Remote Site Control Without Computers, p. 30

Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

JULY 2011

CQ

When All Else Failed, p. 13

The Sunspot Pessimists, p. 103

On the Cover: Tornado Net Control Lloyd Barnett, W4RFZ, of Decatur Alabama, with two "fishy" radio kits. Details on page 112.

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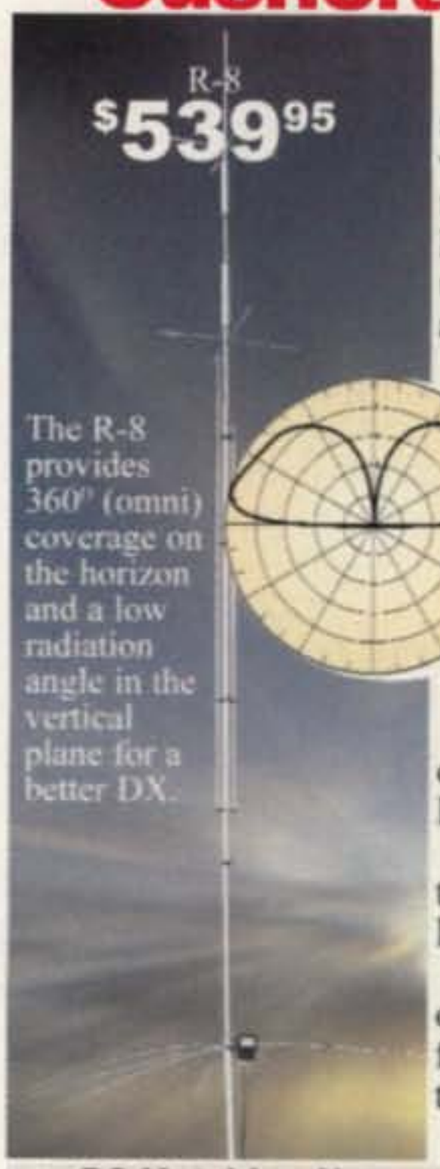
Cushcraft R8 *8-Band Vertical*



Covers 6, 10, 12, 15, 17, 20, 30, and 40 Meters!

The Cushcraft R8 is recognized as the industry gold standard for multi-band verticals, with thousands in use worldwide. Efficient, rugged, and built to withstand the test of time, the R8's unique ground-independent design has a well-earned reputation for delivering top DX results under tough conditions. Best of all, the R8 is easy to assemble, installs just about anywhere, and blends inconspicuously with urban and country settings alike.

Automatic Band Switching: The R8's famous "black box" matching network combines with traps and parallel resonators to cover 8 bands. You QSY instantly, without a tuner!

Rugged Construction: Thick fiberglass insulators, all-stainless hardware, and 6063 aircraft-aluminum tubing that is double or triple walled at key stress points handle anything Mother Nature can dish out.

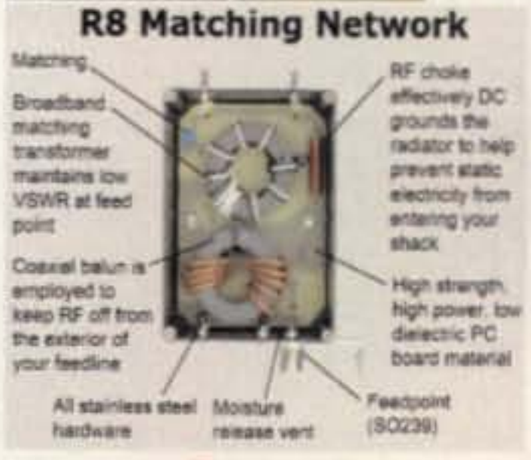
Compact Footprint: Installs in an area about the size of a child's sandbox -- no ground radials to bury and all RF-energized surfaces safely out of reach.

Legal-Limit Power: Heavy-duty components are contest-proven to handle all the power your amplifier can legally deliver and radiating it as RF rather than heat.

The sunspot count is climbing and long-awaited band openings are finally becoming a reality. Now is the perfect time to discover why Cushcraft's R8 multi-band vertical is the premier choice of DX-wise hams everywhere!

R-8GK, $56.95. R-8 three-point guy kit for high winds.

R8 Matching Network



R8's Rugged Design

MA-5B *5-Band* Beam

Small Footprint -- Big Signal

The MA-5B is one of Cushcraft's most popular HF antennas, delivering solid *signal-boosting directivity* in a bantam-weight package. Mounts on roof using standard TV hardware. Perfect for exploring exciting DX without the high cost and heavy lifting of installing a large tower and full-sized array. Its 7 foot 3-inch boom has less than 9 feet of turning radius. Contest tough -- handles 1500 Watts.

The unique MA-5B gives you 5-bands, automatic band switching and easy installation in a compact 26-pound package. On 10, 15 and 20 Meters the end elements become a two-element Yagi that delivers solid power-multiplying gain over a dipole on all three bands. On 12 and 17 Meters, the middle element is a highly efficient trap dipole. When working DX, what really matters are the interfering signals and noise you *don't hear*. That's where the MA-5B's impressive side rejection and front-to-back ratio really shines. *See* ***cushcraftamateur.com*** *for gain figures.*

Cushcraft 10, 15 & 20 Meter Tribander Beams

Only the best tri-band antennas become DX classics, which is why the Cushcraft World-Ranger A4S, A3S, and A3WS go to the head of the class. For more than 30 years, these pace-setting performers have taken on the world's most demanding operating conditions and proven themselves every time. The key to success comes from attention to basics. For example, element length and spacing has been carefully refined over time, and high-power traps are still hand-made and individually tuned using laboratory-grade instruments. All this attention to detail means low SWR, wide bandwidth, optimum directivity, and high efficiency -- important performance characteristics you rely on to maintain regular schedules, rack up impressive contest scores, and grow your collection of rare QSLs!

It goes without saying that the World-Ranger lineup is also famous for its rugged construction. In fact, the majority of these antennas sold years ago are still in service today! Conservative mechanical design, rugged over-sized components, stainless-steel hardware, and aircraft-grade 6063 make all the difference.

The 3-element A3S/A3WS and 4-element A4S are world-famous for powerhouse gain and super performance. **A-3WS, $499.95,** 12/17 M. **30/40 Meter** *add-on kits* available.

Cushcraft Dual Band Yagis

One Yagi for Dual-Band FM Radios

Dual-bander VHF rigs are the norm these days, so why not compliment your FM base station with a dual-band Yagi? Not only will you eliminate a costly feed line, you'll realize extra gain for digital modes like high-speed packet and D-Star! Cushcraft's A270-6S provides three elements per band and the A270-10S provides five for solid point-to-point performance. They're both pre-tuned and assembly is a snap using the fully illustrated manual.

Cushcraft Famous *Ringos* Compact FM Verticals

W1BX's famous *Ringo* antenna has been around for a long time and remains unbeaten for solid reliability. The Ringo is broad-banded, lighting protected, extremely rugged, economical, electrically bullet-proof, low-angle, and more -- but mainly, it just plain works! To discover why hams and commercial two-way installers around the world still love this antenna, order yours now!

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ham radio news

FEMA Head Praises Hams

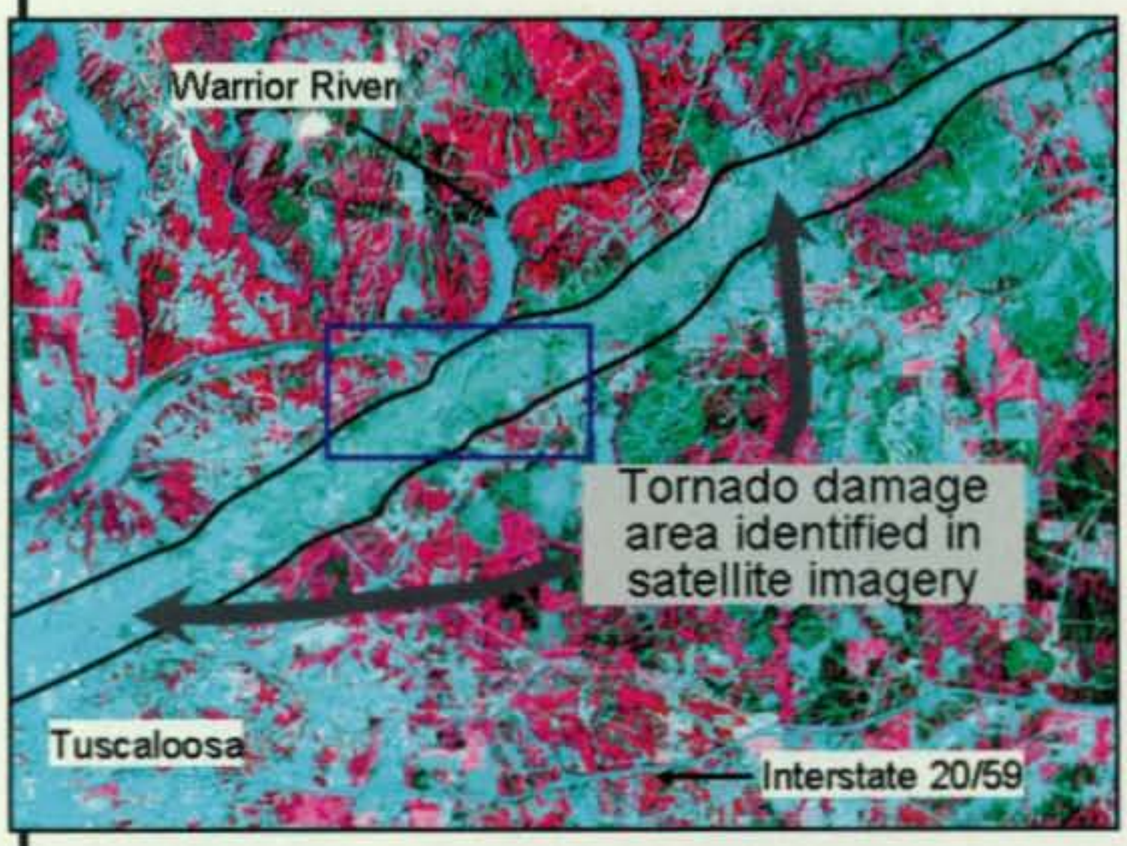
Amateur radio clearly has a friend at the top of the Federal Emergency Management Agency. In a speech at an FCC forum on earthquake communications preparedness in early May, FEMA Administrator Craig Fugate listed amateur radio as one of four broad areas, "all equally important," that are critical to the mission of meeting the needs of disaster survivors. The other three are public safety communications, broadcast radio and TV, and personal wireless communications.

Calling hams "the ultimate backups" and "our last line of defense," Fugate noted how amateur radio often provides the first communications out of stricken areas, "getting the word out in the critical first hours and first days as the rest of the systems come back up." There is a tendency, he said, to dismiss hams because our other communication systems generally are very reliable and "that we can never fathom that they'll fail. They do. They have. They will." He urged including "a strong amateur radio community" in emergency planning because, "when you need amateur radio, you *really* need 'em."

Satellite Image Shows Tornado's Path

The path of destruction left behind by the EF-4 tornado that roared through Tuscaloosa, Alabama, on April 27 is clearly visible in a satellite image from NASA's ASTER satellite system. The Advanced Spaceborne Thermal Emission and Reflection Radiometer is part of NASA's earth-observing Terra satellite. According to NASA's Science News, the photo shows the "tearing up" of vegetation along the twister's path.

As always, ham radio was a key element of the response to the outbreak of tornadoes in the southeast in late April and early May. For a comprehensive report on amateur activities, see this month's "Public Service" column on page 13 of this issue.



WWV/WWVH to Drop Space Weather Reports

The Space Weather Prediction Center will discontinue its regular geophysical alert messages on WWV and WWVH as of this coming September 6, according to the *ARRL Letter.* These messages include solar flux readings, A and K indices and reports on current and predicted space weather storms. The reports, which currently air on WWV at 18 minutes past each hour and on WWVH at 45 minutes past, will continue to be posted on the SWPC's website. Comments and questions may be directed by e-mail to <swpc.wwv@noaa.gov>.

Lifetime Credit Sought for Amateur Exams Passed

The Anchorage VEC, one of 14 Volunteer Examiner Coordinators in the United States, has petitioned the FCC to grant lifetime credit for all amateur examination elements passed, even if the license associated with them has been expired for more than two years. Currently, only Technician exams passed before 1987 are granted lifetime credit. According to the *ARRL Letter,* the group says it is unfair to grant element credit for some applicants but not for others. At press time, the FCC had not indicated whether it would post the petition for public comment.

FCC Wants Another 90 Cents for That Vanity Call

The FCC is proposing a 90-cent increase in the fee for obtaining or renewing a vanity amateur radio callsign, from the current $13.30 for a 10-year term to $14.20. The fees tend to vary slightly from year to year. According to the ARRL, they have ranged from a low of $11.70 to a high of $70. The FCC says it estimates that it will receive more than 14,000 vanity callsign requests or renewals in the upcoming fiscal year.

People in the News...

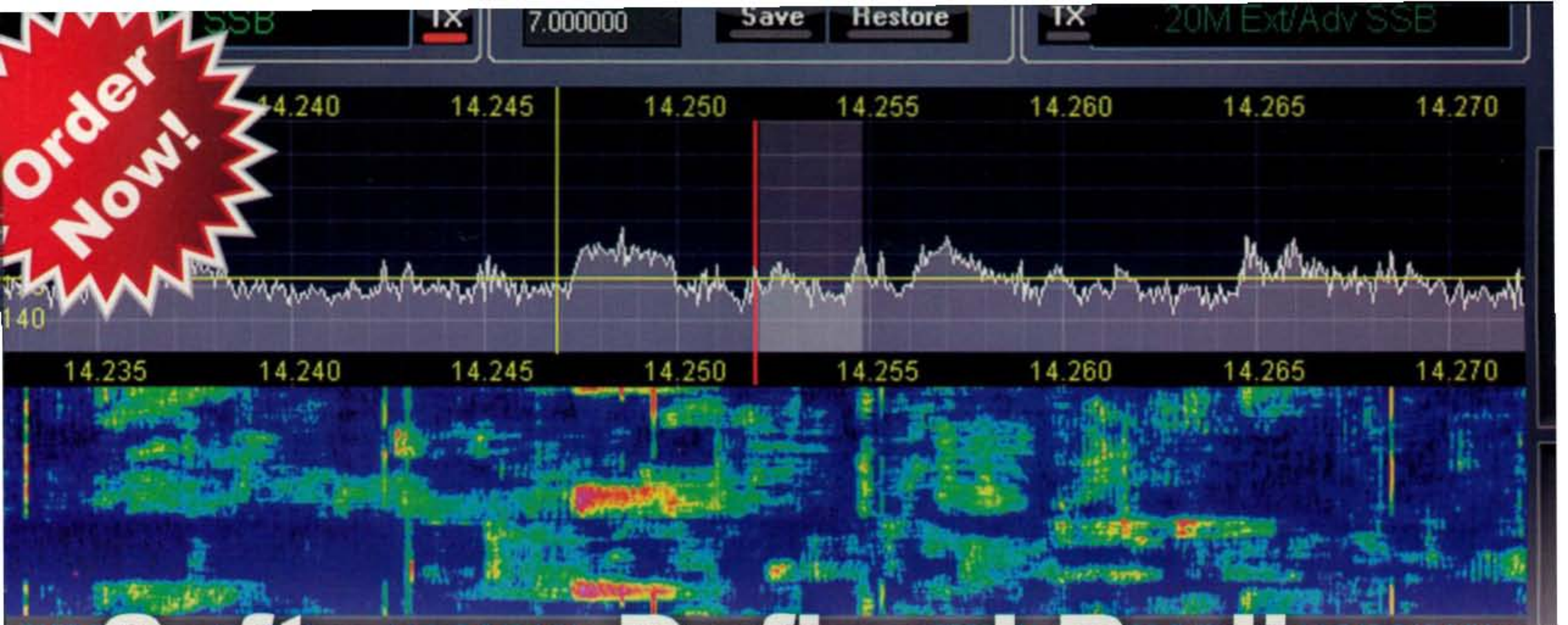
... FCC Commissioner Meredith Attwell Baker stepped down from the Commission on June 3 -- about a month before the end of her term -- to take a job with Comcast as its Senior Vice President of Government Affairs for NBC/Universal. President Obama will have to name a Republican to replace her, as the law permits no more than three members of one political party on the five-member commission.

... Julio Ripoll, WD4R, Assistant Coordinator of the amateur radio station at the National Hurricane Center, was honored in April at the National Hurricane Conference. The *ARRL Letter* reports that Ripoll was awarded the National Weather Service's Distinguished Service Award for "exceptional service in providing emergency communication during hurricane events over three decades while leading (the) WX4NHC Amateur Radio station at the National Hurricane Center."

... The first post-war recipient of CQ's Worked All Zones (WAZ) award has become a Silent Key at age 97. Ben Stevenson, W2BXA, of Colonia, New Jersey, qualified for the award in mid-1947, using all postwar contacts. Prior to World War II, only three hams had qualified for WAZ. Stevenson also held Satellite DXCC #1, mixed DXCC #6 and phone DXCC #6. He was also a founding member and first president of the North Jersey DX Association and active on amateur satellites. The AMSAT News Service reports that W2BXA and W2RS made the first-ever multisatellite contact in any radio service, linking up via AO-6 and AO-7 in 1975.

Second Ham Station Installed on ISS

The International Space Station now has two active amateur stations. In late April, according to *Newsline*, Astronaut Cady Coleman finished installing the Ericsson radio used for early ARISS (Amateur Radio on the International Space Station) contacts, in the Columbus Orbital Laboratory. Astronaut Paolo Nespoli then checked it out for proper operation in time-honored amateur fashion -- by making contacts with hams on the ground. At least one school contact has since been made using the new/old station. *(News continued on p. 10)*



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- Optional Data Management Unit (DMU-2000) permits display of various operating conditions, transceiver status and station logging.
- Optional RF μ -Tune Units for 160 m, 80/40 m and 30/20 m Bands

Optional, YAESU Exclusive, Fully-Automatic μ -Tuning Preselector System!

Fully automatic, Ultra-sharp, External μ -Tuning Preselector (optional) features a 1.1" (28 mm) Coil for High Q

On the lower Amateur bands, strong signal voltages impinge on a receiver and create noise and intermod that can cover up the weak signals you're trying to pull through. YAESU engineers developed the μ (Mu) Tuning system for the FT DX 9000/FT-2000, and it is now available as an option for the FT-950. Three modules are available (MTU-160, MTU-80/40, MTU-30/20); these may be connected externally with no internal modification required! When μ -Tuning is engaged, the VRF system is bypassed, but the fixed Bandpass Filters are still in the received signal path.

Optional External Data Management Unit (DMU-2000) Provides Many Display Capabilities

Enjoy the ultimate in operating ease by adding the DMU-2000! Enjoy the same displays available with the FT DX 9000 and FT-2000: Band Scope, Audio Scope, X-Y Oscilloscope, World Clock, Rotator Control, Extensive Transceiver Status Displays, and Station Logging Capability. These extensive functions are displayed on your user-supplied computer monitor.

Shown with after-market keyer paddle, keyboard, and monitor (not supplied).

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Data Management Unit (option)

"The Best of the Best Just Got Better"
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Compact size: 9" X 3.3" X 8.8" and Light weight: 7.9 lb

HF/50 MHz 100 W All Mode Transceiver

FT-450D

With Built-in Automatic Antenna Tuner

NEW **Illuminated Key buttons**

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NEW **Classically Designed Main Dial and Knobs**

NEW **Dynamic Microphone MH-31A8J Included**

■ **Large informative Front Panel Display, convenient Control knobs and Switches**
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Handy Front Panel Control of Important Features including:

- **CONTOUR Control Operation**
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  Dramatically reduces random noise found on the HF and 50 MHz bands.
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  Vary the IF SHIFT higher or lower for effective interference reduction / elimination.

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zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

HR-607: A Threat Beyond Ham Radio

"Magic in the Sky" columnist Jeff Reinhardt, AA6JR, discusses in his column this month the growing influence of the telecommunications industry in FCC frequency allocations. He also suggests strongly that *CQ* readers write to their Congressional representatives, urging them to oppose that portion of HR-607—one of several bills that would establish a national interoperable public safety network—that would mandate the FCC within ten years to auction off to the highest bidders the 420–440 and 450–470 MHz bands.

Jeff's column prompted me to finally write the letter about the bill that we'd been discussing for quite a while at the office. "At the office" is a key element because our office in Hicksville, New York, is in the district represented by Rep. Peter King, the prime sponsor of HR-607. Our hope is that a letter from a company that has been headquartered in his district for more than 30 years, providing jobs to residents of his district, will at least be read before being filed away with other HR-607 letters.

We also took a different approach than most hams have taken, and even than that which Jeff is suggesting in his column. Since our magazines—especially *Popular Communications*—cover the broad spectrum of radio communications, including user groups that don't have an organized voice as hams do (such as GMRS and Family Radio Service users), we thought it would beneficial to point out the impact that reallocating 420–440 and 450–470 would have *beyond* ham radio. After all, the ARRL and hams around the country have done an excellent job of presenting ham radio's case. Here are the major points of our letter; the full text will be posted on our website:

• The bill erroneously states that 420–440 and 450–470 MHz constitute a "paired" frequency band. We explained that the two bands are currently allocated to entirely different services.

• The primary active user of 420440 is the Defense Department's PAVE PAWS radar, which is our coastline's first line of defense against submarine-launched missiles. Since Rep. King is chairman of the House Homeland Security Committee, we wanted to be sure he was aware that he was attempting to mandate the relocation of a radar system that is critical to our homeland security. We also pointed out that changing the operating frequencies of all of these radar installations and working out new sharing arrangements with other spectrum users in a new frequency segment would likely cost the taxpayers millions of dollars at a time when we are all trying to rein in unnecessary government spending.

• Also in the area of homeland security, we wanted to be sure that Mr. King was aware that the FCC had recently approved the use of 420–450 MHz by law enforcement reconnaissance robots, after being persuaded by the manufacturer that the robots were most effective at these frequencies. Again, it didn't seem as though the chairman of the Homeland Security Committee would want to compromise the operation of robots that will likely see use in counterterrorism operations.

• Next, we moved to 450–470 MHz, a band which has received little to no attention from ARRL or others opposing this forced reallocation proposal. The bill would mandate that all public safety users on 450–470—in fact, on all frequencies between 170 and 512 MHz!—move to the 700-800 MHz band in order to free up this spectrum for eventual auction. We pointed out the enormous financial burden that this would impose on state, county and local governments —and we the taxpayers—again at a time when everyone is trying to reduce unnecessary government spending.

• We also pointed out that there was no mention at all of where the thousands of private land mobile users would go—including the businesses that currently use 450–470—or the financial burdens that would be imposed on mostly-small businesses as a result.

• Furthermore, we reminded Rep. King that the Family Radio Service operates in the 450–470 MHz range, that millions of Americans currently use this service and that, because it is not an individually licensed service, it would be impossible for the FCC to identify or notify all users or to force them to stop using their FRS radios.

• Finally, we pointed out that even without all of the other services that would be displaced, the 400-MHz band is not an ideal frequency range for commercial wireless networks. This is because of the greater distances over which signals propagate on these frequencies (vs. the microwave bands)—meaning greater separation that would be required before a frequency could be re-used - and the possibility of significant interference when weather conditions cause band openings.

We'll see if this letter has any impact. We doubt it as far as Mr. King is concerned. He is a frequent presence on TV in the New York area, talking about homeland security issues and other matters. Yet his priorities in this matter seem to be elsewhere. Why else would the chairman of the Homeland Security Committee propose a bill that would compromise a major coastal defense radar network and limit the usefulness of surveillance robots in counterterrorism operations? Why else would he attempt to derail his own party's efforts to rein in government spending by requiring the expenditure of millions of taxpayer dollars on relocating not only PAVE PAWS but a multitude of other public safety organizations? And why else, in these tough financial times, would he impose significant additional costs on thousands of small businesses that rely on radios operating the 450–470 range for conducting their everyday business?

This provision of HR-607 is not only a threat to ham radio, but to homeland security, state and local government budgets, the taxpayers' pocketbooks, small businesses and the millions of Americans who use the Family Radio Service.

We also sent copies of our letter to the Chairman and Ranking Minority Member of the House Communications and Technology subcommittee, where the bill was referred on introduction, so that they would be aware of our concerns as well. The chairman of this subcommittee is Oregon Rep. Greg Walden, who is also W7EQI, so he should have an understanding of the technical issues involved. Both should have an understanding of the fiscal issues involved.

Dayton

Usually, I use my July editorial to pass along some bit of wisdom picked up at the Dayton Hamvention® or on the trip there or back. This year, though, the calendar is playing tricks on us and we needed to close the issue just *before* Dayton instead of just *after.* So I'll have to wait until next month to pass along any pearls of Dayton wisdom, as well as our annual report on new products introduced at "the big show." 73, W2VU

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

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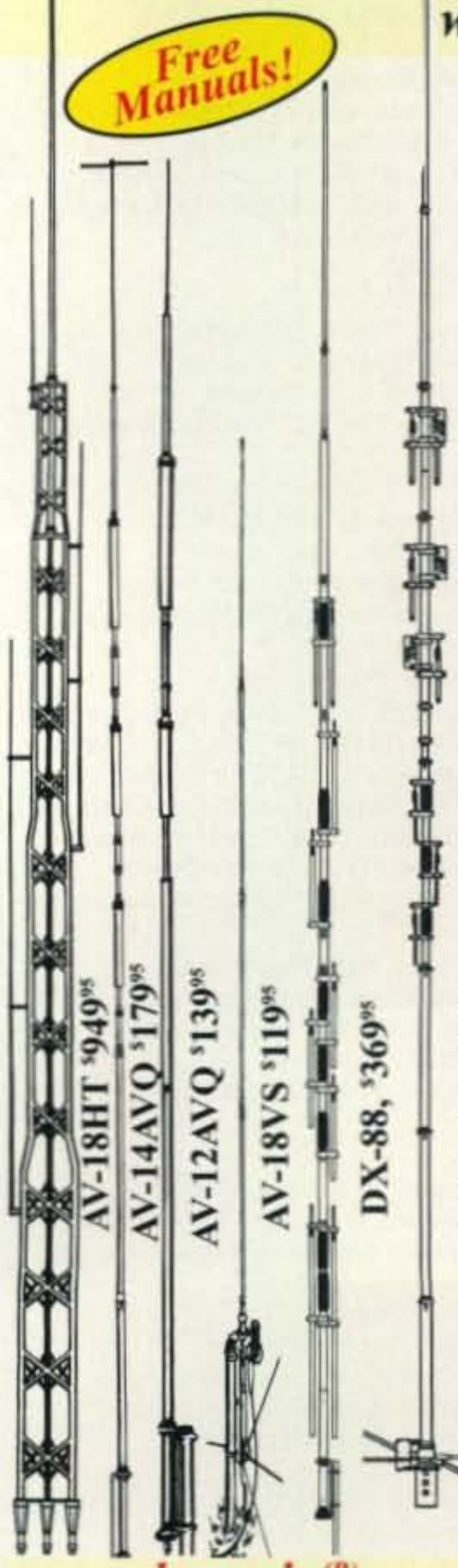

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All hy-gain multi-band vertical antennas are entirely self supporting -- no guys required.

They offer remarkable DX performance with their extremely low angle of radiation and omnidirectional pattern.

All handle 1500 Watts PEP SSB, have low SWR, automatic bandswitching (except AV-18VS) and include a 12-inch heavy duty mast support bracket (except AV-18HT).

Heavy duty, slotted, tapered swaged, aircraft quality aluminum tubing with full circumference compression clamps is used for radiators. Includes all stainless steel hardware. Recessed SO-239 prevents moisture damage. Hy-gain verticals go up easily with just hand tools and their cost is surprisingly low. Two year limited warranty.

AV-18HT, $949.95. (10,12,15,20,40,80 M, 160, 17 Meters optional). 53 ft., 114 lbs.

Standing 53 feet tall, the famous *Hy-Gain HyTower* is the world's best performing vertical! The AV-18HT features automatic band selection achieved through a unique stub-decoupling system which effectively isolates various sections of the antenna so that an electrical 1/4 wavelength (or odd multiple of a 1/4 wavelength) exists on all bands. Approximately 250 kHz bandwidth at 2:1 VSWR on 80 Meters. The addition of a base loading coil (**LC-160Q, $109.95**), provides exceptional 160 Meter performance. **MK-17, $89.95**. Add-on 17 Meter kit. 24 foot tower is all rugged, hot-dip galvanized steel and all hardware is iridited for corrosion resistance. Special tilt-over hinged base for easy raising & lowering.

AV-14AVQ, $179.95. (10,15,20,40 Meters). 18 ft., 9 lbs. **The** Hy-Gain AV-14AVQ uses the same trap design as the famous Hy-Gain Thunderbird beams. Three separate air dielectric Hy-Q traps with oversize coils give superb stability and 1/4 wave resonance on all bands. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

AV-12AVQ, $139.95. (10, 15, 20 Meters). 13 ft., 9 lbs. **AV-12AVQ** also uses Thunderbird beam design air dielectric traps for extremely Hy-Q performance. This is the way to go for inexpensive tri-band performance in limited space. Roof mount with AV-14RMQ kit, $89.95.

AV-18VS, $119.95 (10,12,15,17,20,30,40,80 Meters). 18 ft., 4 lbs. **High** quality construction and low cost make the AV-18VS an exceptional value. Easily tuned to any band by adjusting feed point at the base loading coil. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

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AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$179.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$139.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$119.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 40 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

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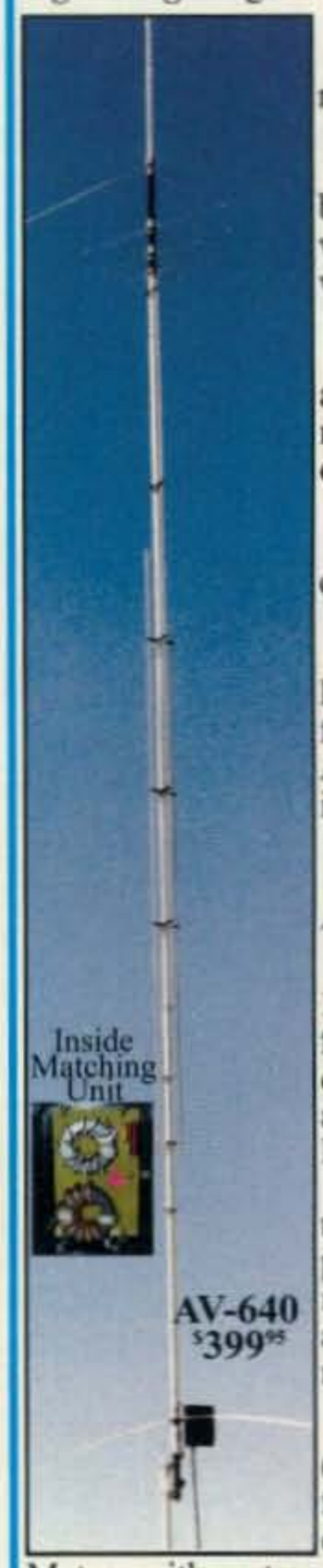

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announcements

• **The following Special Event station is scheduled for July:**

W9ZL, from EAA Airventure 2011, the world's largest airshow and fly-in, Oshkosh, Wisconsin, 1500–0000 UTC July 27–31; Fox Cities Amateur Radio Club, Inc.; on 14.250 and 7.250 MHz, and 52.550 MHz FM. Certificate available. Send QSL and large SASE to FCARC AirVenture 2011, PO Box 2346, Appleton WI 54912.

• **The following hamfests, etc., are scheduled for July:**

July 9, **South Milwaukee Amateur Radio Club 44th Annual SWAPFEST,** American Legion Post No. 434 grounds, Oak Creek, Wisconsin. Free flyer with map: The South Milwaukee Amateur Radio Club Inc., P.O. Box 222, South Milwaukee, WI 53172-0222. On website: <http://www.qsl.net/wa9txe >. (Talk-in 146.52 simplex)

July 9, **Indianapolis Hamfest,** Camp Sertoma, Indianapolis, Indiana. Info: <http://www.indyhamfest.com> or (317) 261-6658.

July 17, **Valley Forge Hamfest and Computer Fair,** Kimberton Fire Company Fairgrounds, Kimberton, Pennsylvania; sponsored by The Mid-Atlantic ARC. Full details including a printable flyer can be found at <http://www.marc-radio,org>. Contact Mike Pilotti, KF3CD, at <kf3cd@arrl.net> or (610) 696-5040. (Talk-in: 145.13/– and 147.06/+ CTCSS 131.8)

July 29–30, **36th Annual Ham Holiday 2011,** Biltmore Hotel/Conference Center, Oklahoma City, Oklahoma; presented by the Central Oklahoma Radio Amateurs Inc. Additional information and registration forms available at: <http://www.HamHoliday.org>. Vendors, contact <kc5qcv1@-att.net> for details. See the CORA webpage <http://hamholiday.org > for preregistration information. (Talk-in: 147.03 [+ offset], PL 167.9 Hz; exams).

July 30, **WCARS Hamfest,** Haywood County Fairgrounds, Waynesville, North Carolina; sponsored by Western Carolina Amateur Radio Society. Contact: Randy Harris, KI4VLW, <rtsp71@aol.com>; <http://www.wcars.org >. (Exams)

July 30, **Pioneer Amateur Radio Club 14th Annual Flea Market,** St. Charles Parish Center, North Bend, Nebraska. Complete details: <http://www.k0jfn.com>.

*Please submit hamfest and special event announcements **at least three months in advance** by e-mail to <hamfest@cq-amateur-radio.com> or <specialevent@cq-amateur-radio.com>, or by postal mail to: CQ Magazine, Attn: Hamfests (or Special Events), 25 Newbridge Rd., Hicksville, NY 11801.*

ham radio news

Battery Issues Beset Ham Satellites

The failure of a much-ballyhooed activation of the ARISSat-1 satellite from on-board the International Space Station in April to mark the 50th anniversary of the first manned space flight has been blamed on a nearly dead battery. The AMSAT News Service reports that the Russian space agency told a teleconference that the battery had been charged only once on the ground and was then used for a variety of tests. Since the battery can only be recharged a limited number of times aboard the ISS, it was decided not to recharge it before the Yuri Gagarin commemorative event. But the battery was nearly discharged at the start of the activation, no one on the ground heard the satellite and it was turned off after six hours to prevent excessive discharging.

It also appears that the batteries aboard the AO-51 satellite are failing. AMSAT officials report that the batteries are in very poor condition and that the satellite will not retain the upload of flight software during eclipse periods when no sunlight is hitting its solar panels. The AMSAT News Service says it is uncertain when, or whether, the satellite will be able to return to normal operation.

Bob Heil to Host Ham Show on TWiT.tv

Microphone manufacturer and showman Bob Heil, K9EID, will host a new ham radio show on an internet-only network known as TWiT.tv (This Week in Technology). His program, to be called "HamNation," was slated to debut on May 24, with Bob's good friend, rock legend Joe Walsh, WB6ACU, as the first guest. Joe also wrote the show's theme music, according to a news release. There is no indication as to how frequently new episodes will "air."

(continued from p. 2)

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.

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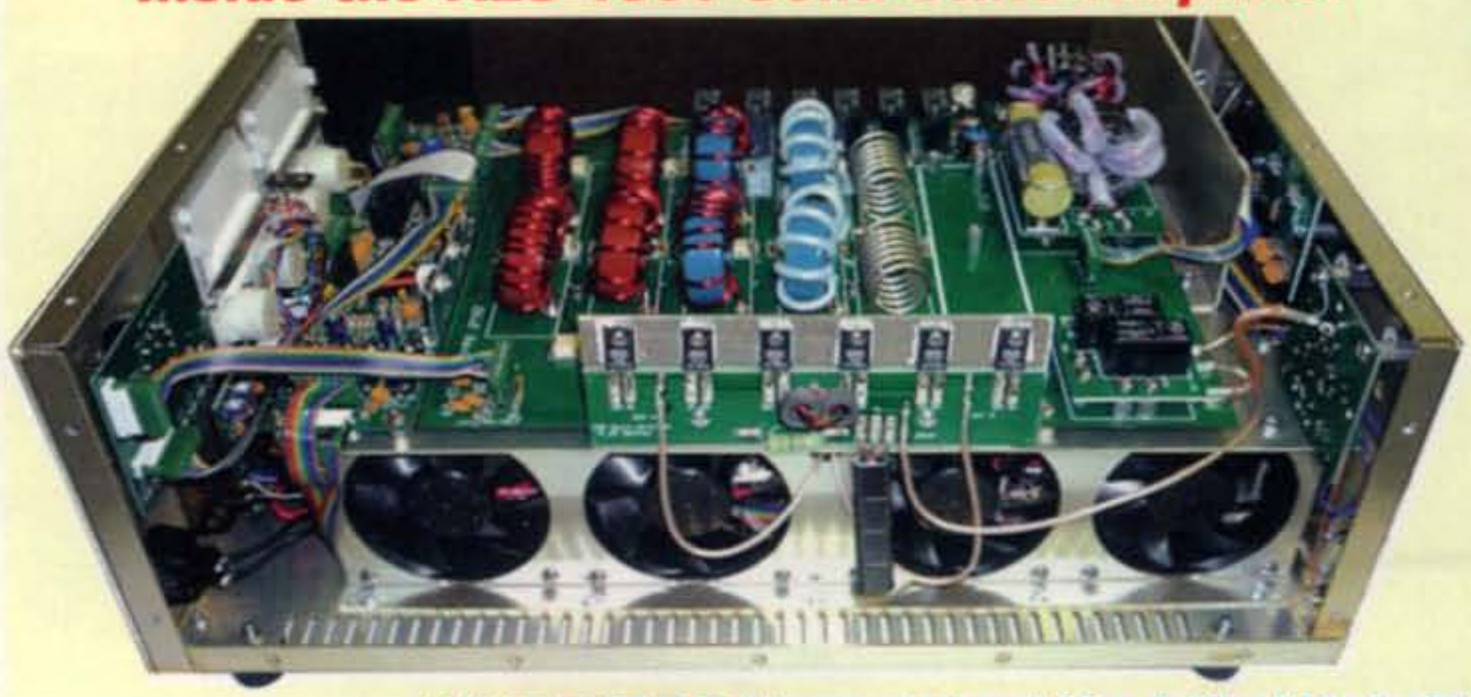
I've been using SN3 for about six weeks now. No processors or digital read-outs, but very easy to use and it puts out 1200 watts on most bands with no problem. I have been operating QSK as the internal relays are plenty fast enough. AD5X

I have had this fine amp now for a week and have made a number of QSO's (20). It can make the difference, and has in a number of occasions, getting thru the QRN and making a contact. Some of my QSO's have lasted up to 1 hour and there has not been a single problem...runs cool and gives me excellent results. KB4KKX

Inside the ALS-1300 Solid State Amplifier



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Radio Amateurs Face Wrath of Tornadoes Head-On

BY RICHARD FISHER,* KI6SN

In some cases, radio amateurs were the last communicators standing as a march of tornadoes ripped through the southern U.S. in mid- and late-April, leaving a grim calling card of almost unimaginable death and devastation. Records of the worst kind were set April 14–16 and 25–28, pushing amateur radio emergency communications to its limit. However, the EmComm operators did not blink. Hams raced to assist local, state, and federal officials across a swath stretching from Oklahoma to North Carolina and beyond.

The accounts of these snapshots of radio amateur EmComm activity were gathered by *CQ* from the operators on the scene and from information published by agencies and organizations including the National Weather Service (NWS), Amateur Radio Emergency Service (ARES®), American Radio Relay League (ARRL), National Oceanic and Atmospheric Administration (NOAA), Federal Emergency Management Agency (FEMA), Radio Amateur Civil Emergency Service (RACES), and SKYWARN.

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Alabama: Simplex was a Salvation

Tuscaloosa was tornado ravaged in the late-April onslaught and took it hard. "Virtually all emergency communications were wiped out by the storm," said Ed Tyler, N4EDT, ARRL Alabama Public Information Coordinator, in a report to the League. "We (were) using simplex to coordinate the efforts to restore communications." Mayor Walter Maddox said there were "neighborhoods that have been basically removed from the map."

Alabama Section Manager Dave Drummond, W4MD, said a tornado knocked out communications at the Tuscaloosa Police Department, so "we dispatched personnel to their location so our

A screen capture from NOAA's Storm Prediction Center website shows the intensity of violent weather across the southern U.S. in April. Blue dots signify damaging winds. Green dots are for large hail, and red are for tornadoes. (From the NOAA website)

Disaster survivors in Pleasant Grove search through debris for their belongings after deadly tornadoes savaged the state of Alabama. The Federal Emergency Management Agency (FEMA) sent teams to Alabama, Georgia, Mississippi, Kentucky, and Tennessee to provide disaster relief. (Courtesy of FEMA)

reports could get to them." At the time, Drummond noted that "many of my first reports were the only communication from the affected area that described the magnitude and devastation, as there were no communications otherwise left. I (was) in shock." All three of Tuscaloosa's amateur radio repeaters were knocked off the air.

For some time there was "no communication from the Emergency Management Agency (EMA)" offices, which had been "blown away," he said. "We had to work simplex as a result, but we managed to communicate quite well."

With the help of three other hams, Drummond said the area's 146.820 repeater was brought back on the air. "So we (did) at least have some repeater coverage. It's amazing that (the repeater site) is still there. The generator back-up did not start, so we (were) running on an extension cord from the Comcast generators!"

East of Birmingham, 100+ mile-per-hour winds demolished antennas at the Pell City Emergency Operations Center (EOC). Tyler said radio amateurs were "on hand all day providing communications support."

At a dozen shelters in St. Clair County, hams provided emergency communications for 500+ people gathered in them. Operators were in place "even before the largest of the storms hit the area," Tyler said. The county's ARES® "provided communication between city hall and local fire stations, as well as to the American Red Cross, Baptist Disaster Relief Service, and local churches."

In the storms' aftermath, radio amateurs from the ARRL Northern Florida Section, at the invitation of ARRL Alabama Section Emergency Coordinator Greg Gross, K4GR, headed to Alabama to assist in disaster communications, according to the League. Each team was comprised of two amateurs and their equipment. Paul Eakin, KJ4G, and Donna Barker, WQ4M, "came to Alabama with a motor home equipped with a full command post, as well as a tow vehicle with HF and VHF/UHF capabilities."

"We took spare UHF/VHF antennas and 600 feet of LMR-400, three HF stations, four VHF/UHF mobiles, and the supplies to build portable HF antennas," Eakin said. "Norm Scholer, K4GFD, and Gary Alberstadt, KA3FZO, were in "a pickup truck and a fifth-wheel trailer with portable equipment and two repeaters." Eakin continued. Each team was prepared to be self-sufficient for seven days.

Arkansas: "We knew it was going to be a long night . . ."

Danny Straessle, KE5WLR, SKYWARN personnel coordinator for Arkansas, remembers intense amateur radio net activity with the mere forecast of heavy weather for April 14–15. But that was only the pre-game warm-up, he told *CQ*.

"Arkansas SKYWARN works in conjunction with local weather nets across the state to route priority weather traffic to and from the National Weather Service Little Rock Forecast Office," Danny said. It is hosted on the W5DI linked repeater system owned and operated by the Central Arkansas Radio Emergency Net (CAREN): <http://bit.ly/m0gr2Y>. "The system is designed to cover the Little Rock County warning area."

Arkansas SKYWARN staffed the Little Rock forecast office beginning at 7 PM, April 14. Dave Weaver, KB5SBP, and Steve Tune, KC5FWE, were net controls until about 10 PM.

"The Little Rock Forecast Office didn't issue the first severe thunderstorm warning until 10:20 PM for an area in the west-

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The remains of a van sittting in front of a damaged church in Walnut Valley, Arkansas. The town and surrounding area were devastated by a tornado in April. (Courtesy of FEMA)

ern part of Arkansas," Straessle said. "At this time Steve Porter, KT5H, and I were on duty as net control operators. We knew it was going to be a long night."

According to Straessle, "It was just before 2 AM when the line of storms moved into the Little Rock metro area. Arkansas SKYWARN began to receive reports of power outages and hail in West Little Rock as radar began to indicate rotation in this area (roughly at the I-430/I-630 interchange). We didn't know it at the time, but an EF1 tornado was making its way through several highly-populated residential neighborhoods. The tornado continued east-northeast toward the Arkansas River and lifted."

The trajectory of the rotation in the storm "put it on course directly for the National Weather Service Little Rock Forecast office and meteorologists quickly made the decision to transfer control of the operations center to the Memphis Forecast Office and take cover in the tornado safe-room," Straessle said. "This is standard operating procedure."

At about the same time, KE5WLR "threw control of Arkansas SKYWARN to Shane Lee, KF5FBR, who was off-site in a community about 20 minutes north of the NWS Little Rock office. We spent 5 to 10 minutes in the tornado safe room. Rotation passed overhead and moved on. We all emerged and resumed normal operations."

A total of 22 tornado warnings and 20 severe thunderstorm warnings were issued by the NWS Little Rock forecast office. *(A graphic summary of reports and warnings can be seen at: <http://bit.ly/lwhS40>.—ed.)*

About 40 stations checked into the SKYWARN net, which lasted from 10:20 PM until 3:40 AM. "This is excellent considering it's the middle of the night!" Straessle said.

Other local weather nets were activated throughout the state—notably, the Northwest Arkansas UHF Society and the Batesville Amateur Radio Club—and traffic from them was relayed to the NWS Little Rock via Arkansas SKYWARN, reported Straessle.

According to ARRL Delta Division Vice Director David Norris, K5UZ, during the severe weather April 25–26, "numerous tornado warnings and sightings kept ARES®/RACES and SKYWARN groups busy. . . . Of particular note was the Faulkner County group, with Vilonia being hit by an EF3 twister, which left a trail of destruction through parts of Faulkner and White counties a half-mile wide," Norris told the ARRL. "Members of Pope, Independence, Conway, Stone, White, and Sebastian County ARES®/RACES groups, as well as members of local clubs, were busy spotting and reporting activity to the National Weather Service and their county Emergency Operations Centers. Randy Wright, AE5RW, monitored these nets and provided timely reports to a Little Rock TV station about traffic being passed on the amateur nets. All in all, these efforts gave local officials and the general public a good impression of the capabilities of amateur radio."

The public was able to monitor Arkansas SKYWARN via Radio-Reference.com, as well. "At its peak, there were nearly 400 listeners," Straessle said. During the second outbreak of storms on April 25, "there were 991 listeners. For about three hours we were the top feed in the country," he reported. *(Listen to Arkansas SKYWARN at <http://bit.ly/jk012v>.—ed.)*

Georgia: A Relentless March Across the State

Lynn Bianco, KN4YZ, Georgia Section Emergency Coordinator for the NWS and Fayette County Emergency Coordinator told *CQ* he remembers it all too well:

"*Oh, what a night.* It wasn't as if it was a big surprise. The storm system had been predicted for days. Only the exact timing was still variable.

"By the morning of April 27, the Peachtree City NWS office had posted a graphic of the expected times for the worst of the weather, which proved to be fairly accurate. A number of storms ahead of the frontal system that would impact northwest Georgia were predicted, as well.

"Our SKYWARN operators had been in close contact with the NWS. Huey Kenmar, KI4NGD, had a schedule worked out based on the forecast timing that would ensure the SKYWARN desk at the NWS was manned and ready. There was a lot of coordination behind the scenes that would help ensure our readiness to respond.

"The first round of storms came through north Georgia at around 8 AM. These were mainly severe thunderstorms with damaging straight-line winds. Numerous *trees down* reports came in, along with reports of several buildings with roof damage. One of the thunderstorms spawned an EF1 tornado.

"As the day progressed, we continued to keep a close eye on what was happening," Bianco said. "Around 12:30 PM, I spoke with the NWS in Peachtree City to solidify the timing for this event. A conversation with KI4NGD and Robert Burton, KD4YDC, assured that from our perspective, things were ready.

"KD4YDC has worked tirelessly over the years building a linked repeater system that covers a majority of the 96 Georgia counties the Peachtree City NWS is responsible for. At present, 31 repeaters can be linked together to provide ham operators' access to the NWS

Department of Homeland Security Secretary Janet Napolitano speaks with a volunteer from Tennessee who came to help with the clean-up of Cherokee Valley, Georgia, near Ringgold after the tornado on April 27. The area not only suffered damage to homes and businesses, but also loss of life. With Napolitano is FEMA Federal Coordinating Officer Gracia Szczech. (Courtesy of FEMA)

for storm reports and to disseminate life-saving information about severe weather. *(See <http://bit.ly/kOn00C> for a map and list of locations.—ed.)*

"At 2 PM, I activated WX4PTC, the SKYWARN net control station at Peachtree City NWS. Although there was no severe weather in Georgia yet, we all were keenly aware of what was happening in Alabama.

"Watching the Doppler images and storm relative velocity screens left *no doubt* strong tornadoes were on the ground in Alabama. I was sitting next to Lans Rothfusz, KD5EJN, Meteorologist in Charge at the Peachtree City NWS. I remember looking at the strongest tornado vortex signature I had seen in the 15+ years I have been volunteering at the NWS. The system stayed relatively intact over half of Alabama as it worked its way toward Georgia—an indication of what we were in for.

"At about 5:30 PM, the first of several EF3 tornadoes hit Dade and Walker counties until just before 6 PM. In spite of numerous requests for reports over both our linked repeater system and on D-STAR, no reports from hams were forthcoming. All of that was about to change.

"KD4YDC and Bill Collins, W4ARA, soon arrived to relieve me. With people getting off from work, the floodgates opened. We were now getting lots of reports of massive damage from Dade and Walker counties. At 8:15 PM, an EF4 tornado devastated parts of Catoosa County. At 8:45, an EF2 tornado ripped across Polk, Floyd, and Bartow counties. To say it was busy would be an understatement.

"At 9 PM, Robert and Bill were relieved by KI4NGD and KJ4BCH. Not long after sitting down, an EF3 tornado hit Bartow, Cherokee, and Pickens Counties. Things were so busy at the NWS there was no possible way to run both the SKYWARN linked repeater net and the D-STAR net. To the best of our recollection, it was WX4EMA who assumed net control of the D-STAR net. Thanks!

"At 11:20 PM, an EF2 tornado struck Troup County. At 11:50 PM, Harris, Meriwether, and Upson Counties were struck by an EF2 tornado. Minutes later, an EF3 devastated Meriwether, Spalding, and Henry counties. These storms cut our link to the analog and D-STAR Pine Mountain repeaters. A half-hour later, Pike, Lamar, Monroe, and Butts Counties were hit by an EF3 tornado."

Melvin Graham, KG4CUT, was at the epicenter of the EF3 tornado coming across Spalding County, and his reports to the NWS were the first of the devastation going on with that tornado:

"KI4NGD and KJ4BCH were on duty until 4 AM, when they were relieved by Jim Burchfield, W4JB, who was net control until 8 AM. The storms had finally exited to the south. During this time, we continued to get reports of the damage and devastation from storms that had gone through earlier. There were five additional confirmed EF1 tornadoes during this outbreak."

North Carolina: Remarkable Day for the Record Book

It is hard to believe these stats are for just one unforgettable day, April 16, 2011:

- At least 12 super-cell thunderstorms tracked across central and eastern North Carolina.
- There were 28 tornadoes which impacted 32 North Carolina counties, resulting in 24 deaths statewide.
- There were six EF0 tornadoes (65–85 mph), nine EF1s (86–110 mph), eight EF2s (111–135mph), and five EF3s (136–165 mph).

"Those are amazing statistics considering that North Carolina averages approximately 14 tornadoes a year!" said Virginia Enzor, NC4VA, Emergency Coordinator, Central Carolina SKYWARN. "This event rivals the 1984 tornado outbreak in the state in which 22 tornadoes occurred in one day, impacting 20 counties and resulting in 42 fatalities statewide," she told *CQ*.

"We were expecting severe weather Saturday," she recalled. "The Raleigh National Weather Service (NWS) had mentioned the severe potential in the Hazardous Weather Outlook beginning Thursday. On Friday, Warning Coordinationn Meteorologist Jeff Orrock, KI4KKX, called me to discuss staffing the SKYWARN station at the NWS.

"As we often conduct the SKYWARN net from our home stations, a request to go to the NWS signified the NWS thought we were looking at a *significant event*. After consulting, we thought it best to send two SKYWARN net control operators (NCOs) to the NWS on Centennial Campus in Raleigh and have backups at home.

"By Saturday the *Storm Prediction Center Day 1 Convective Outlook* showed central North Carolina under high risk for severe weather," said NC4VA.

"Central Carolina SKYWARN (CCS) Assistant Emergency Coordinator Scott Lewis, KJ4BPV, and I arrived at the NWS shortly before noon on Saturday, readied the station, and secured plenty of paper and pens for taking reports. We utilized Gibson Ridge Level 3 radar software, NWSChat, and IEMbot for receipt of warnings and other NWS products.

"We divided up duties and alternated between them. One NCO monitored NWSChat and IEMbot for severe thunderstorm and tornado warnings and announced the warnings over the SKY-

Kevin Smith, K4BGM, took this picture of a tornado on the ground in mid-April a mile or so northeast of I-795 North in Wilson County, North Carolina. He estimates it was "at least a 10th of a mile wide and produced major damage a short time later near Wilson." (Courtesy of K4BGM)

WARN WB4TQD 146.88 repeater. The other NCO took storm reports from spotters.

"Our activation began with the issuance of a PDS (Particularly Dangerous Situation) Tornado Watch issued by the Storm Prediction Center at 12:05 PM. That's unusual for our area, because this type of watch is usually reserved for super-cell thunderstorms on the plains.

"Once the line of storms hit the Eastern Piedmont of North Carolina, things exploded. The Raleigh NWS issued 23 tornado warnings and nine severe thunderstorm warnings for the 18 counties covered by Central Carolina SKYWARN. The Raleigh NWS provided an average warning lead time of 20 to 30 minutes.

"The first tornado warning came at 2:25 PM. A few observations trickled in, but shortly after 3 PM the reports came in, one right after another. The first three were given by Rhett Isley, KB4HG, who relayed reports of quarter-inch hail in Sanford, a funnel cloud over St. Andrews subdivision in Sanford, and house damage and downed trees in the same subdivision. Then followed reports of roofing material and vinyl siding falling from the sky in Apex and Raleigh.

"Other reports through the afternoon across the CCS coverage area included sightings of funnel clouds, tornadoes on the ground, trees uprooted and snapped off, trees across roads, a Lowe's store with significant structural damage, houses with roof damage, houses destroyed, damage to mobile units at Foundations Bible College, a barn destroyed, downed power lines, leaning power poles, damaged and destroyed mobile homes, people trapped under power lines, traffic lights torn off poles and hanging by wires, a twisted and bent high-power electric line tower, hail up to the size of golf balls, overturned vehicles, damaged traffic signs, damage at Shaw University, and more.

"A particularly poignant report came from a spotter who was making his way home in Johnston County. He provided excellent reports of downed trees and house damage while mobile on Highway 242. He later called back to the net to say that he had arrived home, but that his house and that of his neighbor were gone.

"At one point, the Raleigh NWS was potentially in the path of a tornado. Meteorologist in Charge Darin Figurskey, KC2IPY, gave the order to evacuate the third-floor NWS offices to the designated storm shelter in the building.

"The NWS handed its operations to the Blacksburg, Virginia NWS office, and we turned over SKYWARN operations over to two home-based NCOs—CCS Assistant Emergency Coordinator Bob Woodson, WX4MMM, and Jose Guzman, KD4JWF, who continued taking reports.

"Once the tornado passed, we returned to the third floor of the building to resume NCO duties. Fortunately, the tornado did not hit us, but we could smell the scent of nearby pines snapped several miles away by the wind.

"After the storms passed, a number of spotters continued to survey their counties, making detailed, descriptive damage reports and sending photos and videos.

"Our activation ended at 8:11 PM with the cancellation of the tornado watch by the NWS—a little more than eight hours since we started. In all, 96 reports were received from approximately 57 spotters via ham radio in the CCS coverage area. Those reports were highly valued by the NWS and were incorporated into the warning process and used to verify existing warnings."

According to Raleigh NWS Warning Coordinator Jeff Orrock, KI4KKX:

"The detailed reports of tornadoes, damage, and even debris falling from the sky many miles away from the torna-

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Built-in Interference Detection

In Frequency-Counter Mode, the MFJ-266 also tracks down powerful local signals that can disrupt accurate SWR measurements. When picked up by an antenna under test, these signals may compete with the analyzer's internally generated test signal to make SWR readings appear artificially high. All handheld antenna bridges are subject to additive interference, but *only* the MFJ-266 can detect the presence of an offending signal, display its severity, and identify the operating frequency!

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MFJ-266's operating manual was professionally written and illustrated to help you understand and master every function quickly. It also includes a guide for ensuring accurate results and getting the most from the unit's advanced features. In the back, you'll find a one-page *"Quick Guide"* that reviews all controls and functions.

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SKYWARN weather spotter Cassie Mentha, KJ4GKP, photographed giant trees that had been toppled by a tornado on April 16 in Raleigh, North Carolina. "As you can see," she said, "these were mature hardwoods. This is how a number of streets looked in the city of Raleigh." (Courtesy of KJ4GKP)

do coupled with intense radar signatures painted a picture as to the severity of what was unfolding. The relay of damage reports from spotters tuning into local emergency frequencies via scanners proved invaluable. During the height of the event, 911 communication centers were overwhelmed, making regular communication difficult. The spotter relay of 911 communications intercepted via scanners to the NWS proved vital in the midst of tornadoes, providing real-time information which greatly improved warnings and services, protecting lives. This was the event we all plan and train for. We could not have asked for better service and dedication from the SKYWARN Spotter network." *(See a video of KI4KKX being interviewed about the severe weather: <http://bit.ly/iC2Nt8>.—ed.)*

Enzor said there are more than "5,000 trained spotters in the 31 counties covered by the Raleigh National Weather Service. More than 750 of those are amateur radio operators. They utilized their training to serve the NWS well on April 16 and contributed to the NWS effort to save lives and property.

"Spotter Mike Thompson, N5CGG, said that 'listening to the 146.88 repeater during the storm today, I was proud to be a ham.' His comment sums up the public-service feeling."

Enzor said she watched this event unfold "with fascination, horror, and heartbreak. Fascination with the power of nature, horror at the sheer destruction, and heartbreak for the injuries, nine fatalities, and damaged and destroyed homes and businesses within the Raleigh NWS warning area. I pray that it will be a long, long time before central North Carolina sees such devastating weather again."

Oklahoma: They've Seen Fire and Rain

Lloyd Colston, KC5FM, ARRL Oklahoma Section Public Information Coordinator, told *CQ* that April 15 was a hectic day for the state with wildfire emergencies in the west and tornadoes threatening the southeast.

"Both SKYWARN and ARES® were involved," he told the ARRL. "These two groups of volunteers are married together for these types of situations. They work extremely well."

According to a report by Mark Conklin, N7XYO, six radio amateurs helped the Coalgate Fire Department, the Coal County Emergency Management Agency, and Atoka County EMA with weather communications.

"Elsewhere," Colston told *CQ*, "hams in the Tulsa National Weather Service office received spotter reports in northeastern Oklahoma as severe weather impacted that part of the state."

In southwestern Oklahoma, amateur radio operations using the Southwest Independent Repeater Alliance disseminated information from the NWS office in Norman and relayed storm reports to that office," Colston said. *(Visit SWIRA at <http://bit.ly/kDDBuk>.—ed.)*

"Even deeper in southwestern Oklahoma, amateur radio operators were called to the Altus Emergency Operations Center to support communications related to wildfires raging near Blair and Altus. The wildfires were driven by 61-miles-per-hour gusts and 45 miles-per-hour (sustained) winds," he said.

Also related to the fires, in Stephens County 16 radio amateurs worked with Stephens County ARES® to provide communication support for the County Sheriff's Office, the Stephens County EMA, and the Velma Fire Department, Colston said.

Wrap-Up

These most certainly were very trying times in the southeast part of the U.S. All of us hope that the recovery time will be supported and helped not only by the government and its agencies, but by dedicated ham radio operators as well. As these stories have told, "if and when all else fails, amateur radio comes through." Until next month . . .

73, Richard, KI6SN

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Results of the 2011 CQ WPX RTTY Contest

BY ED MUNS,* WØYK

The 17th annual CQ WPX RTTY Contest once again broke the participation record with 2471 submitted logs, up a modest 3% from the 2009 record number, which was up 16% from 2010. There were 191 countries logged, up 10% over 2010. There also were 2024 unique prefixes, and 4O3A got 1095 of them, a new record. However, there were 6% fewer QSOs across all the logs with just slightly more different calls. Conditions were similar to 2010, with 80 and 40 meters a bit more productive and the high bands less so. Recently, 10 meters has shown life in a few contests, but was only slightly up from 2010. Hopefully it will open up stronger for the contest in 2012. Here is a comparison of band activity between 2010 and 2011, showing percent of total QSOs per band:

Band	2010	2011
80	13%	15%
40	27%	28%
20	36%	35%
15	23%	21%
10	0.5%	1%

A number of stations took advantage of the newly added QRP and Overlay categories. There were 77 QRP entries, 34 Rookie overlays, and 324 Tri-Bander/Wires overlays.

Records continue to move higher. This year's event brought 9 new world records, 29 new continental records, and 11 new area records (Canada, Japan, and USA). This does not include the addition of the QRP categories this year, in which lots of first-time records were established.

Single-Operator High Power

Single-Operator, All Band. While a new world record technically was set by Ed P49X (WØYK), it was marginally only 0.04% higher at 13.3M points. Mike, K4GMH, took second with 8.2M, breaking the North America record he set last year by 4%. Tyler, KF3P (K3MM), was third with 7.2M. Yuri, RG9A, won Asia with 6.5M; Boyan, LZ8E (LZ2BE), won Europe with 6.1M; and Robby, VY2SS, set a new Canadian record with 4.7M.

Single-Operator, Single Band 3.5 MHz. Pekka, EE8W (OH1RY), set a new world record at 2.6M, while second place Franco, I4AVG, won Europe with 2.0M. Will, K6ND/1, won North America with 783K.

Single-Operator, Single Band 7 MHz. Jham, HK1T, broke the world record with 5.0M, and Mario, IZØKBR, won Europe with 4.2M. Rudy, N2WQ/VE3, won North America and set a new Canada record with 2.1M. Dick, K9OM/4, won the U.S. with 1.8M.

Single-Operator, Single Band 14 MHz. Both Yuris, D4C (YL2GM), with 4.3M, and second place Antonio, CT3KY (CT3EN), with 4.2M broke the old world record of 3.4M. With 3.3M, Sue, P40YL (AI6YL), broke the South America record she set in 2009, up 43%. John, KK9A/4, set a new North America record at 2.4M, and Nobuo, JA6GCE, won Asia with a new Japan record of 1.2M.

Single-Operator, Single Band 21 MHz. Five stations broke the world record: Girts, D44AC (YL2KL), with 5.2M; Olli, EA8AH (EA4BQ), with 3.4M; Robert, ST2AR (S53R) with 3.4M; Ezequiel, LP2F (LU1FDU), with 3.3M; and Dale CE3/VE7SV with 2.8M. The first three also broke the Africa record, and LP2F set a new South America record. Max, KH6ZM, broke the Oceania record with 1.5M, and Wayne, N2WK, broke the North America record with 1.2M.

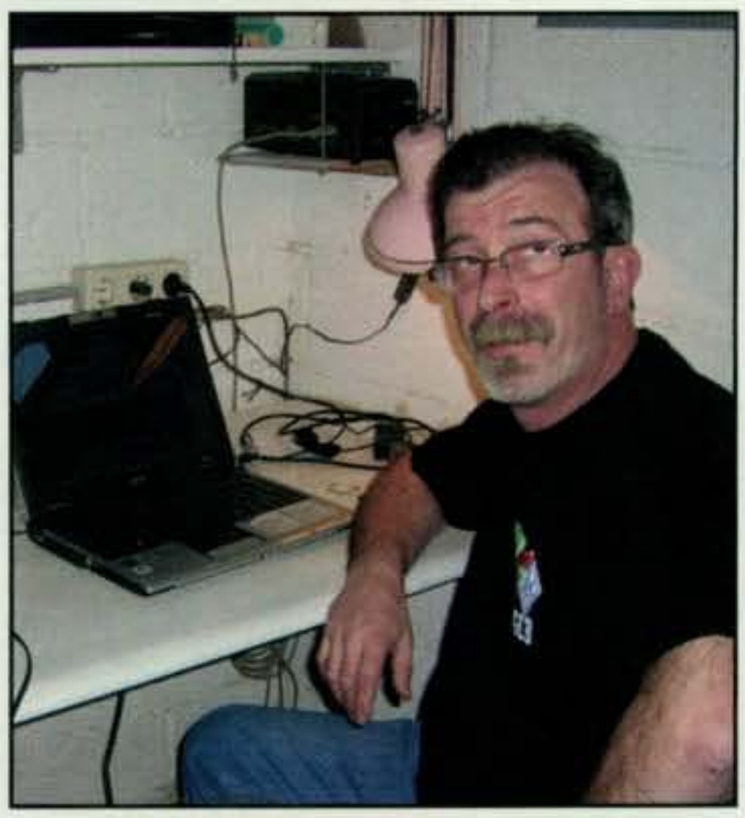
Single-Operator, Single Band 28 MHz. Not surprisingly, the first three places came from South America with the top score of 265K from Rene, LU7HN. Watch this category to heat up in years to come.

Single-Operator Low Power

Single-Operator, All Band. Roger, PJ4R (N4RR), handily took top honors once again by blowing away the prior world record he set in Aruba as P40R. This time Roger raised the bar nearly 21% to 6.8M points. One of his weapons was a Field-Day-style 2-element wire delta loop for 80 meters. Second-place Mohamed, 5C5W (CN8CD), set a new Africa record with 5.5M. Wanderley, ZX2B (PY2MNL), was third with 4.3M. Steve, ZC4LI, set the new Asia record at 3.3M, and Jose, KS1Y (N1BAA), won North America with nearly the same 3.3M points. Aleksander, SQ9UM, won Europe with 2.6M.

Single-Operator, Single Band 3.5 MHz. Tomek, SQ2RGB, led this field with

Jack, FY1FL, with the Ariane 5 rocket in French Guiana where he works when not contesting. Jack was third SOAB LP in South America.



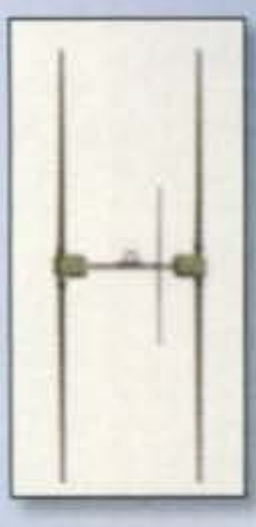
Paco, EA3GLB, set a new world record for SO40 LP.

*e-mail: <w0yk@cqwpxrtty.com>

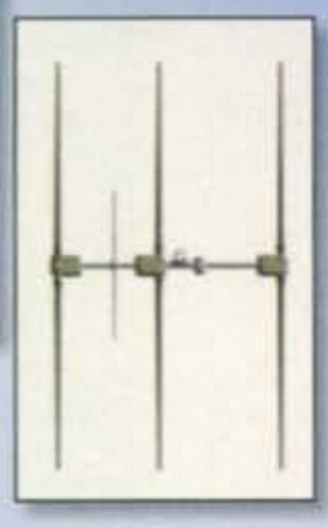
Which SteppIR Product is Best for You?

2, 3, and 4 Element Yagis

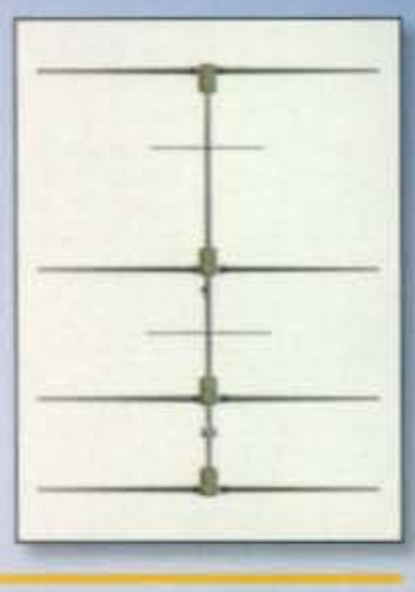
For the hams who are fortunate enough to have towers in their backyards. Gain and directivity is yours with a SteppIR Yagi.



2 Element 20m-6m Yagi
2 element Yagi, 20m-6m continuous coverage; 57" boom, 36 ft longest element, 18.2 ft turning radius, 6 sq ft wind load, 30 lb; SDA 100 controller included.



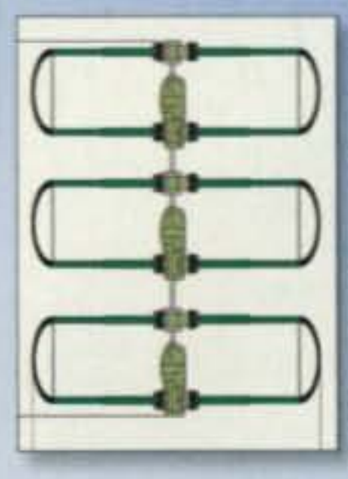
3 Element Yagi 20m-6m
3 element Yagi, 20m-6m continuous coverage; 16 foot boom, 36 ft longest element, 19.7 ft turning radius, 6.1 sq ft wind load, 51 lb; SDA 100 controller included.



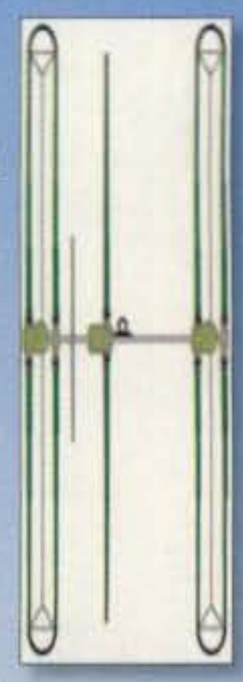
4 Element Yagi 20m-6m
4 element Yagi, 20m-6m continuous coverage; 36 ft longest element, 24.1 ft turning radius, 9.7 sq ft wind load, 99 lb; SDA 100 controller included.

