatch is an automated connection between the repeater and a telephone line. In short, with an autopatch you can make telephone calls from your handheld or mobile. Other uses include turning on remote receivers; connecting to repeaters on other bands (cross banding); making measurements of power, deviation, temperature, wind speed, or whatever; controlling antenna rotators; and a host of other possibilities. The biggest limits are money and imagination.

Although not necessarily located physically inside the controller, a Continuous Tone Coded Squelch System (CTCSS) also serves as part of the control of the repeater (if so equipped). CTCSS is also called PL by old timers; PL is the Motorola trademark for CTCSS. A CTCSS encoder adds a low-level tone to a transmitter's signal. If the receiver is equipped with a CTCSS decoder and it is active, it controls the turning on of the repeater transmitter. A strong signal without the proper CTCSS tone may capture a repeater receiver, but the controller will not turn the transmitter on. Next month we will explore its use further.

The Antenna

Finally, a repeater has an antenna system. Since the transmitter and receiver are on at the same time, antennas are a problem. You cannot simply connect the receiver and transmitter to a single antenna. It would blow the front end of the receiver the first millisecond that the transmitter turned on. For 2 meters and higher a duplexer is commonly used. This is a series of extremely narrow tuned circuits that isolate the transmitter from the receiver. Duplexers are relatively large and expensive—the good ones, anyway.

Some repeaters are configured with separate antennas for transmit and receive. The antennas should be mounted with the receive antenna directly above the transmit antenna with as much vertical separation as possible. This is the best of the separate antenna configurations, and it is poor at best. It's better to invest in a good duplexer.

On lower frequencies (50 and 29 MHz) duplexers are impractical. The most common configuration here is simply having two separate sites a few miles apart. A wire or radio link is used to get the receiver audio over to the transmitter. As inconvenient as this is, most groups find this more practical than attempting to construct duplexers for these frequencies. Once in a while you will come across a 2 meter repeater using separate sites, but this is rare.

In the end, the repeater is just a machine—on a hill. However, it is usually the focal point of the club, and it takes enormous abuse. When the tech crew tells your club it is time to replace the machine, go along with them. They know what they are talking about.

73, Pete, WB2D

Call for Photos and Stories

We'd like to hear from you about your experiences as a newcomer. If you have questions, we'll try to incorporate them into future columns. If you have photos (color prints or slides okay) of your station or antennas, please send them along and we'll publish the best ones. If you have a solution to a common problem that new hams experience, we'd like to hear about it so we can pass it along. You can contact me at <wb2d@cq-amateur-radio.com> or Peter O'Dell, WB2D, Beginner's Corner, 123 NW 13th St., Suite 313, Boca Raton, FL 33432.

Magic In The Sky

BY JEFF REINHARDT, AA6JR

New Views of Amateur Radio

Putting Your Own Magic in the Sky

The HF airwaves have been livelier of late, maybe because of propagation and our "double peak" sunspot cycle or perhaps because of September 11. Whatever the reasons, the activity sounds good, for the most part. There are still a few scofflaws out there, but the FCC seems to be cracking down on those who deserve it. For the life of me, I can't explain why a person takes the time to become licensed, spends a thousand (or two or three) on equipment, and then gets off on making the airwaves miserable for others. Then when they get busted, they cry they can't afford the fine! Gimme a break. Of all the stupid reasons to empty the family treasury or spend time in jail, being a renegade radio operator would be among the dumbest. Can you imagine how one of these radio convicts would answer the question "What are you in for?" Can you imagine how his new roommate might react to the response?

This month we'll wander through a few different topics and see where they lead. I had several interesting responses to the recent "Magic" column that asked if listening would have made a difference in averting some or all of the September attacks. In that column I also raised a concern about more public-safety agencies converting their radios to digital for no apparent benefit other than making their transmissions unintelligible to listening enthusiasts.

One such response, from a correspondent who wishes to remain anonymous, said that some police officers in a major city are now carrying FRS (Family Radio Service) units so they can talk to one another when in close proximity to other officers. The source said their new digital radios are unreliable in certain situations, and they don't want to be at the mercy of a dysfunctional (multi-million dollar) system. Your tax dollars at work.

Kudos

Congratulations to Bob Bruninga, WB4APR, on getting a low-cost but very functional ham satellite successfully launched. Bob had the help of some faculty and students in bringing the project to life, but what a project! He is an instructor at the US Naval Academy in Annapolis and is widely regarded as the "father" of the very popular APRS geolocating system used in ham radio. How popular is APRS? I recently left my computer linked to an APRS website with feeds from all over. After about two hours there were nearly 4000 stations listed! That's almost 10% of all the active hams in the United States!

In any event, "Bob's" satellite was the subject of a recent Associated Press story that appeared in several mainstream newspapers across the country. The satellite, PCSat, is made of conventional parts—rechargeable AA batteries, solar panels from a mail-order catalog, antennas made from tape measures (no trouble cutting those babies to the correct length, eh, Bob?), and an over-the-counter computer! This 25 pound "bird" came in under $50,000 and is working like a charm while orbiting the planet at 5 miles *a second* some 500 miles above your head. Best of all, you can use it with conventional ham gear and no special training.

While the satellite project is great, I'm more in awe of the imagination it took to conceptualize, build, and launch the thing. I guess it all starts with positive people answering those "what if" questions. That's all it takes to put some Magic In The Sky!

Nice to have your class project in orbit. I wonder what the grade was for the students involved?

Two Meters, Anyone?

I started this column with a statement that the HF airwaves seem more lively, but what's up with good ol' VHF? I travel a bit and have noticed repeater use is down across this fair land. Are we talked out? Have cell phones replaced the commuter round table?

I was in Sacramento for several days in December and could barely raise a QSO on VHF. I was in western New York in January and it was a bit better in Buffalo, which was still recovering from its mammoth snowstorm at that time (and doing quite well at it, thank you), but I couldn't raise a conversation in Rochester or in the beautiful Finger Lakes area. Too bad. I sure enjoy making new friends and yakking it up while on the road. I've gotten everything from travel directions to tips on great eateries from 2 meter conversations. Shame on you if you hear a call and don't respond with a friendly "hello."

It's so easy to add your particular brand of Magic to the airwaves.

Two U.S. Naval Academy midshipmen (top photo) work on assembling the PCSat satellite now in orbit and providing APRS links for hams around the world. Lower photo shows the team of Naval Academy students who built PCSat with the satellite prior to launch. They worked under the supervision of Bob Bruninga, WB4APR, who teaches at the academy and developed APRS. (Photos courtesy WB4APR)

Bargains

If you haven't shopped around lately, you haven't noticed that there are some excellent bargains to be had on ham gear. Perhaps it's a combination of the recession, the economy in Japan, or the favorable dollar/yen ratio but value is up on the what you pay versus what you get scale, especially if you compare today's offerings with gear, features, and prices of just a few years ago. Might it be time to unload that boat anchor?

A Dream Radio?

Given that it's getting harder and harder to fit a mobile radio into the new cars

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of today, I had this brainstorm about a "dream" radio. It would be 2 meters/440 on transmit and receive. It could be low power, 5 or 10 watts, but here's the kicker: It would have AM/FM stereo receive and perhaps a CD or cassette tape player and be DIN size. My dream radio would then fit into the dashboard of most vehicles made today, interface with the car's wiring system, and only require connection to a 2 meter/440 antenna to work as a ham unit. Installation would be relatively easy, and non-ham family members would not be put off by ham gear cluttering up the car's interior.

I passed this concept by a major manufacturer and the response was initially good, but it seems there's less of a world market for the unit than I thought. In many other countries there are taxes to be paid on broadcast receivers, which explains why many cars made offshore still have audio equipment as an option. Expense is an obstacle.

Still, I get excited at the notion of an "all-in-one" unit that brings some order to the car and allows for the enjoyment of ham radio along with more conventional forms of automotive entertainment. Similar units made a brief appearance in the late '70s and early '80s, when optional car audio was integrated with a CB. A few of the American manufacturers even offered them as factory options. Such a unit (for hams) would make it much easier to enjoy the best of all worlds!

Five or 10 watts output would not strain the car's electrical system, and face it, if you can hit most local repeaters with an HT at 5 watts or less, why do you need 50 watts from a mobile? (I'm sure I'll hear from some guy who needs the power to hit the closest repeater, which is 50 miles away. Sir, this radio is obviously not for you!) Oh, well. If Bob Bruninga can build a cheap satellite, maybe someone can build my dream radio. What do you think about the concept?

Memorable QSOs

Somewhere in your ham past you had a great conversation with another ham. You learned something and were entertained and really engaged with that person across hundreds or thousands of miles. Perhaps that person took a great trip or shared a tip on a good book. Maybe he or she has, or had, a fascinating job. Regardless, I'm looking for more of those QSOs. The next time you look in a mirror, realize that you're what makes that next contact one of the most enjoyable ever for whomever you meet over the air. The Magic begins with "CQ...." 73, Jeff, AA6JR

QRP

BY DAVE INGRAM, K4TWJ

The Art of Low-Power Hamming

More Build 'em Notes and FT-817 Tips

The areas of ultra-light HFing, pedestrian mobile, and HF backpacking continue to draw an increasing number of folks into our QRP arena. Everyone I have talked with seems to be having a ball. I am referring to the numerous 100 watt amateurs gearing up with a Yaesu/Vertex FT-817 or SGC-2020 plus some portable antennas and accessories such as those featured in our last two columns. These "crossover QRPers" may or may not realize that using only 5 watts is a handicap, but that actually may be working in their favor. They are getting on the air, having fun, and working the world while portable with a low-power setup.

In light of that fact, this month's column features more good news and views of both ultra-light HFing and the FT-817. We are on a roll of non-stop fun, and we want you amidst the action with us! An interesting array of new items/goodies and ideas is lined up for discussion, so let's get started!

Cool Little Power Supply

The Yaesu/Vertex FT-817 has become a very popular transceiver for portable HF and VHF operating, and it is also being called the most energy-hungry 5 watt rig on today's market. Indeed, the little FT-817 requires 13.5 volts at 2.0 amperes or 27 watts input to produce 5 watts output. That calls for a high-capacity battery pack for sure, but MAHA Energy and W4RT Electronics are presently answering the demand with 9.6 volt/1700 maH NiMH packs. Finding a small 13.5 volt/2 amp power supply for operating the FT-817 indoors or from an AC line has been more challenging, however, as most supplies are as large as (or larger than) the transceiver. That's no fun. We all prefer a small pocket-size AC supply for traveling, right?

Well, friends, MFJ Enterprises, Inc. has the answer with their new model 1317 switching-type power supply shown in photo 1. This new delight is more than a heavy-duty wall adapter; it is a big-time power supply that delivers 13.8 volts at up to 2.89 amps. That's 40 watts total, and the power supply measures only 1.4"H × 2.5"W × 4.0"D. The power supply runs cool and seems very well filtered and protected from stray RF energy. Its output cable is terminated in a popular 2.1 mm coaxial plug, with an added 3 inch "pigtail adapter" converting that plug to a special miniature equivalent used with the FT-817. The MFJ-1317 can also serve double duty as a NiCd or NiMH battery charger for the FT-817. Overall, the power supply and adapter cable add up to a terrific deal. The power supplies are available from amateur radio dealers nationwide. Check one out!

Photo 1– The new pocket-size MFJ-1317 switching-type power supply is a gem! Unit measures only 1.4"H × 2.5"W × 4.0"D and delivers 13.8 volts DC at up to 2.89 amps—enough "juice" to power all your QRP gear simultaneously. Power supply is also equipped with a cable and mini-coaxial plug to fit the FT-817.

Easy-Brew Battery Pack

So you say you have an FT-817 and would like to convert its supplied FBA-28 refillable alkaline battery tray into a rechargeable battery pack and would like our opinion. Good idea, but there is a small hitch—and also a simple solution. Loading eight ultra-high-current NiMH cells into the battery tray is a snap (eight snaps, actually). Charging the cells while they are in the tray and in the

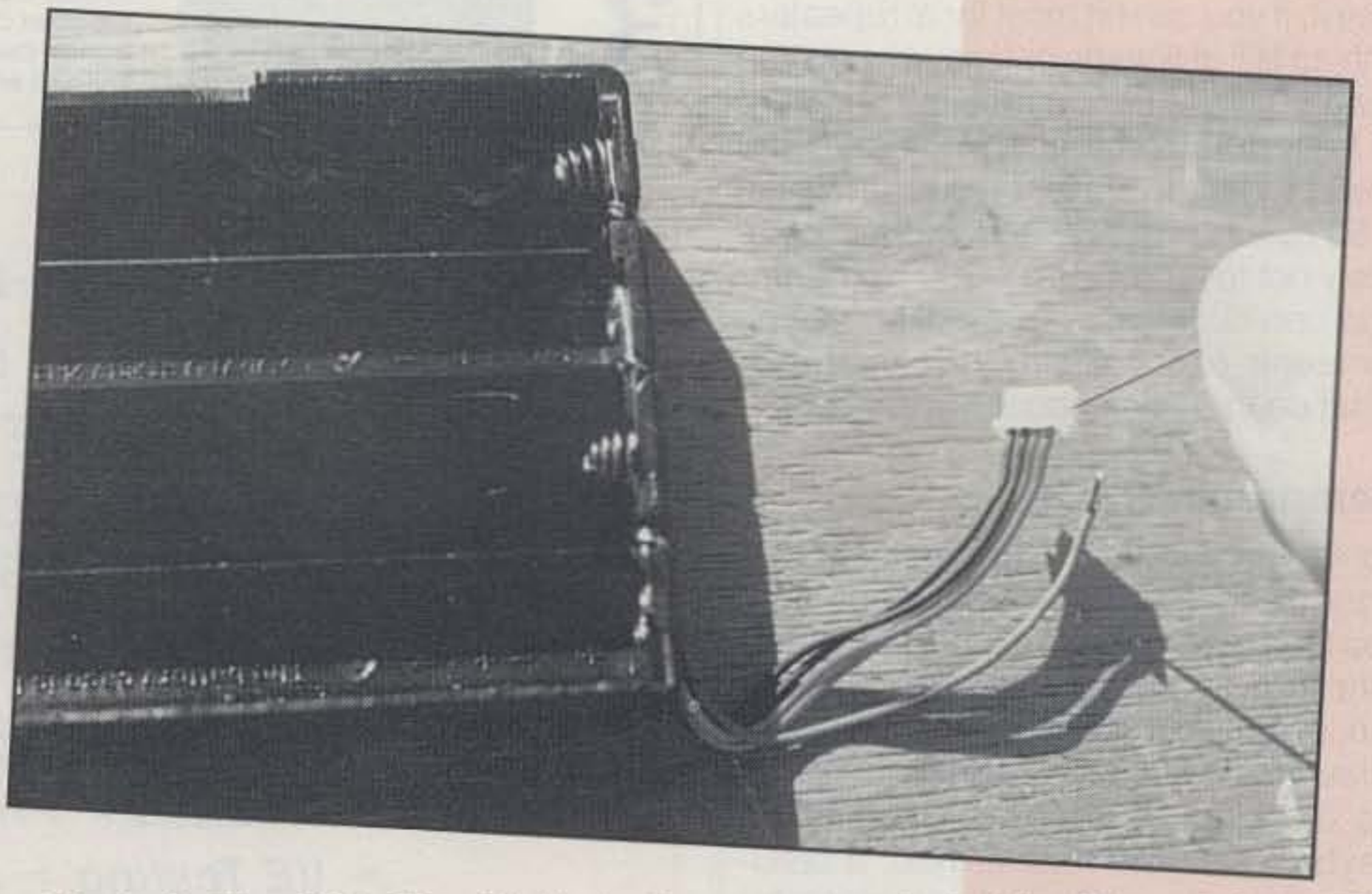


Photo 2– The FBA-28 refillable battery tray supplied with a Yaesu/Vertex FT-817 is designed to hold eight AA cells. The green wire on right side of the tiny power plug prevents battery charging current from reaching the tray so alkaline cells can be used. By using a magnifier and the tip of a straight pin to release the green wire (and then protecting it with a fold of tape), eight rechargeable, high-current NiMH cells can be used in the FT-817's battery tray. (Discussion in text.)

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

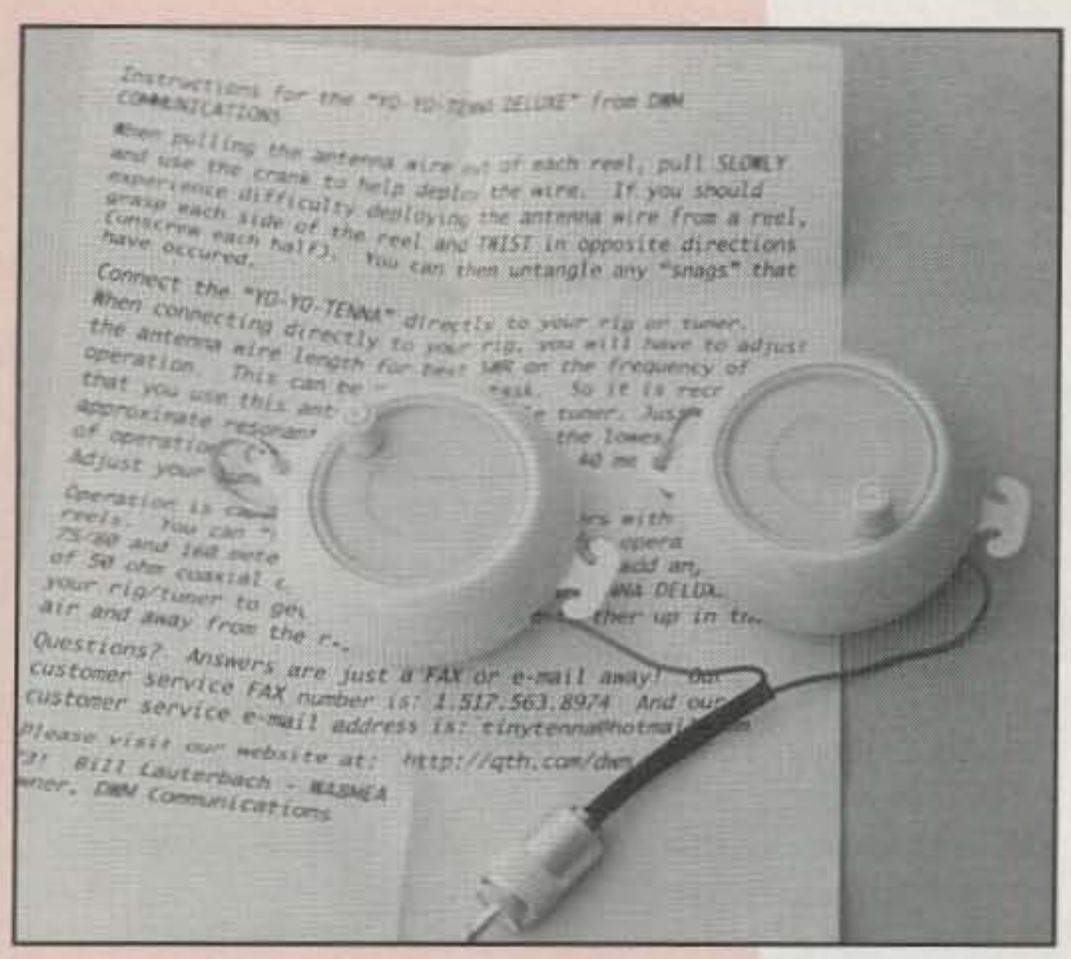


Photo 3– Check out this unique YoYo Deluxe portable antenna from DWM Communications. Each YoYo—err . . . reel—is loaded with 40 feet of insulated wire you pull out to a desired dipole length, then rewind into the reel after use. Wires from each reel connect to the center-located PL-259 you plug into your rig. Clever!

transceiver rather than moving them into a separate holder, however, calls for a quick modification to the battery tray's tiny power plug. Why? A basic battery charging circuit is included in the FT-817. When menu-activated, it passes charging current from an external power source to the battery pack. It also trickle charges a battery pack any and all the time the transceiver is on, even when the charging circuit is not menu-activated. This battery-charging feature must be disabled when alkalines are in the FT-817 (or they may explode from charging current), but enabled when rechargeable cells are in the FT-817.

Now look closely at the tiny power plug on the FBA-28 battery tray and you will see five wires—two black (–V), two red (+V), and one green (charge control). *When the green wire is connected, charging is inhibited; when it is disconnected, charging is enabled.* Disconnect the green wire, and the FT-817 senses its refillable FBA-28 tray is a rechargeable battery pack. It is that simple. You can use your tiny cutters to quickly cut the green wire if desired, but resoldering it if you later decide to switch back to using alkaline cells is not easy. A more effective idea is to release the green wire from its plug (photo 2), then cover its bare-wire tip with a tiny fold of tape for safety. Restoring the tray to original condition then involves just pushing the green wire's tip back into its connector's socket.

Use your magnifier and study the battery tray's plug. One side has some tiny (*tiny!*) plastic strips that hold the black, red, and green wires in place. Slip the point of a straight pin under the green wire's tiny plastic strip just barely enough to release the wire, then tape its end so it cannot cause a short, and the mod is completed. That's it! Do not attempt to perform the mod, however, until you understand the following precautions:

1. Remove the battery tray from the transceiver and remove all cells in it before performing the green-wire mod.
2. Do not cut, change, or release any wires on any cables, plugs, etc., in the transceiver.
3. Do not load alkalines in the battery tray with the green wire disconnected.
4. Installing a 3 ampere fuse in series with the positive wire of the FT-817's external DC cable is a good safety precaution to consider.

Good luck, and enjoy your new rechargeable battery pack!

'Tenna Tips

Portable antennas and pint-size tuners continue to dominate the scene of favored HF accessories, and an impressive variety of both items is available to fit every need. Mini-verticals were highlighted in recent columns, so now let's briefly discuss wire antennas such as 40 and 20 meter dipoles and longwires.

In the ready-for-instant-use category, the unique YoYo Deluxe antenna made by DWM Communications (P.O. Box 87, Hanover, MI 49241; phone 1-517-563-2613; <www.qth.com/dwm>) and shown in photo 3 is quite popular. It consists of two wind-up reels that are each loaded with 40 feet of flexible, insulated wire, which in turn are connected to a center-located PL-259. You just pull the needed wire from each reel (for example, 33 feet for 40 meters, 16 feet for 20 meters, etc.), anchor the end supports/reels, plug the PL-259 into your transceiver or tuner, and tweak the SWR for perfection. After operating, you wind the wires back in their reels, unplug the PL-259, and the YoYo Deluxe is ready for its next outing. That's spiffy!

With respect to flexibility, the YoYo Deluxe can plug directly into a transceiver's SO-239 socket, into an extension RG-58 coax cable (good for extra height and rig/antenna separation), or into a simple antenna tuner. The tuner approach is especially attractive, as it streamlines SWR tweaking, plus it helps minimize RF feedback (assuming the tuner and rig are separated a few feet and isolated by a toroid on their interconnecting cable).

If you prefer a more "disposable" antenna or longwire for portable use, consider the suggestions outlined in fig. 1. The first one is a half-wave radiator and its quarter-wave counterpoise, both cut from a quarter- or half-pound spool of thin, enamel-coated wire (or plastic-insulated hookup wire, if you find it at a low price). The half-wave wire can be positioned vertically, horizontally, or sloping; its counterpoise can simply be laid on the ground below it; and the setup will exhibit a slight signal gain just like the popular half-wave vertical antennas.

The second antenna idea involves extending the counterpoise to a half wavelength and raising it in the air just like the main radiator so both half-wave wires can radiate and produce big-signal results. Both of these skywires exhibit a high feedpoint impedance, so their ends are routed "down and around" as necessary to connect to binding posts on a basic T-type tuner as shown in fig. 2.

This circuit is my favorite design for an antenna tuner because it matches high, medium, or low impedance; it is small; it "remembers" its settings without applying voltage (auto tuners "forget"); and it is flexible in assembly. The variable capacitors, for example, may be 250 pFd or 365 pFd according to what you find at hamfest flea markets. Remember to insulate their bodies and shafts from a metal enclosure (a plastic box works well here). The coil is wound on a pill bottle 1.75 inches in diameter and 2.0 inches tall. It consists of 25 turns of number 16 or 18 copper or bare wire with taps at 2, 4, 8, 16, and 20 turns. A small, self-supported by its own leads 2-turn coil 0.5 inch in diameter is added at the coil's "top end." A switch can be used for selecting coil taps, or a simple clip-lead-to-ground arrangement can be used—your choice. Mount the tuner in some unique plastic enclosure and then enjoy using it. Fun (and also emergency preparedness) reigns supreme!

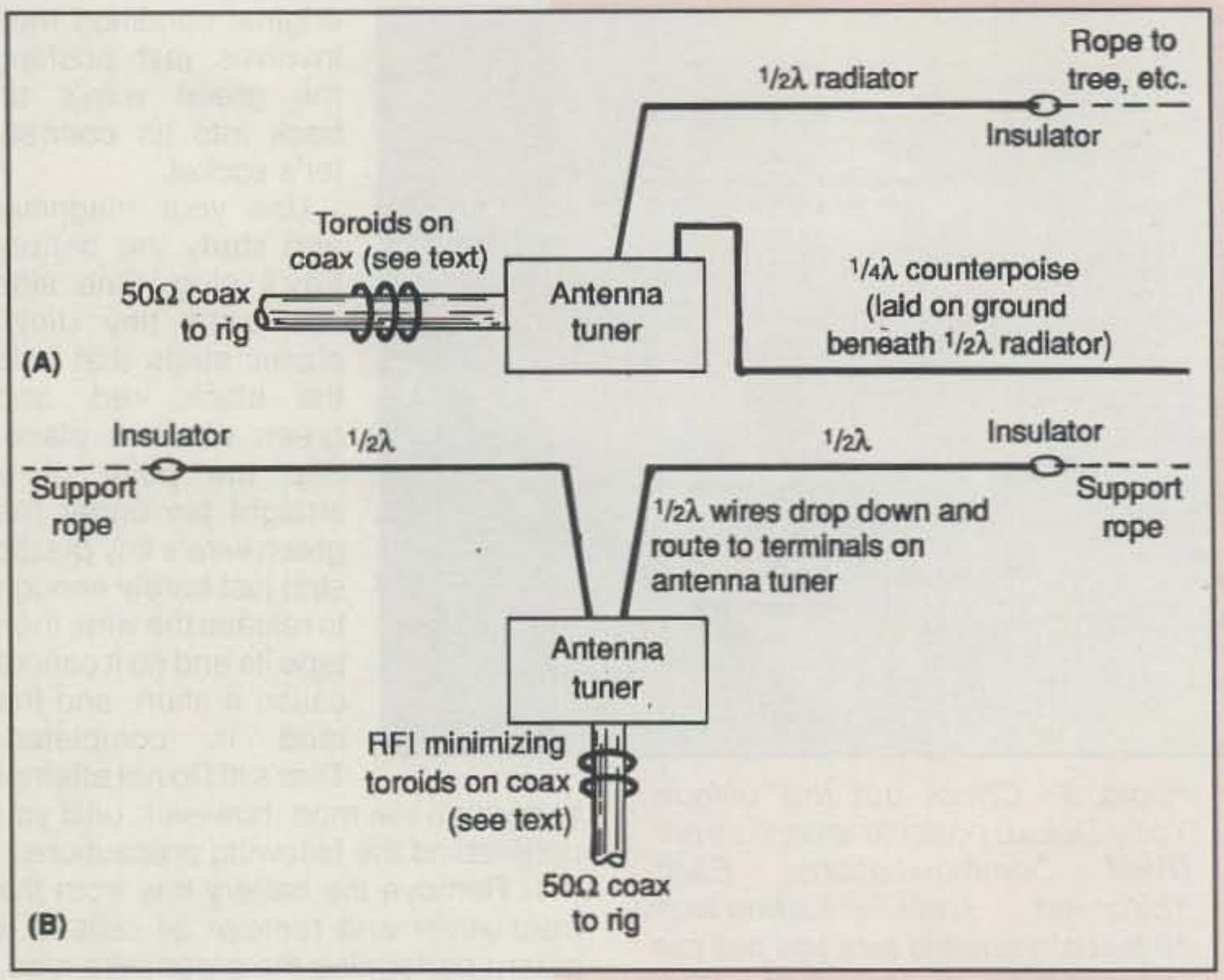


Fig. 1– Outline of two easy-to-implement, disposable wire antennas capable of producing big-signal results. "A" is an end-fed 1/2-wave antenna with its 1/4-wave counterpoise. "B" is a full-wave doublet with its center wires dropping down and connected to a tuner.

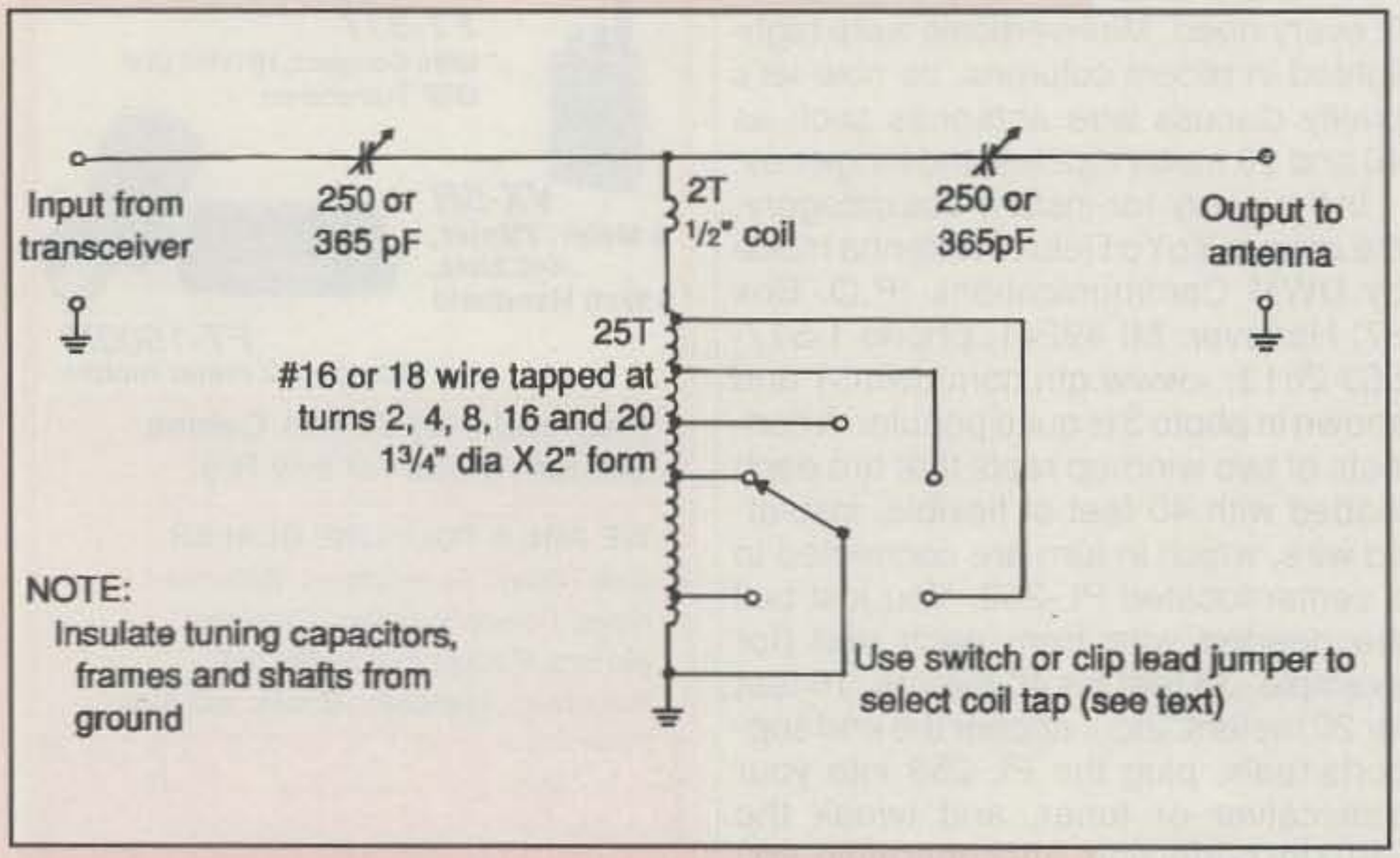


Fig. 2– Circuit diagram of a simple T-type antenna tuner for use with dipoles, longwires, and doublets. (Discussion in text.)

More W4RT Goodies

Remember the high-current NiMH battery pack and "One Touch Tune" module produced for the FT-817 by W4RT Electronics and featured in our recent QRP columns? More neat items have been added to that FT-817 support line, and folks are snapping them up like crazy. First is a small pocket, or "Pack-It," reference manual containing all the operating information in the rig's original/supplied manual plus some extra notes and tips for maximum transceiver enjoyment (photo 4). The little "Pack-It"

Photo 4– Do you find remembering menu settings and keystrokes for special features on the FT-817 challenging? This small "Pack-It" operating guide and quick reference sheet are the ideal solution, and you can use them anywhere and anytime. They are available from W4RT Electronics.

manual is supplied with two laminated quick-referenced guides for accessing the FT-817's numerous features and functions, and it really proves helpful when traveling or using the FT-817 on an occasional rather than daily basis.

The second new W4RT item is a dual Collins mechanical-filter mod supporting both CW and SSB operations, and it really puts the little FT-817 into the big-rig category (photo 5). There is only one slot for an optional Collins filter in an FT-817, so until now an owner had to choose a preferred mode for custom filtering. Ah, but this mod lets an owner enjoy the best of both worlds, and the cost (which includes custom installation) is less than purchasing both optional filters from dealers. Furthermore, easy menu selection lets you quickly switch between wide/SSB and narrow/CW filters for CW (super handy for contesting). Both filters exhibit the Collins famous high quality and steep-skirted selectivity. The SSB filter is 2300 Hz wide and the CW filter is 500 Hz wide, plus an optional 300 Hz wide filter is also available. More details are available on the web at <www.w4rt.com>.

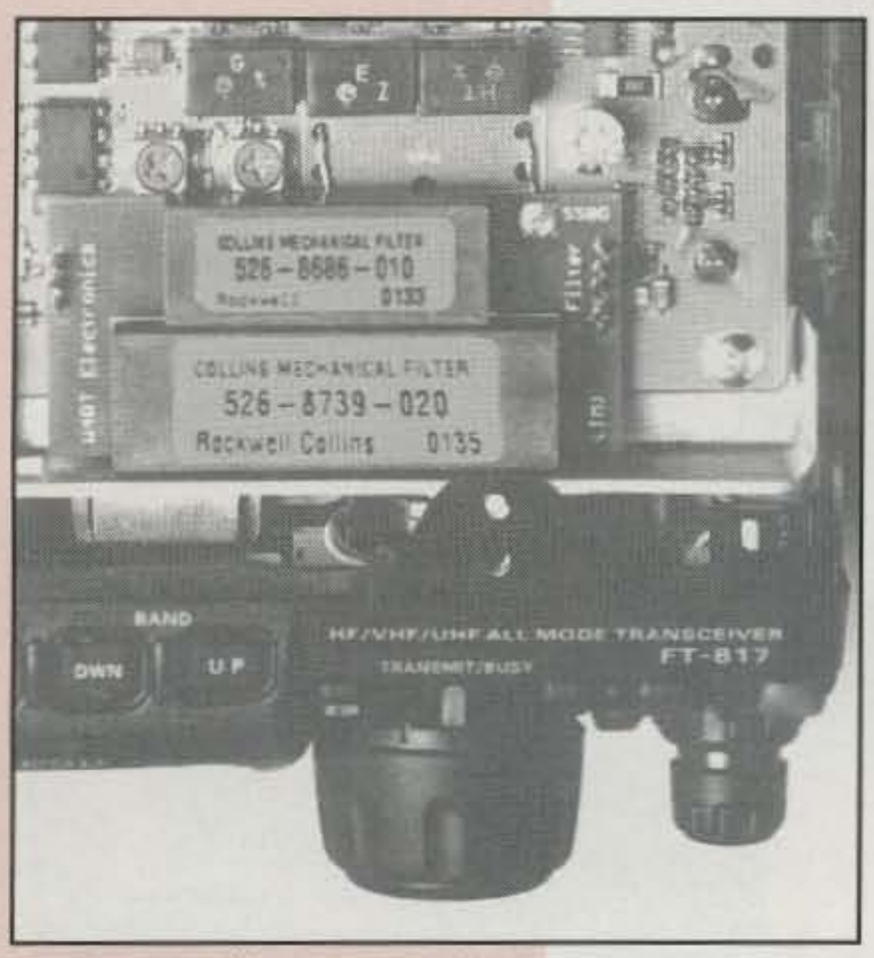


Photo 5– The new W4RT Electronics dual Collins filter mod for an FT-817 turns the little rig into a big-time performer with steep-skirted passbands of 2300 Hz for SSB and CW wide, plus 500 Hz or 300 Hz for CW narrow operations. The filters/mods are available at <www.w4rt.com>.

