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Amateur Radio

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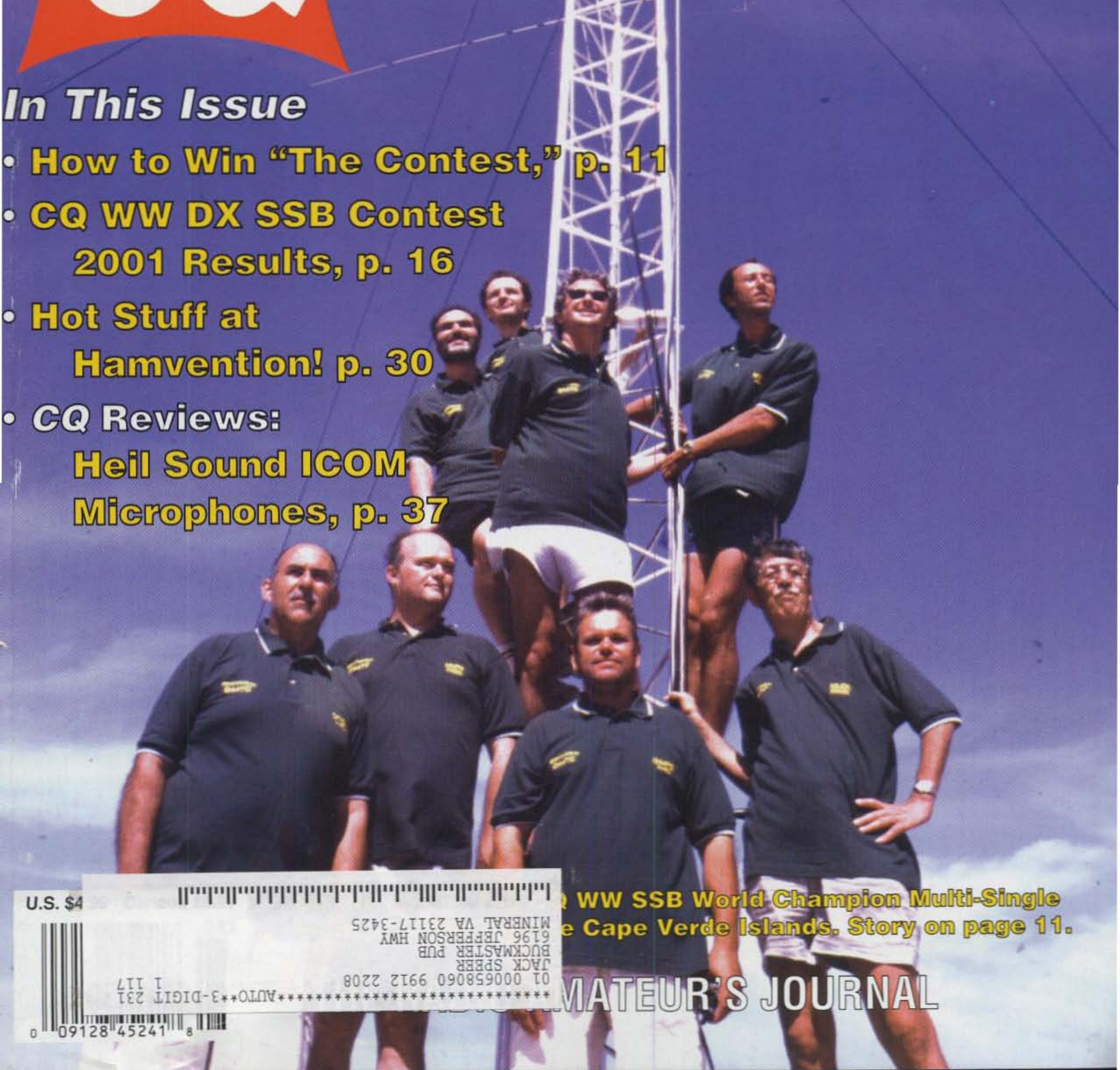
COMMUNICATIONS & TECHNOLOGY

AUGUST 2002

CQ

In This Issue



WW SSB World Champion Multi-Single
e Cape Verde Islands. Story on page 11.

MATEUR'S JOURNAL

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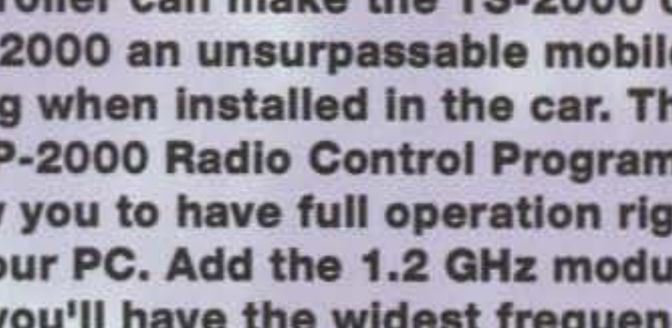

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Get *up-to-the-minute* worldwide DX band conditions in *minutes* on 14, 18, 21, 24, 28 MHz bands using the International Beacon Network of 18 worldwide beacons!

MFJ DX Beacon Monitor lets you instantly see on world map which beacon you're hearing on your transceiver . . . No need to copy 22 wpm CW . . . Positively identify beacons even if CW is weak, fluttery or distorted . . . Tells you where to point your antenna . . . Fascinates visitors . . .

MFJ-890
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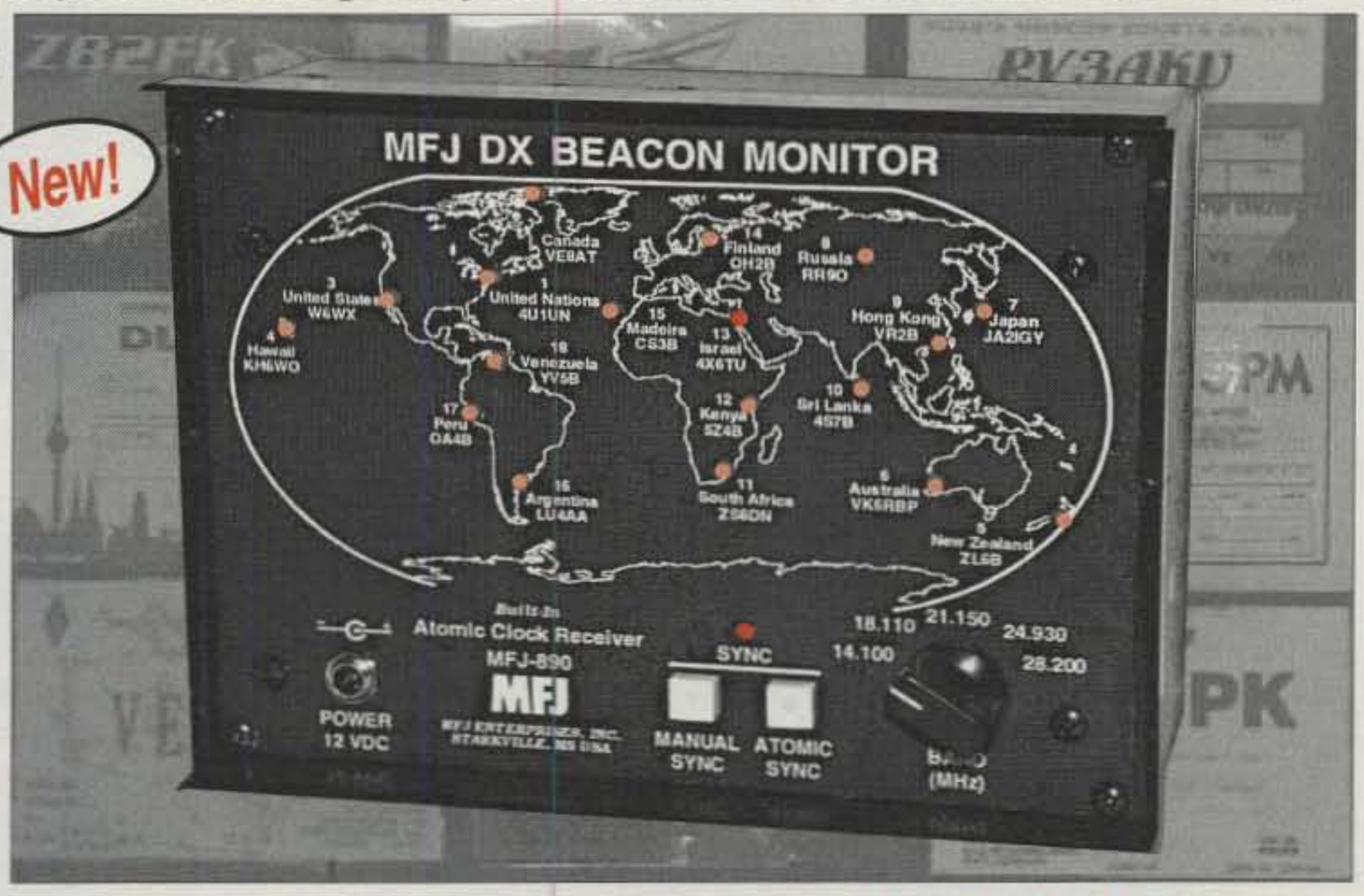
Get up-to-the-minute worldwide DX band conditions in minutes on 14, 18, 21, 24, 28 MHz bands using the International Beacon Network of 18 beacons throughout the world!



MFJ's new* DX Beacon Monitor *lets you instantly see which beacon you're hearing on your transceiver -- an LED lights up on its world map to show you the beacon location and where to point your antenna.

It's fascinating to hear and watch each beacon location light up as they become active across the world.

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For more information see Oct/Nov, 1994, Sept, 1997 *QST* and Jan 1999, Sept/Dec 2001, Jan 2002 Practical Wireless of U.K.

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Which band is best to reach a particular part of the world?

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MFJ DX Beacon Monitor lets you instantly see on world map which beacon you're hearing

You don't have to copy CW at 22 wpm to identify a beacon.

When you *hear* a beacon, an LED instantly lights up on a world map to show you its location. **You** can positively identify each beacon -- even if the signal is weak, and the CW is fluttery or distorted.

The world map display also tells you where to point your antenna.

How does the MFJ DX Beacon Monitor work?

The transmit sequence of the beacons are precision timed using GPS (Global Positioning Satellites).

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CQ Amateur Radio

AUGUST 2002 VOL. 58, NO. 8

FEATURES

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DEPARTMENTS

ON THE COVER: A group shot of the CQ WW SSB Multi-Single world-record-setting team at D44TC in the Cape Verde Islands. For their story and more photos, see "How to Win the Contest" on page 11. (Cover photo by Henryk Kotowski, SMØJHF/D44CF)

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Ham Radio News

From The CQ Newsroom

Comment Deadline Set on Proposed New Bands

July 29 is the deadline for filing comments on the FCC's proposal to create two new amateur bands and upgrade the amateur allocation from secondary to primary at 2.4 GHz (*for details, see this month's "Washington Readout" column on page 44 and "Ham Radio News" and "Zero Bias" in last month's issue*). Reply comments are due by August 15. The dates were set once the Notice of Proposed Rule Making (ET Docket 02-98) was published in the *Federal Register*.

The ARRL says a copy of the NPRM may be viewed on its website at <http://www.arrl.org/announce/regulatory/et02-98>. It also reminds amateurs that comments should be filed electronically through the FCC's Electronic Comment Filing System on the World Wide Web. Go to <http://www.fcc.gov/e-file/ecfs.html>, click on "Submit a Filing," and follow the instructions.

Flippo Convicted of Intentional QRM

A federal jury in Florida has convicted a longtime CB operator of transmitting without a license on the amateur bands and of intentionally interfering with a 2-meter repeater. William Flippo of Jupiter Farms, Florida, was convicted on eight misdemeanor counts – four each of operating without a license and causing deliberate and malicious interference, according to the *Palm Beach Post* newspaper and the ARRL.

The case has been long-running, marked by mysterious "devices" found in trees, an incident in which Flippo reportedly rammed his car into the car of a ham who was following him, and claims of illness during the trial that U.S. District Judge Daniel Hurley characterized as attempts to sabotage the trial. In fact, Hurley revoked Flippo's bail and ordered him held in jail as the trial proceeded, a highly unusual step in a misdemeanor trial. However, Hurley said he was concerned about "the ability to have the airwaves free so if there is an emergency they will be available."

After the convictions, Hurley ordered Flippo to remain in custody and undergo psychiatric testing while he considered the sentence and possible additional charges of perjury. Flippo faces a maximum penalty of one year in jail and a $10,000 fine on each of the eight counts on which he was convicted. Sentencing is expected in about a month, according to the ARRL.

Sponsor of CC&R Bill Speaks to Hams

"In America, we are fair and consistent," says Representative Steve Israel (D-NY), explaining to hams in his home district why he decided to introduce HR 4720, a bill that would include deed restrictions and homeowners' association rules under the limited federal pre-emption of amateur antenna rules that now applies only to state and local governments. According to the *ARRL Letter*, Israel, whose father is a ham, told the Great South Bay Amateur Radio Club "it's the right and fair thing to do." The FCC has consistently refused to expand its limited pre-emption policy to private land use regulations, but in its most recent ruling essentially asked hams to seek relief in Congress. HR 4720 is the result. Joining Israel in introducing the bill were Reps. Greg Walden (R-OR), who is WB7OCE, and Pete Sessions (R-TX). Two additional co-sponsors are Reps. J.D. Hayworth (R-AZ) and Patrick Tiberi (R-OH).

Meanwhile, the FCC may not be done with the issue. A Florida ham, Lee McVey, W6EM, filed a Petition for Review with the FCC in January, after its dismissal of the ARRL's multiple requests to expand limited pre-emption administratively. On May 6, the FCC listed McVey's petition in a public notice, giving 15 days for opponents to file comments against granting a review. This would suggest that the Commission might be considering taking another look at the matter. McVey told *Newsline* he filed the petition after the FCC extended its current pre-emption of certain antenna restrictions under private land use regulations to include wireless internet services that require an outside antenna. Stay tuned.

Hams Respond to Colorado Fires

More than 70 Colorado amateurs turned out to help with communication needs in June as officials there fought the largest wildfire ever in the state. Hams provided backup communications for several sheriff's offices, incident commanders, the Red Cross, and the Salvation Army. According to the *ARRL Letter*, the amateur support was scaled back only as federal officials assumed responsibility for fighting the fire.

WRC-03 Relocated to Geneva

Next year's World Radiocommunication Conference will be held in Geneva, Switzerland instead of Caracas, Venezuela, according to the ARRL. The Venezuelan government pulled out as host in early June, citing economic worries. ARRL Executive Vice President Dave Sumner, K1ZZ, who is part of the International Amateur Radio Union's delegation to the conference, said International Telecommunication Union staff members were able to make arrangements for space in Geneva on short notice. The conference dates remain at June 9 – July 4, 2003. Among items on the agenda are a possible realignment of 40-meter allocations and the likely elimination of the international requirement for Morse code proficiency as a prerequisite for HF operation by amateurs.

AMSAT, ARRL to Discuss QRM at 2.4 GHz

Leaders of AMSAT and the ARRL are planning to develop a joint strategy to address growing interference problems at 2400 MHz from unlicensed "Part 15" devices, including wireless computer networks and digital cordless phones.

According to the AMSAT News Service, two amateur satellites—UO-11 and AO-40—currently operate at 2400 MHz, also known as "S" band, and two new satellites currently on the drawing board are both expected to have S-band transmitters. There are other amateur uses of the band as well, including high-speed digital networks and "weak-signal" modes such as EME (Earth-Moon-Earth). AMSAT asks any ham who has experienced interference from unlicensed devices on the 2.4 GHz band to e-mail the details to AMSAT President Robin Haighton, VE3FRH, at <ve3frh@amsat.org>.

FCC Imposes Three-Year License Suspension

A Minnesota ham cited by the FCC for deliberately and repeatedly causing interference on a Duluth repeater has agreed to a three-year suspension of his amateur operator license, according to FCC amateur enforcement chief Riley Hollingsworth, K4ZDH. The agreement will keep the FCC from pursuing criminal prosecution against Michael Priest, KBØKMJ.

The Commission also issued short-term license renewals in two cases. Sam Jacobs, K3SAM, recently upgraded to Extra but was granted only a two-year license. According to a letter from Hollingsworth, this was due to "enforcement issues" relating to an application Jacobs filed in 2000 for a club license on which "there were discrepancies in your listing of officers." In a separate case, the FCC issued a two-year renewal to Peter Figueroa, N6IWH, because he continued operating after his original license had expired. In both cases, if there are no

problems during the two years, full ten-year renewals will be issued.

Ham "Freebanders" Snagged

Five Indiana amateurs have been cited by the FCC for so-called "freebanding," operating illegally just outside of the CB band. All five were sent warning letters informing them that transmitting without a license (for the frequencies in use) could result in seizure of their radio equipment and fines of up to $10,000. All were asked to call the FCC's Riley Hollingsworth "to discuss this matter."

"Build Your Own Satellite" Exhibit at Air & Space Museum

The National Air & Space Museum's "Space Day" celebration this year included a display from AMSAT entitled "Build Your Own Satellite! Learn how radio amateurs build and launch satellites for science and radio communications." According to the AMSAT News Service, the display included models of various amateur satellites (including an original engineering test model of Microsat), plus photos of students working on satellites and talking with astronauts in orbit.

French Picosats Receive OSCAR Numbers

Two tiny French satellites have been designated as OSCARs 47 and 48, according to AMSAT. The picosats, known as IDEFIX, remained fastened to their third-stage launcher during a planned short-duration mission and transmitted recorded voice messages and telemetry data. Originally known as CU-1 and CU-2, the two payloads were renamed BreizhSat OSCAR-47 and BreizhSat OSCAR-48. It has become traditional in the amateur satellite community to request an OSCAR number once a satellite has been launched and successfully begins operating on the amateur bands. OSCAR stands for Orbiting Satellite Carrying Amateur Radio.

FCC Says No to EMP Shielding

The FCC has dismissed a petition from Nick Leggett, N3NL, and Don Schellhardt to require that all electronic equipment subject to the Commission's jurisdiction be shielded against damage from an electromagnetic pulse (EMP), as might occur in a nuclear blast. The FCC did not say such protection was unnecessary, but rather that "government intervention" is not needed because the telecommunications industry appears to be in the process of developing voluntary standards for EMP protection without the FCC's help.

The FCC *is* looking for public comment on proposed rules for dealing with orbital debris, better known as space junk, which can cause serious damage when it reenters Earth's atmosphere. AMSAT-North America says it's planning to file comments after consulting with the ARRL and worldwide amateur satellite groups.

2003 ARDF Championship Set for Cincinnati

The 2003 national Amateur Radio Direction Finding Championships will be held next summer near Cincinnati, Ohio. According to the *ARRL Letter*, the on-foot hidden transmitter competition will be hosted by the OH-KY-IN Amateur Radio Society. ARRL ARDF Coordinator Joe Moell, KØOV, who also coordinates the annual *CQ* National Foxhunting Weekend, says participants from around the world are welcome. Winners of this event may go on to compete in IARU (International Amateur Radio Union) regional or world championships. For more information, see the 2003 USA ARDF Championships website at <http://w3.one.net/~bfrey> or KØOV's "Homing In" website at <http://www.homingin.com>.

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

Tent Stakes and Tupperware

One of the things I love about ham radio is how we share with each other, and how so many of us very quietly demonstrate what it is we're all about, sometimes without even trying. I recently went to a club meeting where I was supposed to talk about ways of reaching out to hams whose licenses were about to expire, or who were in their two-year grace period after expiration, and helping recharge their interest in amateur radio. As is so often the case, I got a lesson in exactly that subject from one of the members (whose name unfortunately escapes me).

In a very quiet and unassuming manner, this gentleman came into the room and started unloading a bag of stuff onto a table. I saw heavy-duty tent stakes, a Tupperware® container with holes drilled in the body and suction cups installed on the lid, and a few other doodads I didn't recognize. When I asked what it was all for, he explained that he'd been spending a little too much time recently down at the local hardware superstore. The tent stakes, he figured, might be good for holding a lightweight antenna in place during Field Day, and were just $1 each. The things I didn't recognize were also about a buck apiece and they were little plastic clamps for holding ropes and other lines in place as they turned a corner. Perfect corner supports for a temporary wire loop antenna, he said. As for the Tupperware container, he put it upside down on the table, held steady by the suction cups; pulled a mobile automatic antenna tuner out of his bag and placed it on the upside-down lid; then ran its cables through the holes in the main part of the container; sealed it all up; and, *voile*—a waterproof case for his antenna tuner that could be suction-cup mounted to the roof of his car. The suction cups, by the way, came from the same superstore and also sold for about one dollar each.

His goal in bringing it all to the meeting was to share with the other members some examples of how a little time and very little money invested at a hardware store could result in all sorts of things that hams could use for emergency and other temporary setups. He didn't make a point of making a presentation about it; he just had it there and anyone interested got a full and enthusiastic demonstration. Here, I thought, is the true spirit of ham radio—sharing knowledge and ideas, getting people thinking "outside the box" about how they might use everyday items as part of their stations and to improve their emergency preparedness.

Dayton '02

Emergency preparedness was this year's theme at the Dayton Hamvention®, the first time the show has had a specific theme. It went over very well. I didn't have enough space to discuss Dayton last month, as I devoted my whole column to the FCC's proposal for two new ham bands and the introduction of a bill in Congress to bring private land use agreements (such as restrictive covenants) under the umbrella of the FCC's limited federal preemption in matters involving amateur antennas.

Dayton's emergency preparedness theme got off to an early start at Kenwood's annual Thursday night reception. ARRL New York City/Long Island Section Emergency Coordinator Tom Carrubba, KA2D, was presented with one of two Kenwood "Top Gun" awards in recognition of the service provided by amateurs in New York City after last September's attacks on the World Trade Center.

Once the Hamvention itself got started, things were so busy that nearly the only opportunities I had to get away from the *CQ* booth were to attend the two forums on which I was a speaker—the "Ham Radio Town Meeting" and the ARRL Public Relations forum. The speakers were supposed to be experts on various topics relating emergency response and the things that we hams do, should do, and could do, in an emergency, and most were. As I sat there, though, I realized that the true experts in this field were in the audience – the hams who are out there training, organizing, and helping when called on. In fact, some of these people are real-live heroes in my book.

For example, a ham in the audience at one forum was Guy Richman, KC2AYG, one of the net controls in New York City on and after September 11. I had listened to Guy for days, working 12–15-hour shifts, keeping the net professional, keeping himself (somehow) alert and on top of everything, and keeping traffic flowing smoothly—this on the absolute busiest net I have ever heard in my 30+ years as a ham. Traffic was constant, round-the-clock, for days and days. Guy is one of the unsung heroes of 9/11, as are the many other operators who kept the nets running, kept the Red Cross station running, kept up the flow of volunteers (of special note, also at Dayton was Joe Tomasone, AB2M, who used his World Wide Web skills to create a website for registering and scheduling volunteers for duty in New York—from his home in Tampa, Florida), etc. There were others there, too, whose names I don't know, who have made similar contributions in disasters and emergencies all over the United States and all over the world. It is an honor to be a ham, and to be among these everyday heroes, regular guys named Guy, and Joe, and Tom, who go the extra mile when duty calls.

Lessons Learned

Also shared at Dayton were some of the lessons learned in the response to 9/11, and ways in which we can do better in the future. To me, there were two major lessons, one for individual hams and one for our emergency response organizations. First is training, training, training. Many hams who don't "do" public service found themselves volunteering to help in the aftermath of 9/11 as the need for volunteers grew from days into weeks. It was clear to anyone listening who had and hadn't had even basic training in net procedures, passing tactical traffic, etc. Particularly in today's uncertain times, no ham can ever be sure he won't be called on to help in an emergency, even if he's not a "public service ham." Each of us owes it to ourselves, to our fellow hams, and to our communities to at least become familiar with procedures in public service and emergency nets, to at least register with one of the emergency response agencies within amateur radio (such as ARES, RACES, and SATERN), and to receive at least a minimal amount of training and experience. The aftermath of a disaster is no time for on-the-job training.

The second lesson is for our own emergency response organizations and the agencies with which we work. ARES, the ARRL's Amateur Radio Emergency Service, is structured along ARRL section lines. RACES, the Radio Amateur Civil Emergency Service, is run on a state-by-state basis through each state's Office of Emergency Management. There is very little in the structure of these organizations to provide for wide-scale emergencies that require resources from multiple sections/states. It is needed. In New York, where hams from three states regularly work together on large-scale events such as the New York City Marathon, coordination between sections and states went smoothly. Apparently, this was not the case elsewhere. In addition, there were "turf battles" in the midst of the emergency between the Red Cross and the Salvation Army, relating to the use of amateur radio volunteers. This was inappropriate.

Our emergency response organizations need to develop plans for coordination among sections and states in wide-scale emergencies, from recruitment and scheduling of volunteers to such things as bringing public information coordinators from adjacent sections into an emergency area to help deal with the media and make sure that ham radio's story gets told. Wide-area drills are needed as well. In addition, our organizations need to work with served agencies to assure that ham radio volunteers don't get caught in turf battles in the midst of an emergency.

This 'n That

Apparently, I'm not the only one who's noticed that our biggest "numbers" problem today is not that of attracting new people to ham radio—that's been holding steady at about 18,000 per year for the past few years—but one of keeping the people we have. The number of people dropping out of ham radio when their licenses expire has been higher than that 18,000 figure recently and is only now slowly swinging around in the "right" direction. Our biggest challenge today is to keep the licensees we have interested and active. That's a job for which radio clubs are uniquely equipped to accomplish. But many hams and former hams have indicated that they started to lose interest after going to a club meeting and being ignored by everyone there. I've had the experience myself.

Alan Pickering, KJ9N, who writes a QCWA column for *WorldRadio* (yes, folks, I read 'em all), devoted his July column to a club that thought it was friendly but discovered it wasn't, and set out to do something about it. The club adopted a program called HUGS, standing for "Hello," "Unusual attention," "Goodbye," and "Smile." The point was not only to greet newcomers at club meetings, but to pay attention to them during the meeting —asking them to sit with you, talking with them, being sure to say goodbye when they leave—and doing it all with a smile. According to Tom, the club followed up with a series of meeting programs about making a good impression and dealing with people effectively. HUGS became a model for other community organizations, businesses, and even the local high school. "(W)ho would have thought," asked Tom, "that an Amateur Radio Club could have such influence upon its community?" HUGS is a great idea and one we heartily endorse. In fact, we'll even go so far as to suggest that you get your hands on a copy of the magazine and read Tom's complete column.

Along the same train of thought, I had the opportunity recently to spend some time at a rare event—the grand opening of new ham radio store. In this case, it was in my back yard—KJI Electronics, which has operated for more than two decades out of K2KJI's garage and basement, now has a "real" store in Caldwell, New Jersey. The place was packed when I went over, and lots of people were leaving with big boxes and big smiles—good for the ham radio industry and a good sign for the future of the hobby. Now you might be asking, if he's been in business for over 20 years, what's the big deal about moving out of his basement and into a store? Two things: (1) the presence of a full-time retail store helps increase ham radio's visibility in a society that largely doesn't know we exist; and (2) a store is not only a place to buy radios but also a gathering spot where people can learn from each other and pass on the excitement of amateur radio. I heard one experienced ham regaling a couple of new hams with stories of DXing accomplishments, others talking about different types of antennas, discussing various radios. Anyone who was paying any attention had to walk out of that store with a sense of excitement about our hobby. If you're lucky enough to have a real ham radio store near you, try to go there as often as you can, even if you don't have anything in particular on your shopping list. Talk with your fellow hams, learn from each other, find out about the latest equipment, become a salesman for ham radio. Besides, you might just remember that you need some new connectors, or some coax, and, ooh, isn't that new radio nice?

73, Rich, W2VU

Announcements

Maryland-DC QSO Party – This year's QSO Party will take place 1600Z August 10 to 0400 August 11 and from 1600–2359 August 11. Certificates will be awarded to all stations with 50 or more QSO points in their entry. Suggested frequencies: 3.643, 3.92, 7.07, 7.23, 14.055, 14.268, 21.115, 21.37, 28.055, 28.28, 50.15, 52.525, 146.55, 146.58, 446.00 MHz; try CW on the odd half hours. Exchange: QTH (county for MD-DC stations; state, country, or Canadian province all others) and major category (Club, QRP, Mobile, Technician, Standard). For details contact the Antietam Radio Assn., P.O. Box 52, Hagerstown, MD 21741-0052, or see <www.w3cwc.org>.

The following Special Events are scheduled for August:

W3SSA, from 67th anniversary of the Social Security Act, Baltimore, Maryland; Social Security Employees' ARC; 1300–2100Z August 10 on 7.257, 14.275, 21.275, 28.475 MHz. For certificate send QSL and SASE to Greg Stec, K3ANG, 1624 Pickett Road, Lutherville, MD 21093, or for e-certificate e-mail <ac3p@arrl.net>.

W4B, from 40th anniversary of Bristol Motor Speedway, Bristol, Tennessee; Bristol TN/VA ARC; 0001Z August 19 to 2359Z August 25 on 3.860, 7.275, 14.240, 21.375 (±15 kHz). For 8^1/2 × 11 certificate QSL with SASE to William Price, W4CZ, 239 Barger Hollow Road, Blountville, TN 37617.

N7L, from International Lighthouse/Lightship Weekend, Yaquina Bay Lighthouse, Newport, Oregon. For details see the Amateur Radio Lighthouse Society website: <http://www.arlhs.com/>. QSL to Vince Van Der Hyde, K7VV, Box 12941, Salem, OR 97309 (e-mail: <k7vv@navicom.com>).

K8DMA, from Computerfest®, Dayton Ohio; Dayton Microcomputer Association; 1500– 2100Z August 24 and 1500–1800Z August 25. For frequencies see <www.computerfest.com/k8dma.shtml>. For QSL send QSL and SASE to Computerfest – K8DMA, P.O. Box 2336, Dayton, OH 45401-2336.

K8FBN, from Sweet Corn Festival, Fairborn, Ohio; Upper Valley ARC; 1500Z August 17 to 2100Z August 18 on 3.860, 7.260, 14.260, 21.360 MHz. For certificate QSL to Upper valley ARC, P.O. Box 2000, Fairborn, OH 45324.

W8AL, from Pro Football Hall of Fame Festival, Canton, Ohio; Canton ARC; 1400Z August 2 to 2400Z August 4 on 7.265, 14.265, 21.365, 28.365. For certificate send 9 × 12 SASE to Donald Perry, WQ8J, 965 Culverne Ave. NW, Massillon, OH 44647.

W9TCH, from Dodge County Antique Power Show, Burnett, Wisconsin; Rock River Radio Club; 1600–2100Z August 3 & 4 on 14.275 and 28.400 ±. For certificate send QSL, $.60 postage, and $1.00 donation to Rock River Radio Club, P.O. Box 26, Juneau, WI 53039.

KØARF, from International Lighthouse/ Lightship Weekend, Split Rock Lighthouse, 40 miles NW of Duluth, Minnesota (grid square EN47); 1400–2400Z August 17, two HF stations and one VHF/ Satellite, modes to vary (CW, SSB, Digital). For suggested frequencies see <http://www.waterw.com/~weidner/arlhs/index.html>. For certificate send SASE to KØARF, 3001 Eighth St. N., Saint Cloud, MN 56303.

The following hamfests, etc., are slated for August:

Aug. 2–4, **Pacific Northwest DX Convention**, Monarch Hotel, Milwaukie, Oregon. Contact Al Rovner, K7AR, e-mail: <k7ar@arrl.net> or call 360-256-7437; <http://www.wvdxc.org/convention.htm>.

Aug. 3, **Iron Range ARC Hamfest/Swapfest**, Alpha (Upper-Peninsula), Michigan. Contact Pete Oss, WD9DZU, 906-875-3803, or Dan Watters, AA9JG, 906-265-4240. (Exams by request)

Aug. 3, **Lewistown, PA Hamfest**, Decatur Township Fire Co. grounds, Lewistown, Pennsylvania. For more info call 717-242-1882. (Talk-in 146.91)

Aug. 3–4, **2002 ARRL Kentucky State Convention**, National Guard Armory, Lexington, Kentucky. Contact John Barnes, KS4GL, 216 Hillsboro Ave., Lexington, KY 40511-2105 (SASE) or e-mail: <jrbarnes@iglou.com>; phone 859-253-1178. (Talk-in 146.760–; exams contact Bob Cooper, AF4OI, by July 25, e-mail: <AF4OI@cs.com>, 859-272-6460)

Aug. 10, **Lower Columbia ARA Ham Radio, Computer, & Electronics Swapmeet**, Cowlitz Co. Expo Center Fairgrounds, Longview, Washington. Contact Bob Morehouse, KB7ADO, 360-425-6076 (eves.), or write to LCARA Swap Meet, P.O. Box 906, Longview, WA 98632 (e-mail: <kb7ado@aol.com>; <www.qsl.net/nc7p/>). (Talk-in 147.26+, PL 114.8)

Aug. 11, **Northern Berkshire ARC Hamfest**, Adams Fairgrounds, Adams, Massachusetts. Contact Alan, K1SAV, 413-743-1619; <www.nobarc.org/hamfest>. (Talk-in 146.91–)

Aug. 11, **St. Cloud ARC Hamfest**, Del-Win Ballroom, Hwy 75 and 88th Ave. near St. Joseph, Minnesota. See <www.w0sv.org>. (Talk-in 147.015; exams 1 PM)

Aug. 11, **Greentown Hamfest**, Greentown Lions Club Fairgrounds, Greentown, Indiana. Contact L. B. Nickerson, K9NQW, 765-668-4814, e-mail: <k9nqw@arrl.net>, <www.grantarc.com/greentown.html>. (Talk-in 147.24 and 146.79; exams)

Aug. 11, **Shrewsbury Hamfest**, Firehouse, Shrewsbury, Pennsylvania. Info e-mail: <w3pn@yahoo.com>. (Talk-in 146.70 [PL 123], 146.52)

Aug. 11, **Carroll County Tailgate Fest**, Carroll County Ag Center, Westminster, Maryland. Contact Steve Beckman, N3SB, e-mail: <n3sb@qis.net>; <http://www.qis.net/~k3pzn/tailgate.htm>. (Talk-in 145.410)

Aug. 17, **Ramapo Mountain ARC Ham Radio & Computer Fleamarket**, American Legion Hall, Oakland, New Jersey. Contact Steve Oliphant, N2KBD, 973-962-4584; club e-mail: <rmarc@qsl.net>; <www.qsl.net/rmarc>. (Talk-in 147.49 in/146.49 out, 146.52)

Aug. 17, **Hellgate ARC Hamfest**, Greenough Park, Missoula, Montana. Info e-mail: <n7msu@arrl.net>. (Talk-in 147.04, 146.52)

Aug. 17–18, **Huntsville Hamfest**, Von Braun Center, Huntsville, Alabama. Info call 256-880-8004; <www.hamfest.org>. (Talk-in 146.94 K4BFT; exams both days at 10 AM)

Aug. 18, **Warren ARA Hamfest**, Kent State University Work Force Building, Warren, Ohio. Contact Renee McCaman, KB8SVF, 330-847-8478, e-mail: <mccaman@cboss.com>. (Talk-in 146.970–; exams registration 9:30, exam 10 AM, contact Denis Carraher, N8IVE, 330-924-4342, e-mail: <automan@onecom.com>)

Aug. 18, **2002 ARRL Kansas State Convention**, Salina Bicentennial Center, Heritage Hall, Bicentennial Center, Oakdale Park, Kansas. Contact Ron Tremblay, WAØPSF, 785-827-8149, e-mail: <rtremblay@kscable.com>. (Talk-in 147.030+, 443.900+; exams 0900, walk-ins okay)

Aug. 23–24, **Duke City, NM Hamfest**, University of New Mexico Continuing Education & Conference Center, Albuquerque, New Mexico. Contact Richie Allen, KC5NZR, 1624 Columbia Drive SE, Albuquerque, NM 87106 (505-242-0208; e-mail: <kc5nzr@arrl.net>); <www.qsl.net/dchf>. (Talk-in 145.33– [100 hz], 444.00+ [100 Hz]; exams)

Aug. 24, **LPARC Summer Hamfest**, LaPorte County Fairgrounds, State Road 2, west of LaPorte, Indiana. Contact Neil Straub, WZ9N, P.O. Box 30, LaPorte, IN 46352 (219-324-7525); tables <tables@k9jsi.org>; <www.k9jsi.org>. (Talk-in 146.52, 146.61–, PL 131.8)

Aug. 25, **Lapeer County ARA Hamfest & Computer Show**, Lapeer County Center Building, Lapeer, Michigan. Contact Ken, phone 810-245-3907, fax 810-245-0366, e-mail: <w8lap@arrl.net>; <www.w8lap.com>.

Aug. 25, **Vermilion County ARC Hamfest**, Vermilion County ARC clubhouse, Danville, Illinois. Contact Terry Powell, KB9REE, VCARA, P.O. Box 80, Catlin, IL 61817-1007 (217-446-1379; e-mail: <kb9ree@yahoo.com>).

Aug. 31, **Uniontown ARC Gabfest,** club grounds, Old Pittsburgh Rd., Uniontown, Pennsylvania. Contact Carl, WA3HQK, or Joyce, KA3CUT, 304-594-3779. (Talk-in 147.045+)

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Our Readers Say

About Antenna Restrictions...

Editor, *CQ*:

Great article (March Zero Bias). The FCC will not try to do anything about the restrictions and tell the hams to operate MOBILE AWAY from HOME. Great. Since your home ends at the property line all an amateur has to do is put the rig in the car and just drive a few feet beyond their property line. This would meet the FCC edict to operate away from home. Or if the amateur did not or was not able to have a mobile rig setup, then they may ask a friend to bring their vehicle to the area and both could operate from the area. When may we have a "CC&R Special Event" scheduled? Just think of the possibilities. Contact as many MOBILE stations during this great "CC&R Special Event." Certificates and all....

I am fortunate to live out in the country but if I was affected by the CC&Rs I would seriously consider operating this way. It would be a good way to get some practice in operating as in a emergency situation when most normal communications are down.

Cecil Crider, WE8D
Calumet, MI

Editor, *CQ*:

I can't buy a home hardly anywhere now without these communal (Communist) planning CC&Rs and HOAs. I have neighbors who belong to the HOA board and it's all politics... They can pretty well do what they want, and if they don't like you or try to understand your situation, you're pretty well without much legal rights unless you can afford a lawyer, which I can't these days.

I don't want to ride in my car looking suspicious to the law trying to make DX QSOs in zero-degree WX at three in the morning or trying to work a big 24 hour contest on a tank of gas. And I'd sure like to earn my own personal call letter QSOs, not some club.

I had to get votes like a politician to put up my antenna and it was very humiliating. I met very rude people and nice people. I had to go door to door to get permission or they were going to get a court order or take my house. Is this what the FCC wants to create? If it were not for us hams, historically speaking, there would be no FCC jobs. No public radio, TV, etc.... So why are they turning there backs on us in denial?

Steve, K9HY

Editor, *CQ*:

Hats off to the FCC! Their recent decision not to expand the reach of PRB-1 into HOAs, ACCs, and CC&Rs, is a welcome decision in my neighborhood! I would no sooner welcome those 100 foot towers, depicted on your March 2002 cover, as a "neighbor" than I would want that 10-ton thumb coming down on my house. Anyone who moves into one of these socialized communities does so for a reason; it's controlled! For many, the "control" begins at the front gate and continues through the community's paint scheme, lighting and in some, the color of your curtains! Desperados like us, with our wires, beams, and towers, just aren't welcome. We have to remember that this is our hobby, not the neighbors'. There are no specific rights levied here beyond the one to become an amateur.

Complaining that these restrictions aren't voluntary is tantamount to moving next to an airport and complaining about the noise. Buyer beware: If you don't like the rules, don't buy the house.

Chris Brady, N3CB

Editor, *CQ*:

I was disgusted with the dramatic picture on the cover of the March issue of *CQ* magazine. There I saw a dramatization of a huge hand knocking down an amateur radio antenna with the headline "FCC KO's Expansion of PRB-1."

While I understand the frustration of many who live under condominium antenna restrictions, I am optimistic about the future of amateur radio. I see the situation not as a setback but as an opportunity.

Like many other hams, I have lived under such restrictions. This forced me to use my ham radio ingenuity. We have all had limitations over the years. My first limitation was the lack of finances! I built a little 50 watt CW rig, collected enough bamboo to build a cubical quad, and had a ball working DX on 15 meters. Many hams self-impose the limitation of power and work the world with QRP.

I was inspired by the famous DXer KH6JEB, who lived under such antenna restrictions, and with very fine wires that could not be publicly seen, worked more DX than many who had large towers and beams! Inside my attic, I installed wire antennas of my own and had a ball working DX—even though I had similar public restrictions.

These restrictions lead me to use OSCAR. With a small UHF antenna, I worked plenty of DX on OSCAR 13 and continue to do so on OSCAR 40. My OSCAR "DX array" was no larger than my barbecue grill and could not be seen by my neighbors. Had it not been for these restrictions, I never would have bothered with amateur satellite work and would have missed out on all the satellite fun!

It would be nice if we all had the resources (money, land, and public approval) to put up big towers and beams. At the same time, we also should be able to respond to emergencies, putting up whatever kind of antennas that work and communicate!

The glass is not half empty, it is half full. Quit complaining, use the ingenuity that has made hams famous, and enjoy this great hobby of ours!

Marv Feldman, VK6WW/KH6DL
Perth, Western Australia

Editor, *CQ*:

I was reading your editorial in *CQ* this month (April) and must commend you for your actions. I find it very refreshing that an outstanding publication such as yours is working and commending the ARRL for their work on the removal of antenna restrictions with respect to CC&R's.

I live in Salem, Oregon. This is the state capital and the city is NOT friendly to antennas. One of the ways that I have worked around this is to put up a 440 repeater which has a controller tied to it which ties to an ICOM 706. One of the local hams has a Hy-Gain Hy Tower in his yard that was not being used regularly. We were able to put the remote at his place and now enjoy 6 meter to 80 meter coverage from 2 meter handhelds via a 440 linking system to the 440 repeater.

The other way to "operate as an outlaw within the system" is to (as I have done) put up some number 22 stranded and insulated brown-colored wire up in the form of a closed- loop antenna. This runs over the cap of the house, down the fence line, and across the plants in the back of the yard. The beauty of this is if you get 10 feet away from the wire, you cannot see it.

Just thought you would want to see how one guy decided to fight the system and share HF accessibility with some of his fellow hams and neighbors. Thanks for listening.

Dick Melcher, WA6MDI
Salem, OR
wa6mdi@aol.com

Mobile HF Logging Idea

Editor, *CQ*:

Reference Radi Kar's "Proposal for Manufacturers" (February letters), his idea for manufacturers to add features sounds good, but until such additions are installed, may I offer the following?

I often work mobile HF. To log those calls, I carry a small, battery-powered recorder. When I get back to the home QTH, I simply replay the tape, copying the info into the logging program I have installed in my desktop computer. I find that to be a simple substitute for the very dangerous (in my opinion) process of trying to write notes while driving.

Larry G. (Bud) Goreham, WØNEB
Hays, KS

Beyond Hamdom

Editor, *CQ*:

I enjoyed your February '02 "Zero Bias" regarding "play," . . . something I will pass along to my prospective son-in law to pique his interest as he studies for his license... I would like you to add my name to those responding to your request for interest in the possibility of including a column in *CQ* magazine featuring new technologies beyond the boundaries of hamdom. I am definitely in favor of such an addition... thanks and good luck with your writing...

Larry Miller, K7SQT

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Aerial view of Ilha do Sal and the village of Santa Maria, site of the D44TC operation in the 2001 CQ WW DX SSB Contest. (All photos by the author)

Alberto, IV3TAN (in the center), speaks Italian to Xara, CT1EKF. Xara speaks only Portuguese, so Santos, CT1DVV (in the red shirt), translates from Portuguese to English when needed.

Here's the definitive guide to how to break a world record, have fun, and get a lot of suntan . . . in other words, the D44TC Multi-Single entry in the 2001 CQ WW DX SSB Contest.

How To Win "The Contest"

BY HENRYK KOTOWSKI,* SMØJHF/D44CF

I myself got most of the suntan, I would say. I was sunburned the very first day on the Island of Sal (Ilha do Sal) in the Cape Verde archipelago, a group of islands in the Atlantic Ocean off the coast of Africa. Everybody else was cool. "Everybody else" included six Italian and two Portuguese amateur radio operators of the D44TC Multi-Single team in the 2001 CQ World-Wide DX SSB Contest.

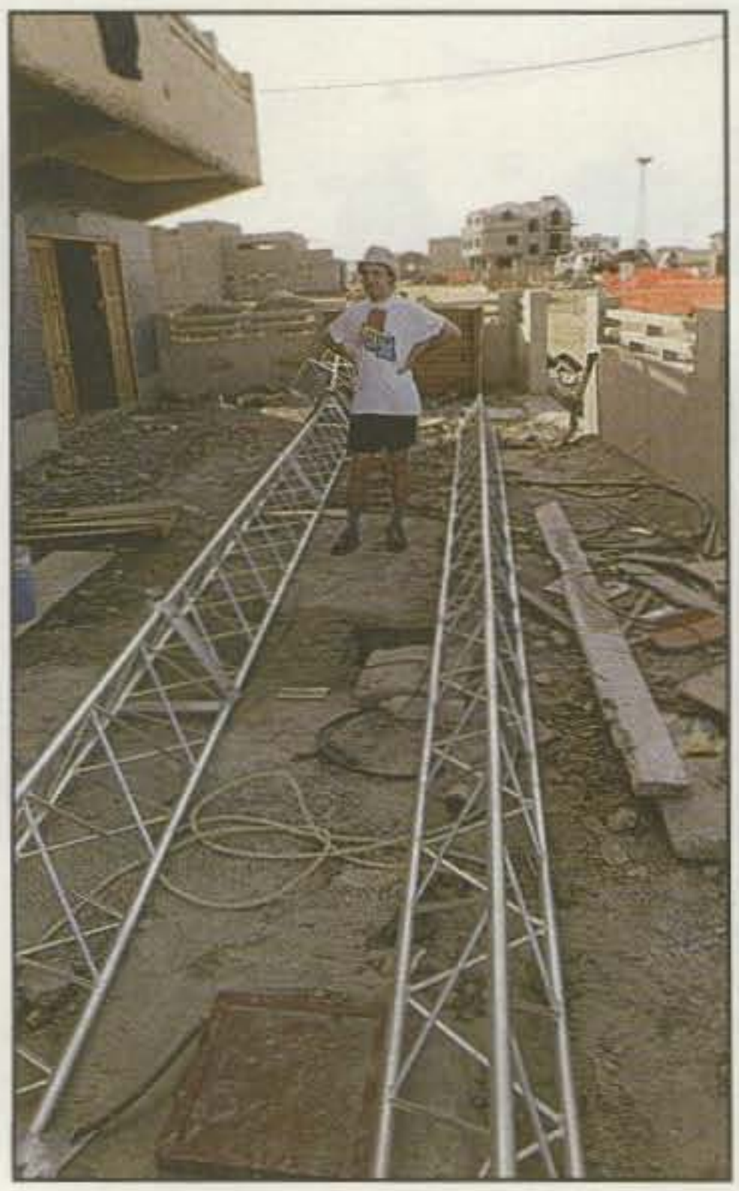
I arrived on Ilha do Sal, the site of D44TC contest operation, on Wednesday, October 24, 2001, exactly 70 hours before the contest was to commence. I was met at the airport in the middle of the night by Alberto, IV3TAN; Fabio, I4UFH; and Xara, CT1EKF. Matteo, IK2SGC, the eighth member of the group, was also on my plane, so I am not so sure that they actually drove to the airport specifically to meet me. I was just plain lucky, I guess!

We all went to Xara's house, which is in Santa Maria, a small town on the south coast of the island. I was exhausted and tried to sleep, but I gave up when the sun was high and the noise was too much. The house was still a construction site. A couple of Portuguese guys were arguing with the Italian majority, and there were mosquitoes inside the house on this desert-like island. I thought, "What the heck am I doing here? Is this a bad dream?" My inner voice told me, "You'll witness something great here."

The towers and antennas had been cleared through the customs office only the evening of the day before our arrival. I was full of doubts, as there was not much time left, and my experience from the club in Stockholm to which I used to belong told me that it would take weeks to complete the planned antenna system. I was very wrong. The first tower was up in a matter of minutes, the large Force 12 arrays were swiftly being erected, and the second tower was hoisted onto the roof. Everybody was busy. There were no pointless discussions, no waiting for "someone else" to do what had to be done. I was becoming more and more upbeat. "They're gonna really make it!" I thought (with a little help from me).

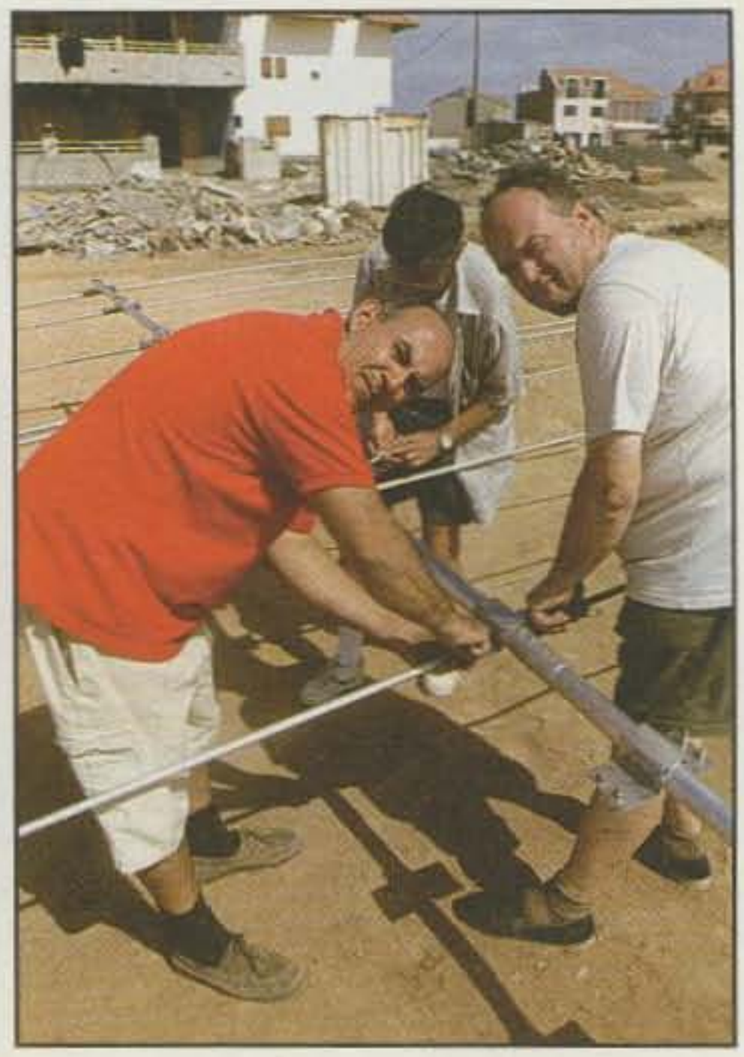
To win a major contest you have to make a choice between two basic strategies—the difficult one and the easy one. The difficult way is to rely on your luck, hope for excellent propagation just for you, pray for other competitors not to participate or to get sick, believe that your being in perfect shape both physically and mentally is obvious, ignore the need for elaborate antennas because simple and small antennas will work well enough, expect all the multipliers to call you, and so on. Since very few win using this strategy, then the way to go must be by using the difficult approach.

**Sibeliusg. 28 XI, SE-16477 Kista, Sweden*
e-mail: <henryk.kotowski@chello.se>



"Is this a 60 ft. tower?" asks Gabriele, IK4UPB. "Yes, it is. Just give us a minute."

Alberto, IV3TAN, glued to the antenna tower. Alberto should be in every picture, as he was everywhere all at once. At times I thought he had a twin brother; he was glued to the tops of the antenna masts but he also was on the ground, on the roof, coordinating antenna assembly, giving instructions, doing a lot of hard work, never taking a rest. He is a bundle of energy, initiative, speed, knowledge, and experience.



The first Force 12 array, the C19XR, grows in the hands of Santos, CT1DVV (left), Fabio, I4UFH (right), and Franco, I4LCK.

Alberto, IV3TAN (left), and Xara, CT1EKF (right), cranking up the 60 ft. tower.

The second tower is pulled up onto the roof by → Alberto, IV3TAN (right), and Gabriele, IK4UPB.

Gabriele is still on the roof while Alberto's twin brother (?) is on tower number one. ↓

The easy way is to have determination, a sensible approach, and lengthy experience in amateur radio and contesting; learn to solve all the potential problems; spend months on preparations and weeks on hard work; invest substantial amounts of money in good-quality hardware; gather together a group of people with profound interest and learn how to cooperate; have a lot of energy and stamina; and finally, be an excellent and enduring operator for 48 hours. This way must be easy, because it gives good results and the D44TC group chose it for last year's CQ WW DX SSB Contest. They broke the world record, and of course won the contest.

The D44TC Team

Obviously, our excellent contest score was a direct result of the input of all the team members. However, it would not have been possible without the thousands of other participants who worked D44TC and who constantly improve their operating techniques, equipment, and on-the-air awareness. Here I wish to pass a sincere "thank you" from all of us to

Gabriele, IK4UPB, assisted by Fabio, I4UFH, and Santos, CT1DVV, puts the final touches on Force 12 antenna number two before it is . . .

. . . heaved to its permanent position. Who's climbing the tower? You bet . . .

Friday and things look good! The antennas are up and ready for the contest. Now it's time to work on the radios!

A few more coax connectors, a few more cables, and . . . soon everything will be ready! Here Fabio, I4UFH, is soldering connectors on the edge of the multiplier station bench.

The battle is on! The run station has two operators listening on the same frequency. Four ears prove to be better than two. Operators are relieved every two hours (sometimes by force!).

everyone who pitched in by calling D44TC. The key to success, however, was the people who put it all together, the team.

The core of the team was basically the trio of Alberto, IV3TAN, Fabio I4UFH, and Gabriele, IK4UPB. They have known each other for years and have done many individual and group contest efforts of different types. For instance, the increased activity from Lampedusa Island (Italian Africa) in recent years is an example of their handiwork.

Team D44TC

Here are some brief biographical sketches of the team:

Alberto, IV3TAN: Born 4 November 1968 (sunspot maximum), brought up in Trieste, a city of international flavor. At the age of 12 he got a walkie-talkie from his father; when he was 14 he had a good CB station. Licensed in 1987 and soon active in the Trieste Radio Club, he contracted the contesting bug at I3MAU in Padova and later joined the teams of IR4T, 4U1ITU, and IG9A. Alberto holds a couple of World Records and African Records in the CQ WW SSB.

Fabio, I4UFH: 41 years old, lives in Bologna. Licensed in 1979 after a long period of CB activity that had started at the age of 11, he started contesting from home in 1980 and later joined contest groups. He is an expert on computers and is responsible for networking and software for this group.

Gabriele, IK4UPB: Youngest member of the team, 30 years old. He started with CB at the age of 13, lives near Modena, and is one of the regular operators at IR4T. His profession is an engineer of telecommunications, and his responsibility in the team is switching, automation, and power splitters. Actually, he likes CW more than SSB, and his real hobby is church-bell ringing . . .

Franco, I4LCK: The oldest member of the team at 60 years old, he is still going strong. Franco lives in Bologna and is a member of the Bologna DX Gang. He was licensed in 1960, but operated earlier on as a pirate on VHF! Nowadays he likes to travel and activate islands of Africa and the Pacific.

Santos, CT1DVV: He is 50 years old, lives in Coimbra, Portugal, and is better known as CT8T in contests. Santos spent over 20 years in Angola, Africa, and later, in 1987, he started with amateur radio. He joined the CT3M team for a contest in Madeira and became infected with the contesting bug. His son Tony, CT1ESV, shares his father's hobby and they help each other. The CT8T call is often used by foreign visitors, and last year Fabio, I4UFH, came for the 10 Meter Contest. That's how Santos put the Italians in touch with Xara, CT1EKF, who then started building a house in Cape Verde.

Xara, CT1EKF: Xara is in his 40s, and I am sorry to say that I know very little about him. My Portuguese is nonexistent, my French was good enough only to say a few words, and Xara speaks no other languages.

Matteo, IK2SGC: I met Matteo in the transit hall of the Lisbon airport. He had hinted that I might be on his flight, and he was right—or had he seen a picture of me on one of those <www.qrz.com> pages? Matteo is 34 and lives in downtown Milan, so his own radio activity is confined to his parents' house. Licensed in 1991, he soon joined the IU2M team, and later also IR4T and IG9A. He works "in computers" but has no duties on the team. This time he was a guest. Matteo likes to travel and often gets on the air from exotic places.

Vittorio, I4YSS: Forty-five and the most silent member of the team, he is the IR4T license holder but at home has a 100 ft. tower with stacked 10-element 6 meter Yagis. His real hobby is making aceto balsamico. He lives near Modena, and his profession is a headhunter. He has been licensed since 1979.

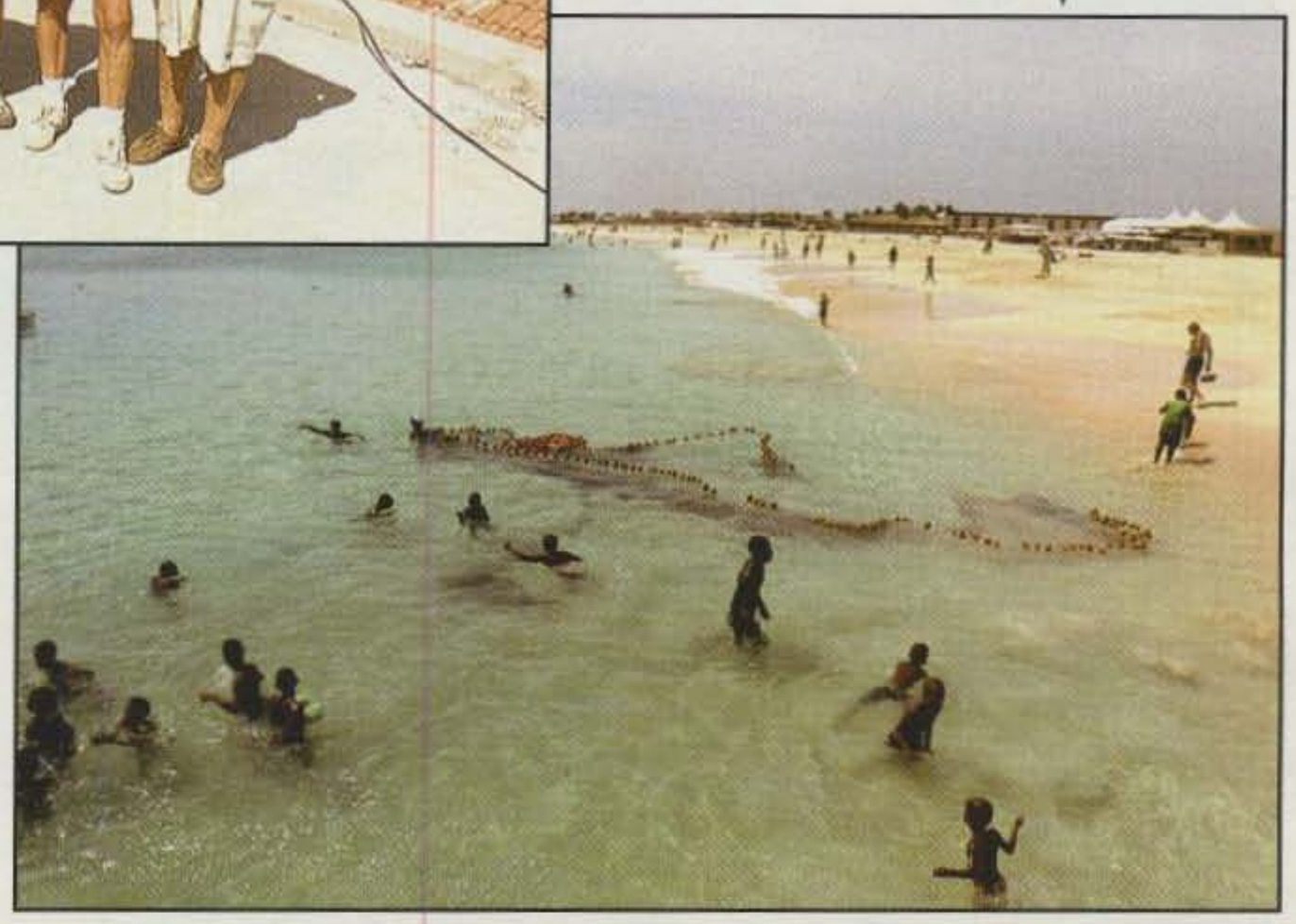
A local TV news crew arrives to shoot footage of this event. Fabio, I4UFH, shows no sign of being camera-shy. Matteo, IK2SGC, on the left, acts as the support operator at the run station.

↑ *Multiplier chasers Santos, CT1DVV, and Franco, I4LCK, at the multiplier station.*

Monday morning at 00:01 UTC after the contest everyone is still standing! From left: Franco, I4LCK; Matteo, IK2SGC; Gabriele, IK4UPB; Fabio, I4UFH; Alberto (his Canadian cousin?), IV3TAN; Vittorio, I4YSS; Xara, ← *CT1EKF; and Santos, CT1DVV.*

Before everyone goes home, it's time for the final pictures . . .

. . . and a swim in the warm waters of the Atlantic Ocean at Santa Maria beach.



How did the members of this group combine their skills to build and operate a championship station on a desert-like tropical island? Well, I'll tell you. I'm primarily a photographer, and they say a picture is worth a thousand words, so I'm going to let the photos and their captions tell you the rest of the story! In the meantime, we hope you had a chance to work D44TC in last year's contest and that you'll have fun and sharpen your skills in this year's CQ WW.

(Is anyone wondering how I took the aerial view of Santa Maria village if I arrived there in the middle of the night? Well, the picture was taken two months later on a different flight that crossed Cape Verde.)

Larry, N7DF, tuning the band with a friend.

The mountaintop QTH of UA9ZZ.

Results of the 2001 CQ WW DX SSB Contest

BY BOB COX,* K3EST

Expanded CQ WW Contest Results on the Web

We've moved a few elements of our contest reporting onto the CQ website this year, including **Station Operators** of Multi-Op stations, **Team Contesting**, **Top Scores in Very Active Zones**, and **Zone Leaders/Single Op**. In addition, we have expanded **QRM** on the web.

To view these additional and expanded elements of this year's CQ WW results, go to <http://www.cq-amateur-radio.com/cqwwhome.html>, then click on "Expanded results, 2001 CQ WW SSB" and select the category you want to see. You may also get there by going to our home page at <http://www.cq-amateur-radio.com>, clicking on "Contest Rules & Info," then clicking on "CQ World Wide DX Contest" and selecting "Expanded results, 2001 CQ WW SSB."

With solar conditions in question, contesters of all ages from all over the world turned on their radios for the CQ WW DX SSB Contest 2001. What did they find? The best 24 hours most had ever experienced, followed by 24 hours of mediocre conditions. Conditions were something beyond expectations. In 2000, 15 meters was the main band; this year it was all the top bands. Ten meters was again wall-to-wall contesters from below 28.3 to above 29.3 MHz—a full megahertz of guys and gals having the time of their lives. With the solar flux hovering between 180 and 170, it looked as if records would fall across the board. Alas, though, the second half of the CQ WW was a real challenge.

After months of planning, building, and practicing, thousands of contesters took full advantage of the smiling ionosphere. The number of logs received was 3970, just a little down from the previous year. Reported on these pages (plus added information on the CQ website) are the final results of the world's largest radio event. Read on to see how you and your friends ended up. Everyone who joined in the CQ WW last year was a winner just by participating.

*c/o CQ magazine
e-mail: <k3est@cqww.com>

High Power

It was a long time coming. A North American station *really did* win the CQ WW, Single Operator, All Band World. Tom, W2SC, traveled down to 8P to activate 8P5A. After he finished, his score stood on top of the world! What a great job with over 8600 Q's and 14+ million points. It is not an easy task to win from a 2-point area. Tom showed that it can be done. Place a great operator in an ideal QTH with great conditions and anything is possible. Finishing in second place was Pekka, OH1RY, who talked EA8AH to a personal best. Third place in the world went to Hrane, YT1AD, operating at 3V8BB. All three operators exemplify the ideal contester, displaying motivation, complete alertness, and detailed planning.

Jose, CU2CE, ended up in a lot of logs with this nice QTH.

Figuring to get into the fray, Martti, OH2BH, traveled down to CT7B. Choosing the tip of the Iberian peninsula from which to operate is not a bad idea. CT7B finished first in Europe and sixth in the world. The battle for second place was very close. At the other end of southern Europe was DL6FBL, who activated SV9CVY

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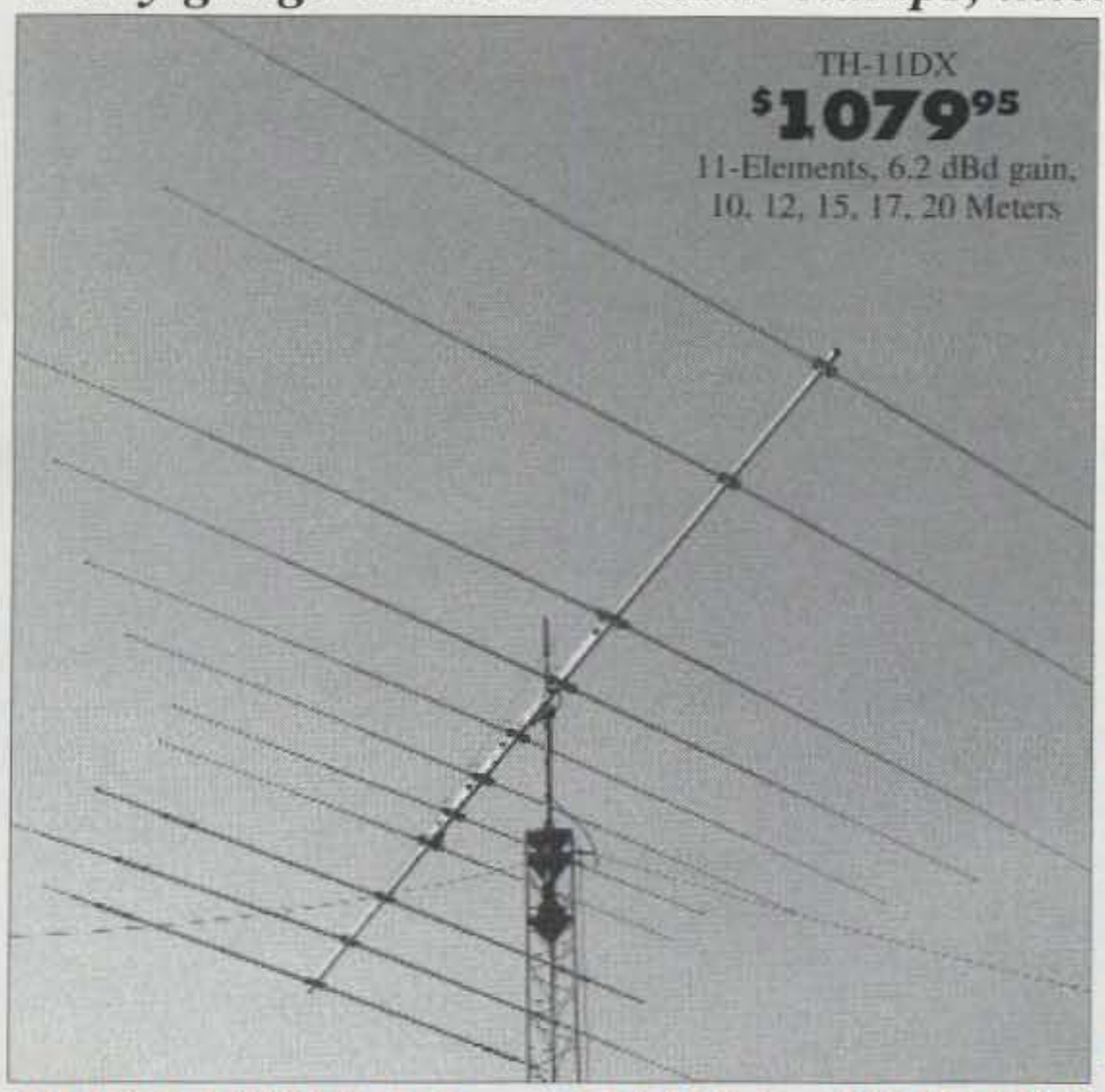

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$1079.95
11-Elements, 6.2 dBd gain,
10, 12, 15, 17, 20 Meters

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

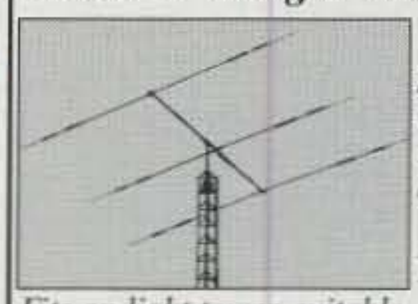
Hy-Gain's *patented* broadbanding *Para Sleeve* gives you less than 2:1 VSWR. 1.5kW PEP.

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

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

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

Compact 3-element 10, 15, 20 Meter Tri-Bander
For limited space . . . Installs anywhere . . . 14.75 ft turning radius . . . weighs 21 lbs . . . Rotate with CD-45II, HAM-IV



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

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

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

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

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

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

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BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSOs/Zones/Countries on each band

WORLD TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
8P5A	62/8/16	452/15/62	729/23/88	1658/30/113	2435/37/119	3354/34/113
EA8AH	114/9/48	382/17/67	641/27/87	2153/33/104	1667/33/109	2619/33/116
3V8BB	139/8/46	396/15/66	412/24/84	1760/34/118	1039/36/125	2977/37/125
FG/T93M	42/7/9	305/14/46	617/24/79	1194/32/103	2213/36/116	3038/33/117
JY9NX	12/6/10	202/11/54	500/22/74	1244/31/95	1717/36/116	2616/37/126
CT7B	74/9.45	214/15/66	356/19/71	1672/32/105	1404/34/124	1917/37/124
9K9X	29/10/19	122/14/39	316/26/69	1452/37/120	1197/37/123	1817/34/113
SV9CVY	85/7/39	131/11/57	139/17/61	1946/33/112	1189/32/113	2341/33/113
FS/AH8DX	73/9/19	257/13/33	509/20/74	1041/32/104	1654/33/114	2001/29/102
M6T	128/7/46	463/14/66	642/23/77	942/33/87	1445/37/112	1600/37/121

USA TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
K1AR	9/5/7	70/14/47	186/20/90	786/35/124	1253/38/133	1716/40/138
KQ2M/1	14/4/8	74/13/43	172/21/84	1085/36/122	1437/37/134	1364/37/123
N2NT/1	23/7/17	91/15/55	232/22/83	896/38/119	766/36/121	1617/33/129
K4ZW	23/7/16	117/19/63	129/22/72	737/31/114	999/25/131	1426/38/127
W9RE	28/6/12	107/18/55	129/22/69	815/37/117	1288/37/127	1038/34/120
K4XS	12/3/9	108/18/59	262/23/92	601/36/110	933/34/123	1302/33/126
K5ZD/1	23/9/16	77/16/56	123/22/73	771/36/121	695/35/125	1273/32/117
K3ZO	13/5/10	112/16/52	157/22/58	489/31/101	1046/36/120	1325/34/113
N2IC/Ø	18/10/13	60/21/40	177/23/65	486/35/105	884/36/126	1257/37/127
WB9Z	13/5/10	112/16/52	157/22/58	489/31/101	1046/36/120	1325/34/113

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

D44TC	148/14/57	194/21/80	290/29/97	2380/38/145	2413/37/151	4213/39/164
P3A	106/11/49	225/15/70	368/25/90	2784/38/135	2373/37/143	3514/38/150
EA8ZS	45/8/37	217/19/81	853/33/114	2184/40/148	1834/37/164	2816/40/169
ZXØF	21/8/19	114/18/64	335/31/98	2197/35/133	2308/37/154	3522/37/151
FY5KE	49/11/23	142/11/43	317/24/91	1429/35/139	2254/35/158	4398/37/142
PJ2Z	65/9/18	396/22/63	923/28/107	1999/37/133	2018/35/136	2765/35/130

USA MULTI-OPERATOR SINGLE TRANSMITTER

K4JA	29/10/25	142/24/80	295/28/106	963/39/151	1272/37/158	1578/38/160
N3RS	21/6/18	83/21/70	118/25/91	1137/40/159	1055/38/159	1579/39/167
K1KI	19/6/16	109/22/71	157/27/93	920/39/144	1064/38/154	1873/39/168
KR1G	10/4/8	95/20/67	132/28/97	1032/38/149	909/37/148	1648/40/163
N2NU	15/6/13	125/19/72	116/25/91	893/38/142	1022/36/144	1676/39/152
K8AZ	19/8/17	58/21/56	126/28/102	903/40/153	1003/38/148	1448/40/162

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

IG9A	776/12/68	1566/25/91	2375/33/123	4736/39/156	4595/37/161	4932/40/174
IH9P	705/13/76	1073/17/79	1857/29/108	4734/40/153	4285/39/166	5070/39/164
VP2E	398/16/52	1109/18/86	1912/32/124	5069/39/167	5625/40/167	5519/40/170
V26B	370/13/30	1053/21/81	1514/27/110	4244/39/155	3840/38/152	4292/39/156
KC1XX	132/11/27	560/25/98	667/33/124	2807/40/177	2767/40/176	2660/39/174
RW2F	931/14/62	1405/24/90	2162/37/129	3041/40/149	2355/39/157	2394/40/161

USA MULTI-OPERATOR MULTI-TRANSMITTER

KC1XX	132/11/27	560/25/98	667/33/124	2807/40/177	2767/40/176	2660/39/174
W3LPL	318/16/35	393/25/90	525/28/118	1954/40/170	2436/39/168	2571/40/175
K9NS	234/13/27	193/21/59	456/32/115	1875/40/164	2339/39/162	2789/40/172
N2RM	29/8/19	492/25/89	323/25/99	1609/38/155	1826/38/157	2180/39/166
N4TO	29/7/11	188/21/69	381/28/108	1476/39/152	1363/37/152	2280/40/160
W4MYA	108/9/23	208/23/76	449/30/112	1004/39/151	1640/39/158	1880/40/162

to the second place finish, just edging out G4PIQ from M6T.

In the U.S., John, K1AR, once again demonstrated why he is a great operator. John put the K1EA station through its paces to win the top U.S. spot. In second place was Bob, KQ2M. Conditions were so good from New England that everyone felt as if they were in Europe. Andy, N2NT/1, took third-place honors.

Low Power

John, W2GD, decided that this was the year for a low-power entry. Jumping on a plane in New Jersey and four hours later sitting in front of the rig at P40W can make contesting very enjoyable. John pushed P40W to a new world low-power record. Second and third place were claimed by ZX2B (PY2MNL) and CE4U (CE4USW), respectively. OH1EH pushed OHØZ to a first-place win in Europe over ER6A (ER1LW) and S53EA.

Here in the U.S. it was a first-place win by N1SV, who edged out KS1J. The battle for third and fourth place was very close, with WD5K beating out W5KFT(N5AW).

Special mention must be made of the efforts of N6NF, who led the U.S. West Coast scores.

QRP

First you go insane. Then you make the decision to try something a little different for a change. Then you try something really difficult. Then you discover QRP in the CQ WW. What a great way to learn very important contesting skills. Jacobo, P40B (P43P) repeated his top- score role of a few years back and put his location and skill to full use to win the world QRP. The next QRP champions were from many diverse places. LY5A with LY2PAJ operating took top European honors, followed by F5BEG and LY1DT. The #1 U.S. QRP score was attained by WE1USA (WA1LNP), followed by K7HBN and K8ZT. Both of the latter contesters really put their skills to the test from less than ideal QTHs. Special mention must be made of the QRP Asian score of JR4DAH. He is a long way from any population center.

Assisted

The year 2001 was a banner year for the Assisted category. This category offers a way for DXers and contesters to contribute to their club's score. The secret to doing well in the Assisted category is to remember that QSOs are the name of the game. Try not to chase the band map too much, and you may end up with a better score than by QSYing each time a juicy multiplier flies by on the screen.

The world top honor went to Jeff, N5TJ, operating at VE3EJ's QTH. Jeff finished ahead of Robert, W5AJ, down at P40P. Jeff's score is quite a feat from Canada. Third world high and first in the U.S. was Rick, KI1G. Second place in the U.S. went to Charlie, K3WW. In Europe OQ1T operated by RA3AUU took top honors; second place went to Tine, S50A.

Multi-Single

A lot of hard work paid off big time, as D44TC won the Multi-Single category for the world. A crew of Italians and locals talked their way to 22.9 million points, a new world Multi-Single record! Congratulations to the fine crew. The battle for second place was tough. After the dust settled, P3A finished just ahead of EA8ZS. The fight for fourth through sixth place was equally close, with ZXØF, FY5KE, and PJ2Z ending in that order. In Europe TM5C came very close to the European record by taking the top spot. They were followed by OM8A and 9A7A. K4JA, located in northeast Virginia, was the top U.S. score. They were followed by N3RS and K1KI.

The Multi-Single category is great fun. If you get a chance to join a team, you will find it a real learning experience.

Multi-Multi

The crew at IG9A finally put it all together for an impressive win and broke the coveted 50 million barrier. They arrived to set up their field-day-style operation on the cliffs of Lampedusa island. The crew was truly international, with operators from six countries. Just across the water was second-place finisher, IH9P. What a great job they did. Third place and #1 in North America went to VP2E; they demolished the long-standing VP2KC record. Congratulations! The # 1 score in Asia was JA3YBK, followed by their friendly rival JA5BJC. Both stations were manned by excellent operators. A special mention must be made of A50A, the first Multi-Multi from Bhutan! It was only a little while ago when working A5 at all was a challenge. Continental leaders were IG9A (AF), JA3YBK (AS), RW2F (EU), VP2E (NA), T88C (OC), and YV4A (SA). In the U.S. another remarkable win was posted by KC1XX, who beat out W3LPL for top U.S. honors, with K9NS a close third (great job!). The gang from

EUROPE TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
CT7B	74/9/45	214/15/66	356/19/71	1672/32/105	1404/34/124	1917/37/124
SV9CVY	85/7/39	131/11/57	139/17/61	1946/33/112	1189/32/113	2341/33/113
M6T	128/7/46	463/14/66	642/23/77	942/33/87	1445/37/112	1600/37/121
GW4BLE	46/7/36	257/11/61	451/21/82	1015/30/93	1227/34/112	1486/35/114
S5ØS	69/6/40	107/10/57	275/22/77	1223/36/121	1438/38/113	1190/35/126
YT7R	95/10/54	343/13/58	370/31/100	897/35/127	926/35/114	1134/37/121
TM2Y	42/6/32	247/13/58	167/17/75	749/32/97	837/32/113	1372/35/120
LY7Z	249/10/47	382/15/61	281/23/82	858/36/119	1030/33/121	898/34/122
ERØND	124/9/44	247/14/51	500/26/79	632/32/107	1101/32/101	1359/35/112
SQ6Z	68/5/31	295/9/50	288/25/80	740/35/106	1063/34/108	1238/34/108

EUROPE MULTI-OPERATOR SINGLE TRANSMITTER

TM5C	55/9/55	297/18/83	630/28/106	2191/40/152	1892/37/150	2644/39/159
OM8A	96/7/45	344/13/63	585/26/94	1427/37/137	1744/38/147	2218/39/155
9A7A	212/7/50	384/16/74	893/29/96	1850/38/142	2157/37/146	976/39/149
IR4T	108/11/57	232/13/68	681/27/99	1745/38/135	1736/36/145	1567/38/152
OK5W	71/8/53	361/17/77	1063/30/113	1069/40/150	1763/39/151	898/39/152
EI7M	123/9/46	370/15/72	507/22/85	1329/34/120	1972/37/144	2285/36/138

EUROPE MULTI-OPERATOR MULTI-TRANSMITTER

RW2F	931/14/62	1405/24/90	2162/37/129	3041/40/149	2355/39/157	2394/40/161
RU1A	547/11/60	1105/27/91	1561/34/117	3228/40/158	2702/39/157	2380/40/168
OH2U	587/10/60	837/19/78	1338/35/119	2760/40/160	2980/40/164	2200/40/168
DFØHQ	730/10/60	1342/24/94	1937/36/117	2406/40/159	2136/40/157	2586/40/172
OT1A	658/11/63	1264/16/81	1949/35/118	3048/40/157	2556/39/155	1991/40/154
HG6N	466/11/58	935/15/73	855/24/93	2937/37/147	2593/38/148	2238/40/151

RW2F finished on top in Europe, followed closely by RU1A. This was quite an achievement for the RW2F crew.

There was very strong representation from all over the world in the Multi-Multi class this year. It is now obvious that during a sunspot maximum the place to be is Africa. Congratulations to all the teams who did so much work to build and man the multi-multi stations. The multi-multis are the beacons that show us what can be the true potential of hardware and signals on all the bands.

Special Mention

Every year the CQ WW attracts contesters who travel to distant QTHs. A special thanks to the following 2001 DXpeditions: 8P5A, V31BD, V31MX, VP9/W6PH, J79RL, FG/T93M, 6Y4Y, V47KP, FS/AH8DX, PJ7/K7ZUM, FP/AC8W, FP/K8DD, VP5B, WP2Z, EA8AH, 9G5KW, CT9L, 5U7JK, 3V8BB, 4Z8GZ, JY9NX, UN1LT, 9K9Z, 8Q7LM, 9V1XE, 9M2TO, OHØMM, OH6LI, OH1EH, SV9CVY, J43J, MJØC, ERØND, CT7B, V8A, 9M8R, 3D2MH, 4W6MM, YBØAVK, P29JA, ZK1NCP, P40A, P40W, P40P, ZW5B, ZV5R, HC8A, HC8Z, 9Y4TBG, TI5X, VY2ZMM, OHØA, J75J, HR3J, J6R, VP5DX, KP2/AA4V, D44TC, E30NA, P3A, 4U1ITU, LX5A, T70A, 9M6TBT, AH2R, 5WØMO, ZXØF, FY5KE, PJ2Z, VP2E, V26B, 8P4B, VB2V, J3A, IG9A, IH9P, A50A, XP1AB, HBØ/HB9AON, GZ7V, T88C, and ZK1CG, to name only a few.

Every year there are many individual competitions within call areas or countries. Please check out the close battles between: N4TZ, N4YDU, N4IG & K4IE; N4MO & WO4O; WD5K & W5KFT; K6NA & W6UE; K8AL & K8DX; ACØW & WØAH; VE3OI & VE3AT; UA9CLB & UA9CDV; 4X2K & 4Z8GZ; JA2BNN & JA2FSM; UN7PCZ & UN7JX; OK1TN & OK2WTM; OK1DCF & OK1FX; OZ1HXQ & OZ9Y; RD4M, RQ4L & RK4FD; UA6LV & R73A; OG6AC & OH6OS; F5NZO & TM9W; I4IKW & IR3Z; LY1FW & LY2GF; LA8OM & LA1PHA; SP4TKR & SP6LUV; YO4CIS & YO3APJ; OM3IAG & OM4TX; S50C & S50K; S53M & S57DX; EA3QP & EA4WF; HB9FBS & HB9GT; LU2BA & LQØF; LU4DX & LU3HIP; KD9ST & K9ZO; JE4VVM & JH7PKU; PQ2Q & PY2AA; ZXØF, FY5KE & PJ2Z; IG9A & IH9P; GM2T & GMØB; LT1F & LU4FM.