Dream Beam Series Yagi's

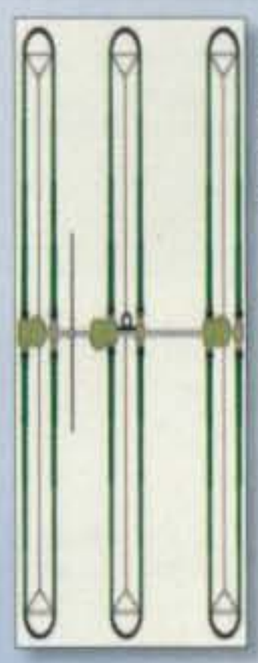
The Dream Beam series offers antennas for both space limited Hams as well as the "Big Guns" who have the space and want the very best.



DB11 Yagi Antenna
DB11 Yagi, 18.5 ft element length, 11 ft boom, 10.8 ft turning radius, 61 lb, 5.9 sq ft wind load; 2 active elements on 20m; 3 active elements on 17, 15, 12, 10, 6m.



DB18 YAGI
Dreambeam DB18 yagi, 3 el on 20m-6m, 2 el on 40/30m, 18 ft boom; Does not include optional 6m passive element kit; Includes SDA100 controller.



DB18E YAGI
Dreambeam DB18E, 3 el 30m-6m, 2 el 40m, three looped elements, does not include optional 6m passive element kit, 18 foot boom; Includes SDA 100 controller.

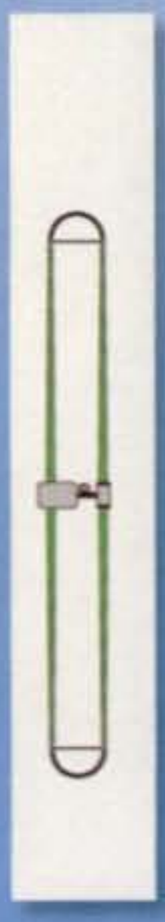
Vertical and Dipoles

For the ham who may not have a tower, but a tree or two for a dipole. SteppIR verticals work great when there are no tall structures around to hang some wire. And, the low take-off angle can be your friend.

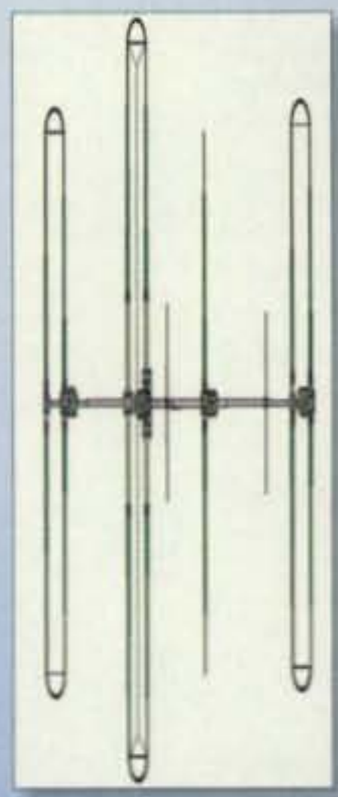
BigIR Vertical Antenna, 40m-6m
BigIR vertical antenna, 40m-6m continuous coverage, 32 ft length, 15 lb total weight, 2 sq ft wind load; EIA 222C wind rating when guyed; Comes with SDA 100 controller and 1.5"mounting pole ; Does not include optional 80m coil.

SmallIR Vertical Antenna 20m-6m
20m-6m continuous coverage, 18 ft total length, 12 lb weight, 1 sq ft wind load; EIA-222C wind rating without guys.

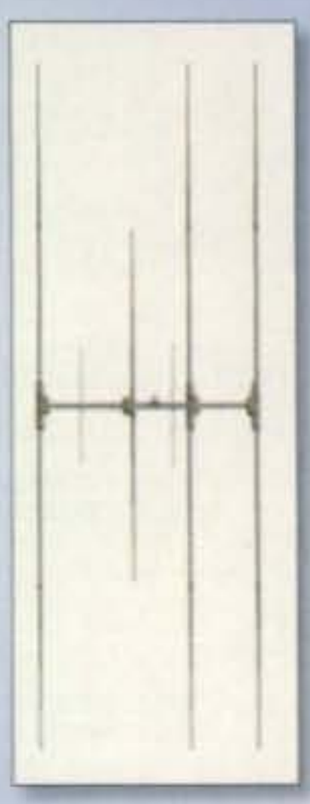
20m-6m Dipole
20m-6m continuous coverage dipole; 36 ft element length; Comes with SDA 100 controller.



40m-6m Loop Dipole
40m-6m continuous coverage, 39 ft total length; SDA 100 controller included.



DB36 DreamBeam Yagi, 40m-6m
DreamBeam DB36 4 element Yagi, 40m-6m continuous coverage; 36ft boom, 48 ft longest element, 26 ft turning radius, 17.5 sq ft wind load, 160 lb; SDA 100 controller included.



MonstIR 4 Element Yagi 40m-6m
MonstIR 4 element Yagi, 40m-6m continuous coverage with full length elements; 34ft boom, 70 ft longest element, 39.7 ft turning radius, 23.9 sq ft wind load, 160 lb; SDA 100 controller included.

SteppIR

2112 116th Ave NE Suite 1-5, Bellevue, 98004

www.steppir.com

Tel: (425) 453-1910 Fax: (425) 462-4415

TOP SCORES

World
SINGLE OPERATOR
HIGH POWER
ALL BAND
P49X(WØYK) 13,302,240
K4GMH 8,203,680
KF3P(K3MM) 7,192,341
RG9A 6,547,255
LZ8E(LZ2BE) 6,137,918

28 MHz
LU7HN 264,979
AY8A 224,094
HK1AA 54,353

21 MHz
D44AC 5,165,056
EA8AH(EA4BQ) 3,431,239
ST2AR 3,419,024

14 MHz
D4C 4,340,853
CT3KY 4,204,768
P4ØYL 3,304,808

7 MHz
HK1T 5,020,160
IZØKBR 4,206,114
UW1M(UR5MW) 4,150,926

3.5 MHz
EE8W(EA8AH) 2,597,000
I4AVG 1,973,000
EMØX(UT2XQ) 1,731,132

LOW POWER
ALL BAND
*PJ4R 6,794,020
*5C5W(CN8KD) 5,470,226
*ZX2B(PY2MNL) 4,342,294
*FY1FL 3,712,044
*ZC4LI 3,298,082

28 MHz
*PY2EB 50,270
*YV5JBI 2,673
*JH6WHN 1,550

21 MHz
*PY2SEX 1,264,304
*UP7P(UN7PBY) 1,011,722
*EA7ISH 917,088

14 MHz
*HG7T(HA7TM) 1,696,940
*GØMTN 653,952
*UT1IA 539,175

7 MHz
*EA3GLB 2,991,728
*S5ØRY(S51D) 1,994,898
*SP3VSE 1,327,920

3.5 MHz
*SQ2RGB 757,154
*UZ2HZ 744,100
*MØVAA 736,334

QRP
ALL BAND
TM3T(F5VBT) 1,187,361
OK3C(OK2ZC) 842,592
F5BEG 728,250
RX1CQ 548,744
HG6C(HA6IAM) 489,727

21 MHz
JH3DMQ 24,104
7N4WPY 11,440
S56G 7,000

14 MHz
TG9ANF 241,779
YO8DDP 132,712
UAØZS 32,100

7 MHz
UU4JIM 46,800
HAØLI 43,056
F8BDQ 33,408

3.5 MHz
HA1WD 39,520
F8CED 6,888
9A4AA 4,620

MULTI-OPERATOR
SINGLE TRANSMITTER
RY9C 7,423,884
F5CWU 6,943,608
ES5Q 6,725,970
LS1D 6,625,332
OM5M 5,923,104

MULTI-OPERATOR
TWO TRANSMITTER
9A1A 16,397,832
IQ1RY 12,072,150
HG1S 11,893,373
YU8NU 9,006,300
NG1G 7,862,238

MULTI-OPERATOR
MULTI-TRANSMITTER
4O3A 19,545,750
Z37M 9,157,950
RWØA 8,519,552
OH6R 8,376,340
KA4RRU 5,552,085

ROOKIE
HIGH POWER
ALL BAND
4X2ØHC(4Z4TL) 708,966
K3GMT 251,489
IZ3KSO 71,614
EA3GOM 1,344

14 MHz
YT5W(YT2PFR) 1,241,376

LOW POWER
ALL BAND
*MØGVZ 736,368
*SN1T(SQ1RET) 353,430
*SO7B 341,504
*OH8FTF 199,808
*SQ9NKK 194,043

28 MHz
*NP3YL 312

21 MHz
*YC1BAH 24,360
*JO3RCK 10

14 MHz
*OK4TX 76,936

7 MHz
*YC2WBF 44,710
*DU7RJA 572

TRIBANDER/SINGLE ELEMENT
HIGH POWER
ALL BAND
EF5Y 2,864,127
RW4PL 2,677,410
WA2ETU 2,603,517
YL9T(YL2TW) 2,478,780
SV2BFN 1,961,000

21 MHz
ZL3TE(W3SE) 483,218
WZ7ZR(W7ZR) 473,970
XE1EE 259,585

14 MHz
SX3B(SV1BDO) 1,508,390
ZY2C(PY2ADR) 1,281,510
EA9LZ/7 1,179,351

7 MHz
UR5WCQ 1,043,768
ED5J(EA5DM) 452,010
KØPK 351,652

3.5 MHz
DJ3IW 418,500
YO4AUL 98,832
EA3DUM 88,548

LOW POWER
ALL Band
*ZC4LI 3,298,082
*H2E 1,818,012
*S57U 1,706,800
*VE2AXO 1,179,026
*KA2D 1,094,901

28 MHz
*EC7KW 207

21 MHz
*IKØEIE 174,838
*EA3NO 114,080
*K2EN 47,450

14 MHz
*GØMTN 653,952
*W1ZD/7 310,708
*IW9FDD 294,216

7 MHz
*CT1EEK 1,126,664
*DL6UAA 454,860
*VE3IAE 388,936

3.5 MHz
*MØVAA 736,334
*SO9G(SP9DTE) 559,908
*DN2SAX(DL2SAX) 390,612

UNITED STATES
SINGLE OPERATOR
HIGH POWER
ALL BAND
K4GMH 8,203,680
KF3P(K3MM) 7,192,341
AA3B 5,767,020
AK1W(K5ZD) 4,046,454
K1SFA 3,707,520

28 MHz
NA4W(K4WI) 7,140

21 MHz
N2WK 1,245,195
K4FJ 1,157,988
K8IA/7 659,892

14 MHz
KK9A/4 2,387,388
KZ7X(W7WW) 774,891
WA8RPK 414,232

7 MHz
K9OM/4 1,782,162
K7WP 670,000
KØPK 351,652

3.5 MHz
K6ND/1 782,640
W4UH 272,748
W6WRT 155,550

LOW POWER
ALL BAND
*KS1Y(N4BAA) 3,256,875
*WE4M(N2QT) 3,039,400
*AA5AU 2,443,193
*KA2D 1,094,901
*WW3S 797,580

28 MHz
*KK8X 1,430
*KC7V 1,080
*ND6S 338

21 MHz
*AE5AA(N5ZM) 810,888
*K2EN 47,450
*KC8ZTJ 28,408

14 MHz
*W1ZD/7 310,708
*K7RE/Ø 248,472
*WG8Y 93,399

7 MHz
*K9NR 774,200
*N6MA/7 633,654
*AB1J 226,720

3.5 MHz
*N7UR 1,188

QRP
ALL BAND
K2YG 409,860
WD9FTZ/8 180,810
KC9NJZ 26,036
AE3J 21,200
KB2HSH 15,054

MULTI-OPERATOR
SINGLE TRANSMITTER
NAØCW 3,669,564
KØTV/1 3,478,328
WX3SKY 2,176,355
WM6A 1,535,196
WX7P 1,364,574

MULTI-OPERATOR
TWO TRANSMITTER
NG1G 7,862,238
W7IV 4,187,010
KF5HHD 3,837,924
WØIW 2,832,100
WX5S/6 1,281,324

MULTI-OPERATOR
MULTI-TRANSMITTER
KA4RRU 5,552,085

ROOKIE
HIGH POWER
ALL BAND
K3GMT 251,489

LOW POWER
ALL BAND
*K7MKL 154,031
*KB1SUA 64,680
*KC2WUF 14,766
*K2CYE 9,360
*KD8MBI 5,368

TRIBANDER/SINGLE ELEMENT
HIGH POWER
ALL BAND
WA2ETU 2,603,517
K3MD 1,769,040
K4FX 1,650,420
AD4EB 1,414,746
W1BYH 1,270,016

21 MHz
WZ7ZR(W7ZR) 473,970
AI1P/Ø 46,505

14 MHz
WA8RPK 414,232

7 MHz
KØPK 351,652
NA4M/5 118,338

3.5 MHz
K4ADR 46,860

LOW POWER
ALL BAND
*KA2D 1,094,901
*K2DSL 701,592
*AB4SF 690,790
*KB3LIX 629,024
*WB2RHM/4 573,586

21 MHz
*K2EN 47,450
*NK6A 23,616

14 MHz
*W1ZD/7 310,708
*K7RE/Ø 248,472
*AF4RK 38,500

7 MHz
*AB1J 226,720
*KCØDEB 192,496
*WB8K 125,172

3.5 MHz
*N7UR 1,188

Europe
SINGLE OPERATOR
HIGH POWER
ALL BAND
LZ8E(LZ2BE) 6,137,918
ED1R(EA1CJ) 5,133,800
S5ØW(S51MA) 4,889,924
OK3R(OK1DVM) 4,667,011
LB8IB 4,372,306

21 MHz
EA1KY 713,878
ED1Q(EA1QA) 593,664
OK7RY(OK1DF) 481,833

14 MHz
RD3A 2,070,880
OH4A(OH4KA) 1,964,024
S53M(S51FB) 1,878,108

7 MHz
IZØKBR 4,206,114
UW1M(UR5MW) 4,150,926
9A3AAX 4,061,116

3.5 MHz
I4AVG 1,973,000
EMØX(UT2XQ) 1,731,132
OL7M 1,708,372

SINGLE OPERATOR
LOW POWER
ALL BAND
*SQ9UM 2,599,250
*LY6A 2,470,372
*LZ9R(LZ3YY) 1,992,792
*URØHQ 1,788,632
*G8APB 1,715,812

28 MHz
*CT5KDN 900
*EC7KW 207

21 MHz
*EA7ISH 917,088
*UZ7HO 265,140
*YO3JF 257,550

14 MHz
*HG7T(HA7TM) 1,696,940
*GØMTN 653,952
*UT1IA 539,175

7 MHz
*EA3GLB 2,991,728
*S5ØRY(S51D) 1,994,898
*SP3VSE 1,327,920

3.5 MHz
*SQ2RGB 757,154
*UZ2HZ 744,100
*MØVAA 736,334

QRP
ALL BAND
TM3T(F5VBT) 1,187,361
OK3C(OK2ZC) 842,592
F5BEG 728,250
RX1CQ 548,744
HG6C(HA6IAM) 489,727

21 MHz
S56G 7,000

14 MHz
YO8DDP 132,712
IV3AOL 29,600
USØMM 27,348

7 MHz
UU4JIM 46,800
HAØLI 43,056
F8BDQ 33,408

3.5 MHz
HA1WD 39,520
F8CED 6,888
9A4AA 4,620

MULTI-OPERATOR
SINGLE TRANSMITTER
F5CWU 6,943,608
ES5Q 6,725,970
OM5M 5,923,104
F2FZ 5,040,750
OH8A 5,009,346

MULTI-OPERATOR
TWO TRANSMITTER
9A1A 16,397,832
IQ1RY 12,072,150
HG1S 11,893,373
YU8NU 9,006,300
DLØCS 7,764,965

MULTI-OPERATOR
MULTI-TRANSMITTER
4O3A 19,545,750
Z37M 9,157,950
OH6R 8,376,340
DM2TS 4,544,553
DR3W 1,058,536

ROOKIE
HIGH POWER
ALL BAND
IZ3KSO 71,614
EA3GOM 1,344

14 MHz
YT5W(YT2PFR) 1,241,376

HIGH POWER
ALL BAND
*MØGVZ 736,368
*SN1T(SQ1RET) 353,430
*SO7B 341,504
*OH8FTF 199,808
*SQ9NKK 194,043

14 MHz
*OK4TX 76,936

TRIBANDER/SINGLE ELEMENT
ALL BAND HIGH POWER
EF5Y 2,864,127
RW4PL 2,677,410
YL9T(YL2TW) 2,478,780
SV2BFN 1,961,000
EW4AA 1,738,800

21 MHz
DL3BQA 245,532
M3I(GØORH) 221,160
UR5MBA 10,860

14 MHz
SX3B(SV1BDO) 1,508,390
EA9LZ/7 1,179,351
RW4WZ 673,440
DK5OS 13,125

7 MHz
UR5WCQ 1,043,768
ED5J(EA5DM) 452,010

3.5 MHz
DJ3IW 418,500
YO4AUL 98,832
EA3DUM 88,548

LOW POWER
ALL BAND
*S57U 1,706,800
*HA5LZ 992,028
*UR4U(UR4UDI) 982,954
*EW1IP 837,680
*GUØSUP 758,520

28 MHz
*EC7KW 207

21 MHz
*IKØEIE 174,838
*EA3NO 114,080
*EA7GV 22,620

14 MHz
*GØMTN 653,952
*IW9FDD 294,216
*EU1DX 147,705

7 MHz
*CT1EEK 1,126,664
*DL6UAA 454,860
*IK4JQQ 25,872

3.5 MHz
*MØVAA 736,334
*SO9G(SP9DTE) 559,908
*DN2SAX(DL2SAX) 390,612

** Low Power*

757K, where the top 24 finishers were in Europe. Twenty-fifth was Ivan, UN9LU, who set a new Asia record with 183K.

Single-Operator, Single Band 7 MHz. Paco, EA3GLB, set a new world record with 3.0M out of the 12 Europeans in the top slots. Next was Don, K9NR, who set a new North America record with 774K. Yuri, UN6P, set a new Asia record with 694K, and Edilson, PU8TEP, won South America with 389K.

Single-Operator, Single Band 14 MHz. The world record moved from North America (J88DR in 2009) to Europe, with Nemeth, HG7T, racking up 1.7M points. Larry, KL2R (N1TX), won North America with 354K, and Shalva, 4L1BR, won Asia with 220K.

Single-Operator, Single Band 21 MHz. Alex, PY2SEX, set a new South America record to win this category with 1.3M, while second-place Artem, UP7P, set a new Asia record with 1.0M. Third-place Francisco, EA7ISH, set a new European record with 917K, and Earl, AE5AA (N5ZM), set the new North America record with 811K.

Single-Operator, Single Band 28 MHz. Augusto, PY2EB, set the new world record with 50K, so there is plenty of opportunity in this category as the band comes back to life.

Single-Operator QRP

Single-Operator, All Band. Rudolf, TM3T, set the inaugural SOAB QRP world

2011 CQ WPX RTTY CONTEST TROPHY SPONSORS AND WINNERS

Single Operator High Power

World: Sponsored by Natasha Tkatch, KU1YL. **Winner: P49X (op: Ed Muns, W□YK)**
Africa: Sponsored by Andrei Stchislenok, EW1AR-NP3D (in Memory of EU1MM). Winner: Barry Murrell, ZS2EZ
Asia: Sponsored by Tyler Stewart, K3MM. **Winner: Yuri Kurinyi, RG9A**
Europe: Sponsored by DL-DX RTTY Contest Group. **Winner: LZ8E (op: Boyan Petkov, LZ8BE)**
N.A.: Jeff Demers, N1SNB. **Winner: Mike Sims, K4GMH**
USA: Sponsored by Glenn Vinson, W6OTC. **Winner: KF3P (op: Tyler Stewart, K3MM)**
7th Call Area (USA): Sponsored by Hank Lonberg, KR7X (in memory of Bob Wruble, W7GG). **Winner: K7ABC (op: David Hachadorian, K6LL)**

Single Operator Low Power

World: Sponsored by Mike Sims, K4GMH. **Winner: Roger Hoffman, PJ4R**
Asia: Sponsored by Doug Faunt, N6TQS. **Winner: Steve Hodgson, ZC4LI**
Europe: Sponsored by Trey Garlough, N5KO. **Winner: Aleksander Wieczorek, SQ9UM**
N.A.: Sponsored by Wayne King, N2WK. **Winner: KS1Y (op: Jose Castillo, N4BAA)**
Oceania: Sponsored by Doug Faunt, N6TQS. **Winner: Felimon Morano, Jr., DV1JM**
USA: Sponsored by Jim Reisert, AD1C. **Winner: Mark Sihlanick, WE4M**

Single Operator Single Band

3.5 MHz World High Power: Sponsored by Sue Cook, AI6YL/P40YL. **Winner: EE8W (op: Pekka Kolehmainen, EA8AH)**
7 MHz World High Power: Sponsored by Wray Dudley, AB4SF. **Winner: Jham Salim Gechem, HK1T**
7 MHz World Low Power: Sponsored by Don Reed, K2OGD. **Winner: Paco Soler, EA3GLB**
14 MHz World High Power: Sponsored by Steve "Sid" Caesar, NH7C. **Winner: Yuris Petersons, D4C**
14 MHz World Low Power: Sponsored by Kenny Young, AB4GG. **Winner: HG7T (op: Nemeth Tibor, HA7TM)**
14 MHz Japan High Power: Sponsored by JA6ZPR GOMAGARA Contest Club. **Winner: Nobuo Matsuoka, JA6GCE**
21 MHz World High Power: Sponsored by Steve Jarrett, K4FJ. **Winner: Girts Budis, D44AC**
28 MHz World High Power: Sponsored by Steve Hodgson, ZC4LI. Winner: Rene Giorda, LU7HN
28 MHz World Low Power: Sponsored by John Marranca, Jr., KB2HSH. **Winner: Augusto Reis, PY2EB**

Multi-Op Single Transmitter

World: Sponsored by Steve Merchant, K6AW. **Winner: RY9C (ops: UA9CGA, RW9CF, RA9DF)**
Asia: Sponsored by CT3 Madeira Contest Team/CQ9K/CT9M. **Winner: RT9J (ops: RA9J, RV9JK, RA9JP)**
N.A.: Sponsored by Whatcom Amateur Radio Society WA7RS. **Winner: VC2SU (ops: VA2UP, VE2SB)**
USA: Sponsored by MTT□SZ Gyor Varosi Radiokub, HG1S. **Winner: NA□CW (ops: W□LSD, N□KE, N□KQ)**

Multi-Op Two Transmitter

World: Sponsored by Nick Smith, W4GKM. **Winner: 9A1A (ops: 9A9A, 9A7R, 9A6A, 9A5W, 9A2DQ)**
N.A.: Sponsored by Ed Muns, W□YK. **Winner: NG1G (ops: W1AN, W1PN, K1DM, W1XX, N1HRA, KO1H, KA1CQR, NG1G)**
U.S.A.: Sponsored by CTRI Contest Group. **Winner: W7IV (ops: W7IV, N7RO, N7BT, KW7XX, VE7YBH, W7SSO)**

Multi-Op Multi-Transmitter

World: Sponsored by Abroham Neal Software by K3NC. **Winner: 4O3A (ops: 4O3A, 4O4A, S50XX, S52X, S55Y, S57MM, S59W, Z30A, Z33F, YU1YV)**
N.A.: Sponsored by Fred Dennin, WW4LL. **Winner: KA4RRU (ops: KA4RRU, K3UI, N4DXS, K4RG, NL7TK, KD6AKC, W4MLD, KI4ZKJ)**
USA.: Sponsored by KA4RRU Contest Group. **Winner: VE7UF (ops: VA7FC, VA7RN, VE7AX, VE7FO, VE7IO, VE7UF)**

Club Competition

World: Sponsored by Potomac Valley Radio Club. **Winner: Bavarian Contest Club**
N.A.: Sponsored by Northern California Contest Club. **Winner: Northern California Contest Club**

CLUB SCORES

UNITED STATES

Club	# Entrants	Score
NORTHERN CALIFORNIA CONTEST CLUB	61	35,334,055
POTOMAC VALLEY RADIO CLUB	40	32,600,392
YANKEE CLIPPER CONTEST CLUB	24	13,543,784
SOCIETY OF MIDWEST CONTESTERS	18	13,134,314
FRANKFORD RADIO CLUB	8	12,243,780
CTRI CONTEST GROUP	7	11,879,656
TENNESSEE CONTEST GROUP	15	7,885,613
MINNESOTA WIRELESS ASSN	22	7,738,664
ARIZONA OUTLAWS CONTEST CLUB	14	6,531,724
GRAND MESA CONTESTERS OF COLORADO	8	5,663,776
WILLAMETTE VALLEY DX CLUB	11	4,130,477
FLORIDA CONTEST GROUP	11	4,024,477
NORTH COAST CONTESTERS	9	3,727,412
MISSISSIPPI VALLEY DX/CONTEST CLUB	3	3,679,010
SPOKANE DX ASSOCIATION	9	3,009,569
LOUISIANA CONTEST CLUB	3	2,900,601
SOUTHWEST OHIO DX ASSOCIATION	3	2,792,091
WESTERN WASHINGTON DX CLUB	11	2,722,289
ORDER OF BOILED OWLS OF NEW YORK	5	2,009,084
CAROLINA SHINE	4	1,611,535
KANSAS CITY DX CLUB	4	1,507,448
LOW COUNTRY CONTEST CLUB	3	1,438,404
ROCHESTER (NY) DX ASSN	3	1,350,976
SOUTHERN CALIFORNIA CONTEST CLUB	10	1,312,640
DELAWARE LEHIGH AMATEUR RADIO CLUB	5	992,067
ALABAMA CONTEST GROUP	7	969,879
HUDSON VALLEY CONTESTERS AND DXERS	4	799,079
SOUTH EAST CONTEST CLUB	4	676,477
PORTAGE COUNTY AMATEUR RADIO SERVICE	3	636,302
METRO DX CLUB	4	577,754
MAD RIVER RADIO CLUB	5	480,371
BRISTOL (TN/VA) ARC	6	440,928
CAROLINA DX ASSOCIATION	3	336,360
CENTRAL TEXAS DX AND CONTEST CLUB	4	198,838

DX

BAVARIAN CONTEST CLUB	63	55,140,160
UKRAINIAN CONTEST CLUB	28	23,085,207
CROATIAN CONTEST CLUB	5	21,481,854
CONTEST CLUB FINLAND	9	18,743,309
RHEIN RUHR DX ASSOCIATION	44	16,066,388
HUNGARIAN DX CLUB	4	15,730,991
BLACK SEA CONTEST CLUB	28	15,447,939
CONTEST CLUB ONTARIO	20	14,729,978
LATVIAN CONTEST CLUB	9	13,935,899
SLOVENIA CONTEST CLUB	9	12,804,594
ORCA DX AND CONTEST CLUB	5	11,799,899
URAL CONTEST GROUP	5	11,738,519
CONTEST GROUP DU QUEBEC	9	11,100,441
YU CONTEST CLUB	4	10,288,240
LU CONTEST GROUP	13	10,228,338
BRITISH COLUMBIA DX CLUB	3	7,602,149
ARAUCARIA DX GROUP	7	7,507,311
WORLD WIDE YOUNG CONTESTERS	5	7,500,498
SOUTH URAL CONTEST CLUB	4	7,179,601
RADIO CLUB HENARES	4	6,996,870
CT3 MADEIRA CONTEST TEAM	3	5,707,548
RUSSIAN CONTEST CLUB	7	5,160,856
LA CONTEST CLUB	3	5,004,853
KAUNAS UNIVERSITY OF TECHNOLOGY RADIO CLUB	5	4,903,148
TEMIRTAU CONTEST CLUB	6	3,410,950
DL-DX RTTY CONTEST GROUP	8	3,310,275
SP DX CLUB	14	2,999,490
KRIVBASS	3	2,888,214
VYTAUTAS MAGNUS UNIVERSITY RADIO CLUB	4	2,737,573
GMDX GROUP	4	2,522,330
TALL TREES CONTEST GROUP	3	2,464,686
BELARUS CONTEST CLUB	3	2,399,250
599 CONTEST CLUB	5	2,223,624
CHILTERN DX CLUB	3	1,983,152
VK CONTEST CLUB	4	1,962,868
MARITIME CONTEST CLUB	4	1,913,638
RTTY CONTESTERS OF JAPAN	4	1,833,575
RIO DX GROUP	4	1,511,881
YO DX CLUB	7	1,437,759
ALRS ST PETERSBURG	4	798,037
CANTAREIRA DX GROUP	5	719,186
BOSNIA AND HERZEGOVINA CONTEST CLUB	3	569,949
TOP OF EUROPE CONTESTERS	4	448,161
GRIMSBY AMATEUR RADIO SOCIETY	3	413,711
CLUB DE RADIO EXPERIMENTADORES DE OCCIDENTE	3	351,120
PERUGIA CONTEST CLUB	3	318,878
VU CONTEST GROUP	3	201,852
UR-QRP-CLUB	3	164,231
CSTA BUCURESTI	3	124,731

record with an impressive 1.2M points. Dave, K2YG, took NA with 410K, and Jose, PU5ATX, took SA with 237K. Hisami, 7L4IOU, initialized Asia with 71K.

Single-Operator, Single Band 3.5 MHz. Toth, HA1WD, took top honors with 40K, out of the four entrants, all European.

Single-Operator, Single Band 7 MHz. Serge, UU4JIM, set this first record with 47K among the five entrants, also all in Europe.

Single-Operator, Single Band 14 MHz. Out of the dozen entrants in this category, Francisco, TG9ANF, won with 242K. Second place Arsene, YO8DDP, won Europe with 133K, and third-place Sergey, UAØZS, won Asia with 32K.

Single-Operator, Single Band 21 MHz. Hiro, JH3DMQ, kicked off this category with a 24K win over four other entries. Third-place Tom, S56G, won Europe with 7K, and Jeffrey, VE3CW, won North America with 4.6K.

Single-Operator, Single Band 28 MHz. There were no entries.

Multi-Operator

Multi-Operator Single-Transmitter (MS). RY9C (UA9CGA, RW9CF, RA9DF) won with 7.4M, and second-place F5CWU (F5CWU, F3EGD, F4ERS) won Europe with 6.9M, with ES5Q (ES5RY, YL2KF, YL1ZF) close behind with 6.7M. LS1D (LW1DTZ, LU3CT, LW9EOC) won South America with 6.6M, and S9DX (DM5TI, DD2ML, DK1AX, DL2JRM) won Africa with 5.2M. VC2SU (VA2UP, VE2SB) won North America with 5.1M.

Multi-Operator Two-Transmitter (M2). 9A1A (9A9A, 9A7R, 9A6A, 9A5W, 9A2DQ) won the world with 16.4M, just shy of the 17M record. The next three places were also from Europe: IQ1RY (I1BEP, IK1SPR, IK1RQT, IK1HXN,

Franco, I4AVG, took second place in SO80 HP and won Europe.

Ezequiel, LP2F (LU2FDU), was fourth in SO15 HP and one of five stations to break that world record.

IW1QN, IZ1LBG, IW1FNW, IW1AYD) with 12.0M; HG1S (HA1TJ, HA1DAI, HA1DAC, HA1DAI) with 11.9M; and YU8NU (YT2T, YT2B, YU2A, YT1BX, YU8NU) with 9.0M. Fifth-place NG1G (W1AN, W1PN, K1DM, W1XX, N1HRA, KO1H, KA1CQR, NG1G) set a new North America record with 7.8M.

Multi-Operator Multi-Transmitter (MM). 4O3A (4O3A, 4O4A, S50XX, S52X, S55Y, S57MM, S59W, Z30A, Z33F, YU1YV) won with 19.5M and a new European record and the second highest score ever in this contest by any category. RWØA (RA1AM, ARØALM, RVØAUI, RWØAR, RUØAB, RZØAI, RUØAM, RZØAF, RZØAT) won Asia with 8.5M, barely missing their own record of 8.6M. KA4RRU (KA4RRU, K3UI, N4DXS, K4RG, NL7TK, KD6AKC, W4WLD, KI4ZKJ) set a new North America record of 5.6M

Club Competition

Once again the Bavarian Contest Club took top honors with 55M points from 63 logs, the highest of any club. They are masters at leveraging club completions to rally their membership and increasing contest participation for the benefit of us all. In the U.S., the Northern California Contest Club finds that WPX is its most competitive DX contest format, and they gathered 61 members to accumulate 35M points and surpass rival PVRC with 33M. Fourth place worldwide was the Ukrainian Contest Club with 23M. The main objective of club competition is to rally members to participate in the contest, making it more fun for all participants.

When submitting a log for any CQ contest, be sure that the club name is exactly, character by character, the same as listed on the club name list at <www.cqww.com/clubnames.htm>. Do not abbreviate, add periods, include other information in parentheses, etc. A computer program compares the club name in each log to the CQ contest club name list and ignores any that do not match exact-

The operating positions at IQ1RY, which took second place in Multi-Two.

Robert, ST2AR (S53R), working on his tower prior to taking third in SO15 HP as one of five stations to break that world record.

ly. It is easy to add a club name to the list following the instructions on the club names web page: <http://www.cqwpxrtty.com/clubnames.htm>.

Log Checking

Accuracy in log checking continues to improve, thanks to the tireless efforts of Ken, K1EA. Thanks to all the logs received, including check logs, over 77% of all QSOs were cross-checked with another log. 3.26% of total QSOs were bad. Another 0.16 % of total QSOs were found bad with the help of "reverse logs," which are created from all the QSOs in the actual received logs. 61% of the unique callsigns were determined to be incorrect. The remaining 39% were likely wrong as well; it is rare that a callsign is worked only once in all the logs received. There is a more detailed analysis of these 3.42% log errors in your individual LCR (Log Check Report) available by request to <w0yk@cqwpxrtty.com>.

Some single operators lament the 30-hour time limit and would like to keep operating on Sunday. Please do so! There is no problem operating beyond 30 hours, but just make sure your log includes all QSOs you make. Log checking will simply calculate your score based on the first 30 hours of logged contacts, less any breaks greater than one-hour each. The QSOs beyond 30 hours must be in your log to avoid unfair NIL (Not In Log) penalties to those stations you work.

Results and Records

Thanks to Don, AA5AU, and Randy, K5ZD, there is a searchable database (www.cqwpxrtty.com/score_db.htm) of all results in the history of CQ WPX RTTY. It is easy to initiate a quick search for all the operations by a given callsign, or see the historical results of a country or region. This, in turn, provides a very rich and accurate set of records (www.cqwpxrtty.com/records.htm) for all categories and any geographical area. The Statistics link brings up a graph of submitted logs since the beginning of CQ WPX, 17 years ago.

Acknowlegements

In addition to Don and Randy, those who support CQ WPX RTTY outside the contest include Gail, K2RED, Magaging Editor of *CQ*, who edits and manages the details for this article as well as mailing out plaques all over the world. Mike, K4GMH, is in charge of the sponsored plaque program, finding sponsors, collecting funds, producing the artwork, and ordering plaques all in a timely manner as soon as results are completed. Barry, W5GN, tackles the monumental job of producing hundreds of certificates and deciphering addresses in the Cabrillo headers to mail out all of them. SWL log checking is performed by Dan, I1-12387, using special log-check software written by Marek, SP7DQR.

See you in the next CQ WPX RTTY Contest, February 11–12, 2012!

73, Ed, WØYK

(Continued on page 107)

DX ENGINEERING

MARK II Hexx 5-Band HF Beam Antenna

- Low noise results—approaches performance of closed loop antennas
- Pre-slit fiberglass—easy assembly
- Good results at 20 to 30 feet above ground
- Patented*, balanced weather-proof feeder system!
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DXE-MBVE-1-4P	43 ft. Multi-Band Vertical/Radial Plate Package.... *SPECIAL*	**$269.95**
DXE-MBVE-1-4UP	43 ft. Multi-Band Vertical/ UNUN Package; *SPECIAL*	**$289.95**
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DXE-MBVE-2-4UP	33 ft. 80 to 10 Meter Multi-Band UNUN Package	**$279.95**
DXE-4030VA-1	THUNDERBOLT™ 40/30 Meter Dual Band	**$199.95**
DXE-40VE-1TB	Foldover 40 Meter 1/4 Wave Freestanding, Heavy Duty ..... *SPECIAL*	**$179.95**

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3 ft. lengths .058 wall - 3/8" to 2 1/8" O.D.
6 ft. lengths .058 wall - 3/8" to 2 1/8" O.D.
Perfect for Most Elements

6061-T8 .120 wall - 1.5" to 3" O.D. Unslit
For Booms and HD Element Designs

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- Drawn, not extruded tubing
- Custom-made just for DX Engineering—better than the other guys
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.058" Wall x 36" Long			.058" Wall x 72" Long		
O.D.	Unslit	Slit One End	O.D.	Unslit	Slit One End
0.375"	$1.45	N/A	0.375"	$2.95	N/A
0.500"	$2.05	$3.75	0.500"	$4.15	$6.05
0.625"	$2.35	$4.05	0.625"	$4.75	$6.65
0.750"	$2.65	$4.35	0.750"	$5.35	$7.25
0.875"	$2.75	$4.45	0.875"	$5.65	$7.55
1.000"	$2.95	$4.65	1.000"	$5.95	$7.85
1.125"	$3.25	$4.95	1.125"	$6.55	$8.45
1.250"	$4.15	$5.85	1.250"	$7.75	$9.65
1.375"	$4.45	$6.15	1.375"	$8.45	$10.35
1.500"	$5.25	$6.95	1.500"	$8.95	$10.85
1.625"	$6.05	$7.75	1.625"	$9.75	$11.65
1.750"	$6.85	$8.55	1.750"	$10.65	$12.55
1.875"	$7.65	$9.35	1.875"	$11.55	$13.45
2.000"	$8.45	$10.15	2.000"	$12.45	$14.35
2.125" D	$9.25	$10.95	2.125"	$13.35	$15.25

6061-T8/.120" Wall Tubing also available in 1.5" to 3" O.D. sizes
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DXE-AT1311	6' x 1.5" O.D.	$23.85
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DXE-AT1314	6' x 2.25" O.D.	$37.45
DXE-AT1315	6' x 2.5" O.D.	$42.50
DXE-AT1316	6' x 2.75" O.D.	$46.95
DXE-AT1317	6' x 3.0" O.D.	$51.40
DXE-AT1325	12' x 3.0" O.D.	$103.95

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DXE-CBC-213JU006	6 ft.	$15.88
DXE-CBC-213JU012	12 ft.	$20.88
DXE-CBC-213JU025	25 ft.	$29.88
DXE-CBC-213JU050	50 ft.	$52.88
DXE-CBC-213JU075	75 ft.	$71.88
DXE-CBC-213JU100	100 ft.	$91.88
DXE-CBC-213JU125	125 ft.	$112.88
DXE-CBC-213JU150	150 ft.	$133.88

RG-8/U JSC-3030 Cable Assemblies with PL-259 Connectors

DXE-CBC-008JU002	2 ft.	$12.88
DXE-CBC-008JU003	3 ft.	$13.88
DXE-CBC-008JU006	6 ft.	$16.88
DXE-CBC-008JU012	12 ft.	$24.88
DXE-CBC-008JU025	25 ft.	$39.88
DXE-CBC-008JU050	50 ft.	$61.88
DXE-CBC-008JU075	75 ft.	$85.88
DXE-CBC-008JU100	100 ft.	$108.88
DXE-CBC-008JU125	125 ft.	$139.88

RG-8X JSC-3060 Cable Assemblies with PL-259 Connectors

DXE-CBC-8XJU002	2 ft.	$10.88
DXE-CBC-8XJU003	3 ft.	$11.88
DXE-CBC-8XJU006	6 ft.	$13.88
DXE-CBC-8XJU012	12 ft.	$16.88
DXE-CBC-8XJU025	25 ft.	$23.88
DXE-CBC-8XJU050	50 ft.	$32.88
DXE-CBC-8XJU075	75 ft.	$40.88
DXE-CBC-8XJU100	100 ft.	$47.88

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DXE-400MAXDU025	25 ft	$39.88
DXE-400MAXDU050	50 ft	$61.88
DXE-400MAXDU075	75 ft	$85.88
DXE-400MAXDU100	100 ft	$104.88
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COM-BAL-11150E	5 kW, side eyebolts	$49.95
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COM-BAL-11150S	5 kW, side studs/wingnuts	$49.95
COM-BAL-11150T	5 kW, top studs/wingnuts	$49.95
1:1 Dual Wire/Dual Core		
COM-BAL-11140T	5 kW, top studs/wingnuts	$69.95
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COM-BAL-41130E	3 kW, side eyebolts	$59.95
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COM-BAL-41130T	3 kW, top studs/wingnuts	$59.95
COM-BAL-41130S	3 kW, side studs/wingnuts	$59.95
4:1 Dual Wire/Dual Core		
COM-BAL-41150T	5 kW, top studs/wingnuts	$89.95
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Advances in Remote Site Control without Computers

BY MARTTI J. LAINE,* OH2BH

The personal computer and the internet made possible the ability to remotely control an amateur radio station, and continued fine-tuning has made this capability ever more available. This benefits radio amateurs who live in antenna-restricted neighborhoods, poor radio locations, or places where noise issues persist.

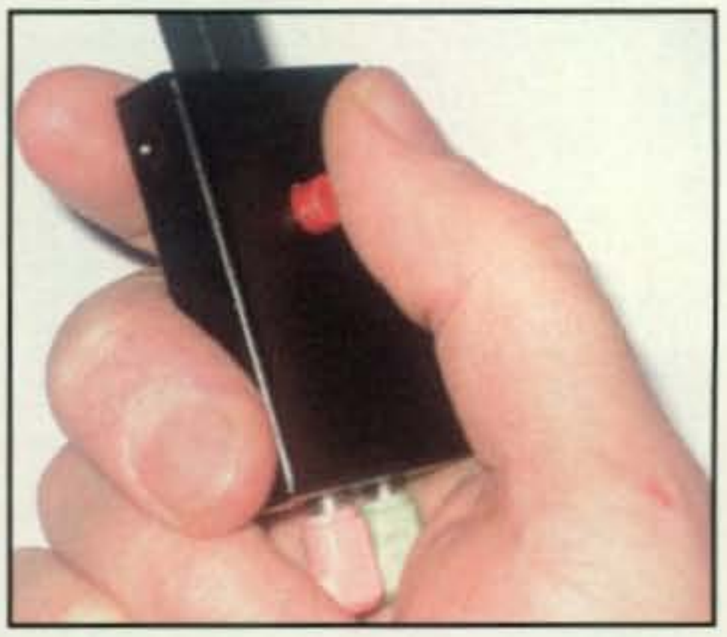
Still, many who may have wanted to take advantage of remotely controlled amateur radio operation lacked an extensive knowledge of computer and/or internet architecture. A recent approach using relatively simple interconnecting devices having their own internet protocol (IP) addresses (see "First Takes," May 2010 *QST*) has eliminated the need for a PC on each end of the remote-control circuit. The SM2O Remote Radio Controller (RRC) now opens the door to controlling a remote amateur radio station virtually from anywhere there's an internet connection (WLAN or Ethernet), with or without a PC.

For several years now, various radio-specific or general-purpose radio programs such as *Ham Radio Deluxe* have let you use your PC to remotely control a station. Audio was routed via the PC's sound card with third-party software such as *Skype* used to carry it over the internet. For many, however, operating a station via a PC display with a mouse does not offer the same satisfying look and feel of operating a real radio. Employing the IP-address-based concept consolidates all signal paths (except RF, of course) within a single path. The RRC acts like a server at the radio end with its own IP address, allowing the remote-site unit to engage in direct two-way communication with the radio. The SM2O PC client lets you operate while on the road using nothing more than a laptop and a small USB "stick." An audio codec optimizes and digitizes speech with good voice quality and minimized latency, all with less than 500 kb/s internet speed.

This is all that Jaakko Silanto, OH1MA, has at home while operating his powerful remote station where large antennas and quiet reception help him work major DX. (All photos courtesy of the author)

Look, Ma! No PC!

As described in the "First Takes" article last year, the RRC concept took advantage of transceivers having separable control heads, such as the Kenwood TS-480 or ICOM IC-706. The head remained at the operating position, while the body was installed at the remote site. The latest RRC wrinkle now takes advantage of a radio's serial port (CAT) to command and control the same or similar radio at the remote site. The radios communicate with each other with the help of the RRC unit. This means that Radio 1 at the operating site can control



The latest version of laptop-based Remote employs an RRC PC Client which packages the needed software, audio codec, and PTT function into one slick unit the size of a USB memory stick. You just have to download the radio software from the web and you will be in control of your radio wherever you are.

*Savasundintie 4C, 02380 Espoo, Finland
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MFJ-1116, $59.95. 8 pairs binding posts, 15A total.Voltmeter, on/off switch.

MFJ-1116 **$59.95**

MFJ-1112, $44.95. 6 pairs binding posts, 15 Amps total.

MFJ-1112 **$44.95**

MFJ-1117, $64.95. Powers *four* transceivers simultaneously (two at 35 Amps each and two at 35 Amps combined). 8x2x3 inches.

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MFJ-1128, $104.95. 3 high-current outlets for transceivers. 9 *switched* outlets for accessories. Mix & match included fuses as needed (one-40A, one-25A, four-10A, four-5A, three-1A fuses installed). 0-25 VDC *Voltmeter*. *Extra* contacts, fuses. 12Wx1¼Hx2¾D".

MFJ-1128 **$104.95**

MFJ-1126, $84.95. 8 outlets, each fused, 40 Amps total. Factory installed fuses: two 1A, three 5A, two 10A, one 25A, one 40A. *0-25 VDC Voltmeter*. Includes *extra PowerPoles®*, *extra* fuses -- *no extra cost*. 9Wx1¼Hx2¾ inches.

MFJ-1126 **$84.95**

PowerPoles™ *AND 5-Way Binding Posts*

MFJ-1129, $114.95. 10 outlets each fused, 40 Amp total. 3 high-current outlets for rigs -- 2 *PowerPoles®* and one 5-way binding post. 7 *switched* outlets for accessories (20A max) -- 5 *PowerPoles®* and 2 binding posts. Fuses include (1- 40A, 2-25A, 3-10A, 3-5A, 2-1A installed). *0-25 VDC Voltmeter*. Includes extra *PowerPoles®* and fuses, 12½Wx1¼Hx2¾D inches.

MFJ-1129 **$114.95**

MFJ-1124, $64.95. 6 outlets each fused, 40 Amps total. 4 *PowerPoles®*, 2 high-current binding posts, Installed fuses: 1-40A, 2-25A, 2-10A, 1-5A, 1-1A. Includes extra *PowerPoles®* & fuses -- *no extra cost.*

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Control and remote RRC units utilize three communication channels; a simple text-based SIP protocol is utilized for radio-to-radio communication, while a UDP datagram protocol is used for control and audio streams. The RRC unit also provides two additional serial ports for connecting devices such as an amplifier and a rotator control.

all functions of Radio 2 at the remote (i.e., antenna) site, just as if the entire station were at the operating site.

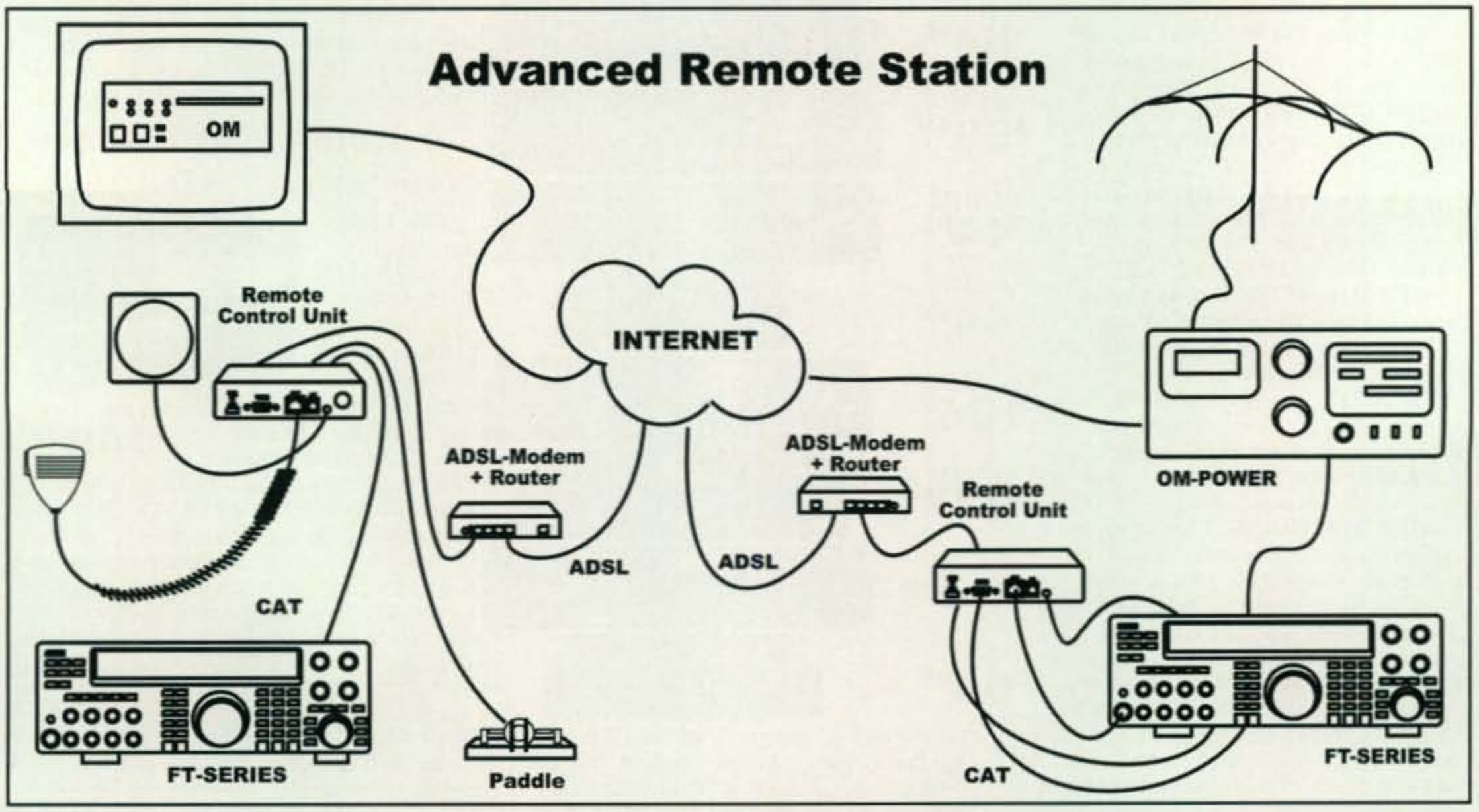
When Radio 1 switches or tunes the bands, so does Radio 2. But hold on! It gets even more exciting. The radio at the operating position can even display S-meter readings from the remote radio by using a calibrated S-meter table. Even the power switch—turning the radio on or off at home—will turn the radio on or off at the remote site. The latest RRC has added CW capability, including a keyer, so that smooth CW would also be available in remote operation. Monitoring CW sending at the operating site is part of the RRC; thus there is no problem to deal with latency issues.

It now is even possible to have different radio models on each end, as long as they use the same CAT protocol and have essentially corresponding front-panel controls. (This new concept applies initially to the Yaesu family of radios sharing the same serial communication command base.) Applying the same approach to other manufacturers' radios should be easy, and I believe that future radios will incorporate these features or offer them as an option.

Amplifier and Rotator Remote Control

Until now, operating a remote-site amplifier or beam rotator typically has involved your logging computer at the operating site. But even here new winds are blowing, so it is reasonable to have an amplifier than can be truly controlled and monitored over the internet using an HTTP approach. Here you should have web-browser-based software on your logging PC that enables the PC to communicate with an amplifier having an IP address, to set and show its operation on a real-time basis.

Radio Arcala (OH8X), a Finnish high-tech consortium, jointly undertook with



The overall station layout connects all necessary building blocks together in a simple way that today's ham operators are bound to know in the contemporary internet-dominated world. Changing between local operation and remote operation is as easy as changing the microphone and headphones. No RF or data-related cables need to be touched.

the European OM-Power amplifier manufacturer to work out such a concept—the first of its kind. It lets you communicate with the amplifier over the internet and see its functions just as though the amplifier were sitting on your operating table. Here the amplifier is not connected to a local computer as currently is often done through an RS-232 port; rather it is hooked up directly with the internet. Radio Arcala <http://www.radioarcala.com> offers the needed open-source software.

Only a few commercial rotators currently fit into the remote-control scheme, although Yaesu's DXA series can be an integral part of the radio and therefore can be controlled from the radio itself. While IP-addressed interface boards are just becoming available for standard rotators, all requisite technologies and building blocks are avail-

Several of the hams working to make traditional amplifier technology and latest IP technology talk to one another. From left: Toni Linden, OH2UA; Martti Laine, OH2BH; Tibi Ferenec, OM3RM; Ivan Miroslav, OM3LZ; and Jozef Lang, OM3GI.

Adding an IP-based radio controller and amplifier interface to your station will not change the traditional layout or assume extra space or heavy wiring but will keep your station's operating convenience and ergonomics intact. It is noted that in some cases, the operator has reappeared among the family members with his laptop (but is still on the air!).

Remote Station Vocabulary

Remote Radio: A remote site controlled from elsewhere.

Control Head: Where the remote radio is controlled by radio software or with another radio.

IP Address: An Internet Protocol Address is a numerical label assigned to each device participating in a computer network that uses the Internet Protocol for communication. An IP address serves two principal functions: host or network interface identification and location addressing. Its role has been characterized as follows: "A name indicates what we seek. An address indicates where it is. A route indicates how to get there."

HTTP: The acronym for Hyper Text Transfer Protocol, the underlying protocol used by the World Wide Web. HTTP defines how messages are formatted and transmitted, and what actions web servers and browsers should take in response to various commands. For example, when you enter a URL in your browser, this actually sends an HTTP command to the web server, directing it to fetch and transmit the requested web page.

Latency: Latency is simply defined as the time delay observed as data transmits from one point to another. Usually, to determine network latency the origin and destination points are used. A so-called low-latency network connection is one that generally experiences small delay times, while a high-latency connection generally suffers from long delays. 500-ms latency is widely used as the limit for speech.

SIP: Session Initiation Protocol, a very simple text-based application-layer control protocol. It creates, modifies, and terminates sessions with one or more participants.

UDP: Universal Datagram Protocol, a protocol to transfer sequential data over data networks.

URL: Uniform Resource Locator, the technical name for the address where a specific web page is found.

VoIP: Voice over Internet Protocol; general definition of voice services delivered over IP networks.

able to allow the remote station to play simply and efficiently. Once again, none of the elements used here suggest that you have to communicate with a PC at the remote site, an issue that typically has been a source of many shortcomings and hassles.

IP Addressability is King

The key to a remote world is having all radios and station accessories IP addressable. This permits the operator to control them locally or remotely in the same fashion. This scenario is coming soon, prompted by hardware and software options on hand today. The IP initiative for hardware radios has been presented to the radio manufacturing industry, and the RJ jack with related circuitry soon will allow you to hook up each piece of your station gear with the internet.

Realizing the magic of SM2O's approach, Radio Arcala had the vision to incorporate this smart concept into full-featured radios and devoted its application knowledge for the common good.

Remote Radio Controller (RRC) A Technical View

RRC is an intuitive way of utilizing existing VoIP technology. The connection established between the control end and the radio end uses the world standard session initiation protocol (SIP).

RRC boxes are built around reliable ARM microprocessor technology which interface with Ethernet networking, digital input/output (serial ports and PTT/CW), and audio channels for transmit/receive audio.

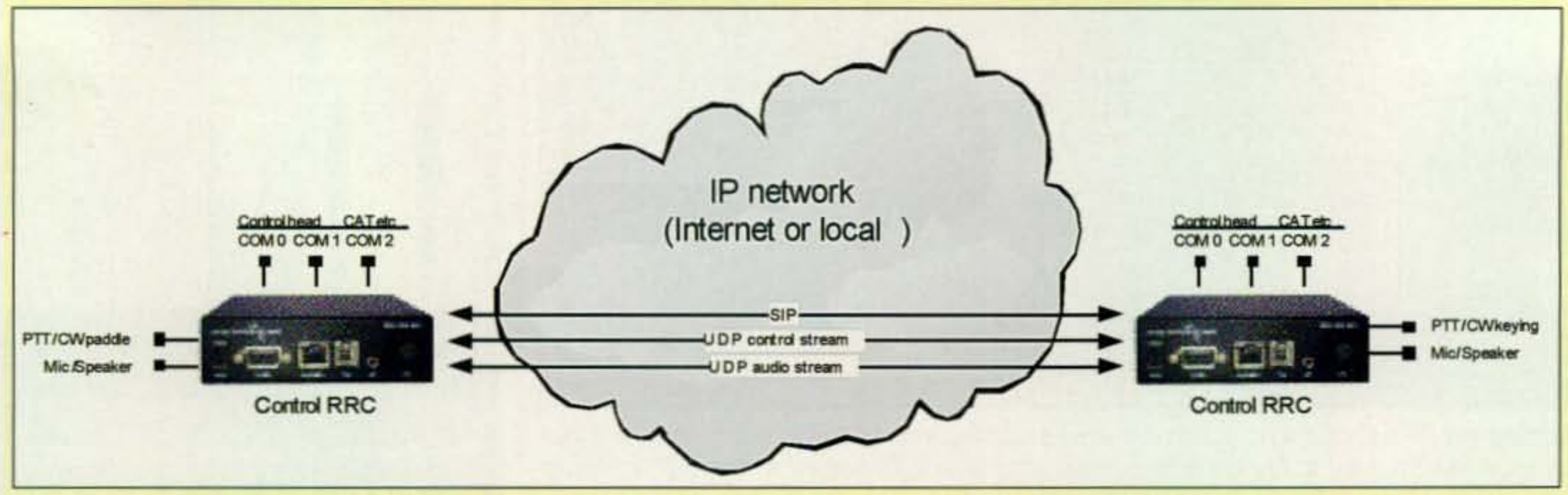
Audio coding in RRC features low latency, as there is really no processing power available to do compressed audio coding which would add audio coding/decoding but save network bandwidth. Several audio quality levels are available, even for low network speeds below 100 kbit/s. Better audio quality means more network bandwidth; highest quality consumes over 300 kbit/s network bandwidth but offers very good audio quality and dynamics. The latest version of Remoterig devices also feature dual audio channels to deliver both main and auxiliary receiver audio to the control end.

RRC comes with three serial ports which are tied together with the corresponding ports on the device at the other end; serial-port traffic flows multiplexed in the control data stream among PTT and CW information.

RRC functions well over firewalls and NAT technology, which is widely used in home broadband network routers, etc., from a single address which is managed by the broadband router. The router takes care of directing the inbound return traffic from the internet to the right machines. A Remoterig session is always established by the control end, which creates all connections to the remote end.

RRC is also capable of announcing the IP address it is assigned to a DynamicDNS service, making it reachable even with a dynamic IP address which changes periodically.

Erik Finskas, OH2LAK
Remoterig Technology Review



Connections and data paths between the Remote Radio Controllers at the control end and the remote end of the circuit. The two ends may be located anywhere that a broadband internet connection is available.

If amplifier noise and heat bother members of the household in a local operation, the small remote unit is all that is needed at the traditional station. The amplifier itself can be placed some 10 meters (30 feet) away from the station, connected over the internet.

What is now reality is so-called "Plug and Play Fixed Remote" at the highest level, connecting full-featured radios remotely to similar radios or using economy radios as their control heads.

The Mother Ship

Today, Radio Arcala members all are connecting to the OH8X Mother Station, allowing those desiring to operate to do so with the flip of a switch from the kind of radio station they cannot build themselves. Ultimately, Radio Arcala members will gather in a virtual world clubhouse from which they can make contacts as well as socialize and learn from each other in a 3D virtual world.

Many have wondered whether the internet is a threat or an opportunity for amateur radio. Clearly it is the latter, and recent innovations such as I've described clearly illustrate the coexistence of both worlds where one benefits the other. With many current supportive tools available on the web, it is time to appreciate the internet as a powerful tool that can enhance amateur radio and help make the younger generation more aware of its existence.

Yasme Foundation Director (and this article's author) Martti Laine, OH2BH, presents the 2010 Yasme Excellence Award to Michael Styrefors, SM2O, at a ceremony on board the cruise ship where two remote stations were operated as part of a live demonstration. Michael is only the seventh person to be so honored.

Remote Radio Interface Developer Honored by YASME Foundation

The 2010 Yasme Excellence Award was presented to Michael Styrefors, SM2O, who developed the Remote Radio Interface. The ability to connect radios and operators transparently and robustly over the internet is a key technological element in putting top-grade remote HF stations on the air—something which is more common every day. Remote stations will undoubtedly be important and popular in making and keeping amateur radio available to urban and suburban amateurs as they deal with mounting antenna restrictions and an increasingly noise-filled and interference-prone electromagnetic environment. For more information on the Yasme Foundation, visit <http:// www.yasme.org/>. *(© Reprinted with permission from Yasme Foundation website)*

This is how the remote amplifier appears on a local computer screen. With HTTP technology, you can control each function with your mouse, see the actual power and monitoring LEDs, plus receive a stream of messages on amplifier functionality. You need not worry about the amplifier being away where it will not cause noise or interference.

Announcing:

2011 CQ Hall of Fame Inductees

25th Anniversary of Contest Hall of Fame

10th Anniversary of Amateur Radio Hall of Fame

Back in 1985, *CQ* Publisher Dick Ross, K2MGA, and *RadioSport* Publisher Yuri Blanarovich, K3BU/VE3BMV, each came up with the same idea at the same time—a special way to recognize the best of the best among ham radio's elite contesters. *CQ*'s approach was to form the CQ Contest Hall of Fame, which, in 1986, inducted its first member, legendary contester Hazzard "Buz" Reeves, K2GL.

RadioSport also awarded its first hall of fame plaque to K2GL in 1986, and ceased publication several years later. In the years since 1986, 55 more outstanding contesters have been inducted into the CQ Contest Hall of Fame, and this year we add one more, John Sluymer, VE3EJ, for a total of 57 honorees over 25 years.

The CQ Contest Hall of Fame was built on the successful model of the CQ DX Hall of Fame, which has also inducted 57 members since it was established in 1967 (Gus Browning, W4BPD, was the first inductee).

Ten years ago, we added the CQ Amateur Radio Hall of Fame to honor hams who had made significant contributions to amateur radio or to society at large, as well as non-hams who have had a major impact on our hobby. This year's 12 inductees will bring the total number of CQ Amateur Radio Hall of Fame members to 230.

We are pleased to announce the 2011 inductees into the CQ Amateur Radio, Contest, and DX Halls of Fame:

Legendary contester Hazzard "Buz" Reeves, K2GL, was the first inductee into the CQ Contest Hall of Fame 25 years ago. The announcement was made at his 80th birthday party. (Photo courtesy Doug Zwiebel, KR2Q)

CQ Amateur Radio Hall of Fame

Bell, Dave, W6AQ—Hollywood TV/film producer; deeply involved in producing multiple amateur radio promotional videos over several decades.

Brightman, Nate, K6OSC—The "spark" behind W6RO, the ham station aboard the *Queen Mary* in Long Beach, CA. Through Nate's efforts with the station, millions of people have been introduced to amateur radio and thousands of hams have had the opportunity to operate from a high-profile station. (He has also been heavily involved with Red Cross disaster communications in Long Beach, spearheaded ham radio involvement in the Long Beach Marathon, brought demo stations to all branches of the Long Beach Public Library, and taught amateur radio to visually-impaired teenagers.)

Ensor, Loretta, W9UA (SK)—Sister of 2006 inductee Marshall Ensor, W9BSP; together they aired lessons on Morse code and radio fundamentals over the radio between 1929 and 1941, and were responsible for helping to get at least 900 new amateurs licensed (a huge number, considering that in 1935 there were only 35,000 licensed hams in the U.S.). She was also one of the founding members of YLRL—the Young Ladies' Radio League—and a noted DXer of her time.

Gunderson, Bob, W2JIO (SK)—Blind ham who was Editor and Publisher of *The Braille Technical Press* in the 1950s; at the time, it was the only monthly electronics magazine for the blind. Also radio-electronics teacher for 37 years at the NY Institute for the Education of the Blind, recipient of GE's Edison Radio Amateur Award for meritorious public service in 1955; developed many pieces of electronics test equipment for the blind. He also appeared on the TV program "This is Your Life," but is perhaps best known as the "answer man" at Hudson Radio on New York's Radio Row, where he worked three days a week as a technical advisor and consultant for the customers.

Mahony, Cardinal Roger, W6QYI—Archbishop Emeritus of Los Angeles, advocate for immigration reform.

Margolis, Sylvia (no call) (SK)—Prolific *CQ* humor writer in the 1960s and early '70s; first public relations officer for Radio Society of Great Britain.

McElroy, Ted (no call) (SK)—World champion radiotelegrapher and key manufacturer. Commercial telegrapher; still holds the telegraphy speed record of 77 wpm, set in a 1939 competition; manufactured namesake McElroy keys and bugs that were popular among hams before and after WW II, and are still popular among collectors today.

Moorefield, Ron, W8ILC—One of the guiding lights of the Dayton Hamvention® for at least the past 30

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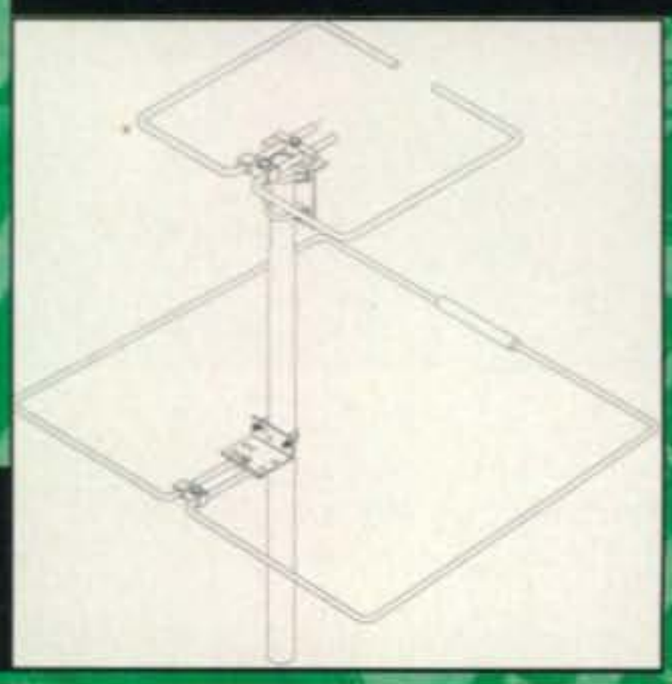

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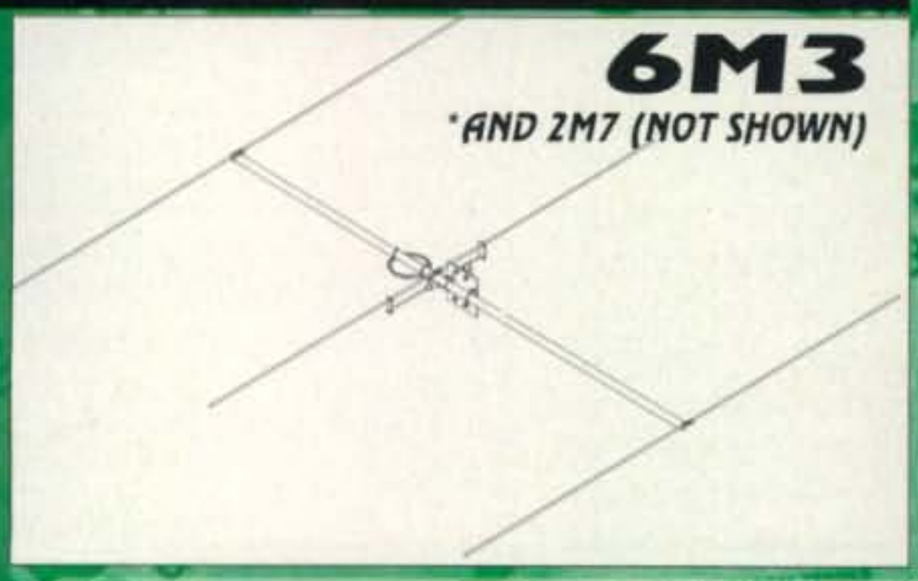

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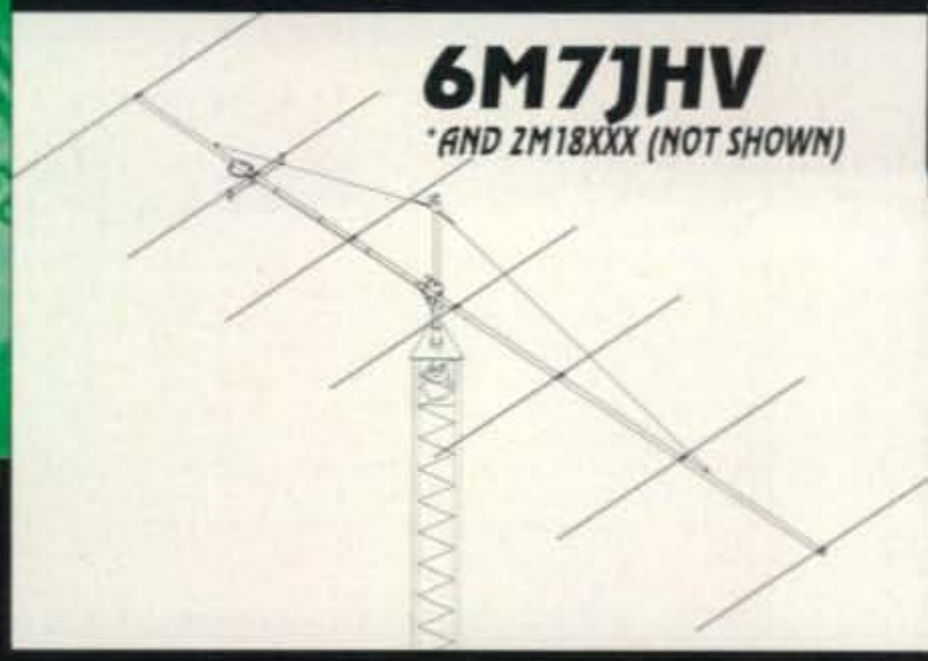

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Michael McGirr, K9AJ, 2011 inductee into the CQ DX Hall of Fame. (Photo courtesy Bob Wilson, N6TV)

John Sluymer, VE3EJ, the 2011 inductee of the CQ Contest Hall of Fame. (Photo courtesy of VE3EJ)

years; national ham radio coordinator for the 1984 Olympic Torch Relay from New York to Los Angeles; also a noted DXer and DXpeditioner; very active in public service in Dayton area and beyond.