Flash! W4RT Electronics has just announced the highest current NiMH battery pack yet for an FT-817. It's a whopping 1800 maH pack, and it still fits inside the FT-817. (See this month's "What's New" column.)

Wrap Up

The closing wire is once again upon us, but there are still many more homebrew ideas and rig tips to share with you. What can I say except tune in again next time for more QRP fun, keep on working the world with low power, and may the force of good signals be with you! 73, Dave, K4TWJ

DX

BY CARL SMITH, N4AA

News Of Communication Around The World

Getting the DX—Keep Your Cool and Listen!

January and early February were good for DXers, especially for the 6 meter "Magic Band" folks. We had the opportunity to work South Sandwich and South Georgia, but it was a struggle for a lot of us in the U.S. I personally could hear them running Europe by the hour, but just could not manage to break the pile-up from here. It turned out to be a matter of just waiting out the propagation until their signal finally peaked and then spending a lot of time chasing up and down the band to figure out their listening pattern. Thankfully, the FT-1000MP has that sub-receiver which allowed me to listen and finally manage to make the contacts I needed to make. Since I only needed these two on a few bands, I was able to concentrate on those bands until I made the contacts. The organizers of this DXpedition indicated that we would have to sharpen our listening ability, and it certainly turned out that way. I hope you were able to make the contacts you needed.

The 2001 CQ WW SSB Contest Multi-Single team at D44TC: (l. to r.) Matteo, IK2SGC; Xara, CT1EKF; Vittorio, I4YSS; Fabio, I4UFH; Alberto, IV3TAN; Gabrielo, IK4UPB; Franco, I4LCK; and Santos, CT1DVV. (Photo courtesy Henryk, SMØJHF/D44CF)

6 Meter Record QSO

On February 4, 2002 at 1801Z, W7KNT worked 9U5D in Burundi on 50.110 MHz CW. This is believed to be the first ever QSO between Burundi and the United States on 6 meters. What makes it more surprising is the QSO was made by W7KNT from Montana, not the east coast. Gus, 9U5D, reports that he was running an IC-706 and a small 3-element beam and that this QSO was his first and only unique QSO to North America on 6 meters.

This will go into the 6 meter firsts record book as the first ever 9U to W QSO on 6 meters. Congratulations to both John, W7KNT, and Gus, 9U5D!

Chasing the Most Wanted and Operating Ethics

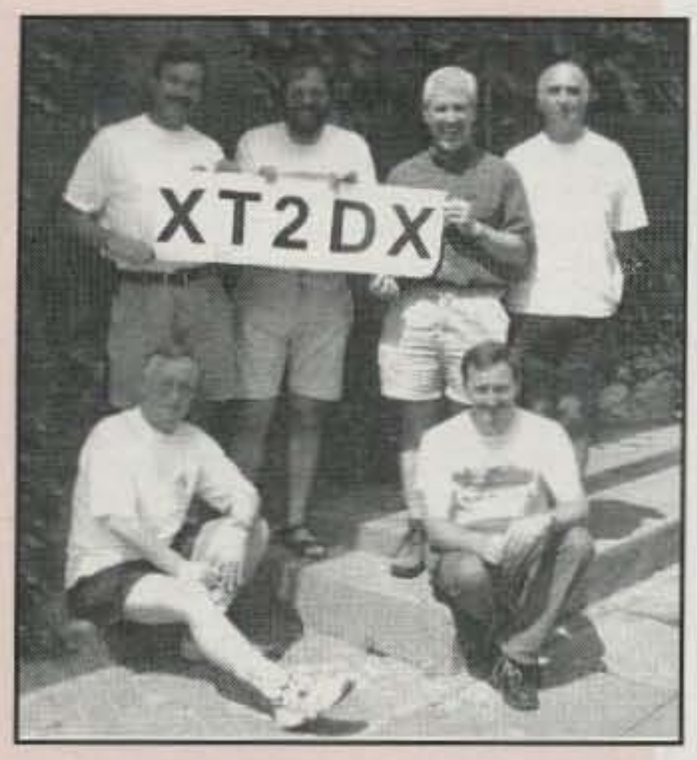
As this is being written, we are gearing up for the PWØT operation from much-needed Trindade to begin a two or three week run in mid-February. At almost the same time, the announced operation will be going on from TI9M – Cocos Island. Both of these are ranked relatively high on the Most Wanted lists, so there will be a lot of activity on the bands through February and into March.

Everyone is looking forward to the delayed operation from Ducie Island in March. This will be a new one for everyone worldwide, and we can expect huge pile-ups from that one, too. Then there is the announced operation from North

Tom, N4XP, listens from "the other side" at the station of José, CT1EEB. Tom stopped off to see José on his way to the LYNX DX Group's DXfest in the spring of 2001. (Photo courtesy Tom, N4XP)

John, W2YR, operating one of the stations at E29AL. He is on an extended stay in Thailand and has been active with his own call, HSØZDJ. (Photo courtesy John, W2YR)

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



The XT2DX Multi-Multi team for the November 2001 CQ WW CW Contest: (l. to r. sitting) Roger, G3SXW, and Gary, G4IFB; (l. to r. standing) Mike, KC7V, Fred, G4BWP, Andy, G4PIQ, and Don, G3XTT. Their final score was 41.3 million points. (Photo courtesy Mike, KC7V)

CQ DX Awards Program

SSB

2365.....K3PD 2366.....W6DRB

CW

1026.....F6UIG/QRPp

SSB Endorsements

320.....K3JGJ/329
320.....W9IL/324
300.....KE4SCY/304
300.....K3BYV/303
28 MHz.....K3PD

CW Endorsements

320.....K3JGJ/333
320.....WØJLC/332
320.....N4OT/321
275.....W9IL/294
200.....K6UXO/214
QRPp.....F6UIG

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 333 active countries. Please make all checks payable to the award manager.

Korea – P5 by Hrane, YT1AD. While Ed, 4L4FN, has been active since last fall, he hasn't been able to make much of an impact on the worldwide demand for P5 QSOs.

Having said all of the above, I want to once again *try* to communicate with the DX community on the subject of operating ethics. I have no doubt that *most* of you heard all of the intentional interference during the VP8 operations. I also have no doubt that you have heard it on any number of other DX operations as well. Malicious interference, fre-

The WPX Program

SSB

2814.....DS5MHE 2817.....KD8KX
2815.....N9DI 2818.....7N1NXF
2816.....N3RB 2819.....I7JFQ

CW

3084.....JH8WGT

Mixed

1888.....I7WTV

CW: 400 KØKG. 850 K1BYE. 950 WA2VQV. 1300 F5YJ.

SSB: 350 7N1NXF. 500 I7JFQ. 600 KD8KX. 700 W8UMR. 1900 I3ZSX. 2550 KF7UR.

MIXED: 1600 KØKG. 4700 WA2HZR.

10 meters: WO3Z
15 meters: WO3Z, VE6ZT

No. America: N3RB
So. America: JA6GWU

Award of Excellence Holders: K6JG, 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.

160 Meter Endorsement: K6JG, 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.*

The WAZ Program

10 Meter SSB

530 ..... WA5VGI

15 Meter SSB

565 ..... WAØQII
566 ..... N3DV
567 ..... DS4NSE
568 ..... JJ1VGA
569 ..... HL4GAV
570 ..... WA5VGI

17 Meter SSB

27 ..... K5UR

20 Meter SSB

1091 ..... WA5VGI

80 Meter SSB

78 ..... K5UR

10 Meter CW

172 ..... W2TX
173 ..... WA5VGI

12 Meter CW

28 ..... K5UR

15 Meter CW

298 ..... WA5VGI

17 Meter CW

37 ..... K5UR
38 ..... WA5VGI

20 Meter CW

524 ..... KE3A
525 ..... JG3LGD

30 Meter CW

48 ..... K5UR

40 Meter CW

221 ..... WA5VGI

6 Meters

22 ..... K4CKS (26 zones)
23 ..... HB9RUZ (28 zones)
24 ..... JA3IW (35 zones)

160 Meters

172 ..... K9JF (31 zones)
173 ..... N3SL (30 zones)
174 ..... UU2JQ (37 zones)

All Band WAZ

SSB

4734 ..... RV1CC
4735 ..... KF3AA
4736 ..... EA7FST
4737 ..... AJ6Z
4738 ..... VE5MC
4739 ..... KM4PW
4740 ..... JH1HYW
4741 ..... W9DWN
4742 ..... JA2KPW
4743 ..... KQ6MW
4744 ..... IZ5BRO
4745 ..... VE3NQK
4746 ..... HK3GKE
4747 ..... NA8W
4748 ..... N9DI
4749 ..... WA5VGI

Mixed

8109 ..... IK1SOW
8110 ..... W2JLK
8111 ..... HL2FDW
8112 ..... JA6AVT
8113 ..... OH4QJ
8114 ..... W6RUJ
8115 ..... N5UW
8116 ..... AAØMZ
8117 ..... KZ6N
8118 ..... KU6YK
8119 ..... 7K1SLY
8120 ..... K6RG
8121 ..... VA3FC

All CW

287 ..... UR5BCJ
288 ..... W9AE
289 ..... JA2WXU
290 ..... S55SL
291 ..... JR7ILA
292 ..... K4EQ
293 ..... JH7IUD
294 ..... 7L4RZL
295 ..... VK6WW
296 ..... JN1NOP
297 ..... JI8MAF
298 ..... IK3DVY
299 ..... N6QS
300 ..... WA5VGI

RTTY

132 ..... I2LXA

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>.

5 Band WAZ

As of February 15, 2002, 583 stations have attained the 200 zone level and 1247 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
W6XA

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)
ABØP, 199 (23)
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)
K2UU, 199 (26)
W1FZ, 199 (26)
UT4UZ, 199 (6)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
K7FL, 199 (23)
W1DIG, 199 (24)
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)
VE3XO, 198 (23,23 on 40)
K4CN, 198 (23,26)
KF2O, 198 (24,26)
W6BCQ, 198 (37,34on40)
G3KMQ, 198 (1, 27)
W5BOS, 198 (18,23)
N2QT, 198 (23,24)
OK1DWC, 198 (6,31)
K7FL, 198 (23,37)
W4UM, 198 (18,23)
KY7M, 198 (17 & 34on10)
US7MM,198 (2, 6)

The following have qualified for the basic 5 Band

K8VD (150 zones)
K9MIE (184 zones)
LZ1CY (159 zones)
AA9IV (158 zones)
WA5VGI (190 zones)
IK1PFE (153 zones)
AK6I (153 zones)
KM9Z (156 zones)

Endorsements: N3SL (200 zones)

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

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

quency cops, etc., can cause nothing but confusion and raised blood pressure for DX chasers. *Real* DXers don't resort to this childish behavior. They don't have to. *Real* DXers, thank goodness, manage to control their anger and blood pressure. They listen a little more closely, engage those *built-in* QRM filters, and manage to work the DX in spite of the ridiculous behavior displayed by that—not so silent—minority of trouble makers. It isn't easy, it's not fun, but one does what one must do to make the contact around, or through, the silly, childish behavior of those who would deprive you of your contact with a rare country.

It doesn't matter if you are running 10 KW and/or have umpteen elements reaching to the heavens. If you can't

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. *This month's listing reflects the 2002 prefix removals.*

MIXED

4965 9A2AA	3742 N6JV	3465 N5JR	3042 WB2YQH	2454 K2XF	2117 OZ1ACB	1914 I2EAY	1448 NG9L	1193 KU6J
4328 W2FXA	3714 N4MM	3121 PAØSNG	2952 KØDEQ	2449 N6JM	2063 WB3DNA	1788 AA1KS	1429 N1KC	1130 PY1NEW
4034 F2YT	3707 VE3XN	3118 I2MQP	2944 IT9QDS	2415 9A4W	2029 PY2DBU	1751 VE6BF	1417 W2EZ	1072 K6UXO
3989 W1CU	3602 I2PJA	3103 W9HA	2914 I2EOW	2414 W9IL	2018 HA9PP	1697 Z35M	1369 KWUSA	937 N3KR
3971 EA2IA	3548 N9AF	3094 KF2O	2841 IK2ILH	2334 W6OUL	1991 JN3SAC	1669 W7CB	1291 VE9FX	680 VE3NQK
3806 N4NO	3517 YU1AB	3086 K9BG	2767 W2ME	2331 W8UMR	1983 W9OP	1564 KØKG	1245 KX1A	
3789 9A2NA	3489 SM3EVR	3062 S53EO	2655 WA1JMP	2288 K5UR	1958 CT1EEB	1461 WT3W	1226 EA2BNU	

SSB

4386 IØZV	3049 F2VX	2688 I2EOW	2325 CX6BZ	1916 N6FX	1582 K8MDU	1238 LU4DA	1048 EA3EQT	
4018 VE1YX	3030 9A2NA	2607 KF2O	2306 EA1JG	1864 K2XF	1562 W2ME	1193 WT3W	990 HA9PP	
3938 ZL3NS	2974 N4NO	2596 4X6DK	2186 IN3QCI	1862 EA7TV	1540 SV3AQR	1190 K4CN	981 AG4W	
3581 I2PJA	2925 I2MQP	2594 I8KCI	2180 OE2EGL	1730 I3ZSX	1520 DF7HX	1162 EA5DCL	822 K1BYE	
3525 F6DZU	2885 I4CSP	2570 LU8ESU	2002 LU5DV	1715 W9IL	1485 W2FKF	1136 VE9FX	821 VE7SMP	
3270 N4MM	2885 N5JR	2509 EA5AT	1969 CT1EEB	1706 NQ3A	1384 LU3HBO	1125 I2EAY	812 KU6J	
3123 OZ5EV	2750 CT1AHU	2444 KF7RU	1954 CT1EEN	1687 K3IXD	1368 NG9L	1089 N1KC	786 KX1A	
3079 EA2IA	2741 PAØSNG	2337 W2WC	1950 K5UR	1658 W6OUL	1287 KI7AO	1059 JN3SAC	783 VE6BMX	

CW

4145 WA2HZR	3035 EA2IA	2219, KF2O	2032 I7PXV	1854 K5UR	1585 EA7AAW	1359 4X6DK	1096 YU1TR	871 WT3W
3743 N6JV	2681 9A2NA	2209 KA7T	2009 OZ5UR	1789 W6OUL	1568 W9IL	1332 EA2CIN	1054 K6UXO	812 KX1A
3469 VE7CNE	2626 N4MM	2189 EA7AZA	1955 G4SSH	1737 IK3GER	1462 IK2ECP	1307 I2EOW	1032 WO3Z	809 KU6J
3369 N4NO	2578 N5JR	2093 G3VQO	1938 LU2YA	1654 VE6BF	1460 I2MQP	1284 AC5K	935 VE6BMX	729 N1KC
3217 K9QVB	2392 WA8YTM	2058 N6FX	1919 K2XF	1603 I2EAY	1442 EA6AA	1118 EA2BNU	911 WA2VQV	

hear the DX station, you'll never know if he heard you or not. That's what these people are trying to do—keep you from hearing the DX station. If you stoop to their level and come on the frequency to chastise them, you are doing nothing but adding even more "garbage" and keeping others from hearing. *Don't do it!!* Keep your cool and don't hit that button in an angry response. You've all heard what happens: One guy starts by telling the QRMer to "shut up" or "QSY," then somebody else comes on and responds to that, and before you know it you've got a bunch of guys yelling and cussing, and it deteriorates to the point where the DX station just goes away. What have you accomplished?

Now no one can work the DX, and just think: That might have been the one chance you had at propagation, or time, to work that station. Who won? The guy who started it all is sitting back laughing at all of you, having done just what he set out to do. You lose!!

There will always be times when some poor guy in the heat of "battle" forgets and punches the wrong button on that high-priced radio with 75 bells and whistles on it. Who hasn't done it? You have; I have. However, it sure won't take him, or you, or me very long to realize that we "done somebody wrong," because somebody will immediately start yelling "Up Up Up, you lid" or some other rude, crude comment. Embarrassing, isn't it? We didn't do it on purpose. At least I would hope that you, as a *real* DXer, didn't. So he, you, or I made a mistake.

QSL INFORMATION

3V8SM via DL6LAU
4L6VV via UA6EZ
5R8O via G3SWH
5T5PBV via JA1PBV
5U1A via I2YSB
5U4R via I2YSB
5U6W via I2YSB
5U8B via I2YSB
7Q7HB via GØIAS
7S2E via SM2DMU
8P9JA via K4MA
8Q7ZZ via G3SWH
9G1AA via PA3ERA
9J2BO via G3TEV
9J2BO via W6ORD
9L1JT via K4ZIN
9QØAR/6 via F2YT
9Q1A via F2YT
9Q1KS via F2YT
9Q1MM via F2YT
9Q1YL via F2YT
AM9MA via EA9CD
AP2ARS via K2PF
BV2FB via AC7DX
C56RF via G3NKO
C6AGS via KI6T
C6AJF via WA2VUN
C6ALC via K2KJI
CE6TBN/2 via N1IBM
CN2JS via F6BEE
CO2AV via EA5KB
ES6Q via ES5RY
FG5BG via YL2K
FO8DX via W6UFT
H40T via DL7AFS
H40YL via DL7AFS
H40ZG via DL7AFS
H44LB via DL7AFS
H44ZG via DL7AFS
IQ3X via IV3SKB
J38A via K4LTA
J79BK via DL6FBK
J79BR via DL6FBR
KG4DZ via W4SD
KG4DZ via W4SD
KG4PK via W4WX
KL7Y via W8LU
OD5QB via YO3FRI
P29VMS via DL2GAC
P40W via N2MM
PJ2T via KN7Y
PJ7B via W8EB
PWØT via KU9C
PY6AI via PT2GTI
S07CRS via JA1UT
S07U via JA1UT
T88DC via G3KHZ
T88RM via N6NBB
V26EW via N2ED
V26G via N2ED
V26G via N2ED
V31JP via KA9WON
V47KP via K2SB
V73UG via W7UG
VP2MDY via N2NB
VP5GA via N2GA
VP8GEO via VE3GCO
VP8ITN via GM3ITN
XF4IH via XE1LWY
XV9SW via SM3CXS
XW3ZNR via IN3ZNR
YA4YT via K4YT
YA5T via KU9C
YZ1V via YU1AAV
Z38B via IK3GES
ZC4DW via GØDEZ
ZF2NT via G3SWH
ZL5/N3SIG via AI3D
ZP6M via PY5XX
ZX3S via PY3UEB
ZYØSAT via PS7JN

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," P.O. Box 3071, Paris, TN 38242; phone 901-641-0109; e-mail: <golist@wk.net>.)

It's not the end of the world, folks.

The guys we all should be after are the ones who are doing the intentional stuff. Who are they? Where are they? Why do they do this stuff? Surely these people live somewhere close to some of you. Do you know who one or more of these people might be? Peer pressure may or may not work on those who would cause this type of malicious, intentional interference. If you know who at least one of the guys might be, have you tried to chastise him/her for these actions? If you have not, *why not?*

If you do know these people, do they belong to your local radio and/or DX club? If they do, consider a program on this very subject. You don't even have to bring up their names/callsigns. If they are guilty, they know it. If they don't get the message, then you can try the direct approach—but *never* on the air. Do it face to face. If they still don't get the message, there is always the FCC enforcement approach, but that is an absolute last resort. We are supposed to be a self-policing group, aren't we?

I guess all of this depends on just how offended you are at what you hear on the air. If it doesn't bother you, I'll never understand why not. I want to "stir the pot" with you *real* DXers and get you stirred up to the point where you will do something for yourself and your fellow DXers everywhere. This situation does not have to continue, and you can help. Remember John F. Kennedy's statement: "Ask not what your country can do for you, but ask what you can do for your country." Well, folks, let me borrow that and restate it this way:

Ask not what the DXing community can do for you, but ask what you can do for the DXing community.

You can begin by identifying those who would deprive you, and your fellow DXers, of the enjoyment of working DX. Once identified, do your best to solve the problem by whatever means are available.

I remember my Elmer well. The late Clyde Fritz, WØDXE, taught me to be considerate of my fellow DXers. He taught me not to offend others—to do unto others as I would have them do unto me. (There's always going to be someone with a bigger antenna, more power, or simply more ability.) He taught me to listen, listen, and listen some more. Another thing Clyde taught me was to give my call and *stop* to *listen.*

When you listen to pile-ups these days you hear people who seem to be doing nothing but yelling their callsign over and over without ever letting up to listen. If the DX station should come back to "Charlie Alpha," you hear hundreds of callsigns that don't even come close to "Charlie Alpha." If your callsign doesn't contain "Charlie Alpha," why did you even key the microphone? Shame on you! In all fairness, however, shame on the DX station for not being more specific or not getting a complete callsign before he opened himself up to all of those "wrong" callers.

It seems that with all of our amazing computer and internet technology we have lost a great deal of our personal integrity. We can't turn back the clock, but I think we can return to a more civilized and considerate manner in which we use all of the technological power we have today.

For all of you with e-mail, internet, cluster spots, and other "instant gratification" resources, let me suggest that you try something. For just one day don't access that cluster spot network; don't log onto that internet site with all of the DX news. Just turn on your radio and from your own personal knowledge and experience listen, listen, and listen some more. Listen to the band(s) you like and tune up and down the band without the benefit of those cluster spots showing you that the YA is on 21025 or the P5 is on 21225. Listen and see what you can find all by yourself. That's the way it used to be, *remember?* I'm certainly not advocating that we abandon these valuable DX news sources, but it just might be eye-opening for you to have to do it all by yourself for just one day.It just might be fun, too.

Bengt, YN4SU/TI4SU, shown here in the ham shack of TI5KD. He also uses the calls H6C and TE5T for contesting. Bengt lives in Nicaragua but visits Costa Rica every month or so to pick up mail. Please note that he does NOT have a QSL manager and it is definitely not PY3ZM. (Photo courtesy Bengt, YN4SU/TI4SU)

In Closing . . .

The International DX Convention in Visalia, California comes up April 26–28. Sponsored this year by the Southern California DX Club, the convention will again be held at the Holiday Inn, Visalia. Check out their website at: <http://www.qsl.net/visalia2002>. I'm looking forward to seeing many of you out there for the festivities. It's always a great event.

Until next month, please try to be more considerate of your fellow DXers.

73, Carl, N4AA

Contesting

BY JOHN DORR, K1AR

News/Views Of On-The-Air Competition

Introducing CQ's 2002 Contest Survey

April's Contest Tip of the Month

Have you checked out your headphones lately? If you're a traditionalist like most contesters, you may be using the same headset that was once sported by Marconi himself. There are a number of great products on the market these days, including very cool noise canceling devices that make you feel like you're in a professional sound studio when tuning the bands. It would be a real shame to have invested all the time and energy in your station to have it go to waste when that first signal hits your ears. Do yourself a favor and make sure your headset is at least as good as the rest of your station.

Calendar of Events

Mar. 22-24	Oklahoma QSO Party
Mar. 30-31	**CQ WW WPX SSB Contest**
Apr. 6-7	MARAC County Hunters SSB
Apr. 6-7	SP DX Contest
Apr. 6-7	EA RTTY Contest
Apr. 6-7	QCWA QSO Party
Apr. 12-14	Japan Int'l HF DX CW Contest
Apr. 14	UBA Spring SSB Contest
Apr. 20	Holyland DX Contest
Apr. 20-21	YU DX Contest
Apr. 20-21	Michigan QSO Party
Apr. 20-21	Ontario QSO Party
Apr. 27-28	SP RTTY Contest
Apr. 27-28	Helvetia Contest
Apr. 27-28	Florida QSO Party
Apr. 27-28	Nebraska QSO Party
May 4-5	ARI Int'l DX Contest
May 4-5	IPA CW Contest
May 4-5	MARAC County Hunters CW
May 11-12	CQ-M DX Contest
May 25-26	**CQ WW WPX CW Contest**

Well, it's that time of year for another *CQ* Contest Survey. When I began running these surveys over ten years ago, I was interested in using them as a vehicle to focus on timely topics centered on contesting, as well as a tool for helping me understand what subjects you want covered in future "Contesting" columns. As participation has continued to grow with each incremental year, I've been very pleased with the interest and effort that many of you have undertaken as part of this effort. With the advent of internet tools, last year turned out to be an all-time low for use of the postal service for your input, given the convenience of completing your responses "on line."

This year I have quite a wide variety of questions in the survey pool. There's something for everyone, whether you own a monster contest station or have concerns about the impact of our operating practices on the hobby. If something in the survey doesn't strike a nerve this time around, a trip to your cardiologist may be in order!

Last year for the first time I asked you for your input on questions you would like to see raised—a survey for the survey, if you will. Many of your comments were the basis for the questions you're about to read (special thanks for the dozens of suggestions from around the world). So how about we get right to it. I encourage you to take a few minutes and voice your opinion. You'll find that in addition to being published in *CQ* magazine, I'll be making this survey available on most of the popular internet e-mail reflectors and other electronic sources. An on-line response is strongly preferred, as it makes for much easier tabulation. With the assistance of Tom Roscoe, K8CX, your responses can be submitted this year by logging on to <http://hamgallery.com/survey/>. By the way, Tom has a very cool website, so after you've completed your survey, be sure to take a drive through his gallery of photographs and news. Of course, you can still "snail mail" your replies in the conventional (is snail mail conventional anymore?) manner to: John Dorr, K1AR, 2 Mitchell Pond Road, Windham, NH 03087-1299.

Enjoy the survey! If all goes according to plan, we'll have results right around the CQ WW contest timeframe.

Final Comments

Thanks in advance for taking the time to respond to this year's survey. Your answers (and comments) are invaluable in helping guide the future editorial direction of the column. I encourage you to respond and pass the survey along to your friends and club members. With the capability of submitting your responses via the internet, the time to participate takes only a matter of minutes. Feel free to include either the survey itself or the internet link in your club's next newsletter. Increased participation will make this a better survey!

73, John, K1AR

2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

2002 *CQ* Contest Survey

Your Callsign (optional): _____
Contesting Experience (years): _____
Age: ___

1. Some would claim that there has been a significant decline in the "spirit of contesting." Some competitors have a "win at all costs" attitude that results in poor operating habits and a search for loopholes in rules. What is the best way to arrest this behavior?

a) Peer pressure
b) Tightening of the rules
c) There are no meaningful problems in this area. Leave things the way they are now.
d) Other _____

2. On a scale of 1–10 (ten as the highest rating), how would you assess your optimism of the long-term survival of our hobby over the next sunspot cycle?

Answer: _____

3. How many contests have you entered full-time in the past 12 months? Answer: _____

4. Have you spent more or less time operating contests this year than in years past?

a) More
b) Less
c) Same

5. If you answered less to Question 4, what has been the primary reason?

a) Work commitments
b) Losing interest in contesting overall
c) Personal/family commitments
d) Too costly to stay competitive
e) Other (please state) _____

6. Do you believe it is appropriate to adjust contest logs after the contest?

a) One should never correct a contest log afterwards under any circumstance.
b) Only for obvious typographical mistakes
c) It is fair game to use any method available to "get it right" before you submit a log.

7. Should the results of log checking (i.e., UBN reports and other data) be made publicly available after contest results are published for any contest entry?

Yes
No

8. Do you feel most contesters don't care about the QRM they may cause to non-contesting operators during a contest, or do they just get a bad rap?

a) Most contesters genuinely care about how their operating affects the bands and get a bad rap from the non-contesting crowd.
b) Most contesters operate with an attitude that nothing else matters but the contest itself.

9. Would you spend more time in a contest (or attempt to operate one you have never participated in) if there were participation awards such as mugs, T-shirts, certificates?

a) Yes
b) No, contest marketing doesn't matter to me.

10. Overall, what do you consider to be the worst problem in contest sponsorship/administration?

a) Timeliness of results
b) Timely receipt of awards
c) Accuracy of results
d) Clarity of contest reporting
e) Other _____

11. Do you think high-quality contest operating helps the reputation of the amateur community in times of public service/emergency, or is that concept overrated?

a) It's a great help to amateur radio's ability to serve the public.
b) Overrated and has little meaningful impact.

12. What is the height of your tallest tower?

a) _____ feet
b) I do not have a tower.

13. How do you rate your contest shack in terms of equipment, layout, computers, etc.?

a) Sub-par
b) Average
c) Above average
d) Professional
e) A ham's dream!

14. Do you feel single operators using two radios have an unfair advantage over those who only use one radio in a contest?

Yes
No

Additional Comments:

_____

_____(use extra paper if necessary)

Return your survey responses to:
John Dorr, K1AR, 2002 Contest Survey, 2 Mitchell Pond Road, Windham, NH 03087 USA, or submit via the internet at:
<http://hamgallery.com/survey>
Deadline: July 1, 2002

Awards

BY TED MELINOSKY, K1BV

News Of Certificate And Award Collecting

The Cost of Wallpaper

What is a fair price that sponsors should charge for their certificates? Let's see . . . the design is generally done by a volunteer, and that is a one-time item, so we'll dismiss that. I doubt that many sponsors use the services of a professional typographer either. The only real costs then are printing, envelopes, and postage.

Airmail rates in most foreign countries range from somewhat greater than to a good deal higher than airmail rates in the U.S., so an estimate for a 3 ounce airmail letter from a foreign country sent to the the U.S. might be about $US3. The cost for the same letter sent first class within the U.S. is 80 cents. Color printing or duplication *may* be done for under $US1 per certificate, but we'll stick with that charge. Envelopes and cardboard stiffeners to protect the certificate are probably not more than 20 cents combined per certificate. Add these up, and the estimated cost for sending a certificate first class within the U.S. is about $1.96, and via airmail from a foreign country to the U.S. it's about $4.20. These costs are raw, rough estimates. Some European countries such as Germany, Austria, and Switzerland have considerably higher postal costs.

The point I'm trying to make is costs are real and must be met, but if a sponsor charges an amount much greater than the above, it needs an explanation. There are a number of awards rules that state that excess monies are donated to specific charities. A big hats off also goes to the many U.S. clubs that sponsor awards that are free or under $US2 to all applicants.

Sponsors that charge amounts that are substantially higher than the above will probably not have a lot of applicants. The rules of economics dictate that people typically spend their discretionary income in a manner that gives them the most pleasure. People just won't spend money on an item that gives limited satisfaction. *CQ*'s USA-CA and 5 Band WAZ award certificates require a great deal of work and indicate a significant achievement, and they are more likely to be framed and exhibited in the shack than a special-event certificate for working three non-related hams with the same last name.

In this column I will continue to present the rules for awards which don't necessarily follow these suggestions of economics. I also suspect that you will use your money wisely.

65 Glebe Road, Spofford, NH 03462-4411
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Honor Roll

500
N8OYY 3178
K8ZZ.....3179
DL3JJ 3180

1000
N8OYY 1588

1500
N8OYY 1327

2000
N8OYY 1227

2500
N8OYY 1148

3000
N8OYY 1058

The total number of counties for credit for the United States of America Counties Award is 3076. 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, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

Dick Karl, W3ZUH USA-CA #1033

Dick, W3ZUH, has the honor of being USA-CA Special Honor Roll member #1033, issued October 26, 2001. Here is his story:

WN3ZUH started hamming at the age of 15 in Pennsylvania. After getting married and settling down, ham radio became important when 5 Band DXCC and 5 Band WAZ were announced. In the process of chasing 5 Band WAS, I found the County Hunters Net and was challenged by the thought of 3076 counties and encountered the friendliness on the net compared to other activities. Over all these years, this is still the most helpful group I have ever met.

In 1971 I began seriously chasing counties and even got a new rig so I could go mobile in 1972. By 1973 I had to get a new beam so I could begin taking my turn as net control on 20 and 75. In June 1975 I submitted and application for USA-CA 2500 and got number 191.

The day I worked number 3000 I found out that life was taking an abrupt change and I had to find a new job. We ended up in California, and in the stress of finding a new home, new job, and moving, I missed the fine print about antennas! I was rudely awakened as soon as I started laying out my beam and tower. I tried several times over the years with a "stealth dipole," but it was just too hard. Besides, with two boys in Boy Scouts and me soon the Scoutmaster, there wasn't enough energy left.

In early 2000 I began getting ready for retirement and bought a new rig, specially for mobile because of my fond memories of county hunting. After retirement we bought a new van and set out to visit family and friends on the east coast. Well, 14,000 miles and 2600 mobile contacts later, as we pulled into the garage my XYL said, "You're hooked again, aren't you?" After adding up my new counties, deleting the "no longer counties," and adding the new ones to my list, I only had 63 to go!

What a great winter I had, but as spring came and the band outages added up, it got slower. When I started to gather up my cards to apply for the 3000 counties seal, I found the original list had disappeared over the past 25 years! I had to do it the hard way and compile a list of all 3076. I got down to the last 12, and thanks to a lot of help from the mobiles alerting me ahead of time, I was down to the last two by June. Then in sorting the cards for submission, I found I was suddenly back to five cards needed! Three must have disappeared in one of the moves—ouch!

Slowly it was down to only two by early October. Just as the band opened on one Friday morning, I worked AI5P/m on CW. Only one more to go! Worth, Missouri—I had a card for it, but it had gotten lost along with the list. N4RS let me know ahead of time that he was going through there, but the band opened 20 minutes late! Then I got a call from W9DFK, who offered to go get it for me. This one went right according to schedule. I didn't think that I would get so emotional as everyone called out their congratulations.

Thanks to all the net controls and mobiles who have helped over many years, and to Cliff and Nelda for doing the tedious job of counting cards. —*W3ZUH*

A Short-Time Award

Marconi Day. Look for special-event stations operating from sites all over the world where Guglielmo Marconi (1874–1937) conducted his experiments and tests to prove the commercial capabilities of HF radio. We all are the beneficiaries of his efforts.

This year Marconi Day will be held on 27 April 2002 starting at 0000Z and end-

ing 24 hours later. Fifteen contacts (mixed mode acceptable) with these special-event stations will qualify you for a handsome certificate with a design based on a 1901 stock certificate from the Marconi Wireless Telegraph Company. The official internet site is located at <http://www.users.globalnet.co.uk/~straff/>. The Cornish Amateur Radio Club in England coordinates many of the activities. As this item was being written, in late January, the web pages were humming with activity and notices of proposed operations for the 2002 event.

The AL-FA Award is issued to amateurs or SWLs who have contacted Argentine lighthouses.

DX Awards

The AL-FA Award. Awards based on contacts with lighthouses continue to be popular, and this one is from Argentina. The Amateur Radio Lighthouse Society is encouraging DX awards that follow in this particular interest. Information on lighthouse operations may be found on the ARLHS (Amateur Radio Lighthouse Society) website, and DX bulletins are probably a good place to look as well.