Comments

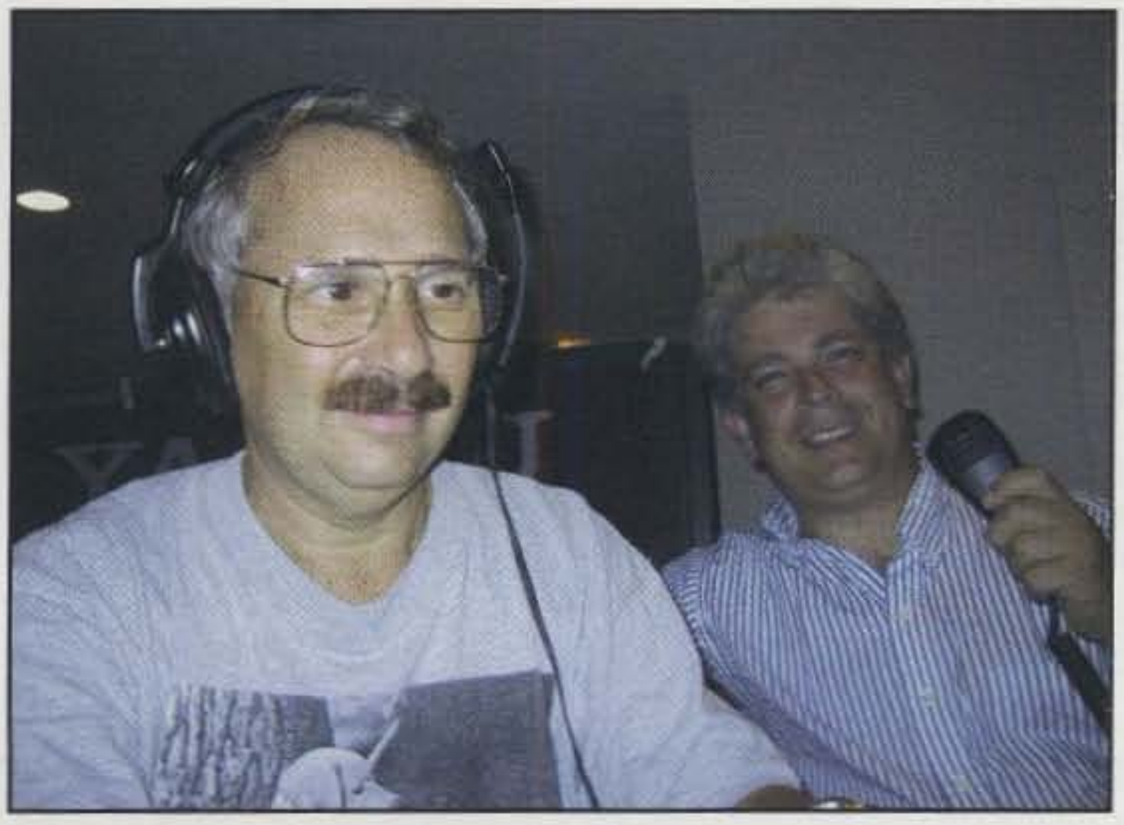
The 2001 CQ WW SSB Contest was a super one. Beyond the great conditions, your help by submitting an electronic log made the contest the most thoroughly checked in history. We received over 3600 e-logs! That was about 88% of the total logs received. Your effort to submit an electronic log allows for a fairer adjudication process.

Submitting an electronic log is easy. If you submit an electronic log for the 2002 SSB contest, send the log and summary sheet to <ssb@cqww.com> by December 1, 2002. Please send your log in Cabrillo format. The Cabrillo format is now a standard submission with CT, TR, NA SuperDuper, and WriteLog. Remember to name your file with your call with .cbr extension—i.e., PJ4B.cbr. Please make every effort to help us out. We thank you in advance.

Rules for the 2002 CQ WW will be in the September issue of *CQ* and on the CQ website, <www.cq-amateur-radio.com>. You can also see information concerning the CQ WW on the web at <http://www.cqww.com>. If you have any questions about the CQ WW, send them to <questions@cqww.com>.

Thanks

Thanks to the CQ WW log checkers who validated the winners and provided insight into many contesting topics. The 2001 crew included K1DG, K3WW, K3ZO, KR2Q, N2AA, N2NC, N3ED, N6ZZ, N9RV, W3ZZ, K1AR, KM3T, KT3Y, N5TJ, N5NJ, and N8BJQ. Our DX advisors were very helpful in offering advice, providing information, and sorting out poten-



KD3TB and KD3RF, ops of 9M6TBT, relaxing after the contest. (Photo via KD3TB)

9M6TBT operated by Irwin, KD3TB, and Andy, KD3RF, put East Malaysia on the map in CQ WW SSB. Here KD3TB, KD3RF, and Don, 9M6SU, are testing out a new antenna before the start of the contest. (Photo via KD3TB)

TOP SCORES

WORLD
High Power
All Band

8P5A 14,531,272
EA8AH 13,785,672
3V8BB.....12,982,876
FG/T93M.....11,059,664
JY9NX.....10,785,336
CT7B 9,097,479
9K9X 8,449,021
SV9CVY.....7,682,324
FS/AH8DX.....7,630,020
M6T 7,506,840

28 MHz

HC8A 3,916,600
ZX5J 2,921,820
LU6ETB.....2,180,304
H2G 2,160,972
KH6ND.....1,841,610
V8A 1,822,680

21 MHz

HC8Z 2,657,718
VP5B 2,282,470
L21I 1,994,517
GIØKOW.....1,698,840
CT3BX.....1,437,247
KH7U 1,376,320

14 MHz

P4ØA 2,225,395
OK1RI 1,282,944
S53M 1,099,605
ZV5R 1,043,700
YU1JW.....1,024,250
S57AL 1,007,620

7 MHz

9Y4TBG 813,654
SP2FAX 596,388
KH6TO 435,342
EA9LZ 421,266
YT1AD.....400,624
T99W 364,596

3.7 MHz

W6RJ 122,843
9A3ØY 120,594
Z33A 114,660
S59CAB 111,748
PA4WM.....107,550
YU7JX.....98,640

1.8 MHz

LZ8T 59,778
OZ3SK 55,368
IV3OWC.....46,209
HG3M 43,761
EU6EU 41,910
PA3GCV.....36,890

Low Power
All Band

P4ØW 7,543,768
ZX2B 4,099,295
CE4U 4,049,472
OHØZ 3,371,225
ER6A 3,214,395
VP9/W6PH 3,134,610
CN8NK.....2,981,316
S53EA.....2,962,734
G4BUO.....2,918,466
EA7GTF 2,902,878

28 MHz

HC1JQ 1,087,380
LU4DX.....938,196
GI4SNA.....887,124
LU3HIP.....875,104
YU1AU 854,080
VR2BG.....799,496

21 MHz

TA3D 1,231,979
SM4DHF 1,100,480
S57O 734,580
VK5AM.....613,168
AY8A 606,564
S57IIO.....594,847

14 MHz

OK1RI 1,282,944
IR5T 1,228,835
YBØAZ.....743,850
XE1L 664,362
S58AL 643,826
S51CK.....519,696

7 MHz

VK4EMM.....97,826
K2UF 44,370
AD3Y/2 42,462
UA1ANA.....41,410
VA3TTT.....31,372
SP9ABU.....28,812

3.7 MHz

9A3PA.....69,144
S53F 55,870
LZ1DM 46,277
OK1FPS.....41,071
9A5AZZ.....36,564
IC8SDL.....34,776

1.8 MHz

HA8BE 40,600
YTØT 31,785
TA3J 30,846
S57NMQ 22,780
UR6QA.....17,328
OK2SNX.....14,448

QRP, All Band

P4ØB 2,326,288
LY5A 1,953,068
VE3KZ.....1,420,482
TI5X 1,400,424
F5BEG 1,195,000
LY1DT.....973,080
WE1USA.....764,160
S54AA.....682,550
JR4DAH 647,496
SP8NR 637,857

Assisted, All Band

VE3EJ 11,080,260
P4ØP 10,224,346
KI1G 8,053,315
K3WW 6,836,410
OQ1T 6,796,680
S5ØA 5,860,490
DLØWW.....5,813,280
N3RR 5,059,152
YL8M 4,957,728
TM2V 4,754,568

Multi-Op, Single Trans

D44TC.....22,978,944
P3A 19,957,716
EA8ZS.....19,877,260
ZXØF 17,996,910
FY5KE.....17,980,494
PJ2Z 17,008,011

Multi-Op, Multi-Trans

IG9A 50,060,759
IH9P 46,562,581
VP2E 44,332,785
V26B 30,364,887
KC1XX 23,653,668
RW2F 21,717,810

EUROPE
High Power
All Band

CT7B 9,097,479
SV9CVY.....7,682,324
M6T 7,506,840
GW4BLE.....6,713,616
S5ØS 6,327,852
YT7R 5,519,115
TM2Y 5,231,520
LY7Z 5,055,273
ERØND.....4,971,006
SQ6Z 4,965,625

28 MHz

9A5K 1,520,184
S5ØC 1,341,380
CT8T 1,324,800
OM5DX 1,219,146
G3TXF.....1,179,900
OE6Z 1,169,125

21 MHz

GIØKOW.....1,698,840
YTØA 1,191,936
OHØV 1,098,720
MJØC 1,078,350
IU2P 1,036,316
YP3A 987,752

14 MHz

OK1RI 1,282,944
IR5T 1,228,835
S53M 1,099,605
YU1JW.....1,024,250
S57AL 1,007,620
S57DX.....958,825

7 MHz

SP2FAX 596,388
YT1AD.....400,624
T99W 364,596
YT7A 357,504
S58WW.....256,200
SP4NI.....194,125

3.7 MHz

9A3ØY 120,594
Z33A 114,660
S59CAB 111,748
PA4WM.....107,550
YU7JX.....98,640
CU2CE.....95,036

1.8 MHz

LZ8T 59,778
OZ3SK 55,368
IV3OWC.....46,209
HG3M 43,761
EU6EU 41,910
PA3GCV.....36,890

Low Power
All Band

OHØZ 3,371,225
ER6A 3,214,395
S53EA.....2,962,734
G4BUO.....2,918,466
EA7GTF 2,902,878
9A2EU.....2,494,185
4N7B 2,107,176
RU3QW.....2,049,875
S51F 2,037,280
HA8IH.....1,887,867

28 MHz

GI4SNA.....887,124
YU1AU 854,080
F5TDK.....635,950
EA2CJC 534,038
GØAEV.....529,223
9A5V 520,828

21 MHz

SM4DHF 1,100,480
S57O 734,580
S57IIO.....594,847
OT1H 519,858
DL1LH.....506,625
EA7HBP.....494,340

14 MHz

S58AL 643,826
S51CK.....519,696
IT9STX.....507,179
M5ACC.....436,076
SKØX 395,738
T92D 382,260

7 MHz

UA1ANA.....41,410
SP9ABU.....28,812
OK1TGI.....22,022
UR5ETN.....21,964
SM2T 19,845
IK3SSJ.....17,775

3.7 MHz

9A3PA.....69,144
S53F 55,870
LZ1DM 46,277
OK1FPS.....41,071
9A5AZZ.....36,564
IC8SDL.....34,776

1.8 MHz

HA8BE 40,600
YTØT 31,785
S57NMQ 22,780
UR6QA.....17,328
OK2SNX.....14,448
SP9RPW.....13,311

QRP, All Band

LY5A 1,953,068
F5BEG 1,195,000
LY1DT.....973,080
S54AA.....682,550
SP8NR 637,857
HG5Z 618,896
S59D 553,815
SM3C 480,036
RV3QX.....403,650
SP3OL.....386,309

Assisted, All Band

OQ1T 6,796,680
S5ØA 5,860,490
DLØWW.....5,813,280
YL8M 4,957,728
TM2V 4,754,568
S52ZW 4,576,662
OE4C 4,128,725
OK2FD 3,843,774
DJ2YA.....3,618,816
DF4RD 3,430,336

Multi-Op, Single Trans

TM5C 16,059,708
OM8A 11,055,402
9A7A 10,927,794
IR4T 10,780,497
OK5W 9,773,643
EI7M 9,563686

Multi-Op, Multi-Trans.

RW2F 21,717,810
RU1A 20,099,454
OH2U 19,883,163
DFØHQ.....19,858,774
OT1A 19,597,131
HG6N 15,546,030

USA
High Power
All Band

K1AR 7,405,156
KQ2M/1 7,317,086
N2NT 6,745,275
K4ZW 6,388,875
W9RE 6,058,656
K4XS 5,806,188
K5ZD/1 5,392,310
K3ZO 5,267,184
N2IC/Ø 5,056,788
WB9Z 4,802,046

28 MHz

W4ZV 1,459,575
K9NW 1,149,889
K5RX 1,053,930
N1RR 824,504
K3ZJ/8 765,912
N2PP 738,196

21 MHz

N9RV 1,254,790
N7DD 901,272
NG2X 853,332
K4WI 707,070
N3HBX 646,736
KIØMB 562,322

14 MHz

K2XR 775,905
W7WA 726,300
WA2QNW.....359,370
K2BA/5 270,248
K5RR/7.....238,140
W5FO 236,988

7 MHz

N4CC 105,300
WQ2M 79,060
KE4SCY.....75,530
K9ES/4 58,191
NC2O 35,100
KD4RH.....24,012

3.7 MHz

W6RJ 122,843
AA1BU 95,680
AA4MM 39,425
W8UVZ.....9,882
ND5S/8 5,082

1.8 MHz

K6SE 180

Low Power
All Band

N1SV 1,974,987
KS1J 1,824,626
WD5K 1,774,872
W5KFT.....1,773,849
K1VR 1,714,122
ACØW 1,631,034
K1VUT.....1,580,374
N4TZ 1,556,180
WØAH 1,477,476
WS1A 1,357,800

28 MHz

N2EE 527,580
KT3RR 317,400
KC2ILN.....272,259
K9HUY/4 271,707
N1LW 226,206
KA2NDX.....224,616

21 MHz

N4MO 245,055
W1EL 227,336
WO4O 222,306
N2GM 111,762
KEØUI.....90,965
W6YJ 77,400

14 MHz

W9AU 141,780
K2RED 80,850
K7LVJ.....73,723
KX2S 64,713
AAØMQ 57,062
WB2DVU.....55,536

7 MHz

K2UF 44,370
AD3Y/2 42,462
K2YEH 21,902
KU6T 5,986
AF8C 576

QRP, All Band

WE1USA.....764,160
K7HBN 348,764
K8ZT 322,438
KKØQ 310,968
KB3TS.....305,606
W1AMF 287,912
W3GK 266,151
N1TM 132,864
KQ4YY 91,657
N8XA 69,144

Assisted, All Band

KI1G 8,053,315
K3WW 6,836,410
N3RR 5,059,152
K2NG 4,674,285
AA3B 4,011,739
W1GD/2 3,983,532
W4NF 3,688,043
K2PS 3,643,350
N2MM 3,627,008
KQ3F 3,617,074

Multi-Op, Single Trans

K4JA 10,171,848
N3RS 9,090,529
K1KI 9,036,837
KR1G 8,359,937
N2NU 7,952,595
K8AZ 7,686,915

Multi-Op, Multi-Trans

KC1XX 23,653,668
W3LPL 19,627,648
K9NS 17,595,136
N2RM 14,344,902
N4TO 11,584,616
W4MYA.....11,345,644

tial problems. They were CT1BOH, DL6RAI, EA3DU, F6BEE, G3SXW, I2UIY, JE1CKA, OH2KI, OK2FD, PY5EG, S50A, UA9BA, and VE3EJ.

A special thanks to Dick, N6AA, who once again spent countless hours to make the CQ WW database the best in contesting. The CQ WW uses the software developed by Tree, N6TR, to create the database. John, K2MM, created the entire web log-entry information. His robot worked smoothly in acknowledging receipt of a log. Translations of the rules into Spanish, Japanese, German, and French were done by EA3DU, JE1CKA, DL6RAI, and F6BEE, respectively. Larry, N6TW, was invaluable in retrieving and processing data from e-mail submissions. Phil, N6ZZ, put lots of hours into making sure the database was as clean as possible. Thanks also to John, K1AR, for his advice and hard work in helping to make the CQ WW so successful.

Congratulations to all the winners! Try to get a fellow contester on for a local, friendly competition. To participate and have *fun* is what contesting is all about! 73 and CU in '02, Bob, K3EST

DX QRM

It is very big surprise that I could QSO with West Coast and SA, because my apartment is now under construction of wall-recoating and covered with a net. Unable to set the

(Continued on page 101)

Step up to the performance leader.
...Step up to Force 12

The XR-5©

20-17-15-12-10 mtrs, one feed line
10 full size elements, full coverage
no traps, no log cells
18' boom, 100 mph
54 pounds, 8.5 sqft

HF and VHF Antennas and Towers
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C-31XR

20-15-10 mtrs for those who want the best.
31' Boom, 100 mph, 5KW

C-19XR

Dollar for dollar the best buy in a
20-15-10 mtr tribander.
19' Boom, 100 mph, 5KW

Sigma-5©

20-17-15-12-10 mtrs, no radials
no tools, 9' tall + base, 7 lbs, 2' pieces
1200w PEP, pre-tuned, >91% efficient
(optional X-base)

Sigma-SV5©

CC&R Friendly© falling
within the OTARD Rule
20-17-15-12-10 mtrs
no radials, 11'11" tall
including 4' base.
12 lbs, 4' sections.
Can receive local TV
broadcast and has
cosmetic TV elements
for concerned neighbors
1200w PEP, pre-tuned
>91% efficient
(optional X-base)

Sigma-80©

36' true vertical
dipole, no radials

Sigma-40©

24' true vertical
dipole, no radials

C-3SS

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Participation in contests seems to be increasing even as the overall number of hams has held fairly steady in recent years. K4RFK, more a DXer than a contester, looks at one possible reason and shares what he's learned to help his fellow non-contesters get the most out of operating in contests!

Contesting For Non-Contesters

BY BOB KONIOR,* K4RFK

In many recent articles on contests there have been reports that the number of participants has increased, as has the number of logs submitted. There have been many theories proposed to explain this increase, but I have not seen the one that I think is most important: computer logging programs and electronic submission of logs.

I'm a relative newcomer to hamming, having been licensed in January 1994. From the very beginning I was interested in DX and very early on discovered the plethora of DX stations to be worked during contests. Every major contest would find me in front of my rig searching for new stations that would fill in my needed countries, states, zones, etc. However, not once did it occur to me to send in a log. I didn't consider myself a contester, and I certainly wasn't in the contest to compete with real contesters.

Family life restricts my available operating time. Devoting 24 to 48 hours to try for a good score in a contest is a remote dream. I am a definite little pistol, running 100 watts into a wire loop for 160–10 meters. My contest contacts and score totals were always small; I saw no purpose in doing all the work necessary to fill out the contest forms and mail them to the contest sponsor.

What I didn't realize was that my logs would be used to check the validity of other logs, that a low score was nothing to be embarrassed about, that sometimes even a low score might be a "good" score for my state or section, and that even if I only made one contact my callsign would end up in print on the pages of *CQ* or *QST*. I also didn't realize that the biggest obstacle, filling out logs and forms, had a very simple and elegant solution: contest logging programs.

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The author first discovered the world of free and nearly-free contest logging programs when he visited the website of Scott Davis, N3FJP.

There are many contest logging programs for computers, some for specific contests and others that work for many different contests. These programs take away the drudgery of pen-and-paper logging of contacts during the contest. After the contest they make an electronic record that you can e-mail to the contest sponsor. What can be simpler than that?

Of course, contest programs cost money, don't they? Well, that can be a problem. I wasn't really into contesting and didn't care much about my score, so I certainly wasn't going to go spend 40 or more dollars for a contesting program. I'm sure most hams who haven't really tried contesting feel the same way. Fortunately, I found some very simple solutions for the not-serious-about-contesting contester. There are free programs, or in some cases almost free programs, available for contesting. They may not be the easiest to use or you might have to fidget around to get the proper log file format to e-mail to the contest sponsor. You also will have to use several different programs to cover the various contests that are out there. However, for the most part they work, and work well at that.

My first introduction to these programs was through Scott Davis, N3FJP. Scott is both a hobby program-

mer and a ham. He put both of these interests together and developed a number of Windows® programs for both general logging and contesting. I found his website when I read in a magazine sidebar that Scott had a program for Sweepstakes that he was offering for free on his website, which is now <http://www.n3fjp.com/>. *Free* was the magic word for someone who wasn't sure about contesting. I downloaded it, set it up in my computer, and had a great time using it in Sweepstakes that year. After the contest it was a simple matter to have the program set up the end-of-contest info and just e-mail it to the ARRL. Even the contest e-mail address is in this program so you know where to send your log file. Suddenly I was a contester! Well, maybe not a real contester, but it sure was a kick to see my callsign in print when the results came out.

Scott's programs are for individual contests and he only supports a few of them, but his programs are easy to install and use and they create logs in the new Cabrillo format (more on that in a bit). At his site you can get programs for Field Day, Sweepstakes, ARRL 10 Meter contest, and CQ WW DX—four great contests in which to get your feet wet. The programs are fully functional and free to use for 45 days; after that you need to register the program for a nominal fee, which is very reasonable considering the effort of creating them. Scott also has his general logging program available at this site.

Scott's programs are perfect for someone like me who doesn't expect to come anywhere near the top scores. They are easy to use and very straightforward, with little or no learning curve. A word of advice here: The day of the contest is not the time to download any program and use it. That is a formula for frustration and disaster. Download a program well before the contest and then use it to get a feel for the way it works. Sit at the computer, make up callsigns and exchanges, and see how the program flows. This way you will be confident when the contest day comes and won't waste time learning to work the program rather than working the contest.

If the contesting bug starts to bite and you find you want to work more contests than Scott supports, there are other developers of contest loggers. Many of these programs are serious contesting programs. By that I mean they do lots of little helpful things for the serious contester that newbies like us probably will not use right away. In many instances they are more powerful and complicated to use than N3FJP's programs. You

will find programs that will check packet clusters, control your rig, take band info from your rig, give beam headings, show "band maps" of stations on the air, operate over 60 contests, and many other features. Of course the developers of these programs expect to get paid for the work of creating them and keeping them updated. If you are ready to jump into lots of contesting, look into these full-featured programs. If you are still just dabbling in contests, there are other options.

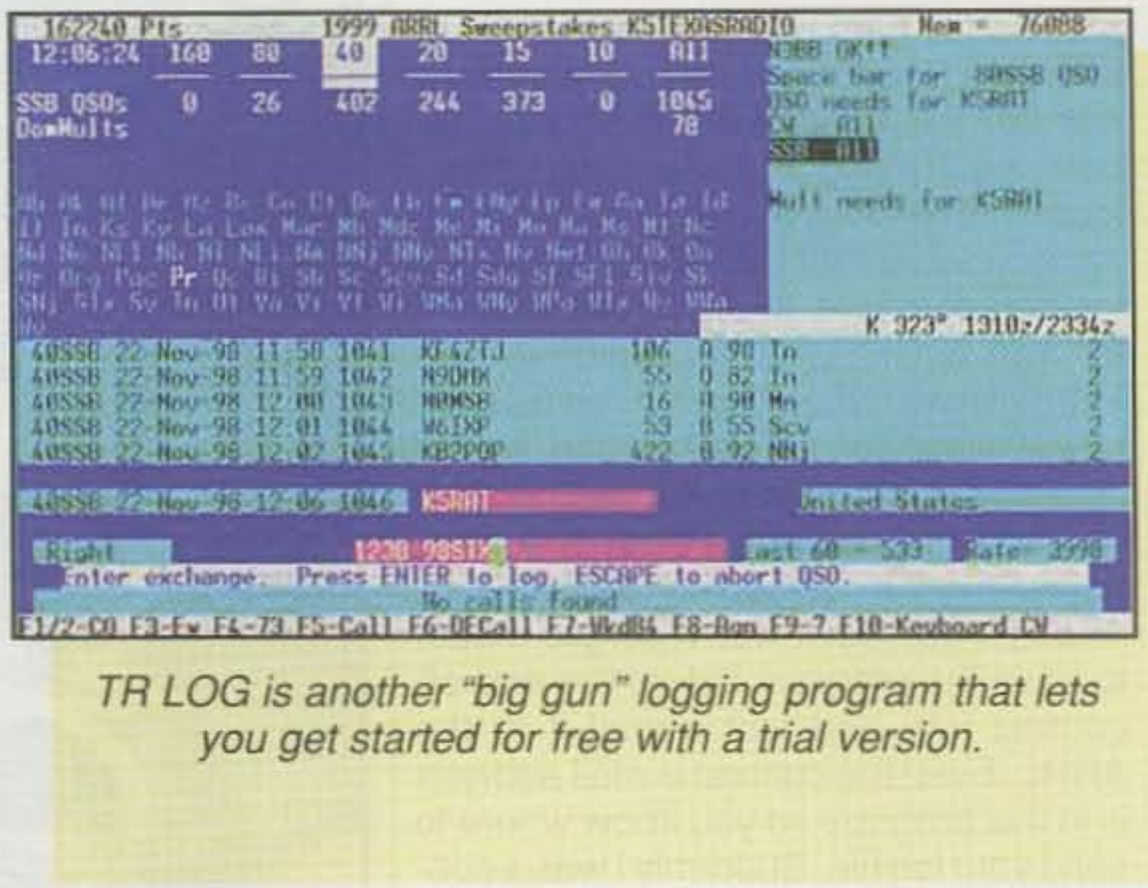
Free Samples

All of the big contest programmers want you to buy and use their programs. To get you to find out about their products, many of them offer some form of freebie so you will learn about their offering and hopefully then buy the complete updated program—good business practice for them, a good deal for us sometime contesters. I've spent a lot of hours looking into these programs to come up with a stable of programs for different contests. Here is a sample of what I've found.

Before you use any of these programs, go into the Help file and print it out. Keep this next to you while you use the program. In most of them navigating through all the options is anything but intuitive. It can be a drag when you have to keep changing screens to see the Help files as the program is running, especially during the contest.

SUPER DUPER (SD) for DOS by Paul O'Kane, EI5DI, found at <www.ei5di.com/index.html>. SD is DOS shareware (try then buy). Generally it will work for you, without buying it, for contests in which you are in effect the DX. Otherwise it's only good for 30 contacts so you can get a feel for it. For example, Americans can use it with unlimited logging in the Radio Society of Great Britain (RSGB) contests. DX stations can use it in CQ-type contests. If you want to try it out, you can hunt around, find a contest it supports, and use it. Just make sure you practice with it before the contest to be certain that the contest you pick will allow you to log over that 30-entry maximum. It would be bad to hit this wall during a contest.

SUPER DUPER IOTA for DOS (SDI). This is a version of SD that is only good for the IOTA contest, and it is freeware. SD is easy to use with very simple single-keystroke commands. It will work on a 386 or better PC under DOS or with any version of Windows®. After the contest it will write the end of contest file in the format that the Radio Society of Great Britain wants and you can e-mail it directly to the RSGB. Paul



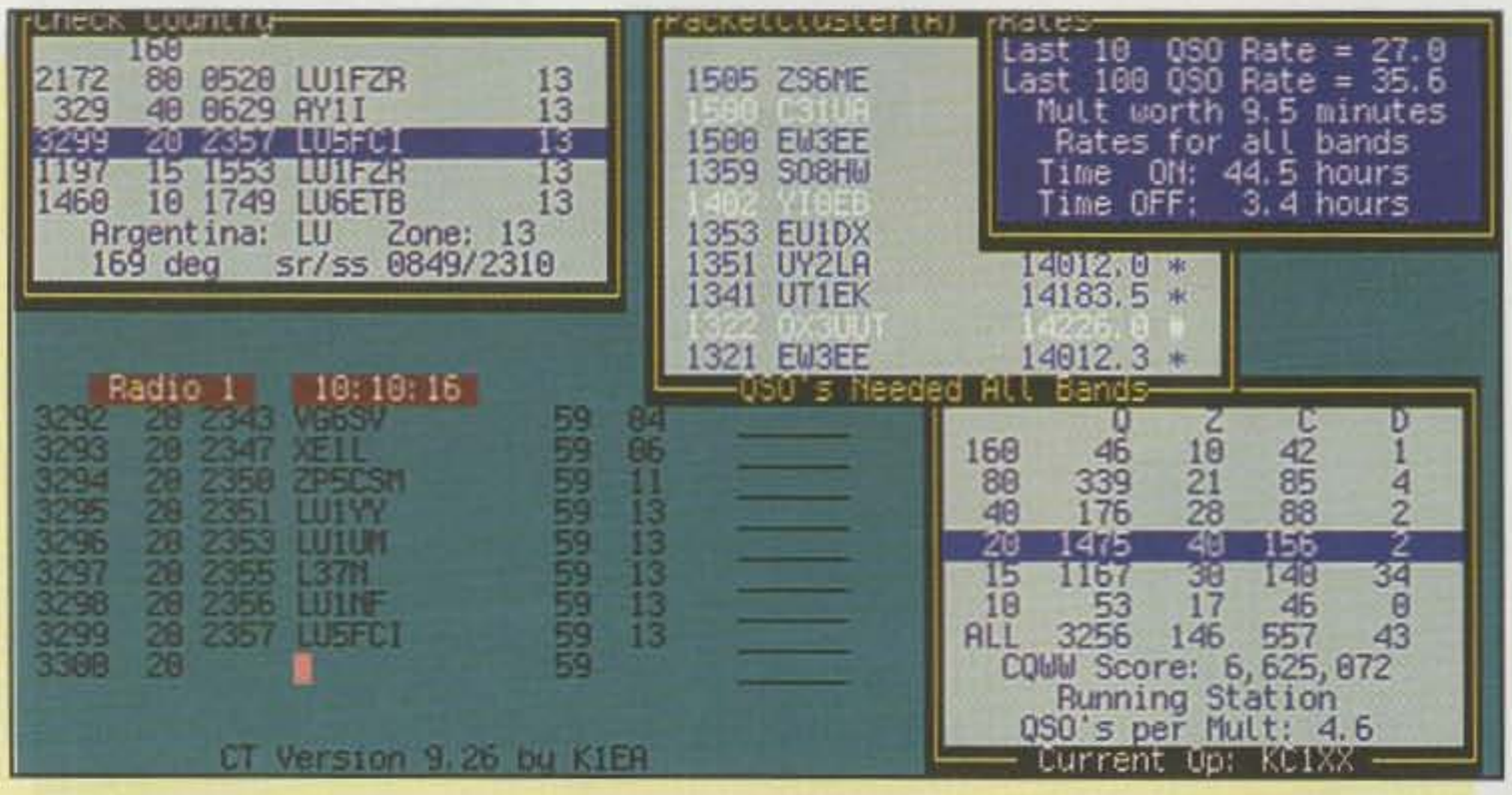
TR LOG is another "big gun" logging program that lets you get started for free with a trial version.

updates this program regularly. I happen to like the IOTA contest, having worked it as an IOTA station when I lived on Long Island, New York, and again from Pine Island, Florida, which is just 10 minutes from my current home. I enjoy using this program for that contest. If you work the IOTA contest, I recommend you download the program and keep it in your contest program stable.

CT (for DOS) by Kenneth Wolff, K1EA, found at <http://www.k1ea.com/>. CT does not offer the opportunity to download any current version, crippled or otherwise. However, if you go to the CT order page at <http://www.k1ea.com/order.htm>, you can download an older version of CT, v6.26. The developer no longer supports this version, created in 1991, and as a result it presents two problems for today's contester. First, the files with the country and ARRL section information are outdated. You can correct this, but it takes a little effort.

Use the Windows® "WORD PAD" program and open the .cty and .sec files. Use "WORD PAD," because it does not add special formatting characters to the file, as would a word-processor program such as "MS WORD" or "WORD PERFECT." Follow the exact format in the .cty and .sec files and add the missing information. For example, in the ss.sec data type the following to add the new West Central Florida Section: **WCF: WCF; 4**. Make sure you put in the colon and semi-colon. Do the same for other missing sections and then save the file. Then go to the .cty files and following the format found in them and add the proper data for new countries. When you're done, CT v6.26 will work just fine for the following supported contests: CQ WW, ARRL DX, Sweepstakes, CQ WPX, Worked All Europe (WAE), and ARRL VHF.

Now we come to CT's second problem, common to other older software. Since the November 2000 Sweepstakes contest the ARRL has requested that all electronic logs follow a new format known as CABRILLO. *CQ* magazine states that Cabrillo is the preferred format for submitting logs. Cabrillo is nothing more than a standard way of reporting your contest data. This



CT is one of several major contest programs that offers a free sample, in this case an outdated (and unsupported) version (not the version shown here).

makes it easier for the contest sponsors to score the logs and get the contest results out with less effort and fewer errors. However, you will have to take a few extra steps to convert the older programs' logs to the Cabrillo format. Thus we come to the next free off-the-web program.

LogConv found at <www.qsl.net/ka5wss/logconv>. This program will take logs made by CT, NA, and TR and convert them to the Cabrillo format. It is a very simple process. Go to the website, download the file wlogconv.zip, unzip it, then just click on the wlogconv icon (w for Windows® version; clogconv if you are in DOS). The program will ask you for the file to convert, browse to the proper directory, and highlight the correct file, and LogConv will convert it to the Cabrillo format—almost. It doesn't quite get it right with these old programs, but it comes close. Here is what you do next to complete the conversion.

First go to the following website: <http://loja.kkn.net/~trey/cabrillo/qso-template.html>. There you will find examples of the Cabrillo format for contests. Print them out and then go to WORDPAD and open the log file that was created by LogConv. The extension for this file will be *.cab*. Start at the top and just plug in the info that LogConv was not able to find. Follow the format in the printouts you got from the Cabrillo template website. Usually the missing info is the ARRL section in ARRL-sponsored contests, plus the power category you were in and possibly your score. You can skip adding the score if you want, as CQ and other contest sponsors will figure it out for you anyway. When you are finished, save the log and then e-mail it. Simple as that.

TR LOG (for DOS) by Larry Tyree, N6TR at <www.qth.com/tr/>, another of the *big ones*. You can download a free full-featured version of the program, except the freebie is only good for a few specific programs. Those are: ARRL Field Day, Region One Field Day, Japanese DX (JIDX), New Zealand Field Day, South American WW, and Stew Perry 160M. This is a great DOS program that will work on most PCs, but once again the free version is limited to those few contests. If you find yourself wanting to try it out and one of these contests is coming up, by all means download it. It does everything you could want during and after a contest and probably more than you will ever use in your first forays into contesting. TR has a bit more of learning curve to it, so download it well before the contest.

NA for DOS by DATOM Engineering

located at <http://datom.contesting.com/nademo.htm>. DATOM offers a demo version of their program that is almost exactly the same as the full version of NA. The major "except" for the NA demo is that it only supports ARRL Sweepstakes and the Florida, Louisiana, Michigan, Ohio, and Texas State QSO parties. If one of these contests is coming up, give this program a shot. Since it is a current version of NA, you won't have to play with LogConv after the contests that the demo supports. This is a very full-featured program, and you might find yourself buying it after you try it.

zLog by Yohei Yokobayashi, AD6AJ, at <http://www.zlog.org/zlog/zlogwin-e.html> (English page). This contest program is Windows® based, completely freeware, and supports all the major contests. It works great. It has lots and lots of advanced features. I like it very much, but there are a few problems that are very tough to work out. Why? Because this program was designed for Japanese contesters, but there is no, repeat NO, documentation for it at this time unless you can read Japanese. Mr. Yokobayashi has only recently updated the program to work in English, but all support files are still in Japanese. Without a manual, getting the program to work is a chore. Mr. Yokobayashi has been very helpful in working with me on this, and I'll tell you what I have learned so far about getting it running.

The latest version to download is the file zlogw19d.lzh. It is a .lzh file, which is a popular Japanese compression program similar to our .zip files. To decompress it you will have to download the file LHA213.exe. You can get this file at <http://www.agtech.co.jp/download/Update/Tools/Details/LHA.html> *(Note: Be sure to use capital letters where shown.)* After downloading the file, place it in a folder and run it. It will decompress itself. You can then put the lha.exe program into your path statement in autoexe.bat or just decompress zLogw19d.lzh in the same folder in which LHA now resides.

The command to decompress zlog is: lha e zlogw19d.lzh. Lha is the executable decompression program, just like typing "pkunzip" with zip files. The "e" means explode and then comes the file to decompress.

After uncompressing zlogw19d.lzh you will see the zLog icon in the folder. Click it and zLog will start up. The first screen lets you pick the contest you want to work. Just click on the contest button you want, click OK, and wait a bit. It is a tad slow setting up at this point, especially on older machines such as my Pentium 90, and I would recommend using a faster machine. It works just fine on my Pentium 166. The next screen is where I would have saved a *lot* of time if there had been a manual. The program asks you what file to open, and there are no choices to pick from when first running zLog. Just type TEST or make up a name for your contest log, i.e., CQWW2001. Click Open and you will be up and running.

The program is pretty cool. It does everything. It's a CW/voice keyer. It will work your rig and take info from it for the log. It will give you running scores and hourly rates. It will connect to the DX clusters on the web and do lots of other neat things. You have to play with it to figure it all out (no manual, remember?). The lowest line on the screen is where data gets entered. It's all pretty intuitive at this point except for the received column (rcvd). The info that goes in here varies according to the contest. It is the special contest info, not 59(9). For example, in the CQ WW DX Contest it is looking for the contest station's zone. In IOTA it's looking for the island number. If the program shows you the "invalid number" message, you put in the wrong data. You definitely have to practice with this program well before the real thing.

zLog has yet one more problem at this time. It will not write the Cabrillo-format logs. Thus, you have nothing to send to the ARRL. For CQ contests, they prefer Cabrillo but will take other log formats. zLog will export the log as an ADIF format log (Amateur Data Interchange Format), *but* it is not standard ADIF format and at this time LogConv will not work with it. There is a Japanese program (in Japanese) that will do a Cabrillo-format conversion, but I have not yet gotten that program to work correctly. The conversion program, z2cabril.lzh, can be obtained at <http://www2.tokai.or.jp/ja2bqx/soft> (the "2" after www is correct). It is a .lzh file, so use the "lha e" command to unpack it. This program is a V Basic program, so you will need the VB6 runtime files on your computer. They are obtainable at <http://support.microsoft.com/support/vbasic/runtime.asp>. I still haven't been able to get z2cabril to run. If anyone gets it to work, let *me* know how you did it! Mr. Yokobayashi is going to work on the ADIF format when he gets the opportunity, so this problem may be resolved by the time you read this. When it is English-friendly, get online and download this program. It doesn't do all the contests yet (most notably CQ 160 Meter, Sweepstakes, and QSO parties), but it's about as close as you will come to an all-around contesting program *for free.*

Is It Really FREE?

Last, let's talk about free. With the notable exception of zLog, all of the developers I have mentioned created these programs with the hope that you will buy their full product. Now no one is going to break your arm if you decide to just stick with the freebies I have talked about, but none of these freebies would be available if contesters weren't supporting the creators. It takes a lot of time and effort to create these programs, and the developers deserve to receive our support. Otherwise, one day there will be no developers. The bottom line, then, is if you really get into contesting, at some point it would behoove you to do the right thing and buy the full current version of the one which best fits your needs. Until then, there is no excuse for not sending in a log the next time you dabble in a contest.

73, and see you on the contest results pages! ■

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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 5/16D 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.

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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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The weather at Dayton was colder than usual this year, but the deals inside Hara Arena were red hot! Here's a look at some of the new products introduced at "Ham Heaven."

Hot Stuff at Hamvention™

BY RICH MOSESON,* W2VU

This year's Dayton Hamvention™ was one of the busiest in years, so busy, in fact, that my time for wandering in search of new stuff was very limited. So, while I found quite a bit, I'm sure I also missed quite a bit, and I apologize in advance to those I missed.

A *very* quick tour of the Hamvention floor turned up a wide array of new products, with a big focus on blending digital communications into mainstream amateur radio.

Digital Systems

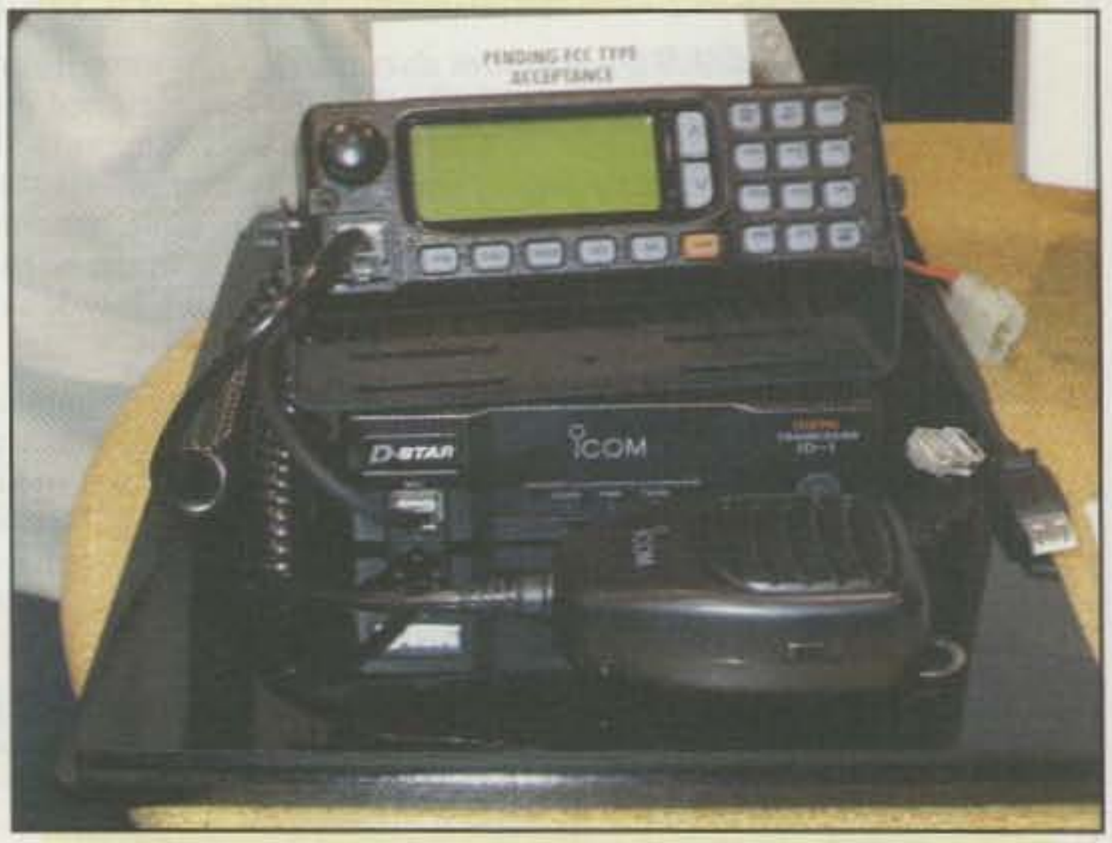
Two of the major equipment manufacturers rolled out prototypes of equipment designed for use in digital networks, with repeaters linked either over the air or via the internet. ICOM introduced its D-STAR System, which it has been developing in conjunction with the Japan Amateur Radio League, plus a prototype of its new ID-1 digital transceiver. D-STAR repeaters will accept either analog or digital voice inputs, plus data at up to 128 kbps, convert analog signals to digital, and communicate with other repeaters either over the air or via the internet. In the prototype system being set up in Japan, the local repeaters operate on 1296 MHz with backbone relays between repeaters on 10 GHz. The backbone datastream runs at 10 Mbps, the same as a standard Ethernet network connection. The ID-1 will transmit analog FM or digital voice plus high-speed (up to 128 kbps) data. It operates on 1296 MHz and can be controlled via a personal computer or an optional remote head. The radios in the system are still awaiting FCC approval, so no price has yet been set.

Yaesu (Vertex-Standard) was showing off its new WIRES internet linking system and the HRI-100 interface box that goes between a radio and a computer to make it all work. WIRES stands for Wide-coverage Internet Repeater Enhancement System and allows users to establish networks of up to ten repeaters and connect them via the internet. A full description of the WIRES technology is in the June issue of *CQ*.

Radios

There were several new radios on display at Dayton from a variety of manufacturers. Ten-Tec brought out the latest in its Argonaut line of QRP (low-power) HF transceivers. The Argonaut V (also known as the Model 516) operates on

This had to be the visual highlight of the 2002 Dayton Hamvention® — an ongoing demonstration that Yaesu's new VX-7R "submersible" handheld really is!



ICOM's new ID-1 digital transceiver operates on 1296 MHz as part of the new D-Star digital network that the company has been developing in conjunction with the Japan Amateur Radio League.

*Editor, CQ
e-mail: <w2vu@cq-amateur-radio.com>

One of two new radios from Ten-Tec, the Argonaut V is a QRP rig (up to 20 watts) for HF. When the FCC approves the new 60 meter ham band, Argonaut V owners will be able to download new operating parameters from Ten-Tec to get on the band right away.

AOR's AR-8600 Mark II is a wideband receiver covering 100 kHz to 3 GHz (minus cellular). An optional NTSC video module will allow you to watch the TV signals it picks up.

160–10 meters with general-coverage receive from 500 kHz to 30 MHz, at a power output of up to 20 watts. You can dial it down as low as one watt from the front panel. It includes 35 built-in IF-DSP filters and is set up to work digital modes such as PSK-31 with direct connections from a computer sound card. All features and functions are stored in Flash ROM, so upgrading the radio to transmit on the recently proposed 60 meter band will be as easy as downloading new software from the Ten-Tec website. The Argonaut V is expected to be available this month and will sell for $795, direct from the manufacturer.

Ten-Tec also had its new Orion transceiver on hand. This top-of-the-line HF radio ($3300) was introduced at the Charlotte hamfest. It features two fully independent receivers, dual 32-bit digital signal processors, and a choice of over 1000 IF-DSP filter combinations, and it puts Ten-Tec squarely in the battle for outfitting the "big gun" stations.

ICOM introduced its new IC-2720H dual-band VHF/UHF FM mobile rig. It covers the 2 meter and 70 centimeter bands with up to 50 watts out on VHF and 35 on UHF, and features a remotable head and separate controls for each band. Plus, it borrows a feature that's been common for years in upper-end scanners: Its 212 memory channels may be organized in 10 fully customizable memory banks, so you can have one group of memories for use at home, another for use in a favorite vacation spot, etc.

AOR brought out its new AR8600 Mark II receiver, which covers 100 kHz to 3 GHz (minus blocked cellular frequencies) and has improved receive audio compared to the previous version. It can also take an NTSC video module for tuning in TV stations. Law enforcement and authorized government users may also be interested in

Yaesu's new FT-897, described as "an FT-817 on steroids," was one of the hits of the show. It puts out up to 100 watts when connected to conventional power sources or 20 watts on its internal NiMH batteries. The radio covers 160 meters – 70 centimeters (minus 222 MHz).

The Alpha-6 gives a new high-power option to 6 meter operators who want to be sure they're heard whenever there's a band opening!

The new Minuteman antenna can be broken down, folded up, and put into a briefcase as part of an all-band "go kit" for emergencies.

The AlfaSpid antenna rotator is unusual in that it operates on a 12 volt DC motor, making it usable in temporary as well as permanent installations.

Pro.Sis.Tel of Italy has introduced its new PST 75-18 elevation rotator for EME (Earth-Moon-Earth) and satellite communications.

AOR's AR-ONE wide-range receiver (nothing is blocked). Each computer-controlled unit has ten VFOs and thousands of memories. Up to 99 of these radios can be linked together and controlled by a single computer.

One of the most eye-catching displays was at the Yaesu/Vertex-Standard booth, where three new Yaesu VX-7R handhelds spent the weekend, turned on, suspended underwater in a fish tank! Besides its ability to "take a lickin' and keep on tickin' " after being submerged in water, the VX-7R is a quad-band HT (6 meters, 2 meters, 70 centimeters, and low power on 222 MHz) with a wide-coverage receiver that features a separate memory bank for shortwave broadcast stations, a weather-channel memory bank with severe-weather alerting, and a third specialized memory bank for marine-band frequencies (receive only). Yaesu anticipates that this radio will be very popular with hams who also enjoy boating.

Yaesu also introduced the "Field" version of its popular high-end FT-1000 MP Mark V. This version has a built-in power supply and puts out 100 watts on all HF bands, plus all the many features of the original Mark-V.

Another new radio from Vertex Standard/Yaesu was the FT-8900, a quad-band FM mobile rig that includes 10 meters as well as 6 meters, 2 meters, and 70 centimeters. There's plenty of DX at the top end of 10 meters as well as the bottom, both on repeaters and via simplex on 29.600 MHz. Features include a whopping 800 memory channels, 50 watts out (30 on 70 cm), and something called "Hyper Memory," which can store and recall a complete set of transceiver configuration data. This lets you switch between complete setups, say one for use around town and one for traveling.

The rig that drew the most attention at the Vertex-Standard booth (even more than the VX-7Rs in the fish tank!) was the FT-897, what Yaesu's Chip Margelli, K7JA, describes as "an FT-817 on steroids." Designed as a mobile, portable, or stay-at-home version of the incredibly popular 817, the FT-897 is about 50% bigger and puts out 100 watts on HF plus 6 meters, along with 50 watts on 2 meters and 20 watts on 70 centimeters. That's if you hook it up to a 12 volt power supply or a car battery. But you can also switch over to its internal nickel metal hydride (NiMH) battery and get 20 watts out on all bands for operating away from a standard 12 volt power source.

Elecraft introduced a high-power version of its very popular K2 QRP transceiver kit. The K2/100 gives 100 watts of punch to the K2. You may either purchase a K2/100 as a full kit, or current K2 owners may the KPA-100 amplifier integration kit to add high power to their existing radios. The K2 plus KPA-100 sells for just over $900.

One other entry in this category isn't really a radio, but it puts out RF—and quite a bit of it. The famous Alpha line of RF amplifiers now includes a 6 meter model, the Alpha 6, which uses a single Svetlana 4CX1600B tube to put out full legal power on the entire 50–54 MHz band. Based on the well-established Alpha 99 design, the Alpha 6 needs just

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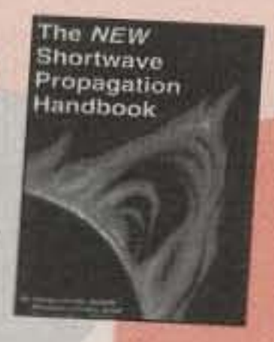

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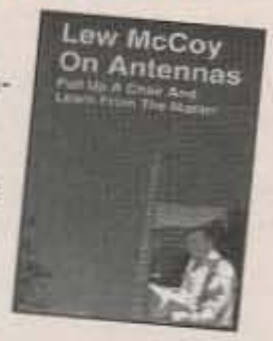
by Lew McCoy, W1ICP



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Kenwood "Top Guns"

Kenwood continued its tradition of honoring outstanding amateurs at a pre-Hamvention reception, presenting its "Top Gun" awards this year to ARRL New York City/Long Island Section Emergency Coordinator Tom Carrubba, KA2D, in recognition of the heroic work by hundreds of amateurs in the aftermath of the terrorist attacks on the United States last September, and to ARRL Honorary Vice President Evelyn Gauzens, W4WYR. Gauzens, who retired earlier this year from the ARRL Board after 22 years as Southeastern Division Vice Director, is well-known in the ham radio industry as the long-time chairman of the annual Miami "Tropical Hamboree" hamfest. Gauzens is the first Vice Director ever named an Honorary Vice President by the ARRL.

Evelyn Gauzens, W4WYR (left), and Tom Carrubba, KA2D (right), are congratulated by Kenwood's Paul Middleton, K4NUH (center), on receiving Kenwood's "Top Gun" award or 2002.

55–60 watts of input to generate full 1500 watt output, and provides full break-in (QSK) operation and unlimited "key-down" transmitting. The Alpha 6 lists for $2895.

Antennas and Rotators

All that power won't do you much good without a good antenna, and we had several new products this year in the antenna and rotator category.

A new "player" in the antenna field is the MinuteMan 20 from Quick Silver Radio Products, a new company formed by former ARRL Advertising Manager John Bee, N1GNV. The MinuteMan 20 is designed as an easy-to-set up antenna for 20–10 meters. Our photo also shows it disassembled and packed into a "go kit" with an FT-817 for quick setup and operation from just about anywhere.

Alfa Radio of Edmonton, Alberta, has introduced the AlfaSpid rotator, powered by a *12 volt DC* motor. The company says it went the 12 VDC route to avoid the added expense (and therefore higher price) of getting UL approval for an AC-operated device, and notes that it makes the rotator useful for portable and mobile operation as well (but don't turn the beam while you're driving!). The cost for U.S. residents is $530 plus $25 shipping. In Canada, it's $850CN.

Italian manufacturer Pro.Sis.Tel has added the PST-75-18 rotator to its already impressive rotator lineup. The 75-18 is a heavy-duty elevation rotator for EME (Earth-Moon-Earth) or satellite use. It lists for $815. Pro.Sis.Tel was displaying its products at the Array Solutions booth, where we also found a brand-new control box for a 4-square array. This is a configuration used mostly by big guns on VHF, stacking two sets of two Yagis next to each other and rotating the whole system as a unit.

Budd Drummond, W3FF, has started W3FF Antennas and is offering the "Buddipole" portable modular antenna system for 40–2 meters. Intended for portable use, it weighs just over two pounds and collapses from its fully-extended length of 16 feet to a mere 22 inches for transportation and storage. It can be set up in a variety of configurations.

Plus, AOR has something new for shortwave listeners with limited antenna space, the LA-350 Indoor Active (Amplified) Loop antenna. It covers 3–30 MHz and additional loops are available.

Other Stuff

MFJ has introduced a "DX Beacon Monitor," which features a world map showing the locations of the 18 worldwide HF beacons of the International Beacon Network and a built-in WWVB receiver which keeps its internal clock in sync with the atomic clock at WWV. The beacons each operate on a precise timetable. The DX Beacon Monitor lights up which beacon is transmitting at what time – so if you hear a beacon on a specific band, even if you can't copy its 22-wpm CW identifier, the Monitor will show you which one it is and let you know the band is open to that part of the world!

Finally, Powerex has introduced a new line of rechargeable NiMH (Nickel Metal Hydride) batteries for the amateur market. The 1800 mAH AM-4AA180 features "memory free" operation and can be recharged up to 1000 times.

As I said at the beginning, the show was so busy that I didn't have time to do a complete tour, so I'm sure I missed quite a bit. We'll try to fill in the blanks in future issues. CU in Dayton next year?

Math's Notes

What's New And How To Use It

BY IRWIN MATH, WA2NDM

Some Unique Applications of Voltage Regulators

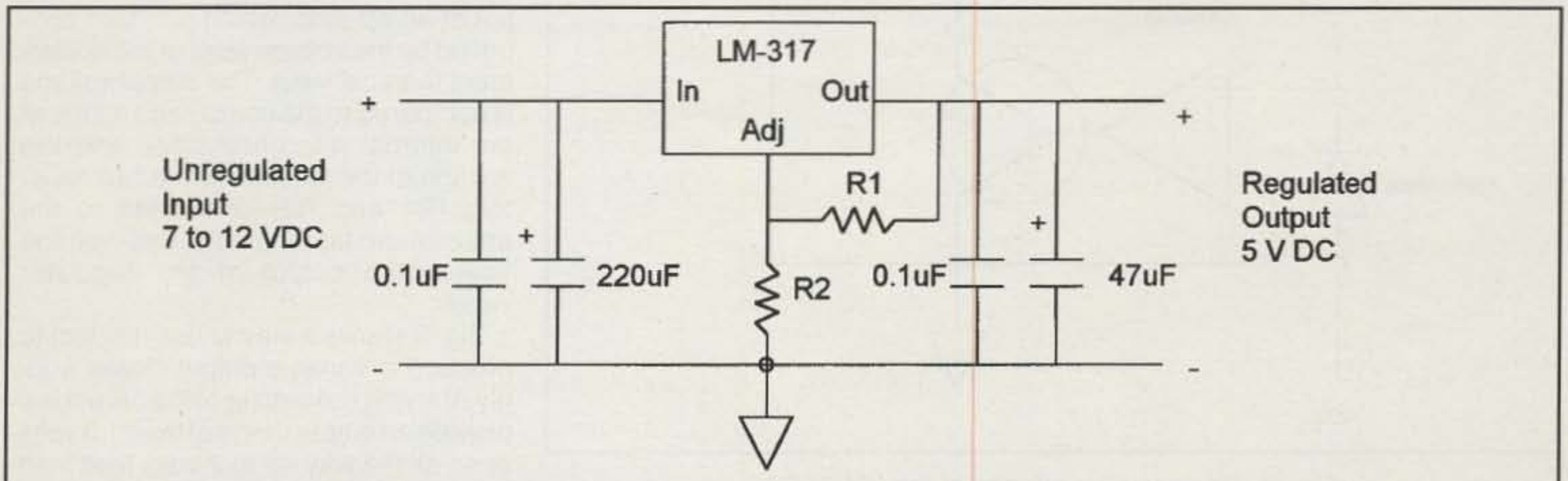

Fig. 1– Normal application circuit for the LM-317 regulator.

Almost everyone who has lifted a soldering iron is familiar with the lowly voltage regulator, in particular the popular adjustable LM317 and its counterparts. However, did you know that they can be used for more than just voltage regulation?

Before we show you some unique applications, let's first look at how these chips actually operate. Although their most popular form is in the TO-220 three-lead package, these

c/o CQ magazine

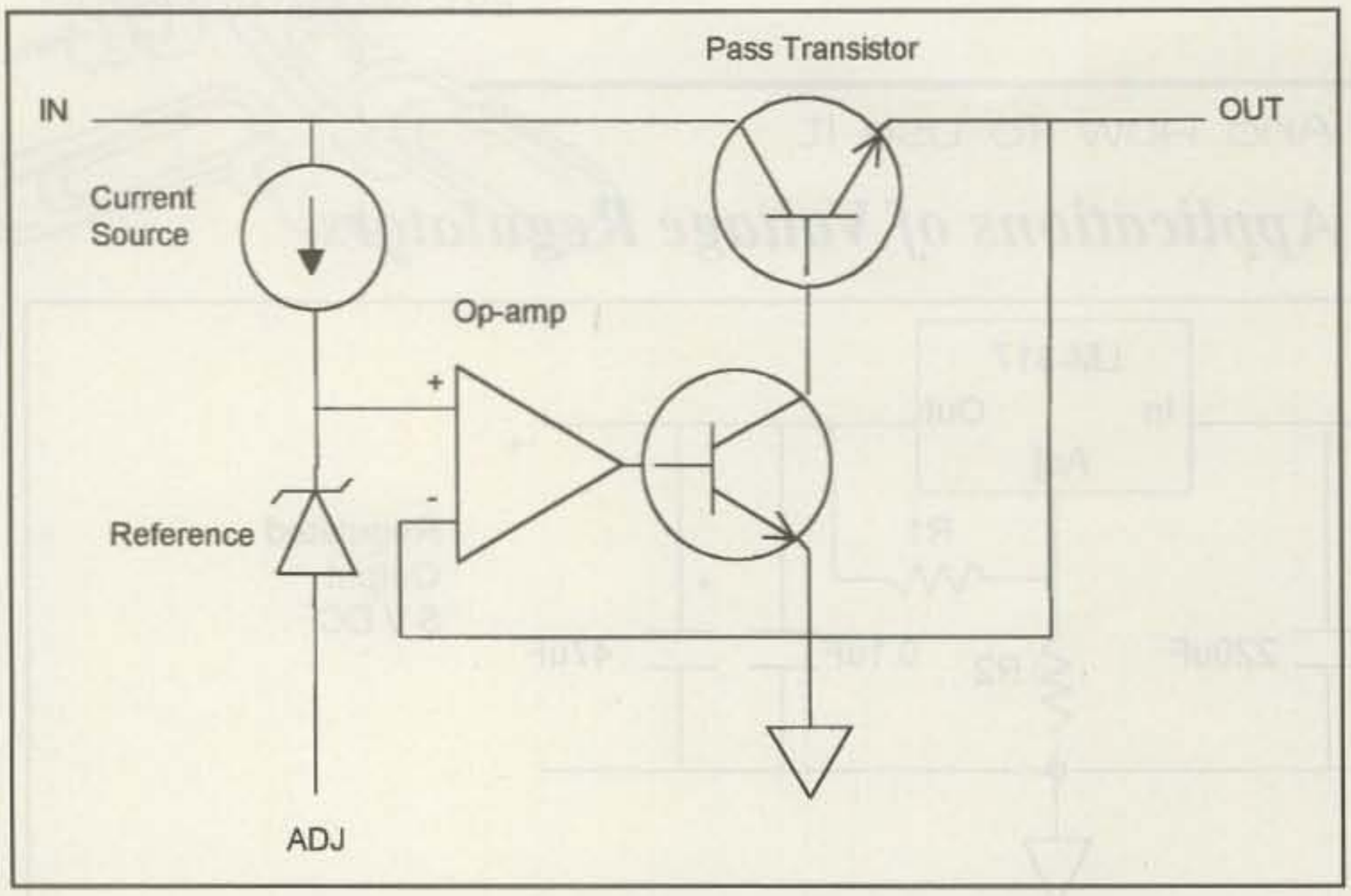

Fig. 2– Basic inner workings of the LM-317.

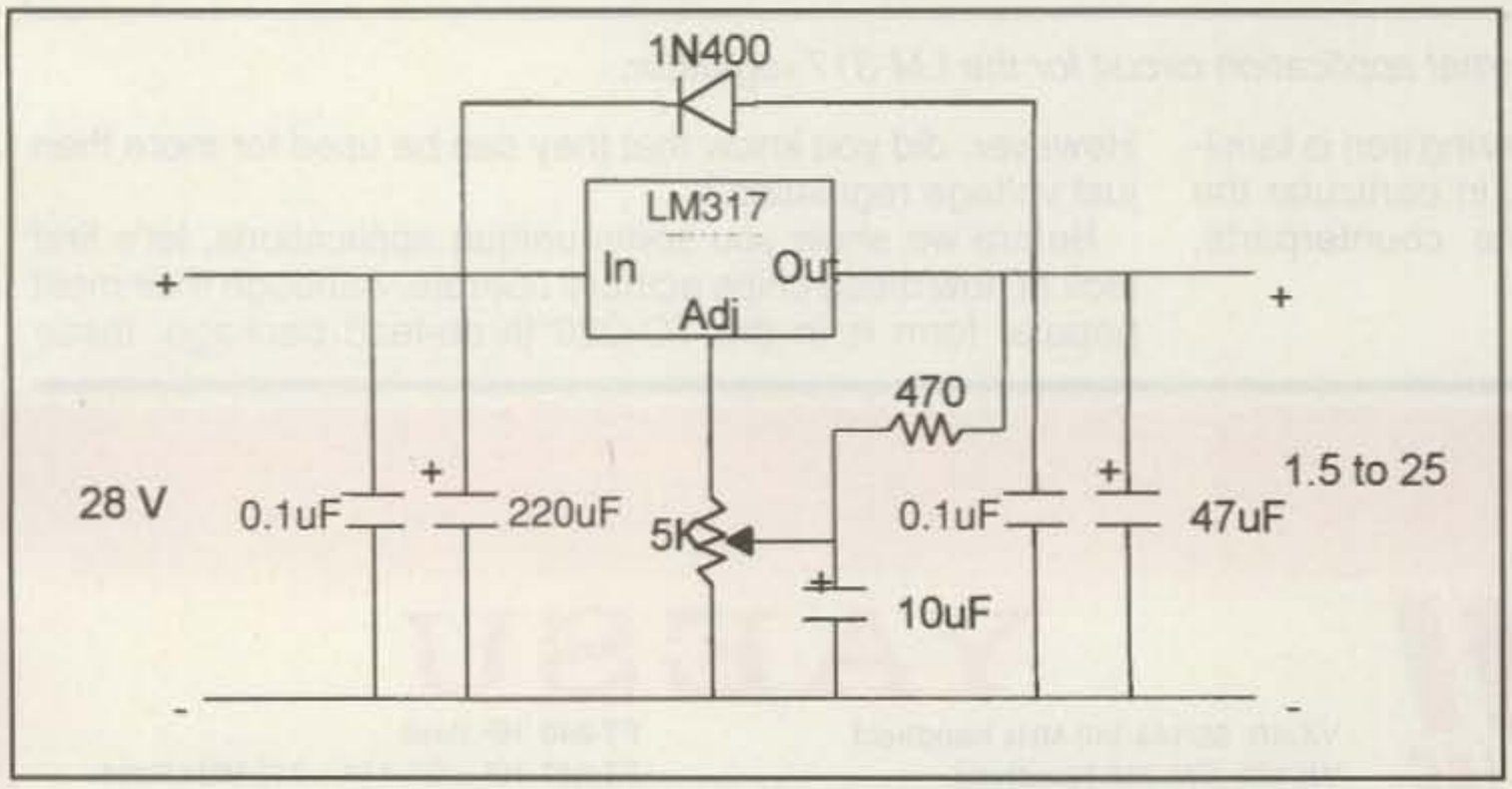

Fig. 3– Circuit for a variable regulated power supply.

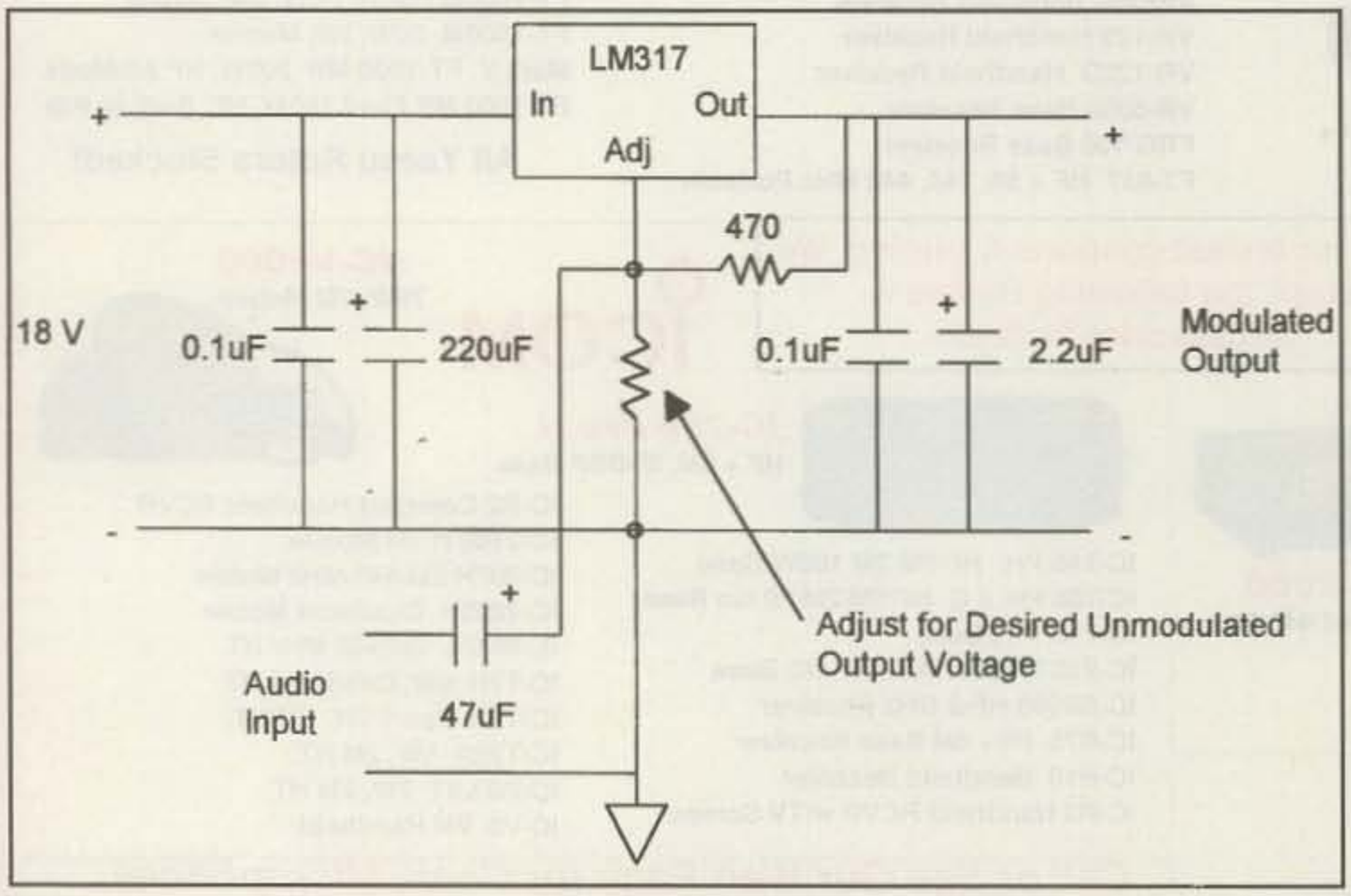

Fig. 4– Circuit for a simple amplitude modulator.

devices are really complete regulators with error amplifiers, internal references, pass transistors, etc. Fig. 1 is a schematic of the usual application circuit, and fig. 2 is a block diagram of what goes on inside. You can see that there is a pass transistor controlled by the output of an op-amp, which is in turn controlled by the voltage level of the adjustment terminal input. The output voltage is compared to the combined voltage of the internal reference diode and the voltage at the junction of the two resistors (R1 and R2) connected to the adjustment terminal. As this voltage varies, the output of the regulator varies.

Fig. 3 shows a way to use this fact to produce a variable-output power supply. Varying the setting of the 5K pot will provide an output range of from 1.3 volts or so all the way up to 2 volts less than the input. The output current will be a function of how well the regulator is heat sunk, but if you choose the right case (the TO-3 version) and mount it properly, you could draw as much as an amp and a half or so. If you plan to draw this much current, be very careful: *The chip will get hot!* The maximum input to the LM317, by the way, should not exceed 28 volts. Such a circuit makes a very inexpensive lab-type supply and is ideal for those operating with a tight budget.

It should now be quite obvious that the output voltage will track the adjustment voltage. Now let's look at fig. 4. You will notice that the 5K pot has been replaced by a resistor and coupling capacitor. This simple variation changes the circuit into an amplitude modulator that is ideal for low-power AM applications. The voltage-adjusting resistors are now chosen to produce the desired DC output, and the audio input level is adjusted so that the output swings as far above and below this value as desired. A secondary benefit is that the output quiescent point (the DC level with no audio) is also regulated. In addition, the output filtering capacitor has been reduced to not shunt too much audio. You will have to "play" with this value for proper operation in your particular application, but if it is made too small, the LM-317 may oscillate.

The above are only a very few uses for this versatile device. I am sure that with a bit of experimentation and an understanding of what an adjustable regulator can really do, you can come up with some unique applications that are not limited to voltage regulation.

73, Irwin, WA2NDM

Are you an ICOM user? How is the quality of your audio? Read what N2OZ discovered about ICOM audio quality and how to improve it.

CQ Reviews:

The Heil Sound Series of Special Microphones for ICOM Transceivers

BY LEW OZIMEK,* N2OZ

I have been a satisfied user of ICOM transceivers for a number of years. When I first obtained my IC-735 I never thought about its audio signal nor ever asked one of my contacts to give me a report on audio quality. I just accepted what was provided by the manufacturer and let it go at that.

In early 1999, however, I was introduced to Heil Sound's microphone Model HM-10 with the HMP ICOM Preamplifier, a product designed specifically for ICOM transceivers to correct an ICOM audio problem, a problem most ICOM users (including me) did not know existed. This microphone included both the HC-4 "DX Dream Machine" element and a full-range dynamic element. A switch mounted on the microphone housing selects either element. The details of that design and its very effective audio improvement were presented in the February 1999 issue of *CQ*.

The ICOM audio problem existed because ICOM transceivers use low-level audio front ends that permit the use of microphones with electret elements. The "electrets" are very inexpensive and produce a high-level signal, but they do not provide good audio quality because the frequency covered is too restricted. In contrast, most other manufacturers designed their units with standard-microphone-level preamp front ends. These manufacturers could use microphones that provided a higher quality of audio, a capability not readily available to ICOM. This lack of universal interchangeability existed in the industry for years.

My on-the-air experience with my IC-735 and the original special Heil microphone has been very satisfying. Recently, however, I had an opportunity to try new versions of Heil Sound ICOM microphones, namely the Model HM-i studio mic and the HMM-ic hand-held unit. The evolution of these new designs and the effect they have on ICOM performance are quite interesting.

Last year ICOM America invited Heil Sound to help them develop a fix for their low-level front ends in the IC-706 transceivers. The intent was to develop a high-performance electret to match the performance of the dynamic elements produced for Kenwood and Yaesu. That effort resulted in the development of a new high-performance HS-706 headset for the IC-706, and coincidentally, led to the technology used in the Heil "i/ic" series. The design was so effective that ICOM ordered a number of HS-706 headsets from Heil Sound and included them as a promotional give-away with their transceivers. These were very well received and were given rave reviews by users. In the words of Bob Heil, "We solved the ICOM audio problem once and for all," a sentiment apparently echoed by ICOM.

With encouragement from ICOM, Heil Sound continued to work on the microphone designs for use with ICOM equipment. The HMM-ic hand-held was produced using the same electret found in the HS-706 but with the electret mounted in a noise-canceling cavity. It is a quality product that is usable with any ICOM transceiver. This hand microphone and the HS-706 share the same high-quality sound performance.

Photo A– Heil Sound Model HM-i Studio Microphone. (Photos and figure courtesy Bob Heil, K9EID, and Heil Sound)

The next step in the Heil development process was the creation of a studio microphone for use with ICOM equipment. Heil became aware of the availability of a large-diameter condenser microphone element. It had excellent performance characteristics but required 48 volts and therefore was not

*Technical Consultant, CQ
e-mail: <n2oz@worldnet.att.net>

directly usable with the +8 volts provided by ICOM units. Some work in Heil Sound's laboratory resulted in a redesign of the bias and operating parameters of the built-in FET. Thus was born the HM-i studio microphone with a large-diameter high-output condenser element—another excellent high-quality audio microphone for use with ICOM transceivers!

Having learned the history of the improvements made to the Heil line of ICOM microphones, I awaited the delivery of the new units with great anticipation. When the package arrived, I tore it open, feeling somewhat like a child in a candy store looking for new goodies to enjoy!

I first opened the HM-i because it happened to be the first item my hand touched. What a spectacular packaging job Heil Sound created for this product. The microphone was packed in a see-through plastic storage bag with protective foam padding at each end. The microphone itself is an object of beauty (see photo A). It has a most impressive mechanical design in a pleasant color; its appearance makes it an item that is almost a shame to hide in a radio shack. The microphone literally reeks with the message "This is a super, high-quality device."

The HMM-ic hand-held was opened next. Its mechanical design is more closely based on traditional hand-held microphones (photo B). It certainly is not as spectacular in appearance as the studio mic, but is also quite handsome. The two units comprise an impressive pair of products.

Photo B– Heil Sound Model HMM-ic Hand-Held Microphone.

It just happened that the package arrived a short while before my time for a regular ham sked with my cousin. I installed the studio microphone first; it plugged right in and needed no adjustment to work properly. I made a good contact on 20 meters and asked for audio and signal reports. I was amazed at my report—signal strength S4, audio outstanding with "full-bodied" voice reproduction. This report came from someone who knows my voice and one who has been listening to my on-the-air audio for years. His report to me was hard to believe. I checked performance of my IC-735 with the built-in speech com-

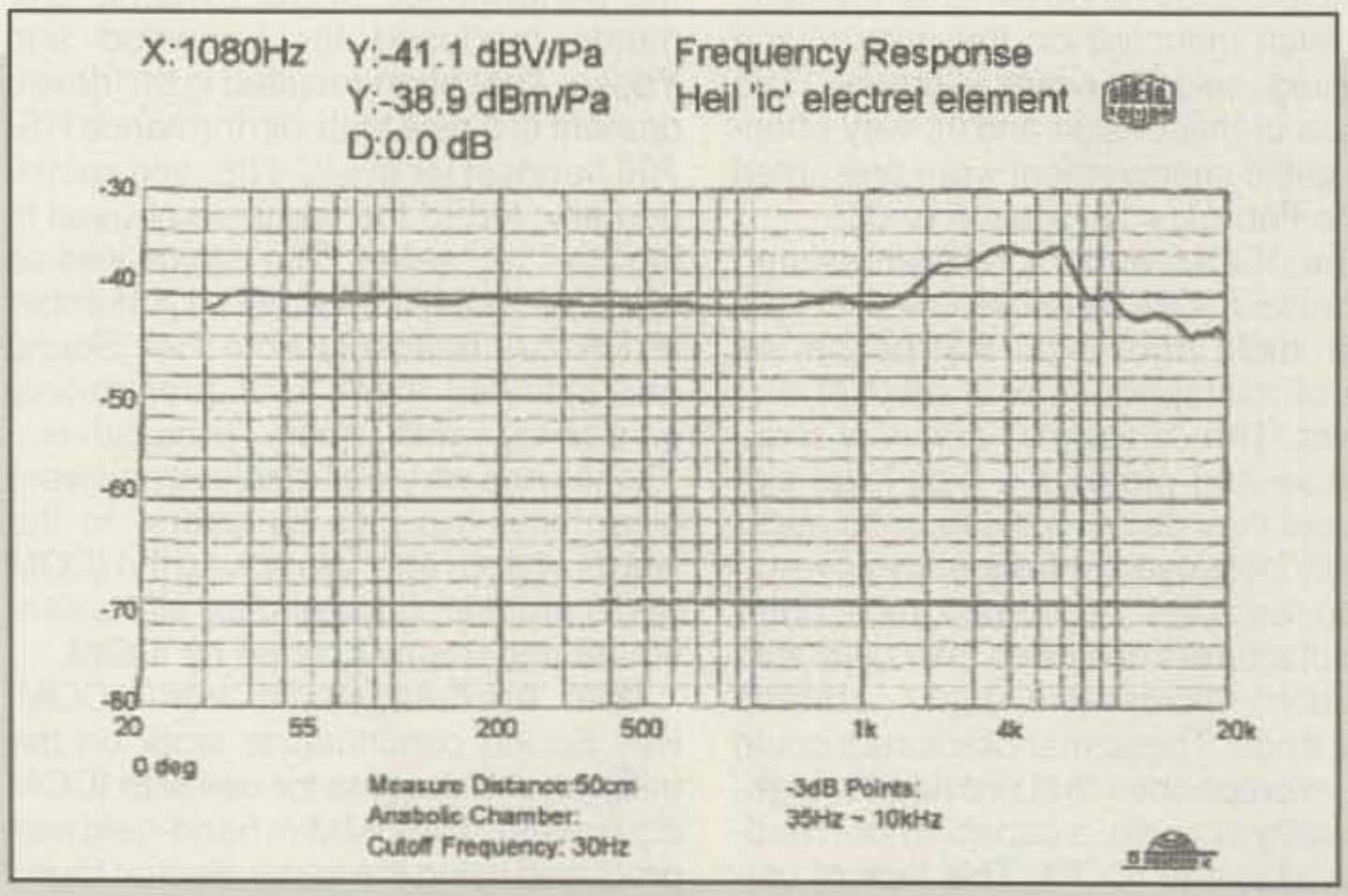

Fig. 1– Response curve of the Heil "ic" electret.

Photo C– Heil Sound Model iCM Microphone.

pressor on and off. The reports indicated that the best audio occurred with the compressor on.

I then substituted the hand-held microphone (HMM-ic) for the studio mic to see how they compare. The report back was that the audio was comparable to that transmitted via the first microphone, and in fact, my contact said that it was difficult to tell apart the audio quality of the two. It appears as if Heil Sound has a pair of winners for use with ICOM transceivers (or really a trio, if you include the HS-706 headset).

I continued to use both versions of microphones on the air. The reports of audio quality were universally excellent, and most listeners liked the audio and rated it as high quality, quite a testimony for this product. However, in April 2002, as part of the celebration of their 20th anniversary, Heil Sound announced a new version of microphone for ICOM transceivers. It was hard to envision something that would surpass the HM-i in performance. I was intrigued and looked forward to an opportunity to try the new microphone.

It wasn't long before I received a Heil Sound iCM microphone, the newest of the line. It had a mechanical design almost identical to that used in the HM-i except that the surface was a beautiful platinum finish (photo C). Again Heil had created a strikingly handsome package, one which would dress up the appearance of any shack.

Before testing the iCM I had to investigate the design parameters that defined the new product. Heil Sound went back to the electret element used in the IC-706 and tweaked its performance to more closely match the filter bandwidth of early ICOM models such as the IC-775, 751, 781, 761, 756, 735, etc. Thus was born a microphone ideally suited to all of the early ICOM versions except the models with numbers ending in zero. (The zero models do not have mic preamps and therefore need microphones with built-in preamps.) The response curve of the "ic" electret element is shown in fig. 1.

I was anxious to repeat on-the-air tests similar to the ones I had performed with the HM-i. The iCM needed no adjustment to work properly with my rig. I made contact on 20 meters on my regular weekly sked. The band happened to be very noisy, but the contact was reasonably good. I switched back and forth between the two models of microphones to let the same individual who evaluated the first model make a direct comparison of my audio. He was able to copy me reasonably well, but when I used the iCM his report was "This microphone provides the most realistic reproduction of your actual voice. Legibility significantly increased with the new microphone and helped to overcome the noise interference." No doubt about it, a solid, favorable testimonial.

I have verified these reports with a number of contacts on various bands. Based on the positive reports I received, I now am exclusively using the iCM with my ICOM-735. It should be noted that these microphones all use the new Heil Audio Wire, which has 100% silver braided shield and 18-gauge wire and has the PTT lines located outside of the audio shield. The PTT outside of the shield reduces RFI and prevents the pops, cracks, or other noise from the DC PTT lines from entering the audio leads. This improved wire certainly contributes to the performance of these Heil Sound microphones.

The prices of these products are quite remarkable. The HM-i studio microphone with connecting cable sells for $125, the HS-706 headset (not tested by the author) sells for $59, and the HMM-ic sells for $59. The new iCM, complete with connecting cable, sells for $89. If you are unhappy with the audio performance of your ICOM, investigate the Heil line of microphones. All of your SSB contacts will applaud your action. ■

What You've Told Us...

Our June survey asked about your VHF/UHF activities and equipment. Your answers solidify the perception that VHF/UHF operating is becoming firmly entrenched in the mainstream of amateur radio, and that the availability of multiple bands on a radio (such as 6 meters on an HF rig) leads to owners making use of those bands. Nearly one-third of you report being predominantly VHF operators, with 15% operating exclusively above 50 MHz and 16% operating more VHF/UHF than HF. In addition, 21% say they split their time about evenly between HF and VHF/UHF, while 42% say they operate more HF than VHF, and only 5% say they don't operate VHF/UHF at all.

The most popular piece of VHF/UHF equipment you own is a single band FM mobile rig (58%), followed closely by a single-band FM handheld (56%), a dual-band HT (47%) and a dual-band FM mobile rig (35%). More surprising is that 26% of you own a multimode HF+VHF/UHF rig for home use, 21% own a multi-multi mobile rig, and 20% own a VHF/UHF only multimode rig for use at home. The rest of the list included multimode VHF/UHF mobile rig (11%), VHF/UHF transverter (4%) and no VHF/UHF equipment at all (3%).

Our next question asked about your operating on VHF/UHF. Nearly 2/3 of you (64%) say you use repeaters; 25% use FM simplex; 18% operate SSB on VHF/UHF; 9% use PacketCluster for DX spotting; 8% operate satellites; 5% (each) use general packet radio and CW, or are not active on VHF; 3% each do experimenting/building or operate APRS (Automatic Position Reporting System); and 2% operate AM.

Finally, we asked which band(s) you regularly use. As expected, 91% of you operate 2 meters and 49% operate on 70 centimeters. But it *was* a surprise that 42% of you are on six meters, followed by 17% on 222 MHz; 8% on 1296; 3% on frequencies above 1300 MHz, and 2% active on 4 meters (70 MHz, Europe only).

Thank you for your responses. This month's winner of a free one-year subscription to *CQ* is Albert Bue, KB9MKJ, of Clinton, Wisconsin.

Reader Survey August 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 (we've already paid the postage). 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, as we begin our CQWW contest results, we have some contesting questions for you.

Please indicate...	**Circle Survey Card #**
1. ... how often you participate in on-air contests.	
Regularly	25
Occasionally	26
Rarely	27
Never	28
2. ... the level of competition at which you view yourself.	
Serious contester/"Big Gun"	29
Serious contester/"Little Pistol"	30
More than casual, less than serious	31
Casual contester	32
Non-competitor; operate to work toward personal goals or to give out points	33
Non-contester	34
3. ... the number of hours you (or your group) typically operate during a 48-hour contest such as the CQWW.	
All 48 hours	35
37–48 hours	36
25–36 hours	37
13–24 hours	38
5–12 hours	39
4 hours or less	40
Do not operate contests	41
4. ... the type of station from which you normally operate during contests.	
Single op/single transmitter (home)	42
Single op/single transmitter (mobile)	43
Single op/single transmitter (guest op)	44
Assisted (any location)	45
Multi-op/single transmitter	46
Multi-op/multi-transmitter	47
Do not operate contests	48
5. ... your typical power level during contests.	
Don't tell the Contest Committee (over 1500 watts)	49
High power (101–1500 watts)	50
Low power (6–100 watts)	51
QRP (5 watts or less)	52
Do not operate contests	53
6. ... your typical antenna setup during contests.	
Multiple Yagis on multiple towers	54
Multiple Yagis on single tower	55
Single Yagi (or similar) on single tower	56
Multi-band vertical	57
Wire antenna(s)	58
"Stealth" antenna	59
Mobile antenna	60

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

NO 41, 42

Alinco Delivers HF Adventure!