Raff, Malcolm, WA2UNP (SK)—Astrophysicist, aerospace engineer and biotechnologist; developed some of the earliest DNA sequencing techniques and contributed software to the human genome project.

Schmieder, Robert, KK6EK—Noted DXer and DXpeditioner, physicist, and ecologist. Worked for 25 years at Sandia National Laboratories; founder and Expedition Leader of Cordell Expeditions, research group responsible for the creation of the Cordell Bank National Marine Sanctuary; author of books on island ecology and amateur radio DXpeditions. He has had a Pacific rock formation and several types of marine life named for him.

Stodola, E. King, W2AXO (SK)—The "father" of EME (Earth-Moon-Earth communications). Pioneer in development of radar; scientific director of the team that sent radar signals to the moon in 1946 and received them back on Earth. These first radio signal echoes off the moon proved that radio signals could pass through the ionosphere in both directions helped pave the way for communication satellites and advances in radio-astronomy.

Taflove, Allen, WA9JLV—Professor of Electrical Engineering and Computer Science at Northwestern University and a leading authority in the field of computational electrodynamics. He is one of the principal pioneers of numerical methods for solving Maxwell's equations and his research and methods form the foundation on which many of today's electromagnetic modeling software suites are based, including programs for antenna modeling and high-speed analog and digital circuit simulation. 2010 Distinguished Educator Award from the IEEE Antennas and Propagation Society. Trustee of Northwestern U. Amateur Radio Society station W9BGX.

CQ DX Hall of Fame

Michael J. McGirr, K9AJ—Mike is a leading DXpeditioner who has operated literally from the ends of the Earth over nearly 30 years. His many radio journeys have ranged from an Arctic expedition to Nunavut to Heard Island, off the coast of Antarctica, and a variety of places in between, including islands in the Indian Ocean, Caribbean, and South Pacific. Mike is also a director of the Island Radio Expedition Foundation (IREF) and 2010 recipient of the W9DXCC Award of Excellence in DXing.

CQ Contest Hall of Fame

John Sluymer, VE3EJ—John has been an active contester and DXer since 1973. He is a founding member and current president of Contest Club Ontario, which has grown from 16 to 250 members in less than a decade. John also holds numerous Canadian domestic and DX contest records; is a frequent host for single- and multi-op contest operations from his station; a longtime member of the CQ WW Contest Committee; and a frequent speaker at hamfest forums and club meetings.

This year's inductees were announced at the 2011 Dayton Hamvention®.

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New! - PK-232SC with Sound Card, Rig Control, USB - All built-in!

PK-232SC Multimode Data Controller*

Sound Card, Rig Control, USB, Pactor, RTTY, CW, Packet & more!

100,000 sold - All-time top selling data controller!

- Single USB connection to computer
- USB Sound Card built-in
- Rig Control built-in - Yaesu CAT, ICOM CI-V & Kenwood logic level
- Computer isolated from Radio

As Always-
Upgrade any PK-232 ever made to the PK-232SC!

The incredible PK-232SC again expands its role in your radio station. Now it connects to your computer with a single USB cable - no audio cables, no RS-232 cables! It has a built-in USB sound card with isolated audio I/O to your radio to prevent ground loops. The new logic level rig control for your Icom CI-V, Yaesu CAT and older Kenwood radios is optically isolated. There is a new audio monitor jack so you can hear the PK-232 ouput. You never have enough downstream USB ports so we even added a pair for that new radio with USB rig control and other accessories.

New! - HamHub II - Connect and Control your TNC, Radio & PC

HamHub II works with any TNC and Radio!

- Single USB connection to computer
- USB Sound Card built-in
- Rig Control built-in - Yaesu CAT, ICOM CI-V & Kenwood logic level, USB and RS-232
- Isolates Computer from Radio
- 2 RS-232 port and two USB ports

The HamHub II connects your computer, your TNC and your radio. It switches seamlessy between data controller modes and sound card modes under software control. A single USB cable connects to your computer - no audio cables, no RS-232 cables! It has a built-in USB sound card with isolated audio I/O to your radio to prevent ground loops. The logic level rig control works with your Icom CI-V, Yaesu CAT and older Kenwood radios. Dual USB and dual RS-232 ports take care of rig control on your newer radios, TNC control and accomodate addtional accessories.

Why do I need a HamHub II?

The problem with a typical sound card interface is that it is designed to work with your radio only. Many stations still use hardware data controllers for modes and features the sound card interfaces and computers don't have. The HamHub II connects any radio, any TNC and your computer in a flexible system to use all the resources of your hardware and software.

- **TZ-900 Antenna Impedance Analyzer**
  Quickly check Antennas & transmission lines- color graphics - no computer required!
- **DSP-232+ Multimode Data Controller***
  Sound card interface, USB, Pactor, 1200/9600 Packet
- **PK-96/100 TNC - 1200/9600 Packet***
  Available with USB or RS-232
- **DSP-599zx Audio Signal Processor***
  Noise Reduction & filtering for Audio, CW & data
- **ANC-4 Antenna Noise Canceller**
  Kill noise before it gets to your receiver!

HamLink™ Wireless and USB Remote Control & Audio

- **HamLinkUSB™ Rig Control Plus**
  Logic Level plus PTT
- **PK-232 RS-232-to-USB Adapter***
  Use the PK-232 with new computers!
- **HamLinkBT-BTH+™ Headset**
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What You've Told Us...

Our April survey asked about your ham radio buying plans for this year and the role that magazine advertising plays in your purchasing decisions.

It seems that *CQ* readers are beginning to feel the effects of the economic recovery. While 36% of the survey respondents plan to spend only $100-$500 on ham gear this year, 55% have budgeted more than $500 for ham radio purchases ($500–$1000: 29%; $1000–$2500: 17% and over $2500: 9%). Only 10% plan to spend less than $100 on ham gear this year.

Reader priorities for ham purchases this year include station accessories (25%), antennas and towers (23%), HF transceivers (17%), "other" (16%), VHF/UHF mobile transceivers (8%), none (7%), ham-related software (4%) and VHF/UHF handhelds (also 4%). Of readers planning to make a purchase, 67% plan to buy new gear, 18% are looking at used equipment and 21% may go either way.

Magazine ads clearly are important in making a purchasing decision. As 38% of respondents said, "They let me see what is available and help me narrow the field of options," followed by 37% saying, "They help educate me about product features to help me decide what to buy." That's 75% total. Next, 22% said ads direct them to manufacturer's or dealer's website to do further research, 4% replied "other," and 1% use ads to make their final buying decisions.

Finally, we asked what readers feel is the most important information our advertisers can share with them this year. Fully half (50%) responded, "How their equipment offers me the best value for my money," followed by "How their equipment can help maximize my station's performance" (33%), availability of low-cost gear (11%), availability of high-quality gear (5%), and other (4%).

This month's free subscription winner is Charles M. Garretson, Jr., AD5SK, of Leroy, Texas.

Reader Survey
July 2011

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

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

Back in May, we asked about your CW activities. This month, we'd like to know about your phone (voice) operating.

Please answer by circling the appropriate numbers on the reply card.

1. Do you currently operate voice at all on the air?
- Yes 1
- No 2

2. Approximately what percentage of your total operating is done on phone?
- 100% 3
- 76–99% 4
- 51–75% 5
- 26–50% 6
- 1–25% 7
- None 8

3. What type of operating accounts for most of your phone activity? (Choose one)
- Contesting 9
- DXing 10
- Rag-chewing 11
- Traffic-handling 12
- VHF/UHF weak-signal (e.g., tropo, sporadic-*E*) 13
- Other 14
- I do not operate voice 15

4. Which voice mode(s) do you currently use?
- AM 16
- Digital (e.g., D-STAR) 17
- FM 18
- SSB 19
- Other (please note mode on reply card) 20
- I do not operate voice 21

5. Which voice mode(s) have you ever used?
- AM 22
- Digital (e.g., D-STAR) 23
- FM 24
- SSB 25
- Other (please note mode on reply card) 26
- I do not operate voice 27

6. If you do NOT operate voice, which mode(s) do you operate?
- CW only 29
- RTTY/Digital only 30
- CW *and* RTTY/Digital 31
- Other (please note mode on reply card) 32

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

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From time to time, we detail how different hams in different places have successfully dealt with antenna restrictions, either municipal or those imposed by homeowners' associations (HOAs). Clearly, each situation is different and there is no "one size fits all" approach. W4UW found that, in his case, a "full disclosure" approach won him permission to put up a modest antenna. Here's Dick's story...

HOAs and Antenna Restrictions The "Full Disclosure" Approach

BY RICHARD A. GENAILLE,* W4UW

There have been numerous references in recent years to CC&Rs (Covenants, Conditions, and Restrictions) regarding the installation of radio antennas in communities throughout the country. However, most of the reports in various amateur publications have dealt not with these rules of homeowners' associations (HOAs), but with the legal cases in which radio antennas have been forbidden by city or town ordinances.

There have been few reports of what was done to be successful in dealing with the rules of HOAs, one of which I happen to belong to, and have been successful in obtaining permission to install an antenna to fit my present needs.

Several years ago I decided that the home and property where I lived for 50 years were becoming more than I could handle and I wanted a smaller home with fewer demands for maintenance, yard work, taxes, ad infinitum. I knew that I would have to give up a 60-foot, locally fabricated, tiltable steel mast with a TH6DXX sitting on top and a commercially made, terminated folded dipole ... antennas with which I had earned DXCC, WPX Honor Roll, and other awards. I also knew that I would keep my equipment just in case I might get to operate from some other location. My move was intended to relieve a certain amount of stress, which it did at first.

In my search for a new home I was shown a small condominium near my former location, which meant I would

Photo A– Aerial view of the author's condominium (not yet built when this photo was taken) and the proposed location of his antenna. (Geodata map courtesy of Forsyth County, NC Tax Office)

**133 Pebble Ridge Lane,
Winston-Salem, NC 27104
e-mail: <rgenaille@juno.com>*

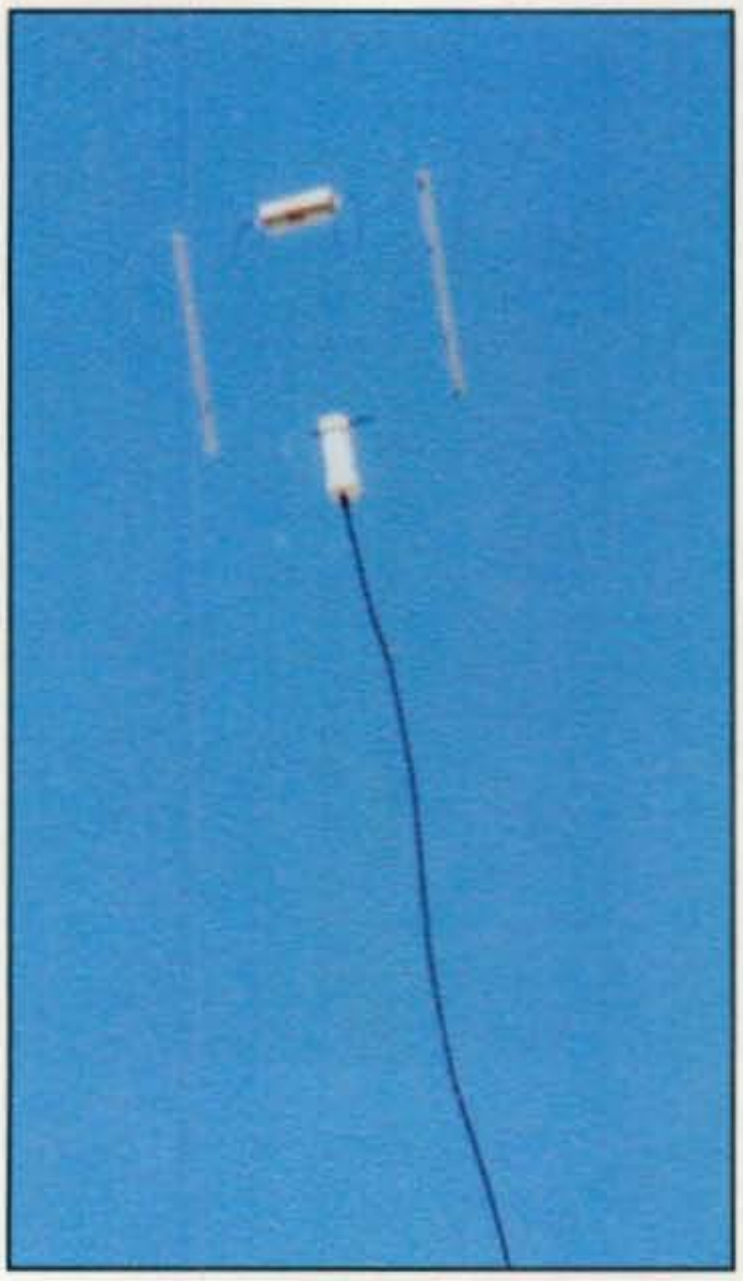

Photo B– Antenna feedpoint and transmission line. You can't really see the antenna itself, a major point made by the author to his neighbors.

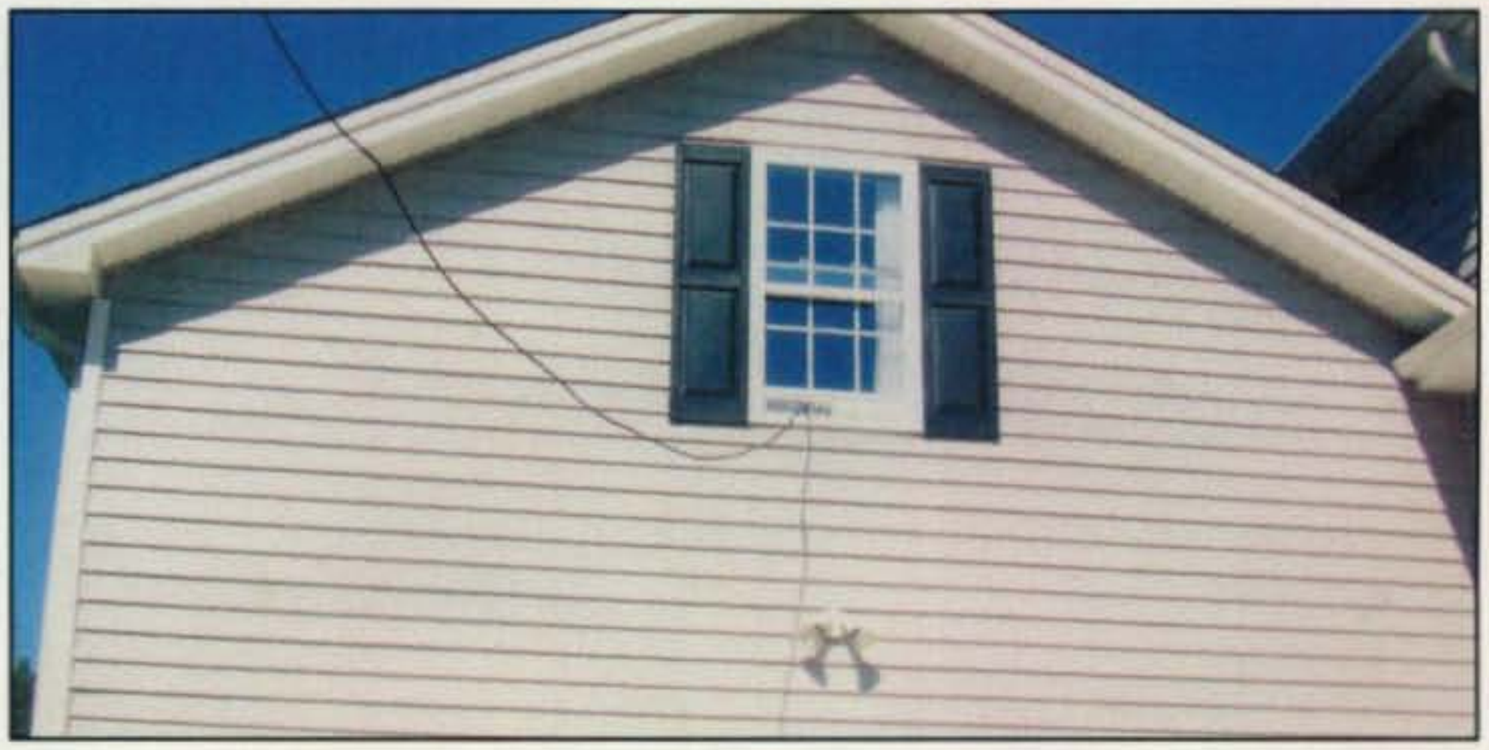

Photo C– Transmission line to feed-through panel in "bonus room" (attic) window.

still be close to all of the facilities that were familiar to me. In the excitement of finding a new home, I didn't think about ham radio, since I believed that it would take quite a bit of time to get settled before I could set up my equipment. The condo had a "bonus" room (attic to me) which would be the new operating location in the future. The real estate agent told me that she didn't think that there were any restrictions on radio antennas but that she would obtain the pertinent details regarding the HOA for me. It was only after the sale was made, though, that I received the literature. Big mistake!

After reading 54 pages of "Declaration of Condominium," 26 pages of amendments and exhibits "A" through "G," I finally found two places that referred to "Rules of Conduct." Exhibits "F" and "G" covered the association by-laws and Stonehaven Condominium by-laws, respectively. The Stonehaven Rules of Conduct state as follows:

"(d) No owner, resident or lessee shall

install wiring or electrical or telephone installation, television or radio antennas, machine or air conditioning units, etc., on the exterior of any building or that protrude through the walls or roof of any building except as authorized by SH/PEACE-HAVEN Association, Inc. The basic Association Rules of Conduct cover objects to be fixed to the Common Property or to any Limited Common Property Areas such as fences, etc., which requires written permission of the Board of Directors or a duly appointed Architectural Control Committee."

I would construe that to include antenna masts, towers, vertical antennas, and possibly a legal squabble. Meanwhile, my rolled-up terminated, folded dipole was lying on the garage floor gathering dust.

Finally, I was able to connect the station equipment consisting of transceiver, amplifier, antenna tuner, several computers and terminal node controllers, and dummy load! Amazingly, I eventually got it all to work. It was then when I got the itch to do some DXing, about the time that the sunspot cycle was supposed to get good! My question was: What will I have to do to get an antenna up in the air? The HOA was already wired by the local cable company, but when I moved from my previous location I also brought my satellite receiver with me. I assumed that the association would not have any objections to a satellite dish rather than run the risk of displeasing the Direct TV people or other dish outfits. Shortly after mine was installed, the lady in the next condo also had one installed. We heard no rumblings from the association!

Planning the Request

Early in 2007, the Stonehaven Homeowner's Association announced a meeting of homeowners, and I decided that I might attempt to get the approval of the association to install my rolled-up dipole antenna. I also noticed that there were some trees near my condo from which I could possibly hang my antenna so that it would clear any structures, be as high as possible, and be difficult to see. The space between the trees was sufficient to accommodate the 90-foot span of my terminated folded dipole.

With my goal in mind, I put my plan of action into gear. First I would get on the meeting agenda to explain, to those homeowners in attendance, what amateur radio is all about. Besides a wonderful hobby that I have enjoyed for nearly 70 years, it has been one that has benefited the communities in which I have lived by being able to provide reliable communications in times of disaster. As a communications engineer specializing in military systems, I was also able to assist this community by answering the mayor's call to be a member of the Cable TV Review Committee for several years. I told the homeowners that I wanted to install (not erect) an antenna that would enable me to communicate with other amateur operators, not only locally but around the world. The antenna that I planned to install would not be an eyesore and would not be detrimental to the appearance of the HOA. At this point I was questioned—more about amateur radio than about the antenna that would be installed if their vote was in the affirmative.

After the initial discussion, I referred to my handout that each homeowner received. Photo A is an aerial view of the W4UW location in the HOA and shows the location of my condo and the proposed antenna. At the time that this aerial view was taken, my condo and several others had not yet been constructed. The view was obtained from the county tax office at no cost. I believe that none of the homeowners

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at the meeting realized that this type of map was available. I didn't mention that all of the details regarding each and every condo were also available at the tax office—names of owners, tax information, etc.! You probably can obtain an aerial view of your location by visiting the local tax office or by going on the internet and searching for aerial mapping services. My county uses the "Geodata" mapping service.

Photo D– Antenna counterbalance. This protects the support ropes from wearing and breaking due to wind.

The folks attending the HOA meeting could see that the proposed antenna was in the clear and far enough away from their homes so as not to be an eyesore. It was also to be at a height of about 30 feet. Sharp-eyed readers may notice that the antenna does go across the street to a tree support. This was of concern to me, since I was aware of certain ordinances that had to do with telephone and power lines stretching across public paths. In checking with the local fire and inspection departments, I was told that the city regulations did not apply to private streets in developments such as the one in which I live.

I was certain that the group would also like to get some idea of what wires in the air might look like, and since I had no other way to show them, I submitted a sketch of the proposed antenna as shown in fig.1. I pointed out that the antenna was 90 feet long and most of what they might see was the wire, which at 30 feet in the air would not be readily visible. It was also mentioned that the rope supporting the antenna was black. (I am certain that everyone would be happy if the whole affair was colored "Carolina Blue.") In any case, my presentation was completed and the following is what appeared in the minutes of the meeting:

"Mr. Genaille presented a request to install a small antenna wire near his residence (unit 133) for his Ham radio operation. He provided a diagram showing the placement of the antenna wire and described the installation process. He has been an amateur radio operator for many years and is fully compliant with FCC regulations. He also described that this could be an asset to the community if a crisis arose. He would still be able to communicate out of this area. After agreeing that he would be responsible for correcting any possible communication interference to neighbors or any other problems that might arise from the placement of this antenna wire, the members present voted to allow this action."

Success and Good Relations

Photos B, C, and D are the "after the approval meeting" so that the residents could see what my installation looks like. The antenna counterbalance is hardly noticeable but will save damage to the antenna from the swaying of the trees to which it is anchored. The excess rope at the opposite end is coiled and secured to a cleat high above the reach of young hands. Incidentally, this article is not an advertisement for any particular antenna system, but how to get the HOA to say yes!

I believe that my approach was far better than telling the people in the HOA, "Hey, I wanna put up an antenna!" Also, I'm happy because I just worked St. Barts from this location for a new one using my approved antenna!

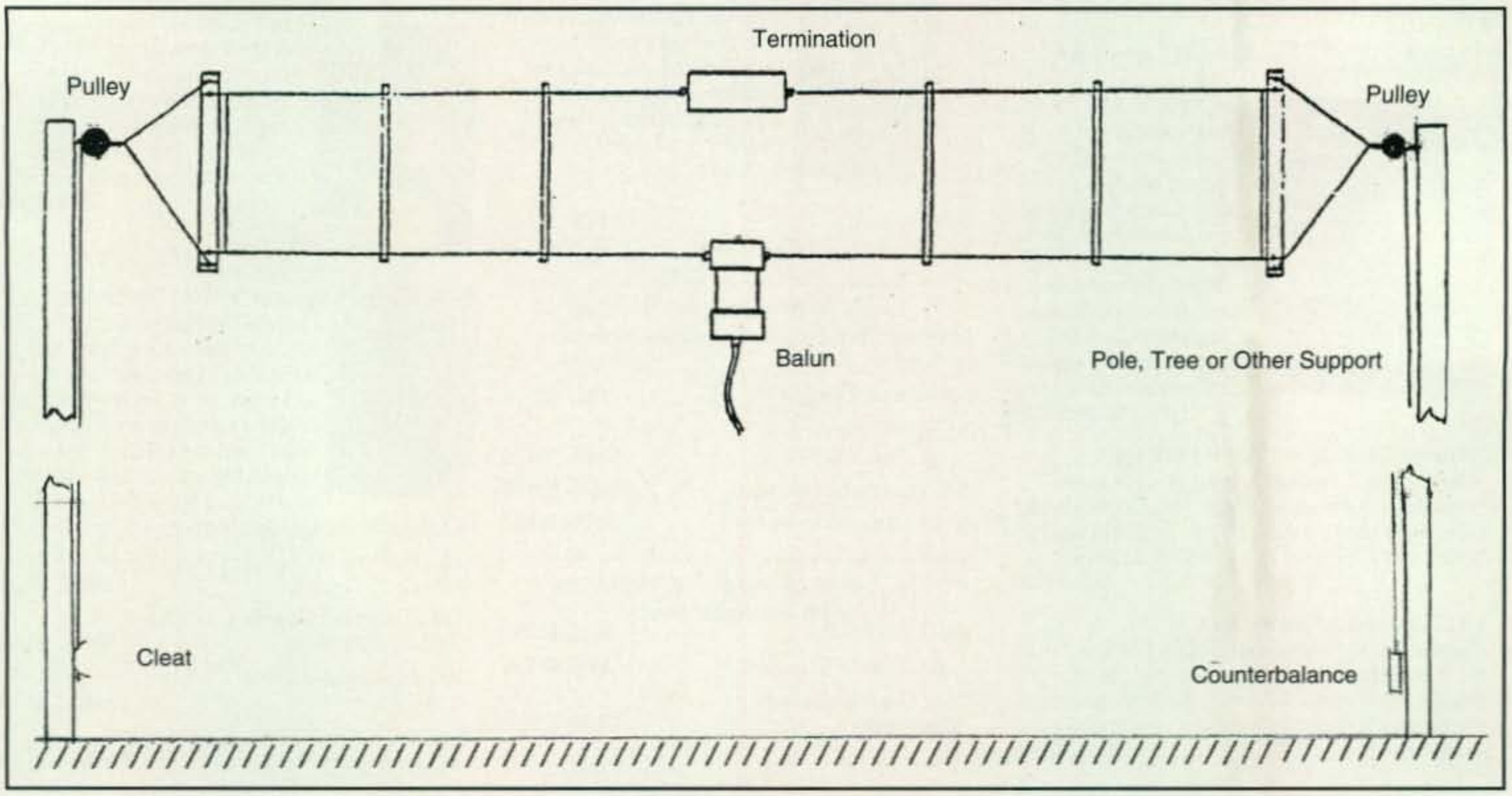

Fig. 1– Broadband terminated folded dipole.

The perfect combo, without compromise.

HF/6m/2m/70cm/23cm[1] Transceiver

IC-9100

For years, the attention to receiver design focused on the HF bands, leaving the upper bands a bit neglected. Icom changed the ham world with the introduction of the IC-7800, which incorporated a new front-end design just for 6m. Now, Icom's introducing the newly FCC approved IC-9100, extending the latest in front-end technology up to more of the VHF/UHF bands. 2m, 70cm, and 23cm[1] enthusiasts can now benefit from high-end IF-DSP performance too! And for those interested in satellite communication, it's the perfect time to try out your new '9100 on the ARISSat-1 when it launches into orbit during the next EVA in July 2011.

100/100/100/75/10[1] Watt Output[2]

AM, FM, SSB, RTTY, CW, & DV[1]

Satellite (Mode B/J/L[1])

Independent Receivers

3kHz/6kHz 1st IF "Roofing" Filters[1] (HF/6m)

Two Independent 32-bit IF-DSP Systems

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Type B USB for Rig Control and Audio

USB Control Audio

Shown with optional desktop microphone SM-30 and additional third party accessories.
[1]Optional unit required. [2]See manual for AM output power.

ICOM

Announcing:

The 2011 CQ WW RTTY DX Contests
RTTY: September 24–25, 2011

Starts 0000 GMT Saturday Ends 2400 GMT Sunday

I. OBJECTIVE: For amateurs around the world to contact other amateurs in as many zones, countries, US states and VE areas as possible.

II. BANDS: Five bands only: 3.5, 7, 14, 21, and 28 MHz.

III. TYPE OF COMPETITION (choose only one):

For all categories:

1. All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score.

2. All high power categories must not exceed 1500 watts total output power on any band at any time.

3. All transmitters and receivers used by the entrant must be located within a single 500-meter diameter circle or within the property limits of the station licensee's address, whichever is greater.

4. All antennas used by the entrant must be physically connected by wires to the transmitters and receivers used by the entrant.

5. Only the entrant's callsign may be used to aid the entrant's score.

6. A different callsign must be used for each CQ WW RTTY entry.

7. An entrant's remote station is determined by the physical location of the transmitters, receivers, and antennas. A remote station must obey all station and category limitations of Rule III.

8. A competitor who wishes to be judged for a top score in their category must agree to a potential visitation at any time during the contest by an observer appointed by the CQ WW Contest Committee (CQ WW CC). Failure of the entrant to respond to our correspondence or to allow a CQ WW CC observer full access to the contest QTH during the full contest may result in the competitor being removed from award eligibility for 3 years.

9. Self-spotting or asking to be spotted is not allowed in any category.

10. Only one signal on a band is allowed at any time for all categories.

11. Remote receivers are not allowed for any category *with the exception* that public remote skimmers are allowed for Multi-Operator and Assisted categories.

12. Only Baudot mode is permitted.

A. Single Operator (All Band or Single Band): only *one person* (the entrant) can contribute to the final score during the official contest period. callsign alerting assistance of any kind places the entrant in one of the Single Operator Assisted categories. For all single operator categories, all band or single band, only one signal is allowed at any time; for the all band category the operator can change bands at any time.

1. **Single Operator:** QSO alerting assistance of any kind is not allowed.

a. Single Operator High (SOAB High or SOSB High): Total output power must not exceed 1500 watts carrier on any band at any time.

b. Single Operator Low (SOAB Low or SOSB Low): Total output power must not exceed 100 watts carrier on any band at any time.

2. **Single Operator Assisted:** Any *public* QSO alerting assistance is allowed for all assisted categories. This includes, but is not limited to, DX Cluster-type networks, local or remote Skimmer and/or Skimmer-like technology, reverse beacon network. A local Skimmer is one obeying Rule III.3.

a. Single Operator High Assisted (SOAAB High or SOASB High): Total output power must not exceed 1500 watts carrier on any band at any time.

b. Single Operator Low Assisted (SOAAB Low or SOASB Low): Total output power must not exceed 100 watts carrier on any band at any time.

B. Multi-Operator (all band operation only): when two or more transmitters are present on a band, either a software or hardware device MUST be used to prevent more than one signal at a time; interlocking two or more transmitters on a band with alternating CQs is not allowed; any public QSO spotting help is allowed. Any number of operators is allowed.

1. **Single Transmitter:** Only one transmitter may be used and it may make a maximum of 8 band changes in any clock hour (run transmitter). Exception: One and only one—other transmitter may be used—if and only if—the station worked is a new multiplier (multiplier transmitter). The multiplier transmitter may also make a maximum of 8 band changes in any clock hour. The run and multiplier transmitters are governed by independent 8-band-change rules. A clock hour runs from 00 through 59 minutes. The multiplier station cannot call CQ. Logs found in violation of the 8-band-change rule may be reclassified as M2. If electronic logging is used (Cabrillo), for each QSO, the run transmitter or multiplier transmitter must be indicated in the log.

a. Single Transmitter High (MS High): Total output power must not exceed 1500 watts carrier on any band at any time.

b. Single Transmitter Low (MS Low): Total output power must not exceed 100 watts carrier on any band at any time.

2. Two Transmitters (M2): A maximum of two transmitted signals at any time on two different bands. Both transmitters may work any station. A station may only be worked once per band regardless of which transmitter is used. The log must indicate which transmitter made each QSO. Each transmitter may make a maximum of 8 band changes in any clock hour. Total output power must not exceed 1500 watts carrier on any band at any time.

3. Multi-Transmitter (MM): No limit to the number of transmitters or operators. Five bands may be activated simultaneously. Total output power must not exceed 1500 watts carrier on any band at any time.

IV. NUMBER EXCHANGE: RST report plus zone (i.e., 59905). US and VE stations also send US state or VE area (i.e., 59905 MA, see **V. MULTIPLIERS** below.)

V. MULTIPLIERS: Three types of multipliers will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band. Stations are permitted to contact their own country and zone for multiplier credit. The Worked All Zones written rules, DXCC country list, WAE country list and IG9/IH9, and WAC boundaries are standards. Maritime mobile stations count only for a zone multiplier.

3. A multiplier of one (1) for each different US "lower-48" state and VE area contacted on each band. Stations are permitted to contact their own US state or VE area for multiplier credit. One multiplier for each US state (48) and each Canadian area (14) on each band. Please use only official U.S. Postal Service abbreviations to identify states (e.g., Michigan = MI; Massachusetts = MA, Ohio = OH). Note: Alaska (KL7) and Hawaii (KH6) are counted as country multipliers only and not as state multipliers. Canadian areas (14

total) are as follows: NB (VE1, 9), NS (VE1), QC (VE2), ON (VE3), MB (VE4), SK (VE5), AB (VE6), BC (VE7), NWT (VE8), NF (VO1), LB (VO2), NU (VYØ), YT (VY1), PEI (VY2).

VI. POINTS:

1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, two (2) points.

3. Contacts between stations in the same country, one (1) point.

VII. SCORING: All stations: the final score is the result of the total QSO points multiplied by the sum of your zone, country and US state/VE area multipliers. *Example:* 1000 QSO points x 100 multiplier (30 Zones + 35 Countries + 35 States/Areas) = 100,000 (final score).

VIII. AWARDS: First place certificates will be awarded in each category listed under Section III in every participating country and in each call area of the United States, Canada, Russia, Spain, and Japan. All scores will be published. To be eligible for an award, a Single-Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. If a log contains more than one band it will be judged as an all-band entry, unless otherwise specified. In countries or call areas where the returns justify, 2nd and 3rd place awards may be made. All certificates/plaques will be issued to the licensee of the station used.

IX. TROPHIES and PLAQUES: Plaques and trophies are awarded for top performance in a number of categories. They are sponsored by individuals and organizations. For a current list of plaques and sponsors, or to learn how to become a sponsor, se e the CQ WW RTTY website: <http://www.cqwwrtty.com>. A station winning a World trophy will not be considered for a sub-area award; the trophy will be awarded to the runner-up in that area.

X. CLUB COMPETITON:

1. The club must be a local group and not a national organization.

2. Participation is limited to members operating within a local geographic area defined as within a 275 km radius from center of club area (except for DXpeditions conducted by member living within the defined club geographic area). Club contributions from DXpedition scores are a percentage of the number of club members on the DXpedition.

3. To be listed, a minimum of 3 logs must be received from a club, and an officer club officer must submit a list of eligible members to the Contest Director.

XI. LOG INSTRUCTIONS:

1. All times must be in UTC.

2. All sent and receive exchanges are to be logged.

3. If submitting a paper log, you must indicate zone, country and US/VE multipliers the FIRST TIME worked on each band. This is not required for electronic Cabrillo log submissions.

4. Electronic log submission: We want your electronic log. The Committee *requires* an electronic log for any possible high-scoring entry. By submitting a log to the CQ WW RTTY Contest, the entrant agrees to have the log open to the public. If possible, we would appreciate complete frequencies in the log.

E-mail Required Content: Please submit your log in the Cabrillo file format created by all major logging programs. Be sure to put the STATION callsign in the "Subject:" line of each message. Your e-mail log will automatically be acknowledged by the server. You will also receive a personal access code from the server at a later time (usually in late spring). Electronic submission implies a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed. Submit your CQ WW RTTY log to <rtty@cqww.com>.

5. Paper log submission: Use a separate log sheet for each band. Each paper log entry *must* be accompanied by a summary sheet showing all scoring information, category of competition, and contestant's name and address in BLOCK LETTERS. Sample log and summary sheets and zone maps are available from *CQ*. A large, self-addressed envelope with sufficient postage or IRCs must accompany your request. If official forms are not available, make up your own, 80 contacts to the page on 8-1/2" x 11" paper or European A4. All paper log entrants are required to submi*t cross-check sheets* (an alphabetical list of calls worked) for each band on which 200 or more QSOs were made.

6. Bad QSO: The bad QSO is removed and a penalty of three more equivalent QSOs is applied to the points only.

7. Low Power stations must indicate their category on their summary sheets and state the actual maximum power output used in the comment section of their Cabrillo submission.

XII. ACTIONS OF THE CQ WW CC: Violation of the rules of the contest makes the entrant subject to either a red or yellow card or a warning letter at the discretion of the CQ WW CC.

A. *YELLOW card:* *One Yellow card:* entrant not eligible for an award in the entered contest. An entrant or operator issued a yellow card will be listed at the end of the published results. *Two Yellow cards:* An entrant receiving two yellow cards in three consecutive CQ WW RTTY contests will be ineligible for any CQ-sponsored contest award for a period of two years beginning with the publication of the second violation in *CQ* magazine. If the entrant is a multi-operator category, all listed operators are so affected.

B. *RED card:* *One Red card:* entrant not eligible for an award in the entered contest. Entrants receiving a red card will be listed at the end of the published results. An entrant or operator receiving a red card will be ineligible for any CQ-sponsored contest award for a period of one year beginning with the publication of the violation in *CQ* magazine. *Two Red cards:* An entry or operator receiving two red cards within five consecutive CQ WW RTTY contests will be ineligible for any CQ-sponsored contest award for a period of three years beginning the month of publication of the second violation in *CQ* magazine. If the entrant is in a multi-operator category, all listed operators are so affected.

Further CQ WW CC actions:

1. The entrant agrees that the CQ WW CC reserves the right to reject any entry for non-compliance with the rules.

2. Unsportsmanlike conduct can be grounds for either a red or yellow card at the discretion of the CQ WW CC. Unsportsmanlike conduct includes, but is not limited to , violation of the CQ WW RTTY rules, *any* use by an entrant of any non-amateur means during the contest including, but not limited to, telephones, Internet, instant messaging, chat rooms, VoIP, or the use of any DX cluster/reflector to SOLICIT, ARRANGE, or CONFIRM any contacts during the contest. Unsportsmanlike conduct also includes out-of-band transmissions by the entrant.

3. Taking credit for excessive unverifiable QSOs or unverifiable multipliers may result in a yellow or red card at the discretion of the CQ WW CC.

4. An entrant is free to withdraw his/her submitted log for any reason prior to receiving an official letter from the CQ WW CC. The log will then be handled per the entrant's request. If after receiving an official letter from the CQ WW CC an entrant chooses to withdraw their log, the entrant's call will be listed at the end of the results showing their log as having been withdrawn.

5. By submitting a CQ WW RTTY Contest log, an entrant agrees that the issuing of red cards, yellow cards, and other decisions of the CQ WW CC are official and final.

6. A card penalty given to an entrant will be honored by all CQ-sponsored contests, the EUHFC, the SCC RTTY Championship, and the JIDXC.

XIII. DEADLINE:

1. All entries must be sent no later than 15 October 2011.

2. An extension of up to one month may be given if requested by e-mail <w0yk@cqwwrtty.com>. The granted extension must be confirmed by the Contest Director, must state a legitimate reason, and the request must be received before the log mailing deadline. Logs postmarked after the extension deadline may be listed in the results but will be declared ineligible for an award. All paper logs should be sent to Ed Muns, WØYK, PO Box 1877, Los Gatos, CA 95031-1877 USA.

DXing has often been compared to going fishing, and your chances for success are improved when you know where the fish are biting. The same applies to DXing.

Fishing for QSOs

Estimating Propagation

BY BILL KARLE,* VE4KZ

My XYL is an avid fisher. Watching her, I see a line linking fishing and hamming. Sometimes she baits the hook and teases for a bite. Other times she reads a book and drowns the worm. Occasionally, armed with local lore, a fish finder, and a "hot" location, she goes all out for the "big one." You can use similar strategies when fishing for QSOs. This article emphasizes arming yourself with easily available propagation information in order to work your "big one.

Print Propagation Information

Your logbook can help you to foresee the future. How? Solar events recur approximately every 27 to 28 days, the Sun's rotational period. These happenings affect propagation (see fig. 1). If your log shows that you were working a lot of DX four weeks ago, it is likely that you can work some today. In addition, take a look at yesterday's log. Did you work a particular part of the world? It is probable that you can repeat the feat today on the same band at the same time. Without going into details, you might be able to work the area on a higher frequency band a few hours earlier today, or on a lower frequency band a few hours later. And you thought logging was an unmitigated pain!

Some hams collect solar flux (SF) or smoothed sunspot number (SSN) values along with geomagnetic *A*- and *K*-indices. Fig. 2 shows an SF data set. The solar rotation often is clear. The trend gives a hint when propagation favors on-the-air work. For instance, a high flux, or SSN, four weeks ago might recur now. Elevated solar activity often means better propagation. Just collecting and reviewing such data are valuable learning experiences. The data can be obtained from WWV and WWVH as well as from online sites.

There are propagation tables in the *ARRL Antenna Book* and CQ's *The NEW Shortwave Propagation Handbook*. These let you examine circuits from your area to regions such as Oceania, Europe, and so on. Fig. 3 is a screen image from the *ARRL Antenna Book*. This table is for low SSNs and shows the highest probable signal strength (S-units) of a 1.5-kilowatt Denver station as received at the targets. The instructions explain how to adjust for different power outputs, antennas, and SSNs. Some practice will give you a sense of what probably will be happening on the air now or months ahead.

Magazine propagation articles are also useful. The write-ups are the result of careful data interpretation and lucid presentation. *CQ*'s "Propagation" column is an example. If your magazine's delivery must suffer multiple postal systems, then expect that the information might not arrive in a timely manner. The description still will help you grasp the propagation "big picture."

Online Propagation Info

Want to see which bands are open while you are away from the shack? Try the list of open HF and VHF bands at <http://www.hamqsl.com/solar1.html>,

Fig. 1– Your log, like mine, can help predict future operating conditions.

*P. O. Box 4, Belair, Manitoba, Canada, R0E 0E0
e-mail: <ve4kz@yahoo.ca>

a site by NØNBH (see fig. 4). Widgets are available for putting these facts on your computer, iPod, iPhone, or BlackBerry. The website also has an interactive map. After entering values in a menu, you can see the situations for short and long paths and for low bands (160, 80, and 40 meters) and high bands (20, 15, 10 and meters). Another online resource is the extensive propagation website run by *CQ* Propagation Editor Tomas Hood, NW7US, at <http://prop.hfradio.org/>.

Some hams use the maximum usable

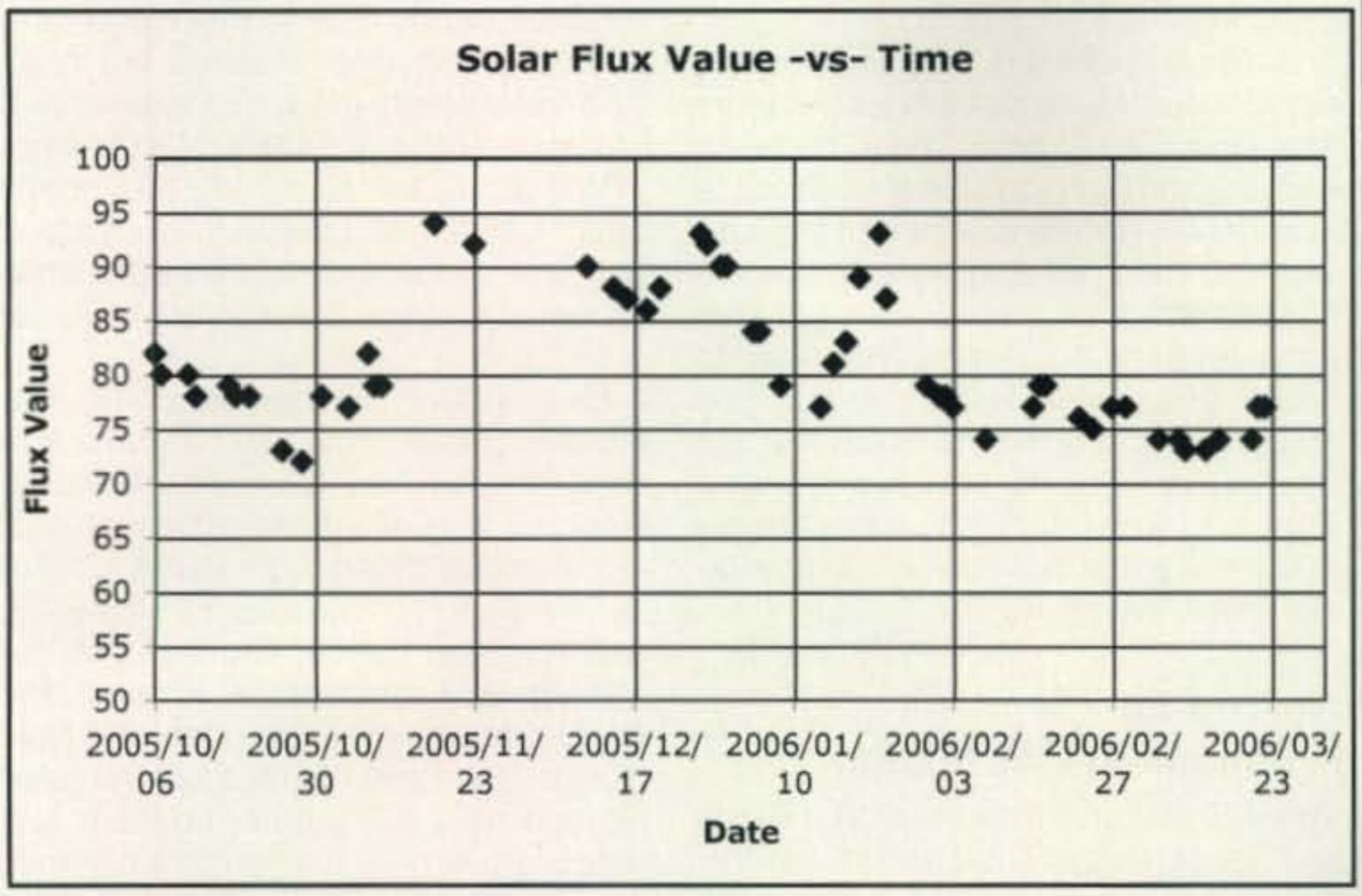

Fig. 2– Plotting solar flux reveals trends and suggests conditions.

Mar., CO (Denver), for SSN = Low, Sigs in S-Units. By N6BV, ARRL.

	80 Meters							40 Meters							20 Meters							15 Meters						
UTC	EU	FE	SA	AF	AS	OC	NA	EU	FE	SA	AF	AS	OC	NA	EU	FE	SA	AF	AS	OC	NA	EU	FE	SA	AF	AS	OC	NA
0	7	-	8	7	1	-	9+	8	1	9+	9	7	2	9+	3	9	9+	9+	9	9	9+	-	8	9+	8	2	9	9+
1	8	-	9+	8	1	-	9+	9	1	9+	9	8	5	9+	3	9	9+	9+	9	9+	9+	-	7	9+	6	2	9+	9+
2	8	-	9+	8	4	1	9+	9	1	9+	9	8	8	9+	1	9	9+	9	9	9+	9+	-	7	8	-	3	9	9
3	9	-	9+	9	-	5	9+	9	1	9+	9+	7	9	9+	2	9	9+	8	9	9+	9+	-	5	1	-	1	7	3
4	9	-	9+	9	-	8	9+	9	3	9+	9+	6	9+	9+	1	9	9	7	7	9+	9	-	1	-	-	-	3	-
5	9	-	9+	9	-	9	9+	9	6	9+	9+	4	9+	9+	4	7	9	6	4	9+	9	-	-	-	-	-	-	-
6	8	-	9+	8	-	9	9+	9	8	9+	9	5	9+	9+	1	5	9	3	1	9	9	-	-	-	-	-	-	-
7	8	1	9+	8	-	9+	9+	9	8	9+	9	7	9+	9+	1	1	9	2	-	9	9	-	-	-	-	-	-	-
8	6	8	9+	7	-	9+	9+	9	9	9+	9	8	9+	9+	1	1	9+	1	-	9	9	-	-	-	-	-	-	-
9	4	8	9+	-	-	9+	9+	8	9	9+	8	8	9+	9+	-	1	9+	-	-	9	9+	-	-	1	-	-	-	-
10	1	9	9+	-	8	9+	9+	8	9	9+	6	9	9+	9+	-	-	9	-	-	9	9	-	-	-	-	-	-	-
11	-	9	9+	-	8	9+	9+	6	9	9+	4	9	9+	9+	-	-	8	-	-	9	7	-	-	-	-	-	-	-
12	-	9	9	-	8	9+	9+	6	9+	9+	-	9	9+	9+	2	-	9	7	-	7	9	-	-	1	-	-	-	-
13	-	9	7	-	8	9+	9+	4	9	9+	-	9	9+	9+	8	4*	9+	9	4	5	9+	-	-	6	2	-	-	-
14	-	8	1	-	6	8	9+	4	9	9	-	8	9+	9+	8	3	9+	9	9	9	5	-	-	9	5	-	2	7
15	-	1	-	-	-	6	9+	4	8	6	-	8	9	9+	9	8	9+	9	9	9+	9+	4	3*	9+	8	3*	6	9+
16	-	-	-	-	-	1	9	1	8	1	-	7	8	9+	8	9+	9	8	9	9+	9+	5	5*	9	9	4*	5	9+
17	-	-	-	-	-	-	3	1	5	-	-	4	5	9	8	9	9+	8	8	9+	9+	5	5	9	9	1	6	9+
18	-	-	-	-	-	-	1	1	2	-	-	2	-	8	9	9	9	8	8	9	9+	4	4	9+	9	-	9	9
19	-	-	-	-	-	-	-	1	1	-	-	1	-	7	9	8	9	9	7	9	9+	3	1	9+	9	-	9	9+
20	-	-	-	-	-	-	-	2	-	-	-	1	-	8	9	8	9+	9	5	8	9+	-	-	9+	9	-	9	9+

Fig. 3– ARRL Antenna Book *Propagation Tables (part shown) provide insights to your signal strength at DX locales. This chart is located on the CD accompanying the printed book. See References. (Table © ARRL, used by permission)*

frequency (MUF) to estimate present conditions. The MUF has to be applied with care. One reason is that depicted MUFs refer to communication between two specific points on Earth, not any pair. A further reason is that in order to experience the long distance and low absorption benefits, one has to operate near to the MUF. This might not be possible if the MUF is not in an amateur band. A site for MUF information is at <http://www.spacew.com/www/realtime.php>, including a near-real-time map of MUF and explanations. Fig. 5 shows a sample map.

If you are a Top Band enthusiast, then you know to watch the gray line, the day/night transition, as an indicator that DX might be around. The question is when the gray line crosses your location *and* a target one. Two gray-line sources are <http://dx.qsl.net/propagation/greyline.html> and <http://www.ips.gov.au/Solar/1/1>.

Should you be interested in predicting how matters might be weeks or months in the future, you can download a file of sunspot numbers from the U.S. National Geophysical Data Service (NGDS). You want the file at <ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SUNSPOT_NUMBERS/sunspot.predict>. The numbers are entered as a yearly record per line and each entry on the line is the historical or predicted SSN for the months January through December.

DXers and QRPers also use spotting sites. The sites list a call of interest, the frequency and time most recently worked, and by whom. Several sites are listed in the References part of this article. You gain not only specific knowledge of which stations are on, but also a feel for band conditions. You need to notice the stations that are near to you and are reporting the DX or QRP. It's of little or no value to you to know that Europe is working Africa. It is valuable to know that stations near you are working Africa. Why not you?

On-The-Air Propagation Information

The U.S. National Institute of Standards and Technology (NIST) has high-frequency radio stations WWV and WWVH which offer a way to find out which ham bands are open. Listen on each of the frequencies, starting at 20 MHz and working down to 2.5 MHz. Note the stations' call letters. The stations identify before sending the minute tone. WWVH in Hawaii announces first, with a female voice, while WWV (in Boulder, Colorado) announces second, with a male voice. Hearing one or both of the announcements, you know that the frequency is open from central U.S., or central Pacific, or both areas to your QTH. By adding stations such as Canada's CHU and the Moscow's RWM CW station, you can visualize which amateur bands near to these standard time and frequency stations are open and from which area. For example, if you hear RWM at 14.996 MHz but not WWV at 15.000 MHz, you can guess that 14-MHz band propagation is good between you and central Europe, while propagation from Boulder to you is not (see fig. 6).

Even better are the beacons. The Northern California DX Foundation (NCDXF) and the International Amateur Radio Union (IARU) have a beacon project. As shown in fig. 7, there are 18 beacons on each of the 20-, 17-, 15-, 12-, and 10-meter bands. The beacons are strategically positioned around the world. Let's say that you hear the New York beacon and later the Los Angeles beacon on the 20-meter band. It is a safe bet that there is propagation across the breadth of the United States to your QTH on 20. Similarly, if you hear the Sri Lanka beacon, then you know that there is propagation from South Asia. The neat thing is that the beacons transmit the station ID at 100 watts, and then steady carriers are transmitted at 10 watts, 1 watt, and finally 100 milliwatts. This gives an idea of the Signal + Noise

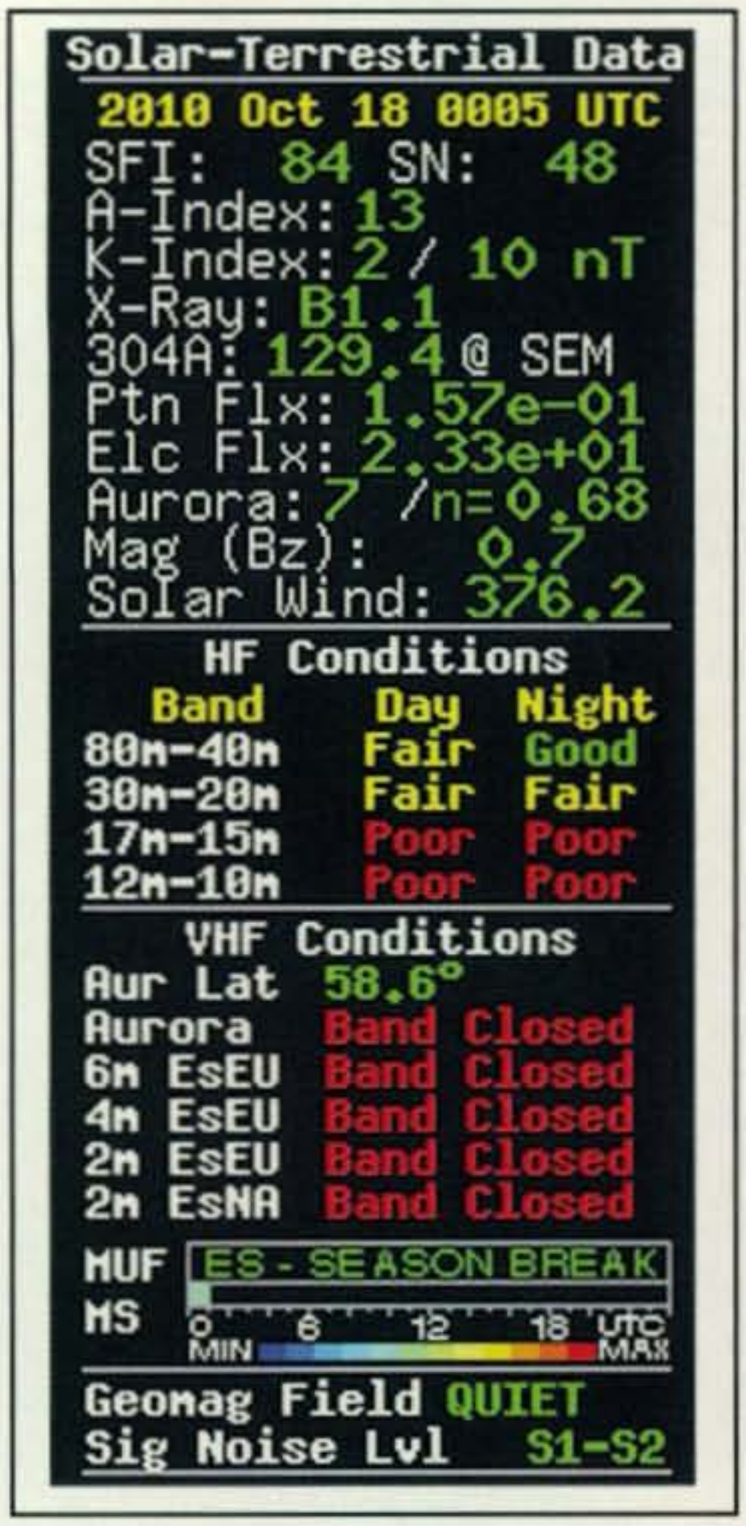

Fig. 4– Information like this, from NØNBH, can be at your fingertips. See text for source.

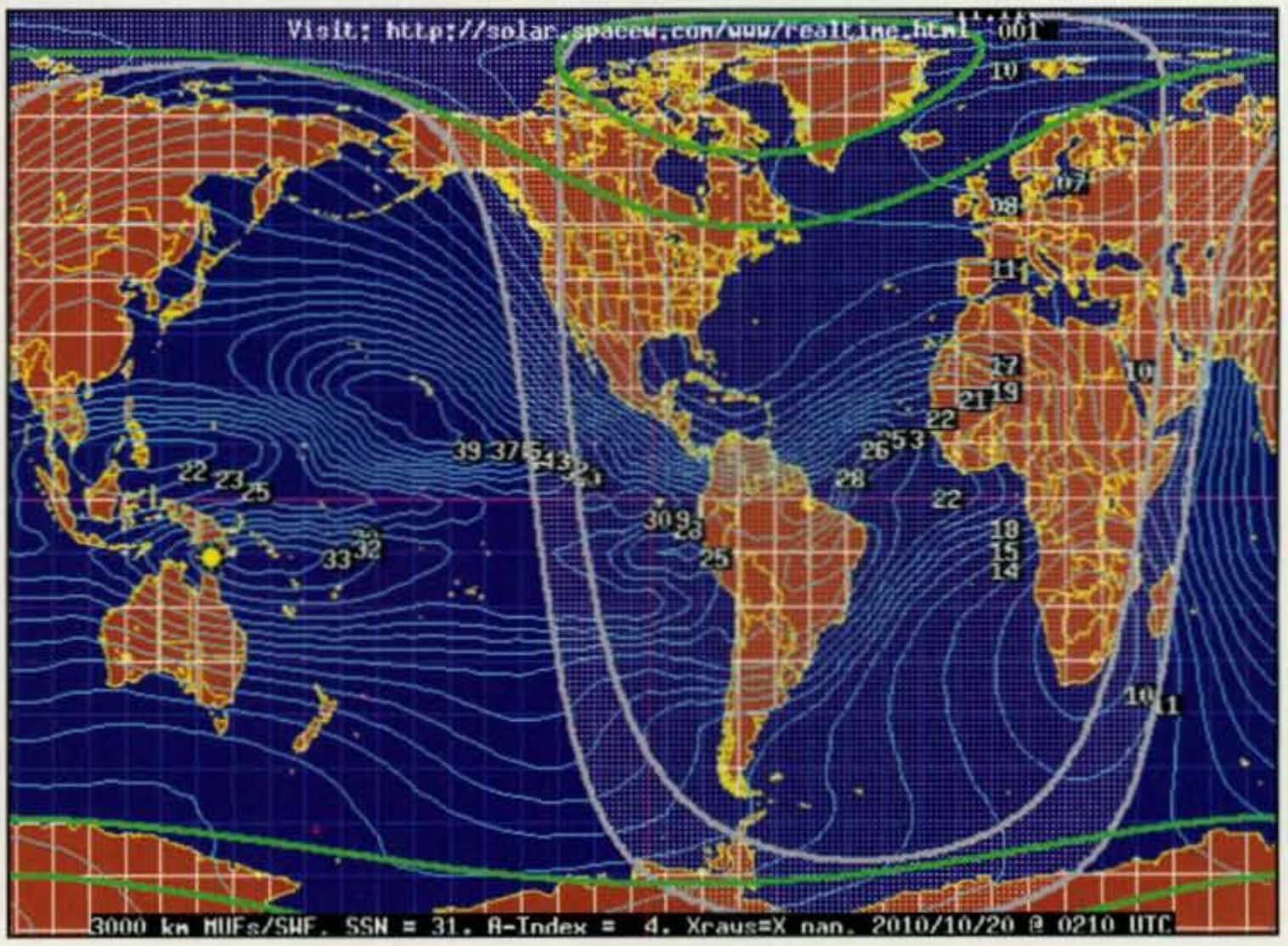

Fig. 5– Used with caution, the MUF map can help you to estimate conditions between any two points. See text for source.

Time and Frequency Stations	
Frequency (in MHz)	Station
2.500	WWV, WWVH
3.300	CHU
4.996	RWM (Moscow)
5.000	WWV, WWVH
7.850	CHU
9.996	RWM
10.000	WWV, WWVH
14.670	CHU
14.996	RWM
15.000	WWV, WWVH
20.000	WWV only

Fig. 6– Time and frequency stations reveal propagation conditions.

to Noise Ratio (S+N/N) at your locale for this station. It is instructive that less than 100 milliwatts can be heard over great distances (QRP proselytizers take note!).

With rising flux, the bands at 10, 6, and even 2 meters up will open for ionospheric propagation. Ducting, scattering, and sporadic-*E* propagation are fascinating and do not rely on high sunspot numbers. Listening to select beacon frequencies can help you optimize your TIFOR ("time in front of the radio"). There are many beacons, some aimed at particular bands. Search "beacon lists" with your favorite browser.

There are also user-based propagation resources on the air, in which participating stations transmit signals at various times. They are received by other stations, plotted on maps indicating the path that is open, and shared on the internet. Two of these are PropNET© and WSPRnet (Weak Signal Propagation Reporter by K1JT). See the References section.

Finally, listen to W1AW at the appropriate time. You can copy the propagation bulletin on several different modes. It will give you data about the Sun and information about likely ham-band effects. See the W1AW schedule. The bulletins also are posted on the ARRL site at <http://www.arrl.org>.

Conclusion

You now have some tools to help you to make contacts and, as a bonus, learn about propagation. Still, what if the band appears dead? It may mean that no one is transmitting. Witness how bands start jumping when contest zero hour arrives. Moments earlier, the bands were "dead." Give a call and see what you catch!

Call		Location	14.100	18.110	21.150	24.930	28.200	Operator	Status
4U1UN		United Nations	00:00	00:10	00:20	00:30	00:40	UNRC	OFF[3]
VE8AT		Canada	00:10	00:20	00:30	00:40	00:50	RAC/NARC	OK[1]
W6WX		United States	00:20	00:30	00:40	00:50	01:00	NCDXF	OK
KH6WO		Hawaii	00:30	00:40	00:50	01:00	01:10	KH6BYU	ON
ZL6B		New Zealand	00:40	00:50	01:00	01:10	01:20	NZART	OK
VK6RBP		Australia	00:50	01:00	01:10	01:20	01:30	WIA	OK
JA2IGY		Japan	01:00	01:10	01:20	01:30	01:40	JARL	OK
RR9O		Russia	01:10	01:20	01:30	01:40	01:50	SRR	OK
VR2B		Hong Kong	01:20	01:30	01:40	01:50	02:00	HARTS	OFF[2]
4S7B		Sri Lanka	01:30	01:40	01:50	02:00	02:10	RSSL	OK
ZS6DN		South Africa	01:40	01:50	02:00	02:10	02:20	ZS6DN	OK
5Z4B		Kenya	01:50	02:00	02:10	02:20	02:30	ARSK	OK
4X6TU		Israel	02:00	02:10	02:20	02:30	02:40	IARC	OK
OH2B		Finland	02:10	02:20	02:30	02:40	02:50	SRAL	OK
CS3B		Madeira	02:20	02:30	02:40	02:50	00:00	ARRM	OFF[4]
LU4AA		Argentina	02:30	02:40	02:50	00:00	00:10	RCA	OK
OA4B		Peru	02:40	02:50	00:00	00:10	00:20	RCP	OK
YV5B		Venezuela	02:50	00:00	00:10	00:20	00:30	RCV	OK

Fig. 7– NCDXA beacons give global insight on band conditions. See text for source.

References

The ARRL Antenna Book, 21st edition. Newington, CT.: The American Radio Relay League, 2007. See especially: "Maximum Usable Frequency," pp. 23-26 to 23-27; "What HF Bands are Open—Where and When," pp. 23–37ff; and, "Propagation Prediction Files" in the appendices.

Jacobs, Cohen, and Rose, The NEW Shortwave Propagation Handbook, Hicksville, NY, CQ Communications, Inc., 1995.

"Radio Clock," *Wikipedia*, at <http://en.wikipedia.org/wiki/Radio_clock>, has a list of time and frequency standard stations.

Radiowave Propagation Center (NW7US): <http://prop.hfradio.org/>.

Rich Arland, K7SZ:. "DXing Basics," *CQ*, 2010 October, pp. 94, 96–97.

CHU: <http://www.nrc-cnrc.gc.ca/eng/services/inms/time-services/short-wavehtml>.

Northern California DX Foundation: <http://www.ncdxf.org/>.

MUF: <http://www.spacew.com/www/realtime.php>.

PropNET: <http://www.propnet.org/>.

RWM: <http://en.wikipedia.org/wiki/RWM>.

Spotting Sites include:

<http://dxcluster.ham-radio.ch/, <http://qrpspots.com><http://www.w1wc.com/dx_pages/dx_spots_bands.php?band=250>

<http://www.dxsummit.fi/DxSpots.aspx>

<http://www.ve7cc.net/>

WSPR (Weak-Signal Propagation Reporter):

<http://wsprnet.org>

<http://www.physics.princeton.edu/pulsar/K1JT/wspr.html>

WWV and WWVH general information, respectively:

<http://www.nist.gov/physlab/div847/grp40/wwv.cfm>

<http://tf.nist.gov/stations/wwvh.htm>

WWV and WWVH broadcast format including propagation information:

<http://www.nist.gov/pml/div688/grp40/wwv_format.cfm>

W1AW Operating Schedule: <http://www.arrl.org/w1aw-operating-schedule>

BY IRWIN MATH,* WA2NDM

The SM-220 Revisited

The Kenwood SM-220 was a station accessory originally offered in the early 1980s. It consisted of a monitor scope, a general-purpose 10-MHz oscilloscope, a two-tone test generator, and a panoramic display. These units occasionally are available on the various amateur radio websites and are quite neat to "play" with, especially the panoramic feature. The SM-220 originally was intended for radios with IF frequencies of either 3.39 MHz or 8.83 MHz (Kenwood's "standard" of the time) and allowed one to "see" signals on either side of the frequency the receiver was tuned to in the panoramic mode. The display width was user selected to either ±20 kHz or ±100 kHz. We have one and covered the conversion from 3.39 MHz to other IF frequencies in a previous column.

This month, however, we would like to try to resolve the other two common complaints with this unit—drift and sensitivity. When these are dealt with, the result is a useful station accessory (at least by 1980 standards). It definitely will not compete with current microprocessor-based displays (nor is it intended to), but it also will not cost nearly as much and should work with most older "boatanchor" type equipment.

The panoramic module originally came in two versions. The BS-5 was for use with IF frequencies of 3.39 MHz and the BS-8 was for 8.83 MHz.

*c/o CQ magazine

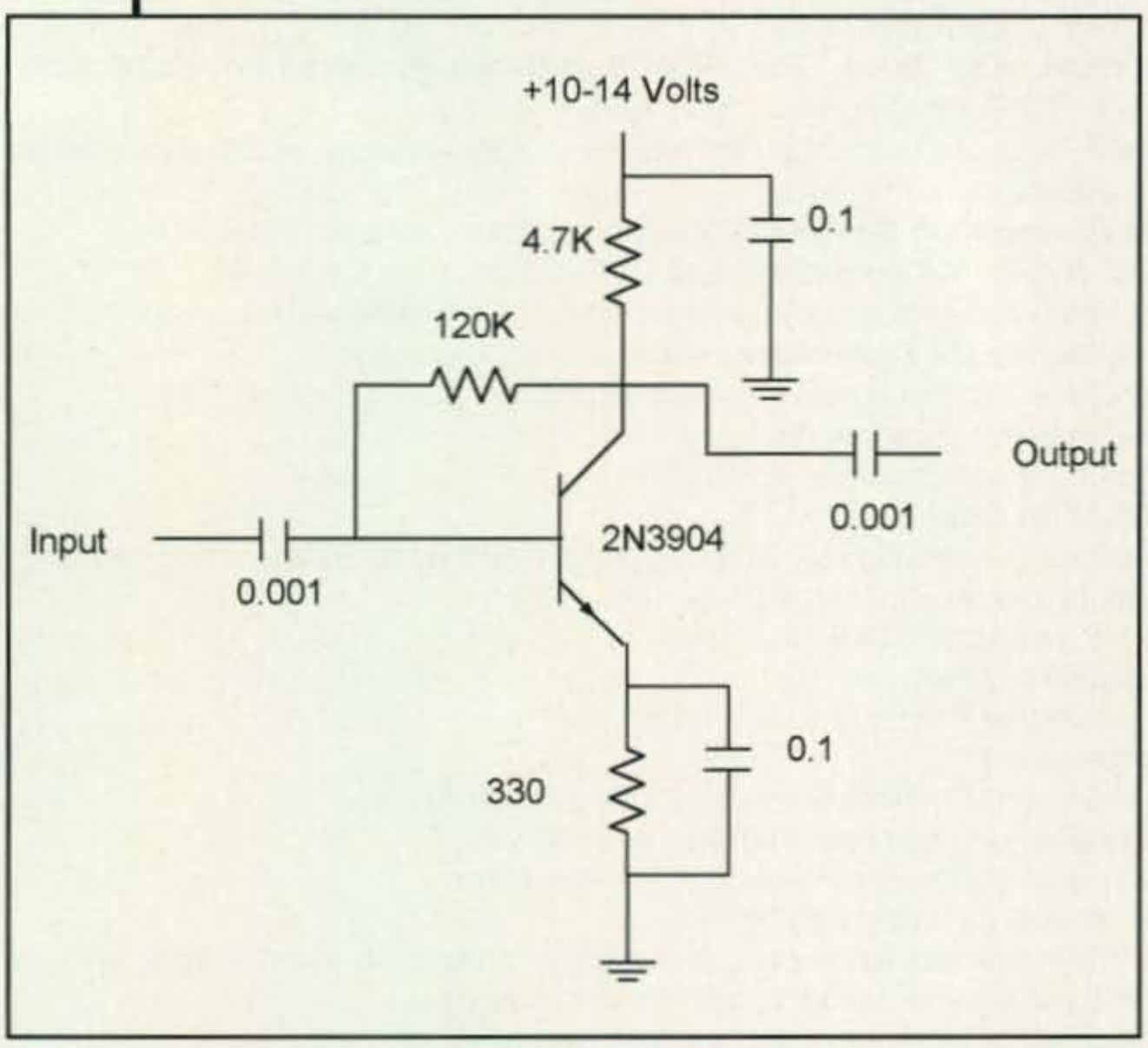

Fig. 1– Simple preamplifier.