The AL-FA Award is issued to amateurs or SWLs who have contacted Argentine lighthouses. All bands and modes may be used, including satellite and repeaters. No cross-band contacts. No date restriction. QSOs must be confirmed. QSLs should show either the name of the lighthouse or its ARLHS number.

The AL-FA Award is issued in two categories:

Silver: LU, CX, PY, ZP, CP, and CE stations need 5 contacts. DX stations need 3 contacts.

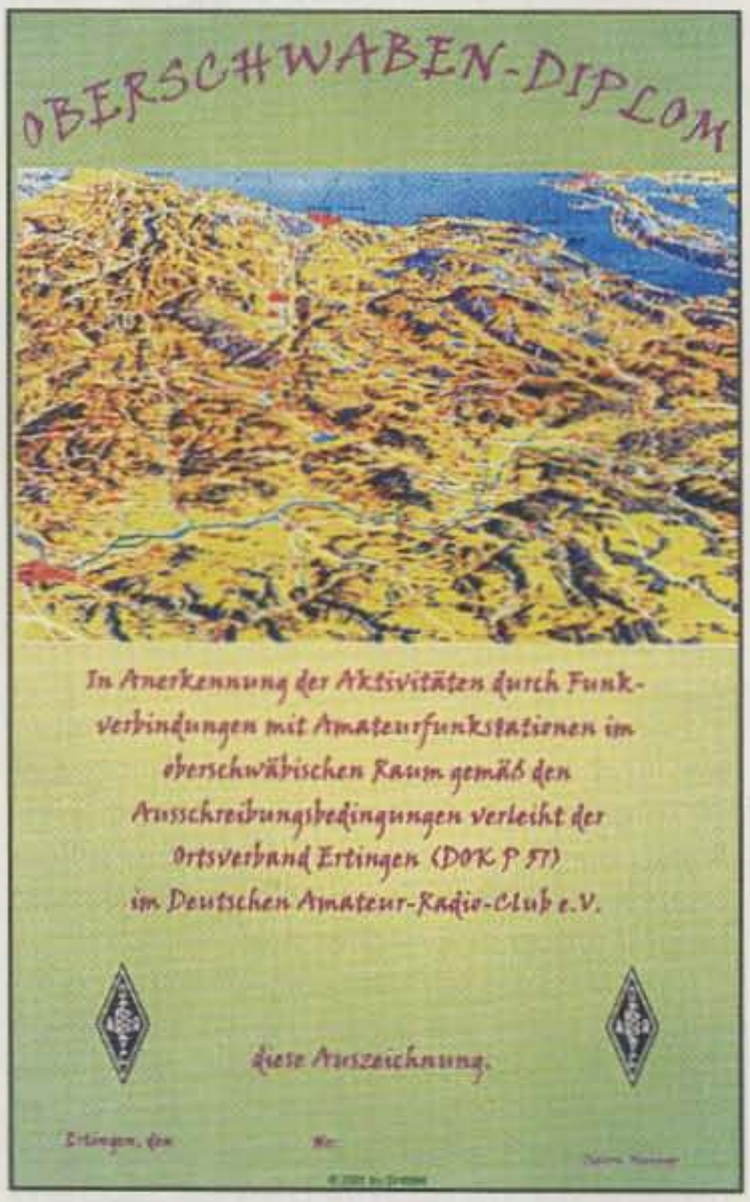
Gold: LU, CX, PY, ZP, CP, and CE need 10 contacts. DX stations need 6 contacts.

The applicant may ask for the award to be printed in English or Spanish. The award is free; the only requirement is to send a self-addressed envelope (22 × 30 cm) and 2 IRCs (Argentine stations should send stamps instead of IRCs.). Either send the QSLs, or you may submit photocopies of them (showing all the data of the contacts). If the actual QSLs are sent, they will be returned together with the award.

The application form for the award can be downloaded from the second internet site shown below. Send the application form, return envelope, and QSLs (or photocopies) to the Award Manager: Claudio Sylwan, LU7CC, Av. Las Heras 3892 (dto. 29), 1425 Buenos Aires, Argentina.

Official lists of Argentine lighthouses are on the web pages:
<www.geocities.com/lu7cc/faros.html>
<www.waterw.com/~weidner/arlhs/awards/A_list.html#ARG>

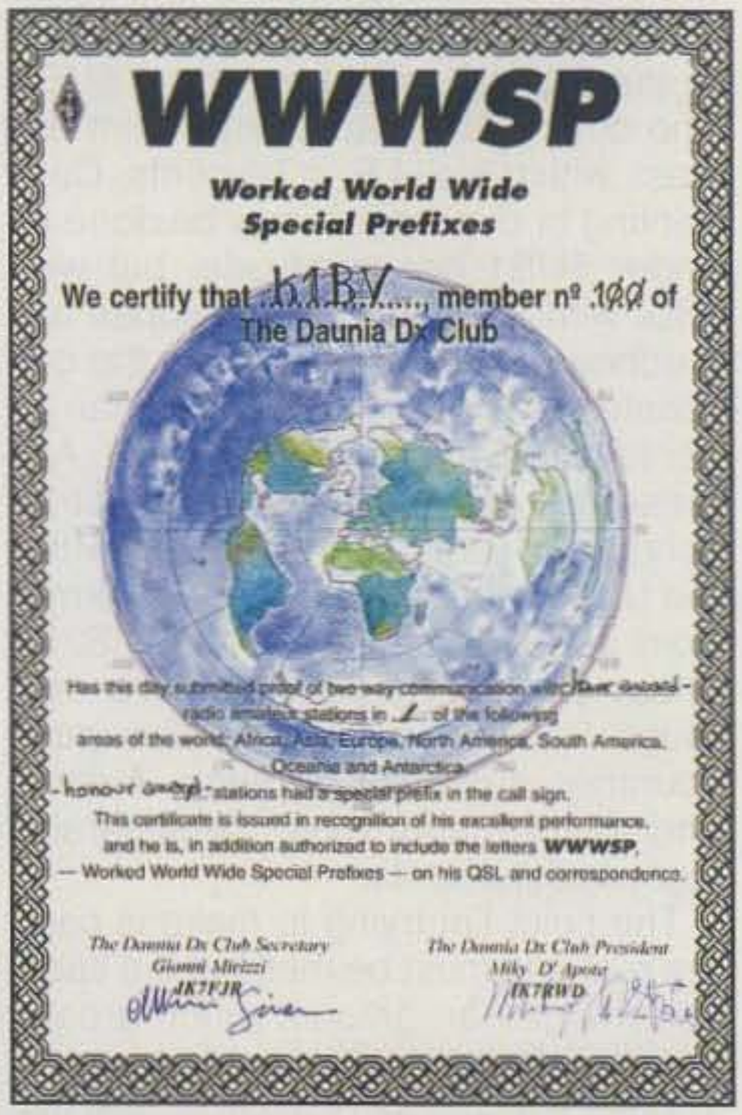
The Oberschwaben Award. This award is a good example of a well-designed, colorful certificate created by a German club. Most German awards require working DOKs. DOK is the letter/number combination used by the Deutsche Amateur Radio Club to identify regional radio clubs. The first letter is the district, and the next two numbers identify the respective club in the district. For example, DH8BM uses DOK P57. P is the District of Wuertemberg and 05 identifies the Radio Club of Ertingen. Germans identify their club on their QSL cards by these letter/number combinations almost religiously. An exception is those who aren't DARC members, and those few don't get to use the QSL bureau system there.



This award is issued by DARC division P57 for contacting stations in the Oberschwaben area of Germany.

The award is issued by DARC division P57 for contacting stations in the Oberschwaben area after 1 January 2001. SWL okay. Work at least one station from each of the following DOKS: A48, P03, P09, P14, P21, P39, P43, P46, P49, and P57. Spell the word OBERSCHWABEN by using any suffix letter from the stations in the above listed DOKs. Club stations DLØRIE and DLØERT count for two missing letters. Any special DOK activated from the Oberschwaben area may be used as a substitute for any missing DOK.

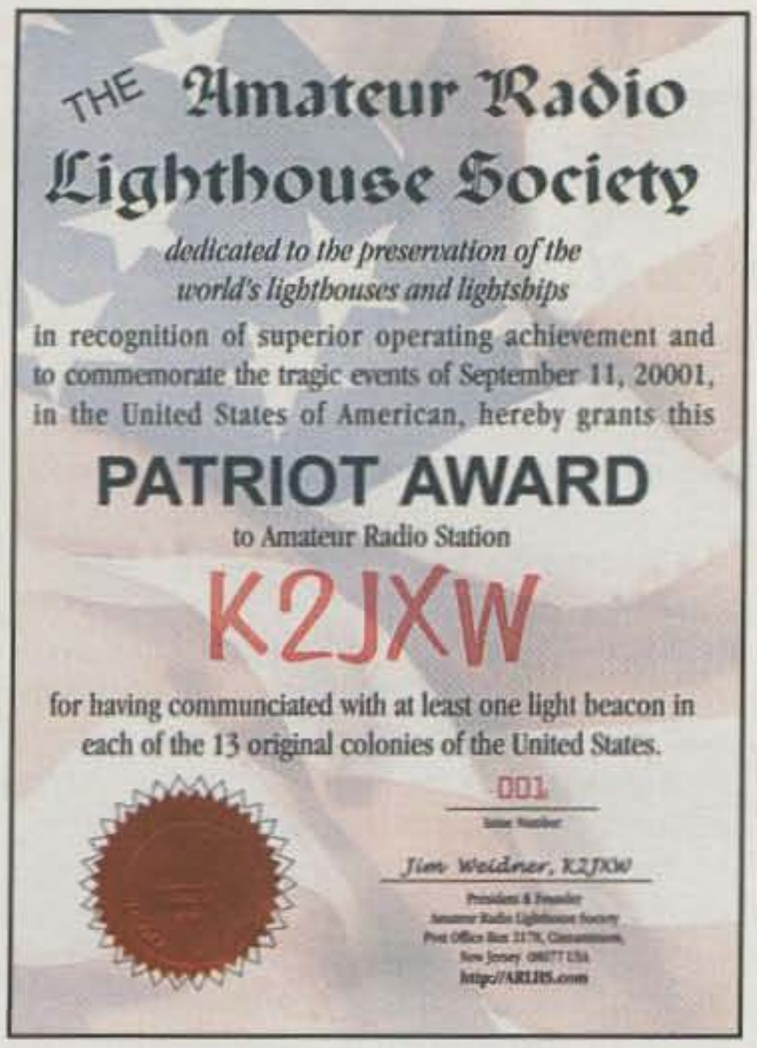
Send GCR list plus fee of 6 Euros or $US6 to: Michael Burgmaier, DH8BM, Heudorferstrasse 9, D-88521 Ertingen, Germany.



Contact one amateur station using a special prefix in its callsign in each of the five continents to earn Italy's World Wide Special Prefixes Award.

World Wide Special Prefixes Award. This award from Italy is somewhat easier to achieve than most of the awards I've been listing recently. The "special prefix" can be any prefix used to celebrate or commemorate a special event or anniversary in the respective country.

Contact one amateur station using a special prefix in its callsign in each of the five continents (EU, AS, NA, SA, AF, and OC) on or after 1 January 1990. A QSO with a station located in Antarctica using any legal callsign may be used as a substitute for any missing continent. SWL okay. Endorsements for band or mode



The Amateur Radio Light House Society Patriot Award is issued in remembrance of the attacks on America on September 11, 2001. Contact lighthouses in the 13 original colonies to earn this award.

are available upon request. Send GCR list and fee of 10 Euros for Europeans and $US10 for all others to Daunia DX Club, Awards Manager Miky D'Apote, IK7RWD, via Campanile 56, I-71036 Lucera (FG), Italy.

ARLHS Patriot Award

The Amateur Radio Light House Society Patriot Award is the first award I know of connected with the attacks on America on September 11, 2001. The symbolism is quite appropriate: Lighthouses are used to show the way to mariners and to protect ships against the perils of marine transportation. Almost all of the 13 original colonies of the United States were located along the Atlantic coast, and the award is available to amateurs worldwide who submit proof with written confirmation of having contacted a lighthouse station in each of these 13 original colonies (Connecticut, Delaware, Georgia, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, and Virginia).

To encourage increased activity and station improvement throughout the bands, contacts on all amateur bands, including the WARC bands, are accepted. The award is available to SWLs on a heard basis. All ARLHS general rules and requirements apply. Contacts may be made over any period of years. Photocopies of cards are accepted. QSL cards and application form must be submitted to the Patriot Award Manager, Jim Weidner, K2JXW, P.O. Box 2178, Cinnaminson, NJ 08077.

All QSL cards sent must be accompanied by sufficient postage for their safe return (registered mail is recommended). Photocopies of QSL cards are permitted and recommended. Include fee of $5.00 for each Patriot Award certificate for ARLHS members and $10.00 for nonmembers. Cost for *all* endorsement seals (and award upgrades) is $2.00 for U.S. stations and $3.00 for DX stations, both member and nonmember. All applications require U.S. currency, U.S. checks, International Money Orders, or U.S. Money Orders made payable to The Weidner Publishing Group. IRCs are accepted for return postage funds only. An application form and other data may be found at: <http://www.waterw.com/~weidner/arlhs/awards/pat1.html>.

Internet Link of the Month

K4HB has a page on his DX-oriented website which provides up-to-date information in an easy-to-read format about postal rates in various countries and whether the dollar you send to cover postage is enough or not. In a surprising number of countries—i.e., Austria, Germany, Norway, Paraguay, Switzerland, and Uruguay—it isn't. You'll see, for example, that the postal rate in Uruguay for an airmail letter to the U.S. is about $US1.75. The link is: <http://www.qsl.net/k4hb>.

I'm still waiting for you to send in a sample of your club or group's award. Publicity is the key to award success and increased activity. We'll help!

73, Ted, K1BV

VHF Plus

BY JOE LYNCH, N6CL

All About The World Above HF

Sunspots: Downhill? Not So Fast!

A year ago in this column I reported on Dr. Tony Phillips' observation of the 2001 mid-February flip of the Sun in its magnetic field. Commenting on the Sun in an article entitled "The Sun Does a Flip" (which was posted on <http://science.nasa.gov> on 15 February 2001) Phillips wrote, "The Sun's magnetic north pole, which was in the northern hemisphere just a few months ago, now points south. It's a topsy-turvy situation, but not an unexpected one."

In his article Phillips went on to quote David Hathaway, a solar physicist at the Marshall Space Flight Center, as saying, "This always happens around the time of solar maximum. The magnetic poles exchange places at the peak of the sunspot cycle. In fact, it's a good indication that Solar Max is really here." From his observation of the Sun's magnetic field flip, Phillips agreed with Hathaway, concluding that at that time we were at solar maximum.

Now, however, Phillips has done a flip of sorts himself. In an article entitled "Sun's Fury Returns, Marking Double Peak in Cycle" (posted on <http://www.space.com/scienceastronomy/astronomy/solar_max_020123.htm> on 23 January 2002) Phillips writes, "The most recent (and ongoing) Solar Max crested in mid-2000. Sunspot counts were higher than they had been in 10 years, and solar activity was intense. But now, as 2002 unfolds, it's back. The Sun is again peppered with spots, and eruptions are frequent." As with last year's article, Phillips again quotes Hathaway, who states, "The current solar cycle appears to be double-peaked," with Phillips concluding, "...and the second peak has arrived."

Continuing, Phillips comments, "The subsequent dip toward solar minimum seemed premature to Hathaway, and indeed it was. Before long, sunspot counts reversed course and began to climb toward a second maximum that now appears to be only a few percent smaller than the first."

Commenting on the various Sun-generated indicators of solar activity, Phillips states, "Sunspots are the most visible sign of those complex magnetic fields—but not the only one. Another sign is solar radio emissions, which come from hot gas trapped in magnetic loops. 'The radio Sun is even brighter now than it was in 2000,' says Hathaway. By the radio standard, this second peak is larger than the first."

P.O. Box 73, Oklahoma City, OK 73101
(phone 918-627-6625; fax 918-835-9785)
e-mail: <n6cl@cq-amateur-radio.com>

VHF Plus Calendar

Apr. 4	Last quarter Moon and lowest Moon declination.
Apr. 7	Poor EME conditions.
Apr. 10	Moon apogee.
Apr. 12	New Moon.
Apr. 14	Poor EME conditions.
Apr. 19	Highest Moon declination.
Apr. 20	First quarter Moon.
Apr. 21	Very good EME conditions.
Apr. 22	*Lyrids* meteor shower.
Apr. 25	Moon perigee.
Apr. 27	Full Moon.
Apr. 26–27	Southeastern VHF Society Conference. (See text.)
Apr. 28	Moderate EME conditions.

** EME conditions courtesy W5LUU*

For those of us who have been around for a few years, we know that Cycles 22 and 21 turned out to be double-peak cycles. If this one also does, it will be the third in a row.

In continuing to refer to Hathaway, Phillips comments, "Hathaway notes a widespread misconception that solar activity varies every 11 years "like a pure sinusoid." In fact, he says, solar activity is chaotic; there is more than one period.

"Earth-directed solar explosions, for instance, tend to happen every 27 days—the time it takes for sunspots to rotate once around the Sun. There is also an occasional 155-day cycle of solar flares. No one knows what causes it. And the double peaks of recent solar maxima are separated by approximately 18 months."

Indeed, the 6 meter activity for the past several months supports the assertion of a double peak. Anecdotally, there have been many stories of daily east coast to European openings, so numerous that they have become almost pedestrian. For example, when I visited my friend Emil Pocock, W3EP, at his home in early January, he commented to me upon my arrival, "You missed another ho-hum European opening," whereupon he proceeded to show me his logs of page after page of European contacts. For this mid-American VHF+ operator, I was quite envious, to say the least.

Reading Phillips' reversal from last year prompts this writer to muse that we on the VHF+ ham bands also work them first and worry later. While our friends on HF work them first and worry later about their legal standing for DXCC, we work them first and worry later as to what propagation mode made it possible for us to have worked them. The fascinating answer to this perennial physics question is "We just don't know."

We also just don't know why the previous two, and now likely this, sunspot peak will be a double. In an effort to supply some sort of speculative answer, Phillips reports that last year scientists used a technique called helioseismology, which, according to him, "...can probe conditions within the Sun much like seismic waves reveal the interior structure of our planet...." Their findings showed that currents of gas at the base of the convective zone sped and slackened every 16 months, which led Hathaway to speculate, "That's about the same as the time between the double peaks of recent solar maxima." Notes Phillips, "Perhaps the two are connected."

Like a good researcher who has once too often been proven wrong, Hathaway cautions, "It's hard to be sure." Continuing, he states, "Helioseismology of the Sun, which can probe beneath its visible surface, is still a young field. We need more time to understand completely how the internal rhythms of our star affect the solar cycle."

Phillips concludes his article stating, "Whatever the cause, a resurgent Sun is welcome news for many sky watchers. Solar eruptions can trigger one of the most beautiful spectacles on our planet: Northern Lights. If the Sun continues to storm, the skies could be alight, off and on, for many months to come." For those of us in the weak-signal community who work both 6 meters *F2* and 6 and 2 meters aurora propagation, this report about the potential double solar peak could be double good news for us!

A First for Asian 10 GHz EME

Kimio, JA9BOH, wrote to the Moon-Net list on 31 January that he got a fax from Hiroshi, JA7BMB, that morning indicating that he had worked Josef, OK1UWA, via 10.451GHz EME at 2010UTC on 30 January 2002. His reported exchanged was M/M. He used a 4.5 m homebrew 8 mm homebrew mesh dish and 20 W IMFET PA. Kimio believes that this is the first Asia to elsewhere 10 GHz EME QSO. Congratulations to both Hiroshi and Josef.

CQ VHF Premier Issue Preview

For those of you who are curious (and who shouldn't be!), here's a bit of a look inside

of the new quarterly *CQ VHF* scheduled to begin publication with the spring issue in May:

What about that exciting *F2* and aurora propagation this past fall? Perennial Magic Band promoter and outspoken propagation prognosticator Ken Neubeck, WB2AMU, gives his opinion on why we have had so much 6 meter *F2* propagation. Here's a bit of what he wrote so as to whet your appetite for the rest of his article:

"Many 6 meter operators who were on the Magic Band during the mid-1990s had not yet experienced significant levels of *F2* propagation on 6 meters. Thus, 6 meter operators were looking toward the peak of the current solar cycle (Cycle 23), which seemed to occur during late 2000. The year 2000 saw only moderate levels of *F2* conditions on 6 meters during the months of November and December.

"These levels, however, were nothing in comparison to what was seen during the last solar cycle (Cycle 22), much to the disappointment of many 6 meter operators. There were a few days during November and December 2000 where east coast U.S. stations worked into Europe, and east coast U.S. stations worked into the west coast. There was no sustained period of activity lasting more than a few days. The solar flux values during November and December rarely reached 200 (the magic number for 6 meter *F2* activity) for any extended period of time.

"Therefore, by the spring of 2001, when many scientists felt that the peak had passed, there were low expectations for the upcoming months in the fall of 2001. A continued decline in the solar flux values was expected by many of the propagation experts.

"Surprisingly, it turned out that the solar flux values were consistently high for the fall of 2001, above 200, which is the magic level needed for 6 meter *F2* activity. The increase in these solar flux values during the fall of 2001 suggests that Cycle 23 was a double-peak configuration. One of the big things with regard to this cycle compared with the last one was the presence of many more 6 meter operators because of 6 meters now being a common band in the newer HF rigs.

"Most of the openings would occur during the daylight hours while one was at work. The internet became a very important tool for spotting 6 meter openings. It would be convenient to listen to these openings using a setup in the car while parked in the work QTH parking lot. Based on my experiences for 2000, I found that a simple vertical setup on the car was not always sufficient for working *F2* openings, particularly when there were pile-ups and a little gain in the signal was needed. As a result, I would set up a 2-element Yagi on a mast into an umbrella stand at lunchtime, and this was proven to be effective in

November of 2000 during a CW QSO with PYØFF on Fernando de Noronha.

"This setup was too obvious to leave out during normal working hours, as it could fall down. Therefore, I developed a setup to hang it on a pine tree that was in the corner of the parking lot at the work QTH."

You can read the rest of Ken's "Up a Tree on the Magic Band" story in the premier issue of *CQ VHF*.

Speaking of opinionated, always outspoken, and sometimes controversial, in the first issue Gordon West, WB6NOA, interviews Chip Angle, N6CA, on the 6 meter DX window. Leading up to his interview with Chip, Gordon writes, "Last November was perhaps the greatest month in the history of the 6 meter band for *F2* and sporadic-*E* band openings throughout the world. Veteran 6 meter DXers claim that the *F2* activity exceeded daily duration and distances in 1957. DX conditions last November, coupled with 6 meter capabilities built into the popular HF transceivers of today, gave us sunrise-to-sunset, long-haul DX from 50 MHz up to an astonishing 50.300 MHz.

"'Spread out!' was the order of the day last November, so the DX 'window' was just about anywhere on the weak-signal portion of the band.

"Spring 6 meter band conditions now get us back to normal, where most everybody parks on 50.125 MHz, listening for activity. The DX window? Somewhere below 50.125 MHz, and a hotly debated subject when you get 'caught' blasting a SSB CQ *below* 50.125 MHz. Just ask well-known 'wider window' advocate Chip Angle, N6CA!"

You can read the whole interview in the premier issue of *CQ VHF*.

How do you move a 42 foot EME dish across town? Rod Blocksome, KØDAS, explains, "Very carefully." Why would you want to move a 42 foot dish across town? Rod begins the story thus: "During the spring of 1980, a magnificent 42 foot parabolic dish antenna arose amid the lush cornfields of Iowa.

"Designed and constructed by my friend Ken Kucera, KAØY, his gigantic dish antenna was entirely homebrew and fully steerable using a Navy surplus 5 inch gun mount, which tipped the scales at a hefty 10 tons! I reported the construction details in the May 1982 issue of *QST*, and an aerial view of Ken's dish graced the cover of that edition.

"Ken's objective was to have a dish that was large enough to work EME on frequencies as low as 2 meters. The dish was a success from the start, netting many 'firsts.' Included among the 'firsts' was the first two-way SSB EME QSO on 220 MHz. By 1986 Ken had worked all 50 states on 432 MHz and during the following year he completed WAS on 220 MHz.

"Ken moved into town in 1988. Consequently, the move resulted in the KAØY EME signal to fall silent from the big dish."

That is not the end of the story, however. Ten years later, Rod picks up this tale of transport: "Early, on a quiet Sunday morning in September 1998, Ken and a crew of helpers loaded the huge dish on a farm trailer. Very carefully, they towed it through the Iowa countryside and through the town of Riverside, Iowa, to his QTH. You *Star Trek* fans will recall that Riverside, Iowa is the future birthplace of Captain Kirk."

You can read more about Captain Kirk's birthplace and the exciting trip through the town of the 42 foot dish in the premier issue of *CQ VHF*.

Do you have too many radios that you want to put on the air and not enough ways to control them? Of course you do! What ham doesn't? In an attempt to put some order into the chaos of the ham shack, Gary Palamara, AF1US, built The (Ultimate) Station Controller. Describing his creation, Gary begins: "Being unique and perhaps complex individuals, we seem to want different things out of our hobby. Luckily, amateur radio has a lot to offer. For me, the most fun comes from SSB DX.

"I enjoy the pile-ups, the casual rag chews, and everything in between. In the shack, station accessories such as computers, voice keyers, and other peripherals only add to the pleasurable experience. Not being satisfied with using a PTT hand or desk microphone, I enjoy the convenience of using a boom mic or even the occasional headset. The problem with using either of the last two options is that of controlling the rig's operation.

"Several years ago I built my first 'Station Controller.' Since then my station controller has gone through several design changes. In the current design, the Station Controller gives one the flexibility of controlling any brand of rig while providing several features that are not offered commercially."

You can read the whole story of Gary's creation in the premier issue of *CQ VHF*.

We've seen them everywhere—parabolic dishes, that is. No longer unique to ham radio or listening for extraterrestrial communications, they pop up on rooftops, windowsills, front lawns, and have even been seen attached to a baby carriage in an outing in the park. Have you ever wondered how they work? George Murphy, VE3ERP, tells us how in his article for *CQ VHF*. Here is an introduction to what he has to teach us:

"We live in a world surrounded by parabolic dish reflectors—on microwave towers, on residential satellite TV antennas, in flashlights in photoflood lamps, and on those strange-looking devices used by football coaches who are trying to listen in on the opposing team's private, whispered conversations on the playing field.

"Did you ever wonder how parabolic reflectors work? For a demonstration, the next time you are watching TV in a room full of noisy kids, cup your hand behind your ear; then adjust your hand until the TV sound comes up and the kids' noise reduces. You have just shaped your hand into a parabolic reflector.

"How It Works: The unique, distinguishing feature of a parabolic curve is its focal point."

You can read the rest of the story of how that parabolic reflector works in the premier issue of *CQ VHF*.

Have these teasers tweaked your interest? I hope so. If not, here are a few more hints of what to expect in that premier issue. Speaking of extraterrestrial listening, Dr. Paul Shuch, N6TX, will run the first installment of his column, "Dr. SETI's Starship." There will be several different articles on batteries—just in time for Rover operations during all the summer VHF contests. Tommy Henderson, WD5AGO, will write about power dividing for multiple antennas. Peter Bertini, K1ZJH, reviews a Ten-Tec product. Which one? Get the magazine and find out.

There are more articles in the pipeline, and it's too soon to say who else will be in the magazine. Your best bet is to get your copy so you can see for yourself.

Commenting on the magazine's return, Lee Kemp, N5TIF, states, "What can I say? *Thank you, thank you* for the return of *CQ VHF*! I had subscribed from the first year to the last. I really loved that magazine and now it's back. Being a weak-signal nut, this magazine will fit me just right. I will be sending in my payment soon by snail mail. Again, *thanks!*"

Hugh Darnell writes, "I just heard tonight that *CQ VHF* is starting back up. *Please* send me an order form so I can start with the May issue. I just took my test on January 19 and am still waiting for my call to come. I think now that so many people will be like me with only a Tech license because we can't have big antennas at our house, only a mobile antenna in the attic.

"I got one of your last magazines before you closed out. So now that I heard on the local repeater in Charlotte, NC that you are coming back—great deal! Please *rush* me an order form."

Both of these fellows did receive order forms and hopefully returned them with their subscription orders. If they did, they, along with many, many others will be watching for the postman to deliver the premier issue of *CQ VHF* early next month. Have you requested your subscription? If not, as soon as you finish reading this column, put down the magazine and immediately call *CQ*'s toll-free number, 800-853-9797, so that you too can watch your mailbox next month.

Perhaps you are a procrastinator. If you are, we have a deal for you, too. However,

this deal will require that you show up at the Dayton HamVention in May. Once inside, stop by the *CQ* booth and pick up the premier issue for just one dollar. Then, if you need to, walk around a bit, but come back and sign up for a year or two of the best VHF-plus coverage in the country.

A Frequently Asked Question

One question that has come up is: "Will the VHF+ column in *CQ* magazine be discontinued?" The answer is a resounding, "No!" Despite the immediacy of the internet, many of you continue to appreciate and expect the frequency and timeliness of reporting on the VHF-plus weak-signal work that is happening out there via this column. We cannot achieve this timeliness in a quarterly publication. Hence, we must continue this column here in *CQ,* and because I enjoy the reporting on your work, I will continue to be its editor.

While generally we will not be reporting on time-value situations in *CQ VHF*, we will be reporting on time-sensitive situations, such as preparing for a meteor shower in an issue that is supposed to be out close to a major shower.

Now, you have a choice, actually multiple choices—but really only one choice. You can continue to subscribe to *CQ* magazine so that you can read this column and not subscribe to *CQ VHF* (not a good choice). You can let your subscription to *CQ* magazine lapse and subscribe to the new *CQ VHF* (again, not a good choice). Finally, you can subscribe to both magazines (the best choice). Whatever you decide, make it the best choice for you.

Current Meteor Showers

This month's meteor showers are the following: The *Lyrids* meteor shower is active between 19–25 April. It is predicted to peak at around 1030 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 and its predicted peaks this month is *pi-Puppids* (peak around 2100 UTC on 23 April). The above information is courtesy the International Meteor Organization and their home page at <http://www.imo.net/calendar/cal01.html#April>.

Current Contests

Spring Sprints: The East Tennessee DX Association will again be sponsoring the Spring Sprints. The following are the dates and times of the various contests:

144 MHz Sprint—from 7 PM until 11 PM local time on Monday, April 1.

222 MHz Sprint—from 7 PM until 11 PM local time on Tuesday, April 9.

432 MHz Sprint—from 7 PM until 11 PM local time on Wednesday, April 17.

Microwave Sprint—from 6 AM until 1 PM local time on Saturday, May 4. This includes all amateur frequencies above 903 MHz. Please include band data in summaries and logs. Note: Use of the Liaison Frequency is encouraged.

50 MHz Sprint—from 2300 UTC Saturday to 0300 UTC Sunday, May 11–12.

Logs may be e-mailed to: <springsprints@etdxa.org>. Paper logs are to be sent to: ETDXA, Jeff J. Baker, KG4ENR, 8218 Foxworth Trail, Powell, TN 37849. Complete rules can be found at <www.etdxa.org>.

Six Club Sprint: The Six Club announced that they will hold their first Sprint on April 27 for five hours beginning at 2300 UTC. The following are their contest rules:

Each QSO is worth one point in his/her own country and two points for every contact made outside of his/her country. Hawaii and Alaska are considered separate countries. Multiply total QSO points by the total number of grids worked. Send logs to:

Six Club, P.O. Box 307, Hatfield, Arkansas 71945. The sprint contest times may vary in your location. For stations outside of North America, you can run the sprint contest in the evening hours starting at the scheduled date of the sprint. Awards will be given out to first-, second-, and third-place winners in each country. For more information. visit <http://6mt.com/contest.htm>.

Current Conferences

Southeastern VHF Society Conference. The sixth annual conference will be held on April 26–27, 2002 at the Garden Plaza Hotel, Oak Ridge, Tennessee. Make reservations before Thursday, April 4 and mention the conference; call the hotel at 1-800-342-7336 or visit <http://home.sprynet.com/~rascoll/hotel1.htm>.

Bring your VUCC eligible QSL cards. There will be card checkers. Complete the proper paperwork prior to submitting your cards to the managers. Rules and forms can be found at <http://www.arrl.org/awards/vucc/>.

For registration, go to <http://www.etdxa.org/>, pull up the announcement, click, and print the registration form.

SETICon02. The SETI League Technical Symposium will be held April 26 and 27, followed by a membership and board of trustees meeting on the 28th, at the Hampton Inn and Suites Newtown, Yardley, Pennsylvania (215-860-1700). For registration go to: <www.setileague.org>.

Call for Papers

The 36th annual Central States VHF Society Conference will be held this year in Milwaukee, Wisconsin on July 26 through July 28. The conference site will be the Four Points by Sheraton Hotel, located near the Milwaukee Airport, not far from the shores of Lake Michigan. This will be the first time a major VHF conference has been held in Wisconsin, and over 13 years since a conference has been held in the area (1989 in Rolling Meadows, Illinois).

Marc Holdwick, N8KWX, is the Technical Chairman this year and will be handling the program and the *Proceedings*. If you can prepare a presentation and/or paper for the conference this year, please contact Marc at <n8kwx@csvhfs.org> or P. O. Box 6051, Buffalo Grove, IL 60089.

While no cutoff date has been mentioned as yet, typically in the past the date has been May 1. Therefore, it would be best to get in touch with Marc fairly quickly to make the arrangements to have your paper included in the *Proceedings*.

More information on registration for the conference will be in next month's column.

Wayne Williams, K4MOB, SK

The following was taken from material by Gary Pearce, KN4AQ:

Wayne Williams, K4MOB, editor of the SouthEastern Repeater Association magazine *The SERA Repeater Journal*, died at home early Tuesday morning, February 12, 2002, of complications from cancer. He was 65 years old. Wayne is survived by his wife Gerry, KB4SER, and two sons, Wayne Jr. and Chris. A third son, Greg, died in 2000.

Wayne's passion in amateur radio was FM and repeaters. He became active in SERA's predecessor, the Carolinas-Virginia Repeater Association, in the early '70s, when 2 meter FM was just beginning its booming popularity. In 1977 he became the editor for the group's magazine, the *Repeater Journal*. The *Journal* was already a respectable 44-page booklet, with regional advertising from local dealers and hamfests, but over the next 23 years Wayne built it into a real quarterly magazine featuring full-color covers and national and regional advertising. The heart of the *Journal* was the Repeater Index, a list of all repeaters in the eight SERA states, but the magazine also included news and feature articles, and regular columns from correspondents in each state.

The story of the growth of FM and repeaters in amateur radio is a remarkable one. Hams "discovered" the mode in the late 1960s. In the '70s band plans were developed and frequency coordinating bodies were formed that led to the kind of organized effort that repeaters demanded to prevent interference and chaos. Wayne Williams chronicled that development from its earliest days to the present, and helped SERA grow into one of the nations largest, most effective coordination bodies.

In parallel with his SERA activity, Wayne also established Williams Radio. He started the business by amassing a huge inventory of crystals. In that pre-synthesizer era, 2 meter FM radios required a pair of crystals for each frequency used. Williams was one of the few "instant" sources of crystals for almost every frequency, and for almost every radio. Other crystal sources made hams wait days or weeks before they got the crystals needed to operate a new radio. Soon the business added accessories and several lines of radios. It was a family affair, with Wayne's wife, brother, and sons pitching in at hamfests across the region. Wayne "retired" from Williams Radio in 1997.

Gary will succeed Wayne as Editor of the SERA Repeater Journal.

And Finally . . .

From what you have read above, Wayne Williams, K4MOB, left quite a legacy. There is something noble about one's dedication even to the end of one's life.