Alinco's HF Transceivers Deliver Incredible Performance at a Tiny Price

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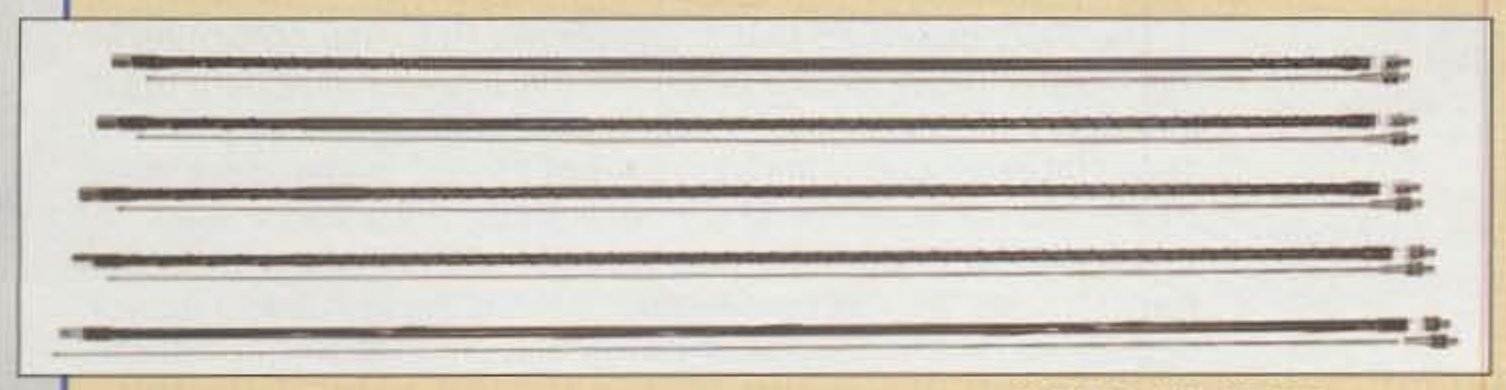

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Washington Readout

Regulatory News In The World Of Amateur Radio

BY FREDERICK O. MAIA, W5YI

FCC Proposes to Allocate New Bands to Amateur Service

"This action proposes changes that would enhance the ability of amateur radio operators to conduct technical experiments, including propagation and antenna design experiments, in the "low frequency" (LF) range of the radio spectrum. In addition, the NPRM proposes to authorize the use of the 5250 kHz band so that amateur licensees can better match their choice of frequency to existing propagation conditions. The Notice, by proposing to upgrade the amateur radio service allocation and add a primary amateur-satellite service allocation in the 2400–2402 MHz band, seeks to protect current amateur use of this band."

(Adapted from FCC Public Notice)

The FCC has adopted a Notice of Proposed Rulemaking (ET Docket No. 02-98) proposing to allocate the 135.7–137.8 kHz (low frequency [LF]) and 5250–5400 kHz (HF) bands to the Amateur Radio Service on a secondary basis.* The Commission also proposed to upgrade the existing secondary Amateur Radio Service allocation in the 2400–2402 MHz band to primary status and add a primary allocation for the Amateur-Satellite Service in this band.

The amateur community can thank the ARRL for all of this. The FCC voted unanimously on May 2 to go along with the League's three petitions.

LF (2200 meter) Band

On October 22, 1998, the ARRL filed a *Petition for Rule Making* requesting that the FCC create two domestic secondary LF allocations for the Amateur Service at 135.7–137.8 kHz and 160–190 kHz. There are currently no amateur allocations in the LF spectrum range. Internationally, the band 130–148.5 kHz is allocated to the Fixed and Maritime Mobile Services on a primary basis.

Section 15.217 permits use of the 160–190 kHz band for general unlicensed operations limited to 1 watt total input power. The League pointed out that numerous amateur radio and non-amateur radio operators in the U.S. are already using the 160–190 kHz band under Part 15.

The petition asked for more liberal operating conditions: an output power limit of 200 W peak envelope power (PEP) and 2 W effective isotropic radiated power (EIRP). "These power limits would allow amateur radio operators to conduct antenna design and construction experiments, and long-range propagation studies with continuous wave (CW, Morse) telegraphy," the ARRL said.

Several countries in Europe and elsewhere already have 136 kHz amateur allocations. The first amateur transatlantic contact on the band was recorded in February 2001.

The European Posts and Telecommunications Commission (CEPT) countries have provided a secondary amateur allocation in the 135.7–137.8 kHz band and limited power output to 1 W effective radiated power (ERP). CEPT members include most European nations who collectively agree on postal and telecommunications issues.

In addition to the general CEPT decision, individual CEPT member nations have instituted some of their own domestic rules. The ARRL noted that Belgian radio amateurs are permitted to use up to 1 kilowatt transmitter output power.

Thirty-two parties filed preliminary comments on the ARRL's LF Petition. Amateur radio operators generally supported an amateur allocation in the LF range. Some commercial users and organizations did not. The FCC, however, agreed that an allocation in the LF range "...would serve the public interest because amateur experimentation could lead to a better understanding of communication techniques in this frequency range [and] would allow amateur radio operators the ability to experiment more freely with propagation, antenna design, and antenna construction." Hams would be secondary to the Fixed and Maritime Mobile Services in the 136 kHz allocation.

"Incumbent use of the 135.7–137.8 kHz band is relatively light and thus a secondary Amateur Service allocation in this band raises few concerns," the FCC added. "The Amateur Service has extensive experience in operating on a secondary basis with primary status services in frequency bands with long-range capabilities and we believe the same would apply here.

"We expect that interference would be rare because amateur radio operators have apparently demonstrated their effective use of the 'listen-before-transmit' protocol, which also can be utilized with the primary users of this band."

To facilitate sharing, the FCC proposed lower power levels than requested by the ARRL. The FCC wants to limit the EIRP to 1 W and the transmission bandwidth to 100 Hz. "Because of possible difficulty in measuring the EIRP of the amateur station in this frequency range, we additionally propose to limit amateur output power in this band to 100 W PEP." The FCC did not suggest restricting antenna size or design for amateur stations because "...such restrictions would inhibit experimentation...."

As requested by the ARRL, access to the band would be limited to amateur operators holding a General, Advanced, or Amateur Extra Class license. With an allocation of only 2.1 kilohertz of spectrum in this band, amateur radio operations "...would be limited to propagation experiments, telegraphy, and low speed data [and RTTY] applications," the FCC said.

Although the League said its engineering surveys suggest that hams could operate without causing problems to power-line carrier (PLC) systems, the Commission declined to provide an allocation in the 160–190 kHz LF band.

The FCC observed that "...significant PLC use continues in this band in many locations" and "...there does not appear to be interest internationally in adding Amateur Services in the 160–190 kHz band." Unallocated Part 15 PLC systems are used by electric utilities to send control signals, data, and voice.

Amateur radio operations in the 160–190 kHz band under the Part 15 rules will not be affected. "Under these rules, amateur operations must meet certain power and antenna length requirements, but they also are allowed to build and operate some equipment of their own design," the FCC said.

60 meter (5250–5400 kHz) Band

Internationally and nationally, the 5250–5400 kHz band is allocated on a primary basis to the Fixed Service, and on a secondary basis to the Maritime Mobile Service. There is currently no international Amateur Service allocation in this band. In the United

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

**The FCC's proposal was released just before our July issue deadline, too late for inclusion in "Washington Readout." We were able to get the basics of the proposal into "Ham Radio News" and "Zero Bias" in July. Fred's column this month now expands on that information with additional detail and background.—ed.*

States, 5250–5400 kHz is primarily used by the U.S. Government for ship-to-shore and fixed point-to-point communications.

The League said the trend for existing 5 MHz Fixed Service operations is to migrate to "alternative technologies" such as microwave, satellite, and fiber for long-haul communications. The organization therefore believes that this band should become increasingly available for amateur radio use.

On January 8, 1999 the FCC granted an experimental (WA2XSY) license to the League so that 15 stations could compare communications reliability among the 3500–4000, 5100–5450, and 7000–7300 kHz bands. The ARRL said the results of this experiment show that amateur stations can indeed co-exist with incumbent operations without causing harmful interference. "There have been no reports of interference attributable to amateur operations."

On July 24, 2001 the ARRL filed a formal Petition for Rule Making (assigned RM-10209) requesting that the FCC create a domestic secondary Amateur Service allocation in the 5250–5400 kHz band. The League claimed "...there is a current need for 150 kilohertz of usable spectrum around 5000 kHz for the Amateur Service, and that this action is needed to fill the ionospheric propagation gap between the propagation paths provided by the Amateur Service allocations in the 3500 to 4000 kHz (80-meter) and 7000 to 7300 kHz (40-meter) bands."

The League maintains that there are times when the existing Amateur Service allocations in the 80 and 40 meter bands do not provide reliable communications due to solar cycles, seasonal and daily variations in the ionosphere, and overcrowding; "...an allocation in the 5000 kHz range would provide optimum propagation conditions on occasions when ionospheric conditions do not permit the use of other frequency bands."

The ARRL added that this "propagation gap" occasionally interrupts emergency communications by amateur radio operators between the U.S. and the Caribbean islands during hurricanes and severe weather disasters.

The League said this new amateur band is supported by both the U.S. Dept. of Commerce and the IARU (International Amateur Radio Union), and there are pending proposals for an amateur allocation around 5000 kHz in Europe. The United Kingdom is studying the 5245–5445 kHz band to address propagation, noise, and congestion problems for amateur HF communications.

The ARRL suggested that the technical rules for this band be the same as for the 3500 kHz and 7000 kHz bands—for example, output power would be limited to 1500 watts PEP with the entire band authorized to RTTY, data, phone, and image emission types.

The FCC agreed that "ARRL's experimentation appears to support its contention that the 5000 kHz frequency band can be effective in supporting communication when the 3500 kHz and 7000 kHz bands are not [usable]. Therefore, we tentatively conclude that the Amateur Service would benefit from a secondary allocation in the 5250 to 5400 kHz band and propose to establish such an allocation.

"The primary allocation to HF broadcasting in Europe and parts of Asia also hinders certain amateur operations in two-thirds of the 7-MHz band in the evenings," the FCC noted. Amateurs are required to "operate around" these primary users.

"It appears that amateur radio operators should be able to avoid interference to primary operations in the 5250 to 5400 kHz band due to the limited numbers of primary assignments which are authorized for operation in the band, and their experience in sharing HF frequencies in other bands.

"The operational protocol of 'listen-before-transmit' employed by amateur radio operators should further minimize interference." Noting that this technique is not explicitly required by Part 97, the FCC requested comment on whether it should be clearly stated in the Rules in order to protect the primary operators in the 5250–5400 kHz band.

As requested by the ARRL, the FCC

Landmark "CC&R" Bill Introduced into Congress Provides for Reasonable Antenna Accommodation

Could provide amateurs relief from prohibitive deed restrictions

On May 14, Rep. Steve Israel (D-NY, whose father is K2JCC) introduced the Amateur Radio Emergency Communications Consistency Act into Congress. H.R. 4720 would require private land-use regulators to "reasonably accommodate" amateur radio antennas consistent with the limited federal preemption known as PRB-1, which now applies only to states and municipalities. Rep Greg Walden, WB7OCE (R-OR), and Rep Pete Sessions (R-TX) have signed on as original co-sponsors.

"Reasonable accommodation" is an extremely flexible standard, and leaves private land use administrators extensive discretion in determining what concessions for ham radio antennas are appropriate in individual cases.

Representative Israel said in a statement read into the Congressional Record that his bill would subject private land-use regulations to the provisions of the FCC's PRB-1 preemption policy. "Under current law, the FCC does not apply this policy consistently," Israel said, noting that PRB-1 now applies only to state and local zoning and land-use regulation of ham radio antennas.

"My bill addresses this issue and provides Amateur Radio licensees with the ability to negotiate reasonable accommodation provisions with homeowners' associations, just as they do now with public land-use regulators [and] will help to protect the vital function of Amateur Radio as an emergency communications and public safety resource."

As it is now, homeowner associations and residents are legally bound by land-use limitations known as "covenants, conditions, and restrictions" applying to their subdivision. The FCC did not include CC&Rs in their PRB-1 pre-emption because of their contractual nature.

At its July meeting last year the ARRL Board of Directors adopted a goal of legislative action to help overcome the restrictions that CC&Rs impose on amateur radio antennas and their structures. League officials met with members of Congress earlier this year in an effort to obtain the needed legislation. It resulted in H.R.-4720.

The bill contains only one sentence: "For purposes of the Federal Communications Commission's regulation relating to station antenna structures in the Amateur Radio Service (Section §97.15), any private land use rules applicable to such structures shall be treated as a state or local regulation and shall be subject to the same requirements and limitations as a state or local regulation."

Speaking at the recently concluded Dayton HamVention®, ARRL president Jim Haynie, W5JBP, acknowledged that getting the bill passed will not be easy. He added that "...it becomes important for all of us to write or call your congressman and voice your support."

proposed to limit the output power to 1500 W PEP and invited comments as to whether the 5250–5400 kHz band should be restricted to Amateur Extra Class operators "...to better ensure compatible sharing with the Federal Government operations." As an alternative, the band could also be made available to operators with a General or higher class license as currently authorized in the 10.1–10.15 MHz (30 meter band).

The Commission also asked for comment on whether the power limit and operator license requirement are sufficient to prevent interference to primary users, and whether an EIRP limit would be appropriate for this band.

"The 5000 kHz Petition does not discuss sub-banding and the ARRL's suggested rules would allow all emission types to use the entire band," the FCC observed.

Several commenters suggested that the lowest 25 kHz of the band should be set aside for CW/digital data modes and the rest for SSB as currently is the policy most of the other HF bands. The FCC asked for comment on whether narrowband emissions should be segregated from wider emissions such as single-side band voice.

The band, if approved, would be the first new amateur HF allocation since the World Administrative Radio Conference 1979 gave amateurs 30, 17, and 12 meters, the so-called "WARC Bands."

Primary Status for Amateur Service at 2.4 GHz

Internationally, in all three ITU Regions the 13 cm band 2300–2450 MHz is allocated on a co-primary basis to the Fixed and Maritime Mobile services and on a secondary basis to the Amateur Service. Furthermore, industrial, scientific, and medical (ISM) devices operate at 2400–2500 MHz, and users in this band must accept interference caused by these devices.

The Amateur-Satellite Service is also permitted to operate in the 2400–2450 MHz band on a non-interference basis. In the United States, unlicensed Part 15 transmitting devices are also permitted in the 2400–2483 MHz band on a non-harmful interference basis to licensed services. These devices are used for a variety of operations, including cordless phones, wireless local area networks, and other broadband wireless applications using industry standards protocols such as IEEE 802.11b and Bluetooth.

On November 18, 1999 the Commission adopted a Policy Statement concluding that the 2400–2402 MHz band should be placed into a spectrum reserve for future "new technology" applications. Responding to this action, the ARRL filed a Petition for Rule Making (assigned RM-9949) on July 17, 2000, requesting that the 2400–2402 MHz band allocation be upgraded to primary status in both the Amateur and Amateur-Satellite Services. Radio amateurs use this spectrum slice for both analog and digital satellite uplink and downlink operations and various other satellite applications. Amateurs already are primary at 2390–2400 and 2402–2417 MHz. In support of its request, the ARRL said that a primary allocation in the remaining 2 MHz would protect its operations from reallocation or use by an incompatible sharing partner.

The League said that upgrading the Amateur Service and Amateur-Satellite Service allocations in this band would not impose constraints on co-frequency Part 15 and Part 18 devices because this band is located at the lower edge of the segment in which such devices operate.

The Radio Amateur Satellite Corporation (AMSAT) commented that the Phase 3D satellite was built mostly by volunteers from a number of countries at a cost of approximately $4 million. This satellite carries a group of broadband receivers that operate in various bands available to the Amateur-Satellite Service from 21 MHz to 5.7 GHz and broadband linear transmitters that operate in various Amateur-Satellite Service bands from 144 MHz to 24 GHz. Two of Phase 3D's satellite transmitters are in the 2400–2402 MHz band, as is one of its receivers. Furthermore, primary status is needed "...to provide some assurances of future occupancy of the band segments for the next generation of amateur satellites."

The FCC said it believed that the ARRL's request to upgrade the allocation status of the 2400–2402 MHz band has merit. The Amateur Service "...has invested time, effort, and money in the development of the Amateur and Amateur-Satellite Services and primary allocations in this band would protect this investment from future allocation requests in the band."

Accordingly, the FCC is proposing to upgrade the Amateur Service allocation from secondary to primary status and add a primary allocation to the Amateur-Satellite Service in the 2400–2402 MHz band. Amateur satellite operators will still be required to protect other services operating in this band outside of the United States from harmful interference. Only a change in the allocation status of the 2400–2402 MHz band is proposed. No change in any other Amateur Service rules affecting the 13 cm band is planned.

Either a primary or secondary allocation in ISM bands must accept interference from, and not hinder the use of, ISM equipment. "Similarly, this band is extensively used by unlicensed operations, which have been able to share with Amateur Radio station use to this point. Because this band is important to unlicensed applications and there is widespread deployment, the removal of such devices would not be feasible," the FCC said. The Commission asked for public comment on whether the proposed primary Amateur Service and Amateur-Satellite Service allocations would conflict with unlicensed use of the band.

The comment period expires 45 days after being published in the Federal Register (about July 15th). Reply comments close 15 days later. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) located at: <www.fcc.gov/e-file/ecfs.html> or by filing paper copies. Due to the recent anthrax scare, electronically-filed comments are preferred. 73, Fred, W5YI

Public Service

BY BOB JOSUWEIT, WA3PZO

Public Service and Emergency Communications

Internet Linking Provides Public-Service Opportunity

These days one of the most exciting aspects of ham radio to the VHF/UHF operator is the linking of hams around the world via the internet. This month we take a look at some of the different sides of public service.

Radios and Computers

IRLP, I-LINK, and EchoLink are three of the most popular applications for linking radios and the internet. In simple terms, a person talks into a repeater. There is a radio link between the repeater and a radio. The radio then is connected to a computer which is connected to the internet. At the other end of the contact the system is the same. The linking across the internet is controlled by the software.

An Educational Tool

Public service is not always providing a service when normal communications fail. It can also provide a service to the educational process of learning about people in other lands, learning about geography, and furthering international goodwill.

Members of the Bonner Computer and Amateur Radio Club along with moderator Fr. Dan, KA3VMA. (Photo courtesy KA3VMA)

One such program is in place at the Monsignor Bonner High School in suburban Philadelphia. Fr. Dan McLaughlin, KA3VMA, moderator for the Bonner Computer and Amateur Radio Club (BCARC) told *CQ:* "As a teacher, I was very happy when I saw the students, on their own, using information sources on the internet while talking to amateur radio operators on the IRLP. The club members shared common enthusiasm using modern resources to piece together a picture of the person to whom they were speaking."

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

At the high school Father Dan is a teacher of theology for freshmen and juniors. Initially, he envisioned making contact with Christian missionaries and arranging QSOs during school hours. "I had thought to use HF radio," said Fr. Dan, "but now may be able to use IRLP instead. My aim is to not just talk about Christian values in class, but to show my students how people apply them in the real world. Having the radio and computer equipment in my classroom should help me once I learn [the best way to use] the system.

"In the club there are four or five students interested in computers. I got their attention when one of the students, Matt Henderson, KB3DRQ, made a few contacts using IRLP. I suspect that we may be able to attract more students to ham radio in the future."

We decided to use the internet for an interview with a few of the students at the school, as the schedules of the students and this author were not matching up. In order to protect the identity of the students we are not using their last names. For those not familiar with working with students, this is a fairly common practice, particularly with non-hams, and often a request from schools.

CQ: What do you think about being able to talk to people in foreign countries?

Tray: I am simply amazed by the fact that I can talk to people half around the world, let alone the country below mine.

Jim: It's fantastic, not simply because you're talking to people many miles away, but from the start you are aware that you both share an interest in something. I expected to have trouble conversing with people from so far away, but it was easy and exciting. The radio helps make our large planet feel like a very small place.

CQ: What are you learning?

Jim: I have learned a great deal from these experiences and I certainly gathered a much stronger interest in amateur radio than I had beforehand. I now know simple communications basics and a few radio functions. I plan to go for a Technician class license over the summer. I find it to be a very intriguing experience. The ability to obtain others' opinions through such an interconnected medium is available through the internet and telephone, but it lacks a certain understanding of effort and communicable technology. Being a newbie, I expected to encounter a great deal of animosity, but truthfully that was not the case. I found most hams to be very friendly, interesting, and more than willing to educate. Most important, amongst the radio functions and lingo I learned that amateur radio is only as fun and interesting as the people who use it.

CQ: How do you compare IRLP to cell phones or a chat room?

Jim: There is a sharp difference between radio and other means of communication. Yes, you can use a telephone to contact your friend in Los Angeles or a chat room to talk with all your friends at once, but something is missing. When you talking via ham radio, there is a mutual love for, and knowledge of, the means of communication being used.

Rachlan: Amateur radio is the best. Unlike cell phones, there is no cost, and unlike chat rooms, you can talk to the person voice to voice and listen to their tone of voice.

CQ: Has ham radio influenced you in what you want to study or in a career path?

Jim: Using ham radio did not influence my career choice, but it most certainly impacted my life. Two years ago the only radio I knew

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about was the one that came with my alarm clock. Today I understand that there is a vast amount of information to obtain concerning amateur radio, and that my current base of knowledge is only the tip off an iceberg.

KB3DRQ: I really feel that most of the learning in amateur radio occurs after you have your radio license. Once you have your license, a whole new world opens up and you can learn from other amateurs and by trial and error. I still learn new things about amateur radio almost every day. I plan to upgrade my license class in the future, which will further facilitate my education. Much of what I learn in amateur radio is applicable to other areas as well, such as a physics class I took here at Bonner.

CQ: What do you tell your friends about your experience?

KB3DRQ: When friends and acquaintances ask about what we do here in the Computer and Amateur Radio Club, I can tell them exciting stories about talking to people in other parts of the world. Usually this sparks an interest in the student, and as a result, contributes to increased club enrollment.

I find the experience of communicating with other hams across town and round the globe to be quite exhilarating. For example, I spoke via IRLP with KBØQQW in California, who during the course of our QSO I found to be involved with a rocketry and astronomy club. Amateur radio is certainly an interesting and appropriate medium for meeting other people with different interests, abilities, talents, etc.... We try to stress here in our club how computers and amateur radio can work together, and the Internet Radio Linking Project is a prime example of this."

Father Dan says the process of using amateur radio in the classroom "has been a slow and steady one aiming in the right direction. We moved our radios from across the hall of the school to my classroom. Then we started building our own LAN (local area network) in the back of my classroom. We put up an HF antenna last fall. It took Vic Teneglia, N3IO, a bit of time to get the IRLP nodes working in our area, but once IRLP was working, his ideas and mine seemed to produce some good final results to stir the creative interest in our young people."

Linking in an Emergency

The Central Alberta (Canada) Amateur Radio Emergency Service used IRLP (Internet Radio Linking Project) during a train derailment. The train was leaking anhydrous ammonia. Emergency Management officials evacuated everything within a 1 kilometer radius of the train. For nearly two days local amateurs provided communications among the emergency command post, the Red Cross shelter, and a Red Cross information center. Amateur radio played a key role in providing inter-agency communication.

The Red Deer IRLP node was in the evacuation area and was used for Red Cross Registration Inquiries. Contact between Edmonton and Red Deer was maintained on the reflector. According to information posted on the Central Alberta ARES website, one of the lessons learned during the evacuation was "a need for regional and national reflector sites that can be used for emergency communications with pre-planned ARES net controls during an emergency. These sites could be invaluable for passing Registration and Inquiry traffic."

Other Advantages of IRLP

Point-to-point communications are often needed. Many times traditional amateur radio links via the National Traffic System have failed when there was an immediate or unscheduled need to pass traffic across many miles. During a National Communications System exercise attempts were made to pass messages across the country at times when NTS nets were not meeting. At the time, MARS and other radio services had an advantage because stations were monitoring specific frequencies at all times. They did not have to tune across the HF bands to try to find a station at the other end. With internet linking, the ability to tune in to a particular city or state at any time has some interesting possibilities.

Other possibilities include being on the air via the internet when getting a radio signal out of a building might not be possible. Another option is selective node linking. This offers the ability to communicate over long distances without everyone listening in on 20 meters. Some ARES groups are looking at the EchoStation software to set up a portable repeater in the field.

The amateur radio industry is getting involved as well. Yaesu recently introduced a system called WIRES for establishing temporary internet links between amateur repeaters (details are in the June issue of *CQ*), and ICOM is working with the Japan Amateur Radio League (JARL) on a digital repeater network called D-Star, which could link repeaters via on-the-air or internet connections. D-Star repeaters would accept either digital or analog audio inputs.

Let us know how your group is using the internet as part of its on-the-air public service operations.

ARES Supports Fire School

A common complaint is that the county never calls on our group when there is an emergency. Here are two examples of hams taking the initiative to educate both fire fighters and search-and-rescue personnel in the services that amateur radio can offer:

Missouri's Fire and Rescue Training Institute Fire School

Missouri amateurs worked with over 1200 professiona land volunteer fire department personnel from throughout the United States at the University of Missouri's Fire and Rescue Training Institute Summer Fire School. The school provides first responders with accredited training in National Fire Academy and National Wildfire Coordinating Group courses.

Fire and Rescue Training Institute Director Bruce Piringer, recognizing the value of ham radio operators in large-scale emergency response situations, worked with Boone County Assistant Emergency Coordinator Dale Huffington, AEØS, to

Missouri hams discuss their plans for the University of Missouri's Fire and Rescue Training Institute Summer Fire School exercise. Shown are KCØCZI, KBØHNR, KCØMGG, KMØR, and NØROK. (Photo courtesy Dale Huffington, AEØS)

Michael Vise, KBØZSV, and Gene Trussell, KC5GWS, provide amateur radio communications from the Fire School Command Post. (Photo courtesy AEØS)

invite central Missouri ARES to become a functional unit of the school's Incident Command System.

Kurt Bleich, KBØHNR, organized amateur communications for four days between the school's staging areas, plus the central classroom building and command post. According to Huffington, the staging areas provided fire fighters with practical experience to complement their classroom training in activities such as building collapse and aircraft rescue and fire-fighting operations. In addition, there were outdoor search-and-rescue drills and hazardous-materials incident response classes.

Amateurs provided three repeaters for the class, base station equipment for the central command and two remote administrative sites, a UHF data link tied into the school's LAN to provide file transfers, and equipment for mobile or portable operators for four sites. "Shadow" operators also provided communication for key administrators in the operation. Huffington said that amateurs donated over 300 hours of service for the training.

Ham Killed During Rescue Attempt

A Kansas missionary and ham radio operator was killed during a rescue attempt in the Philippines. Martin Burnham, KCØDNB, and his wife Gracia had been held hostage for over a year by terrorists reportedly linked with Osama bin Laden's al Qaeda terrorist network. News reports last year said the Burnhams were active on the air keeping in touch with other missionaries in the Philippines.

According to news reports, Martin Burnham and Filipino nurse Deborah Yap were killed during an intense firefight between the Abu Sayyaf terrorists and U.S.-trained Filipino military forces. Gracia Burnham was wounded in the leg by the gunfire, but was rescued and taken to a hospital for treatment.

The Burnhams, along with American Guillermo Sobero and 17 others, were kidnapped from a resort where they were celebrating their wedding anniversary. Yap was kidnapped about a month later. Sobero was found beheaded near Abu Sayyaf's jungle hideout on Basilan. Sixteen Filipinos were later released. Finding and rescuing the Rose Hill, Kansas couple had been a major focus of the Philippine government in the ensuing months.

For the past few months U.S. Special Forces have assisted the Philippine military in patrolling the jungles of Basilan island in a joint mission aimed at wiping out Abu Sayyaf as part of the U.S.-led war on terrorism. U.S. officials said no American forces were involved in the rescue mission on the ground. U.S. helicopters reportedly were used to evacuate the wounded.

Search-and-Rescue Teams Introduced to APRS

Over 80 members of various Arkansas search-and-rescue teams attended Rescue 2002, a conference that trained teams across the state to use similar methods and procedures. According to Scott Ratchford, W5JSR, ARRL Emergency Coordinator for Benton County, at least one third of the attendees were amateur radio operators. The Howard County Search and Rescue (HCSAR), sponsors of the events, requires all of its members to hold an amateur radio license or be studying for one.

HCSAR Communications Officer J. B. Davis, N5THS, asked Ratchford and Benton County ARES Assistant EC Mike Engelke, KD5DGT, to teach two introductory classes on ham radio and APRS. "I wanted to show the SAR members at the seminar a simple way to study for the Technician class license and show them some of the new equipment available today," said Ratchford. He also touched on amateur radio's role in emergency services and ARES and RACES. His presentation was a success. "After the class I had several SAR members ask further questions, and they showed a real interest in obtaining their licenses!"

The next day both presented a class on APRS, the Automatic Position Reporting System. "Last year we came down for the first time to give this class and we were successful. This year we came down to again present the class and to test the program in a 'real-world' situation."

APRS combines Global Positioning System (GPS) receivers and amateur radio to track objects. "This program is perfect for situations like this, when you need to know where your SAR teams are at any given moment," said Davis. "We can track our teams out there that are two miles away and show it on our laptop computer here in the command vehicle. I think this technology will help us on our searches and we will add this to our setup."

Search-and-rescue team members monitor search party's progress via APRS. (Photo courtesy Kathie Engelke, KD5EYX)

Websites

Here are some websites to check out:

IRLP – <http://www.irlp.net>
ILINK – <http://www.aacnet.net/radio.html>
EchoLink and EchoStation – <www.k1rfd.com>
Train Derailment – <http://users.rttinc.com/~carlclub/index.htm>
Cole County ARES – <http://midmoskywarn.net/coleares/>
Howard County Search and Rescue – <www.hcsar.com>

After the classroom instruction it was time to field-test the theory with a simulated search and rescue. Four K9 dogs and search teams had to find several lost persons in the woods.

"We put three tracking devices (made up of Kenwood TH-D7A radios and Garmin GPSs) on search teams and used the APRS program in the HCSAR command vehicle to present a visual clue of team locations to the Incident Commander. The three teams that we tracked were taken about two miles away to a staging area. We were able to watch each team as they left the area and began their track," Ratchford said. "We set the tracking devices to beacon a position every 30 seconds. The APRS program captured the path that the teams took, and we used that data to overlay a track on the map that would show us where the teams had been and the areas where they missed." The field test lasted about 2 1/2 hours.

Debriefing is always an important part of a drill or exercise. Search and rescue is no different. The session began with an overview of what had been seen on APRS. Ratchford began with a map of the area search and outlined the path of each team. After the debriefing, a question was asked of the SAR teams: "What would you like to see more of next year? What can we do to improve the conference? The answers were communications, ham radio, GPS, and APRS!

Rescue 2002 was as much of a success for amateur radio as it was for the SAR teams. Representatives of the Arkansas Department of Emergency Management, Arkansas Fire Academy, and several county-level DEM managers also had the opportunity to learn about amateur radio. According to Ratchford, a lot of information was passed, a lot of training programs were offered, and it was made clear that amateur radio will remain a vital part of search and rescue in Arkansas!

With Thanks

This month we took a look at how some digital modes are being used in public service. I would like to thank Fr. Dan, KA3VMA; Dale, AEØS; and Scott, W5JSR, for helping with this column.

Do you have a story to tell? Drop us a note. Until next time . . .

73, Bob, WA3PZO

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Beginner's Corner

BY PETER O'DELL, WB2D

For the Newcomer to Ham Radio

Ground Zero Plus Ten Years

Hurricane season is here. When a massive storm hits, as did Andrew in September 1992, large areas are devastated with monumental property damage, large numbers of people injured, and inevitably some fatalities. With Andrew, portions of Homestead, Florida (just south of Miami) were leveled as if they had been bombed out of existence, as in "ground zero" last September.

Incidentally, even though I am writing about hurricanes specifically, virtually all of these ideas apply to any disaster, natural or otherwise. In the last few months we have had floods in West Virginia and Kentucky as well as major forest fires out west. Also, keeping in mind that not all disasters are "acts of God," September will be the one-year anniversary of 9-11.

But what about cell phones? Haven't they changed everything? In many cases, cellular telephones are of little use. Even if the cell-phone towers are still standing, chances are power is out. Around here, few, if any, cell towers seem to have emergency power. Without a fully functioning tower in range, a cell phone could not be more useless. Even if the cell system is functional, it will probably become severely overloaded in short order.

A couple of years back we had a "near miss" here in Florida; we were without electric power at our house for only about an hour. However, cell-phone service was disrupted for nearly a day. Incidentally, the local repeaters stayed up, and that was just a near miss. Regular phone service to some of the islands that took direct hits was not totally restored for months. According to local news reports, the only reliable information circuit to some of the islands was ham radio.

Historically, the weather patterns needed to generate these behemoth storms in locations likely to be affected the U.S. is mid-August to late October. Officially, though, the season

A hurricane is a type of tropical cyclone, which is the general term for all circulating weather systems over tropical waters. Tropical cyclones are classified as follows:

Tropical Depression: An organized system of clouds and thunderstorms with a defined circulation and maximum sustained winds of 38 mph (33 knots) or less.

Tropical Storm: An organized system of strong thunderstorms with a defined circulation and maximum sustained winds of 39 to 73 mph (34 to 63 knots).

Hurricane: An intense tropical weather system with a well defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. These same storms go by the name "typhoon" in the western Pacific and "cyclone" in the Indian Ocean.

Table I– NOAA storm classifications.

**123 NW 13th Street, Suite 304-2, Boca Raton, FL 33432*
e-mail: <wb2d@cq-amateur-radio.com>

Ten years ago Hurricane Andrew swept acros the Bahamas, south Florida, and southern Louisiana. It was the most expensive natural disaster in U.S. history, causing nearly $25 billion of damage. (NOAA photo)

Scale Number (Category)	Sustained Winds (mph)	Damage	Examples (States Affected)
1	74–95	Minimal	Florence 1988 (LA) Charley 1988 (NC)
2	96–110	Moderate	Kate 1985 (FL) Bob 1991 (RI)
3	111–130	Extensive	Alicia 1983 (TX) Emily 1993 (NC)
4	131–155	Extreme	Andrew 1992 (FL) Hugo 1989 (SC)
5	>155	Catastrophic	Camille 1969 (LA/MS) unnamed 1935 (FL Keys)

Table II– Saffir-Simpson Hurricane Scale.

runs from June through November. If you live near the eastern seaboard or Gulf coast, you already know this. The media hammers away at it from the beginning of June until sometime around Thanksgiving. Even if you do not live in a "target" area, you'll probably hear or see something about one or more of these major storms in next couple of months.

You do not have to be an alarmist to realize that we are in the midst of a major shift in weather patterns. Statistics bear this out. What we do not know is just what the new emerging patterns will be. More hurricanes or fewer? This too comes at a time when our ability to "predict" seems to be improving. Meteorologists have determined that slight shifts in wind patterns in the Pacific seem to be associated with the formation of hurricanes in the Caribbean 10 to 15 days later. We live in interesting times. Regardless, once a hurricane (or any other natural disaster) hits, ham radio comes to the forefront.

Be Prepared

During disasters, standard public-service circuits (police radio, etc.) quickly become overloaded. That's where ham radio comes in. Hams often provide communications services for law enforcement and civil authorities on the scene. Here two things are of paramount importance: Your equipment (including antennas) has to be reliable, and you have to be accurate. Officials are only going to come to you if they have to; that means their circuits have failed or are overloaded. Your equipment therefore has to be reliable or they will dump you—and your communication has to be accurate. Inaccurate or ambiguous communications may be worse than none at all.

If you live in an area that is a potential target of one of these monster storms, you need to think ahead to what you will need for yourself: auxiliary power (long-lasting batteries or generators), replacement antennas with feedline and connectors ready to go, tools (for instance, a little butane soldering iron could prove invaluable), string, tape, and some large zipper-lock bags are just some of the obvious things that come to mind. In fact, if you have participated in the ARRL's Field Day, you should have a good idea of what you need. If you haven't, then I suggest you join a local club that mounts a Field Day effort each year and volunteer to help out.

If you read this just after Field Day this year, there is no need to wait a year. Go join a local club that is active in public-service functions. Most of these groups have checklists prepared that will quickly tell you what you are most likely to need in your area. They also conduct regular training exercises you will want to take part in. Practice sessions give you the experience to know how to handle almost any communications situation that could possibly come up. That's the key to getting the job done efficiently and accurately when the real thing comes along.

One of the best resources for learning about emergency communications is the ARRL's "Public Service Communications Manual." It is only $1.00 plus shipping and handling from the League. Order a copy today and ask them to also send you their free handouts for message handling, net operation, and such. The booklet may be the best buy in ham radio today.

You will need to learn, too, how to properly handle message traffic. ARRL Sections sponsor phone traffic nets (usually on 75 meters in the General portion of the band). Many local groups sponsor 2 meter FM nets that are part

www.fiu.edu/orgs/w4ehw/ – W4EHW home page of the ham radio station at the national hurricane center.

www.arrl.org – ARRL. Among other things, you can pick up message forms to pass out. You will also get the latest status of communications in and out of the stricken area.

www.redcross.org – The Red Cross. Updates on the disaster area and what supplies are needed.

www.nhc.noaa.gov/index.html – National Hurricane Center. Most of the TV news departments pick up many of their graphics here. Includes the watch, warning, and strike probability charts, as well as forecasts, technical articles, and historical data.

www.cwbol.com/hurr.html – Charles Boley's Hurricanes and Tropical Storms page. This is a wealth of links and storm trivia worth looking over before you make your appearance on "Who Wants To Be A Millionaire."

www.nws.fsu.edu/buoy – Interactive Marine Observations page by the National Weather Service office in Tallahassee, Florida. Click on an offshore buoy and find out what the wind speed and wave height are at that location.

www.srh.noaa.gov/tlh/tropical/ – The National Weather Service, Tallahassee, Florida office Atlantic Tropical Season Page. Provides the current forecast and a "hall of shame" of storms.

goeshp.wwb.noaa.gov – National Oceanographic and Atmospheric Administration's Geostationary Satellite Browse Server. Continuously updated photos of the western Atlantic and Caribbean taken from satellites.

www.hurricanehunters. com – Hurricane Hunters. Information on the airplanes and crews that fly through tropical storms to gather data for forecasts.

Other useful sites to visit include The Weather Channel, CNN, and newspaper home pages from the major newspapers in the targeted areas. Check out one of the search engines for other significant sources of information.

Table III– Web addresses for storm watchers. (If you have an old-version browser, you'll need to add the http:// prefix.)

of the ARRL National Traffic System (NTS). A few hours of listening to either of these will give you the basics. After you have listened and gotten the hang of it, check in. Traffic handling is easy and fun, but there is a right way to do it. It just takes a little bit of practice to get it right.

You don't have to become a fanatic traffic handler. You do, however, need to learn the basics—now. When a disaster hits, it is really too late to take a cram course. Just imagine what it would be like to try to pass your first piece of formal traffic with an anxious Chief of Police standing next to you watching your every move. The Boy Scouts are right: *Be Prepared!*

Maybe you already have a packet station. If so, start looking around on the local BBSs for what is going on in your area. In some areas a lot of the message traffic is handled by packet. Get the hang of sending and receiving messages this way if you haven't already done so. Your local BBS may be a wealth of information, too. Some will have files on emergency preparation and disaster drills. You'll probably find other useful resources, too. There are a number of simple programs around to track storms, for instance. This would

be a good time to download one and learn to use it.

What if you are in the middle of Iowa? Hurricanes hardly ever happen in that area. No, but you or your neighbors undoubtedly have relatives living in a target zone. When the big one hits, the Smiths are going to want to know how Uncle Bob is doing down in Miami. When the phone lines are out or totally overloaded in the affected area, hams get the messages through.

Remember, though, health and welfare messages have the lowest priority in an emergency situation. If things are really bad, such messages will be passed only when the circuits are free of Emergency or Priority messages. They do get through, however, and usually well before the phone lines are restored. In the meantime, Uncle Bob may already have sent messages out of the area to friends and relatives he knew would be concerned about his welfare. As a result, there will be messages coming into your area from afar.

Do a Little Research

If you are going to be involved in disaster preparedness and communications, it would be wise to do a little research on the topic. As with most things in our world, the Internet provides us with tremendous information resources. In addition to the obvious pages (The Weather Channel and CNN, for instance), there are other pages that will provide you with a wealth of information. Table III lists some of the more interesting ones.

One of the first places to start, particularly if you live on the East Coast, is the home page for W4EHW, the ham station at the National Hurricane Center in Miami. Here you will find information about hurricanes, ham involvement, and links to a bunch of other sites. There is even a PDF file of a hurricane tracking map at <http://www.fiu.edu/orgs/w4ehw/tracking-maps.html>.

Another thing to do, particularly during an active storm, is to listen in on the Hurricane Watch Net (14.325 MHz). Even if you are in Montana, you might be able to interest the local TV station in sending a crew out to tape your "involvement" in this national story. If it is a slow news day, the assignment editor may be looking for a local "hook" into a national story. If you get the chance, just remember to act professional on camera.

Who knows? Maybe there will be *fewer* major storms this year. Just in case, though,why not follow the Boy Scout adage and *Be Prepared*!

Feedback

From Ben Bass, N2YDM: Just a quick note to thank you for your column in the June issue of *CQ* on repeaters. I am a trustee of one of our club's repeaters and I'm also the database manager and one of the coordinators for our area repeater council. Both are thankless jobs. So many hams think their license entitles them to use any repeater any way they want or to put a repeater on any place they want. Hopefully your column will set some of them straight.

I especially related to the parts about the trustees controlling *their* repeater and the concept of supporting repeaters you frequent. It's about time somebody had the guts to say that in a respected national publication.

QRP

BY DAVE INGRAM, K4TWJ

The Art of Low-Power Hamming

Three Quick-Brew Projects!

Numerous readers have asked me to highlight more quick-brew QRP circuits from eras past, so this month's column answers those requests. It features details on three all-time favorite mini-rigs—one tube type, one transistor style, one IC based—and more overall "build 'em" fun than the law allows. These little gems are inexpensive and easy-to-assemble "weekender" projects you can snap together on perfboard or a block of wood, or even build in a fancy cabinet and designate as a family heirloom. The objective here is to get everyone homebrewing for both personal enjoyment and emergency preparedness, and our upcoming treats fill that need to a "tee." We have a large amount of ground to cover in only a couple of pages, so let's jump right to the views and descriptions!

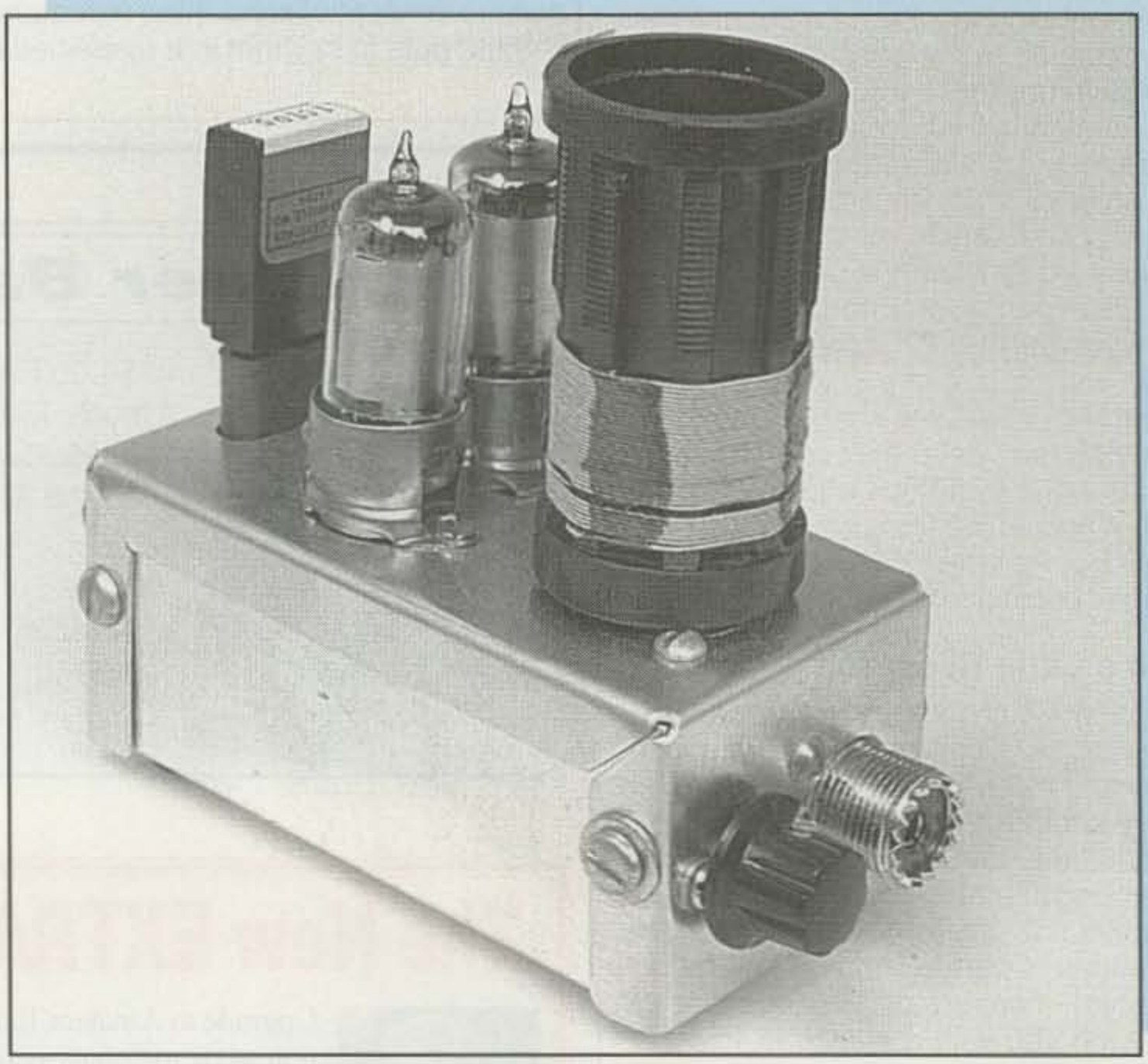

Photo A– Incredible beauty, warmth, and charm best describe this 1950s-style 1S4 transmitter. It can be configured for 80, 40, or 30 meter operation and powered by batteries or a small AC supply. It makes a great "occasional" QRP rig.

Vacuum-Tube QRP

First up is a simple, yet effective one-tube transmitter project ideal for old pros and new homebrewers alike—the sweet little 1S4 transmitter shown in photo A and fig. 1. This 1 watt marvel was popular during the 1950s when portable AM radios used miniature vacuum tubes and hefty 45 or 90 volt "B" batteries. The 1S4 was (and still is!) a popular audio-output tube for those "beach radios" and a nice low-power transmitting tube to boot. A similar 3 volt filament tube, the 3S4, can also be substituted in this circuit, if desired. We highlighted a similar 1S4 transmitter several years back. However, many folks said they missed seeing that article and asked to see it again, so we simply could not resist featuring it again. Space is tight, so here are the main assembly notes.

The transmitter can be built on an aluminum minibox like the one shown and tastefully laid out on a wood decoupage plaque or mounted in any type of unusual enclosure. Use your creative imagination, make a masterpiece, and then send us a photo of your work for inclusion (and well-deserved credit) in a future column. You can build it as a single 1S4 transmitter for milliwatting fun or parallel-wire two 1S4s for approximately 1 watt output. Combine this beauty with one of the new palm-size multimode and "DC to daylight" receivers from Yaesu, ICOM, or Alinco, and you have a portable mini station for 80, 40, or 30 meter fun.

Notice the elegant simplicity of this mini-rig's circuit shown in fig. 1. Less than a dozen parts are used, so you can afford to purchase original-era items (such as "domino-style" capacitors, a midget variable tuning capacitor, phenolic crystal socket, etc.) to produce a work of art. An FT-243 type crystal will yield the most authentic '50s look, and a modern HC-8 crystal is an acceptable substitute. After (and note I say *after*) you get the transmitter perking smoothly, you can add a VXO circuit consisting of a molded 5 or 10 µHy choke and 50 or 75 pFd trimmer capacitor in series with the crystal. It should produce a frequency swing of ±5 kHz. If the swing is greater, if stability is lost, or if the circuit stops oscillating, reduce the values of the choke and trimmer capacitor.

The tank coil is wound on a 1.25 or 1.5 inch diameter plug-in form, which should add a nice touch of fun and excitement to your parts hunt! Wind a 36-turn coil of No. 24 or 26 enamel-coat-

4941 Scenic View Drive, Birmingham, AL 35210

Amateur Radio Supreme!

Nothing is more representative of amateur radio supreme than a good homebrew project. Today's amateurs have limited time for building, however, so we are highlighting a cross-section of quick-to-assemble fun projects you can put together in only a few hours. It is the ultimate form of self-expression, so enjoy!

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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 9⅜	4.2
SS-30	25	30	3¾ x 7 x 9⅜	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

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SS-25M*	20	25	2⅞ x 7 x 9⅜	4.2
SS-30M*	25	30	3¾ x 7 x 9⅜	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅜	6.5
SRM-30	25	30	3½ x 19 x 9⅜	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅜	6.5
SRM-30M	25	30	3½ x 19 x 9⅜	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅜	10.5
SRM-30-2	25	30	3½ x 19 x 9⅜	11.0

WITH SEPARATE VOLT & AMP METERS

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

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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

*ICS – Intermittent Communication Service

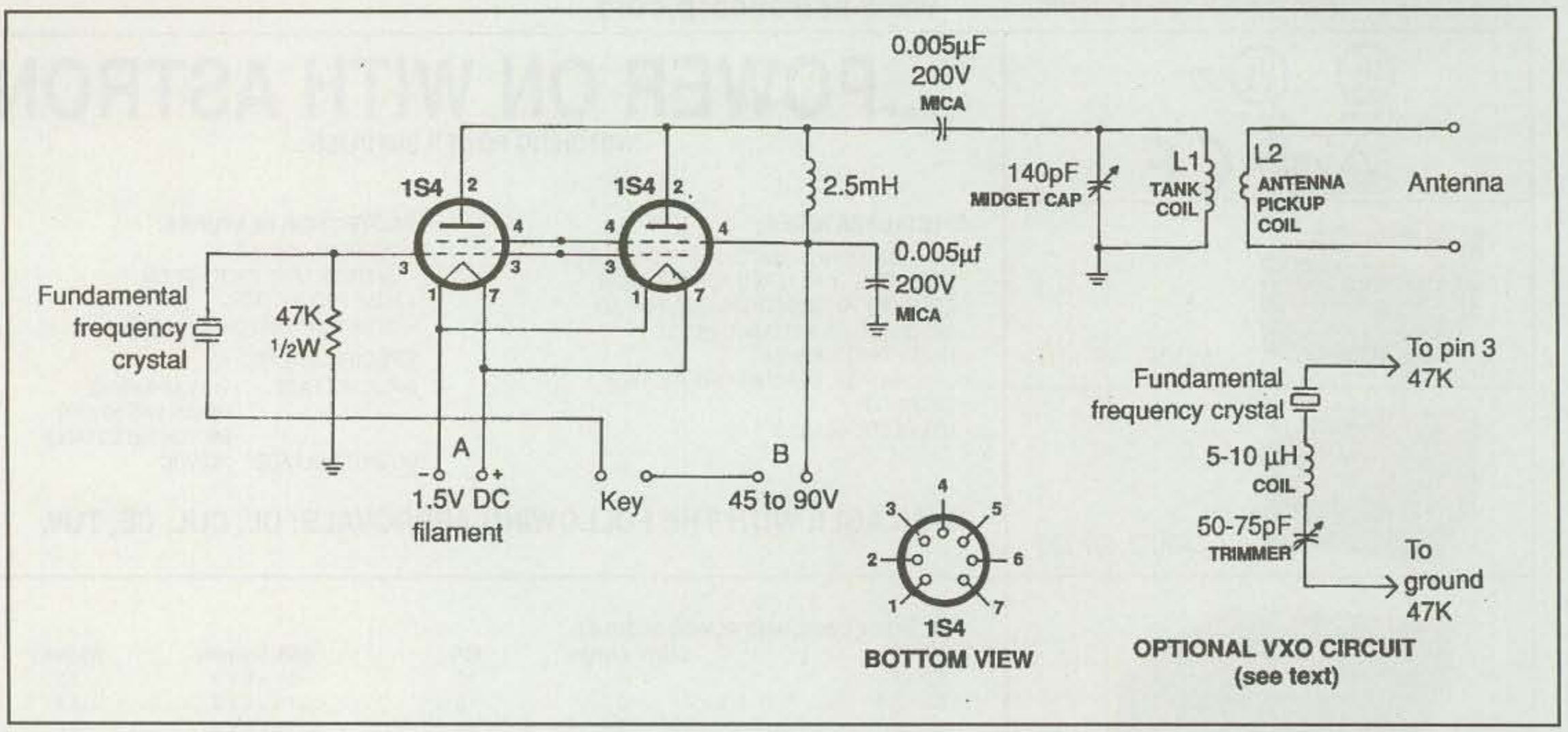

Fig. 1– Circuit diagram of the 1S4 transmitter. It can use a single tube or two parallel-connected tubes as desired. (Details in text.)

ed wire for 80 meter operation, or wind an 18-turn coil (of the same wire) for 40 or 30 meter operation. Space coil turns to occupy 1.25 inches of length on the form. The antenna pick-up/coupling coil is 5 turns (of the same wire) wound below the tank coil on the form (for all three bands).

Although you could use a small 115 volt to 115 volt transformer with a 1.5 or 3 volt filament winding (or a separate 3 volt transformer) to homebrew an AC supply, the easy way to power this transmitter is with batteries. One or two "C" or "D" cells is fine for the filaments, and five to ten series-connected 9 volt batteries make a clever "B" supply. When properly loaded/tuned, the rig will draw around 15 ma at 45 volts and 20 or 25 ma at 90 volts. Regular 9 volt batteries are rated at 90 ma, so they should last through three or four hours of total transmitting time before going dead.

Finally, tune-up and operation of the 1S4 transmitter is a cinch. Just adjust the tank capacitor for maximum clean signal output (as read on your SWR bridge, wattmeter, or receiver's S-meter). If loading is too light, you can connect a 365 pFd antenna tuning capacitor across/in parallel with antenna coil L2 and then alternately adjust the two capacitors "pi-net fashion" until reaching maximum. Be careful, however; 1S4s are not "official transmitting tubes" like 6146s. Give this transmitter a go. You'll love it!

Working with the 1S4 transmitter spun off another quite interesting idea worthy of consideration—modifying a classic five-tube tabletop or kitchen radio from the 1950s to make a direct-conversion transceiver. Ridiculous? Not at all, and considering the full-bodied audio produced by both vacuum tubes and "DC" circuits, it should sound absolutely marvelous. A traditional five-tube radio uses 2-12AX7's, a 12Au7, a 50C5, and a 35W4. By rearranging its circuit (fig. 2), the transmitter could use a 12AX7 oscillator and 50C5 RF amplifier, and the receiver could use a 12AX7 converter and another 50C5 as an audio amplifier. The 35W4 could be replaced with a filament dropping resistor and its socket used for a plug-in coil form. (The radio's chassis is pre-punched, so why waste time drilling holes?) The smaller section of the tuning capacitor and a choke/coil could serve as a VXO so the receiver's dial would serve as the rig's dial. Now visualize performing this super-conversion on a colorful, plastic-case AM radio, the kind with a molded speaker grill on the front. It does the heart good just thinking about actually using such a neat mini-rig! Are you creative enough to give the idea a try?

Mmm . . . Good!

While attending the Michigan State and ARRL National Convention a few years ago, QRP aficionado Tom Jurgens, KY8I, introduced me to a fascinating one-transistor transmitter known as the Michigan Mighty Mite (photo B and fig. 3). The little delight captured my interest not because it was exceptionally small, but because it had only eight parts and produced a whopping 1.5 watt output signal. Combine this quick-brew transmitter with a small shortwave receiver, use separate antennas with a pair of reverse-wired 1N914 diodes

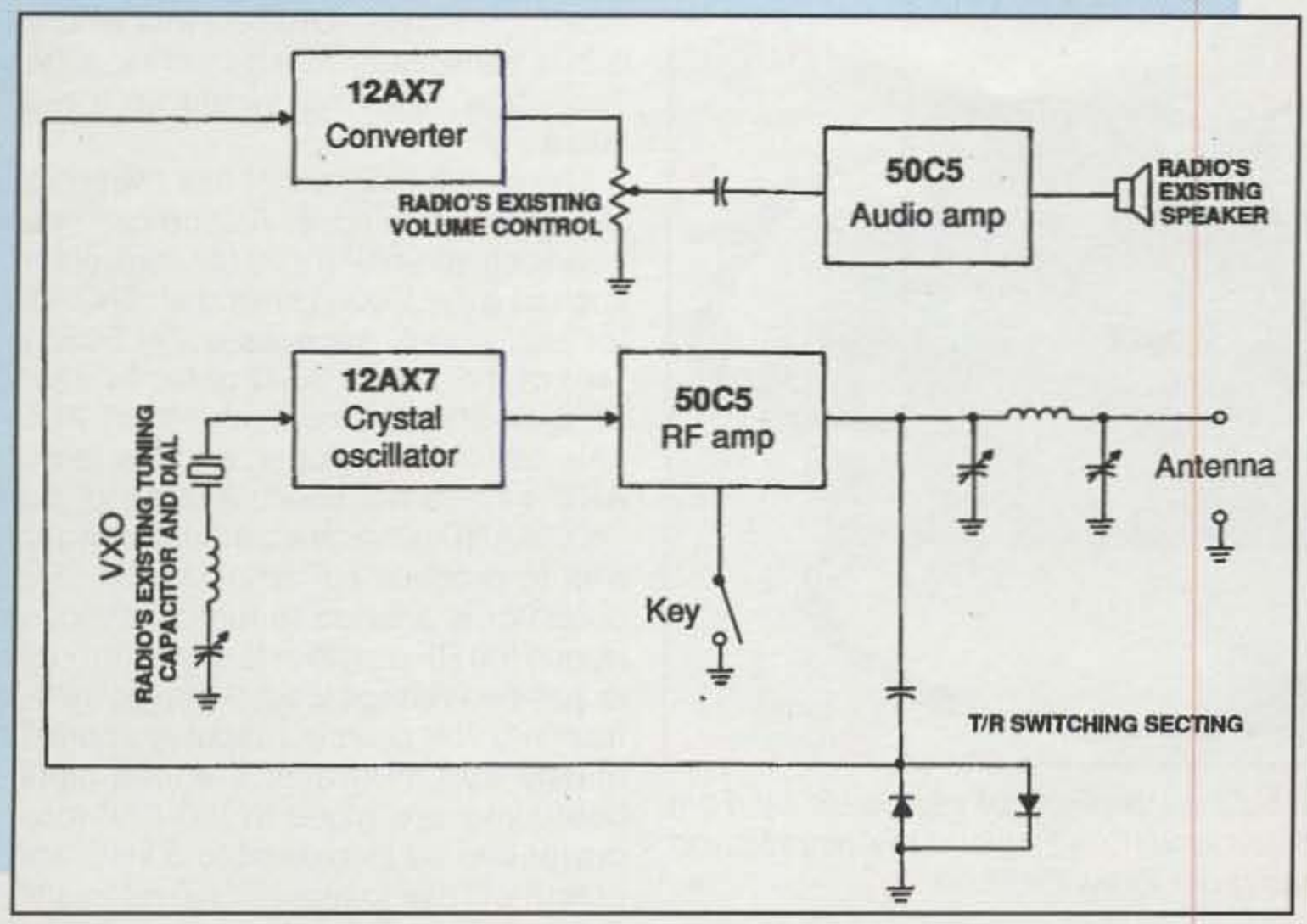

Fig. 2– Hypothetical block diagram of a 1950s-type five-tube AM kitchen radio rebuilt into a direct-conversion transceiver as discussed in the text. This could prove to be the most exciting, fun project of the decade!

connected between the receive antenna and ground, and you have a complete mini-station with full break-in CW operation. What could be better?!

The Michigan Mighty Mite can be assembled on a small piece of perfboard, on a block of wood, or even stuffed into a plastic box. The resistors are the 1/2 watt or 1/4 watt variety, the capacitor is a tubular type, and an FT-243 or HC-8 crystal is used. A plastic-encased tuning capacitor such as that used in a pocket AM radio or a compression-type trimmer capacitor works fine in the tank circuit. The metal-encased 2N3053 transistor will get hot during operation, so be sure to equip it with a hefty heat sink.

A regular 1.25 inch diameter plastic 35 mm film canister is used as a coil form (black is acceptable, but clear has more class; image is everything, you know). Using No. 22 or 24 enamel-coated copper wire, wind a coil of 64 turns tapped at 20 turns for 160 meters, or a coil of 46 turns tapped at 16 turns for 80 meters. The antenna pick-up coil for both bands is 8 turns wound over the tank coil. Be careful to avoid scratching off the enamel coating on either winding (except at the ends and tap for soldering). For 40 meters the coil is 21 turns tapped at 7 turns, and for 30 meters it is 5 turns tapped at 4 turns (again No. 22 or 24 wire). The antenna coil for 40 and 30 meters is 4 turns, again wound over the tank coil.

Tune-up and operation of the Mighty Mite is straightforward: Just apply voltage, connect an antenna, close the key, and tune the tank capacitor for maximum output consistent with the cleanest keyed signal. With 12 volts DC power, input current will be around 200 ma. If you cannot copy the transmitter's signal on your receiver or if current draw is only a few ma, recheck your wiring. Look for poor connections or a defective crystal. Actually, there is little in this simple circuit to go wrong. Right from the first time you turn on the Mighty Mite, your odds for success are great.

I suspect this circuit could be modified into a micro-transceiver. How? First add a second and higher value resistor in series with the 27 ohm emitter resistor, then add a coupling capacitor from the two resistors' junction to an LM-386 audio amp IC. This idea was briefly discussed in last month's "How It Works" column. The higher value resistor will lower the oscillator's signal so the 2N3053 can act as a direct-conversion

Ultralight HF'n

K4TWJ's just-published *Ultralight HF'n* book is new, hot, and right in step with the changing times. It covers "walk and talk" HF'n and emergency preparedness and includes FT-817 tips galore. Copies are $16 each plus $2.50 book rate or $3.95 Priority Mail from Dave Ingram, K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210. Check it out!

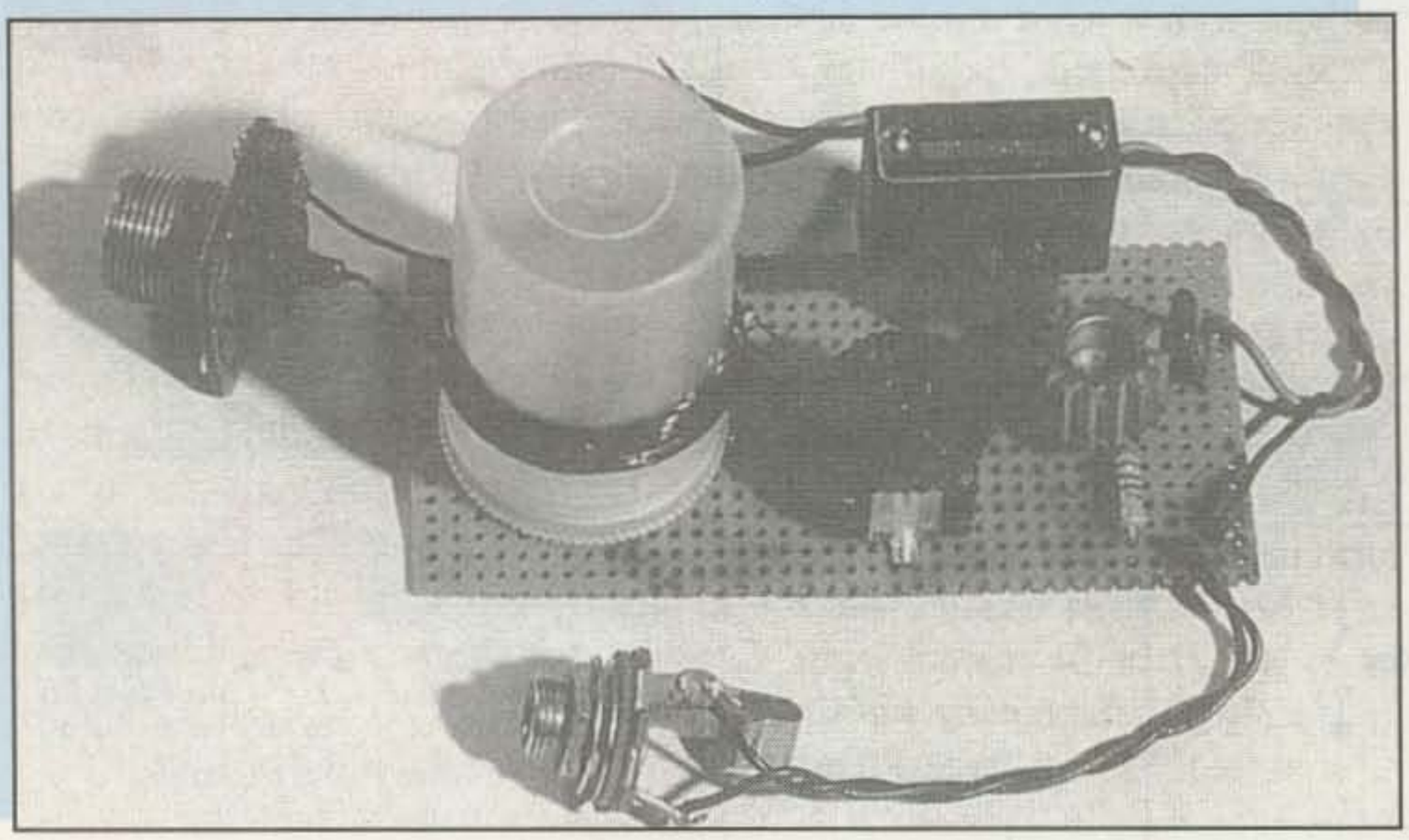

Photo B– The Michigan Mighty Mite as built on a piece of perfboard by Tom Jurgens, KY8I. This little gem has been duplicated from England to Australia and remains an all-time favorite quick-brew QRP rig.

mixer/detector with resultant audio developed across the higher value resistor for receiving. The key is wired across the resistor, so closing it mutes the receiver while increasing oscillator output to maximum for transmitting. Again I ask/offer: Who would like to turn this idea/concept into reality?

28 Legs, 250 Milliwatts

Back when integrated circuits were the new wave in technology and Methuselah was a little kid, several enthusiastic amateurs designed two IC transmitters using 7400-series ICs. The transmitter's circuit diagram appeared in both U.S. and European magazines, and it became quite popular among QRPers on both continents. The mini-rig still draws attention today, especially when someone wishes to whip together an extra-small transmitter for milliwatting or emergency preparedness. In fact, a creative homebrewer might even assemble this little tyke surface-mount style, expand it into a bare-bones transceiver, and mount it in a Tic-Tac® box. Now that would be a real micro-rig!

The circuit diagram of this twin chipper is shown in fig. 4. As you can see, it consists of an SN7400 (or equivalent, such as a 74LS00N) driving an SN7403 (or equivalent, such as a 74LS03N). Two of the 7400's AND gates function as a crystal oscillator, the third AND gate serves as a buffer, and the fourth AND gate is not used. All four of the 7403's AND gates are connected in parallel to produce RF amplification. The oscillator is allowed to run continuously, and the RF amplifier is keyed through its positive voltage lead. When powered from a 5 volt source, output is approximately 250 milliwatts. If finned metal heat sinks are glued to the ICs' tops, power can be increased to 5 volts and output will rise to around 350 milliwatts. Do not exceed 6 volts or the ICs will smoke and croak. The "easy way" to obtain 5 or 6 volts is using a 7805/5 volt or 7806/6 volt three-terminal regular and a 9 volt battery for power.

Looking carefully at the circuit, the RF choke may be a 5 or 10 µHy molded item or simply 6 or 8 turns of thin (No. 28 or 30) wire wound on a tiny ferrite bead. The resistors are 1/2 or 1/4 watt, and newer style HC-8 or HC-18 rather than older style FT-243 encased crystals (which require slightly more feedback current for best oscillation) are preferred. The typical "ham-band type crystals with 32 pFd load capacitance and the least expensive frequency tolerance" work fine both here and in most homebrew circuits. Of course, fundamental-frequency crystals should be used.

Almost any "generic" output filter can be mated with this transmitter. I use a T-50-2 toroid core and disc capacitors, mainly because they are readily available. For 80 meters, the toroid is wound with 34 turns of No. 30 or 32 enamel-coated copper wire and mated with 750 pFd capacitors for C1 and C2. For 40 meters, the core winding is 16 turns (of the same wire) mated with 470 pFd capacitors, and for 30 meters the core winding is 13 turns of No. 28 or 30 wire mated with 330 pFd capacitors.

As to the assembly, I have only one major suggestion: Use top-grade ICs. There are a fair number of pins to solder on both ICs, and using "bargain basement" chips to cut cost is not worth the "Will it work?" gamble. This circuit can also be expanded into a micro-transceiver by tapping its oscillator signal from pin 6 of IC-1, injecting it into a simple twin-diode mixer, and then

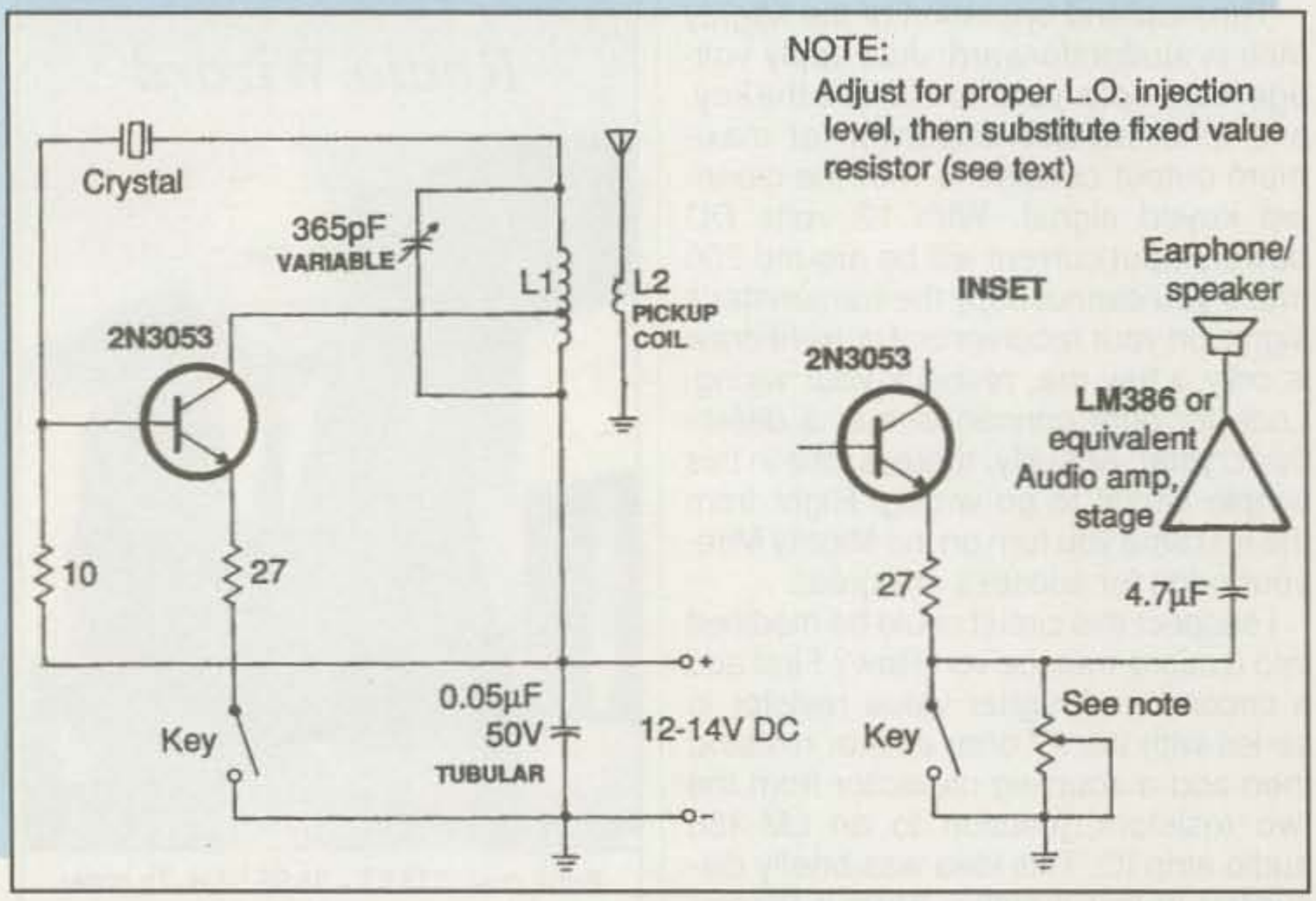

Fig. 3– Circuit diagram of the Michigan Mighty Mite as passed to me by KY8I. Inset shows my ideas for expanding it into a one-transistor and one-IC transceiver. (Details in text.)

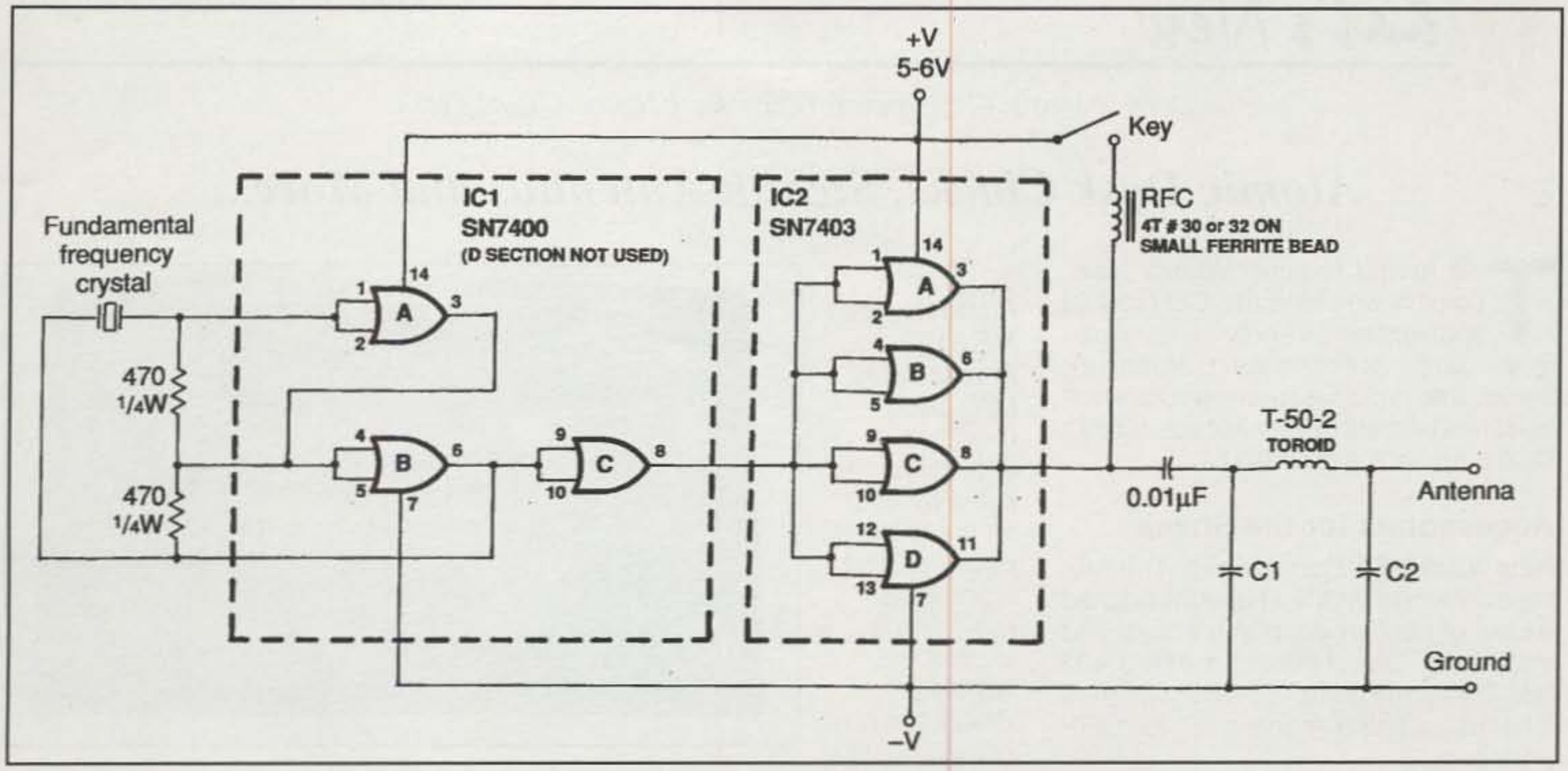

Fig. 4– Circuit diagram of the twin IC transmitter. (Discussion in text.)

directing the resultant output to an LM-386 or equivalent audio amplifier. We are out of space for this month, however, so we will leave the infinite possibilities to your creative imagination and invite you to stay tuned for extra-special QRP treats during the months straight ahead. In the meantime, keep your ears open for the flourishing HF Pack/Pedestrian Mobile/Ultralight HF activities gracing 18.157 MHz weekends around 2200 and 2300 UTC. It is the hottest and most rapidly growing new pursuit in amateur radio today.

73, Dave, K4TWJ

What's New

BY KARL T. THURBER, JR., W8FX

A New Column for A New Century

Atomic Desk Clocks, Stealth Antennas and More...

This month in your "What's New" column we shine the *CQ* product spotlight on a variety of new radio gear and accessories, antennas, books, and radio resources we think will be of real interest to you. Are you ready? Well then, let's get started.

Photo A– The MFJ-122 Atomic 24/12 LCD Desk Clock, at $19.95, is billed by MFJ as the lowest priced atomic clock in ham radio and is loaded with features. Check the text of this month's column for details on the MFJ-122 and other atomic clocks in MFJ's new series. (Photo courtesy MFJ Enterprises)

Accessories for the Shack

New from MFJ Enterprises. The "accessory kings" at MFJ have introduced a slew of new products you'll likely find interesting. One of these is the MFJ-402 "Mini" Keyer/Paddle Combo, which is labeled as being "nano-size" for QRP portability.

Billed as "ham radio's tiniest electronic keyer," it has a built-in iambic paddle. With dimensions of just 2" × 3" × 1" and weighing in at just 3½ oz., the fully-enclosed iambic paddle has a full-size feel for smooth CW. Easy-to-use, you just set one button and send one letter to change your keyer settings, and there is a screwdriver adjustment that lets you instantly change speed. The MFJ-402 is $59.95, and it's precision-formed from resilient phosphorous bronze.

Also, MFJ has introduced a feature-laden new series of atomic clocks. The series includes the MFJ-124 Atomic 24/12 Hour LCD Desk Clock ($24.95), MFJ-130RC Atomic Information Control Center ($39.95), MFJ-121 Dual Time Zone Atomic Clock ($69.95), and MFJ-122 Atomic 24/12 LCD Desk Clock ($19.95). All the clocks in the series look attractive and very functional in the radio ham shack, but I should point out that the MFJ-122 Atomic 24/12 LCD Desk Clock, at $19.95 (see photo A), is billed by MFJ as the lowest priced atomic clock in ham radio. Despite the low price, it's loaded with features. These include switchable 24/12 time, seconds and date/day displays, a snooze/timer, a bright-green backlight, a U.S. time-zone map, and dual crescendo alarms. The clock is black with silver buttons, and it operates on two AAA batteries.

For your nearest dealer, or to order, contact MFJ Enterprises, Inc., 300 Industrial Park Rd., Starkville, MS 39759 (phone 1-800-647-1800; e-mail: <mfj@mfjenterprises.com>; web: <http:/www.mfjenterprises.com>).

Photo B– CAIG Laboratories has improved its DeoxIT formula to provide enhanced performance and longer-lasting protection on all metals that conduct electricity. It is available in many convenient applicators. (Photo courtesy Caig Laboratories)

CAIG Long-Lasting Contact Cleaner Treatment. CAIG Laboratories has improved its popular DeoxIT formula to provide enhanced performance and longer-lasting protection on all metals that conduct electricity. Unlike other contact cleaners that just clean the sur-

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Model 701, Accessory Hand Mic, not shown ($28)
538AT, Internal Auto Antenna Tuner, not shown ($299)

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Repair Dept.: (865) 428-0364 (8–4 EST)

S&H cost for Jupiter in 48 states is $16. With Power Supply, $21.

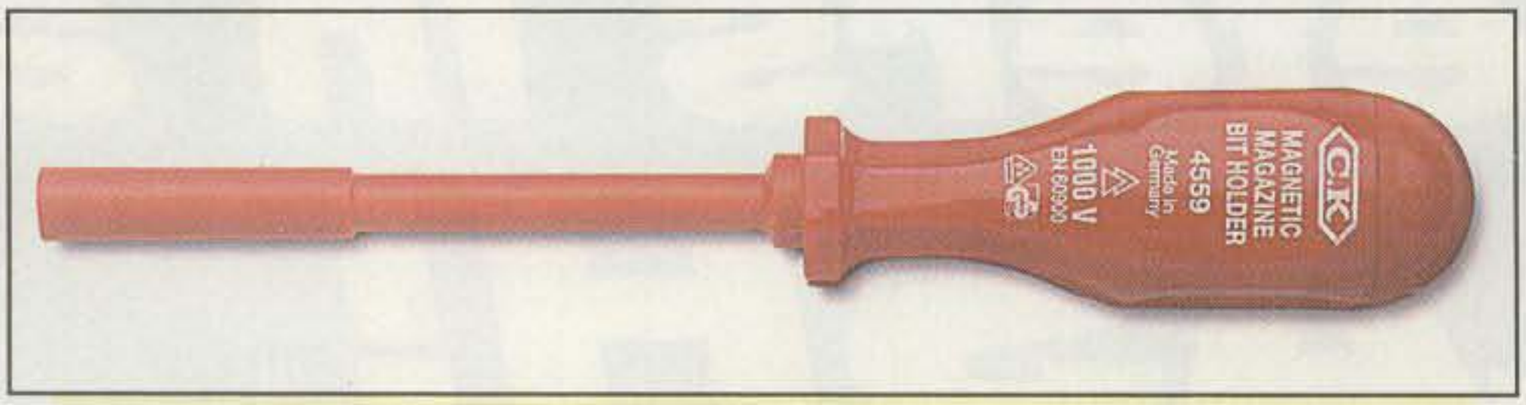


Photo C– The new Insulated 1/4" Hex Bit Driver from CK, distributed by Jensen Tools, meets various industry safety standards and comes with six 1/4" hex bits. The six-bit storage compartments in the handle with a rotating window allow easy selection of the bit you need. (Photo courtesy Jensen Tools)

face and that may provide minimal lubrication, DeoxIT (photo B) is formulated to dissolve oxidation, increase current-carrying capabilities, and provide continuous protection on metal surfaces from wear, abrasion, and atmospheric contamination. DeoxIT is available in many convenient applicators: sprays, pumps, pens, wipes, precision tip dispensers, and in bulk.

For more info and pricing, contact CAIG Laboratories, Inc., 12200 Thatcher Court, Poway, CA 92064-6876 (858-486-8388; e-mail: <caig123@caig.com>; web: <http://www.caig.com>).

CK Insulated 1/4" Hex Bit Driver. Does your toolbox need some updating? If so, the new CK Insulated 1/4" Hex Bit Driver (photo C), distributed by Jensen Tools, meets various industry safety standards and has been individually tested at 10,000 VAC for use up to 1000 volts. It also features an extra-strong magnet for safe bit retention. The tool comes with six 1/4" hex bits: one 0.31 slotted, one 0.47" slotted, two Phillips #1, and two Phillips #2. The driver may be used with most 1" long, 1/4" hex drive bits, making this a highly versatile tool. The six-bit storage compartments in the handle with a rotating window allow easy selection of the bit you need.