All modifications to be described will be done with either one of these, as the various component designations are the same for each; only the values are different. The BS-8 has several more components than the BS-5, so if you have a BS-5, there are a few parts you will not have to deal with. If you are working with other IF frequencies, the component values will be different, but the general approach will be the same. It also would be very advisable to obtain a copy of the Service Manual for the SM-220 from one of the various sources on the internet. You can usually find a free download for this, so there is no valid reason not to have one, and you certainly will need it for final alignment. The user manual also is available for no cost, so you may as well obtain that as well.

The first problem, drift, is caused by instabilities in the Colpitts oscillator section. Q210 is the basic oscillator transistor that is swept. It is a junction FET, and the operating frequency is determined by the various components used as well as the input voltages to D101, a variable capacitance diode.

We will start by replacing all of the parts lists in this column, with more up-to-date modern components. For reference we will list those parts available from Mouser Electronics (www.mouser.com). However, you should be able to easily find similar parts at much lower cost if you do a search or have a good junk box. Just make sure that whatever parts you finally use are high-quality, low-drift substitutes. Otherwise, you will be back where you started. Also note that all parts are marked directly on the circuit board and shown in a photo in the SM-220 repair manual, so they are quite easy to locate.

BS-8 Unit

Part No.	*Value*	*Mouser Part No.*
C231	68 pF	598-CD5EC680JO3F
C233	39 pF	598-CD5EC390JO3F
C234	22 pF	598-CD5EC220JO3F
C236	22 pF	598-CD5EC220JO3F
C237	100 pF	598-CD5EC101JO3F
L204	4.7 µH	807-1840R-22JTR
L205	1 mH	807-1638R-28JTR

BS-5 Unit

Part No.	*Value*	*Mouser Part No.*
C231	1000 pF	598-CD15FA102JO3
C234	100 pF	598-CD5EC101JO3F
C236	47 pF	598-CD5EC470JO3F
C237	680 pF	598-CD15FC681JO3
L204	20 µH	807-1025R-52K
L205	1 mH	807-1638R-28JTR

When replacing these components, take your time and be extremely careful not to disturb anything else or damage the circuit board. Keep in mind

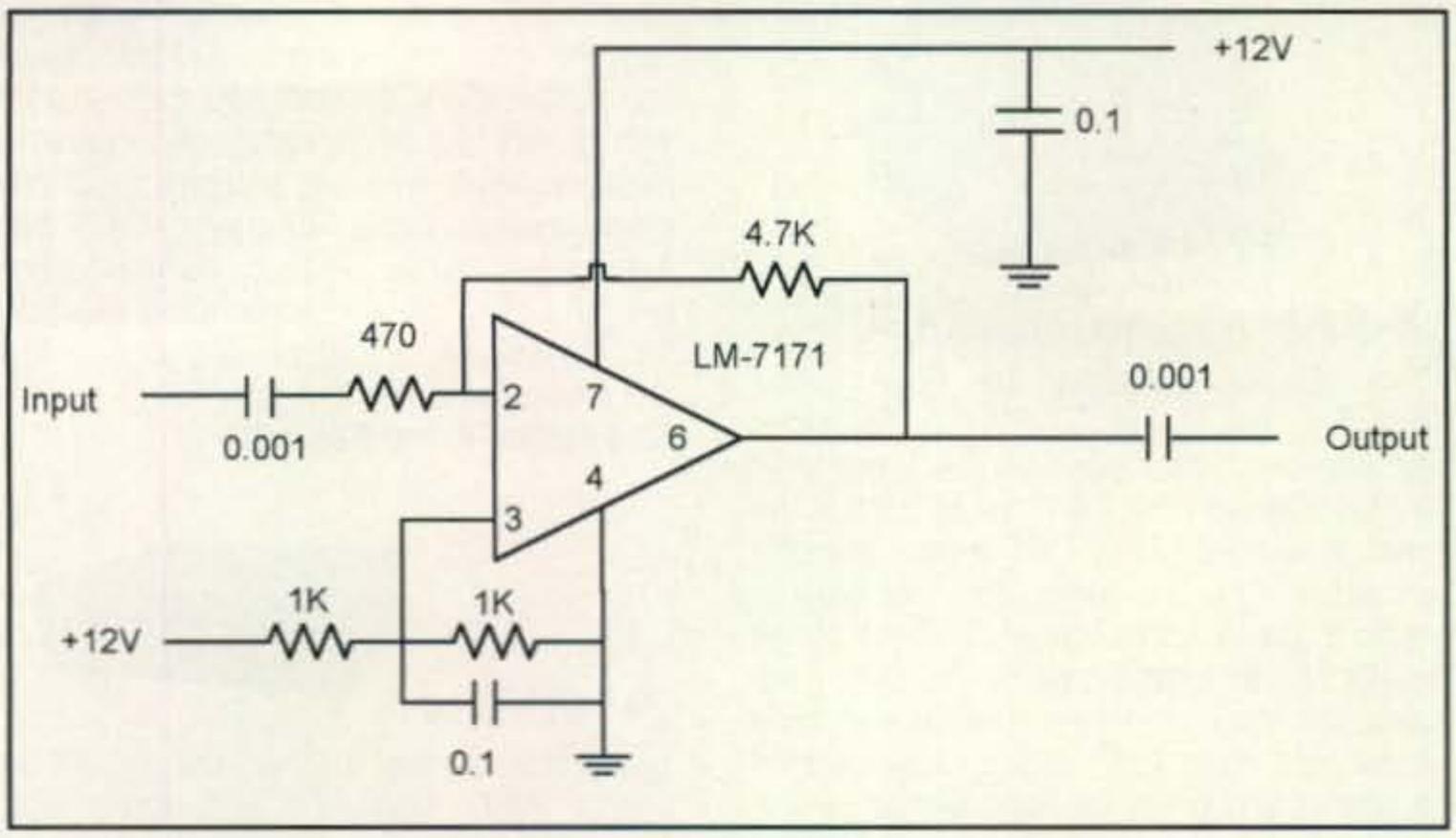

Fig. 2– Simple op-amp preamplifier.

that you really are only replacing older parts that are prone to drift with newer ones (of essentially the same value) that are more stable.

Once you are finished, it would be a good idea to do a complete alignment according to the instructions in the service manual. This is not overly complex and should only take a few moments or so. When you are done, if you have a signal generator you can final-test the unit by setting your receiver to some quiet frequency on one of the amateur bands, say 20 meters, for example. Adjust the signal generator to 14.100 MHz (or a frequency nearby where no other signals are present). Now connect a short piece of hookup wire to the output of your signal generator to act as sort of an "antenna" and tune the receiver to receive the signal. Adjust the output of the generator for a reading of about S9 at the receiver. If everything is working properly, you should see the "spike" of the signal near the center of the screen. If you gradually reduce the generator output, you should reach a point where the "spike" gets lower in amplitude and eventually disappears. This will give you an idea of the sensitivity of your unit. For most SM-220s it will only be around S5 to S7, which now brings us to the second problem—sensitivity.

The cure for sensitivity (as you might imagine) is to add a small preamplifier to the input of the panoramic circuit. This can be done internally or externally to the unit, as you wish. Figs. 1 and 2 are two possible candidates. Fig. 1 is a simple one-transistor stage with a moderate amount of gain. This circuit can be built on a small piece of perf board, keeping all leads as short as possible. If used externally, either one of these amplifiers must be mounted in a small metal box with input, output, and power supply connectors. It is important for it to be totally shielded so that only the IF signal from the receiver is amplified.

The amplifier is then connected in series with the cable from the receiver to the SM-220. A low-cost "wall wart"-

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radio not included

AT-897Plus for the Yaesu FT-897

If you own a Yaesu FT-897 and want a broad range automatic antenna tuner, look no further! The AT-897Plus Autotuner mounts on the side of your FT-897 just like the original equipment and takes power directly from the CAT port of the FT-897 and provides a second CAT port on the back of the tuner so hooking up another CAT device couldn't be easier. ***Suggested Price$199.99***

AT-600Pro

The AT-600Pro handles up to 600 watts SSB and CW, 300 on RTTY (1.8 – 30 MHz), and 250 watts on 54 MHz. Matches virtually any kind of coax-fed antenna and will typically match a 10:1 SWR down to 1.5:1 in just a few seconds. You can also use it with longwires, random wires and antennas fed with ladder line just by adding a balun. Two antenna ports with a front-panel indicator, and separate memory banks for each antenna. LED bar-graph meters shows RF power, SWR and tuner status, tactile feedback control buttons and an LED bypass indicator. Operates from 11 – 16 volts DC at 750 mA. Includes six foot DC power cable.
Suggested Price $359.99

Z-100Plus

Small and simple to use, the Z-100Plus sports 2000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. Includes six foot DC power cable.***Suggested Price $159.99***

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- ***Tunes Automatically***
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This desktop tuner covers all frequencies from 1.8 – 54 MHz (including 6 meters), and will automatically match your antenna in no time. It features a two-position antenna switch with LEDs, allowing you to switch instantly between two antennas. The AT-100ProII requires just 1 watt for operation, but will handle up to 125 watts. Includes six foot DC power cable.

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AT-1000Pro

The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts. Tunes from 1.8 to 54.0 MHz (inc. 6 meters), with tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds. 2000 memories. 2 Antenna connections. Includes six foot DC power cable.

Suggested Price $599

IT-100

Matched in size to the IC-7000 and IC-706, the new IT-100 sports a front panel push-button for either manual or automatic tunes, and status LEDs so you'll know what's going on inside. You can control the IT-100 and its 2000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. It's the perfect complement to your Icom radio that is AH3 or AH-4 compatible.

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YT-450

LDG's newest tuner is specially designed for Yaesu's newest 100 watt radios. The YT-450 interfaces directly with the Yaesu FT-450 and FT-950 radios, making integration easier than ever. Simply connect the tuner to the radio with the customer supplied cables and you are ready to operate. DC power and all control is done through the interface cable. Just press the tune button on the tuner and the rest happens automatically: mode and power are set, a tune cycle runs and the radio is returned to its original settings. It will quickly match nearly any kind of coax fed antenna with an SWR of up to 10:1. 2000 memories recall settings in an instant! An extra CAT port on the back allows seamless connection to a PC. You have the newest radio, now get the newest tuner to go with it!

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The ultimate autotuner for QRP radios including the Yaesu FT-817(D) with addition of the Tokyo High Power HL-45B. The Z-817H interfaces to the CAT port (ACC) on the back of the radio with the provided cable. Tuning could not be simpler; one button push on the tuner and the Z-817H takes care of the rest. Switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! The CAT thru port on the back allows connection to the THP HL-45B for automatic band selection on the amp. The Z-817H will also function as a general purpose antenna tuner with other QRP radios or QRP radios with up to 75 watt HF amps. Powered by four AA internal Alkaline batteries (not included), so there are no additional cables required. 2000 memories cover 160 through 6 meters. Latching relays, so power consumption is Zero when not tuning. ***Suggested Price $159.99***

KT-100

LDG's first dedicated autotuner for Kenwood Amateur transceivers. Easy to use - just right for an AT-300 compatible Kenwood transceiver (except TS-480HX). The KT-100 actually allows you to use the Tune button on the radio. The LEDs on the front panel indicate tuning status, and will show a match in seconds, or even less of you've tuned on or near that frequency before. Has 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. If you have an AT-300 compatible Kenwood radio, you can simply plug the KT-100 into your transceiver with the provided cable; the interface powers the tuner, and the Tune button on the radio begins a tuning cycle. The supplied interface cable makes the KT-100 a dedicated tuner for most modern Kenwood transceivers.

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YT-847

YT-847 Autotuner is an integrated tuner for the Yaesu FT-847. An included CAT/Power cable interfaces with your FT-847. Just press the tune button on the tuner and everything else happens automatically! The mode is set to carrier and the RF power is reduced, a tune cycle runs and the radio is returned to the original settings.

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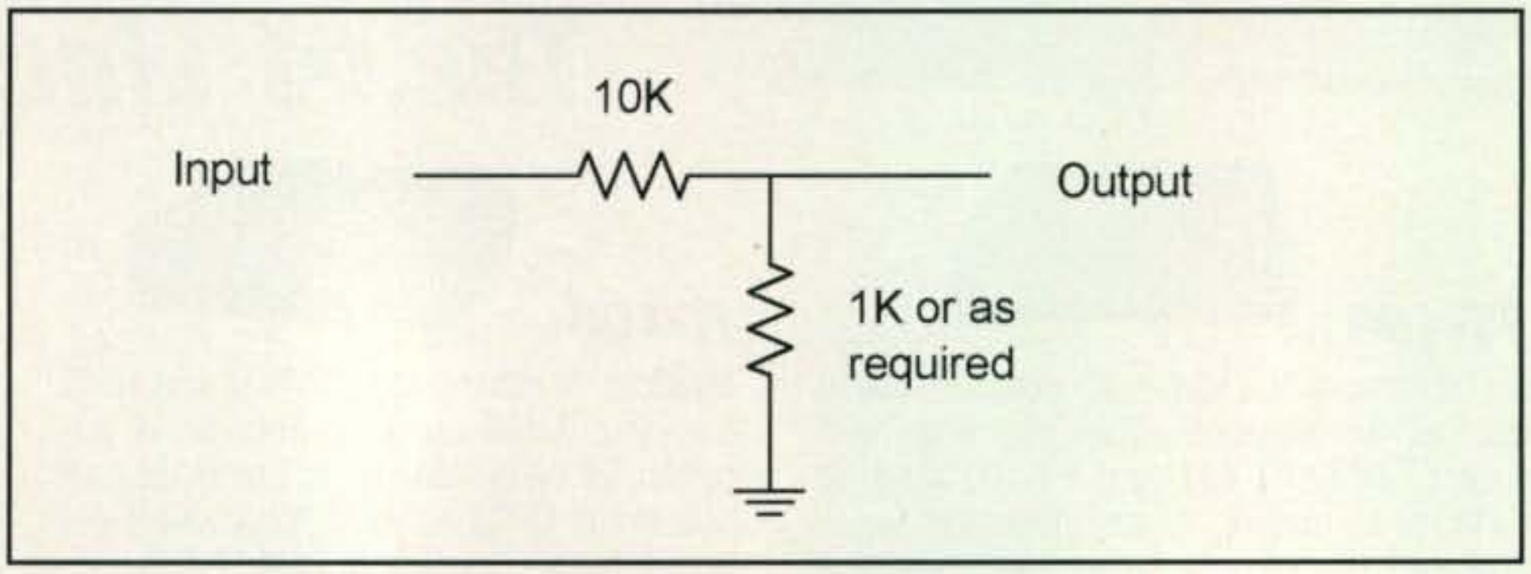


Fig. 3– Simple resistive attenuator.

type plug-in 9- to 12-volt DC supply will be adequate to power the device is you are building an external amplifier. If you wish to mount the amplifier internally (to the SM-220), you must find a suitable location either within the BS-5 or BS-8 module itself as close to the IF input connector as possible. You can then use the 12-volt Vcc within the SM-220 source for power.

Fig. 2 is a somewhat more controllable op-amp–based circuit with easily adjustable gain if you need it. The same considerations apply as for the first amplifier, except that it is more sensitive, so be careful. The op-amp is a National Semiconductor LM-7171 high-frequency type (stocked by DigiKey, at www.digikey.com), and its gain is the product of the feedback resistor (in this case 4.7K) divided by the input resistor (470 ohms), or 10× in the circuit shown. You easily can change the gain, however, by varying either resistor. In any event you should not have to go much above 10× (20 dB) for proper operation. If the amplifier should overload the BS module, you can always add a resistive divider to the input as per fig. 3 or change the resistor ratio as stated. A good choice of gain is enough to allow signals of S1 to S3 to clearly be displayed above the residual noise.

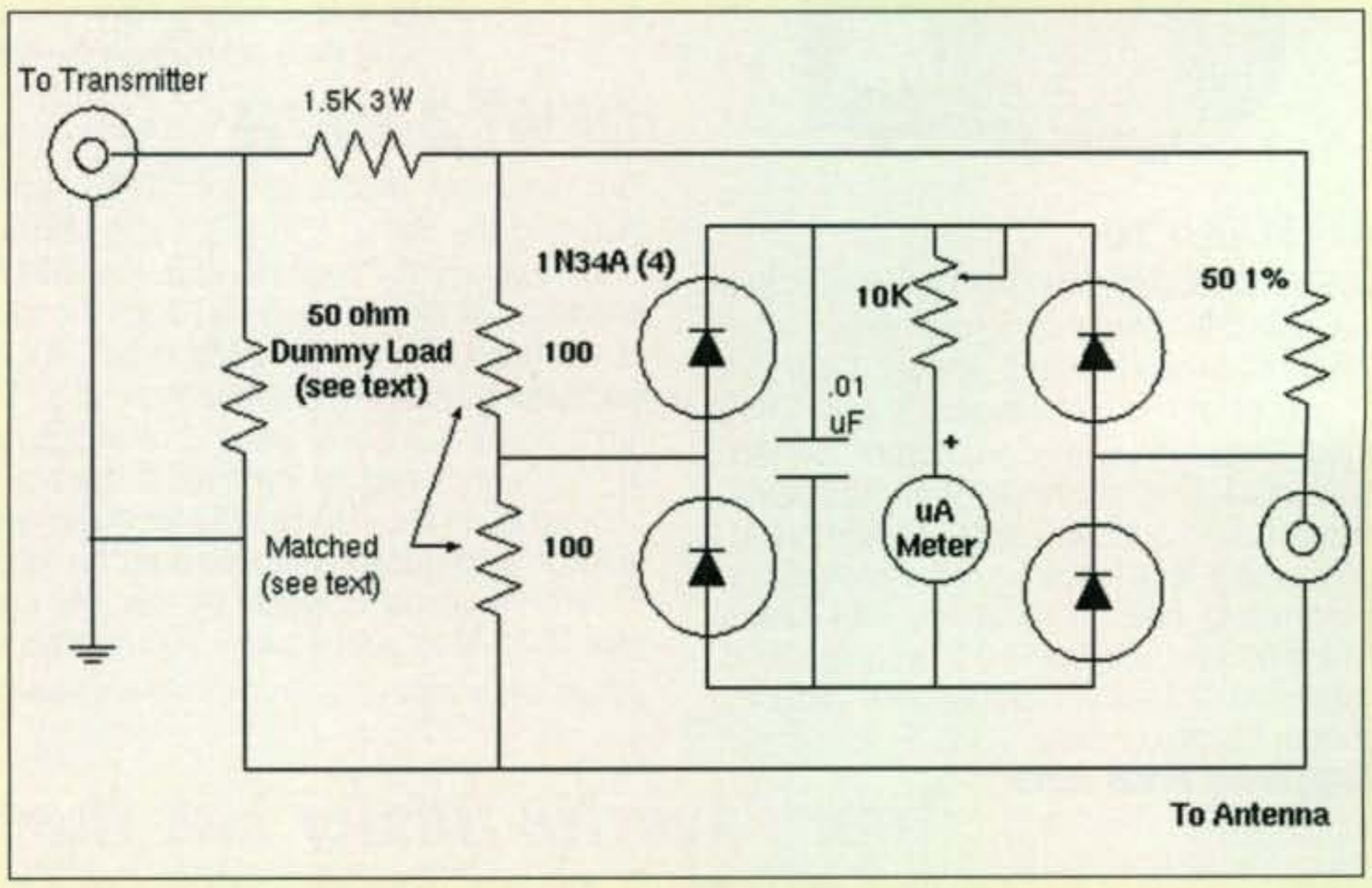
When you are finished, you will have a panoramic adapter that works, at least to what was expected in the early 1980s.

73, Irwin, WA2NDM

May Column Correction

To all of the readers who pointed out the error in figure 1 of my May column, the corrected schmatic is shown here. Thanks especially to Marvin, W4UXJ, and Dave, W9LD. It's nice to know that people out there really digest what I am trying to relate!

—WA2NDM



The corrected simple anntenna tuning aid schematic, fig. 1, of the May column.

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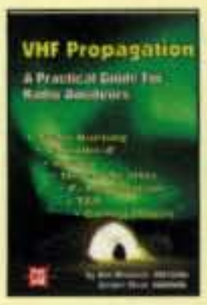

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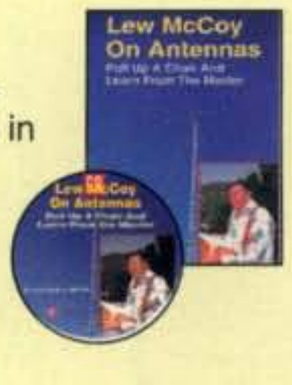

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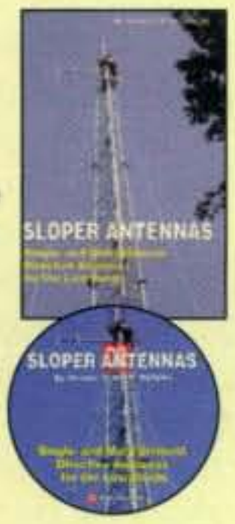

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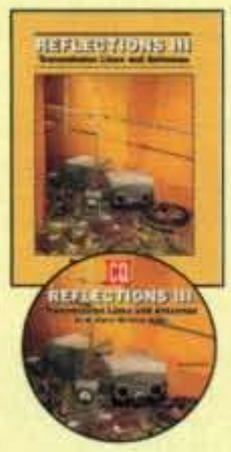

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BY FREDERICK O. MAIA,* W5YI

From the Mailbag: Questions from Readers

We constantly get letters and e-mails from our readers asking questions and seeking information about certain subjects of interest to ham operators. We save up the questions of general interest and every so often we include them in one of our "mailbag" columns.

Q: Glenn Baxter, K1MAN, is to go on trial for violating amateur radio rules. What is the status and why is he being tried in two different court systems?

A: A lawsuit was filed against Glenn A. Baxter, K1MAN, of Belgrade Lakes, Maine, on October 25, 2010. by the U.S. Department of Justice (Case No: 1:10-cv-00435-JAW). A U.S. District Court – District of Maine (Bangor) civil action summons was served on Baxter on October 27, 2010.

The civil action was brought against Baxter for failure to pay FCC fines totaling $21,000 (later reduced to $18,000) for alleged violations that occurred during 2004 and 2005. Baxter was charged with jamming ongoing amateur radio communications, violating the pecuniary interest rules, failure to exercise station control, impermissible broadcasting, and failure to file requested information with the FCC.

Baxter was advised in 2006 that if the fines were not paid, the matter would be referred to the Dept. of Justice for enforcement. The FCC has no collection department; therefore the federal court system acts as the collector for all civil forfeiture debts (fines) payable to the U.S. government.

FCC Rule Section 504(a) states that fines must be paid to the U.S. Treasury and shall be recoverable "...in a civil suit in the name of the United States brought in the district where the person has its principal operating office." Baxter has asked for a trial by jury and it is expected that the trial will be held in Maine in August.

This federal court case is a completely separate matter from the renewal of Baxter's amateur radio license, which expired on October 17, 2005. Due to the alleged violations, his timely-filed renewal was held up by the FCC and has been pending for more than five years. He is allowed to operate his station while his license remains in pending status. That case is being handled by the FCC's internal but separate legal system. The FCC will rule on Baxter's license renewal after the federal litigation has concluded.

Administrative agency rules and regulations have the force of law against individuals. The FCC, as an independent administrative agency, has its own judicial system. Its judges are known as Administrative Law Judges (ALJs). More than thirty federal agencies have ALJs, and unlike federal judges, they need not be confirmed by the Senate. Their power is comparable to that of a trial judge.

Administrative Law Judges have the authority to issue subpoenas, conduct hearings, rule on evidence, make decisions, and determine penalties. Their judgment is independent—that is, free from the pressure of agency officials. Their activity is guided by the Administrative Procedure Act (APA, 1946), a law under which certain federal regulatory agencies create and enforce rules and regulations on major legislative acts such as the Communications Act. An ALJ decision can be appealed to a federal court.

Q: I hear one-by-one callsigns on the ham air waves. How do I get one?

A: The FCC has authorized the use of one-by-one format amateur radio station callsigns for use during "special events." The Special Event Call Sign System meets the needs of amateur operators for temporary operation of their stations during events that are of special importance to the amateur radio community.

A Special Event Call Sign is an amateur station callsign with a one-by-one format (see below) that may be assigned to stations operating in conjunction with these short-term events. The special event callsign is temporarily substituted for the callsign shown on the license of the person making the request while the station is transmitting in conjunction with the special operation.

Here is what the FCC has to say about one-by-one special event callsigns. "A special event callsign aids amateur radio operators in calling attention 'on-air' to their participation in the event as well as helping to bring notice to the event." Examples of the use of one-by-one callsigns by amateur stations include a wide variety of celebrations such as conventions, festivals, on-air operating events, dedications, holiday and anniversaries . . . and even local events qualify.

A one-by-one callsign consists of a single prefix letter (K, N, or W), the region number (Ø to 9), and a single suffix letter (A to Z, except the letter X). There are 750 such callsigns (for example: "K1A"). Amateurs of any license class may reserve a 1×1 callsign for up to 15 days. Unlike the vanity callsign system, there is no cost to obtain a temporary special event one-by-one callsign.

Once you reserve the callsign, you simply substitute the self-selected 1×1 call sign for your FCC-assigned callsign. The special event station must also transmit its FCC-assigned callsign at least once per hour during the operation.

*1020 Byron Lane, Arlington, TX 76012
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Coordinators have been selected by the FCC to approve and post 1×1 callsign reservations. These coordinators maintain and disseminate world-wide a common One-by-One Database for the day-to-day usage of these callsigns.

You can determine which 1×1 callsigns are available during specific dates by going online to <http://www.1x1callsigns.org>. Be sure to read the 1×1 callsign Frequently Asked Questions (FAQ.)

Q: I am totally confused about FCC Rule §97.13(c)(1) and its reference to §1.1307(b). Can you tell me what this is all about? What do I need to know about RF safety?

A: Hardly a week goes by when there is not a story in the media about the possible harmful effects of radiated electromagnetic energy. This includes all forms—from (50–60 Hz) power-line radiation to RF energy up in the GHz range from low-power cell phones. The fact is, however, that the possible hazards of electromagnetic radiation have never been scientifically proven.

Up until August 1996, amateur radio was specifically excluded from the FCC's RF radiation safety rules, the reason being that due to relatively low power and duty cycles, ham radio transmitters were found to be safe under the then-current 1982 RF protection guidelines.

In 1996, the FCC announced new guidelines governing exposure to transmitted radio frequency signals. These rules set new limits on the amount of RF energy to which people may be exposed. The limits for Maximum Permissible Exposure (MPE) are set forth in a table in the FCC's Part 1 regulations. They are very technical and admittedly very hard to understand.

All amateurs whose output power exceeds 50 watts must comply with these rules. To comply, amateurs must do a routine evaluation under guidelines explained in the FCC's RF safety booklets "OET Bulletin 65" and its accompanying "Supplement B" which is available for download from the FCC at <http://www.fcc.gov/oet/info/documents/bulletins/>.

The FCC assumes that certain stations are safe without a formal evaluation. Those are base-station amateur stations radiating less than 50W PEP at the transmitter output and push-to-talk hand-held, mobile, or portable transceivers.

Amateurs radiating more than 50 watts output are required to evaluate their station parameters (including power output, antenna gain, frequency, distance from the antenna to the populated environment, and duty-cycle of the communications) to assure that the Maximum Permissible Exposure (MPE) is not exceeded.

There are three ways to determine whether your station's RF radiation is within the MPE guidelines:

1. Using electronic instruments that measure field strength;

2. Performing complex mathematical calculations.

3. Using various charts, tables, and computer programs that determine "worst case" estimated distances to meet the RF power density guidelines.

It is this third way that most radio amateurs use. Charts and tables in the FCC's RF safety booklets indicate when a station's power, frequency, operating parameters, antenna gain, and antenna placement combine to produce fields that exceed the MPE standards. There are examples showing safe distances

from typical antennas at different frequency bands and power levels.

Nearly all amateur stations with a good, high antenna well removed from inhabited areas pose no hazard to the public. This is especially true when you consider the time-averaging and duty-cycle aspect of amateur radio transmissions.

Time averaging is based on the concept that the human body can withstand a greater rate of body heating (and thus, a higher level of RF energy) for a short time than for a longer period. Amateur radio stations—because of their intermittent operation, low duty cycles, and relatively low power levels—rarely exceed the 1996 MPE standard.

There is no special amateur station evaluation paperwork that needs to be sent to the FCC to prove that you have completed the required RF exposure evaluation. Amateurs do have to certify when they apply for a new or renewed amateur radio license that they have complied with the RF safety rules.

Q: Who determines what frequencies the Amateur Radio Service may use?

A: The International Telecommunication Union (ITU) and Federal Communications Commission (FCC). The allocation of the radio spectrum to various uses and services is a complex matter.

As a general rule, only one radio station can operate on the same frequency and at the same time and place without interference to others. (There are a few exceptions such as multiplexed digital signals and spread spectrum.)

Therefore, people wishing to use radio-communication devices in a given area must cooperate if they are to avoid interference problems. Each user on a specific frequency prevents other simultaneous, nearby uses of the same spectrum.

The electromagnetic spectrum is an unusual natural public resource, because—unlike iron, oil, natural gas, or coal—it is not depleted by use. It fact, it cannot be consumed at all. When one user stops accessing a portion of the spectrum, another can readily use it.

At any given time and place, one use of a portion of the spectrum precludes any other use of that portion. The use of the radio spectrum thus must be regulated, access controlled, and rules for its use enforced because of the possibilities of interference between uncoordinated uses.

The radio spectrum is a scarce resource because it is all currently allocated to various uses. Since the possible number of stations operating in a band is limited, someone must establish spectrum-use standards. Also, because of the propagation distances reached by some radio signals, this regulation must be national and even international in scope.

National governments enact and enforce radio laws and regulations. Generally, this regulation is performed within a framework of international agreements, both regional and global in scope. The Geneva-based ITU is the worldwide governing body over wire and wireless communications.

This specialized agency of the United Nations consists of representatives from nearly 200 nations who meet every couple of years at World Radiocommunication Conferences to consider future telecommunications. The next one will be held in 2012. The ITU's most important function is the allocation of radio frequencies to prevent harmful interference among stations of different countries.

In the United States, private-sector spectrum management is handled by the FCC. Among its duties, the FCC allocates frequency bands for the various non-government radio services, determines frequencies to be used by individual stations, licenses, and regulates stations and operators.

Radio operations of the federal government are not regulated by this agency. Instead, the National Telecommunications and Information Administration (NTIA), an agency within the U.S. Department of Commerce, coordinates the government's use of its portion of the radio spectrum. Much of the work of the NTIA is shrouded in secrecy due to national security issues. The biggest user of government spectrum is, by far, the Department of Defense.

There are two distinct stages to spectrum management: the allocation phase and the licensing phase. The allocation of radio frequencies consists of dividing the spectrum into a number of segments, or frequency bands. These band assignments are influenced by the behavior of radio waves at different frequencies.

Specific frequencies within each band are then reserved for use by individuals, firms, or groups through licensing —or unlicensed use—regulations. The Amateur Service is allocated many frequency bands, each with somewhat different radio-wave propagation characteristics.

The ITU allocation plan divides the world into three geographical regions. Any segment of the radio spectrum can be allocated to one or more radio services either on a worldwide or regional basis. That is, as long as the allocation fits the general band plan agreed upon by the ITU nations.

Since all nations adhere to ITU allocations for their region, radio amateurs of different countries are able to communicate with one another on the same bands (with certain exceptions). The FCC frequency allocations generally conform to those for ITU Region 2: North, Central, and South America.

A communications priority system exists when an allocation has been made to more than one service. In the United States, radio spectrum may be either allocated to government or non-government use "exclusively," or on a

"shared" basis. "Primary" radio services take precedence over "secondary" use. Radio stations operating on a secondary basis cannot cause interference to—and must accept interference from—primary users.

Much of the spectrum used by the U.S. Amateur Service is shared on a secondary basis with the federal government. In fact, all amateur bands above the 2-meter band (except 222 to 225 MHz) are allocated to government radar and other uses on a primary basis.

Q: I know Volunteer Examiners (VEs) administer license exams. What does a VEC (Volunteer Examiner Coordinator) do?

A: For 70 years the U.S. government prepared and administered amateur exams, but due to budgetary constraints and personnel cutbacks, the FCC discontinued these operations in the early 1980s. Congress enacted legislation in 1982, which allowed the FCC to accept the volunteer services of amateur radio operators to prepare and administer Amateur Radio Service examinations.

The FCC then created two levels of exam administration—the Volunteer Examiner Coordinator (VEC) and the Volunteer Examiner (VE). The VEC acts as an administrative liaison (or coordinator) between the FCC and the VEs who give the tests. The FCC thus is able to direct the entire amateur radio testing program through a few VECs.

Three banks of test questions and their multiple-choice answers are developed by the VECs' Question Pool Committee (QPC), which must be used verbatim in all amateur license exams. The QPC is a panel made up of representatives of VECs who are elected annually at the National VEC Conference to develop and revise all written license examination questions.

Only VEC-accredited amateurs (VEs) who have a higher class license (if one exists) than an applicant may administer written examinations. Ham testing is administered by teams of three or more VEs. The FCC no longer administers amateur (or commercial) radio examinations of any type.

The exam results are forwarded by the VE team (along with the appropriate application forms and attachments) to its VEC, which screens the applications for completeness and authenticity. After review, the VEC then electronically submits the successful application data directly into the FCC's computer located at its licensing facility in Gettysburg, Pennsylvania, and an operator/station license is granted.

The Volunteer Examiner Coordinator (VEC) recruits and accredits Volunteer Examiners and issues accreditation documents, coordinates examination sessions with VEs, informs VEs of changes to the examination process, provides a source of amateur license testing materials and forms for its VEs, collects and archives successful candidates' test results, maintains records of all test sessions, and authorizes the grant of an amateur radio license by the FCC.

Although VECs must recruit and accredit Volunteer Examiners, they are under no obligation to accredit any particular amateur into their examining program. VECs have the authority to invalidate a test session. VEs, once accredited, may be separated from the program for any reason—or for no reason at all. 73, Fred, W5YI

magic in the sky

BY JEFF REINHARDT,* AA6JR

Turf Wars

From the earliest examples of recorded history up to the present, battles over "turf" have been a recurrent, if not a dominant, theme. These conflicts have ranged from arguments between two neighbors about a property line, to tribal conflicts over hunting grounds, water rights or access to trade routes, up through all-encompassing wars between entire blocs of nations, such as the World Wars of the 20th century. These battles have been characterized in many ways, such as good vs. evil, Sharks, vs. Jets, and "Haves" vs. "Have Nots." In most cases, the "winner" gets the "turf" and as an added bonus, the ability to write the account of the conflict that's often referred to as "The History Book."

Greeting!

Those of you who are familiar with the Selective Service System may recognize that headline word. For females, or those males who reached the age of 18 sometime after the early 1970s, "Greeting" was the word that announced your selection for induction into one of the branches of the U.S. military. In more common terminology, you just received your "draft notice."

As the holder of an amateur radio license, no matter which country you reside in, you are now a soldier in a turf war that threatens your ability to legally operate on certain frequencies.

Certainly, turf wars over frequency spectrum arenot anything new. Conflicts for prime radio "real estate" are nearly as old as the radio art itself.

Like so many wars, it usually begins small. A certain bit of bandwidth is discovered to have properties desirable for some reason or another, usually linked to some specific purpose. In certain instances, it makes sense as it did in radio's infancy and the safety of ships at sea was readily evident. Of course, the military—first the Navy and then ground forces, followed by air forces—saw the usefulness of wireless. Then came commercial broadcasters. With each new user "amateur" spectrum diminished. After the demise of early broadband spark transmissions, this was not a huge concern; it seemed as though there was plenty of spectrum to go around, although ham communications were relegated to the so-called "useless" higher frequencies in the early 1900s.

A Little History

Funny thing: Everywhere ham radio operators went new uses were "discovered" that had commercial, military, or government appeal. (Remember, when Marconi started he was technically an amateur, kind of like Adam in the electromagnetic Eden.) Things got crazy as the 1920s gave way to the '30s, and radio hit adulthood. In 1934 the FCC was created to bring some law and order to what was then the "wild west." Beside creating the FCC, the Communications Act of 1934 defined the radio spectrum as belonging to the people of the USA.

With certain exceptions, the FCC's administration was effective. New uses were accommodated, such as broadcast FM, TV, and more. Hams sometimes benefited but frequently bore the brunt of spectrum reallocations. Certainly commercial interests had their way more often than not, but the FCC was also there to be sure everyone played nicely and ran in accordance with frequency allocation, bandwidth specs, and power limitations.

The Telecommunications Act of 1996 changed a lot of that. Written largely by industry lobbyists, it changed the FCC into little more than a paper agency and pretty much put commercial interests above all others—in some instances, even ahead of the government's. And before anyone rolls out their partisan preferences, the Telecomms Act has plenty of blame to spread around. It was passed by a Republican congress and signed by a Democratic president.

As with many governmental policy changes, the test of time shows the wisdom—or lack thereof—in the edict, mandate, law, fiat, or policy. Written from a singular perspective, the Telecommunications Act of 1996 is showing many cracks. For one thing, it allowed the government to "sell" chunks of spectrum. At the time I considered that similar to selling off our national parks. Sure you can make money on it—once. However, once it stops being the property "of the people" it's gone forever. Anyone for condos on the rim of the Grand Canyon? (Oh, too bad you can't see it anymore. ...)

Welcome, Recruit!

We hams have always been innovative, which often works to our detriment. The discovery of worldwide propagation on the "useless" HF bands saw commercial, military, and shortwave operators join in a "gold rush" that limited our space. Later we showed how VHF and UHF could be useful through the use of repeaters, setting the stage for public safety, mobile telephone, pagers, and later, cell phones to "move on up."

Now we're being pressed again, and the target is our shared allocation known popularly as the "440" or UHF band. In the USA, it really stretches across 420–450 MHz. Many hams do not know we are a secondary allocation on that swath (the U.S. government has "first dibs"), but until recently we've pretty much been left to play around without much fuss. Yes, there are limits near the Canadian border, and yes, recently some military radar systems have forced additional limitations in

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other regions. Many hams have taken the "herd attitude" that while the lion may have picked off one of the zebras, at least it wasn't me.

Well, now it's you. And me. And every other licensee.

HR 607 is a bill in the current Congress that proposes to sell off 420–440 MHz "as a way of offsetting part of the cost of establishing a new nationwide interoperable emergency system," according to Bill Pasternak's *Newsline* report.

In today's world, 20 MHz is a lot of spectrum and it's "prime real estate." Fortunately, it would appear we don't have to fight this one alone, but we still have to fight it. Government users such as the weather service, law enforcement, and others can be found there. Unfortunately, the current occupants do not have the "clout" (read campaign contribution money or lobbyists) that those who desire the spectrum may have.

Your Arsenal

What you do have is a pen, some paper or a post card, or a QSL card, and a stamp . . . and vote! Trust me, they do count for something. All you have to do is write the following:

Dear (Name of your Congressman)

As an amateur radio operator in (name of your city and state), I ask that you oppose that portion of HR 607 which would remove valuable radio spectrum at 420–440 MHz from existing use and impair the Department of Defense's PAVE-PAWS radar that protects the nation from submarine-launched missiles. In addition, this spectrum is allocated on a secondary basis to the Amateur Radio Service and the Amateur Satellite Service. It is used for amateur television, worldwide amateur satellite communications, control of advanced robotics, and more. Please do not deprive the public of this vital resource.

Respectfully,
Your name & Call Sign

Do it now, right now! Before it's too late. To identify the name and address of your respective congressional representative, go to <www.house.gov>. E-mail is the preferred means of contacting your representatives due to security considerations on postal mail.

Is It Really That Bad?

Heck yeah, it's really that bad. In fact, the rush for spectrum and the power of special interests is going to get worse before it gets better. Maybe you saw the recent coverage on how the FCC granted a license to a company (LightSquared Inc.) to build a broadband service on 1525 to 1559 MHz. "So what?" you might say. Well, that spectrum is adjacent to GPS frequencies. There is concern that weaker GPS signals coming from satellites hundreds of miles above us would be swamped by the new service, and this isn't a "just here or there thing." It's reported the new service would have 40,000 land transmitters and satellite coverage as well.

One suggested solution was that all current GPS users go buy and have filters installed. Seriously.

It's one thing for the mapping system in my car to be thrown off, but I want the emergency responder coming to my house to be able to find it, quickly and accurately. I want the plane I'm flying in to precisely find the correct runway. I don't want to have to wonder if those folks "bought the correct filter."

Now I'd love to ask the FCC, "What the heck were you thinking?" when it granted that use. (Go back to the Telecomms Act of 1996 and who wrote it for your answer.) However, here's an instance where it appears a single commercial interest has, for the moment, trumped the greater good. To learn more, and to see a list of who's concerned about this issue, visit: <http://www.saveourgps.org/>.

Policy Matters

I realize ham radio and politics are a volatile combination. Count me among those who will absolutely not discuss politics on the ham radio bands. I just don't think it's appropriate and I realize others may differ from my opinion. So be it.

However, the issues described in this column are real and they are serious. Ham radio operators, and the millions upon millions who rely on GPS, are at risk. So you have a choice: Do nothing, or take just a few minutes to help preserve the "Magic In The Sky."

73, Jeff, AA6JR

kit-building

BY JOE EISENBERG,* KØNEB

A Tribute to Leo Meyerson, WØGFQ

Photo A– Leo Meyerson, WØGFQ, was the founder of World Radio Laboratories and columnist KØNEB's personal ham radio "Elmer." (Photo courtesy QCWA Chapter 154)

It is not often that a ham has the opportunity to publicly salute the ham who got you started in the hobby, known as your "Elmer." With a heavy heart, I am taking the occasion of his recent passing to tell you about my Elmer and his contribution to the world of kit building.

Leo Meyerson, WØGFQ, (photo A) was a friend of my family and introduced me to ham radio at the age of 7. He already knew I had an interest in radios and electricity and electronics, and my father decided to have Leo show me what ham radio was really like. Sitting down next to Leo as he tuned up his Galaxy 300, I heard the wonders of all of the voices from around the world come spilling from his speaker. After a couple of QSOs, he also showed me a Globe Chief and told me it could be built at home. I was, of course, too young at the time to build one, but my dad took me to Leo's store in Council Bluffs, Iowa to look around. World Radio Laboratories, located just across the bridge from Omaha, was large and the building also housed the factory that produced the Globe kits as well as the Galaxy line of radios. There were aisles of kits, parts, and about every kind of radio available for hams, including the radios built right there at WRL.

My dad bought me a Hallicrafters S-120 general-coverage receiver, and for years it was next to my bed. Each night I spent hours tuning into shortwave broadcasts from all over the world, as well those "Donald Duck" sounding voices on the ham bands. All along, my WRL map of the USA hung on the wall with Leo's smiling face on it reminding me of my Elmer and his guidance. In addition, at Leo's urging my dad got me one of those "50-in-one" electronic kits that let you attach parts to terminals and wire up things such as simple radio circuits and alarms, light flashers, etc. Since there was no soldering needed and it ran on batteries, there wasn't much danger of a kid getting into trouble. As I grew older, Leo would show me his latest radios and tell me how easy it was to get my Novice license. By the time I was 14, he had me enrolled in the Novice classes they held at night in the cafeteria in the WRL factory. My first radio was not a kit. It was a Galaxy GT-550 that I saw being made right there in the same building! At the same time, my father showed me how to use a soldering gun, and I was on my way to learning how to build a kit.

Leo's success came from many of the same circumstances that also brought names such as Heathkit and Lafayette to prominence in the 1950s. After World War II, there was a huge surplus of military-spec electronic parts, and kits became the affordable way to enjoy amateur radio. With simple designs worked around the availability of these rugged parts, a nice transmitter could be built in a few hours. What made Leo's kits unique was that he did a few things to make them more attractive. Cost being a factor, Leo sold a CW transmitter kit for $5 down and $5 a month to pay off the $55 cost of the kit (photo C). Buying a ham radio kit on the installment plan was quite unusual at the time. As

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Photo B– A Globe Chief Deluxe, similar to one that KØNEB finished building at his high school radio club "back in the day."

Photo C– What made World Radio Labs' kits, such as this Globe Scout, unique was the fact that cash-strapped hams could buy them on the installment plan, making a small down payment annd monthly installments for the balance.

I have covered in my earlier columns, many of Heathkit's assembly processes included cutting numerous different-colored wires to certain lengths and stripping the ends to match a need on the chassis. The Globe kits often came with the wires already cut to length and stripped, ready to assemble. Today that would be like having the toroids come already wound.

I entered high school as a Novice, and found myself needing to finish building a Globe Chief Deluxe (photo B) in the school ham shack that had just been started by a student who had left the previous year. Gathering all of the parts and spending a little time each day, it didn't take long before I was plugging crystals into the front panel and making contacts on the air! All along, Leo was there to guide me during my first contacts and answer my questions as I progressed in amateur radio. In later years, I'd fly out to California to see my parents, who spent winter months in the Palm Springs area, close to where Leo was, and I'd make sure I saw him each time. Leo always told all of his friends there that he was the one who started me in ham radio and made sure I was invited to speak to their clubs or come to their luncheons when I visited. I owe my lifelong hobby to the man who also brought many innovations to the world of radio throughout his 100 years. Leo will be missed by all hams, and he will always be etched in my memory. It is with that same wonderment I had when he showed me the insides of a Globe Scout that I look at today's kits and remember that with a little help, a new or experienced ham will find enjoyment in kit building.

Fun New Kits

For those interested in new and simple kits to build, Rex Harper, W1REX, has a couple of fun new kits with no toroids to wind. One is the "Lil' Squall" CW transceiver (photo D). It is Rex's version of the venerable Pixie design, with a lot of flexibility built in. Rex's kit includes removable bandpass filters, so

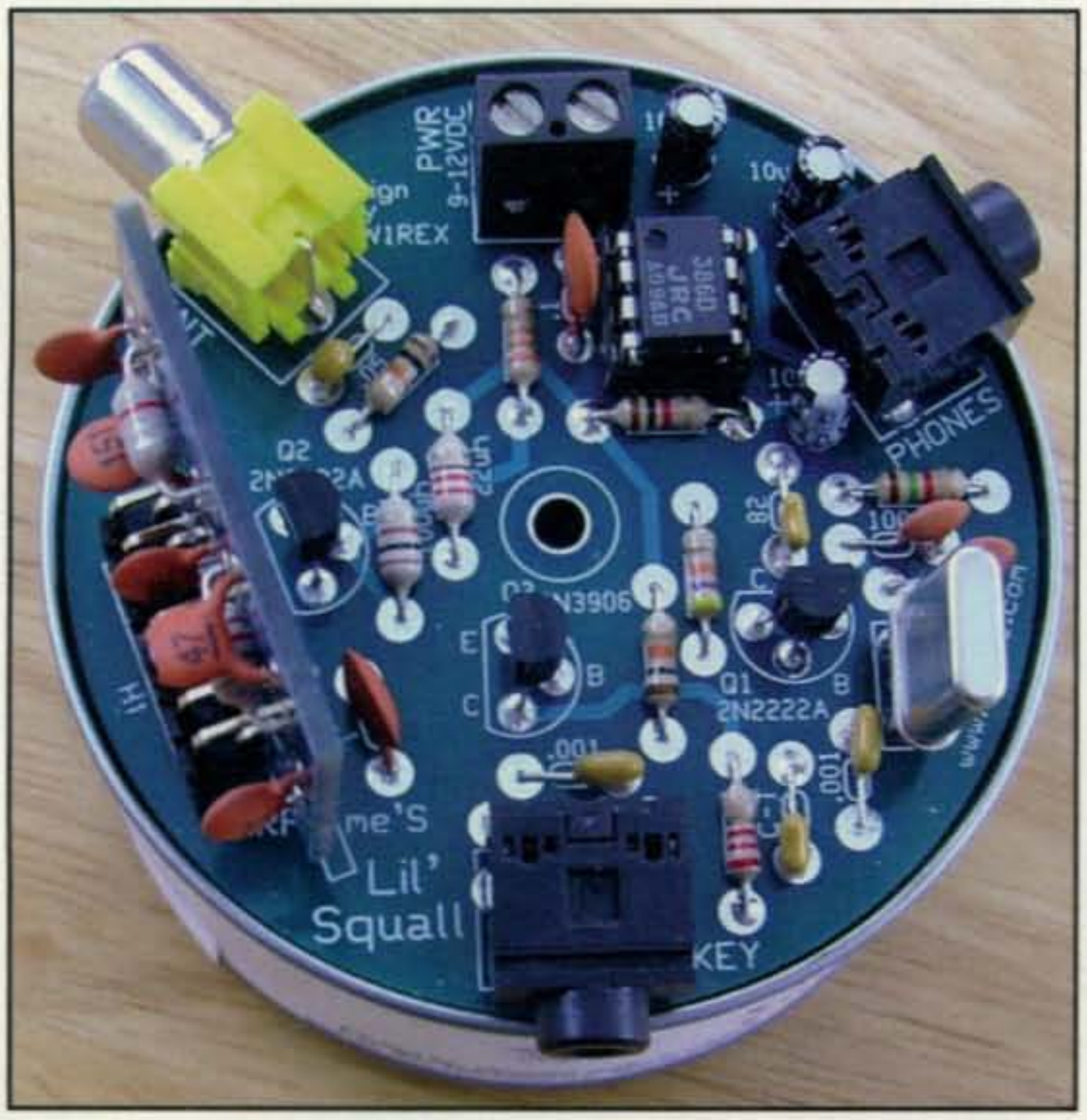

Photo D– The "Lil' Squall" CW transceiver kit from QRPme.com permits multiband operation and has no toroids to wind.

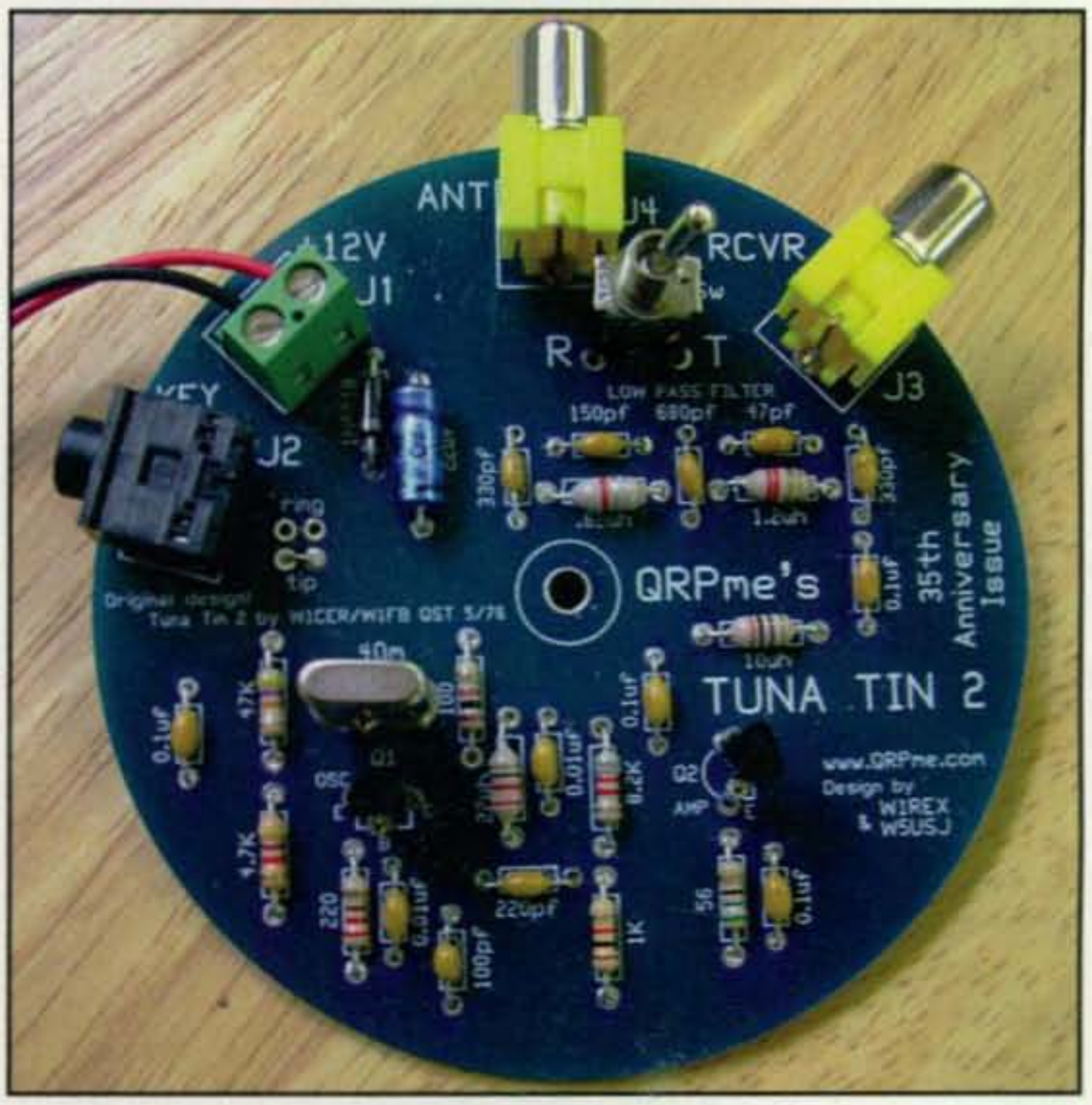

Photo E– Rex Harper, W1REX, of QRPme, has also brought out a special 35th anniversary edition of the venerable Tuna Tin 2 QRP CW transmitter kit. Like the "Lil' Squall," it uses molded inductors instead of hand-wound toroids. Be careful, though. They look a lot like resistors, so don't mix them up!

the builder can choose which band is desired. Also, he includes three crystals for the most popular 40-meter QRP watering holes. There are no toroids to wind and the board layout makes for easy building. The crystal, output transistors, and filter capacitors are all socketed to allow for easy changing and experimentation. After all, experimentation is part of the fun of building a kit!

Be sure to download and read all of the instructions, as there are a few minor changes to the kit that will affect the placement of your parts.

Rex's other new kit is the 35th anniversary edition of the Tuna Tin 2 CW transmitter (photo E). Rex updated this very popular kit to include a nicer board layout for ease of construction, better component marking, and once again, *no* toroids to wind. Rex uses molded inductors instead of hand-wound toroids. These molded inductors look a lot like resistors and are even marked similarly, so be extra careful when building this kit to be sure you choose the right parts. The layout is the same as the schematic, making for a great learning experience. In addition, the transistors are marked on the board as to which is the oscillator, amplifier, etc. The inclusion of a simple two-terminal power input connection is an improvement over using an RCA jack for power input as it is a lot less confusing when connecting a receiver. This would be a fun kit to build as a group and is great for teaching beginners how to build. Rex's kits are available at <http://www.qrpme.com>.

Build Your Own Geiger Counter!

With recent events, monitoring of radiation levels has become a topic of interest. If you are interested in monitoring radiation levels, Chaney Electronics offers a full line of simple Geiger counter kits. These kits are reasonably low cost and easy to assemble. The Geiger counter kits range from $90 to $149. You can see them at <http://www.electronickitsbychaneyelectronics.com>.

Until next time . . . 73 de Joe, KØNEB

Energy Savings for the Home, Shack, and Shop

BY WAYNE YOSHIDA,* KH6WZ

As I write this installment of "The Ham Notebook" in early May, my day-job workplace and community have been practicing Earth Day events all month. There are contests for water and energy conservation. As I thought about this idea of helping to protect Mother Earth by conserving, I thought to myself, "Hmmm, I used to be miserly with electricity and heating just to save money. Now it is called *conservation*."

At any rate, since our ham radio service would not exist without electricity, here's a look at some things I do to keep the utility bills down, and conserve resources, too.

The Easiest Rule to Apply

I thought of something funny while thinking about saving electricity, or water, or natural gas, or anything else a long time ago. It is so simple that I am surprised that no one mentions this in any conservation program I have seen. Therefore, my simple and first rule for conserving anything and everything is: "If you do not use something, you are conserving that something."

See how simple that is? I discovered this when I lived in a small townhouse community, where neighboring houses shared paths and walkways through the complex. My neighbor across from me always burned the front-porch light as soon as the sun went down. The light was so bright that it illuminated my porch and front door. I did not turn my own light on for over 20 years. That is a lot of energy savings, and I didn't have to do anything!

Another example of this concept is using the printer connected to your computer. In this case, you simply don't use the print command to generate a hard copy of an electronic document unless it is absolutely necessary. Instead, you can simply save the document or image or other thing from your computer somewhere on your hard drive for later reference.

As you start your own conservation program at home or at work, please apply "The Simple and First Rule of Conserving" to anything you do.

More Challenging Ideas

One obvious place to trim electrical usage is illumination. Lighting at night is a worldwide drain of

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Photo A– The curly-cue CFL seems to be trendy these days. I made the switch away from incandescent bulbs years ago and am transitioning to LED lamps for even more savings. Sometimes, however, this is not always the way to go. See the text for more details.

Photo B– Various LED lamps for the home and shack. Although quite expensive, these new "bulbs" may last much longer and operate with very little current. They do have some shortcomings, though, as discussed in the text.

electricity, unless human beings evolve to enable night vision. Take a look at photo A. Many people have adopted the compact fluorescent light bulb as a means to save electricity. CFLs have their good points and bad points, and one of the things I do not like is the mercury contained inside those curly things. I had an early CFL in a living-room lamp several years ago that buzzed, hissed, and smoked and finally snapped off one night. That was scary, since that lamp was plugged into a timer and turned on and off automatically, even if I was not at home. Although there was no fire, just a bad smell, I couldn't help but wonder what would have happened if I was not at home, either still at the office or on a business trip.

Therefore, I am moving past the CFL stage and am phasing in light-emitting-diode (LED) lamps around my house (see photo B).

As the 60-watt incandescent lamps in my ceiling fixtures and the 75- and 100-watt bulbs elsewhere in my house burn out, they are being replaced with LED units. In some cases, I am using clear-envelope 15- and 25-watt incandescent bulbs for illumination, as shown in photo C.

In photo D, a simple and inexpensive electro-mechanical timer (about $5 at any hardware store) can save electricity by automatically turning the light on and off at certain points of the day or night. The timer could be considered a device to enable the concept of "not using something in order to conserve that something."

Based on my experience, for electronics-specific applications, LED illumination may not be the optimum choice. This is probably because of the color of the light being produced by the LED. There is something different about the color tem-

The Portable Power Source or "Orange Box"

I have received several requests for more information on my Portable Power Box, also known as the Orange Box. As mentioned before, it is really a battery in a box with ham radio gear friendly features added to it. For folks who want to "roll their own," here are some more pictures with captions on this handy power source.

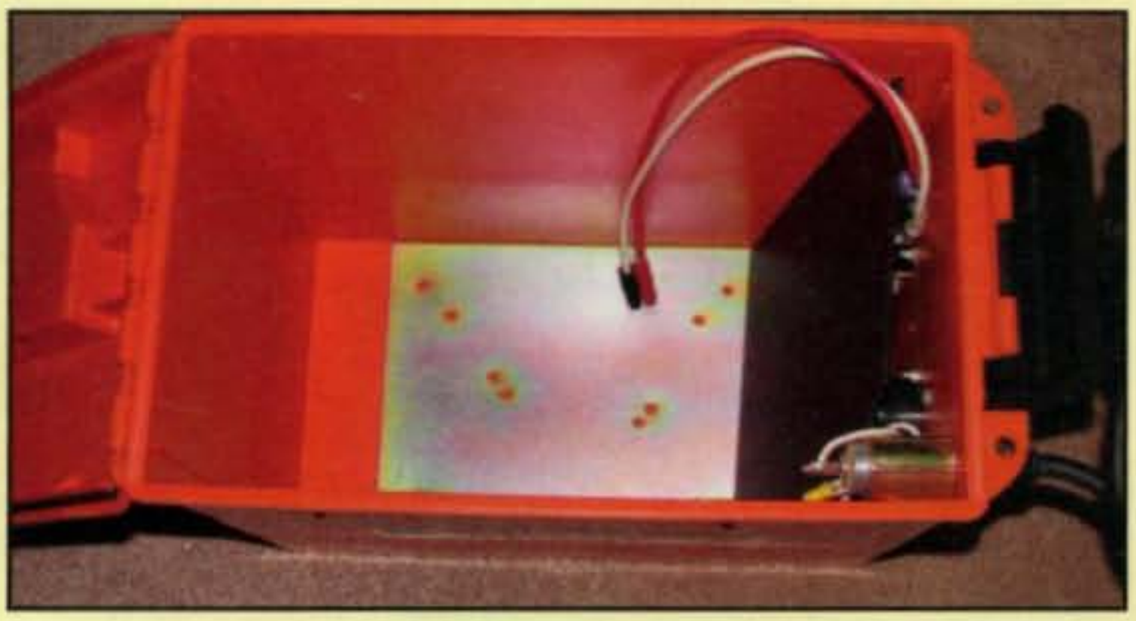

Photo 1– The Portable Power Box is a Sportman's Dry Box sold at camping and sporting-goods stores. This type of box is great for radio projects, since the lid is splash and water resistant. As long as you don't drill any holes in the box, it should shield the contents and keep them dry. Of course, it is not "waterproof," so you don't want to drop this thing into a stream or something. I press-fit a piece of plastic against the meters and wiring on the front panel to prevent short circuits. A scrap of galvanized steel from some junk box item is on the bottom of the box to help increase rigidity. A piece of plywood could work, too.

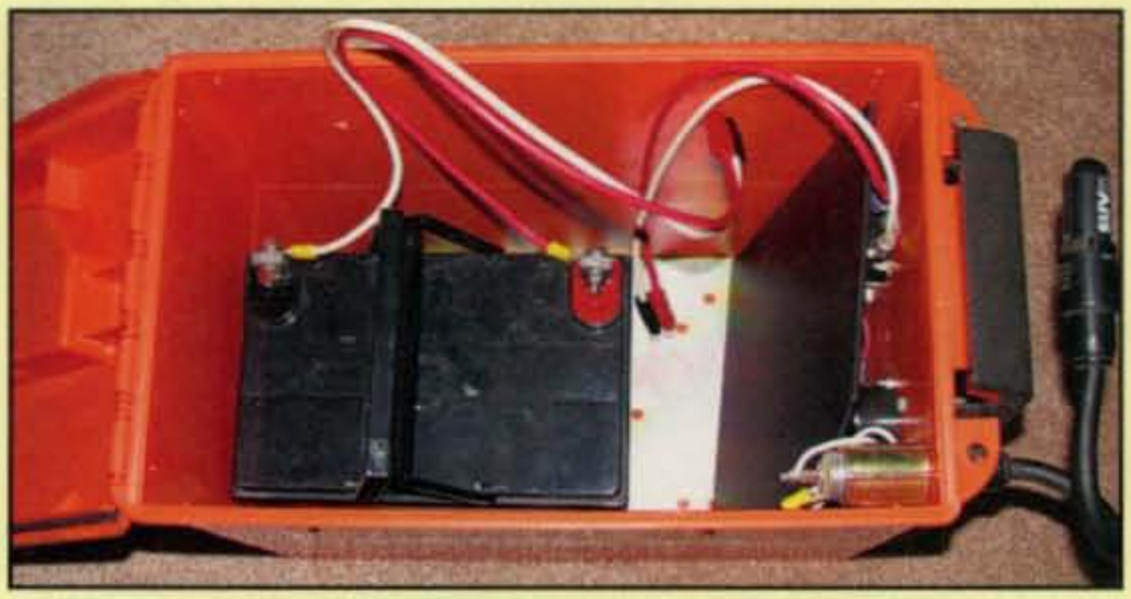

Photo 2– The large gel-cell is a 12V, 35Ah unit purchased from a local electronics store. Just get the biggest battery that can fit into your case safely. It would be best to take the box with you when you go shopping for the battery.

Photo 3– Another sheet of plastic is placed on top of the battery. The skinny rectangular item at the top of the photo is a 12V, 12.5A switched-mode power supply (SMPS) from a local surplus store. The West Mountain Radio PWRgate PG40S mates with the power supply and the battery and turns into an uninterruptible power supply.

Photo 4– The front of the Orange Box includes multiple outputs via West Mountain Radio RIGrunner, model 4005, meters for volts and amps, and switches to turn the meters on and off. The wire-pull handles help protect the meters from damage when bouncing around in the vehicle trunk.

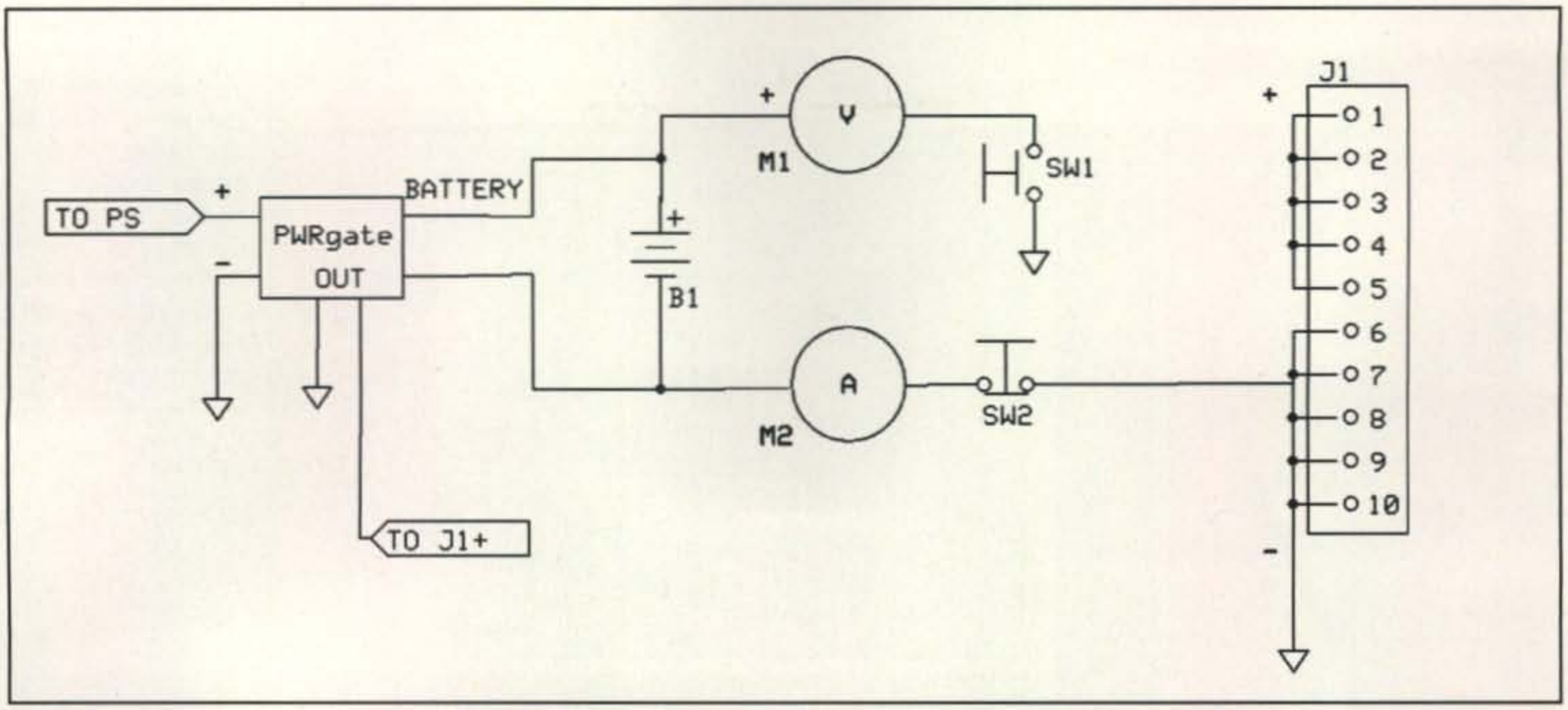

Fig. 1– Here is a schematic of the Portable Power Box. The housing can be any heavy-duty box that can safely carry the battery. The power supply can be found at many electronic-parts and surplus dealers, and the West Mountain Radio products can be purchased at your favorite ham radio dealer. Check the advertisers in this issue.

Photo C– These low-wattage incandescent bulbs with clear-glass envelopes are also very good and may be better than either CFLs or LEDs.

perature of the LED lamps I am using that makes color rendition inaccurate. While this may be acceptable when reading a copy of *CQ* magazine, it is not okay when trying to read the color code on a quarter-watt resistor. I noticed this as I worked on a digital-clock project using many small resistors. For some reason I just could not determine the resistor value as I stared at the colored bands. At first, I thought I needed a new pair of eyeglasses, but then I realized that each band was sharp and in focus. However, the colors seemed to look exactly the same. I took out my trusty multimeter, and measured the resistance (see photo E).

I decided to try an experiment. I turned on my workbench magnifier, equipped with a fluorescent ring light, and then the colored bands became clearly visible and each of the colored bands became color-correct and distinctive. Then I looked at the resistors with some rechargeable flashlights, shown in photo F. One has a three-step switch, which turns the LED to "low," then "medium," and then at "high" the LED is switched out and an incandescent bulb is switched in. The other flashlight has a high/low switch; both positions use an LED.

Interestingly, I saw something similar: Under LED illumination all the colored bands looked the same. However, under incandescent lighting the colored bands looked different.

Thus, now I recommend that one must ignore energy aspects and consider color correctness when selecting lighting for critical applications, such as working with electronics. Avoid using LED lamps in such places.

Here, too, is an energy-saving idea:

Photo D– A simple and cheap timer like this can enable the first rule of conservation: "If you do not use something, you are conserving that something."