I once belonged to a ham radio club that had members who boasted that they had put in their time and would no longer volunteer to do anything. Pity, because the ones who were the losers with this attitude were these men. There is something fulfilling in doing for others, dedicating one's self for the interest of others. Also, there is something about creating something from nothing.

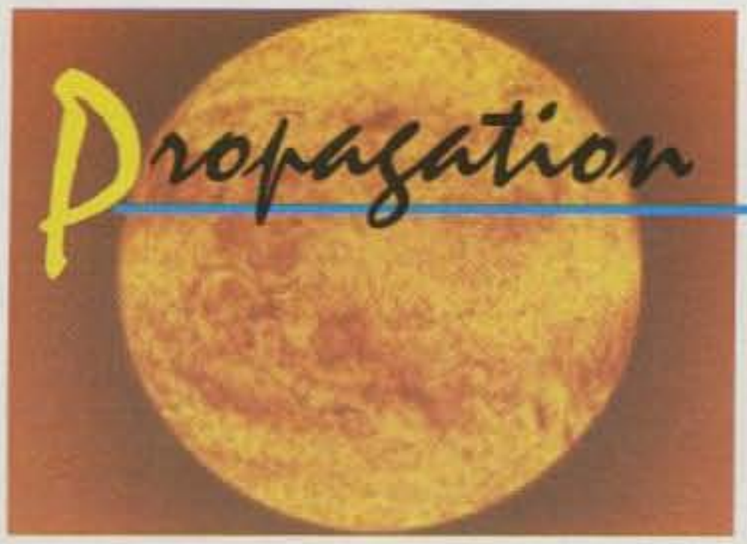
Take another look at this column. When I started writing it, there was nothing on the page. Yet pulling in your ideas, your reports (not so much this month but in the past many reports), your creativity, and your drive, together we all created something from nothing.

I'll give you another example: My friend Tommy Henderson, WD5AGO, is almost single-handedly running the electronics department at Oklahoma State University's technical campus at Okmulgee. When he took over the department it was in shambles. Dwindling enrollment had caused OSU to consider dropping the program. Not now! Tommy reports that there are nearly 70 students working on degrees in electronics. These are students badly needed to fill the shortages of RF electronic technicians.

Why am I waxing philosophical? It is because we all have the responsibility to do the best every day with our talents. Let's take lessons from heroes such as Wayne and Tommy and others you can name and follow their examples as inspiration for us to do our best.

When you do your best, please tell me about it so I can report on it here in this, your column. Until next month...

73, Joe, N6CL



Propagation

BY TOMAS HOOD, NW7US

The Science Of Predicting Radio Conditions

Cycle 23 is Dying (Not)

While tuning around on the high frequency bands I have heard conversations that center on current solar cycle conditions and what the amateur radio operator might expect in coming months and years. More often than not these conversations have a negative outlook for the higher frequencies: "The cycle has peaked, so I am not going to purchase a special 6 meter or 10 meter antenna. It would be a waste of money and time, since propagation is ending for this cycle." I would like to dispel such notions.

Looking back at the last several solar cycles one finds that propagation on the higher portions of our HF spectrum remained at good to excellent conditions for a number of years after each cycle's maximum. This suggests that propagation on 6, 10, 12, and 15 meters will remain very good for at least the next three years during this current cycle.

Conditions during any one-year period will change for each amateur band in the HF spectrum. Winter is a season during which lower frequency propagation improves, for instance. Remember not to judge the solar cycle by seasonal changes. One must look at the overall trend of the 11-year cycle. We are still at the second high of double-peaked Cycle 23. Improving your antenna resources is *not* a wasted effort. You will realize great return on your investment of time, energy, and money. Moreover, when Cycle 23 really does dip down toward the minimum, you will still have a chance to work exciting sporadic-*E* and surprise *F*-layer openings.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for April 2002

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 8, 10, 16-17, 21-23, 26	**A**	**A**	**B**	**C**
High Normal: 4-7, 9, 12-15, 18-20, 27	**A**	**B**	**C**	**C-D**
Low Normal: 3, 11, 24, 30	**B**	**C-B**	**C-D**	**D-E**
Below Normal: 1-2, 28-29	**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 S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be poor to fair (C-B) on Apr. 1st and 2nd, fair to good (C-B) on the 3rd, good (B) on the 4th through the 7th, etc.

MUFs are lower due to solar heating, which causes the ionosphere to expand. An expanded ionosphere produces lower ion density, which results in lower MUFs. Short-path propagation between countries in the Northern Hemisphere will drop out entirely. Ten meter propagation peaks in the fall. April and May are fall months in the Southern Hemisphere, making long-path DX possible. Short-path propagation to South America, the South Pacific, and other areas south of the equator will be strong and reliable when open. However, these conditions do not happen every day on 10 meters.

From April to June excellent propagation occurs on both daytime and nighttime paths. The strongest propagation occurs on paths that span areas of both day and night, following the MUF. During April, peaking in May, and still in June, 15 meters offers 24-hour DX to all parts of the world. Twenty meters is too low, and 10 meters is above the MUF. On 15 meters both short- and long-path openings occur, sometimes at the same time! If you hear a lot of echo on a signal, you might be beaming in the wrong direction. Try the opposite azimuth. Twenty meters is more stable as a nighttime band, with propagation following grayline and nighttime paths.

Low-band propagation is still hot on 40 meters, with Europe in the evening and Asia in the mornings. Occasional DX openings will occur on 80 meters around sunrise.

On VHF many different types of propagation modes can appear once or twice during April. Combination propagation modes may be possible on VHF this month, making for some exciting openings. Aurora (like April showers) is highly likely. Ken Neubeck, WB2AMU,

April Showers Bring . . .

April is one of the most interesting months for propagation. The seasonal change plays out on HF with activity moving up from 40 meters and down from 10 meters. Ten meter propagation suffers during April and the summer months due to lower MUFs (Maximum Usable Frequencies) in the Northern Hemisphere. MUFs peak very late in the day during summer. Summertime

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	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*	*116*	*116*	*117*	*115*
2002	*114*	*114*	*111*	*107*	*104*	*101*	*98*	*95*	*92*	*90*	*88*	*85*

** 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.

informed me that in April 2001 there were a lot of geomagnetic storms with aurora-mode propagation appearing on 6 and 2 meters. I remember the visual light shows in April 2000 and 2001, as well as the high number of contacts reported during those events. This April should be much the same—exciting!

Ken suggests that 6 meter *F2* activity, trans-equatorial propagation (TEP), and aurora propagation are highly possible during April 2002. Sporadic-*E*, he says, is sparse, but can occur as much as four times, based on his previous experience and observations. He says that there are times when sporadic-*E*, TEP, and *F*-layer propagation will link, providing strong DX openings to New Zealand, Australia, or other areas.

April meteor showers provide a chance to experience unique contacts on 6 and 2 meters. The *Quantritids* shower may appear any time during the first part of the month. Other showers might also occur.

Cycle 23 Progression

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a monthly-observed mean sunspot number of 113.9, a 10.7 cm monthly-observed mean solar flux of 226.4, and an observed monthly mean *Ap* index of 7 for January 2002. The sunspot low for the month was 74 on January 17. The sunspot high of 142 occurred on January 4, 2002.

As noted last month in this column, the upward sunspot trend has continued, with 109.9 in June 2001 and 111.7 in July. NASA confirmed that Cycle 23 is double-peaked, as I had observed in February's column.

I predict a smoothed sunspot level of about 107 and a 10.7 cm solar flux of about 170 for April 2002. Geomagnetic activity will increase. Lower HF bands will experience a seasonal rise in noise. Aurora (visual- and aurora-mode propagation) will increase. Overall, though, expect good to excellent conditions.

StratWarm Alerts

Several readers and subscribers of my eAlert e-mail service <http://hfradio.org/propagation.html> have asked me what the "StratWarm Alert" is; it appears in NOAA-issued bulletins and my eAlerts. StratWarm Alerts are announcements of stratospheric warming (stratwarms), a complex, dynamic phenomenon in the polar stratosphere. Scientists have found an interesting but unexpected correlation existing between stratwarms and the solar cycle. Sudden stratwarms occur in the polar stratosphere in winter, but are not equally distributed between the two hemispheres.

When warmed arctic air moves across the North Pole from Siberian Russia to North America during the winter period, some increased *D*-layer absorption of signals occurs. This in turn might lead to some sporadic-*E* (*Es*) propagation.

As the stratosphere lies below the ionosphere, which is at mesosphere and thermosphere height, you normally might not expect to see stratospheric warming affect the AM broadcast band and 160 meter propagation in any way. However, medium-wave frequency signals do refract off temperature inversions and moisture discontinuities. Temperature and moisture inversions are involved in stratospheric warming. It is possible that a medium-wave signal could do any number of things when refracting off a temperature inversion, at any height.

It is unlikely that stratospheric warming will take place during April in the Northern Hemisphere or during the summer months. However, if they exist in the Southern Hemisphere, and when they do exist in the Northern Hemisphere, propagation might be modified by this condition.

Just as the *E*-layer is the main refraction medium for medium-wave signal propagation within approximately 3100 miles, so is sporadic-*E* (*Es*). As with stratospheric-level warming, tropospheric-level temperature, and moisture discontinuities, sporadic-*E* may absorb, block, and refract medium-wave RF signals in an unpredictable manner.

Some limited studies in this area have been made by amateur radio operators. Carl Luetzelschwab, K9LA, did an in-depth study of IV3PRK's 160 meter log to North America during stratwarm months over a three-year period. He states that he "didn't see any correlation between stratwarms and propagation for our typical amateur radio operations—at least nothing conclusive that would stand up in court. With all the other variables in 160 meter propagation (geomagnetic field activity, daily variation in electron density, daily variation in collision frequency, and who knows what else), it would be a big job to try to separate out all these variables to make a definite conclusion. The fact that we don't fully understand all the variables (yet) doesn't help, either." Carl's reports are in the "Technical Correspondence" column in the February 1997 issue of *QST*, and in the January 1998 issue of *The Low Band Monitor*.

I would like to see amateur radio operators study and conduct scientific experimentation on the influence of stratospheric warming on the propagation of our medium-wave and shortwave signals. Hams have uncovered many secrets of radio through the years. There is still much to discover. Will you be another Marconi?

Crawford MacKeand (jcbmck@UDel.Edu) has written a book aimed at the amateur radio operator. Entitled *The Friendly Ionosphere*, the book takes the user right through the complete radio system from the transmitter to the final output of the receiver. How well will the signal propagate to the receiver? Will it be good enough to understand? How much noise will there be and where will it come from? What do you do about it? The technically oriented reader will see how absorption and fading, atmospheric noise and shortwave radio interference, can affect sky-wave and ground-wave signal-to-noise ratio. Antenna gain, diversity, multi-path, aurora, and the effects of modulation, especially in digital systems, are also covered. To bring this reality into sharp focus, the author takes three examples: Marconi's bid to establish a new industry on the premise of transatlantic radio, the loss of Amelia Earhart and the reconstruction of her final position from radio data, and an analysis of three typical amateur radio contacts under various ionospheric conditions.

I've read the book from cover to cover. It is short and to the point and packed with good science. Crawford provides many references, and clearly leads you through the radio system. He confirms my thinking regarding Marconi (see my March column). If you wish to gain a good understanding of the radio circuit, read this book. Details are at <http://www.geocities.com/tyndar_press/>.

Crawford also offers SNAPmax, a very usable and powerful PC computer (DOS) propagation utility program. I installed the program and found it easy to use. It is aimed at both the amateur radio operator and the shortwave listener. You can find this freeware program at my website in the software section <http://hfradio.org/software.html>.

Speaking of shortwave listening, one of the experiences that drew me into the amateur radio hobby is the many long hours I spent as a child listening to exotic stations from around the world on shortwave radio. I continue to this day to enjoy shortwave listening as a hobby. Many of you know the joy of catching far-away countries broadcasting cultural or news programs from their per-

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.

spective. There is an IRC (Internet Relay Channel) group dedicated to this hobby. They have a channel called "SWL" on the StarChat IRC server <http://www.starnet.net>. You might find me there when I am chasing DX, sharing information with other SWLers.

You may e-mail me, write me a letter, or catch me on the HF amateur bands. I'd love to hear from you about your experiences, insights, and studies of propagation. See you on the air!

73, Tomas, NW7US

April 15 - June 15, 2002
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)	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 Mediterranean & 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 of South America	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) 20-22 (1)	04-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-22 (4) 22-00 (3) 00-04 (2)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-07 (1) 21-02 (1)* 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*	15-17 (1)	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)	14-15 (1) 15-16 (2)	20-22 (1) 22-00 (2)
		12-13 (3) 13-14 (2) 14-15 (1)	16-17 (3) 17-18 (2) 18-19 (1) 22-23 (1) 23-01 (2) 01-02 (1)	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)	20-23 (1)
			18-20 (2) 20-22 (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) 02-03 (3) 03-05 (2)	01-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1) 02-03 (1)* 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.

WPX Results *(from page 16)*

entry anyway as probably the only G6 prefix in the contest. First licensed at age 16 in 1932. Bit confused about the Cabrillo log requirement and hope this is OK. . . . **G6QQ**. Just came on to get some practice and give away some points. Great fun as usual, and my 16 foot long piece of wire up a tree in the garden with three ground radials seemed to work remarkably well!. . . . **GMØCLN**. I closed down my main station in England and drove up to Scotland to make more QSOs as GM4OBK. . . . **GM4OBK**. Nice to see some DX stations, including JH3AIU and SU7ZZ, take the time to work my QRP signal. Hard going at times but great fun and my best result so far!. . . . **GWØVSW**. First use of Cabrillo, hope ok. Great contest again. Sorry I was not able to work longer—age 68 and deaf. . . . **GW3KJN**. First CW operation from GW7X. Underestimated the effect of the D layer in summer. When the rate meter changed to hours per QSO it became obvious!. . . . **GW7X**. DE NØJK: Great Top Band conditions from HC8 the second night. G3SED had an awesome signal at his sunrise. Mike noted this was the loudest he had heard HC8N. Signals were great, the noise was sparse. DE K5PI: My first time as DX in a contest and what a way to start. . . . **HC8N**. Wonderful band. Always open—W's and JA's at the same time!. . . . **IK2AIT**. My first CW-only contest ever. Really I enjoyed it and at the end I was even less tired because I saved my voice for the next one in SSB! Very nice conditions. . . . **IK4AUY**. I have lot of prefixes this year due to good antenna on low band and good propagation. . . . **IR2D**. Nice contest but terrible noise (on 80m)! . . . **ISØ/YO3RA**. Good condx on 10!. . . . **IU7M**. Enjoy contest. . . . **JA1HHU**. I could enjoy QRP with Elecraft K2. . . . **JA2KVB/QRP**. I worked QRP 4w through the contest. . . . **JA5CDL**. I enjoyed the contest and QSOs with excellent operators. Thanks! Must improve my antenna and skill for next year. Thanks to all for contacts! . . . **JF2SKV**. I want to have big antennas. . . . **JH2NWP**. First participation. . . . **JI1BBN**. Heavy QRM from CB stations on FM. . . . **JR3RWB**.

Band condx were fb. Too bad I had to work. Hi. Used Kenwood 940S,WriteLog software. Small dipole on porch. . . . **KØCOP/4**. I recently joined PVRC and rekindled an old interest in contesting. This is my first contest log submission since the '70s. . . . **K1MW**. Five watts and a 40m dipole (on 10m!); doesn't get any better than this!. . . . **K2CS**. I had a great time! Conditions seemed to be excellent on 15 and 20 meters!. . . . **K2CY**. Memorial Day weekend weather was lousy. What better way to enjoy your sailboat than to operate the WPX contest from the dock/VE3 while the XYL reads a book? Great fun! . . . **K2NV/VE3**. Indoor antennas and self-imposed quiet hours from apartment. . . . **K2UR**. Great fun; will be back next year. . . . **K2XR**. Great conditions. It was fun to work all continents on 21 MHz with just 5 watts. . . . **K3TW**. Biggest effort I've made in WPX. Still way behind the competition. . . . **K4IE**. I love the CW contests; I just wish my CW skills were better. All those 30+ wpm. . . . **K4RFK**. Good to be back on the air. . . . **K4RO**. I've been on the air since 1959 and this is my first contest where I actually submitted a log. I learned a lot from this contest but I also realize that there is so much more to learn about contesting. I can't wait to do it again!. . . . **K4UY**. This is a personal best score. This is from my new station in Oakdale, CA. Even a little station can work DX. . . . **K6CSL**. My weekend was overbooked in airline parlance. Still, I managed to get on here and there, S&P only, and worked some nice DX. I got two new ones (5X1Z and HZ1AB). Nothing broke, and I had no trouble working anybody I called, and that's a good feeling. . . . .**K6GT**. The action was definitely on 15 in California. . . . **K6RB**. Visiting in Nevada. Brought TS-850S and old trap vertical. What can I say? I think conditions were good, but hard to tell with no gain. . . . **K7JJ**. Conditions were good, but maybe not as good as last year. Operated FT-920 100w with KLM 15M6 and Cushcraft X-9 antennas. . . . **K7ON**. It was amazing to me that a QRP station with average antennas could be this competitive. I really enjoyed having the great ears out there hear my signal. . . . **K7RE**. Contest should move away from Memorial Day weekend and into better propagation time frame. . . . **KF2O**. Hardest decision was when to take off-time. . . . **KG1D**. I took the milliwatt challange and ran a maximum of 750 mw. My rig is Elecraft K2 20m half-square, 10–15m 2-ele quad at 70 ft. . . . **KJ5TF**. New USA M/M record! Great activity from EU, but we need to do more to promote W/VE and JA activity. This is a great, fun contest with really interesting propagation! . . . **KM3T**. Fair conditions, enough to keep an old man busy between naps. . . . **KN4Y**.

Always able to work new prefixes in this one even at over 3900 worked. Condx weren't optimum here but still good enough to make this contest as exciting as always! . . . **KS7T**. Although many refer to the WPX contest as a run-fest, of my 1865 QSOs, 724 were S&P. Ten meters was not as good here this year, no Europeans heard on Saturday and only a handful of big stations from southern Europe heard on Sunday. Of course no JAs on 10. . . . **KS9K**. I operated from Rod, W7ZRC's fine station which made working JA's fun! Many thanks to all who worked me, and to Rod for the use of his fine station. Three elements at 120 feet sure helps. There is also a dipole at 90 feet and a full-size vertical. Wheeee!!!. . . . **KU7Y**. Sure was glad to see 10 open to EU on Sunday. 15 was super all weekend. Still amazed how well the Gap Eagle-DX works!! . . . **KV8Q**. First time with new Stevenage club call and first time in CQ WPX. Great fun but only managed about 35 hrs. Quite pleased with the score for 100w but will try harder next time. . . . **M3S**. Conditions poor to North America. VE3EJ only VE heard. Operating standards good. Thanks to those stations who had patience to copy my weak signals. . . . **M5X**. Great fun with some fb DX about both days. Could only fit a few hours in between family and work but well worth the effort. Heard much more than I could work with 50 watts to a dipole in the back garden. . . . **MMØBQI**. Really must get in more hours. . . . **MUØFAL**. No time to play. Thunderstorms both days cut into prime time. . . . **N2CU**. From an 18th floor apartment in Manhattan, New York City with twisted dipoles on the terrace. . . . **N2NI**. Put up a dipole on Friday and installed Writelog on Friday. Spent the time learning the program and seeing how the antenna worked. Great to be back on the air!. . . . **N2WKS**. First time WPX entry. Limited operation due to thunderstorms and one-week-old harmonic hihi :) Next year will be better! . . . **N3MX**. Out of town until halfway through the contest, but did my best in the time remaining and had fun. . . . **N3UM**. Approached this event casually, but got sucked in with some fine conditions and wish now that I'd approached it more seriously from the

CW & SSB CLUB COMPETITION

NORTHERN CALIFORNIA CONTEST CLUB	**189,046,602**
POTOMAC VALLEY RADIO CLUB	**148,730,644**
YANKEE CLIPPER CONTEST CLUB	141,881,969
CONTEST CLUB FINLAND	128,618,184
RUSSIAN CONTEST CLUB	115,268,884
ARAUCARIA DX GROUP	101,605,145
SLOVENIA CONTEST CLUB	101,405,225
FRANKFORD RADIO CLUB	93,967,119
SOCIETY OF MIDWEST CONTESTERS	92,176,747
BAVARIAN CONTEST CLUB	87,694,566
APHRODITE CONTEST GROUP	74,008,452
URAL CONTEST GROUP	72,295,192
RHEIN RUHR DX ASSOCIATION	62,975,272
FLORIDA CONTEST GROUP	59,247,025
YU CONTEST CLUB	58,214,324
URE	57,849,387
MARCONI CONTEST CLUB	50,294,003
KAUNAS TECHNOLOGY UNIVERSITY RADIO CLUB	47,171,575
CROATIAN CONTEST CLUB	43,783,753
SOUTHERN CALIFORNIA CONTEST CLUB	41,756,228
RADIO CLUB ROSARIO	39,493,468
TuPY - CRASO 30 YRS	38,433,616
SP DX CLUB	36,351,847
SKY CONTEST CLUB	33,613,950
LES NOUVELLES DX GROUP	32,995,747
MAD RIVER RADIO CLUB	31,831,907
SOUTH EAST CONTEST CLUB	29,306,050
HA DX CLUB	28,313,680
TENNESSEE CONTEST GROUP	26,466,203
CENTRAL SIBERIA DX CLUB	26,305,231
WESTERN WASHINGTON DX CLUB	25,904,262
LU CONTEST GROUP	25,414,261
ALBERTA CLIPPERS	24,896,068
LITHUANIAN DX GROUP	24,511,699
UKRAINIAN CONTEST CLUB	23,807,929
KIEV CONTEST GROUP	22,817,203
OKLAHOMA DX ASSOCIATION	21,780,854
VOJVODINA CONTEST CLUB	19,226,010
WILLAMETTE VALLEY DX CLUB	18,812,390
SOUTHWEST OHIO DX ASSOCIATION	17,094,698
CZECH CONTEST CLUB	17,083,833
TOP OF EUROPE CONTESTERS	16,563,565
BANAT CONTEST GROUP	15,883,082
ARM MOLDOVA	15,786,070
BC DX CLUB	15,671,167
GACW CW GROUP OF ARGENTINA	15,116,831
TEXAS DX SOCIETY	15,004,498
LATVIAN CONTEST CLUB	14,929,219
NORTH COAST CONTESTERS	14,778,906
GRAND MESA CONTESTERS	14,341,063
WORLD WIDE YOUNG CONTESTERS	13,314,637
RADIO CLUB CASILDA	11,145,249
MOSCOW CONTEST CLUB	10,625,012
MINNESOTA WIRELESS ASSOCIATION	10,423,577
NORTH TEXAS CONTEST CLUB	10,061,252
UNION FRANCAISE DE TELEGRAPHISTES	9,378,439
BELARUS CONTEST CLUB	9,218,941
SRR	9,139,617
CROATIAN DX CLUB	8,735,008
KRALJEVO CONTEST TEAM	8,366,815
LOW LAND CRAZY CONTESTERS	7,904,284
UA2 CONTEST CLUB	6,746,020
CONTEST CYMRU	6,702,468
RADIO CLUB SLOVENIA	6,169,996
LYNX DX GROUP	5,854,028
ROCHESTER (NY) DX ASSOCIATION	5,366,298
CRIMEAN CONTEST CLUB	5,210,843
CENTRAL ARIZONA DX ASSOCIATION	4,729,453
CANAM CONTEST GROUP	4,280,640
THAILAND GROUP 1996	4,086,767
EASTERN IOWA DX ASSOCIATION	4,066,845
URE CARTAGENA	3,869,098
GLOBUS	3,828,907
Z30M CONTEST TEAM	3,520,326
CENTRAL TEXAS DX & CONTEST CLUB	3,101,600
ODESSA CITY YOUNG RADIOAMATEUR CLUB	2,877,757
WESTERN NY DX ASSOCIATION	2,823,796
SARAJEVO CONTEST GROUP	2,815,629
FOX CONTEST CLUB	2,670,876
NOVOSIBIRISK CONTEST CLUB	2,491,504
CAROLINA DX ASSOCIATION	2,093,412
HOOSIER DX & CONTEST CLUB	1,850,909
LZ CW CLUB	1,730,568
IVANOVO DX CLUB	1,513,149
AMSTERDAM DX CLUB	1,467,128
SP CONTEST CLUB	1,134,053
MOTHER LODE DX/CONTEST CLUB	992,995
NORTHERN ARIZONA DX ASSOCIATION	990,294
A.L.R.S.(RUSSIA)	983,037
YO DX CLUB	957,219
WEST PARK RADIOPS	877,025
GUARA DX GROUP	840,574
BSB DX GROUP	825,657
METRO DX CLUB	715,367
BAY AREA WIRELESS ASSOCIATION	689,774
SHAKHAN CONTEST CLUB	221,302
NORTHERN GREECE CONTEST TEAM	99,980
MNS CONTEST TEAM	28,550

outset! Some outstanding European signals on 15 meters after midnight; 10, however, was disappointing, with only the big European signals making it into southern New Mexico. . . . **N6ZZ**. The opening Sunday morning on 10 meters to Europe was a nice surprise. . . . **N7IR**. One band at a time appeared to be really active. All around better than I expected. . . . **N8LM**.

QRN on Saturday wore me out and didn't take advantage of the second day when there were good condx! . . . **N9AG**. Drake C-Line, ground-mounted vertical. Snagged two new countries!. . . . **N9BOR**. Great conditions on Saturday night on 15m; worked EU till almost midnight local time. . . . **N9GUN**. The weather was far too pleasant to devote a full 48 hours to the contest!. . . . **NH7/N6HC**. Cool condx makes a contest fun. Bad wx couldn't dampen this one! Where were the JA's? Good condx for the few who haven't given up on contesting. . . . **NU5A**. First try at WPX CW from home station. Lots of activity. . . . **NU8Z**. This was an excellent contest. I operated from K7RI's station using my own callsign. Boy, his antennas are excellent! Had a couple of good EU runs which lasted for a bit, but never did get any good JA stuff. 10 meters was very poor up here. I'm curious to see other Rookie entries. I'm 16 years old and this will be my last year entering this category. I think I'm now ready to take on the "big guys". . . . **NW7DX**. Thanks to my dad for the use of his callsign!. . . **NW7R**. Wish I could have operated longer. . . . **NX7K**. Incredible condx on 15m. Usual summer QRN made it rough on 80m. Sure would be nice to move WPX CW back to April—or—switch the dates between Phone and CW. As usual for end of May, many QSOs to be had on 80m but QRN was too rough to copy weaker stations. . . . **NY4A**. Excellent conditions. Unusual opening to North America on 10m for May. My highest score ever in WPX contest. . . . **OE2BZL**. First time I joined the CQ WPX CW Contest. Was a fun weekend but also a lot of other work to do so I could only operate about 25 hours. Bad propagation on 10m but nice DX on the other bands. . . . **OE75CIQ**. First time to make more QSOs on CW than SSB in an international contest. Much fun. . . . **OE75CWL**. Had a lot of fun with modest setup but rare prefix. CU 2002. . . . **OG3M/ø**. I did beat me, did work more than eat. . . . **OH3WW**. Flu and contests—they don't mix! Had fun anyway. . . . **OH6NIO**. Operating on 40m from the same latitude with Anchorage doesn't give dark time for better conditions at all this time of the year. Only a couple of hours in the twilight. There is even a big difference to southern Finland. Anyway, it was a lot of fun. . . . **OH6Y**. My first contest with new FT817, good radio. . . . **OK1IF**. FB condx. . . . **OK1ZP**. Nice contest, abt. 20 hours operating time. . . . **OK2BDF**. Good propagation; thank you for the nice contest. . . . **OK2PCN**. Very good contest and perfect CW operators. See you next year friends. . . . **OK5SWL**. Great to overcome the best result from 80m from last year. . . . **OLØE**. Without linear this year. On 10m with 100 watts and LW only. . . . **OL4M**. I enjoyed very much my first individual participation to this amazing contest. I will be there next year. . . . **ON4KLG**. I utilize only the S&P method for the fun to find all my contest friends. My age is 65 and I hope come back again in 2002. Best 73 to all!. . . . **ON6TJ**. Good condx; small problems with equipment, just making QSOs. . . . **OZ5WQ**.

Band conditions were excellent in PNG. It's amazing how many stations activate their stations during the WPX, proving the bands can deliver some excellent signals. More operating is what's required for the future of this hobby and calling CQ, instead of playing on the internet or just monitoring a DX cluster. . . . **P29IO**. First time in the WPX, to try my new Linux contest program. Worked with 400w and a single wire loop (I guess that puts me into TS.) Was great fun. 80m, normally my best band, was almost empty in EU, although working U.S. was as easy as always. . . . **PAØRCT**. My first single op DXpedition. The Russians and former Soviet Union countries just kept coming. . . . **PJ2U**. First WPX Single, All, High Power with 700 watts and fighting against PY2YU. He won again. Maybe next year!! See you. . . . **PY2NY**. New QTH is working great! . . . **RA3DOA**. Thanks to all Old Mans for good contacts, but don't have many free time. . . . **RV3LO**. It was a great pleasure to work this year event. Thank you very much. . . . **RV6LFE**. Target over 1000 contacts and/or over 1.5 million points not achieved yet. . . . **S54A**. My best score in WPX. Nice conditions. . . . **SM2T**. Rig, Elecraft K1, antenna 10 meter vertical on balcony of the apartment house supported by a 11m fishing pole and with radials inside the apartment. This was my first contest ever!! . . . **SM6EQO**. I was wondering if I could make any contact using such a little power (0.7w) on 40 meters in typical contest QRM. I made 38 QSOs having little time to operate. The longest contact I made was UA9, who responded immediately. I had a great time. . . . **SP5DDJ**. It was very fine to log a few new one DXCC entities during contest pile-ups! . . . **SP5ULV**. Propagation was excellent both days. JA's and K's with great signals during all openings. . . . **SV1DKL**. Keko (TI5KD) got his newly designed 2-element 40 meter quad up just in time for my QRP contest effort. It was amazing to have European stations come back to my 5 watt CQs!. . . . **TE1W**. I wish I could've spent more time on this contest. 73's. . . . **VE2OWL**. Never was one with the contest. Quit midday Saturday. Will meditate on shortcomings and do better next time. . . . .**VE3HG**. Only 8 hours of great conditions. . . . **VE7AV**. The next chapter in the continuing saga of VE7FO's attempt to create and operate a credible contest station, given the following constraints: I live on a 33×120 city lot and I live with a woman. . . . **VE7FO**.

After going into work at 4 AM, I came home, obviously tired. Somewhere along the way I must have worked a couple and not logged them. I know for fact that I worked HSØZCW on 15, but I see he is not in the log. My fault, not his. I wonder how many others I worked while in the nap mode. . . . **VE9DX**. My first CQ WPX. Great fun but with only very limited power it was very tough going. I was very happy to make as many contacts as I did. Many thanks . . . . **VK3VP**. G'day to all contesters. . . . **VK4TT**.

WPX CW TRIBANDER/SINGLE-ELEMENT WORLD & CONTINENTAL RECORDS

WORLD	3V8BB ('00)	11,415,184		**LOW POWER**	
AFRICA	3V8BB ('00)	11,415,184	**WORLD**	IH9/OL5Y ('01)	5,800,434
ASIA	JY9NX ('01)	10,113,847	**AFRICA**	IH9/OL5Y ('01)	5,800,434
EUROPE	ER6A ('01)	5,192,856	**ASIA**	5B4/T97M ('98)	4,339,200
N. AMERICA	FG/RW3QC ('01)	9,134,855	**EUROPE**	T95A ('99)	2,881,890
OCEANIA	*ZK1EFD ('01)	3,366,927	**N. AMERICA**	VE9DX ('00)	3,623,001
S. AMERICA	FY5KE ('00)	9,625,620	**OCEANIA**	ZK1EFD ('01)	3,366,927
USA	NT1N ('00)	5,667,572	**S. AMERICA**	PX2W ('00)	3,852,440
**Low Power*			**USA**	WV2LI ('01)	2,790,110

CQ WW WPX CW CONTEST ALL-TIME RECORDS

The contest is held each year on the last full weekend of May. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS
Single Operator

1.8	IH9/OL5Y('98)	341,068	182
3.5	EA8/OH2KI('96)	1,358,852	347
7.0	LU1IV('97)	7,671,456	702
14	EA9LZ('98)	5,708,498	758
21	A45XR('99)	6,557,697	843
28	LU5CW('00)	5,531,399	757
AB	P4ØW('94)	14,168,115	845

Multi-Operator Single Transmitter

P49V('01)	19,760,774	1034

Multi-Operator Multi-Transmitter

HC8N('99)	54,697,072	1264

U.S.A. RECORD HOLDERS
Single Operator

1.8	K1ZM('95)	40,446	107
3.5	K1ZM('93)	406,080	288
7.0	KI1G('96)	2,573,408	587
14	K2VV('01)	3,523,488	762
21	NU5A('99)	4,411,299	789
28	WW4M('01)	2,547,046	674
AB	AJ1I('01)	8,213,226	849

Multi-Operator Single Transmitter

KM9P('01)	10,691,724	964

Multi-Operator Multi-Transmitter

KM3T('01)	21,103,320	1110

CLUB RECORD
Contest Club Finland('00) 250,320,141

WPX (Prefix) RECORD
HC8N('99) 1264

QRP/p RECORD
P4ØW('97) 4,018,208

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	IH9/OL5Y('98)	341,068	182
3.5	EA8/OH2KI('96)	1,358,852	347
7.0	EA9AZ('01)	4,212,447	547
14	EA9LZ('98)	5,708,498	758
21	5X1Z('01)	6,362,352	782
28	ZS4TX('01)	4,602,028	722
AB	3V8BB('01)	13,639,976	908

ASIA

1.8	4X4NJ('96)	259,420	170
3.5	5B4/UA9YAB('01)	1,332,058	338
7.0	9K2ZZ('94)	3,383,676	487
14	4Z6DX('91)	4,614,030	743
21	A45XR('99)	6,557,697	843
28	5B4/RA9JX('00)	2,715,866	599
AB	P3A('01)	10,723,620	870

EUROPE

1.8	SP5GRM('97)	249,516	261
3.5	LY2BTA('96)	967,974	399
7.0	UA6LAM('96)	3,760,164	701
14	CT2A('95)	4,231,598	826
21	9A3GW('99)	4,893,108	836
28	9HØA('01)	3,965,315	841
AB	OHØZ('00)	7,240,444	893

NORTH AMERICA

1.8	VA1A('99)	103,680	120
3.5	FM5BH('97)	833,490	315
7.0	V26BA('97)	6,227,550	659
14	FM5BH('98)	4,642,866	762
21	ZF1A('99)	5,330,129	799
28	FM5GU('01)	2,849,769	621
AB	WP2Z('99)	12,506,280	890

OCEANIA

1.8	KX6DC('88)	12,240	45
3.5	KX6DC('89)	258,258	143
7.0	ZM1A('98)	5,144,480	592
14	N6VI/KH7('95)	3,103,932	606
21	KH6ND('99)	6,107,256	813
28	KH6ND('00)	1,523,008	424
AB	KH6ND('01)	7,768,297	823

SOUTH AMERICA

1.8	YV1OB('86)	11,550	35
3.5	YX3A('89)	1,004,060	305
7.0	LU1IV('97)	7,671,456	702
14	YW1A('91)	4,617,456	732
21	ZP5XF('97)	5,023,872	712
28	LU5CW('00)	5,531,399	757
AB	P4ØW('94)	14,168,115	845

MULTI-OPERATOR SINGLE TRANSMITTER

AF	CQ3X('96)	13,254,620	790
AS	H2ØA('98)	13,729,156	868
EU	9A7A('01)	10,915,020	1044
NA	6Y1A('01)	17,772,811	1061
OC	AH2R('01)	11,541,420	957
SA	P49V('01)	19,760,744	1034

MULTI-OPERATOR MULTI-TRANSMITTER

AF	6V6U('97)	9,938,896	758
AS	P3A('99)	39,494,534	1174
EU	4OØA('00)	20,932,902	1143
NA	KM3T('01)	21,103,320	1110
OC	KH7R('97)	11,760,354	822
SA	HC8N('99)	54,697,072	1264

QRPp

AF	5Y4FO('92)	649,057	311
AS	UN4L('01)	1,751,703	479
EU	LY5A('01)	2,331,414	646
NA	TI5X('01)	2,568,470	615
OC	FO8JP('86)	572,131	259
SA	P4ØW('97)	4,018,208	632

CONTINENTAL LEADERS

	AFRICA		OCEANIA	
1.8	No Entry	1.8	No Entry	
3.5	No Entry	3.5	No Entry	
7	EA9LZ	4,212,447	*ZL1TM	110,464
14	No Entry	14	No Entry	
21	5X1Z	6,362,352	9M6BG	4,442,400
28	ZS4TX	4,602,028	*VK4TT	342,236
AB	3V8BB	13,639,976	KH6ND	7,768,297

	ASIA		SOUTH AMERICA	
1.8	4X3A	198,360	No Entry	
3.5	5B4/UA9YAB	1,332,058	PY7IQ	149,380
7	*4Z5AX	1,259,595	*LU5OM	70,224
14	5B4/RW9UP	3,286,932	LU7EE	342,000
21	5B4/RA9JX	5,078,472	*PY2NDX	1,609,461
28	*UN9LN	459,360	CX5BW	4,698,344
AB	P3A	10,723,620	P40T	11,726,388

	EUROPE		MULTI-OPERATOR SINGLE TRANSMITTER	
1.8	9A6A	171,589		
3.5	9A3ØY	801,408	AF	ZS6DDX 318,304
7	9A3GW	2,878,644	AS	RT9W 10,821,417
14	DL5LYM	3,344,418	EU	9A7A 10,915,020
21	9H1ZA	3,575,405	NA	6Y1A 17,772,811
28	9HØA	3,965,315	OC	AH2R 11,541,420
AB	OHØZ	6,514,996	SA	P49V 19,760,744

	NORTH AMERICA		MULTI-OPERATOR MULTI-TRANSMITTER	
1.8	No Entry			
3.5	No Entry		AF	No Entry
7	WX4CW	1,264,770	AS	HSØAC 3,738,924
14	K2VV	3,523,488	EU	RU1A 19,788,600
21	VA7CW	3,458,376	NA	KM3T 21,103,320
28	FM5GU	2,849,769	OC	ZL6QH 5,701,696
AB	VP5MM	11,035,570	SA	HC8N 50,454,459

*Low Power

SP9WHN at the controls of Polish 7 MHz champion station SP9W.