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

Antennas and Accessories

Stealth Bazooka Antenna from IAC. Heads up, gang, if you happen to live in an "antenna restrictive" community. International Antenna Corp. has announced the Model SB-10 Stealth Bazooka, a fully functional, 17 ft. flagpole with a triband vertical antenna tucked inside (photos D and E). The new, innovative antenna, which stands 17 ft. 6 in. when assembled, is designed to cover 20, 17, and 10 meters without an antenna tuner, and you can cover additional bands through the use of a tuner. There are no coils or traps used in the design. The antenna is rated at 1.5 kW PEP.

The 2.375 in. O.D. flagpole shell is constructed of impact- and UV-resistant, furniture-grade PVC, and it has a high-gloss white finish. The total assembled weight of the antenna is 19 lbs., and the antenna comes complete with a ground-radial kit and all-stainless-steel hardware. The Stealth Bazooka is $429 plus shipping/handling, and it has a one-year warranty. You'll find full specifications and performance data, including wind-survivability figures, on the IAC website.

Photo D– Shown here is the innovative SB-10 Stealth Bazooka Antenna from IAC, as erected at a house in a deed-restricted neighborhood. Can you find it? (Photo courtesy International Antenna Corp.)

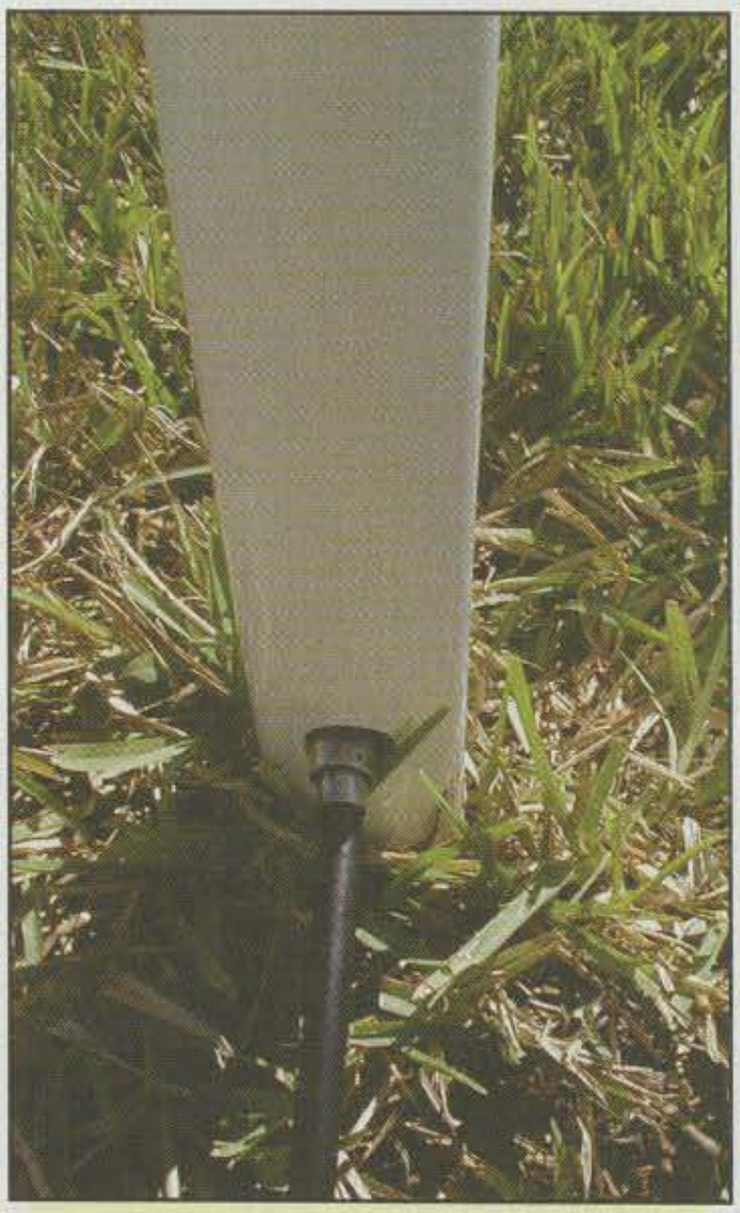


Photo E– The base section of the SB-10 Stealth Bazooka flagpole where a SO-239 coax connector is recessed, providing a 50 ohm feedpoint. The photo shows RG-213 cable connected to the SO-239 feedpoint connector. The connector is weatherproofed through a special encapsulation process to prevent moisture intrusion that might otherwise degrade overall performance. (Photo courtesy International Antenna Corp.)

For details, contact Dave Landis, WA3HDW, at International Antenna Corp., P.O. Box 121430, Clermont, FL 34712 (phone 1-888-268-4214; e-mail: <dBazooka@iacantennas.com>; web: <http://www.iacantennas.com>).

DWM Communications Yo-Yo-Tenna Deluxe. Turning now from innovative flagpoles to unique "yo-yos," we'd like to highlight the new Yo-Yo-Tenna Deluxe from Bill Lauterbach, WA8MEA, of DWM Communications. According to Bill, the Yo-Yo-Tenna Deluxe Portable Dipole Antenna System (photo F) is one of the most unique portable antennas ever developed. Nevertheless, it is very basic and easy to use, especially in Field Day, camping, vacation, and business-trip applications, as well as in apartment and condo use.

Two wind-up, "fishing reel"-style antennas make up the little gizmo. Each reel contains 40 ft. of sturdy, durable, insulated #22 multi-strand wire, giving you coverage from 2 through 40 meters. Some ops are "stacking" the reels (connecting additional Yo-Yos in series) for coverage of 80 to 160 meters.

The reel's wiring connects to a high-quality, silver-coated PL-259 coax connector. Strain relief for the wires is accomplished with a length of insulated tubing joined to a PL-259 reducer. The antenna plugs directly into your transceiver, although you may route it through an antenna tuner if you like.

The Yo-Yo-Tenna Deluxe is $29.95 plus $ 6.95 Priority Mail s/h. For more information, or a printed flyer, send a self-addressed, stamped envelope to Catalog, P.O. Box 87-W, Hanover, MI 49241 (e-mail: <tinytenna@hotmail.com>; web: <http://qth.com/dwm>). An online catalog is available at the DWM Communications website. *(Also see last month's "How It Works" column by Dave Ingram, K4TWJ, for more on the Yo-Yo-Tennas.—ed.)*

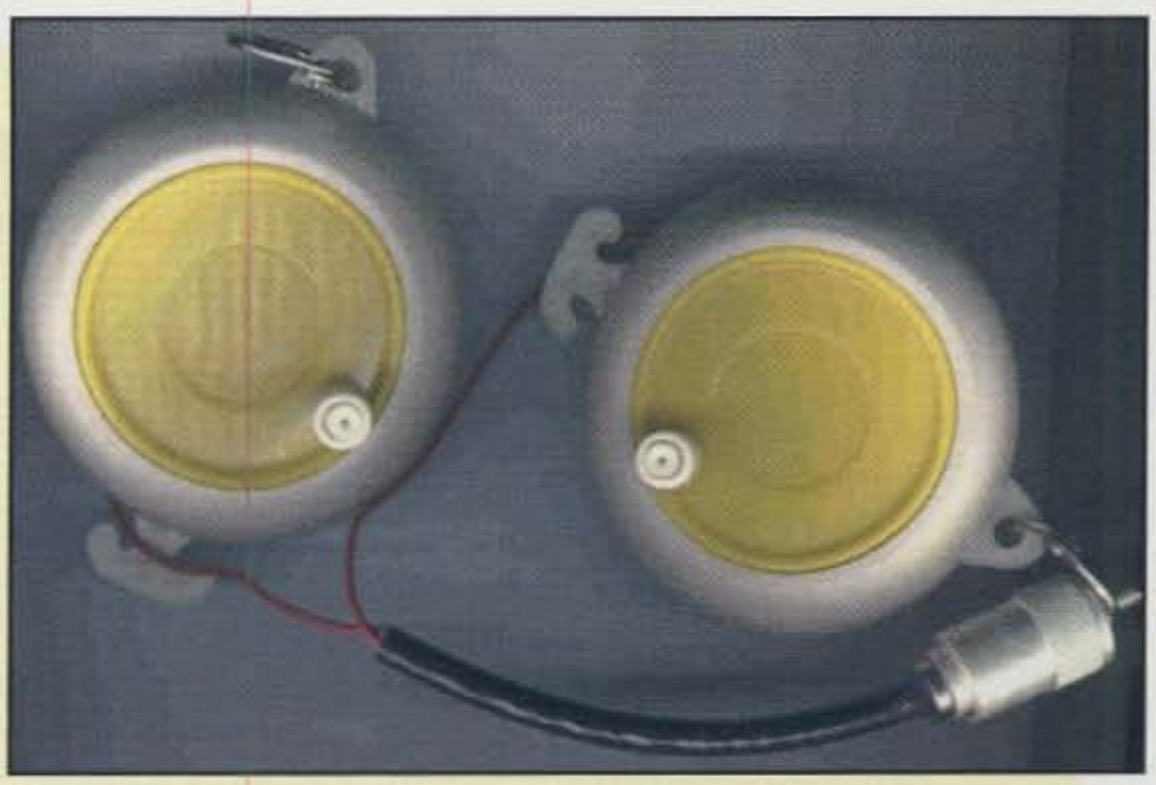


Photo F– The Yo-Yo-Tenna Deluxe Portable Dipole Antenna System from DWM Communications is a unique portable antenna, yet it is basic and easy to use. The antenna plugs directly into the transceiver, although you may route it through an antenna tuner if you like. (Photo from the DWM Communications website)

Software and Computers

NuMorse Professional. Nu-Ware in the U.K. has released NuMorse Professional, a very comprehensive Morse Code training environment that runs under Windows® and is aimed at beginners as well as experienced code enthusiasts (photo G). The program offers a choice of structured training courses, as well as a range of features aimed at more proficient code users.

If you're a beginner, you can select from two built-in, structured training courses, one of which is based on the Koch method; extra custom courses may be added. On completion of the beginner's courses, there is a range of features to help build confidence. Competent typists will find features that monitor and report progress based on their keyboard responses, as well as giving voice and screen-display feedback. Standard and Farnsworth code are supported from 2 wpm up to 50 wpm, while word and character spacing are fully configurable.

More advanced users will find many features designed to enhance copy speed, such as the built-in QSO and callsign generators. Nu-Morse Pro can also provide a realistic simulation of DX work: The "Real Morse Code" option adds fading, noise, and ignition noise to the audio output. Also, the program can simulate the signals generated by the early radio telegraphers, including spark transmitter and other "antique" code sounds.

NuMorse Pro is $34.95 (U.S.). For more pricing, ordering, and discounting details, and a free trial version, contact Tony Lacy, G4AUD, at Nu-Ware, Llanoris, Llanerfyl, Welshpool, Powys,

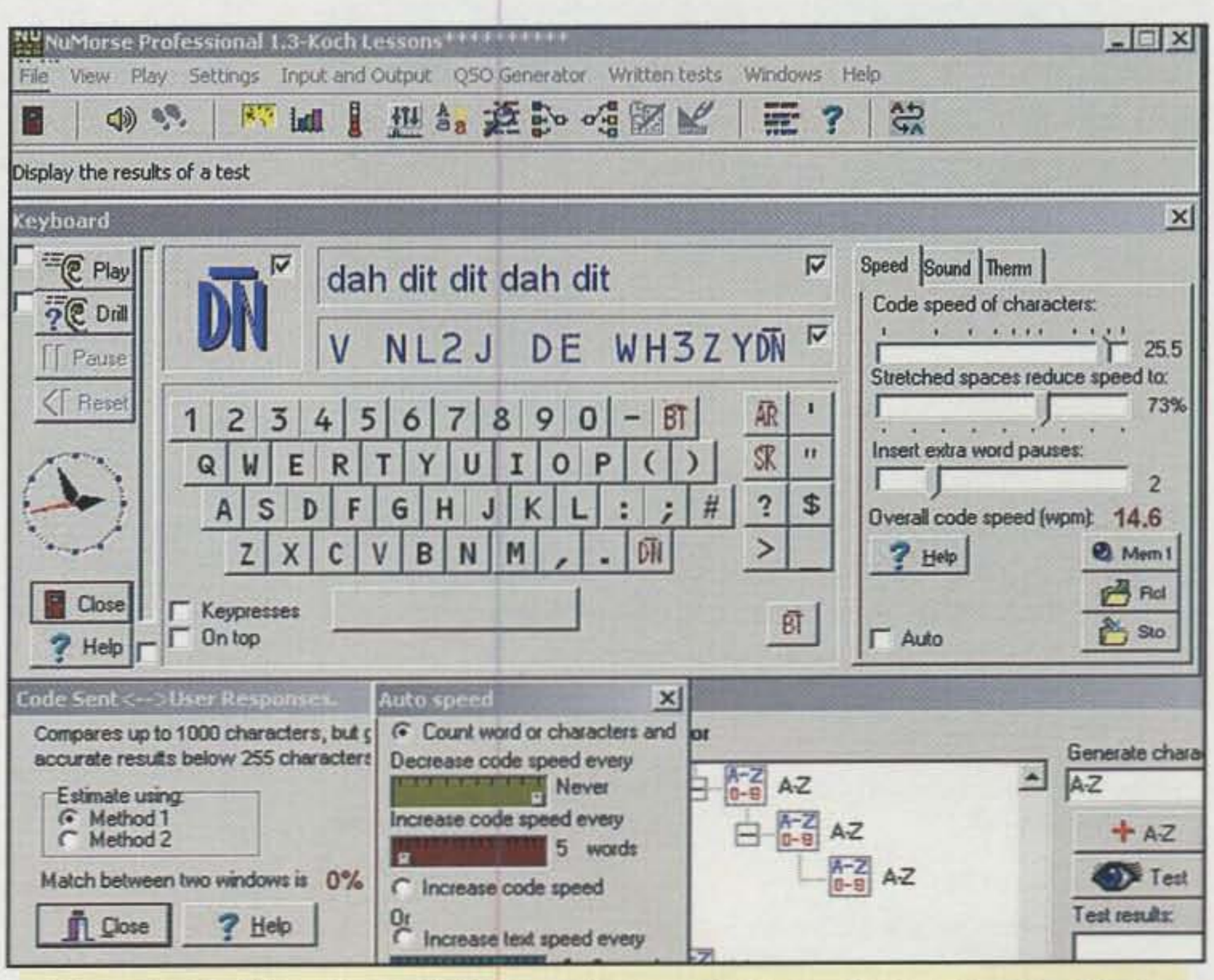
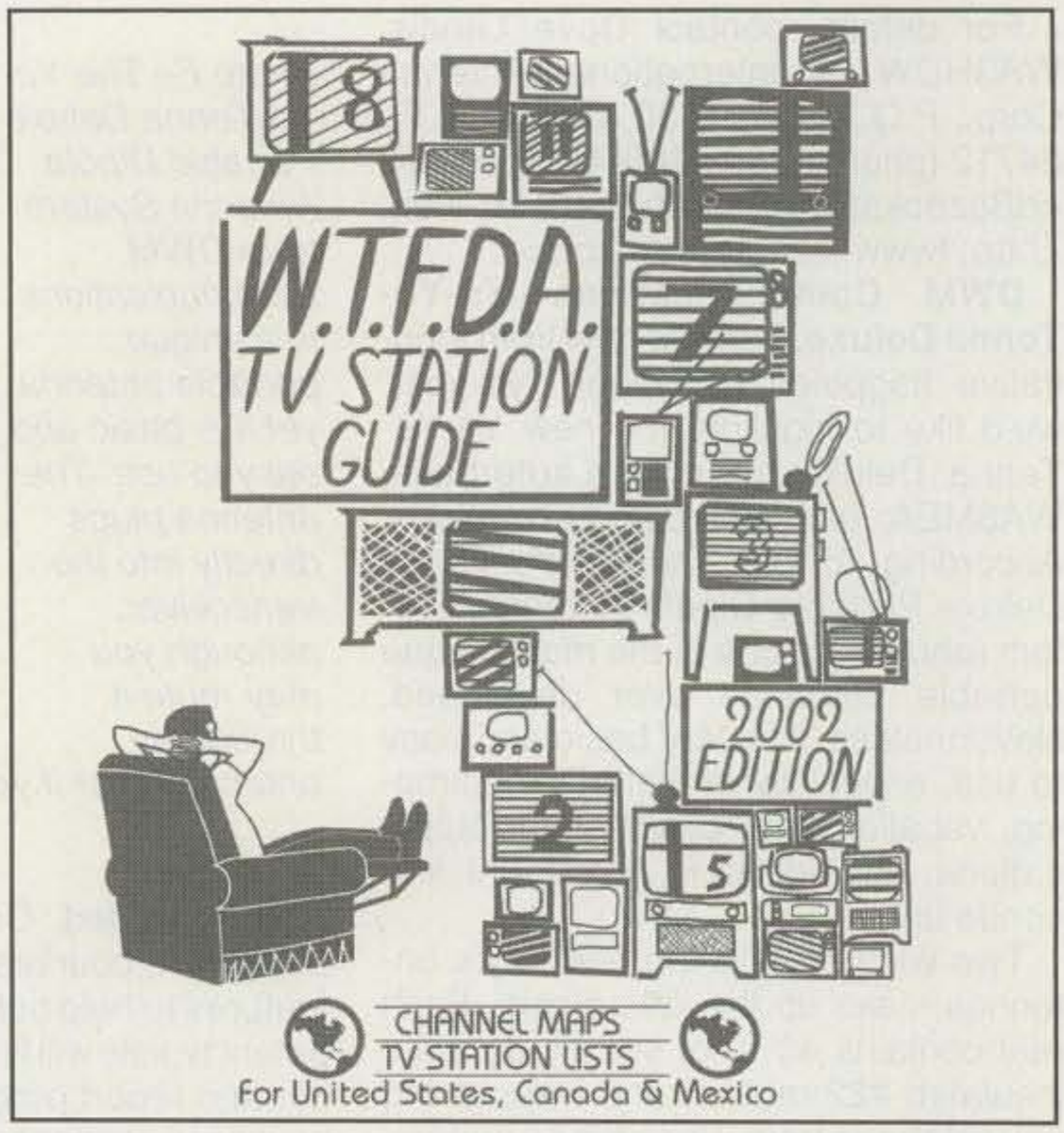


Photo G– Nu-Ware in the U.K. has released NuMorse Professional, a Morse Code training environment that runs under Windows® and is aimed at beginners as well as experienced code enthusiasts. Check out the details in the column. (Photo courtesy Tony Lacy, G4AUD)

Fig. 1– Are you a TV DXer? IF so, you may be interested in the 2002 WTFDA TV Station Guide *which offers a great deal of data on listed stations, including location, call letters, radiated power, antenna height above average terrain, several antenna parameters, geographical coordinates, station status, and programming sources. (Cover graphic downloaded from the ANARC/ WTFDA website)* →



SY21 0EP United Kingdom (phone [+44[1938 820496; e-mail: <TonyLacy@Nu-Ware.com>; web: <http://www.Nu-Ware.com>).

GoWin, GoList for Windows. John Shelton, K1XN, publishes The GoList, an impressive QSL-manager database used by many top DXers worldwide. Recently, John came out with GoWin, the 32-bit GoList for Windows® software program. The program has many new high-power features, and it is internet interactive.

John tells us that all GoList-related programs are developed as DX tools to assist the user in finding routes for DX stations worked. GoWin was also developed this way, with all features being designed around the QSL manager focus. John also tells us that GoWin is a very fast search utility which searches the database at high speed. If you have a callbook CD or callbook installed on your PC, the program also will search the callbook and display the manager address. When you are connected to the internet, GoWin links to several internet sites that provide additional DX resources. Also provided is a link that allows you to explore callbooks and other databases for additional information. In add tion, the GoWin software program provides a handy grayline link.

GoWin sells for $49.95 on CD-ROM, with several freeware programs. Also included are 12 months of the monthly database updates, and a subscription to 50 issues of DX-ALERT, a weekly table of announced DX operations and QSL managers.

Contact John Shelton, K1XN, at The GoList, P.O. Box 3071, Paris, TN 38242 (fax/voice recorder 731-641-4354; e-mail: <golist@ golist.net>; on the web: <http://www .golist.net>).

Oops...

In our July "What's New" column, we provided the web addresses of some amateur radio transceiver manufacturers, but neglected to include several other popular manufacturers. Here is a more complete list of manufacturer websites:

Alinco: http://www.alinco.com/usa.html
Elecraft: http://www.elecraft.com/
MFJ: http://www.mfjenterprises.com
RadioShack: http://www.radioshack.com/
Ranger: http://www.rangerusa.com/amateur.html
ICOM: http://www.icomamerica.com
Kenwood: http://www.kenwood.net
Ten-Tec: http://www.tentec.com
Yaesu (Vertex-Standard): http://www.vxstdusa.com

Also in July, we misspelled the name of the key W9AAZ was using in his article about the J75J operation from Dominica last year. It's a Vibroplex Lightning Bug.

We had some inconsistencies in Tom Wheeler's June article, "The NØGSG Portable Radio Direction Finder" (p. 44). First of all, the frequency of the audio tone generated in the unit is listed in most places as 1 kHz, but in some as 800 Hz. This is the same tone. According to the author, the actual frequency is 900 Hz +/– 100 Hz for both (an RC oscillator is used to determine the CPU clock, and the frequency tolerance doesn't affect operation of the circuit).

In addition, the reference to U104 under "On-Bench Checkout of the Unit" should read U4. The references at the end of the article regarding preprogrammed ICs should read U2 and U3, not U101 and U103. Those who would like to program their own ICs rather than purchasing pre-programmed chips may download the necessary files from: <http://faculty.kc.devry.edu/twheeler/projects/portdf.zip>. This archive contains the HEX object code files for U2 and U3.

Finally, the author informs us that premade circuit boards for this project are available from FAR Circuits, 18N640 Field Court, Dundee, Illinois 60118; (847) 836-9148 Voice/Fax; Web: <http://www.farcircuits.net>. We apologize for the errors.

Finally, in our May issue, we inadvertently left out the name of our co-sponsor in the annual *CQ/RTTY Journal* World Wide RTTY DX Contest. The *RTTY Journal* is still, as it has always been, a joint sponsor of this contest as well as the CQ/RJ RTTY WPX Contest.

From the Bookshelf

2002 WTFDA TV Station Guide. Many amateur television (ATV) operators also are TV broadcast DXers. If you are a TV DXer, you may be interested in the *2002 WTFDA TV Station Guide,* which is expected to prove to be a "hit" with both casual and hardcore TV DXers and amateur radio hobbyists.

The guide, published by the Worldwide TV-FM DX Association, offers a great deal of data on listed TV stations, including location, call letters, radiated power, antenna height above average terrain, several antenna parameters, geographical coordinates, station status, and programming sources. All digital TV stations as well as low-power TV stations are listed in the guide.

All data for the guide was supplied, written, and compiled by WTFDA TV News Editor Doug Smith, W9WI, and the cover design (see fig. 1) was created specifically for the guide by WTFDA member Harry Hayes.

The *2002 WTFDA TV Station Guide* is $23 for members of WTFDA, IRCA, NRC, ODXA, and ANARC affiliated radio clubs; it's $25 for all others. Special ordering instructions apply; for a complete overview of the guide, which includes detailed ordering information, follow this link: <http://fmdx.usclargo.com/tvg.html>.

For more information about the WTFDA organization itself, contact the Worldwide TV-FM DX Association, P.O. Box 501, Somersville, CT 06072 (e-mail: <Mbugaj@snet.net>; on the web: <http://www.anarc.org/wtfda>). Be sure to note that the guide should *not* be ordered through the association or via its website.

Radio Resources

A Good Source for Out-of-Print Manuals: Al Bernard, NI4Q. A little-known, but top-quality manual service is offered by Al Bernard, NI4Q. To the great relief of customers, Al's manual reproductions are of top quality. In fact, many purchasers say that his manual reproductions are virtually identical in look and feel to the originals, with an emphasis on quality and attention to detail. The reproductions are not "stocked" in the usual sense, but are custom-made individually for each and every order.

Al has out-of-print manuals and schematics for most of the ham gear and test equipment that amateurs use, collect, restore, and are familiar with. I won't name all the many "classic" brand manuals covered here, since it would be a lengthy list. I stopped counting at 70, and I'm sure there are many more. Al also buys, sells, and trades radio catalogs, magazines, and handbooks.

Al doesn't advertise in the commercial sense. Most of his inquiries come at the Florida hamfests that he frequents, and by word of mouth from his customers who recommend his manuals to others. In fact, Al sent me a large, fold-out sheet that contained a large number of unsolicited testimonials. He says a printed catalog listing of all available manuals is in the works and may be offered soon. Check with him.

For a request of manual availability and a price quote, contact Alvin J. Bernard, P.O. Box 690098, Orlando, FL 32869-0098 (407-351-5536; e-mail: <ni4q@juno.com>).

Wrap-Up

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

Overheard: When you absolutely know that you have come up with a great idea, don't let the naysayers convince you otherwise. 73, Karl, W8FX

Radio Classics

BY JOE VERAS, N4QB

Vintage Gear and Its History

Dayton 2002

The 2002 Hamvention® wasn't the coldest, windiest, hottest, or rainiest Dayton hamfest on record. Few would regard the weather over the mid-May weekend as pleasant, either, but we're not here to make meteorological small talk; time enough for that when they lock me away in The Home some day. The subject for discussion is vintage radios, this time in regard to the gigantic Dayton flea market.

The wheelers, dealers, collectors, and other usual suspects were frantically scurrying about the acres of flea-market space when I arrived at the Hamvention® site mid-afternoon on Thursday. This is when most of the action seems to take place, in case you are under the mistaken impression the flea market opens for business Friday morning. Most were too busy to stop and talk, but those willing to pause for a moment expressed dismay at the "lack of good stuff this year."

Mind you, (1) this is Thursday when much of the "stuff" is not even there yet, and (2) such viewpoints are subjective. I have been to hamfest flea markets bursting at the seams with great deals on a wide variety of gear, but because they didn't have exactly what I was seeking, I felt the trip was wasted time.

You'll see Jon Weiner, K1VVC, from near Greenville, South Carolina at many hamfests east of the Mississippi, and some farther away than that. He traveled to Dayton with Meir, WF2U, and Glen, WA4AOS, for the sole purpose of participating in the buying/selling/socializing that is part of the hamfest flea-market culture. Jon expressed disappointment in the number of both flea-market vendors present over the weekend and those on hand to buy their goods. He characterized the overall content of the open-air bazaar as lacking the unusual and interesting. Jon's disappointment intensified further when the waitress refused to seat him at our table in the restaurant a bunch of us chose for dinner Thursday evening.

Herman Cone, N4CH, another veteran of countless hamfest flea markets, also felt neither the buying nor selling at this year's Dayton kept pace with previous years. Although Herman may not have discovered flea-market treasures in large numbers, I noticed a rarely seen Sargent 20-MA receiver disappearing into the back of his SUV early Thursday afternoon. Now, *that* was a good find!

Herman also managed to come up with another piece or two that I've either never seen before or didn't know existed (It seems as if he always does . . . it's kind of a tradition.). The old Autronic keyer paddles have become sought-after pieces, both as additions to collections and as *users*. Herman found one with a *chrome*-finish base, disabusing me of the notion they were made in only gray-wrinkle finish. He also purchased a British-made *KW Atlanta* transceiver and told me another ham friend reported spotting a Whippany Labs *Lil Lulu* transmitter and receiver pair for sale. One sees the transmitters around from time to time, but the receivers are scarce. If not in abundance, it seems there was at least *some* rare and unusual stuff in the flea market.

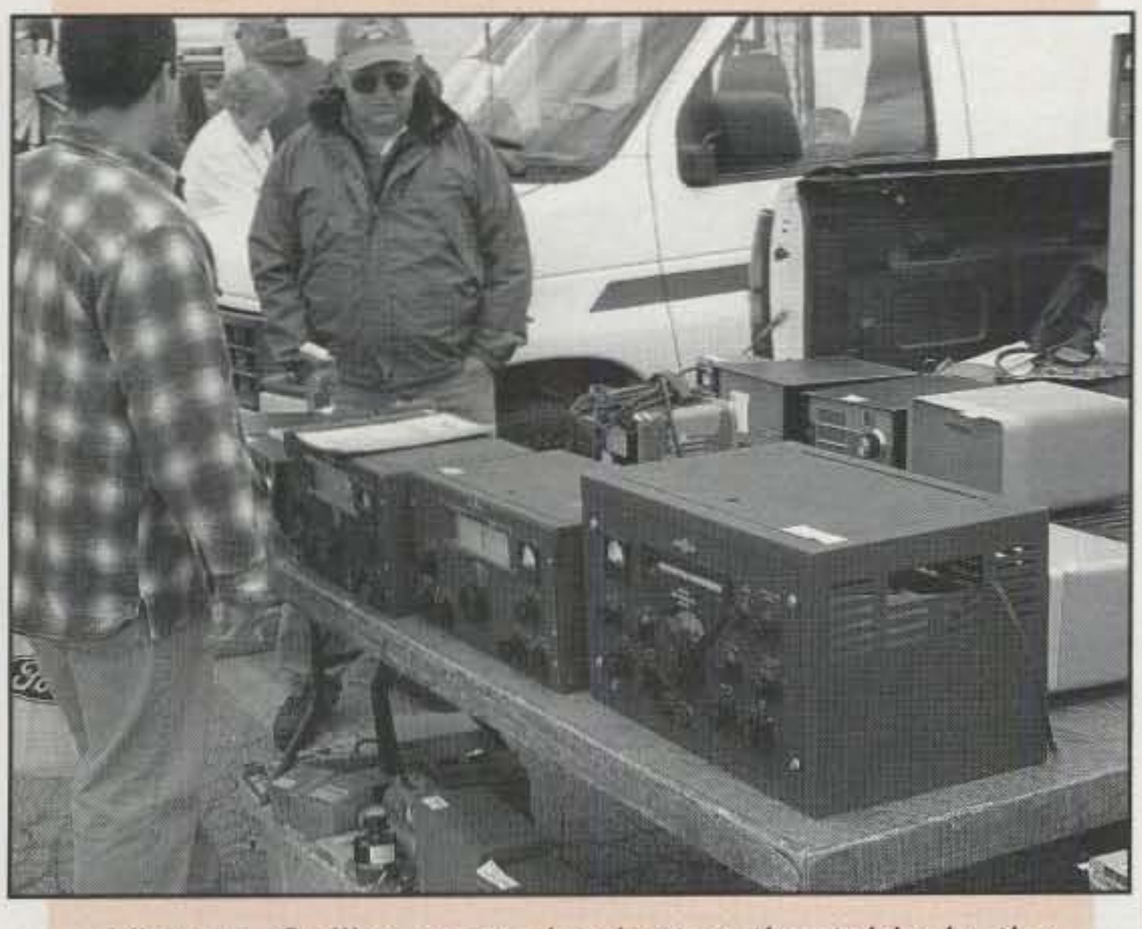
If the volume of even the more commonplace flea-market radio gear was down, the prices weren't. Perhaps driven by what it would later bring at an online auction site if it didn't sell at Dayton, sellers accorded buyers less room to haggle. That is the conclusion drawn by many people I spoke with during the weekend. I'm inclined to think they're partly right, but also believe that much of what they saw were *Dayton* prices. Those who attend hamfests regularly predict the equipment not destined for sale online will be on smaller fests' flea-market tables at reduced prices in months to come.

Often the small, local hamfest offers Dayton competition on more than flea-market prices. Herman, N4CH, recounted for me a number of all-time great finds, both his own and those of others. Many came from hamfests having as few as two- or three-dozen tailgaters. Dayton, on the other hand, allows practicing the economy of scale. By turning one's head both left and right while walking at a moderate pace, it is possible to see three-dozen flea-market spaces in a couple of minutes. Of course, what we're talking about is content; in order to find what you want at the price you wish to pay, a drive down a narrow two-lane blacktop to an event smaller than Dayton may be necessary.

A few of the vintage items for sale at this year's Dayton Hamvention®, in this case Swan and National gear. (All photos by Joe Veras, N4QB)

P.O. Box 1041, Birmingham, AL 35201
e-mail: <n4qb@cq-amateur-radio.com>

Well-known collector Herman Cone, N4CH, and Alan Fryer, N3BJ, in their flea-market space. The 1.2 GHz HTs come in handy when the rest of the spectrum gets saturated.



Vintage Collins gear dominates the table in the space Frank, KW0L (dark jacket, right), shared with his friend Hutch, N9HT (inside somewhere, keeping warm).

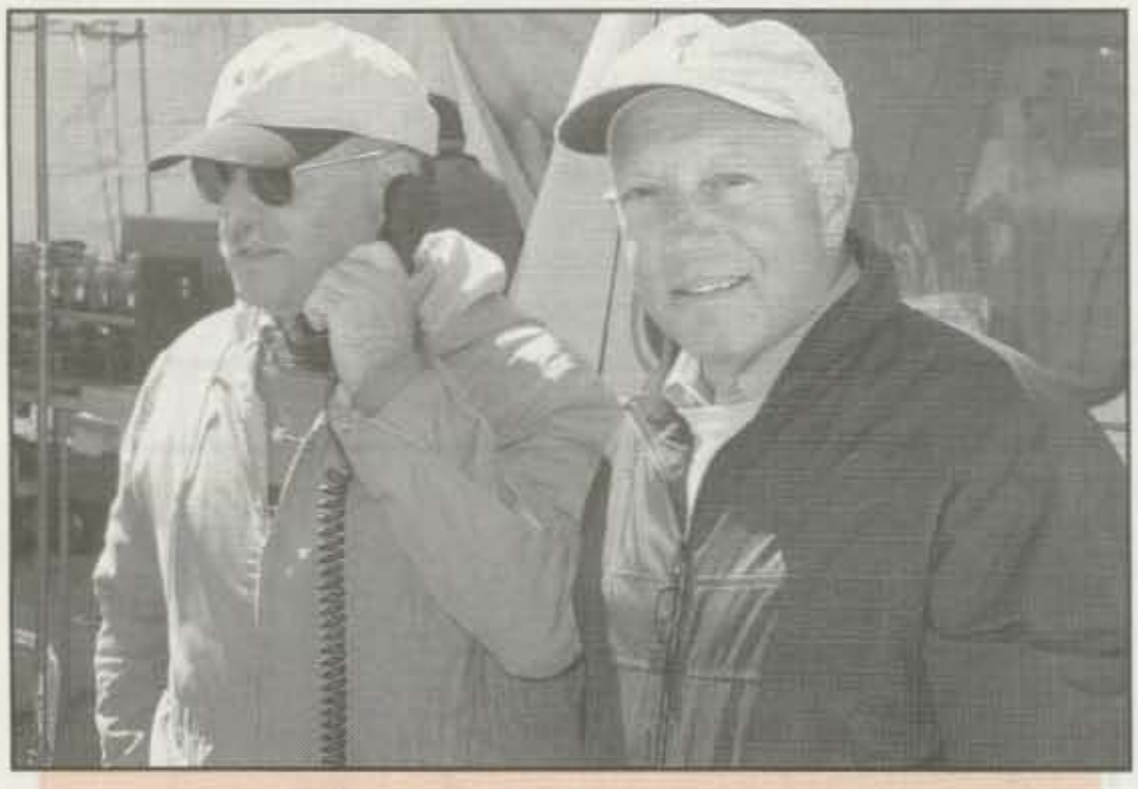
Price, like that blacktop, is a two-way street . . . a story with two sides. I talked not only to buyers, but sellers, as well. Little *feeding-frenzy* buying was in evidence this year, particularly of the eminently collectible gear such as Collins and certain Hallicrafters, Hammarlund, and National pieces. Jim Jorgensen, K9RJ, of Downers Grove, Illinois, was surprised to find no takers for his reasonably priced Harvey-Wells TBS-50 and Hallicrafters SR-2000. He reported many people stopped to photograph the TBS-50 Bandmaster, though. Perhaps others are beginning to follow my lead and collect radios on film. Jim took time away from his own flea-market space to find a fairly rare Hallicrafters HT-20 transmitter to add to his collection.

Jim felt the quality of the gear present was worthy of a Dayton flea market, even if the quantity and variety were down somewhat from previous years. He characterized the prices as generally high and the buyers as reluctant. Whether you're buying, selling, or just walking around looking, though, the social aspect of the flea market is one of the best deals going. I enjoyed the time I spent shooting the breeze with Jim and pal Ron, K7UT. That's another Dayton benefit: Calls become faces; faces become friends.

If I had to pick out *one thing* Dayton is about for me, it would be people. The hamfest would not be complete without the annual board meeting with W0CAR and W8CAR, John and Dan, respectively. We've been doing that for more years than I remember now. Ham friends from my junior high school days in Green Bay still magically appear in the flea market as if we all were performing some sort of migratory-bird ritual. I always spend a few minutes talking with Jay Bellows, K0QB, just because we both have *QB* suffixes in our calls. See, it doesn't take much to form an affinity bond; hams . . . you gotta love 'em! Then there are all the vintage-radio collectors and enthusiasts met in my travels for the calendar and book projects. I've been treated to some of the finest hospitality anyone has ever enjoyed, formed longtime friendships, and benefited much from the expertise of others. Renewing these relationships, even standing in a rainy flea market at Dayton, is an enjoyable time.

Hard data on actual Hamvention® attendance are difficult to obtain, but a survey of several indicators leads me to believe the numbers were down this year. Two large auto-rental companies reported business was off 30–40%. Finding a seat in most restaurants presented no problem, with either a short wait or none at all. Several of the popular hotels still had rooms available at the beginning of hamfest week. From a personal perspective, I was able to leave my

You will be popular bringing this on the crowded shuttle bus with you.



Meir, WF2U (left), and the legendary Jon Weiner, K1VVC (right), shared spot #117. Meir is using the handset connected to a piece of military-surplus VHF gear on their sale table to call in an air strike on the Lemon James flea-market space.

hotel for dinner and return to find my parking place near the door still empty an hour or two later. That's never happened before; usually the lot is full after dark and one leaves at the peril of having to park far away upon returning.

All these things are anecdotal, and not necessarily indicative of a real decline in attendance. The lack of car-rental business, for example, could simply mean fewer people flew to Dayton, arriving instead in their own automobiles. Ask the airlines; fewer people are flying anyplace. I could mention my favorite, more accurate, indicator, but won't. It involves the length of wait in line for certain, ummmm . . . *facilities.*

Even if it's not easy to get an exact-numbers answer to the declining attendance question, the logical follow-up question comes quickly to mind: Why? Again, it depends on whom you ask, and speculation is all over the map, but Jim White, K4OJ, capsuled it in a well-reasoned way that makes sense to me. Without raising the dark specter of conspiracy, he commented, "The Hamvention® and the hobby itself seem less *buddy-oriented* these days." Jim feels that we have our ham friends, sure, but for many they are in close proximity to home. They are drawn from within the circle covered by the local repeater. He noted, "The VHF/UHF ham who uses his gear only for communication and not as part of another facet of the hobby has little to gain by traveling to Dayton to spend time with the same people he passes on the road every day of the week." It is easy enough for these amateurs to contact everyone they know within this smaller circle and meet for coffee any Saturday morning of their choosing. Unfortunately, living with increasingly harsh antenna restrictions in recent years has taken from many of us the choice of how, where, and with what we operate. Jim said, "Ham radio mimics society." I will go beyond that and say it is shaped by it, as well.

One thing high on K4OJ's list of reasons for going to Dayton is the camaraderie, especially among those involved in contesting and DXing. I can confidently add the vintage-radio crowd to those groups, too. He pointed out how necessary it is for those whose main activity is on HF to have a national or international gathering place. Those of us whose beams reach out across the world in search of DX, or the dedicated 48-hours-without-sleep bunch who fill the bands on contest weekends, need a place to have a conversation over a cup of coffee. We need a place to share pieces of our lives, to make a whole person out of the voice or dots/dashes coming from the radio speaker, even if it's only once a year.

Though much of the collecting and restoration of vintage radios does not take place on the air, we are still a widely scattered group. In fact, I have been to U.S. collectors' conferences with several DX hams in attendance and gone to ones in Europe myself. Anyone who has organized a stand-alone conference will tell you the benefits of being part of a larger event such as the Hamvention®. Continuing to have a large, viable flea market certainly adds to the attraction.

Whatever one's specific interest in the broad spectrum of amateur radio, it is likely shared by a large number of people. It would be a shame if Dayton ceased to be *The Place* to meet once a year for some face-to-face time with others in those interest groups, or just socializing with on-the-air friends, for that matter. Other fairly large gatherings exist to serve specific groups, but none seems ready to put on the multi-faceted mantle worn by the Dayton Hamvention® all these years. The direct concern of this column is vintage radio, but the decline seems to have been spread evenly over most of the other areas, too. That's why I tried to get a consensus view and not just wonder whether to blame this year's somewhat disappointing flea market on internet auctions, gasoline prices, or global politics. Personally, I wasn't all that disappointed. I found a piece of test gear I needed and a receiver to fill a gap in my Hallicrafters collection, so I thought the flea market was *great*!

Even though publication time will put us a couple months down the road from the Dayton Hamvention®, I'm interested in your views. Whether you agree with the things expressed here, or have another opinion, I'd enjoy hearing about it. My *CQ* e-mail address may be found at the beginning of the column, or you may go to my website, <www.n4qb.com>, and use the e-mail link there (Your web browser must be configured to work with your e-mail program.). Click the radio button on page two of the site for ham stuff, including vintage radios and keys.

Flea-market opportunities await you. Time flies, but it is not too late to line up a few good projects for those long winter evenings and dreary weekends to come. Me? I think I'll just tackle the ones I was going to do last winter. See all of you back here in a few months. Until then . . .

73, Joe, N4QB

Amateur Satellites

BY PHILIP CHIEN, KC4YER

Ham Radio in Space

FM vs. SSB

The debate over whether future amateur satellites should be FM single channel or SSB/CW linear transponders often reaches the fervor of religious battles or what's the best brand of beer, and there are lots of misconceptions.

As with any other time when easier-to-use modes, licenses, and capabilities become available to the average ham, there are old-timer hams who complain about why things are so easy for "appliance operators." It seems as if complaints about the dumbing down of amateur radio started shortly after AM became available and hams were no longer limited to just CW *(Actually, it started during the transition from spark to CW!—ed.)*. This column is specifically about satellites, though. There are some rather obnoxious hams who insist that FM satellites have *no* place in amateur radio and that future satellites should have *only* linear (SSB) transponders.

FM Satellites Benefits and Drawbacks

FM satellites are certainly "Easysats." They require very little specialized equipment and can be used by beginning hams, those with less experience and skills. However, they have been oversold by some who imply that you can just key up your handheld and make a transatlantic QSO.

The key technical limitation with an FM single-channel bird is only one user can use it at any given moment. Because only one user can capture the receiver at any given moment the satellites are usually busy and it takes operating skills to be able to get in reliably. For a ham who lives in an antenna-restricted area, though, especially an apartment or condo, FM satellites can be the only opportunity to DX. It's quite feasible to use a handheld radio with a 19 inch whip antenna for transatlantic QSOs via FM satellites.

Many hams hate the FM birds because you can't carry on a long conversation, or because of the rude attitude of some users who use high-power amplifiers to overpower others attempting to get into the bird. These are certainly limitations, but there are rude users in many aspects of ham radio.

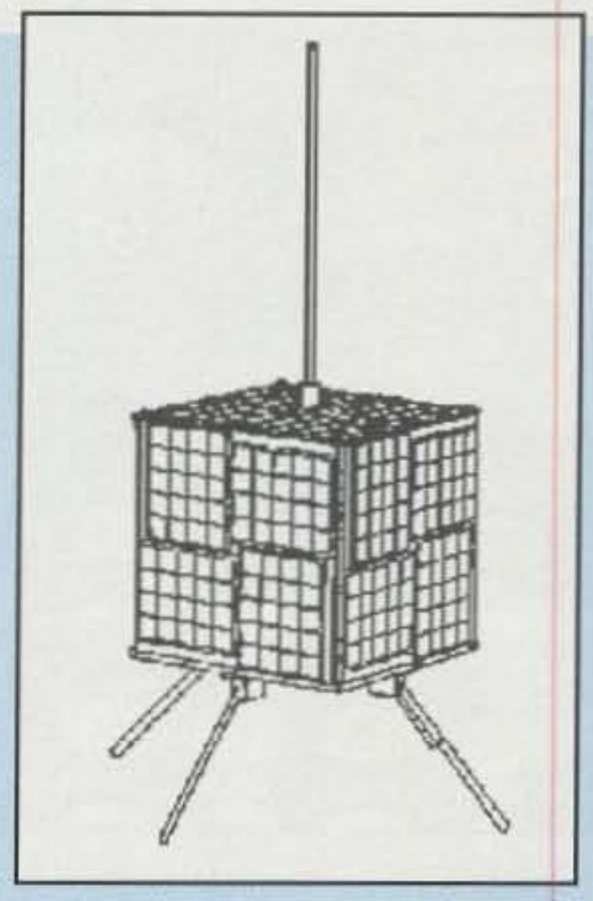


Fig. 1– The Microsat series of amateur satellites generally provides short passes and single-channel operation in either FM voice or digital modes. Some satellite enthusiasts feel these low-orbit "birds" should be discouraged because they don't provide the full range of communication opportunities afforded by larger, higher-orbit satellites such as AO-40. (AMSAT drawing)

The simple big-gun solution is to get a 2000 watt linear amplifier with a computer-controlled, motorized, high-gain antenna and just "take control" of the satellite. On the other hand, that's the equivalent of using a similar setup to hog a local repeater during "drive time"—hardly good amateur operating practices. EIRP and ethical operating practices for FM satellites (or for that matter linear SSB birds) are really no different than using high power to monopolize any repeater during its busiest periods, or monopolizing a conversation at a party by showing up with a megaphone! Every ham should always remember that the microphone button is labeled PTT (Push to Talk), not RTL (Release to Listen)!

The arrogance of the SSB linear satellite-only crowd insulting FM satellite operators by calling them "appliance operators" is just silly. Yes, you can just press the PTT switch on a multi-band, handheld 3 watt radio with a long whip connector to make *a* contact on an FM satellite, but it takes operating skills and agility to make *many* successful contacts with the same setup on FM satellites.

SSB Satellites Benefits and Drawbacks

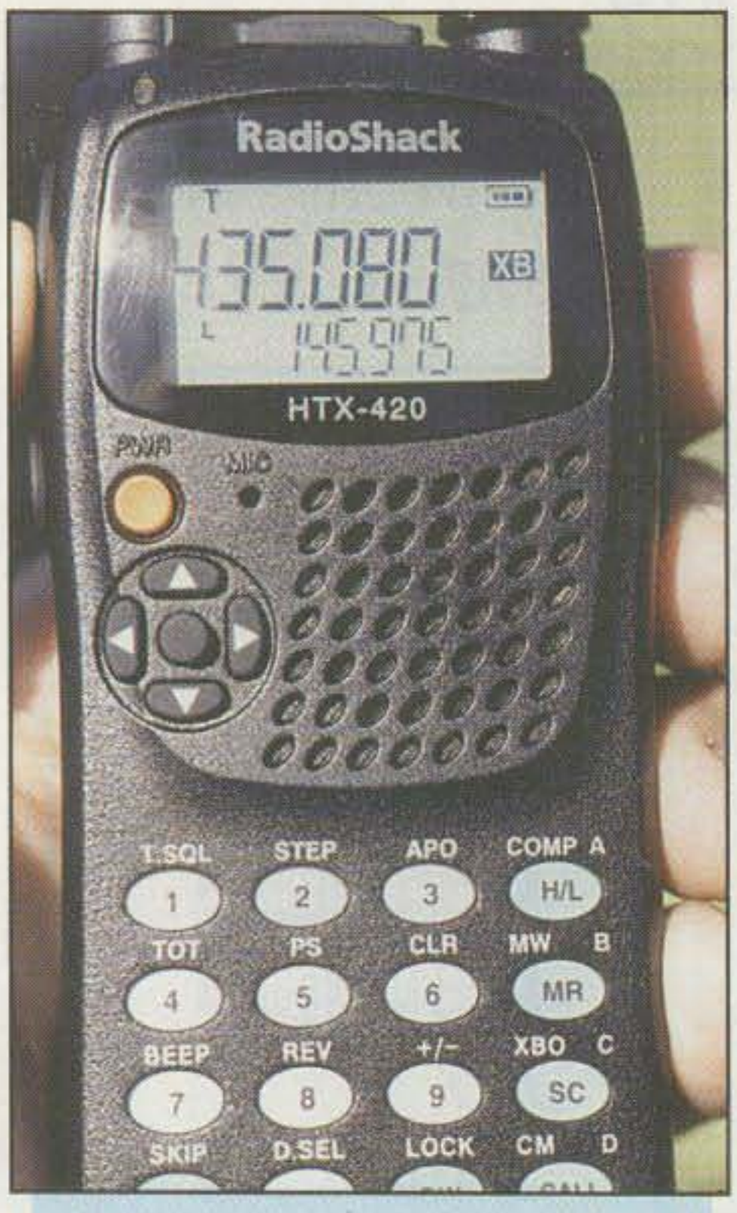
Certainly satellites with linear transponders have many technical advantages over FM satellites. Multiple QSOs plus digital transmissions can occur. You can carry on a casual QSO instead of just hi/bye quick contacts. On the other hand, more sophisticated (read: more expensive) ground stations are required, which limits the number of potential users.

One of the silliest arguments against FM satellites is they are so busy it's impossible to work them. This is akin to Yogi Berra's comment "Nobody goes to that restaurant anymore because it's too crowded." The bottom line is FM sats are busy *because* people are using them. In contrast, many SSB satellites, including the Fuji OSCARs and RS-15, have so *few* users that you can go an entire pass with the whole satellite to yourself. Ironically, one ham who claimed that he was against FM satellites said he uses them anyway because that's where the users are!

One of the reasons FM satellites are popular is the higher cost of SSB rigs. Yes, you can purchase a used 2 meter single-sideband rig for about $200, but for the same price you can get a brand-new 2 meter/70 cm FM handheld. It's hardly fair to compare the price of a used multi-mode rig with that of a brand-new FM multi-band rig!

Newer technologies could conceivably decrease the prices of SSB transceivers if there's enough demand, but the same technologies also contribute to the decreasing prices of FM radios. Also, you can't beat economy of scale. FRS (Family Radio Service) radios can be purchased for about $30 because they're manufactured in such large quantities, and VHF and UHF FM handhelds could be sold for the same price—if they sold in the same quantities and were as easy to use (read: no require-

779 Merritt Island Causeway #808, Merritt Island, FL 32952
e-mail: <kc4yer@cq-amateur-radio.com>



One benefit of the low-orbit FM satellites is that outside of the heavily populated areas, it's possible to work them with nothing more than a dual-band FM handheld, such as the RadioShack HTX-420 shown here. (WB6NOA photo)

ments to pass a test or obtain a license). The bottom line: FM VHF and higher band equipment is more popular, more commonly available, and perhaps most important, available to more folks in the ham radio community.

One of the more unusual comparisons was made by one ham who claimed that a Mode B station (SSB/CW, 70 cm up, 2 meters down) is less expensive than an FM setup. He justified this argument by adding the cost of his existing 2 meter and 10 meter SSB rigs (no cost), a 70 cm to 10 meter transverter, preamps, power amps, a home-built az/el rotor, and home-built 14-element crossed Yagi antennas for the Mode B setup. For the FM satellite rig he used the cost of a brand-new FM dual-band radio and hand-held Arrow dual-band antenna. Can you see the faults behind this logic?

There are many hams who claim that if you aren't willing to spend enough money for a Mode B class OSCAR station you shouldn't be allowed to use satellites, any more so than you should be allowed to join a yacht club if you can't afford a yacht. This argument does have merit. Only the richest people can afford their own aircraft, large mansions, and other luxuries. Why shouldn't only rich hams be permitted to use the most sophisticated amateur radio resources? The logical response is if that's the case, why should any other ham who isn't as rich be able to share *any* resources with those satellites (resources being defined as not just cash, but also bandwidth allocated for satellites)? I strongly doubt that a justification can be presented for only rich hams being permitted to use the OSCAR sub-bands!

FM satellites by their nature are relatively low-altitude satellites. Each satellite is only over a small portion of the Earth at any given time, and several satellites can share the same frequencies. With different CTCSS tones, FM satellites can share frequencies where they rarely will interfere with each other or even linear transponder birds. Experience has shown that FM and linear birds can share the same frequencies when proper operating procedures are used—primarily, don't transmit if the satellite isn't over your horizon! It's the utmost in arrogance for any individual ham resource to demand exclusive 24/7 access to a chunk of RF spectrum that it isn't using continuously.

There's no doubt that the minimal equipment required for using FM satellites has dramatically increased the interest in satellite operations in the ham radio community. Many who start on the FM birds eventually want the capability of making longer, more casual contacts and decide to upgrade to Mode B (or even Mode S) rigs. Others are satisfied staying with FM satellites.

Certainly FM satellites get a lot of publicity, because it is possible for hams with relatively simple setups to use them. However, that doesn't stop anyone interested in linear birds from putting together a setup to operate them.

The comment about how many more contacts could be made, more rag chewing done, and more grid squares exchanged if all of those on the FM satellites would move over to the SSB linear birds is kind of a silly comment for folks who don't own SSB transceivers. I could travel a lot more, own a nicer car, and buy a lot more ham radio equipment if I had more money.

FM satellites are especially popular with DXpeditions and grid-square chasers. It's easy to carry a simple, lightweight setup for FM satellites (a handheld radio and either an Arrow antenna or a 19 inch whip). A far smaller percentage of DX trips and grid

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chasers will also go to the effort to carry the additional equipment necessary for the SSB birds.

Looking to the Future

FM satellites certainly have limitations, but they could be made better if a more integrated systems approach were taken. Instead of just building satellites to work with existing radios, make radios and satellites that complement one another. Imagine an FM transmitter with connectors for a USB port and audio in/out. You would hook these up to your computer's USB port (for control) and sound card. When you clicked on the Talk icon with your mouse, the computer would send a short packet with your callsign on one frequency. The satellite would listen to all of the requests for access and send back a packet to whatever callsign it received. Assuming your packet is the one which got through, an indicator would appear on your computer telling you it's your turn to speak for five seconds. Your radio would transmit on a separate frequency which the satellite would retransmit to everybody in the footprint. If you weren't successful in getting your callsign up to the satellite, then your system wouldn't transmit on the talk frequency, so you wouldn't QRM whatever conversation was in progress.

This is a simplified description of protocols used for many years for digital communications to minimize collisions of data from different sources. Your home or office computer network does it several times each second, transparently to the user. However, this would require new radios and software specifically for use with this hypothetical satellite, and much of the appeal of FM satellites is the ability to use them with off-the-shelf, dual-band handheld radios.

The claim has been made that folks who use FM satellites will demand that the folks who manufacture satellites build and launch more FM-mode satellites, but the users would not be willing to contribute to their development (apparently, the logic here is that by nature FM fans won't contribute?). Even if it is true that FM hams are not as wealthy as hams who own SSB rigs, it's important to note that there are far more hams with FM-only setups. While each user may not donate as much, there are far more potential contributors.

Looking from the other side of the coin, an FM satellite is much less expensive to build than an SSB bird, less expensive to launch, and often easier to find a ride into orbit. Most of the FM satellites are 9 inch cubes, relatively easy to hitch a ride into space. In contrast the linear transponders require more power. This may be counter-intuitive, since SSB is more power efficient than FM. However, linear transponders have a larger bandwidth. On a power-per-user basis SSB uses less, but on a power-per-satellite basis it needs more. In addition, linear transponders are more efficient for higher altitude satellites (As with almost any transmitter, the higher it is the more users are within your footprint.), which means a higher percentage of the launch vehicle's performance.

If the elite OSCAR-equipped hams want satellites with only linear SSB transponders, ATV, digital voice, spread spectrum, or any other specialized purpose, they should go out and build it instead of whining about FM satellites, which can be used by the vast majority of hams. As an alternative, vote with your dollars and only contribute to the projects which have the modes you prefer.

The bottom line: There are places in ham radio for *both* FM and linear transponder satellites. Each has its own advantages and disadvantages, and each potential satellite builder has to weigh the trade-offs before deciding which ones to build. Whiners complaining about how the versions they don't like are "evil" shouldn't influence what is done.

In simpler words, different strokes for different folks. That's what makes ham radio exciting!

73, Phil, KC4YER

World Of Ideas

BY DAVE INGRAM, K4TWJ

A Look At The World Around Us

Crystal Showcase 2002

Whether a spin-off of 9/11, a rekindled interest in free-play radios for emergency preparedness, or an appreciation for life's simple pleasures, homebrewing crystal sets is growing in popularity among today's amateurs. As your requests for more views and "build 'em" details point out, crystal sets are items everyone can enjoy building and using regardless of electronics background or technical expertise. In light of that fact, we are proud to feature more information on the little marvels in both this and next month's columns and also to recognize the world-famous Crystal Set Society. Thanks to the "XSS," incidentally, a most interesting Push-Pull-style crystal set is our special feature this month. It is intriguing to study, and it is also easy to build. Give it a try!

Before becoming hopelessly engrossed in discussing crystal sets, I wish to congratulate the Crystal Set Society and its leader, Rebecca the "Crystal Queen," on 11 years of success. Thanks to the society's enthusiastic membership and Rebecca's efforts to ensure every issue of the XSS newsletter is filled with good projects, the group keeps interest in crystal sets alive and thriving. The newsletter is published six times a year, and a subscription is $12.95. You can order it by telephoning Rebecca at 1-800-927-1771 or on-line at <www.midnightscience.com>. You can also write/order XSS newsletters from the society's new address: P. O. Box 1625, Norman, OK 73070-1625 (clever box choice, Rebecca; I am sure many folks recognize the 1625 as the 12 volt equivalent of the 807 tube).

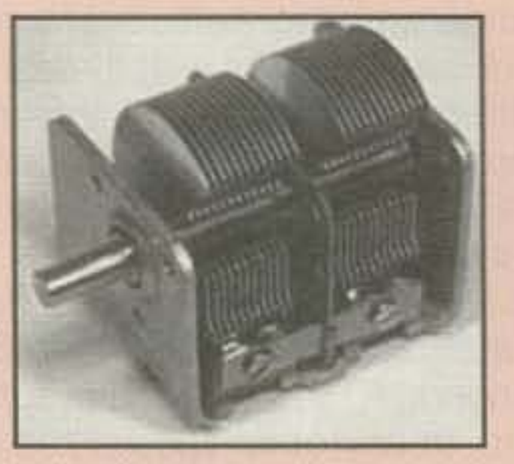

Photo A– In addition to an excellent newsletter and a large selection of books, the Crystal Set Society offers a wide array of special crystal-set-related items such as this custom-made dual-section 365 pFd tuning capacitor. The "XSS" is one-stop shopping for sure.

While communicating with the Crystal Set Society, be sure to check out their other crystal-related goodies such as crystal diodes, galenas, catwhiskers, high-impedance earphones, tuning capacitors, kits, and much more (photo A). Particularly attractive are dual-section 365 pFd variable capacitors—scarce but very useful items (for both crystal sets and homebrewed tube-type transmitters) presently being custom-made for the XSS. Remember, too, crystal radios make dandy easy-to-build projects for school and summer camp groups. Spread the cheer and good times of building a working "survival radio" just for fun, and use the experience as a stepping stone to guide youngsters into our exciting world of amateur radio. More than new rigs and additional frequencies, we need more youngsters and newcomers to continue our proud legacy into future generations. Although amateur radio or hobby communications may change, make no mistake: Future amateurs will always

4941 Scenic View Drive, Birmingham, AL 35210

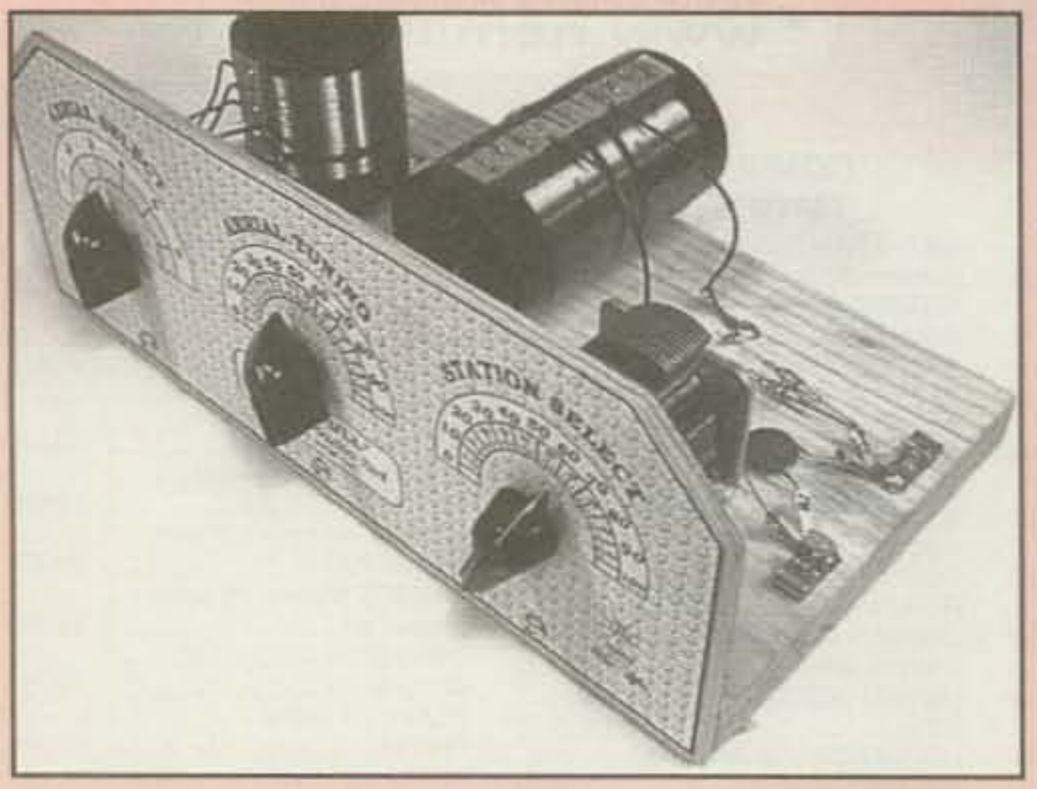

Photo B– The original 1950s-version push-pull crystal set as built recently by Mike Peebles of the Crystal Set Society fame. What a masterpiece!

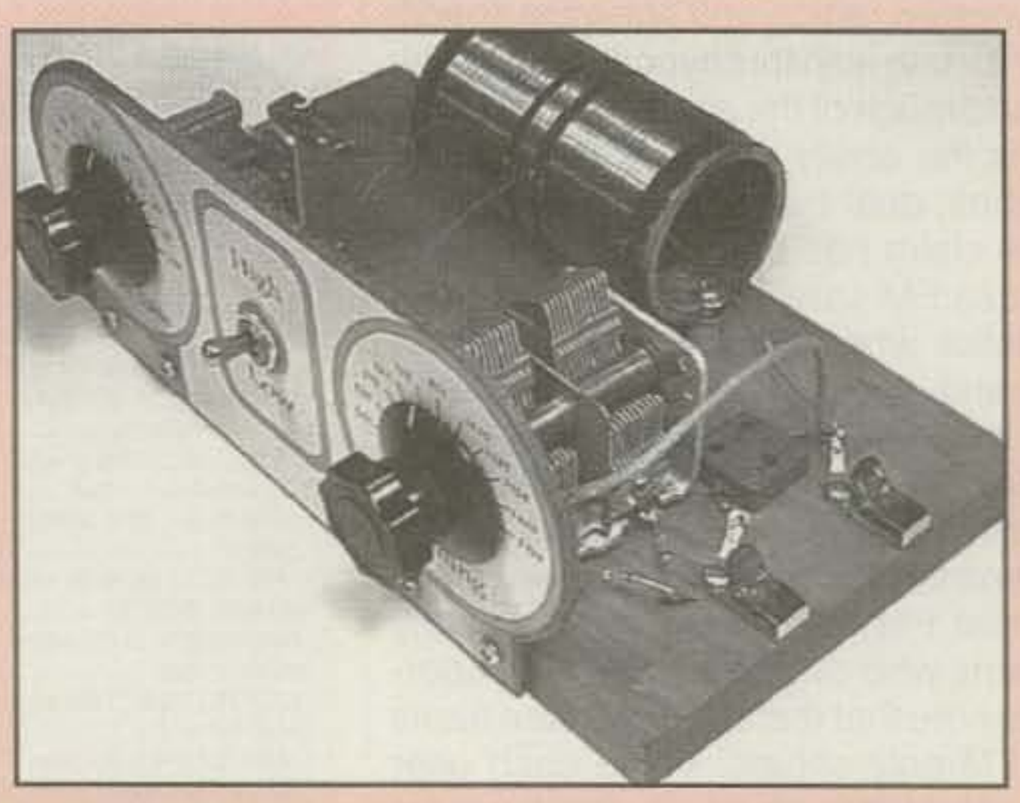

Photo C– The "expanded and improved" push-pull crystal set also built by Mike Peebles sports more antenna-coupling flexibility and greater single-signal selectivity. Custom front panel overlays for the original and/or expanded version are available for downloading at <www.midnightscience.com> and/or <peeblesorig@qwest.net>.

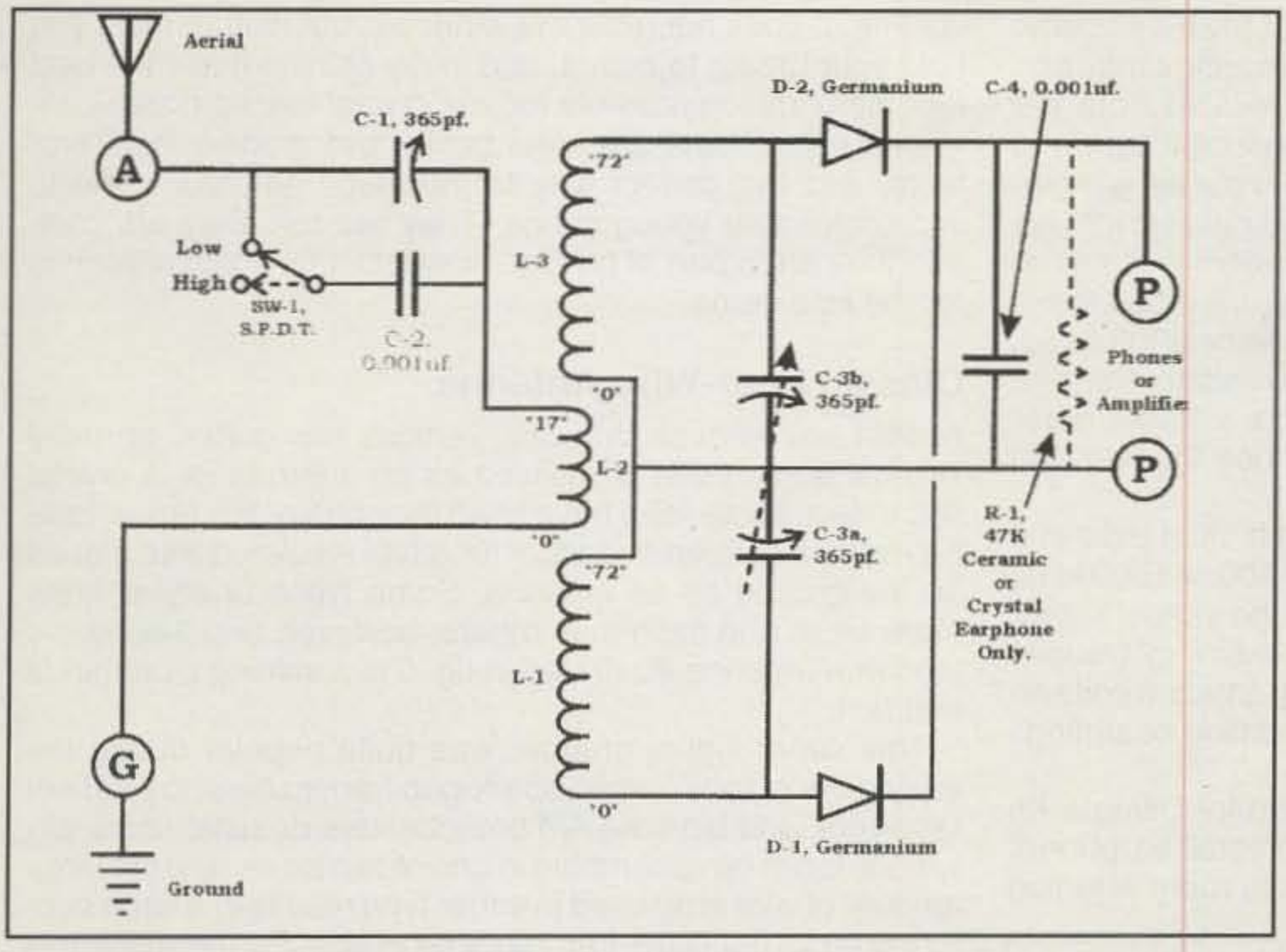

Fig. 1– Circuit diagram of the original 1950s-style push-pull crystal set, courtesy Mike Peebles and the Crystal Set Society. (Discussion in text)

stand 10 dB above the crowd. Now let's focus on crystal sets!

Push-Pull Crystal Sets

You probably have heard of push-pull audio and RF amplifiers, but have you heard of or seen a push-pull crystal set? They are a mite rare, but they really exist and they work like champs. Mike Peebles, the Crystal Set Society's master homebrewer, recently built one of the little delights, and it proved to be such a beauty that it was featured in both the society's newsletter and catalog. In fact, Mike built two versions of the receiver—an original 1950s replica shown in photo B and fig. 1, and an "expanded and improved" version shown in photo C and in fig. 2.

A quick look at the circuits reveals both versions use dual-section 365 pFd tuning capacitors, which are rather scarce today but as previously mentioned are available from the Crystal Set Society. The original version (fig. 1) employs a single antenna/detector coil, with L2 inducing signal voltage into L1 and L3. A single-section 365 pFd capacitor, C1, peaks the antenna while C3 a and b tune in signals. The expanded version (fig. 2) utilizes a second antenna coil comprised of L1 and L2 for additional signal selectivity and gain, plus a double-pole six-position switch can change the circuit back to "original" form if desired. The expanded version uses C1 to peak the antenna circuit and C2 a and b to tune in signals.

Wiring of the previously mentioned double-pole six-position switch is shown in fig. 3. One section selects taps on the antenna coil for optimizing low-, middle-, or high-end AM broadcast-band reception, and the other section bypasses the tapped coil for "original circuit" operation. Jumpers rather than a double-pole switch are employed on the main/detector coil, basically for two reasons. First, best tuning and reception for your particular area may (and probably will) occur at different tap settings, such as 54 or 72 turns on the "lower" coil and 18 or 36 turns on the top coil. Second, the taps generally fall in the "set and forget" category unless the radio is moved to a different QTH. Looking at it from that viewpoint, I also agree with readers' opinions that a couple of jumpers rather than a switch could be used on the antenna coil to minimize assembly cost. I also sense some readers asking if the antenna coil assembly could be deleted completely. Yes. That is why we included a photo and diagram of the original set—so you have two choices for homebrewing.

Construction details of the two coils, incidentally, are included in fig. 4. Both coils are wound on plastic (ABS pipe) forms 1 7/8 inches OD. The detector coil is 3 1/2 inches long and the antenna coil is 2 inches long. All coils are wound with number No. 28 enamel-coated wire, and all windings are in the same direction. The position of the taps is not critical and may vary a couple of turns from their suggested points. Remember, you are building an eye-catching display unit, so work slowly and accurately to ensure the coils look superb. The forms secure to the crystal set's wood-base board with small "L" brackets or stand-off insulators, as desired.

A suggested parts layout for the push-pull crystal set is shown in fig. 5. The wood base is 5 1/2 by 10 inches, and the front panel is 4 by 10 inches. A cus-

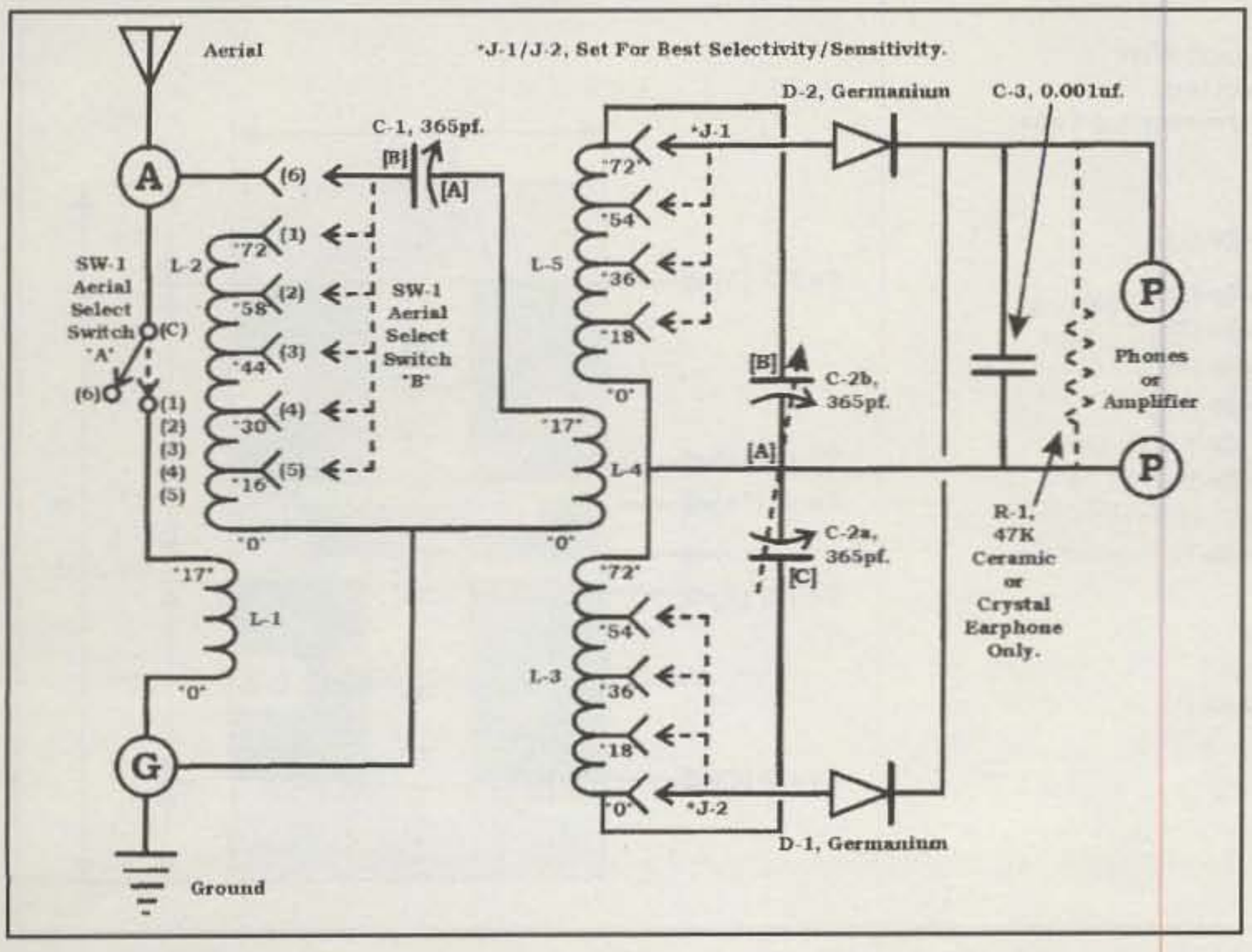

Fig. 2– Circuit diagram of the expanded push-pull crystal set, also courtesy Mike Peebles and the Crystal Set Society.

tom overlay for the front panel is available at Mike's website: <www.peeblesorig. com>. Diodes, Fahnestock clips, and high-impedance crystal earphones are available from the Crystal Set Society. If you have access to a decent supply of 1N34, 1N695, or similar germanium diodes, your set will produce maximum output if you pick a matched pair. How? Use your trusty 20,000 ohms-per-volt VOM (volt-ohm milliammeter) set close to its "X10K" range and measure diode resistance. Connected one way the reading will be near full scale. Reverse the leads and note the lower scale reading. Perform those same "front-to-back" measurements with all other diodes, write down their values, and then use the two with the closest to identical readings in your set.

Alignment of the assembled set is a cinch. Just tune in a station near the high end of the AM band (1400 or 1500 kHz) and alternately tweak the two trimmers on the side of C2 for maximum volume. If you experience "double tuning" (receiving the same station at two dial settings), try antenna coil settings of 1, 2, and 3 to improve low-end reception or settings of 4 and 5 to improve high-end reception.

How well does this homebrewed treat work? Using a 65 foot wire antenna and a homebrewed crystal earphone/speaker, Mike reports it delivers comfortable room listening volume. It does not rattle the windows, but neither must you hold your breath to hear it, and in my opinion that's the best recommendation possible for any crystal set. I am also convinced crystal sets are ideal family and grade-school projects, and the perfect way to introduce amateur radio to impressionable young minds. They are fun, they are cool, and they are a part of history. Now let's talk about antennas for the little gems.

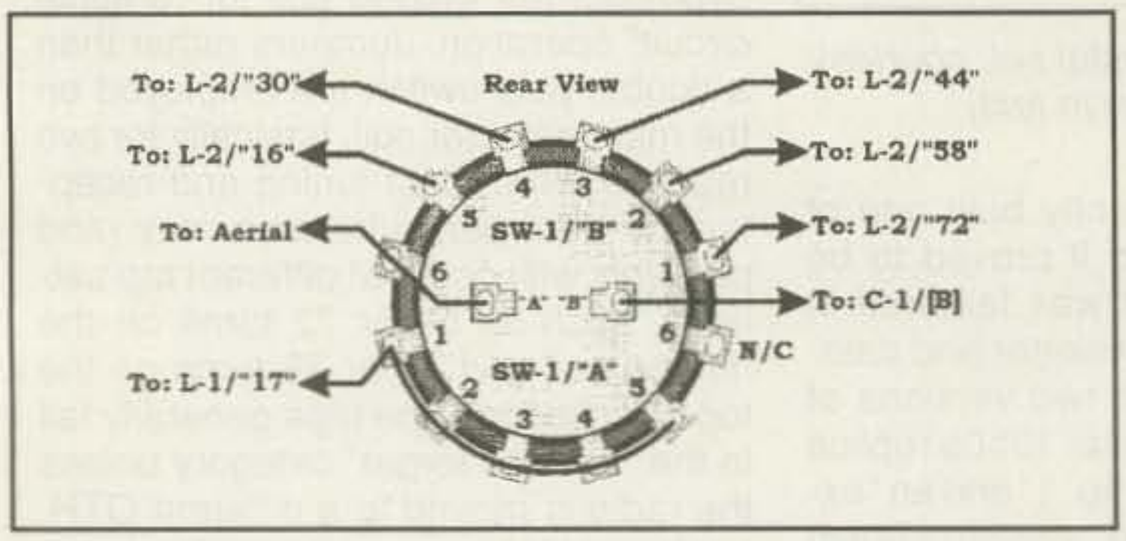

Fig. 3– Outline for wiring the double-pole, six-position antenna coil selection switch. (Discussion in text)

Classic Four-Wire Antenna

Almost any form of longwire, vertical, rain gutter, or metal window screen can be utilized as an antenna for a crystal set. In fact, some folks have used their chain- link fence, telephone line, or even a random length of insulated wire placed on the ground as an antenna. Some types or styles have more class and flash than others, however, and the classic four-wire antenna illustrated in fig. 6 is a shining example of that fact.

This super signal grabber was quite popular during the early days of radio, when spark-gap transmitters, crystal-set receivers, and big-time AM broadcasters dominated the airwaves. It can be assembled in one of two sizes, and the large amount of wire employed in either type results in a large capture area for good low-frequency reception. Furthermore, this skywire exhibits a "real radio" appearance guaranteed to enhance any landscape! In the full-size version each of the flat-top's four wires is 132 feet long and each of the four feeder/phasing lines or wires is 8 feet long. In the half-size version, each flat-top wire is 66 feet long and each feeder wire is 4 feet long. The lead-in wire for either version is not critical and may be any reasonable length required to reach your receiver. Regular copper antenna wire or insulated hook-up wire may be used for the flat-top section, its phasing lines, and its lead-in. The only criteria is getting low-cost wire. Check hamfest fleamarkets. I found a half-full 1000 foot roll of wire for one dollar a couple of years ago and made several neat antennas from it.

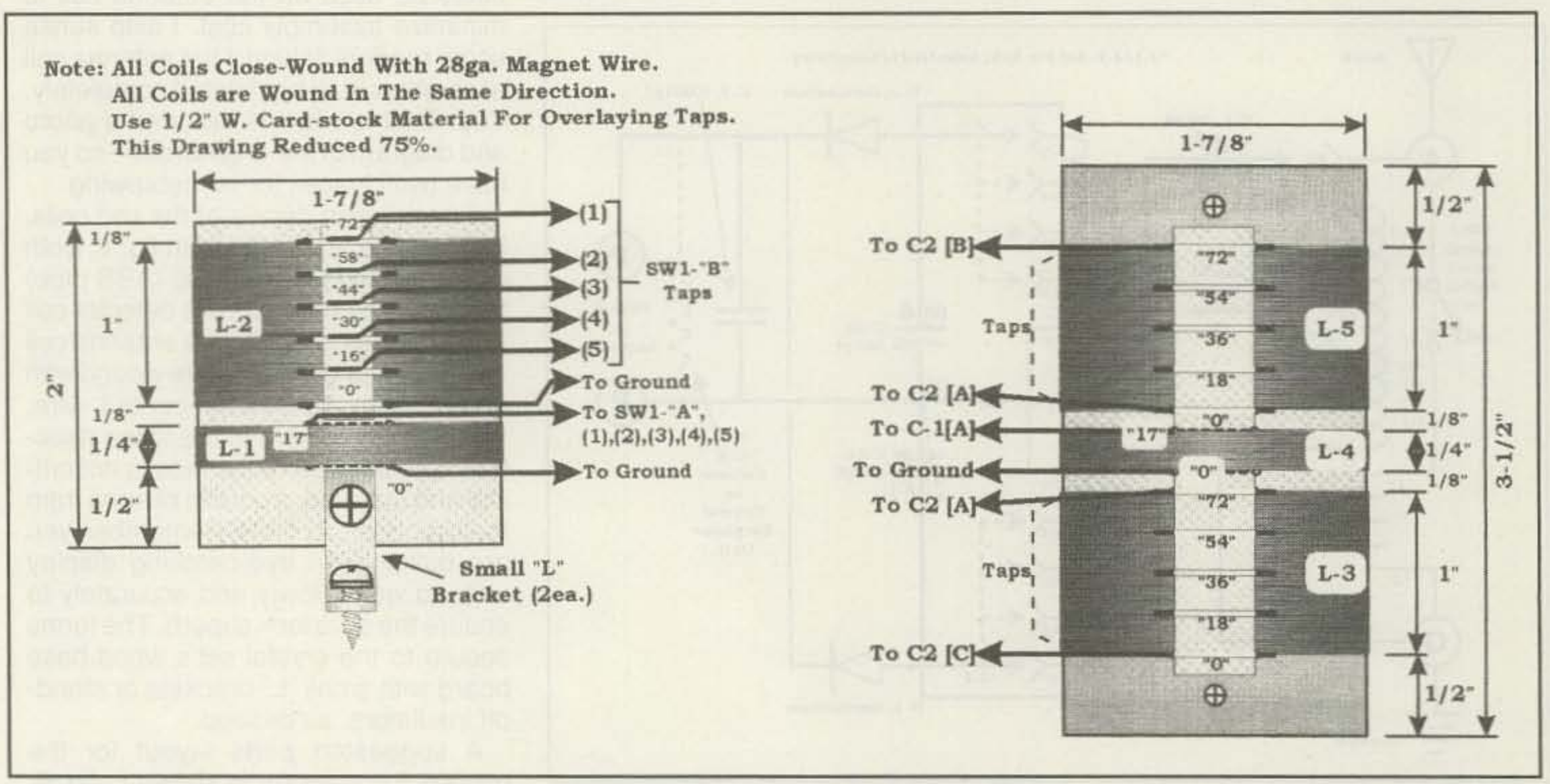

Fig. 4– Assembly details for the antenna and detector coils used in both versions of the push-pull crystal set. Both coils are wound with No. 28 enamel-coated copper wire on 1 7/8 OD plastic forms.