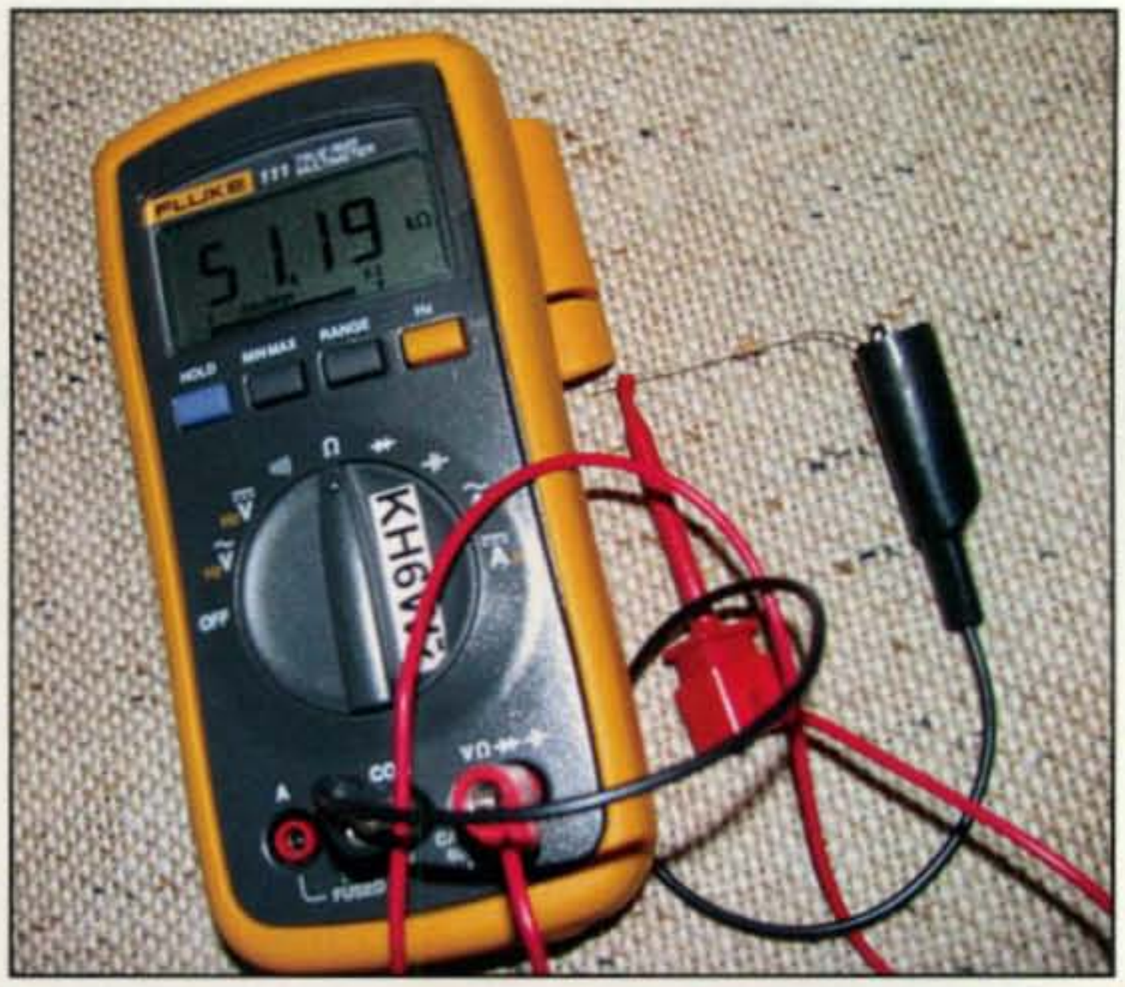

Photo E– A good multimeter is a very useful tool to use when trying to see resistor color codes under certain types of illumination. You can just read the digital display and ignore the little color bands.

Photo F– These LED flashlights are handy because the LEDs will last a long time and they are rechargeable. The black one has a solar panel inside to keep the battery charged. The silver one has a three-position switch. The best feature is the incandescent bulb used in the "high" position.

If you work on your projects during the daytime, you can conserve electricity by using the sun as your lighting source. It is natural and provides the proper color.

Switched-Mode vs. Linear Regulator Power Supplies

A switched-mode power supply, or SMPS, uses a switching regulator that enables high efficiency. An SMPS is always smaller and lighter than a non-switching supply (using a linear regulator) of the same voltage and current rating. Older SMPS units from about the 1980s or so tended to be electrically noisy and were not used much in the ham radio market. I remember being given some power-supply buying advice that went something like "You can figure about a pound per amp on a 12-volt power supply" and "The rule on power supplies is if it is heavy, it is a good one."

While this "heavy" rule still applies today, the switching supply has changed that thinking. In photo G you can see the difference between the two types of power supplies. The switcher is not only smaller and less bulky, it is more efficient. Some computer switching power supplies have efficiency ratings exceeding 98 percent. This also means the switching supply runs much cooler than the linear regulated supply, operating in the efficiency range of 30 to 40 percent. Therefore, by going to a switching supply for your station's DC power, you can use less AC mains power and save some money on that electric bill, too. As a bonus, the switching supply will be smaller, taking up less room on the operating table.

Speaking of power supplies, one thing to consider is keeping some sort of uninterruptible power supply (UPS) on hand, as shown in photo H. Basically, it is a big lead-acid gel-cell with a battery charger always connected to it. Under normal conditions, the battery floats on standby and can power your 12-VDC station gear. When the AC power goes away (intentionally or unintentionally), the battery takes over to supply power. If a solar panel is attached to the setup, then no AC power is needed. Do you see how that first rule of saving something keeps coming up as we talk about conservation?

Your Ham Station Equipment

I am sure everyone is aware of the FCC rules regarding transmit power (and if you aren't, you need to be!). There is one rule that we can apply in our environmentally-friendly station operation, Section 97.313 (a), on transmitter

Photo G– Guess which power supply is the SMPS (switching mode power supply). Switchers are smaller, lighter, and run cooler than linear regulated power supplies. They can save energy, too.

Photo H– This portable power supply (the Orange Box) has appeared in various forms over the years. It is basically a big gel-cell in a handy box with a power supply and battery charger. It is useful for portable operations, and when unplugged from the AC outlet it does not consume any power. The yellow unit next to the Orange Box is a commercially-available unit sold as an emergency automobile jump-start power source. (See sidebar for more on the Orange Box.)

power standards: "An amateur station must use the minimum transmitter power necessary to carry out the desired communications."

Therefore, if you operate your transceiver on high power (this can vary between 5 watts for a hand-held or portable radio to 200 watts for a large HF rig) to establish a contact, you should experiment a little bit and decrease your transmit power. When doing this, you are not only complying with a basic FCC rule, you will be conserving energy at the same time, so go ahead and don't be afraid to turn that power control knob counter-clockwise for a change.

As we celebrate the 41st year of Earth Day, think about how your ham radio station impacts our planet and consider some of these ideas to save energy and money at the same time. Being a miserly sort of guy, I like the saving-money concept, and best of all, a lot of the practices for conservation involve doing nothing at all!

73, Wayne, KH6WZ

References

Earth Day Network: 1616 P St. NW, Suite 340, Washington, DC 20036; phone: 1-202-518-0044; <http://www.earthday.org>

West Mountain Radio: 1020 Spring City Dr., Waukesha, WI 53186; phone 1-262-522-6503; <http://www.westmountainradio.com>

learning curve

BY RICH ARLAND,* K7SZ

One Loop to Rule Them All, de FRØDO

A wondrous thing happened a couple of months ago: I discovered the horizontal full-wave loop antenna! After many months of procrastination coupled with in-depth internet searches and countless e-mails to friends who had horizontal full-wave loops erected for the ham bands, I decided to take the plunge and join the ranks of "The Royal & Mystic Order of the Huge Loop." Why a horizontal loop, you ask? Let's take a time out and visit "Loops 101" for starters.

Exactly what *is* a loop antenna? The easy definition is one continuous length of wire extended out to form a "loop" and terminated back at the transmission line. In other words, one end of a length of wire is connected to one side of the transmission line which is then extended outward to form a full-wavelength of wire roughly in the shape of a loop or rectangle/square/triangle, which is then brought back to the other side of the transmission line and terminated. As you can see, it is nothing "special," just a one-wavelength long piece of wire connected to the transmission line to form a full-wavelength loop antenna. This loop can be oriented horizontally or vertically, your choice. However, the horizontal version seems to work extremely well. Although it takes up a fair amount of real estate, it offers both low and high takeoff angles for DX and NVIS (near vertical incidence skywave) contacts. As we'll see as we progress through this column, a loop antenna is pretty forgiving and you can bend it to fit inside most property lines, even if you don't have the room for a full-size 80-meter dipole!

The simplicity of this antenna is often overlooked by many radio amateurs because they feel that to be effective an HF antenna needs to be complicated in design. Nothing could be further from the truth. The full-wavelength loop (also called a full-wave loop) is an extremely effective HF antenna that has some unique advantages that are often overlooked in favor of more complicated and hard-to-manage arrays. After all, if you want a *really* potent signal on HF you are almost required to erect some form of "beam" antenna that exhibits directivity to increase your signal strength toward the target station, while minimizing signals from other stations off the side or back of the antenna, right?

Wrong! A very effective and efficient radiating array can be made using nothing more than wire, insulators, some Dacron®/nylon line, and some really tall trees! While in the past I have had the pleasure of using really monstrous directional HF antennas (how about a 4-element 40-meter wire beam at 90 feet?!) the logistics of erecting a monster antenna like that is incredible! A single length of wire suspended horizontally from the tops of 50–60-foot tall trees is relatively easy to erect and offers some really interesting possibilities to the frugal ham radio operator. Did I mention it is stealthy? It is extremely difficult to spot my big loop against the sky and/or trees. It's almost (but not quite) invisible!

One of the most intriguing things about full-wave loops is their ability to tune all bands *above* their operating frequency! This means if you erect an 80-meter full-wave horizontal loop (about 270 feet of wire) you can effectively use this one antenna on 40, 30, 20, 17, 15, 12, and 10 meters! Try that with a Yagi! In addition, should you elect to feed this 80-meter loop with ladder line or open-wire feed line, you can also get it to tune on 160 meters! In case you are not paying attention, this equates to all-band HF performance on one piece of wire. Not only does this full-wave loop offer multi-band performance, it is a very cost-effective way to have all the HF bands available on one antenna, greatly simplifying your antenna installations.

All of my research, including my own on-the-air experiences using a horizontal full-wave loop, points to this antenna being exceptionally quiet. This is a big plus with all the Wi-Fi, computer-generated noise flying around inside the shack and house today. Anytime you can eliminate or greatly reduce the noise pickup at the antenna, it is a definite plus. Less or diminished noise means you can start hearing the really weak ones on the band, a must for the budding DXer.

One other fact emerges: In many instances, the full-wave loop will outperform a single-band, full-size dipole antenna. While dipoles are simple to fabricate and erect, they are mediocre performers when compared to a full-wave loop at a height of 50–60 feet above average ground. This includes my all-time favorite dipole, the 40-meter Extended Double Zepp (EDZ), which, up until I erected the full-wave loop at the Bent Dipole Ranch, was my best performer ever! In short; the full-wave loop really opened my eyes as to what a single-wire antenna could accomplish on the HF bands. Why I didn't try one before is a mystery.

The Bent Dipole Ranch Gets a Loop

It all started with Kyle Albritton, W4KDA, and a presentation he gave at our local Gwinnett Amateur Radio Society (GARS) meeting regarding his 160-meter loop antenna. His presentation is still available as a PDF on the GARS website (www.gars.org). Log on as a "guest," go to "Downloads," choose "Antennas," and then choose "W4KDA Loop." The file is just under 4MB and is well illustrated. Kyle goes over all the things that he encountered on the road to a gangbusters antenna and it makes for a great read. Kyle includes several links to other loop sites so you can do your own research and reach your own conclusions as to how well this horizontal loop performs.

Although Kyle's presentation really got my attention, I still lacked the decisive kick in the pants

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Photo A– Norm Schklar, WA4ZXV, past-president of GARS, takes aim with his homebrew tennis-ball antenna launcher. Norm's skill is second to none when it comes to getting a line over a 60–70-foot tree!

Photo B– This is what took three days! Notice how dense the woods are. The hint of blue in the background is Norm's jacket. I am only about 35 feet away from Norm and Mike, ND4V.

I needed to get my project under way. That all changed when I visited Don Keith's, N4KC, site (http://www.donkeith.com/n4kc/article.php?p=12) and talked to him about his big "skywire" loop antenna. Don is an accomplished author and well-respected radio amateur who lives in Alabama. He has a string of non-fiction submarine novels as well as some fiction works to his credit. In addition, Don has many short articles on ham radio available on his site (www.donkeith.com/n4kc). Although Don's 465-foot loop is a bit short for a full-size 160-meter loop, he is well pleased with its performance on the HF bands.

Using the standard equation for a full-wave loop: L = 1004/f(MHz) (where L = length in feet) we get 529 feet as our target wire length for 160 meters. *That* is a *lot* of wire!!Thankfully, Home Depot and Lowe's both sell THHN house wire in various gauges on 500-foot rolls. Kyle chose #18 AWG, but I figured that I'd go with #14 AWG *stranded* THHN house wire (in dark brown for added stealth) to provide more physical strength to the antenna. I had the helpful dude at Home Depot roll off an extra 35 feet of #14 to make up the additional length needed for the antenna plus a couple of feet extra "just in case." I watched for sales on this wire and procured the 500-foot roll of #14 for $50. In addition to the wire, I bought a baggie full of PVC 45° fittings for use in erecting the antenna. Cost, around $5. These PVC fittings were drilled through the back side to accommodate a length of Dacron rope which holds the antenna in the trees. The actual antenna wire is fed through the 45° coupling and allows the wire to slide back and forth during times of high winds, reducing the stress on the entire antenna. This is a "must" unless you enjoy regularly going out into the woods to re-shoot lines into the tops of trees and repairing antenna wire! HRO Atlanta provided the 500-foot roll of Dacron line to support the antenna in the tree tops. Cost: about $70.

K7SZ Gives the "Bat Signal"!

With everything in place, I was ready to start on my monumental antenna project. In every amateur radio club there are a few special individuals who, regardless of their own work schedules, are ready to lend assistance to those needing help erecting antennas. Norm Schklar, WA4ZXV, and Mike Weathers, ND4V, a world-class CW op and DXer, are two of those people. After gathering all the "stuff" I needed to erect my loop, I voiced my desire to erect this antenna on the GARS reflector and followed up with a plea for help at the next GARS meeting. Norm and Mike showed up just like Batman and Robin after Commissioner Gordon flashed the Bat Signal over Gotham City! These two guys are unbelievable; seriously, they are always the first to volunteer to help folks with antennas.

Norm and Mike arrived at the appointed hour ready to get my antenna in the air. Owing to the layout of my lot, I am fortunate to have a lot of woods in the back where a large loop won't attract any attention. Norm's "spud gun" tennis ball launcher (photo A) was used to get the lines over the tops of the target trees. All I have to say about Norm's little toy is "*I gotta get me one of those!*" Between the three of us, we managed to get the antenna partially erected on the first day. What I thought would be a simple task was complicated because of the thick stand of trees and brush (photo B) coupled with the problem of threading the antenna wire between these trees to get a roughly rectangular layout of the antenna.

Day two: Norm and Mike arrived and we proceeded where we had left off the previous day. It took several shots to get the tennis ball over the tops of the selected trees then to back-haul the feeder line, which was tied off onto the Dacron line that was hoisted back up into the trees (photo C). All in all a *lot* of work in early March for three old pharts! (Sorry, Mike . . . just tellin' it like it is!) Chris Fowler, K4FH, joined us for the third day when we finally finished up the

installation. The overall layout is a lopsided rectangle of wire that roughly resembles a loop of sorts. We kind of got carried away with where we went in the woods, so the magic 529 feet was scuttled in favor of an additional length of wire, making the overall length of the big loop roughly 670 feet. I had to procure an extra 500-foot roll of #14 THHN to ensure I had enough to finish the loop and terminate it in the tree outside the shack. Hey, bigger is better, right?

The finishing touches on the installation came a couple days after the "antenna crew" departed. I added an extra 140 feet of wire to complete the loop around several big limbs that were impossible to avoid. This extra length of antenna wire seems to have no ill effects at all on the ability of my manual tuners to obtain a usable match on the loop. In the fall I hope to have the use of a large ladder and, armed with my trusty chain saw, will eliminate the offending limbs and shorten the loop by about 4050 feet.

Final plans call for doing what Kyle, W4KDA, did and that was to feed the loop directly with an LDG Z-11 Pro-II battery powered ATU (antenna tuning unit) located right at the feed point. His solution placed the tuner inside a weatherproof box, which sounds like a very good idea in my case, too. That way I can run low-loss RG-8 or RG-213 coaxial cable from the radio directly to the ATU, maintaining low SWR/line losses between the rig and the tuner and let the tuner do the work on matching the antenna.

My current configuration (photo D) is to feed the huge loop using about 60 feet of 450-ohm ladder line terminated in a 4:1 balun which is then fed with low-loss RG-8U (foam dielectric) to an MFJ manual tuner and finally into the radio via a coaxial switch. The other ports on the switch are terminated in my 40-meter EDZ and the MFJ 40/80-meter vertical antenna. This configuration allows me to switch quickly between three antennas (both the loop and the 40-meter EDZ have their own tuners, which I adjust for each band I use), selecting the best antenna based upon noise and S-meter readings. While not the state-of-the-art used by some, my little antenna farm allows me to instantly switch between antennas while chasing DX. Often I have found that I can receive the DX station better on the loop but use either the EDZ or the vertical to transmit!

Once again I'd like to thank Norm Schklar, WA4ZXV; Mike Weathers, ND4V; Chris Fowler, K4FH; Don Keith, N4KC. I also must thank Dean Straw, N6BV, for his outstanding 21st edition of the *ARRL Antenna Book*. My thanks to all of you for making this antenna project possible.

If you think you'd like to try your hand at erecting a large loop antenna, by all means do an internet search on full-wave loop antennas, check out the *ARRL Antenna Book*, and ask around your local club for anyone who has had experience with big loops. Then dig in and do the deal! You'll be amazed at what you can hear on a very quiet antenns. You'll also be amazed at your DXCC totals as they climb.

That's it for this month, gang. I hope you enjoyed the saga of the "The Royal & Mystic Order of the Huge Loop" at the Bent Dipole Ranch. I look forward to hearing from you either via e-mail, snail mail, or on the air now that I have some antennas that make getting on the air worthwhile! 73, Rich, K7SZ

Photo C– World-class CW op and DXer Mike Weathers, ND4V (left), unties a knot in the line that Norm shot over the top of a 70-foot tree. I am watching; I'm good at that. Actually my official position was "comic relief"!

Photo D– This is the ATU/switching system at K7SZ. The top MFJ model 901 tuner controls the Mega-Loop, while the bottom MFJ Model 901B tuner controls the 40-meter EDZ. The antenna switch to the right lets me choose between the Mega-Loop, EDZ, and the MFJ 40/80M vertical.

BY GORDON WEST,* WB6NOA

Introducing "Gordo's Short Circuits": The Book of Ten-Tec

This is the first installment of an occasional column by Contributing Editor WB6NOA on various things that cross his desk or catch his fancy. If you're aware of something that you think merits Gordo's attention, drop him an e-mail at <wb6noa@cq-amateur-radio.com>.—W2VU

Ten-Tec amateur radio equipment followers will enjoy the new 130-page hardcover book *TEN-TEC, the First 40 Years,* by Nancy Williams, NR4RR (photo A). Nancy is well-known for her award-winning novels *A Matter of Destiny* and *The Agenda 21 Conspiracy*, fiction books portraying *real* ham radio operations. The opening chapters of *TEN-TEC, the First 40 Years* focus on Al Kahn, Ten-Tec founder and radio pioneer. His first call was 9BBI. "We used ink bottle tops for the knobs, and wound wire around Quaker Oats boxes to make coils," was one of Al's comments in the book, taking readers through half-kilowatt rotary gap spark transmitters and through experiments with "electric voice" microphones. His contributions for Electro-Voice include the Heath Company, Radio Manufacturing Engineers (RME), and even phonograph pickup cartridges, ultimately starting Ten-Tec in 1968.

Reproductions of plenty of old Ten-Tec ads and product brochures with Jack Burchfield, K4JU, taking over as Ten-Tec president in 1967 are in the book. Also included are great anecdotes about early and later rigs, plus photos of long-haired Ten-Tec employees at hamfests in the '70s!

After reading this fun book, you will appreciate why Ten-Tec continues as one of the most popular amateur radio manufacturers, with equipment made in the USA. The book is available at <www.nlwilliamswriter.com> and is priced at $29.

Little-known Grandfathered License Opportunities

Your pal at the radio club holds an original Technician class license, earned before March 21, 1987 (photo B). He never let it expire. Good news! With no written exam, this "Grandfathered Technician" may do a paper upgrade for full General Class privileges. "The FCC Report and Order, effective April 15, 2000, grants examination credit to various licensees for examinations they previously passed," comments Fred Maia, W5YI.

There's more good news for your neighbor down the street who once held a Technician Class license back in the '70s or early '80s, but let it expire. Holders of expired Technician Class licenses, issued on or before March 21, 1987, receive General Class Element 3 credit when they successfully pass the relatively simple Technician Class Element 2 exam. That's right: An expired Tech license earned before March of 1987, when the old Tech test was 50 questions and contained

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Photo A– NR4RR's book Ten-Tec: The First 40 Years is a fascinating read, especially for Ten-Tec fans.

Photo B– Many Technician Class operators licensed before 1987 can qualify for a no-test General Class upgrade.

Photo C– Quartzfest demos of ham sets tied into a computer. For a longer article on Quartzfest, see the special web supplement to the June 2011 issue of CQ.

many General Class subjects, can be used to upgrade today.

Find a volunteer examination team who knows of the grandfathered-license process, and likely they have old paper *Callbooks* to look up old license claims. Most longtime operators have long since cleaned out their drawers full of their original licenses, but the *Callbook* should work.

For Advanced Class operators there is no automatic Extra Class upgrade. Going from Advanced to Extra Class requires passing the 50-question Element 4 test.

Finally, the new General Class question pool kicked in on July 1, 2011, and the new questions are not any more difficult than older Element 3 exams, but do get the new study materials to see relevant questions that have been added plus a slug of obsolete technical questions deleted!

The January Quartzfest

This year the week-long "boondocking" on the desert floor was filled with daily seminars (photo C), expanded to two separate fire rings. Steve and Linda Weed, KØ4QT and KI6JUD, respectively, were this year's organizers, studying my notes and suggestions based on ten years of experience with this event.

Every year we hear from Don Wilson, N9ZGE, who brings so much live, show-and-tell ham "stuff" that he rents a big RV

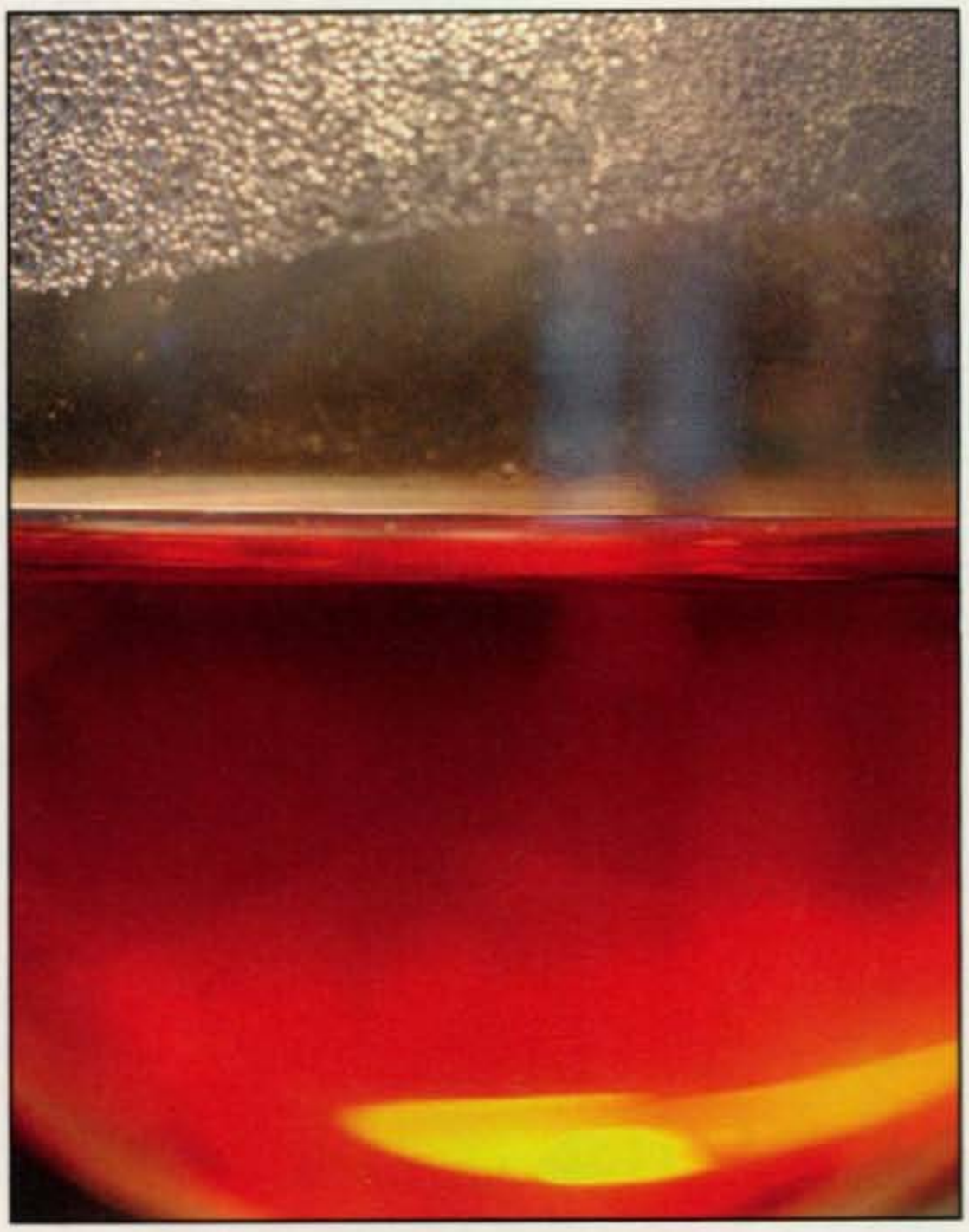


Photo D– Layers of liquids behave much like the atmosphere during subsidence.

to bring it to us. This year it was digital devices, with the following live demo observations:

- Keep any antenna away from the computer and digital devices.
- Use Mix 31 snap-on ferrite beads on every lead connected to the computer, the interface, and the radio.
- Windows XP™ is preferred over Window Vista™ or Windows 7™ for beginners.
- Many USB serial adapters will not work with Windows Vista™.
- Sound cards do not work with Vista and 7 as easily as with XP.
- Use Device Manager to solve comm-port selection errors.
- Only install *one* USB adapter at a time, and reboot each one individually.
- USB serial adapters must be plugged into the same USB port every time.
- Download a free program called Printscreen to help document a working setup.
- External sound cards are easier to set up than using the internal soundcard.
- Some digital USB interface devices will only work when plugged directly into the computer and may not work into an external USB hub.
- Not all USB hubs will work with Vista.

For more information, contact <N9ZGE@ARRL.net>.

Atmospheric Layers Demonstrated

Finally, a popular demonstration I offer to ham radio instructors is the visualization of tropospheric ducting, using a laser to show off a tiny fish bowl with atmospheric layers (photo D). For the demo the layers are liquid. However, they well illustrate the layering effect during high-pressure systems, descending air, and temperature inversions that trigger waveguide-like long-range VHF/UHF DX.

Different densities of various liquors can create an array of colored layers. The specific gravity of the liquid ingredients increases from top to bottom. Liquors with the greatest amount of sugar and the least amount of alcohol are the most dense and are put at the bottom. This would include fruit juices and cream liquors. Those with the least water and most alcohol, such as rum with 75% (!) alcohol by volume are floated on top.

The layers must be poured painstakingly gently to avoid mixing. I have had the most success with the following:

- Bottom layer – lime juice
- Followed by Amaretto
- Followed by Peppermint Schnapps
- Topped with 150-proof Tequila

A 5-milliwatt green laser pen will illustrate reflection, refraction, and defraction off the glass as well as the layered contents within. This is an excellent classroom demonstration for adults only! Properly dispose of individual layers or mixed ones. I prefer a straw (hi).

That's it this month for "Gordo's Short Circuits," and I hope to hear you soon via e-mail and on the airwaves.

73, Gordo, WB6NOA

BY JOHN WOOD,* WV5J

The Importance of Being Relevant

A dictionary will tell us that one of the definitions of the word relevant is "having significant and demonstrable bearing on the matter at hand." That paints a fairly accurate picture about the matters at hand for this month in "What's New," since I will demonstrate, to the best of my ability and without smoke or mirrors, that all of the items covered in this month's column are relevant to the hobby of amateur radio.

Feel free to test me, great readers of *CQ*, to determine that by the end of this column I have consistently drawn a connection to amateur radio about each and every item discussed, ranging from microphones to high-powered switches (easy) and Android apps to functional luggage (difficult, but not impossible).

So with that said, let's begin.

Surface-Mount Switches

I've often said that what amateur radio operators need most is another surface-mount high-powered switch. (See? I told you this connection is easy.) Well, I suppose the folks at Aeroflex-Metelics might have overheard me postulating this point at some time or another and decided to turn a dream into reality with the introduction of the MSW3200-320 and MSW3201-320 SP3T switches which cover the frequencies of 10 to 1500 MHz and 300 to 4500 MHz, respectively (photo A).

Now available from RFMW, Ltd., both switches handle up to 100 watts of CW input RF with a third-order intercept point of 65 dBm. Insertion loss is approximately 0.5 dB. For pulsed applications, these switches handle up to 500 watts at 10 **u**S pulse and 1-percent duty cycle. These switches are designed for durable, reliable use in military IED (Improvised Explosive Device) jammers and radar, and have applications besides amateur radio that include military, commercial, and industrial radios. Typical switching speed is 1 to 2 µS.

For more information about both switches, contact Aeroflex-Metelics stocking distributor RFMW, Ltd. at 90 Great Oaks Blvd. #107, San Jose, CA 95119; phone 408-414-1450 or 877-FOR-RFMW (1-877-367-7369). You can e-mail the company at <info@rfmw.com> or visit <www.rfmw.com>. For more information about Aeroflex-Metelics and this new SFT, visit <www.aeroflex.com/ams/metelics/micro-metelics-prods-PIN-Diode-Sw-HP-SP2T.cfm>.

New Adapters from RFMW and P1dB

RFMW is also launching two new products through its P1dB operation: precision stainless-steel SMA-to-SMA and N-to-SMA 18-GHz coaxial adapters. Priced at $13.95 each, these 18-GHz coaxial adapters reportedly are designed for the most demanding test bench and production test applications for commercial, industrial, and military COTS (Commercial Off-The-Shelf) applications. The SMA adapters are available in male-to-male, female-to-female, and male-to-female models and all claim a maximum VSWR of 1.20:1 at 18 GHz.

For more information about these new SMA adapters, visit <http://www.rfmw.com/P1dB> or <http://www.rfmw.com datasheets/p1db/SMA-

*1870 Alder Branch Lane, Germantown, TN 38139
e-mail: <wv5j@cq-amateur-radio.com>

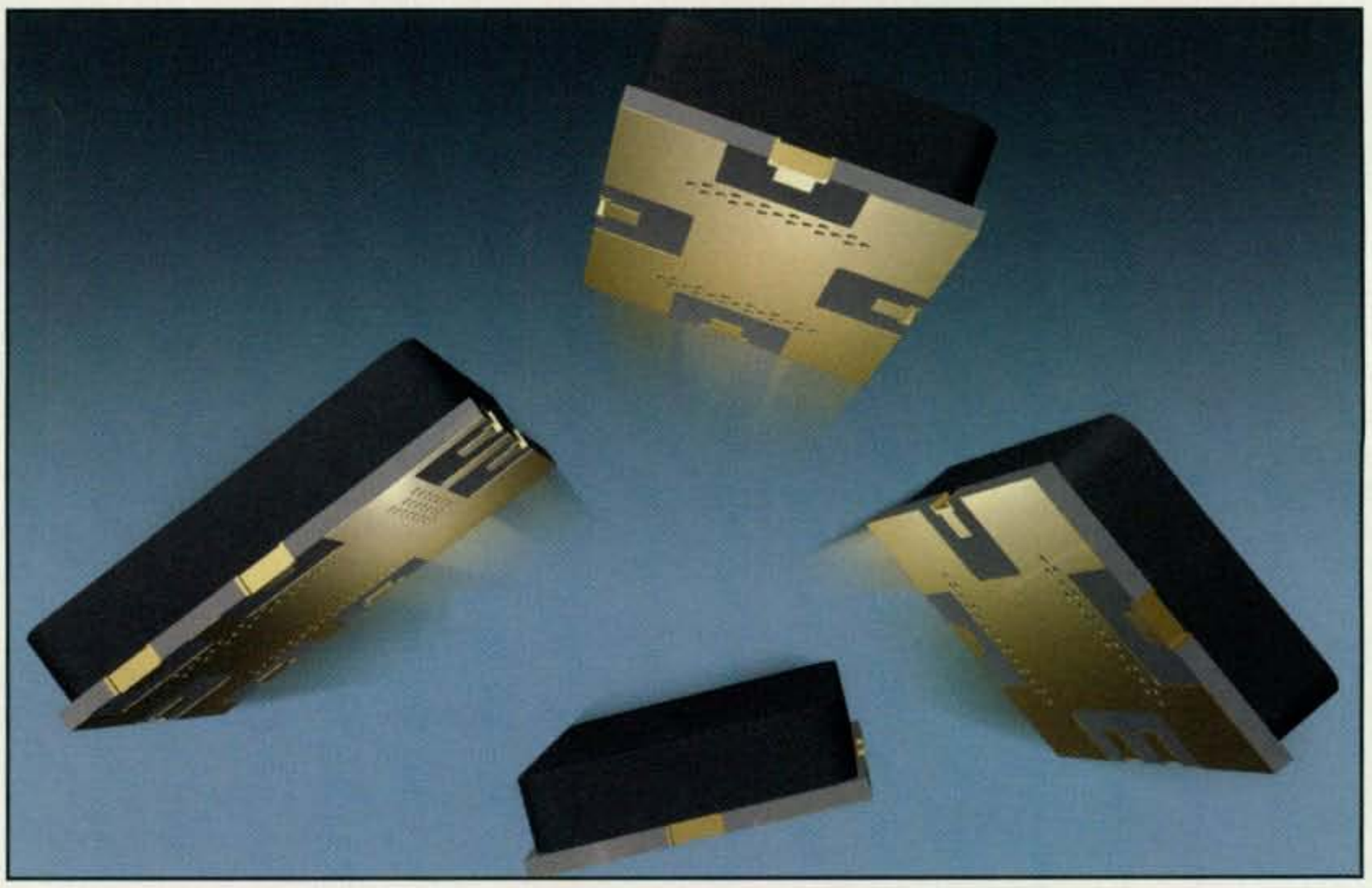


Photo A– Aeroflex-Metelics has expanded its family of high powered switches with two new SP3Ts that cover frequencies of 10 to 1500 MHz and 200 to 4500 MHz, respectively.

Photo B– Heil Sound made this year's Dayton Hamvention® more interesting with its release of two new microphones from the Genesis and Gold Elite series.

SMAADAPTOR.pdf>; e-mail <info@rfmw.com>; write to P1dB Exclusive Stocking Distributor, RFMW, Ltd., 90 Great Oaks Blvd. #107, San Jose, CA 95119; or phone 408-414-1450.

Heil Mics Debut at Dayton

As this is being written in mid-May, just before the Dayton Hamvention®, Heil Sound, Ltd., of Fairview Heights, Illinois, will use this event to introduce its new Genesis series microphone, and Gold Elite dual-element microphone which has been designed for use with AM, FM, and single-sideband amateur radio transceivers (photo B).

By switching to the *wide* position, the Gold Elite microphone exhibits balanced, full-range, 60-Hz to 16,000-Hz responses with +4 dB midrange peak at 2.5K, producing brilliant, clear speech articulation. Since it is a dual-element microphone, switching it to the *narrow* position selects the new Heil HC 5.1 tailored response element with response focused on extreme mid-range speech articulation while rolling off the low-end response at 200 Hz. This new Elite Series microphone also features a "soft touch" PTT switch with gold contacts to give the operator a smooth, noise-free transmitter control. Also, like all Heil products, the Gold Elite has an impressive appearance with its die-cast body covered in a matte-black lacquer and topped with a gold grill. All the ham operator needs to get this microphone on the air with his or her rig is a Heil CC-1 mating connecting cable. The Gold Elite microphone is priced at $160.

Heil Sound also will introduce the first microphone in its Genesis line at this year's Hamvention®, the Heil HM-12. The Genesis line is described by Heil Sound President Sarah Heil as "high-quality products at very affordable prices." The HM-

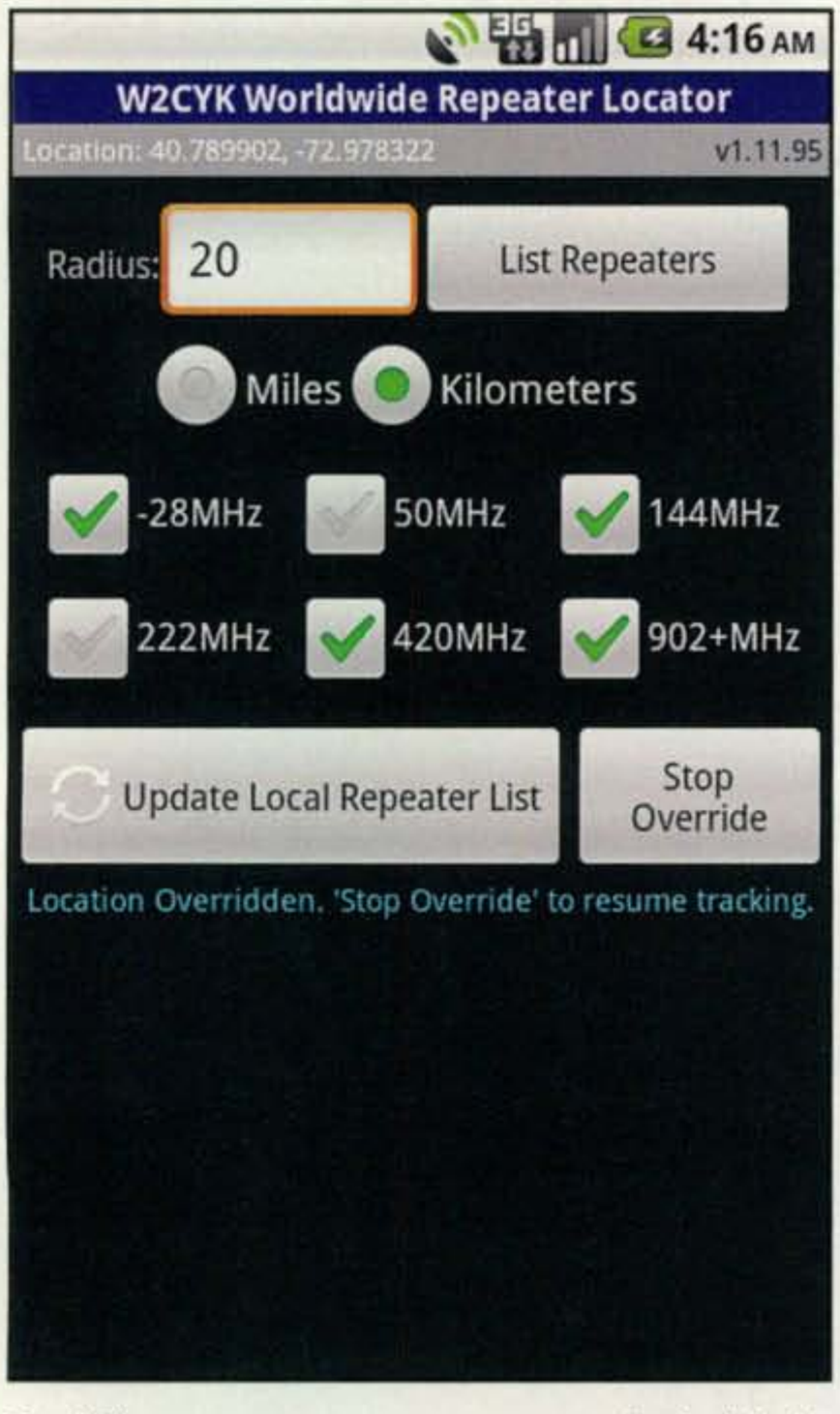


Photo C– Wherever you may go, your Android phone can now help you find the repeaters thanks to RFinder and its ever-growing database.

12 features a visually-striking microphone-body design that incorporates one of Bob Heil's special open-frame, full-range dynamic elements that will work with most amateur radio transceivers. The HM-12, priced at $70, interfaces to popular transceivers using the standard Heil Sound CC-1 Connecting Cable system.

Heil Sound is also expected to display a number of other new products at Hamvention®, including its FS-3 single-channel footswitch which retails for $25; the lightweight Pro Micro headset, priced at $79, which uses the new Heil HC-6 enhanced-response microphone element; and the HB-1 Economy Boom, an articulated arm using a substantial steel-channel structure balanced with four external springs. The HB-1 is capable of supporting up to a 2.5-pound microphone and will fit all standard Heil mic boom mounts and hardware. It ships with a brass-lined C clamp. The Heil HB-1 economy boom carries a retail price of $70.

For more information on all the new Heil Sound products, call Sarah or Bob Heil at 618-257-3000, or go to <www.heilsound.com>.

Time to Hit the Road

Tenba now makes "hitting the road" a somewhat softer proposition with its completely redesigned line of Roadie II rolling cases. While primarily designed to carry sensitive photographic equipment or portable laptop computers, these new rolling cases make great temporary homes for sensitive amateur radio gear and accessories (ham connection made!).

Tenba tells us that Roadies will enable you to take heavy radio equipment off your shoulders, put it all on wheels, and

Photo D– CW Touch Keyer has released its new model P6 MiniTouch Paddle, a small but highly responsive touch-paddle product.

get it into your favorite mode of transportation, whether that's the back seat of your car or the overhead compartment of an airplane. The cases come with rugged ballistic-nylon exteriors, an internal support frame, genuine YKK zippers, heavy-duty and smooth-rolling ball-bearing wheels (that are user replaceable), and massive reinforcement in all stress and load-bearing areas, all to help Roadies withstand the inevitable knocks and bumps of travel. Therefore, if taking your ham station with you is a priority, you might want to take a look at Tenba's Roadie II. For the DXpeditioner or the Field Day equipment chairman, the new line of Roadie II cases looks like a great way to move your amateur radio gear from home to wherever it's needed.

Tenba gives you three sizes of *Roadie II to choose* from: the Roadie II Compact, which fits under the airline seat; the Roadie II Universal, which meets the strictest international carry-on standards; and the Roadie II Large, which meets U.S., domestic, and some international standards.

For more information about Tenba's Roadie II bags or the entire line of Tenba bags, visit <www.tenba.com>.

Calling All Android Phone Users!

Did you ever think someone would design a repeater finder app made just for your Android phone? Well, now there is one. The guys at RFinder are actively marketing the first release of their first Android application, RFinder (photo C), and you can find it in the Android Market at <https://market.android.com/details?id=com.w2cyk.android.rfinder> for $4.99.

RFinder enables you to find repeaters all over the world based on your current location or a specified location. It allows sorting by distance or by trustee callsign, as well as filtering by band and radius in miles or kilometers. RFinder taps into a worldwide repeater database, including IRLP and Echolink information. Please keep in mind that the application only stores information for repeaters within approximately 80 miles (125 km) from your location on your handheld at any

one time, saving you room on your device. It uses geolocation either via cell-tower triangulation, GPS, or manual location entry so you can look up the repeaters you plan to use on vacation or business trips.

Bob Greenberg, the president of RFinder, tells us that 25 percent of the proceeds from this app will be used to fund youth programs in Amateur Radio. He also says that if RFinder buyers do not find their local repeaters listed, that they should not first ask RFinder for a refund. Instead, he suggests that they send RFinder a national list of any repeaters that they do not have and get a 75-percent refund (remember, 25 percent goes to fund youth programs in amateur radio) and he will have the list loaded into the RFinder database within 48 hours. This is just one way that the RFinder database is growing on a daily basis.

"If anyone has lists of repeaters from their countries we would love to incorporate that into our database," Greenberg added. "We already have 137 countries including the U.S., Australia, New Zealand, Mexico, Canada, England, Scotland, Sweden, Norway, The Netherlands, plus worldwide IRLP and Echolink nodes." Future additions to the app's capabilities may include IRLP and Echolink status, integration to Google Maps, and a callsign look-up feature.

To e-mail a list or for more information about RFinder, send an e-mail to Bob Greenberg at <bobg@w2cyk.net>.

CW Touch Keyer

CW Touch Keyer has announced the release of its new Model P6 MiniTouch Paddle (photo D). The MiniTouch Paddle is small but is a highly responsive touch paddle product that the company says, "offers the lightest touch on the market." Its size is 2"W × 3.5"D × 1.5"H and weight is 4.5 oz. with battery, making it right for field use, backpacking, and mobile applications. The self-calibrating paddles have zero movement, require no adjustment or contact cleaning, and are claimed to be 100 percent reliable. Paddles are made from solid metal and come with easy-to-clean gold plating.

The model P6 retails for $45, operates off an internal 9V battery, and draws 1.4 mA. It reportedly interfaces with any logic-level-input electronic keyer. For more information, visit <www.cwtouchkeyer.com>, call 508-285-7600, or write to CW Touch Keyer, 14 Boutas Drive, Norton, MA 02766.

Book Corner

CQ Communications books take center stage this month in the "What's New" book corner with the release of seven top-selling amateur radio publications on CD (photo E). The seven titles include *Sloper Antennas,* by Juergen A. Weigle, QE5CWL; *Reflections III,* by Walter Maxwell, W2DU; *Understanding, Building, and Using Baluns and Ununs,* by Jerry Sevick, W2FMI; *The New Shortwave Propagation Handbook,* by Jacobs, W3ASK, Cohen, N4XX, and Rose, K6GKU; *W6SAI HF Antenna Handbook,* by Bill Orr, W6SAI; *Lew McCoy on Antennas,* by Lew McCoy, W1ICP; and *The Quad Antenna,* by Bob Haviland, W4MB.

The CDs are priced lower than the print versions–from $14.95 to $29.95 each–and customers have the option to buy the books and the CDs separately or together at a special combo price.

CQ is also reprinting *Heathkit: A Guide to the Amateur Radio Products* by Chuck Penson, WA7ZZE. Cost for this print publication is $32.95.

Also available from the CQ Book Store is the new Gordon West General Class manual for 2011–15. Priced at $24.95, it's designed to make it easier for hams to upgrade to the

Photo E– CQ books star in this month's Book Corner with seven top-selling amateur radio publications now also offered on CD.

amateur radio HF bands. There's also a four-CD audio course by Gordon West, if you prefer, for $29.95. The book and the four-CD audio course are available for the combo price of $49.95.

Steve Sternitzke, NS5I, has been busy upgrading the General Class Hamstudy software for the new Element 3 pool, and you can purchase this helpful learning aid complete with the General Class Study Guide for only $34.95.

For more information or to order any of these publications, visit the CQ store online at <http://store.cq-amateur-radio.com/storefront.bok> or call 1-800-853-9797.

In the book news corner, also available now is *The Rod Newkirk Collection: From The Pages of the K9YA Telegraph 2004–2009*. This 105-page illustrated book is sold at cost on a non-profit basis through the website at <http://www.k9ya.org/books.htm>.

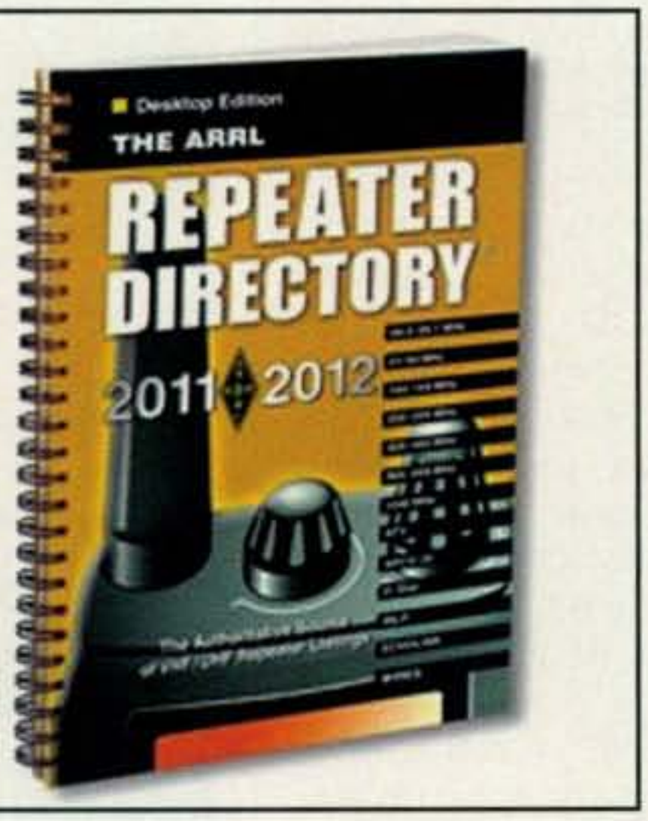


Photo F– The ARRL has released its annual ARRL Repeater Directory, *which is available this year in the usual pocketbook edition and a new spiral-bound book with larger pages and larger print. The League also sells the 2011–2012 edition of* TravelPlus for Repeaters, *which you can install on your computer.*

The book begins with Newkirk's first article for the *Telegraph*, "A QSO with a Crook," about a legendary Chicago gangster and his predilection for Morse Code, and then continues with 44 other articles by W9BRD/VA3ZBB. For more information, visit the website listed above.

Last in the book corner this month, just out from our friends at the ARRL is the 2011–12 edition of the *ARRL Repeater Directory* in pocketbook ($10.95; see photo F) and desktop ($15.95) size, or for your computer try the *TravelPlus for Repeaters* 2011–12 edition on CD ($39.95). All three publications do a great job of giving you an easy way to find repeaters and their frequencies either at home or while away.

Also, for the ham looking to upgrade, the ARRL has just released the seventh edition of its *ARRL General Class License Manual* and the fourth edition of its *General Q&A*. Studying one or the other can help aspiring hams tackle the General Class test, but studied together, these two can turn your doubts about passing the test into quiet confidence. The *General Class License Manual* is priced at $29.95 and includes a CD containing practice exam software. The *Q&A* book includes the latest question pool with answer key for use now through June 30, 2015 and is priced at $17.95.

Also available from the ARRL is the "DXCC List," a compilation of what a ham needs to know and what a ham needs to do to earn his or her DXCC award. This helpful pamphlet is priced at $5.95 and is available, like all of the ARRL books mentioned, on the web at <www.arrl.org>.

That's it for this month's "What's New," and I hope I've passed the test of making *all* of the items mentioned useful in this great hobby of amateur radio we share. Until next month . . .

73, John, WV5J

BY TED MELINOSKY,* K1BV

The Columbus of the Cosmos Award, New SCOTA Awards Series, and more

Earlier this year clubs in Russia and the Ukraine sponsored about ten awards celebrating the 50th anniversary of the first manned space flight, by Yuri Gagarin. The following short-term award from Kazakhstan extends through the end of 2011.

The Columbus of the Cosmos Award

Kazakhstan's Baikonur Cosmodrome has been used as a launching facility for many Russian spacecraft, including the first manned orbital flight by Yuri Gagarin on April 12, 1961. The award requirements are modest, especially for amateur radio operators in North America, and the certificate is not only handsome, but it is free of charge. It is sent as an electronic image only, and you can print a copy on your home PC and printer.

Requirements:

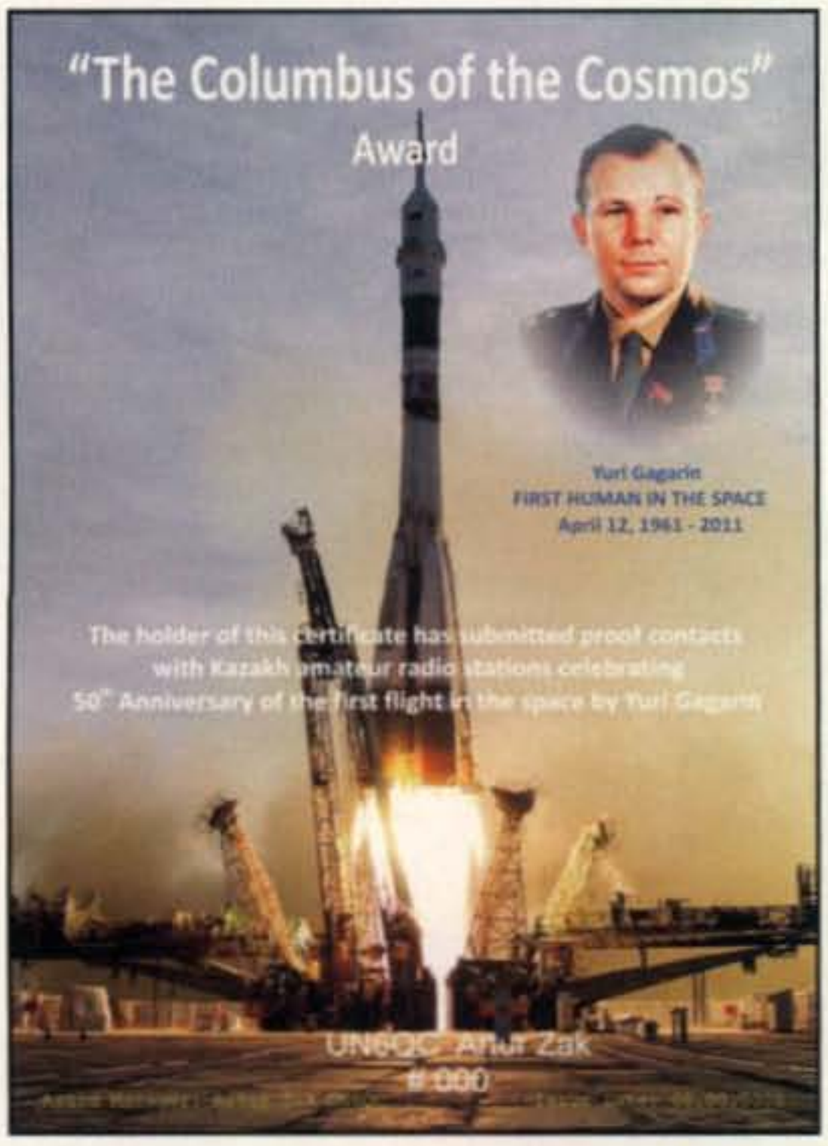
1. Time period: April 1, 2011 to December 31, 2011

2. Points required:

a. Kazakhstan and amateurs from CIS member countries need 16 points.

b. Europe and Asia amateurs need 8 points.

c. All others need 4 points.



Celebrating the 50th anniversary of the first manned space flight, by Yuri Gagarin, this is a short-term award from Kazakhstan.

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

USA-CA Honor Roll

500

UR7GW 3539

1000

W3LL 1814

1500

W3LL 1524

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

3. Point values:

a. QSOs with UP50ASTR and UP1ASTR = 2 points each.

b. UN50SK, UO5OG, UP50G, UP50F, UP50YG, UQ50G, UQ50L, and UP50P, active from April 1, 2011 = 1 point each.

c. UP7G (QTH: Baikonur, active only from April 7–11, 2011) = 1 point.

d. Repeat QSOs are allowed.

e. QSOs may be made on different bands and modes.

f. QSOs for "Yuri Gagarin International Contest 2011" are valid (April 9–10, 2010).

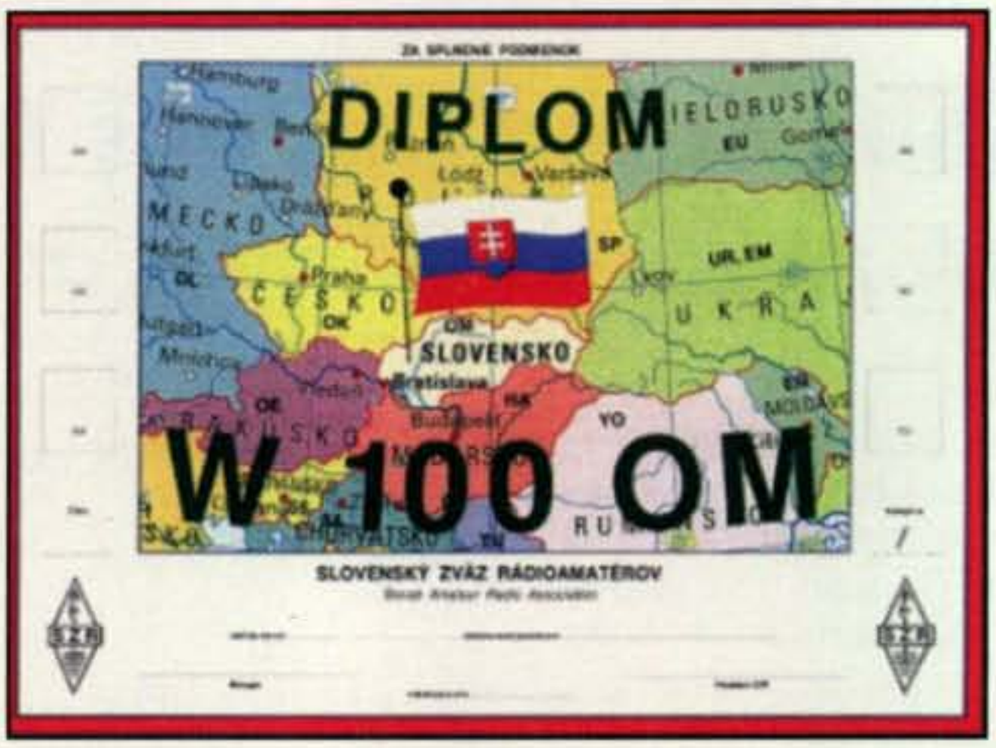
g. Applications must be submitted via e-mail (in MS Word or MS Excel file format) to: <un6qc@yandex.ru>.

Awards from Various Countries

This month's column lists some of the awards that are available for working amateurs of the sponsoring country. There's no figuring province or club membership or much of anything except that your card comes from a particular country. You still need a fairly large QSL collection, although the awards are popular because they can be relatively easily earned. Most of the sponsors of these awards are either a national amateur radio club or offer a series of awards, only one of which is mentioned here. You may want to see what else is listed on each website.

Finnish Amateur Radio League Awards. OH awards are the official certificates of the Finnish Amateur Radio League. All awards are available to amateur radio operators, clubs, and SWLs. Work stations situated in Finland with OH, OHØ, and OJØ prefixes. All bands OK as well as CW, SSB, or/and Digital modes. Contacts after June 10, 1947 count for the awards. For OHA-500, only QSOs worked after January 2, 1967 are valid. Contacts with /AM and /MM stations are not valid. No use of repeaters. Lists of contacts must be listed by callsign area and in alphabetical order—for example OH1A, OH1B,

The Finnish Amateur Radio League offers the OHA-300 award for contacting 300 stations in Finland.



One of the awards of in the Slovak Association of R.A. series is the W-100 OM award for contacts with 100 Slovak stations.

OH2A, etc. Contacts worked with different callsigns and from different QTHs are accepted if applicant is the same. Specify in the application if you want specific band or mode endorsements.

You must have the cards. GCR list is accepted. Fee for each award is 5 Euros, $US8, or 10 IRCs for each award. Apply to: SRAL/Award Manager, P.O. Box 44, FIN-00441 Helsinki, Finland. Internet: <http://sral.fi/en/award.html>.

The Finnish Amateur Radio League also offers OHA-100, 300, 500, 600 paper certificates and plaques for 1000, 2500, and 5000. Refer to its website for particulars. The 300 level is a nice challenge for USA stations.

OHA-300. Finnish stations have to work 300 different Finnish stations such that all the ten call areas are worked on three separate bands. Europeans need to work 150 different stations such that nine call areas are worked. DX stations need to work 75 different stations such that five call areas are worked. The other rules are the same above from the Finnish Amateur Radio League.

Poland's SP-AC Club W-100-SP Award. Work or hear (SWL) 100 different Polish stations. Stickers available for each additional group of 100 up to 3000. Contacts after January 1, 1970 count for the award. SWL OK. All bands and modes OK as well. GCR list accepted. Fee for each award is 5 Euros, $US7, or 10 IRCs. Two IRCs or $US2 for endorsement stickers. Apply to: Arkadiusz Szczyglewski, P.O. Box 6, 59-920 Bogatynia, Poland. Internet: <http://www.spac.com.pl/>.

Slovak Association of R.A. Series. *General Requirements:* All bands and modes except as indicated. No repeater contacts. SWLs may earn award under same conditions as categories shown. Send GCR list and fee of 5 Euros, $US7, or 10 IRCs (endorsements are 2 Euros, $US2. or 2 IRCs) to: Mr. Milan Horvath, OM3CDN, Lopenicka 23, 831 02 Bratislava, Slovakia. (Self-addressed label is welcomed). Internet: <http://www.hamradio.sk/>.

Dipl W-100 OM Award. Contact at least 100 different Slovak stations (OM prefix) after January 1, 1993. SWL OK. Contacts must have been made from the same country. All bands and modes accepted. No use of packet or repeaters. Separate certificates for: CW, SSB, RTTY, and Mixed. Separate certificates issued for each successive 100 contacts (200 up to a maximum of 700). Minimum allowed reports are 33 or 339 both ways.

Unión de Radioaficionados Españoles (U.R.E) Series. *General Requirements:* Send GCR list certified by the award manager of an IARU affiliated society. Fee for each award is 6 Euros, $US6, or 7 IRCs. Endorsements are 6 Euros, $US6, 7 IRC s. A medal is 18 Euros, $US18, or 20 IRCs. SWL OK. Apply to: URE, P.O. Box 220, 28080, Madrid, Spain. Internet: <http://www.ure.es/awards.html>.

100 EA CW Award. 100 points are needed by contacting EA stations using CW after January 1, 1966 as follows:

1. Stations in CQ Zones 14, 15, 16, 20, and 33 need to work 100 EA stations (1 pointt per QSO).

2. Stations in CQ Zones 4, 5, 8, 9, 11, 17, 18, 21, 22, 34, 35, 36, and 37 need 50 EA contacts (2 points per QSO).

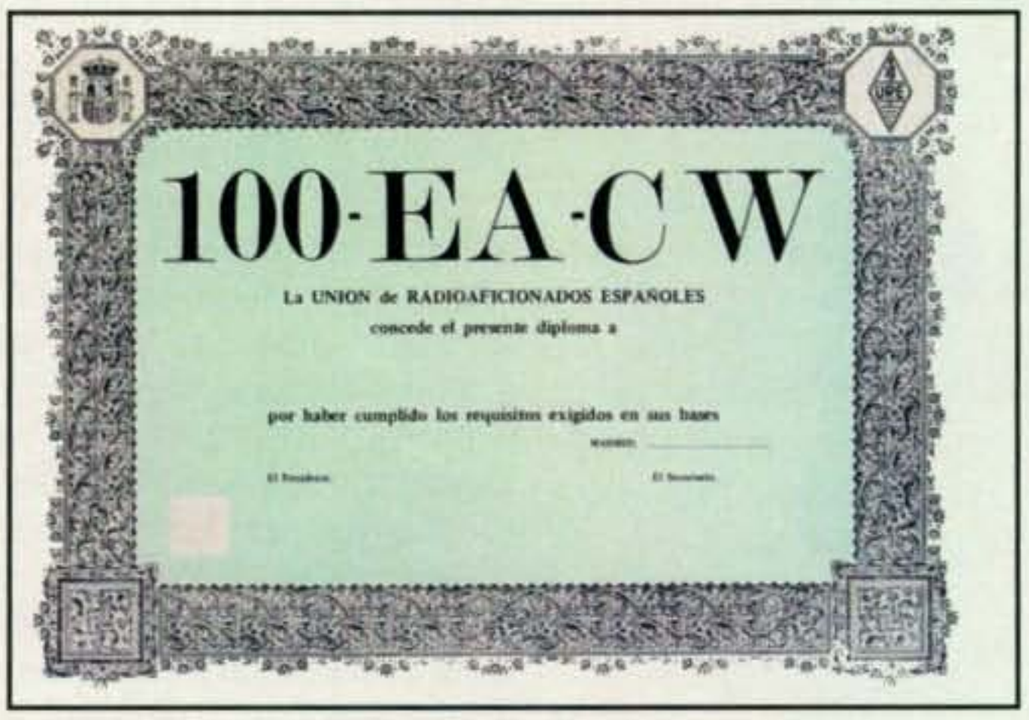
3. Rest of the world needs 25 EA contacts (4 points per QSO).

All applicants need at least 7 call districts and contacts on 3 different bands. The same station may be worked on different bands. A silver medal is awarded for 500 points, a gold medal for 1000.

Radio Club Venezuela Series. *General Requirements:* GCR list accepted. Fee for each award is $US5. Apply to: Radio Venezuelan Club, Commission of Aids and Diplomas, P.O. Box 20285, Caracas 1020-A Venezuela. (It is recommended that Registered Mail be used to send money.) Internet: <http://www.radioclubvenezolano.org/>.

YV100, YV200, YV300. The award is available in 3 levels:

Poland's SP-AC Club W-100-SP Award is issued for contacting 100 different Polish stations.



Unión de Radioaficionados Españoles (U.R.E) offers the 100 EA CW Award for 100 points earned by contacting EA stations using CW only.

This Radio Club Venezuela award is available in 3 levels: YV100, YV200, and YV300.

YV100 requires contact with100 different Venezuelan stations.

YV200 requires contact with 200 different Venezuelan stations.

YV300 requires contact with 300 different Venezuelan stations.

USA-CA Q&A

Q: What is MARAC?

A: MARAC stands for the Mobile Amateur Radio Awards Club, which sponsors a series of awards that provide a way to continue the CQ USA-CA goal of working all USA counties. Many county hunters who enjoy the companionship of fellow hunters and the action of working all counties under different rules are members. There is no official connection between the CQ program and the MARAC program other than the enjoyment of the "chase".

Q: Bob Hallock K7TM earned USA-CA back in 1979 with a "Mixed Modes" endorsement. Now interested in CW, he asks if it would be possible to re-use the old CW contacts and finish off the balance on that mode for a separate award.

A: USA-CA is basically a one-time award. If he is a MARAC member, Bob can earn their USA-CW Award, which requires all counties worked by that mode. Also, I will accept such special requests and issue an endorsement for the original USA-CA award for "All CW." However, no USA-CA official records are maintained for doing it over all again via a different mode. The standard $1.25 endorsement fee applies.

Q: Which states do not issue some kind of an "All Counties" award?

A: I tried to verify all state county awards last year, and was surprised to find that four sponsors have disappeared. Therefore, I'd like to hear from clubs or individuals who would be willing to step up and sponsor awards in the following states: AK, DE, HI, ID, IA, KS, MN, MS, NE, NM, NV, ND, RI, and TN.

Special Announcement

One day before this column was written in early May I received notice from Mike Crownover, AB5EB, of the creation of an awards series for contacting Scout Camps On The Air (SCOTA). The objective is to provide an incentive for amateurs to contact Scouts at summer camps throughout the USA. A series of awards will be available for contacting different camps, with the initial award available for 50 different ones. By the time this issue is in print, we will be well into the camping season, so it's a great way to encourage youth operators and earn another award at the same time. See the website <www.scota.us> for complete rules and lists of Scout camps by state. The certificates are in the design phase, so I could not provide a sample.

We're always on the hunt for new awards to feature in these pages. I invite your e-mails to the address shown on the first page of this column. 73, Ted, K1BV

dx

BY CARL SMITH,* N4AA

Mt. Athos: Monk Apollo and NE8Z

To our friends in the U.S. southern states (Alabama, Mississippi, Georgia, Tennessee and others) I wish to extend my condolences for the hundreds of lost lives in the massive storms and tornadoes in April, as this column is being written in early May. The folks in Alabama, in particular, will be cleaning up for months in the wake of the deadly tornadoes. This was "close to home" for me, as my wife is from Birmingham and has family still living there. Thank God none of them were hurt or affected more than being without power for several days. They had some pretty scary stories to tell of watching first hand as the tornadoes moved across the city. To all of you, may you be able to rebuild what you have lost, cherish what you have, and go on with your lives and in the world of DXing. Many of us stand by to help in any way we can.

Mt. Athos

Rick Dorsch, NE8Z, travels a great deal, mostly to Central and South America. In April, though, Rick made a trip to Europe to a place many DXers would love to visit, or to at least make contact with. Only one station is active from Mt. Athos, Monk Apollo, SV2ASP/A (see the photo of Rick and Monk Apollo below). Here is what Rick had to say upon his return:

"I have just returned from my two-week visit to Greece and pilgramage to Mt. Athos. From the minute that I stepped off the plane in Athens to the minute that I left Greece two weeks later, I was treated with true 'ham hospitality' by SV1JG, SV2ASP/A, and SV2BOH.

"Monk Apollo, SV2ASP/A, greeted me with open arms in Mt. Athos. He spent the entire week making sure that I was comfortable. I participated in all of the church prayer services, and I was also able to work for two long days with the monks cleaning crystal and silver chandelliers in preparation for Easter services. Monk Apollo gave me the keys to his Land Rover and told me to 'go . . . explore . . . take your time.' I was able to visit many of the 20 monasteries on the peninsula.

"I was able to make a donation of various pieces of radio equipment to the monastery, which will allow him to operate from two or more portable hilltop locations in Mt. Athos. SEMDXA *(the SouthEast Michigan DX Association—ed.)* members provided him with a new MFJ Keyer, LDG antenna tuner, and a Heil BM-10 headset. Budd, W3FF, and his son Chris donated a complete Buddipole Antenna system. The ARRL donated eight log books, band-plan charts, and a backpack for the portable-equipment transportation. Monk Apollo never asked for anything. I simply showed up with the gifts for the monastery.