Thanks again for running contest. Pity we cannot have 30 hours again!. . . . **VK5GN**. I put out an open invitation on the local repeater for operators/observers, trying to drum up interest in contest style activity for Field Day. The computer techie with the two-month-old Tech license was impressed with the CW operation on WL; his wife had to call him twice to get him to go home. He is probably studying the code now—or making up with his wife. . . . **WØBR**. Condx on 15m to EU were very good, even late at night and early morning hours. . . . **WØETT**. Had limited time due to family visits. . . . **W1TO**. Best conditions on 15m I have ever heard. Great activity and ops this year. . . . **W1ZT**. Lots of storms, but good band condx. . . . **W4BQF**. Great 10 meter run on Sunday morning. Tnx all for the Q's. . . . **W4FMS**. Great conditions on 15 and 20 meters. After dodging the thunderstorms on Friday night and Saturday morning, everything went fine. 10 never sounded too good from here, but I was amazed to see some of the single band 10 meter scores. . . . **W4IDX**. Bands were good until Sunday. 40 was good Fri. and Sat. eve's. 15 was the best band. Ten was poor all weekend. . . . **W4NTI**. Good conditions, great contest. . . . **W4WS**. First full try at SO2R CW, and right at the start discovered that I didn't have the computer set up right for two CW keying interfaces. Thus, I lost the first 3 hours to Murphy, blowing the transistors in both interface boxes, rotating through four computer/operating system combinations, and since Murphy was pervasive, losing the second radio (a TS850SAT). *Of course,* I didn't have an amplifier cable for the TS940 so the

second radio ran barefoot. Lots of fun once Murphy left. . . . **W6IXP**. This was my first participation in WPX. Conditions were vastly superior on 15 meters to what I have seen during 20 years in CQWW DX. 15 was open to Europe late evening, and I even worked JA during the morning runs to Europe. The biggest problem, as usual, was the scarcity of JA's. All in all it was great fun. . . . **W6YA**. This was a major effort from the home shack. Now I remember why I am usually portable in some off island hotel. . . . **W7DRA**. Very frustrating contest for this condo ham. Hard to compete with all the KW-Yagi stations, but will continue to do contests. . . . **W7EAI**.

Tri-bander is a hexbeam; single element is 45 ft. vertical. . . . **W7UT**. My low-energy inaugural run at this contest. Very enjoyable!. . . . **W8RU**. Too many U.S. stations (high power) hogging frequencies completely drowning weaker stations. I think power should be limited (say 100 watts or so). . . . **W8UMR**. Had a great time with great 15m conditions. . . . **W9ILY**. 15m and 20m were great. 10m and 40m terrible. . . . **WA2VQV**. Many thanks to Ken, N6RO, for giving me a chance to operate his wonderful station. Thanks to Bob, K3EST, for his advice and guidance. . . . **WA6O**. (1) It took almost as long to create the Cabrillo report as it did to dupe the old manual logs! (2) It sure would help if I could have heard them. The dipole antenna plus arcing of the neighbors electric fence during the first day sure made it rough. . . . **WA7LT**. My first ever WPX CW Qs. . . . **WIØWA**. 15 meter opening to Russia on Saturday evening but otherwise the bands were a disaster. I never knew where to go. . . . **WN6K**. Kudos to Tom (K1KY/W4CAT) for allowing me to use his fine station while mine is under construction. As usual: had *fun!* . . . **WO4O**. Lots of fun as usual! My first try at SO2R and I can see why it's so popular. WPX CW is my favorite contest, bar none!. . . . **WV2LI**. Had fun with low power and mag-mount antenna on car, borrowed call. My favorite major CW contest by a long shot. . . . **WW3G**. Lightning, QRN that sounded like 160 and precipitation static couldn't spoil the fun of 10 at the cycle peak! Most fun was a late opening to Central Asia/Europe Saturday night and running JA's via long path on Sunday morning. . . . **WW4M**. Spent all day Friday throwing up bi-square antennas just so I could enter this contest. Great fun for 18 hours. . . . **WX6V**. Bad WX here with lightning. QRT many times. Had to operate around the lightning, even at UTC times that were not good for 15m normally. Saturday conditions were very good. About 0600Z Sunday Europe was back in but I could not stay awake. . . . **WZ1R**. Maximum power used 4 watts. . . . **WZ2T**. What a great way to learn about spring/summer propagation. I had lots of fun making my 500k quota. A note concerning accuracy: With the stricter log checking these days I am surprised by the attitude of some operators who copy my call wrong. Instead of sending my call back to confirm correction, they just send "R" and leave me wondering what they actually copied. . . . **XE1/AA6RX**. Our computer suffer from RF loops so we have to log manually and enter the contacts to the computer after the contest. Where are the SA's?? But lots of fun; will try better next year. . . . **YE1ZTC**. This is my first participation in WPX. . . . **YO2NAA**. This is my first contest. I hope is not only YL who is work on this contest. I think so it's not bad for first time. Best wishes and see you on the next contest. My rig is Yaesu 101Z, pwr is 100w, ant D4B. . . . **YT1LT**. First ever serious effort in WPX. Used it as a testing ground for new software and new transceiver. Hard work on just one single antenna—simple wire doublet with balanced feed to roller-inductor ATU. Operating in 36 degs C of Cyprus heat was appropriate to be at the hot end of a pile-up!. . . . **ZC4DW**. My first serious single band WPX effort. See you next year!. . . . **ZS4TX**. This is the first attempt of this team using the ZW5B station. . . . **ZW5B**.

Station Operators
Multi-Op, Single Transmitter

4G1A: 4F3XX, 4F1FZ, DU1WHO. **4O1Z**: YU1UH, YU1ZZ, Bruco, Mico, Dule, Darko. **6Y1A**: K2KW, KE7X, N6XG, K6ST. **9A7A**: 9A4RX, 9A8A, 9A7V, 9A3OS, 9A3TR, 9A4BT, 9A6DM, 9A2ME, 9A4PA. **9M6ONT**: ON4ON & ON45SY. **AA6EG**: W7SW, AD6TF, AA6EG. **AI7B**: K7ZUM, KI7Y, W7GG, N2WEW. **AN4ML**: EA4AHD, EA4AMO, UY7CW, EB4AKI, EB4EPJ. **DFØSX**: DL1CW & DL5YM. **DJ3EV**: DK2OY, DL5JS, DL5KUT, OK1DX. **DK4WA**: DJ6TF, DJ7TO, DK4WA. **DLØMZ**: DK1EI, DF2PI, DL4FN, DF5WA. **DL7ANR**: DF1LX, DF5JT, DL7ANR, DL7FER. **ED2JJ**: EA2AIJ & EA2AJX. **EM5U**: MØSDX, UT3UA, UT5UGR, US5QNA, UY2UA, UT5UIA, UT5UGQ. **ES5Q**: ES5MC, ES5QX, ES5RN, ES5RY, ES4RD. **F6ENO**: F6ENO, F6CEL, F5AKL. **F6KRK**: W5JLP & F8CRH. **F8KFS/P**: F8AWQ, F5LJY. **IO2L**: IK2NCJ, IK2JUB, IK2PFL, IK2NVY. **JA1YPA**: JA1PEJ, JF1EQA, JK2RCP. **JA7YCQ**: JH7IMX & JI7GBI. **K2XR**: K2XR, VA3UA, N2IX. **K6ZM**: K6WG & KD6RMN. **KF1V**: K1RX & W1AAX. **KM4M**: K4JA, AC4HB, K4ZA, K9GY, K9JY, W4JVN. **KM9P**: W4AN, K4BAI, K5OT. **KQ1F**: KQ1F & K1XM. **KR5DX**: K5MR, K5GA, KG5U, K1OJ, N5TU, K5NZ. **L99D**: LU2DKT, LU7DW, LW8EXF, LW9EUJ. **LW7DX**: LU8DW, LW7DX, LW9DAH. **LY6M**: DK8LV, DL6RAI, LY1DR, LY1DS. **LZ9W**: LZ1ANA, LZ1ZD, LZ3FN, LZ4AX. **M2A**: G3RIR, G4EOF, G4MJS, G3ORY, GØTPH. **M3S**: GØWAT & G4DDX. **NG2P**: K2DB, NG2P. **NX6T**: K6AM, DL3OI, N6KI, K6ZH, KU6I, N6CY. **OD5/OK1MU**: OK1MU, OK1CW, OK1DF, Katka, Nikolka. **OE2S**: OE2LCM & OE2VEL. **OHØ8**: OH2BH, OH2MM, OH2PM, OH2TA, OH2JTE, OH8SR. **OH1F**: OH1MDR, OH1NOA, OH1MM. **OH2U**: OH2IW, OH2XX, OH6CT, OH6EI, OH7BX, OH7JR. **OK5SWL**: OK2WHG & OK2SWD. **OL3A**: OK1AY, OK1CM, OK1DRQ, OK1FCJ, OK1MR. **OL5Q**: OK1HRA, OK1AYE, OK1VSL, OK1FLC, OK1FFU. **OM7M**: OM3PA, OM3PC, OM3TZQ, OM5RM, OM5ZW. **ON4TG**: Club Group. **OT1P**: ON6AH, ON6QR, ON5OO, ON7PC, ON6MH. **P49V**: AI6V, S59AA, S5ØA. **PA4GF**: PA4GF & PA3CVG. **PQ2Q**: PY2WC, PY2EL, PY1NX, PY1SL. **RF9C**: RZ9CO, RA9CKQ, RA9CMO, UA9CIR, UA9CDC, UA9CDT. **RI3A**: RA3FF, RU3DGD, RK3FM, RK3FT. **RK4FWX**: RW4FO, UA4FAR, UA4FCV. **RN3D**: RN3AZ, RX3DCX, RZ3FA, RV3FF. **RT9W**: RU9WX, RX9WR, RX9WI, RV9WA, RW9WW, UA9WFM, RW9WY, RV9WZ, RA9WAA, UA9-Ø84-439, RA9WR. **RW9C**: UA9CGA, RW9CF, RU9CK. **RZ4NWH**: RA4NF, UA4NCI, UA4NC. **RZ6LZL**: RN6LG, RA4AJF/6, RV6LSS, UA6LQ, UA6MF. **S53DRA**: S53AK & S52IM. **SK2TP**: SM2KAL & SM2UJW. **SK3W**: SM3SGP, SM5IMO, SM5TXT, SMØGNU, SMØOEK. **SN2B**: SP2FAX, SP2WKB, SP8RX. **SN45KDU**: SP9AVZ & SO9FMU. **SN8V**: SP8GQU, SP8GWI, SP8HZZ. **SP2AYC**: **T48K**: CO8ZZ, CO8DM, CO8JY. **TM5B**: F5JBR, F5VV, F5XX. **UA4PWW**: RA4PO & RW4PL. **UR4PWC**: US-P-361, US-P-296, US-P-363. **UT7L**: UR4LRG, UR4LTX, UR4LUG, UR8LA, US4LGW, UXØLL, UY5LW. **V25A**: N3OC & DL6LAU. **VA3NA**: VA3TTN & VA3NA. **VE7UF**: VE7RG, VE7ZO, VE7UF. **WØBR**: NØSZE, KCØKDH, WB5PLJ, KØLLS, WØBR. **W3IQ**: W3IQ & N3SD. **WJ6O**: WJ6O, W6KNS, W6LD, N7MH. **WL7E**: WL7E, KL7Y, KL5E. **YBØZZ**: YBØAI, YBØHD, YBØCBI, YBØDPO, YBØECT, YBØFMT, YBØGJS, YBØYAD. **YE1ZTC**: YC1WAE, YC1VBH, YC1YCF, YB1BOD. **YL7C**: YL7C & YL2GQT. **YQ4A**: YO4NF & YO4FRF. **YU1INO**: Lj. Radosavljevic, S. Radosavljevic, S. Mladenovic, D. Dzurdzic, YT1BV, YZ1DQ, YU1EK. **YZ7A**: YU7CM, YU7KC, YT7BR, and ops from YU7JDE, Bence, Robert, Pete, Zoltan, Csongor. **Z37GBC**: Goko, Boko, Igor. **ZS6DDX**: ZS6EGB, ZS6HWC, ZS6MG. **ZW5B**: PY1KN, PY2YP, PY2BW, PY2EX.

Multi-Op, Multi-Transmitter

AK3Z: AK3Z, NY3A, N3SB, WX3B. **HC8N**: N5KO, W6OAT, K5PI, W6RGG, OHØXX, K6TA, NØJK, K6KO. **HG9X**: Club Group. **HSØAC**: HS1CKC, HS6NDK, JA6DEA, E21EIC. **KM3T**: KM3T, KC1XX, K1GQ, K6AW, W1MD, W1FV. **KM5G**: KM5G, KØDEQ, K5ALU, WØJOE, NØEHW, N5OE, K5LG, N5DX, K5GO. **LY7A**: LY2OC, LY2OA, LY3KS, LY1DF, LY3DA, LY3HD, LY3MU, LY2AO, LY3BY, LY2CU, LY1EE, LY4AA, LY2FNK, LY2KZ, LY2NK. **NQ4I**: NQ4I, K2UFT, W7FB, N4AA, AA4S, KS5M, K4WI, K4OGG. **NR4M**: NR4M, K7SV, K4GMH, K1SE, K4ZW, K4EU, K4EC, WA4JUK. **NY4A**: K2AV, K7GM, N4AF, N4CW, W2CS. **OG3M/Ø**: OH6LI, OH8PF, OH8VJ. **OH6K**: OH6XX, OH6MSZ, OH6UV, ex-OH6NU. **OL7R**: OK1XUV, OK1ISB, OK1VWK, OK1WMV, OK1ZMS. **OL7W**: OK1DUT, OK1EP, OK1FDR, OK1AU, OK1TA, OK1DRY, OK1FKV, OK1VBA, OK1FUT. **OZ5WQ**: OZ1BIZ, OZ1ETA, OZ3ZW, OZ5WQ. **RU1A**: RN1AM, RV1AW, RU1AA, RW1AC, RA1ACJ, UA1ARX, RX1AA, UA1AKC. **WK4Y**: K4GAU, W4DR, W4HJ, WA4QDM, WK4Y, W4MYA and Lilly. **WQ7T**: NØAX, N7WA, W7KN/JR1NKN, N7BV, KD7GIM. **WR3L**: K3FT, WR3Z, WR3L. **ZL6QH**: DK1II, ZL2BSJ.

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

CW RESULTS
QRP/p SECTION

WORLDWIDE

TI5X	**A**	**2,581,770**	**1597**	**615**
		(Op: NØKE)		
LY5A	**A**	**2,333,352**	**1591**	**646**
		(Op: LY2PAJ)		
LY9A	*	1,956,100	1548	620
		(Op: LY3BA)		
UN4L	**A**	**1,751,703**	**1127**	**479**
K3WW	**A**	**1,662,210**	**1133**	**506**
HG5Z	**A**	**1,660,659**	**1451**	**553**
		(Op: HA1CW)		
N6MU	**A**	**1,432,497**	**1062**	**523**
SM3C	**A**	**1,311,058**	**1210**	**518**
		(Op: SM5CCT)		
YT7TY	**A**	**1,270,090**	**1138**	**535**
VE1ZJ	**A**	**1,034,520**	**802**	**444**
VE3KP	**A**	**952,380**	**792**	**407**
TMØA	**A**	**935,088**	**1102**	**483**
		(Op: F6OIE)		
DJ1YFK	**A**	**929,475**	**941**	**459**
UX8IX	**A**	**851,212**	**1078**	**482**
WQ1RP	**A**	**753,848**	**732**	**391**
		(Op: K1RC)		
N7IR	**A**	**700,132**	**728**	**404**
UA4YJ	**A**	**656,980**	**793**	**428**
NØUR	**A**	**477,930**	**589**	**358**
K7RE	*	463,386	602	354
WI9WI	**A**	**414,494**	**504**	**334**
N1TM	*	398,100	479	300
US2IZ	*	373,980	603	345
W4WS	**A**	**360,675**	**527**	**315**
		(Op: WB4MSG)		
AM7AAW	**A**	**357,557**	**565**	**337**
VE6BF	**A**	**303,690**	**293**	**265**
JA2KVB	**A**	**290,835**	**395**	**281**
DL1DQY	*	258,468	372	238
HB9XY	**A**	**200,980**	**409**	**260**
PAØADT	**A**	**200,376**	**416**	**253**
DL1LAW	*	187,782	442	263
EA2NA	*	164,944	380	244
SM5DQ	*	141,980	300	229
HB9CZF	*	127,125	267	225
YO4AAC	**A**	**119,028**	**317**	**218**
S59AV	**A**	**112,980**	**308**	**210**
LZ9A	**A**	**99,554**	**251**	**182**
DJ8UV	*	94,940	243	188
KJ5TF	**A**	**91,516**	**201**	**167**
W3PO	*	68,667	183	141
NQ7X	*	63,732	172	141
AC7AF	*	55,341	208	143
JA5CDL	*	50,094	162	138
SP9MRQ	**A**	**49,704**	**186**	**152**
UR5GJP	*	43,358	212	163
DL2BQD	*	42,117	176	139
UR5FAL	*	42,000	170	125
K2CY	**A**	**41,301**	**158**	**117**
F5PBL	*	40,278	158	137
WIØWA	*	39,237	157	123
		(Op: WØETC)		
4N7A	*	38,184	176	129
YO6CFB	*	37,609	182	143
KE1L	*	37,605	144	115
LZ2RS	*	30,996	128	82
AD4J	*	23,959	106	97
IZ8AJQ	**A**	**19,522**	**99**	**86**
UN7LT	*	10,944	66	57
SP2QVS	*	10,125	82	65
UA3QIX	*	9,500	86	76
WZ2T	*	9,387	73	63
DJ5OK	*	9,384	81	69
NVØU	*	8,704	70	64
WD3P	*	8,568	60	51
K5OI	*	7,336	68	56
JG1EIQ	*	7,072	70	52
NØIBT	*	6,696	67	54
PA3CLQ	*	3,456	52	48
F5IQJ	*	2,667	45	21
VK3VP	**A**	**2,639**	**39**	**29**
PA3FSC	*	2,460	30	30
AB8DF	*	36	4	4
4X1VF	**28**	**166,888**	**311**	**184**
I1BAY	**28**	**158,720**	**322**	**248**
JR3RWB	**28**	**88,500**	**214**	**177**
YO5DAS	**28**	**37,973**	**140**	**127**
OH6NPV	**28**	**33,143**	**144**	**131**
DF9ZP	**28**	**23,183**	**105**	**97**
K2CS	**28**	**12,654**	**77**	**74**
OK1AIJ	**28**	**3,780**	**48**	**45**
DF1DX	"	2,584	34	34
VE6JY	**28**	**1,846**	**26**	**26**
LY5G	**21**	**664,092**	**675**	**468**
		(Op: LY2FE)		
RZ6HX	**21**	**575,618**	**690**	**449**
YU1LM	**21**	**454,342**	**588**	**391**
LU5FZ	**21**	**382,464**	**452**	**288**
US9QA	**21**	**362,232**	**538**	**351**
ES1CR	**21**	**284,704**	**431**	**328**
GØDCK	**21**	**190,060**	**317**	**260**
K3TW	**21**	**135,600**	**255**	**226**
WA6FGV	**21**	**131,712**	**298**	**224**
CX2AQ	**21**	**102,258**	**208**	**171**
DL6MHW	**21**	**88,147**	**223**	**181**
YC3MM	**21**	**8,640**	**56**	**54**
YO6EZ	**21**	**6,860**	**55**	**49**
JQ1NGT	**21**	**1,955**	**29**	**23**
OZ1BXM	**21**	**351**	**13**	**13**
SP4GFG	**14**	**277,014**	**500**	**337**
RN6FO	**14**	**190,656**	**410**	**288**
US3QW	**14**	**188,046**	**394**	**279**
N4IJ	**14**	**162,840**	**300**	**236**
GWØVSW	**14**	**130,140**	**318**	**241**
F6GKQ	**14**	**122,018**	**320**	**247**
G3LHJ	**14**	**85,440**	**221**	**192**
K6III	**14**	**50,196**	**156**	**141**
HB9LDO	**14**	**2,847**	**39**	**39**
OK1IF	**7**	**439,075**	**521**	**325**
TE1W	**7**	**395,036**	**333**	**244**
		(Op: W8QZA)		
YU7DP	**7**	**228,084**	**345**	**249**
KU7Y	**7**	**217,568**	**346**	**208**
OK2BJL	**7**	**145,801**	**290**	**211**
SM6EQO	**7**	**125,440**	**271**	**196**
UT5UQV	**7**	**27,742**	**101**	**97**
SP5DDJ	**7**	**2,448**	**37**	**34**
OM3THV	**3.5**	**73,457**	**231**	**149**
UT1PO	**3.5**	**10,880**	**80**	**68**
YU1RA	**1.8**	**3,640**	**43**	**40**

NORTH AMERICA

UNITED STATES

AJ1I	**A**	**8,213,226**	**3352**	**849**
			(Op: K5ZD)	
KG1D	**A**	**7,817,702**	**3006**	**838**
			(Op: K1KI)	
KQ2M	**A**	**7,756,329**	**3069**	**853**
NW7R	*	7,341,600	3069	805
			(Op: K1ZZ)	
KI1G	*	6,608,835	2820	795
KR7G	*	6,031,608	2602	737
			(Op: K1VR)	
WC1M	*	5,827,728	2620	766
KR1G	*	5,538,960	2543	735
AK1N	*	3,191,586	1812	633
			(Op: W1WEF)	
K5MA	*	2,406,168	1400	552
K1SWG	*	96,936	204	168
W1CU	*	42,016	122	104
WZ1R	**21**	**1,835,430**	**1204**	**579**
NT1N	**14**	**2,900,920**	**1648**	**694**
***WE1USA**	**A**	**3,956,437**	**2052**	**713**
			(Op: WA1LNP)	
***K1VUT**	**A**	**3,274,200**	**1797**	**642**
***K1HT**	**A**	**1,299,416**	**981**	**472**
*KS1J	*	415,977	481	313
*KR1B	*	265,104	385	252
*K1GU	*	199,320	313	220
*W1RM	*	192,416	279	224
*W1TO	*	181,882	289	211
*KG1V	*	81,627	213	169
*W1TW	*	74,568	195	156
*K1RFD	*	34,752	113	96
*AB1BX	*	30,576	136	112
*KR3DX	*	936	23	12
			(Op: W1EQ)	
***WA1FCN**	**21**	**439,304**	**502**	**356**
***KO1N**	**21**	**135,884**	**258**	**211**
			(Op: K1KO)	
***KK1W**	**21**	**12,851**	**78**	**71**
KW2O	**A**	**4,639,392**	**2209**	**712**
			(Op: K2LE)	
W2WB	**A**	**2,750,810**	**1548**	**695**
N2GC	**A**	**2,735,440**	**1591**	**620**
N2ED	*	2,637,504	1586	608
N2CU	*	1,951,670	1294	569
KA2MGE	*	450,359	476	343
W2EZ	*	316,944	438	284
W2LE	*	256,255	368	265
N2AA	**14**	**1,875,204**	**1232**	**582**
NA2X	**7**	**121,635**	**182**	**159**
***WV2LI**	**A**	**2,790,110**	**1725**	**590**
			(Op: N2GA)	
***WK2G**	**A**	**1,894,760**	**1330**	**536**
***W2TZ**	**A**	**781,830**	**698**	**365**
*WA2EYA	*	627,946	646	374
*WA2VQV	*	438,200	503	350
*KM2L	*	272,384	382	266
*KA2D	*	264,936	392	249
*KF2EW	*	204,180	424	246
*K2SZ	*	201,160	314	235
*K2UR	*	84,862	198	151
*W2YE	*	40,404	133	111
*NT2W	*	12,627	80	69
*N2WKS	*	6,336	48	48
N3RS	**A**	**5,546,520**	**2544**	**744**
K3ZO	**A**	**5,538,120**	**2493**	**760**
AA3B	**A**	**4,885,050**	**2317**	**725**
K2PLF	*	3,043,260	1691	636
W3AZ	*	524,142	537	333
W3BYX	*	518,000	539	350
N3UM	*	215,196	323	227
KE3MX	*	10,148	70	43
KT3M	**28**	**762,128**	**827**	**436**
			(Op: N3AD)	
WY3T	**14**	**305,613**	**394**	**297**
W3BGN	**7**	**1,188,698**	**735**	**394**
***AA3E**	**A**	**3,555,627**	**1893**	**641**
***N1WR**	**A**	**1,966,950**	**1259**	**558**
***W3UJ**	**A**	**1,235,820**	**959**	**479**
*WF3M	*	730,697	706	367
*WO3Z	*	506,748	590	349
*W3CP	*	420,000	434	300
*W8FJ	*	260,036	359	259
*AD8J	*	238,161	348	231
*K3DSP	*	207,417	351	249
*W2GG	*	187,206	299	246
*N3MK	*	179,014	332	206
*K3VA	*	171,810	292	230
*N3NZ	*	166,944	314	222
*W3FQE	*	73,840	177	142
*KB3MM	*	52,560	151	120
*WW3G	*	24,750	122	99
*K3JHT	*	17,010	101	90
***NJ3K**	**14**	**356,568**	**522**	**332**
NJ4M	**A**	**7,354,704**	**3195**	**826**
			(Op: K1TO)	
WK4R	**A**	**6,488,790**	**2843**	**795**
			(Op: N2NL)	
KR4Z	**A**	**4,430,149**	**2225**	**751**
WC4E	*	4,404,531	2302	717
WW4RR	*	3,918,844	2174	718
			(Op: N4ZZ)	
K4RO	*	3,400,411	1982	703
NW6S	*	1,690,084	1154	541
K4LQ	*	1,388,772	1026	501
KC4ZV	*	1,342,138	1030	518
K4LTA	*	829,370	825	421
NU4Y	*	595,608	592	332
W4NTI	*	546,516	612	342
W4YE	*	513,030	527	349
K4PB	*	458,247	541	309
K4MA	*	366,064	470	274
W4IR	*	344,610	476	315
W4BQF	*	286,604	399	274
K4UY	*	276,654	502	294
N4MM	*	250,977	339	269
K4IU	*	222,820	354	260
K4VV	*	214,326	319	243
W7QF	*	90,240	193	141
W4OGG	*	6,298	50	47
W4JN	*	125	6	5
WW4M	**28**	**2,547,046**	**1573**	**674**
			(Op: W4ZV)	
KZ4DX	**28**	**2,096,016**	**1490**	**624**
K4OAQ	**21**	**2,609,511**	**1580**	**641**
W9WI	**21**	**1,773,477**	**1269**	**579**
N4QB	**14**	**27,606**	**116**	**107**
KE4OAR	*	810	18	18
WX4CW	**7**	**1,264,770**	**730**	**414**
			(Op: W4SO)	
***WJ9B**	**A**	**2,139,291**	**1421**	**567**
***WD4AHZ**	**A**	**2,087,416**	**1399**	**589**
***WO4O**	**A**	**1,843,712**	**1255**	**554**
*N4YDU	*	1,808,810	1339	554
*N4IG	*	1,781,040	1226	543
*NV4X	*	1,306,590	1065	485
			(Op: K4QPL)	
*K4IE	*	1,213,117	1020	487
*NF4A	*	1,174,616	967	488
*W4IDX	*	865,956	834	427
*W4SAA	*	739,200	752	384
*K4ORD	*	277,940	399	260
*W4HGW	*	252,252	352	252
*W4AU	*	238,592	357	233
*WZ5V	*	224,460	371	258
			(Op: KØEJ)	
*WB4IHI	*	202,635	326	237
*NX9T	*	169,488	293	214
*KB4N	*	119,972	261	178
*W4AUI	*	108,540	252	180
*NY4N	*	97,948	258	188
*W4TYU	*	74,500	196	149
*W4UM	*	67,584	167	132
*AA4KD	*	64,622	184	158
*K6ETM	*	54,450	172	121
*KØCOP/4	*	45,360	169	126
*K4RFK	*	23,318	99	89
*AE4EC	*	17,010	97	81
*W4NZ	*	6,664	50	49
*W4ATL	*	912	24	16
***W4FMS**	**28**	**662,872**	**759**	**392**
***KN4Y**	**28**	**415,310**	**620**	**349**
*KA2DIV	*	159,120	302	234
			(Op: N4GM)	
*K4RV	*	1,564	23	23
***K1MW**	**21**	**348,080**	**453**	**304**
***ND4AA**	**14**	**232,050**	**341**	**273**
NU5A	**A**	**6,883,173**	**2954**	**831**
			(Op: K5GN)	
AD5Q	**A**	**4,274,426**	**2241**	**754**
N6ZZ	**A**	**2,648,000**	**1595**	**662**
N5ZK	*	1,018,647	972	483
			(Op: W5ASP)	
N3BB	*	554,694	585	329
W5TM	**21**	**2,871,302**	**1709**	**706**
K2BA	**14**	**2,330,880**	**1457**	**640**
W5FO	**14**	**927,360**	**800**	**483**
N5DO	**7**	**736,048**	**601**	**358**
***WQ5L**	**A**	**3,112,218**	**1806**	**666**
***WD5K**	**A**	**2,196,116**	**1443**	**628**
***NN5P**	**A**	**1,917,069**	**1429**	**579**
			(Op: K8EP)	
*KØCIE	*	416,954	567	326
*NO5W	*	265,720	492	280
*WØRA	*	12,950	80	74
*KM5WR	*	7,600	52	50
***NN5Z**	**14**	**47,082**	**153**	**133**
			(Op: K5PX)	
NE6N	**A**	**6,730,512**	**3035**	**843**
			(Op: N6RT)	
KU6W	**A**	**3,624,714**	**2023**	**698**
			(Op: N6MJ)	
AE6Y	**A**	**3,276,540**	**1813**	**668**
AD6E	*	2,018,874	1361	543
W6TK	*	943,492	822	451
K6RB	*	613,040	710	395
K6VO	*	530,315	615	367
			(Op: K6NR)	
NT6K	*	478,040	622	370
W6IXP	*	448,551	573	333
AJ6V	*	339,120	494	314
N6TW	*	230,144	349	232
K6GT	*	150,202	296	218
KK6F	*	65,875	191	155
KI6T	*	19,440	90	81
WA6O	**21**	**2,787,701**	**1652**	**707**
W6YA	**21**	**2,098,698**	**1317**	**642**
***AA6PW**	**A**	**1,406,224**	**1207**	**491**
***WN6K**	**A**	**1,067,140**	**1054**	**466**
***KX7M**	**A**	**703,038**	**711**	**399**
*WO6M	*	606,616	731	382
*N6EM	*	462,948	557	346
*W6NKR	*	398,080	452	311
*WX6V	*	182,118	334	239
*AA6EE	*	164,302	323	226
*N6NF	*	149,408	313	232
*N6GL	*	132,733	308	199
*AD6G	*	119,364	247	203
*WDØAVV	*	114,624	304	199
*K6CSL	*	88,392	226	174
*W1SRD	*	69,156	180	153
*W6ISO	*	50,964	145	124
*K6LDX	*	35,728	134	116
*K6UM	*	34,884	125	108
*AD6Z	*	6,364	85	74
***W6YJ**	**21**	**239,168**	**356**	**296**
*K6EY	*	37,698	136	122
***KU6T**	**7**	**18,732**	**97**	**84**
NV7A	**A**	**3,579,336**	**1923**	**657**
			(Op: K7NV)	
K7ZZ	**A**	**2,988,624**	**1823**	**678**
K7RAT	**A**	**2,643,060**	**1637**	**609**
			(Op: AD1C)	
W7UT	*	2,510,118	1451	663
N7YX	*	1,150,080	894	480
			(Op: N6HR)	
KS7T	*	737,444	702	428
W7QN	*	501,689	631	367
NX7K	*	434,232	525	326
WA7LT	**21**	**699,885**	**726**	**453**
W7AYY	*	15,691	77	71
KC7V	**14**	**428,542**	**587**	**353**
***NW7DX**	**A**	**2,426,044**	**1610**	**617**
***KN7Y**	**A**	**1,321,893**	**1098**	**519**
***WO7Y**	**A**	**1,022,153**	**935**	**473**
*N7IF	*	339,966	521	303
*AG7W	*	314,675	434	307
			(Op: K6XX)	
*AB7RW	*	310,632	426	301
*W7HS	*	297,250	382	290
*W7GT	*	184,803	358	229
*AC7LX	*	145,521	299	207
*K7JJ	*	87,538	236	173
*WC7S	*	62,850	188	150
*W7EAI	*	28,994	156	109
*AA7IH	*	2,997	42	37
*W7YS	*	2,964	41	39
***K7ON**	**21**	**747,450**	**742**	**450**
***W7DRA**	**7**	**62,225**	**192**	**131**
N9AG	**A**	**2,869,401**	**1674**	**661**
K2UOP	**A**	**1,143,990**	**899**	**446**
K8MR	**A**	**554,162**	**614**	**322**
W8PN	*	418,600	546	322
K8OQL	**28**	**59,290**	**173**	**154**
N8PW	**21**	**1,749,532**	**1217**	**554**
***KK8U**	**A**	**1,495,368**	**1118**	**504**
***KV8Q**	**A**	**1,330,183**	**1037**	**479**
***K5IID**	**A**	**1,241,506**	**989**	**497**
*N8LM	*	745,784	733	404
*K8IR	*	294,224	399	284
*K8CV	*	273,498	372	237
*KF8UN	*	220,336	347	293
*K8AAX	*	163,013	341	223
*W8IDM	*	79,218	196	162
*WA8WV	*	26,404	99	92
*W8RU	*	800	17	16
***W8IQ**	**21**	**188,244**	**302**	**252**
***W8UMR**	**14**	**147,825**	**246**	**219**
WE9V	**A**	**4,629,912**	**2418**	**744**
			(Op: KB3AFT)	
N9FH	**A**	**1,093,988**	**975**	**439**
WA9IRV	**A**	**282,686**	**434**	**281**
K9CU	*	57,450	205	150
			(Op: KB9UWU)	
K9NW	**14**	**3,268,210**	**1761**	**730**
W9RE	**14**	**1,604,351**	**1185**	**547**
AA9PB	*	56,250	219	150
***KS9K**	**A**	**3,193,823**	**1829**	**653**
			(Op: N4TZ)	
***KJ9C**	**A**	**1,869,160**	**1299**	**563**
***K9IG**	**A**	**394,380**	**430**	**313**
*W9FX	*	316,820	443	292
*W9LYA	*	180,412	313	212
*N9CK	*	109,824	257	192
*KW9N	*	66,220	203	140
*N9BOR	*	39,865	148	119
*N9TK	*	21,375	112	95
*W9CM	*	12,920	90	76
*KK9DX	*	5,390	51	49
***W9ILY**	**21**	**656,604**	**619**	**414**
*N9GUN	*	83,213	217	173
***K9QVB**	**14**	**1,737,736**	**1187**	**616**
*W9HR	*	20,315	89	85
***K9CJ**	**7**	**32,680**	**102**	**95**
*KX9DX	*	2,821	36	31
*AA9IV	*	1,326	17	17
KØOU	**A**	**2,804,780**	**1721**	**671**
KØCAT	**A**	**1,536,132**	**1182**	**516**
WØUY	**A**	**329,400**	**434**	**305**
WØHW	*	327,684	394	249
KØJPL	*	307,834	425	298
WØZP	*	131,634	280	213
KJØG	*	104,256	234	192
KTØR	**21**	**1,218,052**	**992**	**517**
K2VV	**14**	**3,523,488**	**1874**	**762**
KØFX	*	663,490	632	430
***WØETT**	**A**	**1,035,648**	**908**	**464**
***KEØUI**	**A**	**534,795**	**615**	**353**
***WØNXS**	**A**	**333,060**	**496**	**305**
*KSØM	*	217,536	356	264
*KØRY	*	107,445	243	195
*KØBJ	*	97,650	219	175
*KØUK	*	38,454	133	102
*WAØIYY	*	15,594	77	69
*WAØMHJ	*	6,302	50	46
*NEØP	*	5,220	50	45
*WN8P	*	4,469	45	41
*KØCO	*	2,624	45	41
***KGØUA**	**21**	**112,110**	**221**	**202**
*WAØOTV	*	14,448	101	86
***AE9B**	**14**	**207,480**	**381**	**273**