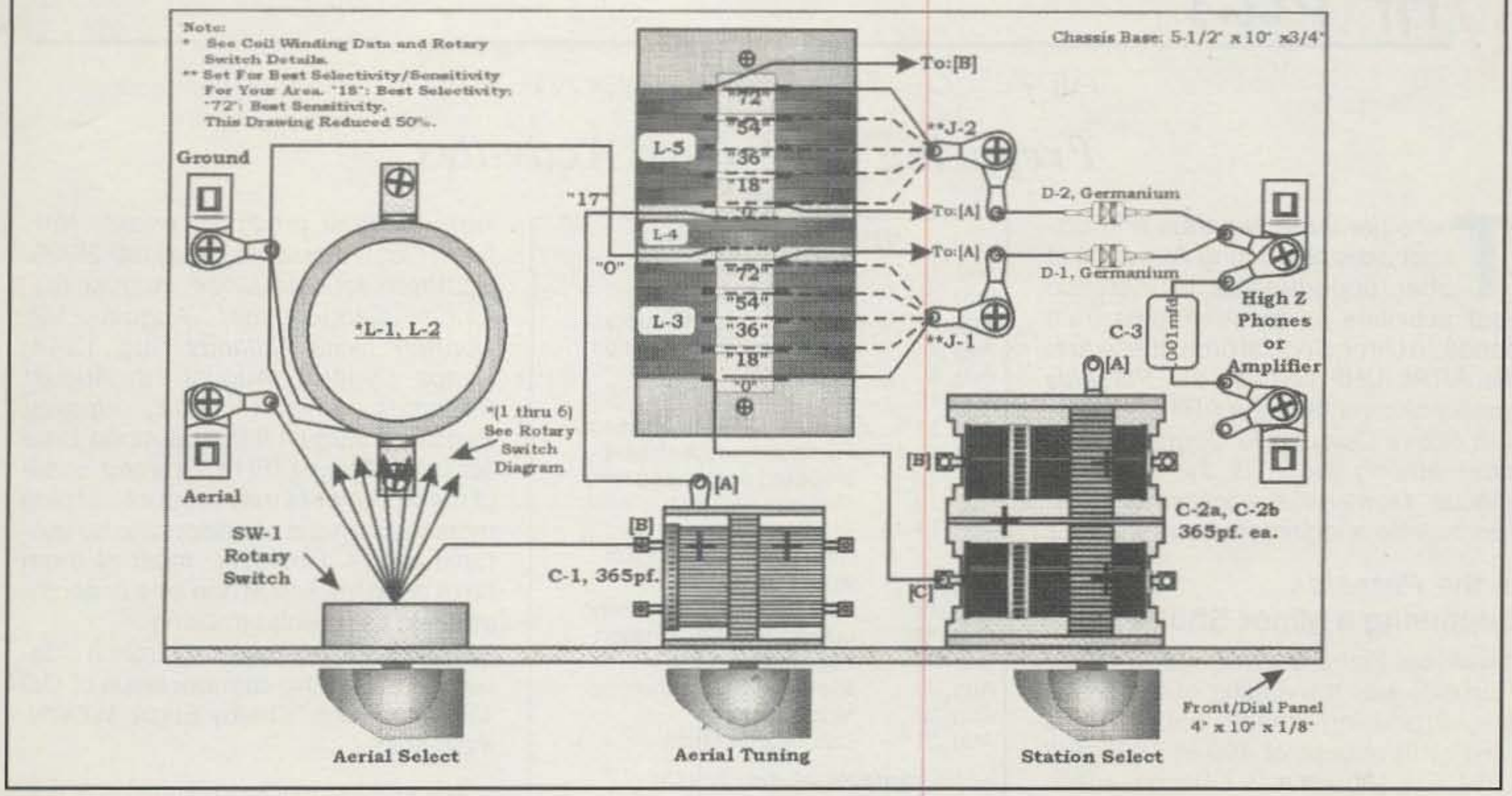

Fig. 5– Suggested parts layout for the push-pull crystal set. When carefully assembled, this little rig becomes a work of art.

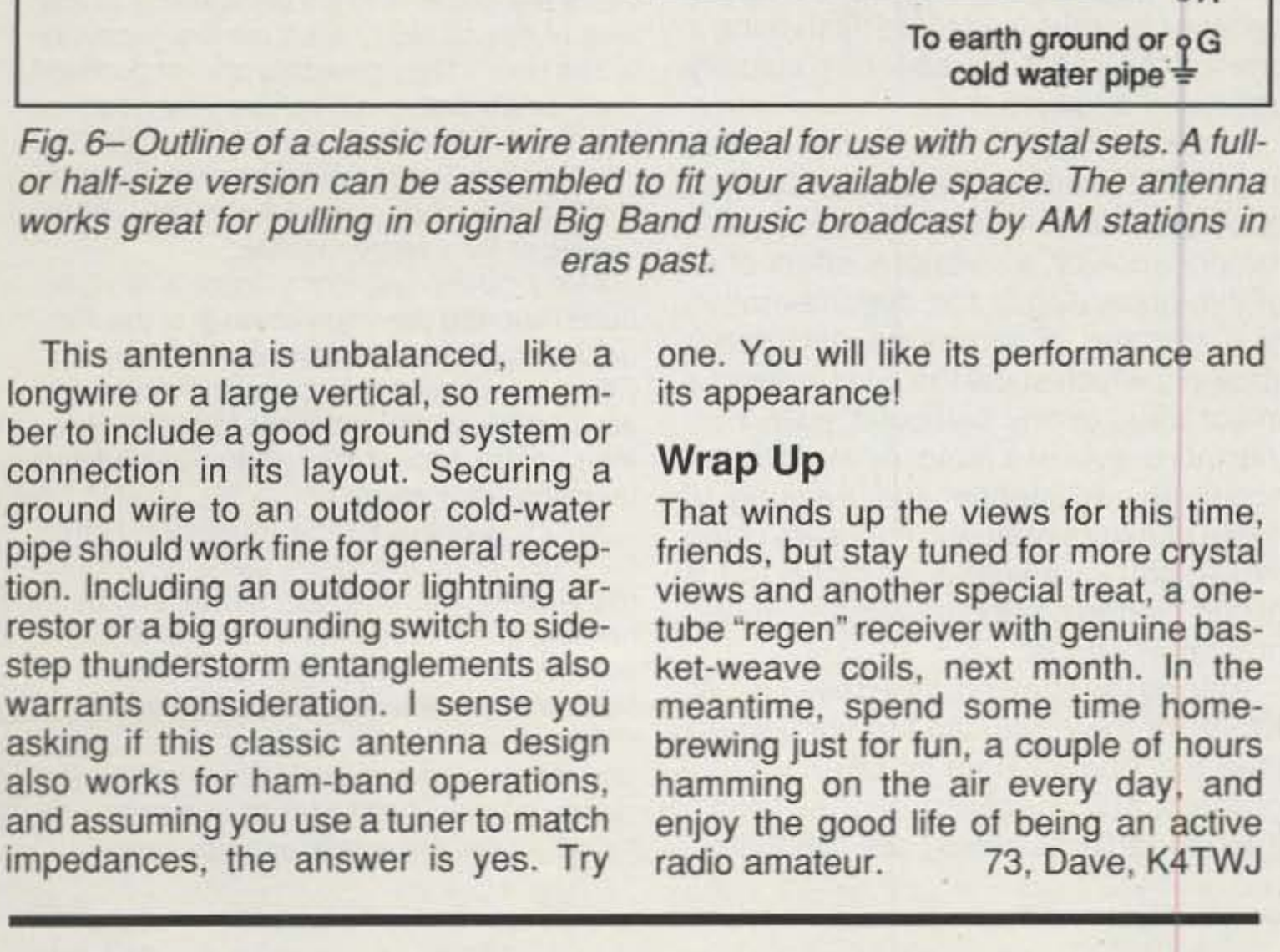

Fig. 6– Outline of a classic four-wire antenna ideal for use with crystal sets. A full- or half-size version can be assembled to fit your available space. The antenna works great for pulling in original Big Band music broadcast by AM stations in eras past.

This antenna is unbalanced, like a longwire or a large vertical, so remember to include a good ground system or connection in its layout. Securing a ground wire to an outdoor cold-water pipe should work fine for general reception. Including an outdoor lightning arrestor or a big grounding switch to sidestep thunderstorm entanglements also warrants consideration. I sense you asking if this classic antenna design also works for ham-band operations, and assuming you use a tuner to match impedances, the answer is yes. Try one. You will like its performance and its appearance!

Wrap Up

That winds up the views for this time, friends, but stay tuned for more crystal views and another special treat, a one-tube "regen" receiver with genuine basket-weave coils, next month. In the meantime, spend some time homebrewing just for fun, a couple of hours hamming on the air every day, and enjoy the good life of being an active radio amateur. 73, Dave, K4TWJ

VHF Plus

BY JOE LYNCH, N6CL

All About The World Above HF

Preparing for August Activities

There are three separate and distinct activities during August that offer opportunities to increase your activities on the VHF-plus ham bands. In chronological order these are: the ARRL UHF contest, the *Perseids* meteor shower, and the ARRL 10 GHz and Above Cumulative Contest. Dominant among these is the *Perseids* shower. However, the following question may be a legitimate one:

Is the *Perseids* Becoming a Minor Shower?

It was less than a decade ago when the *Perseids* was the darling of the showers. Producing zenith hourly rates (ZHRs) in excess of 400 in 1993 and 1994, this shower was the most anticipated event on the meteor-scatter operator's calendar, particularly because of the recovery of the parent comet, Swift-Tuttle, during the summer of 1992.

Knowing that the cloud of dust trailed the comet in the aftermath of perihelion, observers predicted that debris following the comet would make for a significant increase in activity during the following years. As indicated above, observers for the years 1993 and 1994 were not disappointed.

This year, however, we are nearly ten years past perihelion of the comet and the previous eight years' production indicates that we are that much farther away from the clouds of debris that produce the meteor showers.

This year the International Meteor Organization (IMO), the organization that tracks almost every shower known, barely gives the *Perseids* an honorable mention. Even so, what continues to intrigue the IMO and others are the tertiary peaks that occur hours before and hours after the main peak.

This year the IMO forecasts that the first tertiary peak will occur at around 2015 UTC on August 12, the main peak will occur a little over two hours later, and the second tertiary peak will occur at around 0830 UTC on August 13. The tertiary peaks are predicted to exhibit ZHRs on the order of 75, and the main peak is estimated to be around 110. The folks at *Sky and Telescope* magazine are not as generous, however, pegging their peak at around 60. For more internet information on IMO and *Sky and Telescope*, please see their respective websites: <http://www.imo.net> and <http://skyandtelescope.com>. For yet another opinion on the peak of the shower, see the quote below from Shelby Ennis, W8WN.

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

VHF Plus Calendar

Aug. 1	Last quarter Moon
Aug. 3-4	ARRL UHF Contest
Aug. 4	Very poor EME conditions
Aug. 6	Highest Moon declination
Aug. 8	New Moon
Aug. 10	Moon perigee
Aug. 11	Very good EME conditions
Aug. 12-13	*Perseids* meteor shower predicted peaks (see text)
Aug. 15	First quarter Moon
Aug. 17-18	ARRL 10 GHz and Up Cumulative Contest first weekend
Aug. 18	Very poor EME conditions
Aug. 19	Lowest Moon declination
Aug. 23	Full Moon
Aug. 25	Moderate EME conditions
Aug. 28	Moon apogee
Aug. 31	Last quarter Moon

• EME conditions courtesy W5LUU

With the Swift-Tuttle comet traveling toward aphelion at an orbital period of between 120–130 years, the likelihood of future blockbuster productions seems unlikely. Even so, it is pegged right on the Northern Hemisphere's calendar, occurring in the middle of the summer months and thereby making it one of the most consistently visually observed showers ever.

While the Swift-Tuttle comet hurtles into oblivion, taking with it any hopes of good production from the *Perseids* meteor shower, a collateral effect of all of this observing is the documentation of a number of moderate and minor showers which show the possibility of a major peak in any particular year. Furthermore, even if a major peak does not occur, the existence and tracking of these showers provides the users of the WSJT software with a bit higher odds of completing computer-assisted meteor-scatter QSOs.

Among the showers listed by Gary W. Kronk for the American Meteor Society (see the August Radiant URL: <http://comets.amsmeteors.org/meteors/august_radiants.html>) are the following, with their predicted peaks: *Northern Iota Aquarids,* August 25/26; *Southern Iota Aquarids,* August 6/7; *Alpha Capricornids,* August 1/2; *Northern Delta Aquarids,* Aug. 13/14; *Kappa Cygnids,* August 18; *August Eridanids,* August 11/12; *Upsilon Pegasids,* August 8/9; and *Alpha Ursa Majorids,* August 13/14. Granted, some of these showers may produce nothing more than what is considered to be sporadic levels. However, most of them have been tracked at one time or another using radio echo tracking.

In addition, in an excerpt from a sidebar written for the summer issue of *CQ VHF* magazine, Shelby Ennis, W8WN, indicates:

> The *Perseids* has now returned to its normal rate, which is still one of the highest of any of the annual showers. The overall *Perseid* activity consists of two components—one flat and very broad activity level lasting for five weeks, and another one, which causes the sharp peak rates. The main part of the *Perseids* is usually considered to run for about five days, August 10–14, with the major peak predicted for this year on August 12 at about 1720 UTC. This usually is a fairly broad peak. There often are enough usable meteors to make schedules worthwhile over the full three- to five-night period.
>
> The *Perseids* is a high-velocity shower (60 km/sec) and is circumpolar for those in the mid-northern latitudes, reaching a minimum altitude at about 1730 local time. (This means that a few showers might be available at any time of day or night, although the geometry will be poor.) They generally are not good for north-south paths, but can be very good for NW-SE (2400–0500) and NE-SW (0800–1200) paths. The radiant is too high for good E-W paths, but possible (0500–0800). (Times in *local* standard time.)
>
> Many observers, both visual and radio, have reported the impression that the *Perseids* showers sometimes appear in groups. This was explained away some years ago as a "misleading statistical feature." However, more recent data have raised the question once again.
>
> Which is better for the *Perseids*—HSMS or SSB? In recent years there have been many comments such as, "If I had only been running *xxx* [insert either HSMS or SSB, for comments both ways have been heard] for that schedule, it would have been easy!" The *Perseids* are known for their good bursts, and some years have almost *no* underdense pings! Thus, *SSB* may be the preferred mode, especially near the peak."

CQ VHF Summer Preview

The summer issue of *CQ VHF* magazine is now available. Below are some teasers to pique your curiosity.

Do you want to know more about meteor scatter? Once considered one of the "esoteric" VHF propagation modes, meteor scatter has become the easiest way for small 2 meter stations to acquire new grids in the 500–1200 mile range. Shelby Ennis, W8WN, presents an extensive two-part article covering the basics of meteor-scatter operating. In part one, in this issue, he explains the basics of meteor-scatter propagation and how one can take advantage of this form of propagation to complete QSOs on several of the VHF+ ham bands. Part two will appear in the fall issue.

What do students and mirrors and amateur radio operators have in common? The answer has nothing to do with grooming. Rather, the answer is satellites. We are always talking about student involvement in our hobby. Bobette Doerrie, N5IS, writes about a very practical, hands-on involvement in our hobby for students across the country and even around the world!

By special arrangement with AMSAT-NA, Rick Hambly, W2GPS, is simultaneously publishing an article in the summer issue of *CQ VHF* as well as the May/June issue of *The AMSAT Journal* that will introduce the next AMSAT-sponsored satellite, AMSAT OSCAR-E, which, according to Rick, "will be a step forward in the evolution of Microsat technology."

We amateurs almost forget that we have an amateur band in the 902–928 MHz frequency spectrum. So totally loaded with non-amateur users, this band seems to be unattractive to many of us. Despite these deterrents, Jim Labor, KE4NZG, decided to go ahead anyway and built a repeater for this band. His article describes his successful repeater project.

Your editor's first extensive introduction to Software Defined Radio (SDR) theory was at last year's Central States VHF Society Conference in Ft. Worth, Texas, where Gerald Youngblood, AC5OG, made a challenging introductory presentation on the subject. I asked Gerald to write an introductory article for *CQ VHF* more extensive than the one he published in the conference's Proceedings. He obliged with his article in the summer issue.

In his article on the great 6 meter *F2* propagation which appeared in the Spring 2002 issue of *CQ VHF*, Ken Neubeck, WB2AMU, covered the propagation patterns that occurred along with the stations worked. In the summer issue he focuses on some of the tools and tactics that were used by him and others in working this *F2* propagation.

Three well-defined, stable high-pressure systems form up every summer, providing weak-signal operators the excitement of VHF and UHF voice contacts over 1000 miles away. Gordon West, WB6NOA, interviews some experts who blast the myths and know the truths about this atmospheric phenomenon which hits the bands from July through September.

Looking for a simple project that you can build or make into an evening-long club project? Van Field, W2OQI, describes a straightforward antenna tuner for 2 meters that can be made from easily obtainable parts.

Also included in the summer issue of *CQ VHF* are the regular columns plus more features. To purchase your copy or to start your subscription, call CQ Communications at 1-800-853-9797.

New North American Microwave Records

The following is from Al Ward, W5LUA: "On May 1, 2002, I worked KØVXM on 2304 MHz for a new North American DX record of 1000 miles, or 1609 km. KØVXM is located in EL98PJ. Signals were 59+ on 2304 MHz SSB. On May 2, I worked KQ4PI in EL99HK for a new North American DX record of 936 miles, or 1507 km. Signals were 559 both ways on 3456 MHz.

"On 2304 and 3456 I run a 5 ft. dish at 65 ft. I have 300 W output on 2304 and 240 W on 3456 MHz."

Current Contests

As mentioned above, there are two important contests this month. The ARRL UHF and above contest is scheduled for 3–4 August. Complete rules may be found in the July issue of *QST*. The first weekend of the ARRL 10 GHz and above cumulative contest is scheduled for 17–18 August. The second weekend is 21–22 September. Complete rules for this contest also can be found in the July issue of *QST*.

Current Conferences

Normally held in August, the Eastern VHF/UHF Conference will be held in October in conjunction with the Microwave Update Conference. The joint conference will be October 24–27, 2002 at the Radisson Hotel, Enfield, Connecticut. More information on these conferences will be forthcoming in this column and in *CQ VHF* magazine.

Electronics Industry vs. ARRL

The following is from the June 14, 2002 *ARRL Letter:*

An ARRL challenge to the FCC's authority to permit Part 15 unlicensed operation of radio devices that may interfere with licensed services has drawn heavy fire from industry. The list of those filing opposition comments includes several unlicensed device makers and other industry giants, including Apple Computer and Microsoft. Some industry opponents are claiming that the ARRL wants to undo Part 15 altogether and would require individual licensing of such unlicensed devices as garage door openers and cordless telephones. ARRL General Counsel Chris Imlay, W3KD, says the industry commenters have it all wrong.

The industry assault came in direct response to an ARRL Petition for Reconsideration in a proceeding (ET Docket 98-156) to amend Part 15 rules to allow certification of unlicensed, Part 15 equipment in the 24.05 to 24.25 GHz band at field strengths up to 2500 mV/m. The FCC first proposed permitting the 24 GHz Part 15 devices at the elevated field strengths in 1998 in response to a Petition for Rule Making from Sierra Digital Communications.

The ARRL wants the FCC to reverse a portion of its Order that addresses the Commission's jurisdiction to authorize unlicensed RF devices that pose significant interference potential to licensed services. The League has made similar points in two other recent rulemaking proceedings, arguing that the FCC is expanding the concept of unlicensed devices far beyond what the Communications Act ever had in mind.

Citing the "staggering" implications of ARRL's position, opposition comments filed on behalf of Agere Systems, Apple Computer, Bluetooth Special Interest Group, Cisco Systems, Microsoft, and VoiceStream Wireless asserted that potentially every user of devices that radiate RF—intentionally or otherwise—"would be required to obtain an individual license from the Commission" if ARRL's position prevails. Part 15 has "a long, accepted, and successful history," the commenters said, urging rejection of ARRL's petition.

Comments submitted on behalf of the Institute of Electrical and Electronics Engineers (IEEE) 802 Local and Metropolitan Area Network Standards Committee <http://ieee802.org> echoed a similar refrain. "To 'pull the rug out from under' Part 15, as the ARRL would do, would devastate the industry and do great harm to the users of the technologies that Part 15 has enabled," its comments declared.

In its comments in opposition, the Information Technology Industry Council (ITI) said it did not believe the types of unlicensed devices of concern to ARRL "have significant potential for interference to licensed radio services." Line-of-sight systems using highly directional antennas "should not pose any undue or significant threat to amateur satellite operation," ITI said in supporting their operation and deployment. ITI argued that ARRL was misinterpreting the Communications Act.

ARRL's Imlay says the industry commenters are missing the point and, he adds, responding to arguments that ARRL never made—such as individual licensing of Part 15 devices. "This is a perfect example of where the FCC went too far," he said of the Order issued last December in the 24 GHz proceeding. "There's a threshold. The trick is where to draw the line between licensed and unlicensed devices." The League contends the FCC has failed at distinguishing between what should and should not be licensed and, in so doing, has violated the Communications Act.

In its Petition for Reconsideration filed in February, the League said the issue was not whether the FCC has jurisdiction to enact reasonable regulations concerning RF devices. "Rather," the League said, "it is whether or not a device which has substantial interference potential to licensed radio services must be licensed." The ARRL argues that the limit of FCC's jurisdiction is reached when it's concluded that operation of such devices "has a substantial interference potential" to a licensed service.

"Any way you look at it, this ought to be a licensed radio service," Imlay said of the 24 GHz devices at issue. He believes the proceeding provides a good opportunity to test the theory that a license is required for any application that "poses substantial likelihood of interference." Amateurs and Part 15 devices can co-exist on the same spectrum,

Imlay says, "provided there are reasonable power levels that, on a whole, do not pose an interference threat."

And Finally . . .

The industry attack on the ARRL typifies the too often antagonistic relationship that industry has toward the League. A lot of this antagonism can be eliminated, or significantly reduced, if industry would develop a more *laissez faire* attitude toward the amateur radio community. Granted, industry is a constant beneficiary of amateur radio development. However, greed on industry's part is tantamount to killing the goose that lays the golden egg.

It is this columnist's opinion that industry would be far better off by simply sitting back and watching amateurs develop new technology, and then finding their own frequencies to further refine that new technology for their particular use.

An example of how industry has been able to adapt amateur radio research is in the area of meteor-scatter communication. In a February 8, 2001 *ABC News* internet article (http://abcnews.go.com/sections/scitech/DailyNews/meteor010208.html) author Sascha Segan points out that Meteor Communications in Kent, Washington has been commercially using meteor scatter for 25 years.

It seems, however, that industry's corporate mentality is to observe and steal—observe how we developed the technology and then steal everything connected with that technology, including our frequencies. Perhaps the best way to keep industry from stealing from us is to not develop anything new!

Come to think of it, maybe that's what we've been up to lately.

Actually, the best course of action is to continue to be innovative and creative. Then, when it becomes necessary to defend our frequencies, let the experts at the League—people such as the League's legal counsel Chris Imlay, W3KD, and expert witness Paul Rinaldo, W4RI—continue to do their jobs. These two gentlemen are, in this columnist's opinion, two of the unsung heroes of our hobby.

Speaking of Paul, in looking up his license information to confirm his callsign, I noticed that he is 71 years old, an age that some would think of as retirement age. He just might be thinking about retirement in the not too distant future. Is there someone waiting in the wings to replace him? I have no idea. Maybe someone reading this column could become the next expert witness that the League will need. What do you think? Are you that person?

Until next month... 73, Joe, N6CL

BY CARL SMITH, N4AA

News Of Communication Around The World

Pride in Operating

Dayton 2002 has come and gone and the summer is upon us, at least here in the U.S. Hamfests abound everywhere to occupy our weekends, along with the usual summertime activities: Field Day, the IARU HF World Championship contest, and WRTC 2002, the CQ WW VHF Contest, the RSGB IOTA Contest, etc. There should be no lack of things for us to do this summer, no matter where our interests lie. Oh yes, there will be lots of DXing going on, too.

A bit of trivia for you this month: Dick Brown, W5AA, is a veterinarian with some interesting background. If you are old enough to remember the American Project Mercury space program, then you may remember the chimpanzee astronaut named "Ham." This month we have a picture of W5AA, who at the time was a US Air Force pilot and veterinarian, giving one of the future chimps a checkup. Now retired, Dick and his wife Jo Ann, N5FBW, live in Mississippi on the Gulf of Mexico. Dick has another unique credit: He is the only one to hold *three* separate 5 Band DXCC plaques, collected from his operation from three different countries—as WØEXD/4 from Pensacola, Florida; as YBØABV from Jakarta, Indonesia; and finally as W5AA/TI8 from Costa Rica.

Words of Wisdom

A good friend of mine writes under the pen name "Uncle DX." He keeps coming up with words of wisdom for DXers, and I'd like to share one of his recent offerings with you.

In the last issue of *The DX Magazine* (May/June 2002), Uncle DX picked up on a theme Bernie, W3UR, and Carl, N4AA, have being championing concerning behavior and DX. It consisted of breaking down what was considered to be the basic elements of the problem. Not all elements, but a start nonetheless.

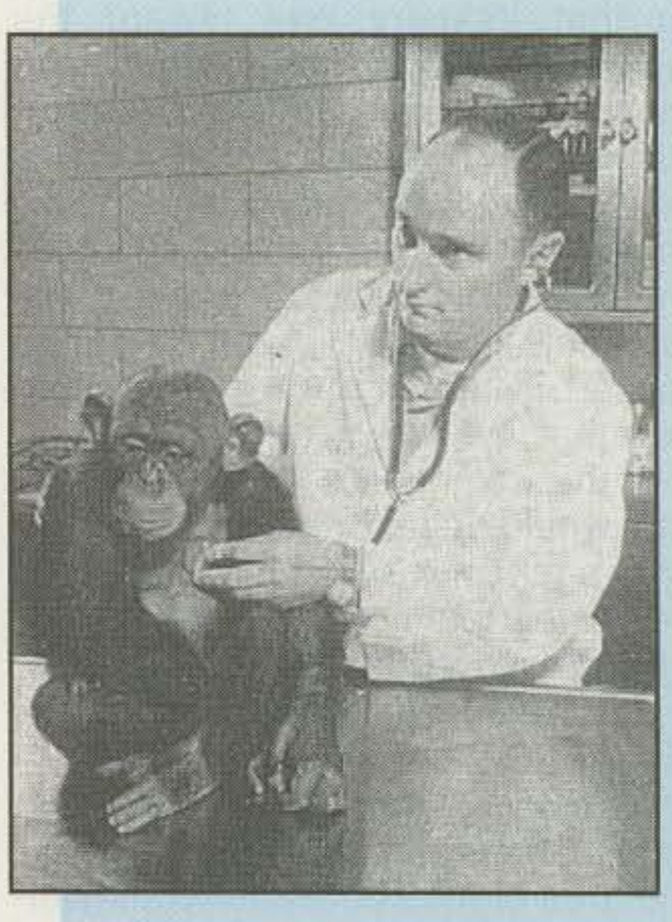
One of the elements high on the list of poor DXer behavior is not knowing how to operate our radios, manifesting itself in a lack of *pride,* plain and simple.

It isn't the radio's fault, since we are blessed with a variety of darn good radios from several manufacturers. All have their wonderful points, and most certainly we have our favorites, as with cars, TV, wives/husbands, tools, etc. Question: Have we ever demanded that a state-of-the-art radio have the capability of programming, by the operator within a band, where we should not transmit? Not an excuse, but a thought.

Take the many that transmit in error on 7.045 atop the DX station. Sorry EU, this is a U.S. example, but you have yours. Why, with today's technology, can't we tell our radios "Don't let me transmit on SSB down there," or anywhere for that matter? This would assist us in not appearing to be less an operator than we think we are. It would keep down the interference, not provide fuel for the "kc" cops, and actually help others make contacts that might otherwise be lost. Would we use it if it were available? Don't know, but if *pride* means anything to the operator, we would.

The question was asked recently of some FT-1000mp owners . . . "Why are some of these fine transceivers on the 'wrong' frequency, in and out of the U.S. bands"? Many are using this transceiver and are recognized when they call the DX station. Shucks, it has two receivers, doesn't it? Why would one be on the wrong frequency? Oops.

Ten-Tec's Omni Vi+ has a REV button at the 2 o'clock position from the main tuning knob. If one holds this momentary button in, the listening frequency will switch. When the pinky releases it, it's back to the setup. Now if someone holds this button in and calls, he will transmit on the DXer's frequency, but hold it in he must. Yes, Ten-Tec has a normal button also, whereby the VFOs can be changed as with many transceivers, but the momentary button is handy and does *help* the operator from making a mistake. *However,* if a small change were made to that button to prevent transmitting while engaged, fewer mistakes would be made.



Dick Brown, W5AA, as a USAF veterinarian, examining one of the future chimpanzee astronauts. (Photo courtesy W5AA)

"Dick, W5AA, with his wife Jo Ann, N4FBW, in front of their home in Mississippi with the view of the Gulf of Mexico from the third floor ham shack. (Photo courtesy W5AA)

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

The WPX Program

SSB

2833.....N3WL 2836.....KT2C
2834.....(not issued) 2837.....EA4AQQ
2835.....JA3EY 2838.....OH8MWD

CW

3090.....9A2EY 3091.....JA3WFQ

Mixed

1897.....SP8MI 1899.....YU2RM
1898.....EA5QB

160 Meter Bar: IN3NJB

CW: 350 JA3WFQ. 500 9A3EY. 1550 3A6AA. 1950 IK3GER. 2300 IN3NJB.

SSB: 500 EA4AQQ. 650 G3TSZ. 700 AE5DX. 1200 IN3NJB. 1600 KWØU.

MIXED: 500 EA5QB, VU2RM. 550 SP8MI. 1500 WZ4P. 2800 N4UH.

10 meters: G5TSZ
20 meters: JH8WGT

Asia: WA2RZJ
Africa: WA2RZJ
No. America: WA2RZJ
So. America: WA2RZJ
Europe: WA2RZJ
Oceania: WA2RZJ

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.*

CQ DX Awards Program

SSB

2377.....KA5EYH 2378.....N5ID

CW

1029.....VE6ZT 1030.....F5JIW

SSB Endorsements

320.....WR5Y/322 275.....AC6WO/283
275.....KKØDX/285 150.....AI6A/152

CW Endorsements

320.....KA7T/331 200.....F5JIW/202
320.....SM5HV/HK7/324 1.8 MHz.....SM5HV/HK7
200.....VE6ZT/240

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.

Bottom line, we could ask the manufacturers to help us stop making mistakes. *However,* we could also take increased *pride* in being more careful in our operating, couldn't we? Mistakes will happen, no question, but they're massive at present. It's not life or death, but tell that to some poor guy or gal who has called Ed in P5 for months.

"Raju, VU2ONR, shown here with his son, makes a lot of noise on 20 meters CW with his 30 watts and dipole. (Photo courtesy Fred Laun, K3ZO)

"Rim, HL1DH, puts out a surprising signal on 40 CW with 100 watts and dipole antenna. (Photo courtesy K3ZO)

The WAZ Program

10 Meter SSB

535 .....JR1HFI 536 .....I5HOR

15 Meter SSB

574 .....N8PCN 576.....VE7SMP
575 .....JE6NBP 576 .....JA3EY

20 Meter SSB

1094 .....IK8JVG 1096 .....I5HOR
1095 .....N5ORT

12 Meter CW

31 .....JA1HSF

15 Meter CW

303 .....WB9CIF 304 .....N1NK

17 Meter CW

40 .....KØCA 41 .....JG3LGD

20 Meter CW

529.....UT5JAJ

40 Meter CW

226 .....W9MJ

6 Meters

41 .....NW5E (25 zones) 46.....ES2WX (30 zones)
42.....ON4AOI (35 zones) 47 ....IW2CAM (25 zones)
43 .....N3DB (25 zones) 48 ..OE4WHG (26 zones)
44 .....K4ZOO (25 zones) 49 .....TI5KD (26 zones)
45 .....G3VOF (30 zones) 50 .....W9RPM (28 zones)
15.....DL3DXX (endorsement 33 zones)

160 Meters

176 .....W9RPM (30 zones) 177.....EA4KD (30 zones)

All Band WAZ SSB

4773 .....WB9CIF 4777 .....JR1QBA
4774 .....EA2CMW 4778.....NØYD
4775 .....DS5SME 4779.....CT1BLE
4776 .....JA4BGK

Mixed

8149 .....OE8CIQ 8157 .....I8MTQ
8150 .....IK1SPR 8158.....AE5RM
8151.....ON4CCP 8159.....W1RWB
8152 .....K4UTI 8160.....JA9GLW
8153 .....W2WO 8161 .....W5WLA
8154.....EA7EJ 8162 .....VA3NR
8155 .....K5EV 8163 .....WAØVBW
8156.....N5OHL (All QSOs QRP)

All CW

314 .....ON6NR 315.....WB9CIF

RTTY

135.....N5ZM 136 .....WA8SWV

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 June 15, 2002, 601 stations have attained the 200 zone level and 1275 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
YL2IX K4XG

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

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
KL7Y, 199 (34)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
KC7V, 199 (34)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
K5MC, 199 (22)
W1JZ, 199 (24)
K2UU, 199 (26)
W1WAI, 199 (24)
W1FZ, 199 (26)
UT4UZ, 199 (6)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
KY7M, 199 (34)
W8AEF, 199 (40)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
KØSR, 198 (22, 23)
UA4PO, 198 (1, 2)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
LA7FD, 198 (3, 4)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
KF2O, 198 (24, 26)
W6BCQ, 198 (37,34on40)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
N4XR, 198 (22, 27)
OE2BZL, 198 (1, 27)

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

WA2RZJ (150 zones)
IK2ECP (153 zones)
KØGT (190 zones)
WB8ZRC (190 zones)
WØAWL (171 zones)
K6RG (170 zones)

Endorsements:

K5MC (199 zones)
W1JZ (199 zones)
N4XR (198 zones)
W1WAI (199 zones)
WB9CIF (188 zones)
OE2BZL (198 zones)
JT1CO (196 zones)
W1DIG (200 zones)
W5RQ (192 zones)
N5ZM (191 zones)
W7SX (196 zones)
W9MJ (175 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>.

Just as they think Ed came back to them, they hear a loud W mistakenly calling on top, and that sets off the "kc" cops . . . that proverbial snowball. The Q is perhaps lost. Been there???

There is a lot of *pride* out there, here and abroad. Uncle DX likes CW and knows of those who are becoming seniors, with the accompanying distance between the fingers and the gray matter increasing. They worry about their CW and actually start practicing once again to send "good" CW. This *pride* should be no different than the *pride* associated with the wrong frequency, a bad note, or audio. *Pride* is *pride,* and why don't we talk up our *pride,* call a spade a shovel, and apply peer pressure and a helping hand when required.

Pride in all aspects of ham radio should be a norm, and it *is* for the really good operators. DX on you. —*Uncle DX*

I really like this guy. He's been around for the better part of 50 years with lots of experience in many areas of amateur radio. We don't always agree, but we respect each other enough to at least listen to the other's point of view and

10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground or radials

Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives high efficiency for more power radiated. Results? Stronger signals and more Q-5 QSOs.

Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.

MFJ-1798
$289.95
Ship Code F

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate Full Size Radiators

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

End Loading

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

No Feedline Radiation to Waste Power

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Built to Last

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$379.95
Ship Code F

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes.

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

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

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

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- not a lossy thin flat-strip -- *gives you highest possible efficiency.*

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning.

Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

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

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

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

MFJ Portable Antenna

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

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

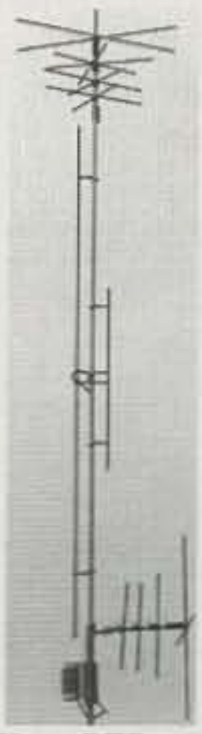
MFJ's G5RV Antenna

$39.95
MFJ-1778, Ship Code A

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

MFJ halfwave vertical

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



MFJ-1796
$209.95
Ship Code F

Only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments,small lots, trailers. Perfect for vacations, field day, DXpedition, camping.

Efficient end-loading, no lossy traps. Entire length is always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting 1 band has minimum effect on others.

MFJ-1792, $169.95. Full size 1/4 wave radiator for 40 Meters. 33 feet, handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $189.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

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and Nearest Dealer . . . 800-647-1800

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Tech Help: (662) 323-0549

MFJ . . . the world leader in ham radio accessories!

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

5062 9A2AA	3784 N6JV	3465 N5JR	3005 HA0IT	2454 K2XF	2117 OZ1ACB	1788 AA1KS	1472 OK1DWC	1130 PY1NEW
4424 W2FXA	3707 VE3XN	3121 PA0SNG	2952 K0DEQ	2415 9A4W	2063 WB3DNA	1751 VE6BF	1461 WT3W	742 K5IC
4146 W1CU	3668 N4MM	3118 I2MQP	2944 IT9QDS	2414 W9IL	2018 HA9PP	1724 W7CB	1448 NG9L	680 VE3NQK
4034 F2YT	3602 I2PJA	3094 KF2O	2912 W2WC	2334 W6OUL	1983 W9OP	1697 Z35M	1429 N1KC	604 VE9FX
3971 EA2IA	3548 N9AF	3090 WB2YQH	2898 IK2ILH	2331 W8UMR	1976 DJ1YH	1573 VE9FX	1369 KW5USA	
3827 9A2NA	3517 YU1AB	3086 K9BG	2694 YU7GMN	2288 K5UR	1958 CT1EEB	1564 K0KG	1325 KX1A	
3806 N4NO	3489 SM3EVR	3062 S53EO	2655 WA1JMP	2121 PY2DBU	1914 I2EAY	1501 W2EZ	1226 EA2BNU	

SSB

4386 I0ZV	3079 EA2IA	2741 PA0SNG	2337 W2WC	1954 CT1EEN	1706 NQ3A	1485 W2FKF	1162 EA5DCL	842 N9DI
4018 VE1YX	3049 F2VX	2607 KF2O	2325 CX6BZ	1950 K5UR	1704 IT9SVJ	1384 LU3HBO	1125 I2EAY	822 N1BYE
3995 ZL3NS	3030 9A2NA	2596 4X6DK	2301 HA0IT	1916 N6FX	1687 K3IXD	1377 VE9FX	1089 N1KC	821 VE7SMP
3581 I2PJA	2974 N4NO	2594 I8KCI	2186 IN3QCI	1864 K2XF	1658 W6OUL	1368 NG9L	1028 EA3KB	812 KU6J
3525 F6DZU	2925 I2MQP	2570 LU8ESU	2180 OE2EGL	1862 EA7TV	1606 K8MDU	1287 KI7AO	1059 JN3SAC	786 KX1A
3260 CT4NH	2885 I4CSP	2509 EA5AT	2061 W2WC	1730 I3ZSX	1562 W2ME	1238 LU4DA	1048 EA3EQT	783 VE6BMX
3234 N4MM	2885 N5JR	2444 KF7RU	2002 LU5DV	1721 DK5WQ	1540 SV3AQR	1193 WT3W	990 HA9PP	
3126 OZ5EV	2750 CT1AHU	2386 EA1JG	1969 CT1EEB	1715 W9IL	1520 DF7HX	1190 K4CN	981 AG4W	

CW

4145 WA2HZR	2822 LZ1XL	2375 W2WC	2032 I7PXV	1905 JN3SAC	1654 VE6BF	1460 I2MQP	1118 EA2BNU	935 VE6BMX
3785 N6JV	2681 9A2NA	2234 KA7T	2009 OZ5UR	1854 K5UR	1603 I2EAY	1359 4X6DK	1118 HB9DOT	877 KX1A
3369 N4NO	2592 N4MM	2219 KF2O	1955 G4SSH	1789 W6OUL	1585 EA7AAW	1332 EA2CIN	1097 K6UXO	871 WT3W
3217 K9QVB	2578 N5JR	2189 EA7AZA	1938 LU2YA	1780 IK3GER	1568 W9IL	1284 AC5K	1096 YU1TR	809 KU6J
3035 EA2IA	2399 HA0IT	2058 N6FX	1919 K2XF	1671 DJ1YH	1483 EA6AA	1218 WO3Z	953 WA2VQV	729 N1KC

give it due consideration. Perhaps you will think about his thoughts on *pride.*

A Happy Ending

I had an interesting and very rewarding experience at Dayton this year. Roger, G3LQP, had approached me last year at Dayton with a "problem." Roger had been working toward a 5-Band WAZ award for many years. He slowly added to the totals until he had all but one zone on 80 meters—zone 31. For years he had been searching for anyone in zone 31 to complete his goal, to no avail. He asked if I knew anyone who might be able to give him that elusive contact. It took me only seconds to come up with a real possibility for Roger. My old friend Mike Gibson, KH6ND, immediately came to mind, and I suggested that Roger contact Mike to see if there was any chance they could get together for the QSO.

I've known Mike since he was a young teen in Arizona and have worked him more times than I can count. He's a world-class contest operator and has operated from KH7R both single op and multi-multi for several years. If there was any chance of Roger working zone 31, I felt that Mike would be the best possible choice. (Mike has the ears of an elephant; he hears everything.)

To make a long story short, it took some time, but finally just after the ARRL CW contest in March, Mike and Roger did make the contact on 80 me-

"JT1BG's daughter Oyuna, JT1CC, does her best to help DXers earn their YL-DXCC award. (Photo courtesy K3ZO)

"Chris, SV8JE (seated), and Fotis, SV8CKM, operate from this fine station. (Photo courtesy K3ZO)

QSL Information

A35CP via KQ1F
A35EA via ZL1AMO
A35MX via KQ1F
A43GI via A47RS
A51A via JH1AJT
A51B via WØGJ
A51GJ via WØGJ
A52A via WØGJ
A52GJ via WØGJ
A52MJ via NØMJ
A52PJ via WØPJ
A52VJ via KL7YL
A52YL via K1MJ
A61AF via N1QMM
A71AW via W3HNK
A71EM via LZ1YE
A92Q via KØDQ
AA9AK/AH2 via NT1N
AA9AK/VS6 via NT1N
AA9AK/WHØ via NT1N
AG9A/AH2 via NT1N
AG9A/WHØ via NT1N
AH2U via NT1N
AH3C via NT1N
AJ1I via KQ1F
AM5OL via EA5OL
AN5KB via EA5KB
AN5OL via EA5OL
AN7IOT via EA5OL
AN8AH via EA8AH
ATØD via VU3DJQ
AY8XW via WD9EWK
BA4RC/4 via BA4RD
BA4RD/4 via BA4RD
BA4RF/4 via BA4RD
BA4TA/4 via BA4RD
BA4TB/4 via BA4RD
BD4RS/4 via BA4RD
BD4XF/4 via BA4RD
BD5RV/4 via BA4RD
BD6BW/4 via BA4RD
BQ9P via KU9C
BV2B/9 via BV2KI
BV9K via BV2KI
BW7/**WB5TEB** via WA4PTZ
C21YL via VK3DYL
C31NB via F6BFH
C4A via NT1N
C5ØA via 6W6JX
C51F via EA5KB
C56RF via G3NKO
C6AGN via W1DIG
C6ASO via W4SO
C98RF via DL6DQW
CB4A via CE4USW
CE2LZR via EA5KB
CM6QN via EA5KB
CM6YD via EA5KB
CM8WAL via EA5KB
CN2DX via HB9HLM
CN2PM via G3WQU
CN8NK via EA5XX
CN9CR via IØSNY
CO1RH via EA5OL
CO2AV via EA5KB
CO2CI via EA5OL
CO2CR via EA5KB
CO2FN via EA5KB
CO3JO via EA7DX
CO3JR via EA5KB
CO7AK via EA5OL
CO8CY via EA5KB
CO8EJ via EA5KB
CO8HF via WØDM
CO8LY via EA7ADH
CO8OT via EA5KB
CP4BT via EA5KB
CQ2H via CT1AHU
CQ5CEC via CT1BNW
CS7GPQ via CT1GPQ
CS8LX via CT2GBU
CT3AS via DJ8FW
CU9AB via WA3HUP
CVØZ via EA5KB
CV1F via EA5KB
CV1Z via EA5KB
CV4Y via CX2TL
CWØZ via EA5KB
CX1CCC via EA5KB
CX2AQ via EA5KB
CX2SA via EA5KB
CX3VB via EA5KB
CX5AO via EA5KB
CZØ/KDØXK via WØGJ
CZØ/NØAFW via WØGJ
CZØ/WAØPUJ via WØGJ
D2U via CT1BFL
D44TD via CT1EKF
D68BT via EA3BT
D68WL via EA3BT
DU1/SQ9BOP via SP6GVU
DU6/GØSHN via F6AJA
DU9AXJ via DU1BP
DZ1BP via DU1BP
EA1AAD via EA5OL
EA1AGZ via EA5OL
EA1AHM via EA5OL
EA1AHP via EA5OL
EA1BJX via EA5OL
EA1BMI via EA5OL
EA1BTL via EA5OL
EA1CAI via EA5OL
EA1CSB via EA5OL
EA1FEO via EA5OL
EA1KK via EA5OL
EA4ENK via EA5OL
EA5/JI6KVR via EA5KB
EA5AEI via EA5OL
EA5CDD via EA5OL
EA5DKR via EA5OL
EA5FD via EA5OL
EA5KT via EA5OL
EA6FB via EA5KB
EA6YX via EA5OL
EA8AH via OH1RY
EA9/JI6KVR via EA5KB
EA9PD via EA5OL
EA9PY via EA5OL
EA9TQ via EA5OL
EDØVPA via EA5OL
EDØVPC via EA5OL
EDØVPV via EA5OL
ED1BD via EA1BD
ED1IBA via EA5OL
ED1MEC via EA1ET
ED1URJ via EA4URJ
ED1XAD via EA5OL
ED4XAD via EA5OL
ED5OL via EA5OL
ED5OPC via EA5OL
ED5XAD via EA5OL
ED6FPG via EA5OL
ED6IB via EA5OL
ED8XAD via EA5OL
EE5ITU via EA5OL
EF7AIR via EA7JX
EG4DIE via EA5OL
EG5ITU via EA5OL
EG5NOU via EA5OL
EG7ITU via EA5OL
EJØA via EI8EM
EJØA via W2ORA
EK8ZZ via F5LGQ
EL7X via PAØWWV
EM11E via UR5EAW
EO57WL via UT1WL
EP3MRD W3HC
EP3UN via LA7JO
EP4HR via I2MQP
ER3R via ER3DX
ER6A via ER1LW
ES9C via ES5RY
EU5F via EW6WF
EX2M via W3HNK
EX7ML via DL4YFF
EY1ØS via DJ1MM
EY1ØT via DJ1MM
EY8/AB6BH via K6VNX
EY8/K5OT via K6VNX
EY8/K6JL via K6VNX
EY8/K6MC via K6VNX
EY8/N6AA via K6VNX
EY8/N6ZZ via K6VNX
EY8/W6WD via K6VNX
EY8CQ via DJ1MM
EZ1ØAQ via DJ1MM
EZ8AQ via DJ1MM
FGØBKZ/FS7 via F6AJA
FGØHVL/FS via F6AJA
FGØHVM/FS via F6AJA
FK/F6BFH via F6BFH
FK8HC via VK4FW
FM/EA3AOK via EA3BT
FM/EA3BT via EA3BT
FM/EA3WL via EA3BT
FOØMIZ via JA1HGY
FOØMIZ via VE3HO
FOØPT via DJØFX
FOØXC via F6BFH
FO8DX via JF1SQC
FR5ZU/T via FR5ZU
FT5XM via WØGJ
FWØBX via ZL1AMO
FY/F6BFH via F6BFH
FYØP via F6BFH
FY5FU via F5PAC
FY5KE via OHØXX
FY9IS via F6BFH
GØSHN/DU1 via F6AJA
G1RCV via G4DFI
G3RCV via G4DFI
GB2SJS via G4DFI
GB9ØMGY via G3XHK
GDØAAA via G3TXF
GJØAAA via G3TXF
GM7V via ZS5BBO
GS2MP via N3SL
GUØAAA via G3TXF

(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>.)

ters. I am very pleased to say that Roger came to Dayton again this year and was presented with his long-awaited 5BWAZ plaque at the CQ booth by Paul, K5RT, *CQ*'s WAZ Award Manager. To make the event even more memorable, Mike was in attendance and stood by quietly as the plaque was presented.

I take considerable pleasure in having had a small part in this happy ending to a very long quest by Roger. It takes people such as Mike, with his helpful "can-do" attitude, to make me still believe that ham radio and contesters/DXers are the greatest. I am proud to be a "small cog in the wheel" of this elite group.

Enjoy the summer. 73, Carl, N4AA

Contesting

BY JOHN DORR, K1AR

News/Views Of On-The-Air Competition

Contesting's Other Flavors

August's Contest Tip of the Month

As you will read this month, it's easy to get in a rut with contest operating. It's even harder for some to get started in the first place. As members of the human clan, we tend to settle into our comfort zones and rarely leave them. In the world of contesting, there are many opportunities to try new and different things. While we may have our favorite contests and/or modes, there are scores of other options. For example, have you ever tried entering a contest operating mobile? How about a single-band entry? What about the possibility of operating low power (100 watts)? In many cases, there are also more opportunities to win awards and gain recognition for you as an operator and not a user of the biggest station. Think about it and give something a try. You may be surprised.

As I read my e-mail this month, I realized that there are many aspects of ham radio and contesting in particular that I've never personally experienced or at the most have participated in in a very limited way. For example, I've never entered a low- power category, enjoyed a mobile QSO, submitted a VHF log, operated QRP, made a QSO from home using one of the available amateur satellites, and so on. As a serious contester, I suspect I'm not alone.

As you're going to read in a minute, this particular aspect of contesting—the less familiar categories—could very well be one tool we can use to encourage a new crop of contesters to join our ranks.

I believe that one of the barriers to entering contesting begins with the size of the mountain itself. The other day, as I looked at the pile of aluminum and tower sections sitting on the ground (unfortunately) in my back yard, I contemplated what the cost would be to buy it all today. It was easily over $10,000 (USD), including the cost of installation. Then I took a stroll into the shack and quickly came up with an even bigger number. Now to be fair, that "inventory" is something that I've built up over a long period of time, and it far exceeds what one would define as a minimum set to participate as an active contester. However, to the new ham, it's an intimidating goal indeed, and one which can be discouraging when you add in the challenges of antenna zoning, the state of our world economy, and other factors. In fact, our greatest strength, which is the number of incredible contest stations that have emerged around the world, could be one of our weaknesses, as the majority of non-contesters see these stations as the only meaningful method for successful contesting.

From where I sit, there is at least a partial solution, and that is to encourage contest participation in operating classes that fit the profile of the station and operator. If I'm a newcomer or only have access to a small tri-band antenna, I should be able to compete more regularly against my peers. The CQ WW WPX Contest does a fine job of dealing with this point. The low-power categories in ARRL and CQ contests have been major contributors to increasing interest amongst new contesters, and they are becoming (if they are not already) the contests' most popular categories.

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e-mail: <K1AR@contesting.com>

Calendar of Events

July 27-28	IOTA Contest
July 27-28	Venezuela Independence CW Contest
Aug. 3	European HF Championship
Aug. 3-4	North American CW QSO Party
Aug. 10-11	Worked All Europe CW Contest
Aug. 10-11	Maryland-DC QSO Party
Aug. 17	SARTG RTTY Contest
Aug. 17-18	North American SSB QSO Party
Aug. 17-18	New Jersey QSO Party
Aug. 17-18	SEANET Contest
Aug. 24-25	SCC RTTY Championship
Aug. 24-25	Ohio QSO Party
Aug. 31-Sept. 1	YO DX HF Contest
Sept. 7-8	All Asian SSB Contest
Sept. 8	North American CW Sprint
Sept. 11-13	YLRL Howdy Days
Sept. 14-15	Worked All Europe SSB Contest
Sept. 15	North American SSB Sprint
Sept. 21-22	Scandinavia Activity CW Contest
Sept. 21-22	Washington State Salmon Run
Sept. 28-29	**CQ/RJ WW RTTY DX Contest**
Sept. 28-29	Scandinavia Activity SSB Contest

While we don't want to dilute contesting to the point where "everyone is a winner" with volumes of new categories, we do need to ensure that a balance exists. We also need to make sure that contest reporting is not just a listing of the winners, but really speaks to the casual contester or new ham who really doesn't understand what it's all about. It's all about "care and feeding" for the potential participant, beginning with the rules and extending all the way to how we describe the results.

Take a minute now and discover how Tim, N8LXR, took action with regard to this month's topic. I hope it's as encouraging for you to read his words as it was for me.

Another Point of View

Tim Polhamus, N8LXR, a 39-year-old ham from Philadelphia, Pennsylvania, concurs that new incentives are needed to foster and recruit new contesters. Perhaps the story of Tim's beginning days in contesting will inspire you. Also, his creative approach towards getting more hams into contesting is equally compelling. Read on!

I was first licensed in April 1983. After my very first ARRL Field Day in June 1983, the first contest-style operating I ever did, I was intensely interested. At that Field Day, as a Novice pounding away on an old J-38 straight key and using a rig without a CW filter, I led the camp with over 400 CW QSOs. I was hooked and wanted to make contesting one of my major pursuits in ham radio.

I quickly learned that to be a contester and compete in some sort of meaningful way is not easy, at least not for people who do not enjoy a living situation where they have lots of room, friendly neighbors, considerable disposable income, and an overall home atmosphere conducive to large and strange-looking (at least to non-hams) antennas. Given that I didn't have those things, I didn't pursue my interest in contesting other than Field Day.

I think the situation is worse today for potential contesters than it was back in 1983. Even if the ARRL successfully manages to have PRB-1 applied to covenants between private parties (as I hope

they will), the days of monster aluminum at 100 feet, huge wire arrays, and the like may be at their end, even for those with the money and real estate to compete in a major contest, as antenna-restricted properties are becoming the norm. Not even the modified application of PRB-1 which calls for "reasonable accommodation" of amateur antennas could justify the antenna farms of today's highly competitive contester.

There is a happy ending to this story for me, however, and it leads me to suggest a unique and interesting way to recruit almost anyone into contesting. Over the past two years I have been carving out a ham radio niche for myself in the areas of mobile award chasing and mobile contesting. I'm currently three QSOs short of 5-Band Worked All States, all on CW with 100 watts output, all mobile, with all contacts made less than 50 air miles apart, per the ARRL rules. According to the ARRL Awards Department, I will likely be the first HF mobilier to earn the 5BWAS Award using exclusively mobile equipment since it was first offered in 1970! From a contesting point of view, I took third place in the Mobile Division and First Place in the First Time Entrant Division in the 2001 Pennsylvania QSO Party—my first-time experience with "in motion" mobile contesting. It was loads of fun!

Last year I placed eighth in the 2001 ARRL Field Day's Mobile Class. I have since bought a new truck, have a much-improved station, and as I write this am planning a full-out assault on the Field Day Mobile Class from a great location on the Delaware River in the SNJ Section, with excellent take-offs over water to the N, NW, W, and SW.

To prepare for Field Day, I am putting together an on-air strategy to maximize my score, based on propagation tables and on-air monitoring of all the bands to ascertain where they are open to at specific times, how good the signals are, and so forth. In short, I am preparing for a contest, much like the operator of a large fixed station would, and that brings me to this point: *I believe that ALL contests, not just Field Day and the various State QSO Parties, should include a MOBILE Division that would be separately scored.* Think of what this could do for contesting. For hams who are antenna restricted or those with very mediocre fixed stations, it would provide yet another outlet for them to *meaningfully compete on an even playing field with similar stations, much like QRP.* Nearly anyone who drives could be a "player" in a major contest such as the CQ World-Wide, Sweepstakes, and the ARRL International DX Contest by entering the Mobile Class.

My experience with 5BWAS all CW Mobile operating has shown me that one can enjoy ham radio without even having a fixed station at all, and I have discovered that mobile CW contesting is a unique form of competition, as it requires a knowledge of your operating area's highways and back roads in addition to having above-average CW skills and being able to send and receive while in motion. It's a whole new twist on traditional contesting, and I think it deserves special recognition, on a par with QRP contesting.

73 and Happy Hamming! —*Tim, N8LXR*

Final Comments

Well, for most of you, by the time you read this WRTC 2002 will be history. While at the time of this writing I'm still planning my adventure, I know that upon my return there will be much to say and write. Fortunately, WRTC is not just a party for the rich and famous. Rather, it embraces the very elements of camaraderie that we all enjoy in the world of contest operating! I look forward to reporting on the events of WRTC in the months ahead. Unfortunately, our publishing deadlines will not allow for my full report until the October issue, but I'm sure you'll enjoy the story telling nonetheless. See you from Finland!

73, John, K1AR

Looking Ahead in CQ

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

- CW Results, 2001 CQ WW DX Contest; CQ WW All-Time Records
- Rules, 2002 CQ World-Wide DX Contest
- Radio Row—"Ground Zero" *before* the World Trade Center
- *CQ* Reviews:
  RadioShack HTX-420
  West Mountain Radio "Rig Runner"

Do you have a ham radio story to tell?

See our writers' guidelines in the *CQ* Information Center on the *CQ* website at <http://www.cq-amateur-radio.com>.

Awards

BY TED MELINOSKY, K1BV

News Of Certificate And Award Collecting

This month we first hear from David Kustra, N7LYR, USA-CA All Counties #1040, March 22, 2002.

My first recollections of shortwave radio are of those cold winter evenings when my dad and I would sit in front of the receiver to listen to broadcast stations from around the world. I can stilll picture the red glow of the tubes and the squint of the magic eye as we took turns tuning across the bands, the occasional trips to the drug store's tube tester, and the longwire antenna strung across our old slate roof. My dad went to radio school as a kid and built some of the first crystal sets so neighbors could pick up KDKA. In those days radio was magic. As I grew up I never lost my fascination with radio, and I joined DX clubs, built better antennas, learned Morse Code, and finally took the plunge in Prescott, Arizona, where I passed the exam and became N7LYR.

Dave Kustra, N7LYR, USA-CA All Counties #1040, March 22, 2002.

It was not long after I upgraded to General that I learned about county hunting from WØOWY, whom I met by chance on 20 meters one day. He invited me to join the group on 14336, and I soon began collecting counties for USA-CA, which I believe is the most impessive award in all of ham radio today.

At first the counties rolled in, 50 a day, but it was not until I got down to the last 50 that I learned what county "hunting" was all about. At this point I began watching for "planned trips," asking mobiles to keep me in mind for certain counties, sending scores of e-mails, and making phone calls. I came to realize that achieving USA-CA is a "team effort," and I was fortunate to see for myself the generosity and camaradrie among county hunters. Anytime I announced that I needed a certain county, there were always mobiles who volunteered to run out to get that one for me, and there were many other county hunters who offered to get me in touch with a mobile who was likely to go through that county. There really are a lot of county hunters out there eager to help others get their awards, and because of them 1040 stations have been awarded USA-CA since 1965.

My thanks go to all who helped me achieve USA-CA #1040: First of all, to the good folks at *CQ* for sponsoring this fine award, and then to the mobiles who filled my log book, the veteran county hunters who made many helpful suggestions along the way, MARAC, and county hunters who have set up web pages for our use. I also want to thank the bureau managers, such as Art Mager, N5DKW, operator of CHARS QSL bureau. Although Art has not yet achieved USA-CA for himself, he spends his time and effort generously helping hundreds of others achieve that goal. That's the spirit of county hunting at its best. I feel that USA-CA #1040 does not so much belong to me as much as it belongs to all those county hunters who came together unselfishly in a team effort to make this possible. I congratulate all of them for another job well done.

Collecting counties for myself was only half the story. Soon after I began collecting counties for USA-CA, I decided to see what it was like from the other side of the QSO—going mobile. In the last 13 years N7LYR/Mobile has trasmitted from 1072 different counties and has made over 14,000 contacts, and I hope that number will grow each year. Without a doubt, going mobile was the best thing I've ever done in ham radio, because it enabled me to discover a face of America that you can't see from the interstates—places and townspeople you only see only when you venture down the "gray lines" of a map. Visiting the byways of America has been personally rewarding for me and my wife because we both like to travel, and country hunting gives us an excuse to visit places we would not otherwise have the opportunity to see.

Like most county hunters who go mobile on a regular basis, I could fill a book with stories of things that happened on the road. One that stands out in my mind is what happened to me one spring morning in Colorado. This was back in the days when I was single and traveled alone on county hunting trips. Because the motel in Colorado Springs was out of coffee that day, I drove off without my usual morning cup. By the time I got onto I-70 heading toward Kansas I was all too comfortable, and then the unthinkable happened—I dozed off. Moments later I woke up when I heard net control break in asking for relays for some mobile he was running. Directly ahead of me, about a hundred yards away, was a huge concrete barrier, part of a drainage ditch. As I eased the car back onto the road I knew that if it hadn't been for that NCS I would have been finished.

Nowadays when my co-pilot and logging partner Patricia and I are on the road, we always have the TS-140 on board, and I never forget my morning coffee. I never did properly thank that NCS, but today I want to thank all of you who have been there over the years to share your county hunting hobby with me. It's been one terrific ride!

73, Dave, N7LYR

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USA-CA Special Honor Roll

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

Dean DeVries, N9VRZ
USA-CA All Counties #1044
May 10, 2002

Raymond Petschonek, WG6X
USA-CA All Counties #1045
May 22, 2002

USA-CA Honor Roll

500		2000	
EA3GHZ	3192	N9VRZ	1233
N9VRZ	3193	WQ1H	1234
WG6X	3194	WG6X	1235
W4YDY	3195	W4YDY	1236

1000		2500	
EA3GHZ	1597	N9VRZ	1154
N9VRZ	1598	WQ1H	1155
WG6X	1599	WG6X	1156
W4YDY	1600	W4YDY	1157

1500		3000	
EA3GHZ	1335	KJ8F	1065
N9VRZ	1336	N9VRZ	1066
WG6X	1337	WG6X	1067
W4YDY	1338		

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

DX Awards

Danish DX SSTV Award. This one is for SSTV enthusiasts who have collected confirmations from numerous countries. OZ6SM created the colorful certificate to celebrate and promote DX achievement using this digital mode.

This is one of the award rules I have seen that make mention of e-qsls. However, it is stated that they are *not* accepted for the award.

The award is available to all amateur radio operators who complete the requirements below. The ARRL's DXCC List is used as the standard for countries. All bands may be used. No use of repeaters allowed. GCR list is accepted. The award manager may request single QSL cards at his option.

Requirements are confirmed contacts with:

50 different countries for the basic award

100 different countries plus one OZ station for the silver sticker

150 different countries plus two OZ stations for the gold sticker

Fee for the basic award is $US8 (10 Euros). Fee for endorsements is $US4 (5 Euros). The application form is available at: <http://home19.inet.tele.dk/oz6sm/awards/>. Apply to: S. K. Mogensen, OZ6SM, Syrenvej 9, DK 9440 Aabybro, Denmark (<oz6sm@nypost.dk>).

The Danish DX SSTV Award sponsored by OZ6SM.

Conveniat-Diplom from Germany. The Conveniat-Diplom has been in effect for about 35 years. Over 1000 certificates have been issued during that time. The award is offered by Conveniat-Runde, a group of about 200 amateurs who are officially involved with church matters. Excess fees received from award charges are passed on to missionaries to help with their purchase of radio equipment.

Contact seven Conveniat-Runde members on HF. On the VHF bands contacts are worth three points. SWL okay. Send GCR list and 10 or 15 IRCs to: Gerhard Richter, DB3AE, Jakob-Bohme-Strasse 27, D-38226 Salzgitter, Germany. Detailed information may be found at: <http://www.conveniat.de> and <http://www.qsl.net/dj1ij>.

Russia "Yupiter" Club Awards. Vlad Koroljiv, UA9CVQ, called our attention to two new awards sponsored by the "Yupiter" Club of Niznij Tajgil, Russia. The first is a short-term award with about four months left by the time this issue is printed. The second commemorates the club's location in northern Asiatic Russia, which is not far from the line dividing Europe and Asia.

General Requirements: SWL okay. Send GCR list and fee of 10 IRCs, or $US5 to: Vlad Koroljov, UA9CVQ, Club "Yupiter," P.O. Box 86, Nizhnij Tagil, 622022 Russia.

Ural Expo Arms Award. Make five contacts with stations located in Oblast 154 "SV" (UA9C and UA9D) between 1 July 2000 and 1 January 2003. All bands and modes may be used. The same station may be contacted on different bands or modes for credit. On 160 meters you need three contacts; on VHF you need just one QSO.

Europe-Asia Award. Make 15 contacts with stations in each of the continents of Europe and Asia (total of 30 contacts) on or after 1 January 2000. All bands and modes. On 160 meters you need five contacts on each continent; on VHF you need just three QSOs.

The Sevastopol Amateur League Award. Contact Sevastopol and Crimea stations after 1 January 1990 to

The Coveniat-Diplom has been offered by the Conveniat-Runde group for about 35 years.

earn this award. (The stations have a "J" as the first letter of the callsign suffix.) CIS-Europeans need three QSOs with Sevastopol stations plus seven QSOs with Crimea stations on HF, or two QSOs with Sevastopol plus five QSOs with Crimea on VHF. CIS-Asia and all others need two QSOs with Sevastopol plus three QSOs with Crimea on VHF. One memorial station from Sevastopol may replace all needed stations from Sevastopol, and one memorial station from Crimea may replace five other Crimea stations. Also, you may earn the award for two QSOs with memorial stations from Sevastopol activated on May 9 each year. SWL okay. QSOs with the same station but on other bands or modes are valid.

Fee is CIS-Europeans $US2, or 4 IRCs; CIS-Asia $US3, or 6 IRCs; all others $US5, or 10 IRCs. The award is free to WW II veterans. Send GCR list and fee to: A. V. Kachan, UU9JQ, P.O. Box 233, Sevastopol-14, Crimea, 335013 Ukraine.

Worked All Minnesota Award

Paul Thompson, KIØRF, writes that the St. Paul Radio Club has sponsored the Worked All Minnesota Award since 1959, but that it may have been one of the best kept secrets in ham radio. We're pleased to help provide publicity for another state county award. Only 39 of the all-87 county awards have been earned during this time.

The award is issued for confirmed contacts with Minnesota counties in five levels, with the basic level starting at 50 counties and endorsements for 60, 70, 80, and all 87 counties. The required special application is available from the sponsor for an SASE. Endorsements for single band and mode are available on request. Send GCR list or notarized list and fee of $US2, or 6 IRCs, for the initial award. There is no charge for endorsements, but an SASE is requested. Apply to custodian Paul Thompson, KIØRF, 395 Sims Avenue E., St. Paul, MN 55101 (or to St. Paul Radio Club, P.O. Box 9375, North St. Paul, MN 55109).

USA-CA Plaque Price Change

Effective immediately, the price for the handsome USA-CA plaque has been increased from $41 to $44. This is the first change in almost five years. We were given the option to hold the old price by using a composite wood substitute instead of the solid walnut and decided to keep the better quality at a minor increase.

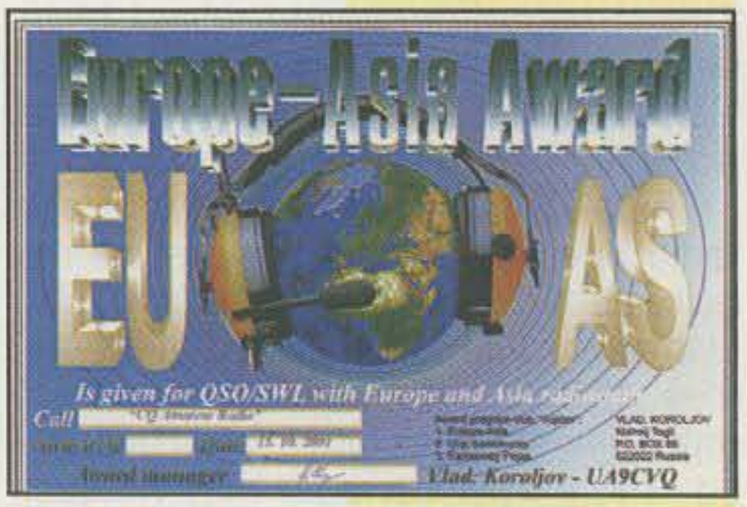
Correction

The December 2001 issue of *CQ* should have listed KK5DO as the awards manager for the AMSAT Awards Series. Apply to Bruce Paige, KK5DO, P.O. Box 310, Alief, TX 77411. Bruce is also the QSL Manager for P5/4L4FN, arguably the rarest DX country on the bands these days.

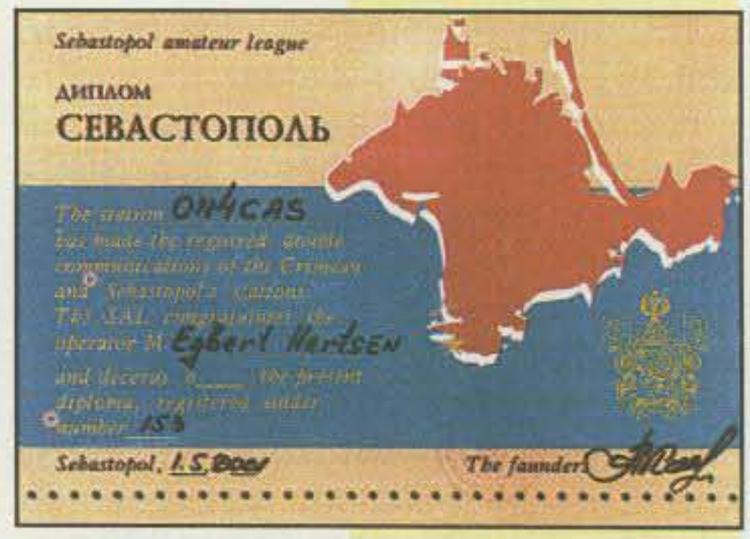
URL of the Month

A special internet mailing "reflector" has been established by Egbert Hertsen, ON4CAS, and it is available to all of us who are into awards hunting. For those unfamiliar with the process, all messages sent to a special address are rerouted to each member on the list. It's a great tool for exchanging awards information of all kinds. Lighthouse and castle temporary operations have already been posted to the site, as well as new or modified awards rules. Go to: <http://groups.yahoo.com/group/HAM_awards/>.

73, Ted, K1BV



Sponsored by the "Yupiter" Club of Russia, the Europe-Asia Award is issued for making 30 contacts with stations in Europe and Asia.



Contact stations in the Crimea and Sevastopol to earn The Sevastopol Amateur League Award.

The Worked All Minnesota Award is issued in five levels and is sponsored by the St. Paul Radio Club.

Propagation

BY TOMAS HOOD, NW7US

The Science Of Predicting Radio Conditions

Geophysical Alerts

Many of you have heard the geophysical reports broadcast by WWV and WWVH. After many years of using a standardized format, the Space Environment Center (SEC) changed to a new format on March 12, 2002. The New Alerts System has real-time alerts, additional information, and a format designed to support automatic decoding. This change has prompted many readers of this column and subscribers to my eAlert service <http://prop.hfradio.org/ealert/> to ask for an explanation of the new format and wording.

The National Oceanic and Atmospheric Administration (NOAA) uses the internet, telephone, and radio stations WWV and WWVH to issue geophysical alert messages that provide information about solar terrestrial conditions. Geophysical alerts are broadcast from WWV at 18 minutes after the hour and from WWVH at 45 minutes after the hour. The messages are less than 45 seconds in length and are updated every 3 hours (typically at 0000, 0300, 0600, 0900, 1200, 1500, 1800, and 2100 UTC). More frequent updates are made when necessary. WWV radiates 10,000 watts on 5, 10, and 15 MHz, and 2500 watts on 2.5 and 20 MHz. WWVH radiates 10,000 watts on 5, 10, and 15 MHz, and 5000 watts on 2.5 MHz. Each frequency is broadcast from a separate transmitter. Although each frequency carries the same information, multiple frequencies are used because the quality of HF reception depends on many factors, such as location, time of year, time of day, the frequency being used, and atmospheric and ionospheric propagation conditions. The variety of frequencies makes it likely that at least one frequency will be usable at all times.

The geophysical alerts provide information about the current conditions for long-distance HF radio communications. The alerts use a standardized format and terminology that requires some explanation. Before looking at a sample message, let's define some of the terminology:

P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for August 2002

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 14-15, 21	A	A	B	C
High Normal: 1, 6-7, 16, 20, 22, 26-28	A	B	C	C-D
Low Normal: 5, 10-12, 18-19, 24	B	C-B	C-D	D-E
Below Normal: 2-4, 8-9, 23, 25, 39-31	C	C-D	D-E	E
Disturbed: 13, 17	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 good (A) on Aug. 1st, fair to poor (C-D) on the 2nd through the 4th, good to fair (B-C) on the 5th, etc.

Solar flux is a measurement of the intensity of 10.7 cm (roughly 2800 MHz) solar radio emissions. At 2000 UTC the Dominion Radio Astrophysical Observatory of the Canadian National Research Council located at Penticton, BC, Canada, records the daily solar flux measurement. The solar flux index broadcasts range from a theoretical minimum of about 50 to numbers larger than 300. During the early part of each 11-year sunspot cycle, the flux numbers are low, but they rise and fall as the cycle proceeds. The numbers will remain high for extended periods around a sunspot maximum.

The ***K*-indices** are a measurement of the behavior of the magnetic field in and around the Earth.The *K*-index uses a scale from 0 to 9 to measure the change in the horizontal component of the geomagnetic field.A new *K*-index is determined and added to the broadcast every 3 hours based on magnetometer measurements made at the Table Mountain Observatory, north of Boulder, Colorado, or an alternate middle-latitude observatory.

The ***A*-index** is a daily value on a scale from 0 to 400 to express the range of disturbance of the geomagnetic field. It is obtained by converting and averaging the eight, 3-hour *K*-index values. An estimate of the *A*-index is first announced at 2100 UTC, based on seven measurements and one estimated value. At 0000 UTC the announced *A*-index consists entirely of known measurements, and the word "estimated" is dropped from the announcement.

Space weather describes the conditions in space that affect Earth and its technological systems. Space weather is a consequence of the behavior of the sun, the nature of Earth's magnetic field and atmosphere, and our location in the solar system.

Space weather storms observed and expected are characterized using the

Geomagnetic Storms	Solar Radiation Storms	Radio Blackouts	Descriptor
G5	S5	R5	Extreme
G4	S4	R4	Severe
G3	S3	R3	Strong
G2	S2	R2	Moderate
vG1	S1	R1	Minor

Fig. 1– NOAA Space Weather Scales.

Planetary *K*-indices	Geomagnetic Storm Level
K = 5	G1
K = 6	G2
K = 7	G3
K = 8	G4
K = 9	G5

Fig. 2– Geomagnetic storm levels.

Flux Level of >10 MeV Particles	Solar Radiation Storm Level
10	S1
10^2	S2
10^3	S3
10^4	S4
10^5	S5

Fig. 3– Solar radiation storm levels.

Peak X-ray Level and Level	Radio Blackout Level
M1 and (10^{-5})	R1
M5 and (5×10^{-5})	R2
X1 and (10^{-4})	R3
X10 and (10^{-3})	R4
X20 and (2×10^{-3})	R5

Fig. 4– Radio Blackouts.

NOAA Space Weather scales. The abbreviated table in fig. 1 shows the levels of activity that are included in the announcements and the associated terminology. The descriptor used to identify observed or expected conditions is the maximum level reached or predicted. The NOAA Space Weather Scales are further described at the Space Environment Center's website <http://www.sec.noaa.gov/NOAAscales>.

Geomagnetic storm levels are determined by the estimated 3-hourly planetary *K*-indices derived in real time from a network of Western Hemisphere ground-based magnetometers. These levels are shown in fig. 2. When the *K*-index reaches 6 and above, there is a very good chance that aurora conditions exist.When the *K*-index reaches 5 or higher, you might wish to check aurora conditions at <http://www.sec.noaa.gov/pmap/>.

Solar radiation storm levels are determined by the proton flux measurements made by NOAA's primary Geostationary Operational Environmental Satellite (GOES). Fig. 3 details these levels.

Radio Blackout levels are determined by the x-ray level measured by the primary GOES satellite. X-ray radiation ionizes the *D*-layer causing absorption of HF signals, starting at the lower frequencies and increasing up to higher HF frequencies with higher levels of radiation. X-ray levels and related flares are categorized using the letters B, C, M, and X, with X being the most intense. Fig. 4 correlates x-ray levels and flux to Radio Blackout levels.

Every geophysical alert consists of three parts.The first part contains the solar-terrestrial indices for the day—specifically, the solar flux, the *A*-index, and the *K*-index. Then comes part two, Space Weather storms observed during the previous 24 hours. This includes all observed geomagnetic storms, solar radiation storms (proton events), and Radio Blackouts (class M1 and greater flares). Finally, part three gives the Space Weather expected during the following 24 hours. An example of a geophysical alert is:

Solar-terrestrial indices for 08 November follow.

Solar flux 173 and Mid-Latitude *A*-index 14.

The Mid-latitude *K*-index at 1500 UTC on 08 November was 3.

Space Weather for the past 24 hours has been severe.

Solar radiation storm(s) reaching the S4 level is in progress.

Radio Blackouts(s) reaching the R2 level occurred.

Another example would be:

Solar-terrestrial indices for 08 November follow.

Solar flux 173 and Mid-Latitude *A*-index 14.

The Mid-latitude *K*-index at 1500 UTC on 08 November was 3.

No Space Weather storms have been observed during the past 24 hours.Space Weather for the next 24 hours is expected to be severe.

Solar radiation storms reaching the S4 level are expected to continue. Radio Blackouts reaching the R2 level are expected.

To hear the current geophysical alert message by telephone dial (303) 497-3235, or tune to one of the frequencies of WWV or WWVH at the times listed above. My eAlert e-mails contain these reports, plus other related information.

Solar Cycle Conditions

The Dominion Radio Astrophysical observatory at Penticton, BC, Canada reports the 10.7 cm observed monthly mean solar flux for May 2002 is 178, down from April's 190.The 12-month smoothed 10.7cm flux centered on November 2001 is 194, only two points higher than October 2001.

The Royal Observatory of Belgium reports an observed monthly mean sunspot number of 121 for May 2002, up only one point from April.The 12-month running smoothed sunspot number centered on November 2001 is 184, up four points from October.

The observed monthly mean *Ap*-index for May is 15, the same as during April 2002.The sunspot low for the month was 74 on May 15, and the high of 172 was observed on May 5, 2002.

Expect a smoothed sunspot level of about 86 and a 10.7 cm solar flux of about 145 for August 2002.The geomagnetic planetary *A*-index (*Ap*) will begin to jump around during August, as we draw near the end of summer in the Northern Hemisphere and closer to the Autumnal Equinox. Cycle 23 is expected to remain in the High solar range for the remainder of 2002.

August Propagation

At last! With August comes a shift from summertime to wintertime ionospheric conditions in the Northern Hemisphere. While most days in August will exhibit summertime conditions, conditions will begin to conform more to a winter pattern of higher daytime and lower nighttime usable frequencies. Moving into August, summer conditions caused by the sun-baked, thinned ionosphere will prevail. However, as we move into September, with less sunlight over the pole, the Maximum Usable Frequencies (MUFs) should become higher, with longer windows on higher bands.

Being in mid-summer with lower 10.7 cm flux numbers, 20 meters will be the most used DX band. The low bands are too noisy and experience a high amount of absorption. The higher bands (10 and 12 MHz) are usually dead due to low summertime MUFs. Fifteen meters will become more usable in the morning and evening hours following the greyline, with peaks during the afternoon. However, 20 meters is where August activity will be strongest.

Daytime: While the 15, 17, and 20 meter bands should be open for DX throughout the daylight hours, peak signals are expected during an approximate 2-hour window immediately following sunrise and again during the late afternoon. Occasional fair openings might occur on 10 and 12 meters during the hours of daylight, particularly along an arc extending across central Africa, Latin America, and into the far Pacific area. Peak conditions should occur during the afternoon hours, but as

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.