"Hams in Asia will soon be able to work Mt. Athos for a new DXCC entity. Both portable locations have clear 360-degree views to all directions, unlike the Docheiariou Monastery, which has a large mountain blocking signals to and from Asia.

"Father Apollo is a very busy monk. His radio time is limited because of church services that last up to eight hours per day, seven days a week. After services he is busy working on construction projects for the monastery. He is presently active on the radio daily between 1700–2100Z on 160, 30, 17, and 12 meters CW, SSB, and RTTY. He is building a new ham shack which will be ready in a few months. Once he is in this ham QTH, he will install his new 40-foot tubular tower and a Stepp-IR three-element Yagi that was donated to him by Dominik, DL5EBE.

"The most exciting part of my trip was to be able to see precious relics of Saints and the Miracle producing Icons of The Virgin Mary. Mt. Athos is by far one of the most beautiful places on Earth.

"Please view the slide show on the SEMDXA website at: <http://live.semdxa.org/tiki-list_file_gallery.php?galleryId=24>.

"Thank you to everyone who made my pilgrimage to Mt. Athos a complete success."

73, Rick, NE8Z

Monk Apollo, SV2ASP/A, and Rick, NE8Z, on top of the lookout tower at Mt. Athos during Rick's visit in April. (Photo courtesy of NE8Z)

More Notable DXpeditions

In late April, Junior, PY2ZA, arrived on Trindade Island and began operation as **PPØT**. He will be on the island until some time in July. This activity is sponsored and supported by the Cantareira DX Group. Transportation to and from the island is via

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

LDG ELECTRONICS

NEW! LDG Electronics Acquires the S9 Antenna Line of Fiberglass Vertical Antennas!

FREE!

RBA-1:1 Balun or RU-4:1 Unun When You Buy A S9V 43', 31' or 18' Multiband Antenna

Purchase an S9V 43', 31' or 18' and fill out the included form. Mail it to LDG Electronics, and we will send you either a 200 watt balun or unun, your choice!

S9V 43' $199.99

80-6 meters *Fixed Operation*

The S9V 43' is a high-performance lightweight telescoping fiberglass vertical. The best value in high-performance 'tall' verticals!

S9V 31' $99.99

40-6 meters *Fixed or Portable Operation*

S9V 18' $49.99

20-6 meters *Fixed or Portable Operation*

The S9V 31' and 18' are tapered, ultra-lightweight fiberglass vertical antennas. Friction-locking sections and high-tech polymer tube rings allow the antenna to be quickly and safely deployed in practically any environment without tools!

Meters!

radio not included

FT Meter signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu. ***Still Only $49***

FTL Meter For Yaesu FT-857(D) and FT-897(D). Signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu.
Suggested Price $79.99

NEW! M-7600 For IC-7600. S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. The M-7700 and the virtual meter on your radio can work together.
Suggested Price $79.99

S9RP $39.99

Aluminum Radial Plate

Includes 20 sets of stainless steel nuts & bolts

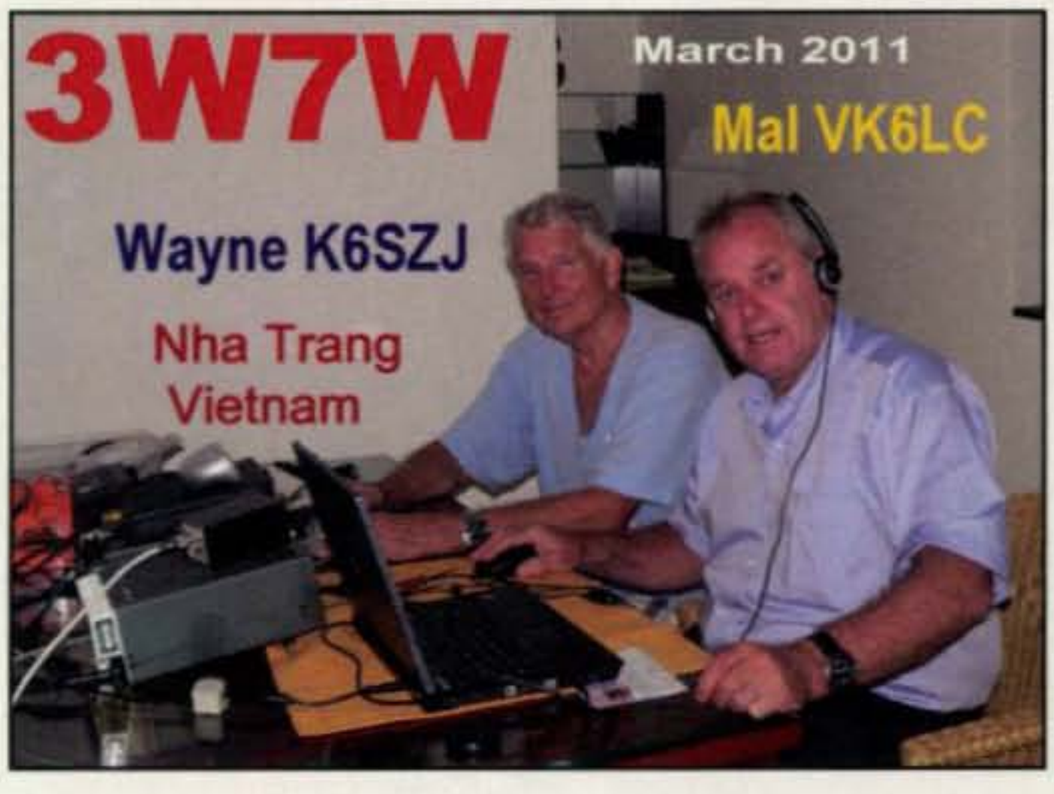
Call or visit your favorite dealer today! **www.ldgelectronics.com** LDG

LDG Electronics, Inc. 1445 Parran Road, St. Leonard, MD 20685 **Phone 410-586-2177 • Fax 410-586-8475**

The three ops who put TO2FH on the air from Mayotte in April. Left to right: Fernando, PY4BZ; Alex, PY2WAS; and Ric, PY2PT. (Photo courtesy of PY2PT)

the Brazilian Navy. Junior is the only operator, but he has been reported as being quite active on most bands using SSB/CW/RTTY/PSK. He also has a 6-meter radio, giving the "Magic Band" folks a shot at a new one there. There is a website for more details and possible on-line logs, depending on reliable internet service, at <http://www.trindade2011.com/>. QSLing will be handled by ED7DX, and there is a note on the website saying all QSOs will be uploaded to LoTW (Logbook of The World).

In April the **T31A** team had transportation delays when the boat failed to



Mal, VK6LC, and Wayne, K6SZJ shown at Nha Trang in Vietnam. Mal operated from other locations in the country in April. (Photo courtesy of VK6LC)

The WPX Program

CW

3265.....OK1DOF 3266.....VE3EK

SSB

3095.....AA4OC

Mixed

2153.....WK3N

Digital

55.....W1/E74OF

CW: 800 VE3EK. 2650 IØNNY. 3800 W4VQ.
SSB: None.
Mixed: 700 WK3N. 800 W1/E74OF. 1650 N3RC. 3000 7K3QPL.
Digital: 750 W1/E74OF.

160 meters: OK1DOF, WD9DZV
80 meters: OK1DOF, WD9DZV
17 meters: WD9DZV

Europe: OK1DOF

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, 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, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, N3XX, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, NN1N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B, KØDEQ, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ, 7K3QPL, EW1CQ., UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UT9FJ, UT4EK, K9UQN, UR5FEO, LY2MM, N3RC, OH3MKH, RA3CQ, UT3IZ, S55SL, RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, TF8GX, S58MU, UX1AA, AB1J, DM3FZN.

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, N3XX, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, NN1N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, UA9CGL, SM6DHU, KØDEQ, DKØPM, SV1EOS, N4GG, UA4RZ, 7K3QPL, EW1CQ, UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UR5FEO, N3RC, UT3IZ RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, S58MU, UX1AA.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage for airmail) to "CQ WPX Awards," P.O. Box 355, New Carlisle, OH 45344 USA. Note: WPX will now accept prefixes/calls which have been confirmed by eQSL.cc. Other electronic QSL confirmation means are not accepted.

*Please Note: The price of the 160, 30, 17, 12, 6, and Digital bars for the Award of Excellence are $6.50 each.

5 Band WAZ

As of May 1, 2011, 841 stations have attained the 200 zone level and 1726 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
NW7E

The top contenders for 5 Band WAZ (zones needed, 80 or 40 meters):

N7US, 199 (18)
N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40)
IK1AOD, 199 (1)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W3NO, 199 (26)
RU3FM, 199 (1)
N3UN, 199 (18)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
N4NX, 199 (26)
EA7GF, 199 (1)
JA5IU, 199 (2)
RU3DX, 199 (6)
N4XR, 199 (27)
HA5AGS, 199 (1)
VE3XN, 199 (26)
N5AW, 199 (17)
JH7CFX, 199 (2)
K7LJ, 199 (37)
RA6AX, 199 (6 on 10m)
RX4HZ, 199 (13)
KØGM, 199 (17)
S58Q, 199 (31)
KQØB, 199 (2 on 10)
K9OW, 199 (34 on 10)
G3NKC, 199 (31 on 10)
K8PT, 199 (26)
N8AA, 199 (23)
IN3ZNR, 199 (1)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
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)
F5NBU, 198 (19, 31)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
W7VJ, 198 (34, 37)
W9RN, 198 (26, 19 on 40)
W5CWQ,198 (17, 18)
I5KKW, 198 (31&23 on 20)
UA4LY, 198 (6&2 on 10)
IK4CIE, 198 (1, 31)
K2FF, 198 (18, 23)
JA7XBG, 198 (2 on 80&10)
JA3GN, 198 (2 on 80&40)

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

WA1PMA (170 zones)
S51DI (170 zones)
UT2UB(170 zones)
WB4YDL (183 zones)
HA2ESM (153 zones)
JK1BSM (197 zones)
VE3EK (154 zones)

5 Band WAZ updates:

N4MM (200 zones)
S53ZZ (193 zones)
HB9ALO (199 zones)
F3SG (196 zones)

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

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, Floyd Gerald, N5FG, P.O. Box 449, Wiggins, MS 39577-0449. 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 Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The CQ DX Field Award Program

Digital

20.....AB1J

Mixed Endorsements

250 .....K2YQC/272 200.....JN3SAC/207

SSB Endorsements

175 .....JN3SAC/177

CW Endorsements

200 .....JN3SAC/202

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Please make all checks payable to the award manager.

The WAZ Program

6 Meters

103 .....UY5ZZ (25 zones)

10 Meters SSB

592.....K2FF

15 Meters SSB

648.....EA3WD

17 Meters SSB

49 .....K8VFV

160 Meters

376.....UX1AA (30 zones) 378.....LA5HE (40 zones)
377 .....RG4F (40 zones)

All Band WAZ

Diamond Jubilee

113 .....OK2CQR 115 .....W6XK
114.....K8AJS 116 .....HB9JW

Mixed

8796 .....N4XYZ 8799 .....M5LRO
8797.....S51DI 8800 .....F2FG
8798.....WØOR 8801.....K6DJ

SSB

5161 .....W4KVS 5163.....YO5QAW
5162 .....VK1GG

CW

627 .....N6UK 629 .....DL8NAV
628 .....VE3EK 630 .....HA7LW

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, Floyd Gerald, N5FG, P.O. Box 449, Wiggins, MS 39577-0449. 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 Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

CQ DX Awards Program

SSB

2566 .....W8ILC 2568 .....N3JON
2867 .....YO4AUL

CW

1122 .....YO4AUL

RTTY

55 .....YO4AUL

SSB Endorsements

340.....OK1MP/341 320.....SV3AQR/326
340 .....OZ3SK/341 275.....N3KV/277
340 .....W8ILC/340 150 .....YO4AUL/156
340.....AB4IQ/340 1.8 MHz.....YO4AUL
330.....N7WR/339 3.5/7 MHz.....YO4AUL

CW Endorsements

340.....OK1MP/340 1.8 MHz.....YO4AUL
150 .....YO4AUL/165 3.5/7 MHz.....YO4AUL

RTTY Endorsements

330.....OK1MP/333

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. As of October 12, we recognize 341 active countries, pending a final decision on the former Netherlands Antilles. Please make all checks payable to the award manager. Photocopies of documentation issued by recognized national Amateur Radio associations that sponsor international awards may be acceptable for CQ DX award credit in lieu of having QSL cards checked. Documentation must list (itemize) countries that have been credited to an applicant. Screen printouts from eQSL.cc that list countries confirmed through their system are also acceptable. Screen printouts listing countries credited to an applicant through an electronic logging system offered by a national Amateur Radio organization also may be acceptable. Contact the CQ DX Award Manager for specific details.

show up at Samoa as scheduled. It arrived some three days late, thus cutting short their operation. Still, they did a good job of keeping the stations on the air through stormy weather. The final tally shows 31,764 QSOs logged up to April 27, 2011 at 1900Z. In case you have not seen it the online, go to <http://www.t31a.com/log.php>.

Also in April, an operation from Mayotte (FH) by a Brazilian team, **TO2FH,** reported making 11,300 QSOs in six days (24 hours) plus one night (on Monday, April 18). QSLs are being handled by PY2PT, *direct* only.

Chris, ZS6RI, is on the air from Zambia as **9J2RI** for the next two years. Chris has been active from several African countries such as Liberia, EL8RI, and Tanzania, 5H9IR. He was also active from Marion Island some years ago as ZS8IR. QSLs are being handled by a U.S. Manager, 9J2RI, Box 333, Bethlehem, GA 30620. Don't forget the SAE and return postage. The bureau route is okay, but that will be very slow.

Nepal, **9N**, is seeing a lot of activity and will see even more as the year goes on. Dov, 4Z4DX, spent some time there in April doing preparatory work for a major operation in November 2011. That will be a multi-national group sponsored by the Mediterraneo DX Club. Operators mentioned are : Dov, 4Z4DX; Ziv, 4Z4OQ; Marco, CE6TBN; Pasquale, IZ8IYX; Gabriele, I2VGW; Sam, F6AML; Antonello, IT9YVO; Mau, IV3ZXQ; Giuliano, IV3RLB; Fabricio,

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

6271 9A2AA	4290 I2PJA	3967 ON4CAS	3105 KC9ARR	2530 YO9HP	2192 N2SS	1593 S55SL	976 KM6HB	662 JA7OXR
6019 K2VV	4250 S53EO	3892 YU7BCD	3104 K9UQN	2511 W6OUL	2084 WD9DZV	1587 N3RC	964 K8ZEE	653 KK3Q
5575 W1CU	4158 N6JV	3773 IK2ILH	3091 9A4W	2499 VE6BF	2001 KØKG	1462 DL4CW	815 KL7FAP	650 N3YZ
5138 9A2NA	4129 S58MU	3770 W9OP	3007 W2WC	2493 I5RFD	1971 W2FKF	1446 DF3JO	781 V51YJ	649 RA9OO
5013 EA2IA	4078 KØDEQ	3712 WB2YQH	3003 JN3SAC	2440 K5UR	1936 AG4W	1337 K6UXO	726 K5IC	644 KWØH
4949 W2FXA	4057 I2MQP	3474 SM6DHU	3001 K1BV	2428 N6QQ	1905 W7CB	1322 AA4FU	725 WK3N	636 ZS2DL
4676 N4NO	4044 KF2O	3354 N8BJQ	2922 OZ1ACB	2338 I2EAY	1862 VE9FX	1269 K5WAF	723 KØDAN	616 DL5JH
4399 YU1AB	4022 N9AF	3305 JH8BOE	2724 W2OO	2292 AB1J	1818 KX1A	1116 YU7FW	707 W1/E74OF	600 IK1RKN
4344 VE3XN	4019 WA5VGI	3207 W9IL	2559 W3LL	2116 AE5B	1655 SV1DPI	982 IWØHOU	682 AI8P	600 KB9OWD

SSB

5122 IØZV	3536 N4NO	2779 YU7BCD	2333 W9IL	2099 KI7AO	1927 AE5B	1612 AG4W	1377 EA3NP	1117 WD9DZV
4584 F6DZU	3323 OE2EGL	2761 KF7RU	2326 CX6BZ	2094 I8LEL	1889 N6QQ	1611 W2ME	1258 N1KC	978 EA7HY
4562 K2VV	3296 KF2O	2711 LU8ESU	2288 W3LL	2093 W2WC	1879 K3IXD	1534 AE9DX	1145 EA3EQT	965 VE6BF
4505 VE1YX	3229 CT1AHU	2689 WA5VGI	2271 SV3AQR	2076 K2XF	1844 YO9HP	1480 AB5C	1089 IZ8FFA	883 WA5UA
4422 OZ5EV	3108 I4CSP	2595 EA1JG	2212 N8BJQ	2072 K5UR	1825 KQ8D	1464 VE7SMP	1083 KX1A	875 K7SAM
4238 I2PJA	3047 KØDEQ	2497 S58MU	2209 IK2QPR	2066 IK2DZN	1758 W6OUL	1463 I2EAY	1042 IZØBNR	758 IV3GOW
4091 9A2NA	3022 I8KCI	2471 I3ZSX	2201 NQ3A	1986 DL8AAV	1719 K9UQN	1410 S55SL	1031 IK8OZP	717 KØDAN
3843 I2MQP	2903 IN3QCI	2451 EA3GHZ	2157 W2OO	1971 W2FKF	1711 JN3SAC	1395 PT7ZT	1022 NW3H	637 K5WAF
3741 EA2IA	2857 4X6DK	2417 SM6DHU	2107 N6FX	1935 SV1EOS	1623 VE9FX	1386 IK4HPU	1012 KU4BP	600 WA2BEV

CW

5464 K9QVB	3750 VE7CNE	2914 SM6DHU	2549 IØNNY	2101 I2MQP	1665 YO9HP	1220 AA4FU	813 VE9FX
5413 WA2HZR	3676 S58MU	2884 I7PXV	2529 IK3GER	2101 W9HR	1548 WD9DZV	1210 DL4CW	794 LA5MDA
5326 K2VV	3598 9A2NA	2723 EA7AZA	2502 JA9CWJ	1983 EA7AAW	1445 EA2CIN	1160 AA5JG	753 F5PBL
4215 N4NO	3483 WA5VGI	2750 N8BJQ	2473 OZ5UR	1979 K5UR	1429 WO3Z	1125 IØWOK	749 AE5B
4182 N6JV	3379 KØDEQ	2721 K9UQN	2434 W9IL	1959 W6OUL	1424 N6QQ	1109 VE1YX	695 S55SL
4024 LZ1XL	3046 YU7BCD	2670 KA7T	2424 W2WC	1917 W2OO	1336 WA2VQV	1102 IT9ELD	629 IV3GOW
3918 VE7DP	3034 KF2O	2632 W2ME	2373 VE6BF	1848 I2EAY	1312 K6UXO	1049 K5WAF	615 JH6JMM
3780 EA2IA	3018 W8IQ	2617 JN3SAC	2342 N6FX	1768 AC5K	1223 KX1A	821 HB9DAX	600 IK2SGV

DIGITAL

1534 W3LL	1133 N6QQ	1056 WD9DZV	894 AG4W	641 KF2O
1303 N8BJQ	1066 YO9HP	1009 GUØSUP	836 KØDEQ	629 W2OO

IZ2KXC; Ant, IZ8CCW; Luis, XE1L; and Adhi, YB3MM. Pilot station is Pino, IZ8BGY. The plan is to operate all HF bands/modes. They also plan to give prizes. See the website for details on this operation at: <http://www.mdxc.org/nepal/topic1/index.html>.

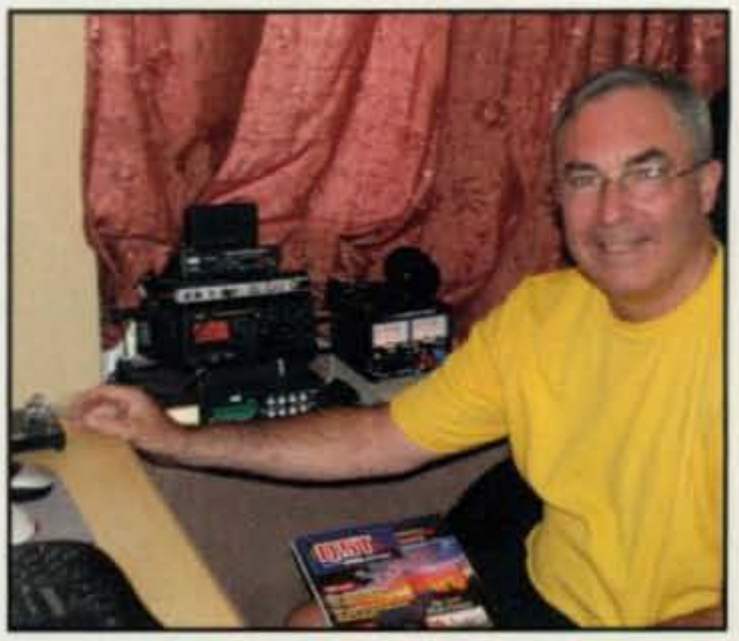
The announced operation from Afghanistan as **T6PSE** was cancelled in early May. Paul, N6PSE, the co-leader for the DXpediton said:

"The Intrepid-DX Group has been planning for many months to conduct a large multi-national DXpedition from Kabul, Afghanistan as T6PSE. We had been receiving advice and assistance from Jim McLaughlin, WA2EWE/T6AF, who was killed in Kabul recently. The Taliban subsequently announced their 'Spring Offensive.' Last night, President Obama announced the killing of Osama Bin Laden. Given these circumstances, and with careful consideration, we have decided to cancel our plans for a DXpedition from Afghanistan. There is just too much uncertainty in the region for us to continue to move forward with our plans. In the next

QSL Information

EB5DZC/EA4 via EB5DZC
EB5KB via EA5KB
ED1PK via EA1URV
ED4RCP via EA4EGA
ED4URE via EA4URE
ED5M via EA5FL
ED5T via EA5ELT
ED5UM/P via EA5UM
ED7TV via EA7TV
ED7TV/P via EA7TV
ED7URF via EA7URF
ED8RC via EA8LE
EE2W via EB2BXL
EE6ANR via EA6ZX
EF7A via EC7ABV
EF7URS via EA7URS
EF8BFH via EA8NQ
EF8M via RD3AF
EF8M via UA3DX
EF8U via EA4URE
EGØAV via EA1EG
EGØXXV via EA4URE
EG1EPC via EC2AMN
EG1FST via EA1EG
EG1OFV via EA1DST
EG1SMP via EA2BT
EG1SPA via EA1EG
EG1SPR via EA1URV
EG2EPC via EC2AMN
EG2FAS via EA2AK
EG2LB via EA3RKR
EG3EN via EA3RKR
EG3FI via EA3NT
EG3GTI via EA3GTI
EG3LB via EA3RKR
EG50URE via EA4URE
EG5G via EA5FL
EG5MB via EA5MB
EG5URJ via EA5FL
EG5WSP via EA5RKB
EG6CIB via EA6JN
EG7CRM via EA7URS
EG7NL via EA7NL
EG7OFM via EA7TV
EG7PL via EA7URP

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>; <http://golist.net/>.)



Silent Key James McLaughlin, WA2EWE/T6AF, who was killed in Afghanistan. (Photo courtesy of Steve, W7VOA)

several weeks, I will refund all donor/sponsor monies that have been given to support our plans."

To follow-up on the mention of Jim, WA2EWE/T6AF, he was one of nine Americans killed in a shooting at the Kabul airport. He was a contractor serving as a flight instructor for Afghan pilots. He had been in the country for some time and was looking forward to operating more. Our sincere condolences to his family and friends.

Top Band Survey

Garry, NI6T, is a Top Band enthusiast. He tells us there is a Top Band Survey available online created by Larry, K8UT, who also put together the AA5AU RTTY online survey. For the Top Band Survey go to: <http://www.topband2011.hamdocs.com>. This survey includes 340 possible contacts, so you can select any and all possible needs. He added that the survey will be available for several months and the results will be published online, hopefully before the fall.

In Closing . . .

For those of us in the Northern Hemisphere, this the time of year to get all that antenna work done that we've been planning during the long, wet winter/spring (at least in the U.S., it's been wet with white stuff and flooding). I know I have some more work to be done on my own outside assets.

Perhaps, finally, I can get a low-noise receiving antenna for 160/80 that I've needed for years. Then there's that 6-meter Yagi that's been gathering dust, and a few spiders in the storage building, that really needs to be in the air.

How about you? Surely you have something outside that needs to be added, or tweaked, right?

Until next time, work on those antennas, enjoy the chase . . . but do Have Fun!

73,Carl, N4AA

CQ DX Field Award Honor Roll

The CQ DX Field Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 175 or more grid fields. Honor Roll lisiting is automatic upon approval of an application for 175 or more grid fields. To remain on the CQ DX Field Award Honor Roll, annual updates are required. Updates must be accompanied by an SASE if confirmation is desired. The fee for endorsement stickers is $1.00 each plus SASE. Please make all checks payable to the Award Manager, Billy F. Williams. Mail all updates to P.O. Box 9673, Jacksonville, FL 32208.

Mixed

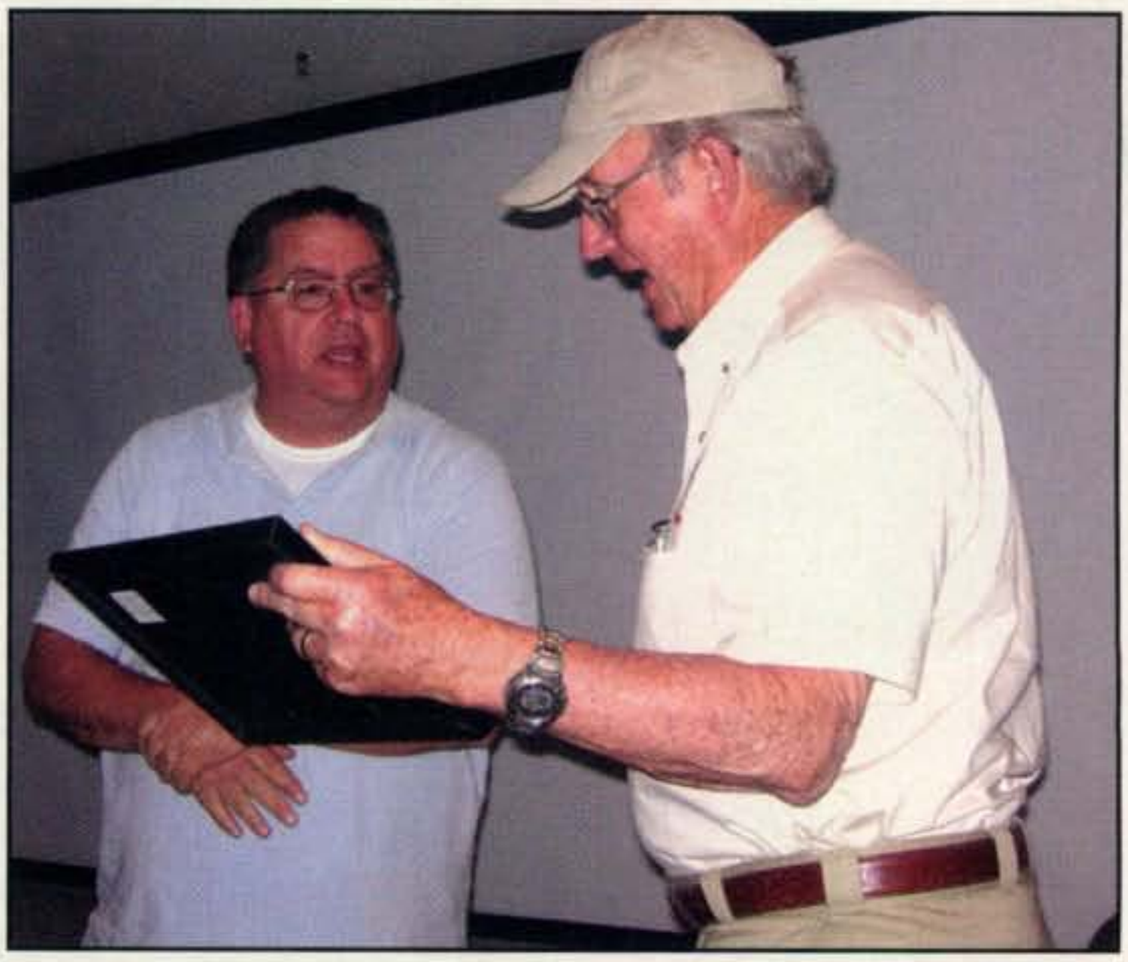
K2TQC....272	K8SIX....215	K8OOK....195
HAØDU....240	W6OAT....212	N4NX....192
VE7IG....239	VE3ZZ....207	ON4CAS....191
W1CU....235	JN3SAC....207	HA9PP....190
VE3XN....234	HA5WA....206	BA4DW....188
HA5AGS....228	F6HMJ....206	HB9DDZ....188
N8PR....223	KF8UN....205	IV3GOW....184
9A5CY....223	OK1AOV....205	K2SHZ....182
HA1RW....220	RW4NH....203	K1NU....180
HA1AG....218	N4MM....202	W5ODD....177
KØDEQ....216	W4UM....202	NØFW....176

SSB

W1CU....213	VE7SMP....190	JN3SAC....177
W4ABW....202	N4MM....186	NØFW....176
KØDEQ....192	W4UM....184	DL3DXX....175

CW

DL6KVA....233	JN3SAC....202	N4MM....179
W1CU....229	W4UM....197	N4NX....177
DL2DXA....209	OK1AOV....196	N7WO....175
KØDEQ....207	HB9DZZ....186	
DL3DXX....203	OK2PO....184	



Curt, K7CU (on the left), formerly lived in Atlanta and met Dave, K4SS, at the SEDXC South Eastern DX Club activity. Dave was headed to Visalia in April, so Curt asked him to stop off and make a presentation on the PJ6A DXpedition to the Utah DX Association. Here Dave is presented with an Honorary Membership certificate in the UDXA. (Photo courtesy of Curt, K7CU)

contesting

GEORGE TRANOS,* N2GA

Suggestions to Combat the Summer Doldrums

July's Contesting Tip

Check out the following website, which allows playback of contest exchanges: <http://gw4ble.dxlist.co.uk/>. Andy, MW0MWZ, performed the behind-the-scenes web design and Steve, GW4BLE, provided the raw-data contest recordings and a few photos. The recordings are from the past eight years (2004 to date), covering a selection of both domestic and international contests records from GW4BLE, GW7X, or MW5A. The screen layout differs for PC, tablet, and mobile phone users, so feel free to experiment on different platforms. Playback duration time (other than the default) is adjustable from the front-page menu. Try it to see what you sound like on the other side of the QSO!

It's a lot easier to stay inside when the weather outside is frightful. Wintertime contesting makes good use of your time, as you probably don't want to go out anyway. Instead of huddling by a crackling fire, many hams instead choose to spend their time by the warm glow of their transceiver's tubes (or transistors). Summer is a different story, though. For the active contester, it is a challenge to fight the pull of outdoor activities and stay involved in radio contesting.

IARU HF Championship Contest

One way to stay busy is to target specific major events and focus your energy on them. The International Amateur Radio Union (IARU) HF Championship is probably the largest summer contest. It is the second full weekend in July and this year will be July 9 and 10. The contest starts at 1200 UTC Saturday and ends 1200 UTC Sunday. Single- and multi-operator stations may operate the entire 24-hour period. This contest garners a lot of activity, with stations from most of the world participating.

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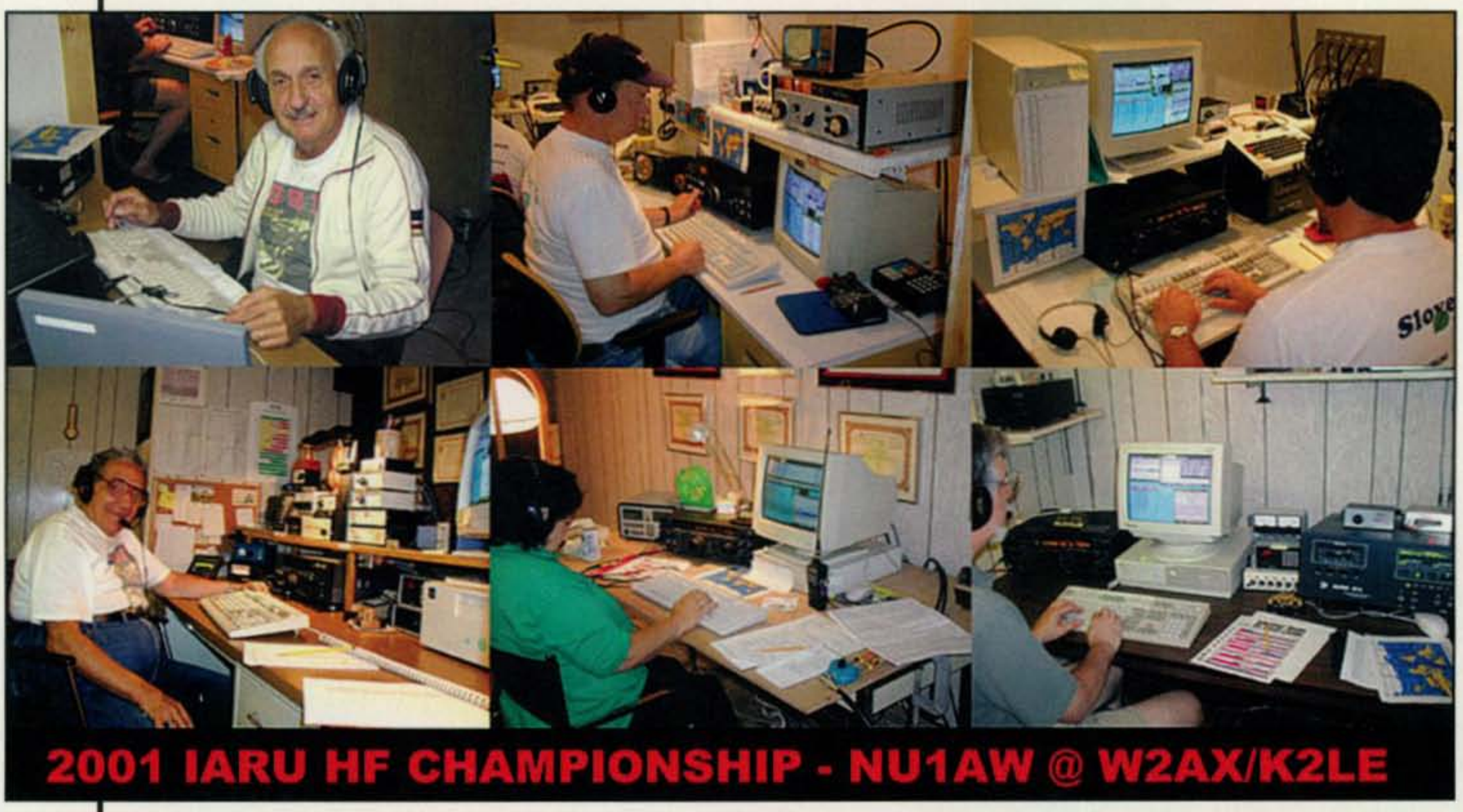
Calendar of Events

All year	**CQ DX Marathon**
June 25–26	ARRL Field Day
June 25–26	King of Spain SSB Contest
June 25–26	Marconi Memorial HF Contest
July 1	RAC Canada Day Contest
July 2–3	DL-DX RTTY Contest
July 2–3	Venezuelan Ind. Day Contest
July 9–10	IARU HF Championship
July 16–17	**CQ WW VHF Contest**
July 16–17	North American RTTY QSO Party
July 30–31	RSGB IOTA Contest
Aug. 6	European HF Championship
Aug. 7	SARL HF Phone Contest
Aug. 6–7	North American CW QSO Party
Aug. 6–7	ARRL UHF Contest

Basic information on many of these events can be found in *WorldRadio Online*'s Contest Corner at <www.worldradiomagazine.com>. For complete information on any of these contests, also see their respective sponsors' web pages.



IARU Headquarters station NU1AW in the 2001 IARU HF Championship Contest. This operation took place from the Vermont QTH of Andy Bodoni, K2LE, and Larry Amodeo, W2AX.

One twist in this contest is that multipliers are ITU zones and IARU member society headquarters (HQ) stations per band. Note that this is a multimode contest. Voice (SSB) and Morse Code (CW) operation are both allowed. Entry categories for single operators are SSB only, CW only, and Mixed Mode. Multiple-operator, single-transmitter stations are mixed mode only and have band-change limitations (and must remain on a single band and mode for 10 minutes before changing). IARU member society HQ stations have unique rules, and the competition among them can be fierce.

IARU member society HQ stations send signal report and official IARU member society abbreviation. IARU International Secretariat club station NU1AW counts as an HQ station. Members of the IARU Administrative Council and the three IARU regional Executive committees send "AC," "R1," "R2," and "R3" as appropriate. All others send signal report and ITU zone. *(Note: ITU zones are different from CQ zones.—ed.)*

Contacts within your own ITU zone, as well as QSOs with any IARU member society HQ station or IARU official (counting as the special multiplier), count one point each. Contacts with a station in the same ITU zone but on a different continent count one point. Contacts within your continent (but different ITU zone) count three points. Contacts with a different continent and IARU zone count five points. The challenge for a single operator is to maximize his or her multiplier total while increasing the QSO and points total.

One of the unique features of this contest is that it exactly 24 hours long. This means you get one shot for propagation to a specific area of the world on a given band. Try to study the propagation predictions and make a band plan in advance of the contest. To improve your score, have a strategy to maximize your QSO rate by being on the highest open band at any given time. You probably will not get another chance to use that frequency during the contest, so make best use of it when it is open and can provide the best rate.

World Radiosport Team Championship Update

Traditionally, the IARU HF Championship has also been the contest used by the World Radiosport Team Championship (WRTC) competitors. The WRTC represents a large gathering of the world's best contesters—as selected regionally—coming from many countries and all continents in the spirit of competition, using the same playing field and allowing pure skills to determine world champions in two-man teams, 24-hour nonstop competition. WRTC was last held in 2010 in the Domodedovo region south of Moscow, Russia. Previous WRTCs have been held in Seattle (1990), San Francisco (1996), Slovenia (2000), Finland (2002), and Brazil (2006). Like the Olympics, competitors must qualify to compete and represent their country. The next WRTC will be in 2014 in New England, USA.

With three years to go before WRTC 2014, operators are participating in qualifying events. The 2011 and 2012 IARU HF Championship contests are two of 55 events in which operators may compete to accumulate a ranking. Up to 12 events may be chosen to compute this ranking. The operators with the highest scores will be chosen among those who submit

applications to be team leaders. See <http://wrtc2014.org/team-selection/> for more information on the team selection criteria.

Other July Events

The LZ HF Field Competition will be held July 1 and 2, 2011, at the Pirin Golf and Country Club, a 5-star resort, nestled in the beautiful Razlog-Bansko valley near the well-known ski resort Bansko, Bulgaria. According to Krassy, K1LZ, "This is going to be a QRP WRTC and the best of this is that all of you are my friends! We will celebrate our friendship and have a good time."

For the first time this year there will be foreign participants in this contest. The organizers' intentions are to turn this competition into an annual international event. This will be a four-hour QRP operating event, held on July 2 from 1100 to 1459 local (Bulgarian) time. Each competitor participates with his/her own transceiver with an output power up to 100 watts and power supply (battery or generator). All competitors must use RF power reducers and antennas supplied by the company ACOM Ltd., which will be distributed among the competitors before the beginning of the contest. Similar to WRTC, the competitors will be assigned callsigns and open the envelope containing their call just 15 minutes prior to the beginning of the contest. The contest will be held on only one band and mode —80 meters CW. A new QSO with the same station may be made after the announcement by the referee's period (20, 25, or 30 minutes).

There are currently over 80 competitors signed up for this event, including over 30 foreign (non-Bulgarian) participants. More information is available on the web at <http://www.bfra.org/qrp/html/home.html>.

Antenna Maintenance Season

Other tasks such as antenna installation and maintenance, which normally are put off until warmer temperatures, should be done now while the weather cooperates. Now is a great time to start thinking about the coming fall and winter contest season.

With the resurgence of sunspots, the high bands will be active again. Ten and 15 meters will see renewed activity. Think about adding antennas for those bands, maybe fixed in the direction of major activity. For those of us here in the northeast U.S., our major population targets are Europe, Japan, and South America. A small Yagi fixed south can yield a quick QSO without turning your larger antenna array which may be pointed toward Europe. Think about side-mounting or stacking small beams on your existing tower to add antenna versatility.

Don't put off checking dipoles, verticals, rotators, and coax. Replace older coax and rotator cable runs. Check to make sure any wire antennas are not fraying and are properly anchored and supported. It's a lot easier to do this work now instead of when snow and ice are on the ground and cold temperatures preclude fixing that wire that's fallen down.

Warmer weather provides the contester with lots of things to do. It's easy to get sidetracked by other non-radio pursuits; however, try to take advantage of this weather for radio projects that cannot be done in the cold. Make use of your time wisely and get ready for the upcoming prime contesting season. Keep your contesting skills in shape by taking part in some of the fun events going on during the summer months. You won't be sorry come fall.

73, George, N2GA

BY JOE LYNCH,* N6CL

The Sunspots are Coming . . .

The latest word from NOAA's Solar Cycle 24 Prediction Panel, which is part of the Space Weather Prediction Center (SWPC), is now more than two years old. The panel includes members from NOAA, NASA, ISES, and other U.S. and international representatives. Even though its prediction is more than two years old, it is the prediction that the panel is sticking with for the moment. On May 8, 2009 the panel issued the following statement:

The Solar Cycle 24 Prediction Panel has reached a consensus decision on the prediction of the next solar cycle (Cycle 24). First, the panel has agreed that solar minimum occurred in December 2008. This still qualifies as a prediction, since the smoothed sunspot number is only valid through September 2008. The panel has decided that the next solar cycle will be below average in intensity, with a maximum sunspot number of 90. Given the predicted date of solar minimum and the predicted maximum intensity, solar maximum is now expected to occur in May 2013. Note, this is a consensus opinion, not a unanimous decision. A supermajority of the panel did agree to this prediction. (Source: <http://www.swpc.noaa.gov/SolarCycle/SC24/index.html>)

Even though the NASA-NOAA prognosticators predict abysmal sunspot activity, there is always hope for the dedicated "Magic Band" enthusiast. What follows is information on what are *F2* and transequatorial (TE) propagation modes, which occur during peaks in the sunspot cycle.

For more information on the predictions for Cycle 24, see Tomas Hood, NW7US's "Propagation" column elsewhere in this issue.

F2 Propagation

The *F*-layer is the ionosphere's highest layer and is found between 100 and 300 miles above the Earth's surface. During the peak of the sunspot cycle this layer receives ionization that will support refraction of wavelengths into the 6-meter band. Worldwide propagation is possible during the years surrounding the peak of the sunspot cycle.

Six-meter enthusiasts plan for these times in order to complete the necessary contacts for achieving DXCC. In fact, the peak of Cycle 22 produced the first recipients of this award and boosted many others within tantalizingly close proximity of their goal. Several operators who didn't quite make it during Cycle 22 did so during the peak of Cycle 23.

When the solar cycle is at its minimum, little *F*-layer propagation occurs. In the past, many operators have actually disassembled their 6-meter stations and stored them until the peak of the next sunspot cycle.

What can you expect from the next sunspot cycle? Peter Taylor, in his book *Observing the Sun,*[1] examines recent cycles and compares the even-numbered with the odd-numbered cycles. Taylor concludes that even-numbered cycles have longer extended maxima than odd-numbered cycles. However, he also points out that recent odd-numbered cycles have been higher than their counterpart even-numbered cycles.

e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

July 1	New Moon, Partial Eclipse of the Sun
July 7	Moon apogee
July 8	First quarter Moon
July 15	Full Moon
July 17–18	CQ WW VHF Contest (See text for details)
July 21	Moon apogee
July 23	Last quarter Moon
July 28	*Southern Delta Aquariids* meteor shower.
July 29–30	Central States VHF Society Conference (See text for details)
July 30	New Moon

What About *F2* on Other VHF+ Frequencies?

The maximum usable frequency (MUF) of *F*-layer propagation rarely reaches 70 MHz. Only on very rare occasions have European amateurs, who have the 70-MHz ham band, made contact with stations via this form of propagation.

In fact, the 6-meter ham band was actually an FCC compromise that recognized the rarity of this form of propagation. Before World War II, amateurs in the United States had the use of the 5-meter band, which existed between 56 and 60 MHz. As a way of allocating frequencies for the then-new television services, the FCC set aside certain blocks of 6 MHz for the lower channels. Originally, the Commission was going to give the amateurs a band between 44 and 48 MHz. However, intense lobbying by the ARRL convinced the FCC that there was sufficient occurrence of both sporadic-*E* and *F2* propagation so the attraction of the band "...would possess small novelty and much of the eager interest of amateur observers would disappear."[2] Owing to the League's urging, the FCC created a channel 1 beginning at 44 MHz, and then granted amateurs the 6-meter band between 50 and 54 MHz. The allocations continued with the assignment of channel 2 between 54 and 60 MHz. Eventually, the FCC abandoned the channel 1 assignment and later subdivided it for use by fixed and mobile services. Such services serve as beacons today, alerting 6-meter operators to possible impending openings on the band.

While most *F2* propagation disappears during sunspot lulls, some signals occasionally are disseminated by this mode. No one knows why; it just happens!

TE Propagation

Transequatorialpropagation is related to *F2* propagation in that its signal is refracted by the *F*-layer. TE also seems to occur most often during the peak of a sunspot cycle. Additionally, TE propagation seems to occur more often in the spring, during the late afternoon or evening hours.

To take advantage of TE propagation, both you and the station you're trying to work must each be the same distance from the equator. Unfortunately, this rules out all but the southern tips of Florida and Texas and the southern West Coast of the continental United States. Nevertheless, it does include stations on the opposite end of South America, Southern Africa, and in the Pacific.

Although it has yet to be reported, propagation up to 432 MHz is possible. With sporadic-*E* link-ups, occasional contacts to more northern QTHs on the continent can occur on 6 meters. Rarer are meteor-burst links with TE propagation. One such event is believed to be the cause of the contact that Larry Lambert, NØLL, had with Nob, VR6JJ. Larry reported that he could barely hear Nob, until all of a sudden he burst through. They quickly completed the contact, and then Nob was gone. Larry attributes that sudden burst to ionization caused by a meteor burn.

How does TE Propagation Work?

Most of the time the southbound signal travels outward to an *F2*-layer north of the equator, is refracted back to Earth at the equator, bounces outward to another *F2*-layer south of the equator, and is finally refracted back to Earth. However, sometimes these two layers break up into ionized clouds and traverse the equator. When this happens, the signal appears to become trapped below these clouds and is continuously refracted until it lands on the surface at the distant location. It is this breakup, which seems to be what occurs during an auroral event, that creates the transequatorial opening on 6 meters.

Meteor Showers

This month there are a number of minor showers. The *Piscis Austrinids* is expected to peak July 28. The *δ-Aquariids* is a southern latitude shower. It has produced in excess of 20 meteors per hour in the past. Its predicted peak is around July 30. The *α-Capricornids* also is expected to peak on July 30.

For more information on the above meteor-shower predictions see NW7US's "Propagation" column. Also visit the International Meteor Organization's website: <http://www.imo.net/calendar/2011>.

Current Contest

CQWW VHF Contest: This year's CQ WW VHF Contest will be held from 1800 UTC July 17 to 2100 UTC July 18. For rules of the contest see the June issue of *CQ*, go to the *CQ* website (www.cq-amateur-radio.com), or see the contest website <http://www.cqww-vhf.com>.

Current Conference

This year's **Central States VHF Society Conference** will be held July 29–30, in Irving, Texas, at the Westin DFW Hotel, which is located at 4545 W. John Carpenter Freeway, Irving, TX 75603. For details, see the society's URL: <http://www.csvhfs.org/>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, e-mail, etc., please contact the person listed with the announcement. The following conference organizer has announced a call for papers for its forthcoming conference:

Technical papers are solicited for presentation at the **30th Annual ARRL and TAPR Digital Communications Conference** to be held September 16–18 in Baltimore, Maryland, and publication in the conference *Proceedings.* Presentation at the conference is not required for publication. Submission of papers is due by July 31, 2011 and should be sent to: Maty Weinberg, KB1EIB, ARRL, 225 Main Street, Newington, CT 06111, or via the internet to <maty@arrl.org>. For suitable topics and submission guidelines also contact Maty via e-mail; check <http://www.arrl.org>, as well.

PZ5RA Correction

The information in my June column concerning PZ5RA and his QSLing with U.S. amateurs was incorrect. He is having no problems with QSLing with U.S. amateurs. Additionally, he uses LoTW for confirming QSOs. My apologies go to Ramon for the incorrect information.

And Finally . . .

This month I covered *F2* and TE propagation modes. Part of my editorial in the Spring 2011 issue of *CQ VHF* magazine covered 6-meter EME communications. I wrote about Lance Collister, W7GJ, and his efforts to use Joe Taylor's WSJT software program to make heretofore impossible EME contacts. Next month Lance is going to Samoa, where he will operate as 5WØGJ. In honor of his latest DXpedition, next month I plan on devoting a significant portion of this column to EME operating—not as an alternative to 6-meter doldrums, but rather as the primary mode of communications, particularly for the lower power stations.

In the meantime, I look forward to receiving your ongoing input for this, your column. Until next month...

73 de Joe, N6CL

Notes

1. Peter O. Taylor, *Observing the Sun,* Cambridge University Press, 1991. It's interesting to note that indirect correlation to this prediction existed some 17 years earlier. In a phone conversation I had with Dr. John A. (Jack) Eddy, the subject of my July 1976 *QST* article on the Maunder Minimum, he expressed the feeling that we were headed for another Grand Maximum of a long-term solar cycle that stretches into 200–300 years in periodicity and that this maximum would probably occur within the 21st century.

2. Excerpt from a brief that appeared in August 1945 *QST*, page 12.

Don't Believe the Pessimistic Forecasts!

BY TOMAS HOOD,* NW7US

propagation

A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, April 2011: 54
Twelve-month smoothed, October 2010: 23

10.7 cm Flux
Observed Monthly, April 2011: 113
Twelve-month smoothed, October 2010: 85

***Ap* Index**
Observed Monthly, April 2011: 9
Twelve-month smoothed, October 2010: 9

One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, April 2010: 8
Twelve-month smoothed, October 2009: 7

10.7 cm Flux
Observed Monthly, April 2010: 76
Twelve-month smoothed, October 2009: 74

***Ap* Index**
Observed Monthly, April 2010: 10
Twelve-month smoothed, October 2009: 4

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 2011

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-10, 12-19, 25-31	A	A	B	C
High Normal: 11, 20, 22-24	A	B	C	C-D
Low Normal: 21	B	C-B	C-D	D-E
Below Normal: N/A	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing in *The New Shortwave Propagation Handbook* by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

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 2 will be good (B) on July 1st through the 10th, fair (C) on the 11th, poor (D) on the 21st, etc.

3. As an alternative, the Last-Minute Forecast may be used as a general guide to space weather and geomagnetic conditions through the month. When conditions are Above Normal, for example, the geomagnetic field should be quiet and space weather should be mild. On the other hand, days marked as Disturbed will be riddled with geomagnetic storms. Propagation of radio signals in the HF spectrum will be affected by these conditions. In general, when conditions are High Normal to Above Normal, signals will be more reliable on a given path, when the path is ionospherically supported.

Faithful readers of this column know that the professionals who forecast sunspot cycles have given us a number of outlooks, each of which have been incorrect. Using various methods to determine the length of the sunspot cycle minimum, and when the new Cycle 24 would begin, dates were authoritatively published, and then came and went. This, of course, is not a new development; with each solar cycle a flurry of forecasting activity occurs in the solar science community. Also, with each solar cycle, solar scientists introduce new data and more enlightened models of the Sun. Yet, invariably, each new forecast fails.

And yet new forecasts are being published for sunspot Cycle 24: when will this cycle peak, and how high will the smoothed sunspot count really reach? Those who know claim that their models are highly accurate, more so than ever before: We should know that this cycle will be rather weak—the weakest in 200 years; no, that's been revised recently to the weakest in the last century. The forecasts all claim that we'll see a peak within two years, and that the peak will be so meager that 6 meters will never see worldwide DX by way of *F*-layer propagation mode! This is so, after all, because the forecast is based on the best of the scientific models.

I want to caution the reader, as in past issues of this column, to throw a bit of salt in with these prognostications. When have these authoritative declarations ever come to pass? In the amateur radio arena, one adage holds true: You cannot work them if you are not on the air. With such a negative forecast, we might as well turn off our radios and go play solitaire on our expensive home computers. Bah!

This column has stated that this sunspot cycle will start late, but have a rapid rise. Look at last month's charts, and note the incredible rise in activity. Notice that last month's observed monthly sunspot number of 56.2 is the highest since November 2003, when it was 67.3. That's a long period between two cycles, but what is more newsworthy is the sharp increase since February 2011.

This month's numbers might be slightly lower, but that is normal. We're going to see other months in the near future with very sharp increases in activity. The rise will be steep and rapid. The Sun is not predictable and will not follow a smoothed statistical line on some scientist's monthly chart. If anything, this particular sunspot cycle is breaking all of the rules, proving that we know very little, indeed, about our amazing star. We are in for a lot of excitement in the coming years.

July Propagation

In the Northern Hemisphere, the long-range *F*-region propagation of radio waves in the highest shortwave frequencies (HF) will be poor, except on

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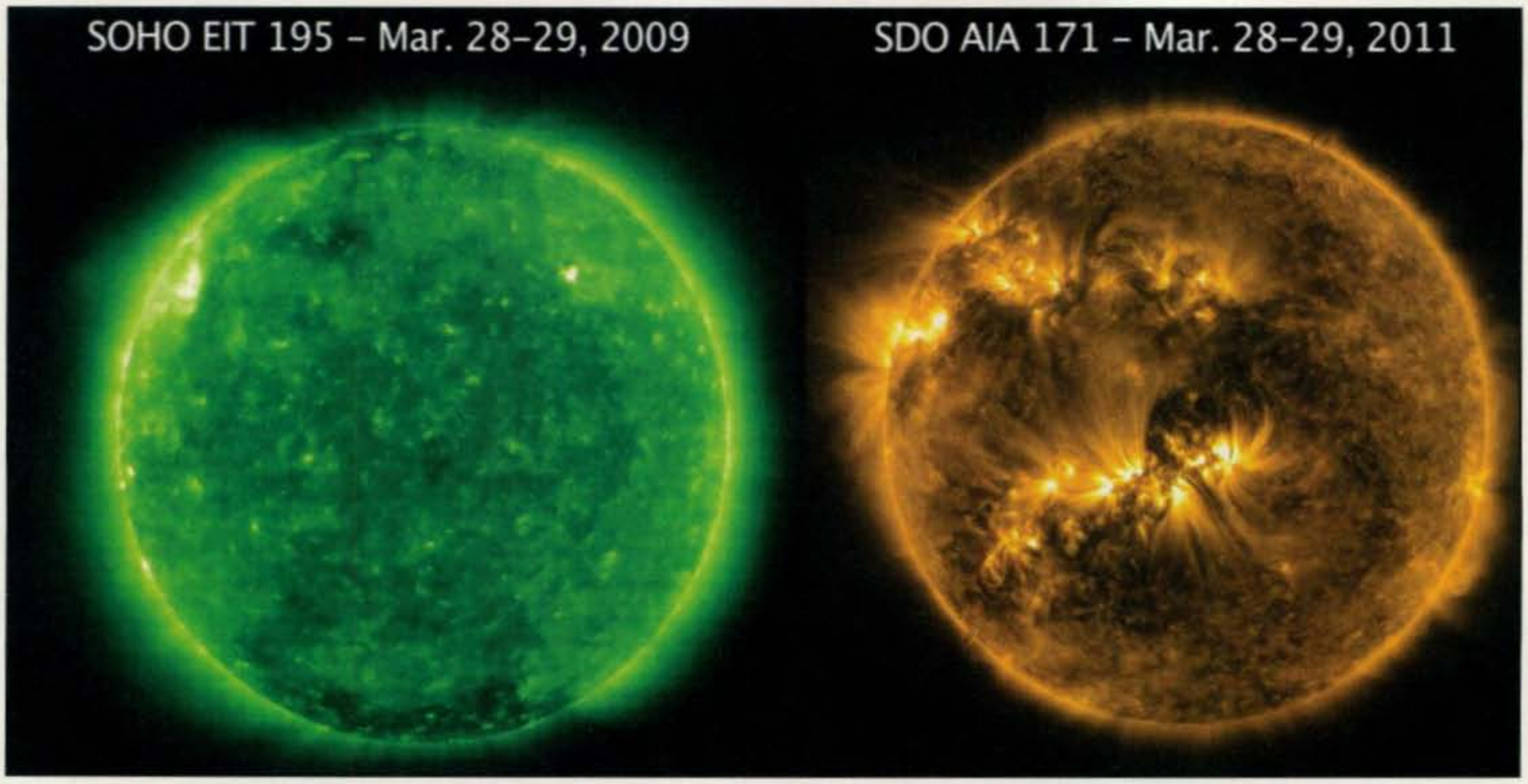


Fig. 1– Then and now, a side-by-side comparison of the Sun from two years ago (left, from SOHO) to the present (right, from Solar Dynamics Observatory) dramatically illustrates just how active the Sun has become (March 28–29, 2011). Viewed in two similar wavelengths of extreme ultraviolet light, the Sun now sports numerous active regions that appear as lighter areas capable of producing solar storms but also provide the energy that ionizes the layers of the ionosphere that help propagate our amateur radio signals on shortwave frequencies. Two years ago the Sun was in a very quiet period (solar minimum). (Source: NASA/SOHO/SDO)

paths crossing the equator, running mostly north/south. At the same time, July is generally the month in which sporadic-*E* (*Es*) ionization is most intense. This should result in a considerable increase in short-skip openings on almost all of the HF amateur bands, and on 6 and 2 meters as well.

Twenty meters should continue to be the best band for DX propagation during the month. The band is expected to remain open to one area of the world or another from sunrise through the early evening. Peak conditions are expected for a few hours after local sunrise and again during the late afternoon and early evening, when the band should open in almost all directions. In early afternoon through midnight, expect 20-meter openings first toward South America, then toward the South Pacific, and then to Oceania. During the best days of the month (when we have the most sunspots) expect additional paths to open, starting with trans-polar paths into Europe and elsewhere.

Considerably fewer DX openings are expected on 15 meters and very few, if any, on 10 meters during July. This is due to a combination of changing seasonal conditions and the current level of solar activity. During this level of sunspot activity, 15 meters should occasionally open towards the south. Look for some short-skip openings into the Caribbean area and Central America as early as 10 AM, with a peak expected to all areas of Latin America between 3 and 5 PM local daylight time. When conditions are better (more sunspots), the band may also open to Africa during the late afternoon from the eastern half of the country, and to Australasia and the South Pacific area during the late afternoon and early evening from the western half of the country. Seventeen meters will act somewhat the same as 15, but openings will be tend to be longer, and signals perhaps stronger and more stable.

Don't expect much DX on 10 and 12 meters during July, except by way of short-skip openings toward the Caribbean and possibly Central America as a result of sporadic-*E* ionization. If we get a high number of sunspots (or more specifically, when the 10.7-cm radio flux exceeds 150), an occasional opening deeper into South America may be possible, especially during the afternoon hours.

Nighttime openings into many areas of the world are possible on 20, 30, and 40 meters. However, seasonally high static levels may often make DX reception difficult on 40. High static levels are also expected to result in somewhat poorer DX conditions on 80 meters, although some long-distance openings are forecast during the hours of darkness. One-sixty meters is virtually shut down due to the high static levels of summer. The best bet for 40-, 80-, and 160-meter DX openings is an hour or two before midnight for openings toward the north and east, and just before local sunrise for openings toward the south and west.

VHF Conditions

Yes, July is one of the two summer months when we expect hot short-skip, sporadic-*E* propagation. This is a yearly phenomenon, and many radio hobbyists focus most of their efforts on nothing but *Es* activity.

Short-skip sporadic-*E* propagation over distances ranging between approximately 600 and 1300 miles is typical on 6 meters and twice that on 10 meters. Openings may also be possible on 2 meters during periods of intense *Es* ionization with stations up to 1300 miles away. While *Es* openings can take place at just about any time of the day or night, statistics indicate that conditions should peak for a few hours before noon and again during the late after-

noon and early evening. During July you can expect 10- and 6-meter sporadic-*E* on at least three out of every four days. Openings may last from a few minutes up to hours.

DX enthusiasts know that during the summer months FM radio stations between 88 and 108 MHz are regularly propagated long distances via *Es* propagation. The first sign that a sporadic-*E* event is starting is by hearing FM stations from distant cities popping up on the local scene that normally are not heard. Some of these stations can come in so strongly as to override a local station, capturing the channel! As the ionization level increases, the FM band becomes filled with signals. During *Es* propagation signals can abruptly appear or disappear. Signals are usually very strong during *Es*. Ordinary "rabbit ears" are adequate for *Es* reception and are preferred by some FM DXers because they can be sharply directional.

While there are various contributing factors and influences that are known to or at least are thought to create sporadic-*E*, one strong theory (supported by good science and observational data) suggests that *Es* is correlated with the presence of an excess of meteor dust in the *E*-layer. This dust is pushed into dense patches on the outside of jetstream wind eddies. Several studies over the past 30 years have confirmed the presence in *Es* clouds of dense patches of meteoric comet dust. This idea is further supported by looking at

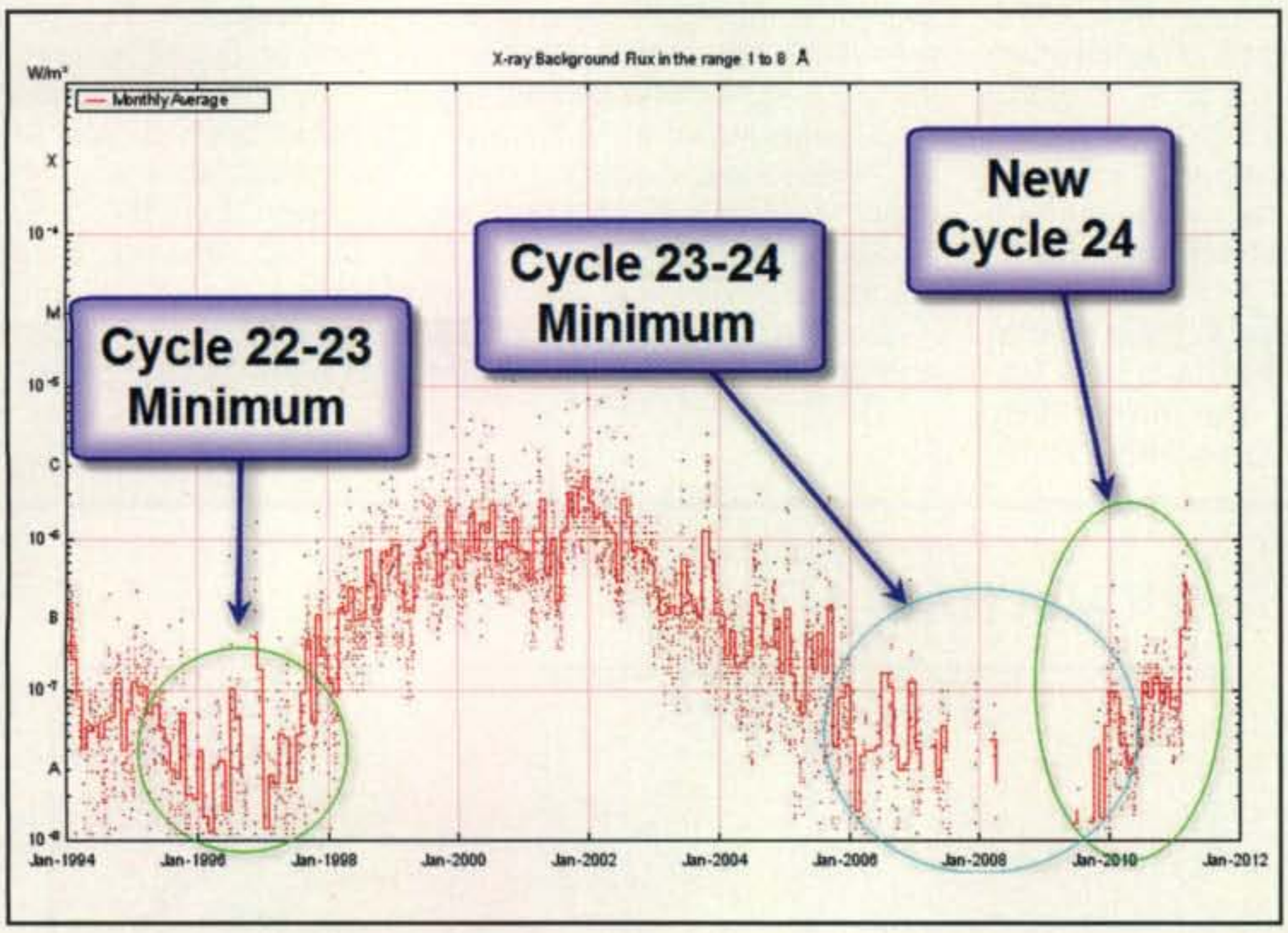


Fig. 2– This graph plots the daily (red dots) and monthly (red line) average of the background "hard" X-ray energy in the 1 to 8 Angstrom wavelengths, as measured by the GEOS satellite. The hard X-ray energy produced by the Sun from the wavelengths of 1 to 8 Angstroms provides the most effective ionizing energy throughout all of the ionospheric layers in our atmosphere. The GEOS satellites measure these wavelengths, and the resulting measurements are reported as the "background X-ray level" throughout the day. A daily average is reported, as well. Just like X-ray flares, the background hard X-ray level is measured in watts per square meter (W/m2), reported using the categories, A, B, C, M, and X. These letters are multipliers; each class has a peak flux ten times greater than the preceding one. Within a class there is a linear scale from 1 to 9. If one recorded the daily background X-ray levels for the course of a sunspot cycle, one would discover that the background X-ray levels remained at the A class level during the sunspot cycle minumum. During the rise and fall of a solar cycle, the background X-ray energy levels remained mostly in the B range. During peak solar cycle periods, the background energy reaches the C and sometimes even M level. Overall, the monthly average background "hard" X-ray level is rising (as seen by the plot), showing a change from deep solar cycle minimum. We are certainly in the rising phase of sunspot Cycle 24. While it has been a slow up-tick over the last 18 months, expect to see a more rapid rise during mid to late 2011. (Source: GEOS-14 data, plotted with the gnuplot program)

the seasonal nature of *Es* and how it coincides directly with those times of year when the Earth passes through the dense tracks of comet dust.

Speaking of comet dust, a number of minor meteor showers are expected during July, but none look promising for significant meteor-scatter propagation. The best chance for meteor-scatter openings will be during the last week of July, when the δ–Aquariids shower is expected to intensify. It should peak on July 30, but with only about 16 meteors per hour. For a detailed list of meteor showers, check out <http://www.imo.net/calendar/2011>.

Don't forget to check out *CQ VHF* magazine for more details on VHF propagation and conditions. If you use Twitter.com then you can follow @hfradiospacewx for hourly updates that include the *K*-index numbers. You can also check the numbers at <http://sunspotwatch.com>.

Curent Solar Cycle Progress

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 112.6 for April 2011, just a slight decrease from 115.3 for March. The 12-month smoothed 10.7-cm flux centered on October 2010 is 85.3, up from September's 82.4. The predicted smoothed 10.7-cm solar flux for July 2011 is 115, give or take about 9 points. Expect strong openings on higher bands primarily on paths between the Northern and Southern Hemispheres; expect an abundance of daytime activity on 15 and 17 meters.

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for April 2011 is 54.4, just a couple of points shy of March's 56.2. The lowest daily sunspot value of 40 (yes, 40!) was recorded on April 5, 10, and 25. The highest daily sunspot count was 91 on April 15. The 12-month running smoothed sunspot number centered on October 2010 is 23.2, up from September's 19.6. A smoothed sunspot count of 60, give or take about 9 points, is expected for July 2011.

The observed monthly mean planetary *A*-index (*Ap*) for April 2011 is 9, up two points from March's 9, but one point less than a year ago. These figures still indicate very quiet geomagnetic conditions overall. This will change by next year, as we watch the quicker rise in solar energy and sunspot activity. The 12-month smoothed *Ap* index centered on October 2010 is 6.4, about the same as September's 6.3. Expect the overall geomagnetic activity to vary greatly between quiet to minor storm levels during July, since the increased sunspot activity also includes flares and related space weather. Refer to the Last-Minute Forecast for the outlook on conditions during this month. You can find the online version of this outlook at <http://sunspotwatch.com>.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. Please come and participate in my online propagation discussion forum at <http://forums.hfradio.org/>. If you are on Facebook, check out <http://www.facebook.com/spacewx.hfradio> and <http://www.facebook.com/NW7US>. Speaking of Facebook, check out the CQ Amateur Radio Magazine fan page at <http://www.facebook.com/CQMag>.

Now that the new solar cycle is active, I'll be keeping my ears to the radio, hoping to hear you on the air. Happy DX!

73, Tomas, NW7US

SUCH A HAM

Mavis, I would like you to meet the competition.