CUBA

***CO8TW**	**14**	**769,832**	**725**	**413**
***CO8LY**	**21**	**753,876**	**757**	**387**

GUADELOUPE

FG/RW3QC	**A**	**9,134,855**	**3507**	**863**

MARTINIQUE

FM5BH	**A**	**8,425,725**	**3348**	**825**
FM5GU	**28**	**2,849,769**	**1758**	**621**

DOMINICAN REPUBLIC

***HI3LFE**	**A**	**217,386**	**320**	**234**

PUERTO RICO

***KP3W**	**28**	**910,623**	**814**	**421**

COSTA RICA

TI3TLS	**21**	**2,588,337**	**1538**	**633**

CANADA

VE3EJ	**A**	**7,076,970**	**2817**	**810**
VA3UZ	**A**	**7,058,340**	**2898**	**810**
VA3RU	**A**	**4,225,020**	**2014**	**670**
VE3RZ	"	2,873,340	1547	612
VA3TTT	"	1,659,000	1050	500
VE7FO	**A**	**821,975**	**751**	**385**
VE3LBQ	"	46,398	138	114
VA7CW	**21**	**3,458,376**	**1820**	**729**
VE7AV	**14**	**1,540,597**	**1120**	**521**
VE4IM	**14**	**463,736**	**481**	**364**
***VE9DX**	**A**	**3,258,996**	**1497**	**676**
***VE2AWR**	**A**	**1,519,456**	**1062**	**461**
***VE7XF**	**A**	**1,156,200**	**929**	**470**
*VE7SV	*	1,130,320	947	398
			(Op: VA7NT)	
***VE6ZT**	**A**	**903,350**	**747**	**445**
***VE4YU**	**A**	**379,134**	**458**	**306**
*VE6LB	"	292,719	398	263
***K2NV/VE3**	**A**	**175,560**	**296**	**210**
*VE3MQW	"	120,945	234	165
***VO1WET**	**A**	**105,703**	**219**	**173**
*VE7IN	*	42,840	129	119
*VE2JCW	*	41,030	127	110
***VE5SF**	**A**	**37,932**	**138**	**109**
*VA3IX	*	36,435	130	105
*VE4MG	*	7,248	51	48
***VE3STT**	**28**	**86,688**	**207**	**172**
***VE6BMX**	**28**	**26,320**	**126**	**94**
***VA3NR**	**21**	**294,424**	**375**	**298**
***VE2FFE**	**21**	**54,000**	**151**	**135**
***VA3SY**	**14**	**815,670**	**752**	**405**
*VE3YDX	*	385,472	463	317
			(Op: RW4WM)	
***VE7NI**	**14**	**23,490**	**177**	**54**
***VE2OWL**	**14**	**1,176**	**21**	**21**

TURKS AND CAICOS

VP5MM	**A**	**11,035,570**	**3671**	**905**
			(Op: YT6A)	

MEXICO

***XE1/AA6RX**	**A**	**492,513**	**594**	**329**
***XE1ZOI**	**A**	**327,168**	**454**	**288**
*XE1KK	*	270,045	396	255
***XE1RGL**	**21**	**255,000**	**432**	**255**

CAYMAN IS.

ZF2AH	21	2,389,024	1482	617	(Op: W6VNR)

AFRICA

TUNISIA

3V8BB	A	13,639,976	4134	908	(Op: YT1AD)

KENYA

5X1Z	21	6,362,352	2720	782	(Op: SM7PKK)

GHANA

*9G1MR	A	2,966,994	1708	573	(Op: UA3AGW)

MOROCCO

*CN8YR	A	1,001,641	818	409	

CANARY IS.

*EA8DY	A	204,200	290	200	
*EA8CN	*	159,300	276	180	
*EA8NN	28	1,798,643	1209	497	
*EA8ASJ	21	1,117,974	872	429	
*AN8NQ	*	345,126	400	291	

CUETA & MELILLA

EA9EU	21	3,524,472	1772	666	
EA9AZ	7	4,212,447	1289	547	

AFRICAN ITALY

*IH9/OL5Y	A	5,800,434	2506	697	(Op: OK1FUA)

EGYPT

*SU9ZZ	A	7,799,260	3061	812	

SOUTH AFRICA

ZS4TX	28	4,602,028	2134	722	
*ZS1NF	A	171,737	257	199	
*ZSØE	*	59,895	157	121	
*ZS5RON	28	58,426	150	131	

ASIA

ISRAEL

4X3A	1.8	198,360	233	152	(Op: 4X4NJ)
4X/OK1DTP	21	3,185,795	1729	635	
*4Z5FW	21	1,274,560	1000	448	
*4Z5AX	7	1,259,595	662	345	

CYPRUS

P3A	A	10,723,620	3696	870	(Op: RZ9UA)
5B4 /RA9JX	21	5,078,472	2300	798	
5B4 /RW9UP	14	3,286,932	1794	673	
5B4 /UA9YAB	3.5	1,332,058	687	338	

WESTERN MALAYSIA

9M2TO	A	2,428,272	1602	502	

PAKISTAN

*AP2ARS	A	407,238	514	299	(Op: S53R)

TAIWAN

BV/JAØID	A	2,752,530	1938	570	
BV7FF	21	312,015	505	305	

CHINA

B5TX	A	2,744,580	1908	614	

KYRGYZSTAN

EX2A	21	373,388	450	289	

SOUTH KOREA

HL1CG	A	536,554	614	367	
*HL5UOG	A	547,390	686	335	

THAILAND

HSØ/SM3DYU	21	537,000	570	375	
*HSØZCW	A	413,070	596	294	(Op: K4VUD)
*HSØ/OZ1HET	A	327,714	504	283	
*E2ØHHK/6	*	15,190	83	70	
*HS4BPQ/9	21	320,073	437	283	

SAUDI ARABIA

HZ1HZ	A	1,882,440	1188	540	
HZ1AB	21	4,044,200	2010	730	(Op: SMØCXU)

JAPAN

JH3AIU	A	4,153,100	2136	698	
JH7XGN	A	3,556,413	1786	651	
JA8RWU	A	3,530,401	1909	661	
JA6GCE	*	3,158,640	1858	615	
JA7DLE	*	2,363,452	1374	602	
JAØQWO	*	1,623,070	1156	505	
JH2AMH	*	1,313,897	947	479	
JL6HKJ	*	518,868	575	348	
JR1LEV	*	436,450	509	301	
JA1HP	*	297,860	430	281	
JA2QVP	*	174,624	297	214	
JG3OYH	*	116,808	248	186	
JR3XEX	*	80,186	200	163	
7J1ABD	*	76,440	190	140	
JA6BGA	*	47,432	135	121	
JQ2EHD	*	41,302	132	107	
JA3WFQ	*	2,268	32	27	
JG3WCZ	*	40	4	4	
JF3BFS	28	130,208	268	208	
JH1AEP	*	118,993	259	191	
JA3XOG	*	40,293	139	121	
JH1FNU	21	49,970	147	130	
JA2RP	*	8,165	54	54	
JF2FIU	*	1,863	27	27	
JN7OJA	*	341	11	11	
JA5APU	14	795,454	693	418	
JA9CWJ	*	256,080	352	264	
JA5AIQ	*	63,204	166	138	
JR3WXA	7	56,135	124	109	
JA5IP	*	53,754	108	102	
JA1HHU	*	36,158	120	101	
*JF1SQC	A	1,961,491	1230	553	
*JQ1UXN	A	1,755,824	1191	514	
*7M1MCT	A	1,582,092	1083	514	
*JS1OYN	*	689,700	702	363	
*JH2NWP	*	433,370	473	302	
*JF2QNM	*	378,531	481	307	
*JA1CP	*	371,553	467	273	
*JJ1JGI	*	306,544	400	272	
*JE1REU	*	304,448	406	284	
*JA2KKA	*	285,936	322	224	
*JN1NOP	*	281,320	419	260	
*JA1XUY	*	216,000	327	216	
*JAØBMS/1	*	182,865	301	219	
*JE3UHV	*	168,896	299	208	
*JR4QZH	*	149,189	265	193	
*JA7ARW	*	144,026	273	202	
*JHØNVX/1	*	136,938	262	174	
*JG3NKP/1	*	134,400	232	210	
*JF2SKV	*	123,255	290	165	
*JR5EHB	*	119,510	239	170	
*JE1HJV	*	108,721	224	163	
*JA7CPW	*	98,344	199	152	
*JA1PS	*	81,087	182	151	
*JH1PXY	*	77,131	184	137	
*JAØAXA	*	76,350	202	150	
*JA1EJD	*	41,471	151	113	
*JA1KI	*	34,632	116	111	
*JA1MXY	*	25,564	100	83	
*JR2AWS/1	*	24,444	110	84	
*JA6BWH/3	*	6,644	57	44	
*JR1UMO	*	3,333	35	33	
*JG1FGL	*	2,542	34	31	
*JJ1GWF	*	1,007	21	19	
*7M4PJX	*	742	14	14	
*JH7CJM	28	16,767	91	81	
*JA2EAB/1	*	2,025	27	27	
*7K2PBB	*	798	20	19	
*JGØOXL	21	607,152	606	364	
*JH7VHZ	21	335,376	412	306	
*JA5ATN	*	283,465	398	245	
*JI1HFJ	*	168,086	282	229	
*JA4AQR	*	47,840	133	130	
*JF7GDF	*	28,126	117	98	
*JF5FGY	*	10,206	63	63	
*JI1BBN	*	7,100	50	50	
*7K2GMJ	*	6,600	64	55	
*JA6ODU	*	1,364	22	22	
*JL3IVX	*	594	19	18	
*JI3ZOX	*	312	14	13	
*JA5IDV	*	240	10	10	
*JA1AAT	*	192	8	8	
*JI1RXQ	14	889,056	746	432	
*JR4GPA	14	438,471	505	309	
*JHØEPI	*	429,819	493	321	
*JA4BAA	*	61,523	166	119	
*JH1APZ	7	62,923	112	101	
*JAØGZ	*	2,160	22	20	
*JE1SPY	1.8	228	14	12	

JORDAN

JY9NX	A	10,113,847	3799	823	(Op: JM1CAX)

TURKEY

*YM3D	14	3,015,792	1686	648	
*TA3BN	*	918	19	18	

ASIATIC RUSSIA

UA9CDV	A	5,373,368	2338	728	
RK9CZO	A	4,252,336	1931	653	
UA9CLB	A	3,851,104	1878	604	
UA9MA	*	3,725,824	1876	608	
RW9TA	*	3,318,056	1679	614	
RA9SG	*	2,374,789	1284	571	
RZ9AE	*	1,830,252	1091	516	
UA9JDP	*	1,445,015	1059	473	
UA9CKS	*	1,115,296	794	416	
RU9CZD	*	775,557	609	333	(Op: UA9CDC)
RA9AC	*	154,036	248	194	
UA9LP	28	270,500	396	250	
UA9KGH	*	55,328	178	104	
UA9WQK	21	1,096,596	802	498	
UA9KM	*	644,250	610	375	
RA9ST	*	49,938	138	123	
RU9LA	14	1,952,470	1189	598	
RA9DZ	14	1,159,536	872	493	
RK9KWB	*	242,780	347	244	
RV9WZ	*	31,773	121	89	
UA9LAC	3.5	212,826	240	158	
RK9AY	1.8	54,379	118	89	
RX9LW	*	32,292	95	69	
*RA9OW	A	2,215,681	1228	533	
*RW9QA	A	1,116,161	822	409	
*UA9OA	A	644,798	596	371	
*UA9AX	*	449,349	442	303	
*RA9AE	*	448,350	460	245	
*UA9BS	*	349,160	417	301	
*UA9DD	*	182,138	268	187	
*RA9WW	*	98,098	200	154	
*UA9CR	*	95,485	209	169	
*UA9XC	28	10,370	66	61	
*UA9AFS	21	578,228	536	386	
*RJ9J	14	1,757,610	1099	590	(Op: RA9JR)
*RA9XF	*	585,480	600	357	
*RW9AV	3.5	405,960	360	204	
RAØJX	A	895,688	762	412	
RWØLZ	28	8,113	99	61	
UAØDC	14	1,285,746	1013	506	
RAØBA	14	1,199,166	950	471	
*UAØJQ	A	3,075,915	1783	705	
*RUØLL	A	1,470,500	1243	500	
*UAØACG	A	1,140,297	890	447	
*RAØFF	*	1,016,103	869	451	
*UAØWW	*	258,863	389	233	
*UAØQBR	*	175,840	218	160	
*RZØCQ	*	90,576	197	153	
*RWØBG	14	44,640	142	124	

KAZAKHSTAN

UN5J	A	91,176	206	174	
UNØLG	3.5	434,217	364	217	
*UP6P	A	3,826,370	1898	670	(Op: UN6P)
*UN8FM	*	27,360	120	90	
*UN9LN	28	459,360	566	290	
*UN7EX	*	12,978	75	63	
*UN7JX	21	89,250	185	170	

UK BASES ON CYPRUS

*ZC4DW	A	5,314,681	2584	673	

EUROPE

MONACO

*3A/DL2JRM/P	A	240,464	414	266	

ITU GENEVA

4U1ITU	28	131,532	362	226	(Op: OM3CGN)

CROATIA

9A3MA	28	1,057,320	964	534	
9A5D	21	2,190,916	1543	676	
9A4X	14	2,959,872	1890	768	
9A3GW	7	2,878,644	1384	618	
9A3ØY	3.5	801,408	804	384	(Op: 9A3NM)
9A6A	1.8	171,589	367	209	
9A3B	1.8	153,075	344	195	(Op: 9A2VR)
*9A6XX	A	2,412,333	1837	649	
*9A4RC	A	1,455,812	1273	542	
*9A3VM	28	853,902	933	486	
*9A1AA	14	2,007,564	1464	663	

MALTA

9HØA	28	3,965,315	2667	841	
9H1ZA	21	3,575,405	2275	815	

PORTUGAL

CT7T	A	5,729,405	3185	803	(Op: ON5UM)
*CQ4CEC	A	17,472	100	91	
*CT1FNT	28	6,579	65	51	

GERMANY

DL1IAO	A	4,734,828	2518	756	
DFØFS	A	1,916,838	1549	594	(Op: DL1EKC)
DL8UAT/P	A	1,808,100	1373	574	
DJ9RR	*	1,110,847	1004	487	
DL1JF	*	1,086,696	946	468	
DL1DTC	*	1,035,258	1047	471	
DK7FP	*	810,421	825	401	
DH1TW	*	679,168	725	379	
DFØNF	*	552,752	729	358	
DL7JV	*	525,087	695	369	
DM3XRF	*	193,734	383	229	
DK3YD	*	107,365	260	197	
DJ5IW	*	52,095	157	115	
DF5AU	*	17,072	100	88	
DL5HF	*	12,792	91	82	
DL3JRA	*	6,844	64	59	
DK7AN	28	12,765	73	69	
DL4MCF	21	2,222,591	1465	677	
DJ9DZ	21	1,823,645	1293	641	
DK2GZ	21	1,637,130	1232	605	
DL5LYM	14	3,344,418	1899	798	
DK3KD	14	832,040	915	440	
*DL4SDW	A	1,591,906	1291	557	
*DFØWER	A	1,559,496	1271	543	(Op: DL5YYM)
*DL5KUD	A	1,150,104	985	519	
*DL2ZAV	*	892,255	991	455	
*DF4XX	*	837,655	829	455	
*DL4HRM	*	833,360	909	440	
*DL1NEO	*	831,420	899	447	
*DKØDO	*	684,204	773	402	
*DK3WN	*	586,170	792	390	
*DL5SVB	*	537,288	677	367	
*DL1TH	*	479,769	657	361	
*DL3ZAI	*	475,434	612	366	
*DJ3XK	*	409,028	523	349	
*DK1QO	*	375,160	541	332	
*DJ1OJ	*	357,975	546	333	
*DL8MUG	*	324,048	450	314	
*DJ2YE	*	309,324	494	298	
*DL3KWF	*	221,100	400	268	
*DJ1MM	*	158,844	353	244	
*DM3PKK	*	136,799	297	221	
*DK7ZH	*	136,648	297	232	
*DL5AUA	*	131,610	268	205	
*DM5JBN	*	121,660	296	220	
*DJ8EF	*	112,918	296	202	
*DL1ARJ	*	99,645	249	195	
*DJ2IA	*	91,692	219	162	
*DL7UCX	*	77,064	201	156	
*DF2IAX	*	66,667	215	163	
*DK5ZX	*	53,312	162	119	
*DL6UAM	*	46,248	164	141	
*DM3XI	*	38,024	134	98	
*DF1HF	*	31,900	142	116	
*DL5MY	*	26,180	139	110	
*DL1SAN	*	16,548	93	84	
*DL5ANS	*	990	19	18	
*DL1EMH	28	76,475	199	175	
*DL9NEI/M	*	1,736	28	28	
*DL5FCO	*	1,113	21	21	
*DLFCO	*	1,113	21	21	
*DL7BY	21	533,596	600	413	
*DL5SBA	*	281,880	460	324	(Op: T97C)
*DJ5GG	14	493,484	633	428	
*DF6LQ	*	440,640	676	405	
*DL6UAA	7	517,776	585	336	
*DL4FN	3.5	138,800	301	200	

SPAIN

AN5FV	A	4,765,084	2877	821	
AN5YU	A	2,057,034	1821	602	
EA3KJ	A	1,320,980	1302	514	
AM1EQ	*	452,550	696	350	
EA5EOH	*	207,378	364	246	
AN7CA	*	118,038	257	191	
EA3AR	*	93,760	218	160	
EA5EU	*	26,923	153	109	
EA1AAA	*	11,529	74	63	
EA1BID	*	2,074	37	34	
EA5WU	21	849,298	948	499	
AM1JO	*	343,311	497	361	
EA1CS	*	67,704	200	186	
EA5FID	7	734,162	591	374	
*AN7GTF	A	2,946,548	2255	668	
*EA7KN	A	2,319,084	1833	654	
*AM4DRV	A	2,058,672	1785	616	
*EA4BSC	*	1,329,861	1230	559	
*EA3ALV	*	584,790	664	386	
*EA7AJR	*	352,495	721	319	
*EA2AOI	*	198,900	340	234	
*EA2BNU	*	159,581	369	227	
*AN3EFQ	*	127,062	309	234	
*AN5VN	*	118,048	295	224	
*EF4ABH	*	62,280	232	180	
*EA3AXM	*	40,320	160	144	
*EA1WX	*	19,008	101	88	
*EA2CR	*	10,008	82	72	
*AN4UB	*	9,804	70	57	
*EA1BYA	*	2,376	38	36	
*EA4BNQ	*	120	10	10	
*AN7AKJ	28		328,164		
553	348				
*EA1AK/AM7	28		271,208		
440	334				
*EA1EXE	*	147,680	352	260	
*AN7ASZ	*	126,795	311	237	
*AN1CBX	*	21,507	137	107	
*EF7AMD	*	15,138	102	87	(Op: EC7AMD)
*EA4OA	*	5,280	50	48	
*AN2BDS	21	260,496	510	324	
*EA2AAZ	*	61,074	187	162	

BALEARIC IS.

*EA6GP	A	174,250	402	250	

IRELAND

*EI4DW	A	1,152,388	984	514	

MOLDOVA

ER6A	A	5,192,856	2913	829	(Op: ER1LW)
*ER1CW	14	190,300	402	275	

ESTONIA

ES2DJ	A	1,304,088	1095	536	
*ES6CO	28	31,806	123	114	

BELARUS

EU1SA	A	1,554,242	1296	578	
EW1WN	*	321,408	400	372	(Op: EW1AM)
EW6MM	14	46,041	195	149	
EU1PA	7	412,386	465	311	
EW1WZ	3.5	420,736	580	304	
*EU1DX	A	2,824,236	1700	684	
*EW1EA	*	32,452	138	122	
*EW6AF	21	82,460	200	155	
*EU1MM	14	698,500	845	500	
*EW1CQ	*	340,014	517	366	
*EU1AZ	3.5	383,024	572	296	
*EW8OU	*	219,936	428	232	
*EU6DX	1.8	31,458	129	107	

FRANCE

F6BEE	A	5,616,980	2643	815	
TM9C	A	4,388,172	2614	727	
*F5KEQ	A	984,060	986	495	(Op: F5MYK)
*F8UFT	A	923,328	977	458	
*F5ICC	*	760,410	794	426	
*F6FTB	*	348,600	504	332	
*F5TNI	*	260,926	391	283	
*F6HHR	*	231,460	422	284	
*F2FX	*	13,020	98	60	
*F5JY	28	26,750	110	107	
*F8PDR	21	288,960	421	320	

ENGLAND

G3TXF	A	1,491,368	1157	554	
G5LP	A	1,350,062	1199	511	
G3MXJ	*	716,870	716	418	
G3TMA	*	487,060	581	355	
G4BJM	*	409,500	554	325	
G4OBK	*	14,014	100	91	
G3UFY	28	82,350	236	183	
MØC	21	1,507,872	1218	556	(Op: GØCKP)
*G4IIY	A	1,970,394	1528	591	
*G3YDD	A	989,460	992	460	(Op: G3ZRJ)
*G3KKP	*	774,312	857	419	
*G3OOU	*	668,108	860	428	
*G3RSD	*	350,568	516	324	
*G3VQO	*	162,675	373	241	
*G6QQ	*	17,864	102	88	
*2EØROB/P	21	379,456	628	352	
*G3TJE	7	297,182	394	278	
*M5X	3.5	206,584	379	238	(Op: G3KKQ)

SCOTLAND

GM4OBK	A	124,176	304	208	
*GM4SID	A	1,593,090	1392	558	
*GMØCLN	*	43,824	163	132	
*GM3CFS	21	514,855	590	407	

GUERNSEY

MU2K	28	265,230	492	315	(Op: G3SQX)
*MUØFAL	A	188,945	349	265	

WALES

GW7X	7	1,883,700	1173	525	(Op: GW3NJW)
*GW3KJN	7	104,896	221	176	

HUNGARY

HA8JV	A	4,382,466	2351	759	
HA7UG	A	2,633,642	1648	649	
HA3LI	A	1,936,707	1473	591	
HA9RU	21	2,405,403	1551	693	
HA5BSW	3.5	72,124	197	146	
HA1ZZ	1.8	117,107	301	181	
*HA4YF	A	1,036,412	989	494	
*HA6IAM	A	886,208	923	454	
*HA8IC	*	175,104	362	256	
*HA3OU	*	56,146	170	134	
*HA7JJS	*	50,715	181	147	
*HA3GE	28	93,313	230	187	
*HA8YU	*	44,280	144	135	
*HA8LLS	*	28,808	115	104	
*HA3O	21	3,381,464	1902	764	(Op: HA3UU)
*HA6PQ	14	50,693	201	163	
*HA6VA	3.5	179,598	350	222	

SWITZERLAND

HB9CIC	A	237,952	424	286	
*HB9ARF	A	1,512,729	1381	537	
*HB9DOT	A	941,780	1032	434	
*HB9HQX	*	18,392	122	88	
*HB9HAW	7	390,630	444	290	

ITALY

IU4T	A	4,216,245	2275	759	(Op: IK4MTF)
II2K	A	3,539,250	2199	726	
IV3FHH	*	218,290	414	263	
IK2AOO	*	68,960	195	160	
IQ3X	7	606,810	600	339	
IO3P	3.5	486,090	630	330	
*IK4UNH	A	689,400	763	450	
*I6FDJ	A	320,436	585	324	
*IK4AUY	*	254,646	404	258	
*IU3A	*	176,904	346	252	
*IN3FHE	*	167,832	305	296	
*IN3NJB	*	157,126	276	251	
*IR2D	*	62,010	205	159	
*IK2WYI	*	31,784	128	116	
*IU7M	28	509,220	646	410	(Op: IK7JWY)
*IK2AIT	21	253,500	431	300	
*IK3SCB	*	7,353	71	57	
*IO7C	14	995,864	1074	562	
*IR2V	*	127,305	283	207	(Op: I2WIJ)
*IZ1DFI	7	286,878	432	274	

***IYØTC**	**1.8**	**5,568**	**58**	**48**	**(Op: IØKHP)**

SARDINIA

ISØ/YO3RA	**3.5**	**389,470**	**574**	**290**	
***ISØIGV**	**A**	**921,202**	**825**	**634**	
*ISØHQJ	"	492,362	653	377	
***ISØSDX**	**14**	**159,134**	**416**	**251**	
*ISØUWX	"	65,272	256	199	

SICILY

***IR9AF**	**28**	**620,620**	**828**	**434**	

NORWAY

LA7MFA	**A**	**3,010,687**	**2011**	**691**	
LA1CCA	"	31,354	142	122	
LA6PB	**28**	**50,958**	**174**	**149**	
LA5UF	**21**	**795,150**	**778**	**475**	
***LA9HFA**	**A**	**1,897,664**	**1644**	**596**	
***LA3BO**	**A**	**1,548,960**	**1337**	**560**	
***LA8OM**	**A**	**1,335,024**	**1240**	**508**	
*LA2HFA	"	858,983	886	431	
*LA9GY	"	115,786	318	209	
*LA5TFA	"	81,939	300	191	
*LA9AU	"	50,025	180	145	
***LA7AK**	**21**	**167,745**	**351**	**265**	
***LA3R**	**21**	**167,000**	**350**	**250**	
					(Op: LA5LJA)
***LA8WG**	**7**	**140,400**	**274**	**200**	

LUXEMBOURG

LX1NO	**21**	**375,040**	**580**	**320**	
***LX1JH**	**A**	**88,389**	**246**	**183**	

LITHUANIA

LY7Z	**A**	**5,585,580**	**2772**	**819**	
					(Op: LY2TA)
LY2IJ	**A**	**3,522,813**	**2180**	**739**	
LY2CY	**A**	**3,226,656**	**1975**	**732**	
LY2FY	"	2,010,048	1491	608	
LY1CX	"	1,477,965	1317	555	
LY2MM	"	1,232,916	1045	508	
LY2KM	"	1,168,836	1019	514	
LY2IC	**28**	**157,122**	**317**	**258**	
LY2BM	**3.5**	**482,806**	**642**	**326**	
LY3CW	**3.5**	**302,225**	**503**	**275**	
LY1CT	"	270,204	486	253	
***LY2LA**	**A**	**1,713,320**	**1398**	**580**	
***LY2DX**	**A**	**1,118,286**	**1092**	**486**	
***LY3ID**	**A**	**1,050,616**	**972**	**514**	
*LY2TE	"	324,720	516	330	
*LY3IW	"	169,416	320	234	
*LY2OM	"	132,472	313	232	
*LY2BBF	"	73,872	213	171	
*LY1DT	"	21,280	108	95	
*LY3CY	"	19,584	112	96	
*LY2GW	"	8,262	55	54	
***LY2BUU**	**21**	**29,505**	**119**	**105**	
***LY2HK**	**3.5**	**101,870**	**275**	**167**	
*LY2FF	"	35,970	155	109	
***LY2FN**	**1.8**	**38,192**	**162**	**112**	

BULGARIA

LZ1QZ	**A**	**319,396**	**500**	**308**	
LZ2CJ	**1.8**	**139,239**	**320**	**191**	
***LZ2AU**	**A**	**1,759,680**	**1513**	**585**	
***LZ1AQ**	**A**	**452,232**	**553**	**396**	
*LZ1IA	"	47,470	150	130	
***LZ9G**	**21**	**1,730,535**	**1365**	**645**	
					(Op: LZ1NK)
***LZ9R**	**14**	**1,291,549**	**1193**	**601**	
					(Op: LZ3YY)
*LZ1FJ	"	24,321	146	121	
***LZ2RF**	**7**	**225,576**	**320**	**241**	
***LZ2UZ**	**1.8**	**149,872**	**336**	**232**	

AUSTRIA

OE2BZL	**A**	**2,215,542**	**1490**	**609**	
OE75CWL	**A**	**1,684,876**	**1351**	**562**	
					(Op: OE5CWL)
***OE/HA6NL**	**14**	**439,140**	**594**	**390**	

FINLAND

OH6NIO	**A**	**3,724,966**	**2192**	**763**	
OH4JFN	**A**	**2,530,335**	**1853**	**645**	
OH3XR	**A**	**1,044,576**	**1060**	**468**	
OH2K	"	883,035	893	465	
OH5UFO	"	403,515	623	305	
OH2VZ	"	355,878	496	306	
OH1EB	"	97,356	233	183	
OH2TI	"	20,844	115	108	
OH3RB	**28**	**636,795**	**827**	**477**	
OH6NJ	**28**	**400,786**	**649**	**398**	
OH3BU	"	162,810	379	270	
OH8L	**14**	**2,164,575**	**1617**	**665**	
					(Op: OH8LQ)
OH2BCD	"	149,328	341	244	
OH6Y	**7**	**861,614**	**799**	**403**	
					(Op: OH6YF)
OH1WZ	**3.5**	**202,920**	**395**	**228**	
OH3RF	"	46,998	166	126	
OH2BCI	**1.8**	**134,310**	**318**	**185**	
OH4MFA	**1.8**	**102,752**	**269**	**169**	
***OH3WW**	**A**	**2,219,886**	**1610**	**639**	
***OH9W**	**A**	**2,076,536**	**1632**	**616**	
					(Op: OH4YR)
***OH2LYP**	**A**	**900,724**	**1015**	**484**	
*OH2HEN	"	619,360	680	395	
*OH2FS	"	358,050	411	341	
*OH2EV	"	170,565	412	249	
*OH2CV	"	114,114	286	209	
*OH7DK	"	104,832	244	208	
*OH3KOK/M	"	9,088	78	71	
***OH6RC**	**28**	**60,716**	**189**	**172**	
*OH2HMB	"	940	20	20	

ALAND IS.