August 15 - September 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	09-15 (1)	08-10 (1) 10-15 (2) 15-17 (1)	05-06 (1) 06-07 (2) 07-10 (3) 10-11 (2) 11-13 (1) 13-14 (2) 14-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-21 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 20-01 (1)* 21-00 (2)* 00-02 (1)*
Northern Europe & European CIS	09-13 (1)	08-09 (1) 09-14 (2) 14-16 (1)	05-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-21 (1)	19-21 (1) 21-00 (2) 00-02 (1) 20-21 (1)* 21-00 (2)* 00-01 (1)*
Eastern Mediter-ranean & Middle East	11-14 (1)	08-09 (1) 09-16 (2) 16-17 (1)	07-09 (2) 09-14 (1) 14-16 (2) 16-19 (3) 19-22 (2) 22-01 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Western Africa	11-14 (1) 14-16 (2) 16-17 (1)	07-09 (1) 09-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-23 (4) 23-02 (3) 02-06 (2) 06-09 (1)	20-23 (1) 23-02 (2) 02-03 (1) 21-02 (1)*
Eastern & Central Africa	13-16 (1)	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-22 (2) 22-00 (1)	20-02 (1) 21-01 (1)*
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	09-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	08-15 (1) 15-17 (2) 17-21 (3) 21-22 (2) 22-00 (1) 00-02 (2) 02-03 (1)	20-22 (1) 22-01 (2) 01-03 (1) 21-02 (1)*
Central & South Asia	*Nil*	09-12 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-20 (1) 20-22 (2) 22-00 (1)	05-07 (1) 19-21 (1)
Southeast Asia	*Nil*	08-10 (1) 10-12 (2) 12-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 08-10 (2) 10-11 (1) 19-22 (1) 22-00 (2) 00-01 (1)	*Nil*
Far East	*Nil*	09-11 (1) 18-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-13 (1) 18-20 (1) 20-22 (2) 22-00 (1)	05-06 (1) 06-07 (2) 07-08 (1) 06-07 (1)*
South Pacific & New Zealand	11-15 (1) 15-18 (2) 18-20 (1)	09-15 (1) 15-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	12-20 (1) 20-22 (2) 22-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-12 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-09 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	16-17 (1) 17-19 (2) 19-21 (1)	09-11 (1) 16-18 (1) 18-21 (2) 21-22 (!)	07-10 (2) 10-16 (1) 16-18 (2) 18-22 (1) 22-00 (2) 00-02 (1)	03-04 (1) 04-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-16 (3) 16-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-18 (3) 18-20 (4) 20-02 (3) 02-04 (2) 04-06 (1) 06-07 (2)	19-20 (1) 20-21 (2) 21-03 (4) 03-05 (3) 05-06 (2) 06-08 (1) 20-00 (1)* 00-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-12 (1) 12-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (1)	13-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-02 (3) 02-03 (2) 03-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1)	20-23 (1) 23-05 (2) 05-07 (1) 03-06 (1)*
McMurdo Sound, Antarctica	*Nil*	14-16 (1) 16-18 (2) 18-19 (1)	18-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-07 (1) 07-09 (2) 09-10 (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 & Southern Europe & North Africa	09-14 (1)	09-11 (1) 11-14 (2) 14-16 (1)	05-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-00 (1)	19-22 (1) 22-01 (2) 01-02 (1) 22-01 (1)*
Northern & Central Europe & European CIS	08-12 (1)	11-16 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-16 (3) 16-18 (2) 18-20 (1)	19-20 (1) 20-00 (2) 00-01 (1) 20-00 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	10-11 (1) 11-13 (2) 13-15 (1)	06-08 (1) 08-10 (2) 10-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-22 (1)	19-00 (1) 20-23 (1)*
Western Africa	10-12 (1) 12-16 (2) 16-17 (1)	07-10 (1) 10-13 (2) 13-17 (3)	13-15 (1) 15-17 (2) 17-19 (3)	20-23 (1) 23-01 (2) 01-02 (1)
Central & South Asia	*Nil*	09-12 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-20 (1) 20-22 (2) 22-00 (1)	05-07 (1) 19-21 (1)
Southeast Asia	*Nil*	08-10 (1) 10-12 (2) 12-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 08-10 (2) 10-11 (1) 19-22 (1) 22-00 (2) 00-01 (1)	*Nil*
Far East	*Nil*	09-11 (1) 18-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-13 (1) 18-20 (1) 20-22 (2) 22-00 (1)	05-06 (1) 06-07 (2) 07-08 (1) 06-07 (1)*
South Pacific & New Zealand	11-15 (1) 15-18 (2) 18-20 (1)	09-15 (1) 15-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	12-20 (1) 20-22 (2) 22-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-12 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-09 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	16-17 (1) 17-19 (2) 19-21 (1)	09-11 (1) 16-18 (1) 18-21 (2) 21-22 (!)	07-10 (2) 10-16 (1) 16-18 (2) 18-22 (1) 22-00 (2) 00-02 (1)	03-04 (1) 04-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-16 (3) 16-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-18 (3) 18-20 (4) 20-02 (3) 02-04 (2) 04-06 (1) 06-07 (2)	19-20 (1) 20-21 (2) 21-03 (4) 03-05 (3) 05-06 (2) 06-08 (1) 20-00 (1)* 00-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-12 (1) 12-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (1)	13-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-02 (3) 02-03 (2) 03-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1)	20-23 (1) 23-05 (2) 05-07 (1) 03-06 (1)*
McMurdo Sound, Antarctica	*Nil*	14-16 (1) 16-18 (2) 18-19 (1)	18-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-07 (1) 07-09 (2) 09-10 (1)	01-05 (1)

		17-19 (2) 19-20 (1)	19-21 (4) 21-00 (3) 00-01 (2) 01-08 (1)	21-00 (1)*
Eastern & Central Africa	13-15 (1)	11-13 (1) 13-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-22 (3) 22-00 (2) 00-02 (1)	20-00 (1) 21-23 (1)*
Southern Africa	11-13 (1)	08-10 (1) 10-12 (2) 12-16 (3) 16-17 (2) 17-18 (1)	06-09 (1) 13-15 (1) 15-18 (3) 18-20 (2) 20-22 (1) 22-00 (2) 00-01 (1)	19-21 (1) 21-00 (2) 00-01 (1) 21-00 (1)*
Central & South Asia	*Nil*	09-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1) 19-21 (1)
Southeast Asia	*Nil*	10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-13 (1) 19-21 (1) 21-23 (2) 23-01 (1)	06-08 (1)
Far East	*Nil*	09-11 (1) 15-16 (1) 16-18 (2) 18-20 (1)	19-22 (1) 22-00 (2) 00-02 (1) 07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (1)	03-06 (1) 06-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	09-15 (1) 15-17 (2) 17-19 (3) 19-20 (1)	09-13 (1) 13-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	08-10 (3) 10-13 (2) 13-18 (1) 18-20 (2) 20-23 (3) 23-03 (4) 03-05 (3) 05-08 (2)	00-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 01-03 (1)* 03-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 14-16 (1) 16-19 (2) 19-20 (1)	09-11 (1) 15-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	08-10 (3) 10-13 (2) 13-20 (1) 20-22 (2) 22-23 (3) 23-01 (4) 01-05 (3) 05-08 (2)	02-04 (1) 04-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	07-08 (1) 08-10 (2) 10-13 (3) 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-22 (4) 22-01 (3) 01-05 (2) 05-08 (3)	19-20 (1) 20-23 (2) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 20-23 (1)* 23-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-11 (1) 11-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-16 (1) 16-17 (2) 17-19 (3) 19-22 (4) 22-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	20-22 (1) 22-05 (2) 05-07 (1) 02-05 (1)*
McMurdo Sound	*Nil*	13-15 (1) 15-17 (2) 17-20 (1)	17-19 (1) 19-21 (2) 21-01 (3) 01-03 (2) 03-07 (1) 07-09 (2) 09-10 (1)	01-06 (1)

Time Zone: PDT
(24-Hour Time)
WESTERN USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	*Nil*	09-11 (1) 11-13 (2) 13-15 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-14 (3) 14-15 (2) 15-18 (1) 22-23 (1) 23-01 (2) 01-02 (1)	20-21 (1) 21-23 (2) 23-00 (1) 22-23 (1)*

Central & Northern Europe & European CIS	*Nil*	09-11 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-17 (1) 22-00 (1)	18-20 (1) 20-22 (2) 22-23 (1) 21-22 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (1) 19-20 (1) 20-22 (2) 22-23 (1)	20-22 (1)
Western & Central Africa	13-16 (1)	08-11 (1) 11-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-00 (2) 00-07 (1) 07-09 (2) 09-10 (1)	21-00 (1)
Eastern Africa	*Nil*	09-13 (1) 13-16 (2) 16-18 (1)	13-15 (1) 15-18 (2) 18-19 (3) 19-21 (2) 21-22 (1)	20-22 (1)
Southern Africa	10-13 (1)	07-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-22 (1) 22-23 (3) 23-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	*Nil*	09-11 (1) 17-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-20 (1) 20-22 (2) 22-23 (1)	06-08 (1)
Southeast Asia	16-19 (1)	09-11 (1) 15-17 (1) 17-20 (2) 20-21 (1)	21-01 (1) 01-03 (2) 03-04 (3) 04-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 19-21 (1)	03-07 (1)
Far East	15-18 (1)	09-11 (1) 14-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	21-23 (2) 23-01 (3) 01-02 (2) 02-07 (1) 07-08 (2) 08-10 (4)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (1) 02-05 (1)* 05-06 (2)*
			10-11 (3) 11-12 (2) 12-14 (1)	06-07 (1)*
South Pacific & New Zealand	09-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	09-13 (1) 13-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-20 (1)	05-09 (2) 09-11 (3) 11-13 (2) 13-17 (1) 17-19 (2) 19-22 (3) 22-01 (4) 01-05 (3)	22-23 (1) 23-04 (3) 04-06 (4) 06-07 (3) 07-08 (1) 23-01 (1)* 01-03 (2)* 03-05 (3)* 05-06 (2)* 06-07 (1)*
Austral-Asia	09-14 (1) 14-18 (2) 18-20 (1)	09-11 (1) 14-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-00 (1)	13-20 (1) 20-22 (2) 22-23 (3) 23-02 (4) 02-05 (3) 05-08 (2) 08-10 (3) 10-13 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central, America & Northern Countries of South America	09-11 (1) 11-16 (2) 16-17 (1)	07-08 (1) 08-10 (3) 10-12 (2) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-20 (4) 20-00 (3) 00-05 (2) 05-06 (3)	19-20 (1) 20-21 (3) 21-04 (4) 04-05 (2) 05-06 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-11 (1) 11-14 (2) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-00 (2) 00-07 (1) 07-09 (2) 09-11 (1)	20-23 (1) 23-04 (2) 04-05 (1) 00-04 (1)*
McMurdo Sound, Antarctica	*Nil*	13-17 (1) 17-19 (2) 19-21 (1)	09-11 (1) 17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-04 (1)	23-03 (1) 03-05 (2) 05-07 (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.

we move into September, earlier and later windows will open.

Nighttime: Between sundown and sunrise 20 meters is expected to be the best DX band. Openings should be possible to nearly all areas of the world, often with exceptionally strong signal levels. Until midnight, good DX conditions may be found on 15 and 17 meters for openings toward Latin America, the far Pacific, and into Asia. Fairly good nighttime DX conditions are also expected on 30, 40, and 80 meters despite the high static at times. Openings should be possible before midnight along an arc extending from northern Europe, through Africa, and into Latin America. By late August it should be possible to work some DX on 160 meters during the hours of darkness. Conditions on this band, as well as on 40 and 80 meters, will tend to peak just as the sun begins to rise on the light, or easternmost, terminal of a path.

By the way, those in North America interested in NVIS (Near Vertical Incidence Skywave) propagation may find the map at <http://www.ips.gov.au/asfc/current/usmap.html> a useful guide to NVIS ionospheric frequency conditions.

Short-Skip Conditions

For openings over distances ranging between 50 and 250 miles use 80 and 40 meters during the day, and 80 and 160 meters at night. Between 250 and 750 miles the best bands should be 40 and 30 meters during the day, and 40 and 80 meters at night. For openings between 750 and 1300 miles the best bands should be 20 and 17 meters during the day, with some fairly good openings also possible on 15 meters. From sundown to midnight try 40 and 30 meters. From midnight to sunrise try 80 meters. Between 1300 and 2300 miles the best daytime bands should be 20 and 17 meters, with some activity on 15. Try 30 and 40 meters during hours of darkness.

VHF Ionospheric Openings

Sporadic-*E* propagation will begin to taper off considerably toward the end of August. Some 6 meter openings should still be possible over distances of about 750 to 1300 miles. During periods of intense and widespread sporadic-*E* ionization, two-hop openings may be possible considerably beyond this range. Don't forget to check 2 meters for an occasional sporadic-*E* opening between 1200 and 1400 miles. Look for these to peak between 8 AM and noon and again between 6 and 9 PM local time.

Solar activity continues to be high enough to support a rare *F*-layer DX opening. During the daylight hours, monitor 6 meters for transcontinental openings, as well as between Hawaii and the western states, and the Caribbean and Central and South America. The best time to look for these openings is during the afternoon hours, especially when conditions are High Normal or better. You just might be surprised.

The best meteor shower expected during August is the *Delta Aquarids* shower, which peaks August 8. The other shower with some promise of supporting radio propagation is the *Perseids,* peaking August 12 and 13.

Continue to expect a high number of solar flares and coronal mass ejections, possibly triggering aurora during August and September. When the *Kp*-index is greater than 5, you can expect possible aurora. The higher the *Kp*-index, the more intense the aurora can become. Consult the Last-Minute Forecast to find those days that are forecast to be Disturbed or Below Normal. You may also visit my propagation page, <http://prop.hfradio.org/> to view current conditions, including aurora activity.

I'm beginning to receive more correspondence from readers. I thank those of you who have taken the time to write to me. I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. I also welcome corrections and clarifications. I hope to serve the radio hobbyist with ever more accurate and useful information each month. You may e-mail me, write me a letter, or catch me on the HF amateur bands. See you on the air!

73, Tomas, NW7US

TROPHY WINNERS AND DONORS

SINGLE OPERATOR
World All Band
8P5A (Opr. Tom Georgens, W2SC)
Donor: Dave Rosen, K2GM
WA2RAU & W2SKE Memorial

World Low Power
P40W (Opr. John Crovelli, W2GD)
Donor: Slovenian Contest Club

World QRP
P40B (Opr. Jacobo Oduber, P43P)
Donor: Doc Sayre, W7EW

World Assisted
VE3EJ (Opr. Jeff Steinman, N5TJ)
Donor: CTRI Contest Group

U.S.A
John Dorr, K1AR
Donor: Potomac Valley R.C. - KC8C Memorial

U.S.A Low Power
Les Peters, N1SV
Donor: North Coast Contesters

U.S.A. Zone 3
Bob Wruble, W7GG
Donor: Dave Pruett, K8CC & Greg Surma, K8GL

U.S.A. Zone 4
Mike Wetzel, W9RE
Donor: Dave Pruett, K8CC & Greg Surma, K8GL

Canada
Dave Dudley, VE3OI
Donor: Niagara Frontier Int'l DX Assn.
VE3WT Memorial

Caribbean/C.A.
FG/T93M (Opr. Daniel Horvat, T93M)
Donor: Alex M. Kasevich, VP2MM

Europe
CT7B (Opr. Martti Laine, OH2BH)
Donor: Potomac Valley R.C. - W4BVV Memorial

Europe Low Power
OHØZ (Opr. Ari Korhonen, OH1EH)
Donor: Scott Jones, N3RA & Tim Duffy, K3LR

Russia
Vadim Ovsiannikov, UA9CLB
Donor: Roman Thomas, RZ3AA

Africa
EA8AH (Opr. Pekka Kolehmainen, OH1RY)
Donor: Gordon Marshall, W6RR

Asia
JY9NX (Opr. Koji Tahara, JM1CAX)
Donor: 2 AM Dayton Pizza Gang

Japan
Satoshi Hara, JH5FXP
Donor: Japan Crazy Contesters Club

Japan Low Power
Kenji Sharyo, JI3BFC
Donor: Western Washington DX Club

Oceania
9M8R (Opr. Jim Sullivan , W7EJ)
Donor: Northern California DX Club

South America
CE4U (Opr. Juan Pablo Mardones, CE4USW)
Donor: Yankee Clipper Contest Club

South America - Mainland
ZX2B (Opr. Wanderly Ferreira Gomes, PY2MNL)
Donor: Radio Club Paraguayo

SINGLE OPERATOR, SINGLE BAND
World 28 MHz
HC8A (Opr. Richard Smith, N6KT)
Donor: Joel Chalmers, KG6DX

World 21 MHz
HC8Z (Opr. Pedro Katz, HC1OT)
Donor: Robert Naumann, N5NJ

World 14 MHz
P40A (Opr. John Bayne, KK9A)
Donor: North Jersey DX Assn. - K2HLB Memorial

World 7 MHz
9Y4TBG (Opr. Andreas Kretzschmar, DL4MEH)
Donor: Fred Laun, K3ZO - K7ZZ Memorial

World 3.7 MHz
Bob Ferrero, W6RJ
Donor: Fred Capossela, K6SSS

World 1.8 MHz
LZ8T (Opr. Valeri Stefanov, LZ2CJ)
Donor: Robert Wruble, W7GG

USA 28 MHz
Bill Tippett, W4ZV
Donor: Donald Thomas, N6DT

USA 21 MHz
Pat Barkey, N9RV
Donor: Worldradio

USA 14 MHz
Dave Franks, K2XR
Donor: Southern California DX Club

USA 7 MHz
Greg Wilson, N4CC
Donor: Stanley Cohen, W8QDQ

USA 3.7 MHz
Joe Gagliardi, Jr., AA1BU
Donor: CQ Magazine

Carib./C.A. (21 MHz)
VP5B (Opr. Elza Foster, K4ISV)
Donor: Snake River Contest Club

Europe 28 MHz
Kresimir Kovarik, 9A5K
Donor: Worldradio

Europe 21 MHz
Robert Cummings, GIØKOW
Donor: Tine Brajnik, S50A

Europe 14 MHz
Jiri Sanda, OK1RI
Donor: A. G. Anderson, GM3BCL

Europe 7 MHz
Kaz Drzewiecki, SP2FAX
Donor: Roger Burt, N4ZC

Europe 3.7 MHz
9A30Y (Opr. Zvonimir Karnik, 9A3LG)
Donor: Marconi Contest Club - I3MAU Memorial

Europe 1.8 MHz
Egon Gadeberg, OZ3SK
Donor: Robert Kasca, S53R

Oceania (28 MHz)
Michael Gibson, KH6ND
Donor: Bruce D. Lee, KD6WW

Japan 21 MHz
Katsumi Furukawa, JH7XGN
Donor: DX Family Foundation

Japan 14 MHz
Hideaki Yasuda, JE2HVC
Donor: Take Yokoyama, JL1BLW

MULTI-OPERATOR, SINGLE TRANSMITTER
World
D44TC (Oprs.: I4UFH, IV3TAN, IK4UPB, IK2SGC, I4LCK, I4YSS, CT1EEV, D44TD)
Donor: So. Calif. DX Club - W6AM Memorial

U.S.A.
K4JA (Oprs.: K4JA, K9GY, K9JY, KA9FOX, KE9I, W4JVN, WE9V)
Donor: Carolina DX Association

Carib./C.A.
PJ2Z (Oprs.: WØCG, KU8E, K8NZ, N8VW, WC4E)
Donor: Eric Scace, K3NA

Africa
EA8ZS (Oprs.: EA1AK, EA4KR, EA7JX, EA8BYL, EA8KK, EA8PP, DL6RAI, DL2NBU)
Donor: CQ Magazine

Asia
P3A (Oprs.: RA9JX, RZ9UA, UA9MA, RW9UP, UA9YAB, RAØAM, RVØAU)
Donor: Edward L. Campbell, NT4TT

Japan
JE4VVM (Oprs.: JE4MHL, JG4CLV, JH4UHW, JH4VDP, JN4FEU, ZL1GO)
Donor: Vienna Int'l. ARC - 4U1VIC

Europe
TM5C (Oprs.: F5LND, F5MUX, F5NLY, F5VCO. TM5K: F5BGR, F5EMP)
Donor: Bob Cox, K3EST

Oceania
AH2R (Oprs.: JI3ERV/NH2C, JR7OMD/WI3O, JH0USD/KH2VO, JE8KKX/AH2K, KH2/JH7QXJ)
Donor: Junichi Tanaka, JH4RHF

South America
ZXØF (Oprs.: PY5EG, PY5CC, PYØFF, N5FA, YU1RL)
Donor: Victor Burns, KI6IM

South America – Mainland
FY5KE (Oprs.: FY5FU, FY5FY, F5HRY, F5MZN, F1HAR, F5OIH, F6HLC)
Donor: Radio Club Paraguayo

MULTI-OPERATOR, MULTI-TRANSMITTER
World
IG9A (Oprs.: IT9GSF, 9A3GW, 9A6A, 9H1EL, I4AVG, I4EAT, I4TJE, I4VEQ, IT9CHU, IT9EQO, IT9INO, IT9IVE, IT9NTD, IT9SGN, IV3TMV, IW9GIH, JH4RHF, N5ZO/OH6DO, S50R, SV2DCD, SV8CS)
Donor: Dave Leeson, W6NL, &
Barbara Leeson, K6BL

U.S.A.
KC1XX (Oprs.: AD1C, K1DG, K1GQ, KC1XX, W1FV, W2RQ, JA3CZY, KM3T, K6AW, N6IG)
Donor: Paul Hellenberg, K4JA

Europe
RW2F (Oprs.: RA2FA, RN2FA, RU4HP, RV2FW, RW4WR, RX3DCX, UA2FB, UA2FF, UA2FM, UA2FX, UA2FZ, UA3DPX)
Donor: Finnish Amateur Radio League

Japan
JA3YBK (Oprs.: JH3PRR, JG3KIV, JI3OPA, JM3XKG, JH4IFF, JH4NMT, JR4ISF, JF4FUF)
Donor: Ryozo Goto, JH3JYS

CONTEST EXPEDITIONS
World Single Operator
SV9CVY (Opr. Bernd Och, DL6FBL)
Donor: National Capitol DX Association
Stuart Meyer, W2GHK Memorial

World Multi-Single
E30NA (Oprs.: DL5NAM, OE2VEL, DJ7EO, DK7YY)
Donor: Dieter Loeffler, DK9KD
European DX Foundation

World Multi-Multi
IH9P (Oprs.: W1NA, W7ZB, OL5Y, I2IFT, IK2ANI)
Donor: Tachio Yuasa, JA9VDA

Special Award
A50A (Oprs.: WØGJ, WØHT, KØEN, NØADQ, N4BQW, KW4DA, KC7JPA, A51AA, A51PR, A51UD, A51YL, A51WD)
Donor: CQ WW Contest Committee

SPECIAL SINGLE OPERATOR AWARDS
World-All Band Under 21 years old
Hamilton Oliveira Martins, PY2YU
Donor: Gene Zimmerman, W3ZZ

World All Band High YL
Emily Thiel, P43E
Donor: Yutaka Tanaka, JH3DPB

whip antenna vertically from my porch on the 5th floor, unwillingly set it horizontally to the wall. Output power is also only 10W. CU on my love, 10 meters . . . **7K2PBB**. Condx for North America was OK, but was no good for Europe. But I enjoyed it anyway . . . **7K4XNN**. First time for a number of years in the All Band class. Managed to put up the 160 meter antenna the week before the contest. Borrowed a 2nd PA for radio #2 and made more band changes than usual but need more practice. Needless to say I enjoyed the contest as always . . . **7S2E**. Great contest, fabulous propagation on 10 meters, more than 1 MHz of goodies. Saturday was the best ever, and Sunday Was down, but I have improved my best score for more than 1 million points. I have been too much on S&P strategy, so the mults are great, but I am missing about 400–500 QSOs for even better score . . . **9A2EU**. Conditions were quite good. Had a lot of help from the hotel maintenance engineers in accessing the roof! Albert did an amazing job in getting the special call organised. It is amazing what you can do with just simple antennas!! A very enjoyable contest. Look forward to next year . . . **9HØWW**. First time from a DX location with

totally different band conditions. Our thanks to Don Soh, 9M6SU, for a great time contesting, DXing, and touring Kota Kinabalu, Sabah, East Malaysia. Some of the "big gun" station ops need to develop much better listening skills . . . **9M6TBT**.

From no radio in Bhutan to a Multi-Multi effort in a year! Wow! Ho-hum, just another A5! . . . **A50A**. Only few QSOs from my home station. Was one of the operators at DF3CB Multi-Single. Will be QRV in CQ WW CW from EA8/DJ1OJ again . . . **DJ1OJ**. Thanks for a fine contest; excellent propagation on 10 meters, so I get different new ones on this band . . . **DL5NAV**. Sending my little log to help checking the logs from the "big guns," hi! Had fun and many new DXCC! . . . **DL9GMN**. Licensed 1950; 51 years in amateur radio . . . **EA2CR**. Ten meters has been perfect. On the other hand 80 has been impossible for me . . . **EA7EWX**. Many new countries easy to work. I recommend the contest for newcomers . . . **EA7GLJ**. This is the first time that I am operating in this well-known contest. Therefore I would appreciate your looking over my log so I don't screw anybody up. I have taken great pains to do the best I could given my level of experience . . . **EC8AQQ**. All contest in "search and pounce" mode . . . **F5BEG**. My first contest with more than 1000 QSOs. Good propagation . . . **F5RAB**. My first CQWW (new callsign since March 2001) . . . **F8CTY**. Thanks for making the best ham radio weekend of the year . . . **GØAZH**. An unbelievable experience which I doubt I will ever want to sit through again. My hand goes out to all those devoted QRPers. They should carry the flag and the recognition as being the top of the pile when contest results are declared. The result of my station was achieved without the help of anything or anyone, and only about 10 QSOs were achieved by a CQ call; the rest were all in answer to CQ calls . . . **GØKDS**.

In 29 years of contesting this is my first serious phone SOAB entry. Entering low power it was hard work keeping a frequency, but it was good fun, especially when I was able to get through the pile-up for a mult . . . **G4BUO**. First time entering the SSB test and was great the 1st day, but the second was hard going but still enjoyed the experience . . . **G5X**. Conditions were spectacular on Saturday, but noticeably worse on Sunday after the solar flare struck. Life can be tough at high latitudes! But we had fun and did a little better than last year . . . **GD6IA**. Our very 1st attempt at Multi-Single, which was interesting. Enjoyed the contest but did have some antenna problems. Was great to work so well with just the Butternut. Highlight of the year and already looking forward to next year to improve on the score . . . **GW7X**. Our second contest expedition to Shetland and great fun again. Auroral conditions on Sunday reduced our QSO total considerably. Maybe one of these years we'll get two good days in CQWW phone! . . . **GZ7V**. The first big contest with a new rig. First time 1000 QSOs in a contest. What an event! . . . **HB9CIC**. I really enjoyed this contest, especially a pile-up with W stations. It is my 1 st participation on SSB. I think I will come back . . . **HB9DCM**. Since 1997 YN6WW, TI5WFM, TI5EBU, TI5WFM, and HR3J. We hope to see you again next year from Central America . . . **HR3J**. Very good propagation and participation from USA, but not so many QSOs with JA and Asia. First day ended very well. My best score ever. Glad to work you all . . . **IR4B**. Is my first international contest. I have this call by Oct. '01. I have work only 6 hours, but next year . . . **IZØEHL**. Good propagation especially on 10 meters. My contribution is always modest but I believe that this year there is a motive to participate. Believe that would be necessary to apply in the life our ham-spirit! . . . **IZ1ANZ**. This is my first CQWW and followimg the suggestions of a friend, at the end I participated on 15 meters, and I think I made a good choice. A bit hard sometimes with a vertical antenna, but I got a lot of enjoyment . . . **IZ4DYP**. We enjoyed big pile-up to me in the good condx . . . **JA7YRR**.

Very glad to have made my personal record and to have broken a 4M barrier thanks to the great condx and the least sleep (40 minutes) . . . **JA8RWU**. Exciting conditions on 10 m but I missed several AF zones . . . **JA9SCB**. Twenty meters from the ground. I enjoyed this CQWW 2001. I think that for 28 MHz is very good condition this year . . . **JGØGGI**. This is our first try to enjoy Multi-Single. We would like to brush up on our apparatus and operation . . . **JH7BZR**. First serious effort with two radios. Excellent propagation on the first day didn't allow to play with the second radio; two radios boosted the score significantly the second day. It was amazing how the rates can improve due to SO-2R . . . **OE4C**. Very interesting to have two excellent guest operators. Our team had four WRTC operators! . . . **OG1F**. The best run of CQWW DX Contest on 10 meters of my lifetime! . . . **OG3OJ**. Nice openings on saturday to JA and W. Northern Lights were strong on Sunday so I lost quite a few multipliers maybe because of that, but anyway it was a great contest even with tribander, OH6-land is a real black hole of RF when aurora comes up . . . **OG6NJ**. I was just giving the points to others and trying to find new ones for my DXCC. I'll be attending CQWW CW more seriously . . . **OH6QU**. The OQ1 prefix was an all-time new one for the WPX guys but a bit of a tongue twister for a contest (OT1T is easier) . . . **OQ1T**. Very fine contest, very good propagation on 10 meters . . . **OQ4HAM**. I am falling in love with this band (80). Last-minute opportunity to join the game. Raised a portable quarterwave with switchable el. radials . . . **PA4WM**. Managed 41 hours of the 48. Used event as training for two new ops. Problems with our 160 m and 40 m antennas. Aurora made hard work . . . **M4U**. Good opportunity for antenna testing—hi. Had lots of fun. Tremendous pile-ups here and there operator is rookie. Licensed since Dec. 2000. 73 es CU next year . . . **PA9TT**. Very nice party to celebrate ten years of TUPY DX Group, founded by PY2APQ, PY2NY, and PT2AW in 1991 . . . **PY2AA**. After more than 20 years of ham radio license this was my first WW contest. It was great fun and nice experience . . . **S51FB**. First CQWW from this club. We worked for fun and learning! Will be better next . . . **SKØCC**. Worked OX3R for new one on 80 . . . **SV1DKR**. Very good propagation on 10 m in the contest period. Nice openings with Asia and North America. This contest is my best of all contest I running in the last 3 years . . . **SV1DNW**.

That great contest is the only way for everyone to make a DXCC in one band and up to 30 zones with only 10 hours operation in one weekend! Do you know something else like that? . . . **SV2AEL**. We would have got more points if we had more operators, but always nice to give zone 40 . . . **TF3IRA**. Nine years old . . . **US5WMS**. Nice condx first day! But aurora on the second day killed our hope for the new record of the Ukraine! We had 3267 QSOs during the first 24 hours and and only 2326 QSOs second 24 hours. Also missed many DX mults! . . . **UU7J**. Good to avoid the aurora this year. Thanks for the memories of all the QSOs and the good time we had . . . **VB2V**. I don't know if it's due to more experienced and patient ops or our equipment getting better. After 50 years of contesting I noticed a lot less harsh words and bickering . . . **VE4IM**. Conditions varied from brilliant to terrible. I was ahead of 2000 for most of the test but fell into a black hole in the last six hours nowhere to run! . . . **VK5GN**. Friday night and Saturday were great. I had some good pile-ups going on Sat. with over 100 contacts in one hour (1900Z) on 10 meters. I don't have a very good antenna for working 40 and 80. One of these days I will put up a vertical for these bands . . . **VY1MB**. Surprised for not hearing the K3LR super MM station. Tim, where were you? . . . **XE2AC**. My first SOSB 10 m in SSB, no gud condx to EU, but it was fun. I hope to work better in CW . . . **XQ1ZW**. Propagation within Indonesia and South and North America is very good . . . **YE1A**. Only time for 7 hours operating, still a good opportunity to test the new voice keyer though. Delighted to work E30NA for an all-time new one . . . **ZC4DW**. Fantastic conditions! I wish that I could have operated longer . . . **ZL2AL**. Once again an enjoyable contest. Increased DXCC totals. Heard VP2E on the higher bands; could only work him on 40 meters. I was first ZS QSO for at least two stations! Thanks everybody from *CQ*. I don't like contesting—I love it! . . . **ZS4BS**.

USA QRM

It's great to be back into contesting. I had a ball . . . **AD8P**. Conditions were very much better than I expected—a real joy . . . **AE4EC**. Had lots of fun! 10 meters, wow! . . . **KØIL**. FT-817 to loaded whip on hotel balcony . . . **K1ZZ**. Great contest. Ten meters was hot! . . . **K2NV**. First real contest effort totally on my own! Operated from my QTH with an FT-840, 100 watts, and a 20 meter dipole up 60 feet in the trees. I had a great time plugging away (all S&P) and really loved contacting friends on the air! My thanks to N2GA for the "George Dipole" and especially to K3EST, a great teacher and motivator . . . **K2RED**. Biggest thrill: working E30NA—finally! Overall, had a great time with personal best score . . . **K2YSY**. Great conditions, great operators, great contest, great time! . . . **K3PP**. Cabrillo standard doesn't list Single Operator with packet yet so using Assisted for category . . . **K3WW**. First time in a CQWW DX Contest! Tnx for the opportunity! . . . **K6OWL**. All together it was a lot of fun. Aurora during the next night was spectacular! BTW, last year's results were only 10% better than now: Propagation god was with us! We would like to express our deepest appreciation to Peggy, W6AFI, for her hospitality and support . . . **K6ZM**. This was my second CQWW Contest. I really enjoyed it! Thanks for the great contest! . . . **K8FK**. Operated for two hours as a 5 watt QRP operator stationary mobile in driveway and Hamstick antenna . . . **K9IUA**. Great condx! Not bad for a tribander at 26 feet and inverted-Vees even lower! . . . **K9MWM**. Multi-Multi with my 10-year-old son, Corey ! He made 100 QSOs! He will be KB1???. Next year! . . . **KC1F**. Thanks for the best DX contest there is! Great to have a DX friend (JA3CZY) visiting this time . . . **KC1XX**. YL, my first CQWW . . . **KC2ILN**. It was a most glorious moment when I got Alaska (KL7Y)! What a rush!! And I loved working split on 40 meters . . . **KD7EJC**. Great contest! Band conditions were much better Saturday than Sunday. Looking forward to next contest . . . **KE6QR**. Things were looking good until the 30th hour. Then we got hammered by the CME that was ejected prior to the contest. By Sunday morning we could barely hear East Coast USA, and no EU at all . . . **KH6ND**.

Impressive 10 meter conditions on Friday night and Saturday with all parts of the world coming into the East Coast. A geomagnetic disturbance on Saturday night made Sunday much less productive, although much of Europe and Asia was still audible on 10 m during the day, even if the polar path had shut down. I mainly hunted for new countries (only one new one worked—V8A), but still had a lot of fun hunting for multipliers . . . **KO4MR**. Started out with amplifier trouble, quickly swapped it out with the standby amp (thanks to Bill, KØUK). If you're gonna be serious in this contest you had better have redundancy! Great conditions all weekend . . . **NØHF**. All was going well until about 23:00 local. Then the solar event hit us. Bands were almost dead until 06:00 gray line in the morning. Then, fortunately, things started to pick up again. Great time was had by all. Thanks to everyone for the Q's and see you next year . . . **N1LN**. Tried the same setup from home as used at ocean front. Looks like about 50% difference . . . **N2EE**. Tough going for three older guys on SSB. Congrats to K4JA and K1KI for their super efforts. Hope to do better on CW . . . **N3RS**. Great condx, particularly on 28 MHz. Logging a million points in 26 hours took some work, given the antennas are stealth dipoles on a deed-restricted lot . . . **N4GG**. Just doing our part "to promote international goodwill" . . . **N4GN**. Friday and Saturday results projected many records would be broken and then we experienced Sunday morning propagation! . . . **N4MO**. This was our first time in this category and as a team. We had a first day but conditions were tough from then on. But we had lots of fun. Thanks for a great contest! . . . **N5TW**. I could have danced a jig when I worked E30NA on Saturday morning! . . . **N6OU**. Great fun despite Sunday condx . . . **N6RO**. Working stations halfway around the world with a very simple station and low power (50 watts) . . . **N8GM**. Worked 23 Chinese stations! . . . **N9RV**. My thanks to *CQ* for a great contest and to all the ops who dug out my weak signal . . . **ND6S**.

Single band was fun, and learned a lot from just operating on one band . . . **WØZA**. My first CQWW—what an experience! With 30 minutes left in the contest I moved to 15 m and picked up my last 11 contacts, including 5 multipliers! . . . **W2RDS**. First contest ever as a single op. Enjoyed it . . . **W3KHZ**. At age 75 contests are still a fun way to spend a few hours. QRP makes even more fun (and hard work!) . . . **W3MGL**. My very first contest outside of ARRL Field Day. Thanks, I had a great time! . . . **W4KAZ**. Wow—WAZ on 10 meters! Last time I made Single Band WAZ was on 20 meters in the 1983 CQWW SSB! . . . **W4ZV**. I had a great time this year and added five more new entities to my 10 meter total . . . **W5CWQ**. Thanks for the work the CQWW Contest Committee does each year. It was a learning experience. Lots of things I could have done better. Regardless of the score, I had fun and that's really what it's all about . . . **W5KFT**. Big pileups of out-of-band operators on the high end of 15; maybe we need a new category for stations that don't observe the rules . . . **W8TWA**. First time using a computer logging program. It was great catching a zone 20 station on 40 meters with 100 watts to an old trap vertical . . . **W9LYN**. Conditions could have been better, but I still managed to better last year's score. I couldn't have done it without a plate of my wife's fresh chocolate-chip cookies . . . **WD4DDU**. Best surprise was to work my old college buddy 5WØMO (op. KM9D) on his around-the-world sailing trip . . . **WN9O**.

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. An asterisk (*) before a call indicates low power. Certificate winners are listed in bold. (All country terminology reflects the DXCC list at the time of the contest.)

SSB RESULTS

SINGLE OPERATOR

NORTH AMERICA

UNITED STATES

K1AR	**A**	**7,405,156**	**4020**	**152**	**519**
KQ2M/1	**"**	**7,317,086**	**4146**	**148**	**514**
K5ZD/1	**"**	**5,392,310**	**2962**	**150**	**508**
			(Op: CT1BOH)		
W1AO	*	2,251,060	1684	103	387
K5MA/1	*	1,817,738	1433	110	353
W1KT	*	1,572,592	1063	124	408
N1API	*	1,279,745	1308	83	278
W1KRS	*	1,271,160	1030	105	335
W1LLU	*	1,154,780	1175	96	266
AK1N	*	1,151,495	1006	111	326
W1OP	*	1,124,988	1054	96	293
			(Op: K1PLX)		
N1RY	*	1,112,640	860	108	380
W1TE	*	1,075,607	949	94	309
K1LI	*	869,056	933	86	281
K1CN	*	859,512	854	90	301
W1CTN	*	829,185	875	92	279
K1BD	*	726,478	698	94	297
K1VDF	*	700,574	788	78	248
AB1R	*	649,296	725	79	255
KB1LN	*	617,192	694	90	268
WT1M	*	600,590	872	70	220
			(Op: N1HKO)		
K1RO	*	568,690	698	73	217
N1FUS	*	562,400	731	73	231
W1JQ	*	447,606	577	76	231
W1GF	*	431,244	537	67	230
N1SOH	*	414,960	545	72	208
			(Op: W1FM)		
W1MK	*	394,134	529	79	247
W1BIH	*	252,000	388	78	202
N1JW	*	241,319	364	64	183
W1VET	*	224,664	539	67	209
KV1J	*	159,850	282	68	162
W1EZ	*	137,946	299	39	127
KA1VMG	*	119,997	287	56	143
N1BCL	*	118,944	283	48	129
K1OZ	*	89,280	227	41	103
W1AF	*	28,820	117	37	73
			(Op: N1QZY)		
WA1Z	*	26,978	103	30	64
N1RR	**28**	**824,504**	**1627**	**35**	**149**
AA1QD	*	515,247	1051	36	141
W1AIR	*	95,472	340	24	80
K1SM	*	15,232	98	11	45
K2SS/1	**21**	**330,187**	**836**	**32**	**111**
W1ZK	**14**	**177,536**	**436**	**34**	**112**
K1QS	*	122,232	337	30	102
AA1UT	*	32,676	146	18	66
AA1BU	**3.7**	**95,680**	**389**	**22**	**82**
K1YN	1.8	4	1	1	1
***N1SV**	**A**	**1,974,987**	**1557**	**106**	**377**
***KS1J**	**"**	**1,824,626**	**1434**	**108**	**346**
***K1VR**	**"**	**1,714,122**	**1283**	**110**	**376**
***K1VUT**	**"**	**1,580,374**	**1293**	**100**	**354**
*WS1A	*	1,357,800	1120	101	337
*WT1S	*	1,350,650	1078	107	347
*N1DD	*	1,286,120	1089	106	334
*K1HT	*	1,274,156	1043	104	324
*WG1Z	*	948,420	887	95	301
*K1YS	*	853,129	984	86	293
*K1LD	*	768,473	704	100	331
*W1EQ	*	702,886	786	81	268
*KX1X	*	655,200	857	66	207
*W1DAD	*	649,944	663	92	262
*N3KCJ/1	*	598,410	740	75	230
*NM1W	*	594,720	605	79	275
*K1NYK	*	593,388	769	70	241
*W1ZS	*	489,645	651	66	213
*N1DS	*	398,274	616	60	186
*K1YA	*	348,355	491	68	201
*W3TB/1	*	290,924	441	74	209
*K1YZ	*	255,432	438	56	176
*KA1OEO	*	194,866	377	53	164
*K1VSJ	*	153,056	277	67	154
*K1VU	*	132,300	295	44	136
*N1DC	*	130,345	268	50	149
*K1ILR	*	120,432	304	38	118
*KG1V	*	111,888	245	52	137
*K1XS	*	111,296	264	54	134
*KV1R	*	86,359	222	43	126
*W1MMM	*	70,920	249	31	89
*KY1B	*	54,144	177	34	94
*W1TW	*	44,950	168	45	100
*K1WCC	*	39,996	157	24	77
*AE1D	*	32,100	119	32	75
*KC1VQ	*	22,977	98	32	79
*N1VI	*	17,064	106	21	51
*K1MOM	*	16,892	80	29	53
*KQ1F	*	16,632	97	12	54
*K1SWG	*	14,514	74	29	53
*K3UOC/1	*	8,496	55	20	39
*N1QXV	*	1,062	41	27	32
***N1LW**	**28**	**226,206**	**566**	**32**	**110**
***W1EL**	**21**	**227,336**	**514**	**33**	**124**
*N1SHM	*	7,680	53	18	42
*WA1MKS	14	49,700	184	24	76
N2NT	**A**	**6,745,275**	**3625**	**151**	**524**
W6XR/2	**"**	**2,822,088**	**2156**	**117**	**355**
			(Op: NA2U)		
K2BX	*	1,828,236	1263	117	407
N2LT	*	1,689,996	1438	112	322
N2MR	*	1,650,384	1339	99	339
N2WK	*	1,584,648	1257	117	351
WA2NHA	*	1,237,936	1200	89	303
N7UN/2	*	1,006,824	1002	86	278
W2LE	*	858,375	832	84	291
K2XF	*	775,744	733	97	294
K2XT	*	620,483	710	81	242
NA2M	*	556,100	615	86	249
N2GC	*	534,136	531	97	276
K2ZP	*	470,611	558	78	245
W2YK	*	448,392	554	78	236
W2FCA	*	377,202	475	69	225
N2LK	*	335,174	500	68	201
WB2KLD	*	324,157	456	66	204
N2OO	*	317,814	410	79	203
WR2V	*	315,507	486	59	192
WB2HJV	*	304,008	467	62	177
K2TV	*	291,856	465	57	175
N2XG	*	284,791	525	63	184
AE2F	*	250,162	338	65	209
KD2HE	*	237,411	413	52	191
WF2B	*	219,780	393	56	164
K2TZ	*	198,000	372	55	165
NA2A	*	194,134	333	62	164
NE2I	*	168,272	385	48	160
N2XR	*	150,080	253	60	164
K2SZ	*	133,308	265	57	150
W2FU	*	95,580	210	54	123
K2AF	*	85,800	202	52	113
WA2BKN	*	60,852	161	54	96
W2FUI	*	45,535	155	18	54
KV2X	*	38,700	148	36	93
N2SQW	*	33,824	133	32	80
WA2BMH	*	28,405	112	35	80
N2BT	*	23,980	80	44	66
KZ2A	*	9,424	92	22	54
WB2SXY	*	7,722	68	30	48
W2RE	**28**	**1,245,798**	**2301**	**39**	**162**
N2PP	*	738,196	1524	39	140
K2MFY	*	384,836	804	38	140
WB2OSM	*	316,512	787	31	113
N2CU	*	83,808	275	27	81
WA2VUM	*	13,140	98	17	43
NG2X	**21**	**853,332**	**1698**	**38**	**140**
KU2M	*	197,334	642	29	85
K2XR	**14**	**775,905**	**1572**	**38**	**157**
WA2QNW	*	359,370	803	38	127
K2MGA	*	130,340	365	30	103
WQ2M	**7**	**79,060**	**279**	**25**	**93**
NC2O	*	35,100	152	23	77
N3XOF/2	*	22,000	121	17	63
***W2RDS**	**A**	**1,051,560**	**1011**	**82**	**299**
***K2CS**	**"**	**670,680**	**767**	**86**	**238**
*WB2ZTH	*	577,191	531	106	315
*N2PN	*	369,357	486	76	227
*N2USB	*	352,121	521	64	205
*W2TZ	*	321,455	456	75	194
*K2DBK	*	296,555	429	64	195
*W2UI	*	283,215	452	57	180
*AA2YG	*	265,640	443	58	174
*N2MUN	*	249,400	463	50	165
*KC2DTJ	*	201,576	339	56	166
*N2LEB	*	181,478	305	64	162
*W2VU	*	178,277	320	52	157
*W2QQ	*	161,403	291	52	149
*W2MKW	*	160,310	326	56	149
*KM2L	*	159,488	333	46	132
*K2UR	*	157,248	328	47	145
*K2YSY	*	147,744	266	55	161
*AA2TM	*	137,594	284	47	131
*N2LQQ	*	105,270	245	43	122
*KB4VL/2	*	81,776	204	36	116
*WB2TPS	*	72,645	164	46	121
*W2PI	*	70,924	183	42	107
*N2MTG	*	64,350	191	47	96
*W2FGY	*	47,771	141	45	96
*W2/VE3THX	*	40,005	169	37	90
*KV2R	*	33,125	145	39	86
*NJ2DX	*	32,512	109	39	88
*KX2J	*	27,365	161	25	86
*WA2IAU	*	16,732	101	22	67
*WA4ATJ/2	*	16,517	92	27	56
*WB2AIU	*	13,440	80	25	55
*N2VM	*	7,490	68	25	45
*K2RAD	*	357	12	8	9
***N2EE**	**28**	**527,580**	**1113**	**36**	**144**
			(Op: K3BU)		
*KC2ILN	*	272,259	627	38	131
*KA2NDX	*	197,662	510	33	114
*K2BOW	*	106,776	352	31	60
*WB2HWI	*	27,230	159	17	53
*W2DBA	*	21,560	114	16	54
*K2SWZ	*	5,200	66	16	34
***N2GM**	**21**	**111,762**	**348**	**26**	**100**
***K2RED**	**14**	**80,850**	**282**	**24**	**86**
*KX2S	*	64,713	232	27	84
*WB2DVU	*	55,536	199	26	78
*WA2ASQ	*	15,822	100	16	46
***K2UF**	**7**	**44,370**	**170**	**22**	**80**
*K2YEH	*	21,902	125	23	71
*AD3Y/2	*	1,225	21	9	161
K3ZO	**A**	**5,267,184**	**3142**	**144**	**454**
W3BGN	**"**	**4,275,915**	**2658**	**139**	**440**
N3AD	*	2,856,770	2088	122	396
N3HXQ	*	1,059,310	1087	93	277
W3RJ	*	939,277	1278	83	200
NQ3N	*	926,712	995	86	280
N3NS	*	818,025	912	71	254
			(Op: K3IPK)		
N3UM	*	780,767	775	90	287
N3KR	*	741,972	772	80	283
N3RJ	*	665,520	802	85	269
K4JLD/3	*	659,362	732	85	289
K3GEG	*	578,963	442	115	396
AD8J/3	*	536,116	692	75	212
W3BYX	*	475,046	587	66	236
W3DQ	*	341,386	494	66	196
K3SX	*	326,827	411	92	225
W3FVT	*	316,000	506	59	191
AD3Z	*	192,150	357	61	164
W3KV	*	157,830	326	43	145
AJ3M	*	122,844	267	52	122
W3JRY	*	15,784	78	17	59
N3HS	*	6,731	59	21	32
N3ME	*	1,836	32	24	30
N3RW	28	61,182	228	29	74
N3LL	*	40,392	193	19	69
N3HBX	**21**	**646,736**	**1482**	**34**	**132**
KM3J	7	4,900	42	15	34
***WO3Z**	**A**	**889,350**	**952**	**85**	**245**
***KQ3V**	**"**	**713,864**	**716**	**89**	**273**
*K1EFI/3	*	611,064	678	69	259
*K3DSP	*	498,480	624	77	233
*N3MK	*	422,940	566	68	217
*K3AN	*	258,884	393	66	178
*K2YWE/3	*	258,111	446	59	182
*KE3VV	*	229,896	379	71	177
*N3UN	*	209,760	361	74	166
*NA3J	*	208,362	413	70	161
*W3LL	*	202,982	389	53	158
*WA3SES	*	187,544	311	68	170
*W3CP	*	182,304	339	55	156
*N3OW	*	151,017	294	54	159
*K3VY	*	135,600	300	48	152
*W3DF	*	120,384	335	38	94
*WN3C	*	114,752	247	41	122
*AA3ML	*	110,210	240	58	148
*W3BEN	*	86,880	229	37	123
*AD3F	*	69,750	172	48	107
*W3FQE	*	55,796	181	27	94
*N3ZNU	*	40,920	164	38	94
*N3EYB	*	31,200	129	29	71
*N9GG/3	*	28,215	119	30	69
*N3OA	*	27,336	100	28	74
*K3NK	*	15,833	86	26	45
*AB8HY/3	*	13,770	116	21	64
***KT3RR**	**28**	**317,400**	**792**	**32**	**118**
*N3CTA	*	18,285	119	15	54
*WN3USA	14	6,737	63	13	31
K4ZW	**A**	**6,388,875**	**3431**	**152**	**523**
K4XS	**"**	**5,806,188**	**3218**	**147**	**519**
K4AB	*	3,855,320	2491	139	423
N4ZZ	*	1,987,928	1881	87	295
K4MA	*	1,738,604	1493	102	332
K4VUD	*	1,704,451	1648	109	304
N8WRL/4	*	1,691,802	1370	108	355
WA4TII	*	1,687,392	1246	118	386
KØEJ/4	*	1,662,367	1475	113	318
AA4NU	*	1,426,698	1129	125	382
K4NO	*	1,408,160	1314	112	304
N4PQX	*	1,229,114	919	119	360
N4MM	*	1,117,648	865	120	356
W2JJC/4	*	961,824	1114	85	259
W3GQ/4	*	937,550	828	109	316
K4LTA	*	918,972	975	100	302
W2YE/4	*	793,520	793	96	268
KG7H/4	*	773,277	833	113	270
N4KG	*	770,374	811	97	264
N4YQ	*	747,915	767	90	267
W4JAM	*	742,045	841	83	282
N4CW	*	725,824	752	84	268
WD4DDU	*	723,788	676	100	303
W4OX	*	575,694	558	99	279
W4SI	*	570,375	688	80	245
WA4JUK	*	481,299	639	77	224
KO7X/4	*	471,510	548	81	229
K4BS	*	424,257	504	71	238
W4YDY	*	410,350	564	71	219
K1GG/4	*	402,264	462	97	236
K4XG	*	396,576	506	89	217
AD4L	*	396,240	617	66	174
N4EK	*	354,960	537	64	191
WK4R	*	348,480	547	59	181
			(Op: KI7WX)		
W4YE	*	333,411	489	57	192
K4FYM	*	305,996	495	57	170
N4EL	*	244,342	424	50	167
W7QF/4	*	206,976	341	58	166
WT2J/4	*	175,890	328	61	185
WØYVA/4	*	161,028	284	76	208
WD4JR	*	159,810	289	54	156
WB4SQ	*	153,472	323	60	158
KQ2P/4	*	147,580	281	63	172
N4GU	*	129,762	300	39	123
W4PA	*	112,420	263	41	113
WB2LEZ/4	*	98,437	204	50	123
N4TL	*	80,410	204	51	119
NC4MI	*	78,880	188	48	112
N4UH	*	53,505	166	31	92
K4RO	*	40,000	123	45	80
K4BP	*	32,508	131	43	65
W4OGG	*	22,417	100	31	63
KE4MLT	*	17,850	144	23	62
KS4JB	*	7,257	49	21	38
W4TO	*	88	4	4	4
W4ZV	**28**	**1,464,255**	**2654**	**40**	**155**
N4BP	*	494,650	1342	30	100
W4EEH	*	256,476	696	29	103
NC4NC	*	177,660	601	31	95
WA4DOU	*	60,452	180	30	97
W3TMZ/4	*	35,244	102	33	99
K4WI	**21**	**707,070**	**1490**	**39**	**146**
K4SN	*	254,343	726	31	118
W4WA	*	42,369	175	20	67
W4JN	*	13,416	94	22	56
N4PSE	14	67,932	242	28	83
N4QB	*	22,596	130	24	60
N4CC	**7**	**105,300**	**286**	**32**	**103**
KE4SCY	*	75,530	235	28	102
K9ES/4	*	58,191	240	26	93
KD4RH	*	24,012	129	20	67
AA4MM	**3.7**	**39,425**	**187**	**21**	**74**
***N4TZ**	**A**	**1,556,180**	**1251**	**111**	**349**
***N4YDU**	**"**	**1,314,720**	**1227**	**100**	**315**
*N4IG	*	1,271,627	1111	101	312
*K4IE	*	1,262,316	1076	112	326
*NS4T	*	883,456	854	95	311
*N4NX	*	882,576	731	114	340
*W4IDX	*	852,756	808	94	303
*W4LC	*	630,805	694	83	252
*K4LAW	*	452,518	547	92	215
*W4MES	*	400,040	508	76	216
*KU4FP	*	336,071	450	77	216
*KK4TA	*	335,587	509	62	189
*N4JED	*	322,608	479	67	197
*W4DHE	*	320,160	494	80	210
*NA4K	*	269,666	438	59	159
*K1DCB/4	*	245,016	442	63	186
*AB4MT	*	229,250	435	70	180
*WB4ZPF	*	221,844	390	65	163
*KG6AR/4	*	218,845	358	64	189
*KC4PX	*	214,008	293	84	212
*KD4RKJ	*	192,720	341	58	161
*K3MTO/4	*	158,508	295	53	151
*W4EBA	*	154,036	326	45	149
*KB4KA	*	120,098	248	63	143
*K4OOO	*	117,961	275	45	134
*W4WNT	*	114,534	235	53	136
*K8FK/4	*	106,590	251	45	125
*WT5L/4	*	104,951	195	53	150
*KU4AW	*	99,190	275	50	132
*N4WD	*	97,944	248	44	115
*NI4S	*	94,710	227	44	121
*W4PC	*	94,392	237	50	121
*N4DWK	*	90,801	220	50	121
*K4AHC	*	88,380	269	49	131
*AA4KD	*	88,110	211	53	112
*KS4YX	*	87,080	241	39	101
*W4KAZ	*	57,266	163	41	96
*W4NTI	*	50,126	145	46	96
*W4JH	*	49,280	163	26	86
*WW4M	*	37,036	152	26	68
*AF4MO	*	35,700	172	26	76
*WA4FXX	*	31,290	115	29	76
*AE4EC	*	29,640	110	37	77
*W4XP	*	24,252	113	28	58
*K3CQ/4	*	23,871	95	39	70
*WA4NRQ	*	21,901	288	52	129
*W4ECL	*	21,070	99	21	65
*K4RFK	*	20,909	86	33	70
*WA4JA	*	19,283	93	25	58
*K4ALH	*	16,650	86	29	45
*N4SG	*	15,200	101	32	63
*KF4GWW	*	14,420	83	21	49
*AA3VA/4	*	13,600	70	26	42
*KO4OL	*	13,542	70	25	49
*K5OT/4	*	13,230	70	29	41
*K1SO/4	*	13,104	66	28	50
*K4UVT	*	10,981	54	27	52
*K4DIT	*	3,552	58	17	31
*WB9BSH/4	*	3,321	32	12	29
*WA3RGH/4	*	100	44	17	33
***K9HUY/4**	**28**	**271,707**	**715**	**32**	**109**
*KC4UCK	*	182,248	470	33	119
*ND4AA	*	101,616	333	26	90
*KR4QI	*	24,768	123	19	53
*W9CNF/4	*	6,554	52	15	34
*WD4NCQ	*	100	38	15	20
***N4MO**	**21**	**245,055**	**566**	**32**	**123**
***WO4O**	**"**	**222,306**	**527**	**35**	**123**
K5TR	**A**	**4,609,020**	**3029**	**159**	**463**
N5ZK	*	1,043,460	1217	78	263
			(Op: W5ASP)		
K5RA	*	1,024,632	897	116	312
KM5VI	*	597,740	643	94	286
N5PA	*	470,920	650	75	230
N5RXF	*	395,736	557	86	214
N5DD	*	369,564	475	80	219
N5RXF	*	317,401	531	85	208
KA5BSE	*	252,120	398	70	194
WA5SOG	*	64,922	168	46	97
WDØHWX/5	*	47,094	142	47	94
KC5NYO	*	35,990	150	46	72
K5RX	**28**	**1,053,930**	**2028**	**40**	**150**
N7DF/5	*	613,047	1323	37	144
K5AM	*	577,304	1199	37	145
K8EP/5	**21**	**299,138**	**783**	**33**	**128**
K2BA/5	**14**	**270,248**	**635**	**36**	**130**
W5FO	*	236,988	534	38	136
***WD5K**	**A**	**1,774,872**	**1315**	**123**	**375**
***W5KFT**	**"**	**1,773,849**	**1260**	**133**	**406**
			(Op: N5AW)		
*W5CWQ	*	725,985	749	98	267
*K5ER	*	270,485	439	70	165
*NN5T	*	265,872	422	72	160
*W5GZ	*	211,596	393	76	155
*W5KK	*	138,573	201	77	190
*KM5WR	*	99,076	198	65	123
*KK5VN	*	68,392	183	55	111
*KK5IJ	*	31,270	123	38	68
*AA5CK	*	30,167	128	38	59
*N5CHA	*	27,485	90	45	70
*KE5C	*	26,862	152	41	70
*KD5AIA	*	3,950	47	17	33
*WD5GSL	28	1,829	33	12	19
			(Op: KD5PXU)		
***KZ5A**	**21**	**68,043**	**280**	**26**	**85**
*N5ID	*	28,658	136	22	67
*KD5CKP	*	84	4	3	4
K6NA	**A**	**1,532,856**	**1287**	**128**	**314**
W6UE	**"**	**1,524,864**	**1280**	**120**	**336**
			(Op: N6VI)		
KI6CG	*	1,119,131	1073	108	295
WN6K	*	811,070	890	106	261
WW6O	*	801,720	824	102	258
K7JJ/6	*	762,540	825	107	251
WA5VGI/6	*	620,280	651	104	256
W6TKV	*	597,502	705	106	252
K6GT	*	558,144	665	85	219
N6IJ	*	500,224	742	78	178
			(Op: AD6TF)		
K6NR	*	499,596	576	95	221
NN6XX	*	467,200	570	101	219
KC6X	*	447,885	525	86	247
N6VH	*	414,036	539	94	185
W6KNB	*	346,472	504	86	183
W6TE	*	341,134	554	87	194
W7CB/6	*	338,130	454	87	219
W6QEU	*	226,051	539	97	204
K6HRT	*	178,080	352	58	154
AJ6V	*	175,536	334	66	141
K6DXX	*	131,085	227	74	150
WB6NFO	*	107,490	265	63	99
KE6QR	*	94,685	251	58	87
W6KC	*	86,135	207	55	106
K6VNX	*	65,888	174	51	91
AG6RT	*	58,424	241	59	75
W6DRB	*	47,677	202	52	87
N6UB	*	35,990	114	42	76
KG6EVH	*	25,807	97	55	76
W4EF/6	*	21,525	84	47	58
W6MVW	*	15,006	92	47	76
N6BXO	*	7,420	49	28	42
NY6Y	*	7,189	76	33	46
W6AFA	**28**	**298,028**	**674**	**38**	**134**
NW6S	*	92,996	264	29	105
K6HNZ	**21**	**499,875**	**1173**	**35**	**120**
W6RJ	**3.7**	**122,843**	**625**	**32**	**77**
K6SE	**1.8**	**180**	**12**	**7**	**8**
***N6NF**	**A**	**1,183,200**	**1075**	**119**	**281**
***K6UM**	**"**	**602,330**	**645**	**101**	**234**
*K6LRN	*	398,136	482	98	220
*N6NG	*	391,920	530	77	199
*W6NS	*	379,671	515	87	184
*K6XV	*	357,798	496	99	195
*AA6PW	*	313,968	512	71	177
*N6DQ	*	304,677	391	82	209
*N6EM	*	294,779	463	81	176
*W6RCL	*	193,817	351	77	144
*ND6S	*	180,486	356	74	148
*W6SA	*	174,276	331	76	130
*KO6IS	*	99,360	192	55	129
*W6FFH	*	89,782	248	55	99
*AA6DX	*	80,556	226	57	90
*W6SI	*	69,733	236	53	84
*N6LL	*	61,803	205	44	65
*AA6EE	*	49,306	166	52	78
*KA6MAL	*	41,600	155	58	70
*N6AN	*	39,285	125	50	85
*KE6OUA	*	36,000	152	42	58
*KF6M	*	26,145	124	37	46
*AD6AB	*	15,504	97	31	37
*N6IBP	*	11,952	79	44	74
*K6OWL	*	8,478	59	25	29
*K6LDX	*	6,798	46	29	37
*W6RFF	*	5,280	45	19	25
*K6ZCL	*	187	7	6	5
***AC6WD**	**28**	**160,480**	**439**	**33**	**103**
*NT6K	*	122,140	376	30	94
*WK6I	*	113,280	345	28	90
*NK6A	*	45,924	195	25	64
*W6JEN	*	37,310	169	28	63
*KR6ER	*	1,870	34	9	13
*KF6NMA	*	264	10	6	6
***W6YJ**	**21**	**77,400**	**247**	**32**	**88**
*W6ZZZ	*	1,144	28	11	11
*KU6T	7	5,986	59	15	26
W7GG	**A**	**2,933,730**	**2058**	**146**	**409**
K7RI	**"**	**2,367,860**	**2101**	**131**	**339**
KØJJ/7	*	718,960	693	107	273
NE9Z/7	*	504,216	493	118	305
KE7GI	*	475,785	596	89	238
K7XZ	*	430,650	536	88	209
W7QN	*	429,180	578	78	198
KC7UP	*	326,133	475	69	188
W8AEF/7	*	319,000	469	82	193

KI7AO	*	301,599	443	89	190
N7NTN	*	287,152	453	86	188
NB7X	*	223,504	380	69	160
KS7T	*	212,364	393	66	138
W7WHY	*	204,327	396	71	148
W7LGG	*	202,110	422	75	163
NF7E	*	75,680	170	65	111
W7HUY	*	47,880	128	71	109
AC7BN	*	40,334	120	47	87
K7QE	*	19,032	102	29	49
WG7X	*	18,928	83	43	61
WC7S	*	6,968	49	30	37
KB7TYA	*	5,934	92	23	20
K7QQ	**28**	**462,590**	**1105**	**38**	**129**
KI7XA	*	40,050	180	25	64
K6TIM/7	*	39,312	160	32	94
W7AYY	*	15,370	86	21	50
N7DD	**21**	**901,272**	**1850**	**40**	**148**
W7UT	**"**	**469,452**	**1011**	**35**	**139**
K7ZZ	*	446,350	1234	35	123
W7EB	*	376,740	1044	31	107
K7VS	*	348,777	952	32	111
WA7AR	*	236,652	556	35	121
KX7J	*	23,298	125	22	53
W7WA	**14**	**724,140**	**1430**	**38**	**142**
K5RR/7	*	238,140	535	38	124
***WS7V**	**A**	**548,576**	**647**	**97**	**219**
***N7LOX**	**"**	**473,060**	**591**	**91**	**219**
*N3AIU/7	*	272,525	490	88	187
*N7MAL	*	242,553	396	71	162
*KW7N	*	227,130	393	77	149
*W7QDM	*	104,742	219	67	131
*KC7X	*	86,432	274	51	97
*N7EMC	*	82,160	219	42	88
*AB7RW	*	70,470	194	55	80
*W7SNH	*	58,245	178	63	102
*W7YVK	*	51,195	189	44	57
*KK7VC	*	48,929	161	43	70
*W7GTO	*	42,979	140	46	74
*K7EMI	*	41,019	151	46	75
*AC7LX	*	37,146	160	36	46
*N7XY	*	35,535	120	45	70
*W7LKG	*	31,892	125	41	78
*N7TL	*	29,500	126	42	58
*WI7F	*	12,544	124	42	56
*W7IIT	*	11,434	60	29	42
*K7ATA	*	5,772	76	19	20
*W7JAM	*	4,180	52	24	31
*KT7G	*	1,116	23	16	15
*KD7EJC	*	825	20	11	14
***W7UPF**	**28**	**162,009**	**472**	**31**	**110**
*K7ON	*	116,298	349	30	96
*W7ZMD	*	1,748	39	16	22
***K7LVJ**	**14**	**73,723**	**258**	**23**	**84**
K8AL	**A**	**1,686,230**	**1059**	**141**	**454**
K8DX	**"**	**1,615,950**	**1502**	**108**	**291**
N8KM	*	1,517,184	1288	114	325
WB8TLI	*	1,418,378	1152	104	338
K8AO	*	1,301,438	1169	105	304
K2UOP/8	*	1,227,969	1066	98	325
W8KEN	*	967,974	893	102	297
AA8PA	*	922,429	995	99	274
W8BIN	*	815,475	842	99	294
NC8V	*	760,380	903	86	259
N8KR	*	704,520	846	90	252
K6VWE/8	*	519,342	675	81	222
W8JY	*	506,304	661	81	212
W8LU	*	361,746	447	79	240
KC8KE	*	273,088	475	80	192
K3GP/8	*	251,784	405	62	172
W8WH	*	198,253	300	72	197
N8DSG	*	153,676	327	62	144
W8KNO	*	152,488	367	53	143
W8XI	*	144,885	303	51	144
N4ZR/8	*	139,761	312	36	123
K8EMS	*	91,584	236	37	107
KC8LTL	*	87,690	214	46	112
N8OH	*	66,249	187	49	104
K8IA	*	31,415	165	21	82
WB8TCT	*	23,975	147	43	94
N8IK	*	17,388	105	17	52
KC8RAN	*	2,691	27	18	21
K3ZJ/8	**28**	**765,912**	**1647**	**36**	**132**
N8MZ	*	204,400	511	34	112
N8TT	*	61,146	195	29	100
W8TWA	**21**	**329,312**	**727**	**36**	**128**
W8UD	*	224,676	545	35	123
W8UVZ	**3.7**	**9,882**	**124**	**17**	**44**
ND5S/8	*	5,082	68	11	31
***N8CN**	**A**	**929,097**	**956**	**85**	**266**
*KI8IZ	*	450,278	564	78	220
*W8PG	*	316,758	545	61	201
*WT8E	*	217,294	407	67	171
*N8WK	*	183,551	422	49	142
*K8GT	*	156,378	283	57	144
*W8IDM	*	150,678	274	53	145
*W8VE	*	144,024	294	59	145
*W8TTS	*	141,759	312	48	123
*N8XWO	*	133,856	294	49	139
*ND8L	*	131,675	235	62	167
*W8MHB	*	125,967	246	55	144
*KA8PTT	*	109,928	226	53	129
*K8VUS	*	100,746	252	51	123
*KE8FO	*	89,176	211	47	110
*W8IQ	*	87,113	216	65	119
*K8CI	*	85,816	237	32	104
*WA8MEG	*	78,880	213	47	113
*N8BV	*	71,651	213	47	90
*AD8P	*	60,830	180	47	107
*W8MKO	*	42,572	157	32	84
*N8CH	*	28,120	104	29	66
*K8MEG	*	26,070	115	37	73
*NS8O	*	23,040	103	30	60
*WA8OEY	*	15,484	80	30	49
*KA8JXG	*	11,704	71	32	56
*KC8PKN	*	11,455	84	28	51
*W8CK	*	841	25	18	17
***K8IR**	**28**	**207,144**	**551**	**29**	**108**
*KF8BT	*	74,844	271	24	75
*N8GM	*	4,305	48	16	25
*W8NGO	21	27,454	172	17	57
*AF8C	7	576	18	7	17
W9RE	**A**	**6,058,656**	**3405**	**154**	**500**
WB9Z	**"**	**4,802,046**	**2800**	**154**	**472**
NA9D	*	1,453,375	1384	97	288
KB9BUM	*	1,389,465	1020	118	377
K9BGL	*	1,265,148	1048	123	329
N9QQK	*	889,785	917	85	266
W9JA	*	755,153	687	119	344
K8LEE/9	*	704,234	670	122	324
K9UQN	*	656,934	788	69	240
WA1MKE/9	*	585,078	646	91	247
AA9RN	*	455,096	541	89	237
NF9V	*	206,712	351	67	165
NO9E	*	200,396	352	75	163
N2BJ/9	*	141,984	220	64	168
K9TTT	*	129,781	344	67	166
WO9S	*	38,115	146	39	60
W3HDH/9	*	33,899	131	40	69
W9LYA	*	16,182	83	38	55
K9NW	**28**	**1,149,889**	**2088**	**39**	**158**
WI9WI	*	388,284	912	37	119
W9OF	*	260,091	543	37	132
W9SE	*	154,380	481	29	95
KB9SNE	*	481	49	13	24
N9RV	**21**	**1,254,790**	**2578**	**37**	**142**
KX9DX	*	135,061	378	29	102
KB9KEG	*	58,032	251	26	78
KF9VJ	*	19,680	128	21	59
K9CAN	**14**	**111,260**	**295**	**33**	**111**
W9BCV	*	26,362	152	26	72
***N9UA**	**A**	**1,082,988**	**986**	**101**	**301**
***K9JE**	**"**	**785,420**	**818**	**89**	**257**
*WA9Z	*	698,880	810	86	250
*WN9O	*	657,580	523	124	366
*KC9FC	*	488,224	667	72	220
*N9REP	*	379,808	518	84	202
*KD9AC	*	230,838	404	71	166
*N9CIQ	*	225,264	337	66	181
*N9KT	*	177,062	310	62	161
*K9KUP	*	167,915	400	58	157
*W9YS	*	137,085	291	59	126
*W9LYN	*	136,840	259	69	151
*N9KO	*	134,082	294	52	139
*N9LYE	*	122,815	433	41	162
*WØHED/9	*	102,856	226	54	130
*W9WUU	*	75,460	202	52	102
*N9TF	*	56,922	132	49	110
*WD9FEN	*	36,519	137	32	79
*KØHNM/9	*	18,343	93	26	57
*KG9PF	*	13,098	75	24	50
*KDØAV/9	*	10,833	65	21	48
*KK9DX	*	9,240	91	18	52
***W9RN**	**28**	**194,085**	**437**	**38**	**133**
*W9FGH	*	158,369	449	28	99
*KG9N	*	111,888	379	29	79
*NN9K	*	103,920	333	27	93
*WI9H	*	63,776	183	33	104
*N9GUN	*	58,590	240	25	68
*NG9L	*	23,100	110	18	59
*W9ILY	21	37,840	159	20	68
***W9AU**	**14**	**141,780**	**373**	**33**	**106**
*W9HV	*	38,335	216	22	63
N2IC/Ø	**A**	**5,056,788**	**2882**	**162**	**476**
NRØX	**"**	**2,457,064**	**1569**	**135**	**427**
KØKX	*	2,089,126	1649	125	369
KØIR	*	1,993,290	1391	135	403
WØBV	*	1,310,272	990	131	341
KKØSS	*	1,278,220	1286	95	300
NØIJ	*	1,101,399	1043	105	298
WØMRD	*	937,020	901	96	292
K9MWM/Ø	*	911,816	993	113	276
WØZQ	*	668,325	761	93	242
WØMW	*	642,160	665	108	260
KØTT	*	492,024	730	72	175
KØGAS	*	460,257	581	94	209
KBØENE	*	394,476	513	83	201
KØBX	*	376,623	539	68	193
WØGG	*	365,638	471	83	204
WØOR	*	267,876	425	78	174
KCØCWU	*	179,584	385	63	181
KØDAT	*	171,897	299	66	163
KZØC	*	170,277	313	63	148
WØPPF	*	132,100	266	59	138
WAØDCB	*	128,575	307	61	124
WØOSK	*	114,185	238	71	134
WØRT	*	94,640	199	63	119
W7IY/Ø	*	75,933	197	47	96
KØCAT	*	67,203	207	43	88
			(Op: K9WIE)		
NVØP	*	57,408	186	38	100
KFØOS	*	40,002	147	40	73
KØHB	*	34,104	139	27	71
KCØIEE	*	4,845	63	25	32
KVØQ	**28**	**734,734**	**1501**	**38**	**144**
KMØO	*	546,940	1219	35	129
NØUU	*	252,925	603	33	118
KØDAS	*	177,177	456	32	111
WNØL	*	103,056	340	26	88
KIØMB	**21**	**562,322**	**1447**	**36**	**122**
WAØOTV	*	176	12	8	8
***ACØW**	**A**	**1,631,034**	**1308**	**119**	**355**
***WØAH**	**"**	**1,477,476**	**1217**	**132**	**360**
*NØHJZ	*	1,057,662	950	109	293
*NØYYO	*	562,928	693	80	222
*WBØSMS	*	529,074	652	100	242
*KØVM	*	367,783	578	66	181
*NØPO	*	197,540	301	70	168
*NØZA	*	164,190	376	54	141
*NUØC	*	156,177	314	63	138
*KØIL	*	143,634	265	65	157
*NØWY	*	142,048	285	56	128
*WBØIEL	*	135,816	213	65	147
*WBØTRA	*	130,676	289	61	121
*KØUD	*	125,768	253	57	142
*KBØMZG	*	117,151	252	62	131
*WA2HFI/Ø	*	65,554	181	56	90
*WRØDK	*	54,708	159	53	88
*KAØEIC	*	44,660	131	52	88
*AAØZZ	*	40,217	132	44	87
*NØLZ	*	30,326	94	49	69
*WØCBH	*	27,645	111	34	61
*KØMPH	*	25,553	109	35	66
*KCØCQD	*	21,441	150	21	34
*KC8JRF/Ø	*	20,140	115	34	72
*KCØIDI	*	11,700	115	38	52
*WØBR	*	9,027	58	14	45
*WØIE	*	5,400	43	13	32
***KØXM**	**28**	**117,980**	**269**	**39**	**131**
*WØRUN	*	14,640	95	16	44
***KEØUI**	**21**	**90,965**	**301**	**28**	**87**
*WØZA	*	74,160	297	26	77
*KØCO	*	4	1	1	1
***AAØMQ**	**14**	**57,062**	**206**	**27**	**76**
*NØMSB	*	6,794	60	11	32

ALASKA

*KLØDS	28	2,184	34	10	18

BARBADOS

8P5A	**A**	**14,531,272**	**8690**	**147**	**511**
			(Op: W2SC)		
***8P6EX**	**A**	**1,191,120**	**1878**	**67**	**213**

BELIZE

***V31BD**	**A**	**963,036**	**1883**	**68**	**173**
			(Op: WQ7R)		
***V31MX**	**28**	**343,512**	**1392**	**21**	**83**
			(Op: KØBCN)		

BERMUDA

***VP9 /W6PH**	**A**	**3,134,610**	**3101**	**99**	**336**

CANADA

VE1ZJ	**A**	**1,590,159**	**1603**	**96**	**315**
VO1WET	**28**	**895,968**	**2630**	**29**	**107**
VO1MP	**21**	**1,161,040**	**2449**	**37**	**147**
***VE1JS**	**28**	**252,306**	**736**	**29**	**102**
***VO1BC**	**21**	**307,850**	**894**	**26**	**105**
VE2IM	**A**	**7,266,150**	**4596**	**138**	**465**
			(Op: VA3UZ)		
VE2AYU	*	1,786,054	1668	91	310
VE2ZP	**28**	**918,756**	**1949**	**37**	**144**
***VE2GSO**	**A**	**1,317,555**	**2114**	**76**	**209**
*VE2AWR	*	941,466	1011	78	268
*VE2LHP	*	171,097	404	41	132
*VA2IC	*	98,670	383	46	97
*VE2OWL	21	9,840	67	16	44
VE3OI	**A**	**5,166,546**	**3489**	**142**	**441**
VE3AT	**"**	**4,863,075**	**3506**	**125**	**400**
VE3SY	*	1,246,530	1449	99	271
VE3KPU	*	954,654	1127	78	243
VA3WN	*	460,625	725	75	200
VE3DWT	*	194,634	400	54	144
VA3KOC	*	4,182	47	17	34
VA3RU	**28**	**1,037,706**	**2016**	**39**	**155**
VE3PN	*	243,712	772	28	91
VE3CFK	**21**	**194,337**	**554**	**31**	**120**
VE3UZ	7	10,187	68	16	45
***VE3BUC**	**A**	**961,110**	**1095**	**86**	**268**
***VA3SWG**	**"**	**667,161**	**1002**	**71**	**222**
*VE3FWA	*	537,300	789	72	198
*VE3YQY	*	261,576	504	64	157
*VA3IX	*	249,480	500	68	157
*VA3SX	*	219,209	486	61	162
*VE3DXP	*	94,276	227	60	136
*VE3NQM	*	51,816	157	49	87
*VA3SPN	*	10,140	75	20	40
***VE3MQW**	**21**	**226,380**	**563**	**31**	**116**
*VA3FP	*	72,228	256	25	84
***VA3TTT**	**7**	**31,372**	**317**	**15**	**47**
			(Op: Barski)		
VE4IM	**A**	**592,680**	**774**	**89**	**241**
***VE4YU**	**A**	**784,454**	**810**	**101**	**261**
*VE4RA	*	204,085	309	74	171
*VE4RP	*	29,550	142	33	58
*VE4HAZ	28	340	19	5	5
***VE4COZ**	**21**	**142,205**	**552**	**30**	**89**
VE5FX	**28**	**293,756**	**1028**	**30**	**94**
***VE5MC**	**A**	**509,040**	**928**	**73**	**167**
*VE5AAD	21	31,638	155	23	61
VE5UA/6	**A**	**1,151,712**	**1268**	**112**	**275**
VE6WQ	**28**	**879,864**	**2024**	**39**	**144**
VE6JY	**21**	**981,272**	**2165**	**37**	**147**
			(Op: VE5MX)		
VA6RC	*	196,647	911	27	74
***VE6ZT**	**A**	**609,466**	**858**	**81**	**205**
VE7VR	**A**	**657,312**	**724**	**101**	**233**
VE7XB	*	423,440	629	80	188
VE7XO	*	257,538	458	68	143
VE7KD	**28**	**116,012**	**635**	**25**	**67**
VA7RR	**21**	**998,592**	**2405**	**35**	**133**
VE7OSO	*	20,845	166	22	33
VE7XR	**14**	**474,614**	**1257**	**36**	**131**
***VE7IN**	**A**	**681,792**	**937**	**109**	**209**
*VE7FO	*	328,001	626	81	160
***VE7VF**	**28**	**53,244**	**214**	**27**	**75**
VY1VY	**A**	**492,012**	**864**	**87**	**150**
VE8AE	*	54,704	253	46	58
***VY1MB**	**A**	**332,688**	**920**	**70**	**104**

COSTA RICA

*TI2DLL	A	90,405	352	38	85
***TE2M**	**14**	**120,016**	**552**	**27**	**77**
			(Op: TI2KAC)		

CUBA

CO8ZZ	**A**	**1,803,870**	**2177**	**96**	**297**
CO8TW	**28**	**101,808**	**442**	**23**	**78**
***CO8LY**	**A**	**636,696**	**1402**	**63**	**159**
***CO2TK**	**28**	**319,788**	**1402**	**28**	**80**
*CO2PH	*	34,122	283	18	48

DOMINICA

***J79RL**	**A**	**343,729**	**595**	**61**	**168**
			(Op: DL9DRA)		

GUADELOUPE

FG/T93M	**A**	**11,059,664**	**7409**	**146**	**470**

GUATEMALA

***TG9AJR**	**21**	**336,720**	**1107**	**29**	**109**

HONDURAS

HR1AAB	**A**	**149,472**	**872**	**51**	**93**
HR1AGC	*	108,360	277	45	123

JAMAICA

***6Y4Y**	**A**	**302,353**	**664**	**54**	**137**
			(Op: YO3YB)		

MARTINIQUE

FM5DN	**7**	**200,860**	**831**	**27**	**94**
***FM5FJ**	**21**	**426,793**	**1183**	**34**	**110**

MEXICO

XE2AC	**A**	**968,940**	**1419**	**92**	**223**
XE1ZOI	*	203,013	350	69	150
XE1CRO	**21**	**859,261**	**2484**	**33**	**124**
XE1CT	*	31,160	174	22	60
***XE1RGL**	**A**	**1,074,944**	**1575**	**91**	**232**
*XE1ZQC	*	604,953	1517	72	135
*XE2AUB	*	336,814	988	62	104
*XE1MEX	*	102,150	276	51	99
*XE2MX	*	84,613	207	72	119
***4A1AC**	**21**	**71,058**	**477**	**22**	**56**
			(Op: XE1BEF)		
***XE1L**	**14**	**665,658**	**1958**	**36**	**126**

NICARAGUA

***H6C**	**A**	**1,142,478**	**1769**	**77**	**216**
			(Op: YN4SU)		

PANAMA

3E1AA	**21**	**1,209,581**	**3181**	**35**	**132**
			(Op: HP1XVH)		
***HP1BYS**	**14**	**466,752**	**1431**	**30**	**106**

PUERTO RICO

KP3Z	**A**	**7,172,550**	**5186**	**147**	**483**
WP3W	*	1,101,899	1337	93	269
***WP4LNY**	**A**	**88,971**	**503**	**25**	**42**
*WP3GW	*	61,760	199	32	94
***NP3E**	**28**	**267,448**	**1383**	**28**	**73**

ST. KITTS & NEVIS

V47KP	**A**	**5,121,148**	**4357**	**128**	**380**
			(Op: W2OX)		
V44NK	*	1,575,840	2572	80	214

SAINT MARTIN

FS/AH8DX	**A**	**7,630,020**	**5535**	**136**	**446**

SINT MAARTIN

***PJ7 /K7ZUM**	**A**	**2,908,819**	**4787**	**108**	**323**

ST. PIERRE & MIQUELON

***FP/AC8W**	**A**	**345,312**	**775**	**43**	**133**
*FP/K8DD	*	168,480	500	45	111

TURKS & CAICOS ISLANDS

VP5B	**21**	**2,282,470**	**5026**	**39**	**151**
			(Op: K4ISV)		

U.S. VIRGIN ISLANDS

WP2Z	**A**	**1,814,364**	**2645**	**84**	**219**
			(Op: K2DM)		
***KP2BH**	**A**	**460,852**	**1022**	**68**	**150**
*NP2DJ	*	58,600	240	28	72

AFRICA

CANARY ISLANDS

EA8AH	**A**	**13,785,672**	**7576**	**152**	**531**
			(Op: OH1RY)		
EA8AJO	*	1,670,340	2265	74	213
EA8LS	**21**	**468,802**	**1198**	**31**	**114**
EA8YG	**1.8**	**7,181**	**91**	**10**	**33**
***EC8AUZ**	**A**	**792,176**	**1639**	**46**	**130**
*EA8AD	*	294,464	751	51	121
*EA8IK	*	69,168	190	31	101
*EA8BMP	*	2,959	28	18	23
*EA8BU	28	18,368	160	16	48
***EC8AQQ**	**21**	**71,878**	**320**	**17**	**66**

CEUTA & MELILLA

EA9LZ	**7**	**421,266**	**1341**	**27**	**95**
***EA9AR**	**A**	**807,084**	**1043**	**66**	**216**

GHANA

9G5KW	**A**	**1,174,634**	**1781**	**66**	**175**
			(Op: WØSD)		

LIBYA

5A1A	**28**	**21,408**	**156**	**13**	**35**

MADAGASCAR

5R8FU	**A**	**1,120,487**	**1218**	**89**	**234**

MADEIRA ISLANDS

CT9L	**A**	**6,935,082**	**4273**	**123**	**438**
			(Op: DJ6QT)		
CT3CK	*	429,345	781	60	175
CT3HF	*	173,313	479	40	107
CT3BX	**21**	**1,437,247**	**3853**	**33**	**128**
***CT3KN**	**A**	**708,246**	**878**	**73**	**221**
*CT9KY	*	366,858	499	69	198

MOROCCO

CN8NK	**A**	**2,981,316**	**3061**	**77**	**271**

NIGER

***5U7JK**	**A**	**710,688**	**1412**	**47**	**129**
			(Op: KCØIFR)		

NIGERIA

5N41NHD	**21**	**488,424**	**1298**	**32**	**109**

REUNION

***FR5FD**	**A**	**2,194,512**	**2261**	**93**	**256**

SENEGAL

*6W1/F5JJW	28	39,719	249	14	45

SIERRA LEONE

9L1BTB	A	432	9	8	8

SOUTH AFRICA

ZS5NK	**28**	**229,936**	**803**	**29**	**83**
ZS6HO	*	210	10	5	5
*ZS4BS	A	34,498	133	38	56
*ZS1JY	*	510	10	8	9
***ZS6EGB**	**21**	**98,580**	**426**	**30**	**76**

TUNISIA

3V8BB	**A**	**12,982,876**	**6723**	**154**	**564**
			(Op: YT1AD)		

TRISTAN DA CUNHA

ZD9IR	**A**	**947,674**	**1346**	**75**	**179**

ASIA

ARMENIA

EK8WA	**A**	**2,301,000**	**2839**	**78**	**247**
			(Op: EK6TA)		
EK6CC	**14**	**292,120**	**931**	**33**	**98**

ASIATIC RUSSIA

UA9CLB	**A**	**4,202,370**	**3046**	**129**	**401**
UA9CDV	**"**	**4,064,228**	**3077**	**126**	**392**
RW9HA	*	3,067,592	2696	124	360
RA9ST	*	2,729,484	2211	117	391
RV9SV	*	2,514,120	2420	95	315
RV9BB	*	1,256,440	1022	118	387
RM9A	*	963,144	987	88	304
			(Op: UA9ACJ)		
UA9BS	*	860,886	1040	81	257
UA9JDP	*	786,315	1304	68	199
UA9OS	*	354,627	519	77	195
UA9CKS	*	223,860	424	47	148
RA9AOL	*	118,680	297	41	143
RA9FLW	**28**	**486,750**	**1137**	**35**	**130**
UA9KJ	*	305,890	1075	29	101
UA9XMC	**21**	**650,142**	**2011**	**37**	**134**
UA9UHD	*	534,996	1581	36	118
UA9KM	*	360,936	950	38	124
RZ9UC	*	223,428	964	34	95
RJ9J	**14**	**831,093**	**2121**	**37**	**122**
			(Op: RA9JR)		
UA9LAC	*	8,029	97	8	23
UA9ZZ	**3.7**	**90,552**	**443**	**24**	**74**
RV9FQ	**1.8**	**21,720**	**154**	**11**	**49**
***RN9RZ**	**A**	**1,396,442**	**1267**	**109**	**349**
***RA9DA**	**"**	**747,915**	**800**	**84**	**273**
*UA9TQ	*	657,143	925	76	235
*RZ9ZR	*	625,920	795	88	232
*RW9QA	*	606,056	817	66	218
*RA9XF	*	557,757	828	59	202
*RV9WZ	*	385,605	763	57	152
*UA9AX	*	311,298	403	96	242