(from page 22)

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

2011 WPX RTTY RESULTS

SINGLE OPERATOR

NORTH AMERICA

United States

AK1W	**A**	**4,046,454**	**1845**	**738**
			(OP: K5ZD)	
K1SFA	*	3,707,520	1568	640
KA2KON/1	*	1,697,020	1082	535
W1BYH	*	1,270,016	971	484
NO2T/1	*	1,147,200	971	480
			(OP: N1MM)	
W1ZK	*	978,456	795	472
K3IU/1	*	903,120	775	424
NN1N	*	627,070	633	365
AJ1E	*	524,400	647	345
KI1G	*	510,600	468	296
KZ1M	*	367,970	518	310
			(OP: W1EQ)	
W1TO	*	330,211	394	293
AE1T	*	317,934	402	306
NR1X	*	267,512	393	238
W1UJ	*	233,876	380	236
WA1Z	*	83,738	203	149
N1QEH	*	9,664	70	64
NX9G/1	*	48	6	6
K1UO	**7**	**5,742**	**34**	**33**
K6ND/1	**3.5**	**782,640**	**610**	**360**
***KS1Y**	**A**	**3,256,875**	**1589**	**675**
			(OP: N4BAA)	
*KA1C	*	231,240	365	235
*N1IPA	*	223,333	348	257
*K1PL	*	182,666	328	209
*W1/YO7ARY	*	174,070	309	206
*N8WXQ/1	*	154,934	295	202
*W1FA	*	136,458	250	189
*NJ1H	*	70,858	188	142
*KB1SUA	*	64,680	192	132
*N1API	*	53,392	192	142
*AD1DX	*	53,186	163	131
*KK1X	*	48,112	171	124
*AB1HL	*	28,454	105	82
*WO1N	*	18,920	120	86
*NJ1T	*	13,847	83	61
*KB1THU	*	10,208	68	58
*W1MJ	*	5,546	54	47
*KB1GKN	*	5,130	48	45
*N2ULF/1	*	1,416	25	24
*NJ1Q	*	798	19	19
*K1QW	*	160	10	10
*NE1F	*	104	8	8
*NF1O	*	6	1	1
***KC1UX**	**14**	**41,020**	**179**	**140**
*KG1V	*	21,728	112	97
***AB1J**	**7**	**226,720**	**338**	**218**
*KA1CQR	*	10,192	59	52
WA2ETU	**A**	**2,603,517**	**1421**	**623**
N2KI	*	1,619,358	1028	507
KF2O	*	747,400	584	404
AB2ZY	*	606,214	688	371
WW2DX	*	500,640	538	336
K2MK	*	492,586	557	326
W2LE	*	225,250	337	250
KC2LST	*	146,370	280	210
KI2P	*	105,252	226	179
K2PAL	*	62,308	184	148
K2NV	*	60,515	156	133
NG2P	*	35,956	113	101
W2RZS	*	20,328	93	84
			(OP: WB2NVR)	
AI2I	*	13,542	91	74
KC2KZJ	*	8,820	53	49
N2WK	**21**	**1,245,195**	**942**	**531**
W2IUC	**14**	**11,972**	**88**	**73**
N2EIK	**3.5**	**104,370**	**330**	**147**
***KA2D**	**A**	**1,094,901**	**796**	**453**
*K2DSL	*	701,592	798	372
*N2FF	*	550,250	554	355
*N2JDQ	*	250,344	452	228
*NA2M	*	241,713	401	251
*KD2MX	*	229,890	389	237
*KB2NB	*	209,294	323	227
*WA2MCR	*	177,325	314	205
*AD2TM	*	117,836	261	178
			(OP: @AD2TM)	
*KS2G	*	103,788	245	186
*KA2FHN	*	77,614	202	151
*K2UF	*	76,440	202	140
*K2TV	*	73,296	186	144
*K9CHP/2	*	69,825	191	147
*K2SI	*	63,928	198	131
*KA2BSK	*	53,170	168	130
*N2SO	*	40,716	151	117
*KC2RXS	*	39,211	143	113
*WB2JEP	*	25,543	108	89
*WV2ZOW	*	19,044	85	69
*K2ONP	*	16,744	110	91
*KR2D	*	15,420	66	60
*KC2WUF	*	14,766	81	69
*K2CYE	*	9,360	63	60
*W2HIY	*	8,639	67	53
*KC2GLG	*	5,376	53	42
*K2SZ	*	1,566	29	29
*KA2ANF	*	741	19	19
*NP3D/2	*	656	16	16
***K2EN**	**21**	**47,450**	**159**	**130**
***WS9M/2**	**14**	**37,092**	**150**	**132**
***N2YBB**	**7**	**18,432**	**66**	**64**
KF3P	**A**	**7,192,341**	**2696**	**837**
			(OP: K3MM)	
AA3B	*	5,767,020	2315	796
W3FV	*	2,517,696	1324	576
K3MD	*	1,769,040	1239	567
K3WW	*	1,656,360	1031	516
NA3M	*	1,198,800	772	432
N3INJ	*	400,995	451	285
W2GG/3	*	277,305	449	285
K3GMT	*	251,489	371	259
N3SQD	*	129,532	248	188
W3DAD	*	104,320	216	160
NN3RP	*	92,272	236	158
KD3TB	*	91,176	256	174
W3TNU	*	87,318	196	162
N3IYX	*	75,530	212	166
N3NZ	*	71,920	201	155
AF3I	*	68,310	186	135
K3PG	*	64,240	205	146
WI2E/3	*	54,934	169	121
NV3V	*	49,320	151	120
WA3AAN	*	10,744	73	68
4U1WB/3	*	742	14	14
			(OP: AJ3M)	
AI3Q	**14**	**185,928**	**337**	**254**
K3RWN	**3.5**	**17,856**	**100**	**72**
***WW3S**	**A**	**797,580**	**766**	**420**
*KB3LIX	*	629,024	614	352
*K3TN	*	369,265	470	299
*KW3W	*	305,869	429	263
*KT3W	*	225,302	374	242
			(OP: K1RY)	
*N3CHX	*	217,384	378	232
*WB9KPT/3	*	183,600	335	200
*W3BUI	*	162,681	307	211
*KB3CTX	*	134,521	268	193
*KA3QLF	*	114,211	256	181
*WA1LWS/3	*	101,352	239	164
*W3RGA	*	75,735	198	135
*W3AG	*	42,400	128	106
*N3ALN	*	36,580	162	118
*N1SZ/3	*	30,300	112	100
*N3JNX	*	15,048	83	66
*K3CWF	*	7,102	62	53
*NY3DX	*	3,367	40	37
			(OP: K3SV)	
*N3RDV	*	1,768	28	26
*N1MD/3	*	703	20	19
K4GMH	**A**	**8,203,680**	**2898**	**844**
W4PK	*	3,604,993	1732	707
WB4YDL	*	2,324,810	1471	607
W4GKM	*	1,750,812	1450	532
K4FX	*	1,650,420	1155	530
AD4EB	*	1,414,746	1189	486
N6AR/4	*	1,298,394	971	477
N4LV	*	1,010,028	842	438
K4CX	*	871,134	960	402
W2YE/4	*	870,980	793	407
AB4GG	*	766,863	811	417
K4HMB	*	654,444	643	371
W6IHG/4	*	540,216	556	366
K4MGE	*	473,281	591	317
N4QS	*	469,224	600	342
K4HAL	*	436,570	577	298
K4SKB	*	409,513	529	289
W4TMO	*	389,486	417	298
K7OM/4	*	334,894	475	266
W4VIC	*	288,444	369	258
KF4QQY	*	287,526	398	277
			(OP: W4MYA)	
KC4D	*	248,110	307	215
NB4M	*	239,776	403	236
AI4WW	*	232,128	373	234
K4RO	*	205,860	377	219
AB4IQ	*	190,888	341	223
KI4MFF	*	168,498	302	198
NQ1W/4	*	132,489	284	189
			(OP: K1KO)	
KE4KY	*	122,136	265	168
KR4LO	*	108,049	221	167
N4DWK	*	98,439	203	157
N4MM	*	90,470	200	166
W4BQF	*	87,300	196	150
N4DW	*	75,816	209	156
N4TL	*	62,643	169	133
WX4G	*	46,550	123	98
WR1Q/4	*	41,200	114	103
K3KO/4	*	37,828	99	98
KØCOP/4	*	29,044	111	106
WD4LBR	*	20,124	101	86
W4GHD	*	17,111	99	71
WA3OFC/4	*	13,530	71	66
KW4G	*	11,096	80	73
W2OO/4	*	6,396	43	41
N3UA/4	*	2,125	30	25
KC3EF/4	*	1,593	27	27
NA4W	**28**	**7,140**	**65**	**51**
			(OP: K4WI)	
K4FJ	**21**	**1,157,988**	**908**	**507**
WJ2D/4	*	327,789	454	301
WF4W	*	12,627	76	69
KK9A/4	**14**	**2,387,388**	**1440**	**703**
AJ4FM	*	34,496	120	112
K9OM/4	**7**	**1,782,162**	**902**	**513**
AA4VV	*	143,424	196	166
N3BM/4	*	8,550	49	45
W4UH	**3.5**	**272,748**	**408**	**238**
K4ADR	*	46,860	138	110
K4WW	*	19,500	100	75
***WE4M**	**A**	**3,039,400**	**1592**	**650**
			(OP: N2QT)	
*K1GU/4	*	718,500	633	375
*AB4SF	*	690,790	668	370
*WF7T/4	*	603,100	758	326
*WB2RHM/4	*	573,586	626	338
*N2WN/4	*	507,190	506	335
*WC4CC	*	399,900	483	300
			(OP: K4CC)	
*W4PJW	*	388,476	538	297
*K4FPF	*	370,682	473	269
*KS4S	*	334,836	503	262
*WD4PDZ	*	324,960	381	240
*W6SAI/4	*	285,782	446	274
			(OP: K4CWW)	
*K4FJW	*	186,637	373	209
*W4WWQ	*	170,400	307	200
*ND4X	*	158,976	305	192
*W8KHP/4	*	155,976	323	201
*WØQQG/4	*	149,342	303	178
*K4SKA	*	148,800	301	192
*KM4JA	*	146,688	329	191
*N4PSE	*	140,063	330	187
*KR4V	*	131,999	279	173
*WØPV/4	*	129,200	242	200
*AI4SV	*	116,081	243	161
*AA4DD	*	106,080	273	160
*AK4MT	*	102,492	245	156
*WB4OMM	*	93,258	195	157
*W4BK	*	86,523	251	151
*K4FTO	*	83,230	219	145
*NA4C	*	75,060	223	139
*WA8OJR/4	*	73,370	217	145
*NS9I/4	*	66,719	198	137
*AJ4RW	*	65,296	219	154
*ND1Y/4	*	63,516	194	134
*KB4BYH	*	62,745	205	141
*W4UEF	*	56,250	154	125
*NV4B	*	54,924	157	138
*NQ4S	*	54,520	163	116
*N3CZ/4	*	49,932	149	114
*KW4J	*	49,764	161	132
*KN5S/4	*	49,104	173	132
*N4AU	*	40,710	144	115
*N4LF	*	33,066	126	99
*NR4C	*	32,670	119	99
*AJ4GL	*	32,400	106	100
*KI4EEY	*	32,017	133	101
*AA4FU	*	29,205	99	99
*AA1AR/4	*	28,714	102	98
*KTØP/4	*	22,278	103	94
*W4BCU	*	21,696	116	96
*KJ4NPR	*	20,412	96	81
*K4KAY	*	17,787	87	77
*NG4L	*	17,301	97	79
*KJ4BIX	*	16,252	92	68
*WO4O	*	7,344	56	48
*KB4KBS	*	6,106	47	43
*KD4RSL	*	3,267	45	33
*KI4SP	*	2,516	37	34
*K4EDI	*	1,595	32	29
*W4WNT	*	1,512	30	27
*KI4CBF	*	1,064	27	19
*KU4PY	*	987	24	21
*KD4NH	*	780	20	20
*K8YC/4	*	12	2	2
***AF4RK**	**14**	**38,500**	**181**	**140**
*W4JHU	*	2,304	39	36
***NZ4O**	**7**	**107,016**	**211**	**156**
*W3NR/4	*	54,978	175	119
*KN4QD	*	3,300	38	30
WA5ZUP	**A**	**1,904,760**	**1736**	**572**
NX5O	*	756,903	860	399
K7IA/5	*	500,324	703	332
N5RN	*	460,284	729	317
N5VU	*	379,848	571	294
W5AP	*	227,959	401	257
AB5C	*	198,428	409	226
KD5JAA	*	184,129	405	209
W5KI	*	167,359	303	199
N5DY	*	126,672	310	174
WS1L/5	*	117,730	250	193
K5WBM	*	103,776	227	188
K5UO	*	81,490	209	145
AA5VU	*	77,409	232	141
KZ5J	*	57,658	181	127
K5HDU	*	53,888	185	128
NF5T	*	49,368	164	121
			(OP: K5BG)	
K5MV	*	6,174	51	49
KK5JY	*	3,276	44	36
N5WY	*	720	16	15
NA4M/5	**7**	**118,338**	**312**	**163**
***AA5AU**	**A**	**2,443,193**	**1624**	**619**
*AD5XD	*	590,328	829	324
*N5IJE	*	380,628	511	291
*KZ5A	*	336,076	605	281
*W3DQN/5	*	328,245	509	277
			(OP: W3DQN/5)	
*N5KWN	*	304,647	588	267
*KD5J	*	198,000	411	220
*KB5HPL	*	185,097	363	213
*WB5TUF	*	173,680	328	208
*W5UE	*	158,400	298	198
*NK5G	*	156,585	357	195
*AE5PW	*	133,331	340	187
*WØVX/5	*	113,778	289	189
*NN5T	*	112,860	271	165
*W5GWH	*	92,462	256	166
*W5JBO	*	92,160	229	144
*AD5LU	*	87,516	301	153
*W5TTY	*	83,665	212	145
*WB5AAA	*	77,560	204	140
*NI5F	*	67,298	189	133
*N5UWY	*	58,185	214	135
*AE5MM	*	52,734	186	141
*KE5LQ	*	35,143	170	113
*W5JE	*	25,935	113	95
*N5UM	*	18,942	121	77
*WA9AFM/5	*	18,873	101	81
*AA5JG	*	15,795	105	81
*K1DW/5	*	12,420	98	69
*KØMIS/5	*	5,445	72	55
*K5PI	*	3,007	36	31
*NX8G/5	*	2,349	31	29
			(OP: NX8G/5)	
***AE5AA**	**21**	**810,888**	**773**	**452**
			(OP: N5ZM)	
*KU5B	*	84	7	6
***KØGEO/5**	**7**	**19,712**	**92**	**77**
WQ6K	**A**	**1,529,934**	**1374**	**499**
K6TU	*	1,339,998	1176	474
W6SX	*	1,193,920	1217	416
WX6V	*	1,101,985	918	433
KYØW/6	*	1,035,048	1159	427
			(OP: K6SRZ)	
KE1B/6	*	976,415	1176	433
W6EU	*	934,120	1033	440
KU6W	*	859,600	953	400
			(OP: K9YC)	
NG6S	*	778,120	866	397
			(OP: W4UAT)	
K6ST	*	707,124	942	363
W6LED	*	513,924	641	339
WE6Z	*	485,070	744	345
N6ML	*	310,786	515	281
KI6VC	*	310,344	651	268
NN6NN	*	293,066	524	277
			(OP: W6XK)	
NZ6K	*	289,142	559	266
			(OP: K6RB)	
N6HE	*	270,596	543	244
K6GT	*	245,700	446	260
K6DGW	*	183,570	421	211
K6XN	*	168,588	369	223
K6LRN	*	159,315	348	215
W6OQI	*	130,414	340	197
K6NV	*	102,648	316	182
KF6T	*	80,028	222	162
K6HGF	*	69,255	308	171
NF6A	*	69,020	201	140
			(OP: K6XX)	
N6DW	*	63,431	184	137
W6TK	*	61,962	168	138
K6UUW	*	59,917	207	143
KM6I	*	51,304	201	121
NU6T	*	34,884	124	102
N6TV	*	18,240	97	76
WB6JJJ	*	13,332	73	66
W6UFO	*	13,320	93	72
N6WIN	*	12,600	106	84
AK6M	*	10,858	67	61
			(OP: K6MM)	
N6RI	*	9,894	60	51
KX7M/6	*	5,292	51	36
N6QEK	*	5,280	59	44
K6IP	*	5,085	51	45
AF6SN	*	4,816	73	43
W6TQG	*	2,418	32	31
NI6T	*	2,142	21	21
W6RKC	*	45	6	5
KF6A	**21**	**165,808**	**396**	**241**
W6OAT	**14**	**4,888**	**59**	**52**
W6WRT	**3.5**	**155,550**	**364**	**183**
***K3FIV/6**	**A**	**321,975**	**510**	**243**
*W6FFH	*	240,038	475	257
*W6UX	*	218,986	399	223
*N6BM	*	138,531	345	183
*KF6RY	*	137,025	340	203
			(OP: W6ZL)	
*N6EE	*	102,312	230	174
*N6DZR	*	83,106	251	162
*KE6SHL	*	75,366	288	159
*K6GEP	*	73,500	238	140
*K6BIR	*	46,846	208	118
*N6VH	*	41,790	166	105
*N6AJR	*	39,437	169	113
*AA6GZ	*	35,568	170	114
*K6GFJ	*	33,960	147	120
*NA6G	*	27,538	148	98
*KO6LU	*	19,007	105	83
*K6VUG	*	18,532	99	82
*K6TV	*	17,748	118	87
*N6TQS	*	16,275	96	75
*K6LE	*	14,560	94	80
*WT6K	*	13,246	97	74
*KE6QR	*	11,375	83	65
*K9JM/6	*	8,742	66	62
*N6FD	*	4,508	53	46
*KF6RCP	*	3,822	57	49
*N6BHX	*	3,198	49	41
*NS6T	*	10	3	2
***ND6S**	**28**	**338**	**13**	**13**
***NK6A**	**21**	**23,616**	**124**	**96**
***K6KQV**	**14**	**2**	**1**	**1**
***W6KY**	**7**	**25,120**	**113**	**80**
K7ABC	**A**	**2,695,264**	**1885**	**608**
			(OP: K6LL)	
KR7X	*	1,935,722	1620	578
K7VC	*	1,298,784	1094	489
K7ZS	*	868,608	894	416
W7VXS	*	581,350	891	385
W7OM	*	527,814	678	354
NG7Z	*	452,704	688	329
K7AR	*	400,566	439	303
N3RC/7	*	370,620	684	284
KV7DX	*	308,269	631	299
			(OP: KN5H)	
K6UFO/7	*	276,192	368	288
W7PU	*	268,554	562	313
N6KW/7	*	252,672	552	256
WG7X	*	251,808	597	244
AC7GP	*	211,511	506	257
K7LV	*	210,512	385	223
KD7MSC	*	182,880	485	240
WU6W/7	*	142,740	312	180
NO7T	*	129,948	274	196
W7IJ	*	125,580	351	210
KJ7GI	*	123,200	312	175
K7EG	*	103,408	270	184
NI7R	*	101,844	287	164
W7WHY	*	99,369	284	181
KT7G	*	77,142	216	138
NA2U/7	*	69,762	251	151
K7EIQ	*	60,853	207	151
N1KEZ/7	*	56,485	242	143
KQ7M	*	33,396	192	121
			(OP: KØMP)	
W6SA/7	*	31,284	132	99
WA1PMA/7	*	27,606	121	107
NG7M	*	15,836	105	74
KI7Y	*	8,600	63	50
KK7CG	*	2,952	51	41
W7RFD	*	-27	9	9
K8IA/7	**21**	**659,892**	**792**	**433**
WZ7ZR	*	473,970	728	366
			(OP: W7ZR)	
KS7S	*	4,386	49	43
KZ7X	**14**	**774,891**	**940**	**481**
			(OP: W7WW)	
K7XC	*	18,231	120	103
K7WP	**7**	**670,000**	**577**	**335**
***K7TQ**	**A**	**629,990**	**841**	**365**
*N7ESU	*	331,996	596	284
*W6AEA/7	*	328,530	568	282
*NQ7R	*	324,414	611	269
*K7GS	*	223,076	405	257
*KW7N	*	206,565	478	235
*K7JE	*	204,058	405	257
*K7VIT	*	187,989	445	223
*AB7R	*	179,256	510	231
*N7UVH	*	163,614	435	222
*K7MKL	*	154,031	310	181
*WAØWWW/7	*	134,067	328	201
*KS5A/7	*	127,652	295	194
*WO7V	*	127,243	394	181
*KX7L	*	122,794	310	179
*W7SO	*	105,435	297	165
*AD7MQ	*	68,244	242	132
*N1JM/7	*	45,384	178	124
*K6UM/7	*	41,943	170	123
*K7ARJ	*	38,076	150	114
*WS7I	*	29,362	170	106
*WB7W	*	25,474	148	94
*W7WEC	*	23,377	130	97
*N7NTQ	*	22,640	115	80
*W6NF/7	*	19,481	86	77
			(OP: W6NF/7)	
*WV7P	*	19,266	108	78
*W7LKG	*	17,862	99	78
*KD7RUS	*	15,549	83	73
*WA7BME	*	13,860	84	63
*W4JLS/7	*	9,720	99	54
*W9NGA/7	*	8,478	72	54
*WS7V	*	6,902	63	58
*N7VEA	*	2,108	36	34
*N7EPD	*	1,020	22	17
***KC7V**	**28**	**1,080**	**21**	**20**
*K7ULS	*	48	4	4
***W1ZD/7**	**14**	**310,708**	**525**	**345**
*KL1SF/K7	*	3,600	48	48
			(OP: KL1SF)	
*W7JAZ	*	168	13	12
***N6MA/7**	**7**	**633,654**	**549**	**329**
***N7UR**	**3.5**	**1,188**	**24**	**22**
N8BJQ	**A**	**2,506,119**	**1347**	**627**
KU1T/8	*	1,981,634	1197	529
W8EI	*	1,208,130	930	462
W8JWN	*	889,240	903	440
ND8L	*	764,421	700	409
WT8C	*	443,716	485	299
K3GP/8	*	313,317	430	279
K8KY	*	257,005	398	245
KQ8M	*	147,368	318	218
W8CAR	*	78,971	225	157
N8TR	*	78,240	200	160
AA8LL	*	28,967	103	83
K8ESQ	*	26,631	113	99
W8OHT	*	20,325	91	75
WD8KNC	*	14,118	105	78
K8UT	*	12,208	76	56
N8AGU	*	5,850	46	45
WA8RPK	**14**	**414,232**	**553**	**364**
N8XI	*	52,540	169	148
***KB8UHN**	**A**	**320,636**	**469**	**284**
*KK8MM	*	299,557	397	263
*WB8TLI	*	215,280	333	234
*K8SIA	*	191,673	324	229
*K8AJS	*	162,048	276	211
*AA8IA	*	126,374	298	179
*W8UL	*	75,774	185	146
*W8KX	*	67,320	180	153
*K8TJM	*	51,250	162	125
*W8IDM	*	47,355	167	123
*KA8HKC	*	41,623	137	107
*K8GT	*	32,900	105	94
*N8GU	*	28,124	117	89
*AF8C	*	18,644	115	79
*KC8KCU	*	16,060	108	73
*W8WTS	*	13,277	94	71
*N8NOE	*	12,096	92	72
*KD8MBI	*	5,368	49	44
***KK8X**	**28**	**1,430**	**24**	**22**
***KC8ZTJ**	**21**	**28,408**	**127**	**106**
***WG8Y**	**14**	**93,399**	**233**	**191**
***WB8K**	**7**	**125,172**	**245**	**171**
*WB8JUI	*	87,024	232	147
W9IU	**A**	**1,719,585**	**1141**	**515**
N2BJ/9	*	1,478,103	1203	517
AI9T	*	495,191	495	307
N9AKR	*	353,362	528	323
WA9IVH	*	326,832	496	264
N9WKW	*	109,048	262	172
K9BJM	*	101,320	243	170
AJ9C	*	97,197	240	179
W9AKS	*	88,335	242	151
WB9VKZ	*	61,155	187	135
K9DUR	*	42,375	152	125
WI9WI	*	16,236	116	82
K9QH	*	4,830	47	46
***KA9MOM**	**A**	**170,355**	**355**	**205**
*N9CK	*	134,325	258	199
*KB9DVC	*	114,700	274	185
*KK7Z/9	*	108,290	287	182
*W9ILY	*	103,934	257	157
*W9OA	*	100,570	221	178
*K9QC	*	98,490	276	201
*WR9Y	*	77,256	219	148
*N9YKE	*	71,371	187	149
*KU8T/9	*	63,189	228	153
*N9UY	*	62,040	195	132
*K9JU	*	32,200	133	100
*W9VQ	*	27,900	126	100
*K9JWI	*	26,224	110	88
*K9PY	*	19,888	102	88
*K9PLX	*	17,556	113	77
*KC9IRQ	*	11,999	73	71
*KB9YGD	*	11,115	90	65
*N9RYM	*	9,490	73	65
*N9LYE	*	7,154	54	49
*K9AIH	*	207	9	9
*W9EEU	*	200	13	10
***KB9S**	**21**	**25,705**	**119**	**97**
***K9NR**	**7**	**774,200**	**630**	**350**
*KB9OWD	*	155,474	348	191
ABØRX	**A**	**3,474,198**	**1978**	**707**
KØKX	*	2,206,878	1284	618
NEØU	*	1,594,620	1282	540
NØAT	*	1,006,384	890	496
ACØC	*	995,128	1051	424
KØALT	*	730,048	899	374
KØJJR	*	587,880	727	345
KSØAA	*	532,679	791	343
KØFX	*	399,324	456	321
KØWA	*	380,380	595	308
WGØM	*	355,984	598	304
NØMA	*	285,310	485	277
			(OP: W7II)	
WMØL	*	236,436	538	244
WØHW	*	217,141	386	241
WBØN	*	186,998	332	259
KØBX	*	185,942	317	239
WØEM	*	154,656	417	216
KØSDW	*	145,867	399	199
WØRIC	*	120,884	259	188
W4RK/Ø	*	120,744	290	172
KØWB	*	100,640	264	160
WØHBH	*	92,070	205	155
KØVG	*	74,730	208	141
NØKK	*	41,890	185	118
WØTY	*	30,388	121	107
WØBH	*	27,972	148	111
KØØØAP	*	27,156	106	93
AI1P/Ø	**21**	**46,505**	**185**	**131**
NSØM	*	18,870	98	85
KØPK	**7**	**351,652**	**444**	**266**

***KØRC**	**A**	**459,875**	**558**	**325**
*NXØI	*	403,564	681	284
*KØBJ	*	362,039	514	277
*AD1C/Ø	*	297,111	532	291
*KSØM	*	184,756	370	209
*WØEB	*	153,182	391	191
*WØRAA	*	146,322	425	198
*WNØL	*	142,667	316	229
*KØVM	*	109,222	298	194
*KØAD	*	104,842	326	178
*WAØLJM	*	100,080	266	180
*WØSM	*	80,028	303	171
*KSØT	*	71,960	228	140
*WTØO	*	59,360	207	140
			(OP: KØTI)	
*ABØS	*	57,120	197	120
*NØOK	*	56,261	161	127
*NØUJJ	*	50,955	209	129
*NØLLH	*	46,101	176	121
*AAØAW	*	44,268	177	119
*ABØDI	*	38,872	152	113
*WØOVM	*	28,122	133	109
*K4IU/Ø	*	25,116	111	91
*NØHJZ	*	17,595	103	85
*AAØK	*	15,642	116	79
*KRØL	*	12,870	102	78
*KØPIR	*	8,816	74	58
*KAØEIC	*	5,671	58	53
*NØRRG	*	2,508	35	33
***KFØIQ**	**21**	**8,880**	**71**	**60**
***K7RE/Ø**	**14**	**248,472**	**523**	**306**
***KCØDEB**	**7**	**192,496**	**317**	**212**
*NØAX	*	1,334	24	23
Alaska				
AL5A	**A**	**854,856**	**916**	**372**
AL1G	*	200,849	478	209
KL8DX	**14**	**1,278,567**	**1046**	**533**
***WL7BDO**	**A**	**1,825**	**28**	**25**
***KL2R**	**14**	**353,745**	**459**	**315**
			(OP: N1TX)	
Bahamas				
***C6ANM**	**A**	**24,210**	**130**	**90**
Barbados				
8P9ME	**A**	**952,173**	**882**	**423**
Canada				
VY2SS	**A**	**4,684,520**	**1854**	**664**
VE1OP	*	781,870	682	410
VE9MY	*	359,260	362	284
***VE1ZD**	**A**	**709,104**	**638**	**374**
*VY2MGY	*	360,951	504	237
			(OP: VE3MGY)	
*VE9HF	*	63,404	173	131
VA2AM	**A**	**2,406,113**	**1266**	**587**
VE2FK	*	1,818,324	1111	477
VE2FXL	*	1,636,843	999	481
VA2WA	*	699,888	636	336
			(OP: VA2WDQ)	
VE2EZD	*	262,570	366	217
N2WQ/VE3	**7**	**2,147,040**	**925**	**504**
			(OP: N2WQ/VE3)	
***VE2AXO**	**A**	**1,179,026**	**881**	**437**
*VE2XAA	*	404,400	453	300
*VE2LX	*	152,832	291	192
*VA2SG	*	21,594	90	61
*VE2QV	*	9,072	61	54
			(OP: VE2FFE)	
VE3UTT	**A**	**4,286,967**	**1626**	**699**
VA3DX	*	3,785,600	1577	676
VE3GLA	*	549,836	555	292
VA3PC	*	493,122	504	354
VA3PL	*	260,925	392	245
VE3CX	*	223,886	323	218
VE3SS	**14**	**210**	**10**	**10**
***VE3KAO**	**A**	**753,984**	**623**	**352**
*VE3FH	*	662,175	615	327
*VE3XAT	*	236,574	332	234
*VE3AJ	*	203,200	315	200
*VE3EK	*	199,398	292	199
*VE3RCN	*	36,472	124	94
*VA3FN	*	11,144	72	56
*VE3FDT	*	850	18	17
***VE3KJ**	**21**	**89,608**	**184**	**184**
***VE3FJ**	**14**	**45,666**	**156**	**129**
***VE3IAE**	**7**	**388,936**	**371**	**244**
VE4EAR	**A**	**2,133,144**	**1290**	**559**
VE5MX	**A**	**160,528**	**269**	**158**
VE6RRD	**A**	**159,510**	**361**	**195**
VE6CMV	*	12,789	77	63
***VE6SQ**	**A**	**270,512**	**425**	**212**
*VA6MM	*	54,621	188	119
*VE6MO	*	16,320	97	64
VE7CC	**A**	**4,641,895**	**2122**	**727**
VA7KO	*	1,534,871	1124	481
VE7CF	*	428,400	599	306
VE7NSR	*	7,392	68	56
			(OP: VA7JMO)	
VE7TG	**7**	**179,780**	**225**	**178**
***VA7ST**	**A**	**786,560**	**827**	**320**
*VA7AM	*	661,576	787	326
*VE7BSM	*	282,064	455	244
*VA7CPC	*	26,117	127	91
*VE7BGP	*	15,663	85	69
Costa Rica				
***TI2JCY**	**A**	**12,900**	**56**	**50**
***TE2M**	**7**	**9,328**	**47**	**44**
			(OP: TI2KAC)	
Cuba				
***CO2GL**	**A**	**468,648**	**600**	**276**
*CO2IZ	*	280,283	410	241
*CM2RVA	*	42,552	158	108
***CO2OT**	**7**	**100,540**	**164**	**136**
*CO2VE	*	30,096	93	76
*CO3LC	*	12,036	57	51
Dominican Republic				
HI8PJP	**14**	**85,635**	**239**	**165**
***HI3/IK4QJF**	**A**	**18,919**	**72**	**61**
***HI3FVA**	**7**	**636,560**	**484**	**292**
Guadeloupe				
***FG4NO**	**A**	**68,783**	**173**	**143**
Martinique				
***FM1HN**	**14**	**55,338**	**186**	**138**
Mexico				
XE1GRR	**A**	**309,600**	**428**	**225**
XE1MM	*	170,562	288	186
XE1EE	**21**	**259,585**	**432**	**269**
***XE2FGC**	**A**	**453,264**	**625**	**266**
*XE3DX	*	138,768	317	177
*XE1ZTW	*	102,982	225	151
*XE1GZU	*	24,806	97	79
***XE2YWH**	**7**	**128,188**	**207**	**146**
*XE1FZE	*	16,714	68	61
Puerto Rico				
WP4WW	**A**	**561,432**	**577**	**298**
			(OP: KP4JRS)	
***KP4ED**	**A**	**462,429**	**538**	**297**
*KP4JFR	*	73,980	178	137
***NP3YL**	**28**	**312**	**12**	**12**
U.S. Virgin Islands				
***KP2DX**	**A**	**127,664**	**296**	**158**
			(OP: KP2BH)	

AFRICA

Burkina Faso				
***XT2RJA**	**A**	**148,928**	**237**	**179**
Canary Islands				
EC8AFM	**A**	**319,338**	**310**	**226**
EA8CNB	*	219,440	363	208
EA8AH	**21**	**3,431,239**	**1611**	**721**
			(OP: EA4BQ)	
EE8W	**3.5**	**2,597,000**	**903**	**500**
			(OP: EA8AH)	
***EA8OM**	**A**	**416,597**	**410**	**257**
			(OP: DJ1OJ)	
*EA8/DL3KVR	*	261,790	366	235
*EA8NQ	*	11,118	60	51
Cape Verde				
D44AC	**21**	**5,165,056**	**2085**	**832**
D4C	**14**	**4,340,853**	**1814**	**807**
Chagos Islands				
***VQ9ZZ**	**21**	**126,900**	**241**	**180**
Djibouti				
***J28AA**	**14**	**352**	**11**	**11**
			(OP: E7BA)	
Madeira Islands				
CT3DZ	**28**	**14,396**	**82**	**61**
CT3EN	**21**	**1,488,384**	**996**	**512**
CT3KY	**14**	**4,204,768**	**1799**	**788**
***CT3BD**	**A**	**33,712**	**125**	**98**
Mauritius				
***3B8/SP2FUD**	**A**	**52,800**	**141**	**120**
Morocco				
***5C5W**	**A**	**5,470,226**	**1850**	**698**
			(OP: CN8KD)	
South Africa				
ZS2EZ	**A**	**1,488,080**	**896**	**445**
ZS1LS	*	35,776	109	86
***ZS1JY**	**A**	**56,952**	**156**	**113**
Sudan				
ST2AR	**21**	**3,419,024**	**1607**	**712**

ASIA

Armenia				
***EK3GM**	**A**	**1,032,840**	**698**	**380**
Asiatic Russia				
RG9A	**A**	**6,547,255**	**2320**	**715**
UA9OG	*	2,856,542	1390	607
UA9TF	*	2,329,558	1257	539
RN9CM	*	1,729,472	994	488
RA9AAA	*	361,208	406	277
RN9U	*	237,996	267	198
UI9I	*	111,740	186	148
			(OP: R9IR)	
RO9O	*	53,737	119	109
UA9UR	*	10,208	47	44
R9CD	*	4,320	40	40
RK9UE	*	1,664	18	16
RA9RR	**21**	**291,667**	**395**	**263**
R8IA	**14**	**696,797**	**653**	**419**
RA9UN	*	31,290	124	105
RK9AX	**7**	**250,056**	**246**	**207**
***UA9AFS**	**A**	**888,659**	**730**	**373**
*RA9JB	*	746,430	685	358
*R8XF	*	410,493	495	293
*RW9C	*	313,728	375	258
*RX9OJ	*	272,064	333	218
*UI9OI	*	264,953	353	229
*R9FA	*	89,142	197	166
*UA9OV	*	56,161	151	113
*R9MC	*	41,475	132	105
*UA9FFV	*	3,564	36	33
*RV9CX	*	3	1	1
***UA9TZ**	**21**	**420,497**	**516**	**301**
*RA9FEL	*	173,800	303	200
*UA9AX	*	21,082	98	83
*RM8W	*	2,175	35	29
***UFBT**	**14**	**119,145**	**235**	**195**
*RA9AFZ	*	101,775	208	177
*RT8I	*	52,662	151	131
*RA9SQ	*	44,286	133	121
*RW9QA	*	26,038	102	94
***UA9UKL**	**7**	**74,580**	**129**	**113**
*RK9Q	*	4,466	29	29
			(OP: RW9QA)	
UAØCA	**A**	**2,985,136**	**1476**	**616**
UCØA	*	1,551,110	1032	478
RØFA	*	1,466,814	1033	453
UAØCNX	*	312,120	549	204
UAØAGI	*	208,075	291	203
UAØYAY	*	176,600	280	200
UAØCW	*	88,920	200	152
UAØSR	*	16,568	86	76
RØQA	*	11,418	71	66
UAØQBR	**14**	**176,143**	**300**	**239**
RAØFF	**7**	**74,140**	**145**	**110**
RXØAT	**3.5**	**166,474**	**186**	**161**
***RDØA**	**A**	**877,176**	**712**	**393**
*RWØSR	*	650,325	697	345
*RXØSA	*	214,130	332	230
*RMØW	*	144,308	228	172
*RUØLL	*	122,112	250	159
*RAØLG	*	88,768	209	146
*RAØWHE	*	27,388	110	82
*RZØSW	*	24,764	94	82
*RAØAY	*	7,267	50	43
*RVØCS	*	7,228	60	52
*UAØZC	*	5,166	47	42
*UAØSIK/Ø	*	2,275	29	25
*UAØC	*	2,100	34	28
*RNØSS	*	1,656	25	24
*RAØANO	*	1,122	18	17
Asiatic Turkey				
TA7AO	**A**	**556,284**	**572**	**302**
Azerbaijan				
***4K9W**	**21**	**74,796**	**194**	**138**
China				
BA2IA	**A**	**286,578**	**436**	**261**
BD2SH/7	*	54,750	178	125
BA1AI	**7**	**7,140**	**37**	**35**
***BD7IS**	**A**	**424,362**	**555**	**321**
*BD4QH	*	416,315	530	265
*BD1DCG	*	89,355	242	161
*BD3OE	*	72,078	242	123
*BA4SD	*	61,610	216	101
*BD3RQ	*	19,803	84	69
*BH7OXR	*	7,728	59	46
*BD3PCH	*	2,573	42	31
*BD4HZ	*	2,139	35	31
*BD2BT	*	2,116	28	23
*BG4UZN	*	1,491	22	21
***BG6JPV**	**21**	**12,958**	**100**	**62**
***BD6JJX**	**14**	**69,552**	**229**	**138**
***BG2AUE**	**7**	**118,800**	**195**	**135**
Cyprus				
***H2E**	**A**	**1,818,012**	**978**	**483**
Georgia				
***4L1BR**	**14**	**220,077**	**316**	**247**
Hong Kong				
VR2XMT	**A**	**530,944**	**696**	**272**
***VR2VIY**	**A**	**7,245**	**59**	**45**
India				
VU2LBW	**14**	**152,460**	**263**	**210**
***VU2NKS**	**A**	**62,436**	**142**	**129**
*VU2PTT	*	48,678	133	114
***VU3DJQ**	**7**	**63,000**	**113**	**100**
Israel				
4X2ØHC	**A**	**708,966**	**573**	**342**
			(OP: 4Z4TL)	
***4Z5MY**	**A**	**31,296**	**113**	**96**
Japan				
JM1XCW	**A**	**1,568,490**	**940**	**462**
JA1OVD	*	1,508,904	913	456
JQ1BVI	*	720,154	705	359
JE1LFX	*	505,110	541	298
JA1SJV	*	441,600	485	300
JA1AYO	*	358,140	444	254
JA1WSK	*	179,200	294	200
JA1IZZ	*	160,380	256	180
JJ1WWL	*	105,120	210	160
JA1EMQ	*	74,624	174	128
JA1HFY	*	59,778	204	123
JN1RQV	*	57,007	161	109
JF1NZW	*	45,815	141	119
JL1DLQ	*	31,195	108	85
JA1QGT	*	27,063	118	93
JO1KCQ	*	19,240	91	74
JF1PTX	*	6,624	51	46
JR1NHD	**14**	**197,316**	**308**	**243**
7K4OOK	*	84,826	187	166
JA1XS	*	9,291	59	57
JA1BPA	**3.5**	**4,704**	**51**	**42**
***JH8KYU/1**	**A**	**618,072**	**571**	**312**
*JP1ODH	*	504,944	553	302
*JI1RAK	*	467,754	515	301
*JA1BJI	*	449,526	522	278
*JS1OYN	*	428,262	531	274
*JG1IEF	*	316,080	413	240
*7N2UOC	*	269,330	423	230
*JA1BNW	*	174,148	309	197
*JA1IZ	*	147,600	263	200
*JE1SGH	*	95,480	221	155
*JA1AZR	*	79,121	211	127
*JA1DDZ	*	62,464	145	122
*JG1WNO	*	55,930	160	119
*JH1XUZ	*	49,257	165	117
*JA1OHP	*	41,040	137	90
*JH1DGQ	*	37,136	117	88
*7M4OOS	*	34,400	129	100
*JA1XUY	*	34,020	111	81
*JK1NSR	*	30,636	128	92
*JJ1LRD	*	28,884	129	83
*JP1HUJ	*	26,524	118	76
*JI1LAT	*	23,016	99	84
*JA1PTO	*	21,460	113	74
*JI1SAI	*	16,705	81	65
*7K4VPV	*	14,008	79	68
*JR1UMO	*	8,736	50	42
*JA1CPZ	*	6,854	55	46
*JA1IWP	*	6,165	53	45
*JA1IST	*	3,616	38	32
*JI1UDD	*	1,500	24	20
*7K3OZQ	*	704	16	16
*JI1UCL	*	528	14	12
***JI1ALP**	**21**	**18,368**	**89**	**82**
*JF1PYJ	*	15,111	82	69
*JR1NKN	*	12,222	75	63
*JI1EWK	*	3,570	40	35
*JQ1KRT	*	2,025	29	27
*JH8SEG/1	*	1,196	25	23
			(OP: JH8SEG/1)	
***JF1TEU**	**14**	**24,480**	**106**	**90**
*JS1IFK	*	2,268	33	28
*JK1LUY	*	84	6	6
***JA1BFN**	**7**	**448**	**18**	**18**
JA2FSM	**A**	**380,562**	**474**	**273**
JR2PMT	*	56,949	152	123
JH2FXK	*	41,976	128	106
JA2CPD	*	5,032	39	37
JA2XYO	*	4,600	43	40
JA2MOG	**14**	**50,148**	**145**	**126**
JA2VHO	*	14,454	90	66
JF2IWL	**3.5**	**13,110**	**91**	**57**
***JR2PAU**	**A**	**148,925**	**260**	**175**
*JA2AXB	*	111,251	225	161
*JA2GHP	*	47,952	148	108
*JK2KNR	*	45,318	134	91
*JA2KCY	*	17,094	81	66
*JJ2DWL	*	16,348	81	61
*JA2VHG	*	13,800	76	69
***JP2MRD**	**21**	**9,794**	**67**	**59**
*JE2UFF	*	9,676	63	59
*JR2AAN/2	*	7,450	55	50
*JM2RUV	*	3,150	36	30
***JJ2PUG**	**7**	**5,544**	**34**	**33**
JS3CTQ	**A**	**633,872**	**591**	**346**
JN3SAC	*	110,880	225	144
JR3UIC	*	7,152	56	48
JL3SBE	**28**	**36**	**4**	**3**
JF3LOP	**14**	**1,060**	**20**	**20**
JO3AGQ	**7**	**15,096**	**62**	**51**
***JG3FEA**	**A**	**293,544**	**367**	**243**
*JA3IKG	*	237,354	342	221
*JK3GWT	*	184,414	308	211
*JA3HBF	*	118,269	242	153
*JF3NKA	*	94,105	215	145
*JA3JM	*	90,942	222	138
*JA3PYC	*	30,008	115	88
*JH3WKE	*	29,520	124	90
*JF3AYR	*	22,352	109	88
*JE3UHV	*	15,840	84	60
*JH3PTC	*	9,020	67	44
*JI3OGI	*	1,501	20	19
***JL3TMH**	**21**	**192,423**	**318**	**231**
*JR3RIY	*	174,460	290	220
*JO3RCK	*	10	2	2
*JO3EVM	*	2	1	1
***JA3MIB**	**14**	**31,930**	**127**	**103**
*JG3WDN	*	10,614	68	61
***JI3FLA**	**7**	**17,228**	**67**	**59**
*JO3PSJ	*	572	13	11
***JI3BFC**	**3.5**	**1,850**	**29**	**25**
JH4UTP	**A**	**1,222,661**	**839**	**451**
JH4BTI	*	165,640	306	202
JO4CFV	*	62,100	184	115
***JH4UYB**	**A**	**1,289,632**	**802**	**422**
*JE4MHL	*	80,199	202	133
*JH4GLG	*	3,000	36	30
*JA4CBX	*	2,175	26	25
***JJ4CDW**	**28**	**24**	**3**	**3**
***JR4VEV**	**21**	**34,335**	**129**	**105**
*JN4UUS	*	4,914	43	42
***JR4GPA**	**14**	**24,459**	**105**	**93**
***JG5DHX**	**A**	**8,112**	**68**	**52**
JA6BZI	**A**	**378,378**	**415**	**286**
JA6GCE	**14**	**1,201,033**	**851**	**527**
***JR6GIM**	**A**	**157,520**	**273**	**179**
*JF6MGC	*	8,624	64	49
***JH6WHN**	**28**	**1,550**	**28**	**25**
***JA6WFM**	**21**	**186,780**	**304**	**220**
***JA6DIJ**	**14**	**128,876**	**252**	**202**
***JA6FGC**	**7**	**39,732**	**91**	**86**
JA7BME	**A**	**1,221,650**	**828**	**461**
JA7IC	*	1,035,902	809	427
JH7QXJ	*	356,096	421	256
JA7ZP	*	124,081	231	167
JA7VEI	*	66,825	146	135
JA7COI	**14**	**74,850**	**187**	**150**
***JF7VVL**	**7**	**40**	**5**	**5**
JA8TR	**A**	**457,995**	**458**	**285**
JA8JMG	**14**	**289,420**	**368**	**290**
JA8MXC	**7**	**18,522**	**78**	**63**
***JA8EIU**	**A**	**394,394**	**483**	**286**
*JL8MBF	*	57,412	185	124
*JE8KKX	*	8,150	59	50
***JH8SIT**	**14**	**73,500**	**181**	**147**
*JA8CEA	*	918	18	18
JA9CWJ	**14**	**336,952**	**406**	**308**
***JA9LX**	**A**	**52,947**	**153**	**111**
JHØINP	**A**	**87,314**	**228**	**149**
JHØNOS	*	13,603	75	61
JHØWRT	*	120	5	5
***JAØNFP**	**21**	**3,848**	**39**	**37**
Kazakhstan				
UP5P	**A**	**722,579**	**555**	**341**
			(OP: UN7PL)	
UN8P	*	245,618	378	254
UN5J	*	1,360	17	17
UN4PG	**14**	**618,580**	**570**	**394**
UN1L	**7**	**1,873,200**	**774**	**446**
			(OP: UN7ZL)	
***UN7JX**	**A**	**563,640**	**578**	**366**
*UN6G	*	482,850	463	290
*UN7TDB	*	277,248	368	228
*UN7CN	*	252,651	308	227
***UP7P**	**21**	**1,011,722**	**844**	**458**
			(OP: UN7PBY)	
*UN6QC	*	78,936	203	156
***UN9PQ**	**14**	**118,611**	**227**	**191**
*UN2G	*	6,650	53	50
***UP6P**	**7**	**693,840**	**428**	**295**
			(OP: UN6P)	
*UN5C	*	231,250	235	185
***UN9LU**	**3.5**	**183,824**	**200**	**164**
Kyrgyzstan				
***EX8AI**	**A**	**111,390**	**183**	**141**
*EX8AB	*	5,588	45	44
Mongolia				
***JT1DA**	**A**	**300,093**	**562**	**201**
Qatar				
***A71EM**	**A**	**213,144**	**296**	**214**
Saudi Arabia				
HZ1FS	**A**	**69,440**	**172**	**140**
			(OP: DL2RMC)	
7Z1SJ	**14**	**876,680**	**698**	**434**
***HZ1DG**	**14**	**8,700**	**64**	**58**
South Korea				
DS5QLJ	**A**	**172,224**	**309**	**192**
DS5DNO	*	169,280	289	184
HL5JCB	*	4,346	47	41
HL1/WX8C	**14**	**13,662**	**85**	**69**
***HL5YI**	**14**	**9,794**	**68**	**59**
Taiwan				
BV1EK	**A**	**166,496**	**285**	**176**
***BV4VQ**	**A**	**47,124**	**206**	**99**
***BV4VR**	**14**	**11,520**	**90**	**60**
Thailand				
***E21YDP**	**A**	**905,592**	**685**	**389**
UK Bases on Cyprus				
***ZC4LI**	**A**	**3,298,082**	**1321**	**566**
United Arab Emirates				
A61BK	**A**	**3,478,640**	**1471**	**590**
Vietnam				
XV1X	**A**	**5,226**	**41**	**39**
West Malaysia				
9M2NNM	**A**	**280,770**	**471**	**245**
***9M2DRL**	**14**	**11,682**	**85**	**66**

EUROPE

Austria				
OE1MCU	**A**	**3,799,789**	**1401**	**629**
OE6MDF	*	1,966,140	1073	540
***OE2GEN**	**A**	**1,340,466**	**822**	**471**
*OE6MMF	*	562,542	516	318
*OE3JTB	*	332,442	368	253
*OE2IJL	*	5,763	51	51
*OE1TKW	*	2,727	31	27
***OE5PEN**	**7**	**271,320**	**290**	**228**
***OE3DMA**	**3.5**	**9,408**	**52**	**47**
Belarus				
EW4AA	**A**	**1,738,800**	**1005**	**504**
EV25D	*	1,692,255	1049	505
			(OP: EW8DD)	
EV85DOSAAF	*	1,432,902	931	474
			(OP: EU1AZ)	
EV1R	*	965,996	714	428
EW7EW	*	843,900	688	388
EW8CD	*	564,300	539	330
EV1P	*	365,200	395	275
EV25N	*	354,811	407	269
			(OP: EW8NN)	
***EW1IP**	**A**	**837,680**	**648**	**370**
*EU6AF	*	712,309	625	349
*EW8DZ	*	610,035	542	335
*EW8OG	*	318,967	386	271
*EW8OF	*	259,424	329	242
*EW7LE	*	41,067	133	117
*EW6GL	*	3,100	34	31
*EU2MM	*	352	12	11
***EW6FX**	**21**	**3,996**	**44**	**37**
***EW6EN**	**14**	**156,842**	**290**	**238**
*EU1DX	*	147,705	282	215
***EW6DM**	**7**	**177,444**	**237**	**186**
***EU8RZ**	**3.5**	**461,290**	**408**	**283**
Belgium				
OQ4B	**A**	**1,310,244**	**866**	**481**
			(OP: ON4BHQ)	
ON4KGL	*	260,338	343	247
ON4TO	**14**	**80,852**	**208**	**164**
***ON4ANL**	**A**	**653,730**	**574**	**330**
			(OP: ON2AD)	
*ON4ALY	*	4,070	41	37
*ON6FC	*	126	7	7
***OP4A**	**21**	**101,870**	**225**	**167**
			(OP: ON6LY)	
***OP7B**	**14**	**442,881**	**526**	**349**
***ON4CBA**	**7**	**55,826**	**117**	**103**
Bosnia-Herzegovina				
***E73ATB**	**A**	**179,450**	**253**	**194**
			(OP: E73DJ)	
*E74A	*	74,817	180	153
*E78CB	*	18,576	101	86
***E73X**	**7**	**59,280**	**129**	**114**
*E73PY	*	5,304	35	34
*E73ECJ	*	4,080	31	30
			(OP: E73ZR)	
***E74AA**	**3.5**	**494,780**	**430**	**286**
Bulgaria				
LZ8E	**A**	**6,137,918**	**1940**	**799**
			(OP: LZ2BE)	
LZ2ZG	*	227,416	289	217
LZ5ZI	**7**	**280,000**	**291**	**224**
LZ17ØMDS	*	138,474	211	157
			(OP: LZ2UW)	
***LZ9R**	**A**	**1,992,792**	**1120**	**516**
			(OP: LZ3YY)	
*LZ2FQ	*	265,959	356	261
*LZ2XF	*	168,870	264	195
***LZ2JA**	**21**	**62,133**	**177**	**139**
***LZ1QV**	**7**	**129,244**	**198**	**158**
Crete				
SV9COL	**A**	**105,610**	**235**	**179**
***SV9/ON5WP**	**A**	**191,828**	**320**	**221**
Croatia				
9A8W	**14**	**953,914**	**800**	**494**
9A3AAX	**7**	**4,061,116**	**1363**	**631**
***9A8A**	**7**	**64,372**	**132**	**121**
Czech Republic				
OK3R	**A**	**4,667,011**	**1690**	**733**
			(OP: OK1DVM)	
OK2PF	*	1,046,021	764	389
OK2SFP	*	924,903	663	371
OK2SG	*	269,500	296	245
OK4MM	*	250,250	339	250
OK1EP	*	232,921	251	247
OK6DJ	*	71,676	170	132
OK1IL	*	7,065	46	45
OK7WW	*	1,600	20	20
OK7RY	**21**	**481,833**	**538**	**341**
			(OP: OK1DF)	
OL8M	**14**	**1,466,245**	**984**	**583**

OL7M	**3.5**	**1,708,372**	**866**	**478**
***OK1VRF**	**A**	**839,573**	**645**	**371**
*OK2EA	"	498,015	467	315
*OK2KV	"	424,359	425	279
*OK1SI	"	415,710	415	279
*OK1DKO	"	374,920	395	280
*OK1DBE	"	371,544	384	274
*OK2PCL	"	273,760	323	236
*OK1UDJ	"	253,568	320	224
*OK1VPO	"	177,210	261	198
*OK2UHP	"	162,877	244	187
*OK2PQS	"	153,664	264	196
*OK1PMA	"	43,618	113	113
*OK1ZHV	"	29,585	103	97
*OK2PAD	"	330	11	10
***OK1XC**	**21**	**30,700**	**114**	**100**
*OK2PMS	"	23,908	101	86
***OK2VWB**	**14**	**151,417**	**282**	**223**
*OK4TX	"	76,936	212	163
***OK2RU**	**7**	**1,148,960**	**617**	**430**
*OK2SAR	"	618,268	485	311
*OK3MO	"	118,296	181	159
***OK1HEH**	**3.5**	**239,696**	**288**	**211**
*OK7T	"	66,240	139	120
				(OP: OK1FHI)
*OK1DX	"	44,200	111	100
Denmark				
OV1A	**A**	**1,208,567**	**829**	**439**
OZ1ADL	"	712,803	566	373
OZ1DSD	"	197,175	327	239
OU4O	"	125,800	211	170
OZ6TL	**7**	**175,392**	**221**	**189**
OZ1AXG	**3.5**	**73,810**	**153**	**121**
***OZ1DUG**	**A**	**81,360**	**172**	**144**
*OZ5BD	"	37,620	129	114
*OZ7AEI	"	30,783	103	93
*OZ6EI	"	22,240	96	80
*OZ1DGQ	"	12,600	71	63
England				
GØHDV	**A**	**645,795**	**573**	**339**
M1AQV	"	467,480	418	290
G4MKP	"	251,720	312	232
G4OJB	"	67,770	172	135
G8UBJ	"	53,448	138	102
G3ZVW	**21**	**281,220**	**415**	**258**
M3I	"	221,160	382	228
				(OP: GØORH)
G3Y	**14**	**668,655**	**660**	**405**
				(OP: G3YBY)
MØUNI	"	47,190	156	143
***G8APB**	**A**	**1,715,812**	**998**	**526**
*MØGVZ	"	736,368	620	348
*GØHVQ	"	498,597	463	319
*G4SGI	"	454,803	495	303
*MØAFZ	"	435,875	436	275
*G4NDM	"	383,328	440	288
*GØCER	"	363,419	410	269
*G3SNU	"	315,594	406	267
*G1XKZ	"	304,794	356	246
*G4WGE	"	265,341	345	241
*G3RSD	"	205,205	268	205
*G7TMU	"	160,186	277	202
*G3VIP	"	153,450	254	186
*GØTOC	"	95,456	196	152
*G3SZS	"	22,102	89	86
*2EØVDS	"	18,907	84	73
*GØWHO	"	13,110	64	57
*G3TDH	"	12,540	63	60
*M6BZT	"	5,544	38	36
*G7RTI	"	3,850	39	35
*GØRJL	"	1,776	24	24
*G4AIU	"	1,404	28	27
***2EØTQR**	**21**	**6,096**	**52**	**48**
***GØMTN**	**14**	**653,952**	**659**	**416**
*MØDVV	"	2,808	39	36
***G8HBA**	**7**	**820,224**	**554**	**356**
*G6NUM	"	55,056	122	111
***MØVAA**	**3.5**	**736,334**	**516**	**347**
*G3RLE	"	16,900	67	65
Estonia				
ES2DJ	**A**	**1,439,127**	**925**	**489**
***ES4MM**	**A**	**340,338**	**370**	**262**
*ES5TF	"	235,305	302	249
*ES2BH	"	35,100	117	108
*ES2MA	"	30,900	116	103
***ES5NHC**	**14**	**2,736**	**37**	**36**
European Russia				
RZ1AZ	**A**	**384,813**	**434**	**299**
RU1AB	"	123,950	236	185
RV1CC	"	106,124	210	172
UA1NFA	"	29,104	112	107
***RA1ALC**	**A**	**183,150**	**298**	**222**
*RO1B	"	132,300	243	180
*UA1CAK	"	52	6	4
***UA2FFX/1**	**21**	**61,758**	**181**	**141**
RG3K	**A**	**3,770,752**	**1713**	**662**
RT3P	"	2,354,804	1339	571
				(OP: UA3PAB)
RN3ZC	"	1,186,556	894	434
RA5F	"	634,656	610	352
RX3AEX	"	596,045	594	355
UA3QUP	"	569,530	609	338
R5DT	"	532,800	570	333
UA3QGT	"	518,340	501	318
RM5P	"	507,256	488	326
RU3ZK	"	505,160	590	346
R3PW	"	492,768	533	348
RW3LB	"	456,940	499	310
RT2T	"	390,096	498	344
				(OP: RA3TT)
R3BT	"	312,480	359	288
UA3TN	"	306,530	405	290
RV3IC	"	228,956	376	259
UA3QJJ	"	226,746	292	221
RW2WR	"	223,000	307	223
R3KM	"	195,264	315	216
R3QN	"	177,232	301	212
RW2L	"	157,941	283	207
UA3TCJ	"	65,201	167	113
RA3IS	"	715	14	13
UA3AGW	"	336	8	8
RL3A	**21**	**17,548**	**97**	**82**
				(OP: RA3ATX)
RD3A	**14**	**2,070,880**	**1275**	**688**
RU5TT	"	465,880	580	380
				(OP: RN3TE)
RA3SI	**3.5**	**771,818**	**553**	**361**
RV5K	"	459,760	428	280
***R3BB**	**A**	**1,026,863**	**812**	**449**
*RV3ZN	"	632,111	581	361
*RQ3M	"	467,226	491	303
*R2LA	"	452,530	493	295
*R2SA	"	386,969	411	277
*UA3RQG	"	373,302	468	279
*R2AT	"	348,300	376	270
*UA3PT	"	321,328	431	266
*RX3VF	"	306,774	390	247
*R5ACQ	"	283,514	377	263
*RZ3AV	"	217,616	332	232
*R3PA	"	214,592	305	224
*R2EAA	"	199,735	318	215
*RW3WX	"	179,949	262	209
*RX3XP	"	168,896	293	203
*RC2MT	"	125,730	221	165
*RV3DZ	"	93,775	191	155
*RV3DHC	"	90,465	224	163
*RU3XJ	"	88,796	197	158
*RV3YR	"	75,651	195	151
*R3QX	"	74,226	191	139
*RV3A	"	65,000	157	130
*UA3NFI	"	63,440	162	130
*RN3DFS	"	55,083	155	129
*RX3MX	"	49,080	142	120
*RK3BA	"	46,090	133	110
*UA3LTW	"	40,115	140	113
*RZ3QM	"	16,875	80	75
*RV3DCZ	"	15,407	86	71
*RX3AGQ	"	11,256	74	67
*RX3MM	"	10,044	69	62
*RN3BW	"	6,251	48	47
*RN3QIS	"	5,320	41	38
*RW3PF	"	3,264	34	34
*RV3LZ	"	1,700	27	25
***RN3ZIC**	**21**	**21,360**	**104**	**89**
*UA3LIZ	"	3,906	49	42
***UA3URG**	**14**	**17,020**	**97**	**92**
*RA4LBS/3	"	5,104	50	44
				(OP: RA4LBS/3)
***RM3P**	**7**	**32,940**	**98**	**90**
*UA3PQN	"	13,688	59	58
***RA3UAG**	**3.5**	**117,236**	**196**	**158**
RW4PL	**A**	**2,677,410**	**1418**	**639**
RW4W	"	2,206,752	1319	543
RA4HL	"	1,766,618	1180	514
RT4W	"	474,904	625	356
RK4S	"	325,035	411	279
RU4CO	"	49,894	120	101
RV4LC	"	1,056	16	16
RW4WZ	**14**	**673,440**	**694**	**460**
RK4R	"	6,264	55	54
***UA4HJ**	**A**	**1,005,472**	**767**	**416**
*UA4ALI	"	706,936	699	388
*RX4W	"	629,625	607	345
*RU4PH	"	541,981	536	319
*RN4CA	"	404,352	450	312
*UA4FCO	"	304,678	356	242
*RU4LM	"	301,860	395	270
*R4WT	"	151,943	293	209
*RW4F	"	114,275	217	175
*RA4FDY	"	25,520	103	88
*UA4PAY	"	16,830	77	66
*RW4LQ	"	8,280	50	46
*RK4YJ	"	2,016	23	21
***RN4SS**	**21**	**168,590**	**347**	**230**
*RA4LK	"	5,625	48	45
*RV4LS	"	494	13	13
***RA4WC**	**14**	**216,212**	**365**	**283**
*RK4HZ	"	104,648	240	206
***RA4FUT**	**3.5**	**78,260**	**156**	**130**
UA6CE	**A**	**1,954,994**	**1035**	**542**
RW6CR	"	1,392,183	938	489
R6DX	"	1,243,385	904	481
RZ6DX	"	242,786	323	233
R7LV	"	112,056	200	161
RZ6AK	"	108,970	223	170
RN7F	"	104,041	199	167
R7GX	"	75,348	173	138
R7HF	**21**	**103,558**	**241**	**182**
UC7A	**7**	**956,480**	**577**	**392**
RX6MR	"	114,954	184	147
***UC6A**	**A**	**1,371,708**	**966**	**468**
*UC7F	"	1,295,272	1053	451
*RN6MA	"	1,078,756	822	413
*RO7M	"	827,296	723	412
*RY7A	"	290,160	336	248
*RA6HSM	"	111,072	217	178
*RA6HMS	"	104,890	214	170
*RV6ACC	"	99,532	217	167
*RA6HQY	"	84,940	195	155
*RN6DR	"	7,222	54	46
*RU6HL	"	6,987	55	51
***RV6ALI**	**14**	**441,600**	**557**	**368**
*R7BN	"	211,500	355	282
*RW6AH	"	142,272	300	228
***RV6LCI**	**7**	**607,332**	**459**	**321**
European Turkey				
TC1DX	**A**	**396,110**	**429**	**277**
				(OP: TA1DX)
Finland				
OH8X	**A**	**3,895,868**	**1695**	**718**
				(OP: OH6UM)
OH7KNM	"	1,346,000	963	500
OH3OJ	"	1,190,825	915	437
OH2BBT	"	890,842	731	422
OH3JR	"	188,340	258	258
OH2GI	"	165,825	289	201
OH7MJU	**21**	**447,392**	**527**	**341**
OG4X	"	93,939	216	181
OH3NDH	"	3	1	1
OH4A	**14**	**1,964,024**	**1256**	**641**
				(OP: OH4KA)
OH6BA	"	205,660	352	260
OH2RI	**7**	**861,084**	**536**	**378**
***OH2NT**	**A**	**345,056**	**422**	**263**
*OH2LNH	"	263,550	341	251
*OH8KVA	"	216,087	295	223
*OH8FTF	"	199,808	300	224
*OH8KVY	"	144,584	269	212
*OH3DP	"	112,391	211	167
***OH6GAZ**	**21**	**32,340**	**127**	**105**
***OH7MN**	**7**	**370,620**	**338**	**261**
***OH1TN**	**3.5**	**481,600**	**428**	**280**
France				
F8KHF	**A**	**1,083,564**	**828**	**508**
				(OP: F4EGZ)
F5CQ	"	603,229	489	341
F5PU	"	447,840	469	311
F5VML	"	122,976	210	168
F5GFA	"	58,033	151	131
F1HMR	"	25,032	103	84
F5JY	**21**	**99,932**	**224**	**172**
***F4FDA**	**A**	**786,828**	**511**	**357**
*F5RD	"	486,675	454	309
*F1IWH	"	303,282	373	249
*F4FDR	"	114,036	227	172
*F5LMJ	"	107,756	205	158
*F1AEY	"	84,000	206	175
*F6FDR	"	80,370	176	114
*F4EFL	"	73,712	178	136
*F5CDE	"	47,790	135	118
*F6ITD	"	38,496	108	96
*F4FSB	"	35,535	121	103
*F6DZD	"	10,858	63	61
*F5TMJ	"	6,903	43	39
*F1USC	"	6,360	54	53
***TM45RY**	**7**	**1,221,168**	**689**	**412**
				(OP: F6FNL)
*F6FTB	"	14,848	63	58
Germany				
DJ6QT	**A**	**1,987,752**	**991**	**554**
DL1NEO	"	1,331,785	841	455
DHØGHU	"	1,278,179	773	467
DK6CQ	"	1,203,020	801	455
DK1KC	"	1,174,716	753	438
DJ9MH	"	1,170,018	762	461
DK1QH	"	1,044,086	771	446
DL4SVA	"	982,592	719	416
DL4ME	"	918,040	698	389
DL5JS	"	723,135	560	355
DF2TT	"	708,597	592	387
DC2YY	"	645,123	556	359
DL6EZ	"	598,228	548	347
DF5BX	"	520,974	492	309
DC9ZP	"	485,367	463	307
DJ6TK	"	384,705	428	309
DK7ZT	"	372,590	395	265
DL5ZBA	"	360,747	389	279
DJ8OG	"	357,607	393	277
DJ9RR	"	354,716	391	284
DL1TPY	"	320,160	364	276
DF6QV	"	318,976	381	256
DL5YM	"	302,706	362	251
DL4RCK	"	271,816	324	244
DL2GK	"	269,868	344	258
DL4NER	"	214,940	279	220
DK1BX	"	174,150	252	215
DL9NCR	"	173,460	262	196
DM3BJ	"	161,964	259	198
DL9SEV	"	116,793	223	171
DL4FAP	"	110,208	208	164
DL1NHW	"	107,256	205	164
DJ1ER	"	104,652	192	162
DL6UNF	"	98,600	207	170
DL8OH	"	92,480	200	136
DD7ZT	"	86,867	174	149
DD8JJ	"	71,750	157	125
DL5KUR	"	53,654	162	139
DJ2IA	"	45,864	134	117
DK4RL	"	44,070	129	113
DL8USA	"	38,961	128	111
DF6RI	"	37,536	115	96
DJ6TB	"	35,154	106	93
DL6UAM	"	31,152	101	88
DL7UFN	"	30,783	107	93
DK4IO	"	26,292	99	84
DJ5IW	"	6,612	41	38
DJØTP	"	300	10	10
DL3BQA	**21**	**245,532**	**365**	**259**
DO4DXA	"	61,560	172	135
DK1AW	"	37,060	126	109
DF9ZP	**14**	**1,689,064**	**1118**	**596**
DK3WW	"	1,330,708	938	554
DK5OS	"	13,125	79	75
DJ2YE	**7**	**131,596**	**192**	**167**
DL5MEV	"	2,562	23	21
DJ3IW	**3.5**	**418,500**	**387**	**279**
DC3RJ	"	267,960	322	231
***DJ8EW**	**A**	**1,264,776**	**822**	**453**
*DD5M	"	1,157,971	746	449
				(OP: DJØZY)
*DJ5IR	"	988,324	714	422
*DL4ZA	"	826,828	636	388
*DL1ZBO	"	800,172	642	372
*DH6BH	"	750,476	597	373
*DK5MB	"	599,233	492	349
*DD1LI	"	579,303	530	337
*DL6SFR	"	553,600	499	320
*DO1BEN	"	541,080	482	334
*DK9ETM	"	541,022	483	314
*DL5ARM	"	537,675	500	321
*DJ4MH	"	531,520	508	302
*DF2RG	"	509,056	489	328
*DL5GAC	"	469,710	450	307
*DFØBV	"	412,368	419	284
				(OP: DL1MAJ)
*DL4JYT	"	378,849	419	293
*DM2GG	"	374,262	389	266
*DJØMCZ	"	351,513	401	277
*DL9GCG	"	347,616	386	272
*DK3GI	"	320,712	380	276
*DL9SUB	"	286,628	351	262
*DF6WE	"	268,380	333	252
*DL2AL	"	242,585	322	239
*DL2YCA	"	234,156	335	237
*DL1THB	"	228,618	310	234
*DL6NDW	"	228,112	285	212
*DL5SWB	"	222,410	328	230
*DM2RM	"	210,112	321	224
*DF9OO	"	197,808	289	208
*DG4YGW	"	193,028	284	214
*DRØY	"	190,246	293	214
				(OP: DJ6JH)
*DB2BJT	"	173,250	281	210
*DO9PL	"	165,677	252	197
*DM6DX	"	156,798	253	186
*DH7LF	"	155,832	243	172
*DK3WJ	"	154,818	250	183
*DK6KN	"	144,724	232	194
*DC8QT	"	143,152	246	184
*DJ5TT	"	126,936	214	172
*DM5JBN	"	122,672	226	176
*DK1LRS	"	117,245	221	179
*DH3RB	"	116,985	224	165
*DL3XM	"	112,216	199	166
*DL1EAL	"	100,625	199	161
*DL2ZA	"	100,254	183	154
*DL7UGO	"	99,699	221	167
*DK1AUP	"	93,000	190	155
*DF7JC	"	84,000	181	150
*DGØKS	"	69,639	164	139
*DL3FBB	"	67,184	184	152
*DJ6UP	"	65,376	176	144
*DL4EAX	"	63,315	153	135
*DL5BCF	"	62,920	172	143
*DK1IP	"	56,704	148	128
*DL7UXG	"	55,811	138	119
*DB3KE	"	50,576	130	109
*DL1DBR	"	43,798	141	122
*DL2RUG	"	43,700	115	100
*DL3WKG	"	40,590	135	110
*DL5ZB	"	40,304	121	88
*DD8OA	"	40,020	136	116
*DO3PKE	"	36,666	103	97
*DJ2YA	"	35,292	112	102
*DK5DC	"	33,024	102	96
*DJ3GE	"	32,742	118	102
*DL1HSI	"	29,294	110	97
*DL2IAN	"	26,936	103	91
*DJ2GMS	"	19,908	89	84
*DL5WS	"	19,564	95	73
*DL2EUL	"	12,672	73	66
*DL3DRN	"	12,600	77	63
*DK8EY	"	11,899	75	73
*DL9NDV	"	11,554	56	53
*DF1HF	"	11,466	66	63
*DC2CB	"	11,304	74	72
*DK2CX	"	10,974	63	59
*DL8ZAJ	"	8,234	54	46
*DL9FB	"	7,875	49	45
*DC2IP	"	5,330	48	41
*DL2AJB	"	3,960	37	33
*DL5HF	"	1,680	22	21
*DL2MJ	"	1,298	22	22
*DD3WW	"	1,197	21	19
*DK4EF	"	1,188	19	18
***DO6SR**	**21**	**24,206**	**109**	**91**
*DO6GZ	"	12,416	75	64
***DL6EAQ**	**14**	**68,145**	**179**	**165**
*DL1BA	"	20,424	105	92
***DL1DTL**	**7**	**894,588**	**589**	**381**
*DL5KUD	"	597,640	443	335
*DL6UAA	"	454,860	369	285
*DM3HZN	"	323,288	323	251
*DJ2MX	"	149,400	201	166
*DMØB	"	97,344	161	144
				(OP: DK9IP)
*DL7URH	"	54,484	123	106
*DL8DUL	"	52,756	122	109
*DK9MH	"	15,730	67	65
*DL2AA	"	3,538	29	29
*DGØOM	"	324	9	9
***DF8XC**	**3.5**	**498,600**	**454**	**300**
*DN2SAX	"	390,612	420	258
				(OP: DL2SAX)
*DF4WC	"	124,416	206	162
Greece				
SV2BFN	**A**	**1,961,000**	**1134**	**530**
SY2V	"	1,031,009	800	397
				(OP: SV2GJV)
SV1JMO	"	980,271	768	447
SV1DPI	"	464,816	406	304
SV1JG	"	354,305	400	265
SV1GYG	"	314,148	493	282
SV2IPF	"	102,204	198	153
SV2FLQ	"	37,291	103	89
SX3B	**14**	**1,508,390**	**1161**	**566**
				(OP: SV1BDO)
SV1DPP	**7**	**1,180,242**	**702**	**399**
***SV4FFL**	**A**	**452,598**	**537**	**313**
*SV2AEL	"	42,291	145	111
***SV1BJW**	**21**	**109,060**	**250**	**190**
Guernsey				
***GUØSUP**	**A**	**758,520**	**557**	**430**
Hungary				
HA5PT	**A**	**573,876**	**534**	**342**
HA1SU	"	123,079	214	167
HA9PP	**14**	**283,100**	**407**	**298**
HG1G	**3.5**	**1,390,534**	**769**	**437**
HA8BE	"	1,172,172	694	411
***HA5BSW**	**A**	**1,339,712**	**888**	**484**
*HA5LZ	"	992,028	659	361
*HG2Ø11EU	"	987,090	705	390
*HG8C	"	968,506	676	418
				(OP: HA8EK)
*HA5KN	"	211,509	292	213
*HA8XF	"	161,408	257	194
*HA3OU	"	37,917	115	99
*HAØLW	"	23,318	109	89
***HG3IPA**	**21**	**75,036**	**182**	**156**
				(OP: HA3JB)
***HG7T**	**14**	**1,696,940**	**1149**	**595**
				(OP: HA7TM)
*HA7MB	"	170,068	299	244
*HA7PO	"	138,648	282	212
***HA8WY**	**3.5**	**147,368**	**221**	**169**
*HA5UY	"	66,792	140	121
Iceland				
TF3IG	**A**	**885,705**	**861**	**411**
TF1AM	"	355,014	493	326
				(OP: TF3AM)
TF3AO	**14**	**939,500**	**844**	**500**
***TF3PPN**	**14**	**413,971**	**549**	**347**
Ireland				
EI2GLB	**A**	**1,037,910**	**802**	**435**
EI7KD	**14**	**8,906**	**65**	**61**
***EI9ES**	**A**	**2,568**	**27**	**24**
Isle of Man				
MDØCCE	**A**	**1,167,309**	**885**	**429**
Italy				
II2S	**A**	**2,356,380**	**1234**	**585**
IK2SND	"	1,822,979	1018	521
IK8UND	"	1,039,635	698	405
IV3AVQ	"	803,728	620	382
I1OQI	"	802,996	581	367
IZ5DKJ	"	550,830	514	305
IK5FKF	"	516,150	495	333
I3VJW	"	316,901	336	247
IK2LOL	"	293,436	365	247
IK2DPP	"	254,448	351	248
IZØFWD	"	229,398	279	221
IN3BFW	"	223,872	335	212
IWØGYC	"	218,790	287	221
IK1MEG	"	184,671	306	213
I2WIJ	"	155,229	221	177
IZ3KSO	"	71,614	149	122
IWØSAF	"	61,440	144	120
I3TGW	"	51,062	154	121
II1TO	"	35,435	107	95
IZ8DVD	"	35,114	118	97
IZØGXM	"	30,420	103	90
IW6PWC	"	7,098	42	39
IZ2DII	"	5,632	47	44
IN3BMN	"	3,440	47	43
IZØGYP	"	3,328	34	32
IKØYUT	"	2,190	30	30
I5JFG	**21**	**66,120**	**175**	**145**
IK2AHB	"	10,912	70	62
IZ6TSA	**14**	**1,590,936**	**1060**	**604**
IK3PQG	"	133,140	298	210
IK2GWH	"	9,768	68	66
IZØKBR	**7**	**4,206,114**	**1313**	**657**
I4IKW	"	4,053,336	1264	644
IZ8CCW	"	195,426	270	189
IV3IZU	"	112,914	184	153
I4AVG	**3.5**	**1,973,000**	**910**	**500**
***IK1DFH**	**A**	**621,954**	**483**	**317**
*I2XLF	"	530,660	482	314
*IZ2EWM	"	527,136	492	304
*IW2MXY	"	491,184	504	324
*IZ5EKV	"	329,680	471	260
*IW2MYH	"	320,993	378	257
*IØGIA	"	302,822	352	247
*IK2RZG	"	257,495	337	245
*IK2YSJ	"	221,350	306	233
*IK4UNH	"	187,902	281	234
*IW8EHK	"	181,050	289	213
*IN3XWE	"	173,352	238	186
*I2TFJ	"	141,120	250	180
*IK1JJM	"	136,980	218	180
*IK5ZTT	"	134,757	243	189
*IK2AUK	"	134,225	235	175
*IW5ALG	"	128,828	223	172
*IZ2EAS	"	128,770	228	163
*IK7RVY	"	120,508	240	188
*IØZUT	"	87,290	180	145
*I4HRH	"	84,318	159	138
*IZ4AFW	"	83,707	168	137
*IV3KSE	"	69,048	176	137
*IN3FHE	"	67,056	130	127
*IZ1MHY	"	66,560	159	128
*I2ORX	"	61,125	141	125
*IK3CST	"	60,606	153	126
*IW5EIJ	"	51,220	152	130
*IK7WPD	"	49,014	152	126
*IZ2MHT	"	48,708	112	99
*IZ4OUR	"	45,808	112	112
*IV3XZG	"	44,096	106	106
*IK4ZHH	"	39,672	130	114
*I8IEQ	"	35,685	133	117
*IK8MYM	"	33,405	99	85
*I1ABT	"	33,250	115	95
*IK2NCF	"	32,648	119	106
*I2BZN	"	30,086	107	98
*IØKHP	"	28,372	89	82
*IK5PVX	"	27,810	96	90
*IN3TEX	"	20,350	90	74
*IK2WYI	"	13,870	84	73
*IKØTUM	"	12,948	58	52
*IV3XNF	"	11,816	59	56
*IZØFVD	"	8,736	61	56
*IZ1GLX	"	6,600	50	44
*IZ8CLM	"	5,075	35	35
*IW3SAR	"	3,880	42	40
*IK1PXP	"	3,848	39	37
*IK4XQT	"	2,618	35	34
*IZ8FTW	"	340	12	10
***IKØEIE**	**21**	**174,838**	**299**	**214**
***IZ2JPN**	**14**	**231,530**	**344**	**274**
*IR2ITA	"	88,247	225	179
				(OP: IN3OWY)
*IK8NBE	"	33,960	134	120
*IZ2JNN	"	4,512	50	48
*IZ5ILK	"	55	5	5
***IK5AMB**	**7**	**978,948**	**595**	**383**
*IZ5DKO	"	108,116	176	151
*IK4JQQ	"	25,872	84	77
***IO2Z**	**3.5**	**287,820**	**306**	**246**
				(OP: IK2DZN)
*I4UUL	"	132	6	6
Kaliningrad				
***RA2FB**	**14**	**63,832**	**180**	**158**
***RU2FB**	**7**	**87,954**	**163**	**137**
***UA2FL**	**3.5**	**145,692**	**212**	**171**
Latvia				
YL9T	**A**	**2,478,780**	**1288**	**586**
				(OP: YL2TW)
YL3FP	"	1,020,144	738	401
YL2IP	"	127,710	242	198
***YL2QV**	**A**	**346,920**	**387**	**280**
***YL2CV**	**21**	**32,825**	**127**	**101**
*YL2PJ	"	14,204	80	67
***YL3CU**	**7**	**5,400**	**36**	**36**
***YL2CI**	**3.5**	**436,832**	**399**	**272**
Lithuania				
LY1R	**A**	**1,183,130**	**793**	**479**
LY5W	**7**	**1,189,960**	**647**	**419**
LY2FN	**3.5**	**912,888**	**593**	**372**
***LY6A**	**A**	**2,470,372**	**1241**	**578**
*LY3X	"	563,713	510	313
*LY5D	"	461,280	454	310
*LY2SA	"	378,936	405	277
*LY2BVB	"	369,600	425	280
*LY2TS	"	228,150	336	234
*LY1CT	"	85,176	223	169
*LY2CV	"	49,250	144	125
***LY2W**	**14**	**71,012**	**196**	**164**
Luxembourg				
LX1EA	**A**	**23,655**	**110**	**95**
Macedonia				
***Z33A**	**14**	**80,013**	**230**	**179**