OHØZ	**A**	**6,514,996**	**3199**	**862**	
					(Op: OH7JT)

CZECH REPUBLIC

OK1AXB	**A**	**1,292,522**	**1112**	**539**	
OK2HBR	**A**	**1,232,451**	**1093**	**531**	
OK1HGM	"	351,936	444	312	
OK2PZ	"	222,762	395	274	
OK1DVK	"	97,760	220	160	
OK2BJ	"	37,389	126	103	
OK2SG	"	21,924	95	87	
OL3E	**21**	**493,056**	**572**	**384**	
OK5W	**14**	**3,262,932**	**1894**	**778**	
					(Op: OK2ZW)
OK1CF	**14**	**2,268,010**	**1566**	**673**	
OK1XJ	"	374,533	575	353	
OK2BVG	**7**	**1,042,190**	**820**	**445**	
OK1FPG	**7**	**851,580**	**717**	**415**	
OK2FD	"	592,950	515	354	
OK2EQ	"	341,634	459	291	
OLØE	**3.5**	**625,464**	**714**	**357**	
					(Op: OK2ZU)
OK1RR	**3.5**	**443,556**	**566**	**324**	
***OK2PP**	**A**	**2,818,800**	**1825**	**675**	
***OK1QM**	**A**	**2,202,180**	**1557**	**635**	
***OK1EW**	**A**	**1,822,289**	**1388**	**593**	
*OK1HX	"	1,722,258	1396	587	
*OK1BA	"	1,606,600	1252	554	
*OK2EC	"	1,531,803	1261	543	
*OK1AYY	"	1,232,474	1122	482	
*OK1ZP	"	1,219,000	1115	500	
*OK2VWB	"	1,116,043	1008	491	
*OK2QX	"	1,088,912	1018	506	
*OK2MBP	"	1,037,370	1004	458	
*OK2SGY	"	899,442	816	467	
*OK1FHI	"	896,460	864	446	
*OK1MKI	"	829,962	906	447	
*OK2PTZ	"	829,863	886	437	
*OK1HCG	"	676,488	796	397	
*OK1TC	"	668,118	757	382	
*OK2BMT	"	623,441	636	403	
*OK1DKO	"	428,002	555	346	
*OK2BND	"	361,460	541	341	
*OK2PAE	"	279,930	430	301	
*OK2CSU	"	270,720	441	288	
*OK2SWD	"	217,819	355	259	
*OK2BDF	"	213,030	376	263	
*OK1FMX	"	202,979	393	271	
*OK1FCA	"	169,822	300	218	
*OK2BNC	"	144,440	314	230	
*OK1DOS	"	120,669	294	219	
*OK8YL	"	115,560	230	180	
*OK1DXD	"	47,719	151	119	
*OK1AOU	"	20,706	109	102	
***OK1DDO**	**28**	**379,850**	**520**	**355**	
***OL4M**	**28**	**184,080**	**348**	**260**	
*OK1AES	"	179,307	314	261	
*OK2PCN	"	108,368	247	208	
*OK1XC	"	2,624	32	32	
*OK2BHE	"	836	20	19	
***OK2NN**	**21**	**640,320**	**678**	**464**	
***OK2HZ**	**21**	**567,850**	**639**	**410**	
***OK1GS**	**14**	**459,716**	**600**	**409**	
***OK1DCF**	**14**	**363,461**	**567**	**379**	
*OK2PBG	"	254,696	407	316	
***OK1EE**	**7**	**918,050**	**826**	**427**	
*OK1WDQ	"	157,290	298	210	
***OK2SNX**	**1.8**	**49,024**	**199**	**128**	

SLOVAKIA

OM5M	**A**	**4,541,097**	**2436**	**759**	
OM7JG	**A**	**4,349,568**	**2268**	**752**	
OM3IAG	**A**	**1,825,373**	**1360**	**583**	
*OM6T	"	2,819,424	1855	683	
					(Op: OM5AW)
*OM4TX	"	1,061,542	1016	491	
*OM7AG	"	1,045,213	1114	481	
*OM4DN	"	960,944	1034	464	
*OM6RM	"	834,670	924	437	
*OM7RC	"	555,770	654	373	
*OM1AF	"	546,924	727	383	
*OM3PQ	"	512,910	655	369	
*OM3CDZ	"	342,681	604	309	
*OM1II	"	329,340	496	330	
*OM4DA	"	309,290	505	314	
*OM8MM	"	221,427	524	177	
*OM7VF	"	140,030	300	209	
*OM6TX	"	135,378	293	218	
*OM3BA	"	98,430	250	193	
*OMØCW	"	64,680	222	168	
*OM7YC	"	29,325	125	115	
***OMØTT**	**21**	**159,975**	**284**	**237**	
*OM7PY	"	87,000	190	174	
***OM9TR**	**14**	**275,400**	**546**	**340**	
*OM3CDN	"	54,080	204	169	
***OM8DD**	**7**	**364,968**	**490**	**296**	
***OM3RRF**	**3.5**	**108,965**	**276**	**185**	
					(Op: OM4AA)

BELGIUM

OT1A	**A**	**3,533,376**	**2191**	**704**	
					(Op: JK3GAD)
***ON4IG**	**A**	**163,048**	**318**	**229**	
*ON6CR	"	47,187	174	147	
***ON4KLG**	**21**	**264,996**	**416**	**306**	
***ON6TJ**	**14**	**296,650**	**472**	**349**	
***ON7SS**	**7**	**45,859**	**160**	**121**	

DENMARK

OZ1LO	**A**	**4,393,475**	**2257**	**775**	
OZ1AA	**A**	**3,673,240**	**2137**	**701**	
***OZ8SW**	**A**	**475,645**	**595**	**379**	
***OZØRS**	**A**	**326,808**	**501**	**306**	
*OZ5UR	"	299,208	456	312	
*OZ4FF	"	76,120	208	173	
*OZ4RT	"	14,400	73	72	

THE NETHERLANDS

PAØRCT	**A**	**1,810,522**	**1492**	**553**	
PA3FDO	**3.5**	**97,944**	**261**	**168**	
***PA3ELD**	**A**	**1,120,284**	**1139**	**492**	
*PAØMIR	"	33,744	133	114	
*PAØLSK	"	22,000	131	110	
*PA2DGR	"	12,312	93	81	

SLOVENIA

S59A	**A**	**4,573,794**	**2398**	**757**	
S57DX	**A**	**4,309,248**	**2338**	**744**	
S56A	**A**	**2,995,485**	**1822**	**691**	
S53Z	**14**	**591,209**	**733**	**419**	
***S5ØR**	**A**	**4,309,032**	**2310**	**728**	
***S56M**	**A**	**2,666,606**	**1732**	**631**	
*S57IIO	"	698,340	729	452	
*S57NPR	"	264	12	11	
***S54A**	**7**	**1,320,655**	**943**	**485**	
***S53F**	**3.5**	**374,226**	**571**	**291**	
***S57U**	**3.5**	**325,080**	**520**	**280**	

SWEDEN

7S2E	**A**	**2,919,982**	**2193**	**689**	
					(Op: SM2DMU)
SM6FUD	**A**	**2,210,310**	**1664**	**599**	
SM6WQB	**A**	**636,402**	**726**	**398**	
SM3AF	"	43,508	200	149	
SM3CBR	"	3,002	44	38	
SM5BEU	**28**	**17,100**	**94**	**90**	
SKØHB	**14**	**492,264**	**684**	**387**	
SM5HJZ	**1.8**	**10,416**	**76**	**62**	
***SM2T**	**A**	**1,965,918**	**1693**	**599**	
					(Op: SM2EZT)
***SM5G**	**A**	**1,881,198**	**1484**	**594**	
					(Op: SM5JBM)
***7S3A**	**A**	**1,400,650**	**1311**	**514**	
					(Op: SM3CER)
*7S3J	"	617,088	725	384	
*SM2LIY	"	468,999	738	369	
*SM6CST	"	464,400	513	344	
*SM3X	"	374,070	562	337	
					(Op: SM3CVM)
*SM6DER	"	306,240	524	319	
*SM7BJW	"	270,652	434	284	
*8SØW	"	89,060	330	244	
					(Op: SMØNJO)
*SM7BQX	"	40,296	162	146	
*SM6PVB	"	19,437	110	93	
***SM5NBE**	**28**	**182,050**	**360**	**275**	
***SMØGNS**	**21**	**407,862**	**529**	**378**	
*SM4SX	"	305,108	449	332	
*SM6BSK	"	266,700	350	350	
***SM2JEB**	**14**	**25,145**	**117**	**107**	
***8S5X**	**7**	**527,960**	**559**	**335**	
					(Op: SM5HJZ)
***8S6A**	**7**	**323,712**	**472**	**281**	
					(Op: SM6DPF)
*8S3A	"	137,708	275	199	
					(Op: SM3DXC)
*SM2ODB	"	102,600	225	171	
***SM7ATL**	**3.5**	**20,358**	**114**	**87**	

POLAND

SP7GIQ	**A**	**6,353,152**	**2955**	**832**	
SP5WA	**A**	**1,272,575**	**1110**	**545**	
SP6AZT	**A**	**1,092,311**	**1009**	**499**	
SP3HUU	"	397,935	530	333	
SP2HPM	"	129,766	294	217	
SP8FHJ	"	76,125	226	175	
SP2DKI	"	1,240	22	20	
SN3A	**21**	**3,456,102**	**1916**	**751**	
					(Op: SP3RBR)
SP2AVE	"	738,240	760	480	
SP9W	**7**	**1,155,882**	**881**	**438**	
SQ4NR	**3.5**	**318,330**	**525**	**270**	
SP5GH	"	265,200	284	272	
***SN4T**	**A**	**1,798,569**	**1582**	**593**	
***SP3CW**	**A**	**1,311,871**	**1107**	**499**	
***SP7JKW**	**A**	**1,061,625**	**1052**	**475**	
*SQ2HEB	"	945,999	1003	459	
*SP9KRT	"	642,884	750	418	
*SP3GTS	"	593,628	616	382	
*SP6BEN	"	570,555	650	409	
*SP5ATO	"	471,105	514	361	
*SP9GKM	"	443,119	603	347	
*SP3HC	"	368,256	554	336	
*SP9DAE	"	284,544	483	312	
*SP6GNJ	"	231,744	409	272	
*SP5ICS	"	201,585	361	267	
*SP6MQO	"	148,941	349	201	
*SP4AVG	"	130,680	316	220	
*SP9ADV/P	"	96,258	238	183	
*SP4CQU	"	93,840	212	170	
*SN9R	"	78,373	241	181	
					(Op: SP9BRP)
*SP4HHI	"	35,625	140	125	
*SP5ULV	"	22,437	97	81	
*SP3XR	"	21,060	105	90	
*SP5JSZ	"	15,478	82	71	
*SP9WUM	"	6,840	54	45	
***SQ9HYM**	**28**	**103,000**	**262**	**206**	
*SP3LWP	"	25,680	117	107	
*SP9NH	"	22,698	104	97	
*SP2FWC	"	8,494	65	62	
*SP6AYP	"	341	11	11	
***SP9BBH**	**21**	**1,016,120**	**870**	**532**	
*SP2BLC	"	327,672	450	333	
*SP9EMI	"	81,054	208	171	
*SP1BLE	"	41,250	130	110	
***SP4DEU**	**14**	**684,912**	**790**	**456**	
*SP8BAB	"	388,408	523	376	
*SP4JCQ	"	108,066	256	249	
***SP7FBQ**	**7**	**19,210**	**111**	**85**	
***SP6LV**	**1.8**	**14,040**	**135**	**72**	

GREECE

J41YM	**A**	**3,725,748**	**2777**	**741**	
					(Op: OK1YM)
***SV1DKL**	**14**	**574,448**	**872**	**446**	
*SV2BFL	"	163,153	441	277	

DODECANESE

J45KLN	**A**	**1,418,067**	**1684**	**567**	
					(Op: SMØCMH)
SV5/DL3DRN	"	176,280	534	260	
SV5/DJ5AA	"	170,085	472	255	
***SV5DZX**	**A**	**3,476**	**54**	**44**	

CRETE

***J49HW**	**A**	**1,082,730**	**1433**	**510**	
***J49NG**	**A**	**757,640**	**1138**	**470**	
					(Op: HA5NG)

BOSNIA-HERZEGOVINA

T94MZ	**21**	**2,364,189**	**1681**	**703**	
T9ØU	**3.5**	**576,840**	**663**	**345**	
***T94DO**	**7**	**242,466**	**405**	**251**	
*T95MOJ	"	73,359	234	143	
***T9ØE**	**3.5**	**169,122**	**370**	**213**	
					(Op: T95DXT)
***T9ØC**	**1.8**	**34,540**	**153**	**110**	
					(Op: T94GL)

ICELAND

***TF3GB**	**A**	**1,535,573**	**1494**	**533**	

EUROPEAN RUSSIA

RZ3AZ	**A**	**3,326,523**	**2284**	**723**	
RM3C	**A**	**3,257,400**	**2093**	**732**	
					(Op: RA3CW)
RN3QO	**A**	**3,203,050**	**2068**	**725**	
RD4M	"	3,155,727	2210	731	
					(Op: UA4LU)
RW1ZA	"	3,003,876	2132	724	
UA4LL	"	2,740,320	1992	692	
RN6AL	"	2,607,600	1989	636	
RI4C	"	2,584,456	1955	694	
					(Op: UA4CCG)
UA3ABJ	"	2,250,552	1503	632	
UA4WA	"	2,245,890	1886	645	
RN4WA	"	1,765,618	1669	586	
RA3NN	"	1,575,704	1442	556	
RZ4AN	"	887,656	890	484	
RU3DX	"	869,725	930	475	
UA3DNR	"	860,046	993	498	
RU3HD	"	839,376	910	464	
RA3XO	"	698,810	729	469	
UA4FEN	"	550,812	699	394	
RK4FF	"	546,530	789	410	
RK4HYT	"	538,332	744	397	
RV1CC	"	531,178	596	349	
UA3XAC	"	445,302	600	346	
UA3UCD	"	436,680	540	360	
RU6FA	"	311,388	515	308	
RA4AG	"	213,333	427	267	
RK3DK	"	147,196	320	196	
RV6AB	"	105,363	251	207	
UA3UJE	"	60,489	184	143	
UA6AAY	"	2,494	33	29	
RN3AX	"	1,738	24	22	
RU3RQ	**28**	**66,800**	**198**	**167**	
RZ3QU	**21**	**2,366,700**	**1545**	**690**	
RU3AA	**21**	**2,073,018**	**1449**	**642**	
RV3ACA	**21**	**1,249,888**	**1134**	**556**	
RA3ATX	"	674,175	743	445	
RM4W	**14**	**2,089,800**	**1486**	**675**	
RZ6FA	**14**	**2,061,800**	**1550**	**676**	
UA4HN	**14**	**752,856**	**884**	**508**	
UA4NF	"	199,500	407	300	
RX3AP	"	105,127	247	209	
RZ6LG	**7**	**1,013,285**	**737**	**455**	
RG3A	**3.5**	**539,334**	**685**	**342**	
					(Op: RZ3BW)
RA1ACJ	"	15,096	98	74	
***UA4FER**	**A**	**2,750,559**	**1865**	**681**	
***UA3TU**	**A**	**1,735,118**	**1536**	**593**	
***RG9O**	**A**	**1,715,186**	**1792**	**583**	
					(Op: RZ9OU)
*UA1ANA	"	1,542,532	1336	542	
*RN6CF	"	1,321,080	1179	545	
*RW3AX	"	1,317,960	1207	523	
*RV3QX	"	1,033,266	1049	507	
*RV3LO	"	1,002,352	1032	488	
*RN3BK	"	1,000,912	1105	484	
*RK3BA	"	985,214	941	446	
*RU4LM	"	959,850	1072	474	
*UA4SS	"	949,725	1109	469	
*RK1QXX	"	840,360	1002	447	
*UA1ZZ	"	751,065	952	483	
*RX3RZ	"	695,376	773	439	
*RA3UAG	"	694,680	744	420	
*UA1AQF	"	688,467	850	417	
*RZ4FA	"	642,420	725	387	
*RW1AI	"	561,792	694	399	
*UA1TBK	"	500,960	687	404	
*RA3UT	"	500,000	653	400	
*UA3QU	"	388,020	556	348	
*UA3DK	"	326,360	456	410	
*UA3UMT	"	321,300	510	340	
*UA6JD	"	317,485	496	329	
*UA3XB8	"	280,035	466	315	
*RU4CO	"	263,406	493	307	
*RW3DY	"	229,625	404	275	
*RA1WJ	"	194,790	408	258	
*RA6AX	"	158,510	325	242	
*RK3RX	"	155,871	353	251	
*RA3TT	"	110,019	297	217	
*RA3WDK	"	101,616	228	174	
*RW3AFY	"	87,285	205	165	
*RN3FT	"	52,150	182	149	
*UA3AKI	"	50,518	153	134	
*UA4QK	"	38,544	140	132	
*RW3VZ	"	21,888	109	96	
*UA4CIF	"	20,188	110	103	
*RN6AH	"	14,181	107	87	
*RA4UAT	"	697	17	17	
*RU6AT	"	8	2	2	
*UA3LBE	28	96	9	8	
***RA6LW**	**21**	**1,829,502**	**1391**	**666**	
***RU4WT**	**21**	**449,109**	**609**	**417**	
*RA6ATN	"	185,754	340	249	
*RA3DOA	"	22,896	112	106	
***UA1ONG**	**14**	**314,519**	**525**	**367**	
***RZ3FQ**	**14**	**215,940**	**410**	**305**	
*UA1CEC	"	210,915	485	315	
*RK6AXA	"	146,544	352	258	
*UA4HY	"	89,252	262	212	
*RA1OHL	"	30,831	149	129	
*RA3VY	"	2,640	59	48	
***UA3RF**	**7**	**525,965**	**558**	**365**	
*RV6LFE	"	291,225	426	275	
***RA6FV**	**3.5**	**172,002**	**368**	**218**	
*UA6AKD	"	78,069	240	159	

KALININGRADSK

RV2FW	**A**	**1,774,501**	**1481**	**587**	
UA2FB	**3.5**	**705,960**	**768**	**370**	
***RA2FW**	**A**	**1,008,819**	**1045**	**469**	
*UW2F	"	869,264	946	449	
					(Op: UTØFT)

UKRAINE

EOØIDX	**A**	**4,098,548**	**2737**	**772**	
					(Op: UX7IA)
UV5U	**A**	**3,292,290**	**1954**	**699**	
					(Op: UX1UA)
UT8IT	**A**	**656,500**	**780**	**404**	
UXØIB	"	521,734	686	353	
UT2QQ	"	494,852	649	386	
UX5UO	"	472,675	554	365	
EM3J	**28**	**975,932**	**1104**	**538**	
					(Op: UU2JZ)
EO1I	"	107,100	360	225	
					(Op: UT1IA)
UU7J	**21**	**2,655,014**	**1755**	**746**	
					(Op: UUØJM)
UX3MW	"	74,490	297	130	
UT4NY	**14**	**374,492**	**630**	**373**	
UY3QW	**7**	**1,224,450**	**885**	**450**	
UT8LL	**7**	**987,399**	**803**	**441**	
UX2MM	"	837,581	775	419	
UW7Q	"	135,949	243	187	
					(Op: UR7QM)
UX5I	**3.5**	**222,076**	**420**	**236**	
UYØZGI	**3.5**	**179,676**	**354**	**217**	
UR6F	"	101,904	256	176	
					(Op: UXØFF)
UR6QA	**1.8**	**118,096**	**294**	**176**	
UT/UAØQGQ	"	198	11	9	
***UR5MID**	**A**	**2,523,010**	**1800**	**665**	
***UR2E**	**A**	**1,239,060**	**1257**	**535**	
***UR3DPT**	**A**	**1,285,880**	**1222**	**488**	
*UY4I	"	1,048,312	1080	472	
					(Op: US3IZ)
*UR6QS	"	931,556	970	463	
*UY7C	"	690,704	935	392	
					(Op: UR3CMA)
*UT5UJY	"	668,794	784	434	
*UY5TE	"	551,650	786	374	
*UY5ZI	"	497,420	623	380	
*UT3QT	"	274,912	473	284	
*EO3Q	"	117,875	279	205	
*UT8LO	"	53,836	221	172	
***US7IGF**	**21**	**520,248**	**628**	**409**	
*UY5WA	"	204,631	385	287	
*UTØH	"	67,320	196	165	
***US1ITU**	**14**	**1,403,864**	**1245**	**616**	
***UXØZX**	**14**	**771,144**	**980**	**508**	
*UR6IJ	"	759,720	822	487	
*UX7MY	"	265,793	497	331	
*UT2AU	"	202,938	391	298	
*UT3EK	"	148,775	337	275	
*US1PM	"	147,900	340	255	
*UY5YA	"	72,102	232	183	
*UY5LQ	"	20,646	138	111	

*UT1EJ	*	18,480	112	105
***UZ5I**	**7**	**1,125,157**	**768**	**439**
***UT8AS**	**7**	**343,008**	**465**	**288**
*UR5FCM	*	307,440	437	280
*UR5NX	*	285,140	445	269
*UY8IF	*	115,200	248	180
***UT5PW**	**3.5**	**115,107**	**289**	**183**
*UR5TAU	*	66,924	209	143
*UR4III	*	58,528	197	124
***UT1FA**	**1.8**	**95,518**	**251**	**163**

LATVIA

YL2SM	**A**	**4,020,750**	**2255**	**750**
YL2GN	**A**	**3,293,290**	**2075**	**715**
YL1ZF	**A**	**1,550,092**	**1432**	**554**
YL2MR	*	1,534,736	1362	568
YL9W	**21**	**2,755,956**	**1630**	**763**
YL2LY	**14**	**353,977**	**591**	**373**
YL8A	**3.5**	**760,920**	**812**	**408**
***YL2PP**	**A**	**313,500**	**447**	**330**
***YL2TW**	**A**	**133,249**	**297**	**227**

ROMANIA

YO9HP	**A**	**2,007,264**	**1579**	**618**
YO8WW	*	101,493	233	189
YP3A	**21**	**2,946,168**	**1974**	**747**
YO3FF/P	**14**	**140,032**	**323**	**256**
YO2BEH	**1.8**	**14,688**	**100**	**72**
***YO3APJ**	**A**	**2,095,537**	**1498**	**643**
***YO5PBF**	**A**	**1,050,240**	**985**	**480**
***YO2DFA**	**A**	**886,896**	**969**	**432**
*YO6EX	*	878,826	571	494
*YO4GDP	*	818,078	957	449
*YO2NAA	*	542,728	643	379
*YO8MI	*	351,680	340	314
*YO8RFS	*	311,700	479	300
*YO6ADW	*	238,911	438	291
*YO4R8K	*	196,560	379	260
*YO8DHD	*	183,744	381	261
*YO2LLL	*	61,875	193	165
*YO9DQ	*	9,100	62	50
***YO6BHN**	**28**	**240,800**	**396**	**301**
*YO6MT	*	43,798	140	122
***YO5OHO**	**21**	**166,162**	**307**	**251**
*YO7BBS	*	7,920	62	60
***YO9FJW**	**14**	**761,181**	**923**	**487**
*YO4B8H	*	187,050	400	290
***YO2AQB**	**1.8**	**6,591**	**43**	**39**

YUGOSLAVIA

YT7R	**A**	**5,018,400**	**2580**	**800**
		(Op: YU7BW)		
YU7NU	**A**	**4,015,050**	**2183**	**754**
4N8/LZ1BJ	**A**	**1,357,374**	**1351**	**538**
YTØT	*	663,750	706	354
		(Op: YU1EA)		
YU1AT	*	7,392	74	66
4O1W	**28**	**2,000,156**	**1586**	**673**
		(Op: YZ1AU)		
4O7A	**21**	**3,534,070**	**1990**	**785**
		(Op: YU7AV)		
4O1X	**14**	**3,110,030**	**1993**	**770**
		(Op: YU1NW)		
4O1J	**14**	**2,511,054**	**1813**	**702**
		(Op: YU1JW)		
4O7M	**7**	**1,995,019**	**1237**	**533**
		(Op: YU7GW)		
YT1BB	**7**	**623,376**	**620**	**324**
***4N7N**	**A**	**2,288,088**	**1621**	**648**
		(Op: YT7KM)		
***YU7CF**	**A**	**1,198,600**	**1043**	**520**
***YZ1EW**	**A**	**1,131,426**	**1016**	**478**
*YT1LT	*	735,250	822	425
*4O7B	*	627,260	759	395
		(Op: YU7BJ)		
*YT1RX	*	428,289	610	367
*YU1PJ	*	335,846	521	322
*YU1AAT	*	266,667	474	309
		(Op: 4N1MD)		
*YU7RN	*	164,478	329	237
*YU7KO	*	107,916	282	204
***YU7W**	**28**	**402,220**	**545**	**364**
*YU1HA	*	277,552	428	332
*YU7SF	*	154,638	296	242
*YT1D	*	63,282	190	159
		(Op: 4N1NW)		
***YT1AT**	**14**	**275,835**	**495**	**355**
*YU7FN	*	235,422	394	319
*YU7KW	*	180,975	371	285
*YU7KM	*	147,846	315	246
***4N1FG**	**7**	**780,125**	**742**	**395**
***YU1KR**	**3.5**	**432,291**	**586**	**309**
***4N1A**	**1.8**	**116,100**	**301**	**180**
		(Op: YT1DX)		

MACEDONIA

Z31GX	**28**	**1,495,680**	**1384**	**615**
Z35M	*	2,040	30	30
Z33F	**7**	**1,908,286**	**1182**	**538**
***Z31MM**	**A**	**31,734**	**147**	**129**
***Z35G**	**14**	**1,824**	**42**	**38**
***Z36W**	**1.8**	**81,530**	**241**	**155**

OCEANIA

EAST TIMOR

4W6MM	**A**	**87,780**	**213**	**140**
		(Op: TF1MM)		

EAST MALAYSIA

9M6BG	**21**	**4,442,400**	**2076**	**720**
		(Op: VR2BG)		

THE PHILIPPINES

DU3NXE	**A**	**562,928**	**616**	**302**

FRENCH POLYNESIA

***FO8DX**	**A**	**2,243,900**	**1306**	**475**
		(Op: W1HIJ)		

HAWAII

KH6ND	**A**	**7,768,297**	**2959**	**823**
NH7/N6HC	**A**	**1,090,238**	**880**	**419**

PAPUA NEW GUINEA

***P29IO**	**A**	**306,159**	**422**	**239**

AUSTRALIA

VK8AV	**A**	**735,768**	**561**	**396**
VK5GN	**A**	**666,250**	**695**	**325**
***VK4DX**	**A**	**1,622,264**	**1056**	**491**
***VK2DPD**	**A**	**308,550**	**404**	**255**
***VK4TT**	**28**	**342,236**	**435**	**268**

INDONESIA

***YC1CVA**	**A**	**180,804**	**269**	**228**

SOUTH COOK IS.

***ZK1EFD**	**A**	**3,366,927**	**1747**	**591**
		(Op: DL1EFD)		

NEW ZEALAND

***ZL3CW**	**A**	**745,108**	**617**	**322**
***ZL1AIH**	**28**	**116,754**	**231**	**174**
***ZL1TM**	**7**	**110,464**	**154**	**128**

SOUTH AMERICA

CHILE

***CC4A**	**A**	**4,674**	**43**	**38**
		(Op: CE4USW)		
***XQ1ZW**	**21**	**27,456**	**108**	**96**

URUGUAY

CW6V	**A**	**6,584,000**	**2700**	**800**
		(Op: CX6VM)		
CX5BW	**28**	**4,698,344**	**2132**	**742**
***CX9AU**	**A**	**1,448,975**	**927**	**479**

ECUADOR

***HC2 /UA4WAE**	**A**	**1,967,508**	**1101**	**492**

ARGENTINA

LU1DZ	**A**	**2,482,809**	**1416**	**573**
LO7H	**A**	**1,271,784**	**943**	**456**
LU5FA	**28**	**4,025,200**	**1872**	**725**
LT1F	**28**	**3,971,976**	**1866**	**718**
		(Op: LU1FAM)		
LT5F	**28**	**3,710,820**	**1816**	**690**
		(Op: LU4FPZ)		
LP1F	*	3,354,540	1731	652
		(Op: LU5FC)		
LU7EE	**14**	**342,000**	**394**	**300**
***LQØF**	**A**	**3,910,400**	**1999**	**650**
		(Op: LU5FF)		
***LU1EWL**	**A**	**1,390,170**	**1942**	**447**
***LU1AEE**	**A**	**1,073,709**	**821**	**437**
***L4ØE**	**28**	**1,353,456**	**978**	**468**
		(Op: LW1EXU)		
***LU9APM**	**28**	**939,250**	**764**	**425**
***LU5OM**	**7**	**70,224**	**128**	**112**

PERU

OA4SS	**A**	**3,097,675**	**1565**	**571**
OA4DKC	**A**	**1,498,503**	**1103**	**457**

ARUBA

P4ØT	**A**	**11,726,388**	**4029**	**849**
		(Op: N6TJ)		

NETHERLANDS ANTILLES

PJ2U	**A**	**9,825,816**	**3570**	**858**
		(Op: K6LA)		

BRAZIL

PX2W	**A**	**6,830,928**	**2749**	**801**
		(Op: PY2YU)		
PY2NY	**A**	**6,289,629**	**2556**	**739**
PY3AU	*	244,400	330	235
PY4VB	**28**	**1,934,750**	**1202**	**545**
PY7IQ	**3.5**	**149,380**	**184**	**140**
PY7ZY	*	54,450	104	90
***PY2QI**	**A**	**1,490,619**	**1022**	**481**
***PY2ZI**	**A**	**465,504**	**503**	**312**
*PR4F	*	313,740	393	270
			(Op: PY4FQ)	
*PP7CW	*	303,530	379	254
*PY2APQ	*	90,804	175	141
*PY2GG	*	36,736	116	112
*PP2RON	*	36,360	124	101
***PY2EDY**	**28**	**1,738**	**27**	**22**
***PY2NDX**	**21**	**1,609,461**	**1029**	**531**
*PU2NYV	*	435,416	501	296
*PY2AER	*	188,140	280	230
*PY7OJ	*	39,644	117	106
***PP2JT**	**14**	**92,496**	**198**	**164**
*PY2ZR	3.5	24	2	2

FERNANDO DE NORONHA

PVØF	**A**	**11,639,509**	**3855**	**833**
		(Op: K7BV)		

VENEZUELA

***YV7QP**	**A**	**421,660**	**488**	**290**
***YV6AZC**	**28**	**646,200**	**611**	**360**

TRIBANDER/ SINGLE ELEMENT

UNITED STATES

WW4RR	**A**	**3,918,844**	**2174**	**718**
		(Op: N4ZZ)		
K2PLF	**A**	**3,043,260**	**1691**	**636**
N2GC	**A**	**2,735,440**	**1591**	**620**
N2ED	*	2,637,504	1586	608
W7UT	**A**	**2,510,118**	**1451**	**663**
N2CU	*	1,951,670	1294	569
NW6S	*	1,690,084	1154	541
K4LQ	*	1,388,772	1026	501
W6TK	**A**	**943,492**	**822**	**451**
KS7T	*	737,444	702	428
K8MR	**A**	**554,162**	**614**	**322**
K6VO	*	530,315	615	367
			(Op: K6NR)	
NT6K	*	478,040	622	370
K4PB	*	458,247	541	309
KA2MGE	*	450,359	476	343
WØUY	**A**	**329,400**	**434**	**305**
N4MM	*	250,977	339	269
WØZP	*	131,634	280	213
KK6F	*	65,875	191	155
W1CU	**A**	**42,016**	**122**	**104**
W7AYY	**21**	**15,691**	**77**	**71**
NT1N	**14**	**2,900,920**	**1648**	**694**
KE4OAR	*	810	18	18
***WV2LI**	**A**	**2,790,110**	**1725**	**590**
			(Op: N2GA)	
***WD5K**	**A**	**2,196,116**	**1443**	**628**
***WD4AHZ**	**A**	**2,087,416**	**1399**	**589**
***KJ9C**	**A**	**1,869,160**	**1299**	**563**
*N4YDU	*	1,808,810	1339	554
*NV4X	*	1,306,590	1065	485
			(Op: K4QPL)	
***WN6K**	**A**	**1,067,140**	**1054**	**466**
*W4IDX	*	865,956	834	427
***N8LM**	**A**	**745,784**	**733**	**404**
*W4SAA	*	739,200	752	384
*KX7M	*	703,038	711	399
*W6NKR	*	398,080	452	311
*W9FX	*	316,820	443	292
***W7HS**	**A**	**297,250**	**382**	**290**
*K8IR	*	294,224	399	284
*NO5W	*	265,720	492	280
*KA2D	*	264,936	392	249
*W4AU	*	238,592	357	233
***K1GU**	**A**	**199,320**	**313**	**220**
***W2GG**	**A**	**187,206**	**299**	**246**
*W9LYA	*	180,412	313	212
*K3VA	*	171,810	292	230
*NX9T	*	169,488	293	214
*N6GL	*	132,733	308	199
*K6CSL	*	88,392	226	174
*W4TYU	*	74,500	196	149
*KW9N	*	66,220	203	140
*K6ETM	*	54,450	172	121
*W2YE	*	40,404	133	111
***KØUK**	**A**	**38,454**	**133**	**102**
*K1RFD	*	34,752	113	96
*AB1BX	*	30,576	136	112
*WW3G	*	24,750	122	99
*K3JHT	*	17,010	101	90
*W9CM	*	12,920	90	76
*AD6Z	*	6,364	85	74
*N2WKS	*	6,336	48	48
*WAØMHJ	*	6,302	50	46
*KR3DX	*	936	23	12
			(Op: W1EQ)	
*W4ATL	*	912	24	16
***W8IQ**	**21**	**188,244**	**302**	**252**
***KGØUA**	**21**	**112,110**	**221**	**202**
***N9GUN**	**21**	**83,213**	**217**	**173**
***K9CJ**	**7**	**32,680**	**102**	**95**