*RK9AD	*	233,099	376	72	185
*RA9XE	*	227,290	511	43	148
*RZ9IB	*	199,108	479	51	131
*RV9UF	*	140,238	430	38	109
*RU9CZ	*	102,767	229	51	150
*RA9DZ	*	93,160	252	32	104
*RU9UG	*	62,118	222	30	89
*UA9XK	*	11,218	63	28	51
*RX9AAN	*	1,134	19	8	19
***RX9SR**	**28**	**411,588**	**1120**	**33**	**115**
*RA9FRD	*	295,548	885	28	104
*UA9MAZ	*	218,439	793	26	91
*RV9JR	*	187,392	635	31	97
*RU9YU	*	161,364	738	26	76
*UA9MQR	*	133,560	458	29	91
*UA9HN	*	121,099	476	27	82
*RA9UW	*	62,016	371	26	76
*UA9OA	*	7,980	101	10	28
***RA9JP**	**21**	**169,604**	**622**	**28**	**81**
*UA9WQK	*	123,860	444	26	84
*UA9AAP	*	60,720	296	18	62
*RX9JW	*	13,800	111	24	51
*UA9QCP	*	667	25	5	18
***UA9OMT**	**14**	**75,393**	**380**	**32**	**77**
*RA9MJ	7	13,992	145	9	35
*RX9UKF	*	7,728	83	14	34
***UA9AFZ**	**1.8**	**6,216**	**89**	**8**	**29**
RAØFA	**A**	**1,388,388**	**1820**	**107**	**247**
UAØANW	"	510,232	958	73	163
UAØDC	"	159,373	412	72	125
UAØJDD	"	65,280	265	55	81
RAØBA	**28**	**514,800**	**1441**	**35**	**108**
UAØSR	"	12,390	106	15	44
RSØF	**21**	**747,892**	**1903**	**38**	**143**
			(Op: UAØFZ)		
UAØCW	*	257,472	754	36	113
*RZØSR	7	20,740	197	14	47
RAØJJ	3.7	3,650	135	12	13
***UAØACG**	**A**	**872,266**	**1159**	**100**	**246**
*UAØYAY	*	487,695	747	94	211
*RWØBG	*	441,438	676	64	194
*RUØLL	*	386,136	586	91	188
*RWØAB	*	29,493	157	36	77
*RAØALM	*	27,630	123	28	62
*RUØAK	*	25,284	186	37	61
*UAØIV	*	19,840	180	25	37
*RUØAT	*	15,343	112	21	46
*RZØAF	*	8,610	52	33	37
*RAØFF	*	578	12	8	9
***RAØFN**	**28**	**257,697**	**826**	**35**	**102**
*UAØSJ	*	131,936	468	30	82
*UAØEX	*	39,221	191	26	65
***UAØFDX**	**21**	**287,950**	**1014**	**35**	**95**
*RUØBB	*	172,608	667	30	94
*RZØIWR	*	79,837	595	24	50
			(Op: UAØIHA)		
*UAØAPP	*	14,858	105	15	48
*RAØSU	14	9,360	107	23	42
*UAØLOD	*	7,581	121	21	36

ASIATIC TURKEY

***TA2RJ**	**A**	**291,276**	**696**	**48**	**126**
*TA3YJ	*	61,710	210	26	76
***TA5FA**	**28**	**166,170**	**740**	**23**	**64**
***TA3D**	**21**	**1,231,979**	**2830**	**32**	**125**
***TA3J**	**1.8**	**30,846**	**215**	**7**	**46**

AZERBAIJAN

*4K9W	A	7,119	46	24	39
*4K6DI	*	198	9	9	9

CAMBODIA

*XU7ABZ	A	10,011	82	25	46
*XU7ABY	28	2,688	65	13	29

CHINA

BD4XA	**A**	**335,730**	**885**	**65**	**125**
BD5RT	**21**	**328,986**	**1472**	**34**	**92**
BA4RF	**7**	**86,730**	**598**	**30**	**68**
***BA4ED**	**28**	**550,130**	**2032**	**34**	**111**
*BD5RI	*	420,147	1400	34	99
***BD8HD**	**14**	**158,002**	**763**	**32**	**86**

CYPRUS

H2G	**28**	**2,160,972**	**4121**	**39**	**148**
			(Op: 5B4AGC)		

HONG KONG

VR2MY	**28**	**514,791**	**1803**	**34**	**107**
***VR2BG**	**28**	**770,770**	**2182**	**36**	**107**
***VR2RO**	**21**	**71,988**	**680**	**26**	**58**

INDIA

VU2PAI	**A**	**2,735,180**	**2151**	**118**	**372**
VU2WAP	**"**	**1,065,401**	**1179**	**114**	**253**
*VU2OB	21	7,599	70	13	38
*ATØD	14	5,658	52	15	31

ISRAEL

4X2K	**A**	**1,659,336**	**2056**	**87**	**232**
4Z8GZ	**"**	**1,412,423**	**1983**	**71**	**206**
			(Op: OE1GZA)		
4Z5KJ	*	28,634	103	35	68
4Z5LA	*	10,400	64	26	39
4X4DZ	**21**	**848,820**	**1915**	**38**	**134**
4X6ZK	**14**	**381,568**	**1129**	**29**	**99**
4XØJ	**7**	**201,687**	**708**	**23**	**88**
			(Op: 4X4FJ)		
***4X6UU**	**A**	**211,932**	**389**	**57**	**146**
*4X1RF	*	12,006	66	24	45

JAPAN

JK1OLT	**A**	**2,469,303**	**2043**	**136**	**317**
JA1PCY	**"**	**750,168**	**973**	**91**	**211**
JR1LEV	*	741,096	1034	93	199
JM1XCW	*	353,760	792	69	96
JR1LQK	*	290,280	532	88	148
JA1QOW	*	120,294	272	54	109
7J1ABD	*	90,288	230	59	85
7M4GTU	*	83,265	210	64	119
JH1FNU	*	5,716	45	21	37
JA1HP	*	3,430	27	24	25
7M1MCU	*	1,755	26	14	13
JH1AEP	**28**	**946,452**	**2264**	**36**	**120**
JJ1RDX	*	488,376	1234	36	116
JR1MQT	**21**	**317,240**	**976**	**35**	**90**
JH1RFM	7	25,647	142	27	56
***JH1UAJ**	**A**	**1,277,727**	**1408**	**104**	**237**
***JS1OYN**	**"**	**866,438**	**1113**	**98**	**204**
*JH1KLN	*	463,698	784	74	155
*JA1XRH	*	267,840	438	84	156
*JG1OWV	*	233,220	350	100	160
*JR1MRG	*	211,124	444	69	119
*JM1GHT	*	208,740	382	70	140
*JA1XUY	*	197,760	378	72	134
*JA1GYO	*	147,864	276	75	127
*JA1IZ	*	109,124	228	74	121
*JE1REU	*	104,304	244	55	109
*JA1CP	*	103,824	295	59	109
*JA1ALX	*	90,312	267	54	88
*JA1RRA	*	89,700	303	48	82
*JR1SGU	*	88,392	204	69	105
*JA1HFY	*	83,930	256	61	93
*JA1KK	*	70,800	270	51	99
*JA1SWB	*	52,304	174	40	72
*JE1HJV	*	41,470	139	43	67
*JA1XPU	*	40,052	150	56	68
*JJ1QJP	*	21,924	116	37	50
*JH1RMH	*	18,906	92	35	47
*JH1TUX	*	6,956	73	29	45
*JA1STY	*	4,067	48	21	28
*7K1OUO	*	248	11	4	4
***JA1VVH**	**28**	**185,320**	**620**	**30**	**83**
***JA1BUI**	**"**	**159,000**	**508**	**33**	**87**
*JG1TVK	*	122,304	448	30	74
*JI1HFJ	*	115,038	440	28	71
*JHØNVX/1	*	67,940	299	25	61
*JH1CML	*	62,689	335	30	63
*7N2UQC	*	61,857	296	25	62
*JK1SPQ	*	55,056	292	25	49
*JA1EMQ	*	37,084	205	26	47
*JA1AAT	*	26,442	113	26	70
*7N1BHO	*	25,564	189	26	51
*JA1EEG	*	12,636	95	20	34
*JH1PXY	*	7,379	77	17	22
*JR1UMO	*	540	10	8	10
*7K2PBB	*	187	7	5	6
***JH1TOE**	**21**	**172,362**	**510**	**36**	**102**
*JI1FDF	*	123,984	392	32	94
*7K4XNN	*	52,920	308	24	48
*7M2ALP	*	46,644	234	28	64
*7K2GMJ	*	34,960	180	31	49
*JQ1AHZ	*	13,110	91	23	34
*JG1GCO	*	10,637	59	30	49
*JA1FRQ	*	9,240	80	20	36
*JH1FOP	*	4,800	59	15	17
*JK1BII	*	4,708	47	20	24
*JR1BSV	*	3,727	46	13	22
*JH1KZQ/1	*	2,992	37	8	14
*JG1TCV	*	2,550	33	12	18
*JA1XEM	*	1,782	29	12	15
*JA1JLP	*	651	13	7	11
*7N4LNK	*	79	6	3	2
***JH1UUT**	**14**	**45,176**	**198**	**26**	**66**
*JE1GZB	*	18,945	112	23	46
***JH1APZ**	**7**	**15,260**	**92**	**25**	**45**
*JH1AZO	*	4,375	51	14	21
*JE1SPY	3.7	650	26	5	5
JA2BNN	**A**	**1,179,453**	**1344**	**112**	**235**
JA2FSM	**"**	**1,028,250**	**1061**	**117**	**258**
JH2BTM	*	132,361	320	56	113
JF2FIU	*	88,515	313	47	58
JG2CNZ	*	53,156	161	58	79
JG2SON	**28**	**433,550**	**1172**	**36**	**109**
JHØSDA/2	*	161,100	632	29	71
JI2UNR	**21**	**271,880**	**848**	**36**	**104**
JE2HVC	14	28,728	99	31	77
***JF2QNM**	**A**	**512,040**	**759**	**83**	**168**
***JA2BQX**	**"**	**318,746**	**667**	**66**	**131**
*JA2VZL	*	158,056	316	58	126
*JA2OJ	*	142,200	339	65	115
*JA2GHP	*	119,327	347	47	90
*JK2VOC	*	113,568	277	71	111
*JA2KKA	*	78,558	265	31	86
*JN2AMD	*	63,360	247	43	67
*JG2REJ	*	50,945	172	41	74
*JA2QVP	*	20,832	92	35	49
*JK2PNY	*	17,255	91	39	46
*JA2KPW	*	15,405	80	33	46
*JA2PFO	*	4,932	53	18	18
*JR2AWS	*	2,340	28	17	22
*JJ2TKX	*	221	15	8	9
***JG2KKG**	**28**	**374,100**	**1088**	**34**	**95**
*JG2TKH	*	267,978	831	32	86
*JR2TMB	*	336	16	4	3
*JF2FKJ	21	3,515	50	16	21
*JE2OTM	7	4,149	40	18	23
JS3CTQ	**A**	**4,580,667**	**3784**	**126**	**315**
JA3LEZ	*	98,700	238	47	103
JR3WXA	*	60,792	160	54	82
JA3ARM	*	31,482	167	39	67
JA3WFQ	*	3,309	33	20	20
JN3MUC	*	1,320	29	15	40
JE3BMU	21	23,406	117	27	51
JA3BBG	*	2,260	39	9	11
JA3ORD	14	29,996	155	25	53
***JI3BFC**	**A**	**1,368,684**	**1161**	**125**	**312**
*JF3CCN	*	628,650	678	113	268
*JH3JUB	*	194,085	423	55	116
*JE3UHV	*	131,826	299	71	102
*JG3NKP	*	98,868	245	57	97
*JL3RDC	*	62,376	229	39	74
*JA3PYC	*	48,434	150	43	79
*JM3HYL	*	1,162	20	12	12
***JF3BFS**	**28**	**529,455**	**1356**	**35**	**106**
*JR3CVO	*	42,286	206	28	54
*JJ3OOZ	*	3,890	50	19	21
***JR3RIY**	**21**	**414,882**	**962**	**36**	**126**
*JI3VUB	*	64,328	285	28	58
*JH3OXM	*	21,584	130	24	47
*JN3DSH	*	13,090	71	26	59
*JR3KAH	*	1,080	24	9	15
*JK3AHS	*	765	17	6	11
JH4UYB	**A**	**5,269,473**	**3751**	**147**	**380**
JA4ESR	*	263,546	453	91	145
JA4JJI	21	12,309	100	20	32
***JR4GPA**	**A**	**529,620**	**940**	**63**	**147**
*JR4QZH	*	210,125	367	66	139
*JG4OOU	*	128,589	315	51	113
*JA4BAA	*	44,376	156	52	65
*JN4JZI	*	20,648	101	40	49
***JA4AQR**	**28**	**61,638**	**273**	**25**	**64**
*JI4WHS	21	14,064	100	21	40
JH5FXP	**A**	**6,682,125**	**4716**	**148**	**367**
***JA5EO**	**A**	**310,189**	**781**	**51**	**101**
*JH5OXF	*	162,610	374	55	106
*JA5ATN	*	92,760	385	34	86
***JH5PHC**	**28**	**116,166**	**397**	**30**	**84**
*JF5FGY	*	27,720	148	24	51
***JA5APU**	**21**	**98,610**	**363**	**32**	**82**
*JG5VIA	*	14,793	78	28	54
JA6GCE	**A**	**3,474,688**	**2991**	**130**	**318**
JA6JAP	*	1,248,805	1236	122	257
JH6OPP	*	815,328	1010	89	209
JA6BGA	*	126,900	256	69	119
JA6AV	**28**	**78,645**	**286**	**31**	**76**
JA6WW	*	26,250	168	25	50
***JA6SRB**	**A**	**263,802**	**455**	**87**	**144**
*JA6AKV	*	80,693	232	54	83
*JA6JVY	*	50,600	190	45	65
***JA6EFT**	**28**	**100,880**	**374**	**31**	**73**
*JA6QDU	*	56,875	258	25	66
*JH6FTJ	*	8,085	86	15	20
*JK6ISK	21	42,230	203	27	55
*JJ6DGP	14	8,085	59	19	30
JH7LRS	**A**	**3,373,920**	**2627**	**136**	**344**
JA7NVF	**"**	**2,852,524**	**2759**	**120**	**277**
JH7AFR	*	2,214,784	2442	110	242
JH7DNO	**28**	**895,620**	**2443**	**34**	**104**
JR7SEM	*	453,590	1274	34	100
JH7XGN	**21**	**631,620**	**1361**	**38**	**136**
JA7DOT	*	116,859	356	36	98
***JR7WAB**	**A**	**602,144**	**957**	**79**	**169**
*JF7PHE	*	61,047	182	52	81
*JA7ARW	*	7,555	41	27	31
***JH7XMO**	**28**	**347,760**	**1097**	**33**	**93**
*JE7DOT	*	117,902	443	29	76
*JO7BBS	*	264	9	6	6
*JR7XGL	21	37,788	196	29	65
*JA7IKI	*	13,248	92	27	45
*JA7ADV	*	100	64	18	25
JA8RWU	**A**	**4,367,487**	**3259**	**137**	**356**
JA8TEZ	*	20,870	113	31	46
***JA8JCR**	**A**	**696,180**	**977**	**90**	**193**
*JA8CSY	*	177,885	335	69	132
*JA8AGI	*	22,344	97	38	60
***JH8DHV**	**28**	**76,540**	**329**	**29**	**60**
*JA8IJI	*	31,188	174	22	47
*JK8NIP	21	23,940	143	25	51
*JI8BUR	*	13,620	91	22	38
*JK8HDS	*	190	6	6	6
JA9CWJ	A	456	10	9	10
JE9VOI	**21**	**108,284**	**477**	**29**	**63**
JH9URT	*	59,016	230	27	74
***JA9TQY**	**A**	**176,295**	**426**	**49**	**112**
***JH9VSF/9**	**28**	**639,072**	**1742**	**36**	**108**
*JA9SCB	*	456,624	1186	36	108
*JH9VJW	*	2,070	29	12	16
*JF9DSJ	*	231	10	2	9
***JR9NVB**	**21**	**205,825**	**560**	**37**	**109**
JAØQNJ	**A**	**3,815,100**	**3208**	**134**	**316**
JHØIXE	*	175,275	345	71	134
JAØQWO	*	94,752	238	38	106
JRØWZR	*	10,804	55	28	46
JRØPJR	**21**	**127,380**	**361**	**34**	**98**
JJØACA	*	1,971	32	12	15
***JAØFVU**	**A**	**353,659**	**554**	**91**	**160**
*JGØØGGI	*	172,480	441	54	106
*JAØBMS	*	134,397	402	49	88
*JAØGEY	*	24,076	104	48	61
*JHØSGG	*	6,200	42	26	36
*JAØBPY	*	3,290	33	23	24
*JRØEFE	"	1,012	16	12	11
***JAØIAA**	**28**	**198,648**	**602**	**33**	**91**
*JEØLNS	"	546	16	9	12
*JRØGUY	21	20,559	104	26	51
*JAØRCK	"	4,230	34	13	32
*JEØVFV	"	1,562	28	11	14
*JAØBJY	"	704	18	10	12
***JHØEPI**	**14**	**131,903**	**399**	**35**	**95**
*JAØGZ	"	345	27	7	7

JORDAN

JY9NX	**A**	**10,785,336**	**6290**	**143**	**475**
			(Op: JM1CAX)		

KAZAKHSTAN

UN1LT	**A**	**6,670,380**	**3952**	**158**	**484**
			(Op: UA9BA)		
UN5J	*	4,450	41	18	32
UN7TO	14	55,656	279	24	59
***UP6P**	**A**	**2,041,700**	**2174**	**113**	**312**
			(Op: UN6P)		
*UN8FM	*	1,334	35	12	17
***UN7PCZ**	**28**	**438,516**	**1284**	**34**	**122**
***UN7JX**	**"**	**408,122**	**1245**	**31**	**112**
*UN6G	*	55,783	226	23	68
***UN9LY**	**21**	**125,268**	**486**	**34**	**112**
*UN4PG	*	58,300	258	26	74
***UN7SW**	**14**	**195,506**	**592**	**29**	**105**
*UN9LN	*	43,624	250	21	61

KOREA

*HL3AMO	28	14,193	113	22	35
*HL5UOG	*	10,176	91	19	29

KUWAIT

9K9X	**A**	**8,449,021**	**4933**	**158**	**483**
			(Op: 9K9X)		
9K9Z	**28**	**1,610,457**	**3951**	**39**	**134**
			(Op: K4CY)		

KYRGYZSTAN

EX2T	**A**	**2,230,458**	**2061**	**96**	**325**
EX8O	"	590,118	815	104	250
***EX8MIO**	**21**	**223,272**	**1022**	**33**	**93**
*EX7ML	"	91,471	480	23	74

MACAO

*XX9AU	21	9,636	185	16	28

MALDIVE ISLANDS

*8Q7LM	A	57,663	151	57	92
			(Op: DL7ULM)		

MONGOLIA

JT1CS	**A**	**66,516**	**227**	**46**	**92**

OGASAWARA ISLANDS

*JD1BIA	3.7	739	93	3	5

SAUDI ARABIA

***7Z1SJ**	**21**	**108,658**	**406**	**32**	**89**

SINGAPORE

9V1UV	A	69,540	194	69	114
9V1RH	*	46,900	142	57	83
*9V1XE	A	7,874	56	27	35
			(Op: VK3DXI)		

TAIWAN

BV7FF	**28**	**84,348**	**353**	**29**	**79**

TAJIKISTAN

EY7AF	**28**	**240,856**	**865**	**30**	**89**
EY8MM	**21**	**586,654**	**1585**	**37**	**121**
*EY8BA	A	22,032	271	18	63
***EY7AV**	**21**	**129,162**	**613**	**26**	**77**

THAILAND

HS1CKC	**A**	**463,372**	**1090**	**88**	**159**
*HS5AYO	A	27,018	118	43	71
*HS4BPQ	21	8,000	53	17	47
*E20NTS	14	12,537	91	19	44

TURKMENISTAN

*EZ3A	A	102,010	137	34	71
			(Op: EZ8CW)		

UZBEKISTAN

UK9AA	**28**	**1,143,369**	**2884**	**35**	**124**
UK8IG	**14**	**113,432**	**476**	**25**	**75**

VIETNAM

XV9TH	A	54,173	211	44	70

WEST MALAYSIA

***9M2TO**	**A**	**1,053,690**	**2002**	**99**	**211**
			(Op: JAØDMV)		

EUROPE

ALAND ISLANDS

OHØMM	**A**	**4,694,560**	**3856**	**143**	**467**
			(Op: OH2MM)		
OHØV	**21**	**1,098,720**	**2833**	**37**	**143**
			(Op: OH6LI)		
***OHØZ**	**LA**	**3,371,225**	**2808**	**128**	**447**
			(Op: OH1EH)		

ANDORRA

C31WP	A	12,636	100	27	54

AUSTRIA

OE1A	**A**	**3,933,494**	**3148**	**142**	**504**
			(Op: OE1EMS)		
OE75CWL	*	1,634,432	2053	104	348
			(Op: OE5CWL)		
OE2BZL	*	1,144,260	1391	101	367
OE3I	*	940,602	1170	96	293
			(Op: OE1JNB)		
OE6Z	**28**	**1,169,125**	**2618**	**40**	**159**
			(Op: OE6MBG)		
OE2LCM	*	657,825	1699	39	136
OE2S	**21**	**520,949**	**1759**	**35**	**108**
			(Op: OE2GEN)		
OE75WWL	*	9,656	81	18	53
OE7AJT	7	48,626	553	11	71
***OE3JIS**	**A**	**147,499**	**458**	**63**	**190**
***OE3WMW**	**28**	**86,445**	**378**	**27**	**86**
*OE1BKA	*	24,235	169	19	49

AZORES

CU2CE	**3.7**	**95,036**	**635**	**18**	**74**
***CU2AF**	**28**	**353,847**	**1819**	**27**	**102**

BALEARIC ISLANDS

EA6TC	**A**	**1,704,838**	**2731**	**95**	**299**
EA6DD	**28**	**780,224**	**2261**	**35**	**132**
EA6ABK	7	88	9	3	8
***EA6XD**	**A**	**125,990**	**406**	**54**	**161**
*EA6XQ	28	53,064	294	25	74

BELARUS

EU1SA	**A**	**705,865**	**1079**	**101**	**294**
EW2AA	**28**	**230,850**	**683**	**38**	**152**
EU6EU	**1.8**	**36,881**	**556**	**11**	**55**
***EW1CQ**	**A**	**217,605**	**585**	**58**	**209**
*EU1MM	"	2,856	24	18	24
*EW1GA	"	306	13	8	10
***EU1GA**	**21**	**74,365**	**491**	**25**	**82**
*EW8DA	"	28,710	181	23	67
*EW7DK	7	10,842	173	9	46

BELGIUM

OQ4HAM	**A**	**71,331**	**265**	**52**	**125**
			(Op: ON4KAS)		
OQ4CIZ	"	1,890	48	10	25
			(Op: ON4CIZ)		
***OQ4CAS**	**A**	**526,640**	**893**	**78**	**212**
			(Op: ON4CAS)		
*ON4XG	*	353,350	680	70	231
*ON5JD	*	73,150	277	39	94
*ON4CHK	*	26,575	152	33	63
*ON4KVA	*	5,148	58	20	32
*ON4KMB	28	5,130	69	13	25
***OT1H**	**21**	**519,858**	**1623**	**37**	**125**
			(Op: ON4AAM)		
*ON4AEY	14	32,130	239	20	65

BOSNIA-HERZEGOVINA

T99W	**7**	**364,596**	**1773**	**31**	**107**
*T90C	21	20,794	163	17	57
			(Op: T94GL)		
***T92D**	**14**	**382,260**	**1906**	**33**	**105**
*T95O	*	41,040	186	29	85

BULGARIA

LZ1NG	**28**	**1,010,610**	**2753**	**40**	**150**
LZ2PL	*	428,166	1518	36	126
LZ2JA	*	311,387	1276	32	99
LZ9V	**21**	**139,566**	**1164**	**26**	**73**
LZ1GJ	14	13,090	185	17	53
LZ8T	**1.8**	**59,778**	**704**	**13**	**68**
			(Op: LZ2CJ)		
***LZ1AQ**	**A**	**534,465**	**852**	**84**	**237**
*LZ5ZI	*	59,332	280	38	125
*LZ4CB	*	25,439	47	14	20
***LZ2LDS**	**28**	**84,313**	**397**	**29**	**81**
***LZ2ZY**	**14**	**55,472**	**384**	**24**	**84**
*LZ2WE	*	4,291	52	15	38
*LZ2RF	7	14,209	155	14	53
***LZ1DM**	**3.7**	**46,277**	**527**	**12**	**65**

CRETE

SV9CVY	**A**	**7,682,324**	**5831**	**133**	**495**
			(Op: DL6FBL)		

CROATIA

9A3Z	**A**	**387,500**	**1032**	**61**	**189**
9A5K	**28**	**1,520,184**	**3308**	**39**	**155**
9A2GA	*	10,339	100	16	33
9A3OY	**3.7**	**120,594**	**1133**	**17**	**84**
			(Op: 9A3LG)		
***9A2EU**	**A**	**2,494,185**	**1971**	**136**	**511**
*9A3CY	*	322,903	653	66	217
***9A5V**	**28**	**520,828**	**1696**	**35**	**119**
*9A3W	"	286,080	835	32	128
***9A2R**	**21**	**194,922**	**635**	**33**	**120**
*9A4RV	14	86,612	493	28	90
*9A5BB	"	38,848	406	17	64
***9A3PA**	**3.7**	**69,144**	**821**	**13**	**73**
*9A5AZZ	"	36,564	540	11	55

CZECH REPUBLIC

OK1EP	**A**	**1,865,781**	**2069**	**112**	**401**
OK2EQ	"	441,252	819	78	279
OK2ABU	"	406,455	772	76	267
OK8ACS	"	350,054	739	86	276
OK2PZ	"	217,118	494	66	212
OK1TFH	"	124,852	375	56	140
OK2TBC	"	82,665	307	50	115
OK1AOV	"	30,371	112	43	78

OK1TD	**28**	**533,195**	**1407**	**36**	**133**
OK1ARI	"	219,375	767	31	104
OK2BJT	"	125,059	426	33	94
OK2ZO	**21**	**254,932**	**928**	**35**	**128**
OK2PCN	"	72,848	355	26	90
OK1RI	**14**	**1,282,944**	**3234**	**40**	**152**
OK1XC	"	43,758	279	25	74
OK1DTP	**3.7**	**23,310**	**361**	**9**	**54**
OK1TP	1.8	11,550	322	6	44
***OK1TN**	**A**	**1,299,016**	**1303**	**121**	**447**
***OK2WTM**	**"**	**1,140,220**	**1641**	**102**	**368**
*OK2MBP	"	757,640	1112	84	319
*OK2SGY	"	707,199	1092	90	271
*OK2BMT	"	636,768	900	92	304
*OK1KZ	"	351,600	696	73	227
*OK1FMX	"	221,832	578	56	178
*OK1CRM	"	221,160	755	35	117
*OK1MKI	"	197,927	544	64	189
*OK1DVK	"	175,407	381	70	208
*OK2EC	"	155,431	445	61	162
*OK2CSU	"	139,593	396	61	176
*OK2DU	"	106,210	408	48	167
*OK1SI	"	94,956	404	43	150
*OK1DSZ	"	74,932	223	43	88
*OK1DOL	"	67,667	224	49	108
*OK2BDF	"	67,076	349	35	129
*OK2VP	"	46,230	186	41	97
*OK1DXR	"	44,409	181	36	77
*OK1TRM	"	40,020	209	35	81
*OK2XA	"	39,040	149	42	80
*OK1FJD	"	28,060	154	32	83
*OK1FFH	"	27,390	188	31	79
*OK2HZ	"	17,296	77	33	61
*OK2SWD	"	15,582	105	24	82
*OK2BEN	"	14,388	159	22	87
*OK1RV	"	7,659	125	11	58
*OK1JNL	"	2,590	67	26	44
***OK1DCF**	**28**	**247,500**	**759**	**33**	**117**
***OK1FX**	**"**	**220,473**	**662**	**37**	**116**
*OK2QA	"	150,612	496	32	100
*OK2PTZ	"	134,000	502	29	96
*OK1ES	"	101,132	336	29	102
*OK1DUG	"	95,256	406	29	97
*OK1FHI	"	82,410	304	31	92
*OK1LO	"	49,572	295	22	59
*OK2BLD	"	36,270	239	19	46
*OK2BRX	"	16,625	188	19	40
***OK2ZV**	**21**	**340,354**	**1079**	**34**	**127**
*OK2NN	"	217,350	724	35	126
*OK1KCI	"	159,840	691	30	105
					(Op: OK1CDJ)
*OK1VD	"	106,503	417	31	100
*OK1MMN	"	48,314	290	21	77
***OK2GZ**	**14**	**174,290**	**794**	**31**	**114**
*OK1CAZ	"	6,762	100	13	36
*OK1SRD	"	280	14	3	11
***OK1TGI**	**7**	**22,022**	**273**	**11**	**66**
***OK1FPS**	**3.7**	**41,071**	**635**	**11**	**56**
*OK2HI	"	21,204	354	10	51
*OK2ZIL	"	20,160	408	9	47
*OK1SMU	"	7,697	178	6	37
***OK2SNX**	**1.8**	**12,714**	**318**	**6**	**37**

DENMARK

OZ1HXQ	**A**	**1,532,321**	**1985**	**101**	**356**
OZ9Y	**"**	**1,455,840**	**1875**	**87**	**273**
OZ1AA	"	1,055,241	1345	85	278
OZ5EV	"	310,834	465	104	316
OZ0KR	"	275,210	700	70	220
OZ1FAO	"	163,184	407	56	161
OZ8EA	28	16,188	133	20	56
OZ3SK	**1.8**	**55,368**	**779**	**12**	**60**
***OZ1ACB**	**A**	**338,708**	**723**	**65**	**228**
*OZ1HX	"	271,032	560	70	206
*OZ1JMO	"	2,009	49	21	27
***OZ8AE**	**28**	**159,544**	**508**	**31**	**117**
***OZ1JVX**	**14**	**69,010**	**454**	**23**	**80**
*OZ3ANT	"	26,953	262	16	60

ENGLAND

M6T	**A**	**7,506,840**	**5220**	**151**	**509**
					(Op: G4PIQ)
GØAZH	"	514,332	957	74	240
G3LUW	"	92,584	254	56	86
G3UFY	"	21,917	102	34	67
G3TXF	**28**	**1,179,900**	**2672**	**39**	**141**
GØRAH	"	11,421	110	13	34
G3NLY	**21**	**700,964**	**1953**	**39**	**139**
G4WTD	"	414,120	1147	38	130
G4HTD	"	50,232	258	23	69
G3ZXD	**14**	**104,920**	**572**	**29**	**93**
G4Z	"	81,198	593	26	91
					(Op: G4DEZ)
G3TVU	"	46,354	341	23	75
M5ACR	"	210	10	6	8
***G4BUO**	**A**	**2,918,466**	**2361**	**118**	**444**
***GØMTN**	**"**	**882,973**	**1358**	**82**	**321**
*MØØCSU	"	611,200	1011	73	247
*M4T	"	195,250	534	59	191
					(Op: GØVQR)
*G4DDX	"	192,325	499	52	193
*G4NXG	"	180,532	449	57	185
*MØBEX	"	151,840	499	41	119
*GØWJN	"	143,654	424	50	167
*MØBWY	"	114,660	370	45	135
*MØBZK	"	97,152	405	45	147
*M5FUN	"	95,496	445	48	136
*G3RSD	"	83,065	306	44	141
*G4GOY	"	80,465	415	34	99
*M5TEM	"	78,020	205	56	179
*MØZAK	"	48,927	196	42	99
*G4AXX	"	4,920	69	13	28
***GØAEV**	**28**	**529,223**	**1350**	**37**	**130**
*G3KWK	"	176,468	570	36	121
*G3PJV	"	108,944	661	20	68
*G3ZRJ	"	31,416	203	20	46
*GØKXL	"	17,819	93	22	81
*M5BGR	"	7,682	94	15	31
***M5ACC**	**14**	**436,076**	**1760**	**35**	**129**

ESTONIA

ES1FB	**A**	**780,192**	**1367**	**82**	**262**
ES1XQ	"	49,329	345	49	140
ES6CO	**28**	**139,264**	**427**	**35**	**101**
ES5GI	**21**	**421,600**	**1596**	**37**	**123**
***ES2DJ**	**A**	**93,688**	**246**	**60**	**179**
*ES5RIM	"	60,168	322	31	123
***ES1OX**	**28**	**70,040**	**354**	**25**	**78**
*ES6PA	"	31,280	208	21	64
***ES5TX**	**21**	**111,925**	**508**	**27**	**94**
*ES6MT	"	41,760	298	22	68
*ES5RGJ	"	34,579	149	26	85
*ES5AGP	"	13,728	145	16	47
*ES4RD	14	8,120	125	12	44

EUROPEAN RUSSIA

RD4M	**A**	**3,194,516**	**3263**	**134**	**464**
					(Op: UA4LU)
RQ4L	**"**	**3,158,245**	**3023**	**151**	**516**
					(Op: UA4LCQ)
RK4FD	**"**	**3,112,366**	**3388**	**142**	**472**
UA4FER	"	2,315,040	2345	125	435
RX3RC	"	2,171,345	2782	109	376
RM3C	"	1,933,200	2153	130	410
					(Op: RA3CW)
RW4PL	"	1,866,291	2032	124	367
UA1QV	"	1,791,056	2090	118	378
RA3WA	"	1,642,230	1976	111	403
UA3BL	"	1,528,050	1961	103	398
RW1ZA	"	969,048	1351	92	295
RN4WA	"	942,745	1485	105	356
UA4LY	"	832,480	1181	100	330
RU3DX	"	710,084	1385	82	252
UA3BM	"	621,010	802	98	344
RV3ACA	"	540,602	1027	67	207
RW1QW	"	531,525	748	95	278
UA1OMS	"	469,268	533	101	311
RK4HYT	"	388,064	823	84	278
RA3FC	"	375,022	718	69	209
RK4CN	"	325,960	714	77	213
RZ1AZ	"	240,261	332	87	270
UA3AP	"	202,247	476	68	195
UA9KG/1	"	191,352	407	48	156
UA1ORT	"	173,224	521	59	177
RV1CC	"	164,238	354	52	134
UA4FEN	"	141,467	370	61	180
RZ3DH	"	140,008	153	20	43
UA4NC	"	74,513	363	78	191
UA4RF	"	36,685	172	43	102
UA1AKE	"	30,988	91	46	81
UA6LV	**28**	**813,624**	**2068**	**40**	**163**
R73A	**"**	**789,399**	**2483**	**35**	**134**
					(Op: RZ3AA)
RZ3QU	**21**	**772,954**	**2237**	**38**	**144**
UA4RC	"	267,624	989	37	140
RU3FS	**14**	**220,076**	**1008**	**35**	**113**
RN6HZ	"	205,254	792	39	123
RU4PU	7	8,052	143	16	50
RA6CO	**3.7**	**55,488**	**386**	**18**	**78**
RU6LA	"	38,106	411	18	69
RA6AFB	"	23,120	319	13	55
RK6BZ	"	20,196	275	10	56
RX3DQN	1.8	1,316	54	5	23
***UA3QDX**	**A**	**3,860,520**	**3434**	**145**	**491**
***RU3QW**	**"**	**2,049,875**	**2331**	**129**	**446**
*RZ4FA	"	1,430,828	1508	128	420
*UA3MBP	"	991,850	1521	105	373
*UA3ABJ	"	787,528	1174	98	294
*RA3XM	"	764,288	1199	99	349
*RK3BY	"	729,656	1040	98	311
*UA3LHL	"	708,708	1090	82	282
*RZ3AZ	"	646,323	1291	81	242
*RZ3AV	"	623,610	1013	87	303
*RA3AUM	"	546,150	1012	80	250
*UA3DNR	"	439,546	896	64	205
*RZ1AU	"	423,144	800	72	252
*RU4LM	"	402,420	743	81	272
*RU3WR	"	379,440	763	74	236
*RV3YR	"	375,060	881	66	216
*RV6FT	"	322,531	545	86	183
*RW3VZ	"	284,565	604	72	239
*RV3LO	"	281,065	597	80	255
*RW3DL	"	277,791	551	67	242
*RX3RZ	"	245,640	638	68	208
*RU3AT	"	205,720	432	78	218
*RW1AI	"	198,900	504	57	198
*U1BA	"	198,274	631	48	185
*RX3DTN	"	165,130	347	64	181
*UA6ADC	"	143,726	276	64	214
*RU3DVR	"	140,298	305	51	150
*RA3FH	"	130,143	377	53	160
*RW1QM	"	118,860	311	53	157
*UA3XBB	"	111,672	392	55	161
*UA3RE	"	100,688	234	68	164
*UA3UMT	"	100,488	289	50	162
*RW4CG	"	95,790	353	45	141
*RW6CW	"	82,620	288	45	159
*RN3AY	"	65,136	240	47	130
*RV3FM	"	63,603	195	58	133
*RW3SU	"	58,875	256	40	117
*RV6AB	"	56,595	204	43	122
*RK3AFP	"	54,775	305	40	135
*UA1ZZ	"	51,633	216	19	43
*RN3DN	"	50,718	224	47	111
*UA1AFZ	"	30,602	219	26	81
*RU4CO	"	28,675	123	36	119
*UA4CIF	"	25,029	156	29	74
*UA3RF	"	23,331	113	28	73
*RX3MM	"	19,796	93	32	69
*UA1OZ	"	11,808	75	28	54
*RW3AFY	"	5,400	37	26	34
*RN3FA	"	4,080	40	17	23
*RA4NAJ	"	100	12	7	10
*RX3AEX	"	36	6	6	6
***RU6FA**	**28**	**425,126**	**1468**	**38**	**128**
*RA1AW	"	201,695	702	32	113
*UA1CKC	"	93,091	384	28	99
*UA3RAW	"	71,306	358	24	77
*RX3ABI	"	21,070	187	17	53
*UA3WW	"	15,540	155	20	50
*RV3DCC	"	11,390	102	14	53
*RA1QDP	"	3,444	87	9	33
***UA3SAQ**	**21**	**161,516**	**696**	**34**	**115**
*RA3DNC	"	155,084	718	29	108
*RX3DBG	"	84,822	413	26	87
*UA3BZ	"	70,638	350	30	92
*RZ6YZ	"	66,367	421	25	76
*UA3XDO	"	43,845	299	24	72
*RV6ASU	"	32,078	154	25	61
*RV6FG	14	3,317	45	12	19
*RK3DOV	"	2,337	69	7	34
*RK3DZH	"	155	74	6	25
***UA1ANA**	**7**	**41,410**	**309**	**19**	**82**
*RV6LFE	"	16,353	161	12	57
*RW3VA	"	4,640	61	12	46
***RA1ZZ**	**3.7**	**8,084**	**177**	**7**	**40**
*RA4PO	"	2,555	52	11	24
***RW3XX**	**1.8**	**8,234**	**172**	**8**	**38**

EUROPEAN TURKEY

*TA1AL	A	27,360	182	43	77
***TA1FA**	**21**	**31,969**	**291**	**19**	**57**

FAROE ISLANDS

OY1A	L28	13,806	248	12	47

FINLAND

OH6RX	**A**	**4,233,390**	**3287**	**130**	**440**
OH2RA	**"**	**2,803,280**	**2861**	**125**	**411**
OH2PM	"	2,644,140	2059	138	497
OG3OJ	"	1,401,940	2161	94	273
OH5XL	"	974,160	1377	113	338
OH5NE	"	554,931	1209	73	278
OH1BV	"	460,252	798	83	251
OH3JR	"	360,297	480	96	303
OH1TV	"	287,012	480	67	175
OH2VZ	"	162,190	406	62	183
OH2LU	"	99,828	331	50	127
OH1EB	"	80,729	231	53	126
OH1BOI	"	30,208	157	27	91
OH5TT	"	12,470	79	28	37
OG1MM	"	3,584	35	22	34
OG6AC	**21**	**673,027**	**1786**	**37**	**126**
					(Op: OH6CS)
OH6OS	**"**	**593,680**	**1679**	**37**	**127**
OH2BCD	"	123,715	866	28	81
OH3MC	"	47,628	259	27	81
OH2MF	"	21,864	102	28	73
OH7M	**14**	**754,824**	**2382**	**38**	**130**
					(Op: OH6LNI)
OG8L	**"**	**636,660**	**2099**	**39**	**141**
					(Op: OH8LQ)
OH2NN	"	114,935	556	30	97
OH2BYS	**3.7**	**56,018**	**730**	**11**	**63**
***OG5A**	**A**	**1,631,750**	**1623**	**125**	**410**
					(Op: OH5BM)
*OH2BPA	"	243,809	534	69	227
*OH5NHI	"	202,014	512	60	201
*OH2EV	"	42,340	243	26	90
*OH3AD	"	9,315	141	20	61
					(Op: OH3HY)
*OH5HCK	"	8,970	102	17	52
*OH2FS	"	8,901	59	33	52
*OH5TE	"	3,186	86	7	10
*OH2BFS	"	255	13	6	11
***OH7C**	**28**	**289,476**	**978**	**37**	**116**
					(Op: OH7HDU)
*OH2LP	"	67,100	281	28	94
*OH5NZ	"	57,275	186	33	112
*OH6RC	"	22,823	130	25	66
*OH8OB	"	19,275	127	19	56
*OH4LW	"	7,911	87	15	43
***OH2MO**	**21**	**56,628**	**349**	**25**	**74**
*OH4YT	"	27,816	200	21	52
*OG3WS	"	15,548	97	22	70
*OH6MTG	"	13,802	146	15	52
***OG5ZZ**	**14**	**264,417**	**1076**	**38**	**121**

FRANCE

TM2Y	**A**	**5,231,520**	**3414**	**135**	**495**
					(Op: F6BEE)
F5RZJ	**"**	**3,068,385**	**2604**	**135**	**472**
F5RAB	"	960,813	1174	94	359
F6BNH	"	516,780	743	73	246
F5BBD	"	452,303	823	75	224
F8CMF	"	431,852	883	62	152
F2AR	"	396,603	781	68	265
F6FYD	"	323,152	742	71	233
F6DZD	"	200,512	494	55	186
F5NBK	"	113,125	343	52	129
F5IDB	"	26,394	127	30	53
F8BQQ	**28**	**263,664**	**813**	**34**	**110**
F8CTY	"	172,550	551	40	135
TM8C	**21**	**619,546**	**2182**	**34**	**108**
					(Op: F6HMQ)
TM2WW	**14**	**700,900**	**2660**	**38**	**134**
					(Op: F5SJP)
TM1H	"	504,060	1893	37	118
F6GOX	**3.7**	**35,768**	**510**	**9**	**59**
F6CWA	1.8	10,560	184	8	47
***F5NZO**	**A**	**1,318,460**	**1406**	**104**	**357**
***TM9W**	**"**	**1,237,298**	**2176**	**86**	**296**
*F6FTB	"	775,656	1118	80	298
*F6KZC	"	731,860	1233	82	288
					(Op: F5IRY)
*F5ICC	"	287,564	540	68	200
*F5JBR	"	99,470	315	51	152
*F5PSA	"	87,857	269	45	118
*F8CFE	"	76,479	270	45	114
*F6DRP	"	71,201	312	33	60
*TM5SIA	"	35,598	254	33	69
					(Op: F5NQL)
*F8CMZ	"	10,074	98	22	51
***F5TDK**	**28**	**635,950**	**1740**	**36**	**122**
*F8AAN	"	243,317	832	35	114
*F5VCR	"	111,555	438	25	86
*F5MGD	"	20,400	181	15	45
*F6CLM	"	871	32	7	15
***F8BJI**	**21**	**170,240**	**593**	**35**	**117**
*F8AKS	"	125,782	568	27	95
*F5JY	"	49,187	345	24	77

GERMANY

DJ4PT	**A**	**3,906,238**	**3125**	**127**	**391**
DL2MEH	**"**	**2,811,960**	**2459**	**130**	**454**
DF9XV	**"**	**2,320,812**	**2259**	**121**	**392**
DL2DX	"	1,741,122	1484	129	384
DJ3HJ	"	904,638	1168	87	270
DJ8UV/P	"	711,510	1323	84	286
DL8AAE	"	705,654	924	87	307
DJ8UV	"	594,280	1344	86	294
DL1DTC	"	567,430	900	78	280
DH9SBL	"	557,997	864	85	322
DK6CQ	"	474,012	741	79	245
DL2APJ	"	444,437	680	87	280
DJØIF	"	378,585	746	71	164
DL3JPN	"	372,008	587	74	218
DL8KAW	"	301,541	605	80	251
DL5XAT	"	220,830	419	60	195
DL9NCR	"	218,155	405	78	193
DK7DN	"	209,532	540	56	172
DL6RBO	"	197,496	485	54	157
DLØMFL	"	174,192	561	49	103
					(Op: DL2JRM)
DL5IF	"	165,984	446	58	170
DL6AKK	"	163,068	410	58	156
DL1ASF	"	155,112	293	72	204
DL1YC	"	146,832	462	47	121
DL6RBH	"	113,850	295	62	136
DL6USA	"	113,643	342	59	148
DL6DVU	"	109,408	402	61	147
DM5JBN	"	97,785	312	42	117
DL3DBY	"	91,364	320	49	133
DL6AG	"	88,660	240	46	109
DL1EIZ	"	69,440	293	39	101
DL3LAB	"	40,170	154	41	89
DJ1AD	"	39,578	178	49	105
DF2EY	"	23,861	144	32	75
DN1MA	"	23,403	142	27	60
DL3JRA	"	7,095	89	17	38
DF5AU	"	4,558	45	18	35
DJ5IW	"	3,471	36	19	20
DL2AKH	"	3,162	44	16	35
DL2SDQ	"	1,806	39	11	31
DL4FAY	"	0	0	0	0
DF9ZP	**28**	**1,036,104**	**2465**	**40**	**144**
DL1IAO	**"**	**837,016**	**1951**	**39**	**145**
DL8UD	"	751,555	1733	40	157
DL2DBH	"	634,352	1617	37	127
DF7IT	"	298,263	974	34	113
DL6UNF	"	224,190	722	30	111
DL5NAV	"	137,344	450	35	113
DL1BM	"	385	13	5	6
DFØKR	"	100	1	1	1
DL4WA	**21**	**203,184**	**732**	**36**	**108**
DL3BRA	"	101,430	439	30	96
DF3KV	**14**	**390,060**	**1268**	**38**	**127**
DL1IAN	"	230,115	1067	34	111
DL1EHR	"	32,648	271	20	57
***DL7ANR**	**A**	**1,658,435**	**1518**	**120**	**425**
***DL5ASE**	**"**	**1,263,587**	**1383**	**103**	**378**
***DKØDO**	**"**	**971,499**	**1219**	**93**	**350**
					(Op: DL1MGB)
*DF6LQ	"	803,652	1163	82	304
*DJ4JF	"	759,888	836	108	324
*DL1TS	"	676,622	905	86	287
*DH8AF	"	665,852	964	93	314
*DL3ZAI	"	663,100	949	84	296
*DL2HX	"	657,306	1134	111	366
*DF7ZS	"	632,832	857	87	297
*DH1UK	"	589,724	887	94	295
*DH2MA	"	557,718	954	82	261
*DL2FDL	"	512,505	1007	70	245
*DF3QG	"	441,210	652	99	283
*DFØIT	"	428,364	904	65	261
					(Op: DF6QC)
*DL8SDC	"	414,250	792	68	182
*DH2PL	"	409,032	791	75	267
*DL1FZZ	"	384,979	561	76	225
*DK5DS	"	354,277	662	72	229
*DL1PT	"	340,272	578	84	222
*DK8AX	"	332,194	537	81	245
*DL3NBL	"	306,646	634	77	234
*DL1STG	"	282,448	610	74	180
*DJ5CL	"	276,936	593	64	200
*DH6JL	"	244,224	487	62	194
*DL6ZNG	"	234,780	513	64	196
*DL6UYA	"	232,562	587	57	185
*DF3IS	"	204,392	501	59	173
*DL8ULO	"	203,820	595	63	195
*DH5ST/P	"	165,360	433	66	174
*DJ6TK	"	164,458	354	68	170
*DK4IO	"	157,828	396	53	134
*DH5AO	"	150,480	432	55	165
*DL3YEI	"	138,370	400	52	150
*DM2AWM	"	130,524	398	45	174
*DF1RK	"	127,479	194	50	91
*DJ2IE	"	95,719	303	52	147
*DL3SKF	"	89,544	299	45	123
*DK5NAD	"	79,618	325	42	112
*DL3TF	"	71,394	200	47	99
*DK8EY	"	71,103	193	56	117
*DL4YAO	"	71,064	220	47	94
*DL5AUA	"	62,930	186	45	100
*DL1JNA	"	55,417	233	40	111
*DJ2UB	"	51,220	214	41	89
*DF6WE	"	45,190	184	36	95
*DL3AG	"	44,811	173	46	77
*DK7AN	"	44,022	192	38	100
*DL1HCM	"	42,350	219	39	115
*DL7IZ	"	36,080	140	40	70
*DL1HSR	"	21,792	99	32	50
*DL3WB	"	12,135	100	23	47
*DJ1OJ	"	6,426	47	30	33
*DL7UXG	"	2,067	38	13	26
*DH6AB	"	1,935	46	15	30
***DH6LS**	**28**	**377,394**	**903**	**39**	**147**
*DJ1AA	"	246,790	790	31	114
*DL2IAN	"	123,615	420	29	94
*DL7UIO	"	116,560	468	27	97
*DJ2XC	"	112,288	466	29	92
*DL2ZAE	"	78,183	385	28	91
*DL2VB	"	74,918	335	24	70
*DL2MIH	"	25,160	141	26	59
*DN3FL	"	22,464	150	23	55
					(Op: DO1FPL)
*DJ3GE	"	19,080	123	17	43
*DL2AL	"	18,112	117	16	48
*DL1DRD	"	17,885	101	20	53
*DL3DRN	"	16,720	184	27	47
*DJ6XB	"	5,811	61	15	24
***DL1LH**	**21**	**506,625**	**1383**	**38**	**137**
*DJØMCZ	"	234,150	835	33	117
*DA1LDN	"	118,000	526	28	97
					(Op: ON4JM)
***DF7YU**	**14**	**269,920**	**998**	**36**	**124**
*DL8SDI	"	44,722	177	37	95
*DL1FMG	"	1,473	52	8	23
*DH6YMC	"	1,053	34	6	21

GREECE

SV1DPI	**A**	**1,706,382**	**2388**	**101**	**322**
SV1CIB	**28**	**128,832**	**989**	**22**	**66**
SV1DKL	**14**	**453,453**	**1860**	**36**	**115**
SV1DKR	**3.7**	**53,300**	**584**	**15**	**67**
***SV1CQN**	**A**	**201,200**	**549**	**56**	**144**
***SV2AEL**	**28**	**219,188**	**835**	**32**	**116**
*SV1DNW	"	131,428	937	30	86
***J43J**	**21**	**115,680**	**741**	**28**	**92**
					(Op: DJ5JH)
*SV1DZB	"	83,655	574	28	89

GUERNSEY

***MUØFAL**	**A**	**369,572**	**883**	**55**	**213**

HUNGARY

HA8JV	**A**	**2,449,648**	**2389**	**119**	**422**
HAØHW	"	578,340	906	78	228
HA1ZH	"	451,346	811	78	235
HG8W	"	158,283	564	35	94
HA3NU	**28**	**719,580**	**1740**	**39**	**140**
HG1W	"	491,462	1538	36	106
					(Op: HA1WD)
HG8Z	"	432,360	1082	38	142
					(Op: HA8UT)
HA3FT	"	139,461	601	29	93
HA8UH	"	100	43	14	18
HA3O	**21**	**900,297**	**2524**	**38**	**129**
					(Op: HA3UU)
HG3M	**1.8**	**43,761**	**855**	**15**	**72**
					(Op: HA3MY)
***HA8IH**	**A**	**1,887,867**	**2322**	**100**	**357**
***HA1BC**	**"**	**1,023,327**	**1088**	**108**	**345**
*HA8YU	"	68,970	196	60	130
***HA8QB**	**28**	**119,728**	**475**	**28**	**90**
*HA3OU	"	43,240	181	26	66
***HA7JTO**	**21**	**112,359**	**577**	**30**	**99**
*HA3IV	"	19,494	157	19	52
***HA3LN**	**14**	**171,696**	**889**	**33**	**113**
***HA9MDP**	**3.7**	**23,063**	**446**	**8**	**48**
***HA8BE**	**1.8**	**40,600**	**556**	**10**	**60**

ICELAND

***TF3MA**	**28**	**23,408**	**165**	**17**	**60**

IRELAND

***EI4CF**	**28**	**204,792**	**689**	**29**	**109**
***EI8IC**	**14**	**230,184**	**1191**	**31**	**108**

ISLE OF MAN					
*GD4GWQ	A	172,557	473	54	195
ITALY					
IQ4T	A	4,275,768	3102	131	520
(Op: IK4MGP)					
IK4ADE	"	2,945,568	2974	108	380
IQ8A	"	2,798,145	3725	110	331
(Op: IK8NWK)					
IK6SNQ	"	2,422,782	2427	127	435
IQ2C	"	1,653,577	1996	96	283
(Op: IK2JUB)					
IZ8DPL	"	999,688	1828	71	207
IZ6CST	"	810,166	1304	78	265
IK8WTM	"	514,710	968	79	236
IZØBVU	"	506,025	1134	83	242
IK6UBY	"	386,750	801	75	250
IZ1ANK	"	170,286	817	68	213
I3MLU	"	96,252	289	43	113
IR4R	"	82,800	357	43	77
(Op: IK4ALM)					
IK2REA	"	49,984	238	41	101
IZ3EIN	"	32,110	127	42	88
IK4RVG	"	31,144	171	41	95
I3MGN	"	26,471	121	37	74
I4CSP	"	23,320	121	27	73
IK3XJL	"	15,458	112	26	33
IK5ZTT	"	12,516	96	27	57
IK2PTL	"	9,180	124	33	69
I4IKW	28	811,941	1791	40	151
IR3Z	"	781,812	2043	37	125
(Op: IN3ZNR)					
IQ3X	"	779,284	2056	39	139
(Op: IV3SKB)					
I2ODL	"	572,832	1435	35	127
(Op: IK2YSA)					
IZ5EBL	"	433,420	1509	34	96
IKØYVV	"	412,104	1201	34	120
IU2C	"	383,572	1270	33	100
(Op: IK2ULH)					
IK2WZV	"	308,000	912	34	120
IZ5ASZ	"	152,366	523	33	109
IZ1EGV	"	69,269	252	30	83
IZ8DFO	"	39,420	180	29	79
IK5YJK	"	37,620	229	23	53
IK7YZF	"	10,272	87	18	30
IU2P	21	1,036,316	2550	39	139
(Op: I2PJA)					
IK5ZTW	"	735,546	2062	36	130
IR4B	"	632,100	1659	36	139
(Op: IK4AUY)					
IO4P	"	625,582	1758	35	132
(Op: IK4ZIF)					
I6FLD	14	218,313	865	31	96
IZ4DYQ	"	21,437	196	20	64
IV3OWC	1.8	46,209	652	11	62
*IO4C	LA	1,719,131	1969	106	373
(Op: IZ4DPV)					
*IK6OIN	"	614,537	898	77	270
*IZ8DBJ	"	538,332	1017	86	253
*IZ2DOA	"	474,120	735	87	273
*IK3SCB	"	472,149	988	64	197
*IK8DUI	"	366,206	985	64	205
*IK3CXG	"	327,972	590	71	231
*IN3FHE	"	320,860	522	71	234
*IZ2DVI	"	287,790	440	79	239
*IZ5DKG	"	234,378	386	68	193
*IN3HDE	"	189,360	489	61	179
*IZ4DJZ	"	181,890	418	58	157
*IZ2BKA	"	171,255	381	58	175
*IK3AES	"	168,128	349	70	214
*I8TWB	"	130,804	454	47	165
*IK2VUC	"	129,766	381	50	132
*IK7RVY	"	124,262	522	21	100
*IK6VXO	"	114,840	413	46	134
*IØYQV	"	107,712	285	53	134
*IK8YFU	"	105,600	394	46	130
*IZ2ABN	"	105,080	266	51	134
*IK8IFW	"	103,695	426	33	122
*IK2WZQ	"	95,040	238	60	116
*IZ1ANZ	"	87,200	312	40	120
*IZ2ACG	"	79,344	243	54	120
*IK2YSJ	"	70,794	287	45	117
*IZØBPI	"	68,250	265	42	133
*IV3KSE	"	60,300	226	40	110
*IK8NRW	"	57,060	218	46	111
*IZ4AQL	"	42,624	173	38	110
*IZ2EAS	"	40,014	227	25	92
*IK2WFN	"	39,975	163	43	80
*IU3A	"	39,611	235	30	113
(Op: IV3HAX)					
*IK8MVB	"	37,510	182	33	92
*IX1ALR	"	37,380	213	35	105
*IR3T	"	31,688	159	40	96
(Op: IV3AJZ)					
*IK3XTY	"	27,852	155	39	93
*IK8JVG	"	25,123	103	37	60
*IK3ORD	"	24,985	112	36	59
*IZ1CQZ	"	22,852	113	41	75
*IK2WYI	"	21,939	127	25	46
*IZØBNR	"	20,741	136	28	38
*IK4CBM	"	17,073	133	12	27
*IZØEHL	"	13,912	118	30	64
*IØKHP	"	6,853	70	15	29
*IV3BKH	"	4,840	56	15	40
*IK4NPC	"	1,728	26	15	21
*IZ5CML	28	325,080	809	39	133
*IO2L	"	179,025	481	35	130
(Op: I2OKW)					
*IZ8EFD	"	149,359	514	30	103
*IK2YGZ	"	77,376	470	23	81
*I1GXV	"	31,284	167	26	53
*IK7WUE	"	25,740	197	18	48
*IK2OLJ	"	21,978	146	22	52
*IV3/IK2AIT	"	6,727	76	14	28
*IK3SSW	"	6,018	67	17	34
*IK4QJM	21	119,600	530	29	101
*IZ4DYP	"	90,174	450	25	89
*IR5T	14	1,081,375	3157	40	139
(Op: IK5ORP)					
*IV3UHL	"	90,957	826	23	72
*II8C	"	28,458	289	22	71
(Op: IK8AFN)					
*IZ5BSA	"	23,994	228	19	67
*IK3SSJ	7	17,775	226	14	61
*IC8SDL	3.7	34,776	493	11	58
*IQ5B	"	30,750	403	11	64
(Op: I5VXG)					
JERSEY					
MJØC	21	1,078,350	2756	35	140
(Op: G3XTT)					
KALININGRAD					
*UA2CZ	A	42,432	152	41	95
*UA2FHZ	28	2,821	50	11	20
LATVIA					
YL2KO	A	2,920,680	2869	122	410
YL2GD	"	1,948,716	2279	109	353
YL2KF	28	66,440	324	22	88
YL2GTD	"	4,004	37	16	28
YL2BJ	21	97,580	551	26	93
YL7A	7	149,445	716	32	103
(Op: YL2GM)					
*YL5W	A	600,732	1067	84	285
*YL2PN	"	28,798	184	32	89
*YL2LY	3.7	12,096	208	9	47
LITHUANIA					
LY7Z	A	5,055,273	3698	151	552
(Op: LY2TA)					
LY4AA	"	4,550,139	3568	138	489
LY2CY	"	3,255,252	2991	122	450
LY2MM	"	968,808	1230	97	347
LY2OX	"	723,805	1036	102	299
LY3BX	"	581,218	1115	77	242
LY1CX	"	479,025	1057	63	162
LY3BE	"	329,022	807	59	184
LY6M	"	101,331	371	39	100
(Op: LY1DS)					
LY1FW	28	646,727	1663	38	141
LY2GF	"	638,308	1652	39	139
LY2OM	"	110,124	402	30	103
LY2TE	21	117,368	510	29	107
LY2BM	3.7	92,711	1091	14	69
*LY3BY	A	1,343,082	1590	114	400
*LY2OU	"	587,664	1173	74	297
*LY3CY	"	428,220	891	67	238
*LY2DX	"	372,900	864	76	254
*LY2FN	"	363,560	750	60	238
*LY4BP	"	61,214	327	27	100
*LY2DM	28	221,920	741	33	113
*LY2BBF	"	101,660	420	26	89
*LY2AT	"	67,320	316	29	81
*LY2BET	21	28,896	220	20	64
*LY2TZ	14	28,050	270	15	60
*LY3GJ	"	2,397	147	10	41
*LY2OO	3.7	3,999	105	6	37
LUXEMBOURG					
LX1NO	21	939,339	2475	39	138
LX2LX	"	2,916	59	9	18
*LX1JH	A	542,082	884	83	251
MACEDONIA					
Z32XX	28	748,007	2243	37	126
Z31B	21	229,356	1045	29	109
Z35M	7	3,927	71	10	36
Z33A	3.7	114,660	1125	15	75
*Z33Z	A	279,129	867	60	117
*Z33AA	28	203,008	982	30	98
*Z37A	21	402,896	1774	35	114
*Z35W	"	172,672	852	31	111
MALTA					
*9H1DE	A	335,220	1066	51	171
MOLDOVA					
ERØND	A	4,971,006	3963	148	494
(Op: UT7ND)					
*ER6A	A	3,214,395	3664	116	433
(Op: ER1LW)					
*ER5DX	"	1,221,286	1483	108	365
NETHERLANDS					
PAØIJM	A	1,591,096	2217	97	341
PAØAGA	"	1,270,826	1754	97	395
PAØJNH	"	510,204	859	77	289
PAØJSE	"	45,535	217	49	127
PA1CC	21	306,844	1011	34	130
PA4WM	3.7	107,550	1110	14	76
PA3GCV	1.8	36,890	630	9	53
*PAØRBS	A	311,771	738	59	210
*PAØJED	"	257,715	565	66	183
*PAØRRS	"	223,851	424	64	185
*PA9TT	"	171,684	556	51	177
*PAØKDM	"	93,357	352	52	155
*PA3GZC	"	42,684	237	33	96
*PA3FGJ	"	36,418	129	44	87
*PA7DA	"	33,449	125	40	70
*PA7RA	"	15,792	118	29	65
*PAØLRK	"	11,579	87	60	26
*PA3BDK	"	8,374	97	24	55
*PA9LUC	"	5,069	18	10	18
*PA9JAM	"	4,010	70	13	36
*PAØLSK	"	2,788	43	16	18
*PAØFEI	"	930	23	12	19
*PAØKHS	28	154,813	589	30	97
*PA3EMN	"	123,090	532	27	83
*PAØEHF	"	56,771	243	27	69
*PAØJR	"	8,340	100	19	41
*PA1TT	21	197,580	649	33	115
*PAØCYW	"	141,611	523	28	103
*PA2SWL	3.7	21,303	345	9	59
NORTHERN IRELAND					
GIØKOW	21	1,698,840	3915	38	160
*GIØKVQ	A	1,031,990	1648	67	243
*GIØVTS	"	58,216	224	42	110
*GI4SNA	28	887,124	2440	38	139
*MI5AFL	21	2,196	39	11	25
*GIØOUM	14	5,640	105	10	37
NORWAY					
LA9DFA	A	2,524,914	2682	120	402
LA1VKA	"	128,205	320	63	168
LB8AE	"	83,838	374	37	141
LA2HFA	"	45,264	212	38	85
LA2IJ	"	12,193	63	40	49
LA2CQ	"	3,910	45	17	29
LA8W	28	821,744	1997	38	138
(Op: LA8SDA)					
LA6YEA	"	423,514	1020	39	143
LA9HW	7	84,579	577	25	96
LA6EIA	3.7	66,839	662	18	71
LA1NG	"	29,601	400	11	58
LA6WEA	1.8	11,492	276	6	46
*LA8OM	A	297,471	787	54	175
*LA1PHA	"	271,691	569	66	193
*LA2DKA	"	51,508	292	34	124
*LA8RIA	"	45,087	228	41	92
*LA5YJ	"	25,983	258	35	76
*LA3TR	"	5,519	62	24	40
*LA5JX	28	123,827	495	31	92
*LA7WCA	"	78,752	350	25	82
*LA2MJA	"	62,007	338	25	73
*LA8WG	"	37,077	238	21	70
*LA1YE	"	13,398	125	15	43
*LA7IJA	7	672	25	4	20
POLAND					
SQ6Z	A	4,965,625	3692	142	483
(Op: SP3RBR)					
SP9W	"	2,205,672	2353	120	412
(Op: SP9HWN)					
SP2DKI	"	115,010	378	54	163
SP4AVG	"	54,782	191	49	109
SP5BNB	"	50,554	131	57	100
SP3KPN	"	40,487	204	42	100
SP9KJ	"	14,952	95	30	54
SP6AYP	"	3,536	29	23	29
SP8FHM	"	2,170	23	15	20
SP7GIQ	28	952,614	2289	40	137
SP6IXF	"	760,562	1871	38	143
SP5WA	"	505,050	1243	38	137
SP5LKM	"	312,748	869	37	127
SP6JKH	"	73,432	261	32	105
SP2BLC	"	15,153	121	20	47
SP3GEM	21	905,877	2285	38	151
SP9QMP	14	535,781	1771	36	137
SP2QG	"	114,342	752	27	91
SP3CYY	"	102,735	600	32	103
SP2FAX	7	596,388	2205	36	120
SP4NI	"	194,125	990	28	97
SP4DEU	"	73,140	705	19	73
SP8BRQ	3.7	88,071	911	17	76
SN4M	"	72,226	908	13	64
(Op: SP4MPB)					
SP6AZT	"	20,923	379	10	51
SP7VC	"	8,624	165	7	37
*SN2X	A	1,501,548	2000	103	368
(Op: SP2DWG)					
*SP5DDJ	"	1,257,389	1438	107	362
*SP6CPF	"	556,626	751	101	305
*SP6AXW	"	494,403	738	72	201
*SQ9HZM	"	489,216	829	77	259
*SP6IEQ	"	477,139	749	76	213
*SP7LZD	"	456,500	722	81	251
*SQ8FEW	"	452,010	818	69	236
*SP9HQC	"	419,718	712	81	253
*SP9LAS	"	385,728	788	75	261
*SP9UPH	"	293,619	588	73	218
*SNØLEO	"	289,867	549	77	232
(Op: SP3BYZ)					
*SP8BVN	"	266,819	448	84	245
*SP5ICS	"	250,272	519	65	199
*SP9MRQ	"	243,375	563	70	216
*SP1HTS	"	214,049	450	70	197
*SP5GMM	"	164,736	364	66	168
*SP1MVG	"	152,022	372	69	175
*SP9OHP	"	151,655	390	66	179
*SQ4HRN	"	147,232	425	55	159
*SP6TRX	"	142,780	325	68	168
*SP3GTS	"	134,784	332	57	151
*SP3KRE	"	133,866	399	50	151
*SP6FXY	"	131,130	370	57	178
*SP9LDB	"	122,960	404	50	162
*SP3RBG	"	119,756	243	72	150
*SQ7BCG	"	116,655	371	58	173
*SP6CES	"	105,072	354	53	123
*SP8JPR	"	98,564	289	54	110
*SN8R	"	97,566	316	58	144
(Op: SP8ONZ)					
*SP3FYM	"	87,377	293	42	89
*SP8UZJ	"	86,028	357	30	77
*SP9MZU	"	82,170	267	54	112
*SP2MKT	"	70,686	272	47	106
*SP5AKG	"	67,332	254	30	104
*SP2QVU	"	65,469	237	42	97
*SP7JQQ	"	64,856	215	40	94
*SP4BY	"	62,478	259	49	129
*SP9DEM	"	61,050	194	47	118
*SP8TDE	"	57,652	175	62	141
*SP4DZT	"	46,512	149	44	108
*SP6CDP	"	43,428	157	36	96
*SP9XUE	"	43,365	167	45	102
*SP3DOF	"	40,986	181	47	91
*SP3GHK	"	40,690	602	44	81
*SP4Z	"	29,344	120	44	68
(Op: SP4EEZ)					
*SP6NIF	"	27,424	107	36	70
*SP9OYK	"	21,840	112	32	52
*SP6DHD	"	17,336	104	30	70
*SQ9DXT	"	15,552	167	25	83
*SP7VCA	"	14,850	107	21	45
*SP6RGC	"	14,469	152	26	65
*SP4BGQ	"	13,568	139	25	81
*SP2GCE	"	10,288	193	44	89
*SQ9DXN	"	8,778	55	29	37
*SP9DAE	"	7,371	100	15	48
*SP4XQN	"	7,250	55	26	32
*SP2LHX	"	6,660	81	26	40
*SP6BEN	"	3,947	44	17	22
*SP8MCP	"	3,174	37	19	27
*SP4AUN	"	1,665	41	11	26
*SP2JLR	"	475	12	9	10
*SP6EWB	"	100	29	9	21
*SP3KEY	28	469,152	1114	39	142
(Op: SP3DWQ)					
*SP3LWP	"	275,471	793	35	126
*SP9RCL	"	267,410	722	35	135
*SQ9PM	"	264,816	818	32	112
*SP5LCC	"	244,807	721	32	117
*SP6FJ	"	178,904	447	35	117
*SP3VT	"	154,888	521	34	118
*SQ9IET	"	137,333	496	31	104
*SP4DM	"	110,084	303	34	112
*SP4DC	"	95,694	340	28	95
*SP1DMD	"	95,128	431	30	85
*SP9VEG	"	85,920	319	30	90
*SP1AMU	"	59,074	277	24	74
*SP3EAX	"	45,609	236	22	62
*SP8OOB	"	28,037	239	19	40
*SP7FDV	"	21,024	112	25	47
*SP2HXY	"	20,150	157	17	45
*SQ8JLF	"	18,003	155	18	35
*SP9IBJ	"	9,300	84	15	35
*SP8DYY	"	7,941	62	17	31
*SP6NIG	"	4,356	56	13	17
*SP9OJQ	"	966	16	10	11
*SP4TKR	21	324,744	1175	37	131
*SP6LUV	"	309,761	984	35	122
*SP6OWA	"	39,900	229	24	71
*SP2MKI	"	21,920	156	23	57
*SP2AYC	"	15,525	116	14	55
*SP9EWO	14	69,321	440	25	89
*SP9DNO	"	52,670	254	28	87
*SP4SHD	"	40,940	313	20	72
*SP5DRE	"	35,931	256	19	68
*SP8GNF	"	26,287	203	21	76
*SQ6FHP	"	23,845	224	18	61
*SP6DMI	"	15,552	164	15	57
*SP3JUN	"	6,426	112	9	45
*SP9IKN	"	1,491	55	6	11
*SP9ABU	7	25,355	237	15	69
*SP9HML	3.7	9,918	201	8	43
*SP9RPW	1.8	13,311	272	6	45
*SP6IHE	"	9,576	505	9	54
PORTUGAL					
CT7B	A	9,097,479	5637	146	535
(Op: OH2BH)					
CT/DJ9MH	"	1,241,108	2013	95	326
CT8T	28	1,324,800	3606	39	141
(Op: CT1ESV)					
CT1AHU	"	616,395	2175	31	114
CT1GPQ	21	604,072	1684	37	147
*CT1GFK	A	800,768	1195	90	301
*CT1CJJ	"	450,954	580	98	280
*CT2GWZ	"	61,777	226	44	119
*CT1ESQ	"	43,472	225	41	135
*CT7HAL	"	33,304	150	31	56
(Op: CT2HAL)					
*CT1CXP	"	567	13	8	13
*CT2GQN	28	151,944	918	23	81
*CT1FNT	"	44,555	298	21	74
*CT1FLD	"	32,757	230	17	55
*CT1FOH	"	16,758	87	23	75
*CT1ETX	21	107,457	558	26	103
*CT4NC	14	1,848	45	7	26
ROMANIA					
YO9HP	A	2,267,320	2897	106	334
YO3FRI	"	483,647	986	70	213
YO2DFA	"	185,460	430	55	165
YO5OHZ	"	183,529	509	51	172
YO4RHK	"	12,231	146	18	63
YO8CRU	"	10,540	96	19	43
YO/ER1BL	"	3,827	35	14	29
YO3JW	28	38,595	245	24	59
YO5ODC	"	27,576	194	19	53
YO3FWC	"	23,040	201	17	43
YP3A	21	987,752	3313	39	149
(Op: YO3GDA)					
YO4NF	"	711,504	2576	37	125
YO9FJW	14	62,656	620	24	64
*YO4CIS	A	1,155,312	1578	106	346
*YO3APJ	"	1,112,938	1227	115	367
*YP2A	"	881,175	2175	83	296
(Op: YO2LIF)					
*YO6BHN	"	632,875	674	101	314
*YO5CYG	"	272,646	619	76	230
*YO7ARY	"	189,932	490	54	152
*YO3NL	"	188,436	539	60	208
*YO8RFS	"	154,048	554	54	178
*YO9FYP	"	147,908	515	50	156
*YO7LBX	"	129,132	422	55	149
*YO4RLP	"	64,584	261	48	136
*YO3CVG	"	32,922	156	33	85
*YO8COK	"	29,367	212	26	91
*YO6ADW	"	28,625	179	30	86
*YO3GSZ	"	26,445	226	34	89
*YO2CJX	"	17,892	198	16	68
*YO3JF	28	393,820	1438	33	112
*YO8WW	"	107,736	392	32	102
*YO5TP	"	33,180	178	19	60
*YO9CXE	"	30,318	177	27	66
*YO3FLQ	"	20,416	211	15	43
*YO8DHD	"	16,131	132	18	39
*YO7BGA	"	16,124	146	17	41
*YO8DDP	"	14,040	76	24	41
*YO5OHO	21	60,799	404	24	81
*YO5DMB	14	16,632	209	15	51
*YO4UQ	"	12,000	192	12	48
*YO3FF	"	1,480	35	8	12
*YO5OXN	7	7,205	156	7	42
*YO2BEH	1.8	11,000	218	6	44
*YO2KHK	"	3,024	75	5	31
SARDINIA					
*ISØIGV	A	122,202	390	51	131
SCOTLAND					
GMØF	A	3,615,147	3213	132	459
(Op: GM4AFF)					
GM3POI	7	96,360	464	22	88
*GMØFET	A	1,147,928	1506	86	290
*GM3BCL	"	227,205	793	62	193
*MMØBQI	"	123,900	335	51	185
*GM3YOG	28	28,201	229	17	56
(Op: G3YOG)					
SICILY					
*IT9VCE	A	465,120	1085	70	234
*IT9AJP	"	150,411	405	51	130
*IT9YAO	"	135,136	415	50	156
*IT9RYJ	21	298,812	1183	31	117
*IT9STX	14	507,179	1743	37	130
*IT9ICS	"	281,880	1444	30	90
*IT9YSW	"	7,144	68	12	55
SLOVAK REPUBLIC					
OM6TX	A	68,229	272	45	126
OM5DX	28	1,219,146	2883	39	144
OM3RG	"	563,504	1511	39	125
OM5M	21	709,830	2095	38	127
(Op: OM4EN)					
*OM3IAG	A	690,086	1131	99	290
*OM4TX	"	600,510	1020	81	289
*OM4XA	"	548,895	1029	73	272
*OM4DN	"	503,034	956	78	276
*OM3YK	"	250,466	560	63	203
*OM8FF	"	232,290	545	66	195
*OM7AG	"	147,064	398	63	185
*OM3CDZ	"	123,431	437	64	130
*OM6CU	"	94,248	357	45	153
*OM8HG	"	92,466	316	56	142
*OM7AT	"	44,480	188	32	92
*OM4KK	28	172,800	612	29	106
*OM7YC	21	74,625	381	29	96
*OM4WW	14	91,691	585	28	90
*OM7RC	"	38,710	250	23	75
*OM8DD	7	20,020	259	14	56
*OM7AB	3.7	22,007	444	8	51
SLOVENIA					
S5ØS	A	6,327,852	4302	147	534
(Op: S51TA)					
S59KW	"	2,868,698	3229	98	315
S5ØO	"	1,387,926	1941	115	383
S5ØC	28	1,341,380	3118	39	149
(Op: S5500)					
S5ØK	"	1,224,840	2973	37	140
S58D	"	1,018,675	2411	39	136
S57AL	"	1,007,620	2641	35	131
S53O	"	822,342	2194	39	138
S51FB	21	809,592	2256	39	129
S58M	"	569,268	1759	37	125
S53M	14	1,099,605	2874	39	156
(Op: S51ZO)					
S57DX	"	958,825	2729	39	136
S58WW	7	256,200	1403	28	92
S59CAB	3.7	111,748	1176	16	75
(Op: S53MM)					
S51NM	"	59,175	719	11	64
(Op: S52OP)					
*S53EA	A	2,962,734	2534	128	478
*S51F	"	2,037,280	1839	109	435
*S51RJ	"	971,080	1204	102	338

*S57AW	"	811,296	1162	96	336
*S58RU	"	333,690	746	67	227
*S53DX	"	153,920	505	50	135
*S57LWG	28	216,970	826	31	99
*S57NRO	"	167,824	594	34	102
*S5ØB	"	165,915	596	30	105
*S57O	21	734,580	2027	37	128
*S57IIO	"	594,847	1515	37	150
*S53Z	"	71,720	359	25	85
*S58AL	14	643,826	2188	38	140
*S51CK	"	519,696	1870	36	126
*S53F	3.7	55,870	752	10	64
*S57NMQ	1.8	22,780	356	11	56
*S54A	"	13,237	236	9	52
*S52U	"	2,442	85	5	28

SPAIN

EA5DFV	A	4,347,756	4173	112	385
EA3BOX	"	2,238,925	2511	100	315
EA4KD	"	1,699,047	1669	103	344
EA1DAX	"	992,592	1487	85	281
ED1URS	"	878,700	1195	96	339
EA3ALV	"	621,851	811	99	338
EA3EJI	"	349,160	637	78	212
EA1JO	"	325,752	724	69	208
EA5GCT	"	246,636	624	68	211
EA1OT	"	194,622	556	54	145
EA4AES	"	85,013	303	41	110
EA5EG	"	70,315	237	58	147
EA3TA	"	55,535	222	38	107
EA4NP	"	42,485	123	51	94
EA1DDO	"	38,223	202	36	101
EA1HF	"	35,224	115	48	88
EC1DMQ	"	30,784	157	32	72
EA4EIY	"	30,441	162	39	100
EA5GMA	"	29,625	164	42	83
EA7CA	"	18,748	100	32	54
EA1CQJ	"	6,477	63	23	28
EC4CRH	"	2,242	34	15	23
EA3QP	28	1,109,658	2663	39	148
EA4WF	"	1,072,632	2588	40	147
EA5YJ	"	359,898	1187	33	121
EA5FFC	"	345,651	1144	30	107
EA3DUZ	"	105,318	349	31	92
EA2KV	"	56,511	301	24	67
EA7NK	"	53,428	338	22	52
EA3DWU	"	44,854	286	20	62
EA3EZD	"	1,364	22	13	18
EC3CJN	21	78,473	684	22	75
EC7DHJ	"	8,960	78	18	46
EA1AAA	"	3,105	32	14	31
EA3CKX	14	202,293	871	32	101
EA3AEL	"	33,375	444	16	59
EA3CCN	1.8	2,294	59	6	31
*EA7GTF	A	2,902,878	2775	103	383
*EA3CI	"	1,840,352	2269	87	311
*EA3GEG	"	1,536,120	1436	120	382
*EA7RU	"	1,066,090	1613	85	277
*EA3ASX	"	855,380	1100	82	298
*EA5EOR	"	719,230	1169	79	276
*ED5ASF	"	705,744	1194	82	295
*EA1EYG	"	553,668	811	83	265
*EA3EGB	"	533,902	802	85	298
*EA3CT	"	533,416	992	68	231
*EA1WS	"	444,768	1110	56	170
*EA7BDL	"	386,694	783	68	229
*EA1AJV	"	353,837	883	56	153
*EA3AKA	"	336,182	716	61	198
*EA3BWF	"	314,820	650	63	207
*EA1BLI	"	298,984	671	67	214
*EA3NP	"	291,870	788	48	182
*EA1ET	"	261,590	534	68	191
*EA2AP	"	252,540	542	59	171
*EA3MR	"	248,005	803	46	147
*EA1SH	"	208,008	482	59	184
*EA7TG	"	153,630	293	77	193
*EA2AAZ	"	141,312	382	51	141
*EA4EMC	"	140,128	363	59	173
*EA3NA	"	139,003	357	57	172
*EA7EWX	"	134,128	406	51	151
*EA3CZR	"	119,794	298	57	121
*EA1FD	"	110,619	323	45	108
*EA3AAW	"	103,385	377	35	110
*EA1GL	"	103,292	276	53	143
*EA1DOU	"	102,790	315	52	138
*EA5IT	"	99,324	352	46	140
*EA3CZM	"	98,716	252	54	94
*EA3FAJ	"	68,250	232	43	107
*EA2AVM	"	63,218	244	36	110
*EA4MD	"	55,760	192	50	120
*EA1AW	"	53,998	199	36	97
*EA1EZZ	"	53,890	296	40	130
*EA3GEO	"	48,000	198	35	90
*EA5FME	"	40,588	188	40	99
*EA7CWV	"	39,438	160	39	87
*EA7FCQ	"	39,150	226	36	109
*EA3AEI	"	24,440	112	29	65
*EA7GLJ	"	22,374	146	33	66
*EA7FIQ	"	19,800	107	36	63
*EA5TN	"	17,000	135	20	65
*EA3ATO	"	14,600	129	33	67
*EA1BXF	"	10,412	154	15	61
*EA5CZL	"	10,184	78	22	45
*EA4WD	"	7,254	86	20	42
*EA7FUH	"	4,015	42	22	33
*EA2AZ	"	3,248	39	23	35
*EA3FM	"	2,499	60	17	34
*EA1DFP	"	1,596	33	15	27
*EA5AVW	"	675	15	10	15
*EA3BUI	"	432	10	9	9
*EA3CJZ	"	392	17	11	17
*EA2CJC	28	534,038	1691	33	106
*EA3FCQ	"	406,435	1271	33	112
*EA1FDI	"	387,243	1249	33	120
*EA7FTR	"	330,482	1290	36	113
*EA5ON	"	246,301	976	34	113
*EA5KV	"	241,280	937	34	111
*EA3RA	"	194,954	833	30	77
*EA1YB	"	148,944	646	27	89
*EA5AJX	"	145,263	606	30	93
*EA3ESJ	"	72,518	398	25	76
*EA1EZV	"	50,568	333	20	64
*EA5GU	"	50,406	337	26	67
*EA1CCM	"	49,608	307	18	54
*EA4EER	"	42,889	305	20	57
*EC3DEZ	"	30,267	224	17	42
*EA1BZP	"	15,494	142	15	46
*EA5CGU	"	12,636	73	27	51
*EA3BAK	"	5,760	120	12	36
*EA7SL	"	3,136	52	16	33
*EC1ALT	"	169	10	5	8
*EC5CQL	"	24	4	1	1
*EA7HBP	21	494,340	1700	33	121
*EC5CEK	"	199,048	1119	29	110
*EA1UU	"	143,840	623	30	115
*EA7IA	"	136,584	629	28	98
*EA2BLK	"	135,082	551	28	109
*EA1FFH	"	131,852	723	27	92
*EA7ANM	"	109,787	745	24	77
*EA1BIM	"	97,680	531	25	86
*EC2ADR	"	93,112	665	26	87
*EA7FRX	"	87,453	423	24	99
*EA3AGB	"	67,142	340	27	91
*EA3KT	"	63,144	340	26	87
*EA1YR	"	46,828	272	20	72
*EC4DKL	"	27,722	288	17	66
*EC4DFA	"	22,253	235	19	58
*EA4APP	"	18,841	144	20	63
*EC3CMT	"	4,100	68	12	38
*EA4DAU	"	400	16	5	5
*EA4DKS	"	143	8	6	7
*EA7HE	"	102	60	7	27
*EC3DEO	"	100	28	11	22
*EA3GHZ	14	304,704	1170	33	111
*EA1OS	"	104,580	511	26	100
*EA5GFK	"	10,653	118	16	51
*EA2CHL	"	4,268	105	9	35
*EA1BID	"	132	15	3	8
*EA4WC	7	5,724	74	12	42