Moldova

*ER5LL	A	470,256	474	303	
*ER3ZZ	"	37,050	109	95	

Netherlands

PG3N	A	283,095	343	243	
PAØLSK	"	48,514	146	127	
PAØLOU	"	24,722	105	94	
PE1JNT	"	6	3	3	
*PA3DBS	A	783,940	621	380	
*PD5LO	"	562,343	486	323	
*PD7BZ	"	270,702	323	243	
*PA3ØDD	"	235,807	295	221	
*PA3ANN	"	218,872	293	218	
*PI3ØETL	"	201,612	294	212	(OP: PA3EBP)
*PG7V	"	161,070	248	195	
*PA3GVI	"	157,664	244	208	
*PA3ØCVD	"	151,920	268	211	
*PA3HCF	"	101,386	210	163	
*PE1PTS	"	11,696	71	68	
*PE1KEH	"	11,128	58	52	
*PD3EM	"	10,176	60	53	
*PE1MMZ	"	9,231	58	51	
*PA2W	"	3,382	40	38	
*PA3ARM	"	2,678	28	26	
*PA3HGF	"	1,909	27	23	
*PAØVST	"	1,700	25	25	
*PAØO	"	748	17	17	
*PDØMD	14	9,800	72	70	
*PA3EWG	7	46,844	120	98	

Northern Ireland

*MIØSAI	14	87,296	224	176	

Norway

LB8IB	A	4,372,306	1790	746	
LA8PDA	"	860,078	717	398	
LA5TFA	"	426,390	544	305	
LA1PHA	"	17,754	77	66	
LA9TY	"	3,531	34	33	
LA9TJA	7	627,372	487	314	
*LA9DFA	A	152,250	253	203	
*LA9DK	"	93,632	210	154	
*LA3LJA	"	76,209	175	133	
*LA8OKA	"	36,064	106	92	
*LA7CL	"	35,344	113	94	
*LA1YE	"	30,740	122	106	
*LA9AU	"	3,268	39	38	
*LA9FFA	"	598	13	13	
*LA7JO	21	5,175	47	45	
*LA5QIA	14	179,172	334	252	
*LA1QDA	"	69,536	196	164	
*LA7WCA	"	31,248	130	112	

Poland

SP9LJD	A	1,201,113	765	421	
SO6I	"	937,888	666	424	
SN7F	"	535,857	495	323	(OP: SP7LFT)
SQ7B	"	375,300	426	278	
SP3RBG	"	285,585	308	237	
SP4CJA	"	115,241	197	163	
SP2HNL	"	91,902	215	159	
SP5GMM	"	48,287	110	109	
SP2JPG	"	40,959	139	123	
SN2M	"	40,685	126	103	(OP: SP2XF)
SN1Z	"	19,380	75	68	(OP: SQ1EIX)
SP7IIT	"	2,380	29	28	
SN3C	14	133,136	266	212	(OP: SP3ASN)
*SQ9UM	A	2,599,250	1296	562	
*SP9H	"	1,359,276	848	454	
*SP8CGU	"	657,865	545	349	
*SP6JZP	"	584,192	500	326	
*SP9BGS	"	571,851	489	313	
*SP9NWN	"	551,180	486	310	
*SP3DSC	"	531,336	498	338	
*SP3HC	"	413,127	432	297	
*SN1T	"	353,430	420	270	(OP: SQ1RET)
*SO7B	"	341,504	379	256	
*SP6DNZ	"	315,456	379	248	
*SP6QKP	"	310,989	381	251	
*SP9AUV	"	294,318	373	249	
*SP1DMD	"	278,472	338	246	
*SP2HXY	"	271,594	334	229	
*SN7S	"	258,570	339	234	
*SQ8LEC	"	234,814	335	226	
*SP4BPH	"	223,104	294	192	
*SQ3RX	"	211,788	292	222	
*SP3GAX	"	208,768	299	224	
*SP5BUJ	"	194,200	260	200	
*SQ9NKK	"	194,043	300	213	
*SN9A	"	189,819	273	207	(OP: SP9FQI)
*SP6NVK	"	151,125	277	195	
*SP3UIW	"	141,660	252	180	
*SP7QHR	"	140,504	227	182	
*SP3DOF	"	122,796	216	162	
*SP5NHK	"	110,505	202	159	
*SP7LIE	"	104,328	200	161	
*SP7QJB	"	103,463	194	157	
*SQ6LAK	"	96,160	188	160	
*SQ7LQJ	"	82,546	177	149	
*SP7SZC	"	82,400	196	160	
*SP2MKZ	"	75,852	193	147	
*SP4Z	"	66,804	129	114	
*SP5ECC	"	65,250	153	125	
*SP9GKJ	"	44,339	122	101	
*SN5O	"	34,947	112	99	(OP: SP5BYC)
*SP9OYB	"	33,077	105	97	
*SQ2TOM	"	29,088	118	101	
*SQ6NSJ	"	28,350	107	90	
*SP7FBQ	"	24,166	102	86	
*SP3MGM	"	23,332	87	76	
*SP1MHZ	"	20,824	92	76	
*SQ9JXB	"	18,150	79	75	
*SP6BEN	"	12,152	58	56	
*SP1DTG	"	5,907	34	33	
*SP6JQC	"	5,676	45	43	
*SN4X	"	5,376	42	42	(OP: SP5OXJ)
*SP9IHP	"	4,060	39	35	
*SP5GDY	"	2,604	31	28	
*SN51CCB	"	2,480	33	31	(OP: SP7CCB)
*SP5APW	"	290	10	10	
*SP3IC	21	19,558	95	77	
*SP5CJQ	"	11,407	67	61	
*SQ9IDE	"	1,560	24	24	
*SP3GXH	14	270,494	386	278	
*SP8NR	"	147,777	269	227	
*SP9CXN	"	42,037	157	127	
*SP3VSE	7	1,327,920	712	440	
*SQ2NNN	"	496,314	403	303	
*SQ3LLR	"	208,684	255	203	
*SQ2RGB	3.5	757,154	552	347	
*SO9G	"	559,908	477	302	(OP: SP9DTE)
*SP6EIY	"	467,042	407	293	
*SP9CTS	"	429,862	422	269	
*SP2QOT	"	379,104	373	264	
*SP6DMI	"	329,500	344	250	
*SP3EPX	"	327,304	354	251	
*SP9BNM	"	298,776	332	236	
*SQ8JX	"	288,540	326	229	
*SP4GL	"	178,092	242	194	
*SN9I	"	126,080	205	160	(OP: SP9EMI)
*SP2EWQ	"	55,080	131	108	

Portugal

*CT1BWU	A	378,765	469	285	
*CT5KDN	28	900	20	18	
*CT2IOV	14	115,577	284	209	
*CT1EEK	7	1,126,664	589	413	
*CT1AOZ	3.5	352,090	319	257	

Romania

YQ6A	A	1,220,120	790	472	(OP: YO6BHN)
YO6OAF	"	568,802	538	334	
YO5OHY	"	544,933	512	313	
YP7P	"	428,032	478	304	
YO8SAI	"	107,712	183	153	
YO7DAA	"	83,148	226	169	
YO5BEU	"	9,782	72	67	
YO2MKL	"	98	8	7	
YO2RR	21	138,193	273	187	
YO3VU	"	78,900	216	150	
YO9HP	7	1,010,548	540	386	
YO5OEF	"	590,948	446	314	
YO4AUL	3.5	98,832	174	142	
*YO8WW	A	706,112	609	352	
*YO9GSB	"	568,218	492	326	
*YO5BYV	"	463,800	452	300	
*YO8RFS	"	365,490	407	262	
*YO6HSU	"	337,937	383	271	
*YO3APJ	"	282,259	301	239	
*YO4RST	"	150,288	254	186	
*YO4AAC	"	132,205	249	193	
*YO2MJI	"	59,432	147	136	
*YO5TP	"	57,706	144	122	
*YO7LGI	"	47,672	139	118	
*YO6PZZ	"	35,948	112	86	
*YO3FOM	"	33,696	111	96	
*YO4UQ	"	26,663	99	91	
*YO4BTB	"	8,950	55	50	
*YO2DFA	"	6,864	48	44	
*YO3JF	21	257,550	381	255	
*YO2IS	"	46,000	149	115	
*YO3ZA	14	64,372	193	154	
*YO8RIJ	7	246,390	294	215	
*YO5OYR	"	3,240	31	30	
*YP5Z	3.5	112,800	192	150	

San Marino

T77NM	14	1,273,244	1002	518	

Sardinia

IMØ/IKØFMB	A	1,026,025	837	455	
ISØHQJ	"	385,244	412	274	
*ISØLFZ	A	443,775	452	305	

Scotland

GM1F	A	1,714,062	979	518	(OP: GM4FAM)
GM8SBH	"	1,192,191	790	429	(OP: GMØFGI)
MMØGPZ	14	639,122	666	418	
*GM1BSG	A	431,843	429	277	
*MMØR	"	166,650	273	202	
*MM3T	"	81,137	206	173	(OP: GMØELP)
*GM1J	3.5	2,496	25	24	(OP: MMØBQI)

Serbia

YT2U	A	995,106	689	406	
YT5W	14	1,241,376	974	536	(OP: YT2PFR)
YT9A	"	1,222,336	933	538	
YTØW	"	635,904	673	414	(OP: YU1JW)
YT8A	7	2,824,992	1077	577	(OP: YU1EA)
YT4T	3.5	1,179,120	699	408	
*YTØZ	A	987,216	636	393	(OP: YU1ZZ)
*YU1M	21	25,317	107	87	(OP: YU1MM)
*YT7AW	"	8,892	62	52	
*YU1BN	14	15,247	89	79	
*YU7D	7	434,016	373	274	
*YT2AAA	3.5	683,316	500	333	

Sicily

IT9DFI	A	43,491	119	109	
*IT9SGN	A	699,670	680	370	
*IW9BCW	"	153,242	230	193	
*IT9ORA	"	100,260	224	180	
*IT9JDH	"	33,614	107	98	
*IT9VDQ	"	21,912	96	83	
*IT9SMU	"	13,179	70	69	
*IW9FDD	14	294,216	430	312	
*IT9BXR	7	21,164	76	74	

Slovakia

OM2KW	A	3,557,560	1518	604	
OM6BB	"	500,240	452	296	
OM3IAG	"	381,335	378	265	
OM3TPN	"	327,860	384	260	
*OM7OM	A	1,238,160	825	420	
*OM7AG	"	624,461	534	337	
*OM1VA	"	601,698	509	347	
*OM8LA	"	360,800	404	275	
*OM5MX	"	343,170	390	279	
*OM3TLE	"	208,527	290	213	
*OM2WX	"	173,400	260	204	
*OM7RC	"	116,706	194	159	
*OM7YL	"	114,149	204	161	
*OM3R	"	87,750	183	150	(OP: OM3CFR)
*OM3ZBG	"	86,580	196	156	
*OM7ANO	"	38,130	100	93	
*OM5NA	7	16,472	60	58	
*OM7YC	"	4,608	32	32	

Slovenia

S5ØW	A	4,889,924	1708	694	(OP: S51MA)
S53APR	"	1,680,135	966	505	(OP: S5ØLD)
S56A	"	1,452,752	843	476	
S53MJ	21	40,515	135	111	
S53M	14	1,878,108	1151	636	(OP: S51FB)
S57AL	"	32,523	118	111	
S51CK	7	1,864,170	850	495	
*S57U	A	1,706,800	970	502	
*S57AM	"	903,952	630	392	
*S51JQ	"	360,680	402	284	
*S5ØRY	7	1,994,898	824	503	(OP: S51D)
*S52SK	"	417,360	363	282	
*S57EA	3.5	78,232	160	127	
*S53F	"	26,196	85	74	

Spain

ED1R	A	5,133,800	1913	760	(OP: EA1CJ)
EA1KY	21	713,878	686	407	
ED1Q	"	593,664	617	384	(OP: EA1QA)
ED1A	3.5	539,340	431	303	(OP: EA1AST)
*EA1GHT	A	111,627	208	157	
*EA1HRR	"	70,056	166	139	
*EC1KR	"	32,895	104	85	
*EA1EPM	"	13,860	97	84	
EA2VE	A	1,530,263	1000	497	
EA2AZ	"	48,615	119	105	
EB2RA	"	20,358	94	78	
EE2W	14	771,379	744	419	(OP: EB2BXL)
*EA2BNU	A	414,600	455	300	
*ED2TMM	"	248,000	344	248	
*EA2IV	"	145,275	223	195	
*EA2BVV	14	8,064	65	63	
EE3J	A	2,099,708	1159	542	
EA3ANE	"	84,056	199	158	
EA3GOM	"	1,344	24	24	
EE3Y	14	44,544	154	128	
EA3DUM	3.5	88,548	170	141	
*EA3FHP	A	477,666	509	306	
*EA3GUM	"	139,293	253	189	
*EA3GBA	"	84,915	170	135	
*EF3A	"	80,178	162	138	(OP: EA3KU)
*EA3GYK	"	46,332	158	132	(OP: DK7TM)
*EB3JT	"	41,040	115	108	
*EA3AHU	"	3,861	34	33	
*EA3NO	21	114,080	254	184	
*EA3EJJ	14	11,385	73	69	
*EA3GLB	7	2,991,728	1107	578	
*EB3GIH	"	62,330	134	115	
*EA3EGB	3.5	141,284	205	169	
EA4BT	A	268,804	369	268	
*EC4AIU	A	183,600	345	225	
EF5Y	A	2,864,127	1429	609	
EF5K	"	1,290,835	1037	455	(OP: EA5KB)
EA5HT	"	918,029	713	419	
EA5DKU	"	800,069	637	379	
EA5HH	"	46,516	135	116	
EF5HIH	"	12,626	74	59	
EA5IY	"	3,731	45	41	
EA5BZ	21	127,908	271	209	
EA5HAB	14	751,824	770	454	
ED5J	7	452,010	363	285	(OP: EA5DM)
*EA5XC	A	411,230	462	295	
*EB5CS	"	294,245	356	245	
*EA5EV	"	146,804	262	196	
*EA5HRT	"	101,808	244	168	
*EA5FDM	21	36,153	149	117	
*ED5T	"	12,709	83	71	(OP: EA5KV)
*ED5W	"	2,100	32	30	(OP: EA5DWS)
*EA5HJO	14	57,760	173	160	
*EA5YI	7	706,744	477	334	
EA7TG	A	260,130	349	230	
EA9LZ/7	14	1,179,351	1002	531	
EA7ZY	"	345,030	514	318	
*EE7A	A	491,372	509	322	(OP: EA7CIX)
*EA7CWA	"	75,600	166	140	
*EA7AZA	"	48,364	133	107	
*EA7VJ	"	26,800	109	100	
*EA7MT	"	1,863	23	23	
*EC7KW	28	207	9	9	
*EA7ISH	21	917,088	821	466	
*EA7GV	"	22,620	108	87	
*EA7CVF	7	51,260	126	110	

Sweden

SMØBSO	A	901,845	707	409	
SD4ØJZ	"	375,335	410	271	(OP: SM5DJZ)
SM6GKT	"	188,088	264	204	
SM5FUG	"	160,857	247	183	
SM6AHU	"	37,572	115	101	
SF5D	"	6,345	47	47	(OP: SMØDSF)
SM6FUD	"	4,120	41	40	
SM3LBP	14	170,140	292	235	
SA1A	"	448	15	14	(OP: SM1TDE)
*SM7BHM	A	832,275	669	405	
*7S5S	"	580,560	536	328	(OP: SM5CSS)
*SM6NET	"	522,954	510	306	
*SM2JUR	"	492,128	526	338	
*SM6NOC	"	300,699	375	259	
*SM7CIL	"	179,724	269	204	
*SF3A	"	115,184	232	184	(OP: SM3CER)
*8SØA	"	112,266	208	162	(OP: SMØAIG)
*SA3V	"	102,336	194	156	(OP: SA3ARL)
*SM2BJS	"	87,449	199	157	
*SM5EPO	"	40,945	112	95	
*SM5ACQ	"	39,904	133	116	
*SM5LNS	"	37,510	121	110	
*SK6HD	"	33,027	122	109	(OP: SA6AQP)
*SM7ATL	"	27,971	96	83	
*SE6Y	"	11,394	61	54	(OP: SM6DED)
*SM6NJK	3.5	69,784	145	122	

Switzerland

HB9DHG	A	465,227	454	287	
HB9CRV	"	247,213	320	233	
HB9DVH	"	52,530	132	103	
*HB9SVT	A	610,566	576	319	
*HB9ELD	"	26,746	95	86	
*HB9BGF	"	6,956	50	47	
*HB9AWS	3.5	6,006	42	39	

Ukraine

UW8I	A	4,041,030	1641	735	(OP: UT2IZ)
UW5U	"	1,971,072	1116	531	
UV5U	"	1,725,750	956	531	(OP: UX1UA)
UT5R	"	1,358,958	918	474	(OP: UY2RA)
UT6IS	"	1,094,145	876	403	
UT2IW	"	629,247	593	349	
UT8IO	"	533,572	531	331	
UR5FBM	"	483,595	439	337	
UR4EI	"	402,087	424	287	
UR7R	"	332,847	433	279	(OP: UX1RX)
UR4IOR	"	231,500	365	250	
UY5QZ	"	81,635	184	145	
UR3QM	"	48,763	146	121	
UX3IW	"	46,530	114	99	
UX7QV	"	18,232	97	86	
UT2AB	"	8,745	62	55	
UR5LBM	"	4,230	31	30	
EMØK	21	185,920	313	224	(OP: USØKW)
UR5MBA	"	10,860	68	60	
UU4JC	"	3,293	40	37	
EO3Q	14	1,652,014	1128	626	(OP: UR3QCW)
UW4I	"	1,646,720	1163	620	(OP: US5IQ)
UT7E	"	832,815	816	465	(OP: UV5EOZ)
UV8M	"	603,316	668	406	
UR5ZMK	"	69,642	191	159	
UW1M	7	4,150,926	1327	657	(OP: UR5MW)
UR5WCQ	"	1,043,768	588	409	
UT3N	"	807,828	562	354	(OP: UT3NK)
UT4XD	"	350,280	338	252	
EMØX	3.5	1,731,132	875	486	(OP: UT2XQ)
UR5IFX	"	414,594	402	279	
*URØHQ	A	1,788,632	1049	536	
*UT5EPP	"	1,516,536	980	472	
*UU7J	"	1,480,064	1036	496	(OP: UU3JX)
*UX1UX	"	1,465,776	925	464	
*UT8EL	"	1,316,250	973	450	
*US8ICM	"	1,023,360	740	390	
*UR4U	"	982,954	733	427	(OP: UR4UDI)
*US6CQ	"	949,200	750	400	
*UT4XU	"	731,584	621	368	
*US7KC	"	648,600	565	345	
*UX6IB	"	593,028	535	342	
*UY5TE	"	586,792	563	328	
*UXØSX	"	493,698	482	321	
*UUØJC	"	486,424	490	328	
*US7IID	"	461,656	506	299	
*UX6IR	"	410,633	411	283	
*US7IS	"	406,644	436	282	
*UT3RS	"	389,478	404	278	
*US7IA	"	350,784	406	261	
*UT7I	"	340,067	407	259	(OP: UT2IO)
*UY7MM	"	317,754	432	254	
*UX7FC	"	305,920	368	256	
*UR5FS	"	275,770	341	253	
*UT3WW	"	250,983	333	237	
*UX7FD	"	244,280	346	248	
*UX8ZA	"	189,108	320	204	
*UT5JCE	"	165,406	276	191	
*UT2AA	"	151,126	237	194	
*US1VS	"	123,624	196	153	
*UT1PO	"	115,672	215	152	
*UV5QR	"	112,959	195	163	
*UT4ULJ	"	108,173	224	157	
*UT5CL	"	100,464	192	156	
*UT7Y	"	91,808	187	151	(OP: USØYW)
*UT5ERV	"	90,902	181	151	
*UR5EIT	"	87,057	176	153	
*UY5AA	"	69,564	165	132	
*UR5LJD	"	67,596	154	131	
*UR8EQ	"	55,428	149	124	
*UR5LY	"	54,634	128	118	
*UR5XMM	"	50,020	146	122	
*US8UA	"	48,521	138	121	
*UU7JN	"	46,053	155	129	
*UR3AC	"	44,735	144	115	
*UTØFC	"	31,992	119	93	
*UR7QM	"	25,149	115	101	
*UR3LTD	"	15,104	66	64	
*UT3UX	"	7,178	45	37	
*UR3LPM	"	8	2	2	
*UZ7HO	21	265,140	395	270	
*UT2IV	"	49,848	157	134	
*UR2VA	"	9,828	66	54	
*UT1IA	14	539,175	636	395	
*UR8QR	"	202,788	351	262	
*UR5EQU	"	42,966	152	126	
*USØHZ	7	1,156,908	650	421	
*UR7TZ	"	991,304	603	394	
*UY7C	"	899,496	551	372	
*US5E	"	454,168	379	286	(OP: UR7EQ)
*UW2F	"	233,624	271	212	(OP: UTØFT)
*USØZZ	"	197,960	230	196	
*UU9JQ	"	124,168	193	166	
*UR7MZ	"	113,150	193	155	
*UZ2HZ	3.5	744,100	546	350	
*UT5KO	"	477,128	434	292	
*UR9QQ	"	359,922	359	269	
*UR5CSL	"	206,230	281	205	
*UT4EK	"	97,002	175	153	
*UT5ECZ	"	1,368	19	18	

Wales

GW4BLE	A	267,624	393	216	
*MWØCRI	21	57,323	167	133	

OCEANIA

Australia

VK3TDX	A	1,682,184	958	476	
*VK3FM	A	254,696	311	248	
*VK4BL	A	7,097	55	47	
*VK4FJ	21	84,118	210	137	
VK6HZ	A	87,171	210	147	
*VK6GOM	A	47,268	142	101	
VK7AD	A	13,869	70	67	
VK7XX	"	6,132	49	42	

East Malaysia

9M6YBG	A	64,974	210	102	
9M6XRO	"	10,140	53	52	

French Polynesia

FO8RZ	28	4,165	43	35	

Guam

*KH2/JS6RRR	A	26,696	129	71	(OP: JS6RRR)

Hawaii

KH6GMP	A	358,428	455	238	
KH6ZM	21	1,494,867	1087	467	
*KH6CO	A	24,450	104	75	(OP: KH6OO)

Indonesia

YB1AR	A	779,724	673	358	
YB8EXL	14	46,098	141	117	
YB1ACN	7	240,482	238	187	
*YB1ALL	A	645,932	580	322	
*YB8EL	"	7,011	48	41	
*YBØCOU	"	3,240	38	30	
*YC1BAH	21	24,360	100	87	
*YBØJIV	14	50,904	149	126	
*YBØNDT	"	29,939	118	91	
*YBØECT	"	12	2	2	
*YC2WBF	7	44,710	101	85	
*YC6EN	"	24,192	65	63	

New Zealand

ZM2A	A	71,020	165	134	
ZL4NR	"	65,283	165	141	
ZL3TE	21	483,218	532	307	(OP: W3SE)
ZL3PAH	7	28,542	72	67	

Papua New Guinea

*P29CW	A	109,395	213	143	(OP: VK2GR)

Philippines

4H1T	A	436,606	552	199	(OP: DU1IVT)
DU1UGZ	"	73,723	235	107	
*DV1JM	A	705,880	622	280	
*DU3/KL7IWC	"	120,099	279	133	(OP: KL7IWC)
*DV1/JO7KMB	14	27,209	106	91	
*DU7RJA	7	572	13	11	

SOUTH AMERICA

Antarctica

RI1ANC	A	398,412	445	279	

Argentina

LV5V	A	3,482,514	1510	666	(OP: LU5VV)
LU1BJW	"	97,244	206	151	
LU4DX	"	22,468	97	82	
LU7HN	28	264,979	413	221	
AY8A	"	224,094	348	221	
LP2F	21	3,292,288	1564	712	(OP: LU1FDU)
LU5FF	14	255,892	357	247	
*LW1HR	A	145,656	297	168	
*LU1WI	"	105,740	227	170	
*LU1FAM	"	26,244	112	81	
*LU8DCF	"	5,940	55	44	
*LU5CAB	21	12,261	81	67	

Aruba

P49X	A	13,302,240	3540	888	(OP: WØYK)
P4ØYL	14	3,304,808	1530	739	

Bonaire

*PJ4R	A	6,794,020	2346	722	

Brazil

ZV2C	A	1,245,447	820	477	(OP: PY2CX)
PT7DX	"	64,922	172	143	
PY2KP	"	40,891	131	103	
PP5BK	"	22,194	97	81	
PY7ZY	"	2,976	33	31	
PV8DX	"	2,520	31	28	
PY2NZ	21	117,916	254	164	
ZY2C	14	1,281,510	896	491	(OP: PY2ADR)
PY2KJ	7	82,128	127	116	
*ZX2B	A	4,342,294	1753	682	(OP: PY2MNL)
*PY2NY	"	1,461,312	890	472	
*PY2SHF	"	536,922	528	326	

*PX2T	*	297,024	352	273
			(OP: PY2DN)	
*PY2RDZ	*	33,063	135	107
*PY4RGS	*	13,797	76	63
*PY1NX	*	10,545	64	57
*PP5AMP	*	72	6	6
***PY2EB**	**28**	**50,270**	**162**	**110**
*PT9PA	*	532	14	14
***PY2SEX**	**21**	**1,264,304**	**876**	**496**
*PY4EK	*	181,260	283	228
*PU5AAD	*	59,535	161	135
*PY7ZBK	*	9,735	66	59
*PU2WDX	*	3,996	39	37
***PY2UN**	**14**	**37,408**	**124**	**112**
*PR7AR	*	2,184	31	28
*PY1RY	*	312	13	13
***PU8TEP**	**7**	**388,512**	**296**	**228**
*PY2OC	*	7,992	39	37
Chile				
XR3P	**A**	**611,436**	**605**	**348**
			(OP: CE3PG)	
CE3FZ	*	333,600	482	240
CE3/VE7SV	**21**	**2,780,474**	**1439**	**653**
CE3DNP	**14**	**71,154**	**184**	**134**
***CE1TT**	**A**	**102,414**	**216**	**169**
***CE2WZ**	**14**	**64,253**	**168**	**137**
Colombia				
HK1AA	**28**	**54,353**	**171**	**113**
HK1T	**7**	**5,020,160**	**1345**	**640**
***HK3W**	**7**	**96,280**	**146**	**116**
Ecuador				
***HC1JQ**	**14**	**53,628**	**154**	**123**
French Guiana				
***FY1FL**	**A**	**3,712,044**	**1595**	**642**
Paraguay				
***ZP9EH**	**A**	**71,487**	**183**	**141**
Peru				
OA6/OE3NHW	**A**	**62,964**	**159**	**132**
Uruguay				
CW7T	**A**	**23,142**	**95**	**87**
CX4AAJ	**21**	**1,597,554**	**988**	**558**
***CX9AU**	**A**	**116,802**	**242**	**162**
Venezuela				
***YV5KG**	**A**	**1,309,768**	**871**	**404**
*YV6BTF	*	1,167,856	539	376
***YV5JBI**	**28**	**2,673**	**39**	**33**
***YV1JGT**	**21**	**588,276**	**589**	**351**

QRP

TM3T	**A**	**1,187,361**	**805**	**423**
			(OP: F5VBT)	
OK3C	**"**	**842,592**	**619**	**402**
			(OP: OK2ZC)	
F5BEG	*	728,250	607	375
RX1CQ	**"**	**548,744**	**527**	**328**
HG6C	**"**	**489,727**	**482**	**301**
			(OP: HA6IAM)	
K2YG	**"**	**409,860**	**512**	**297**
UR7CT	**"**	**393,370**	**439**	**283**
SQ9AOR	**"**	**258,300**	**362**	**246**
PU5ATX	**"**	**236,720**	**372**	**220**
S59D	**"**	**221,936**	**294**	**208**
WD9FTZ/8	**"**	**180,810**	**377**	**205**
EA4EQD	**"**	**163,392**	**298**	**222**
ON2AD	**"**	**129,000**	**223**	**172**
DL8LR	**"**	**128,283**	**237**	**183**
DK6NF	*	116,272	220	172
YO9BXC	**"**	**99,300**	**202**	**150**
IK1TWC	**"**	**73,659**	**160**	**129**
			(OP: IK1TWC/QRP)	
7L4IOU	**"**	**71,247**	**213**	**127**
UX2MF	*	66,712	160	124
RV3DBK	**"**	**59,220**	**168**	**126**
PE2K	**"**	**56,448**	**159**	**128**
RZ3XA/3	*	52,576	157	124
JK1TCV	*	52,185	163	105
OZ1NF	**"**	**45,990**	**121**	**105**
SE6C	**"**	**44,776**	**139**	**116**
			(OP: SM6CDN)	
SO1D	*	39,700	120	100
			(OP: SP1JPQ)	
DH5MM	*	35,096	112	107
BG7NFM	**"**	**31,652**	**105**	**82**
UU4JO	*	30,420	97	90
KC9NJZ	**"**	**26,036**	**123**	**92**
DL8AWK	*	25,116	105	92
OZ7DK	*	24,108	108	98
IT9IGN	**"**	**21,384**	**89**	**81**
AE3J	**"**	**21,200**	**93**	**80**
7K1CPT	*	21,016	107	74
JA1KEB	*	17,420	98	67
KB2HSH	*	15,054	94	78
W1MAT	**"**	**14,756**	**75**	**68**
AI9K	*	12,384	91	72
ES1WST	**"**	**10,492**	**71**	**61**
K6MI	**"**	**8,046**	**66**	**54**
KG4IGC	**"**	**6,150**	**55**	**50**
DL1JB	*	4,788	39	38
WB7CYO	**"**	**3,675**	**53**	**49**
RW3AI	*	1,976	28	26
JA4RWN	**"**	**1,610**	**25**	**23**
LU1FU	**"**	**1,464**	**26**	**24**
USØYA	*	720	17	15
VU2UR	**"**	**714**	**19**	**17**
AF9J	*	544	20	16
PY2SRL	*	462	15	14
JH3DMQ	**21**	**24,104**	**111**	**92**
7N4WPY	**"**	**11,440**	**75**	**65**
S56G	**"**	**7,000**	**54**	**50**
VE3CW	**"**	**4,578**	**43**	**42**
JG2VSF	**"**	**126**	**8**	**7**
TG9ANF	**14**	**241,779**	**451**	**249**
YO8DDP	**"**	**132,712**	**296**	**212**
UAØZS	**"**	**32,100**	**138**	**100**
IV3AOL	**"**	**29,600**	**120**	**100**
USØMM	**"**	**27,348**	**115**	**106**
ON8NT	**"**	**17,680**	**91**	**85**
EA1GFY	**"**	**16,999**	**96**	**89**
IZ2QKG	*	14,359	86	83
LY2BBF	**"**	**5,720**	**55**	**52**
VE6SKY	**"**	**3,608**	**47**	**41**
JRØBUL	**"**	**1,265**	**25**	**23**
PY2ZA	**"**	**55**	**5**	**5**
UU4JIM	**7**	**46,800**	**111**	**100**
HAØLI	**"**	**43,056**	**113**	**104**
F8BDQ	**"**	**33,408**	**99**	**87**
YT5WAW	**"**	**17,152**	**67**	**64**
DF5WW	**"**	**15,196**	**60**	**58**
HA1WD	**3.5**	**39,520**	**108**	**95**
F8CED	**"**	**6,888**	**45**	**41**
9A4AA	**"**	**4,620**	**37**	**35**
RU6YJ	**"**	**2,450**	**26**	**25**

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

United States			
KØTV/1	**3,478,328**	**1688**	**716**
KT1I	779,492	867	388
NA1QP	540,850	540	373
W1AF	190,743	400	217
WX3SKY	**2,176,355**	**1416**	**589**
N3WZR	476,386	573	313
NJ4F	**1,097,360**	**967**	**473**
AA4YL	218,080	362	232
KA4PKB	171,384	292	193
KU5Z	**126,201**	**351**	**177**
WM6A	**1,535,196**	**1435**	**507**
AF6T	217,152	442	232
WX7P	**1,364,574**	**1345**	**487**
KX7YT	242,880	527	240
NC7J	80,850	299	175
NAØCW	**3,669,564**	**2052**	**708**
KU1YL/Ø	863,070	989	390
WØPC	493,468	706	302
ACØE	81,600	260	150
K7SCX/Ø	76,725	236	155
Alaska			
KL7RA	**3,608,930**	**2153**	**598**
KL5DX	1,144,050	1100	435
Canada			
VC2SU	**5,068,724**	**1925**	**724**
VE3FJB	**1,998,700**	**1141**	**506**
VE6AO	**179,496**	**392**	**216**
Mexico			
XE2AU	**19,229**	**92**	**67**

AFRICA

Sao Tome & Principe			
S9DX	**5,215,557**	**2153**	**703**

ASIA

Asiatic Russia			
RY9C	**7,423,884**	**2423**	**754**
RT9J	2,128,696	1217	529
RK9KWI	383,688	475	292
RK9SWF	82,485	196	141
UAØAYA	**469,965**	**536**	**323**
China			
BY4DX	**16,717**	**110**	**73**
South Korea			
DS2XUM	**128**	**8**	**8**

EUROPE

Aland Islands			
OHØZ	**4,400,932**	**1849**	**733**
Bulgaria			
LZ5R	**4,398,732**	**1668**	**723**
Czech Republic			
OK1KSL	**3,197,710**	**1427**	**655**
England			
GØRPM	**550,140**	**515**	**318**
Estonia			
ES5Q	**6,725,970**	**2306**	**859**
European Russia			
RK3DXW	**1,977,423**	**1242**	**573**
RM3Q	1,299,480	1023	442
RK3PWJ	24,570	86	78
RK4WWQ	**2,271,432**	**1458**	**568**
Finland			
OH8A	**5,009,346**	**2003**	**794**
OG6R	2,843,067	1457	619
OH9GIT	2,571,324	1404	588
France			
F5CWU	**6,943,608**	**2304**	**828**
F2FZ	5,040,750	1958	705
TM38O	2,003,680	1168	560
TM4C	851,322	630	398
F6KBG	2	1	1
Germany			
DF5MA	**3,375,506**	**1453**	**641**
DR2N	2,010,897	1121	541
DL8SCG	1,369,095	890	455
Hungary			
HA3E	**1,918,683**	**1084**	**529**
HAØKLL	568,458	525	319
Italy			
IV3HYD	**4,683,514**	**1766**	**718**
IØJBL	1,260,064	858	466
IQ2VC	22,134	103	93
Lithuania			
LY2BUU	**936,320**	**713**	**385**
Poland			
SP6ZDA	**3,006,380**	**1239**	**620**
SP9KDA	1,940,817	1065	509
SP9KRT	62,643	207	133
Serbia			
YT7W	**3,305,930**	**1542**	**622**
Slovakia			
OM5M	**5,923,104**	**1994**	**781**
OM3RRC	2,494,260	1261	558
OM3KWZ	1,128,850	761	422
Spain			
ED2V	**2,967,137**	**1525**	**601**
EE2K	2,722,616	1475	611
ED2Y	1,951,675	1123	517
Switzerland			
HB9ZZ	**1,892,214**	**1065**	**523**
Ukraine			
UT2G	**4,368,728**	**1867**	**706**
UU4JYM	1,519,168	951	448
UU4JWC	331,470	413	261
UR4PWC	173,428	276	191
UT7AXA	4,360	45	40
Argentina			
LS1D	**6,625,332**	**2352**	**854**
LU1UM	1,012,480	816	448
LV6D	945,250	715	398
LT5X	167,206	301	218
LU7FJ	50,779	173	103
Uruguay			
CV5D	**2,501,436**	**1284**	**614**

MULTI-OPERATOR TWO TRANSMITTER NORTH AMERICA

United States			
NG1G	**7,862,238**	**2982**	**873**
WB8SKP/4	**322,920**	**584**	**260**
KF5HHD	**3,837,924**	**2634**	**684**
WX5S/6	**1,281,324**	**1065**	**374**
W7IV	**4,187,010**	**2554**	**699**
WØIW	**2,832,100**	**1931**	**635**
Belize			
V31GW	**3,160,946**	**1595**	**527**

ASIA

China			
B3C	**2,294,292**	**1300**	**546**
Japan			
JA6ZPR	**3,853,577**	**1654**	**689**

EUROPE

Croatia			
9A1A	**16,397,832**	**4155**	**1074**
Germany			
DLØCS	**7,764,965**	**2632**	**871**
DL3TD	3,706,227	1557	661
Hungary			
HG1S	**11,893,373**	**3259**	**947**
Italy			
IQ1RY	**12,072,150**	**3439**	**965**
Norway			
LN5O	**6,381,600**	**2321**	**800**
Serbia			
YU8NU	**9,006,300**	**2817**	**900**

SOUTH AMERICA

Argentina			
LU4FLJ	**3,782,580**	**1696**	**690**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

United States			
KA4RRU	**5,552,085**	**2521**	**805**
Canada			
VE7UF	**4,629,882**	**2478**	**646**
VE5RI	**1,223,739**	**1093**	**423**

ASIA

Asiatic Russia			
RWØA	**8,519,552**	**2884**	**808**

EUROPE

Finland			
OH6R	**8,376,340**	**2722**	**893**
Germany			
DM2TS	**4,544,553**	**1811**	**741**
DR3W	1,058,536	757	431
Macedonia			
Z37M	**9,157,950**	**3036**	**866**
Montenegro			
4O3A	**19,545,750**	**4797**	**1095**

ROOKIE

United States				
K3GMT	**A**	**251,489**	**371**	**259**
***K7MKL**	**A**	**154,031**	**310**	**181**
*KB1SUA	*	64,680	192	132
*KC2WUF	*	14,766	81	69
*K2CYE	*	9,360	63	60
*KD8MBI	*	5,368	49	44
DX				
4X2ØHC	**A**	**708,966**	**573**	**342**
			(OP: 4Z4TL)	
IZ3KSO	*	71,614	149	122
EA3GOM	*	1,344	24	24
YT5W	**14**	**1,241,376**	**974**	**536**
			(OP: YT2PFR)	
***MØGVZ**	**A**	**736,368**	**620**	**348**
*SN1T	*	353,430	420	270
			(OP: SQ1RET)	
*SO7B	*	341,504	379	256
*OH8FTF	*	199,808	300	224
*SQ9NKK	*	194,043	300	213
*IW8EHK	*	181,050	289	213
*BD3OE	*	72,078	242	123
*IZ2MHT	*	48,708	112	99
*UA3LTW	*	40,115	140	113
*OM7ANO	*	38,130	100	93
*YO6PZZ	*	35,948	112	86
*YO3FOM	*	33,696	111	96
*LA1YE	*	30,740	122	106
*SQ2TOM	*	29,088	118	101
*BD3RQ	*	19,803	84	69
*IZ1GLX	*	6,600	50	44
*M6BZT	*	5,544	38	36
*BD3PCH	*	2,573	42	31
***NP3YL**	**28**	**312**	**12**	**12**
***YC1BAH**	**21**	**24,360**	**100**	**87**
*JO3RCK	*	10	2	2
***OK4TX**	**14**	**76,936**	**212**	**163**
***YC2WBF**	**7**	**44,710**	**101**	**85**
*DU7RJA	*	572	13	11

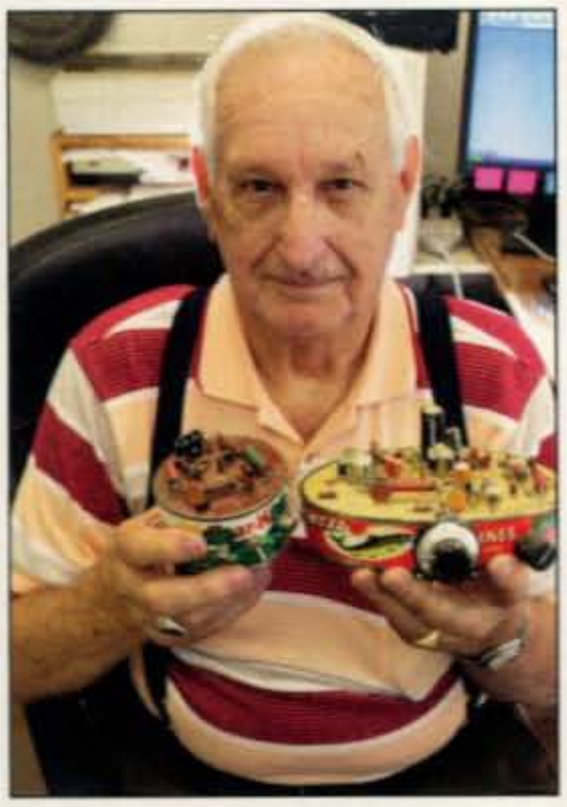
TRIBANDER/SINGLE ELEMENT NORTH AMERICA

United States				
WA2ETU	A	2,603,517	1421	623
K3MD	*	1,769,040	1239	567
K4FX	*	1,650,420	1155	530
AD4EB	*	1,414,746	1189	486
W1BYH	*	1,270,016	971	484
W6SX	*	1,193,920	1217	416
NO2T/1	*	1,147,200	971	480
			(OP: N1MM)	
WX6V	*	1,101,985	918	433
KYØW/6	*	1,035,048	1159	427
			(OP: K6SRZ)	
KE1B/6	*	976,415	1176	433
W2YE/4	*	870,980	793	407
KØALT	*	730,048	899	374
AB2ZY	*	606,214	688	371
AJ1E	*	524,400	647	345
WE6Z	*	485,070	744	345
N5RN	*	460,284	729	317
K2YG	*	409,860	512	297
N3RC/7	*	370,620	684	284
WGØM	*	355,984	598	304
W1TO	*	330,211	394	293
WA9IVH	*	326,832	496	264
AE1T	*	317,934	402	306
KV7DX	*	308,269	631	299
			(OP: KN5H)	
N6HE	*	270,596	543	244
NR1X	*	267,512	393	238
K8KY	*	257,005	398	245
N6KW/7	*	252,672	552	256
WG7X	*	251,808	597	244
W5AP	*	227,959	401	257
W2LE	*	225,250	337	250
AC7GP	*	211,511	506	257
K6XN	*	168,588	369	223
W5KI	*	167,359	303	199
NI7R	*	101,844	287	164
W9AKS	*	88,335	242	151
KØVG	*	74,730	208	141
N3NZ	*	71,920	201	155
W6TK	*	61,962	168	138
K7EIQ	*	60,853	207	151
KZ5J	*	57,658	181	127
KM6I	*	51,304	201	121
KQ7M	*	33,396	192	121
			(OP: KØMP)	
WI9WI	*	16,236	116	82
WA3OFC/4	*	13,530	71	66
N8AGU	*	5,850	46	45
K6IP	*	5,085	51	45
4U1WB/3	*	742	14	14
			(OP: AJ3M)	
WZ7ZR	21	473,970	728	366
			(OP: W7ZR)	
AI1P/Ø	*	46,505	185	131
WA8RPK	14	414,232	553	364
KØPK	7	351,652	444	266
NA4M/5	*	118,338	312	163
K4ADR	3.5	46,860	138	110
*KA2D	A	1,094,901	796	453
*K2DSL	*	701,592	798	372
*AB4SF	*	690,790	668	370
*KB3LIX	*	629,024	614	352
*WB2RHM/4	*	573,586	626	338
*N2FF	*	550,250	554	355
*N2WN/4	*	507,190	506	335
*W4PJW	*	388,476	538	297
*K4FPF	*	370,682	473	269
*KZ5A	*	336,076	605	281
*KS4S	*	334,836	503	262
*W6AEA/7	*	328,530	568	282
*K3FIV/6	*	321,975	510	243
*KW3W	*	305,869	429	263
*AD1C/Ø	*	297,111	532	291
*W6SAI/4	*	285,782	446	274
			(OP: K4CWW)	
*KT3W	*	225,302	374	242
			(OP: K1RY)	
*WB8TLI	*	215,280	333	234
*KB2NB	*	209,294	323	227
*KW7N	*	206,565	478	235
*K8SIA	*	191,673	324	229
*WB5TUF	*	173,680	328	208
*W5UE	*	158,400	298	198
*N8WXQ/1	*	154,934	295	202
*WØRAA	*	146,322	425	198
*WØPV/4	*	129,200	242	200
*KS5A/7	*	127,652	295	194
*WØVX/5	*	113,778	289	189
*W7SO	*	105,435	297	165
*W9ILY	*	103,934	257	157
*KS2G	*	103,788	245	186
*WA1LWS/3	*	101,352	239	164
*K9QC	*	98,490	276	201
*W5GWH	*	92,462	256	166
*K4FTO	*	83,230	219	145
*N6DZR	*	83,106	251	162
*W8UL	*	75,774	185	146
*K2TV	*	73,296	186	144
*NJ1H	*	70,858	188	142
*K9CHP/2	*	69,825	191	147
*N5UWY	*	58,185	214	135
*ABØS	*	57,120	197	120
*W4UEF	*	56,250	154	125
*N1API	*	53,392	192	142
*W3AG	*	42,400	128	106
*K6UM/7	*	41,943	170	123
*N6VH	*	41,790	166	105
*N2SO	*	40,716	151	117
*ABØDI	*	38,872	152	113
*N3ALN	*	36,580	162	118
*K6GFJ	*	33,960	147	120
*K9JU	*	32,200	133	100
*WS7I	*	29,362	170	106
*WB7W	*	25,474	148	94
*KTØP/4	*	22,278	103	94
*WV2ZOW	*	19,044	85	69
*WA9AFM/5	*	18,873	101	81
*AF8C	*	18,644	115	79
*N6TQS	*	16,275	96	75
*KC8KCU	*	16,060	108	73
*KC9IRQ	*	11,999	73	71
*KB4KBS	*	6,106	47	43
*K2EN	21	47,450	159	130
*NK6A	*	23,616	124	96
*W1ZD/7	14	310,708	525	346
*K7RE/Ø	*	248,472	523	306
*AF4RK	*	38,500	181	140
*K6KQV	*	2	1	1
*AB1J	7	226,720	338	218
*KCØDEB	*	192,496	317	212
*WB8K	*	125,172	245	171
*W3NR/4	*	54,978	175	119
*KØGEO/5	*	19,712	92	77
*N2YBB	*	18,432	66	64
*N7UR	3.5	1,188	24	22

DX

EF5Y	A	2,864,127	1429	609
RW4PL	*	2,677,410	1418	639
YL9T	*	2,478,780	1288	586
			(OP: YL2TW)	
SV2BFN	*	1,961,000	1134	530
EW4AA	*	1,738,800	1005	504
S53APR	*	1,680,135	966	505
			(OP: S5ØLD)	
VE2FXL	*	1,636,843	999	481
S56A	*	1,452,752	843	476
EV85DOSAAF	*	1,432,902	931	474
			(OP: EU1AZ)	
UT5R	*	1,358,958	918	474
			(OP: UY2RA)	
DL1NEO	*	1,331,785	841	455
OQ4B	*	1,310,244	866	481
			(OP: ON4BHQ)	
GM8SBH	*	1,192,191	790	429
			(OP: GMØFGI)	
DK1KC	*	1,174,716	753	438
MDØCCE	*	1,167,309	885	429
SV1JMO	*	980,271	768	447
SMØBSO	*	901,845	707	409
DF2TT	*	708,597	592	387
VA2WA	*	699,888	636	336
			(OP: VA2WDQ)	
UT2IW	*	629,247	593	349
XR3P	*	611,436	605	348
			(OP: CE3PG)	
YO5OHY	*	544,933	512	313
SN7F	*	535,857	495	323
			(OP: SP7LFT)	
RM5P	*	507,256	488	326
JE1LFX	*	505,110	541	298
VA3PC	*	493,122	504	354
UR4EI	*	402,087	424	287
SD4ØJZ	*	375,335	410	271
			(OP: SM5DJZ)	
RA9AAA	*	361,208	406	277
KH6GMP	*	358,428	455	238
DL5YM	*	302,706	362	251
IWØGYC	*	218,790	287	221
DL4NER	*	214,940	279	220
OU4O	*	125,800	211	170
DK6NF	*	116,272	220	172
JN3SAC	*	110,880	225	144
RV1CC	*	106,124	210	172
SV9COL	*	105,610	235	179
DJ1ER	*	104,652	192	162
LU1BJW	*	97,244	206	151
DD7ZT	*	86,867	174	149
7L4IOU	*	71,247	213	127
ZM2A	*	71,020	165	134
JA7VEI	*	66,825	146	135
JR2PMT	*	56,949	152	123
SE6C	*	44,776	139	116
			(OP: SM6CDN)	
DF6RI	*	37,536	115	96
DJ6TB	*	35,154	106	93
DH5MM	*	35,096	112	107
LX1EA	*	23,655	110	95
EB2RA	*	20,358	94	78
JO1KCQ	*	19,240	91	74
UAØSR	*	16,568	86	76
JHØNOS	*	13,603	75	61
JR3UIC	*	7,152	56	48
IN3BMN	*	3,440	47	43
IZØGYP	*	3,328	34	32
SP7IIT	*	2,380	29	28
LU1FU	*	1,464	26	24
VU2UR	*	714	19	17
ZL3TE	21	483,218	532	307
			(OP: W3SE)	
XE1EE	*	259,585	432	269
DL3BQA	*	245,532	365	259
M3I	*	221,160	382	228
			(OP: GØORH)	
UR5MBA	*	10,860	68	60
SX3B	14	1,508,390	1161	566
			(OP: SV1BDO)	
ZY2C	*	1,281,510	896	491
			(OP: PY2ADR)	
EA9LZ/7	*	1,179,351	1002	531
RW4WZ	*	673,440	694	460
UN4PG	*	618,580	570	394
JA9CWJ	*	336,952	406	308
JR1NHD	*	197,316	308	243
JA2MOG	*	50,148	145	126
RA9UN	*	31,290	124	105
DK5OS	*	13,125	79	75
UR5WCQ	7	1,043,768	588	409
ED5J	*	452,010	363	285
			(OP: EA5DM)	
ZL3PAH	*	28,542	72	67
BA1AI	*	7,140	37	35

On the Cover



Lloyd Barnett, W4RFZ, of Decatur, Alabama, has connections to two stories in this issue: Lloyd was net control of his local emergency net after tornadoes swept through northern Alabama and many other parts of the southeast in late April—the main topic of this month's Public Service column; and Kit-Building Editor Joe Eisenberg, KØNEB, points out that 2011 is the 35th anniversary of the circuit for the classic "Tuna Tin 2" QRP transmitter (in Lloyd's right hand ... that's a "Herring Aid 5" 40-meter regenerative receiver in his left hand, built into a sardine can because "I couldn't find a herring can.")

A ham since 1970, Lloyd says his primary interest is DXing; he's also been licensed in Ecuador, Panama, and Germany while serving in multiple posts as a civil affairs officer for the Army National Guard. Now retired from both the Guard and a civilian career with the phone company, Lloyd enjoys operating both CW and SSB, as well as building kits. "I just loved to tinker and build stuff," he notes. But DXing is king ... literally.

"My most interesting QSO," Lloyd recalled, "was with King Hussein of Jordan, just before he went to Minneapolis for cancer treatment." He says the king responded to his "CQ DX" call and once they'd exchanged the usual pleasantries, he said, "Your majesty, you and I have something in common."

JY1 said, "What's that, Lloyd?"

"Other than amateur radio," W4RFZ responded, "I am a cancer survivor, a 29-year cancer survivor." Lloyd says the two of them then talked for 15–20 minutes about dealing with cancer, and that not a single person tried to interrupt them. "Nobody bothered us," he says, "but as soon as we were finished, there was a roar" of other stations wanting to contact JY1. Lloyd's advice, now as then, for anyone facing cancer is, "Don't give up and keep a good attitude." *(Cover photo by Larry Mulvehill, WB2ZPI)*

Looking Ahead in CQ

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

- SSB Results: 2010 CQ WW DX Contest
- The Dayton "Sunday Safari" – New Products
- Public Service Special in October
- Hi-Tech Special in November

Do you have a ham radio story to tell? A possible article for one of our specials? We'd like to hear from you. See our writers' guidelines on the CQ website at <http://www.cq-amateur-radio.com/guide.html>.

This clean stack of 6-element monobanders helped John, KK9A, set a new North America record in SO20 HP.

DJ3IW	3.5	418,500	387	279	*OK1PMA	*	43,618	113	113
YO4AUL	*	98,832	174	142	*OM2RVA	*	42,552	158	108
EA3DUM	*	88,548	170	141	*EW7LE	*	41,067	133	117
JA1BPA	*	4,704	51	42	*EB3JT	*	41,040	115	108
*ZC4LI	A	3,298,082	1321	566	*DD8OA	*	40,020	136	116
*H2E	*	1,818,012	978	483	*JH1DGQ	*	37,136	117	88
*S57U	*	1,706,800	970	502	*LA8OKA	*	36,064	106	92
*VE2AXO	*	1,179,026	881	437	*7M4OOS	*	34,400	129	100
*HA5LZ	*	992,028	659	361	*JA1XUY	*	34,020	111	81
*UR4U	*	982,954	733	427	*JP1HUJ	*	26,524	118	76
			(OP: UR4UDI)		*JI1LAT	*	23,016	99	84
*EW1IP	*	837,680	648	370	*JA2KCY	*	17,094	81	66
*GUØSUP	*	758,520	557	430	*VE7BGP	*	15,663	85	69
*OM1VA	*	601,698	509	347	*EA1EPM	*	13,860	97	84
*LY3X	*	563,713	510	313	*IV3XNF	*	11,816	59	56
*PY2SHF	*	536,922	528	326	*PE1KEH	*	11,128	58	52
*DJ4MH	*	531,520	508	302	*PE1MMZ	*	9,231	58	51
*JP1QDH	*	504,944	553	302	*DL8ZAJ	*	8,234	54	46
*DL5GAC	*	469,710	450	307	*JE8KKX	*	8,150	59	50
*LY5D	*	461,280	454	310	*VK4BL	*	7,097	55	47
*MØAFZ	*	435,875	436	275	*YO2DFA	*	6,864	48	44
*EA8OM	*	416,597	410	257	*LU8DCF	*	5,940	55	44
			(OP: DJ10J)		*JA1IST	*	3,616	38	32
*DFØBV	*	412,368	419	284	*VE3FDT	*	850	18	17
			(OP: DL1MAJ)		*EC7KW	28	207	9	9
*EA5XC	*	411,230	462	295	*IKØEIE	21	174,838	299	214
*VE2XAA	*	404,400	453	300	*EA3NO	*	114,080	254	184
*UT3RS	*	389,478	404	278	*JR4VEV	*	34,335	129	105
*R2SA	*	386,969	411	277	*EA7GV	*	22,620	108	87
*DL4JYT	*	378,849	419	293	*JP2MRD	*	9,794	67	59
*VY2MGY	*	360,951	504	237	*GØMTN	14	653,952	659	416
			(OP: VE3MGY)		*IW9FDD	*	294,216	430	312
*S51JQ	*	360,680	402	284	*4L1BR	*	220,077	316	247
*OE3JTB	*	332,442	368	253	*EU1DX	*	147,705	282	215
*IZ5EKV	*	329,680	471	260	*UN9PQ	*	118,611	227	191
*SM6NOC	*	300,699	375	259	*JH8SIT	*	73,500	181	147
*VE7BSM	*	282,064	455	244	*DL6EAQ	*	68,145	179	165
*RX9OJ	*	272,064	333	218	*PY2UN	*	37,408	124	112
*PD7BZ	*	270,702	323	243	*DV1/JO7KMB	*	27,209	106	91
*VE6SQ	*	270,512	425	212	*JG3WDN	*	10,614	68	61
*7N2UQC	*	269,330	423	230	*CT1EEK	7	1,126,664	589	413
*DL6NDW	*	228,112	285	212	*DL6UAA	*	454,860	369	285
*IK2YSJ	*	221,350	306	233	*VE3IAE	*	388,936	371	244
*SQ3RX	*	211,788	292	222	*CO2OT	*	100,640	164	136
*IK4UNH	*	187,902	281	234	*JA6FGC	*	39,732	91	86
*JK3GWT	*	184,414	308	211	*CO2VE	*	30,096	93	76
*RA1ALC	*	183,150	298	222	*IK4JQQ	*	25,872	84	77
*PG7V	*	161,070	248	195	*CO3LC	*	12,036	57	51
*PA3GVI	*	157,664	244	208	*YO5OYR	*	3,240	31	30
*LA9OFA	*	152,250	253	203	*MØVAA	3.5	736,334	516	347
*XT2RJA	*	148,928	237	179	*SO9G	*	559,908	477	302
*EA5EV	*	146,804	262	196				(OP: SP9OTE)	
*JA3HBF	*	118,269	242	153	*DN2SAX	*	390,612	420	258
*SF3A	*	115,184	232	184				(OP: DL2SAX)	
			(OP: SM3CER)		*I4UUL	*	132	6	6
*OH3DP	*	112,391	211	167					
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*LY1CT	*	85,176	223	169					
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*LA3LJA	*	76,209	175	133					
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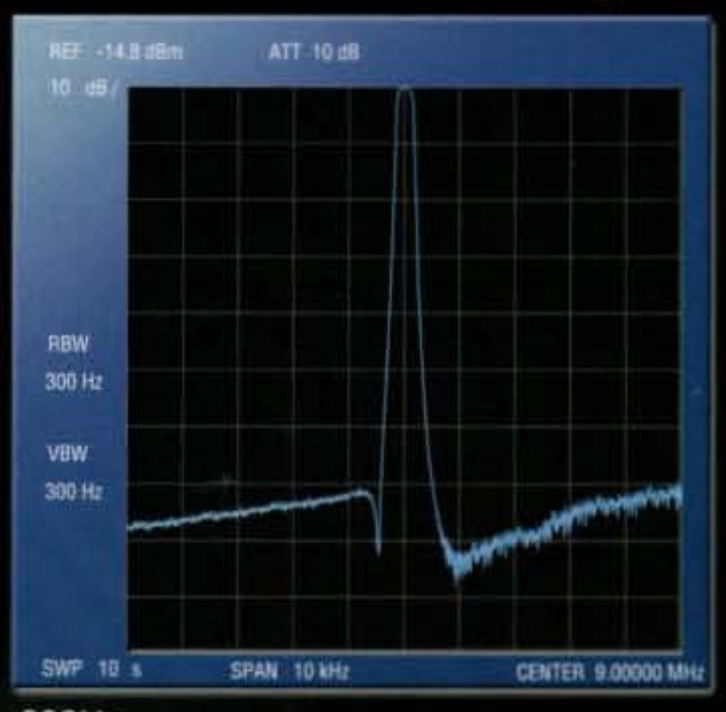

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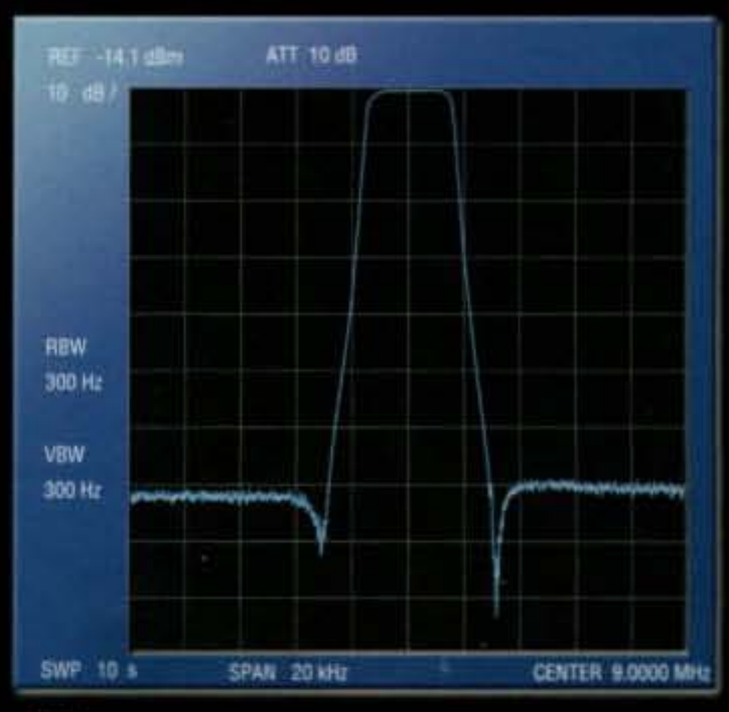

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