DX

JY9NX	**A**	**10,113,847**	**3799**	**823**
		(Op: JM1CAX)		
FG/RW3QC	**A**	**9,134,855**	**3507**	**863**
CW6V	**A**	**6,584,000**	**2700**	**800**
		(Op: CX6VM)		
ER6A	**A**	**5,192,856**	**2913**	**829**
		(Op: ER1LW)		
YT7R	**A**	**5,018,400**	**2580**	**800**
		(Op: YU7BW)		
AN5FV	**A**	**4,765,084**	**2877**	**821**
DL1IAO	**A**	**4,734,828**	**2518**	**756**
HA8JV	**A**	**4,382,466**	**2351**	**759**
VA3RU	**A**	**4,225,020**	**2014**	**670**
IU4T	**A**	**4,216,245**	**2275**	**759**
			(Op: IK4MTF)	
YU7NU	*	4,015,050	2183	754
LY2IJ	**A**	**3,522,813**	**2180**	**739**
RM3C	**A**	**3,257,400**	**2093**	**732**
			(Op: RA3CW)	
RN6AL	*	2,607,600	1989	636
RI4C	*	2,584,456	1955	694
			(Op: UA4CCG)	
9M2TO	**A**	**2,428,272**	**1602**	**502**
RA9SG	**A**	**2,374,789**	**1284**	**571**
UA3ABJ	*	2,250,552	1503	632
HA3LI	*	1,936,707	1473	591
DFØFS	*	1,916,838	1549	594
			(Op: DL1EKC)	
PAØRCT	**A**	**1,810,522**	**1492**	**553**
DL8UAT/P	*	1,808,100	1373	574
OE75CWL	**A**	**1,684,876**	**1351**	**562**
			(Op: OE5CWL)	
VA3TTT	*	1,659,000	1050	500
JAØQWO	**A**	**1,623,070**	**1156**	**505**
EU1SA	**A**	**1,554,242**	**1296**	**578**
OA4DKC	**A**	**1,498,503**	**1103**	**457**
J45KLN	**A**	**1,418,067**	**1684**	**567**
			(Op: SMØCMH)	
G5LP	**A**	**1,350,062**	**1199**	**511**
NH7/N6HC	**A**	**1,090,238**	**880**	**419**
OH3XR	**A**	**1,044,576**	**1060**	**468**
UA3DNR	*	860,046	993	498
VE7FO	**A**	**821,975**	**751**	**385**
DK7FP	*	810,421	825	401
RU9CZD	*	775,557	609	333
			(Op: UA9CDC)	
DFØNF	*	552,752	729	358
JL6HKJ	*	518,868	575	348
G3TMA	*	487,060	581	355
G4BJM	*	409,500	554	325
HB9CIC	**A**	**237,952**	**424**	**286**
GM4OBK	**A**	**124,176**	**304**	**208**
JA6BGA	*	47,432	135	121
DF5AU	*	17,072	100	88
G4OBK	*	14,014	100	91
JG3WCZ	*	40	4	4
Z31GX	**28**	**1,495,680**	**1384**	**615**
OH6NJ	**28**	**400,786**	**649**	**398**
UA9LP	**28**	**270,500**	**396**	**250**
MU2K	**28**	**265,230**	**492**	**315**
			(Op: G3SQX)	
OH3BU	*	162,810	379	270
LY2IC	**28**	**157,122**	**317**	**258**
5X1Z	**21**	**6,362,352**	**2720**	**782**
DK2GZ	**21**	**1,637,130**	**1232**	**605**
JH1FNU	**21**	**49,970**	**147**	**130**
S53Z	**14**	**591,209**	**733**	**419**
SKØHB	**14**	**492,264**	**684**	**387**
JA9CWJ	**14**	**256,080**	**352**	**264**
Z33F	**7**	**1,908,286**	**1182**	**538**
GW7X	**7**	**1,883,700**	**1173**	**525**
			(Op: GW3NJW)	
OLØE	**3.5**	**625,464**	**714**	**357**
			(Op: OK2ZU)	
IO3P	**3.5**	**486,090**	**630**	**330**
PY7IQ	**3.5**	**149,380**	**184**	**140**
RA1ACJ	**3.5**	**15,096**	**98**	**74**
***IH9/OL5Y**	**A**	**5,800,434**	**2506**	**697**
			(Op: OK1FUA)	
***ZC4DW**	**A**	**5,314,681**	**2584**	**673**
***ZK1EFD**	**A**	**3,366,927**	**1747**	**591**
			(Op: DL1EFD)	
***VE9DX**	**A**	**3,258,996**	**1497**	**676**
***UAØJQ**	**A**	**3,075,915**	**1783**	**705**
***9G1MR**	**A**	**2,966,994**	**1708**	**573**
			(Op: UA3AGW)	
***AN7GTF**	**A**	**2,946,548**	**2255**	**668**
***UA4FER**	**A**	**2,750,559**	**1865**	**681**
***S56M**	**A**	**2,666,606**	**1732**	**631**
***9A6XX**	**A**	**2,412,333**	**1837**	**649**
***OK1QM**	**A**	**2,202,180**	**1557**	**635**
*AM4DRV	*	2,058,672	1785	616
***G4IIY**	**A**	**1,970,394**	**1528**	**591**
***SN4T**	**A**	**1,798,569**	**1582**	**593**
***RG9O**	**A**	**1,715,186**	**1792**	**583**
			(Op: RZ9OU)	
***LY2LA**	**A**	**1,713,320**	**1398**	**580**
***GM4SID**	**A**	**1,593,090**	**1392**	**558**
*UA1ANA	*	1,542,532	1336	542
*RUØLL	*	1,470,500	1243	500
***CX9AU**	**A**	**1,448,975**	**927**	**479**
***LA8OM**	**A**	**1,335,024**	**1240**	**508**
*EA4BSC	*	1,329,861	1230	559
***EI4DW**	**A**	**1,152,388**	**984**	**514**
***PA3ELD**	**A**	**1,120,284**	**1139**	**492**
*OK2QX	*	1,088,912	1018	506
***LU1AEE**	**A**	**1,073,709**	**821**	**437**
*RV3QX	*	1,033,266	1049	507
*RAØFF	*	1,016,103	869	451
*RN3BK	*	1,000,912	1105	484
*G3YDD	*	989,460	992	460
			(Op: G3ZRJ)	
*RK3BA	*	985,214	941	446
***F5KEQ**	**A**	**984,060**	**986**	**495**
			(Op: F5MYK)	
*SQ2HEB	*	945,999	1003	459
***ISØIGV**	**A**	**921,202**	**825**	**634**
***VE6ZT**	**A**	**903,350**	**747**	**445**
*OH2LYP	*	900,724	1015	484
*OK1FHI	*	896,460	864	446
***DL2ZAV**	**A**	**892,255**	**991**	**455**
*DL4HRM	*	833,360	909	440
*DL1NEO	*	831,420	899	447
***J49NG**	**A**	**757,640**	**1138**	**470**
			(Op: HA5NG)	
*UA1ZZ	*	751,065	952	483
***UY7C**	**A**	**690,704**	**935**	**392**
			(Op: UR3CMA)	
***JS1OYN**	**A**	**689,700**	**702**	**363**
*UA1AQF	*	688,467	850	417
*SP9KRT	*	642,884	750	418
*EA3ALV	*	584,790	664	386
***YO2NAA**	**A**	**542,728**	**643**	**379**
***XE1/AA6RX**	**A**	**492,513**	**594**	**329**
*ISØHQJ	*	492,362	653	377
*DL3ZAI	*	475,434	612	366
***SM2LIY**	**A**	**468,999**	**738**	**369**
***PY2ZI**	**A**	**465,504**	**503**	**312**
*JH2NWP	*	433,370	473	302
***YV7QP**	**A**	**421,660**	**488**	**290**
***VE4YU**	**A**	**379,134**	**458**	**306**
*JA1CP	*	371,553	467	273
*SP3HC	*	368,256	554	336
*G3RSD	*	350,568	516	324
***OM3CDZ**	**A**	**342,681**	**604**	**309**
*JA2KKA	*	285,936	322	224
*JN1NOP	*	281,320	419	260
*RU4CO	*	263,406	493	307
*OK2SWD	*	217,819	355	259
***HI3LFE**	**A**	**217,386**	**320**	**234**
*JAØBMS/1	*	182,865	301	219
***UAØQBR**	**A**	**175,840**	**218**	**160**
*G3VQO	*	162,675	373	241
*IN3NJB	*	157,126	276	251
*DM3PKK	*	136,799	297	221
*JG3NKP/1	*	134,400	232	210
*SP4AVG	*	130,680	316	220
***VE3MQW**	**A**	**120,945**	**234**	**165**
*OH2CV	*	114,114	286	209
*JE1HJV	*	108,721	224	163
***VO1WET**	**"**	**105,703**	**219**	**173**
*OM3BA	*	98,430	250	193
***OZ4FF**	**A**	**76,120**	**208**	**173**
*UA3AKI	*	50,518	153	134
*LA9AU	*	50,025	180	145
*PY2GG	*	36,736	116	112
*PP2RON	*	36,360	124	101
*JA1KI	*	34,632	116	111
*PAØMIR	*	33,744	133	114
***Z31MM**	**A**	**31,734**	**147**	**129**
***UN8FM**	**A**	**27,360**	**120**	**90**
*JA1MXY	*	25,564	100	83
*OZ4RT	*	14,400	73	72
*RN6AH	*	14,181	107	87
***CC4A**	**A**	**4,674**	**43**	**38**
			(Op: CE4USW)	
***VK4TT**	**28**	**342,236**	**435**	**268**
***EA1AK/AM7**	**28**	**271,208**	**440**	**334**
***SM5NBE**	**28**	**182,050**	**360**	**275**
***ZL1AIH**	**28**	**116,754**	**231**	**174**
***CO8LY**	**21**	**753,876**	**757**	**387**
***VA3NR**	**21**	**294,424**	**375**	**298**
***IK2AIT**	**21**	**253,500**	**431**	**300**
***PY2AER**	**21**	**188,140**	**280**	**230**
***JA4AQR**	**21**	**47,840**	**133**	**130**
***PY7OJ**	**21**	**39,644**	**117**	**106**
***IR2V**	**14**	**127,305**	**283**	**207**
			(Op: I2WIJ)	
***PP2JT**	**14**	**92,496**	**198**	**164**
***JA4BAA**	**14**	**61,523**	**166**	**119**
***G3TJE**	**7**	**297,182**	**394**	**278**
***ZL1TM**	**7**	**110,464**	**154**	**128**
***ON7SS**	**7**	**45,859**	**160**	**121**

BAND RESTRICTED

***J49NG**	**A**	**757,640**	**1138**	**470**
		(Op: HA5NG)		
***S57IIO**	**A**	**698,340**	**729**	**452**
***JR5EHB**	**A**	**119,510**	**239**	**170**
***EF7AMD**	**28**	**15,138**	**102**	**87**
		(Op: EC7AMD)		
***OH2HMB**	**28**	**940**	**20**	**20**

ROOKIE

OA4DKC	**A**	**1,498,503**	**1103**	**457**
SM6WQB	**A**	**636,402**	**726**	**398**
K9CU	**A**	**57,450**	**205**	**150**
		(Op: KB9UWU)		
RN3AX	**A**	**1,738**	**24**	**22**
N8PW	**21**	**1,749,532**	**1217**	**554**
SQ4NR	**3.5**	**318,330**	**525**	**270**
***NW7DX**	**A**	**2,426,044**	**1610**	**617**
***YT1RX**	**A**	**428,289**	**610**	**367**
***MUØFAL**	**A**	**188,945**	**349**	**265**
***AC7LX**	**A**	**145,521**	**299**	**207**
***RW3AFY**	**A**	**87,285**	**205**	**165**
***IR2D**	**A**	**62,010**	**205**	**159**
***W7EAI**	**A**	**28,994**	**156**	**109**
***OZ4RT**	**A**	**14,400**	**73**	**72**
***AN7ASZ**	**28**	**126,795**	**311**	**237**
***YT1D**	**28**	**63,282**	**190**	**159**
		(Op: 4N1NW)		
***EA2AAZ**	**21**	**61,074**	**187**	**162**

ASSISTED

UNITED STATES

NX3A	**A**	**4,776,259**	**2268**	**769**
		(Op: W3PP)		
K5KG	**A**	**4,196,278**	**2043**	**734**
N8BJQ	**A**	**3,779,121**	**1944**	**723**
WF2B	**A**	**3,246,308**	**1738**	**652**
		(Op: K2ONP)		
K9NR	**A**	**3,098,224**	**1759**	**664**
WN9O	*	2,304,880	1415	613
			(Op: W9IU)	
K3KO	**A**	**2,213,106**	**1215**	**609**
WØTM	**A**	**2,067,952**	**1358**	**614**
W2YC	*	2,055,375	1181	609
W7OM	**A**	**1,213,772**	**923**	**469**
KC1F	**A**	**1,110,377**	**839**	**449**

K3DI	*	960,426	716	458
K9UQN	*	663,702	660	402
W4/OH7KD	*	611,910	687	390
W1ZT	*	498,292	539	359
KØAD	**A**	**449,829**	**615**	**331**
AG1C	*	415,736	499	331
N3ED	*	395,724	412	294
K1KU	*	249,260	314	242
KØMS	*	138,785	260	205
W3AP	*	77,010	177	151
K6JG	*	30,738	100	94
KF2O	*	9,028	63	61
NO9Z	**14**	**496,184**	**572**	**367**
***N6CW**	**A**	**1,577,442**	**1114**	**566**
***K9CS**	**A**	**1,144,284**	**919**	**501**
***NU8Z**	**A**	**852,480**	**726**	**444**
***AB2E**	**A**	**691,795**	**651**	**377**
*N2NI	*	259,032	397	258
*KC9TV	*	201,476	342	241
*KQ2F	*	180,688	228	184
*K8LN	*	169,850	278	215
***WA3KPP**	**A**	**156,244**	**300**	**212**
***AF5Z**	**A**	**121,476**	**263**	**212**
***NC1N**	**A**	**95,049**	**230**	**179**
*W3HVQ	*	73,500	182	147
*WO1N	*	53,000	142	125
*N3MX	*	43,078	138	119
***KØBX**	**A**	**38,862**	**128**	**102**
*AF8C	*	15,111	74	69
*AB4RL	*	450	15	15

DX

S5ØA	**A**	**6,051,375**	**2800**	**825**
			(Op: S57AW)	
RM9H	**A**	**5,388,972**	**2289**	**717**
			(Op: RZ9HT)	
IR4T	**A**	**5,347,919**	**2548**	**841**
			(Op: IK4UPB)	
YL8M	**A**	**5,056,064**	**2544**	**824**
DK3GI	**A**	**4,775,540**	**2375**	**770**
S51TA	*	4,765,152	2445	784
RX3APM	**A**	**4,386,015**	**2631**	**795**
IKØYVV	*	3,916,465	2244	751
RK3AWL	*	3,862,788	2294	746
			(Op: RV3BA)	
OK1FDY	**A**	**2,524,125**	**1716**	**635**
UA1QV	*	2,260,000	1703	625
AM5BM	**A**	**2,238,067**	**1747**	**697**
YBØAVK	**A**	**1,437,535**	**1021**	**443**
OE3I	**A**	**1,437,345**	**1236**	**567**
			(Op: OE1JNB)	
II1H	*	1,156,150	1085	475
OE75CIQ	*	1,092,896	1119	476
			(Op: OE8CIQ)	
HB9DDO	**A**	**1,034,160**	**990**	**496**
DK9IP	*	601,244	681	394
UAØAGI	**A**	**523,572**	**550**	**322**
OH5UX	**A**	**427,040**	**634**	**340**
AM1FBJ	*	186,467	380	263
PA5WT	**A**	**159,120**	**309**	**240**
DF5ZV	*	153,679	271	227
DL6KWU	*	122,206	262	203
RZ9HG	*	66,612	151	122
DL6KVA	*	39,044	153	86
OE1TKW	*	9,394	66	61
S5ØC	**28**	**1,459,164**	**1204**	**609**
			(Op: S53RM)	
LZ8T	**28**	**962,920**	**1022**	**532**
			(Op: LZ2FV)	
IR2Y	**21**	**3,022,320**	**1834**	**771**
			(Op: IK2QEI)	
UA6LV	**21**	**2,965,032**	**1738**	**777**
OH7M	**21**	**2,024,880**	**1466**	**649**
PA3EWP	**21**	**1,871,498**	**1304**	**653**
PI4TUE	*	1,204,257	993	563
			(Op: PA3EZL)	
9A1AYZ	**21**	**1,028,938**	**926**	**499**
			(Op: 9A4KW)	
9A5W	**14**	**2,800,060**	**1797**	**764**
UA9TQ	**14**	**1,426,809**	**973**	**537**
AM3AJW	**14**	**914,022**	**1011**	**522**
RAØAM	**14**	**38,232**	**118**	**118**
S51U	**3.5**	**57,590**	**190**	**130**
S57M	**1.8**	**204,392**	**400**	**232**
YZ1W	**1.8**	**50,435**	**182**	**131**
			(Op: YU1ANT)	
***YU1OJ**	**A**	**3,040,901**	**1870**	**709**
***OK2YZ**	**A**	**939,840**	**873**	**480**
*OK2ZJ	*	777,920	835	440
***JA3YPL**	**A**	**579,852**	**629**	**351**
			(Op: JJ3TBB)	
***ZX2B**	**A**	**380,926**	**437**	**299**
			(Op: PY2MNL)	
***IO2A**	**A**	**339,880**	**668**	**293**
***AM5RM**	**A**	**238,524**	**406**	**286**
			(Op: EA5RM)	
***RN2FA**	**A**	**127,022**	**275**	**211**
***S53AU**	**A**	**110,126**	**269**	**158**
***VE3HG**	**A**	**40,768**	**127**	**112**
***MMØBQI**	**A**	**37,343**	**129**	**107**
*JK2VOC	*	31,096	144	92
***GW4BLE**	**A**	**5,796**	**48**	**46**
***YU1QW**	**28**	**366,417**	**509**	**369**
***DJ6TK**	**28**	**41,472**	**134**	**128**
***JL2TAW**	**14**	**3,552**	**35**	**32**
***S52ZW**	**7**	**1,184,846**	**929**	**458**

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

KM9P	**10,691,724**	**3864**	**964**
KM4M	8,703,114	3219	903
KR5DX	**7,655,265**	**3196**	**933**
K2XR	**6,827,760**	**2757**	**872**
AI7B	**6,740,872**	**2827**	**838**
WJ6O	**6,075,132**	**2666**	**868**
NX6T	4,711,099	2372	811
KF1V	**4,354,176**	**2109**	**736**
K6ZM	4,210,075	2109	725
KQ1F	735,471	721	391
AA6EG	683,760	725	407
W3IQ	**350,364**	**406**	**291**
NG2P	197,355	305	223
WØBR	**70,200**	**209**	**156**

NORTH AMERICA

6Y1A	**17,772,811**	**5217**	**1061**
V25A	**12,898,742**	**4675**	**937**
WL7E	**10,288,032**	**3531**	**992**
VE7UF	**6,279,507**	**2487**	**843**
VA3NA	**5,388,306**	**2339**	**763**
T48K	**4,533,324**	**2128**	**708**

AFRICA

ZS6DDX	**318,304**	**309**	**232**

ASIA

RT9W	**10,821,417**	**3429**	**907**
OD5/OK1MU	**10,503,504**	**3638**	**912**
RF9C	10,364,382	3419	882
RW9C	7,903,126	2741	814
JA1YPA	**1,049,910**	**837**	**443**
JA7YCQ	77,220	190	135

EUROPE

9A7A	**10,915,020**	**4364**	**1044**
OH2U	**8,786,250**	**3799**	**990**
OHØB	**8,709,134**	**3955**	**989**
SN2B	**8,615,705**	**3553**	**995**
HG1S	**8,440,524**	**3682**	**956**
OH1F	8,388,408	3600	1019
ES5Q	**8,212,644**	**3453**	**1023**
OM7M	**8,024,240**	**3356**	**980**
SK3W	**7,964,832**	**3390**	**978**
LY6M	**7,431,372**	**3300**	**948**
M2A	**7,341,285**	**3240**	**973**
OL3A	**6,600,165**	**3057**	**905**
EM5U	**6,004,926**	**3189**	**898**
SN8V	5,725,321	2866	827
OL5Q	5,542,371	2686	881
YQ4A	**5,236,836**	**3236**	**818**
UT7L	**5,074,551**	**2695**	**867**
LZ9W	**4,850,546**	**2691**	**794**
RI3A	**5,026,944**	**2924**	**832**
DK4WA	**4,781,901**	**2383**	**817**
DJ3EV	4,677,876	2487	798
RN3D	4,268,948	2575	796
DL7ANR	4,124,706	2379	762
RZ6LZL	3,974,562	2441	827
4O1Z	**3,964,529**	**2497**	**751**
PB6X	**3,638,250**	**2185**	**750**
YL7C	**3,618,000**	**2171**	**750**
UA4PWW	3,235,206	2148	703
OT1P	**3,219,740**	**2076**	**703**
OE2S	**3,160,194**	**1922**	**722**
TM5B	**2,917,850**	**2325**	**670**
F6ENO	2,379,252	1681	642
YZ7A	2,099,568	1547	664
DFØSX	1,732,154	1411	577
SK2TP	1,731,063	1734	587
RZ4NWH	1,700,724	1488	593
AN4ML	**1,254,957**	**1365**	**561**
F8KHZ	1,189,548	1034	519
DLØMZ	1,077,651	1012	501
RK4FWX	1,005,556	1109	524
YU1INO	941,858	984	487
M3S	816,205	973	433
S53DRA	788,480	828	448
F6KRK	586,806	727	374
ED2JJ	507,528	753	371
IO2L	371,565	521	345
F8KFS/P	266,952	458	294
SP2AYC	251,246	375	269
PA4GF	116,688	290	208
UR4PWC	70,493	205	157
SN45KDU	39,497	159	127
OK5SWL	27,742	110	97
ON4TG	5,546	63	59
Z37GBC	1,560	30	26

OCEANIA

AH2R	**11,541,420**	**3834**	**957**
YBØZZ	**3,466,980**	**1768**	**612**
9M6ONT	**1,750,840**	**1264**	**455**
4G1A	**1,528,189**	**1179**	**437**
YE1ZTC	823,536	776	336

SOUTH AMERICA

P49V	**19,760,774**	**5382**	**1034**
ZW5B	**12,020,645**	**3624**	**1015**
PQ2Q	4,497,920	2170	640
LW7DX	**3,220,787**	**1693**	**643**
L99D	409,262	487	287

MULTI-OPERATOR MULTI-TRANSMITTER

UNITED STATES

KM3T	**21,103,320**	**6559**	**1110**
NY4A	**15,461,384**	**5267**	**1018**
NQ4I	15,379,484	5642	1063
KM5G	**13,293,397**	**4913**	**1073**
WK4Y	11,452,560	4248	1020
NR4M	9,770,292	3960	959
WR3L	**6,367,746**	**2899**	**847**
WQ7T	**4,136,076**	**2145**	**756**
AK3Z	2,035,296	1323	573

ASIA

HSØAC	**3,738,924**	**2190**	**666**

EUROPE

RU1A	**19,788,600**	**7346**	**1180**
HG9X	**18,120,374**	**6551**	**1138**
LY7A	**14,566,144**	**5785**	**1088**
OL7W	**11,943,360**	**4870**	**1040**
OG3M/Ø	**9,198,280**	**4378**	**980**
OL7R	6,529,536	3353	872
OH6K	**4,503,207**	**2696**	**813**
OZ5WQ	**2,590,640**	**1817**	**611**

OCEANIA

ZL6QH	**5,701,696**	**2348**	**712**

SOUTH AMERICA

HC8N	**50,454,459**	**10967**	**1299**

CHECK LOGS

The following logs were used as check logs. Check logs and SWL logs are always appreciated.

AN5DCL, DL2SDQ, EA5TD, EA8BYM, EY8MM, F5YJ, JHØOQL, OH6QU, OY4M, RA1OK, RK1B/P, RW3XA, RX3AEX, SP9KJU, UA1AUW, UA3AVR, UA4ARL, UT5UGR, UUØJC, YO9GIX.

Our Readers Say

Thanks for the Memories...

Editor, *CQ*:

I just wanted to say "thanks" for the great job on the January issue of *CQ*, which featured three articles on vintage radio. I've been in touch with Mike Bryce and urged him to continue to write about Heathkits. I hope *CQ* will also be able to publish more articles like his in the future. Maybe it's due to the "graying" of the ham demographics, but I think a lot more folks will be interested in buying *CQ* to read this kind of article than those endless pages of contest stats that you used to run ;-).

Here is a post I put on the "Old Tube Radios" mail reflector. These articles have had a lot of positive response from those like me who enjoy reliving the "golden era of ham radio":

CQ Magazine is starting to "Get it!"...

The January 2002 issue features a nice article, "Confessions of a Heathkit Collector," by Mike Bryce, WB8VGE; another by Gil McElroy, VE3PKD, "Batteryless—Ted Rogers and the Invention of the AC Vacuum Tube"; and "An OT Remembers—Starting Out with a Crystal Detector," by Bob Shrader, W6BNB.

These aren't the first articles about "our kind of radio" and I don't think they will be the last. Against the background of deregulation and the changes that have already occurred in the amateur service, it is great to see interesting articles containing radio history (and vacuum tube symbols!) in a contemporary ham magazine. Based on my experience with local "no code" hams, there is a strong desire to learn more about radio theory—and yes, even CW skills!—beyond what is required to pass the FCC license exam. Articles like *CQ* has been publishing stimulate the curiosity of these new hams who have yet to experience the fun of a crystal set, the simplicity of a "firebottle" transmitter, or the magic of building a Heathkit...

Bob Nickels, W9RAN
via e-mail

Editor, *CQ*:

I just wanted to tell you how much I am enjoying the January issue, especially the article by Mike Bryce. As a fellow collector of the "Green Stuff," I fully appreciate all he had to say. The discussion on the RigBlaster was also timely as I have been thinking about buying one.

I would love to see more articles about the old boat anchor stuff. Keep up the good work.

Gary H. Harmon, Jr., K5JWK
San Antonio, TX

Editor, *CQ*:

A very nice, interesting, and useful issue *(January—ed.)*! As a Heath collector, old timer (licensed in 1958 as Novice), but very involved in antique radio (built a Doerle Duplex twin triode regen recently), I loved the "OT Remembers" article. Only there was a problem; all the amplifier stage triangles were backwards! The convention, of course, is the point goes to output end. Now for a transistor/FET version of a twin triode regen....

Karl, WA2KBZ
Jefferson City, MO

Editor, *CQ*:

Just a quick "thank you" for the article on Heathkits by Mike Bryce. Took me back many years. Terrific!

Gilles Masson, VE2AMN
via e-mail

The following letter was sent to author Bob Shrader, W6BNB:

Bob,

Congratulations! Great article on the development of early receivers and transmitters. I like to build regen radios and crystal sets and always enjoy articles on vintage radio. Glad to see *CQ* running so many good articles on vintage radio and radio history, such as yours, and the article on the AC vacuum tube by VE3PKD.

I am also in the Santa Rosa area and wish I could find a local group that shares my interest in old radios and history.

Rich, W3HWJ
via e-mail

Thanks, but No Thanks...

Editor, *CQ*:

Well another trip down Antique Lane (January issue, p. 22)! Endless pictures about CW paddles in other issues and of course (p. 11) the boat anchors. Getting hard to justify $7.00 (Canadian) for your magazine. What happened to the technology part? How about some articles on microwave bands, how to build, etc.? We are in danger of losing these frequencies, if not used, to commercial interests. How about a feature on U.S. band limits? So many operating out of band these days. U.S. stations on SSB trying to work DX on 7.055 and below the 20 meter edge. Maybe a reminder would be helpful.

Dennis Furnell, VA7FU

Dennis – Well, you've just given them a reminder and I hope it will be helpful. As you can see from other letters, nostalgia articles are very popular right now. You should realize, though, that our December and January issues were nostalgia specials. We do have more this month, but we balance it with cutting-edge research on 160 meter propagation, the latest in LED technology, and a look at using the internet to link repeaters worldwide. As for microwave articles, you may be happy to note the return of CQ VHF *magazine this spring, with a higher technical level than before.*

How To Work It...

Editor, *CQ*:

This is a quick note to thank you for your recent review of the RIGblaster in *CQ* magazine. While it was a product review, it also was the most concise explanation of how to listen to PSK31 that I've ever read. I'm now monitoring PSK and looking forward to transmitting as soon as I get an interface such as the RIGblaster.

By the way, a number of folks on the internet attempted to help me set up PSK on my OMNI V without an interface. Some people use VOX to key the transmitter, but I'll be darned if I can make that work, especially since you have to adjust the VOX every time you go back to SSB, etc. That's been waaaay too confusing to me. Hi. I think an interface to my Kenwood TS570 will be the way I go.

Again, thanks for the article.

Rick, WO8L
Pfafftown, NC

Rick – You've tapped into one of my pet peeves in amateur radio ... describing the technical operation of something new without getting into operation. I try to make sure we always tell readers "how to work it" as well as "how it works."

Limit Contesting Frequencies

Editor, *CQ*:

I operate QRP CW with the exception of keeping an occasional sked on SSB. This is what I like to do. When contesters have their big events like CQWW and SS, etc., I'm out of luck, because I'm not in it for the contesting. Contesters don`t care if you are using the frequency, only that they can dominate the frequency, keeping other contesters from assuming control. Regular hams are out of luck. I have nothing against contesting, but how about you guys making part of your rules that there must be sections of the band that are NOT allowed to be used in the contest?

This would certainly help mitigate the complaints you guys get from regular hams, and more important it would be unselfish to the point of being downright fair, and even considerate (important values in a post Sept 11 America don`t you think?)

Dennis Powers, AB6QR
Forest Ranch, CA

Marketing Ham Radio

Editor, *CQ*:

I thought the suggestion for a brainstorming session ("Our Readers Say," September 2001 *CQ*) was terrific. Hold it at O'Hare and I'll be there. Why not several locations? All that would be needed is a facilitator and a meeting room. But here's a jump-start, building on the letter about how FRS provides an introduction to ham radio. Let's take that a step or two further. . . .

How about working with FRS manufacturers to leverage this connection? The FRS radios are small-ticket, low-margin sales as compared to ham gear, and many manufacturers such as Kenwood and Drake make both. I think they'd love to use their FRS sales as a means of "pulling through" ham gear sales. Suppose they position it this way in the packaging and promotion, and include ham literature, a nice slick book or magazine, in

the FRS box? Maybe even a discount coupon that could be applied to ham gear?

Now think about the "brand power" of some ham radio institutions, such as the ARRL or even *CQ* magazine. Let's pick the ARRL. Suppose they were to license the use of their "brand," the ARRL logo, to FRS manufacturers in return for the ham radio promotion? Think of the ARRL brand (or the *CQ* brand) being displayed in the discount stores, in the media . . . There are many angles that could be explored.

I disagree with the second letter-writer; we have a *lot* to sell! People are turning back to two-way radio as a safer, less-expensive, and faster alternative to cell phones. Why not position ham radio as the "Lexus" or "Rolex" of radio, by finding ways to tie our "product" to these entry-level purchases where the volume and exposure are greatest?

Is it beyond the realm of possibility that in the future we'll have commercial companies pushing *for* ham radio expansion rather than trying to take our bands away—because we are good for their business?

Bob, W9RAN
via e-mail

A Few Words From K1MAN

Editor, *CQ*:

K1MAN bulletins have been heard world wide since 1987. Like W1AW, K1MAN transmissions are perfectly legal under FCC rules. Like W1AW, good amateur practice requires publishing a transmitting schedule and then sticking to it. It is far more disruptive to do otherwise.

Hams can be very childish and territorial about the use of amateur radio spectrum. Our surveys show that about one ham in ten is against both K1MAN and W1AW one-way bulletins. We are sure there are also those who are against contests, nets, etc. This is OK! There is plenty of room for everyone in our Amateur Radio Service. If you have a problem with this, try another hobby; you are probably not cut out for big-time amateur radio.

An experienced ham knows that if you are trying to talk to another station per a sked, you might have to QSY one or more times during any given hour. If you don't know this and practice this, you are not an experienced radio amateur.

Actually, our amateur spectrum is *underutilized*. The commercial guys are drooling over our spectrum and would love to divide us and conquer us. They love to see us squabble and act like babies. There are even evil persons in the FCC (dressed like good guys) who are very subtly promoting and documenting amateur radio disruption under a long-term private plan to assist commercial interests take as much amateur spectrum as possible. A primary function of AARA (the American Amateur Radio Association) is to warn you about this frequency grab and to expose the corruption that exists within the FCC. Corruption is nothing new in American politics, and if you don't think that our amateur radio spectrum is worth billions upon billions of dollars, you are very naive.

Glenn Baxter, K1MAN
Belgrade Lakes, Maine

Zero Bias *(from page 6)*

"goes against the grain" of most Americans but millions have felt they have little choice and reluctantly agreed to go along. But we hams would be tilting at windmills if we tried to attack the whole system, unjust as it is to so many people.)

6) The federal government has traditionally been loath to interfere in private contracts because, generally speaking, all provisions of a contract are open to negotiation and as long as whatever the responsible adults on either side of a contract negotiation agree to isn't blatantly illegal, the government tries to keep its fingers out of it (as well it should). But these contracts are different. In virtually all cases, deed restrictions and homeowner association rules are not subject to negotiation at the time of purchase, and don't vary much from development to development, so they're not really voluntary and you often don't really have the choice to buy a home without similar restrictions in a different area of the same town. *Again, the FCC has already pre-empted these contracts in the case of TV receiving antennas and small satellite dishes.*

7) The FCC is seeking direction from Congress in this matter. In its most recent ruling denying the extension of limited preemption to private developments, the FCC concluded by writing that "should Congress see fit to enact a statutory directive mandating the expansion of our reasonable accommodation policy, the Commission would expeditiously act to fulfill its obligation thereunder." *Congress needs to enact the "statutory directive" that the FCC seems to be requesting.*

Contacting Your Representatives

There are three ways of getting in touch with your Representative (Congressman) and Senators: by letter (considering recent problems with mail to Congress, we'd suggest either e-mailing or faxing your letter), by phone or by meeting in person with your representative or a member of his/her staff. Your phone book should have contact information, as does the web. The House website at <http://www.house.gov> can point you to your Congressman as long as you know your state and Zip code. The Senate website at <http://www.senate.gov> can help you as long as you know what state you live in.

A letter should be addressed to the Senator or Congressman, and should describe your personal experiences. *Do not* write fill-in-the-blank form letters. They are quickly recognized and may or may not be counted before being sent to the shredder. Form letters are not taken seriously.

If you call or visit, expect to speak with a staff member, unless you already know the Congressman or Senator personally. Your goal should be to meet with a Legislative Assistant. This is the person who drafts bills for "the member" and otherwise deals with matters involving bills moving through Congress. If you get the Legislative Assistant in your corner, you're a step ahead, because the Congressman often seeks this person's advice on bills before voting. But it's OK to start with another staff member such as a caseworker. Getting a local group together for a meeting is also good, since elected officials count heads and voters. An issue that's important to a dozen voters is more significant than an issue of importance to only one.

Can't the League Do It?

Now I can hear a bunch of you saying, "Gee, this sounds awfully complicated. Shouldn't we just leave this to the ARRL's professional staff in Washington? Isn't this what we pay them for through our dues?"

Well, the ARRL certainly must play a role—a central leadership role—and it is. But the League's efforts must be backed up by grassroots action and that's where each and every one of us comes in, especially those of us forced off the air or made to use indoor antennas because of inflexible restrictions. The ARRL must also serve as a central clearinghouse for information to assure a consistent and coordinated approach, but we the people have a level of access to all 435 House members and 100 Senators that the League staff doesn't. When an ARRL staffer knocks on the door of a Congressional office, he or she is just one more lobbyist representing one more special interest – and a relatively small and poor one at that. But when *you* knock on *your* Congressman's or Senator's door, it's a different story. *You* are a constituent, a voter, one of the people your Congressman and Senators were elected to represent. Their jobs depend on *you* and they know it.

What Next?

If you meet with your Congressman, Senator or one of their staff members, and get a positive response, be sure to let the ARRL know. Pass the word to your Division Director, who will know which staff member is coordinating League efforts on the matter. In addition, keep an eye on this space and on updates in our news pages, on our website and on the ARRL website, to see if a bill has been introduced. Once it is, contact your representatives again and urge them to cosponsor it or at least support it if it comes to the floor for a vote.

Citizen action—a part of our responsibility as Americans—is essential to getting the government to redress this grievance. Be part of the solution.

73, Rich, W2VU

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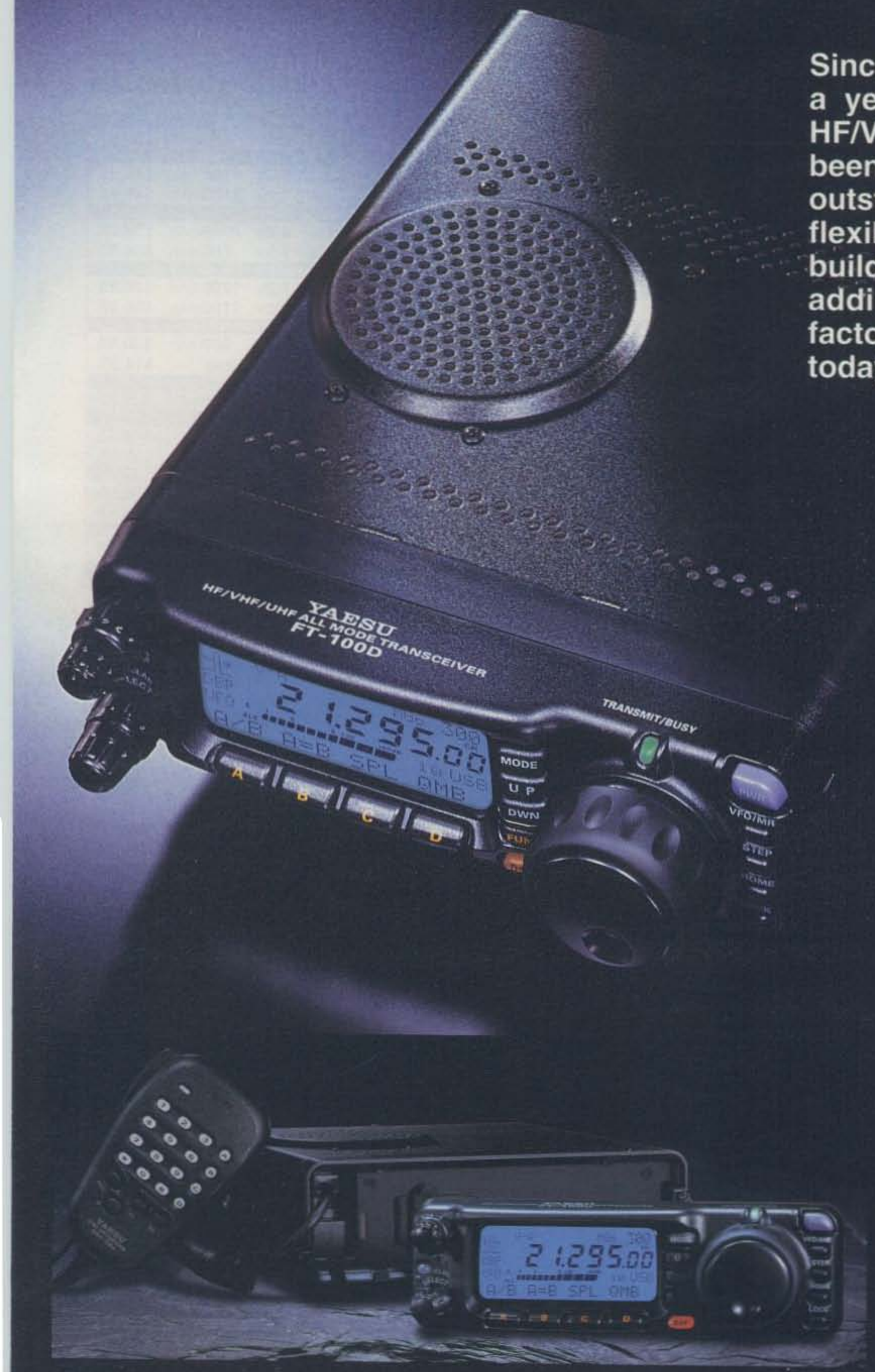

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