SWEDEN

SM5CEU	A	2,747,168	2448	130	456
7S2E	"	1,945,834	2347	117	365
(Op: SM2DMU)					
SM7CQY	"	381,258	669	87	267
SM7BJW	"	250,328	500	61	171
SM3LIV	"	181,162	456	64	175
SM6IQD	"	120,186	402	50	148
SM3R	"	36,585	146	44	91
(Op: SM3CBR)					
SM7GXR	28	53,940	293	23	64
SLØW	21	478,777	1279	37	132
(Op: SMØAJU)					
SM6CDG	14	4,410	73	12	33
SM6CPO	"	5	1	1	1
*SM6DER	A	497,696	958	70	232
*SM3BIZ	"	359,841	659	78	243
*7S6J	"	226,366	593	62	204
(Op: SMØJSM)					
*SMØBDS	"	169,435	449	58	177
*SM5U	"	100,128	245	64	104
(Op: SM5UGC)					
*SM4XIH	"	94,680	290	52	128
*SM6RXZ	"	82,898	366	46	135
*SMØFM	"	68,322	199	54	139
*SM7CWI	"	32,208	162	38	84
*SM3EAE	"	18,988	157	29	65
*SM3X	"	12,692	69	30	46
(Op: SM3CVM)					
*SM1HPV	"	10,488	148	21	55
*SMØLZT	"	8,036	95	23	59
*SM7DXQ	"	7,450	73	16	34
*SM6GJZ	"	5,115	63	19	36
*SM4HEJ	"	1,404	40	8	31
*SK6AW	"	280	16	8	12
(Op: SM6KIU)					
*SM4AIO	28	128,500	381	28	97
*SK4UW	"	84,436	471	27	74
*SM2EZT	"	73,902	325	26	83
*SM2LIY	"	52,407	450	18	63
*SM6NJK	"	27,238	180	20	53
*SM3VDX	"	3,864	60	14	14
*SM4DHF	21	1,100,480	2979	33	127
*7SØMG	"	73,514	246	34	105
(Op: SMØKV)					
*SM6FJY	"	46,706	291	25	78
*SM5DQE	"	44,100	310	22	76
*SM6AHU	"	8,662	115	14	37
*SM5AJV	"	1,056	40	5	17
*SKØX	14	395,738	1355	35	126
(Op: SMØWKA)					
*8SØF	"	43,243	463	16	67
(Op: SMØOGQ)					
*7S5C	"	35,604	331	21	65
(Op: SM5CBM)					
*SM7HSP	"	5,262	101	12	34
*SM2T	7	19,845	206	14	67
(Op: SM2EZT)					

SWITZERLAND

HB9FBS	A	1,413,075	2086	90	325
HB9GT	"	1,178,468	1824	99	305
HB9DCM	"	792,625	921	94	279
HB9AAA	"	726,796	969	99	305
HB9CIC	"	466,872	955	66	228
HB9AUS	"	302,400	407	95	305
HB9NN	"	134,460	382	48	132
*HB9AA	A	803,010	1086	86	304
(Op: HB9ARF)					
*HB9AWS	"	187,670	527	54	191

UKRAINE

EO3Q	A	4,157,332	3734	134	470
(Op: UR3QCW)					
UR6MX	"	626,516	1168	82	237
UW7M	"	443,230	911	77	272
(Op: UR3MP)					
UT6EE	"	302,964	638	73	238
UR5E	"	291,214	505	82	259
(Op: UR5EDX)					
UT2UB	"	259,920	633	70	234
UT7MD	"	228,228	478	76	210
UR5GFO	"	49,800	227	30	90
UT7QF	28	984,700	2868	38	134
UT8LL	"	375,226	1419	35	128
UR3IWA	"	271,425	1791	34	107
(Op: UR6IRM)					
UT4EK	"	106,150	559	25	85
UT7QL	"	73,644	391	28	86
UT1YV	"	2,064	42	7	17
UT7L	21	537,684	1751	36	137
(Op: UXØLL)					
UW5U	"	419,485	1617	34	111
(Op: UY2UA)					
UXØIB	"	334,881	1451	35	122
US2IM	"	158,301	951	30	87
UX3HA	"	23,769	252	24	50
EM3J	14	493,584	1787	36	120
(Op: UU2JZ)					
UX3MR	"	206,847	766	32	109
UT7EF	"	31,328	288	20	69
UT5IZ	7	31,348	385	15	53
UT2IW	3.7	38,236	420	14	65
*UR7M	A	1,602,638	2083	113	395
*UZ4E	"	861,522	1592	93	324
(Op: Kopanica)					
*USØKW	"	721,067	1095	96	313
*UX4UA	"	709,794	982	99	324
*UY7MM	"	479,484	964	85	257
*US3IZ	"	475,956	975	69	270
*UR5ZMK	"	318,400	519	67	253
*UR7IKV	"	269,698	837	66	220
*UUØJC	"	252,301	488	73	198
*UY5TE	"	175,440	533	53	187
*UT5OH	"	155,190	638	46	164
*UX5EF	"	120,114	396	48	169
*UU5JSP	"	116,103	380	49	180
*UT3QT	"	108,546	338	54	175
*UY2UF	"	97,650	561	33	122
*UR4EI	"	63,000	266	41	109
*UT5AY	"	59,740	236	38	107
*UT4MW	"	59,740	220	44	101
*USØYA	"	55,245	170	47	98
*UR7UL	"	21,730	134	30	76
*UW2F	"	6,674	57	26	45
(Op: UTØFT)					
*UX2RV	"	6,554	48	22	36
*USØLW	"	3,219	38	14	23
*UT4PZ	"	2,664	26	15	22
*UR8QA	28	91,250	444	33	92
*US5WMS	"	85,396	277	34	114
*UR3QFB	"	76,507	452	29	79
*UT1ML	"	64,269	415	26	85
*UT5UML	"	38,808	265	21	51
*US9PA	"	23,970	131	24	61
*UR3QKD	"	15,950	182	14	44
*UR5FCM	"	13,446	174	14	40
*USØHZ	21	156,228	684	34	107
*US7IGF	"	130,032	531	35	109
*US5MTJ	"	55,212	443	25	82
*UT1T	14	188,131	954	32	111
(Op: UR7TZ)					
*UR6IJ	"	154,350	622	35	112
*US1PM	"	73,902	470	23	86
*UYØMF	"	14,129	148	14	58
*UR5ETN	7	21,964	216	13	63
*UR6QA	1.8	17,328	287	9	48
*UT8E	"	4,446	121	7	32
(Op: UR3EA)					
*UR5EAW	"	4,080	102	9	31
*UT5ERV	"	100	18	4	15

WALES

GW4BLE	A	6,713,616	4482	138	498
GW3YVC	"	1,462	27	16	18
*GW3NJW	A	136,652	298	58	196
*MWØCRI	21	71,400	486	26	79
*GWØAJI	"	54,243	397	20	72
*MW5HOC	7	8,692	199	8	45

YUGOSLAVIA

YT7R	A	5,519,115	3765	161	574
(Op: YU7BW)					
YU1AAT	"	108,650	458	52	153
YZ9A	28	1,160,204	2926	38	140
(Op: YU1NW)					
YU1EW	"	880,334	2161	38	144
4N1N	"	603,943	2063	39	134
(Op: YU1BX)					
YTØA	21	1,191,936	2982	39	153
(Op: YZ1AU)					
YZ1SG	"	450,892	1472	37	132
YU7CF	"	324,216	1160	37	121
YU1JW	14	1,024,250	3184	39	131
YU7ACO	"	381,746	1450	37	126
YT1AD	7	400,624	1650	34	112
(Op: YU7NU)					
YT7A	"	357,504	1632	33	119
(Op: 4N7DW)					
YT1BB	"	120,006	981	27	91
YU7JX	3.7	98,640	1082	16	74
*4N7B	A	2,107,176	2371	110	346
(Op: YU7BJ)					
*YU7QL	"	1,220,806	1712	101	353
*YT1AT	"	582,736	1198	71	230
*YU1EA	"	200,326	414	80	207
*YU1AU	28	854,080	2079	37	133
*4N7N	"	453,924	1231	36	126
(Op: YU7WW)					
*YU7YZ	"	134,292	467	28	96
*YU7SF	"	86,486	382	26	78
*YU7KWX	21	411,060	1548	36	120
*YU7KM	"	46,406	262	23	79
*YT1VM	"	21,666	146	23	64
*YT1Z	3.7	13,572	227	9	49
(Op: VE2ZIV)					
*YTØT	1.8	31,785	479	8	57
(Op: YT1DX)					
*YU1RA	"	9,204	168	7	45
*YU1AST	"	3,716	92	8	35
(Op: YT1KA)					

OCEANIA

AUSTRALIA

VK5GN	A	2,907,368	2418	122	302
VK2FHN	"	401,568	830	62	116
VK2CA	"	386,136	570	88	160
VK2BCQ	"	152,685	302	70	125
VK8TX	"	23,941	115	33	56
VK2XZ	28	628,952	1968	33	83
VK2CZ	"	603,882	1431	38	121
*VK2ARJ	A	444,900	761	69	155
*VK3KKD	"	68,649	185	51	96
*VK2LAJ	"	15,045	113	20	39
*VK2DPD	"	9,295	54	26	39
*VK2HV	28	130,910	485	29	66
*VK4EJ	"	120,768	464	30	66
*VK5AM	21	613,168	1578	38	114
*VK4DMP	"	93,415	296	27	92
*VK4DX	"	90,825	436	19	56
*VK4II	"	27,808	165	25	63
*VK4EMM	7	97,826	438	27	55

BELAU

*T88MZ	A	684	18	9	10

BRUNEI

V8A	28	1,822,680	3838	37	129
(Op: JO1RUR)					

EAST MALAYSIA

9M8R	A	6,768,846	4332	163	404
(Op: W7EJ)					

EAST TIMOR

4W6MM	LA	172,989	521	64	85
(Op: TF1MM)					

FIJI

*3D2MH	28	171,054	641	30	72
(Op: DL1MHM)					

HAWAII

NH7A	A	5,951,046	4962	138	311
KH6ND	28	1,841,610	3881	39	131
KH7U	21	1,376,320	3005	37	123
AH6JR	"	514,985	1537	36	91
AH6OZ	14	843,764	2200	37	105
KH6TO	7	435,342	1386	33	78
KH6FKG	"	221,966	949	29	57
NH6XO	1.8	4,114	92	8	9
*AH7R	A	25,122	126	37	42
*KH6GMP	28	304,184	1112	29	65

INDONESIA

YBØAI	A	304,212	477	87	164
YB2LAB	28	438,354	1200	34	113
YBØAVK	"	176,520	536	31	89
(Op: HA7VK)					
YBØA	3.7	8,400	122	18	22
*YE1A	A	217,140	560	83	152
(Op: YB1KOR)					
*YB2LSR	"	25,419	94	44	67
*YBØUNC	"	2,210	32	14	20
*YB2ERL	28	267,208	759	29	98
*YCØUFF	21	24,006	116	26	54
*YC2VVD	"	13,203	111	24	57
*YC2VNE	"	12,920	115	22	46
*YC2VMS	"	9,150	123	16	45
*YC2VTO	"	4,386	35	22	29
*YB2UJY	"	2,052	50	19	35
*YC8QP	"	870	22	12	18
*YBØAZ	14	743,850	1652	38	136

MARSHALL ISLANDS

V73UX	A	3,149,811	3092	123	234

NEW CALEDONIA

*FK8GM	A	702,924	1154	81	147

NEW ZEALAND

ZL1ANJ	A	2,109,400	1914	119	279
ZL1ALZ	"	365,720	795	65	99
ZL3JT	21	181,955	446	37	114
*ZL2AL	A	796,340	1033	96	194
*ZL3DW	"	6,270	53	24	31
*ZL/PAØMIR	28	2,604	35	11	20

NORTHERN MARIANAS

KHØCE	A	308,616	733	67	87

PAPUA-NEW GUINEA

P29JA	A	311,860	724	56	99
(Op: JG7AMD)					

PHILIPPINES

4E9RG	A	3,228,324	2862	131	276
(Op: DU9RG)					
DU1UGZ	"	165,532	563	49	67
*4D69SAN	A	168,514	591	45	64
(Op: DU1SAN)					
*DU1BP	"	144,771	442	48	75
*4D69DX	28	15,582	126	18	35
(Op: DU1DX)					

SOUTH COOK ISLANDS

ZK1NCP	A	1,623,998	2141	111	163
(Op: JI1NJC)					

TUVALU

*T2DX	A	107,628	217	69	113

SOUTH AMERICA

ARGENTINA

LV5V	A	3,802,968	3419	109	299
(Op: LU5VV)					
LU1BR	"	1,934,140	2177	102	244
LT7H	"	1,413,030	1471	112	258
(Op: LU1HLH)					
LU1FF	"	1,370,415	1791	80	229
LU4MCS	"	843,495	1232	79	186
LW3DAV	"	5,546	55	15	32
LU6ETB	28	2,180,304	3910	39	157
L2ØF	"	1,358,952	3407	35	133
(Op: LU9FDG)					
LW7DX	"	948,948	2254	36	120
LP5F	"	935,816	2620	31	105
(Op: LU1FZR)					
LU8VCC	"	438,340	1345	29	111
LU3MAM	"	333,438	1235	27	75
LW1EGD	"	330,488	1321	27	82
LW8EXF	"	149,296	612	23	63
LU4DJC	"	126,000	481	24	81
LU5YDK	"	69,168	360	22	66
L21I	21	1,994,517	3785	38	151
(Op: LU7DW)					
LO7H	"	314,604	1137	28	80
LTØH	"	184,737	586	32	101
(Op: LU3HY)					
LU7YS	14	527,088	1251	36	122
LU9MBY	"	84,316	449	31	76
LU1VM	1.8	342	22	4	2
*LU2BA	A	1,334,868	1487	99	247
*LQØF	"	1,221,984	1720	80	208
(Op: LU5FF)					
*L6H	"	654,720	982	72	176
(Op: LU6HDV)					
*LU7DR	"	396,388	945	57	107
*LU5EVK	"	394,808	1023	42	94
*LU9DAG	"	292,208	1055	27	85
*LU2DKN	"	282,124	419	76	175
*L99D	"	194,016	455	68	104
(Op: LW9EUJ)					
*LU1ARV	"	190,912	455	42	110
*LU5JKG	"	178,542	622	34	83
*LU9JLI	"	101,472	259	47	121
*AY9H	"	54,954	180	48	81
(Op: LU9HO)					
*LU4DX	28	938,196	2175	33	120
*LU3HIP	"	875,104	1891	35	129
*LU7VCH	"	705,172	1955	31	111
*LU1VEW	"	597,828	1655	32	100
*LU2EC	"	403,370	1297	29	81
*L4ØE	"	289,872	1016	27	81
(Op: LW7EIC)					
*LU7YW	"	281,710	1037	24	86
*LU7HF	"	271,296	1040	27	81
*LW5DPQ	"	231,426	994	29	88
*LU7VFJ	"	215,985	801	25	80
*LU2FDN	"	178,653	721	24	69
*LW5HBE	"	172,615	811	27	68
*LW1HDJ	"	155,520	674	23	67
*LW7EGO	"	134,717	555	23	69
*LU3DDH	"	132,905	532	24	71
*LU9GDN	"	128,700	592	25	74
*LU4DZ	"	119,040	508	27	66
*LU7DNN	"	111,908	407	24	77
*LU4HXJ	"	46,472	274	20	54
*LU1HN	"	42,399	245	20	43
*AY8A	21	599,256	1323	38	126
(Op: LU8ADX)					
*LU5MEC	"	184,470	591	31	99
*LU4HKL	"	27,766	161	20	48
*LOØD	14	84,022	385	27	59
(Op: LU1DK)					

*LU2JCW	7		1,365	31	14	21
*LU8EEM	3.7		52	10	6	7
ARUBA						
P4ØA	**14**	**A**	**2,225,395**	**4639**	**37**	**144**
			(Op: KK9A)			
***P4ØW**		**A**	**7,543,768**	**4927**	**133**	**415**
			(Op: W2GD)			
***P43E**	**28**		**771,260**	**1992**	**30**	**110**
BOLIVIA						
CP6XE		**A**	**1,147,600**	**1693**	**82**	**222**
CP6UA		"	649,773	1251	57	150
CP1FF		"	146,034	378	52	131
BRAZIL						
PY2YU		**A**	**3,405,585**	**2887**	**113**	**332**
ZW5B		**"**	**2,561,874**	**2498**	**105**	**257**
			(Op: N6TJ)			
PY3MHZ		"	1,301,535	1853	79	200
PY2EMC		"	670,480	969	76	214
PV2M		"	230,748	480	63	138
PY1BR		"	22,684	97	35	71
PT2CMN		"	12,610	92	33	64
ZX5J	**28**		**2,921,820**	**5166**	**39**	**170**
			(Op: PP5JR)			
ZY3C		"	575,650	1864	33	112
				(Op: PY3OC)		
PP5UB		"	496,992	1647	31	93
PY5HSD		"	325,815	986	34	111
PY5JO		"	312,909	1128	23	88
PY2DBU		"	18,060	107	19	51
ZY5G	**21**		**1,163,952**	**2756**	**38**	**139**
			(Op: PP5WG)			
PY4OY		"	352,240	962	33	115
PY2GA		"	85,981	429	20	51
ZV5R	**14**		**1,043,700**	**2085**	**38**	**137**
			(Op: IV3NVN)			
PP5UA	**7**		**47,952**	**335**	**24**	**57**
PP5FL	3.7		23,460	192	18	33
PY2FUS	1.8		44	10	5	6
***ZX2B**		**A**	**4,099,295**	**2904**	**118**	**375**
			(Op: PY2MNL)			
***PY2NDX**		**"**	**1,901,588**	**1816**	**100**	**277**
*PR7CP		"	841,890	1214	78	207
*PY2TNT		"	412,000	1234	46	114
*PY7IQ		"	316,545	502	60	175
*PV8DX		"	237,350	391	60	175
*PY2DJ		"	179,982	420	57	141
*PP8EB		"	152,096	309	62	132
*PT2ND		"	115,128	304	43	113
*PP7ZZ		"	111,045	246	48	117
*PP5VB		"	107,824	230	58	126
*PT2TD		"	98,808	290	56	123
*PP5ZP		"	47,744	182	41	87
*PY3ASM		"	29,680	135	35	71
*PY1WAG		"	27,648	100	41	67
*PY2IRL		"	23,688	104	29	65
*PS8NF		"	19,570	99	29	66
*PR7SM		"	15,052	92	17	54
*PY3YY		"	6,612	44	33	43
*PU7XAF		"	3,498	76	19	34
*PY2VA		"	784	15	13	15
***PP5MQ**	**28**		**613,536**	**1663**	**28**	**104**
***PX2E**		**"**	**521,227**	**1504**	**31**	**102**
			(Op: PY2QD)			
*PY2SBY		"	419,520	1206	31	107
*PY2XAT		"	324,000	948	32	112
*PY4DBU		"	202,492	662	26	98
*PY2DJH		"	114,954	524	23	79
*PR8RZJ		"	80,550	343	23	67
*PU2RFA		"	45,510	276	21	53
*PU2TES		"	44,678	244	26	63
*PY1SX		"	44,034	138	27	96
*PU7EEL		"	33,670	193	14	60
*PY5DC		"	19,856	129	19	54
*PY1AFS		"	5,680	59	15	25
*PR7HT		"	364	10	6	8
*PU5PLG		"	192	9	4	8
*PR7KV		"	180	10	4	6
***ZV2V**	**21**		**521,568**	**1507**	**35**	**109**
			(Op: PY2LED)			
*PP1CZ		"	73,392	335	23	65
*PT2PC		"	38,500	168	28	82
*PY2OF		"	30,970	312	17	21
*PY3AJB		"	11,814	76	22	44
*PY4NF		"	976	31	8	8
***PR7QI**	**14**		**144,433**	**573**	**22**	**75**
*PP2RON		"	115,440	402	24	80
*PY2EDY		"	6,096	72	14	34
*PY7BEL		"	4,428	54	14	22
*PY5TJ	7		100	16	4	4
CHILE						
XR1X		**A**	**2,072,640**	**1976**	**104**	**304**
			(Op: XQ1IDM)			
CE3CDV		"	519,552	754	88	176
CE6SAX		"	92,125	332	50	75
CE4Y	**28**		**1,046,061**	**2517**	**35**	**118**
			(Op: CE4FXY)			
CE6BDN		"	1,166	24	11	11
CE2CQB	21		11,985	105	16	31
CE3NR	7		27,531	190	22	41
***CE4U**		**A**	**4,049,472**	**3948**	**108**	**260**
			(Op: CE4USW)			
*XR5A		"	42,513	161	44	67
				(Op: XQ5SM)		
*CE4MLN		"	100	3	3	3
*CE3LAR		"	80	11	10	10
***CA2VDQ**	**28**		**183,173**	**673**	**30**	**83**
*XQ1ZW		"	71,176	471	21	41
*CA6VMR		"	1,040	26	12	14
*CE4P	7		12,336	128	21	27
				(Op: CE4PBB)		
COLOMBIA						
HK2JFF/3	28		20,262	184	22	44
HK3JJH	**21**		**681,392**	**1803**	**33**	**115**
***HK6PSG**		**A**	**113,538**	**294**	**51**	**98**
*HK6IUI		"	6,144	72	23	41
*HK3BRK	28		2,184	24	11	23
ECUADOR						
***HC1JQ**	**28**		**1,087,380**	**2113**	**38**	**142**
GALAPAGOS ISLANDS						
HC8A	**28**		**3,916,600**	**6957**	**39**	**161**
				(Op: N6KT)		
HC8Z	**21**		**2,657,718**	**5043**	**38**	**151**
				(Op: HC1OT)		
PARAGUAY						
ZP5VAY		**A**	**632,352**	**1234**	**64**	**160**
ZP2W		"	268,498	735	44	105
				(Op: ZP5CGL)		
ZP8Y	**28**		**223,504**	**764**	**31**	**91**
				(Op: ZP6DEM)		
PERU						
OA4BA		**A**	**1,535,436**	**1697**	**88**	**236**
OA4SS	**21**		**757,516**	**1762**	**33**	**116**
TRINIDAD & TOBAGO						
9Y4TBG	**7**		**813,654**	**1870**	**33**	**120**
				(Op: DL4MEH)		
***9Z4DZ**	**21**		**457,919**	**1287**	**32**	**101**
URUGUAY						
CX5BW	**28**		**1,380,672**	**3662**	**34**	**119**
***CX9AU**		**A**	**1,273,584**	**1518**	**95**	**217**
*CX7BF		"	308,342	936	52	99
***CX2TG**	**28**		**668,712**	**1891**	**28**	**104**
***CX2AM**	**21**		**339,416**	**923**	**35**	**119**
VENEZUELA						
YV1EJ	**21**		**42,536**	**329**	**23**	**81**
YY5OHI	**7**		**148,521**	**689**	**18**	**75**
YY5OIG		"	9,200	106	13	27
***YW3B**		**A**	**449,085**	**673**	**70**	**203**
				(Op: YV3BKC)		
*YV5JBI		"	159,803	233	70	189
***YV4BK**	**28**		**118,602**	**641**	**24**	**75**
*YV7QP	21		7,399	59	15	34
QRP						
P4ØB		**A**	**2,326,288**	**2440**	**93**	**254**
				(Op: P43P)		
LY5A		**"**	**1,953,068**	**1812**	**121**	**477**
				(Op: LY2PAJ)		
VE3KZ		**"**	**1,420,482**	**1228**	**97**	**337**
TI5X		**"**	**1,400,424**	**1829**	**95**	**249**
				(Op: NØKE)		
F5BEG		**"**	**1,195,000**	**1292**	**106**	**372**
LY1DT		**"**	**973,080**	**1340**	**100**	**359**
WE1USA		**"**	**764,160**	**757**	**96**	**288**
				(Op: WA1LNP)		
S54AA		**"**	**682,550**	**840**	**94**	**331**
JR4DAH		**"**	**647,496**	**888**	**86**	**190**
SP8NR		**"**	**637,857**	**851**	**86**	**293**
HG5Z		**"**	**618,896**	**1042**	**84**	**292**
				(Op: HA1CW)		
S59D		"	553,815	897	83	314
UU4J		**"**	**543,756**	**1022**	**85**	**251**
				(Op: UU4JO)		
SM3C		**"**	**480,036**	**913**	**71**	**256**
				(Op: SM5CCT)		
RV3QX		**"**	**403,650**	**862**	**73**	**252**
SP3OL		**"**	**386,309**	**759**	**78**	**241**
YU1LM		**"**	**380,556**	**868**	**60**	**219**
K7HBN		**"**	**348,764**	**501**	**78**	**169**
VK4WPX		**"**	**343,804**	**624**	**62**	**140**
LU1VK		**"**	**341,770**	**566**	**75**	**164**
K8ZT		**"**	**322,438**	**481**	**61**	**202**
KKØQ		**"**	**310,968**	**503**	**78**	**174**
KB3TS		**"**	**305,606**	**453**	**61**	**202**
W1AMF		"	287,912	448	60	172
W3GK		"	266,151	453	57	180
DF1DX		**"**	**210,080**	**498**	**56**	**146**
IK5RUN		**"**	**208,266**	**374**	**79**	**230**
SN2E		"	199,000	512	58	192
				(Op: SP2EWQ)		
SP9RQH		"	175,826	367	68	198
UA4YJ		"	172,032	533	50	174
CT1DYV		**"**	**161,389**	**396**	**54**	**145**
N1TM		"	132,864	261	54	138
EA1GT		"	118,584	394	48	135
OK2ZAW		**"**	**115,379**	**397**	**46**	**141**
LZ2FM		**"**	**110,536**	**363**	**48**	**161**
OK2PLK		"	106,488	394	45	171
KQ4YY		**"**	**91,657**	**242**	**45**	**106**
G3FNM		**"**	**77,328**	**389**	**35**	**109**
SM5ARL		"	76,220	213	52	133
GM4HQF		**"**	**71,995**	**307**	**31**	**88**
9A2EY		**"**	**68,816**	**334**	**98**	**136**
N8XA		"	60,847	186	39	95
AA2BN		**"**	**57,155**	**186**	**28**	**87**
YO4BII		**"**	**54,813**	**204**	**45**	**106**
RZ3QY		"	43,680	191	43	113
EA3FHP		"	42,721	211	27	92
UT5ECZ		"	40,869	255	37	134
OK1AIJ		"	36,918	249	24	102
YO4ZL		"	35,644	203	36	97
WA3NKO/4		"	34,790	126	26	72
G4JZO		"	32,680	236	23	72
YO4AAC		"	31,940	219	28	91
KG4CHX		"	29,999	117	42	89
HB9AYZ		**"**	**27,201**	**168**	**30**	**80**
N7ZG		"	26,496	143	29	40
NQ7X		"	22,616	113	36	52
GM4ELV		"	20,995	133	15	64
UAØKCL/3		"	20,895	97	37	69
K2WX		"	17,424	114	19	53
W3MGL		"	17,220	88	24	60
RW9UDD		"	10,494	232	21	32
HS9EQY		**"**	**9,590**	**72**	**31**	**39**
EA6BB		**"**	**9,396**	**106**	**20**	**67**
EA5BAO		"	8,648	71	30	64
OQ7CC		**"**	**8,118**	**119**	**14**	**52**
				(Op: ON7CC)		
RV9WP		"	7,770	79	29	41
US5IND		"	5,811	80	71	93
DL2YET		"	5,663	83	17	38
DHØJAE		"	4,896	36	21	27
SP2JHJ		"	4,784	41	20	32
JA1PTO		"	2,640	33	19	21
AAØXJ		"	1,254	31	14	19
SP2QVS		"	1,214	28	14	26
K1ZZ		"	837	23	11	16
KG4NXP		"	525	17	11	14
K9IUA/Ø		"	192	12	5	7
W2JEK		"	77	5	3	5
JR3RWB	**28**		**229,749**	**660**	**34**	**95**
NA4CW		**"**	**202,150**	**562**	**29**	**101**
GØKDS		**"**	**143,716**	**533**	**27**	**95**
S57MSU		**"**	**133,632**	**537**	**29**	**87**
PA3ELD		**"**	**132,278**	**501**	**28**	**90**
YL2PP		**"**	**130,290**	**494**	**29**	**100**
N4IJ		"	95,200	373	24	76
SP4GFG		**"**	**93,192**	**333**	**30**	**102**
EA4TA		**"**	**80,190**	**373**	**28**	**82**
LW7DQW		**"**	**68,820**	**357**	**20**	**54**
WAØVBW		**"**	**59,189**	**241**	**22**	**73**
LU6DTS		"	58,464	429	17	31
NO9Z		**"**	**54,872**	**254**	**18**	**58**
N6WR		**"**	**50,484**	**221**	**24**	**60**
UR5FAI		**"**	**46,640**	**320**	**26**	**62**
LU2HNP		"	42,849	238	21	60
WA6FGV		"	35,713	192	22	49
K6III		"	30,804	168	21	47
CT1ELF		**"**	**29,808**	**213**	**19**	**53**
UT4EO		"	24,825	191	20	55
KR1ST		**"**	**13,456**	**85**	**11**	**47**
EC7AMD		"	12,282	140	15	31
SP1EK		"	9,653	97	17	32
YO4RSS		"	1,395	31	9	22
YO3KYO		"	296	18	4	8
CT1GVN		"	288	14	5	11
VE7DDR		"	255	17	7	8
JQ1AWC		"	150	9	3	7
K6MI		"	6	1	1	1
JL7BRH	**21**		**104,830**	**361**	**32**	**78**
GMØIIO		**"**	**47,718**	**316**	**24**	**75**
UR5SFX		**"**	**27,452**	**237**	**19**	**63**
RN6FO		**"**	**19,908**	**274**	**21**	**63**
LA4OGA		**"**	**5,386**	**116**	**11**	**40**
7K3AAC/2		"	49	3	3	3
JAØYCD		"	26	3	3	3
PA3DAT		"	6	2	1	2
KP4KE	**14**		**315,326**	**1150**	**28**	**93**
EA2CAR		**"**	**202,502**	**708**	**32**	**114**
RWØAR		**"**	**73,937**	**272**	**26**	**81**
KU1CW/Ø		**"**	**68,640**	**241**	**34**	**98**
LY5G		**"**	**66,025**	**524**	**20**	**75**
SP3BLT		**"**	**65,300**	**435**	**22**	**78**
ES1CW		**"**	**50,508**	**296**	**30**	**92**
N7IR		**"**	**45,656**	**180**	**30**	**74**
YT1CS		**"**	**45,479**	**354**	**19**	**70**
LT2D		**"**	**44,451**	**187**	**28**	**71**
				(Op: LU3DR)		
OH7FF		**"**	**24,430**	**202**	**17**	**53**
W6CN		**"**	**17,325**	**92**	**22**	**53**
SV1COT		"	8,632	132	13	39
LU5FZ		"	2,414	31	13	21
EA2CR		"	819	29	5	16
T94DO	**7**		**28,107**	**298**	**12**	**69**
W6QU		**"**	**5,360**	**58**	**14**	**26**
				(Op: W8QZA)		
DL1DQY		**"**	**5,262**	**84**	**11**	**47**
IK5WGK		"	736	27	5	17
YT7TY	**3.7**		**26,841**	**389**	**10**	**59**
UN4L		**"**	**18,650**	**164**	**11**	**39**
UA9AT		**"**	**15,150**	**118**	**10**	**40**
OK1IR		**"**	**10,914**	**221**	**6**	**45**
OK1IF		"	10,710	223	7	44
T91ATC		"	1,960	78	5	23
				(Op: T95DTC)		
DF2FM		"	132	12	3	9
ASSISTED						
NORTH AMERICA						
UNITED STATES						
KI1G		**A**	**8,053,315**	**3768**	**168**	**617**
N1DG		**"**	**3,029,982**	**1618**	**144**	**534**
K1JN		**"**	**3,020,742**	**1845**	**127**	**466**
N8RA/1		"	2,465,100	1617	125	415
NR1DX		"	2,204,112	1429	123	441
K1JE		"	2,062,452	1436	114	402
K2TE/1		"	2,022,744	1311	133	489
AA1V		"	1,893,381	1126	136	473
N1EU		"	1,890,746	1137	135	466
N1JP		"	1,846,086	1373	110	388
N1RK		"	1,720,670	1225	124	399
KK1DX		"	1,496,574	982	122	427
W1UK		"	1,449,238	1236	95	332
K1GU		"	1,326,249	1061	100	347
N1HRA		"	1,323,304	1184	106	318
KE1IH		"	1,316,997	1029	105	372
K1RV		"	1,280,370	1000	109	360
W1RY		"	1,194,308	918	112	396
WO1N		"	1,009,296	770	117	372
N1RJF		"	985,120	930	77	299
WV1M		"	936,387	787	107	332
KK1H		"	879,840	895	90	286
N1NQD		"	820,479	570	131	398
WJ1Z		"	687,913	635	106	333
N1AU		"	678,146	602	99	314
W1NG		"	563,750	462	100	351
N1IBM		"	546,966	578	94	284
K1TW		"	433,716	539	69	213
K1KU		"	284,500	487	56	194
W1QK		"	239,766	348	73	194
N4XR/1		"	219,681	296	84	233
W1DAR		"	160,008	275	54	172
W1BK		"	152,975	292	49	162
K1TH		"	93,626	210	42	127
N1CPC		"	84,331	231	39	130
W1JR		"	68,775	171	54	121
WA1ZYX		"	58,437	164	31	98
KB1FTX		"	39,932	191	49	100
KD1EA		"	30,888	104	34	83
W1DY	21		3,738	38	15	27
K2NG		**A**	**4,674,285**	**2190**	**168**	**613**
W1GD/2		**"**	**3,983,532**	**2119**	**144**	**514**
K2PS		"	3,643,350	2050	139	503
N2MM		"	3,627,008	2142	146	498
W2WB		"	2,299,126	1383	153	509
K2SX		"	1,921,980	1461	112	403
W2YC		"	1,862,685	1260	127	456
NA2NA		"	1,635,928	1346	96	350
W2TV		"	1,546,512	1055	122	406
AA2FB		"	1,351,299	1144	103	350
K2ONP		"	1,174,950	992	108	342
K2UT		"	1,044,164	927	95	323
W2YR		"	904,779	759	115	324
N3RG/2		"	818,090	867	90	287
N2UM		"	675,216	598	100	332
KA2D		"	618,310	623	85	280
N2BA		"	552,660	671	79	226
K2NV		"	536,598	601	78	264
K2EP		"	525,382	564	88	246
K2QMF		"	507,501	590	71	250
N2CY		"	439,264	428	83	288
WK2H		"	363,275	506	59	216
K2MP		"	357,210	500	70	200
WA3RHW/2		"	329,708	425	77	201
KV2M		"	316,762	467	53	198
N2NI		"	128,640	261	48	144
N2CQ		"	127,000	236	44	156
KD2P		"	107,200	217	60	140
KF2O		"	84,584	149	77	141
W2RD	**28**		**617,192**	**1267**	**36**	**143**
K3WW		**A**	**6,836,410**	**3326**	**165**	**604**
N3RR		**"**	**5,059,152**	**2431**	**158**	**598**
AA3B		"	4,011,739	2293	131	488
KQ3F		"	3,617,074	2092	136	478
K3PP		"	3,267,612	1844	147	506
W3FV		"	2,910,600	1784	138	456
N3AM		"	2,499,272	1556	128	450
K3NZ		"	2,285,130	1320	147	486
W3GM		"	1,749,330	1116	132	426
					(Op: K3ND)	
WT3W		"	1,738,928	1300	115	387
W3MF		"	1,719,096	1249	112	386
N3HF		"	1,686,528	1157	123	426
N3ZA		"	1,654,203	1057	132	447
N3DL		"	1,472,967	1018	125	424
K3JG		"	1,416,196	1098	110	377
N2WKS/3		"	1,341,360	935	131	421
WT3P		"	1,270,962	995	99	363
W3EKT		"	1,188,368	953	114	400
N3NA		"	1,168,975	895	116	359
WB3CIW		"	1,051,764	1091	82	317
W3OV		"	1,013,526	911	95	316
NN3Q		"	994,896	843	100	332
W3UJ		"	908,208	857	93	315
K3ZV		"	739,872	805	77	259
W3OU		"	700,158	742	96	270
N3KF		"	677,787	596	101	336
WW3S		"	633,975	731	78	243
KB3MM		"	571,095	639	74	259
K3CP		"	566,470	587	87	283
NY3C		"	492,480	572	78	242
W3HVQ		"	482,160	523	110	282
W3MR		"	379,392	459	76	236
KU3X		"	339,696	488	67	185
W8FJ/3		"	304,975	424	62	213
AA3JU		"	300,204	425	66	203
NE3H		"	244,755	425	64	181
K3TLP		"	203,364	343	70	182
N3GPU		"	193,500	340	72	143
W3VT		"	158,922	304	52	166
W3KHZ		"	109,417	222	73	130
NZ3O		"	48,042	114	42	111
NB3I		"	15,762	110	25	49
W3BG		"	14,964	72	25	61
W4NF		**A**	**3,688,043**	**2246**	**133**	**466**
K1PT/4		**"**	**2,093,868**	**1340**	**134**	**454**
K3SV/4		"	1,955,619	1212	129	462
W4RM		"	1,727,594	1768	91	327
K4YT		"	1,685,988	1299	118	348
N4GG		"	1,043,550	890	100	350
K7SV/4		"	941,818	829	109	334
K3KO/4		"	926,386	741	117	362
AA4GA		"	743,015	589	109	346
N4VV		"	693,076	736	85	241
K4JAF		"	282,564	365	81	253
KE1F/4		"	213,408	410	59	169
AD4IE		"	162,240	334	50	142
K4KR		"	54,937	151	41	96
K8YC/4		"	44,940	139	44	96
W4UFO		"	44,730	138	43	99
KØLUZ/4	**28**		**377,226**	**810**	**35**	**136**
KO4MR		"	106,403	201	38	149
KG4FVL		"	3,094	32	12	22
W4FDA	**21**		**236,384**	**483**	**37**	**141**
NJ2F/4		"	101,864	276	31	105
N5JR		**A**	**3,080,322**	**1830**	**144**	**465**
KØGEO/5		"	692,832	744	84	252
K5LP		"	486,918	504	95	286
AB5K		"	474,308	620	83	200
K5HDU		"	13,440	94	32	64
W5ZO	**28**		**362,736**	**796**	**36**	**140**
N5MT		"	271,180	532	39	143
NX5M	1.8		1,334	30	8	15
N6WS		**A**	**1,520,820**	**1102**	**124**	**386**
KI6T		**"**	**1,238,295**	**978**	**125**	**340**
N6IC		"	862,773	843	121	296
W6TK		"	809,930	843	103	267
N6CCL		"	768,526	746	106	280
W6FRH		"	339,144	414	100	212
N6OU		"	319,956	435	83	210
KJ6RA		"	253,742	347	96	193
K6EP		"	236,344	342	77	171
K6ACZ		"	214,758	344	75	171
WZ6Z		"	187,048	314	66	161
K6XX		"	136,480	315	58	102
NF6R		"	6,227	44	22	36
KA6BIM	**28**		**429,824**	**912**	**39**	**145**
W6RKC		"	1,984	24	12	20
W7OM		**A**	**811,408**	**873**	**102**	**274**
K7BTW		**"**	**730,065**	**789**	**97**	**260**
W7IJ		"	650,480	676	92	254
K7LJ		"	573,500	559	107	263
W7MCU		"	317,117	388	107	230
K7ABV		"	313,775	451	88	187
W7BJB		"	298,368	429	81	178
W7DNS		"	281,873	420	76	175
W7BX		"	135,880	253	69	146
W7ZR	**28**		**402,318**	**792**	**39**	**147**
K7OX		"	271,124	650	37	124
NV7A		"	261,274	611	39	130
				(Op: K5RC)		
WJ7R		"	63,835	263	27	58
N8TR		**A**	**3,244,500**	**1678**	**152**	**548**
N8BJQ		**"**	**2,156,253**	**1435**	**127**	**416**
KV3R/8		"	1,956,069	1370	124	389
N8SHZ		"	254,254	349	71	215
WO9Z		**A**	**1,113,740**	**942**	**115**	**351**
KI9A		"	805,120	875	101	269
WA9TPQ		"	374,077	424	90	251
AE9YL		"	166,448	299	57	145
W9GIG		"	145,702	216	78	185
N9LF		"	34,352	117	40	73
K9OSH		"	4,335	38	24	27
N9LCR	**28**		**309,070**	**715**	**34**	**121**
N2WW/Ø		**A**	**1,898,715**	**1375**	**132**	**403**
KØOB		**"**	**1,063,104**	**887**	**112**	**340**
WB8ZRL/Ø		"	603,165	549	103	292
WØTM		"	538,206	620	99	232
AKØM		"	475,566	529	98	240
WØTT		"	202,470	335	67	188
NØXB		"	111,780	271	67	113
WØRSR		"	75,192	174	44	112
KØPC		"	73,416	181	49	103
WØDET		"	27,984	133	33	73
AEØQ		"	9,694	50	31	43
ACØX		"	4,557	34	15	34
KNØL		"	3,510	41	24	30
NEØP	28		109,080	376	28	92
CANADA						
VE3EJ		**A**	**11,080,260**	**5029**	**178**	**674**
				(Op: N5TJ)		
VE9FX		"	447,480	538	82	248
VE6LB	28		57,618	231	29	70
VY2MGY/3	3.7		17,752	358	8	20
VA6DXR		"	7,774	75	16	30
				(Op: VE6JY)		
VY2ZMM	**1.8**		**47,369**	**372**	**12**	**55**
MEXICO						
XE1KK		**A**	**1,978,240**	**1541**	**142**	**420**
ASIA						
ASIATIC RUSSIA						
UA9AM		**A**	**5,660,354**	**3751**	**138**	**440**
RVØAR		"	425,980	466	96	265
UAØAGI		"	346,086	526	99	207
JAPAN						
JR1AIB		**A**	**2,770,846**	**2470**	**143**	**351**

7L4IOU	*	555,324	701	108	200
JA3YPL	*	505,716	710	84	184
			(Op: JJ3TBB)		
JA3OLO	*	225,398	344	81	170
JF2SKV	*	116,320	328	64	96
JI1EFP	*	89,110	347	40	55
7M4KRX	*	77,972	190	69	133
JA7OWD	**28**	**1,030,176**	**2349**	**37**	**131**
JH4UTP	*	380,820	1230	35	97
JA9XBW	*	253,281	629	36	111
JH1OAI	*	190,146	521	34	100
JH6WHN	*	30,646	173	26	51
JL3VUL	**21**	**342,207**	**916**	**32**	**109**
JQ1NGT	*	100	401	35	84

UK BASES ON CYPRUS

ZC4DW	**A**	**273,600**	**632**	**37**	**113**

EUROPE

ALAND ISLANDS

OHØNA	A	3,168	70	9	41
OHØA	**28**	**980,343**	**2422**	**39**	**150**
			(Op: OH4XX)		

AUSTRIA

OE4C	**A**	**4,128,725**	**3293**	**147**	**544**
			(Op: OE1DIA)		
OE1TKW	*	16,800	89	37	63
OE9Y	**14**	**889,836**	**2644**	**38**	**136**
			(Op: OE9MON)		

BELGIUM

OQ1T	**A**	**6,796,680**	**3664**	**166**	**647**
			(Op: RA3AUU)		
OQ7NQ	*	1,441,020	1334	99	339
			(Op: ON7NQ)		
OQ1Z	**28**	**1,051,856**	**2574**	**36**	**133**
			(Op: ON4AMX)		
OQ6NL	*	873,448	1970	40	144
			(Op: ON6NL)		
OQ6CC	**21**	**731,783**	**1847**	**37**	**144**
			(Op: ON6CC)		
OT1L	**7**	**297,528**	**1181**	**29**	**103**
			(Op: ON4AKL)		
ON4AEK	**3.7**	**131,222**	**1213**	**20**	**83**

CROATIA

9A2W	**A**	**841,617**	**1041**	**100**	**327**
			(Op: 9A4KW)		
9A7D	**28**	**876,764**	**2208**	**38**	**135**
			(Op: 9A3HX)		
9A5W	**21**	**1,024,480**	**2855**	**38**	**152**

CZECH REPUBLIC

OK2FD	**A**	**3,843,774**	**2689**	**150**	**569**
OK1FDY	*	558,145	787	100	331
OK2ZJ	*	299,460	540	70	206
OK1MU	**28**	**1,527,417**	**3437**	**37**	**136**
OK2BXU	**21**	**190,368**	**777**	**31**	**113**

ENGLAND

G4IIY	A	20,394	90	42	57
G5X	**28**	**676,035**	**1782**	**39**	**142**
			(Op: G4RCG)		

EUROPEAN RUSSIA

RX3APM	**A**	**3,324,657**	**2864**	**142**	**509**
RW3DU	*	648,301	1011	93	304
RK3AD	*	39,680	201	35	89
RA6CM	**28**	**1,086,003**	**2817**	**40**	**161**
RA3AJ	*	735,258	1913	40	161
RA3OU	*	212,100	800	34	116

FINLAND

OG4AB	**A**	**3,378,753**	**3281**	**133**	**434**
			(Op: OH4JFN)		
OG6NIO	*	2,178,928	2014	110	386
OG6Y	*	689,728	883	100	316
			(Op: OH6YF)		
OH6QU	*	170,145	339	62	109
OH5NG	*	58,256	203	53	147
OG6NJ	**28**	**457,412**	**1233**	**38**	**135**
OH3BU	**7**	**71,379**	**501**	**21**	**82**

FRANCE

TM2V	**A**	**4,754,568**	**3233**	**133**	**504**
			(Op: F6GYT)		
F6FGZ	*	2,483,096	1870	132	484
F5PHW	28	10,864	97	16	40
TM9R	**21**	**1,090,176**	**2782**	**38**	**154**
			(Op: F5FLN)		

GERMANY

DLØWW	**AA**	**5,813,280**	**3525**	**154**	**580**
			(Op: DK3GI)		
DJ2YA	**"**	**3,618,816**	**2126**	**151**	**593**
DF4RD	**"**	**3,430,336**	**2152**	**148**	**580**
DJ5BV	*	2,782,433	1891	132	521
DK1RP	*	2,167,128	1618	140	492
DL4RDJ	*	1,919,000	1853	107	368
DF6QN	*	1,569,645	1541	110	385
DF6QV	*	1,182,328	1383	115	376
DL1NEO	*	1,150,546	1292	102	376
DL3EA	*	962,885	975	98	353
DL8AAM	*	796,732	1134	88	321
DF5ZV	*	577,122	656	111	342
DK3WN	*	551,421	1018	81	270
DL8NFU	*	539,220	871	83	297
DJ1TU	*	508,576	707	92	276
DL4RCK	*	496,824	808	85	296
DL8YR	*	489,510	723	86	284
DL5OB	*	470,196	744	92	241
DL9NDV	*	431,250	633	84	261
DL6KAC	*	422,095	648	86	269
DL5XL	*	303,620	425	91	232
DL4MFP	*	238,656	432	74	190
DL2ZAV	*	193,214	406	65	194
DL4DXF	*	149,736	343	59	145
DL6RDE	*	141,910	395	63	167
DJ5AV	*	132,870	258	77	181
DK3QJ	*	97,440	263	64	160
DL6GV	*	81,400	200	59	126
DL9GMN	*	61,686	239	40	109
DL8WX	*	25,080	113	37	77
DK3DM	**28**	**914,144**	**2022**	**40**	**156**
DK5TX	*	521,100	1231	39	141
DK1QH	*	403,168	1042	38	134
DK5JM	*	263,384	810	32	114
DL3BQA	*	118,716	317	36	120
DJ6GK	*	73,632	259	31	87

GREECE

SV1XV	A	68,210	214	52	138

HUNGARY

HA5BSW	**A**	**621,756**	**1051**	**93**	**311**
HA5NG	*	363,132	749	66	196
HG9X	**14**	**1,068,804**	**2971**	**40**	**158**
			(Op: HA9PP)		
HA5PP	**7**	**225,171**	**1320**	**33**	**94**

IRELAND

EI4DW	**28**	**472,512**	**1516**	**29**	**109**

ITALY

IK1RQT	**A**	**970,546**	**1303**	**94**	**279**
IK3OII	*	151,986	312	68	151
IK2SAE	*	7,935	84	24	45
IK3STG	21	61,115	284	22	63
II1H	**14**	**704,006**	**2103**	**37**	**129**
			(Op: I1HJT)		

KALININGRAD

RA2FW	**A**	**338,140**	**719**	**69**	**250**

LATVIA

YL8M	**A**	**4,957,728**	**3516**	**147**	**541**
			(Op: YL2KL)		
YL9W	**28**	**709,222**	**1727**	**40**	**162**
			(Op: YL3DW)		

LITHUANIA

LY2FY	**A**	**3,478,158**	**3027**	**143**	**514**
LY1DR	*	454,977	813	83	286
LY2CX	*	231,546	577	64	158

NORTHERN IRELAND

GI4XSF	**A**	**159,929**	**413**	**55**	**162**
GI4VIV	*	66,051	264	39	140

POLAND

SN3UU	**A**	**689,936**	**940**	**98**	**330**
			(Op: SP3HUU)		
3Z1V	*	126,360	232	80	163
			(Op: SP1MHV)		
3Z6V	*	14,696	88	34	66
			(Op: SP6DVP)		
SP4DGN	**28**	**537,105**	**1452**	**39**	**144**

PORTUGAL

CT1DSJ	**A**	**201,249**	**810**	**44**	**133**

SLOVAK REPUBLIC

OM7PY	A	19,005	70	42	63

SLOVENIA

S5ØA	**A**	**5,860,490**	**3904**	**155**	**515**
S52ZW	**"**	**4,576,662**	**3381**	**137**	**520**
S56A	*	1,642,260	1436	129	477

SPAIN

EA3QA	**A**	**577,258**	**1000**	**94**	**324**
EA3FF	*	438,922	729	78	203
EA5FID	*	267,288	525	67	191
EA5BY	*	85,840	258	44	72
EA3SD	*	85,444	370	49	115
EA1FBJ	*	63,294	346	35	119
EA3IN	**21**	**644,904**	**1895**	**35**	**134**

SWEDEN

SM7E	**A**	**976,393**	**1341**	**90**	**317**
			(Op: SM7BHM)		

SWITZERLAND

HB9HFN	A	975	13	12	13

UKRAINE

UY5ZZ	**A**	**1,855,308**	**2125**	**129**	**417**
UV5U	*	738,078	975	100	322
			(Op: UX1UA)		
UU2JQ	*	4,158	44	22	41
UZ7U	**3.7**	**61,068**	**715**	**14**	**70**
			(Op: UT3UA)		

YUGOSLAVIA

4N1SM	**A**	**2,691,192**	**3178**	**130**	**451**
4O3A	**28**	**860,814**	**2420**	**38**	**133**
			(Op: YT6T)		
YZ3A	**21**	**985,942**	**2613**	**38**	**153**
			(Op: YT6A)		
YT9X	**14**	**746,710**	**2342**	**39**	**139**
			(Op: YU1ZZ)		

SOUTH AMERICA

ARUBA

P4ØP	**A**	**10,224,346**	**5498**	**149**	**500**
			(Op: W5AJ)		

BRAZIL

PY2EX	**A**	**559,584**	**996**	**59**	**142**
PY3DX	*	108,882	266	73	134
PY3FOX	**21**	**565,956**	**1345**	**34**	**124**

MULTI-OPERATOR SINGLE TRANSMITTER

NORTH AMERICA

UNITED STATES

K1KI	**9,036,837**	**4142**	**171**	**646**
KR1G	**8,359,937**	**3826**	**167**	**632**
N1MM	3,753,564	2171	143	509
AA1ON	3,741,740	2329	137	473
KK1L	3,197,258	2328	124	418
W1HR	3,178,728	1894	129	483
N1LN	2,854,770	1946	146	499
K1NU	2,583,684	1647	124	440
K1VV	1,022,307	897	104	325
W1SRG	268,062	421	72	186
W1FY	201,390	364	53	157
N2NU	**7,952,595**	**3847**	**163**	**614**
WE2F	**3,453,672**	**2057**	**139**	**465**
AA2MF	2,701,750	2058	124	411
N2SS	2,465,839	1610	118	439
W2LC	2,106,123	1610	115	374
N2LBR	1,367,244	1078	104	362
W2NNY	974,435	955	94	291
AB2DE	809,259	882	104	307
WB2KHO	728,344	737	87	275
WB2ELW	508,090	610	88	253
WB2JSM	2,982	79	28	43
W2GSB	986	33	11	23
N3RS	**9,090,529**	**3993**	**169**	**664**
K3OO	**3,346,892**	**2069**	**138**	**455**
NE3F	3,279,684	2179	149	525
W3LJ	828,604	781	91	313
W3IQ	683,436	754	77	261
K3BSA	568,431	644	86	247
W3FT	505,703	661	85	256
K4JA	**10,171,848**	**4279**	**176**	**680**
N4PN	**6,493,291**	**3478**	**161**	**552**
W4WS	4,066,855	2295	150	553
N4GN	2,683,261	1613	146	477
K4FK	1,656,248	1548	114	358
W4PRO	1,037,104	890	97	327
W4TE	923,796	1014	97	305
N4SEA	635,364	832	85	248
K4FUN	590,733	702	89	262
WM3T/4	397,782	515	69	218
KA6R/4	201,576	390	60	167
KØUH/4	131,908	286	56	140
N5TW	**5,330,805**	**2905**	**173**	**588**
K5NA	**4,411,666**	**2315**	**165**	**598**
N5YA	3,549,729	2079	157	530
AA5NT	3,397,839	2078	156	543
K5GH	1,048,432	823	125	393
W6TER/5	886,879	853	122	305
N5RLM	139,020	250	56	154
K5BAT	77,292	218	57	114
WA5CHX	50,700	132	42	108
W6EEN	**3,757,512**	**2207**	**151**	**511**
K6ZM	**2,040,104**	**1787**	**130**	**348**
W6NV	1,067,144	1076	117	286
W6YRA	436,848	738	93	211
AF6P	112,896	340	66	130
NK7U	**3,138,120**	**2232**	**144**	**408**
W7VJ	**2,162,114**	**1686**	**141**	**361**
KC7V	937,448	727	120	368
K7UQT	634,410	694	95	247
WX7P	497,384	650	91	225
W7CT	303,366	504	71	162
W6JA/7	55,510	200	35	87
K8AZ	**7,686,915**	**3557**	**175**	**638**
N8BI	1,570,350	1294	110	365
W8HO	392,678	528	68	218
KD9ST	**2,237,625**	**1423**	**138**	**447**
K9ZO	**2,147,522**	**1616**	**141**	**406**
W9YB	559,910	712	88	277
K9CU	443,100	611	74	226
KØRF	**6,225,050**	**3138**	**181**	**604**
NØNI	**5,504,944**	**2740**	**169**	**607**
AE9B/Ø	2,736,475	1709	156	509
NØHF	1,025,725	942	118	327
KGØUS	1,017,828	890	111	330
NØXI	980,208	946	120	312
NØLM	518,126	694	91	220
KØSV	269,748	402	81	173

BAHAMAS

C6AKO	**4,167,904**	**4404**	**103**	**313**

CANADA

VY2SS	**10,623,080**	**5570**	**161**	**645**
VE1JF	**6,234,449**	**3783**	**141**	**526**
VE3RM	**5,639,546**	**3833**	**133**	**445**
VA3SK	4,944,996	3226	140	493
VA3MG	4,737,500	3247	137	488
VE6SV	**4,705,690**	**3560**	**147**	**458**
VE7SV	**4,469,976**	**3561**	**158**	**430**
VE5SF	**4,152,600**	**3303**	**140**	**460**
VE6AO	2,664,496	2714	128	354
VE6FI	2,129,000	2248	126	374
VE7GL	1,987,356	2539	108	246
VO2WL	**849,585**	**1385**	**75**	**210**
VE3MIS	632,415	1008	67	218
VA2TG	600,780	860	72	238
VE7UQ	505,609	678	95	204
VA3OC	352,107	679	65	178
VE9GLF	290,628	461	57	177
VE2CRL	196,100	604	57	155
VA3PRC	94,848	226	63	129

DOMINICA

J75J	**5,562,060**	**5383**	**128**	**364**

HONDURAS

HR3J	**1,690,038**	**2972**	**72**	**166**

NICARAGUA

YN2EJ	**2,282,216**	**2877**	**92**	**254**

PUERTO RICO

WP3F	**177,534**	**778**	**48**	**78**

ST. LUCIA

J6R	**5,522,872**	**4828**	**109**	**363**

TURKS & CAICOS ISLANDS

VP5DX	**14,619,537**	**8415**	**164**	**583**

U.S. VIRGIN ISLANDS

KP2/AA4V	**6,269,846**	**5493**	**133**	**373**

AFRICA

CANARY ISLANDS

EA8ZS	**19,877,260**	**7949**	**177**	**713**
EA8RA	4,421,012	3815	107	345

CAPE VERDE

D44TC	**22,978,944**	**9638**	**178**	**694**

ERITREA

E3ØNA	**12,249,776**	**7108**	**144**	**472**

MADEIRA ISLANDS

CQ9K	**15,178,400**	**7085**	**159**	**641**

ASIA

ASIATIC RUSSIA

RF9C	**10,590,060**	**5101**	**170**	**610**
RT9W	**6,348,186**	**3690**	**150**	**552**
RW9OWD	4,815,828	3889	133	416
RK9CZO	4,341,023	2719	138	463
RZ9SWP	1,912,566	1807	105	348
RK9KWB	841,824	1267	75	221
RK9CYA	112,197	346	40	109

ASIATIC TURKEY

YM3WW	**1,784,994**	**2304**	**74**	**217**

AZERBAIJAN

4K7Z	**2,004,498**	**2289**	**88**	**298**

CHINA

B4R	**1,610,763**	**2602**	**104**	**263**
BY6HF	111,938	597	72	122

CYPRUS

P3A	**19,957,716**	**9370**	**164**	**637**
P39P	856,320	1426	55	185

GEORGIA

4LØG	**7,936,160**	**5941**	**115**	**399**

INDIA

VU3DMP	**312,678**	**566**	**73**	**188**

JAPAN

JE4VVM	**7,919,049**	**4365**	**165**	**522**
JH7PKU	**7,384,858**	**4268**	**157**	**490**
JA7YAA	**6,738,849**	**3739**	**159**	**498**
JK6SEW	**4,666,670**	**3374**	**149**	**417**
JI2ZJS	**4,120,625**	**3382**	**134**	**341**
JJ3YBB	**3,687,400**	**3154**	**136**	**379**
JA1YNE	**2,456,960**	**2177**	**130**	**310**
JI2ZEY	2,277,456	2198	122	286
JH7BZR	1,502,570	1613	114	256
JA2ZJW	1,077,255	1263	103	230
JA7YFB	1,219	22	6	17

KAZAKHSTAN

UPØL	**9,467,385**	**5439**	**147**	**538**

KOREA

HLØO	**638,566**	**1124**	**88**	**190**

KYRGYZSTAN

EX9A	**6,341,069**	**4850**	**131**	**432**

SINGAPORE

9V1YC	**2,914,940**	**2807**	**127**	**343**

TAIWAN

BV5Y	**4,005,190**	**4531**	**113**	**293**

THAILAND

E21EIC	**770,176**	**1165**	**97**	**255**

EUROPE

4U-GENEVA

4U1ITU	**1,013,035**	**1627**	**86**	**297**

AUSTRIA

OE5T	**6,619,734**	**4556**	**146**	**591**
OE75W	7,854	60	25	41

BELARUS

EV5AGB	**2,809,866**	**3605**	**114**	**405**
EW1WZ	1,856,624	1994	117	431
EW1ZR	100	525	50	154

BELGIUM

OT1C	**6,131,290**	**4224**	**145**	**550**
OT1P	4,256,784	3638	128	446
OQ6BR	797,340	1340	88	300
OR5EU	155,264	730	29	99

CRETE

J49Z	**4,592,652**	**4962**	**127**	**437**

CROATIA

9A7A	**10,927,794**	**6472**	**166**	**657**
9A1P	5,763,710	4435	124	466
9A5D	3,451,360	3762	141	451
9A8M	2,383,741	2972	102	347
9A2L	1,994,456	2169	114	422

CZECH REPUBLIC

OK5W	**9,773,643**	**5225**	**173**	**696**
OL5Q	4,179,498	3353	127	487
OL7R	2,988,285	3051	130	485
OL3A	2,750,041	2389	130	459
OK1BNS	2,285,192	2426	115	396
OK1KQH	1,239,546	1419	99	363
OK2KDS	1,033,571	1331	90	343
OK6A	975,456	1254	104	328
OK1KDT	612,870	1083	73	237
OL5DX	127,206	341	61	161
OK5SWL	3,248	46	16	40

DENMARK

OZ5ESB	**1,928,950**	**2322**	**98**	**348**
OZØQ	1,084,876	1654	95	308

ENGLAND

G4UJS	**5,728,970**	**3949**	**135**	**559**
G5W	**4,280,598**	**3903**	**125**	**516**
G6PZ	4,211,636	3279	118	454
G9Q	3,141,548	3542	122	387
G3B	2,210,274	2112	108	441
M4U	895,026	1459	86	296
MØRCA	663,432	1044	85	274

EUROPEAN RUSSIA

RI3A	**4,135,732**	**3919**	**148**	**493**
RK3AWV	**3,082,164**	**3133**	**137**	**476**
RX3RXX	**2,233,944**	**2858**	**121**	**431**
RI4M	1,631,840	2287	118	378
RZ3DZF	1,568,892	2089	122	412
RU6LWT	1,536,834	2118	112	382
RW3WWW	1,276,344	2198	105	351
RK4WWA	1,252,845	1800	115	380
RK6LZS	733,116	1424	92	306
RK6AYN	724,152	1307	97	325
RZ1AWO	669,123	1347	84	303
RM3D	597,888	2046	38	135
RK4HWZ	296,400	645	76	228
RK3DZD	52,542	366	40	99

FINLAND

OG1F	**8,185,924**	**4535**	**170**	**672**
OH5LF	3,890,656	3223	133	483
OH3MMM	1,116,612	1450	113	328
OH2KU	425,600	740	86	218

FRANCE

TM5C	**16,059,708**	**7709**	**171**	**705**
TMØDX	**6,191,227**	**4828**	**147**	**574**
F8KCF	3,957,304	3135	134	542
F6KRK	2,437,840	2522	112	384
F6KTL	2,014,770	2546	112	366
TM5K	1,069,344	1841	88	288
F6KFI	890,352	1179	93	339
F5LJA	497,007	2045	36	125
F5KSE	140,316	538	30	102

GERMANY

DF3CB	**6,800,455**	**3762**	**155**	**630**
DK1MM	**5,829,762**	**3776**	**162**	**624**
DL8OH	5,670,804	3640	154	578
DL5RBK	4,464,525	2801	148	575
DLØGK	4,365,532	2841	147	584
DFØRF	2,182,856	2299	124	432
DL3ABL	1,934,205	1775	119	426
DLØDX	1,416,243	1569	101	356
DL1RYD	1,374,468	1590	118	446
DL3SR	920,298	1116	107	382
DKØFR	905,040	1265	96	336
DL8EAD	267,720	600	58	218

HUNGARY

HG1S	**9,363,442**	**5551**	**161**	**653**

ICELAND				
TF3IRA	**1,695,261**	**3109**	**76**	**235**
IRELAND				
EI7M	**9,563,686**	**6586**	**153**	**605**
EI9E	2,518,862	2507	112	451
ISLE OF MAN				
GD6IA	**6,334,180**	**5322**	**123**	**457**
ITALY				
IR4T	**10,780,497**	**6069**	**163**	**656**
IU2M	**3,934,155**	**3373**	**132**	**483**
IO4T	3,924,678	3239	131	466
IU4U	3,709,332	3027	130	497
IQ0N	1,997,196	2391	104	343
IR3P	1,932,991	1951	127	460
IU2R	1,012,320	1892	61	179
IZØBEE	690,480	1011	88	332
IQ8D	608,268	1158	86	260
IR3A	521,208	908	87	255
IK1YLL	401,170	708	94	291
LATVIA				
YL7C	**2,303,266**	**2246**	**126**	**496**
YL1XN	58,819	358	30	90
LUXEMBOURG				
LX5A	**8,701,072**	**5121**	**153**	**634**
MACEDONIA				
Z39A	**4,868,115**	**4380**	**134**	**519**
MALTA				
9HØWW	**2,125,606**	**3735**	**94**	**333**
MOLDOVA				
ER3R	**1,934,400**	**2707**	**113**	**383**
NETHERLANDS				
PA7MM	**8,197,256**	**4615**	**156**	**638**
PI4CC	4,646,868	3274	141	546
PI4ZOD	452,488	1033	80	267
PA3GDN	446,964	856	70	243
NORWAY				
LA2Z	**1,992,150**	**2399**	**104**	**371**
POLAND				
SN8V	**4,466,406**	**4004**	**129**	**450**
SP5ZCC	2,252,850	2244	117	458
SPØPZK	1,506,362	1715	110	396
SP9PRO	579,852	900	83	268
SP6KFA	196,415	668	52	189
SP9PDG	170,030	438	67	178
SP9KJU	65,208	208	48	102
PORTUGAL				
CQ7O	**5,325,224**	**4893**	**128**	**398**
CQ1CV	1,226,508	1858	82	276
CQ2T	512,383	1087	77	230
CQ4WIN	73,108	317	35	63
SAN MARINO				
T7ØA	**5,336,396**	**5216**	**120**	**413**
SICILY				
IQ9K	**2,403,576**	**3236**	**92**	**307**
IT9FXY	1,555,740	2267	99	331
SLOVAK REPUBLIC				
OM8A	**11,055,402**	**6414**	**160**	**641**
OM7M	7,675,529	4433	167	654
OM3A	7,567,314	4709	162	604
SPAIN				
EA1EEY	**6,931,386**	**4587**	**142**	**551**
ED1BD	**3,057,413**	**3402**	**109**	**324**
EA1BAP	2,902,784	2989	102	362
EA1COZ	2,533,056	2605	116	358
EA5FKX	2,515,484	2633	122	441
EA4RKU	1,333,446	1762	92	284
ED1CL	1,256,427	1745	89	322
EA1BP	1,127,784	1715	81	262
EA1AYU	549,858	1065	79	260
EA1FCI	495,924	974	73	216
ED2WWW	460,692	1090	50	151
EA1FCR	425,750	822	71	254
EA7UR	371,520	893	64	206
EA4TD	256,641	582	56	175
EA2BNU	198,492	452	61	177
ED4URJ	98,658	439	47	156
SWEDEN				
SK3W	**9,057,510**	**5239**	**163**	**607**
SL2ZA	776,488	1094	91	313
SKØCC	736,980	1142	101	325
SK6NL	367,136	801	72	236
SK2TP	274,089	827	51	160
SK7IJ	257,382	580	64	173
SK2GJ	11,050	75	26	39
SWITZERLAND				
HB9H	**5,771,480**	**3781**	**145**	**570**
HB9OK	2,201,112	2760	97	359
UKRAINE				
UU7J	**7,420,005**	**5299**	**171**	**666**
UR4PWC	206,114	563	64	193
UR4ZYD	47,422	292	35	96
UT4UWC	13,944	150	23	61
WALES				
GW7X	**967,270**	**1557**	**83**	**311**
YUGOSLAVIA				
YU7AJM	233,961	527	68	205
YU1INO	12,960	145	21	60

OCEANIA

AUSTRALIA				
VK6ANC	**998,562**	**1268**	**87**	**195**
VK4DZ	358,956	735	72	105
VK1MJ	316,710	449	95	175
EAST MALAYSIA				
9M6TBT	**905,993**	**1507**	**87**	**166**
GUAM				
AH2R	**8,600,706**	**5035**	**157**	**461**
NEW ZEALAND				
ZL6QH	**1,212,727**	**1550**	**103**	**190**
PHILIPPINES				
DX1E	**265,454**	**768**	**56**	**78**
WESTERN SAMOA				
5WØMO	**1,506,162**	**1715**	**122**	**205**

SOUTH AMERICA

ARGENTINA				
LRØN	**5,153,464**	**3762**	**133**	**435**
L8ØAA	2,296,182	2806	90	232
LU4DRC	1,134,712	1729	89	179
LU1BJW	1,018,420	1561	74	186
LU5EML	820,995	2091	32	115
L78H	26,144	167	25	51
BRAZIL				
PQ2Q	**4,744,042**	**3703**	**121**	**370**
PV7BZ	**4,644,684**	**3941**	**105**	**339**
PY2AA	**4,540,401**	**3366**	**128**	**371**
ZY2Y	2,333,825	2670	83	242
PT2CM	1,647,780	2329	81	209
PY2ZR	396,898	814	55	136
FERNANDO DE NORONHA				
ZXØF	**17,996,910**	**8497**	**166**	**619**
FRENCH GUIANA				
FY5KE	**17,980,494**	**8589**	**153**	**596**
NETHERLANDS ANTILLES				
PJ2Z	**17,008,011**	**8166**	**166**	**587**
URUGUAY				
CX5BBR	**587,692**	**1660**	**31**	**108**

MULTI-OPERATOR MULTI-TRANSMITTER

NORTH AMERICA

UNITED STATES				
KC1XX	**23,653,668**	**9593**	**188**	**776**
W3LPL	**19,627,648**	**8197**	**188**	**756**
K9NS	**17,595,136**	**7886**	**185**	**699**
N2RM	**14,355,198**	**6460**	**173**	**685**
N4TO	**11,584,616**	**5717**	**172**	**652**
W4MYA	**11,345,644**	**5289**	**180**	**682**
W1FJ	**10,367,082**	**4600**	**173**	**664**
W2AX	9,426,780	4750	161	598
W4KZ	9,389,820	4876	173	647
W3PP	9,308,000	4543	163	637
K1RX	9,275,788	4503	164	632
W6KK	**9,237,194**	**4816**	**178**	**600**
K1TTT	8,809,115	4405	169	636
KB1H	7,951,116	3814	163	631
N4RV	7,825,572	3882	161	586
N6RO	7,277,718	4468	175	544
K3NM	7,039,139	4172	150	553
K2RD	6,870,815	3270	158	605
KV1W	6,014,464	3276	151	540
W8ZA	5,835,904	3250	155	563
AA1K/3	4,714,812	2398	156	576
K3ANS	4,706,080	2792	150	520
K3II	4,674,728	2735	142	487
W2CG	4,470,004	2626	142	489
NY6DX/1	2,471,031	1617	132	461
K6IDX	2,131,282	1344	144	442
W3GNQ	2,121,336	1635	129	423
K3DI	2,096,640	1433	130	430
KTØR	1,991,314	1482	125	426
AK3Z	957,348	949	101	292
KC1F	826,400	749	95	305
W5OK	517,890	718	77	228
K6NO	354,654	483	83	223
ALASKA				
KL7Y	**21,485,088**	**12445**	**171**	**558**
KL7RA	**15,222,240**	**9778**	**149**	**511**
ANGUILLA				
VP2E	**44,332,785**	**19214**	**185**	**760**
ANTIGUA				
V26B	**30,364,887**	**15313**	**177**	**684**
BARBADOS				
8P4B	**4,482,618**	**4128**	**106**	**368**
CANADA				
VB2V	**13,687,652**	**9515**	**153**	**485**
VE3DC	5,400,045	3601	146	505
VE9US	4,386,160	3737	111	392
VE5RI	3,777,136	3646	130	354
VE7SCC	1,340,648	1549	107	305
COSTA RICA				
TI8/K4QFF	363,545	774	73	162
GRENADA				
J3A	**13,842,225**	**9193**	**147**	**528**
JAMAICA				
6Y6L	**6,878,022**	**7138**	**129**	**374**
TURKS & CAICOS ISLANDS				
VP5T	**11,741,280**	**8185**	**138**	**472**

AFRICA

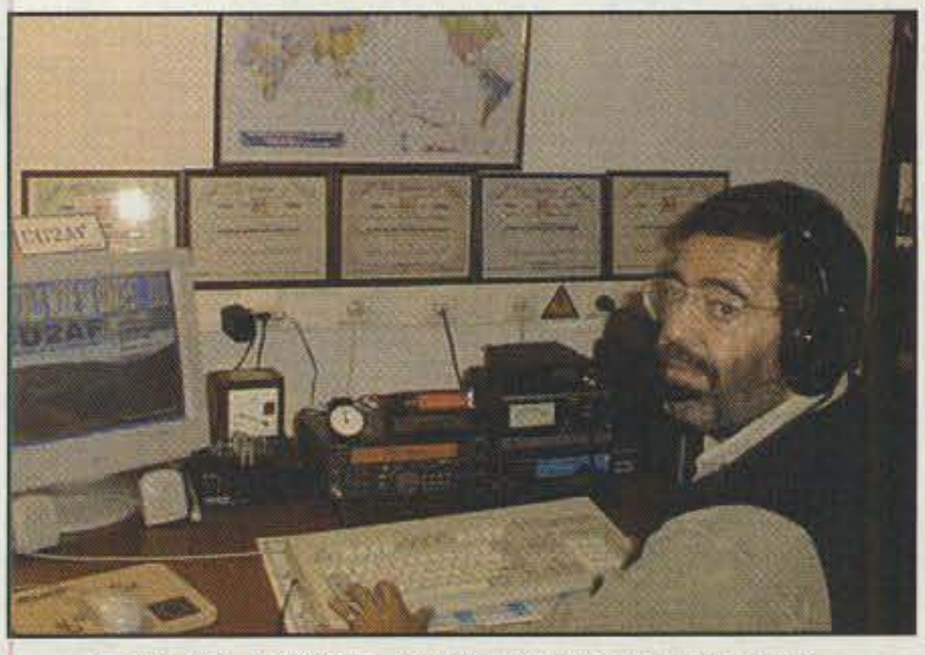
AFRICAN ITALY				
IG9A	**50,060,759**	**18980**	**186**	**773**
IH9P	**46,562,581**	**17724**	**177**	**746**
CHAGOS ISLANDS				
VQ9IO	**4,278,185**	**3197**	**127**	**358**

ASIA

BHUTAN				
A5ØA	**3,646,879**	**3231**	**135**	**388**
JAPAN				
JA3YBK	**13,786,320**	**7111**	**172**	**572**
JA5BJC	**11,454,498**	**6273**	**167**	**530**
JA1YPA	**7,553,772**	**4821**	**158**	**478**
JA7YRR	**6,334,237**	**4544**	**160**	**451**
JA6ZPR	**3,124,786**	**3131**	**125**	**302**

EUROPE

BELGIUM				
OT1A	**19,597,131**	**11466**	**181**	**728**
BULGARIA				
LZ9W	**6,121,876**	**4917**	**155**	**584**
CZECH REPUBLIC				
OL7W	**7,271,880**	**5405**	**151**	**619**
OL5T	3,305,625	3620	135	510
DENMARK				
XP1AB	**14,924,286**	**10354**	**139**	**459**
ESTONIA				
ES9C	**15,182,700**	**9467**	**181**	**703**
EUROPEAN RUSSIA				
RU1A	**20,099,454**	**11523**	**191**	**751**
RK3DWH	373,472	561	93	259
FINLAND				
OH2U	**19,883,163**	**10702**	**184**	**749**
GERMANY				
DFØHQ	**19,858,774**	**11137**	**190**	**759**
DL2ARD	6,295,077	4243	145	568
DH4JQ	4,369,626	4073	129	537
HUNGARY				
HG6N	**15,546,030**	**10024**	**165**	**670**
KALININGRAD				
RW2F	**21,717,810**	**12288**	**194**	**748**
LIECHTENSTEIN				
HBØ/HB9AON	**7,329,168**	**6510**	**131**	**530**
LITHUANIA				
LY7A	**11,746,047**	**8499**	**166**	**655**
NETHERLANDS				
PI4COM	**10,825,905**	**7334**	**157**	**650**
POLAND				
SP3KFH	**2,766,960**	**2459**	**134**	**406**
SP7PGK	1,220,120	1260	107	410
SP9KDA	283,754	859	77	260
SARDINIA				
ISØA	**950,880**	**1858**	**84**	**336**
SCOTLAND				
GM2T	**4,276,044**	**4523**	**114**	**434**
GMØB	**3,405,285**	**3384**	**123**	**462**
SHETLANDS				
GZ7V	**8,492,334**	**5826**	**152**	**601**
SPAIN				
EA4URE	**8,003,755**	**7067**	**152**	**603**
ED7VG	2,027,634	2374	109	374
SWEDEN				
SK6D	**1,050,248**	**1965**	**88**	**336**
UKRAINE				
UTØAZA	**2,165,760**	**3307**	**106**	**374**
UX8IXX	272,240	1709	91	324
YUGOSLAVIA				
YZ7W	**2,605,394**	**3136**	**117**	**425**



Eduardo, CU2AF, put the Azores on the map.

OCEANIA

BELAU				
T88CC	**17,593,920**	**9539**	**165**	**491**
INDONESIA				
YEØZQT	14,937	147	19	22
PHILIPPINES				
DX1DBT	**570,780**	**1113**	**80**	**130**
SOUTH COOK ISLANDS				
ZK1CG	**2,934,165**	**2886**	**116**	**251**

SOUTH AMERICA

ARGENTINA				
LT1F	**8,923,758**	**7113**	**141**	**406**
LU4FM	**8,067,360**	**6323**	**139**	**421**
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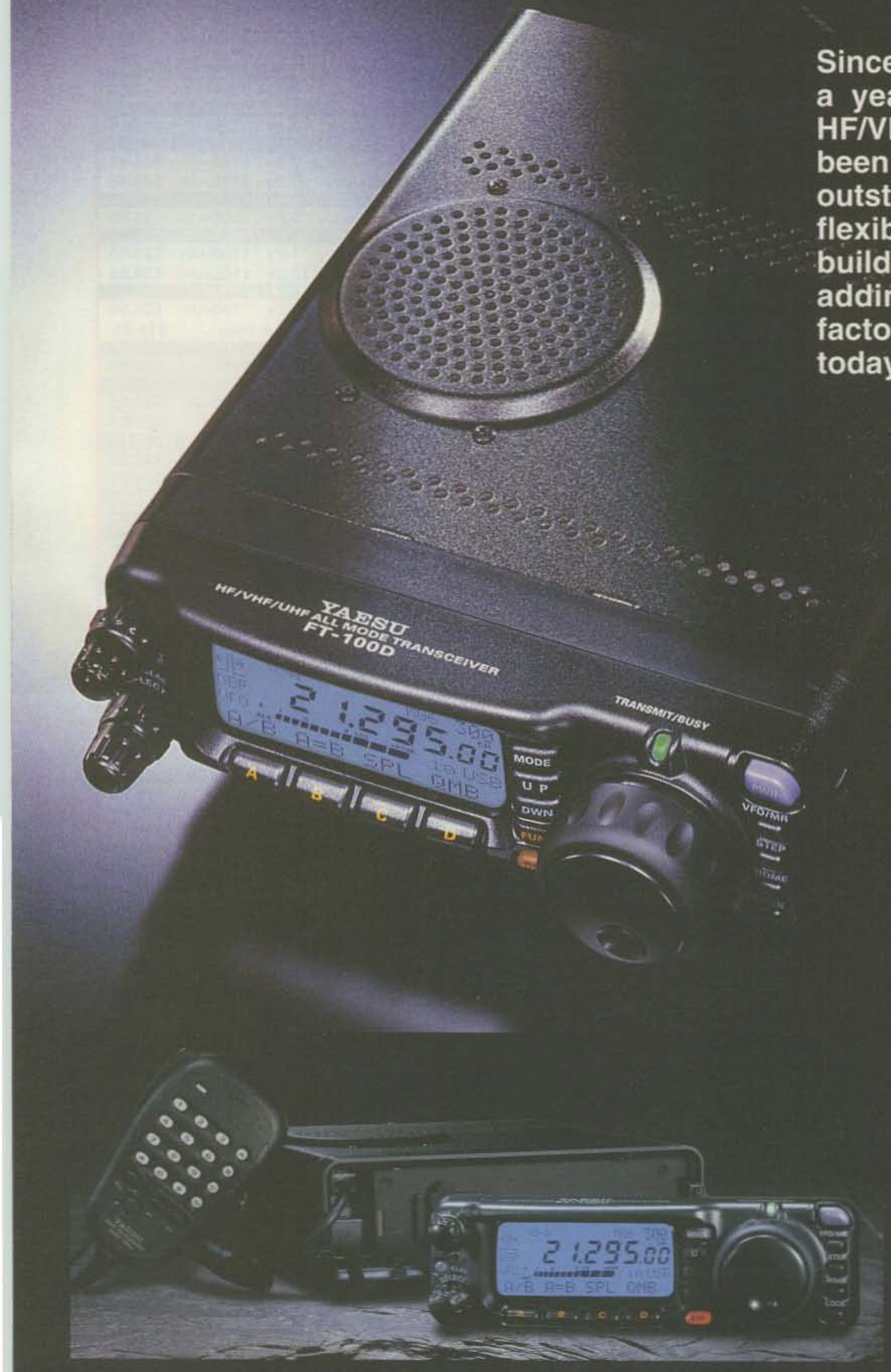

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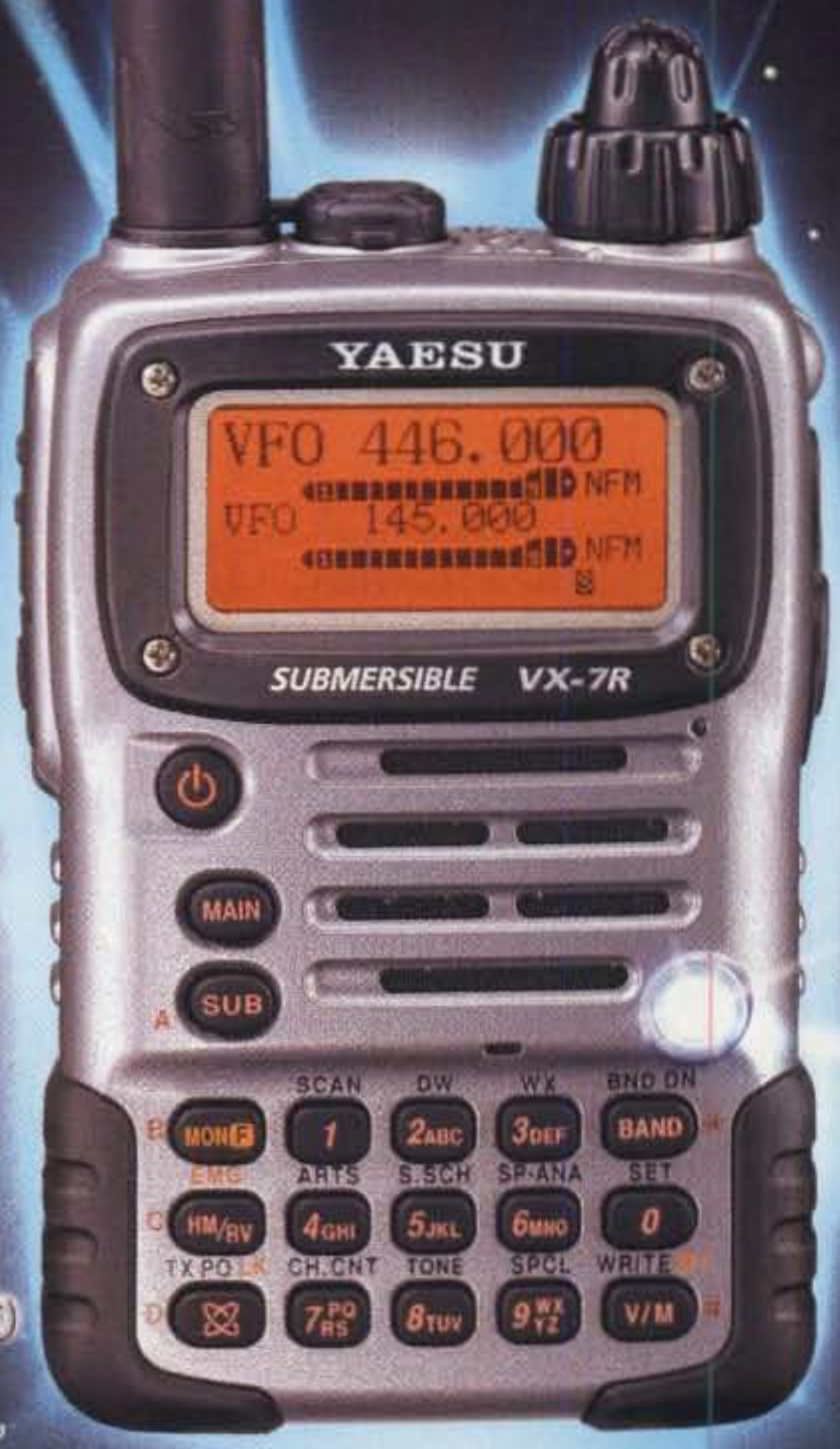

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